Final
Site Management Plan for the Carroll Town Landfill Site

Town of Carroll
Chautauqua County, New York
NYSDEC Site No. 907017

August 2020

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation
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August 2020

CERTIFICATION STATEMENT

I, Neil Joseph Brown, certify that I am currently a New York State-registered professional engineer and that this Site Management Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Neil Joseph Brown, P.E.

8-28-2020

Date

Revisions to Final Approved Site Management Plan

Revision	Date Submitted	Summary of Revisions	NYSDEC Approval Date

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List of Abbreviations and Acronyms

DER	Division of Environmental Remediation
DUSR	data usability summary report
EC	engineering control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Accreditation Program
FS	feasibility study
GHASP	Generic Health and Safety Plan
IC	institutional control
IDW	investigation-derived waste
NYCRR	New York Codes, Rules, and Regulations
NYS PE	New York State-licensed Professional Engineer
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	operation, maintenance, and monitoring
PFA	Perfluorinated Alkyl Acids
PPE	personal protective equipment
PRR	periodic review report
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RI	remedial investigation
ROD	Record of Decision
RSO	Remedial Site Optimization
SCG	standards, criteria, and guidance value
SCO	soil cleanup objective
sHASP	Site-Specific Health and Safety Plan
SMP	Site Management Plan
SVOC	semi-volatile organic compound

List of Abbreviations and Acronyms (cont.)

VOC	volatile organic compound

1 Administrative Setting and Site Background

1.1 Introduction and Basis for the Site Management Plan

This Site Management Plan (SMP) was prepared by Ecology and Environment Engineering and Geology, P.C., on behalf of the New York State Department of Environmental Conservation (NYSDEC), in accordance with the requirements in NYSDEC's Division of Environmental Remediation (DER)-10: *Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010) and other guidelines provided by NYSDEC. The SMP is for the long-term operation, maintenance, and monitoring (OM&M) of the Carroll Town Landfill Site (NYSDEC Site No. 907017). The site is located in the village of Frewsburg, town of Carroll, Chautauqua County, New York (see Figure 1-1).

This SMP identifies and describes the institutional controls (ICs) and engineering controls (ECs) required to implement the remedies mandated in the Record of Decision (ROD) issued for the Carroll Town Landfill Site (see Appendix A). The ROD was signed by NYSDEC and accepted by the New York State Department of Health (NYSDOH) on March 31, 2009. NYSDEC selected excavation, waste consolidation, construction of a soil cover over the consolidated waste, and clean backfill placement in excavation areas. The ROD also mandates the implementation of ICs and a long-term groundwater, surface water, and soils monitoring program.

In summary, the ROD specifies the following:

1. Excavation and consolidation of waste on-site;
2. Construction of a soil cover over consolidated waste areas;
3. Placement of clean fill in excavation areas;
4. A long-term groundwater and soils monitoring program;
5. This SMP with various ICs and ECs;
6. Provisions for continued proper operation and maintenance of components of the remedy;
7. An environmental easement; and
8. Periodic review and certification of ICs and ECs by the responsible party or property owner.

If the property owner proposes to convey the whole or part of its property interest at the site, the property owner shall, not fewer than 60 days before the date of such conveyance, notify NYSDEC in writing of the identity of the transferee and of the nature and proposed date of the conveyance, and the property owner shall notify the transferee in writing, with a copy to NYSDEC, of the applicability of the environmental easement.

1.2 Administrative Setting

The PRPs for the site, documented to date, include: The Town of Carroll (the current owner of the site) and Keywell, LLC (the successor corporation to Vac Air Alloys Corporation).

After completion of the site remedial work, some contamination was left in the subsurface at the site (hereinafter referred to as "residual contamination"). This SMP was prepared to manage the residual contamination at the site in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. Reports associated with the site can be obtained for review by contacting NYSDEC or its successor agency managing environmental issues in New York State.

1.3 Environmental Easement

In New York State, an environmental easement is required for remedial projects that rely on one or more ICs and/or ECs after remediation has been completed and where residual contamination remains that needs to be monitored and controlled. An environmental easement remains with the land, meaning it is applicable to both present and future owners of the land, subject to the provisions of ECL Article 71, Title 36.

The environmental easement for the Carroll Town Landfill Site will describe the ICs for use restriction(s) and/or prohibition(s) on the use of land in a manner consistent with the ECs deemed necessary to control the residual contamination. An environmental easement provides an effective and enforceable means of encouraging the reuse and redevelopment of a controlled property in a manner that has been determined to be safe for a specific use, while providing for the performance of the OM&M requirements deemed necessary to control the residual contamination on the property.

The environmental easement will be prepared by NYSDEC and executed by the Town of Carroll. The easement will be filed and recorded with Chautauqua County by the Town to so that future owners of the site will be informed of development restrictions and site classification on the property due to environmental concerns. To date, the environmental easement has not been executed; once executed, the environmental easement will be provided in Appendix B.

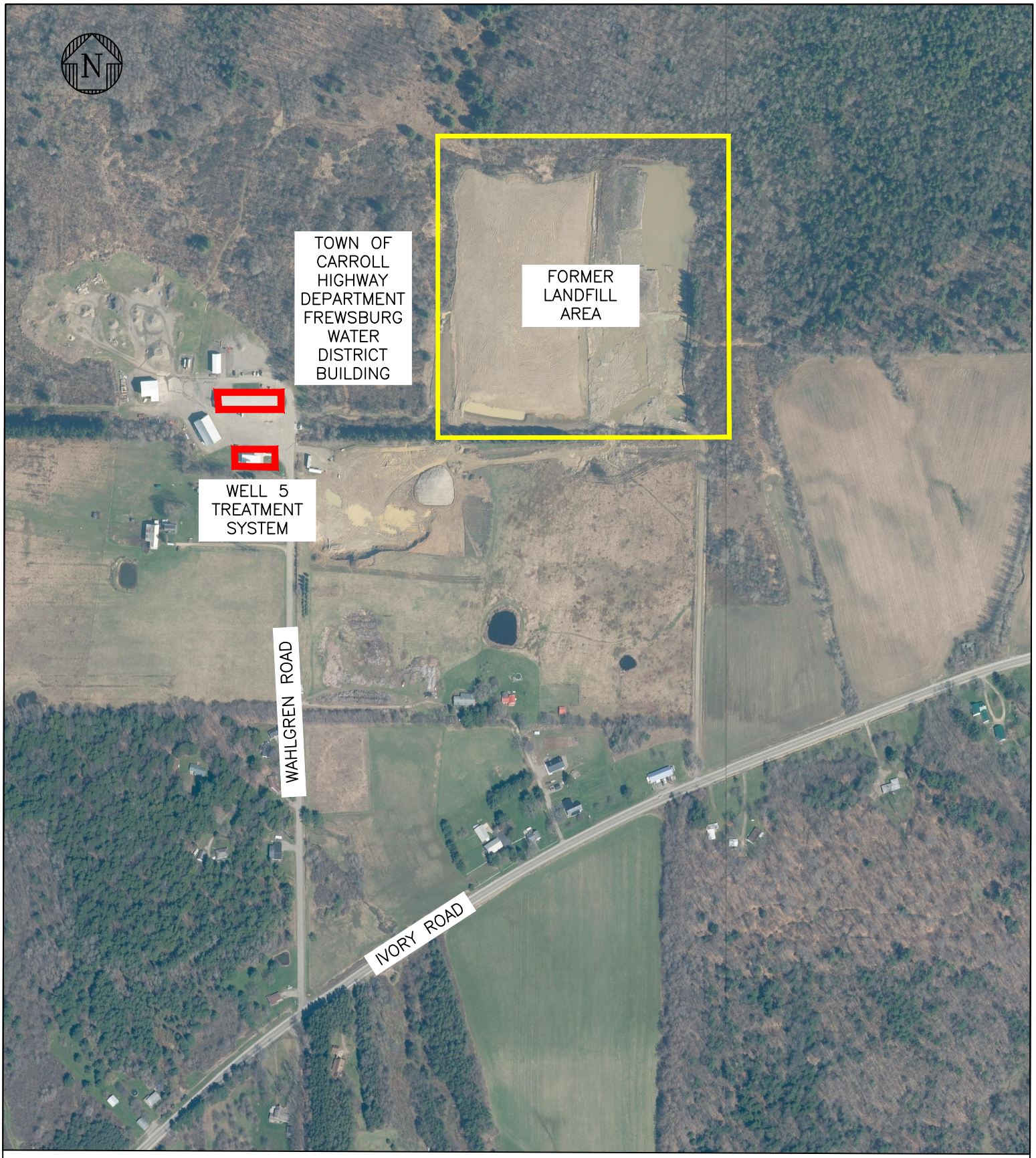

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FIGURE 1-1 SITE LOCATION MAP
TOWN OF CARROLL LANDFILL
FREWSBURG, NEW YORK

1.4 Site Management Plan

This SMP outlines the remedial action methods and describes the mandatory obligations for future remedial management and monitoring at the Carroll Town Landfill Site. The requirements presented in this SMP (or the latest revision) to address residual contamination are necessary to provide for compliance with the ROD and environmental easement. The ICs were established to place restrictions on the Carroll Town Landfill Site's use and mandate reporting measures for the ECs in the SMP. The ECs that have been incorporated into this SMP were established to control potential exposure of site personnel and the environment to residual contamination during current and future use of the Carroll Town Landfill Site. NYSDEC must approve revisions to this SMP.

This SMP describes the future remedial actions to be performed at the Carroll Town Landfill Site, including:

- Implementation and management of ICs and ECs;
- Media monitoring;
- Maintenance of mitigation and monitoring systems; and
- Performance of periodic inspections, certification of results, and submittal of periodic review reports (PRRs).

To address these needs, this SMP includes the following plans:

- A plan for implementing and managing ICs and ECs.
- Plans for implementing site monitoring:
  - Groundwater Monitoring Well Sampling Procedures Work Plan;
  - Sediments Sampling Plan;
  - Soil Management Plan; and
- A Maintenance Plan for the inspection and maintenance of the groundwater monitoring well network and sediment sampling points.

This SMP also includes a description of PRRs, which will be used to periodically submit data, information, recommendations, and certifications to NYSDEC.

It is important to note the following:

- This SMP details the specific implementation procedures that are required by the environmental easement. Failure to properly implement the SMP is a violation of the environmental easement; and
- Failure to comply with this SMP is also a violation of ECL 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the ROD for the site and is subject to applicable penalties.

Revisions to this SMP may be proposed in writing to NYSDEC's project manager for the Carroll Town Landfill Site. In accordance with the environmental easement for the site, NYSDEC will provide a notice of approved changes to the SMP and append those notices to the SMP that is retained in its files.

1.5 Summary of Remedial Goals

The main remedial goals selected for the Carroll Town Landfill Site, as identified in the ROD, are to eliminate, to the extent practicable, the following:

- Exposures of persons at or around the site to landfill waste;
- Exposures to contaminated groundwater via the Frewsburg Water District drinking water well located adjacent to the Site;
- Environmental exposures of flora or fauna to inorganics in leachate and surface water;
- Impacts on biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial and aquatic food chains;
- The release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and
- The potential for vapor intrusion into structures on or nearby the landfill.

The remediation program will consist of monitoring the designated on- and off-site locations with respect to the remaining residual contamination. The monitoring program will consist of the following:

- Long-term monitoring of the groundwater well network to determine trends in groundwater quality and to determine whether an upgradient source of groundwater contamination exists;
- Long-term monitoring of the sediment sampling network to determine trends in surface water quality and whether contaminants are migrating off-site.
- Long-term monitoring of reconstructed areas of the site to verify and report establishment of vegetation and integrity of the soil cover system.

1.6 General Site Background and History

1.6.1 Background

The Carroll Town Landfill Site is located in the village of Frewsburg, Town of Carroll, in Chautauqua County, New York. The site, which is owned by the Town of Carroll, is part of a 305-acre property at the end of Wahlgren Road, approximately 1,700 feet north of State Route 62 (also known as Ivory Road). The property is bounded by Conewango Creek to the north and west and State Route 62 to the south and east. The surrounding area includes farmland, wooded areas, wetlands, and private residential properties.

The landfill occupies an area of approximately 20 acres and is divided into two irregularly shaped cells: the East Landfill Cell and West Landfill Cell. The fill material in the cells was reported as generally municipal in nature (e.g., brush and wood pieces, plastics and glass, miscellaneous metallic debris, paper, plastic toys, and tires) with industrial materials (e.g., metal turnings, drum carcasses, and metal debris) observed primarily in the northern portions of the West Landfill Cell.

1.6.2 Site History

The site operated as a municipal landfill from the early 1960s to 1979. A Part 360 Permit for landfill operation expired in 1976. In June 1979, the Town of Carroll filed a permit application to operate a transfer station at the site. Following the issuance of a Consent Order on October 2, 1979, to address several solid waste violations, including failure to provide a complete application for the landfill operation, the Town operated the site as a construction and demolition debris landfill and transfer station. The West Landfill Cell was closed in 1980.

During a public meeting for the remedial investigation (RI) of the Vac Air Alloys site (NYSDEC Site No. 907016), citizens attending the meeting alleged that Vac Air Alloys disposed of industrial waste at the Carroll Town Landfill. Allegations included citizen's reports of having witnessed drums of waste labeled as "trichloroethene" being disposed of at the landfill. NYSDEC records indicated that Vac Air Alloys allegedly disposed of drums containing metal debris and metal turnings. During inspections performed in April 1992, NYSDEC identified partially buried 55-gallon drums (NYSDEC 2009a).

1.6.3 History of Remedial Activities at the Site

Between December 1992 and March 1993, Moody and Associates, Inc., performed a hydrogeological investigation for the Frewsburg Water Department to locate a water supply well (NYSDEC 2009a). After identifying the Town of Carroll Public Works site, which is adjacent to the landfill, as the probable site for the new water supply well, water quality testing was performed to characterize the aquifer.

Groundwater samples collected for the hydrogeological investigation were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), iron, manganese, dissolved solids, hardness, and chloride. At that time, test parameters indicated the water quality was good, except for chloride, which was attributed to runoff from the road salt storage pile and brine storage tank at the Public Works garage.

Subsequent sampling results indicated that VOCs in leachate may have been migrating from the landfill site to the municipal supply well, which led to classifying the landfill site as a potential hazardous waste disposal site on June 9, 1992.

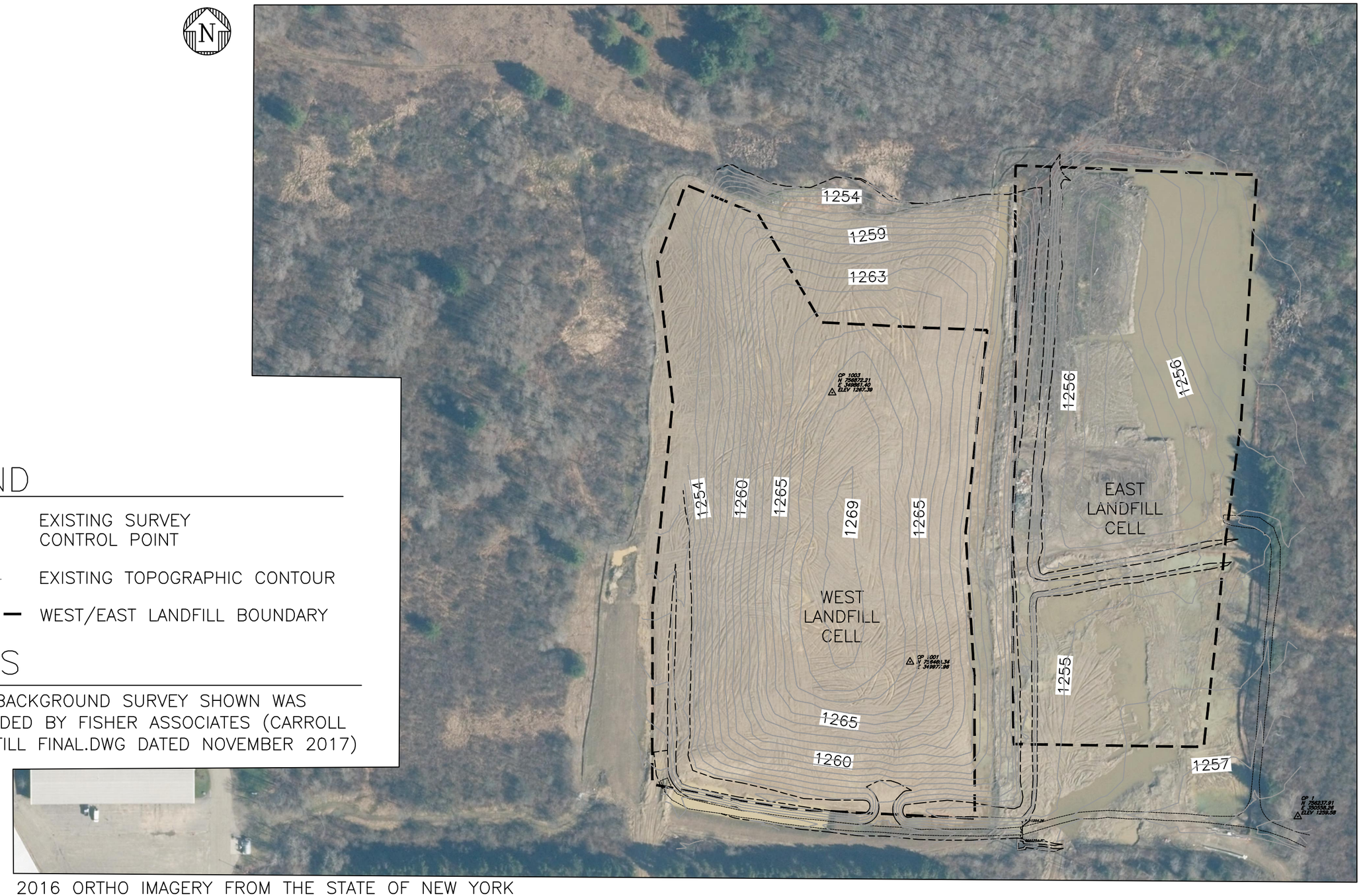
A Preliminary Site Assessment was completed in February 1997 by ABB Environmental Services, Inc. The resulting determination that the site presented a significant threat lead NYSDEC in May 1998 to list the site as a Class 2 site on

the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to public health and/or the environment and action is required.

The RI/Feasibility Study (FS) for the Carroll Town Landfill Site was completed in 2006 by O'Brien and Gere Engineers, Inc., under contract to NYSDEC (O'Brien and Gere 2006). The ROD was signed in March of 2009. As the remedy for the site, the ROD selected consolidation of the two landfill cells followed by the construction of a landfill cover to minimize infiltration of surface water and subsequent migration of contamination from the landfill waste.

Site remediation work began in May 2015 and was completed in September 2017. The following actions were completed as part of the remedial work:

- Clearing and grubbing of the areas necessary to complete the work;
- Grading of the West Landfill Cell to the Modified Pre-Cover Grading Plan;
- Excavation of waste from the East Landfill Cell and placement of the waste on the West Landfill Cell;
- Grading of the East Landfill Cell according to the East Landfill Modifications Plan;
- Installation of the engineered soil cover, including demarcation the layer, 18 inches of common fill, and 6 inches of topsoil;
- Grading and backfill placement in the East Landfill Cell Excavation Area; and
- Site restoration.



LEGEND

△	EXISTING SURVEY CONTROL POINT
—1269—	EXISTING TOPOGRAPHIC CONTOUR
– – – – –	WEST/EAST LANDFILL BOUNDARY

NOTES

1. THE BACKGROUND SURVEY SHOWN WAS PROVIDED BY FISHER ASSOCIATES (CARROLL LANDFILL FINAL.DWG DATED NOVEMBER 2017)

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FIGURE 1-2 SITE LAYOUT
TOWN OF CARROLL LANDFILL
FREWSBURG, NEW YORK

2 Institutional and Engineering Controls

2.1 Introduction

ICs and ECs are needed to protect human health and the environment from the residual contamination present in soil and groundwater beneath the site. This section describes the procedures for managing the ICs and ECs at the site. The ICs and ECs are components of the SMP, and revisions to the SMP are subject to approval by NYSDEC.

NYSDEC's DER-10: *Technical Guidance for Site Investigation and Remediation* outlines the requirements for the phases of the remediation process (NYSDEC 2010). Among these requirements are the ICs and ECs that must be followed under the SMP. The final site survey presented in Appendix C identifies locations of major ECs for the site. The environmental easement to be filed by the Town of Carroll will describe the ICs at the time the document was entered into the public record.

2.2 Institutional Controls

The ICs at the Carroll Town Landfill Site are necessary so that residual contaminated material remains undisturbed. Current and future site owners will be required to perform soil characterization and disposal/reuse in accordance with NYSDEC regulations if residual contaminated soil is disturbed and/or excavated.

The following or similar language will be added to the environmental easement:

"All requirements of the SMP and all referenced plans, including all revisions, on file must be maintained and adhered to."

This applies to existing and future property owners.

The ICs required by the environmental easement refer to non-physical mechanisms designed to:

- Identify the allowable use or development of the site;
- Limit human exposure to site contaminants;
- Prevent actions that would threaten the effectiveness of a remedy at or pertaining to this site; and

- Implement, maintain, and monitor ECs.

The environmental easement also stipulates the following:

- Compliance with the SMP;
- Restrictions on the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by NYSDOH;
- Periodic certification of ICs by the property owner; and
- Restriction on future property use that is no less restrictive than "commercial or industrial use" as defined by 6 NYCRR Part 375.

2.3 Engineering Controls

2.3.1 Engineering Control Systems

The ECs established at the Carroll Town Landfill Site are designed to limit contaminant migration by reducing the amount of infiltration that enters into the consolidated waste areas. Groundwater and sediment monitoring will be conducted so that contaminant migration and recontamination of remediated sediment does not occur. The analytical results for samples collected from the monitoring locations will be used to evaluate the control of contaminants at the site. (See Appendices D and E for the site-specific media sampling plans.)

During the remedial activities at the Carroll Town Landfill Site, several ECs were installed to limit contaminant migration by reducing the amount of infiltration that enters the consolidated waste. The ECs installed during site remediation and the procedures for inspection and maintenance are summarized below:

- West Landfill Cell

  The original ground surface of the West Landfill Cell was regraded to accept waste excavated from the East Landfill Cell. Excavated waste from the East Landfill Cell was placed on the West Landfill Cell and graded to allow for adequate surface water drainage and slope stability. A soil cover system was then installed to reduce surface water infiltration. The soil cover was seeded to prevent soil erosion.

  The cover system is a permanent control, that must be inspected annually. Inspection will focus on the presence of erosion and the detection of significant slope movement.

- East Landfill Cell

  Waste was excavated from most of the East Landfill Cell area and consolidated with waste in the West Landfill Cell. Excavated areas were graded to allow for adequate surface water drainage and backfilled with clean fill where necessary.

Waste remaining in the East Landfill Cell was graded to allow for adequate surface water drainage and slope stability. A soil cover system was then installed to reduce surface water infiltration. The soil cover was seeded to prevent soil erosion.

In areas where waste remains, this is a permanent control, and the soil cover system must be inspected annually. Inspection will focus on the presence of erosion and the detection of significant slope movement.

- Drainage Swales

  Drainage swales were excavated around the West Landfill Cell and seeded in order to provide stable drainage routes for surface water that is shed from the landfill cells. The swales are permanent controls, and the swales must be inspected annually. Inspection will focus on the presence of erosion along the banks of the swales and the vegetative growth within the swales.

2.3.1.1 Monitored Contaminant Confinement

Groundwater monitoring activities to assess stabilization of contamination will continue until the State has determined that residual levels of contaminants in groundwater are consistently within standards, criteria, and guidance values (SCGs). Monitoring will continue until permission to discontinue is granted in writing by NYSDEC. The groundwater sampling locations will be inspected as follows:

- The on-site groundwater monitoring wells will be inspected annually to maintain their integrity. Attachment A of Appendix D presents the Groundwater Monitoring Well Inspection Checklist. If the well(s) are damaged or determined to be otherwise unusable for obtaining samples, the well(s) may need to be repaired or replaced. If a new monitoring well(s) is required, then:
  - The defective well(s) shall be decommissioned as described in NYSDEC's Commissioner Policy 43: *Groundwater Monitoring Well Decommissioning Policy*, dated November 3, 2009, or latest revision.
  - Replacement well(s) or new well(s) shall be installed as described in Section 4.3.4 of this SMP; or
  - If it is determined that a monitoring well must be decommissioned and replaced or an additional monitoring well is required, the work will be performed in accordance with Sections 4.3.3 and 4.3.4 of this SMP.

2.3.2 Criteria for Completion of Remediation

Generally, remedial processes are considered completed when the effectiveness of the monitoring program indicates that the remedy has achieved the remedial action objectives identified by the ROD or other post-remedial decision documents. The framework for determining when remedial processes are complete is

provided in Section 6.5 of NYSDEC's DER-10: *Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010).

2.4 Certification of Institutional and Engineering Controls

To verify that the ICs and ECs are monitored and enforced, this SMP and a long-term OM&M program must be instituted at the Carroll Town Landfill Site. The major tasks will include the following:

- Maintaining and enforcing ICs;
- Completing work required in the ECs;
- Evaluating and repairing erosion to the slopes around the consolidated waste areas as necessary;
- Conducting annual inspections to evaluate the performance of the landfill cell cover systems;
- Inspecting and evaluating potential erosion leading to and in the drainage swales; and
- Prompting repair to damage of these ECs that have been put into place.

Periodic inspection of the ICs and ECs is required per the ROD, and certification of the inspection results is achieved through the preparation of a PRR. Specific requirements of IC and EC certifications are listed in Section 5.2 of this SMP.

2.4.1 Certification of Institutional Controls

The ICs required and that will be described by the environmental easement prepared by the Town of Carroll will be an attachment to an amended deed filed with the Chautauqua County Clerk and other appropriate offices. An affidavit shall be submitted annually by the Town to NYSDEC certifying that there have been no changes to the executed environmental easement or other ICs that have been put in place as a result of this SMP.

2.4.2 Certification of Engineering Controls

The ECs described herein must be installed under the direct supervision of a New York State-licensed Professional Engineer (NYS PE), and the ECs must be reviewed and certified by the NYS PE on an annual basis. A separate inspection and repair summary for each inspection and necessary repair shall be prepared by the supervising NYS PE, who will sign and certify the summary. An affidavit (Enclosure 1) shall be submitted annually (via the PRR) to NYSDEC that there have been no changes to the ECs that have been put in place as a result of this SMP (see Section 5.2).

3 Site Monitoring Plan Summary

3.1 Introduction

The overall goals of this remediation effort were provided in Section 1. As part of the remediation effort, the monitoring of groundwater shall be performed in a manner acceptable to NYSDEC. This section provides a summary and description of the site monitoring and sampling plans for the groundwater.

These monitoring activities must continue indefinitely or until NYSDEC has determined that the site is no longer capable of discharging contamination off-site or has the potential to affect human health.

3.1.1 General

This SMP describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site and the affected site media. Monitoring procedures are described in the Groundwater Monitoring Well Sampling Procedures Work Plan (see Appendix D), Soils Management Plan (see Appendix E), and Community Protection Plan (see Appendix G). These plans may be revised only with the approval of NYSDEC. The SMP and the latest revisions to the SMP will be filed with NYSDEC.

3.1.2 Purpose and Frequency

The services of a qualified professional firm must be retained to inspect, maintain, and replace monitoring wells on-site as required, and to obtain, analyze, and report groundwater sediment sample results to the NYSDEC PM via the PRR.

The site monitoring plan describes the methods to be used for the following:

- Sampling and analysis of appropriate media (i.e., groundwater);
- Assessing compliance with applicable NYSDEC SCGs, particularly ambient groundwater standards, Part 375 Soil Cleanup Objectives (SCOs);
- Assessing achievement of the remedial performance criteria;
- Periodically evaluating site information to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this SMP provides information on the following:

- Sampling locations, protocols, and frequencies;
- Information on designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements, including independent validation of analytical data;
- Reporting requirements;
- Quality assurance(QA)/quality control (QC) requirements;
- Inspection and maintenance requirements for monitoring wells (see Section 4.3.1);
- Monitoring well decommissioning procedures (see Section 4.3.3); and
- Annual sampling, inspection, and periodic review certification.

Groundwater sampling shall be completed as described in the sampling procedures work plans (see Appendix D). Groundwater shall be analyzed for inorganics (metals), including lead, VOCs, SVOCs, and Perfluorinated Alkyl Acids (PFAs). Table 3-1 presents the sampling schedule and analytical methodologies for the Carroll Town Landfill Site.

Table 3-1 Carroll Town Landfill Site Sampling Schedule and Analytical Methods

Monitoring Program	Reporting Frequency[1]	Matrix	Analysis[2,3]
Groundwater	Annually	Water	SW-846 EPA Methods 6010C, 8260C, 8270D, and 537
Imported Soils	As needed[4]	Soils	SW-846 EPA Methods 6010C, 8260C, and 8270D

Notes:

[1] The sampling frequency will be as indicated unless otherwise specified by the New York State Department of Environmental Conservation.

[2] Additional analytical parameters may be required under Department of Environmental Remediation (DER)-10 to provide for compliance with the site cleanup objectives.

[3] Inorganics are analyzed through SW-846 EPA Method 6010. Volatile organic compounds are analyzed through SW-846 EPA Method 8260C. Semi-volatile organic compounds are analyzed through SW-846 EPA Method 8270D. Perfluorinated Alkyl Acids are analyzed through EPA Method 537.

[4] When intrusive work is required on-site.

Key:
EPA = U.S. Environmental Protection Agency

3.1.3 Access

Access to properties not owned by the Town of Carroll will not be required to complete the tasks and services described in this SMP. Sampling locations are located on Town property, and thus prior request for access to these properties is not required.

3.2 Media Sampling Program

Sampling activities shall be recorded in a dedicated site field logbook and a groundwater sampling log. The Groundwater Monitoring Well Sampling Procedures Work Plan is provided in Appendix D and the Soil Management Plan is provided in Appendix E.

3.2.1 Soil Sampling

Samples shall be collected from on-site soil that is intended to be reused on the site, and soil that is imported to or exported from the site, pursuant to DER-10 Table 5.4(e)4 "Reuse of Soil" and Table 5.4(e)10 "Recommended Number of Soil Samples for Soil Imported To or Exported From a Site."

3.2.2 Groundwater Sampling

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy. Thirteen active groundwater monitoring well locations are located on the Carroll Town Landfill Site property. These shallow, intermediate, and deep wells allow for the monitoring of contaminant trends in the local groundwater. Available well logs of the groundwater monitoring wells are provided in Appendix H. Table 3-2 lists the on-site monitoring wells. Figure 3-1 shows the location of the monitoring wells.

Table 3-2 Carroll Town Landfill Site Monitoring Well Summary

On-Site Monitoring Wells	Well Depth (feet BGS)
MW-13[1]	70.78
MW-101	17.8
MW-102S[1]	32.19
MW-102I[1]	45.49
MW-103[1]	30.80
MW-109S[1]	23.07
MW-109I	43.80
MW-109D[1]	73.19
MW-111S[1]	18.05
MW-111I[1]	43.01
MW-112S	22.72
MW-113S	22.50
MW-114S	22.40
MW-115S	22.80
MW-116S	22.85
MW-117S	22.68
MW-117I	57.9
MW-117D	75.40
MW-118S	22.90

Note:
[1] Total well depths obtained from E & E purge logs, September 2014.
Key:
BGS = below ground surface

The groundwater monitoring wells (see Table 3-1) must be sampled annually. These wells are located on the Carroll Town Landfill Site property within individual well casings.

Groundwater levels in the wells shall be recorded when the sampling is performed. The samples shall be analyzed for VOCs, SVOCs, inorganic contaminants (i.e., metals), and PFAs by an Environmental Laboratory Accreditation Program (ELAP)-certified laboratory in accordance with the analytical procedures listed in Table 3-1. Sampling personnel should have spill prevention and spill response equipment on hand in the event of an accidental spill. Standard groundwater well sampling procedures provided in Appendix D. The groundwater well purge and sample record form are provided as Attachment B to Appendix D.

3.2.3 Community Air Monitoring

Community air monitoring and dust control are required when intrusive work dealing with the movement of soils occurs on the Carroll Town Landfill Site. Real-time air monitoring for particulate matter will be conducted at the perimeter of the exclusion zone during intrusive activities. Ground-intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. Particulates will be monitored at the downwind perimeter of the exclusion zone on a continuous basis. The Community Protection Plan is provided in Appendix G.

3.2.4 Sampling Equipment Decontamination Procedures

Decontamination will be performed in accordance with NYSDEC-approved procedures. Sampling methods and equipment have been chosen to minimize decontamination requirements and reduce the possibility of cross-contamination. Standard equipment decontamination procedures for sampling elements are presented in each sampling work plan.

3.2.5 Sample Packaging and Shipping Procedures

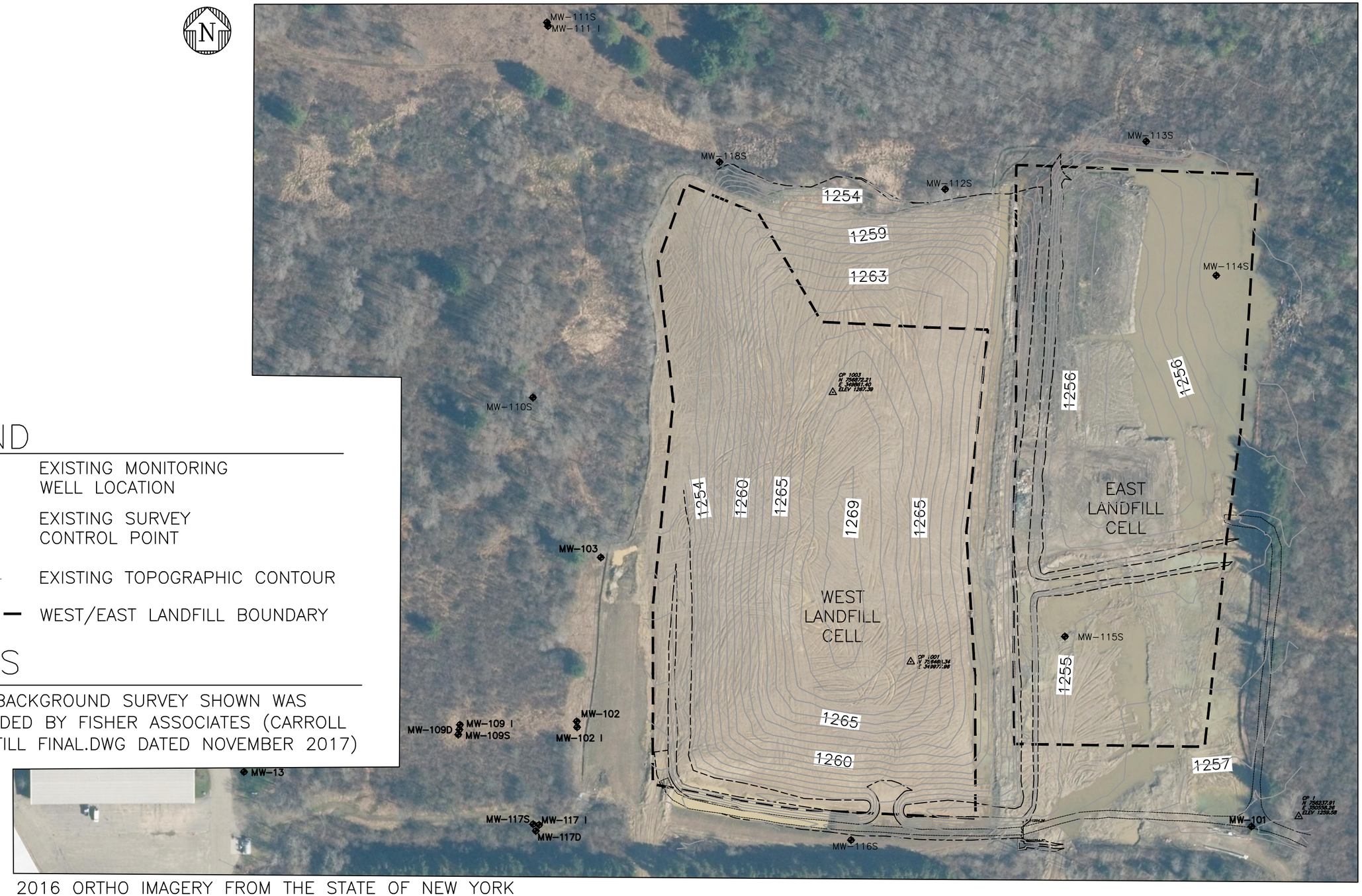
Samples shall be shipped in strict accordance with the applicable U.S. Department of Transportation regulations. Sample packaging and shipping procedures are presented in each sampling plan. See Appendices E and F for specific procedures for each environmental medium.

3.3 Storage and Disposal of Investigation-Derived Wastes

3.3.1 Typical Wastes

Typical site-related wastes that must be disposed of include the following:

- Liquid and solid investigation-derived waste (IDW) from sampling activities, including water and sediments; and
- Personal protective equipment (PPE).



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MW-110S ◆	EXISTING MONITORING WELL LOCATION
△	EXISTING SURVEY CONTROL POINT
—1269—	EXISTING TOPOGRAPHIC CONTOUR
– – – – –	WEST/EAST LANDFILL BOUNDARY

NOTES

1. THE BACKGROUND SURVEY SHOWN WAS PROVIDED BY FISHER ASSOCIATES (CARROLL LANDFILL FINAL.DWG DATED NOVEMBER 2017)

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FIGURE 3-1 MONITORING WELL LOCATIONS
TOWN OF CARROLL LANDFILL
FREWSBURG, NEW YORK

Sampling Work Plans (see Appendices E, and F) describe the disposal methods for IDW.

3.3.2 Temporary Storage

In the event that disposal cannot be performed immediately, IDW and contaminated materials from the implementation of additional ECs shall be temporarily stored in a NYSDEC-approved area until an approved waste-handling contractor removes them for proper disposal. The storage area must be capable of containing potential spills and precipitation runoff. IDW and contaminated materials must be stored in approved containers, roll-offs, or drums. The contents and origin of the material must be clearly described on the exterior of the container and managed in accordance with the requirements of 6 NYCRR Part 375. No wastes shall be stored on-site for more than 90 days after the accumulation of the waste without written permission from NYSDEC.

3.3.3 Backfill of Excavated Areas

Clean backfill shall be obtained from a NYSDEC-approved source, be similar to the soil it is replacing, and be suitable for the final in-place use. The soil must be verified clean in accordance with the analytical criteria in NYSDEC's DER-10: *Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010*)*. The backfill shall be placed and compacted as necessary.

3.3.4 Responsibility

Written documentation and approved manifests describing the disposal destination and handler shall be obtained and stored on-site. Copies of the documentation and manifests shall be submitted annually to NYSDEC along with the PRR for the Carroll Town Landfill Site.

3.4 Analytical Program

The two main components of the Analytical Program Work Plan are the Quality Assurance Project Plan (QAPP) (see Appendix I) and monitoring reporting requirements.

The sampling procedures work plans provided in Appendices D and E present the policies, organization, objectives, functional activities, and specific QA/QC measures that must be implemented by the laboratory selected for this project. The program is designed to so that the technical data generated by the laboratory are accurate, representative, and will (if needed) withstand judicial scrutiny.

3.4.1 Quality Assurance/Quality Control

Sampling and analyses shall be performed in accordance with the requirements of the generic QAPP prepared for the site (see Appendix I). The main components of the QAPP include the following:

- QA/QC objectives for data measurement;
- Sampling program:

  - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such,
  - Sample holding times will be in accordance with the NYSDEC Analytical Service Protocol requirements, and
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary;

- Sample tracking and custody;
- Calibration procedures:
  - Field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions, and
  - The laboratory will follow the calibration procedures and schedules as specified in U.S. Environmental Protection Agency SW-846 and subsequent updates that apply to the instruments used for the analytical methods;
- Analytical procedures;
- Preparation of a data usability summary report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method;
- Internal QC and checks;
- QA performance and system audits;
- Preventive maintenance procedures and schedules; and
- Corrective action measures.

3.4.2 Reporting Requirements

Forms and other information generated during regular monitoring events and inspections shall be kept on file at the site. Forms and other relevant reporting formats used during the monitoring/inspection events will be subject to approval by NYSDEC and submitted at the time of the PRR, as specified below. The first PRR shall be submitted 18 months after approval of the final engineering report, which documents work performed under the remedial contract. The final engineering report is prepared, sealed, and issued to the State by the Engineer to show compliance with the ROD.

Monitoring results must be reported to NYSDEC on a periodic basis in the PRR. A report will also be prepared, if required by NYSDEC, subsequent to each sampling event. The report (or letter) shall include, at a minimum:

- The date of the event;
- The names of the personnel who conducted the sampling;
- A description of the activities performed;
- The type of samples collected (e.g., groundwater, sediment, surface water);
- Copies of the field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sample results in comparison to appropriate standards/criteria/guidance;
- A figure illustrating sample type and sampling locations;
- Copies of the laboratory data sheets and the required laboratory data deliverables required for the points sampled (to be submitted electronically in the NYSDEC-identified format);
- Relevant observations, conclusions, or recommendations; and
- A determination as to whether groundwater or soil conditions have changed since the last reporting event.

Deliverables shall be submitted in electronic format as required by NYSDEC.

4 Maintenance Plan

4.1 Introduction

This Maintenance Plan describes the ECs in place at the Carroll Town Landfill Site and the provisions for the continued proper maintenance of the components of the remedy. ECs put in place during site remediation include the soil cover system and groundwater monitoring well network. The maintenance required for these ECs is discussed in Section 2.

NYSDEC will be notified prior to the performance of work on a monitoring well, including repairs, replacement, or decommissioning. Such work shall be documented in the subsequent PRR.

4.2 Groundwater Monitoring Well System

Each permanent groundwater monitoring well must be inspected semiannually to determine and document its physical condition and to identify the maintenance required for the well to remain operational.

4.2.1 Groundwater Monitoring Well Inspection

Routine inspections of each component of the monitoring system shall be performed for the duration of the groundwater monitoring program. Minor problems with the physical condition of the existing monitoring wells (i.e., problems that will not prevent or interfere with sampling) should be identified during each inspection.

