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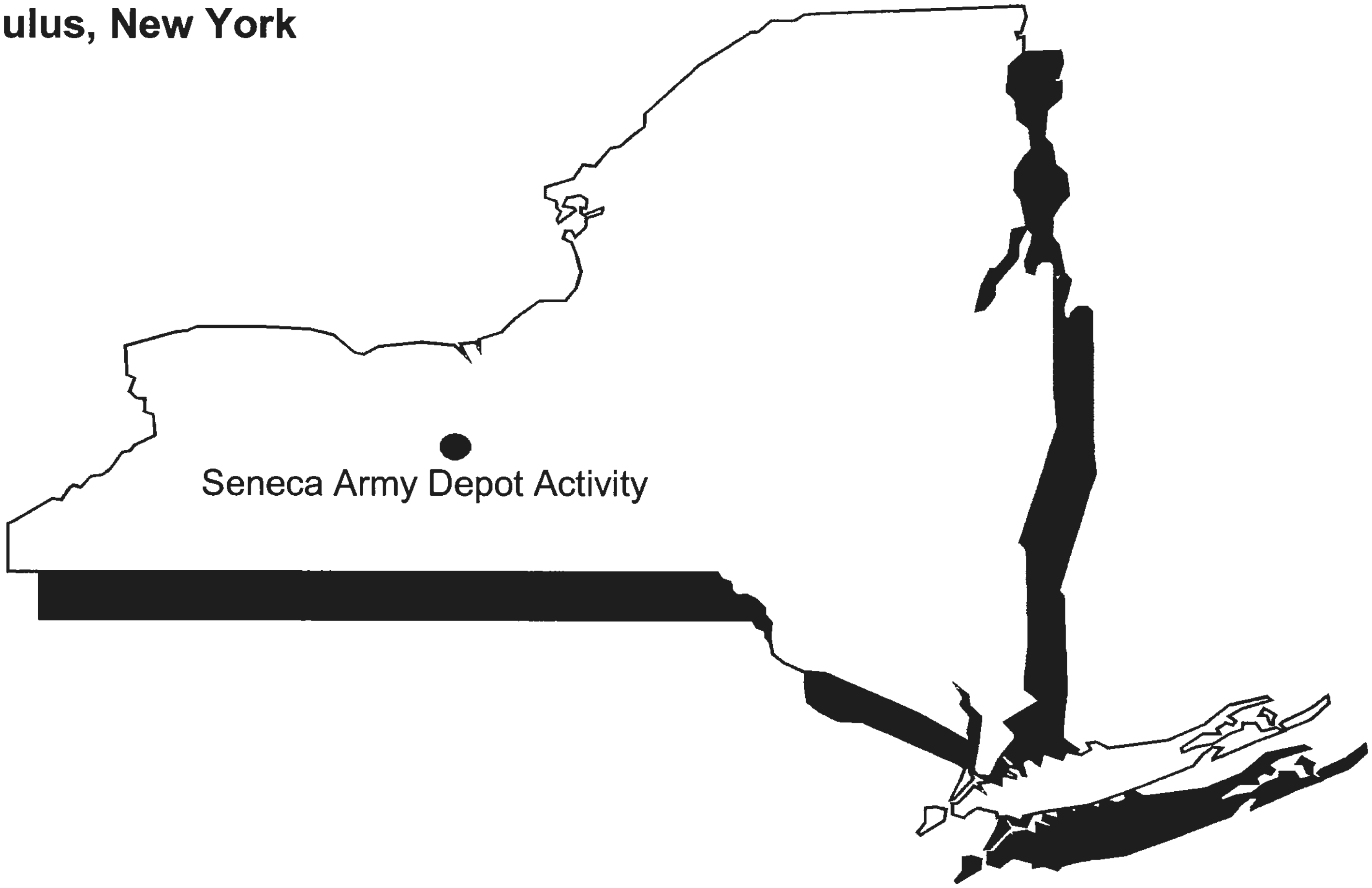
Seneca Army Depot Activity
Romulus, New York



DRAFT
ANNUAL REPORT AND ONE-YEAR REVIEW
FOR THE ASH LANDFILL OPERABLE UNIT SENECA ARMY DEPOT ACTIVITY

AFCEE CONTRACT NO. FA8903-04-D-8675
TASK ORDER NO. 0012
CDRL A001H
EPA SITE ID# NY0213820830
NY SITE ID# 8-50-006

PARSONS
MARCH 2008

AFCEE
USACE
Seneca Army
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Romulus NY

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FOR THE ASH LANDFILL OU, SENECA ARMY DEPOT ACTIVITY

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ANNUAL REPORT AND ONE-YEAR REVIEW

FOR THE ASH LANDFILL OPERABLE UNIT
SENECA ARMY DEPOT ACTIVITY, ROMULUS, NEW YORK

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1.0 INTRODUCTION

This Annual Report for the Ash Landfill Operable Unit (OU) located at the Seneca Army Depot Activity (SEDA or the Depot) in Romulus, New York provides a review of long-term groundwater monitoring for 2007 and provides recommendations for future long-term monitoring at the site. This document also provides an annual review of the effectiveness of the remedy implemented in 2006, which includes the following:

- A comparison of the 2007 groundwater data to the LTM objectives, listed below in **Section 1.1;**
- An evaluation of the need to recharge the biowall, as outlined in the Remedial Design Report (RDR) (Parsons, 2006b) in **Section 3.4**; and
- An assessment of the remedy's compliance with USEPA's "Guidance for Evaluation of Federal Agency Demonstrations (Section 12(h)(s))".

In accordance with the Record of Decision (ROD) for the Ash Landfill OU (Parsons, 2004), the Remedial Design Work Plan (Parsons, 2006a), and the Remedial Design Report (RDR) (Parsons, 2006b), a remedial action (RA) was completed in October and November 2006. The remedial action involved the following:

- Installation of three dual biowall systems (A1/A2, B1/B2, C1/C2) to address volatile organic compounds (VOCs) in groundwater that exceed New York State Department of Environmental Conservation's (NYSDEC's) Class GA groundwater standards;
- Construction and establishment of a 12-inch vegetative cover over the Ash Landfill and the Non-Combustible Fill Landfill (NCFL) to prevent ecological receptors from coming into direct contact with the underlying soils contaminated with metals and polycyclic aromatic hydrocarbons (PAHs);
- Excavation and disposal of Debris Piles A, B, and C; and
- Regrading of the Incinerator Cooling Water Pond to promote positive drainage.

As part of the RA at the Ash Landfill OU, long-term groundwater monitoring (LTM) is being performed as part of the post-closure operations. Groundwater monitoring is required as part of the remedial design, which has been formulated to comply with the ROD. The first of four rounds of groundwater sampling for the first year of LTM was completed between January 3, 2007 and January 4, 2007, the second was completed between March 15, 2007 and March 17, 2007, the third was completed between June 5, 2007 and June 7, 2007, and the last of the four was collected between November 13, 2007 and November 15, 2007. The analytical and geochemical results were presented in four letter reports, submitted April 12, 2007 (Quarter 1), June 5, 2007 (Quarter 2), September 19, 2007 (Quarter 3), and February 21, 2008 (Quarter 4). This Annual Report reviews the results of the entire year of 2007 LTM as part of the evaluation of the remedy and provides conclusions and recommendations about the effectiveness of the remedial action, including the groundwater remedy as well as the vegetative landfill covers.

1.1 Long-Term Groundwater Monitoring Objectives

Three types of long-term groundwater monitoring are being performed: plume performance monitoring, biowall process monitoring, and off-site performance monitoring. On-site performance monitoring is being conducted to measure groundwater contaminant concentrations and the effectiveness of the biowall remedy for the Ash Landfill OU. The objectives of performance monitoring are as follows:

- Confirm that there are no exceedances of contaminants of concern (COC) groundwater standards at the off-site trigger monitoring well MW-56;
- Document the effectiveness of the biowalls to remediate and attenuate the chlorinated ethene plume; and
- Confirm that groundwater concentrations throughout the plume are decreasing to eventually meet GA standards.

Biowall process monitoring is being conducted at two locations (shown in **Figure 1**) to determine if, and when, any needed maintenance activities should be performed. The first location is within Biowalls B1 and B2 in the segment that runs along the pilot-scale biowalls installed in July 2005. The second location is within Biowall C2, the furthest downgradient biowall. The objectives of biowall process monitoring for operations and maintenance (O&M) activities are as follows:

- Monitor the long-term performance and sustainability of the biowalls;
- Monitor substrate depletion and chemical and geochemical conditions under which the effectiveness of the biowalls may decline; and
- Determine if, and when, the biowalls need maintenance (i.e., need to be recharged with additional organic substrate).

2.0 SITE BACKGROUND

2.1 Site Description

SEDA is a 10,587-acre former military facility located in Seneca County near Romulus, New York, which has been owned by the United States Government and operated by the Department of the Army since 1941. SEDA is located between Seneca Lake and Cayuga Lake in Seneca County and is bordered by New York State Highway 96 on the east, New York State Highway 96A on the west, and sparsely populated farmland on the north and south.

The location of the Ash Landfill OU, also referred to as the Ash Landfill is composed of five solid waste management units (SWMUs). As shown in **Figure 2,** the five SWMUs that comprise the Ash Landfill OU are the Incinerator Cooling Water Pond (SEAD-3), the Ash Landfill (SEAD-6), the Non-Combustible Fill Landfill (NCFL) (SEAD-8), the Debris Piles (SEAD-14), and the Abandoned Solid Waste Incinerator Building (SEAD-15).

Prior to the development of the Ash Landfill OU, the land in this area was used for farming. From 1941 (the date SEDA was constructed) to 1974, uncontaminated trash was burned in a series of burn pits near the abandoned incinerator building (Building 2207). According to a U.S. Army Environmental Hygiene Agency (USAEHA) Interim Final Report, Groundwater Contamination Survey No. 38-26-0868-88 (July 1987), the ash from the refuse burning pits was buried in the Ash Landfill (SEAD-6) from 1941 until the late 1950's or early 1960's.

The incinerator was built in 1974. Between 1974 and 1979, materials intended for disposal were transported to the incinerator. Nearly all of the approximately 18 tons of refuse generated per week on the Depot were incinerated. The source for the refuse was domestic waste from depot activities and family housing. Large items that could not be burned were disposed of at the NCFL (SEAD-8). The NCFL has an area of approximately two acres and is located southeast of the incinerator building (immediately south of the SEDA railroad line). The NCFL was used as a disposal site for non-combustible materials, including construction debris, from 1969 until 1977.

Ash and other residue from the incinerator were temporarily disposed in an unlined cooling pond immediately north of the incinerator building. The cooling pond consisted of an unlined depression approximately 50 feet in diameter and approximately 6 to 8 feet deep. When the pond filled, the fly ash and residues were removed, transported, and buried in the adjacent ash landfill east of the cooling pond. The refuse was dumped in piles and occasionally spread and compacted. No daily or final cover was applied during operation. The active area of the Ash Landfill extended at least 500 feet north of the incinerator building, near a bend in a dirt road, based on an undated aerial photograph of the incinerator during operation. A fire destroyed the incinerator on May 8, 1979, and the landfill was subsequently closed. The landfill was apparently covered with native soils of various thicknesses but has not been closed with an engineered cover or cap. Other areas on the site were used for a grease pit and burning of debris.

2.2 Site Geology/Hydrogeology

The site is underlain by a broad north-to-south trending series of rock terraces covered by a mantle of glacial till. As part of the Appalachian Plateau, the region is underlain by a tectonically undisturbed sequence of Paleozoic rocks consisting of shales, sandstones, conglomerates, limestones and dolostones. At the Ash Landfill site, these rocks (the Ludlowville Formation) are characterized by gray, calcareous shales and mudstones and thin limestones with numerous zones of abundant invertebrate fossils. Locally, the shale is soft, gray, and fissile. Pleistocene age (Late Wisconsin age, 20,000 years before present [bp]) till deposits overlie the shales, which have a thin (2 to 3 feet) weathered zone at the top. The till matrix varies locally, but generally consists of unsorted silt, clay, sand, and gravel. At the Ash Landfill OU, the thickness of the till generally ranges from 4 to 15 feet. At the location of the biowalls, the thickness of the till and weathered shale is approximately 10 to 15 feet.

Groundwater is present in both the shallow till/weathered shale and in the deeper competent shale. In both water-bearing units, the predominant direction of groundwater flow is to the west, toward Seneca Lake. Based on the historical data, the wells at the Ash Landfill site exhibit rhythmic, seasonal water table and saturated thickness fluctuations. The saturated interval is at its thinnest (generally between 1 and 3 feet thick) in the month of September and is the thickest (generally between 6 and 8.5 feet thick) between the months of December and March.

The average linear velocity of the groundwater in the till/weathered shale was calculated during the RI using the following parameters: 1) an average hydraulic conductivity of 4.5×10^{-4} centimeters per second (cm/sec) (1.28 feet per day [ft/day]), 2) an estimated effective porosity of 15% (0.15) to 20% (0.20), and 3) a groundwater gradient of 1.95×10^{-2} foot per foot (ft/ft) (Parsons Engineering Science, Inc. [ES], 1994a). The average linear velocity was calculated to 0.166 ft/day or 60.7 feet per year (ft/yr) at 15% effective porosity and 0.125 ft/day or 45.5 ft/yr at 20% effective porosity. The actual velocity on-site may be locally influenced by more permeable zones possibly associated with differences in the actual porosity of the till/weathered shale.

2.3 Soil and Groundwater Impacts

The nature and extent of the constituents of concern at the Ash Landfill OU were evaluated through a comprehensive remedial investigation (RI) program. It was determined that surface water and sediment were not media of concern and did not require remediation. During the RI, a groundwater contaminant plume, emanating from the northern end of the Ash Landfill, was delineated. The primary constituents of concern at the Ash Landfill are VOCs in the groundwater, such as primarily chlorinated and aromatic compounds, semivolatile organic compounds (SVOCs), PAHs, and, to a lesser degree, metals in the soil. Release of the constituents of concern is believed to have occurred during the former activities at the Ash Landfill OU, as described above.

Soil

VOCs, specifically trichloroethene (TCE), were detected in the soil in the "Bend in the Road" area, located northwest of the Ash Landfill. Between 1994 and 1995, the Army conducted a Non-Time Critical Removal Action (NTCRA), also known as an Interim Removal Measure (IRM), to address VOC and PAH soil contamination in areas near the "Bend in the Road". This area is believed to be the source of the groundwater plume. The NTCRA was successful in reducing risk due to future exposure to these soils and prevented continued leaching of VOCs to groundwater associated with this operable unit. In the years that have passed since the NTCRA, the positive benefits of the NTCRA have been observed in that the concentration of VOCs in groundwater near the original source area has decreased by two orders of magnitude. Further remediation for VOCs in the soil at the "Bend in the Road" was not required.

The other compounds of significance detected in the soils were PAHs and metals. PAHs were detected at concentrations above NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) values in the NCFL and in the Debris Piles present around the former Ash Landfill. In general, the highest PAH concentrations were detected in the NCFL and small Debris Pile surface soils. The metals detected at elevated concentrations (significantly above TAGMs) in soils were copper, lead, mercury, and zinc. These elevated concentrations were found in the Ash Landfill, the NCFL, and the Debris Piles, and the highest concentrations of metals were detected at the surface of the Debris Piles. These piles are small, localized, surface features that are visibly discernable and do not extend into the subsurface.

Groundwater

The primary potential impact to human health and the environment is the groundwater plume, approximately 1,100 feet long by 625 feet wide, containing dissolved concentrations of TCE, 1,2-dichloroethene (DCE), and vinyl chloride (VC) that originated in the "Bend in the Road" area near the northwestern edge of the Ash Landfill. The nearest exposure points for groundwater are the three farmhouse wells, located approximately 1,250 feet from the leading edge of the plume. Two of the farmhouse wells draw water from the till/weathered shale aquifer and the remaining well draws water from the bedrock aquifer. Vertically, the plume is restricted to the upper till/weathered shale aquifer and is not present in the deeper competent shale aquifer. As noted above, the source of the plume was removed by the NTCRA.

2.4 Summary of the Remedial Action

2.4.1 Biowalls

Three biowall pairs were installed to address groundwater contamination on-site, as documented in the Construction Completion Report (Parsons, 2007), by excavating a linear trench down to competent bedrock and backfilling the trenches with a mixture of mulch and sand to ground surface.

Biowalls A1/A2, B1/B2, and C1/C2, shown on **Figure 1**, were constructed perpendicular to the chlorinated solvent plume in the locations prescribed in the RDR. The entire length of Biowalls A1/A2 and the northern portion of B1/B2 were combined into a single double-width trench (minimum of 6 feet in width) due to unstable soil conditions encountered, which caused trench widening. All trenches were excavated to competent bedrock. Approximately 2,840 linear feet (lf) of biowalls were constructed in the areas downgradient of the Ash Landfill at depths ranging from 7 feet below ground surface (bgs) to 18.5 feet bgs.

A 12-inch soil cover was placed over the entire length of the biowalls to impede surface water from preferentially flowing into the biowall. Trench spoils were used as the cover material and were compacted with the backhoe. It is anticipated that the mulch backfill within the trenches will settle over time and the cover will eventually settle to ground surface.

2.4.2 Incinerator Cooling Water Pond

The Incinerator Cooling Water Pond (ICWP) was regraded to meet the surrounding grade to prevent the accumulation of water in this inactive pond, as specified in the RDR. Prior to regrading, the vegetation that had grown on the berms surrounding the ICWP was removed with an excavator. The soil berm was then regraded with a dozer to match the surrounding grade. The ICWP was seeded with a standard meadow mix to promote vegetation and prevent erosion.

2.4.3 Ash Landfill and NCFL Vegetative Cover

A soil cover comprised of mulch, biowall trench spoils, and off-site topsoil was placed over the 2.2 acres of the Ash Landfill. The Ash Landfill was covered with 4,380 cy of fill to achieve a minimum cover thickness of 12 inches. Biowall trench spoils meeting the site cleanup critera and off-site topsoil were placed over the 3.4 acre NCFL. The NCFL was covered with 6,015 cy of fill to achieve a minimum cover thickness of 12 inches. The purpose of the covers are to prevent terrestrial wildlife from directly contacting or incidentally ingesting metals-impacted soils.

2.4.4 Debris Pile Removal

During the RA, approximately 200 cy of debris was removed from Debris Piles B and C. Approximately 1,000 cy of debris was removed from within and beyond the staked limits of Debris Pile A. The total volume of debris removed was approximately 1,200 cy (1,548 tons).

2.5 Biowall Technology Description

Solid-phase organic substrates used to stimulate anaerobic biodegradation of chlorinated ethenes include plant mulch and compost. Mulch may be composted prior to emplacement, or the mulch may be mixed with another source of compost, to provide active microbial populations for further degradation of the substrate in the subsurface. Mulch is primarily composed of cellulose and lignin, but "green" plant material is incorporated to provide a source of nitrogen and nutrients for microbial growth. These substrates are mixed with coarse sand and emplaced in a trench or excavation in a permeable reactive biowall configuration. Biodegradable vegetable oils may also be added to the mulch mixture to increase the availability of soluble organic matter. This treatment method relies on the flow of groundwater under a natural hydraulic gradient through the biowall to promote contact with slowly-soluble organic matter. As the groundwater flows through the organic matter within the biowall, a treatment zone is established not only within the biowall, but downgradient of it, as the organic matter migrates with the groundwater and microbial processes are established.

Degradation of the organic substrate by microbial processes in the subsurface provides a number of breakdown products, including metabolic acids (e.g., butyric and acetic acids). The breakdown products and acids produced by degradation of mulch in a saturated subsurface environment provide secondary fermentable substrates for generation of hydrogen, the primary electron donor utilized in anaerobic reductive dechlorination of chlorinated ethenes. Thus, a mulch biowall has the potential to stimulate reductive dechlorination of chlorinated ethenes for many years. If needed, mulch biowalls can be periodically recharged with liquid substrates (e.g., vegetable oils) to extend the life of the biowall. Vegetable oil is a substrate that is readily available to microorganisms as a carbon source to enable them to establish and continually develop their population. Used in combination with the mulch, it has the potential to increase the duration of organic carbon release.

Reductive dechlorination is the most important process for natural biodegradation of the more highly chlorinated solvents (EPA, 1998) and is shown in **Figure 3**. Complete dechlorination of TCE and the other chlorinated solvents present in the groundwater is the goal of anaerobic biodegradation using the mulch biowall technology.

Biodegradation causes measurable changes in groundwater geochemistry that can be used to evaluate the effectiveness of substrate addition in stimulating biodegradation. For anaerobic reductive dechlorination to be an efficient process, the groundwater typically must be sulfate-reducing or methanogenic. Thus, groundwater in which anaerobic reductive dechlorination is occurring should have the following geochemical signature:

- Depleted concentrations of dissolved oxygen (DO), nitrate, and sulfate;
- Elevated concentrations of methane, carbon dioxide, chloride, and alkalinity; and
- Reduced oxidation reduction potential (ORP).

3.0 LONG-TERM MONITORING DATA ANALYSIS AND GROUNDWATER REMEDY EVALUATION

3.1 Sample Collection

Four rounds of sampling were conducted during the first year of LTM, as follows:

- The first quarter was completed between January 3, 2007 and January 4, 2007;
- The second quarter was completed between March 15, 2007 and March 17, 2007;
- The third quarter was completed between June 5, 2007 and June 7, 2007; and

- The fourth quarter was completed between November 13, 2007 and November 15, 2007.

Groundwater samples were collected using low flow sampling techniques at the Ash Landfill OU during each of the four sampling rounds. Bladder pumps were used to purge the wells and collect the samples during these rounds. Sampling procedures, sample handling and custody, holding times, and collection of field parameters were conducted in accordance with the "Final Sampling and Analysis Plan for Seneca Army Depot Activity (SAP)" (Parsons, 2005).

Fourteen monitoring wells were sampled and they were classified into three groups, listed in **Table 1**: eleven on-site plume performance, one off-site performance monitoring, and five biowall process wells. The off-site performance monitoring well, MW-56, was monitored on a semi-annual basis, and was monitored in January 2007 and June 2007. The well locations are shown on **Figure 4**.

The five biowall process monitoring wells include three wells that are also plume performance wells (MWT-23, MWT-28, and MWT-29). These five wells are either within or immediately upgradient or downgradient of the biowalls and are used to assess when and if the biowalls may require additional substrate.

At each well, groundwater samples were collected and submitted to Severn Trent Laboratory (STL) in Buffalo, New York. The main objective of performance monitoring, listed in **Section 1.1**, is to confirm that concentrations throughout the plume are decreasing to eventually reach the Class GA groundwater standards and that there are no exceedances of standards detected at the off-site well. Therefore, wells that are in the plume performance group only were analyzed for VOCs by USEPA SW846 Method 8260B.

The samples from the five wells in the process monitoring group were collected to monitor substrate depletion and chemical and geochemical conditions under which the effectiveness of the biowalls may decline (**Section 1.1**); therefore, these samples were submitted to STL for the following analysis:

- VOCs by USEPA SW846 Method 8260B
- Sulfate by USEPA Method 300.1
- Total organic carbon (TOC) by USEPA SW846 Method 9060A

The samples from the five wells in the process monitoring group were also submitted to Microseeps, Inc. located in Pittsburg, Pennsylvania, for analysis for methane, ethane, and ethane by AM20GAX, Microseeps version of Method RSK 175. In the field, the following geochemical parameters were measured and recorded for each groundwater sample: pH, oxidation-reduction potential (ORP), conductivity, and temperature were measured using Horiba U-22; dissolved oxygen (DO) was measured with an YSI 55; and turbidity was measured with a Lamotte 2020 turbidity meter. In addition, a HACH® DR/850 Colorimeter was used in the field at the five process wells to measure manganese and ferrous iron by USEPA Method 8034 and USEPA Method 8146, respectively. A summary of the samples collected is presented in **Table 1**.

3.2 Geochemical Data

Biodegradation causes measurable changes in groundwater geochemistry that can be used to evaluate the effectiveness of substrate addition in stimulating biodegradation. For anaerobic reductive dechlorination to be an effective process, the groundwater typically must be sulfate-reducing or methanogenic. Geochemical parameters collected in the field that also serve as water quality indicators, such as ORP, DO, and conductivity, were recorded for all the wells in the LTM program. Analysis for geochemical parameters (TOC, sulfate, and methane/ethene/ethane) was completed for the five wells in the biowall process monitoring group, as indicated in **Section 3.1**. Anaerobic reductive dechlorination is occurring if the following geochemical signatures are identified according to USEPA guidance on natural attenuation of chlorinated Solvents (USEPA, 1998):

- Depleted concentrations of dissolved oxygen and sulfate;
- Elevated concentrations of methane;
- Reduced oxidation reduction potential (ORP); and
- Distribution of soluble organic substrate in groundwater (TOC).

Geochemical parameter results are shown on **Table 2**. Comparisons of geochemical parameters for biowall locations MWT-26 (upgradient of Biowall B1) to MWT-28 (in Biowall B2) are summarized below to evaluate the biowall process performance, demonstrating the change in geochemistry across the B1/B2 Biowall pair. **Table 2** is organized with the wells listed in the direction of groundwater flow, with the most upgradient well listed first and the most downgradient well listed last.

Dissolved Oxygen

Dissolved oxygen (DO) is the most favored electron acceptor used by microbes for the biodegradation of organic carbon, and its presence can inhibit the biodegradation of chlorinated ethenes. DO levels are depleted (less than 2 milligrams per liter [mg/L]) in all the wells measured in the fourth quarter, shown in **Table 2**. DO levels at the upgradient wells have decreased over the four sampling rounds, and DO levels over the entire site have been depleted as well. This indicates that DO is depleted due to the presence of the biowall substrate. The unavailability of DO enhances the degradation of chlorinated ethenes in the aquifer.

Sulfate

Sulfate is used as an electron acceptor during sulfate reduction, competing with anaerobic reductive dechlorination for available substrate (electron donor). Sulfate levels lower than 20 mg/L are desired to prevent inhibition of reductive dechlorination of chlorinated ethenes (USEPA, 1998). The sulfate levels detected in the biowalls are orders of magnitude lower than the concentration of sulfate detected upgradient of Biowalls B1/B2 at MWT-26, shown in **Table 2**. Sulfate concentrations at

MWT-29, located downgradient of Biowall B2, are higher than the sulfate levels detected in the biowalls, but much lower than the upgradient sulfate concentrations. The data shown in **Table 2** indicate that the availability of this electron acceptor is diminished and conditions for anaerobic dechlorination are enhanced in the biowalls and the area immediately downgradient.

Methane

The presence of methane in groundwater is indicative of strongly reducing methanogenic conditions. An increase in the concentrations of methane is an indication that reducing conditions are optimal for anaerobic reductive dechlorination to occur. Methane was detected in the well upgradient of Biowall B1/B2 (MWT-26) at a concentration of 44 µg/L. The methane concentrations increased by three orders of magnitude compared to the upgradient level at all of the process wells located in biowalls and increased by two orders of magnitude in the process well located immediately downgradient of Biowall B2, shown in **Table 2**. This data demonstrate that there is an increase in the level of methanogenic activity within the biowalls and in downgradient areas, compared to upgradient locations.

