GLENN SPRINGS HOLDINGS, INC.
MILLER SPRINGS REMEDIATION MANAGEMENT, INC.

QUARTERLY MONITORING REPORT
SECOND QUARTER -- 2002

- **NAPL AND APL PLUME CONTAINMENT SYSTEMS**
- **OVERBURDEN BARRIER COLLECTION SYSTEM**
- **RESIDENTIAL COMMUNITY MONITORING PROGRAM**
- **LEACHATE TREATMENT SYSTEM**
- **NAPL ACCUMULATION AND RECOVERY**

HYDE PARK RRT PROGRAM
NIAGARA FALLS, NEW YORK

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1.0 INTRODUCTION

Reporting of monitoring data for the Non-Aqueous Phase Liquid (NAPL) Plume Containment System, Aqueous Phase Liquid (APL) Plume Containment System, and Overburden Barrier Collection System (OBCS) began in 1993. Monitoring reports for the NAPL and APL Plume Containment Systems as well as the OBCS have been submitted quarterly since 1996. These quarterly monitoring reports have also included data from the Leachate Treatment System, Residential Community Monitoring Program, and NAPL accumulation and recovery.

All monitoring data presented in this report have been collected and presented in accordance with the following documents:

i) "Stipulation on Requisite Remedial Technology Program" (RRT), dated November 13, 1995; and

ii) "Long-Term Monitoring Manual, Hydraulic (Water Levels), Physical (NAPL Presence-Seeps), Chemical (Groundwater Sampling), Hyde Park Landfill Site", dated October 9, 1998.

Miller Springs Remediation Management, Inc. (MSRM), has been assigned the responsibility of managing the Hyde Park RRT Program under the direction of Glenn Springs Holdings, Inc. (GSHI), a subsidiary of Occidental Petroleum Corporation.

1.1 REPORT ORGANIZATION

This report has been prepared to present monitoring data collected during the second quarter (April through June) 2002. The report is organized as follows:

- **Section 1.0 Introduction:** Section 1.0 presents a summary of the project, its administration, and the organization of the report.
- **Section 2.0 NAPL Plume Containment System:** Section 2.0 presents NAPL purge well operating data, performance monitoring data, statistical analyses of analytical data, and descriptions of non-routine investigations and activities performed during this reporting period. Recommendations for further investigation of the Site groundwater flow system are also presented in Section 2.0.
- **Section 3.0 APL Plume Containment System:** Section 3.0 presents APL purge well operating data, performance monitoring data, APL plume flux calculations where required, and descriptions of non-routine investigations and activities performed

during this reporting period. Recommendations for further investigation of the APL Plume Containment System are also presented in Section 3.0.

- **Section 4.0 Overburden Monitoring Data:** Section 4.0 presents performance data from the Overburden Barrier Collection System and Residential Community Monitoring Well Network, and descriptions of non-routine investigations and activities performed during this reporting period. Recommendations for further investigation, if deemed necessary, are also presented in Section 4.0.
- **Section 5.0 Leachate Treatment Facility:** Section 5.0 presents analytical data collected from the Leachate Treatment Facility.
- **Section 6.0 NAPL Accumulation:** Section 6.0 presents a summary of the volume of NAPL collected from the Bedrock and Overburden Containment Systems and volumes of NAPL shipped off-Site for incineration.

2.0 NAPL PLUME CONTAINMENT SYSTEM

The objective of the NAPL Plume Containment System as stated in the RRT is to design, install and monitor a system to contain, to the extent practicable, NAPL and APL within the NAPL Plume found in the Lockport Bedrock and to maximize collection of contained NAPL.

Operation of the NAPL Plume Containment System commenced in 1994 and consisted of extraction from a series of six purge wells. The system has been modified over time to better achieve its objectives. The system presently consists of 17 NAPL Plume Containment Purge Wells (PWs) as shown on Figure 2.1 and 43 performance monitoring wells. The monitoring wells are installed at bedrock "unit" specific depths, or zones, within the Lockport Bedrock formation. The zones are designated as upper, middle, and lower. The locations of the performance monitoring wells in the upper, middle and lower bedrock zones are shown on Figures 2.2 through 2.4, respectively.

2.1 PURGE WELL OPERATIONS

The PW system was generally operated continuously during the second quarter of 2002. A summary of the “shut-down” periods for the PWs is noted in Table 2.1.

Maintenance of the PW system was required during the second quarter of 2002 as noted below.

- PW-5UR, pump and motor replaced on April 5, 2002 due to plugging. Purge well cleaned.
- PW-8U, pump and motor replaced on May 8, 2002 due to plugging.
- PW-6MR, pump and motor removed on May 9, 2002 due to plugging.
- PW-5UR, pump and motor replaced on June 14, 2002 due to plugging.
- PW-5UR, pump and motor replaced on June 23, 2002 due to plugging.

The average operating pumping rates and set point elevations at each of the bedrock purge wells during the second quarter of 2002 are presented in Table 2.1.

Based on the metered flow from individual wells, the average operating pumping rate of the NAPL Plume Containment System during operation over the second quarter was 68.6 gallons per minute (GPM), this flow rate represents an increase of approximately

15 GPM over the pumping rate from previous quarters. This increase in pumping rate is a result of the addition of the five new purge wells installed in 2001.

During the second quarter of 2002, a total of 11,392,988 gallons of groundwater were pumped from the NAPL Plume Containment System purge wells and treated. Based upon the analyses of Site Specific Compounds, treatment of the pumped groundwater resulted in the removal of approximately 413 pounds of chemical mass.

2.2 CONTAINMENT SYSTEM MONITORING

Performance monitoring conducted during this quarter consisted of hydraulic, chemical, and NAPL presence monitoring. The performance monitoring well network is as presented in the "NAPL Plume Assessment and System Design Recommendations" report, dated July 1995, and modified most recently during the fourth quarter of 2000.

During this reporting period, routine hydraulic, chemical and NAPL presence monitoring were conducted as described in Sections 2.2.1, 2.2.2, and 2.2.3 of this report.

The hydraulic monitoring program for the NAPL Plume Containment System was modified during the second quarter 2002 with the submission of the report entitled "Work Plan for the Site Characterization Report – Hydrologic Characterization" dated April 5, 2002 (Hydrologic Characterization Work Plan). With the submission of this work plan, MSRM discontinued the hydraulic monitoring program until a revised monitoring network, representative of the significant discrete flow zones beneath the Site is established.

2.2.1 HYDRAULIC MONITORING

Hydraulic monitoring of well pairs located at the perimeter of the NAPL plumes (referred to as bedrock performance well pairs) was established in the RRT to gather data to verify the effective performance of the NAPL Plume Containment System.

The hydraulic monitoring and data evaluation performed during this quarter are described in the following subsections.

2.2.1.1 WATER LEVEL MEASUREMENTS

Routine hydraulic monitoring was performed on April 3, 2002 during PW operation. Further hydraulic monitoring was discontinued after this date in order to begin work necessary to establish a revised monitoring network. The measured water level depths were recorded on field data sheets and then entered into a Site water level database where they were converted to elevations based on surveyed reference points (tops of casings). The cumulative hydraulic monitoring data for the Site from 1993 through this report are included on the enclosed CD under the filename HIST.pdf.

2.2.1.2 HYDRAULIC GRADIENT EVALUATION

The RRT requires that the performance of the NAPL Plume Containment system be evaluated through the calculation and review of horizontal hydraulic gradients across the limits of the NAPL plumes. The gradient evaluation criteria are specified in the RRT, Section 4.3.7.3 (NAPL Plume Containment Performance Monitoring). Based on the evaluation of the monitoring wells, the groundwater modeling study, and recent characterization activities it was determined that the hydraulic gradient evaluation described in the RRT is not applicable in its present form. The majority of wells in the current monitoring network intercept multiple flow zones; therefore, water level measurements obtained from these wells represent weighted averages of the water levels in the individual intercepted flow zones.

With the discontinuation of the hydraulic monitoring program, the hydraulic gradient evaluations have also been discontinued. A revised hydraulic gradient monitoring program will be developed following the revision of the hydrologic characterization of the Site.

2.2.2 NAPL MONITORING

NAPL monitoring is performed to provide information to assist in the evaluation of containment system effectiveness. NAPL monitoring consists of:

i) the physical inspection of monitoring wells located both inside and outside the NAPL plumes for the presence of NAPL; and

ii) determination of the volume of NAPL removed by the NAPL Plume Containment System.

2.2.2.1 NAPL PRESENCE CHECKS

Prior to any purging or sampling activities, a check for NAPL presence was performed at each well using a weighted tape measure with a length of cotton rope attached. This NAPL presence check methodology was summarized in the memorandum entitled "NAPL Presence Check Method Comparison, Hyde Park RRT Program" dated January 12, 2001. During the second quarter of 2002, NAPL was not observed in any of the outer wells or those inner wells that are located beyond the limits of the bedrock NAPL plume definitions. Table 2.2 summarizes the cumulative findings of the NAPL presence checks performed between 1998 and this reporting period.

2.2.2.2 NAPL ACCUMULATION RATIO

In accordance with the Future Monitoring and Assessment Requirements document (1996), Section 4.1.2.2, a determination of the ratio of NAPL/APL extracted through the operation of the bedrock NAPL plume containment system during the second quarter was made. Approximately 11.4 million gallons of APL were removed from the bedrock purge wells. During the same period, 349 gallons of NAPL were removed from the bedrock purge wells. The current NAPL/APL ratio (0.000031) and the ratios calculated from previous quarters are presented in Table 2.2. There is no apparent trend in the APL/NAPL ratio data.

2.2.3 CHEMICAL MONITORING

Groundwater samples are collected and analyzed each quarter to obtain data for use in the evaluation of the NAPL Plume Containment System. The groundwater monitoring consists of the collection of samples from the outer well of each of the bedrock performance well pairs. The results of the analyses of these samples were used for the quarterly comparisons presented in Section 2.2.3.2 of this report. The analytical data are also used in the statistical analyses presented in Section 2.2.3.3 of this report. The chemical monitoring was conducted between April 27 and May 28, 2002. A well purging and sampling summary for the April/May 2002 sampling event is presented in Table 2.4.

2.2.3.1 FIELD PROCEDURES

All monitoring well purging and sample collection activities were conducted in accordance with the procedures presented in the report entitled "Long-Term Monitoring Manual, Hydraulic (Water Levels), Physical (NAPL Presence-Seeps), Chemical (Groundwater Sampling), Hyde Park Landfill Site", dated October 9, 1998. The volumes of standing water removed from each well are summarized in Table 2.4. All purged groundwater was transported to the Hyde Park treatment facility for treatment and disposal. Table 2.4 also presents a sample key and water quality observations and measurements for the samples collected.

2.2.3.2 ANALYTICAL RESULTS

The analytical results for the second quarter 2002 chemical monitoring event are summarized in Table 2.5. The cumulative analytical data for all quarterly chemical monitoring events dating back through 1996 are included on the enclosed CD under the filename HIST.pdf. The analytical data were reviewed for conformance to standard Quality Assurance / Quality Control (QA / QC) protocols and copies of the resultant data validations are kept on file at the Western New York MSRM Administration office.

2.2.3.3 STATISTICAL ANALYSIS OF ANALYTICAL RESULTS

In accordance with Section 4.3.8.1-Lateral NAPL Plume Migration of the RRT Stipulation, a statistical evaluation of the NAPL Plume Containment Effectiveness Parameters (phenol, benzoic acid, chlorendic acid, total chlorobenzoic acid, and total organic halides [TOX]), was performed using the second quarter 2002 analytical data from the outer well of each gradient pair.

The second quarter 2002 groundwater monitoring data were assessed for trends (on an individual well basis) using either the Mann-Kendall trend test (if <50 percent non-detects) or logistic regression (for 50-99 percent non-detects). For the purposes of the second quarter 2002 data analysis, the analytical data from the 10 most recent sampling events (i.e., from February 2000 to present) were used. Analytes that were not detected at a given well (i.e., 100 percent non-detects) between February 2000 and the present were not evaluated. The results of the trend analyses are presented in Table 2.6. A memorandum presenting the second quarter 2002 statistical analyses, including descriptions of the statistical methods and concentration vs. time plots for each of the wells evaluated is contained in Appendix A of this report.

One statistically significant (P>0.05) increasing trend was identified through the statistical trend analyses, total chlorobenzoic acid at J2M. During the fourth quarter of 2001 and first quarter of 2002 this same trend was identified. Six statistically significant decreasing trends were identified; the decreasing trends were for TOX at B1U, B1L, C1U, C1M, C1L, and D2M.

Table 2.7 presents a comparison of the statistical trend analyses performed using data from each quarter of 2001 and the first and second quarters of 2002. Only wells/analytes with a significant trend identified during at least one evaluation are presented. In 24 cases, the trends changed from statistically significantly decreasing to not significant or vice versa between the six quarters. Of note, one trend that was identified as statistically significantly increasing during the second quarter of 2002; total chlorobenzoic acid at J2M, was identified as having a statistically significant decreasing trend during the first quarter of 2001 evaluation. There were no statistically significant trends observed for the second and third quarters of 2001. Since the fourth quarter 2001 evaluation, statistically significant increasing trends have been consistently observed at this well, including the one observed during the second quarter 2002 evaluation. The detection of chemistry along the J-vector roughly corresponds in time to the drilling activities near Niagara University and the New York Power Authority in the J-vector area. The borings installed during this drilling may have provided temporary vertical pathways for chemical migration from the upper bedrock zone to the middle and lower bedrock zones.

The variability in the data as shown in Table 2.7 and the appearance of a few statistically increasing parameters is likely an effect of shutdown tests as well as the movement of contaminants due to the operation of the additional purge wells. Further evaluations will be provided in future Quarterly Reports.

2.3 NON-ROUTINE INVESTIGATIONS AND FIELD ACTIVITIES

During the second quarter of 2002, field activities were initiated in order to define the groundwater flow patterns within the revised geologic framework developed for the Site. The field activities that will be performed to make this definition are presented in the Hydrologic Characterization Work Plan.

During the second quarter the following activities outlined in the Work Plan were performed:

i) Lower Well Slug Testing

The lower well slug testing program was performed in order to assess and quantify the hydraulic characteristics of the lowermost flow zones at the Site (FZ-10 and FZ-11). The data are being analyzed for trends, and to assess the groundwater flow rate through these flow zones. The results of the lower well slug testing will be incorporated into a new groundwater flow model for the Site. A report of the testing will be included as an appendix to the forthcoming Site Hydrologic Characterization report. A total of 43 slug tests were performed in 38 accessible lower zone monitoring wells.

ii) Packer Testing

Packer tests were performed in existing well clusters to provide hydraulic confirmation of the presence of the discrete flow zones at the Site. A total of 21 existing monitoring wells in 10 clusters were packer-tested. The locations were chosen to provide a large spatial coverage across the Site. The data from the packer tests will be incorporated into a new groundwater flow model for the Site. A report of the packer testing will be included as an appendix to the forthcoming Site Hydrologic Characterization report.

iii) Monitoring Well Retro-Fits

Work was initiated following the packer testing program to install flow zone specific monitoring wells. This work involved the installation of 1-inch diameter piezometers screened across specific flow zones within existing monitoring wells. The Work Plan specifies the retrofitting of 14 existing well clusters and the installation of 6 new wells. During the second quarter of 2002, 12 of the 14 existing well clusters were retrofit.

No other investigations were performed with respect to the NAPL plume containment system during the second quarter of 2002.

2.4 SUMMARY

The water levels in the operating bedrock purge wells were generally at or very close to their set point elevations during April, May, and June 2002. The average pumping rate for the system during operation over the second quarter was 68.6 GPM.

11,392,988 gallons of groundwater were pumped from the bedrock by the NAPL Plume Containment System purge wells and treated resulting in the removal of 413 pounds of chemical mass based upon the analyses of Site Specific Compounds.

The hydraulic monitoring program for the NAPL Plume Containment System was modified during the second quarter 2002 with the submission of the Hydrologic Characterization Work Plan. With the submission of this Work Plan, MSRM discontinued the hydraulic monitoring program until a revised monitoring network, representative of the significant discrete flow zones beneath the Site is established.

NAPL monitoring indicates that NAPL is not present in any monitoring well located outside of the NAPL plume boundary in any of the three bedrock zones.

Chemical monitoring and statistical analyses indicate that chemical concentrations, where detected, are generally stable. There is limited variability in some parameters likely due to the impact of starting the recently installed purge wells.

2.5 ACTION ITEMS

Work described in the Hydrologic Characterization Work Plan will continue into future quarters.

3.0 APL PLUME CONTAINMENT SYSTEM

The objective of the APL Plume Containment System is to contain by pumping, to the extent practicable, APL in the Lockport Bedrock within the area of the remediated APL plume.

The APL Plume Containment System currently consists of two purge wells (APW-1 and APW-2) and four monitoring well pairs (ABP-1/ABP-2, ABP-3/ABP-4, ABP-5/ABP-6, and ABP-7/ABP-8). The locations of these wells and the remediated APL plume are shown on Figure 3.1. The performance criteria for the APL Plume Containment System (remediated APL plume) is to achieve flow convergence towards the purge wells and eliminate seepage at the gorge face to the extent practicable.

Three clusters of APL Flux Monitoring Wells (AFW-1U/M/L, AFW-2U/M/L, and AFW-3U/M/L) oriented toward the west of the Site and located south of the remediated APL plume (as shown on Figure 3.2) monitor the remainder of the APL plume. The performance criteria for the APL Flux Monitoring Wells (AFWs) is to monitor the APL plume flux to the Niagara River through chemical monitoring and to determine whether the flux measured in these wells exceeds the Flux Action Levels specified in the RRT Stipulation.

3.1 APL PURGE WELL OPERATIONS

During the second quarter of 2002, automated pump operations were uninterrupted and groundwater levels within each purge well were generally maintained within their respective design settings. No maintenance activities were performed on APWs during this quarter.

During the second quarter of 2002, 1,403,780 gallons of groundwater were pumped from the bedrock by the APL Plume Containment System purge wells and treated. Based upon the analyses of Site Specific Compounds, treatment of the pumped groundwater resulted in the removal of approximately 1 pound of chemical mass.

3.2 PERFORMANCE MONITORING

3.2.1 WATER LEVEL MEASUREMENTS

Routine hydraulic monitoring was performed on April 3, 2002 during purge well operation. Further hydraulic monitoring was discontinued after this date in order to begin the investigative work necessary to establish a revised monitoring network. The measured water level depths were recorded on field data sheets and then entered into a Site water level database where they were converted to elevations based on surveyed reference points (tops of casings). The cumulative hydraulic monitoring data for the Site from 1993 through this report are included on the enclosed CD under the filename HIST.pdf.

The hydraulic monitoring program for the APL Plume Containment System was modified during the second quarter 2002 with the submission of the Hydrologic Characterization Work Plan. With the submission of this work plan, MSRM discontinued the hydraulic monitoring program until a revised monitoring network representative of the significant discrete flow zones beneath the Site is established.

Groundwater levels were also measured at the nine AFW monitoring wells prior to sample collection for APL flux monitoring. These levels are required as part of the hydraulic monitoring program, as well as to calculate the standing volume of groundwater in each well to determine the purge volume prior to sample collection. The cumulative monitoring data for the AFW monitoring wells from 1993 to present is included on the enclosed CD under the filename HIST.pdf.

3.2.2 GRADIENT EVALUATION

Based on the evaluation of the monitoring wells, the groundwater modeling study, and recent characterization activities it was determined that the hydraulic gradient evaluation described in the RRT is not applicable in its present form. The majority of wells in the current monitoring network intercept multiple flow zones; therefore, water level measurements obtained from these wells represent weighted averages of the water levels in the individual intercepted flow zones.

With the discontinuation of the hydraulic monitoring program, the hydraulic gradient evaluations have also been discontinued. A revised hydraulic gradient monitoring program will be developed following the revised hydrologic characterization of the Site.

3.2.3 SEEP FLOWS

The four gorge face seeps (GF-S1, GF-S2, GF-S3, and GF-S4 shown on Figure 3.3) were inspected in April in conjunction with hydraulic monitoring events and the flow rate of each seep was visually estimated. A cumulative history of the flow rate estimations is included on the enclosed CD under the filename HIST.pdf. During the second quarter monitoring event the estimated gorge face seep flow rates were:

- 1.5 GPM at GF-S1, 4.0 GPM at GF-S2, 2.0 GPM at GF-S3, and 3.0 GPM at GF-S4;

Seep GF-S4 originates below the Rochester formation and is below any known Hyde Park influences.

The flow rates at each of the four seeps prior to pumping of the APWs were typically 3 to 5 GPM at GF-S1, 5 to 10 at GF-S2, 8 GPM at GF-S3 and 15 GPM at GF-S4. Each of the estimated seep flow rates during the April 2002 inspection indicated a reduction in flow when compared to the flow rates prior to pumping from the APWs.

3.2.4 CHEMICAL MONITORING

Analytical groundwater samples are collected each quarter from the APW and AFW wells in order to assist in the evaluation of the APL Plume Containment System and calculate the APL Plume flux when required. The APW wells are also sampled semi-annually in February and August for analysis of the Collected Liquids Monitoring Parameters as described in Section 9.9 of the RRT. The quarterly chemical monitoring was conducted on May 2, 2002.

3.2.4.1 FIELD PROCEDURES

All monitoring well purging and sample collection activities were conducted in accordance with the procedures presented in the report entitled "Long-Term Monitoring Manual, Hydraulic (Water Levels), Physical (NAPL Presence-Seeps), Chemical (Groundwater Sampling), Hyde Park Landfill Site", dated October 9, 1998. Well volumes removed from each well prior to sampling are summarized in Table 3.1. All purged groundwater was transported to the Hyde Park treatment facility for treatment.

3.2.4.2 AFW/APW FLUX COMPOSITE SAMPLING AND ANALYSES

In order to determine the APL flux to the Niagara River, a volume composite sample consisting of water from five AFW monitoring wells and the two APW purge wells is prepared. The required volume of the aliquot from each well for the composite sample is calculated prior to initiation of groundwater sample collection. The volumes required from each well are presented in Table 3.2. These volumes were calculated based on the percentage of cross-sectional contributing area of groundwater flow past each well as compared to the total groundwater flow toward the Niagara River Gorge Face represented by all seven wells.

Groundwater sampling was performed on May 2, 2002 using the protocols previously described for the bedrock performance monitoring wells (Section 2.4.2), with the exception of the two APWs where samples are collected directly from the discharge of the operating pumps. The sample key, pH, conductivity, temperature, and water quality observations are summarized in Table 3.1.

The composite sample was prepared by collecting an individual water sample from each of the wells included in the AFW/APW flux program. The relative percent of the composite sample collected from each well is listed in Table 3.1. The individual samples were all poured into a large glass container for mixing. Following mixing, the composite was poured into individual containers for shipment to the analytical laboratories. Samples collected for analysis of volatile organic compounds (VOCs) were submitted in individual containers for compositing at the analytical laboratory to ensure that any VOCs present were not lost due to field compositing. The laboratory was provided with the predetermined percentages listed in Table 3.2 for compositing. Analyses of the APL Plume Flux Parameters and APL Plume Monitoring Parameters defined in the RRT Stipulation (Sections 9.3 and 9.4) were performed by Ecology and Environment (E&E). The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) analyses were performed by Alta Labs and polychlorinated biphenyls (PCB) analyses were performed by Triangle Labs. The results of the analyses of the AFW/APW composite sample are presented in Table 3.3.

3.2.4.3 APW CLMP/ACIDS SAMPLING AND ANALYSES

In accordance with the RRT Stipulation (Section 11.1.3 Collected APL Monitoring and Section 9.9 Collected Liquids Monitoring Parameters), the APWs are sampled semi-annually during the first and third quarters for analysis of the Collected Liquids

Monitoring Parameters (CLMP) as well as benzoic, monochlorobenzoic (sum o, p, and m isomers) and chlorendic acids. This sampling was last conducted on February 14, 2002 in conjunction with the AFW/APW composite sampling. The next sampling event for the CLMP parameters will be performed in August 2002.

3.2.4.4 APL PLUME FLUX CALCULATIONS

The performance criteria for the APL Plume Containment System beyond the boundary of the remediated APL Plume is maintaining the mass flux of each compound to the Niagara River Gorge Face below the Mass Flux Action Levels. When a parameter is reported at a concentration which exceeds its respective APL Plume Flux Parameter detection limit in the composite sample collected from the two APWs and five AFWs, the chemical flux of that parameter to the Niagara River from the Lockport bedrock must be calculated. The calculated flux in grams per year (g/year) or pounds per day (lbs/day) is then compared to its Flux Action Level as required under the RRT Stipulation.

The composite sample analyses indicated that the concentrations of the APL Plume Flux Parameters during the second quarter of 2002 were all below their respective Flux Action Levels, therefore, calculation of the flux for these parameters to the Niagara River is not required.

3.3 NON-ROUTINE INVESTIGATIONS AND ACTIVITIES

During the second quarter of 2002, a number of investigative activities were performed as described in the Hydrologic Characterization Work Plan. These activities are discussed in further detail in Section 2.3 of this report.

3.4 SUMMARY

1,403,780 gallons of groundwater were pumped from the bedrock by the APL Plume Containment System purge wells and treated resulting in the removal of approximately 1 pound of chemical mass based upon the analyses of Site Specific Compounds.

The reductions in flow at seeps GF-S3 and GF-S4 indicate that the APWs are working properly in reducing APL migration to the Niagara River.

The AFW/APW flux composite sample prepared during future APL Plume Containment System monitoring events will be comprised of aliquots from the same five AFWs and two APWs used during this monitoring period.

3.5 ACTION ITEMS

One investigation/activity that was scheduled to be performed during 2001 was delayed due to outside issues. This investigation/activity is the installation of one APL Plume Containment System Purge Well (APW-3). The installation of APW-3 is dependant on access agreements with the applicable property owners. APW-3 will be installed once access has been granted for the well and forcemain installations.

4.0 OVERBURDEN MONITORING DATA

The required overburden monitoring reporting includes monitoring data for the following programs:

i) Overburden Barrier Collection System (Section 4.1); and

ii) Residential Community Monitoring Program (Section 4.2).

4.1 OVERBURDEN BARRIER COLLECTION SYSTEM

The objective of the Overburden Barrier Collection System (OBCS) is to contain the lateral migration of NAPL in the overburden and, to the extent practicable, contain APL migration in the overburden.

The OBCS consists of an overburden collection trench that extends around the north, west, and south of the Site and is located within the limits of the overburden APL plume. Eight pairs of OBCS monitoring wells (OMWs) are located beyond the OBCS alignment, with one well from each pair installed within the overburden APL plume limits and the second well from each pair installed outside of the overburden APL plume limits. The locations of the OMWs are shown on Figure 4.1.

During the second quarter of 2002, 4,552,754 gallons of groundwater were collected from the overburden by the OBCS System and treated. Based upon the analyses of Site Specific Compounds, treatment of this water resulted in the removal of approximately 47 pounds of chemical mass.

4.1.1 PERFORMANCE MONITORING

Hydraulic and NAPL monitoring are performed at the OMWs in order to assess the performance of the OBCS system. Hydraulic data are used to determine whether or not an inward horizontal gradient across the APL plume boundary is being created by the OBCS or if a downward vertical gradient exists between the overburden and upper bedrock. NAPL monitoring is performed as an additional assessment in order to determine whether or not horizontal migration of overburden NAPL is occurring.

4.1.1.1 GRADIENT EVALUATION

Hydraulic monitoring of the OBCS is performed by collecting water level measurements from the 16 OMWs installed around the Hyde Park Landfill. Hydraulic monitoring of the 16 OMWs was performed weekly in April, May, and June 2002. Additionally, in order to demonstrate the presence of a downward vertical hydraulic gradient, some Upper Bedrock Zone monitoring wells were monitored monthly at locations where inward horizontal hydraulic gradients were historically not achieved. Table 4.1 summarizes the second quarter hydraulic head differential gradients (referred to herein as hydraulic gradients). The cumulative hydraulic monitoring data for the OBCS from 1992 to present are included on the enclosed CD under the filename HIST.pdf.

The data presented in Table 4.1 demonstrate that an inward horizontal hydraulic gradient within the overburden regime was achieved this quarter at four of the eight monitoring well pairs during each of the monitoring events. The well pairs in which inward horizontal hydraulic gradients were observed are:

i) OMW-1 / OMW-2;
ii) OMW-3 / OMW-4R;
iii) OMW-5R / OMW-6; and
iv) OMW-15 / OMW-16R

Two monitoring well pairs, OMW-10R / OMW-9 and OMW-11R / OMW-12R each maintained inward hydraulic gradients for the majority of the second quarter. OMW-10R / OMW-9 maintained an inward gradient for 11 of the 12 weeks in the quarter and OMW-11R / OMW-12R maintained an inward gradient for 9 of the 12 weeks in the quarter.

The data in Table 4.1 also indicate the presence of a downward vertical hydraulic gradient from the inner overburden well to the nearest upper bedrock zone monitoring well at each of the OBCS monitoring well pairs that did not meet the inward hydraulic gradient criteria as follows:

i) B1U / OMW-8R2;
ii) B1U / OMW-10R;
iii) D1U / OMW-11R; and
iv) E4U / OMW-14R.

4.1.1.2 OVERBURDEN NAPL PRESENCE CHECKS

In accordance with Section 3.6.2.3 of the RRT Stipulation, a NAPL presence check was conducted at all overburden wells within the overburden APL plume but outside the defined (1996) overburden NAPL plume limit. Table 4.2 summarizes the results of the NAPL presence checks conducted since 1998. NAPL was not observed in any of the overburden monitoring wells during the second quarter of 2002 or during any monitoring event.

4.2 RESIDENTIAL COMMUNITY MONITORING PROGRAM

The objective of the Residential Community Monitoring Program is to supplement other monitoring and remedial programs by monitoring to provide “early warning” of APL plume migration toward residential areas, taking all feasible actions to prevent or remediate such migration to residential areas and taking any additional action required to protect those living in the Hyde Park – Bloody Run area.