Repairs or equipment replacement shall be completed within 30 days after inspection. Inspections of the monitoring wells should be conducted prior to scheduled sampling times to allow scheduled sampling to proceed as planned. Examples of minor problems and typical solutions for monitoring wells are presented in the Operations and Maintenance Plan in Section 4.3.2. The results of the inspections must be documented on the Monitoring Well Inspection Checklist provided in Attachment A of Appendix D.

4.2.2 Monitoring Well Repairs

Repair and/or replacement of each well in the monitoring well network will be performed based on the assessment of its structural integrity and overall performance. Repairs or equipment replacement shall be completed within 30 days after inspection.

Some minor problems that may be encountered and typical solutions include the following:

- Well identification markings are faded or illegible – re-label as necessary;
- Broken protective casings – repair as necessary;
- Cracked anti-percolation pad – replace with new pad;
- Rusty lock or broken cap – replace;
- Casings that have peeling paint or are rusty – remove loose paint and rust and repaint;
- Bent casings – repair if possible (if the casing cannot be repaired to allow for sampling, then the monitoring well may have to be decommissioned and replaced, if determined necessary by NYSDEC); and
- Leaking seals or cap – install watertight replacements.

If biofouling, chemical precipitation, or silt accumulation occurs in the on- or off-site monitoring wells, the wells should be physically agitated, surged, and then redeveloped. The most common well redevelopment methods are bailing, mechanical surging, air surging, jetting, and over pumping.

Monitoring well redevelopment using the mechanical surging method is performed as follows:

- Following completion of the monitoring well inspection, the well pump is removed and the interior of the well screen is mechanically cleaned (e.g., scrubbed with a wire brush) prior to the start of surging.
- Mechanical surging forces water into and out of the well screen by operating a plunger, called a surge block, which is attached to a drill rod or a wire line. The surge block is lowered to the top of the well screen and operated in a pumping action, with strokes typically of about 3 feet. The surge block is gradually worked downward through the screened interval. The surge block can be constructed of materials that will not alter the water chemistry (e.g., a sand-filled PVC pipe) and should be 5 feet long with an outside diameter of approximately 0.5 inch less than the well's inside diameter. Periodically, the surge block is removed and fines that have entered the well are removed by pumping or bailing.
- If biofouling or chemical precipitation has occurred, a more rigorous redevelopment procedure may be necessary, including the introduction of chemical agents such as sodium hypochlorite (bleach), or commercially available well cleaners.
- After the initial surge and sediment removal, chemical agents are added to the well and a second surge is completed. The purpose of the chemical additive is to acidify the water within the well and filter pack, and to break up carbonate or similar scaling that may have developed.

- Allow the chemical agent to soak overnight. After soaking, the well is surged again, with accumulated material to be bailed from the well.

In addition, a monitoring well will be properly decommissioned and replaced (in accordance with this SMP) if the redevelopment event renders the well unusable.

4.2.3 Groundwater Monitoring Well Decommissioning

If a monitoring well is determined by the inspection/sampling staff to be unusable for obtaining samples because of damage or otherwise, the well will be decommissioned as described in NYSDEC's Commissioner Policy 43: *Groundwater Monitoring Well Decommissioning Policy* (NYSDEC 2009b).

Well decommissioning without replacement will be performed only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's latest version of the Commissioner Policy 43: *Groundwater Monitoring Well Decommissioning Policy* (NYSDEC 2009b). Monitoring wells that are decommissioned because they have become unusable will be reinstalled in the nearest available location approved by NYSDEC.

4.2.4 Installation of New or Replacement Groundwater Monitoring Wells

If a new monitoring well is installed in a new location, the well location and depth will be determined by NYSDEC. If a new monitoring well is intended to replace an existing monitoring well, the new monitoring well shall be installed approximately 5 feet from the existing monitoring well and to the same depth of the well it is replacing. A typical "stick up" groundwater monitoring well is shown on Figure 4-1.

4.3 Soil Cover Cap Inspection and Maintenance

As part of the long-term maintenance of the Site, annual assessments of the soil cover and regular maintenance shall be performed (see Appendix F for the site inspection form). The annual soil cover inspection shall take place in conjunction with the annual groundwater sampling event and necessary repair work will be recommended.

The Town of Carroll shall be responsible for properly maintaining the soil cover and addressing repairs recommended based on the annual inspections. The Town shall mow the soil cover cap as necessary (at a minimum once per month), weather permitting. Mowing shall not take place within 48 hours of a storm event, to prevent damage to the soil cover system. Emergent woody vegetation shall not be permitted to grow on the soil cover and, if present, shall be removed from the soil cover. Vehicle traffic on soil cover cap areas shall be restricted to low-ground-pressure mowing equipment. Other vehicle traffic on the soil cover cap is prohibited.

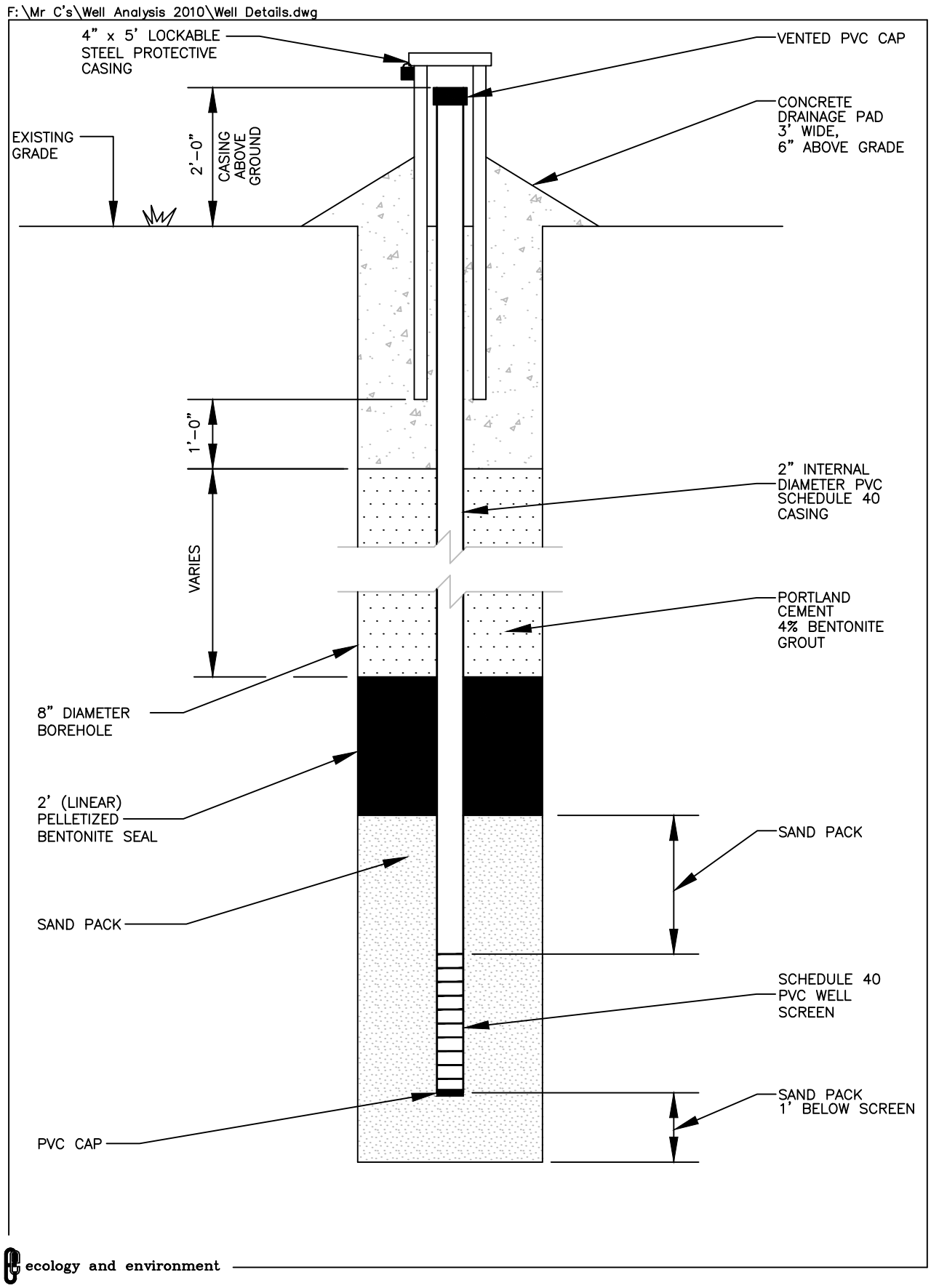

FIGURE 4-1 TYPICAL STICK UP MONITORING WELL

5 Reporting Requirements

5.1 Site Management Reports

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

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 5-1 and summarized in the PRR.

Table 5-1 Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency[1]
Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department
Groundwater Monitoring Report	Annually

Note:
[1] The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

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 problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater, soil);
- Copies of the field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of laboratory data sheets and the required laboratory data deliverables required for the 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 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 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.

5.2 Periodic Review Report

The initial periodic review will be conducted no more than eighteen (18) months after the Certificate of Completion is issued. After submittal of the initial PRR, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the site described in Appendix B - Environmental Easement.

The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the PRR. The report will include:

- Identification, assessment, and certification of the ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- 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.
- Data summary tables and graphical representations of contaminants of concern, by media (groundwater and soil), which include a listing of the compounds analyzed, along with the applicable standards, with the exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of the analyses, copies of the laboratory data sheets, and the required laboratory data deliverables for the 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 EQuISTM 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 Excavation Work Plan and ROD;
  - The operation and the effectiveness of the treatment units, etc., including identification of 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 necessary changes to the remedy and/or Monitoring and Sampling Plan;
  - 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; and
  - The overall performance and effectiveness of the remedy.

5.2.1 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 PRR, 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;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *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 or Owner's Designated Site Representative] (and if the site consists of multiple properties): [and I have been authorized and designated by all site owners to sign this certification] for the site.

The signed certification will be included in the PRR.

The PRR 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 PRR may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

5.3 Corrective Measures Work Plan

If a 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 NYSDEC.

5.4 Remedial Site Optimization Report

In the event that a remedial site optimization (RSO) is to be performed, upon completion of the RSO, an RSO report must be submitted to the Department for approval. 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, Health and Safety Plans, 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.

6 Health and Safety Plan

A Site-specific Health and Safety Plan (sHASP) must be developed for the work assignments to be conducted. As required by NYSDEC's DER-10: *Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010), a Generic HASP (GHASP) included in this SMP can be used as a guide when producing a sHASP for the activities, or separately for each activity, as required. A copy of the GHASP is provided in Appendix J.

7 References

O'Brien and Gere Engineers, Inc. (O'Brien and Gere). 2006. *Remedial Investigation/Feasibility Study, Town of Carroll Landfill, Site #9-07-017, Frewsburg, New York.* Prepared for NYSDEC. January 2006.

New York Department of Environmental Conservation (NYSDEC). 2006. 6 NYCRR Part 375, Environmental Remediation Programs, Subparts 375-1 to 375-4 & 375-6.

_____. 2009a. *Record of Decision, Carroll Landfill Site, Town of Carroll, Chautauqua County, New York*, Division of Environmental Remediation (DER), Site No. 907017. December 2009.

_____. 2009b. Commissioner Policy 43: *Groundwater Monitoring Well Decommissioning Policy*. November 2009.

_____. 2010. Final *Technical Guidance for Site Investigation and Remediation*, DER-10, 3 May 2010.

A Record of Decision

Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Carroll Town Landfill Site

Town of Carroll, Chautauqua County, New York

Site Number 9-07-017

March 2009

New York State Department of Environmental Conservation
DAVID A. PATERSON, *Governor* PETE GRANNIS, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Carroll Town Landfill Inactive Hazardous Waste Disposal Site
Town of Carroll, Chautauqua County, New York
Site No. 9-07-017

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Carroll Town Landfill site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Carroll Town Landfill inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Carroll Town Landfill site and the criteria identified for evaluation of alternatives, the Department has selected to place a soil cap on the landfill to improve drainage and to reduce surface water infiltration and to treat the groundwater migrating towards the municipal water supply to remove contaminants from the groundwater. The components of the remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. An evaluation will be made to consolidate the landfill. The consolidation will include the excavation of waste from east cell and consolidate into the west cell that will result in a smaller landfill footprint and restore the east cell to a usable land. If the consolidation of the landfill is not found to be cost effective or practical, the landfill will be covered with a soil cover.

3. A treatment system will be designed and installed at Well No.5 to insure that drinking water standards are not contravened. The Frewsburg Water district could use the treated water for public water supply.

4. A soil cover will be constructed over the landfill to prevent exposure to contaminated soils and provide contouring to promote runoff of surface water. The cover materials will be further evaluated during design but nominally would consists of 6 inches of topsoil and18 inches of clean soil material underlain by an indicator such as orange plastic snow fence to demarcate the cover soil from the subsurface soil. Clean soil will constitute soil that meets the Division of Environmental Remediation's criteria for backfill or local site background. Non-vegetated areas such as roadways are not anticipated at this site but if they are required, these areas will be covered by a paving system at least 6 inches thick.

5. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to permit commercial or industrial uses; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

6. Development of a site management plan which will include the following institutional and engineering controls: (a) management of the final cover system to restrict excavation below the soil cover's demarcation layer. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) continued evaluation of the potential for vapor intrusion for any buildings developed on or adjacent to the site, including provision for mitigation of any impacts identified; (c) monitoring of groundwater; (d) identification of any use restrictions on the site; (e) provisions for the continued proper operation and maintenance of the groundwater treatment system and other components of the remedy.

7. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

8. The soil cover will be maintained periodically. Maintenance will include mowing the cover and repair of any areas of the cover that were damaged or compromised in any way. Since the remedy results in untreated waste remaining at the site, a long-term monitoring program will be instituted. This program will allow the effectiveness of the landfill cover and treatment system to be monitored and will be a component of the long-term management for the site.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

MAR 31 2009

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

Carroll Town Landfill Site
Town of Carroll, Chautauqua County, New York
Site No. 9-07-017
February 2009

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for the Carroll Town Landfill Site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document, landfilling of municipal and industrial waste and construction debris at the site have resulted in the disposal of hazardous wastes, including volatile organics (VOCs), semi-volatile organics (SVOCs), and inorganics. These wastes have contaminated the groundwater and landfill waste at the site, and have resulted in:

- a significant threat to human health associated with current and potential exposure to groundwater and landfill waste.

- a significant environmental threat associated with the current and potential impacts of contaminants to groundwater.

To eliminate or mitigate these threats, the Department has selected to place a soil cap on the landfill to improve drainage and to reduce surface water infiltration. This will reduce the amount of water entering the landfill mass and eliminate direct exposure to landfill waste. The groundwater migrating towards the municipal water supply will be treated to remove contaminants from the groundwater.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform to officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate requirements (ARARs). The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria, and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Town of Carroll Landfill is a former municipal and construction and demolition (C&D) debris landfill and solid waste transfer station in the Village of Frewsburg, Town of Carroll, Chautauqua County (Figure 1). The landfill is located at the end of an unnamed gravel road, approximately 1,700 feet north of NYS Route 62 (also known as Ivory Road). The landfill is approximately 25 acres. The surrounding area includes farmland, wooded areas, wetlands, and private homes. Conewango Creek lies to the north, northwest, and west of the Site within a broad floodplain.

The Site is located in the Allegany Plateau physiographic province of New York State and is composed of fill, lacustrine sandy silt and silty clay, glacial outwash sand and gravel, till, and bedrock. The total depth of fill within the landfill ranged from approximately 2-ft to10-ft. The top of the fill material was encountered between approximately 1 and 5-ft within each test pit. The sandy silt unit varies in thickness from 5 ft (southwest) to 10 ft (northeast) and the silty clay unit varies in thickness from about 3 ft to 10 ft. The total depth of these units ranges from 7 ft to 20 ft below ground surface. An outwash of sand and gravel, at a total approximate depth of 45-ft, underlies the sandy silt and silty clay units. The till layer beneath the outwash sand and gravel unit is about 15-ft deep. The weathered shale bedrock was encountered at 76 to 81 ft below ground surface.

Groundwater was observed between 3 ft and 9 ft below grade. The natural flow of groundwater is generally northerly toward Conewango Creek. Shallow groundwater was observed to have a flow component to the west-northwest and to the west-southwest. Groundwater in the intermediate zone flows to the southwest. It is likely that groundwater flow direction is being influenced to the southwest by pumping activities of the Frewsburg Water District Supply Well No. 5 beginning in April 2000. The well No. 5 is installed at a depth of approximately 80 feet with a10 foot screen at the bottom.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The Site operated as a former municipal landfill from the early 1960's to 1979. A Part 360 Permit for landfill operation expired in 1976. In June 1979, the Town of Carroll filed a permit application to operate a transfer station at the site. Following the issuance of a Consent Order on October 2, 1979, to address several solid waste violations including failure to provide a complete application for the landfill operation, the Town operated the site as a C&D debris landfill and transfer station. The western disposal area was closed in 1980.

During a public meeting for the remedial investigation of the Vac Air Alloys site (Site No. 907016), citizens attending the meeting alleged that Vac Air Alloys disposed industrial waste at the Town of Carroll Landfill. Allegations included citizen's reports of having witnessed drums of waste labeled as "trichloroethene" being disposed at the landfill. NYSDEC records indicated that industrial waste was allegedly disposed in the landfill during its operation. These records indicated that Vac Air Alloys allegedly disposed drums containing metal debris and metal turnings. Inspections by NYSDEC indicated the presence of partially buried 55-gallon drums in April 1992.

3.2: Remedial History

In May 1998, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

Between December 1992 and March 1993, Moody and Associates, Inc. performed a hydrogeologic investigation for the Frewsburg Water District to locate a water supply well. After identifying the Town of Carroll Public Works site, which is adjacent to the landfill, as the probable site for the new water supply well, water quality testing was performed to characterize the aquifer. Groundwater samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), iron, manganese, dissolved solids, hardness, and

chloride. At that time, test parameters indicated the water quality was good, except for chloride, which was attributed to runoff from the road salt storage pile and brine storage tank at the Public Works Garage.

Subsequent sampling results indicated that volatile organic compounds (VOCs) in leachate may have been migrating from the Site. This led to making the Site a potential hazardous waste disposal site on June 9, 1992. A Preliminary Site Assessment (PSA) was completed in February 1997. The resulting determinations of a significant threat lead to the listing of the site as Class 2 site on the Registry of Inactive Hazardous Waste Disposal Sites in May 1998.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include: the Town of Carroll, the current owner of the site and Keywell, L.L.C. the successor corporation to Vac Air Alloys Corporation.

The PRPs declined to implement the RI/FS at the site when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State has incurred.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between August 2004 and November 2004. The field activities and findings of the investigation are described in detail in the RI report.

The RI included the following activities:

- Environmental samples were collected from the following media: soil vapor, surface soil, surface water, sediment, landfill waste, leachate seep liquid, and groundwater.
- Groundwater wells were installed.
- Landfill waste was sampled from test pits excavated at locations along the boundary of the western cell.
- Surface water and sediment samples were collected from a drainage swale (intermittent stream) north of the landfill cells, the wetland area west of the western landfill cell, and the drainage swale between the eastern and western landfill.

Figure 2 shows the locations of all the samples collected at the site.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the landfill waste and groundwater contains contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's 'Ambient Water Quality Standards and Guidance Values' and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on 6 NYCRR Subpart 375-6 – Remedial Program Soil Cleanup Objectives.

- Sediment SCGs are based on the Department's " Technical Guidance for Screening Contaminated Sediments".

- Soil vapor SCGs are based on the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil, groundwater, surface water, and sediment samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganics (metals). For comparison purposes, where applicable, SCGs are provided for each medium in parentheses next to the compound.

Chemical concentrations are reported in parts per billion (ppb) for water, microgram per liter (ug/l) for leachate and parts per million (ppm) for waste, soil, and sediment. Air samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Table 1 summarizes the degree of contamination for the contaminants of concern in the groundwater, soils, soil vapor, leachate, sediment and surface water and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Leachate

The only VOC detected was trichloroethene at a concentration of 21 ug/l (guidance value is 40 ug/l) which is less than the established NYS Class C water quality criteria. Twelve inorganic constituents were detected at concentrations that exceeded NYS Class C water quality criteria. Review of the data indicates that the highest concentrations of these constituents were detected at the LT-03 location to the northwest of the western landfill cell. Some of the inorganics detected above the water quality standards are cadmium at 24.9

ug/l (SCG is 4) and zinc at 4150 ug/l (SCG is 152). Lead was detected at a concentration of 302 ug/l (SCG is 300) which is marginally greater than the SCG. No SVOCs, pesticides or PCBs were detected in the samples.

Surface Soil (0-2 inches)

Surface soil concentrations of inorganic constituents that appear to be related to the landfill due to their elevated concentrations include cadmium, lead and zinc at the SS-09 location as well as lead and zinc at the SS-10 location. The highest concentration detected was cadmium at 2.9 ppm (SCG is 2.5), barium at 448 ppm (SCG 350), zinc at 381 (SCG 109), nickel at 52.4 (SCG 30) and lead at 98 ppm (SCG is 63). These surface soil samples were collected within the eastern landfill cell. Although lead concentrations at SS-09 may be related to landfill operations, the concentration is within the range for Eastern United States background soils. The analytical results for pesticides and PCBs indicate that concentrations are below SCG for unrestricted future use.

Subsurface Soil

Fifteen VOCs including 1,4-dichlorobenzene, cis-1,2-dichloroethene and trichloroethene were detected in the subsurface soil samples but none of them exceeded the SCG for unrestricted future use.

Inorganic constituents within subsurface soil that appear to be related to the landfill due to their elevated concentrations include arsenic, cadmium, chromium, copper, mercury, nickel, and zinc. These subsurface soil samples were from test pits installed at the northern, eastern, and southern limits of the western landfill cell. Concentrations of cadmium, chromium, copper and nickel exceeded the cleanup level for unrestricted future use. Chromium and nickel are the only inorganic compounds of concern that was detected at significant concentration at two locations. At TP-07, chromium was detected at a concentration of 8870 ppm (SCG is 30) and nickel was detected at 30,700 ppm (SCG 30). At TP-10 chromium was detected at 5900 ppm and nickel at 4300 ppm.

Groundwater

Groundwater samples were collected from eighteen wells installed at the site and one water sample collected from each of three test pits. One round of groundwater samples were collected in October 2004 and another round of samples were collected in January 2005. A recent groundwater sampling event was conducted in August 2008 to obtain current groundwater quality after the pumping at well#5 was discontinued in early 2007. Figure 3 shows the groundwater samples from the wells installed at the site and the concentration of contaminants detected at each location.

Based on the results from 2004 and 2005 sampling, only two monitoring wells had VOC concentration exceeding the groundwater standard. The highest concentration of VOCs was detected at MW-107S with 600 ppb of vinyl chloride (SCG is 2 ppb) and 69 ppb of cis-1,2-dichloroethene (SCG is 5 ppb). The wells installed around this location detected very low levels of these compound which indicate that this could be a localized impact from past disposal activities and is not a widespread area of contamination. Soil samples collected from test pits installed adjacent to this location did not detect these compounds. The same two compounds were detected at MW-102I but at low concentrations and marginally exceeding the groundwater standard.

The detection of VOCs in the shallow, intermediate and deep monitoring wells suggests that VOCs have migrated from the landfill. However, based on the groundwater analytical data, VOC concentrations appear to decrease with depth. This may suggest that the limited detection and low concentration of VOCs in the intermediate and deep sand and gravel unit are the result of biodegradation/natural attenuation of VOCs along the migration pathways.

Based on the analytical data, vinyl chloride and cis-1, 2-dichloroethene have migrated from the landfill to public water supply well No. 5. The supply well was installed west of the landfill and pumping was initiated in 2000. The Town has installed a sentinel monitoring well (MW-13) approximately 600 feet from the west of the landfill and 185 feet east of the supply well. The well is being sampled periodically to monitor contaminant migration from the landfill towards the public water supply well, prior to the contaminated groundwater reaching the water supply. While well No. 5 was operational in June 2005 the groundwater samples were collected from MW-13 and well No. 5. The concentrations of vinyl chloride and cis-1, 2-dichloroethene were detected at 10 ppb and 15 ppb respectively in MW-13. Vinyl chloride and cis-1, 2-dichloroethene were detected at 0.8 ppb and 2.4 ppb respectively in well No. 5. Although the concentration was less than the drinking water standards, pumping of supply well No. 5 was discontinued in early 2007 to insure that groundwater standards were not exceeded. The May 2007 sampling detected vinyl chloride and cis-1,2-dichloroethene at 0.6 ppb and 9.3 ppb respectively at MW-13 and non-detect at supply well No. 5. This indicates that when pumping at well No. 5 is operational contamination is migrating from the landfill to the supply well. Conversely, the recent groundwater sampling conducted in August 2008 indicate that the contaminated plume is no longer migrating toward the water supply, as evidenced from the decreasing contaminant concentration in MW-13, because of the termination of pumping at well No. 5.

Three SVOCs (4-methylphenol, 4-chloro-3-methylphenol, and 4-nitrophenol) were detected in the temporary well water sample collected from TW-TP-02 at concentrations exceeding NYS Class GA groundwater standards. The water collected from the TW-TP-02 location was in contact with the fill materials. SVOCs were not detected in the groundwater samples collected from the monitoring wells suggesting that the migration of SVOCs present within the fill materials to groundwater is limited.

Arsenic, barium, chromium, iron, lead and manganese were detected within groundwater at concentrations exceeding groundwater standards. Of these contaminants, iron was the only contaminant that was detected consistently (30 of 31 samples) exceeding groundwater standards in the groundwater samples. Inorganic concentrations above the groundwater standards were detected sporadically, both spatially and temporally, with the exception of iron. Review of the iron concentrations, combined with the frequency of detection suggests that the detected concentrations are likely representative of naturally occurring background groundwater quality conditions.

Surface Water

Phenol was detected in surface water sample SW1 at a concentration of 11 ppb, which is slightly exceeds the NYS Class C water quality criteria of 5 ppb. No other SVOCs were detected in the surface water samples at concentrations exceeding NYS Class C water quality criteria.

Inorganic contaminants in surface water at concentrations exceeding NYS Class C water quality criteria included cobalt, lead, vanadium, and zinc. The concentration of these compounds range from 0.99 – 11.2 ppb (SCG is 5 ppb) for cobalt, 8.4 – 22.5 ppb (SCG is 5 ppb) for lead, 1.1 – 16.6 ppb (SCG is 14 ppb) for vanadium and 8.8 – 210 ppb (SCG is 152 ppb) for zinc. The inorganic contaminants detected in the surface

water samples are likely attributable to the migration of leachate from the landfill to drainage swales between the two landfill cells, which ultimately drain to the drainage swale to the north of the cells. Similar inorganic contaminants were detected in the surface water samples as in the leachate samples. The potential for these contaminants to impact the Conewengo Creek is minimal because the creek is located approximately 4000 feet to the west of the site.

Drainage Swale Soils

No VOCs or SVOCs were detected above the sediment cleanup guidance.

Drainage swale soil samples were co-located with the surface water samples. In general, similar inorganic contaminants were detected in the drainage swale soil samples as in the surface water samples. However, in almost all cases, contaminant concentrations in the drainage swale soil were higher than those detected in surface water. Inorganic drainage swale soil concentrations were collected in locations where surface water is not present throughout the year, the concentrations were compared to soil cleanup levels. The concentrations of inorganics in drainage swale soil samples were below cleanup levels when compared to soil cleanup objectives.

Soil Vapor

Thirty-seven soil vapor points were installed within the landfill area for VOC and methane screening purposes. VOCs were detected in soil vapor within the boundaries of the landfill cells at four locations. The soil vapor data were screened according to NYSDOH guidance to evaluate potential vapor impacts relative to potential future uses of the landfill property. However, occupied structures are not currently present in the immediate vicinity of the landfill, therefore the potential for vapor impacts are considered minimal.

Methane was detected at three locations ranging from 2.4% - 14.0%. These concentrations range above the Lower Explosive Level of 5% and are less than the Upper Explosive Level of 15%. During the design of the proposed remedy, evaluation would be done to include a venting system in the soil cover to be placed on the landfill.

Review of the soil vapor VOC data indicates that detected VOCs consist mainly of petroleum hydrocarbons and other compounds such as benzene, toluene, ethylbenzene, xylene. Other chlorinated compounds such as tirchloroethene, and tetrachloroethene were also present in soil vapor. The highest concentrations of VOCs were generally detected in the soil vapor sample collected at SV-16. The magnitudes of detected concentrations in the soil vapor samples are relatively low and do not appear indicative of the presence of a significant source at the soil vapor sample locations. Soil vapor samples were collected within the waste limits.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS and a direct threat to humans or environment exist.

An IRM was initiated by the Department in early 2006 to evaluate the existing problems with the treatment system at well No. 2A and repair the system as necessary. The IRM was initiated because the sentinel well MW-13 located upgradient of well No. 5 detected vinyl chloride above drinking water standards and well No. 5 detected vinyl chloride but below drinking water standards. In order for the Frewsburg Water District to meet water supply demand, the treatment on well No. 2A needed to be repaired.

The evaluation of the treatment system on well No. 2A was completed in September 2006. During the evaluation, it was identified that the influent pipe which extends above the roof freezes during winter and shuts down the air stripper tower, hammering occurs along the supply line and the service pumps are subject to frequent cycling. These issues were evaluated and several alternatives were proposed during the evaluation. Final alternatives were selected and equipment was purchased to implement the selected alternatives.

Equipment installation began on October 5, 2006 and completed on October 10, 2006. Based on trial runs, the equipment installed to resolve the problems is functioning properly. The Department provided assistance to the Town by helping them to train the Town staff to operate the new equipment.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 7.0 (Appendix I) of the RI report. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Under current and future use scenario's, there exists the potential for exposure to metals via incidental ingestion or dermal contact with on-site contaminated surface soils, subsurface soils and leachate. There could also be exposure to volatile organic compounds via soil vapor intrusion should structures be build on or in the vicinity of the site.

Groundwater in the vicinity of the site is utilized for drinking water for the Village of Frewsburg. The groundwater on site is contaminated with volatile organic compounds. This contamination represents a threat to this public water supply source.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, which is included in Section 6.0 of the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The following environmental exposure pathways and ecological risks have been identified:

- Aquatic areas existing on-site include a portion of the unnamed tributary of Conewango Creek, emergent and scrub-shrub wetlands and several drainage ways. The wetlands provide habitat for a variety of terrestrial and aquatic receptors. The unnamed tributary likely provides some habitat for a variety of fish and other wildlife species that frequent aquatic habitats. However, the relatively small size of the tributary limits the value of this habitat to some wildlife, particularly fish.
- The terrestrial areas surrounding the site and within the study area consists of a mixture of natural communities and areas exhibiting rural (predominantly agricultural and residential) land use. Approximately 45 percent of the aerial extent of the study area consist of agricultural and residential land uses that may somewhat limit use by transient or residential wildlife species.
- Approximately 55 percent of the aerial extent of the study area consists of natural cover types such as coniferous and hardwood forest; freshwater wooded, scrub-shrub and emergent wetlands; and streams that provide appropriate habitat for a variety of fish and wildlife species.
- Due to the presence of chemical constituents in surface soil, surface water and sediment associated with the site, complete exposure pathways to terrestrial and aquatic receptors likely exist at and down-gradient of the site.

Site contamination has impacted the groundwater to the southwest of the landfill, which in turn was migrating towards the Frewsburg Water District Supply Well No. 5 when the well was in use. Based on available data from the Chautauqua County Department of Health, vinyl chloride and cis-1, 2-DCE have been detected but have not exceeded the drinking water standard in the supply well since 2003.

The proposed remedy will minimize the impacts from contaminants found at the site to wetlands and other surface water bodies. In addition, the impacted groundwater will be addressed in the proposed remedy.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- Exposures of persons at or around the site to landfill waste;

- Exposures to contaminated groundwater via the Frewsburg Water District drinking water well located adjacent to the Site;

- Environmental exposures of flora or fauna to inorganics in leachate and surface water;

- The release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and

- The potential for vapor intrusion into structures on or nearby the landfill.

Further, the remediation goals for the site include attaining to the extent practicable:

- Ambient groundwater quality standards.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Carroll Town Landfill Site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site. However, in some instances, the alternatives presented in the FS have been modified as determined appropriate for the site related to current activities associated with the public drinking water wells, as well as, following currently accepted presumptive remedies as established by the EPA.

The use of a part 360 low permeable landfill cap was evaluated as one of the alternatives in the FS report but is not included in the PRAP as an alternative. The soil cover considered in the PRAP will minimize infiltration, provides proper drainage, promote natural attenuation and will offer flexibility for future beneficial use. The soil cover will be as effective as the low permeable cover in eliminating the direct exposure to humans and wildlife. The soil cover will be contoured to promote surface water runoff thereby reducing water infiltration further. This will effectively reduce infiltration of water into the landfill waste and minimize the migration of contamination from the waste. An impermeable part 360 cap will eliminate infiltration into the waste but at an increased cost of $2.5 million in capital costs. It is our proposal that the measures taken to reduce the infiltration through contouring a soil cover will result in a landfill that will effectively minimize contamination migrating from the landfill.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth represents the amount of money invested in the current year that will be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring will cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated groundwater, leachate, and landfill waste at the site.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative will leave the site in its present condition and will not provide any additional protection to human health or the environment. It also will not achieve the remedial goals and will not satisfy the ARARs established for the site.

Present Worth: *$221,500*
Capital Cost: *$0*
O&M Present Cost: *$221,500*
Annual O&M Costs: *$11,300*
Time to Implement: ..... *NA*

Alternative 2: Landfill Cover with Monitored Natural Attenuation

Alternative 2 includes a landfill cover with continued monitoring. Based on the RI data, the soil or the waste samples collected from the landfill detected contamination but the contamination was below the SCGs. Groundwater contamination can be attributed to the migration of surface water through the landfill carrying contaminants to the groundwater. Also, leachate can generally be attributed to surface water entering the landfill at a higher elevation and migrating to seeps at lower elevations and to surrounding surface waterways. A soil cap will be placed on the landfill to improve surface drainage thereby reducing the infiltration of surface water; and will eliminate direct exposure to landfill waste.

An evaluation will be made to consolidate the landfill. The consolidation will include the excavation of waste from east cell and consolidate into the west cell that will result in a smaller landfill footprint and restore the east cell to a usable land. If the consolidation of the landfill is found to be not cost effective or practical, the landfill will be covered with the soil cover as it exists now.

Soil cover will consist of 6 inches of topsoil and18 inches of soil material. During the design of the remedy, the soils to be used will be further evaluated to determine the availability of low permeability soils and their impact on infiltration of water into the landfill. The surface will be sloped so that drainage was directed away from the landfill towards the swale that flows towards the north. Control of the surface water should also minimize concerns associated with leachate. Covering the landfill waste will minimize potential exposure to humans in and around the landfill.

It is evident from the groundwater sampling results that subsurface biological activity is occurring at the site and therefore, under this alternative, groundwater will continue to naturally attenuate. Groundwater will be monitored for increases in contaminant levels and any direct threats to humans, particularly if the public water system Well No. 5 was to be used for potable water. However, institutional controls such as an environmental easement will be required to restrict the use of groundwater for potable purposes.

Costs are based on construction of a landfill cover followed by continued monitoring over a 30 year period.

Present Worth: *$2,941,500*
Capital Cost: *$2,720,000*
O&M Present Cost: *$221,500*
Annual O&M Costs: *$11,300*
Time to Implement: ..... *8 months*

Alternative 3: Landfill Cover with In Situ Treatment

Similar to Alternative 2, a landfill cover would be constructed under Alternative 3 in a similar manner. In addition, in situ treatment will be performed to address the groundwater contamination. In order to accelerate the current subsurface biological activity, an in-situ treatment product capable of reducing contaminant levels would be installed/injected, or an air sparging system would be installed. Since the groundwater plume has been identified between the landfill and the sentry well, this area and extending north to intercept the natural groundwater flow direction northwest of the landfill would be the focus for in situ treatment.

A pilot study will be conducted to determine the number of injection points and the biological compound or the air sparging compound that will be applicable for the site conditions. In addition, institutional controls preventing the use of public supply Well No. 5 should be implemented during the implementation of this technology because the pumping at Well No. 5 would draw the injected compound towards the direction of pumping and could compromise the effectiveness of this technology.

Groundwater will be monitored for changes in contaminant levels, particularly increases. Institutional controls such as an environmental easement will be required to restrict the use of groundwater for potable purposes.

Costs are based on construction of a landfill cover and a one time injection of an in situ bioremediation product followed by continued monitoring over a 30 year period.

Present Worth: *$4,066,500*
Capital Cost: *$3,845,000*
O&M Present Cost: *$221,500*
Annual O&M Costs: *$11,300*
Time to Implement: ..... *8 months*

Alternative 4: Landfill Cover with Ex Situ Treatment

Similar to Alternative 2, a landfill cover will also be constructed under Alternative 4 in a similar manner. In addition, ex situ treatment will be performed to address the groundwater contamination. An appropriate treatment system will be installed at well No. 5 to treat the groundwater. The treatment system will be installed and operated for a period of one year following the Department's approval of the final engineering report and then the responsibility of operating the system will be transferred to the Town. During this time, training to operate the system will be provided to the Town staff.

Groundwater will be monitored for changes in contaminant levels.

Costs are based on construction of a landfill cover and installation of a treatment system such as an air stripper for VOC removal within the pump house at Well No. 5. Operation and maintenance of the treatment system is assumed for a period of 1 year and the maintenance and monitoring of the landfill is assumed for a period of 30 years.

Present Worth: *$3,291,700*
Capital Cost: *$3,032,000*
O&M Present Cost: *$259,700*
Annual O&M Costs: ..... *$ 49,500*
Time to Implement: ..... *8 months*

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protecti*on of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The major SCGs applicable for this site include groundwater and drinking water standards in the Department's Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria. The discharge of treated groundwater to surface water would also have to meet state pollution discharge elimination system requirements.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

This final criterion, community acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the Department addressed the concerns raised.

In general, the public comments received were supportive of the selected remedy. Several comments received, however, pertaining to the landfill consolidation. The public raised concerns about the proposal to consolidate the waste from east cell of the landfill into the west cell because the public did not want the landfill waste to be disturbed. The landfill waste is already covered with soil. Additionally, the consolidation will increase the height of the landfill with the soil cover which is unacceptable.

As proposed by the Department, a detailed evaluation will be made to consolidate the landfill. If the consolidation of the landfill is found to be not cost effective or practical, the landfill will be covered with the soil cover as it exists now.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative 4, Landfill Cover with Ex Situ Treatment, as the remedy for this site. The selected remedy is based on the results of the RI and the evaluation of alternatives presented in this document and the FS.

The components of the remedy include the construction of a landfill cover to minimize infiltration of surface water and subsequent migration of contamination from the landfill waste. The cover will promote water runoff thereby minimizing migration of leachate from the landfill waste to the surface drainage ditches. A treatment system will be installed at Well No. 5 and be used as an ex situ treatment system of the groundwater. This will provide the Frewsburg Water district with an effective supply well which could be used under current conditions. Refer to Figure 4 for the layout of the proposed remedy.
Alternative 4 is being selected based on the evaluation of the four alternatives developed for this site. With the exception of the No Action alternative, each of the alternatives will comply with the threshold criteria,

although Alternative 2 may take a longer period due to natural attenuation. In addition, alternatives 2, 3 and 4 will comply with the balancing criteria but the level of compliance varies for each alternative. The major differences between the three alternatives are overall effectiveness and cost. Essentially, Alternative 4 provides the greatest certainty of achieving the remediation goals for the site and is effective.

Alternative 2 (Landfill Cover with Monitored Natural Attenuation) is the lowest cost compared to Alternatives 3 and 4, but the groundwater cleanup goals may take a significant time for natural attenuation to achieve clean up goals. The soil cover under Alternative 2 will improve surface drainage thereby reducing the infiltration of surface water; and will eliminate direct exposure to landfill waste but the groundwater contamination plume will continue to pose exposures to public heath and the environment.

Alternative 3 (Landfill Cover with In Situ Treatment) will rely on effective design and implementation of an in situ remediation compound or air sparging system to treat the contaminated groundwater. Alternative 3 will require a pilot study prior to the implementation of this treatment technology on a full-scale level at the site. The long-term effectiveness of Alternative 3 will depend on its implementability and availability of experienced contractors. Also groundwater flow will need to be better defined in order to properly design a treatment system. Alternative 4 will be readily implementable.

Compared to other alternatives, Alternative 4 will be effective in removing the contaminants from the groundwater and will eliminate the threat of potential ingestion of contaminated groundwater.

The cost of the alternatives varies. Alternative 4 is less expensive than Alternative 3. The costs for Alternatives 2 and 4 are approximately the same. Alternative 3 costs significantly more and its implementability and effectiveness are uncertain. Designing the remedy, mobilizing the equipments, preparing the site, and construction management are substantial costs associated with each of these remedies.
The estimated present worth cost to implement the remedy is $3,198,200. The cost to construct the remedy is estimated to be $3,032,000 and the estimated average annual O & M cost is $38,200.

The elements of the proposed remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. An evaluation will be made to consolidate the landfill. The consolidation will include the excavation of waste from east cell and consolidate into the west cell that will result in a smaller landfill footprint and restore the east cell to usable land. If the consolidation of the landfill is not found to be cost effective or practical, the entire landfill will be covered with a soil cover.

3. A treatment system will be designed and installed at Well No.5 to insure that drinking water standards are not contravened. The Frewsburg Water district could use the treated water for public water supply.

4. A soil cover will be constructed over the landfill to prevent exposure to contaminated soils and provide contouring to promote runoff of surface water. The cover materials will be further evaluated during design but nominally would consists of 6 inches of topsoil and18 inches of clean soil material underlain by an indicator such as orange plastic snow fence to demarcate the

cover soil from the subsurface soil. Clean soil will constitute soil that meets the Division of Environmental Remediation's criteria for backfill or local site background. Non-vegetated areas such as roadways are not anticipated at this site but if they are required, these areas will be covered by a paving system at least 6 inches thick.

5. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to permit commercial or industrial uses; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

6. Development of a site management plan which will include the following institutional and engineering controls: (a) management of the final cover system to restrict excavation below the soil cover's demarcation layer. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) continued evaluation of the potential for vapor intrusion for any buildings developed on or adjacent to the site, including provision for mitigation of any impacts identified; (c) monitoring of groundwater; (d) identification of any use restrictions on the site; (e) provisions for the continued proper operation and maintenance of the groundwater treatment system and other components of the remedy.

7. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

8. The soil cover will be maintained periodically. Maintenance will include mowing the cover and repair of any areas of the cover that were damaged or compromised in any way. Since the remedy results in untreated waste remaining at the site, a long-term monitoring program will be instituted. This program will allow the effectiveness of the landfill cover and treatment system to be monitored and will be a component of the long-term management for the site.

TABLE 1
Nature and Extent of Contamination
Groundwater

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)	SCG (ppb)	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Cis-1,2 Dichloroethene	1 – 69	5	6 of 38
	Dichlorodifluoromethane	0.6 – 9	5	1 of 38
	1,2 Dichloroethene	0.6 – 2	0.6	1 of 38
	Benzene	0.6 - 2	1	1 of 38
	Chloroethane	1-7	5	1 of 38
	Vinyl Chloride	1 – 600	2	6 of 38
	Xylene (total)	ND - 11	5	1 of 38
Semivolatile Organic Compounds (SVOCs)	4-Methylphenol	ND – 60	1	1 of 5
	4-chloro-3-Methylphenol	ND- 5	1	1 of 5
	4- Nitrophenol	ND – 2	1	1 of 5
Inorganic Compounds	Arsenic	2.7 – 87.8	25	8 of 31
	Barium	97.2 - 1230	1000	1 of 31
	Chromium	0.94 - 112	50	2 of 31
	Iron	32.7 – 82,600	300	30 of 31
	Lead	0.74 – 157	25	5 of 31
	Manganese	41.1 - 12300	3000	4 of 31

Key:
ppb = parts per billion, which is equivalent to micrograms per liter, µg/L
SCG = standards, criteria, and guidance values – NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class GA groundwater Criteria.

TABLE 1
Nature and Extent of Contamination
Leachate

Leachate	Contaminants of Concern	Concentration Range Detected (ppb)	SCG (ppb)	Frequency of Exceeding SCG
Inorganic Compounds	Lead	9.9 – 302	5	3 of 3
	Aluminum	998 – 110,000	100	3 of 3
	Arsenic	2.7 – 156	150	1 of 3
	Cadmium	0.2 – 24.9	4	1 of 3
	Cobalt	0.99 – 291	5	1 of 3
	Copper	4.9 – 365	18	1 of 3
	Iron	14,600 – 721,000	300	3 of 3
	Mercury	0.02 – 0.78	0.77	1 of 3
	Nickel	5.7 – 2560	101	1 of 3
	Selenium	2.7 – 31.23	4.6	1 of 3
	Thallium	3.7 – 22.9	8	1 of 3
	Vanadium	1.1 – 195	14	1 of 3
	Zinc	56.3 – 4150	152	1 of 3

Key:
ppb = parts per billion, which is equivalent to micrograms per liter, µg/L
SCG = standards, criteria, and guidance values – NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria.

TABLE 1
Nature and Extent of Contamination
Surface Water

Surface Water	Contaminants of Concern	Concentration Range Detected (ppb)	SCG (ppb)	Frequency of Exceeding SCG
Semivolatile Organic Compounds (SVOCs)	Phenol	ND – 11	5	1 of 5
Inorganic Compounds	Lead	8.4 – 22.5	5	4 of 5
	Aluminum	253 – 10,200	100	5 of 5
	Cobalt	0.99 – 11.2	5	3 of 5
	Iron	1350 – 38,000	300	5 of 5
	Vanadium	1.1 – 16.6	14	1 of 5
	Zinc	8.8 – 210	152	1 of 5

Key:
ppb = parts per billion, which is equivalent to micrograms per liter, µg/L
SCG = standards, criteria, and guidance values – NYSDEC Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1) – Class C Surface Water Criteria.

TABLE 1
Nature and Extent of Contamination
Soil Vapor and Surface Soil

Soil Vapor	Contaminants of Concern	Concentration Range Detected (ppbv)	SCG (ppbv)	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Dichlorodifluoro-methane	0.6 - 7600	400	1 of 4
	Trichoroethylene	ND - 18	4.1	1 of 4
	1,2,4-Trimethylbenzene	0.6 - 19	12	1 of 4

Key:
ppbv = parts per billion volume
SCG = standards, criteria, and guidance values – USEPA, 2002 - OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils

Surface Soil	Contaminants of Concern	Concentration Range Detected (ppm)	SCG (ppm)	Frequency of Exceeding SCG
Inorganic Compounds	Barium	81.3 - 448	300	1 of 5
	Cadmium	0.4 – 2.9	2.5	1 of 5
	Lead	16.1 - 98	63	1 of 5
	Nickel	18.8 – 52.4	30	2 of 5
	Zinc	42.8 - 381	109	2 of 5

Key:
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil
SCG = standards, criteria, and guidance values – "Technical and Administrative Guidance Memorandum [TAGM 4046]; Determination of Soil Cleanup Objectives and Cleanup Levels" and 6 NYCRR Subpart 375-6 – Remedial Program Soil Cleanup Objectives).

TABLE 1
Nature and Extent of Contamination
Subsurface Soil

Subsurface Soil	Contaminants of Concern	Concentration Range Detected (ppm)	SCG (ppm)	Frequency of Exceeding SCG
Inorganic Compounds	Arsenic	5.3 – 29.7	13	2 of 8
	Cadmium	0.87 – 23.9	2.5	1 of 8
	Chromium	15 - 8870	30	3 of 8
	Copper	11.3 - 1800	50	3 of 8
	Mercury	0.04 – 2.2	0.18	2 of 8
	Nickel	23 – 30,700	30	3 of 8
	Zinc	56.4 - 1820	109	6 of 8

Key:
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil
SCG = standards, criteria, and guidance values - "Technical and Administrative Guidance Memorandum [TAGM 4046]; Determination of Soil Cleanup Objectives and Cleanup Levels" and 6 NYCRR Subpart 375-6 – Remedial Program Soil Cleanup Objectives.

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Action	0	0	0
Landfill Cover with Monitored Natural Attenuation	2,720,000	11,300	2,941,500
Landfill Cover with In Situ Treatment	3,845,000	11,300	4,066,500
Landfill Cover with Ex Situ Treatment	3,032,000	38,200	3,291,700

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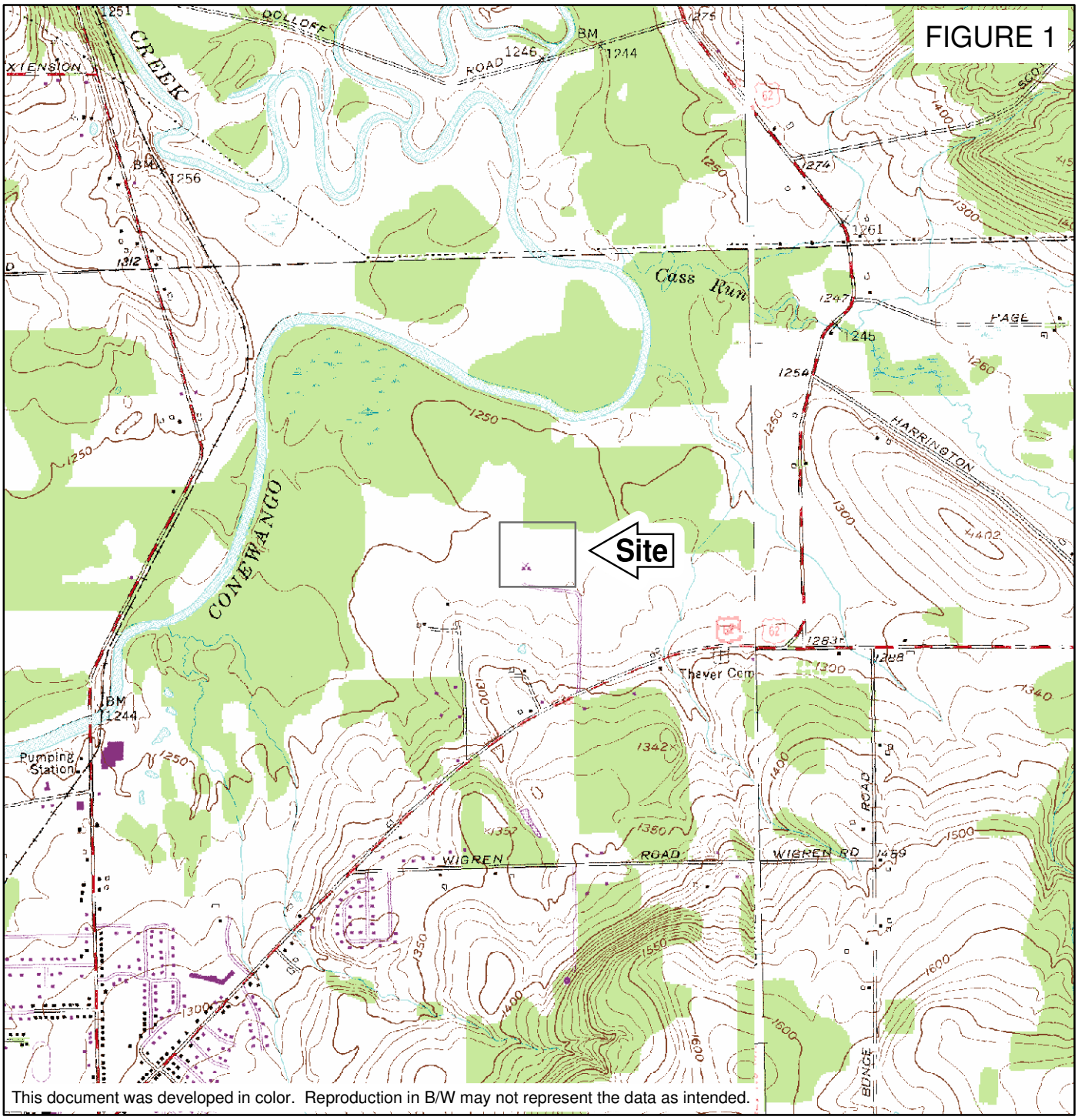
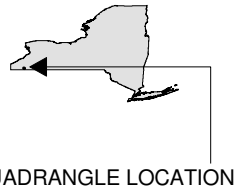
PLOT DATE: 03/03/05 DIV. 84 JPS

FIGURE 1



This document was developed in color. Reproduction in B/W may not represent the data as intended.

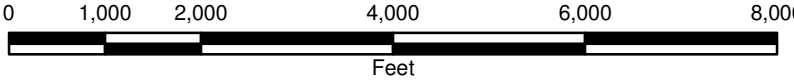
ADAPTED FROM: IVORY AND JAMESTOWN, NEW YORK USGS QUADRANGLES.



QUADRANGLE LOCATION

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK

SITE LOCATION



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MARCH 2005

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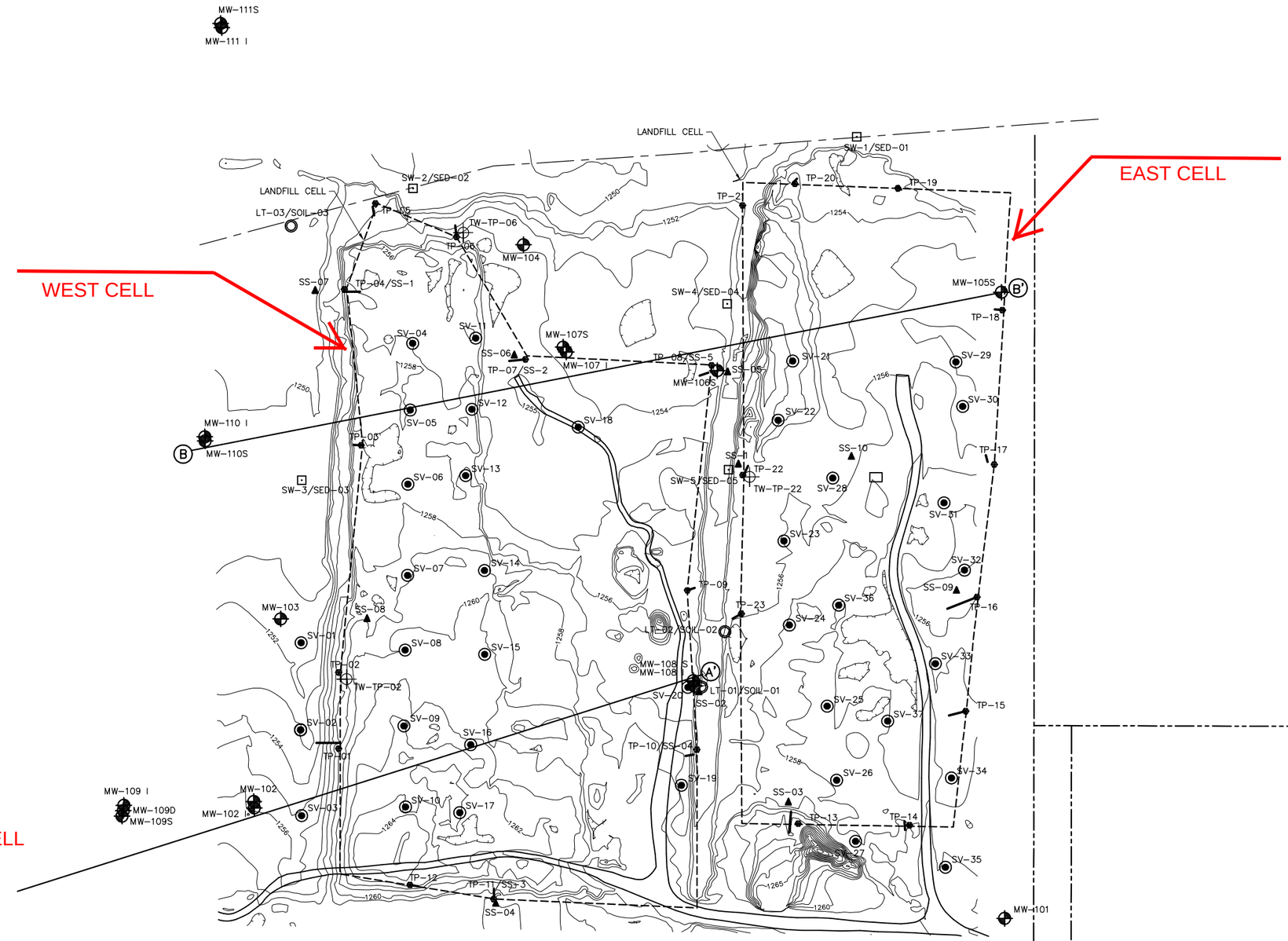
O'BRIEN & GERE ENGINEERS, INC.

Jan 06, 2006 - 8:24am

FIGURE 2



LEGEND

- PROPERTY LINE
- EDGE OF CREEK
- ACCESS ROAD
- SV-30 SOIL VAPOR LOCATIONS
- SW-1/SED-01 SURFACE WATER AND SEDIMENT LOCATIONS
- SS-07 SURFACE SOIL LOCATIONS
- LT-01 LEACHATE SEEP LOCATIONS
- TP-18 TEST PIT LOCATIONS
- MW-105S MONITORING WELL LOCATIONS
- A CROSS SECTION LINES
- TW-TP-02 TEMPORARY WELL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

SAMPLE LOCATION PLAN

0 80 160
SCALE IN FEET

FILE NO.10653.34241.013
DECEMBER 2005

O'BRIEN & GERE
ENGINEERS, INC.

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MW-111S

CHEMICAL NAME	10/13/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	**30.5***	NS	NA
Iron	**48,800***	NS	NA

MW-111I

CHEMICAL NAME	10/13/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**20,700***	NS	NA

MW-104

CHEMICAL NAME	10/14/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	**53.2***	24.1	NA
Iron	**13,200***	**37,300***	NA
Magnesium	R	**39,500***	NA
Sodium	**R**	**27,100***	NA

MW-107I

CHEMICAL NAME	10/12/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**12,100***	NS	NA

MW-107S

CHEMICAL NAME	10/12/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**24,900***	**679***	NA
Magnesium	**R**	**37,600***	NA
VOCs			
Dichlorodifluoromethane	**9.0 J***	3.0 J	0.8 J
Vinyl Chloride	**600.0 D***	**250***	**48 D***
cis-1,2-Dichloroethene	**69.0 J***	**25.0***	1
1,2-Dichloroethane	**2.0 J***	0.6 J	1 U

MW-110I

CHEMICAL NAME	10/13/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	**87.8***	23.0	NA
Beryllium	**3.6 B***	0.72 B	NA
Chromium	**112***	24.5	NA
Iron	**191,000***	**37,000***	NA
Lead	**92.4***	15.7	NA
Magnesium	**70,900***	26,300	NA
Manganese	**3,720***	880	NA
Thallium	**14***	4.5 U	NA

MW-110S

CHEMICAL NAME	10/13/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	**35.1***	10.9	NA
Iron	**74,900***	**6,310***	NA
Lead	**26.8***	2.1B	NA

MW-103

CHEMICAL NAME	10/12/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**1,030***	NS	NA
VOCs			
Vinyl Chloride	10 U	10 U	2

MW-102

CHEMICAL NAME	10/11/04	03/08/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Cadmium	0.2 U	**8.4***	NA
Iron	32.7 B	**6,220***	NA
VOCs			
Vinyl Chloride	2 J	1 J	**30 D***
Chloroethane	1 J	1 J	**11***
Trichloroethene	10 U	10 U	**9***
cis-1,2-Dichloroethene	2 J	1 J	**130 D***

MW-102I

CHEMICAL NAME	10/11/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**3,800***	**12,200***	NA
VOCs			
Vinyl Chloride	**5.0 J***	**3.0 J***	0.6 J
Chloroethane	**7.0 J***	5.0 J	1 U
cis-1,2-Dichloroethene	**14***	**6.0 J***	**12***
Trichloroethene	10 U	10 U	**20***

MW-109I

CHEMICAL NAME	10/12/04	03/08/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	17.8	**37***	NA
Iron	**36,000***	**68,300***	NA
Lead	**40.7***	**87.1***	NA
Manganese	1,970 U	**3,720***	NA
Thallium	3.7 U	**7.2 B***	NA

MW-109D

CHEMICAL NAME	10/12/04	03/08/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**8,440***	**29,900***	NA
VOCs			
Vinyl Chloride	1.0 J	**108***	0.4 J
cis-1,2-Dichlorethene	10 U	1 J	**9***

MW-109S

CHEMICAL NAME	03/13/04	03/09/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**2,520***	**18,400***	NA

MW-13

CHEMICAL NAME	09/03/04	10/14/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	NA	**979***	NA

MW-105S

CHEMICAL NAME	10/14/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	**29.2***	22.1	NA
Iron	**53,400***	**50,100***	NA

MW-106S

CHEMICAL NAME	10/14/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**8,440***	NS	NS

MW-108I

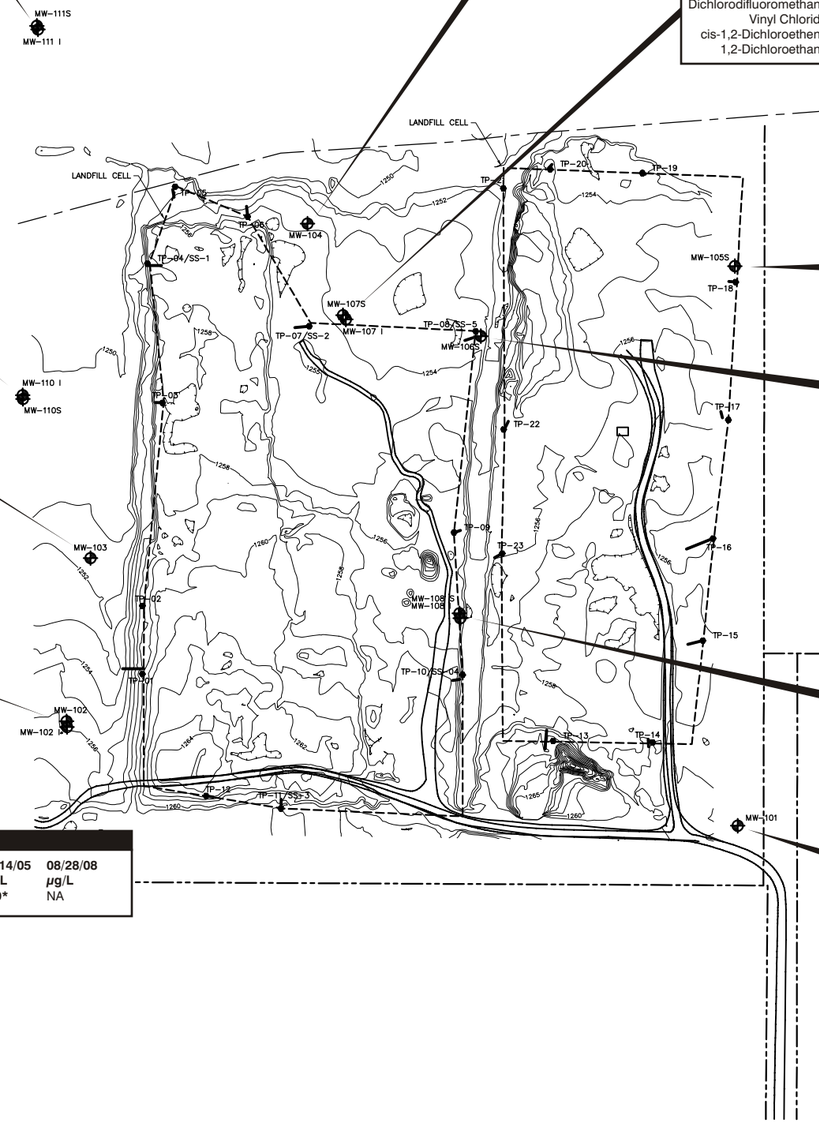
CHEMICAL NAME	10/13/04	03/07/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Iron	**15,300***	**1,740***	NA

MW-108S

CHEMICAL NAME	10/14/04	03/10/05	08/28/08
Inorganics	**µg/L**	**µg/L**	**µg/L**
Arsenic	12.1	**28.2***	NA
Barium	**1,230***	890	NA
Chromium	8.3 B	**68.4***	NA
Iron	**55,100***	**82,600***	NA
Manganese	**3,150***	2,890	NA

MW-101

CHEMICAL NAME	10/14/04	08/28/08
Inorganics	**µg/L**	**µg/L**
Arsenic	**46.1***	NS
Iron	**4,910***	NS



Town of Carroll
Landfill Site
Frewsburg, New York
NYSDEC SITE #9-07-017
September 2008

LEGEND

- Property Line
- Edge of Creek
- Access Road
- TP–18 Test Pit Locations
- MW–105S Monitoring Well Locations

NOTES

- NA Not Applicable
- NS Not Sampled
- U Analyte Not Detected
- B Value is Greater than IDL but less than CRDL
- * Concentration Exceeds Water Quality Standard
- J Estimated Concentration
- R Analytical Result Rejected During Validation
- D Compound Identified at Secondary Dilution Factor

NYS CLASS GA WATER QUALITY STANDARDS AND GUIDANCE (6NYCRR Part 703 or TOGS 1.1.1)

CHEMICAL NAME	
Inorganics	**µg/L**
Arsenic	25
Barium	1000
Beryllium	3.0
Cadmium	5.0
Chromium	50
Iron	300
Lead	25
Magnesium	35000
Manganese	3000
Sodium	20000
Thallium	0.5
VOCs	
Dichlorodifluoromethane	5
Vinyl Chloride	2
Chloroethane	5
cis-1,2-Dichloroethene	5
1,2-Dichloroethane	0.6
Benzene	1
Xylene (Total)	5
Trichloroethene	5
SVOCs	
4-Methylphenol	1
4-chloro-3-Methylphenol	1
4-Nitrophenol	1

SOURCE: O'Brien & Gere Engineers, Inc., 2005.

APPROXIMATE SCALE IN FEET
0 150 300

Figure 3 **Groundwater Detections Greater than Criteria**

Dec 14, 2005 - 2:56pm

FIGURE NO. 4

LANDFILL CELL WEST

LANDFILL CELL EAST

INSTALL GROUNDWATER TREATMENT SYSTEM

SUPPLY WELL #5

NOTE:
AS PART OF THE REMEDY, EAST CELL WOULD BE CONSOLIDATED INTO WEST CELL, IF NECESSARY.

LEGEND

- PROPERTY LINE
- EDGE OF CREEK
- ACCESS ROAD
- SV-30 SOIL VAPOR LOCATIONS
- SW-1/SED-01 SURFACE WATER AND SEDIMENT LOCATIONS
- SS-07 SURFACE SOIL LOCATIONS
- LT-01 LEACHATE SEEP LOCATIONS
- TP-18 TEST PIT LOCATIONS
- MW-105S MONITORING WELL LOCATIONS
- TW-TP-02 TEMPORARY WELL

TOWN OF CARROLL
LANDFILL SITE
FREWSBURG, NEW YORK
NYSDEC SITE #9-07-017

PROPOSED REMEDY LAYOUT

0 80 160
SCALE IN FEET

FILE NO.10653.34241.027
MAY 2005

O'BRIEN & GERE ENGINEERS, INC.

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APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A

Responsiveness Summary

Carroll Town Landfill Site
Town of Carroll, Chautauqua County, New York
Site No. 907017

The Proposed Remedial Action Plan (PRAP) for the Carroll Town Landfill site, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on November 17, 2008. The PRAP outlined the remedial measure proposed for the contaminated groundwater and the landfill waste at the Carroll Town Landfill site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on January 21, 2009, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on February 4, 2009.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: An ecosystem thrives in and around the landfill. We do not want you to disturb this by consolidating the landfill.

RESPONSE 1: Although there may be some short-term impacts due to consolidation the long-term benefits of reducing water infiltration into the waste and thereby reducing the migration of contaminants from the landfill is preferable. However, if the consolidation of cells is found not to be cost effective or practical, the landfill will be covered in the footprint that exists at present. As stated in the PRAP, we will evaluate in detail the option to consolidate material from one cell to the other to minimize the landfill footprint and therefore, the amount of soil cover. Consolidation would remove the waste from the east cell making it available for unrestricted future development.

COMMENT 2: Why consolidate the waste into the west cell which is closer to public supply well PW-5? Why not consolidate the west cell into the east cell?

RESPONSE 2: Consolidation of the east cell into the west cell is preferable because the east cell is smaller in size compared to the west cell and the groundwater samples from two of the monitoring wells installed on the west cell showed high concentrations of volatile organic compounds. Disturbance of the west cell could cause contaminants to migrate from the landfill. Additionally, the waste is found to be deeper in the west cell compared to the east cell. Therefore, less waste will need to be excavated from the east cell compared to the west cell for consolidation.

COMMENT 3: What are the benefits of consolidation? Why does the landfill need a cover and what are the advantages of the cover? We want to let you know that about fifteen property owners who live around the landfill will be against consolidation of the landfill.

RESPONSE 3: Please refer to Response 1. Landfill consolidation would minimize the footprint of the landfill and therefore, minimize the amount of soil cover to be placed on the landfill and reduce the amount of water infiltrating into the landfill via rainfall or snowmelt. Also, after consolidation, the area currently occupied by the east cell would be available for unrestricted future use. A soil cover will be placed on the landfill with or without consolidation to eliminate direct contact with landfill waste and promote surface water runoff. The soil cover will minimize the amount of water that infiltrates into the landfill and hence, reduce the leachate originating from the landfill.

COMMENT 4: What would be the thickness of the cap (cover) and how high will the landfill be after the placement of the cover?

RESPONSE 4: The soil cover will consist of 6 inches of topsoil and18 inches of soil material underlain by an indicator (e.g. orange plastic snow fence) to demarcate the cover soil from the subsurface soil. The final cover without consolidation will be approximately 2 feet higher than the current surface elevation. Should the landfill be consolidated, the final cover placed after consolidation of the landfill will be approximately 4 to 6 feet higher than the existing surface elevation and the area of the east cell of the landfill will be contoured to meet the existing surrounding grade.

COMMENT 5: Are there any safety issues to walk, hunt or walk the dog in the landfill area?

RESPONSE 5: Currently the landfill is moderately wooded, has an uneven surface with localized areas of stagnant water. There is potential for direct contact with exposed landfill waste. We suggest not using the landfill for any outdoor activities until it is properly covered to avoid contacting the waste.

COMMENT 6: Will anything from the landfill affect property owners who live close to the site? If nothing is done could contaminated groundwater reach any private wells?

RESPONSE 6: The landfill is heavily vegetated and moderately wooded and therefore the potential for landfill waste to become airborne during windy conditions and move to adjacent areas does not exist. The groundwater from the landfill is moving west. The properties are located either side-gradient or up-gradient of the landfill and there is no potential for contaminated groundwater to reach private wells.

COMMENT 7: How significant are the volatile organic compounds found in the groundwater? Would you supply your family with this water?

RESPONSE 7: The contaminated groundwater at the landfill has volatile organic compounds that exceed the groundwater standards. For this reason, the selected remedy for the site includes the imposition of an institutional control in the form of an environmental easement that will require restricting the use of groundwater at the site as a source of potable water, without necessary water treatment as determined by NYSDOH. As part of the proposed remedy, the treatment system to be installed at the public supply well PW-5 will remove the contaminants from the water and the treated water can be used for potable purposes.

COMMENT 8: Instead of treating the water at public supply well PW-5, why not find a new clean well in another part of the Town?

RESPONSE 8: Prior to finalizing the Proposed Remedial Action Plan, the Town asked the Department not to install a treatment system and instead wanted to conduct exploratory work to identify a location for a new well that would provide clean water with no treatment. The exploratory work was conducted in March 2008 by drilling at four different locations. Unfortunately this work was unsuccessful because the drilling encountered bedrock at all locations and would not be able to produce an adequate supply of water for Town purposes. As a result the Town requested the Department to finalize the Proposed Remedial Action Plan that includes the installation of a treatment system at well PW-5.

COMMENT 9: When the landfill was originally closed was it covered with clean soil? Which landfill cell is leaching contamination into the groundwater?

RESPONSE 9: We do not have the information or the details of the cover that was placed on the landfill after the operations at the landfill were discontinued. During our investigation we found that a soil cover was in place on the landfill in most of the areas and was thickly vegetated. The landfill is not graded properly for surface water run-off from the landfill. In addition, the landfill contains many pockets and areas where water runs onto the landfill. Both landfill cells would have contributed contamination to the groundwater. Results from the latest investigation indicated groundwater contamination exceeding the groundwater standards in the west cell.

COMMENT 10: Would VacAir Alloys pay for the cost of remediating this site? If not, where do the funds for clean up come from?

RESPONSE 10: The Department will pursue all the potentially responsible parties to have them assume responsibility for the clean up of the site. If an agreement cannot be reached with potentially responsible parties, the Department will evaluate the site for further action under the State Superfund. The potentially responsible parties are subject to legal actions by the State for recovery of all response costs the State has incurred.

COMMENT 11: Who will maintain the landfill after the placement of the soil cover?

RESPONSE 11: If potentially responsible parties do not implement the remedy and maintain the landfill then the Department will take over responsibility for the site. The groundwater at the site will be monitored to determine whether the treatment system installed at public supply well PW-5 is effectively meeting remediation requirements.

COMMENT 12: During the bidding of the construction contract, is the State obligated to select the low-bid contractor? Can the State hire the Town to do the work?

RESPONSE 12: To the extent the State performs the work; the State is obligated to select the low-bid contractor. The State will verify the low-bid contractor's qualification and experience and evaluate whether the contactor can do the work. The Town may submit a bid for the work if they can meet the requirements of bidding.

COMMENT 13: What is the next step in this process? Are the timelines presented tonight firm?

RESPONSE 13: The following was presented at the meeting as the next step and approximate timelines:
After the completion of the public comment period on February 5, 2009, the Record of Decision (ROD) will be prepared and a responsiveness summary summarizing all the comments received along with our response will be attached to the ROD.
The environmental easement will be prepared to be signed by the Department and the Town.
The details of the treatment system and the operation and maintenance of the system will be discussed with the Town.
The ROD will be completed by the end of March 2009. Remedial Design will take twelve (12) months from the date of the approval of the design budget. Remedial Construction will take twelve (12) to eighteen (18) months from the date of the approval of the construction contract.
The project schedule depends on the amount of time it takes to negotiate with responsible parties and to get approval for the design budget and the construction contract.

COMMENT 14: Are there other town dumps in this area being worked on by the Department?

RESPONSE 14: There are no other municipal landfills in this area that are currently being investigated and/or being remediated by our Division.

COMMENT 15: What is the best way to communicate comments?

RESPONSE 15: You can call the Project Manager at the toll free number 1-888-459-8667 or mail your comments to Vivek Nattanmai at 625 Broadway, Albany, NY 12233 or e-mail comments to vrnattan@gw.dec.state.ny.us
Please note that the fact sheet that was mailed to the residents and public officials has all the information to communicate with the Department and the agenda handed out at the public meeting had the Project Manager's business card at the bottom.

The following are the responses to written comments received during the comment period:

COMMENT 16: The project manager, Vivek Nattanmai, received several comment letters and e-mails with same message. The main issues raised in these letters are: 1) There is little or no value in consolidating the landfill. It will do more harm to the environment than good by consolidating the landfill and 2) Since the Town is struggling with the water supply issues for many years, the State should help the town financially to locate a new well in an area away from the landfill that will yield clean water on a long-term basis for the Town residents.

RESPONSE 16: Please refer to responses 1, 2, 3 and 9 concerning landfill consolidation. Regarding issue No.2, the Department has already explored this option with the Town. See Response 8. Unfortunately, a location for a new water supply well was not found that could meet the Town's requirements.

COMMENT 17: The project manager received a comment letter dated February 2, 2009 from Douglas E. Conroe, Chairman, Chautauqua Environmental Management Council and also received a comment letter dated January 30, 2009 from Randall S. Peterson, Deputy General Manager, Board of Public Utilities, Jamestown, New York.. The comments included in these letters are similar which are: 1) consideration should be given to evaluate the possibility of using the water supply source from Jamestown and then utilize less expensive remediation technology to address the contamination from the landfill; 2) utilizing the Jamestown water supply source would provide water with no treatment requirements and would not require new infrastructure for the proposed treatment system; and 3) should the groundwater from the site be utilized for public water supply prior to the completion of remediation?

RESPONSE 17: The Proposed Remedial Action Plan (PRAP) was developed to address the contamination found in groundwater and to place a cover on the landfill to prevent direct contact with the landfill waste. The PRAP was developed based on the results from the Remedial

Investigation conducted at the Carroll Town Landfill site and a Feasibility Study that was conducted to evaluate the potential remedial alternatives that are applicable for the groundwater contamination found at the site. Some of the remedial alternatives that were considered for groundwater include bio-remediation, air sparging and extraction and treatment. Bio-remediation and air sparging technologies rely on effective design and implementation of an in-situ remediation compound or air sparging system to treat the contaminated groundwater and will require a pilot study prior to the implementation of this treatment technology on a full-scale level at the site. The effectiveness of these technologies is uncertain. An extraction and treatment system is the appropriate remedial technology and is both reliable and cost effective.

Therefore, to address the contaminated groundwater originating from the landfill we proposed to install the treatment system at the public supply well PW-5, which is located approximately 800 feet west of the site instead of installing an extraction and treatment system at the site. The treated groundwater would meet both groundwater and drinking water standards and allow the Town to use the treated water as part of their water supply system. We are proposing a remedy for the landfill site and the contaminated groundwater originating from the site and not proposing an alternate public water supply source for the Town. It is our current understanding that the water district is adequately supplied by the remaining two supply wells operated by the Town of Carroll. Nevertheless, the water quality exiting the treatment unit will meet both groundwater and drinking water standards. In December 2006, the County Health Department asked the Town not use well No.5 for public water supply. Well No.5 has been shut down since then. The groundwater from the site can be used for public water supply after the treatment system is installed and becomes operational.

COMMENT 18: The project manager received a letter dated February 3, 2009 from Michael Bolender, the Town Attorney. The comments included in the letter are: 18-1: will the treatment system installed as part of the remedy be able to treat other contaminants such as arsenic, barium, chromium, iron, lead and manganese that were found above groundwater standards in the groundwater at the site?; 18-2: the PRAP indicates that the treatment system will be installed within the building of the well PW-5 but the building does not have enough space to accommodate the system; 18-3: the PRAP states that the interim remedial measure completed at well 2A is functioning properly but there are other items and issues that need to be resolved to make the system at well 2A function properly; 18-4: concerns were raised during the public meeting about the consolidation of the landfill. We suggest that the west cell be consolidated into the east cell to increase the distance between the landfill and well PW-5 and other sensitive areas around the site; and 18-5: what would the cover placed at the landfill be capable of sustaining in the future? The letter also states that the Town attorney had a discussion with a representative of the Jamestown Board of Public Utilities about the possibility of obtaining water from Jamestown. The Town would like to cooperate with the State in completing this remedial work and will take responsibility of the treatment system after the completion of construction.

RESPONSE 18:

Response to comment 18-1: We will evaluate the treatment of contaminants other than VOCs during the design of the treatment system. Sampling done by the Town and the County Health Department during the approximately nine years of operation of the public supply well PW-5 indicated that no metal compounds were detected above groundwater standards. The volatile organic compounds (VOCs) detected at the public water supply well did not exceed the groundwater standards but the sentinel well MW-13 did detect VOCs above groundwater standards.

Response to comment 18-2: Spacing limitations within the building will be evaluated during the design. We will coordinate with the Town during the design and obtain your comments prior to finalizing the design document.

Response to comment 18-3: The PRAP states that the problems identified by the Department at well 2A have been addressed by the installation of a relief valve and a variable frequency device and that the equipment is functioning properly. It was our understanding that the Town will have the original design engineer evaluate the electronic components of the system and make adjustments to improve operating efficiency. The Town was notified by letter dated February 3, 2009 that the Department's efforts to resolve the problems at well 2A are completed.

Response to comment 18-4: Please refer to responses 1, 2, 3 and 9.

Response to comment 18-5: The landfill with the cover system could be used for commercial purposes such as parking lot or passive recreational purposes such as a ball field with prior approval from the Department. Should beneficial uses of the landfill, be made by the municipality all operation and maintenance associated with those uses would be the responsibility of the municipality.

COMMENT 19: The project manager received a letter dated February 3, 2009 from Thomas H. Forbes, Benchmark Environmental Engineers for their client, Keywell, LLC, a PRP for the site. The comments included in the letter are:
Comment 19-1: The site does not pose human health and environmental risks because there are only limited exceedances of soil cleanup objectives and minor exceedance of groundwater standards. In addition, the chemicals found in all the media are typical of sanitary landfills and the need for pumping at well 5 does not exist because well 2A is functional. Based on the above reasons, the site should be reclassified to a Class 3 Site;
Comment 19-2: The need for the proposed landfill consolidation and cover system as remedial measures is not justified because the organic compounds detected in soil were below SCOs and the inorganics found in surface soil can be addressed by an environmental easement that would limit future site use to commercial or industrial applications. Certain inorganics detected in subsurface soil are addressed with the existing surface soil cover which is at least 1 foot thick

and therefore the landfill should be closed under Part 360 which governs construction, operation and closure of solid waste facilities rather than closing the landfill under Part 375;
Comment 19-3: If a cover system is required to satisfy Part 360 requirements the Town could reopen the landfill as a construction and demolition debris C&D landfill until such time as desired subgrade elevations were achieved that would provide revenues in the form of C&D tipping fees that could be used to substantially offset final cover system construction cost. To avoid transportation costs and minimize short term impacts from truck traffic associated with import of cover soil from an offsite borrow source harvesting of soil from areas adjacent to the landfill could be considered;
Comment 19-4: The remedial benefits from pumping and treatment at municipal well No.5 will be minimal because pumping at well 5 will exacerbate the migration of contaminants to the southwest which would otherwise be expected to attenuate southwest of the site. The proposed air stripping system will only remove VOCs; it will not address other groundwater constituents such as arsenic and other landfill contaminants. This will require not only additional cost but will again increase health risk in that fouling will reduce air stripper efficiency and potentially allow for contaminant pass-through. The data support monitored natural attenuation as a better means to address the low levels of landfill constituents in groundwater and
Comment 19-5: The protection against exposures from the impacted drinking water well is best achieved by either decommissioning municipal well No. 5 and relying on the remaining existing municipal pumping wells (as has been the case for over a year), or relocating municipal well No.5 to another site outside the influence of the landfill and other potential contaminant sources. This latter alternative is consistent with NYSDECs DER-24 guidance entitled "Assistance for Contaminated Water Supplies". The Town's efforts to locate a new pumping well, if required for capacity purposes, would be far less expensive and much more protective of human health and the environment than the wellhead treatment alternative. It is therefore recommended that the NYSDEC employ a monitored natural attenuation approach to address groundwater at the site and confirm the continued degradation of VOCs.

RESPONSE 19:

Response to comment 19-1: The site was classified as a Class 2 Inactive Hazardous Waste Site on the registry of NYS Inactive Hazardous Waste Disposal Sites in 1998 based on VOC's in the groundwater. The Class 2 designation means that a significant threat to the public health or environment exists and action is required. Subsequent investigations have confirmed this determination and fully demonstrate that groundwater as well as soil, leachate and sediment are contaminated. Further, the groundwater contamination has resulted in the County Department of Health stating that the Town discontinue use of public water supply well number 5 located down gradient of the site because of the threat posed by the contamination in the nearby sentinel well.

Response to comment 19-2: Two of the applicable groundwater Remedial Action Objective's for Public Health Protection at this site are to restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable and to prevent ingestion of groundwater

with contaminant levels exceeding drinking water standards. The selection of this remedy is based on a goal of eliminating or reducing potential exposures to the extent practicable. While it is true that an environmental easement can limit further use of the site to commercial or industrial use, the easement by itself, with no other action, does nothing to reduce potential exposures.

Two of the applicable soil Remedial Action Objective's at this site are to prevent ingestion/direct contact with contaminated soil and to prevent migration of contaminants that would result in groundwater or surface water contamination. Our investigation indicates that a one foot soil cover does not exist as a continuous layer over the entire site. The remedy to be implemented will be in conformance with NYCRR Part 360.2-15, Landfill Closures and Post Closure Criteria. Additionally, landfill consolidation will be evaluated during the initial design phase. Consolidation has the benefit of reducing the footprint which reduces the waste mass subject to rainfall infiltration, reduces cover material requirements and ultimately reduces OM&M costs. It also makes more land available for other uses.