Oxidation-Reduction Potential

ORP indicates the level of electron activity and indicates the tendency for the groundwater to accept or transfer electrons. Low ORP, less than -100 millivolts (mV), is a condition common for anaerobic reductive dechlorination to occur (USEPA, 1998). During the Quarter 4 November 2007 monitoring event, ORP values upgradient of Biowall A1/A2 were significantly higher than the ORP values observed at the wells within the biowalls, which were less than -100 mV, shown in **Table 2**. The ORP data indicates that a zone conducive to anaerobic degradation is setting up between Biowalls B1/2 and C1/C2, with ORP values observed at levels less than -100 mV at the monitoring wells located in that area. Conditions with ORP values less than -100 mV extend downgradient of Biowall C2, based on data collected at MWT-24. ORP values near the boundary of the site (MWT-7 and PT-24) are much higher, indicating that the presence of aerobic conditions in this area.

Total Organic Carbon

The presence of organic substrate is necessary to fuel anaerobic degradation processes, including reductive dechlorination. Carbon is an energy source for anaerobic bacteria and drives reductive dechlorination. Levels of TOC greater than 20 mg/L are sufficient to maintain sulfate reducing and methanogenic conditions (USEPA, 1998). TOC levels increased greatly in the biowalls compared to the upgradient concentrations, shown in **Table 2**. The concentration of TOC remained at the threshold value of 20 mg/L at the well located immediately downgradient of Biowall B2, providing evidence that conditions in the zone between Biowalls B1/B2 and C1/C2 are becoming more conducive to reductive dechlorination. The TOC data from the wells in the biowalls indicates that the biowalls are promoting conditions supportive of anaerobic degradation processes.

In summary, there is a decrease in concentrations of TOC as readily degraded organics (vegetable oil and cellulose) within the mulch mixture are consumed; though, TOC remains above the threshold level of 20 mg/L. However, as discussed in the **Section 3.3** below, the change in TOC concentrations appears to have no impact on the efficiency at which chlorinated organics are degraded within the biowalls and does not indicate that the mulch requires recharging.

In summary, for monitoring locations within the biowalls:

- Concentrations of TOC remain elevated at 92 to 167 mg/L;
- ORP within the biowalls remains at -144 to -166 mV;
- Sulfate remains less than 32 mg/L, with only a small rebound in sulfate in the B1 Biowall. This level is still substantially lower than background concentrations (up to 1,060 mg/L at MWT-29 in fourth quarter 2007); and
- Methane remains at 11 mg/L or higher.

Therefore, highly anaerobic conditions remain within the biowalls and sufficient levels of organic carbon are being sustained for effective anaerobic degradation of chlorinated ethenes.

3.3 Chemical Data Analysis and Groundwater Remedy Evaluation

Table 3 summarizes chlorinated ethenes detected in groundwater during the four quarters of the first year of long term monitoring. **Table 3** is organized with the wells listed in the direction of groundwater flow, with the most upgradient well listed first and the most downgradient well listed last. A complete presentation of the groundwater data is provided in **Appendix A.** **Figure 5** presents the chlorinated ethene data for the four quarters. The discussion below presents analysis of the groundwater data from the first year of the LTM program and addresses how the remedial action objectives are being achieved.

Achievement of first performance monitoring objective:

- *Confirm that there are no exceedances of contaminants of concern (COC) groundwater standards at the off-site trigger monitoring well MW-56;*

Concentrations of chlorinated organics near the site boundary (PT-24) and at the off-site well, MW-56, remain low or non-detect, with no significant increase (i.e., approaching regulatory standards) in the concentration of cis-DCE or VC. TCE and VC were not detected in any of the quarters at MW-56, and DCE was detected below the Class GA groundwater standard (5 µg/L), shown in **Table 3.** The first year of long-term monitoring confirmed that there were no exceedances of COC groundwater standards at MW-56.

Achievement of second performance monitoring objective:

- *Document the effectiveness of the biowalls to remediate and attenuate the chlorinated ethene plume;*

Concentrations of chlorinated ethenes at well MWT-26 (between Biowall A and Biowall B1) have steadily declined for each quarterly monitoring event to concentrations of 2.8 µg/L of TCE, 2.8 µg/L of cis-DCE, and less than 1.0 µg/L (non-detect) of VC (all below regulatory standards). Concentrations at MWT-24, located downgradient of Biowall C2, similarly show a steady decline in cis-DCE for each monitoring event (from 210 µg/L in the first quarter to 6.7 µg/L in the fourth quarter), and a substantial decline in VC (from 45 µg/L in the second quarter to 3.8 µg/L in the fourth quarter). TCE has consistently been below 2 µg/L at MWT-24.

Upgradient of the biowall systems, TCE was detected above the Class GA groundwater standard (5 µg/L) at concentrations ranging from 2,000 µg/L to 2,700 µg/L at PT-18A and 26 µg/L to 55 µg/L at MWT-25 over the four quarterly sampling events, shown on **Table 3**. TCE concentrations within the biowalls (MWT-27, MWT-28, and MWT-23) remain below detection limits, which is an expected performance measure. However, it is just as significant that concentrations of DCE or VC are not elevated within the biowalls. This suggests complete mineralization of chlorinated ethenes, perhaps involving multiple anaerobic degradation processes. Ethene is only slightly elevated within the biowalls, but this is not unusual. Ethene is not produced by anaerobic oxidation of cis-DCE or VC, or by abiotic transformation of chlorinated ethenes by reduced iron sulfides. In addition, ethene may be further reduced under highly anaerobic conditions and is volatile (may off-gas) relative to other biogenic gases (carbon dioxide and methane) produced within the biowalls. Therefore, the biowalls are operating as expected with no loss of performance. TOC concentrations remain sufficiently elevated to promote effective degradation of chlorinated ethenes within the biowalls.

The changes in groundwater concentrations of TCE, DCE, and VC as the groundwater passes through the biowalls are shown in **Figures 5A** through **5D** for Quarters 1, 2, 3, and 4, respectively. The figures show that the concentrations of TCE in groundwater are reduced to concentrations below the detection limit within the biowalls. The concentration of TCE does rebound as the distance away from Biowalls C1/C2 increases as residual levels of TCE desorp from the soil. These results indicate that when groundwater is intercepted and treated by the biowalls, a measurable (albeit slower) improvement in downgradient water quality will occur.

Anaerobic degradation of TCE may also occur downgradient of the biowalls in the aquifer formation due to soluble organic carbon released from the biowalls. It is notable that concentrations of cis-DCE and VC are highest downgradient of the biowalls, and not within the biowalls. This suggests that sequential biotic reductive dechlorination of chlorinated organics is the primary degradation process in the downgradient reaction zones, with low levels of TCE being released by desorption from the aquifer matrix or from back diffusion of contaminated groundwater from low permeability sediments. A further indication of biotic reductive dechlorination is the elevated concentration of ethene (200 µg/L) observed at well location MWT-29 during fourth quarter monitoring. Further downgradient, TCE was detected at MWT-7 (310 feet from C1/C2) at a maximum concentration of 510 µg/L in the fourth quarter; it is likely that the effects of the biowalls have not reached this part of the plume, which is expected after only one year since the biowall installation.

Achievement of third performance monitoring objective:

- *Confirm that groundwater concentrations throughout the plume are decreasing to eventually meet GA standards.*

In general, concentrations of TCE, cis-DCE, and VC decreased over the four sampling events (with some seasonal variation) at the wells near the biowalls and downgradient of the biowalls. Time plots for monitoring wells MWT-25, MWT-26, MWT-27, MWT-29, MWT-22, PT-22, MWT-23, MWT-24, and PT-24 are presented in **Figures 6A** through **6I**, respectively. The plots show an overall decreasing trend for COCs, though **Figure 6E** (MWT-22) and **Figure 6F** (PT-22) show that cis-DCE may increase initially as TCE decreased, and VC increases as concentrations of cis-DCE decrease, specifically in wells near the biowalls. This increase is expected when reductive dechlorination is occurring; however, over time, the concentrations of cis-DCE and VC are expected to diminish. The time plots of the downgradient wells (MWT-29, MWT-22, PT-22, MWT-24, and PT-24) show that the TCE concentrations measured in the wells in the vicinity of the biowalls and downgradient of the biowalls are decreasing.

An exponential regression, which matches the rate of decay typical for biological processes, has been calculated for the monitoring wells as a means of calculating an estimate of the time it will take for the concentrations of chlorinated organics to meet their respective GA groundwater standards. **Table 4** summarizes the trend for each contaminant in each well and provides an estimate of the date that the standards will be achieved based on the exponential regressions. This table shows that with the exception of the source well (PT-18A), PT-17, and MWT-7, all concentrations at the wells have either reached the Class GA groundwater standard or are expected to reach their respective standards by 2014. These dates are intended to provide an indication of the timeframe required for concentrations to reach acceptable levels, and are not meant as a time commitment for the remedy. There may be limiting factors in reaching the groundwater standards by the specified date, such as desorption and back diffusion from low permeability sediments, which may drive the actual time required to reach compliance. The time plots with the regression lines are included as **Appendix B**.

Time plots of the data for PT-18A, PT-17, and MWT-7 (**Figures 7A**, **B**, and **C**) include historic data prior to the installation of the biowalls. **Figures 7A** and **7B** indicate that there is an overall decreasing trend for the COCs at PT-18A and PT-17, respectively, even though more recent data has been increasing. The concentrations of TCE at PT-18A (located upgradient of the biowalls), MWT-7, and PT-17 (both located well downgradient of Biowall C2) do not appear to have been impacted by the biowall system and dates to achieve compliance cannot be estimated due to the natural variation in concentrations over time. Concentrations at these wells are within historical levels and that the Army will continue to evaluate any impact from the biowall on this portion of the plume.

Other Compounds

Other non-chlorinated organics were detected in the groundwater, shown in **Appendix A**. Toluene was detected in five wells, and exceeded the NYSDEC Class GA groundwater standard at three of the wells located within the biowalls at MWT-27 (7.3 J μg/L in Q4), at MWT-28 (in all four quarters ranging from 160 μg/L to 340 J μg/L – average of the sample and its associated duplicate), and MWT-23 (in Quarters 2, 3, and 4 at concentrations ranging from 7.4 μg/L to 580 μg/L – average of sample and associated duplicate concentrations). Ethyl benzene was detected once in Biowall C2 at MWT-23 during the Quarter 3 event at a concentration below its Class GA groundwater standard, 1.3 J μg/L. Neither toluene nor ethyl benzene is a historic contaminant of concern, and the detections of toluene and ethyl benzene are not believed to be associated with historic site operations or with degradation products of reductive dechlorination. The higher detections of toluene were observed in two isolated wells (MWT-28 and MWT-23) and were not detected at significant concentrations downgradient of these wells. The Army will continue to monitor the concentrations during subsequent monitoring events.

Ketones were detected in the monitoring wells at the site, with higher concentrations detected in the wells located within the biowalls, shown in **Appendix A**. The maximum detections of acetone and methyl ethyl ketone were observed at the well located in Biowall B2, MTW-28, at concentrations of 2,600 J μg/L and 4,900 J μg/L, respectively, during the first quarter. Concentrations of ketones have decreased significantly in the more recent sampling events. Ketones, produced by fermentation reactions in the biowalls, readily degrade in aerobic conditions and were not detected within 100 feet of the site boundary.

The complete data for all four sample quarters is included in **Appendix A**.

3.4 Biowall Recharge Evaluation

The RDR calls for a recharge evaluation at the end of the first year of quarterly monitoring. A recharge evaluation, defined on Figure 7-3 of the RDR and presented below, is the determination of the need to recharge a biowall segment. The evaluation consists of the following:

- Determining the need to recharge a biowall segment requires a review of chemical concentrations and geochemical parameters by an experienced professional. A specific, absolute set of conditions or parameter values are not appropriate to determine the need to recharge. Rather, a lines-of-evidence approach will be used that correlates a decrease in the efficiency of the system to degrade chloroethenes to geochemical evidence that indicates the cause is due to substrate depletion.

- The following parameters will be evaluated on an annual basis using at least two consecutive rounds of sampling data in order to determine if recharge of the biowalls is necessary:
  - COC concentrations in the wall (e.g., MWT-27, MWT-28, and MWT-23). If COC concentrations have rebounded by greater than 50% for any single sampling event, this will indicate that recharge should be considered. Concentrations within the biowalls, not at downgradient locations, will be used to make this evaluation so that the effectiveness of the wall itself is being measured without the interference of effects such as desorption and mixing.
  - Geochemical parameters, specifically ORP, TOC, and DO, in the wall (e.g., at MWT-27, MWT-28, and MWT-23). Benchmark values will be used initially to evaluate anaerobic conditions in the groundwater. These benchmarks are:
    - ORP < -100 mV
    - TOC > 20 mg/L
    - DO < 1.0 mg/L

Parameters described in (a) and (b) above are intended to be used as guidelines and will be considered in the evaluation if, and when, a depletion of bioavailable organic substrate results in a rebound in geochemical redox conditions under which effective biodegradation does not occur.

A recharge evaluation indicates that recharging the biowalls is not necessary at this time. **Section 3.2** presents the geochemical data and the analytical data, showing that the geochemical parameters are positive indicators that reductive dechlorination is occurring.

	Benchmark Value	**MWT-27 (Qs 1, 2, 3, 4)**	**MWT-28 (Qs 1, 2, 3, 4)**	**MWT-23 (Qs 1, 2, 3, 4)**
ORP (mV)	< -100	-158, -145, -141, -166	-150, -113, -131, -151	-122, -109, -87, -144
TOC (mg/L)	> 20	2050, 1350, 755, 167	1775, 171, 309, 92	260, 210, 303, 151
DO (mg/L)	< 1.0	0.25, 0.08, 0, 0.06	0.16, 0.09, 0, 0.08	0.26, 0.35, 0, 0.12

This table shows that the geochemical parameters meet the benchmark values and groundwater conditions are as expected. This is further established by a review of the change in concentrations at MWT-27 (Biowall B1), MWT-28 (Biowall B2), and MWT-23, summarized below.

		TCE (µg/L)	**cis-DCE (µg/L)**	**VC (µg/L)**
MWT-27	Q1	ND	ND	ND
	Q2	ND	ND	ND
	Q3	ND	ND	ND
	Q4	ND	ND	ND
MWT-28	Q1	ND	ND	ND
	Q2	ND	ND	ND

	Q3	ND	ND	ND
	Q4	ND	ND	ND
MWT-23	Q1	ND	60	23
	Q2	ND	11	4.8
	Q3	ND	3.1	ND
	Q4	ND	3.6 J	3.65

The analytical data shows that concentrations at MWT-27 and MWT-28 have remained below detections limits, and at MWT-23 concentrations were either below the detection limit or decreasing since the first sampling quarter. Based on a review of the analytical and geochemical data, the biowalls do not need to be recharged and the system is meeting the long-term monitoring objectives established in the RDR (Parsons, 2006b).

3.5 Soil Remedy Evaluation

Part of the remedial action was installing a 12-inch vegetative cover over the Ash Landfill and the NFCL. The covers have been inspected and field observations noted that the landfills are vegetated with grasses and clovers. At the NCFL, visual observations noted a small amount of soil erosion and the presence of deer trails; however, the erosion and the trails cut less than 6 inches into the cover. Therefore, underlying soil has not been exposed to the environment. The Army will continue to monitor the integrity of the covers and ensure that the vegetative covers have not been breached and that the underlying soil is not exposed.

3.6 Land Use Controls (LUCs)

The remedy for the Ash Landfill OU requires the implementation and maintenance of land use controls (LUCs) at the two sites. The LUC requirements are detailed in the "Land Use Control Remedial Design for SEAD 27, 66, 64A, *Final*" (2006). The selected LUCs for the Ash Landfill OU are as follows:

- Prevent access to or use of the groundwater until cleanup levels are met;
- Maintain the integrity of any current or future remedial or monitoring system such as monitoring wells and impermeable reactive barriers;
- Prohibit excavation of the soil or construction of inhabitable structures (temporary or permanent) above the area of the existing groundwater plume; and
- Maintain the vegetative soil layer over the ash fill areas and the NCFL to limit ecological contact.

As part of the LTM program, the Army inspected the site to determine that the LUCs are being maintained. While performing the groundwater sampling, it was confirmed that no prohibited facilities have been constructed and no access to or use of groundwater was evident. As discussed in **Section 3.5** above, the vegetative covers are limiting ecological contact with the underlying soil.

3.7 Operating Properly and Successfully

The USEPA's "Guidance for Evaluation of Federal Agency Demonstrations (Section 12(h)(s))" outlined the implemented design has met the requirements for "operating properly and successfully". The Army believes that the remedial action completed at the Ash Landfill has demonstrated that it meets the "operating properly and successfully" designation.

The remedial action is operating "properly".

The USEPA guidance describes that "a remedial action is operating 'properly' if it is operating as designed." The Construction Completion Report (CCR) (Parsons, 2007) details that the construction of the vegetative covers were installed as designed, meeting or exceeding the 12-inch of soil requirement as a cover. **Section 3.5** above describes that the covers are intact and effectively prevent ecological contact with the underlying soil; therefore, the vegetative covers are operating properly.

The CCR also details the construction of the biowalls; deviation from the design resulted in the placement of additional mulch in the biowalls, which were thicker than designed. As this is an enhancement of the design, it is fair to say that the biowalls were constructed as designed. The geochemical data presented and discussed in **Section 3.1** indicates that anaerobic conditions favorable to reductive dechlorination have been established in the areas of the biowalls, which was the expectation of the design of the biowall system.

The remedial action is operating "successfully".

A remedial action may receive USEPA's designation of operating successfully (1) if "a system will achieve the cleanup levels or performance goals delineated in the decision document" and (2) if the remedy is protective of human health and the environment. The data presentation in **Section 3.3** above demonstrates that concentrations of VOCs are decreasing and will eventually meet the Class GA groundwater standards. The time plots presented in **Figure 6 (A** through **I)** show a decreasing trend for the COCs; **Table 4** summarizes the trends in concentrations and provides a time estimate based on exponential regressions of the time plots. The time estimates are not exact dates that Class GA groundwater standards will be achieved; rather they serve to demonstrate that the concentrations in groundwater will eventually meet the groundwater standards. Recent inspection of the vegetative covers at the Ash Landfill and the NCFL indicate that the covers are preventing ecological receptors from contacting the underlying soil. The LUCs have been maintained and no one is accessing the groundwater; therefore, there is no threat to human health. Based on a review of the site data, inspection of the condition of the vegetative covers, and confirmation that the LUCs are being maintained, the Army believes that the remedial action is operating successfully.

Based on an assessment of the design and construction of the remedial action, as well as an evaluation of the geochemical and analytical data from the first year of quarterly groundwater monitoring, the Army believes that the remedial action at the Ash Landfill meets the requirements to be designated as "operating properly and successfully".

4.0 LONG-TERM MONITORING CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the results of the long-term monitoring at the Ash Landfill since the installation of the full-scale biowalls, the Army has made the following conclusions:

- TCE within the biowalls remains below the detection limits;
- TCE, cDCE, and VC are present in the groundwater at the site at concentrations above the Class GA groundwater standard;
- Chemical results indicate that the chlorinated ethenes are decreasing as they pass through the biowall systems;
- Geochemical parameters indicate that reductive dechlorination is occurring and that anaerobic treatment zones are established within and downgradient of the biowalls;
- Concentrations of chlorinated ethenes detected near the site boundary (PT-24) and at the off-site well (MW-56) are below Class GA groundwater standards;
- Additional monitoring is required to observe the COC trends at PT-18A, PT-17, and MWT-7;
- Recharge of the biowalls is not necessary at this time; and
- The remedial action meets the requirements of the USEPA's "operating properly and successfully" designation.

4.2 Recommendations

Based on the first four quarters of long-term monitoring, the Army recommends modifying the frequency of monitoring based on the process detailed in the RDR in Figure 7-3, included in this annual report as **Figure 8**. The recommendations for LTM for year two of monitoring are as follows:

- The biowall process monitoring wells (MWT-26, MWT-27, MWT-28, MWT-28, MWT-29, and MWT-23) will be monitored on a semi-annual basis. Each year a recharge evaluation will be completed. After recharge is conducted, MWT-26, MWT-27, and MWT-29, will be excluded from the LTM program, as advised in **Figure 8**. MWT-28 and MWT-23 will continue to be monitored as part of the performance monitoring wells.

- The performance monitoring wells (PT-17, PT-18A, PT-22, PT-24, MWT-7, MWT-22, MWT-24, and MWT-25) will be monitored on a semi-annual basis instead of the current quarterly basis. The concentrations of COCs, specifically TCE, detected in the wells located downgradient of the source area (near PT-18A) showed decreasing trends over the four LTM events, with the exception of data at MWT-7, which showed no significant change in concentrations. To better monitor the progress of the treatment zone, additional geochemical parameters (TOC, sulfate, and methane, ethene, and ethane) will be analyzed at PT-17 and MWT-7 for the next two semi-annual events, and the inclusion of these parameters after the two rounds will be reevaluated in the next Annual Report. The addition of geochemical parameters to the analytical requirements for PT-17 and MWT-7 will allow for an assessment of the establishment of treatment zones around these wells and for the development of a time estimate for the concentrations at these wells to reach the groundwater standards.

- The off-site performance monitoring well (MW-56) will continue to be monitored on a semi-annual basis.

- The vegetative covers at the Ash Landfill and the NCFL will be inspected annually to ensure that they remain intact and protective of ecological receptors.

- The Army recommends that the USEPA designate the remedial action at the Ash Landfill OU as “operating properly and successfully”.

- The frequency of monitoring will be reviewed based on the process outlined in **Figure 8** in the annual report submitted after the completion of the second year of LTM.

5.0 REFERENCES

Parsons, 1994. Remedial Investigation Report at the Ash Landfill Site, Final. July 1994

Parsons, 2004. Record of Decision for the Ash Landfill Operable Unit, Final. July 2004

Parsons, 2005. Final Sampling and Analysis Plan for Seneca Army Depot Activity (SAP), May 2005.

Parsons, 2006a. Remedial Design Work Plan for the Ash Landfill Site at Seneca Army Depot Activity, July 2006.

Parsons, 2006b. Remedial Design Report for the Ash Landfill Operable Unit, August 2006.

Parsons, 2007. Construction Completion Report for the Ash Landfill Operable Unit, April 2007.

USEPA, 1996. Guidance for Evaluation of Federal Agency Demonstrations that Remedial Actions are Operating Properly and Successfully, Interim. August 1996.

USEPA, 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128. September 1998

Table 1
Groundwater Sample Collection
Ash Landfill Annual Report
Seneca Army Depot Activity

Monitoring Wells	**Monitoring Well Group**			**Laboratory Analysis**			
	On-Site Plume	**Biowall Process**	**Off-Site Performance**	VOC 8260B	TOC 9060A	MEE RSK-175	Sulfate EPA 300.1
PT-18A	X (all)			X			
MWT-25	X (all)			X			
MWT-26		X (all)		X	X	X	X
MWT-27		X (all)		X	X	X	X
MWT-28	X (all)	X (all)		X	X	X	X
MWT-29	X (all)	X (all)		X	X	X	X
MWT-22	X (all)			X			
PT-22	X (all)			X			
MWT-23	X (all)	X (all)		X	X	X	X
MWT-24	X (all)			X			
PT-17	X (all)			X			
MWT-7	X (all)			X			
PT-24	X (all)			X			
MW-56			X (1,3)	X			

Note:
All samples were analyzed for field parameters including pH, ORP, dissolved oxygen, conductivity, temperature, and turbidity.
temperature, and turbidity.
(all) - This well was sampled in all four quarters of the LTM.
(1,3) - This well was sampled in Quarters 1 and 3 of the LTM.