In order to meet this objective, eleven pairs of Community Monitoring Wells (CMWs), each consisting of one overburden and one shallow bedrock well, are located in the residential areas around the Hyde Park Landfill Site. These wells provide an early warning for possible APL plume migration towards the residential areas. The overburden (OB) wells are screened to within 1-foot of the bottom of the clay layer overlying the bedrock, while the shallow bedrock (SH) wells extend approximately 15 feet below the top of bedrock.

4.2.1 PERFORMANCE MONITORING

The performance monitoring activities required for the Residential Community Monitoring Program are as follows:

i) quarterly monitoring of overburden and bedrock groundwater elevations;

ii) analyses of soil air samples where no overburden groundwater is present; and

iii) annual groundwater sampling and analysis of CMW-2OB.

4.2.1.1 HYDRAULIC MONITORING AND GRADIENT EVALUATION

For the second quarter of 2002 hydraulic monitoring of the CMWs was performed in April, 2002. Table 4.3 summarizes the vertical hydraulic head differential gradients (referred to herein as hydraulic gradients) for the second quarter. The cumulative hydraulic monitoring data for the CMWs from 1987 to present are included on the enclosed CD under the filename HIST.pdf.

The calculation of vertical hydraulic gradients shows that the required downward hydraulic gradients were present this past quarter at all of the well pairs where water was present in the overburden. Three overburden wells; CMW-4OB, CMW-7OB, and CMW-8OB were dry for the April monitoring event. At each of the overburden wells that were dry, the elevation of the bottom of the well was higher than the groundwater elevation in the shallow bedrock well of the pair during each monitoring event.

4.2.1.2 SOIL VAPOR SAMPLING

At two CMW well pair locations (CMW-7 and CMW-8), the overburden wells have historically contained little to no groundwater, indicating unsaturated conditions in the overburden soils in these areas. As a result, soil vapor samples are collected each quarter from the wells at these locations. Table 4.4 presents the analytical data for the soil vapor samples collected from CMW-7OB and CMW-8OB on June 30, 2002. All parameters were non-detect at each of these locations during the second quarter and have historically been non-detect.

4.2.1.3 ANNUAL GROUNDWATER SAMPLING

Sampling of community monitoring well CMW-2OB is performed annually each year as an early warning of APL migration in the overburden. This sampling event is performed in conjunction with quarterly sampling activities during the third quarter (August through October) of each year. The next sampling event at CMW-2OB will occur during the third quarter of 2002.

4.3 NON-ROUTINE INVESTIGATIONS AND ACTIVITIES

During the second quarter of 2002, there were no non-routine investigations or field activities conducted with regards to the overburden systems.

4.4 SUMMARY

4.4.1 OVERBURDEN BARRIER COLLECTION SYSTEM

Four million, five hundred fifty-two thousand, seven hundred fifty-four (4,552,754) gallons of groundwater were collected from the overburden by the OBCS System and treated which resulted in the removal of approximately 47 pounds of chemical mass based upon the analyses of Site Specific Compounds.

A review of the hydraulic monitoring data for the second quarter of 2002 indicates that inward horizontal hydraulic gradients were present at four of the eight monitoring well pairs. Downward vertical gradients were present at monitoring well pairs where an inward horizontal gradient was not maintained.

NAPL was not observed in any of the overburden monitoring wells, indicating that the OBCS continues to serve as an effective barrier to off-Site NAPL migration.

4.4.2 RESIDENTIAL COMMUNITY MONITORING PROGRAM

Downward vertical gradients were achieved at all of the monitored well pairs during the second quarter of 2002. Three monitoring wells, CMW-4OB, CMW-7OB, and CMW-8OB were dry during the second quarter. No analytes were detected in the soil vapor samples collected from these wells.

4.5 ACTION ITEMS

From the monitoring data obtained during the second quarter of 2002, it has been determined that the overburden systems are operating properly and no further investigation or maintenance issues are evident at this time.

5.0 LEACHATE TREATMENT SYSTEM

In accordance with Section 11.1.4 of the RRT and Addendum I of the Settlement Agreement, the midpoint and effluent of the APL treatment system are monitored. Sampling is required at daily, weekly, and monthly intervals for various parameter groups in order to determine whether the APL Plume Flux is below the Flux Action Levels and whether and when the carbon beds need to be replaced or other maintenance activities need to be undertaken.

5.1 EFFLUENT ANALYSIS

The APL treatment system effluent was sampled daily, weekly, and monthly during the second quarter of 2002. The sample data is grouped by frequency of sample collection for discussion in the following subsections.

5.1.1 DAILY SAMPLING

Table 5.1 summarizes the results of the daily composite sampling. No exceedances of the treatment levels were reported this quarter for any of the three daily parameters; pH, total organic carbon (TOC), and phenol.

5.1.2 WEEKLY SAMPLING

Table 5.2 summarizes the results of the weekly composite sampling. No exceedances of the treatment levels were reported this quarter for any of the five weekly parameters or their isomers from the collected effluent samples.

5.1.3 MONTHLY SAMPLING

Table 5.3 summarizes the results of the monthly composite sampling. No exceedances of the treatment levels were reported this quarter for any of the eight parameters or their isomers.

6.0 NAPL ACCUMULATION

The well extraction systems and manual NAPL removal collected approximately 440 gallons of NAPL during the second quarter of 2002. Monthly NAPL recovery identified by source is summarized in Table 6.1.

6.1 DECANTERS

Manual NAPL level measurements are conducted monthly in the three decanters. The levels are extrapolated to estimate the quantity of NAPL present in each of the decanters. A description of each decanter's source is provided below:

- Decanter No. 1 Bedrock Purge Well System.
- Decanter No. 2 Overburden Barrier Collection System.
- Decanter No. 3 Source Control System.

NAPL accumulated in the decanters during the second quarter of 2002 was 386 gallons.

NAPL measurements in the decanters are subject to a measurement error of ±6 inches which equates to ±188 gallons of NAPL.

6.2 MANUAL RECOVERY

In an effort to enhance NAPL recovery at the Site, MSRM has voluntarily initiated manual NAPL removal from monitoring wells where sufficient NAPL volumes exist. During the second quarter of 2002, MSRM recovered 54 gallons of NAPL from monitoring wells CD1U, PMW-3U and PMW-3M.

6.3 INCINERATION

During the second quarter of 2002, there were no shipments of NAPL from the Hyde Park Site for incineration.

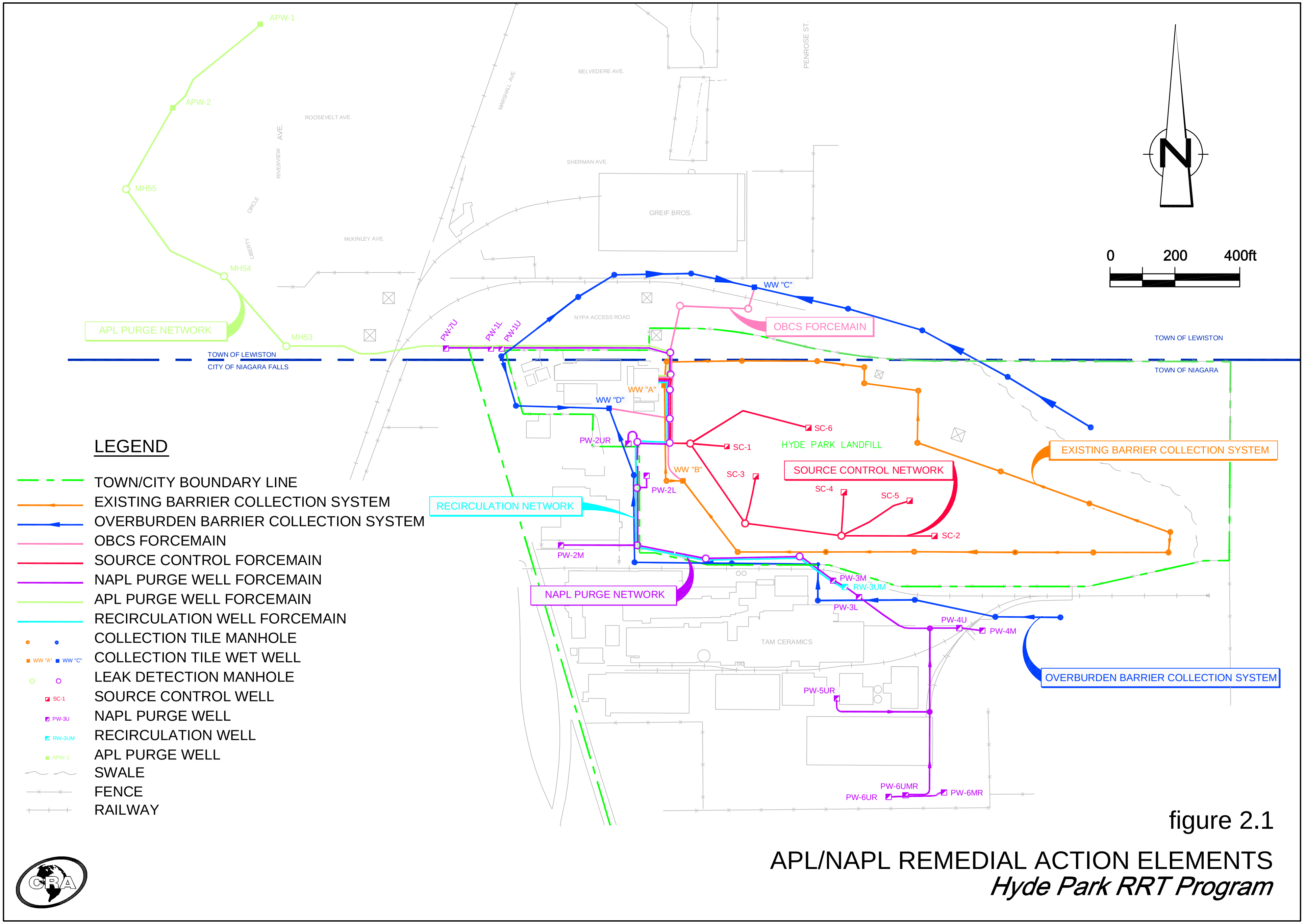

figure 2.1

APL/NAPL REMEDIAL ACTION ELEMENTS

Hyde Park RRT Program

01069-20(318)GN-NF001 SEP 25/2002

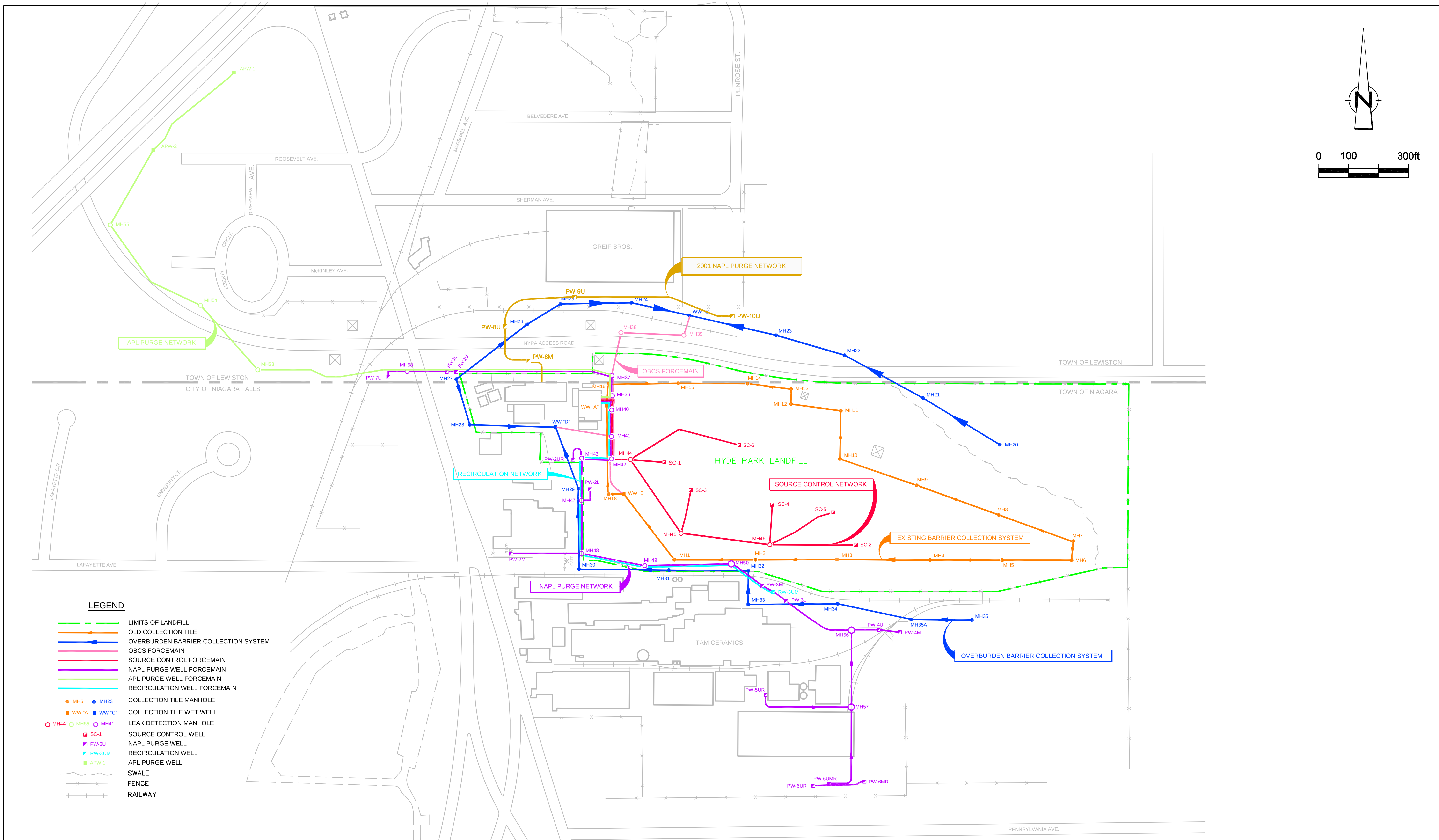

figure 2.1

APL/NAPL REMEDIAL ACTION ELEMENTS
HYDE PARK RRT SITE

Miller Springs Remediation Management

01069-20(318)GN-NF010 SEP 25/2002

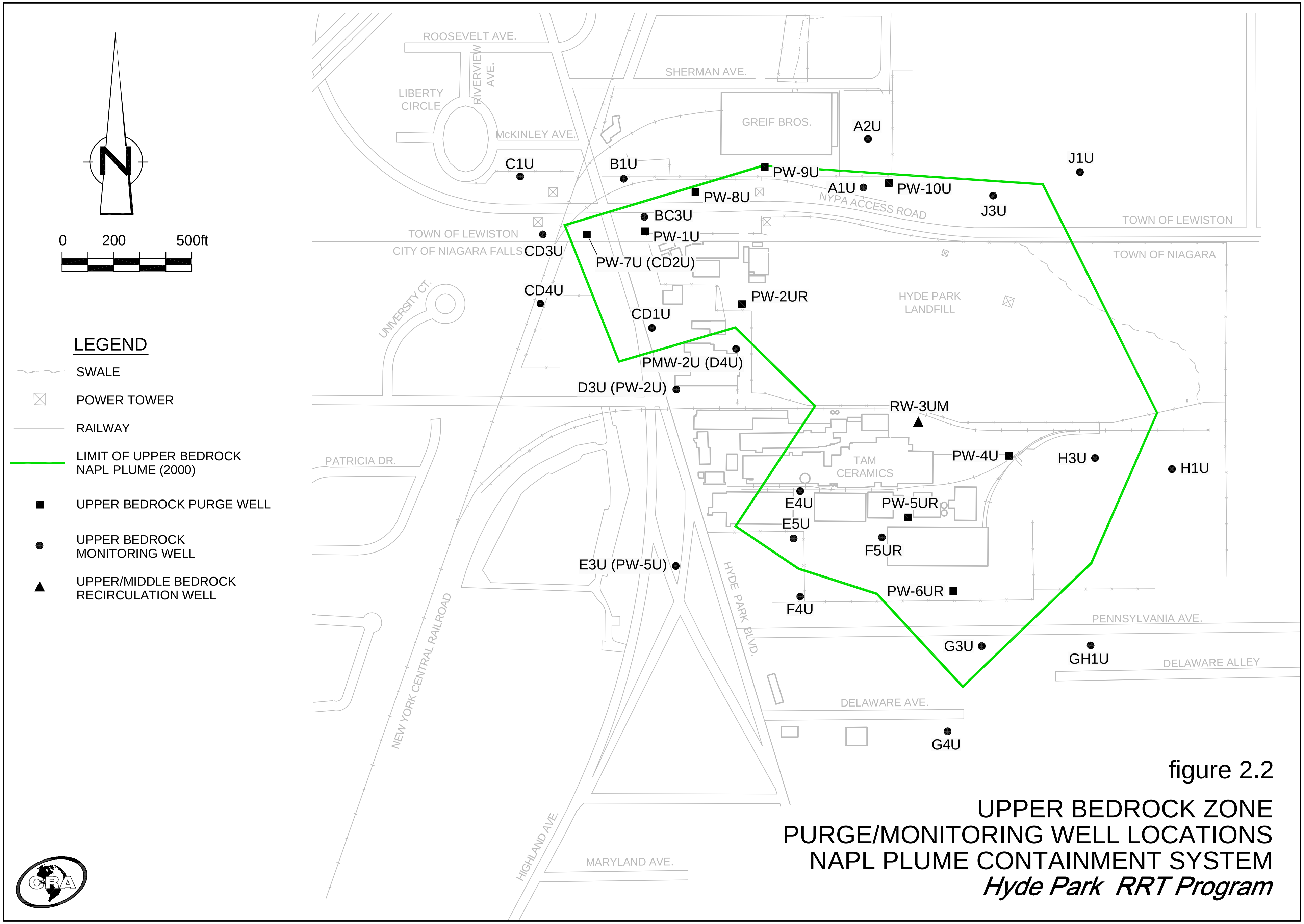

figure 2.2

UPPER BEDROCK ZONE
PURGE/MONITORING WELL LOCATIONS
NAPL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF002 SEP 25/2002

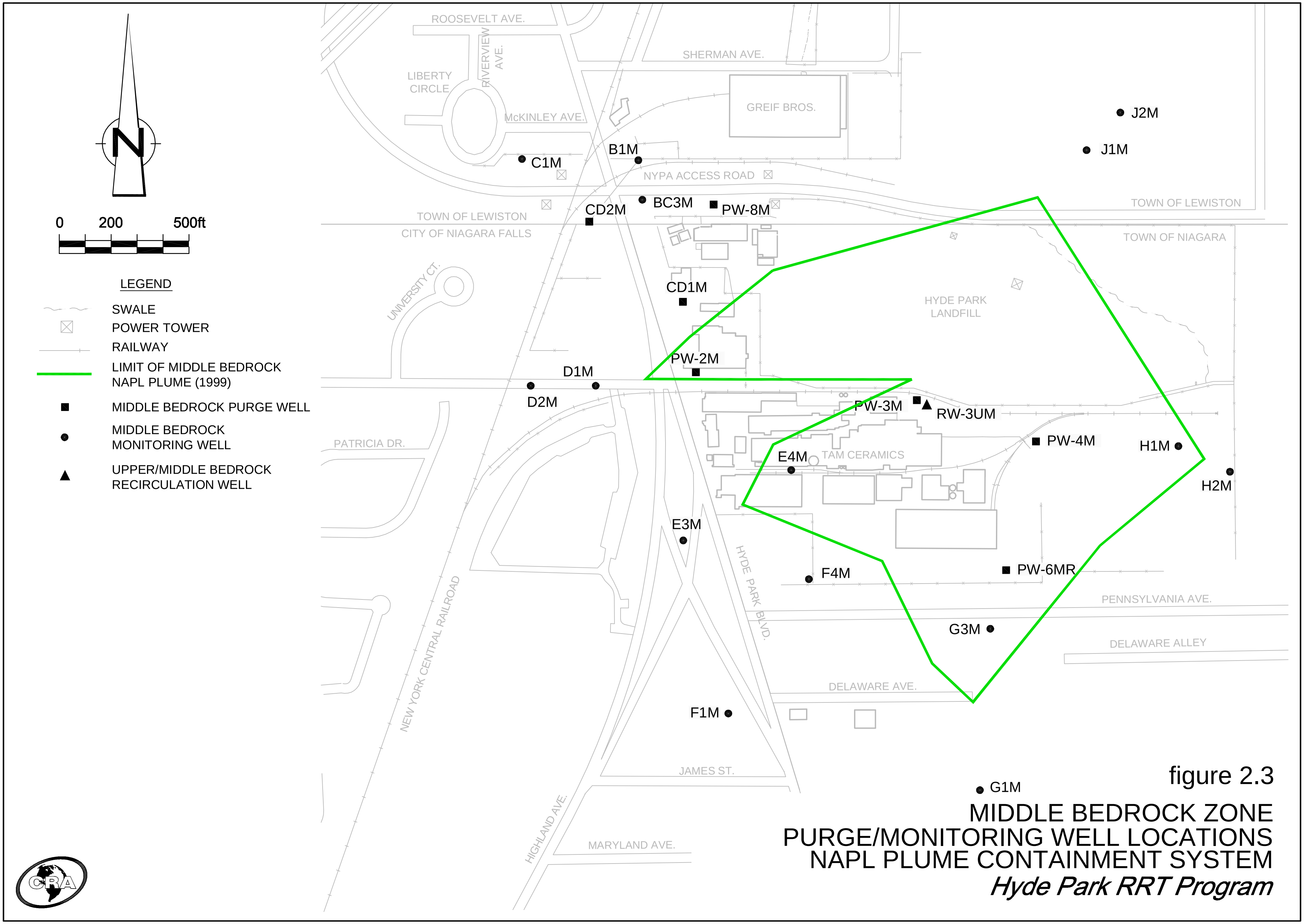

figure 2.3

MIDDLE BEDROCK ZONE
PURGE/MONITORING WELL LOCATIONS
NAPL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF003 SEP 25/2002

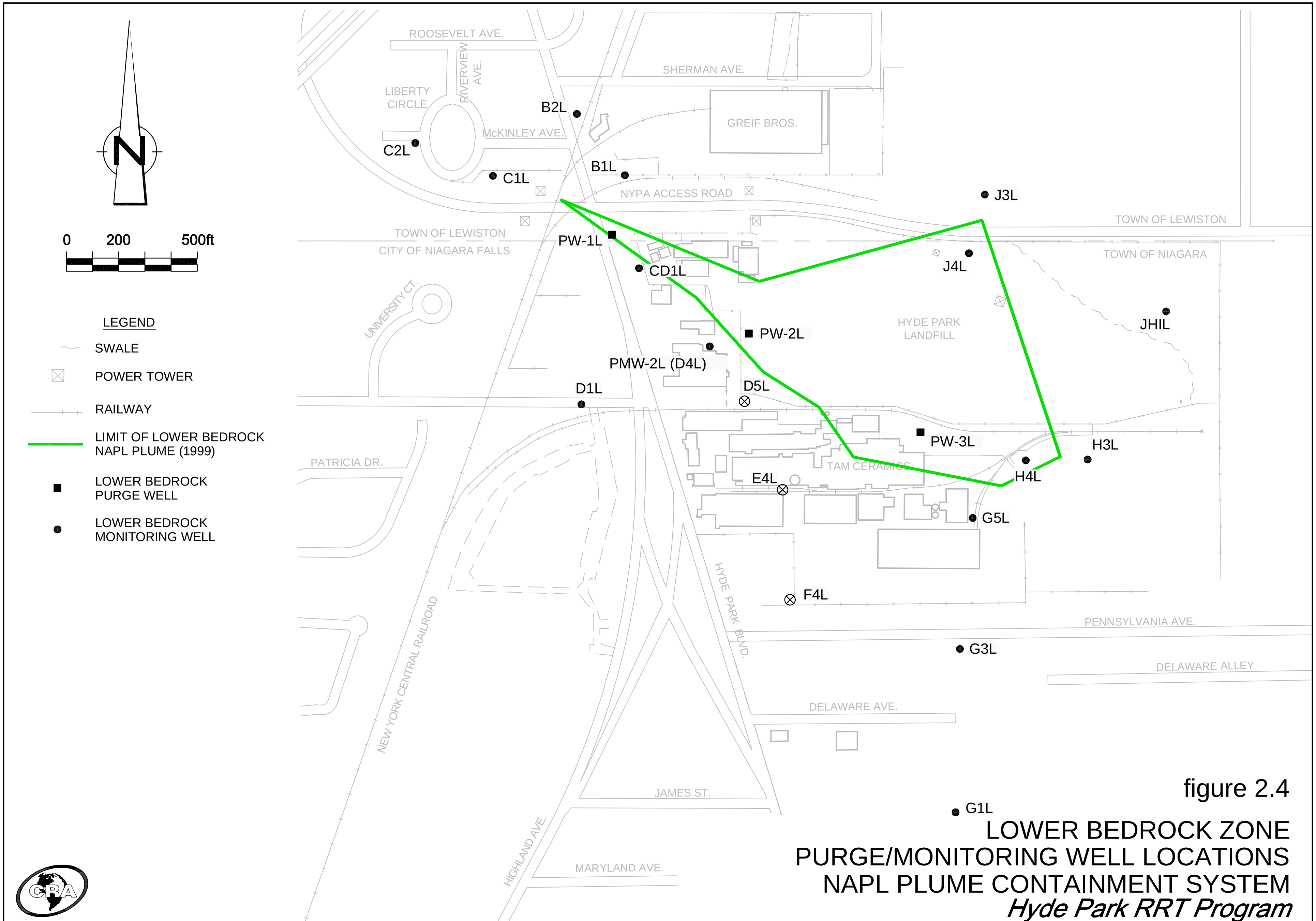

figure 2.4

LOWER BEDROCK ZONE
PURGE/MONITORING WELL LOCATIONS
NAPL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF004 SEP 25/2002

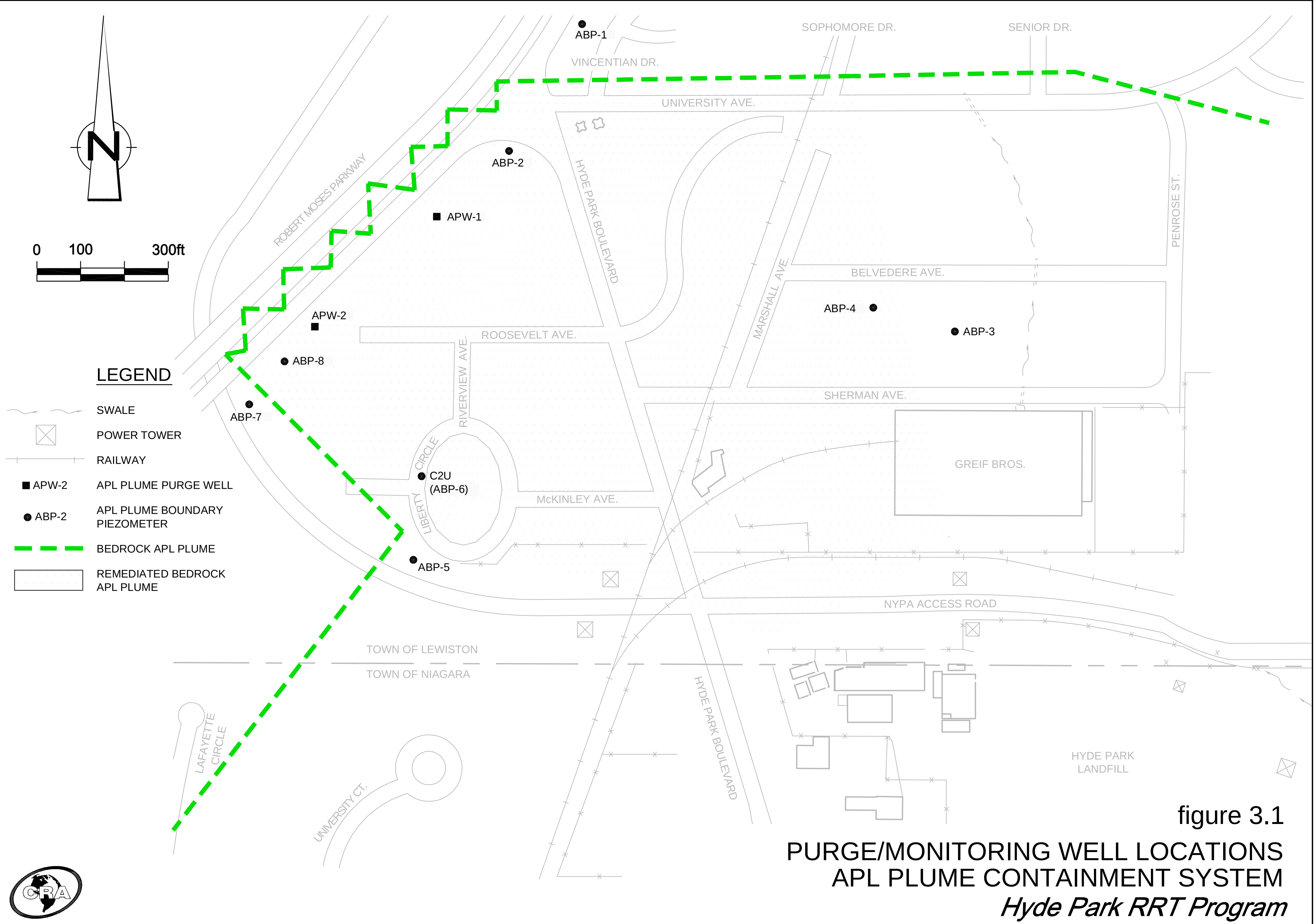

figure 3.1

PURGE/MONITORING WELL LOCATIONS
APL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF005 SEP 25/2002

