COLESVILLE LANDFILL

BROOME COUNTY

COLESVILLE, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 704010

Prepared By:

Broome County

Division of Solid Waste Management

60 Hawley Street, 5th floor

Binghamton, NY 13902

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

June 2020

CERTIFICATION STATEMENT

I __________________certify that I am currently a [NYS registered professional engineer or Qualified Environmental Professional as in defined in 6 NYCRR Part 375] and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

________________________ [P.E., QEP]

________________________DATE

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COLESVILLE, NEW YORK

SITE MANAGEMENT PLAN

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List of Acronyms

ASP	Analytical Services Protocol
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERD	Enhanced Reductive Dechlorination
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences
EWP	Excavation Work Plan
GAC	Granulated Activated Carbon
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
IRZ	In-Situ Reactive Zone
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRB	Permeable Reactive Barrier
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan

RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound
ZVI	Zero Valent Iron

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: **#704010 - Colesville Landfill, 1538 East Windsor Road, Colesville**

Institutional Controls:	Unless otherwise approved by DEC and EPA, there shall be no development of the property that could compromise the remedy's integrity or cause contaminant migration. No drinking water wells may be installed.
	Compliance with the Declaration of Covenants, Restrictions and Environmental Easement
	All ECs must be inspected at a frequency and in a manner defined in the SMP.
Engineering Controls:	Landfill cover system including geomembrane liner and gas vents
	Subsurface biological remediation
	Spring water carbon filtration

Inspections:	Frequency
Cover inspection	Annually
General site inspection including roads, fences, gates, ditches and culverts, gas vents, monitoring wells, and treatment building	Annually
Monitoring:	
1. Four (4) Spring Locations 2. One Sediment (SP-3) Location 3. Four (4) Surface Water Locations	Semi-annually

Site Identification:	**#704010 - Colesville Landfill, 1538 East Windsor Road, Colesville**

4. Groundwater Monitoring Wells GMMW-2, GMMW-5, GMMW-6, GMMW-7, PW-7, PW-3, PW-4, PW-5, W-7, W-16S, W-18, W-17S, W-20S, and GMPW-4	Every 5th quarter
Maintenance:	
Areas of settlement are corrected to maintain drainage off the landfill cap.	As needed
Mowing of the grass cap cover	Once per year
Fences and gates are kept intact and in working order	As needed
Monitoring wells kept in good repair	As needed
Gas vents are repaired if leaning or broken	As needed
Access roads are kept free of potholes and erosion	As needed
Treatment building is kept secured	As needed
Remove contaminated sediment from the SP-3 area	Annually
Reporting:	
Monitoring data	Annually
Operation and maintenance activities	Annually
Periodic Review Report	Every 3 years

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Colesville Landfill located in Colesville, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program, Site No. 704010 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Broome County and GAF Corp. entered into an Order on Consent, Index #T010687 on April 13, 1987 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Broome County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the Order on Consent, for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix B of this SMP.

This SMP was prepared by Broome County (Remedial Party), in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Order on Consent, Environmental Easement, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order on Consent, Environmental Easement, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

This section provides a description of the location and layout of the site; all areas of remaining contamination; remedial activities performed on-site; history; and nature and extent of contamination both before and after the remedy implementation.

2.1 Site Location and Description

The site is located in the Town of Colesville, County of Broome, New York and is identified as Tax ID# 118.02-1-9 on the Broome County Tax Map. The site is bounded by East Windsor Road to the west and by unnamed tributaries of the Susquehanna River to the north (North Stream SR-120) and to the east and south (South Stream SR119A) (see Figure 1). The boundaries of the site are more fully described in Appendix A – Metes and Bounds Section.

In addition to the landfill parcel, other parcels in close proximity with institutional controls are Tax ID#s 118.02-1-5, 118.04-2-24 and 118.04-2-25. These are also in Appendix [A], Declaration of Covenants and Restrictions and Environmental Easements/Metes and Bounds.

The owner of the site parcel(s) at the time of issuance of this SMP is Broome County.

2.2 Physical Setting

2.2.1 Land Use

The area surrounding the Site is characterized as 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 properties adjoining the Site primarily include vacant properties. The properties immediately south of the Site include vacant and one residential properties; the properties immediately north of the Site include agricultural and wooded properties; the properties immediately east of the Site include vacant wooded properties; and the properties to the west of the Site include agricultural, vacant, and residential properties. The closest currently inhabited residence is located approximately 900 feet south of the Site.

2.2.2 Geology

According to Wehran's Remedial Investigation report, revised September 1988, bedrock is overlain by a thick sequence of glacially derived material and fill material. The stratigraphic sequence and approximate thickness of unconsolidated deposits found onsite from youngest to oldest stratums are as follows:

	Thickness (ft.)
Clean fill	3 to 7
Refuse Fill	0 to 35
Glacial till (upper)	0 to 70
Glacial outwash	5 to 40
Glaciolacustrine	80 to 180
Glacial till (lower)	0 to 20

North and east of the site is a fairly thick low permeability stratum of glacial till that overlies glacial outwash deposits of variable permeability. Areas have been identified under the landfill where refuse directly overlies the glacial outwash. Beneath the outwash deposit are thick strata of low permeability glaciolacustrine silt and clays and glacial till which confine the bedrock aquifer.

Geologic cross sections from the Wehren RI Report are shown in Appendix C.

2.2.3 Hydrogeology

The depth to groundwater varies at the site from about 50 ft bgs in the higher elevation areas (e.g., beneath the landfill) to 0 ft bgs where the water table intersects land surface in spots adjacent the North Stream, resulting in a spring. Water moving within the glacial outwash aquifer beneath the landfill is part of a shallow groundwater subsystem that discharges into nearby surface-water bodies. In this type of hydrogeologic setting essentially all of the areal recharge to the glacial outwash aquifer moves horizontally because of the dense glaciolacustrine clay confining unit that underlies the glacial outwash aquifer. The predominant direction of groundwater flow at the Colesville Landfill site is toward the west and southwest, discharging to the North Stream and Susquehanna River.

Historical aquifer testing indicates that the glacial outwash aquifer in the area of interest has a low permeability (approximately 0.2 to 0.3 feet per day (ft/day) and poor ability to yield water (0.25 to 0.5 gallons per minute (gpm)). The historical horizontal groundwater gradient ranges from 0.05 to 0.07 foot per foot (ft/ft).

There are no private wells near the landfill that are currently affected by contaminated groundwater. The residence south of the landfill was provided with a deep, double cased bedrock well.

A groundwater contour map including posted groundwater elevation data is shown on Figure 3. Groundwater monitoring well construction logs are provided in Appendix D.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

Groundwater and Soil/Sediments

Wehran Engineering began a RI in 1983 to characterize the nature and extent of contamination at the site, with other confirmatory sampling and further evaluations culminating in the Record of Decision in 1991. The results of the RI are described in detail in the following reports:

- Hydrogeologic Investigation, Colesville Landfill, Wehran Engineers, Sept. 1983.
- Phase II Hydrogeologic Investigation and Remedial Alternative Evaluation, Volumes 1 & 2, Wehran Engineers. Nov. 1984.
- Agency for Toxic Substances and Disease Registry, Public Health Assessment, Colesville Municipal Landfill, Colesville, Broome County, NY, 1984.
- Colesville Landfill Remedial Investigation Report, Wehran Engineers, Revised Sept. 1988.
- Record of Decision (ROD), Colesville Landfill Site, Town of Colesville, Broome County, NY, issued in March 1991.

Monitoring wells were installed and sampled; surface water and sediment samples were collected, and area homeowner wells were sampled. In addition, a multi-phase geophysical investigation was conducted to determine the location and extent of landfilled materials buried on site.

The Town of Colesville owned and operated the Site from 1969 to 1971. In 1971, Broome County became the owner of the Site and operated the landfill from 1971 until it was closed in 1984 (Wehran 1988). The landfill was primarily used for the disposal of municipal solid waste. However, between 1973 and 1975, industrial waste consisting primarily of drummed aqueous dye wastes, as well as organic and chemical solvent mixtures were also disposed at the landfill (Wehran 1988). According to Broome County's annual reports, recorded in the Legislature's Journals of Proceedings, 264,000 tons of waste were placed in the landfill.

The primary contaminants identified during the Wehran investigations were volatile organic compounds (VOCs) found in ground water beneath and downgradient of the landfill, as well as four surface seeps. Total volatile organic compounds (TVOCs), ranged from 48 to 2,800 parts per billion (ppb) within and around the Site. The areas of highest contamination occurred along the southern and western site boundaries. Contamination is confined to the upper portions of the glacial outwash aquifer. Three residential wells immediately downgradient of the landfill (that are now demolished or vacant) were impacted by trace or low-level amounts of contaminants. No VOCs were detected in any surface water samples from the North and South streams or the Susquehanna River. Metals were detected in surface water samples at locations downstream of the landfill; however, the levels were not significantly elevated above background.

An evaluation of the potential risk from hazardous substances identified at the Colesville Landfill was performed. Five indicator chemicals were identified for evaluation based on their known or potential toxicity and relative environmental fate and mobility characteristics and include: 1,1-dichloroethene, trichloroethene, benzene, chlorobenzene, and 1,1-dichloroethane. Possible human exposure pathways include consumption of groundwater in the immediate vicinity of the site, and through direct contact with contaminated stream sediments or soils in the vicinity of the leachate seeps. Based on a comparison of exposure point concentrations to health-based standards, baseline risk exceeds that which is acceptable under Federal and State drinking water standards.

Public comment was solicited for all of the proposed remedial alternatives in the detailed analysis phase of the feasibility study. In Spring 1991, the USEPA selected the preferred remedy for the Colesville Landfill which includes: (1) placement of a multi-media cap on the landfill which complies with New York State solid waste regulations; (2) installation of a leachate collection system; (3) pumping of ground water at and downgradient of the landfill, followed by treatment via air stripping prior to discharge to the North Stream or the Susquehanna River; and (4) provision of a new public water supply, to be located north of the landfill, with distribution to affected residents.

Additional post-ROD studies were conducted by Arcadis to evaluate aquifer properties, pilot test a potential remedy enhancement using injections to introduce a carbon substrate (i.e., dilute solution of molasses) to enhance bioremediation of chlorinated VOCs, and delineate the downgradient extent of VOCs in groundwater to assess whether impacted groundwater was discharging to the North Stream in the area near the Susquehanna River.

Based on design related aquifer tests, it was determined that the pump and treat method, called for in the ROD, would be ineffective. Therefore, following successful pilot testing of an in-situ reactive zone (IRZ) remedy for enhanced reductive dechlorination (ERD), a combination of downgradient extraction wells with an air stripper and an anaerobic bioremediation system using injections wells for subsurface introduction of molasses solution was designed. An Explanation of Significant Differences (ESD) to change the ROD remedy was issued by the EPA in September 2000. The groundwater management system, constructed by Clean Earth Technologies, Inc. became operational in 2002. It consists of 17 automated reagent injection wells, three groundwater recovery wells, and an on-site groundwater treatment system.

Design and construction reports for the remedies include:

- Final Engineering Design Report for the Closure Action, Wehran revised July 1994: subgrade preparation, gas venting layer with vents, geomembrane liner, barrier protection and topsoil, 3.08 acre wetland mitigation, structural integrity, stormwater management
- Construction Certification Report, C&S Engineers January 1996
- Results of the Well Installation and Step-Drawdown Testing at the Colesville Landfill, Colesville, New York, Arcadis December 1997: The study concluded that poor well yields and low hydraulic conductivities were consistent with the heterogeneous deposits of silt and fine sand. The results further supported previous work including slug testing, well performance

testing, and groundwater flow modeling which concluded that the hydraulic conductivity of the glacial deposits was very low.

- Results of Enhanced Reductive Dechlorination Pilot Study, Colesville Landfill, Broome County, New York, Arcadis October 1999: The pilot test demonstrated the effectiveness of ERD at the Colesville Landfill based on a significant decrease in VOC concentrations at the downgradient edge of the ERD zone. Significant concentrations of total organic carbon were sustained in the groundwater system and a redox zone was strongly established to create conditions amenable to the reductive dechlorination of VOCs.
- Groundwater Remediation Systems Engineering Report, Arcadis July 2000: The groundwater remedy is comprised of a groundwater extraction and treatment system combined IRZ ERD technology. The objective of the remedial design was to enhance the groundwater component of the remedy documented in the March 29, 1991 ROD which called for groundwater extraction and treatment only. The report summarizes the pre-design investigations which determined that remedy enhancements were appropriate for the site, documents the design and engineering analysis that supported the design criteria, and describes the remedy components, process controls and operation.

- Interim Remedial Action Report, Arcadis September 2004: Following the discovery of contaminated springs, an ESD was issued in July 2004 (Appendix E). South of the landfill an upwelling spring, known as SP-5, was remediated by placing a sand filter and granulated activated carbon unit in an existing concrete structure. The remedy of the contaminated spring, SP-4, along the North Stream consisted 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 land surface. The SP-4 remedy was severely impacted by North stream flooding in 2006 and 2011 and was repaired after both instances.

- Soil Vapor Screening Evaluation Report, Arcadis January 2009 (Appendix F): A screening evaluation was conducted through the collection of soil vapor samples in the vicinity of the residences and on the west side of the North Stream. A comparison of the soil vapor sample concentration data to the site-specific Target Shallow Soil Gas Concentrations indicated that 1,3-butadiene (SV-1, SV-4, and SV-5 soil vapor samples) and TCE (SV-2 soil vapor sample) exceed their respective site-specific Target Shallow Soil Gas Concentrations for the $1x10^{-6}$ risk level, but not at the$1x10^{-4}$ risk level. Those exceedances did not pose a potential for exposure at residences that were, at that time, downgradient of the landfill.
- Volatile Organic Compound Plume Delineation Report, Colesville Landfill Superfund Site, Arcadis August 2011: Temporary monitoring well data indicated that the VOC plume has been delineated downgradient of monitoring well W-18. The VOC plume decreases along the groundwater flowpath between W-18 and the Susquehanna River, and the VOC plume is attenuating prior to reaching the Susquehanna River.
- Focused Feasibility Study Report, Arcadis April 2012: The FFS was prepared to reevaluate whether the site-wide remedies for groundwater and associated spring water and surface water described in the Explanation of Significant Differences, dated September 2000 and July 2004, were still warranted and cost-effective. Recommendations were to implement engineering and institutional controls and to remediate groundwater through monitored natural attenuation.
- In-Situ Reactive Zone Discontinuation Report, Arcadis September 2015: Pilot program to evaluate the effect on groundwater quality by discontinuing injections and groundwater extraction and treatment, document the response of groundwater geochemistry including the evaluation of alternate electron acceptors such as dissolved iron and manganese, and evaluate if nearby springs (e.g., SP-3) had a positive response to the discontinuation of injections. Conclusions from the initial study period were that VOC concentrations in groundwater were generally stable to decreasing and the

springs were relatively unchanged. Data indicated that enhanced attenuation through reductive dechlorination was continuing and subsurface conditions remained anaerobic despite declining levels of TOC. Recommendations included continued plume and downgradient well monitoring for natural attenuation parameters and inspections of the springs and sediment.

- Remedial System Optimization Report, Arcadis March 2017: As described in the ROD, “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 report described the significant remedial progress that was achieved through enhanced reductive dichlorination of VOCs, revised the Conceptual Site Model and described the site conditions that make the remedy inefficient and unable to restore groundwater quality to the cleanup criteria in the ROD in a cost effective and timely manner, and recommended transitioning the site remedy to MNA. The report figures also show the chlorinated VOC plume delineation prior to remedial system startup in September 2002 and significantly improved conditions in June 2016 following several years of remedy implementation.
- Revised Focused Feasibility Study, Arcadis April 2018: Groundwater remediation technologies were evaluated and compared including:
    1. In-situ chemical oxidation.
    2. Zero-valent iron permeable reactive barrier (ZVI PRB).
    3. Injectable granulated activated carbon (GAC).
    4. Air sparging.
    5. In-well air stripping
    6. Monitored Natural Attenuation and Institutional and Engineering Controls
    7. Operation of the Existing ERD System until remedial action objectives (RAOs) are Achieved

The report recommended Monitored Natural Attenuation and Institutional and Engineering Controls as the preferred remedy.

- Fifth Five-Year Review for the Colesville Municipal Landfill Superfund Site, EPA March 2020: From October 2012 through September 2019, the groundwater was monitored while the molasses injections and the groundwater extraction and treatment system were dormant to evaluate the behavior of site contaminants in natural conditions (In-Situ Reactive Zone Discontinuation Pilot Study). Based on contaminant of concern trends observed during the pilot study (*i.e.,* increasing levels of contaminants in several monitoring wells), it was decided that substrate injections (molasses) would resume in September 2019 and continue on an annual basis. The groundwater extraction and treatment system remains off but is maintained should it be needed in the future. The landfill cap eliminates any potential risk from surface soil contaminants to terrestrial receptors. Any potential ecological risks associated with the North Stream have been addressed by sediment excavations conducted by Broome County staff. The North Stream sediment sampling and scraping is ongoing.

Emerging Contaminants

Analysis of per- and polyfluoroalkyl substances (PFASs) was performed for a subset of 7 monitoring wells sampled on March 29, 2017. In accordance with NYSDEC requirements, PFASs were analyzed via EPA Method 537 for the six (6) substances originally monitored as part of EPA's UCMR3 (third Unregulated Contaminant Monitoring Rule). The concentration of the six (6) PFASs ranged from below the limits of detection to 9.8 parts per trillion (ng/L). Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) were each detected at concentrations below the NYS maximum contaminant level (MCL) of 10.0 ng/L. The same subset of wells was sampled for 1,4-dioxane. The concentration of 1,4-dioxane in the subset of 7 monitoring wells ranged from below the limits of detection to 1.9 µg/L. In August of 2020, New York State set a MCL for 1,4-dioxane of 1.0 µg/L. The emerging contaminant sampling results were documented in the 2017 Annual Monitoring Report.

On September 17, 2019 six residential wells, within a half-mile radius of the landfill (both up and down gradient), were sampled for 1,4 dioxane and 21 individual PFA compounds, 1,4 dioxane was found to be below the method detection limit of 0.27 ppb in all those drinking water wells. The only PFA detection close to the method reporting limit of 1.7 ng/l was at 27 Centerville Loop Road where a PFOA concentration of 1 ng/l was reported.

2.4 Remedial Action Objectives

The media of concern identified for the Site include groundwater in the glacial outwash aquifer and leachate seeps in the North Stream and on the south side of the landfill. The Remedial Action Objectives (RAOs) for the Site as listed in the ROD dated March 29, 1991 are as follows:

Soil

- Eliminate any direct contact with soil and reduce or eliminate the infiltration of precipitation through the Site.

Groundwater

- 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.

Sediments

- Eliminate the leachate seeps from the Site and any associated leachate discharges to the North and South Stream to prevent further contamination of sediments.

The ROD Remedy has addressed the RAOs for soil through the installation of a landfill cap which was completed in November 1995. The ROD Remedy addresses the RAOs for sediments through the SP-4 spring water remedy and use of existing engineering controls. RAOS for groundwater are being addressed through a combination of injections to enhance the biodegradation of chlorinated VOCs and natural attenuation processes.

2.5 Remaining Contamination

2.5.1 Sediment

Sediment samples (SP-3-SED) are collected in the vicinity of SP-3 during semi-annual sampling events. Table 2 summarizes the results of all sediment samples collected during 2019 and 2020 relative to the 6 NYCRR Table 375-6.8(b): Restricted Use Soil Cleanup Objectives (SCOs) - Protection of Ecological Resources SCOs. The sediment sampling location is shown on Figure 4. Both the May and November 2020 sampling activities found exceedances of arsenic when compared to the Protection of Ecological Resources SCOs, which was generally consistent with concentrations in samples collected in previous years; manganese was also detected at a concentration above its SCO in May 2020. The sediment data will continue to be assessed to determine if future sediment scraping and disposal is necessary as an ongoing periodic remedial action to maintain conditions that are consistent with Protection of Ecological Resources SCOs.

2.5.2 Groundwater

Table 3 summarizes the results of all samples of groundwater collected during 2019 and 2020 for analysis of VOCs, including exceedances of SGVs. Figure 5 shows the monitoring well locations.

As shown in Table 3, landfill perimeter monitoring well PW-7 exhibited a significant decrease in the number of VOCs detected when compared with 2019 results, and also displayed a decreasing concentration trend. The only VOCs detected above their respective SGV in November 2020 were 1,1-dichloroethane (DCA) and cis-1,2-dichloroethene (DCE) at 14 µg/L and 16 µg/L, respectively. Landfill perimeter monitoring well GMMW-7 also exhibited decreasing TVOC concentrations from 2019 to 2020, indicating the potential of a decreasing trend in VOC mass emanating from beneath the landfill.

Downgradient from the landfill perimeter in the mid-plume area (i.e., GMMW-5, GMMW-6, and GMMW-2), concentrations of chlorinated ethenes have significantly decreased over time as a result of the in-situ reactive zone (IRZ) enhanced reductive dechlorination (ERD). The primary VOCs present in groundwater in the mid-plume area are DCA and chloroethane (CA).

Further downgradient in monitoring wells near East Windsor Road (i.e., PW-4, PW-3 and W-16S), TVOC concentrations range from 5.6 µg/L to 23 µg/L in 2020.

Concentrations of VOCs south of East Windsor Road (i.e., W-18 and W-20S) were also consistent with previous sampling results. TVOC concentrations in W-18 (12 µg/L) continue to show a decreasing trend and W-20S remains below detection limits.

Tracking of groundwater quality trends over time indicates that natural biodegradation processes are maintaining stable to decreasing VOC concentrations.

2.5.3 Surface Water

Surface water sampling results demonstrate that SCGs have not been exceeded over time (Table 4). Surface water sampling locations are shown on Figure 4. The data indicate that TVOC concentration at surface water sampling locations have been below the limits of detection except for sporadic trace levels of VOCs. The metals concentrations, many below limits of detection, at the F-6, SW-3 and SW-4 sampling locations were also consistent with the background, upgradient sample SW-2, and historical data. These data indicate that surface water quality is not being adversely impacted by the landfill.

2.5.4 Spring Water

Spring water samples are collected at the SP-2, SP-3, and SP-4 locations unless spring flow is not evident due to dry conditions. Spring water sampling results for VOCs and metals are provided in Table 5, including exceedances of NYSDEC Part 703 WQS. Spring water sampling locations are shown on Figure 4.

Spring water VOC concentrations in November 2020 only exceeded the WQS for Class C fresh surface waters for chlorobenzene (12 µg/L) at SP-3. All other VOC compounds were below the applicable WQS or non-detect. Where WQSs were not available, the NYSDEC Division of Water Technical Operational Guidance Series (TOGS 1.1.1) standards and guidance values were listed for comparative purposes. Since the designated use of Class C waters is fishing, the standards and guidance values are protective of fish, shellfish, and wildlife propagation and survival, as well as primary and secondary contact recreation. Despite the presence of VOCs in spring water samples, only non-detect to trace concentrations of VOCs were present in the co-located surface water samples collected from the North Stream. These data demonstrate that VOC concentrations detected in the spring water are not adversely impacting surface water quality in the North Stream.

In general, the concentrations of metals were below their respective WQS with the exception of iron, which was present in all spring water samples at levels that exceeded the criteria for protection of aquatic life from chronic effects. However, these springs are found over a very limited area and all surface water samples were in compliance with applicable WQS.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix G) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the ROD, the ESD of 2000 and the ESD of 2004 to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 2. These ICs are:

- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the Broome County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;

- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;

- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.

- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 6, and any potential impacts that are identified must be monitored or mitigated; and

3.3 Engineering Controls

3.3.1 Cover (or Cap)

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of an engineered 6 NYCRR Part 360 (1993) compliant cap with geomembrane liner. Figure 6 presents the location of the landfill cap. The Excavation Work Plan (EWP) provided in Appendix G outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix I.

Procedures for maintaining the landfill cover system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings are included in Appendix H. Figure 6 shows the location of the ECs for the site.

3.3.2 In-Situ Reactive Zone (IRZ) Molasses Injections

The purpose of the anaerobic IRZ injection is to drive groundwater geochemistry to more highly anaerobic conditions to facilitate enhanced reductive dechlorination of VOCs, particularly chlorinated ethenes, near the landfill perimeter in areas of historic higher concentrations. Molasses solution will be gravity fed into the subsurface utilizing eleven (11) injection wells (PW-6, GMMW-1, and IW-1 through IW-9). The solution strength will be 4% molasses by volume, but may be adaptively managed for future injections, if necessary, based on performance monitoring results and remedial objectives. Injection wells GMMW-1, IW-4, IW-5 and IW-6 will receive higher injection volumes to target the elevated total COC concentrations at GMMW-5 (76.6 ppb) and GMMW-6 (190 ppb).

Procedures for operating and maintaining the IRZ injection system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). Figure 6 shows the location of the ECs for the site.

3.3.3 Spring Remedy at SP-5

The SP-5 spring remedy consists of a spring water collection trench, a 350-pound LPGAC unit, a sand pre-filter, a lockable aluminum cover, a two-inch diameter Schedule 40 PVC discharge pipe, a riprap-lined infiltration bed, and engineering controls for erosion and sediment control.

Spring water from the SP-5 spring area is first collected within the collection trench and/or the sand pre-filter prior to exfiltrating land surface. Spring water collected within the trench is conveyed to the bottom of the concrete structure by gravity. The collected spring water then travels up through the LPGAC unit. Treated effluent is conveyed through 20 feet of two-inch diameter Schedule 40 PVC pipe into a below grade infiltration bed consisting of a four-inch diameter rip-rap layer approximately one and one-half feet thick, 14 feet wide and 14 feet long.

SP-5 modifications were implemented during September 2008 to mitigate the presence of tailwater at the SP-5 discharge outfall. Specific modifications included the installation of a subsurface clay barrier immediately downgradient of the existing SP-5 carbon unit and the extension of the SP-5 discharge pipe to a location approximately twelve (12) feet to the southwest of the existing outfall location.

Procedures for operating and maintaining the SP-5 remedy are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). An as built drawing is shown on Figure 7. Figure 6 shows the location of SP-5.

3.3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.4.1 - Cover (or Cap)

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.4.2 – Injection Wells

The IRZ injection well system will not be abandoned unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that carbon substrate injections may no longer be required, a proposal to discontinue the injections will be submitted by the remedial party. Conditions that may warrant discontinuing the injections include contaminant concentrations in groundwater that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs, as appropriate; (2) have become asymptotic to a low level over an extended period of time, as accepted by the NYSDEC; or (3) the NYSDEC has determined that the injection system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

3.3.4.3 - Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation in areas of the site not directly influenced by remedial injections will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the system will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

3.3.4.4 – SP-4 Remediation System)

The SP-4 remediation system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP until no longer required by the NYSDEC.

3.3.4.5 – SP-5 Remediation System)

The SP-5 remediation system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that influent monitoring data indicates that the SP-5 system may no longer be required, a proposal to discontinue the system, including the results of an impact study, will be submitted by the remedial party. Conditions that may warrant discontinuing the SP-5 system include contaminant concentrations in groundwater (i.e., system influent) that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs as appropriate, (2) have become asymptotic to a low level over an extended period of time as accepted by the NYSDEC; or (3) the NYSDEC has determined that the SP-5 system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in influent samples collected from the SP-5 system. The SP-5 system will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC. Concentrations of VOCs detected in influent and effluent aqueous samples collected from the SP-5 spring water remediation system during 2020 are provided in Table 6.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in Appendix J.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, spring water, surface water and sediment);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and 6 NYCRR Table 375-6.8(b): Restricted Use SCOs – Protection of Ecological Resources SCOs. Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed annually. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix M – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;

- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater, springs, surface water and sediment on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 7 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

All monitoring well sampling activities will be recorded in a groundwater-sampling log presented in Appendix K. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Sampling is conducted in accordance with the Quality Assurance Project Plan included in Appendix J. Groundwater wells are sampled using either disposable polyethylene bailers, or “dedicated” bailers that are left in place in the wells. If recharge conditions allow, a minimum of three well volumes of water are purged from the wells prior to sample collection. In the event that supplemental analytes are required to be sampled and analyzed, low-flow (minimal drawdown) sampling methods may be used. Pumping techniques would require the use of equipment blanks. Surface water and sediments are sampled by working from downstream to upstream locations.

Detailed sample collection and analytical procedures and protocols are provided in Appendix L – Field Activities Plan and Appendix J – Quality Assurance Project Plan.

4.3.1 Groundwater Sampling

Groundwater monitoring will be performed on a 5th quarter basis to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site and off-site wells has been designed based on the following criteria:

- Contamination is confined to the glacial outwash aquifer
- The delineated plume extents and the direction of groundwater flow

Table 8 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring both on-site wells and downgradient wells are sampled to evaluate the effectiveness of the remedial system.

Monitoring well locations are shown on Figure 5. The wells are primarily screened in the glacial outwash aquifer, with a few wells screened in bedrock. Representative geologic cross sections from the RI Report are provided in Appendix C. Monitoring well construction logs are included in Appendix D of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.3.2 Surface Water Sampling

Surface water sampling will be performed semi-annually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Midstream surface water samples will be collected as grab samples directly from the North Stream at Location F-6 (see Figure 4) and at SW-2, SW-3, and SW-4, located in the vicinity of the correspondingly named springs. During sampling, pH, temperature, dissolved oxygen, and specific conductivity will be tested. Additional details on surface water sample collection and quality assurance/quality control (QA/QC) requirements are provided in the Quality Assurance Project Plan (QAPP) (Appendix J).

4.3.3 Spring Water Sampling

Field observations of the presence or absence of springs along the North Stream will be performed during the sampling rounds and when landfill cap maintenance activities occur. When the springs are present, they are a manifestation of the groundwater table intersecting land surface along, but not within, the streambed. If present, representative spring water samples will be periodically collected as grab samples directly from Locations SP-2, SP-3, and SP-4 (Figure 4). It should be noted that SP-3 has emerged at various, and sometimes simultaneously multiple, locations along an approximately 20-foot stretch of the stream. SP-3 is representatively sampled from the spring with the highest observed flow in that area. During sampling, pH, temperature, and specific conductivity will be tested.

4.3.4 Sediment Sampling

Sediment sampling will be performed semi-annually to assess the quality of the sediment at the most impacted spring location, which is SP-3. A composite sediment sample of the top 2 inches of sediment will be collected from three random locations in the SP-3 area and a laboratory analysis for total metals will be performed. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Deliverables for the sediment sampling program are specified in Section 7.0 – Reporting Requirements. Additional details on sediment sample collection and QA/QC requirements are provided in the FAP and QAPP, in Appendices L and J, respectively.

4.3.5 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix K - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Activities Plan provided as Appendix L of this document.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the surface water sampling program are specified in Section 7.0 – Reporting Requirements.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the groundwater injection and SP-5 GAC systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the injection and GAC systems are operated and maintained.

This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Operation and Maintenance of In-Situ Reactive Zone Injection System

The following sections provide a description of the operation and maintenance of the IRZ injection system.

5.2.1 <u>Routine System Operation and Maintenance</u>

Injections will be completed in the following manner:

- The injection wells will be inspected, sounded, and purged prior to the injection where piping configuration in individual wells allows.
- Delivery of water used for the injection will be from a potable source.
- Injections will be performed via gravity feed. Feed lines remaining from the prior automated system to the wells will be used as appropriate.

- The molasses solution will be mixed in a 1,000 gallon portable aboveground mixing tank.

- Injection will be conducted in up to eleven (11) wells simultaneously.

- Flow and volume into each injection will be monitored and recorded.

- Nearby monitoring wells and/or injection wells will be occasionally monitored (baseline and 2 additional measurements per day) for water level elevation, pH and conductivity.

- Once the injection event has been completed, all mixing tanks will be rinsed out with water, drained to an injection well, hoses rinsed and rolled up, and equipment will be returned or stored in the treatment building.

Target Injection Volumes (4% Molasses Solution)

- PW-6: 100 gallons
- IW-3: 100 gallons
- IW-1: 100 gallons
- IW-2: 100 gallons
- GMMW-1: 650 gallons
- IW-4: 1000 gallons
- IW-5: 1000 gallons
- IW-6: 650 gallons
- IW-7: 100 gallons
- IW-8: 100 gallons
- IW-9: 100 gallons

5.2.2 Non-Routine Operation and Maintenance

Injection wells will be periodically evaluated for fouling and will be redeveloped as necessary.

5.3 Operation and Maintenance of SP-5 Granular Activated Carbon (GAC) System

The following sections provide a description of the operations and maintenance of the SP-5 GAC system.

5.3.1. Routine Equipment Maintenance

Operational performance monitoring of the SP-5 spring remedy is conducted on a semiannual basis and includes routine visual inspection, recording system field parameters, and maintenance on system equipment (as necessary, such as clearing deposited material from the discharge pipe, carbon media change-out). Collection of influent and effluent spring water samples will be done in accordance with Section 4 of this SMP. System effluent spring water samples will be compared to effluent criteria in order to ensure compliance with the BPJ limits and monitor system performance.

5.3.2 Non-Routine Equipment Maintenance

Non-routine maintenance and troubleshooting of treatment system components will be also completed as necessary, based on routine inspection and monitoring observations.

5.4 Operation and Maintenance of SP-4 Spring Water Suppression System

The SP-4 spring water suppression system is a subsurface stone collection trench and drainage layer in the area of a former spring that prevents the spring water from exfiltrating above the land surface. Large stones have been placed along the streambank to protect the integrity of the trench and infiltration bed during high water conditions. The SP-4 remediation system does not require routine maintenance but should be inspected annually.

5.5 Operation and Maintenance of the SP-3 Area

Based on sediment sampling results at the SP-3 area, surficial sediment is removed in the area of SP-3 once to twice per year. The sediment data will continue to be assessed to determine if future sediment scraping and disposal is necessary to maintain conditions that are consistent with 6 NYCRR Table 375-6.8(b): Restricted Use SCOs – Protection of Ecological Resources SCOs.

5.6 Operation and Maintenance of the Landfill Cap

The following section provide a description of the operations and maintenance of the Landfill Cap.

5.6.1. Routine System Operation and Maintenance

Periodic maintenance of the landfill cap is to be completed as follows:

- Cap vegetation is to be mowed at least one time per year
- Maintenance of the access road must be completed as needed
- Cap settlement must be inspected and repaired as needed
- Fences and gates are to be inspected and maintained as needed
- Monitoring wells are to be repaired and locks replaced as needed
- The gas vents must be repaired as needed

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

The primary potential site vulnerability is erosion of the steep embankment the rises up from the North Stream to the plateau on which the landfill was constructed. Storms of higher intensity can cause scouring of the stream embankment that can destabilize the hillside. Riprap reinforcement of the embankment has been constructed in areas between the North Stream and the hillside to prevent destabilization and erosion of the hillside. Inspection of the hillside between the landfill and the North Stream should be conducted as part of the landfill cap inspection.

6.2 Green Remediation Evaluation

NYSDEC’s DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of green remediation techniques being employed and any evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

The anaerobic IRZ enhances bioremediation of VOCs without generating a separate waste stream that would require treatment and/or disposal. In addition, the current injection methodology relies on gravity injection with very little energy usage. At this time water usage is from a potable source in order to protect the injection wells from fouling and to be consistent with protection of groundwater SCOs.

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

As discussed in Section 7.0 and as shown in Appendix M – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits; a set of metrics has been developed.

6.3 Remedial System Optimization

A Remedial System Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;

- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

A RSO Report was submitted to the NYSDEC in March 2017 following their request for an RSO Study in December 2016; the RSO report is provided in Appendix N.

The RSO study focuses on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix M. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 9 and summarized in the Periodic Review Report.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected;
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;

- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);

- Any observations, conclusions, or recommendations; and

- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;

- Name, company, and position of person(s) conducting maintenance activities;

- Description of maintenance activities performed;

- Any modifications to the system;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,

- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

Periodic Review Reports (PRR) are submitted to the Department every third year, or at another frequency as may be required by the Department. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 60 days of the end of each certification period. As a point of reference, the next PRR is due March 1, 2022. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.

- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, surface water, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

– The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;

– The operation and the effectiveness of groundwater injections and SP-5 passive treatment., including identification of any needed repairs or modifications;

– Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

– Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

- Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*

- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] (and if the site consists of multiple properties): *[I have been authorized and designated by all site owners/remedial parties to sign this certification] for the site."*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial System Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report will be consistent with the format used in the March 2017 RSO

Report that was submitted to the NYSDEC and is provided as Appendix N. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

Agency for Toxic Substances and Disease Registry 1984. Public Health Assessment, Colesville Municipal Landfill, Colesville, Broome County, NY, 1984.

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Arcadis of New York, Inc. 2017. Remedial System Optimization Report. Colesville Landfill, Broome County, New York. March 30, 2017.

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NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

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Wehran-New York, Inc. 1984. Phase II Hydrogeologic Investigation and Remedial Alternative Evaluation, Volumes 1 & 2. November 1984.

Wehran-New York, Inc. 1988. Colesville Landfill Remedial Investigation Report. September 1988.

Wehran-New York, Inc. 1994. Final Engineering Design Report for the Closure Action, Colesville Landfill. Revised July 1994:

TABLES

Table 1. Notifications

Name	**Contact Information**
Payson Long, NYSDEC Project Manager	(518) 402-9813 payson.long@dec.ny.gov
Chris Mannes, NYSDEC Region 7 - Regional Engineer	(315) 426-7519 chris.mannes@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	(518) 402-9813 kelly.lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary

Table 2. Summary of Sediment Sample Results Showing Remaining Exceedences, Colesville Landfill, Broome County, New York.

Constituents	NYSDEC Subpart 375-6 Protection of Ecological Resources SCO[1]	Location ID: Sample ID: Date:	SED-3 SP-3 -SED 06/03/19	SED-3 SP-3 -SED 09/16/19	SED-3 SP-3 -SED 05/27/20	SED-3 SP-3 -SED 11/05/20
Metals (units in mg/kg)						
Arsenic	13		**35.4**	**10.3**	**13.6**	**14.7**
Barium	433		**61.8**	**41.8**	**69.5**	**61.6**
Beryllium	10		<0.410	<0.380	**0.540**	**0.490**
Cadmium	4		**0.740**	<0.640	<0.640	<0.610
Calcium	NA		<140	270	**1,570**	**1,330**
Chromium	41[a]		**10.9**	**10.3**	**15.5**	**16.2**
Cobalt	NA		**9.00**	**7.70**	**12.3**	**11.0**
Copper	50		**16.2**	**14.9**	**24.9**	**20.0**
Iron	NA		**40,100**	**22,500**	**31,800**	**31,100**
Lead	63		**13.4**	**14.0**	**16.4**	**14.7**
Magnesium	NA		**2,900**	**2,660**	**4,280**	**4,170**
Manganese	1600		**1,660**	**506**	**4,680**	**996**
Mercury	0.18		<0.0490	<0.0430	<0.0400	<0.0410
Nickel	30		**17.8**	**16.3**	**28.8**	**25.4**
Potassium	NA		**820**	**670**	**1,100**	**1,040**
Selenium	3.9		<1.40	<1.30	<1.30	<12.0
Silver	2		<1.40	<1.30	<1.30	<1.20
Sodium	NA		<140	<130	<130	<120
Thallium	NA		<14.0	<1.30	<1.30	<1.20
Vanadium	NA		**12.4**	**11.3**	**17.4**	**16.2**
Zinc	109		**51.7**	**46.2**	**73.9**	**69.9**
Miscellaneous						
Percent Moisture (% by wt.)			**32.3**	**29.1**	**22.2**	**22.4**

Notes and abbreviations on last page.

Notes and abbreviations:

1	Table 375-6.8(b): Restricted Use Soil Cleanup Objectives.
a	The SCO for trivalent chromium is provided.
NYSDEC	New York State Department of Environmental Conservation
SCO	Soil Cleanup Objective
mg/kg	milligrams per kilogram
NA	Not available
Bold	Indicates detection above laboratory Method Detection Limit
	Analyte concentration exceeds Protection of Ecological Resources SCO
<	Analyte below detection limit.

Table 3. Summary of Groundwater Monitoring Results Showing Remaining Exceedences, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	NYSDEC TOGS (1.1.1) SGV	Location ID: Date:	GMMW-02 09/17/19	GMMW-02 11/05/20	GMMW-02 11/05/20 dup	GMMW-05 09/17/19	GMMW-05 11/05/20	GMMW-06 09/17/19	GMMW-06 11/05/20	GMMW-07 09/17/19	GMMW-07 11/05/20	PW-03 09/17/19	PW-03 11/05/20	PW-04 09/17/19	PW-04 09/17/19 dup	PW-04 11/05/20	PW-05 09/17/19	PW-05 11/05/20	PW-07 09/17/19	PW-07 11/05/20	W-07 09/17/19
1,1,1-Trichloroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-trichloro-1,2,2-trifluoroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	5		**26**	**17**	**16**	<5.0	<5.0	**51**	**53**	**110**	**47**	**6.6**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**76**	**14**	<5.0
1,1-Dichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	0.04		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	0.0006		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	0.6		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	50		<10	<10	<10	<10	**19**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	50		<10	<10	<10	<10	**17**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Disulfide	60		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	5		**16**	**15**	**14**	**14**	**11**	**22**	**27**	**11**	**14**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**21**	<5.0	<5.0
Chloroethane	5		**8.0**	**5.9**	**6**	**69**	**47**	**110**	**99**	**53**	**16**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**36**	<5.0	<5.0
Chloroform	7		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	5		**7.5**	<5.0	<5.0	<5.0	<5.0	**9.0**	**17**	**77**	**42**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**56**	**16**	<5.0
cis-1,3-Dichloropropene	0.4*		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cyclohexane	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl acetate	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl tert-butyl ether	10		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylcyclohexane	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	0.4*		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	5		**8.7**	**7**	**6.7**	<5.0	<5.0	<5.0	**5.2**	**23**	**17**	**6.3**	**5.6**	**6.8**	<5.0	**6.0**	<5.0	<5.0	**9.1**	<5.0	<5.0
Trichlorofluoromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	2		<5.0	<5.0	<5.0	<5.0	<5.0	**12**	**12**	**40**	**17**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**16**	<5.0	<5.0
Xylenes (total)	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total VOCs			**66**	**45**	**43**	**83**	**94**	**200**	**210**	**310**	**150**	**13**	**5.6**	**6.8**	ND	**6.0**	ND	ND	**210**	**30**	ND

Table 3. Summary of Groundwater Monitoring Results Showing Remaining Exceedences, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	NYSDEC TOGS (1.1.1) SGV	Location ID: / Date:	W-07 11/05/20	W-16S 09/17/19	W-16S 11/05/20	W-17S 09/17/19	W-17S 11/05/20	W-18 09/17/19	W-18 11/05/20	W-20S 09/17/19	W-20S 11/05/20	GMPW-04 09/17/19	GMPW-04 11/05/20
1,1,1-Trichloroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-trichloro-1,2,2-trifluoroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	5		<5.0	**11**	**6.3**	<5.0	<5.0	**6.0**	**5.2**	<5.0	<5.0	**18**	**16**
1,1-Dichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	0.04		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	0.0006		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	0.6		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	3		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	50		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	50		**15**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Disulfide	60		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	5		<5.0	**24**	**17**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**8.7**	**8.9**
Chloroethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**6.2**	**7.4**
Chloroform	7		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	**5.7**	<5.0	<5.0	<5.0	**8.3**	**7.3**
cis-1,3-Dichloropropene	0.4*		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cyclohexane	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	50		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl acetate	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl tert-butyl ether	10		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylcyclohexane	--		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	0.4*		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	5		<5.0	<5.0	<5.0	<5.0	<5.0	**9.2**	**7.0**	<5.0	<5.0	**21**	**19**
Trichlorofluoromethane	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	2		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes (total)	5		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total VOCs			**15**	**35**	**23**	ND	ND	**21**	**12**	ND	ND	**62**	**59**

Notes and abbreviations:

NYSDEC	New York State Department of Environmental Conservation.
TOGS	Technical and Operational Guidance Series.
SGV	Ambient Water Quality Standards and Guidance Values.
B	Compound considered non-detect at the listed value due to associated blank contamination.
D	Concentration is based on a diluted sample analysis.
J	Concentration is an estimated value.
NA	not applicable
ug/L	micrograms per liter
*	Applies to the sum of cis- and trans-1,3-dichloropropene.
VOCs	volatile organic compounds
<	analyte below detection limit
Bold	Indicates detection above laboratory method detection limit.
	Compound concentration exceeds SGV.

Table 4. Summary of Surface Water Monitoring Results Colesville Landfill, Broome County, New York.

Constituents	Sample ID: / Date:		F-6 05/27/20	F-6 11/05/20	SW-2 05/27/20	SW-2 11/05/20	SW-3 05/27/20	SW-3 11/05/20	SW-4 05/27/20	SW-4 11/05/20
VOC's (units in ug/L)	**NYSDEC Part 703 WQS [2] Basis NA Cs)**	**Basis**								
1,1,1-Trichloroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-trichloro-1,2,2-trifluoroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	40	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	NA		**0.62 J**	**0.40 J**	**0.51 J**	**0.24 J**	**0.97 J**	**0.76 J**	**0.75 J**	**0.69 J**
1,1-Dichloroethene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	5	A(C) a	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	5	A(C) b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	5	A(C) b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	A(C) b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	NA		<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	NA		<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	NA		<10	<10	<10	<10	<10	<10	<10	<10
Acetone	NA		<10	<10	<10	<10	<10	<10	<10	<10
Benzene	10	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Disulfide	NA		<10	<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	5	A(C)	**0.25 J**	<5.0	<5.0	<5.0	**0.48 J**	**0.25 J**	**0.35 J**	<5.0
Chloroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloroform	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	NA		<5.0	<5.0	<5.0	<5.0	**0.49 J**	**0.27 J**	**0.47 J**	**0.32 J**
cis-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cyclohexane	NA		<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	17	A(C) c	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl acetate	NA		<10	<10	<10	<10	<10	<10	<10	<10
Methyl tert-butyl ether	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylcyclohexane	NA		<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	200	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	1	H(FC) c	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	6000	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	40	H(FC)	<5.0	<5.0	<5.0	<5.0	**0.34 J**	<5.0	**0.26 J**	**0.21 J**
Trichlorofluoromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes (total)	5	A(C) c	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total VOCs	**NA**		**0.87 J**	**0.40 J**	**0.51 J**	**0.24 J**	**2.3 J**	**1.3 J**	**1.8 J**	**1.2 J**

Table 4. Summary of Surface Water Monitoring Results Colesville Landfill, Broome County, New York.

	Sample ID:		F-6	F-6	SW-2	SW-2	SW-3	SW-3	SW-4	SW-4
Constituents	**Date:**		**05/27/20**	**11/05/20**	**05/27/20**	**11/05/20**	**05/27/20**	**11/05/20**	**05/27/20**	**11/05/20**
Metals (units in mg/L)	**NYSDEC Part 703 WQS [2] Basis NA Cs)**	**Basis**								
Aluminum	0.1	A(C)	<0.100	<0.100	**0.110**	<0.100	<0.100	<0.100	<0.100	<0.100
Antimony	NA		<0.0600	<0.0600	<0.0600	<0.0600	<0.0600	<0.0600	<0.0600	<0.0600
Arsenic	0.15	A(C) d	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Barium	NA		<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Beryllium	1100	A(C) e	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300
Cadmium	0.002	A(C) f	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Calcium	NA		**15.4**	**17.7**	**13.7**	**14.6**	**14.2**	**16.0**	**14.4**	**16.7**
Chromium	0.086	A(C) f	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Cobalt	0.005	A(C) g	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Copper	0.009	A(C) f	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Iron	0.3	A(C)	**0.200**	<0.100	**0.200**	<0.100	**0.260**	<0.100	**0.210**	<0.100
Lead	0.005	A(C) f	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Magnesium	NA		**3.50**	**3.80**	**3.20**	**3.30**	**3.30**	**3.50**	**3.30**	**3.70**
Manganese	NA		**0.0570**	**0.0700**	**0.0200**	<0.0100	**0.0650**	**0.0720**	**0.0580**	**0.0840**
Mercury	0.0000007	H(FC)	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200
Nickel	0.05	A(C) f	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400
Potassium	NA		<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Selenium	0.0046	A(C) d	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Silver	0.0001	A(C) h	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Sodium	NA		**6.30**	**7.00**	**6.20**	**6.70**	**6.20**	**6.80**	**6.10**	**6.90**
Thallium	0.008	A(C) g	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Vanadium	0.014	A(C) g	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Zinc	0.08	A(C) f	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200

Notes and abbreviations:

Bold constituent detected above method detection limit.

J	Concentration is an estimated value.
mg/L	milligrams per liter
ug/L	micrograms per liter
<	Analyte below detection limit.
(1)	Data presented in this table corresponds to monitoring data during a two-year period (March 2013 to December 2015).
	Concentration exceeds WQS.
WQS	Water quality standard
B	Analyte was also detected in the associated method blank.

Table 5. Summary of Spring Water Monitoring Results Showing Remaining Exceedences, Colesville Landfill, Broome County, Ne

Constituents	Sample ID:		SP-2	SP-2	SP-3	SP-3	SP-4	SP-4
	Date:		5/27/2020	6/26/2020	5/27/2020	11/5/2020	9/16/2019	5/27/2020
VOCs (units in ug/L)	NYSDEC Part 703 WQS (1)	Basis						
1,1,1-Trichloroethane	NA		**0.26 J**	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-trichloro-1,2,2-trifluoroethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	40	H(FC)	**0.22 J**	<5.0	**0.27 J**	<5.0	<5.0	<5.0
1,1-Dichloroethane	NA		**21**	<5.0	**9.0**	**12**	**3.6 J**	**7.7**
1,1-Dichloroethene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	5	A(C) a	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	5	A(C) b	**0.36 J**	<5.0	<5.0	**0.26 J**	<5.0	<5.0
1,2-Dichloroethane	NA		**0.54 J**	<5.0	**0.57 J**	<5.0	**0.33 J**	<5.0
1,2-Dichloropropane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	5	A(C) b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	A(C) b	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	NA		<10	<10	<10	<10	<10	<10
2-Hexanone	NA		<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	NA		<10	<10	<10	<10	<10	<10
Acetone	NA		<10	<10	<10	<10	**2.1 BJ**	<10
Benzene	10	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Disulfide	NA		<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	5	A(C)	**16**	<5.0	**0.66 J**	**12**	**4.2 J**	**1.3 J**
Chloroethane	NA		**5.5**	<5.0	<5.0	**2.6 J**	**2.9 J**	**2.9 J**
Chloroform	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	NA		**7.1**	<5.0	**7.5**	**2.7 J**	**0.93 J**	**0.53 J**
cis-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cyclohexane	NA		<10	<10	<10	<10	<10	<10
Dibromochloromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	17	A(C) c	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl acetate	NA		<10	<10	<10	<10	<10	<10
Methyl tert-butyl ether	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylcyclohexane	NA		<10	<10	<10	<10	<10	<10
Methylene Chloride	200	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	1	H(FC) c	**0.33 J**	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	6000	H(FC)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	40	H(FC)	**3.0 J**	**0.35 J**	**1.5 J**	**1.9 J**	**0.49 J**	**1.7 J**
Trichlorofluoromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	NA		**1.1 J**	<5.0	**1.1 J**	**0.54 J**	**0.40 J**	<5.0
Xylenes (total)	5	A(C) c	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total VOCs	**NA**		**55 J**	**0.35 J**	**21 J**	**32 J**	**15 J**	**14 J**

See notes on last page.

Table 5. Summary of Spring Water Monitoring Results Showing Remaining Exceedences, Colesville Landfill, Broome County, Ne

	Sample ID:		SP-2	SP-2	SP-3	SP-3	SP-4	SP-4
Constituents	**Date:**		**5/27/2020**	**6/26/2020**	**5/27/2020**	**11/5/2020**	**9/16/2019**	**5/27/2020**
Metals (units in mg/L)	**NYSDEC Part 703 WQS [(1)]**	**Basis**						
Aluminum	0.1	A(C)	<0.100	<0.100	**0.150**	<0.100	<0.100	<0.100
Antimony	NA		<0.0600	<0.0600	<0.0600	<0.0600	<0.0600	<0.0600
Arsenic	0.15	A(C) d	**0.0210**	<0.0100	**0.0200**	**0.0190**	**0.0920**	**0.0170**
Barium	NA		**0.0470**	<0.0200	<0.0200	**0.0400**	**0.0780**	**0.0340**
Beryllium	1100	A(C) e	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300
Cadmium	0.002	A(C) f	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Calcium	NA		**29.7**	**8.90**	**33.6**	**27.1**	**42.5**	**39.5**
Chromium	0.086	A(C) f	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Cobalt	0.005	A(C) g	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Copper	0.009	A(C) f	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Iron	0.3	A(C)	**22.7**	**2.90**	**11.0**	**27.1**	**14.6**	**2.90**
Lead	0.005	A(C) f	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Magnesium	NA		**6.20**	**2.30**	**6.20**	**5.70**	**7.80**	**8.10**
Manganese	NA		**6.15**	**2.25**	**1.86**	**4.51**	**4.63**	**1.75**
Mercury	0.0000007	H(FC)	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200
Nickel	0.05	A(C) f	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400
Potassium	NA		<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Selenium	0.0046	A(C) d	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Silver	0.0001	A(C) h	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Sodium	NA		**3.20**	**4.80**	**3.60**	**3.20**	**7.90**	**7.00**
Thallium	0.008	A(C) g	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Vanadium	0.014	A(C) g	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Zinc	0.08	A(C) f	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200

See notes on last page.

Table 5. Summary of Spring Water Monitoring Results Showing Remaining Exceedences, Colesville Landfill, Broome County, New York.

Notes and Abbreviations:

Bold constituent detected above method detection limit.

$\boxed{}$	Concentration exceeds WQS.
J	Concentration is an estimated value.
B	Compound considered non-detect at the listed value due to associated blank contamination.
mg/L	milligrams per liter
ug/L	micrograms per liter
NA	not applicable
VOCs	volatile organic compounds
WQS	water quality standard
<	analyte below detection limit
(1)	NYSEC Part 703 water quality standards were tabulated for Class C fresh surface waters. Where not available, the NYSDEC Division of Water Technical Operational Guidance Series (TOGS 1.1.1) standards and guidance values were used. Where standards for metals are based on hardness, a default value of 100 mg/L was used. Codes for the basis of the standards and guidance values follows: H(FC) = Health (Fish Consumption) A(C) = Aquatic (Chronic) gv = guidance value a = applies to sum of 1,2,3-, 1,2,4- and 1,3,5-trichlorobenzenes b = applies to sum of 1,2-, 1,3- and 1,4-dichlorobenzenes c = TOGS 1.1.1 guidance value d = for dissolved form e = for hardness > 75 ppm f = hardnes dependent standard, which is based on a default hardness of 100 mg/L g = acid-soluble form h = for ionic silver

Table 6. Summary of SP-5 Remediation System Influent and Effluent Results, Broome Countiy Landfill, Colesvile, New York.

Constituents	Model Technology BPJ Limits[1,2]	Sample ID: Date:	SP-5 INF. 05/27/20	SP-5 INF. 11/05/20	SP-5 EFF. 05/27/20	SP-5 EFF. 11/05/20
VOCs (units in ug/L)						
1,1,1-Trichloroethane	10		<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	50		<5.0	<5.0	<5.0	<5.0
1,1,2-trichloro-1,2,2-trifluoroethane	NA		<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	100		<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	10		**5.4**	**4.8 J**	**4.6 J**	**4.0 J**
1,1-Dichloroethene	10-100		<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	NA		<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	NA		<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	NA		<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	10-50		<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	10-100		<5.0	**0.26 J**	<5.0	<5.0
1,2-Dichloropropane	10		<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	10		<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	10		<5.0	<5.0	<5.0	<5.0
2-Butanone	NA		<10	<10	<10	<10
2-Hexanone	NA		<10	<10	<10	<10
4-Methyl-2-pentanone	NA		<10	<10	<10	<10
Acetone	NA		<10	<10	<10	<10
Benzene	5		**0.76 J**	**0.90 J**	**0.23 J**	**0.26 J**
Bromodichloromethane	NA		<5.0	<5.0	<5.0	<5.0
Bromoform	50		<5.0	<5.0	<5.0	<5.0
Bromomethane	10		<5.0	<5.0	<5.0	<5.0
Carbon Disulfide	NA		**4.7 J**	**3.7 J**	<10	<10
Carbon Tetrachloride	10-50		<5.0	<5.0	<5.0	<5.0
Chlorobenzene	10-25		**10**	**11**	**2.8 J**	**2.6 J**
Chloroethane	10		<5.0	<5.0	<5.0	**1.2 J**
Chloroform	100		<5.0	<5.0	<5.0	<5.0
Chloromethane	10		<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	10		**1.4 J**	**0.99 J**	**0.69 J**	**0.60 J**
cis-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0
Cyclohexane	NA		<10	<10	<10	<10
Dibromochloromethane	NA		<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	10		<5.0	<5.0	<5.0	<5.0
Ethylbenzene	5		<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	NA		<5.0	<5.0	<5.0	<5.0
Methyl acetate	NA		<10	<10	<10	<10
Methyl tert-butyl ether	NA		<5.0	<5.0	<5.0	<5.0
Methylcyclohexane	NA		<10	<10	<10	<10
Methylene Chloride	10-100		<5.0	<5.0	<5.0	<5.0
Styrene	NA		<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	10-50		<5.0	<5.0	<5.0	<5.0
Toluene	5		<5.0	**0.20 J**	<5.0	<5.0
trans-1,2-Dichloroethene	10-100		<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	NA		<5.0	<5.0	<5.0	<5.0
Trichloroethene	10		**1.8 J**	**1.7 J**	**0.60 J**	**0.65 J**
Trichlorofluoromethane	10		<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	10		<5.0	<5.0	**0.43 J**	**0.30 J**
Xylenes (total)	NA		<5.0	<5.0	<5.0	<5.0
Total VOCs			**24 J**	**24 J**	**9.4 J**	**9.6 J**

Table 6. Summary of SP-5 Remediation System Influent and Effluent Results, Broome Countiy Landfill, Colesvile, New York.

Constituents	Model Technology BPJ Limits[1,2]	Sample ID: Date:	SP-5 INF. 05/27/20	SP-5 INF. 11/05/20	SP-5 EFF. 05/27/20	SP-5 EFF. 11/05/20
Metals (units in mg/L)						
Aluminum			**0.270**	**0.110**	<0.100	<0.100
Antimony			<0.0600	<0.0600	<0.0600	<0.0600
Arsenic			**0.313**	**0.148**	**0.151**	**0.117**
Barium			**0.137**	**0.144**	**0.156**	**0.155**
Beryllium			<0.00300	<0.00300	<0.00300	<0.00300
Cadmium			<0.00500	<0.00500	<0.00500	<0.00500
Calcium			**43.1**	**44.6**	**43.4**	**42.9**
Chromium			<0.0100	<0.0100	<0.0100	<0.0100
Cobalt			<0.0500	<0.0500	<0.0500	<0.0500
Copper			<0.0200	<0.0200	<0.0200	<0.0200
Iron			**45.6**	**30.6**	**31.5**	**28.5**
Lead			**0.240**	**0.0612**	<0.00500	<0.00500
Magnesium			**9.70**	**9.70**	**10.0**	**9.90**
Manganese			**6.07**	**6.50**	**6.26**	**6.60**
Mercury			<0.000200	<0.000200	<0.000200	<0.000200
Nickel			<0.0400	<0.0400	<0.0400	<0.0400
Potassium			**2.70**	**3.00**	**2.70**	**3.00**
Selenium			<0.0100	<0.0100	<0.0100	<0.0100
Silver			<0.0100	<0.0100	<0.0100	<0.0100
Sodium			**6.20**	**7.00**	**6.50**	**7.20**
Thallium			<0.0100	<0.0100	<0.0100	<0.0100
Vanadium			<0.0500	<0.0500	<0.0500	<0.0500
Zinc			**14.2**	**4.36**	<0.0200	<0.0200

Notes and Abbreviations:

1. Model Technology BPJ Limits recommended for carbon adsorption with appropriate pretreatment from Attachment C of TOGS 1.2.1.
2. When a range is listed for the BPJ limit, a variation in available references was found. Recommended daily maximum limits should be in this range.

Bold constituent detected above method detection limit.

EFF.	effluent
INF.	influent
J	Concentration is an estimated value
B	Compound considered non-detect at the listed value due to associated blank contamination.
NA	not applicable
ug/L	micrograms per liter
VOCs	volatile organic compounds
BPJ	Best Professional Judgment
<	Analyte below detection limit.
TOGS	Technical and Operational Guidance Series

Table 7. Long Term Monitoring Sampling Requirements and Schedule

Sample ID wells	VOCs Method 8260C	Dissolved & total iron	Water Level	Dissolved gases	NO_3, SO_4	TOC	Field Parameters	Frequency
GMMW-2	L	L	F	L	L	L	F	5th quarter
GMMW-5	L	L	F	L	L	L	F	5th quarter
GMMW-6	L	L	F	L	L	L	F	5th quarter
GMMW-7	L	L	F	L	L	L	F	5th quarter
PW-4	L	L	F	L	L	L	F	5th quarter
PW-3	L	L	F	L	L	L	F	5th quarter
PW-5	L		F				F	5th quarter
W-7	L		F				F	5th quarter
W-16S	L	L	F	L	L	L	F	5th quarter
W-18	L	L	F	L	L	L	F	5th quarter
PW-7	L	L	F	L	L	L	F	5th quarter
W-17S	L		F				F	5th quarter
W-20S	L		F				F	5th quarter
GMPW-4	L	L	F	L	L	L	F	5th quarter
Spring/Surface Water Monitoring								
Sample ID	VOCs	Metals						Frequency
SP-2	L	L					F, (w/o ORP)	semi-annual
SP-3	L	L					F, (w/o ORP)	semi-annual
SP-4	L	L					F, (w/o ORP)	semi-annual
SP-5 influent	L	L					F, (w/o ORP)	semi-annual
SP-5 effluent	L	L					F, (w/o ORP)	semi-annual
All springs visual/photo monitoring								
F-6	L	L					F, (+ DO)	semi-annual
SW-2	L	L					F, (+ DO)	semi-annual
SW-3	L	L					F, (+ DO)	semi-annual
SW-4	L	L					F, (+ DO)	semi-annual
Sediment Sampling		*Metals 6010C*			% solids			
SP-3-Sed		L			L			semi-annual
Cover System Monitoring								annually

Notes:
L = Laboratory Analysis
$N0_3$ = Nitrate
$S0_4$ = Sulfate
TOC = Total Organic Carbon
Field Parameters = ORP, Temperature, pH, Conductivity, Turbidity
ORP = Oxidation Reduction Potential
Dissolved gases = Methane/Ethene/Ethane, Method RSK 175

	MRL (ug/L)	MDL (ug/L)
Methane	1	0.5
Ethane	1	0.162
Ethene	1	0.138

Residential testing on a 5^{th} quarter basis for:
Marcy
Gaines
Lee Spring
- Scott

Table 8. Monitoring Well Construction Details

Date	Well ID*	Depth (ft.)	Description	Depth to Water (ft.)	Notes
6/6/1983	W-1	55	2" PVC	45	
6/15/1983	W-2	70	2" PVC	58	
11/1/1987	W-2S	20	2" PVC	58	screened 10-20
6/8/1983	W-3	47	2" PVC	34	
6/10/1983	W-4	50	2" PVC	37	
6/10/1983	W-5	60	2" PVC	48	
6/15/1983	W-6	60	2" PVC	46	
6/15/1983	W-7	50	2" PVC	40	7/20/2018 cut 3" off
6/17/1983	W-8	100	2" PVC	70	glaciolacustrine
2/29/1984	W-10	67	2" PVC	55	upgradient NE
4/4/1984	W-11	303	2" steel	65	
11/1/1987	W-12S	19	2" PVC	dry	
3/5/1984	W-12	110	2" steel	35	
3/2/1984	W-13	50	2" PVC	40	
3/5/1984	W-14	21	2" PVC	10	east of Smith proprty
10/8/1987	W-14D	67	2" PVC	6.5	screened 40-50
3/6/1984	W-15	27	2" PVC	14.5	Doraville
3/6/1984	W-16	22	2" PVC	10	
10/11/1987	W-16D	92	2" PVC	30	Screened 75-85
3/7/1984	W-17	20	2" PVC	?	
10/26/1987	W-17i	41	2" PVC		
12/17/1987	W-17D	216	2" PVC		screened 204-216
3/7/1984	W-18	22	2" PVC	15	
3/8/1984	W-19S	18	2" PVC	10	
3/20/1984	B-19D	131	2" steel	6	located in Doraville
3/8/1984	W-20S	22	2" PVC	10	
3/19/1984	W-20D	257	2" steel	10	dry at 150' (outwash?)
3/9/1984	W-21	50	2" PVC	saturated 40, perched 10	
10/14/1987	W-22S	22.5	2" PVC	10	
10/13/1987	W-22D	82	2" PVC	17	screened 60-70
Date	Well ID	Depth (ft.)	Description	Depth to Water (ft.)	Notes
10/6/1986	W-23	20	2" PVC	5	
1/6/1992	PW-1	29	2" PVC	16.5	all PW wells installed by Empire Soils
12/31/1991	PW-2	24	2" PVC	5	
12/30/1991	PW-3	34	2" PVC	7	
12/27/1991	PW-4	28	2" PVC	13	
1/2/1992	PW-5	33	2" PVC	7	
12/11/1991	PW-6	82	4" steel?	40	converted to injection well
12/19/1991	PW-7	68	2" PVC	30.5	
12/26/1991	PW-8	76	2" PVC	36.4	
12/17/1991	PW-9	76	2" PVC	36	
12/26/1991	PW-10	85	2" PVC	34.4	
1/6/1992	PW-11	75	2" PVC	36	
1/10/1992	PW-12	83	2" PVC	wet throughout	odor to 43
1/13/1992	PW-13	80	2" PVC	20	
11/1/1987	PZ-1S	31	2" PVC	30	
10/31/1987	PZ-1D	81.2	2" PVC	46	
12/11/1987	RFB	62	2" PVC	52	
12/9/1997	GM-PW-1	70	4" steel	45 saturated	15' screened interval
11/26/1997	GM-PW-2	55	4" steel	30' saturated	15' screened interval
11/25/1997	GM-PW-3	35	4" steel	12' saturated	15' screened interval
11/1/2000	GM-PW-4	37	6" PVC	11	screened 22-32
10/31/2000	GM-PW-5	37	6" PVC	5.8	screened 22-32
11/18/1997	GMMW-1	68	2" PVC	53' saturated	screened 53-63
2/11/1998	GMMW-2	54	2" PVC		screened 39-49

Table 8. Monitoring Well Construction Details

Date	Well ID*	Depth (ft.)	Description	Depth to Water (ft.)	Notes
2/12/1998	GMMW-3	54	2" PVC		screened 37.5-47.5
11/16/1998	GMMW-4	67	2" PVC		screened 52-62
11/13/1998	GMMW-5	68	2" PVC		screened 53-63
11/1/2000	GMMW-6	55	2" PVC	37.5	screened 40-50
8/23/2005	GMMW-7	70	2" PVC		screened 55-65
11/11/1998	IW-1	70	2" PVC		screened 50-65
11/12/1998	IW-2	70	2" PVC		screened 50-65

The following injection wells were all installed by Parrat Wolff, media is predominantly fine sand and silt in screened area, all grouted to 5' below ground surface to allow injection piping tie in

Date	Well ID	Depth (ft.)	Description	Depth to Water (ft.)	Notes
9/12/2000	IW-3	70	2" PVC		screened 50-70
9/12/2000	IW-4	70	2" PVC	50	screened 50-70
9/13/2000	IW-5	75	2" PVC	50	screened 55-75
9/15/2000	IW-6	75	2" PVC	50	trash observed in 7'-12'
9/18/2000	IW-7	75	2" PVC	50	screened 55-75
9/19/2000	IW-8	75	2" PVC		screened 55-75
9/20/2000	IW-9	80	2" PVC		screened 55-80
9/29/2000	IW-10 orig	abandoned, lost 50 feet of auger down collapsed hole, grouted to surface			
9/29/2000	IW-10	80	2" PVC		screened 55-80
9/22/2000	IW-11	80	2" PVC		screened 55-80
9/25/2000	IW-12	80	2" PVC		screened 55-80
9/26/2000	IW-13	80	2" PVC		screened 55-80
9/24/2000	IW-14	80	2" PVC		screened 60-80
9/28/2000	IW-15	80	2" PVC		screened 60-80
12/5/2006	TW-1	70	2" PVC	53	screened 50-70
8/1/1989	TB-W-25	105	2" PVC	61	screened 77-87 gray clay

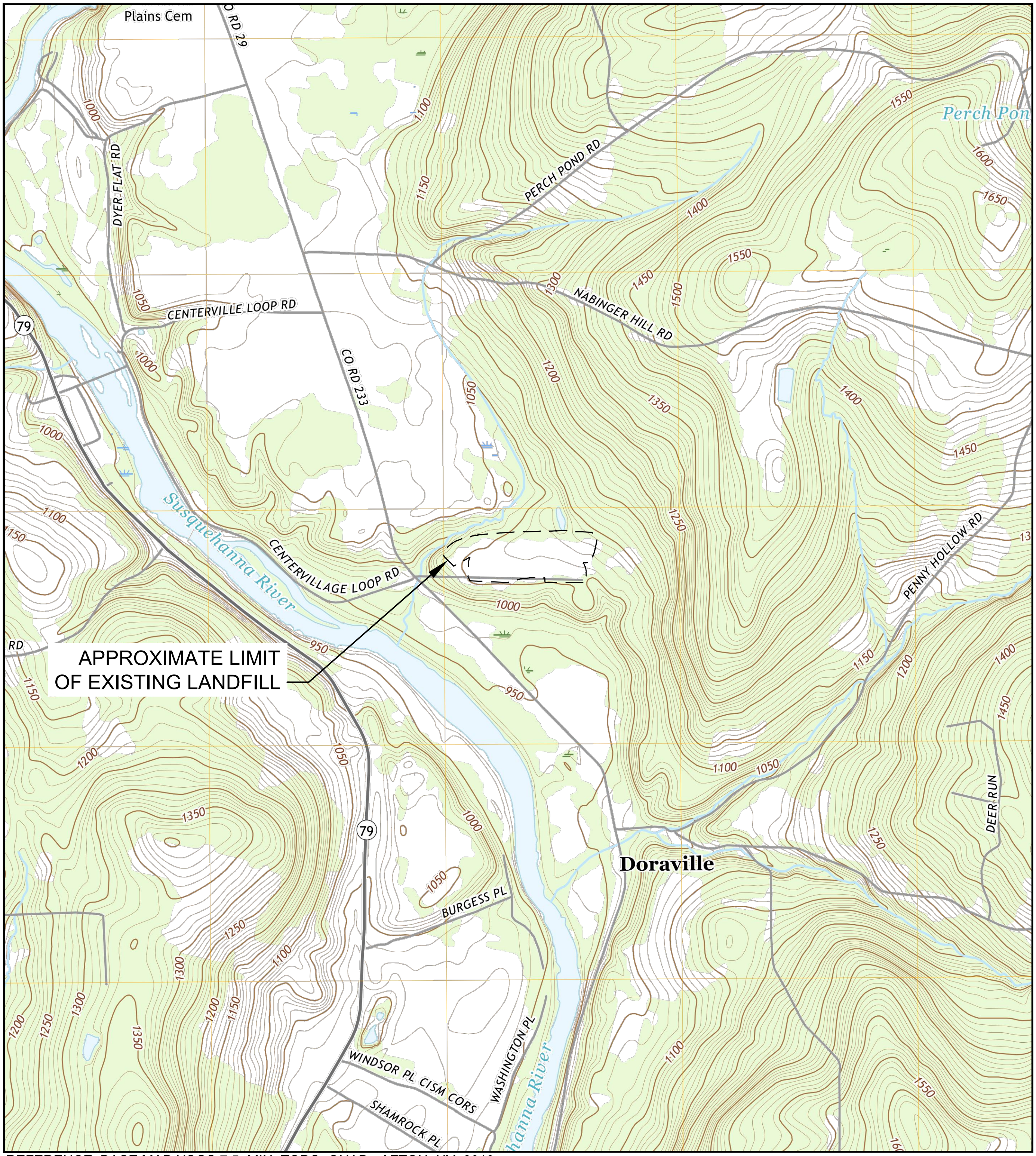
* Highlighted wells are part of the current monitoring network.

Table 9. Schedule of Interim Monitoring/Inspection Reports

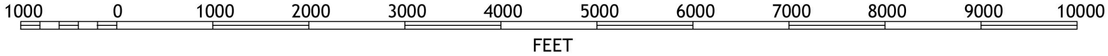
Task/Report	**Reporting Frequency***
Inspection Report	Annually
Periodic Review Report	Every three years, or as otherwise determined by the Department
Monitoring Surface Water, Springs, and Sediment	Annually
Monitoring Groundwater	5^{th} quarter
Molasses injection event	Annually
SP-5 Treatment System Maintenance	Annually

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

FIGURES



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., AFTON, NY, 2019.



SITE LOCATION MAP

1

NOTE: ALL LOCATIONS ARE APPROXIMATE

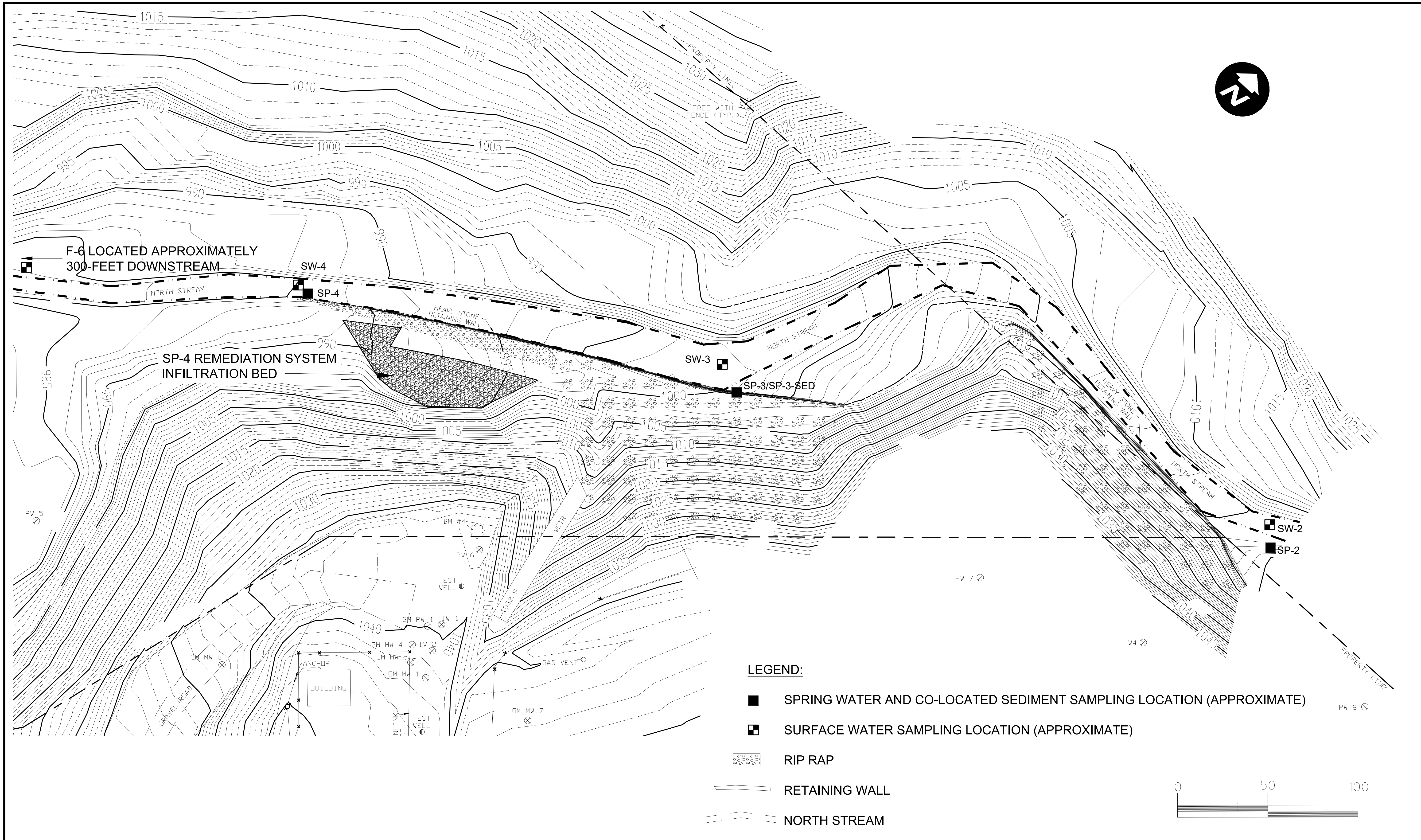
SITE LAYOUT

2

GROUNDWATER CONTOUR MAP

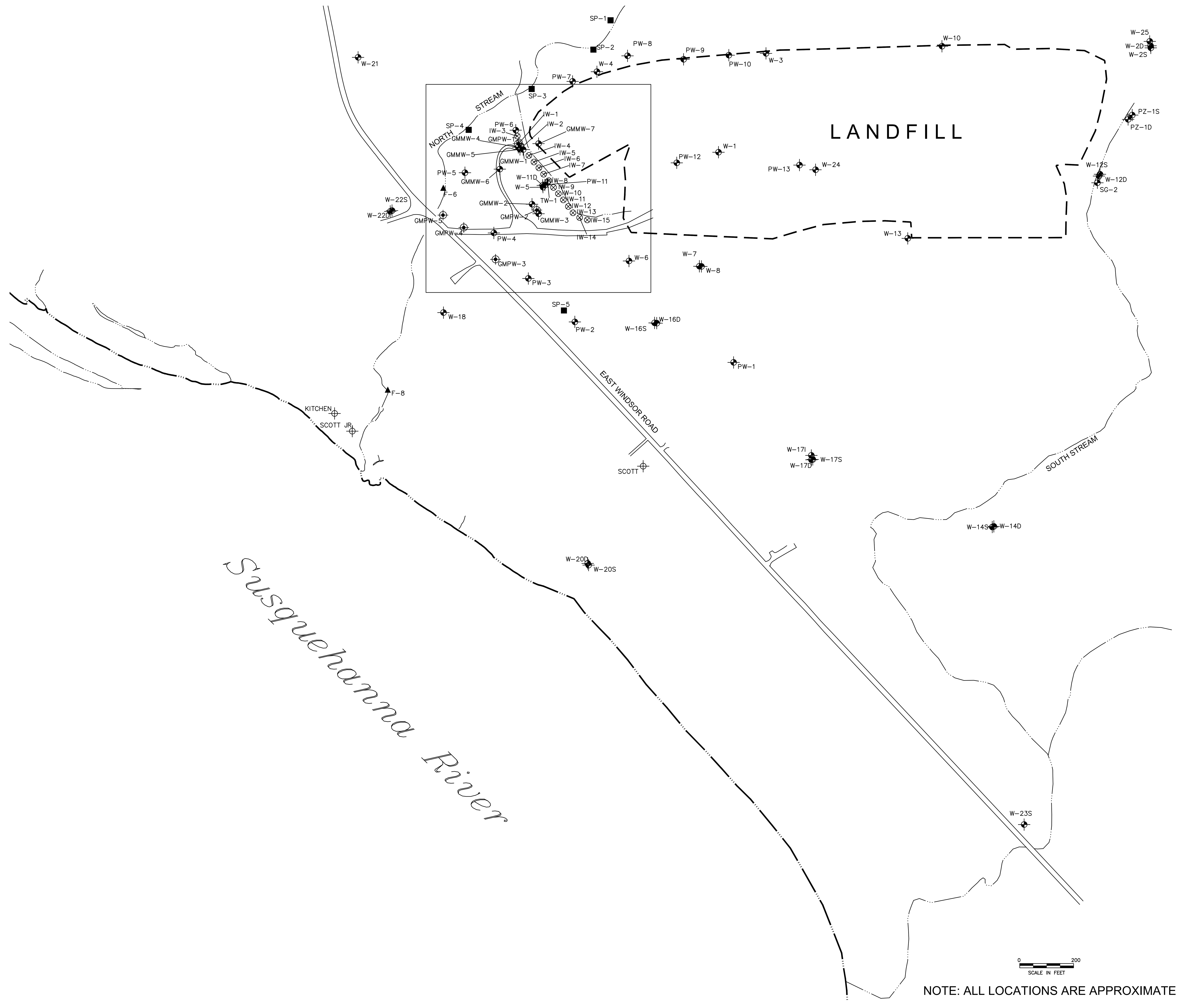
Groundwater elevations taken March 18, 2014.

3



SPRING WATER AND SURFACE WATER SAMPLING LOCATIONS ALONG THE NORTH STREAM

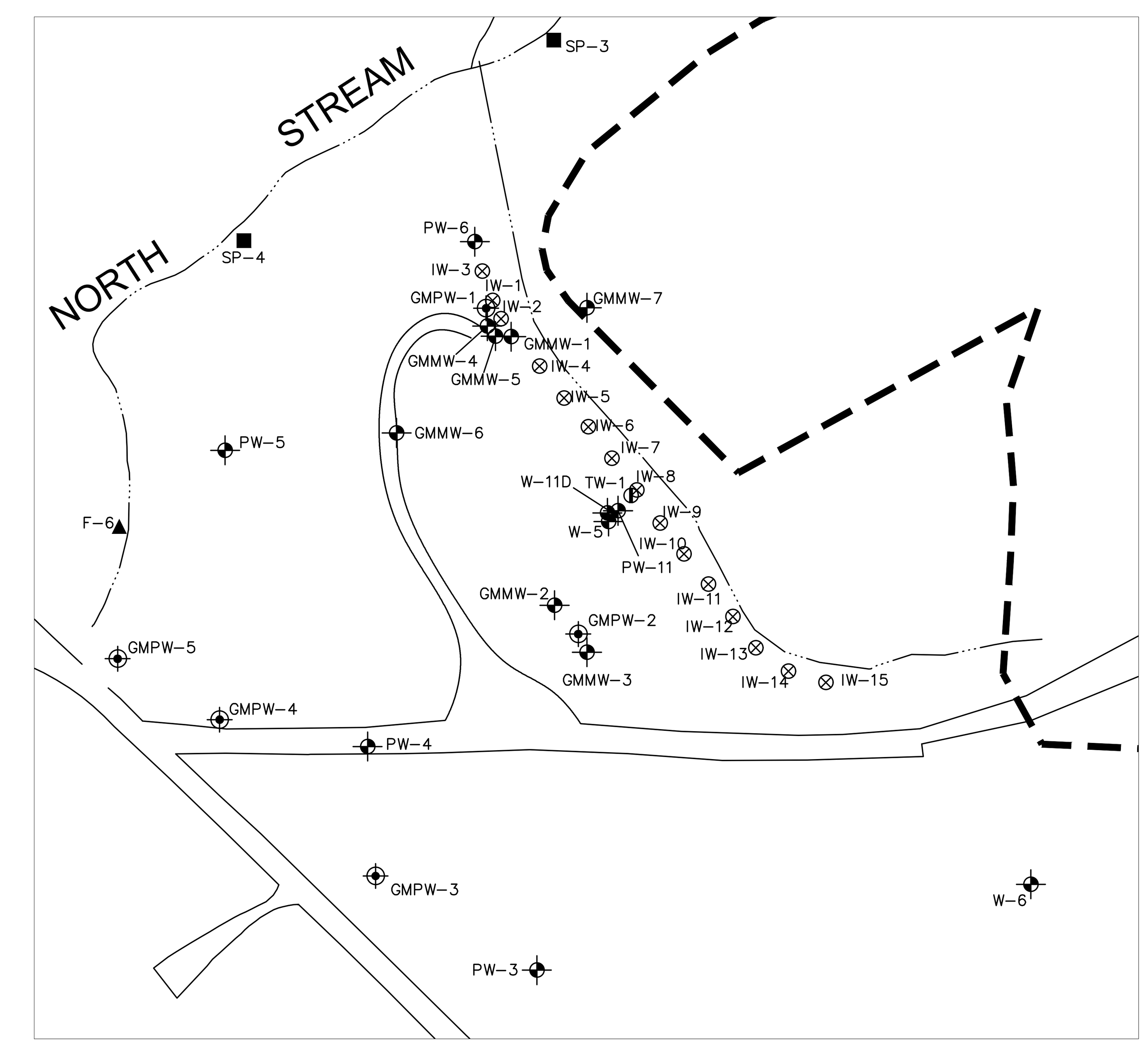
4



NOTE: ALL LOCATIONS ARE APPROXIMATE

EXPLANATION

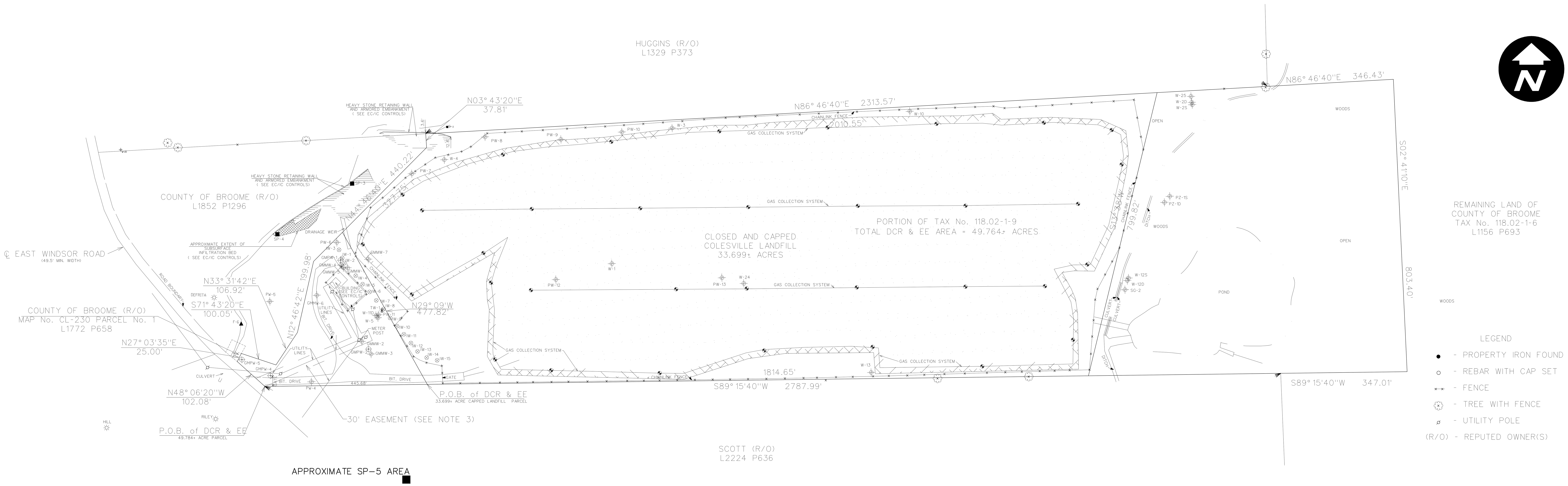
GRAY SHADE	IN-SITU REACTIVE ZONE (IRZ) DISCONTINUATION PILOT TEST MONITORING WELL
W-24 GMMW-7	LOCATION AND DESIGNATION OF MONITORING WELL
SCOTT	LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
IW-2	LOCATION AND DESIGNATION OF INJECTION WELL
GMPW-3	LOCATION AND DESIGNATION OF PRODUCTION WELL
TW-1	LOCATION AND DESIGNATION OF TEST MONITORING WELL
F-6	LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
SP-2	LOCATION AND DESIGNATION OF SPRING SAMPLE AND CO-LOCATED SEDIMENT SAMPLE



SITE PLAN SHOWING PROJECT AREA

SITE MAP SHOWING MONITORING WELL LOCATIONS

5



DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 49.784± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at a point on the northeasterly boundary of East Windsor Road at its intersection with the southerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

Thence N 48-06-20 W along the northeasterly boundary of East Windsor Road a distance of 102.08 feet to a point;

Thence along the boundaries of said Broome County property the following seven courses and distances:

1) N 27-03-35 E a distance of 25.00 feet to a point;
2) S 71-43-20 E a distance of 100.05 feet to a point;
3) N 33-31-42 E a distance of 106.92 feet to a point;
4) N 12-46-42 E a distance of 199.98 feet to a point;
5) N 44-46-40 E a distance of 440.22 feet to a point;
6) N 03-43-20 E a distance of 37.81 feet to a point;
7) N 86-46-40 E a distance of 2313.57 feet to a point;

Thence through said Broome County property the following three courses and distances;

1) N 86-46-40 E a distance of 346.43 feet to a point;
2) S 02-41-10 E a distance of 803.40 feet to a point;
3) S 89-15-40 W a distance of 347.01 feet to a corner of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 2787.99 feet to the Point of Beginning. Containing 49.784+ acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 33.699± ACRE CLOSED AND CAPPED LANDFILL PARCEL
(CONTAINED WITHIN FENCE)

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Commencing at a point on the northeasterly boundary of East Windsor Road at its intersection with the southerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 445.68 feet to the Point of Beginning for the parcel herein conveyed.

Thence N 29-09 W through said Broome County property a distance of 477.82 feet to a point on the northwesterly boundary of said Broome County property;

Thence along the boundaries of said Broome County property the following three courses and distances:

1) N 44-46-40 E a distance of 327.75 feet to a point;
2) N 03-43-20 E a distance of 37.81 feet to a point;
3) N 86-46-40 E a distance of 2010.55 feet to a point;

Thence S 13-38 W through said Broome County property a distance of 799.82 feet to a point on the southerly boundary of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 1814.65 feet to the Point of Beginning. Containing 33.699+ acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

Engineering Controls/Institutional controls on Tax Lot No. 118.02-1-9

a. Enginnering Controls:

Heavy stone retaining walls and armored embankments;

The molasses tank is inside the building shown on the survey just westerly of the closed/capped landfill area;

Subgrade infiltration bed;

Infiltration Gallery;

Landfill Cover and Gas Venting;

Groundwater Containment System (Including Extraction wells);

Fencing Bordering the Capped Landfill; and,

Monitoring Well Network.

b. Institutional Controls:

Groundwater wells for drinking water shall not be installed or used on any portion of Tax Lot No. 118.02-1-9;

Any Excavation or other intrusive activity that could affect the integrity of the landfill cap, monitoring wells, or extraction wells is prohibited; and

The Tax Lot No. 118.02-1-9 shall not be used for "Residential use" and "Restricted-Residential use" as defined by New York State Department of Environmental Conservation (NYSDEC) Regulations - 6-NYCRR Part 375 - 1.8 (g) (2) (i) and (ii). Allowable Uses include "Commercial Use" and "Industrial use" as defined in NYSDEC Regulations -6 NYCRR Part 375-1.8 (g) (2) (iii) and (iv).

EXPLANATION:

LONG-TERM MONITORING PLAN DESIGNATIONS

W-24 LOCATION AND DESIGNATION OF MONITORING WELL
SCOTT LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
HILL LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
IW-2 LOCATION AND DESIGNATION OF INJECTION WELL
GMPW-3 LOCATION AND DESIGNATION OF PRODUCTION WELL
F-6 LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
SP-2 LOCATION AND DESIGNATION OF SPRING SAMPLE
TW-1 LOCATION AND DESIGNATION OF TEST MONITORING WELL
LOCATION AND DESIGNATION OF METHANE VENT
FENCE
- CLOSED & CAPPED LANDFILL AREA
- HEAVY STONE WALL & EMBANKMENT
-INFILTRATION BED

NOTES

1. REFERENCE MAP - BOUNDARY SURVEY OF COLESVILLE LANDFILL PROPERTY BY THOMAS R. MILO, L.S. DATED JANUARY 22, 1993 COPY PROVIDED BY THE BROOME COUNTY DPW.

2. CREEK AND POND WERE MEASURED AUGUST 24, 2011.

3. EASEMENT GRANTED TO NYSEG & DEPOSIT TELEPHONE RECORDED IN L2076 P150 IS STATED TO BE "30' IN WIDTH THROUGHOUT ITS EXTENT...AS SHOWN ON SCHEDULE A". SCHEDULE A SHOWS THE EASEMENT 20' IN WIDTH.

4. THIS SURVEY HAS BEEN PREPARED IN CONJUCTION WITH TITLE ABSTRACT DATED 08/05/2011. PREPARED BY STEWART TITLE INSURANCE Co.

5. THE MOLASSES TANK IS INSIDE THE BUILDING SHOWN ON THE SURVEY JUST WESTERLY OF THE CLOSED/CAPPED LANDFILL AREA.

THIS PROPERTY IS SUBJECT TO A DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO ARTICLE 39 OF TITLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THE DECLARATION OF CONVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN ("SMP"). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP MAY BE OBTAINED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR BY SENDING AN EMAIL REQUEST TO DERWEB@GW.DEC.STATE.NY.US.

DECLARATION OF COVENANTS, RESTRICTIONS & ENVIRONMENTAL EASEMENT AREA ACCESS:
THE DEC, EPA, OR THEIR AGENTS MAY ACCESS THE ENVIRONMENTAL EASEMENT AREAS AS SHOWN HEREON THROUGH ANY EXISTIONG STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

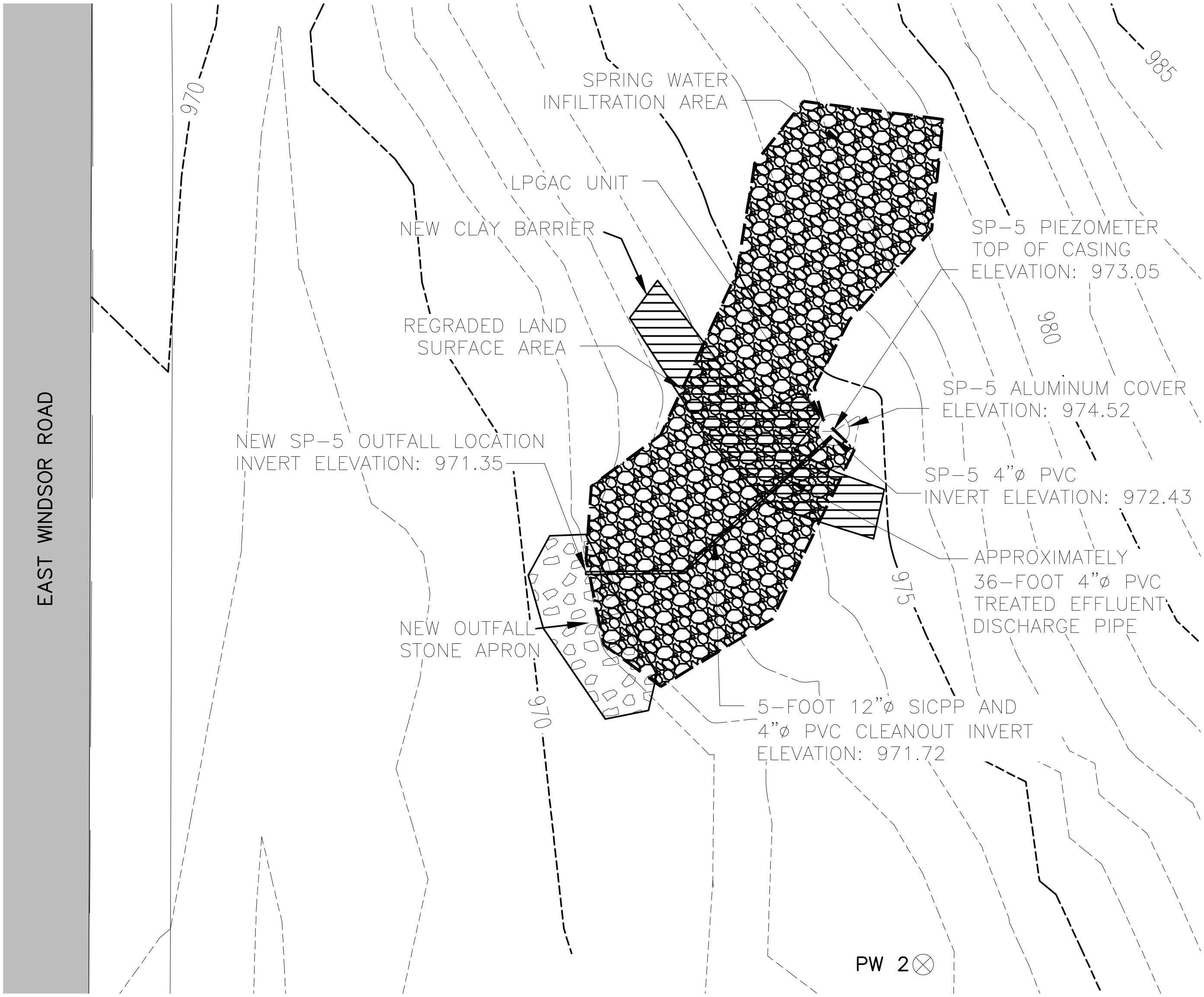
NOTE: ALL LOCATIONS PROVIDED BY OTHERS.
ALL LOCATIONS ARE APPROXIMATE.

0 150 300

"UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW"

SITE LAYOUT SHOWING INSTITUTIONAL CONTROL BOUNDARIES AND LOCATION OF ENGINEERING CONTROLS

6



SP–5 SPRING AREA SITE PLAN

NOTE:

1. BASE MAP TAKEN FROM "TOPOGRAPHIC SITE SURVEY, COLESVILLE LANDFILL." BY RONALD SCHIESS, PLS, NY LIC NO. 049554, SOURTHERN TIER SURVEYING, LLP, DATED DECEMBER 14, 1999, REVISED AUGUST 2004, DECEMBER 2007, APRIL 2008, AND OCTOBER 2008.

LEGEND

TREATED WATER DISCHARGE LINE

980 EXISTING GRADE LINE

RIPRAP AREA

ASPHALT

PW 2 EXISTING MONITORING WELL

N

0 20
SCALE IN FEET

SP-5 SPRING REMEDIATION SYSTEM AS-BUILT SITE PLAN

7

APPENDIX A

DECLARATION OF COVENANTS, RESTRICTIONS, AND ENVIRONMENTAL EASEMENTS

DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT

This Declaration of Covenants, Restrictions and Environmental Easement (DCR & EE) is made this 5th day of March, 2014, by and between the County of Broome, a municipal corporation organized and existing under the laws of the State of New York, having an address at 60 Hawley Street, Binghamton, New York 13902 ("Grantor"), and the People of the State of New York (the "Grantee"), acting through their Commissioner of the New York State Department of Environmental Conservation with its Central Office, located at 625 Broadway, Albany, New York 12233 ("Grantee").

WITNESSETH:

WHEREAS, Grantor is the owner of a parcel of land located in Town of Colesville, County of Broome, State of New York, more particularly described on Exhibit A and Exhibit "B" attached hereto and made a part hereof together with any buildings and improvements thereon and appurtenances thereto (the "Property"); and

WHEREAS, the Property is part of the Colesville Landfill Superfund Site ("Site"), the location of a former municipal landfill and hazardous waste disposal facility which the United States Environmental Protection Agency ("EPA"), pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9605, placed on the National Priorities List, as set forth in Appendix B of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, by publication in the Federal Register on June 10, 1986; and

WHEREAS, in a Record of Decision dated March 29, 1991 ("ROD") as modified by Explanation of Significant Difference ("ESDs") dated September 7, 2000 and July 31, 2004, EPA Region 2 selected, and the New York State Department of Environmental Conservation ("NYSDEC") concurred with, a response action for the Site, which provided, in part, for the following actions:

Imposition of property deed restrictions to prevent the installation of drinking water wells at the site and to restrict activities which could affect the integrity of the cap, monitoring wells, and extraction wells;

WHEREAS, the construction activities associated with the remedial action have been completed at the Site and long term monitoring activities are ongoing; and

WHEREAS, the parties hereto have agreed that Grantor shall grant to the Grantee a permanent Declaration of Covenants, Restrictions and Environmental Easement, covenant with respect to the restrictions on the use of the Property, and provide a right of access to the Property in favor of Grantee and EPA, for purposes of implementing, facilitating and monitoring the response action; such restrictions will run with the land for the purpose of protecting human health and the environment; and

WHEREAS, Grantor wish to cooperate fully with the Grantee in the implementation of all response actions at the Site;

NOW, THEREFORE:

1. Grant: Grantor, on behalf of itself, its successors and assigns, for ten dollars and other good and valuable consideration, receipt whereof is hereby acknowledged, does hereby give, grant, covenant and declare in favor of the Grantee that the Site shall be subject to this DCR & EE and Grantor does further give, grant and convey to the Grantee the perpetual right to enforce said restrictions, covenants, right of access and Environmental Easement, all of which shall be of the nature and character, and for the purposes hereinafter set forth, with respect to the Property.

2. Purpose: It is the purpose of this instrument to convey to the Grantee real property rights, which will run with the land, facilitate the remediation of past environmental contamination and to impose use restrictions and covenants to protect human health and the environment by reducing the risk of exposure to contaminants.

3. Restrictions : The following restrictions apply to the use of the Property, run with the land and are binding on the Grantor and its successors in title and assigns:

   (i) Unless otherwise approved in writing by NYSDEC and EPA, or their successor agencies, there shall be no future development or use of the Property that could compromise the integrity of the remedy or cause the contaminants to migrate;
   (ii) There shall be no installation of drinking water wells at the Property nor use of the groundwater from the unconfined aquifer underlying the Property as a source of potable or process water unless such groundwater meets or is treated to meet quality standards established under federal and state laws and regulations for the intended use;
   (iii) Grantor, for itself and its successors and assigns, covenants and agrees that it shall, upon request by Grantee or EPA, certify to Grantee and to EPA that it is in compliance with the current Site Management Plan for the Site (a copy of which is available from Grantee at the address provided in Section 15, below, and electronically at the Grantee's website, currently http://www.dec.ny.gov/chemical/36045.html);
   (iv) restrictions on use as described in the SMP and Exhibit "B" attached hereto and made a part hereof, and;

4. Modification or termination of restrictions, covenants and easement: The restrictions and easement specified in the preceding paragraph of this instrument may only be modified or terminated, in whole or in part, in writing, by the Grantee, provided, however, that any modification or termination of said restrictions shall not adversely affect the remedy selected by EPA and NYSDEC for the Site. If requested by the Grantor, such writing will be executed by Grantee in recordable form. Any request by Grantor for a modification or termination of this instrument shall be made in writing by Grantor to NYSDEC and to EPA in accordance with paragraph 15 of this instrument.

5. Right of access: Grantors hereby convey to Grantee and to EPA a right of access to the Property at all reasonable times for the following purposes, which shall run with the land and be binding on Grantor, it's successors and /or assigns, and on any tenants or any other parties having an interest in and/or rights to the Property:

   a) Implementing the response actions in the ROD as modified by the ESDs;

   b) Verifying any data or information relating to the Site;

   c) Verifying that no action is being taken on the Property in violation of the terms of this instrument or of any federal or state environmental laws or regulations;

   d) Conducting investigations under CERCLA or the ECL relating to contamination on or near the Site, including, without limitation, sampling of air, water, sediments, soils; and

   e) Implementing additional or new response actions under CERCLA or ECL.

6. Reserved rights of Grantor: Grantor hereby reserves unto itself, its successors, and assigns, all rights and privileges in and to the use of the Property which are not incompatible with the restrictions, rights, covenants and easements granted herein.

7. Federal authority: Nothing in this document shall limit or otherwise affect EPA's rights of entry and access or EPA's authority to take response actions under CERCLA, the NCP, or other federal law.

8. State authority: Nothing herein shall constitute a waiver of any rights the State may have pursuant to the Environmental Conservation Law, regulations and/or relevant provisions of statutory or common law.

9. No public access and use: No right of access or use by the general public to any portion of the Property is conveyed by this instrument.

10. Public notice: Grantor, on behalf of itself, its successors and assigns, agrees to include in each instrument conveying any interest in any portion of the Property, including but not limited to deeds, leases and mortgages, a notice which is in substantially the following form:

    NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO A DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT, DATED ________, 20__, RECORDED IN THE ______COUNTY CLERK'S OFFICE ON ___________, 20__, IN BOOK ______, PAGE _____, IN FAVOR OF, AND ENFORCEABLE BY, THE PEOPLE OF THE STATE OF NEW YORK AND BY THE UNITED STATES OF AMERICA AS THIRD-PARTY BENEFICIARY.

    Within thirty (30) days of the date any such instrument of conveyance is executed, Grantor agrees to provide Grantee and EPA with a certified true copy of said instrument and, if it has been recorded in the public land records, its recording reference.

11. Enforcement: The Grantee shall be entitled to enforce the terms of this instrument by resort to specific performance. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA. Any forbearance, delay or omission to exercise Grantee's rights under this instrument in the event of a breach of any term of this instrument shall not be deemed to be a waiver by the Grantee of such term or of any of the rights of the Grantee under this instrument.

12. Damages: Grantee shall also be entitled to recover damages for breach of any covenant or violation of the terms of this instrument including any impairment to the remedial action that increases the cost of the selected response action for the Site as a result of such breach or violation.

13. Waiver of certain defenses: Grantor hereby waives any defense of laches, estoppel, or prescription.

14. Covenants: Grantor hereby covenants that the Grantor is lawfully seized in fee simple of the Property, that the Grantor has a good and lawful right and power to sell and convey it or any interest therein and that the Property is free and clear of encumbrances.

15. Notices: Any notice, demand, request, consent, approval, or communication under this instrument that either party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantor:

The County of Broome
Broome County Executive
60 Hawley St, 6th Floor
Binghamton, NY 13902

Broome County Attorney
PO Box 1766
Binghamton, NY 13902

Broome County Division
of Solid Waste Management
60 Hawley St, 5th Floor
Binghamton, NY 13902

To Grantee:

Office of General Counsel
NYS Department of Environmental Conservation
625 Broadway
Albany, New York 12233-5500

NYS Department of Environmental Conservation
Division of Environmental Remediation
Site Control
625 Broadway
Albany, New York 12233

A copy of each such communication shall also be sent to EPA in the same manner as to Grantor or Grantee, and addressed to the following two addressees:
U.S. Environmental Protection Agency
Emergency & Remedial Response Division
New York Remediation Branch
Attention: Colesville Landfill Site Remedial Project Manager
290 Broadway, 20th Floor,

New York, New York 10007-1866

U.S. Environmental Protection Agency
Office of Regional Counsel
Attention: Colesville Landfill Site Attorney
290 Broadway, 17th Floor,
New York, New York 10007-1866

16. General provisions:

a) Controlling law: The interpretation and performance of this instrument shall, with respect to the Declaration of Covenants, Restrictions and Environmental Easement, be governed by the laws of the State of New York, and with respect to other matters, shall be governed by the laws of the United States or, if there are no applicable federal laws, by the law of the State of New York.

b) Liberal construction: Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed in favor of the grant to effect the purpose of this instrument and the policy and purpose of CERCLA. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

c) Severability: If any provision of this instrument, or the application of it to any person or circumstance, is found to be invalid, the remainder of the provisions of this instrument, or the application of such provisions to persons or circumstances other than those to which it is found to be invalid, as the case may be, shall not be affected thereby.

d) Entire agreement: This instrument sets forth the entire agreement of the parties with respect to rights and restrictions created hereby, and supersedes all prior discussions, negotiations, understandings, or agreements relating thereto, all of which are merged herein;

e) No forfeiture: Nothing contained herein will result in a forfeiture or reversion of Grantors' title in any respect.

f) Joint obligation: If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

g) Successors: The covenants, easements, terms, conditions, and restrictions of this instrument shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property. The term "Grantor", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantor" and their personal representatives, heirs, successors, and assigns. The term "Grantee", wherever used herein, and any pronouns used in place thereof, shall mean the People of the State of New York acting through their Commissioner of NYSDEC or through any successor department or agency of the State of New York.

h) Captions: The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

i) Counterparts: The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

j) Third-Party Beneficiary: Grantor and Grantee hereby agree that the United States, through EPA, shall be, on behalf of the public, a third-party beneficiary of the benefits, rights and obligations conveyed to Grantee in this instrument; provided that nothing in this instrument shall be construed to create any obligations on the part of EPA.

TO HAVE AND TO HOLD unto the Grantee and its assigns forever.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Executed this 14th day of February, 2014.

GRANTOR: COUNTY OF BROOME

By: Debra A Preston

Title: Broome County Executive

Approved as to form
By [signature]
BROOME COUNTY
ATTORNEY'S OFFICE

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 14 day of February, in the year 2014 before me, the undersigned, personally appeared Debra A. Preston, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that she executed the same in ~~his~~ her capacity as County Executive of the Broome County and that by ~~his~~ her signature on the instrument, the Grantor Broome County, upon behalf of which the individual acted, executed the instrument.

Notary Public - State of New York

PETER J ROSEBOOM
Notary Public, State of New York
No. 01RO5058867
Qualified in Broome County
My Commission Expires 4/15/2014

THIS DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner.

By: ______________________
Robert W. Schick, Director
Division of Environmental Remediation

Date: MAR 05 2014

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 5th day of March, in the year 20 , before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his signature on the instrument, the People of the State of New York, upon behalf of which the individual acted, executed the instrument.

____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2014

EXHIBIT A
To
Declaration of Covenants, Restrictions and Environmental Easement
Description of Property
Colesville Landfill Site

Southern Tier Surveying, L.L.P.
39 GRISWOLD STREET
BINGHAMTON, NEW YORK 13904
PHONE 607-722-7765
FAX 607-722-9323

Ronald C. Schiess, PLS *Roger H. Holmes, PLS*

SURVEYOR'S DESCRIPTION
7.55± ACRE PARCEL
DECLARATION OF COVENANTS AND RESTRICTIONS
AND
ENVIRONMENTAL EASEMENT AREA

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at a point on the centerline of East Windsor Road at its intersection with the southeasterly boundary of the property conveyed to the County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1852 at page 1296.