NYCRR Part 375 addresses Environmental Remediation Programs in general and does not provide specific engineering details for the remediation of any sites.

Response to comment 19-3: The objective of the proposed remedy is to close the existing landfill in accordance with our Part 360 regulation and not reopen the landfill for the disposal of waste. However, prior to the Department's implementation of the remedy the Responsible Parties will be offered an opportunity to implement the remedy. At that time, the PRPs may discuss with DEC Legal Staff innovative ways to accomplish the remedial plan for the site. Any major revision to the remedy would be subject to citizen participation and Department's approval.

Response to comment 19-4: Natural attenuation of some VOC's in groundwater is occurring at, and down gradient of the site. However, Vinyl Chloride will not naturally attenuate to a concentration low enough to alleviate the threat to the water supply and requires treatment. Vinyl Chloride has been detected in Monitor Well MW-13 exceeding groundwater standards. MW-13 is located in close proximity to the water supply well and is approximately 100 feet upgradient of well 5. The use of water supply well number 5 was discontinued because of the potential threat as measured in MW-13. The aquifer in this immediate area has a particularly high yield, is not easily replaceable and is, therefore, worthy of remediation. Well number 5 being in close proximity to MW-13 provides an opportunity to avoid construction of a new well and associated structure to implement the remedy.

Further, we do not believe that inorganic compounds will be an overly burdensome problem to mitigate in the treatment process.

Response to comment 19-5: The replacement of well number 5 has been explored with the

Town over the past year. Unfortunately, no other location providing the same high yield, in reasonable proximity to the existing distribution system, was found. Well 2A still requires some electronics control correction but is operating and the current system needs are being met.

Natural attenuation of Vinyl Chloride was discussed in response to comment 19-4 above. For dechlorination of Vinyl Chloride to occur, a bioremedial technology would need to be employed. This technology was evaluated and found to be more costly and the outcome would be more uncertain than ex-situ treatment. The use of natural attenuation alone is not consistent with the the Remedial Action Objectives for groundwater for this site as discussed in response 19-2 above.

COMMENT 20: The project manager received an e-mail dated February 5, 2009 (after the end of comment period) from Mark Stow, Director of Human Health Services, Chautauqua County Department of Health. The County DOH would like to know who will be responsible for operating the treatment system during the first year, the type of expenses that will be covered and whether an agreement will be signed between the Town and the Department. Also, the county DOH wants a third party to estimate the difference in cost of providing the water from well PW-5 after treatment versus obtaining water from the Jamestown Board of Public Utilities.

RESPONSE 20: As stated in the PRAP, the Department will pay for the cost of operating and maintaining the system for a period of one year following the Department's approval of the final engineering report. The responsibility of operating and maintaining the system will be negotiated with the Town based on the usage of treated water by the Town. During the Design, the Department will enter into an agreement with the Town for the transfer of responsibility of operating and maintaining the system. All costs incurred by the State are subject to recovery from PRPs.

Please refer to Response 17, page A-7. The Department is proposing a remedy for the landfill site and the contaminated groundwater originating from the site and not proposing an alternate public water supply source for the Town. The cost estimation referred in your letter should be the responsibility of the Town.

APPENDIX B

Administrative Record

Administrative Record

Carroll Town Landfill Site
Site No. 907017

1. Proposed Remedial Action Plan for the Carroll Town Landfill Site, dated November 2008, prepared by the Department.

2. Preliminary Site Assessment, Volume 1, February 1997, prepared by ABB Environmental Services.

3. RI/FS Work Plan, July 2004, prepared by O'Brien & Gere Engineers.

4. Citizen Participation Plan, January 2005, prepared by the Department.

5. Final RI Report, December 2005, prepared by O'Brien & Gere Engineers.

6. Final FS Report, April 2006, prepared by O'Brien & Gere Engineers.

7. IRM Work Plan, June 2006, prepared by Ecology & Environment Inc.

8. IRM Report on the problems identified with the treatment system at well -2A, July 2006, prepared by Ecology & Environment Inc.

9. IRM Report summarizing the work performed to address the problems with the treatment system at well-2A, October 2006, prepared by Ecology & Environment.

10. Hydraulic Analysis Report, May 2007, prepared by Nussbaumer & Clarke, Inc. for the Town of Carroll.

11. Letter from the Town Supervisor dated July 15, 2008, requesting the Department to install the treatment system at the public supply well PW-5 as included in the proposed remedy.

12. Letter from the Vivek Nattanmai to Mike Bollender, Town attorney, dated February 3, 2009 regarding the completion of the IRM at well-2A.

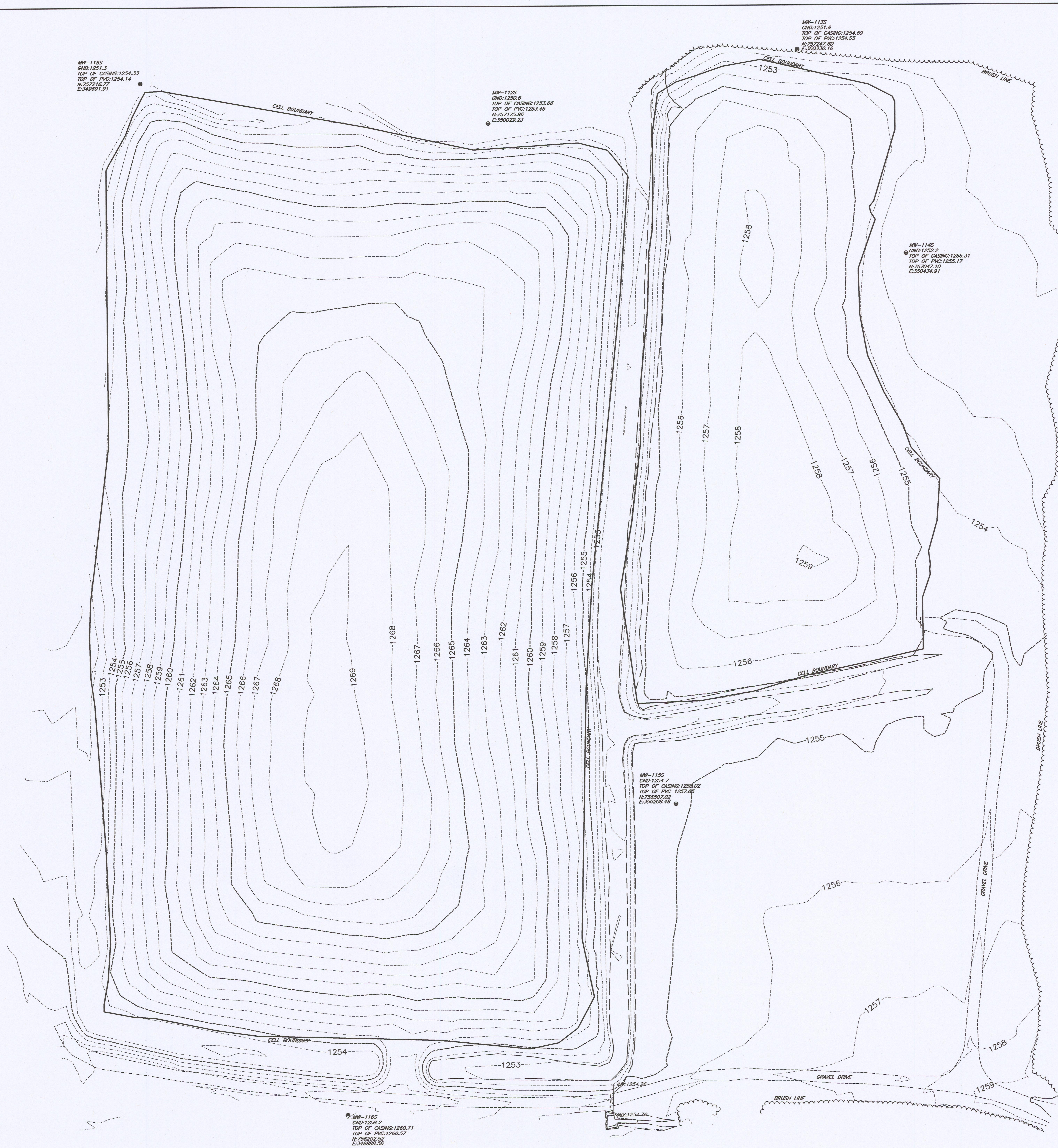
13. Fact Sheet, December 2008, prepared by the Department.

14. Copy of all the comment letters.

B Environmental Easement

To be provided at a later date.

C Final Site Survey



CONTOURS DERIVED FROM GROUND SURVEY PERFORMED BY FISHER ASSOCIATES ON SEPTEMBER 19, 2017. (TOP OF TOPSOIL)

CELL BOUNDARY

MW-117S MONITORING WELL

SURVEY NOTES:

1. COORDINATES SHOWN HEREON ARE REFERENCED TO NY STATE PLANE WEST NAD27 (FEET), AND ELEVATIONS ARE REFERENCED TO NGVD 29 (FEET) AS SHOWN ON DRAWING NO. G-2 OF A SET OF PLANS RECEIVED THAT ARE ENTITLED "TOWN OF CARROLL LANDFILL SOIL COVER DESIGN", PREPARED BY ECOLOGY AND ENVIRONMENT ENGINEERING, P.C., AND HAVING A FIRST ISSUED DATE OF 9-20-13 AND LAST REVISION DATE OF 4-1-14.

2. THIS FINAL CONDITIONS MAP IS A COMPILATION OF THE FOLLOWING DRAWINGS THAT WERE PREVIOUSLY SUBMITTED;
   A. "MONITORING WELL LOCATIONS" WITH AN ISSUE DATE OF 10/17/17.
   B. "EAST LANDFILL SOIL COVER GRADING AND VERIFICATION OF TOP SOIL ON GARBAGE AREA" WITH AN ISSUE DATE OF 10/19/17.
   C. "EAST LANDFILL ORIGINAL GROUND TO PRE-GRADE SURVEY" WITH AN ISSUE DATE OF 10/09/17". ONLY THE EDGE OF PRE-GRADE GARBAGE AUGUST 1, 2017 BOUNDARY CALLED OUT IN THE FILE WAS USED.
   D. "WEST LANDFILL WASTE PLACEMENT" WITH AN ISSUE DATE OF 10/17/17. ONLY THE WASTE/DEMARCATION BOUNDARY CALLED OUT IN THE FILE WAS USED.

50 0 50 100

SCALE: 1" = 50'

DATE	BY	DESCRIPTION	REV
			7
			6
			5
			4
			3
			2
			1

FA PROJECT NO. 162017

PROJECT MANAGER S. BODDECKER

DRAWN BY M. MILLER

SCALE 1"=50'

ISSUE DATE 07/16/20

STATE OF NEW YORK · JOHN STEPHAN BODDECKER · 050923 · LICENSED LAND SURVEYOR

FISHER ASSOCIATES

WWW.FISHERASSOC.COM

PROJECT: TOWN OF CARROLL LANDFILL SOIL COVER DESIGN PROJECT FREWSBURG, (TOWN OF CARROLL), N.Y.

TITLE OF DRAWING: MAP SHOWING FINAL CONDITIONS OF EAST AND WEST CELL

DRAWING NO. FA-1

SHEET 1 OF 1

D

Groundwater Monitoring Well Sampling Procedures Plan

Groundwater Monitoring Well Sampling Procedures Work Plan for the Carroll Town Landfill NYSDEC Site No. 907017 Frewsburg, New York

April 2020

Prepared by: Jared Pristach, Ecology and Environment Engineering and Geology, P.C. (EEEPC)

Reviewed by: Jim Taravella, EEEPC Work Assignment Project Manager – Carroll Town Landfill

Accepted for Use:

Revisions:

Dated	Revisions	By

1.0 Objective

To perform a sampling/analytical program to evaluate trends on groundwater concentrations of lead, mercury, arsenic, and volatile organic compounds (VOCs) at the site. The Carroll Town Landfill Site is located to the south of the road at 1735 Wahlgren Road in the village of Frewsburg, Chautauqua County, New York (see Figure 1).

2.0 Site Access and Coordination

2.1 Access to Carroll Town Landfill Site

Prior to a sampling event, the sampling team and/or the work assignment Project Manager will call at least one week in advance to notify the Town of Carroll of the date of groundwater monitoring well sampling. Access to the site shall be coordinated with the Town of Carroll and the Carroll Department of Public Works (DPW). The site owner, as of the date of this plan, is the Town of Carroll. All sampling will be conducted in accordance with the American Society for Testing and Material (ASTM) Standard Guide for sampling Groundwater Monitoring Wells, D-4448-85a or most recent revision and be coordinated with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation at (518) 402-9764 (Central Office).

2.2 NYSDEC Coordination

The NYSDEC Project Manager should be informed of all sampling events at the Carroll Town Landfill Site and can be contacted at NYSDEC's central office in Albany, New York, at (518) 402-9814.

3.0 Site Monitoring Wells

3.1 Monitoring Well Description

There are 19 active groundwater monitoring wells locations on site at the Carroll Town Landfill Site property (MW-13, MW-101, MW-102, MW-102I, MW-103, MW-109S, MW-109I, MW-109D, MW-111S, MW-111I, MW-112S, MW-113S, MW-114S, MW-115S, MW116S, MW-117S, MW-117I, MW-117D, and MW-118S). There are no off-site monitoring wells associated with the site. These shallow, intermediate, and deep wells allow EEEPC to evaluate local groundwater contaminant trends. Available groundwater monitoring well logs are provided in Appendix H of the Site Management Plan (SMP).

The groundwater monitoring wells should be sampled annually. The locations of these on-site groundwater monitoring wells are presented on Figure 2. Sixteen monitoring well locations contain a single, shallow or intermediate depth well with a stickup casing, while one well casing (MW-117) contains a shallow, intermediate, and deep depth well.

3.2 Monitoring Well Inspection

During the sampling of each monitoring well, an inspection of the well's physical condition will be performed. Minor well repairs, including well labeling, will be made as needed. The need for more extensive repairs will be noted, if necessary. More extensive well repairs will be noted on the Monitoring Well Inspection Checklist (see Attachment A). The SMP should be consulted for information regarding monitoring well decommissioning, abandonment, and repairs. The NYSDEC Project Manager will approve all activities prior to implementation, as required, among other things, per the SMP.

4.0 Groundwater Sampling

4.1 Analytical Plan

Groundwater monitoring wells will be sampled and analyzed for Target Compound List Compounds in accordance with NYSDEC Analytical Services Protocol using SW – 846 United States Environmental Protection Agency (EPA) Methods 6010, 8260B, and 8270D to analyze for lead and arsenic, VOCs, and mercury, respectively. Groundwater sampling will be performed using the equipment and procedures described in Sections 4.2 and 4.3, respectively.

4.2 Equipment and Supplies

- Water level indicator;
- Appropriate keys for well cap locks;
- Stopwatch, logbook, calculator;
- Typhoon pump with power source and dedicated polyethylene tubing;
- pH/temperature/specific conductance meter;
- Turbidity meter;
- Sample bottles, labels, custody seals, chain-of-custody forms; and
- Packing material and cooler with ice.

4.3 Monitoring Well Groundwater Sampling Procedures

- All wells will be purged prior to sampling. Refer to the Well Purge and Sample Record provided as Attachment B. Prior to purging, record the static depth to water and total well depth as measured from the top of inner casing (PVC) to within ±0.01 foot in each well (see Table 1). The volume of standing water will be calculated in gallons or liters.
- Purge each well of three to five times the volume of water standing in the well using the Typhoon pump and dedicated tubing. Purge at a rate that minimizes drawdown of the water level in the well. After stabilization, the depth to water should not change by more than 0.1 foot. Purged water will be handled as described in Section 9. Temperature, pH, specific conductance, and turbidity will be measured and recorded, at a minimum, initially, after each well volume, and just prior to sampling. Purging will be performed until pH, specific conductance, temperature, and turbidity have stabilized. Stabilization shall be considered to be achieved after three consecutive readings are within ±0.1 pH units, 5% for temperature and specific conductance, and 10% for turbidity.
- After completion of purging, slow the flow rate of the pump down to as low a rate as practicable for sampling. Fill bottles, leaving minimum headspace. The proper collection of a sample for dissolved VOCs requires minimal disturbance of the sample to limit volatilization and subsequent loss of volatiles from the sample. The following procedures should be followed when collecting volatile organic analysis (VOA) samples:
  - Open the vial, set the cap in a clean place, and place the proper amount of preservatives (HCl) in the vial;
  - Fill the vial to the top until a convex meniscus forms on the top of the vial. Do not overfill the vial;
  - Check that the cap has not been contaminated, and carefully cap the vial. Place the cap directly over the top and screw down firmly. Do not over tighten and break the cap;
  - Invert the vial and tap gently. If an air bubble appears, discard the sample and begin again. It is imperative that no entrapped air remains in the sample vial; and
  - Place the VOA vial in a cooler, oriented so that it is lying on its side, not straight up.
- Label sample bottles as specified in Section 6. All samples requiring preservation must be preserved as soon as practically possible, ideally immediately at the time of sample collection. Upon collection, immediately place the samples in a cooler maintained with ice at 4°C. Prepare chain-of-custody pending shipment in accordance with the procedures specified in Section 6.

5.0 Field Quality Control Samples

Field quality control (QC) samples help determine whether project data quality objectives are being met. Analyzed in the laboratory as ordinary field samples, they are used to assess sampling and transport procedures as possible sources of sample contamination and to document overall sampling and analytical precision. One duplicate sample will be collected per 20 samples per sampling round and analyzed for all parameters (VOCs and inorganics). Additional volume

will be collected for matrix spike/matrix spike duplicate (MS/MSD) analyses at the rate of one MS/MSD sample set per 20 samples during each sampling round. Rinsate blank samples will not be required.

6.0 Sample Containers, Labeling, Packaging and Shipping, and Custody

The volumes and containers for aqueous samples, as well as sample preservation are presented in Table 2. Sample containers pre-washed and prepared in accordance with EPA bottle washing procedures will be provided by the laboratory. During the holding period prior to delivery to the laboratory, the samples will be chilled using wet ice with the goal of achieving 4±2°Celsius.

6.1 Sample Labeling

All samples will be assigned a unique sample identifier. Labels for each sample will contain the sample identifier, date of sample collection, analytical parameters, and type of preservation used. Any change in the label information prepared prior to the sample collection will be initialed by the sampler.

An example of the sample identifier is CTL-MW101-MMMYY, where:

CTL = Carroll Town Landfill
MW101 = groundwater monitoring well number
MMMYY = abbreviated month and year of sample collection

6.2 Sample Custody

Sample containers will be placed inside sealed plastic bags as a precaution against cross-contamination caused by leakage or breakage. The bags will be placed in coolers in such a manner as to minimize the chance of breakage during shipment. Ice in plastic bags will be placed in the coolers to chill the samples with the goal of achieving 4±2°C throughout the shipment.

Sample shipment will be performed in strict accordance with all applicable U.S. Department of Transportation (DOT) regulations. The samples will be shipped to a NYSDEC-approved laboratory.

6.3 Sample Custody

A sample is considered to be in custody under the following situations:

- The sample is directly in your possession;
- The sample is clearly in your view;
- The sample is placed in a locked location; or
- The sample is in a designated secure area.

In order to demonstrate that the samples and coolers have not been tampered with during shipment, adhesive custody seals will be used. The custody seals will be placed either around the cap of each sample container or across the cooler lids in such a manner that they will be

visibly disturbed upon opening of the sample container or cooler. The seals will be signed or initialed and dated by field personnel when affixed to the container and cooler.

Documentation of sample chain-of-custody is necessary to demonstrate that the integrity of the samples has not been compromised between collection and delivery to the laboratory. Each sample cooler will be accompanied by a chain-of-custody record to document the transfer of custody from the field to the laboratory. All information requested in the chain-of-custody record will be completed. A standard turnaround time will be requested for sample analysis. One copy of the chain-of-custody documents will be completed. It is the responsibility of the laboratory to document the condition of custody seals and sample integrity upon receipt.

6.4 Turnaround Time for Analysis

All groundwater samples will be analyzed at the approved laboratory within a turnaround time indicated in Table 3.

7.0 Health and Safety

Health and safety procedures will be as described in the site-specific Health and Safety Plan (sHASP) and its amendment for these groundwater sampling tasks. Care will be taken when opening any well to avoid breathing of vapors, particularly methane, that have potentially accumulated in the headspace inside the well. In addition, smoking is strictly prohibited during sampling due to the potential for methane buildup in the headspace inside the well. Wasps/bees in well casings are also concerns. All work is expected to be completed in Level D personal protective equipment (PPE).

The generic Health and Safety Plan for this work plan is provided as Appendix K of the SMP.

8.0 Decontamination Procedures

All decontamination will be performed in accordance with NYSDEC-approved procedures. Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross-contamination. Any non-dedicated sampling equipment will be decontaminated using the procedure above or by the following procedure:

- Initially remove all foreign matter;
- Wash in a laboratory-grade detergent solution (e.g., Alconox);
- Rinse with deionized or distilled water; and
- Allow to air dry.

Fluids generated during decontamination will be handled according to the procedures outlined in Section 9.

9.0 Investigation-Derived Waste

At least two waste stream types of investigation-derived waste (IDW) will be generated: groundwater from purging and PPE. NYSDEC will determine, on a case-by-case basis, what other wastes will require disposal. Waste streams will be segregated and not mixed. Existing data indicates that there are no direct contact exposure concerns, so purge and decontamination

will be disposed of by discharging onto the ground in an unpaved area. In the event that evidence of significant contamination is present (e.g., strong odors, sheen, product), the waste will be containerized in steel drums and stored on site pending analysis and potential off-site disposal. All expendable materials generated during the investigation (including, but not limited to, gloves and plastic sheeting) will be bagged and disposed of off-site as non-regulated solid waste.

10.0 Report

A brief report summarizing all field activities and providing a summary of the analytical results will be provided to the NYSDEC Project Manager upon receipt and review of the analytical report from the laboratory. Groundwater sampling results electronic data must be provided in accordance with the most recent version of NYSDEC standardized electronic data deliverable (EDD) format. Further information on EDD is available at the website http://www.dec.ny.gov/chemical/62440.html.

11.0 Schedule

Monitoring well evaluation and sampling is expected to be performed on an annual basis. Sampling is to be performed in approximately May of each year. Efforts should be made to conduct groundwater sampling at the same time as sediment sampling (Appendix D of the SMP).

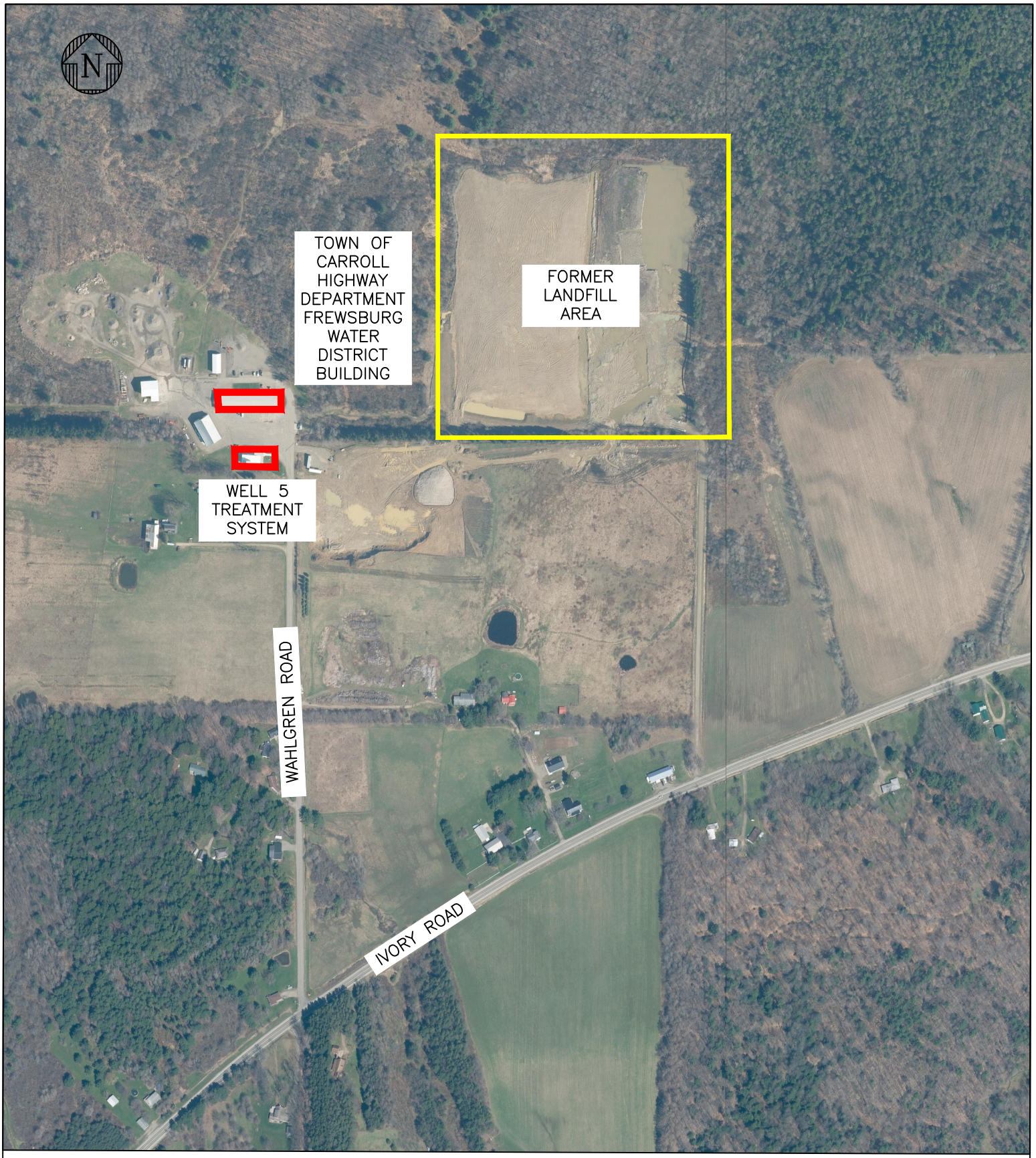
12.0 References

American Society for Testing and Material (ASTM). 1986. *Standard Guide for Sampling Groundwater Monitoring Wells*, D-4448-85a, Philadelphia, Pennsylvania.[1]

Ecology and Environment Engineering, P.C. 2016. *Final Engineering Report, Carroll Town Landfill Site.* Prepared for NYSDEC. November 2016.[2]

Gibb, J.P., R.M. Schuller, and R.A. Griffin. 1980. *Monitoring Well Sampling and Preservation Techniques*, EPA-600/9-80-010.[3]

Korte, N. and P. Kearl. 1985. *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells*, Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measures Center, Grand Junction Projects Office.[4]



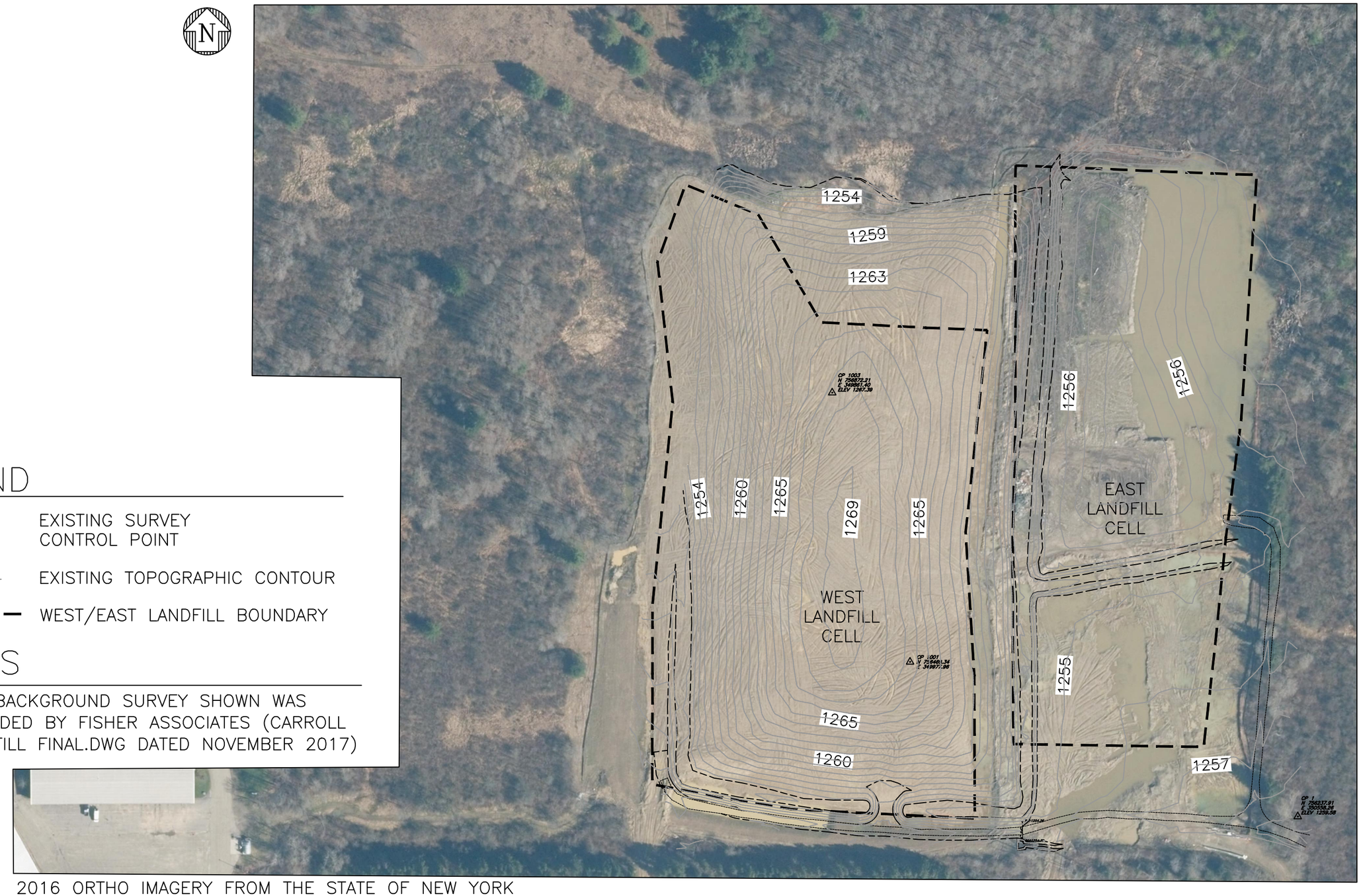
2016 ORTHO IMAGERY FROM THE STATE OF NEW YORK

SCALE IN FEET

0 500 1000 1500

ecology and environment

FIGURE 1-1 SITE LOCATION MAP
TOWN OF CARROLL LANDFILL
FREWSBURG, NEW YORK



LEGEND

△	EXISTING SURVEY CONTROL POINT
—1269—	EXISTING TOPOGRAPHIC CONTOUR
– – – – –	WEST/EAST LANDFILL BOUNDARY

NOTES

1. THE BACKGROUND SURVEY SHOWN WAS PROVIDED BY FISHER ASSOCIATES (CARROLL LANDFILL FINAL.DWG DATED NOVEMBER 2017)

2016 ORTHO IMAGERY FROM THE STATE OF NEW YORK

SCALE IN FEET

0 150 300 450

ecology and environment

FIGURE 1-2 SITE LAYOUT
TOWN OF CARROLL LANDFILL
FREWSBURG, NEW YORK

Attachment A

Monitoring Well Inspection Checklist

Monitoring Well Inspection Checklist
Carroll Town Landfill Site, Frewsburg, NY
NYSDEC Site No. 907017

Well Number	Water Level (feet TOIC)	Current Depth (feet TOIC)	Well Completion (A/F)	Well Paint (G/F/P)	Casing Lock (G/F/P)	Protective Cover (G/F/P)	Inner Well Cap (G/F/P)	Equipment in Well (B/U/H)	Obstruction in Well (Y/N)	Water in Annulus (Y/N)	Concrete Pad (G/F/P)	Inspection Date	Comments/Needs
MW-101													
MW-109I													
MW-112S													
MW-113S													
MW-114S													
MW-115S													
MW-116S													
MW-117S													
MW-117I													
MW-117D													
MW-118S													

Note: Proper disposal of all IDW wastes including PPE must be documented

Attachment B

Groundwater Well Purge and Sample Record Form

WELL PURGE AND SAMPLE RECORD

Site Name/Location: _____ Well ID: _____

Project No.: _____ Date: _____

Initial Depth to Water: _____ feet TOIC Start Time: _____

Total Well Depth: _____ feet TOIC End Time: _____

Depth to Pump: _____ feet TOIC ☐ Bailer ☐ Pump

Initial Pump Rate: _____ Lpm / gpm Pump Type: _____

adjusted to: _____ at _____ minutes Well Diameter: _____ inches

adjusted to: _____ at _____ minutes 1x Well Volume: _____ gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
Final Sample Data:								

Sample ID: _____ Duplicate? ☐ Dupe Samp ID: _____

Sample Time: _____ MS/MSD? ☐

Analyses:	Methods:
☐ VOCs	☐ CLP
☐ SVOCs	☐ SW846
☐ PCBs	☐ Drink. Wtr.
☐ Metals	☐ _____
☐ _____	☐ _____

Comments: _____

Sampler(s): _____

E Soils Management Plan

Site Soils Management Plan
for the Carroll Landfill Site
NYSDEC Site No. 9-07-017
Frewsburg, New York
April 2020

Prepared by: Jared Pristach, Ecology and Environment Engineering and Geology, P.C.

Reviewed by: Jim Taravella, EEEPC Work Assignment Project Manager – Carroll Town Landfill

Accepted for Use:

Revisions:

Dated	Revisions	By

1.0 Introduction

This Soils Management Plan has been prepared for use in conjunction with the Carroll Town Landfill Site Management Plan (SMP). The purpose of this Soils Management Plan is to provide guidance for the proper handling and final disposition of volatile organic compound (VOC), semivolatile organic compound (SVOC), and inorganics-contaminated materials excavated in and around the site. Any proposed excavation of existing soils, including decommissioning of monitoring wells and other subsurface utilities must be evaluated for the potential to expose contaminants to the environment in designated areas of the site.

These activities must be performed in accordance with this Soils Management Plan, the Community Protection Plan (CPP), the Generic Health and Safety Plan (HASP) and the established and approved Institutional Controls and Engineering Controls (IC/EC) presented in the Carroll Town Landfill SMP. A Site-Specific Soils Management Plan must be prepared using, as a minimum, the requirements of this Soils Management Plan. Only the designated areas of the Carroll Town Landfill are included in this Soils Management Plan based on information submitted from the Carroll Town Landfill Final Engineering Report (FER) and obtained by the New York State Department of Environmental Conservation (NYSDEC) indicating those areas where the presence of lead contamination remains after remedial action completion. It should be noted, however, that there is a potential for lead contamination to exist even in areas that have been excavated and backfilled with clean material. All excavations on site should follow the procedures outlined in this Soils Management Plan, regardless of their location.

When excavation or maintenance activities are planned in the designated areas of the Carroll Town Landfill Site where sediments or soils may be contaminated with VOCs, SVOCs, and/or inorganics, adequate personal protective equipment (PPE) must be used to prevent exposure to potentially contaminated soils.

A work plan must be prepared that addresses the methods of excavation or maintenance, precipitation runoff and groundwater control, handling and storing of the contaminated sediment or excavated materials on site, and the proper transportation and disposal of the sediment or excavated material. The testing and analytical requirements must be described in detail as part of the work plan. In addition, a HASP and specifications and drawings must be prepared and submitted to the NYSDEC for their comment and approval prior to performing any maintenance activities or excavations within these potentially contaminated areas.

2.0 Excavated Material

Soils and materials excavated from designated areas of the Carroll Town Landfill Site are considered to be contaminated with VOCs, SVOCs, and inorganics, while materials from other areas either have not been exposed to waste or consist of clean soils used to backfill areas where contaminated material was excavated. Soils outside of the designated areas still should be considered to be potentially contaminated, and necessary precautions to prevent against exposure to this potential contamination should be taken. Excavated soils and other materials at the Carroll Town Landfill Site are classified as follows:

a. **Contaminated:** The Carroll Town Landfill has been consolidated and capped to contain contaminated waste on-site and to limit potential human and ecological exposure to this waste. The waste below the soil cover located on the West Landfill Cell and northwest corner of the East Landfill Cell are known to have high concentrations of VOCs, SVOCs, and inorganics. Materials from future excavations could include waste material including household waste and construction and demolition waste, soils, concrete slabs and structures, and other soils materials located within the boundaries of the contaminated area regardless of the depth of excavation.

b. **Probably contaminated:** All other areas on site. The majority of the East Landfill Cell has been excavated and backfilled with clean material, but should be considered to be probably contaminated.

3.0 Excavated Material Handling

This section describes the minimum requirements that must be followed when handling contaminated excavated materials in the designated areas of the Carroll Town Landfill Site. Additional requirements may be added as necessary by NYSDEC.

a. All maintenance activities and excavations should be completed during non-precipitation events unless these activities must be performed immediately. A water-handling and treatment plan must be developed for inclusion into the Soils Management Plan as a contingency in the event that emergency maintenance or excavation activities must be performed during a precipitation event.

b. Prior to performing any maintenance or excavation activity, samples of the excavated materials (either new or from an existing stockpile) must be submitted to a laboratory for analysis (a) to determine the appropriate disposal method, and (b) for waste characterization and profiling for disposal. The analysis must be performed by a laboratory certificated by the National Voluntary Laboratory Accredited Program (NVLAP). If, in the opinion of NYSDEC, the materials are considered free of contamination, then the materials may be handled by standard construction means and methods and in conformance with the Erosion and Sediment Control Plan or Storm Water Pollution Prevention Plan prepared by the Village of Frewsburg and approved by NYSDEC.

c. Transport of excavated materials (if deemed necessary) must be performed using approved watertight containers. Dump trucks may be used if their beds are lined with 40-mil polyethylene or an approved equivalent.

d. Waterproof containers, such as roll-offs and drums, should be used to store excavated materials. However, as an option for small quantities of materials, sediments and excavated materials may be stored on a 40-mil polyethylene base sheet and covered with a waterproof cover when not being added to or removed.

e. Non-contaminated drainage from the cover must be directed away from the stockpiled soils suspected of being contaminated and collected in a water-tight sump for observation or analysis prior to being manually discharged to an on-site ditch or drainageway.

f. Uncontaminated soils must not come into contact with excavated materials. If the uncontaminated soils come into contact with the excavated materials, these soils must also be considered contaminated.

g. Contaminated materials should be stored on site for as short a period as possible prior to disposal. In no event should the materials be stored for longer than 90 days.

h. Transport of contaminated excavated materials (if deemed necessary) shall be provided by a certified transportation company that can ship either hazardous waste or solid wastes.

i. Disposal of excavated materials shall be at an approved disposal facility. Sampling and analysis shall be performed as described in the Carroll Town Landfill SMP. Additional requirements of the company receiving the waste (if deemed necessary) shall also be followed.

4.0 Backfill Materials

All backfill materials shall be obtained from an approved source, free of all contaminants per the NYSDEC Department of Environmental Remediation 10 requirements, and suitable for the intended purpose (NYSDEC 2010). Analytical results are to be provided to demonstrate acceptability of the materials. Uncontaminated on-site soils should be used as on-site backfill when feasible.

a. Backfill materials used around sewers and other below-grade features shall be placed and compacted such that no voids will result and full support will be provided to the below-grade feature and the pavement structure in the vicinity of the below-grade feature.

b. Backfill material used under floor slabs must be well-graded crushed stone and placed and compacted to support the anticipated loadings within buildings.

c. Backfill used in other areas shall be material appropriate for that area's use.

5.0 Backfill Placement

a. Backfill used beneath pavements shall be placed on a prepared subgrade in 6-inch lifts and compacted to 95% of the maximum dry density per American Society for Testing and Materials 1557 for modified Proctor. The combined thickness of the lifts shall be at least the same as the thickness of the existing fill.

b. Backfill used in unpaved areas must be compacted as necessary and be suitable for the intended use of the area being backfilled.

6.0 Investigation-Derived Waste

At least one waste stream type of IDW is anticipated to be generated: PPE. NYSDEC will determine, on a case by case basis, what other wastes will require disposal. Waste streams will be segregated and not mixed. Existing data indicates that there are no direct contact exposure concerns, so decontamination waters will be disposed of by discharging onto the ground in an unpaved area. In the event that evidence of significant contamination is present (e.g., strong odors, sheen, product), the waste will be containerized in steel drums and stored on site pending analysis and potential off-site disposal. All expendable materials generated during the investigation (including, but not limited to, gloves and plastic sheeting) will be bagged and disposed of off-site as non-regulated solid waste.

7.0 References

New York State Department of Environmental Conservation (NYSDEC). 2010. *Final Technical Guidance for Site Investigation and Remediation*, DER-10, 3 May 2010.

