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Volume I

SITE INVESTIGATION REPORT

Newstead Site
Newstead, New York

VOLUME I - TEXT, FIGURES, AND TABLES

DRAFT
FOR REVIEW

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1.0 INTRODUCTION

This document presents the "Site Investigation Report" for the Newstead Site (Site) consistent with the Administrative Order on Consent, Index Number, II CERCLA - 00209 (Consent Order), dated September 26, 1990, between the United States Environmental Protection Agency (U.S. EPA) and Pratt & Lambert.

This Site Investigation Report presents the results of investigative activities conducted at the Site from June 7, 1993 to September 20, 1996. The three interim reports, previously submitted to the U.S. EPA, which presented the results of investigative tasks conducted in 1993 are incorporated into this Site Investigation Report.

Previous investigations conducted at the Site during the period 1987 to 1990 by the New York State Department of Environmental Conservation (NYSDEC), Erie County Health Department (ECHD), the New York State Department of Health (NYSDOH), and the U.S. EPA are also summarized. A Baseline Health Risk Evaluation and a Fish and Wildlife Impact Analysis are presented in this Site Investigation Report.

All investigative tasks and reporting including this Site Investigation Report were completed in accordance with the "Site Investigation Work Plan" (Work Plan), April 1993 prepared by Conestoga-Rovers & Associates (CRA) (CRA, 1993a) and the responses to the following U.S. EPA comments:

- U.S. EPA comments on Work Plan, March, 1993;
- U.S. EPA comments on Work Plan, July 1993;
- U.S. EPA comments on Interim Report 1 (CRA, 1993b), August 1993;
- U.S. EPA comments on Interim Report 2 (CRA, 1993c), January 1994;
- U.S. EPA comments on Interim Report 3 (CRA, 1994b), February 1994;
- U.S. EPA comments on Interim Report 3, October 1995; and
- U.S. EPA response to CRA's responses to U.S. EPA comments on Interim Report 3 Revision, January 1996.

1.1 SITE BACKGROUND

The Site occupies approximately 6.6 acres at 8471 Fletcher Road, Town of Newstead, Erie County, New York. The property location is presented on Figure 1.1 and the Site plan is presented on Figure 1.2. A previous tenant of the property used the northern portions of the property for waste disposal. The U.S. EPA has determined that waste disposal occurred between 1948 and 1954 and consisted of paint sludges and other paint related wastes.

In 1985 the Erie County Department of Environment and Planning reported evidence of waste disposal on the property to the NYSDEC. NYSDEC and the NYSDOH in conjunction with ECHD conducted investigations during 1987 and 1988 into possible environmental contamination at the Site. Results of these investigations are presented in the report entitled "Clouse Property, 8471 Fletcher Road, Town of Newstead, Erie County", dated August 1989.

Regulatory responsibility for the Site was transferred to the U.S. EPA, Region II, in 1989. U.S. EPA notified Pratt and Lambert that the U.S. EPA believed the waste originated from Pratt and Lambert's Buffalo Plant and that Pratt and Lambert would be identified as a Potentially Responsible Party (PRP) under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA, Superfund).

During 1990, four separate investigations were undertaken under the direction of the U.S. EPA Removal Action Branch. The investigations are documented in the following reports:

1. Fletcher Road Geophysical Investigations, Town of Newstead, N.Y., January 5, 1990;
2. Site Analysis, Newstead Site, Newstead, N.Y., U.S. EPA, TS-PIC-89147, April 1990; and
3. Soil Gas Survey, Fletcher Road Site, Newstead, N.Y., August 1990.
4. Final X-Ray Fluorescence Results, Newstead Site, Newstead, N.Y.

The Consent Order between the U.S. EPA and Pratt & Lambert governs the Site investigation and analysis of remedial alternatives for the Site. Pratt and Lambert was acquired by the Sherwin-Williams Company in January 1996.

1.2 SITE INVESTIGATION PROCESS AND PURPOSE

As stated in the Work Plan, the purpose of an RI/FS is to gather sufficient information about environmental conditions to support an informed decision about the degree of risk posed by a particular site. The information is then used to develop and evaluate, if necessary, remedial alternatives that will mitigate the defined risk.

Section IV of the Consent Order describes an "Investigation" that is defined by the "Remedial Investigation" part of the "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", (U.S. EPA, 1988a).

The investigation, including a Baseline Health Risk Evaluation, is to be completed in a manner which provides sufficient data suitable for the Analysis of Alternatives as defined in Section V of the Consent Order. The purpose of the analysis of alternatives is to fully evaluate alternatives that are appropriate to prevent or mitigate the release or the threat of release of hazardous substances that may be present at the Site.

The analysis of alternatives will be conducted in accordance with the "Feasibility Study" part of the "Interim Final" U.S. EPA guidance document and the requirements of CERCLA and the National Contingency Plan (NCP). Feasibility Study tasks will be described in a separate submission as required in Section V of the Consent Order. The Analysis of Alternatives Work Plan will provide for the performance of a feasibility study and will include a schedule for the completion of the tasks required for the Analysis of Alternatives.

1.3 REPORT ORGANIZATION

This Site Investigation report is organized as follows:

- Section 2.0 presents a summary of the previous investigations conducted by the NYSDEC, NYSDOH, ECHD, and U.S. EPA;
- Section 3.0 presents a description of the Site Investigation activities that were completed under this program;
- Section 4.0 presents the Site setting including physiography, climatology, adjacent land use, geology, hydrogeology, and surface water hydrology;
- Section 5.0 presents the results of the soil gas survey;
- Section 6.0 presents a discussion of chemical distribution in soils, groundwater, surface water, sediment, waste material, and airborne particulates;
- Section 7.0 presents a discussion of the chemical fate and transport mechanisms of the Site-related chemicals;
- Section 8.0 presents the results of the Baseline Health Risk Evaluation;
- Section 9.0 presents the findings of the Fish and Wildlife Impact Analysis;
- Section 10.0 presents the summary and conclusions of the Site Investigation; and
- Section 11.0 provides the references used throughout the report.

2.0 PREVIOUS INVESTIGATIONS

A number of investigations were conducted at the Site during the period from 1987 to 1990. The following list summarizes the previous investigative work at the Site:

- September 1987 - NYSDEC (NYSDEC, 1988) collected and analyzed the following samples:
  - three samples from on-Site waste materials, and
  - groundwater samples from two existing on-Site wells;
- September 1988 - NYSDOH in conjunction with the ECHD (NYSDEC, 1988) collected and analyzed the following samples:
  - twenty surface soil samples, and
  - groundwater samples from two existing on-Site wells;
- November/December 1989 - Gartner Lee, Inc. (Gartner Lee, Inc., 1990):
  - geophysical survey of the Site, and
  - prepared and issued under the direction of the U.S. EPA Removal Action Branch;
- April 1990 - U.S. EPA (U.S. EPA, 1990):
  - analysis of historical aerial photography from 1938 to 1986 for the Site, and
  - prepared and issued under the direction of the U.S. EPA Removal Action Branch;
- June 1990 - Roy F. Weston, Inc. (Roy F. Weston, Inc., 1990a):
  - conducted a soil gas survey of the Site, and
  - prepared and issued under the direction of the U.S. EPA Environmental Response Team (ERT); and
- June 1990 - Roy F. Weston, Inc. (Roy F. Weston, Inc., 1990b):
  - X-Ray fluorescence analysis of surface, subsurface, and ditch samples, and

- prepared and issued under the direction of the U.S. EPA Removal Action Branch by the U.S. EPA Field Investigation Team (FIT).

2.1 NYSDEC - SEPTEMBER 1987

On September 9, 1987 the NYSDEC collected three samples of various waste materials identified as tar, soil/paint sludge, and soil waste. Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Sample locations were not identified in the report but it is expected that the samples came from the northwest quadrant of the Site. The analytical results are summarized in Table 2.1.

The results indicate the presence of several organic compounds in one or more samples ranging in concentration from 1.85 µg/kg for chloroform to 8521.79 µg/kg for benzene. Other organic compounds detected include toluene, ethylbenzene, xylenes, trans-1,2-dichloroethene, 2-butanone, trichloroethene, tetrachloroethene, naphthalene, isophorone, 2-methylnaphthalene, and phthalate esters.

On September 9, 1987, the NYSDEC also collected groundwater samples from the on-Site shallow (39 feet deep) well and the deep (93 feet deep) well. Samples were analyzed for VOCs, SVOCs, and metals (shallow well only). The analytical results are summarized in Tables 2.2 and 2.3.

The results indicated the presence of low concentrations of VOCs and SVOCs in the sample from the shallow well ranging from 0.03 µg/L to 26.93 µg/L for acenaphthylene and 2-butanone, respectively. Other organic compounds detected in the shallow well included methylene chloride, trichloroethene, benzene, toluene, ethylbenzene, xylenes, and phthalate esters. Inorganics detected in the shallow well above the NYSDEC Class GA groundwater standards include barium, cadmium, iron, lead, and zinc.

Two organic compounds were detected in the deep well, methylene chloride at 15.79 µg/L and benzene at 1.62 µg/L.

2.2 NYSDOH/ECHD - SEPTEMBER 1988

On September 21, 1988 the NYSDOH in conjunction with ECHD collected 20 surface soil samples from 0 to 6 inches in depth at the locations shown on Figure 2.1. Soil sample locations were selected to determine:

- soil chemistry in areas of high usage;
- soil chemistry in areas beyond the observable fill areas; and
- the eastern extent of disposal.

Samples were analyzed for purgeable halocarbons and aromatics and selected metals. The analytical results are summarized in Table 2.4.

Organic compounds were detected in seven samples (S-6, S-7, S-8, S-10, S-18, S-19, and S-20) ranging from 30 µg/kg for toluene to 1,400 µg/kg for 1,2,4-trimethylbenzene.

The NYSDOH/ECHD 1988 "Clouse Property" report noted that "Contamination of surface soils with metals appears to represent the greatest concern including lead (up to 19,200 mg/kg), cadmium (175 mg/kg), selenium (10.5 mg/kg), barium (5,160 mg/kg), chromium (2,680 mg/kg), and zinc (25,500 mg/kg)."

The highest levels of inorganic parameters generally correspond to sample locations with reported VOC concentrations. These locations occur in the northern area of the Site.

The NYSDOH/ECHD collected groundwater samples from the shallow and deep wells on September 21, 1988. Samples were analyzed for purgeable halocarbons and aromatics and selected metals. The analytical results are summarized in Tables 2.2 and 2.3.

The results indicate the presence of low concentrations of organic compounds in the sample from the shallow well ranging from 0.8 μg/L for ethylbenzene to 7 μg/L for toluene. Other organic compounds detected in the shallow well include xylenes and trimethylbenzenes.

Inorganics detected in the shallow well above NYSDEC Class GA groundwater standards include cadmium, lead, and zinc. No inorganics were detected above the groundwater standards for samples from the deep well.

2.3 GEOPHYSICAL SURVEY - NOVEMBER/DECEMBER 1989

Gartner Lee Inc. conducted a seismic refraction, electromagnetic (EM) terrain conductivity and magnetometer/gradiometer survey at the Site from November 27 to December 5, 1989 as a subcontractor to Roy F. Weston, Inc.

The purpose of the geophysical survey was as follows:

- locate and delineate any areas of conductive contaminated soils and buried metallic objects; and
- map subsurface stratigraphy and bedrock topography.

The results of the geophysical survey indicate the following:

- approximately 50 percent of the 5-acre Site contains soils that are representative of background conditions; and

- the northwest corner and northern section of the Site exhibit the following anomalous, possibly waste-related, subsurface conditions as shown on Figure 2.2:

- Anomaly A - approximate grid location 0+25S to 1+05S and 0+00E to 0+50E, approximate area is 3,600 ft^2. This anomaly may be the result of buried metal drums and associated contaminants,

- Anomaly B - approximate grid location 0+45S to 1+25S and 1+20E to 1+80E, approximate area is 4,800 ft^2. This anomaly appears to be the result of infilling and may contain buried metal. The northern section of the Site from approximately 0+25S to 1+45S and 0+00 to 3+55E contains above background conductive soil which may be naturally occurring clay fill, contaminated fill or contaminated groundwater,

- Anomaly H - approximate grid location 2+15S to 2+65S and 1+45E to 1+65E, approximate area 675 ft^2. This anomaly appears to be the result of infilling and appears to contain buried metal based on the in-phase electromagnetic response. This anomaly may be a septic leaching tank or bed, but may also be buried contaminated fill, and

- other anomalies reported were attributed to human cultural sources such as a car and snowmobile, trailer, propane tanks, overhead power lines, a well casing, a metal culvert, and a water filled ditch.