Thence along the boundaries of said County of Broome property the following nine courses and distances:

1) N 26°29'55"E a distance of 63.09 feet to a point;
2) S64°22'10"E a distance of 40.54 feet to a point;
3) S27°10'25"W a distance of 23.11 feet to a point;
4) S71°43'20"E a distance of 100.05 feet to a point;
5) N33°31'40"E a distance of 106.92 feet to a point;
6) N12°43'40"E a distance of 199.98 feet to a point;
7) N44°46'40"E a distance of 440.22 feet to a point;
8) N03°43'20"W a distance of 37.81 feet to a point;
9) S86°46'40"W a distance of 924.99 feet to a point on the centerline of East Windsor Road;

Thence along the centerline of East Windsor Road the following four courses and distances:

1) S12°23'E a distance of 89.25 feet to a point;
2) Southerly along a tangent curve to the left having a radius of 500.00 feet an arc distance
of 240.13 feet to a point;
3) S39°54'E a distance of 199.27 feet to a point;

4) Southeasterly along a tangent curve to the left having a radius of 1135.00 feet an arc distance of 161.06 feet to the Point of Beginning. Containing 7.55± acres.

SUBJECT TO the rights of the public in and to that portion of the above described parcel lying within the bounds of East Windsor Road.

Being the same premises conveyed to the County of Broome from Rudolf C. DeFreitas and Ella DeFreitas by deed recorded in the Broome County Clerk's Office in Liber 1852 at page 1296.

SURVEYOR'S DESCRIPTION 33.699± ACRE
CLOSED AND CAPPED LANDFILL PARCEL
(CONTAINED WITHIN FENCE)
DECLARATION OF COVENANTS AND RESTRICTIONS
ENVIRONMENTAL EASEMENT AREA

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome
and State of New York bounded and described as follows:

Commencing at a point on the northeasterly boundary of East Windsor Road at its intersection
with the southerly boundary of the property conveyed to The County of Broome by deed recorded
in the Broome County Clerk's Office in Liber 1156 at page 693

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance
of 445.68 feet to the Point of Beginning for the parcel herein conveyed.

Thence N 29-09 W through said Broome County property a distance of 477.82 feet to a point
on the northwesterly boundary of said Broome County property;

Thence along the boundaries of said Broome County property the following three courses and
distances:

1) N 44-46-40 E a distance of 327.75 feet to a point;

2) N 03-43-20 E a distance of 37.81 feet to a point;

3) N 86-46-40 E a distance of 2010.55 feet to a point;

Thence S 13-38 W through said Broome County property a distance of 799.82 feet to a point
on the southerly boundary of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of
1814.65 feet to the Point of Beginning. Containing 33.699± acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

DECLARATION OF COVENANTS AND RESTRICTIONS
AND
ENVIRONMENTAL EASEMENT AREA

SURVEYOR'S DESCRIPTION
49.784± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome
and State of New York bounded and described as follows:

Beginning at a point on the northeasterly boundary of East Windsor Road at its intersection
with the southerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

Thence N 48-06-20 W along the northeasterly boundary of East Windsor Road a distance of 102.08 feet to a point;

Thence along the boundaries of said Broome County property the following seven courses
and distances:

1) N 27-03-35 E a distance of 25.00 feet to a point;
2) S 71-43-20 E a distance of 100.05 feet to a point;
3) N 33-31-42 E a distance of 106.92 feet to a point;
4) N 12-46-42 E a distance of 199.98 feet to a point;
5) N 44-46-40 E a distance of 440.22 feet to a point;
6) N 03-43-20 E a distance of 37.81 feet to a point;
7) N 86-46-40 E a distance of 2313.57 feet to a point;

Thence through said Broome County property the following three courses and distances;

1) N 86-46-40 E a distance of 346.43 feet to a point;
2) S 02-41-10 E a distance of 803.40 feet to a point;
3) S 89-15-40 W a distance of 347.01 feet to a corner of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 2787.99 feet to the Point of Beginning. Containing 49.784± acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

SURVEYOR'S DESCRIPTION
20.155± ACRE PARCEL
DECLARATION OF COVENANTS AND RESTRICTIONS
AND
ENVIRONMENTAL EASEMENT AREA

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and
State of New York bounded and described as follows:

Beginning at a point on the centerline of East Windsor Road at its intersection with the easterly
boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1633 at page 187.

Thence along the boundaries of said Broome County property the following four courses and distances:

1) N 19-27-45 E a distance of 1279.93 feet to a point;

2) S 88-23-40 W a distance of 1206.96 feet to a point;

3) S 41-01-20 E a distance of 183.20 feet to a point;

4) S 66-44-40 W a distance of 282.05 feet to a point on the centerline of East Windsor Road;

Thence along the centerline of East Windsor Road the following three courses and distances:

1) S 44-28 E a distance of 614.64 feet to a point;

2) S 45-00 E a distance of 169.86 feet to a point;

3) S 45-17 E a distance of 518.24 feet to the Point of Beginning. Containing 20.155± acres as shown on a survey by Southern Tier Surveying, LLP dated October 26, 2011.

SUBJECT TO the rights of the public in and to that portion of the above described parcel lying
within the bounds of East Windsor Road.

Being the same premises conveyed to The County of Broome from Elwood Lee and C. Lorraine Lee by deed recorded in the Broome County Clerk's Office in liber 1633 at page 187.

SURVEYOR'S DESCRIPTION
1.43± ACRE PARCEL
DECLARATION OF COVENANTS AND RESTRICTIONS
AND
ENVIRONMENTAL EASEMENT AREA

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at an iron found in the northeasterly boundary of East Windsor Road at its intersection with the northerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1952 at page 124.

Thence along the boundaries of the property of The County of Broome the following three
courses and distances:

1) N 88-23-40 E a distance of 339.30 feet to a point;

2) S 41-01-20 E a distance of 183.20 feet to a point;

3) S 66-44-40 W a distance of 255.50 feet to a point on the northeasterly boundary of East
Windsor Road;

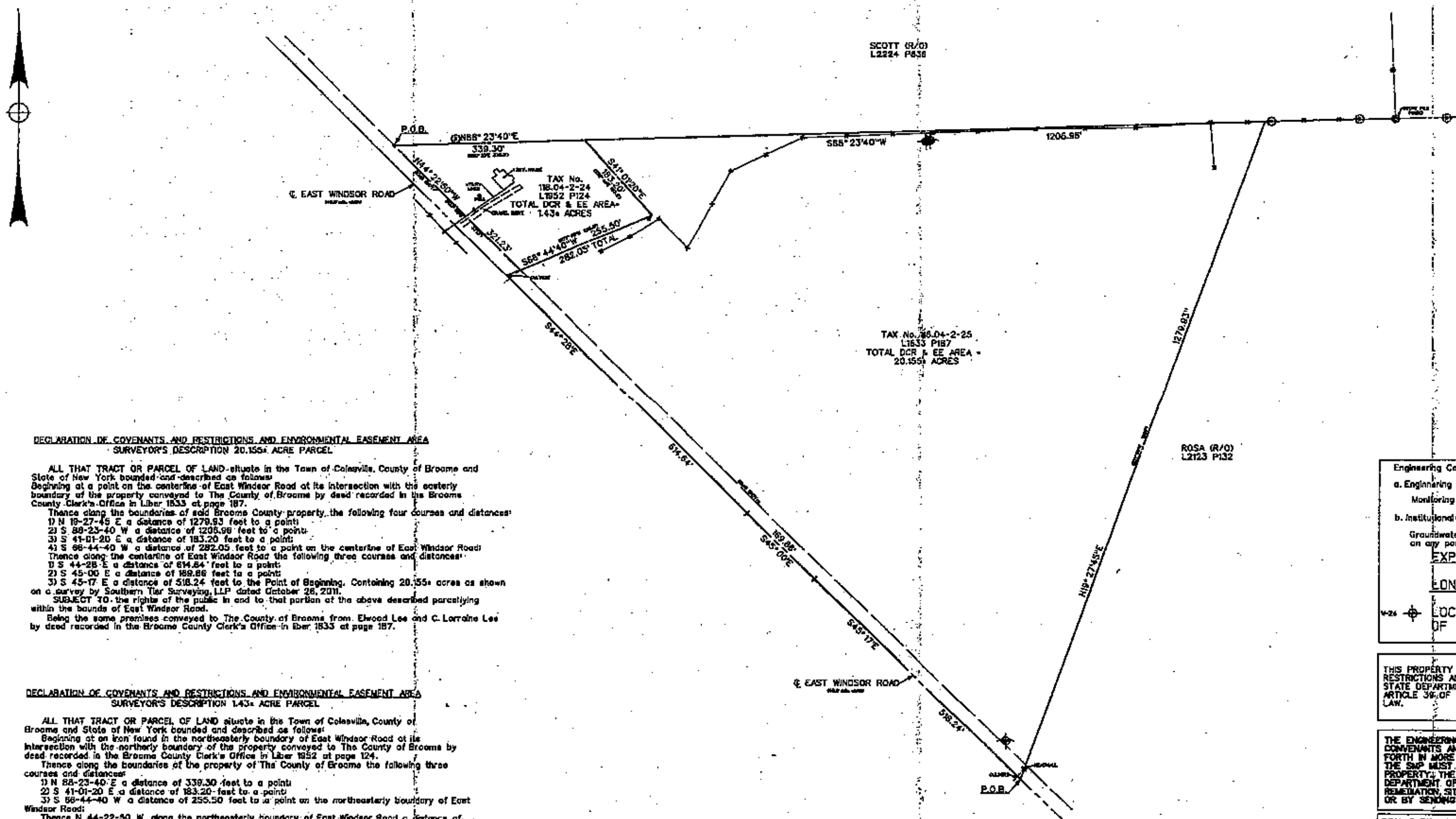
Thence N 44-22-50 W along the northeasterly boundary of East Windsor Road a distance of
321.23 feet to the Point of Beginning. Containing 1.43± acres as shown on a survey by Southern Tier Surveying, LLP dated October 26, 2011.

ALSO INCLUDING any right, title and or interest the grantor may have in and to the property lying between the centerline of East Windsor Road and the above described property.

Being the same premises conveyed to The County of Broome from Janet Smith by deed recorded in the Broome County Clerk's Office in Liber 1952 at page 124.

EXHIBIT B
To
Declaration of Covenants, Restrictions and Environmental Easement
Where Development or Use has been Restricted
Colesville Landfill Site

(See attached as-built survey of Property depicting restricted-use areas)



DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 20.155± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:
Beginning at a point on the centerline of East Windsor Road at its intersection with the easterly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1833 at page 187.

Thence along the boundaries of said Broome County property, the following four courses and distances:
1) N 19-27-45 E a distance of 1279.93 feet to a point;
2) S 88-23-40 W a distance of 1206.98 feet to a point;
3) S 41-01-20 E a distance of 183.20 feet to a point;
4) S 66-44-40 W a distance of 282.05 feet to a point on the centerline of East Windsor Road;
Thence along the centerline of East Windsor Road the following three courses and distances:
1) S 44-28 E a distance of 614.64 feet to a point;
2) S 45-00 E a distance of 169.86 feet to a point;
3) S 45-17 E a distance of 518.24 feet to the Point of Beginning. Containing 20.155± acres as shown on a survey by Southern Tier Surveying, LLP dated October 26, 2011.

SUBJECT TO the rights of the public in and to that portion of the above described parcel lying within the bounds of East Windsor Road.

Being the same premises conveyed to The County of Broome from Elwood Lee and C. Lorraine Lee by deed recorded in the Broome County Clerk's Office in liber 1833 at page 187.

DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 1.43± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at an iron found in the northeasterly boundary of East Windsor Road at its intersection with the northerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1952 at page 124.

Thence along the boundaries of the property of The County of Broome the following three courses and distances:
1) N 88-23-40 E a distance of 339.30 feet to a point;
2) S 41-01-20 E a distance of 183.20 feet to a point;
3) S 66-44-40 W a distance of 255.50 feet to a point on the northeasterly boundary of East Windsor Road;

Thence N 44-22-50 W along the northeasterly boundary of East Windsor Road a distance of 321.23 feet to the Point of Beginning. Containing 1.43± acres as shown on a survey by Southern Tier Surveying, LLP dated October 26, 2011.

ALSO INCLUDING, any right, title and or interest the grantor may have in and to the property lying between the centerline of East Windsor Road and the above described property.

Being the same premises conveyed to The County of Broome from Janet Smith by deed recorded in the Broome County Clerk's Office in liber 1952 at page 124.

NOTES:
1. BEARINGS AND DISTANCES IN PARENTHESIS ARE DEED BEARINGS AND DISTANCES.
2. THIS SURVEY HAS BEEN PREPARED IN CONJUCTION WITH TITLE ABSTRACT DATED 10/21/2011, PREPARED BY STEWART TITLE INSURANCE Co.

LEGEND
- • - PROPERTY IRON FOUND
- o - REBAR WITH CAP SET
- FENCE
- TREE WITH FENCE
- UTILITY POLE
- (R/O) - REPUTED OWNER(S)

Engineering Controls/Institutional controls on Tax Lot No.'s 118-02-1-24 & 25

a. Engineering Controls:

Monitoring Well Network.

b. Institutional Controls:

Groundwater wells for drinking water shall not be installed or used on any portion of Tax Lot No.'s 118.02-1-24 & 25.

EXPLANATION:

LONG-TERM MONITORING PLAN DESIGNATIONS

W-24 — LOCATION AND DESIGNATION OF MONITORING WELL

THIS PROPERTY IS SUBJECT TO A DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMANTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO ARTICLE 36, OF TITLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THE DECLARATION OF CONVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN ("SMP"). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP MAY BE OBTAINED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR BY SENDING AN EMAIL REQUEST TO DERWEB@GW.DEC.STATE.NY.US.

DECLARATION OF COVENANTS, RESTRICTIONS & ENVIRONMENTAL EASEMENT AREA ACCESS:
THE DEC, EPA, OR THEIR AGENTS MAY ACCESS THE ENVIRONMENTAL EASEMENT AREAS AS SHOWN HEREON THROUGH ANY EXISTIONG STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

0 100 200 300 FT

SCALE 1"=100' (1:1200)

SURVEY OF PROPERTY OF

BROOME COUNTY

TAX No.'s 118.04-2-24 & 25
TOWN OF COLESVILLE
BROOME COUNTY, NEW YORK

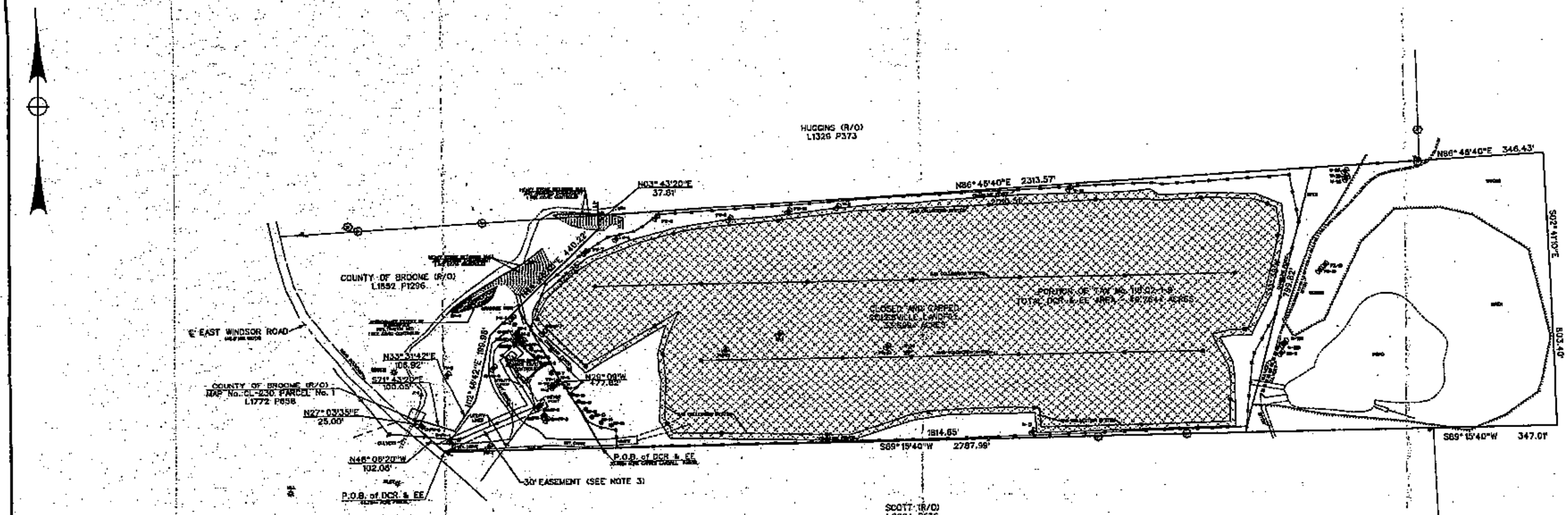
SCALE: 1 INCH = 100 FEET — OCTOBER 26, 2011

STS SOUTHERN TIER SURVEYING, LLP
39 GRISWOLD STREET
BINGHAMTON, NEW YORK 13904
PHONE 607-722-7765

RONALD C. SCHIESS, PLS
N.Y. LIC. No. 049554

ROGER H. HOLMES, PLS
N.Y. LIC. No. 050206
PA. LIC. No. SU-051533-E

10/26/11



LEGEND

- ○ - PROPERTY IRON FOUND
- ○ - REBAR WITH CAP SET
- FENCE
- TREE WITH FENCE
- UTILITY POLE
- (R/O) - REPUTED OWNER(S)

Engineering Controls/Institutional controls on Tax Lot No. 118.02-1-9

a. Engineering Controls:

Heavy stone retaining walls and armored embankments;

The molasses tank is inside the building shown on the survey just westerly of the closed/capped landfill area;

Subgrade infiltration bed;

Infiltration Gallery;

Landfill Cover and Gas Venting;

Groundwater Containment System (including Extraction wells);

Fencing Bordering the Capped Landfill; and,

Monitoring Well Network.

b. Institutional Controls:

Groundwater wells for drinking water shall not be installed or used on any portion of Tax Lot No. 118.02-1-9;

Any Excavation or other intrusive activity that could affect the integrity of the landfill cap, monitoring wells, or extraction wells is prohibited; and

The Tax Lot No. 118.02-1-9 shall not be used for "Residential use" and "Restricted-Residential use", as defined by New York State Department of Environmental Conservation (NYSDEC) Regulations - 6-NYCRR Part 375 - 1.8 (g) (2) (i) and (ii). Allowable Uses include "Commercial Use" and "Industrial use" as defined in NYSDEC Regulations - 6 NYCRR Part 375-1.8 (g) (2) (iii) and (iv).

EXPLANATION:

LONG-TERM MONITORING PLAN DESIGNATIONS

- LOCATION AND DESIGNATION OF MONITORING WELL
- LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
- LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
- LOCATION AND DESIGNATION OF INJECTION WELL
- LOCATION AND DESIGNATION OF PRODUCTION WELL
- LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
- LOCATION AND DESIGNATION OF SPRING SAMPLE
- LOCATION AND DESIGNATION OF TEST MONITORING WELL
- LOCATION AND DESIGNATION OF METHANE VENT
- FENCE
- CLOSED & CAPPED LANDFILL AREA
- HEAVY STONE WALL & EMBANKMENT
- INFILTRATION BED

THIS PROPERTY IS SUBJECT TO A DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO ARTICLE 39 OF TITLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THE DECLARATION OF CONVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN ("SMP"). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP MAY BE OBTAINED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR BY SENDING AN EMAIL REQUEST TO DERWEB@GW.DEC.STATE.NY.US.

DECLARATION OF COVENANTS, RESTRICTIONS & ENVIRONMENTAL EASEMENT AREA ACCESS:
THE DEC, EPA, OR THEIR AGENTS MAY ACCESS THE ENVIRONMENTAL EASEMENT AREAS AS SHOWN HEREON THROUGH ANY EXISTING STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 49.784± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at a point on the northeasterly boundary of East Windsor Road at its intersection with the southerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

Thence N 46-06-20 W along the northeasterly boundary of East Windsor Road a distance of 102.06 feet to a point;

Thence along the boundaries of said Broome County property the following seven courses and distances:

1) N 27-03-35 E a distance of 25.00 feet to a point;
2) S 71-43-20 E a distance of 100.05 feet to a point;
3) N 33-31-42 E a distance of 106.92 feet to a point;
4) N 12-46-42 E a distance of 199.98 feet to a point;
5) N 44-46-40 E a distance of 440.22 feet to a point;
6) N 03-43-20 E a distance of 37.81 feet to a point;
7) N 86-46-40 E a distance of 2313.57 feet to a point;

Thence through said Broome County property the following three courses and distances:

1) N 86-46-40 E a distance of 346.43 feet to a point;
2) S 02-41-10 E a distance of 803.40 feet to a point;
3) S 89-15-40 W a distance of 347.01 feet to a corner of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 2787.99 feet to the Point of Beginning. Containing 49.784± acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA
SURVEYOR'S DESCRIPTION 33.699± ACRE CLOSED AND CAPPED LANDFILL PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Commencing at a point on the northeasterly boundary of East Windsor Road at its intersection with the southerly boundary of the property conveyed to The County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 445.68 feet to the Point of Beginning for the parcel herein conveyed.

Thence N 29-09 W through said Broome County property a distance of 477.82 feet to a point on the northwesterly boundary of said Broome County property;

Thence along the boundaries of said Broome County property the following three courses and distances:

1) N 44-46-40 E a distance of 327.75 feet to a point;
2) N 03-43-20 E a distance of 37.81 feet to a point;
3) N 86-46-40 E a distance of 2010.55 feet to a point;

Thence S 13-38 W through said Broome County property a distance of 799.82 feet to a point on the southerly boundary of said Broome County property;

Thence S 89-15-40 W along the southerly boundary of said Broome County property a distance of 1814.65 feet to the Point of Beginning. Containing 33.699± acres as shown on a survey by Southern Tier Surveying, LLP dated September 26, 2011.

Being a portion of the same premises conveyed to The County of Broome from the Town of Colesville by deed recorded in the Broome County Clerk's Office in Liber 1156 at page 693.

NOTES

1. REFERENCE MAP - BOUNDARY SURVEY OF COLESVILLE LANDFILL PROPERTY BY THOMAS R. MILO, L.S. DATED JANUARY 22, 1993 COPY PROVIDED BY THE BROOME COUNTY DPW.
2. CREEK AND POND WERE MEASURED AUGUST 24, 2011.
3. EASEMENT GRANTED TO NYSEG & DEPOSIT TELEPHONE RECORDED IN L2076 P150 IS STATED TO BE "30' IN WIDTH THROUGHOUT ITS EXTENT...AS SHOWN ON SCHEDULE A". SCHEDULE A SHOWS THE EASEMENT 20' IN WIDTH.
4. THIS SURVEY HAS BEEN PREPARED IN CONJUCTION WITH TITLE ABSTRACT DATED 08/05/2011. PREPARED BY STEWART TITLE INSURANCE Co.
5. THE MOLASSES TANK IS INSIDE THE BUILDING SHOWN ON THE SURVEY JUST WESTERLY OF THE CLOSED/CAPPED LANDFILL AREA.

NOTE: ALL LOCATIONS PROVIDED BY OTHERS.
ALL LOCATIONS ARE APPROXIMATE.

0 150 300
SCALE 1"=150' (1:1800)

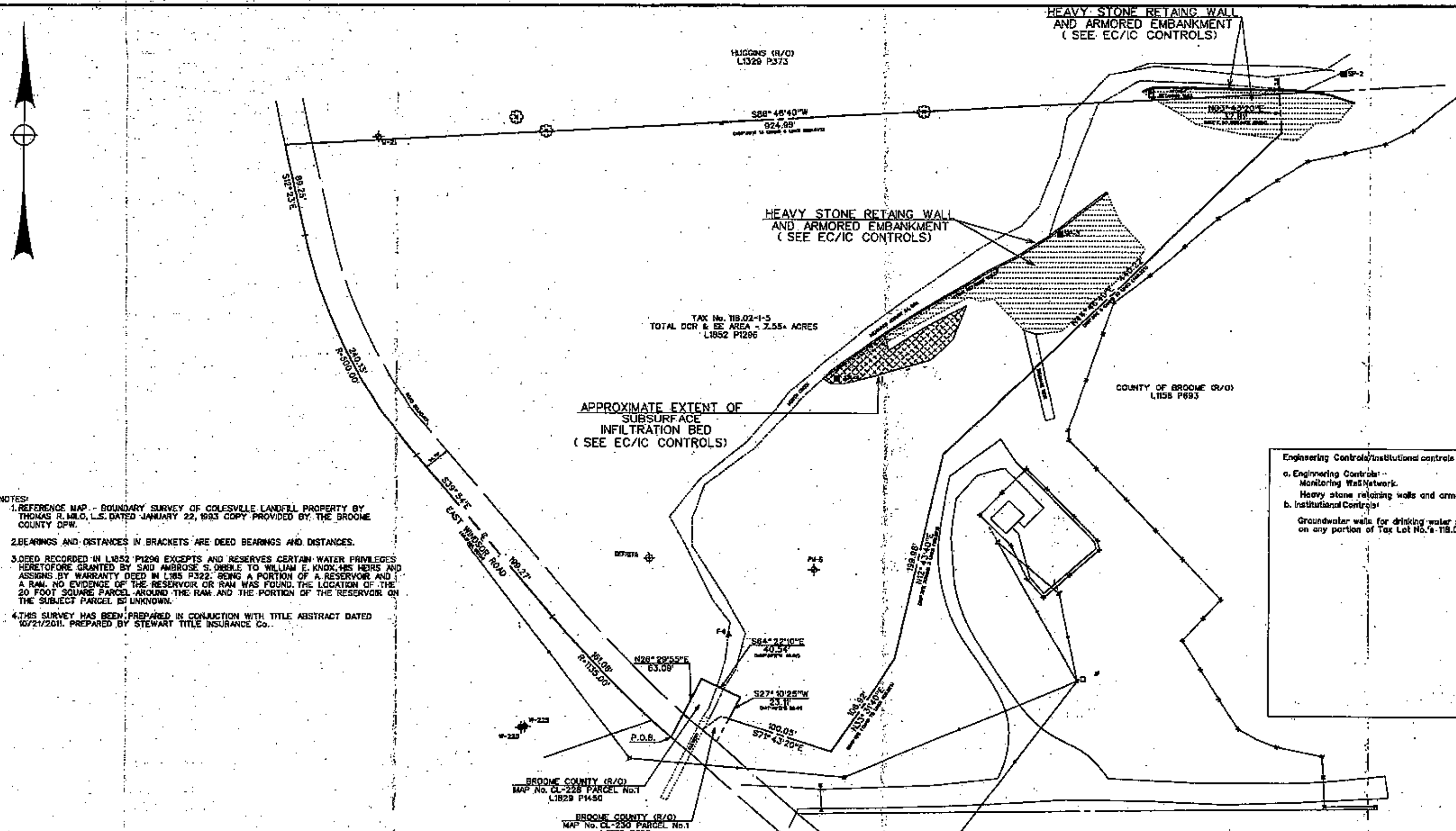
SURVEY OF PROPERTY OF
BROOME COUNTY
COLESVILLE TAX No. 118.02-1-9
EAST WINDSOR ROAD
TOWN OF COLESVILLE
BROOME COUNTY, NEW YORK

SCALE: 1 INCH = 150 FEET SEPTEMBER 26, 2011

STS SOUTHERN TIER SURVEYING, LLP
39 GRISWOLD STREET
BINGHAMTON, NEW YORK 13904
PHONE 607-722-7765

RONALD C. SCHIESS, PLS
N.Y. LIC. No. 049554

ROGER H. HOLMES, PLS
N.Y. LIC. No. 050206
PA LIC. No. SU-051533-E



NOTES:

1. REFERENCE MAP - BOUNDARY SURVEY OF COLESVILLE LANDFILL PROPERTY BY THOMAS R. MILO, L.S. DATED JANUARY 22, 1993 COPY PROVIDED BY THE BROOME COUNTY DPW.
2. BEARINGS AND DISTANCES IN BRACKETS ARE DEED BEARINGS AND DISTANCES.
3. DEED RECORDED IN L1852 P1296 EXCEPTS AND RESERVES CERTAIN WATER PRIVILEGES HERETOFORE GRANTED BY SAID AMBROSE S. DIBBLE TO WILLIAM E. KNOX, HIS HEIRS AND ASSIGNS BY WARRANTY DEED IN L165 P322. BEING A PORTION OF A RESERVOIR AND A RAM. NO EVIDENCE OF THE RESERVOIR OR RAM WAS FOUND. THE LOCATION OF THE 20 FOOT SQUARE PARCEL AROUND THE RAM AND THE PORTION OF THE RESERVOIR ON THE SUBJECT PARCEL IS UNKNOWN.
4. THIS SURVEY HAS BEEN PREPARED IN CONJUCTION WITH TITLE ABSTRACT DATED 10/21/2011. PREPARED BY STEWART TITLE INSURANCE Co.

Engineering Controls/Institutional controls on Tax Lot No.'s 118-02-1-5

a. Enginnering Controls:
Monitoring Well Network.
Heavy stone retaining walls and armored embankments:

b. Institutional Controls:
Groundwater wells for drinking water shall not be installed or used on any portion of Tax Lot No.'s 118.02-1-5:

EXPLANATION:

LONG-TERM MONITORING PLAN DESIGNATIONS

- LOCATION AND DESIGNATION OF MONITORING WELL
- LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
- LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
- LOCATION AND DESIGNATION OF INJECTION WELL
- LOCATION AND DESIGNATION OF PRODUCTION WELL
- LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
- LOCATION AND DESIGNATION OF SPRING SAMPLE
- LOCATION AND DESIGNATION OF TEST MONITORING WELL
- LOCATION AND DESIGNATION OF METHANE VENT
- FENCE
- HEAVY STONE WALL & EMBANKMENT
- INFILTRATION BED

LEGEND

- • - PROPERTY IRON FOUND
- o - REBAR WITH CAP SET
- FENCE
- TREE WITH FENCE
- UTILITY POLE
- (R/O) - REPUTED OWNER(S)

NOTE: ALL LOCATIONS PROVIDED BY OTHERS. ALL LOCATIONS ARE APPROXIMATE.

0 50 100 150

SCALE 1"=50' (1:600)

DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT AREA

SURVEYOR'S DESCRIPTION 7.55± ACRE PARCEL

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Colesville, County of Broome and State of New York bounded and described as follows:

Beginning at a point on the centerline of East Windsor Road at its intersection with the southeasterly boundary of the property conveyed to the County of Broome by deed recorded in the Broome County Clerk's Office in Liber 1852 at page 1296.

Thence along the boundaries of said County of Broome property the following nine courses and distances:

1) N 26° 29'55"E a distance of 63.09 feet to a point;
2) S84° 22'10"E a distance of 40.54 feet to a point;
3) S27° 10'25"W a distance of 23.11 feet to a point;
4) S71° 43'20"E a distance of 100.05 feet to a point;
5) N33° 31'40"E a distance of 106.92 feet to a point;
6) N12° 43'40"E a distance of 199.98 feet to a point;
7) N44° 46'40"E a distance of 440.22 feet to a point;
8) N03° 43'20"W a distance of 37.81 feet to a point;
9) S88° 46'40"W a distance of 924.99 feet to a point on the centerline of East Windsor Road;

Thence along the centerline of East Windsor Road the following four courses and distances:

1) S12° 23'E a distance of 89.25 feet to a point;
2) Southerly along a tangent curve to the left having a radius of 500.00 feet an arc distance of 240.13 feet to a point;
3) S39° 54'E a distance of 199.27 feet to a point;
4) Southeasterly along a tangent curve to the left having a radius of 1135.00 feet an arc distance of 161.06 feet to the Point of Beginning. Containing 7.55± acres.

SUBJECT TO the rights of the public in and to that portion of the above described parcel lying within the bounds of East Windsor Road.

Being the same premises conveyed to the County of Broome from Rudolf C. DeFreitas and Ella DeFreitas by deed recorded in the Broome Couty Clerk's Office in Liber 1852 at page 1296.

THIS PROPERTY IS SUBJECT TO A DECLARATION OF COVENANTS AND RESTRICTIONS AND ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO ARTICLE 39 OF TITLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW.

THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THE DECLARATION OF CONVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN ("SMP"). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP MAY BE OBTAINED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR BY SENDING AN EMAIL REQUEST TO DERWEB@GW.DEC.STATE.NY.US.

DECLARATION OF COVENANTS, RESTRICTIONS & ENVIRONMENTAL EASEMENT AREA ACCESS:
THE DEC, EPA, OR THEIR AGENTS MAY ACCESS THE ENVIRONMENTAL EASEMENT AREAS AS SHOWN HEREON THROUGH ANY EXISTING STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

SURVEY OF PROPERTY OF

BROOME COUNTY

COLESVILLE TAX No. 118.02-1-5
EAST WINDSOR ROAD
TOWN OF COLESVILLE
BROOME COUNTY, NEW YORK

SCALE: 1 INCH = 50 FEET | SEPTEMBER 23, 2011

STS SOUTHERN TIER SURVEYING, LLP
39 GRISWOLD STREET
BINGHAMTON, NEW YORK 13904
PHONE 607-722-7765

RONALD C. SCHESS, PLS
N.Y. LIC. No. 049554

ROGER H. HOLMES, PLS
N.Y. LIC. No. 050206
PA LIC. No. SU-051533-E

BROOME COUNTY CLERK
RECORDING PAGE

[redacted]

Return To:

BROOME COUNTY ATTORNEY
44 HAWLEY STREET
P O BOX 1766
BINGHAMTON, NY 13902

Index	:	BOOK OF DEEDS
Book	:	02428 Page: 0182
Pages	:	0018
Instrument	:	Easement
Date	:	3/19/2014
Time	:	2:11:01
Control#	:	201400010207
Fil#2	:	TT 2014 003140
Employee ID:		GMG30953

BROOME COUNTY OF

No fee	$	0.00
Total	$	.00

MORTGAGE TAX

Mortgage Amount	$	.00
Basic	$	.00
Special	$	.00
Additional	$	.00
Total	$	.00

STATE OF NEW YORK
BROOME COUNTY CLERK

WARNING-THIS SHEET CONSTITUTES THE CLERKS ENDORSEMENT, REQUIRED BY SECTION 316-A(5) & SECTION 319 OF THE REAL PROPERTY LAW OF THE STATE OF NEW YORK. DO NOT DETACH.

TRANSFER TAX

Taxable Amt	$	.00
Transfer Tax	$	.00

RICHARD R BLYTHE

Comp ______ ______
Ver. ______ ______
Bk. ______ ______

0201400010207

ENVIRONMENTAL PROTECTION EASEMENT

AND

DECLARATION OF RESTRICTIVE COVENANTS

This Environmental Protection Easement and Declaration of Restrictive Covenants is made this 11th day of February, 2015, by and between Thomas Lee Scott ("Grantor"), having an address of 49 Main Street, Afton, New York 13730, and the County of Broome ("Grantee"), having an address of Edwin L. Crawford County Office Building, Binghamton, New York 13902.

WITNESSETH:

WHEREAS, Grantor is the owner of a parcel of land located in the county of Broome, State of New York, more particularly described on **Exhibit A** attached hereto and made a part hereof together with any buildings and improvements thereon and appurtenances thereto (the "Property"); and

WHEREAS, a portion of the Property is part of the Colesville Landfill Superfund Site ("Site"), which the U.S. Environmental Protection Agency ("EPA"), pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9605, placed on the National Priorities List, as set forth in Appendix B of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, by publication in the Federal Register on June 10, 1986; and

WHEREAS, in a Record of Decision dated March 29, 1991 ("ROD"), modified by Explanations of Significant Differences (ESDs) issued in September 2000 and July 2004, the Regional Administrator of EPA Region 2 selected, and the New York State Department of Environmental Conservation ("NYSDEC") concurred with, a "response action" for the Site, which provides for response actions at the Site that include, in relevant part, the implementation of property deed restrictions to prevent the installation of drinking water wells at the Site;

WHEREAS, a double-cased deep bedrock well acceptable to EPA and DEC will be installed by the Grantee on the Grantor's deed-restricted property. The double-cased well is not covered by this Environmental Protection Easement and Declaration of Restrictive Covenants; and

WHEREAS, the remedy is being implemented at the Site by the Grantee pursuant to an Order on Consent, Index No. T010687, dated April 13, 1987 between the Grantee and NYSDEC; and

WHEREAS, the parties hereto have agreed that Grantor shall grant a permanent easement and covenant a) to provide a right of access over the Property to the Grantee for purposes of implementing, facilitating and monitoring the response action; and b) to impose on the Property use restrictions that will run with the land for the purpose of protecting human health and the environment; and

WHEREAS, Grantor wishes to cooperate fully with the Grantee in the implementation of all response actions at the Site;

NOW, THEREFORE:

Grant: Grantor, in consideration of $1,000.00 (one thousand dollars) and other good and valuable consideration, does hereby give, grant, covenant and declare in favor of the Grantee that the Property shall be subject to the restrictions on use and rights of access set forth below, and does give, grant and convey to the Grantee with general warranties of title the perpetual right to enforce said restrictions and rights, which shall be of the nature and character, and for the purposes hereinafter set forth, with respect to the Property.

Purpose: It is the purpose of this instrument to convey to the Grantee real property rights, which will run with the land, to facilitate the remediation of past environmental contamination and to protect human health and the environment by reducing the risk of exposure to contaminants.

Restrictions on use: The following restrictions on use apply to the use of the Property, run with the land and are binding on the Grantor until such time as groundwater quality standards are met at the Property, as determined by EPA: Grantor shall not (1) install or use any groundwater wells on the property, with the exception of double-cased bedrock wells which have been approved by the Grantee after consultation with and oversight by EPA and NYSDEC, in accordance with the ROD and ESDs;

Modification or termination of restrictions: The restrictions on use specified in the preceding paragraph of this instrument may only be modified, or terminated in whole or in part, in writing, by the Grantee, with the prior written consent of EPA, provided, however, that any modification or termination of said restrictions shall not adversely affect the remedy selected by EPA for the Site. If requested by the Grantor, such writing will be executed by Grantee in recordable form.

Right of access: A right of access to the Property at all reasonable times for the following purposes shall run with the land and be binding on Grantor:

a) Implementing the response actions in the ROD as modified by the ESDs;

b) Verifying any data or information relating to the Site;

c) Verifying that no action is being taken on the Property in violation of the terms of this instrument or of any federal or state environmental laws or regulations;

d) Conducting investigations under CERCLA relating to contamination on or near the Site, including, without limitation, sampling of air, water, sediments, soils; and

e) Implementing additional or new response actions under CERCLA.

Reserved rights of Grantor: Grantor hereby reserves unto itself, its successors, and assigns, all rights and privileges in and to the use of the Property which are not incompatible with the restrictions, rights, covenants and easements granted herein.

Restoration of Property: Grantee, in implementing the remedy on Grantor's Property, agrees, following completion of the remedy to remove all supplies, equipment, and refuse placed on the Property by Grantee or its agents, and to restore the condition of the surface of the Property, to the extent practicable, to that which was present prior to implementation of the remedy; provided that Grantee shall have no obligation to restore any changes introduced by Grantor or its agents.

Liability release and hold harmless: Recognizing that Grantor and its predecessors in interest did not cause or contribute to contamination present on the Colesville Landfill Superfund site, and in further consideration of Grantor's agreement to the rights of access and restrictions on use set forth in this Easement and Declaration, Grantee agrees to hold Grantor (and its successors and assigns) harmless and free from liability as a potentially responsible party for response costs or cost contribution for Landfill-related contamination within the scope of the response actions covered by the 1987 Order on Consent between Grantee and NYSDEC.

Federal authority: Nothing in this document shall limit or otherwise affect EPA's rights of entry and access or EPA's authority to take response actions under CERCLA, the NCP, or other federal law.

No public access and use: No right of access or use by the general public to any portion of the Property is conveyed by this instrument.

Public notice: Grantor agrees to include in each instrument conveying any interest in any portion of the Property, including but not limited to deeds, leases and mortgages, a notice which is in substantially the following form:

NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL PROTECTION EASEMENT AND DECLARATION OF RESTRICTIVE COVENANTS, DATED _________, 20__, RECORDED IN THE COUNTY CLERK'S OFFICE, BROOME COUNTY, STATE OF NEW YORK ON ____________, 20___, IN BOOK _______, PAGE _____, IN FAVOR OF, AND ENFORCEABLE BY BROOME COUNTY AND BY THE UNITED STATES OF AMERICA AS THIRD PARTY BENEFICIARY.

Within thirty (30) days of the date any such instrument of conveyance is executed, Grantor agrees to provide Grantee and EPA with a certified true copy of said instrument and, if it has been recorded in the public land records, its recording reference.

Enforcement: The Grantee shall be entitled to enforce the terms of this instrument by resort to specific performance. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA. Any forbearance, delay or omission to exercise Grantee's rights under this instrument in the event of a breach of any term of this instrument shall not be deemed to be a waiver by the Grantee of such term or of any of the rights of the Grantee under this instrument.

Damages: Grantee shall also be entitled to recover damages for breach of any covenant or violation of the terms of this instrument including any impairment to the remedial action that increases the cost of the selected response action for the Site as a result of such breach or violation.

Waiver of certain defenses: Grantor hereby waives any defense of laches, estoppel, or prescription.

Covenants: Grantor hereby covenants to and with the Grantee and its assigns, that the Grantor is lawfully seized in fee simple of the Property, that the Grantor has a good and lawful right and power to sell and convey it or any interest therein, that the Property is free and clear of encumbrances and that the Grantor will forever warrant and defend the title thereto and the quiet possession thereof.

Notices: Any notice, demand, request, consent, approval, or communication under this instrument that either party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantor:

Thomas Lee Scott
49 Main Street
Afton, New York 13730

To Grantee:

Broome County Division of Solid
Waste Management
PO Box 1766
Binghamton, New York 13902
ATTN: Laurie Haskell

A copy of each such communication shall also be sent to the following:

To EPA:
United States Environmental Protection Agency
Region 2
Office of Regional Counsel
290 Broadway
New York, NY 10007-1866
Attn: Colesville Landfill Site Attorney

To NYSDEC:
New York State Dept. of Environmental
Conservation, Environmental Remediation
625 Broadway
Albany, New York 12233
Attn: Colesville Landfill Site Administrator

General provisions:

a) Controlling law: The interpretation and performance of this instrument shall be governed by the laws of the United States or, if there are no applicable federal laws, by the law of the state where the Property is located.

b) Liberal construction: Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed in favor of the grant to effect the purpose of this instrument and the policy and purpose of CERCLA. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

c) Severability: If any provision of this instrument, or the application of it to any person or circumstance, is found to be invalid, the remainder of the provisions of this instrument, or the application of such provisions to persons or circumstances other than those to which it is found to be invalid, as the case may be, shall not be affected thereby.

d) Entire agreement: This instrument sets forth the entire agreement of the parties with respect to rights and restrictions created hereby, and supersedes all prior discussions, negotiations, understandings, or agreements relating thereto, all of which are merged herein; provided that nothing in this instrument shall be deemed to alter or modify the Consent Decree.

e) No forfeiture: Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

f) Joint obligation: If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

g) Successors: The covenants, easements, terms, conditions, and restrictions of this instrument shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property. The term "Grantor", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantor" and their personal representatives, heirs, successors, and assigns. The term "Grantee", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantee" and their personal representatives, heirs, successors, and assigns.

h) Captions: The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

i) Counterparts: The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

j) Third-Party Beneficiary: Grantor and Grantee hereby agree that the United States, through EPA shall be, on behalf of the public, third-party beneficiaries of the benefits, rights and obligations conveyed to Grantee in this instrument; provided that nothing in this instrument shall be construed to create any obligations on the part of EPA.

TO HAVE AND TO HOLD unto the Grantee and its assigns forever.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in his name.

Executed this 11th day of Feb, 2015

Thomas L. Scott

By: ______________________

Its:

STATE OF NEW YORK)

COUNTY OF BROOME) ss.:

On the 11th day of February in the year 2015 before me personally came Thomas L. Scott to me known, who, being duly sworn, did depose and say that he/she/they reside(s) in Afton, N.Y [if the place of residence is in a city, include the street and street number, if any, thereof]; that he/she/they is [are] the [president or other officer or director or attorney in fact duly appointed] of the [name corporation], the corporation described in and which executed the above instrument; that he/she/they know(s) the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their name(s) thereto by like authority.

Witness my hand and official seal hereto affixed the day and year written above.

Notary Public in and for the

State of New York

ROBERT G BEHNKE
Notary Public - State of New York
NO. 02BE4763842
Qualified in Broome County
My Commission Expires 7/31/18

My Commission Expires: ______.

This instrument is accepted this ____ day of __________, 20__.

COUNTY OF BROOME

By:

Debra A. Preston
County Executive

Approved as to form
By KEO
BROOME COUNTY
ATTORNEY'S OFFICE

STATE OF NEW YORK)

COUNTY OF BROOME) ss.:

On the 12th day of February in the year 2015 before me personally came Debra A. Preston to me known, who, being duly sworn, did depose and say that he/she/they reside(s) in Binghamton, NY [if the place of residence is in a city, include the street and street number, if any, thereof]; that he/she/they is [are] the [president or other officer or director or attorney in fact duly appointed] of the [name corporation], the corporation described in and which executed the above instrument; that he/she/they know(s) the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by authority of the board of directors of said corporation, and that he/she/they signed his/her/their name(s) thereto by like authority.

Witness my hand and official seal hereto affixed the day and year written above.

Karen M. Veruto

Notary Public in and for the

State of New York

My Commission Expires: April 24, 2015

KAREN M VERUTO
Notary Public, State of New York
No. 01VE5042801
Qualified in Broome County
Commission Expires April 24, 2015

Attachment: Exhibit A - legal description of the Property

EXHIBIT A

ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Colesville, County of Broome and State of New York, in the First Tract of Warren Township, bounded and described as follows, to wit:

Beginning at a black oak tree at the northwest corner of the farm known as the Abbot Farm on the easterly bank of the Susquehanna River, thence running south 85° east 41 chains and 50 links to a stake and stones; thence north 5° east 16 chains to a stake and stones; thence north 85° west 42 chains and 75 links to a stake in the center of the highway; thence north 25° west 1 chain and 75 links; thence 35° west 14 chains to the river; thence down the river as it winds and turns to the place of beginning, containing seventy-six acres (76) of land be the same more or less. Being the same premises conveyed to Stephen Wasson by E. Rathbone and wife and Robert Harpur and wife by deed June 1st 1847, which is recorded in Broome County Liber 32 of Deeds at pages 444 445.

ALSO, all that certain other Piece or Parcel of Land, situate in the Town of Colesville aforesaid, being a part of the farm formerly owned by Philo Kent, deceased, being bounded and described as follows, to wit: Beginning at the northwesterly corner of said farm and running thence south 84 ½° east along the north line of said farm 7 chains and 85 links to a stake on the north line on a lot formerly conveyed by James P. Abbott and Wife Asa M. Abbott; thence south 52 ¼° west 4 chains and 50 links to the Susquehanna River; thence along the river to the place of beginning, containing one and one-fourth acres of land be the same more or less. Being the same premises conveyed to Stephen Wasson by James P. Abbott and wife by deed dated September 24, 1849, and recorded in Broome County Liber 34 of Deeds at pages 222 and 223.

The aforementioned two parcels of land are the same premises owned and occupied by the said Stephen Wasson in his lifetime and of which he died seized.

Excepting and reserving therefrom that part of said premises heretofore conveyed by said Stephen Wasson and wife to James P. Abbott by deed dated September 24, 1849, conveying one and one-fourth acres; also two and 56/100 acres conveyed by said Stephen Wasson to the Delaware and Hudson Canal Company by deed dated December 14, 1870.

All of the foresaid premises hereby conveyed are the same as conveyed by Hector S. Williams and Anna B. Williams, his wife, to the said Ada Scott, by Warranty Deed, dated December 16, 1920, recorded January 21, 1921, in Liber 302, page 206.

This conveyance is subject, however, to an easement for a high tension power line over the aforesaid lands, heretofore conveyed by the said Ada M. Scott to the Delaware and Hudson R.R. Corp., by an instrument dated August 26, 1930, recorded October 31, 1930, in Liber 400, page 510. Also subject to a water right and agreement therewith made between the said Ada M. Scott and Arthur T. Root, dated July 22, 1939, recorded May 17, 1945, in Liber 550, page 356; reference to which said two instruments is hereby made for a more particular description contained therein. Also excepting and reserving a parcel of land conveyed by said Ada M. Scott to Arthur T. Root, dated August 15, 1936, recorded in Book 463, page 467

BEING the same premise conveyed to Thomas Lee Scott by Thomas Lee Scott as Administrator of the Estate of Harry Ray Scott, John Ray Scott, Michael Riley, Laura Volk, Timothy Riley and Jamie Riley by deed dated January 22, 2008 and recorded in the Broome County Clerk's Office on April 21, 2008 at Liber 2224 of Deeds at page 636.

RICHARD R BLYTHE

BROOME COUNTY CLERK
60 Hawley Street, 3rd Floor
Binghamton, NY 13902-2062
(607) 778-2255

BROOME COUNTY ATTORNEY
44 HAWLEY STREET
P O BOX 1766
BINGHAMTON, NY 13902-0000

Rcpt # 745729 02/13/15 11:53AM

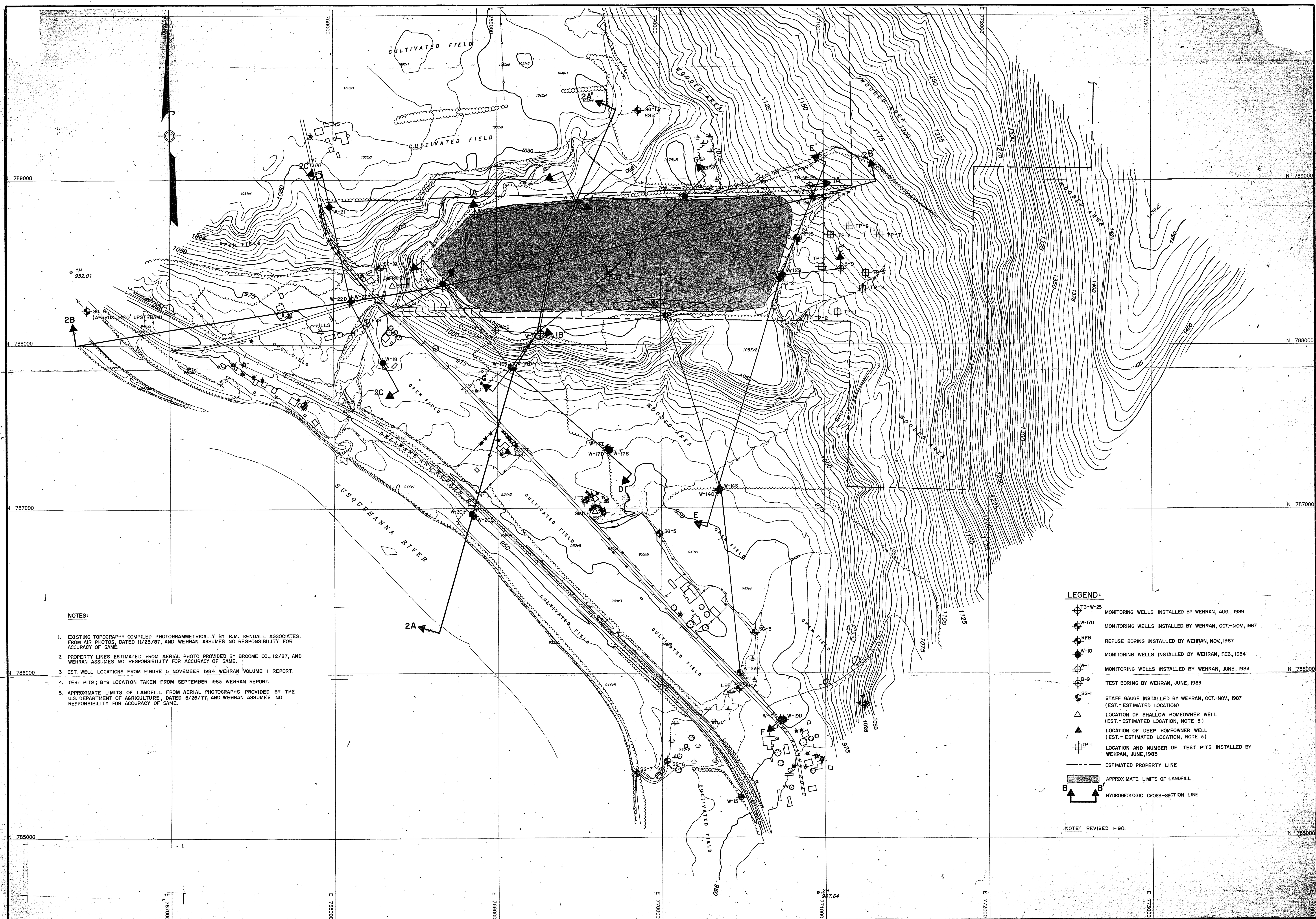
Description	Fee
DOC# 201500004888 Easement TT2015002631 B/P D 02455 0283 1 SCOTT THOMAS LEE 2 BROOME COUNTY OF	$0.00
No Fee	$0.00
DOC# 201500004889 TT Return	$0.00
No Fee	$0.00
Total Amount Due	$0.00
Total Paid	

KEEP FOR REFERENCE
THANK YOU
WWW.GOBCCLERK.COM

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Debra A. Smith, Broome County	Debra.Smith@BroomeCounty.US
[Qualified Environmental Professional]	[phone] [email address]
Payson Long, NYSDEC DER Project Manager]	(518) 402-9813 payson.long@dec.ny.gov
Chris Mannes, NYSDEC Region 7 - Regional Engineer	(315) 426-7519 chris.mannes@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	(518) 402-9813 kelly.lewandowski@dec.ny.gov

APPENDIX C – GEOLOGIC CROSS SECTIONS FROM RI REPORT



NOTES:

1. EXISTING TOPOGRAPHY COMPILED PHOTOGRAMMETRICALLY BY R.M. KENDALL ASSOCIATES FROM AIR PHOTOS, DATED 11/23/87, AND WEHRAN ASSUMES NO RESPONSIBILITY FOR ACCURACY OF SAME.
2. PROPERTY LINES ESTIMATED FROM AERIAL PHOTO PROVIDED BY BROOME CO., 12/87, AND WEHRAN ASSUMES NO RESPONSIBILITY FOR ACCURACY OF SAME.
3. EST. WELL LOCATIONS FROM FIGURE 5 NOVEMBER 1984 WEHRAN VOLUME I REPORT.
4. TEST PITS; B-9 LOCATION TAKEN FROM SEPTEMBER 1983 WEHRAN REPORT.
5. APPROXIMATE LIMITS OF LANDFILL FROM AERIAL PHOTOGRAPHS PROVIDED BY THE U.S. DEPARTMENT OF AGRICULTURE, DATED 5/26/77, AND WEHRAN ASSUMES NO RESPONSIBILITY FOR ACCURACY OF SAME.

LEGEND:

TB-W-25	MONITORING WELLS INSTALLED BY WEHRAN, AUG., 1989
W-17D	MONITORING WELLS INSTALLED BY WEHRAN, OCT.-NOV., 1987
RFB	REFUSE BORING INSTALLED BY WEHRAN, NOV., 1987
W-10	MONITORING WELLS INSTALLED BY WEHRAN, FEB., 1984
W-1	MONITORING WELLS INSTALLED BY WEHRAN, JUNE, 1983
B-9	TEST BORING BY WEHRAN, JUNE, 1983
SG-1	STAFF GAUGE INSTALLED BY WEHRAN, OCT.-NOV., 1987 (EST.- ESTIMATED LOCATION)
△	LOCATION OF SHALLOW HOMEOWNER WELL (EST.- ESTIMATED LOCATION, NOTE 3)
▲	LOCATION OF DEEP HOMEOWNER WELL (EST.- ESTIMATED LOCATION, NOTE 3)
TP-1	LOCATION AND NUMBER OF TEST PITS INSTALLED BY WEHRAN, JUNE, 1983
— - - —	ESTIMATED PROPERTY LINE
	APPROXIMATE LIMITS OF LANDFILL
B B'	HYDROGEOLOGIC CROSS-SECTION LINE

NOTE: REVISED 1-90.

WehranEnviroTech
WEHRAN ENGINEERING, INC.

		DATE
DESIGN BY:	DBM	1/90
DRAWN BY:	[illegible]	3/11/88
CHECK BY:	RTM	4/5/88
SUPV. BY:	TDB	4/5/88
APP'VD BY:	WPW	4/5/88

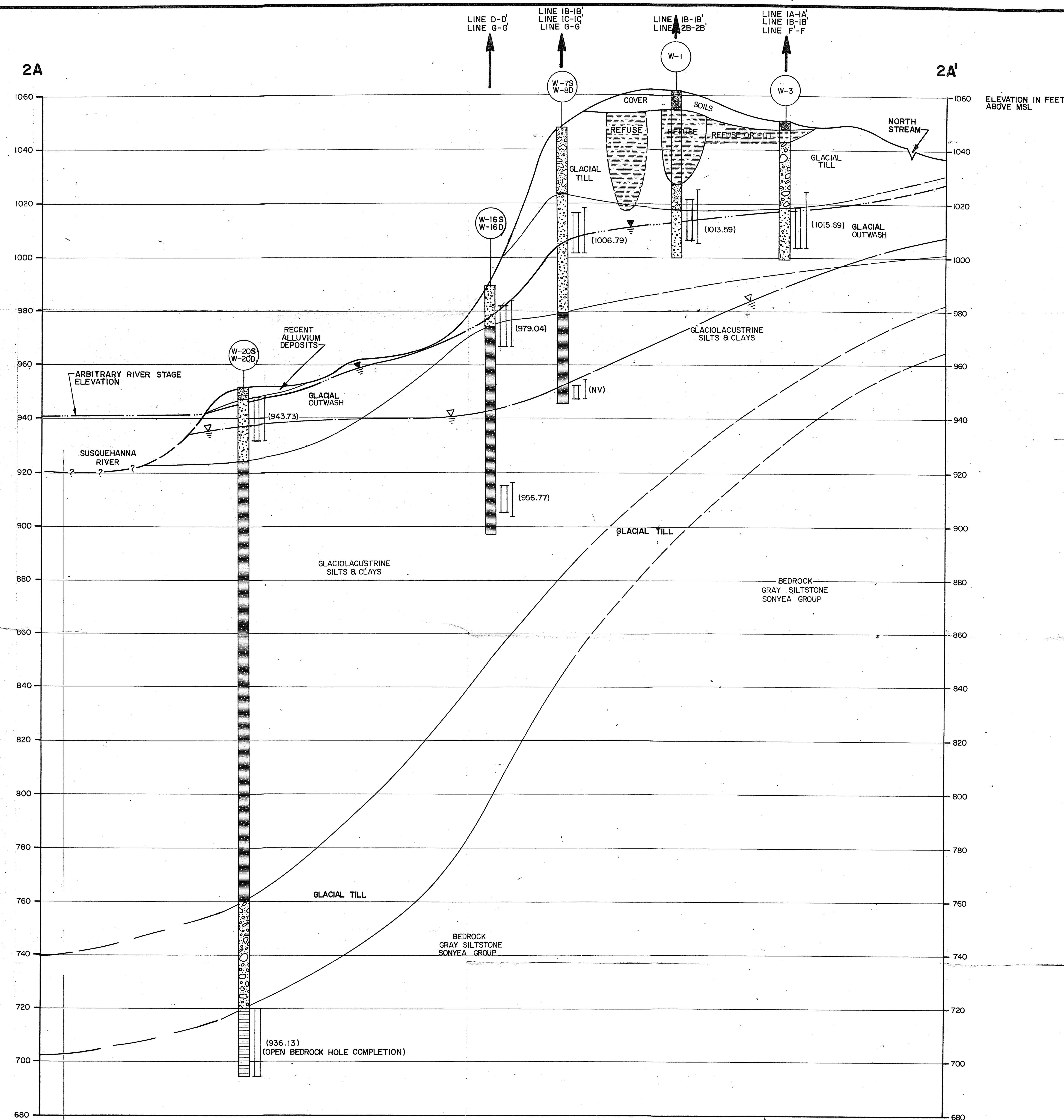
Scales
1" = 200'

COLESVILLE LANDFILL
BROOME COUNTY TOWN OF COLESVILLE NEW YORK

No. By Date REVISIONS

MONITORING WELL, TEST BORING, TEST PIT, STAFF GAUGE, HOMEOWNERS WELLS AND HYDROGEOLOGIC CROSS-SECTION LOCATION PLAN

Sheet 2 Of 7
Project No. 07522



LEGEND

W-16S MONITORING WELL LOCATION

GEOLOGIC CONTACT (DASHED WHERE INFERRED)

GROUNDWATER TABLE ELEVATION (DASHED WHERE INFERRED)

WELL SCREEN INTERVAL

WELL SANDPACK INTERVAL

(1015.03) GROUNDWATER ELEVATION ABOVE MEAN SEA LEVEL (AS MEASURED 8/14-17/89)

BEDROCK PIEZOMETRIC SURFACE ELEVATION (AS MEASURED 8/14-17/89)

DEPTH OF TRENCH AND TRENCH WIDTH BASED ON THE GEOPHYSICAL SURVEY.

DESIGNATION	FORMATION	GENERAL GEOLOGIC DESCRIPTION
COVER SOILS		COVER MATERIAL REWORKED GLACIAL TILL
REFUSE		GENERAL HOUSEHOLD WASTES
GLACIAL TILL		UNSTRATIFIED CLAYEY SILT TO SILT & CLAY LITTLE GRAVEL, LITTLE SAND
GLACIAL OUTWASH		BROWN SAND TO GRAVEL, TRACE SILT
GLACIOLACUSTRINE SILTS & CLAYS		BROWN SILT TO SILT & CLAY, TRACE FINE SAND VARVED, LAMINATED
BEDROCK SONYEA GROUP		GRAY SILTSTONE TO SHALE, SOME OBLIQUE FRACTURING

1) FILL AREA GENERALLY CONSISTS OF REWORKED GLACIAL TILL ALTHOUGH OCCASIONALLY REFUSE MAY BE IDENTIFIED.

NOTE:
1. EXTENT OF WASTE EXAGGERATED BY CROSS-SECTION
2. REVISED 1-90.

WehranEnviroTech
WEHRAN ENGINEERING, INC.

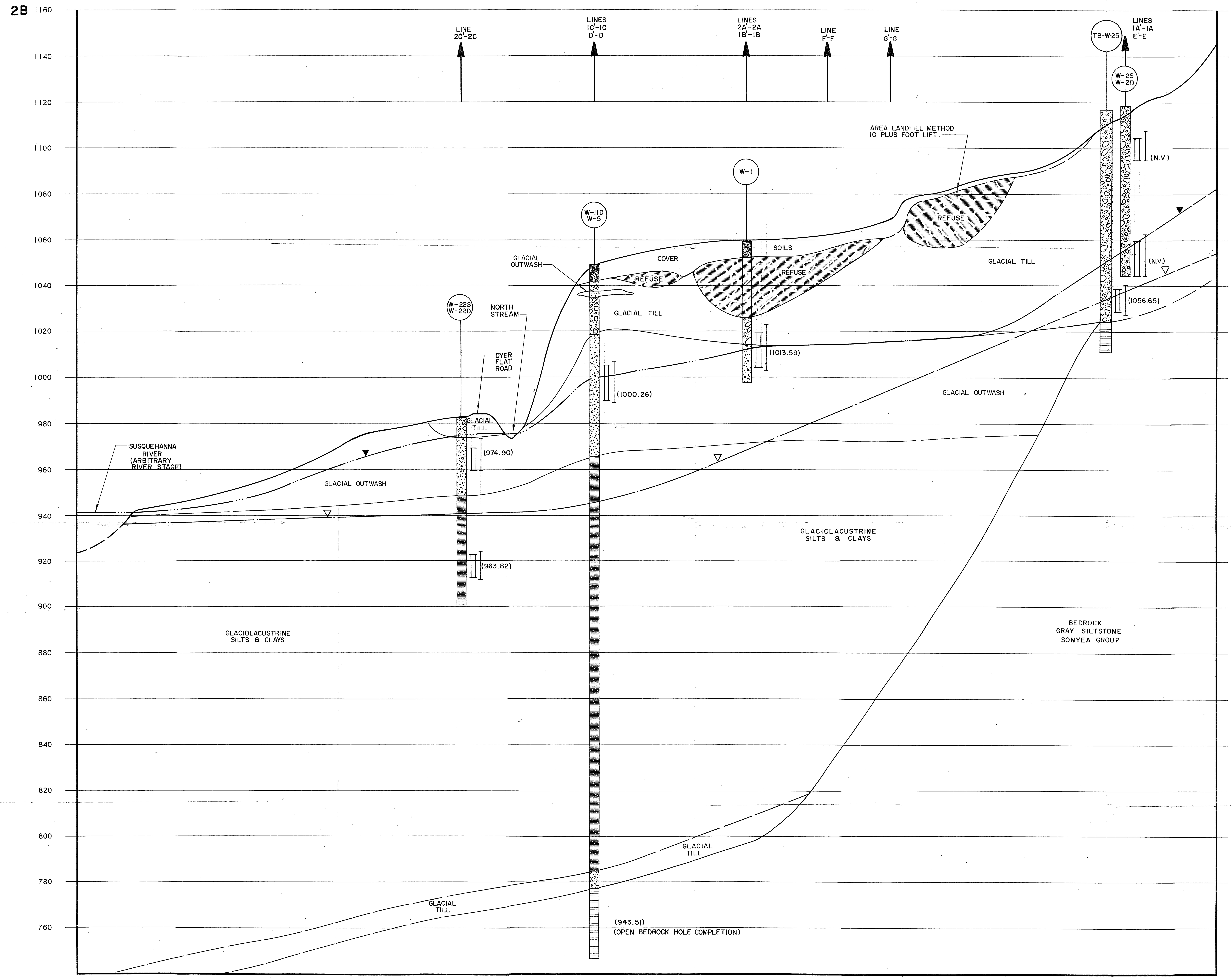
		DATE
DESIGN BY:	DBM	1-90
DRAWN BY:	Andrew Schellberg	2-9-88
CHECKED BY:	RTM	4-5-88
SUPV. BY:	TOB	4-5-88
APP'VD BY:	WPW	4-5-88

Scales
HORIZONTAL 1"=200'
VERTICAL 1"=20'
VERTICAL EXAGGERATION=10X

COLESVILLE LANDFILL
BROOME COUNTY TOWN OF COLESVILLE NEW YORK

HYDROGEOLOGIC CROSS-SECTION 2A-2A'

Sheet 3 of 7
Project No. 07522



LEGEND

(W-16S)	MONITORING WELL LOCATI
	GEOLOGIC CONTACT (DASHED WHERE INFERRED
	GROUNDWATER TABLE ELEV (DASHED WHERE INFERRED
	WELL SCREEN INTERVAL
	WELL SANDPACK INTERVAL
(1015.03)	GROUNDWATER ELEVATION MEAN SEA LEVEL (AS MEAS 8/14-17/89)
	BEDROCK PIEZOMETRIC SUR ELEVATION (AS MEASURED 8
	DEPTH OF TRENCH AND TRE WIDTH BASED ON THE GEOPH SURVEY

DESIGNATION	FORMATION	GENERAL GEO DESCRIPT
COVER SOILS		COVER MATERIAL REWORKED GLACIAL
REFUSE		GENERAL HOUSEHO WASTES
GLACIAL TILL		UNSTRATIFIED CLAY SILT TO SILT & CLA LITTLE GRAVEL, LITT
GLACIAL OUTWASH		BROWN SAND TO GRAVEL, TRACE SILT
GLACIOLACUSTRINE SILTS & CLAYS		BROWN SILT TO SILT & CLAY, TRACE FINE SAND VARVED, LAMINATED
BEDROCK SONYEA GROUP		GRAY SILTSTONE TO SHALE, SOME OBLIQUE FRACTURIN

1) FILL AREA GENERALLY CONSISTS OF REWORKED GL TILL ALTHOUGH OCCASIONALLY REFUSE MAY BE IDENTIFIED.

NOTE:
1. EXTENT OF WASTE EXAGGERATED BY CROSS-SEC
2. REVISED 1-90.

No.	BY	DATE	REVISION

WehranEnviroTech
WEHRAN ENGINEERING, INC.

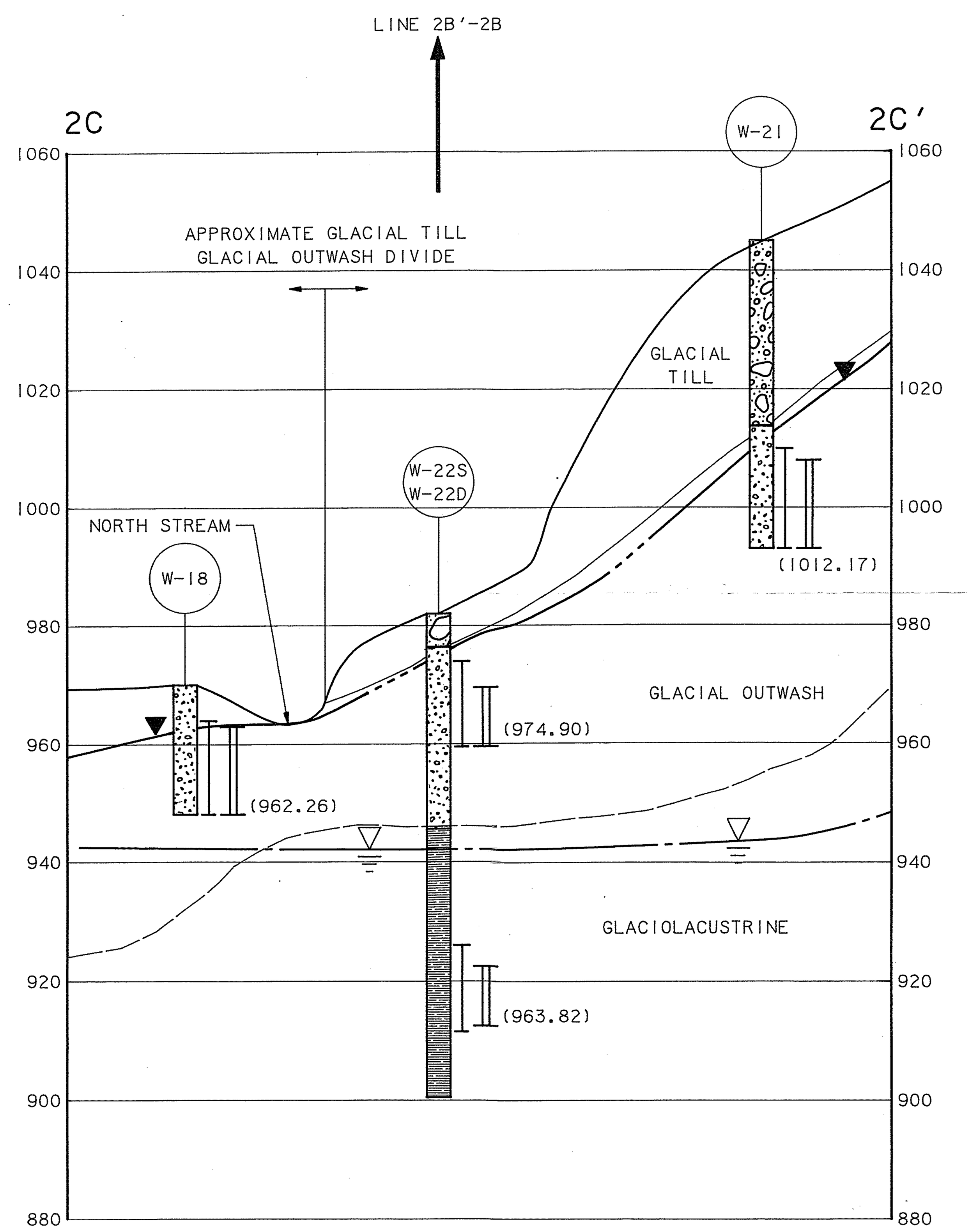
		DATE
DESIGN BY:	DBM	1-90
DRAWN BY:	Andrew Schellberg	2-9-88
CHECKED BY:	RTM	3-88
SUPV. BY:	TDB	3-88
APP'VD BY:	WPW	3-88

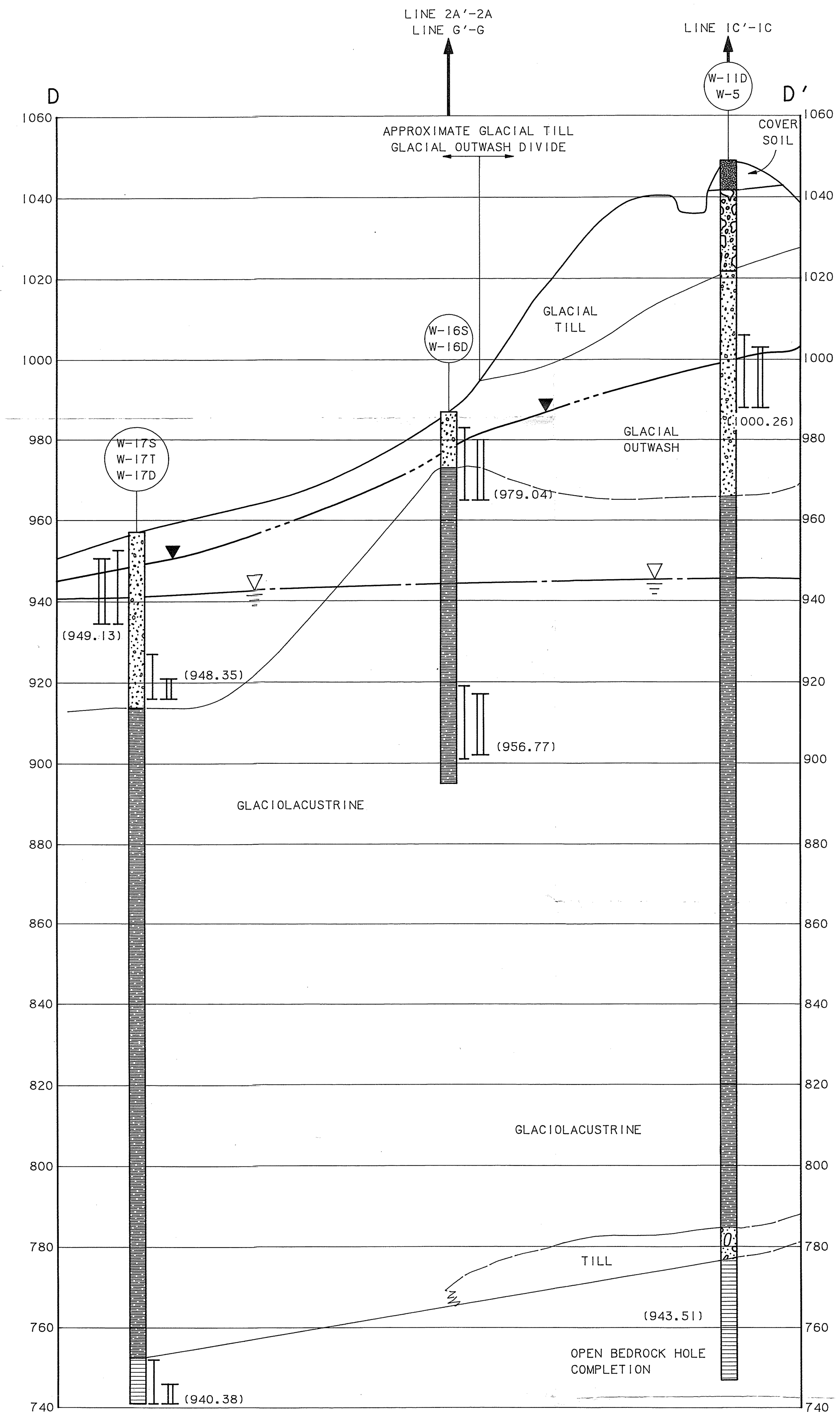
Scales
HORIZONTAL 1" = 200'
VERTICAL 1" = 20'
VERTICAL EXAGGERATION = 10X

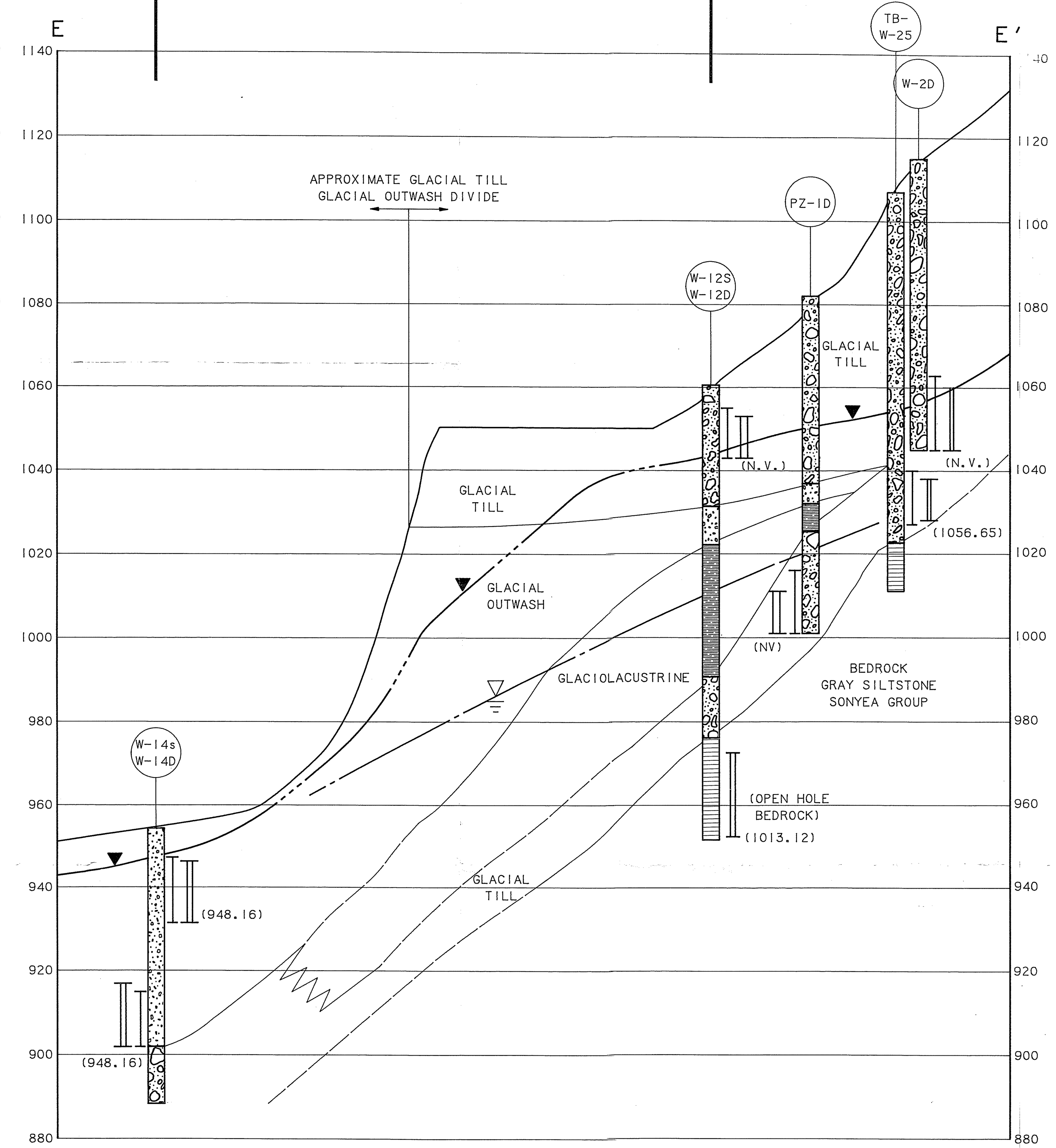
COLESVILLE LANDFILL
BROOME COUNTY TOWN OF COLESVILLE NEW YORK

HYDROGEOLOGIC CROSS-SECTION 2B-2B'

Sheet 4
Project No. 07522







LEGEND:

W-14D	MONITORING WELL LOCATION
	GEOLOGIC CONTACT (DASHED WHERE INFERRED)
	WELL SANDPACK INTERVAL
	WELL SCREEN INTERVAL
(1015.03)	GROUNDWATER ELEVATION ABOVE MEAN SEA LEVEL (AS MEASURED 8/14-17/89)
	GROUNDWATER TABLE ELEVATION (DASHED WHERE INFERRED)
	BEDROCK PIEZOMETRIC SURFACE ELEVATION (AS MEASURED 8/14-17/89) (DASHED WHERE INFERRED)
	INTERSECTION OF CROSS-SECTION LINES

DESIGNATION	FORMATION	GENERAL GEOLOGIC DESCRIPTION
COVER SOILS		COVER MATERIAL REWORKED GLACIAL TILL
REFUSE		GENERAL HOSEHOLD WASTES
GLACIAL TILL		UNSTRATIFIED CLAYEY SILT TO SILT & CLAY LITTLE GRAVEL, LITTLE SAND
GLACIAL OUTWASH		BROWN SAND TO GRAVEL, TRACE SILT
GLACIOLACUSTRINE SILTS & CLAYS		BROWN SILT TO SILT & CLAY, TRACE FINE SAND VARVED, LAMINATED
BEDROCK SONYEA GROUP		GRAY SILTSTONE TO SHALE, SOME OBLIQUE FRACTURING

NOTES:

1. CROSS-SECTIONS C-C', D-D', E-E' PROVIDED ON COMPUTER AIDED DESIGN FOR MULTIPLE SIMULATION PURPOSES
2. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
3. ~~REVISED 1-90.~~

ICM: (07522.EB.HG)XSECTIONS C-C D-D E-E
DWG: XSECTCC

WehranEnviroTech
WEHRAN ENGINEERING, INC.

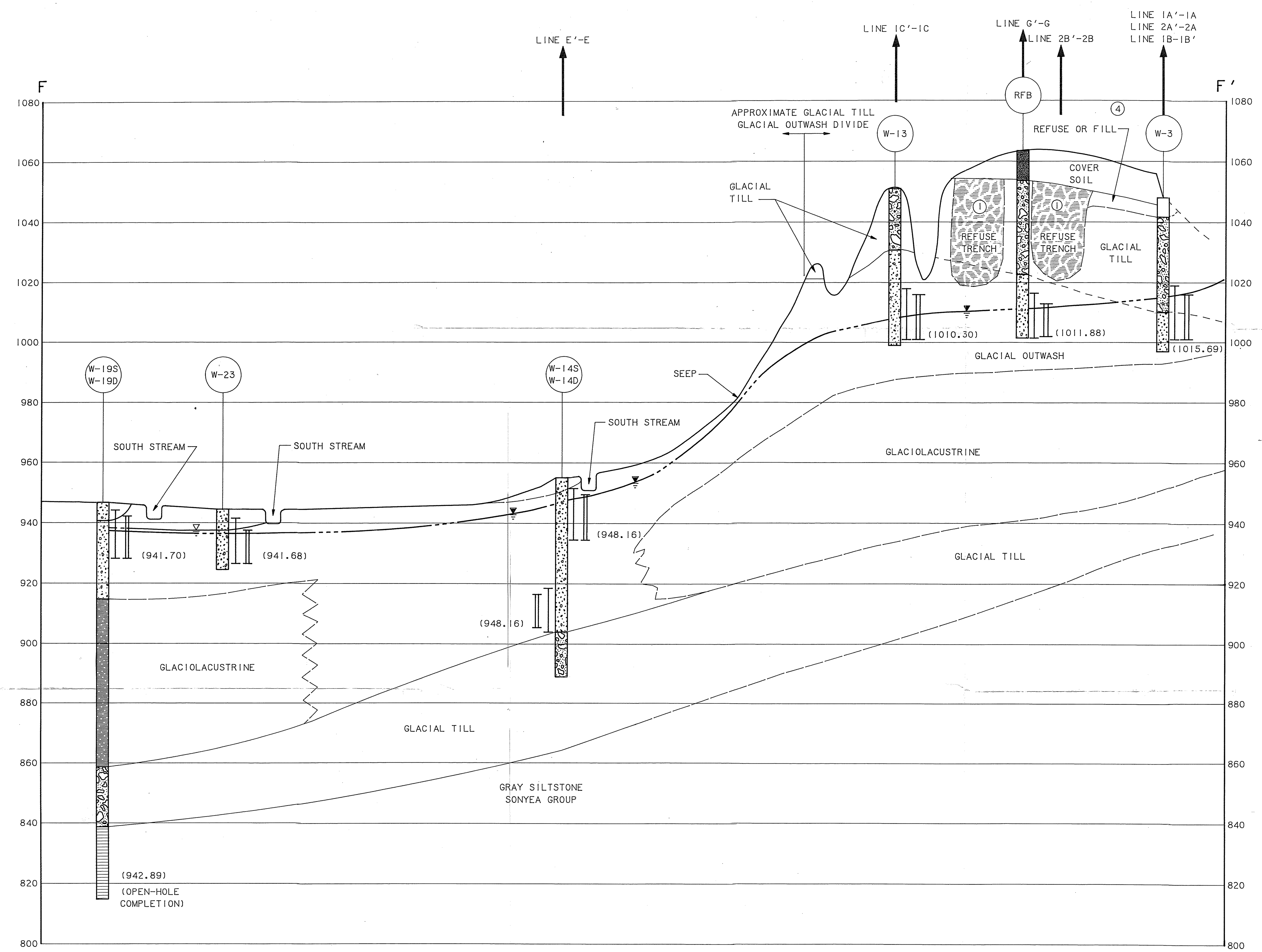
	DATE
DESIGN BY:	
DRAWN BY:	
CHECK BY:	
SUPV. BY:	
APP'VD BY:	

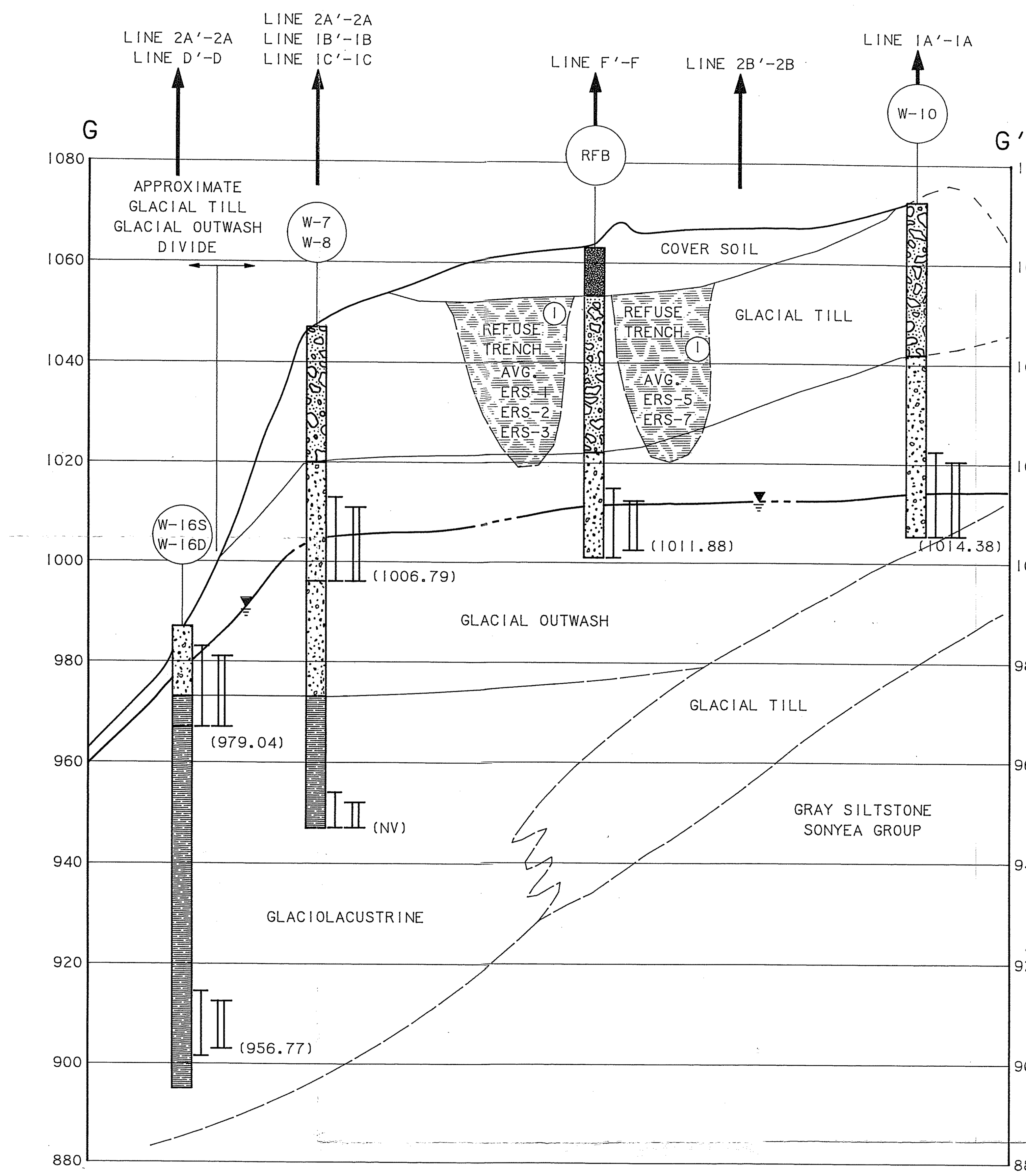
Scales
HORIZ: 1"=200'
VERT: 1"=20'

COLESVILLE LANDFILL
BROOME COUNTY TOWN OF COLESVILLE NEW YORK

HYDROGEOLOGIC
CROSS-SECTIONS
2C-2C', D-D', E-E'

Sheet 5 of 7
Project No. 07522





LEGEND:

W-14D — MONITORING WELL LOCATION

GEOLOGIC CONTACT (DASHED WHERE INFERRED)

WELL SANDPACK INTERVAL

WELL SCREEN INTERVAL

(1015.03) GROUNDWATER ELEVATION ABOVE MEAN SEA LEVEL (AS MEASURED 8/14-17/89)

GROUNDWATER TABLE ELEVATION (DASHED WHERE INFERRED)

BEDROCK PIEZOMETRIC SURFACE ELEVATION (AS MEASURED 8/14-17/89) (DASHED WHERE INFERRED)

NOTE:

1. REFUSE TRENCH LOCATION DETERMINED FROM TERRAIN CONDUCTIVITY SURVEY AND TRENCH DEPTH AVERAGED FROM EARTH RESISTIVITY SOUNDINGS (ERS)
2. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
3. CROSS SECTIONS F-F'& G-G' PRODUCED ON COMPUTER AIDED DESIGN FOR MULTIPLE SIMULATION PURPOSES
4. FILL AREA GENERALLY CONSISTS OF REWORKED GLACIAL TILL ALTHOUGH OCCASIONALLY REFUSE MAY BE IDENTIFIED
5. REVISED 1-90.

DESIGNATION	FORMATION	GENERAL GEOLOGIC DESCRIPTION
COVER SOILS		COVER MATERIAL REWORKED GLACIAL TILL
REFUSE		GENERAL HOSEHOLD WASTES
GLACIAL TILL		UNSTRATIFIED CLAYEY SILT TO SILT & CLAY LITTLE GRAVEL, LITTLE SAND
GLACIAL OUTWASH		BROWN SAND TO GRAVEL, TRACE SILT
GLACIOLACUSTRINE SILTS & CLAYS		BROWN SILT TO SILT & CLAY, TRACE FINE SAND VARVED, LAMINATED
BEDROCK SONYEA GROUP		GRAY SILTSTONE TO SHALE, SOME OBLIQUE FRACTURING

ICM: 07522.EB.HG1XSECTIONS G-G F-F
DWG: XSEC6F

WehranEnviroTech
WEHRAN ENGINEERING, INC.

DESIGN BY:
DRAWN BY:
CHECKED BY:
SUPV. BY:
APP'VD BY:
DATE

Scales
HORIZ: 1"=200'
VERT: 1"=20'

COLESVILLE LANDFILL
BROOME COUNTY TOWN OF COLESVILLE NEW YORK

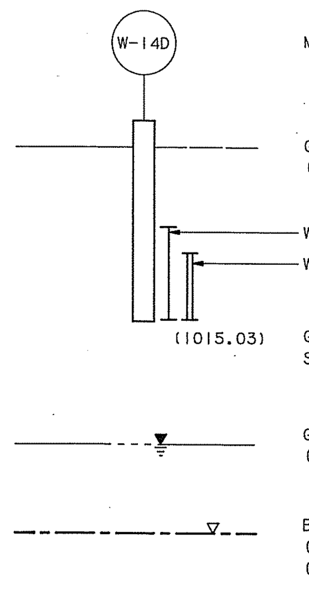
HYDROGEOLOGIC CROSS-SECTIONS F-F'& G-G'

Sheet 6 of 7
Project No. 07522

NOTES:

1. THE WATER TABLE CONTOUR ELEVATION MAP, CROSS-SECTIONS A-A, B-B AND C-C WERE ORIGINALLY SHEETS 2 OF 4, 3 OF 4 AND 4 OF 4 FROM THE HYDROGEOLOGIC INVESTIGATION, COLESVILLE LANDFILL, TOWN OF COLESVILLE, BROOME COUNTY, N.Y. SEPTEMBER 1983.
2. REVISED 1-90.

LEGEND:



MONITORING WELL LOCATION

GEOLOGIC CONTACT (DASHED WHERE INFERRED)

WELL SANDPACK INTERVAL

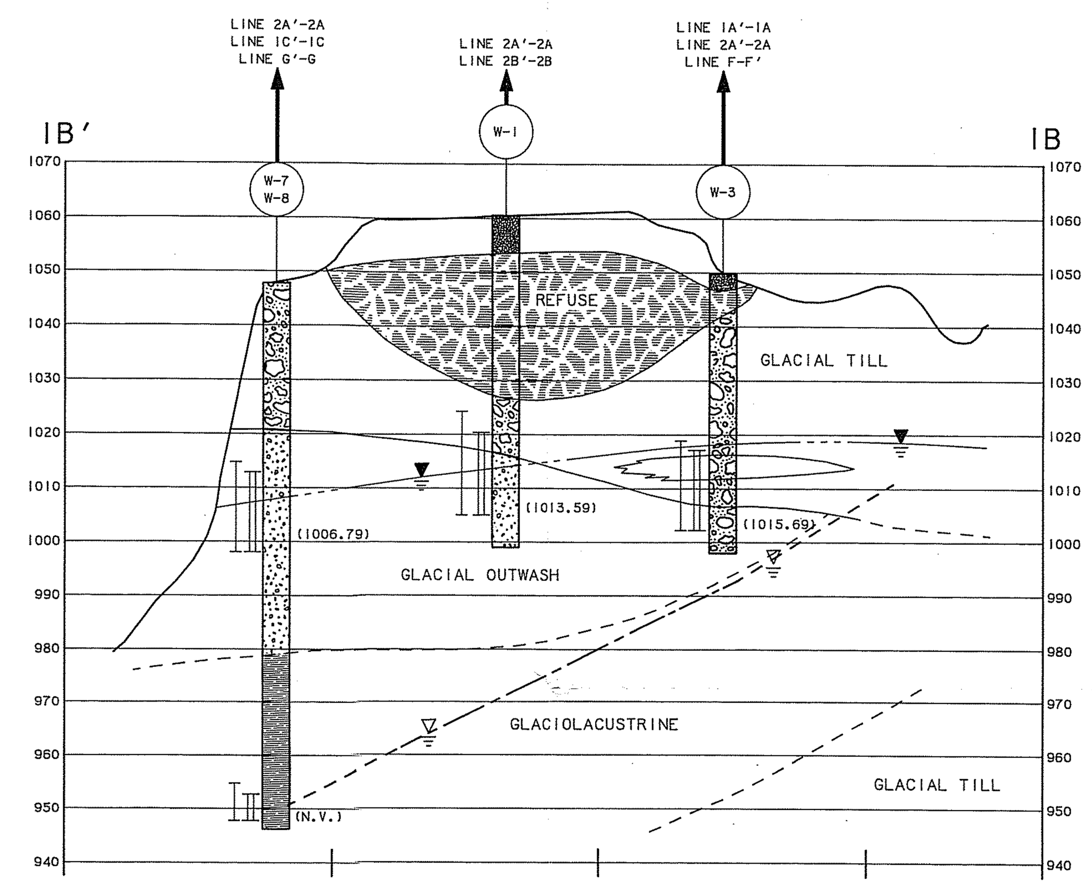
WELL SCREEN INTERVAL

GROUNDWATER ELEVATION ABOVE MEAN SEA LEVEL (AS MEASURED 8/14-17/89)

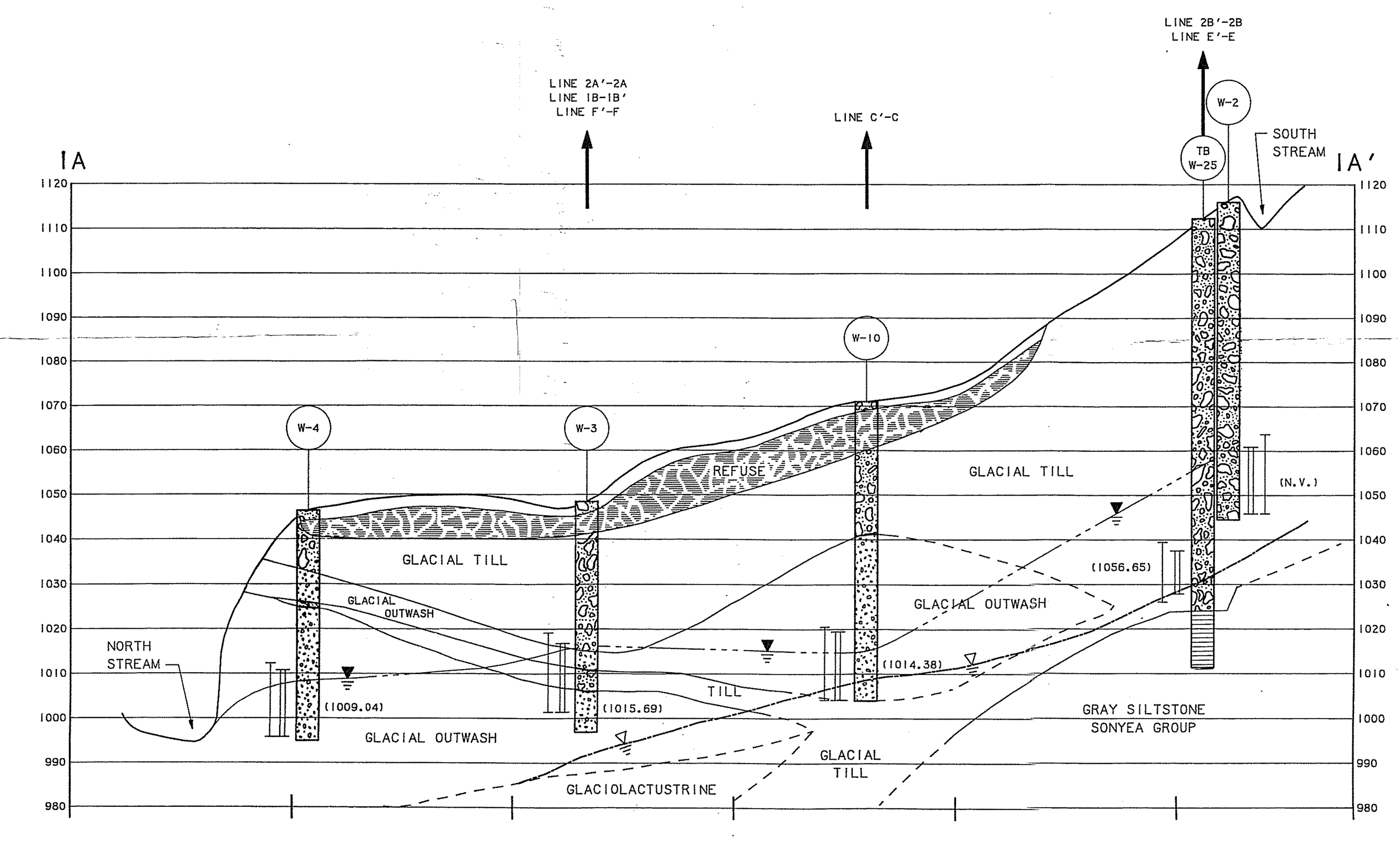
GROUNDWATER TABLE ELEVATION (DASHED WHERE INFERRED)

BEDROCK PIEZOMETRIC SURFACE ELEVATION (AS MEASURED 8/14-17/89) (DASHED WHERE INFERRED)

DESIGNATION	FORMATION	GENERAL GEOLOGIC DESCRIPTION
COVER SOILS		COVER MATERIAL REWORKED GLACIAL TILL
REFUSE		GENERAL HOSEHOLD WASTES
GLACIAL TILL		UNSTRATIFIED CLAYEY SILT TO SILT & CLAY LITTLE GRAVEL, LITTLE SAND
GLACIAL OUTWASH		BROWN SAND TO GRAVEL, TRACE SILT
GLACIOLACUSTRINE SILTS & CLAYS		BROWN SILT TO SILT & CLAY, TRACE FINE SAND VARVED, LAMINATED
BEDROCK SONYEA GROUP		GRAY SILTSTONE TO SHALE, SOME OBLIQUE FRACTURING

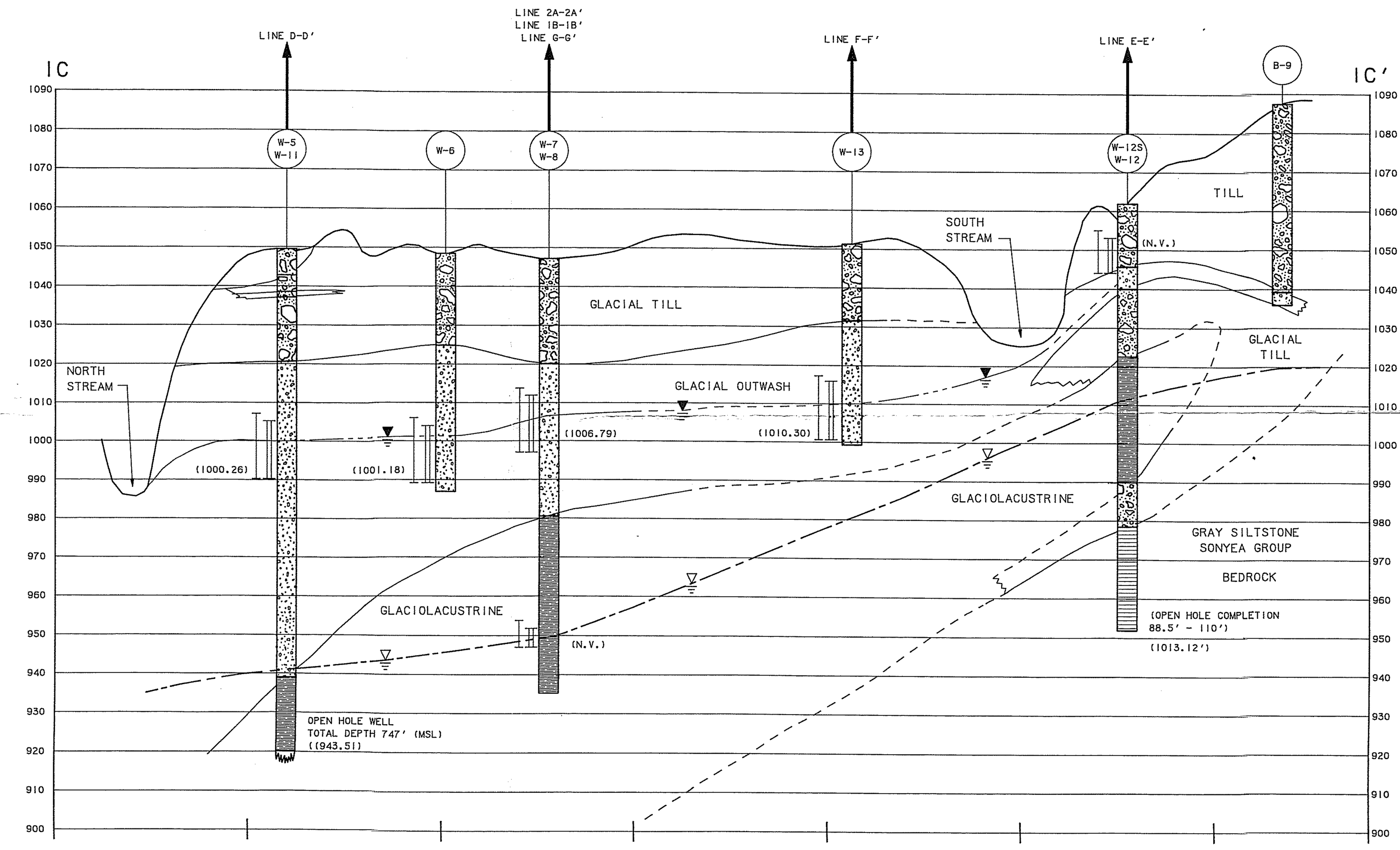


HYDROGEOLOGIC CROSS-SECTION 1B-1B'



HYDROGEOLOGIC CROSS-SECTION 1A-1A'

CROSS-SECTION SCALES:
HORIZONTAL: 1"=200'
VERTICAL: 1"=20'



HYDROGEOLOGIC CROSS-SECTION 1C-1C'

ICM:(07522.E8.HD)SHT SECTIONS A-A TO C-C
DWG: SW019028

WehranEnviroTech WEHRAN ENGINEERING, INC.	DESIGN BY: DRAWN BY: CHECK BY: SUPV. BY: APP'VD BY: DATE	Scales AS SHOWN	COLESVILLE LANDFILL BROOME COUNTY TOWN OF COLESVILLE NEW YORK	No. By Date REVISIONS

HYDROGEOLOGIC CROSS-SECTIONS 1A-1A', 1B-1B', 1C-1C'

Sheet 7 Of 7

Project No. 07522

APPENDIX D – MONITORING WELL BORING AND CONSTRUCTION LOGS

COLESVILLE LANDFILL WELL NETWORK

Date	Well ID*	Depth (ft.)	Description	Media	Depth to Water (ft.)	Elevation surface	Notes
6/6/1983	W-1	55	2" PVC	refuse/fill to 34'	45	1059.2	installed by Northstar Drilling
6/15/1983	W-2	70	2" PVC	upper glacial till	58	1115.6	installed by Northstar Drilling
11/1/1987	W-2S	20	2" PVC	upper glacial till	58	1115.1	screened 10-20
6/8/1983	W-3	47	2" PVC	clean 3', refuse 7', gla	34	1048.2	installed by Northstar Drilling
6/10/1983	W-4	50	2" PVC	Clean 3', refuse to 5',	37	1045.6	installed by Northstar Drilling
6/10/1983	W-5	60	2" PVC	clean fill to 7, till, outv	48	1049.3	installed by Northstar Drilling
6/15/1983	W-6	60	2" PVC	till, outwash	46	1048.3	installed by Northstar Drilling
6/15/1983	W-7	50	2" PVC	till, outwash	40	1047.2	installed by Northstar Drilling
6/17/1983	W-8	100	2" PVC	till, outwash	70	1046.8	glaciolacustrine
2/29/1984	W-10	67	2" PVC	till, outwash	55	1072.5	upgradient NE
4/4/1984	W-11	303	2" steel	see W-5, outwash, ro	65	1049.3	installed by Atlantic Testing
11/1/1987	W-12S	19	2" PVC	upper glacial till	dry	1062.8	installed by R&R International
3/5/1984	W-12	110	2" steel	till, outwash, till, rock	35	1062.4	installed by Atlantic Testing
3/2/1984	W-13	50	2" PVC	till, outwash	40	1050.9	installed by Atlantic Testing
3/5/1984	W-14	21	2" PVC	till, outwash	10	954.2	east of Smith
10/8/1987	W-14D	67	2" PVC	glaciolacustrine	6.5	954.4	screened 40-50
3/6/1984	W-15	27	2" PVC	till, outwash	14.5	949.36	installed by Northstar Drilling, Doraville (Cower?)
3/6/1984	W-16	22	2" PVC	outwash	10	987.1	installed by Northstar Drilling
10/11/1987	W-16D	92	2" PVC	glaciolacustrine	30	987.3	Screened 75-85
3/7/1984	W-17	20	2" PVC	gravel/sand	?	956.2	installed by Northstar Drilling
10/26/1987	W-17i	41	2" PVC	gray silt		956.8	installed by R&R International
12/17/1987	W-17D	216	2" PVC	bedrock at 204'		955.7	screened 204-216
3/7/1984	W-18	22	2" PVC	till, outwash	15	970.4	installed by Northstar Drilling
3/8/1984	W-19S	18	2" PVC	till, outwash	10	946.4	installed by Northstar Drilling
3/20/1984	B-19D	131	2" steel	till, outwash, till, rock	6	946.3	located in Doraville
3/8/1984	W-20S	22	2" PVC	outwash, till outwash	10	950	installed by Atlantic Testing
3/19/1984	W-20D	257	2" steel	outwash to 190, till, r	10	950	dry at 150' (outwash?)
3/9/1984	W-21	50	2" PVC	till, outwash	saturated 4	1049.4	installed by Northstar Drilling
10/14/1987	W-22S	22.5	2" PVC	glacial outwash	10	982.4	installed by R&R International
10/13/1987	W-22D	82	2" PVC	glaciolacustrine	17	982.4	screened 60-70

Date	Well ID	Depth (ft.)	Description	Media	Depth to Water (ft.)	Elevation surface	Notes
10/6/1986	W-23	20	2" PVC	glacial outwash	5	944.5	installed by R&R International
1/6/1992	PW-1	29	2" PVC	outwash, till outwash	16.5	973.6	all PW wells installed by Empire Soils
12/31/1991	PW-2	24	2" PVC	outwash, silt&clay	5	972.7	
12/30/1991	PW-3	34	2" PVC	till, outwash	7	986.2	
12/27/1991	PW-4	28	2" PVC	till, outwash	13	999.8	
1/2/1992	PW-5	33	2" PVC	till, outwash	7	983.7	
12/11/1991	PW-6	82	4" steel?	till, outwash	40	1038	converted to injection well
12/19/1991	PW-7	68	2" PVC	till, outwash, GLST de	30.5	1040.4	
12/26/1991	PW-8	76	2" PVC	till, outwash, GLST de	36.4	1047.7	
12/17/1991	PW-9	76	2" PVC	till, outwash, GLST de	36	1047.3	
12/26/1991	PW-10	85	2" PVC	till, outwash, GLST de	34.4	1047	
1/6/1992	PW-11	75	2" PVC	till, outwash, GLST de	36	1049.7	
1/10/1992	PW-12	83	2" PVC	refuse to 12, till, outw	wet through	1058.4	odor to 43
1/13/1992	PW-13	80	2" PVC	refuse to 30, till outw	20	1062.5	
11/1/1987	PZ-1S	31	2" PVC	upper glacial till	30	1081.8	installed by R&R International
10/31/1987	PZ-1D	81.2	2" PVC	deep glacial till	46	1081.7	installed by R&R International
12/11/1987	RFB	62	2" PVC	glacial outwash	52	1063.4	installed by Kendrick Drilling
12/9/1997	GM-PW-1	70	4" steel	sandy silt some clay	45 saturated		from Dec 30, 1997 GM Results of well installation and step-drawdown testing
11/26/1997	GM-PW-2	55	4" steel	sand gravel silty sand	30' saturated		GM-PW 1,2,3 installed by Maxim Technologies
11/25/1997	GM-PW-3	35	4" steel	silty sand	12' saturated		GM-PW-1,2,3 have 15' screened intervals
11/1/2000	GM-PW-4	37	6" PVC	dense fine sand/silt	11		installed by Parrat Wolff screened 22-32
10/31/2000	GM-PW-5	37	6" PVC	fine sand/silt	5.8		installed by Parrat Wolff screened 22-32
11/18/1997	GMMW-1	68	2" PVC	clay, sand, silty sand	53' saturated		installed by Maxim Tech, screened 53-63
2/11/1998	GMMW-2	54	2" PVC				installed by Maxim Tech, screened 39-49
2/12/1998	GMMW-3	54	2" PVC				installed by Maxim Tech, screened 37.5-47.5
11/16/1998	GMMW-4	67	2" PVC				installed by Uni-Tech Drilling, screened 52-62
11/13/1998	GMMW-5	68	2" PVC				installed by Uni-Tech Drilling, screened 53-63
11/1/2000	GMMW-6	55	2" PVC	sand/silt	37.5		installed by Parrat Wolff, screened 40-50
8/23/2005	GMMW-7	70	2" PVC	no well log, very close to GMMW-5			installed by Parrat Wolff, screened 55-65
11/11/1998	IW-1	70	2" PVC			1040.28	installed by Uni-Tech, screened 50-65
11/12/1998	IW-2	70	2" PVC			1040.86	installed by Uni-Tech, screened 50-65

Date	Well ID	Depth (ft.)	Description	Media	Depth to Water (ft.)	Elevation surface	Notes
The following injection wells were all installed by Parrat Wolff, media predominantly fine sand and silt in screened area,							
	all grouted to 5' below ground surface to allow injection piping tie in						
9/12/2000	IW-3	70	2" PVC	fine sand/silt			screened 50-70
9/12/2000	IW-4	70	2" PVC		50		screened 50-70
9/13/2000	IW-5	75	2" PVC		50		screened 55-75
9/15/2000	IW-6	75	2" PVC		50		trash observed in 7'-12'
9/18/2000	IW-7	75	2" PVC		50		screened 55-75
9/19/2000	IW-8	75	2" PVC				screened 55-75
9/20/2000	IW-9	80	2" PVC				screened 55-80
9/29/2000	IW-10 orig	abandoned, lost 50 feet of auger down collapsed hole, grouted to surface					
9/29/2000	IW-10	80	2" PVC				screened 55-80
9/22/2000	IW-11	80	2" PVC				screened 55-80
9/25/2000	IW-12	80	2" PVC				screened 55-80
9/26/2000	IW-13	80	2" PVC				screened 55-80
9/24/2000	IW-14	80	2" PVC				screened 60-80
9/28/2000	IW-15	80	2" PVC				screened 60-80
12/5/2006	TW-1	70	2" PVC		53		Parrat Wolff; screened 50-70
8/1/1989	TB-W-25	105	2" PVC	bedrock at 92.5'	61	1116.6	installed by Warren? Screened 77-87 gray clay

* Highlighted wells are part of the current monitoring network.