Groundwate ıemical Data
Ash Landfi nnual Report
Seneca Army Depot Activity

Upgradient

Well ID	Location Description	Sample ID	Sample Round	pH	Turbidity (NTU)	Specific Conductance (mS/cm)	DO (mg/L)	ORP (mV)	TOC (mg/L)	Sulfate (mg/L)	Ethane (ug/L)	Ethene (ug/L)	Methane (ug/L)	Manganese (ug/L)	Ferrous Iron (ug/L)
PT-18A	upgradient of walls	ALBW20059	1Q2007	6.63	141	1.69	1.33	93							
		ALBW20074	2Q2007	6.44	110	2.87	0.76	-177							
		ALBW20088	3Q2007	6.71	5	1.66	0	-23							
		ALBW20103	4Q2007	6.41	0.0	1.25	0.04	-5							
MWT-25	upgradient of Biowall A	ALBW20064	1Q2007	8	9.6	0.29	2.83	63							
		ALBW20079	2Q2007	7.27	14	2.2	2.8	52							
		ALBW20093	3Q2007	7.36	6.2	2.43	4.14	100							
		ALBW20108	4Q2007	6.9	0	1.2	0.21	65							
MWT-26	**upgradient of Biowalls B1/B2**	**ALBW20066**	**1Q2007**	**6.89**	**10**	**2.01**	**1.84**	**-3**	**3.9 J**	**958**	**ND**	**ND**	**ND**		
		ALBW20081	**2Q2007**	**7.26**	**9**	**1.9**	**0.48**	**-135**	**15.2**	**738**	**0.4**	**7.8**	**210**	**2.1**	**> 3.3**
		ALBW20095	**3Q2007**	**6.89**	**2.2**	**1.94**	**0.21**	**-170**	**10.3**	**473**	**1**	**13**	**390**	**3.1**	**> 3.3**
		ALBW20111	**4Q2007**	**7.08**	**50**	**1.9**	**0.89**	**-40**	**6.1**	**1060**	**0.16**	**0.4**	**44**	**0.0**	**1.09**
MWT-27	**in Biowall B1**	**ALBW20067**	**1Q2007**	**6.34**	**120**	**5.31**	**0.25**	**-158**	**2050 J**	**ND**	**ND**	**ND**			
		ALBW20082	**2Q2007**	**6.65**	**87**	**4.37**	**0.08**	**-145**	**1350**	**ND**	**0.15**	**2.7**	**15,000**	**> 22**	**> 3.3**
		ALBW20096	**3Q2007**	**6.59**	**154**	**3.35**	**0**	**-141**	**754.5**	**1.9 J**	**0.0805**	**0.33**	**13,500**	**> 22**	**> 3.3**
		ALBW20112	**4Q2007**	**6.43**	**58**	**5.76**	**0.06**	**-166**	**167**	**31.7**	**ND**	**0.014 J**	**13,000**	**> 22**	**2.19**
MWT-28	**in Biowall B2**	**ALBW20068**	**1Q2007**	**7.5**	**163**	**0.61**	**0.16**	**-150**	**1775 J**	**1.7**	**ND**	**ND**	**12,500 J**		
		ALBW20083	**2Q2007**	**6.6**	**21**	**2.3**	**0.09**	**-113**	**171**	**ND**	**0.67**	**0.48**	**19,000**	**7.5**	**> 3.3**
		ALBW20098	**3Q2007**	**6.56**	**100**	**2.74**	**0**	**-131**	**309**	**ND**	**0.01 J**	**0.057**	**11,000**	**> 22**	**> 3.3**
		ALBW20113	**4Q2007**	**6.48**	**10**	**1.72**	**0.08**	**-151**	**92**	**ND**	**0.014 J**	**ND**	**11,000**	**> 22**	**2.15**
MWT-29	**downgradient of Biowall B2**	**ALBW20070**	**1Q2007**	**6.49**	**7.2**	**2.1**	**0.33**	**-76**	**25.1 J**	**113**	**ND**	**ND**	**ND**		
		ALBW20084/5	**2Q2007**	**6.8**	**1.7**	**2.21**	**0.39**	**-53**	**36.7**	**173**	**25**	**150**	**8,100**	**7.5**	**> 3.3**
		ALBW20099	**3Q2007**	**6.64**	**1.8**	**1.68**	**0.11**	**-79**	**15.7**	**151**	**13**	**160**	**2,800**	**8.1**	**2.84**
		ALBW20114	**4Q2007**	**7.04**	**12.2**	**1.88**	**0.21**	**-101**	**20.9**	**289**	**19**	**200**	**2,600**	**8.6**	**> 3.3**
MWT-22	downgradient of Biowall B2	ALBW20071	1Q2007	7.7	4.5	0.13	0.09	-80							
		ALBW20075	2Q2007	6.72	41	2.16	0.3	-65							
		ALBW20100	3Q2007	6.45	2.7	2.03	0.05	-107							
		ALBW20115	4Q2007	6.53	7.5	1.81	0.18	-132							
PT-22	between Biowalls B and C	ALBW20060	1Q2007	7.70	4.5	0.13	0.09	-80							
		ALBW20086	2Q2007	6.78	7	1.18	0.78	-54							
		ALBW20089	3Q2007	6.67	0	1.44	0.09	-97							
		ALBW20104	4Q2007	6.73	5.1	1.26	0.17	-166							
MWT-23	**in Biowall C2**	**ALBW20065**	**1Q2007**	**7.2**	**5**	**0.2**	**0.26**	**-122**	**260 J**	**ND**	**ND**	**ND**	**12,000**		
		ALBW20080	**2Q2007**	**6.51**	**30**	**1.8**	**0.35**	**-109**	**210**	**ND**	**45**	**5.9**	**23,000**	**5.4**	**2.73**
		ALBW20094	**3Q2007**	**6.3**	**69.3**	**1.82**	**0**	**-87**	**303**	**ND**	**4.1**	**0.28**	**18,000**	**> 22**	**2.99**
		ALBW20109	**4Q2007**	**6.32**	**21**	**2.21**	**0.12**	**-144**	**151**	**2.8**	**0.58**	**0.35**	**16,000**	**> 22**	**2.32**
MWT-24	downgradient of Biowalls C1/C2	ALBW20063	1Q2007	7.02	10	0.762	0.27	-160							
		ALBW20078	2Q2007	6.91	59	1.08	0.32	-146							
		ALBW20092	3Q2007	6.8	5.4	1.48	0.03	-115							
		ALBW20107	4Q2007	6.81	134	1.32	0.41	-114							
PT-17	downgradient of biowalls	ALBW20058	1Q2007	8	3.8	92	0.23	-111							
		ALBW20073	2Q2007	7.1	14	0.729	0.76	-151							
		ALBW20087	3Q2007	6.99	0.4	0.732	0.9	-157							
		ALBW20102	4Q2007	7.12	8.7	2	NS	-24							
MWT-7	immed. Upgradient of ZVI wall	ALBW20062	1Q2007	6.8	19.6	0.581	0.01	62							
		ALBW20077	2Q2007	6.95	8	0.763	0.76	52							
		ALBW20091	3Q2007	6.91	4	0.586	0.19	22							
		ABLW20106	4Q2007	6.88	0	0.9	0.16	14							
PT-24	downgradient of ZVI wall	ALBW20061	1Q2007	8.1	10	70	0.37	-59							
		ALBW20076	2Q2007	7.58	0	0.464	2.2	-59							
		ALBW20090	3Q2007	7.22	1.3	0.557	0.13	-80							
		ALBW20105	4Q2007	7.35	9.7	2.36	0.19	-46							
MW-56	off-site well	ALBW20072	1Q2007	6.85	3.3	0.462	0.37	-102							
		ALBW20101	3Q2007	6.9	0	0.603	NS	-65							

Downgradient

Notes:

ND = Non-detect.

NS = Not sampled: water level was below the Indicator probe.

> = The concentration exceeded the range of the Hach DR/850 Colorimeter field kit.

1Q2007 - First round of LTM (January 2007)

2Q2007 - Second round of LTM (March 2007)

3Q2007 - Third round of LTM (June 2007)

4Q2007 - Fourth round of LTM (November 2007)

Empty cells indicate that the specified analysis was not completed for that well. The bolded wells are the five wells included in the biowall process monitoring group.

Analysis of TOC, sulfate, methane, ethane, and ethene were completed for the biowall process wells only.

TABLE 3
CHLORINATED ORGANICS IN GROUNDWATER
Ash Landfill Annual Report
Seneca Army Depot Activity

	Sample Identification		Sample Date	PCE ug/L (5)	TCE ug/L (5)	1,1-DCE ug/L (5)	cis-DCE ug/L (5)	trans-DCE ug/L (5)	VC ug/L (2)	1,1-DCA ug/L (5)
Upgradient	PT-18A	upgradient of walls	3-Jan-07	1 U	2000	0.64 J	220	1.6	2.4	1 U
			17-Mar-07	1 U	1000	0.73 J	170	1.4	2.9	1 U
			5-Jun-07	1 U	1100	1.4	430	3.3	3.3	1 U
			15-Nov-07	1 U	2700	2.1	720	3.4	8.2	1 U
	MWT-25	upgradient of Biowall A	3-Jan-07	1 U	50	1 U	41	0.56 J	1.6	1 U
			17-Mar-07	1 U	55	1 U	84	1.2	9.6	1 U
			6-Jun-07	1 U	28	1 U	36	0.5 J	2.1	1 U
			15-Nov-07	1 U	26	1 U	17	1 U	0.64 J	1 U
	MWT-26	**upgradient of Biowalls B1/B2**	3-Jan-07	1 U	10	1 U	19	0.6 J	2	1 U
			17-Mar-07	1 U	11	1 U	17	1	6.1	1 U
			5-Jun-07	1 U	3.2	1 U	11	0.7 J	4.4	1 U
			15-Nov-07	1 U	2.8	1 U	2.8	1 U	1 U	1 U
	MWT-27	**in Biowall B1**	3-Jan-07	20 U	20 UJ	20 UJ	49 J	20 UJ	20 UJ	20 UJ
			16-Mar-07	20 U	20 U	20 U	20 U	20 U	20 U	20 U
			5-Jun-07	20 U	20 U	20 U	20 U	20 U	20 U	20 U
			15-Nov-07	10 U	10 U	10 U	10 U	10 U	10 U	10 U
	MWT-28	**in Biowall B2**	3-Jan-07	20 U	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ
			16-Mar-07	20 U	20 U	20 U	20 U	20 U	20 U	20 U
			5-Jun-07	20 U	20 U	20 U	20 U	20 U	20 U	20 U
			15-Nov-07	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	MWT-29	**downgradient of Biowall B2**	3-Jan-07	2 U	22	2 U	280	6.5	140	2 U
			16-Mar-07	4 U	19	4.5 U	220	7.8	165	4.5 U
			5-Jun-07	2 U	7.6	2 U	100	2.1	81	2 U
			14-Nov-07	1 U	4.4	1 U	96	0.63 J	74	1 U
	MWT-22	downgradient of Biowall B2	3-Jan-07	2 U	5.2	2 U	130	2.7	98	2 U
			17-Mar-07	4 U	3.8 J	4 U	90	4 U	84	4 U
			6-Jun-07	1 U	6.5	1 U	120	3.2	81	1 U
			14-Nov-07	1 U	2.6	1 U	99	0.85 J	180	1 U
	PT-22	between Biowalls B and C	3-Jan-07	1 U	11	1 U	67	0.86 J	22	1 U
			15-Mar-07	1 U	16	1 U	41	0.51 J	10	1 U
			5-Jun-07	1 U	8.5	1 U	61	0.72 J	32	1 U
			14-Nov-07	1 U	9.7	1 U	30	0.67 J	11	1 U
	MWT-23	**in Biowall C2**	3-Jan-07	4 U	4 U	4 U	60	4 U	23	4 U
			16-Mar-07	4 U	4 U	4 U	11	4 U	4.8	4 U
			6-Jun-07	2 U	2 U	2 U	3.1	2 U	2 U	2 U
			16-Nov-07	7 U	7 U	2.55 U	3.55 J	7 U	3.65 J	7 U
	MWT-24	downgradient of Biowalls C1/C2	3-Jan-07	1 U	0.94 J	1 U	210	2.1	19	0.81 J
			15-Mar-07	1 U	1 U	1 U	66	0.88 J	45	0.83 J
			5-Jun-07	2 U	2 U	2 U	19	2 U	22	1.1 J
			13-Nov-07	1 U	1.6	1 U	8.7	1 U	3.8	1 U
	PT-17	downgradient of biowalls	2-Jan-07	1 U	6	1 U	62	1 U	21	1 U
			15-Mar-07	2 U	11	2 U	28	2 U	21	2 U
			5-Jun-07	1 U	3.4	1 U	43	0.77 J	9.9	1 U
			13-Nov-07	1 U	15	1 U	27	0.54 J	22	1 U
	MWT-7	immed. Upgradient of ZVI wall	4-Jan-07	1 U	490	1 U	35	1 U	0.51 J	1 U
			15-Mar-07	1 U	440	1 U	42	1 U	9.7	1 U
			5-Jun-07	1 U	410	1 U	61	1 U	18	1 U
			13-Nov-07	1 U	610	1 U	90	1 U	24	1 U
	PT-24	downgradient of ZVI wall	2-Jan-07	1 U	4	1 U	54	0.86 J	0.6 J	0.68 J
			15-Mar-07	1 U	2.8	1 U	38	0.81 J	1 U	1 U
			5-Jun-07	1 U	3.1	1 U	60	1.6	2.6	0.75 J
			13-Nov-07	1 U	3.8	1 U	39	1 U	1 U	0.56 J
Downgradient	MW-56	off-site well	4-Jan-07	1 U	1 U	1 U	1.2	1 U	1 U	1 U
			6-Jun-07	1 U	1 U	1 U	1.7	1 U	1 U	1 U

Note:

1) Sample duplicate pairs were collected at MWT-28 in Jan-07, at MWT-29 in Mar-07, at MWT-27 in Jun-07, and at MWT-23 in Nov-07. If an analyte was detected in the sample but not detected in the duplicate (or vice versa), the non-detect value was taken at half and averaged with the detected value.

(5) = Class GA groundwater standard

U = compound was not detected

J = the reported value is an estimated concentration

▨ Shading indicates concentration detected above its Class GA groundwater standard.

Table 4
Groundwater Trends
Ash Landfill Annual Report
Seneca Army Depot Activity

Sampled Wells	Location			TCE	cis-1,2-DCE	VC
PT-18A[1]	Source Area (Upgradient of Biowalls)	Sample Date:	Nov-07	2700	720	8.2
			Trend:	Increasing	Increasing	Increasing
		Est. Date[2]:				
MWT-25	Upgradient of Biowall A	Sample Date:	Nov-07	26	17	0.64
			Trend:	Decreasing	Decreasing	Compliant
		Est. Date[2]:		5/31/2007	10/4/2009	5/29/2007
MWT-26	Upgradient of Biowalls B1/B2	Sample Date:	Nov-07	2.8	2.8	1 U
			Trend:	Compliant	Compliant	Compliant
		Est. Date[2]:		6/30/2006	12/22/2006	7/7/2006
MWT-27	In Biowall B1	Sample Date:	Nov-07	10 U	10 U	10 U
			Trend:	Non-Detect	Non-Detect	Non-Detect
		Est. Date[2]:		7/17/2008	7/21/2007	8/19/2009
MWT-28	In Biowall B2	Sample Date:	Nov-07	5 U	5 U	5 U
			Trend:	Non-Detect	Non-Detect	Non-Detect
		Est. Date[2]:		12/17/2007	12/17/2007	7/3/2008
MWT-29	Downgradient of Biowall B2	Sample Date:	Nov-07	4.4	96	74
			Trend:	Compliant	Decreasing	Decreasing
		Est. Date[2]:		3/25/2008	7/21/2009	7/26/2010
MWT-22	Downgradient of Biowall B2	Sample Date:	Nov-07	2.6	99	180
			Trend:	Compliant	Decreasing	Increasing
		Est. Date[2]:		3/5/2007	4/25/2015	5/21/2003
PT-22	Between Biowalls B and C	Sample Date:	Nov-07	9.7	30	11
			Trend	Decreasing	Decreasing	Decreasing
		Est. Date[2]:		10/8/2009	5/1/2006	7/31/2014
MWT-23[3]	In Biowall C2	Sample Date:	Nov-07	7 U	3.65 J	3.65 J
			Trend:	Non-Detect	Compliant	Decreasing
		Est. Date[2]:		10/5/2006	1/7/2007	2/16/2008
MWT-24	Downgradient of Biowalls C1/C2	Sample Date:	Nov-07	1.6	6.7	3.8
			Trend:	Compliant	Decreasing	Decreasing
		Est. Date[2]:		10/20/2010	2/1/2008	12/10/2008
PT-17[1]	Downgradient of Biowalls	Sample Date:	Nov-07	15	27	22
			Trend:	Increasing	Decreasing	No Trend
		Est. Date[2]:				
MWT-7[1]	Immed. Upgradient of ZVI wall	Sample Date:	Nov-07	510	90	24
			Trend:	Increasing	Increasing	Increasing
		Est. Date[2]:				
PT-24	Downgradient of ZVI wall	Sample Date:	Nov-07	3.8	39	1 U
			Trend:	Compliant	Decreasing	Compliant
		Est. Date[2]:		10/21/2007	3/29/2013	7/9/2005

Notes:

1. The concentration of TCE at these wells has not been impacted by the biowall system and dates to achieve compliance cannot be estimated at this time due to the natural variation in concentrations over time.
2. The date that the groundwater standard will be achieved is estimated based on an exponential regression of the time plots for each well. The dates are rough estimates that indicate that the groundwater concentrations will eventually reach the GA standard and are not intended to represent a definitive timeframe for achieving the GA standards.
3. The concentrations presented were an average of the sample and its associated duplicate.

U = compound was not detected

J = the reported value is an estimated concentration

LEGEND:

- PAVED ROAD
- DIRT ROAD
- 650 — GROUND CONTOUR AND ELEVATION
- TREE
- W-B WETLAND & DESIGNATION
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- FUEL OR UNDERGROUND STORAGE TANK
- ☒ SEAD-1 EL.630.90' SURVEY MONUMENT
- MONITORING WELL AND DESIGNATION
- RAILROAD TRACKS
- WATER MAIN
- —670— POST CONSTRUCTION AS BUILT GROUND ELEVATION CONTOUR
- PILOT STUDY BIOWALL (2005)
- SINGLE BIOWALL (2006)
- DOUBLE-WIDE BIOWALL (2006)
- ZERO VALENT IRON WALL (1998)

100 0 100 200
(feet)

PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT
ASH LANDFILL
ANNUAL REPORT

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 744538-01400

FIGURE 1
ASH LANDFILL
SITE PLAN

SCALE 1" = 200'
DATE MARCH 2008
REV –

LEGEND:

PAVED ROAD
DIRT ROAD
650 GROUND CONTOUR AND ELEVATION
TREE
W-B WETLAND & DESIGNATION
BRUSH
CHAIN LINK FENCE
UTILITY POLE
APPROXIMATE LOCATION OF FIRE HYDRANT
FUEL OR UNDERGROUND STORAGE TANK
SEAD-1 EL.630.90' SURVEY MONUMENT
PT-22 MONITORING WELL AND DESIGNATION
RAILROAD TRACKS
WATER MAIN
APPROXIMATE EXTENT OF IRM SOIL TREATMENT
APPROXIMATE AREA REQUIRING LAND USE CONTROLS

NOTE:
FIGURE SHOWS PRE-CONSTRUCTION CONDITIONS

100 0 100 200
(feet)

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
ASH LANDFILL
ANNUAL REPORT

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 744535-01400

FIGURE 2
ASH LANDFILL
HISTORIC SITE MAP

SCALE 1" = 200'
DATE MARCH 2008
REV

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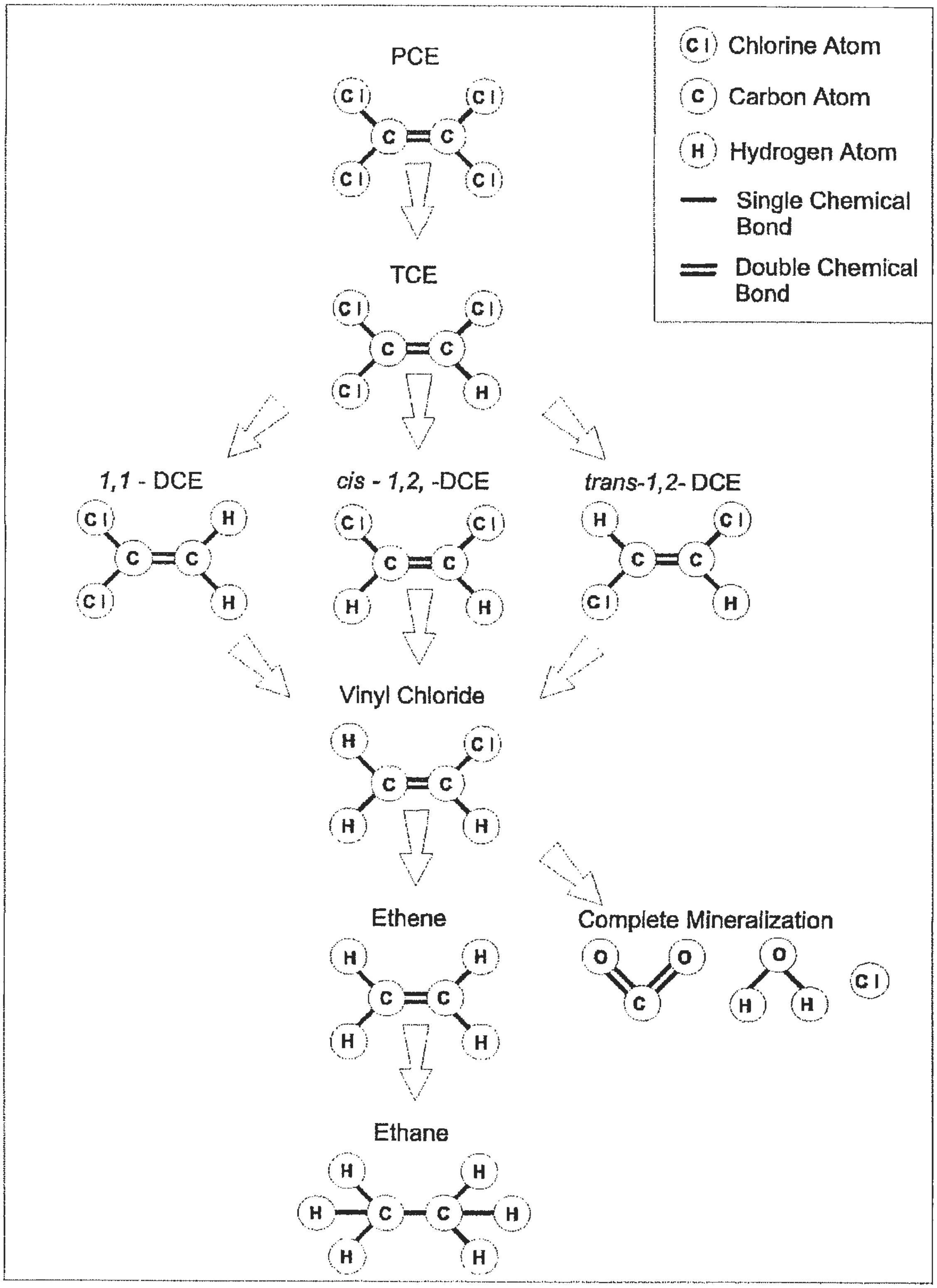
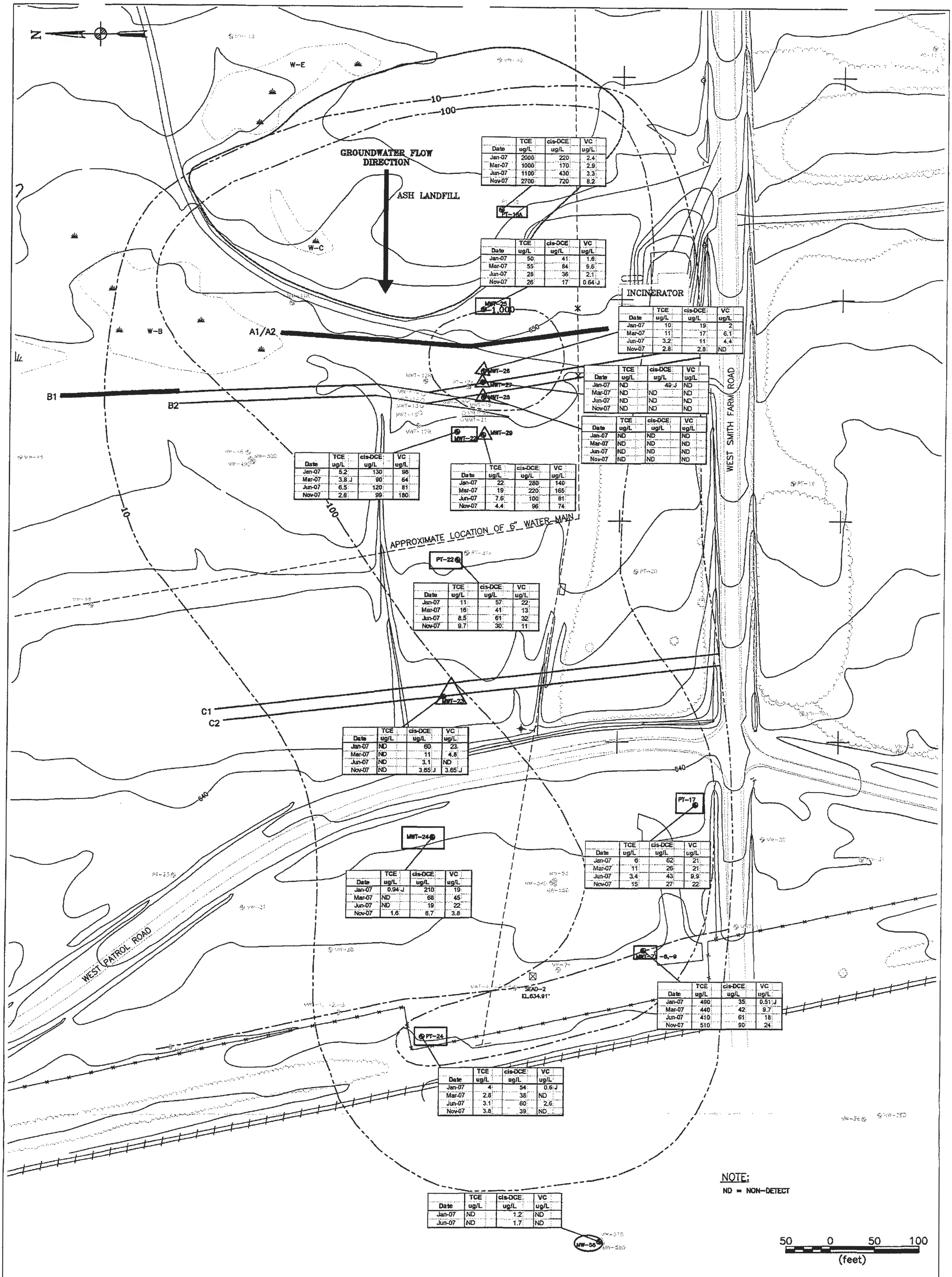
Figure 3
Reductive Dechlorination of Chlorinated Ethenes
Ash Landfill Annual Report
Seneca Army Depot Activity



(USEPA, 1998)



Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	2000	220	2.4
Mar-07	1000	170	2.9
Jun-07	1100	430	3.3
Nov-07	2700	720	8.2

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	50	41	1.6
Mar-07	55	84	9.6
Jun-07	28	36	2.1
Nov-07	26	17	0.64 J

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	10	19	2
Mar-07	11	17	6.1
Jun-07	3.2	11	4.4
Nov-07	2.8	2.8	ND

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	ND	49 J	ND
Mar-07	ND	ND	ND
Jun-07	ND	ND	ND
Nov-07	ND	ND	ND

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	ND	ND	ND
Mar-07	ND	ND	ND
Jun-07	ND	ND	ND
Nov-07	ND	ND	ND

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	5.2	130	98
Mar-07	3.8 J	90	64
Jun-07	6.5	120	81
Nov-07	2.6	99	180

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	22	280	140
Mar-07	19	220	165
Jun-07	7.6	100	81
Nov-07	4.4	96	74

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	11	57	22
Mar-07	16	41	13
Jun-07	8.5	61	32
Nov-07	9.7	30	11

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	ND	60	23
Mar-07	ND	11	4.8
Jun-07	ND	3.1	ND
Nov-07	ND	3.65 J	3.65 J

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	6	62	21
Mar-07	11	26	21
Jun-07	3.4	43	9.9
Nov-07	15	27	22

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	0.94 J	210	19
Mar-07	ND	68	45
Jun-07	ND	19	22
Nov-07	1.6	6.7	3.8

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	490	35	0.51 J
Mar-07	440	42	9.7
Jun-07	410	61	18
Nov-07	510	90	24

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	4	54	0.6 J
Mar-07	2.8	38	ND
Jun-07	3.1	60	2.6
Nov-07	3.8	39	ND

Date	TCE ug/L	cis-DCE ug/L	VC ug/L
Jan-07	ND	1.2	ND
Jun-07	ND	1.7	ND

NOTE:
ND = NON-DETECT

LEGEND:

PAVED ROAD
DIRT ROAD
GROUND CONTOUR AND ELEVATION
TREE
WETLAND & DESIGNATION
MONITORING WELL AND DESIGNATION
RAILROAD TRACKS
BRUSH
CHAIN LINK FENCE
UTILITY POLE
APPROXIMATE LOCATION OF FIRE HYDRANT
FUEL OR UNDERGROUND STORAGE TANK
SEAD-1 EL.630.90' SURVEY MONUMENT
ABANDONED MONITORING WELL
APPROXIMATE LOCATION OF WATER MAIN
PILOT STUDY BIOWALL (2005)
SINGLE BIOWALL (2006)
DOUBLE-WIDE BIOWALL (2006)
ZERO VALENT IRON WALL (1998)
----10---- GROUNDWATER ISOCONTOUR (UG/L) BASED ON JANUARY 2000 DATA
OFF-SITE PERFORMANCE MONITORING WELL IN L.T.M. PROGRAM
ON-SITE PLUME PERFORMANCE MONITORING WELL IN L.T.M. PROGRAM
BIOWALL PROCESS MONITORING WELL IN L.T.M. PROGRAM