Three distinct velocity layers were reported in the seismic survey results. From the top down they are:

V1 - an unsaturated, sandy silt soil typically less than 6 feet deep;
V2 - a continuous section of fine grained saturated overburden material extending to depths of 60 to 70 feet or a combination of heavily weathered shale and overburden; and
V3 - a dense compact rock, generally flat, under the survey area.

2.4 SITE ANALYSIS - APRIL 1990

An analysis of historical aerial photography was performed for the Site by U.S. EPA in an effort to identify features significant to waste disposal activities. Aerial photography from 1938, 1951, 1959, 1963, 1966, 1972, 1978, and 1986 was used for this analysis.

The following evidence is noted in this report: mounded material, debris, standing liquid, ground scars, pits, excavations, and light toned material. Based upon this evidence, it was concluded that disposal activities commenced sometime between 1938 and 1951, were most likely completed sometime before 1963 and were confined to the northern section of the Site.

2.5 SOIL GAS SURVEY - JUNE 1990

In June 1990 a soil gas survey was performed at the Site by Roy F. Weston Inc., to further investigate the anomalies reported during the geophysical survey (see Section 2.3). The resulting report ("Soil Gas Survey, Fletcher Road Site", Newstead, N.Y., August 1990) was issued and prepared under the direction of the U.S. EPA Environmental Response Team (ERT). Soil gas samples were collected at 50-foot intervals along the grid established for the geophysical survey. The main area of investigation was the northern half of the Site, with five samples collected from the southern half of the Site.

Soil gas samples were collected by driving a 3⁄8-inch diameter hole to a depth of 1 to 4 feet and sealing a 1⁄4-inch diameter stainless steel tube in the hole with modeling clay. Ambient air was evacuated before screening with an HNU and an OVA. Samples were collected in 1 liter tedlar bags and analyzed for chlorinated and aromatic target compounds including vinyl chloride, 1,1-dichloroethene, trans-1,2-dichloroethene, trichloroethene, tetrachloroethene, benzene, toluene, ethylbenzene, xylene, and styrene.

The total target aromatic concentration at each sampling location is presented on Figure 2.3. It should be noted that Figure 2.3 was reproduced from the Soil Gas Survey, Fletcher Road Site report and the Site grid system identified on this figure is different than the grid system established for the current investigation. Based upon the data presented on Figure 2.3, it is apparent that the highest concentrations were reported present in the northwestern portion of the Site. Elevated levels were also reported at the sampling locations in the southern half of the survey area (sampling nodes 150E-200N; 200E-100N; 250E-200N; 350E-100N) and at sampling location 400E-300W located along the eastern edge of the survey area. Elevated concentrations were also reported in the samples collected from the ditch along the western Site perimeter. The major constituents found in the soil gas samples include ethylbenzene, xylenes, and meta-ethylbenzene. Results were not reported for nodes 0E-150N, 0E-200N, 0E-300N, and 400E-450N.

Soil gas results provide a general indication of VOCs in the soil vapor. The VOCs may be present in the soil or groundwater. The actual measured concentrations can be affected by many factors. The variability in analytical results obtained can be great, as for sampling location OE-350N where the sample had a reported concentration of 168,990 ppb, and the replicate sample from this location was reported as non-detect.

2.6 X-RAY FLUORESCENCE SURVEY - JUNE 1990

From June 26 to June 28, 1990 Roy F. Weston Inc. collected approximately 145 soil samples at the grid locations established for the geophysical survey. Samples were collected from surface, subsurface, and the western ditch soils and analyzed for chromium, lead, and zinc by X-Ray fluorescence. The resulting report (Roy F. Weston, Inc., 1990b) was issued and prepared under the direction of the U.S. EPA Removal Action Branch.

The results indicate elevated concentrations of lead, zinc, and chromium in samples collected from the northern half of the Site. The highest concentrations were reported for samples in the northwestern quadrant of the Site. Maximum reported concentrations in this area were 7,000 mg/kg for lead, 7,900 mg/kg for zinc, and 1,800 mg/kg for chromium.

3.0 SITE INVESTIGATION ACTIVITIES

The overall objective of the Site Investigation was to define environmental conditions at the Site. Sufficient data was collected for the evaluation of potential risks to human health and the natural environment and to conduct an evaluation of potential remedial measures for the Site, if required.

As specified in the Work Plan, specific objectives of the Site Investigation were:

i) to investigate areas of potential concern delineated by previous historic investigations (geophysical survey, soil gas survey, X-Ray fluorescence analysis, and surface soil and groundwater sampling);
ii) to investigate the areal and vertical extent of contamination that may exist in potential disposal areas;
iii) to investigate previously identified areas of the Site for the potential presence of buried containers of waste;
iv) to characterize the subsurface geologic conditions;
v) to characterize the Site hydrogeologic conditions including horizontal and vertical groundwater flow directions and velocities;
vi) to investigate the nature and extent, of groundwater flow and quality under the Site;
vii) to characterize chemical concentrations in the surface water and sediments in the ditches adjacent to the Site; and
viii) to evaluate potential risks to human health and the environment.

3.1 SCOPE OF WORK

As specified in the Work Plan, the work tasks which were completed during the Site Investigation include:

Task 1	Project Planning Meeting;
Task 2	Establish Field Office and Decontamination Facility;
Task 3	Property and Grid Survey;

Task 4	Topographic Mapping;
Task 5	Stratigraphic Borehole Installation;
Task 6	Groundwater Monitoring Well Installations;
Task 7	Groundwater Sampling and Analysis;
Task 8	Single Well Response Tests;
Task 9	Subsurface Soil Sampling and Analysis;
Task 10	Surface Soil Sampling and Analysis;
Task 11	Sediment and Surface Water Sampling and Analysis;
Task 12	Soil Gas Survey;
Task 13	Test Pit Excavations; and
Task 14	Interim Reporting.

In addition to these tasks, a Baseline Health Risk Evaluation and a Fish and Wildlife Impact Analysis were also completed in accordance with the Work Plan.

Air particulate monitoring was conducted for evaluation of this pathway in the Baseline Health Risk Evaluation as requested by the U.S. EPA.

Each of these tasks is described in Sections 3.2 to 3.4.

3.2 FIELD ACTIVITIES

3.2.1 Task 1 - Project Planning Meeting

Before any work was initiated, a meeting between the U.S. EPA, NYSDEC, Pratt & Lambert and CRA was held. During this meeting project objectives were discussed, lines of communication established and key personnel identified and introduced. Schedules were confirmed and Work Plan amendments that were appropriate to specific weather or schedule considerations were discussed.

3.2.2 Task 2 - Establish Field Office and Decontamination Facility

An equipment/vehicle decontamination facility was constructed on the former garage concrete foundation as presented on Figure 1.2.

The decontamination facility, which consists of a 16-foot x 16-foot timber frame underlined with a 80-mil HDPE liner, was constructed in accordance with Section 4.1.2 of the Work Plan with several modifications which were made with the concurrence with the on-Site U.S. EPA representative. The geotextile blanket consisted of a double layer of a 50-mil geotextile instead of a single 90-mil geotextile layer. The 80-mil HDPE underliner was secured directly to the 16-foot x 16-foot timber frame. The plywood layer was omitted. A sump was installed in the southwest corner of the decontamination facility and consisted of one-half of a 55-gallon drum.

An interim drum staging area was established adjacent to and south of the decontamination facility in accordance with the Work Plan. All drums containing investigation generated wastes (e.g., soil cuttings and collected decontamination liquids) were staged in this area on pallets and were wrapped with polyethylene sheeting prior to off-Site disposal.

3.2.3 Task 3 - Property and Grid Survey

Available Site plans were used to establish property boundaries in the field. A field survey was conducted to update the location of existing Site features on the Site plan as necessary and appropriate.

A 100-foot grid in a north-south and east-west orientation was established across the Site by installation of markers at every 100-foot station. Establishment of the grid system permitted the location and progress of field activities to be quickly established and recorded as work proceeded. The 100-foot grid and existing Site features are presented on Figure 1.2.

3.2.4 Task 4 - Topographic Mapping

A topographic survey of the Site and surrounding area was conducted. As presented on Figure 1.2, elevation is indicated utilizing contour lines at every 2-foot change in elevation.

3.2.5 Task 5 - Stratigraphic Borehole Completion

During the period from June 7 to June 16, 1993, three (3) stratigraphic boreholes were completed to bedrock adjacent to proposed monitoring well nests MW1, MW2, and MW3 as shown on Figure 3.1. The stratigraphic logs for these boreholes are provided in Appendix A. The stratigraphic information obtained from each of these deep soil borings was used to design well installation depths and construction details.

Borehole BH-W1 was installed adjacent to proposed background monitoring well nest MW1 in the southeast corner of the Site. Borehole BH-W2, installed in the northwest corner of the Site and borehole BH-W3 installed in the northeast corner of the Site, are adjacent to proposed monitoring well nests MW2 and MW3, respectively.

All drilling and sampling procedures were conducted in accordance with Section 4.1.5 of the Work Plan and Section A.3.0 of the Field Sampling Plan (FSP) with the following exception.

Borehole BH-W2 was completed with 4 1/4-inch inside diameter (ID) hollow stem augers (HSA). Borehole BH-W1 was completed down to a depth of 14 feet below the ground surface (BGS) with 4 1/4-inch ID HSA followed by 2 1/4-inch ID HSA from 14 feet BGS to bedrock. Borehole BH-W3 was also drilled with 2 1/4-inch ID HSA. This reduction in auger size was implemented following sample collection for chemical and grain size analysis at 14 feet BGS at borehole BH-W1. This change to a 2 1/4-inch ID HSA, which is less than the minimum of 3 1/4-inch specified in the Work Plan, was made to accommodate the smaller rig size used on these boreholes and to expedite drilling. These modifications to the protocol were made with the concurrence of the U.S. EPA field representative.

Continuous split spoon sampling was conducted during augering at each borehole location. Each split spoon was visually examined for chemical presence and the stratigraphy was described utilizing the Unified Soil Classification System (USCS) by CRA's field geologist. Soil samples were collected for geologic record and stored on Site in 500 mL widemouth clean glass jars for future reference.

During the continuous split spoon sampling for each of the three boreholes, photoionization detector (PID) readings were taken as each split spoon was opened as an indication of volatile organic contamination. In addition, PID readings of the headspace of the sample jars were taken and recorded in accordance with the protocols outlined in Section A.3.2 of the FSP. The PID headspace readings were recorded on the borehole logs presented in Appendix A.

Soil samples were collected from the four overburden stratigraphic units identified beneath the Site at borehole BH-W1 (adjacent to background monitoring well MW1) and analyzed for particle size distribution in accordance with Method ASTM D-422, Standard Test Method for Particle Size Analysis of Soils. These samples were collected from the following depth intervals:

Sample ID	*Depth Interval (feet below ground surface)*
BHA-1	2 - 12
BHA-2	20 - 26
BHA-3	36 - 38
BHA-4	44 - 46

The results of the grain size analyses are presented in Appendix B.

Two samples were collected for chemical analysis from BH-W1 over the depth intervals of 2 to 6 and 10 to 14 BGS. These samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/PCBs and Target Analyte List (TAL) metals and cyanide. All sampling and analytical procedures were completed in accordance with the Quality Assurance Project Plan (QAPP). Results for samples submitted for chemical analysis are discussed in Section 6.2.

Prior to drilling at each borehole location, the drill rig and all drilling and sampling equipment were cleaned in accordance with the protocols presented in Section A.9.0 of the FSP.

Following completion, each borehole was backfilled with cement/bentonite grout tremied to the bottom of the borehole in accordance with Section A.3.0 of the FSP.

3.2.6 Task 6 - Groundwater Monitoring Well Installations

During the period from September 8 to September 17, 1993, seven (7) groundwater monitoring wells were installed at the Site at the locations proposed in the Work Plan. The monitoring well locations are presented on Figure 3.1.

The purpose of the monitoring well installations was to investigate the geologic and hydrogeologic conditions at the Site; determine the horizontal and vertical groundwater flow directions and velocities; and to investigate the nature and extent of groundwater contamination.