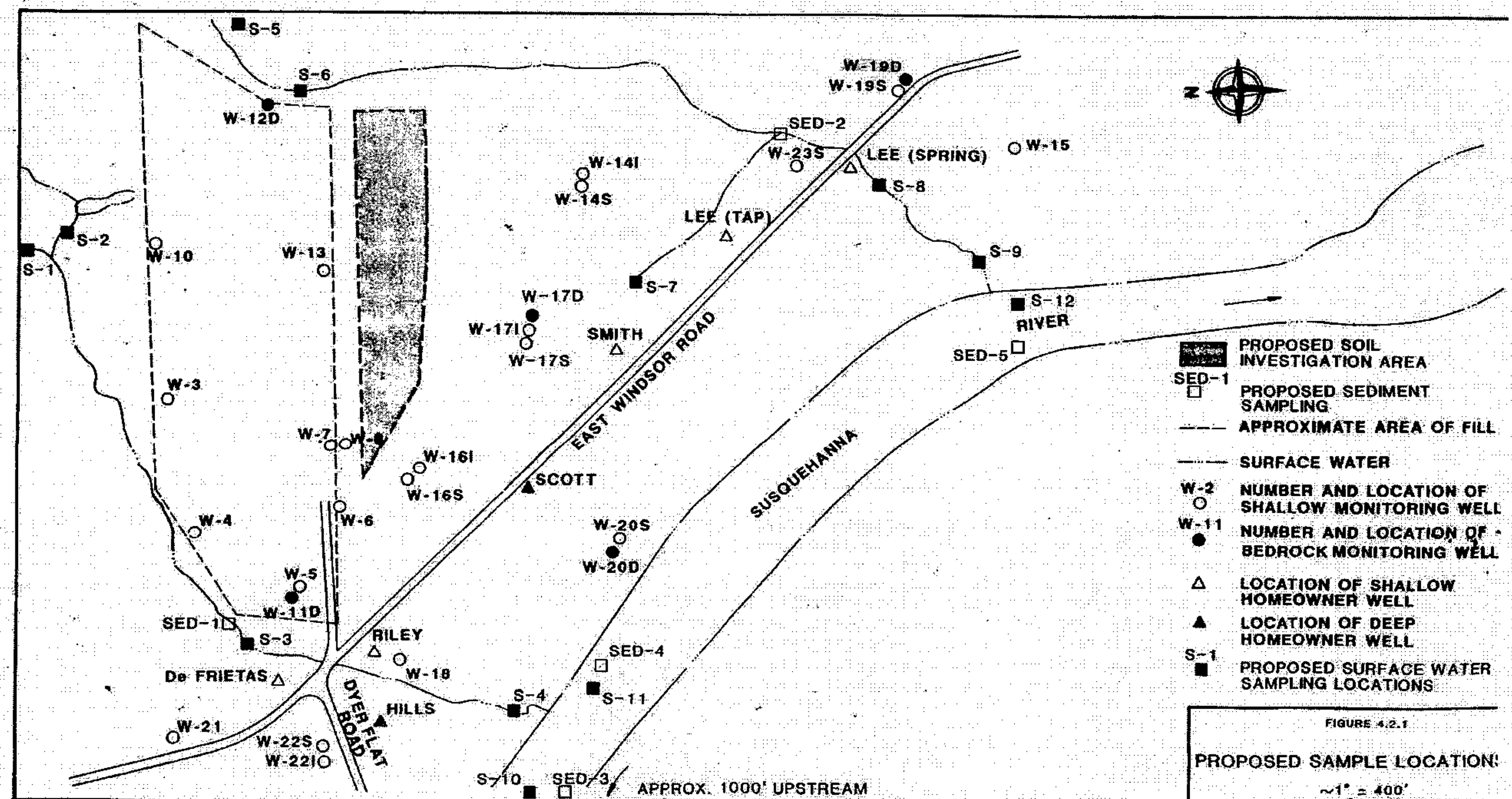
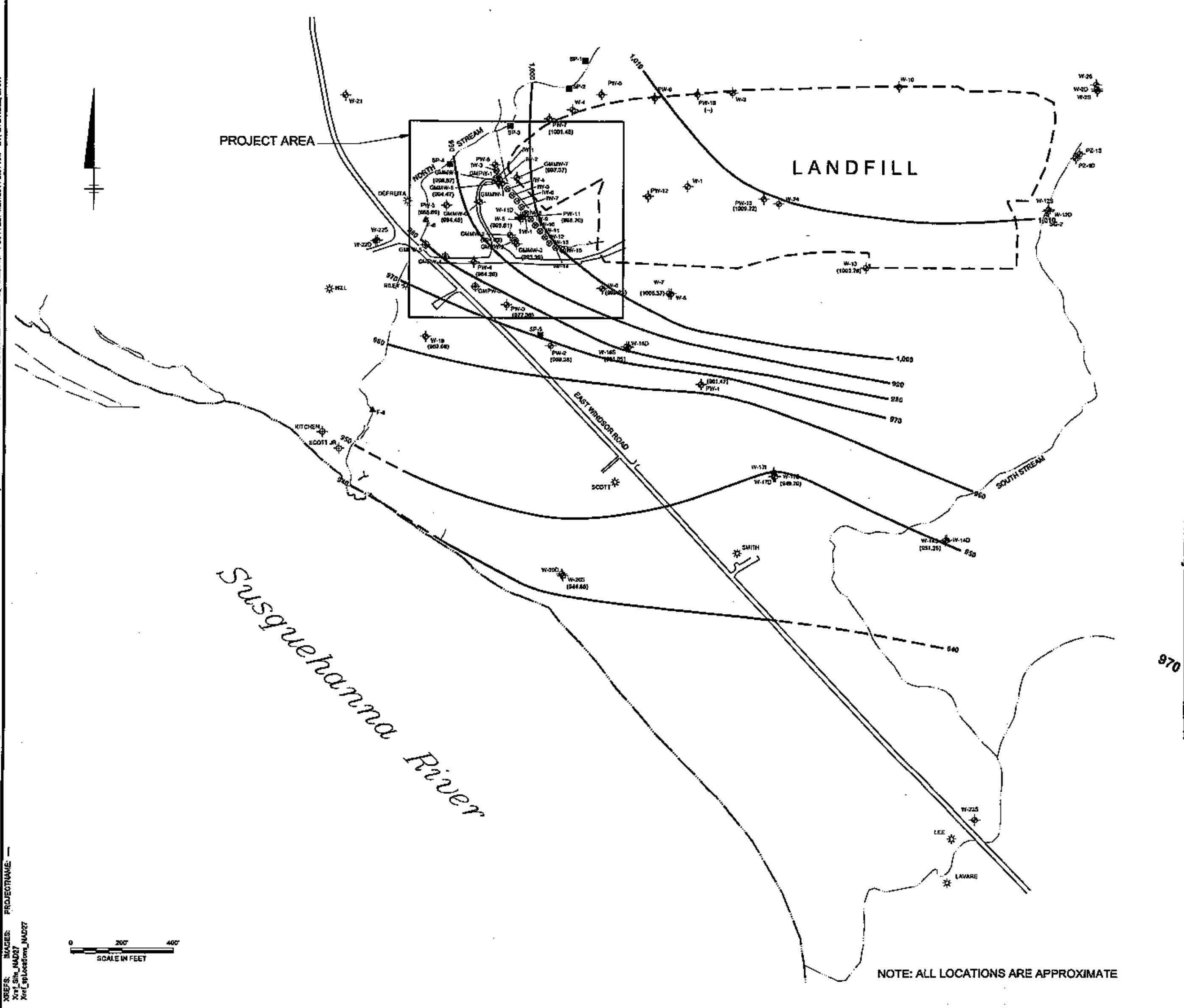


FIGURE 4.2.1

PROPOSED SAMPLE LOCATIONS

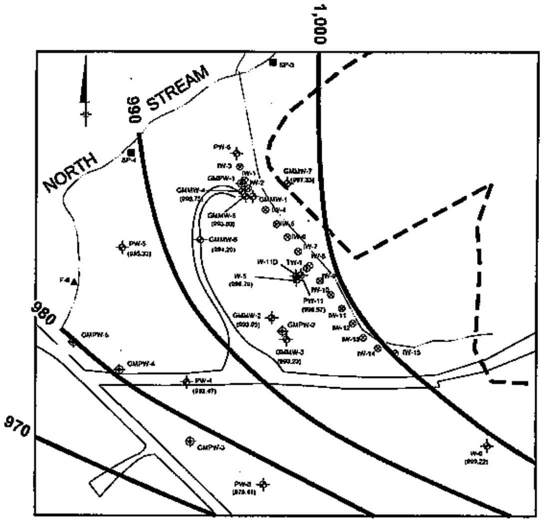
~1" = 400'



EXPLANATION

LONG-TERM MONITORING PLAN DESIGNATIONS

- W-24 — LOCATION AND DESIGNATION OF MONITORING WELL
- SCOTT — LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
- HILL — LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
- IW-2 — LOCATION AND DESIGNATION OF INJECTION WELL
- GMPW-3 — LOCATION AND DESIGNATION OF PRODUCTION WELL
- TW-1 — LOCATION AND DESIGNATION OF TEST MONITORING WELL
- F-5 — LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
- SP-2 — LOCATION AND DESIGNATION OF SPRING SAMPLE AND CO-LOCATED SEDIMENT SAMPLE
- GMMW-5 — LOCATION AND DESIGNATION OF QUARTERLY MONITORING WELL
- PE-3 — LOCATION AND DESIGNATION OF ANNUAL MONITORING WELL



SITE PLAN SHOWING PROJECT AREA

COLESVILLE LANDFILL
COLESVILLE, NEW YORK

SITE PLAN SHOWING WATER-LEVEL ELEVATIONS ON MARCH 18, 2014

ARCADIS

FIGURE 1

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-1

PROJECT: COLESVILLE LANDFILL
CLIENT: BROOME County
BORING CONTRACTOR: Northstar Drilling INC
GROUND WATER 45'

SHEET NO. 1 OF 2
JOB NO. 01273290
ELEVATION
DATE STARTED 6/6/83
DATE FINISHED 6/6/83
DRILLER JEFF Thew
INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" PVC Riser	0				CLEAN FILL	
	7.0				REFUSE/FILL	
Bentonite Pellet seal	34.0				GLACIAL TILL	
Graded Sand Pack	36	1	S.S.	14 26 19	m-F GRAVEL, Some(+) F-C sand, little(+) Silt & Clay	
PVC Screen	41	2	S.S.	10 19 19		
	44.0				OUTWASH	

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-1

PROJECT: COLESVILLE LANDFILL

CLIENT: BROOME County

SHEET NO. 2 OF 2

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
12" pvc screen; Graded sand pack	45	3	S.S.	8 8 / 9	C-F SAND, little(+) F Gravel Trace Silt & Clay	Saturated
	50	4	S.S.	6 4 / 5	@ 50'-51' silt & clay content increases To little.	
collapsed Soils	55	5	S.S.	8 9 / 11	F-C SAND, little silt & clay Trace F Gravel	
	60	6	S.S.	2 5 / 9	m-c SAND, little(-) SILT & clay, Trace F Gravel occasional ½" lense OF SILT & clay	61.5'
					END OF BORING	Well Fully developed with air upon completion.
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-2

PROJECT: COLESVILLE LANDFILL	SHEET NO. 1 OF 2
CLIENT: BROOME county	JOB NO. 01273290
BORING CONTRACTOR: Northstar Drilling Inc.	ELEVATION
GROUND WATER 58'	DATE STARTED 6/13/83
	DATE FINISHED 6/14/83
	DRILLER JEFF Thew
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION: Cement - Bentonite Grout (0–45'+); 2" PVC riser (0–45'+)

DEPTH FEET	NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	S.S.	1 3 / 1	GLACIAL TILL SILT and F SAND, with vegitation	
5	2	S.S.	14 14 / 30	Brown SILT & CLAY, little(+) F Gravel, Trace F Sand	
10	3	S.S.	4 16 / 14		
15	4	S.S.	7 16 / 25	@ 15' becomes grayish in color.	
20	5	S.S.	9 9 / 12		
25	6	S.S.	5 11 / 12	@ 25' becomes green-gray in color.	
30	7	S.S.	10 12 / 15	@ 30' grades To Gray Green CLAY & SILT, little(+) F-m Gravel, Trace F Sand	
35	8	S.S.	9 35/5"	ClAY & SILT some(-) F Gravel, Trace F Sand	
40	9	S.S.	13 26 / 21		
45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

PROJECT: COLESVILLE LANDFILL	TEST BORING LOG
CLIENT: BROOME County	BORING NO. W-2
	SHEET NO. 2 OF 2
	JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Bentonite Pellet Seal	45	10	S.S.	28 27 23	SILT & CLAY, Some F Gravel little(-) F Sand	
	50	11	S.S.	40 40 28	@ 50' becomes m-F-c SAND Some F Gravel, little(+) silt & clay	
	55	12	S.S.	23 60/5"	SILT & CLAY, some F-mc Sand Some(-) F Gravel	WL 58' Saturated
	60	13	S.S.	22 50/2"	m-F-c SAND, some F Gravel little silt & clay	
2" PVC screen; Graded Sand pack	65	14	S.S.	9 16 12	F-m GRAVEL, some m-c Sand, little(-) silt & Clay. @ 66' becomes SILT & CLAY little(+) F-m Gravel, little(-) F-m Sand	
	70	15	S.S.	19 34 59	Grey siltstone - highly contorted, soft, well sorted	
					END OF BORING at 71.5'	well Fully developed with air upon completion.
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

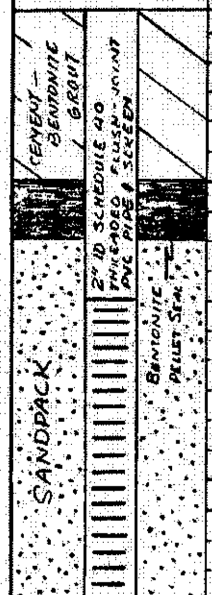
BORING NO. W2s
SHEET NO. 1 OF 1
JOB NO. 07522HX
ELEVATION 1115.84
DATE STARTED 1 NOV 87
DATE FINISHED 1 NOV 87
DRILLER E DUCCI
INSPECTOR KWB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA			
DIA.	4 1/4			
WT.				
FALL				

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	0–20				FOR DETAILED SOILS DESCRIPTION SEE BORING LOG W-2 (20 FT)	
	20				END OF BORING	
	25					
	30					
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-3

PROJECT: COLESVILLE LANDFILL	SHEET NO. 1 OF 2
CLIENT: BROOME COUNTY	JOB NO. 01273290
BORING CONTRACTOR: NORTHSTAR DRILLING INC	ELEVATION
GROUND WATER 34'	DATE STARTED 6/7/83
	DATE FINISHED 6/8/83
	DRILLER JEFF Thew
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" PVC Riser	0	1	S.S.	2 3 / 4	CLEAN FILL — 3.0	
	5	2	S.S.	2 6 / 7	Refuse/Fill — 7.0	
	10	3	S.S.	17 21 / 18	GLACIAL TILL: med Brown M-C SAND little F-M Gravel, Trace(+) silt	
	15	4	S.S.	20 75/4"	F Gravel, little F-M SAND, Trace Silt	
Bentonite Slurry*	20	5	S.S.	18 52 / 37	Brown Gray SILT & CLAY little(+) F-M Gravel, little F-C Sand	*Due To Running Sand and hole collapse, Bentonite slurry was injected
	25	6	S.S.	29 35 / 38	F-M GRAVEL, little(-) Silt, little(-) F-C sand	
SAND Pack	30	7	S.S.	25 21 / 23	— 33.0	
2" PVC Screen	35	8	S.S.	8 10 / 12	OUTWASH: Dark Brown M-C SAND little(-) Silt, — 37.0	WL at 34' saturated
	40	9	S.S.	29 32	GLACIAL TILL: F-M Gravel, little(+) silt & Clay, Trace(+) F-C SAND — 43.0	
	45				OUTWASH	

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CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-3

PROJECT: COlESVillE LANDFILL
CLIENT: BROOME County
SHEET NO. 2 **OF** 2
JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Collapsed soil	45	10		7 9 / 9	alternating 6" layers of F-C SAND Trace(+) silt + clay with F-m Gravel little(+) F sand, little silt + clay	Hole collapsed while pulling augers. Had To Jet inside augers To clear running Sand. Sand pack is likly mixed with natural sand.
	50	11		11 11 / 12	F-C SAND, little(-) silt + clay.	
					END of Boring at 51.5'	Well Fully developed with air upon completion.
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-4

PROJECT: COLESVILLE LANDFILL	SHEET NO. 1 OF 2
CLIENT: BROOME county	JOB NO. 01273290
BORING CONTRACTOR: North Star Drilling, Inc.	ELEVATION
GROUND WATER 37.4'	DATE STARTED 6/9/83
	DATE FINISHED 6/10/83
	DRILLER JEFF Thow
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" PVC Riser	0	1	S.S.	4 4 6	CLEAN FILL — 3.0	
	5				Refuse/Fill — 5.0	
	5	2	S.S.	3 7 17	GLACIAL TILL SILT & CLAY, Some(-) m-F sand, little(-) F Gravel	
	10	3	S.S.	23 22 12	SILT, some F-m sand, little(+) F Gravel — 13.0	
	15	4	S.S.	13 10 6	OUTWASH @ 15.5' grades To F-M SAND, Trace(+) silt — 20.0	
	20	5	S.S.	7 6 6	GLACIAL TILL	
	25	6	S.S.	4 6 3	OUTWASH Dark Brown m-F SAND, Trace silt	
Bentonite Pellet Seal	30	7	S.S.	7 9 8		
Graded Sand Pack; 2" PVC Screen	35	8	S.S.	8 8 8	Grading To F SAND, little- silt	WL - 37.4
	40	9	S.S.	9 12 12	F SAND, some silt	Saturated
	45					

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CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-4
SHEET NO. 2 **OF** 2
JOB NO. 01273290

PROJECT: COLESVILLE LANDFILL
CLIENT: BROOME COUNTY

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	45	10	S.S.	9 10 11	@ 46' 2" lense of SILT	
	50	11	S.S.	10 13 12	F-m SAND, little silt & clay.	
					END OF BORING at 51.5'	Well Fully developed with air upon completion.
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-5

PROJECT: COLESVILLE LANDFILL

CLIENT: BROOME COUNTY

BORING CONTRACTOR: NORTHSTAR DRILLING INC.

GROUND WATER 47.2'

SHEET NO. 1 OF 2

JOB NO. 01273290

ELEVATION

DATE STARTED 6/10/83

DATE FINISHED 6/10/83

DRILLER Jeff Thew

INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0–8				CLEAN FILL — 8.0	
8–11				GLACIAL TILL: brown SILT and F SAND, little(+) F Gravel — 11.0	
10	1	S.S.	4 7 11		
11–13				OUTWASH: @11' becomes brown M-F SAND, trace(+) silt — 13.0	
15	2	S.S.	8 8 10	GLACIAL TILL: F-M SAND, some F Gravel, little(+) silt & clay	
20	3	S.S.	9 17 17	SILT & CLAY, some F-M Sand, little F-M Gravel.	
25	4	S.S.	12 13 10	F-M SAND, some silt & clay, little(+) F Gravel — 28'	Frequent cobbles and Boulders To 28'
30	5	S.S.	8 7 6	OUTWASH: M-F SAND, little SILT	
35	6	S.S.	6 9 8	F SAND, little(+) silt, occasional lense of silt	
40	7	S.S.	6 8 9		

WELL CONSTRUCTION: Cement – Bentonite Grout; 2" PVC Riser; Bentonite Pellet Seal

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-5

PROJECT : COlESVILLE LANDFILL

SHEET NO. 2 OF 2

CLIENT : BROOME COUNTY

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
2" PVC screen; Graded Sand Pack	45	8	S.S.	10 12 13		
						WL - 47.2
	50	9	S.S.	8 11 11	Grading To F SAND, some(-) silt.	saturated
	55	10	S.S.	7 10 11		
	60	11	S.S.	7 9 13		
					END OF BORING at 61.5'	Well Fully developed with air upon completion.
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-6

SHEET NO. 1 OF 2

JOB NO. 01273290

ELEVATION

DATE STARTED 6/15/83

DATE FINISHED 6/15/83

DRILLER JEFF Thew

INSPECTOR T. Roeper

PROJECT: COLESVILLE LANDFILL

CLIENT: BROOME COUNTY

BORING CONTRACTOR: NORTHSTAR Drilling Inc

GROUND WATER 46'

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH IN FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" PVC Riser	0	1	S.S.	2 8 11	GLACIAL TILL SILT and F SAND, some F Gravel.	
	5	2	S.S.	24 25 20	F-M GRAVEL, little(+) F Sand little Silt	
	10	3	S.S.	17 20 20	SILT & CLAY, some(-) F Gravel, little(+) F sand	
	15	4	S.S.	13 13 14	SILT and F SAND, little(+) F Gravel	
	20	5	S.S.	10 9 10	m-c SAND, some F Gravel little Silt 23'	
	25	6	S.S.	8 7 7	OUTWASH Grades To m-c SAND, little(-) F Gravel Trace silt	
	30	7	S.S.	5 4 5		
	35	8	S.S.	7 6 5		
Bentonite Pellet Seal	40	9	S.S.	7 7 9	Grades To m-F-c SAND Trace silt.	
	45					

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-6

PROJECT: COLESVILLE LANDFILL

CLIENT: BROOME COUNTY

SHEET NO. 2 OF 2

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
2" PVC SCREEN; Graded Sand Pack	45	10	S.S.	8 7 9	Grading to fine sand, little silt	saturated WL - 46'
	50	11	S.S.	6 6 9	F SAND, some(-) silt	
	55	12	S.S.	10 10 11		
	60	13	S.S.	6 8 10		61.5'
					END OF BORING at 61.5	Well Fully developed with air upon completion.
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-7

PROJECT: COLESVILLE LANDFILL	SHEET NO. 1 OF 2
CLIENT: BROOME COUNTY	JOB NO. 01273290
BORING CONTRACTOR: NORTHSTAR DRILLING INC.	ELEVATION
GROUND WATER 40'	DATE STARTED 6/15/83
	DATE FINISHED 6/15/83
	DRILLER JEFF Thew
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
					GLACIAL TILL	
Cement - Bentonite Grout; 2" PVC Riser	0	1	S.S.	2 4 / 3	F SAND and SILT, Trace+ F Gravel	
	5	2	S.S.	5 30/2"		
	10	3	S.S.	9 18 / 13	Brown F-M SAND and SILT little(+) F Gravel	evidence of Perched water
	15	4	S.S.	18 16 / 18		
	20	5	S.S.	8 8 / 8	m-c-F SAND, little(-) F Gravel, Trace(+) silt	
	25	6	S.S.	11 9 / 8	27'	
					OUTWASH	
Bentonite Pellet Seal	30	7	S.S.	8 8 / 10	m-F SAND, Trace F Gravel Trace(-) silt	
2" PVC SCREEN; Graded SAND Pack	35	8	S.S.	8 5 / 10	Med. SAND, Trace silt occasional silt lense	
	40	9	S.S.	11 14 / 14	grading to F SAND, little silt	W.L. 40' Saturated
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

PROJECT : COLESVILLE LANDFILL
CLIENT : BROOME COUNTY

TEST BORING LOG
BORING NO. W-7
SHEET NO. 2 OF 2
JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	45	10	S.S.	7 8 11	F SAND and SILT	
	50	11	S.S.	4 8 11	END OF BORING at 51.5'	
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-8

PROJECT: COLESVILLE LANDFILL	SHEET NO. 1 OF 3
CLIENT: BROOME COUNTY	JOB NO. 01273290
BORING CONTRACTOR: NORTHSTAR DRILLING INC.	ELEVATION
GROUND WATER 40'	DATE STARTED 6/17/83
	DATE FINISHED 6/17/83
	DRILLER JEFF Thew
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE		S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
2" PVC Riser (0–45+)	0				GLACIAL TILL	
	5				For soils classification see W-7	
	10					
	15					
	20					
	25					
	27				OUTWASH	
	30					
	35					
	40					
	45					

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TEST BORING LOG
BORING NO. W-8
SHEET NO. 2 **OF** 3
JOB NO. 01273290

PROJECT: COLESVILLE LANDFILL
CLIENT: BROOME COUNTY

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" PVC Riser	45					
	50				OUTWASH	
	55	1	S.S.		Brown SILT and F SAND	
	60	2	S.S.		Grading To F SAND and SILT	
	65	3	S.S.			
	70	4	S.S.		varying in composition from F SAND and SILT to SILT and F SAND with occasional lense of clay.	
	75	5	S.S.			
	80	6	S.S.		SILT and F SAND	
	85	7	S.S.			
Bentonite Pellet Seal	90	8	S.S.		Grading To SILT, little (-) F SAND, 2" clay lense	
Screen; Graded SAND Pack	95	9	S.S.		@ 95.5 1" clay lense	

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CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. w-8
SHEET NO. 3 **OF** 3
JOB NO. 01273290

PROJECT: Colesville Landfill
CLIENT: BROOME County

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
2" PVC	95	9	S.S.			
	100	10	S.S.		Grading To clayey SILT	
	105					
	110					
	115					
	120					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-10

PROJECT: Colesville Landfill	SHEET NO. 1 OF 2
CLIENT: Broome County	JOB NO. 01273290
BORING CONTRACTOR: NorthSTAR Drilling Inc.	ELEVATION 1072.7
GROUND WATER	DATE STARTED 7/28/84
	DATE FINISHED 7/29/84
	DRILLER Harry
	INSPECTOR T. Enzer

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S		
DIA.	6"	2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION: Cement-Bentonite Grout; 2" pvc riser pipe

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	S.S.	2 4 / 6 7	GLACIAL TILL light brown SILT & CLAY, little F-m Gravel, Trace F-c Sand	
5	2	S.S.	17 15 / 16 20	brown & Gray mottled CLAY & SILT little(+) f-m Gravel, little f-c Sand	
10	3	S.S.	12 16 / 23 19	light brown CLAY & SILT Some(-) f-m Gravel, little f-c Sand	
15	4	S.S.	52 40 / 28 37	light brown SILT & CLAY, Some(-) f-c Sand, little f-m Gravel	
20	5	S.S.	20 32 / 38 27		
25	6	S.S.	30 32 / 36 38	grading to med brown F-C SAND, little f-m Gravel, little Silt & Clay	
30	7	S.S.	11 13 / 25 21	GLACIAL OUTWASH (31') med brown f-m SAND, little(-) f Gravel, Trace Silt @ 35', 8" lense of med brown f-c SAND little f-m Gravel, little Silt & Clay	31'
35	8	S.S.	5 12 / 11 12	@ 36' light brown f SAND, Some Silt	
40	9	S.S.	16 16 / 16 19	@ 40' brown f-c SAND, little Silt little(-) f Gravel	
45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-10
SHEET NO. 2 OF 2
JOB NO. 01[illegible]

PROJECT: Colesville Landfill
CLIENT: Broome County

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Bentonite Pellet Seal	45	10	S.S.	11 13 / 15 20	GLACIAL OUTWASH light brown very F SAND and SILT	
Graded Sand Pack	50	11	S.S.	11 22 / 22 21	occasional varves	
	55	12	S.S.	11 21 / 22 20	light brown SILT and F SAND occasional lense of silt 2" lense of Dark brown F SAND some silt Saturated	1st encountered Saturation in Sample # 12
	60	13	S.S.	12 16 / 16 20		
	65	14	S.S.	15 / 16 25		
					END of Boring at 67	
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

SHEET NO. 1 OF 7

JOB NO. 01273729

ELEVATION 1049.30

DATE STARTED 2/29/84

DATE FINISHED 4/4/84

DRILLER Ralph

INSPECTOR T. Roeper

PROJECT: Colesville Landfill

CLIENT: Broome County

BORING CONTRACTOR: Atlantic Testing Lab.

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	Steel	SS		
DIA.	2"	2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Bentonite Grout; 2" Steel Casing (0–45+)	0–45				For detailed description of soils See log of W-5	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

PROJECT: Colesville Landfill

CLIENT: Broome County

SHEET NO. 2 **OF** 7

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" steel Casing	45				GLACIAL OUTWASH	
	65	1	S.S.	16 12 / 15 20	Dark brown F SAND little Silt saturated	
	70	2	S.S.	12 14 / 15 15		
	75	3	S.S.	12 21 / 26 40	grading To F SAND and SILT	
	80	4	S.S.	14 11 / 12 27		
	85	5	S.S.	13 17 / 22 29		
	90	6	S.S.	23 29 / 30 31		
	95	7	S.S.	20 27 / 35 40		

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-11
SHEET NO. 3 **OF** 7
JOB NO. 01273290

PROJECT: Colesville Landfill
CLIENT: Broome County

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" Steel Casing	95	7	S.S.	20 27 / 35 49	GLACIAL OUTWASH med to dark brown F SAND and SILT	
	100	8	S.S.	43 34 / 34 40	@ 101 grades to brownish gray clayey SILT	
	105	9	S.S.	21 27 / 25 30		
	110	10	S.S.	26 43 / 51 57		
	115	11	S.S.	21 37 / 40 46		
	120	12	S.S.	26 34 / 43 51	brownish gray SILT, some To little F Sand	
	125	13	S.S.	24 37 / 38 49		
	130	14	S.S	22 31 / 34 45		
	135	15	S.S.	21 32 / 51 52		
	140	16	SS	28 36 / 48 59		
	145	17	S.S	24 38 / 51 [illegible]		

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

PROJECT: Colesville Landfill
CLIENT: Broome County
SHEET NO. 4 OF 7
JOB NO. 01273282

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" steel casing	145	17	S.S.	24 38 / 61 75	GLACIAL OUTWASH light brownish gray, faintly varved clayey SILT	
	150	18	S.S.	26 35 / 52 64		
	155					
	160	19	S.S.	37 52 / 67 78	@161 1'op Red brown clay & SILT, varved	
	165					
	170					
	175					
	180					
	185					
	190					
	195					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

SHEET NO. 5 OF 7

JOB NO. 01273290

PROJECT : Colesville Landfill

CLIENT : Broome County

WELL CONSTRUCTION	DEPTH IN FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" Steel Casing	195–245				GLACIAL OUTWASH light brownish gray SILT, Some To little F Sand	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

PROJECT : Colesville Landfill

CLIENT : Broome County

SHEET NO. 6 OF 7

JOB NO. [illegible]

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" Steel Casing	245				GLACIAL OUTWASH	
	250				light brownish gray SILT, some to little F Sand	
	255					
	260					
	265					
	270					
					GLACIAL TILL Gray with frequent cobbles and boulders	2" steel casing would not advance any further so it was grouted in place
	275					
	280				Sonyea Group Gray SILTSTONE	
open rock hole	285					Note: while cleaning out grout a piece of carbide steel broke off of bit. Did not get any core runs due to this. Bedrock was therefore drilled with a roller bit.
	290					
	295					

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-11

PROJECT: Colesville Landfill

CLIENT: Broome County

SHEET NO. 7 OF 7

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
open rock hole	45				Sonyea Group Gray Siltstone	
	300 / 50					
					END of Boring at 303'	
	305 / 55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-12S
SHEET NO. 1 OF 1
JOB NO. 07522HX
ELEVATION 1062.80
DATE STARTED 1 NOV 87
DATE FINISHED 1 NOV 87
DRILLER E. RUCCI
INSPECTOR KJB

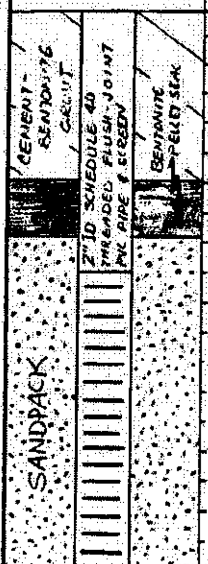
PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA			
DIA.	4 1/4"			
WT.				
FALL				

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	0				FOR DETAILED SOILS DESCRIPTION SEE BORING LOG W-12	
	5					
	10					
	15					
					19.0 FT	
	20				END OF BORING	
	25					
	30					
	35					
	40					
	45					



WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

PROJECT: ColEsville LandFill	BORING NO. W-12
CLIENT: Broome County	SHEET NO. 1 OF 3
BORING CONTRACTOR: Atlantic Testing Lab.	JOB NO. 01273290
GROUND WATER	ELEVATION 1062.4

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	Steel	S.S.		
DIA.	3"	2"		
WT.		140 lbs		
FALL		30"		

DATE STARTED 2/29/84
DATE FINISHED 3/5/84
DRILLER Caird
INSPECTOR T. Roeper

WELL CONSTRUCTION: Cement-Bentonite Grout; 2" steel riser pipe

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	S.S.	13 18 / 20 19	GLACIAL TILL Med brown SILT & CLAY, Some f-m Gravel, little f-c Sand	
5	2	S.S.	18 38 / 30 32		
10	3	SS	13 21 / 30 45		
15	4	S.S.	14 20 / 25 24	Grading To brown SILT & CLAY, Some f-c Sand, little f-m Gravel	
				GLACIAL OUTWASH med brown SILT, little f Sand wet	18
20	5	S.S.	5 9 / 13 27		
				GLACIAL TILL Med brown clayey SILT, little f-c Sand, little f-m Gravel	21
25	6	S.S.	29 81 / 53 75	med To dark brown f-c SAND Some(-) Silt & Clay, Trace(+) f-m Gravel	
30	7	S.S.	24 38 / 30 30		
35	8	S.S.	13 16 / 26 30	med To dark brown f-m GRAVEL Some f-c Sand, little silt & Clay Saturated	
				GLACIAL OUTWASH med brown SILT & F SAND Faint varves, saturated	39
40	9	S.S.	9 12 / 14 14		
45	10	S.S.	[illegible] 12 / 14 17		

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-12

PROJECT: Colesville Land Fill

CLIENT: Broome County

SHEET NO. 2 **OF** 3

JOB NO. 01273292

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" steel riser pipe	45	10	S.S.	11 12 / 16 19	GLACIAL OUTWASH	
					Med brown SILT, little F Sand, faint varves	
	50	11.	S.S.	10 12 / 13 15		
	55	12	S.S.	11 10 / 12 13	grading to med brown SILT	
	60	13	S.S.	10 14 / 16 17		
	65	14	S.S.	14 16 / 17 20		
	70	15	S.S.	10 15 / 17 20		
					GLACIAL Till	73
	75	16	S.S.	19 21 / 23 26	Gray clayey SILT, Some F-C Sand, little F-m Gravel	
	80	17	S.S.	41 21 / 28 77		
					SONYEA Group	84
	85				Gray SILTSTONE	
	90	RUN	# 1	90.0' To 95.0'	AX Core; Rec 4.8'	
open rock	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-12
SHEET NO. 3 OF 3
JOB NO. 01273290

PROJECT: Colesville Landfill
CLIENT: Broome County

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
open rock	95	RUN	#2	95.0 TO 100.0	Sonyea Group Gray SILTSTONE Rec 5.0'	
	100	RUN	#3	100.0 TO 105.0	Rec 4.8'	
	105	RUN	#4	105.0 TO 110.0	Rec 5.0'	
	110				END of Boring at 110'	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-13
SHEET NO. 1 **OF** 2
JOB NO. 01273290
ELEVATION 1051.4
DATE STARTED 3/1/84
DATE FINISHED 3/2/84
DRILLER Harry
INSPECTOR T. Foeper

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: North Star Drilling Inc.

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.	8"	2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION: 2" PVC riser pipe; Cement - Bentonite Grout; Bentonite Pellet Seal; Graded Sand Pack

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	S.S.	8 6 / 6 4	GLACIAL TILL med brown SILT & CLAY, Some F-m Gravel, little f-c Sand	
5	2	S.S.	30 51 / 46 37	F-m GRAVEL, Some silt & Clay little f-c Sand	
10	3	S.S.	14 18 / 19 13	Grading to med brown F-C SAND little(+) F-m Gravel, little Silt & Clay layer of cobbles 6'-8'	
15	4	S.S.	8 10 / 8 8		evidence of perched water
20	5	S.S.	6 5 / 6 9	GLACIAL OUTWASH @ 20.3' F-C SAND, Trace Silt, Trace F Gravel, grading to very F SAND Some Silt	
25	6	S.S.	6 6 / 7 10	med brown F SAND, Trace Silt	
30	7	S.S.	10 8 / 10 10	grading to F SAND, some silt Thin laminations, grading to F SAND Trace Silt	
35	8	S.S.	8 6 / 8 4	@ 35'-36' med brown SILT, little(+) F-C SAND, Trace F Gravel @ 36' becomes F SAND, little Silt	
40	9	S.S.	12 2 / 13 14	med brown SILT and F SAND with lense of Dark brown F-m SAND, little silt saturated	1st encountered Saturation in Sample 9
45					

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TEST BORING LOG

BORING NO. W-13

PROJECT: Colesville Landfill

CLIENT: Broome County

SHEET NO. 2 **OF** 2

JOB NO. 01272290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	45	10	S.S.	10 9 / 15 21	GLACIAL OUTWASH med brown SILT and F SAND irregular varves. Saturated	
Collapsed Soil	50	11	S.S	9 11 / 13 20		
					END of Boring at 52'	
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

PROJECT: Colesville Landfill	BORING NO. W-14
CLIENT: Broome County	SHEET NO. 1 OF 1
BORING CONTRACTOR: Northstar Drilling	JOB NO. 01273290
GROUND WATER	ELEVATION 954.2
	DATE STARTED 3/5/84
	DATE FINISHED 3/5/84
	DRILLER Jeff Thew
	INSPECTOR T. Roeper

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.	6"	2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Grout	0	1	S.S.	2 2 / 4 7	GLACIAL TILL Gray and brown mottled SILT and CLAY, pieces of lignite	
Graded Sand Pack; Bentonite Pellet Seal 2'	5	2	S.S.	10 10 / 12 10	GLACIAL OUTWASH Brown & gray mottled, varved, SILT & CLAY @6' becomes layered, med brown, F-m SAND with light brown F SAND and SILT lenses. Tip saturated	
	10	3	S.S.	1 2 / 1 2	becomes Dark brown To black F-m SAND, Trace silt. Saturated	
	15	4	S.S.	1 1 / 2 2	Dark brown F-m SAND Trace silt. occasional CLAY & SILT lenses	
collapsed soil	20	5	S.S.	2 3 / 4 5		
					END of Boring at 21'	
	25					
	30					
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W14d

PROJECT:	Colesville Landfill Remedial Investigation
CLIENT:	Broome County Dept. of Public Works
BORING CONTRACTOR:	R&R International

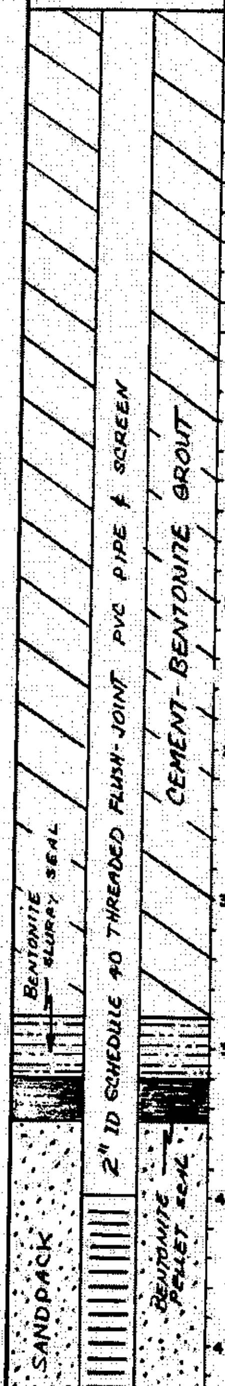
SHEET NO.	1 OF 2
JOB NO.	07522 HX
ELEVATION	954.10
DATE STARTED	7 OCT 87
DATE FINISHED	8 OCT 87
DRILLER	E. Pucci
INSPECTOR	KJB

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4"	2"		
WT.		140 lb		
FALL		30"		

WELL CONSTRUCTION



DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	SS	1 2 / 4 6	6" TOPSOIL WITH ROOTS	
	2	SS	6 9 / 9 9	Brown to Grey SILT & CLAY trace (f) Sand	
5	3	SS	10 12 / 12 12	5.5 FT — GLACIAL OUTWASH DEPOSITS. Brown (f) SAND, some(-) Silt trace (f) Gravel	
10	4	SS	3 4 / 4 3		
15	5	SS	1 1 / 1 3		
20	6	SS	1 1 / 4 5		
25	7	SS	5 6 / 7 8		
30	8	SS	2 2 / 3 4		
35	9	SS	1 1 / 2 1		
40	10	SS	1 1 / 1 1	@40FT becoming Brown sandy SILT to SILT	
45	11	SS	1 6 / 17 31	@45FT Brown (f-m) SAND, little Silt trace (f) Gravel	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-14d

SHEET NO. 2 OF 2

JOB NO. 07522 HX

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION

CLIENT: BROOME COUNTY DEPT of PUBLIC WORKS

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
SANDPACK	45	11	SS	1 6 / 17 31	GLACIAL OUTWASH DEPOSITS Brown (f) SAND, little Silt trace (f) Gravel	
BENTONITE PELLET SEAL	50	12	SS	31 38 / 70 75	50.8 FT GLACIAL TILL Brown SILT & CLAY, trace (f) Gravel, trace (f) Sand	
SAND BACKFILL	55	13	SS	34 100/3	@ 55 FT (f) Gravel, trace (f) Sand	
	60	14	SS	1 5 / 6 11	@ 60 FT becoming red-brown Clayey SILT with interbedded red clay seams and silt seams	
BENTONITE PELLET SEAL	65	15	SS	1 5 / 6 11	67.0 FT	
					END OF BORING	
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-15
SHEET NO. 1 **OF** 1
JOB NO. 01273290
ELEVATION 949.36
DATE STARTED [illegible]
DATE FINISHED [illegible]
DRILLER Jeff Thew
INSPECTOR T. Sueper

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: Northstar Drilling Inc.

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Bentonite Grout; 2" pvc riser pipe	0	1	S.S.	1 1 / 2 5	GLACIAL TILL Med Brown clayey SILT, little F-m Gravel	
	5	2	S.S.	24 30 / 50/.2	light brown clayey SILT, Some F-m Gravel, little F-c Sand	
Bentonite Pellet Seal; Graded SAND Pack	10	3	S.S.	14 29 / 45 19	F-m GRAVEL, some F-c Sand little Silt + Clay.	saturated at 14.5'
	15	4	S.S.	17 19 / 18 18	Med brown SILT + CLAY, Some F-m Gravel, some(-) F-c sand saturated	
	18				GLACIAL OUTWASH	
	20	5	S.S.	5 6 / 7 9	Med brown SILT and F SAND, occasional varves	
	25	6	S.S.	5 6 / 6 9	Saturated	
	27				END of Boring at 27'	
	30					
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-16

SHEET NO. 1 **OF** 1
JOB NO. 01[illegible]3290
ELEVATION 987.1
DATE STARTED [illegible]
DATE FINISHED [illegible]
DRILLER Jeff [illegible]
INSPECTOR T. [illegible]

PROJECT: COLESVILLE LANDFILL
CLIENT: BROOME County
BORING CONTRACTOR: NorthSTAR Drilling

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Grout	0	1	S.S.	1 1 / 2 2	GLACIAL OUTWASH Brown & Gray mottled SILT & F SAND	
Bentonite Pellet Seal	5	2	S.S.	15 19 / 33 50/	Brownish orange SILT & F SAND grading To F-C SAND & SILT some F-m Gravel Saturated cobbly from 6-9'	
Graded Sand Pack	10	3	S.S.	3 4 / 5 8	Dark brown F SAND & SILT Saturated	
	15	4	S.S.	4 6 / 9 11	grading To SILT & F. SAND	
	20	5	S.S.	5 5 / 7 7		
	25				END of Boring at 22'	
	30					
	35					
	40					
	45					

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TEST BORING LOG

BORING NO. W16d
SHEET NO. 1 OF 2
JOB NO. 07522HX
ELEVATION 987.30
DATE STARTED 9 OCT 87
DATE FINISHED 11 OCT 87
DRILLER E. PUCCI
INSPECTOR KJB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS
BORING CONTRACTOR: R&K INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4¼"	2"		
WT.		140lb.		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT-BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH-JOINT PVC PIPE & SCREEN	0	1	SS	1 3 / 4 6	10" TOPSOIL WITH ROOTS GLACIAL OUTWASH DEPOSITS Brown (fm) SAND, some (f) Gravel, trace Silt	
	5	2	SS	15 11 / 12 20		
	10	3	SS	4 6 / 8 11		
					13.4 FT	
	15	4	SS	7 8 / 10 13	GLACIOLACUSTRINE DEPOSITS Brown SILT, little (f) Sand, thin red clay seams	
	20	5	SS	6 12 / 14 19		
	25	6	SS	1 6 / 10 14		
	30	7	SS	1 4 / 3 8		
	35	8	SS	4 7 / 8 11	@35FT clayey sand seams	
	40	9	SS	1 2 / 6 8	@40FT red clay partings	
	45	10	SS	2 9 / 7 13		

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-16d

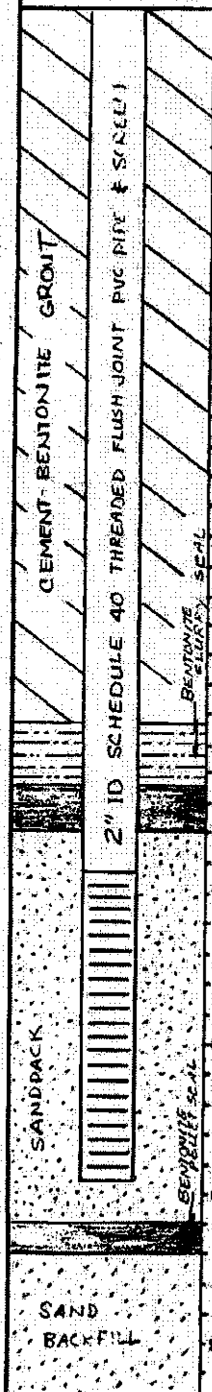
SHEET NO. 2 OF 2

JOB NO. 07522HX

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION

CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

WELL CONSTRUCTION



DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
45	10	SS	2 9 / 7 13	GLACIOLACUSTRINE DEPOSITS Brown SILT, little (vf) Sand thin red clay seams	
50	11		5 3 / 7 18		
55	12		1 1 / 5 10	@ 55 FT 3" RED CLAY SEAM	
60	13		1 1 / 2 4		
65	14		2 7 / 10 9	@ 65 FT becoming Grey SILT little (vf) Sand.	
70	15		1 1 / 2 4	@ 70 FT interbedded grey-green SILT seams	
75	16		1 1 / 5 9		
80	17		1 1 / 2 6	faint laminations	
85	18		1 2 / 5 8		
90	19		1 6 / 14 9	92.0 FT END OF BORING	
95					

WE WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-17

PROJECT:	Colesville Landfill
CLIENT:	Broome County
BORING CONTRACTOR:	North Star Drilling
SHEET NO.	1 OF 1
JOB NO.	01273290
ELEVATION	956.2
DATE STARTED	3/7/84
DATE FINISHED	3/7/84
DRILLER	Jeff Thew
INSPECTOR	T. Roeper

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A	S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH IN FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Grout	0	1	S.S.	1 1 / 1 1	GLACIAL OUTWASH light brown F SAND, little Silt	
Bentonite Pellet Seal	5	2	S.S.	5 5 / 5 5	grading to Dark brown F SAND, Some Silt	
Graded Sand Pack	10	3	S.S.	4 6 / 6 7	grading To dark brown F-M SAND little(+) Silt, Trace F Gravel	
	15	4	S.S.	8 7 / 9 10	dark brown F-C SAND little F-m Gravel, little Silt	
	20	5	S.S.	4 8 / 7 6	dark brown F-C SAND, little Silt	
					END of Boring at 22'	
	25					
	30					
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-17i

SHEET NO. 1 OF 1

JOB NO. 07522 HX

ELEVATION 956.80

DATE STARTED 26 OCT 87

DATE FINISHED 28 OCT 87

DRILLER E. PUCCI

INSPECTOR KJB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION

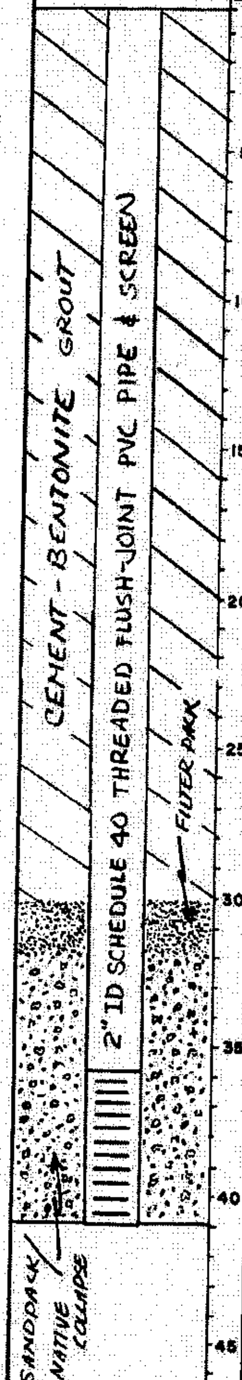
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4	2"		
WT.		140 lb		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	0–45				FOR DETAILED SOILS DESCRIPTION SEE BORING LOG W-17d	
	40.9				40.9 FT END OF BORI	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-17d
SHEET NO. 1 OF 5
JOB NO. 07522 HX
ELEVATION 955.70
DATE STARTED 15 OCT 87
DATE FINISHED 12 DEC 87
DRILLER E. PUCCI
INSPECTOR KJB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS
BORING CONTRACTOR: R & R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS	NX	
DIA.	4 1/4"	2"		
WT.		140 lb		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement/Bentonite Grout; 2" PVC FJ riser pipe	0	1	SS	2 2 / 2 4	GLACIAL OUTWASH DEPOSITS Brown (f-c) SAND, some (f) Gravel trace Silt	6" STEEL PROTECTIVE CASING CEMENTED AT SURFACE
	5	2	SS	4 5 / 6 6		
	10	3	SS	6 8 / 18 17		
	15	4	SS	9 27 / 26 32	@ 15 FT becoming (f) GRAVEL, some (k) Sand, trace Silt	
	20	5	SS	13 39 / 26 19		
	25	6	SS	26 13 / 17 15		
	30	7	SS	21 38 / 41 63		
	35	8	SS	33 29 / 23 26	@ 35 FT Grey (f) GRAVEL, some (f) Sand trace Silt	
	40	9	SS	6 12 / 13 17	41.8 FT GLACIOLACUSTRINE DEPOSITS Brown SILT, little (f) Sand	
	45	10	SS	10 17 / 17 19		

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-17d
SHEET NO. 2 OF 5
JOB NO. 01522HX

PROJECT : COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT : BROOME COUNTY DEPT. of PUBLIC WORKS

WELL CONSTRUCTION: Cem. bentonite grout; 2" FT PVC Sch 40 riser pipe

DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
45	10	SS	10 17 / 14 19	GLACIOLACUSTRINE DEPOSITS Brown SILT, little (vf) Sand	
50	11	SS	1 13 / 11 12	@ 50 FT becoming Grey SILT, some vf Sand	
55	12	SS	10 17 / 15 27		
60	13	SS	17 13 / 19 31		
65	14	SS	5 9 / 9 15	@ 65 FT, red clay partings	
70	15	SS	6 8 / 14 17		
75	16	SS	2 7 / 9 11	@ 75 FT clayey SILT	
80	17	SS	10 13 / 22 31	@ 80 FT distinct red tint	
85	18	SS	2 8 / 10 9		
90	19	SS	9 16 / 24 34		
95	20	SS	8 9 / 14 22	@ 95 FT becoming SILT & CLAY with red clay seams	

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TEST BORING LOG

BORING NO. W-17d

SHEET NO. 3 OF 5

JOB NO. 07522HX

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION

CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT BENTONITE GROUT; 2" PVC SCH 40 RISER PIPE	95	20	SS	8 9 / 14 22	GLACIOLACUSTRINE DEPOSITS Grey to Red-Brown Clayey SILT with red clay seams	
	100	21	SS	4 15 / 23 28		
	105	22	SS	1 9 / 13 14	@105 becoming red-brown SILT trace (VF) Sand	
	110	23	SS	10 14 / 18 29		
	115	24	SS	5 13 / 15 22		
	120	25	SS	2 9 / 11 16		
	125	26	SS	1 1 / 10 14		
	130	27	SS	6 11 / 13 19	@130 FT Brown SILT, trace red clay	
	135	28	SS	1 1 / 10 16		
	140	29	SS	2 18 / 11 15		
	145	30	SS	17 38 / 36 52	@145 GREY SILT	becoming dryer

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TEST BORING LOG
BORING NO. W17d
SHEET NO. 4 OF 5
JOB NO. 07522HX

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Bentonite Grout; 2" PVC Sch 40 riser pipe		30	SS	17 38 / 36 52	GLACIOLACUSTRINE DEPOSITS Grey SILT, trace (+) (vf) S and red clay partings	
	150					
		31	SS	28 50 / 67 65	@ 155 FT becomes Brown SILT	
	160					
		32	SS	19 35 / 43 78	@ 165 FT Grey SILT	
	170					
		33	SS	16 16 / 26 76		
	180					
	190	34	SS	11 17 / 27 44	@ 190 FT thin red clay seams	

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TEST BORING LOG

BORING NO. W17d

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION

CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

SHEET NO. 5 OF 5

JOB NO. 07522HX

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT / BENTONITE GROUT; 2" Sch 40 PVC riser pipe	195–204				GLACIOLACUSTRINE DEPOSITS Grey SILT, some red clay seams 204 FT	
SAND PACK; BENTONITE SLURRY SEAL	204–214	RUN 1	NX-CORE	REC=80" RQD=61	BEDROCK Dark Grey SHALE some oblique fracturing	
2" Sch 40 Flush Joint PVC Well Screen 10 slot	214–216				216 FT End of Boring @ 216 ft	

Depth scale: 195, 200, 205, 210, 215, 220

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TEST BORING LOG

BORING NO. W-18
SHEET NO. 1 OF 1
JOB NO. 01273299
ELEVATION 970.4
DATE STARTED 3/7/84
DATE FINISHED 3/7/84
DRILLER Jeff Thew
INSPECTOR T. Roeper

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: Northstar Drilling
GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement Grout	0	1	S.S.	1 2 / 1 50/.1	GLACIAL TILL dark brown SILT, some F Sand Trace F Gravel	
Bentonite Pellet Seal	5	2	S.S.	6 14 / 50/.2	light brown SILT, Some F-C Sand, little(+) F-m Gravel	
Graded Sand Pack	10	3	S.S.	12 22 / 21 50/.5	med to dark brown F-C SAND Some F-m Gravel, little(+) Silt Saturated	
	15	4	S.S.	5 8 / 10 13	GLACIAL OUTWASH med brown F SAND and Silt Saturated	
	20	5	S.S.	9 13 / 16 20		
					END of Boring at 22'	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-19 S

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: Northstar Drilling
GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.		2"		
WT.		140 lb		
FALL		30"		

SHEET NO. 1 OF 1
JOB NO. 01273290
ELEVATION 946.4
DATE STARTED
DATE FINISHED
DRILLER Jeff Thew
INSPECTOR T. Roerer

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Bentonite Pellet Seal	0	1	S.S.	1 1 / 2 2	GLACIAL TILL dark brown SILT & CLAY little(-) F-m Gravel	
	5	2	S.S.	6 8 / 5 8	brown C-F SAND, Some F-m Gravel, little Silt	
Graded Sand Pack					GLACIAL OUTWASH	
	10	3	S.S.	1 * / * *	light brown F SAND Some Silt saturated grading To brown F SAND little Silt	* weight of hammer
	15	4	S.S.	1 1 / 1 1		Note. Sand pack is mixed with native Sand. Sand was coming up in augers and hole would not stay open.
	18				END OF Boring at 18'	
	20					
	25					
	30					
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. B-19D

PROJECT: Colesville LandFill	SHEET NO. 1 OF 3
CLIENT: BROOME county	JOB NO. 01272290
BORING CONTRACTOR: NorthSTAR Drilling	ELEVATION 946.3

GROUND WATER

DATE	TIME	WATER EL.	SCREEN		CAS.	SAMP.	CORE	TUBE
				TYPE	H.S.A	S.S		
				DIA.	6 3/4	2"		
				WT.		140 lbs		
				FALL		30"		

DATE STARTED 3/13
DATE FINISHED 3/20
DRILLER Jeff Thew
INSPECTOR T. Rooper

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" Steel riser pipe	0				GLACIAL TILL For detailed discription of Soils See B-19S	
	5				GLACIAL OUTWASH	Saturation at 6.0'
	10					
	15					
	20	1	S.S.	1 / 1	Med To Dark brown F SAND little (-) Silt	
	25	2	S.S.	4 6 / 6 7	grading to Dark brown F-m SAND, Trace Silt	
	30	3	S.S.	9 13 / 13 10		
	31				GLACIAL TILL Med brown F-C SAND, some (-) Silt & clay, little F-m Gravel	
	33				GLACIAL OUTWASH	
	35	4	S.S.	9 9 / 7 8	Reddish brown SILT & CLAY with pockets of Silty Clay	
	40	5	S.S.	5 8 / 7 8	Reddish brown varved SILT & CLAY with silty clay lenses	
	45					

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. D-19D

PROJECT : Colesville Landfill

CLIENT : Broome County

SHEET NO. 2 **OF** 3

JOB NO. 01273289

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" steel riser pipe	45	6	S.S.	8 9 / 10 10	GLACIAL OUTWASH Reddish brown varved SILT + CLAY, with silty clay lenses	
	50	7	S.S.	4 7 / 8 10		
	55	8	SS	6 6 / 7 8		
	60	9	S.S.	6 8 / 8 10	grading to med brown clayey SILT, infrequent pieces of Gravel, faint varves	
	65	10	S.S.	6 8 / 7 10		
	70	11	S.S.	4 7 / 9 11	occasional silty CLAY lenses	
	75	12	S.S.	7 10 / 11 13		
	80	13	S.S.	6 11 / 12 13		
	85	14	S.S.	9 15 / 15 17		
					GLACIAL TILL	87
	90	15	S.S.	100/.2	Gray SILT + CLAY, some F-C sand, little f-m Gravel	Note: went through ≈2.0' boulder. Appeared as though we were in bedrock. Took continuous core run. Came up with Till.
	95					

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TEST BORING LOG

BORING NO. B-19D
SHEET NO. 3 OF 3
JOB NO. [illegible]

PROJECT: Colesville Landfill
CLIENT: Broome County

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" steel riser pipe					GLACIAL TILL	
	100	RUN	# 1	97.0 To 103.0	core run came up as Till	
	105					
					Sonyea Group Gray Siltstone Irregular Fractures	
	110					
open rock hole		RUN	# 1	111 To 116	Rec = 3.2'	Note: pieces of shale Falling in on core barrel so we roller bit The remainder of The boring.
	115					
	120					
	125					
	130					
					END of Boring at 131'	
	135					
	90					
	95					

WE WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-20S

PROJECT:	Colesville LANDFILL
CLIENT:	Broome County
BORING CONTRACTOR:	Northstar Drilling
SHEET NO.	1 OF 1
JOB NO.	[illegible]
ELEVATION	950.0
DATE STARTED	[illegible]
DATE FINISHED	[illegible]
DRILLER	[illegible]
INSPECTOR	[illegible]

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION: Cement Grout; Bentonite Pellet Seal; Graded Sand Pack

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1		1/1.0' 1/1.0'	GLACIAL OUTWASH med brown clayey SILT	
5	2		8 21 30 19	GLACIAL TILL med to dark brown f-c SAND Some f-m Gravel, some silt	4
10	3		4 6 6 6	GLACIAL OUTWASH F SAND and SILT Saturated	9
15	4		5 6 8 9	grading to med brown SILT and F SAND	
20	5		6 7 7 8		
				END of Boring at 22'	
25					
30					
35					
40					
45					

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TEST BORING LOG

BORING NO. W-20D
SHEET NO. 1 **OF** 6
JOB NO. [illegible]
ELEVATION 950.0
DATE STARTED 3/19/84
DATE FINISHED
DRILLER [illegible] Mathews
INSPECTOR T. Roeper

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: Atlantic Testing Lab

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	Steel	S.S.	AW	
DIA.	4"	2"		
WT.		140 lbs		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite grout; 2" steel riser pipe	0				GLACIAL OUTWASH	
					For detailed description of Soils See W-20S	
	25	1	S.S.	6 8 / 10 10	Med brown SILT & F SAND saturated	
	30	2	S.S.	5 8 / 10 9	Brownish Gray SILT & F SAND occasional varves	
	35	3	S.S.	5 6 / 7 7		
	40	4	S.S.	5 7 / 8 7		
	45	5	S.S.	5 6 / [illegible] 7		

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-20D

PROJECT: Colesville Landfill

CLIENT: Broome County

SHEET NO. 2 OF 6

JOB NO. 01273285

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" steel riser pipe	45	5	S.S.	5 6 / 10 9	GLACIAL OUTWASH med brown F SAND and silt, @ 46.5 - 47' Red brown silty CLAY lense	
	50	6	S.S.	4 8 / 9 12		
	55	7	S.S.	6 8 / 9 11	Brownish Gray SILT, some F Sand	
	60	8	S.S.	7 7 / 9 10		
	65	9	S.S.	9 9 / 11 12		
	70	10	S.S.	8 9 / 11 13	Brownish gray SILT, some to little F Sand	
	75	11	S.S.	14 16 / 16 17		
	80	12	S.S.	13 14 / 14 15		
	85	13	S.S.	11 14 / 14 12	@ 86.5 becomes Red brown Silty CLAY	
	90	14	S.S.	6 8 / 11 14	@ 91' changes to Brownish gray SILT, some F Sand, occasional Silty Clay lenses.	
	95	15	S.S.	6 6 / 8 8		

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TEST BORING LOG

BORING NO. W-20D

PROJECT : Colesville Landfill

CLIENT : Broome County

SHEET NO. 3 OF 6

JOB NO. 01173290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement - Bentonite Grout; 2" steel riser pipe	95	15	S.S.	6 6 / 8 8	GLACIAL OUTWASH	
					Brownish Gray SILT, Some To little f Sand occasional silty CLAY lenses	
	100	16	S.S.	10 19 / 27 26		
	105					
	110	17	S.S.	13 19 / 34 38		
	115					
	120	18	S.S.	24 47 / 56 67		
	125				Brownish Gray SILT, some To little f Sand, occasional silty CLAY lenses	
	130	19	S.S.	22 40 / 57 68		
	135					
	140	20	S.S.	27 45 / 55 67		
	145					

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CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. ?-20 D

SHEET NO. 4 OF 6

JOB NO. 01273200

PROJECT : Colesville Landfill

CLIENT : Broome County

WELL CONSTRUCTION	DEPTH IN FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" steel riser pipe	145				GLACIAL OUTWASH Brownish Gray silty CLAY Indistinct layers	
	150	21	S.S.	58 68 60 100	@ 149.5 becomes extremely dense gray SILT, Dry	Decided to drill to bedrock without samples in the interest of time.
	155					
	160					
	165					
	170					
	175					
	180					
	185					
	190				GLACIAL TILL Gray, cobbly, relatively hard	
	195					

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TEST BORING LOG

BORING NO. W-20D

PROJECT: Colesville landfill

CLIENT: Broome County

SHEET NO. 5 **OF** 6

JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Cement-Bentonite Grout; 2" steel riser pipe	195				GLACIAL TILL	
	200					
	205					
	210				@ 214 Till becomes less dense	
	215				drilling is irregular with small cobbles	
	220					
	225					
	230					232
					SONYEA GROUP	
open rock	235				Gray SILTSTONE	Note: in the interest of time, only one core run was taken from 252-257'
	240					
	245					

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TEST BORING LOG

BORING NO. W-20D

PROJECT: Colesville Landfill

CLIENT: Broome County

SHEET NO. 6 OF 6

JOB NO. 01173282

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
open rock	250				Sonyea Group Gray Siltstone	
	255	RNN	#1	252 To 257	Rec - 3.5'	
					END of Boring at 257'	
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-21

PROJECT: Colesville Landfill
CLIENT: Broome County
BORING CONTRACTOR: NorthSTAR Drilling

SHEET NO.	1 OF 2
JOB NO.	01273290
ELEVATION	1049.4
DATE STARTED	3/9/84
DATE FINISHED	3/9/84
DRILLER	Jeff Thew
INSPECTOR	T. Roeper

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	H.S.A.	S.S.		
DIA.		2"		
WT.		140 lbs		
FALL		30"		

DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	S.S.	1 1 / 1 1	GLACIAL TILL med brown clayey SILT, little F-m Gravel	
5	2	S.S.	30 26 / 26 24	med brown SILT and CLAY, Some F-m Gravel, little F-c Sand.	
10	3	S.S.	12 11 / 9 9	med brown F-c SAND, little F-m Gravel, little silt	evidence of Perched water in S-3 & 4
15	4	S.S.	33 29 / 36 50/.2	med brown SILT & CLAY, Some F-c Sand little(+) F-m Gravel	
20	5	S.S.	66 69 / 50/0		
25	6	S.S.	22 50/.1		
30	7	S.S.	26 32 / 20 18		
				GLACIAL OUTWASH	
35	8	S.S.	9 9 / 10 13	med brown F SAND little silt	
40	9	S.S.	10 11 / 13 15	Saturated at 40'	
45	10	SS	[illegible] 14 / [illegible] 18		

WELL CONSTRUCTION: Cement - Bentonite Grout; 2" pvc riser pipe; Bentonite Pellet Seal; Graded Sand Pack

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W-21

PROJECT : COLESVILLE LANDFILL
CLIENT : BROOME COUNTY
SHEET NO. 2 OF 2
JOB NO. 01273290

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	45	10	S.S.	10 14 / 16 18	GLACIAL OUTWASH med brown F SAND, little silt saturated	
					grading to med brown F SAND, some to and silt	
	50	11	S.S.	5 10 / 10 14		
					END of Boring at 52'	
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W22s

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION	SHEET NO. 1 OF 1
CLIENT: BROOME COUNTY DEPT of PUBLIC WORKS	JOB NO. 07522 HX
BORING CONTRACTOR: R&R INTERNATIONAL	ELEVATION 987.40

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4¼"	2"		
WT.		140 lb		
FALL		30"		

DATE STARTED 14 OCT 87
DATE FINISHED 14 OCT 87
DRILLER E PUCCI
INSPECTOR KTB

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT-BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH-JOINT PVC PIPE & SCREEN; BENTONITE PLUG SEAL; SAND PACK	0–22.5				FOR DETAILED SOILS DESCRIPTION SEE BORING LOG W-22d	
	22.5 FT				END OF BORING	

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W22d

SHEET NO. 1 OF 2

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT OF PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

JOB NO. 07522 HX
ELEVATION 982.40
DATE STARTED 12 OCT 87
DATE FINISHED 13 OCT 87
DRILLER E DUCCI
INSPECTOR KVB

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4¼"	2"		
WT.		140 lb.		
FALL		30"		

WELL CONSTRUCTION: CEMENT - BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH JOINT PVC PIPE & SCREEN

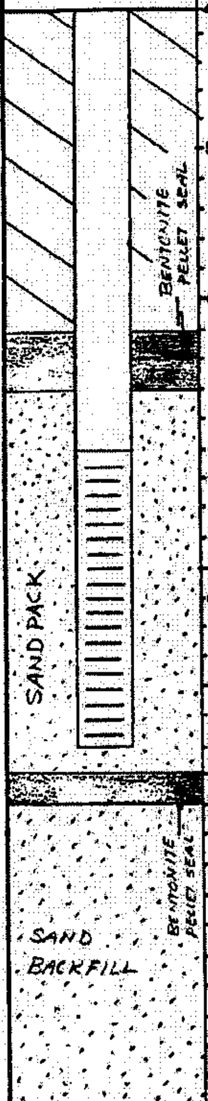
DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	SS	1 1 / 4 5	GLACIAL TILL Brown (f) SAND, little silt trace(+) (f) Gravel	
	2	SS	8 8 / 14 25		
5	3	SS	16 23 / 33 33		
				8.1 FT GLACIAL OUTWASH DEPOSITS	
10	4	SS	17 28 / 30 33	Brown (f-c) SAND, some (f) Gravel trace silt	
15	5	SS	5 17 / 22 20	@ 15 FT brown (f-c) GRAVEL, some (f-c) Sand, little Silt	possible till seams
20	6	SS	28 18 / 19 16	@ 20 FT becoming (f) GRAVEL	
25	7	SS	14 14 / 12 16	@ 25 FT becoming (f-c) SAND some Gravel (in seams)	
30	8	SS	6 9 / 14 16	@ 30 FT becoming SILT and (vf) Sand little (f) Gravel	
35	9	SS	7 12 / 16 30	35.8 FT GLACIOLACUSTRINE DEPOSITS Brown SILT, little (vf) Sand thin red clay seams	
40	10	SS	10 12 / 17 21		
45	11	SS	1 1 / 3 4		

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. W-22d
SHEET NO. 2 OF 2
JOB NO. 07522 HX

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS

WELL CONSTRUCTION



DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
45	11	SS	1 1 / 8 9	GLACIOLACUSTRINE DEPOSITS Brown-Grey SILT, little (f) Sand thin red clay seams	
50	12	SS	1 7 / 15 25		
55	13	SS	1 9 / 9 15		
60	14	SS	1 2 / 6 10		
65	15	SS	1 1 / 8 16	@66 FT changes to grey Silt, little(-) (f) Sand.	
70	16	SS	1 5 / 15 36		
75	17	SS	1 7 / 15 24	@75 FT red clay parting's	
80	18	SS	1 6 / 9 15	82.0 FT END OF BORING	
85					
90					
95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. W23s
SHEET NO. 1 OF 1
JOB NO. 07522 HX
ELEVATION 944.50
DATE STARTED 6 OCT 86
DATE FINISHED 6 OCT 86
DRILLER E. PUCCI
INSPECTOR TOB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT of PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4"	2"		
WT.		140lb		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH JOINT PVC PIPE & SCREEN	0	1	SS	2 3 / 3 4	6" TOPSOIL WITH ROOTS	
BENTONITE PELLET SEAL		2	SS	2 3 / 2 2	Brown SILT, trace (fm) Sand grading to Brown (fm) SAND trace Silt	
INSTALLED NATIVE SANDPACK	5	3	SS	3 2 / 2 2		
					8.1 FT	
					GLACIAL OUTWASH DEPOSITS	
	10	4	SS	12 10 / 9 9	Brown-Grey (fm) GRAVEL and (cf) Sand, trace (+) Silt	
	15					
	20				20 FT	
					END OF BORING	
	25					
	30					
	35					
	40					
	45					

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BORING/WELL NO. PW-1

SHEET 1 of 1

PROJECT: COLESVILLE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS
PROJECT NO: 02260HG
RIG: CME-850

GS ELEV: 973.6ft.
N-S COORD: 787,728.26
E-W COORD: 769,396.14
WL REF ELEV: 976.23ft.
DATE STARTED: 1/3/92
DATE FINISHED: 1/6/92
OPERATOR: S. Breeds
GEOLOGIST: J. Gilbert

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
1/6/92	16.5	959.73	25'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

SAMPLE NUMBER	RECOVERY (feet)	N-VALUE
1	1.8	3
2	1.8	11
3	2.0	9
4	1.8	7
5	1.7	5
6	0.9	4
7	2.0	6
8	0.7	2
9	1.6	26
10	1.4	60
11	0.1	20
12	1.6	11
13	1.7	23

Columns: WELL CONSTRUCT | DEPTH (feet) | SAMPLE NUMBER | SAMPLE & TYPE | RECOVERY (feet) | N-VALUE | LOG | UNIFIED | FIELD DESCRIPTION (Modified Burmister) | REMARKS

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

FIELD DESCRIPTION (Modified Burmister)

OUTWASH
0'to ~2' TOPSOIL. Brown f SAND, Some (+) Silt, interbedded, moist.

@ 8' Solvent odor?

@ 14' Black-brown f SAND, little (-) Silt, w/1" Silt seam, wet.

17.6'

TILL
Gray fmc GRAVEL, some (-) fmc SAND, little Silt, wet.

25.0'

GLACIOLACUSTRINE DEPOSIT
Brown SILT, some (+) f Sand, high dilatancy, wet.
@~26.5' 3 1"+ Red Silty Clay seams.
@ 27' 0.25" Silty Clay seams, high dilatancy, wet.

29.0'

End Of Boring

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BORING/WELL NO. PW-2

SHEET 1 of 1

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 972.7ft.
N-S COORD: 787,879.59
E-W COORD: 768,807.09
WL REF ELEV: 975.28ft.
DATE STARTED: 12/30/91
DATE FINISHED: 12/31/91
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA	SS		
DIAM.	4"	2"		
WEIGHT		140#		N/A
FALL		30"	N/A	N/A

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		1		1.1	5			OUTWASH Brown f SAND, Some (-) Clayey Silt, little (-) f subangular Gravel, organics, moist.	
	5	2		1.6	8			@ 5'change to Dark Brown fm SAND, some (-) Silt, saturated.	
		3		1.7	8				
	10	4		1.0	7				
		5		1.1	29				
		6		2.0	20			@ 11.2' Cobble/Boulder. The hole was relocated for sample #6.	
		7		2.0	60				
	15	8		1.0	28			@ 13.8' Cobble	
		9		1.7	14			16.0'	
		10		1.7	17			GLACIOLACUSTRINE DEPOSITS Light Brown SILT and (-) f Sand, soft, m dense, saturated.	
	20	11		1.7	14			@ 20.5' 1" Red Clay layer.	
		12		1.6	16			@ 21.8' laminated silt layer (2") @ 22'-24' Clay layers/Silt layers	
	25							24.0' End Of Boring	
	30								
	35								
	40								
	45								
	50								
	55								

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BORING/WELL NO. PW-3

SHEET 1 of 1

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG

RIG: CME-75

GS ELEV: 986.2ft.
N-S COORD: 788,040.98
E-W COORD: 768,634.61
WL REF ELEV: 988.92ft.
DATE STARTED: 12/27/91
DATE FINISHED: 12/30/91
OPERATOR: J. Hammond
GEOLOGIST: B.A.O./J.G.

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

SAMPLE NUMBER	RECOVERY (feet)	N-VALUE
1	1.0	4
2	1.0	19
3	1.4	61
4	1.0	23
5	1.4	14
6	1.5	7
7	1.6	16
8	1.0	9
9	1.6	19
10	1.7	14
11	1.6	24
12	2.0	28
13	1.2	11
14	1.3	28
15	1.2	11
16	1.1	26
17	1.6	23

WELL CONSTRUCT | DEPTH (feet) | SAMPLE & TYPE | LOG | UNIFIED | REMARKS

FIELD DESCRIPTION (Modified Burmister)

TOPSOIL
Orange-brown fm SAND, some (+) Silt, little (-) fm subangular Gravel, moist.
@ 2'Tan fmc Subangular Gravel and f Sand, some (+) Silt, moist.

4.0'

TILL
Gray-Brown f SAND and Clayey Silt, some (+) f subangular Gravel, moist.

7.0'

GLACIAL OUTWASH
SILT and f Sand, m dense, soft, saturated.
@ 8.0' w/ Red 0.5" Clay seam.
@ 10' Brown f SAND (coarse Silt) and Silt, saturated.
@ 12' w/Silt layers. @ 12.8' 0.5" Clayey Silt seam.
@ 17.5' 0.5" Silty Clay layer.
@ 22' Brown f SAND and Silt, m dense, dilatanty, wet. @ ~25.9' 0.25" Red Silty Clay seam.

30.0'

GLACIOLACUSTRINE DEPOSIT
Brown SILT and (-) f Sand, high dilatancy, saturated.
@ 32.6' 1" Red Silty Clay seam.

34.0'

End Of Boring.

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

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BORING/WELL NO. PW-4

SHEET 1 of 1

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG

RIG: CME-75

GS ELEV: 999.8ft.
N-S COORD: 788,210.21
E-W COORD: 768,506.88
WL REF ELEV: 1001.75ft.
DATE STARTED: 12/27/91
DATE FINISHED: 12/27/91
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/29/91	13'	986.8	10'-14'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		1		1.6	38			SOIL FILL/TILL Brown f SAND and Silt, some (+) fm subangular-angular Gravel, moist, dense.	
	5	2		1.4	18				
								6.0' OUTWASH Brown f SAND, some (+) Silt, moist.	
	10	3		1.6	14				
		4		1.0	21			@ 13' saturated.	
	15	5		1.3	15				
		6		1.8	34				
		7		1.0	17				
	20	8		0.3	17			20.0' GLACIOLACUSTRINE DEPOSIT Brown SILT and f Sand, soft, m dense, saturated.	
		9		1.8	43				
	25	10		1.2	15			@ 24.0' Brown Clayey SILT and f Sand w/1" Red Silty Clay layer. @ 25' w/0.25" Clay layer.	
		11		1.8	49			@ 26' w/1" to 2" Silt layers to 28'.	
	30							28.0' End Of Boring	
	35								
	40								
	45								
	50								
	55								

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BORING/WELL NO. PW-5

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 983.7ft.
N-S COORD: 788,434.27
E-W COORD: 768,399.52
WL REF ELEV: 986.12ft.
DATE STARTED: 12/31/91
DATE FINISHED: 1/2/92
OPERATOR: S. Breeds, J.H.
GEOLOGIST: J. Gilbert

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE
1		1.6	4
2		0.7	34
3		0.4	13
4		1.6	15
5		2.0	24
6		1.2	11
7		1.8	15
8		2.0	27
9		2.0	4
10		1.6	22
11		2.0	23
12		1.5	16
13		2.0	28
14		1.8	17
15		1.4	37

WELL CONSTRUCT | DEPTH (feet) | LOG | UNIFIED | REMARKS

FIELD DESCRIPTION (Modified Burmister)

TOPSOIL
Brown Silt, some (+) fm Sand, loose, moist, organics.
0.6'

Gray brown Clayey SILT, some fm Sand, sl. plasticity, soft, moist, organics.
1.4'

TILL
Gray to Brown SILT, some fmc Sand, little (+) fmc Gravel, wet.
7.0'

GLACIAL OUTWASH
Brown f SAND, some (+) Silt, m dense, wet, high dilatancy.

@ 18.3' 0.25" Red Silty Clay seam, high plasticity.

@ 26.5' 1.5" Red Silty Clay seam, high plasticity.
27.0'

@ 27' to 27.7' Brown SILT, some f Sand, w/0.25" Red Silty Clay seam, high dilatancy, wet.
29.0'

GLACIOLACUSTRINE DEPOSIT
Brown SILT and (-) f Sand, interbedded, high dilatancy, wet.
@ 31.5' w/1.5" Red Silty Clay seam, high plasticity.
33.0'

@ 33.0' End Of Boring

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BORING/WELL NO. PW-6

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG

RIG: CME-75

GS ELEV: 1038.1ft.
N-S COORD: 788,592.07
E-W COORD: 768,588.69
WL REF ELEV: 1040.42ft.
DATE STARTED: 12/5/91
DATE FINISHED: 12/11/91
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/9/91	38.2	999.9	44'
12/10/91	39'	99.1	48'-70'

	CASING	SAMPLE	TUBE	CORE
TYPE	steel	SS		
DIAM.	5"/4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE
	1		1.2	8
5	2		1.5	29
10	3		1.1	56
15	4		1.2	99
20	5		1.0	49
	6		0.4	30
25	7		0.6	109
	8		0.5	34
	9		1.2	103
30	10		0.7	56
	11		1.1	108
35	12		0.7	31
	13		1.0	57
	14		1.4	40
40	15		1.6	56
	16		1.5	46
45	17		0.2	28
	18		1.7	43
	19		1.6	40
50	20		2.0	60
	21		1.4	45
55	22		1.6	46

FIELD DESCRIPTION (Modified Burmister)

FILL/TOPSOIL
Brown f SAND, some (-) Silt, moist.

2.0'
Brown SILT, some (+) f Sand, some (-) f subangular Gravel, loose, dry.

9.5'
TILL
Gray f SAND and Silt, some (+) fmc subangular Gravel, loose, dry.

14.5'
Brown-gray Clayey SILT and fmc subangular Gravel, some (+) f Sand, m dense, moist.

18.0'
OUTWASH DEPOSITS
Brown f SAND, some (-) Silt, moist.
@ 22' w/ thin partings (<0.25") of Silt, m dense, moist.

@ 38' Change to Gray f SAND, some (+) Silt, m dense, wet.
@ 40' wet to saturated. Slight solvent odor.

@ 46' Change to Brown f SAND, some (-) Silt, saturated.

REMARKS

A 14' switched from 4" Augers to 5" casing.

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BORING/WELL NO. PW-6

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1038.1ft.
N-S COORD: 788,592.07
E-W COORD: 768,588.69

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
	23	1.3	19		
	24	1.8	35		
60	25	1.4	58		
	26	1.3	117	@ 62' Brown f SAND, some (-) Silt, w/Silt seam, saturated.	
65	27	1.3	29		
	28	1.6	40		
	29	1.5	55		
70	30	1.5	80		
	31	1.7	93	@ 72' Brown f SAND, Some (+) Silt, saturated	
75	32	1.8	56	74.0'	
	33	2.0	81	GLACIOLACUSTRINE DEPOSITS Gray-brown f SAND, some (-) Silt. @ 75' w/1" Red-Brown Silty Clay seam.	
	34	1.6	60	@ 76' Gray-Brown f SAND, some (++) Silt, soft texture, smears, saturated.	
80	35	1.6	91	@ 78'-82' Gray Brown f SAND, Some (-) Silt, wet.	
				82.0' End Of Boring	
85					
90					
95					
100					
105					
110					
115					
120					

Wehran EnviroTech

BORING/WELL NO. PW-7

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS
PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1040.4ft.
N-S COORD: 788,772.38
E-W COORD: 768,799.94
WL REF ELEV: 1042.54ft.
DATE STARTED: 12/16/91
DATE FINISHED: 12/19/91
OPERATOR: Jeff Hammond
GEOLOGIST: JHK

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/17/91	30.5'	1009.9	32'
12/18/91	30.3'	1010.1	40'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (inches)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
0	1	12"	11	TILL Black to brown Clayey SILT, some cf Sand, little (+) fm Gravel, occ. Cobble, m dense, moist.	
5	2	10	9		
10	3	16	69		
15	4	20	21	15.5'	
	5	18	25	GLACIAL OUTWASH Gray cf SAND, and mf Gravel, little Clayey Silt, m dense, moist.	
20	6	12	13		
	7	16	20	@ 22' Gray fm SAND, some (-) Clayey Silt.	
25	8	12	11	@ 23' becomes Brown fm SAND, little Silt, m dense, moist.	
	9	14	16		
	10	15	14		
30	11	22	11	@ 30' becomes Gray f SAND and Silt, moist, slight odor.	
	12	18	21	30.6' @ 30.6' Gray Silt and (-) f Sand, saturated.	
35	13	15	8		
	14	16	19		
	15	18	12	@ 37' SILT and f Sand, occ. <0.25" Clay & Silt parting.	
40	16	17	39	@ 39' Clayey SILT, some f Sand, occ. orange-brown Silt & Clay parting.	Switched from 4" Augers to 5" casing @ 40'
	17	18	38	42.0' @ 42' f SAND, some (+) Silt, occ. <0.25" Silt & Clay parting.	
45	18	18	33		
	19	16	39		
	20	18	34		
50	21	15	45		
	22	15	28		
55	23	13	30	@ 55' Grades to SILT and (-) f Sand.	

Wehran EnviroTech

BORING/WELL NO. PW-7

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1040.4ft.
N-S COORD: 788,772.38
E-W COORD: 768,799.94

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		24		16	26				
		25		15	37				
	60	26		17	34			59.0' GLACIOLACUSTRINE DEPOSIT Brown Clayey Silt, little f Sand, w/reddish brown Silty Clay layer @ 59'.	
		27		16	43			@ 61.9' Reddish brown Silty Clay layer.	
	65	28		18	35				
		29		15	40			@ 65.9' 0.5" Reddish brown Silty Clay layer.	
	70							68.0' @ 68' End Of Boring.	
	75								
	80								
	85								
	90								
	95								
	100								
	105								
	110								
	115								
	120								

Wehran EnviroTech

BORING/WELL NO. PW-8

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-850

GS ELEV: 1047.7ft.
N-S COORD: 788,867.17
E-W COORD: 769,003.90
WL REF ELEV: 1049.73ft.
DATE STARTED: 12/20/91
DATE FINISHED: 12/26/91
OPERATOR: Jeff Hammond
GEOLOGIST: D.L./B.A.O.

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/28/91	36.4'	1011.3	64'-70'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE
0	1	1.4	17
5	2	0.8	80
10	3	1.1	51
15	4	0.7	42
20	5	0.0	47
	6	1.4	15
25	7	0.7	14
	8	1.1	16
	9	0.0	22
30	10	1.2	39
	11	1.3	25
35	12	1.3	17
	13	0.9	23
	14	1.8	19
40	15	1.3	26
	16	1.3	28
45	17	1.0	28
	18	1.6	27
	19	1.2	34
50	20	1.5	20
	21	1.6	38
55	22	1.0	28

FIELD DESCRIPTION (Modified Burmister)

TOPSOIL
Brown SILT and (+) fmc Sand, little (+) fm Gravel, trace Clay, m dense, organics, moist.

5.0'

TILL
Brown Clayey SILT and fmc Sand, little (+) fmc Gravel, sl. plasticity, moist.

@ 10' Hard, dry.

@ 15' Brown Clayey SILT and cf Sand, some (+) cf Gravel, hard, dry.

22.0'

OUTWASH
Brown fm SAND, trace (+) fm Gravel, trace Silt, damp, loose.
@ 24' Brown fm SAND, little (+) Silt, m dense, damp.

@ 36' Saturated.

@ 38' Brown fm SAND and (-) Silt, m dense, saturated.

54.0'

Brown Clayey SILT some to trace (-) f Sand, m dense, saturated.

REMARKS

Switched from 4" Augers to 5" casing @ 15'.

Wehran EnviroTech

BORING/WELL NO. PW-8

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-850

GS ELEV: 1047.7ft.
N-S COORD: 788,867.17
E-W COORD: 769,003.90

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		23		1.2	33			@ 57.0' Reddish brown Silty Clay layer.	
		24		2.0	31				
	60	25		1.1	34				
		26		1.8	44				
	65	27		1.2	44				
		28		0.9	37				
		29		2.0	42			@ 68.0' occ. thin Reddish-brown Silty Clay layer.	
	70	30		1.0	31			70.0'	
		31		1.3	47			GLACIOLACUSTRINE DEPOSIT Brown Clayey SILT, trace (-) f Sand, m. dense, saturated. @ 71.7' 0.25" Silty Clay layer.	
	75	32		1.6	41			@ 74' Brown SILT and f Sand, m dense, soft, saturated. @ 75.6' ~1" Red Clay layer. 76.0'	
								@ 76' End Of Boring.	
	80								
	85								
	90								
	95								
	100								
	105								
	110								
	115								
	120								

Wehran EnviroTech

BORING/WELL NO. PW-9

SHEET 1 of 2

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1047.3ft.
N-S COORD: 788,854.58
E-W COORD: 769,212.05
WL REF ELEV: 1049.47ft.
DATE STARTED: 12/12/91
DATE FINISHED: 12/17/91
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/12/91	36'	1011.3	30'-38'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

SAMPLE NUMBER	RECOVERY (feet)	N-VALUE
1	1.0	27
2	1.2	26
3	1.4	86
4	1.0	41
5	0.2	20
6	0.7	29
7	1.0	30
8	1.3	29
9	1.5	19
10	1.6	24
11	1.6	22
12	1.4	26
13	1.7	31
14	1.5	12
15	1.1	17
16	1.2	20
17	0.9	36
18	2.0	48
19	1.5	48
20	1.4	57
21	1.1	36
22	1.4	46

WELL CONSTRUCT | DEPTH (feet) | SAMPLE NUMBER | SAMPLE & TYPE | RECOVERY (feet) | N-VALUE | LOG | UNIFIED

Depth marks: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

FIELD DESCRIPTION (Modified Burmister)

FILL
Brown fmc SAND and Clayey Silt, some (+) fmc subangular Gravel, organics, m dense, moist.

@ 5' w/ Refuse, loose.

10.0'

FILL to Reworked TILL
Brown SILT and f Sand, some (+) fmc subangular Gravel.

15.0'

TILL
Brown SILT and f Sand, some (+) fmc subangular Gravel, w/Cobbles, m dense, moist.

OUTWASH
Brown fmc SAND, Some (-) Silt, little (-) f subangular Gravel, m dense, wet, w/ Sand grading from f Sand @ 22' to C Sand @ 24'.

30.0'

TILL
Brown fmc SAND, some (+) fmc subangular Gravel, some (-) Silt, m dense, moist to wet.

32.0'

OUTWASH DEPOSITS
Brown fm SAND, Some (-) Silt, little (-) f subangular Gravel, m dense, moist.
@ 34' Wet to saturted.

@ 42' Change to Brown f SAND, some (+) Silt, m dense, saturated.

@ 50' "Coarse SILT" (finer Sand than above).

@ 54' Brown f SAND and (-) Silt, m dense, saturated.

REMARKS

22'-24' Coarsening downward sequence.

Switch from 4" Augers to 5" casing @ 40'.

@ 54' beginning of extremly gradual gradation to Glaciolacustrine.

Wehran EnviroTech

BORING/WELL NO. PW-9

PROJECT: *COLESVILE LF Remedial Design*
CLIENT: *BROOME COUNTY/GAF*
CONTRACTOR: *EMPIRE SOILS*

PROJECT NO: *02260HG*
RIG: *CME-75*

GS ELEV: *1047.3ft.*
N-S COORD: *788,854.58*
E-W COORD: *769,212.05*

SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
23	1.0	45		
24	1.7	54	@ 58' 0.25" Brown Clayey Silt seam, w/Silt layers alternating between f SAND.	
25	1.0	63		
26	1.1	70	@ 62' Brown f SAND and Silt, m dense, saturated.	
27	1.0	37		
28	1.3	34	@ 66' w/1" Silt layers, soft texture.	
29	1.2	55		
30	1.8	43		
31	1.4	49	@ 72.8' 1" Brown Silty CLAY seam.	
32	2.0	53	74.0'	
			GLACIOLACUSTRINE DEPOSIT Brown SILT and f Sand, m dense. @ 75' Reddish-Brown Silty CLAY 0.25" seam.	
			76.0' @ 76' End Of Boring	

Column headings: WELL CONSTRUCT, DEPTH (feet), SAMPLE NUMBER, SAMPLE & TYPE, RECOVERY (feet), N-VALUE, LOG, UNIFIED, FIELD DESCRIPTION (Modified Burmister), REMARKS

DEPTH scale: 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120

Wehran EnviroTech

BORING/WELL NO. PW-10

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1047.0ft.
N-S COORD: 788,870.17
E-W COORD: 769,379.82
WL REF ELEV: 1049.29ft.
DATE STARTED: 12/18/91
DATE FINISHED: 12/26/91
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
12/20/91	35.4	1011.6	59'
12/23/91	32.0'	1015	59'-61'
12/24/91	34.4	1012.6	59.5'-77'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
	1	0.3	47	TOPSOIL Brown SILT, some (+) fm Sand, w/organics, loose, moist.	
5	2	0.9	8	5.0' TILL Gray Clayey SILT and fm subangular Gravel, some (+) fm Sand, wet.	
10	3	1.8	33		
15	4	0.8	39	@ 15' loose, moist.	
20	5	1.3	57		
25	6	1.4	114		
30	7	1.1	58	@ 30' Dark Brown SILT and f Sand, some (+) fmc subround-subangular Gravel, w/Cobbles, moist to wet, loose.	
35	8	1.2	31	@ 35' Color change to Gray.	water @ ~34'
	9	1.5	32		
40	10	2.0	22	37.0' OUTWASH Gray subangular fmc GRAVEL, some (+) Silt, some (-) fmc Sand, loose, saturated.	
	11	1.9	46	Gray fmc SAND, some (+) f subangular Gravel, some (-) Silt, loose.	
	12	1.8	40	@ 42.2' Brown f SAND and (-) Silt, saturated.	
45	13	2.0	45		
	14	1.6	35	46.7' TILL Gray SILT and f Sand, some (-) fm subangular Gravel, dense, saturated.	
50	15	1.7	13		
	16	1.6	30	@ 49' Gray fmc SAND and fm subangular Gravel, some (+) Silt, loose.	
	17	1.8	26		
55	18	1.9	37	50.7' OUTWASH Brown fm SAND, some (-) Silt, little (-) f subangular Gravel, m dense, saturated.	

Wehran EnviroTech

BORING/WELL NO. PW-10

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1047.0ft.
N-S COORD: 788,870.17
E-W COORD: 769,379.82

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		19		1.2	60			@ 57' Brown fmc SAND, some (-) Silt, little (++) fm subangular Gravel, m dense.	@ 57' flowing Sands.
	60	20		0.4	180				
		21		1.3	44				
		22		1.4	57				
	65	23		1.5	41				
		24		1.0	61				Switched from 4" Augers to 4" casing @ 65'.
	70	25		1.2	53				
		26		1.1	68				
		27		1.6	58			@ 72.3' Brown f SAND and (-) Clayey Silt, m dense, w/<0.25" Silt layers.	@ 72.3' Gradually grading to Glaciolacustrine.
	75	28		1.4	113			@ 75' w/ 0.25" to 1" Clayey Silt layers, dense.	
		29		1.6	58			77.0'	
	80	30		1.5	63			GLACIOLACUSTRINE DEPOSIT Brown SILT and f Sand, soft, sticky, m dense, saturated.	
		31		1.6	53			@ 81' w/1" to 2" Silt layers; 0.25" Clay layer.	
		32		1.0	83			@ 83' Dense.	
	85							85.0' @ 85' End Of Boring	
	90								
	95								
	100								
	105								
	110								
	115								
	120								

Wehran EnviroTech

BORING/WELL NO. PW-11

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS
PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1049.7ft.
N-S COORD: 788,388.17
E-W COORD: 768,696.43
WL REF ELEV: 1051.85ft.
DATE STARTED: 12/31/91
DATE FINISHED: 1/6/92
OPERATOR: Layne Pech
GEOLOGIST: BAO

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE
1/3/92	36'	1013.7	42'-44'

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
0	1	0.5	10	TOPSOIL/SOIL FILL Orange-Brown Clayey Silt, some (+) f Sand, some (-) fm subangular Gravel, moist.	
5	2	1.3	13		
10	3	1.2	19	10.0' OUTWASH Brown fm SAND, some (-) Clayey Silt, little (++) fm subangular Gravel, moist.	
15	4	1.0	30	15.0' TILL Gray-Brown fm subangular GRAVEL and f Sand, some- Silt, w/Cobbles, moist.	
20	5	0.8	42		
25	6	1.0	29		@ 24' Auger refusal due to Cobbles; replaced w/4" steel casing.
30	7	0.7	32	28.5' OUTWASH Brown f SAND and (-) Silt.	
	8	0.4	44		
35	9	0.0	27		34'-42' Problems with samples of wash. water @ ~36'
	10	1.0	42		
	11	0.2	42		
	12	1.1	34	38.0' @ 38' Brown SILT and f Sand, soft.	
40	13	1.3	34	40.0' Dark Brown f SAND, some (-) Silt.	
	14	0.5	63		
45	15	1.3	74		
	16	1.2	83		
	17	1.5	48	@ 48' Brown to Gray f SAND, some (+) Silt, saturated.	
50	18	1.2	108	@ 50' to 50.3' w/ Red Speckles.	
	19	1.3	48	52.0' @ 52'-52.4' Green SILT and f Sand.	@ 51.5' Begins grading to Glaciolacustrine.
55	20	1.9	52	52.4' @ 52.4'Gray to Brown f SAND and Silt, soft, m dense, saturated.	

Wehran EnviroTech

BORING/WELL NO. PW-11

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1049.7ft.
N-S COORD: 788,388.17
E-W COORD: 768,696.43

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (feet)	N-VALUE	LOG	UNIFIED	FIELD DESCRIPTION (Modified Burmister)	REMARKS
		21		1.8	37				
		22		1.5	72				
	60	23		0.0	34			@ 59.2' 2" Tan Silt layer w/ <0.25" Red Clay layer.	
		24		0.9	32				
		25		1.5	46			@ 63' Brown Silt and f Sand, soft, saturated.	
	65	26		0.6	54			@ 64.3' w/0.25" Clay layer.	
								@ 65.0'Brown f SAND and Silt, soft, saturated.	
		27		1.6	70				
	70	28		1.4	54			68.6' GLACIOLACUSTRINE DEPOSIT Brown SILT and (−) f Sand, soft, w/ three <0.25" Clay layers from 68.6' to 68.7'.	
		29		1.5	40				
		30		1.5	86				
	75							@ 74.6' w/ 1" Red Clay layer.	
								75.0' @ 75' End Of Boring	
	80								
	85								
	90								
	95								
	100								
	105								
	110								
	115								
	120								

Wehran EnviroTech

BORING/WELL NO. PW-12

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-850

GS ELEV: 1058.4ft.
N-S COORD: 788,469.78
E-W COORD: 769,177.32
WL REF ELEV: 1060.42ft.
DATE STARTED: 1/6/92
DATE FINISHED: 1/10/92
OPERATOR: S. Breeds
GEOLOGIST: J. Gilbert

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
	1	0.8	13	TOPSOIL/SOIL FILL Brown SILT, some (+) fmc Sand, little (-) fm subangular Gravel, organic, wet	
5	2	0.5	25	5.0' REFUSE Plastics, wood, odorous, wet.	
10	3	1.0	18		
	4	1.3	28	12.0' TILL Red-Brown Clayey SILT, some (-) fmc Gravel, little fmc Sand, dense, dry to damp.	
15	5	1.0	31	@ 15.0' Brown Clayey SILT and (-) fmc Gravel, some (-) fmc Sand, plasticity, loose, chemical odor, wet.	20', 6.5"O.D. Permanent Casing set @ 14.4'. Switched from 4" Augers to 4" casing @ 14'.
20	6	1.4	44	@ 20' m dense.	
25	7	1.0	53		
30	8	0.8	58	@ 30.0' Brown Clayey SILT, some (+) fmc Gravel, some (-) fmc Sand, wet.	
35	9	1.4	42	35.0' OUTWASH Brown cmf SAND, trace (+) Silt, trace fm Gravel, wet.	
	10	1.3	35		
40	11	1.4	24		
	12	1.2	29		
	13	1.6	26	@ 43' Gray-black fmc SAND, trace (-) Gravel, sl. chemical odor, wet.	
45	14	1.2	26		
	15	0.0	32		
50	16	0.5	38		
	17	1.6	22		
	18	1.6	35		
55	19	1.6	29	@ 55' Dark Gray fm SAND, some (-) Silt, w/ Silt sorted, wet.	

Wehran EnviroTech

BORING/WELL NO. PW-12

PROJECT: *COLESVILE LF Remedial Design*
CLIENT: *BROOME COUNTY/GAF*
CONTRACTOR: *EMPIRE SOILS*

PROJECT NO: *02260HG*
RIG: *CME-850*

GS ELEV: *1058.4ft.*
N-S COORD: *788,469.78*
E-W COORD: *769,177.32*

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
	20	2.0	35	@ 58' Silt seams w/ Red Silty Clay seam.	
60	21	1.7	26		
	22	2.0	40		
	23	1.0	18	@ 63.0' Dark Brown f SAND, some (+) Silt, laminated. @ 64.6' Red Silty Clay seam, high dilatancy, wet.	
65	24	2.0	34		
	25	1.8	32		
70	26	1.7	34		
	27	2.0	30	@ 71' becomes dense.	
	28	1.7	36		
75	29	1.7	44	75.0'	
	30	2.0	39	GLACIOLACUSTRINE DEPOSIT Brown SILT and f Sand, dense, w/ <0.25" Red Clay seam @ 75.5'.	
80	31	1.5	48	@ 79' high dilatanty, wet, w/ 0.25" Red Silty Clay seam.	
	32	1.8	41		
				@ ~83' 0.5" Red Silty Clay seam w/ silt seams.	
85				83.0' @ 83.0' End Of Boring.	
90					
95					
100					
105					
110					
115					
120					

Wehran EnviroTech

BORING/WELL NO. PW-13

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1062.5ft.
N-S COORD: 788,462.54
E-W COORD: 769,640.70
WL REF ELEV: 1064.37ft.
DATE STARTED: 1/7/92
DATE FINISHED: 1/13/92
OPERATOR: L. Pech
GEOLOGIST: D.R.L./B.A.O.

GROUNDWATER DATA (feet)

DATE	GW DEPTH	GW ELEV	INTAKE

	CASING	SAMPLE	TUBE	CORE
TYPE	HSA/steel	SS		
DIAM.	4"	2"		
WEIGHT		140#		
FALL		30"		

SAMPLE NUMBER	RECOVERY (feet)	N-VALUE
1	0.7	8
2	0.8	40
3	0.0	27
4	0.3	100
5	0.0	50
6	0.5	17
7	0.4	20
8	0.6	54
9	0.0	9
10	0.2	28
11	1.0	26
12	0.8	24
13	0.0	28
14	1.8	24
15	1.3	20
16	1.0	20
17	1.0	17
18	0.7	25
19	1.2	27
20	0.9	24
21	1.8	21
22	2.0	39
23	1.3	17

FIELD DESCRIPTION (Modified Burmister)

SOIL FILL
Brown cf SAND, little Silt & Clay, trace (+) fm Gravel, loose, moist.

15.0'
REFUSE
w/ FILL, tire, plastic, wood, paper, glass, slight odor, wet.

@ 20' Saturated.

30.0'
TILL
Grayish-brown SILT & Clay and cf Sand, little mf Gravel, m dense, moist.

@ 37.0' Grayish-brown fc SAND, little f Gravel, trace (-) Silt, dry.

40.0'
GLACIAL OUTWASH
Gray fc SAND, little (-) fm Gravel, trace (+) Silt, m dense, dry.
@ 44.5' Becomes moist.

@ 50'Becomes Grayish-brown f SAND and Silt, m dense, moist.

55.0'
GLACIOLACUSTRINE DEPOSIT
~~Brown Clayey SILT, little f Sand, dense, moist, saturated.~~

REMARKS

Permanent 6" steel casing to 41'b.g.s. Switched from 4" Augers to 4" casing @ 41'.