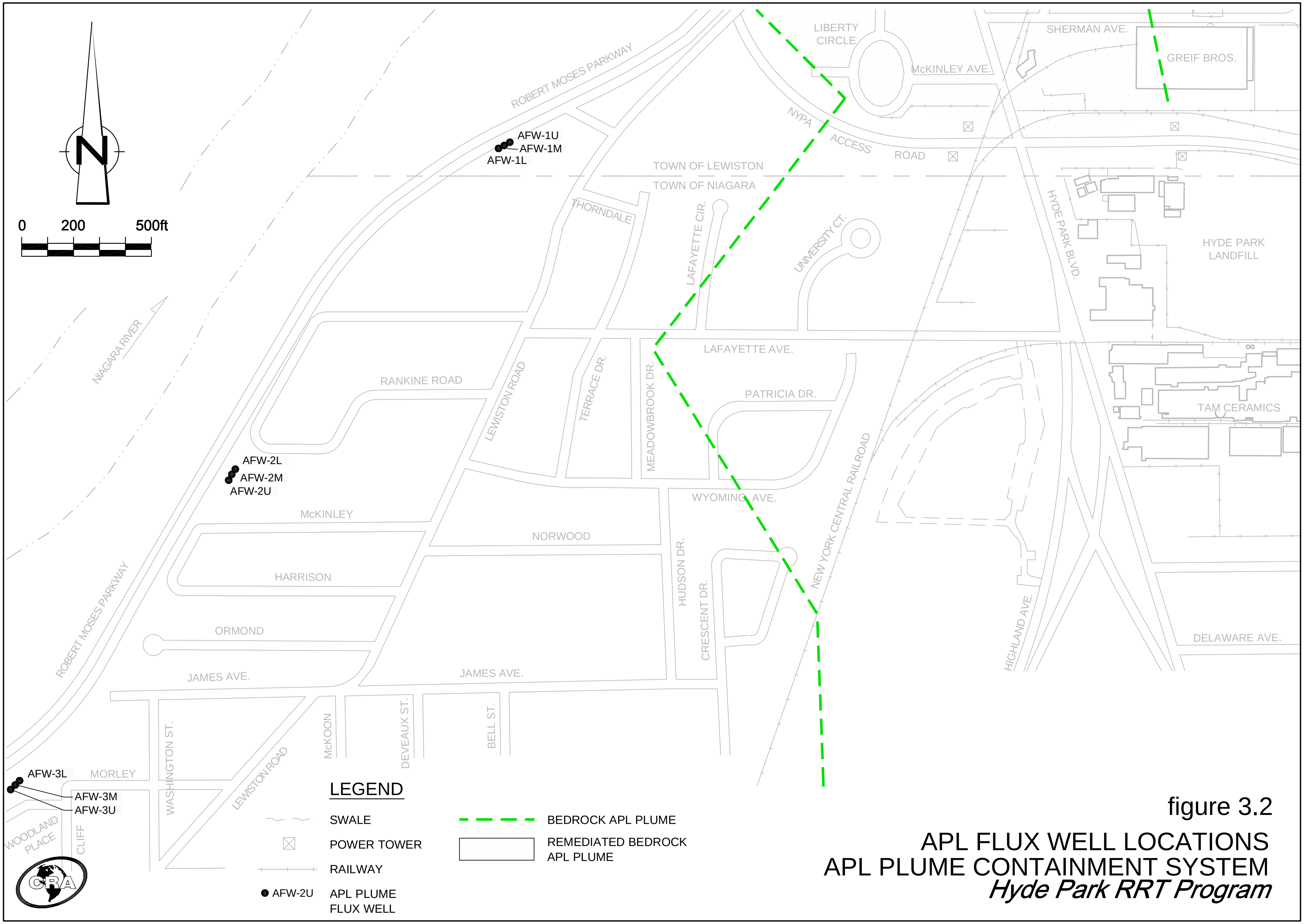

figure 3.2

APL FLUX WELL LOCATIONS
APL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF006 SEP 25/2002

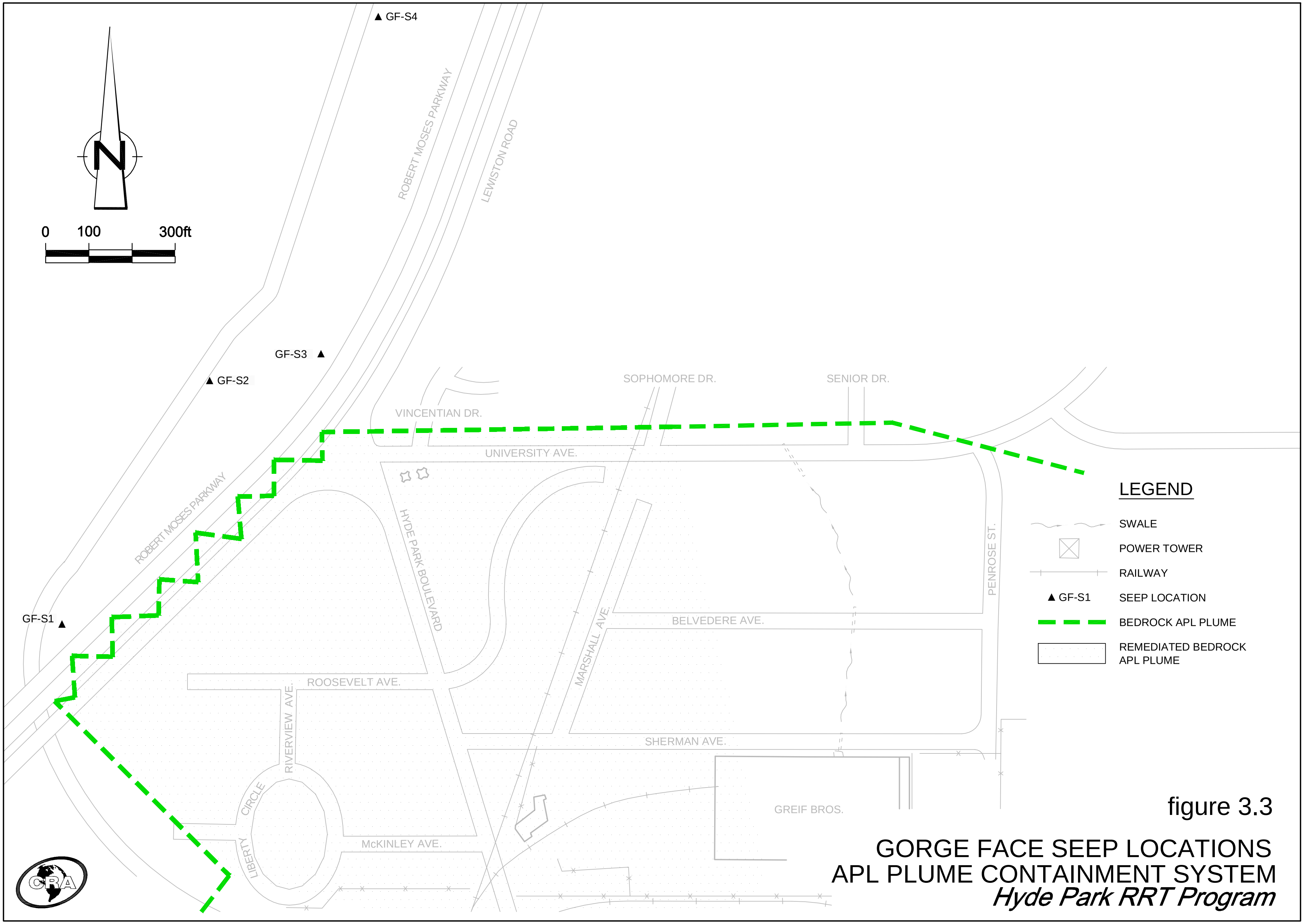

figure 3.3

GORGE FACE SEEP LOCATIONS
APL PLUME CONTAINMENT SYSTEM
Hyde Park RRT Program

01069-20(318)GN-NF007 SEP 25/2002

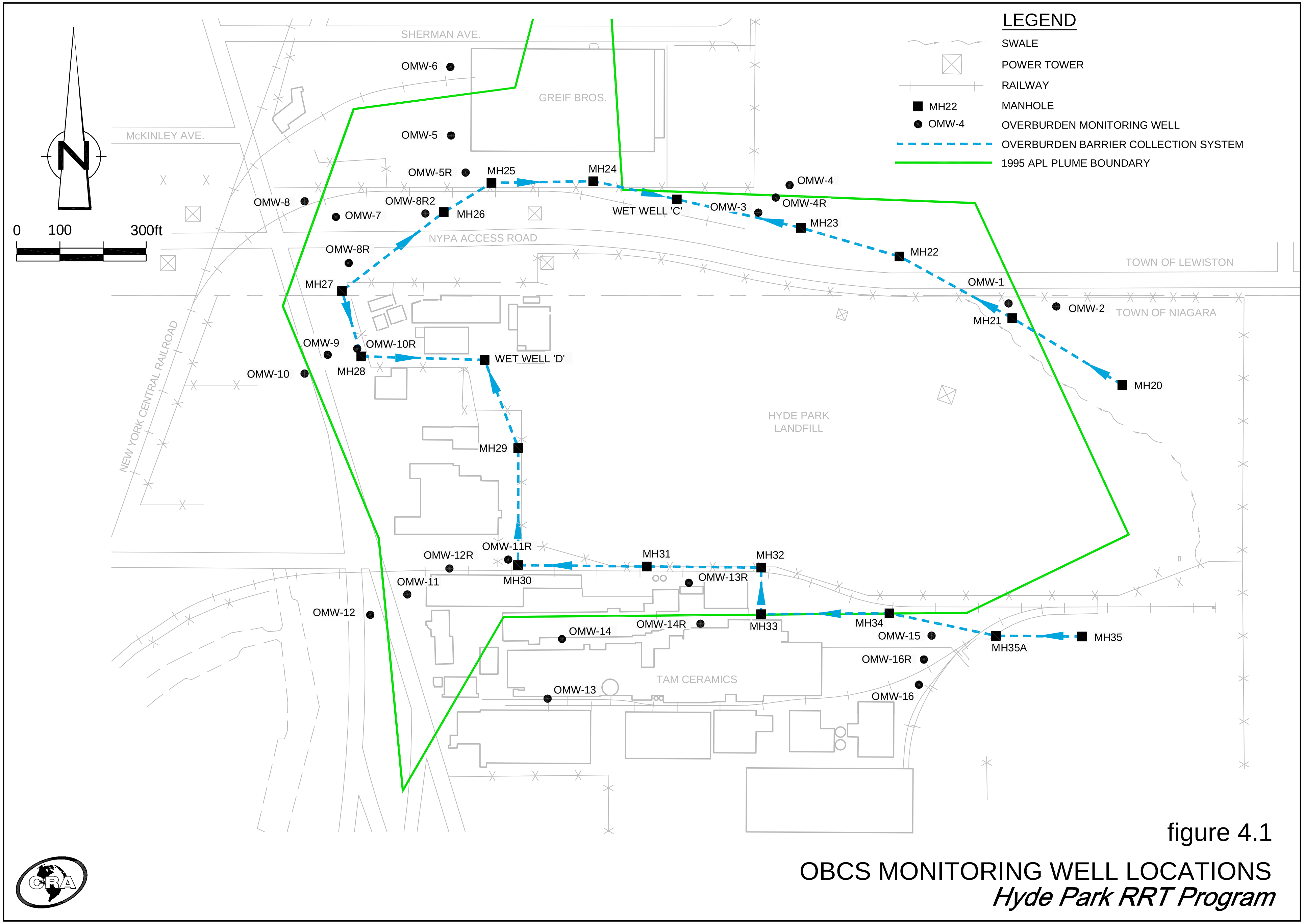

figure 4.1

OBCS MONITORING WELL LOCATIONS

Hyde Park RRT Program

01069-20(318)GN-NF008 SEP 25/2002

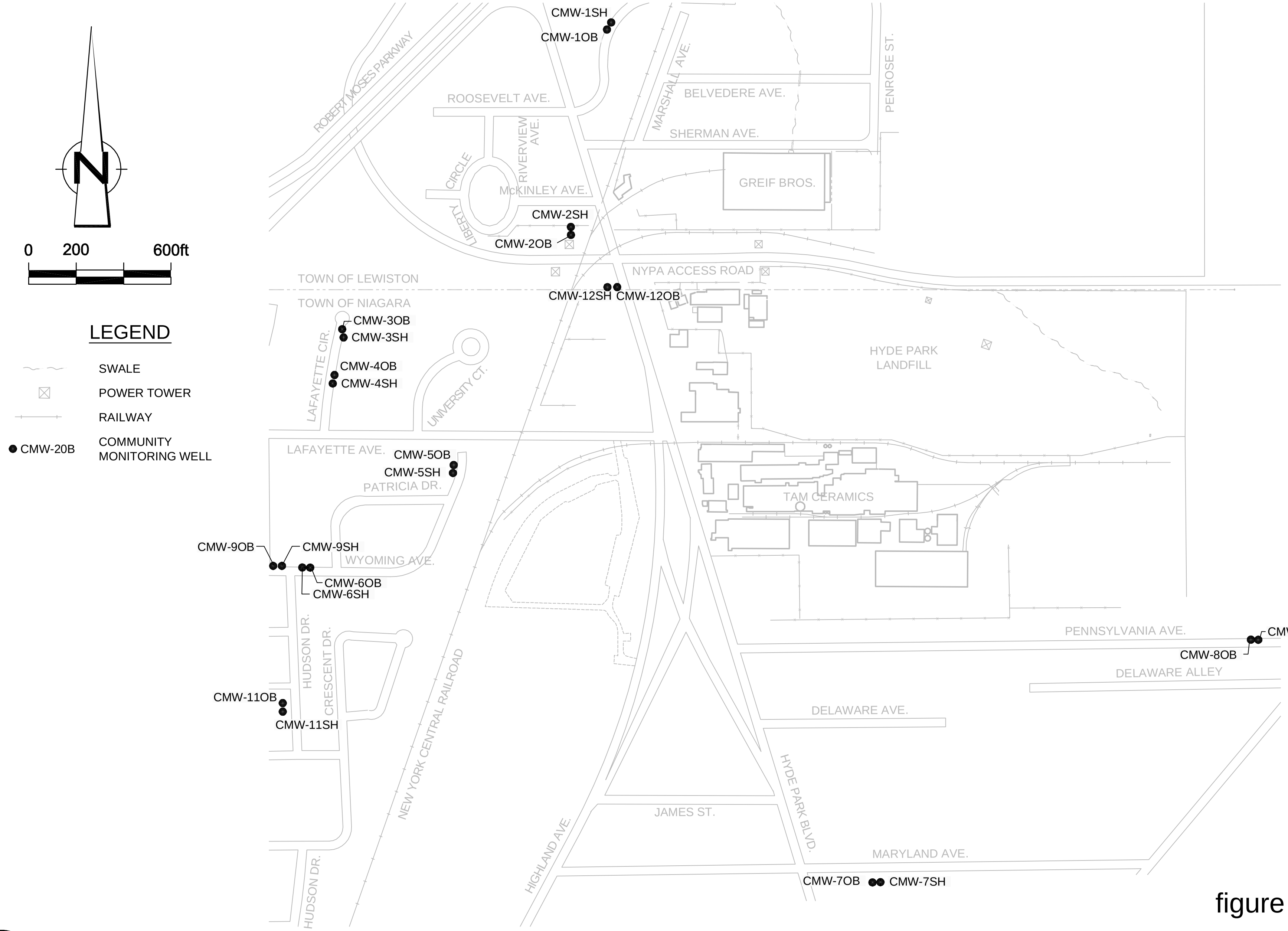

figure 4.2

COMMUNITY MONITORING WELL LOCATIONS
Hyde Park RRT Program

01069-20(318)GN-NF009 SEP 25/2002

TABLE 2.1

MONTHLY AVERAGE PURGE WELL PUMPING RATES (GPM)
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER - 2002
HYDE PARK RRT PROGRAM

Bedrock Purge Wells	***Set Points*** *(Ft. AMSL)*	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***	***Monthly Average***
PW-1U	549	0.4	0.5	0.4	0.3	0.4	0.5	0.4
PW-1L	527	7.0	8.2	8.6	6.8	8.1	6.2	0.9
PW-2UR	559	0.8	1.0	0.9	1.1	5.7	2.7	2.0
PW-2M	532	29.9	34.5	37.6	24.3	27.6	39.4	6.6
PW-2L	505	1.3	2.1	0.8	1.3	1.3	0.0	1.1
PW-3M	522	0.0	0.0	0.1	0.3	0.6	0.1	2.8
PW-3L	525	6.1	7.0	6.7	4.4	7.0	6.6	6.3
PW-4U	573	0.5	0.5	0.6	0.7	0.6	0.6	0.6
PW-4M	522	0.0 (1)	0.0	0.0	0.4	0.1	0.0	0.1
PW-5UR	555	3.5	5.3 (3)	5.8	3.2 (6)	5.6	3.1 (9,10)	4.4
PW-6UR	560	2.5	2.9	3.1	2.1	3.2	2.7	2.7
PW-6MR	505	4.8	4.6	4.4	3.1	3.8 (8)	3.9	4.1
PW-7U	540	1.3 (2)	2.2	3.0	3.7	3.9	3.8	3.0
PW-8M	520	3.5	3.9	5.4	0.1	5.1	1.3	3.2
PW-8U	546	1.0	0.0 (5)	0.4	1.1	1.8 (7)	0.1	0.7
PW-9U	542	0.0	0.0 (4)	0.0	0.1	2.6	2.1	0.8
PW-10U	542	1.5	1.3 (4)	0.7	1.7	0.2	0.5	1.0
Individual Total		64.2	74.0	78.4	54.6	77.4	73.7	70.4
Combined Meter		52.4	62.1	120.1	65.1	57.8	68.5	71.0

Notes:

(1) PW-4M pulled twice plugging problems January-2002
(2) PW-7U place in to service January-2002
(3) PW-5UR Replaced pump / motor February 4th (pluged)
(4) PW-9U & 10U Pulled February 20th, to be drilled deeper.
(5) PW-8U Pulled February 25th.
(6) PW-5UR Replaced pump / motor April 5th, well cleaned.
(7) PW-8U Pump / Motor Replace May 8th.
(8) PW-6MR Pump / Motor Replace May 9th.
(9) PW-5UR Replaced pump / motor June 14h.
(10) PW-5UR Replaced pump / motor June 23rd.

GPM Gallons per Minute
N / A Not Available

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

Well I.D.	*1st Quarter 1998*	*2nd Quarter 1998*	*3rd Quarter 1998*	*4th Quarter 1998*	*1st Quarter 1999*	*2nd Quarter 1999*	*3rd Quarter 1999*	*4th Quarter 1999*	*1st Quarter 2000*	*2nd Quarter 2000*	*3rd Quarter 2000*	*4th Quarter 2000*	*1st Quarter 2001*	*2nd Quarter 2001*	*3rd Quarter 2001*
A1U	-	-	-	-	-	-	NO	NO	NO	YES	NO	YES	YES	YES	YES
A2U	-	-	-	-	-	-	NO	NO	NO	NO	NO	NO	NO	NO	NO
B1L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
B1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
B1U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BC3L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BC3M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BC3U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C1L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C1U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CD1L	-	-	-	-	-	-	NO	NO	NO	NO	NO	NO	NO	NO	NO
CD1M	-	-	-	-	-	-	NO	NO	NO	NO	NO	-	NO	NO	NO
CD1U	-	-	-	-	-	-	YES	NO	NO	YES	NO	YES	YES	YES	YES
CD2U	-	-	-	-	-	-	-	-	NO	YES	NO	YES	YES	YES	NO
CD3U	-	-	-	-	-	-	-	-	-	NO	NO	NO	NO	NO	NO
D1L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D2M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D3U	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D4L	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D4U	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D5L	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E3M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E3U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E4L	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E4U	YES	YES	YES	NO *	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
E5U	-	-	-	-	-	-	-	-	-	NO	NO	NO	NO	NO	NO
F1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F4L	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F4M	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F4U	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F5UR (2)	YES	NO	NO	NO *	NO	NO	YES	YES	YES	YES	YES	NO	NO	NO	NO
G1L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

Well I.D.	*1st Quarter 1998*	*2nd Quarter 1998*	*3rd Quarter 1998*	*4th Quarter 1998*	*1st Quarter 1999*	*2nd Quarter 1999*	*3rd Quarter 1999*	*4th Quarter 1999*	*1st Quarter 2000*	*2nd Quarter 2000*	*3rd Quarter 2000*	*4th Quarter 2000*	*1st Quarter 2001*	*2nd Quarter 2001*	*3rd Quarter 2001*
G1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G3L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G3M	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
G3U	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
G4U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
GH1U	-	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H1L	-	NO	NO	NO	NO	NO	NO	NO	NO	-	-	NO	NO	NO	NO
H1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H1U	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H2L	-	NO	NO	NO	NO	NO	NO	NO	NO	-	-	NO	NO	NO	NO
H2M	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
H3L	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	-	-	-
H3U	YES	NO	YES	YES *	YES	YES	YES	YES	NO	NO	YES	NO	YES	NO	YES
J1M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J1U	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J2M	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J3L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J3U	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES
J4L	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J5U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OMW-1	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-10R	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-11	NO	NO	NO	NO *	NO	NO	NO	NO	NO	-	-		NO	NO	NO
OMW-11R	-	-	-	-	-	-	-	-	-	NO	NO	NO	NO	NO	NO
OMW-12R	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-13R	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW14R	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-15	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-16R	NO	NO	NO	NO *	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-4R	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-5	NO	NO	NO	NO	NO	NO	NO	NO	NO	-	-	-	NO	NO	NO
OMW-5R	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

Well I.D.	*1st Quarter 1998*	*2nd Quarter 1998*	*3rd Quarter 1998*	*4th Quarter 1998*	*1st Quarter 1999*	*2nd Quarter 1999*	*3rd Quarter 1999*	*4th Quarter 1999*	*1st Quarter 2000*	*2nd Quarter 2000*	*3rd Quarter 2000*	*4th Quarter 2000*	*1st Quarter 2001*	*2nd Quarter 2001*	*3rd Quarter 2001*
OMW-6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-7	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-8R	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
OMW-8R2	-	-	-	-	-	-	-	-	-	-	NO	NO	NO	NO	NO
OMW-9	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
PMW-1L	-	-	-	-	-	-	-	-	-	NO	YES	YES	YES	YES	YES
PMW-3M	-	-	-	-	-	-	-	-	NO	YES	YES	YES	YES	YES	NO
PW-2L	-	-	-	-	-	-	-	-	-	NO	NO	NO	NO	NO	YES
PW-3UM	-	-	-	-	-	-	-	-	-	YES	-	YES	YES	YES	YES
PW-6UMR	-	-	-	-	-	-	YES	YES	NO	YES	NO	NO	YES	YES	NO

Notes:
(1) LNAPL found in well, no DNAPL (due to historic diesel fuel spill in well area).
(2) Not NAPL but Fuel Oil
- Not Available
* Wells checked on 12/10/98, strike at TAM (wells located on TAM property).
Manual NAPL recoveries listed in Table 5.1 of this report.
LNAPL Light Aqueous Phase Liquid.
NAPL Non-Aqueous Phase Liquid.
NO Not Observed.

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

4th Quarter 2001	*1st Quarter 2002*	*2nd Quarter 2002*
YES	YES	YES
NO	YES	YES
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
YES	YES	YES
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
YES	YES	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

4th Quarter 2001	*1st Quarter 2002*	*2nd Quarter 2002*
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
-	-	-
YES	YES	YES
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
YES	YES	YES
NO	NO	NO
-	-	YES
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO

TABLE 2.2

NAPL PRESENCE CHECK SUMMARY
NAPL PLUME CONTAINMENT SYSTEM
SECOND QUARTER 2002
HYDE PARK RRT PROGRAM

4th Quarter 2001	*1st Quarter 2002*	*2nd Quarter 2002*
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
NO	NO	NO
YES	YES	YES
YES	YES	YES
NO	NO	NO
YES	YES	YES
NO	NO	NO

APPENDIX A

STATISTICAL TREND ANALYSIS OF GROUNDWATER MONITORING DATA SECOND QUARTER 2002 MONITORING

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MEMORANDUM

TO:	Mike Mateyk; Jon Williams	REF. NO.:	01069-20
FROM:	Naz Syed-Ritchie; Wesley Dyck	DATE:	August 20, 2002

RE: **Statistical Trend Analysis of Groundwater Monitoring Data**
Second Quarter 2002 Monitoring
Hyde Park Landfill
Niagara Falls, New York

1.0 INTRODUCTION

Groundwater at the Hyde Park Landfill in Niagara Falls, New York (Site) is sampled quarterly and analyzed for indicator parameters including benzoic acid, chlorendic acid, phenolics, total chlorobenzoic acids, and total organic halides (TOX). As part of the evaluation of the quarterly monitoring data, a statistical analysis is performed to look for any evidence of increasing trends in indicator parameters at a given well over time.

This memorandum reports the findings of statistical evaluations of the Site groundwater monitoring data up to and including the second quarter 2002 samples.

2.0 STATISTICAL TREND ANALYSES

Helsel and Hirsch (1992) recommend a number of statistical trend analysis methods for application to environmental data sets. A typical pattern in groundwater constituent concentrations is a rapid decline in concentration immediately following a remedial action, which then slows and observed concentrations fluctuate up and down at a much lower level. This type of pattern has been observed at a number of Site monitoring wells, and may be observed in the concentration vs. time plots (Attachment A).

A recommended statistical procedure for trend assessment commonly applied to environmental monitoring data is the Mann-Kendall trend test. The Mann-Kendall test is a non-parametric (rank-based) method that evaluates a set of data for a monotonic (unidirectional) trend. The procedure makes no assumptions regarding the shape of the trend (e.g., linear, log-linear…), except that it is in a single direction (i.e., either consistently upward or downward). However, the Mann-Kendall procedure loses sensitivity if a large proportion of non-detected results is present.

For data sets with large proportions (> 50 percent) of censored data, logistic regression is recommended by Helsel and Hirsch. In this procedure, the numerical values of the monitoring data are not used, but instead the presence or absence of a detectable concentration of the analyte of interest is considered. Thus, the hypothesis tested as a measure of trend by logistic regression is that more detectable results are occurring later than earlier (increasing trend), or earlier than later (decreasing trend).

The Site groundwater monitoring data were assessed for trends on an individual well basis using either the Mann-Kendall trend test (if < 50 percent non-detects) or logistic regression (for 50-99 percent non-detects). Analytes that were not detected at a given well (i.e., 100 percent non-detects) during the time period of interest were not statistically evaluated.

3.0 SCOPE OF DATA

The approach most applicable to assessing current trends in groundwater quality at the Site is to apply a given test to analytical data representative of the current groundwater conditions at the Site. This is accomplished for the Site by treating calendar years as a unit (i.e. either keeping or removing the four quarters of monitoring data for a calendar year) and ensuring that a minimum of 8 data points and maximum of 11 data points are used for the statistical evaluation. In the case of the second quarter 2002 data analysis, the analytical data include ten sampling events from 2000 to present. This data scope approach provides a moving two to three year comparison window.

For the concentration vs. time plots (Attachment A), all historical data are included (1993 to present).

4.0 RESULTS

The results of the trend analyses are presented in Table 1. One statistically significant ($P<0.05$) increasing trend was identified; total chlorobenzoic acid at well J2M. Six statistically significant ($P<0.05$) decreasing trends were observed; all for TOX at wells B1U, B1L, CIU, C1M, C1L, and D2M.

Table 2 presents the comparison of the statistical trend analyses performed following the first, second, third and fourth quarters of 2001 and the first and second quarter of 2002. Only wells/analytes with a significant trend identified during at least one evaluation are presented. In 24 cases, the trends changed from statistically significantly decreasing to not significant or vice versa between the six quarters. TOX was identified to be statistically significantly decreasing at B1L and D2M for the second quarter evaluation of 2002. No significant trends had been identified for these well/parameter combinations in the previous evaluations.

Statistically significantly increasing trends were identified for total chlorobenzoic acid at J2M in the fourth quarter 2001, first quarter 2002, and second quarter 2002 evaluations. This well/parameter combination had a statistically significant decreasing trend during the first quarter 2001 evaluation and no significant trends were identified during the second and third quarter 2001 evaluations. Statistically significant increasing trends were identified for chlorendic acid at B1U and total chlorobenzoic acid at J3L during the fourth quarter 2001 evaluation. However, there were no statistically significant trends identified during the second quarter 2002 evaluation or during previous evaluations.

TOX was identified to be statistically significantly decreasing in the fourth quarter 2001 and first and second quarter 2002 evaluations at B1U and C1M and first and second quarter 2002 evaluations for C1U. TOX was also identified to be statistically significantly decreasing in the second quarter 2002 evaluation. TOX at this well had also been identified to be statistically significantly decreasing during the first, second, and third quarter 2001 evaluations. For seventeen cases, statistically significant decreasing trends had been identified during at least one of the previous evaluations but no significant trends were identified during the second quarter 2002 evaluation (see Table 2). It should be noted that for total chlorobenzoic acid at well J2M, a statistically significant decreasing trend was observed during the first quarter 2001 evaluation.

There were no statistically significant trends observed for the second and third quarter 2001 evaluations. Since the fourth quarter 2001 evaluation, statistically significant increasing trends have been consistently observed at this well for total chlorobenzoic acid, including the one observed during the second quarter 2002 evaluation.