Both deep and shallow monitoring wells were installed at locations MW1, MW2, and MW3 and a shallow monitoring well was installed at MW4. The shallow monitoring wells are designated as "A" wells and were installed in the Upper Sand Unit. The deep wells are assigned a "B" designation and were installed in the Lower Sand Unit. These two units are separated by a glaciolacustrine Clay Unit. A more complete description of the Site geology is presented in Section 4.0.

The monitoring well locations were selected based upon the expected north to northwesterly regional groundwater flow direction towards Tonawanda Creek. Based on this expectation, the MW1 well cluster was to provide background groundwater quality data and the MW2 and MW3 well clusters were to provide downgradient groundwater quality. MW4A-93 was positioned to monitor groundwater quality in the potential waste disposal area. MW4A-93 was installed in the soil sampling borehole BH3-93.

All monitoring wells were constructed in accordance with the protocols presented in Sections 4.1.6 and A.4.1 of the Work Plan and Interim Report 1.

The design for the deep and shallow wells at each monitoring location were based on the subsurface data obtained from the drilling of the stratigraphic boreholes BH-W1, BH-W2, and BH-W3 at proposed groundwater monitoring well nest locations MW1, MW2, and MW3, respectively. The stratigraphic logs for these boreholes, grain size distribution data and the filter pack and screen design calculations are provided in Appendices A, B, and C, respectively.

At each location, a monitoring well was installed in both the Upper and Lower Sand Units. The screen and filter pack in the shallow and deep wells were designed based on the grain size distribution results provided in Appendix B. The well design calculations are presented in Appendix C. Based on the design calculations, a filter pack with an average grain size of 0.02 inch (0.5 mm) and a uniformity coefficient of 3.0 was determined to be appropriate for both the shallow and deep monitoring wells. As specified in the Work Plan, the screens were constructed of 2-inch diameter stainless steel. The deep well screens are 4 feet long at locations MW1 and MW2 and 5 feet long at MW3. The screen lengths were selected to monitor the limited thickness of the Lower Sand Unit. The shallow well screens are 10 feet long. In order to retain 90 percent of the filter pack, a No. 8 slot (0.008 inch) was selected for the screen for all wells.

A surface casing was installed at each deep well location to prevent the potential for cross-contamination of the Lower Sand Unit from the Upper Sand Unit. In order to install the surface casing, a 13-inch diameter borehole was drilled with 10 1/4-inch ID HSA to a depth 2 feet below the top of the Glaciolacustrine Clay Unit. A 10-inch diameter steel casing was set and was pressure grouted in place using a cement/bentonite mixture. The casing was allowed to set for a minimum period of 24 hours.

An eight-inch diameter borehole was drilled (within the surface casing for the deep wells) using 4 1/4-inch ID HSA . Upon reaching the target depth at each well location, the augers were left in place and the screen was lowered to the bottom of the borehole on 2-inch diameter stainless steel riser with threaded and coupled joints. A filter pack composed of silica sand with the specified size and uniformity was placed between the borehole and the screen utilizing a tremie pipe. The filter pack was placed to a height of approximately 2.0 feet above the top of the screen. A 2-foot thick bentonite pellet seal was placed in the annulus above the filter pack material. The bentonite pellets were high density, approximately 3/8-inch diameter and were tamped into place to ensure that a good seal was formed. The annulus above the seal was backfilled with a cement/bentonite grout utilizing a tremie pipe and the positive displacement grouting method (see Section A.3.1 of the Work Plan for the grout specifications). Surface protection consisting of a 4-inch diameter steel casing, complete with a lockable cap, was embedded in the cement/bentonite grout. The top of the stainless steel riser pipe was capped with a watertight sealable cap.

A summary of the monitoring well installation details is presented in Table 3.1. Stratigraphic and instrumentation logs for all wells are presented in Appendix D.

3.2.7 Task 7 - Groundwater Sampling and Analysis

3.2.7.1 Monitoring Well Development

All newly installed monitoring wells and the two existing wells at the Site were developed during the period from September 27 to October 1, 1993, approximately two weeks after the new monitoring wells were installed. The monitoring wells were developed in accordance with the protocols presented in the Work Plan. Well development records are summarized in Appendix E.

The total number of well volumes removed from each monitoring well during development is presented in Table 3.2. In the seven newly installed wells (MW1A/B-93, MW2A/B-93, MW3A/B-93, and MW4A-93) the number of well volumes removed was more than the maximum volume required in the Work Plan protocols. This additional effort was made to minimize the turbidity in the well water to the greatest extent possible. Despite this additional effort, turbidity readings remained greater than 200 NTU in all monitoring wells, except at the shallow existing well (33.5 NTU) and the deep existing well (22.3 NTU).

High turbidity readings are common for monitoring wells installed in formations which, as here, contain significant percentages of clay and silt. High turbidity readings for groundwater samples is an indication that there is significant sediments that may result in false reporting of higher concentrations for inorganic parameters. During groundwater sample collection, care was taken not to disturb sediments which may have accumulated at the bottom of the wells. At the time of sample collection, the water quality in all wells was reported as clear.

3.2.7.2 Groundwater Sample Collection

The Round 1 groundwater sampling event at the Site occurred during the period from October 18 to October 20, 1993, and included all newly installed monitoring wells and the two existing wells. The groundwater sampling details are summarized in Table 3.3. In accordance with the Work Plan, Round 1 groundwater samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals (total and dissolved), and cyanide.

Groundwater samples were collected during the Round 1 sampling event with some minor deviations from the Work Plan as described below.

The protocols in the Work Plan specified that samples for TAL metals analyses would be collected using a peristaltic pump or a bladder pump, and that samples for TCL VOCs would be collected using a bottom loading teflon bailer. However, groundwater samples for all parameters were collected using a bottom loading stainless steel bailer. Although this sampling procedure is not consistent with the Work Plan protocols, it is in compliance with the sampling procedures outlined in the following U.S. EPA guidance documents: "Region II, CERCLA Quality Assurance Manual", (U.S. EPA, 1988b); and "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document", (U.S. EPA, 1986c). Further, the purpose for employing the Work Plan sampling protocol was accomplished so that the change produced no impact on the results. An evaluation of the absence of impact on the analytical data resulting from this change to the sampling protocol was presented in Interim Report 3 and is reiterated in the following paragraphs.

The use of peristaltic or bladder pumps was proposed for collecting groundwater samples for the analysis of TAL metals so as to minimize the potential for sediments in the samples. However, during Round 1 sampling, the bailer was lowered gently into the water column to minimize the disturbance of sediments in the well. Further, at the time of sample collection, the water quality at all wells was reported as clear. It is therefore concluded that the objective of collecting sediment free samples was achieved. If present, sediments in the samples could only result in false reporting of higher concentrations of inorganic parameters.

Similarly, sampling for VOCs was to be conducted using a teflon bailer so as to avoid agitation of the water (see Specific Comment 14, page 9, U.S. EPA letter dated November 17, 1992). This objective can be achieved using a stainless steel bottom loading bailer that is lowered gently into the water column, as was done in all cases during the Round 1 sampling event. Again, the objective of avoiding agitation of the well water was achieved.

Monitoring wells MW2A/B-93 and MW4A-93 were anticipated to have the highest chemical concentrations. Based upon the expected northwesterly groundwater flow direction, all other monitoring wells were expected to be relatively clean. The Work Plan specified that groundwater samples from the monitoring wells with the lowest potential for chemical presence were to be collected first. However, to further reduce the potential for cross-contamination between samples, different sets of sampling equipment were used for the two groups of wells.
Wells MW2A/B-93 and MW4A-93 were sampled initially using one bailer and other bailers were used for the remaining wells. A new nylon rope and sampling gloves were used at each sampling location. The sampling equipment was decontaminated between each well in accordance with the protocols as presented in the Work Plan.

A second round of groundwater samples was collected from all newly installed monitoring wells and the two existing wells. The Round 2 sampling event occurred during the period from June 25 to June 28, 1996. The Round 2 sampling details are summarized in Table 3.3. The analytical data for Round 1 groundwater samples were used to develop a Site Specific Parameter List (SSPL) for the Round 2 groundwater sampling event. The SSPL for the Round 2 samples was presented in Interim Report 3 and includes parameters detected in the Round 1 samples plus parameters detected at elevated levels in the soil samples from the waste disposal area. The SSPL consists of TCL VOCs, SVOCs, and selected TAL metals (aluminum, barium, cadmium, calcium, cobalt, copper, iron, lead, manganese, magnesium, selenium, sodium, and zinc). Iron and manganese were included on the SSPL for Round 2 groundwater samples as several of the Round 1 groundwater data for these parameters were determined to be unusable. PCBs and pesticides were not included in the Round 2 SSPL as these compounds were not detected in any of the Round 1 groundwater samples. PCBs and, to a lesser extent, pesticides have a strong affinity for adsorption to soil and it is, therefore, uncommon to find these compounds in groundwater given the relatively low concentrations reported in surface and subsurface soil samples at the Site.

The CLP SOW low level method OLC 01.06/91 was used for the analysis of VOCs for Round 2 samples. In order to be below the New York State Class GA groundwater standard of 0.7 µg/L, the lab reported a contract required quantitation limit (CRQL) of 0.5 µg/L for benzene. The detection limit for all other VOCs was below Class GA criteria with the exception of samples requiring dilution (MW2A-93).

The Round 2 groundwater samples for inorganics (both filtered and unfiltered) were collected with a peristaltic pump to minimize the potential for disturbance of any sediments present in the bottom of the wells. Round 2 groundwater samples for the analysis of organics (VOCs and SVOCs) were collected with stainless steel bottom loading bailers to maintain consistency with the Round 1 sampling method.

All wells were purged in accordance with the protocols specified in the Work Plan prior to Round 1 and Round 2 groundwater sampling. Purge records are presented in Appendix E. All purging equipment was decontaminated in accordance with the protocols presented in the Work Plan. During purging, care was taken to minimize the disturbance of any sediments that may have accumulated at the bottom of the well. This practice resulted in improved water clarity over what was reported during well development. At the time of sampling, the water quality at all wells was reported to be clear.

3.2.8 Task 8 - Single Well Response Tests

Single well response tests were performed at each of the new monitoring wells. These tests involved changing the water level within a well and monitoring the time required for the level to return to the static position. Two types of response tests are normally performed including falling head tests, where a slug of known volume is introduced into the standing water column, and rising head tests, where a known volume of water is removed from the well and the recharge is monitored. Both falling head and rising head single well response tests were conducted on all newly installed wells.

Several methods have been developed for determination of hydraulic conductivity values from single well response test data. These methods consider well morphology, hydrogeologic setting, and time lag response as factors to calculate in situ hydraulic conductivity. The slug test data for the deep wells was analyzed with AQTESOLV computer software using the method of Cooper et al. (Cooper, 1946) for a confined aquifer. The slug test data for the shallow wells was analyzed with AQTESOLV using the Bouwer and Rice method (Bouwer, 1976).

The results of the single well response tests are presented in Appendix F and discussed in Section 4.0. Details on the protocols for conducting the single well response tests are presented in the Work Plan.

3.2.9 Task 9 - Subsurface Soil Sampling and Analysis

During the initial phase of the investigation during the period September 17 to September 23, 1993, subsurface soil samples were collected from seven boreholes (BH1-93 to BH7-93) in accordance with Sections 4.1.9, A.3.1 and A.3.2 of the Work Plan. The subsurface soil sampling locations are presented on Figure 3.2. The subsurface soil samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, and cyanide. In addition, a contaminated soil sample and a sample of waste material were submitted for Toxic Characteristic Leaching Procedure (TCLP) analysis. This section presents a description of the subsurface soil sample collection including the rationale for the sampling locations and selected sampling depth intervals.

Boreholes BH1-93, BH2-93, BH3-93, and BH4-93 were all completed at locations previously identified as potentially containing buried drums and/or contaminated waste material based on the 1990 Geophysical Survey. The purpose of these boreholes was to:

- provide stratigraphic information at each location;

- provide chemical data to be used in developing protocols for the test pits that were to be excavated at these locations during subsequent phases of the investigation (see Section 3.2.13);
- provide information regarding the horizontal and vertical distribution of chemicals in the soils;
- provide chemical data to be used for developing the SSPL for the Round 2 groundwater sampling; and
- provide chemical data to be used for the Baseline Health Risk Evaluation.