Wehran EnviroTech

BORING/WELL NO. PW-13

PROJECT: COLESVILE LF Remedial Design
CLIENT: BROOME COUNTY/GAF
CONTRACTOR: EMPIRE SOILS

PROJECT NO: 02260HG
RIG: CME-75

GS ELEV: 1062.5ft.
N-S COORD: 788,462.54
E-W COORD: 769,640.70

DEPTH (feet)	SAMPLE NUMBER	RECOVERY (feet)	N-VALUE	FIELD DESCRIPTION (Modified Burmister)	REMARKS
	24	1.1	57		
60	25	1.4	39	@ 60'becomes Brown laminated SILT and f Sand, soft.	
	26	1.3	50		
65	27	1.6	39	@ 64' Brown f SAND and Silt grading to Light Green-brown SILT and f Sand, w/ f Sand partings.	
	28	1.5	52		
	29	1.5	39		
70	30	1.3	61	@ 70' Brown SILT and f Sand, soft, dense, layered, w/<0.25" Clay seam @ 71.5'.	
	31	1.4	26		
75	32	1.6	36		
	33	1.7	39		
	34	1.9	53	@ 78.0'Green-brown SILT, some (+) f Sand, soft, w/ 0.75" Red Clay seam @ 79.5'.	
80				@ 80' End Of Boring. 80.0'	
85					
90					
95					
100					
105					
110					
115					
120					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. Pz-1s
SHEET NO. 1 OF 1
JOB NO. 07522HX
ELEVATION 1081.30
DATE STARTED 31 OCT 87
DATE FINISHED 1 NOV 87
DRILLER E. PUCCI
INSPECTOR KJB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT of PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA			
DIA.	4 1/4"			
WT.				
FALL				

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT-BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH-JOINT PVC PIPE & SCREEN	0				FOR DETAILED SOILS DESCRIPTION SEE BORING LOG Pz-1d	
	5					
	10					
BENTONITE PELLET SEAL	15					
SANDPACK	20					
	25					
	30				31 FT	
					END OF BORING	
	35					
	40					
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. Pz-1d
SHEET NO. 1 **OF** 2
JOB NO. 07522 HX
ELEVATION 1081.70
DATE STARTED 29 OCT 87
DATE FINISHED 31 OCT 87
DRILLER E. PUCCI
INSPECTOR KJB

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME COUNTY DEPT. of PUBLIC WORKS
BORING CONTRACTOR: R&R INTERNATIONAL

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS	NX	SHELBY
DIA.	4 1/4	2"		
WT.		140 lb		
FALL		30"		

WELL CONSTRUCTION: CEMENT - BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSH-JOINT PVC PIPE & SCREEN

DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	1	SS	1 2 / 10 24	GLACIAL TILL Lt Brown - Grey SILT & CLAY some (fc) Sand, some (fm) Gravel	
5	2	SS	22 23 / 37 32		
10	3	SH/SS	PUSH / 13 50		@ 10 FT ATTEMPTED SHELBY SAMPLE - TUBE SEVERELY DEFORMED & SAMPLED REMAINING INTERVAL VIA SPOON
15	4	SH	PUSH / driven	@ 15 FT Grey (fc) SAND and SILT & CLAY and (fm) Gravel	@ 15 FT PUSHED SHELBY SAMPLE 8", drove tube ADDITIONAL 10"
20	5	SS	26 15 / 23 24		
25	6	SS	10 22 / 23 21		
30	7	SS	11 19 / 25 17	@ 30 FT becoming Brown SILT & CLAY	
35	8	SS	23 50 / 24 46		
40	9	SS	17 27 / 28 47	44.1 FT	
45	10	SS	34 25 / 18 13	GLACIAL OUTWASH DEPOSITS Brown (fc) SAND and (f) GRAVEL trace SILT	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. Pz-1d

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
SHEET NO. 2 OF 2
CLIENT: BROOME COUNTY DEPT of PUBLIC WORKS
JOB NO. 07522HX

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
CEMENT-BENTONITE GROUT; 2" ID SCHEDULE 40 THREADED FLUSHJOINT PVC PIPE & SCREEN	45	10	SS	34 25 / 18 13	GLACIAL OUTWASH DEPOSITS Brown (fc) SAND and (f) GRAVEL Trace Silt 42 FT	
					GLACIOLACUSTRINE DEPOSITS Brown Clayey SILT, little (f) Sand	
	50	11	SS	10 10 / 10 12	53.5 FT	
	55	12	SS	5 5 / 10 19	GLACIAL TILL Grey SILT & CLAY, some (fm) Gravel little (fm) Sand	
FILTER PACK	60	13	SS	56 34 / 57 56	@ 60 FT Grey (fm) GRAVEL and (cf) Sand, little clayey Silt	@≈60 FT SATURATION increasing number of shale fragments
SANDPACK	65	14	SS	33 50 / 84 100/4	@ 66 FT Broken shale fragments	
	70	RUN 1	NX CORE			@ 68 FT LARGE BOULDER
	75	15	SS	67 100/4 / 100/4		
	80	16	SS	79 140 / 100/3	81.2 FT END OF BORING	
	85					
	90					
	95					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. RFB

SHEET NO. 1 OF 2

PROJECT: COLESVILLE LANDFILL REMEDIAL INVESTIGATION
CLIENT: BROOME CO. DEPT. OF PUBLIC WORKS
BORING CONTRACTOR: KENDRICK DRILLING

JOB NO. 07522 4X
ELEVATION 1063.40
DATE STARTED 12-7-87
DATE FINISHED 12-11-87
DRILLER J. STEVENSON
INSPECTOR EMA DBM

GROUND WATER

DATE	TIME	WATER EL.	SCREEN

	CAS.	SAMP.	CORE	TUBE
TYPE	FJ	SS	NA	DENNISON
DIA.	4"	2"		
WT.	300#	140#		
FALL	30"	30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	RECOVERY	REMARKS
CEMENT / BENTONITE GROUT; 2" Sch 40 FJ PVC Riser Pipe	0	10	SS	6 10 / 14 28	Fill BROWN SILT & CLAY to Clayey SILT, little (m-f) Sand, trace (f) Gravel dry 10 ft	.5	advance hole w/ 6 1/4 Hollow stem augers
	5	11	SS	18 22 / 27 25		.5	
	10	1	SS	21 22 / 28 30	Glacial OUTWASH @ 10 ft becoming brown Clayey SILT, trace (f) Sand, trace (f) Gravel occ. lens of f Sand	1.9	@ 10' change to mud rotary 4" driven casing
	15	2	SS	25 36 / 35 22	@ 15 ft becoming damp Note mottling. tan, orange, yellow & blue faint thin laminations	1.6	
		3	SS	100/6 / 75/2		.7	DENNISON attempted @ 17.5 ft for 0.8 ft No recovery
	20	4	SS	35 60 / 90 100/6		1.8	
	25	D-2	DENNISON	N/A / N/A		1.8	@ 25 ft water loss in hole
		D-3	DENNISON	N/A / N/A		1.4	
	30	5	SS	32 33 / 50 75	@ 30 ft Grey-Brown (fine) SAND and Clayey Silt, little (fm) Gravel	1.2	
	35	6	SS	38 40 / 80 100/1		.6	
	40	7	SS	21 22 / 30 36	@ 41 ft becoming Brown, (v.f.-fine) fm SAND, Some Clayey Silt	1.4	@ 39' Wash water changes from brown to red brown, quickly changes back to brown
	45	8	SS	23-16 / 15-17	@ 45 ft Sand becoming well sorted trace fine Gravel	1.3	

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG
BORING NO. RFB
SHEET NO. 2 OF 2
JOB NO. 07522 4X

PROJECT: COLESVILLE LANDFILL REMEDIAL INV.
CLIENT: BROOME CO. DEPT. OF PUBLIC WORKS

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	Recovery	REMARKS
	45	8	SS	23 16 15 17	Glacial Outwash @ 45 ft Sand becomming well sorted	1.3	4" dia steel protective casing cemented at surface
Sand pack	50	9	SS	10 10 10 12	@ 50 ft NOTE Green tint in Sands well sorted	1.3	
	55	12	SS	20 21 23 33	Brown w/ dark Green tint fine SAND and Silt @ 56.5 ft grading to BROWN SILT little to some fine sand	1.5	
	60	13	SS	22 27 35 38	@ 60 ft becomming Reddish Brown 62' END OF BORING @ 62'	1.2	
2" dia. Sch. 40 FJ PVC well screen and riser pipe	65						
	70						
	75						
	80						
	85						
	90						
	95						

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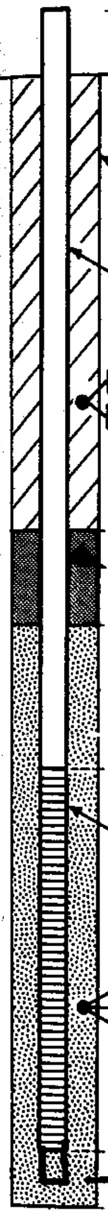
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



2ft ft

LAND SURFACE

11 inch diameter drilled hole

Well casing, 4 inch diameter, Sch 40 Steel

☐ Backfill
■ Grout 95% Cement 5% Bentonite

43 ft*

Bentonite ☐ slurry ■ pellets / chips

45 ft*

50 ft*

Well Screen. 4 inch diameter Stainless Steel, 0.006 slot

☐ Gravel Pack
■ Sand Pack #000
☐ Formation Collapse

65 ft*

70 ft* 70 ft } Sump

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project NY 000949. 0010 Well GM-PW-1

Town/City Colesville, N.Y.

County Broome State NY

Permit No. ______

Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) [redacted], 12-9-97

Drilling Method HSA

Drilling Contractor Maxim Tech.

Drilling Fluid None

Development Technique(s) and Date(s)
3" pump, Surge & pump method

Fluid Loss During Drilling [redacted] gallons

Water Removed During Development ______ gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm Date ______

Specific Capacity ______ gpm/ft

Well Purpose Production Well

Remarks ______

Prepared by A.C. Gilmore

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SAMPLE/CORE LOG   Task I

Boring/Well GMPW-1 Project/No. COLESVILLE LANDFILL/NY000949.010 Page 1 of 3

Site Location COLESVILLE, NY Drilling Started 11.17.97 Drilling Completed

Total Depth Drilled 65 feet Hole Diameter 8 inches Type of Sample/Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval 5'/CONTINUOUS feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used NONE Drilling Method 3¼" HSA

Drilling Contractor MAXIM TECHNOLOGIES Driller SCOTT Helper AL

Prepared By D. STERN Hammer Weight 140 Hammer Drop 30 inches

PID (ppmv)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIME
3.0	5	7	1.2	5,9,15,15	GRAVELLY SAND (SP) medium to fine	1300
					angular to subangular, moist.	
					DARK BROWN 10YR 3/4.	
3.0	7	10	-	CUTTING	GRAVEL + SAND, Med. to coarse,	
					dry BROWN 10YR 5/4.	
2.1	10	12	1.3	3,3,4,5	CLAY (CL) SILTY, laminated, moist	1315
					DARK BROWN 10YR 3/4	
2.2	12	15	-	CUTTINGS	CLAYEY SILT + GRAVEL, DARK BROWN	
2.6	15	17	1.3	2,5,12,14	(0.3)' CLAY AS ABOVE	1330
					(0.3-1.3) SILTY SAND (SM) undifferentiated	
					DRY GREENISH GRAY GLEY 1	
3.0	17	20	-	CUTTINGS	CLAYEY SILT + GRAVEL DARK BROWN TO OLIVE.	
1.5	20	22	1.5	6,5,5,5	SAND (SW) fine, undifferentiated	1345
					DRY DARK BROWN 10YR 3/4	
1.2	22	25	—	CUTTINGS	SILTY some CLAY DARK BROWN.	
1.2	25	27	1.6	6,7,7,8	SILTY SAND (SM) very fine,	1415
					trace gravel, subangular. undifferentiated	
					DARK BROWN 10YR 3/4, DRY.	
<0.1	27	30	-	CUTTINGS	SILTY w/ SAND + CLAY BROWN	

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SAMPLE/CORE LOG (Cont.d)

Boring/Well GMPW-1

Page 2 of 3

Prepared By: D. SPRN

PID (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	Time
<1.0	30	32	2.0	6,8,10,11	SAND (SW) fine, little silt laminated, DARK BROWN 10YR 3/4 DRY.	1430
<1.0	32	35	-	CUTTINGS	SAND, SILT + CLAY, few gravel, DARK BROWN.	
<1.0	35	37	2.0	10,12,13,15	SAND (SW) fine, stratified some medium, DRY. BROWN 10YR 3/4.	1450
<1.0	37	40	-	CUTTINGS	SAND, medium to fine, some gravel, clay, BROWN 10YR 4/4.	
<1.0	40	42	2.0	6,9,10,12	(0-0.2) AS ABOVE (0.2-2) SAND, medium to fine, greenish gray MOIST. GLEY 1	1510
<1.0	42	45	—	CUTTINGS	SAND + GRAVEL, DRY BROWN	1535
<1.0	45	47	2.0	6,7,7,8	SILTY SAND (SM) undifferentiated, SATURATED. DARK BROWN 10YR 3/4	
SIEVE <1.0	47	49	2.0	3,8,10,12	SILTY SAND (SM) very fine, trace clay SATURATED, DARK BROWN 10YR 3/4.	
.5/1500	49	51	1.3	PUSH	SHELBY TUBE	0815
<1.0	51	53	2.0	5,8,10,13	SILTY SAND (SM) very fine, undifferentiated DARK BROWN 10YR 3/4	0910
SIEVE <1.0	53	55	2.0	6,8,8,7	SILTY SAND (SM) very fine, laminated trace clay, BROWN 10YR 4/4.	0925

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SAMPLE/CORE LOG (Cont.d)

Boring/Well GMPW-1

Page 3 of 3

Prepared By D. STERN

PID (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches (min/lbs.)	Sample/Core Description	TIME
<1.0	55	57	2.0	8,9,10,12	SILTY SAND (SM) very fine, laminated BROWN 10YR 4/4.	0940
<1.0	57	59	2.0	0.5/1000	SHELBY TUBE	1020
<1.0 ~~SIEVE~~ ~~SIEVE~~ SIEVE	59	61	2.0	1,6,8,10	SILTY CLAY (CL) some very fine sand undifferentiated. BROWN 10YR 3/4	1050
<1.0 ~~SIEVE~~ SIEVE	61	63	2.0	8,8,10,15	SILTY SAND (SM) very fine, trace clay, ~~Strand~~ clay stringer @ 1.1 ft DARK BROWN 10YR 3/4.	1110
SIEVE <1.0	63	65	20	7,10,10,12	SILTY SAND (SM) undifferentiated, very fine, DARK BROWN 10YR 3/4	1125
<1.0	65	67	2.0	5,7,10,15	SILTY SAND (SM) stratified clay and silt. laminae, DARK GREYISH BROWN 10YR 3/1.	1150
					EOB	

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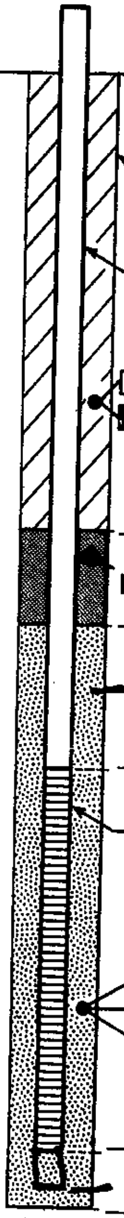
WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



ft LAND SURFACE

11 inch diameter drilled hole

Well casing, 4 inch diameter, low carbon steel sch 40

☐ Backfill
■ Grout Cement 95% Bentonite 5%

28 ft*

Bentonite ☐ slurry
30 ft* ■ pellets/chips

32 Ft } Finer Sand #000

35 ft*

Well Screen. 4 inch diameter
, .012 slot

☐ Gravel Pack
■ Sand Pack #00
☐ Formation Collapse

50 ft*

54.9 Ft } Sump

55 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project NY000999.0010 Well GM-PW-2

Town/City Coksville

County Broome State NY

Permit No. ______

Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 11.23.97 TO 11.26.97

Drilling Method HSA

Drilling Contractor Maxim Tech.

Drilling Fluid Potable Water

Development Technique(s) and Date(s)
Pump & surge. 12-3-97, 12.1 & 12.2

Fluid Loss During Drilling [redacted] 150 gallons

Water Removed During Development 225 gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm Date ______

Specific Capacity ______ gpm/ft

Well Purpose Production well

Remarks ______

Prepared by A.C. Gilmore

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well GMPW2 Project/No. Colesville Landfill / NY0999.010 Page 1 of 3

Site Location Colesville, NY Drilling Started 11.12.97 Drilling Completed 11.13.97

Total Depth Drilled 56 feet Hole Diameter 8 inches Type of Sample/Coring Device Split-spoon

Length and Diameter of Coring Device 2' x 2" Sampling Interval 5' / Continuous feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used NONE Drilling Method 3¼" ID HSA

Drilling Contractor Maxim Techology Driller S. Breecks Helper A. Burr

Prepared By D. STERN Hammer Weight 140 Hammer Drop 30 inches

PID	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	Time
1.5	5	7	1.5	10,8,4,4	SILTY SAND (SM) very fine, few gravel, angular, medium undifferentiated BROWN 7.5YR 4/4. DRY	1430
.0	7	10	—	Cuttings	SAND, fine w/ gravel. BROWN TO LIGHT BROWN. Augers grinding grades to darker brown.	
0	10	12	1.5	27,50 34,72	SILTY SAND (SM) with gravel, angular reddish brown to gray SAND IS BROWN 7.5YR 4/4	1500
.8	12	15	—	Cuttings	SAND + fine gravel, Chattering	
.8	15	17	1.5	11,11,9,9	SAND (SP), fine, some silt, gravel, subangular, BROWN 7.5YR 4/4.	1525
1.0	17	20	—	Cuttings	SAND, SILTY with gravel grayish brown.	1540
1.0	20	22	2.0	5,5,4,5	SAND (SW) medium to fine, dark grayish brown 10YR 4/2.	
1.0	22	25	—	Cuttings	SAND, medium to fine, some fine gravel, light brown	

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Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well GMPW2

Prepared By D STERN

PID	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
<1.0 ✓	25	27	2.0	8,8,10,12	SAND (SW) medium to fine, some silt, trace gravel, angular, fine dark brown 10YR 3/4. DRY undifferentiated,	1600
<1.0	27	30	-	Cuttings	SAND, fine some gravel light brown	~~1615~~
<1.0	30	32		7,8,11,11	SAND, (SW) medium to fine, trace gravel, saturated ▽ ?	1615
<1.0 S	32	34	2.0	7,9,11,11	SILTY SAND (SM) FINE, trace quartz garnet. DARK BROWN 10YR 3/4 SATURATED. NO ODOR.	0800
<1.0 ✓	34	36	~~2.0~~	4,10,11,9	SILTY SAND (SM) Very fine, ~~undifferentiated~~ DARK BROWN 10YR 3/4, SATURATED NO ODOR, LAMINAE SILT LT BROWN	0810
1.2	36	38	~~1.8~~	~~[illegible]~~ 0.5/500	SHELBY TUBE Foc, BD, Porosity.	0910
1.0 S	38	40	2.0	6,8,12,13	SILTY SAND (SM) very fine, laminated DARK BROWN, SATURATED. 10YR 3/4	950
<1.0 ✓	40	42	2.0	6,11,14,15	SILTY SAND (SM) fine, laminae of silt, clay stringer (<0.05') @ 41.5' BROWN 10YR 3/4. SATURATED	1005
1.0 ✓	42	44	2.0	3,8,10,12	SILTY SAND (SM) fine, undifferentiated. DARK BROWN 10YR 3/4	1020
1.0 S	44	46	2.0	4,6,7,10	SILTY SAND (SM) fine, clay stringer @ 45.3', laminae of silt, BROWN, 10YR 3/4 SATURATED	1030

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SAMPLE/CORE LOG (Cont.d)

Boring/Well GMPW2

Prepared By D STERN

PID	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIME
2.1 –	46	48	1.9	3.5/650	SHELBY TUBE for, BD, Porosity	11:10
1.5 ✓	48	50	2.0	5,7,10,11	SILTY SAND (SM) fine, little clay, laminae of clay @ 49.5' BROWN SATURATED.	11:30
<1.0	50	52	2.0	4,7,10,11	SILTY SAND (SM) v. fine, undifferentiated. BROWN 10YR 3/4.	1150
<1.0 ✓	52	54	2.0	2,8,9,12	SILTY SAND (SM) very fine, laminae of silt, clayey at 54' LACUSTRINE?	1300
<1.0 ✓	54	56	2.0	5,7,10,10	SILTY SAND (SM) laminated. trace clay stringers. GRAY TO GRAYISH GREEN	1315
					EOB.	

GERAGHTY
& MILLER, INC.
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WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

ft
LAND SURFACE

11 inch diameter drilled hole

Well casing, 4 inch diameter, Sch 40 low Carbon steel

☐ Backfill
■ Grout Cement 95% Bentonite 5%

8 ft*

Bentonite ☐ slurry
10 ft* ■ pellets/chips

12 Ft } #000 Sand

15 ft*

Well Screen.
4 inch diameter
Stainless, .012 slot
Sch 40

☐ Gravel Pack
■ Sand Pack #00
☐ Formation Collapse

30 [redacted] ft*

35 ft* 34.9 Ft } Sump

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project NY000999.0010 Well GM-PW-3
Town/City Colesville, N.Y.
County Broome State N.Y.
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated
Installation Date(s) 11.24.97, 11.[redacted].97 25
Drilling Method HSA
Drilling Contractor Maxim Tech.
Drilling Fluid Potable water

Development Technique(s) and Date(s)
Pump & Surge. 12.4.97, 12.3.97

Fluid Loss During Drilling [redacted] 80 gallons
Water Removed During Development 160 gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft
Well Purpose Production Well

Remarks

Prepared by A.C. Gilmore

5 12-88

Southprint 89-0978

GERAGHTY & MILLER, INC.
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SAMPLE/CORE LOG

Boring/Well GMPW3 Project/No. Colesville Landfill / NY0945001.0001 Page 1 of 2

Site Location Colesville NY

Drilling Started 11.14.97 Drilling Completed 11.14.97

Total Depth Drilled ~~[illegible]~~ 30 feet Hole Diameter 8 inches Type of Sample/Coring Device split-spoon

Length and Diameter of Coring Device 2' x 2"

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Sampling Interval 5' / continuous feet Datum ____

Drilling Fluid Used NONE Drilling Method 3¼" ID HSA

Drilling Contractor Maxim Technologies Driller Scott Helper Al

Prepared By D. STERN Hammer Weight 140 Hammer Drop 30 inches

PID	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIME
2.9	0	5	–	Cuttings	SANDY LOAM, topsoil Few round gravel DARK BROWN.	0800
3.1	5	7	2.0	4,5,5,6	SAND + SILT, laminated, DARK BROWN 10 YR 3/4 DRY	0810
.4	7	10	~	cuttings	~~[illegible]~~ CLAYEY LOAM DARK BROWN.	
1.0	10	12	1.5	3,4,4,5	SILTY SAND (SM) laminae of silt DARK BROWN	0830
1.0	12	14	1.5	3,5,5,6	SILTY SAND, very fine, laminated. SATURATED 10YR 3/4 DK. BROWN	0845
1.0	14	16	1.5	3,5,5,5	SAME AS ABOVE	0910
1.0	16	18	1.5	1,3,7,8	SILT little sand ~~[illegible]~~, laminated. DARK BROWN AT TIP SILTY CLAY, OLIVE BROWN. SATURATED	0940
1.0	18	20	2.0	5,6,10,12	CLAYEY SILT, laminated 18.0-18.3 Silty Clay (OLIVE BROWN) STRINGER. SATURATED DARK BROWN 10YR 3/4.	1000
1.0	20	22	1.5	2,3,3,5	Silt, little fine sand laminated DARK BROWN 10YR 3/4.	1020

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GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well GMPW3

Page 2 of 3

Prepared By D. STERN

PID	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIME
1.0	22	24	2.0	7,8,8,11	SILT, little vf sand, laminated DARK BROWN 10YR 3/4 SATURATED.	1030
1.0	24	26	2.0	6,8,10,11	SILT, little very fine sand, some laminae. AT 26 fat clay (CH) BROWN TO OLIVE BROWN. ~~LACUSTRINE~~?	1040
1.0	26	28	2.0	5,8,10,10	SILT little sand, vf, some laminae. DARK BROWN, 10YR 4/3	1050
1.0	28	30	2.0	6,9,10,13	SILTY SAND, trace clay laminated throughout DARK GRAY w/ GREEN ORGANICS? LACUSTRINE?	1105
					EOB.	

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2' ft.

Land Surface

10 1/4 inch diameter drilled hole

Well Casing
6 inch diameter,
Sch 80 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

16 ft.*

Bentonite ☐ slurry ☐ pellets
19 ft.*

22 ft.*

Well Screen
6 inch diameter
Stainless steel .004 slot

☐ Gravel Pack
☒ Sand Pack (000)
☐ Formation Collapse

32 ft.*

37 ft.*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well GMW-4
Town/City Colesville
County Broome State NY
Permit No.
Land-Surface Elevation
and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 10/31/00 - 11/1/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid –

Development Technique(s) and Date(s)
Surge block + Submersible pump

Fluid Loss During Drilling – gallons
Water Removed During Development ______ gallons
Static Depth to Water 11.3' feet below M.P.
Pumping Depth to Water 31.5' feet below M.P.
Pumping Duration – hours
Yield ~.38 gpm Date 11/3/00
Specific Capacity ______ gpm/ft.

Well Purpose Extraction of groundwater for treatment System.

Remarks

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well GMPW4 Test Boring Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/14/00 Drilling Completed 9/14/00

Total Depth Drilled 35' ± Feet Hole Diameter 4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval 4/continuous feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor Parratt Wolff Inc. Driller Jim Helper Cayne

Prepared By Kris Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	4		Cuttings	Sand, Silt + Gravel (All material); some chattering
4	6	2'	28,34,38,28	Coarse Sand + Gravel; ~4" of pure rock; cobble
6	8		Cuttings	Brown Sand + Silt; little gravel
8	10	2'	9,7,9,9	Brown Sand (mostly fine) + Silt; moist
10	12		Cuttings	Same as above
12	14	2'	4,7,9,10	Fine Brown Sand + Silt; saturated @ ~13'
14	16	2'	5,9,10,10	Very dense fine Sand + Silt (brown)
16	18	2'	6,10,16,18	Same as above except well laminated
18	20	2'	6,9,10,12	Same as 16-18'
20	22	2'	6,10,12,14	Same as 18-20'
22	24	2'	9,16,19,21	Same as 20-22'.
24	26	2'	7,10,13,18	Same as above
26	28	2'	11,14,16,19	Fine Brown Sand + Silt; no obvious lamination
28	30	2'	6,10,12,17	Same as 26'-28'
30	32	2'	10,13,18,19	Same as 28'-30'
32	34	2'	12,16,18,19	Same as above w/ a ~1" layer of red clay
34	36	2'	3,5,9,12	Fine Sand w/ a silt matrix
	End of	boring		

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2' ft.
Land Surface

10 1/4 inch diameter drilled hole

Well Casing
6 inch diameter,
Sch 80 PVC

☐ Backfill
☒ Grout Cement (bentonite w/clay)

18 ft.*

Bentonite ☒ slurry ☐ pellets
19 ft.*

22 ft.*

Well Screen
6 inch diameter
Stainless steel 004 slot

☐ Gravel Pack
☒ Sand Pack (000)
☐ Formation Collapse

32 ft.*

37 ft.*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well GMPW-5
Town/City Colesville
County BRoome State NY
Permit No.
Land-Surface Elevation
and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 10/30/00 – 10/31/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid –

Development Technique(s) and Date(s)
Surge block + submersible pump

Fluid Loss During Drilling – gallons
Water Removed During Development ______ gallons
Static Depth to Water 6.8' feet below M.P.
Pumping Depth to Water 31.5' feet below M.P.
Pumping Duration – hours
Yield ~.40 gpm Date 11/2/00
Specific Capacity ______ gpm/ft.

Well Purpose Extraction of groundwater for treatment system.

Remarks

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well GM-PW5 TEST BORING Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/13/00 Drilling Completed 9/14/00

Total Depth Drilled 40 Feet Hole Diameter 4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device Sampling Interval 4'/continuous feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used Drilling Method HSA

Drilling Contractor Parratt Wolff Inc. Driller Jim Helper Layne

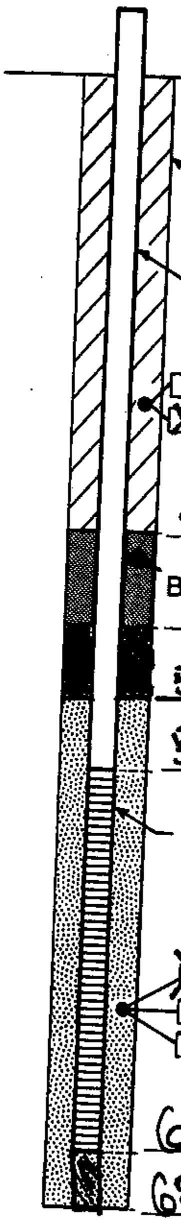
Prepared By Kris Schmitt Hammer Weight Hammer Drop ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	4		Cuttings	Very cobbly material below soil (6") : River Rock : Alot of chattering
4	6	2'	8,5,5,5	River Rock, very gravelly with a sand matrix
6	8		cuttings	Same as 4-6 except slightly more silt; still chattering
8	10	~1.5'	12,10,9,9	water @ ~9'; Very cobbly material with a sand (coarse) matrix
10	12	~6"	5,8,8,7	Very cobbly sandy unit; completely saturated
12	14	2'	11,6,8,10	Very fine silty unit
14	16	2'	9,13,16,18	Same as above with a gray clay lense in it (very dense)
16	18	2'	8,15,18,18	Same as above (silt + some clay) top 6" gravel/sand
18	20	2'	4,4,4,7	Fine sand + silt (~50/50)
20	22	1.5'	4,4,6,6	Fine sand + silt (some pebbly river rock @ middle)
22	24	2'	5,7,10,12	Fine sand + silt (1' bottom) & sandy unit with pebbles (top 1')
24	26	2'	6,8,12,17	mostly silt w/ some clay lenses; laminated, fine sand top 8"
26	28	2'	10,15,21,23	Fine sand + silt with very thin clay lenses (~1-2" red clay unit)
28	30	2'	6,8,13,16	Fine sand + silt; no clay lenses
30	32	2'	7,10,13,15	Almost all silt with little fine sand
32	34	2'	17,20,27,28	Fine silt, very little sand (top); clay at base ~2"?
34	36	2'	4,6,11,13	Sand (medium) and some silt
36	38	2'	6,10,17,22	Fine silt and sand (no clay)
38	40	2'	12,13,17,17	Same as 36'-38'
		End of boring		

Samplelg.xls
9/8/00

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



ft LAND SURFACE

8½ inch diameter drilled hole

Well casing, 2 inch diameter, Sch. 40 PVC

☐ Backfill
☒ Grout 90/10 Portland Cement Type I

47 ft* Bentonite

Bentonite ☐ slurry
49 ft* ☒ ~~pellets~~ Chips

50 ft SAND

53 ft*

Well Screen, 2 inch diameter
PVC, 10 slot

☒ Gravel Pack
☐ Sand Pack
☐ Formation Collapse

63 ft*

68 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Colesville LandFill Well GMMW-1
Town/City Colesville, NY
County Broome State NY
Permit No. ______
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated
Installation Date(s) 11-18-97
Drilling Method 4¼" I.D. HSA
Drilling Contractor Maxim Technologies
Drilling Fluid None

Development Technique(s) and Date(s) ______

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft
Well Purpose Monitoring

Remarks ______

Prepared by David E. Stern

G&M Form 05 12-88

Southprint 89-0978

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well GMMW-1 Project/No. COLESVILLE LANDFILL/NY000949.00010 Page 1 of 1

Site Location COLESVILLE, NY

Drilling Started 11.18.97 Drilling Completed

Total Depth Drilled ______ feet Hole Diameter 8½" inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2"

Sampling Interval 53-55, 58-60 feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used NONE

Drilling Method 4¼" ID HSA

Drilling Contractor MAXIM TECHNOLOGIES Driller SCOTT Helper KEITH

Prepared By D. STERN

Hammer Weight 140 Hammer Drop 30 inches

PID ppm

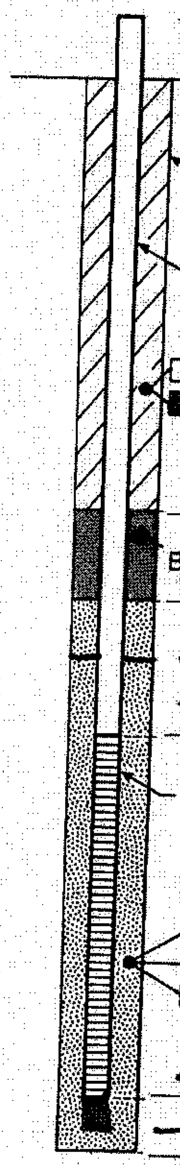
Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	Time
0	17	–	CUTTINGS	CLAY + SAND DARK BROWN. MOIST	
17	18	–	CUTTINGS	CLAY, SOME CHATTERING MOIST	
18	23	–	CUTTINGS	CLAY, DRILLING SMOOTHLY, MOIST BROWN	
23	25	–	CUTTINGS	SANDY CLAY, DARK BROWN, DRY.	
25	30	–	CUTTINGS	SAND, SILT + CLAY, DARK BROWN DRY.	
30	53	–	CUTTINGS	SAND + SILT fine, trace gravel. BROWN. DRY.	
53	55	1.5	3,8,10,10	SILTY SAND (SM) laminated Saturated, BROWN 10YR 4/4.	1245
55	58	–	CUTTINGS	SILTY SAND, ~~some~~ AND Clay, DARK GRAYISH BROWN.	
58	60	1.6	6,9,12,12	SILTY SAND (SM) clay laminae. Stratified sections of olive brown coloration BROWN 10YR 4/4.	1310
60	68	–	CUTTINGS	SILTY SAND + CLAY. GRAYISH BROWN	
				EOB.	

G&M Form 03 6-86

Southprint 89-1257

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



T ft LAND SURFACE

8 1/2 inch diameter drilled hole

Well casing,
2 inch diameter,
Sch 40 PVC

☐ Backfill
■ Grout 90/10 cement/ Bentonite

32 ft*

Bentonite ☐ slurry
34 ft* ■ ~~pellets~~ chips

36 ft* } Fine Sand #000

39 ft*

Well Screen.
2 inch diameter
PVC , 0.010 slot

☐ Gravel Pack
■ Sand Pack #00
☐ Formation Collapse

49 ft*
59 ft* } Sump
54 ft*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Colesville Landfill Well GMMW-2

Town/City Colesville, N.Y.

County Broome State NY

Permit No. ____

Land-Surface Elevation and Datum ____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 2.10, 2.11.98

Drilling Method 4 1/4" I.D. HSA

Drilling Contractor Maxim Technologies

Drilling Fluid None

Development Technique(s) and Date(s)
Pump & Surge. 2.13.98

Fluid Loss During Drilling none gallons

Water Removed During Development ≈ 80 gallons

Static Depth to Water ____ feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

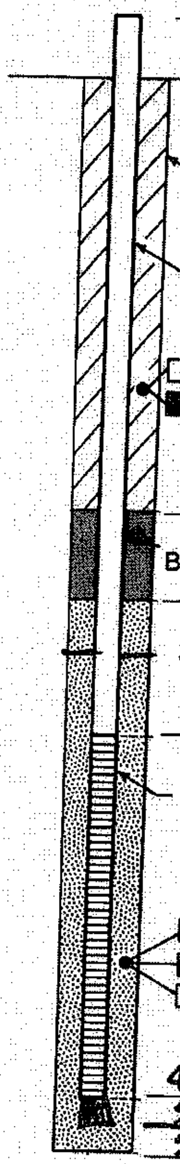
Well Purpose Monitoring

Remarks ____

Prepared by A. C. Gilmore

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Colesville Landfill Well GMMW-3

Town/City Colesville

County Broome State NY

Permit No. ____

Land-Surface Elevation and Datum ____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 2.12.98

Drilling Method 4 1/4" ID HSA

Drilling Contractor Maxim Technologies

Drilling Fluid None

Development Technique(s) and Date(s)
Pump & Surge 2.14.98

Fluid Loss During Drilling None gallons

Water Removed During Development ≈ 80 gallons

Static Depth to Water ____ feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose Monitoring

Remarks ____

Prepared by A.C. Gilmore

G&M Form 05 12-88 Southprint 89-0978

ARCADIS GERAGHTY & MILLER

Well Construction Log
(Uncolsolidated)

ft
LAND SURFACE

8 1/2 inch diameter drilled hole

Well casing, 2 inch diameter, PVC sch40

☐ Backfill
■ Grout 95% cement 5% Bentonite

43 ft*

Bentonite ■ slurry ☐ pellets

46 ft*

49 Ft } Fine Sand Morie #00

52 ft*

Well Screen. PVC 2 inch diameter sch40 .6 slot

☐ Gravel Pack
■ Sand Pack Morie #0
☐ Formation Collaspse

62 ft*
67 ft* } sump

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project: Colesville landfill Well: GMMW-4

Town/City: Colesville

County: Broome State: NY

Permit No.:

Land-Surface Elevation and Datum:

1040.50 msl feet ☐ Surveyed ■ Estimated

Installation Date(s): 11.16.98

Drilling Method: HSA w/ Teflon bottom plug

Drilling Contractor: Uni-Tech drilling Co. Inc.

Drilling Fluid: None, potable water

Development Technique(s) and Date(s)

11.19.98 pump & surge 2" grundfos

Fluid Loss During Drilling: < 100 gallons

Water Removed During Development: 110 gallons

Static Depth to Water: ______ feet below M.P.

Pumping Depth to Water: ______ feet below M.P.

Pumping Duration: ______ hours

Yield: ______ gpm Date: ______

Specific Capacity: ______ gpm/ft

Well Purpose: Monitoring Well

Remarks:

Prepared by: A.C. Gilmore

Wellcstr.xls.xls
10/20/98

ARCADIS GERAGHTY & MILLER

Well Construction Log
(Uncolsolidated)

ft

LAND SURFACE

8 1/2 inch diameter drilled hole

Well casing, 2 inch diameter, Sch 40 PVC

☐ Backfill
■ Grout 95% Cement 5% Bentonite

44 ft*

Bentonite ■ slurry ☐ pellets

47 ft*

50 ft } Fine Sand Morie #00

53 ft*

Well Screen, 2 inch diameter Sch 40 PVC, 6 slot

☐ Gravel Pack
■ Sand Pack Morie #0
☐ Formation Collaspse

63 ft*
68 ft* } sump

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project Colesville landfill Well GMMW-5

Town/City Colesville

County Broome State NY

Permit No. ____

Land-Surface Elevation and Datum:

1040.90 MSL feet ☐ Surveyed ■ Estimated

Installation Date(s) 11.12.98, 11.13.98

Drilling Method ____

Drilling Contractor Unit-Tech Drilling Co. Inc.

Drilling Fluid None, potable water

Development Technique(s) and Date(s)

11.18.98 pump & surge
2" grundfus

Fluid Loss During Drilling < 100 gallons

Water Removed During Development 114 gallons

Static Depth to Water ____ feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose Monitoring Well

Remarks ____

Prepared by A.C. Gilmore

Wellcstr.xls.xls
10/20/98

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2' ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout/Cement (Portland Type I)

32 ft.*

Bentonite ☒ slurry ☐ pellets
35 ft.*

40 ft.*

Well Screen
2 inch diameter
Sch 40 006 slot

☐ Gravel Pack
☒ Sand Pack (000)
☐ Formation Collapse

50 ft.*

55 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well GMMW-6
Town/City Colesville
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 10/1/00 - 11/2/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid –

Development Technique(s) and Date(s)
Waterra; pump + surge (continuous)

Fluid Loss During Drilling – gallons
Water Removed During Development ______ gallons
Static Depth to Water 37.5' feet below M.P.
Pumping Depth to Water 48.0' feet below M.P.
Pumping Duration ______ hours
Yield ~.35 gpm Date 11/3/00
Specific Capacity ______ gpm/ft.

Well Purpose Monitoring Well

Remarks well is complete to surface with casing assembly and ballards on 3 sides to protect from impact (roadside) painted orange on top 6".

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well GMMW-6 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY

Drilling Started 11/1/00 Drilling Completed 11/1/00

Total Depth Drilled 55 Feet Hole Diameter 4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 2' x 2"

Sampling Interval – feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used –

Drilling Method HSA

Drilling Contractor Parratt Wolff Inc. Driller Jim Helper Layne

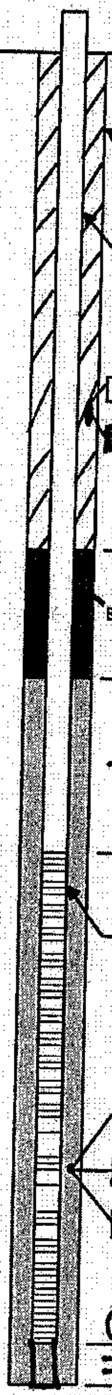
Prepared By K.Schmitt Hammer Weight – Hammer Drop – ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	34	–	cuttings	Fill over fine brown Sand + Silt
34	36	~1'	12,14,14,15	fine brown Sand + Silt; some pebbles; dry
36	38	2'	10,14,15,17	pure fine brown Sand + Silt; moist
38	40	2'	9,10,14,17	Same as 36'-38' with some medium Sand near top; wet
40	42	2'	14,15,18,28	Same as 38'-40'
42	55	–	cuttings	Same as 40'-42'
				* Fill is fine brown Sand, silt + gravel
				* wet = Saturated

Samplelg.xls
9/8/00

ARCADIS GERAGHTY & MILLER

Well Construction Log
(Uncolsolidated)



ft LAND SURFACE

8 1/2 inch diameter drilled hole

Well casing, 2 inch diameter, Sch 40 PVC

☐ Backfill
■ Grout 95% Cement 5% Bentonite

41 ft*

Bentonite ■ slurry ☐ pellets

44 ft*

47 ft } Fine Sand Seal Morie #00

50 ft*

Well Screen. PVC Sch 40 2 inch diameter
 . 6 slot

☐ Gravel Pack
■ Sand Pack Morie #0
☐ Formation Collaspse

65 ft*
70 ft* } Sump

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project Colesville landfill Well IW-1

Town/City Colesville

County Broome State NY

Permit No.

Land-Surface Elevation and Datum:

1040.28 MSl feet ☐ Surveyed ■ Estimated

Installation Date(s) 11.11.98

Drilling Method HSA w/ Teflon bottom plug

Drilling Contractor Uni-Tech Drilling Co. Inc.

Drilling Fluid None, Potable water

Development Technique(s) and Date(s)

11.17.98 pump & surge w/ 2" grundfos

Fluid Loss During Drilling ~~250~~ <100 gallons

Water Removed During Development 107 gallons

Static Depth to Water feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

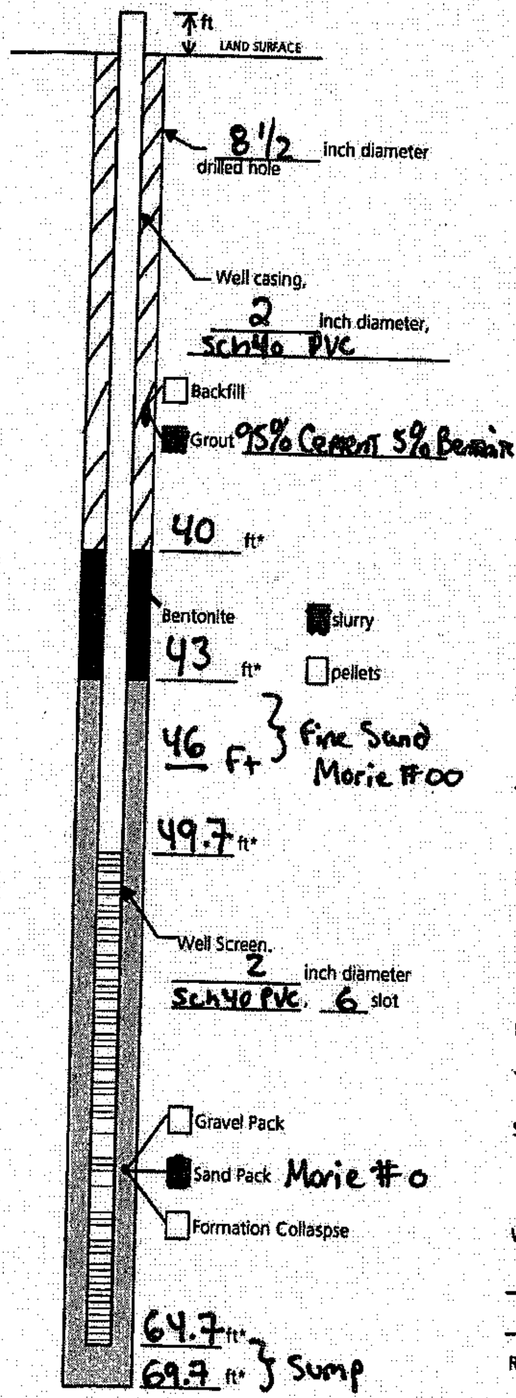
Well Purpose Injection Well

Remarks

Prepared by A.C. Gilmore

ARCADIS GERAGHTY & MILLER

Well Construction Log
(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project Colesville landfill Well IW-2

Town/City Colesville

County Broome State NY

Permit No. ______

Land-Surface Elevation and Datum:

1040.86 MSl feet ☐ Surveyed ■ Estimated

Installation Date(s) 11.12.98

Drilling Method HSA w/ Teflon bottom plug

Drilling Contractor Uni-Tech Drilling Co. Inc.

Drilling Fluid None, Potable water

Development Technique(s) and Date(s)

11.19.98 pump & surge
2" grunfus

Fluid Loss During Drilling ~~[illegible]~~ < 100 gallons

Water Removed During Development 110 gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm Date ______

Specific Capacity ______ gpm/ft

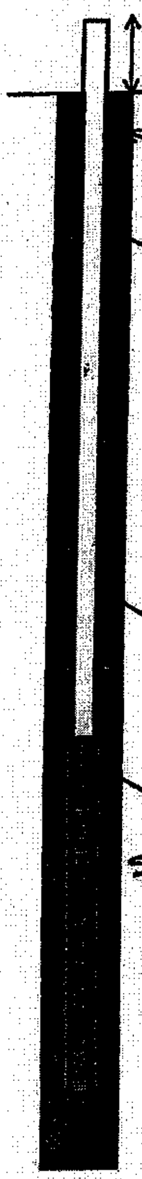
Well Purpose Injection Well

Remarks ______

Prepared by A.C. Gilmore

Wellcstr.xls.xls
10/20/98

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

43' ft.*

Bentonite ☒ slurry ☐ pellets
45 ft.*

50 ft.*

Well Screen
2 inch diameter
Sch40PVC 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

70 ft.*

70 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-3
Town/City Colesville
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/11/00–9/12/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5' below surface to allow for future piping. 2 feet '00' (47'-45') sand is above the '0' SAND

Prepared by Nick Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW3 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, N.Y. Drilling Started 9/11/00 Drilling Completed 9/11/00

Total Depth Drilled 70 Feet Hole Diameter 4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method HSA

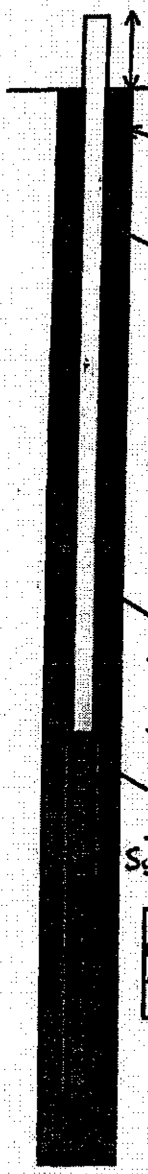
Drilling Contractor Parratt Wolff Inc. Driller Jim Helper Layne

Prepared By Kris Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	20		Cuttings	Brown silt, sand + gravel (fill material)
20	43		"	fine silt and sand; some gravel
43	50		"	same as 20'-43' except more fine SAND
50	52	2'	6,10,11,15	Brown silt and fine sand, little clay
52	60		Cuttings	Same as 50'-52'
60	62	2'	6,10,10,15	Same as 52'-60'
62	70		Cuttings	Same as 60'-62'
			End of	Boring

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

43

Bentonite ☒ slurry ☐ pellets
45 ft.*

50 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (10)
☐ Formation Collapse

70 ft.*

70 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-4
Town/City Colesville
County BRoome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated
Installation Date(s) 9/12/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation.

Remarks Grout is ~ 5 feet below Surface to allow for future piping; 2 feet of '00' (47'-45') is above the 'O' Sand

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW4 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/12/00 Drilling Completed 9/12/00

Total Depth Drilled 70' Feet Hole Diameter 4 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method HSA

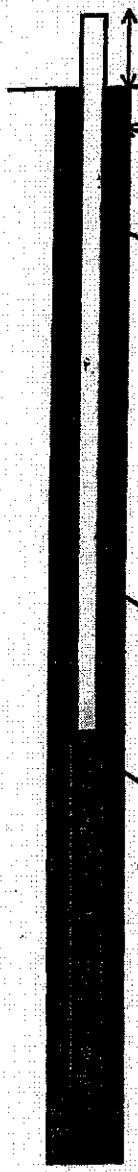
Drilling Contractor Parratt Wolff Inc. Driller Jim Helper Cayne

Prepared By Kurt Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	12		Cuttings	Brown Sand, Silt + some gravel (fill material)
12	19		"	mostly Silt with some clay, no gravel
15	21		"	very clayey material, little sand (fine)
21	32		"	very dense clay with some sand, moist, some cobbles
32	36		"	dense, very dry Sand and Silt (gray)
36	50		"	Brown, dry sandy clay
50	52	6"	8,36,10,10	fine Sand + Silt (brown) + a broken cobble (Sandstone) - , wet
52	60		Cuttings	Very dense, wet, sandy clay
60	62	2'	6,8,11,14	fine sand, brown, saturated
62	70			" Same as 60'-62'
			End of Boring	

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



2' ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☐ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 PVC 10 slot

☐ Gravel Pack
☒ Sand Pack (o)
☐ Formation Collapse

75 ft.*

75 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-5

Town/City Colesville

County Broome State NY

Permit No.

Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/12/00 – 9/13/00

Drilling Method HSA

Drilling Contractor Parratt Wolff Inc.

Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons

Water Removed During Development ______ gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm Date ______

Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is ~ 5 feet below surface to allow for future piping. 2 feet of '00' sand (52'-50') is above the '0' sand

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW5 Project/No. NY000949. 0014. 00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/12/00 Drilling Completed 9/13/00

Total Depth Drilled 75 Feet Hole Diameter 4 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

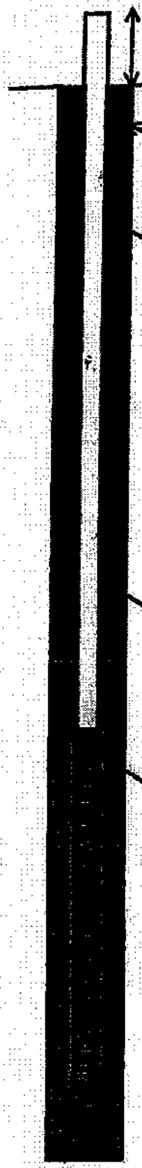
Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor PARRatt Wolff Inc. Driller Jim Helper Cayne

Prepared By KRis Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	16		cuttings	BROWN SAND, Silt + gravel (Fill material)
16	18		"	V.DARK SAND and silt; very little gravel
18	17		"	SANDY CLAY (V.DARK); Some chattering (~15')
17	42		"	COARSE DENSE SANDY CLAY; very moist
42	50		"	Silt, SAND + GRAVEL ; Very wet
50	52	2'	4,5,6,10	mostly sand with little silt (gray) ; Saturated
52	60		cuttings	SAND with a little more silt than before
60	62	2'	6,10,11,13	~~[illegible]~~ SANDY Silt ~~[illegible]~~ (Brown)
62	73		Cuttings	FINE SAND in Silt (Brown)
73	75	2'	6,10,13,18	Very fine sandy Silt (Brown)
		End of boring		

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement

47 ft.* (Bentonite Volclay)

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

75 ft.*

75 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-6
Town/City Colesville
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ________ feet ☐ Surveyed ☐ Estimated
Installation Date(s) 9/15/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Inc.
Drilling Fluid

Development Technique(s) and Date(s)

Fluid Loss During Drilling ________ gallons
Water Removed During Development ________ gallons
Static Depth to Water ________ feet below M.P.
Pumping Depth to Water ________ feet below M.P.
Pumping Duration ________ hours
Yield ________ gpm Date ________
Specific Capacity ________ gpm/ft.

Well Purpose Injection of molasses mixture for remediation.

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of "00" SAND (52'-50') is above the "0" SAND.

Prepared by Rob Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well: IW6 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location: Colesville, NY Drilling Started: 9/13/00 Drilling Completed: 9/15/00

Total Depth Drilled: 75 Feet Hole Diameter: 4 inches Type of Sample/Coring Device: Split Spoon

Length and Diameter of Coring Device: Sampling Interval: - feet

Land-Surface Elev.: feet ☐ Surveyed ☐ Estimated Datum:

Drilling Fluid Used: Drilling Method: HSA

Drilling Contractor: Parratt Wolff Inc. Driller: Jim Helper: Layne

Prepared By: Kris Schmitt Hammer Weight: Hammer Drop: ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	7		Cuttings	a lot of chattering ~1 to 2 feet; Brown Sand, Silt + gravel (fill)
7	12		"	mainly fill material with some trash (see + smell)
				TRASH: rags, plastic + paper
	Stopped drilling hole			remove to SMPW-5
12	27		Cuttings	Some chattering ~19' to 20' + 24' to 24.5'
				gray sandy Silt with a little clay (v. slight odor to ~18')
27	32		Cuttings	fine sand + gravel with some cobbles; grey + very dry
32	39		"	fine sand + gravel, appears to be some clay (grey)
39	50		"	fine brown Sand + Silt with few pebbles
50	52	2'	4,7,11,18	fine brown Sand + Silt; water table is
				just ~50'
52	60		Cuttings	Same as 50'-52'
60	62	2'	5,8,10,12	Same as 52'-60'
62	75		Cuttings	Same as 60'-62'

End Of Boring

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

75 ft.*

75 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-7
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/18/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~ 5 feet below surface to allow for future piping. 2 feet of '00' Sand is above the '0' SAND.

Prepared by Kris Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-7 Project/No. NY000949.0004.00002 Page 1 of 1

Site Location Colesville, NY

Drilling Started 9/15/00 Drilling Completed 9/18/00

Total Depth Drilled 45 Feet Hole Diameter 4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device

Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used —

Drilling Method HSA

Drilling Contractor Parratt Wolff Inc.

Driller Jim Helper Cayne

Prepared By KRis Schmitt

Hammer Weight ____ Hammer Drop ____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	7		cuttings	Brown SAND, silt + gravel (Fill material)
7	15		"	Brown Sand + Silt; chattering @ ~15'
15	28		"	gray sandy silt with some clay; some chattering
28	32		"	fine sand + gravel with some cobbles; gray + very dry
32	40		"	fine Sand + gravel with some clay + Silt
40	50		"	fine brown Sand and Silt; some pebbles
50	52	2'	4,7,11,18	fine brown Sand + Silt;
52	60		cuttings	H2O table is @ ~50'; Same as 50'-52'
60	62	2'	5,8,10,12	Same as 52'-60'
62	75		cuttings	Same as 60'-62'; grading to finer
				More Silt; little clay
end of Boring.				

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

[ ] Backfill
[X] Grout Cement (bentonite volclay)

47 ft.*

Bentonite [X] slurry [ ] pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

[ ] Gravel Pack
[X] Sand Pack (o)
[ ] Formation Collapse

75 ft.*

75 ft.*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-8
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation
and Datum ______ feet [ ] Surveyed [ ] Estimated

Installation Date(s) 9/19/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' sand is above the 'o' SAND.

Prepared by Kris Schmitt

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-8 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/18/00 Drilling Completed 9/19/00

Total Depth Drilled 75 Feet Hole Diameter 2 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor Parratt Wolff Driller Jim Helper Cayne

Prepared By KRis Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	17		Cuttings	Brown Sand, silt & gravel ? All material?
17	24		"	Fine Brown Sand & Silt, Some clay and chattering
24	33		"	Same as 17'-24' with more gravel & no clay
33	37		"	Fine brown Sand & Silt
			"	no clay; few pebbles
37	45		"	Very fine Sand & Silt with more clay
45	50		"	Same as 37'-45'
50	52	2'	14,9,9,11	Same as 45'-50' but no clay
52	65		cuttings	Same as 50'-52'
65	67	2'	12,9,9,13	Same as 52-65'; very well laminated in
				upper 1'; bottom foot much siltier
67	75		Cuttings	Same as 65'-67'
		end of	Boring.	

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-9
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/20/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ____ gallons
Water Removed During Development ____ gallons
Static Depth to Water ____ feet below M.P.
Pumping Depth to Water ____ feet below M.P.
Pumping Duration ____ hours
Yield ____ gpm Date ____
Specific Capacity ____ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' Sand is above the '0' SAND.

Prepared by K. Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well: IW-9 Project/No.: NY000949.0014.00002 Page 1 of 1

Site Location: Colesville, NY Drilling Started: 9/19/00 Drilling Completed: 9/20/00

Total Depth Drilled: 80 Feet Hole Diameter: 2 inches Type of Sample/ Coring Device: Split Spoon

Length and Diameter of Coring Device: ______ Sampling Interval: ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method: HSA

Drilling Contractor: Parratt Wolff Driller: Jim Helper: Layne

Prepared By: Kris Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	17		Cuttings	light brown Sand, Silt & gravel (fill material)
17	23		"	light brown Sand & Silt (fill material) with little trash
23	34		"	Fine Sand & Silt (grey) with some pebbles
34	46		"	Same as 23'-34' with a little more clay;
				brown in color
46	50		"	Fine brown Sand & Silt
50	52	1.5'	7,8,9,12	Fine to medium Sand & Silt (moist - not Saturated)
				Cobble @ top; ~½" clay @ ~51'; water @ ~52'
52	65		Cuttings	Fine brown Sand & Silt
65	67	2'	6,12,13,15	Same as 52'-65'
67	78		Cuttings	Same as 65'-67'
78	80	2'	5,8,13,17	Same as 67'-78'; grading to finer
				from ~50' down.
		end	of Boring	

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

0 ft.
Land Surface

4 inch diameter
drilled hole

Well Casing
– inch diameter,
–

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

– ft.*

Bentonite ☐ slurry ☐ pellets
– ft.*

– ft.*

Well Screen
– inch diameter
– – slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse + grout

– ft.*

80 ft.*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW10 Abandoned
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation
and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/29/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

INTENDED
Well Purpose Injection of molasses mixture for remediation

Remarks ~~Grout is to 5 feet below surface to allow for future piping. 2 feet of '00' sand is above the '0' SAND.~~

well was abandoned; 50' of auger were lost down the hole; it is grouted to the surface.

Prepared by R. Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well ABANDONED IW-10 (Original Hole) Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/20/00 Drilling Completed 9/20/00

Total Depth Drilled 80 Feet Hole Diameter 2 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor Parratt Wolff Driller Jim Helper Cayne

Prepared By Kris Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	23		cuttings	Fine brown Sand, Silt + gravel (fill material), some chattering
23	34		"	Fine brown Sand + Silt
34	50		"	fine dark brown Sand + Silt with a lot of clay
50	52	2'	9,10,14,16	Top 8" dark brown Sand + Silt with clay grading to gray medium to fine Sand + Silt (bottom 1.2") (moist)
52	65		cuttings	Same as 50'-52'
				(bottom 1.5') grading finer down; H2O @ ~52'
65	67	2'	10,13,16,21	Very fine brown Sand + Silt, Saturated
67	80		cuttings	Same as 65'-67'
80	82	2'	8,14,20,24	Fine brown Sand + Silt for top 1';
				@ 81' is a 1" red clay with some brown
				clay around it; Some brown Sand + Silt
				around the clays.

End of Boring

Augers lost in hole (~50')? ; grouted 9/29/00 to surface
Hole Abandoned.

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-10
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/29/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' Sand is above the '0' SAND.

Prepared by K. Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-10 Project/No. NY000949.0014.00002 Page 1 of 1

Site Actual

Location

Drilling Started 9/28/00 Drilling Completed 9/[illegible]/00

Total Depth Drilled 80 Feet Hole Diameter 2" inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device

Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used

Drilling Method HSA

Drilling Contractor Parratt Wolff

Driller Jim Helper Layne

Prepared By Kris Schmitt

Hammer Weight ____ Hammer Drop ____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	80			NO Spoons taken
				* use log from previous IW-10 boring on 9/20/00
				well is relocated ~3' east of abonned IW-10

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-11
Town/City Colesville, [redacted]
County Broome State NY
Permit No. ______
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/22/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s) ______

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' sand is above the '0' SAND.

Prepared by K. Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-11 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY

Drilling Started 9/22/00 Drilling Completed

Total Depth Drilled 80 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device

Sampling Interval feet

Land-Surface Elev. feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used

Drilling Method HSA

Drilling Contractor Parratt Wolff

Driller Jim Helper Layne

Prepared By Kris Schmitt

Hammer Weight Hammer Drop ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	23		cuttings	BRown Sand, Silt + gravel (fill material)
23	34		"	fine brown Sand, Silt + gravel
34	43		"	fine brown Sand + Silt
43	52		"	fine dark brown Sand + Silt with some clay; dry
52	54	2'	9,10,17,17	mostly fine brown sand + silt (bottom 1.5'); Some medium sand (top .5'; H2O @ ~52'
54	65		cuttings	Same as 52'-54'
65	67	2'	10,11,14,17	mostly fine brown Sand + Silt; some small
				clay lenses {~.2"} and one @ ~66' (red)
67	78		cuttings	Same as 65'-67' but no clay
78	80	2'	6,9,14,18	even finer material; grading to more Silt
				than fine Sand
				end of boring

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-12
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/25/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' sand is above the '0' SAND.

Prepared by Kris Schmitt (C. Carr)

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-12 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY

Drilling Started 9/25/00 Drilling Completed 9/25/00

Total Depth Drilled 80 Feet Hole Diameter 2 inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device

Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used

Drilling Method HSA

Drilling Contractor Parratt Wolff

Driller Jim Helper Gayne

Prepared By KRis Schmitt / Chris CARR

Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	5		Cuttings	Fine to medium brown Sand + gravel (some silt + clay); dry
12	33		"	Brown Silty material with clay + SAND; some gravel
33	50		"	Brown fine Sand + gravel; little silt
50	52	2'	10, 12, 13, 17	Brown Silty SAND with trace of clay
				medium gray sand from 51.0' → 51.5' (moist)
52	65		cuttings	Same fine brown Silty Sand
65	67	2'	—	fine brown Sand with some silt; Saturated
				Brown Silt + clay with little fine sand; very dense
67	78		cuttings	Same as 65'-67'; grading finer down
78	80	2'	—	Same as 67'-78'
				end of Boring.

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

47 ft.*

Bentonite ☒ slurry ☐ pellets
50 ft.*

55 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-13
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/26/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid –

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation.

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' Sand is above the '0' SAND.

Prepared by K S[illegible]

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-13 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY

Drilling Started 9/26/00 Drilling Completed 9/26/00

Total Depth Drilled 80 Feet Hole Diameter 2 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device

Sampling Interval ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used

Drilling Method HSA

Drilling Contractor Parratt Wolff Driller Jim Helper Cayne

Prepared By KRis Schmitt

Hammer Weight ____ Hammer Drop ____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	23		Cuttings	Brown Sand, Silt and gravel (fill material)
23	34		"	fine brown Sand, Silt & gravel
34	42		"	fine brown Sand + Silt
42	52		"	fine dark brown Sand + Silt; some clay; bone dry
			"	
52	54	2'	8,9,12,13	fine - medium Sand + Silt (mostly brown); grey medium
				Sand @ ~51'.
54	65		Cuttings	Same as 52'-54'
65	67	2'	2,3,9,12	fine brown Sand + Silt; grading finer down; some clay
67			Cuttings	Very fine Sand + Silt; more clay than before
				end of boring

Samplelg.xls
9/8/00

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

52 ft.*

Bentonite ☒ slurry ☐ pellets
55 ft.*

60 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-14
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 9/27/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid -

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation.

Remarks Grout is to ~5 feet below surface to allow for future piping. 2 feet of '00' sand is above the '0' SAND.

Prepared by K Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well: IW-14 Project/No.: NY000949.0014.00002 Page 1 of 1

Site Location: Colesville, NY Drilling Started: 9/26/00 Drilling Completed: 9/27/00

Total Depth Drilled: 80 Feet Hole Diameter: 2 inches Type of Sample/Coring Device: Split Spoon

Length and Diameter of Coring Device: ____

Sampling Interval: ____ feet

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used: ____ Drilling Method: HSA

Drilling Contractor: Parratt Wolff Driller: Jim Helper: Cayne

Prepared By: Kris Schmitt Hammer Weight: ____ Hammer Drop: ____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	24		cuttings	Brown Sand, Silt & gravel (fill material)
24	35		"	fine brown Sand & Silt; little gravel
35	44		"	fine brown Sand & silt
44	52		"	fine dark brown sand & silt with some clay, dry
52	54	2'	8,10,13,13	medium to fine brown sand with trace silt
				moist; not saturated; water table @ ~55'
54	65		cuttings	finer Sand & Silt; saturated; very little clay
65	67	2'	7,10,16,16	Same as 54'-65'
67	78		cuttings	Same as 65'-67'
78	80	2'	4,5,8,12	Very fine Sand & Silt; grading finer down
				and alot more clay material
				end of boring

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

2 ft.
Land Surface

4 inch diameter drilled hole

Well Casing
2 inch diameter,
Sch 40 PVC

☐ Backfill
☒ Grout Cement (Bentonite Volclay)

52 ft.*

Bentonite ☒ slurry ☐ pellets
55 ft.*

60 ft.*

Well Screen
2 inch diameter
Sch 40 10 slot

☐ Gravel Pack
☒ Sand Pack (0)
☐ Formation Collapse

80 ft.*

80 ft.*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project NY000949.0014.00002 Well IW-15
Town/City Colesville, [redacted]
County Broome State NY
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed ☐ Estimated
Installation Date(s) 9/28/00
Drilling Method HSA
Drilling Contractor Parratt Wolff Incorporated
Drilling Fluid -

Development Technique(s) and Date(s)

Fluid Loss During Drilling ______ gallons
Water Removed During Development ______ gallons
Static Depth to Water ______ feet below M.P.
Pumping Depth to Water ______ feet below M.P.
Pumping Duration ______ hours
Yield ______ gpm Date ______
Specific Capacity ______ gpm/ft.

Well Purpose Injection of molasses mixture for remediation

Remarks Grout is to ~ 5 feet below surface to allow for future piping. 2 feet of '00' sand is above the '0' SAND.

Prepared by K. Schmitt

Wellcnst

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well IW-15 Project/No. NY000949.0014.00002 Page 1 of 1

Site Location Colesville, NY Drilling Started 9/27/00 Drilling Completed 9/28/00

Total Depth Drilled 79 Feet Hole Diameter 2 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device ______ Sampling Interval ______ feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor Parratt Wolff Driller Jim Helper Layne

Prepared By Kris Schmitt Hammer Weight ______ Hammer Drop ______ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	24		Cuttings	Brown Sand, Silt + gravel (fill material)
24	35		"	fine brown Sand + Silt; some chattering; little gravel
35	45		"	fine brown Sand + Silt
45	54		"	fine dark brown Sand + Silt; very little clay
54	56	2'	9,13,17,20	mostly fine brown Silty Sand; little medium
				Sand; H2O @ ~55.5'.
56	68		Cuttings	finer Sand + Silt; saturated; very little clay
68	70	2'	5,9,15,20	Same as 56'-68'
70	78		Cuttings	Very fine Sand + Silt with some clay
78	80	2'	6,8,11,13	Same as 70'-78' with more clay and
				grading fine down.
			end of	boring

Samplelg.xls
9/8/00

ARCADIS
Infrastructure, environment, facilities

Well Construction Log
(Unconsolidated)

Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project Colesville Landfill Well TW-1

Town/City Colesville

County Broome State NY

Permit No. ____

Land-Surface Elevation and Datum:

____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 12/5/06 - 12/6/06

Drilling Method ~~[illegible]~~ Hollow Stem Augers

Drilling Contractor Parratt Wolff

Drilling Fluid water ~10 gallons

Development Technique(s) and Date(s)

Whale pump - unsuccessful
Foot Valve + Bailer
12/7, 12/8/06

Fluid Loss During Drilling ____ gallons

Water Removed During Development ____ gallons

Static Depth to Water 52.91 feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose ____

Remarks ____

Prepared by Katie Arnold (AY)

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

PROJECT: Colesville Landfill	BORING NO. TB-W-25
CLIENT: Broome County [illegible]	SHEET NO. 1 OF 3
BORING CONTRACTOR: Warren [illegible]	JOB NO. 7522 EX
GROUND WATER	ELEVATION GL 1116.0 TOC 1118.[illegible]
	DATE STARTED [illegible]
	DATE FINISHED 8-1-89
	DRILLER [illegible]
	INSPECTOR [illegible]

DATE	TIME	WATER EL.	SCREEN
[illegible]	[illegible]	62.11 TOC	[illegible]

	CAS.	SAMP.	CORE	TUBE
TYPE		SS		
DIA.		2"		
WT.		140#		
FALL		30"		

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
Protective Casing; Surface Seal	0				REFER TO MW-2 FOR SOILS CLASSIFICATION FROM 5' - 25±	
2" Schedule 40 PVC [illegible]	5					
	10					
	15					
	20				GLACIAL TILL	
	25	1	SS	7, 13, 21, 23	GRAY [illegible]	
	30					
	35					
	40	2	SS	22, 19, 18, 24	[illegible]	
	45					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. TB-W-25

PROJECT: Colesville Landfill

CLIENT: Broome County [illegible] GAF Corp.

SHEET NO. 2 OF 3

JOB NO. 07522 EX

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	45				GLACIAL TILL	
	50	3	SS	32, 45, 34, 34,	Gray brown [illegible] gravel, [illegible] sand, trace [illegible]	
	55	4	SS	9, 27, 28, 30		Mottled
	60	5	SS	15, 5, 10, 4	@ 61' Gray fine SAND, [illegible], trace [illegible]	SATURATED
	65	6	SS	7, 0, 9, 2		
	70	7	SS	26, 24, 23, 29		
	75	8	SS	17, 28, 38, 78	Gray gravel [illegible] fine gravel, some [illegible] sand	
	80	9	SS	55, 57, 60, 51		
	85	10	SS	26, 37/1"		Occasional [illegible]
Bentonite pellets	90	11	SS	25, 70, 35, 100	92.5'	
Gravel backfill	95				BEDROCK Gray siltstone (Catskills)	[illegible]

Well construction labels: 2" Sch 40 PVC riser; [illegible]; #1 sand pack; .010 slotted screen; Bentonite pellets; Gravel backfill

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TEST BORING LOG

BORING NO. TB-W-25

PROJECT: COLESVILLE LANDFILL

CLIENT: Broome County and GAF CORP

SHEET NO. 3 OF 3

JOB NO. 07522 E1

WELL CONSTRUCTION	DEPTH FEET	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
GRAVEL BACKFILL	100	12	SS	100/1"	BEDROCK	
	105	13	SS	100/1"	TD 105' 1" END OF BORING	
	110					
	115					
	120					
	125					
	130					
	135					
	140					
	145					
	150					

APPENDIX E – ORDER ON CONSENT, RECORD OF DECISION, ESDs 2000 and 2004

STATE OF NEW YORK: DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of the Development and Implementation of a Remedial Investigation, Feasibility Study and Implementation of a Remedial Program for an Inactive Hazardous Waste Disposal Site, Under Article 27, Title 13, of the Environmental Conservation Law of the State of New York (the "ECL") by

BROOME COUNTY
and
GAF CORPORATION

Respondents.

ORDER
ON
CONSENT

Index #T010687

RECITALS

R-1. The New York State Department of Environmental Conservation (the "Department") is responsible for the enforcement of Article 27, Title 13, of the Environmental Conservation Law of the State of New York (the "ECL"), entitled "Inactive Hazardous Waste Disposal Sites".

R-2. Respondent, Broome County (the "County"), is a municipality which owns property in the Town of Colesville, north of Doraville, New York, known as the Colesville Landfill (the "Site"). A map of the Site is attached hereto and is hereby incorporated into this Order on Consent (the "Order") as Exhibit "A". Broome County operated the Colesville Landfill from 1971 to 1984 and has owned the Site since 1971.

R-3. Town of Colesville (the "Town"), is a municipality which owned the Site from 1965 to 1969 and operated the landfill thereat from 1965 to 1971.

R-4. Respondent, GAF Corporation ("GAF"), is a corporation doing business in the State of New York that did manufacture film and graphic products at a facility in Binghamton, New York.

R-5. Malchak Garbage Service ("Malchak"), does business in the State of New York which in the past included the transport of industrial and hazardous waste.

R-6. Tri-Cities Barrel Corporation ("Tri-Cities") is a New York Corporation doing business at Fenton, New York. Tri-Cities' business includes the manufacture and reconditioning of steel drums and barrels.

R-7. The Department alleges that Respondents Broome County and GAF Corporation and the Town of Colesville, Malchak Garbage Service and Tri-Cities Barrels and other as yet unidentified parties are "the owner[s] and/or person[s] responsible for the disposal of hazardous wastes" at the Site pursuant to ECL Article 27 Title 13.

R-8. The Department further alleges that the Site is an inactive hazardous waste disposal site, as that term is defined in ECL Section 27-1301(2).

R-9. Based on the information set forth in reports prepared by Wehran Engineering Inc. on behalf of the County, and on the Department's files, the Commissioner of the Department of Environmental Conservation (the "Commissioner") has determined that the Site and the hazardous wastes disposed thereat constitute a significant threat to the environment.

R-10. Pursuant to ECL Section 27-1313(3)(a), "whenever the Commissioner finds that hazardous wastes at an inactive hazardous waste disposal site constitute a significant threat to the environment, he may order the owner of such site and/or any person responsible for the disposal of hazardous wastes at such site (i) to develop an inactive hazardous waste disposal site remedial program, subject to the approval of the department, at such site, and (ii) to implement such program within reasonable time limits specified in the order."

R-11. The objective of this Order shall be to develop an inactive hazardous waste disposal site remedial program for the Site, as described in this Order and as approved by the Department, and to implement such program within the release of hazardous waste at and from the Site into the environment. A Remedial Program, as set forth in greater detail below, must be implemented at the Site.

IT IS FURTHER ORDERED THAT:

I. Respondents shall commence implementation of the "Supplemental Remedial Investigation" as described in the Work Plan attached hereto as Exhibit B within 30 days of the effective date of this Order or May 1, 1987 whichever is later.

II. All investigations, proposals, reports, plans, remedial programs, and supplements and revisions thereto required by this Order shall address both on-Site and off-Site contamination caused by the disposal of hazardous wastes at the Site, and shall be prepared, designed and executed in accordance with Requisite Remedial Technology. As used in this Order, Requisite Remedial Technology means engineering, scientific and construction principles and practices subject to the Department's approval which (a) are technically feasible, and (b) will most effectively identify, mitigate and eliminate any present or potential threat to the environment posed by the disposal of hazardous and industrial wastes at the Site.

III. As used herein, "hazardous wastes" shall mean hazardous wastes, any hazardous constituents thereof, and any toxic degradation products of such wastes and of such constituents.

IV. Not later than the effective date of this Order, Respondents shall select a technical coordinator, to be known as the "Technical Coordinator", and shall submit the name, address, and telephone number of the Technical Coordinator to the Department.

V. As appropriate during the course of the Remedial Program at the Site, Respondents or their consultants or contractors, acting through the Technical Coordinator, may confer with the Department concerning the Remedial Program. Based upon new circumstances or new information not in the possession of the Department on the date of this Order, the Technical Coordinator may request, in writing prior to any modification, approval of such modification of the Work Plan. If approved by the Department, such modification shall be implemented by Respondents.

VI. If there is a dispute between Respondents and the Department as to any matter under this Order, including but not limited to any dispute concerning the terms of any proposal, report or plan, the matter shall be settled in accordance with the following procedures:

A. Either party, upon written notice to the other, may request the Commissioner of Environmental Conservation to appoint an Administrative Law Judge ("ALJ") to settle the dispute.

B. In all proceedings hereunder:

1. The parties shall be Respondents and the Department.

2. In addition to those powers conferred by Article 3 of the State Administrative Procedure Act, the ALJ shall have the power to:

a. set the time and place of the proceeding;
b. hear arguments;
c. permit cross-examination; and
d. question parties and receive exhibits.

3. All proceedings conducted pursuant to this Paragraph shall be stenographically recorded. The ALJ shall arrange for a stenographic transcript to be made as soon as possible after conclusion of the proceeding and for the original and two copies of the transcript to be delivered to the ALJ at the expense of the Respondents.

4. The ALJ shall prepare, no later than thirty (30) working days after receipt of the transcript of the proceeding, a written summary of the documentation and

testimony received during the proceeding and a recommended decision. The summary and recommendation shall be delivered to the Department's representative and forwarded by certified mail, return receipt requested, to Respondents.

5. The ALJ's recommended decision shall become the final determination of the Commissioner unless, within ten (10) working days from receipt of the recommended decision, either Responents or the Department objects in writing. Any objections shall be submitted in writing to the ALJ with a copy to the other party.

6. If Respondents or the Department timely objects to the recommended decision, the ALJ shall refer the matter to the Commissioner for final determination.

7. The final determination of the Commissioner shall be made within ten (10) days of receipt of a party's objections to the ALJ's recommended decisions.

8. Respondents may, provided such is commenced within thirty (30) days of the final determination of the Commissioner, initiate judicial review of such determination pursuant to Article Seventy-Eight (78) of the Civil Practice Laws and Rules of the State of New York.

VII. On or before sixty (60) days after the completion of the field work required in the Remedial Investigation, Respondents shall submit to the Department a Supplemental Remedial Investigation Report (the "Report") as described in the Work Plan, founded upon its performance of the Remedial Investigation.

VIII. At any time prior to the approval of the Report, the Department reserves the right to request a clarification, appropriate modification or amplification of the Remedial Investigation and Report by Respondents to address the relevant off-Site areas related to hazardous waste disposal if the Department determines that further off-Site investigation is necessary as a result of the Department's review of data generated by the Remedial Investigation as it might be related to the Respondents' disposal and treatment of hazardous waste at the Site. The Department and Respondents will seek to resolve any deficiencies or requested changes expeditiously through discussion and clarification. Should the parties disagree on such a request, the matter shall be submitted for determination pursuant to Paragraph VI of this Order.

IX. Within sixty (60) days after its receipt of the Report, the Department shall determine if the Remedial Investigation was conducted and the Report prepared in accordance with the terms, provisions and conditions of this Order, and shall provide written notification to Respondents of its approval or disapproval of the Report.

a) If the Department disapproves of the Report, the Department shall notify Respondents in writing within thirty (30) days of the Department's objections. Within thirty (30) days after its receipt of notice of disapproval, Respondents shall revise the Report and/or revise or supplement the Remedial Investigation in accordance with the terms, provisions and conditions of this Order and shall submit to the Department its Report which has been revised after consideration of the Department's objections (the "Revised Report").

b) Within fifteen (15) days after its receipt of the Revised Report, the Department shall determine if the Revised Report is in accordance with the terms, provisions and conditions of this Order and shall provide written notification to Respondents of its approval or disapproval of the Revised Report.

c) If the Department disapproves the Revised Report, the Respondents shall try to resolve any deficiencies or requested changes expeditiously through discussion and clarification.

d) Should the parties disagree on the disapproval of the Revised Report, the matter shall be submitted for determination pursuant to Paragraph VI of this Order.

e) The Report or the Revised Report, whichever is approved by the Department, or as approved in Paragraph VI above, shall become incorporated in and shall become a part of this Order, and shall be attached hereto as Exhibit "C". Said Report shall hereafter be referred to as the "Approved Report".

X. Within ninety (90) days after receipt of the Department's approval of the Report, or within such greater period as the Department may allow for good cause shown, Respondents shall submit to the Department a feasibility study (the "Feasibility Study") in accordance with the terms and conditions of the Work Plan as annexed hereto as Exhibit "B".

XI. Within sixty (60) days after its receipt of the Feasibility Study, the Department shall determine if the Feasibility Study is prepared in accordance with the terms, provisions and conditions of this Order, and shall provide written notification of its approval or disapproval.

a) If the Department disapproves the Feasibility Study, the Department shall notify Respondents in writing within thirty (30) days of the Department's objections. Within thirty (30) days after its receipt of notice of referred to as the "Approved Feasibility Study".

XII. Within one hundred and twenty (120) days after receipt of the Department's approval of the Feasibility Study, or within such greater period as the Department may allow for good cause shown, Respondents shall submit to the Department a remedial design and engineering report (the "Remedial Design") in accordance with the Work Plan, which is attached as Exhibit B.

XIII. Within sixty (60) days after its receipt of the Remedial Design, the Department shall determine if the Remedial Design was prepared in accordance with the terms, provisions and conditions of this Order and shall provide written notification of its approval or disapproval.

a) If the Department disapproves the Remedial Design, the Department shall notify Respondents in writing within thirty (30) days of the Department's objections. Within thirty (30) days after its receipt of notice of disapproval, Respondents shall revise the Remedial Design and shall submit to the Department a Remedial Design which has been revised after consideration of the Department's objections (the "Revised Remedial Design").

b) Within fifteen (15) days after its receipt of the Revised Remedial Design, the Department shall determine if the Revised Remedial Design is in accordance with the terms, provisions and conditions of this Order, and shall provide written notification to the Respondents of its approval or disapproval of the Revised Remedial Design.

c) If the Department disapproves of the Revised Remedial Design, the Department and Respondents shall try to resolve any deficiencies or requested changes through discussion and clarification.

d) Should the parties disagree on the disapproval of the Revised Remedial Design, the matter shall be submitted for determination pursuant to Paragrah VI of this Order.

e) The Remedial Design or the Revised Remedial Design, whichever is approved by the Department, or as approved in Paragraph VI above, shall become incorporated in and made a part of this Order, and shall be attached hereto as Exhibit "E". Such Remedial Design shall hereafter be referred to as the "Approved Remedial Design".

XIV. Within such period as may be allowed therefor by the Approved Remedial Design, Respondents shall complete construction pursuant to the Approved Remedial Design, and within forty-five (45) days thereafter, shall submit to the Department "as-built" drawings and a certification that construction was completed in accordance with the Approved Remedial Design. Such certification shall be by a licensed professional engineer registered in the State of New York.

XV. Within forty-five (45) days after receipt of the "as-built" drawings and certification, the Department shall review the same and provide comments to Respondents.

a) In the event that the Department shall not be satisfied with the quality and completeness of construction, the Department shall enter into discussion with Respondents to resolve in good faith any differences and Department requests for supplementary work.

b) Should the parties disagree as to any supplementary work, the matter shall be submitted for determination pursuant to Paragraph VI of this Order.

c) If the Department acknowledges that the implementation is complete and in accordance with the Approved Remedial Design, then, unless a Supplementary Remedial Program is required pursuant to Paragraph XXVI hereof, and except for the requirements of Paragraph XIX hereof, such acknowledgement shall constitute a full and complete satisfaction and release of each and every claim, demand, remedy or action whatsoever against Respondents, their officers and directors, which the Department has or may have pursuant to Article 27, Title 13, of the ECL relative to or arising from the disposal of hazardous waste at the Site.

d) This satisfaction and release shall inure only to the benefit of Respondents, their officers, directors and employees, with respect to the aforesaid matter.

XVI. Nothing contained in this Order shall be deemed to limit the liability of any person who is not a party to this Order or to adversely affect any right, claim, interest, defense, or cause of action of any party hereto with respect to any person who is not a party to this Order, or with respect to any other persons whom the Department has notified in relation to the Site.

XVII. The Department shall ensure that the United States Environmental Protection Agency, Region II ("EPA") is fully advised of each phase of remediation of the Site, including but not limited to the phases outlined in this Consent Order. The Department shall forward to EPA copies of all necessary data, documents, proposals, reports, studies, and correspondence that pertain to remediation of the Site and action taken towards remediation in accordance with the provisions of the "CERCLA Enforcement Protocol" between the Department and EPA (attached hereto and incorporated herein as Exhibit F) which provides a framework for the relationship between the Department and EPA with regard to actions brought under the Federal Comprehensive Environmental Response Compensation and Liability Act ("CERCLA") concerning hazardous waste sites in New York. (The October 15, 1986 letter from Lynn Wright to Joseph Forti is attached hereto as Exhibit "G").

XVIII. The right of the Department to enforce the terms of this Order shall be consistent with the terms of the release contained herein.

XIX. Notwithstanding any provision contained in this Order to the contrary, Respondents shall maintain and provide for physical security at the Site and conduct a monitoring program thereat in accordance with the Approved Remedial Design ("Post-Closure Period"). Respondents shall have the right, upon written notification to the Department, to seek discontinuation of such monitoring program upon a showing that such monitoring is no longer necessary. Any dispute concerning same shall be submitted for determination pursuant to Paragraph VI of this Order. During such Post-Closure Period, Respondents shall provide the Department with periodic monitoring reports as set forth in the Approved Remedial Design.

XX. The Department shall have the right to obtain for the purpose of comparative analysis "split samples" or "duplicate samples", at the Department's option, of all substances and materials sampled by Respondents pursuant to this Order. As used herein: "split samples" shall mean whole samples divided into aliquots; "duplicate samples" shall mean multiple samples that are collected at the same time from exactly the same location, using the same sampling apparatus, collected in identical containers that are prepared identically, filled to the same volume, and thereafter identically handled and preserved.

XXI. The Department and Respondents shall each have access to and shall share all raw data, field notes, logs and chemical analyses generated during the investigation as soon as they become available, except that the Department shall not provide results of analyses of split samples until Respondents' results for the corresponding portions of such samples have been provided to the Department.

XXII. Respondents shall provide notice to the Department of any excavating, drilling or sampling to be conducted pursuant to the terms of this Order. Such notice shall be provided at least five (5) working days in advance of such activities to such person as is designated for such purpose by the Department.

XXIII. a) Respondents shall permit, at all reasonable times, any duly designated officer, employee, consultant, contractor or agent of the Department to enter upon the Site or areas in the vicinity of the Site which may be under the control of Respondents and any areas necessary to gain access thereto for inspection purposes and for the purpose of making or causing to be made such sampling and tests as the Department deems necessary and for ascertaining Respondents' compliance with the provisions of this Order.

b) Notwithstanding the foregoing, the Department reserves whatever rights it may have under ECL § 27-1309.

XXIV. Respondents shall obtain whatever permits, easements, rights-of-way, rights-of-entry, approvals or authorizations are necessary in order to perform the Field Investigation and all of Respondents' other obligations pursuant to this Order. The Department shall assist and expedite Respondents' efforts whenever and however possible in obtaining permits, easements, rights-of-way, rights-of-entry, approvals or authorizations.

XXV. Respondents shall not suffer any penalty under any of the provisions, terms or conditions hereof, or be subject to any proceedings or actions for any remedy or relief, if their activities under this Order are delayed by an act of God, war, riot, conduct of a third party, or the refusal of a governmental authority to issue required permits, provided such conduct or refusal does not result from Respondents' negligence, willful misconduct or failure to meet whatever standards are established pursuant to law or regulation for obtaining any such required permit. Respondents shall immediately notify the Department in writing when it obtains knowledge of any such condition and may request an appropriate extension or modification of the provisions hereof if appropriate.

XXVI. In the event that either the Department or Respondents find that it is not feasible to comply with any of the elements of the Remedial Program, with the requirements and goals of this Order or with the provisions of the Approved Remedial Design at any time prior to or during the Post-Closure Period, one shall immediately notify the other by telephone and in writing of such present or prospective failure. Immediately upon such discovery or immediately upon its receipt of written notification, both Department and Respondents shall investigate to determine the causes thereof and any appropriate solutions therefor. If appropriate, Respondents shall develop a Supplementary Remedial Program (the "SRP") in an effort to avoid or remedy failure, and shall submit the SRP, which shall include, if appropriate, a written scope of work and time schedule for implementation, to be submitted to the Department within sixty (60) days of the mutually resolved failure or prospective failure by written notification. For the purpose of this paragraph, a substantial increase in cost may be a factor considered in determining feasibility.

XXVII. Within thirty (30) days of receipt of the SRP, the Department shall provide written notification to Respondents' of its approval or disapproval of the SRP. If the Department approves the SRP, Respondents shall implement the elements of the SRP in accordance with the SRP. If the Department disapproves the SRP, the Department shall notify Respondents in writing of the Department's objections.

a) Within thirty (30) days after receipt of notice of disapproval, Respondents shall revise the SRP in accordance with the terms, provisions and conditions of this Order, and shall submit to the Department an SRP which has been revised after consideration of the Department's objections (the "Revised SRP").

b) Within fifteen (15) days of receipt of the Revised SRP, the Department shall provide written notification to Respondents of its approval or disapproval of the Revised SRP. If the Department approves the Revised SRP, Respondents shall implement the elements of the Revised SRP in accordance with the Revised SRP.

c) If the Department disapproves the Revised SRP, the Respondents shall try to resolve any deficiencies or requested changes expeditiously through discussion and clarification.

d) Should the parties disagree on the disapproval of the Revised SRP, the matter shall be submitted for determination pursuant to Paragraph VI of this Order.

e) The SRP or Revised SRP, whichever is approved by the Department or as approved in Paragraph VI (the "Approved SRP"), shall become incorporated in and made a part of this Order and shall be attached hereto as Exhibit "H".

XXVIII. Respondents shall exercise good faith in completing construction and other elements of the Approved SRP in an expeditious fashion as provided by the provisions and schedules herein.

XXIX. Within forty-five (45) days of the completion of the construction elements of the Approved SRP, Respondents shall submit to the Department "as-built" drawings and shall submit certification by a licensed professional engineer registered in the State of New York that the construction elements were completed in accordance with the Approved SRP.

XXX. Within forty-five (45) days of the receipt of the "as-built" drawings, the Department shall advise Respondents in writing as to whether the implementation of the construction and other elements of the SRP are complete and in accordance with the provisions of the Approved SRP.

a) If the Department determines that the implementation of the construction or other elements are not in accordance with the Approved SRP, the Department and Respondents shall seek to resolve any basis for deviation from the Approved SRP.

b) In the event the parties cannot agree, the matter shall be submitted for determination pursuant to Paragraph VI of this Order.

c) If the Department acknowledges that the implementation is complete in accordance with the Approved SRP then, except for the requirements of Paragraphs XIX and XXVI hereof, such acknowledgement shall constitute a full and complete satisfaction and release of each and every claim, demand, remedy or action whatsoever against Respondents, their officers and directors, which the Department has or may have pursuant to Article 27, Title 13 of the ECL, relative to or arising from the disposal of hazardous waste at the Site.

d) This satisfaction, release and covenant not to sue those Respondents who enter into this Consent Order for any further legal responsibility relating to the Site shall inure only to the benefit of Respondents, their officers, directors and employees, with respect to the aforesaid matter.

e) Nothing herein shall be construed as barring, diminishing, adjudicating or in any way affecting any legal or equitable rights or claims, actions, suits, causes of action or demands whatsoever that the Department may have against anyone other than Respondents, their officers, directors and employees.

XXXI. The failure of Respondents to comply with any provision of this Order shall constitute a default and a failure to perform an obligation under this Order and under the ECL. Failure to comply shall mean Respondents' refusal to comply barring any event contemplated by the force majeure provisions set forth in paragraph XXV above.

XXXII. Nothing contained in this Order shall be construed as barring, diminishing, adjudicating or in any way affecting (1) any legal or equitable rights or claims, interests, defenses, actions, suits, causes of action or demands whatsoever that the Department or the Respondents may have against anyone other than the parties to this Order and their directors, officers, employees, servants, agents, successors and assigns; or (2) the Department's right to enforce, at law or in equity, the terms and conditions of this Order against Respondents, their directors, officers, employees, servants, agents, successors and assigns.

XXXIII. After receipt of Respondents' consent to this Order, the Department will announce the availability of this Order to the public for review and comment. The Department will accept comments from the public for a period of thirty (30) days after such announcement. The Department will also announce that a public informational meeting will be held during the thirty-day comment period at which members of the public may present their comments. At the end of the comment period, the Department will review all such comments and will either:

a) Determine that this Order should be made effective in its present form, in which case Respondents will be so notified in writing and the Order shall become effective upon the Commissioner's signature; or

b) Determine that modification of this Order is necessary, in which case Respondents will be informed as to the nature of any such required modifications and, if Respondents agree to such modifications, the Order shall be so modified and shall become effective upon the subscription thereto by Respondents and signature by the Commissioner.

c) In the event that the Respondents and the Department are unable to agree on modifications required by the Department in response to public comments, this Order may be withdrawn by the Department. In such an event, the Department explicitly reserves the rights to take any action and pursue any remedy to which it may be entitled by law. Respondents explicitly reserve all rights to contest such action.

XXXIV. If, for any reason, Respondents desire that any provision of this Order, including the Exhibits attached hereto, be changed at any time, Respondents shall make written application therefor to the Commissioner setting forth reasonable grounds for the relief sought.

XXXV. Within thirty (30) days after the effective date of this Order, Respondent County shall file a Declaration of Covenants and Restrictions with the real property records of the Broome County Clerk's Office for the purpose of providing notice of this Order to all potential future purchasers of any portion of the Site. Said Declaration must indicate that any successor in title to any portion of the Site shall be responsible for implementing the provisions of this Order.

XXXVI. In the event that Respondent County proposes to convey the whole or any part of its ownership interest in the Site, Respondent County shall, not less than thirty (30) days prior to the consummation of such proposed conveyance, notify the Department and any other Respondent in writing of the identity of the transferee and of the nature and date of the proposed conveyance. In advance of such proposed conveyance, that Respondent County shall notify the transferee in writing, with a copy to the Department and any other Respondent, of the applicability of this Order.

XXXVII. a) All communication required hereby to be made between the Department and Respondents shall be made in writing and transmitted by United States Postal Service, return receipt requested, or hand delivered to the address listed hereinunder.

b) Communication to the Department shall be made as follows:

(1) Two copies to the Division of Solid and Hazardous Waste, Room 208, 50 Wolf Road, Albany, New York 12233.

(2) Two copies to Division of Environmental Enforcement, Room 105, 50 Wolf Road, Albany, New York 12233.

(3) One copy to the Regional Director, Region 7, 7481 Henry Clay Boulevard, Liverpool, New York 13088.

c) Communication to Respondent GAF shall be made as follows:

(1) One copy to Irving Kagan, Senior Vice

President and General Counsel, GAF Corporation, 1361 Alps Road, Wayne, New Jersey 07470.

(2) One copy to Anthony J. Ten Braak, GAF Corporation, 1361 Alps Road, Wayne, New Jersey 07470.

(3) One copy to A. Patrick Nucciarone, Hannoch Weisman, 4 Becker Farm Road, Roseland, New Jersey 07068.

d) Communication to Respondent Broome County shall be made as follows:

(1) One copy to Carl S. Young, Broome County Executive, Broome County Office Building, Government Plaza, P.O. Box 1766, Binghamton, New York 13902.

(2) One copy to John E. Murray, Broome County Attorney, Law Department, 6th Floor, Broome County Office Building, 44 Hawley Street, Binghamton, New York 13901.

(3) One copy to David Donoghue, P.E., Department of Public Works, Broome County Office Building, 44 Hawley Street, Binghamton, New York 13901.

e) The Department and Respondents respectively reserve the right to designate other or different addresses on notice to the other.

XXXVIII. No informal advice or guidance by the Department's officers or employees or representatives upon any plan, report, proposal, study or other document, or modifications or additions thereto, submitted by Respondents to the

Department, shall relieve Respondents of any obligation to obtain the Department's formal written approval of the same unless such advice or guidance constitutes formal approval, as provided by a writing from the Department.

XXXIX. Notwithstanding the execution of this Order, the Department and Respondents shall continue reasonable efforts to identify and obtain participation and/or contribution to remediation of the Site, including the Department's administrative costs, from other individuals and entities that may be "owner[s] and/or person[s] responsible for the disposal of hazardous wastes" at the Site. However, regardless whether or not additional Respondents to this proceeding can be identified or whether or not participation in and contribution to remediation of the Site can be obtained from such additional Respondents, those Respondents who subscribe to this Order shall continue to be responsible for all functions, duties and costs incurred under and by reason of this Order.

XL. The provisions of this Order shall be deemed to bind Respondents and their officers, directors, agents, servants, employees, successors and assigns.

XLI. Respondents shall indemnify and hold harmless the State of New York, the Department, and its officers and employees and representatives, for all claims, suits, actions, damages and costs of every name and description arising out of or resulting from Respondents' performance or attempted performance of its obligations hereunder, and due to the negligent or willful actions or omissions of Respondents and their respective officers, directors, employees, servants and agents, and successors and assigns.

XLII. Notwithstanding the provisions of Paragraph R-12 above, in any action or proceeding or litigation brought to enforce this Order by or on behalf of the State of New York, the Department or Commissioner, Respondents agree not to contest the validity of this Order.

XLIII. In consideration of the undertakings to be performed by the County pursuant to this Order, the County shall be reimbursed by the Hazardous Waste Remedial Fund (the "Fund") for 75% of its share of the eligible costs for the development and implementation of the hazardous waste disposal site remedial program described herein on the condition that:

(1) the County's share shall not exceed 50% of such eligible costs of the remedial program;

(2) the County shall take reasonable measures to recover money from its insurance carriers for expenditures made pursuant to this Order;

(3) the County shall consult with and obtain the approval of the Department prior to settling any claims or

causes of actions which it may have against its insurance carriers or any other parties for such expenditures made by the County pursuant to this Order;

(4) the County shall notify the Department within thirty (30) days of its receipt of any money pursuant to subparagraph 2 above and the amount of the Fund share shall be recalculated by the Department; and

(5) the County shall, within thirty (30) days of the Department's determination of the recalculated amount, pay to the Department for deposit in the design and construction account of the Fund established under § 97(b) of the State Finance Law, the amount by which the State payment actually exceeds the County's recalculated share.

XLIV. Nothing herein contained shall be deemed to limit or otherwise affect in any manner the Commissioner's power to order the summary abatement of conditions and activities according to ECL § 71-0301 and 6 NYCRR, Part 620, or to take any action authorized by law and not inconsistent with the terms, provisions and conditions of this Order.

XLV. The provisions hereof shall constitute the complete and entire Order between Respondents and the Department concerning the Site. No terms, conditions, understandings or agreements purporting to modify or vary the terms hereof shall be binding unless made in writing and subscribed by the party to be bound.

DATED: , New York

, 1986

HENRY G. WILLIAMS
Commissioner
New York State Department of
Environmental Conservation

____

or agreements purporting to modify or vary the terms hereof shall be binding unless made in writing and subscribed by the party to be bound.

DATED: Albany , New York
April 13 , 1987

HENRY G. WILLIAMS
Commissioner
New York State Department of
Environmental Conservation

Henry G Williams

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of this Order, waives its right to a hearing herein as provided by law, and agrees to be bound by the provisions, terms and conditions contained in this Order.

GAF CORPORATION

By: Irving Kagan

Title: Senior Vice President, Secretary, and General Counsel

Date: January 8, 1987

STATE OF NEW JERSEY)
) s.s.:
COUNTY OF PASSAIC)

On this 8th day of January , 1987, before me personally came Irving Kagan , to me known, who being duly sworn, did depose and say that he resides in New York City ; that he is the Senior Vice President of the GAF CORPORATION corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

Veronica C. Obringer
Notary Public

Notary Public of New Jersey
My Commission Expires May 6, 1990

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of this Order, waives its right to a hearing herein as provided by law, and agrees to be bound by the provisions, terms and conditions contained in this Order.

BROOME COUNTY

By: Carl S. Young

Title: County Executive

Date: Jan. 7, 1987

STATE OF NEW YORK)
) s.s.:
COUNTY OF Broome)

On this 7th day of January, 1987 before me personally came Carl S. Young, to me known, who being duly sworn, did depose and say that he resides in Binghamton, N.Y.; that he is the County Executive of the County of Broome, the municipality described in and which executed the foregoing instrument; that he knew the seal of said County; that the seal affixed to said instrument was the seal of said County; that it was so affixed by order, resolution or authority of the Legislature of said County, and that he signed his name thereto by like order, resolution or authority.

Mary A. Walsh
Notary Public

MARY A. WALSH
Notary Public, State of New York
Residing in Broome County
My commission expires ~~March 30, 19~~ 11/30/88

APPENDIX E-2

RECORD OF DECISION

United States Environmental Protection Agency

Office of Emergency and Remedial Response

EPA/ROD/R02-91/135
March 1991

EPA

Superfund Record of Decision:

Colesville Municipal Landfill, NY

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-91/135	2.	3. Recipient's Accession No.

4. Title and Subtitle	5. Report Date
SUPERFUND RECORD OF DECISION Colesville Municipal Landfill, NY First Remedial Action - Final	03/29/91
	6.
7. Author(s)	8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address	10. Project/Task/Work Unit No.
	11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/000
	14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 35-acre Colesville Municipal Landfill site is a former municipal and industrial landfill in Colesville, Broome County, New York. Land use in the area is rural, and wetlands and woodlands are present in the vicinity of the site. Many of the 1,921 residents living within three miles of the site use ground water from shallow and deep aquifers and springs as their drinking water. From 1969 until its closure in 1984, the landfill accepted primarily municipal solid waste, although some drummed industrial wastes were accepted from 1973 to 1975. The majority of the 468,000 cubic yards of waste was disposed within three trenches at the site, and the drums were either buried intact, punctured, or crushed. In 1983 and 1984, private investigations identified that upper portions of the ground water beneath the site and in the vicinity of the site were being contaminated by the landfill. The county provided temporary water supplies and carbon filters to affected residences, and conducted well monitoring. This Record of Decision (ROD) provides a final remedy for the landfill waste and soil, leachate seeps, associated contaminated sediment, and ground water. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene, PCE, TCA, TCE; and metals including arsenic.

(See Attached Page)

17. Document Analysis a. Descriptors

Colesville Municipal Landfill, NY
First Remedial Action - Final
Contaminated Media: soil, sediment, debris, gw
Key Contaminants: VOCs (benzene, PCE, TCA, TCE, toluene, xylenes), metals (arsenic)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 260
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

The selected remedial action for this site includes cutting and regrading the sides and surface of the landfill; constructing lined leachate collection trenches; installing a multi-media cap over the existing landfill; installing a gravel gas venting layer in the landfill, with a filter fabric layer placed over the gravel; seeding and mulching the top soil layer of the landfill; pumping and treatment of the contaminated ground water beneath and downgradient of the landfill using air stripping and metals treatment, and discharging the treated water onsite to surface water after disinfection by an ultra-violet disinfection, if required; constructing a water supply system for present and future affected residences, and providing temporary water supplies and carbon filtration units to affected residences until construction is completed; conducting long-term ground water monitoring; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing, as necessary. The estimated present worth cost for this remedial action is $5,135,000, which includes an annual O&M cost of $250,000 for 4 years.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific ground water cleanup goals are based on the more stringent of State or Federal MCLs including benzene 5 ug/l (State), PCE 5 ug/l (State), TCE 5 ug/l (State), toluene 5 ug/l (State), and xylenes 5 ug/l (State).

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.

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

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

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Location/State: Town of Colesville, Broome County, New York
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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

TABLE OF CONTENTS

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.

[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/l of 1,1-dichloroethane were detected at the seep and levels of 4 ug/l and 3 ug/l 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/l) 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/l, 122 ug/l, and 101 ug/l, respectively, as compared with levels of 7,200 ug/l at the seep and 1,500 ug/l and 1,200 ug/l, 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/l) and at the seep area south of the landfill at SW-18 (34 ug/l). In the South Stream, levels of total iron were also elevated at the SW-12 seep (22,600 ug/l) and 10 feet downstream from the seep (12,100 ug/l) as compared with upstream levels of 2,630 ug/l. The highest level of iron was noted in leachate seeps emanating from the hillside south of the landfill (266,00 ug/l).

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 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 effective 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 sub-alternative 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 treat ment 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, vegetated topsoil to promote evapotranspiration, as well as the installation of a FML with a permeability of 1×10^{-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^{-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. 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.

APPENDIX 1 - TABLES

TABLE 1

NATURE AND AMOUNT OF INDUSTRIAL WASTES
RECEIVED AT THE COLESVILLE LANDFILL

Waste Type	Description	Amount Drums/ Month
Aqueous Dye Wastes	. pH - neutral to alkline . 0.18% sulfate (average 10%) . Density - 8.3-9 lbs/gallon . 15% total solids at 110° C . Traces of Zn, Al, Fe, Sn	10
Organic Solvent Mixtures	. Density - 6.8 - 8.3 lbs/gallon 5% total solids at 110° C Heating value - 8,000 BTU/lb (min) . Included benzene, cyclohexane, acetone isopropyl alcohol, methanol, ethanol, n-hexane, toluene, xylene, methyl, cellosolve, 10% chlorinated solvents and water, diethyl ether	10
Mixed Chemical Solvents	. Density - 8.3 lbs/gallon . 5% total solids at 110° C . 15% chloride . Heating value - 6,500 BTU/lb (min) . Included isopropyl alcohol, methanol, methylene chloride acetone, minor amounts of other hydrocarbons and solvents	10

Source: Wehran Engineering, "Hydrogeologic Investigation," September 1983.

Table 2

BROOME COUNTY - COLESVILLE LANDFILL

VOLATILE ORGANIC COMPOUNDS IN MONITORING WELLS

Volatile Compounds (µg/ℓ)	Monitoring Well W-21				Monitoring Well W-22S		Monitoring Well W-22I	Monitoring Well W-22D	Monitoring Well W-23S			Monitoring Well W-24	Monitoring Well W-25
	4/7/84 Chemtech EPA 624	6/8/84 Chemtech EPA 624	12/10/87 Nanco EPA 624	8/15/89 NY Test EPA 8010/8020	12/10/87 Nanco EPA 624	8/15/89 NY Test EPA 8010/8020	12/10/87 Nanco EPA 624	8/15/89 NY Test EPA 8010/8020	12/10/87 Nanco EPA 624	12/10/87 H₂M EPA 624	8/15/89 NY Test EPA 8010/8020	8/15/89 NY Test EPA 8010/8020	8/15/89 NY Test EPA 8010/8020
Chloromethane													
Vinyl Chloride												39	
Chloroethane													
Methylene Chloride				3								4	4
1,1 Dichloroethene													
1,1 Dichloroethane												37	
Trans 1,2-Dichloroethene												0.5	
Chloroform												2	
1,2-Dichloroethane												43	
2 Butanone													
1,1,1-Trichloroethane												3	
1,2 Dichloropropane													
Trichloroethene												21	
Benzene													5
Toluene													
Chlorobenzene												0.5	
Ethylbenzene													
Total Xylenes													
Trichlorofluoromethane	14												
Tetrachloroethene												0.5	

Note: Blank cells indicate not detected

Table 3
BROOME COUNTY - COLESVILLE LANDFILL
VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELLS

Volatile Compounds (μg/ℓ)	Residential Well No. 1						
	3/31/83 NY Testing EPA 624	4/21/83 NYSDOH EPA 601	12/29/83 H_2M EPA 601	9/28/87 H_2M EPA 601	12/11/87* Nanco EPA 624	12/11/87* H_2M EPA 624	8/15/89 NY Test EPA 8010/8020
Chloromethane							
Vinyl Chloride		6					
Chloroethane							
Methylene Chloride	96	10		8			6
1,1-Dichloroethene		12	12	54	7	110	11
1,1-Dichloroethane		33	27	170	130	480	320
Trans-1,2-Dichloroethene	130	70	120			600	140
Chloroform		12	8	12		10	8
1,2-Dichloroethane							
2-Butanone							
1,1,1-Trichloroethane	460	150	330	220	190	400	270
1,2-Dichloropropane							
Trichloroethene	440	130	140	100	84	220	160
Benzene		31					
Toluene	2	1					
Chlorobenzene							
Ethylbenzene							
Total Xylenes		1					
Trichlorofluoromethane		2					

Notes

Blank cells indicate not detected; BMRL = Below Minimum Reportable Level

* Samples taken by Wehran

Table 3a

BROOME COUNTY - COLESVILLE LANDFILL

VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELLS

Volatile Compounds (µg/ℓ)	Residential Well No. 2							
	4/21/83 NYSDOH EPA 601	12/29/83 H_2M EPA 601	5/7/84 H_2M EPA 601	6/8/84 Chemtech EPA 624	9/28/87 H_2M EPA 601	12/16/87 H_2M EPA 601	12/11/87* Nanco EPA 624	8/15/89 NY Test EPA 8010/8020
Chloromethane								
Vinyl Chloride	2					11		
Chloroethane								
Methylene Chloride	1					4		
1,1-Dichloroethene						13		
1,1-Dichloroethane	6	4	4		5	46	6	
Trans-1,2-Dichloroethene	7	11	11	15		40	6	
Chloroform	2					82		
1,2-Dichloroethane								
2-Butanone								
1,1,1-Trichloroethane	10		10	15	7	31	BMRL	
1,2-Dichloropropane								
Trichloroethene					1	5		
Benzene	4							
Toluene								
Chlorobenzene								
Ethylbenzene								
Total Xylenes								
Trichlorofluoromethane					34			

Notes:

Blank cells indicate not detected, BMRL = Below Minimum Reportable Level

*Samples taken by Wehran

Table 3b
BROOME COUNTY – COLESVILLE LANDFILL
VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELLS

Volatile Compounds (μg/ℓ)	Residential Well No. 3								
	3/31/83 NY Testing EPA 624	4/21/83 NYSDOH EPA 601	12/29/83 H_2M EPA 601	5/7/84 H_2M EPA 601	6/8/84* Chemtech EPA 624	9/28/87 H_2M EPA 601	12/16/87 H_2M EPA 601	2/11/87* Nanco EPA 624	8/15/89 NY Test EPA 8010/8020
Chloromethane									
Vinyl Chloride									
Chloroethane									
Methylene Chloride	100						2		
1,1-Dichloroethene									
1,1-Dichloroethane									
Trans-1,2-Dichloroethene									
Chloroform							72		
1,2-Dichloroethane									
2-Butanone							13		
1,1,1-Trichloroethane									
1,2-Dichloropropane									
Trichloroethene	1								
Benzene									
Toluene	12								
Chlorobenzene									
Ethylbenzene									
Total Xylenes									
Trichlorofluoromethane									

Notes

Blank cells indicate not detected; BMRL = Below Minimum Reportable Limit

*Samples taken by Wehran

Table 4
BROOME COUNTY – COLESVILLE LANDFILL
COLESVILLE CONFIRMATORY SAMPLING PROGRAM 1989
DISSOLVED METALS IN MONITORING WELLS*
AUGUST 1989

Metal (µg/ℓ)	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8†	MW-10	MW-11	MW-12D	MW-13	MW-14S	MW-14D	MW-15	MW-16S
Arsenic			22		24									13
Cadmium														
Chromium														
Copper														
Iron		84.1	21.7	120,000	3,270					34.6				84.9
Lead														
Nickel			26.6											
Silver														
Zinc	37.1	35.5	42.8	51.6	50.2		22			60.5				48.0

Note: Blank cells indicate not detected

* Samples taken by Wehran

† Not Sampled

Table 4 a

BROOME COUNTY-COLESVILLE LANDFILL

COLEVILLE CONFIRMATORY SAMPLING PROGRAM 1989

TOTAL METALS IN MONITORING WELLS

AUGUST 1989

Metals (ug/l)	MW-3	MW-4	MW-5D	MW-6	MW-7	MW-10	MW-13	MW-16S	MW-16D	MW-17S	MW-17I	MW-22S	MW-22D	MW-24	MW-25
Arsenic	7	7	33		24	8			28	21		52	22	14	22
Cadmium															
Chromium	24 2	20 6	14 4		29 6	10 8	74 4		159			10 8	502	435	19 7
Copper	62 2	46 4	39 6	26 2	76 1	32 1	101	24 3	296	22 3	33	32	979	889	31 8
Iron	42,400	27,800	7,860	125,000	26,400	12,400	132,000	5,570	273,000	3,680	7,850	12,200	785,000	754,000	30,400
Lead	29	19 8	21 5		40 4	20 4	96 2		143		7 7	10 5	652	16,700	
Nickel	37 8	34 2		52 2			128	21 4	329			27	995	696	34 2
Silver									10 3						
Zinc	216	197	122	165	171	130	2,010	163	811	99 8	113	99 7	2,460	2,100	164

Note: Blank cells indicated not detected

* Samples taken by Wehran

Table 5
BROOME COUNTY - COLESVILLE LANDFILL
VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER*
AUGUST 1989

Volatile Compounds (µg/ℓ)	SW-01	SW-02	SW-05	SW-07	SW-08	SW-09	SW-10	SW-11	SW-12	SW-13	SW-14	SW-15	SW-18
Chloromethane													
Vinyl Chloride													
Chloroethane					9								
Methylene Chloride			3						5	5			225
1,1-Dichloroethene													
1,1-Dichloroethane					121	4	3	2					4
Trans-1,2-Dichloroethene													
Chloroform													
1,2-Dichloroethane													
2-Butanone													
1,1,1-Trichloroethane					4			2					
1,2-Dichloropropane													
Trichloroethene													
Benzene													
Toluene													
Chlorobenzene					62								
Ethylbenzene													
Total Xylenes													
Trichlorofluoromethane													
1,1,2,2-Tetrachloroethene									5				

Note: Blank cells indicate not detected

* Samples taken by Wehran

Table 6

BROOME COUNTY - COLESVILLE LANDFILL

COLESVILLE CONFIRMATORY SAMPLING PROGRAM 1989

TOTAL METALS IN SURFACE WATER*

AUGUST 1989

Metal (µg/ℓ)	SW-1	SW-02	SW-03	SW-04	SW-05	SW-06	SW-07	SW-08	SW-09	SW-10	SW-11	SW-12	SW-13	SW-14	SW-15	SW-16	SW 17	SW-18
Arsenic								24	6	8								34
Cadmium																		
Chromium																		
Iron	1,240	1,320			274	122	101	7,200	1,500	1,220	366	2,630	22,600	12,100	297			266,000
Lead		103										86.7	14.5		28.7			67.3
Nickel										21.6			25					
Silver																		
Zinc	32.4	41			38.3	34.5	45.3	37.2	36.1	35	60.4	98.9	54.5	58.3	65.2			56

Note: Blank cells indicate not detected

* Samples taken by Wehran

Table 7

BROOME COUNTY - COLESVILLE LANDFILL

VOLATILE ORGANIC COMPOUNDS IN STREAM SEDIMENTS*

AUGUST 1989

Volatile Compounds (mg/kg)	SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	SD-08	SD-09	SD-10	SD-11	SD-12	SD-13	SD-14	SD-15	SD-16	SD-17	SD-18
Chloromethane																		
Vinyl Chloride																		
Chloroethane																		
Methylene Chloride	71	3				21	6	7	5	29	7	23	4	101	3	231	12	21
1,1 Dichloroethene																		3
1,1-Dichloroethane								11									12	
Trans-1,2 Dichloroethene																		
Chloroform																		
1,2 Dichloroethane																		
2 Butanone																		
1,1,1-Trichloroethane																		
1,2 Dichloropropane																		
Trichloroethene																		
Benzene																		
Toluene																		
Chlorobenzene								0.9										
Ethylbenzene																		
Total Xylenes																		
Trichlorofluoromethane																		

Notes

Blank cells indicate not detected, BMRL = Below Minimum Reportable Level

* Samples taken by Wehran

Table 8

BROOME COUNTY - COLESVILLE LANDFILL

COLESVILLE CONFIRMATORY SAMPLING PROGRAM 1989

TOTAL METALS IN STREAM SEDIMENTS*

AUGUST 1989

Metal (µg/ℓ)	SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	SD-08	SD-09	SD-10	SD-11	SD-12	SD-13	SD-14	SD-15	SD-16	SD-17	SD-18
Arsenic	8.3	11.6			25.5	28.7	79.7	14.8		12.3	11.9	2.8	16.8	10.4	10.8	25.2	32.4	
Cadmium																		
Chromium	11.1	14.9			11.8	15.6	14.3	14.2	15.3	8.0	13.3	18.1	14.2	12.9	10.9	19.9	8.7	
Iron	23,100	30,700			29,900	37,400	30,200	25,600	31,500	20,000	30,400	31,800	29,400	34,900	35,100	44,200	81,800	24,200
Lead	24.9	21.9			43.7	13.9	12.6	10.1	10.4	15.4	10.7	10.1	1.3	15.7	9.9	428	3.3	11.9
Nickel	28.2	5.3			31.9	25.2	31.[illegible]	32.5	25.6	12.5	28.9	33.4	21.4	25	29.0	31.2	34.9	23.1
Silver																		
Zinc	355	191			1,510	159	237	1,170	163	128	144	88.6	140	161	138	261	197	153

Note: Blank cells indicate not detected

* Samples taken by Wehran

† Not Sampled

Table 9
BROOME COUNTY – COLESVILLE LANDFILL
CONFIRMATORY SAMPLING PROGRAM 1989
POTENTIAL EXPOSURE PATHWAYS

Release Medium	Release Source	Exposure Point	Exposure Route	Number of People	Pathway Complete*
Groundwater	Buried waste	Nearest residences less than 0.5 mile	Ingestion of drinking water	13[1]	Yes
Surface Water	Seeps/groundwater	Direct contact	Dermal	1,921[1]	Yes
Steam/Seep/Sediments	Seeps/groundwater	Direct contact	Dermal	1,921[1]	Yes

Notes:

* Pathway is considered complete if the release medium, source exposure points, and exposure routes all exist.
[1] Source: 1980 U.S. Census data for Town of Colesville estimated 3.18 persons per household.
[1] Population within a three-mile radius of the landfill.