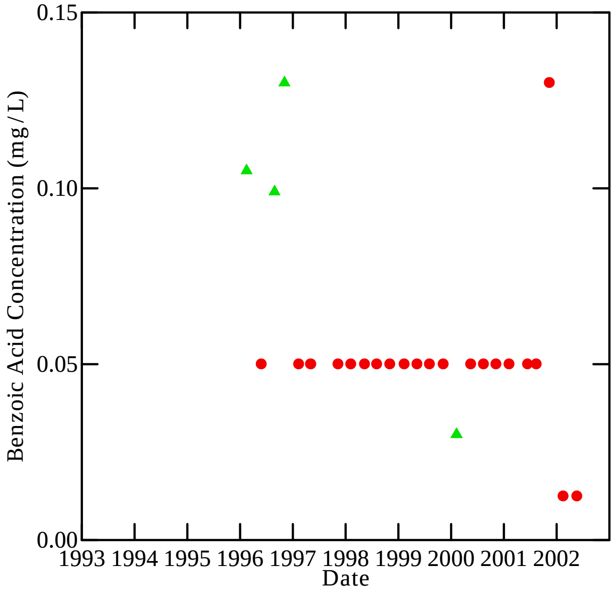
5.0 CONCLUSIONS

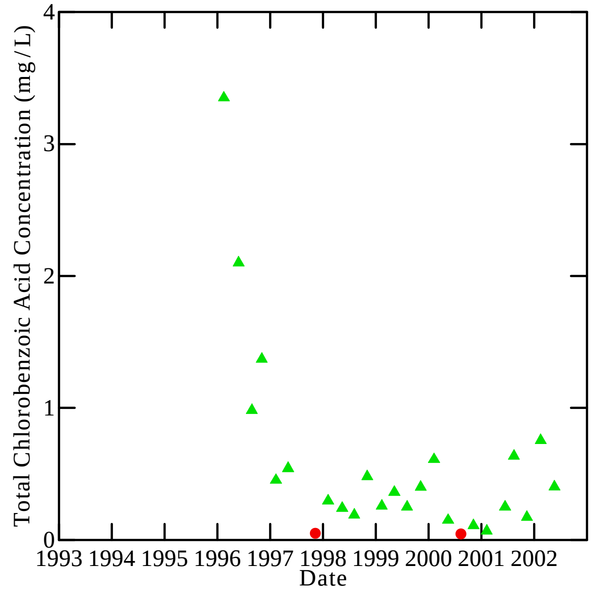
Statistical trend evaluations of Site groundwater monitoring data following the second quarter 2002 monitoring unit were carried out using either the Mann-Kendall trend test or logistic regression (depending on proportion of non-detect values present). Data sets consisting entirely of non-detect results were not evaluated.

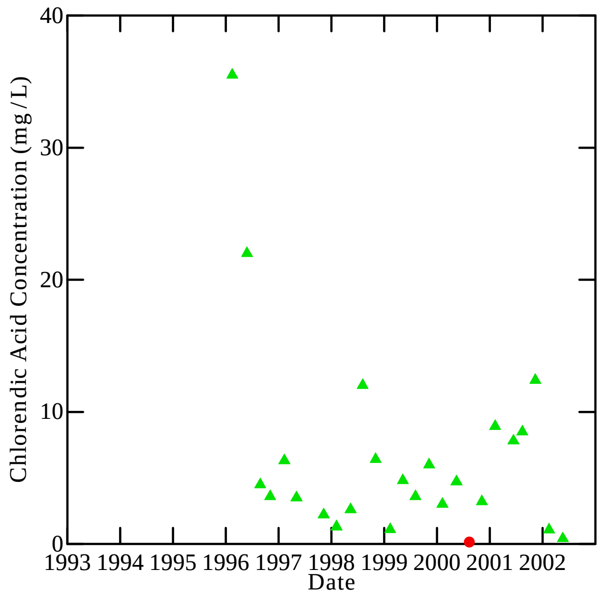
One statistically significant increasing trend and six statistically significant decreasing trends were identified as noted in Section 4.0 and on Table 1. These findings are consistent with those of previous investigations with one exception (total chlorobenzoic acid at J2M), as discussed in Section 4.

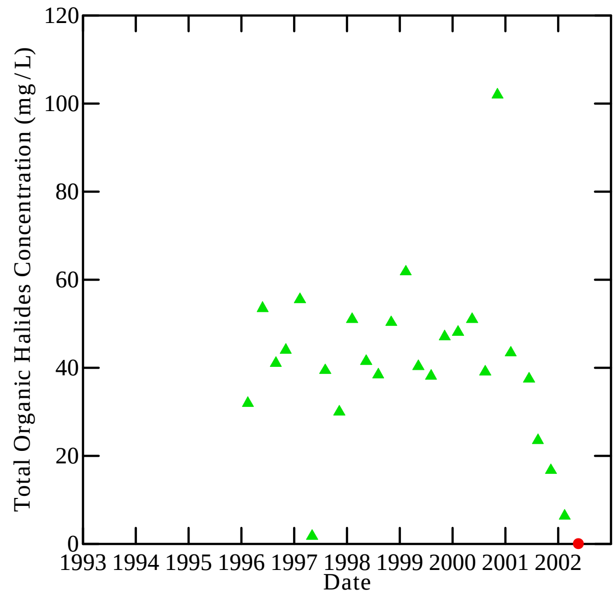
6.0 REFERENCE

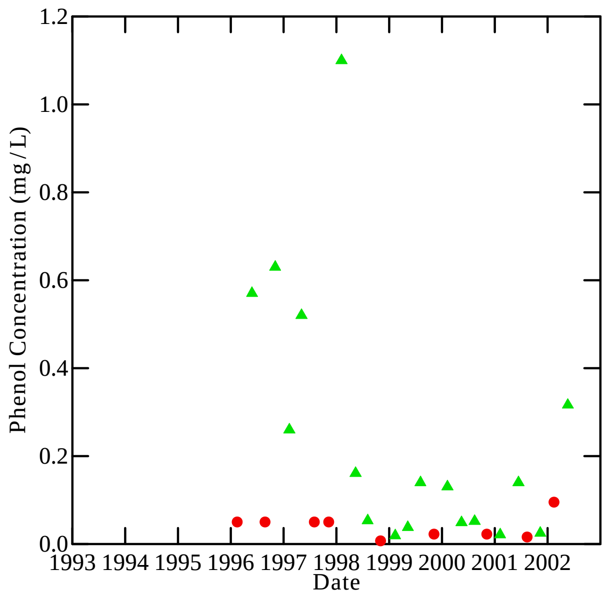
Helsel, D.R. & R.M. Hirsch, 1992. Statistical Methods in Water Resources. Amsterdam: Elsevier.











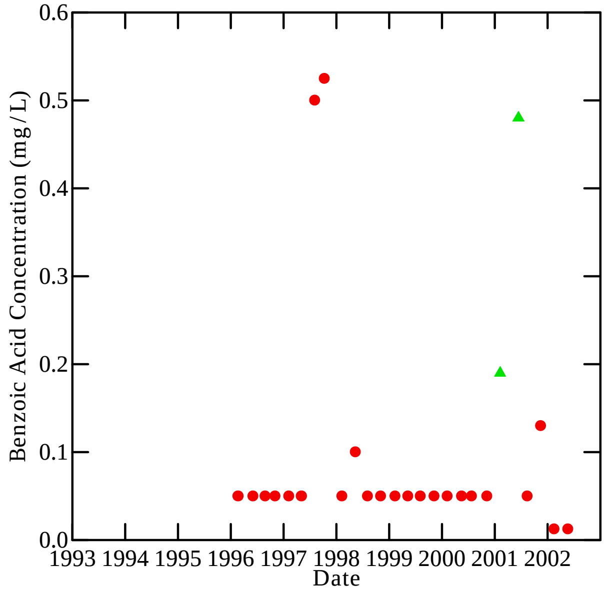
Notes:

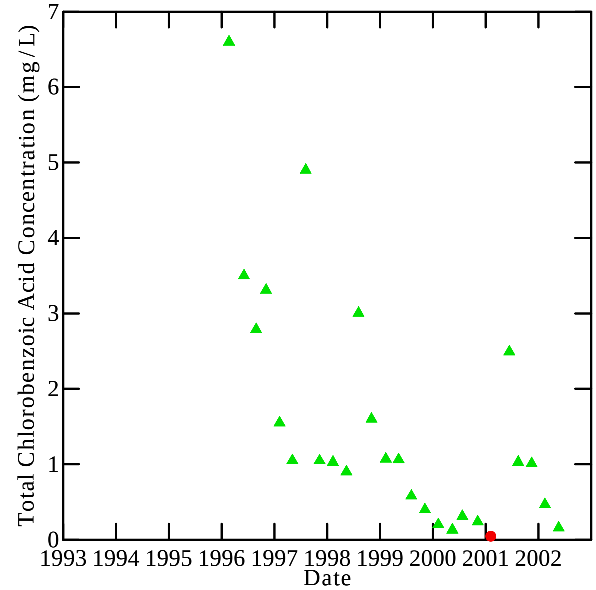
● Non-detect result

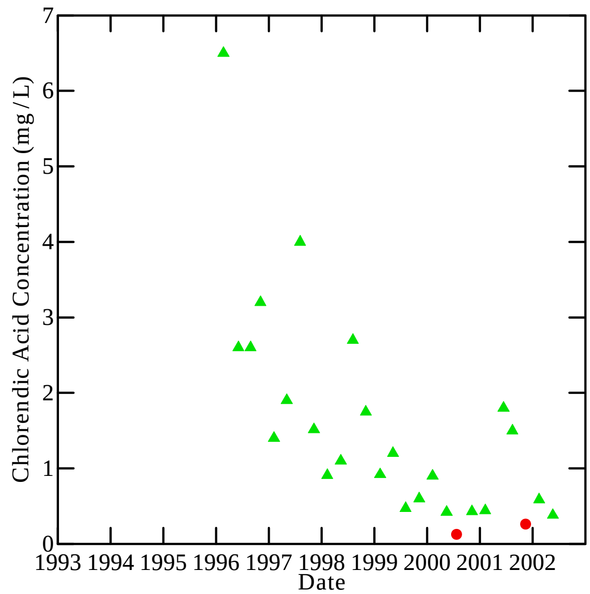
▲ Detected result

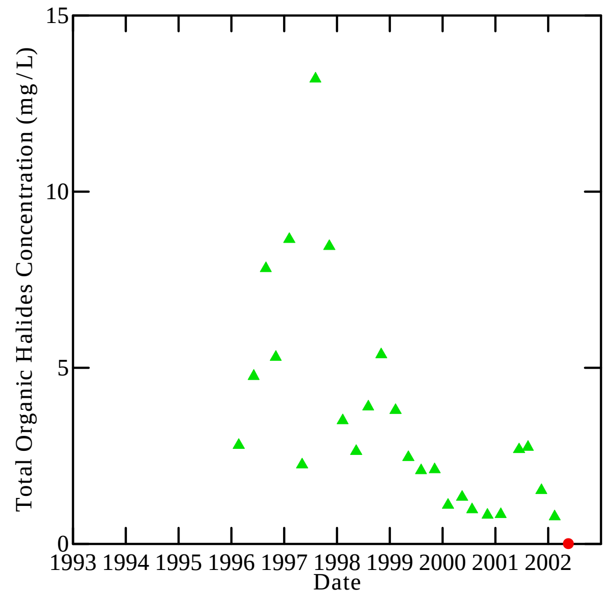
figure 1

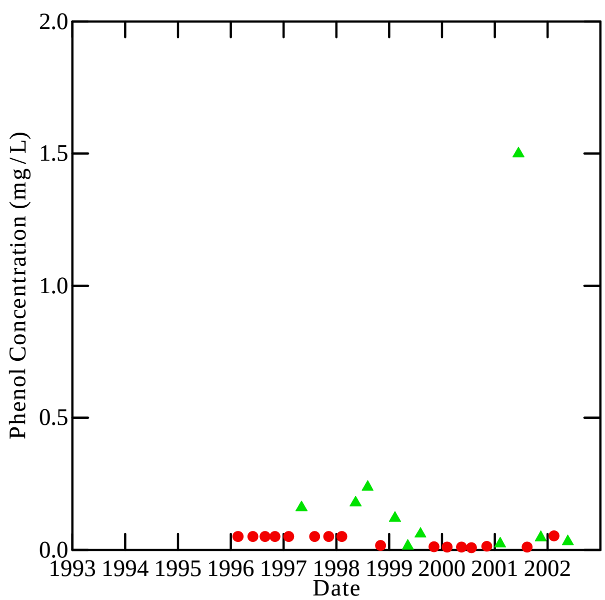
Well B1U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











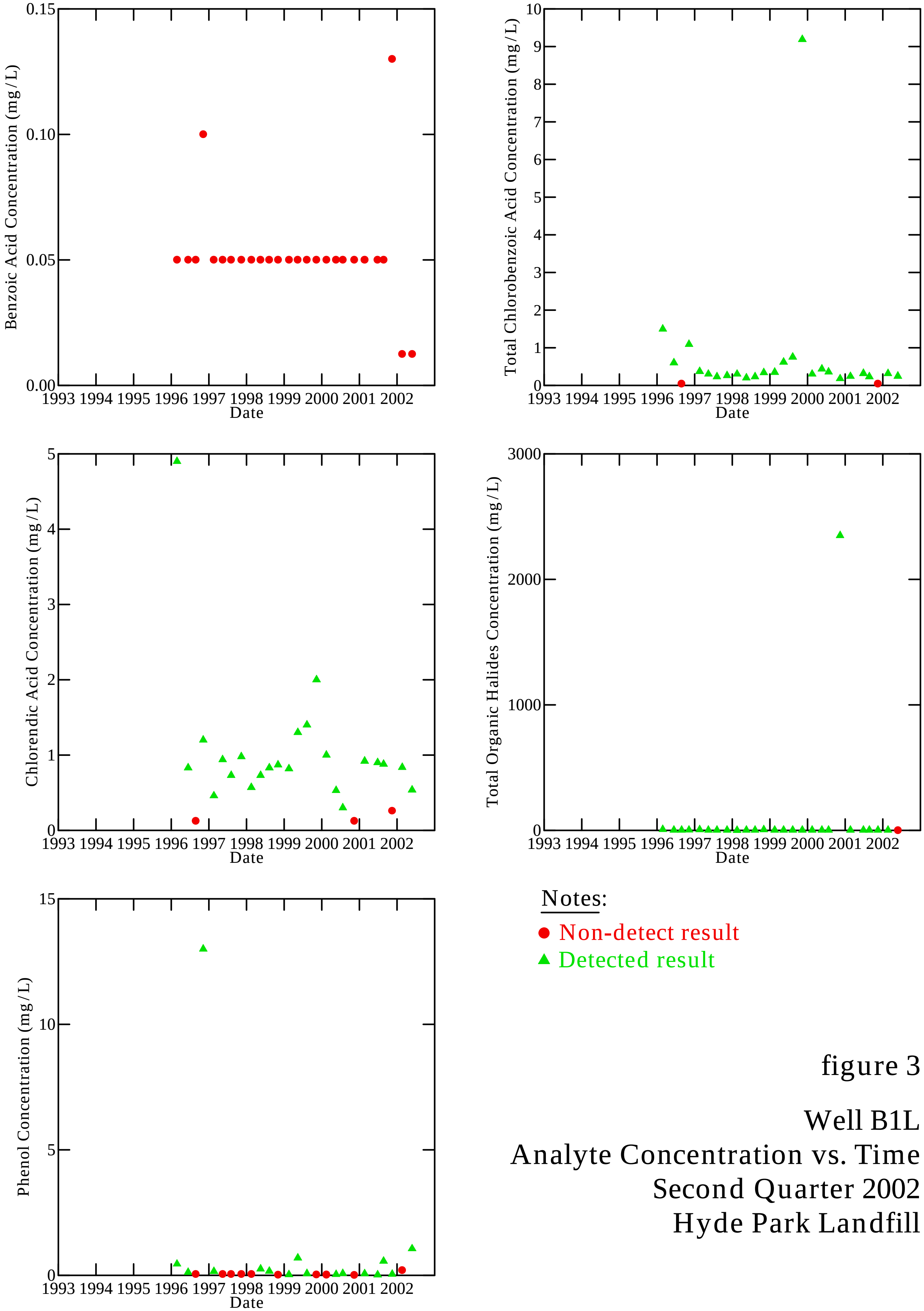
Notes:

● Non-detect result

▲ Detected result

figure 2

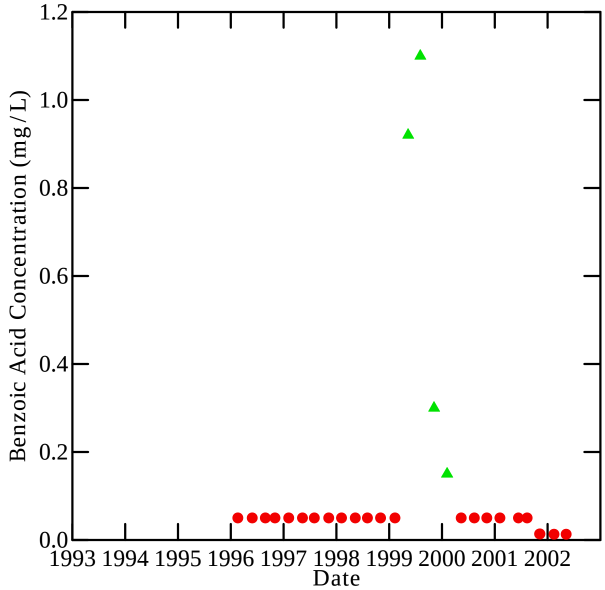
Well B1M
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill

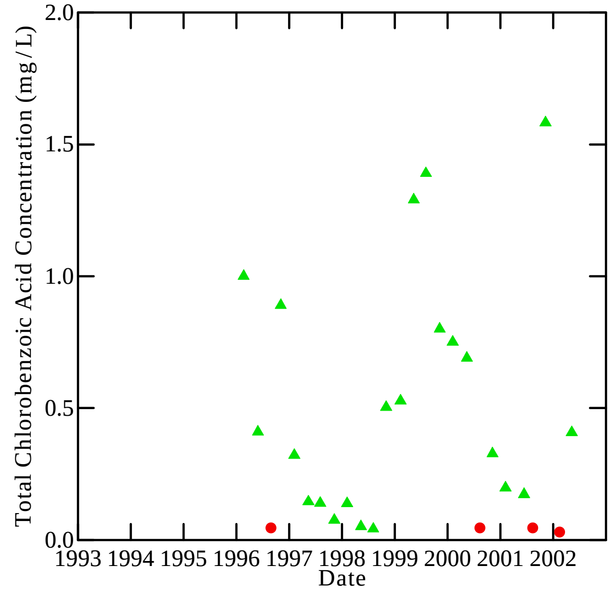


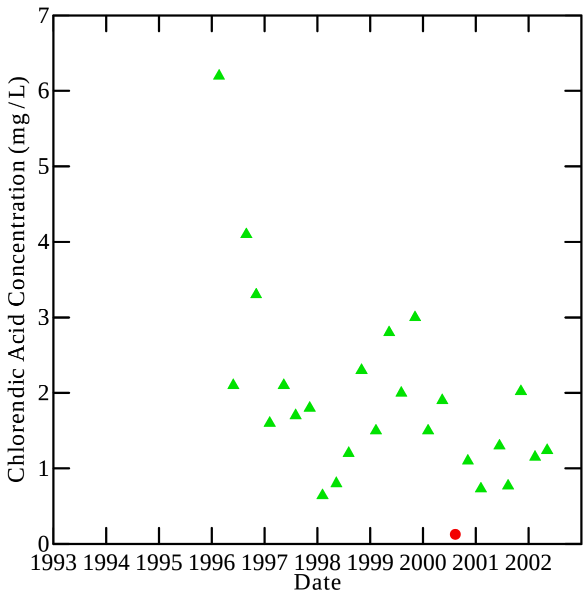
Notes:
- ● Non-detect result
- ▲ Detected result

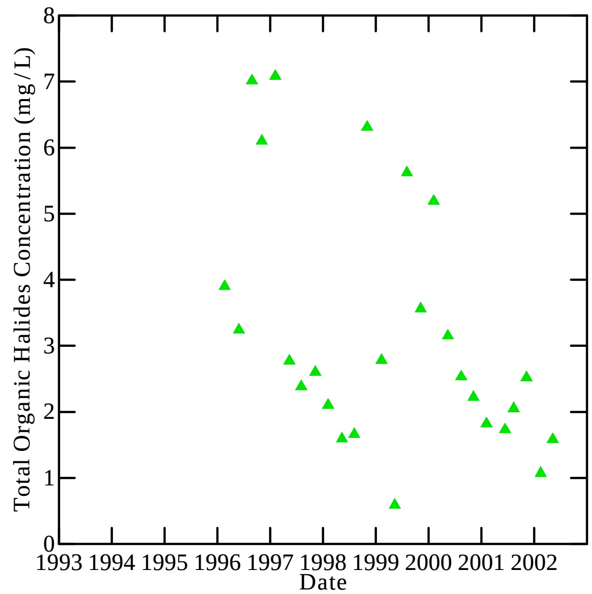
figure 3

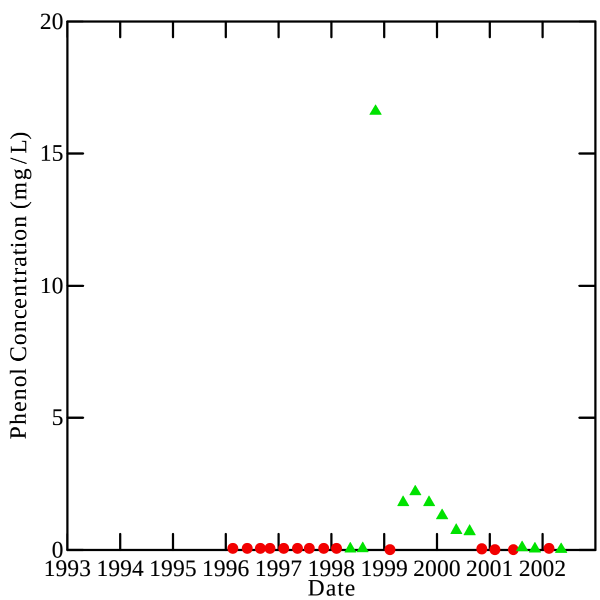
Well B1L
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill









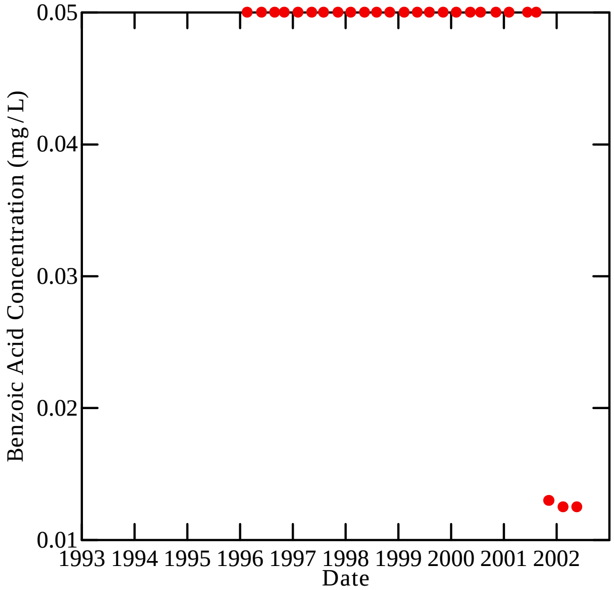


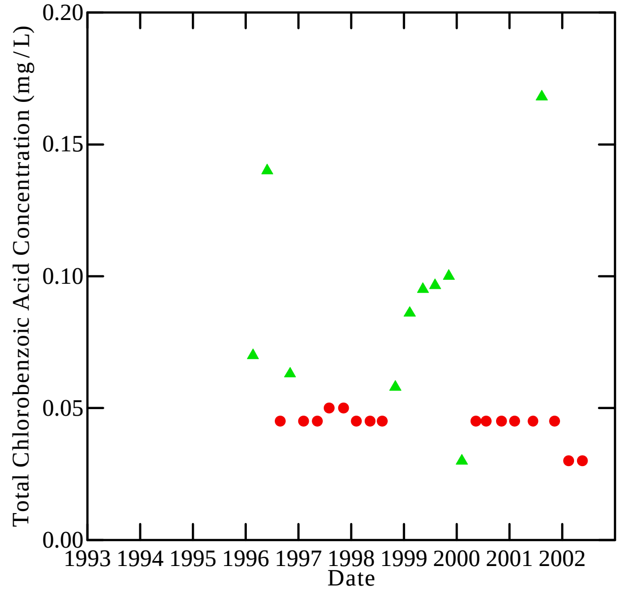
Notes:

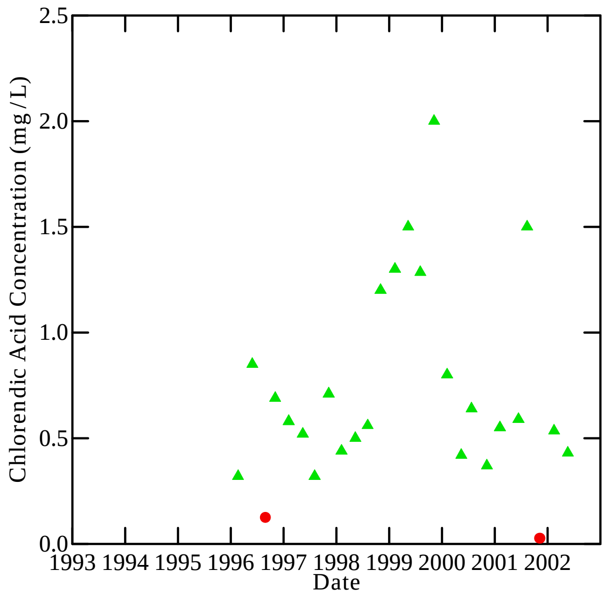
- ● Non-detect result
- ▲ Detected result

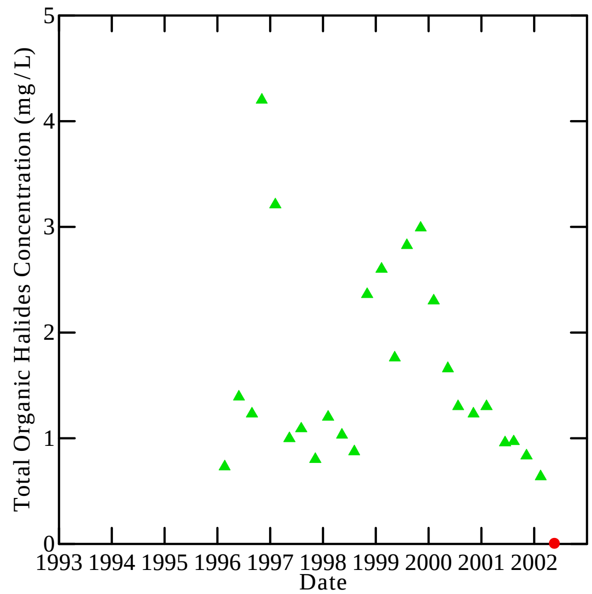
figure 4

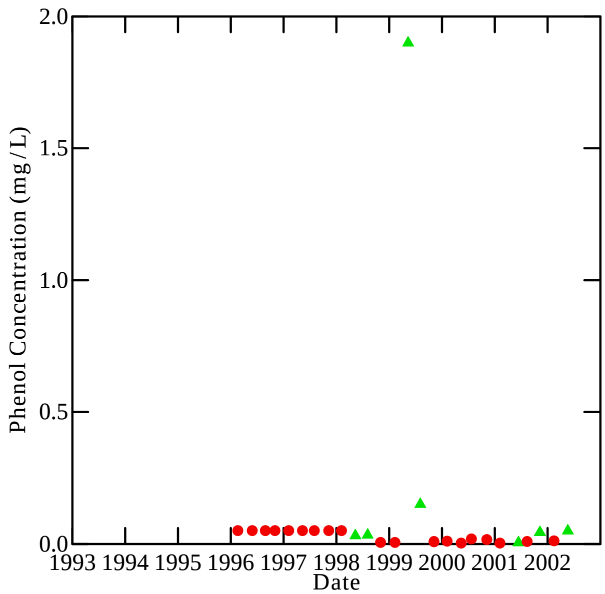
Well C1U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