Boreholes BH5-93, BH6-93, and BH7-93 were completed in areas of the Site exhibiting high levels of total aromatic hydrocarbons based on the results of the 1990 Soil Gas Survey. The purpose of these boreholes was to:

- provide stratigraphic information at each location;
- provide information regarding the horizontal and vertical distribution of chemicals in the soils;
- provide actual data to verify the presence or absence of elevated chemical concentrations at each location;
- provide chemical data to be used for developing the SSPL for the Round 2 groundwater sampling; and
- provide chemical data to be used for the Baseline Health Risk Evaluation.

Consistent with the Work Plan, the boreholes were advanced to a depth 2 feet below identified fill limits or, in the case of boreholes exhibiting elevated PID readings, drilling continued until background PID readings were re-established or until 2 feet below the fill limit, whichever was deeper.

PID readings above background were noted in samples collected from boreholes BH1-93, BH2-93, and BH6-93 to depths ranging from 6 to 10 feet. These boreholes were advanced until background PID readings were re-established. In accordance with the Work Plan, samples for chemical analysis from each of these boreholes were selected from the two intervals with the highest potential for chemical contamination based upon PI readings and visual inspection.

Borehole BH3-93 was completed to a depth of 16 feet BGS, approximately 9 feet below the groundwater table to permit the installation of monitoring well MW4A-93. No PID readings above background were noted for borehole BH3-93. Samples for chemical analysis were selected from the top two intervals after consultation with the U.S. EPA field representative as to the expectation that the shallow soils would have the highest potential for chemical contamination in areas that are remote from the actual waste disposal areas, due to the tendency for flooding at the Site.

Borehole BH4-93 was advanced to a depth of 18 feet BGS. Fill was identified to a depth of approximately 1 foot at this location and PID readings above background levels were noted for samples collected from 0 to 18 feet BGS. Samples for chemical analysis were selected from 2 to 4 feet BGS and from 4 to 6 feet BGS based upon these samples having the highest PID readings. Following completion of this borehole, it was determined that the PID was not functioning properly based upon the erratic readings obtained. The malfunctioning PID was replaced with another unit and a second borehole was advanced within 1 foot of borehole BH4-93 to confirm that the proper intervals had been selected for chemical analysis. No PID readings above background were noted for samples collected from 0 to 6 feet BGS, the depth of the second borehole. The samples originally selected for chemical analysis from borehole BH4-93 were determined to be appropriate and were submitted for analyses.

Borehole BH5-93 was advanced to a depth of 4 feet BGS. No PID readings elevated above background were noted for samples collected from borehole BH5-93. Samples for chemical analysis were selected from 0 to 2 feet BGS and 2 to 4 feet BGS after consultation with the U.S. EPA field representative based upon the same rationale as described for BH3-93.

Sample containers for all analytical parameters were filled for each 2-foot interval during drilling of boreholes BH3-93 and BH4-93. Following the completion of these boreholes, appropriate samples were selected for chemical analysis based on PID readings, visual inspection or after consultation with the U.S. EPA field representative. The samples that were not used were placed in drums with the soil cuttings from the boreholes. This practice proved to be time consuming and inefficient. To expedite the collection of additional subsurface soil samples, it was decided, in consultation with the U.S. EPA field representative, to pre-screen borehole locations BH1-93, BH2-93, BH5-93, BH6-93, and BH7-93 prior to sample collection. At each of these boreholes, the appropriate intervals for soil sample collection were determined based on the results of PID readings and visual inspection of samples collected from the pre-screening borehole. A second borehole was then completed at each location to allow sample collection from the selected depth intervals. The second borehole at each location was completed within 1-foot of the pre-screening borehole. PID readings were confirmed for each of the intervals that were selected for chemical analyses.

The depth of fill encountered in the boreholes was approximately 1 foot BGS in borehole BH4-93, 1.7 feet BGS in borehole BH3-93, 2 feet BGS for boreholes BH2-93, BH5-93, and BH6-93 and 4 feet BGS in borehole BH1-93. No fill was encountered in BH7-93.

Following completion, each borehole was backfilled with cement/bentonite grout.

In accordance with the Work Plan, one waste sample and one contaminated soil sample from a location with a high potential for chemical presence were submitted for TCLP analysis. The samples for TCLP analyses were selected by the CRA and U.S. EPA field representatives. These analyses were conducted to determine the leaching potential for Site-related chemicals given the Site's history of flooding and the potentially high seasonal water table. The TCLP results also provide useful information for evaluating potential remedial actions for the Site. The contaminated soil sample submitted for TCLP analysis was collected from BH1-93 from the 2 to 4-foot depth interval. This sample exhibited the highest potential for contamination based on a PID reading of 4,151 ppm and visible evidence of waste material in the split spoon sample. This sample was collected on September 22, 1993.

The waste sample for TCLP analysis (Waste-1-993JW), was collected on September 30, 1993 approximately 30 feet east of monitoring well MW2B-93. During the installation of monitoring well MW2B-93, waste material was noted consisting of an orange-brown semi-solid located approximately 6 inches BGS. This material may have been containerized when it was originally disposed as metal fragments were observed associated with the waste.

The contaminated soil and waste samples were analyzed in accordance with the QAPP.

Following the completion of the Soil Gas Survey conducted in 1993, it was recommended in Interim Report 2 that five additional shallow soil samples be collected to investigate elevated soil gas readings in areas outside of the disposal area. Each of the following shallow boreholes was completed to investigate a soil gas sampling point where elevated response values were noted (see Section 5.0):

Shallow Borehole	*Gas Sampling Point*	*Coordinates*	*Elevated Constituent*
BH8-96	SG-16	4+00 S, 1+00 E	BTEX
BH9-96	SG-23	3+00 S, 1+00 E	BTEX
BH10-96	SG-26	2+00 S, 1+00 E	BTEX Tetrachloroethene Cycloalkanes/Alkenes
BH11-96	SG-20	3+00 S, 4+00 E	BTEX Dichlorobenzene Cycloalkanes/Alkenes
BH12-96	SG-29	2+00 S, 4+00 E	BTEX Dichlorobenzene

Boreholes BH8-96 to BH12-96 were completed on July 9, 1996 using a gas-powered hammer and tripod setup. Borehole locations are presented on Figure 3.2. Borehole logs are presented in Appendix A. At each borehole location split-spoon soil samples were collected from the ground surface to the top of the water surface or to a depth of 4 feet BGS, whichever was greater. Each split-spoon sample was visually inspected and screened using a PID. A sample for analysis was obtained from the interval determined to have the highest potential for chemical presence based on the screening results. All soil samples were collected in accordance with Sections 4.19 and A.3.0 of the Work Plan.

Soil samples from boreholes BH8-96 to BH12-96 were analyzed for TCL VOCs, SVOCs, and PCBs in accordance with the QAPP. Details of the samples and analyses are presented in Table 3.4. Although the purpose of the five soil samples was to confirm or deny the implied presence of VOCs at these locations, PCBs and SVOCs were also analyzed to define the general nature and extent of contamination at the Site as requested by the U.S. EPA in Additional Comment 2 of the U.S. EPA Comments on Interim Report 3 dated October 20, 1995.

3.2.10 Task 10 - Surface Soil Sampling and Analysis

Three surface soil samples were collected at the Site in accordance with the protocols presented in Sections 4.1.10 and A.6.0 of the Work Plan. The surface soil sampling locations are presented on Figure 3.3.

Surface soil samples were collected at locations SS-1 and SS-2 to investigate the elevated levels of VOCs reported south of the disposal area during the 1990 Soil Gas Survey. Sampling location SS-3 was located within the suspected waste disposal area. Chemical data for these sampling locations will be used to assess:

- the actual chemical concentrations in areas identified as potentially containing elevated VOCs based on previous screening studies; and
- the potential redistribution of chemicals about the Site via wind, flooding and previous on-Site activities.

These data will also be used in the Baseline Health Risk Evaluation Assessment to evaluate potential risks associated with chemicals present in the surface soils at the Site.

Surface soil sampling locations SS-1 and SS-2 were sampled on September 22, 1993. Surface soil sample location SS-3 was sampled on September 23, 1993. All samples were collected at a depth of approximately 6 to 12 inches by driving a split-spoon sampler to the required depth interval.

Surface soil samples were analyzed in accordance with the QAPP for TCL VOCs, SVOCs, Pesticides/PCBs, TAL metals and cyanide. The surface soil sampling summary is presented in Table 3.5.

3.2.11 Task 11 - Sediment and Surface Water Sampling

On September 29, 1993 eight sediment and surface water locations (SW-1 to SW-8) were sampled in accordance with the protocols presented in Sections 4.1.11 and A.7.0 of the Work Plan. Two additional sediment samples (SW-9 and SW-10) were collected on June 27, 1996. Sediment and surface water sampling locations are presented on Figure 3.4. This section presents a description of the sediment and surface water sample collection including the rationale for the sampling locations.

Sampling locations SW-1, SW-2, and SW-3 are located in on-Site drainage ditches. Chemical data for surface water and sediment samples from these locations will be used to:

- evaluate the significance of the on-Site drainage ditches as a chemical migration pathway from the Site; and
- provide data to be used for the Baseline Health Risk Evaluation.

Sampling locations SW-4 to SW-8 are located in the drainage ditches along Fletcher Road. Sampling locations SW-4, SW-5, and SW-7 are located in the ditch on the east side of Fletcher Road. Location

SW-7 is located approximately 500 feet north of the property boundary and represents background conditions for sampling locations SW-4 and SW-5, which are located adjacent to the Site. Sampling locations SW-6 and SW-8, are located in the ditch on the west side of Fletcher Road. Sampling location SW-8, also located approximately 500 feet north of the Site, serves to monitor background or upstream conditions for sampling location SW-6, which is adjacent to the Site but on the other side of Fletcher Road.

Chemical data for surface water and sediment samples from these locations will be used to:

- evaluate the significance of the Fletcher Road ditches as a chemical migration pathway from the Site; and
- provide data to be used for the Baseline Health Risk Evaluation.

Sediment samples were collected from the bottom of the ditch at each of the eight locations with a stainless steel trowel. Sediment samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, cyanide and percent organic carbon. The sediment sampling summary is presented in Table 3.6.

Surface water was present at each of the eight sampling locations following a rainfall event the previous day. Surface water samples were collected prior to sediment samples so as to minimize the amount of disturbed sediment in the surface water samples. Surface water samples were collected using the grab sampling technique by collecting samples directly in the laboratory supplied bottles. Surface water samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, cyanide and hardness. The surface water sampling summary is presented in Table 3.7.

No flow was observed at any of the sampling points during sample collection. Consequently all of the samples were from standing or ponded water.

Following the review and evaluation of the sediment and surface water sampling results from the initial eight locations as presented in

Interim Report 3, the U.S. EPA requested that additional sediment samples be collected from locations both upgradient and downgradient of the previous endpoints along the eastern Fletcher Road ditch (SW-5 and SW-7). The additional sediment sampling was requested in General Comment 1 in "Comments on CRA's Responses to U.S. EPA Comments on Interim Report 3 Revision" dated October 20, 1995. The U.S. EPA requested the additional sediment sampling to provide additional background data.

On June 27, 1996 sediment sample SW-9, located approximately 200 feet upgradient of the southern property boundary, and sediment sample SW-10, located approximately 700 feet north of the northern property boundary, were collected from the drainage ditch on the eastern side of Fletcher Road.

The samples were analyzed for TCL base/neutral SVOCs, PCBs, and TAL metals in accordance with the QAPP. The samples were not analyzed for TCL VOCs, acid extractable SVOCs or pesticides as these compounds were not reported at significant concentrations or frequencies in the original ditch sediment samples collected in 1993.

3.2.12 Task 12 - Soil Gas Survey

A soil gas survey was conducted at the Site by Northeast Research Institute Inc. (NERI) in accordance with the approved Work Plan. The report for the soil gas survey is presented in Appendix H. The purpose of the soil gas survey was to verify previous soil gas survey results obtained in June 1990 by Roy F. Weston, Inc. and to aid in the selection of groundwater monitoring wells and soil sampling locations for the current investigation.

Initially, a survey grid was established to locate the 43 sampling points. Thirty sampling locations were established on a 100-foot square grid across the Site. A 50-foot offset grid consisting of four sampling locations was surveyed in the northern end of the Site. An additional sampling location was positioned by the former concrete garage. Seven sampling locations were established immediately west of Fletcher Road and one sampling location was positioned on the east side of Fletcher Road approximately 50 feet north of the Site. The sampling locations are presented on Figure 3.5.