Table 10
BROOME COUNTY - COLESVILLE LANDFILL
CONFIRMATORY SAMPLING PROGRAM 1989
MAXIMUM CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS

Compound	Concentration		
	Groundwater (mg/ℓ)	Surface Water (mg/ℓ)	Soils* (mg/kg)
Benzene	0.120	ND	ND
Chlorobenzene	0.035	0.062	0.001
Chloroethane	0.048	0.009	ND
1,1-dichloroethane	0 320	0 121	0.012
1,1-dichloroethene	0.015	ND	ND
Trans-1,2-dichloroethene	0 140	ND	ND
1,2-dichloroethane	0 043	ND	ND
1,2-dichloropropane	0 003	ND	ND
Ethylbenzene	0.008	ND	ND
Toluene	0.021	ND	ND
1,1,1,-trichloroethane	0.270	0.004	ND
Tetrachloroethene	0.005	0 005	ND
Trichloroethene	0 160	ND	ND
Total Xylene	0.020	ND	ND
Vinyl Chloride	0.134	ND	ND

Notes:

Samples taken by Wehran-New York, Inc. 1989

* Sediments in the immediate vicinity of leachate seeps

ND = Detected

TABLE 11

BROOME COUNTY - COLESVILLE LANDFILL

CONFIRMATORY SAMPLING PROGRAM 1989

COMPARISON OF MCLs TO ESTIMATED EXPOSURE POINT CONCENTRATIONS

Compound	Value of MCL* (µg/ℓ)	Exposure Point† Concentration (µg/ℓ)	Concentration/ Standard Ratio‡
1,1-dichloroethene	7	11	1.6
Trichloroethene	5	160	32.0
Tetrachloroethene	5	N/D	--
Benzene	5	N/D	--
1,2-dichloroethane	5	320	64.0
1,1,1-trichloroethane	5	270	54.0
Vinyl Chloride	2	N/D	--
Chlorobenzene	5	N/D	--
1,2-dichloroethane	5	N/D	--

Notes:

* New York State Department of Health Drinking Water Standards for Volatile Organic Compounds. January 1989.

† Maximum concentrations measured in homeowner wells (Wehran, 1989 Samples)

‡ Ratios greater than one indicate exceedance of the requirements.

N/D = not detected

TABLE 12

BROOME COUNTY - COLESVILLE LANDFILL

CALCULATION OF BASELINE CARCINOGENIC RISK ASSOCIATED WITH INTAKE OF CONTAMINATED GROUNDWATER

DRINKING WATER INGESTION

Compound	Water Conc. mg/l	Intake mg/kg/day	Oral Slope Factor	Oral RfD	Carcinogenic Risk	Hazard Index
1,1-Dichloroethene	0.011	3.14E-04	-	0.021		1.50E-02
Trichloroethene	0.16	4.57E-03	1.1E-03	2.1E-01	5.03E-06	2.18E-02
1,1,1-Trichloroethane	0.27	7.71E-03	-	0.09		8.57E-02
1,1-Dichloroethane	0.32	9.14E-03	-	1.2E-01		7.62E-02
1,2-Dichloroethene	0.14	4.00E-03	-	0.25		1.60E-02
				Total:	5.03E-06	2.15E-01

INHALATION FROM TAP WATER

Compound	Water Conc. mg/l	Intake mg/kg/day	Inhalation Slope Factor	Inhalation RfD	Carcinogenic Risk	Hazard Index
1,1-Dichloroethene	0.011	4.19E-03		7.20E-01		5.82E-03
Trichloroethene	0.16	6.10E-02	4.60E-03	1.00E+00	2.80E-04	6.10E-02
1,1,1-Trichloroethane	0.27	1.03E-01		6.30E+00		1.63E-02
1,1-Dichloroethane	0.32	1.22E-01		1.38E-01		8.83E-01
1,2-Dichloroethene	0.14	5.33E-02		2.00E-02		2.67E+00
				Total:	2.80E-04	3.63E+00

RfD = Reference Dose

Total Risk and HI:	2.85E-04	3.85E+00

Table 13
COLESVILLE LANDFILL
POTENTIAL CHEMICAL-SPECIFIC GROUNDWATER ARARS

Compound	Number of Detects/ Number of Wells	Concentration Range (ug/l)	Chemical-Specific ARARS/SCGs NYS DEC 703 Stds (1)	Fed MCLs (2)	NYS DOH MCLs (3)	NYS Guidance Values (4)	ARAR Range	Number of Exceedences/ Number of Wells (of lowest ARAR)	(of highest ARAR)
Benzene	8/32	5-62	ND	5	5	0.7 (A)	ND-5	8/32	8/32
Chlorobenzene	5/32	0.05-35	NA	NA	5	20 (C)	5-20	3/32	2/32
Chloroethane	3/32	8-48	NA	NA	5	NA	5	3/32	-
1,1-Dichloroethane	12/32	3-320	NA	NA	5	5 (E)	5-50	10/32	4/32
1,1-Dichloroethene	3/32	4-15	NA	7	5	0.07 (A)	0.07-7	3/32	2/32
Trans-1,2-dichloroethene	4/32	0.5-140	NA	100 *	5	5 (E)	5-50	1/32	1/32
1,2-Dichloroethane	1/32	43	NA	5	5	0.8 (A)	0.8-5	1/32	1/32
1,2-Dichloropropane	1/32	3	NA	5 *	5	5 (E)	5-50	0/32	0/32
Ethylbenzene	1/32	8	NA	700 *	5	5 (E)	5-50	1/32	0/32
Toluene	1/32	21	NA	NA	5	5 (E)	5-50	1/32	0/32
1,1,1-Trichloroethane	10/32	2-270	NA	200	5	5 (E)	5-200	6/32	1/32
Tetrachloroethene	2/28	0.5-5	NA	NA	5	0.7 (A)	0.7-5	1/28	1/28
Trichloroethene	8/32	0.9-160	10	5	5	3 (A)	3-10	6/32	5/32
Total Xylene	1/32	20	NA	10000*	5	5 (E)	5-50	1/32	0/32
Vinyl Chloride	2/32	39-134	5	2	2	0.3 (A)	0.3-5	2/32	2/32

Notes:
* All values in ug/l; 1989 confimatory sampling round data
U - below detection limits
NA No Standard Available
ND Non-Detectable Level
(1) 6 NYCRR Part 703
(2) 40 CFR Part 141.61
(3) 10 NYCRR Part 5
(4) NYSDEC Ambient Water Quality Standards and Guidance Values, September 25, 1990
(A) 6 NYCRR Part 701.4
(C) 6 NYCRR Part 701.6
(E) 6 NYCRR Part 701.15(e)
(M) 6 NYCRR Part 701.12

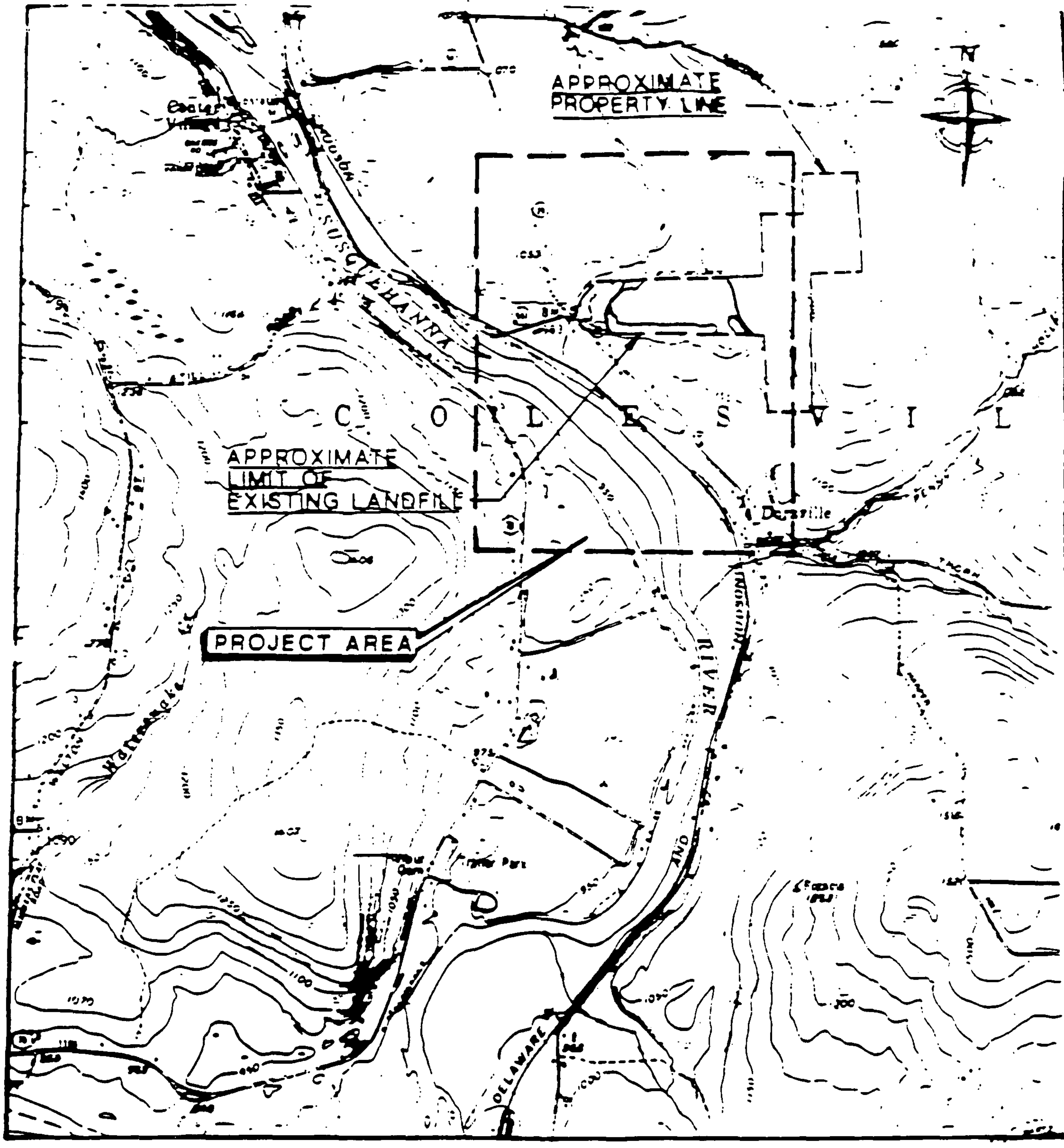
* Phase II MCLs promulgated 1/30/91 in 56 FR 3526 and will take effect for PWSS in 7/92. THese MCLs must be adopted or made more stringent by the States by 7/92.

Table 14
COLESVILLE LANDFILL
DETAILED ANALYSIS
COST AND TIMING SUMMARY TABLE

Alternative	Estimated Capital Cost ($000)	Estimated O & M Cost (per year) ($000)	Estimated Present Value Cost* ($000)	Estimated Time to Implement (Design/Construct)	Estimated Time to Meet ARARs after Implementation
1	$0	$14	$128	0	>20 yrs
3a	$0	$71	$672 +	6 mo	>20 yrs
3b	$150	$53	$648	1 yr	>20 yrs
4b1	$4,163	$268	$5,595	1.5 yr	8 yrs
4b2	$4,313	$250	$5,646	1.5 yr	8 yrs
4c1	$4,193	$268	$5,040	1.5 yr	4 yrs
4c2	$4,273	$250	$5,135	1.5 yr	4 yrs
4d1	$8,811	$230	$10,977	1.5 yr	>20 yrs
4d2	$8,701	$268	$11,230	1.5 yr	>20 yrs

* The present worth factor was based on an interest rate of 10%/year for the duration of cleanup (30 yrs is used for >20yrs)

APPENDIX 2 - FIGURES



SOURCE:
TOPOGRAPHY TAKEN FROM
1957 AFTON, N.Y.
U.S.G.S. QUADRANGLE
7.5 MINUTE SERIES

SCALE: 1" = 2000'

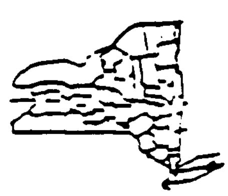


FIGURE 1

FIGURE 2

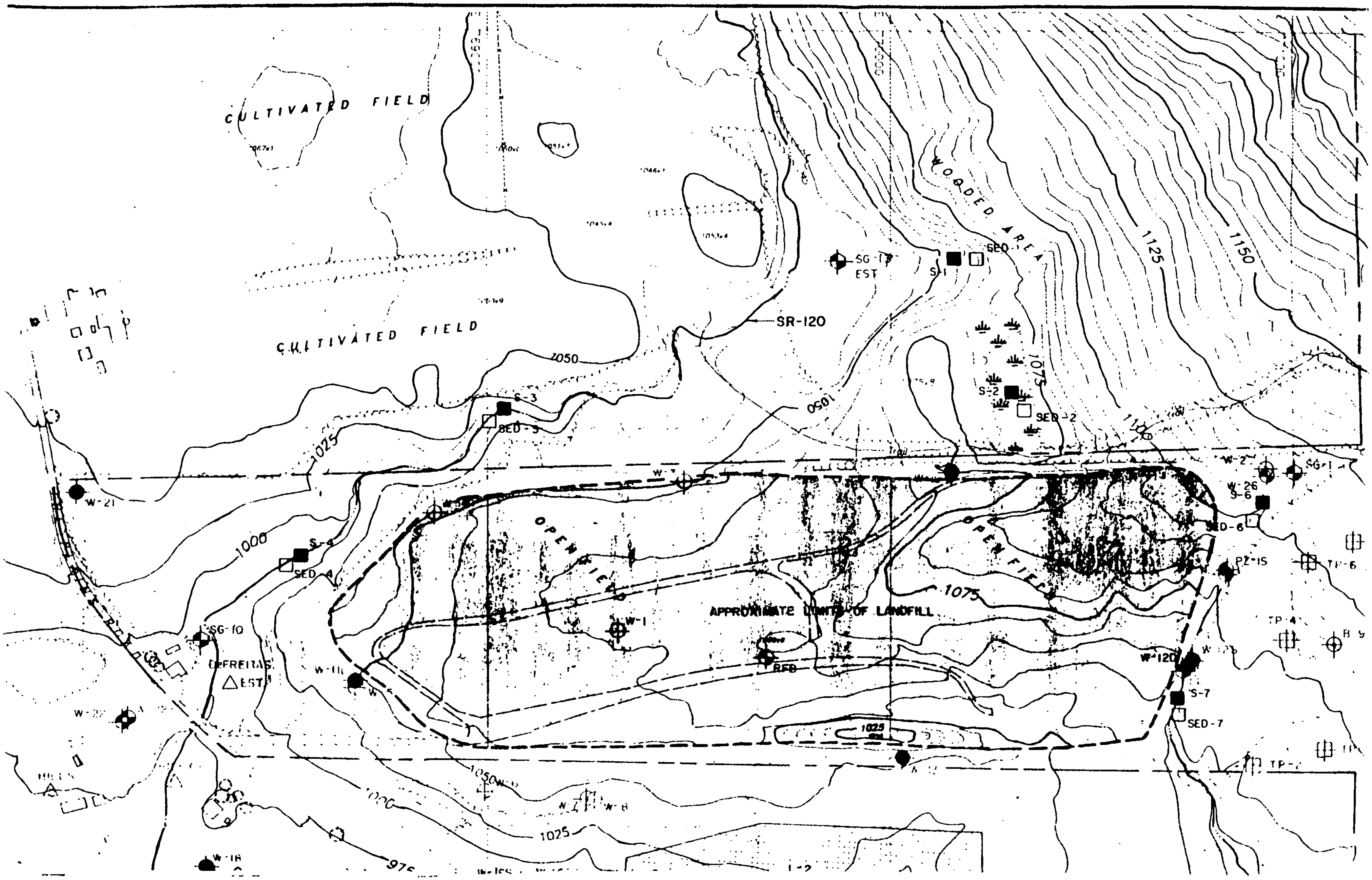

CULTIVATED FIELD
CULTIVATED FIELD
WOODED AREA
SR-120
SG-13 EST
S-1
SED
S-2
SED-2
S-3
SED-3
S-4
SED-4
S-6
SED-6
S-7
SED-7
W-2
SG-1
W-26
W-21
SG-10
DeFREITAS EST
W-1
W-120
PZ-1S
TP-6
TP-4
B-9
APPROXIMATE LIMITS OF LANDFILL
OPEN FIELD
OPEN FIELD
1025
1000
1050
1075
1100
1125
1150
975
W-8

FIGURE 3

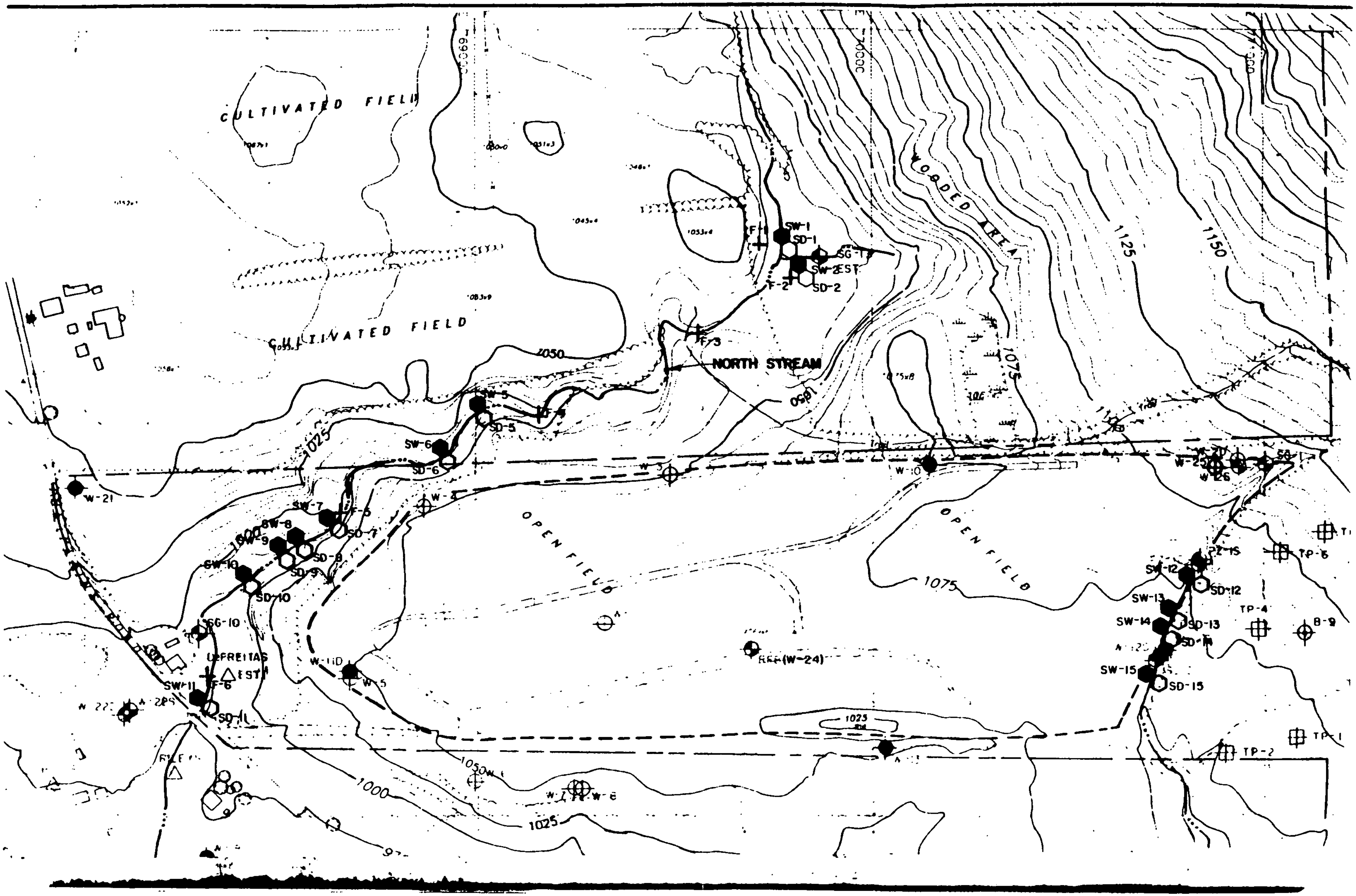
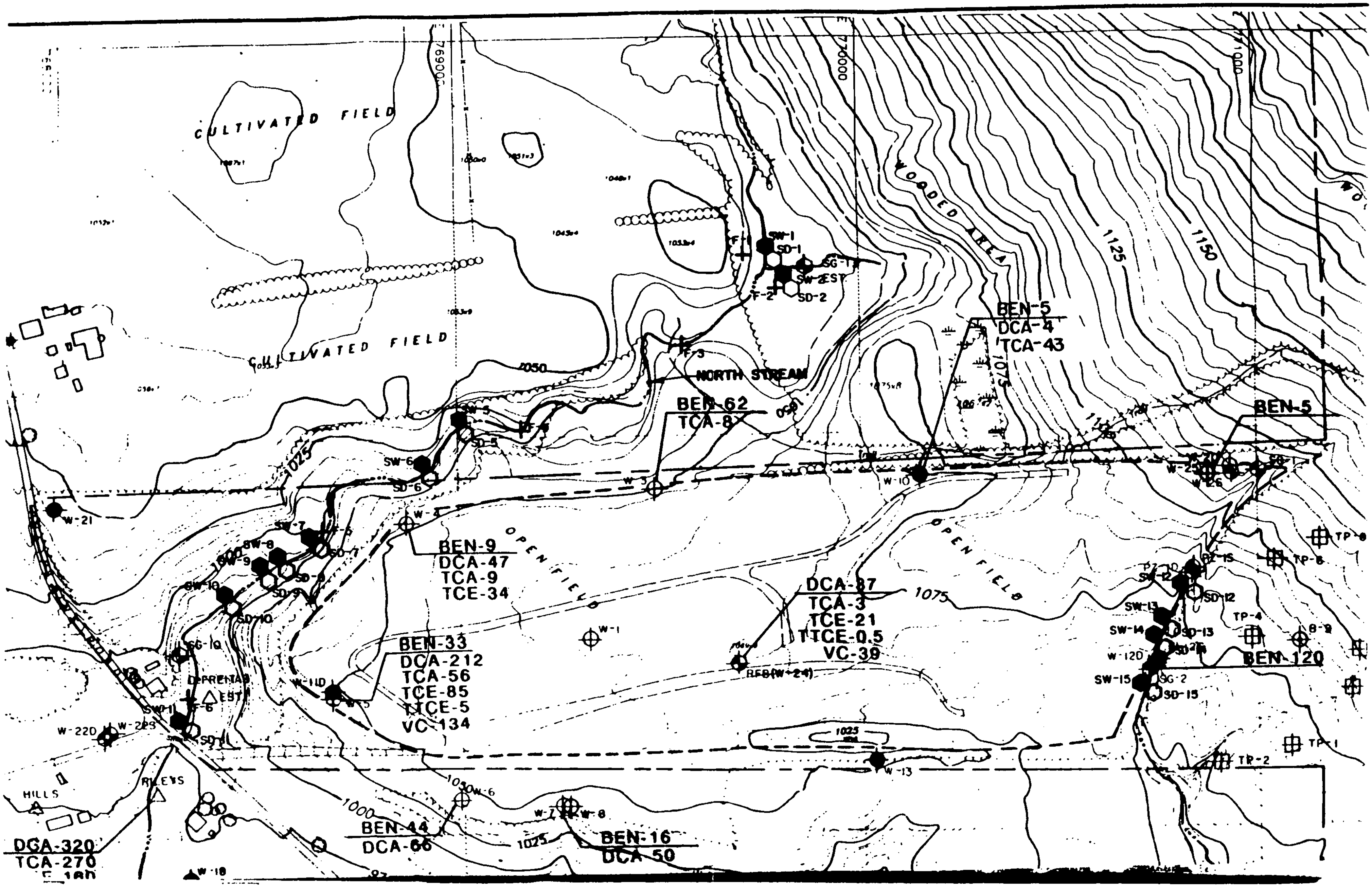

CULTIVATED FIELD
CULTIVATED FIELD
WOODED AREA
NORTH STREAM
OPEN FIELD
OPEN FIELD
SW-1
SD-1
SW-2
SD-2
SW-5
SD-5
SW-6
SD-6
SW-7
SD-7
SW-8
SD-8
SW-9
SD-9
SW-10
SD-10
SW-11
SD-11
SW-12
SD-12
SW-13
SD-13
SW-14
SW-15
SD-15
F-1
F-2
F-3
F-4
F-5
F-6
SG-10
W-3
W-4
W-5
W-10
W-11D
W-21
W-25
W-26
RFF (W-24)
TP-2
TP-4
TP-6
B-9
1025
1050
1000
1075
1125
1150

FIGURE 4


CULTIVATED FIELD
CULTIVATED FIELD
WOODED AREA
NORTH STREAM
OPEN FIELD
OPEN FIELD
1125
1150
1075
1075
1050
1025
1000
1025
SW-1
SD-1
SW-2
SD-2
SG-1
F-2
F-3
SW-5
SD-5
SW-6
SD-6
SW-7
SW-8
SW-9
SD-9
SW-10
SD-10
SG-10
SW-11
W-21
W-3
W-10
W-25
W-26
W-1
W-6
W-7
W-8
W-13
W-18
W-220
W-22S
W-11D
BEN-5
DCA-4
TCA-43
BEN-62
TCA-8X
BEN-5
BEN-9
DCA-47
TCA-9
TCE-34
DCA-87
TCA-3
TCE-21
TTCE-0.5
VC-39
BEN-33
DCA-212
TCA-56
TCE-85
TTCE-5
VC-134
BEN-120
SW-12
SD-12
SW-13
SD-13
SW-14
W-120
SW-15
SG-2
SD-15
PZ-10
PZ-15
TP-4
TP-1
TP-2
TP-6
RFB(W-24)
HILLS
RILEYS
BEN-44
DCA-66
BEN-16
DCA-50
DCA-320
TCA-270

APPENDIX 3 - ADMINISTRATIVE RECORD

COLESVILLE MUNICIPAL LANDFILL
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

SITE IDENTIFICATION

PRELIMINARY ASSESSMENT REPORTS

P. 1 - 9	Report: Summary of History and Management Options, prepared by the Broome County Department of Public Works, Division of Sanitation, September 28, 1983.

CORRESPONDENCE

P. 10	Memo to Mr. David King, NYSDEC, from Mr. Larry Lepak, NYSDEC, Re: Colesville as a NPL site. December 4, 1984.
P. 11	Memo to Larry Lepak, NYSDEC, from Mr. Frank Ricotta, NYSDEC, Re: Response to memo. December 11, 1984.

REMEDIAL INVESTIGATION

SAMPLING AND ANALYSIS PLANS

P. 12 - 284	Report: Confirmatory Sampling Program Report -Volume 2- Appendix B - Analytical Data Summary Report, prepared by Wehran Inc., February, 1990.
P. 285 - 296	Report: Confirmatory Sampling Program Report - Volume 3 - Maps and Figures, prepared by Wehran Inc., February, 1990.
P. 297 - 413	Report: Confirmatory Sampling Program Report - Volume I, prepared by Wehran Inc., July, 1990.
P. 414 - 418	Outline of sampling techniques.
P. 419 - 420	Two maps of proposed sample locations.

SAMPLING & ANALYSIS DATA/CHAIN OF CUSTODY FORMS

P. 421 - 426 Data: New York State Department of Health (NYSDOH) - Wadsworth Center for Laboratories and Research. November 24, 1986.

P. 427 - 447 Data: Inorganic & Organic Data Samples from Enesco Labs. November 23, 1987.

P. 448 - 541 Data: Inorganic Analyses Data Package, Rocky Mountain Analytical, January 20, 1988.

P. 542 - 549 Data: Analysis Water data, January 22, 1986.

P. 550 - 975 Data: Analytical results from Enesco Labs. November 30, 1987.

P. 976 - 1434 Data: Analytical Results from Enesco Labs, January 21, 1988.

- 1435 - 1528 Data: Organic Data Review Summary, Case no. 2225, Sample Matrix - Water, CCJM and Wehran, August, 1989.

P. 1529 - 1542 Data: Inorganic Data Review Summary, Case no. 2119, Sample Matrix - 1 Low Water, CCJM and Wehran, August, 1989.

P. 1543 - 1579 Data: Organic Data Review Summary, Case no. 2207, Sample Matrix - Water, CCJM and Wehran, August, 1989.

P. 1580 - 1613 Data: Organic Data Review Summary, Case no. 2198, Sample Matrix - Water, CCJM and Wehran, August, 1989.

P. 1614 - 1650 Data: Organic Data Review Summary, Case no. 2225 and 2207, Sample Matrix - Sediment, CCJM and Wehran, August, 1989.

P. 1651 - 1662 Data: Organic Data Review Summary, Case no. 2119, Sample Matrix - Water, CCJM and Wehran, August, 1989.

P. 1663 - 1753 Data: Inorganic Data Review Summary, Case no. 2207, Sample Matrix - 19 Low Water, CCJM and Wehran, August, 1989.

P. 1759 - 1804 Data: Organic Data Review Summary, Case no. 2207, Sample Matrix - 16 sediments CCJM and Wehran, August, 1989.

P. 1805 - 1853 Data: Inorganic Data Review Summary, Case no. 2207, Sample Matrix - Low Water, CCJM and Wehran, August, 1989.

P. 1854 - 1869 Data: Inorganic Data Review Summary, Case no. 2201 and 2225, Sample Matrix - Water, Soil, CCJM and Wehran, August, 1989.

P. 1870 - 1882 Data: Inorganic Data Review Summary, Case no. 2119, Sample Matrix - Water, Soil, CCJM and Wehran, August, 1989.

P. 1882A - 2311 Report: Organic Analytical Data Report Package, prepared by NYTEST Environmental Inc., Vol. I, August 20, 1989.

P. 2312 - 2643 Report: Organic Analytical Data Report Package, prepared by NYTEST Environmental Inc., Vol. II, August 20, 1989.

P. 2644 - 2899 Report: Organic Analytical Data Report Package, prepared by NYTEST Environmental Inc., Vol. III, August 20, 1989.

P. 2900 - 2929 Report: Summary Package for Wehran, prepared by NYTEST Environmental Inc., Vol. I, August 31, 1989.

P. 2930 - 3136 Report: Summary Package for Wehran, prepared by NYTEST Environmental Inc., Vol. II, August 31, 1989.

P. 3137 - 3586 Report: Inorganic Analytical Data Report Package, prepared by NYTEST Environmental Inc., Vol. I, September 21, 1989.

P. 3587 - 3910 Report: Inorganic Analytical Data Report Package, prepared by NYTEST Environmental Inc., Vol. II, September 21, 1989.

P. 3911 - 3943 Data: Additional CLP Backup - Colesville, Wehran, October 13, 1989.

P. 3944 - 3962 Data: Volatile Organic Compounds in Monitoring Wells.

P. 3963 - 4408 Report: Inorganic Data Review Summary, prepared by CCJM, November 13, 1989.

P. 4409 - 4426 Letter to Mr. Brian Davidson, NYSDEC, from Messrs. Michael O'Hara and Anthony Savino, Re: Results of Well W-12D Investigations, November 29, 1990. Detailed Attachments.

WORK PLANS

P. 4427 - 4434 Report: Work Plan - Feasibility Study, Colesville Landfill, Broome County, New York, prepared by Wehran Engineering P.C., December, 1985.

P. 4435 - 4444 Report: Work Plan - Supplemental Investigation at the Colesville Landfill, Broome County, New York, prepared Wehran Engineering, December, 1985.

P. 4445 - 4455 Report: QA/QC Plan, Colesville Landfill, Broome County, New York, prepared by Wehran Engineering, December, 1985.

P. 4456 - 4462 Report: Site Safety Plan for Supplemental Investigation at the Colesville Landfill, Broome County, prepared by Wehran Engineering, December, 1985.

P. 4463 - 4464 Letter to Mr. Joseph Forti, NYSDEC, from Mr. Bob Senior, NYSDEC, Re: Work Plan Comments, January 7, 1986

P. 4465 - 4488 Letter to Mr. Joseph Forti, NYSDEC, from Mr. William Soukup and Mr. Gary DiPippo, Wehran Engineering, P.C., Re: Enclosed documents - Work Plan - Supplemental Investigation, Work Plan - Feasibility Study. Documents attached. February 20, 1986.

P. 4489 - 4497 Report: Wehran Engineering Site Safety Plan for Supplemental Investigation at the Colesville Landfill, Broome County, New York, prepared by Wehran Engineering Inc., revised April, 1986.

P. 4498 - 4522 Letter to Mr. Joseph Forti, NYSDEC, from Mr. Randall C. Mills, Wehran and Mr. Gary DiPippo, Wehran, prepared by Wehran Engineering P.C., Re: Documents attached. July 9, 1986.

P. 4522A-4556 Report: Remedial Program - Colesville Landfill, Broome County, New York, prepared by Wehran Engineering Inc., August, 1986.

P. 4557 - 4558 Letter to Mr. Brian Davidson, NYSDEC, from Mr. James Madigan, NY State Department of Health, Re: RI/FS Confirmatory Sampling Workplan, December 13, 1988.

P. 4558A-4723 Report: RI/FS - Confirmatory Sampling Program Work Plan; Part 1: Sampling Plan; Part 2: Quality Assurance/Quality Control Plan, prepared by Wehran Engineering, P.C., Revised April, 1989.

P. 4724 - 4725 Letter to Mr. Irving Kagan, GAF Corporation and Mr. Timothy M. Grippen, from Mr. Brian Davidson, NYSDEC, Re: Revised Confirmatory Sampling Program Work Plan, May 2, 1989.

REMEDIAL INVESTIGATION REPORTS

P. 4726 - 4797 Report: Phase II- Hydrogeologic Investigation and Remedial Alternative Evaluation - Volume 1 - Text, prepared by Wehran Engineering, November, 1984.

P. 4797A-5015 Report: Phase II - Hydrogeologic Investigation and Remedial Alternative Evaluation - Volume 2 - Appendices A-1, prepared by Wehran Engineering, November, 1984.

P. 5016 - 5023 Report: Scope of Services - Supplemental Investigation at the Colesville Landfill - Broome County, New York, prepared by Wehran Engineering, September, 1985.

P. 5024 - 5059 Report: Remedial Program - Colesville Landfill - Broome County, New York, prepared by Wehran Engineering, August, 1986.

P. 5059A-5278 Report: Colesville Landfill - QA - QC Report, Volume 1 - Report, prepared by Wehran Engineering, Revised September, 1986.

P. 5279 - 5285 Report: Colesville Landfill Remedial Investigation/Feasibility Study - Exhibit C - Basis of Compensation, prepared by Wehran Engineering, September 11, 1987.

P. 5285A-5305 Report: Colesville Landfill - Remedial Investigation Report, Volume 2 - Maps & Figures, prepared by Wehran Engineering, April, 1988.

P. 5306 - 5640 Report: <u>Colesville Landfill - Remedial Investigation Report, Volume 3 - Appendices,</u> prepared by Wehran Engineering, April, 1988.

P. 5641 - 5831 Report: <u>Colesville Landfill - Remedial Investigation Report, Volume 4 - appendices</u>, prepared by Wehran Engineering, April, 1988.

P. 5832 - 6174 Report: <u>Colesville Landfill - Remedial Investigation Report, Volume 5 - Appendices,</u> prepared by Wehran Engineering, April, 1988. Revised September, 1988.

P. 6175 - 6377 Report: <u>Colesville Landfill - Remedial Investigation Report</u>, prepared by Wehran Engineering, April, 1988. Revised September, 1988.

CORRESPONDENCE

P. 6378 - 6381 Memorandum to Mr. Walt Demick, NYSDEC, from Mr. Larry Lepak, NYSDEC, Re: Proposed capping of Colesville Landfill, December 3, 1984.

P. 6382 - 6384 Memorandum to Mr. Marsden Chen, NYSDEC, from Mr. Joseph Forti, NYSDEC, Re: Review by the Division of Solid & Hazardous Waste of files of the Colesville landfill, February 5, 1985.

P. 6385 Memorandum to Mr. John Iannotti, NYSDEC, from Mr. John Morelli, NYSDEC, Re: NCP Deficiencies of the Hydrogeologic Investigation and Remedial Alternative Evaluation at the Colesville Landfill, February 20, 1985.

P. 6386 - 6387 Memorandum to Mr. David Donoghue, NYSDEC, from Mr. Joseph Forti, NYSDEC, Re: Waste at site is a health hazard, March 5, 1985.

P. 6388 - 6389 Memorandum to Mr. John Iannotti, NYSDEC, from Mr. John Morelli, NYSDEC, Re: Colesville Landfill RI/FS Deficiencies, March 20, 1985.

P. 6390 Memorandum to Mr. John Iannotti, NYSDEC, from Mr. John Morelli, NYSDEC, Re: Phase II and RI/FS deficiencies of Wehran Engineering, March 21, 1985.

P. 6391 - 6394 Letter to Mr. Michael Wright, Esquire, from Mr. Joseph Forti, NYSDEC, Re: Review of Hydrogeologic Investigation and Remedial Alternative Evaluation of the Colesville Landfill, April 26, 1985.

P. 6395 Letter to Mr. John Murray, Esquire, from Mr. Joseph Forti, NYSDEC, Re: Confirm Conversation with David Donoghue regarding remediation of Colesville Landfill, May 7, 1985.

P. 6396 Memorandum to distribution, from Mr. Joseph Forti, NYSDEC, Re: Status Report of clean-up of the Colesville Landfill, June 10, 1985.

P. 6397 Memorandum to Mr. John Iannotti, NYSDEC, from Mr. Robert Senior, NYSDEC, Re: US EPA visit, September 25, 1985.

P. 6398 - 6406 Letter to Mr. Brian Davidson, NYSDEC from Mr. David Donoghue, Broome County, Department of Public Works, Re: Review and comments on Supplemental Colesville Landfill Investigation, September 30, 1985.

P. 6407 - 6409 Letter to Mr. Ed Murray, Court Attorney, from Mr. Joseph Forti, NYSDEC, Re: September 9th meeting between NYSDEC and Broome County, October 29, 1985.

P. 6410 - 6421 Letter to Mr. Anthony Marchetta, Hannoch, Weisman, from Mr. Edward Murray, County Attorney, Re: Development of proposed workplan, November 18, 1985.

P. 6422 - 6423 Memorandum to Mr. John Iannotti, NYSDEC, from Mr. Robert Senior, NYSDEC, Re: November 14th meeting between GAF, NYSDEC and U.S. EPA, November 19, 1985.

P. 6424 - 6428 Letter to Mr. A. Clough, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, December 5, 1985.

P. 6429 - 6433 Letter to Mr. A. Cower, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, December 5, 1985.

P. 6434 - 6440 Letter to Mr. C. Scott, Senior, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, December 5, 1985.

P. 6441 - 6445 Letter to Mr. C. Nagle, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, December 9, 1985.

P. 6446 - 6449 Letter to Mr. Claude Scott, Sr., public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, December 9, 1985.

P. 6450 - 6455 Letter to Ms. Hills, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, December 9, 1985.

P. 6456 - 6457 Letter to Mrs. LaVare, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, January 3, 1986.

P. 6458 - 6460 Letter to Mr. E. Lee, Public Citizen, from Mr. Robert Denz, Broom County, Health Department, Re: Inorganic and Organic results for the Raw Water, January 9, 1986.

P. 6461 - 6463 Letter to Mr. C. Scott, Jr., public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, January 14, 1986.

P. 6464 - 6466 Letter to Mr. J. Smith, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, January 16, 1986.

P. 6467 - 6468 Letter to Mrs. LaVare, public citizen , from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic test results, January 16, 1986.

P. 6469 - 6470 Letter to Mr. John Rankin, NYSDEC, from Mr. Bob Senior, NYSDEC, Re: Near approval of scope of work for a remedial investigation, January 31, 1986.

P. 6471 - 6472 Memorandum to Mr. Bob Senior, NYSDEC, from Mr. John Rankin, NYSDEC, Re: Work plan and QA/QC protocol, February 6, 1986.

P. 6473 - 6476 Letter to Mr. C. Nagle, NYSDEC, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6477 - 6480 Letter to Mrs. Smith, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6481 - 6485 Letter to Mr. C. Scott Sr., public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6486 - 6489 Letter to Mrs. Hills, public citizen, from Mr. Robert Denz, Broome County Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6490 - 6492 Letter to Mr. Claude Scott Sr., from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6493 - 6496 Letter to Mr. Cower, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results. March 6, 1986.

P. 6497 - 6500 Letter to Mr. Lee, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, March 6, 1986.

P. 6501 - 6507 Letter to Mr. Gaines, public citizen, from Mr. Robert Denz, Broome county, Health Department, Re: Inorganic and organic results, March 11, 1986.

P. 6508 - 6548 Letter to Mr. Joseph Forti, NYSDEC, from Mr. William Soukup, Wehran Engineering, Re: Attached Colesville Landfill Workplans, April 11, 1986.

P. 6549 - 6550 Letter to Mr. David Donoghue, Broome County, from Mr. Robert Senior, NYSDEC, Re: Modification of RI/FS workplans, July 10, 1986.

P. 6551 - 6553 Letter to Mr. Gary DiPippo, Wehran Engineers, from Mr. Joseph Forti, NYSDEC, Re: Revision of RI/FS workplans, July 23, 1986.

P. 6554 - 6555 Letter to Mr. Randy Mills. Senior Geologist, from Mr. Robert Senior, NYSDEC, Re: QA/QC Protocol, August 14, 1986.

P. 6556 Memorandum to Mr. David Engel, NYSDEC, from Mr. Norman Nosenchuck, NYSDEC, Re: Reimbursement costs, September 8, 1986.

P. 6557 - 6560 Letter to Mr. Gaines, public citizen, from Mr. Robert Denz, Broome County, Health Department, Re: Inorganic and organic results, January 29, 1987.

P. 6561 Letter to Ms. Caroline Cappello, Legislator, from Mr. Brian Davidson, NYSDEC, Re: Public Meeting, February 6, 1987.

P. 6562 Letter to Ms. Mary Clark, NYCAN, from Mr. Brian Davidson, NYSDEC, Re: Public meeting, February 6, 1987.

P. 6563 Memorandum to distribution, NYSDEC, from Mr. David Engel, NYSDEC, Re: Order of consent, April 20, 1987.

P. 6564 Memorandum to Ms. Donna Weigel, NYSDEC, from Mr. Brian Davidson, NYSDEC, Re: RI Work Plan, August 14, 1987.

P. 6565 Memorandum to Mr. Norman Nosenchuck, NYSDEC, from Mr. Stephen Hammond, Re: Project status, September 1, 1987.

P. 6566 - 6579 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Douglas Tomchuk, US EPA, Re: Sampling of homeowner wells, November 25, 1987.

P. 6580 - 6592 Letter to Mr. Irving Kagan, GAF Corporation, and Carl Young, Broome County, from Mr. Earl Barcomb, NYSDEC, Re: RI Workplan Modifications, December 15, 1987. Attachments.

P. 6593 Letter to Mr. Joseph Forti, NYSDEC, from Mr. Anthony Savino, Re: Project schedule included in RI Workplan, December 16, 1987.

P. 6594 - 6595 Letter to Mr. Anthony Savino, Wehran Engineering, from Mr. Brian Davidson, NYSDEC, Re: Three surface water samples, December 21, 1987.

P. 6596 - 6597 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Anthony Savino, Wehran Engineering, Re: Selection of monitoring wells for second round of groundwater sampling, February 11, 1988.

P. 6598 - 6601 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Douglas Tomchuk, U.S. EPA, Re: Copy of memo regarding confirmatory sampling plan, January 26, 1989. Attachments.

P. 6602 - 6603 Letter to Mr. Brian Davidson, NYSDEC, from Mr. James Madigan, State of New York Department of Health, Re: RI/FS confirmatory sampling workplan, April 14, 1989.

P. 6604 - 6605 Letter to Messrs. Irving King and Timothy Grippen, from Mr. Brian Davidson, NYSDEC, Re: Revised confirmatory sampling program work plan, May 2, 1989.

P. 6606 Memorandum to distribution, Wehran Inc., from Mr. Anthony Savino, Wehran, Re: RI/FS, confirmatory sampling work plan, bids received, June 14, 1989.

P. 6607 - 6614 Letter to Mr. Irving Kagan, GAF Corporation and Mr. Carl Young, Broome County Executive, Re: RI report, June 27, 1988. Attachments.

P. 6615 - 6616 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Michael O'Hara and Anthony Savino, Wehran Envirotech, Re: Well W-12D Investigation, June 29, 1990.

P. 6617 Memorandum to Mr. Michael O'Hara, CCJM, from Ms. Susan Della, CCJM, Re: Draft data validating summaries for Colesville Landfill RI/FS, November 10, 1989.

P. 6618 Letter to Mr. Eduardo Gonzalez, U.S. EPA, from Wehran, Re: Documents regarding Colesville Landfill Files, October 9, 1990.

P. 6619 - 6636 Letter to Mr. Brian Davidson, NYSDEC, from Mrs. Michael O'Hara, Mr. Anthony Savio, Wehran Envirotech, Re: Well-12 D Investigation, November 29, 1990. Attachments.

P. 6637 - 6640 Letter to Mr. Joel Singerman, U.S. EPA, from Mr. Robert Cozzy, NYSDEC, Re: Draft PRAP, December 21, 1990.

FEASIBILITY STUDY

FEASIBILITY STUDY WORK PLAN

P. 6640A-6702 Report: Colesville Landfill RI/FS, Revised Feasibility Study and Landfill Gas Evaluation Work Plan, prepared by Wehran Envirotech, June, 1990.

FEASIBILITY STUDY REPORTS

P. 6702A-6871 Report: Hydrogeologic Investigation, Colesville Landfill, Town of Colesville, Broome County, N.Y., prepared by Wehran Engineering, September, 1983.

P. 6872 - 7199 Report: Feasibility Study for Colesville Landfill, prepared by Wehran Envirotech, December, 1990.

CORRESPONDENCE

P. 7200 -7204 Letter to Mr. Edward Murray, County Attorney, from Mr. Joseph Forti, NYSDEC, Re: Colesville Landfill, January 13, 1986.

P. 7205 - 7213 Letter to Mr. Joseph Forti, NYSDEC, Mary Walsh, Broome County, and Leonard Pasculli, GAF Corporation, from Mr. Anthony Savino, Wehran Engineering Corporation, Re: Formalization of recent discussions, December 3, 1987. Detailed attachments.

P. 7214 - 7225 Letter to Mr. Irving Kagan, GAF Corporation, and Mr. Carl Young, Broome County, from Mr. Earl Barcomb, NYSDEC, Re: Modifications to the August 1986 work plan, December 15, 1987. Detailed assessment attached.

P. 7226 Memorandum to Chittibabu Vasudevan, NYSDEC, from Mr. Brian Davidson, NYSDEC, Re: Review of site characteristics Fact Sheet and draft revised feasibility study, May 1, 1990.

P. 7227 - 7230 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Eduardo Gonzalez, U.S. EPA, Re: Colesville Landfill RI/FS - Draft Revised Feasibility Study and Landfill Gas Evaluation Work Plan, May 30, 1990.

P. 7231 - 7234 Letter from Mr. Brian Davidson, NYSDEC, from Messrs. Michael O'Hara and Anthony Savino, Wehran Envirotech, Re: Colesville Landfill RI/FS - Response to comments on the Confirmatory Sampling Program Report WE Project No. 07522 EB, June 7, 1990.

P. 7235 - 7242 Letter to Mr. Brian Davidson, NYSDEC, from Messrs. Michael O' Hara and Anthony Savino, Wehran Envirotech, Re: Colesville Landfill RI/FS - Feasibility Study Meeting - September 13, 1990 - WE Project 07522 FS, October 1, 1990.

P. 7243	Letter to Mr. Eduardo Gonzalez, U.S. EPA, from Mr. Anthony Savino, Wehran Envirotech, Re: Colesville Remedial Investigation/Feasibility Study, October 12, 1990.
P. 7244	Memorandum to distribution, from Mr. Brian Davidson, NYSDEC, Re: Draft feasibility study, November 1, 1990.
P. 7245	Letter to Mr. Joel Singerman, NYSDEC, from Mr. Brian Davidson, NYSDEC, Re: Draft feasibility study, November 2, 1990.
P. 7246	Letter to Mr. Joel Singerman, U.S. EPA, from Mr. Robert Cozzy, NYSDEC, Re: U.S. EPA will prepare PRAP, November 8, 1990.
P. 7247 -7250	Letter to Mr. Brian Davidson, NYSDEC, from Mr. Eduardo Gonzalez, U.S. EPA Re: EPA review of Feasibility Study. Detailed summary. November 26, 1990.
P. 7251 - 7255	Letter to Mr. Brian Davidson, NYSDEC, from Messrs. Michael O' Hara and Anthony Savino, Wehran Engineering, Re: Colesville Landfill - Draft Feasibility Study Report Revisions, November 27, 1990.
P. 7256 - 7262	Letter to Mr. Irving Kagan, GAF, and Mr. Timothy Grippen, Broome County Executive, from Mr. Brian Davidson, NYSDEC, Re: Draft feasibility report, November 30, 1990.
P. 7266 - 7267	Letter to Mr. Irving Kagen, GAF Corporation, and Mr. Timothy Grippen, Broome County, Re: Draft feasibility study report, December 7, 1990.
P. 7268	Letter to Mr. Robert Cozzy, NYSDEC, from Mr. Joel Singerman, U.S. EPA, Re: Soliciting comments on the draft proposed plan, December 7, 1990.
P. 7271	Letter to Mr. Steve Hammond, NYSDEC, from Mr. Ronald Tramontano, NYDOH, Re: Review of proposed plan, December 19, 1990.
P. 7282	Letter to Mr. Constantine Sidamon-Eristoff, U.S. EPA, from Mr. Edward Sullivan, NYSDEC, Re: Proposed plan, January 4, 1991.
P. 7283	Letter to Mr. Richard Rhodes, Town of Colesville, from Mr. Eduardo Gonzalez, U.S. EPA, Re: Copies of the Proposed Plan, January 7, 1991.

P. 7285 Letter to Mr. Richard Rhodes, Town of Colesville, from Mr. Eduardo Gonzalez, U.S. EPA, Re: Copies of the Proposed Plan, January 10, 1991.

P. 7287 - 7289 Memorandum to Mr. Vallabh Thakkar, NYSDEC, from Mr. Brian Davidson, NYSDEC, Re: Colesville Landfill, January 25, 1991.

RECORD OF DECISION

CORRESPONDENCE

P. 7290 - 7293 Letter to Mr. Brian Davidson, NYSDEC, from Mr. Anthony Savino, Wehran, Re: ROD, February, 2, 1990.

P. 7294 Memorandum to Mr. Joel Singerman, U.S. EPA, from Mr. Dennis Santella, U.S. EPA, Re: Review of the Risk Assessment for the Colesville Landfill Site, November 30, 1990.

P. 7295 - 7298 Letter to Mr. Robert Cozzy, NYSDEC, from Mr. Joel Singerman, U.S. EPA, Re: ROD, December 13, 1990. Attachments.

P. 7299 Letter to Mr. Joel Singerman, U.S. EPA, from Mr. Robert Cozzy, NYSDEC, Re: Colesville Landfill - Draft ROD, February 22, 1991.

STATE COORDINATION

CORRESPONDENCE

P. 7300 Letter to Mr. John Murray, Broome County, from Mr. Joseph Forti, NYSDEC, Re: Plan of action for future work, May 7, 1985.

P. 7301 - 7305 Letter to Mr. Edward Murray, Broome County Office Building, from Mr. Joseph Forti, NYSDEC, Re: State/Federal funding, May 28, 1985. Attachments.

P. 7306 - 7309 Letter to Hon. Al D'Amato, from Mr. Christopher Daggett, Re: Response to Mr. Tony Fouguet's letter - reference to Remedial Action at the Colesville Landfill, January 3, 1986.

ENFORCEMENT

ADMINISTRATIVE ORDERS

P. 7310 - 7318 Notice of Hearing, October 16, 1985.

P. 7319 - 7338 NYSDEC, 1986 Environmental Quality Bond Act, Title 3 Inactive Hazardous Waste Disposal Sites Remediation Program State Assistance Contract.

P. 7339 - 7355 Agreement, 1987

P. 7356 - 7389 NYSDEC, Order of consent, January 7, 1987.

CORRESPONDENCE

P. 7390 - 7391 Letter to Mr. Jeffery Teitel, Hannoch, Weisman, from Mr. Joseph Forti, NYSDEC, Re: Review of department's records, April 26, 1985.

P. 7392 Letter Mr. George Malchak, Malchak Garbage Service, from Mr. Joseph Forti, NYSDEC, Re: Potential PRP, March 1, 1985.

P. 7393 Letter to Mr. Samuel Heyman, GAF Corporation, from Mr. Joseph Forti, Re: Potential PRP, March 1, 1985.

P. 7394 - 7397 Letter to Mr. Edward Shea, GAF Corporation, and Mr. Edward Murray, County Attorney, from Mr. Joseph Forti, Re: Meeting, June 17, 1985. Attachments.

P. 7398 Memorandum to Mr. Michael Tone, NYSDEC from Mr. Joseph Forti, NYSDEC, Re: Colesville Landfill, September 11, 1985.

P. 7399 Letter to Mr. Walter Mugdan, U.S. EPA, from Mr. James Sevinsky, Environmental Protection Bureau, Re: Colesville Landfill, September 13, 1985.

P. 7400 Letter to Messrs. Edward Shea, GAF Corporation, and Edward Murray, County Attorney, Re: Remediation of Colesville Landfill, September 13, 1985.

P. 7401 Memorandum to Mr. Norman Nosenchuck, NYSDEC, from Request for information, NYSDEC, Re: Request for information, December 18, 1985.

P. 7402 Memorandum to Mr. Norman Nosenchuck, NYSDEC, from Mr. Request for information, Re: Request for information, December 19, 1985.

P. 7402A Letter to Mr. Anthony Marchetta, Esq., GAF Corporation; Mr. Edward Murray, Broome County; Mr. Philip H. Gitlen, Whiteman, Osterman & Hanna; Mr. Sidney Manes, Tri-Cities Barrels, Inc.; and Mr. Sidney Manes, Manes, Rifken, Frankel, and Greenman, Re: Colesville site, January 13, 1986.

P. 7403 - 7435 Letter to Hon. Andrew Pearlstein, NYSDEC, from Mr. Joseph Forti, NYSDEC, Re: Colesville Landfill, February 21, 1986.

P. 7436 - 7438 Letter to Ms. Sandra Hills, public citizen, from Mr. Joseph Forti, NYSDEC, Re: Governor Cuomo's letter, May 13, 1986.

P. 7439 - 7441 Memorandum to Mr. Norman Nosenchuk, NYSDEC, from Mr. David Engel, NYSDEC, Re: Colesville Landfill site, August 15, 1986.

P. 7442 - 7443 Memorandum to Mr. Joe Forti, NYSDEC, from Mr. Stephan Henriquez, NYSDEC, Re: Colesville Landfill, February 25, 1987.

P. 7444 Letter to Ms. Mary Walsh, Broome County, from Mr. Joseph Forti, NYSDEC, Re: RI Work, August 6, 1987.

HEALTH ASSESSMENTS

ATSDR HEALTH ASSESSMENTS

P. 7445 - 7453 Memorandum to Mr. Doug Tomchuk, NYCCB, from Mr. William Nelson, Department of Helath & Human Services, Re: Enclosed copy of Preliminary Health Assessment for the Colesville site, July 12, 1989. Attachment.

PUBLIC PARTICIPATION

COMMENTS AND RESPONSES

P. 7454 - 7455 Newspaper article, unidentified newspaper, April 10, 1985.

COMMUNITY RELATIONS PLANS

P. 7456 - 7465 Report: Citizen Participation Plan.

P. 7466 - 7472 Letter to Ms. Ethel Oliver, public citizen, from Mr. Brian Davidson, NYSDEC, Re: Citizen participation plan, May 9, 1989.

PUBLIC NOTICES

P. 7473 - 7475 Notice of public comment period and public meeting by the New York State Department of Environmental Conservation.

FACT SHEETS AND PRESS RELEASES

P. 7476 News Release, NYSDEC, April 16, 1987.

P. 7477 News Release: Reactions vary to Colesville dump Plans, January 31, 1991, The Press & Sun Bulletin.

CORRESPONDENCE

P. 74/8 - 7479 Letter to Mrs. Sandy LaVare, public citizen, from Mr. Joseph Forti, NYSDEC, Re: Sept. 13 letter, September 26, 1985.

P. 7480 - 7481 Letter to Mr. Joel Singerman, U.S. EPA, from Mr. Brian Davidson, NYSDEC, Re: Administrative Record, January 8, 1991.

APPENDIX 4 - NYSDEC LETTER OF CONCURRENCE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 - 7010

Thomas C. Jorling
Commissioner

Mr. Constantine Sidamon-Eristoff
Regional Administrator
United States Environmental Protection
Agency, Region II
26 Federal Plaza
New York, New York 10278

MAR 2 2 1991

Dear Mr. Sidamon-Eristoff:

RE: Colesville Landfill - Site No. 704010
Record of Decision

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the Record of Decision for the Colesville Landfill, and the Department concurs with the selection of Alternative 4c2. Alternative 4c2 consists of a landfill cap, gas control, leachate control, drainage control, long-term post-closure monitoring and maintenance, pumping wells at and downgradient of the landfill, groundwater treatment, discharge of the treated groundwater to the north stream or the Susquehanna River, and a new water supply for affected residents. The Department concurs that the Record of Decision adequately documents and justifies the selection of this remedy.

Should GAF Corporation and Broome County successfully negotiate the purchase of the remaining affected properties, construction of the new water supply system would not be necessary.

Furthermore, as is documented in the Record of Decision, this site will be subject to five year reviews as required by the Comprehensive Environmental Response, Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act.

Sincerely,

Edward Sull

Edward O. Sullivan
Deputy Commissioner

cc: K. Callahan, USEPA
G. Pavlou, USEPA
J. Singerman, USEPA

APPENDIX 5 - RESPONSIVENESS SUMMARY

Responsiveness Summary

Prepared By: Brian H. Davidson, Project Manager
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation

Colesville Landfill Record of Decision - Site No. 704010

A responsiveness summary is required by Superfund policy. It provides a summary of citizens' comments and concerns received during the public comment period, and the New York State Department of Environmental Conservation's (NYSDEC) responses to those comments and concerns. All comments summarized in this document will be considered in NYSDEC's and EPA's final decision for selection of a remedial alternative for the Colesville Landfill site.

The public comment period for the Colesville Landfill Proposed Plan began on January 7, 1991. The Proposed Plan is attached in Appendix A. A public meeting was held at the Broome County Office Building at 7:00 pm on January 30, 1991. The public comment period and public meeting were announced in legal notices which appeared in the January 7, 1991 and January 28, 1991 Binghamton Press and Sun-Bulletin. The legal notice is attached in Appendix B. A press release was also issued by the New York State Department of Environmental Conservation (NYSDEC), and a newspaper article appeared in the January 11, 1991 Binghamton Press and Sun-Bulletin which provided information on the project and announced the public comment period and public meeting. A copy of the Press Release and January 11, 1991 newspaper article are attached in Appendix C. Residents, interested public, and local officials listec on the contact list in the Citizen Participation Plan for the Colesville Site were mailed letters to encourage their participation and solicit their comments. A copy of the Citizen Participation Plan and a sample of the letter mailed to residents is included in Appendix D.

The public comment period closed on February 6, 1991. Attached is the transcript from the public meeting. About 45 people attended the public meeting. Most of the questions asked at the public meeting were adequately answered by the responses given at the public meeting and are included in the attached transcript. A January 31, 1991 newspaper article that summarized the meeting is attached in Appendix C. The transcript and attendance list is attached in Appendix E.

The written comments essentially reiterated technical concerns that were raised at the public meeting. The one concern that was expressed at the public meeting that was not reiterated in the written comments was the protection of water supply for the Hamlet of Doraville. The Hamlet of Doraville is located south of the south stream and south of the area effected by the site. All of the data collected to date indicates that residential water supply wells in Doraville have not been impacted by the landfill. The data also indicates that residential supply wells in Doraville are not likely to be impacted in the future. Groundwater discharges to the south stream, and groundwater monitoring wells between Doraville and the landfill have been clean. Nevertheless, there will be long-term, 30 years monitoring of monitoring wells located between Doraville and the landfill. Should the data collected from these wells indicate that contamination is moving toward Doraville, appropriate response action will be considered during the five year reviews.

Response action would most likely include an expansion of the new water supply system. The new water supply system will be designed to have sufficient capacity to accommodate some future expansion. However, we do not anticipate, based on the existing data, that future expansion of the new water supply system will be necessary to protect Doraville.

Mr. Thomas O'Meara asked at the public meeting (Page 69 of the transcript), whether affected residents would ever have to pay for their water. The long-term operation and maintenance of the water system provided to the affected residences is the responsibility of the responsible parties, and therefore, affected residents will not have to pay for their water in the future. It should be noted, however, that since Broome County is a responsible party there will be some cost to all Broome County taxpayers (including the affected residents) associated with the installation and long-term operation and maintenance of the new water system.

Ms. Mary Clark testified at the public meeting (Pages 44 through 49 of the transcript included in Appendix E) that a number of intermittent streams exist in the vicinity of the site. She indicated through her statements that these streams were not mapped or sampled during the Remedial Investigation.

Site reconnaissance and sampling occurred during various times of the year and as was indicated by Mr. O'Hara on Page 47 of the transcript, "We sampled the streams we saw..." The surface drainage in the vicinity of the site is properly characterized in the Remedial Investigation Report, and as is indicated on Page 57 of the transcript, the south stream was repeatedly sampled at various locations along the stream. No contamination was detected in the south stream.

Copies of the written comments that were received are included in Appendix F. The concerns raised in written correspondences, and the response to those concerns is included below.

<u>Correspondence from the Broome County Division of Solid Waste Management Dated February 5, 1991</u>

1. Suggested amendment (a.) recommends purchasing affected properties rather than installing a new water system.

Response:

Clearly, there are advantages to the County and GAF purchasing the remaining affected properties. Construction of the water supply system would not be necessary if the remaining affected properties could be purchased. However, purchasing the remaining affected properties becomes difficult if the property owners are not receptive to that option. The decision of whether to construct the new water supply or negotiate the purchase of the remaining affected properties is GAF's and Broome County's. Either option is acceptable to the NYSDEC and the USEPA. Should GAF and Broome County successfully negotiate the purchase of all the affected properties, they are still obligated to install and maintain the landfill cap and groundwater pump and treat system.

2. Suggested amendment (b.) recommends recirculating treated groundwater under the cap. The concern is raised that the model does not account for unbroken drums that may rupture in the future and Broome County does not want to treat this site for 100 years.

Response:

The Feasibility Study Report estimates that the landfill cap will reduce infiltration from the current 500 gallons per acre, per day to 10 callons per acre, per day. Since the watertable is beneath t-- refuse, this will essentially eliminate leachate generation at the site. Although it is possible that unbroken drums of chemicals are buried on site, and will rupture in the future causing slugs of contamination to enter the groundwater, this scenario is not likely for the following reasons:

1. Although we do not have much in the way of disposal records, the records we do have indicate that many of the drums were crushed or dumped and emptied off the back of trucks.

2. Any intact drums would have been buried for 16 to 18 years, and mucn of their contents would probably have leaked out.

3. A number of intact drums should have indicated anomalies during the geophysical surveys. However, the geophysical data did not indicate any such anomalies.

4. Groundwater monitoring well data collected from 1984 to 1989 indicates that contaminants on-site and immediately downgradient have become less concentrated over time. No spikes or sporadic sharp increases of a given contaminant have been observed. The overall pattern from the groundwater data tends to indicate bulk of contamination from the drums has been released, and is dispersing and diluting in the groundwater.

Recirculating treated groundwater under the cap would defeat the purpose of the cap, and the effectives of such a system would be hampered by stratification in the upper portion of the outwash aquifer.

Obtaining Maximum Contaminant Levels (MCLs) within four years, as predicted by the contaminant transport model, is probably an optimistic prediction. Factors, such as stratification in the outwash aquifer, may hamper the achievement of that goal. However, the effectiveness of the pump and treat system will be reevaluated in five years as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). If it does not seem to be achieving the program goals as predicted, alternatives will be evaluated at that time.

Correspondence from Mr. Franklyn P. Cism, Jr.

General Comment:

Alternative 4c2 is an acceptable and efficient procedure to follow, and with good fortune, will work.

Response:

Thank you for your comments. We concur that Alternative 4c2 is an appropriate and highly protective remedial alternative for the site.

Comments Included in the February 5, 1991 Correspondence from Broome County Environmental Management Council (EMC)

Hydrogeologic Issues:

Comment No. 1:

General Concern - Wehran Engineering contradicted the vertical profiles at the Public Meeting, log data should be verified, the model is sensitive to one data point which may not be representative of the disposal area.

Response:

The stratigraphic cross-sections from the Remedial Investigation (RI), which were updated and revised as part of the Confirmatory Sampling Program, clearly indicates that the outwash aquifer is in direct contact with the refuse (refer to cross-sections F-F' and G-G'). This fact was correctly stated by Wehran at the public meeting and there is *no* contradiction between that statement made by Wehran and the geologic cross-sections.

The two-dimensional solute transport model evaluates changes in concentration over time caused by the processes of convective transport, hydrodynamic dispersion, mixing and chemical retardation. Preliminary model input variables for the steady-state base simulation included both hydraulic and transport properties that were determined from available boring log and well data, existing watertable maps, cross-sections and published sources. Therefore, the model is sensitive to more than one data point. The model does require that basic assumptions be made. Those assumptions, and the limitations of the model are discussed in the RI Report and Appendix C of the feasibility study. The results of any groundwater model must be viewed with same degree of skepticism as it is very difficult (if not impossible) to accurately predict contaminate transport in a somewhat complex and variable groundwater flow system. Nevertheless, the groundwater modeling effort used at the Colesville Landfill represents a legitimate attempt to predict contaminate transport.

Comment No. 2:

The RI fails to discuss the source of the stream seeps. In order for the remediation to be effective, the source of the seeps must be substantiated.

Response:

Based on the RI data the North Stream seeps on the north side of the landfill seem to be contaminated springs, or an intersection of the groundwater table and the ground surface. The seeps along the south side of the landfill are close to the watertable, but may actually be due to water perched on thin discontinues clay seams in the upper portions of the outwash aquifer. The seeps are contaminated by landfill leachate. The refuse is above the watertable. The contamination of the seeps is due to infiltration through the landfill mass. Regardless of the exact origin and relation of the seeps to the watertable, they will be remediated by the landfill cap. They should dry up over time due to the combined effect of the landfill cap and the 13 pumping wells. Once the pumping wells are shut off, the seeps on the north side of the landfill may return, but they should be clean due to the landfill cap preventing infiltration through the landfill mass. At this point, we are confident that we know enough to go forward with the remediation. There would be no real benefit from attempting to recalculate stream loading.

Comment No. 3:

The proposed plan does not evaluate the remedial alternative of capping the site and providing a new drinking water supply exclusive of the pump and treat option.

Response:

True. The cost of capping and a new water supply alone can be obtained by subtracting the costs associated with pump and treat from Alternative 4c2 on Table E-1. However, landfill capping with a new water supply without pumping and treating groundwater would not be an acceptable alternative to the NYSDEC or the USEPA.

The outwash aquifer is considered a valuable resource. It has been contaminated by the uncontrolled release of hazardous wastes emanating from the Colesville Landfill. Groundwater quality standards have been violated and an off-site plume of contaminated groundwater has been identified. An attempt must be made to remediate the aquifer and restore the resource.

Comment No. 4:

EMC recommends the inclusion of run-off provisions in all capping alternatives.

Response:

The proper management of run-off of precipitation from the site due to the landfill cap will be addressed during the remedial design.

Managerial Issues:

Comment No. 1:

The cost estimates in the proposed plan do not include inflation factors. Ignoring the effects of inflation can bias the present worth analysis to favor alternatives with large operating and maintenance costs. EMC recommends revising the economic analysis to account for inflation.

Response:

Although cost is considered during the development and initial screening of alternatives, the overall protection of human health and the environment is the driving force behind the selection of remedy.

Typically, cost estimates made during feasibility studies are expected to provide an accuracy of +50 percent to -30 percent, and are prepared using data available from the RI. In conducting the present worth analysis, assumptions must be made regarding the discount rate and the period of performance. Like groundwater models, the results of a present worth analysis must be viewed with some degree of skepticism, since no one can really accurately predict how our economy will perform over the next 30 years. However, it is generally recommended that a discount rate equivalent to the 30-year US treasury bond rate before taxes and after inflation be used in determining the present worth of an alternative. A discount rate equivalent to the 30-year US treasury bond rate before taxes and after inflation would result in a higher present worth factor than used by Wehran. However, Wehran's present worth factor provides present value costs of remedial alternatives for relative comparison, and recalculating present value costs using an inflation factor or higher present worth factor will not affect the selection of remedy.

Comment No. 2:

Issues relating to the responsible entities for operation, permitting and monitoring of remedial actions were not addressed.

Response:

Broome County and GAF are responsible for the operation, maintenance, and monitoring of the remedial action. Since the Colesville Landfill is a designated hazardous waste site, no actual permits for on-site remedial activities will necessary, although regulatory permit requirements and standards will be satisfied. The NYSDEC will review and oversee the remedial design, construction, operation, maintenance, and long-term monitoring with input from the NYSDOH and USEPA in accordance with the Order on Consent, the State Environmental Conservation Law (ECL), and the Federal CERCLA.

Preferred Alternative:

General Comment:

EMC generally agrees with Alternative 4c2, however, EMC's position is that the remediation of the groundwater will take more than four years to accomplish. EMC is concerned that the pump and treat system will be in operation for many years at a significant cost to the taxpayers of Broome County. EMC recommends a phased remediation with cap and water supply first, and then pump and treat only if necessary.

Response:

The Feasibility Study Report predicts, based on the solute transport model, that MCL's will be achieved within four years by implementing the pump and treat system with the landfill cap. It is entirely possible that this prediction is overly optimistic due to the assumptions and limitations of the model. Nevertheless, the pump and treat system is a necessary and integral part of the remediation. Restoration of the groundwater resource at this site is feasible, warranted and must be attempted.

The pumping wells also enhance the landfill cap by providing hydrologic control. There will be some flexibility during design, and even during remedial construction, to amend the system as necessary based on actual site conditions. The duration and pump rates of various wells can be varied once the system is in place.

This site will be subject to five year reviews established by CERCLA. If, in fact, MCL's are not achieved within four years as predicted by the FS Report, alternatives will be considered during the five year review. It is premature to discuss the alternatives that might be appropriate at that time.

APPENDIX A

Superfund Proposed Plan

Colesville Landfill Site

Town of Colesville, Broome County, New York

EPA
Region 2

January, 1991

NYSDEC

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Colesville Landfill Superfund site located in the Town of Colesville, Broome County, New York, 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) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 USC Section 9617(a) as amended, and the National Contingency Plan (NCP). The alternatives summarized here are described in the remedial investigation and feasibility study (RI/FS) report, which should be consulted for a more detailed description of all the alternatives. The RI/FS report has been prepared by Wehran-New York, Inc., Middletown, New York on behalf of the Broome County Department of Public Works, Binghamton, New York and the GAF Corporation of Wayne, New Jersey pursuant to the requirements of an Order of Consent (Index No. T010687) with the New York State Department of Environmental Conservation (NYSDEC). The NYSDEC is the lead agency for this project; EPA is the support agency.

This Proposed Plan is being provided as a supplement to the RI/FS report to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made if public comments or additional data indicates that such a change will result in a more appropriate solution. The final decision regarding the selected remedy will be made after EPA and NYSDEC have taken into consideration all comments from the public. We are soliciting public comment on all of the alternatives considered in the detailed analysis phase of the RI/FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

Copies of the RI/FS report, Proposed Plan, and supporting documentation are available at the following repositories:

- Town of Colesville
  Town Hall
  Harpursville, NY 13787

- New York State Department of
  Environmental Conservation
  50 Wolf Road, Room 222
  Albany, NY 12233-7010

- U. S. Environmental Protection Agency
  Emergency and Remedial Response Division
  26 Federal Plaza, Room 29-30
  New York, NY 10278

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 RI/FS report has been made available to the public for a public comment period which concludes on February 6, 1991.

Pursuant to Section 117(a) of CERCLA, a public meeting will be held during the public comment period in the Broome County Office Building, 44 Hawley Street, second floor auditorium, Binghamton, New York, on January 30, 1991 at 7:00 p.m. to present the conclusions of the RI/FS, to further elaborate on the reasons for recommending the preferred remedial alternative, and to receive public comments.

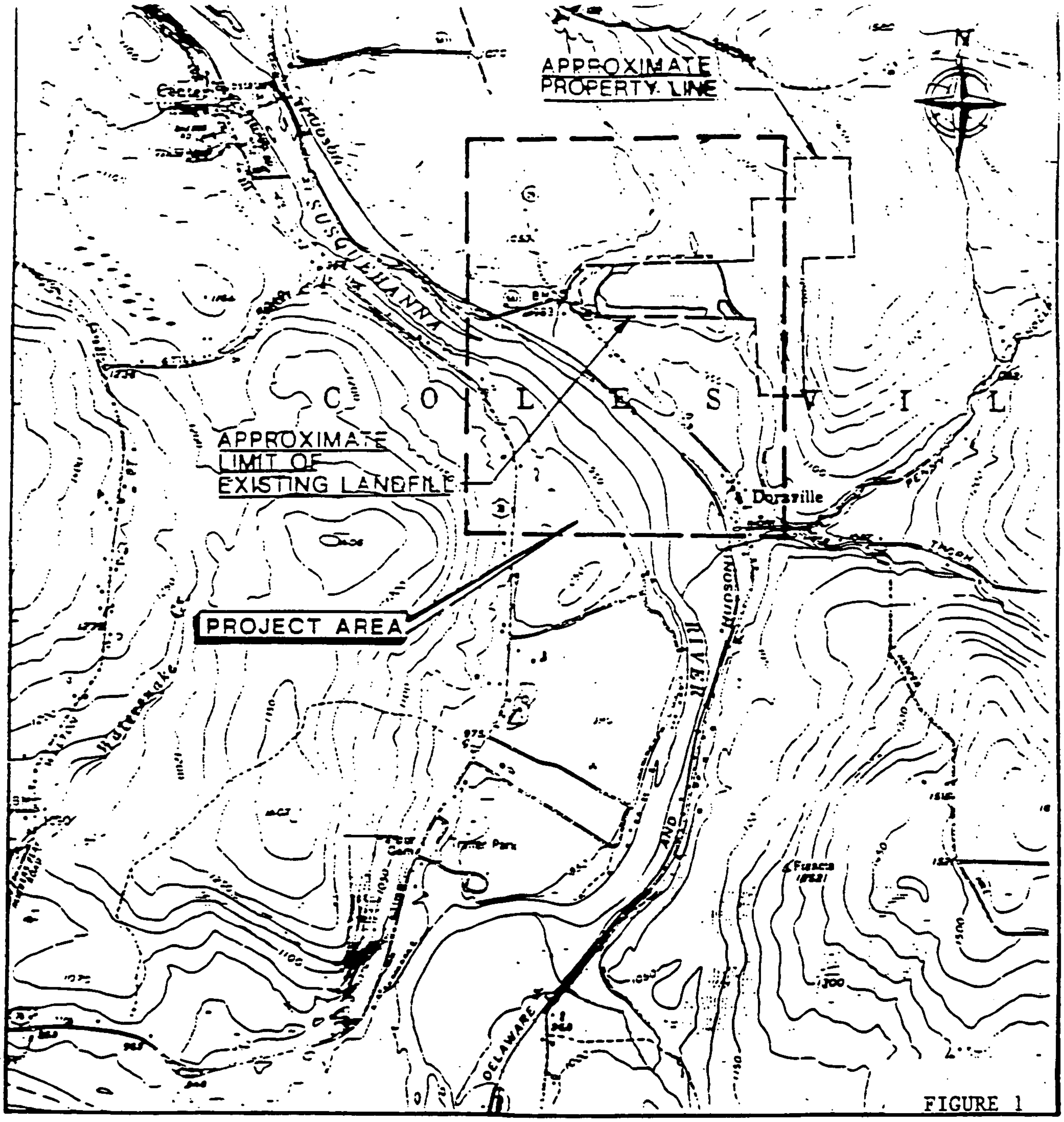


FIGURE 1

Written and oral comments will be documented in the Responsiveness Summary section of the Record of Decision (ROD), the document which formalizes the selected remedy.

All written comment should be addressed to:

Brian Davidson, Project Manager
Bureau of Eastern Remedial Action
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

BACKGROUND

The Colesville Landfill is an inactive landfill located in the Town of Colesville, Broome County, New York, (Figure 1). 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 acres on which the landfill is situated, only about 35 acres have been used for waste disposal. The area is bounded by East Windsor Road to the west, and by unnamed streams to the north, east, and west (termed the North and South Streams). Surface water in the area drains to the Susquehanna River. The North Stream to the Susquehanna River is the surface water body most sensitive to potential impacts from the landfill. Most groundwater contamination in the aquifer eventually enters this tributary. The second potential impact is direct groundwater discharge to the southwest and the river.

SITE HISTORY

Landfill operations at the Colesville site commenced in 1969 and continued until 1984. Throughout its operational life, the Colesville Landfill was used for the disposal of municipal solid waste (MSW). Between 1973 to 1975, drums of industrial wastes were disposed of along with the MSW. The industrial wastes that were disposed of consisted primarily of organic solvents. A total of approximately 468,000 cubic yards of MSW and industrial wastes are estimated to have been disposed of at the site. The landfill has not been closed in accordance with New York State Part 360 landfill closure requirements.

In 1983, samples collected by the Broome County Health Department from homeowner wells near the site indicated that the Colesville Landfill was contaminating the groundwater beneath and in the immediate vicinity of the site. There are four residential wells located downgradient from the Colesville Landfill within the maximum zone of groundwater contamination. Based on the analytical results from groundwater samples taken from homeowner wells, groundwater was found to be contaminated with volatile organic compounds (VOCs) such as 1,1-dichloroethene (11 ug/l), trichloroethene (160 ug/l), 1,1,1-trichloroethane (270 ug/l), 1,1-dichloroethane (320 ug/l), chloroform (8 ug/l), and trans 1,2-dichloroethene (140 ug/l).

This results prompted the Broome County Department of Public Works to install granular activated carbon filters on private well supplies and to perform two investigative studies of the Colesville Landfill. These studies were performed by Wehran Engineering in 1983 and 1984. Both of these studies also indicated that the groundwater was being contaminated with VOCs from the landfill leachate. The contamination was found to be moving southwest toward the Susquehanna River.

The Colesville Landfill site was listed on the Superfund National Priorities List in June, 1986.

In 1988, Wehran completed an RI at the site. In 1990, Wehran completed a confirmatory sampling program which verified the conclusion of the 1988 RI. This additional investigation further defined the nature and extent of groundwater and surface water contamination. The key findings of these investigations are as follows:

. The Colesville Landfill is currently releasing low levels (parts-per-billion) of volatile organic compounds (VOCs).

. Over the last six seven years, it has became 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.

. Part-per-billion levels of VOCs have been detected in wells at three residences downgradient of the landfill. This contamination has been consistent over time.

. The only bedrock well currently used within the path of the VOC plume is not affected.

. Historical and current data have failed to confirm contamination of the bedrock aquifer.

. No VOC contamination has been detected downgradient of the Lee property.

. The available data suggest that VOCs currently being released from the landfill via the groundwater pathway are not expected to impact the Susquehanna River.

. The only measurable discharge points to surface water are in leachate discharging to the North 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 survey data.

SUMMARY OF SITE RISKS

A baseline risk assessment was performed as part of the RI for the Colesville Landfill site. The risk assessment evaluates the potential impacts on human health and the environment assuming that no remedation occurs.

This baseline risk assessment considered the identity and the number of chemicals found in the various environmental media sampled, potential human and animal exposure pathways, site conditions as related to chemical migration, chemical toxicity, and appropriate environmental standards.

Indicator chemicals for the baseline risk assessment were selected based on their known or potential toxicity and relative environmental fate and mobility characteristics. They include VOCs such as: 1,1-dichloroethene; 1,1,1-trichloroethene; trichloroethene; tetrachloroethene benzene; chlorobenzene; 1,1-dichloroethane; 1,2-dichloroethane: and vinyl chloride.

The human exposure pathways were: exposure to groundwater; dermal contact with contaminated surface water and sediments near the leachate seeps; and ingestion of game species from the vicinity of the site. EPA considers risks in the range of 10^{-4} to 10^{-6} to be acceptable. This risk range can be interpreted to mean that an individual may have a one in ten thousand to a one in a million increased chance of developing cancer as result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the site.

The risk assessment indicates that the most significant public health risk results form the exposure to potable well water at the site. At this time, the total baseline carcinogenic risk associated with exposure to potable well water at the site is 2.85×10^{-4}. This indicates that an individual has approximately a three in ten thousand increased chance of developing cancer as a result of drinking this water for 70 years. The baseline carcinogenic risk has been significantly reduced by the provision of carbon filters and bottled water to the affected residences.

For non-carcinogenic compounds, 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 exceedence of unity, that is 1.0, in the HI indicates that conditions existing at the site are not adequately protective of human health.

The risk assessment concludes that exposure to potable water from wells in the vicinity of the site represents a significant risk to human health and the environment.

Furthermore, since the landfill has been a continuous source of groundwater contamination, contaminants are found in excess of federal and state standards in the site groundwater plume. EPA policies and regulations allow remedial actions to be taken whenever impacts result in the exceedance of Applicable or Relevant and Appropriate Requirements (ARARs). EPA has promulgated drinking water regulations designed to protect human health from the potential adverse effects of drinking water contaminants. Under the Safe Drinking Water Act, ARARs include Maximum Contaminant Levels (MCLs), which are enforceable standards that apply to specified drinking water contaminants which EPA has determined have an adverse effect on human health. The MCLs are set to levels that are protective of human health.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other remedial measures considered, may present a current or potential threat to public health, welfare, and the environment through the groundwater pathway.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The overall objective of the remediation is to reduce the concentrations of contaminants to levels which are protective of human health and the environment. The RI/FS report contains the detailed information and data used in determining the nature and extent of the contamination, and the development of remedial alternatives to address the contamination.

The remedial response objectives for the Colesville Landfill site are as follows:

. Control the release of VOCs from the Colesville Landfill to the underlying aquifer;

. Eliminate the leachate seeps from the Colesville Landfill, 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; and

. Eliminate the potential risk associated with the exposure to contaminated potable well water.

Accordingly, the FS report evaluates, in detail, nine remedial alternatives for addressing the contamination associated with the Colesville Landfill site.

These alternatives are:

Alternative 1- No Action with Monitoring

Capital Cost: $0
Operation and maintenance (O & M) Cost: $14,000
Present Worth Cost: $128,000

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.

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 with Existing Water Supply and Use Restrictions

Capital Cost: $0
O & M Cost: $71,000
Present Worth Cost: $672,000

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 property operated for all household needs. 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 with New York Water Supply

Capital Cost: $150,000
O & M Cost: $53,000
Present Worth Cost: $648,000

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 with Downgradient Pumping and Existing Water Supply

Capital Cost: $4,163,000
O & M Cost: $268,000
Present Worth Cost: $5,595,000

This alternative would involve the installation of multi-media cap that combines a number of layers of different materials, such as a synthetic membrane, compacted clay layer, sand drainage layer, and topsoil/vegetation. The cap should be designed 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 with Downgradient Pumping and New Water Supply

Capital Cost: $4,313,000
O & M Cost: $250,000
Present Worth Cost: $5,646,000

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 the groundwater. 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 with Pumping at Landfill and Downgradient with Existing Water Supply

Capital Cost: $4,193,000
O & M Cost: $268,000
Present Worth Cost: $5,040,000

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 well, and treatment of groundwater. The existing water supply program, upgraded as described in Alternative 3a, would be continued.

Long-term monitoring would 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 with pumping at Landfill and Downgradient with New Water Supply

Capital Cost: $4,273,000
O & M Cost: $250,000
Present Worth Cost: $5,135,000

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 douwngradient. A new water supply and distribution system would be constructed 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 4d1-Landfill Cap, Downgradient Cutoff, and New Water Supply

Capital Cost: $8,811,000
O & M Cost: $230,000
Present Worth Cost: $10,977,000

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, Existing Water Supply

Capital Cost: $8,701,000
O & M Cost: $268,000
Present Worth Cost: $11,230,000

This alternative would involve the placement of a partial groundwater cutoff wall downgradient of the landfill, as described for 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.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 4c2 as the preliminary choice for the site remedy. This alternative consists of a landfill cap, groundwater pumping from wells at and downgradient of the landfill, treatment of the extracted water by air stripping, discharge of the treated water to the North Stream or the Susquehanna River, and the provision of a new water supply for the affected residents. The cap will eliminate leachate seeps from the landfill. The pumping system will provide containment and removal of the VOC plume, and is predicted to reduce the risk to acceptable levels within one year and to attain groundwater standards within four years. The preferred alternative will be immediately protective of human health by utilizing a new water supply. Long-term monitoring would be utilized to verify the effectiveness of the groundwater remediation and the cap.

The preferred alternative 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. However, because treatment of the principal threats of the site is not practicable, this remedy 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.

RATIONALE FOR SELECTION

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, ARARs overall protection of human health and the environment, and state and community acceptance.

The evaluation criteria are explained below.

o 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.

o Compliance ARAR's addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

o 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.

o 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.

o 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.

o Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

o Cost includes the estimated capital, O&M, and the present worth costs.

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

o Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the RI/FS report and the Proposed Plan.

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 is not 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 affected residences.

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

Compliance with ARARs

The no-action alternative will not ensure compliance with chemical-specific ARARs within a reasonable or predictable time frame. Alternative 3a, which addresses actual current groundwater use, will immediately comply with health-based ARARs at the point of use, but provides no action to ensure compliance at the groundwater source. The pumping and containment alternatives (Alternatives 4b1, 4b2, 4c1, 4c2) also 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) 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.

Long-Term Effectiveness and Permanence

The no-action alternative is neither effective or permanent in the reduction of the magnitude of risk associated with the Colesville Landfill site.

Alternative 3a is effective in the reduction of risk, but the permanence of this option will depend on the strict enforcement control. By comparison, Alternative 3b is effective in the long-term reduction of risk to existing residents, but not to future residents.

Alternatives 4b1, 4c1 and 4d2 provide for controlled source containment and groundwater treatment, which will reduce risk, but long-term maintenance and monitoring will be required. The limited action component of these alternatives reduces 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. The proposed controls will require long-term operation and maintenance, 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 will 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, will 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 the containment alternatives (Alternatives 4b1, 4b2, 4c1, 4c2, 4d1, and 4d2) reduce the toxicity, mobility, and volume through containment and the treatment of the groundwater using air stripping. For these alternatives, emissions from the air stripper will 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 is not effective in protecting human health and the environment. Improvement of groundwater quality will only occur through natural recovery, which is predicted to require at least 20 years.

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

All the containment options (Alternative 4b1, 4b2, 4c1, 4c2, 4d1 and 4d2) will 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 several years. Aquifer cleanup under Alternatives 4d1 and 4d2 will take much longer.

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

Environmental impacts during 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 will 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 options that include limited action as a subalternative component.

The containment options calling for a downgradient cutoff wall will 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.

Cost

The no-action alternative has the lowest estimated present value 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.

State Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred remedy will be assessed in the ROD following a review of the public comments received on the RI/FS report and the Proposed Plan.

CONCLUSION

EPA and NYSDEC believe that the preferred remedy described above is fully protective of human health and the environment, meets all ARARs, offers the best balance among the evaluation criteria discussed above, and satisfies the statutory preference for treatment as a principal element in remedy selection.

It is important to note that the remedy described above is the preferred remedy for the site. The final selection will be documented in the ROD only after consideration of all comments on any of the remedial alternatives addressed in the Proposed Plan and the RI/FS report.

APPENDIX B

Notice of Public Comment Period and
Public Meeting by the New York State
Department of Environmental Conservation

Notice is hereby given that at the time and place designated below the New York State Department of Environmental Conservation (NYSDEC) will be holding a public meeting to solicit public comments on remedial alternatives for the Colesville Landfill Inactive Hazardous Waste Site (#704010) on East Windsor Road in the Town of Colesville. Written comments will be accepted during a public comment period that will begin on January 7, 1991 and will continue until February 5, 1991.

The Colesville Landfill is a 35-acre landfill which was operated by Broome County from 1969 to 1984. Between 1973 and 1975 drums of industrial wastes were codisposed with municipal solid waste. In 1983, Broome County Health Department homeowner well samples indicated groundwater contamination in the immediate vicinity of the landfill. The landfill gates were closed in 1984 and the site was subsequently listed on the National Priority List (NPL).

A two phase hydrogeologic investigations of the Colesville Landfill site was completed in 1984. In April 1987, Broome County, GAF Corporation and the NYSDEC entered into an Order on Consent which required a Remedial Investigation and Feasibility Study (RI/FS) to be performed on the Colesville site. The work plan for the RI/FS was presented to the public at two (2) public meetings held on February 4, 1987 at the Broome County Office Building in Binghamton, New York. The Remedial Investigation (RI) was completed in September 1988. The RI Report concluded that:

- The landfill is currently releasing low levels of volatile organic compounds to the groundwater.
- An off-site plume of contaminated groundwater exists southwest of the site.
- Three (3) homeowner wells have been contaminated by volatile organic compounds.
- Impacts from the site to air, surface water and sediments are not significant.

A Confirmatory Sampling Report completed in February 1990 essentially confirmed the RI findings and provided additional data validated data. A Landfill Gas Evaluation Report, dated August 1990, indicated only low levels of methane in one area on the southwest perimeter of the site.

The Feasibility Study (FS), which evaluates remedial alternatives for the site, was completed in December 1990.

The FS Report evaluates the following nine (9) alternatives in detail:

- Alternative 1 - No Action with Monitoring
- Alternative 3a - Limited Action with Existing Water Supply and Use Restrictions. This Alternative would upgrade existing carbon/UV filters, purchase properties and restrict deeds if possible.

- Alternative 3b - Limited Action with New Water Supply. This Alternative would provide new water supply wells upgradient of the landfill and a distribution system.
- Alternative 4b1 - Landfill Cap with Downgradient Pumping and Existing Water Supply. This Alternative includes a cap with downgradient pumping and treatment of groundwater.
- Alternative 4b2 - Landfill Cap with Downgradient Pumping and New Water Supply. This Alternative includes a cap, pumping and treating downgradient, and a new water supply.
- Alternative 4c1 - Landfill Cap with Pumping at Landfill and Downgradient with Existing Water Supply. The Alternative includes a cap, pumping groundwater downgradient and within the landfill, treatment and upgrading existing water supply treatment systems.
- Alternative 4c2 - Landfill Cap with Pumping at Landfill and Downgradient with New Water Supply. This Alternative includes a cap, pumping at the landfill and downgradient, treatment and a new water supply.
- Alternative 4d1 - Landfill Cap, Downgradient Cutoff and a New Water Supply. This Alternative includes a cap, a partial groundwater slurry cutoff wall, pumping and treating within the containment wall and a new water supply.
- Alternative 4d2 - Landfill Cap, Downgradient Cutoff, and Existing Water Supply. This Alternative includes a cap, a partial groundwater cutoff wall, pumping and treatment of groundwater with and outside the cutoff wall, and upgrading existing water supply systems.

The FS Report recommends that Alternative 4c2 above be implemented.

The United States Environmental Protection Agency (USEPA) in consultation with the NYSDEC, has issued a Proposed Plan for the Colesville Landfill as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP). The Proposed Plan summarizes the findings of the RI/FS. The administrative record file, which contains the information upon which the selection of the remedial response action will be based, is available at the following location:

Colesville Town Hall
Box 27
Harpersville, New York
Telephone: (607) 693-1174
Hours: Monday-Friday 9:00 am - 4:00 pm
Saturday 9:00 am - Noon

The Proposed Plan, the RI Report, FS Report and other reports generated on the Colesville site are also available for public review of the NYSDEC offices in Kirkwood and Albany, and the USEPA office in New York City.

Location of Public Meeting	Date and Time
Second Floor Conference Room Broome County Office Building 44 Holly Street Binghamton, New York	January 30, 1991 7:00 pm

Written and oral comments will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

Written comments should be sent to:

Mr. Brian Davidson
Project Manager
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road - Room 222
Albany, New York 12233-7010

APPENDIX C

News Release Region 7

New York State Department of Environmental Conservation

THOMAS C. JORLING, *Commissioner*
WILLIAM KRICHBAUM, *Regional Director*

615 Erie Boulevard West
Syracuse, New York 13204

January 22, 1991

PRESS ADVISORY/BACKGROUND

The New York State Department of Environmental Conservation will conduct an informational meeting on January 30th at 7:00 p.m. to update local citizens on cleanup plans for the Colesville Landfill. The meeting will be held in the second floor auditorium of the Broome County Office Building at 44 Holley Street, Binghamton

The primary purpose of the meeting will be to present results of a comprehensive Remedial Investigation and Feasibility Study (RI/FS) conducted under the supervision of both the State DEC and the U.S. Environmental Protection Agency. The RI/FS was prepared by Wehran-New York, Inc. on behalf of the Broome County Department of Public Works and the GAF Corporation. GAF and the County signed a Consent Order with the DEC in April 1987. Under terms of the agreement, the County and GAF will split the cost of the cleanup. The County will be eligible for reimbursement of 75% of their cost from the New York State Hazardous Waste Superfund which is funded through the voter approved 1986 Environmental Quality Bond Act.

The designated hazardous waste site is a 35 acre portion of the 113 acre former municipal landfill property. The site, located on East Windsor Road just north of the hamlet of Doraville, served as the town's landfill from 1969 until 1984. During most of that time it received usual municipal waste. However, records show that between 1973 and 1975, drummed industrial wastes from various sources were disposed at Colesville. These industrial wastes consisted primarily of organic solvents.

In 1983 the Broome County Department of Health sampled homeowner wells in the vicinity of the landfill and verified contaminated groundwater in the area immediately adjacent to the landfill. The groundwater was contaminated with volatile organic compounds (VOC's). The Broome County Department of Public Works performed two hydrogeologic investigations in 1983 and 1984. Based on the information gathered, the Colesville Landfill was listed on the New York State Registry of Inactive Waste Sites and subsequently (in 1986) was added to the National Priority List (commonly called Superfund List).

Under terms of the agreement signed by the County, GAF, and the DEC, a Remedial Investigation (RI) was required at the site. The work plan for that investigation was described to local citizens at public meetings in a February 1987, and the RI work was completed in September 1988. The RI report concluded that the landfill continues to release low levels of volatile organic compounds to the groundwater and that three homeowners' wells have been contaminated. Testing confirmed an off-site plume of contaminated groundwater southwest of the site. The report also described impacts to air, surface water and sediments as "not significant." A Sampling Report completed in February 1990 essentially confirmed the RI findings.

A Feasibility Study (FS) based on all the sampling data was completed in December 1990. The FS evaluated nine possible alternatives for remediating the site. The FS recommends that the landfill be capped, that wells be installed to pump and treat the contaminant plume and that a new water supply and distribution system be constructed. The treated water would be discharged to the Susquehanna River. The pumping system is predicted to reduce the risk to acceptable levels within one year and to attain groundwater standards within four years. The selected alternative would provide immediate protection of human health by utilizing a new water supply.

The January 30th meeting will include presentations by DEC and EPA staff as well as by the engineers who prepared the reports upon which the proposed Remedial Action Plan is based. The presenters will welcome both comments and questions during the public meeting. Additionally, written comments will be accepted until February 5th. Following receipt of oral and written public comments a Responsiveness Summary will be prepared. That document will include evaluation of any new information and answer to any issues raised by public comments. If no major revisions in the selected remedial alternative, a record of decision could be issued in the spring and the process would move to the design and construction phase.

The administrative record which contains information on selection of the remedial plan is available for review at the Colesville Town Hall in Harpursville from 9-4 weekdays and from 9 until noon on Saturday. Additional technical documents, including the Remedial Investigation, the Feasibility Study, and the Proposed Plan are available at the DEC offices in Kirkwood. Written comments should be sent to:

Brian Davidson, Project Manager
Division of Hazardous Waste Remediation
NYS DEC
50 Wolf Road, Room 222
Albany, New York 12233-7010

For additional information contact Katie Lacey, Regional Citizen Participation Specialist, (315) 426-7400.

1/11/91

Dump-cleaning hearing planned

By DON SBARRA
Staff Writer

Cleaning some of the most contaminated property in Broome County is the scheduled topic of a public hearing Jan. 30.

State Department of Environmental Conservation officials are seeking public comment on a $5.14 million remediation plan for the county's old Colesville landfill. The 30-acre dump, operated by Broome County from 1969 until December 1984, is considered a hazardous waste site and is on the federal Superfund list.

County health officials first found chemical contamination in the drinking water of homes near the site about seven years ago, starting a process that prompted study after study, multimillion-dollar lawsuits, and a county buyout of several private homes.

Much of the pollution at the old dump was traced back to a period between 1973 and 1975, when the county legally buried thousands of drums of industrial waste from the former GAF Corp. plant in Binghamton. The burial was allowed at the time under the county's landfill permit from the DEC.

Kate Lacey, spokeswoman for the DEC's regional office in Syracuse, said the cleanup could begin this spring if no significant problems arise out

See HEARING/Page 2B

Hearing planned on Colesville dump —

Continued from Page 1B

of the hearing process. The DEC is accepting written comments on the remediation plan until Feb. 5, and will accept oral comments at a 7 p.m. hearing Jan. 30 in the second-floor auditorium of the county office building.

Lacey said GAF and the county will split the cost of the cleanup, and that 75 percent of the county's cost will be reimbursed through the state Environmental Quality Bond Act. That would leave the county paying about $535,000.

The old dump is along East Windsor Road, about a mile from Doraville and a short distance from the Susquehanna River.

The cleanup plan, selected from several proposals developed through a series of studies at the site, would include placing an impermeable cap over the dump to prevent rain and snow runoff from percolating through the waste and leaching into the ground water below, and installing a pumping and treatment mechanism that strips contaminants from the ground water. The plan would also include drilling new wells up gradient of the contaminated water field, with a distribution system connecting the affected homes near the site.

According to DEC projections, the installation is expected to take about 18 months, with treatment taking up to four years to return ground water quality to acceptable levels.

One of the homes closest to the dump belongs to Charles A. Scott, who has lived next to the landfill all of his 60 years and "long before the landfill came." Scott, who has been drinking bottled water supplied by the county for about six years, said Thursday he fears the remediation plan, especially the cap, will only make matters worse.

He said the dump was built over a creek-crossed piece of property fed by natural underground springs, and that capping it won't stop the contaminated water pouring out from underneath. He believes the cap would prevent the site from "breathing," creating downward pressure that would force chemicals into the ground water.

"It's an underground lake where they put that landfill; water came out from the hills long before they put it there, the woods are all swamp… They're not going to dry it up (with cap)," said Scott, a retired Delawar… & Hudson Railway Co. worker. "W… was here long before that landfill, an… we had nothing to say; the people i… town had the votes."

More than a dozen homeowners i… the area filed civil actions against th… county because of the damage th… contamination did to their propert… Several properties have been boug… by the county using a $500,000 fun… set aside by legislators.

Scott, who can see the old dum… from his front door, said he refuse… the county's $82,000 offer for the tw… parcels he owns partly because… "couldn't put a price" on proper… that has been in his family since t… 1930s, and partly because "yo… couldn't begin to replace it for that."

POOR QUALITY ORIGINAL

Reactions vary to Colesville dump plans

By EDIE LAU
Staff Writer

Plans to clean a hazardous waste dump in the Town of Colesville were described Wednesday as too limited, too ambitious and not researched enough.

The reactions came at a public meeting sponsored by the state Department of Environmental Conservation and the federal Environmental Protection Agency to discuss cleanup measures for the old Colesville landfill, a "superfund" site.

The 35-acre dump, owned by Broome County and operated from 1969 to 1984, is contaminated by a variety of industrial chemicals that have infiltrated groundwater, including water serving private wells in the area.

A $5.14 million remediation plan advocated by the DEC and EPA as well as the state Department of Health involves capping the landfill to prevent water from flowing through the waste and leaching into the aquifer below; pumping the spoiled water into a device called an air stripper to purify it; and drilling new wells to serve four affected residences near the dump.

The costs would be evenly split by the county and GAF Corp., which once had a plant in Binghamton and illegally disposed of waste chemicals in Colesville. Of Broome's share, 75 percent will be reimbursed through the 1986 state Environmental Quality Bond Act, said DEC spokeswoman Kate Lacey. She said she expects a decision on the plan within six weeks.

About 35 people attended Wednesday's meeting in the county office building.

Mary J. Clark, regional coordinator for Citizen Action of New York, a consumer and environmental advocacy group, applauded parts of the plan, but asked that the new water system be enlarged to serve residents of Doraville, southeast of the dump on East Windsor Road.

DEC Project Manager Brian Davidson said although the county has provided bottled water or a filtration system for a few Doraville residents — as well as people living

> **"We're not sure what's in here, what's still in there to be released."**
> — Michael O'Hara, Wehran Engineering

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Dump cleanup discussed

Continued from Page 1B . . .

nearer the landfill — tests have shown Doraville's water is unaffected.

Thomas O'Meara, chairman of the Broome County Environmental Management Council, questioned whether pumping and treating the water might fail to reduce contaminants to levels considered safe for drinking water.

Joel A. Singerman, acting chief of the EPA's New York and Caribbean superfund branch, acknowledged that no superfund cleanup efforts have yet restored an aquifer to drinking-water standards. "We're in the process of it. I don't think we've reached the point yet," he said.

Jon P. Link, vice president of Environmental Control Technologies in Sidney, asked whether anyone considered a future surge of contaminants after buried barrels rust apart. Michael W. O'Hara, senior engineer for the county's consultants, Wehran Engineering of Middletown, replied: "Good question. We're not sure what's in here, what's still in there to be released."

Documents detailing studies at the landfill are available for public review at the Colesville Town Hall in Harpursville and at the DEC office on Route 11 in Kirkwood.

POOR QUALITY ORIGINAL

APPENDIX D

Citizen Participation Plan
Colesville Landfill (I.D. No. 704010)

Section I Introduction to Plan

The New York State Department of Environmental Conservation is committed to a citizen participation program as a part of its responsibilities for the inactive hazardous waste site remedial program. Citizen participation promotes public understanding of the Department's responsibilities, planning activities, and remedial activities at inactive hazardous waste disposal sites. It provides an opportunity for the Department to learn from the public information that will enable the Department to develop a comprehensive remedial program which is protective of both public health and the environment.

Section II Basic Site Information and Project Description

The Colesville Landfill is a 35-acre former municipal landfill in the Town of Colesville, Broome County, just north of the hamlet of Doraville. Landfill operations at the Colesville site commenced in 1969 and continued until 1984. The site was used primarily for the disposal of municipal solid waste, although drummed industrial wastes from various sources were also disposed between 1973 and 1975.

In 1983, homeowner well samples collected in the vicinity of the landfill by the Broome County Health Department indicated contaminated groundwater in the immediate vicinity of the landfill. This prompted the Broome County Department of Public Works to perform two hydrogeologic investigations in 1983 and 1984.

Based on available information, the Colesville site was listed on the New York State Registry of Inactive Hazardous Waste Sites and subsequently was listed on the National Priority List (NPL). The listing of the site on the New York State Registry and the NPL requires that specific procedures be followed to thoroughly investigate and remediate the site. After considerable negotiations between GAF Corporation, Broome County, and the NYSDEC, agreement on a Consent Order and Work Plan for further investigation and remediation of the Colesville Landfill was reached. The Consent Order also allowed for up to 75 percent of Broome Counties costs for site remediation to be reimbursed by the State under Title 3 of the Environmental Quality Bond Act (EQBA), making this Consent Order the first of its kind in the State.