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PARSONS

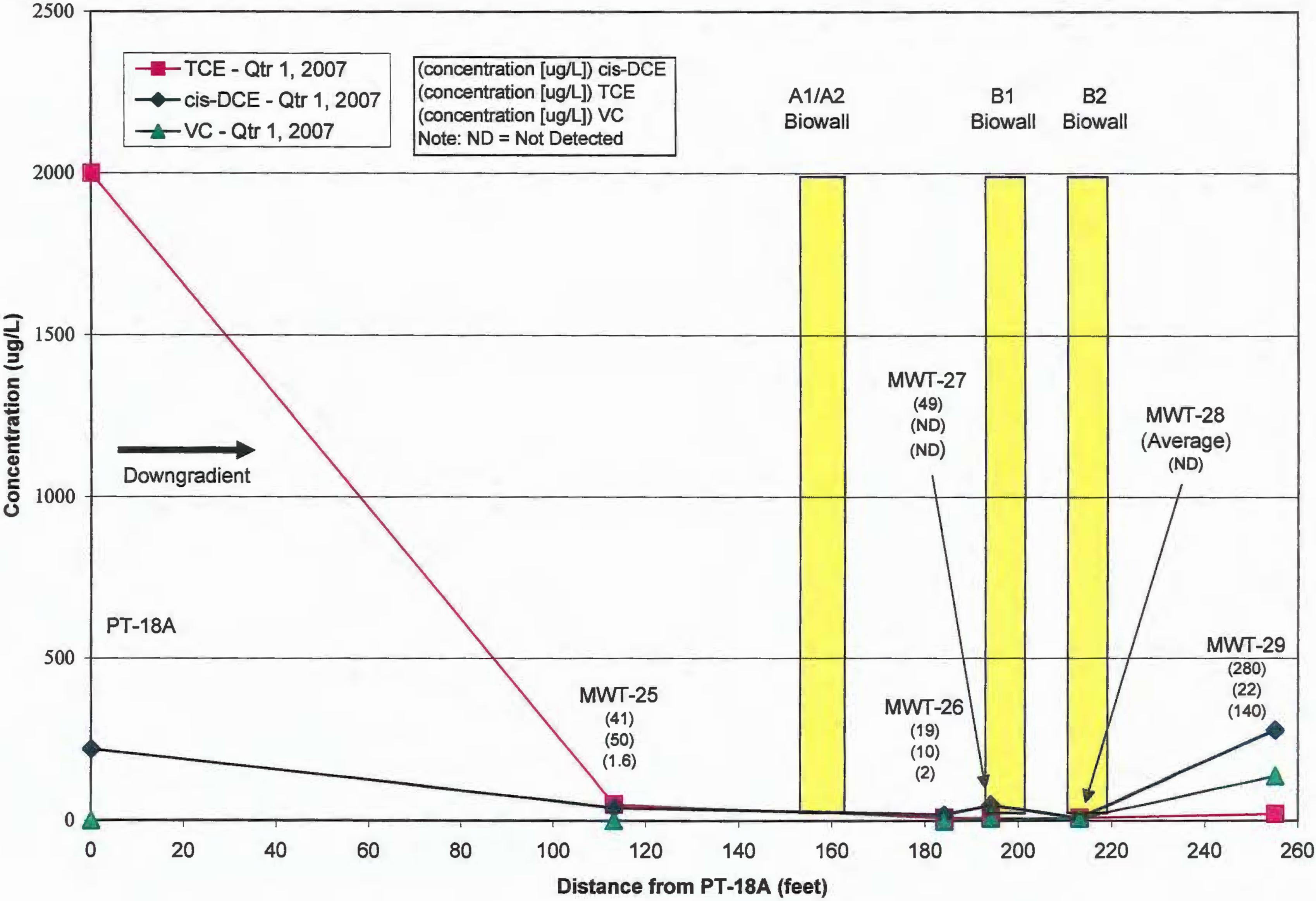
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
ASH LANDFILL
LONG-TERM MONITORING REPORT

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 744538-01400

FIGURE 4
CHLORINATED ETHENES CONCENTRATIONS IN GROUNDWATER

SCALE 1" = 100'
DATE MARCH 2008
REV –

Figure 5A
Concentrations of VOCs Along the Biowalls - Quarter 1, 2007
Ash Landfill Annual Report
Seneca Army Depot Activity



P:\PIT\Projects\Seneca PBC I\Ash Landfill LTM\Annual Report\Figures\AR Figure 5 - Biowall Concen.xls-Dwngrd Wells LTM Rnd 1

3/5/2008

Figure [illegible]
Concentrations of VOCs Along the Biowalls - Quarter 2, 2007
Ash Landfill Annual Report
Seneca Army Depot Activity

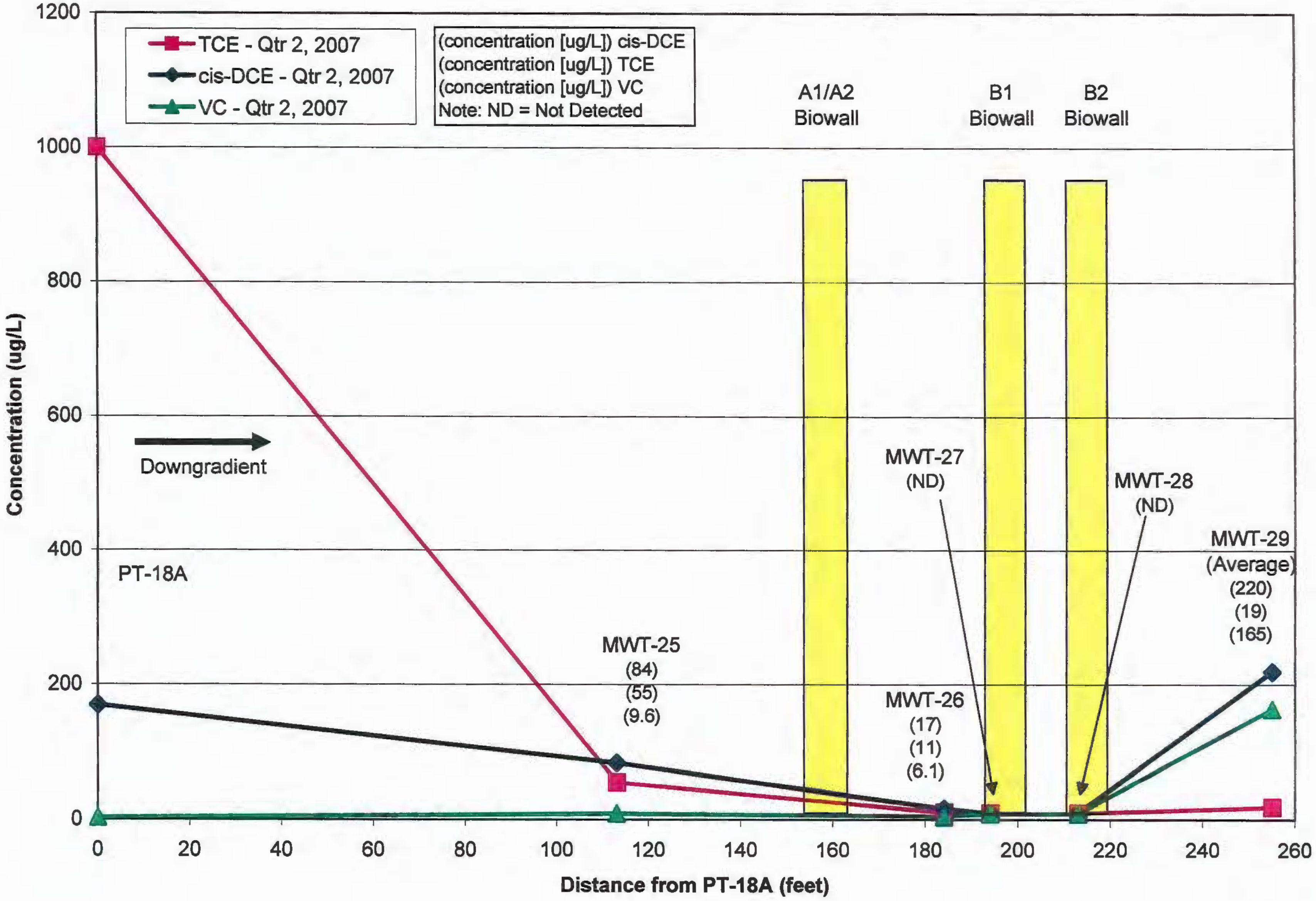


Figure [illegible]
Concentrations of VOCs Along the Biowalls - Quarter 3, 2007
Ash Landfill Annual Report
Seneca Army Depot Activity

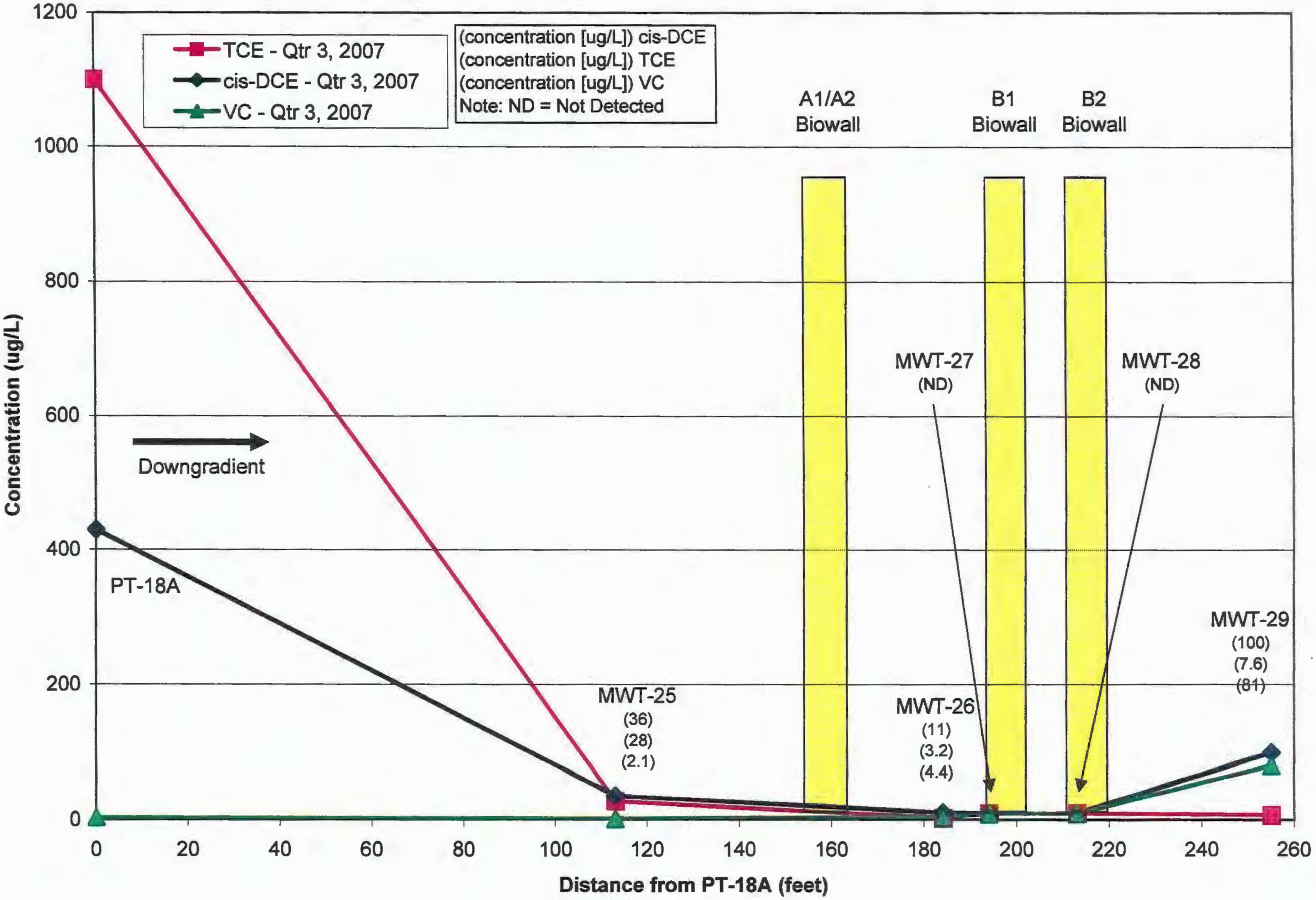
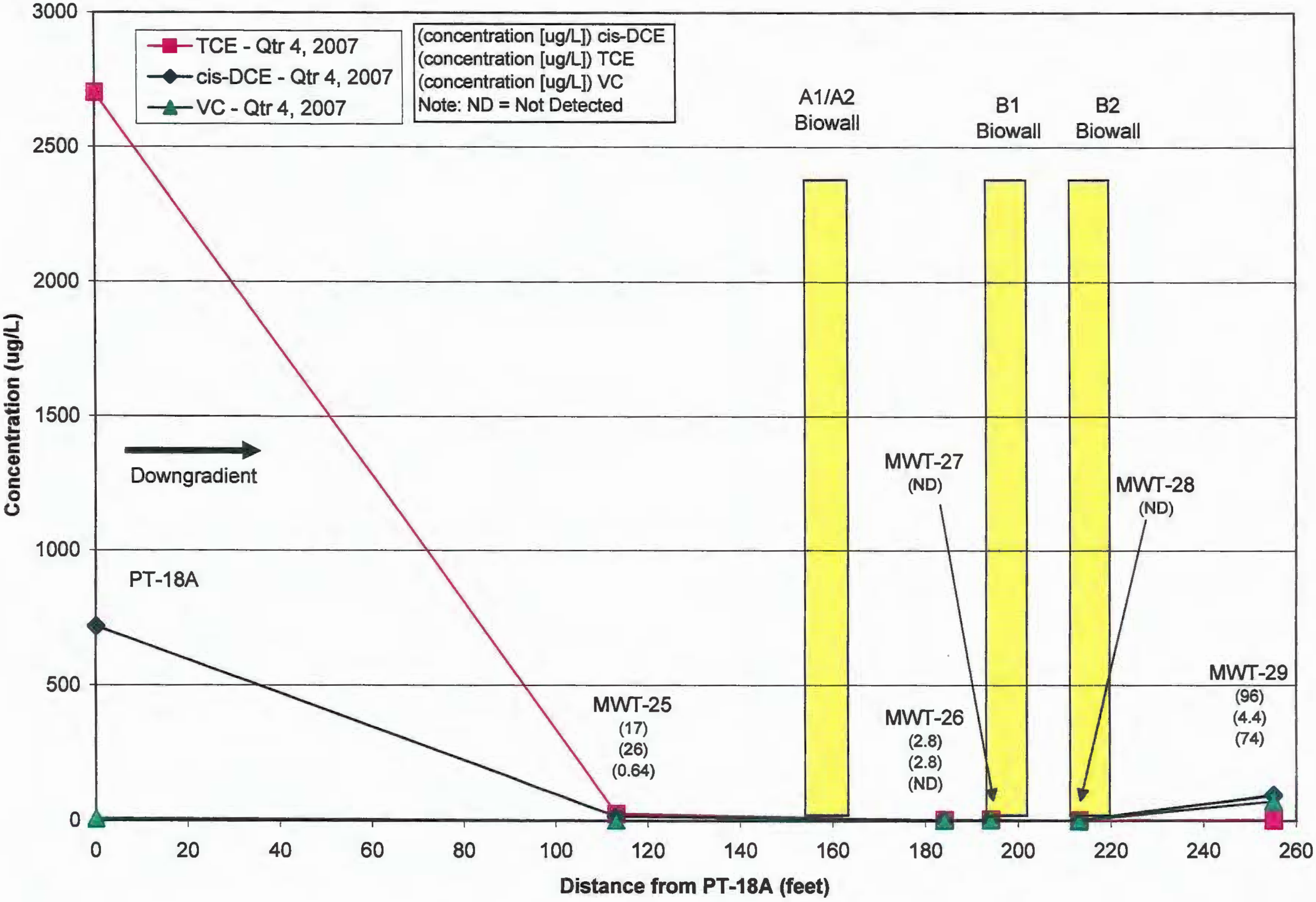


Figure [illegible]
Concentrations of VOCs Along the Biowalls - Quarter 4, 2007
Ash Landfill Annual Report
Seneca Army Depot Activity



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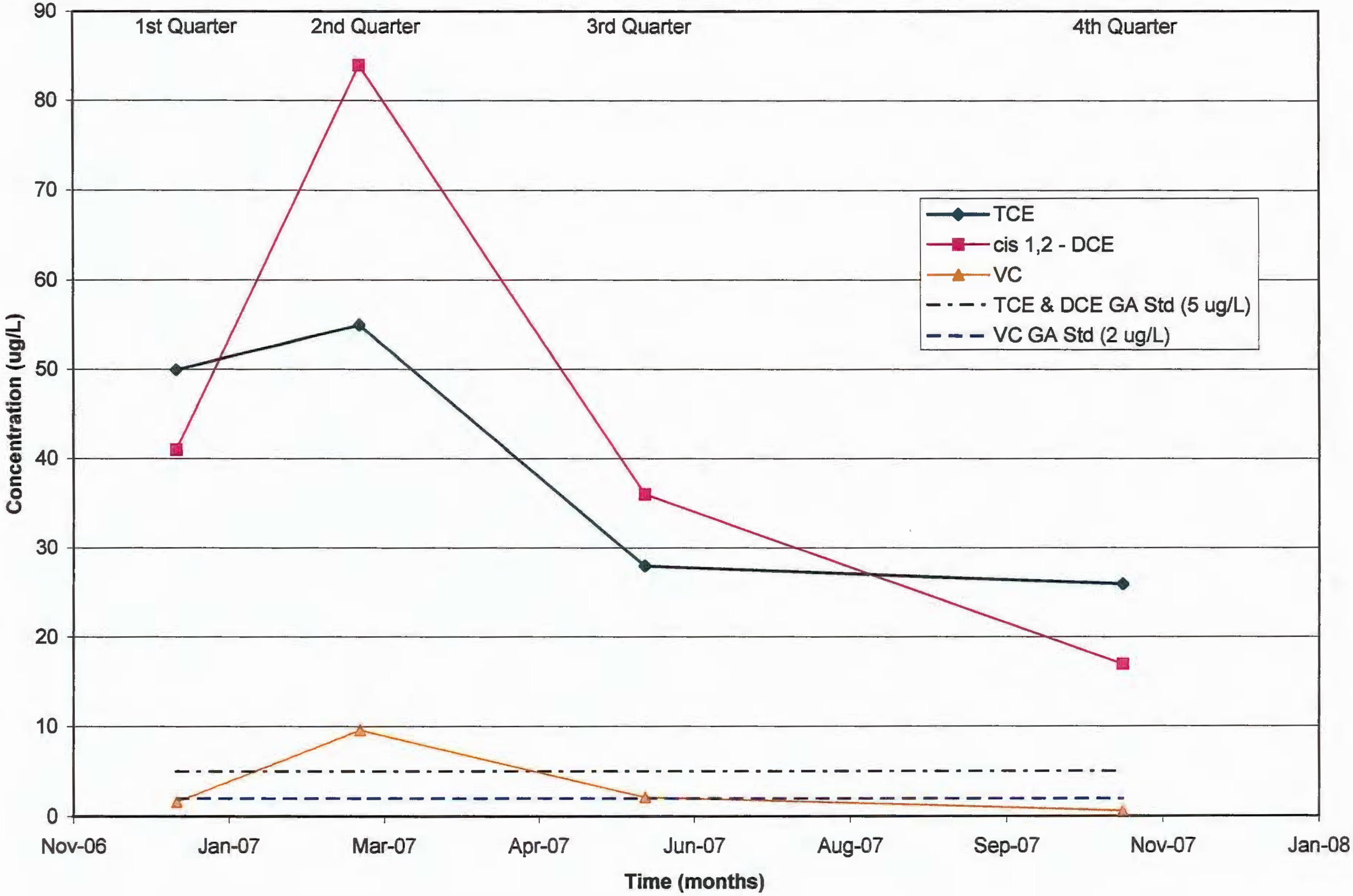
3/5/2008

Figure 6A
Concentrations of Chlorinated Organics Over Time at MWT-25
Ash Landfill Annual Report
Seneca Army Depot Activity



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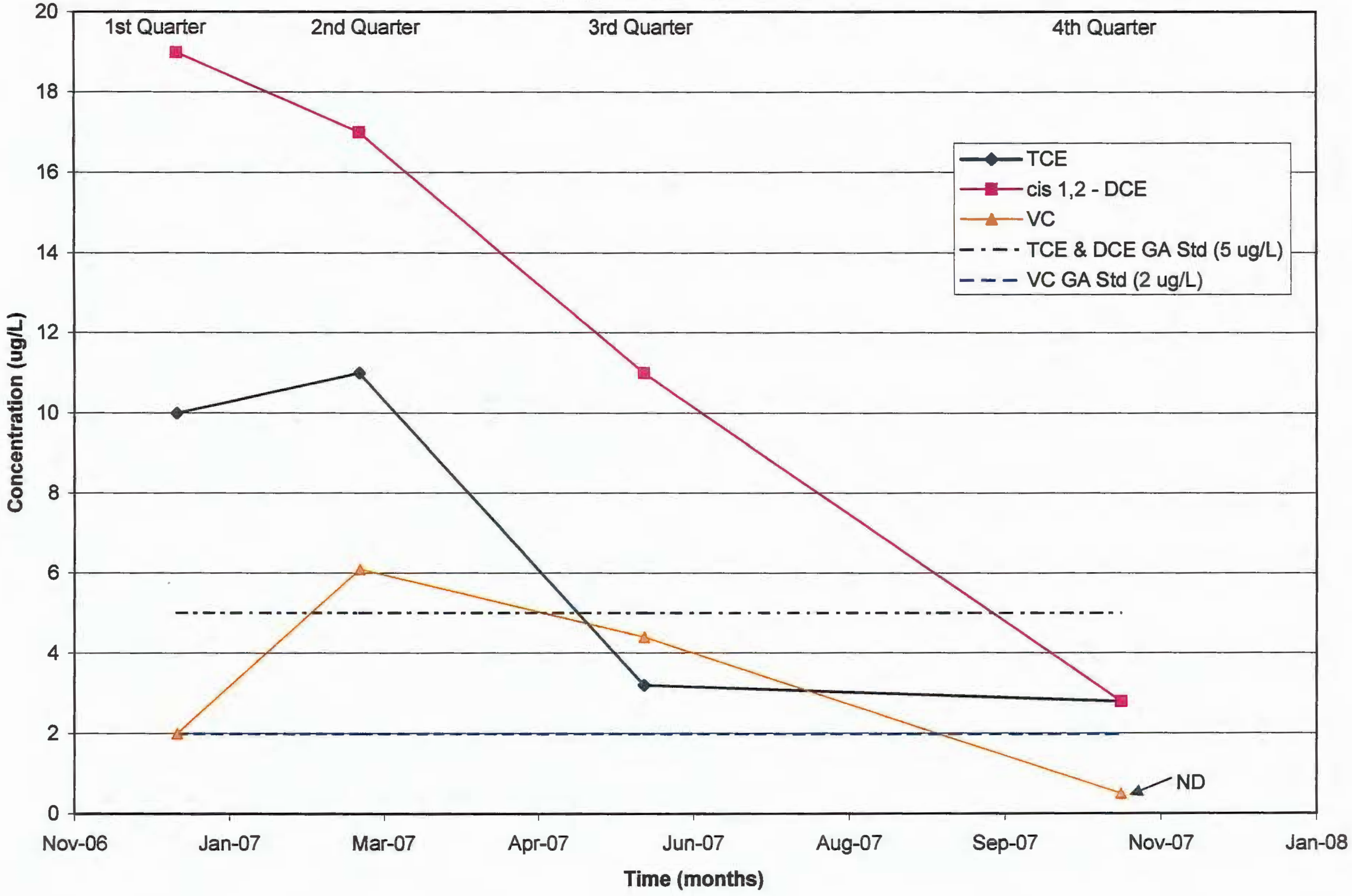
3/5/2008

Figure 6B
Concentrations of Chlorinated Organics Over Time at MWT-26
Ash Landfill Annual Report
Seneca Army Depot Activity



ND = not detected.