Soil gas samples were obtained by using the Petrex sampling method which involved the installation of 43 Petrex soil gas samplers between August 17 and August 18, 1993 to a depth of approximately 14 inches below the ground surface. Samples were retrieved on August 31, 1993 with the exception of sample 37 located along the northern property boundary which could not be located at the time of sample collection.

Each Petrex sampler was analyzed by NERI's standard method of Thermal Desorption/Mass Spectrometry (TD-MS). By comparing the mass spectral peaks to reference spectra, the most prominent compounds in the soil gas were determined. Benzene, toluene, ethyl benzene, and xylene (BTEX); cycloalkanes/alkenes; dichlorobenzene (DCB) and tetrachloroethene (PCE) were found to be the most prominent compounds.

The ion counts corresponding to mass spectral peaks of these compounds were summed and plotted. The ion count value represents the relative response of a particular compound which was present in the soil gas at the sample location site. The Petrex ion count data are a qualitative measurement and cannot be converted to any quantitative measure of concentration. In addition, ion counts of different compounds cannot be directly compared to each other. Therefore, ion count levels for any compound can only be compared to the same compound at different sample locations throughout a survey area.

The results of the TD-MS analysis of all the sample locations are presented in Appendix H. The ion counts for BTEX, cycloalkanes/alkenes, DCB and PCE are presented on Plates 2 to 5 (see Appendix H), respectively.

It should be noted that due to a calibration error during the initial TD-MS analysis of the Petrex samplers it was necessary to analyze the second wire of each of the samplers. This wire is normally reserved for

Thermal Desorption-Gas Chromatography/Mass Spectrometry (TD-GC/MS). The TD-GC/MS was, therefore, not conducted. The analysis of selected samples (typically 10 percent or less) by TD-GC/MS is used to resolve any unknown peaks and to confirm and identify more completely the compounds detected in the TD-MS analysis. However, the omission of the TD-GC/MS analysis does not significantly diminish the validity of the soil gas survey data as the TD-MS analysis is usually sufficient to provide the identification and relative levels of the VOCs of interest.

3.2.13 Task 13 - Test Pit Excavation

A test pitting program was conducted from June 24 to June 26, 1996 to define the horizontal and vertical limits of waste disposal at the Site. In addition, test pits were excavated at specific locations to investigate the potential for buried drums in areas identified as anomalies during the Geophysical Survey conducted in 1989. Test pit locations are presented on Figure 3.6. Logs for the test pits are presented in Appendix G. All work and decisions regarding the test pitting program were with the concurrence of the U.S.EPA field representative.

The general test pitting protocols that were implemented were in accordance with Sections 4.1.13 and A.8.0 of the Work Plan. A backhoe with an 18-inch bucket was used to excavate the test pits. The test pits were excavated in approximately 12-inch passes. All excavated material was temporarily stockpiled on polyethylene sheeting adjacent to each test pit. Following logging and sampling, each test pit was backfilled. Excavated materials were placed roughly in the same location of the test pit from which they were excavated. The backhoe bucket was used to compact the material returned to each test pit. The backhoe used for excavation and any portions of it coming into contact with potentially contaminated soil, was steam cleaned prior to demobilization from the Site.

Past information including aerial photography and the results of the current surface and subsurface soil sampling program indicate that waste disposal was confined to the northwestern quadrant of the Site.

The test pitting program, therefore, focused on this area of the Site. The areal extent of the fill at the Site was defined by excavating fifteen (15) shallow trenches (TP-1, TP-2, TP-3, TP-4, TP-5, TP-6, TP-7, TP-8A, TP-9, TP-10, TP-11, TP-12, TP-13, TP-14 and TP-19) along the expected perimeter of the fill area. Each of these trenches were excavated starting outside the expected fill area and were advanced towards the fill area.

In addition to the fifteen (15) shallow trenches excavated to define the perimeter of the former fill area, four (4) test pits (test pits TP-6, TP-8B, TP-15 and TP-16) were excavated to investigate anomalies identified during the Geophysical Survey conducted in 1989. Test Pit TP-6 was also used to define the perimeter of the fill area. As presented in Section 2.3, the following possible waste-related anomalous areas were identified by the Geophysical Survey:

- Anomaly A - current grid location 0+25S to 1+05S and 0+05E to 1+48E;
- Anomaly B - current grid location 0+45S to 1+25S and 1+20E to 1+80E; and grid location 0+25S to 1+45S and 0+05E to 3+50E; and
- Anomaly H - current grid location 2+15S to 2+60S and 1+45E to 1+65E.

These anomalous areas were initially investigated during the borehole program in September 1993 by the completion of boreholes BH1-93 and BH2-93 at Anomaly A and boreholes BH3-93 and BH4-93 at Anomaly B. Anomaly H was not investigated during the borehole program. At Anomaly A, paint-related waste material was identified at boreholes BH1-93 and BH2-93 to a depth of approximately 2 ft BGS. Elevated PID readings up to 4,151 ppm were also recorded at these locations. At Anomaly B, paint-related waste was evident to a depth of approximately 1.7 ft BGS at borehole BH3-93 and to a depth of approximately 1.0 ft BGS at borehole BH4-93. PID readings were not recorded above background levels at these two locations.

The excavation of test pits TP-15 and TP-16 at Anomaly A indicate fill containing waste material to approximate depths of 2.5 and 2.0 ft BGS for TP-15 and TP-16, respectively. This waste material consists of paint-related waste, paper, various sizes of metal cans, burlap bags, bottles and jars, glass fragments, assorted wood debris and bricks. It is expected that this fill material accounts for the anomalous Geophysical Survey results in the area of Anomaly A.

The excavation of test pit TP-6 at Anomaly B indicates fill containing waste material to an approximate depth of 1.2 ft BGS. This waste material consists of a small amount of paint-related waste and trace amounts of broken glass. It is expected that this fill material accounts for the anomalous Geophysical Survey results in the area of Anomaly B.

The excavation of test pit TP-8B at Anomaly H indicates that fill containing waste material is not present at this location. The results for test pit TP-8B indicate that the anomalous results of the Geophysical Survey in the area of Anomaly H is not related to waste material at the Site.

In addition to the perimeter test pits and the test pits excavated to investigate the Geophysical Survey anomalies, two (2) additional test pits (TP-17 and TP-18) were completed within the interior of the fill area to further define the depth and nature of the fill material. Fill containing waste material was encountered to depths of 2.5 and 2.0 ft BGS for test pits TP-17 and TP-18, respectively. The waste material consisted of paint waste and some glass and wood debris.

Waste material was not observed at test pits TP-4, TP-8B and TP-19. In addition, waste material was not encountered over the 42-foot length of test pit TP-12 with the exception of a one-foot long section of a small amount of pink and red paint chips at a depth of 8 to 10 inches BGS.

Based on the excavation of the twenty (20) test pits, the areal limit of fill material as defined by the test pit program is presented on Figure 3.6. The area of continuous fill is estimated to be approximately 23,450 ft^2 ranging in depth from 1.0 ft at TP-7 to a maximum depth of 2.5 ft at test pits TP-1, TP-15 and TP-17. Intermittent waste material was observed outside of the continuous fill area at shallower depths ranging from approximately 1.0 ft at test pit TP-9 to a maximum depth of 2.0 ft at test pit TP-11. The area of intermittent fill is estimated to be approximately 9,580 ft^2. The volume of the continuous fill area consisting primarily of waste material is estimated to be approximately 1,750 yd^3 based on an average depth of 2.0 ft. The volume of the intermittent fill area consisting primarily of soil with waste material is estimated to be approximately 530 yd^3 based on an average depth of 1.5 ft. The total volume of fill material at the Site containing waste material is estimated to be approximately 2,300 yd^3.

The waste material encountered at the Site during the test pit program consists of metal paint cans; pink, white, green, purple, yellow, blue and red paint-like waste; dried red and white paint-like material; deteriorated 5-gallon paint cans and drum; household wastes consisting of broken glass, china and plastic; pale blue powdery material; 16 oz metal cans, bottles, paper, burlap bags, glass bottles, wood debris, bricks, glass jars and small metal cans.

Samples for chemical analysis were collected from test pits TP-9, TP-12 and TP-15 as presented in Table 3.8. These samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals and cyanide. The results for these analyses are discussed in Section 6.2. In addition, test pits TP-14 and TP-17 were sampled from their fill and native constituents and were analyzed for grain size and Atterburg limits. The results for the grain size and Atterburg limits analyses are presented in Appendix B. The grain size results indicate the following distribution for the fill and native material at test pits TP-14 and TP-17:

	Gravel	*Sand*	*Silt*	*Clay*
Fill				
TP-14	5.7%	47.2%	29.3%	17.8%
TP-17	12.1%	20.3%	54.4%	13.2%

	Gravel	*Sand*	*Silt*	*Clay*
Native				
TP-14	0.0%	37.6%	31.2%	31.2%
TP-17	0.0%	14.7%	52.2%	33.1%

3.2.14 Task 14 - Interim Reporting

As specified in the Work Plan, three interim reports were submitted to the U.S. EPA at the completion of the following tasks:

Interim Report 1 - Stratigraphic Borehole Program (Task 5);
Interim Report 2 - Soil Gas Survey (Task 12); and
Interim Report 3 - Groundwater Sampling and Analyses (Task 7),
- Subsurface Soil Sampling (Task 9).

Interim Report 1, submitted for review to the U.S. EPA on August 17, 1993, presented the results of the stratigraphic borehole program and the proposed details of the groundwater monitoring well installations. In accordance with the U.S. EPA's comments dated August 31, 1993, Interim Report 1 was revised and resubmitted on September 3, 1993.

Interim Report 2, submitted to the U.S. EPA on December 1, 1993, presented the results of the property and grid survey, topographic mapping and the soil gas survey. In addition, the analytical results for soil samples collected from stratigraphic borehole BH-W1 were also presented.

Interim Report 3, submitted to the U.S. EPA on February 10, 1994, presented the following:

- the results of the subsurface soil sampling and the Round 1 groundwater analyses;
- additional details for the test pitting program;
- a proposed SSPL for the Round 2 groundwater monitoring and any future subsurface soil sampling;
- a description of the groundwater monitoring well installations;
- a description of all sampling activities (groundwater, surface soil, subsurface soil, surface water, and sediment);
- an evaluation of the results of the sample analyses;
- groundwater level measurements and figures presenting potentiometric contours;

- a revised conceptual Site model; and
- a description of additional investigative tasks required to define the environmental conditions at the Site.

Interim Report 3 was revised and resubmitted on May 3, 1994 in response to U.S. EPA comments dated April 1, 1994. Subsequent U.S. EPA comments were attached to letters dated August 25, 1994, October 20, 1995, and January 17, 1996. Responses to these comments were submitted on October 13, 1994, November 27, 1995, and April 9, 1996, respectively.

The information presented in the three interim reports has been incorporated into this Site Investigation Report.

3.2.15 Air Particulate Monitoring Program

Two rounds of air particulate monitoring were conducted to determine ambient conditions (i.e., when no intrusive work is being performed) for evaluation in the Baseline Health Risk Evaluation. The particulate monitoring was requested by the U.S. EPA as a supplementary task to the Work Plan [see general comment 6, Responses to U.S. EPA Comments of February 1994 on IR-3 and specific comment 2, U.S. EPA Responses to CRA's Responses to U.S. EPA's Comments on IR-3 Revision (October 1994)]. In response to U.S. EPA's request, the air particulate monitoring program was added as an additional task of the investigation.

Real-time particulate monitoring was conducted for each air particulate sampling round. Three Miniram PDM-3 particulate monitors were calibrated in accordance with the manufacturer's guidelines and positioned approximately 4 feet above the ground surface at each of the following monitoring locations:

- at the property boundary upwind of the former waste disposal area;
- immediately downgradient of the former waste disposal area; and

- at the nearest property boundary downwind of the former waste disposal area.

The U.S. EPA was notified prior to each sampling event. Sample locations were determined in the field by CRA's field representative based on the prevailing wind direction at the time of monitoring and the areal extent of the former waste disposal area. Sample locations for Round 1 and Round 2 monitoring events are presented on Figures 3.7 and 3.8, respectively.