On February 4, 1987, two public hearings were held at the Broome County Office Building to present the Work Plan for the Remedial Investigation and Feasibility Study (RI/FS) to the public. In October 1987, field work for the remedial investigation began, and the RI Report was completed in September 1988. After the RI was completed, confirmatory sampling was performed, and a Confirmatory Sampling Report, completed in February 1990, essentially confirmed the findings in the RI Report. A Landfill Gas Evaluation Report, dated August 1990, presented the findings of a perimeter methane gas survey which indicated only very low levels of methane in area on the southwest side of the landfill.

Section III Identification of Affected and/or Interested Public

(Contact List - the contract list will be expanded as affected or interested public are identified)

Mr. Richard Rhodes
Supervisor
Town of Colesville
Box 27
Harpursville, New York 13787
607-693-1174

Citizens Action of New York
293 Chenango Street
Binghamton, New York
Attention: Ms. Mary Clark
607-723-0110

Mr. Charles Scott Sr.
RD #1 Box 197
Nineveh, New York 13813

Mr. Claude Scott Sr.
Box 98 RD #1
Nineveh, New York 13813

Mr. Charles R. Scott
Box 51A RD #2
Harpursville, New York 13787

Mrs. Janet Smith
Box 196 RD #1
Nineveh, New York 13813

Mr. Marvin Gaines
RD #1 Box 194
Nineveh, New York 13813

Mrs. Sandra LaVare
RD #1 Box 193
Nineveh, New York 13813

Harry and Mildred Jones
RD #2 Box 50
Harpursville, New York 13787

Mr. Larry T. Huggins
Box 201 RD #1
Nineveh, New York 13813

Rudolph and Ella DeFreitas
20 Stoneleight Avenue
Carmel, New York 10512

Anna Valerio Mastellone
42 Lakewood Avenue
Lake Ronkonkoma, New York 11779

Mrs. Marjorie Kitchen
79 Charles Street
Ashley, PA 18706

Gregory Bidwell
RD #2 Box 53 River Road
Harpursville, New York 13787

Elwood Lee
RD #1 Box 584
Afton, New York 13730

Albert J. Laplaca
10 Seth Lane
Hicksville, New York 11801

Gerda Doran
c/o Phoebe A. Brundin
5161 - 69th Avenue North
Pinellos Park, PA 34665

Harry Ray Scott
49 Main Street
Afton, New York 13730

Hon. Edward Mosher
Council Member
RD #2
Harpursville, New York 13787

Hon. Gary Rhodes
Council Member
RD #1, Box 186
Harpursville, New York 13787

Hon. Margaret Wicks
Council Member
RD #2, Box 305
Harpursville, New York 13787

Hon. E. Leon Smith
Council Member
RD #1, Box 35
Harpursville, New York 13787

Hon. James Malley
County Legislator
17 Third Street
Deposit, New York 13754

Senator Thomas Libous
NYS Senate
84 Court Street
Binghamton, New York 13901

Hon. James Tallon, Jr.
19 Chenango Street
Press Building, Room 404
Binghamton, New York 13901

COLESVILLE LANDFILL MEDIA LIST:

Media

WBNG - TV
Front Street
Binghamton, NY 13905

WICZ - TV
Vestal Parkway
Binghamton, NY 13903

WMGC - TV
Ingraham Rd.
Binghamton, NY 13903

WEBO - Radio
119 McMaster St.
Owego, NY 13827

WINR - Radio
Windy Hill
Binghamton, NY 13905

WSKG Radio
531 Gates Rd.
Vestal, NY 13850

WENE Radio
2721 E. Main
Endicott, NY 13760

Binghamton Press/Sun Bulletin
Vestal Parkway East
Binghamton, NY 13902-9982

Section IV   Identification of Department Contacts

NYSDEC Project Manager:

Brian H. Davidson
NYSD of Environmental Conservation
50 Wolf Road - Room 224
Albany, New York 12233-7010
518-457-1641

NYSDEC Regional Contact:

Scott Rodabaugh
NYSD of Environmental Conservation
RD #1 Route 11
Kirkwood, New York 13795
607-773-7763

NYSDEC Citizen Participation Specialist:

Susan Miller
NYSD of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204
315-426-7400

NYSDOH Contact:

Gary Robertson
NYSD of Health
677 South Salina Street
Syracuse, New York 13202
315-426-7612
Albany, New York 12203

County Health Department Contact:

Robert W. Denz
Director of Environmental Health
Broome County Department of Health
1 Wall Street
Binghamton, New York 13901
607-772-2887

NYSDEC Toll Free Information Phone:

1-800-342-9296

Section V   Identification of Document Repositories

New York State Department of
  Environmental Conservation
RD #1 Route 11
Kirkwood, New York   13795

Town Clerk
Town of Colesville
Box 27
Harpersville, New York   13787
607-693-1174

New York State Department of
  Environmental Conservation
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York   12233-7010

United States Environmental
 Protection Agency, Region II
Western New York Remedial Action Section
Room 29-102
26 Federal Plaza
New York, New York   10278

Section VI Description of Citizen Participation Activities

1. The Consent Order was described, the RI/FS process was explained, and the RI/FS Work Plan was presented to the public at two (2) public meetings on February 4, 1987.

2. When the RI/FS is completed a Public Notice of the Proposed Remedial Action Plan (PRAP) will be published. The Public Notice will include a description of the problems identified at the site, a description of and reasons for the selection of the proposed remedial action, identification of the document repository, identification of a contact person, and a announcement of public meeting.

3. The RI/FS report, preferred remedial action plan, and tentative schedules for design and construction will be presented at the public meeting. The public meeting will be held January 30, 1991 at the second floor Auditorium, Broome County Office Building, 44 Holly Street, Binghamton, New York at 7:00 pm. The PRAP will be available on January 6, 1991, and the public comment period will be from January 6, 1991 to February 5, 1991.

4. A Responsiveness Summary listing significant public comments received and demonstrating how these comments were taken into account will be written.

5. A Public Notice of the Final Remedial Plan selected will be published. The Public Notice will include a brief analysis of the remedial action selected, a discussion of any significant changes from the plan presented to the public at the Public Meeting, and a notice of availability of the Responsiveness Summary.

Definitions of Significant Elements and Terms of the Remedial Program

NOTE: The first eight definitions represent major elements of the remedial process. They are presented in the order in which they occur, rather than in alphabetical order, to provide a context to aid in their definition.

Site Placed on Registry of Inactive Hazardous Waste Sites - Each inactive site known or suspected of containing hazardous waste must be included in the Registry. Therefore, all sites which state or county environmental or public health agencies identify as known or suspected to have received hazardous waste should be listed in the Registry as they are identified. Whenever possible, the Department carries out an initial evaluation at the site before listing.

Phase I Site Investigation - Preliminary characterizations of hazardous substances present at a site; estimates pathways by which pollutants might be migrating away from the original site of disposal; identifies population or resources which might be affected by pollutants from a site; observes how the disposal area was used or operated; and gathers information regarding who might be responsible for wastes at a site. Involves a search of records from all agencies known to be involved with a site, interviews with site owners, employees and local residents to gather pertinent information about a site. Information gathered is summarized in a Phase I report.

After a Phase I investigation, DEC may choose to initiate an emergency response; to nominate the site for the National Priorities List; or, where additional information is needed to determine site significance, to conduct further (Phase II) investigation.

Phase II Site Investigation - Ordered by DEC when additional information is still needed after completion of Phase I to properly classify the site. A Phase II investigation is not sufficiently detailed to determine the full extent of the contamination, to evaluate remedial alternatives, or to prepare a conceptual design for construction. Information gathered is summarized in a Phase II report and is used to arrive at a final hazard ranking score and to classify the site.

Remedial Investigation (RI) - A process to determine the nature and extent of contamination by collecting data and analyzing the site. It includes sampling and monitoring, as necessary, and includes the gathering of sufficient information to determine the necessity for, and proposed extent of, a remedial program for the site.

Feasibility Study (FS) - A process for developing, evaluating and selecting remedial actions, using data gathered during the remedial investigation to: define the objectives of the remedial program for the site and broadly develop remedial action alternatives; perform an initial screening of these alternatives; and perform a detailed analysis of a limited number of alternatives which remain after the initial screening stage.

Remedial Design - Once a remedial action has been selected, technical drawings and specifications for remedial construction at a site are developed, as specified in the final RI/FS report. Design documents are used to bid and construct the chosen remedial actions. Remedial design is prepared by consulting engineers with experience in inactive hazardous waste disposal site remedial actions.

Construction - DEC selects contractors and supervises construction work to carry out the designed remedial alternative. Construction may be as straightforward as excavation of contaminated soil with disposal at a permitted hazardous waste facility. On the other hand, it may involve drum sampling and identification, complete encapsulation, leachate collection, storage and treatment, groundwater management, or other technologies. Construction costs may vary from several thousand dollars to many millions of dollars, depending on the size of the site, the soil, groundwater and other conditions, and the nature of the wastes.

Monitoring/Maintenance - Denotes post-closure activities to insure continued effectiveness of the remedial actions. Typical monitoring/maintenance activities include quarterly inspection by an engineering technician; measurement of level of water in monitoring wells; or collection of ground water and surface water samples and analysis for factors showing the condition of water, presence of toxic substances, or other indicators of possible pollution from the site. Monitoring/maintenance may be required indefinitely at many sites.

Consent Order - A legal and enforceable negotiated agreement between the Department and responsible parties where responsible parties agree to undertake investigation and cleanup or pay for the costs of investigation and cleanup work at a site. The order includes a description of the remedial actions to be undertaken at the site and a schedule for implementation.

Contract - A legal document signed by a contractor and the Department to carry out specific site remediation activities.

Contractor - A person or firm hired to furnish materials or perform services, especially in construction projects.

Delisting - Removal of a site from the state Registry based on study which shows the site does not contain hazardous wastes.

Potentially Responsible Party Lead Site - An inactive hazardous waste site at which those legally liable for the site have accepted responsibility for investigating problems at the site, and for developing and implementing the site's remedial program. PRP's include: those who owned the site during the time wastes were placed, current owners, past and present operators of the site, and those who generated the wastes placed at the site. Remedial programs developed and implemented by PRP's generally result from an enforcement action taken by the State and the costs of the remedial program are generally borne by the PRP.

Ranking System - The United States Environmental Protection Agency uses a hazard ranking system (HRS) to assign numerical scores to each inactive hazardous waste site. The scores express the relative risk or danger from the site.

Responsible Parties - Individuals, companies (e.g. site owners, operators, transporters or generators of hazardous waste) responsible for or contributing to the contamination problems at a hazardous waste site. PRP is a potentially responsible party.

Site Classification - The Department assigns sites to classifications established by state law, as follows:

o Classification 1 - A site causing or presenting an imminent danger of causing irreversible or irreparable damage to the public health or environment --immediate action required.

o Classification 2 - A site posing a significant threat to the public health or environment--action required.

o Classification 2a - A temporary classification for a site known or suspected to contain hazardous waste. Most likely the site will require a Phase I and Phase II investigation to obtain more information. Based on the results, the site then would be reclassified or removed from the state Registry if found not to contain hazardous wastes.

o Classification 3 - A site which has hazardous waste confirmed, but not a significant threat to the public health or environment--action may be deferred.

o Classification 4 - A site which has been properly closed--requires continued management.

o Classification 5 - A site which has been properly closed, with no evidence of present or potential adverse impact--no further action required.

State-Lead Site - An inactive hazardous waste site at which the Department has responsibility for investigating problems at the site and for developing and implementing the site's remedial program. The Department uses money available from the State Superfund and the Environmental Quality Bond Act of 1986 to pay for these activities. The Department has direct control and responsibility for the remedial program.

January 22, 1991

SAMPLE

[redacted]

Dear Mr. [redacted]

On January 30th local citizens will be updated on remedial plans for the Colesville Landfill which is a listed inactive hazardous waste site. I have included the press announcement which has been forwarded to the media in order to inform local residents of the meeting. As required by law, a complete legal notice appeared in the Binghamton Press and a copy of that notice is also enclosed.

The encouragement of public participation in decisions regarding inactive hazardous waste sites is an integral part of both the State and Federal programs to locate, investigate, and remediate hazardous waste sites. Staff from both the EPA and the DEC are available to answer questions by phone if you are unable to attend the January 30th meeting.

I would encourage you to attend the public meeting and to raise any questions or objectives you have regarding the studies or the chosen remedial alternative. A Responsiveness Summary will be prepared to answer any questions raised by the local community during this public review process. Most of the documents you might want to view are available at the Colesville Town Hall. Additional, more technical data may be reviewed at the DEC suboffice in Kirkwood. Scott Rodabaugh of the Kirkwood stff would be able to arrange for your access to this material (607-773-7763). If you have any questions or concerns you wish to raise prior to the meeting, you may contact me at our DEC regional headquarters in Syracuse (315-426-7400).

Sincerely yours,

Kate Lacey
Citizen Participation Specialist

KL:fn

Enclosures

APPENDIX E

STATE OF NEW YORK
COUNTY OF BROOME

- -

In the Matter of a
Public Meeting
Re: Colesville Landfill Site
NYSDEC Superfund
and
EPA Superfund

- -

A public meeting held in the above-entitled matter at Broome County Office Building, Second Floor, Binghamton, New York, on the 30th day of January, 1991, commencing at 7:00 PM.

REPORTED BY: CZERENDA COURT REPORTING
Binghamton - (607) 723-5820
- (800) 633-9149
RANDALL A. CZERENDA
Certified Shorthand Reporter

APPEARANCES: Brian Davidson, DEC
Robert Cozzy, DEC
Katie Lacey, DEC
Joel Singerman, EPA
Eduardo Gonzalez, EPA
Michael O'Hara, Wehran Engineering
Anthony Savino, Wehran Engineering

MS. LACEY: Okay, we might just as well get started here.

I am Kate Lacey. I'm the citizen participation specialist for the regional Department of Environmental Conservation office.

Before we get into the actual informational part of the meeting, there is a little bit of housekeeping that has to be taken care of for the legal record.

This is Randy Czerenda, who is taking the official transcript. For the purpose of the transcript, we need to have it in the record that this is a public meeting to receive comment on the Colesville landfill federal and state Superfund site, that it is the required meeting as part of the public review, public participation regulations, and that the meeting has been properly noticed in the local newspaper of the legal record on January 7 and on January 28. The legal notice appeared in the Binghamton newspaper announcing the public comment period, which began on January 7 and which will last until February 6, and this meeting is an integral part of that public review process.

End of housekeeping.

Now, so that you know who the people are that are going to be up here in front giving you some information first and then answering questions or receiving questions from you, the people on my left are from the State Department of Environmental Conservation. You have to get used to initials when you're dealing with government people.

The DEC is the state environmental group. The EPA are the federal environmental people. So, if you can just remember that these are the federal people, these are the state people.

On my far left is Brian Davidson, who is the project manager for the Colesville landfill site. He is the direct state person involved in oversite of the Colesville landfill.

Next to him is Robert Cozzy, who is the section chief for the Title III program. The Title III program, in case that term comes up again, is the funding program, the funding mechanism under which the state will be reimbursing the county for a portion of the clean-up expenses. And if there is a question about that later on, maybe anyway it will be a good idea to give some explanation of the way that works, the dollar involvement of the state.

On my right is Joel Singerman, who is the acting chief of the New York and Carribean Superfund branch for the EPA. Anyone who is in charge of New York and the Carribean and chooses to be in New York in January, I don't know as I would go with his judgment.

Eduardo Gonzalez is on the far right and he is the overseeing project manager for the federal EPA.

The people who are going to be doing the bulk of the presentation on the technical information are from Wehran Engineering. If you want to just stand up -- the bulk of the information will be presented by Michael O'Hara, who is the senior engineer with Wehran Engineering. And Anthony Savino is also with Wehran Engineering.

Seated over here in the front, we have a county representative David Donahue, who is with the commissioner of public works, who will be available to comment or answer questions as far as the county involvement is concerned.

We also have a representative from the New York State Department of Health, Gary Robertson, who is over there with his hand raised.

And the oversite of Superfund sites and of programs such as this are a joint responsibility, in this case of the federal and the state government, and of the Department of Health and the

Department of Environmental Conservation. So, the Department of Health does have a role in reviewing information, making sure that the health issues are properly dealt with in the course of the remediation process.

As you came in, I hope that you signed up on the back table. There is a sign-up list with a place for you to put a name and an address. If there is a need afterward to send out additional information, we would like to keep an updated mailing list of people who have an interest, either a direct or an indirect involvement with the Colesville site.

So, if you put your name and address on the sheet at the back, if there is additional information sent out or if there is any reason to contact people who have expressed an interest, we would like to have as accurate and up-to-date list as possible. So, if you didn't sign up on the way in, please do during the course of the meeting at some point do that.

Also on the back table were some blue sheets, which are fact sheets, particularly pertinent to this meeting because what we're going to be talking about mainly tonight is a remedial investigation feasibility study and the results of that work for the Colesville site. The blue sheet here will give you a pretty good description of exactly what a remedial investigation and a feasibility study, what they are so that -- I know sometimes the technical terms can get to be a bit confusing. And if you grab ahold of some of these, they do give you a little bit of a background to understand what some of the initials and the terms are that people are talking about.

I think with that, I will just point out that one of the requirements of the Superfund was -- is that there be a concerted effort to encourage citizen input, to inform the public and to allow the public and encourage the public to comment back both to bring additional information to the process and to comment on activities that take place, to criticize, to ask questions, to make us, in effect, accountable for the decisions that are made by asking questions at any point in the process.

We now are at the point of having a considerable amount of data on the Colesville site, and as you'll hear tonight, getting close to the point in the process where some significant decisions are made. So, it is important that the people of the immediate area and of the general area be aware of what's being done and involved in the decision itself.

Following this meeting, there will be until the 6th of February written comments received on the proposals that are going to be discussed here tonight. Those comments can be sent to the DEC office. There is an address -- a name and an address for forwarding any comments that you have or any additional questions that you have. Before any final determination is made on remediation, it will be necessary to have a responsiveness summary of the questions that are raised, will have to be dealt with, and that will occur in the time after the close of the public comment period.

I think with that, I will introduce the project manager, Brian Davidson, who is going to give a brief overview, a history of some of the activities that have taken place and try to get all of us up to speed on what has occurred over the course of the last several years in the process. Brian.

MR. DAVIDSON: Thank you, Kate. The Colesville landfill is a 113-acre parcel of property owned by Broome County. It's actually 35 acres of landfilled area. It is operated by

Broome County from 1969 to 1984. Other companies that contributed waste to the landfill were GAF Corporation and Tri-City Barrels and Malchak Salvage Corporation. Municipal waste was primarily what was disposed of at the landfill.

Between 1973 and 1975, drums of industrial waste were co-exposed with municipal solid waste. The industrial waste included hickories dyes, organic solvents and mixtures, mixed chemical solvents.

They were primarily disposed of in trenches, in approximately 468,000 cubic yards of material was disposed of in the trenches.

The landfill is in a rural area over large tracts of undeveloped woodlands, large agricultural tracts and scattered residential parcels.

In 1983, the Broome County Health Department sampled homeowner wells and they indicated -- the results indicated groundwater contamination in the immediate vicinity of the landfill. Broome County then provided bottled water to homeowner wells in the immediate vicinity of the landfill.

In 1984, the landfill gates were closed and then the county provided granulated activated carbon treatment with ultraviolet disinfection to eight homeowners at their request in the immediate vicinity of the landfill.

In 1983 and 1984, a two-phase hydrogeologic investigation was completed by Wehran. In 1985, the site was accepted to the national priority list.

On February 4, 1984, we held two public hearings out here in the Broome County offices to present a proposed work plan for the remedial investigation and feasibility study at the Colesville site, and in April of 1987, an order on consent was signed between Broome County, GAF and the Department of

Environmental Conservation which calls for the investigation and remediation of the landfill.

Under the terms of that agreement, Broome County is paying for 50 percent of the cost of the investigation and remediation, GAF Corporation is paying for 50 percent and the state is reimbursing Broome County 75 percent of their cost under the 1986 Environmental Quality Bond Act.

Remedial investigation was completed in September of 1988 and a confirmatory report was completed in February of 1990, which essentially confirmed the findings of the remedial investigation and provided additional data -- validated data. A methane gas study was completed in August of 1990 and in December 1990, the feasibility study was completed.

Mike, I think I'd like to turn it over to Mike O'Hara from Wehran Engineering to present the findings of the remedial investigation and the feasibility study.

MR. O'HARA: Thanks, Brian. Just to orient the site, first. This shows the location of the site. The shaded area is a 35-acre landfill site. It's located north of Doraville, east of -- Windsor Road runs nearby and there are several residential parcels, as Brian mentioned, in this area.

Just as some preliminary definitions, the remedial investigation that we're talking about is an investigation of the site so that we can define the occurrence of contamination, and the feasibility study is a study to look at alternatives to remediate the site or clean the site up. So, it's a two-phase type study. So, we can look at the slides.

First, I will go over the components of the remedial investigation so you can get an idea of what we've done over the years with these various phases. There were various phases done and what I'll do is summarize the results of all the phases.

Basically, we reviewed the available site history, the operations and the setting of the landfill. We looked at soil borings at 27 locations around the site, at various locations and depths to get a handle on the geology of the site, the definition of the different formations, their thickness. We also installed 27 groundwater monitoring wells to define the groundwater occurrence and movement.

We looked at groundwater levels and permeability testing of the aquifers. In total, we sampled 27 groundwater monitoring wells, four private wells in this area of the site, surface water and sedimented samples from the small streams that are located near the site.

There is a south stream and a north stream. There are discharges of leachate groundwater from the landfill to the streams, so we looked at the quality of the surface water and sediments in those streams.

We actually sampled three seep locations and the analyses that were performed were for volatile organic compounds and metals.

Based on that level of field work, we were able to come up with a hydrogeologic characterization, which basically gives us a picture of the movement of groundwater and surface water around the site, the contaminant assessment which tells us what contaminants are there, where they're located and where they might move. And we also looked -- made an assessment of any increase in risk to human health and the environment.

Based on those, we came up with some preliminary remedial action objectives or some definitions of how we could clean up the site.

In summarizing the major RI

conclusions, the hydrogeologic characterization, there are two aquifers in the project area. There is a shallow permeable glacial outwash aquifer zero to seventy feet beneath the refuse, and the direction of groundwater flow is south -- basically the groundwater flow direction is this way, flow to the Susquehanna River, and also there is a southwest component to the north stream. In other words, the groundwater comes up and surfaces at surface water in the north stream.

Another aquifer is the bedrock aquifer, which is beneath the upper aquifer, and that occurs at 85 to 310 feet below the refuse. And the direction of the flow in that aquifer is southwest to the Susquehanna River.

The major conclusions of the contaminant assessment, and I guess the first one is the most important, is that the landfill is currently releasing low levels -- and by that we mean part per billion range, of several volatile organic compounds to groundwater and streams at the site. Metals were detected, but did not fit any similar pattern of contamination and, therefore, we don't believe they're attributable to the site.

In the last few years, the extent of the contamination has been limited to the same area. Basically we have -- I pointed out the direction of the groundwater flow. What we see is a contaminant plume that is down gradient of the landfill in that direction of flow and it encompasses an area of approximately that large (indicating). We haven't seen any major movement of this plume over the several phases of sampling. And we have not really seen big increases in the levels of contaminants.

There has been significant contamination of a private well, which we would call the center of the plume, and that was one residential well. And there has been a trace of contamination of two other wells, which the levels have been consistent over time.

There was one bedrock private well, and that has not shown any contamination. And in conjunction with our five other monitoring wells that we haven't seen any bedrock contamination and can conclude the contamination is limited to the upper aquifer and has not moved vertically downward to the bedrock aquifer.

We also looked at potential impact on the Susquehanna River from this groundwater discharge, and based on some mathematical modeling, using concentrations here, we determined that there is no impact on the Susquehanna River. That was also confirmed with some sampling of surface water and sediments in the Susquehanna River.

There has been discharge to the north stream and the south stream and the contamination is limited to the exact areas where there has been discharge. And surface water contamination drops off significantly from that point basically.

We also looked at sediments at those points of discharge, and we find low levels of VOC contamination, volatile organic contamination. But, again, it's limited to those areas right where the discharge is to the surface water.

The seeps that do come from the landfill basically present an aesthetics problem and it's also a pathway for direct contact of humans with those discharges. And there has been no significant release of volatile organic compounds to the air or to the air pathway as a result of their disposal in the landfill.

So, basically, the contamination is essentially limited to discharges in the immediate area of the seeps and also the upper aquifer.

Now, based on this contaminant profile and where contaminants may be moving, we also did an assessment of human health and environmental health risk.

Basically, there are two human pathways based on the direction of groundwater flow and potential exposure. One is -- the largest one is consumption of groundwater from the shallow aquifer where the residents have wells that are screened in that shallow aquifer and where there has been contamination documented.

The other human pathway is direct contact with the surface water and sediments in the north and south stream where there has been contamination.

The secondary pathway is consumption of any game animals that are in this area which themselves have direct contact with the surface water or sediments.

We followed a US EPA guidance

procedure for determining any increased health risk and based -- just to outline the process, we selected indicator compounds based on their toxicity and we make an estimate of any increased risk of cancer based on these indicator compounds, possible exposure to the materials, body weights and estimated time of exposure. That estimated time of exposure we used, to be very conservative, as 70 years.

The conclusions from this exercise was that there were unacceptable human health risks from consumption of the untreated ground water from the shallow aquifer. The maximum contaminant levels, which are levels set by the New York State Department of Health, were exceeded for several of the volatile organic compounds.

As far as the other pathways, there is no unacceptable human health risk from direct contact with leachate seeps and sediments, and that's based on the very low levels of contamination that were in the surface water and sediment.

And also there is no unacceptable human health risk anticipated from the consumption of any game species that may have been in contact with these surface waters or sediments.

Up to now, I've described the investigation portion of the RI process. We have all the background data, we have put together contamination profile, we've looked at a base line risk.

Now, the next step is to look at a feasibility study where we want to determine what's the best way to remediate the site, to clean up the site, given those patterns of contamination, base line risk and also the requirements, regulatory requirements, advisories, guidance that we would have to meet to clean up the site.

Just to outline the feasibility study process, we summarized all the remedial investigation work, and then we defined remedial action objectives, which tell us which media and where media are groundwater, soil, surface water and sediments, need to be addressed.

We come up with general response actions, and they're very general: They can be treatment, containment of the site or removal of the source waste. We get into a technology screening where we look at the various technologies that are available to remove, in this case, the volatile organic compounds. We screen out those that aren't applicable. We develop alternatives and screen out the alternatives based on their effectiveness in meeting the regulatory requirements and their ability to be implemented. In other words, can this remedy actually be constructed at the site and would it meet the conditions normally required of permits?

After we narrow down the number of

alternatives we have, we look at those remaining and subject them to detailed analysis. And we use these basic -- these criteria to evaluate each alternative.

The protectiveness of human health and the environment is looking at what kind of risk reduction do we get from the base line risk in implementing a remedial alternative. We look at compliance with applicable requirements. For example, do we meet -- after implementing the alternative, do we meet the groundwater requirements? We look at long-term effectiveness. Once we institute the remediation and start to clean up the site, will this alternative provide a long-term effectiveness or will there be some reversability after some initial treatment?

We look at reduction of toxicity, mobility and volume of the contaminants. There is a preference for reducing the amount of contaminants on site and not simply containing them because we like to have a permanent remedy.

Short-term effectiveness, we look at whether or not there is any potential risk to the community during the construction period. If we're doing things to remediate the site that could have some short-term impacts during construction.

We look at implementability. Again, can the alternative actually be constructed and are there any administrative barriers to implementing the alternative?

We look at cost, we look at capital, operating and maintenance costs and we express the costs, the present value cost.

And the last two criteria are done after our technical analysis, basically the regulatory agency acceptance and what we're doing -- part of what we're doing tonight, the community acceptance.

Now, the major conclusions from the

feasibility study for the remedial action objectives, which is the starting point for looking at different alternatives. The objectives are to control the release of the volatile organic compounds from the landfill to the glacial outwash aquifer, or the shallow aquifer that is contaminated. We want to eliminate the leachate seeps from the landfill and any associated discharges to the streams.

Just cutting off those seeps should be adequate for the surface water and sediments. The levels of contamination in surface water and sediment were not high enough so that we had to look at actual remediation, possible removal of sediments. But cutting off the seeps will mitigate any further contamination of the sediments and surface water.

We want to eliminate the potential for direct human contact or animal contact with these seeps. And we also want to continue the existing homeowner well monitoring program that's been done by Broome County, along with a temporary water supply and filtration program to the affected residents down here until the remediation of the site is complete.

One thing that came out of the technology screening was, when we were looking at various techniques to treat the site, to remove the VOCs, was that treatment of the mass of the landfill itself, trying to treat the source by various methods such as bioremediation, chemical extraction of VOCs. And vacuum extraction of VOCs from the whole mass of the landfill was impractical because of the way materials were disposed in the landfill. The VOCs are contained in waste that was in drums disposed in the trenches and also co-disposed randomly through the site so we could not -- really it would not be practical to subject the whole mass of the waste and landfill to any treatment in situ because we have discrete pockets of contamination and we don't know where they are at this point. So, that was one conclusion that came out of the technology screening as far as techniques for treating the waste in place.

We developed a total of 14 alternatives to look at. A lot of these are variations -- some of these are variations on a similar alternative, just that they have different components to them.

But these are the general categories of alternatives. There is no action alternative, which we always have to include based on guidance for doing these studies. And we use that as a base line in which to compare any other remediation.

We determined that that was not effective in meeting the regulatory requirements because that would do nothing to meet our remedial action objective of dealing with the volatile organic compounds in the shallow aquifer. However, we continue this alternative through the process, even though we determine at this point it's not effective, again to use it as a base line alternative.

We came up with a couple of limited action alternatives, and these are basically continuing the existing water supply and filtration program, putting deed restrictions on future groundwater use so no one can go in there and start using this groundwater without anyone knowing and also the variation on that would be to supply water to the affected residents instead of using the existing filtration program.

And both of those alternatives we considered potentially applicable to look at in further detail.

We came up with a number of groundwater containment and treatment options. Basically, by implementing containment, what we would do is prevent the flow of groundwater from moving further. We wouldn't arrest the movement of this plume further down gradient in time by putting in interceptor wells, a ring of interceptor wells in the most contaminated area of the plume. And we had several variations on that which I'll get into in the next slide.

The next general type of alternative that we had was to actually go in and remove the waste, remove the source of the volatile organic compounds. The basic problem with that, the fatal flaw in those types of alternatives was that we have mixed refuse in here along with the drums and the co-disposed waste. We could have a lot of bulky material that, when we exhumed it, we would have contaminated bulky waste which we would have to decontaminate, stage in different areas and either dispose of it or decontaminate it and leave it at the landfill site. Essentially, it becomes a very extensive materials handling problem. And because of the inclusion of the bulky waste in the landfill, those types of alternatives were not considered practical.

The things that we had considered along with the removal were incineration of all the waste, chemical treatment of all the waste. But, again, it wasn't the treatment, it was the material handling problem that really made those types of alternatives impractical.

So, after screening all of those alternatives, we came down to basically nine alternatives that we looked at in detail. And I'll just describe in a little detail what each of these is.

The no-action alternative, again, is basically not doing anything at the site. It's a base line alternative. But what we would do is we would monitor the groundwater to determine if there was any movement of this plume. This sort of would be an analytical program where we would monitor groundwater basically quarterly and for VOCs.

The limited action, first limited action one we have here, we would again have that same monitoring program, we would restrict groundwater usage at the site and we would use the existing water supply and filtration program.

This basically would be protective of human health because no one would be ingesting the groundwater, the filtration -- supplied water would be still in effect. And no one would be using groundwater inadvertently there.

The variation on that is limited action B where we would restrict the groundwater use and, instead of continuing the existing water supply and filtration program, we would develop a new water source, upgrading of the site and supply water to the affected residents.

As far as the containment alternatives, what we would do to contain groundwater would be downgrading of the site, we would intercept the contaminated groundwater with a series of pumping wells, and conceptually we had basically ten wells pumping 10 gallons per minute, a total of 100 gallons per minute. That would be collected. This would -- any ground -- contaminated groundwater flowing from the landfill would be intercepted and removed from the groundwater and we would also reverse the gradient for contamination that has gotten further down gradient, we would reverse that gradient and start to pick up that contamination and remove it from the aquifer.

We would collect that groundwater and the technique for treating that would be air stripping, which would strip these volatile organic compounds from the groundwater. We might have to look at metal precipitation because of the natural high levels of iron and manganese in this groundwater. And also before discharge to the area of the volatile organic compounds, we may need to use a catalytic incinerator or catalytic convert to destroy those. We couldn't simply emit those to the atmosphere.

Those issues on the treatment will be decided in the detailed design phase where we actually look at the amounts of metals coming into the system and the amounts of volatile organics being emitted as they're stripped.

The other aspect of the down grading pumping, to reduce the amount of groundwater that goes through the site and picks up contaminants in the site is to cap the site, is to cut off the infiltration of rain water through the site. And here we would use a multi-layered cap that would meet New York State solid waste regulations for caps. And that is a component of all the remaining alternatives that we have there.

A variation of the pumping would be to accelerate that pumping by not only pumping down gradient of the site but to pump also within the landfill. We looked at placing two pumping wells within the landfill, and that would accelerate the removal of contaminated groundwater from the landfill. And again, we have variations just with the -- using the existing water supply and coming in with a new water supply.

Another variation of containment was to put in a cut-off wall to actually physically cut off the flow of groundwater down gradient and here we would use what's called slurry wall. We would trench around the site and backfill the trench with a soil and vermiculate fixture which would provide a physical barrier to groundwater flow. And then we could pump outside the wall and also we could pump inside the wall. It's just a variation we looked at to see if that would speed up the remediation.

As far as evaluating these alternatives, some of the features are that we used a mathematical model to simulate the contaminant transport or the movement of the contaminants under these different scenarios. Where I said we had ten wells pumping at ten gallons per minute, we used a model to predict how long it would take to reach the required groundwater concentrations using those pumping wells. And we also recalculated from the base line risk. We also recalculated the reduction in risk after implementing these alternatives. In other words, as the contaminant levels decreased under the pumping, we looked at the risk that would remain at the receptor areas or the residential areas with time.

This table also, the columns basically give you a good idea of the relative effectiveness of each alternative. But we have cost and time to implement the alternative, which would consist of designing the alternative and then constructing it and starting it up.

And also the estimated time to meet the groundwater concentration limits. You see an acronym there, ARARS. I'll just say that what it stands for in this case, basically is meeting the maximum contaminant levels for VOCs in groundwater as set by the New York State Department of Health.

As you can see, the no-action alternative, which is just the monitoring, is the least expensive alternative. We could implement it right now because the monitoring wells are out there.

However, if we were to just rely on natural flushing of the landfill, our modeling predicts that it would take greater than twenty years to ever reach the maximum contaminant levels that are allowed down gradient.

With the limited action, again, there are two alternatives, one using the existing water supply and one with the new water supply. Those could be implemented in six months to a year. However, again, while it is protective of human health, no one is drinking contaminated groundwater. To meet the levels that we want to get to to remediate the groundwater, again, relies on natural flushing and natural recovery of the aquifer, and we predict that that would take, again, greater than twenty years.

The down gradient pumping is basically the ten wells and groundwater treatment and discharge of the treated groundwater to the Susquehanna River. The present value cost of that is $650,000. Take approximately -- sorry. I'm reading the wrong one there. That's a little over five and a half million dollars. It will take approximately a year and a half to design and construct. And based on our modeling, it would take eight years to meet the groundwater requirements in this area.

If we accelerated the pumping by having the down gradient pumping and pumping in the landfill, we would meet the groundwater requirements in approximately four years. Of course, the models are approximate. These are not exact times. But it gives us an idea that we're talking in the order of years for us to meet the clean-up criteria in the groundwater.

When we looked at putting in the cutoff wall, we actually ended up predicting that it would take longer than twenty years to meet the groundwater requirements because putting in the cutoff wall limited the rates that we could pump at outside and inside the wall. And, therefore, it did not accelerate the pumping rates and removal of contaminants. So, as far as containment, that was actually the worst one.

So, basically, there was more to the detailed analysis than these columns, but it's a basic summary and gives you the basic idea of the relative trade-offs of each alternative. This is basically where our study concluded.

So, I think Brian wants to discuss the alternatives more.

MR. DAVIDSON: Thanks, Mike. Based on the detailed analysis and the feasibility study, the New York State Department of Health, EPA and the DEC independently arrived at the same conclusion that alternative 4C-2 was the preferred alternative. Alternative 4C-2 consists of the landfill cap, pumping wells at and down gradient of the landfill, air stripping at the groundwater, discharge of the treated groundwater to the north stream or the Susquehanna River and construction of new water supply. It has it all.

It's important to note that the remedy -- that 4C-2 is the preferred remedy for this site. The final selection will be documented only after the record of decision, which is referred to as the ROD, only after consideration of all comments on any of the remedial alternatives addressed in the proposed plan or the remedial investigation and feasibility study. Written comments and any oral comments will be documented in the responsiveness summary section of the record of decision, which is the document which formalizes the selection of the remedy. Kate?

MS. LACEY: All right. Before we get down to questions that you may wish to raise, or statements that you may wish to make, I'd point out that the documents that have been produced as a result of the investigation that's taken place are available for your review at the town hall. Also, the major documents are at the Kirkwood DEC suboffice which may be as convenient for some of you. Also at the DEC office in Albany and the EPA regional office in New York City, if those are convenient for you.

Almost the entire file is at the Kirkwood office. All of the documents are at the -- all of the studies and the back-up documentation are available in the town hall.

On the back table, along with the blue sheets which describe a couple of the technical terms that you hear thrown around a lot, remedial investigation, feasibility study, also in the back of the room is a stack of copies of a PRAP, P-R-A-P, which is a proposed remedial action plan. This is a description of the alternatives and the process for determining which of those alternatives is at this point preferred. Any of you who haven't picked up copies of this, it gives a more detailed description of each of the alternatives that were described by Mr. O'Hara and the one that was selected as described by Brian Davidson.

At this point, any of you who have questions or statements, you're more than welcome to make them. Also, keep in mind that written comments can be forwarded between now and February 6 to Brian Davidson and his address and the way to get in touch with him to properly get those comments in is on the bottom of the PRAP. And also, I'm sure if you approached him, he would give you an address so you can make sure that he gets the material.

If you have any questions or if you have any comments that you wish to make, the only thing I would ask is that you identify yourself clearly and with a general address, if you're from the town, just a general address. You don't have to go into great detail. But we would like the stenographer to get an accurate name and identification of the people who are making comments.

MS. CLARK: My name is Mary Clark. I'm with Citizen Action of New York. I've worked for a number of years with many of the residents who are living in the Doraville area and around the site.

I have a number of questions and concerns that maybe you can answer and comment.

First, in terms of the surface water and the streams, we've written the DEC, and a number of things, back in 1985, of pointing out some real discrepancies with the Wehran report which left out a number of creeks, one that flows directly from the landfill. Is that on your map? I believe you said that it is. I'm not sure if -- from your pointing, that you referred to the south stream. Could you explain to me where you see the south stream?

MR. O'HARA: Here is the north

stream and the south stream and there are also some seeps along this part of the landfill.

MS. CLARK: Because some of the concerns with, particularly the Doraville residents, are at different times of the year that maybe aren't visible in the summer and the spring is that there are actually streams that come out of the seep area on what you would refer to as, I believe, what it looks -- right there.

MR. O'HARA: This area?

MS. CLARK: Right in that area. There is a main stream that comes out of that and the landfill, there is a stream that comes out where you referred to as the south stream. That leads one to -- that comes all the way down and connects to the thing that goes -- the stream that goes by the Doraville area. It comes all the way down.

MR. O'HARA: All the way down.

MS. CLARK: And there is also the

stream that comes out of the main seep area that isn't identified. That leads people to be very concerned, particularly in the Doraville area, that you're indicating that everything is going in a south, southwest manner when we actually have surface streams that are coming out of the other ends that come down towards the Doraville side. And that's very disturbing to people and leads one to question some of the accuracies in terms of the report.

MR. O'HARA: Okay. What we did was we sampled the streams that we saw in this area.

MS. CLARK: They're not visible all year round. I mean, clearly in the spring and the fall, they're very, very visible. These streams are -- particularly the one to the right, our right there, is actually quite a large stream in the fall and in the spring with the other one, it really dries up in the summer. And that's some of the concerns in terms of how this testing occurred, did it occur for all of these things, throughout like -- all different seasons, through all different years. That's, you know, when it was dry, when it was, you know, extremely, you know, wet, a lot of precipitation, things like that.

MR. O'HARA: Okay. We sampled streams where we saw them here and the outbreaks where we saw them. And we also looked at the results.

As I mentioned, the levels of contaminants in the surface water and the sediments were basically restricted to the area where the seep was coming out.

MS. CLARK: So, you did not sample the streams that you did not see, then, the ones that we're talking about because they do exist. I mean it's very obvious in the spring and the fall and that's some of the concerns in terms of the accuracy of this report.

MR. O'HARA: Based on the levels that we saw, I guess if we had seen higher levels here, we would have expanded -- we would have looked further. But, based on the levels that we saw, which are closest to the landfill which would be the highest.

MS. CLARK: The one stream comes directly out of the landfill. And I guess that leads one to be concerned about -- and particularly with the concept of capping, not that people are necessarily against it. But there is also concerns that there are springs that flow and percolate up which a capping does not necessarily, you know --

MR. O'HARA: In conjunction with the cap, we will have the groundwater pumping, which will cause any springs -- cause the water levels in the landfill to go down. So, we --

MS. CLARK: And where would the pumping be with this one proposal?

MR. O'HARA: Basically in this area just down gradient of the landfill. And also two wells approximately here in this portion of the landfill.

THE COURT: Where would your monitoring wells be?

MR. O'HARA: We would use the existing monitoring well systems here to monitor the effect.

MS. CLARK: Okay. The concern is particularly in the Doraville residence area because we've neglected to actually sample the streams that do exist at certain times of the year is for there to be monitoring wells down in the Doraville area. That's critically important.

MR. O'HARA: There are monitoring wells that go all the way down to Doraville.

MS. CLARK: Will they continue to be monitored? That's the question.

MR. O'HARA: No. We looked at these in the past and basically have not found contamination.

MS. CLARK: The concern is once we start capping, pumping different things with the residents that there could be, without monitoring of these -- of this whole area, that things could change and, like the other things haven't really been looked at, that we would really prefer that the monitoring of the wells on that side heading, you know, and protecting of the Doraville residents still be maintained.

MR. O'HARA: Basically with the cap and the groundwater pumping, we will be forcing any groundwater to move in this direction much more strongly than is going right now. This is the direction of the groundwater flow now, south to southwest. But when we put the groundwater containment system in, we will design the pumping rate so that we're able to really reverse -- not reverse, but more strongly get groundwater to go in this direction.

And that should alleviate any concern about groundwater flow.

MS. CLARK: What would be the problem with continuing to monitor those wells or some of those wells facing that area in terms of protecting a number of citizens -- a larger number of people who live in that area in addition to those who live in the other?

MR. DAVIDSON: Excuse me, Mike. They will be. As part of -- after the construction is complete, there is an operation and maintenance plan referred to as O&M. Part of the O&M will be selecting monitor wells to monitor long term and perhaps on a quarterly basis. That will be decided in part of the design which wells will be monitored where, how often and for what parameters. So, there will be long-term monitoring. I think that's what you're driving at. And the wells that are between the landfill and Doraville will certainly be included.

MS. CLARK: Okay.

MR. DAVIDSON: There will either be new wells installed or we will utilize monitoring wells that were installed as part of the remedial investigation.

MS. CLARK: That's the assurance I think people want to see that there are monitoring --

MR. DAVIDSON: Absolutely. That's part of every remedial program.

MS. CLARK: The additional question I have is, looking at the water system, when we refer to creating a new water system, which I think is -- you know, I commend that choice rather than keeping with the existing system because currently there is serious problems with break down of the filter system, not being reimbursed for the cost of the electricity or extreme delays in terms of reimbursement for people. Some people have actually even given up the filter system and are just not dealing with it and dealing with the contaminated water.

What area of the residents are you looking for the new water system or will that also include the area in Doraville?

MR. O'HARA: Basically, we've talked about a new water supply on the conceptual level. Basically we're talking about supplying the residents in this area and not going down to Doraville. Again, the contamination has not been detected.

MS. CLARK: Although in Doraville, two residents are on bottled water. There is also -- the LeVare residence also has a water system put in by the county, a filter system put in by the county. Indeed at some point, there has been some contamination to warrant that action in the past and the concern is that these residents be included as well.

MR. O'HARA: I guess that would be considered in the design of the water supply system.

MR. DAVIDSON: The water supply system is anticipated to take in three, or actually now two, since the county has purchased one property, the two residences that have been impacted by the landfill. The LeVare residence or residences in Doraville may have been provided treatment by the county, but there is no evidence in any of the sampling data that any of the residences in Doraville have been impacted by the landfill.

So, there may -- you know, this system will hopefully be sized such that it could be expanded to some degree, but it's not the intent of this remedial program to provide municipal water supply to everyone in the area. We're looking to remediate the site and to provide a new water supply to the residents that have been impacted by the landfill.

MS. CLARK: The concern is that obviously there was some past history and some warranting of providing this costly thing to the county to put in these filter systems, to provide bottled water and there is also some concerns in a number of reports throughout -- throughout the years that this has been going on. Any time there has been any kind of level that has been unacceptable or beyond the standards, there has been a statement that says laboratory contamination. And that's been consistent rather than saying that, gee, there may be something here. It's always been basically brushed aside as if there is laboratory contamination.

And some of the residents there and Betty Springfield, whose daughter just actually died of cancer this last week, who is 42 years old, could not make it here. She has had private well testing that indicates different levels than the levels that were indicated by the county testing.

And so there is real concern of

residents in that area that things, particularly when streams aren't indicated, aren't even tested, that there may be some real contamination there. There has been in the past. It's been just removed as we'll just write that off as laboratory contamination, that there is real issues and real concerns of the drinking water in the Doraville residents and they would like to be included in terms of the new water supply as well.

Because it seems almost absurd in terms of putting in a whole new water system to provide things for three families when, less than a quarter mile down the road, there is another ten families that can benefit by that, whether you want to admit or not or whatever the situation may be in terms of just their peace of mind to include them and incorporate them on the water system as well.

MR. DAVIDSON: Well, I think, you

know, we have to go on the evidence we have.

First of all, with respect to your first comments on the streams not being included, the first two-phase hydrogeologic studies done by Wehran in 1983 and 1984, there was a sketch map in there that did not include all of the south stream. And that was noted by one of the residents. It was also noted in our review and it was, in fact, correct, that stream wasn't on there. It was included in the subsequent remedial investigations.

That stream has been sampled continually at various locations along that stream. I have more, perhaps, peace of mind that that stream is cleaner than others because I personally took one of the samples. I mean, I can show you the analytical results if you really wanted to see them about midway in that fielc in the south stream.

Wehran Engineering also took samples

repeatedly throughout that south stream and along the seeps on the south edge of the landfill. And that, combined with a number of cluster wells that we have, deep, shallow and intermedial depth monitoring wells, repeated sampling indicating the limits of the plume do not extend beyond the south stream.

We're fairly certain of that. I think all studies that have been done on this landfill, incidentally, have come to the same conclusion that the boundary of any possible influence of that plume is that south stream. Once you get beyond the south stream, you're in a different drainage basin. You're still in the Susquehanna River drainage basin, but you're beyond the limits of the influence or the possible influence of the landfill.

MS. CLARK: That's how the stream goes.

MR. DAVIDSON: Excuse me. The county may have provided -- well, I believe eight residences out there with filters and UV systems. That -- at their request. In other words, if a resident lived out there and requested -- they were near the landfill. Whether or not their well was impacted down gradient, up gradient, the county responded by providing treatment estimates. That doesn't necessarily mean their well was contaminated, or if it did have some contamination, that was in any way related to the landfill. That was the purpose -- one of the main purposes of the remedial investigation is to very clearly bear out where the extent of the contamination that was related to the landfill was.

I know that, for example, it's not uncommon to see, and I don't remember specifically which residents, but in one case, they had extremely high lead levels in one of the samples, I believe taken by the Broome County Health Department, and it was just after their system was installed. I believe they had a Culligan system that was installed backwards. It was probably -- or could have been due to the soldering -- lead solder being used on the pipes.

In any case, in the landfill, we have been using volatile organics to monitor groundwater contamination because they migrate much faster than anything. And we look for certain organics as a fingerprint along with groundwater contour maps. And that hasn't shown up in Doraville.

MR. O'MARA: My name is Tom O'Mara. I'm with the Broome County Environmental Management Council. Just a series of questions based on the hydraulics and some environmental -- the environmental assessment and the management applications to this study.

First, was the vertical profiles that are in the reports. They seem to lead the reader to believe that there is a continuous till layer below the refuse, is that correct?

MR. O'HARA: No. There are areas where the refuse is in direct contact with the glacial outwash aquifer.

MR. O'MARA: Secondly, also in the reports, it states that the refuse -- the entire refuse area is below the groundwater table. Is that accurate? Or is above the groundwater level.

MR. O'HARA: Yes.

MR. O'MARA: Is there a water table in the till area, that's in the refuse area?

MR. O'HARA: No. The two aquifers that were identified were the glacial outwash and the bedrock.

MR. O'MARA: So, somehow that till is draining into the outwash, is that accurate?

MR. O'HARA: Well, no, we believe that we're getting the contamination to the glacial outwash where there is no till. In other words, where the refuse is in contact with the glacial outwash.

MR. O'MARA: The till is a very impermeable layer. Therefore, the water is running off the site as opposed to percolating down, is that what you're saying?

MR. O'HARA: Right. The till layer is not saturated.

MR. O'MARA: The groundwater under this site and the seeps, what is the relationship there? Is this a discharge for the glacial outwash? Is that what's causing the seeps or is this a run off of the till?

MR. O'HARA: The seeps, we believe, are discharge of leachate from the landfill. So, it would be discharge from the till.

MR. O'MARA: From the till?

MR. O'HARA: Not from the till. But from the landfill and the flow would be over the till.

MR. O'MARA: It's not an outcropping of the glacial outwash then?

MR. O'HARA: I don't believe so,

no.

MR. O'MARA: There is a silt clay layer under the glacial outwash. Is that continuous? And if so, is that act being as a confining layer to migration moving downward?

MR. O'HARA: Yes. That is continuous. And that is probably why we're not seeing migration vertically to the bedrock.

MR. O'MARA: Also, the interpretation of the hydrology, it appears that there is a downward vertical gradient. Is that accurate?

MR. O'HARA: Yes.

MR. O'MARA: From an environmental perspective, was there any modeling done, looking at the loading to the two creeks or to the Susquehanna?

MR. O'HARA: Yes, there was. That's why we measured the flow in the north stream to see what kind of discharge there was of groundwater to the north stream.

MR. O'MARA: So, from a modeling standpoint, it is insignificant, the discharge to those water bodies, from an environmental standpoint?

MR. O'HARA: To the north stream, yes.

MR. O'MARA: And to the Susquehanna?

MR. O'HARA: We also looked at the discharge there. And we determined, based on the initial concentrations back at the landfill, that the discharge to the Susquehanna of contaminants would be negligible I believe.

MR. O'MARA: From a management perspective, who would be operating -- this is open to the panel as well -- who would be operating the groundwater pump and treat systems once a remediation action has taken place? Would that be the county's responsibility, the DEC as the lead agency? Who would be there for the routine maintenance, filter changes or whatever?

MR. COZZY: It would basically be between the county and GAF. Our agreement with the county is that they will take responsibility for O&M. I don't know what their arrangement is with GAF. Basically from our perspective, it's the county's responsibility.

MR. O'MARA: In looking at the economic analysis, how come inflation wasn't included as a factor? How come there was no inflation rate put into the O&M charges?

MR. O'HARA: Well, that's correct. We didn't use inflation and we didn't use that through all the alternatives. So, it's still valid as a comparative.

THE COURT: Would that be biased if you were looking at a long-term treatment operation where, if you did not include maintenance for the O&M, the O&M charges could sort of skew the results for the net present value analysis?

MR. O'HARA: Well, we could go back and do the costing, including inflation, but we didn't do it in this particular case.

MR. SILVERMAN: Also it's a plus or minus 15 percent accuracy in this study. It's not a ballpark process.

MR. O'MARA: It's just for the county, should the groundwater not be below the MCL after four years, the county is stuck with this albatross and this pumping system, which I'm sure the DEC is not going to allow them to turn off if the groundwater does not meet the MCL. That could be a significant issue with the O&M charges associated with this remedial action. That's all of my questions.

MS. LACEY: Okay. Anybody else?

MS. CLARK: I have a question about the air stripping. That was a question people had. You made some reference to -- in regard to like the heavy metals and things. The air stripping would not work for that -- or could you explain the air stripping process and what alternative, if that would not alleviate that and how it would affect cost?

MR. O'HARA: Basically, we can use the air stripping to remove the volatile organic compounds for the site. What I was referring to is possible interference with the metals concentrations. There are high natural iron and manganese concentrations there and that would tend to foul the air strip.

In that case, what we would do is simply precipitate the metals out ahead of the air strip to take care of that problem. Or if the levels were intermediate levels, we could use a sequestering agent to prevent the metals from -- it would keep the metals in solution as it went through the air strip so it wouldn't foul the medium.

Basically what you're doing is running the groundwater -- you're running the groundwater through a tower, you're pumping it up to the top of the tower where it's filled with some plastic-type media, and you're forcing air upward through it. And that strips the volatile organic compounds from the groundwater. And then you have discharge downward and that's what would be sent to the Susquehanna or north stream.

With those rings or plastic medium, if you have metals, they could precipitate on to the medium and reduce the efficiency of the stripping of the volatile organics. And so, if the levels are high enough, you would simply remove the metals or keep them in solution as it went through the tower.

There are techniques to deal with that.

In other words, we wouldn't have a situation where we couldn't deal with that and we would have to go to another removal technique.

MR. O'MARA: In terms of the water system for the residents as they are preparing, would they ever have to pay for their water? I think that's a guarantee people would like to see with the new water system, that it will never be created a situation where they'll have to actually pay for the actual water system.

MR. COZZY: If there is any way for us to guarantee, I don't know if we can do it administratively. We'll get an answer in the responsive summary.

MR. O'MARA: And we'd like to register the comment that we would like the system to be expanded.

MS. LACEY: Way in the back.

MR. O'MARA: My name is John Link from Binghamton. My question is about the modeling that you used to come up with, how long it might take to get under the maximum limits for VOCs in the water. Do you have a handle on the total amount that are in that landfill?

And secondly, are you assuming that you've got a consistent percentage that leeches out? I mean, one of the concerns that Tom brought up, the cost of possibly pumping this ad infinitum, if you have barrels in that with this compound, I assume at the time these barrels would rust through. It would create an influx of these chemicals into the water again. Are these things taken into account or do you have a standard deviation how long it might take to get these levels down?

MR. O'HARA: Basically, that is a good question. We don't -- we're not sure what has been and what's still in here that needs to be released in the future. Basically, the reason we were applying the model is that over the different sampling periods, we really haven't seen much difference in the levels of contaminants. Basically, we went from that, I guess, assumption.

MR. O'MARA: This assumption is

based on four to five years or so that you have looked at it. You're saying that the mental picture is a sponge that's letting this stuff out as the water is going through it. You're basing that consistency of release on four or five years, am I correct?

MR. O'HARA: Well, basically, what we did is we picked the wells, we picked the pumping rate. Based on modeling, we determined how many years it would take to get down to the MCL levels at the receptors.

MR. O'MARA: And that's assuming -- I guess I still don't have a good, clear concept on it. It's coming out at a fixed rate. And you're pumping at a fixed rate. I can see at a certain point in time where the rate of pumping overcomes the rate coming out and so the levels are now below, but it's still coming out, isn't it, leaching out of the landfill. I know it's slower, but .....

MR. O'HARA: Basically, we have a data point in the landfill. We have one well and that gives us the source of concentration. That was the initial concentration used in the model. And based on the dilution, we come out with lower concentrations out here. So, that was -- this concentration that we have data for here was assumed as the initial condition.

MR. O'MARA: There isn't -- is there any factor in this model that takes into account the possibility that perhaps 155-gallon drums with trichloroethylene in it that is sitting in there and no one knows about it, and at some point in time, 10 years or 15 years, they finally give up and start releasing all of that? You have no idea?

MR. O'HARA: We're limited in that point.

MR. O'MARA: Right.

MR. O'HARA: If we don't know

something is in here, we can't take that into account. We did attempt to find out where there were areas where drums were located. We used the geophysical techniques. And that really was not successful in determining clusters of drums or pockets like that.

MR. O'MARA: And I understand that that is very limited as to what went into the landfill. That's why Tom's question particularly distresses me to think about if we put all this money in and do this and the landfill will start bleeding again and we'll be in the same boat that we're in right now.

MR. O'HARA: Well, that will be dealt with in terms of impact by continuing to monitor. We're not saying that after four years, this is going to shut off. The operation is based on monitoring to prove that --

MR. O'MARA: So, the model says this is what's there, this is what we think is there. This is how long it's going to take to release the concentrations. You don't know anything about what else might show up, which is a big question.

MR. O'HARA: We don't know exactly what might show up, that's correct.

MR. O'MARA: The bedrock aquifer that is -- you use the term aquifer. I'm assuming that that means that that has the capacity to be utilized at a future date, that has the groundwater flow velocities to be utilized as an aquifer, is that correct?

MR. O'HARA: Yes.

MR. O'MARA: And what would be the -- were two alternatives selected and screened out, one being to utilize the deeper aquifer as a drinking water source at the site? I mean at the down gradient locations if it is not contaminated?

MR. O'HARA: Basically, we stayed away from that because we were concerned about carrying contamination from the upper aquifer down to the lower aquifer during that well installation. So, that's why we were considering more of a sand and gravel well out towards the Susquehanna River. At this point, that's conceptually where we think that would be located. And the exact location of that would be decided in the detail design.

MR. O'MARA: I guess I'm -- has the EPA in any of the Superfund sites remediated a drinking water aquifer to drinking water standards?

MR. SILVERMAN: We're in the process of it. I don't know if any action has been completed where we actually reached drinking water standard.

MR. O'MARA: There is a lot of information that's coming out that it may be impossible to pump an aquifer long enough to ever clean it to drinking water standards. And I'm wondering if, since we're providing private water source anyway, are we just pouring more money down the drain by trying to remediate something that might not ever be remediated?

MR. SINGERMAN: We're providing water because the people's wells are impacted. So, we're providing alternate water supply. The site itself, we're under an obligation to try to contain the source and prevent further degradation of the groundwater and the leachate seeps and whatever. So, we're attempting to contain the site so that a further degradation of the environment doesn't occur.

MR. O'MARA: So, the alternative of capping and providing a private drinking water source was not evaluated because you felt it did not satisfy the ARARs, is that accurate?

MR. SINGERMAN: They're being violated. If you have groundwater that exceeds the state and federal standards, it's being violated. If the groundwater is impacted and it exceeds the ARAR, we have to address the problem. And the remedy we're proposing will accommodate that. We're trying to eliminate the source.

MS. LACEY: The purpose of the Superfund program is the reclamation of the resource itself as a resource, not just because people are drinking it, just because it is a groundwater source.

MR. O'MARA: As a nation, shouldn't we be looking at whether this policy is effective and if these aquifers are not being remediated, aren't we just spending money?

MR. SINGERMAN: The leachate is entering -- the contamination is entering the groundwater. The groundwater is being contaminated. That's a resource. Granted we may never reach the levels we're attempting to reach, but at least we're doing some good. We're attempting to clean up the aquifer. I mean just to leave it as it is now, we'll never clean it up that way. It's going to take perhaps 20 years to degrade by itself.

MR. O'HARA: In this case, where the limits of the plume are basically in this area, we don't try to contain the plume, it will move. That's what Joel is getting at, that we're trying to contain and reverse the flow and also remove the contaminants. We will remove a large mass of contaminants through pumping.

MS. LACEY: Here in the middle. Sir?

MR. ROSE: I'm Richard Rose, Supervisor for the Town of Colesville. We are concerned if we are going to be involved in this procedure or not in any way in the cost of or responsibility.

MR. DAVIDSON: No.

MS. LACEY: The party to the consent order is the county.

MR. COZZY: Only as county taxpayers.

MS. LACEY: Right. A different pocket of the same pair of pants.

MR. DAVIDSON: We elected to use your town hall as a document repository because we felt it was the most available to the citizens in the area.

MR. ROSE: There was rumors that we would be responsible for these wells that you install. That's why I asked.

MS. LACEY: In the back?

MR. CARUBIA: Paul Carubia, Sidney. I just had a question about, if you look at the potential that air stripping will not remove all the contaminants that would make it a -- being able to dump the water once you treated it into the Susquehanna, which I assume that's where it's going to go, I have an understanding that we're putting a cap on the landfill and reducing the flow of water. You may increase the water contaminants that are coming out such as heavy metals which the air stripping won't remove. Have you addressed any of those possibilities of the contingencies in the pumping scenario in --

MR. O'HARA: Well, basically, we've looked at -- we've looked at the concentrations we've seen in the landfill and here. And we've set the pumping rates so we have contaminant concentrations and flow rates. And based on those concentrations going to the air stripper, there will be no problem. All of the compounds that we're trying to remove are very volatile based on Henry's Law. So, they're very strippable.

MR. SINGERMAN: Also anything discharged in surface water would have to comply with federal and state requirements.

MR. CARUBIA: That's what I'm saying. What happens if the air stripping effluent doesn't meet the requirements, what contingencies are there? Does it shut off or more air strips?

MR. O'HARA: Basically, there are things that you can do to fine tune the operation. You can add more air. If you really had to, you can put in another unit and split the flow. But based on the concentrations and the compounds involved, we don't expect any problems. The metals, if we think they would be a problem fouling the air strip, we can remove them.

MR. SILVERMAN: Also the organics stripped off will be collected as well. So, no discharge from any treatment unit on site would violate any federal or state standards. If it does, at that time, it would be shut off and we would correct the problem.

MS. LACEY: Way in the back?

MR. FISHER: Bob Fisher from Binghamton. I want to ask, how many data points do you have in the landfill from which we can get an idea of what exactly we're dealing with?

MR. O'HARA: Well, within the

landfill, we just have -- we have one well basically.

MR. FISHER: One data point. What type of geophysical survey have you done with that?

MR. O'HARA: It was a magnetometer survey to look for drums.

MR. FISHER: Did you do a resistivity survey?

MR. DAVIDSON: Yes, conductive survey. It was an EM-34 conductive survey done to try to trace the plume, the contaminated groundwater and --

MR. FISHER: Has anybody looked into the possibility of using ground-penetrating radar? It's a technique that allows very good resolution for shallow surface exploration like this, which might allow you to detail what's in there more effectively.

MR. O'HARA: Okay. The studies that we did with the magnetometer, terrain conductive and Earth resistivity. One of the problems was because of the large amounts of scrap metal disposed in the landfill, there were a lot of interference with those methods. And the ground-penetrating radar, even though it could be effective to a depth of about 40 feet, which is basically the bottom of the refuse, we would expect to have the same kinds of interference due to the metals.

MR. FISHER: With the metal?

MR. O'HARA: Yes.

MR. FISHER: You don't think you can shoot around those?

MR. O'HARA: Well, we don't know where it is.

MR. FISHER: You could stack your data in a way you can't do when you use the resistivity or magnetics and eliminate the effects of those metals. In fact, a lot of metals is what you're looking for, right? When you're looking for buried drums in a lot of cases.

MR. O'HARA: Right. We're looking

for --

MR. FISHER: You're looking for little anomalies.

MR. O'HARA: The ground-penetrating radar would give us profile where we can see shapes of drums. But as you can imagine, there are refrigerators, there are car bumpers, everything in here. And we would get a lot of interferences.

MR. FISHER: So, you don't have any idea what's in this thing is, I guess, what I'm saying. One data point, you said, and you've sampled the soils within the landfill. Based on that one data point, you said that this is what the contaminants we have to deal with are, right?

MR. O'HARA: Well, not just this one data point. We also have things off the landfill site.

MR. FISHER: But you're only measuring what's presently coming out of the landfill.

MR. O'HARA: Yes. With these other

monitoring wells.

MR. FISHER: And the contaminants to the groundwater that are external to the landfill at this point, you're not measuring anything that may be slowly moving out of the landfill?

MR. O'HARA: Yes. We have the periphery covered. There is also some information from -- as I said, we would be looking at the site history. There is also some information on what materials were put in the landfill.

MR. FISHER: But not much, from what I gather.

MR. O'HARA: It's not very definitive. It doesn't tell us exactly how many drums or exactly where they were put or exactly what was in them.

MR. FISHER: You don't think it would be feasible to trench some of these drums and remove them?

MR. O'HARA: Basically, since these drums were put in trenches and also co-disposed, put in randomly, basically they would be all over the place.

MR. FISHER: I guess what concerns me is what you said is you have a steady stay situation here. We have a little bit of volatile organics leaching out of this thing and they're showing up in these wells. What you're going to do is alter the conditions around this landfill and you're going to start pumping these wells down gradient and you're going to increase the flow out of the landfill. And I don't think you really considered what that may do to other contaminants that are present in that landfill and how that may mobilize those.

MR. O'HARA: Well, basically, what we're going on is what we've seen here.

MR. FISHER: Which isn't much when it comes right down to it.

MR. O'HARA: Well --

MR. FISHER: I mean, you're looking at what's going on now. And you're saying that if everything stays the same, and we start pumping this landfill, and maybe we can clean it up. But you have no -- I mean, you haven't made any contingency for if something changes. You really don't know what's in there. I mean you really don't have a clue as to what's in there.

MR. O'HARA: That's not entirely true.

MR. FISHER: I mean there could be drums of heavy metals in there. There are plenty of sources of it around here with all the photographic and computer processes that go on. I mean there are tremendous amounts of heavy metal pollutants.

MR. O'HARA: Basically, when these programs of investigation have gone on for seven years, we're not just looking at a sample. So, we do have a good idea from when the industrial waste was put in in 1974. We basically have 16 years of -- an oppc-tunity over 16 years for things to come out. And we have looked at different snapshots over seven years.

MR. FISHER: Have you looked at -- now, there is a vertical hydraulic radiant in this landfill, right?

MR. O'HARA: Yes.

MR. FISHER: We're not just looking at a horizontal component. There is also a vertical component.

MR. O'HARA: Right.

MR. FISHER: Have you analyzed the water at the bottom of that vertical hydraulic gradient to see what's coming straight down, because it's not -- I mean it's not a given that all pollutants move in the same direction. They can differentially separate out.

MR. O'HARA: Right.

MR. FISHER: Heavy metals and things like that can go right to the bottom and you still have a -- there will be different effects than volatile organics can be swept along in a more horizontal direction. Have you examined that possibility?

MR. O'HARA: We've had -- we've looked at -- we've had five monitoring wells, bedrock monitoring wells analyzed for metals and VOCs.

MS. LACEY: I'd like to suggest that those of you with the kind of technical background and knowledge to really want to get into some of the information that is contained in the files that are in the town hall, the test results and the locations of the monitoring wells and the kinds of data that we received are all available for those who want to -- who have a better understanding than I do of parts per million and those kind of things. But all of that is available for those of you who have these very technical kinds of concerns and the background to really get into some of the data.

There was another question far in the back there.

MR. BRIDGE: John Bridge from Binghamton. I just wanted to reiterate the point that he made about one sample from the landfill itself, and you're basing mathematical model, initial concentrations on that one sample. You actually admitted in the beginning that they could be -- the concentrations could vary quite a lot through that landfill. How valid is the mathematical model based on one initial concentration? That's one question.

The other question I have is if you have some knowledge of the total amount of the contaminant that was put in that landfill, and you have some knowledge of the rate of discharge of the contaminants, can you calculate how long it will take for those contaminants at that particular discharge rate to move out of the landfill? Do the discharge rates vary seasonally? Did you monitor the wells at different times of the year?

MR. DAVIDSON: I can respond. As far as there being one monitoring point in the landfill, there is one monitoring well near the center of the landfill that has had -- that we've used for worst-case scenarios as far as it's been one of the worst wells. We installed another boring in another location in the landfill because we wanted to get more definition and we got no refuse whatsoever because the refuse was deposited in trenches. We know -- we have a series of aerial photographs that show the waste being deposited at various times during the operation of the landfill. We looked at records from -- of disposal, the records that we do have. But it's a fairly big area and the waste is deposited in trenches.

We also have a lot of information around the periphery of the landfill. Drilling through refuse is a difficult thing to do at times and not always the wisest thing to do. It can be dangerous sometimes.

In this case, where we did try,

because of the trench method of disposal, we actually put that boring and missed refuse. So, it's difficult to define over the entire 35-acre area that was used for disposal. But we did the best job we could.

And as far as the two dimentional groundwater model that was used, it takes into account a number of things, convective transport, hydrodynamic dispersion, mixing, chemical retardation, a lot of things. It's not perfect. It was an attempt to -- as any modeling is not perfect. It was an attempt to give us parameters to use. Groundwater flow rates were attempted to be calculated based on the data we had from various monitoring wells.

And I believe in the RI ~~ARAR~~ report, rates were estimated that groundwater could be moving from 50 to 250 feet in a year. Something like the rate varied from .1 to .7 feet per day. It's quite a range. It's variable. But we felt that at the conclusion of the remedial investigation, we had installed enough wells and had enough data that we could go ahead with the remediation.

The other key element in this remediation is the cap. It will be a multi-media landfill cap that we estimate will reduce infiltration from 500 gallons per acre per day to 10 gallons per acre per day. I mean theoretically, it shouldn't leak at all. Evidentally, there is some leakage through the cap. That's the main control over groundwater movement or continued leachate generation will be the landfill cap.

The ten down gradient wells are essentially a hydraulic barrier. And then there will be three additional wells within the landfill mass which will also act as hydraulic barriers. So, I think :t's a good remediation compared to what I've seen done at other sites. It's very conservative. We're doing everything that we can.

If we can get 130 gallons per minute out of those total 13 wells, I think we'll be doing great. But that combined with the cap over a 35-acre area, I think we're doing everything we can to control the hydraulics.

MR. BRIDGE: But can you tell how long, with the present rates that you have mentioned, how long it will take all of the contaminants that you think are in the landfill to flow out? How many years would it take?

MR. O'HARA: How many years would it take for all the contaminants in the landfill --

MR. BRIDGE: All the contaminants that you think are in the landfill to flow out, how many years will that take?

MR. DAVIDSON: I don't know if anyone can give that number definitively. My impression is it would take a long, long time. They would continued to leach and continue to leach and, you know, you would see more dilution and dispersion in the lower levels. But they would be there for a long, long time.

And if you just go out to the landfill, I mean the landfill is not covered by any kind of impermeable cover or impermeable till. It's covered by just cover and it's very permeable. And an awful lot of -- there is an awful lot of infiltration that will be cut off by the cap.

MR. COZZY: I think the point we're attempting to show here is that we may not know the exact amount of the source. What we're proposing is a way to isolate the source from continuing to leach. You keep asking how long is it going to take to leach out. What we want to do is to stop the leaching and create an inward gradient so it doesn't migrate. That's the whole point of the remediation. It's not to study it for another five years so we can find every single barrel while the rest of the plume migrates away from us. We want to clean it up now and not five years from now.

MR. BRIDGE: If it hasn't been released yet, how can you clean it up?

MR. COZZY: Because what we're going to capture is what is mobile. What we know is mobile is by our perimeter wells. If it's not mobile, leave it there.

MR. FISHER: What happens if you mobilize something that is presently immobile and you disturb it? You're going to alter the physical parameters there that controls what flows in and out of this landfill. You don't have any idea what that's going to do to the landfill, do you, to the chemical potability in the landfill? You're putting a cap on the landfill so you're changing the amount of water that's flowing into it. And then you're going to start sucking on these pumps down gradient so you're going to be increasing the hydraulic gradient. You're accelerating the discharge from the landfill at the same time you're going to be cutting off the in flow.

MR. DAVIDSON: I think in the feasibility study, the radius of influence of the pumping wells is predicted. And you know it will gradually spread over the landfill. But it will help to capture anything that's there or comes through. But in terms of drawing water down, it's not going to draw water down below --

MR. FISHER: I didn't say that. I just said you're increasing the rate at which you're drawing water out.

MR. COZZY: But that's only until --

MR. FISHER: You're not drawing any --

MR. COZZY: That's only until the mound is dewatered. Once it's dewatered and we have a cap over the top, we're not going to have those transport paths. The groundwater -- the refuse will be above the groundwater.

MR. FISHER: So, you're saying that all of the infiltration of this landfill occurs through the -- directly above it?

MR. DAVIDSON: Right.

MR. FISHER: That there is no infiltration that occurs through the sides?

MR. DAVIDSON: The water table is beneath the refuse, that's correct.

MS. LACEY: The gentleman in the back.

MR. DONNELY: Brian Donnely from Binghamton. My concern is kind of a follow-up on some of this other, but if, say, your four years works out, the contamination is down to a level which is acceptable, and let's assume that it gets shut down or whatever as far as having to remove the water, I presume that the monitoring will continue at least for a number of years. And say ten years from now, you come to another problem. Who is going to pick up the cost or is this something that will continue to be split up by GAF and the state and however it's set up now or will that be something that also the county is going to be totally responsible for?

MR. COZZY: At this point, it would be between the county and GAF. If ten years from now or twenty years from now, there is a similar state bond act, the state may reconsider its position.

MR. O'MARA, just as a follow-up to that point, when does the relationship where the state is contributing 75 percent of the county's cost, when does that dissolve?

MR. COZZY: Shortly after the completion of construction. We allow about a six-month start-up period.

MR. BRIDGE: So, the capital cost would be included, but not the O&M

costs?

MR. COZZY: Right. Basically that's it.

MS. LACEY: Are there other questions? Okay. Any of you who come up with other questions or if you take a look at technical data and something else occurs to you, avail yourself of the opportunity to make written comments. The white copies in the back of the room on the table have the address, where to send in and mail your comments. The last date for comments is February 6. Following that, a responsiveness summary will be produced answering any questions that have been raised tonight or any that are raised in written comments.

Anything else anyone wants to raise, questions? Okay. Thank you very much.

(Whereupon the meeting was adjourned at 8:50 PM)

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STATE OF NEW YORK
COUNTY OF BROOME

I, RANDALL A. CZERENDA, a Certified Shortand Reporter, do hereby certify that the foregoing is a true and correct transcription of my stenographic notes made in the above-entitled matter.

RANDALL A. CZERENDA, CSR

- - [illegible] meeting Jun 30, 1991

SIGN IN SHEET

Name	Address
Mary Clark	Citizen Action 293 Chenango St Bing
Jamie Malley	17 Third St., Deposit, N.Y. 13754
[illegible] Jones	Box 90 Harpursville 13787
Brian Donnelly	Dorman Rd Bing
Claudia Stallman	Broome County EMC / SUNY-B
Patrick O. Leathie	97½ Oak St Bing. 13905 / SUNY
Suzanne Cohen	16 Mildred Ave J.C. / SUNY-B
Laura Wolslegel	6 Seymour St Bing 13903 / SUNY-B
Denise Goberille	74 Park Street Bing / SUNY-B
Andrea Fishkin	130 Murray St., Bing. / SUNY-B
Laurence Leveen	19 Schiller St. Bing. 13905
Tifani Safford	Broome Hall - SUNY
Kristopher E. Abroad	Johnson Hall - SUNY Binghamton
Jeanette Dadwe	Hinman Hall " "
Kevin Conklin	132 Digman Hall Suny-B
Cynthia Connell	Assy man Jim Tallon's
Edie Lau	Press & Sun-Bulletin
Margaret Wicks	Harpursville
Richard Rhodes	"
Paul M Gunning	87 Chapin St. 1st Fl. Bing., N.Y.
Paul Dartin	Broome Hall SUNY-B
DAVID PFIFFER	2 LUCY ST.
Claudine F. Jones	NYSDOH - Albany, NY
Sue Collamer	NYSDOH - Albany, NY
Tom O'Meara	E.M.C. Broome County
Gary Robinson	N.Y.S.D. of H
[illegible] Albert	BCHD

Margin notes: Leg (Jamie Malley); me (Claudia Stallman); Tallon (Cynthia Connell); [illegible] (Edie Lau); Council (Margaret Wicks); 15 (Claudine F. Jones); 15 (Sue Collamer)

Cutsuite Landfill Meeting
SIGN IN SHEET

NAME	ADDRESS
Jon Link	10 Lookout St, Binghamton
Darryl Kittle	3791 vestal parkway east, vestal
Renato Stabile	4 Florence St., Binghamton
Frank Rush	" "
John Varas	SUNY Binghamton PO 7318
Mike McElhare	DSWM
Paul Carubia	PO Box 239 Sidney NY 13838
Bob Denz	Broome Co. Health Dept
Robert E Fisher	132 Beethoven St Binghamton NY
Chuck Casto	WMGC-TV/WAAL/WBNK Radio
Jim Trevbig	48 Tompkins St Binghamton
Jennifer Haupt	10 Johnson Ave Bing. 1390[illegible]
Mildred Jones	RD 2 Box 50 Harpursville NY 1378[illegible]

APPENDIX F

Broome County
ENVIRONMENTAL MANAGEMENT COUNCIL
Broome County Office Building / Government Plaza / Box 1766 / Binghamton, New York 13902 / (607) 778-2116

Claudia Stallman, Director

Timothy M. Grippen, County Executive

February 5, 1991

FEB 8 1991

Brian Davidson, Project Manager
Bureau of Eastern Remedial Action
NYSDEC
50 Wolf Road
Albany, NY 12233-7010

SUBJECT: PROPOSED REMEDIAL PLAN FOR THE COLESVILLE LANDFILL

Dear Mr. Davidson:

In response to the proposed remedial action plan for the "Colesville Landfill Site," the Broome County Environmental Management Council (EMC) has the following comments and recommendations regarding the plan:

HYDROGEOLOGICAL ISSUES

1) The vertical profiles presented in the remedial investigation indicated that the refuse area was encapsulated by the glacial till. However, at the public meeting Wehran Engineering contradicted the vertical profiles by stating that portions of the area where refuse was deposited were in direct contact with the glacial outwash layer. The limited number of borings in this area makes either generalization difficult to verify.

   - EMC recommends that the log data from the boring located within the landfill boundary be verified. We are concerned that the modeling done for the site is extremely sensitive to that one data point. We wonder whether there is reason to believe that this single observation is representative of the situation in the rest of the disposal area. (Additional borings are not requested as any borings in the landfill have the potential to be conduits for contaminant migration into the glacial outwash aquifer.)

2) The remedial investigation fails to discuss the source of the stream seeps. In order for stream remediation activities to be effective, the source of the stream seeps must be substantiated.

   - EMC recommends a review of the remedial investigation data to determine if the seeps are originating from run-off from the glacial till layer or from discharge from the glacial outwash zone. Once the source is verified, the stream loading calculations should be revised accordingly.

3) The proposed plan does not evaluate the remedial alternative of capping the site and providing a new drinking water supply (excluding the pump and treat option).

- EMC recommends the inclusion of a remedial alternative that involves a landfill cap and a new drinking water supply. This alternative would address the immediate concern of local residents by providing a new drinking water supply and allow time to monitor the groundwater to determine the impacts and effectiveness of the landfill cap. It appears to be premature to design a pump and treat system without first knowing the impacts of the cap on groundwater flow and solute migration.

4) The remedial alternatives proposed that involve capping do not address provisions to manage the increased run-off of precipitation from the site.

    - EMC recommends inclusion of run-off provisions in all capping alternatives.

MANAGERIAL ISSUES

1) The proposed plan does not include inflation factors for future charges in any of the remedial alternatives. Ignoring the effects of inflation can bias the present worth analysis to favor alternatives with large operating and maintenance cost requirements in future years.

    - EMC recommends revising the economic analysis to account for inflation.

2) Issues relating to the responsible entities for operation, permitting, and monitoring of remedial actions are not addressed.

    - EMC recommends inclusion of a clear definition of the future responsibilities of PRPs and state and federal agencies in the remedial plan that is selected.

PREFERRED ALTERNATIVE

1) The EMC agrees with the alternative that is selected and described in the Superfund Proposed Plan; however, the EMC requests that the issues described above be addressed prior to finalizing the plan. The preferred alternative (4c2) consists of a landfill cap, groundwater pumping from the wells at and down-gradient of the landfill, treatment of the extracted water by air stripping, discharge of the treated water to North Stream or to the Susquehanna River, and provision of a new water supply to the affected residents. The pump and treat aspects of the remedial plan were calculated to take four years to bring the ground water near the site up to groundwater standards.

    - EMC's position is that remediation of the groundwater may take many more years to accomplish, if indeed it is possible. We are not aware of any Superfund site at which groundwater remediation has restored an aquifer to drinking water standards. The more likely scenario is that the pump and treat system will be in operation for many years at a significant cost to the taxpayers of Broome County. Since a new drinking water supply will be installed for the area residents and the capping will significantly alter the current groundwater system, it appears prudent to conduct the remediation program in a series of phases. In this way, a pump and treatment system can be designed, if needed, to meet the new hydrological conditions.

The EMC recognizes the effort that the DEC and EPA have put into this project and support the agencies' goal of remediating the site. However, the EMC feels that the additional analysis of the data is required to fully address the environmental concerns brought up in the remedial investigation. Furthermore, an additional remedial alternative is proposed here. It may be more prudent to perform the remedial activities in a step-wise fashion. This will ensure that any remedial actions taken are effective and help protect the financial resources of the County's tax payers.

Thank you for the opportunity to comment on this most important subject. Please direct any questions regarding the EMC comments and recommendations to Claudia Stallman, Director of the Broome County EMC. She can be reached at the Broome County Office Building at (607) 778-2116.

Sincerely,

Thomas M O'Meara

Thomas M. O'Meara
Chairperson, Broome County
Environmental Management Council

TOM/nt

cc: T. Grippen, BC Executive
L. Augostini, BC Legislature Environmental Committee
M. McElhare, BC Solid Waste Division
R. Rhodes, Town of Colesville
EMC members

R D 2 Box 93
Harpursville, NY
30 January 1991

FEB - 5 1991

NYS Department of Environmental Conservation
50 Wolf Road, Room 222
Albany, NY

To whom it may concern:

I am writing with reference to the proposed clean-up of the Colesville landfill that is contaminated by industrial waste that was buried therein between the years 1973 and 1975, and subsequently closed in December of 1984.

It is my sincere hope that nothing will arise at the public hearing this evening at the Broome County Office Building to stop or affect a proposed Superfund - GAF - county endeavor to clean-up, at least as well as possible, a disaster that has made so many individuals in the Town of Colesville, and especially in Doraville, unhappy.

I regret that circumstances prevent my attending this evening's meeting and contributing orally the thoughts that I, as a resident of the Town of Colesville, a member of the Colesville Planning Board, the Colesville Conservation Advisory

Council and a former member of the Colesville Town Board, have in regard to this most important undertaking.

It is unfortunate that so much time has elapsed between contamination and apparent expedition of the clean-up process.

I have examined the NYSDEC's summary of remedial alternatives for the clean-up process and future monitoring of the old landfill and find that "Alternative 4C2 - Landfill Cap with pumping at Landfill and Downgradient with New Water Supply" to be a most acceptable and efficient procedure to follow.

The provision of new water supply wells upgradient of the landfill, quite possibly to the north and most certainly up the hillside to the east, as well as provision of a distribution system to residences within any affected area, is advisable. It is good that the site would be reviewed every five years that remedial action might be taken to remove or treat wastes.

Rock substrata is difficult to determine as are trapped aquifers and dikes. With good fortune, Alt. 4C2 will work. Thank you. Sincerely

Franklyn T. Olson, Jr.

Broome County
DIVISION OF SOLID WASTE MANAGEMENT
Broome County Office Building / Government Plaza / Box 1766 / Binghamton, New York 13902 / (607) 778-2482

John P. Kowalchyk, Director
Timothy M. Grippen, County Executive

February 5, 1991

Brian Davidson
Project Manager
Bureau of Eastern Remedial Action
NYSDEC
50 Wolf Road
Albany, New York 12233-7010

RE: COLESVILLE LANDFILL REMEDIATION

Dear Mr. Davidson:

The Broome County Division of Solid Waste Management would like to make the following comments on the FS/RI report:

We agree with the suggested alternative with the following amendments:

a. Instead of installing a new water system, purchase the remaining properties in the area that have contamination. We feel this would be most protective of human health and more cost effective since there is no way to accurately determine how long contamination will continue to leak out of the landfill.

b. We would like to incorporate recirculation of treated groundwater into the design of the landfill cap. We think this would accelerate stabilization of the landfill and help break down any remaining barrels quicker. It is our opinion that the modeling used does not account for more contamination entering the groundwater from as yet unbroken barrels. A "dry tomb" capping scenario would extend future barrels breaking indefinitely, but they would eventually break. Broome County does not want to have to treat this site for the next hundred (100) years. Accelerating the break down will help ensure this does not occur.

Broome County is appreciative of the help and support the NYSDEC and EPA have given, and hope to resolve this situation as soon as possible.

Sincerely,

John P. Kowalchyk
Director

JPK/MNM/cas

cc: David Donoghue, Commissioner, Public Works
Bob Behnke, Chief Assistant County Attorney, Law
Anthony Savino, Wehran Engineering
Anthony tenBraak, GAF

APPENDIX E-3

ESD_JULY 2004

Explanation of Significant Differences

COLESVILLE MUNICIPAL LANDFILL SUPERFUND SITE

Town of Colesville
Broome County, New York

EPA
Region 2 July2004

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.

1 The purpose of five-year reviews is to assure that implemented ɜdies protect public health and the environment and that they function as ıded.

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 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,

1975. The drums were either buried intact or punctured and crushed prior to burial.

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

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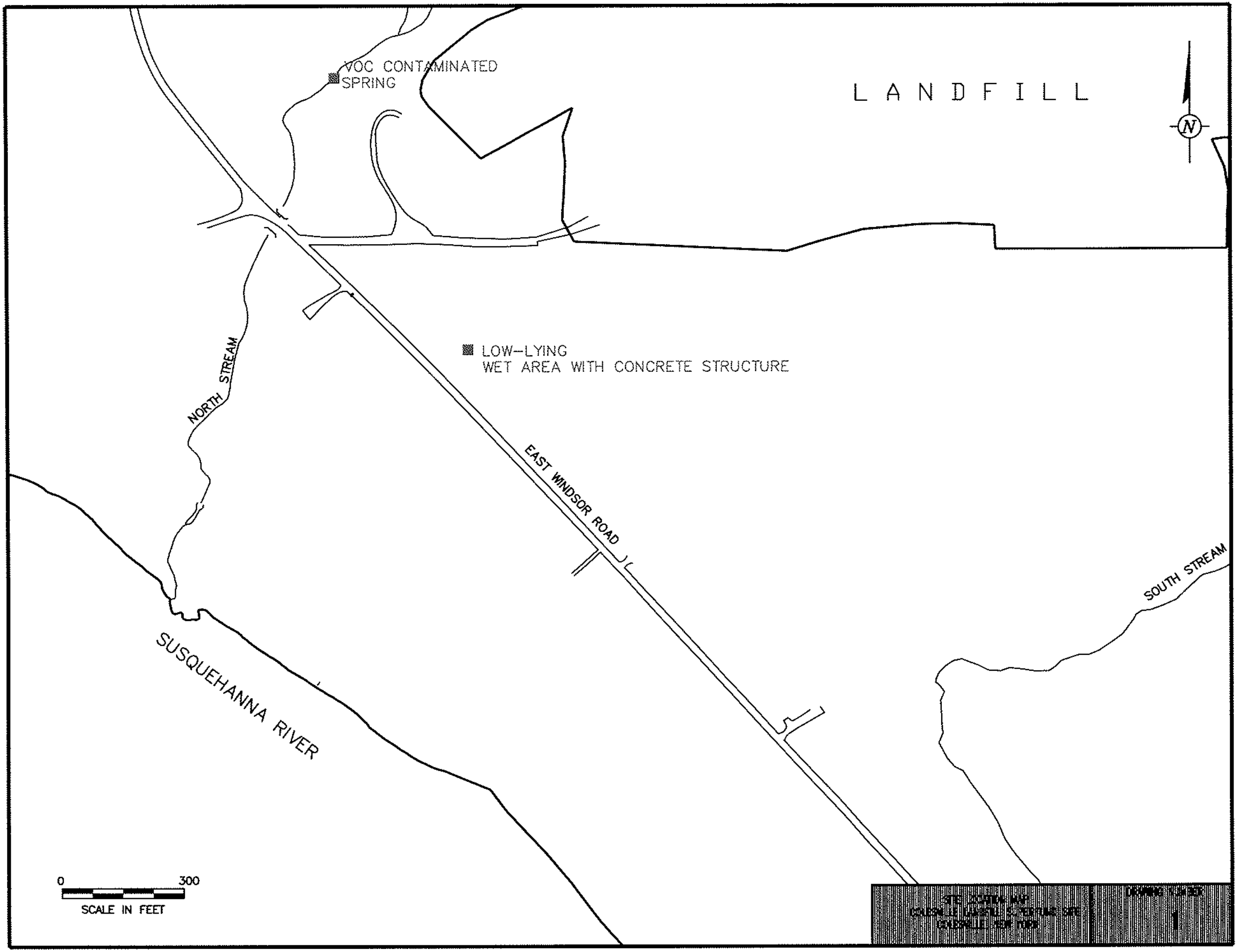
2 Post-treatment samples collected in October 2003, December 2003, and March 2004 indicate that ambient water quality standards are being met.

New York, NY 10007-1866

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

E-mail: jacob.george@epa.gov


VOC CONTAMINATED
SPRING
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N
LOW-LYING
WET AREA WITH CONCRETE STRUCTURE
NORTH STREAM
EAST WINDSOR ROAD
SOUTH STREAM
SUSQUEHANNA RIVER
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300
SCALE IN FEET
SITE LOCATION MAP
COLESVILLE LANDFILL SUPERFUND SITE
COLESVILLE, NEW YORK
DRAWING NUMBER
1

APPENDIX E-4

ESD_SEPTEMBER 2000

EXPLANATION OF SIGNIFICANT DIFFERENCES

COLESVILLE MUNICIPAL LANDFILL SUPERFUND SITE

Colesville Township
Broome County, New York

EPA
Region 2

September 2000

INTRODUCTION

In accordance with 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 ("NCP"), 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 March 1991 Record of Decision ("ROD") for the Colesville Landfill site that called for, among other things, capping the landfill, collecting and treating contaminated groundwater, and providing a new water supply system for the affected residents.

Installation of the landfill cap was completed in 1995. The provision of a new water supply system is on hold pending the efforts of the County to purchase the affected properties. Based upon the results of field tests and post-capping groundwater sampling, it was determined that the groundwater extraction system called for in the ROD, by itself, is not likely to be an effective means of remediating the groundwater. Therefore, an enhancement of the remedy will be employed to restore the groundwater to federal and state standards within a reasonable time frame.

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") report, ROD, design reports, a post-ROD investigation and evaluation of alternative technologies report, and other relevant documents, are available for public review at the following locations:

Town of Colesville Town Hall
Harpursville, NY 13787

New York State Department of Environmental Conservation
50 Wolf Road, Room 222
Albany, NY 12233-7010

and

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

The changes to the selected remedy are not considered by EPA or the New York State Department of Environmental Conservation ("NYSDEC") to be a fundamental alteration of the remedy selected in the ROD. The remedy modification maintains the protectiveness of the groundwater action with respect to human health and the environment, increases the cost-effectiveness of the action, and complies with federal and state requirements that were identified in the ROD.

SUMMARY OF SITE HISTORY, CONTAMINATION PROBLEMS, AND SELECTED REMEDY

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.

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 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.

In 1990, an RI/FS was completed by Broome County and GAF Corporation, potentially responsible parties ("PRPs") identified for the site, pursuant to an Order on

Consent (Index No. T010687) issued by NYSDEC (the "State Order").

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, and the provision of new deep wells for six affected residences located in the vicinity of the site.

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

An alternate water supply well design was approved by the State in 1995. The implementation of the design has, however, been delayed pending Broome County's purchase of the six affected residences and the placement of deed restrictions preventing the installation and use of groundwater wells on the properties, so that there will be no drinking water receptors. To date, the County has purchased three of the properties and is trying to purchase the remaining properties. Of the three remaining properties, one is abandoned and two have deep bedrock wells, which have always tested clean. The County is, however, maintaining carbon filters on the two bedrock wells. One of the remaining properties also has a shallow well which services a fishing camp located on the property. Sample results from this well indicated the presence of low levels of VOCs and bacteria. The County is providing the fishing camp residents with bottled water. It is anticipated that the County will either purchase the remaining properties or install new water supply wells by the end of 2000. If all of the affected properties are purchased and deed restrictions preventing the installation and use of groundwater wells on the properties are implemented, EPA will consider modifying the remedy to eliminate the need to install the alternate water supply well design called for in the ROD.

DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE REASONS FOR THOSE DIFFERENCES

Based upon design-related aquifer tests conducted at the site, it was determined that extracting contaminated groundwater from beneath 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 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. This pilot-scale study involved injecting the impacted groundwater with molasses, which accelerated the microbial degradation of the VOCs in the groundwater[1]. 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, offers the most technically feasible approach to restoring groundwater quality in a reasonable time frame[2].

A final groundwater remediation design, using this technology in combination with a downgradient groundwater extraction and treatment system, was approved by NYSDEC on August 24, 2000. It is anticipated that construction will commence in late September 2000.

STATE AGENCY COMMENTS

NYSDEC supports the change to the remedy.

AFFIRMATION OF STATUTORY DETERMINATIONS

EPA and NYSDEC believe that the modified remedy is as protective as the ROD remedy with respect to human health and the environment, increases the cost-effectiveness of the action, 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.

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1 The technical name of this process is "enhanced reductive dechlorination." Under this process, microbes remove the chlorine from the VOCs, allowing the compounds to further degrade into carbon dioxide and water.

2 Based upon preliminary modeling results, it is estimated that it will take 7 to 10 years to remediate the aquifer downgradient of the landfill using the molasses technology in combination with the installation of downgradient extraction wells, as compared to an estimated 65 years for site-wide groundwater extraction and treatment.

PUBLIC PARTICIPATION ACTIVITIES

EPA and NYSDEC are making this ESD and supporting information available to the public in the Administrative Record. EPA and NYSDEC invite comments or questions related to this ESD. Comments or questions should be directed to:

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

Telephone: **(212) 637-4266**
Telefax: (212) 637-3966
E-mail: jacob.george@epa.gov

APPENDIX E-5

ESD OCTOBER 2016

Explanation of Significant Differences

COLESVILLE MUNICIPAL LANDFILL SUPERFUND SITE

Town of Colesville Broome County, New York

EPA Region 2 October 2016

INTRODUCTION

The purpose of this Explanation of Significant Differences (ESD) is to explain a change made by the U.S. Environmental Protection Agency (EPA) to the 1991 remedy selected for the Colesville Municipal Landfill Superfund site (Site), located in the Town of Colesville, Broome County, New York.

Under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), as amended, EPA is required to issue an ESD when, after issuance of a Record of Decision (ROD),[1] a significant, but not fundamental, change is made to a selected site remedy. Sections 300.435(c)(2)(i) and 300.825(a)(2) of the National Oil and Hazardous Substances Contingency Plan (NCP) set forth the criteria for issuing an ESD and requiring that an ESD be issued if the remedy is modified in a way that differs significantly in either scope, performance or cost from the remedy selected for the site.

This ESD summarizes a significant difference to the remedy selected in the 1991 ROD for the Site, as modified by 2000 and 2004 ESDs, provides a brief history of the Site, describes the original remedy, as modified, and explains how, subsequent to the finalization of the ROD and the ESDs, an issue concerning the protectiveness of the selected remedy related to vapor intrusion, discussed below, has been identified for the Site.

Volatile organic compounds (VOCs) are present in the groundwater underlying the Site. VOCs in groundwater can migrate through the soil and into buildings. This process, which is called vapor intrusion, can result in actual or threatened unacceptable human exposures to VOCs inside occupied buildings. Although this pathway is currently incomplete at the Site because no buildings are currently occupied in the vicinity of the Site, based on soil gas sampling results, it was concluded that if structures are built in the vicinity of the Site or if the nearby vacant houses are occupied, vapor intrusion could be a concern.

EPA has determined that, to ensure the protectiveness of the remedy, an institutional control (IC)[2] that requires vapor intrusion sampling to determine whether this pathway is of concern if buildings are constructed in this area in the future or if the nearby vacant houses are occupied, is needed. To that end, letters were sent by EPA to the Broome County Department of Public Works and the Town of Coleville Office of Code Enforcement indicating that EPA and New York State Department of Environmental Conservation (NYSDEC) should be contacted prior to the approval of any building permits or Certificates of Occupancy for the residential properties in the vicinity of the Site that do not have environmental easements and restrictive covenants. Periodic reminders to these agencies will be issued. The initial notifications and the subsequent reminders constitute an IC.

This ESD serves to document EPA's determination to incorporate into the remedy an informational IC in the form of the above-noted letters. The IC will remain in place until vapor intrusion is no longer a viable exposure pathway.

The remedy as modified by this ESD remains protective of human health and the environment.

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

[1] A ROD documents EPA's remedy decision.

[2] ICs are non-engineered controls, such as property or groundwater use restrictions imposed by a property owner by recorded instrument or by a governmental body by law or regulatory activity for the purpose of reducing or eliminating the potential for human exposure to contamination and/or protect the integrity of a remedy.

453925

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 acres on which the landfill is situated, only about 35 acres have been used for waste disposal. 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.

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 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 a remedial investigation and feasibility study (RI/FS)[3] in 1990, pursuant to an Order on Consent (Index No. T010687) issued by NYSDEC (State Order). The RI/FS showed elevated levels of 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, collection and treatment of contaminated groundwater at and downgradient of the landfill, and provision of new deep wells for six affected residences located in the vicinity of the Site.

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

An alternate water supply well design (deep wells), which was prepared by Wehran-New York, Inc., was approved by NYSDEC 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. All but two of the properties have environmental easements and restrictive covenants preventing the installation or use of groundwater wells; the two remaining properties have double-cased deep wells.

Based upon design-related aquifer tests conducted at the Site in 1998, 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 an easily degradable carbohydrate solution (in this case molasses was the organic substrate used) into the contaminated groundwater, 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 controlling the migration of contaminated groundwater to ensure that groundwater beyond the Site boundary meets groundwater standards. The change to the remedy was documented in a September 2000 ESD.

The groundwater management system as modified by the 2000 ESD became operational in 2002. It consists of 17 automated reagent injection wells, three groundwater recovery wells, and an on-site groundwater treatment system. Molasses was injected via 17 automated reagent injection wells every three months until October 2012. The groundwater extraction and treatment and the injections of molasses were stopped at that time to allow the performance of a natural attenuation study. A pilot study is underway to evaluate the effects of terminating the operation of the groundwater extraction and treatment and molasses injections.

[3] The purpose of an RI/FS is to determine the nature and extent of contamination at a site, evaluate the risk to public health and the environment and identify and evaluate remedial alternatives.

In April 2000, during an inspection of the Site performed as part of the five-year review process, EPA determined that contaminated water from a spring and low-lying wet area in the vicinity of the landfill were discharging to nearby streams. *In-situ* treatment measures were subsequently implemented to prevent the migration of contaminated water from the spring and low-lying wet area. The implemented actions were documented in a July 2004 ESD.

BASIS FOR THE DOCUMENT AND DESCRIPTION OF SIGNIFICANT DIFFERENCES

VOCs are present in the groundwater underlying the Site. VOCs in groundwater can migrate through the soil and into buildings. This process, which is called vapor intrusion, can result in unacceptable human exposures to VOCs inside occupied buildings.

Although soil vapor intrusion into indoor air was not evaluated during the risk assessment performed as part of the 1990 RI/FS, such an evaluation was conducted in 2008 based on recommendations from prior five-year reviews.[4] Because no houses in the immediate vicinity of the landfill were appropriate for subslab soil gas sampling (the only house directly downgradient of the landfill is unoccupied, dilapidated, and the safety of the basement is questionable), the County's contractor, Arcadis, collected six soil gas samples from immediately above the water table along East Windsor Road, toward the south side of the landfill in 2008. Based on these sample results, the 2010 and 2015 five-year reviews concluded that if structures were to be built downgradient of the landfill, vapor intrusion could be a concern, primarily based on the trichloroethylene concentration of 550 micrograms per cubic meter detected in one location (SV-2 located approximately 190 feet from East Windsor Road, on the east side of North Stream) out of the six locations sampled. However, because no buildings are currently occupied in the immediate area of this sample location, this pathway of exposure remains incomplete.

EPA has concluded that, if buildings are constructed in the vicinity of the Site in the future, or if the nearby vacant houses are occupied, additional vapor intrusion sampling would be necessary to determine whether this pathway is of concern. Therefore, this ESD documents EPA's determination that to ensure the protectiveness of the remedy, an IC requiring vapor intrusion sampling to determine whether vapor intrusion is a pathway of concern if buildings are constructed in the vicinity of the Site in the future or if the nearby vacant houses are reoccupied, is needed. To that end, letters were sent by EPA on May 7, 2015 to the Broome County Department of Public Works and the Town of Coleville Office of Code Enforcement indicating that EPA and the NYSDEC should be contacted prior to the approval of any building permits or Certificates of Occupancy for the residential properties in the vicinity of the Site that are not included in the environmental easements and restrictive covenants. Periodic reminders to these agencies will be issued. The initial notifications and the subsequent reminders constitute an IC.

The noted IC will remain in place until vapor intrusion is no longer a viable exposure pathway.

SUPPORT AGENCY COMMENTS

NYSDEC, after careful consideration of the modified remedy, supports this ESD, as the modified remedy significantly changes but does not fundamentally alter the remedy selected in the ROD, as modified by the 2000 ESD.

FIVE-YEAR REVIEWS

Since hazardous substances, pollutants or contaminants remain at the Site which do not allow for unlimited use or unrestricted exposure, in accordance with 40 CFR 300.430 (f) (4) (ii), the remedy for the Site must be reviewed no less often than every five years.

Four five-year reviews have been conducted at the Site. The most recent review, completed in May 2015, concluded that the remedy is functioning as intended by the decision documents and is protecting human health and the environment. It is anticipated that the next five-year review will be completed by May 2020.

AFFIRMATION OF STATUTORY DETERMINATIONS

EPA is issuing this ESD after consultation with the NYSDEC. The NYSDEC concurs with the approach presented in this ESD. When implemented, the remedy, as modified by this ESD, will continue to be protective of human health and the environment, and will continue to comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action. The modified remedy is technically feasible and cost-effective. The remedy as set forth in the ROD and ESDs satisfies the statutory requirements of CERCLA by providing for a remedial action that has a preference for treatment as a principal element and, therefore, permanently and significantly reduces the toxicity, mobility and volume of hazardous substances.

PUBLIC PARTICIPATION ACTIVITIES

Pursuant to NCP §300.825(a)(2), this ESD will become part of the Administrative Record file for the Site. The

[4] The purpose of a five-year review is to ensure that implemented remedies continue to protect public health and the environment and function as intended by the Site decision documents.

Administrative Record for the remedial decisions related to the Site is available for public review at the following locations:

Town of Colesville Town Hall
Harpursville, New York 13787

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

and

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

EPA and NYSDEC are making this ESD available to the public to inform them of the change made to the remedy. Should there be any questions regarding this ESD, please contact:

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

Telephone: (212) 637-4266
e-mail: jacob.george@epa.gov

or

Michael Basile
U.S. Environmental Protection Agency
Public Information Office
186 Exchange Street
Buffalo, New York 14204
Telephone: (716) 551-4410
e-mail: basile.michael@epa.gov

With the publication of this ESD, the public participation requirements set out in §300.435(c)(2)(i) of the NCP have been met.

Figure 1

Broome County Parcel Mapper

DISCLAIMER: Broome County does not guarantee the accuracy of the data presented. Information should be used for illustrative purposes only.

APPENDIX F – SOIL VAPOR SCREENING EVALUATION REPORT

ARCADIS

Infrastructure, environment, facilities

Imagine the result

Broome County Division of Solid Waste Management

Soil Vapor Screening Evaluation Report

Colesville Landfill

Broome County, New York

NYSDEC Site 704010

January 28, 2009

ARCADIS

Christopher Keen
Senior Scientist

Nadine Weinberg
Senior Scientist

Steven M. Feldman
Project Manager/Associate Vice President

Soil Vapor Screening Evaluation Report

Colesville Landfill
Broome County, New York
NYSDEC Site 704010

Prepared for:
Broome County Division of Solid Waste Management

Prepared by:
ARCADIS
Two Huntington Quadrangle
Suite 1S10
Melville
New York 11747
Tel 631.249.7600
Fax 631.249.7610

Our Ref.:
NY000949.0021.00004

Date:
January 28, 2009

Tables

Figures

Appendices

1. Introduction

On behalf of the Broome County Division of Solid Waste Management, ARCADIS conducted a soil vapor screening evaluation to assess the potential for indoor air vapor intrusion at residences in the vicinity of the Colesville Landfill (Site). The Site is located in Broome County, New York. This Soil Vapor Screening Evaluation Report (Report) documents the work and findings of the soil vapor screening evaluation.

The soil vapor screening evaluation scope of work was presented in a final Soil Vapor Screening Evaluation Work Plan (Work Plan) that was submitted to the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of Health (NYSDOH) on October 3, 2008 (ARCADIS, 2008). The EPA pre-approved the final Work Plan in an e-mail dated September 9, 2008, which indicated that a final Work Plan should be submitted that incorporated the agency comments on the August 16, 2006 Work Plan and ARCADIS' response to comments. The work was performed in accordance with the methods outlined in the final Work Plan.

1.1 Background

The scope of work presented in the final Work Plan was developed in response to EPA's recommendation in the EPA Second Five-Year Review Report for the Site dated April 2005. The EPA suggested that sub-slab soil vapor samples be collected beneath homes located hydraulically downgradient of the Site to evaluate the potential for vapor intrusion. Based on follow up discussions with EPA, it was mutually agreed that soil vapor samples would be collected from the interval immediately above the water table to evaluate the potential for vapor intrusion. Consequently, the scope of work presented in the final Work Plan was developed to evaluate volatile organic compounds (VOCs) in soil vapor in the vicinity of the residences.

Consistent with Section 2.2.2 of the October 2006 NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, sub-slab soil vapor samples may only be necessary after soil vapor characterization and/or other environmental sampling (e.g., soil and groundwater characterization) indicate they are warranted. Therefore, consistent with the approved Work Plan, the soil vapor samples were collected as an initial step to determine if VOCs are present in soil vapor on parcels with existing structures.

Based on a number of discussions and correspondences with the EPA, the NYSDEC, and the NYSDOH between 2006 and 2008, the key aspects of the work scope were as follows:

- Soil borings were advanced in the vicinity of the residences and along East Windsor Road.
- It is believed that the North Stream intercepts VOC-impacted groundwater. At the request of the EPA, one of the soil borings (SV-1) was advanced on the west of the North Stream to evaluate the potential for vapor intrusion at the residences on this side of the stream.
- Soil vapor samples were collected at the interval approximately one foot above the water table.
- The soil vapor sample results were evaluated in accordance with the Office of Solid Waste and Emergency Response (OSWER) document entitled, "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)" (EPA, 2002).
- The soil vapor sample data was compared to Target Shallow Soil Gas Concentrations and evaluated using attenuation factors.

2. Environmental Setting

The following subsections describe the soil type in the vicinity of the soil borings and groundwater flow conditions.

2.1 Soil Type

The soil type in the vicinity of the soil borings is glacial till. The surficial till is generally brown in color, consisting of sand and gravel, with some clay and silt. The density of the material, as determined during remedial investigation drilling activities, is quite low with blow counts generally less than 20 per six inches.

Soil from the two-foot interval above the soil vapor sample depth (e.g., 6 to 8 foot soil core if the soil vapor sample was collected at 8 feet below land surface [ft bls] and the depth to water is 9 ft bls) was submitted to a laboratory for particle size analysis by ASTM D422 Standard Test Method for Particle-Size Analysis of Soils (see Section 4.1 of this Report).

2.2 Groundwater Flow Conditions

The depth to water in the vicinity of the residences ranges from approximately 7 to 10 ft bls. The groundwater flow direction in the project area (i.e., adjacent to the landfill western perimeter) is toward the southwest from the western perimeter of the landfill. The groundwater flow direction in areas further to the east of the project area is toward the south/southwest (see Figure 1).

3. Soil Vapor Screening Evaluation

The scope of work described in Section 1 of this Report focused on determining if there is a potential for the vapor intrusion pathway to be complete in the vicinity of the residences located hydraulically downgradient of the Site. To meet this objective, a screening evaluation was conducted through the collection of soil vapor samples in the vicinity of the residences and on the west side of the North Stream.

3.1 EPA Second Five-Year Review

During its Second Five-Year Review, EPA reviewed the potential for vapor intrusion into downgradient residences using a conservative screening level analysis. This analysis was conducted by using the worst-case assumption that concentrations in the groundwater under the residences are the same as the maximum chemical concentration that was detected in downgradient off-site monitoring wells. Appropriately, only the off-site wells were used by the EPA in this screening level evaluation because the on-site wells exhibit concentrations that are not representative of groundwater quality beneath the residences downgradient of the Site.