F

Site Inspection Form

Inspection Form-Landfills

New York State Department of Environmental Conservation
Inactive Hazardous Waste Site

Site Name: Carroll Town Landfill		**NYSDEC Site Number: 907017**	**NYSDEC PM:**
Site Location: Village of Frewsburg Town of Carroll, NY		**Site Classification # (circle):** 1 2 2a 3 4	**Primary Site Contact:**
Site Inspection Date:	**Purpose of Inspection:**		
Name of Inspector:	**Title:**	**Agency/Company:**	**Address:**
Phone Number:			

Landfill Cover System				
Cover System Onsite?	*Yes*	*No*	*(Proceed to next Section)*	**Cover System Observations:**
Vegetative Cover Condition	*Good*	*Poor*	*NA*	
Evidence of Vegetative Stress	*Yes*	*No*	*NA*	
Mowing Required	*Yes*	*No*	*NA*	
Presence of Debris	*Yes*	*No*	*NA*	
Evidence of Ponded Water	*Yes*	*No*	*NA*	
Exposed Geotextile	*Yes*	*No*	*NA*	
Evidence of Erosion Settlement	*Yes*	*No*	*NA*	
Engineered Drainage Swale Condition	*Good*	*Poor*	*NA*	
Evidence of Leachate Seepage	*Yes*	*No*	*NA*	
Evidence of Erosion	*Yes*	*No*	*NA*	
Presence of Woody Growth	*Yes*	*No*	*NA*	
Animal Burrows	*Yes*	*No*	*NA*	
Stormwater Collection and Drainage				
Drainage Channel Condition	*Good*	*Poor*	*NA*	**Observations:**
Sedimentation	*Yes*	*No*	*NA*	
Sediment Samples Collected	*Yes*	*No*	*NA*	
Debris	*Yes*	*No*	*NA*	
Erosion/Slope Loss	*Yes*	*No*	*NA*	
Evidence of Leachate Seepage	*Yes*	*No*	*NA*	
Rip-Rap Condition	*Good*	*Poor*	*NA*	
Condition of Synthetic Liner	*Good*	*Poor*	*NA*	
Culvert Condition	*Good*	*Poor*	*NA*	
Other Drainage Structures/Pipes	*Good*	*Poor*	*NA*	
Condition of Drainage Grates	*Good*	*Poor*	*NA*	
Retention Ponds	*Good*	*Poor*	*NA*	
Building Structures				
Are there any building structures at the site?	*Yes*	*No*	*(Proceed to next section)*	**Building Condition Observations:**
Overall Exterior Condition	*Good*	*Poor*	*NA*	
Overall Interior Condition	*Good*	*Poor*	*NA*	
Interior Floor	*Good*	*Poor*	*NA*	
Vaulted Areas	*Good*	*Poor*	*NA*	
Leachate Collection System				
Is there a leachate collection system at the site?	*Yes*	*No*	*(Proceed to next section)*	**Collection System Observations:**
Collection Trench Condition	*Good*	*Poor*	*NA*	
Transfer Flow Pipes	*Good*	*Poor*	*NA*	
Condition of Valves	*Good*	*Poor*	*NA*	
Leachate Pump Condition	*Good*	*Poor*	*NA*	
Holding Tank(s) Condition	*Good*	*Poor*	*NA*	
Leachate Transfer/Loading Area	*Good*	*Poor*	*NA*	
List other applicable components and their overall condition				
Environmental Monitoring Locations				
Is there a monitoring network at the site?	*Yes*	*No*	*(Proceed to next section)*	**Monitoring Network Observations:**
Monitoring Wells/Piezometers	*Good*	*Poor*	*NA*	
Soil Gas Monitoring Probes	*Good*	*Poor*	*NA*	
Landfill Gas Vents	*Good*	*Poor*	*NA*	
List other applicable location types and their overall condition				

Inspection Form-Landfills

New York State Department of Environmental Conservation
Inactive Hazardous Waste Site

Interviews/Additional Contacts			
Name/Title	**Phone:**	**Company/Entity**	**Contact Information**

Additional Observation Notes:

Photograph Log:
Photograph 1
Photograph 2
Photograph 3
Photograph 4
Photograph 5
Photograph 6
Photograph 7
Photograph 8
Photograph 9
Photograph 10

Performance Monitoring

Were check samples collected during this visit? Yes No

Sample type collected *(circle or write in other)* : Groundwater Sediment Soil Leachate Air Surface Water

List Parameters/Methods Collected Per Media:

Analytical Laboratory/Location:

Sample Observations:

G Community Protection Plan

Community Protection Plan
for the Carroll Town Landfill Site
NYSDEC Site No. 907017
Frewsburg, New York

July 2020

Prepared by: Jared Pristach, Ecology and Environment Engineering and Geology, P.C.

Reviewed by: Jim Taravella, EEEPC Work Assignment Project Manager – Carroll Town Landfill

Accepted for Use:

Revisions:

Dated	Revisions	By

1.0 Introduction

This Community Protection Plan (CPP) has been prepared for use in conjunction with the Carroll Town Landfill Site Management Plan (SMP). The purpose of the CPP is to provide guidance on the minimum precautions necessary for community protection in the event that contaminated soils and waste materials in and around the Carroll Town Landfill site are disturbed or contaminants are found during monitoring events. Any proposed excavation of existing soils including installation and/or decommissioning of monitoring wells and other subsurface utilities must be evaluated for the potential to expose lead or other contaminants to the community in the surrounding area.

These activities must be performed in accordance with this CPP, the Soils Management Plan, the generic Site-Specific Health and Safety Plan (sHASP) and the established and approved Institutional Controls and Engineering Controls (IC/EC) presented in the Carroll Town Landfill SMP. A Site-Specific CPP must be prepared using, as a minimum, the requirements of this CPP. The site-specific CPP must address the methods of community protection. The testing and analytical requirements must be described in detail as part of the plan. In addition, a Site-Specific Health and Safety Plan (sHASP), specifications and drawings must be prepared and submitted to the New York State Department of Environmental Conservation (NYSDEC) prior to performing any maintenance activities or excavations within the site.

2.0 Precautions Necessary to Protect Human Health

This section describes the minimum community protection requirements that must be followed when intrusive work occurs on the Carroll Town Landfill Site. Additional requirements may be added as necessary for the Site-Specific CPP.

a. **Air Monitoring** is required for community safety for odor, dust, and VOCs when intrusive work occurs on site. VOC monitoring must be conducted when groundwater monitoring wells are being sampled in addition to any intrusive work. The Community Air Monitoring Plan (CAMP) shall be followed.

b. **Dust Control** should be accomplished by wetting soil with water.

c. **Dewatering Excavation.** Water must be sampled and characterized before it can be discharged to storm sewers. If water is found to be contaminated or stained it should be placed in storage containers for proper transportation and disposal (i.e., 55-gallon drums or larger containers).

3.0 Community Air Monitoring Plan

Real-time air monitoring for dust particulates will be conducted at the perimeter of the exclusion zone during all intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. VOC levels and dust particulates will be monitored at the downwind perimeter of the exclusion zone on a continuous basis. Continuous air monitoring will be conducted as follows:

- If TCE levels meet or exceed 50% of the short-term exposure limit (STEL) (12.5 parts per million [ppm] TCE), work activities will be halted and workers will moved to a properly ventilated area. Appropriate measures will be taken to reduce and mitigate TCE levels both on- and off-site as soon as possible. All readings will be recorded and be available for NYSDEC and New York State Department of Health (NYSDOH) personnel to review if requested.
- If particulate levels at the downwind station exceed particulate levels at the upwind station by more than 150 micrograms per cubic meter ($\mu g/m^3$), work activities will be halted and appropriate dust suppression measures will be employed. All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review, if requested.

3.1 VOC Monitoring, Response Levels, and Actions

VOC concentrations will be monitored continuously at the downwind perimeter of the exclusion zone at temporary air monitoring stations. The VOC monitoring will be performed using real-time monitoring equipment. The equipment will include an audible alarm to indicate exceedances of the action level. VOC action levels and the required responses are as follows:

- If the downwind VOC concentration exceeds 50% of the STEL (12.5 ppm), then all work must stop and all workers will move to a properly ventilated area. If a monitoring well is the source of VOCs, the well cap should be left open to vent any excess TCE. If VOCs are present in an excavation above the action level, the area should remain vacated until VOC levels drop below the action level.

- If VOC levels once again exceed or continue to rise above the action level, all work must be suspended indefinitely. Steps should be taken to increase ventilation in the area and to prevent ignition of the VOCs.

3.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter of 10 microns or less (PM_{10}) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will include an audible alarm to indicate exceedances of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. Particulate matter action levels and the required responses are as follows:

- If the downwind PM_{10} particulate is 100 $\mu g/m^3$ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that either of the downwind stations report PM_{10} particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM_{10} particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM_{10} particulate concentration to within 150 $\mu g/m^3$ above the upwind level and preventing visible dust migration.

4.0 Community Fact Sheet

A fact sheet will be prepared and made available to the public in the event that there is a breakdown in the corrective action process. The necessity of a fact sheet will be determined by NYSDEC and NYSDOH.

Examples of such an event could include, but are not limited to, the following events:

- Groundwater samples found to exceed the standards, criteria, and guidance values[1] (SCGs);
- Visible landfill material present outside of the landfill cap; and
- Contaminant issues on-site or off-site after sampling event.

H Well Logs

ecology and environment engineering, p.c.
International Specialists in the Environment
BUFFALO CORPORATE CENTER 368 Pleasant View Drive, Lancaster, New York 14086
Tel: 716/684-8060, Fax: 716/684-0844

WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW-102S
EEEPC Project No.:
Date: 9-9-14

Initial Depth to Water: 0.42 feet TOIC
Total Well Depth: ~~37.90~~ LK 32.19 feet TOIC
Depth to Pump: 30.19 feet TOIC
Initial Pump Rate: 600 mL/min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 0850
End Time: 1031
☐ Bailer ☒ Pump
Pump Type: Typhon
Well Diameter: 2 inches
1x Well Volume: 5.17 gallons x3 15.51 gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
0850	0.0L	7.05	12.0	~~200.33~~ 233 LK	532.4	—	35.9	0.61
0855	3.0L	7.52	11.6	109	483.7	—	30.3	0.71
0900	6.0L	7.54	11.2	74	467.4	—	21.1	0.71
0905	9.0L	7.54	11.3	82	568.5	—	9.01	0.71
0910	12.0L	7.55	11.3	86	457.5	—	6.56	0.71
0915	15.0L	7.55	11.5	94	560.7	—	4.20	0.71
0920	18.0L	7.56	11.8	102	461.8	—	2.79	0.71
0925	21.0L	7.56	11.8	98	455.2	—	1.30	0.71
0930	24.0L	7.58	11.6	~~107~~ 105 LK	458.1	—	1.97	0.71
0935	27.0L	7.58	12.1	107	~~447~~ LK 455.3	—	1.10	0.71
0940	30.0L	7.58	11.3	114	455.1	—	1.17	0.71
0945	33.0L	7.59	11.3	110	458.0	—	0.93	0.71
0950	~~32~~ 36 ~~32~~ 35.0L	7.60	10.8	114	458.1	—	1.06	0.71
0955	~~38~~ 39 LK 38.0L	7.63	10.7	118	460.0	—	1.03	0.71
1000	~~44~~ 42 LK 41.0L	7.61	10.9	121	455.6	—	0.54	0.71
Final Sample Data:								

Sample ID: MW102-S6P14
Sample Time: 1031
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID: _____

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: 0ppm on Reading of purge water.
Casing lid not fastened to base - only held on with lock.

Sampler(s): LKalmbach / L Roell

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW-102S
EEEPC Project No.: _____
Date: 9-9-14

Initial Depth to Water: _____ feet TOIC
Total Well Depth: _____ feet TOIC
Depth to Pump: _____ feet TOIC
Initial Pump Rate: _____ Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

LK 9-9-14

Start Time: _____
End Time: _____
☐ Bailer ☐ Pump
Pump Type: _____
Well Diameter: _____ inches
1x Well Volume: _____ gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1005	~~49.0L~~ 45 LK	7.61	10.7	121	454.9	—	0.81	0.71
1010	48.0L	7.61	10.9	117	454.2	—	0.92	0.71
1015	51.0L	7.60	11.0	118	456.7	—	0.86	0.71
1020	54.0L	7.60	10.9	124	455.9	—	0.61	0.71
1025	57.0L	7.61	11.0	126	456.1	—	0.51	0.71
1030	60.0L	7.61	11.2	125	456.6	—	0.50	0.71
Final Sample Data:		7.61	11.2	125	456.6	—	0.50	0.71

Sample ID: _____ Duplicate? ☐ Dupe Samp ID: _____
Sample Time: _____ MS/MSD? ☐

Analyses: Methods:
☐ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☐ Metals ☐ _____
☐ _____ ☐ _____

Comments: _____

Sampler(s): LKahlbaugh | LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW-103
EEEPC Project No.:
Date: 9/11/2014 LK 9.11.14

Initial Depth to Water: 1.04 feet TOIC
Total Well Depth: 30.80 feet TOIC
Depth to Pump: 25.80 feet TOIC
Initial Pump Rate: 1000ml/min lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1307
End Time: 1425
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2" inches
1x Well Volume: 4.9 gallons = 14.7 gal 14.7gal LK 9.11.14

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1307	0.0	7.79	11.8	-104 LK 9.11.14	457.5	—	42.6	1.95
1312	5.0L 10.0L LK 9.11.14	7.83	11.2	-117	443.2	—	24.6	6.05
1317	10.0L	7.82	11.0	-116	451.2	—	12.1	10.44
1321	15.0L	7.84	11.0	-108	450.5	—	5.47	10.61
1331	25.0 ~~20.0L~~ LK 9.11.14	7.83	11.2	-101	449.2	—	1.94	9.65
1341	35.0L	7.84	11.1	-98	443.9	—	2.34	11.54
1351	45.0L	7.85	11.1	-101	442.5	—	0.86	11.59
1401	55.0L	7.86	11.1	-104	444.3	—	0.57	11.38
1411	65.0L	7.85	11.1	-106	444.1	—	0.64	11.38
1421	75.0L	7.81	11.1	-101	445.2	—	0.33	11.38
Final Sample Data:		7.81	11.1	-101	445.2	—	0.33	11.38

Sample ID: MW103-SGP14
Sample Time: 9.11.14 1425
Duplicate? ☐ MS/MSD? ☐ Dupe Samp ID: _____

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: 0 ppm at discharge to ground
Water clear, No sheen

Sampler(s): LKubasek / LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW104
EEEPC Project No.:
Date: 9.11.14

Initial Depth to Water: 5.58 feet TOIC
Total Well Depth: 21.52 feet TOIC
Depth to Pump: ____ feet TOIC
Initial Pump Rate: Soml/min Lpm / gpm
adjusted to: ____ at ____ minutes
adjusted to: ____ at ____ minutes

Start Time: 0905
End Time: 0930
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 2.5 gallons x3 = 7.7

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
0905	0.0	7.93	13.0	-222	334.8	—	28	6.96
0910	1 gallon or L	7.82	11.6	-212	333.2	—	71.4	8.71
0915	3.5 or gallon L	7.77	12.7	-177	336.1	—	51.9	12.61
0920	5.0 L	7.78	11.2	-147	337.6	—	34.5	14.01
0925	7.5 L	7.84	12.4	-170	338.1	—	71.2	15.48
9:30	10.0 L	7.84	12.4	-187	328.4	—	94.0	17.52
		DRY						
Final Sample Data:		7.87	11.1	-140	336.2	—	75.7	12.42

Sample ID: MW104-SE14
Sample Time: 9.11.14 1202
Duplicate? ☐ Dupe Samp ID: ____
MS/MSD? ☐

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ ____
☐ ____ ☐ ____

Comments: Soft bottom of well
Sampled with bailer at 1202
NO SHEEN
4 ppm at discharge to ground

Sampler(s): LKalmbach | LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY Well ID: MW105S

EEEPC Project No.: Date: 9-9-14

Initial Depth to Water: 5.44 feet TOIC Start Time: 1517

Total Well Depth: 19.33 feet TOIC End Time: 1533

Depth to Pump: feet TOIC ☐ Bailer ☒ Pump

Initial Pump Rate: 1.0 (Lpm) / gpm Pump Type: Typhoon

adjusted to: at minutes Well Diameter: inches

adjusted to: at minutes 1x Well Volume: gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1517	0.0L	8.04	15.6	3	293.5	—	>1000	
1519	1.0L	8.03	14.3	9	295.9	—	>1000	
1521	4.0L	8.05	12.9	21	292.6	—	>1000	
1524	8.0L	8.05	11.8	5	292.4	—	>1000	
1527	12.0L	8.03	11.2	22	309.8	—	>1000	
1530	16.0L	8.03	12.2	-17	316.5	—	>1000	
			Dry @	1533				
Final Sample Data:		7.21	14.5	249	352.3	—	74	4.96

Sample ID: MW105S-SEP14 Duplicate? ☐ Dupe Samp ID:

Sample Time: 9.10.14 0835 MS/MSD? ☐

Analyses:	Methods:
☒ VOCs	☐ CLP
☐ SVOCs	☐ SW846
☐ PCBs	☐ Drink. Wtr.
☒ Metals	☐
☐	☐

Comments: no pid Reading Purge water dumped to ground

Sampler(s): LKalwbach | LLoed

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW106S
EEEPC Project No.:
Date: 9.10.14

Initial Depth to Water: 5.24 feet TOIC
Total Well Depth: 22.61 feet TOIC
Depth to Pump: ~~27.61~~ 17.61 JK 9.10.14 feet TOIC
Initial Pump Rate: 550 ml/min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1521
End Time: ~~Typhoon~~ 1541 JK 9.10.14
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 2.8 gallons x 3 = 8.4 gal

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1521	0.0 L	8.02	14.8	-161	331.2	-	>1000	7.94
1526	2.75 L	7.97	12.6	-159	343.4	-	147	10.00
1529	4.40 L	7.97	12.1	-158	342.7	-	69.0	12.01
1534	~~5.075 L~~ 7.150 L	7.95	12.6	-146	343.8	-	81.4	14.00
1539	9.90 L	7.93	12.0	-112	343.2	-	131	18.30
			DRY @ 1541					
9/11/14 0845		8.17	15.6	90	353.9	-	17.8	6.38
Final Sample Data:								

Sample ID: MW106S-SEP14
Sample Time: 9.11.14 0845
Duplicate? ☐ Dupe Samp ID: _____
MS/MSD? ☐

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: Sample taken by bailer on 9.11.14 at 0845
0 ppm at discharge to ground.

Sampler(s): KKalbach | LRoedel

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW107S
EEEPC Project No.:
Date: 9.10.14

Initial Depth to Water: 4.99 feet TOIC
Total Well Depth: 22.50 feet TOIC
Depth to Pump: 17.50 feet TOIC
Initial Pump Rate: 250 mL/min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1310
End Time: 1337
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: _____ gallons

Time	Purge Volume (gallons/liters)	pH (S.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1310	0.0 L	8.08	10.8	-122	355.1	—	129	
1315	1.25 L	7.81	11.8	-142	358.2	—	66.0	12.16
1320	2.50 L	7.80	12.2	-149	360.2	—	57.9	13.28
1325	3.75 L	7.79	12.1	-128	359.3	—	>1000	14.05
1330	5.00 L	7.79	11.1	-108	362.5	—	>1000	15.69
1335	6.25 L	7.78	10.5	-108	377.7	—	>1000	19.31
			DRY	@ 1337				
Final Sample Data:								

Sample ID: MW107S-SEP14
Sample Time: 9.10.14 1503
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID: _____

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: 0 ppm at discharge to ground. Sample collected by bailer at 1503 on 9/10/14. Not enough volume for water quality parameters.

Sampler(s): LKalmbach/LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW108S
EEEPC Project No.:
Date: 9.11.14

Initial Depth to Water: 4.51 feet TOIC
Total Well Depth: 22.71 feet TOIC
Depth to Pump: feet TOIC
Initial Pump Rate: 500mL/min Lpm / gpm
adjusted to: at minutes
adjusted to: at minutes

Start Time: 1003
End Time: 1018
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1003	0.0	7.13	12.4	-178	1008	—	>1000	7.57
1008	2.5	7.11	13.1	-147	998.1	—	>1000	10.67
1013	5.0	7.12	13.3	-144	1010	—	>1000	13.25
1016	6.5	7.13	13.8	-142	993.8	—	>1000	15.69
			DRY at 1018					
			pH	Temp	ORP	Cond	Turb	Water Level
Final Sample Data:			7.22	13.1	-136	1654.8	38	9.37

Sample ID: MW108S-SEP14
Sample Time: 9.11.14 1120
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID:

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: Soft bottom of well.
0 ppm at discharge to ground
Sampled by bailer at 1120

Sampler(s): L Kahlbach / L Roedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW109S
EEEPC Project No.:
Date: 9-9-14

Initial Depth to Water: 1.42 feet TOIC
Total Well Depth: 23.07 feet TOIC
Depth to Pump: 17.07 feet TOIC
Initial Pump Rate: 400 mL/min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1147
End Time: 1245
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: _____ gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1147	0.0	7.82	16.0	104	386.6	—	31.1	2.24
1151	1.6 L	7.82	13.9	116	374.0	—	27.6	4.57
1156	3.6 L	7.79	12.3	155	340.1	—	23.7	5.40
1200	6.0 L	7.80	12.7	123	381.5	—	17.0	8.91
1205	8.0 L	7.82	11.6	163	373.4	—	17.7	11.19
1210	10.0 L	7.81	12.0	135	354.7	—	37.3	14.20
1215	12.0 L	7.85	11.9	105	375.9	—	36.6	15.49
1220	14.0 L	7.80	11.7	103	379.5	—	29.8	15.82
1225	16.0 L	7.81	10.8	105	388.2	—	78.3	17.44
			DRY					
			@ 1230					
Final Sample Data:								

Sample ID: MW109S-SEP14
Sample Time: 9.9.14 1245
Duplicate? ☐ MS/MSD? ☐ Dupe Samp ID: _____

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: Well pumped dry. Sample collected by bailer at 1245. Not enough volume for water quality. 0 ppm at discharge to ground.

Sampler(s): KKahnbach / LBeetle

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW110S
EEEPC Project No.:
Date: 9.9.14

Initial Depth to Water: 5.74 feet TOIC
Total Well Depth: 22.69 feet TOIC
Depth to Pump: feet TOIC
Initial Pump Rate: 300 mL/min Lpm / gpm
adjusted to: at minutes
adjusted to: at minutes

Start Time: 1436
End Time: 1500
☐ Bailer ☐ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1436	0.0 L	8.04	12.4	-79	315.5	—	>1000	5.64
~~1724~~ 1441	1.5 L	8.02	12.1	-63	315.1	—	>1000	13.15
1446	3.0 L	8.05	12.5	-61	305.6	—	>1000	15.41
1451	4.5L	8.03	11.7	-44	316.4	—	>1000	19.19
			Dry @	1452				
Final Sample Data:		7.91	15.9	184	319.9	—	71000	4.61

Sample ID: MW110S-SEP14
Sample Time: 9-10-14 0900
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID:

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: Effort Reading on max Rate Pump to prevent (precipitate) Samples on 9-10-14 within 24 hrs of ~~sampling~~ purging

Sampler(s): L. Kalembach, C. Rand

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW11S
EEEPC Project No.:
Date: 9.10.14

Initial Depth to Water: 4.64 feet TOIC
Total Well Depth: 18.05 feet TOIC
Depth to Pump: feet TOIC
Initial Pump Rate: 700 mL/min Lpm / gpm
adjusted to: 500 mL/min at 1005 minutes
adjusted to: at minutes

Start Time: 1000
End Time: 1008
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: gallons

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1000	0.0	7.62	16.5	233	497.6	—	>1000	
1005	3.5	7.53	14.9	118	500.7	—	>1000	10.23
1007	4.5	7.67	16.2	154	478.5	—	>1000	12.50
			DRY @ 1008					
Final Sample Data:								

Sample ID: MW11S-SEP14
Sample Time: 9.10.14 1156
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID:

Analyses: ☒ VOCs ☐ SVOCs ☐ PCBs ☒ Metals ☐ _____
Methods: ☐ CLP ☐ SW846 ☐ Drink. Wtr. ☐ _____ ☐ _____

Comments: Sample collected with bailer at 1156
0 ppm at discharge to ground.
Not enough volume for water parameters at sampling.

Sampler(s): [illegible] | L Roedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW-102I
EEEPC Project No.:
Date: 9-9-14

Initial Depth to Water: 1.09 feet TOIC
Total Well Depth: 45.49 feet TOIC
Depth to Pump: 40.49 feet TOIC
Initial Pump Rate: 400 mls/permin Lpm / gpm
adjusted to: 500 mls/permin at 9:17 minutes
adjusted to: 1000 mls/min at 10.02 minutes

Start Time: 0942
End Time: 11.22
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 7.2 gallons x 3 = 21.6 g 5.41L

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
~~0855~~ 9:02 4L	0.0	7.64	12.0	107	414.2	—	78	1.09
~~10:12~~ 9:07	4.0L	7.64	11.8	108	425.2	—	119	1.09
~~10:47~~ 9:17	6.0L	7.68	12.3	108	417.6	—	102.7	1.09
~~11:07~~ 9:22	8.5	7.64	12.1	108	417.5	—	98.7	1.09
9:32	11.0	7.66	12.0	109	417.6	—	89.6	1.09
10:02	13.5	7.67	12.4	110	417.7	—	32.9	1.09
10:12	18.0	7.67	11.2	114	422.1	—	63.5	1.12
10:21	23.0	7.67	11.1	113	421.7	—	60.5	1.12
10:31	33.0	7.67	11.1	118	408.6	—	9.05	1.12
10:41	43.0	7.70	12.2	112	409.2	—	9.43	1.12
10:51	53.0	7.68	12.3	108	405.5	—	9.45	1.12
11:01	63.0	7.69	11.9	110	407.1	—	4.89	1.12
11:11	73.0	7.69	11.9	110	406.1	—	4.11	1.12
11:21	83.0	7.69	11.9	110	406.3	—	4.98	1.12
Final Sample Data:		7.69	11.9	110	406.3	—	4.98	1.12

Sample ID: MW102I-SEP14
Sample Time: 1122
Duplicate? ☐ Dupe Samp ID:
MS/MSD? ☐

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: 0 ppm at discharge to ground.

Sampler(s): L. Rood | LKalbach

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW107
EEEPC Project No.: LOC 3074.0009.01
Date: 9.10.14

Initial Depth to Water: 5.65 feet TOIC
Start Time: 13:18
Total Well Depth: 44.60 feet TOIC
End Time: 14:47
Depth to Pump: 39.60 feet TOIC
☐ Bailer ☒ Pump
Initial Pump Rate: 1 (Lpm)/ gpm
Pump Type: Typhoon
adjusted to: ______ at ______ minutes
Well Diameter: 2" inches
adjusted to: ______ at ______ minutes
1x Well Volume: 6.3 gallons x3 = 19.0

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
13:18	0	7.94	10.8	-140	321.2	—	1000	5.81
13:23	5.0	7.94	10.5	-131	314.2	—	48	5.44
13:28	10.0	7.94	10.7	-117	317.2	—	37.4	5.56
13:33	15.0	7.94	10.3	-122	318.1	—	33.1	5.56
13:38	20.0	7.96	10.4	-120	314.3	—	27.7	5.56
13:43	25.0	7.96	10.2	-121	314.6	—	15.9	5.56
13:49	30.0	7.98	10.1	-119	315.0	—	17.8	5.56
13:54	35.0	7.98	10.2	-114	313.2	—	14.2	5.56
14:04	45.0	7.98	10.2	-118	318.1	—	16.5	5.56
14:14	55.0	7.97	10.2	-117	313.4	—	14.1	5.56
14:24	65.0	7.97	10.2	-116	314.5	—	8.95	5.56
14:34	75.0	7.97	10.2	-117	314.3	—	8.64	5.56
14:44	80.0	7.97	10.2	-117	314.4	—	8.55	5.56
Final Sample Data:		7.97	10.2	-117	314.4	—	8.55	5.56

Sample ID: MW107 Sep'14
Duplicate? ☒
Dupe Samp ID: MW107I-SEP14-FD
Sample Time: 14:47
MS/MSD? ☐

Analyses:
- ☒ VOCs
- ☐ SVOCs
- ☐ PCBs
- ☒ Metals
- ☐ ______

Methods:
- ☐ CLP
- ☐ SW846
- ☐ Drink. Wtr.
- ☐ ______
- ☐ ______

Comments: Odor on purge water Dumped to ground

Sampler(s): L. Noel / L Kalenbach

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Tel: 716/684-8060, Fax: 716/684-0844

WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
EEEPC Project No.:

Well ID: MW108I
Date: 9.11.14

Initial Depth to Water: 3.99 feet TOIC
Total Well Depth: 47.33 feet TOIC
Depth to Pump: ____ feet TOIC
Initial Pump Rate: 800 ml/s per min Lpm / gpm
adjusted to: 600 ml/s at 10:10 minutes
adjusted to: 1000 ml/s at 10:55 minutes

Start Time: 10:01
End Time: 11:46
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 7.0 gallons x 3 = 21.0

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
10:01	0	7.88	12.6	-177	450.6	—	71000	5.25
10:05	4 L.	7.74	11.2	-165	543.7	—	71000	7.30
10:10	8 L.	7.73	11.5	-161	546.3	—	71000	7.20
10:15	11 L	7.69	11.1	-162	552.5	—	760	7.20
10:25	17 L.	7.77	11.5	-135	476.9	—	37.0	7.80
10:35	23 L.	7.78	11.1	-140	456.3	—	10.24	7.05
10:45	29 L.	7.80	11.1	-147	455.3	—	9.80	7.20
10:55	35 L.	7.80	11.1	-140	454.2	—	4.86	7.20
11:05	41 L.	7.80	11.1	-139	455.1	—	4.53	7.68
11:15	47 L. 55	7.79	11.1	-142	455.7	—	3.49	7.68
11:25	53 L. 65	7.80	11.1	-141	455.0	—	3.03	7.68
11:35	59 L. 75	7.79	11.1	-141	456.0	—	3.01	7.68
11:45	65 L. 85	7.80	11.1	-141	455.2	—	2.46	7.68
	71							
	77							
Final Sample Data:		7.80	11.1	-141	455.2	—	2.46	7.68

Sample ID: MW108I-SEP14
Sample Time: 11:46
Duplicate? ☐ Dupe Samp ID: ____
MS/MSD? ☐

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ ____
☐ ____ ☐ ____

Comments: Soft bottom of well
0 ppm at discharge to ground.

Sampler(s): LKalmbach | LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW110I
EEEPC Project No.:
Date: 9-9-14

Initial Depth to Water: 3.78 feet TOIC
Total Well Depth: 44.52 feet TOIC
Depth to Pump: 39.52 feet TOIC
Initial Pump Rate: 600 mL/min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1413
End Time: 1430
☐ Bailer ☑ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 6.6 gallons x 3 = 19.9

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1413	0.0 L	8.20	12.0	-80	311.8	←	>1000	6.40
1418	3.0 L	8.10	12.2	-114	316.0	←	251	7.20
~~1423~~ 1423	6.0 L	8.04	12.9	-101	314.5	←	>1000 ~~607~~	8.65
1428	9.0 L	8.02	12.1	-99	316.3	←	>1000	17.00
			DRY @ 1430					
Final Sample Data:		7.70	15.6	119	275.8	←	42.1	3.34

Sample ID: MW110I-SEP14
Sample Time: 9:07 9.10.14
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID: _____

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: ~~Rain~~ Well went dry at 1430.
Bailer in well filled with very fine sediment.
Sampled on Sept 10 within 24 hr of after purging
0 ppm at discharge to ground.

Sampler(s): L. Rowell L. Kalmbach

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW111I
EEEPC Project No.:
Date: 9.10.14

Initial Depth to Water: 4.43 feet TOIC
Total Well Depth: 43.01 feet TOIC
Depth to Pump: feet TOIC
Initial Pump Rate: 600 mL/min Lpm / gpm
adjusted to: 1000 mL/min at 10:36 minutes
adjusted to: at minutes

Start Time: 1026
End Time: 1152
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 6.2 gallons x3 = 18.8

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1026	0.0	7.89	13.8	-5	379.2	—	30.3	4.64
* 1036	~2.0	7.93	13.7	-219	371.6	—	23.8	4.68
1041	5.0	7.91	13.3	-196	376.2	—	14.9	4.81
10:46	10.0 L	7.92	13.2	-163	382.6	—	8.98	4.85
10.51	15.0L	7.92	12.0	-139	371.2	—	5.13	4.86
10.56	20.0L	7.92	12.0	-121	369.0	—	3.63	4.87
11.01	25.0L	7.91	12.0	-121	371.3	—	3.04	4.87
11.06	30.0L	7.91	12.0	-112	367.4	—	2.41	4.87
1111	35.0L	7.91	12.1	-122	370.5	—	2.38	4.87
1121	45.0L	7.92	12.1	~~-124~~ -107 (1049)	371.0	—	2.18	4.87
1131	55.0L	7.92	11.2	-125	369.2	—	1.67	4.87
1141	65.0L	7.92	11.7	-128	369.5	—	2.30	4.87
1151	75.0L	7.91	11.7	-122	369.5	—	2.35	4.87
Final Sample Data:		7.91	11.7	-122	369.5	—	2.35	4.87

Sample ID: MW111I-SEP14
Sample Time: 9.10.14 1152
Duplicate? ☐
MS/MSD? ☐
Dupe Samp ID:

Analyses: ☒ VOCs ☐ SVOCs ☐ PCBs ☒ Metals ☐ _____
Methods: ☐ CLP ☐ SW846 ☐ Drink. Wtr. ☐ _____

Comments: * Well ~~Casing~~ has two bullett holes through one side steel and PVC casings. PVC casing shattered in two sections. * Adjusting Flow Rate.
0 ppm at discharge to ground

Sampler(s): LKalmbach | LRoedl

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW109D
EEEPC Project No.:
Date: 9-9-14

Initial Depth to Water: 0.91 feet TOIC
Total Well Depth: 73.19 feet TOIC
Depth to Pump: 68-19 feet TOIC
Initial Pump Rate: 1000 mL per min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 11:45
End Time: 12:30
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2" inches
1x Well Volume: 11.7 gallons x3 35.3

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
11:45	0.0	7.89	19.6	89	379.1	—	56.4	0.99
11:50	5.0 @ 1l/m	7.81	11.6	91	387.8	—	19.8	0.99
~~11:50~~ 12:00	15.0 @ 1l/m	7.83	10.4	116	383.2	—	12.3	0.99
12:05	20.0	7.81	10.2	148	387.1	—	9.48	0.99
12:10	25.0	7.81	10.1	125	387.2	—	4.91	1.00
12:15	30.0	7.81	10.1	96	390.2	—	6.67	1.00
12:20	35.0	7.81	10.1	92	391.3	—	6.41	1.00
12:25	40.0	7.80	10.1	96	391.8	—	3.59	1.00
Final Sample Data:		7.80	10.1	96	391.8	—	3.59	1.00

Sample ID: MW109D-Sep14
Sample Time: 1230
Duplicate? ☐
MS/MSD? ☒
Dupe Samp ID: MW109D-Sep14

Analyses: ☒ VOCs ☐ SVOCs ☐ PCBs ☒ Metals ☐ _____
Methods: ☐ CLP ☐ SW846 ☐ Drink. Wtr. ☐ _____

Comments: 55 gpm on purge water Dumped to ground.

Sampler(s): L Rand | LKuhlbach

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WELL PURGE & SAMPLE RECORD

Site Name/Location: Carroll Town Landfill, Frewsburg, NY
Well ID: MW-13
EEEPC Project No.:
Date: September 11, 2014

Initial Depth to Water: 7.49 feet TOIC
Total Well Depth: 70.78 feet TOIC
Depth to Pump: 65.78 feet TOIC
Initial Pump Rate: 1.8 4min Lpm / gpm
adjusted to: _____ at _____ minutes
adjusted to: _____ at _____ minutes

Start Time: 1456
End Time: 1608
☐ Bailer ☒ Pump
Pump Type: Typhoon
Well Diameter: 2 inches
1x Well Volume: 10.3 gallons x 3 = 30.9gal 123L

Time	Purge Volume (gallons/liters)	pH (s.u.)	Temp. (°C/°F)	ORP (mV)	Conductivity (µS/cm mS/cm)	DO (mg/L)	Turbidity (NTU)	Water Level (feet)
1456	0.0 L	7.95	11.9	236	378.3	—	>1000	7.51
1506	~~14.8 L~~ 18.0	7.82	11.0	150	356.6	—	59.0	7.52
1516	36.0 L	7.83	10.9	127	353.3	—	46.3	7.52
1526	54.0 L	7.82	10.9	121	351.6	—	25.4	7.53
1536	72.0 L	7.83	10.9	117	351.4	—	11.4	7.52
1546	90.0 L	7.81	10.9	115	354.9	—	8.56	7.52
1556	108 L	7.84	11.0	112	351.7	—	4.41	7.52
1606	126 L	7.82	10.9	119	352.8	—	5.74	7.52
Final Sample Data:		7.82	10.9	119	352.8	—	5.74	7.52

Sample ID: MW13-SEP14
Sample Time: 9.11.14 1608
Duplicate? ☐ Dupe Samp ID: _____
MS/MSD? ☐

Analyses: Methods:
☒ VOCs ☐ CLP
☐ SVOCs ☐ SW846
☐ PCBs ☐ Drink. Wtr.
☒ Metals ☐ _____
☐ _____ ☐ _____

Comments: 0 ppm at discharge to ground.