The first round of air particulate monitoring was conducted on August 14, 1996. Weather data was obtained for the weather station at the Buffalo International Airport. Wind speed was approximately 3 miles/hour from the south/southwest. The temperature and relative humidity at the time of sampling were 77°F and 52 percent, respectively. Field observations were made at the time of sampling to confirm the wind direction and to ensure that there were no pools of surface water in the areas to be monitored. The Site was heavily vegetated at the time of sampling.

The second round of air particulate monitoring was conducted on September 20, 1996. The second round of monitoring was to occur during a worst-case wind event (i.e., relatively high winds and dry conditions). However, high winds often coincided with wet periods during the potential monitoring period, August and September 1996. September 20, 1996 was chosen for the second event as the preceding days were dry and the wind was relatively high in comparison to the first monitoring event. For Round 2, a portable weather station (WeatherPort WS-14) was set up on Site to provide accurate weather data at the Site at the time of sampling. Wind speed was measured at the Site at approximately 12 miles/hour from the southwest. The temperature and relative humidity at the time of sampling were 70°F and 45 percent, respectively. Field observations were made at the time of sampling to confirm the wind direction and to ensure that there were no pools of surface water in the areas to be monitored. The Site was heavily vegetated at the time of sampling.

At the completion of the 1-hour monitoring period, the time-weighted average (TWA) air particulate concentrations for each monitoring station were recorded from the Mini-Ram PDM-3 particulate monitors. The following TWA particulate concentrations were recorded at each monitoring station for the Round 1 and Round 2 monitoring events:

	TWA Air Particulate Concentration (mg/m^3)	
Monitor Location	***Round 1***	***Round 2***
1	0.00	0.00
2	0.04	0.020
3	0.04	0.020

It should be noted that during the Round 2 event, airborne particulates suspected to be pollen were observed upwind of monitors 2 and 3. Pollen was not observed upwind of monitor 1 located at the upwind property boundary. The presence of pollen at the time of sampling may have significantly impacted the concentrations of particulates at monitors 2 and 3.

3.3 BASELINE HEALTH RISK EVALUATION

Based on the Site Investigation and historic sampling data base, a Baseline Health Risk Evaluation was completed by CRA. The evaluation was conducted in accordance with the U.S. EPA guidance document entitled "Risk Assessment Guidance for Superfund" (July 1989). The Baseline Health Risk Evaluation provides a basis for reviewing potential remedial action alternatives. The Baseline Health Risk Evaluation is presented in Section 8.0 of this report.

3.4 FISH AND WILDLIFE IMPACT ANALYSIS

A Fish and Wildlife Impact Analysis (FWIA) was conducted in accordance with the document entitled "Fish and Wildlife

Impact Analysis for Inactive Hazardous Waste Sites" prepared by NYSDEC Division of Fish and Wildlife, October 1994.

Beak Consultants Inc. of Akron, New York were retained to conduct Step I of the FWIA. Fish and wildlife resources that may be affected by Site-related contaminants and the potential contaminant migration pathways that may affect these resources were identified. A topographic map documenting regulated wetlands, streams, and lakes within two miles of the Site was prepared. A cover type map was prepared identifying vegetative communities within 0.5 miles from the perimeter of the Site. Fish and wildlife species expected to be associated with each cover type and aquatic habitat were identified.

A qualitative assessment was made regarding the general ability of the area to provide habitat for fish and wildlife species, and the degree to which the habitats meet the requirements for food, seasonal cover, bedding areas, breeding and roosting sites.

Based on the results of Step I of the FWIA and the data obtained from the groundwater monitoring, surface water and sediment sampling and surface soil sampling, an evaluation was made regarding the potential for the Site to impact fish and wildlife resources (Step II of the FWIA).

The results of the FWIA are presented in Section 9.0 of this report.

4.0 REGIONAL AND SITE SETTING

4.1 CLIMATOLOGY

Climatic data was obtained from a document entitled "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961-1990" prepared by the National Oceanic and Atmospheric Administration (NOAA) for the State of New York. The nearest weather station is located in Lockport, New York, approximately 9.5 miles northwest of the Site. The annual average monthly normal temperature for Lockport, New York is 47.8°F. The maximum monthly temperature normals range from 81.4°F in July to 30.9°F in January. The minimum monthly temperature normals range from 60.4°F in July to 16.1°F in January. The mean monthly temperatures range from 70.9°F in July to 23.5°F in January.

The monthly precipitation normals for Lockport, New York range from 2.31 inches in February to 3.89 inches in August with an average total annual precipitation of 37.08 inches.

4.2 ADJACENT LAND USE

The adjacent land use is rural agriculture and unused scrub brush. The area is zoned rural agricultural. The area to the southeast of the Site is a wetland identified as NYS freshwater wetland WO-25 by the NYSDEC, Fish and Wildlife Division. This wetland is located approximately 2,000 feet southeast of the Site.

The closest residence to the Site is approximately 300 yards south of the Site along Fletcher Road. Based upon the aerial photographs presented in "Site Analysis, Newstead Site, Newstead, New York" (U.S. EPA, 1990) no other structures have existed closer to the Site since at least 1938.

There are no schools, playgrounds or other public gathering areas within a half mile radius of the Site.

A survey was conducted on April 5, 1993 to identify drinking water wells within a half mile of the Site. At the time of the survey, several residents were not at home. In some cases information regarding well details and the number of occupants was obtained from neighbors. Detailed information regarding well completion details, yield and analytical results was not available from the residents that were surveyed.

Based upon this survey, nine households with a total estimated population of twenty-five residents currently use well water for bathing, dish washing, and other household uses within a half mile radius of the Site. Seven of these households currently use their wells as a source of drinking water. Two households use bottled water for drinking. In general, the majority of the wells are completed at depths less than 30 feet. Deeper wells completed at depths ranging from 50 to 90 feet were reported by the residents to yield poorer quality water.

The closest downgradient groundwater well is located approximately 300 yards south of the Site along Fletcher Road. This well is completed at a depth of approximately 75 feet and is used as a drinking water source.

The closest upgradient groundwater well is located approximately 700 yards northeast of the Site along Tonawanda Creek Road. This well is completed at a depth of approximately 20 feet and is used as a drinking water source.

There is currently no indication of any significant off-Site contaminant sources in the immediate vicinity of the Site other than potential pesticides/herbicides or fertilizer that may have been used on the adjacent agricultural properties or chemicals associated with road construction, paving, and maintenance.

4.3 REGIONAL GEOLOGY

The Site is located near the northern boundary of the Erie-Niagara basin. This feature encompasses all of Erie County, and parts of Niagara, Genesee, Wyoming, and Cattaraugus Counties. The basin consists of layers of sedimentary bedrock, which are covered to a large extent by unconsolidated deposits.

The regional surficial geology consists of till and lake deposits (glaciolacustrine). The till is essentially reworked rock material deposited from glacial ice. Where till overlies Camillus Shale, it is dark gray and clayey or silty. The till can vary in thickness from a thin 2-foot to 3-foot cover to almost 200 feet (La Sala, 1968).

In the vicinity of the Site, till is overlain by lake deposits. These deposits consist of horizontally bedded clay, silt, and fine sand which were deposited in quiescent glacial lakes. These generally form a thin veneer over the till. Localized occurrences of alluvium and ice-contact deposits can be found overlying the lake deposits.

Bedrock beneath the Site and vicinity consists of Upper Silurian Camillus Shale. It is underlain by Lockport Dolomite (Middle Silurian), and overlain by Bertie Limestone and Akron Dolomite. These bedrock units generally strike east-west and dip gently to the south.

Camillus Shale varies in composition from a gray shale to a shale interbedded with gray limestone and dolomite. Along with these carbonates, gypsum comprises a significant part of the Camillus Shale. Some gypsum beds are as much as 5 feet thick. Gypsum also occurs in the Camillus as thin lenses and veins (La Sala, 1968).

4.4 REGIONAL HYDROGEOLOGY

The Camillus Shale is a bedrock aquifer with well yields varying from a few gallons per minute (gpm) to 1,200 gpm. Generally, the maximum yield available is less than 50 gpm (La Sala, 1968). The extensive occurrences of soluble gypsum beds in the Camillus Shale allows openings to be created for the passage and storage of water. The water bearing zones are mainly horizontal because most of the gypsum occurs in horizontal beds of gypsiferous dolomite and shale. Only those gypsum zones actually exposed to circulating groundwater can be widened by solution (La Sala, 1968).

The regional surficial hydrostratigraphic units are considered to be poor aquifers. The fine-grained nature of the lake deposits (silts, clays) indicates that only sandy parts of these deposits may yield small water supplies. Otherwise, this unit is considered not to be water yielding. The low permeability of nonsorted till material reveals that this unit will also yield little or no water.

4.5 REGIONAL HYDROLOGY

The Site and vicinity is located within the Tonawanda Creek drainage basin. Surface water is discharged to Tonawanda Creek via small tributaries, or enters the Creek as runoff. Ultimately, Tonawanda Creek discharges into the Niagara River, which empties into Lake Ontario further downstream, approximately 25 miles northwest of the Site.

4.6 SITE GEOLOGY

The geologic conditions encountered beneath the Site are consistent with the regional geologic setting provided in Section 4.3 of this report and Section 3.3 of the Work Plan. The Work Plan identified three general stratigraphic units, namely an uppermost unsaturated sandy silt unit (0 to 6 feet BGS), a saturated fine-grained unit (6 to 70 feet BGS) and a bedrock unit found at depths between 60 and 70 feet BGS.

The geology of the Site is derived from Site-specific stratigraphic data as provided in the stratigraphic and instrumentation logs in Appendix D. The locations of soil borings, monitoring wells and geologic cross-sections are presented on Figure 4.1. Three geologic cross-sections were prepared to define the stratigraphic setting at the Site. Based on the subsurface information obtained during drilling activities and the stratigraphic data provided on geologic cross-sections A-A' to C-C', the following five stratigraphic units were identified in order of descending depth:

1) Glaciolacustrine Sandy Silt/Silty Sand Unit;
2) Glaciolacustrine Clay Unit;
3) Glaciolacustrine Sand Unit;
4) Silt Till Unit; and
5) Bedrock Unit.

West to east cross-section A-A' (Figure 4.2) and south to north cross-sections B-B' and C-C' (Figures 4.3 and 4.4) detail the upper three glaciolacustrine units (and to a lesser degree the underlying silt till and bedrock unit) of the stratigraphic sequence identified during drilling activities. The cross-sections reveal that these units are continuous across the Site. The stratigraphic contacts appear to be relatively horizontal and gradual. Detailed descriptions of the stratigraphic units are presented in this section.

The upper 6 feet of the Glaciolacustrine Sandy Silt/Silty Sand Unit corresponds to the unsaturated sandy silt unit described in Section 3.3 of the Work Plan. The Glaciolacustrine Sandy Silt/Silty Sand Unit, Clay Unit, Sand Unit and Silt Till Unit correspond to the saturated fine-grained unit estimated to occur at a depth of 6 to 70 feet BGS in the Work Plan.

4.6.1 Glaciolacustrine Sandy/Silt Silty Sand Unit

The Glaciolacustrine Sandy Silt/Silty Sand Unit is continuous across the Site and consists of fine grained sand and silt with varying amounts of clay. A composite soil sample of split spoons from 2 to 12 feet BGS from borehole BH-W1 indicated that this unit is composed of approximately 40 percent sand (37.5 percent fine grained) and 60 percent silt.

Two samples of this unit were also collected during the July 1996 test pit program, and were submitted for grain size analysis. The TP-14 sample yielded a result of 37.6 percent sand, 31.2 percent silt, and 31.3 percent clay. The sample from test pit TP-17 was comprised of 52.2 percent silt, 33.1 percent clay, and 14.7 percent sand.

This unit has an approximate thickness of 11.8 feet, 12.9 feet, and 14.6 feet at boreholes BH-W1, BH-W2, and BH-W3, respectively.

4.6.2 Glaciolacustrine Clay Unit

The Glaciolacustrine Clay Unit is continuous across the Site and consists mainly of clay and silt. A composite soil sample of split spoons from 20 to 26 feet BGS from borehole BH-W1 indicated that this unit is comprised of approximately 59 percent clay and 41 percent silt.

The Glaciolacustrine Clay Unit has an approximate thickness of 19.9 feet, 22.5 feet, and 22.1 feet at boreholes BH-W1, BH-W2, and BH-W3, respectively.