EPA compared the maximum concentrations of VOCs measured between 2002 and 2004 in the downgradient off-site monitoring wells with risk-based screening criteria provided in the "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)" (EPA, 2002). This guidance provides chemical-specific groundwater concentrations protective of indoor air quality based on a cancer risk ranging from one in one million to one in ten thousand ($1x10^{-6}$ to $1x10^{-4}$) and/or a noncancer hazard quotient (HQ) of 1.0.

The primary constituent of potential concern (COPC) detected downgradient of the Site relative to the soil vapor intrusion pathway is trichloroethene (TCE). For TCE, EPA compared the maximum groundwater concentration detected in a downgradient off-site monitoring well (19 micrograms per liter [µg/l] at well W-18) to the EPA Target Groundwater Concentration (5.3 µg/L), which is based on a cancer risk of one in ten thousand (10^{-4}). The comparison showed that the measured concentration in well W-18 exceeded the Target Groundwater Concentration. While monitoring well W-18 is located on a property where there is currently an abandoned house and, therefore, no current potential for exposure, these results did suggest that vapor intrusion could potentially be a route of future exposure if a residential dwelling were to be constructed there.

It is unlikely that groundwater VOC concentrations in well W-18 are representative of the groundwater VOC concentrations near occupied residences. This is due to the fact that the residences are located either sidegradient of the locations where the highest VOC concentrations have been measured in groundwater, or are located on the other side of the North Stream.

3.2 Sampling Approach and Methodology

To evaluate VOCs in soil vapor, six (6) soil borings (SV-1 through SV-6) were advanced for the collection of soil cores and soil vapor samples along East Windsor Road and in the vicinity of well W-18. The approximate soil boring locations are shown on Figure 1. As outlined in the Work Plan, the soil boring locations were positioned to meet the objectives of the screening evaluation. Specifically, the soil borings were located to provide areal coverage and were situated along a transect that is generally transverse to the direction of groundwater flow. Soil borings SV-2, SV-4, and SV-6 were advanced at least 10 feet away from the residential structures.

A soil vapor sample could not be collected at proposed soil boring SV-3 due to an insufficient air flow rate (i.e., less than 20 milliliters per minute [mL/min]) that was observed during purging. Soil vapor sampling was attempted in multiple soil borings at the SV-3 location before concluding that a soil vapor sample could not be collected at this location due to the soil permeability (see Section 4.1 of this Report for particle size analysis results).

SV-2 was initially located along East Windsor Road. SV-2 was relocated approximately 185 feet southwest of its original location due to an insufficient air flow rate (i.e., less than 20 mL/min) that was observed during purging at the initial location.

This relocated sample collection point was approximately 18 feet northeast (i.e., upgradient and toward East Windsor Road) of well W-18. Soil vapor sampling was attempted in multiple soil borings at the initial SV-2 location before relocating.

A soil boring was advanced at each location to a depth of 8 to 12 ft bls for the collection of continuous soil cores. The soil cores were used to characterize the soil lithology and to determine the depth of the water table in the vicinity of each soil vapor sample location. After the soil cores were collected, a separate boring was advanced approximately five feet from the soil boring for the collection of the soil vapor sample. The soil cores and soil vapor samples were collected using the methodologies outlined in Sections 3.2.1 and 3.2.2 of the final Work Plan.

Groundwater was encountered at approximately 9 to 10 ft bls and soil vapor samples were collected at a depth of 8 to 9 ft bls in soil borings SV-1, SV-2, SV-4, and SV-5 (see Table 1 for specific sample depths). Groundwater was encountered at approximately 5 ft bls and the soil vapor sample was collected at a depth of 4 ft bls in soil boring SV-6.

As outlined in the Work Plan, tracer gas (i.e., helium) testing was conducted at all of the soil boring locations to check the seal established around the temporary soil vapor sampling point. The tracer gas testing indicated that there was a sufficient seal established around the temporary soil vapor sampling points and that there was no ambient air infiltration.

A duplicate soil vapor sample was collected at the SV-2 location. The duplicate sample was collected at the same time as the SV-2 sample using a stainless steel "T" fitting, a second SUMMA® canister, and the methodologies outlined in the final Work Plan. The replicated data were acceptable.

The particle size analyses were performed by TestAmerica Laboratories, Inc. using ASTM D422 Standard Test Method for Particle-Size Analysis of Soils. The soil vapor samples were collected in individually (100%) certified, pre-cleaned 6-liter SUMMA® canisters provided by Air Toxics, Ltd. (ATL), a NYSDOH approved laboratory, located in Folsom, California. All samples were analyzed by ATL for the ATL TO-15 low-level compound list by EPA Method TO-15.

4. Data Evaluation

The soil vapor sample analytical results were evaluated in accordance with the OSWER document entitled, *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (EPA, 2002). Consistent with EPA (2002), the soil vapor results were evaluated in a step-wise manner. First, the soil vapor analytical results were compared to target concentrations presented in Tables 2a and 2c, which represent target soil vapor concentrations based on cancer risks of 1×10^{-4} and 1×10^{-6}, respectively, as a means to bracket the potential risk associated with the soil gas results. This information aided in determining all available options ranging from no further action to additional sampling. Second, COPCs with soil vapor results greater than target concentrations presented in Tables 2a and 2c were evaluated further using site-specific attenuation factors selected from Tables 3a and 3c of the guidance. The site-specific Target Shallow Soil Gas Concentrations in Tables 3a and 3c represent target soil vapor concentrations based on cancer risks of 1×10^{-4} and 1×10^{-6} (see Table 1), considering site-specific information on soil type and sample depth as presented in Figure 3a.

Table 1 provides the concentrations of VOCs in the soil vapor samples that were collected from the temporary soil vapor points and compares those concentrations with relevant generic and site-specific Target Shallow Soil Gas Concentrations. The soil vapor samples analytical data are provided in Appendix A. Relevant information that provides the rationale for selecting the representative site-specific attenuation factors is provided in Appendix B.

4.1 Particle Size Analysis Data

As discussed previously, soil from the two-foot interval above the soil vapor sample depth (e.g., 6 to 8 foot soil core if the soil vapor sample was collected at 8 ft bls and the depth to water is 9 ft bls) was submitted to a laboratory for particle size analysis by ASTM D422 Standard Test Method for Particle-Size Analysis of Soils. The particle size analyses laboratory data are provided in Appendix C.

The particle size analyses indicated that the predominant soil type was loamy sand (i.e., soil cores from soil borings SV-1, SV-2, SV-4, and SV-5). The particle size analyses indicated that the soil type for the soil cores collected from soil borings SV-3 and SV-6 were silt loam and loam, respectively. The silt loam at soil boring SV-3 is consistent with the insufficient air flow rate that was observed during purging activities (i.e., low permeability soil). These soil types are consistent with a glacial depositional environment. The soil types were determined using the laboratory particle size analyses data and soil texture descriptions in the United States Department of Agriculture Soil Survey Manual (USDA, 1993).

The soil particle size analyses data indicate that movement of soil vapor will be limited due to the presence of lower permeability soil types. For example, at SV-3 and the initial location of SV-2, a soil vapor sample could not be obtained due to the lack of sufficient air flow.

4.2 Soil Vapor Sample Data

As discussed previously, if the soil vapor sample concentration data exceeded the relevant target concentrations provided in Tables 2a and 2c, the data were then compared to site-specific Target Shallow Soil Gas Concentrations provided in Tables 3a and 3c of the EPA guidance (see Table 1). A comparison of the soil vapor sample concentration data to the site-specific Target Shallow Soil Gas Concentrations indicates that 1,3-butadiene (SV-1, SV-4, and SV-5 soil vapor samples) and TCE (SV-2 soil vapor sample) exceeded their respective site-specific Target Shallow Soil Gas Concentrations for the $1x10^{-6}$ risk level in a limited number of samples. No constituents exceeded the site-specific soil gas concentrations at the $1x10^{-4}$ risk level.

The TCE exceedance at soil boring SV-2 is consistent with the fact that TCE is the primary COPC detected downgradient of the Site relative to the soil vapor intrusion pathway. As discussed previously, SV-2 was located approximately 18 feet from well W-18, which historically had the highest detected TCE concentrations off-site. TCE concentrations at SV-2 are below the site-specific target concentrations at the $1x10^{-4}$ risk level. The site-specific values are most appropriate for use at the Site because they take into consideration both soil type and depth of sampling.

1,3-butadiene is a chemical made from the processing of petroleum (ATSDR, 1995). About 75% of the manufactured 1,3-butadiene is used to make synthetic rubber, including tires on cars and trucks. 1,3-butadiene is also used to make plastics including acrylics. Small amounts are found in gasoline. 1,3-butadiene was detected at soil borings SV-1, SV-4, SV-5, and SV-6, which were located along East Windsor Road, but was not detected at soil boring SV-2, which was located approximately 190 feet from East Windsor Road. The presence of 1,3-butadiene in the soil vapor samples collected adjacent to East Windsor Road suggests that this compound is related to vehicle use on the road (i.e., impacts from roadway runoff).

Similar to 1,3-butadiene, aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene, and xylene [BTEX]) were detected at low levels at soil vapor points SV-1, SV-4, SV-5, and SV-6. BTEX compounds were not detected at soil boring SV-2. The presence of BTEX compounds in the soil vapor samples collected adjacent to East Windsor Road also suggests that these compounds are related to vehicle use on the road.

Site-related chlorinated VOCs (CVOCs) (e.g., TCE, 1,1,1-trichloroethane [1,1,1-TCA], 1,1-dichloroethane [1,1-DCA], cis-1,2-dichloroethene [cis-1,2-DCE]) were not detected in the soil vapor sample collected at soil boring SV-1. The absence of these CVOCs at soil boring SV-1 supports the conceptual site model (CSM) that the North Stream intercepts VOC-impacted groundwater. These CVOCs were detected in the soil vapor sample collected at soil boring SV-2, which is located on the east side of the North Stream.

Collectively, the data indicate that there is no current potential for exposure at residences downgradient of the landfill. However, vapor intrusion could potentially be a route of future exposure if a residential dwelling were to be constructed in the general area of soil boring SV-2.

5. Conclusions

Based on the data that was collected during the soil vapor screening evaluation, ARCADIS concludes the following:

- The particle size analyses indicate that the predominant soil type is loamy sand. Lower permeability soil types (i.e., silt loam and loam) are also present. These soil types are consistent with a glacial depositional environment and are expected to significantly limit the potential movement of VOCs in soil vapor.

- Groundwater was generally encountered at depths approximately 9 to 10 ft bls in the soil borings.

- A comparison of the soil vapor sample concentration data to the site-specific Target Shallow Soil Gas Concentrations indicates that 1,3-butadiene (SV-1, SV-4, and SV-5 soil vapor samples) and TCE (SV-2 soil vapor sample) exceed their respective site-specific Target Shallow Soil Gas Concentrations for the $1x10^{-6}$ risk level, but not at the$1x10^{-4}$

risk level. These exceedances do not pose a current potential for exposure at residences downgradient of the landfill.

- TCE was detected at concentrations above the $1x10^{-6}$ risk level only at SV-2, which was near the off-site groundwater well (W-18) that exhibited the highest concentration of TCE in off-site groundwater.

- The presence of 1,3-butadiene in the soil vapor samples collected adjacent to East Windsor Road and not near the groundwater plume suggests that this compound is related to vehicle use on the road.

- BTEX compounds in the soil vapor samples collected adjacent to East Windsor Road are also likely related to vehicle use on the road.

- The absence of Site-related CVOCs at soil boring SV-1 supports the CSM that the North Stream intercepts VOC-impacted groundwater.

- While monitoring well W-18 is located on a property where there is currently an abandoned house and, therefore, no current potential for exposure, the soil vapor sample data collected from soil boring SV-2 suggests that vapor intrusion could potentially be a route of future exposure if a residential dwelling were to be constructed there.

- The collective soil vapor sample data support the CSM that groundwater VOC concentrations in well W-18 are not representative of the groundwater VOC concentrations near other residences (e.g., Scott and Smith residences). This is due to the fact that the residences are located either sidegradient of the locations where the highest VOC concentrations have been measured in groundwater, or are located on the other side of the North Stream.

6. References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. ToxFAQs for 1,3-Butadiene. September 1995.

ARCADIS. 2008. Soil Vapor Screening Evaluation Work Plan. October 2008.

U.S. Department of Agriculture (USDA). 1993. Soil Survey Manual. October 1993.

U.S. Environmental Protection Agency (USEPA). 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 2002.

Table 1. Concentrations of Volatile Organic Compounds in Soil Vapor Samples Collected from Temporary Soil Vapor Points, Soil Vapor Screening Evaluation, Colesville Landfill, Broome County, New York.

Sample ID Compound [5]	Soil Vapor Concentration (ug/m^3)	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1 x 10^{-4}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1 x 10^{-4}	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1 x 10^{-6}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1 x 10^{-6}	Soil Type [2]	Representative Scenario-Specific Attenuation Factor [3]	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1 x 10^{-4}	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1 x 10^{-6}
SV-1 (8')									
Freon 12	1.5	2,000	No	2,000	No	**Loamy Sand**	2x10^{-3}	NR	NR
Chloromethane	0.86	900	No	24	No			NR	NR
1,3-Butadiene	**54**	8.7	**Yes**	0.087	**Yes**	**SV-1 (6-8)**		430	4.3
Bromomethane	2.8	50	No	50	No	Gravel - 7.5%		NR	NR
Freon 11	1.3	7,000	No	7,000	No	Sand - 70%		NR	NR
Ethanol	3.6	NA	--	NA	--	Coarse Sand - 5.1%		--	--
Acetone	130	3,500	No	3,500	No	Medium Sand - 10.9%		NR	NR
Carbon Disulfide	9.8	7,000	No	7,000	No	Fine Sand - 54.0%		NR	NR
Hexane	36	2,000	No	2,000	No	Silt - 14.7%		NR	NR
2-Butanone (Methyl Ethyl Ketone)	25	10,000	No	10,000	No	Clay - 7.7%		NR	NR
Chloroform	2.5	110	No	1.1	**Yes**			5,300	53
Cyclohexane	10	NA	--	NA	--			--	--
Benzene	26	310	No	3.1	**Yes**			16,000	160
Heptane	28	NA	--	NA	--			--	--
Toluene	14	4,000	No	4,000	No			NR	NR
Ethyl Benzene	0.90	2,200	No	22	No			NR	NR
m,p-Xylene	1.7	70,000	No	70,000	No			NR	NR
o-Xylene	0.84	70,000	No	70,000	No			NR	NR
SV-2 (8')									
Freon 12	31	2,000	No	2,000	No	**Loamy Sand**	2x10^{-3}	NR	NR
Chloroethane	10	100,000	No	100,000	No			NR	NR
Freon 11	7.6	7,000	No	7,000	No	**SV-2 (6-8)**		NR	NR
Ethanol	10	NA	--	NA	--	Gravel - 47.7%		--	--
Freon 113	74	300,000	No	300,000	No	Sand - 39.1%		NR	NR
1,1-Dichloroethene	8.2	2,000	No	2,000	No	Coarse Sand - 4.9%		NR	NR
Acetone	34	3,500	No	3,500	No	Medium Sand - 17.1%		NR	NR
trans-1,2-Dichloroethene	3.2	700	No	700	No	Fine Sand - 17.1%		NR	NR
1,1-Dichloroethane	230	5,000	No	5,000	No	Silt - 7.0%		NR	NR
2-Butanone (Methyl Ethyl Ketone)	12	10,000	No	10,000	No	Clay - 6.1%		NR	NR
cis-1,2-Dichloroethene	130	350	No	350	No			NR	NR
Chloroform	17	110	No	1.1	**Yes**			5,300	53
1,1,1-Trichloroethane	710	22,000	No	22,000	No			NR	NR
Trichloroethene	**550**	22	**Yes**	0.22	**Yes**			1,100	11

See footnotes on last page.

Table 1. Concentrations of Volatile Organic Compounds in Soil Vapor Samples Collected from Temporary Soil Vapor Points, Soil Vapor Screening Evaluation, Colesville Landfill, Broome County, New York.

Sample ID Compound [5]	Soil Vapor Concentration (ug/m^3)	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1×10^{-4}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1×10^{-4}	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1×10^{-6}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1×10^{-6}	Soil Type [2]	Representative Scenario-Specific Attenuation Factor [3]	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1×10^{-4}	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1×10^{-6}
SV-4 (9')									
Freon 12	1.8	2,000	No	2,000	No	**Loamy Sand**	2×10^{-3}	NR	NR
Chloromethane	0.94	900	No	24	No			NR	NR
1,3-Butadiene	$\boxed{9.2}$	8.7	**Yes**	0.087	**Yes**	**SV-4 (7-9)**		430	4.3
Freon 11	2.0	7,000	No	7,000	No	Gravel - 47.9%		NR	NR
Ethanol	5.4	NA	--	NA	--	Sand - 39.4%		--	--
Freon 113	6.9	300,000	No	300,000	No	Coarse Sand - 14.5%		NR	NR
Acetone	35	3,500	No	3,500	No	Medium Sand - 14.6%		NR	NR
Carbon Disulfide	3.4	7,000	No	7,000	No	Fine Sand - 10.2%		NR	NR
Hexane	57	2,000	No	2,000	No	Silt - 7.7%		NR	NR
1,1-Dichloroethane	2.3	5,000	No	5,000	No	Clay - 5.1%		NR	NR
2-Butanone (Methyl Ethyl Ketone)	7.2	10,000	No	10,000	No			NR	NR
Chloroform	3.0	110	No	1.1	**Yes**			5,300	53
1,1,1-Trichloroethane	15	22,000	No	22,000	No			NR	NR
Cyclohexane	18	NA	--	NA	--			--	--
Benzene	11	310	No	3.1	**Yes**			16,000	160
Heptane	34	NA	--	NA	--			--	--
Trichloroethene	2.3	22	No	0.22	**Yes**			1,100	11
Toluene	6.8	4,000	No	4,000	No			NR	NR
Ethyl Benzene	0.79	2,200	No	22	No			NR	NR
m,p-Xylene	1.3	70,000	No	70,000	No			NR	NR
o-Xylene	0.64	70,000	No	70,000	No			NR	NR
SV-5 (8.5')									
Freon 12	2.6	2,000	No	2,000	No	**Loamy Sand**	2×10^{-3}	NR	NR
1,3-Butadiene	$\boxed{7.7}$	8.7	No	0.087	**Yes**			430	4.3
Bromomethane	0.64	50	No	50	No	**SV-5 (6.5-8.5)**		NR	NR
Freon 11	1.6	7,000	No	7,000	No	Gravel - 46.8%		NR	NR
Ethanol	2.0	NA	--	NA	--	Sand - 40.2%		--	--
Freon 113	7.4	300,000	No	300,000	No	Coarse Sand - 11.8%		NR	NR
Acetone	45	3,500	No	3,500	No	Medium Sand - 19.8%		NR	NR
Carbon Disulfide	2.8	7,000	No	7,000	No	Fine Sand - 8.6%		NR	NR
Hexane	23	2,000	No	2,000	No	Silt - 7.9%		NR	NR
1,1-Dichloroethane	2.5	5,000	No	5,000	No	Clay - 5.2%		NR	NR
2-Butanone (Methyl Ethyl Ketone)	8.0	10,000	No	10,000	No			NR	NR
Chloroform	3.2	110	No	1.1	**Yes**			5,300	53
1,1,1-Trichloroethane	26	22,000	No	22,000	No			NR	NR
Cyclohexane	6.4	NA	--	NA	--			--	--
Benzene	7.7	310	No	3.1	**Yes**			16,000	160
Heptane	16	NA	--	NA	--			--	--
Trichloroethene	4.2	22	No	0.22	**Yes**			1,100	11
Toluene	6.9	4,000	No	4,000	No			NR	NR
Tetrachloroethene	1.4	810	No	8.1	No			NR	NR
m,p-Xylene	1.5	70,000	No	70,000	No			NR	NR

See footnotes on last page.

Table 1. Concentrations of Volatile Organic Compounds in Soil Vapor Samples Collected from Temporary Soil Vapor Points, Soil Vapor Screening Evaluation, Colesville Landfill, Broome County, New York.

Sample ID Compound [5]	Soil Vapor Concentration (ug/m^3)	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1×10^{-4}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1×10^{-4}	Target Shallow Soil Gas Concentration [1] (ug/m^3) Risk = 1×10^{-6}	Soil Vapor Concentration Exceeds Target Shallow Soil Gas Concentration [1] Risk = 1×10^{-6}	Soil Type [2]	Representative Scenario-Specific Attenuation Factor [3]	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1×10^{-4}	Target Shallow Soil Gas Concentration [4] (ug/m^3) Risk = 1×10^{-6}
SV-6 (4')									
Freon 12	0.67 J	2,000	No	2,000	No	**Loam**	1×10^{-3}	NR	NR
Chloromethane	0.85 J	900	No	24	No			NR	NR
1,3-Butadiene	1.8 J	8.7	No	0.087	**Yes**	**SV-6 (2-4)**		870	8.7
Bromomethane	1.8 J	50	No	50	No	Gravel - 0.3%		NR	NR
Ethanol	3.4 J	NA	--	NA	--	Sand - 49.0%		--	--
Freon 113	1.3 J	300,000	No	300,000	No	Coarse Sand - 0.5%		NR	NR
Acetone	120 J	3,500	No	3,500	No	Medium Sand - 1.7%		NR	NR
2-Propanol	1.7 J	NA	--	NA	--	Fine Sand - 46.8%		--	--
Hexane	1.9 J	2,000	No	2,000	No	Silt - 32.4%		NR	NR
2-Butanone (Methyl Ethyl Ketone)	19 J	10,000	No	10,000	No	Clay - 18.4%		NR	NR
Chloroform	1.0 J	110	No	1.1	No			NR	NR
1,1,1-Trichloroethane	2.2 J	22,000	No	22,000	No			NR	NR
Benzene	1.9 J	310	No	3.1	No			NR	NR
Heptane	1.0 J	NA	--	NA	--			--	--
Toluene	2.3 J	4,000	No	4,000	No			NR	NR
Ethyl Benzene	0.86 J	2,200	No	22	No			NR	NR
m,p-Xylene	0.77 J	70,000	No	70,000	No			NR	NR
Styrene	3.1 J	10,000	No	10,000	No			NR	NR
4-Ethyltoluene	0.81 J	NA	--	NA	--			--	--
1,2,4-Trimethylbenzene	0.95 J	60	No	60	No			NR	NR

1 Generic Attenuation Factor = 0.1.
2 Soil types were determined using laboratory particle size analyses and soil texture descriptions in the United States Department of Agriculture Soil Survey Manual, October 1993.
3 The representative Scenario-Specific Attenuation Factor was selected using Figure 3a from EPA OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002.
4 Representative Scenario-Specific Attenuation Factor.
5 Only compounds detected above the laboratory reporting limit are presented.
ug/m^3 Micrograms per cubic meter.
J Estimated value.
NA Not available.
NR Analysis not required based on comparison to Target Shallow Soil Gas Concentrations (Generic Attenuation Factor).
[ ] Soil Vapor Concentration Equals or Exceeds Target Shallow Soil Gas Concentration, Risk = 1×10^{-6} (Representative Scenario-Specific Attenuation Factor).

EXPLANATION

LOCATION AND DESIGNATION OF SOIL BORING AND SOIL VAPOR SAMPLE POINT

LOCATION AND DESIGNATION OF RI MONITORING WELL

LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL

LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL

LOCATION AND DESIGNATION OF INJECTION WELL

LOCATION AND DESIGNATION OF PRODUCTION WELL

950 WATER LEVEL CONTOUR IN FT. MSL; CONTOUR INTERVAL IS FIVE (5) FT (DASHED WHERE INFERRED)

HORIZONTAL COMPONENT OF FLOW

LONG-TERM MONITORING PLAN DESIGNATIONS

LOCATION AND DESIGNATION OF QUARTERLY MONITORING WELL

LOCATION AND DESIGNATION OF SEMI-ANNUAL MONITORING WELL

LOCATION AND DESIGNATION OF ANNUAL MONITORING WELL

LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE LOCATION

LOCATION AND DESIGNATION OF SPRING SAMPLE LOCATION

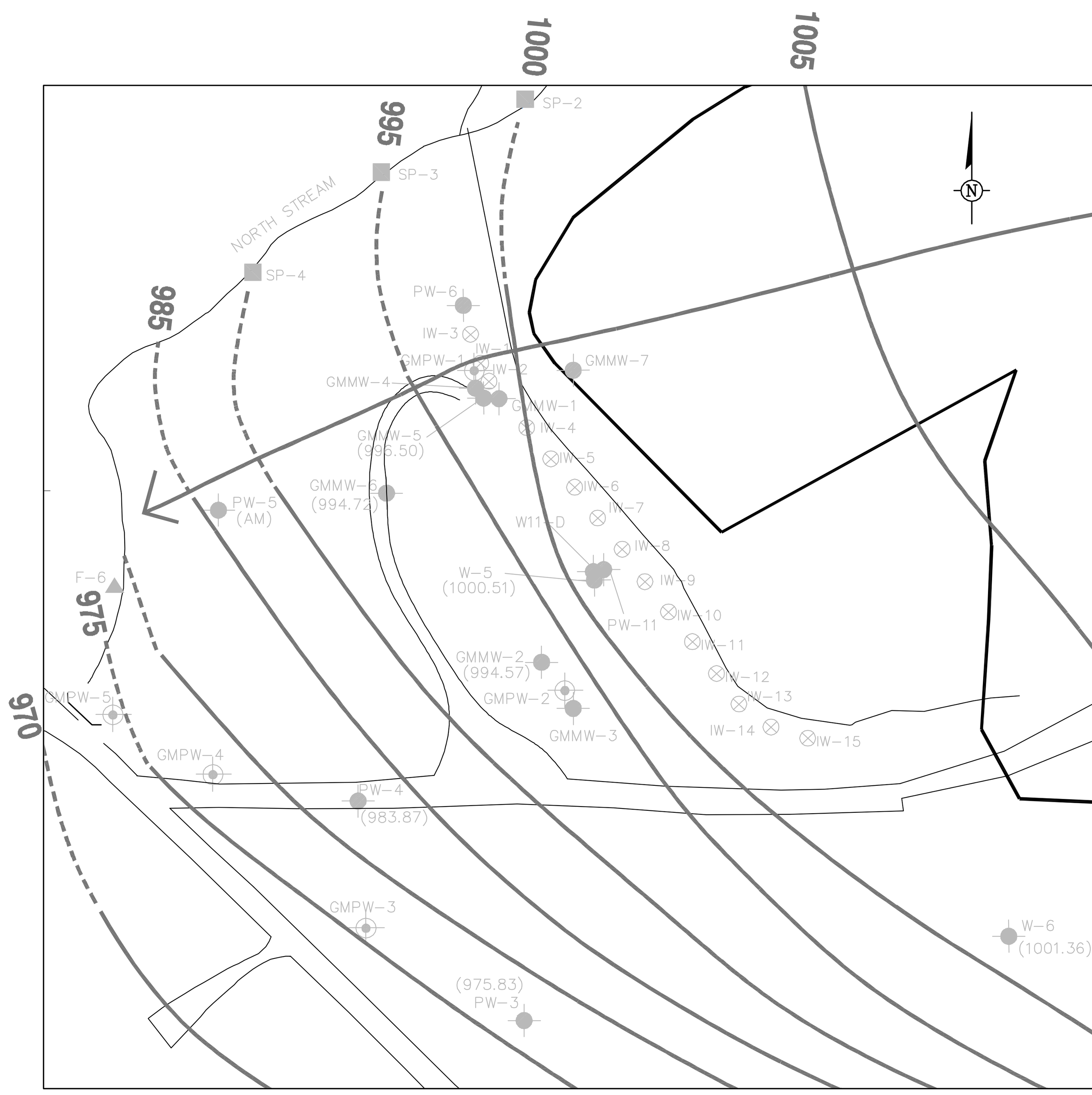
LOCATION AND DESIGNATION OF WELLS INCLUDED IN HYDRAULIC MEASUREMENT PROGRAM AND WATER-LEVEL ELEVATION IN FT MSL (WELL SYMBOL AND OTHER LTM COMPONENTS NOT SHOWN)

NOTES:

WATER-LEVEL ELEVATIONS AND GROUNDWATER FLOW DIRECTION BASED ON SEPTEMBER 13, 2005 WATER-LEVEL ROUND

FT MSL FEET RELATIVE TO MEAN SEA LEVEL

AM ANOMALOUS MEASUREMENT



SITE PLAN SHOWING PROJECT AREA

0 100' 200'
SCALE IN FEET

COLESVILLE LANDFILL
BROOME COUNTY, NEW YORK

SOIL BORING AND
SOIL VAPOR SAMPLE LOCATIONS

ARCADIS

FIGURE
1

ARCADIS

Appendix A

Soil Vapor Samples Analytical Data

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-5 (8.5')

Lab ID#: 0811050-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	g111415	**Date of Collection:** 10/30/08
Dil. Factor:	1.52	**Date of Analysis:** 11/14/08 07:39 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.15	0.54	0.75	2.6
Freon 114	0.15	Not Detected	1.1	Not Detected
Chloromethane	0.15	Not Detected	0.31	Not Detected
Vinyl Chloride	0.15	Not Detected	0.39	Not Detected
1,3-Butadiene	0.15	3.5	0.34	7.7
Bromomethane	0.15	0.16	0.59	0.64
Chloroethane	0.15	Not Detected	0.40	Not Detected
Freon 11	0.15	0.29	0.85	1.6
Ethanol	0.76	1.1	1.4	2.0
Freon 113	0.15	0.97	1.2	7.4
1,1-Dichloroethene	0.15	Not Detected	0.60	Not Detected
Acetone	0.76	19	1.8	45
2-Propanol	0.76	Not Detected	1.9	Not Detected
Carbon Disulfide	0.76	0.90	2.4	2.8
Methylene Chloride	0.30	Not Detected UJ	1.0	Not Detected UJ
Methyl tert-butyl ether	0.15	Not Detected	0.55	Not Detected
trans-1,2-Dichloroethene	0.15	Not Detected	0.60	Not Detected
Hexane	0.15	6.6	0.54	23
1,1-Dichloroethane	0.15	0.61	0.62	2.5
2-Butanone (Methyl Ethyl Ketone)	0.15	2.7	0.45	8.0
cis-1,2-Dichloroethene	0.15	Not Detected	0.60	Not Detected
Tetrahydrofuran	0.76	Not Detected	2.2	Not Detected
Chloroform	0.15	0.65	0.74	3.2
1,1,1-Trichloroethane	0.15	4.8	0.83	26
Cyclohexane	0.15	1.9	0.52	6.4
Carbon Tetrachloride	0.15	Not Detected	0.96	Not Detected
Benzene	0.15	2.4	0.48	7.7
1,2-Dichloroethane	0.15	Not Detected	0.62	Not Detected
Heptane	0.15	3.9	0.62	16
Trichloroethene	0.15	0.78	0.82	4.2
1,2-Dichloropropane	0.15	Not Detected	0.70	Not Detected
1,4-Dioxane	0.15	Not Detected	0.55	Not Detected
Bromodichloromethane	0.15	Not Detected	1.0	Not Detected
cis-1,3-Dichloropropene	0.15	Not Detected	0.69	Not Detected
4-Methyl-2-pentanone	0.15	Not Detected	0.62	Not Detected
Toluene	0.15	1.8	0.57	6.9
trans-1,3-Dichloropropene	0.15	Not Detected	0.69	Not Detected
1,1,2-Trichloroethane	0.15	Not Detected	0.83	Not Detected
Tetrachloroethene	0.15	0.21	1.0	1.4

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-5 (8.5')

Lab ID#: 0811050-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	g111415	**Date of Collection:**	**10/30/08**
Dil. Factor:	1.52	**Date of Analysis:**	**11/14/08 07:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	0.76	Not Detected	3.1	Not Detected
Dibromochloromethane	0.15	Not Detected	1.3	Not Detected
1,2-Dibromoethane (EDB)	0.15	Not Detected	1.2	Not Detected
Chlorobenzene	0.15	Not Detected	0.70	Not Detected
Ethyl Benzene	0.15	Not Detected	0.66	Not Detected
m,p-Xylene	0.15	0.34	0.66	1.5
o-Xylene	0.15	Not Detected	0.66	Not Detected
Styrene	0.15	Not Detected	0.65	Not Detected
Bromoform	0.15	Not Detected	1.6	Not Detected
Cumene	0.15	Not Detected	0.75	Not Detected
1,1,2,2-Tetrachloroethane	0.15	Not Detected	1.0	Not Detected
Propylbenzene	0.15	Not Detected	0.75	Not Detected
4-Ethyltoluene	0.15	Not Detected	0.75	Not Detected
1,3,5-Trimethylbenzene	0.15	Not Detected	0.75	Not Detected
1,2,4-Trimethylbenzene	0.15	Not Detected	0.75	Not Detected
1,3-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
1,4-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
alpha-Chlorotoluene	0.15	Not Detected UJ	0.79	Not Detected UJ
1,2-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
1,2,4-Trichlorobenzene	0.76	Not Detected	5.6	Not Detected
Hexachlorobutadiene	0.76	Not Detected	8.1	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	107	70-130
4-Bromofluorobenzene	98	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-6 (4')

Lab ID#: 0811050-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**g111416**	**Date of Collection:**	**10/30/08**
Dil. Factor:	**1.34**	**Date of Analysis:**	**11/14/08 08:19 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)		Rpt. Limit (uG/m3)	Amount (uG/m3)	
Freon 12	0.13	0.14	J	0.66	0.67	J
Freon 114	0.13	Not Detected		0.94	Not Detected	
Chloromethane	0.13	0.41		0.28	0.85	
Vinyl Chloride	0.13	Not Detected		0.34	Not Detected	
1,3-Butadiene	0.13	0.80		0.30	1.8	
Bromomethane	0.13	0.48		0.52	1.8	
Chloroethane	0.13	Not Detected		0.35	Not Detected	
Freon 11	0.13	Not Detected		0.75	Not Detected	
Ethanol	0.67	1.8		1.3	3.4	
Freon 113	0.13	0.16		1.0	1.3	
1,1-Dichloroethene	0.13	Not Detected		0.53	Not Detected	
Acetone	0.67	49		1.6	120	
2-Propanol	0.67	0.68		1.6	1.7	
Carbon Disulfide	0.67	Not Detected	J	2.1	Not Detected	J
Methylene Chloride	0.27	Not Detected	UJ	0.93	Not Detected	UJ
Methyl tert-butyl ether	0.13	Not Detected	J	0.48	Not Detected	J
trans-1,2-Dichloroethene	0.13	Not Detected		0.53	Not Detected	
Hexane	0.13	0.54		0.47	1.9	
1,1-Dichloroethane	0.13	Not Detected		0.54	Not Detected	
2-Butanone (Methyl Ethyl Ketone)	0.13	6.6		0.40	19	
cis-1,2-Dichloroethene	0.13	Not Detected		0.53	Not Detected	
Tetrahydrofuran	0.67	Not Detected		2.0	Not Detected	
Chloroform	0.13	0.21		0.65	1.0	
1,1,1-Trichloroethane	0.13	0.40		0.73	2.2	
Cyclohexane	0.13	Not Detected		0.46	Not Detected	
Carbon Tetrachloride	0.13	Not Detected		0.84	Not Detected	
Benzene	0.13	0.59		0.43	1.9	
1,2-Dichloroethane	0.13	Not Detected		0.54	Not Detected	
Heptane	0.13	0.24		0.55	1.0	
Trichloroethene	0.13	Not Detected		0.72	Not Detected	
1,2-Dichloropropane	0.13	Not Detected		0.62	Not Detected	
1,4-Dioxane	0.13	Not Detected		0.48	Not Detected	
Bromodichloromethane	0.13	Not Detected		0.90	Not Detected	
cis-1,3-Dichloropropene	0.13	Not Detected		0.61	Not Detected	
4-Methyl-2-pentanone	0.13	Not Detected		0.55	Not Detected	
Toluene	0.13	0.61		0.50	2.3	
trans-1,3-Dichloropropene	0.13	Not Detected		0.61	Not Detected	
1,1,2-Trichloroethane	0.13	Not Detected		0.73	Not Detected	
Tetrachloroethene	0.13	Not Detected	J	0.91	Not Detected	J

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-6 (4')

Lab ID#: 0811050-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	g111416	**Date of Collection:**	10/30/08
Dil. Factor:	1.34	**Date of Analysis:**	11/14/08 08:19 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	0.67	Not Detected J	2.7	Not Detected J
Dibromochloromethane	0.13	Not Detected	1.1	Not Detected
1,2-Dibromoethane (EDB)	0.13	Not Detected	1.0	Not Detected
Chlorobenzene	0.13	Not Detected	0.62	Not Detected
Ethyl Benzene	0.13	0.20	0.58	0.86
m,p-Xylene	0.13	0.18	0.58	0.77
o-Xylene	0.13	Not Detected	0.58	Not Detected
Styrene	0.13	0.73	0.57	3.1
Bromoform	0.13	Not Detected	1.4	Not Detected
Cumene	0.13	Not Detected	0.66	Not Detected
1,1,2,2-Tetrachloroethane	0.13	Not Detected	0.92	Not Detected
Propylbenzene	0.13	Not Detected	0.66	Not Detected
4-Ethyltoluene	0.13	0.16	0.66	0.81
1,3,5-Trimethylbenzene	0.13	Not Detected	0.66	Not Detected
1,2,4-Trimethylbenzene	0.13	0.19	0.66	0.95
1,3-Dichlorobenzene	0.13	Not Detected	0.80	Not Detected
1,4-Dichlorobenzene	0.13	Not Detected J	0.80	Not Detected J
alpha-Chlorotoluene	0.13	Not Detected UJ	0.69	Not Detected UJ
1,2-Dichlorobenzene	0.13	Not Detected J	0.80	Not Detected J
1,2,4-Trichlorobenzene	0.67	Not Detected J	5.0	Not Detected J
Hexachlorobutadiene	0.67	Not Detected J	7.1	Not Detected J

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	106	70-130
4-Bromofluorobenzene	100	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Rep 103108

Lab ID#: 0811050-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**z111708**	**Date of Collection:**	**10/31/08**
Dil. Factor:	**6.20**	**Date of Analysis:**	**11/17/08 02:01 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.62	6.4	3.1	32
Freon 114	0.62	Not Detected	4.3	Not Detected
Chloromethane	0.62	Not Detected	1.3	Not Detected
Vinyl Chloride	0.62	Not Detected	1.6	Not Detected
1,3-Butadiene	0.62	0.72	1.4	1.6
Bromomethane	0.62	Not Detected	2.4	Not Detected
Chloroethane	0.62	4.1	1.6	11
Freon 11	0.62	1.6	3.5	8.8
Ethanol	3.1	3.8	5.8	7.2
Freon 113	0.62	10	4.8	77
1,1-Dichloroethene	0.62	2.4	2.4	9.5
Acetone	3.1	12	7.4	29
2-Propanol	3.1	Not Detected	7.6	Not Detected
Carbon Disulfide	3.1	Not Detected	9.6	Not Detected
Methylene Chloride	1.2	Not Detected UJ	4.3	Not Detected UJ
Methyl tert-butyl ether	0.62	Not Detected	2.2	Not Detected
trans-1,2-Dichloroethene	0.62	Not Detected	2.4	Not Detected
Hexane	0.62	0.77	2.2	2.7
1,1-Dichloroethane	0.62	60	2.5	240
2-Butanone (Methyl Ethyl Ketone)	0.62	4.0	1.8	12
cis-1,2-Dichloroethene	0.62	36	2.4	140
Tetrahydrofuran	3.1	Not Detected	9.1	Not Detected
Chloroform	0.62	4.8	3.0	23
1,1,1-Trichloroethane	0.62	130	3.4	730
Cyclohexane	0.62	Not Detected	2.1	Not Detected
Carbon Tetrachloride	0.62	4.2 J	3.9	26 J
Benzene	0.62	0.66	2.0	2.1
1,2-Dichloroethane	0.62	Not Detected	2.5	Not Detected
Heptane	0.62	Not Detected	2.5	Not Detected
Trichloroethene	0.62	100	3.3	540
1,2-Dichloropropane	0.62	Not Detected	2.9	Not Detected
1,4-Dioxane	0.62	Not Detected	2.2	Not Detected
Bromodichloromethane	0.62	Not Detected	4.2	Not Detected
cis-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
4-Methyl-2-pentanone	0.62	Not Detected	2.5	Not Detected
Toluene	0.62	Not Detected	2.3	Not Detected
trans-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
1,1,2-Trichloroethane	0.62	Not Detected	3.4	Not Detected
Tetrachloroethene	0.62	Not Detected	4.2	Not Detected

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Rep 103108

Lab ID#: 0811050-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**z111708**	**Date of Collection: 10/31/08**
Dil. Factor:	**6.20**	**Date of Analysis: 11/17/08 02:01 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	3.1	Not Detected	13	Not Detected
Dibromochloromethane	0.62	Not Detected	5.3	Not Detected
1,2-Dibromoethane (EDB)	0.62	Not Detected	4.8	Not Detected
Chlorobenzene	0.62	Not Detected	2.8	Not Detected
Ethyl Benzene	0.62	Not Detected	2.7	Not Detected
m,p-Xylene	0.62	Not Detected	2.7	Not Detected
o-Xylene	0.62	Not Detected	2.7	Not Detected
Styrene	0.62	Not Detected	2.6	Not Detected
Bromoform	0.62	Not Detected	6.4	Not Detected
Cumene	0.62	Not Detected	3.0	Not Detected
1,1,2,2-Tetrachloroethane	0.62	Not Detected	4.2	Not Detected
Propylbenzene	0.62	Not Detected	3.0	Not Detected
4-Ethyltoluene	0.62	Not Detected	3.0	Not Detected
1,3,5-Trimethylbenzene	0.62	Not Detected	3.0	Not Detected
1,2,4-Trimethylbenzene	0.62	Not Detected	3.0	Not Detected
1,3-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,4-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
alpha-Chlorotoluene	0.62	Not Detected UJ	3.2	Not Detected UJ
1,2-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,2,4-Trichlorobenzene	3.1	Not Detected	23	Not Detected
Hexachlorobutadiene	3.1	Not Detected	33	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	116	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	99	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-4 (9')

Lab ID#: 0811050-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	z111707	Date of Collection:	10/31/08
Dil. Factor:	1.44	Date of Analysis:	11/17/08 01:11 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.14	0.37	0.71	1.8
Freon 114	0.14	Not Detected	1.0	Not Detected
Chloromethane	0.14	0.46	0.30	0.94
Vinyl Chloride	0.14	Not Detected	0.37	Not Detected
1,3-Butadiene	0.14	4.2	0.32	9.2
Bromomethane	0.14	Not Detected	0.56	Not Detected
Chloroethane	0.14	Not Detected	0.38	Not Detected
Freon 11	0.14	0.35	0.81	2.0
Ethanol	0.72	2.9	1.4	5.4
Freon 113	0.14	0.91	1.1	6.9
1,1-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Acetone	0.72	15	1.7	35
2-Propanol	0.72	Not Detected	1.8	Not Detected
Carbon Disulfide	0.72	1.1	2.2	3.4
Methylene Chloride	0.29	Not Detected UJ	1.0	Not Detected UJ
Methyl tert-butyl ether	0.14	Not Detected	0.52	Not Detected
trans-1,2-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Hexane	0.14	16	0.51	57
1,1-Dichloroethane	0.14	0.58	0.58	2.3
2-Butanone (Methyl Ethyl Ketone)	0.14	2.4	0.42	7.2
cis-1,2-Dichloroethene	0.14	Not Detected	0.57	Not Detected
Tetrahydrofuran	0.72	Not Detected	2.1	Not Detected
Chloroform	0.14	0.62	0.70	3.0
1,1,1-Trichloroethane	0.14	2.8	0.78	15
Cyclohexane	0.14	5.2	0.50	18
Carbon Tetrachloride	0.14	Not Detected	0.91	Not Detected
Benzene	0.14	3.6	0.46	11
1,2-Dichloroethane	0.14	Not Detected	0.58	Not Detected
Heptane	0.14	8.3	0.59	34
Trichloroethene	0.14	0.42	0.77	2.3
1,2-Dichloropropane	0.14	Not Detected	0.66	Not Detected
1,4-Dioxane	0.14	Not Detected	0.52	Not Detected
Bromodichloromethane	0.14	Not Detected	0.96	Not Detected
cis-1,3-Dichloropropene	0.14	Not Detected	0.65	Not Detected
4-Methyl-2-pentanone	0.14	Not Detected	0.59	Not Detected
Toluene	0.14	1.8	0.54	6.8
trans-1,3-Dichloropropene	0.14	Not Detected	0.65	Not Detected
1,1,2-Trichloroethane	0.14	Not Detected	0.78	Not Detected
Tetrachloroethene	0.14	Not Detected	0.98	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-4 (9')

Lab ID#: 0811050-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	z111707	**Date of Collection:**	10/31/08
Dil. Factor:	1.44	**Date of Analysis:**	11/17/08 01:11 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	0.72	Not Detected	2.9	Not Detected
Dibromochloromethane	0.14	Not Detected	1.2	Not Detected
1,2-Dibromoethane (EDB)	0.14	Not Detected	1.1	Not Detected
Chlorobenzene	0.14	Not Detected	0.66	Not Detected
Ethyl Benzene	0.14	0.18	0.62	0.79
m,p-Xylene	0.14	0.30	0.62	1.3
o-Xylene	0.14	0.15	0.62	0.64
Styrene	0.14	Not Detected	0.61	Not Detected
Bromoform	0.14	Not Detected	1.5	Not Detected
Cumene	0.14	Not Detected	0.71	Not Detected
1,1,2,2-Tetrachloroethane	0.14	Not Detected	0.99	Not Detected
Propylbenzene	0.14	Not Detected	0.71	Not Detected
4-Ethyltoluene	0.14	Not Detected	0.71	Not Detected
1,3,5-Trimethylbenzene	0.14	Not Detected	0.71	Not Detected
1,2,4-Trimethylbenzene	0.14	Not Detected	0.71	Not Detected
1,3-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
1,4-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
alpha-Chlorotoluene	0.14	Not Detected UJ	0.74	Not Detected UJ
1,2-Dichlorobenzene	0.14	Not Detected	0.86	Not Detected
1,2,4-Trichlorobenzene	0.72	Not Detected	5.3	Not Detected
Hexachlorobutadiene	0.72	Not Detected	7.7	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-2 (8')

Lab ID#: 0811050-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**z111709**	**Date of Collection:**	**10/31/08**
Dil. Factor:	**6.20**	**Date of Analysis:**	**11/17/08 02:32 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.62	6.3	3.1	31
Freon 114	0.62	Not Detected	4.3	Not Detected
Chloromethane	0.62	Not Detected	1.3	Not Detected
Vinyl Chloride	0.62	Not Detected	1.6	Not Detected
1,3-Butadiene	0.62	Not Detected	1.4	Not Detected
Bromomethane	0.62	Not Detected	2.4	Not Detected
Chloroethane	0.62	3.8	1.6	10
Freon 11	0.62	1.4	3.5	7.6
Ethanol	3.1	5.5	5.8	10
Freon 113	0.62	9.7	4.8	74
1,1-Dichloroethene	0.62	2.1	2.4	8.2
Acetone	3.1	14	7.4	34
2-Propanol	3.1	Not Detected	7.6	Not Detected
Carbon Disulfide	3.1	Not Detected	9.6	Not Detected
Methylene Chloride	1.2	Not Detected uJ	4.3	Not Detected uJ
Methyl tert-butyl ether	0.62	Not Detected	2.2	Not Detected
trans-1,2-Dichloroethene	0.62	0.82	2.4	3.2
Hexane	0.62	Not Detected	2.2	Not Detected
1,1-Dichloroethane	0.62	57	2.5	230
2-Butanone (Methyl Ethyl Ketone)	0.62	3.9	1.8	12
cis-1,2-Dichloroethene	0.62	34	2.4	130
Tetrahydrofuran	3.1	Not Detected	9.1	Not Detected
Chloroform	0.62	3.5	3.0	17
1,1,1-Trichloroethane	0.62	130	3.4	710
Cyclohexane	0.62	Not Detected	2.1	Not Detected
Carbon Tetrachloride	0.62	Not Detected J	3.9	Not Detected J
Benzene	0.62	Not Detected	2.0	Not Detected
1,2-Dichloroethane	0.62	Not Detected	2.5	Not Detected
Heptane	0.62	Not Detected	2.5	Not Detected
Trichloroethene	0.62	100	3.3	550
1,2-Dichloropropane	0.62	Not Detected	2.9	Not Detected
1,4-Dioxane	0.62	Not Detected	2.2	Not Detected
Bromodichloromethane	0.62	Not Detected	4.2	Not Detected
cis-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
4-Methyl-2-pentanone	0.62	Not Detected	2.5	Not Detected
Toluene	0.62	Not Detected	2.3	Not Detected
trans-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
1,1,2-Trichloroethane	0.62	Not Detected	3.4	Not Detected
Tetrachloroethene	0.62	Not Detected	4.2	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-2 (8')

Lab ID#: 0811050-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**z111709**	**Date of Collection:**	**10/31/08**
Dil. Factor:	**6.20**	**Date of Analysis:**	**11/17/08 02:32 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	3.1	Not Detected	13	Not Detected
Dibromochloromethane	0.62	Not Detected	5.3	Not Detected
1,2-Dibromoethane (EDB)	0.62	Not Detected	4.8	Not Detected
Chlorobenzene	0.62	Not Detected	2.8	Not Detected
Ethyl Benzene	0.62	Not Detected	2.7	Not Detected
m,p-Xylene	0.62	Not Detected	2.7	Not Detected
o-Xylene	0.62	Not Detected	2.7	Not Detected
Styrene	0.62	Not Detected	2.6	Not Detected
Bromoform	0.62	Not Detected	6.4	Not Detected
Cumene	0.62	Not Detected	3.0	Not Detected
1,1,2,2-Tetrachloroethane	0.62	Not Detected	4.2	Not Detected
Propylbenzene	0.62	Not Detected	3.0	Not Detected
4-Ethyltoluene	0.62	Not Detected	3.0	Not Detected
1,3,5-Trimethylbenzene	0.62	Not Detected	3.0	Not Detected
1,2,4-Trimethylbenzene	0.62	Not Detected	3.0	Not Detected
1,3-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,4-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
alpha-Chlorotoluene	0.62	Not Detected UJ	3.2	Not Detected UJ
1,2-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,2,4-Trichlorobenzene	3.1	Not Detected	23	Not Detected
Hexachlorobutadiene	3.1	Not Detected	33	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-1 (8')

Lab ID#: 0811050-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	g111419	**Date of Collection:**	10/31/08
Dil. Factor:	1.68	**Date of Analysis:**	11/14/08 10:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.17	0.30	0.83	1.5
Freon 114	0.17	Not Detected	1.2	Not Detected
Chloromethane	0.17	0.42	0.35	0.86
Vinyl Chloride	0.17	Not Detected	0.43	Not Detected
1,3-Butadiene	0.17	25	0.37	54
Bromomethane	0.17	0.72	0.65	2.8
Chloroethane	0.17	Not Detected	0.44	Not Detected
Freon 11	0.17	0.24	0.94	1.3
Ethanol	0.84	1.9	1.6	3.6
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Acetone	0.84	55	2.0	130
2-Propanol	0.84	Not Detected	2.1	Not Detected
Carbon Disulfide	0.84	3.2	2.6	9.8
Methylene Chloride	0.34	Not Detected UJ	1.2	Not Detected UJ
Methyl tert-butyl ether	0.17	Not Detected	0.60	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Hexane	0.17	10	0.59	36
1,1-Dichloroethane	0.17	Not Detected	0.68	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.17	8.6	0.50	25
cis-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Tetrahydrofuran	0.84	Not Detected	2.5	Not Detected
Chloroform	0.17	0.51	0.82	2.5
1,1,1-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Cyclohexane	0.17	3.0	0.58	10
Carbon Tetrachloride	0.17	Not Detected	1.0	Not Detected
Benzene	0.17	8.2	0.54	26
1,2-Dichloroethane	0.17	Not Detected	0.68	Not Detected
Heptane	0.17	6.8	0.69	28
Trichloroethene	0.17	Not Detected	0.90	Not Detected
1,2-Dichloropropane	0.17	Not Detected	0.78	Not Detected
1,4-Dioxane	0.17	Not Detected	0.60	Not Detected
Bromodichloromethane	0.17	Not Detected	1.1	Not Detected
cis-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
4-Methyl-2-pentanone	0.17	Not Detected	0.69	Not Detected
Toluene	0.17	3.7	0.63	14
trans-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
1,1,2-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Tetrachloroethene	0.17	Not Detected	1.1	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SV-1 (8')

Lab ID#: 0811050-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**g111419**	**Date of Collection:**	**10/31/08**
Dil. Factor:	**1.68**	**Date of Analysis:**	**11/14/08 10:36 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Hexanone	0.84	Not Detected	3.4	Not Detected
Dibromochloromethane	0.17	Not Detected	1.4	Not Detected
1,2-Dibromoethane (EDB)	0.17	Not Detected	1.3	Not Detected
Chlorobenzene	0.17	Not Detected	0.77	Not Detected
Ethyl Benzene	0.17	0.21	0.73	0.90
m,p-Xylene	0.17	0.40	0.73	1.7
o-Xylene	0.17	0.19	0.73	0.84
Styrene	0.17	Not Detected	0.72	Not Detected
Bromoform	0.17	Not Detected	1.7	Not Detected
Cumene	0.17	Not Detected	0.82	Not Detected
1,1,2,2-Tetrachloroethane	0.17	Not Detected	1.2	Not Detected
Propylbenzene	0.17	Not Detected	0.82	Not Detected
4-Ethyltoluene	0.17	Not Detected	0.82	Not Detected
1,3,5-Trimethylbenzene	0.17	Not Detected	0.82	Not Detected
1,2,4-Trimethylbenzene	0.17	Not Detected	0.82	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.17	Not Detected UJ	0.87	Not Detected UJ
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.84	Not Detected	6.2	Not Detected
Hexachlorobutadiene	0.84	Not Detected	9.0	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	119	70-130
Toluene-d8	108	70-130
4-Bromofluorobenzene	102	70-130

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Appendix B

Scenario-Specific Attenuation Factors Rationale Information

Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):

SV-1 – Loamy Sand

1) 7.5 % Gravel
2) 70 % Sand
3) 14.7 % Silt
4) 7.7 % Clay

14.7 % (Silt) + 1.5 x 7.7 % (Clay) = 26.25 %

14.7 % (Silt) + 2 x 7.7 % (Clay) = 30.1 %

Loamy Sand:
1) Between 70 and 91 % Sand
2) % of Silt + 1.5 x % Clay >15 %
3) % of Silt + 2 x % Clay <30 %

Reference: United States Department of Agriculture Soil Survey Manual (USDA, 1993)

Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):

SV-2 – Loamy Sand

1) 47.7 % Gravel
2) 39.1 % Sand
3) 7 % Silt
4) 6.1 % (Clay)

7 % (Silt) + 1.5 x 6.1 % (Clay) = 16.15 %

7 % (Silt) + 2 x 6.1 % (Clay) = 19.2 %

Loamy Sand:

1) Between 70 and 91 % Sand
2) % of Silt + 1.5 x % Clay >15 %
3) % of Silt + 2 x % Clay <30 %

Reference: United States Department of Agriculture Soil Survey Manual (USDA, 1993)

Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):

SV-4 – Loamy Sand

1) 47.9 % Gravel
2) 39.4 % Sand
3) 7.7 % Silt
4) 5.1 % Clay

7.7 % (Silt) + 1.5 x 5.1 % (Clay) = 15.35 %

7.7 % (Silt) + 2 x 5.1 % (Clay) = 17.9 %

Loamy Sand:

1) Between 70 and 91 % Sand
2) % of Silt + 1.5 x % Clay >15 %
3) % of Silt + 2 x % Clay <30 %

Reference: United States Department of Agriculture Soil Survey Manual (USDA, 1993)

Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):

SV-5 – Loamy Sand

1) 46.8 % Gravel
2) 40.2 % Sand
3) 7.9 % Silt
4) 5.2 % Clay

7.9 % (Silt) + 1.5 x 5.2 % (Clay) = 15.7 %

7.9 % (Silt) + 2 x 5.2 % (Clay) = 18.3 %

Loamy Sand:
1) Between 70 and 91 % Sand
2) % of Silt + 1.5 x % Clay >15 %
3) % of Silt + 2 x % Clay <30 %

Reference: United States Department of Agriculture Soil Survey Manual (USDA, 1993)

Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):

SV-6 – Loam

1) 0.3 % Gravel

2) 49.0 % Sand

2) 32.4 % Silt

3) 18.4 % Clay

Loam:

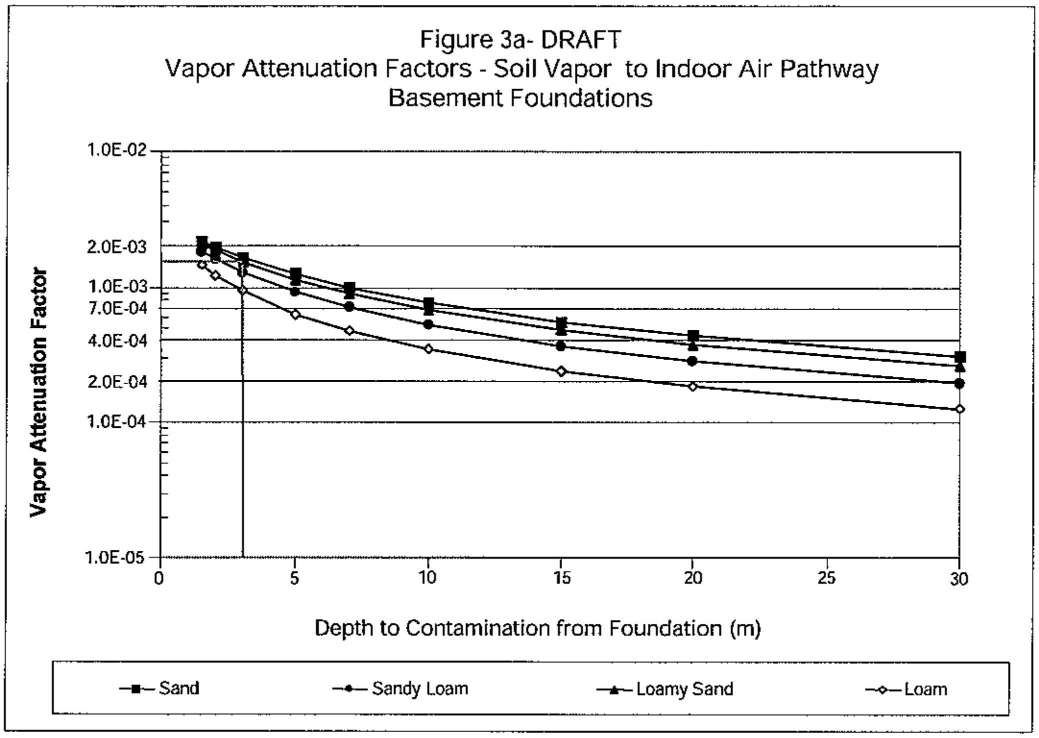
1) 7 to 27 % Clay

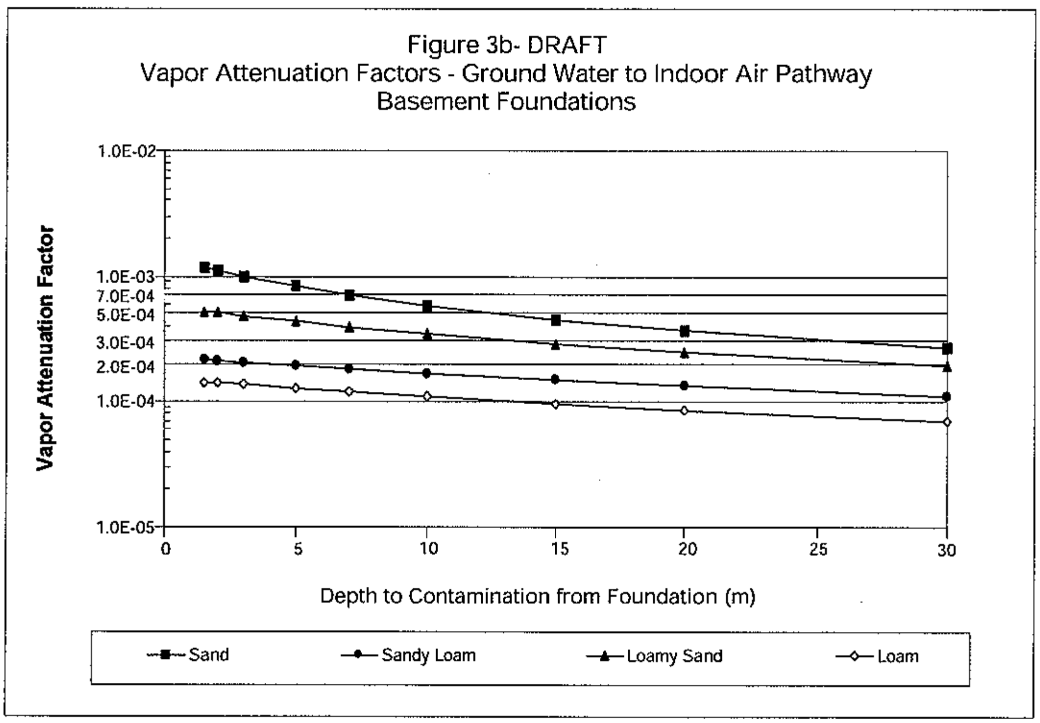
2) 28 to 50 % Silt

3) 52 % or less Sand

Reference: United States Department of Agriculture Soil Survey Manual (USDA, 1993)

Loamy Sand - SV-1, SV-2, SV-4, and SV-5





Loam - SV-6

Figure 3a- DRAFT
Vapor Attenuation Factors - Soil Vapor to Indoor Air Pathway
Basement Foundations

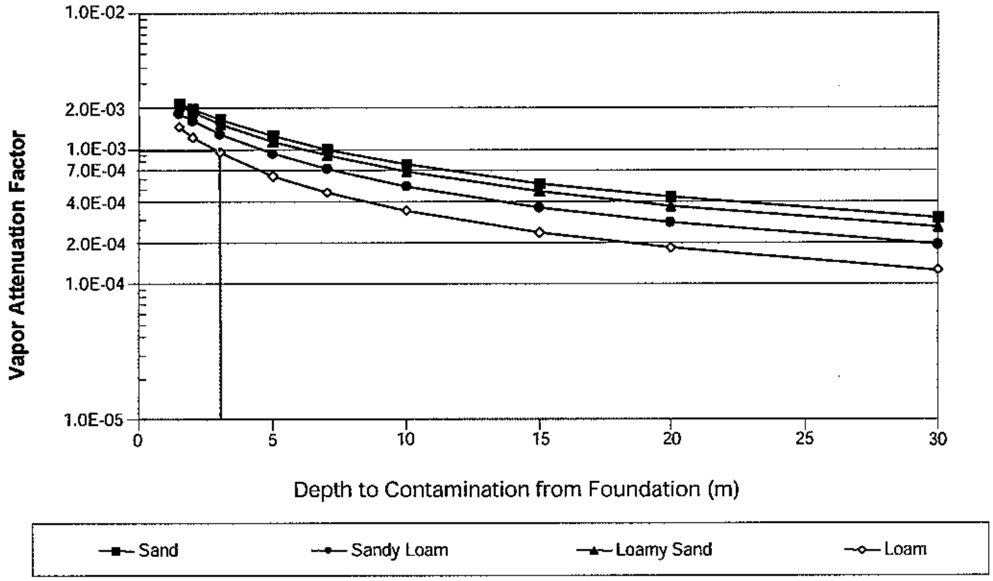
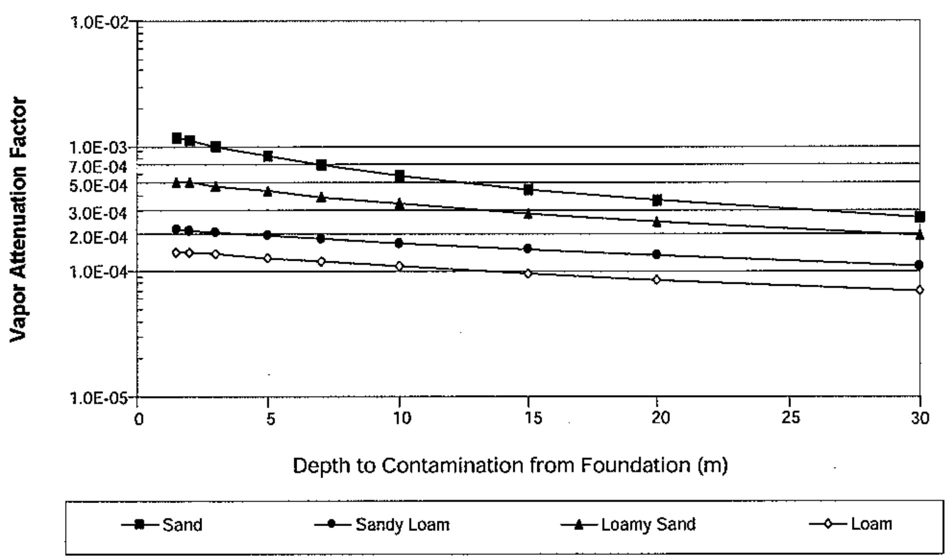


Figure 3b- DRAFT
Vapor Attenuation Factors - Ground Water to Indoor Air Pathway
Basement Foundations



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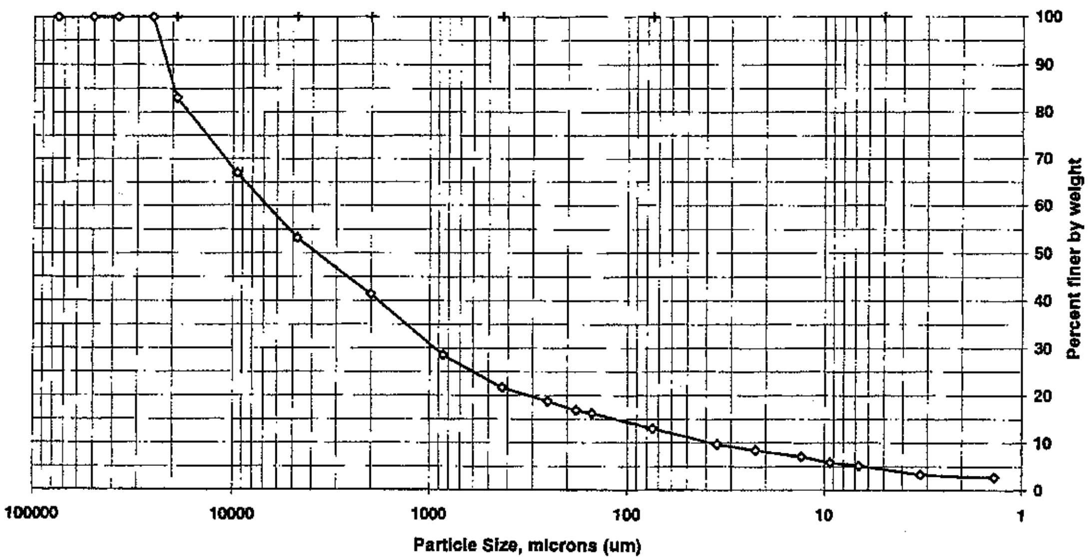
Appendix C

Particle Size Analyses Laboratory Data

Particle Size of Soils by ASTM D422

Client Code:	STLCTS	**SDG:**	22071081	**Date Received:**	11/5/2008
Sample ID:	SV-5(6.5-8.5)	**ETR(s):**	128675	**Start Date:**	11/10/2008
Lab ID:	774608			**End Date:**	12/1/2008

Percent Solids:	95.9%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	subangular
Maximum Particle Size:	25 mm	**Hardness (> #10):**	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	83.1	16.9
3/8 inch	9500	66.9	16.2
#4	4750	53.2	13.7
#10	2000	41.4	11.8
#20	850	28.6	12.8
#40	425	21.6	7.0
#60	250	18.8	2.8
#80	180	16.8	1.9
#100	150	16.3	0.6
#200	75	13.0	3.3
Hydrometer	35.2	9.7	3.3
|	22.5	8.4	1.3
|	13.1	7.1	1.3
|	9.3	5.8	1.3
|	6.7	5.2	0.6
|	3.2	3.3	1.8
V	1.4	2.7	0.6

Soil Classification	Percent of Total Sample
Gravel	46.8
Sand	40.2
Coarse Sand	11.8
Medium Sand	19.8
Fine Sand	8.6
Silt	7.9
Clay	5.2

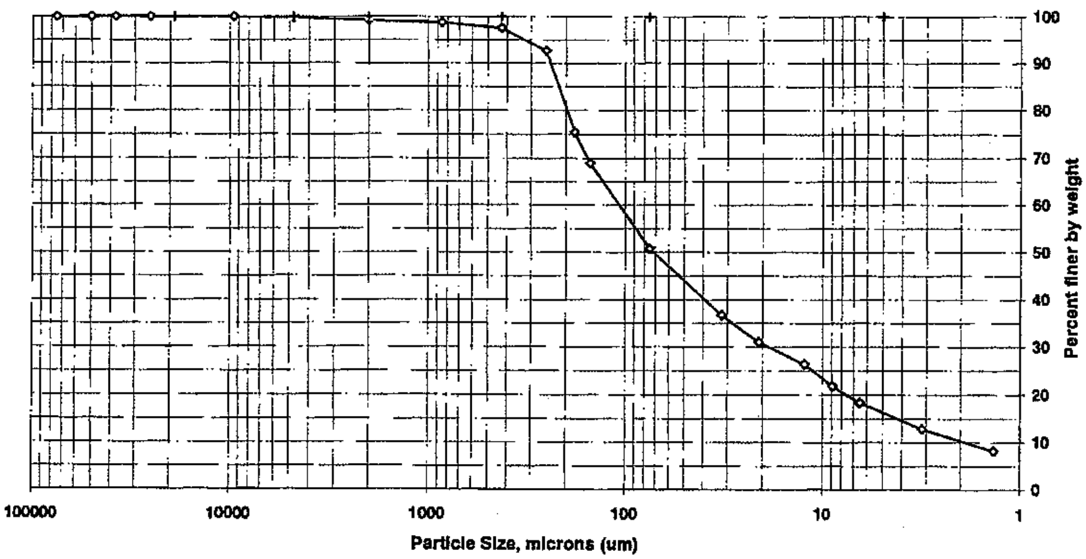
Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

FSL024:07.29.05:0

Particle Size of Soils by ASTM D422

Client Code:	STLCTS	**SDG:**	22071081	**Date Received:**	11/5/2008
Sample ID:	SV-6(2-4)	**ETR(s):**	128675	**Start Date:**	11/10/2008
Lab ID:	774609			**End Date:**	12/1/2008

Percent Solids:	85.0%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	subangular
Maximum Particle Size:	9.5 mm	**Hardness (> #10):**	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.2	0.5
#20	850	98.7	0.6
#40	425	97.5	1.1
#60	250	92.7	4.8
#80	180	75.5	17.2
#100	150	68.9	6.6
#200	75	50.8	18.1
Hydrometer	32.0	36.7	14.0
|	20.9	31.0	5.7
|	12.3	26.4	4.6
|	8.9	21.8	4.6
|	6.5	18.4	3.4
|	3.1	12.8	5.6
V	1.4	8.2	4.6

Soil Classification	Percent of Total Sample
Gravel	0.3
Sand	49.0
Coarse Sand	0.5
Medium Sand	1.7
Fine Sand	46.8
Silt	32.4
Clay	18.4

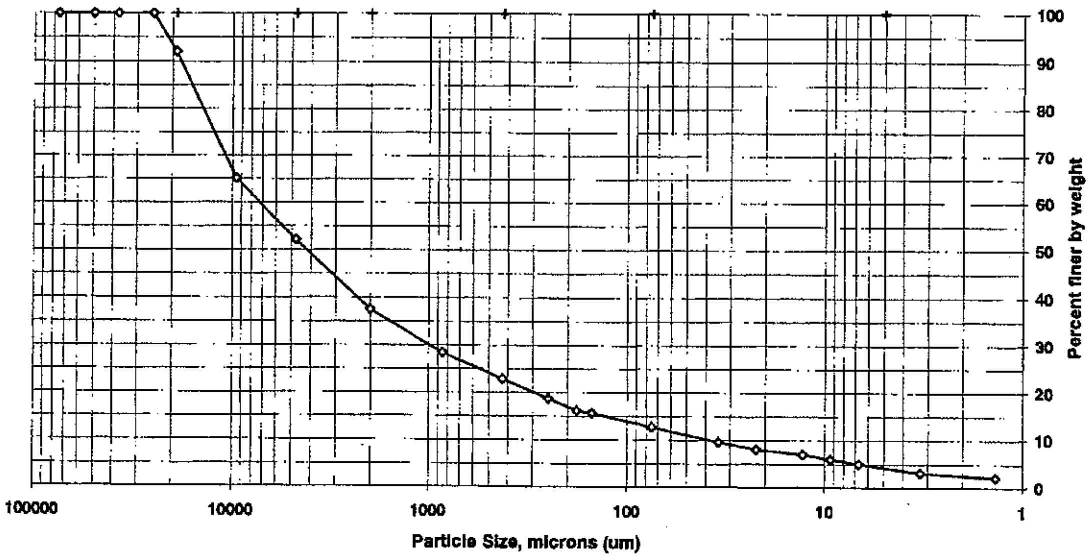
Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

FSL024:07.29.05:0

Particle Size of Soils by ASTM D422

Client Code:	STLCTS	**SDG:**	22071081	**Date Received:**	11/5/2008
Sample ID:	SV-4(7-9)	**ETR(s):**	128675	**Start Date:**	11/10/2008
Lab ID:	774610			**End Date:**	12/1/2008

Percent Solids:	95.3%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	subrounded
Maximum Particle Size:	25 mm	**Hardness (> #10):**	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	92.0	8.0
3/8 inch	9500	65.1	26.9
#4	4750	52.1	13.1
#10	2000	37.5	14.5
#20	850	28.4	9.1
#40	425	22.9	5.5
#60	250	18.8	4.1
#80	180	16.2	2.5
#100	150	15.7	0.5
#200	75	12.7	3.0
Hydrometer	34.4	9.6	3.1
|	22.1	8.1	1.5
|	12.9	7.1	1.0
|	9.4	6.1	1.0
|	6.7	5.1	1.0
|	3.3	3.1	1.9
V	1.4	2.1	1.0

Soil Classification	Percent of Total Sample
Gravel	47.9
Sand	39.4
Coarse Sand	14.5
Medium Sand	14.6
Fine Sand	10.2
Silt	7.7
Clay	5.1

Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

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Particle Size of Soils by ASTM D422

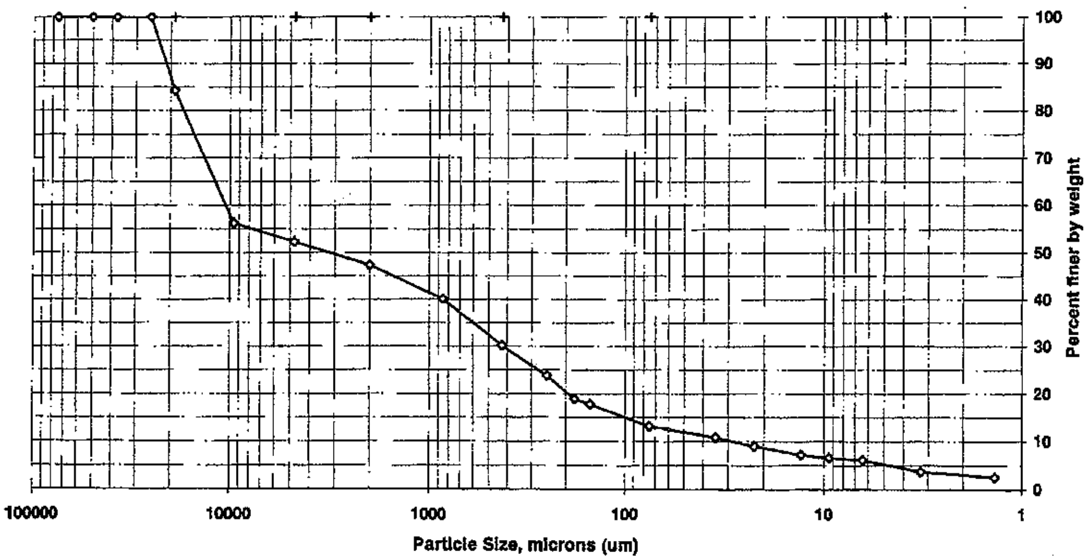
Client Code: STLCTS
Sample ID: SV-2(6-8)
Lab ID: 774611

SDG: 22071081
ETR(s): 128675

Date Received: 11/5/2008
Start Date: 11/10/2008
End Date: 12/1/2008

Percent Solids: 93.8%
Specific Gravity: 2.650
Maximum Particle Size: 25 mm

Non-soil material: na
Shape (> #10): subrounded
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	84.3	15.7
3/8 inch	9500	56.2	28.1
#4	4750	52.3	3.9
#10	2000	47.3	4.9
#20	850	40.1	7.2
#40	425	30.2	9.9
#60	250	23.8	6.4
#80	180	18.9	4.9
#100	150	17.7	1.2
#200	75	13.1	4.6
Hydrometer	34.6	10.8	2.3
|	22.2	9.0	1.8
|	13.0	7.2	1.8
|	9.4	6.6	0.6
|	6.4	6.1	0.5
|	3.3	3.7	2.4
V	1.4	2.5	1.2

Soil Classification	Percent of Total Sample
Gravel	47.7
Sand	39.1
Coarse Sand	4.9
Medium Sand	17.1
Fine Sand	17.1
Silt	7.0
Clay	6.1

Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

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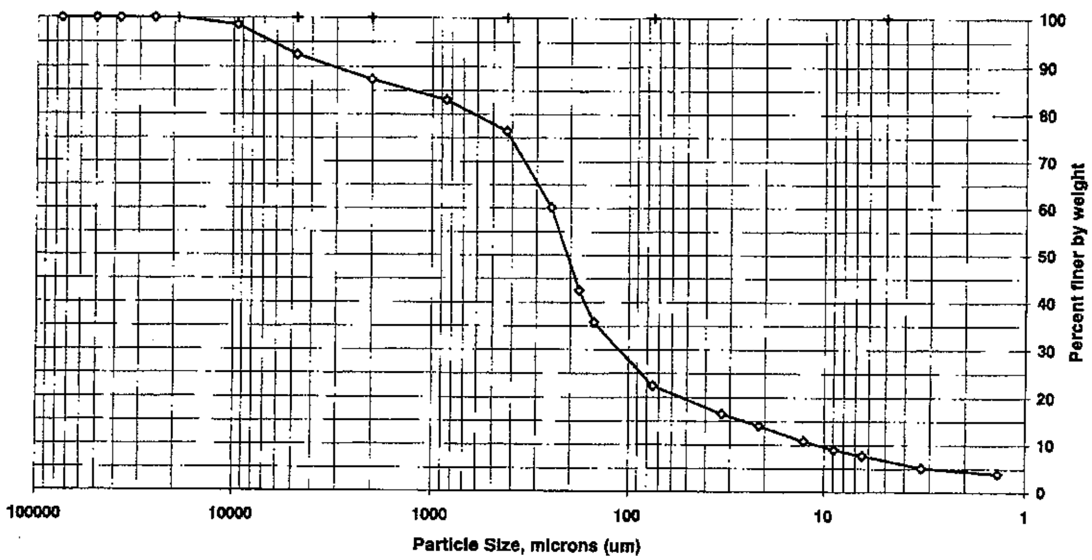
Particle Size of Soils by ASTM D422

Client Code:	STLCTS	**SDG:**	22071081	**Date Received:**	11/5/2008
Sample ID:	SV-1(6-8)	**ETR(s):**	128675	**Start Date:**	11/10/2008
Lab ID:	774612			**End Date:**	12/1/2008

Percent Solids:	90.6%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	subangular
Maximum Particle Size:	19 mm	**Hardness (> #10):**	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	98.6	1.4
#4	4750	92.5	6.1
#10	2000	87.3	5.1
#20	850	83.1	4.3
#40	425	76.4	6.7
#60	250	60.1	16.3
#80	180	42.5	17.7
#100	150	35.8	6.7
#200	75	22.4	13.3
Hydrometer	33.0	16.6	5.8
|	21.3	14.1	2.5
|	12.6	10.9	3.2
|	8.9	9.0	1.9
|	6.5	7.7	1.3
|	3.3	5.2	2.5
V	1.4	3.9	1.3

Soil Classification	Percent of Total Sample
Gravel	7.5
Sand	70.0
Coarse Sand	5.1
Medium Sand	10.9
Fine Sand	54.0
Silt	14.7
Clay	7.7

Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

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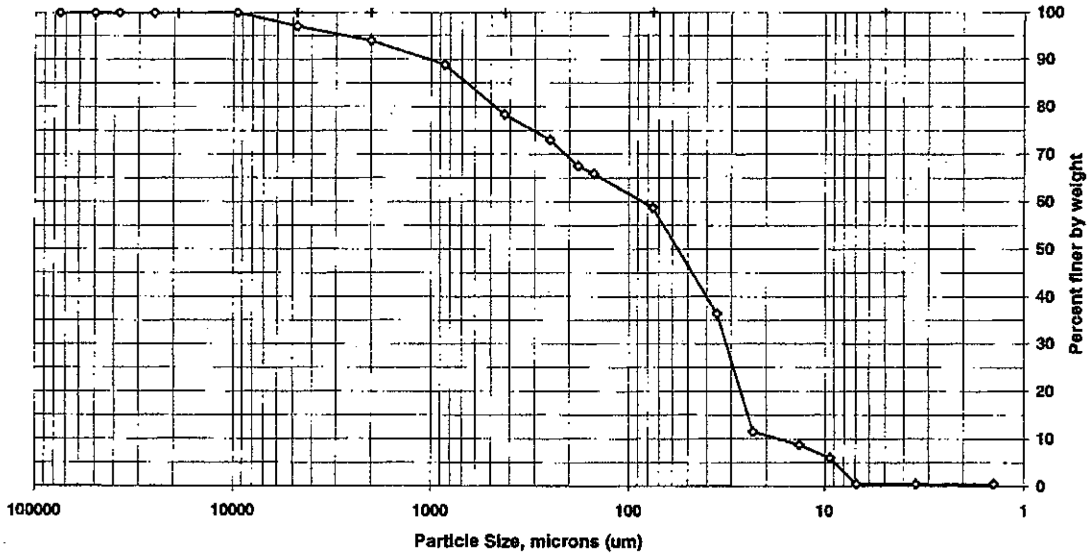
Particle Size of Soils by ASTM D422

Client Code:	STLCTS	**SDG:**	22071081	**Date Received:**	11/5/2008
Sample ID:	SV-3(3.2-5.2)	**ETR(s):**	128675	**Start Date:**	11/10/2008
Lab ID:	774613			**End Date:**	12/1/2008

Percent Solids:	28.3%	**Non-soil material:**	plant
Specific Gravity:	2.650	**Shape (> #10):**	subangular
Maximum Particle Size:	9.5 mm	**Hardness (> #10):**	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	97.1	2.9
#10	2000	94.0	3.1
#20	850	88.8	5.2
#40	425	78.4	10.4
#60	250	73.0	5.4
#80	180	67.5	5.4
#100	150	65.9	1.6
#200	75	58.7	7.2
Hydrometer	35.3	36.4	22.4
|	23.3	11.5	24.9
|	13.5	8.7	2.8
|	9.4	6.0	2.8
|	6.9	0.5	5.5
|	3.5	0.5	0.0
V	1.4	0.5	0.0

Soil Classification	Percent of Total Sample
Gravel	2.9
Sand	38.4
Coarse Sand	3.1
Medium Sand	15.6
Fine Sand	19.7
Silt	58.3
Clay	0.5

Preparation Method: **D2217**
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

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APPENDIX G – EXCAVATION WORK PLAN (EWP)

1 INTRODUCTION

This Excavation Work Plan (EWP) has been prepared as an Appendix to the Site Management Plan and will be implemented to address soil excavation and management activities that may be conducted in connection with future activities at the site.

2 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1: Notifications*

Name	Contact Information
Payson Long, NYSDEC Project Manager	(518) 402-9813 payson.long@dec.ny.gov
Chris Mannes, NYSDEC Region 7 - Regional Engineer	(315) 426-7519 chris.mannes@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	(518) 402-9813 kelly.lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;

- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix I of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

3 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections 7 and 8 of this Appendix.

4 SOIL STAGING METHODS

Stockpiles of excavated material will, at minimum, be placed on top of polyethylene sheeting. If necessary, stockpiles of excavated material will be placed within an engineered staging area (which may include a bermed area with a continuous liner, a liquid collection sump, and a stone drainage layer). Stockpiles will be kept covered whenever soil is not actively being placed into or removed from the stockpile, during overnight/weekend hours, during periods of precipitation, or whenever dust action levels are exceeded with appropriately anchored impervious covers (e.g., tarps or plastic sheeting) to reduce potential infiltration of precipitation, migration of wind-blown dust, and direct contact exposures. Stockpiles will be routinely inspected and damaged covers will be promptly replaced.

During all soil disturbance activities, erosion and sediment controls will be employed in accordance with this EWP and in conformance with applicable laws and regulations (good work practices that require erosion and sediment controls are not limited to potentially impacted areas). Proven soil conservation practices will be incorporated in any such plans to mitigate soil erosion, off-site sediment migration, and water pollution from erosion. Such practices would include the use of sediment control and erosion control measures (hay bales, silt fence, etc.) or other methods (e.g., inlet protection as needed near catch basins, surface waters and other discharge points) to prevent soil from entering these features. Appropriate temporary erosion and sediment control measures (e.g., silt fencing, hay bales, etc.) will be installed and maintained around all impacted and potentially impacted soil/fill stockpiles during such activities. Such stockpiles will be graded and compacted as necessary for positive surface water runoff and dust control. Stockpiles will be located and sized to minimize potential for material or runoff to enter discharge points.

Stockpiles will be segregated on site based on the soil/material type. These soil/material types will include impacted soils, reuse soil, and imported fill.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site.

5 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional (QEP) or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are responsible for safe execution of all intrusive and other work, including the structural integrity of excavations and structures such as subsurface utilities and buildings that may be affected by excavations.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

The QEP will be responsible for monitoring that all egress points for truck and equipment transport from the Site are clean of soil and other materials derived from the Site during intrusive excavation activities. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking. If there is evidence of off-site soil tracking, trucks will be cleaned (via approved dry or wet methods) of loose soil found on the outside of vehicle or tires prior to exiting the Site.

The QEP will be responsible for monitoring that all egress points for truck and equipment transport from the Site are clean of soil and other materials derived from the Site during intrusive excavation activities. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking. If there is evidence of off-site soil tracking, trucks will be cleaned (via approved dry or wet methods) of loose soil found on the outside of vehicle or tires prior to exiting the Site.

6 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the Site will be secured with tight-fitting water-proof tarpaulin covers. At a minimum, trucks transporting any material off-site shall be water-tight and structurally sound, have competent cover systems, and functional locking tailgates. The bed and sidewalls of each dump box or trailer will be completely lined with not less than 6-mil polyethylene sheeting prior to loading contaminated waste. Loose-fitting canvas-type truck covers or mesh covers will be prohibited. All trucks transporting impacted material will be decontaminated prior to leaving the Site. Decontamination water, if any, will be collected and disposed of off-site in an appropriate manner.

Truck transport routes are as follows:

- Exit the Site to the right onto East Windsor Road;
- Turn left onto Center Village Loop Road;
- Proceed to Old Bridge Street and turn left;
- At Route 79, turn right and proceed to Route 88.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

It is the contractor's responsibility to follow all applicable State, local, and municipal rules, regulations, and guidelines (including Broome County Department of Transportation and NYSDOT) regarding truck routes. Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited. Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

7 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6NYCRR Parts 360. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360 Registration Facility).

[X]-7 MATERIALS REUSE ON-SITE

This section provides details for methods to be followed for materials reuse on-site. 'Reuse on-site' applies to material that originates at the site and which does not leave the site during the excavation. Material reuse on-site will comply with the requirements of NYSDEC DER-10 Section 5.4(e)4.

Excavated material that is visibly stained or exhibits an obvious odor shall be considered potentially impacted and stockpiled on site for further assessment. Potentially impacted material shall be placed on polyethylene sheeting in stockpiles not to exceed 250 cubic yards (CY). The stockpiled potentially impacted material shall be covered whenever soil is not actively being placed onto or removed from the stockpile, during overnight/weekend hours, during periods of precipitation, or whenever dust action levels are exceeded. This material shall be covered using polyethylene sheeting to reduce potential infiltration of precipitation, migration of wind-blown dust, and direct contact exposures.

Prior to reuse, soil samples will be collected from the stockpiled potentially impacted material and analyzed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory to evaluate whether the material can be reused at the Site or must be transported for off-site disposal. One grab sample and one composite sample shall be collected for each 250 CY of potentially impacted soil. The grab sample will be analyzed for target compound list (TCL) volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260. Each composite sample shall be formed using individual grab samples collected from five locations within each stockpile (i.e., five discrete grab samples per composite). The composite sample shall be formed by placing equal portions of soil from each of the five discrete grab sampling locations into a pre-cleaned, stainless steel bowl. The composite sample shall be thoroughly homogenized using a stainless steel scoop or trowel before being transferred into the sample containers provided by the laboratory. The filled sample containers shall be labeled and transported to the laboratory using a chain-of-custody form. The composite sample will be submitted for the following analyses:

- TCL semi-volatile organic compounds (SVOCs) using EPA Method 8270
- TCL polychlorinated biphenyls (PCBs) using EPA Method 8082
- TCL pesticides
- Total cyanide using EPA Method 9012
- Target analyte list (TAL) metals using EPA Methods 6010 and 7471
- Hexavalent chromium using EPA Method 7196

Chemical criteria for on-site reuse of material will be the Restricted Use Protection of Public Health Commercial Use SCOs and Protection of Groundwater SCOs presented in 6 NYCRR Part 375. The QEP will document that procedures defined for materials reuse in this EWP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

9 FLUIDS MANAGEMENT

All impacted liquids to be removed from the site, including but not limited to, excavation dewatering and decontamination waters will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Groundwater monitoring purge and development water will be recharged back to the land surface (but not directly to the subsurface) based on previous agreements with the NYSDEC. Excavation dewatering and decontamination waters will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

10 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Record of Decision.

11 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the QEP and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards to be used for the Site are 6 NYCRR Part 375 Restricted Use Protection of Public Health Commercial Use SCOs and Protection of Groundwater SCOs. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Samples will be collected from imported fill in accordance with the analytical sampling requirements of DER-10 and the frequency requirements in NYSDEC's Soil Cleanup Guidance CP-51. At a minimum, samples will be analyzed for inorganics, pesticides, PCBs, VOCs, and SVOCs in accordance with the analytes for the Restricted Commercial Use SCOs listed in Table 375-6.8(b) of 6 NYCRR Part 375. The frequency and type of the sampling (i.e., discrete or composite) will be based on the quantity of material imported in accordance with sur of CP-51.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

12 STORMWATER POLLUTION PREVENTION

For construction activities that will involve the disturbance of greater than 1 acre of land, a Stormwater Pollution Prevention Plan (SWPPP) shall be developed and implemented to address erosion and sediment control measures. The following stormwater management practices will be completed in accordance with the requirements in the New York State Stormwater Management Design Manual, latest revision.

Silt fencing and/or hay bale checks will be installed for erosion control around the entire perimeter of the construction area and will be inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

13 EXCAVATION CONTINGENCY PLAN

Identification of unknown or unexpected potentially impacted media identified by screening during intrusive site work will be promptly communicated to Broome County and Broome County will notify NYSDEC's Project Manager.

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

In the event that potential impacts are encountered at unexpected depths or locations, Site activities will be suspended and Broome County will be notified and will evaluate the observed conditions. Broome County may determine that laboratory testing is required to evaluate the observed conditions for concentrations and characteristics. If the encountered materials are determined to be impacted, then the encountered materials will be segregated and stockpiled for disposal at a Broome County approved facility.

If determining the nature of the encountered materials requires further assessment, sampling will be performed on surrounding soil and groundwater, as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL VOCs and SVOCs, TCL pesticides, PCBs, and cyanide). In the event that future sampling results provide a sufficient justification to limit the list of analytes, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

14 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will consist of a real-time monitoring and action level reporting system. The CAMP will be implemented during all intrusive activity on the Site and will be performed in accordance with a project-specific CAMP that will be prepared in accordance with the NYSDOH Generic CAMP (Appendix 1A of DER-10). The NYSDOH Generic CAMP and the Fugitive Dust and Particulate Monitoring (Appendix 1B of DER-10) set forth minimum requirements applicable to a project-specific CAMP. Air monitoring station locations will be chosen based on generally prevailing wind conditions and adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

15 ODOR CONTROL PLAN

The following text should be included as part of this section:

This odor control plan provides the means and methods for controlling emissions of nuisance odors off-site [and on-site, if there are residents or tenants on the property]. Specific odor control methods to be used on a routine basis will include all reasonable and necessary means as described in the following paragraph. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of Broome County and its contractors, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems.

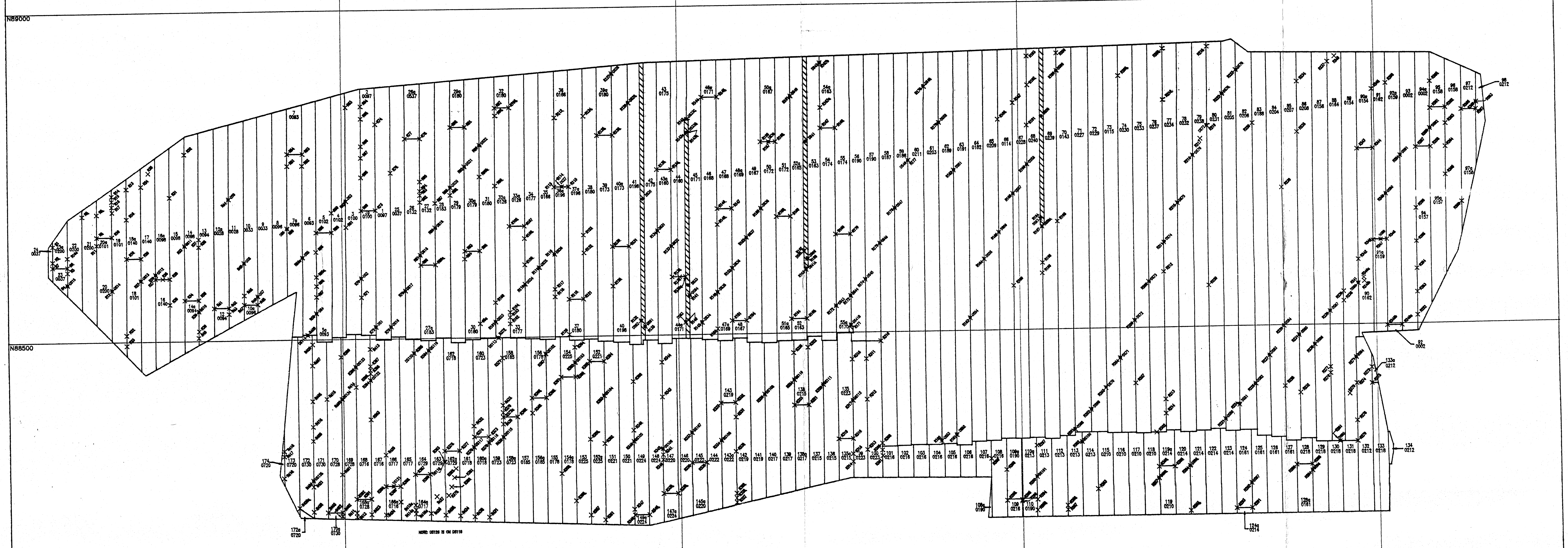
[X]-15 DUST CONTROL PLAN

Dust which derives from Site contaminants may cause a nuisance to some Site workers and the surrounding community, even though the contaminants are at levels well below the action levels defined in the CAMP. Dust monitoring will be performed in accordance with the project-specific CAMP. Real-time air monitoring may be implemented at representative upwind and downwind locations in the vicinity of the intrusive activities for particulate matter less than 10 microns in diameter (PM10). Perimeter monitoring will include the use of a real-time particulate monitoring instrument. As required by the NYSDOH Generic CAMP, real-time airborne particulate monitoring will be conducted continuously during intrusive activities, including soil excavation, backfilling, and related soil handling. Fugitive dust migration will be visually assessed during work activities, and reasonable dust suppression techniques will be used during Site activities that may generate fugitive dust.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

APPENDIX H
LANDFILL CAP AS-BUILT DRAWING



KEY

● = DESTRUCTIVE TEST LOCATION

▨ = SEAM REPAIR (CAP STRIP)

COLESVILLE LANDFILL CLOSURE	
LINER AS BUILT	
DATE: 10/21/95	PROJECT: 9501
SHEET 1 OF 1	SCALE: 1"=80'
CHENANGO CONTRACTING INC.	
18 THOMAS STREET BINGHAMTON NY 13901 (607) 648-8500	

LEGEND:

EXISTING TREE
EXISTING WOODS
EXISTING BUILDING
960 EXISTING GROUND SURFACE ELEVATION CONTOUR (IN FEET, MSL)
EXISTING ROADWAY
EXISTING STREAMS/WATER BODIES
+1054.7 EXISTING SPOT ELEVATION
PW-2 PROPOSED PUMPING WELL (NOT IN CONTRACT)
W-1 MONITORING WELL/PILOT WELL
B-9 TEST BORING
PZ-1S PIEZOMETER
SG-1 STAFF GAGE
RILEY WATER SUPPLY WELL
TP-1 TEST PIT
PROPERTY BOUNDARY
APPROXIMATE LIMIT OF LANDFILL
PROPOSED DRAINAGE SWALE
1050 PROPOSED CONTOUR
PROPOSED BORROW AREA
LANDFILL AREA
WETLAND LIMIT
LS-03 APPROXIMATE SEEP LOCATION
G PROPOSED GAS COLLECTION LINE
PROPOSED PASSIVE GAS VENT
S PROPOSED SEEP COLLECTION LINE (NOT IN CONTRACT)
PROPOSED PUMP STATION (NOT IN CONTRACT)
PROPOSED PERIMETER FENCE

WELL COORDINATE CHART

WELL #	NORTHING	EASTING
W-1	788,508.7	769,341.0
W-2D	788,901.8	770,945.7
W-3	788,881.9	769,509.3
W-10	788,903.0	770,170.5
W11-D	788,386.5	768,688.3
W-12D	788,418.6	770,753.5
W-24	788,440.8	769,702.1
PW-12	788,469.7	769,177.3
PW-13	788,462.4	769,640.6

NOTES:

1. TOPOGRAPHIC MAPPING WAS PREPARED PHOTOGRAMMETRICALLY BY R.M. KEDDALL ASSOCIATES FROM AERIAL PHOTOGRAPHY DATED 12-31-91.
2. TOPOGRAPHIC MAPPING CONTROL WAS PROVIDED BY WEHRAN ENGINEERING AND IS BASED UPON U.S.G.S. DATUM OF 1929. ELEVATIONS WITHIN THE LANDFILL LIMIT HAVE BEEN FIELD VERIFIED BY WEHRAN ENGINEERING, INC.
3. PROPERTY LINE LOCATION BASED UPON FIELD SURVEY PERFORMED BY WEHRAN ENGINEERING, NOVEMBER 1992.
4. LIMITS OF LANDFILL SHOWN ON THIS PLAN ARE FROM INTERPRETATION OF AERIAL PHOTOGRAPHY SUPPLIED BY BROOME COUNTY AND FIELD VERIFIED BY FIELD TEST PIT PROGRAM PERFORMED JULY 22, 1992 THROUGH JULY 24, 1992 BY WEHRAN-NEW YORK, INC.
5. THE LOCATION OF ALL MONITORING WELLS, BORINGS, PIEZOMETERS, STAFF GAUGES AND TEST PITS ARE BASED UPON FIELD SURVEY PERFORMED BY WEHRAN ENGINEERING
6. GRID COORDINATES SHOWN HEREON ARE BASED UPON NEW YORK STATE PLANE COORDINATE GRID SYSTEM.
7. PROPOSED CONTOURS REPRESENT TOP OF FINAL COVER WITHIN THE LIMIT OF LANDFILL AND LIMIT OF CUT WITHIN THE BORROW AREA.

FCM:102260.CS.LDE(SHT 0193 FINAL GRADE PLAN 200
DWG: SW019351

IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER, IN ANY WAY, PLANS, SPECIFICATIONS, PLATS OR REPORT TO WHICH THE SEAL OF A PROFESSIONAL ENGINEER OR LAND SURVEYOR HAS BEEN APPLIED UNLESS DONE SO IN CONFORMANCE WITH THE PROVISIONS OF THE ABOVE LAW.

NO.	DATE	REVISIONS	CHK BY:	DATE
1	7/7/94	ADDED 1" CONDUIT TO PW-13	MCS	7-11-94

WehranEnviroTech
Wehran-New York, Inc.

		DATE
DESIGN BY:	[signature]	7/6/94
DRAWN BY:	[signature]	7/11/94
CHECKED BY:	[signature]	7/11/94
SUPV. BY:	[signature]	7/6/94
APP'VD BY:	[signature]	7/94

Scales
200 0 200
SCALE IN FEET

JOSEPH J. GURDA, P.E.
Joseph J. Gurda July 11, 1994
N.Y.P.E. Lic. No. 51494 Date

BROOME COUNTY DIVISION OF SOLID WASTE MANAGEMENT/ GAF CORPORATION
COLESVILLE LANDFILL CLOSURE
FINAL CONSTRUCTION PLANS
TOWN OF COLESVILLE BROOME COUNTY NEW YORK

FINAL GRADING PLAN

Sheet 2 of 9
Project No. 02260.CS

APPENDIX I – HASP AND CAMP

Health and Safety Plan

This health and safety plan incorporates the requirements of applicable federal, state, and local regulations. These include, but are not limited to the following:

29 Code of Federal Regulations (CFR) 1910.120.

29 CFR 1926.

On-site supervisors shall have completed HAZWOPER training. The on-site air quality is not anticipated to exceed permissible exposure limits; therefore medical surveillance is not required for working at this site. Air monitoring will be performed by qualified personnel to ensure exposure limits are not exceeded.

Site Security Plan

Site security is of the utmost importance to protect the public, protect the landfill cap, secure equipment and materials left on site, eliminate the chance of spreading contamination, and assure worker safety. The landfill area and treatment plant building are encircled by 8' tall fence with locking gates. The treatment plant building is secured with a locking door.

Site Control

The site superintendent will maintain a list of on-site workers and vehicle types, with license numbers. The superintendent will coordinate with subcontractors prior to any deliveries by vendors or mobilization to the site.

Work Zones

If excavation is performed beneath the landfill's geomembrane cap, the work area will be delineated and divided into an exclusion zone, a contamination reduction zone, and a support zone. The exclusion zone will be maintained around the work area by placing signs, barricades, and/or yellow tape as necessary. The size and the shape of the exclusion zone will be determined by the site conditions; it will be large enough to include any potentially hazardous areas.

Excavation Safety

(Appendix D, Excavation Work Plan provides additional information)

The superintendent will place yellow caution barricade tape around the excavation areas any time the work area is left unattended and until the excavation is backfilled to its original ground surface level. Equipment and materials will be stored inside the fenced area to secure them after hours. No flammable liquid will be stored onsite for safety reasons. Weatherproof warning signs will be attached to the barricade tape in compliance with California Proposition 65 requirements. Test pits will be excavated to evaluate the waste composition within the landfill before any large scale excavation. The excavations will not be designed or intended to be entered by site personnel. ***Under no circumstances will personnel enter an excavation.*** Excavated materials will be placed at a distance 2 feet or greater from the excavation edge to minimize the risk of cave-in. Personnel will not stand, sit, or walk between the material pile and the excavation edge. In the event of an excavation collapse, site personnel will evacuate the area and will not re-enter the area until it is deemed safe by a competent person. A competent person is "one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them”. If equipment in the vicinity of a collapsed excavation is unstable, site personnel will not enter into the area surrounding the equipment until the equipment can be adequately stabilized.

General Procedures

Site workers, vendors, and subcontractors are required to observe security and safety measures imposed by the superintendent. These include, among others, prohibition of weapons, drugs, smoking, and alcoholic beverages. In addition, cell phone usage is prohibited by the driver when a vehicle is in motion.

Decontamination Procedures

Decontamination of heavy equipment shall be completed within the decontamination area. In addition, if the trucks were in contact in an area of the site where soil contaminants exist, it will be necessary to decontaminate trucks before leaving the site. The following two sections describe the decontamination procedures for hand tools and for heavy equipment.

Hand tools will be decontaminated by the following method. Large particles of soil will be first be removed from the equipment or tools, then the equipment will be scrubbed with a brush in a water and mild soap solution followed by rinsing with deionized or distilled water, before it is allowed to dry. The clean water and a mild soap solution will be changed frequently to prevent sample cross-contamination. Spent wash water and rinsate will be discharged in the landfill.

All heavy equipment and trucks (if needed) will be cleaned prior to leaving the site. The contractor will be required to steam-clean their equipment using high-pressure sprayers. The decontamination portion of the area will be constructed in a manner where liquids from the decontamination activities can be drained back into the landfill. Cleaning will be performed with the minimum amount of water necessary for the task.

Liquid Handling

If leachate is encountered during the removal actions, it shall be managed in the following manner. The source of the liquid shall be controlled, if possible. Liquids shall be pumped into an appropriately sized container. If multiple types of liquids are found, samples of each liquid type will be collected and submitted to an analytical laboratory for analysis. The sample shall be analyzed for the chemicals of concern expected for the area where the liquid was encountered. The EPA shall approve the analytical parameters prior to sending the samples to the analytical laboratory. Based on the analytical results of each liquid sample, the liquids will be managed appropriately. If source of the liquids cannot be controlled, cease excavation efforts in the area and develop an action plan with DEC and/or EPA.

Hazard Identification

The following table identifies possible hazards and risks that may be encountered during the field work activities:

Possible Hazards	Possible Risks
Heavy equipment	Struck by Noise
Vapors and gases	Exposure (short-term or prolonged) Flammability Explosion
Unexpected hazardous waste	Exposure (short-term or prolonged) Toxic/reactive/flammable liquids Toxic/reactive solids
Excavations	Collapse Unstable piles of excavated material Dust
Excessive heat	Heat stress Heat exhaustion Heat stroke
Vectors (i.e., bees/wasps, ticks, snakes, rodents)	Bites/stings Disease

Hazard Mitigation

To minimize potential risks to site personnel, the following practices and procedures must be observed while on the site.

Heavy Equipment

Site personnel must wear a hard hat, reflective vest, and work shoes or boots at all times while within the exclusion zone, regardless of their work activities. Visual contact should be maintained with the equipment operator as frequently as possible to ensure both the operator and personnel on the ground are cognizant of each other's locations and intended movement. If excessive equipment noise or distance prevents adequate verbal communication between the vehicle operator and personnel on the ground, hand signals that are mutually understood by both parties should be employed. Personnel must never stand or sit behind a vehicle that is reversing nor ride on the outside of a moving vehicle. During test pit excavation, personnel must not stand or sit within the swing radius of the excavator or backhoe while it is operating. If it is necessary to enter within the swing radius of the equipment, site personnel must do so only when the excavator or backhoe is not in operation.

Vapors and Gases

Direct reading vapor and gas monitors will be used during the advancement of borings and the excavation of test pits to periodically test for hazardous atmospheric conditions. Daily field calibration of the equipment will be performed prior to using the equipment within the exclusion zone. A record of this field calibration will be maintained in the field log book. In the event the action level is exceeded, action levels and response procedures are provided in the Table below.

The following direct-reading monitors will be used:

Photoionization Detector

A PID will be used to detect for the presence of volatile organic compounds in vapors and gases released from the borings, test pits, and excavated material.

Gas Meter

A gas meter equipped to detect percent oxygen, percent of lower explosive limit (LEL), and hydrogen sulfide, at a minimum, will be used during boring advancement and test pit excavation. Readings will be taken at various locations around the excavation or boring. Personnel will not enter a test pit excavation to obtain a reading.

The following table presents action levels for vapors/gases that may be encountered during the field investigation activities. Response actions for each action level are also listed.

Vapor/Gas	Action Level	Response
Volatile organic compounds by PID reading	10 ppm sustained	• Stop work immediately. • Assess possible source of the reading.
	50 ppm sustained	• Stop work immediately. • Evacuate area.
Percent oxygen	19.5%	• Stop work. • Assess possible cause of oxygen deficiency.
	18%	• Stop work immediately. • Evacuate area.
Percent LEL	25%	• Stop work immediately. • Evacuate area.
Hydrogen sulfide	10 ppm	• Stop work. • Assess possible source of the reading.
	20 ppm	• Stop work immediately. • Evacuate area.

The Site H&S Coordinator must be contacted immediately if any of these action levels are exceeded. Work cannot resume until the source of the vapor/gas has been identified and additional precautions taken to mitigate the hazard. These additional precautions will be determined based on the identified source and concentration of the vapor/gas.

Unexpected Hazardous Waste

Although the landfill cell was used primarily for municipal solid waste, some hazardous waste materials may be present. Possible hazardous or regulated waste that may be encountered includes, but is not limited to, hazardous chemicals, used oil, asbestos, and lead paint. Field personnel will wear protective nitrile gloves if excavated material or boring cuttings are to be handled. Nitrile gloves will be replaced between test pits, borings, and boring sample levels to minimize the risk of cross contamination. If potentially hazardous or regulated wastes are encountered during test pit excavation, the suspect material will be segregated to the extent possible from other excavated material, containerized, and held for characterization. Initial field characterization of the material will be made using visual observation and PID readings. If PID readings exceed the action levels presented in the above Table, the container must be closed, labeled "Potential Hazardous Waste – Pending Further Characterization," and moved to a stable location. Additional sampling and laboratory analysis may be required to determine proper disposal methods.