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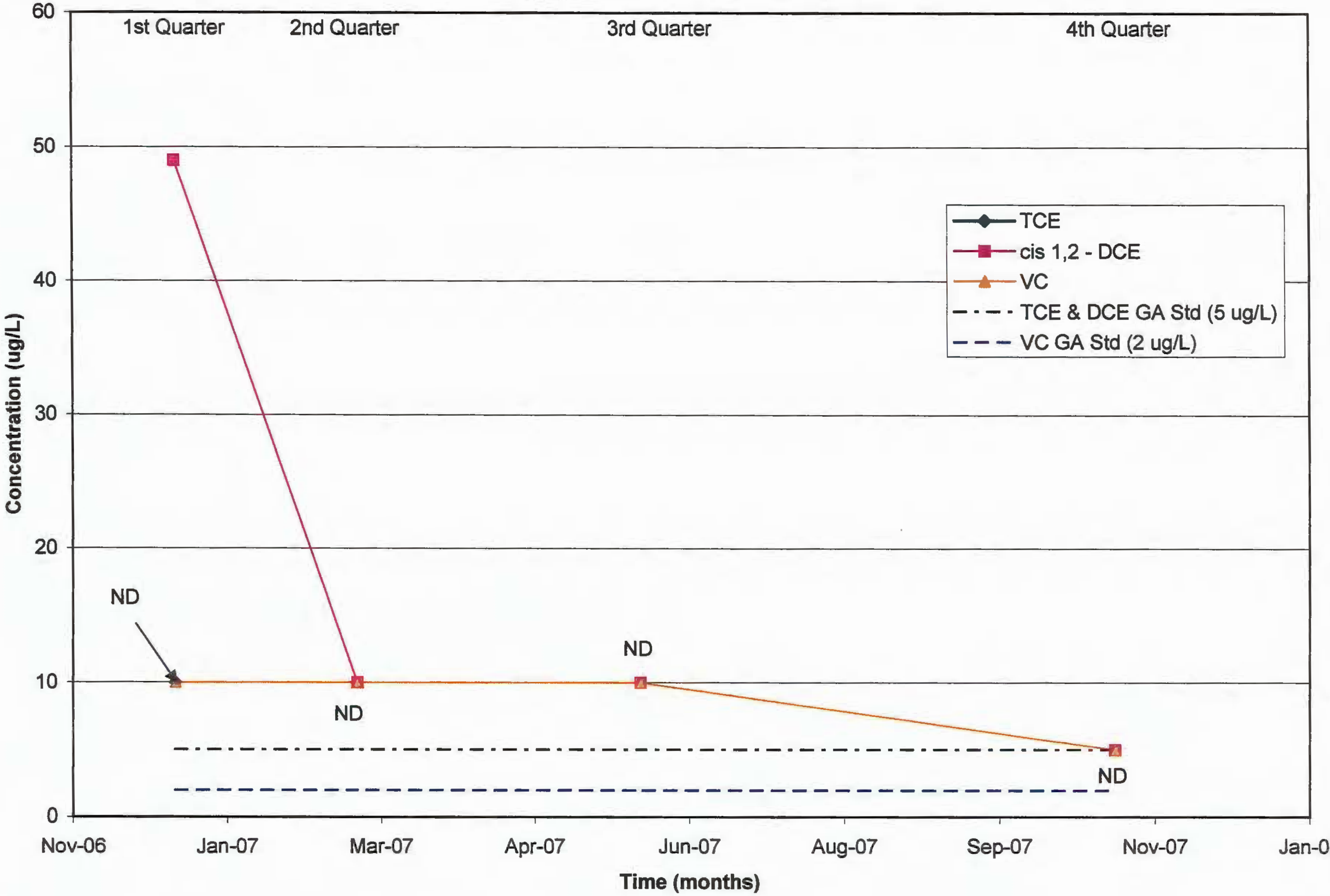
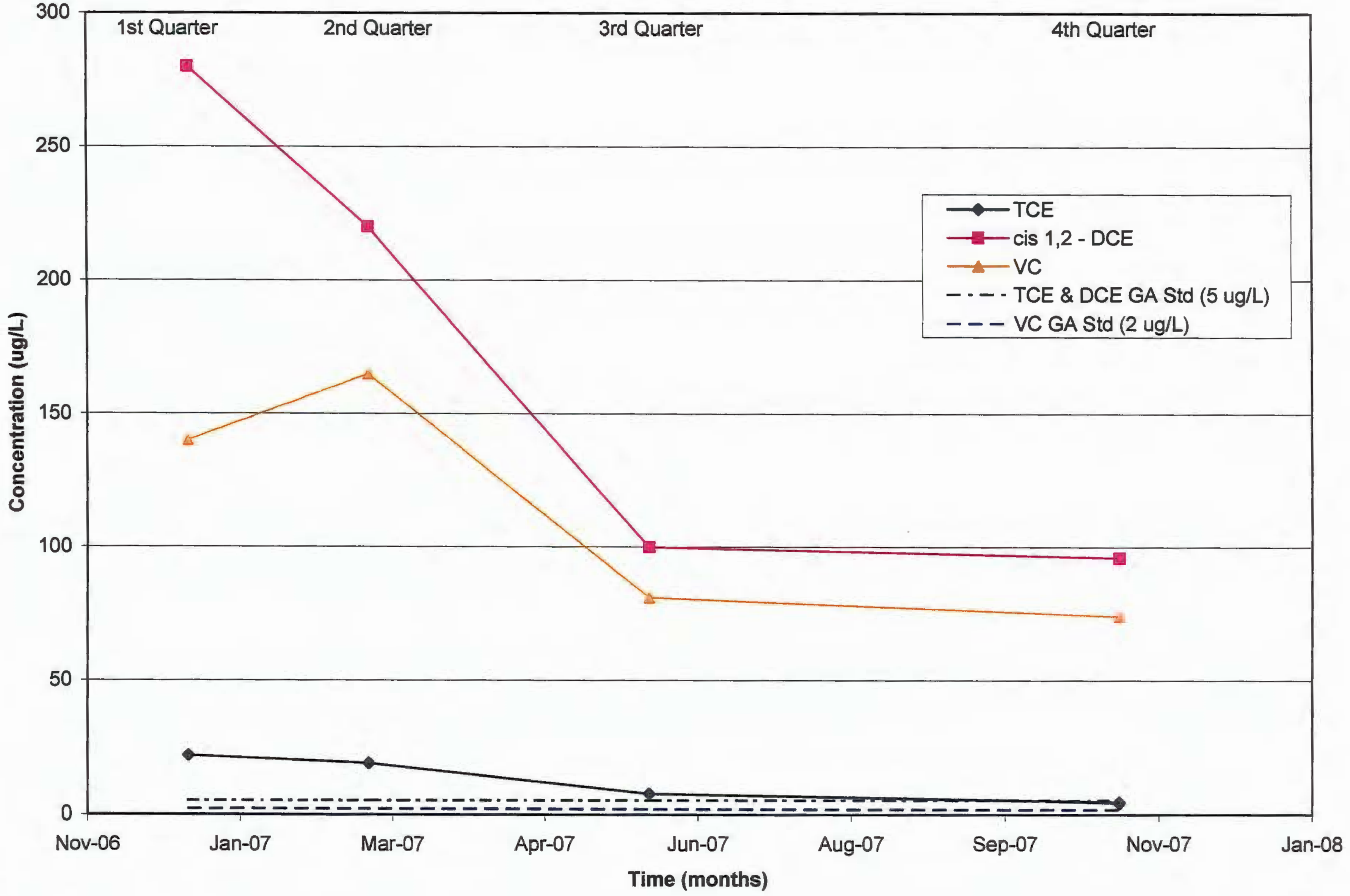
3/5/2008

Figure 6C
Concentrations of Chlorinated Organics Over Time at MWT-27
Ash Landfill Annual Report
Seneca Army Depot Activity



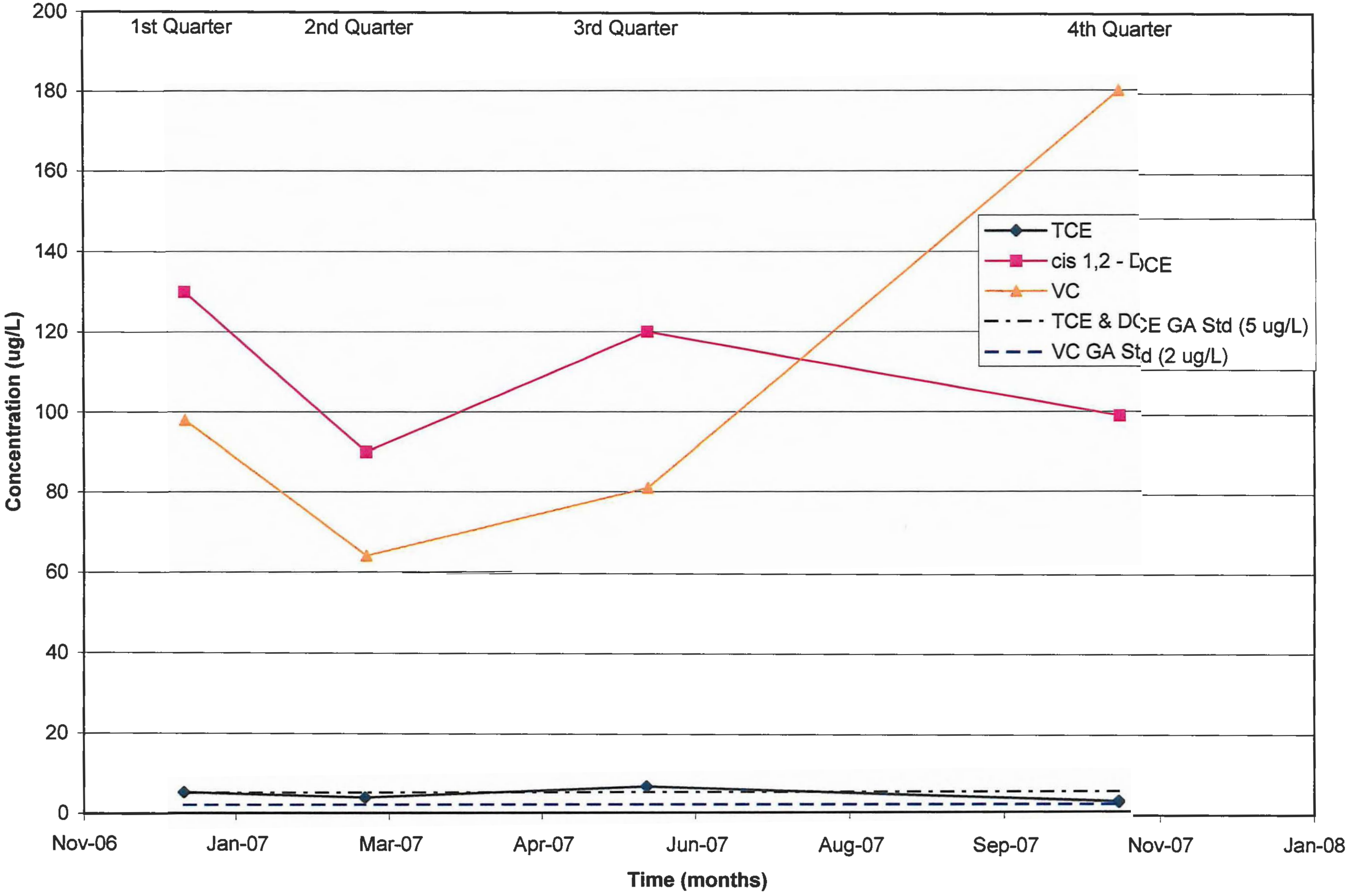
Note:
Round 3 data is the average of the sample and its duplicate.
ND = not detected.

Figure 6D
Concentrations of Chlorinated Organics Over Time at MWT-29
Ash Landfill Annual Report
Seneca Army Depot Activity



Note:
Round 2 data is the average of the sample and its duplicate.

Figure 6E
Concentrations of Chlorinated Organics Over Time at MWT-22
Ash Landfill Annual Report
Seneca Army Depot Activity



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3/5/2008

Figure 6F
Concentrations of Chlorinated Organics Over Time at PT-22
Ash Landfill Annual Report
Seneca Army Depot Activity

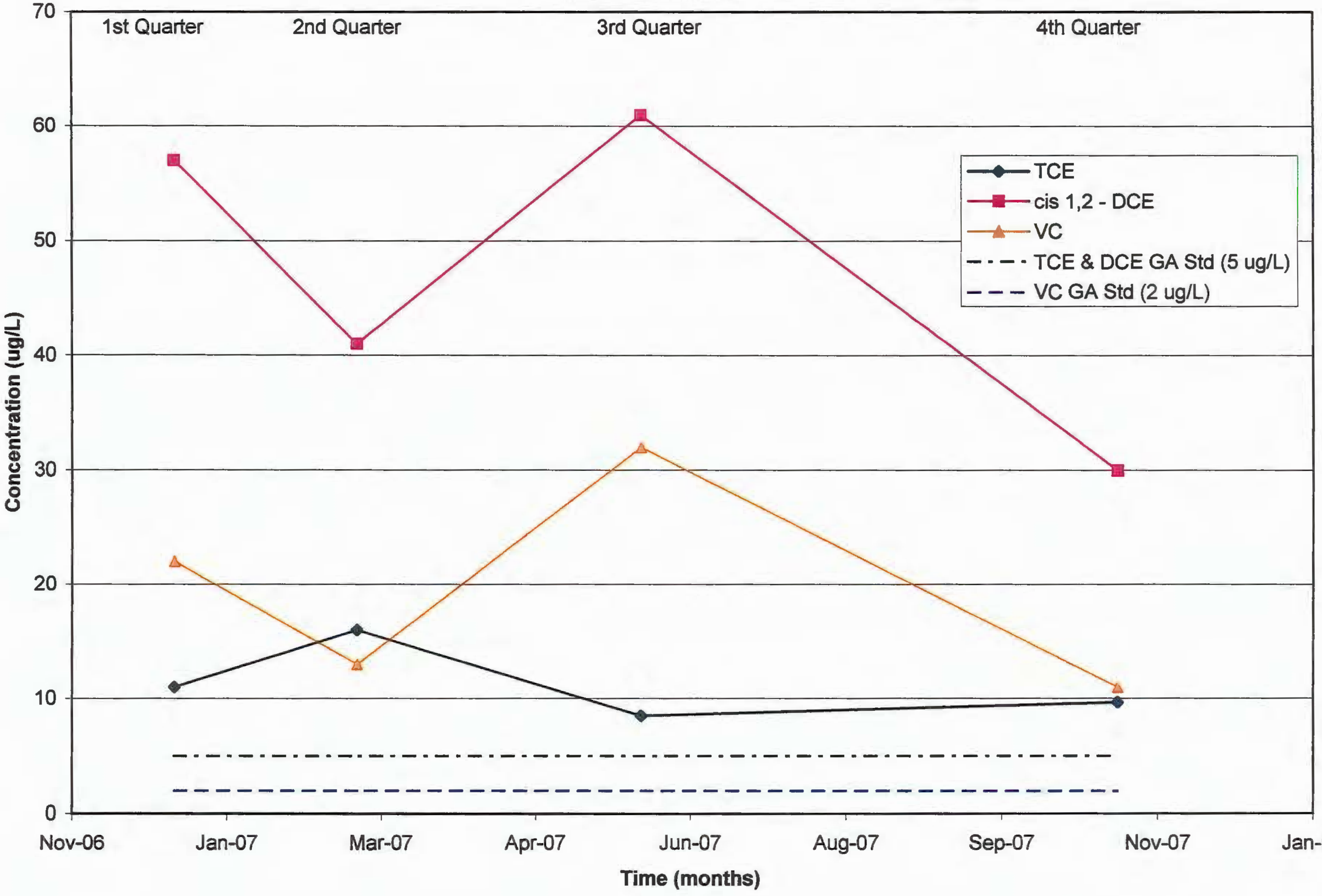
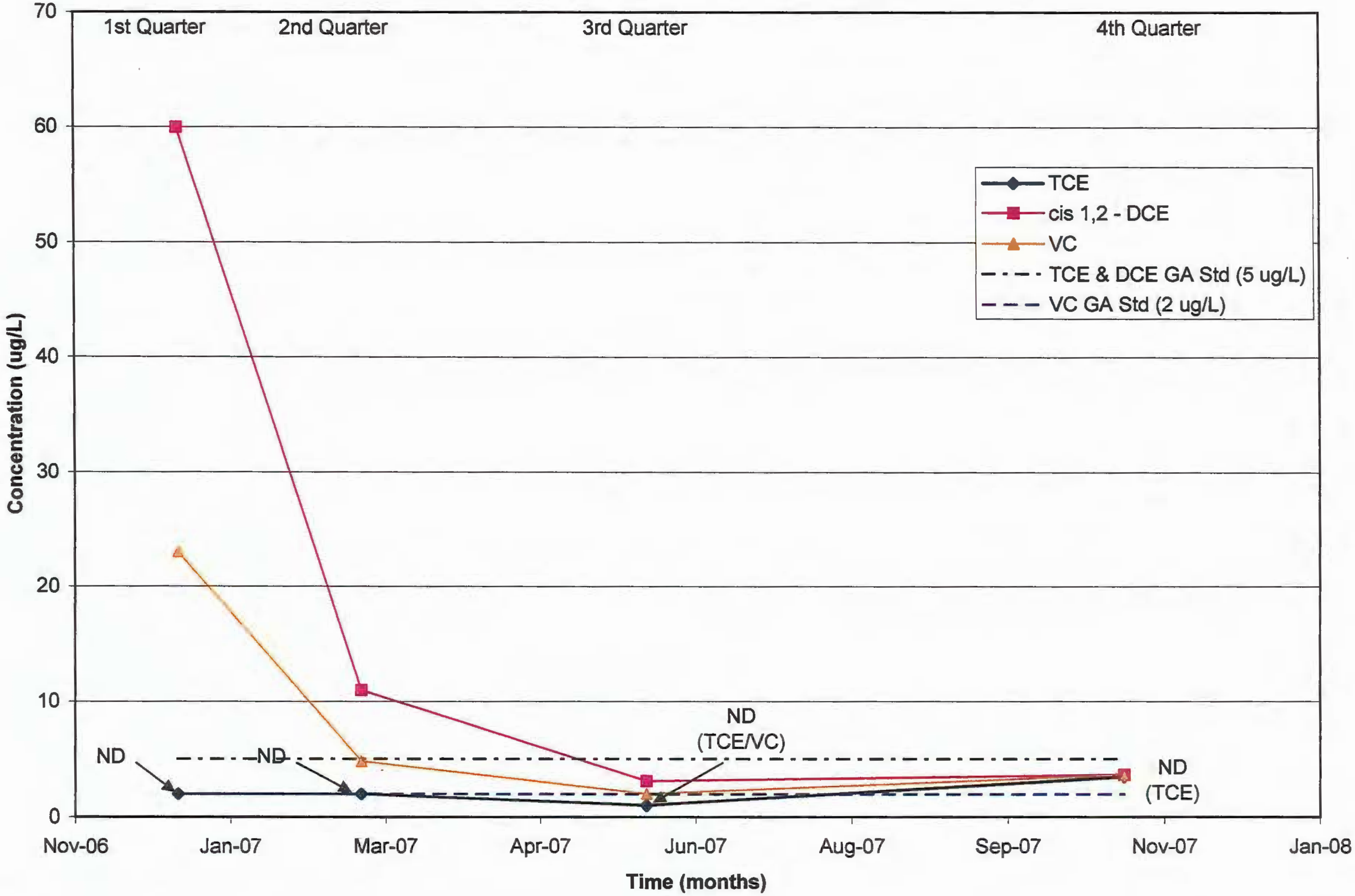


Figure 6G
Concentrations of Chlorinated Organics Over Time at MWT-23
Ash Landfill Annual Report
Seneca Army Depot Activity

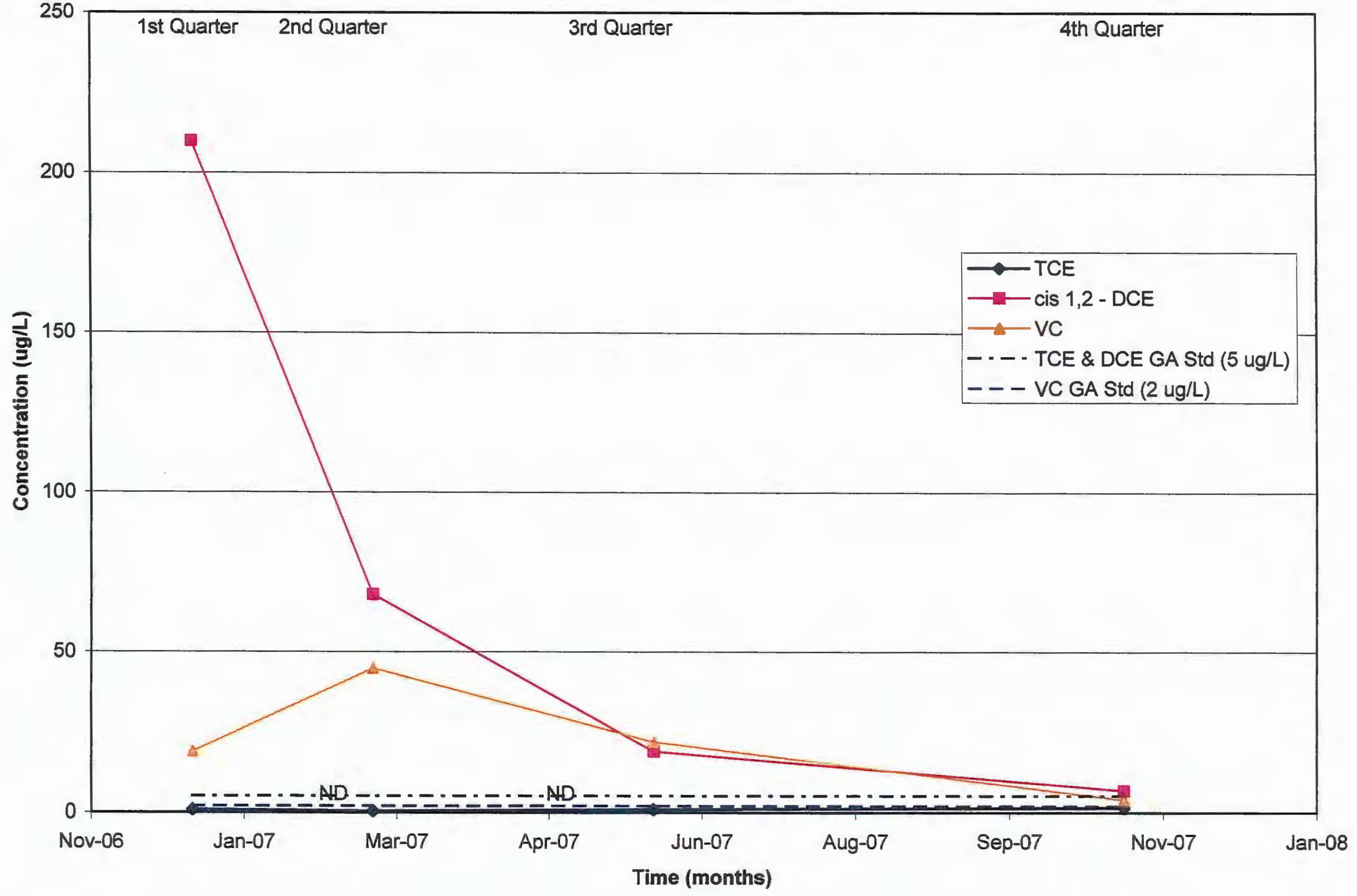


Note:
Round 4 data is the average of the sample and its duplicate.
ND = not detected.

P:\PIT\Projects\Seneca PBC I\Ash Landfill LTM\Annual Report\Figures\AR Figure 6 - Well Concentrations Over Time.xls MWT-23

3/5/2008

Figure 6H
Concentrations of Chlorinated Organics Over Time at MWT-24
Ash Landfill Annual Report
Seneca Army Depot Activity



P:\PIT\Projects\Seneca PBC I\Ash Landfill LTM\Annual Report\Figures\AR Figure 6 - Well Concentrations Over Time.xls MWT-24