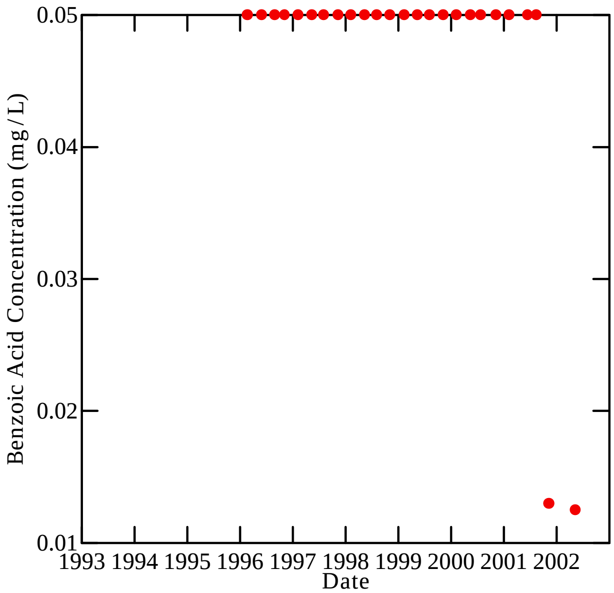
figure 5

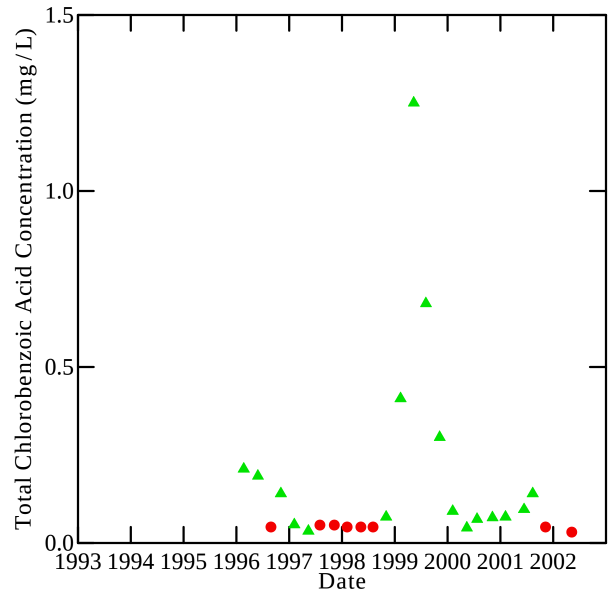
Well C1M

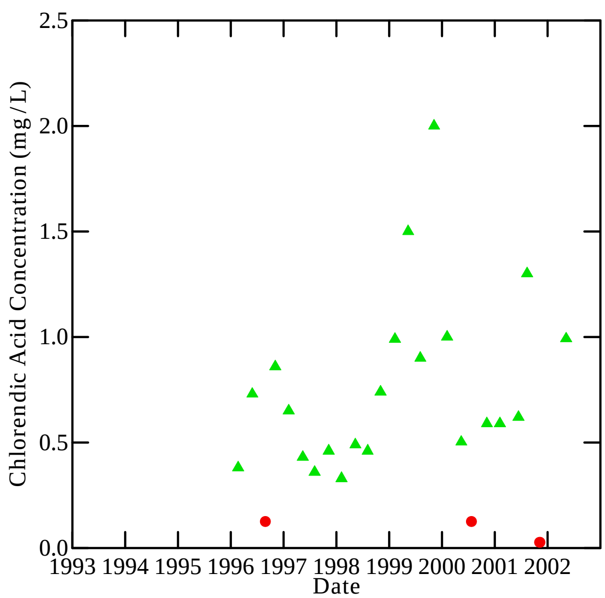
Analyte Concentration vs. Time

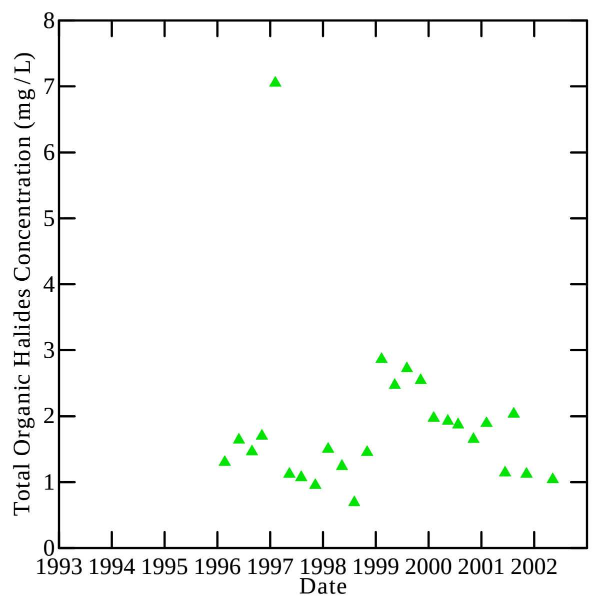
Second Quarter 2002

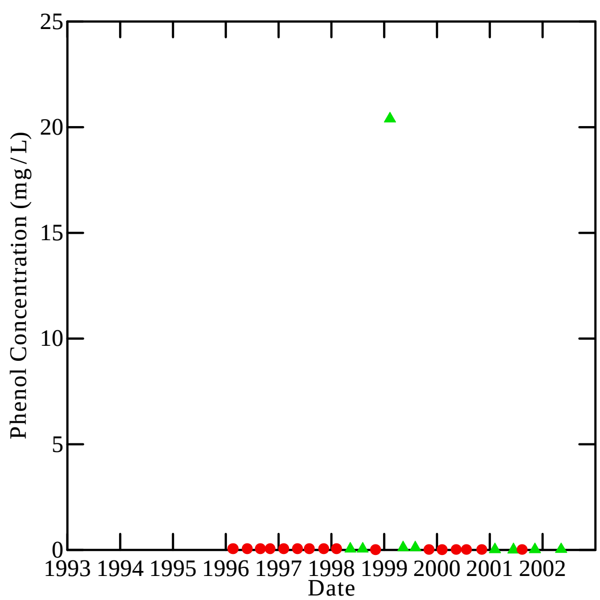
Hyde Park Landfill









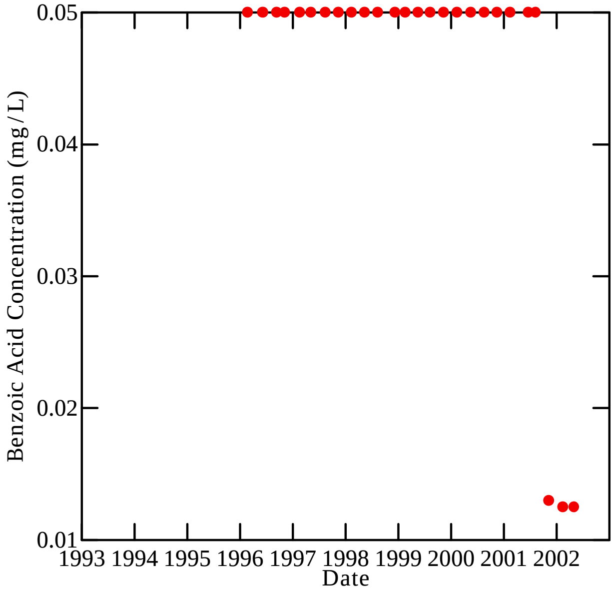


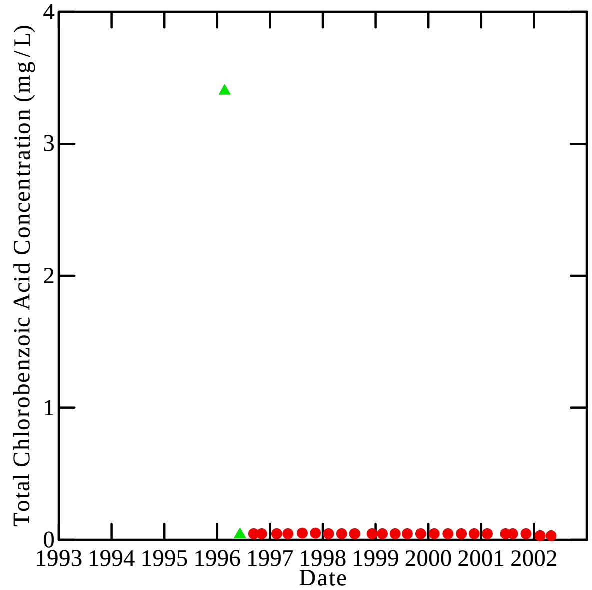
Notes:

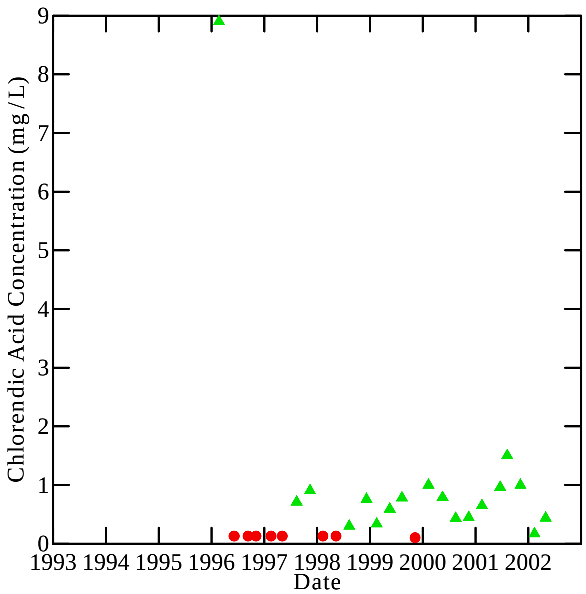
- ● Non-detect result
- ▲ Detected result

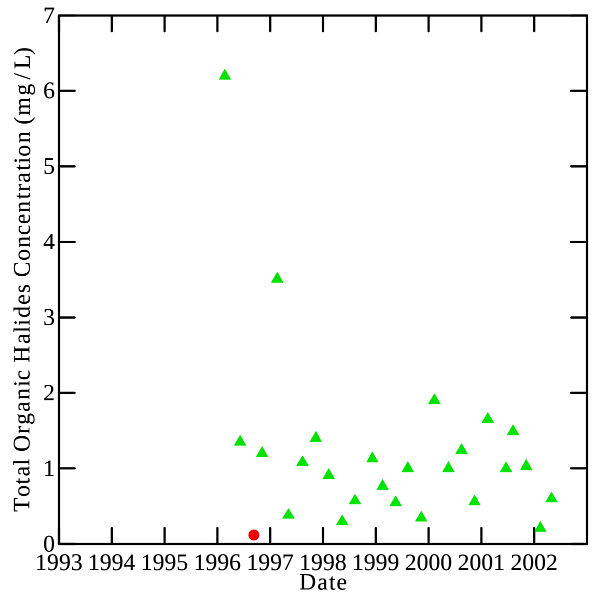
figure 6

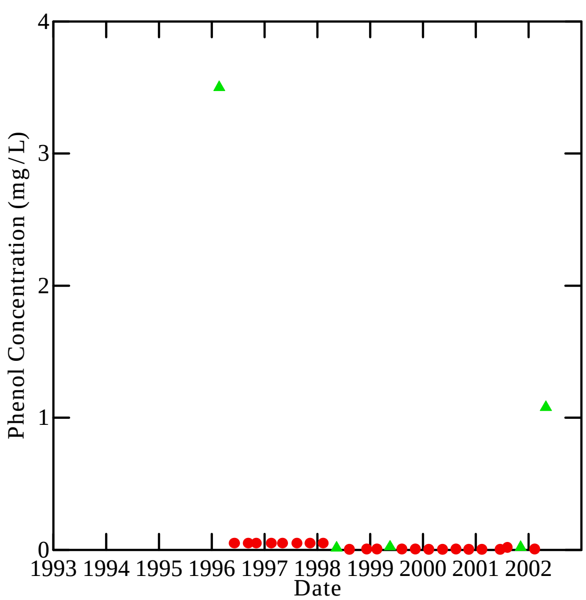
Well C1L
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill







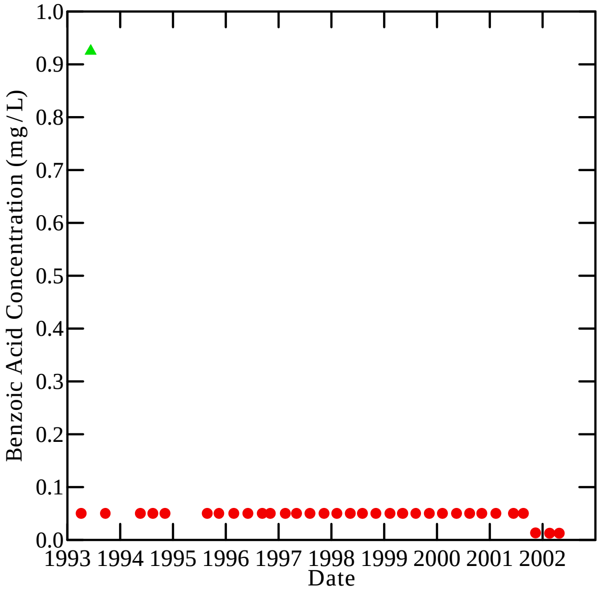


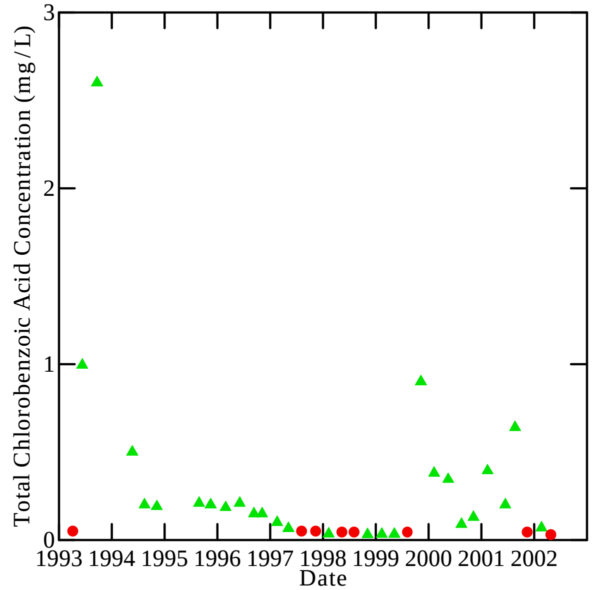


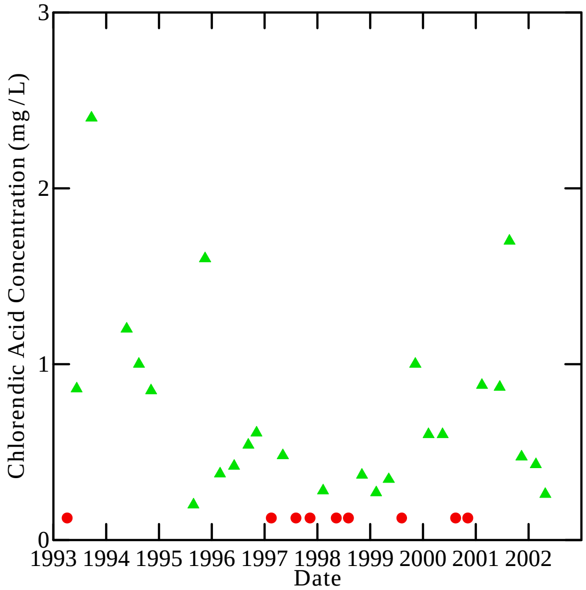
Notes:
● Non-detect result
▲ Detected result

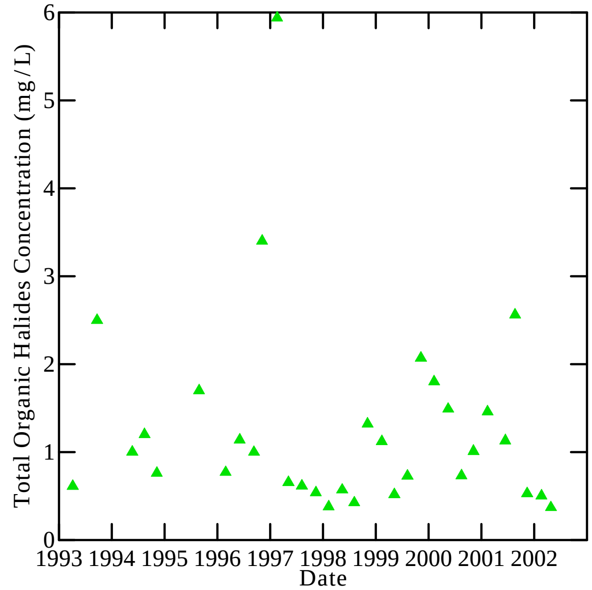
figure 7

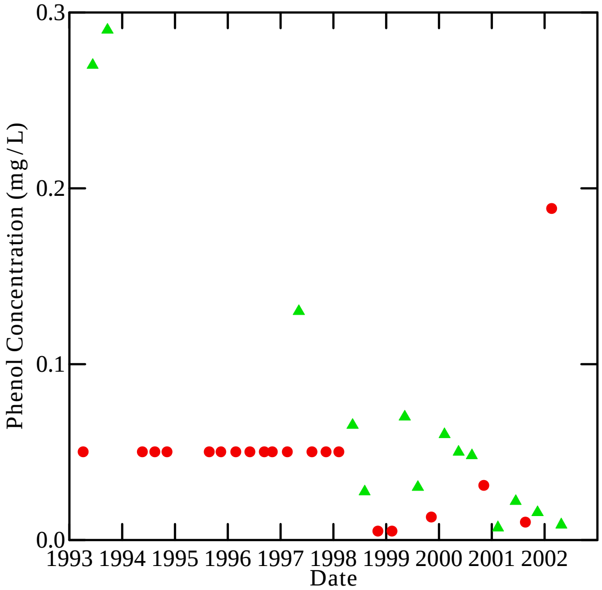
Well D3U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

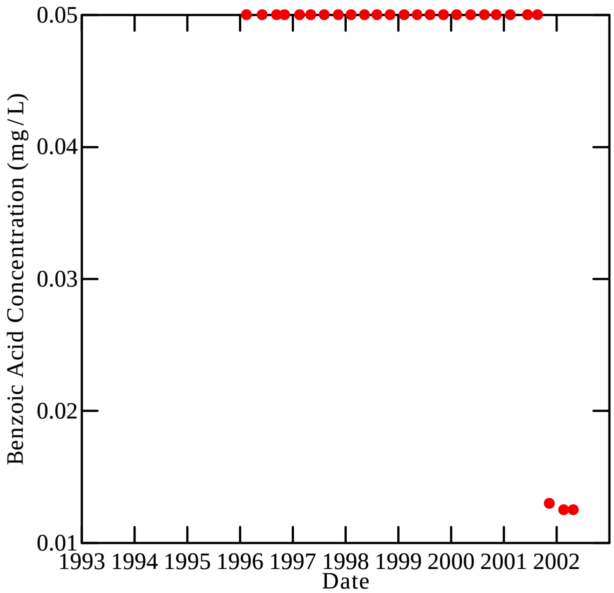
figure 8

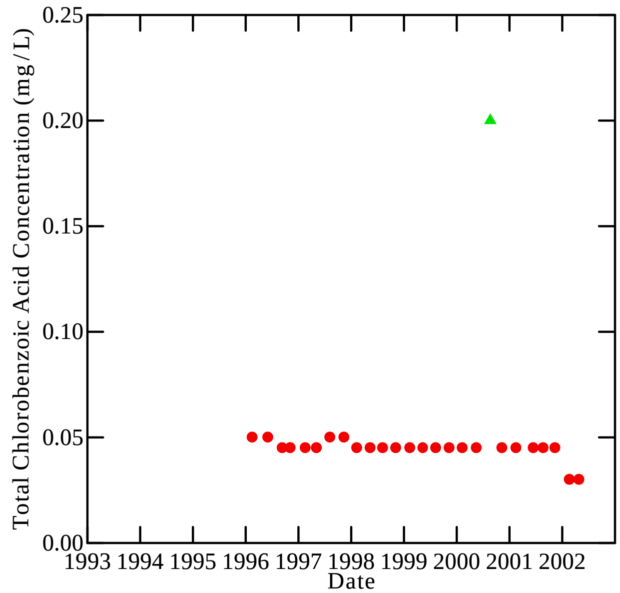
Well D2M

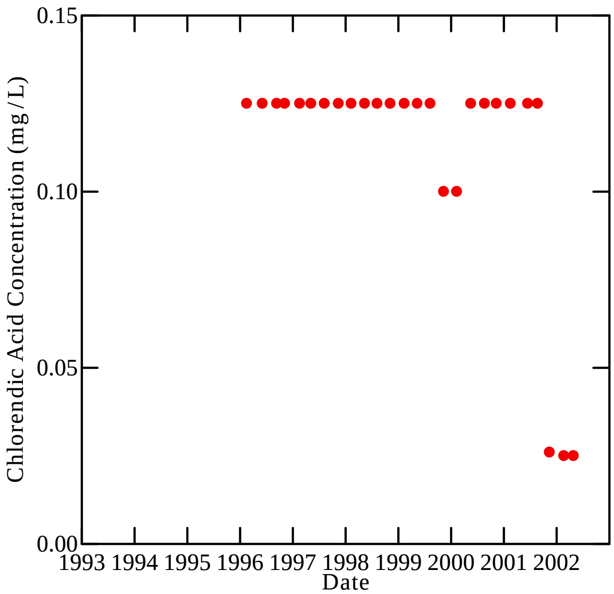
Analyte Concentration vs. Time

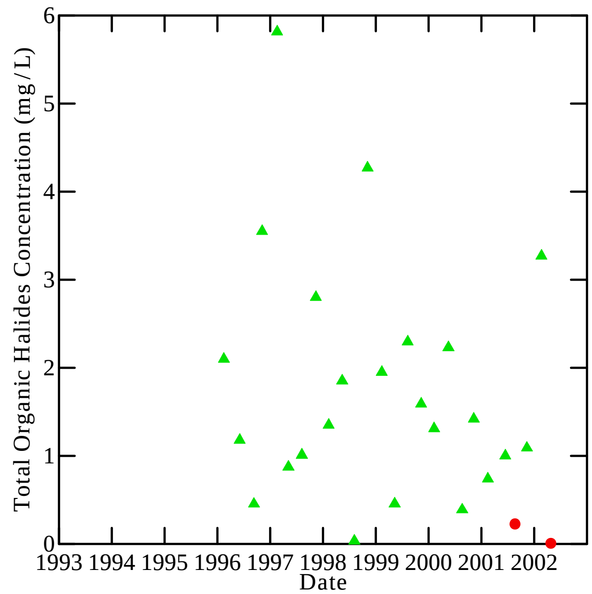
Second Quarter 2002

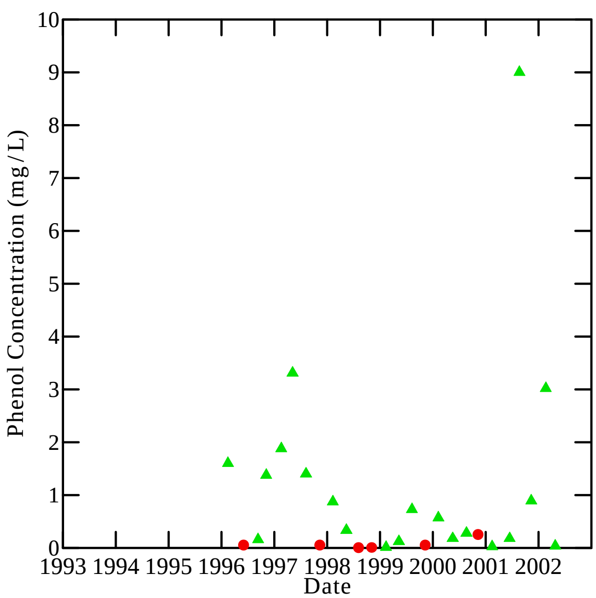
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

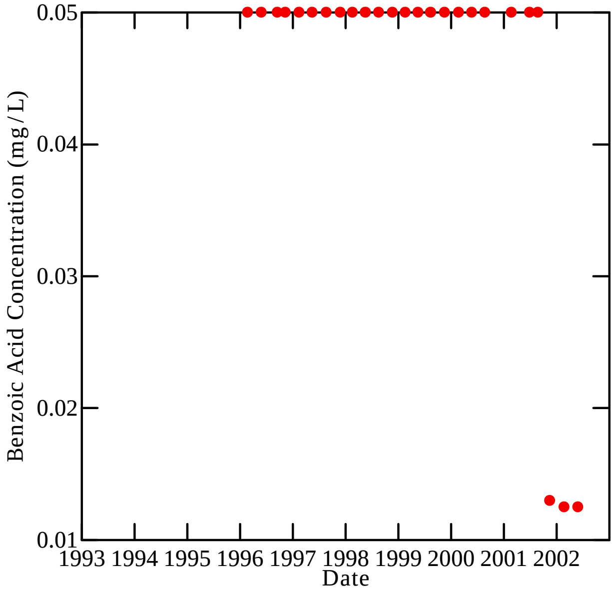
figure 9

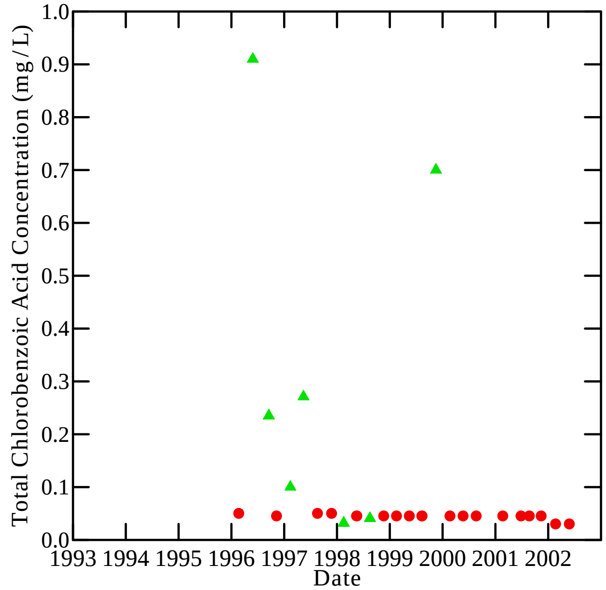
Well D1L

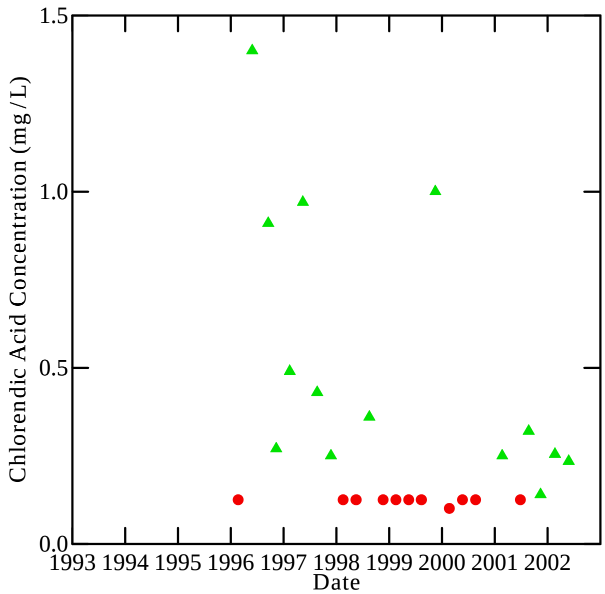
Analyte Concentration vs. Time

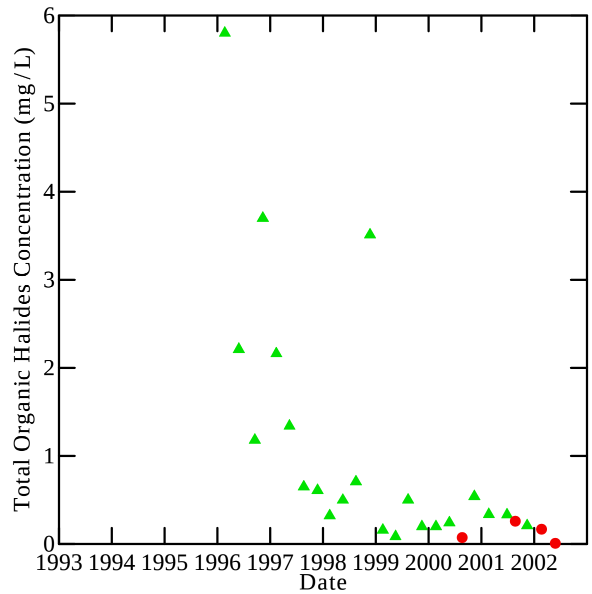
Second Quarter 2002

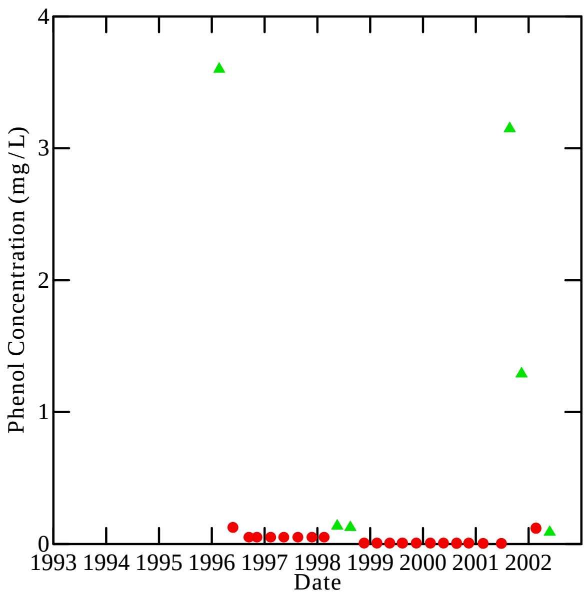
Hyde Park Landfill











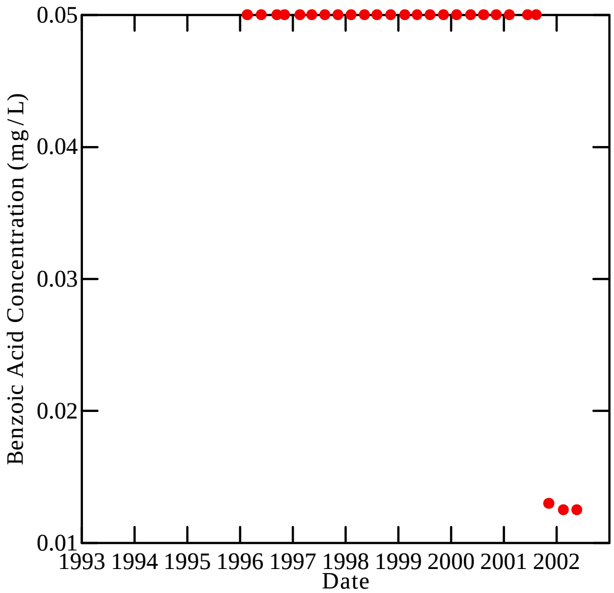
Notes:

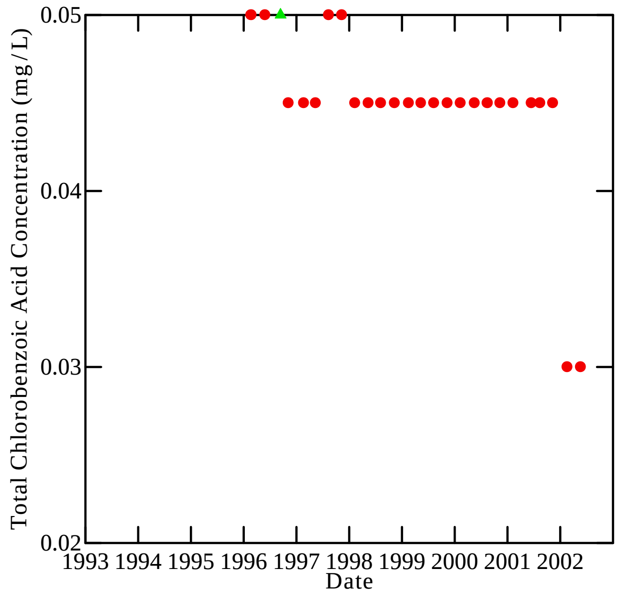
● Non-detect result

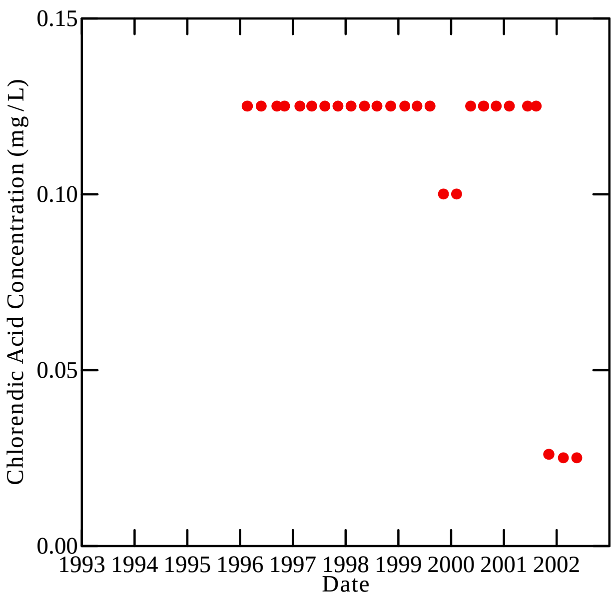
▲ Detected result

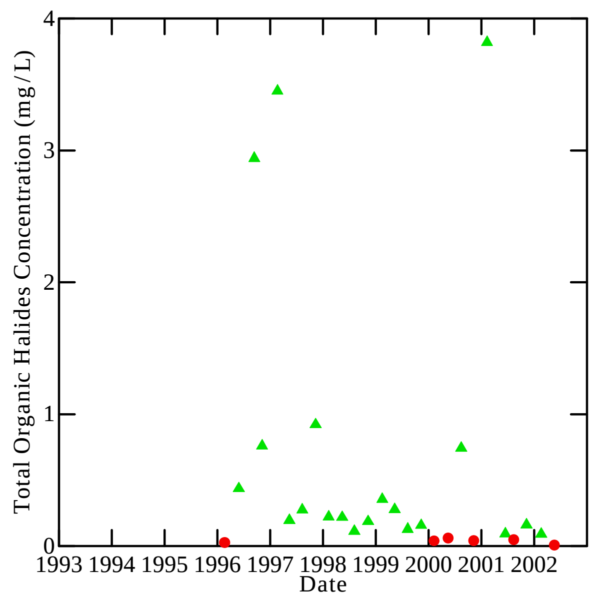
figure 10

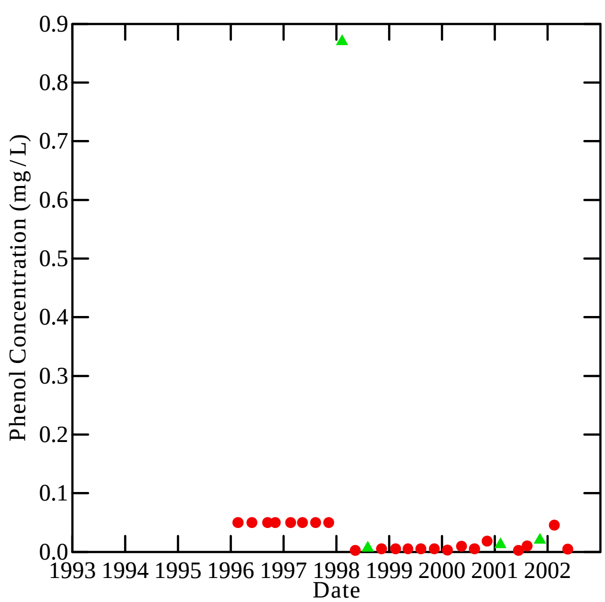
Well E3U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











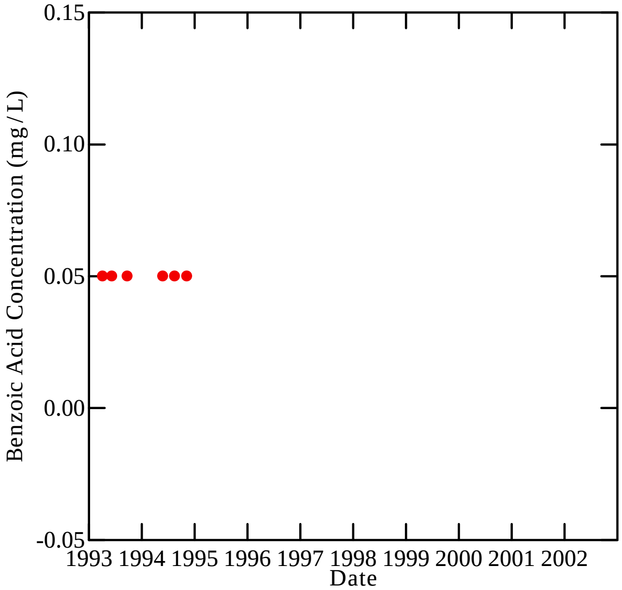
Notes:

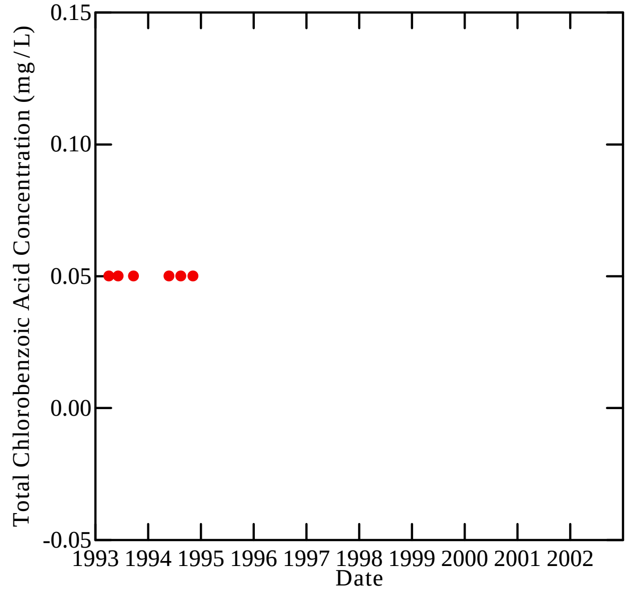
● Non-detect result

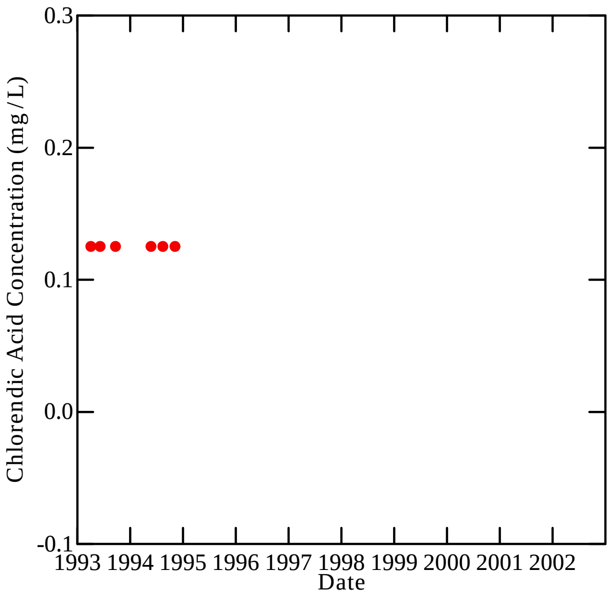
▲ Detected result

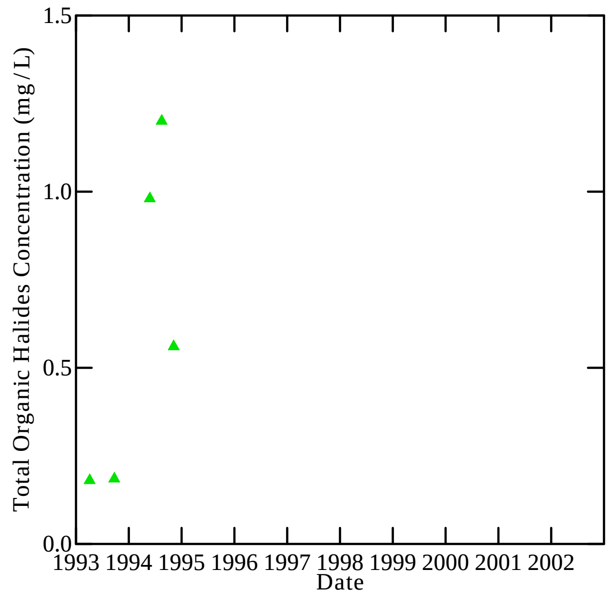
figure 11

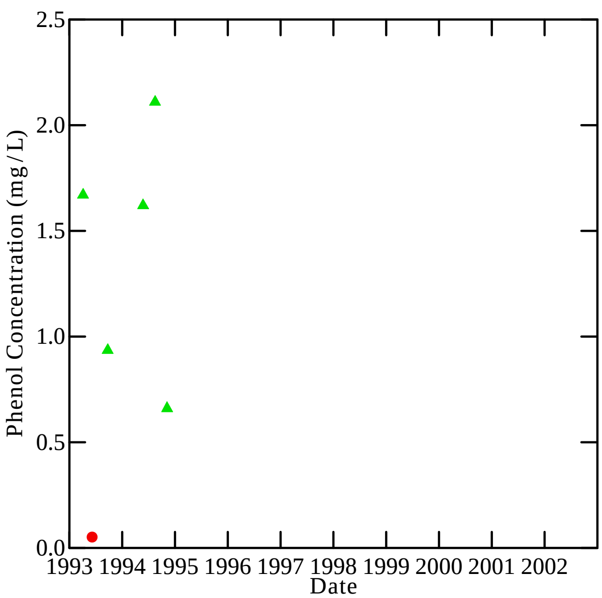
Well E3M
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill









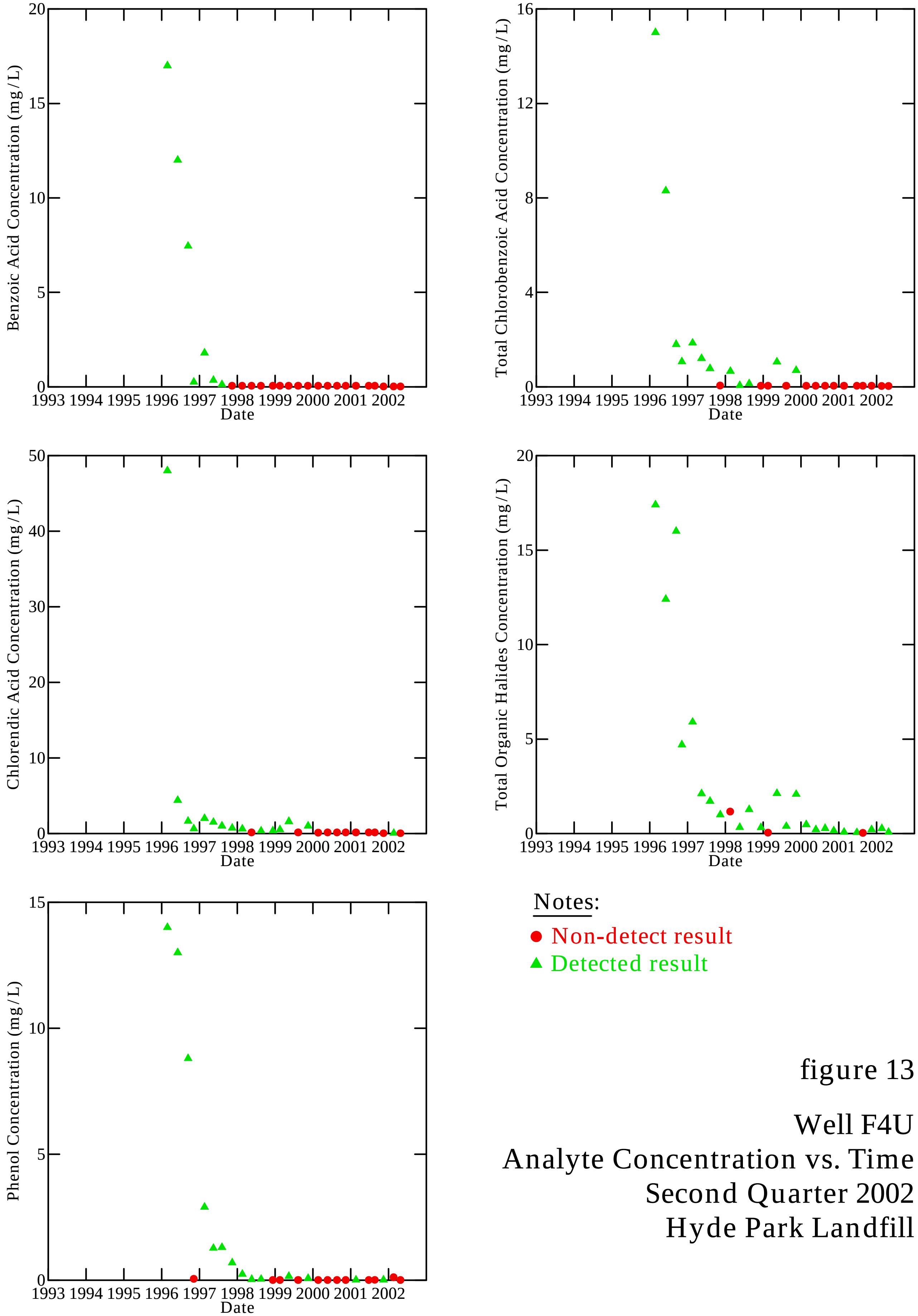


Notes:

- ● Non-detect result
- ▲ Detected result

figure 12

Well E2L
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill

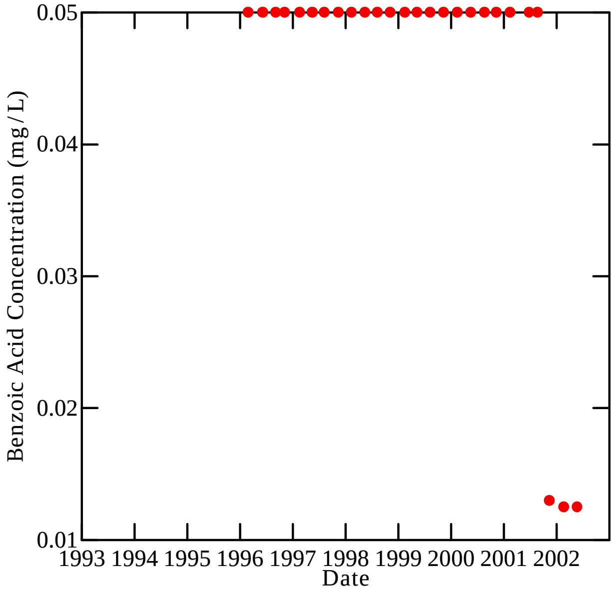


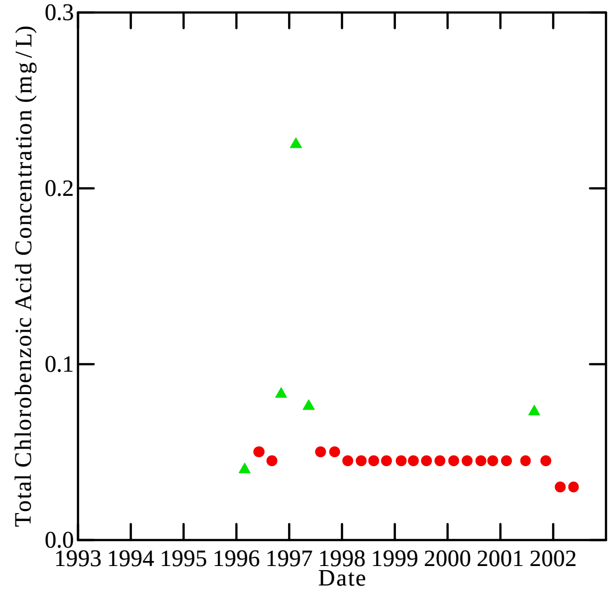
Notes:

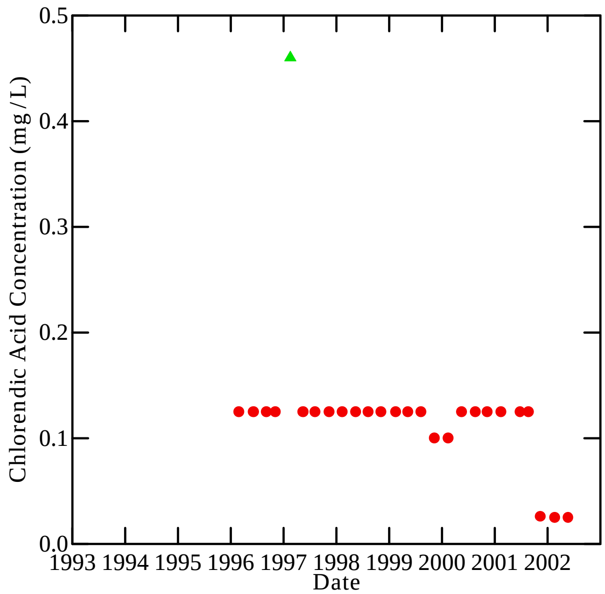
- ● Non-detect result
- ▲ Detected result

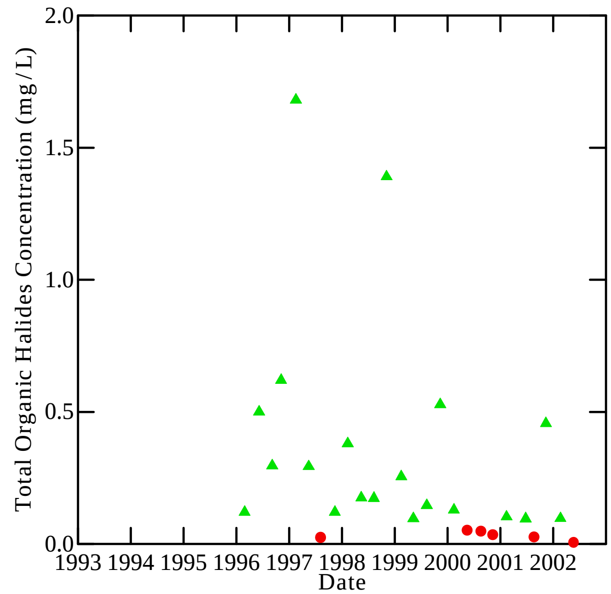
figure 13

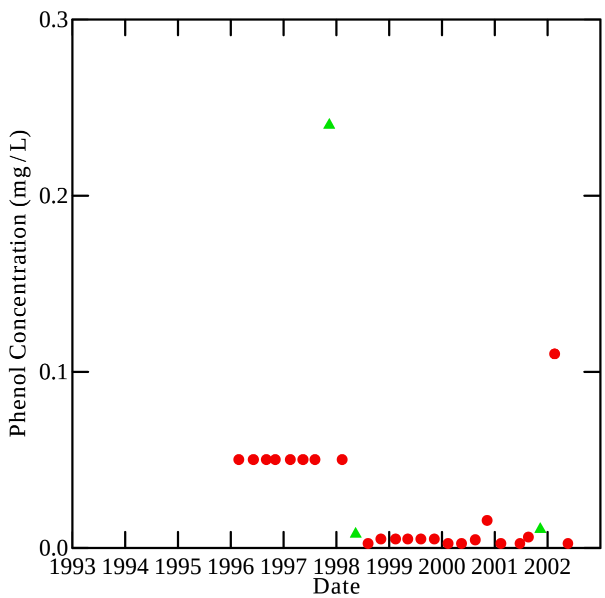
Well F4U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











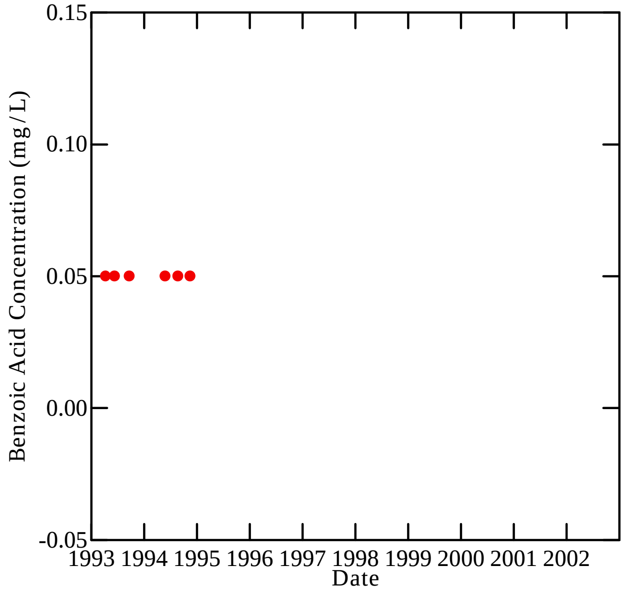
Notes:

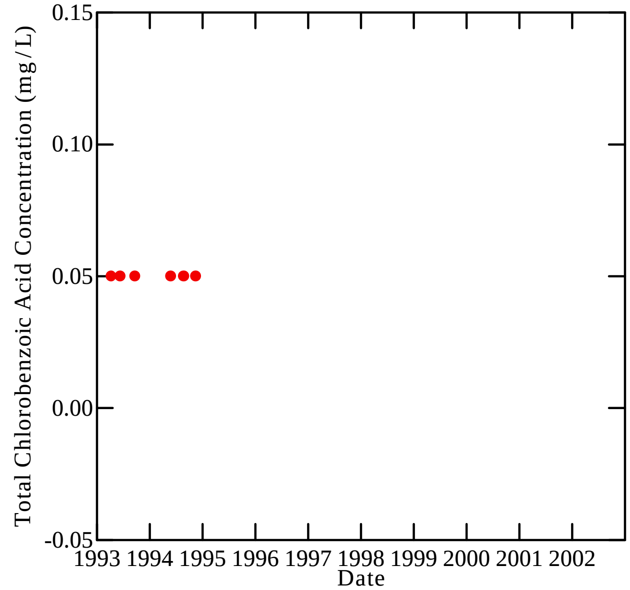
● Non-detect result

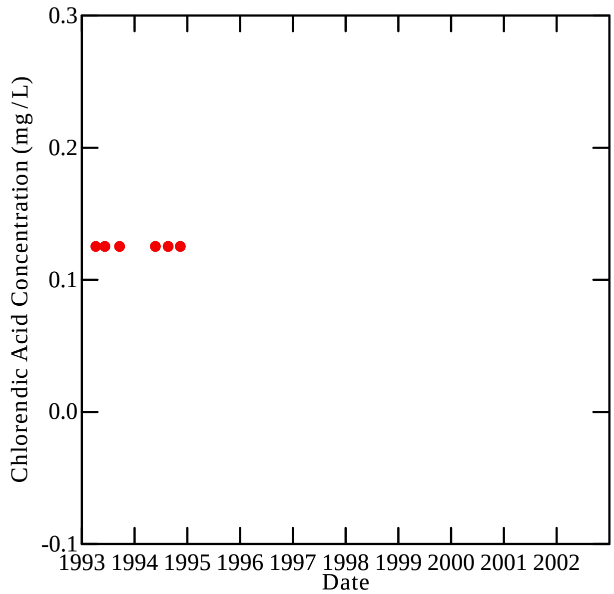
▲ Detected result

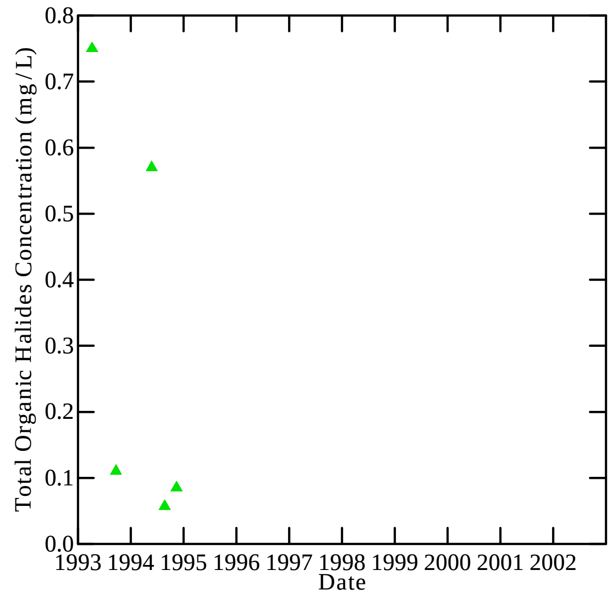
figure 14

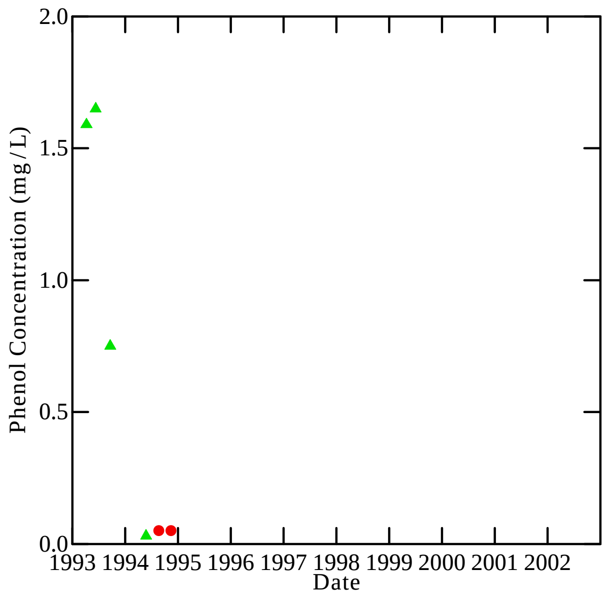
Well F1M
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

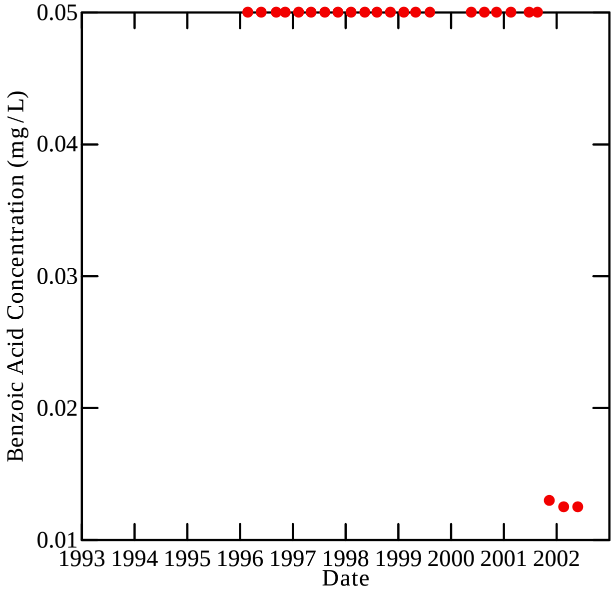
figure 15

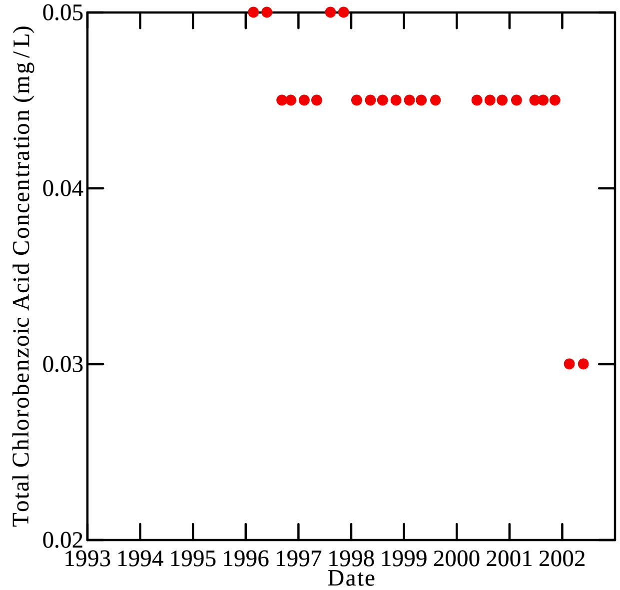
Well F2L

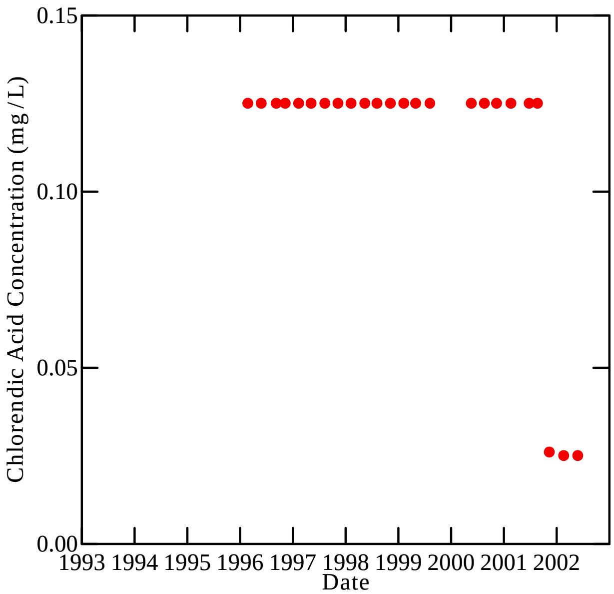
Analyte Concentration vs. Time

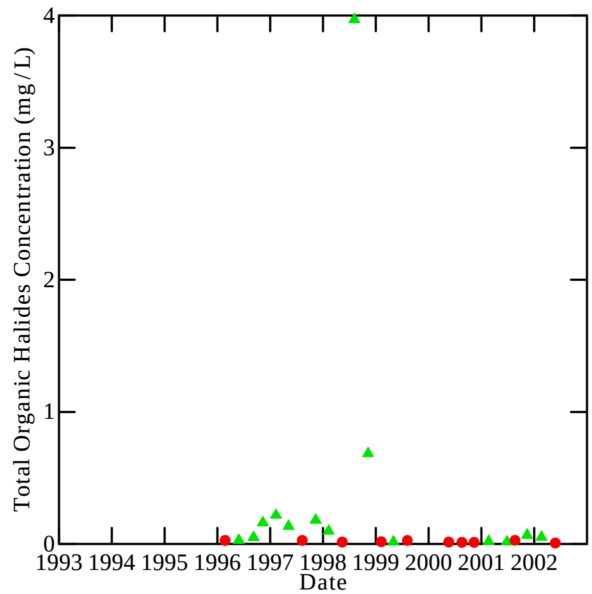
Second Quarter 2002

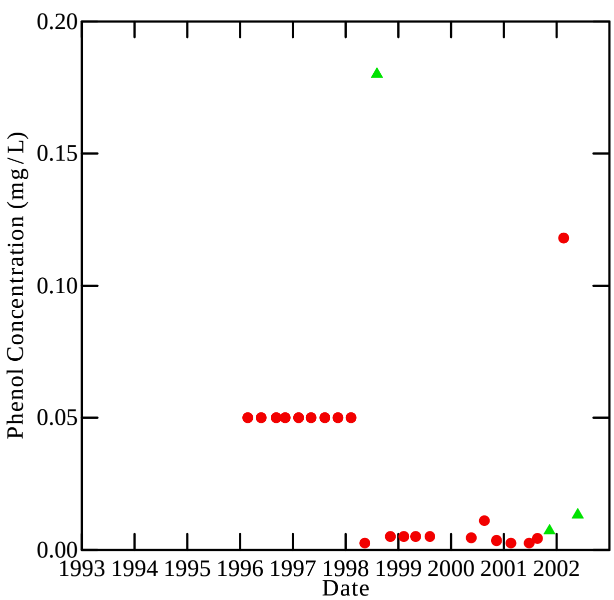
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