If suspect asbestos-containing materials are encountered, the site supervisor will evaluate the necessity to the project for disturbance of these materials. If the material must be excavated it will be wetted and placed in polyethylene lined containers or double bagged and closed. It may be reburied in the landfill at the completion of field activities.

Excessive Heat

If field investigation activities occur during high heat periods, an adequate water supply will be available to site personnel. Sufficient water will be available to provide each employee with approximately 1 pint of water per hour of work time. A shaded rest area will be available for personnel when an excessive heat warning has been issued for Broome County. Personnel will take periodic rest breaks during excessive heat warning events.

Vectors

Ticks, bees/wasps, and other flying insects are the most likely vectors to be encountered. To minimize the risk of tick bites, site personnel must wear long pants, socks, and work shoes during field activities. Insect repellent may be used. Periodic checks for ticks should be made if personnel have walked through long grass. If wild animals are observed during field activities, they are to be avoided.

If a worker is bitten by a tick, rodent, or other animal or insect, check for signs of infection at the bite location. If the bite was inflicted by a potentially rabid animal, medical attention should be sought. Bites by ticks may require medical attention if the following symptoms arise: red, expanding rash; fatigue; chills; fever; headache; muscle and joint aches; and swollen lymph nodes.

Personnel allergic to bee/wasp stings should inform the Site H&S Coordinator and ensure they are properly equipped with the medication necessary to counteract an allergic reaction. Other site personnel working with the allergic individual should also be informed of this condition and of the medication's location in the event the individual is unable to self-administer it. Allergy medicine should be administered as soon as possible if symptoms of an allergic reaction occur (dry mouth, swelling around the eyes, difficulty breathing, wheezing, coughing, and hives). Medical attention should be sought if an allergic reaction occurs.

Venomous snakes are not likely to be encountered in the work area.

Emergency Response

The following response actions shall be taken in the event of an emergency. The Site H&S Coordinator shall be contacted as soon as possible for any emergency.

Contact Name: Rich Hand

Contact Phone: (607) 763-4275 (office) or (607) 343-8016 (cell)

Personal Injury

A first aid kit will be available at the site and site personnel will be informed of its location. All injuries to site personnel will be recorded in the field log. The person injured, type of injury, and a general description of the cause will be provided. Minor injuries will be treated on site. In the event of an injury requiring further attention, the closest emergency department is:

General Hospital
24 Mitchell Ave.
Binghamton, NY
(607) 762-2200
The Emergency Room entrance is on Park Ave.

Call 911 if an injury requiring immediate medical treatment occurs.

Excessive Heat

If an employee suffers from the effects of excessive heat, the following actions, based on OSHA Fact Sheet *Protecting Workers from the Effects of Heat*, will be taken.

Heat Rash

Heat rash looks like a red cluster of pimples or small blisters that usually appear on the neck, upper chest, in the groin, and in elbow creases. Remove the employee from the work area to a cooler location if possible. Keep the affected area dry. If necessary, powders may be applied to increase comfort. Ointments and creams should not be applied to the affected area.

Heat Cramps

Heat cramps are caused by a loss of body salts and fluids during sweating. Workers with heat cramps should replace fluid loss by drinking water and/or electrolyte replacement liquids every 15 to 20 minutes.

Heat Exhaustion

Headache, nausea, dizziness, weakness, irritability, confusion, thirst, heavy sweating and a body temperature greater than 100.4°F are indications of heat exhaustion. Workers with heat exhaustion should be removed to a cooler location and given liquids to drink. Unnecessary clothing should be removed and cold compresses applied to the head, neck, and face. Medical evaluation at a clinic or emergency room should be undertaken.

Heat Stroke

Heat stroke is a medical emergency that may result in death and requires immediate medical assistance. Call 911. Symptoms of heat stroke include confusion, loss of consciousness, seizures, excessive body temperature (greater than 104°F) and possibly lack of sweating. Until medical help arrives, move the worker to a shady, cool area and remove as much clothing as possible. Wet the worker with cool water and circulate air to increase cooling. Place cold wet towels or clothes over the worker.

Decontamination

Decontamination procedures will be implemented between borings and test pit locations if hazardous wastes or grossly contaminated materials are encountered.

Drilling/excavating equipment and associated tools, including augers, drill rods, sampling equipment, wrenches, and any other equipment or tools that have come in contact with contaminated materials, will be decontaminated between each boring or test pit, and prior to removing equipment from the site. The preferred decontamination procedure will be to use a high pressure steam cleaner to remove soils and other materials from the equipment. The water used for this procedure will be contained and shall come from a controlled source, preferably a municipal drinking supply. Representative samples of the contained decontamination water and well development water will be screened in the field to determine the proper method of disposal. Every effort will be made to minimize the generation of contaminated water.

Communication

On-site communication will be accomplished through cell phones, if coverage is available. If coverage is not available, handheld portable radios may be used.

Non-verbal communication such as hand signals between site personnel on the ground and vehicle operators will be utilized when equipment is operating and noise prevents adequate verbal communication.

Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Continuous monitoring will be required for all ground intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching below the landfill geomembrane cap.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified after consultation with NYSDOH. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present, in particular chlorinated solvents. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;

(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50o C (14 to 122o F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX J – QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Project Plan

Revision No. 1

Colesville Municipal Landfill Superfund Site

1538 East Windsor Road

Colesville, NY 13813

NYSDEC Site No. 704010

Prepared for:

Broome County
Division of Solid Waste Management
60 Hawley Street, 5th floor
Binghamton, NY 13902
www.gobroomecounty.com
Phone: (607) 778-2190
Fax: (607) 778-6051

Prepared by:

ARCADIS
Two Huntington Quadrangle, Suite 1S10
Melville, NY 11747
www.arcadis-us.com
Phone: (631) 391-5244
Fax: (631) 249-7610

REV 1: Updated by Broome County – 11/28/2020

June 2015

SECTION A – PROJECT MANAGEMENT

A.1 Title of Plan and Approval

Quality Assurance Project Plan, Revision No. 1
Colesville Municipal Landfill Superfund Site

Lead Agency:

New York State Department of Environmental Conservation
Division of Environmental Remediation

____ __________
Payson Long, DEC Project Manager **(date)**

Environmental Protection Agency:

USEPA Region 2
Emergency & Remedial Response

____ __________
George Jacob, Project Manager **(date)**

Engineering Consultants:

ARCADIS

Steven Feldman

____ **6/8/2015**
Steven Feldman, P.E. Project Manager **(date)**

Dennis K Capria

____ **6/8/2015**
Dennis Capria, Quality Assurance Leader **(date)**

A.2 – Table of Contents

A.3 – Distribution List

The following individuals and their organizations will receive copies of this approved QA Project Plan, including persons responsible for implementation and representatives of all agencies involved.

Payson Long, NYSDEC Project Manager
Remediation Bureau
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-7013
(518) 402-9812
Payson.long@dec.ny.gov

George Jacob, EPA Project Manager
USEPA Region 2
Emergency & Remedial Response
290 Broadway, 20th Floor
New York, NY 10007-1866
Phone: (212) 637- 4266
Fax: (212) 637-3966
Jacob.george@epamail.epa.gov

Debra Smith, Director
Broome County Division of Solid Waste Management
P.O. Box 1766
Binghamton, NY 13902
Phone: (607) 778-2397
Fax: (607) 778-6051
Debra.Smith@BroomeCounty.us

Laurie Haskell, Project Coordinator
Broome County Division of Solid Waste Management
P.O. Box 1766
Binghamton, NY 13902
Phone: (607) 778-2932
Fax: (607) 778-6051
Laurie.Haskell@BroomeCounty.us

Richard Hand, Broome County Landfill Supervisor
Broome County Landfill
286 Knapp Road
Binghamton, NY 13905
Phone: (607) 763-4275
Richard.Hand@BroomeCounty.US

Steven Feldman, ARCADIS Project Manager
ARCADIS
Two Huntington Quadrangle, Suite 1S10
Melville, NY 11747
Phone: (631) 391-5244
sfeldman@arcadis-us.com

Brady Kalkman, Laboratory Project Manager
ALS Global
1565 Jefferson Rd, Bldg. 300, Suite 360
Rochester, NY 14623
Phone: 585-288-5380
Fax: 585-288-8475
Brady.Kalkman@alsglodal.com

Brian Mackin, ALS, Field Services Manager
ALS Life Sciences Division, Environmental
1565 Jefferson Rd, Bldg. 300, Suite 360
Rochester, NY 14623
Mobile: (585) 738-3818
Brian.Mackin@alsglobal.com

A.4 Project/ Task Organization

The responsibilities of the key project personnel are outlined in Table 1.A and detailed below.

- The Project Director (Lead Agency) is responsible for overseeing the implementation of the project tasks. The Project Director will review all documents and other correspondence concerning the activities performed pursuant to the requirements contained in the Order on Consent (NYSDEC, January 1987) and the ROD (March 1991). The Project Director is also responsible for the overall QA including technical adequacy of the project activities and reports and conformance to the scope of work.
- The Project Manager is responsible for the following: sampling QC; overall project coordination; adherence to the project schedules; directing, reviewing, and assessing the adequacy of the performance of the technical staff and subcontractors assigned to the project; implementing corrective action, if warranted; interacting with the Project Director; preparing reports; and maintaining full and orderly project documentation.
- The project team members include the task managers, field hydrogeologists, sampling team/field technicians, support staff (e.g., data processors, secretaries, and in-house experts in engineering, etc.) who are responsible for work in their respective specialty areas which are or may be required to meet the project objectives.
- The Project QA/QC Officer is responsible for performing systems auditing and for providing independent data quality review of project documents and reports.
- The Project Health and Safety Coordinator is responsible for implementing the site-specific health and safety directives in the Health and Safety Plan (HASP) and for contingency response.

Table 1.A Roles and Responsibilities

Individual Assigned	Responsible for:	Authorized to:
Payson Long, NYSDEC	Lead agency on the project; attaining project goals	Represent DEC, approve submittals
George Jacob, USEPA	Review of project plans; conducts 5-year site investigation and review	Represent EPA, approve submittals
Debra Smith, Broome County	Oversight of county implementation of the project	Make decisions on behalf of Broome County or seek legislative approval, oversee all county personnel
Steven Feldman,	Project engineering,	Submit reports and plans as

Individual Assigned	Responsible for:	Authorized to:
ARCADIS	management, and documents	directed by Broome County
Laurie Haskell, Broome County	Project coordination and task assignment; site safety and health	Write, review and comment on project documents, liaison between Broome County and all others
Brady Kalkman, ALS	Project oversight at the lab	Submit reports to Broome County and ARCADIS
Brian Mackin, ALS	Ensures quality control and proper field sampling protocol	Liaison between lab and Broome County
Richard Hand, Broome County	Site maintenance	Oversees landfill staff

A.5 Problem Definition/Background

Residual groundwater contamination exists beneath the Colesville Landfill and downgradient. The contamination primarily consists of volatile organic compounds and degradation products. Institutional controls that restrict the use of ground water for consumption are in place. Remedial activities have been substantially completed including capping the landfill and implementing various groundwater treatment systems. Subsurface injection of a carbon substrate solution (molasses) is performed annually to enhance biodegradation of contaminants. Monitoring of the groundwater is ongoing to evaluate VOCs concentration, movement and stabilization.

The project goals remain as they were established in the Record of Decision of March 1991, to return the groundwater to drinking water quality via the remedy and natural attenuation processes.

A.6 Project Description

Waste disposal operations were conducted at the Site from 1969 until it was closed in 1984. The landfill was primarily used for the disposal of municipal solid waste. Historical data indicate that waste was not placed below the water table during operation of the landfill. Installation of the landfill cap, which was completed on November 1, 1995, will essentially eliminate the generation of landfill leachate over time. In addition to the expected improvement in groundwater quality resulting from this source control measure, VOC mass removal via intrinsic remediation is an ongoing process at the Site.

Groundwater samples collected from beneath and downgradient of the landfill since 1995 indicate that the areal extent of VOC-impacted groundwater is static, and total VOC concentrations are stable to decreasing with time. Evidence of the intrinsic remediation of VOC-impacted groundwater is provided by the distribution and occurrence of the biogeochemical indicators such as ethene, ethane, oxygen, nitrate, sulfate, methane, and soluble iron and manganese.

A.7 Quality Objectives and Criteria

This Revised QAPP provides an up to date (2020) version of current quality objectives and criteria and is a companion document for the revised Site Management Plan (SMP) and Field Activities Plan (FAP). The SMP is intended to be the primary reference for groundwater monitoring. This QAPP presents the methodologies to be employed during sample collection and analysis activities associated with the various monitoring requirements presented in the SMP.

The overall objective of the QAPP is to produce data of the highest quality that can be used to support the SMP. The QAPP was prepared in accordance with the USEPA guidance “EPA Requirements for Quality Assurance Project Plans” (EPA QA/R-5; USEPA, March 2001) and “Guidance for Quality Assurance Project Plans” (EPA QA/G-5; USEPA December 2002), New York State Department of Environmental Conservation (NYSDEC) “Technical Guidance for Site Investigation and Remediation” (DER-10; May 2010), and considering requirements of the Order on Consent (NYSDEC, January 1987). This QAPP is intended to address the field sampling and analysis component of the SMP. Therefore, this QAPP presents the project organization and responsibilities, and QA/QC protocols related to field sampling and analysis activities associated with various monitoring requirements presented in the SMP (i.e., operational, performance, and compliance). The procedures in this QAPP will be implemented to ensure that precision, accuracy, representativeness, completeness, and comparability (PARCC parameters) of the data can be documented.

The data quality objective (DQO) process, as described in “Guidance on Systematic Planning Using the Data Quality Objectives Process” (EPA QA/G-4; USEPA, February 2006), is intended to provide a “logical framework” for planning field investigations. The following section addresses each of the seven sequential steps in the USEPA’s DQO process.

Step 1: State the Problem. The Colesville Municipal Landfill operated as a municipal solid waste landfill from 1969 until it was closed in 1984. Residual groundwater contamination with volatile organic compounds (VOCs) exists beneath and downgradient of the landfill. Remedial activities have been completed, including capping the landfill, implementing various groundwater treatment systems, and restriction of the use of groundwater as drinking water. Groundwater samples collected from beneath and downgradient of the landfill since 1995 indicate that the areal extent of VOC-impacted groundwater is static, and total VOC concentrations are stable to decreasing over time. Groundwater monitoring is being conducted to evaluate the movement and stabilization of the VOC-impacted groundwater plume.

Step 2: Identify the Goal of the Study. The goal of the study is to continue groundwater monitoring at the landfill in support of the Site Management Plan.

Step 3: Identify Information Inputs. Decision inputs incorporate both concentration and distribution of constituents of concern (COCs) in site media. A fundamental basis for decision-making is that a sufficient number of data points of acceptable quality are available from the investigation to support the decision. Thus, the necessary inputs for the decision are: 1) the proportion of non-rejected (usable) data points and 2) the quantity of data needed to support the site monitoring.

The data will be evaluated for completeness, general conformance with the requirements of this QAPP, and consistency among data sets and with historical data, as appropriate.

Step 4: Define the Boundaries of the Study. The landfill is approximately 30 acres in size and is located in the Town of Colesville, Broome County, New York. Groundwater wells around the downgradient perimeter, as well as sentinel wells off-site, and springs and a stream west and south of the landfill are the focus of environmental monitoring.

Step 5: Develop the Analytical Approach. The decision on whether data can be used to support the SMP and ROD will be based on the verification and validation results (see Section D.2). Following verification/validation, the data will be flagged, as appropriate, and any use restrictions noted. The sampling process has been devised so that the loss of any single data point will not hinder description of the distribution of COCs. Given this, a reasonable decision rule would be that at least 90% of the data points would be deemed usable for exposure evaluation purposes. Applicable actions would be evaluated, if needed, based on the site action levels. The action levels for the site are the New York State Groundwater Effluent Limitations (Class GA) as defined in the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations”, June 1998, as summarized in Table 1. The required laboratory reporting limits are also documented in Table 1 so that the lowest achievable detection limit will be reported by the laboratory.

Step 6: Specify Performance or Acceptance Criteria. Specifications for this step call for: 1) giving forethought to corrective actions to improve data usability and 2) understanding the representative nature of the sampling design. This QAPP has been designed to meet both specifications for this step. The sampling and analysis program have been developed based on a review of previous site data and knowledge of present site conditions. Corrective actions are described elsewhere in the document. The representative nature of the sampling design has been assured by discussions among professionals familiar with the site and the appropriate government agencies.

Step 7: Develop the Plan for Obtaining Data. The overall quality assurance objective is to develop and implement procedures for field sampling; chain of custody, laboratory analysis, and reporting that will provide results to support the evaluation of site data consistent with the National Contingency Plan requirements. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, data reporting, internal quality control, audits, preventative maintenance of field and laboratory equipment, and corrective action are described in other sections of this QAPP.

A.8 Special Training/Certification

Site documents, plans and drawings shall be signed by a NYS licensed Professional Engineer, or a Qualified Environmental Professional, as so required by NYSDEC and EPA.

In compliance with the Occupational Safety and Health Administration's (OSHA) final rule, "Hazardous Waste: Operations and Emergency Response," all personnel performing sampling activities at the site will have completed the requirements for OSHA 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) initial training and current 8-hour refresher training. Current certificates will be kept on file at the Division of Solid Waste Management.

Laboratory personnel shall be trained and certified in accordance with the lab's Quality Assurance Manual in Appendix A.

A.9 Documents and Records

The Broome County Division of Solid Waste Management will be responsible to ensure that the appropriate project personnel have the most current version of the QAPP, including version control, updates, distribution, and disposition.

Information and records that must be included in the data report package include:

- summary of the sampling methodology,
- discussion of groundwater, surface water, spring water and sediments' quality
- trend analysis
- spring water remediation performance
- landfill cap performance and maintenance
- conclusions and recommendations
- complete laboratory report

Reports shall be transmitted from ARCADIS to NYSDEC, USEPA, and Broome County via electronic media (compliant with DEC's EDD requirements) and hard copies as requested. Broome County will maintain a record archive in perpetuity. ARCADIS and ALS shall maintain audit and validation files as required by law.

SECTION B – DATA GENERATION & ACQUISITION

B.1 Sampling Process Design

The overall QA objective for this aspect of the project is to develop and implement procedures for field measurements, sampling, and analytical testing that will provide data of known quality that is consistent with the intended use of the information. Generally, the specific field sampling and analysis activities to be conducted during this project that require QA/QC protocols include groundwater, spring, and surface water sampling associated with groundwater quality monitoring. Standard procedures are used so that known and acceptable levels of PARCC parameters are maintained for each data set.

Quality assurance/quality control protocols will be used to ensure the PARCC parameters of data collected during these field activities meet the objectives of the overall project. Specifically, all data will be gathered or developed using procedures appropriate for the intended use. The field measurements and laboratory analyses will be used to support one or more steps in evaluating the objectives of the overall project discussed in the SMP. The QA/QC protocols for this aspect of the project include laboratory analysis and verification procedures, field decontamination procedures, calibration and maintenance of field instruments, and QA/QC sampling procedures.

B.2 Sampling Methods

To ensure that data collected in the field is consistent, accurate and complete, forms will be utilized for repetitive data collection, such as depth to water in wells, groundwater sampling etc. These field forms include a Water-Level Measurement form and a Water Sampling Log, as applicable to a specific field task.

Quality assurance/quality control samples will be collected to assure quality control for the groundwater monitoring component (environmental effectiveness) and system performance monitoring component of the SMP. Analyses of QA/QC samples will enable data evaluation for accuracy and integrity. A quality assurance/quality control sample set includes a rinse (equipment) blank, a trip blank, a site-specific matrix spike/matrix spike duplicate (MS/MSD), and/or a blind duplicate, as applicable, for groundwater and/or water samples associated with the long-term monitoring components identified above. The QA/QC sample set will also vary depending on the parameter or group of parameters specified for analysis and the sample collection method. For a complete description of sampling procedures see the Field Activities Plan.

B.3 Sample Handling & Custody

To maintain and document sample possession, chain-of-custody procedures will be followed. A chain-of-custody form contains the signatures of individuals who have possession of the samples after collection in the field; a sample chain-of-custody form is provided in the QAM.

A sample is under custody if it is:
1. In one's actual possession; or
2. In one's view, after being in your physical possession; or
3. Was in one's physical possession and then was locked up or sealed to prevent tampering; or
4. It is in a designated secure place restricted to authorized personnel.

Each person involved with the samples will know chain-of-custody procedures. A detailed discussion of the stages of possession (i.e., field collection, transfer, and laboratory custody) is presented below in the following sections.

Environmental Samples Chain-of-Custody

The laboratory begins the chain-of-custody procedure with the preparation of the sample bottles. The field sampler continues the chain-of-custody procedure in the field and is the first to sign the form upon collection of samples. The field sampler is personally responsible for the care and custody of the samples until they are transferred and properly dispatched. Sample labels shall be completed for each sample, using waterproof ink, subjected to proper preservation, and packaged to preclude breakage during shipment. Every sample shall be assigned a unique identification number that is entered on the chain-of-custody form. Samples can be grouped for shipment using a single form.

Transfer of Custody and Shipments

All samples will be accompanied by a chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time of transfer. This record documents transfer of custody of samples from the sampler to another person to the analytical laboratory.

Samples will be properly packed for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample cooler. All chemical analytical samples will be delivered to the laboratory within 24 hours of collection.

Whenever samples are split with a facility or government agency, a separate chain-of-custody record will be prepared for those samples and marked to indicate with whom the samples were split.

Laboratory Sample Custody
The laboratory has standard operating procedures for documenting receipt, tracking and compilation of sample data. Sample custody, related to sampling procedures and sample transfer, is described in the QAM, Appendix A.

B.4 Analytical Methods

All groundwater, spring, and surface water samples and sediments (including QA/QC samples) will be collected by and sent to ALS Environmental (ALS), located in Rochester, New York, for the analysis. The sampling locations and schedule is described in the SMP. The ALS facility is an NELAP and NYSDOH-approved laboratory. Groundwater, spring, and surface water samples will be analyzed for Target Compound List (TCL) VOCs using USEPA Method 8260C. Groundwater samples will be analyzed for dissolved iron and manganese using USEPA Method 6010, total organic carbon using USEPA Method 5310B/C, and nitrate, nitrite, and sulfate using USEPA Method 300.0. Groundwater samples may be tested for permanent gases (i.e., methane, ethene, and ethane) as necessary, using Method RSK 175.

All performance and compliance monitoring water samples (including QA/QC samples) will be analyzed for parameters listed in the SMP Monitoring Plan, Section 4.

The following tables attached at the end of this QAPP summarize general analytical requirements:

Table	Title
1	Parameters, Methods, and Target Reporting Limits
2	Sample Containers, Preservation, and Holding Times
3	Laboratory Quality Control Limits

B.5 Quality Control

The overall quality assurance objective for this QAPP is to develop and implement procedures for sampling, chain of custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventative maintenance, and corrective action such that valid data will be generated.

Quality assurance indicators are generally defined in terms of six parameters:

1. **Representativeness.** Representativeness is the degree to which sample data precisely represent site conditions and is dependent on sampling and analytical variability and the variability (or homogeneity) of the site itself. The site actions have been designed to assess the presence of the chemical constituents at the time of sampling and throughout the study area. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data.

2. **Comparability.** Comparability is the degree of confidence with which one data set can be compared to another. Comparability between the current groundwater monitoring activities and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in the SMP, QAPP, USEPA approved laboratory methods, and through use of QA/QC procedures and appropriately trained personnel.

3. **Completeness.** Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results. Completeness will be calculated as follows:
   Completeness = (usable data points obtained/total data points planned)*100

4. **Precision.** Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical procedures will be followed. All work for this investigation will adhere to established protocols presented in the SMP. Checks for analytical precision will include the analysis of MS/MSDs, laboratory duplicates, and field duplicates. Table 3 includes the RPD requirements for the LCS/LCSD, laboratory duplicates, and field duplicates. The precision of data will be measured by calculation of the RPD by the following equation:

$$RPD = \{(abs\,[D1 - D2]) / ((D1 + D2)/2)\}*100$$

   Where:
   abs = absolute value

D1 = value measured in original sample
D2 = value measured in duplicate sample

5. **Accuracy.** Accuracy is a measure of how close a measured result is to the true value. Recovery of MS, LCS, and surrogate spikes will be used to assess the accuracy of the analytical data. Table 3 includes the percent recovery requirements for the MS, LCS, and surrogate spikes. Accuracy will be calculated in terms of percent recovery.

6. **Sensitivity.** Sensitivity is defined as the ability of the method or instrument to detect the COC and other target compounds at the level of interest. Method detection limit (MDL) is defined as the minimum concentration of a substance that can be identified, measured, and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from repeated analysis of a sample in a given matrix containing the analyte. MDLs have been determined as required in Title 40 of the Code of Federal Regulations Part 136B. The reporting limit (RL) is greater than or equal to the lowest standard used to establish the calibration curve. The RLs for this investigation are generally at least 3 times greater than the MDL. Results greater than the MDL and less than the RL will be reported by the laboratory and qualified as estimated (i.e., J qualifier).

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

Testing and maintenance schedules have been developed for both field and laboratory instruments. A summary of the testing and maintenance activities to be performed is presented below.

Field Instruments and Equipment
Prior to field sampling, each piece of field equipment will be inspected to confirm that it is operational. If the equipment is not operational, it will be serviced prior to use. All meters that require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, the appropriate field personnel will be responsible for following the maintenance schedule and arranging for timely service. Field instruments will be maintained according to the manufacturers' instructions.

Field instrumentation to be used in this study includes meters to measure pH, ORP, turbidity, temperature, conductivity, dissolved oxygen, and groundwater levels. A logbook will be kept for each field instrument. Each logbook will contain records of operation, maintenance, calibration, and any problems and repairs. The logbooks will be maintained in project records. The task manager will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm that it is in working order. The inspection will be recorded in the logbook or field notebooks, as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook. Non-operational field equipment will either be repaired or replaced. Appropriate spare parts for field equipment/meters will be available from the rental companies or manufacturers.

Laboratory Instruments and Equipment

Laboratory instrument and equipment documentation procedures include details of any observed problems, corrective measure(s), routine maintenance and instrument repair (including information regarding the repair and the individual who performed the repair).

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer. Maintenance schedules for laboratory equipment adhere to each manufacturer's recommendations. Records reflect the complete history of each instrument and specify the time frame for future maintenance. Major repairs or maintenance procedures are performed through service contracts with the manufacturer or qualified contractors. Paperwork associated with service calls and preventive maintenance calls will be kept on file by the laboratory.

Laboratory Systems Managers are responsible for the routine maintenance of instruments used in the laboratory. Any routine preventive maintenance carried out is logged into the appropriate logbooks. The frequency of routine maintenance is dictated by the nature of samples being analyzed, the requirements of the method used and/or the judgment of the Laboratory Systems Manager.

All major instruments are backed up by comparable (if not equivalent) instrument systems in the event of unscheduled downtime. An inventory of spare parts is also available to minimize equipment/instrument downtime.

On a daily basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

B.7 Instrument/Equipment Calibration and Frequency

Field Equipment Calibration Procedures and Frequency

Calibration checks will be performed daily or as often is as required to ensure the accuracy of field equipment.

Field calibration solutions, standards and gases will be used within specified expiration dates and will be obtained from manufacturers or authorized suppliers. Calibration solutions, standards and gases will be discarded or returned to the supplier if expiration dates have been exceeded.

Field personnel are responsible for confirming that a master calibration/maintenance log is maintained following the procedures specified for each measuring device. A calibration log for each specific field instrument (as identified by serial/instrument number) will be used to link daily calibrations to that specific field instrument. Where applicable, each log will include, at a minimum, the following information in order to link daily calibrations to specific field instruments:

- name of device and/or instrument calibrated
- device/instrument serial/identification numbers
- calibration method
- tolerance
- calibration standard used
- frequency of calibration
- date(s) of calibration(s)
- name of person(s) performing calibration(s)

Instruments and equipment used to gather, generate or measure environmental data will be calibrated at the intervals specified by the manufacturer or more frequently, and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. If an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service. Equipment found to be out of tolerance during the period of use will be removed from the field and measuring and testing activities performed using the equipment will be addressed via the corrective action system.

Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used. The analytical methods for chemical constituents are identified in Tables 1 and 2.

When analyses are conducted according to USEPA methods, the calibration procedures and frequencies specified in the applicable method will be followed. For analyses governed by SOPs, see the appropriate laboratory SOP for the required calibration procedures and frequencies. Records of calibrations will be filed and maintained by the laboratory. These records will be subject to QA audit. For all instruments, the laboratory will maintain trained repair staff with in-house spare parts or will maintain service contracts with vendors.

All standards used to calibrate equipment are traceable, directly or indirectly, to the National Institute of Standards and Technology. All standards received will be logged into standard receipt logs maintained by the individual analytical groups. Each group will maintain a standards log that tracks the preparation of standards used for calibration and QC purposes.

B.8 Inspection/Acceptance of Supplies & Consumables

All supplies to be used in the field and laboratory will be available when needed. They will be free of target chemicals and interferences.

All laboratory reagents will be tested for acceptability, prior to use in the analyses of site samples. All standards will be verified against a second source standard. The laboratory will follow a “first in/first out” procedure for the storage and use of all consumables to minimize the risk of contamination and degradation.

B.9 Data Acquisition Requirements for Non-Direct Measurements

Historical data that have been generated consistent with appropriate laboratory requirements will be used in decision making. The criteria for usable analytical data are that the data must be generated through procedures consistent with good data collection practices, must contain backup to facilitate verification or validation, and must be deemed acceptable for use following review of the supporting laboratory documentation.

B.10 Data Management

The purpose of the data management is to provide for the accuracy and ready accessibility of all the necessary data to meet the analytical and reporting objectives of the project. The data management program established for the project includes field documentation and sample QA/QC procedures, methods for tracking and managing the data, and a system for filing all site-related information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate. These procedures are described in detail in the following section.

The data management plan has four elements: 1) sample designation system; 2) field activities; 3) sample tracking and management; and 4) data management system.

Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy resampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected.

Field Activities

Field activities designed to gather the information necessary to make decisions require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documenting field activities.

Complete and accurate record keeping is a critical component of the field investigation activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and validation process. To confirm that all aspects of the field investigation are thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained.

The personnel performing the field activities will keep field logs that detail all observations and measurements made during sampling. Data will be recorded directly into field forms, with each entry dated and signed. Erroneous entries will be corrected by crossing out the original entry, initialing it, and then documenting the proper information.

Sample Tracking and Management

A record of all field documentation, as well as analytical and QA/QC results, will be maintained to confirm the validity of data used in the site analysis. To effectively execute such documentation, carefully constructed sample tracking and data management procedures will be used throughout the sampling program.

Sample tracking will begin with the completion of chain of custody forms. Copies of all completed chain of custody forms will be maintained in the field office. The laboratory will verify receipt of the samples electronically (via email) on the following day.

When analytical data are received from the laboratory, the incoming analytical data packages will be reviewed against the information on the chain of custody to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed up with the laboratory.

Data Management System

In addition to the sample tracking system, a data management system will be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database, to be maintained by the Database Administrator, will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from three primary sources: surveying of sampling locations, field observations, and analytical results.

The database will be written in Microsoft Access, running in a Windows operating system. Custom applets, such as diskette importing programs, will be written in either Microsoft VBA or Microsoft Visual Basic. Geographic Information System (GIS) applications will be developed in ESRI ArcGIS, with additional customization performed with Visual Basic. Tables and other database reports will be generated through Access in conjunction with Microsoft Excel and Microsoft Word. These software products will be upgraded to current industrial standards, as necessary. The NYSDEC guideline is being followed for NYSDEC submittals: https://earthsoft.com/products/edp/edp-format-for-nysdec/

SECTION C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions

Assessments involve monitoring data evaluation to determine the remedy's protectiveness of human health and the environment. Data is collected semi-annually for the springs, sediment and surface water and every 5th quarter for groundwater.

As long as contaminant concentration trends continue to be generally stable or decreasing no response is necessary. If data is collected from a location that shows a marked increase in contaminants and, as such, could pose a threat to human health or the environment, then a resample event will be performed as soon as practicable. If the results are confirmed, then an evaluation must be performed to determine if additional bioremediation efforts are required.

C.2 Reports to Management

The following reports will be submitted to NYSDEC and USEPA by the Project Manager in conjunction with Broome County Division of Solid Waste Management.

1. At the end of the calendar year on an annual basis the functionality of engineered and institutional controls will be reported. Reports will include results of the landfill cap inspection, the condition of the spring remedies, and the status of institutional controls (environmental easement compliance).
2. A semi-annual report that summarizes the conditions of springs and surface water based on data obtained through laboratory testing.
3. A 5th quarter groundwater sampling report.

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications. It essentially evaluates performance against pre-determined specifications, for example, in an analytical method, or a software or hardware operations system. This process is performed by the ELAP certified laboratory and is discussed in the laboratory's Quality Assurance Manual (QAM), Appendix A.

Data validation is a process in which analytical data generated by the laboratory are evaluated against a specific set of requirements and specifications, and determinations of data usability and limitations are made by a third-party validator. The data validator examines the criteria pertaining to analytical data generated in accordance with CLP protocols from four perspectives, as follows:

- Technical requirements.
- Contractual requirements.
- Determination of compliance.
- Determination and action of how to define the usability or qualify the data.

Data validation is not part of the QC program for Intermediate Sampling events, as defined in NYSDEC DER-10, currently ongoing for the Colesville Project. Intermediate Sampling occurs after the groundwater has been fully characterized and relatively consistent results have been observed. The following paragraphs regarding validation will pertain to the Final Delineation Sample collection series to be analyzed and evaluated after Intermediate Sampling has indicated that groundwater has met the MCL standards for the project.

Data can be validated to produce a NYSDEC data usability summary report (DUSR) as outlined in NYS DER 10 for each individual SDG using the most recent and relevant versions of the USEPAs Data Validation Guidelines outlined below. These procedures and criteria may be modified as necessary to address project-specific and method-specific criteria, control limits, and procedures. Data validation consists of data screening, checking, reviewing, editing, and interpretation to document analytical data quality and to determine whether the quality is sufficient to meet the DQOs.

The data validation guidelines used to perform the validation will follow the QA/QC criteria set forth in the NYSDEC ASP, October 1995 and the USEPA CLP National

Functional Guidelines for Organic Data Review, October 1999. Validation of the inorganic data will be performed following the QA/QC criteria set forth in the NYSDEC ASP, October 1999 and the USEPA CLP National Functional Guidelines for Inorganic Data Review, February 1994.

D.2 Verification and Validation Methods

After groundwater appears to have met MCL goals, a full data validation will be conducted on the VOCs, metals, and wet chemistry that are collected as part of the aqueous sampling. The monitoring wells, spring, and surface water sampling for VOCs, metals, and/or wet chemistry will be reviewed for completeness and technical compliance. The review of the data packages will include checking the following:

- Chain-of-custody forms.
- Adherence to specified holding times.
- Trip, field, and/or laboratory (method) blank-detected constituents.
- Matrix spike/spike duplicate precision and accuracy.
- Laboratory control sample accuracy.
- Surrogate spike accuracy.
- Field replicate precision.

For performance and compliance monitoring, VOC sample results will be reviewed for completeness and technical compliance. The review will include checking the following:

- Chain-of-custody form.
- Adherence to specified holding times.
- Laboratory blank-detected constituents.
- Field replicate precision.

Final validation of data obtained during the field sampling and analysis activities will be performed by the County's contracted consultant. Upon receipt of the laboratory data, the following reduction, validation, and reporting scheme will be executed by the data validator:

- Laboratory data will be screened to confirm that the necessary QC procedures (e.g., detection limit verification, duplicates, spikes, blanks) have been performed. QC information not included or of insufficient frequency will be identified in the validation report, including a discussion of the implications.

- QC supporting information will subsequently be screened to identify QC data outside established control limits. If out-of-control data are discovered, documentation of appropriate corrective action will be reviewed. Out-of-control data without appropriate corrective action shall result in designation of the affected data as qualified or rejected, as appropriate.

It should be noted that the existence of qualified results does not automatically invalidate data. This point is repeatedly emphasized in the USEPA National Functional Guidelines and is inherently acknowledged by the very existence of the data validation/flagging guidelines. The goal to produce the best possible data does not necessarily mean producing data without qualifiers. Qualified data can provide useful information.

Resolution of any issues regarding laboratory performance or deliverables will be handled between the Data Validator, laboratory Project Manager, consultant's Project Manager, and Broome County's Project Coordinator.

Upon completion of the data validation, a Data Usability Summary Report addressing the following topics will be prepared:

- Assessment of the data package.
- Description of any deviations.
- Failures to reconcile reported and/or raw data.
- Assessment of any compromised data.
- Laboratory case narrative,
- Overall appraisal of the analytical data.
- Table of site name, sample quantities, data submitted to the laboratory, protocol used, matrix, and fractions analyzed.

D.3 Reconciliation with User Requirements

The data validator for the project will review the analytical data for usability including determining if the data are accurate, precise, representative, complete, and comparable. The review of the analytical results will include checking chain-of-custody forms, sample holding times, blank contamination, spike recoveries, surrogate recoveries, internal standards, precision of duplicate sample analysis, and laboratory control samples. This review will be used to classify the data as valid, usable, or unusable. Valid data will indicate that all QA/QC review parameters have been met and are acceptable (as per details outlined in the preceding section). Data will be characterized as usable when QA/QC parameters are marginally outside acceptable limits (example: sample holding times were slightly exceeded) where the data may be questionable, but still usable within limitation. Unusable data will be data that are observed to have gross errors or analytical interference that would render the data invalid for any purpose.

Performance and system audits will be performed on a periodic basis, as appropriate, to ensure that the work is implemented in accordance with the approved project SOPs and in an overall satisfactory manner. Examples of audits that will be performed during the project activities are as follows:

- The field personnel will supervise and check, on a daily basis during sampling activities, that monitoring well integrity is intact; that field measurements are made accurately; that equipment is thoroughly decontaminated; that samples are collected and handled properly; and that all field work is accurately and neatly documented.
- On a timely basis, the data packages submitted by the laboratory will be checked for the following information: that all requested analyses were performed; that sample holding times were met; that the data were generated through the approved methodology with the appropriate level of QC effort and reporting; and that the analytical results are in conformance with the prescribed acceptance criteria. The quality and limitations of the data will be evaluated based on these factors.
- The project manager and or the project coordinator will oversee the field personnel and check that the management of the acquired data proceeds in an organized and expeditious manner.
- Audits of the laboratory are performed on a regular basis by regulatory agencies. Audits are discussed in the laboratory Quality Assurance Manual, Appendix A.

The field personnel are responsible for making sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions before being taken to the field.
The laboratory also follows a well-defined program to prevent the failure of laboratory equipment and instrumentation. This preventive maintenance program is described in the laboratory QAM.

Appendix A
ALS lab's Quality Assurance Manual

APPENDIX K – SAMPLING LOGS

FIELD MONITORING REPORT

PROJECT ______________________________ **LAB ID**____________________

SAMPLE POINT ID____

PURGE INFORMATION

Well Depth (ft.) ______________________ Purge Date ____________ Purge Method ____________________

SWL (ft.) ____________________________ Start Time ________________ Stop Time __________________

Standing Water (ft.) ____________________ Volume Purged gal. ___________ # casings__________________

Well Constant (gal/ft.) _________________ Observations ____

Well Volume (gal.) _____________________ ____

SAMPLING INFORMATION

Sample Method ____

Date _________________________ Time _____________________ SWL _____________

Appearance ____

Weather Conditions ____

Sampling Technician (Print)____________________________ Signature _____________________________

Meter	**Parameter**	**Unit**	**Replicate 1**	**Replicate 2**
Myron 6p	pH	unit		
Myron 6p	Conductivity	µmhos/cm		
Myron 6p	Temperature	Degrees Celsius		
Myron 6p	Redox	millivolts		
Lamotte	Turbidity	NTU		

Calibration Date/Time _____/_____/______ ___________

OBSERVATIONS ____

____

____

____

Sampling procedures were performed in accordance with all applicable protocols.

APPENDIX L

FIELD ACTIVITIES PLAN

THE COLESVILLE LANDFILL
FIELD ACTIVITIES PLAN

Introduction

This Field Activities Plan (FAP) pertains to the ongoing remediation water quality monitoring program at the Colesville Landfill Superfund Site. It is a companion document to the Site Management Plan (SMP) and the Quality Assurance Project Plan and describes the methods of sample collection and preservation, chain of custody documentation, analyses to be performed, analytical methods, data quality objectives, procedures for corrective actions, and procedures for data reduction, validation and reporting.

The Colesville Landfill's monitoring network is comprised of on-site and off-site groundwater monitoring wells, downgradient springs, sediment, and surface water from an adjacent stream. Full descriptions of these locations are available in the SMP.

Data quality objectives are the same for all landfill areas and include providing reliable, high quality data with which to evaluate any impacts to groundwater or surface water from the landfill and ensure the protection of human health and the environment. Consistent collection and analysis protocols must be followed to produce data capable of establishing accurate trends in water quality.

As described in the SMP, wells are monitored in the 5th quarter and springs, sediment and surface water are sampled semi-annually. The SMP includes all the sampling location points and media types for the entire facility. The minimum detection limits for each parameter will be the lowest achievable by the contracted laboratory.

Analytic quality assurance (AQA)/analytic quality control (AQC).

The AQA/AQC for the sampling program associated with the facility must be sufficient to ensure that the data generated by the sampling and analysis activities are of a quality commensurate with their intended use and the requirements of the NYSDEC. The overall objective for this FAP is to develop and implement procedures for field measurements, sampling, and analytical testing that will provide data of known quality that is consistent with the intended use of the information. Generally, the specific field sampling and analysis activities to be conducted that require AQA/AQC protocols include: groundwater and surface water sampling associated with groundwater quality operational monitoring.

Qualifications required to perform this work include:

- New York State Department of Health Environmental Laboratory Approval Program (ELAP) certification, with no lapses in certification for the three years prior to being contracted,
- A scientist/chemist with 10 years of water quality experience on staff for the laboratory and able to answer all technical questions and offer guidance on analytical methods,

- A project manager who is a college degreed professional hydrogeologist, environmental scientist, or engineer with at least 5 years of experience must oversee report preparation and be available to help resolve any inconsistencies in water quality or data.

Minimum experience requirements for field sample collection and field testing crews must include recent work on similar projects for three (3) 6 NYCRR permitted Active Landfills for a period of not less than four (4) years each. At least one of the field technicians must have this level of experience, be an employee or established subcontractor of the laboratory, and be onsite to supervise the work.

Field Sampling Procedures

The sampling program has been developed to assess the impacts of landfill-related activities on the environment, if any. Samples will be handled in accordance with these Field Sampling Procedures and the laboratory's Quality Assurance Plan, which is approved and then included as an appendix to the QAPP.

Laboratory information and chain-of-custody sheets will be provided by the laboratory. The chain-of-custody form will be filled out completely. The laboratory staff will insert preservation chemicals into sample bottles prior to sample collection and provide the state documentation regarding holding times and sample preservation techniques.

A. **Bottle Preparation.** It is important to use the proper sample containers to protect against the alteration of the groundwater chemistry between the field and the laboratory. Sample containers will be prepared by the laboratory. Proper preservation will be performed, the jars tagged, and the chain-of custody initiated prior to shipping.

B. **Sample Designation.** Sampling locations of a particular matrix type (surface water, groundwater) will be given a unique sample designation. The sample designation consists of matrix type, location, site name, date and time of sampling. Sample matrices are identified by a short alphanumeric prefix to the sample location number. A list of prefixes for various matrices is as designated in the EMP monitoring schedules

Sample bottles will be labeled individually. Each label will identify the site name, depth, matrix and sample location (i.e., MW-1, SW-1) and date and time of sample collection. Chain-of-custody forms and field log book entries should refer to each sample in the same manner. No two samples will carry the same sample designation.

C. **Monitoring Well Sampling Techniques.**

1. **Explosive and Volatile Organic Vapors.** If explosive or volatile organic vapors are suspected, ambient air in the well will be measured before the well is evacuated.

2. **Documented Contamination.** For wells with documented contamination, standing water in the well will be checked for immiscible layers or other contaminants that are lighter or heavier than water (floaters or sinkers). Floaters or sinkers will be sampled and

analyzed by a separate method described in Section D.4.c.12 of the field sampling procedures.

3. **Evacuation.** Volume of water removed and evacuation method, whether bailing or pumping is to be recorded on the field log for each well. Evacuation methods, including pumping rate, depth of pump intake, and method of determining sufficiency of evacuation must be consistently applied each time the well is sampled. This information must also be noted on the field log. Evacuation methods must create the least possible turbidity in the well. Currently all monitoring wells at the landfill have dedicated bailers in place.

D. **Sampling Equipment and Procedures.**

1. **Recordkeeping.** Field records are the responsibility of the field sampling personnel. The field personnel are responsible for keeping the field log book and preparing the chain-of-custody forms. All field records must be dated and kept in an organized, legible, and up-to-date form in the log book. Copies must be submitted to the lab for inclusion with their respective analytical reports that are provided to the County.

2. **Decontamination.** The following materials and procedures should be used to decontaminate equipment that will come in contact with sample media. Wherever possible, dedicated or disposable sampling equipment is used to eliminate the need for decontamination and further reduce the possibility of cross contamination between samples.

Materials:
1. Five-gallon jug with pour spout, potable water source
2. Five-gallon bucket- wash tub
3. Tall kitchen style garbage can, lined with clean garbage bag (clean equipment holder/dryer)
4. Small Rubbermaid storage box (small parts wash tub)
5. Alconox
6. Bottle brushes – 24” or more
7. Bristle scrub brush
8. Pesticide grade methanol or hexane
9. Deionized water
10. PVC gloves
11. Nitrile gloves
12. Tyvek suit
13. Pipe wrench
14. Paper towels
15. Aluminum foil
16. Goggles

To avoid being splashed during decontamination, the sampler shall wear a Tyvek suit, goggles and a pair of nitrile gloves over PVC gloves. Outer gloves must undergo decontamination procedures simultaneously with equipment.

3. **Procedure**

a) Wash in alconox and water; use bottle brush on inside of bailers; use bottle brush or scrub brush as necessary; wipe with paper towel.

b) Rinse with tap water; be sure to rinse hands (collect rinse solution in wash bucket).

c) Rinse with methanol or hexane and allow to air dry; rinse hands.

d) Rinse with deionized water; air dry.

e) Dispose of rinse water properly.

Groundwater Sampling by Bailer. Below are listed step-by-step procedures for sampling monitoring wells using bailers. The protocol is designed to provide representative samples while reducing the chances for cross contamination between sampling points. Toward this end dedicated bailers constructed of appropriate inert components appropriate for the types of sampling to be performed should be used. In addition, sampling shall proceed from the least likely to the most likely to be contaminated locations.

4. **Bailer Sampling Procedure**

a. **Preparation**

1) Review sampling plan and project FAP.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

4) Receive bottles. Check for proper bottles and chain-of-custody information.

5) Attend pre-sampling meeting.

6) Assemble and check necessary equipment (personal protection equipment, rope, bailers, field instruments, and notebook).

b. **Calibration Data** The following data must be included whenever the pH, Eh, and conductivity meters are calibrated:

1) The temperature, nominal value, and expiration date of the calibration fluids.

2) The temperature-corrected value of the calibration fluids.

3) The final (after calibration) reading of the instruments as they measure the calibration fluids and the time those readings is taken.

4) If necessary, reasons why calibration could not be achieved.

c. **Sampling**

1) Identify the well and record the location in the field book.

2) Put on a new pair of disposable PVC gloves.

3) Put on a pair of nitrile gloves.

4) Cut a slit in the center of the plastic sheet and slip it over the well, creating a clean surface onto which the sampling equipment can be positioned.

5) Do not kick, transfer, drop or in any way let soils or other materials fall onto this plastic sheet unless it comes from inside the well.

6) Clean meters, tools, equipment, etc. before use.

7) Clean the well cap with a clean towel; remove the well cap, and plug, placing both on the plastic sheet. Do not use petroleum products or aerosol lubricants to free.

8) Using an electric water level indicator, measure the depth to the water table to the nearest 0.01 foot. If free-phase product is present, use an oil-water interface probe or a clear bottom-valve bailer to determine the thickness of the free product. Record this information in the field book.

9) Note if the static water level is above the sand pack so that when the well is evacuated the least possible turbidity is created in the well by not lowering the water below the top of sand pack if possible.

10) Clean the well depth probe and rinse it with deionized water after use.

11) Compute the volume of water in the well and record this volume in the field book.

12) Attach enough polypropylene rope to a bailer to reach the bottom of the well and lower the bailer slowly into the well, making certain to submerge it only far enough to fill it one-half full. The purpose of this is to recover any oil film if one is present on the water table. If floaters or sinkers are present in the well, then thoroughly describe the color, appearance, thickness, and odor in the field book. The need for and type of chemical analysis will be determined on an as needed basis depending on the nature of the non-aqueous phase liquid.

13) Pull the bailer out of the well, keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a clean glass quart container and observe its appearance. Note: This sample will not undergo laboratory analysis and is collected to observe the physical appearance of the groundwater only.

14) Record the physical appearance of the groundwater in the field book.

15) Initiate bailing the well from the top of the water column, making certain to keep the polypropylene rope on the plastic sheet. Groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well.

16) Continue bailing the well until a sufficient volume of groundwater in the well has been removed or until the well is bailed dry. If the well is bailed dry, allow sufficient time for the well to recover before proceeding with Step 17. This is typically the day after purging. Record this information on the groundwater field sampling record.

17) Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect labels to verify proper sample identification. Be sure labeling is complete before filling containers. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the containers for volatile organic compounds first, then sample for field parameters. Filter and add preservatives to appropriate samples. Groundwater samples must not be filtered.

18) Record time sampling begins and note the interval between bailing (purging) and sampling. To provide comparable samples, maintain same interval between well evacuation and sampling.

19) To minimize agitation of the water and obtain a sample fresh from the surrounding formation, initiate sampling by lowering the bailer slowly into the well, making certain to submerge it only far enough to fill it completely. Fill sample bottles and return each to its proper transport container. Keep samples on ice. Seal each container with chain-of-custody seals.

20) If the sample bottles cannot be filled quickly, keep them cool with the caps on until they are filled. The vials labeled purgeable priority pollutant analysis should be filled from one bailer, and then securely capped.

21) After the last sample has been collected, record the date and time and empty one bailer of water from the surface of the water in the well into a beaker and measure and record the pH, Eh, conductivity and temperature of the groundwater following the procedures outlined in the equipment operation manuals. Record this information in the field book. The beaker must then be rinsed with distilled water prior to reuse.

22) Begin the chain-of-custody record. A separate entry is required for each well with the required analysis listed individually.

23) Replace the well cap and lock the well protection assembly before leaving the well location.

24) Place the polypropylene rope and disposable bailer (if applicable), gloves, rags and plastic sheeting into a plastic bag for disposal.

5. **Surface Water Sampling.** When sampling from the stream, care must be exercised to collect a representative sample. The sample should cause as little disturbance to the water body as possible. Avoid taking a sample of water which shows evidence of sediment, debris or other material which may have been stirred up by the presence of the sampler. Downstream samples will be collected first to avoid disturbing the sediment bottom.

6. **Surface Water Sampling Procedure.**

a. Preparation.

1) Review sampling plan.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

4) Receive bottles. Check for proper bottles and chain-of-custody information.

5) Attend presampling meeting.

6) Assemble and check necessary equipment (personal protection equipment, field instruments, and notebook).

b. Surface Water Sampling

1) Determine sampling locations, record on site map and in field book. Begin at farthest downstream location.

2) Properly label sample containers.

3) Put on PVC and nitrile gloves.

4) Record physical appearance of water body, sampling time, and date in the field book.

5) Take pictures of the sample locations of surface water and leachate seeps or springs.

6) Fill sample bottles directly, if possible, always tilted upstream. If depth of water body is insufficient to fill containers, use a clear glass beaker. Take care not to include sediment in the sample. Place samples immediately in a cooler on ice. If required, seal containers with a chain-of-custody seal.

7) If sample is collected from water bodies over 3-feet, check for stratification. If stratification is detected, record field parameters of each stratum for contamination. Sample each stratum that shows evidence of contamination, and if no stratification is visible, then collect a composite surface water sample.

8) Using a clean beaker or by measuring directly in water, record field parameters (pH, Eh, conductivity, temperature and turbidity). Record this information in the field book.

9) If turbidity is greater than 50 NTUs, filtered samples should be obtained for metals analysis.

10) Remove and dispose of gloves before sampling next locations.

11) Sediment samples should consist of the upper five centimeters of sediment.

7. **Water supply well** sampling methods must be consistently applied each time a well is sampled and must comply with the following:

   a. If possible, samples should be collected directly from the well so as to yield water representative of the formations supplying the well. If this is not possible, samples must be collected as near to the well as possible and before the water is softened, filtered, or heated.

   b. If possible, samples should be collected before the water enters the pressure tank; otherwise the water must run long enough to flush water stored in the tank and pipes.

   c. Before sampling, water must be evacuated from the well to ensure a fresh sample of aquifer water.

   d. If samples are collected from a tap, aerators, filters, or other devices must be removed before sampling.

8. **Corrective Action.** The field sampling procedure will be followed as described in this document. In the event of a problem, any corrective measures taken will be documented in the sampling report submitted to the NYSDEC. The documentation will include a description of the deficiency, the corrective action taken, and the persons responsible for implementing the corrective action. Any alterations to the field sampling procedures shall be included as an amendment to the FAP.

9. **Field QA/QC.** In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40ml VOA vials as follows:

   a. **Trip Blank.** A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for VOCs are planned (water matrix only). The trip blank will be analyzed for volatile organic compounds as a measure of the internal laboratory procedures and their effect on the results.

   b. **Field (Wash) Blanks.** Field wash blanks are analyzed to check the effectiveness of decontamination. Each sample consists of distilled deionized water (prepared by the laboratory) poured through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure prior to sampling of a monitoring well. The wash blank can be analyzed for all or some of the compounds which the subsequent monitoring well sample is scheduled for. In the event dedicated sampling equipment (i.e., dedicated bailers) is used such that decontamination procedures are not warranted, field blanks will not be included for analysis.

   c. **Duplicate Samples.** One duplicate sample will be collected during each sampling event. The duplicate sample will be collected from one of the monitoring wells sampled in that event and will be analyzed for the parameter list for that particular sampling event. The sample containers for the duplicate sample will not reveal the identity of the well from which the sample is collected. The results of the duplicate analyses will be used to check for analytical integrity.

10. **Sample Handling and Analysis.** The following sections describe what to do with samples once they have been collected.

a. **Packaging.** If samples are not hand delivered to the lab, they must be packaged for shipment in accordance with current U.S. Department of Transportation (DOT) regulations. Required government and commercial carrier shipping papers must be filled out. Information can be obtained from the carrier (i.e., Federal Express) before field sampling begins.

The following checklist should be followed regardless of transport method:

1) Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or styrofoam containers are unacceptable).

2) Remove previously-used labels, tape and postage from cooler.

3) Ship filled sample bottles in same cooler in which empty bottles were received. Coolers should have a permanent identification number affixed to the outside walls or lid.

4) Affix return address label to cooler.

5) Check to see that sample bottles are tightly capped.

6) Be sure bottle labels are completed.

7) While packing cooler, fill out chain-of-custody form.

8) Wrap sample bottles in bubble pack and place in cooler.

9) Pack bottles with extra bubble pack, vermiculite, or styrofoam "peanuts". Be sure to pack trip blank if applicable.

10) Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.

11) Separate sampler's copy of chain-of-custody and keep with field notes.

12) Tape paperwork (COC, manifest, return address) in ziplock bag to inside cooler lid.

13) Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.

14) Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

b. **Shipping -** Because holding times are very important for accurate laboratory analyses, it is imperative that samples arrive at the lab as soon as possible following sampling. Samples must be hand delivered on the same day as sampling or sent via overnight mail.

When using a commercial carrier, follow the steps below.

1) Securely package samples and complete paperwork.

2) Weigh coolers for air transport.

3) Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

4) Keep customer copy of air bill with field notes and chain-of-custody form.

5) When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of shipment, cooler identification numbers, and expected time of arrival.

6) Call lab on day following shipment to be sure samples arrived intact. If bottles are broken, locations can be determined from chain-of-custody and re-sampled.

Laboratory Procedures

Samples will be handled in accordance with these laboratory procedures and the laboratory's Quality Assurance Plan, which is approved during procurement of services and then included as an appendix to the QAPP.

1. Laboratory analyses must be performed by a laboratory currently certified under the appropriate approval categories by the New York State Department of Health's Environmental Laboratory Approval Program (ELAP) and in accordance with NYSDEC Analytical Services Protocol (ASP – Category A or B, as appropriate).

2. Standard operating procedures include:

    a. Samples are received at the lab and logged in using a unique job number identifier for each batch of samples. Each sample is assigned an identifier corresponding to that from the chain-of-custody (COC);

    b. Each sample is reviewed and its condition is noted including temperature, if custody seal is intact, integrity of container, if the sample is properly preserved, if labels and COC match, and if sample size is adequate for analysis to be performed. If potential problems are identified the lab will notify the County before proceeding;

    c. Each sample is then scheduled to ensure that holding time requirements are met and is stored appropriately. Samples will be kept at the lab for a minimum of 60 days.

    d. Other procedures include the following that are contained in the laboratory's approved Quality Assurance Plan:

        i. reagent/standard preparation;

        ii. general laboratory techniques (*e.g.*, glassware cleaning procedures, operation of analytical balances, pipetting techniques and use of volumetric glassware);

        iii. description of how analytical methods are to be performed including precise reference to the analytical method used, and not a simple reference to standard methods;

        iv. standard operating procedures for equipment calibration and maintenance to ensure that laboratory equipment and instrumentation are in working order, including, but not limited to procedures and schedules for calibration and maintenance in accordance with manufacturer’s specifications; and

v. corrective action plan, standard operating procedures for identifying and correcting deficiencies in the laboratory procedures. Each corrective action must be documented in the lab report with a description of the deficiency, the corrective action taken, and the person responsible for implementing the corrective action. Any alterations to the laboratory procedures must be included as an amendment to the AQA/AQC Plan.

APPENDIX M
SITE MANAGEMENT FORMS

Colesville Landfill Inspection and Certification Form

Date:___________________________________ **Time:** _____________________

Inspected by:____

Weather conditions: ____

Engineering Controls

Landfill Property and Cap:	Yes	No
Is the access road stable and free of erosion?		
Are the culverts and drainage ditches free from sediment and debris?		
Any visible debris, litter, and/or waste on the site?		
Are the gates and fences in good condition, operational and with locks?		
Is the vegetation providing adequate protection from erosion?		
Are there any woody plants growing on the cap?		
Was the cap vegetation mowed this year?		
Is there any settlement, ponding, or animal burrows?		
Are all the groundwater monitoring wells in good condition?		
Are the gas venting pipes in good condition?		
Is the SP-5 remedy functioning as intended?		
Is the SP-4 remedy intact (no stream bed erosion)?		
Was the SP-3 iron-stained area cleaned this year?		
Is the rip rap armored bank above SP-3 stable and free of erosion?		
Is the treatment building secure and in good condition?		

Institutional Controls

Are there any new or inhabited buildings on any easement properties? (includes County and Tom Scott properties)		

Describe any problems identified below:

Describe inspection observations: ____

These activities were conducted in connection with IC/EC requirements and compliance. ______________

Describe any repairs, maintenance, or corrective actions required to correct observed deficiencies:

Inspector's Signature:

Signature: ____ Date: __________________

COLESVILLE LANDFILL
BROOME COUNTY, NEW YORK
SITE NO. 704010

O&M PLAN COMPLIANCE FORM

Site Address: Colesville Landfill, 1538 East Windsor Road, Harpursville, New York 13787

Compliance Period: ______________________________

Compliance Evaluator (Name, Title, and Affiliation______________________________

Describe O&M Plan Compliance:

A. Components of O&M Plan

1.
2.
3. .

B. Summary of O&M Completed During 2020 Period

C. Evaluation of Remedial Systems

D. O&M Deficiencies

E. Conclusions and Recommendations for Improvements

Signature: ______________________________ Date: ____________________

INSPECTION AND CERTIFICATION FORM

Summary of Green Remediation Metrics for Site Management

Site Name: ______________________________ Site Code: ____________________
Address: ________________________________ City: ______________________
State: __________________ Zip Code: ________ County: ______________________

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date:

____

Current Reporting Period
Reporting Period From: ______________________ To: __________________________

Contact Information
Preparer's Name: __________________________ Phone No.: ___________________
Preparer's Affiliation: __________________________________

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR

I, ____ (**Name**) do hereby certify that I am ______________________ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application.

____

Date **Contractor**

APPENDIX N

REMEDIAL SYSTEM OPTIMIZATION REPORT

Broome County, New York

REMEDIAL SYSTEM OPTIMIZATION REPORT

Colesville Landfill,

Broome County, New York

March 30, 2017

REMEDIAL SYSTEM OPTIMIZATION REPORT

For The Colesville Landfill, Broome County, New York

Paul Martorano, P.E.
Project Engineer

Steven M. Feldman
Project Manager

Prepared for:

Broome County, New York

Prepared by:

Arcadis of New York, Inc.
Two Huntington Quadrangle
Suite 1S10
Melville
New York 11747
Tel 631 249 7600
Fax 631 249 7610

Our Ref.:

NY000949

Date:

March 30, 2017

CONTENTS

FIGURES

ACRONYMS AND ABBREVIATIONS

AGC	Annual Guidance Concentration
ARARs	Applicable or Relevant and Appropriate Requirements
Arcadis	Arcadis of New York, Inc.
ARI	Automated Reagent Injection
BPJ	Best Professional Judgment
COC	Contaminants of Concern
CSM	Conceptual Site Model
ERD	Enhanced Reductive Dechlorination
ESD	Explanation of Significant Differences
ft/ft	Foot per Foot
FML	Flexible Membrane Liner
ft/day	Feet per Day
FYR	Five-Year Review
gpm	Gallons per Minute
IRZ	In-Situ Reactive Zone
MCL	Maximum Contaminant Levels
MNA	Monitoring and Natural Attenuation
NYSDEC	New York State Department of Environmental Conservation
PRP	Principal Responsible Parties
PT	Pump and Treat
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RSO	Remedial System Optimization
SGC	Short-Term Guidance Concentration
SMP	Site Management Plan
SW-SGVs	Ambient Water Quality Standards and Guidance Values
TOC	Total Organic Carbon
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1 INTRODUCTION

Arcadis of New York, Inc., (Arcadis) on behalf of Broome County has prepared this Remedial System Optimization Report (RSO) for groundwater and associated affected media (i.e., spring water and surface water) at the Colesville Landfill site (Site), located in Broome County, New York. The purpose of this RSO report is to evaluate the effectiveness of the site-wide remedies relative to the remedial action objectives (RAOs) documented in the Record of Decision (ROD). As described in the ROD, "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". Based on the remedial status, the findings that were documented in the In-Situ Reactive Zone Discontinuation Pilot Test Report (Arcadis 2015), and the reevaluation mechanism outlined in the ROD, a reassessment of the current remedy and the RAOs is warranted.

1.1 Site Overview

landfill is situated is generally bounded by East Windsor Road to the west and by unnamed tributaries of the Susquehanna River to the north, west, and east. The tributary to the north (DEC Tributary 120) is commonly referred to as the North Stream. The property consists of approximately 113 acres, 35 of which, located in the northern and western areas, were utilized for landfill operations. A site plan is provided as Figure 1.

A complete description of the hydrogeologic and hydrologic setting is presented in Section 2.2 of the 1996 Revised Focused Feasibility Study (Geraghty & Miller 1996). Two aquifers have been identified in the vicinity of the Site: the glacial outwash aquifer and the bedrock aquifer. These aquifers are separated by low permeability glaciolacustrine silt and clays and glacial till. In this type of hydrogeologic setting, a very high percentage of the areal recharge to the glacial outwash aquifer moves horizontally because of the dense glaciolacustrine clay confining unit that underlies the glacial outwash aquifer. Water moving within the glacial outwash aquifer beneath the landfill is part of a shallow groundwater subsystem that contributes base flow to surface-water bodies. The direction of groundwater flow at the Site is toward the west and southwest, discharging to the North Stream and Susquehanna River. Although groundwater is present in the till and glaciolacustrine clay, the low permeabilities of these units limits their potential for groundwater flow.

Historical aquifer testing indicates that the glacial outwash aquifer in the area of interest has a low permeability (approximately 0.2 to 0.3 feet per day (ft/day) and poor ability to yield water (0.25 to 0.5 gallons per minute (gpm)). The historical horizontal groundwater gradient ranges from 0.05 to 0.07 foot per foot (ft/ft). Assuming a mobile porosity range of three (3) percent to seven (7) percent (which is typical for glacial tills (Driscoll 1986), the calculated advective groundwater velocity ranges from 0.3 ft/day to 0.5 ft/day at the Site.

1.2 Project Objectives and Scope of Work

The objectives of this evaluation are to:

- Describe the significant remedial progress that has been achieved through reductive dichlorination of volatile organic compounds (VOCs) via the anaerobic in-situ reactive zone (IRZ).
- Describe the site conditions that make the current remedy inefficient and unable to restore groundwater quality to the cleanup criteria in the ROD in a cost effective and timely manner.
- To recommend an alternative remedial approach and/or revised RAOs that are achievable, and will be protective of human health and the environment.

1.3 Report Overview

This remainder of this Remedial System Optimization Report is organized in three sections: Section 2, Remedial Action Description, provides a description of the Site's regulatory and remedial action history; Section 3, Findings and Observations, provides a summary of groundwater quality observations over time and treatment system performance; and Section 4, Recommendations, describes the recommended modified remedial approach.

2 REMEDIAL ACTION DESCRIPTION

This section provides a brief overview of the Site history, regulatory history and requirements, remedial goals and site closure criteria, and past and current remedial actions.

2.1 Site Location and History

Waste disposal operations were conducted at the Site from 1969 to 1984. The Town of Colesville owned and operated the Site from 1969 to 1971 and then was transferred to Broome County. Broome County operated the landfill from 1971 until it was closed in 1984 (Wehran 1988).

The landfill was primarily used for the disposal of municipal solid waste. However, between 1973 and 1975, industrial waste consisting primarily of drummed aqueous dye wastes, as well as organic and chemical solvent mixtures were also disposed at the landfill (Wehran 1988). The primary disposal practice utilized during the operational life of the landfill was the trench method. Approximately ninety-three (93) percent of the material disposed at the Site was disposed in this way. The remaining seven (7) percent was disposed by utilizing the area method (Wehran 1988). Further information regarding the landfill operation is presented in Section 1.2 of the Colesville Landfill Site Management Plan (SMP) (Arcadis 2015).

2.2 Regulatory History and Requirements

A Remedial Investigation (RI) was initiated in 1983 by Wehran Engineering to characterize the nature and extent of contamination at the Site with other confirmatory sampling and further evaluations culminating in the ROD in 1991. The results of the RI are described in detail in the following reports:

- Hydrogeologic Investigation, Colesville Landfill, Wehran Engineers, Sept. 1983
- Phase II Hydrogeologic Investigation and Remedial Alternative Evaluation, Volumes 1 & 2, Wehran Engineers, Nov. 1984

- Agency for Toxic Substances and Disease Registry, Public Health Assessment, Colesville Municipal Landfill, Colesville, Broome County, NY, 1984.
- Colesville Landfill Remedial Investigation Report, Wehran Engineers, Revised Sept. 1988
- Record of Decision, Colesville Landfill Site, Town of Colesville, Broome County, NY, issued in March 1991.

As part of the RI, monitor wells were installed and sampled; surface water and sediment samples were collected and area homeowner wells were also sampled. In addition, a multi-phase geophysical investigation was conducted to determine the location and extent of landfilled materials buried on site. The RI was completed in the spring of 1988. In 1990, confirmatory sampling was conducted by Wehran Engineering to verify conclusions of the RI.

Studies found that ground water beneath the landfill was being contaminated with VOCs from wastes disposed at the Site. The areas of highest ground water contamination occurred along the southern and western site boundaries. Contamination was primarily confined to the upper portions of the glacial outwash aquifer underlying the Site and ground water flow was in a southwesterly direction, towards the Susquehanna River. Based on the geology, groundwater flow, and sampling data; groundwater and private water supply wells to the south and southeast and near Doraville did not appear to be impacted by site contaminants.

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

Following the RI/FS, the United States Environmental Protection Agency (USEPA) issued a ROD for the Site in 1991 (USEPA 1991), which included the selection of a remedial method. The ROD called for capping the landfill, installing a leachate collection system, collecting and treating contaminated groundwater, and constructing and operating a new water supply system for the affected residents. The Principal Responsible Parties (PRPs) developed an engineering design package for the capping of the landfill and wetlands restoration areas between 1991 and 1994. The capping of the landfill and wetlands restoration were completed in October 1995. The alternate water supply design (consisting of a series of deep wells) was approved by the State in 1995.

Based upon design-related aquifer tests conducted at the Site, it was determined that extracting contaminated groundwater, as called for in the ROD, would not likely be an effective means of remediating groundwater in a reasonable timeframe. This conclusion led to an evaluation of alternative groundwater remediation technologies. Based upon this evaluation and a pilot-scale study of anaerobic IRZ technology, it was concluded that this technology, in combination with the installation of downgradient extraction wells, offered a more technically feasible approach for achieving site cleanup goals. A final groundwater remediation design was approved by New York State Department of Environmental Conservation (NYSDEC) on August 24, 2000. The Explanation of Significant Differences (ESD) to modify the ROD remedy was issued in September 2000.

Further information regarding regulatory history and requirements is presented in the SMP (Arcadis 2015).

2.3 Clean-Up Goals and Site Closure Criteria

As defined in the ROD, remedial measures are based on attaining groundwater maximum contaminant levels (MCLs) while mitigating potential exceedances of NYSDEC Ambient Water Quality Standards and Guidance Values (SW-SGVs) in the North Stream, a Class C water body (NYSDEC 1998) and potential risks to human health or ecological receptors from direct contact exposure to spring water along the North Stream. As stated in the ROD, the RAOs are as follows:

Surface Water

- Prevent exceedances of SW-SGVs for Site-related VOCs in the North Stream.

Groundwater

- Attain groundwater MCLs for Site-related VOCs in the glacial outwash aquifer; and
- Protect human health and the environment from current and potential future migration of contaminants in groundwater.

The ROD also identified soil and sediments as media of concern at the Site. However, the ROD Remedy addressed the RAOs for soil through the installation of a landfill cap which was completed in November 1995 and addresses the RAOs for sediments through the SP-4 spring water remedy and use of existing engineering controls.

The ROD describes several factors that contribute to the potential inability to reach remedial goals. The large 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 efficiently. Furthermore, the ROD was prepared based on an incomplete understanding of Site conditions that limit remedy effectiveness. This provided for the opportunity to reevaluate the ROD remedy, over time, to ensure ROD remedial measures continue to be effective.

2.4 Previous Remedial Actions

Prior to the preparation of the ROD, no remedial actions were undertaken at the Site.

In 1991, the USEPA issued the ROD Remedy , which included: (1) installation of a landfill cap; (2) construction of a gas venting layer; (3) installation of groundwater extraction wells beneath and downgradient of the landfill; (4) ex-situ groundwater treatment; (5) surface-water discharge to either the Susquehanna River or to the North Stream, a tributary of the Susquehanna River; (6) fencing to restrict access to the Site; (7) imposition of property deed restrictions, if necessary; (8) development and construction of a new water supply system (which may include a new well or wells) for impacted residential wells in the area that remain in use, and (9) implementation of a monitoring program upon completion of closure activities to provide data to evaluate the effectiveness of the remedial effort over time.

As previously discussed, installation of the landfill cap was completed in November 1995, and an anaerobic IRZ remedial system, in combination with the installation of downgradient extraction wells, was implemented as the groundwater remedy.

2.5 Description of Existing Remedy

The section provides a summary of the remedial system objectives, components, and operations and maintenance procedures.

2.5.1 System Goals and Objectives

The remedial response objectives of the remedy that was implemented include the following:

- Protect human health and the environment from current and future migration of contaminants in groundwater; and
- Restore the onsite groundwater to levels consistent with federal and state groundwater standards.

In a September 2000 ESD, it was determined that extracting groundwater from beneath the landfill, as called for in the ROD, would not likely be an effective means of remediating the source in a reasonable time frame. Specifically, the low permeability of the aquifer would necessitate the installation of an inordinate number of extraction wells. The ESD called for a groundwater remediation design using molasses injections in combination with a downgradient extraction and treatment system, on the basis of a successful pilot study of molasses injection technology.

A 2004 ESD addressed the discovery of a contaminated spring along the stream bank of the North Stream and an additional low-lying wet area located approximately 375 feet to the south of the landfill that could potentially overflow during rainy conditions to a vegetated drainage swale that conveys water to the South Steam. The remedy at the contaminated spring along the North Stream, identified as the SP-4 Remedy, consists 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. The remedy at the low-lying wet area south of the landfill, identified as the SP-5 Remedy, consists of a sand filter and a granular activated carbon unit that were placed in an existing concrete structure, and the installation of a riprap-lined outlet structure to prevent erosion at the discharge point of the drainage pipe. The spring water flows vertically upward through the filter materials in the concrete structure, and the treated water is discharged via a horizontal drainage pipe at the rip-rap lined discharge area.

As part of the revised ROD remedy, both the IRZ and pump and treat (PT) systems were implemented. The IRZ was historically the primary remedial component used to treat VOC mass, with the PT system proving not to be highly effective at removing VOC mass. Beyond the IRZ treatment zone, natural attenuation has also been a major component of the remedy in areas beyond the area of the IRZ. Therefore, natural attenuation processes have effectively treated VOC-impacted areas that are side-gradient or downgradient of the IRZ treatment zone during the period of active remediation at the site, and have been a significant factor in maintaining a stable to decreasing plume extent over that time period. A further description of mass transport and natural attenuation processes is provided in Section 4.1.3 Conceptual Site Model.

2.5.2 System Description

Remedial systems associated with the Site are shown on Figure 1 and include the following:

Landfill Cap

The landfill cap consists of a multimedia cap over the landfill material that attains the performance requirements for caps at hazardous waste landfills as specified in the Code of Federal Regulations (CFR) Part 264.310. It provides for long-term minimization of migration of liquids through the closed landfill by establishing proper slopes for drainage of precipitation, vegetated topsoil to promote evapotranspiration, and installation of a flexible membrane liner (FML) with a permeability of 1×10^{-12} centimeters per second. The objective of the landfill cap is to prevent stormwater infiltration into the landfill thereby eliminating further contaminant migration from vadose zone soils (e.g., contamination from buried waste) into groundwater.

Groundwater Recovery System

When it is in operation, the Groundwater Recovery System consists of three recovery wells (GMPW-3, GMPW-4, and GMPW-5) and associated pumps that extract groundwater at a combined flow rate of approximately 1 gallon per minute. The pneumatic pumps deliver the extracted groundwater to a treatment building, and into the top of a low-profile air stripper. The air stripper off-gas is discharged through a stack to the atmosphere. The treated groundwater is then pumped through two cartridge filter housings that remove iron and silicate particulates. The treated groundwater is then discharged to the swale that conveys water to the North Stream.

Enhanced Reductive Dechlorination Automated Reagent Injection System

An automated reagent injection (ARI) system was installed within the treatment building to serve as the means for delivering organic carbon to the subsurface to establish conditions conducive for enhanced reductive dechlorination (ERD) across the southwest boundary (the IRZ) of the landfill. The system accelerates the microbial degradation of VOCs. The ARI system consists of two raw molasses blend storage tanks, a temporary PT system effluent water holding tank, a cone-bottom mixing tank where the raw molasses and PT system effluent water are mixed prior to being pumped into 17 injection wells, mixer motor and impellor, transfer pumps, and an associated controls and instrumentation system to automate the injection process.

SP-5 Spring Water Remediation System

The SP-5 spring remedy consists of a spring water collection trench, a 350-pound LPGAC unit, a sand pre-filter, a lockable aluminium cover, a two-inch diameter discharge pipe, a riprap-lined infiltration bed, and engineering controls for erosion and sediment control. Spring water from the SP-5 spring area is first collected within the collection trench and/or the sand pre-filter prior to exfiltrating land surface. Spring water collected within the trench is conveyed to the bottom of the concrete structure by gravity. The collected spring water then travels up through the LPGAC unit. Treated effluent is conveyed into a below grade infiltration bed consisting of a riprap layer. A rip-rap lined outlet structure to prevent erosion was installed at the discharge point of the drainage pipe.

SP-4 Spring Water Remedy

The remedy for the spring at SP-4 consisted of the installation of a subsurface stone infiltration bed in the area of the spring to prevent the contaminated spring water from exfiltrating above the land surface. Large boulders were placed between the stream and the infiltration bed to protect the integrity of the infiltration bed during high water conditions. A heavy stone retaining wall was also installed along a larger stretch of the North Stream as an erosion control measure and the stream channel was realigned as part of this effort.

2.5.3 Operation and Maintenance Program

The following briefly describes the components of the long-term effectiveness and performance monitoring programs. A detailed description of the long-term monitoring programs is found in the "Long-Term Monitoring Plan" (Arcadis 2002) the Long-Term Monitoring Addendum for Spring Water Remediation Systems" (Arcadis 2003) and the SMP (Arcadis 2015).

Effectiveness Monitoring

The long-term effectiveness monitoring program at the Site includes: hydraulic monitoring (depth to groundwater measurements); groundwater quality monitoring (groundwater sampling); sampling at spring water locations along the North Stream that were identified during the remedial investigation; and sampling of downstream surface water in the North Stream. A total of 18 existing monitoring wells, four spring water sample locations, and one surface water sample location were included in the long-term monitoring program. The components of effectiveness monitoring are described below:

- Monitor groundwater flow patterns on-site
- Monitor VOC concentrations in groundwater, spring water (if present) located along the north stream, and surface water in the North Stream downstream of the existing springs
- Monitor key field and biochemical indicator parameters in the area immediately downgradient of the ERD injection wells and other select monitoring wells

Groundwater Remediation System Operational Performance Monitoring

PT system operational performance monitoring, when the system is operating, includes: routine visual inspection, recording system field parameters, maintenance on system equipment (as necessary) and collection of air and water compliance samples. PT system effluent water and air samples are compared to effluent emissions criteria in order to ensure compliance and monitor system performance. System operational parameters are compared to design criteria to ensure the system continues to operate in accordance with the Groundwater Remediation System Design Drawings and Technical Specifications.

ARI groundwater monitoring, when the system is operating, includes: sampling select injection wells for total organic carbon (TOC) and monitoring field parameters (i.e., oxidation-reduction potential, pH, specific conductance, temperature, dissolved oxygen, and sulfide). Results from the injection well sampling are used to adjust carbon loading and/or frequency of reagent injections, as necessary. In addition to groundwater monitoring conducted explicitly for the ARI system monitoring, field parameter and analytical results for select monitoring wells associated with the long-term effectiveness monitoring program are also used as needed, to evaluate performance of the ARI system.

SP-4 and SP-5 Spring Water Remediation System Performance Monitoring

Operational performance monitoring of the SP-4 spring remedy is conducted on a semi-annual basis and includes visual inspection of the SP-4 area to ensure that the spring water generally remains suppressed within the groundwater system and the collection of a sample from the intermittent spring and a mid-stream surface sample immediately downgradient of the former SP-4 spring area. Operational performance monitoring of the SP-5 spring remedy is conducted on a semi-annual basis and includes routine visual inspection, recording system field parameters, maintenance on system equipment (as necessary) and collection of influent and effluent water samples. System effluent spring water samples are compared to effluent criteria in order to ensure compliance with the Best Professional Judgment (BPJ) limits and monitor system performance.

Residential Supply Well Operational Performance Monitoring

Groundwater quality samples are collected from the residential water supply wells on a quarterly basis and analysed at a NYSDOH approved laboratory. The analytical list was taken from 6 NYCRR Part 360 Baseline Parameters List.

Further information regarding the current system operations and maintenance is provided in Section 4 of the SMP (Arcadis 2015).

2.5.4 Institutional Controls

Following issuance of the ROD, Broome County installed double-cased bedrock wells for the two residences on the Charles Scott parcel (referred to as the Charles Scott Sr. and River residences). The Charles Scott Sr. residence is occupied, and the River residence (Claude Scott) is currently vacant and abandoned. The bedrock wells were installed to provide the residents with a clean drinking water supply.

In addition, the NYSDEC and the USEPA approved the Broome County and GAF Corporation (i.e., PRPs) proposal to undertake a program of acquiring the residential properties where wells were impacted by VOCs (the contaminants of concern [COCs]) as an alternative to implementing the new water supply required by the ROD. The impacted residential properties are or were owned by the DeFreitas family, Harry Ray Scott (Riley), the Smith family, and Charles Scott. The DeFreitas and Smith properties have been purchased and have been vacated; negotiations to purchase the Harry Ray Scott and Charles Scott properties were not successful, and as previously mentioned the residences on the Charles Scott parcel were provided with bedrock wells. The Harry Ray Scott residence is abandoned and dilapidated. Moreover, deed restrictions on groundwater use were recorded for Broome County-owned properties, and the Harry Ray Scott property, now owned by Thomas Scott.

3 FINDINGS AND OBSERVATIONS

The areal extent and distribution of total chlorinated VOCs prior to remedial implementation is shown on Figure 2. The plume can be described as centered at the westernmost toe of the landfill and decreasing in concentration with increasing distance from the landfill. As depicted on Figure 3, groundwater quality in monitoring wells has exhibited a significant improvement as a result of groundwater remediation system operation.

For site-wide groundwater concentrations to continue to decrease and eventually decline to MCLs, the following conditions are needed:

- A decreasing concentration trend for groundwater migrating from underneath the landfill. The landfill cap continues to remain in place to ensure that concentrations decrease over time, and long-term monitoring data from landfill monitoring well GMMW-7 demonstrate this trend.
- Stable to decreasing VOC concentrations in groundwater downgradient of the landfill. The time-concentration graphs shown on Figure 3 indicate that between remedial system startup (September 2002) and implementation of the IRZ Discontinuation Pilot Test (May 2012), concentrations decreased to asymptotic low levels. Following discontinuation of anaerobic IRZ injections in May 2012, there has also been very little change in the VOC concentration trends, indicating that the treatment systems (i.e., groundwater extraction and anaerobic IRZ injections) have effectively removed VOC mass and are no longer a necessary component of removing the remaining low levels of persistent VOCs.

The fact that VOC concentrations continue to persist at low, asymptotic levels approximately five years following discontinuation of active remedial measures indicates that natural attenuation processes are an equivalent and effective means of remediating groundwater at this stage of the remedial life cycle. Therefore, a more optimized means of progressing toward the cost-effective attainment of MCLs is to utilize natural attenuation processes as the primary means to remediate groundwater.

As VOC concentrations in groundwater continue to improve over time through natural attenuation processes, spring water quality and surface water quality will also exhibit commensurate improvements as they are a reflection of downgradient groundwater quality.

3.1 Subsurface Performance

Overall, the data indicate that the plume extent is stable as a result of degradation processes primarily occurring in the strongly anaerobic portion of the site (i.e., approximate area of the former anaerobic IRZ). Enhanced and/or natural attenuation mechanisms (e.g., reductive dechlorination completed through a biologically mediated pathway) continue to degrade chlorinated VOCs within the former IRZ area despite the discontinuation of carbon injections, as evidenced by stable VOC concentrations. The data indicate that shutdown of the groundwater extraction and treatment and automated injection systems have not resulted in an adverse impact to groundwater quality. A representation of the current plume delineation is provided on Figure 3. Furthermore, the time-concentration graphs shown on Figure 3 indicate decreasing VOC concentrations over time, no adverse concentration trends following discontinuation of anerobic IRZ injections (May 2012), and VOC concentrations predominantly at low, asymptotic levels.

The PT system recovered an estimated 2.39 million gallons of groundwater and an estimated 3.8 lbs of VOCs between system startup in 2002 and the initiation of the discontinuation pilot test in 2012. The spring water remediation system has treated an estimated 5.3 million gallons of spring water and recovered an estimated 2.3 lbs of VOC since remedy implementation in October 2003.

3.2 Treatment System Performance

When it is in operation, the PT consisted of three recovery wells that extracted groundwater at a combined flow rate of approximately 1 gpm. After treatment, the extracted groundwater was either used onsite for injections or discharged to the North Stream.

During PT system operation, regular sampling included collection of individual recovery well samples, total influent, and total effluent after the cartridge filters. A PT system air stripper effluent sample was also collected. Historically, all groundwater VOCs were treated to below their respective BPJ limits via the low-profile air stripper. Based on the results of the air model, all VOCs in air stripper emissions were historically below their respective short-term guidance concentrations (SGCs) and annual guidance concentrations (AGCs). While the treatment system operated as designed, and effectively treated influent groundwater, it represented only a minor component of VOC-mass removal from the subsurface in comparison with degradation processes (i.e., reductive dichlorination with the former anaerobic IRZ and site-wide natural attenuation).

3.3 Regulatory Compliance

As described in the Operational Year 10 Annual Monitoring Report (Arcadis 2013) the PT system operated effectively through 2012 and treated influent VOCs and total iron to below their respective BPJ limits during each operational period prior to system shutdown.

Site-related COCs have historically been detected in spring water samples at low concentrations. Despite the presence of site-related COCs in spring water, non-detect to trace concentrations are present in the surface water of the North Stream, immediately downgradient of each respective spring. These data demonstrate that surface water quality is not being adversely impacted by the landfill and spring water.

Metals results for spring sediment samples greater than background concentrations have also been detected in two locations (SP-3 and SP-4), primarily related to dissolved metals within the spring water that flocculate on the sediment surface when oxidized. Overall, this area is relatively inaccessible due to rip-rap within the spring area.

The USEPA issued a Fourth Five-Year Review (FYR) report on May 26, 2015 which stated that the remedy protects human health and the environment in the short-term because unacceptable exposure to contaminated media has been interrupted by the implemented remedial actions, and all institutional controls are in place. In order to demonstrate long-term protectiveness, it needs to be demonstrated that natural attenuation is effectively addressing impacted media. Furthermore, North Stream sediment sampling and scraping needs to continue. This scraping has been documented to be effective through the collection of sediment samples both prior to and after completion of surficial sediment removal.

3.4 Major Cost Components of Processes

During two typical years of PT system operation (April 2010 to March 2011 and May 2011 to April 2012), the project cost between $220,000 and $295,000 annually. This included costs for project management, operation and maintenance, groundwater monitoring, reporting and engineering.

Since the shutdown of the PT system, costs have declined due to the elimination of operation and maintenance and extensive groundwater monitoring. The proposed monitoring and natural attenuation (MNA) sampling program, including an Annual Report, would cost an estimated $20,000 to $25,000 per year, which saves approximately $200,000 to $275,000 on an annual basis.

3.5 Safety Record

No safety issues have been identified or recorded at the Site.

4 RECOMMENDATIONS

Based on known information regarding the efficacy of the ROD remedy (as modified by ESDs) and groundwater quality observations and trends over time, a modified approach to achieve site closure is warranted.

4.1 Recommendations to Achieve or Accelerate Site Closure

This section describes the Conceptual Site Model (CSM) including the nature of historic site disposal activities, limitations on the feasibility of source reduction, and hydrogeologic factors that cause VOCs to persist in the subsurface.

4.1.1 Source Reduction/Treatment

The source of contamination is below the landfill cap. The landfill cap serves to isolate the source material and limit the spread of contamination by preventing infiltration. Due to the difficulty of locating and removing the source of contamination, natural degradation is the only available means of source reduction. Although the source VOC mass has been reduced over time, concentrations remain above applicable or relevant and appropriate requirements (ARARs) in groundwater migrating from beneath the landfill.

VOC concentrations have exhibited a declining trend over time in GMMW-7, in terms of total volatile organic compounds (TVOCs) as well as the five Site indicator chemicals (1,1-dichloroethene, trichloroethene, benzene, chlorobenzene, and 1,1-dichloroethane). GMMW-7 is located at the downgradient edge of the landfill. VOC concentrations have also declined over time in the monitoring wells installed beneath the landfill cap (see Figure 3). These results indicate that the landfill cap, in combination with natural degradation, is effectively controlling source migration to a degree that allows for VOC concentrations in groundwater downgradient of the landfill to attenuate to levels that are protective of human health and the environment.

4.1.2 Sampling

Please refer to Section 4.2.2 for information regarding the new monitoring schedule prepared for the SMP.

4.1.3 Conceptual Site Model (Risk Assessment)

For most sites, mass transport is primarily governed by diffusion and the complex interaction between aquifer mass storage zones (e.g., immobile porosity/secondary porosity and low aquifer hydraulic conductivity architecture) and aquifer mass transport zones (e.g., mobile porosity and high hydraulic conductivity architecture). The primary factors in mass transport or plume behavior are plume age, the variability in hydrogeologic architecture (i.e., number of transitions or lenses of high hydraulic conductivity to low hydraulic conductivity media within a vertical section of aquifer), and the ratio of total porosity to mobile porosity. These concepts are described in detail in *Remediation Hydraulics* (Payne et al., 2008). Ultimately, these concepts, as a general rule, explain why traditional site remedies such as groundwater extraction are extremely inefficient at mass removal and explain why the actual estimated remedial timeframes at most sites are much longer than initially anticipated or modeled. The concepts also reveal that the rate of mass transport is typically much lower using the new paradigm when compared to the previous standard transport models.

Performance monitoring data from the anaerobic IRZ provided invaluable insight into the mass transport behavior at the Site. Specifically, the monitoring of TOC introduced into the aquifer during anaerobic IRZ implementation and the monitoring of the inert tracer bromide as part of the Alternate Electron Donor Pilot Test (ARCADIS G&M, Inc. 2006) were used to estimate the rate of advective groundwater velocity and estimate the rate of overall mass transport. As a general rule, the initial observation of an injected solute at relatively low concentration at nearby downgradient monitoring locations corresponds to the advective groundwater velocity because the solute has not had an opportunity to transfer into mass storage zones. The long-term behavior of solute mass, or the time to reach the center of solute mass at a location downgradient from the injection point, represents the overall mass transport rate as it accounts for the processes that drive mass retardation. Ultimately, TOC and bromide monitoring data support an advective groundwater transport velocity in the range of 0.3 ft/day to 0.5 ft/day, which is consistent with previous hydrogeologic data. However, these data also support an average mass transport rate of approximately 0.03 ft/day to 0.05 ft/day. When compared to current literature, these data correlate well to the overall hydrogeologic setting at the Site and the complex hydrogeologic architecture comprised of significant variability in vertical strata with varying conductivities and a high proportion of immobile to mobile porosity. However, the data indicate that groundwater cleanup times will be significant and will be dictated by the rate of mass transfer from the mass storage zones to the mass transfer zones, irrespective of remedial technology implemented. The revised CSM provides a significant challenge to expediting groundwater remediation within a reasonable timeframe; however, it also supports the fact that groundwater mass transport rates are extremely low and easily tracked using a monitoring only or similar approach.

The revised CSM indicates that the active remedy components provide little additional benefit to the quantity of mass removed and to the overall remedial timeframe, and MNA will be the primary driver for achieving groundwater MCLs, regardless of whether operation of the ROD remedy is continued. Since implementation of the IRZ Discontinuation Pilot Test, groundwater quality data indicate that the areal extent of VOC-impacted groundwater in the glacial outwash aquifer is static and total VOC concentrations are generally stable to decreasing over time, as evidenced by historical analytical results from landfill interior, landfill perimeter, downgradient and plume boundary monitoring well data.

4.2 Recommendations to Improve Performance

The performance of the current remedy can be maintained through the implementation of an equivalent MNA remedy. The MNA remedy is more sustainable than the current remedy and will provide equal protection of human health and the environment.

4.2.1 Maintenance Improvements

No improvements to the current maintenance schedule are necessary. County personnel will continue conducting periodic site visits to scrape and remove the surface sediments in the SP-3 and SP-4 areas.

4.2.2 Monitoring Improvements

An updated monitoring schedule has been prepared for the SMP that includes periodic sampling of natural attenuation parameters.

4.2.3 Process Modifications

As discussed in Section 3, the recommended modified remedial approach is MNA. The associated process modifications are the discontinuation of the PT and IRZ, to be implemented as proposed in the Discontinuation Pilot Test Work Plan (Arcadis 2012).

4.3 Recommendations to Reduce Costs

As noted in Section 3.4, operation, maintenance and monitoring of the PT and ARI systems have been costly, compared to monitoring only. Natural attenuation provides an equivalent means of protecting human health and the environment at a reduced cost. As described in Section 3.4, MNA has the potential to reduce costs by eliminating operation and maintenance, project management and other costs associated with the PT system.

4.3.1 Supply Management

There are no recommendations for supply management that can have a material effect on the efficiency or cost of remedial operations at the Site.

4.3.2 Process Improvements or Changes

Please refer to section 4.2.3 for a description of the recommended process change. The recommended change to MNA from active treatment will result in reduced costs and greater sustainability due to decreased electricity usage and decreased use of resources for maintenance and monitoring activities.

4.3.3 Optimize Monitoring Program

The monitoring program will be reviewed on an annual basis and any recommended changes to the monitoring program over time will be submitted to NYSDEC for their approval.

4.3.4 Maintenance and Repairs

Maintenance and repair activities will continue in order to maintain the integrity of the Site remedy, and will include inspections and any necessary maintenance of the cap, perimeter fencing, and monitoring wells.

4.4 Recommendations for Implementation

In light of the success of the IRZ Discontinuation Pilot Test, demonstration of a stable to decreasing plume extent, and no deterioration in the quality of springs, sediment or surface water associated with the North Stream, a transition to MNA will be an effective alternative to the current remedy.

Furthermore, based on projections for continued improvement, and unfavorable costs with no significant remedial benefit associated with groundwater extraction and treatment and ARI system groundwater treatment, a transition to MNA is implementable and more favorable than the ROD remedy. An MNA remedy should be implemented at the Site upon approval by the NYSDEC.

4.5 References

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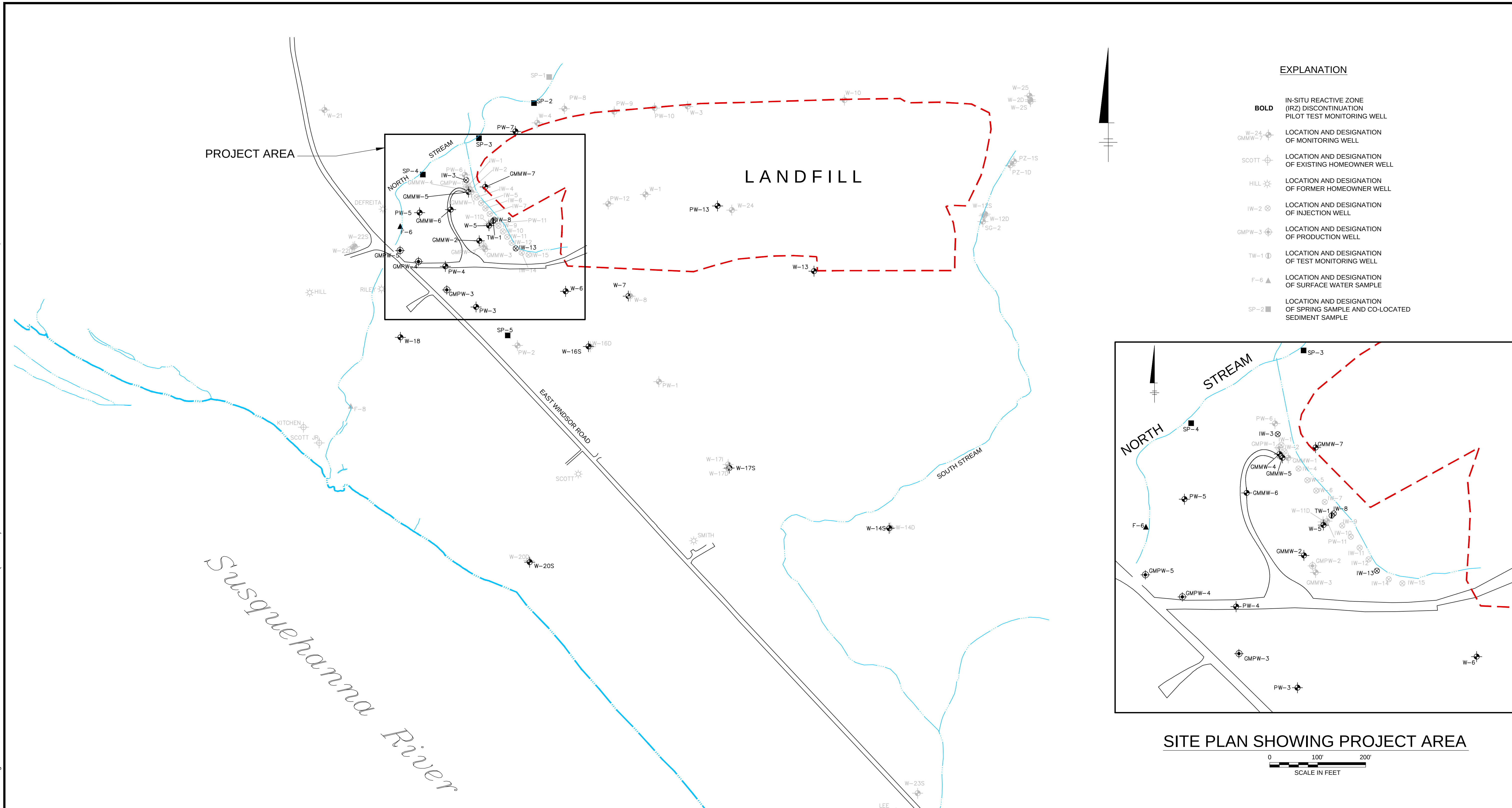
FIGURES



COLESVILLE LANDFILL
COLESVILLE, NEW YORK

SITE PLAN

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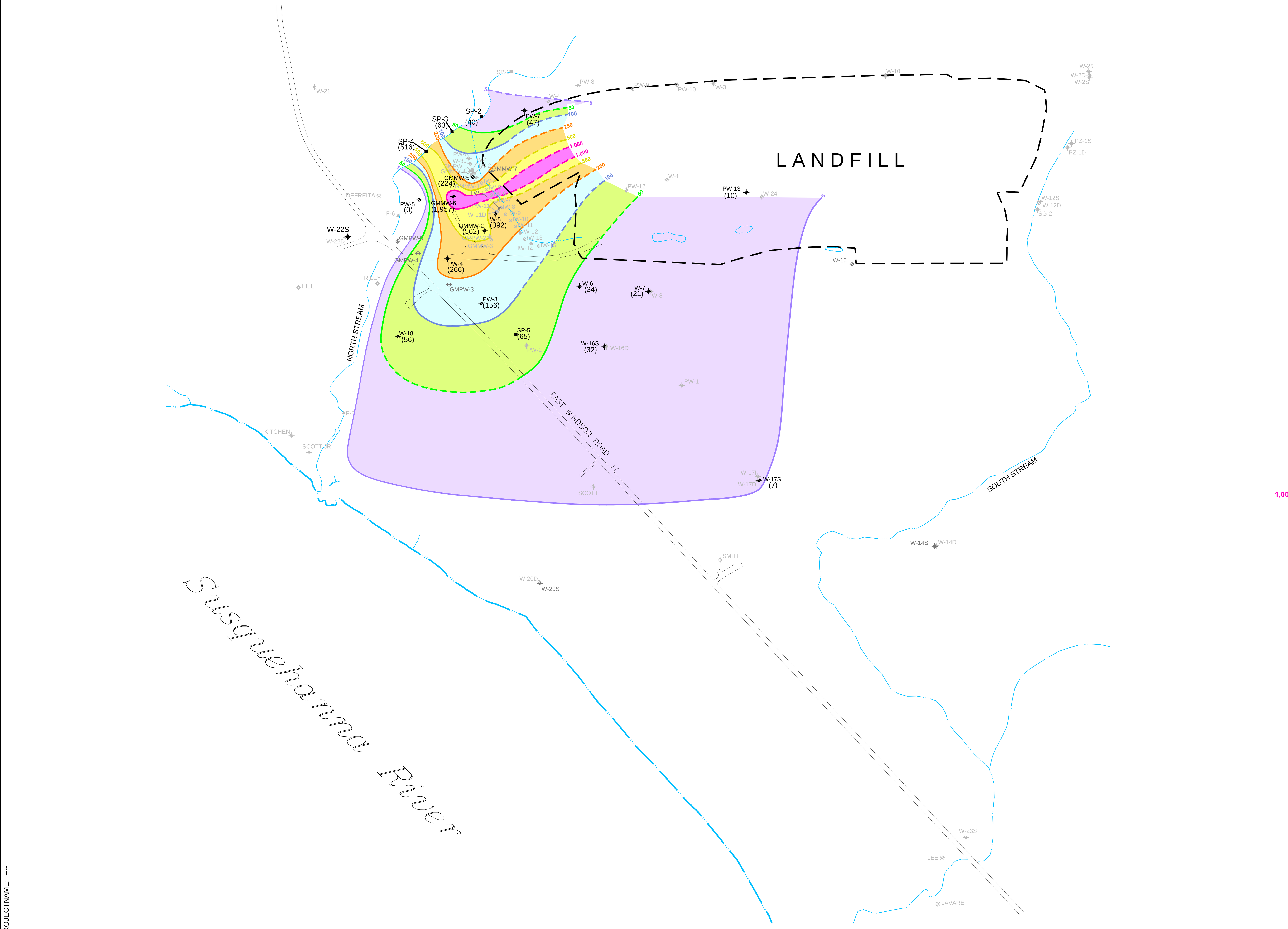
FIGURE
1



LEGEND:

W-24	LOCATION AND DESIGNATION OF MONITORING WELL
SCOTT	LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
HILL	LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
IW-2	LOCATION AND DESIGNATION OF INJECTION WELL
GMPW-3	LOCATION AND DESIGNATION OF PRODUCTION WELL
F-6	LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
SP-2	LOCATION AND DESIGNATION OF SPRING SAMPLE
TW-1	LOCATION AND DESIGNATION OF TEST MONITORING WELL
COCs	CONTAMINANTS OF CONCERN
(65)	COC CONCENTRATION VALUE
1,000	COC CONCENTRATION CONTOUR (DASHED WERE INFERRED)
	>5 ppb
	>50 ppb
	>100 ppb
	>250 ppb
	>500 ppb
	>1,000 ppb

0 200' 400'
SCALE IN FEET

NOTES:

1. TOTAL CONTAMINANTS OF CONCERN (COCs) IS EQUAL TO THE SUM OF THE CONCENTRATIONS OF 1,1,1-TRICHLOROETHANE, 1,1,2-TRICHLOROETHANE, 1,1-DICHLOROETHANE, 1,1-DICHLOROETHENE, 1,2-DICHLOROETHANE, CHLOROETHANE, CIS-1,2-DICHLOROETHENE, TETRACHLOROETHENE, TRANS-1,2-DICHLOROETHENE, TRICHLOROETHANE, AND VINYL CHLORIDE.
2. ALL LOCATIONS ARE APPROXIMATE.

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CHLORINATED VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER JULY 2002

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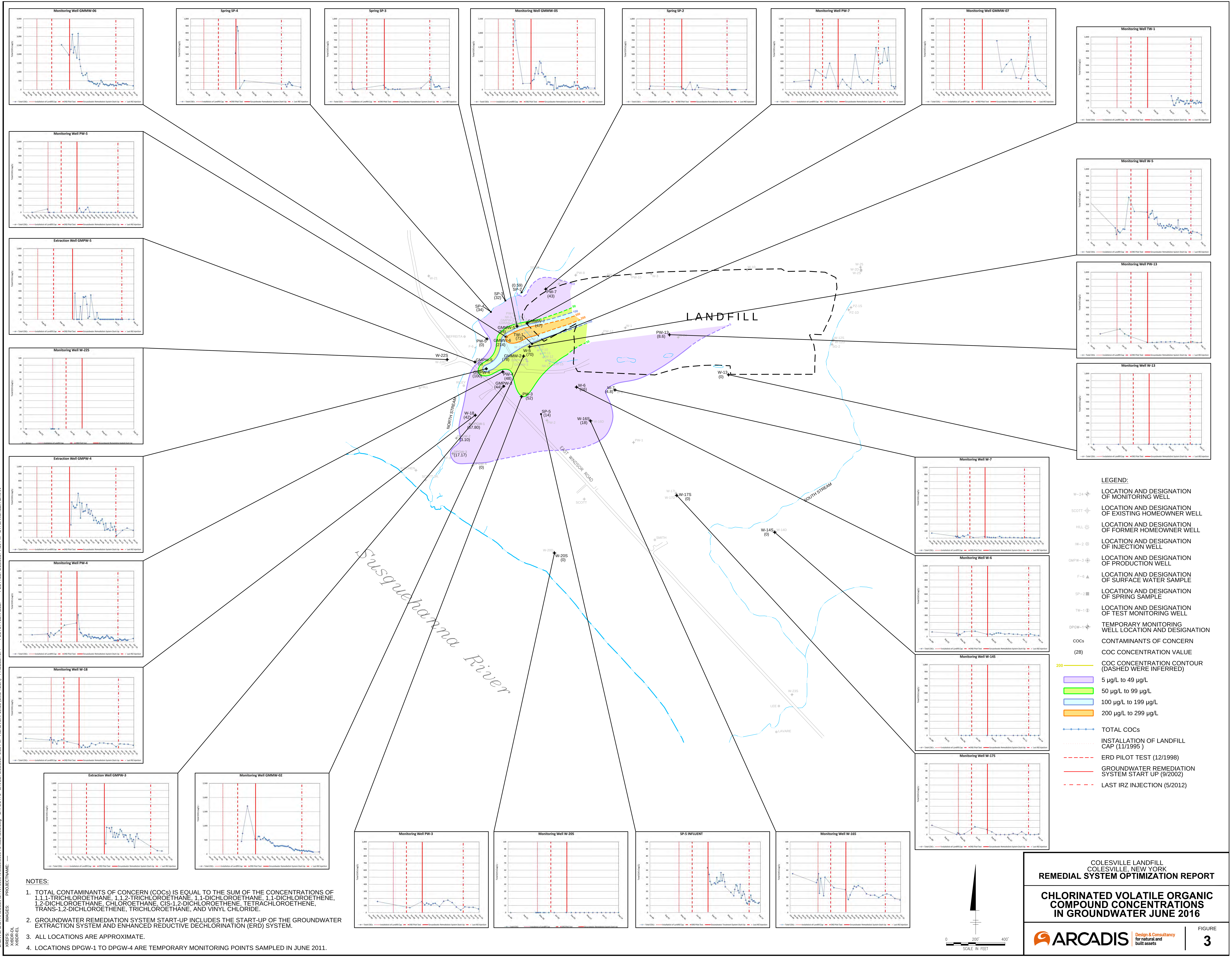
FIGURE
2



LEGEND:

- W-24 — LOCATION AND DESIGNATION OF MONITORING WELL
- SCOTT — LOCATION AND DESIGNATION OF EXISTING HOMEOWNER WELL
- HILL — LOCATION AND DESIGNATION OF FORMER HOMEOWNER WELL
- IW-2 — LOCATION AND DESIGNATION OF INJECTION WELL
- GMPW-3 — LOCATION AND DESIGNATION OF PRODUCTION WELL
- F-8 — LOCATION AND DESIGNATION OF SURFACE WATER SAMPLE
- SP-2 — LOCATION AND DESIGNATION OF SPRING SAMPLE
- TW-1 — LOCATION AND DESIGNATION OF TEST MONITORING WELL
- DPGW-1 — TEMPORARY MONITORING WELL LOCATION AND DESIGNATION
- COCs — CONTAMINANTS OF CONCERN
- (28) — COC CONCENTRATION VALUE
- 200 — COC CONCENTRATION CONTOUR (DASHED WERE INFERRED)
- 5 µg/L to 49 µg/L
- 50 µg/L to 99 µg/L
- 100 µg/L to 199 µg/L
- 200 µg/L to 299 µg/L
- TOTAL COCs
- INSTALLATION OF LANDFILL CAP (11/1995)
- ERD PILOT TEST (12/1998)
- GROUNDWATER REMEDIATION SYSTEM START UP (9/2002)
- LAST IRZ INJECTION (5/2012)

NOTES:

1. TOTAL CONTAMINANTS OF CONCERN (COCs) IS EQUAL TO THE SUM OF THE CONCENTRATIONS OF 1,1,1-TRICHLOROETHANE, 1,1,2-TRICHLOROETHANE, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHANE, CHLOROETHANE, CIS-1,2-DICHLOROETHENE, TETRACHLOROETHENE, TRANS-1,2-DICHLOROETHENE, TRICHLOROETHENE, AND VINYL CHLORIDE.
2. GROUNDWATER REMEDIATION SYSTEM START-UP INCLUDES THE START-UP OF THE GROUNDWATER EXTRACTION SYSTEM AND ENHANCED REDUCTIVE DECHLORINATION (ERD) SYSTEM.
3. ALL LOCATIONS ARE APPROXIMATE.
4. LOCATIONS DPGW-1 TO DPGW-4 ARE TEMPORARY MONITORING POINTS SAMPLED IN JUNE 2011.

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CHLORINATED VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER JUNE 2016

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FIGURE
3

Arcadis of New York, Inc.

Two Huntington Quadrangle

Suite 1S10

Melville, New York 11747

Tel 631 249 7600

Fax 631 249 7610

www.arcadis.com