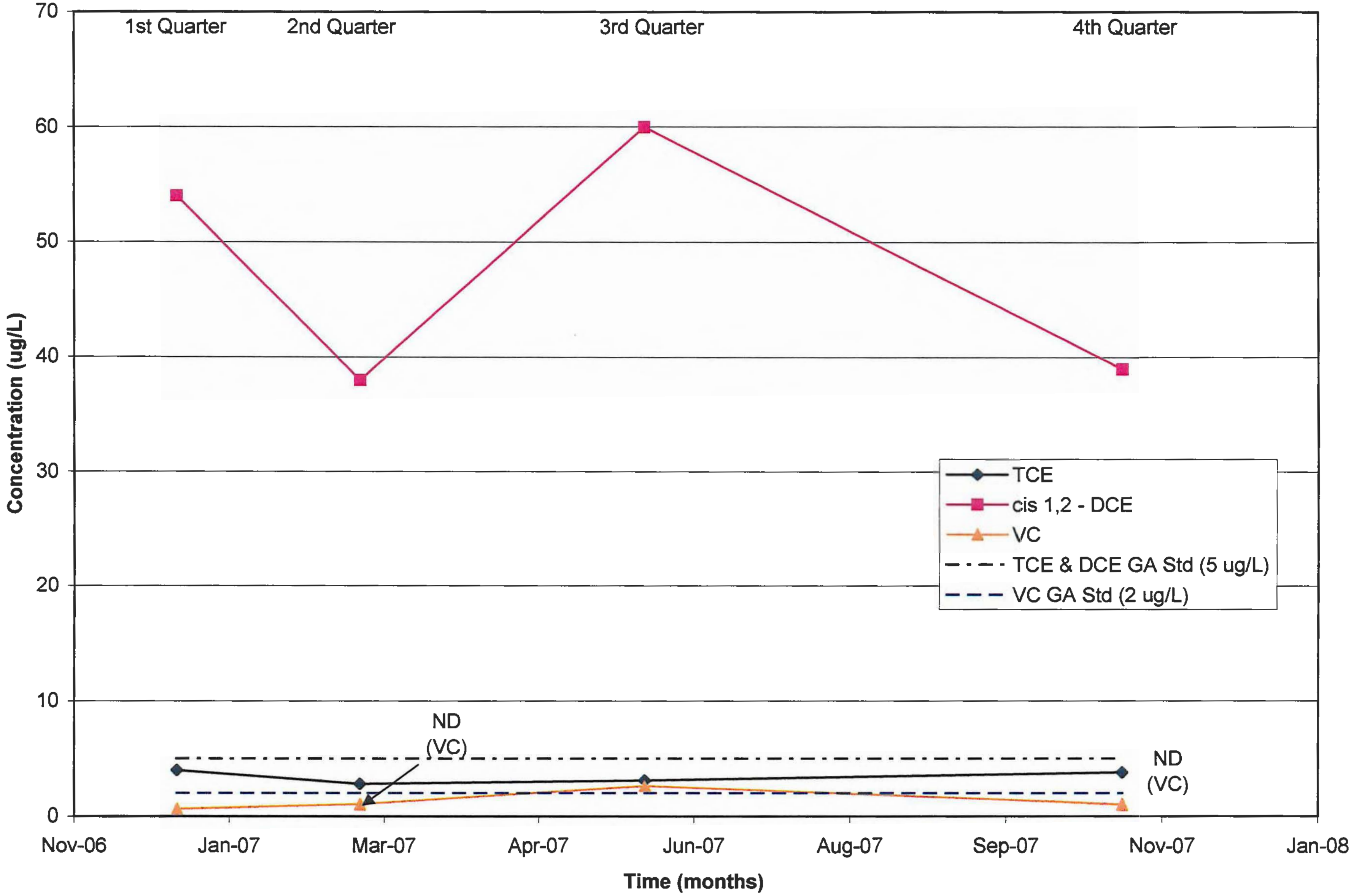
3/5/2008

Figure 6I

Concentrations of Chlorinated Organics Over Time at PT-24

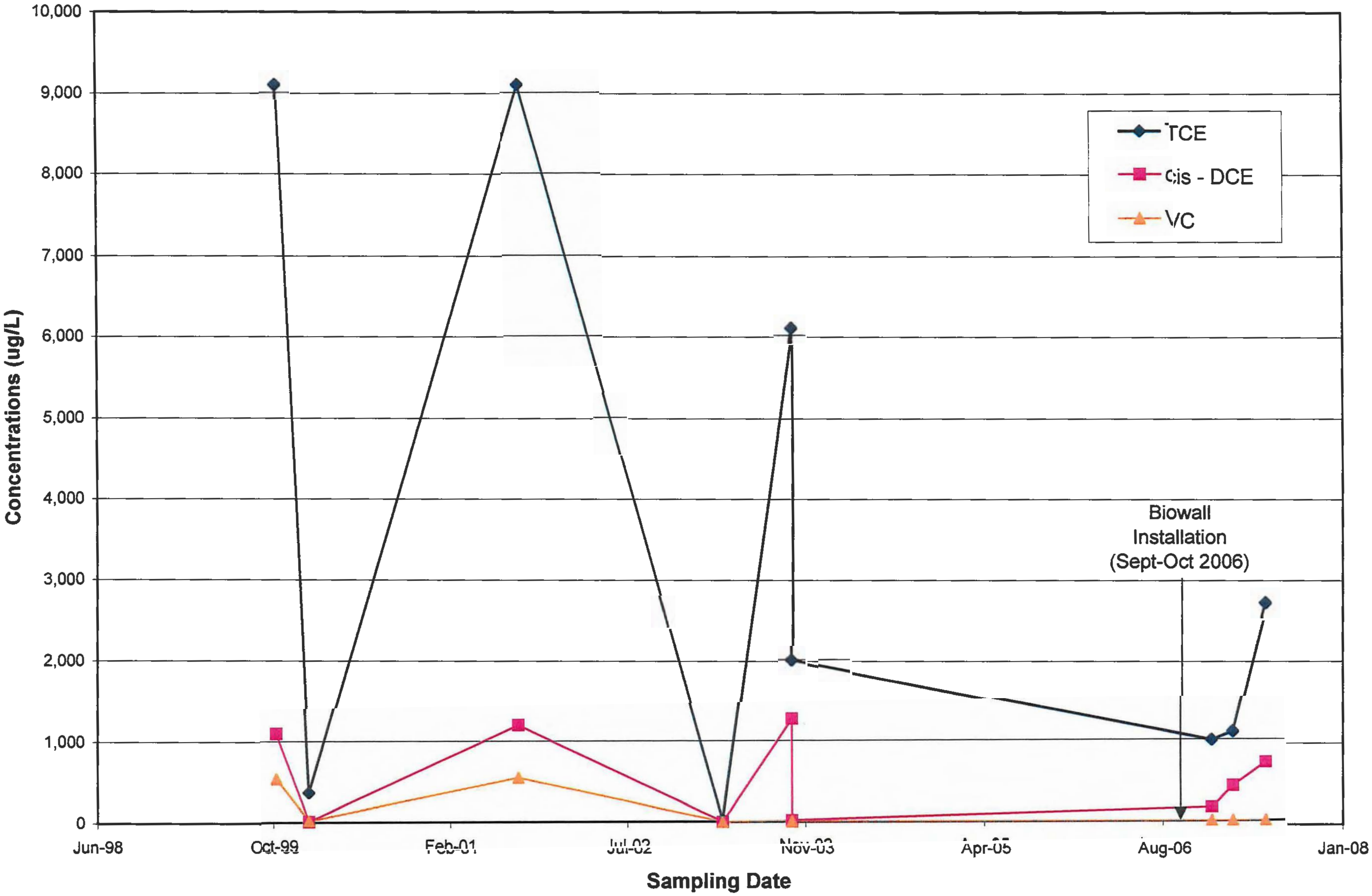
Ash Landfill Annual Report

Seneca Army Depot Activity

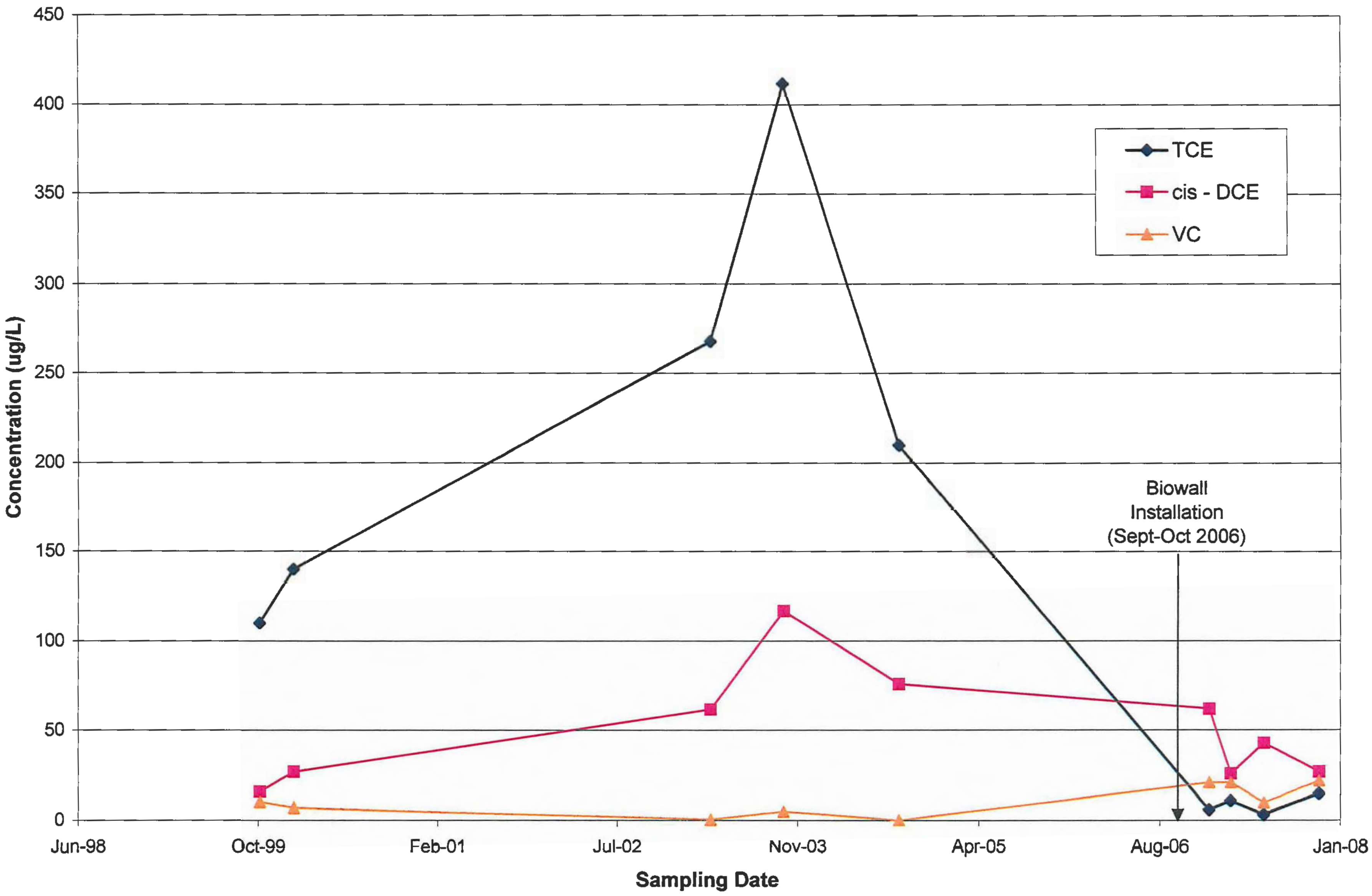


ND = not detected.

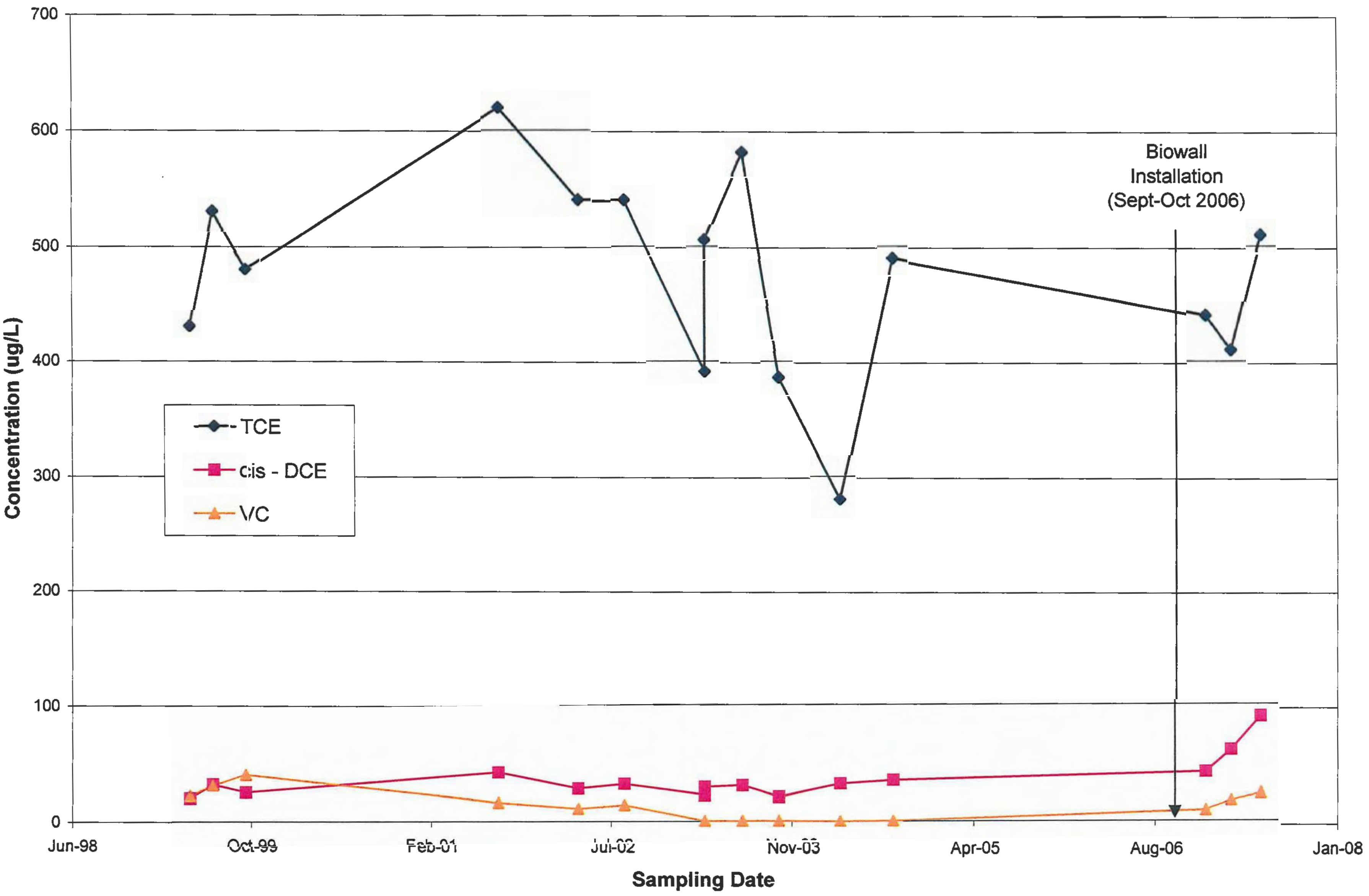
Fig 7A
Historic Concentrations of Chlorinated Organics at PT-18
Ash Landfill Annual Report
Seneca Army Depot Activity

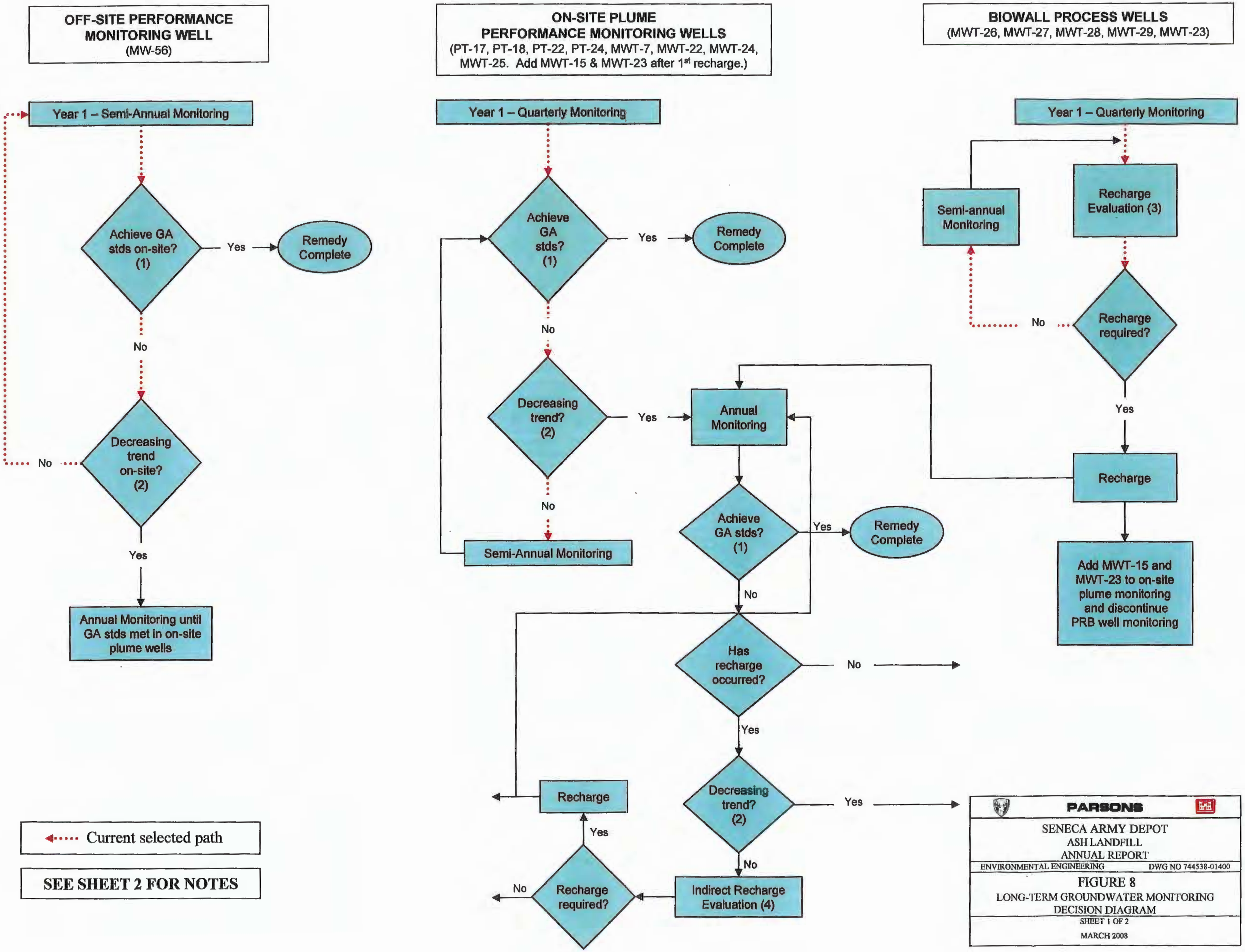


Fi 7B
Historic Concentrations of Chlorinated Organics at PT-17
Ash Landfill Annual Report
Seneca Army Depot Activity



Fi 7C
Historic Concentrations of Chlorinated Organics at MWT-7
Ash Landfill Annual Report
Seneca Army Depot Activity





SEE SHEET 2 FOR NOTES

PARSONS

SENECA ARMY DEPOT
ASH LANDFILL
ANNUAL REPORT

ENVIRONMENTAL ENGINEERING DWG NO 744538-01400

FIGURE 8
LONG-TERM GROUNDWATER MONITORING
DECISION DIAGRAM

SHEET 1 OF 2

MARCH 2008

NOTES:

1. **Achieving GA Stds:** The condition of achieving GA standards applies to achieving groundwater standards for all COCs in all of the On-Site Plume Wells. If GA standards are achieved in the On-Site Plume Wells for two successive monitoring events, then the remedy is complete and no further monitoring is required at the site.

2. ***Decreasing Trend:*** *After each year of sampling, the Army will review the results to determine if the chemical concentrations* of the COCs are increasing, decreasing, or are unchanged. Graphical and statistical analyses will be used as the basis for this determination. For example, data points will be plotted and a best fit line (linear regression) will be graphed. The slope of the best fit line is representative of the trend in concentration; a negative slope indicates a decreasing trend in COC concentrations. A decreasing COC trend indicates that the potential for contaminants to migrate and negatively impact groundwater further downgradient is decreasing, and that the plume is being effectively managed by the remedy. Any evaluation of trends in contaminant concentrations will take into account that historic data at the Ash Landfill shows that there are seasonal fluctuations in contaminant concentrations. Semi-annual monitoring during wet and dry seasons is appropriate until it is established in which season maximum concentrations are observed. Annual monitoring would occur in the season of maximum concentrations.

3. **Recharge Evaluation:**

- Determining the need to recharge a biowall segment requires a review of chemical concentrations and geochemical parameters by an experienced professional. A specific, absolute set of conditions or parameter values are not appropriate to determine the need to recharge. Rather, a lines-of-evidence approach will be used that correlates a decrease in the efficiency of the system to degrade chloroethenes to geochemical evidence that indicates the cause is due to substrate depletion.

- The following parameters will be evaluated on an annual basis using at least two consecutive rounds of sampling data in order to determine if recharge of the biowalls is necessary:

  a. COC concentrations in the wall. If COC concentrations have rebounded by greater than 50% for any single sampling event, this will indicate that recharge should be considered. Concentrations within the biowalls, not at downgradient locations, will be used to make this evaluation so that the effectiveness of the wall itself is being measured without the interference of effects such as desorption and mixing.

  b. Geochemical parameters, specifically ORP, TOC, and DO, in the wall. Benchmark values will be used initially to evaluate anaerobic conditions in the groundwater. These benchmarks are:
    - ORP < -100 Mv
    - TOC > 20 mg/L
    - DO < 1.0 mg/L

Parameters described in a and b above are intended to be used as guidelines and will be considered in the evaluation if, and when, a depletion of bioavailable organic substrate results in a rebound in geochemical redox conditions under which effective biodegradation does not occur.

4. **Indirect Recharge Evaluation**: Once the biowalls are recharged the first time, an indirect recharge evaluation will be conducted if an increasing trend in COC concentrations is observed in the plume performance monitoring wells. An increasing trend is a positive slope on the best-fit line, described in *Note 2* above. Two biowall monitoring wells, MWT-15 and MWT-23, will be added to the Plume Performance Monitoring program after the first recharge is completed. The evaluation will review the chemical and geochemical data and determine if the contaminant increase is a result of poor biowall performance or due to other issues, such as seasonal variations, recent precipitation events, desorption, etc. As stated in Note 2, a rebound in concentrations of COCs of 50% in MWT-15 and MWT-23 in two consecutive monitoring rounds is a major indication that recharge is needed. Once this COC rebound is observed, the geochemical parameter concentrations at MWT-15 and MWT-23 will be reviewed. In addition, conditions at the other plume performance wells will be reviewed and compared to the conditions observed at those wells at the time that the initial recharge was required. The Army will determine if similar conditions in the well provide further proof that carbon source recharge is needed again.

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								PT-18A	PT-18A	PT-18A	PT-18A	MWT-25	MWT-25
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20059	ALBW20074	ALBW20088	ALBW20103	ALBW20064	ALBW20079
Sample Date								1/3/2007	3/17/2007	6/5/2007	11/15/2007	1/3/2007	3/17/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								1	2	3	4	1	2
Parameter	**Units**	**Maximum Value**	**Frequency of Detection**	**Cleanup Goal^{2}**	**Number of Exceedances**	**Number of Times Detected**	**Number of Samples Collected**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 UJ	1 U	1 U	1 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	0.64 J	0.73 J	1.4	2.1	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0 0006	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Acetone	UG/L	2600	48%		0	28	58	5 U	2 J	7	5 U	5 U	5 U
Benzene	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	27	13 U	14	8.7	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	220	170	430	720	41	84
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl Acetate	UG/L	8	3%		0	2	58	1 U	1 UJ	1 U	1 UJ	1 U	1 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 UJ	5 U	5 U
Methyl chloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	5 U	5 U	5 U	5 U	5 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 UJ	1 U	1 U	1 U	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	1 U	1 U	1 U	1 U	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	3 U	3 U	3 U	3 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	1.6	1.4	3.3	3.4	0.56 J	1.2
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	2000	1000	1100	2700	50	55
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 UJ	1 U	1 U	1 U
Vinyl chloride	UG/L	180	71%	2	36	41	58	2.4	2.9	3.3	8.2	1.6	9.6
Other													
Manganese	UG/L	56900	100%	300	12	12	12						
Ethane	UG/L	45	71%		0	17	24						
Ethene	UG/L	200	71%		0	17	24						
Methane	UG/L	23000	88%		0	21	24						
Sulfate	MG/L	1060	58%	250000	0	14	24						
Total Organic Carbon	MG/L	2050	100%		0	24	24						

Notes:
1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1. June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected
J = the reported value is and estimated concentration

Appendix A

Table A-1

Complete Groundwater Data for Ash Landfill Long Term Monitoring

Ash Landfill Annual Report

Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-25	MWT-25	MWT-26	MWT-26	MWT-26	MWT-26
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20093	ALBW20108	ALBW20066	ALBW20081	ALBW20095	ALBW20111
Sample Date								6/6/2007	11/15/2007	1/3/2007	3/17/2007	6/5/2007	11/15/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								3	4	1	2	3	4
Parameter	Units	Maximum Value	Frequency of Detection	Cleanup Goal^2	Number of Exceedences	Number of Times Detected	Number of Samples Collected	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	1 UJ	1 U	1 U	1 U	1 UJ	1 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Acetone	UG/L	2600	48%		0	26	58	4.5 J	5 U	5 U	17	5 U	5 U
Benzene	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	36	17	19	17	11	2.8
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	1 U	1 UJ	1 U	1 UJ	1 U	1 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	5 U	5 UJ	5 U	5 U	5 U	5 UJ
Methyl chloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	5 U	5 U	5 U	15	5 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	UG/L	500	24%	5	10	14	58	4.6	1 U	1 U	1 U	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	3 U	3 U	3 U	3 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	0.5 J	1 U	0.6 J	1	0.7 J	1 U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	28	26	10	11	3.2	2.8
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	1 UJ	1 U	1 U	1 U	1 UJ	1 U
Vinyl chloride	UG/L	180	71%	2	36	41	58	2.7	0.64 J	2	6.1	4.4	1 U
Other													
Manganese	UG/L	56900	100%	300	12	12	12			768	1620		
Ethane	UG/L	45	71%		0	17	24			2 U	0.4	1	0.16
Ethene	UG/L	200	71%		0	17	24			2 U	7.8	13	0.4
Methane	UG/L	23000	88%		0	21	24			2 U	210	390	44
Sulfate	MG/L	1060	58%	250000	0	14	24			958	738	473	1060
Total Organic Carbon	MG/L	2050	100%		0	24	24			3.9 J	15.2	10.3	6.1

Notes:

1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

Appendix A

Table A-1

Complete Groundwater Data for Ash Landfill Long Term Monitoring

Ash Landfill Annual Report

Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-27	MWT-27	MWT-27	MWT-27	MWT-27	MWT-28
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20067	ALBW20082	ALBW20097	ALBW20096	ALBW20112	ALBW20069
Sample Date								1/3/2007	3/16/2007	6/5/2007	6/5/2007	11/15/2007	1/3/2007
QC Code								SA	SA	DU	SA	SA	DU
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								1	2	3	3	4	1
Parameter	**Units**	**Maximum Value**	**Frequency of Detection**	**Cleanup Goal²**	**Number of Exceedences**	**Number of Times Detected**	**Number of Samples Collected**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 UJ	20 UJ	10 U	20 UJ
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Acetone	UG/L	2600	48%		0	28	58	2000 J	1300	1300	1300	30 J	2600 J
Benzene	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Bromodichloromethane	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Bromoform	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Carbon disulfide	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Chlorobenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Chloroethane	UG/L	1.1	5%	5	0	3	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Chloroform	UG/L	27	5%	7	3	3	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	49	58	49 J	20 U	20 U	20 U	10 U	20 UJ
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Cyclohexane	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Isopropylbenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Methyl Acetate	UG/L	6	3%		0	2	58	20 UJ	20 UJ	20 U	20 U	10 UJ	20 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Methyl bromide	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Methyl butyl ketone	UG/L	0	0%		0	0	58	100 UJ	100 U	100 U	100 U	50 UJ	100 UJ
Methyl chloride	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Methyl cyclohexane	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	4100 J	2200	1700	1800	50 U	4900 J
Methyl Isobutyl ketone	UG/L	0	0%		0	0	58	100 UJ	100 U	100 U	100 U	50 U	100 UJ
Methylene chloride	UG/L	18	21%	5	7	12	58	18 J	20 U	13 J	11 J	10 U	14 J
Styrene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Tetrachloroethene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Toluene	UG/L	590	24%	5	10	14	58	20 UJ	20 U	20 U	20 U	7.3 J	350 J
Total Xylenes	UG/L	0	0%	5	0	0	58	60 UJ	60 U	60 U	60 U	30 U	60 UJ
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Trichloroethene	UG/L	2700	67%	5	27	39	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 UJ	20 UJ	10 U	20 UJ
Vinyl chloride	UG/L	180	71%	2	36	41	58	20 UJ	20 U	20 U	20 U	10 U	20 UJ
Other													
Manganese	UG/L	56900	100%	300	12	12	12	56900	44500				30800
Ethane	UG/L	45	71%		0	17	24	10000 UJ	0.15	0.079	0.082	0.025 U	10000 UJ
Ethene	UG/L	200	71%		0	17	24	10000 UJ	2.7	0.32	0.34	0.014 J	10000 UJ
Methane	UG/L	23000	88%		0	21	24	10000 UJ	15000	13000	14000	13000	13000 J
Sulfate	MG/L	1060	58%	250000	0	14	24	10 U	10 U	2.7	2 U	31.7	2.3
Total Organic Carbon	MG/L	2050	100%		0	24	24	2050 J	1350	771	738	167	1730 J

Notes:

1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-28	MWT-28	MWT-28	MWT-28	MWT-29	MWT-29
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20068	ALBW20083	ALBW20098	ALBW20113	ALBW20070	ALBW20085
Sample Date								1/3/2007	3/16/2007	6/5/2007	11/15/2007	1/3/2007	3/16/2007
QC Code								SA	SA	SA	SA	SA	DU
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								1	2	3	4	1	2
Parameter	Units	Maximum Value	Frequency of Detection	Cleanup Goal^{2}	Number of Exceedances	Number of Times Detected	Number of Samples Collected	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 UJ	5 U	2 U	4 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Acetone	UG/L	2600	48%		0	28	58	2500 J	170	520	25 U	10 U	14 J
Benzene	UG/L	0	0%	1	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Bromoform	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Carbon disulfide	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Chloroform	UG/L	27	5%	7	3	3	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	20 UJ	20 U	20 U	5 U	280	220
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Cyclohexane	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Methyl Acetate	UG/L	6	3%		0	2	58	20 UJ	20 UJ	20 U	5 UJ	2 U	4 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Methyl bromide	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	100 UJ	100 U	100 U	25 UJ	10 U	20 U
Methyl chloride	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	4900 J	180	510	25 U	10 U	20 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	100 UJ	100 U	100 U	25 U	10 U	20 U
Methylene chloride	UG/L	18	21%	5	7	12	58	13 J	20 U	9.3 J	5 U	2 U	4 U
Styrene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Toluene	UG/L	590	24%	5	10	14	58	330 J	160	500	210	2.6	2.2 J
Total Xylenes	UG/L	0	0%	5	0	0	58	60 UJ	60 U	60 U	15 U	6 U	12 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	20 UJ	20 U	20 U	5 U	6.5	8
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	20 UJ	20 U	20 U	5 U	2 U	4 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	20 UJ	20 U	20 U	5 U	22	19
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	20 UJ	20 U	20 UJ	5 U	2 U	4 U
Vinyl chloride	UG/L	180	71%	2	36	41	58	20 UJ	20 U	20 U	5 U	140	170
Other													
Manganese	UG/L	56900	100%	300	12	12	12	31800	4450			7250	6500
Ethane	UG/L	45	71%		0	17	24	10000 UJ	0.67	0.01 J	0.014 J	2000 U	25
Ethene	UG/L	200	71%		0	17	24	10000 UJ	0.48	0.057	0.025 U	2000 U	150
Methane	UG/L	23000	88%		0	21	24	12000 J	19000	11000	11000	2000 U	8100
Sulfate	MG/L	1060	58%	250000	0	14	24	2 U	2 U	2 U	2 U	113	173
Total Organic Carbon	MG/L	2050	100%		0	24	24	1820 J	171	309	92	25.1 J	36.7

Notes:
1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

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J = the reported value is and estimated concentration