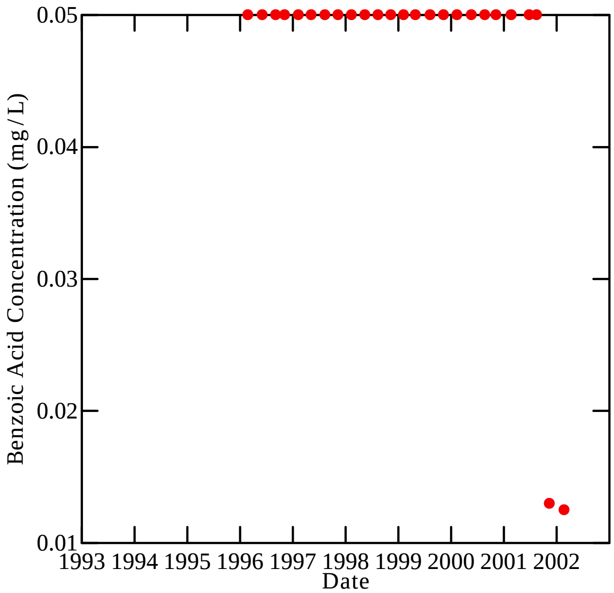
figure 16

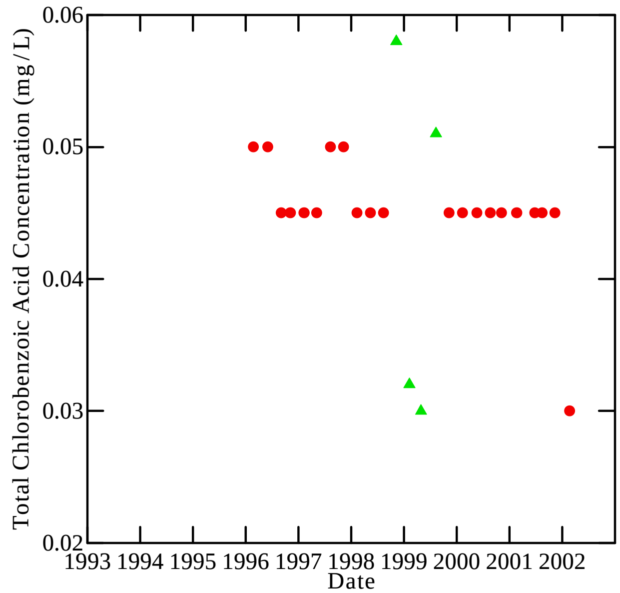
Well G4U

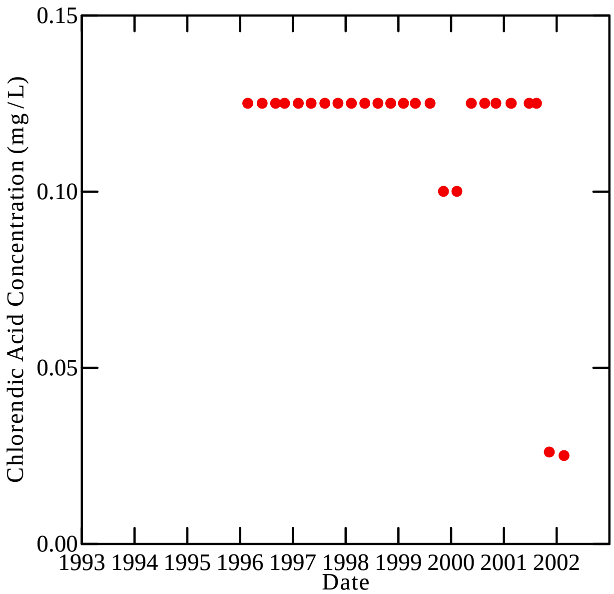
Analyte Concentration vs. Time

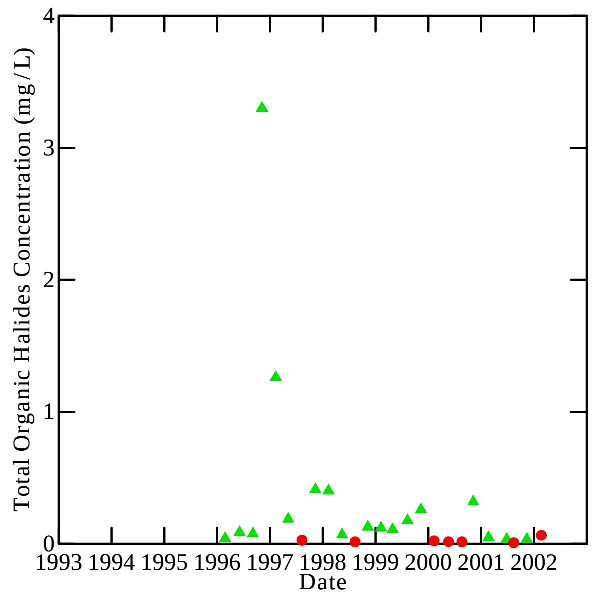
Second Quarter 2002

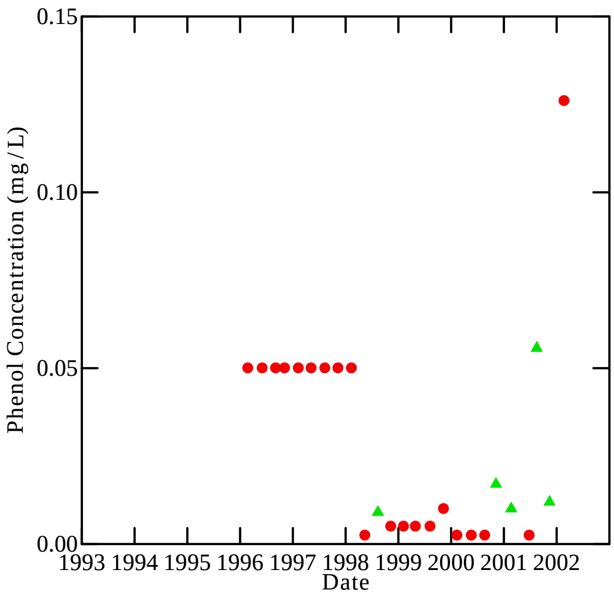
Hyde Park Landfill











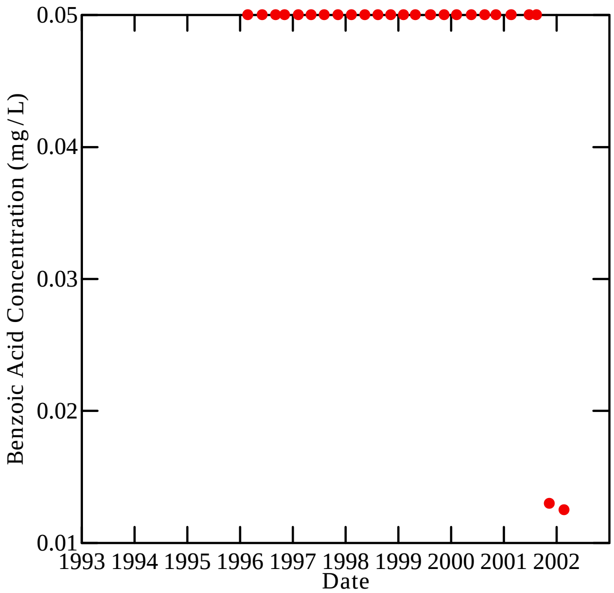
Notes:

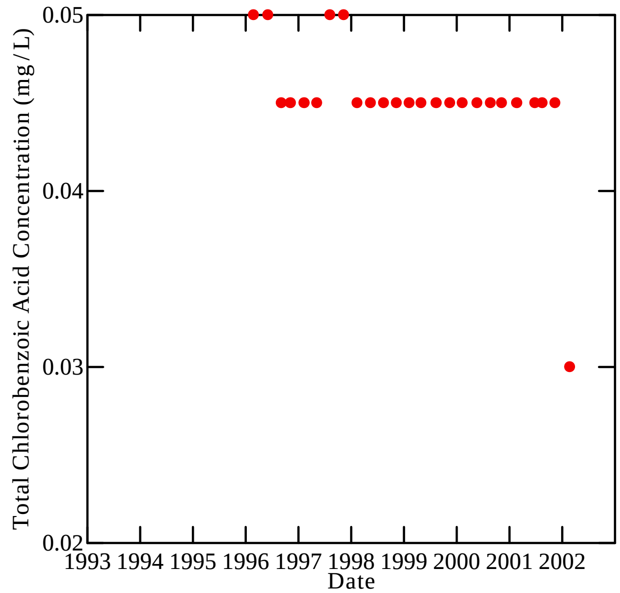
● Non-detect result

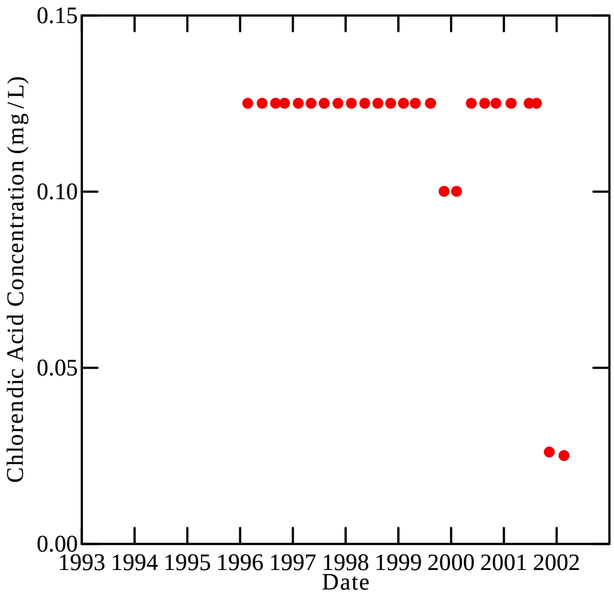
▲ Detected result

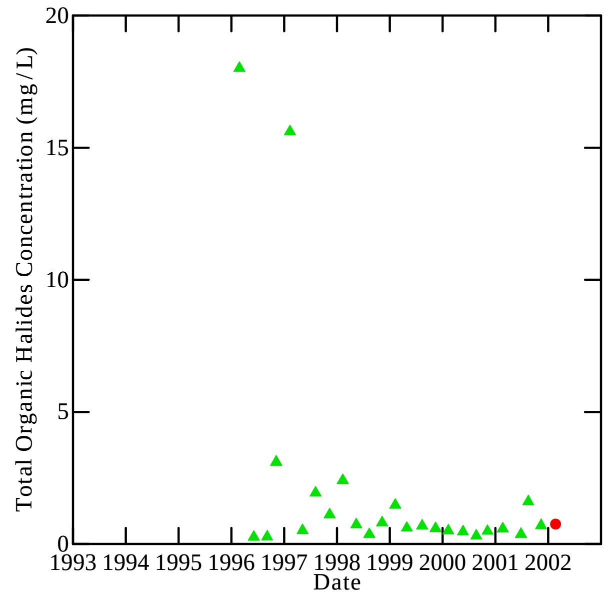
figure 17

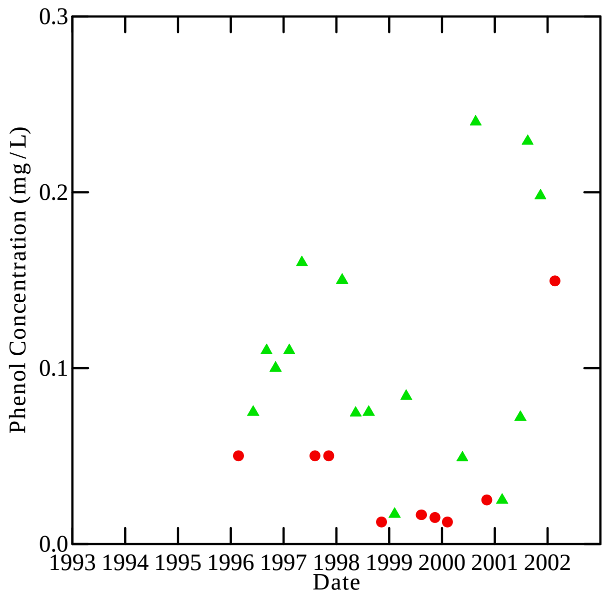
Well G1M
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











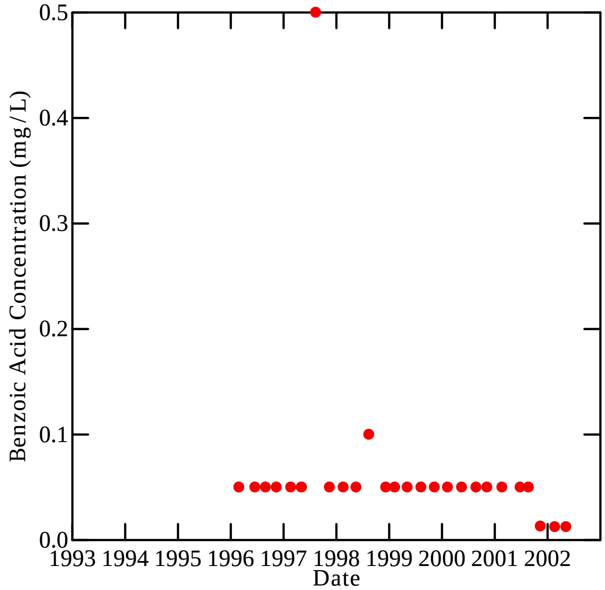
Notes:

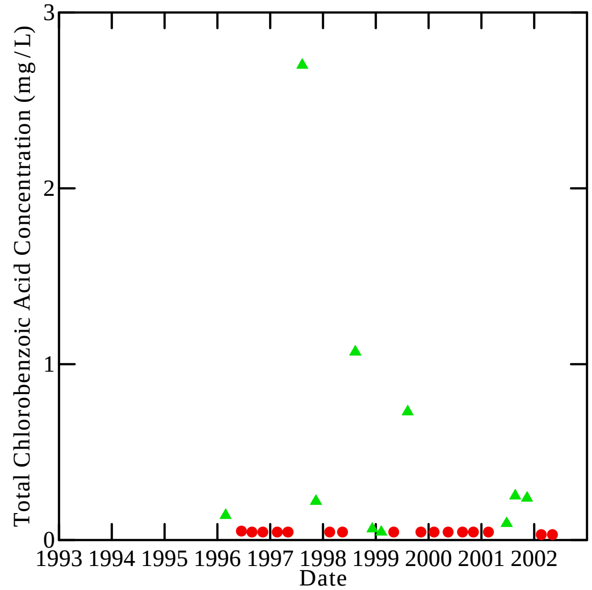
● Non-detect result

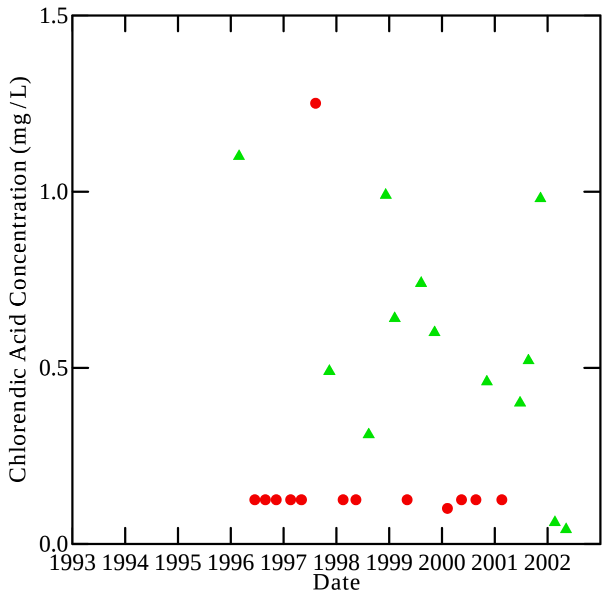
▲ Detected result

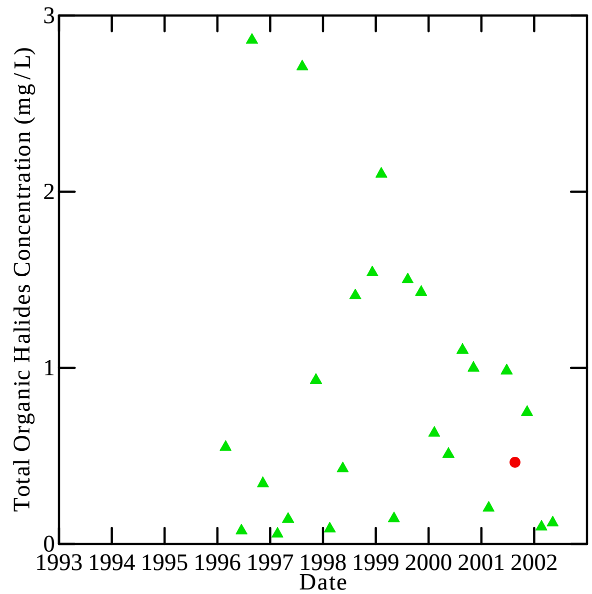
figure 18

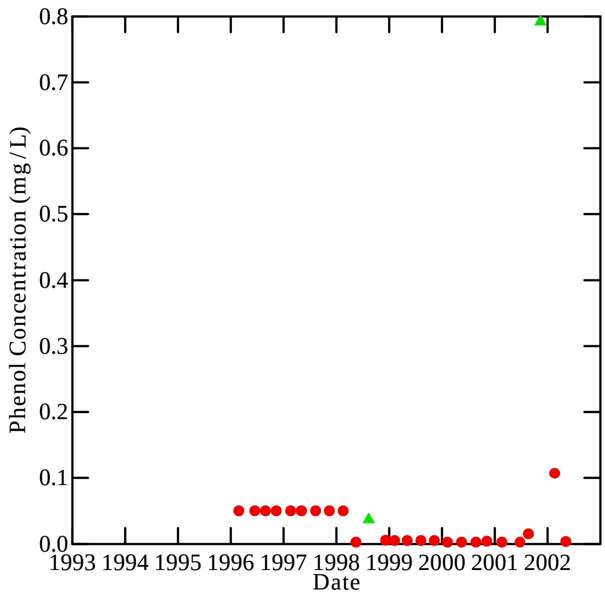
Well G1L
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











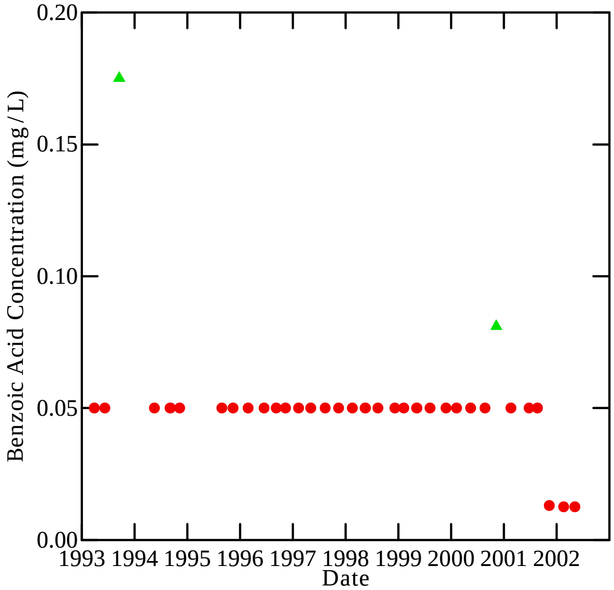
Notes:

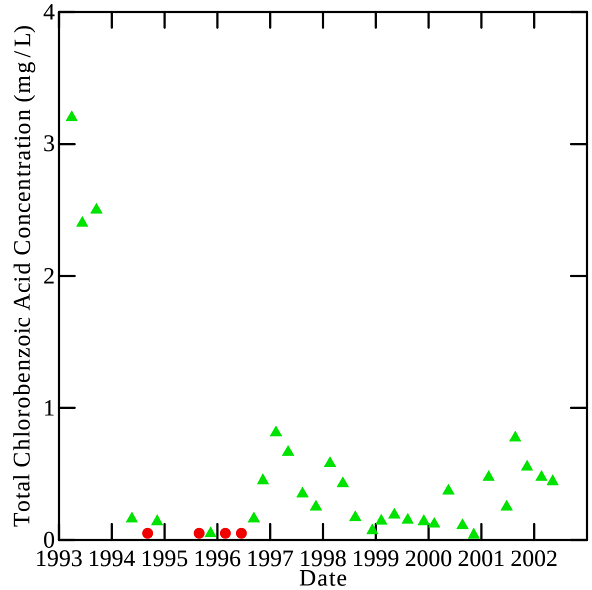
● Non-detect result

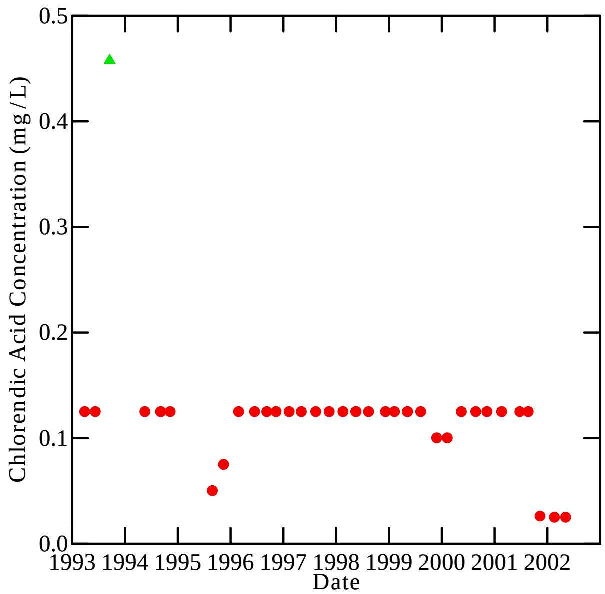
▲ Detected result

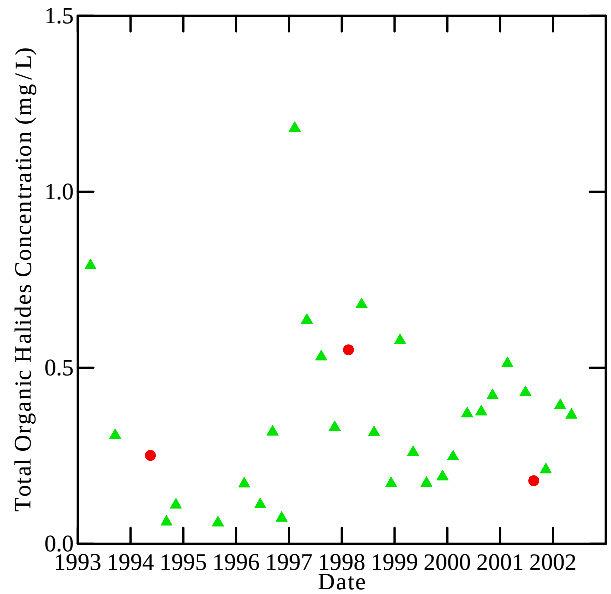
figure 19

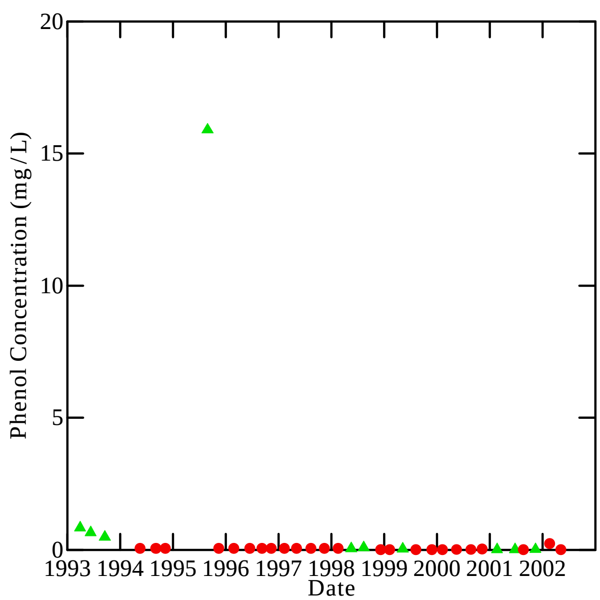
Well H1U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