4.6.3 Glaciolacustrine Sand Unit

The Glaciolacustrine Sand Unit is continuous across the Site. This unit at borehole BH-W1 consists of fine grained sand and silt with minor amounts of gravel and clay and is approximately 6.3 feet thick at this location. A soil sample from BH-W1 from 36 to 38 feet BGS indicated that at this location, the Glaciolacustrine Sand Unit is comprised of 2.5 percent fine gravel, 50 percent sand (32.5 percent fine grained), 38.5 percent silt, and 9 percent clay. At BH-W2, this unit is comprised of a silt layer 2.3 feet in thickness overlying a layer of fine to coarse sand approximately 3.1 feet in thickness. The presence of the silt layer at this location indicates that the contact between the overlying Glaciolacustrine Clay Unit and the underlying Glaciolacustrine Unit may be gradational in nature. This sand layer contains angular rock fragments, likely as a result of reworking of the underlying Silt

Till Unit. At BH-W3, the Glaciolacustrine Sand Unit consists of poorly sorted sand with variable amounts of gravel.

The thickness of the Glaciolacustrine Sand unit is 4.0, 3.1, and 11.5 feet at boreholes BH-W1, BH-W2 and BH-W3, respectively.

4.6.4 Silt Till Unit

The Silt Till Unit is continuous across the Site and is predominantly composed of silt with some fine grained sand and minor amounts of gravel and clay. A soil sample from BH-W1 from 44 to 46 feet BGS indicated that the Silt Till Unit at this location consists of 9 percent fine gravel, 38 percent sand (25 percent fine grained), 43 percent silt, and 10 percent clay. The high sand content in the soil sample from 44 to 46 feet BGS reflects a high sand content in the upper part of the Silt Till Unit. Visual observations of the split spoon soil samples at BH-W1, BH-W2, and BH-W3 indicate that the sand content in the Silt Till Unit decreases with depth. The Silt Till Unit includes a layer of fine grained sand approximately 5 feet in thickness at BH-W1 at a depth of approximately 63 feet BGS. This layer of fine-grained sand was not encountered at BH-W2 or BH-W3.

The Silt Till Unit is approximately 28 feet, 25.2 feet, and 16.2 feet thick at boreholes BH-W1, BH-W2, and BH-W3, respectively.

4.6.5 Bedrock Unit

Bedrock was identified by auger refusal at depths of 74.2 feet, 68.3 feet, and 65.2 feet in boreholes BH-W1, BH-W2, and BH-W3, respectively. Weathered bedrock fragments were encountered near the top of the bedrock in the Silt Till Unit. The bedrock is believed to be the Camillus Shale.

4.7 SITE HYDROGEOLOGY

The stratigraphic units identified and defined in Section 4.6 of this report are classified into hydrostratigraphic units based on other hydraulic properties. Generally, water-bearing units consist of geologic media which are able to transmit water, such as sand and gravel. Confining units consist of geologic media which are not able to transmit significant amounts of water, such as silt and clay.

4.7.1 Water Bearing Units

An evaluation of the hydraulic properties of the water bearing stratigraphic units was completed based upon field observations during the drilling activities, grain size distribution and moisture content data. Also, groundwater levels were measured at all on-Site wells on four occasions (November 18, 1993; November 26, 1993; December 23, 1993, and November 26, 1996). The water level data are presented in Table 4.1. Potentiometric contour plans were developed for the last three rounds of water level measurements and are presented on Figures 4.5, 4.6, and 4.7 for the shallow water bearing zone and on Figures 4.8, 4.9, and 4.10 for the deep water bearing zone.

4.7.1.1 Upper Sand Unit

Hydrostratigraphy

The Glaciolacustrine Sandy Silt/Silty Sand Unit (Upper Sand Unit) is the uppermost water bearing unit, also referred to as the shallow water bearing zone. The moisture content of a soil sample collected from 2 to 12 feet BGS at BH-W1 was 21.9 percent. Shallow monitoring wells (MW1A-93, MW2A-93, MW3A-93, and MW4A-93) are completed in this unit. Local perched conditions were encountered at BH-W3 at a depth of approximately 2 feet BGS.

Field observations indicated that the water table was encountered at depths of approximately 6 feet in boreholes BH-W1 to BH-W3, respectively. The average saturated thickness for the Upper Sand Unit ranged from 14.4 feet in late November 1993 to 13.6 feet in June 1996. It should be noted that due to the close proximity of the water table to ground surface, and the location of the Site within the Tonawanda Creek floodplain, large seasonal fluctuations are expected to occur.

Hydraulic Conductivity

The grain size distribution analyses data provided in Appendix B, indicated that the hydraulic conductivity for this material would be approximately 9×10^{-4} cm/sec, as determined by the Hazen method (see Appendix C). It should be noted that the Hazen method (Freeze, 1979) was originally developed for uniformly graded sands and is not strictly applicable to fine-grained soils. It is however, useful as a general indicator of expected hydraulic conductivity.

The results of single well response tests or slug tests are presented in Table 4.2. A total of nine falling and rising head tests were conducted for Upper Sand Unit wells MW1A-93 to MW4A-93, inclusive, on November 29 and 30, 1993. The data were analyzed with the aid of the AQTESOLV software package using the Bouwer & Rice solution (Bouwer, 1976). Calculated hydraulic conductivity values ranged from 1.8×10^{-5} to 2.4×10^{-4} cm/s, with a geometric mean of 5.2×10^{-5} cm/s (1.5×10^{-1} ft/day), which is approximately one-half order of magnitude less than the hydraulic conductivity calculated using the Hazen method.

Groundwater Flow

Groundwater in the Upper Sand Unit is under unconfined or water table conditions. The water table in the Upper Sand Unit is relatively high and close to the ground surface. As a result, groundwater in the Upper Sand Unit is controlled by ground surface topography and drains into topographic low areas and ditches. Originally the local topographic low area was the swamp southwest of the Site.

Subsequently man-made drainage ditches were excavated between the swamp and the Site. The drainage ditches provide an alternative outlet for groundwater seepage southwest of the Site. Groundwater seepage can occur anywhere along the ditches depending on the water table elevation.

Examination of Figures 4.5 and 4.6, indicates that groundwater flow in the Upper Sand Unit was in a southwesterly direction towards the ditch along Fletcher Road during November and December 1993. Adjacent to the Site this ditch lies at an elevation of (592 to 593 ft AMSL) which is lower than the shallow groundwater potentiometric levels (593.43 to 594.15 ft AMSL) and therefore serves as a groundwater discharge location. This ditch crosses Fletcher Road approximately 350 feet south of the Site and continues in a southwesterly direction in a man-made channel. Topographic information indicates that the elevation of this channel on the west side of Fletcher Road is less than 590 ft AMSL. This channel discharges into Tonawanda Creek approximately 2 miles southwest of the Site.

The groundwater elevations for November 1996 (Figure 4.7) reveal that the groundwater flow appears to be generally to the southwest. However, a hydraulic low occurs in the vicinity of MW4A-93. This is likely caused by the presence of a combination of the following:

- presence of higher permeability material at MW4-93; and
- localized effects of on-Site ditches.

Hence, it is concluded that the shallow groundwater flow is mainly controlled by the Fletcher Road drainage ditch and the man-made channel west of Fletcher Road.

Groundwater Flow Velocity

The horizontal hydraulic gradient was determined for the Upper Sand Unit using the November 1996 groundwater elevations presented on Figure 4.7. In order to assess the potential for contaminant migration in this unit, the interstitial one-dimensional groundwater flow velocity was calculated using the following modified Darcy's Law:

$$v = \frac{Ki}{n} = \frac{1.5 \times 10^{-1} \text{ ft/day} \times 0.0011}{0.3} = 5.5 \times 10^{-4} \text{ ft/day (0.20 ft/yr)}$$

where:
v = interstitial one-dimensional groundwater flow velocity (ft/day);
K = hydraulic conductivity (geometric mean of slug test data in ft/day);
i = horizontal hydraulic gradient (ft/ft); and
n = porosity (dimensionless).

This calculation indicates that the groundwater flow velocity (v) in the Upper Sand Unit is small, due to the small horizontal hydraulic gradient and relatively low hydraulic conductivity (K). The small groundwater flow velocity and fine-grained nature of the soil combine to limit the migration of contaminants away from the source area in the Upper Sand Unit.

Groundwater Flux

The groundwater flux across the downgradient (western) property boundary was also estimated, using the groundwater flow patterns presented on Figure 4.7. The groundwater flux was calculated using the following:

$$Q = T \times i \times L = [(1.5 \times 10^{-1} \text{ ft/day}) \times (13.1 \text{ ft})] \times (0.0011) \times (555 \text{ ft}) = 1.2 \text{ ft}^3\text{/day}$$

where:
Q = groundwater flux (ft^3/day);
T = transmissivity = (k x b) = (hydraulic conductivity • saturated thickness);
i = horizontal hydraulic gradient (ft/ft); and
L = length of downgradient property boundary (ft).

The calculated groundwater flux across the downgradient property boundary for the Upper Sand Unit using the November 1996 Site groundwater flow patterns is 1.2 ft^3/day, or approximately 0.006 gallons per minute (gpm).

4.7.1.2 Lower Sand Unit

Hydrostratigraphy

The Glaciolacustrine Sand Unit (Lower Sand Unit) underlies the Glaciolacustrine Clay Unit and is not hydraulically connected to the Upper Sand Unit. The Lower Sand Unit is also referred to as the deep water bearing zone. Groundwater in the Upper Sand Unit is under confined conditions. The deep monitoring wells (MW1B-93, MW2B-93, and MW3B-93) are completed in this unit.

Hydraulic Conductivity

The grain size distribution data for a soil sample from the 36 to 38 feet interval of BH-W1 indicates that the hydraulic conductivity for this material would be on the order of 4 x 10^{-5} cm/sec as determined by the Hazen Method (see Appendix C).

Slug test results for the Lower Sand Unit wells are also presented in Table 4.2. The data were analyzed with the aid of the AQTESOLV software package using the Cooper et al. solution for a confined aquifer. Hydraulic conductivities for the six rising/falling head tests ranged from 4.1 x 10^{-6} to 5.8 x 10^{-5} cm/s. The geometric mean value was 2.2 x 10^{-5} cm/s (6.2 x 10^{-2} ft/day). This value closely approximates the hydraulic conductivity values determined using the Hazen method.

Groundwater Flow

Examination of Figures 4.8 and 4.9 indicates that during November and December 1993, groundwater flow in the Lower Sand Unit was in a northerly direction towards Tonawanda Creek. At normal water levels, Tonawanda Creek is low enough to receive groundwater discharge from the Lower Sand Unit. The water levels measured at individual deep wells increased approximately 2 feet over the November 18 to December 23, 1993 time period. The results for the November 1996 hydraulic monitoring event presented on Figure 4.10 indicate that groundwater flow is to the northwest. The change in groundwater flow pattern from 1993 to 1996 may be due to measurement discrepancies. As shown by the groundwater contours presented on Figure 4.10, the horizontal hydraulic gradient is very small.

Groundwater Flow Velocity

The average groundwater flow velocity (v) was also calculated for the Lower Sand Unit in the same manner as that of the Upper Sand Unit. Using the geometric mean hydraulic conductivity (K) value for the slug test data of 2.2×10^{-5} cm/sec (6.2×10^{-2} ft/day), a horizontal hydraulic gradient (i) of 0.00018 (calculated using the November 1996 groundwater elevations), and a porosity (n) of 0.3, the groundwater velocity was determined to be 3.7×10^{-5} ft/day (0.01 ft/yr). This result is approximately one order of magnitude lower than the groundwater flow velocity for the Upper Sand Unit. The groundwater flow velocity in the Lower Sand Unit is very small.

Groundwater Flux

The groundwater flux across the downgradient (northern) property boundary (L = 465 feet) was calculated for the Lower Sand Unit using November 1996 Site conditions. Employing a hydraulic conductivity of 6.2×10^{-2} ft/day, a saturated thickness of 11.5 feet, and a horizontal gradient of 0.00018, the calculated groundwater flux for the Lower Sand Unit is 0.06 cubic ft/day, or approximately 0.0003 gpm.

4.7.1.3 Bedrock Unit

The Site-specific hydraulic properties of the bedrock are presently unknown. Regional studies (La Sala, 1968) indicate that due to the presence of solution cavities (i.e., dissolution of gypsum) in the bedrock, large quantities of water can be locally obtained from the Camillus Shale.