Sampler(s): LKalmbach / LRoad

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING
MW-102I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 3
Location: N 42°04'29.2" W79°08'45"
Start Date: 9/3/04
End Date: 9/3/04

Boring Company: SJB Services Inc.
Foreman: Dale Matthies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
0	1	2	3/5 6/7	2/1.5	11	olive gray (5Y 3/2), damp STIFF, Fn sandy SILT, some gravel, little clay Topsoil at top.	Topsoil Fn sandy SILT		0.0	NA
2	2	4	7/4 7/7	2/1.0	11	same as above				
4	3	6	3/4 5/5	2/1.8	9	olive gray (5Y 3/2), damp STIFF, SILTY clay, some Fine sand. at 5.5' changes to med. gray (N5) SILTY clay to clay	SILTY clay	4'	0.0	
6	4	8	3/5 6/7	2/1.5	11	same as above up to 7' bgs. then is mod-brown (5Y 3/4), moist, dense, Fn sand and SILT, some med-sand, little gravel	SILTY clay to clay	5.5'	0.0	
							Fn sandy SILT	7'	0.0	
8	5	10	3/7 9/9	2/0.5	16	Poor recovery Cobbles	cobble area	8'	6.7	
10	6	12	9/8 10/11	2/1.0	18	mod. yellowish brown (10YR 5/4), wet, dense Fn-med Sand, some SILT and Gravel, little clay	Fn-med sand Gravel	10'	0.0	
12	7	14	12/12 8/10	2/1.0	20	same as above			1.4	
14	8	16	13/11 14/25	2/1.5	25	same as above little Cobbles.	Fn-med Sand Gravel		0.0	
16	9	18	35/21 10/11	2/1.8	31	same as above. but sat. up to 17' bgs. Then is moist, dense, cobbles and med sand and gravel little SILT.		▽ 16' Sat. 16'-17'		
							Cobbles + Gravel	17'	0.0	

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-102I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:
Hammer:
Fall:

Page 2 of 3
Location:

Start Date: 9/3/04
End Date:

Boring Company: SJB Services Inc.
Foreman: Dale MaThies
OBG Geologist: Yuri Veliz

Screen / Riser
Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
18	10	20	11/14 19/22	2/1.0	23	Mod. brown (5YR 4/4), wet, dense, med-cs sand and cobble, some gravel little silt.	med-cs sand Gravel		0.0	NA
20	11	22	17/41 49/49	2/1.5	89	same as above. wet to saturated. some cobbles			0.6	
								22' sat. 22'-26'		
22	12	24	30 50/4	2/1.0	-	Light olive gray (5Y 5/2) saturated, very dense, f-cs sand and gravel some cobbles and silt, med sand. Auger to 24'	cs-sand Gravel	23'	0.6	
24	13	26	28/38 50/.3	2/1.0	-	same as above med-cs sand. Auger to 26'		24'	1.7	
26	14	28	21/22 100/.4	2/1.0	82	same as above wet to sat. Auger to 28'	med-cs sand Gravel		2.9	
29	15	30	24/34 40/10/4	2/1.0	74	same as above. trace cobbles. wet to sat	med-cs sand Gravel		2.5	
30	16	32	17/32 50/.4	2/1.0	82	Light olive gray (5Y 5/2), saturated, dense, med-cs sand, some gravel, trace silt. Auger to 32'		30'	0.7	
							med-cs sand			
32	17	34	21/32 26/30	2/1.0		same as above. little cs gravel and cobble	med-cs sand cobbles		0.4	
34	18	36	2/9 46/44	2/1.5	25	Light olive gray (5Y 5/2), saturated, dense, med. sand (well sorted). at ~35' is cs sand, trace cs gravel, cobble.	medium Sand	34'	0.7	
							coarse Sand	35'		

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-102I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 3 of 3
Location:

Start Date: 9/3/04
End Date: 9/3/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathieu
OBG Geologist: Yuri Veliz

Screen
Riser
Grout
Sand Pack
Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
36	19	38	50/-3	2/0.3	—	Poor recovery. Same as above. Augered to 38'	Coarse sand		2.9	NA
38	20	40	14/14 30/36	2/1.0	44	Same as above. Increase gravel and cobbles to bottom	Coarse sand + Gravel	38'	2.9	
40	21	42	11/4 17/44	2/1.5	21	Olivegray (5Y3/2), wet to saturated, dense, medium sand, little med. gravel.	medium sand	40'	0.5	
42	22	44	12/14 50/-4	2/2	54	Same as above some gravel at bottom	medium sand + Gravel		1.4	
						EOB → 45' bg		44'		

Well desing → Screen - 43'-33' ; Sand - 43'-30'
Seal - 30'-27' ; Grout - 27'-0' bg

Well located ~10' South of MW-102. (existing well)

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-109S

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 1
Location:
Start Date: 9/9/04
End Date: 9/9/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser
Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
						Boring through overburden utilizing 4 1/4" Hollow stem auger, TO 20' bg See soil description in MW-109D boring log.				

well desing: Screen - 20'-10'; sand - 20'-8'
seal - 8'-5'; Grout - 5'-0'

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-109I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 1
Location:

Start Date: 9/9/04
End Date: 9/9/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathes
OBG Geologist: Yuri Veliz

Screen
Riser

Grout
Sand Pack
Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
						Boring through overburden utilizing 4 1/4" HSA To 40' bg See soil description in MW-109D boring log				

well desing: Screen 45-35'; Sand - 45'-33'
Seal - 33'-30'; Grout - 30'-0'

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-109D

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" split spoon
Hammer: Automatic
Fall: 30"

Page 1 of 4
Location:

Start Date: 9/7/04
End Date: 9/8/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
0	1	2	2/2 4/7	2/1.5	6	Topsoil. Dusky brown (5YR 2/2), moist, SOFT Topsoil Then at 1' bs is mod. yellowish brown (10YR 5/4) damp, STIFF, Fn sandy SILT, LITTLE clay, Trace gravel.	Topsoil	1'	0.0	NA
			5/5 7/8		13		Fn Sandy SILT		0.0	
2	2	4	5/6 7/8	2/1.5	13	Same as above	Fn Sandy SILT			
4	3	6	5/5 6/6	2/1.5	11	Same as above up TO 5.5' Then is Light olive gray (5Y 5/2), moist, STIFF, fn sand and SILTY clay		5.5'	0.0	
6	4	8	5/4 5/6	2/1.8	9	Same as above up TO 7.25' Then is med. gray (N5), wet, STIFF, SILTY clay and fn sand, Trace gravel	Silty clay + Fn Sand		0.0	
8	5	10	3/3 2/4	2/1.5	6	med. gray (N5), saturated STIFF, SILTY clay and fn sand	▽ 8'	10'	0.0	
10	6	12	3/2 3/4	2/1.5	5	med. gray (N5), sat, STIFF SILTY clay TO clay, some fn sand.	Silty clay		0.0	
12	7	14	5/4 5/4	2/1.8	9	Same as above	Silty clay		0.0	
14	8	16	1/2 5/5	2/1.0	7	med. gray (N5), saturated STIFF, SILTY clay TO clay LITTLE fn sand	Silty clay TO clay		0.0	
16		18	6/6 2/5	2/1.0	8	Same as above up TO 17' Then is med. gray (N5), sat, dense, fn-med sand Some SILTY clay, LITTLE Gravel, Trace cobble	Fn-med Sand	17'		

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-109D

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 2 of 4
Location:

Start Date: 9/7/04
End Date:

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veltz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
18	10	~~20~~	4/5 5/5	2/1.0	~~10~~	Same as above	fn-med Sand		0.0	NA
20	11	22	7/7 9/7	2/0	16	NO Recovery	NO Recovery	20'		
22	12	24	4/6 10/11	2/0.5	16	Poor Recovery. Mod. yellowish brown (10YR 5/4), saturated, soft med. sand and gravel some fn sand.	med-Sand + Gravel	22'	0.0	
24	13	26	6/5 6/5	2/1.0	11	mod. yell. brown (10YR 5/4) Sat, dense, medium sand, little gravel	med. Sand	24'	0.0	
26	14	28	11/21 4/14	2/0.5		Poor Recovery Same as above	med. Sand		0.0	
28	15	30	18/14 18/29	2/1.5	32	mod. yellowish brown (10YR 5/4), saturated, Medium dense, med-cs sand and gravel, little cobble	med-cs sand + Gravel	28'	0.0	
30	16	32	1/5 37/30	2/1.0	42	Same as above. Increase cobble content			0.0	
32	17	34	Sol.4	2/0.4	—	Poor Recovery. Same as above. Spoon Refusal. Auger to 34'	med-cs sand + Gravel		0.0	
34	18	36	4/7 11/15	2/1.8	18	Light olive gray (5Y 5/2) Sat. dense, med-cs sand and Gravel, little cobble	med-cs Sand + Gravel		0.0	
36	19	38	12/24 Sol.4	2/1.5	34	Same as above Auger to 38'			0.0	

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING

MW-109D

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

Sampler:
Hammer:
Fall:

Page 3 of 4
Location:
Start Date: 9/7/04
End Date: 9/8/04

File No.: 34241.002.001
Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen
Riser

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change	Water Encountered	Testing PID (ppm)	Testing UV
38	20	40	13/17 11/12	2/1.5		Same as above	Sand + Gravel		0.0	NA
40	21	42	6/17 17/20	2/		Same as above			0.0	
42	22	44	5/4	2/1.5		Same as above. Augered TO 44'	med-cs Sand + Gravel		0.0	
44	23	46"	9/24 15/26	2/1.0		Same as above up TO 45.5'. Then is medium sand, some Gravel.		45.5'	0.0	
46	24	48	12/25 10/11	2/	35	Same as above	med. sand		0.0	
48	25	50	5/9 6/14 9/	2/1.5	15	Light olive gray (5Y5/2) saturated, dense, med-Fn sand, some silt, little gravel	Fn-med sand	48'	0.0	
50	26	52	11/6 3/21	2/1.0	9	Same as above. Trace cobbles	Fn-med sand		0.0	
52	27	54	8/10 14/19	2/1.0	24	Same as above Trace cobbles	Fn-med Sand		0.0	
54	29	56	4/10 24/26	2/1.0	39	Same as above up TO 56' bg. Then is light olive gray (5Y5/2), saturated, very dense, med Gravel and cs sand, little cobble, trace med Sand.	Gravel + Cs Sand	55'	0.0	
						Poor recovery, [illegible] Same material [illegible]	Gravel + Cs Sand			

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING
MW-109D

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 4 of 4
Location:

Start Date: 9/7/04
End Date: 9/8/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
58	30	60	11/15 18/50/.4	2/0.4	32	Poor recovery Same as above spoon refusal auger to 60' bg Same as above auger to 61	Gravel + Cs Sand		0.0	NA
61	31	63	5/6 50/.4	2/0.4	56	Same as above auger to 63'		62'	0.0	
63	32	65	50/.4	2/0.4	—	Light olive gray (5Y 6/1) saturated, very dense Med-Cs sand, some	Med-Cs Sand		0.0	
64	33	66	11/11 50/.4	2/1.0	61	gravel, little fine sand auger to 64'			0.0	
66	34	68	50/.4	2/1.0	—	Same as above auger to 66'	Med-Cs Sand		0.0	
68	35	70	11/14 50/.4	2/1.0	64	Same as above auger to 68'		70'		
						EOB - 75' bg well set at 70' bg				

well desing - screen - 70'-60' bg ; sand - 70'-55'
seal - 55'-50' ; grout - 50'-0' bg

well located ~300' NE of existing MW-13

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-111

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler: 2" Split Spoon
Hammer: Automatic
Fall: 30"

Page 1 of 3
Location:

Start Date: 9/14/04
End Date: 9/14/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathias
OBG Geologist: Yuri Veliz

Screen / Riser — Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
0	1	2	1/1 3/5	2/1.0	4	Topsoil to ~0.5'. the it is med. brown (5YR 7/4) moist, stiff, silt, some fn sand, little clay	Topsoil		0.0	NA
							SILT			
2	2	4	7/10 8/6	2/1.0	16	Same as above. Trace cs gravel.	SILT		0.0	
4	3	6	4/5 6/10	2/1.5	11	Same as above. at ~ 5.5' is fn sandy silt	SILT		0.0	
								5.5'		
6	4	8	8/7 8/10	2/1.5	15	Light olive gray (5Y 5/2) moist, stiff, fn sandy silt, some clay	Fn Sandy SILT		0.0	
8	5	10	3/3 3/4	2/1.5	6	med. gray (N5), saturated, stiff, fn sandy silt, some clay	▽ 9' Fn Sandy SILT	SOIL	0.0	
10	6	12	3/2 4/5	2/1.8	6 6	Same as above			0.0	
								12'	0.0	
12	7	14	5/6 6/7	2/1.5	12	med. gray (N5), saturated, soft, silty clay to clay. then at ~ 13' is silty clay, some fn sand.	SILTY clay TO CLAY	13'		
							SILTY clay		0.0	
14	8	16	2/3 3/4	2/1.5	6	med. gray (N5), saturat. stiff, silty clay, some fn sand		16'	0.0	
16	9	18	4/11 6/7	2/1.5	10	Same as above. silty clay to clay some fn sand.	SILTY clay TO CLAY	18'	0.0	
18	10	20		2/1.0		Same as above silty clay	SILTY clay	20'		

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING MW-111I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 1 of 3
Location:

Start Date: 9/14/04
End Date: 9/14/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser

Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
20	11	22	1/2 2/4	2/1.8	4	Med. gray (NF), saturat. soft, silty clay, some fn sand.	silty clay		0.0	NA
							silty clay to clay	22'		
22	12	24	-	2/1.5		Same as above silty clay to clay		24'	0.0	
24	13	26	5/4 5/6	2/1.5	9	Same as above up to 25'. then is med. gray (NF), sat. dense, fn sand and silt, some med. sand and gravel	silty clay	25'	0.0	
26	14	28	9/9 11/11	2/1.5	19		fn sand med. + Gravel		0.0	
					↳	Med. gray (NF), saturat. dense, fn sand and silt some med. sand and Gravel, little clay				
28	15	30	5/4 8/7	2/0.5	12	Light olive gray (5Y 5/2) saturated, dense, fn sand and silty, some Gravel, med. sand, little clay, Trace cs Gravel	fn sand med. + Gravel		0.0	
							fn-med Sand Gravel			
30	16	32	11/10 13/21	2/0.5	27	Same as above		32'	0.0	
32	17	34	19/21 50/.3	2/0.5'	71	Light olive gray (5Y 5/2) sat. dense, cs gravel then fn-med sand little silt	cs Gravel fn-med Sand		0.0	
34	18	36	21/36 40/41	2/0.5	76	Light olive gray (5Y 5/3) sat, dense, cs sand and Gravel, some med. sand, silt.		34'		
							cs sand + Gravel		0.0	
36	19	38	50/.2	2/0.5	-	Same as above augers to 38'				

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING

MW-111I

Client: NYSDEC
Remedial Investigation Feasibility Study
Proj. Loc: Town of Carroll, Frewsburg, NY

File No.: 34241 002.001

Sampler:

Hammer:

Fall:

Page 3 of 3
Location:

Start Date: 9/14/04
End Date: 9/14/04

Boring Company: SJB Services Inc.
Foreman: Dale Mathies
OBG Geologist: Yuri Veliz

Screen / Riser / Grout / Sand Pack / Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	Field Testing UV
38	20	40	5/6 14/17	2/1.5	20	olive gray ( ), sat. dense, medium sand. at ~39' is medium sand and gravel, little silt, some cs sand.	Medium Sand	39'	0.0	ND
							med. sand + Gravel	39'		
40	21	42	10/11 45/40	2/1.5	56	Same as above			0.0	
42	22	44	50/.4	2/1.8	-	Same as above	med. Sand + Gravel		0.0	
						EOB - 45'. well set at 45' bgs		44'		

well desing - Screen - 45'-35' ; Sand - 45'-33'
Seal - 33'-30' ; Grout - 30'-0'

well located ~250' NW of TP-05

Generic Quality Assurance Project Plan

Generic Quality Assurance Project Plan (GQAPP) for the Carroll Town Landfill Site NYSDEC Site No. 9-07-017

July 2020

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway
Albany, New York 12233

Program QA Officer _____ Date _____

Table of Contents

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Section **Page**

List of Tables

List of Figures

Figure **Page**

List of Abbreviations and Acronyms

AAS	atomic absorption spectroscopy
ASP	Analytical Services Protocol
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CLP	Contract Laboratory Program
CM	construction management
COC	chain-of-custody
CPR	cardiopulmonary resuscitation
DOT	United States Department of Transportation
DUSR	Data Usability Summary Report
ECL	Environmental Conservation Law
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FSP	field sampling plan
GC/MS	gas chromatography/mass spectrometry
HAZWOPER	Hazardous Waste Operations and Emergency Response
IATA	International Air Transport Association
ICP	inductively coupled plasma

List of Acronyms (Cont.)

ICS	interference check sample
IDW	investigation-derived waste
IIWA	immediate investigation work assignment
IRM	interim remedial measure
LCS	laboratory control sample
MDL	method detection limit
MEDD	multimedia electronic data deliverable
mL/min	milliliters per minute
MS/MSD	matrix spike/matrix spike duplicate
MSB	matrix spike blank
NELAP	National Environmental Laboratory Accreditation Program
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OVA	organic vapor analyzer
PARCC	precision, accuracy, representativeness, completeness, and comparability
PE	performance evaluation
PID	photoionization detector
PPE	personal protection equipment
PSA	preliminary site assessment
QA/QC	quality assurance/quality control
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
RA	remedial action
RD	remedial design
RI	Remedial Investigation

List of Acronyms (Cont.)

RPD	relative percent difference
SARA	Superfund Amendments and Reauthorization Act of 1986
SDG	sample delivery group
SI	site inspection
SOP	Standard Operating Procedure
SOW	scope of work
SVOC	semi-volatile organic compound
TCLP	toxicity characteristic leaching procedure
TRPH	total recoverable petroleum hydrocarbon
VOA	volatile organic analysis
VOC	volatile organic compound
VTSR	verified time of sample receipt

Distribution List

Party	Affiliation and Title	Revision	Date Sent
QAPP Original Distribution			
	QA Director		
	Project Manager(s)		
	NYSDEC Contracts		
	NYSDEC QA Officer		

Revision List

Revision	Modifications	Distributed

Laboratory Distribution and Approval

All site specific contract or subcontract laboratories working on project must perform analytical services and work in compliance with this QAPP.

Party	Affiliation and Title	Revision	Date Sent
QAPP Original Distribution			

This page must be completed and returned to NYSDEC with each revision of the QAPP.

Laboratory certifies that it will conduct analytical services in compliance with QAPP unless modified by any project-specific requirements listed in the site-specific QAPP or approved laboratories exceptions or clarifications.

Executed this day of , 20

_____
Contractor or Subcontractor Laboratory

_____
Signature

_____
Name

_____
Title

1 Project Management

This generic Quality Assurance Project Plan (GQAPP) has been prepared in support of projects performed for the New York State Department of Environmental Conservation (NYSDEC).

The GQAPP is applicable to the Carroll Town Landfill project and needs to be implemented by site monitoring personnel and is subject to regulatory oversight by NYSDEC or that must be conducted in accordance with NYSDEC regulations.

This GQAPP has been prepared in accordance with "United States Environmental Protection Agency (EPA) Requirements for Quality Assurance Project Plans," final, EPA QA/R-5 (March 2001) and incorporates NYSDEC requirements. This GQAPP presents the policies, organization, objectives, functional activities, and specific quality assurance/quality control (QA/QC) procedures that will be employed by site monitoring personnel to ensure that all technical data generated are accurate, representative, and ultimately capable of withstanding judicial scrutiny. These activities will be implemented under the requirements of site monitoring personnel's comprehensive QA program as documented in the corporate Quality Management Plan (QMP).

The GQAPP is formatted to address the four major sections listed in the EPA QAPP guidance document: Project Management, Data Generation and Acquisition, Assessment and Oversight, and Data Validation and Usability.

1.1 Project Organization

The organizational chart for the site specific environmental investigation, design, or construction project work in New York is presented as Figure 1-1. The owner and project team members are primarily responsible for implementation of the QA program on NYSDEC related projects. All project communications are directed through the site specific project manager. The site specific project manager is the primary point of contact for the NYSDEC Project Manager and technical staff. The QA Officer for the site specific work provides independent review functions to verify that the projects are implemented in accordance with applicable QA documents. The site specific project manager is responsible for independent oversight of projects involving engineering services for design and

construction. The roles and specific QA responsibilities of key project personnel are described below.

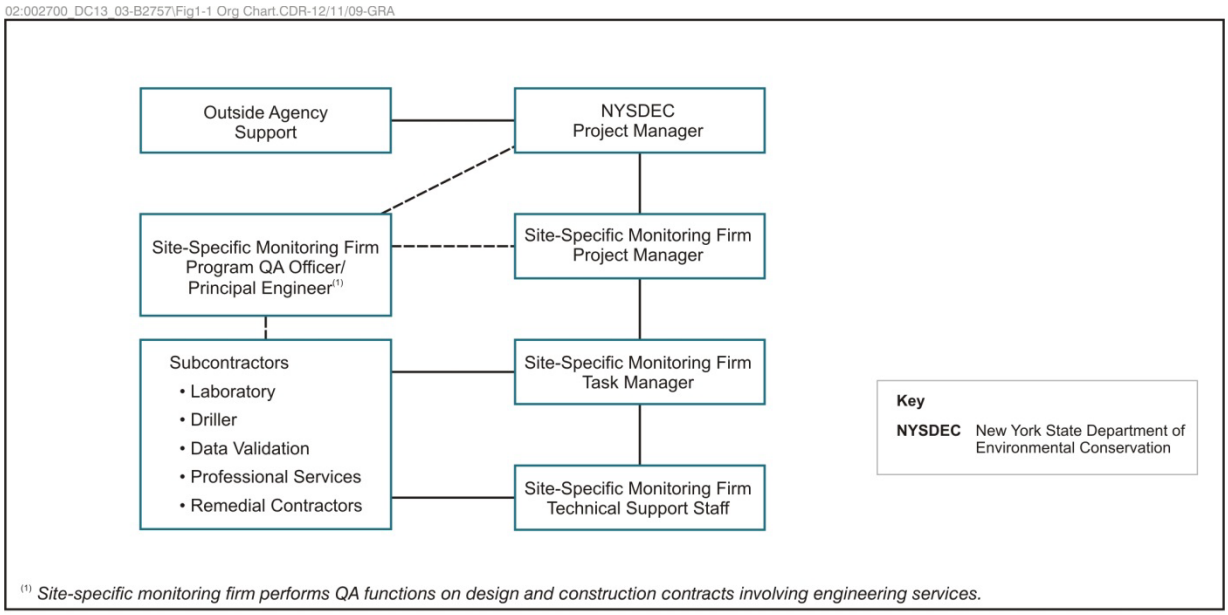

Figure 1-1 Organizational Chart

Project Manager

The site specific Project Manager is responsible for QA/QC functions for all task-specific operations on NYSDEC projects, and will coordinate with the owner on issues that impact the overall quality of performance on the site specific work.

The Project Manager will also be responsible for the overall quality of work performed under project activities as it relates to the following specific roles:

- Overseeing day-to-day performance including all technical and administrative operations;
- Interfacing frequently with the NYSDEC Project Manager and technical staff;
- Tracking schedules and budgets and managing of mobilization and contract closeout activities;
- Selecting and monitoring field staff;
- Managing the development of detailed work plans; and
- Reviewing and approving all final reports and other work products.

Corporate or Program QA Officer

The site specific monitoring firm's Corporate QA Director is responsible for ensuring compliance with the site specific QA program. The Program QA Officer is responsible for oversight of all QA/QC activities for NYSDEC projects. The QA Officer will remain independent of day-to-day, direct project involvement but will have the responsibility for ensuring that all project and task-specific QA/QC requirements are met. The QA Officer will have direct access to corporate executive staff, as necessary, to resolve any QA/QC problems, disputes, or deficiencies. The QA Officer's specific duties include:

- Reviewing and approving the QAPP;
- Conducting field and laboratory audits in conjunction and keeping written records of the audits;
- Coordinating with the NYSDEC technical staff, Project Manager, Task Managers, and laboratory management to ensure that QA objectives appropriate to the project are set and that laboratory and field personnel are aware of these objectives; and
- Recommending, implementing, and/or reviewing actions taken in the event of QA/QC failures in the laboratory or field.

Project Chemist

The Project Chemist is responsible for data validation and verification, generation of Data Usability Summary Reports (DUSRs), and independent assessment of the hard copy and electronic analytical data. The Project Chemist will report nonconformance with QC criteria (including an assessment of the impact on data quality objectives) to the appropriate managers.

Technical Support Staff

The technical support staff for this program will be drawn from the site specific pool of resources. The technical support staff will implement project and site tasks, analyze data, and prepare reports/support materials. All support personnel assigned will be experienced professionals who possess the degree of specialization and technical competence necessary to perform the required work effectively and efficiently.

Laboratories

Laboratories providing analytical services will be chosen as appropriate for the project requirements. All laboratories will be certified by the New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) for the methods that they are contracted to perform. Laboratories performing for Superfund sites with full data packages must be certified by NYSDOH for Contract Laboratory Program (CLP) analysis.

The laboratory QA programs are reviewed and approved by the QA Officer or the project chemist, and will be submitted to NYSDEC for approval. Copies of the laboratory QA manuals are available on request. The laboratory must provide an experienced Project Manager and a QA Officer that is independent of the day-to-day operations of the laboratory. The specific duties of the laboratory Project Manager and QA Officer for NYSDEC activities include:

- Reviewing the GQAPP to verify that analytical operations will meet project requirements;
- Documenting review and approval of GQAPP on distribution page;
- Reviewing receipt of all sample shipments and notifying the Project Manager and Project Chemist of any discrepancies within one day of receipt;
- Rapidly notifying the site specific Project Manager and Project Chemist regarding laboratory nonconformance with the GQAPP or analytical QA/QC problems affecting project samples; and
- Coordinating with the site specific Project Manager and Project Chemist, and laboratory management to implement corrective actions approved by NYSDEC or others as applicable.

1.2 Problem Definition/Background

All work is to be carried out consistent with NYSDEC and EPA requirements, protocols, and guidance.

1.3 Project Description

The work covered by this QAPP is defined under the site specific Site Management Plan (SMP). If necessary, site-specific QAPP information will be provided as an appendix to the field sampling plan (FSP).

1.4 Quality Objectives and Criteria

Quality objectives are qualitative or quantitative statements derived from the systematic planning process. Quality objectives are used to clarify the goals of the project and define the appropriate type of data to collect to support project decisions. General quality objectives for NYSDEC projects are summarized in Table 1-1.

Table 1-1 General Data Quality Objectives, NYSDEC Projects

Data Collection Activity	Quality Objectives	Standards[a]	Acceptability/ Performance Criteria[b]
Sampling and Analysis	To have samples and analytical results that accurately represents the nature and extent of contamination at the site. Data must be of sufficient quality to meet all regulatory requirements and allow assessment of impacts on human health by comparison to New York State criteria or background values. Data also may be used for long-term monitoring or to meet regulatory permit requirements. In these cases, data must meet the requirements of the permit.	■ NYSDEC Ambient Water Quality Standards ■ NYSDOH Soil Vapor Intrusion Guidance Values ■ NYSDEC Remedial Program Soil Cleanup Objectives	■ Data must be collected under an approved FSP using approved SOPs. Data must meet the acceptance and performance criteria documented in Section 2 of this QAPP. ■ Reporting limits should be below risk-based screening values for 90% of target analytes and 100% of critical analytes of concern. ■ Data must be compared to standards.
Field Screening Analysis	To have samples and analytical results that effectively indicate the nature and extent of contamination at the site. Technical personnel use data to determine the best locations to collect samples for laboratory analysis.	■ None	■ Data must be collected under an approved FSP using approved SOPs. Data must meet the acceptance and performance criteria for the screening method. ■ Reporting limits should be below anticipated concentrations of critical analytes of concern.
Subsurface Logging	To provide a description of the subsurface soils that is consistent and accurate, and to record drilling and sampling procedures and well construction details.	■ Site Specific SOPs (including Geologic Logging and Monitoring Well Installation)	■ Accurate, consistent, signed, and legible documentation as described in SOPs. ■ Unconsolidated materials described according to the Unified Soil Classification System. ■ Rock/soil material described using standard geologic nomenclature.
Surveying	To relate project work locations (including sample, monitoring well, and test pit locations) to existing local benchmarks.	■ Surveying subcontract ■ Differential correction for GPS data	■ Relation of all survey points to existing/known benchmarks. ■ Accurate horizontal coordinates (∀0.5 foot for wells; ∀3 feet for GPS locations). ■ Accurate vertical elevations (∀0.01 foot) for permanent monitoring well locations.
Field Records	To document all field activities and to allow accurate representation field events in the final report. Records must be capable of withstanding legal scrutiny.	■ Section 2 of the QAPP ■ Site Specific SOPs (Field Activities Logbooks)	■ Consistency between field and laboratory data. ■ Clear and legible documentation for sample collection and equipment decontamination for final report.

Table 1-1 General Data Quality Objectives, NYSDEC Projects

Data Collection Activity	Quality Objectives	Standards[a]	Acceptability/ Performance Criteria[b]
Outside Records	To use the most current reference values, reports, or data from outside sources in data assessments and recommendations for the site.	None	■ All versions of data or standards must be the most current values available. ■ Data or standards must be accurately incorporated into the final report.
Data Review and Assessment	To review and verify data are generated according to the QAPP, and assign data qualifiers as necessary to indicate limitations on data usability.	■ NYSDEC DUSR Guidance ■ EPA Region 2 Data Validation SOPs ■ EPA National Functional Guidelines	■ Data must be reviewed by Project Chemist meeting minimum NYSDEC qualifications. ■ Data qualifiers or changes to data must be documented in a DUSR.

Notes:

[a] Major standards.
[b] Major or noteworthy acceptability criteria. All performance criteria must be verified using procedures listed in the QAPP.

Key:

GPS = Global Positioning System.
NYSDEC = New York State Department of Environmental Conservation.
NYSDOH = New York State Department of Health.
QAPP = Quality Assurance Project Plan.
SOP = Standard Operating Procedure.

Acceptance and performance criteria establish the quality and quantity of data needed to meet the project quality objectives. General acceptance or performance criteria for the collection, evaluation, or use of environmental data for NYSDEC projects are outlined in Section 2.5, Analytical Methods. Quality objectives or acceptance and performance criteria applicable to a project are specified in the site-specific QAPP or work plan.

1.4.1 Data Assessment Definitions

Acceptance and performance criteria are often specified in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Numerical acceptance criteria cannot be assigned to all PARCC parameters, but general performance goals are established for most data collection activities. Numerical goals for analytical methods are presented in Section 2.4. Data assessment procedures throughout the QAPP clearly outline the steps to be taken, responsible individuals, and implications if QA objectives are not met. PARCC parameters are briefly defined below.

Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value, usually stated in terms of standard deviation or coefficient of variation. It also may be measured as the relative percent difference (RPD) between two values. Precision includes the interrelated concepts of instrument or method detection limits and multiple field sample variance. Sources of this variance are sample heterogeneity, sampling error, and analytical error.

Accuracy

Accuracy measures the bias of the measurement system. Sources of this error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis. Data interpretation and reporting may also be significant sources of error. Typically, analytical accuracy is assessed through the analysis of spiked samples and may be stated in terms of percent recovery or the average (arithmetic mean) of the percent recovery. Blank samples are also analyzed to assess sampling and analytical bias (i.e., sample contamination). Background measurements similarly assess measurement bias.

Representativeness

Representativeness expresses the degree to which data represent a characteristic of a population, a parameter variation at a sampling point, or an environmental condition. Representativeness is a qualitative parameter, which is most concerned with proper design of the measurement program. Sample/measurement locations may be biased (judgmental) or unbiased (random or systematic). For unbiased schemes, sampling must be designed not only to collect samples that represent

conditions at a sample location, but also to select sample locations, which represent the total area to be sampled.

Completeness

Completeness is defined as the percentage of measurements performed that are judged to be valid. Although a quantitative goal must be specified, the completeness goal is the same for all data uses—that a sufficient amount of *valid* data be generated. It is important that critical samples are identified and plans are made to ensure that valid data are collected for them.

Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset may be compared to another. Sample data should be comparable with other measurement data for similar samples and sample conditions. This goal is achieved through the use of standard techniques to collect and analyze samples.

1.5 Special Training/Certification

The site specific monitoring firm is committed to providing vigorous training in health and safety procedures, the proper use of protective equipment, and overall policy objectives. General training requirements for NYSDEC activities are as follows:

- Site monitoring employees that participate in on-site activities must have completed a 40-hour HAZWOPER health and safety training program and the cardiopulmonary resuscitation (CPR)/first aid certification course. To continue such participation, each employee must successfully complete a minimum of eight hours of refresher training, annually; and

- All personnel shipping samples must complete the United States Department of Transportation (DOT) hazardous materials transportation training and certification, including training in specific International Air Transport Association (IATA) regulations (air shipments).

1.6 Documentation and Records

The site monitoring firm's QA Officer will approve the site specific QAPP and maintain the most current approved version of the document. The site specific Project Manager is responsible for providing the most current copy of the site specific QAPP and other planning documents to the project team members.

In addition to the QAPP and other planning documents, the primary documentation for the project is field records and analytical data packages. Requirements for field records are documented in site monitoring firm's Standard Operating Procedures (SOPs) for Field Activities Logbooks and Geotechnical Logbooks and are described briefly below. Requirements for analytical data

packages for NYSDEC activities are also described below. The remainder of the QAPP describes additional project documentation and record requirements for QA/QC assessments, data validation, data management, and other areas.

1.6.1 Field Documentation

Sample Identification

Samples will be identified using the format described below. Each sample will be labeled, chemically preserved (if required), and sealed immediately after collection. To minimize handling of sample containers, labels will be completed prior to sample collection as practicable. The sample label will be completed using waterproof ink and will be firmly affixed to sample containers and protected with clear tape. The sample label will give the following information:

- Date of collection;
- Unique sample number;
- Analyses requested; and
- Preservation.

Each sample will be referenced by sample number in the logbook and on the chain-of-custody (COC) record.

Individual samples will be identified by a unique alphanumeric code. Normal field samples (non-quality-control) will be numbered according to the following convention:

SSS-MC-###-Q

SSS - Three letter code for site name

MC - Matrix code as designated below
- Sequential sample number
Q - Quality control sample code such as D for duplicate, F for filtered, S for split, etc.

The matrix codes are as follows:

AS - Bulk Asbestos
BA - Indoor Air from Basement or Crawlspace
DW - Drinking Water
EB - Equipment Blank
FA - Indoor Air, First Floor (not basement)

GW - Groundwater
OA - Outdoor Air
SD - Sediment
SB - Subsurface Soil
SF - Surface Soil
SS - Sub-slab Vapor
SV - Soil Vapor
SW - Surface Water
TB - Trip Blank
WS - Waste

Samples collected with an additional volume for matrix spike/matrix spike duplicates (MS/MSD) will be designated on the COC.

Field Logs and Data Forms

Field logs and data forms are necessary to provide sufficient data to enable participants to reconstruct events that occurred during the project and to refresh the memory of field personnel should they be called upon to give testimony during legal proceedings. Field logs also should document any deviations from the work plan, QAPP, or other applicable planning document. Procedures for recording information are specified in the Field Activities Logbook SOP. All field logs will be kept in a bound notebook containing numbered pages unless a specific field form is completed. All entries will be made in waterproof ink and the time of the entry will be recorded. The top of each page of the logbook or field form will contain the site specific project number, project name, and date that the entries on that page were recorded. No pages will be removed for any reason. Corrections will be made according to the procedures given later in this section. The field logs will include both site- and task-specific information.

Recording of information related to site activities is the responsibility of the site specific monitoring staff and will include a complete summary of the day's activities at the site and any communications outside the project team. Site information includes:

- Name of the person making the entry (signature);
- Names of team members, subcontractors, and visitors on site;
- Levels of personal protection equipment (PPE):
  - Level of protection originally used,
  - Changes in protection, if required, and
  - Reasons for changes; and
- Time spent on site.

Task-specific information may be recorded in multiple field logbooks. The task-specific information will include:

- Drilling information, including:
  - Method employed,
  - Diameter of borehole and well casing,
  - Materials used,
  - Depth of borehole, and
  - Well construction (if appropriate);

- Documentation on samples collected, including:
  - Construction of existing wells (if appropriate),
  - Sampling location and sample identification number,
  - Sampling depth for subsurface soil and surface water (if depth-specific surface water samples are collected) samples,
  - Flow rate of water from in-place plumbing (500 milliliters per minute [mL/min]) for samples of existing water supplies,
  - Sampling date, time, and personnel,
  - Sample sequence (order in which samples were collected),
  - Equipment used (including the use of fuel-powered units/motors during surface water sampling),
  - Type of sample (e.g., grab, composite, QC) and matrix,
  - Amount of each subsample or aliquot (if sample is a composite), and
  - Sample preservation and verification of preservation;

- Types of field QC samples, including when and where they were collected. The description of rinsate sample collection should include the equipment rinsed and the actual field samples collected with that equipment prior to collection of the rinsate;

- Information regarding well purging including:
  - Depth to water and total well depth,
  - Calculations used for volume purged,
  - Volume purged,
  - Equipment used,
  - Field measurements,
  - Length of purge time, and
  - Date and time well was purged;

- Drum inventory:
  - Type of drum and description of contents, and
  - Description of material in the drum and which ayers were sampled (if performed);

- Field equipment used, equipment identification numbers, and calibration information;
- On-site measurement data;
- Field observations and remarks;
- Weather conditions;
- Decontamination procedures;
- Unusual circumstances or difficulties; and
- Initials of person recording information.

Corrections to Documentation Notebook

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, they must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

Photographs

Photographs will be taken as directed by the site specific Team Leader. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be noted in the task log concerning photographs:

- Date, time, location, and direction photograph was taken;
- Description of the photograph taken;
- Reasons why the photograph was taken;
- Sequential number of the digital photo; and
- Camera system used.

1.6.2 Laboratory Data Reporting

The data packages for all CLP and similar Superfund analytical services are consistent with NYSDEC Analytical Services Protocol (ASP) Category B (July 2005) and, therefore, must include a full data package with all associated sample and QC results, calibrations, and raw data. The data packages for long-term monitoring events are consistent with NYSDEC ASP Category A, and therefore must consist of a case narrative, COC, summary table of sample identifications

and sample tracking information, a summary of analytical results, and a summary of QC results. The laboratory will provide a summary package of results for all data packages. The laboratory will provide a summary of the sample analyzed, methods used, and date and time of analysis. The laboratory will provide an electronic data deliverable that matches all data reported on the hard copy analytical report. Electronic data report requirements are described in Section 2.10.

Within 48 hours of sample receipt, the laboratory will provide a sample receipt file and copy of the completed COC.

The analytical summary report will include the sample aliquot analyzed, final extract volume, and dilution factor. The analytical summary data report also will include the laboratory reporting limit and method detection limit (MDL) for all target compounds. These limits will be corrected for percent moisture and all dilution factors. Any compounds found less than the reporting limit, but greater than the MDL will be reported and qualified with a "J" flag as estimated.

QC reports must provide a summary report or batch identifier clearly linking all QC results to actual field sample results. QC summary reports must include the laboratory control limits and flag any result reported outside control limits. The case narrative must include an explanation of all QC results reported outside control limits. The laboratory must provide copies of any nonconformance or corrective action forms associated with data in the laboratory report.

For Category A, the laboratory should provide copies of chromatograms for any samples for which elevated reporting limits are used because of sample matrix, but no target compounds are found above the reporting limit.

For organic analytes reported in both Category A and Category B deliverables, the laboratory must report results of the most concentrated extract analysis in order to achieve required quantitation limits.

1.6.3 Record Retention

All records related to the project must be stored in secure areas consistent with requirements in site specific QMP. All records related to the analytical effort must be maintained at the laboratory or in the office (for field screening data) in lockable filing cabinets for at least one year, except those stored in the computer (i.e., cost information, scheduling, custody transfers, and management records). All records must be maintained in a secure area for a period of six years after the end of the calendar year in which the final report is issued.

Types of records to be maintained in addition to the final technical reports for NYSDEC include the following:

- Field logbooks, sampling documents, photographs, QA/QC records, and any other supporting documentation for collection of field samples;

- Administrative records including time cards, costing, and scheduling information; and

- Client correspondence, subcontractor records, minutes of meetings, and any related project management records.

Types of records to be maintained by the laboratory in addition to the analytical report for the NYSDEC include the following:

- Complete COC records from sample receipt to destruction. Sample destruction records must contain information on the manner of final disposal;

- Supporting documentation for any nonconformance or corrective action forms supplied in the analytical report or related to the analysis of project samples;

- Computer records on disk with magnetic tape backup of cost information, scheduling, laboratory COC transfers, and laboratory management records;

- All laboratory notebooks including raw data such as readings, calibration details, and QC results; and

- Hard copies of data system printouts (i.e., chromatograms, mass spectra, and inductively coupled plasma [ICP] data files).

2 Data Generation and Acquisition

This section of the QAPP contains descriptions of all aspects of the implementation of field, laboratory and data handling procedures to meet the requirements of NYSDEC activities. The QAPP provides the basis for ensuring that appropriate methods are used and thoroughly documented. These procedures will be adapted, as appropriate, to meet the objectives of each NYSDEC project as described in the appropriate work plan.

2.1 Sampling Process Design

The sampling process design is documented in the work plan or in the FSP for each site. The FSP will include a project schedule and a summary table listing the type of samples collected, the sampling location, the rationale for selecting the location, sample handling procedures, analytical methods, and the number and type of QA/QC samples.

2.2 Sampling Methods

The sampling methods are documented in the work plan or in the FSP. The site specific monitoring firm's sampling SOPs serve as the basis for sampling procedures.

In general, sampling at a site will progress from clean areas to contaminated areas. This minimizes the potential for cross contamination of samples and, subsequently, eliminates data anomalies or misinterpretation of the extent of contamination. The order of sample collection at a specific location normally proceeds as follows:

1. Volatile organic compounds (VOCs) or other volatile parameters;
2. Extractable organics (including total recoverable petroleum hydrocarbons [TRPH]);
3. Oil and grease;
4. Total metals;
5. Dissolved metals;

6. Microbiological samples;

7. Other inorganics; and

8. Physical parameters (including ignitability, corrosivity, and reactivity).

This sequence helps maintain the representativeness of samples and analytical results.

The remainder of this section describes typical procedures for equipment decontamination and the handling of investigation-derived waste (IDW), and sample containers, preservatives, holding times, packing, and shipping. Specific procedures for each site are provided in the work plan or in the FSP.

2.2.1 Equipment Decontamination

Sampling methods and equipment are chosen to minimize decontamination requirements and the possibility of cross-contamination. Equipment or supplies that cannot be effectively decontaminated (e.g. sample tubing or rope) will be disposed of after sampling. Investigation/sampling equipment will be cleaned at the site prior to use, between sampling locations, and prior to transport off-site. Decontamination of field equipment will be noted in the field logbook. If it is necessary to make decontamination procedure changes in the field, the changes will be noted in the logbook. Otherwise, a notation will be made each day that decontamination was conducted as specified in the work plan or in the FSP. Rinsate blanks will be collected to verify the effectiveness of decontamination procedures. If field blanks indicate poor techniques, the QA Officer and Project Manager will ensure techniques are modified and samplers trained appropriately.

All decontamination will be performed in accordance with NYSDEC-approved procedures. Decontamination of large equipment will consist of the following:

- Removal of foreign matter; and

- High-pressure steam cleaning.

Decontamination of heavy equipment will be performed by the subcontractor and will be performed in a decontamination pad as described in the contract.

The following alternative procedures will be used for smaller equipment and may also be employed for downhole tooling such as split spoons and Geoprobe rods or routine sampling equipment:

- Initially remove all foreign matter;
- Scrub with brushes in a laboratory-grade detergent solution (e.g., Alconox);
- Rinse with potable water with a final deionized or distilled water rinse; and
- Allow to air dry.

If sampling for metals is conducted, then an additional rinse with a 10% nitric acid solution will be added between the potable and deionized water rinses.

Sensitive down-hole devices that only contact water (e.g., water level indicator and miniTROLL pressure transducer) may be decontaminated by triple rinsing with deionized or distilled water. A temporary decontamination area will be established in each work area using heavy plastic sheeting as a pad. The decontamination will be performed by the field team.

Fluids generated during decontamination will be handled according to procedures described in Section 2.2.2.

2.2.2 Investigation-Derived Waste (IDW)

Unless otherwise directed by NYSDEC staff, all IDW will be handled in a manner consistent with requirements in the work plan and applicable federal and state regulations. IDW includes disposable equipment and PPE, purge and development waters, drilling fluids, soil cuttings, and decontamination fluids. Waste streams will not be mixed and will be segregated to the maximum extent possible.

Investigation-derived soils and water will be field-screened for organic vapors with an organic vapor analyzer (OVA) or photoionization detector (PID) and visual inspected to initially determine whether these wastes are potentially contaminated. In order to minimize the generation of drummed wastes and the costs associated with storage, testing, transportation, and disposal of drums, IDW will be handled in the following manner:

- **Soil cuttings from boreholes:** as much of the soil cuttings as possible will be used as backfill. Remaining cuttings that are not significantly contaminated (OVA or PID readings of 5 parts per million [ppm] or less and lack of staining, sheen, etc.) will be spread on the ground near the site of generation if the location is in a suitably undeveloped area. If this is not possible or if contamination is suspected, the excess soil cuttings will be drummed;
- **Soil cuttings from monitoring well boreholes:** cuttings that are not significantly contaminated (OVA or PID readings of 5 ppm or less and lack of

staining, sheen, etc.) will be spread on the ground near the site of generation if the location is in a suitably undeveloped area. If this is not possible or if contamination is suspected, the excess soil cuttings will be drummed;

- **Development and purge waters from monitoring wells and decontamination water:** water that is not significantly contaminated (OVA or PID readings of 5 ppm or less, lack of sheen, etc.) will be discharged to the surface in the area where it was generated only if the area is suitably undeveloped (e.g., not paved and not on residential property). If the water cannot be discharged to the surface, then it may be discharged to the municipal sanitary sewer system pending receipt of a temporary discharge permit from the local sewer department. Alternatively, significantly contaminated waters or waters that cannot be discharged will be drummed; and

- **Used sampling equipment and PPE:** unless field screening indicates that PPE and other solid wastes are contaminated to the level that they cannot be disposed of as non-hazardous waste, this material will be double-bagged and disposed of off-site as non-regulated solid waste.

Wastes that need to be drummed will be placed in United States Department of Transportation (DOT) approved 55-gallon drums and stored at a central storage location selected by NYSDEC, pending analysis and disposal. Drums will be staged within secondary containment units and covered with a plastic tarp if stored outside. All drums containing IDW will be labeled as to their contents, the site name, location where the material was generated, and date the waste was generated. Composite samples of like wastes will be collected for toxicity characteristic leaching procedure (TCLP) VOCs, TCLP semivolatile organic compounds (SVOCs), TCLP pesticides/herbicides, TCLP metals, PCBs, and pH. A waste disposal firm will then be subcontracted to haul the waste off-site to an appropriate disposal facility as either solid or hazardous waste. The site specific monitoring firm will coordinate drum hauling with the NYSDEC project manager to ensure that NYSDEC or its representative or the site owner or responsible party is available to sign the waste shipping manifest(s), as legal waste generator.

2.3 Sample Handling and Custody

2.3.1 Sample Containers

The volumes and containers required for sampling activities are indicated in Table 2-1. Prewashed sample containers will be provided by the laboratory and will be wide-mouth jars with Teflon-lined caps unless otherwise indicated. The laboratory must use an approved specialty container supplier, which prepares containers in accordance with EPA bottle-washing procedures. The laboratory must maintain a record of all sample bottle lot numbers shipped in the event of a

contamination problem. Trip blanks will be transported to the site inside the same box as volatile organic analysis (VOA) vials or as the air sampling canisters.