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-29	MWT-29	MWT-29	MWT-22	MWT-22	MWT-22
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20084	ALBW20099	ALBW20114	ALBW20071	ALBW20075	ALBW20100
Sample Date								3/16/2007	6/5/2007	11/14/2007	1/4/2007	3/17/2007	6/6/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								2	3	4	1	2	3
Parameter	Units	Maximum Value	Frequency of Detection	Cleanup Goal[2]	Number of Exceedences	Number of Times Detected	Number of Samples Collected	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	5 U	2 U	1 U	2 U	4 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	5 U	2 UJ	1 U	2 U	4 U	1 UJ
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	5 U	2 U	1 U	2 U	4 U	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	5 U	2 U	1 U	2 U	4 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Acetone	UG/L	2600	48%		0	28	58	15 J	5.7 J	5 U	10 U	16 J	38
Benzene	UG/L	0	0%	1	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	5 U	2 U	1 U	2 UJ	4 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	5 U	2 U	1 U	2 U	4 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	220	100	96	130	90	120
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	5 U	2 U	1 U	2 U	4 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	5 UJ	2 U	1 UJ	2 U	4 UJ	1 U
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	25 U	10 U	5 UJ	10 U	20 U	5 U
Methyl chloride	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	25 U	10 U	5 U	6 J	20 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	25 U	10 U	5 U	10 U	20 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	2.5 J	2 U	1 U	1.2 J	4 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	5 U	2 U	2.1	2 U	4 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	15 U	6 U	3 U	6 U	12 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	7.5	2.1	0.83 J	2.7	4 U	3.2
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	5 U	2 U	1 U	2 U	4 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	19	7.6	4.4	5.2	3.8 J	6.5
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	5 U	2 UJ	1 U	2 U	4 U	1 UJ
Vinyl chloride	UG/L	180	71%	2	36	41	58	160	81	74	98	64	81
Other													
Manganese	UG/L	56000	100%	300	12	12	12	6280					
Ethane	UG/L	45	71%		0	17	24	20	13	19			
Ethene	UG/L	200	71%		0	17	24	120	160	200			
Methane	UG/L	23000	88%		0	21	24	6500	2800	2600			
Sulfate	MG/L	1060	58%	250000	0	14	24	179	151	289			
Total Organic Carbon	MG/L	2050	100%		0	24	24	35	15.7	20.9			

Notes:
1 The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1 1.1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected
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Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-22	PT-22	PT-22	PT-22	PT-22	MWT-23
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20115	ALBW20060	ALBW20086	ALBW20089	ALBW20104	ALBW20065
Sample Date								11/14/2007	1/3/2007	3/15/2007	6/5/2007	11/14/2007	1/3/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								4	1	2	3	4	1
Parameter	**Units**	**Maximum Value**	**Frequency of Detection**	**Cleanup Goal^2**	**Number of Exceedences**	**Number of Times Detected**	**Number of Samples Collected**	**Value (Q)**	**Value (Q)**	**Value (Q)**	**Value (Q)**	**Value (Q)**	**Value (Q)**
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	1 U	1 U	1 U	1 U	1 U	4 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	1 U	1 U	1 U	1 U	1 U	4 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	1 U	1 U	1 U	1 U	1 U	4 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 UJ	1 U	4 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	1 U	3.3	2.3	5.6	5	2.3 J
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Acetone	UG/L	2600	48%		0	28	58	5 U	5 U	5 U	3.8 J	5.3	180
Benzene	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Bromoform	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Carbon disulfide	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	1 U	1 UJ	1 U	1.1 J	0.82 J	4 U
Chloroform	UG/L	27	5%	7	3	3	58	1 U	1 U	1 U	1 U	1 U	4 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	99	57	41	61	30	60
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 UJ	1 U	4 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	1 U	1 U	1 U	1 U	1 U	4 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Methyl Acetate	UG/L	8	3%		0	2	58	1 UJ	1 U	1 UJ	1 UJ	1 U	4 U
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Methyl bromide	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 UJ	1 U	4 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	5 UJ	5 U	5 U	5 U	5 U	20 U
Methyl chloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 UJ	1 U	4 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	5 U	5 U	5 U	5 U	5 U	250
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 U	5 U	20 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 U	1 UJ	1 U	1 U	1 U	2.5 J
Styrene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Toluene	UG/L	590	24%	5	10	14	58	1 U	1 U	1 U	1 U	1 U	4 U
Total Xylenes	UG/L	0	0%	5	0	0	58	3 U	3 U	3 U	3 U	3 U	12 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	0.85 J	0.86 J	0.51 J	0.72 J	0.67 J	4 U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	2.6	11	16	8.5	9.7	4 U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	4 U
Vinyl chloride	UG/L	180	71%	2	36	41	58	180	22	13	32	11	23
Other													
Manganese	UG/L	56900	100%	300	12	12	12						19500
Ethane	UG/L	45	71%		0	17	24						10000 U
Ethene	UG/L	200	71%		0	17	24						10000 U
Methane	UG/L	23000	88%		0	21	24						12000
Sulfate	MG/L	1060	58%	250000	0	14	24						2 U
Total Organic Carbon	MG/L	2050	100%		0	24	24						260 J

Notes

1 The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)

2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-23	MWT-23	MWT-23	MWT-23	MWT-24	MWT-24
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20080	ALBW20094	ALBW20110	ALBW20109	ALBW20063	ALBW20078
Sample Date								3/16/2007	6/6/2007	11/16/2007	11/16/2007	1/3/2007	3/15/2007
QC Code								SA	SA	DU	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								2	3	4	4	1	2
Parameter	Units	Maximum Value	Frequency of Detection	Cleanup Goal²	Number of Exceedences	Number of Times Detected	Number of Samples Collected	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	4 U	2 U	4 U	10 U	0.71 J	0.58 J
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	4 U	2 UJ	4 U	10 U	1 U	1 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	4 U	2 U	4 U	10 U	0.81 J	0.83 J
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	4 U	2 U	4 U	10 U	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.8	10%	0.6	6	6	58	4 U	1.6 J	4 U	10 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Acetone	UG/L	2600	48%		0	28	58	190	190	62	64	42 U	54
Benzene	UG/L	0	0%	1	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	4 U	2 U	4 U	10 U	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	4 U	2 U	4 U	10 U	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	11	3.1	2.1 J	10 U	210	68
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	4 U	1.3 J	4 U	10 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	4 UJ	5.1	4 UJ	10 U	1 U	1 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	20 U	10 U	20 UJ	50 U	5 U	5 U
Methyl chloride	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	130	73	25	26 J	24	36
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	20 U	10 U	20 U	50 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	4 U	2 U	4 U	12	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	7.4	37	390	570	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	12 U	6 U	12 U	30 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	4 U	2 U	4 U	10 U	2.1	0.88 J
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	4 U	2 U	4 U	10 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	4 U	2 U	4 U	10 U	0.94 J	1 U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	4 U	2 UJ	4 U	10 U	1 U	1 U
Vinyl chloride	UG/L	180	71%	2	38	41	58	4.8	2 U	2.3 J	10 U	19	45
Other													
Manganese	UG/L	56900	100%	300	12	12	12	19500					
Ethane	UG/L	45	71%		0	17	24	45	4.1	0.66	0.49		
Ethene	UG/L	200	71%		0	17	24	5.9	0.28	0.39	0.3		
Methane	UG/L	23000	88%		0	21	24	23000	18000	17000	15000		
Sulfate	MG/L	1060	58%	250000	0	14	24	2 U	2 U	2.7	2.8		
Total Organic Carbon	MG/L	2050	100%		0	24	24	210	303	155	147		

Notes:

1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected
J = the reported value is and estimated concentration

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-24	MWT-24	PT-17	PT-17	PT-17	PT-17
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALSW20092	ALBW20107	ALBW20058	ALBW20073	ALBW20087	ALBW20102
Sample Date								6/5/2007	11/13/2007	1/2/2007	3/15/2007	6/5/2007	11/13/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								3	4	1	2	3	4
Parameter	**Units**	**Maximum Value**	**Frequency of Detection**	**Cleanup Goal[2]**	**Number of Exceedences**	**Number of Times Detected**	**Number of Samples Collected**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	2 U	1 U	1 U	2 U	1 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	2 UJ	1 U	1 U	2 U	1 UJ	1 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	1.1 J	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	2 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Acetone	UG/L	2600	48%		0	28	58	73	5 U	9.3 U	22	5 U	5 U
Benzene	UG/L	0	0%	1	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	2 U	1 U	1 U	2 U	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	2 U	1 U	1 U	2 U	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	19	67	62	26	43	27
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	2 U	1 U	1 U	2 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	6	1 UJ	1 U	2 UJ	1 U	1 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	10 U	5 UJ	5 U	10 U	5 U	5 UJ
Methyl chloride	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	40	5 U	5.4	11	5 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	10 U	5 U	5 U	10 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 J	1 U	1 U	1.2 J	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	2 U	1 U	1 U	2 U	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	6 U	3 U	3 U	6 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	2 U	1 U	1 U	2 U	0.77 J	0.54 J
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	2 U	1 U	1 U	2 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	2 U	1.6	6	11	3.4	15
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	2 UJ	1 U	1 U	2 U	1 UJ	1 U
Vinyl chloride	UG/L	180	71%	2	38	41	58	22	3.8	21	21	9.9	22
Other													
Manganese	UG/L	56900	100%	300	12	12	12						
Ethane	UG/L	45	71%		0	17	24						
Ethene	UG/L	200	71%		0	17	24						
Methane	UG/L	23000	88%		0	21	24						
Sulfate	MG/L	1060	56%	250000	0	14	24						
Total Organic Carbon	MG/L	2050	100%		0	24	24						

Notes:
1 The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1. June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected
J = the reported value is and estimated concentration

Appendix A

Table A-1

Complete Groundwater Data for Ash Landfill Long Term Monitoring

Ash Landfill Annual Report

Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								MWT-7	MWT-7	MWT-7	MWT-7	PT-24	PT-24
Matrix								GW	GW	GW	GW	GW	GW
Sample ID								ALBW20062	ALBW20077	ALBW20091	ALBW20106	ALBW20061	ALBW20076
Sample Date								1/4/2007	3/15/2007	6/5/2007	11/13/2007	1/2/2007	3/15/2007
QC Code								SA	SA	SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM	LTM	LTM
Sampling Round								1	2	3	4	1	2
Parameter	**Units**	**Maximum Value**	**Frequency of Detection**	**Cleanup Goal[2]**	**Number of Exceedances**	**Number of Times Detected**	**Number of Samples Collected**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs													
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 UJ	1 U	1 U	1 U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	1 U	1 U	1 U	1 U	0.68 J	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.8	10%	0.6	6	6	58	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Acetone	UG/L	2600	48%		0	28	58	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	1 U	1 U	1 U	0.65 J	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	35	42	61	90	54	38
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	1 U	1 UJ	1 U	1 UJ	1 U	1 UJ
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 UJ	5 U	5 U
Methyl chloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	5 U	5 U	5 U	5 U	5 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	1 U	1 U	1 U	1 U	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	3 U	3 U	3 U	3 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	6	50%	5	3	29	58	1 U	1 U	1 U	1 U	0.86 J	0.81 J
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	490	440	410	510	4	2.8
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 UJ	1 U	1 U	1 U
Vinyl chloride	UG/L	180	71%	2	36	41	58	0.51 J	9.7	18	24	0.6 J	1 U
Other													
Manganese	UG/L	56900	100%	300	12	12	12						
Ethane	UG/L	45	71%		0	17	24						
Ethene	UG/L	200	71%		0	17	24						
Methane	UG/L	23000	88%		0	21	24						
Sulfate	MG/L	1060	58%	250000	0	14	24						
Total Organic Carbon	MG/L	2050	100%		0	24	24						

Notes:

1 The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1.1, June 1998)

2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

Appendix A
Table A-1
Complete Groundwater Data for Ash Landfill Long Term Monitoring
Ash Landfill Annual Report
Seneca Army Depot Activity

Facility								ASH LANDFILL	ASH LANDFILL	ASH LANDFILL	ASH LANDFILL
Location ID								PT-24	PT-24	MW-56	MW-56
Matrix								GW	GW	GW	GW
Sample ID								ALBW20090	ALBW20105	ALBW20072	ALBW20101
Sample Date								6/5/2007	11/13/2007	1/4/2007	6/6/2007
QC Code								SA	SA	SA	SA
Study ID								LTM	LTM	LTM	LTM
Sampling Round								3	4	1	3
Parameter	Units	Maximum Value	Frequency of Detection	Cleanup Goal[2]	Number of Exceedances	Number of Times Detected	Number of Samples Collected	Value (Q)	Value (Q)	Value (Q)	Value (Q)
VOCs											
1,1,1-Trichloroethane	UG/L	0.71	3%	5	0	2	58	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	0	0%	5	0	0	58	1 UJ	1 U	1 U	1 UJ
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U
1,1-Dichloroethane	UG/L	1.1	10%	5	0	6	58	0.75 J	0.56 J	1 U	1 U
1,1-Dichloroethene	UG/L	2.1	7%	5	0	4	58	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	58	1 U	1 U	1 U	1 U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	58	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U
1,2-Dichloroethane	UG/L	5.6	10%	0.6	6	6	58	1 U	1 U	1 U	1 U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	58	1 U	1 U	1 U	1 U
Acetone	UG/L	2600	48%		0	28	58	5 U	5 U	5 U	5 U
Benzene	UG/L	0	0%	1	0	0	58	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U
Bromoform	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U
Carbon disulfide	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U
Carbon tetrachloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Chlorobenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Chlorodibromomethane	UG/L	0	0%	80	0	0	58	1 U	1 U	1 U	1 U
Chloroethane	UG/L	1.1	5%	5	0	3	58	1 U	1 U	1 U	1 U
Chloroform	UG/L	27	5%	7	3	3	58	1 U	1 U	1 U	1 U
Cis-1,2-Dichloroethene	UG/L	720	83%	5	43	48	58	60	39	1.2	1.7
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U
Cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Ethyl benzene	UG/L	1.3	2%	5	0	1	58	1 U	1 U	1 U	1 U
Isopropylbenzene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Methyl Acetate	UG/L	6	3%		0	2	58	1 U	1 UJ	1 U	1 U
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U
Methyl bromide	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Methyl butyl ketone	UG/L	0	0%		0	0	58	5 U	5 UJ	5 U	5 U
Methyl chloride	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Methyl cyclohexane	UG/L	0	0%		0	0	58	1 U	1 U	1 U	1 U
Methyl ethyl ketone	UG/L	4900	34%		0	20	58	5 U	5 U	5 U	5 U
Methyl isobutyl ketone	UG/L	0	0%		0	0	58	5 U	5 U	5 U	5 U
Methylene chloride	UG/L	18	21%	5	7	12	58	1 U	1 U	1 U	1 U
Styrene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Tetrachloroethene	UG/L	0	0%	5	0	0	58	1 U	1 U	1 U	1 U
Toluene	UG/L	590	24%	5	10	14	58	1 U	1 U	1 U	1 U
Total Xylenes	UG/L	0	0%	5	0	0	58	3 U	3 U	3 U	3 U
Trans-1,2-Dichloroethene	UG/L	8	50%	5	3	29	58	1.6	1 U	1 U	1 U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	58	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	2700	67%	5	27	39	58	3.1	3.8	1 U	1 U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	58	1 UJ	1 U	1 U	1 UJ
Vinyl chloride	UG/L	180	71%	2	36	41	58	2.6	1 U	1 U	1 U
Other											
Manganese	UG/L	56900	100%	300	12	12	12				
Ethane	UG/L	45	71%		0	17	24				
Ethene	UG/L	200	71%		0	17	24				
Methane	UG/L	23000	88%		0	21	24				
Sulfate	MG/L	1060	58%	250000	0	14	24				
Total Organic Carbon	MG/L	2050	100%		0	24	24				

Notes:

1. The cleanup goal values are NYSDEC Class GA Groundwater Standards (TOGS 1.1 1, June 1998)
2. Shading indicates a concentration above GA groundwater standard.

U = compound was not detected

J = the reported value is and estimated concentration

Figure B-1
Regression Plot of Well Concentrations At MWT-25
Ash Landfill Annual Report
Seneca Army Depot Activity

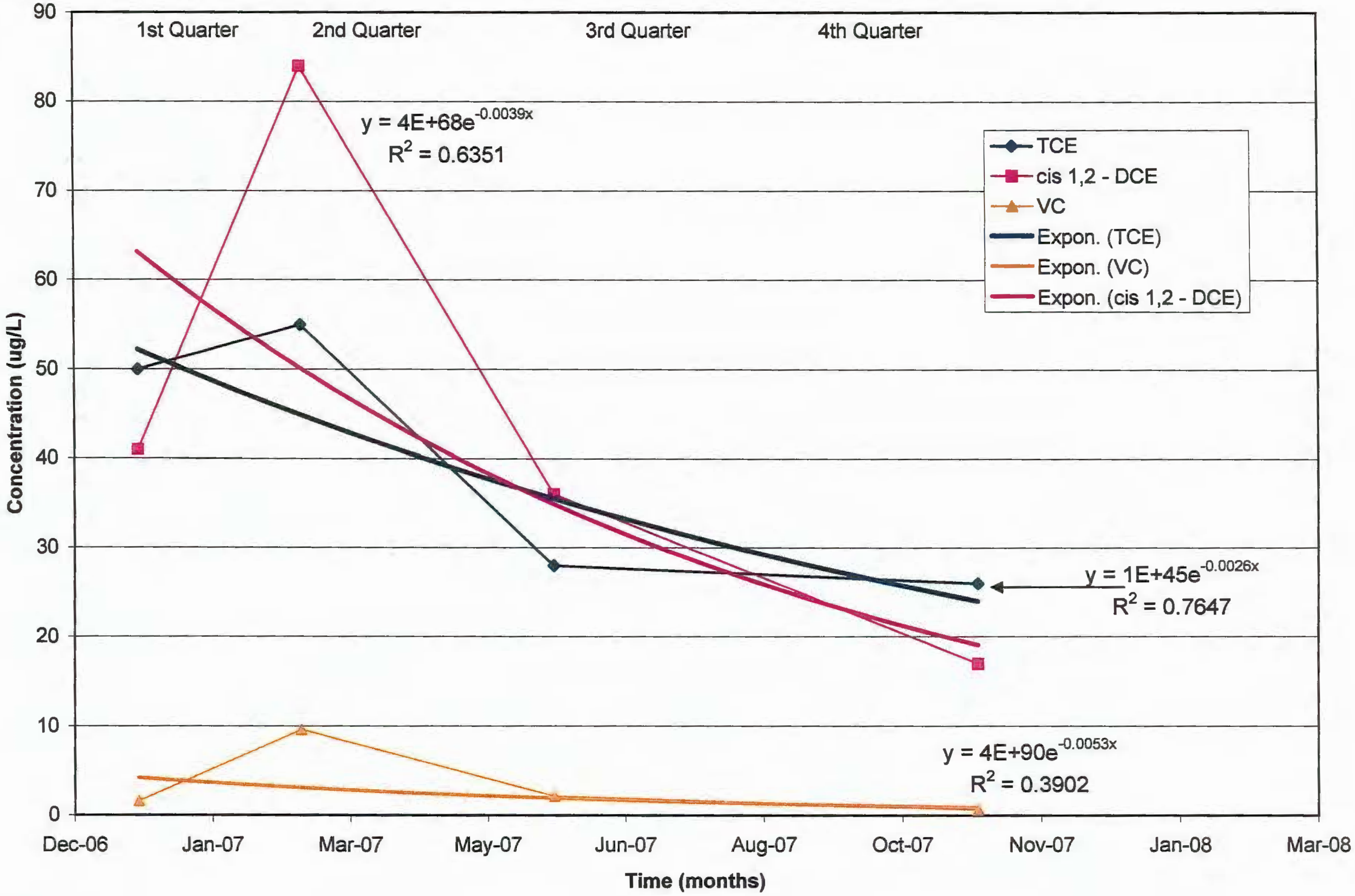

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Figure B-2
Regression Plot of Well Concentrations At MWT-26
Ash Landfill Annual Report
Seneca Army Depot Activity

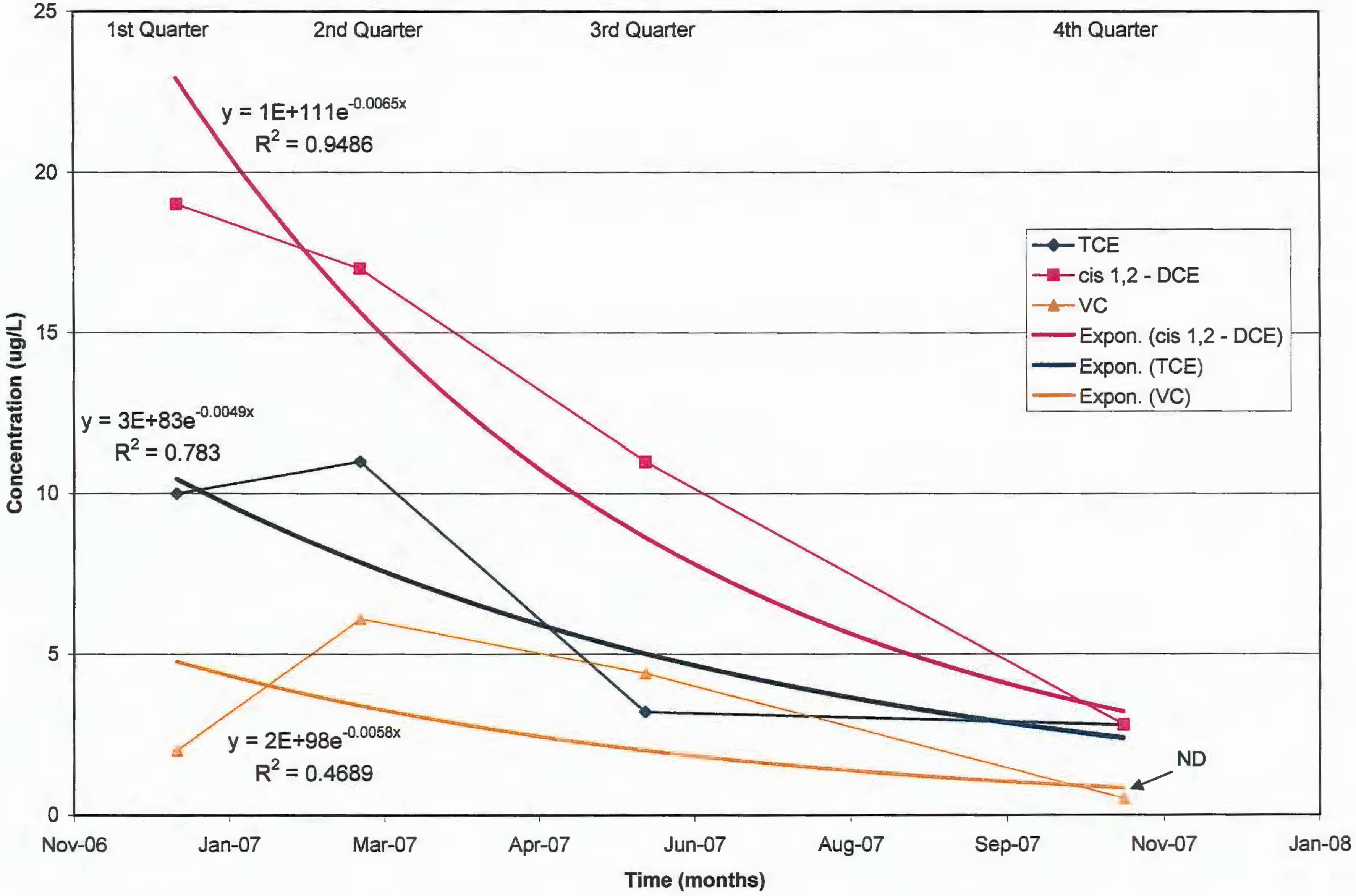

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Figure B-3
Regression Plot of Well Concentrations At MWT-27
Ash Landfill Annual Report
Seneca Army Depot Activity

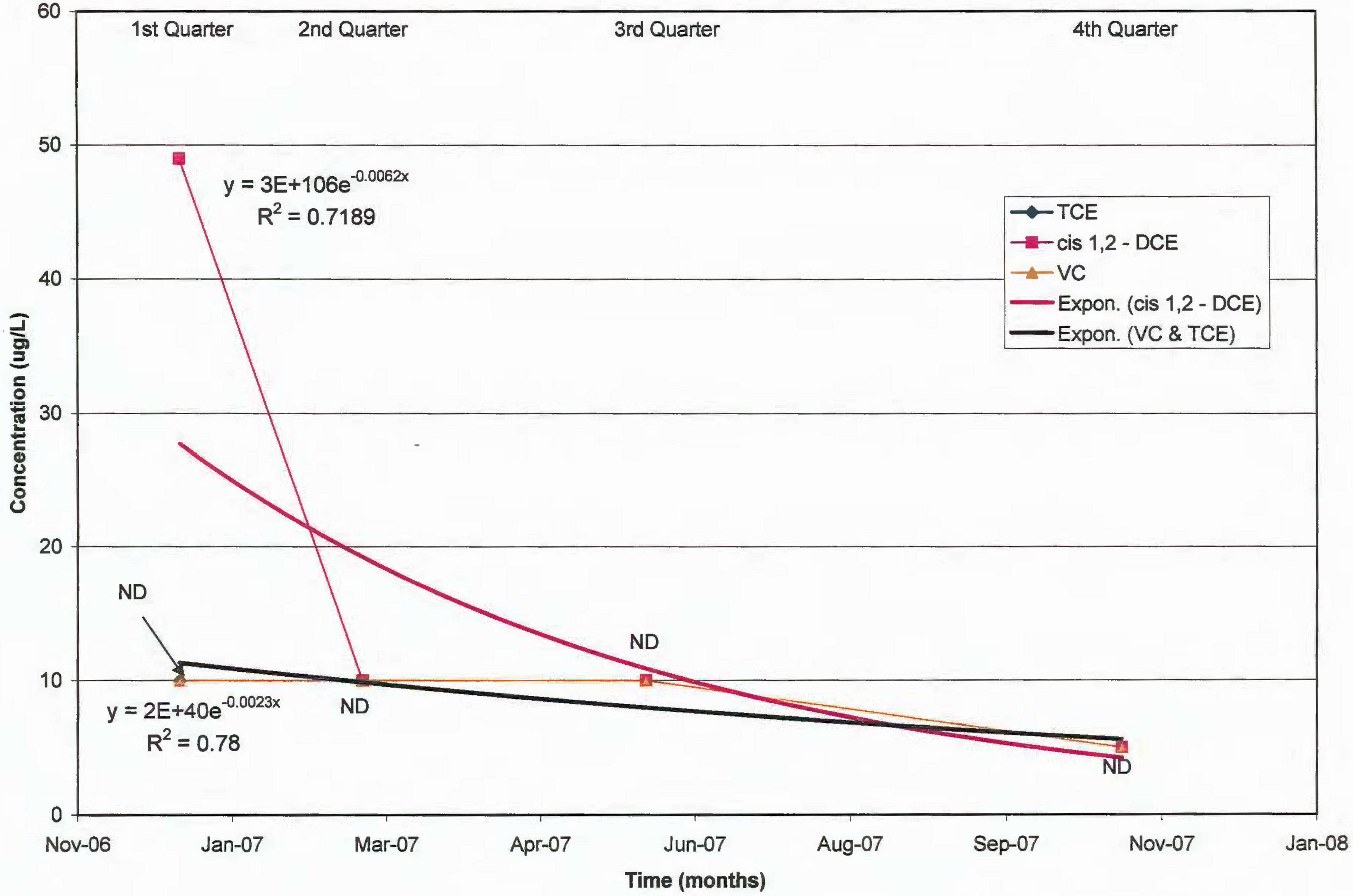

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Figure B-4
Regression Plot of Well Concentrations At MWT-28
Ash Landfill Annual Report
Seneca Army Depot Activity