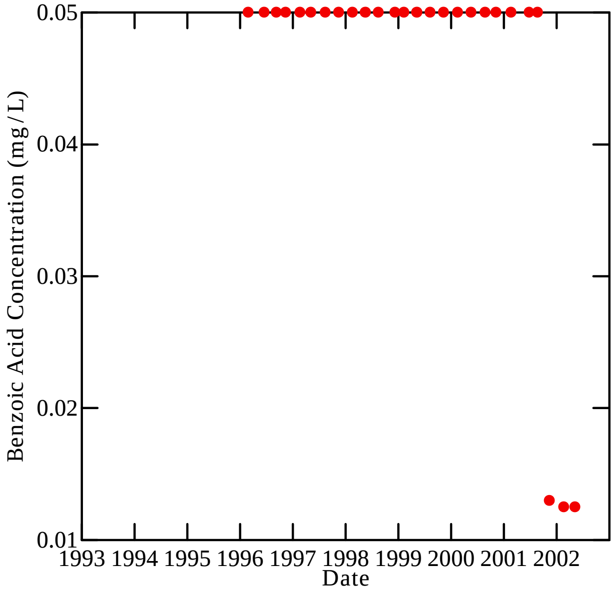
figure 20

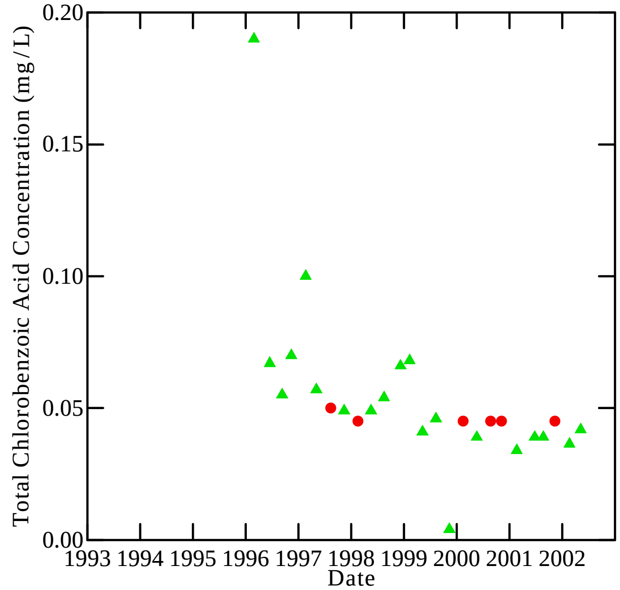
Well H2M

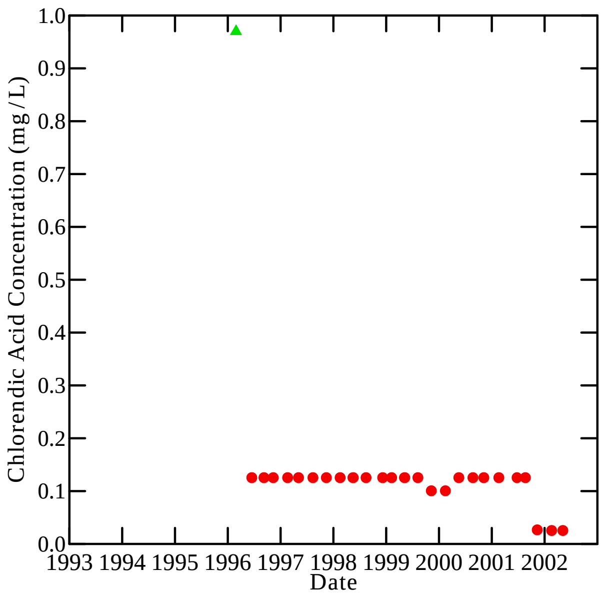
Analyte Concentration vs. Time

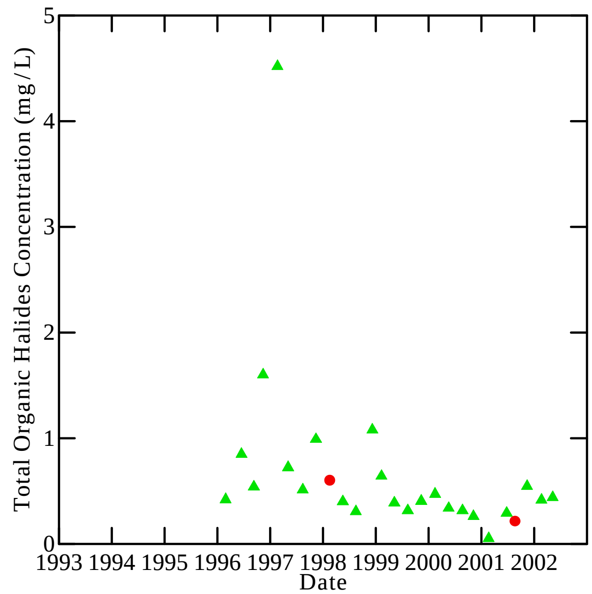
Second Quarter 2002

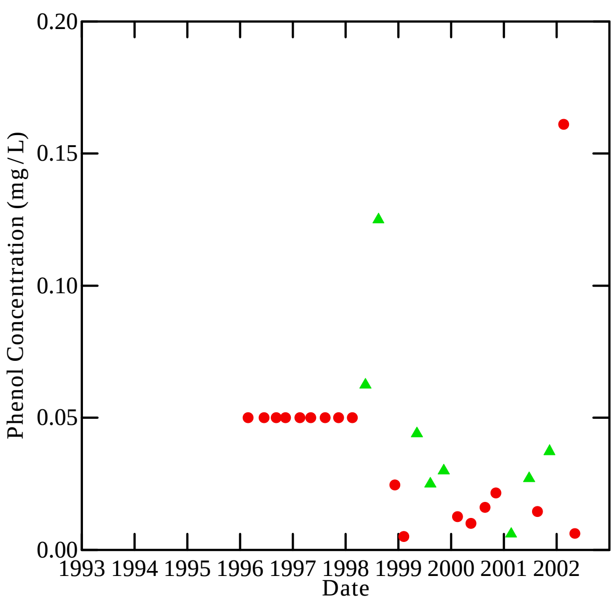
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

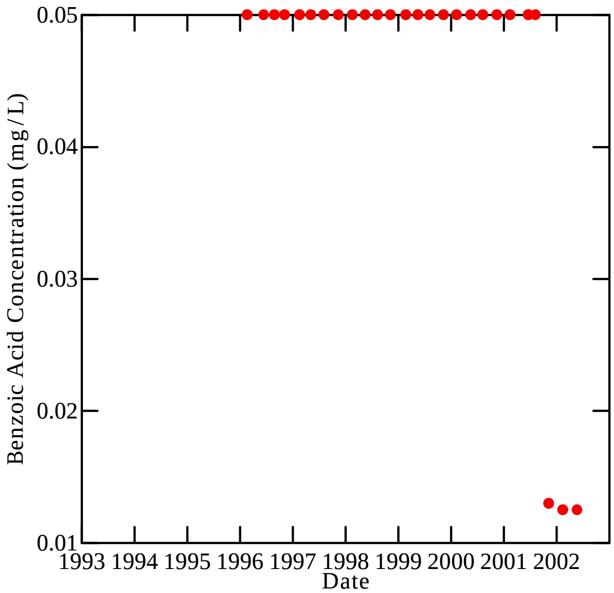
figure 21

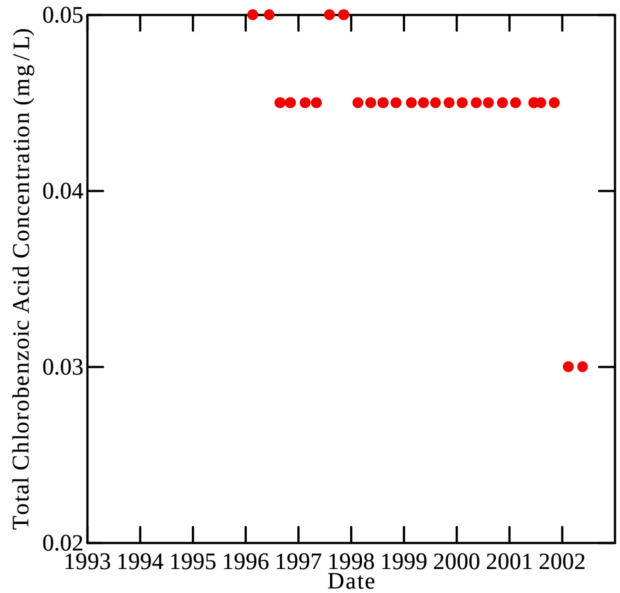
Well H3L

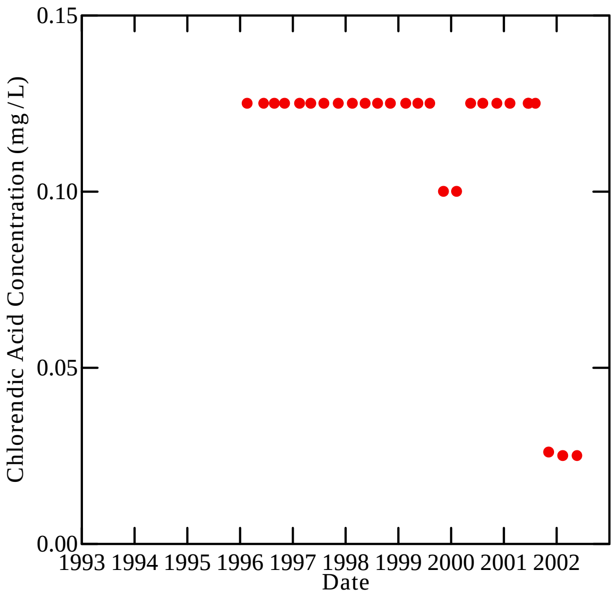
Analyte Concentration vs. Time

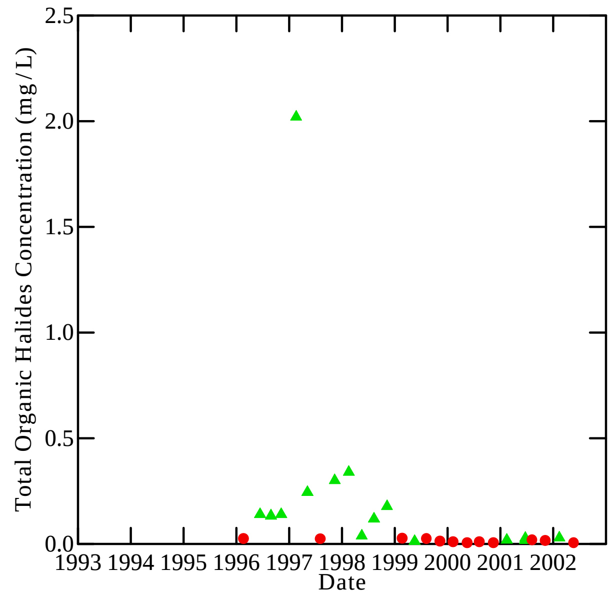
Second Quarter 2002

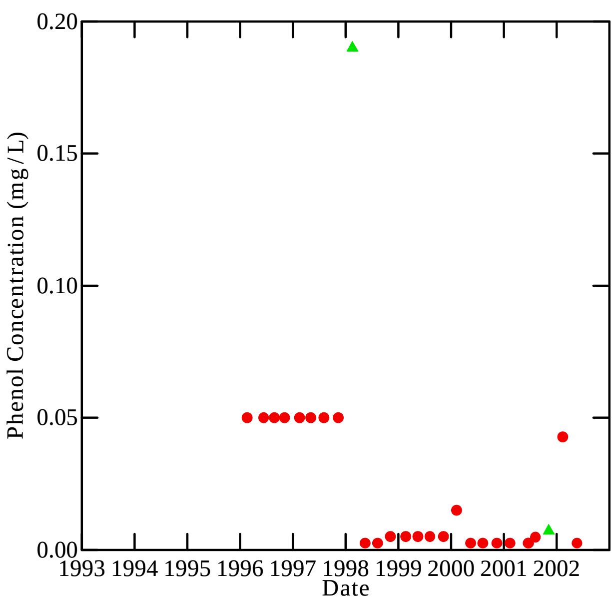
Hyde Park Landfill









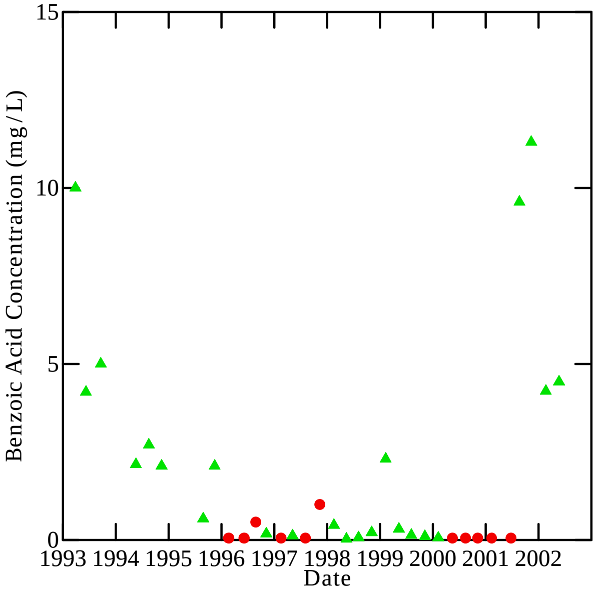


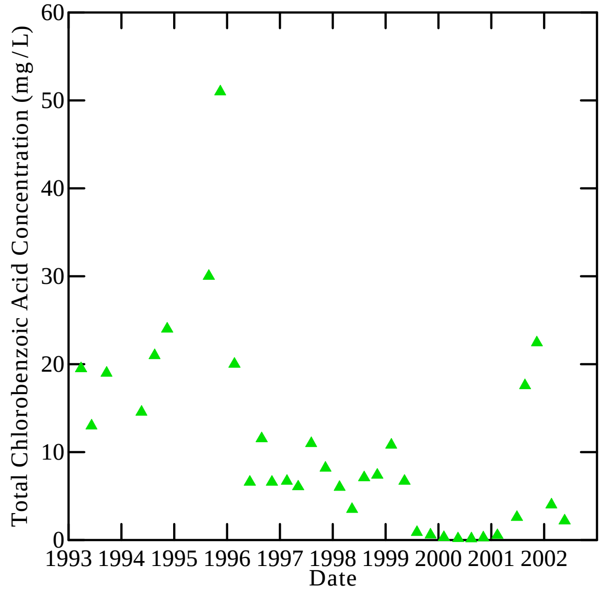
Notes:

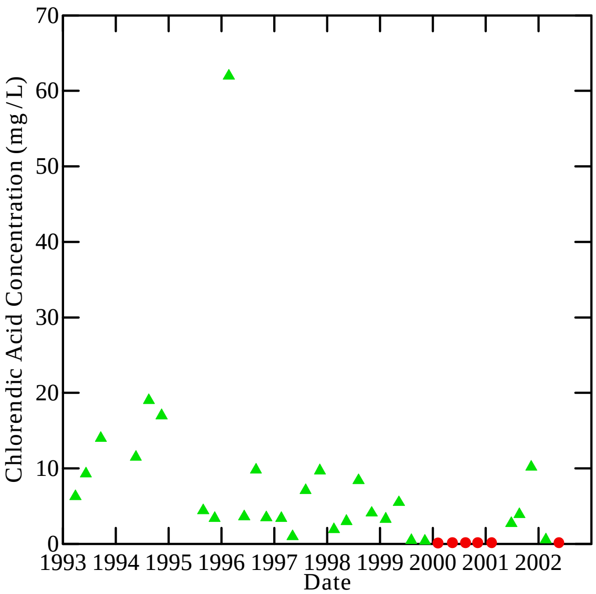
- ● Non-detect result
- ▲ Detected result

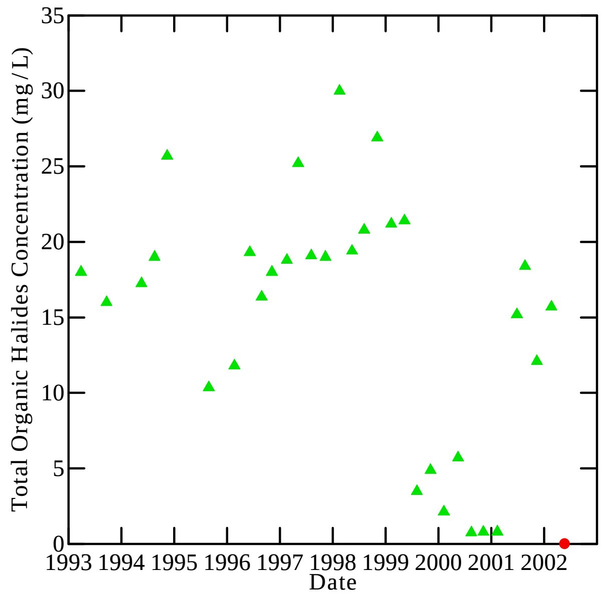
figure 22

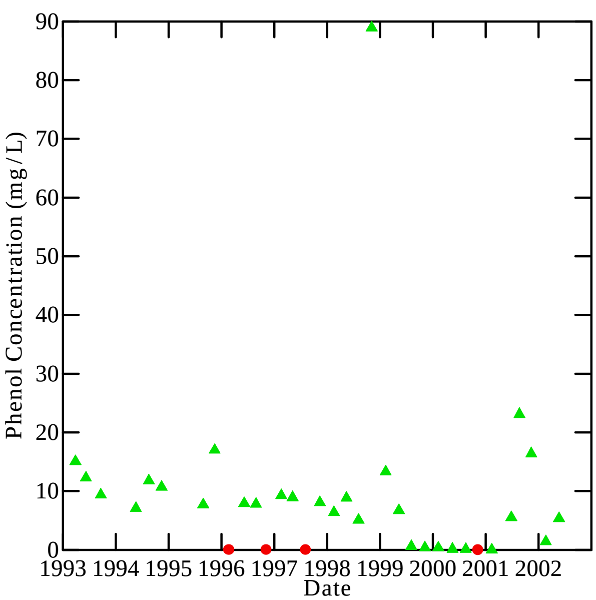
Well J1U
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill











Notes:

● Non-detect result

▲ Detected result

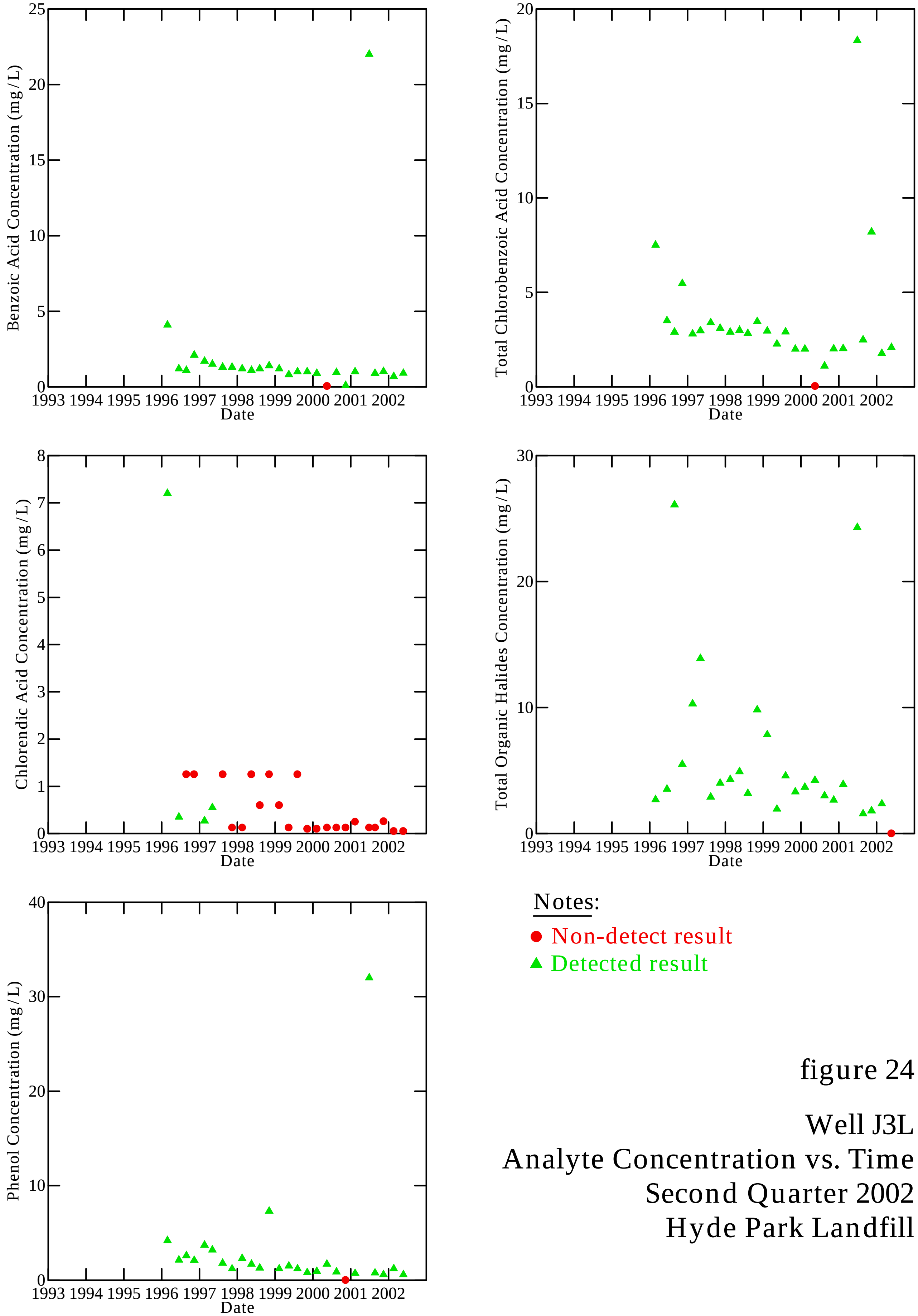
figure 23

Well J2M

Analyte Concentration vs. Time

Second Quarter 2002

Hyde Park Landfill



Notes:

- Non-detect result
- Detected result

figure 24

Well J3L
Analyte Concentration vs. Time
Second Quarter 2002
Hyde Park Landfill

TABLE A-1

RESULTS OF STATISTICAL TREND ANALYSES MONITORING EVALUATION
SECOND QUARTER 2002
HYDE PARK LANDFILL
NIAGARA FALLS, NEW YORK

Location	*Analyte*	*Number of Observations*	*Percentage Non-Detect*	*Trend Test* *Method*	*Test Statistic*	*Probability*	*Conclusion*
B1U	Benzoic Acid	10	90%	Logistic	-0.232	0.929	NST
	Chlorendic Acid	10	10%	Mann-Kendall	5	0.721	NST
	Phenolics	10	30%	Mann-Kendall	3	0.858	NST
	Total Chlorobenzoic Acid	10	10%	Mann-Kendall	15	0.210	NST
	Total Organic Halides	10	10%	Mann-Kendall	-35	**0.002**	**Decreasing**
B1M	Benzoic Acid	10	80%	Logistic	2.08E-04	0.944	NST
	Chlorendic Acid	10	20%	Mann-Kendall	1	1.000	NST
	Phenolics	10	60%	Logistic	0.005	0.145	NST
	Total Chlorobenzoic Acid	10	10%	Mann-Kendall	7	0.592	NST
	Total Organic Halides	10	10%	Mann-Kendall	-9	0.474	NST
B1L	Benzoic Acid	10	100%	Non-Detect	-9	ND	ND
	Chlorendic Acid	10	20%	Mann-Kendall	-9	0.474	NST
	Phenolics	10	30%	Mann-Kendall	21	0.074	NST
	Total Chlorobenzoic Acid	10	10%	Mann-Kendall	-13	0.283	NST
	Total Organic Halides	10	10%	Mann-Kendall	-27	**0.020**	**Decreasing**
C1U	Benzoic Acid	10	90%	Logistic	-0.232	0.929	NST
	Chlorendic Acid	10	10%	Mann-Kendall	3	0.858	NST
	Phenolics	10	40%	Mann-Kendall	-20	0.089	NST
	Total Chlorobenzoic Acid	10	30%	Mann-Kendall	-12	0.325	NST
	Total Organic Halides	10	0%	Mann-Kendall	-31	**0.007**	**Decreasing**
C1M	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	10%	Mann-Kendall	-9	0.474	NST
	Phenolics	10	70%	Logistic	0.007	0.132	NST
	Total Chlorobenzoic Acid	10	80%	Logistic	-0.003	0.425	NST
	Total Organic Halides	10	10%	Mann-Kendall	-40	**4.86E-04**	**Decreasing**
C1L	Benzoic Acid	9	100%	Non-Detect	-15	ND	ND
	Chlorendic Acid	9	22%	Mann-Kendall	5	0.677	NST
	Phenolics	9	56%	Logistic	0.009	0.107	NST
	Total Chlorobenzoic Acid	9	22%	Mann-Kendall	0	1.000	NST
	Total Organic Halides	9	0%	Mann-Kendall	-20	**0.048**	**Decreasing**
D3U	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	0%	Mann-Kendall	-5	0.721	NST
	Phenolics	10	80%	Logistic	0.013	0.186	NST
	Total Chlorobenzoic Acid	10	100%	Non-Detect	-16	ND	ND
	Total Organic Halides	10	0%	Mann-Kendall	-17	0.152	NST
D2M	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	20%	Mann-Kendall	-3	0.858	NST
	Phenolics	10	30%	Mann-Kendall	-19	0.107	NST
	Total Chlorobenzoic Acid	10	20%	Mann-Kendall	-17	0.152	NST
	Total Organic Halides	10	0%	Mann-Kendall	-23	**0.049**	**Decreasing**
D1L	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	100%	Non-Detect	-17	ND	ND
	Phenolics	10	10%	Mann-Kendall	2	0.929	NST
	Total Chlorobenzoic Acid	10	90%	Logistic	-0.004	0.415	NST
	Total Organic Halides	10	20%	Mann-Kendall	-9	0.474	NST

TABLE A-1

RESULTS OF STATISTICAL TREND ANALYSES MONITORING EVALUATION
SECOND QUARTER 2002
HYDE PARK LANDFILL
NIAGARA FALLS, NEW YORK

Location	*Analyte*	*Number of Observations*	*Percentage Non-Detect*	*Trend Test*			
				Method	*Test Statistic*	*Probability*	*Conclusion*
E3U	Benzoic Acid	9	100%	Non-Detect	-20	ND	ND
	Chlorendic Acid	9	44%	Mann-Kendall	19	0.061	NST
	Phenolics	10	70%	Logistic	0.009	0.129	NST
	Total Chlorobenzoic Acid	9	100%	Non-Detect	-14	ND	ND
	Total Organic Halides	10	40%	Mann-Kendall	-13	0.283	NST
E3M	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	100%	Non-Detect	-17	ND	ND
	Phenolics	10	80%	Logistic	0.002	0.621	NST
	Total Chlorobenzoic Acid	10	100%	Non-Detect	-16	ND	ND
	Total Organic Halides	10	50%	Logistic	0.002	0.435	NST
E2L	Benzoic Acid	--	--	--	--	--	--
	Chlorendic Acid	--	--	--	--	--	--
	Phenolics	--	--	--	--	--	--
	Total Chlorobenzoic Acid	--	--	--	--	--	--
	Total Organic Halides	--	--	--	--	--	--
F4U	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	90%	Logistic	0.012	0.346	NST
	Phenolics	10	80%	Logistic	0.002	0.596	NST
	Total Chlorobenzoic Acid	10	100%	Non-Detect	-16	ND	ND
	Total Organic Halides	10	10%	Mann-Kendall	-19	0.107	NST
F1M	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	100%	Non-Detect	-17	ND	ND
	Phenolics	10	90%	Logistic	0.004	0.429	NST
	Total Chlorobenzoic Acid	10	90%	Logistic	0.002	0.594	NST
	Total Organic Halides	10	50%	Logistic	0.001	0.723	NST
F2L	Benzoic Acid	--	--	--	--	--	--
	Chlorendic Acid	--	--	--	--	--	--
	Phenolics	--	--	--	--	--	--
	Total Chlorobenzoic Acid	--	--	--	--	--	--
	Total Organic Halides	--	--	--	--	--	--
G4U	Benzoic Acid	9	100%	Non-Detect	-20	ND	ND
	Chlorendic Acid	9	100%	Non-Detect	-20	ND	ND
	Phenolics	9	78%	Logistic	0.012	0.182	NST
	Total Chlorobenzoic Acid	9	100%	Non-Detect	-14	ND	ND
	Total Organic Halides	9	56%	Logistic	0.003	0.302	NST
G1M (*)	Benzoic Acid	9	100%	Non-Detect	-15	ND	ND
	Chlorendic Acid	9	100%	Non-Detect	-9	ND	ND
	Phenolics	9	56%	Logistic	0.001	0.894	NST
	Total Chlorobenzoic Acid	9	100%	Non-Detect	-8	ND	ND
	Total Organic Halides	9	56%	Logistic	0.001	0.87	NST
G1L (*)	Benzoic Acid	9	100%	Non-Detect	-15	ND	ND
	Chlorendic Acid	9	100%	Non-Detect	-9	ND	ND
	Phenolics	9	33%	Mann-Kendall	13	0.211	NST
	Total Chlorobenzoic Acid	9	100%	Non-Detect	-8	ND	ND
	Total Organic Halides	9	11%	Mann-Kendall	16	0.118	NST

TABLE A-1

RESULTS OF STATISTICAL TREND ANALYSES MONITORING EVALUATION
SECOND QUARTER 2002
HYDE PARK LANDFILL
NIAGARA FALLS, NEW YORK

Location	*Analyte*	*Number of Observations*	*Percentage Non-Detect*	*Trend Test*			
				Method	*Test Statistic*	*Probability*	*Conclusion*
H1U	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	40%	Mann-Kendall	4	0.788	NST
	Phenolics	10	90%	Logistic	0.005	0.425	NST
	Total Chlorobenzoic Acid	10	70%	Logistic	0.003	0.275	NST
	Total Organic Halides	10	10%	Mann-Kendall	-19	0.107	NST
H2M	Benzoic Acid	10	90%	Logistic	-0.003	0.571	NST
	Chlorendic Acid	10	100%	Non-Detect	-17	ND	ND
	Phenolics	10	70%	Logistic	0.002	0.508	NST
	Total Chlorobenzoic Acid	10	0%	Mann-Kendall	15	0.210	NST
	Total Organic Halides	10	10%	Mann-Kendall	1	1.000	NST
H3L	Benzoic Acid	10	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	10	100%	Non-Detect	-17	ND	ND
	Phenolics	10	70%	Logistic	0.002	0.510	NST
	Total Chlorobenzoic Acid	10	40%	Mann-Kendall	-8	0.531	NST
	Total Organic Halides	10	10%	Mann-Kendall	1	1.000	NST
J1U	Benzoic Acid	11	100%	Non-Detect	-23	ND	ND
	Chlorendic Acid	11	100%	Non-Detect	-17	ND	ND
	Phenolics	11	91%	Logistic	0.005	0.42	NST
	Total Chlorobenzoic Acid	11	100%	Non-Detect	-16	ND	ND
	Total Organic Halides	11	64%	Logistic	-0.007	0.396	NST
J2M	Benzoic Acid	10	50%	Logistic	0.005	0.146	NST
	Chlorendic Acid	10	60%	Logistic	0.006	0.113	NST
	Phenolics	10	10%	Mann-Kendall	11	0.371	NST
	Total Chlorobenzoic Acid	10	0%	Mann-Kendall	25	**0.032**	**Increasing**
	Total Organic Halides	10	10%	Mann-Kendall	9	0.474	NST
J3L	Benzoic Acid	10	10%	Mann-Kendall	10	0.421	NST
	Chlorendic Acid	10	100%	Non-Detect	-2	ND	ND
	Phenolics	10	10%	Mann-Kendall	-9	0.474	NST
	Total Chlorobenzoic Acid	10	10%	Mann-Kendall	19	0.107	NST
	Total Organic Halides	10	10%	Mann-Kendall	-21	0.074	NST

Notes:

ND: Parameter not detected at this location. No trend analysis performed.
NST: No statistically significant ($P<0.05$) trend detected.
Increasing: Statistically significant ($P<0.05$) increasing trend detected.
Decreasing: Statistically significant ($P<0.05$) decreasing trend detected.
Logistic: Logistic regression used for trend test (>= 50%ND).
Mann-Kendall: Mann Kendall method used for trend test (<50%ND).
--: No data collected at wells E2L and F2L during the past 2 years.
Data used for the statistical tests include monitoring events from 1999 to present.
(*) - The wells G1L and G1M were not sampled during the second quarter 2002 round of sampling.