Table 2-1 Summary of Analytical Methods, Preservatives, and Holding Times, NYSDEC Projects

Parameter	Method	Containers/Preservative for Solid Samples[a]	Containers/Preservative for Aqueous Samples[a]	Holding Time for Solid Samples[a]	Holding Time for Aqueous or Air Samples[a]
Contract Laboratory Program Analysis					
TCL VOCs	OLM04.2/SOM01.0	Two pre-weighed 40-mL plus one pre-weighed 40-mL vial with stir bar and methanol and one 4-oz. glass vial with septum (if no other containers are shipped)	Three 40-mL glass vials with septa, preserved HCl < pH 2	48 hours for analysis or freezing to <7˚C and 12 days for analysis following freezing	12 days for waters with chemical preservative, and 5 days for unpreserved sample
TCL SVOCs	OLM04.2/SOM01.0	One 8-oz. glass jar	Two 1-L amber glass bottles	12 days/40 days[d]	5 days/40 days[d]
TCL Pest/PCB	OLM04.2/SOM01.0	One 8-oz. glass jar	Two 1-L amber glass bottles	12 days/40 days[d]	5 days/40 days[d]
TAL Metals/ Mercury	ILM05.3	One 8-oz. glass jar	One 1-L HDPE bottle, preserved HNO_3 to pH <2	180 days/26 days for mercury	180 days/26 days for mercury
TAL Cyanide	ILM05.3	One 8-oz. glass jar	One 1-L HDPE bottle, preserved NaOH to pH >12	180 days/12 days for cyanide	180 days/12 days for cyanide
Air/Vapor Samples					
Target VOCs	TO-15[g]	1.0, 1.4, or 6.0 L Minican (depending on lab availability	NA		30 Days
Solid Waste					
Ignitability	SW-846 Chapter 8 (8.1)	One 8-oz. glass jar	One 1-L HDPE bottle for both tests	40 days	40 days
Corrosivity (as pH)	SW-846 Chapter 8 (8.2)	One 8-oz. glass jar		28 days	28 days
Reactivity	SW-846 Chapter 8 (8.3)	One 8-oz. glass jar	Two 1-L HDPE bottles	28 days	28 days
TCLP Extraction	1311	Two 8-oz. glass jars	Various (see below)	5 days for SVOCs and mercury, 7 days for VOCs, 180 days for metals	5 days for SVOCs and mercury, 7 days for VOCs, 180 days for metals

Table 2-1 Summary of Analytical Methods, Preservatives, and Holding Times, NYSDEC Projects

Parameter	Method	Containers/Preservative for Solid Samples[a]	Containers/Preservative for Aqueous Samples[a]	Holding Time for Solid Samples[a]	Holding Time for Aqueous or Air Samples[a]
TCLP Metals/ Mercury	6010B/7471	One 8-oz. glass jar	One 1-L HDPE bottle[c]	26 days[b] for mercury, 180 days for metals	26 days[b] for mercury, 180 days for metals
TCLP Volatile Organics	8260B	One 125-mL VOA jar	Two 40-ml glass vials with septa	7 days	7 days
TCLP Base/ Neutral Acid Extractables	8270C	One 8-oz. glass jar	Two 1-L amber glass bottles	7 days, 40 days for analysis[b]	7 days, 40 days for analysis[b]
TCLP Pesticides	8081A	One 8-oz. glass jar	Two 1-L amber glass bottles	7 days, 40 days for analysis[b]	7 days, 40 days for analysis[b]
TCLP Herbicides	8151A	One 8-oz. glass jar	Two 1-L amber glass bottles	7 days, 40 days for analysis[b]	7 days, 40 days for analysis[b]
TCLP STARS Base/Neutral Extractables	8270C	One 8-oz. glass jar	Two 1-L amber glass bottles	7 days, 40 days for analysis[b]	7 days, 40 days for analysis[b]
TCLP STARS Volatile Organics	8021B or 8260B	One 125 mL VOA jar	Two 40-mL glass vials with septa	7 days[b]	7 days[b]
Additional Methods					
Hardness	130.1,130.2	NA	One 1-L HDPE bottle (can combine with metals) preserved HNO_3 to pH <2	NA	180 days
pH	150.1	NA	To be performed in the field	NA	ASAP
TDS	160.1	NA	One 1-L HDPE bottle	NA	24 hours
TSS	160.2	NA	One 1-L HDPE bottle	NA	5 days
Priority Pollutant Metals	200.7	One 4-oz. glass jar	One 1-L HDPE bottle preserved HNO_3 to pH <2	180 days, 26 days for mercury	180 days, 26 days for mercury
Alkalinity	310.1, 310.2	NA	One 1-L HDPE bottle	NA	12 days
Nitrate or Nitrite	353.2/300,/9056	One 4-oz. glass jar	One 1-L HDPE bottle (can combine with pH and BOD_5)	24 hours	24 hours
Nitrate-Nitrite	353.2	One 4-oz. glass jar	One 1-L HDPE bottle preserved H_2SO_4 to pH <2	26 days	26 days

Table 2-1 Summary of Analytical Methods, Preservatives, and Holding Times, NYSDEC Projects

Parameter	Method	Containers/Preservative for Solid Samples[a]	Containers/Preservative for Aqueous Samples[a]	Holding Time for Solid Samples[a]	Holding Time for Aqueous or Air Samples[a]
Orthophosphorus	365.2/300,/9056	NA	One 1-L HDPE bottle (can combine with pH and BOD_5)	NA	24 hours
Total Phosphorus	365.2	One 4-oz. glass jar	One 1-L HDPE bottle preserved H_2SO_4 to pH <2	26 days	26 days
Chloride, Bromide, Sulfate, Fluoride	300, 9056 or individual methods	One 4-oz. glass jar	One 1-L HDPE bottle	26 days	26 days
COD	410.1	NA	One 1-L HDPE bottle (can combine with ammonia and TKN) preserved H_2SO_4 to pH <2	NA	26 days
Oil/Grease	1664	One 4-oz. glass jar	One 1-L amber glass bottle preserved HNO_3 to pH <2	26 days	26 days
TRPH	1664	One 4-oz. glass jar	One 1-L amber glass bottle preserved H_2SO_4 to pH <2	26 days	26 days
Metals/Mercury	6010B	One 4-oz. glass jar	One 125-mL HDPE bottle preserved HNO_3 to pH <2	180 days/26 days for mercury	180 days/26 days for mercury
Chromium, Hexavalent	7196A	One 4-oz. glass jar	One 1-L HDPE bottle unpreserved or preserved pH of 9.3 to 9.7 with an ammonia sulfate buffer solution	24 hours from collection for unpreserved soils and 28 days for preserved soils	24 hours from collection for unpreserved water and 28 days for preserved water
PCBs	8082	One 4-oz. glass jar	Two 1-L amber glass bottles	12 days/40 days[d]	5 days/40 days[d]

Table 2-1 Summary of Analytical Methods, Preservatives, and Holding Times, NYSDEC Projects

Parameter	Method	Containers/Preservative for Solid Samples[a]	Containers/Preservative for Aqueous Samples[a]	Holding Time for Solid Samples[a]	Holding Time for Aqueous or Air Samples[a]
VOCs and related tests	8260B/8021B/8015B	Two pre-weighed 40-mL with deionized water and one pre-weighed 40-mL vial with stir bar and methanol and one 4-oz. glass vial with septum(if no other containers are shipped)	Three 40-mL glass vials with septa preserved HCl < pH 2	48 hours for analysis or freezing to <7˚C and 12 days for analysis following freezing	12 days for waters with chemical preservative, and 5 days for unpreserved sample
SVOCs and related tests	8270C	One 8-oz. glass jar	Two 1-L amber glass bottles	12 days/40 days[d]	5 days/40 days[d]
Chlorinated Dioxins and Furans	8280A or 8290	One 8-oz. glass jar	Two 1-L amber glass bottles	30 days/45 days[d]	30 days/45 days[d]
Cyanide	9010C/9012B	One 4-oz. glass jar	One 1-L HDPE bottle preserved NaOH to pH >12	12 days	12 days
TOX	9020B	One 4-oz. glass jar	One 1-L amber glass preserved H_2SO_4 to pH <2	7 days	7 days
pH	9045C/9040B	One 4-oz. glass jar	One 125-mL HDPE bottle	ASAP	ASAP
Total Phenols	420.1	One 4-oz. glass jar	One 1-L amber glass preserved H_2SO_4 to pH <2	26 days	26 days
Total Organic Carbon	Lloyd Kahn; 415.1; 9060	One 4-oz. glass jar	NA	26 days	26 days
Total Glycol	DEC 89-9	One 4-oz. glass jar	One 1-L glass	26 days	14 days
Specific Gravity	SM 22710 F	NA	Can combine with other analyses (requires 500 mL)	NA	40 days
TKN	351.3	One 4-oz. glass jar	One 1-L HDPE bottle (can combine with COD and ammonia) preserved H_2SO_4 to pH <2	26 days	26 days
Ammonia	350.2	One 4-oz. glass jar	One 1-L HDPE bottle (can combine with COD and TKN) preserved H_2SO_4 to pH <2	26 days	26 days

Table 2-1 Summary of Analytical Methods, Preservatives, and Holding Times, NYSDEC Projects

Parameter	Method	Containers/Preservative for Solid Samples[a]	Containers/Preservative for Aqueous Samples[a]	Holding Time for Solid Samples[a]	Holding Time for Aqueous or Air Samples[a]
BOD_5	405.1	NA	One 1-L HDPE bottle (can combine with pH and nitrates)	NA	24 hours

[a] All samples to be cooled to 4°C except for metals analysis samples shipped alone. Sample containers must have Teflon-lined lids. Holding times are based on verified times of sample receipt and are consistent with NYSDEC requirements. 0.008% Na2S2O3 to be added to water samples in the presence of residual chlorine.
[b] Time listed is from TCLP extraction.
[c] TCLP analysis of water samples assumes less than 0.5% solids.
[d] Holding time is 5 days from collection to extraction and 40 days from extraction to analysis.

Key:
ASAP = As soon as possible.
BOD_5 = Biochemical oxygen demand-5.
BTX = Benzene, toluene, xylene.
COD = Chemical oxygen demand.
EPA = U.S. Environmental Protection Agency.
HDPE = High-density polyethylene.
HNO_3 = Nitric acid.
H_2SO_4 = Sulfuric acid.
L = Liter.
mL = Milliliter.
NA = Not applicable.
NaOH = Sodium hydroxide.
oz. = Ounce.
PCBs = Polychlorinated biphenyls.
SM = Standard Methods of Analysis for Water and Wastewater.
STARS = NYSDEC Spill Technology and Remediation Series (Memorandum No. 1 [1992]).
SVOCs = Semivolatile organic compounds.
TAL = Target Analyze List.
TCL = Target Compound List.
TCLP = Toxicity characteristic leaching procedure.
TDS = Total dissolved solids.
TKN = Total Kjeldahl nitrogen.
TOX = Total Organic Halides.
TRPH = total recoverable petroleum hydrocarbon.
TSS = Total suspended solids.
VOC = Volatile organic compounds.

2.3.2 Sample Preservation and Holding Times

All samples requiring preservation will be collected in containers pre-preserved by the laboratory supplier. If field preservation is necessary, preservation will be immediately after collection and transportation to the site office. A clean, disposable pipette or a premeasured, single-use, glass ampule will be used to transfer liquid preservatives to the sample container. Care will be taken to avoid contact between the pipette or ampule and the sample or sample container. Solid preservatives will be transferred to the sample container using a clean, stainless-steel spoon. The sample preservation will be checked on representative samples by pouring the sample into a clean cup and testing with pH paper to determine if a sufficient amount of preservative has been used. Preserved samples for VOA will be tested on an extra vial at a rate of approximately 10%. Use of additional preservative also will be recorded in the logbook. Field blanks, which require preservation, will be preserved with a volume of reagent equal to the volume of reagent used in the samples that the blanks represent. A list of preservatives and holding times for each type of analysis are indicated in Table 2-1. Additional preservation requirements and holding times for non-target analyses are listed in the NYSDEC ASP.

Samples for soil VOCs will be collected in accordance with Method 5035. The laboratory must supply two pre-tarred VOA vials with 5 mL of deionized water, one pre-tarred vial with methanol, and one 2-ounce container for dry weight analysis (only if no other tests are required). The laboratory also must provide one coring device per sample for collection of a 5-gram plug. Soil samples for VOCs must arrive at the laboratory within 48 hours to be frozen at -7^{o}C.

Reagents used for preservation are reagent-grade and are supplied by the laboratory or approved chemical supplier. The laboratory must maintain traceability records on preservatives in the event of potential field contamination of samples. Each bottle is received from the laboratory and must be clearly labeled with laboratory name, type of chemical, lot number, and expiration date. Field personnel should record the date used in the field, site name, and site specific project number on the label or in the site logbook. Fresh sample containers and preservatives will be obtained from laboratory stocks prior to mobilization for each sampling event. Preservatives stored on site will be disposed of after use unless containers are sealed and stored under COC in a secure area. No preservatives will be used passed the expiration date.

Sample preservation will be verified at the laboratory at receipt or prior to analysis for VOCs. The preservation or pH will be recorded in the logbook. If samples are improperly preserved, a corrective action form will be submitted to the laboratory project manager for follow-up action. The laboratory will notify the Field Leader or Project Manager to implement corrective action in the field.

Methods for the analysis of soils, sediments, or solid matrices for VOCs will be used in conjunction with Method 5035A: Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples. The recommended collection technique for Method 5035A calls for the transfer of a 5-gram aliquot of sample to a tarred empty 40-mL VOA vial. The sample is iced at 4°C for transport to the lab. The laboratory will refrigerate VOA vials at 4°C ± 2°C for 48 hours or less or preserve by freezing at < -7°C within 48 hours of receipt to extend holding time to 14 days.

2.3.3 Sample Handling

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of samples but also prevents any detrimental effects due to the possible hazardous nature of the samples. Regulations for packaging, marking, labeling, and shipping of hazardous materials are promulgated by the DOT in 49 CFR 171 through 177. The site specific monitoring firm needs to trains all staff responsible for the shipment of samples in these regulations. Procedures for sample packing and shipping are documented in the site specific monitoring firm's SOP.

Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with their original containers;
- Shipping coolers must be partially filled with packing materials and ice (when required) to prevent bottles from moving and breaking during shipping;
- Environmental samples are to be cooled. Wet ice packaged in sealable, plastic bags will be used to cool samples during shipping. Ice is not to be used as a substitute for packing materials;
- Any remaining space in the cooler should be filled with inert packing material such as bubble wrap. Under no circumstances should material such as sawdust or sand be used;
- A duplicate custody record must be placed in a plastic bag and taped to the inside of the cooler lid. Custody seals are affixed to the sample cooler; and

- All containers for a given sample will be shipped in the same cooler when possible. In cases where samples for volatile analysis would be shipped in several coolers on a single day, VOA vials will be consolidated into a single cooler to minimize the number of required trip blanks.

Shipping Containers

Environmental samples will be properly packaged and labeled for transport and dispatched to the laboratory facility. The SOP procedure will be followed to mark and label sample shipments. A separate COC record must be prepared for each shipping container. The following requirements for shipping containers will be followed.

Sample shipping containers will generally be commercially purchased coolers (e.g., Coleman coolers) or boxes provided from the laboratory for air canisters. Each container will be custody-sealed for shipment, as appropriate. The container custody seal will consist of filament tape wrapped around the package at least twice and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking a seal.

Field personnel will make arrangements for transportation of samples to the laboratory. In most cases, samples will be shipped using an overnight express carrier (e.g., Federal Express). Field monitoring personnel will provide the laboratory with a shipment schedule and notify them of deviations from planned activities. The field monitoring personnel will notify the laboratory of all of samples intended for Saturday delivery, no later than 3 p.m. (Eastern Standard Time) on Thursday.

2.3.4 Sample Custody

Formal sample custody procedures begin when the precleaned sample containers leave the laboratory or upon receipt from the container vendor. The laboratory must follow written and approved SOPs for shipping, receiving, logging, and internally transferring samples. Sample identification documents must be carefully prepared so that sample identification and COC can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks;
- Sample labels;
- Custody seals; and
- COC records.

The primary objective of COC procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from sampling through completion of all required analyses. A sample is in custody if it is:

- In a team member's physical possession;
- In a team member's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

Field Custody Procedures

Precleaned sample containers will be relinquished by the laboratory to the Field monitoring personnel. The Field monitoring personnel will record receipt of the sample containers in the project logbook. The following field custody procedure will be used for collection of samples:

- As few persons as possible should handle samples;
- Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use;
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under COC rules;
- The sample collector will record sample data in the field logbook; and
- The Field monitoring personnel will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

Chain-of-Custody Record

The COC form must be fully completed in duplicate by the field technician designated by the site specific monitoring firm's Project Manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations), the person completing the COC record should note these constraints. The custody record also should indicate any special

preservation techniques necessary or whether samples need to be filtered. Copies of COC records are maintained with the project file.

Custody Seals

Custody seals are preprinted, adhesive-backed seals with security slots designed to break if the seals are disturbed. DOT-approved sample shipping containers are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. Upon receipt at the laboratory, the custodian must check and document on a cooler receipt form that seals on boxes are intact.

2.3.5 Laboratory Custody Procedures

All laboratory custody procedures must maintain a system that provides for sample log-in, sign-out and sign-in of samples to and from individual analysts, data storage and reporting, and sample disposal. These procedures must ensure continuous documentation of sample custody from receipt to disposal. Procedures used by the laboratory must meet all NYSDEC requirements. Laboratories must complete a cooler receipt form documenting the temperature and condition of samples on receipt. The form must be provided in the laboratory data package.

The laboratory must submit sample receipt documents for each set of samples received. A sample delivery group (SDG) is defined as a batch of up to 20 samples collected during one calendar week. Samples shipped on Friday will normally conclude an SDG. The sample receipt documents consist of the Sample Receipt file, a pdf of the COC, and a pdf of the laboratory log report showing the tests selected.

The laboratory must implement, practice, and maintain programs for managing waste disposal. The site specific monitoring firm's and NYSDEC markings must be removed from all sample containers prior to disposal. Waste disposal procedures must include use of a certified hauler and meet Federal and State regulations.

2.4 Analytical Method Requirements

Analytical method requirements will be documented in the appropriate work plan or FSP. The specific implementation of analytical methods will be documented in laboratory SOPs. Laboratory SOPs and the QA program will be reviewed and approved as part of the procurement process.

2.4.1 Standard Laboratory Analytical Procedures

Analytical methods in support of NYSDEC activities are referenced in NYSDEC's ASP. The protocol is based on the following methods:

1. 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act;

2. "Standard Methods for the Examination of Water and Wastewater," APHA/AWWA/WEF, 21st ed, 1992;

3. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983;

4. "Test Methods for Evaluating Solid Waste, Physical Chemical Methods," 3rd ed, SW-846, 1998, latest update;

5. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air," 2nd ed, EPA/625/R-96/010b, January 1999;

6. "USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, OLM04.3, 2003or SOM01.2, 2007";

7. "EPA Contract Laboratory Program, Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration ILM05.4, 2007; and

8. American Society for Testing and Materials (ASTM).

The laboratory must be certified by the NYSDOH ELAP for all analytical methods for which the NYSDOH provides an approval program. Laboratories also must be National Environmental Laboratory Accreditation Program (NELAP) approved by NYSDOH or related accrediting authority.

Table 2-1 lists all analyses that may be performed for NYSDEC projects. Reporting limits for any additional methods will be included in the site-specific QAPP.

The site specific monitoring firm's anticipates that laboratories will use the most current method available and/or recommended by EPA. For example, EPA has promulgated the use of Standard Methods references instead of the water method reference listed above. The actual methods for the project will be reviewed and approved as part of the project planning process.

2.5 Quality Control

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of glassware and reagents. Field QC will include duplicates, trip blanks, field equipment blanks, and miscellaneous

field QC samples. Field QC samples will be preserved, documented, and transported in the same manner as the samples they represent. Laboratory-based QC will consist of standards, replicates, spikes, and blanks. Method QC limits for analyses need to be provided by the site specific monitoring firm's laboratory or are included in NYSDEC ASP 2005. Quality control limits for any additional methods will be included in the site-specific work plan or FSP.

2.5.1 Field Quality Control Samples

The collection of field QC samples and the conditions, under which the samples were collected, will be documented in the field logbook. Unless otherwise directed by NYSDEC, the field QC samples listed below will be collected and analyzed at the frequency listed in Table 2-2.

Table 2-2 Field Quality Control Guidelines, NYSDEC Projects

QC Sample	Description
Field Duplicate	One per matrix per 20 samples for each analysis.
Field Equipment Blank	One per equipment per 20 samples for each analysis. Only equipment sets that are subject to decontamination require equipment blanks. Dedicated or disposal equipment does not require equipment blanks.
Trip Blank	One per shipment for each cooler in which aqueous samples for VOC analysis are shipped or one per shipment batch for air samples. Trip blanks are analyzed for all VOC methods designated for samples. Trip blanks are shipped only for aqueous matrix.

Duplicate Samples

Duplicate samples will be collected at the rate one duplicate per 20 project samples of the same matrix. Duplicate soil samples will be prepared by collecting equal aliquots from the same sample source and placing them in separate sample bottles. Duplicate water samples will be prepared by collecting successive volumes of water and placing them in separate bottles. Duplicate air samples will collected with a tubing splitter. Duplicate samples will be shipped with the samples they represent and will be analyzed in the same manner.

The RPD between the concentration in the original and duplicate sample measures the overall precision of the field sampling and analytical method. Field duplicates are evaluated by using two times the laboratory QC criteria for duplicates (i.e., RPDs of 40% for water and air and 70% for soils). If all other laboratory QC criteria are met, RPD results outside control limits indicate potential matrix effects. Significant deviations in RPD results of field duplicates are assessed to evaluate whether data met all quality objectives for the project.

Trip Blanks

Trip blanks are collected to establish that the transport of sample bottles to and from the field does not result in contamination of the sample from external sources. Trip blanks will be collected for, and in conjunction with, only VOA for aqueous samples. If the 40-mililiter (mL) VOA vials are shipped to the field team by the laboratory sample custodian, a representative number of vials filled with analyte-free water (preserved, capped, and labeled) will accompany the shipment to and from the laboratory. Trip blanks will be treated in the same manner as the VOA samples they represent and will be taken to representative field sample sites, but remain unopened. Trip blanks will be sent with each sample-shipping container that contains aqueous samples for VOA.

Field Equipment Blanks

Field equipment blanks are blank samples (also called rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use and that cleaning procedures between samples are sufficient to minimize cross-contamination. Field equipment blanks will be prepared in the field using an approved water source. Sampling of the water source may also be required if analyte-free water is not obtained from the lab. The field equipment blank will be preserved, documented, shipped, and analyzed in the same manner as the samples it represents. Equipment blanks will be collected at the rate of one sample per day, per equipment set.

An equipment set is all sampling equipment required to collect one sample. For example, one soil sample equipment set may include a stainless-steel bowl, a stainless-steel trowel, and a bucket auger. Samples collected with dedicated or disposable equipment do not require equipment blank samples.

Field equipment and trip blanks serve to demonstrate contamination-free procedures in the field and during sample transport. The goal is for field blanks to be free of contamination. Low-level contamination may be present, but must be less than five times the level found in associated samples. If contamination is greater, the sample results are qualified as non-detect at an elevated-reporting limit. If field blank contaminants are also present in the method blank, or are typical laboratory contaminants, or are not present in project samples, then no further action is required. All other sources of contamination must be investigated as part of the corrective action process. Sample results that do not meet quality objectives after qualification, re-sampling may be required. The QA Officer, Project Chemist, and Project Manager must determine potential changes in field procedures to eliminate contamination sources prior to re-sampling.

Miscellaneous Field QC Samples

This type of QC sampling involves analysis of investigation water sources and monitoring well drilling fluids (if used). Because the water supply source is used in decontamination and well drilling activities, it may be necessary to determine the possibility for the introduction of outside contaminants. Drilling fluids (muds) that are used during well installation may also be analyzed in order to assess the possibility of such constituents affecting groundwater samples.

Field background samples are required for air sampling events. Results of the background sample are used in the assessment process to determine whether contamination is site-related or significant.

2.5.2 Laboratory Quality Control Analyses

Analytical performance is monitored through QC samples and spikes, such as laboratory method blanks, surrogate spikes, QC check samples, matrix spikes, matrix spike duplicates, duplicate samples, and duplicate injections (see Table 2-3). All QC samples are applied on the basis of a laboratory batch. Batches do not exceed 20 samples excluding associated field and laboratory QC samples. The QC samples associated with sample preparation include method blanks, laboratory control samples (LCSs) (also called matrix spike blanks [MSB] by NYSDEC), matrix spikes, and duplicates. The run batch represents all samples analyzed together in the run sequence. The run sequence is typically limited to 24 hours unless defined differently for the analytical method. For some analyses, such as volatile organics, the run batch is equivalent to the preparation batch. The QC samples associated with the run sequence include calibration standards, instrument blanks, and reference standards. Unless otherwise directed by NYSDEC staff, the laboratory QC samples listed below will be collected and analyzed at the frequency listed in Table 2-3.

Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving detection limits or associated QC target criteria. In such instances, data will not be rejected *a priori* but will be examined on a case-by-case basis. The laboratory will report the reason for deviations from these detection limits or noncompliance with QC criteria in the case narrative.

Table 2-3 Laboratory Quality Control Sample Guidelines, NYSDEC Projects

QC Sample	Description
MB	One per matrix per preparation batch for each analysis.
LCS/MSB	One per matrix per preparation batch for each analysis. The LCS/MSB must contain all target analytes of concern at the site.
Surrogate Spikes	All samples analyzed for organic methods.
Internal Standards	All samples analyzed by GC/MS methods.

Table 2-3 Laboratory Quality Control Sample Guidelines, NYSDEC Projects

QC Sample	Description
MS/MSD	One per matrix per SDG for each analysis. The spike solution must contain a broad range of the analytes of concern at the site. The overall frequency of MS/MSD on project samples must be at least one set per 20 samples.
MS/MD	One per matrix per SDG for metals and general chemistry methods. The spike solution must contain a broad range of analytes of concern at the site. The overall frequency of MS/MD on the project samples must be at least one set per 20 samples.
Serial Dilution/Post Digestion Spike	All samples analyzed for metals.

Key:
SDG = Sample Delivery Group.
LCS = Laboratory Control Samples.
MSB = Matrix Spike Blank.
MS/MD = Matrix Spike/Matrix Duplicate.
MS/MSD = Matrix Spike/Matrix Spike Duplicate.
MB = Method Blank.
TAL = Target Analyte List.

Laboratory Method Blank

Laboratory method blanks serve to demonstrate a contamination-free environment in the laboratory. The goal is for method blanks to be free of contamination. Low-level contamination may be present, but must be less than the reporting limit. If contamination is greater, samples are reanalyzed. If contaminants are present in the method blank but not in project samples, no further action is required. All sources of contamination that are not common laboratory contaminants as defined in the method SOPs must be investigated as part of the corrective action process. Sample results must not be blank subtracted unless specifically required by the analytical method.

Surrogate Standards

Surrogate recoveries must be within QC criteria for method blanks and LCSs to demonstrate acceptable method performance. If surrogate recoveries are outside QC criteria for method blanks or LCSs, corrective action is required and the Project Chemist should be notified. Surrogate recoveries in the samples indicate the method performance on the particular sample matrix. Surrogate recoveries that are outside QC criteria for a sample indicate a potential matrix effect. Matrix effects must be verified based on review of recoveries in the method blank or LCS, sample reanalysis, or evaluation of interfering compounds. Sample clean-up procedures are required by the NYSDEC ASP must be implemented to alleviate potential matrix problems.

Laboratory Control Sample

LCS recoveries must be monitored on control charts for all non-CLP methods. Laboratory QC criteria must be established for each method and matrix using a minimum of 30 points. QC criteria should be updated annually for all non-CLP methods. The LCS recovery must be within the control limits to demonstrate acceptable method performance. Sporadic marginal failures of a few target analytes reported when greater than five target analytes are required are allowed as part of the data review guidance. If LCS recoveries are outside QC criteria for more than a few target analytes, recoveries are significantly low, or the compounds were detected in the samples, then corrective action is required. After corrective action is complete, sample re-analysis is required for failed parameters. If LCS recoveries exceed the QC criteria, and that parameter is not found in any samples, re-analysis is not necessary. For any other deviations from LCS control limits that can not be resolved by sample re-analysis within holding times, the Project Chemist must be notified immediately. If critical samples are affected, the Project Manager may determine that re-sampling is required.

Matrix Spike Sample

MS recoveries are a measure of the performance of the method on the sample being analyzed. Field and trip blanks must not be chosen for spiking. MS recoveries outside the control limits applied to the LCS indicate matrix effects. Sample clean-up procedures may be warranted for samples with severe matrix effects. The laboratory should notify the Project Chemist of these instances to determine an appropriate corrective action.

Matrix Spike Duplicate Sample

The MSD sample is commonly prepared in conjunction with the MS sample. The MSD is prepared from a separate portion of the sample and processed with the same additions as the MS. The MSD is prepared for methods that do not typically show concentrations of target analytes above MDLs, such as organic methods. The RPD between the recoveries in the MS and MSD measures the precision of the analytical method on actual project samples. QC criteria for RPDs are 20% for waters and 35% for soils unless the laboratory provides additional statistical criteria.

Duplicate Sample

The duplicate is prepared for methods that typically show concentrations of target analytes above MDLs, such as metals and wet chemistry methods. The RPDs between recoveries in the original and duplicate measures the precision of the analytical method on the actual project samples. QC criteria for RPDs are 20% for waters and 35% for soils unless the laboratory provides additional statistical criteria.

If all other QC criteria are met, RPD results outside control limits indicate potential matrix effects. The laboratory should investigate significant deviations in the RPD results by observing the sample to determine any visual heterogeneity or reviewing sample chromatograms for matrix interference. If visual observation does not indicate a potential problem, the sample may be reanalyzed. Potential matrix effects are reported in the case narrative.

Instrument Blanks

Instrument or reagent blanks are analyzed in the laboratory to assess laboratory instrument procedures as possible sources of sample contamination. Instrument blanks are part of the laboratory corrective action if method blanks show contamination or the analyst suspects carryover from a high concentration sample. Instrument blank results are reported on a laboratory corrective action form.

QC Check Standards

A QC check standard is obtained from a different source or at a minimum a lot different from that of the calibration standard. A check standard result is used to validate an existing concentration calibration standard file or calibration curve. The check standard provides information on the accuracy of the instrumental analytical method, independent of various sample matrices. Check standards are analyzed with each new calibration curve.

Internal standard area counts for water and solid sample analysis for all samples must be in the inclusive range of 50% to 200%, and retention time must not marry more than +/- 30 seconds of its associated 12-hour calibration standard (i.e., opening Continuing Calibration Verification or mid-point standard from Initial Calibration).

The serial dilution analysis (a five-fold dilution) must agree within a 10% difference of the original determination after correction for the dilution if the analyte concentration is sufficiently high (concentration in the original sample is >50 times [50x] the MDL).

The post-digestion spike (%R) must be within the acceptance limits of 75% to 125%. However, spike recovery limits do not apply when the sample concentration is greater than 4x the spike added.

Other Laboratory QC Samples

The laboratory performs analysis of other QC samples or standards, depending on the analytical method. Method-specific QC samples or standards include internal standard spikes for gas chromatography/mass spectrometry (GC/MS) methods; post-digestion spikes and serial dilutions for metals analysis; and interference check samples (ICSs) for ICP analysis.

Blind QC Check Samples

Types of blind QC check samples include external performance evaluation (PE) samples provided by an outside certifying agency and internal QC samples submitted for routine analysis by the laboratory QA officer. The laboratory must pass NYSDOH samples as part of the approval process. If methods are used that are not included in NYSDOH approval process, blind QC samples may be submitted to the laboratory to evaluate method performance.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

All laboratory and field instruments and equipment used for sample analysis must be serviced and maintained only by qualified personnel. Laboratory instrument maintenance procedures will be evaluated to verify that there will be no impacts on analysis of project samples due to instrument malfunction. For example, the laboratory must have duplicate instrumentation and/or major laboratory instruments (e.g., GC/MS, ICP, atomic absorption spectroscopy [AAS]) maintained under service agreements with the manufacturer that require rapid respond by manufacturer-approved service agents.

Field instruments will be rented through approved suppliers that have manufacturer-approved maintenance programs.

2.6.1 Field Equipment Maintenance

Field equipment will be checked upon receipt to verify that instruments are in working condition and that the rental company provided appropriate calibration records or certifications. On-site operation will be performed in accordance with manufacturer manuals. If any problems occur, the instrument will be replaced immediately. Equipment purchased for the contract will be maintained in accordance with manufacturer guidance.

2.6.2 Laboratory Equipment Maintenance

The laboratory must maintain a stock of spare parts and consumables for all analytical equipment. Routine preventive maintenance procedures should be documented in site specific monitoring firm's SOPs. Maintenance performed on each piece of equipment must be documented in a maintenance logbook. Daily checks of the laboratory deionized water and other support systems are required. The laboratory must operate backup instrumentation for most of its analytical equipment in the event of major instrument failure or have an alternative approached to ensure analytical work proceeds within holding times with no adverse impacts on data quality.

2.7 Instrument/Equipment Calibration and Frequency

All instruments and equipment used during sampling and analysis will be operated and calibrated according to the manufacturer's guidelines and recommendations, as well as criteria set forth in applicable analytical methodology references. Personnel properly trained in these procedures will perform operation and calibration of all instruments. Documentation of all field maintenance and calibration information will be maintained in the field logbook. Table 2-4 lists typical monitoring equipment used during fieldwork. This equipment is representative of instruments typically required for NYSDEC projects. All equipment used for the NYSDEC projects will be NYSDEC-owned or rented. All field personnel receive annual refresher training on the field operation of all health and safety related

Table 2-4 General Field Equipment and Calibration Procedures

Instrument or Equipment	Description[a]	Field Calibration Procedure	Acceptability/ Performance Criteria	Responsible Personnel
Organic Vapor Analyzer (OVA)	Flame Ionization Detector to provide continuous data on organic vapor concentrations. Unit must be Class I, Division 1, Grade A,B,C,D. Unit must have rechargeable battery, range of 0 to 1,000 ppm, and ultra-high purity hydrogen as fuel source.	Units are factory calibrated to remain with performance specification for an excess of 6 months. During field use, a carbon filter is used with the OVA to distinguish methane from other organics. The unit is checked daily with calibration gas to ensure the response is consistent. If needed, the unit will be re-calibrated to manufacturer specifications. When the OVA is used to screen samples (except samples for headspace analysis), periodic ambient air readings will also be recorded in the logbook.	A carbon filter must remove sources of organic vapors other than methane (i.e., marker). Instrument must detect organic vapors without filter. Response should be checked daily with calibration gas. The accuracy will depend on the application.	Site Safety Officer, Project Geologist
O_2 Explosimeter	Gas monitor designed to simultaneously monitor areas for oxygen deficiency and dangerous levels of combustible gas. Units must be equipped with sample pumps and hoses to measure gases in a confined space. Range O_2 - 0 to 25%, LEL - 0 to 100%, H_2S - 0 to 200 ppm, and CO - 0 to 999 ppm. Not all units have the additional capability to detect hydrogen sulfide or H_2S or carbon dioxide.	Procedures for field calibration of the O_2/explosimeter are as follows: ■ Inspect instrument to ensure entry and exit ports are clear; ■ Turn the switch to ON position; ■ Allow the meters to stabilize and then press the reset button; ■ Check the battery level; ■ Calibrate the oxygen meter to 20.8% by using the calibrate knob; ■ Adjust the explosimeter to zero by using the zero knob; and ■ Check alarm levels by adjusting the calibrate knob for oxygen levels and the zero knob for explosimeter levels and note the readings when the alarm sounds. Return readings to normal and depress the reset button.	Alarm must sound during calibration procedure. Battery must have sufficient charge for operation. Blocking the sample line probe and observing the drop of the flow indicator float checks flow system. If flow system is not functioning, return unit for repairs.	Site Safety Officer, Project Geologist

Table 2-4 General Field Equipment and Calibration Procedures

Instrument or Equipment	Description[a]	Field Calibration Procedure	Acceptability/ Performance Criteria	Responsible Personnel
pH/Conductivity, Temperature, Dissolved Oxygen (DO), Oxidation Reduction (REDOX) Meter	Meter designed for field use with battery operation. The unit must contain separate pH, temperature, conductivity, DO, and ORP probes in one unit.	Before use, pH, specific conductance, DO, and ORP probes need to be calibrated or tested for responsiveness. The pH probe will be calibrated first. This is done by placing the probe in pH 7, then pH 4, standard solutions and adjusting the pH calibration knobs until the correct measurement is obtained. The ORP probe is then calibrated with the ORP standard solution (Zobell), and the DO probe is checked in accordance with manufacturer guidelines. The probes should be rinsed with deionized water between each calibration solution and following calibration. Used calibration solution is to be discarded. Finally, the conductivity probe is checked with a solution of known conductivity.	Turbidity and DO ∀ 10% pH ∀ 0.01 pH Conductivity at ∀ 2% FSD The instrument will be checked with a pH standard every 4 hours and at the end of the sampling day. If the response is greater than 0.2 units more or less than the standard, complete calibration will be conducted.	Project Geologist, Sampler
Turbidity Meter	Nephelometer designed for field use with battery operation. Range 0.01 to 1,000 NTU.	The unit is factory calibrated. Field procedures involve checking the unit's responsiveness at least once a day using factory supplied standards. The responsiveness should be checked on the 0 to 10 range, 0 to 100 range, and 0 to 1,000 range.	∀ 10%	Sampler
PID Meter	The PID is a portable, non-destructive trace gas analyzer. Units for site characterization must have a range of 0 to >2,000 ppm and a 10.6 or 11.7 eV lamp (e.g., MiniRAE 2000). Units for indoor air monitoring must have a range of 1 ppb to 2,000 ppm and a 10.6 eV lamp (e.g., ppb RAE Plus).Calibration check gas (e.g., isobutylene) must be provided with unit.	In the field, PIDs will be calibrated at the start of each field event by the manufacturer. Initial calibration must be verified by a certificate of calibration from the rental company or field calibration is required. There is no field calibration for a MiniRae 2000. If a significant change in weather occurs during the day (i.e., change in humidity or temperature) or if the unit is turned off for an extended period, then there is a field test, called a Bump Test. It consists of having the unit sniff 100ppm cal gas and determine the reading. If the unit is reading 100 ppm or close to it, then it is OK. If not, depending on how far off it is, either dry out the unit on a heater (due to potential fogging of the lamp), or send the unit back to the rental company for in-house calibration.	Meter must give consistent background readings.	Site Safety Officer, Project Geologist

Table 2-4 General Field Equipment and Calibration Procedures

Instrument or Equipment	Description[a]	Field Calibration Procedure	Acceptability/ Performance Criteria	Responsible Personnel

[a] Description is for typical equipment; equivalent units may be used.

equipment, which includes calibration procedures. Brief descriptions of calibration procedures for major field instruments are listed on Table 2-4.

The site specific monitoring firm requires laboratories to use the most current method available for calibration criteria. For example, EPA no longer allows the use of the grand mean to evaluate calibration linerity for organic methods. The site specific monitoring firm requires that the most stringent method criteria be met for all compounds of concern at site. Unless modified by the method, the site specific monitoring firm requires at least a five point curve for all calibrations for organics and a minimum of three calibration points for inorganics; exclusion of points is not allowed to meet criteria without technical justification. Any manual integration performed for calibrations needs to be documented with the rationale and included in the data package. Manual integrations of internal standards or surrogates in calibrations are not allowed.

2.8 Inspection/Acceptance of Supplies and Consumables

Measures are established by the site specific monitoring firm's QMP to assure that purchased material, equipment, and services whether purchased directly or through contractors or subcontractors conform to procurement documents.

2.9 Non-Direct Measurements

For data acquired from non-direct measurement sources include the following:

- Physical information such as descriptions of sampling activities and geologic logs;
- State and local environmental agency files;
- Reference computer databases and literature files; and
- Historical reports on a site and subjective information gathered through interviews.

Data from non-direct measurements will be reviewed and used as indicated in the work plan. Data from all non-direct measurement sources are stored as indicated in Section 1.6.

2.10 Data Management

Data management procedures track samples and results from work plan generation to the final report. The field data include approved work planning tables, labels, field sampling forms, COC forms, and logbooks. The surveyor will provide coordinates for all sample locations. The field team leader of the monitoring firm will review all field data for accuracy. Any field data not provided by the laboratory will be entered into a database or spreadsheet.

Electronic data will be provided in accordance with the most recent version of EPA Region 2's standardized electronic data deliverable (EDD) format. The format is based on the Multimedia Electronic Data Deliverable, or MEDD format. Further information on MEDD is available at the Web site http://www.epa.gov/region02/superfund/medd.htm. Currently this is the EPA Region 2 EDD dated December 2003. If required for the project, the laboratory also may provide an alternative EDD consistent with the Corporate EDD or other approved format.

The site specific monitoring firm will process the EDD to verify that criteria established in this QAPP are met. The Project Chemist will review all laboratory and field data to verify the results against the hard copy and check for transcription errors. The Project Chemist will verify qualifiers added by data processing and add any data qualifiers. The individual SDG EDD files will be processed to a centralized data management system to store all reviewed and approved data. Data that will appear on data tables for the report will be generated from the centralized database, which will serve as the central, protected data source for all data handling operations.

The central database will be stored in a secure area on site specific monitoring firm's network with access limited to data management specialists designated by the Project Manager. Data users may enter additional electronic data such as risk-based criteria for comparison of results. This data will be stored in separate tables in the database and linked to the actual results. Any data from outside sources will include a description of the data, a reference to the source, and the date updated. Outside data will be checked prior to use verify that current values are used. The central database will be used to create tables for the final report.

3 Assessment and Oversight

The site specific monitoring firm's assessment and oversight procedures will be implemented in accordance with the QMP. The QMP outlines general roles and responsibilities for the project team.

3.1 Assessment and Response Actions

The site specific monitoring firm's overall assessment activities include management assessments, development of SOPs, and performance evaluations. Management assessments include weekly meetings and conference calls to evaluate project readiness and staff utilization. Assignment of qualified personnel, maintenance of schedules and budgets, and quality of project deliverables are verified as part of these assessments. The development of SOPs and performance evaluations are used to provide trained and qualified personnel for the project.