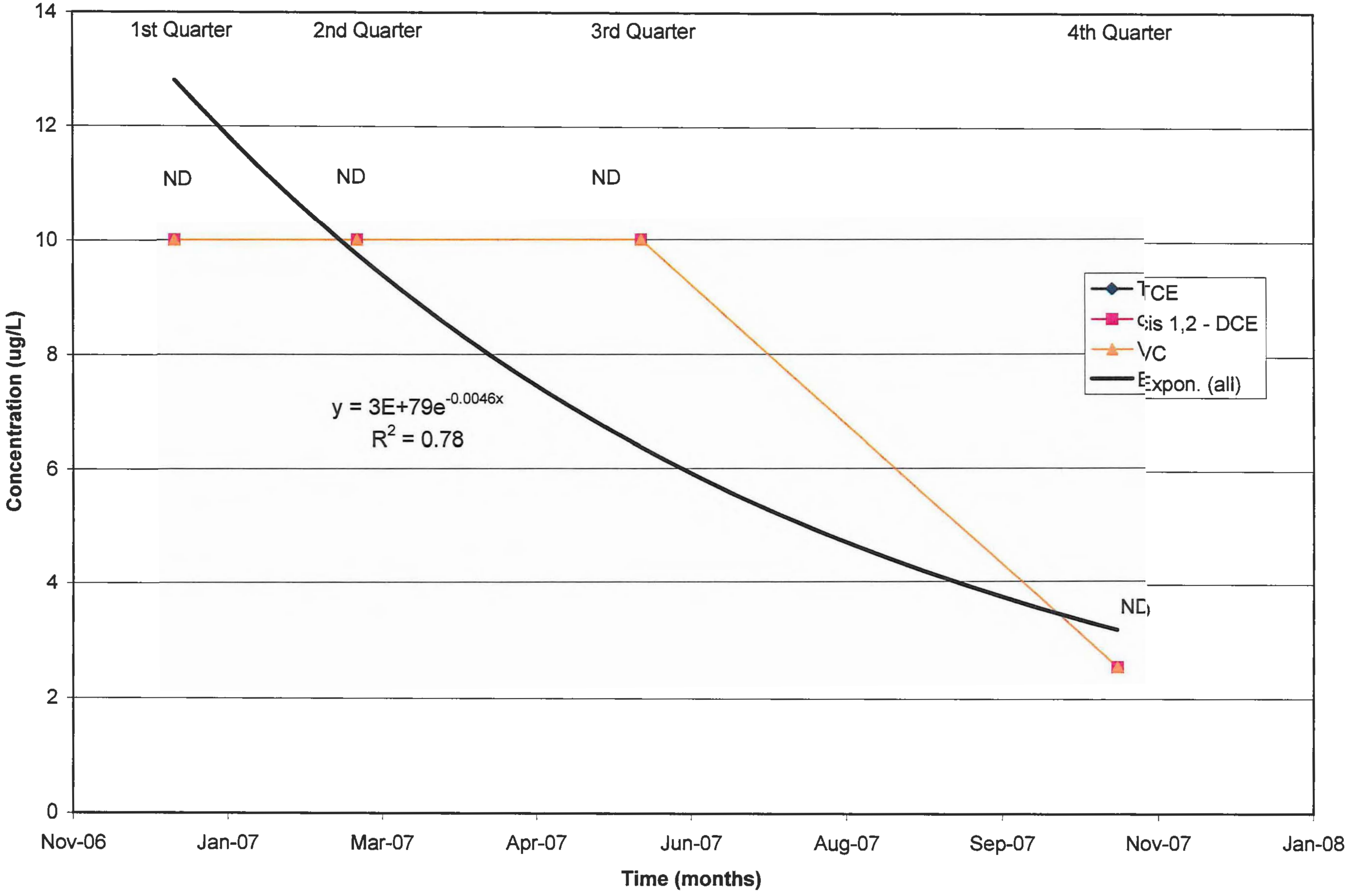

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Figure B-5
Regression Plot of Well Concentrations At MWT-29
Ash Landfill Annual Report
Seneca Army Depot Activity

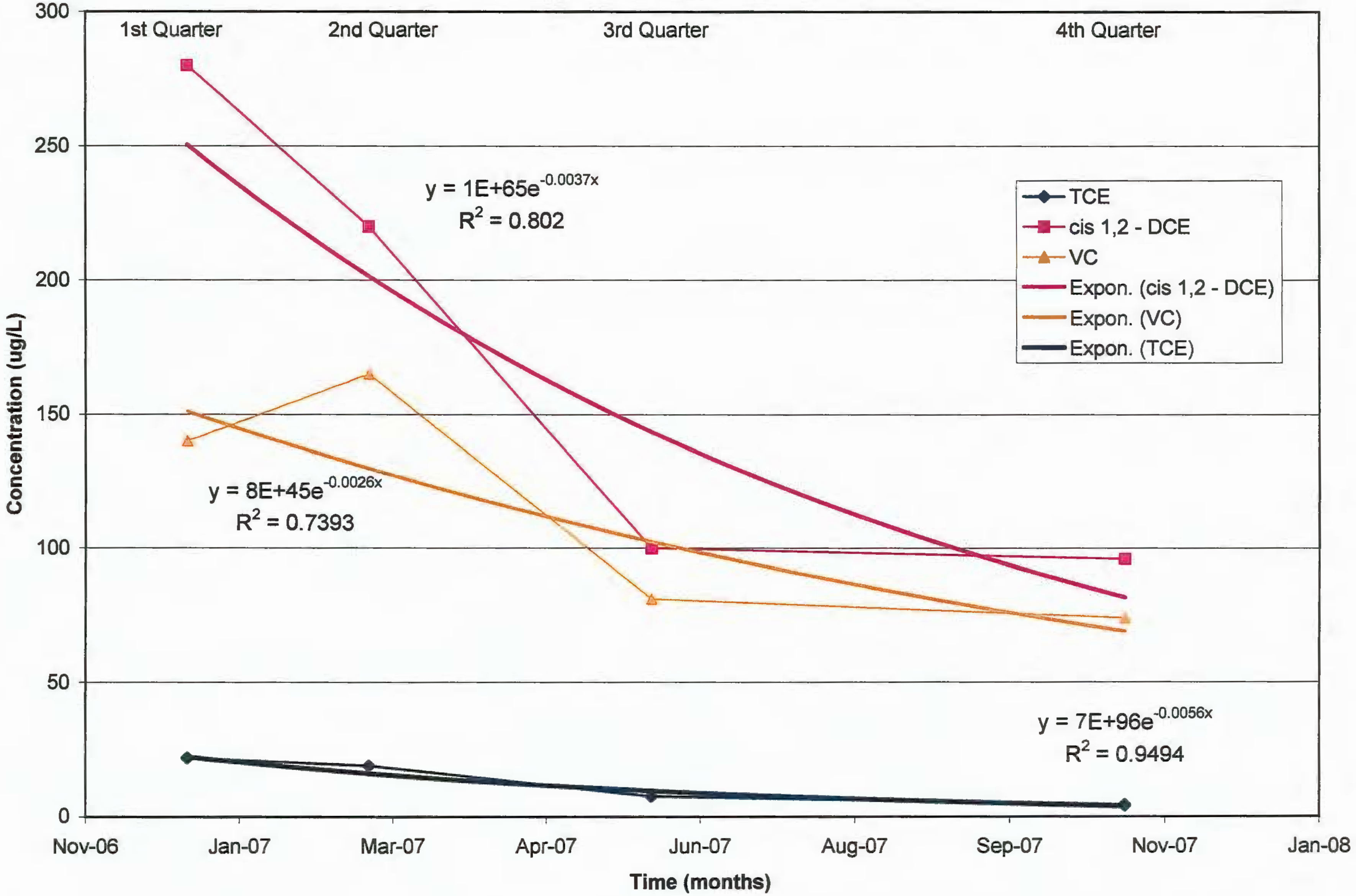

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Figure B-6
Regression Plot of Well Concentrations At MWT-22
Ash Landfill Annual Report
Seneca Army Depot Activity

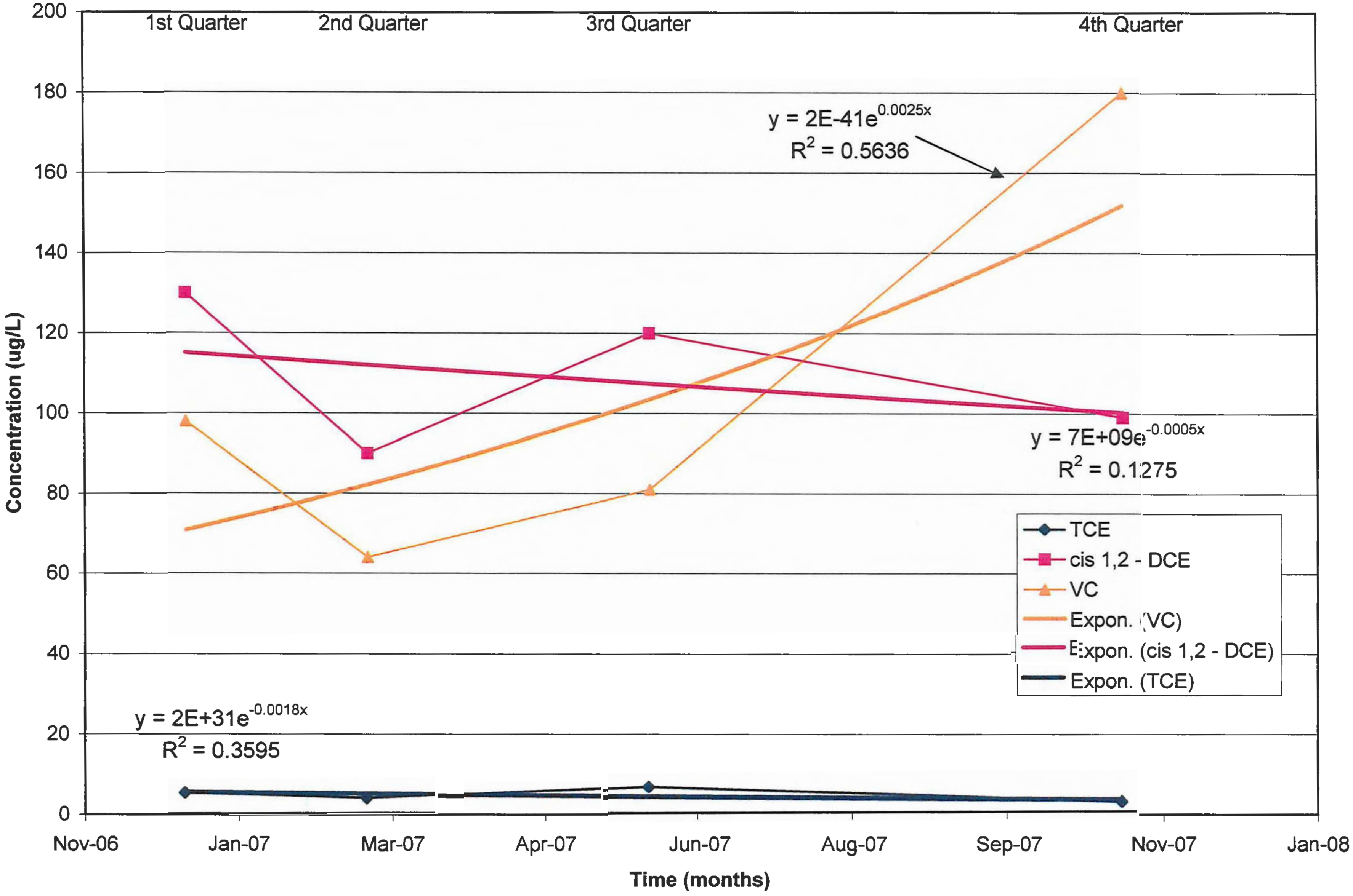

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Figure B-7
Regression Plot of Well Concentrations At PT-22
Ash Landfill Annual Report
Seneca Army Depot Activity

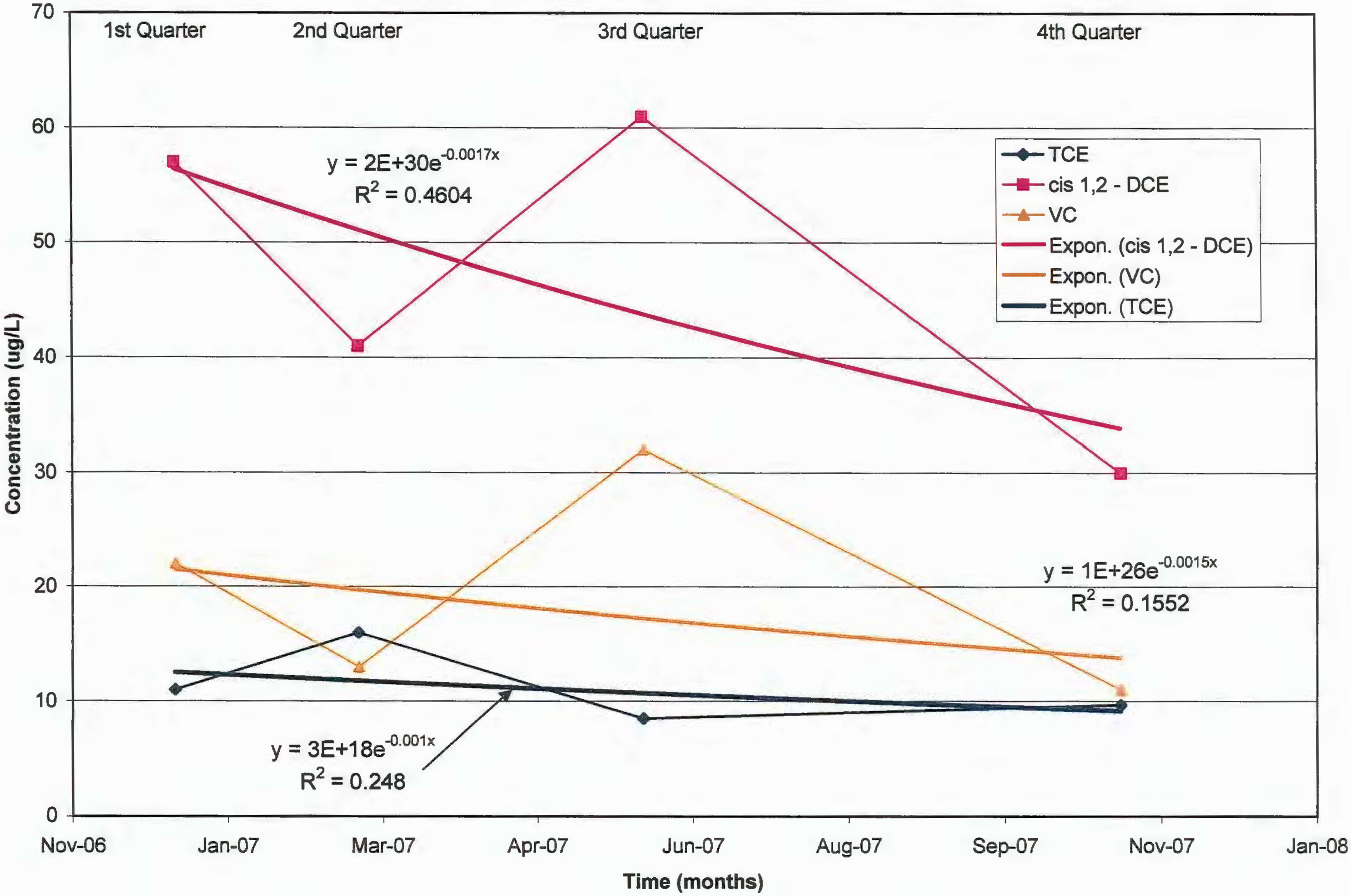

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Figure B-8
Regression Plot of Well Concentrations At MWT-23
Ash Landfill Annual Report
Seneca Army Depot Activity

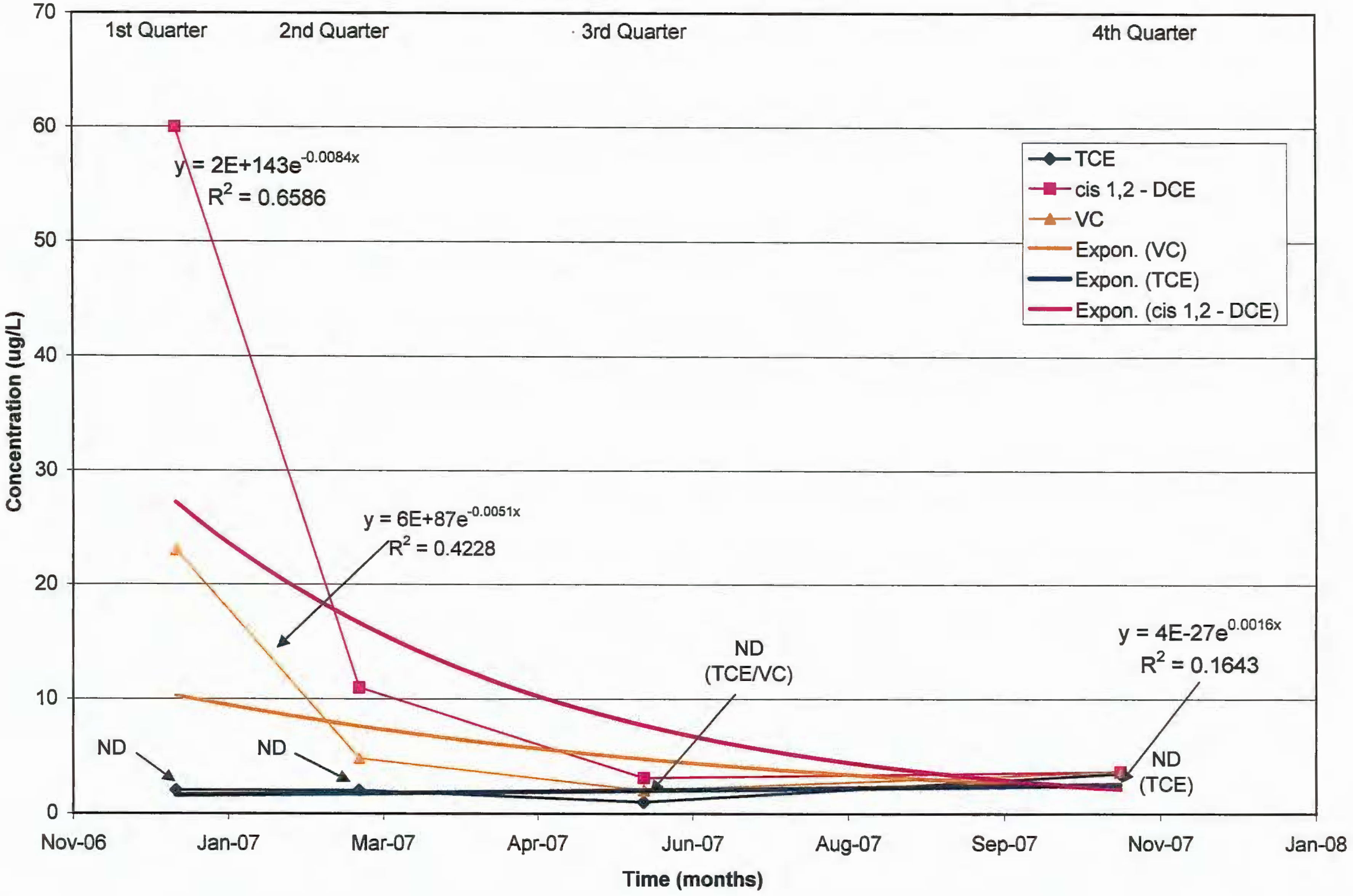

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Figure B-9
Regression Plot of Well Concentrations At MWT-24
Ash Landfill Annual Report
Seneca Army Depot Activity

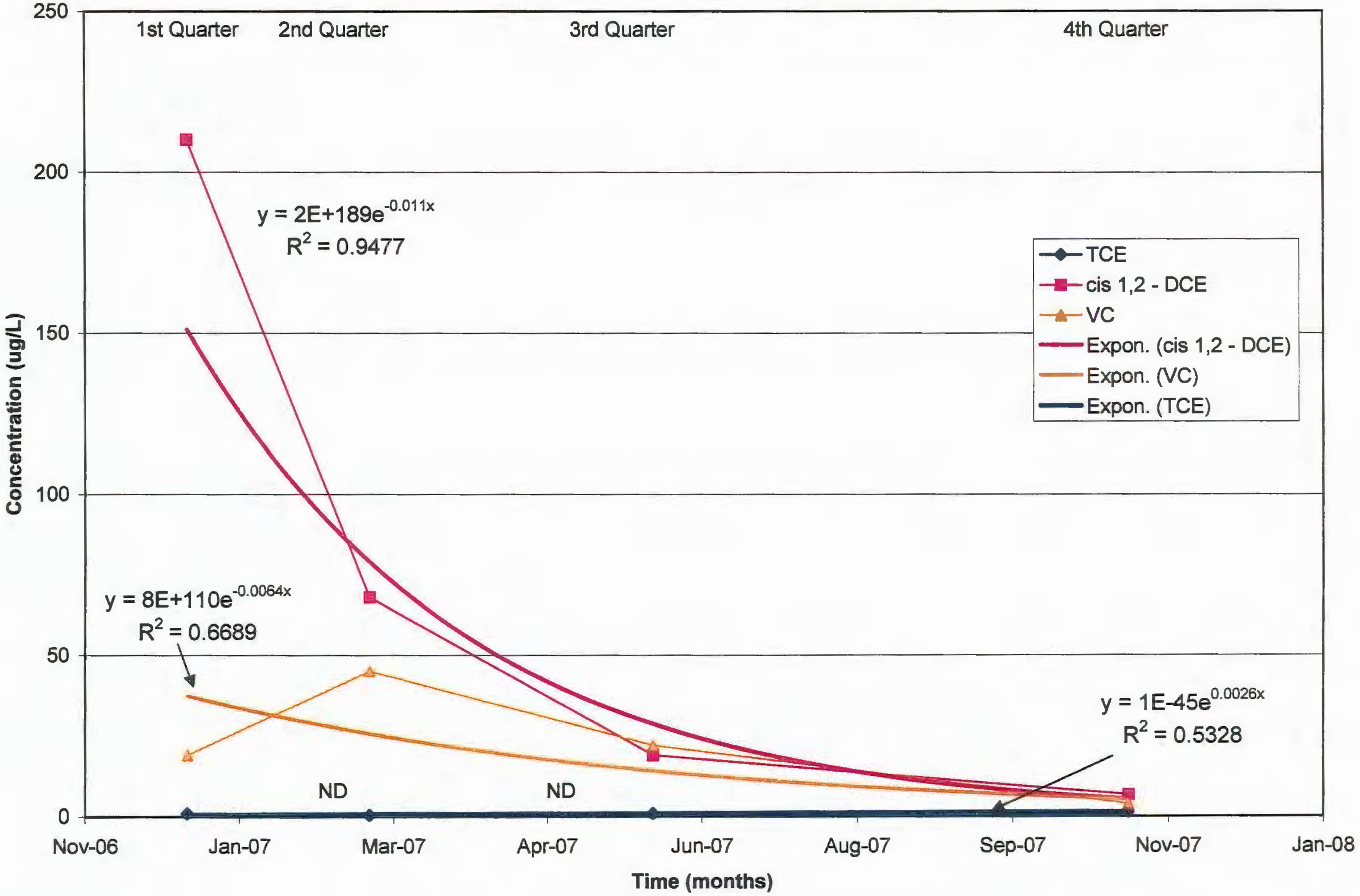

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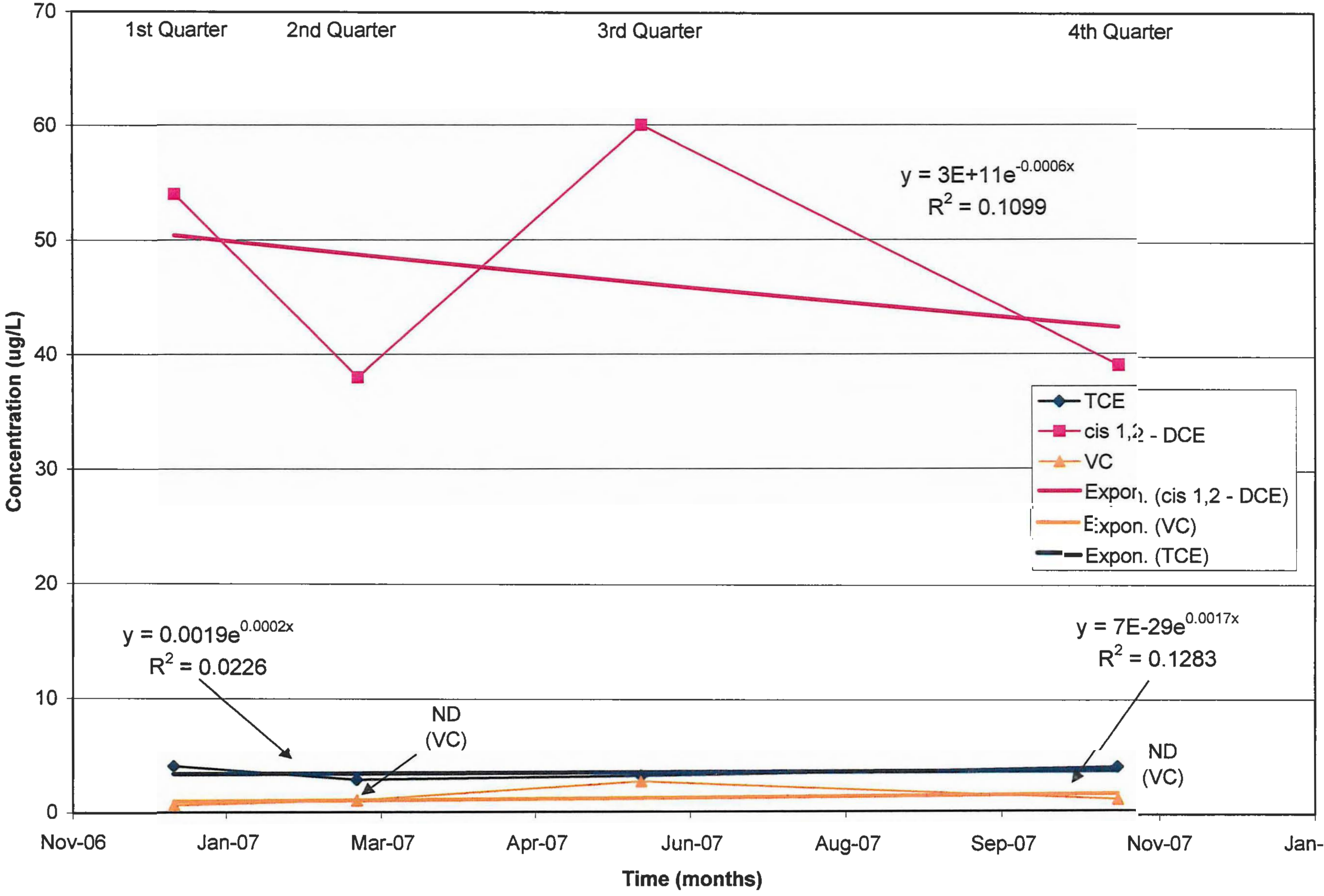
Figure B-10
Regression Plot of Well Concentrations At PT-24
Ash Landfill Annual Report
Seneca Army Depot Activity



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