The site specific monitoring firm's technical assessment activities include peer review, data quality reviews, and technical system audits (i.e., laboratory and field). Procedures for assessment and audit of data quality are described in Section 4 of this QAPP. Procedures for peer review and technical assessments are summarized briefly below.

Both overall and direct technical assessment activities may result in the need for corrective action. The site specific monitoring firm's approach to implementing a corrective action response program for both field and laboratory situations is summarized briefly below. The NYSDEC QA Officer has stop work authority on all NYSDEC projects that may have negative quality impacts prior to completion of corrective actions.

3.1.1 Peer Review

The site specific monitoring firm's implements peer review for all project deliverables including work plans, QAPPs, draft and final reports, and technical memoranda. The peer review process provides for a critical evaluation of the deliverable by an individual or team to determine if the deliverable will meet established criteria, quality objectives, technical standards, and contractual obligations. The Project Manager will assign peer reviewers, when the

publications schedule is established. The publications staff will be responsible for ensuring all peer reviewers participate in the review process and approve all final deliverables. For technical memoranda and other project documents, the Project Manager will be responsible for obtaining principal review and approval.

3.1.2 Technical Systems Assessments

The entire project team is responsible for ongoing assessment of the technical work performed by the team, identification of nonconformance with the project objectives, and initiation, implementation and documentation of corrective action. Independent performance and systems audits are technical assessments that are a possible part of the QA/QC program. The following describes types of audits conducted, frequency of these audits, and personnel responsible for conducting audits.

Field Audits

Field audits are performed under the direction of the QA Officer. The need for field audits will be determined during project planning and indicated in the work plan. Field audits will be documented on the site specific monitoring firm's field audit checklists. Field audits will be typically performed during the early field programs.

Field Inspections

The Project Manager will be responsible for inspecting all field activities to verify compliance of activities with project plans.

Laboratory Audits

The laboratory must implement a comprehensive program of internal audits to verify compliance of their systems with SOPs and QA manuals.

NYSDOH must certify the laboratory and will perform external systems audits at an approximate frequency of once a year. External audits include reviews of analytical capabilities and procedures, COC procedures, documentation, QA/QC, and laboratory organization. These audits also include analysis of blind PE samples.

The QA Officer or designee may also audit laboratories. These audits are typically performed to verify laboratory capabilities and implementation of any complex project requirements or in response to a QC nonconformance identified as part of the data review process.

3.1.3 Corrective Action

Corrective actions will be implemented as needed. In conjunction with the QA Officer and Laboratory QA Coordinator, the Project Manager is responsible for

initiating corrective action and implementing it in the field and office, and the laboratory project manager is responsible for implementing it in the laboratory. It is their combined responsibility to see that all sampling and analytical procedures are followed as specified and that the data generated meet the prescribed acceptance criteria. Specific corrective actions necessary will be clearly documented in the logbooks or analytical reports.

Field Situations

The need for corrective action in the field may be determined by technical assessments or by more direct means such as equipment malfunction. Once a problem has been identified, it may be addressed immediately or an audit report may serve as notification to project management staff that corrective action is necessary. Immediate corrective actions taken in the field will be documented in the project logbook. Corrective actions may include, but are not limited to:

- Correcting equipment decontamination or sample handling procedures if field blanks indicated contamination;
- Recalibrating field instruments and checking battery charge;
- Training field laboratory personnel in correct sample handling or collection procedures; and
- Accepting data with an acknowledged level of uncertainty.

After a corrective action has been implemented, its effectiveness will be verified. If the action does not resolve the problem, appropriate personnel will be assigned to investigate and effectively remediate the problem. Corrective actions recommended by NYSDEC personnel will be addressed in a timely manner.

Laboratory Situations

Out-of-control QC data, laboratory audits, or outside data review may determine the need for corrective action in the laboratory. Corrective actions may include, but are not limited to:

- Reanalyzing samples, if holding times permit;
- Correcting laboratory procedures;
- Recalibrating instruments using freshly prepared standards;
- Replacing solvents or other reagents that give unacceptable blank values;

- Training additional laboratory personnel in correct sample preparation and analysis procedures; and

- Accepting data with an acknowledged level of uncertainty.

The laboratory corrective actions must be defined in analytical SOPs. Any deviations from approved corrective actions must be documented and approved by the Project Chemist.

Whenever corrective action is deemed necessary by the Project Chemist or NYSDEC technical staff, the laboratory project manager will ensure that the following steps are taken:

- The cause of the problem is investigated and determined;

- Appropriate corrective action is determined;

- Corrective action is implemented and its effectiveness verified by the laboratory QA officer; and

- Documentation of the corrective action verification is provided to the Project Chemist and NYSDEC staff in a timely manner.

3.2 Reports to Management

For reports to management include the following:

- **Audit Reports** - Audit reports are prepared by the audit team leader immediately after completion of the audit. The report will list findings and recommendations and will be provided to the Project Manager and QA Officer.

- **Data Usability Summary Report** - A DUSR will be completed by the Project Chemist and provided to the NYSDEC technical staff in the appendix of the report. Impacts on the usability of data will be tracked by adding qualifiers to individual data points as described in Section 4.

Upon completion of a project sampling effort, analytical and QC data will be included in a comprehensive technical report that summarizes field activities and provides a data evaluation. A discussion of the validity of results in the context of QA/QC procedures will be made and the DUSR will be provided.

Serious analytical problems will be reported immediately to NYSDEC personnel. Time and type of corrective action (if needed) will depend on the severity of the

problem and relative overall project importance. Corrective actions may include altering procedures in the field, conducting an audit, or modifying laboratory protocol.

4 Data Validation and Usability

The site specific monitoring firm will implement procedures for data validation and usability described below. These procedures will be adapted, if necessary, to meet project-specific requirements as determined in the work plan or FSP. A generic data usability validation checklist report form is provided in Appendix A.

4.1 Data Review, Validation, and Verification Requirements

All data generated will be reviewed by comparing accuracy and precision results for the QC samples to QC criteria listed in NYSDEC ASP 2005. The following types of data will be reviewed:

- Analytical reporting limits and target compounds will be compared to limits listed in the site-specific QAPP;
- Holding times will be verified against Table 2-1;
- QC summary data for surrogates, method blanks, LCS, and MS/MSD samples will be compared to criteria listed in the site-specific QAPP;
- Field QC results for duplicates and blanks will be compared to criteria listed in Section 2.5.1;
- Calibration summary data will be checked by the laboratory to verify that all positive results for target compounds were generated under an acceptable calibration as defined by the analytical method. Any deviations will be noted in the case narrative and reviewed by the Project Chemist;
- Field data such as sample identifications and sample dates will be checked against the laboratory report; and
- Any raw data files from the field and laboratory will not be reviewed unless there is a significant problem noted with the summary information.

4.2 Validation and Verification Methods

The data review scheme for analytical results from the receipt of the analytical data through the validated report is described below. The laboratory is responsible for performing internal data review. The laboratory data review must include 100% analyst review, 100% peer review, and 100% review by the laboratory project manager or designated QC reviewer to verify that all project-specific requirements are met. All levels of laboratory review must be fully documented and available for review if requested or if a laboratory audit is performed.

After receipt from the laboratory, project data will be validated using the following steps:

Evaluation of Completeness

The Project Chemist checks the electronic files for compliance with required format and the project target compounds and units. If errors in loading are found, the EDD files will be returned to the laboratory and the Project Chemist will request resubmission via SubLab. The Project Chemist also verifies that the laboratory information matches the field information and that the following items are included in the data package:

- COC forms and laboratory sample summary forms;
- Case narrative describing any out-of-control events and summarizing analytical procedures;
- Data report forms (i.e., Form I);
- QA/QC summary forms; and
- Chromatograms documenting any QC problems.

If the data package is incomplete, the Project Chemist will request resubmission. The laboratory must provide all missing information within one day.

Evaluation of Compliance

The Project Chemist will review all processed files and add data qualifiers for outliers. If QC data are provided in the EDD, the results will be used to verify compliance electronically. If no QC data are provided in the EDD, the reports will checked manually. Additional compliance checks on representative portions of the data are briefly outlined below:

- Review chromatograms, mass spectra, and other raw data if provided as backup information for any apparent QC anomalies;

- Review of calibration summaries or any other QC samples not provided in the EDD by the laboratory;

- Ensure that all analytical problems and corrections are reported in the case narrative and that appropriate laboratory qualifiers are added;

- For any problems identified, review concerns with the laboratory, obtain additional information if necessary, and check all related data to determine the extent of the error;

- Project chemists will follow qualification guidelines in EPA Region 2 data validation SOPs or *EPA CLP National Functional Guidelines for Organic Data Review, EPA 540/R-99-008* (October 1999) or *EPA CLP National Functional Guidelines for Inorganic Data Review,* EPA 540-R-04-004 (October 2004), but will use the specific method criteria for evaluation. The DUSR will be completed as specified in NYSDEC *Guidance of the Development of DUSRs* (July 1999); and

Data Review Reporting

The Project Chemist will perform the following reporting functions:

- Alert the Project Manager to any QC problems, obvious anomalous values, or discrepancies between the field and laboratory data, that may impact data usability; and

- Discuss QC problems in a DUSR for each laboratory report. DUSR will include a short narrative and print out of qualified data;

- Prepare analytical data summary tables of qualified data that summarize those samples and analytes for which detectable concentrations were exhibited including field QC samples; and

- At the completion of all field and laboratory efforts, summarize planned versus actual field and laboratory activities and data usability concerns in the technical report.

4.3 Reconciliation with User Requirements

For routine assessments of data quality, The site specific monitoring firm's will implement the data validation procedures described in Section 4.2 and assign appropriate data qualifiers to indicate limitations on the data. The Data

Validation Chemist will be responsible for evaluating precision, accuracy, representativeness, comparability, and completeness of data using procedures described in Section 2.5 of this QAPP. Any deviations from analytical performance criteria or quality objectives for the project will be documented in the DUSR provided to the data users for the project.

The QA Officer or Project Chemist will work with the final users of the data in performing data quality assessments. The data quality assessment may include some or all of the following steps:

- Data that are determined to be incomplete or not usable for the project will be discussed with the project team. If critical data points are involved which impact the ability to complete project objectives, data users will report immediately to the Project Manager. The Project Manager will discuss resolution of the issue with NYSDEC technical staff and implement necessary corrective actions (for example re-sampling);

- Data that are non-detect but have elevated reporting limits due to blank contamination or matrix interference will be compared to screening values. If reporting limits exceed the screening values, then results will be handled as incomplete data as described above; and

- Data that are qualified as estimated will be used for all project decision making. If an estimated result is close to a screening value, then there is uncertainty in any conclusions as to whether the result exceeds the screening value. The data user must evaluate the potential uncertainty in developing recommendations for the site. If estimated results become critical data points in making final decisions on the site, the Project Manager and NYSDEC technical staff should evaluate the use of the results and may consider the data point incomplete.

The assessment process involves comparing analytical results to screening values and background concentrations to determine if the contamination present is site-related (i.e., above background levels) or significant (i.e., above screening values). Additional data assessment may be performed on a site-by-site basis.

A Data Usability Summary Report Model

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Generic Health and Safety Plan

April 2020

GENERIC SITE-SPECIFIC HEALTH AND SAFETY PLAN

Project: Carroll Town Landfill, NYSDEC Project No. 907017

Project No.: _____

TDD/PAN No.: _____

Project Location: Frewsburg, Chautauqua County, NY

Proposed Date of Field Activities: _____

Project Director: _____

Project Manager: _____

Prepared by: _____ Date Prepared: _____

Approved by: _____ Date Approved: _____

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1. INTRODUCTION

1.1 POLICY

It is COMPANY's policy to ensure the health and safety of its employees, the public, and the environment during the performance of work it conducts. This site-specific health and safety plan (SHASP) establishes the procedures and requirements to ensure the health and safety of COMPANY employees for the above-named project. COMPANY's overall safety and health program is described in *Corporate Health and Safety Program* (CHSP). After reading this plan, applicable COMPANY employees shall read and sign COMPANY's Site-Specific Health and Safety Plan Acceptance form.

This SHASP has been developed for the sole use of COMPANY employees and is not intended for use by firms not participating in COMPANY's training and health and safety programs. Subcontractors are responsible for developing and providing their own safety plans.

This SHASP has been prepared to meet the following applicable regulatory requirements and guidance:

Applicable Regulation/Guidance
29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER)
Other:

1.2 SCOPE OF WORK

Description of Work: This project involves operation, maintenance, and monitoring of a NYSDEC inactive hazardous waste site, including site inspections and sampling of contaminated environmental media, such as groundwater, sediments, and potentially soils. There is also the potential for methane buildup in the headspace of monitoring wells on-site.

Equipment/Supplies: Attachment 1 contains a checklist of equipment and supplies that will be needed for this work. Also see Appendices D, E, and F of the SMP for the equipment needed for each sampling plan.

The following is a description of each numbered task:

Task Number	Task Description
I	Long-Term Monitoring and Reporting
II	Operations and Maintenance

1.3 SITE DESCRIPTION

Site Map: A site map or sketch is attached at the end of this plan.

Site History/Description (see project work plan for detailed description): The Carroll Town Landfill received municipal and C&D waste from the early 1960s through 1979. The site consists of two Consolidated Waste Areas: one at the West Landfill Cell and the northwest corner of the former East Landfill Cell. The entire site is approximately 20 acres in size, with drainage swales that discharge surface water to the north and northwest of the site.

Is the site currently in operation? ☐ Yes ☒ No

Locations of Contaminants/Wastes: The contaminants are in the remaining Consolidated Waste Areas, located on the West Landfill Cell and in the northwest corner of the former East Landfill Cell.

Types and Characteristics of Contaminants/Wastes:

☒ Liquid	☒ Solid	☐ Sludge	☒ Gas/Vapor
☒ Flammable/Ignitable	☐ Volatile	☐ Corrosive	☐ Acutely Toxic
☐ Explosive	☐ Reactive	☒ Carcinogenic	☐ Radioactive
☐ Medical/Pathogenic	Other:		

2. ORGANIZATION AND RESPONSIBILITIES

COMPANY team personnel shall have on-site responsibilities as described in COMPANY's standard operating procedure (SOP) for Site Entry Procedures. The project team, including qualified alternates, is identified below.

Name	Site Role/Responsibility
TBD based on actual field crew and activities	Project/Task Manager
TBD based on actual field crew and activities	Site Safety Officer
TBD based on actual field crew and activities	Field Tech

3. TRAINING

Prior to work, COMPANY team personnel shall have received training as indicated below. As applicable, personnel shall have read the project work plan, sampling and analysis plan, and/or quality assurance project plan prior to project work.

Training	Required
40-Hour Initial Health and Safety Training and Annual Refresher	X
First Aid/CPR (within 2 years)	X
Hazard Communication (29 CFR 1910.1200)	X

Training	Required
40-Hour Radiation Protection Procedures and Investigative Methods	
8-Hour General Radiation Health and Safety	
Radiation Refresher	
DOT and Biannual Refresher	X
Other: _____	

4. MEDICAL SURVEILLANCE

4.1 MEDICAL SURVEILLANCE PROGRAM

COMPANY field personnel shall actively participate in COMPANY's medical surveillance program as described in the CHSP and shall have received, within the past year, an appropriate physical examination and health rating.

COMPANY's health and safety record (HSR) form will be maintained on site by each COMPANY employee for the duration of his or her work. COMPANY employees should inform the site safety officer (SSO) of any allergies, medical conditions, or similar situations that are relevant to the safe conduct of the work to which this SHASP applies.

Is there a concern for radiation at the site? ☐ Yes ☒ No

If no, go to 5.1.

4.2 RADIATION EXPOSURE

4.2.1 External Dosimetry

Thermoluminescent Dosimeter (TLD) Badges: TLD badges are to be worn by all COMPANY field personnel on certain required sites.

Pocket Dosimeters: _____

Other: _____

4.2.2 Internal Dosimetry

☐ Whole body count ☐ Bioassay ☐ Other

Requirements: _____

4.2.3 Radiation Dose

Dose Limits: COMPANY's radiation dose limits are stated in the CHSP. Implementation of these dose limits may be designated on a site specific basis.

Site-Specific Dose Limits: _____

ALARA Policy: Radiation doses to COMPANY personnel shall be maintained as low as reasonably achievable (ALARA), taking into account the work objective, state of technology available, economics of improvements in dose reduction with respect to overall health and safety, and other societal and socioeconomic considerations.

5. SITE CONTROL

5.1 SITE LAYOUT AND WORK ZONES

Site Work Zones: Refer to the map or site sketch, attached at the end of this plan, for designated work zones.

Site Access Requirements and Special Considerations: None.

Illumination Requirements: None.

Sanitary Facilities (e.g., toilet, shower, potable water): None available onsite. Potable water shall be brought onsite by field personnel for activities onsite, as necessary.

On-Site Communications: Cell phone will be brought on site and maintained with either team member.

Other Site-Control Requirements: None known at this time. TBD.

5.2 SAFE WORK PRACTICES

Daily Safety Meeting: Safety meetings will be conducted as necessary.

Work Limitations: Work shall be limited to a maximum of 12 hours per day. If 12 consecutive days are worked, at least one day off shall be provided before work is resumed. Work will be conducted in daylight hours unless prior approval is obtained and the illumination requirements in 29 CFR 1910.120(m) are satisfied.

Weather Limitations: Work shall not be conducted during electrical storms. Work conducted in other inclement weather (e.g., rain, snow) will be approved by project management and the regional safety coordinator or designee.

Other Work Limitations: No confined entry allowed or will be performed in connection with this project.

Buddy System: Field work will be conducted in pairs of team members according to the buddy system.

Line of Sight: Each field team member shall remain in the line of sight and within verbal communication of at least one other team member.

Eating, Drinking, and Smoking: Eating, drinking, smoking, and the use of tobacco products shall be strictly prohibited in the

exclusion and contamination reduction areas, at a minimum, and shall only be permitted in designated areas.

Contamination Avoidance: Field personnel shall avoid unnecessary contamination of personnel, equipment, and materials to the extent practicable.

Sample Handling: Protective gloves of a type designated in Section 7 will be worn when containerized samples are handled for labeling, packaging, transportation, and other purposes.

Other Safe Work Practices: Safety glasses, steel-toed boots, and high visibility vest are required at all times while on-site.

6. HAZARD EVALUATION AND CONTROL

6.1 PHYSICAL HAZARD EVALUATION AND CONTROL

Potential physical hazards and their applicable control measures are described in the following table for each task.

Hazard	Task Number	Hazard Control Measures
Biological (flora, fauna, etc.)	**I & II**	■ Potential hazard: ■ Establish site-specific procedures for working around identified hazards. ■ Other:
Cold Stress	**I & II**	■ Provide warm break area and adequate breaks. ■ Provide warm noncaffeinated beverages. ■ Promote cold stress awareness. ■ See *Cold Stress Prevention and Treatment* (attached at the end of this plan if cold stress is a potential hazard).
Compressed Gas Cylinders	**N/A**	■ Use caution when moving or storing cylinders. ■ A cylinder is a projectile hazard if it is damaged or its neck is broken. ■ Store cylinders upright and secure them by chains or other means. ■ Other:
Confined Space	**N/A**	■ Ensure compliance with 29 CFR 1910.146. ■ See SOP for Confined Space Entry. Additional documentation is required. ■ Other:
Drilling	**N/A**	■ See SOP for Health and Safety on Drilling Rig Operations. Additional documentation may be required. ■ Landfill caps will not be penetrated without prior discussions with corporate health and safety staff. ■ Other:
Drums and Containers	**I & II**	■ Ensure compliance with 29 CFR 1910.120(j). ■ Consider unlabeled drums or containers to contain hazardous substances and handle accordingly until the contents are identified. ■ Inspect drums or containers and assure integrity prior to handling. ■ Move drums or containers only as necessary; use caution and warn

Hazard	Task Number	Hazard Control Measures
		nearby personnel of potential hazards.
		■ Open, sample, and/or move drums or containers in accordance with established procedures; use approved drum/container-handling equipment. ■ Other:
Electrical	**I & II**	■ Ensure compliance with 29 CFR 1910 Subparts J and S. ■ Locate and mark energized lines. ■ De-energize lines as necessary. ■ Ground all electrical circuits. ■ Guard or isolate temporary wiring to prevent accidental contact. ■ Evaluate potential areas of high moisture or standing water and define special electrical needs. ■ Other:
Excavation and Trenching	**I & II**	■ Ensure that excavations comply with and personnel are informed of the requirements of 29 CFR 1926 Subpart P. ■ Ensure that any required sloping or shoring systems are approved as per 29 CFR 1926 Subpart P. ■ Identify special personal protective equipment (PPE) (see Section 7) and monitoring (see Section 8) needs if personnel are required to enter approved excavated areas or trenches. ■ Maintain line of sight between equipment operators and personnel in excavations/trenches. Such personnel are prohibited from working in close proximity to operating machinery. ■ Suspend or shut down operations at signs of cave in, excessive water, defective shoring, changing weather, or unacceptable monitoring results. ■ Other:
Fire and Explosion	**I & II**	■ Inform personnel of the location(s) of potential fire/explosion hazards. ■ Establish site-specific procedures for working around flammables. ■ Ensure that appropriate fire suppression equipment and systems are available and in good working order. ■ Define requirements for intrinsically safe equipment. ■ Identify special monitoring needs (see Section 8). ■ Remove ignition sources from flammable atmospheres. ■ Coordinate with local fire-fighting groups regarding potential fire/explosion situations. ■ Establish contingency plans and review daily with team members. ■ Other:
Heat Stress	**I & II**	■ Provide cool break area and adequate breaks. ■ Provide cool noncaffeinated beverages. ■ Promote heat stress awareness. ■ Use active cooling devices (e.g., cooling vests) where specified. ■ See *Heat Stress Prevention and Treatment* (attached at the end of this plan if heat stress is a potential hazard).

Hazard	Task Number	Hazard Control Measures
Heavy Equipment Operation	**I & II**	■ Define equipment routes, traffic patterns, and site-specific safety measures. ■ Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms. ■ Ensure that ground spotters are assigned and informed of proper hand signals and communication protocols. ■ Identify special PPE (Section 7) and monitoring (Section 8) needs. ■ Ensure that field personnel do not work in close proximity to operating equipment. ■ Ensure that lifting capacities, load limits, etc., are not exceeded. ■ Other:
Heights (Scaffolding, Ladders, etc.)	**N/A**	■ Ensure compliance with applicable subparts of 29 CFR 1910. ■ Identify special PPE needs (e.g., lanyards, safety nets, etc.) ■ Other:
Noise	**I & II**	■ Establish noise level standards for on-site equipment/operations. ■ Inform personnel of hearing protection requirements (Section 7). ■ Define site-specific requirements for noise monitoring (Section 8). ■ Other:
Overhead Obstructions	**N/A**	■ Wear hard hat. ■ Other:
Power Tools	**I**	■ Ensure compliance with 29 CFR 1910 Subpart P. ■ Other:
Sunburn	**I & II**	■ Apply sunscreen. ■ Wear hats/caps and long sleeves. ■ Other:
Utility Lines	**I & II**	■ Identify/locate existing utilities prior to work. ■ Ensure that overhead utility lines are at least 25 feet away from project activities. ■ Contact utilities to confirm locations, as necessary. ■ Other:
Weather Extremes	**I & II**	■ Potential hazards: ■ Establish site-specific contingencies for severe weather situations. ■ Provide for frequent weather broadcasts. ■ Weatherize safety gear, as necessary (e.g., ensure eye wash units cannot freeze, etc.). ■ Identify special PPE (Section 7) needs. ■ Discontinue work during severe weather. ■ Other:
Slips, Trips, & Falls:	**I & II**	■ Stay in good physical condition ■ Wear appropriate and properly fitting footwear ■ Stay well hydrated ■ Do not be in too much of a hurry

Hazard	Task Number	Hazard Control Measures
		■ Be attentive; constantly scan the way ahead when walking
Other:		■ ■

6.2 CHEMICAL HAZARD EVALUATION AND CONTROL

6.2.1 Chemical Hazard Evaluation

Potential chemical hazards are described by task number in Table 6-1. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan.

6.2.2 Chemical Hazard Control

An appropriate combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below published exposure levels (see Section 6.2.1).

Applicable Engineering/Administrative Control Measures: _____

_____

PPE: See Section 7. _____

6.3 RADIOLOGICAL HAZARD EVALUATION AND CONTROL

6.3.1 Radiological Hazard Evaluation

Potential radiological hazards are described below by task number. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan.

Task Number	Radionuclide	DAC (μCi/ml)	Route(s) of Exposure	Major Radiation(s)	Energy(s) (MeV)	Half-Life

6.3.2 Radiological Hazard Control

Engineering/administrative controls and work practices shall be instituted to reduce and maintain employee exposures to a level at or below the permissible exposure/dose limits (see sections 4.2.3 and 6.3.1). Whenever engineering/administrative controls and work practices are not feasible or effective, any reasonable combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below permissible exposure/dose limits.

Applicable Engineering/Administrative Control Measures: _____

_____

PPE: See Section 7. _____

TABLE 6-1

CHEMICAL HAZARD EVALUATION

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
		PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
I & II	Vinyl chloride	2.56 mg/m^3	25.6 mg/m^3	2.56 mg/m^3	Yes	Inhalation, skin absorption	Weakness, dizziness, drowsiness, headache, abdominal pain, eye redness/pain, frostbite	N/A	N/A	N/A
I & II	TCE*	537 mg/m^3	134 mg/m^3	537 mg/m^3	Yes	Inhalation, skin absorption, ingestion, skin and/or eye contact	Drowsiness, dizziness, headache, nausea, vomiting	N/A	N/A	N/A
I & II	Arsenic*	0.010 mg/m^3 organic	0.002 mg/m^3	0.01 mg/m^3 inhalable	Yes	Inhalation, skin absorption, ingestion, skin and/or eye contact	Sensory irritant, lung & skin cancer, aplastic anemia and numbness	N/A	N/A	N/A
I & II	Lead*	0.050 mg/m^3	0.01 mg/m^3	0.05 mg/m^3	Yes	Inhalation, skin absorption, ingestion	Irritated eyes, upper respiratory system, metal fume, fever	N/A	N/A	N/A
I & II	Mercury	0.025 mg/m^3		0.025 mg/m^3	Yes	Inhalation, skin absorption, ingestion, skin and/or eye contact		N/A	N/A	N/A

Note: Use an asterisk (*) to indicate known or suspected carcinogens.

7. LEVEL OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

7.1 LEVEL OF PROTECTION

The following levels of protection (LOPs) have been selected for each wor5k task based on an evaluation of the potential or known hazards, the routes of potential hazard, and the performance specifications of the PPE. On-site monitoring results and other information obtained from on-site activities will be used to modify these LOPs and the PPE, as necessary, to ensure sufficient personnel protection. The authorized LOP and PPE shall only be changed with the approval of the regional safety coordinator or designee. Level A is not included below because Level A activities, which are performed infrequently, will require special planning and addenda to this sHASP.

Task Number	B	C	D	Modifications Allowed
I			X	
II			X	

Note: Use "X" for initial levels of protection. Use "(X)" to indicate levels of protection that may be used as site conditions warrant.

7.2 PERSONAL PROTECTIVE EQUIPMENT

The PPE selected for each task is indicated below. COMPANY's PPE program complies with 29 CFR 1910.120 and 29 CFR 1910 Subpart I and is described in detail in the CHSP. Refer to 29 CFR 1910 for the minimum PPE required for each LOP.

PPE	Task Number/LOP					
	I	**II**				
Full-face APR						
PAPR						
Cartridges:						
P100						
GMC-P100						
GME-P100						
Other:						
Positive-pressure, full-face SCBA						
Spare air tanks (Grade D air)						
Positive-pressure, full-face, supplied-air system						
Cascade system (Grade D air)						
Manifold system						

PPE	Task Number/LOP					
	I	**II**				
5-Minute escape mask						
Safety glasses	X	X				
Monogoggles						
Coveralls/clothing	X	X				
Protective clothing:						
Tyvek						
Saranex						
Other:						
Splash apron						
Inner gloves:						
Cotton	X	X				
Nitrile						
Latex						
Other:						
Outer gloves:						
Viton						
Rubber						
Neoprene						
Nitrile	X	X				
Other:						
Work gloves						
Safety boots (as per ANSI Z41)	X	X				
Neoprene safety boots (as per ANSI Z41)						
Boot covers (type: _____)						
Hearing protection (type: _____)						
Hard hat						
Face shield						
Other:						
Other:						

8. HEALTH AND SAFETY MONITORING

Health and Safety monitoring will be conducted to ensure proper selection of engineering/administrative controls, work practices, and/or PPE so that employees are not exposed to hazardous substances at levels that exceed permissible exposure/dose limits or published exposure levels. Health and safety monitoring will be conducted using the instruments, frequency, and action levels described in Table 8-1. Health and safety monitoring instruments shall have been appropriately calibrated and/or performance-checked prior to use.

9. DECONTAMINATION PROCEDURES

All equipment, materials, and personnel will be evaluated for contamination upon leaving the exclusion area. Equipment and materials will be decontaminated and/or disposed and personnel will be decontaminated, as necessary. Decontamination will be performed in the contamination reduction area or any designated area such that the exposure of uncontaminated employees, equipment, and materials will be minimized. Specific procedures are described below.

Equipment/Material Decontamination Procedures (specified by work plan): See Appendices D, E, and F of the Carroll Town Landfill SMP for individual decontamination procedures.

Ventilation: All decontamination procedures will be conducted in a well-ventilated area.

Personnel Decontamination Procedures:

PPE Requirements for Personnel Performing Decontamination:

Personnel Decontamination in General: Following appropriate decontamination procedures, all field personnel will wash their hands and face with soap and potable water. Personnel should shower at the end of each work shift.

Disposition of Disposable PPE: Disposable PPE must be rendered unusable and disposed as indicated in the work plan.

Disposition of Decontamination Wastes (e.g., dry wastes, decontamination fluids, etc.):

TABLE 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels[a]	
☐ PID (e.g., RAE mini RAE) ☐ FID (e.g., OVA 128-) ☐ TVA 1000	I & II	Methane	At all wells	When wells are open	**Unknown Vapors** Background to 1 ppm above background: Level D 1 to 5 ppm above background: Level C 5 to 500 ppm above background: Level B >500 ppm above background: Level A	**Contaminant-Specific**
Oxygen Meter/Explosimeter					**Oxygen** <19.5% or >22.0%: Evacuate area; eliminate ignition sources; reassess conditions. 19.5 to 22.0%: Continue work in accordance with action levels for other instruments.	**Explosivity** ≤10% LEL: Continue work in accordance with action levels for other instruments; monitor continuously for combustible atmospheres. >10% LEL: Evacuate area; eliminate ignition sources; reassess conditions.
Radiation Alert Monitor (Rad-mini or RAM-4)					<0.1 mR/hr: Continue work in accordance with action levels for other instruments. ≥0.1 mR/hr: Evacuate area; reassess work plan and contact radiation safety specialist.	
Mini-Ram or Other Particulate Monitor					**General/Unknown** Evaluate health and safety measures when dust levels exceed 2.5 milligrams per cubic meter.	**Contaminant-Specific**
HCN/H_2S (Monitox)					≥4 ppm: Leave area and consult with SSO.	
Draeger Colorimetric Tubes					**Tube** **Action Level** **Action**	
Air Monitor/Sampler Type: _____ Sampling medium: _____					**Action Level** **Action**	

TABLE 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels[a]
Personal Sampling Pump Type: _____ Sampling medium: _____					**Action Level** **Action**
Micro R Meter					<2 mR/hr: Continue work in accordance with action levels for other instruments. 2 to 5 mR/hr: In conjunction with a radiation safety specialist, continue work and perform stay-time calculations to ensure compliance with dose limits and ALARA policy. >5 mR/hr: Evacuate area to reassess work plan and evaluate options to maintain personnel exposures ALARA and within dose limits.
Ion Chamber					See micro R meter action levels above.
Radiation Survey Ratemeter/Scaler with External Detector(s)					**Detector** **Action Level** **Action**
Noise Dosimeter (Sound Level Meter)					≤85 decibels as measured using the A-weighed network (dBa): Use hearing protection if exposure will be sustained throughout work shift. >85 dBA: Use hearing protection. >120 dBA: Leave area and consult with safety personnel.
Other:					
Other:					

a Unless stated otherwise, airborne contaminant concentrations are measured as a time-weighted average in the worker's breathing zone. Acceptable concentrations for known airborne contaminants will be determined based on OSHA/NIOSH/ACGIH and/or NRC exposure limits. As a guideline, 1/2 the PEL/REL/TLV, whichever is lower should be used.

10. EMERGENCY RESPONSE

This section contains additional information pertaining to on-site emergency response and does not duplicate pertinent emergency response information contained in earlier sections of this plan (e.g., site layout, monitoring equipment, etc.). Emergency response procedures will be rehearsed regularly, as applicable, during project activities.

10.1 EMERGENCY RESPONSIBILITIES

All Personnel: All personnel shall be alert to the possibility of an on-site emergency; report potential or actual emergency situations to the team leader and SSO; and notify appropriate emergency resources, as necessary.

Team Leader: The team leader will determine the emergency actions to be performed by COMPANY personnel and will direct these actions. The team leader also will ensure that applicable incidents are reported to appropriate COMPANY and client project personnel and government agencies.

SSO: The SSO will recommend health/safety and protective measures appropriate to the emergency.

Other: _____

_____

10.2 LOCAL AND SITE RESOURCES (including phone numbers)

Ambulance: 911

Hospital: WCA Hospital

Directions to Hospital (map attached at the end of this plan): _____

_____

_____

Poison Control: 911

Police Department: 911

Fire Department: 911

Client Contact: _____

Site Contact: _____

On-Site Telephone Number: _____

Cellular Telephone Number: _____

Radios Available: _____

Other: _____

10.3 COMPANY EMERGENCY CONTACTS

COMPANY Operations Center (After Hours):

Corporate Health and Safety Director:

Regional Office Contact: _____ (office)
_____ (home)

Other: _____ (office)

a. COMPANY Operations Center (After Hours):

b. Corporate Health and Safety Director: (office)
(home)

c. Assistant Corporate Safety Director: (office)
(home)
(Cell)

10.4 OTHER EMERGENCY RESPONSE PROCEDURES

On-Site Evacuation Signal/Alarm (must be audible and perceptible above ambient noise and light levels): _____

_____

On-Site Assembly Area: _____

Emergency Egress Route to Get Off Site: _____

_____

Off-Site Assembly Area: _____

Preferred Means of Reporting Emergencies: _____

_____

Site Security and Control: In an emergency situation, personnel will attempt to secure the affected area and control site access.

_____

Spill Control Procedures: _____

_____

_____

_____

Emergency Decontamination Procedures: _____

_____

_____

PPE: Personnel will don appropriate PPE when responding to an emergency situation. The SSO and Section 7 of this plan will provide guidance regarding appropriate PPE.

Emergency Equipment: Appropriate emergency equipment is listed in Attachment 1. Adequate supplies of this equipment shall be maintained in the support area or other approved work location.

Incident Reporting Procedures: _____

_____

SITE-SPECIFIC HEALTH AND SAFETY PLAN ACCEPTANCE

Project:	
Project No.:	TDD/PAN No.:
Project Location:	
Project Manager:	Project Director:

The undersigned acknowledge that they have read and understood and agree to abide by the health and safety plan.

Name (Printed)	Name (Signature)	Date

ATTACHMENT 1

EQUIPMENT/SUPPLIES CHECKLIST

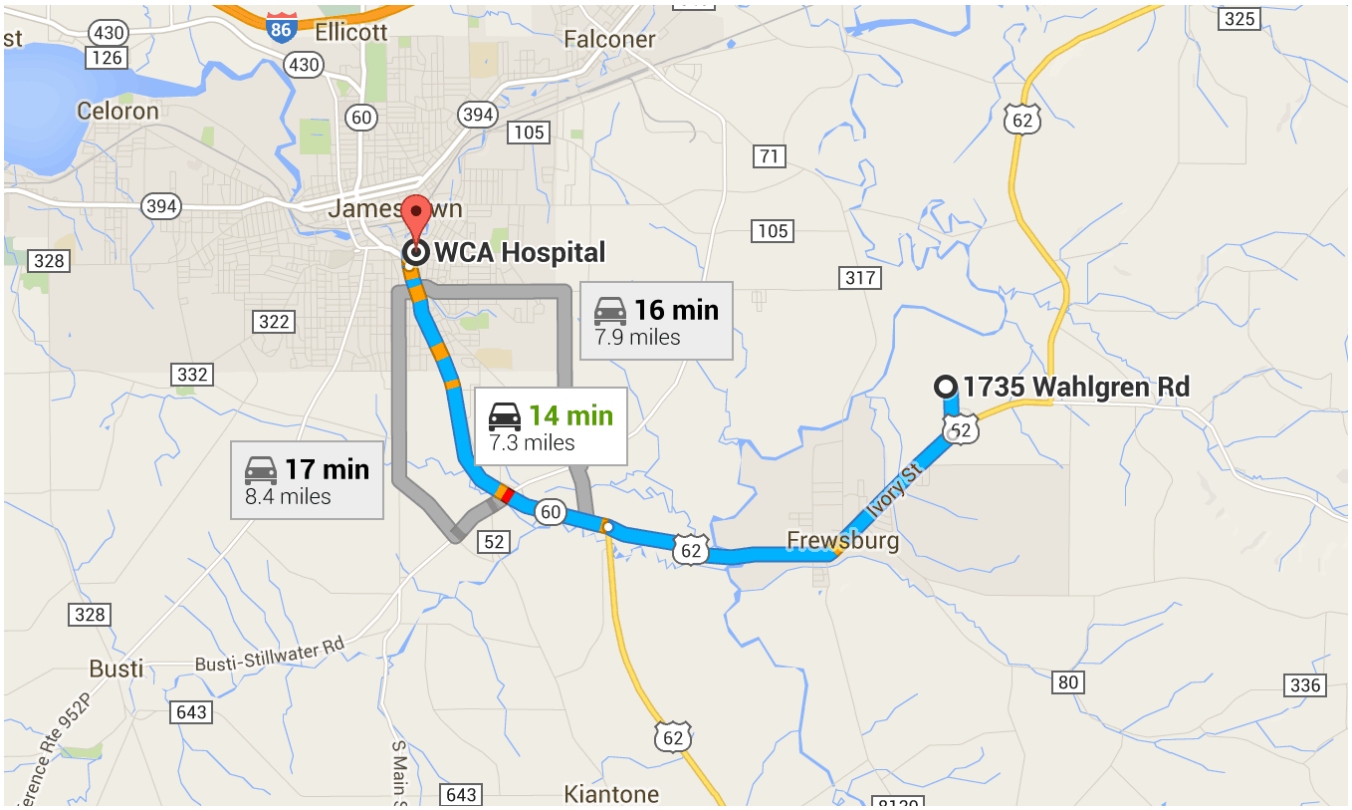
	No.
INSTRUMENTATION	
FID	
Thermal desorber	
O_2/explosimeter w/cal. Kit	
Photovac tip	
PID (probe: _____eV)	
Magnetometer	
Pipe locator	
Weather station	
Draeger tube kit (tubes: _____)	
Brunton compass	
Real-time cyanide monitor	
Real-time H_2S monitor	
Heat stress monitor	
Noise equipment	
Personal sampling pumps and supplies	
MiniRam dust monitor	
Mercury monitor	
Spare batteries (type: _____)	
RADIATION EQUIPMENT/SUPPLIES	
Documentation forms	
Portable ratemeter	
Scaler/ratemeter	
1" NaI gamma probe	
2" NaI gamma probe	
ZnS alpha probe	
GM pancake probe	
Tungsten-shielded GM probe	
Micro R meter	
Ion chamber	
Alert monitor	
Pocket dosimeter	

	No.
Dosimeter charger	
Radiation warning tape	
Radiation decon supplies	
Spare batteries (type: _____)	
SAMPLING EQUIPMENT	
8-oz. bottles	
Half-gallon bottles	
VOA bottles	
String	
Hand bailers	
Thieving rods with bulbs	
Spoons	
Knives	
Filter paper	
Bottle labels	
MISCELLANEOUS	
Pump	
Surveyor's tape	
100' Fiberglass tape	
300' Nylon rope	
Nylon string	
Surveying flags	
Camera	
Film	
Bung wrench	
Soil auger	
Pick	
Shovel	
Catalytic heater	
Propane gas	

	No.
Banner tape	
Surveying meter stick	
Chaining pins and ring	
Logbooks (_____ large, _____ small)	
Required MSDSs	
Intrinsically safe flashlight	
Potable water	
Gatorade or equivalent	
Tables	
Chairs	
Weather radio	
Two-way radios	
Binoculars	
Megaphone	
Cooling vest	
EMERGENCY EQUIPMENT	
First aid kit	
Stretcher	
Portable eye wash	
Blood pressure monitor	
Fire blanket	
Fire extinguisher	
Thermometer (medical)	
Spill kit	
DECONTAMINATION EQUIPMENT	
Wash tubs	
Buckets	
Scrub brushes	
Pressurized sprayer	
Spray bottle	
Detergent (type: _____)	
Solvent (type: _____)	
Plastic sheeting	
Tarps and poles	
Trash bags	

	No.
Trash cans	
Masking tape	
Duct tape	
Paper towels	
Face mask	
Face mask sanitizer	
Step ladders	
Distilled water	
Deionized water	
SHIPPING EQUIPMENT	
Coolers	
Paint cans with lids, 7 clips each	
Vermiculite	
Shipping labels	
DOT labels:	
"Up"	
"Danger"	
"Inside Container Complies ..."	
Hazard Group	
Strapping tape	
Baggies	
Custody seals	
Chain-of-custody forms	
Express shipment forms	
Clear packing tape	
Permanent markers	

Directions from 1735 Wahlgren Rd to WCA Hospital



1735 Wahlgren Rd
Frewsburg, NY 14738

- Head east on Wahlgren Rd toward US-62 N
  0.5 mi
- Turn right onto US-62 S
  3.5 mi
- Continue straight onto NY-60 N/Foote Ave
  3.2 mi
- Turn right onto Foote Ave
  0.1 mi

WCA Hospital
207 Foote Avenue, Jamestown, NY 14702