4.7.2 Confining Units

4.7.2.1 Clay Unit

The Glaciolacustrine Clay Unit is comprised of clay (59 percent) and silt (41 percent). The moisture content of the soil sample collected from this unit at BH-W1 at a depth of 20 to 26 feet BGS was 45.7 percent. This Unit functions as a confining unit which restricts vertical movement of groundwater from the Upper Sand Unit to the Lower Sand Unit. It is expected that the hydraulic conductivity of this Unit would be on the order of 10^{-8} to 10^{-9} cm/sec. Water levels measured at the nested well pairs indicate a downward vertical gradient between the Upper Sand Unit and the Lower Sand Unit. Vertical gradients measured at each well nest are summarized in Table 4.3. The average (downward) vertical hydraulic gradient is 0.09 ft/ft.

4.7.2.2 Silt Till Unit

The Silt Till Unit underlies the Lower Sand Unit and is expected to restrict downward movement of groundwater. This unit is composed predominantly of silt. The grain size distribution analysis provided in Appendix B, indicates that the Hazen hydraulic conductivity for this material would be on the order of 4×10^{-5} cm/sec. Although this hydraulic conductivity value is similar to that of the overlying water bearing unit, it is to be noted that the selected sample had high sand content which may have resulted in overestimation of the hydraulic conductivity.

4.8 SITE HYDROLOGY

Surface water is drained from the Site in four shallow westward flowing ditches. The ditches are illustrated on Figure 4.11. The most northerly ditch has a 90° bend southward to avoid the former house location and is connected to the second ditch from the north. The most southerly ditch is coincident with the southern property boundary. All Site ditches drain to the roadside ditch on the east side of Fletcher Road. This east side Fletcher Road ditch drains in a southerly direction as indicated in the 1990 EPA Site Analysis report. This flow direction is confirmed by surveyed elevations obtained along the ditch during the current investigation. Approximately 350 feet south of the Site, the drainage is conveyed beneath Fletcher Road via a culvert. From Fletcher Road, drainage is directed southwestward via ditches to Tonawanda Creek. The regional surface water drainage is shown on Figure 4.12.

5.0 SOIL GAS SURVEY

A soil gas survey was conducted by Northeast Research Institute Inc. (NERI) between August 17 and August 31, 1993. The survey involved installation, retrieval, and analysis of 43 Petrex soil gas samplers. Each sample was analyzed by Thermal Desorption/Mass Spectrometry (TD-MS). Additional information regarding the methods utilized for the soil gas survey are presented in Section 3.2.12 and a copy of NERI's report is presented in Appendix H. This section presents an evaluation of the analytical results.

It is to be noted that soil and/or groundwater analyses will be used to quantify actual chemical concentrations at the Site. The soil gas data is only used as a screening tool to guide additional sampling and analyses, as required.

Figure 5.1 presents a summary of the results of the soil gas survey. The colored areas represent sample locations with ion counts greater than 100,000 for one or more compounds. Areas with elevated ion counts greater or equal to 1,000,000 for one or more compounds are also highlighted on Figure 5.1. Results for the individual compounds are presented in the soil gas survey report prepared by NERI (see Appendix H). For presentation purposes, reported ion counts ranging from 100,000 to 999,999 are referred to as "moderate response" and reported ion counts greater than 1,000,000 are referred to as "elevated response" in the following discussion.

The results for BTEX indicate a moderate response primarily north of grid line 1 + 00S. Two fingers project in a southern direction from this northern area along grid lines 1 + 00E and 4 + 00E. A single elevated response was indicated at sample location 39 (1 + 00S, 1 + 00E).

The results for cycloalkanes/alkenes indicate a moderate response at sample locations 35 (0 + 50S, 3 + 50E) and 20 (3 + 00S, 4 + 00E). An elevated response for cycloalkanes/alkenes is evident in the northwest corner of the Site north of 2 + 00S and west of 1 + 50E.

The results for DCB indicate a moderate response in the east-central region of the Site at sample locations 29 (2 + 00S, 4 + 00E) and 20 (3 + 00S, 4 + 00E).

The results for PCE indicate a moderate response in the extreme northwest corner of the Site at sample locations 15 (0 + 00S, 0 + 00E) and 41 (0 + 50S, 0 + 50E). An additional moderate response was evident at sample location 26 (2 + 00S, 1 + 00E).

Samples collected west of Fletcher Road (sample locations 6, 7, 9, 10, 11, 12, and 13) did not indicate moderate or elevated responses for BTEX, cycloalkanes/alkenes, DCB or PCE.

Ion counts above non-detect levels but below moderate to elevated response levels for the four groups of primary compounds (i.e., BTEX, DCB, PCE and cycloalkanes/alkenes) were reported at sample locations outside of the colored areas presented on Figure 5.1 (see plates 2 to 5, Appendix H). These values, which cannot be translated into actual concentrations, may represent background levels for the area as indicated by surface soil, subsurface soil and sediment samples collected from these areas (see Sections 6.1, 6.2, and 6.4).

The previous soil gas survey conducted by Roy F. Weston, Inc. for the U.S. EPA focussed on the northern area of the Site north of grid line 2 + 26S. Five additional locations were sampled south of grid line 2 + 26S. The highest levels of total target aromatic compounds were reported in the northwestern portion of the Site in the previous survey. The major aromatic constituents previously found in the soil gas included the BTEX compounds.

The results of the current soil gas survey are generally consistent with the previous survey. Both surveys indicate that the highest concentrations are in the northwestern corner of the Site. However, there are some differences in the results for the two surveys. Relatively high levels were reported in samples from the western side of Fletcher Road, along grid line 2+26S and at grid nodes 1+76S, 0-10E; 2+76S, 0-10E; 3+26S, 1+40E; 3+26S, 2+40E and 4+26S, 1+90E, during the previous survey, however, elevated levels were not detected in samples in close proximity to these locations in the current survey. Also, during the current survey, areas with elevated readings were identified at grid nodes 4+00S, 1+00E; 3+00S, 1+00E; 2+00S, 1+00E; 3+00S, 4+00E; and 2+00S, 4+00E, whereas these areas were not sampled during the previous survey. As described in Section 3.2.9, five boreholes were added to the subsurface soil sampling program to investigate elevated soil gas survey readings at these five locations.

Overall, the current survey is consistent with the historical knowledge of waste material placement at the Site. Waste material placement is known to have occurred in the northern portion of the Site, the area where the highest soil gas readings were recorded. No new chemical sources were identified by the survey.

6.0 CHEMICAL DISTRIBUTION

This section presents an evaluation of the chemical data for the various sampled media. The purpose of this evaluation is to:

- determine the chemical constituents related to waste disposal activities at the Site;
- determine the extent of elevated Site related chemicals in the various media relative to background conditions and Federal/State standards where applicable;
- determine actual chemical concentrations at locations previously identified as potentially containing elevated chemical presence based on screening tests; and
- assess the need for any additional sampling required so as to better define the environmental conditions at the Site.

6.1 SURFACE SOILS

Surface soil samples were collected from three locations on September 22 and 23, 1993. Soil sampling locations SS-1 and SS-2 correspond to areas previously identified as having elevated VOCs based upon the 1990 Soil Gas Survey. Sampling location SS-3 is located within the suspected waste disposal area. Each sample was analyzed for TCL VOCs, SVOCs, Pesticides/PCBs and TAL parameters. The complete analytical results are presented in Table J.1 in Appendix J. Compounds detected in the surface soil samples are summarized in Table 6.1. The results for detected organic parameters are summarized on Figure 6.1. The results for selected inorganic parameters (i.e., barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc) are presented on Figure 6.2.

The analytical data for soil samples collected from BH-W1 (see Section 6.2) are considered to be representative of background conditions. Borehole BH-W1 is located in the southeast corner of the Site and samples collected from this borehole were analyzed for TCL VOCs, SVOCs, pesticides/PCBs and TAL metals. No organic parameters were detected in the shallow (2 ft to 6 ft) sample collected from this borehole. Three SVOCs, acenaphthene (62J µg/kg), di-n-butylphthalate (180JB µg/kg) and phenanthrene (94J µg/kg) were detected at relatively low levels in the sample collected from the depth interval of 10 to 14 ft. Given that these parameters were reported present in the deep sample but not the shallow sample, and, that this sampling location is upgradient of the former waste disposal area, it is concluded that their presence in this sample is not a result of waste disposal activities at the Site. Hence, these data are considered representative of background conditions and are used for comparison purposes in the evaluation of the surface and subsurface soil data.

As indicated previously, SS-1 and SS-2 are located at locations identified as potentially containing elevated VOCs based upon the 1990 Soil Gas Survey. The analytical data presented on Figure 6.1 indicate that no organic compounds were detected in the sample from SS-2 and only one organic compound (phenol) was detected in the sample from SS-1 at a relatively low concentration of 46J µg/kg. These data indicate that the elevated VOC levels previously reported at these locations during the 1990 Soil Gas Survey are anomalous and that elevated organic chemical concentrations are in fact, not present at these locations. The data presented in Table 6.1 indicate that the inorganic parameter concentrations at locations SS-1 and/or SS-2 are similar to the levels reported for the background locations. Some inorganic parameters (i.e., aluminum, beryllium, chromium, iron, and lead) were reported at concentrations slightly higher than the range for the background locations. However, these exceedances are relatively insignificant and considered essentially the same as the background levels, with the exception of lead at SS-1 (90.5 mg/kg) which is approximately seven times higher than the background level (12.1 mg/kg) but still significantly lower than the lead concentrations reported at other locations at the Site closer to the former waste disposal area.

Sampling location SS-3 is located within the suspected waste disposal area. Analytical results for this location will be used to define chemical concentrations in the surface soils in this area. These data, in conjunction with other analytical data for near surface soil samples, will also be used for evaluating potential risks associated with the Site. The data presented on Figure 6.1 indicate that polycyclic aromatic hydrocarbons (PAHs) were detected in the sample from SS-3 at concentrations up to 280J µg/kg for benzo(B)fluoranthene. PCBs (aroclor-1254 at 14,000 D µg/kg and aroclor-1260 at 7,800 DP µg/kg) were also detected in this sample.

The inorganic results for SS-3 presented in Table 6.1 and on Figure 6.2 indicate that several inorganic parameters were reported at concentrations exceeding both the background concentrations and the reported concentrations at locations SS-1 and SS-2. The most prominent inorganic parameters with elevated concentrations in this sample are barium (7,100 mg/kg), cadmium (123 mg/kg), chromium (1,760 mg/kg), cobalt (161 mg/kg), copper (466 mg/kg), cyanide (26.4 mg/kg), lead (15,900 mg/kg) and zinc (8,350 mg/kg).

Based upon the surface soil data presented above, the following conclusions are appropriate:

- the elevated VOC levels reported in the 1990 Soil Gas Survey at locations SS-1 and SS-2 are not supported by actual chemical data for the surface soil samples collected from these locations;
- organic and inorganic concentrations in the surface soils outside of the area of waste disposal are at or close to background levels; and
- PAHs, PCBs, and inorganic parameters (primarily barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc) are present at concentrations above background levels in surface soils within the former waste disposal area.

6.2 SUBSURFACE SOILS

During the period from September 17 to September 23, 1993, two subsurface soil samples were collected from each of seven boreholes (BH1-93 to BH7-93) and analyzed for TCL VOCs, SVOCs, pesticides/PCBs and TAL metals. These samples were selected from the two sampling intervals which indicated the highest potential chemical presence based on visual inspection and organic vapor readings. The analytical data for these samples are presented in Table J.2 in Appendix J.

Boreholes BH8-96, BH9-96, BH10-96, BH11-96, and BH12-96 were completed on July 9, 1996. At each of these boreholes, a sample was collected from the interval with the highest potential for chemical presence based on visual evidence and PID readings and analyzed for TCL VOCs, SVOCs, and PCBs. The analytical results for these samples are presented in Table J.2 in Appendix J.

Additionally, one waste sample was collected from each of the test pits TP-9, TP-12, and TP-15. These samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, and cyanide. The analytical results for the test pit samples are presented in Table J.6 in Appendix J.

Summaries of the detected compounds reported for the borehole samples and test pit samples are presented in Tables 6.2 and 6.3, respectively. Detected organic compound results are presented on Figure 6.3. Figure 6.4 presents analytical results for selected inorganic parameters (i.e., barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc). The borehole stratigraphic information is presented in Appendix A.

In general, the subsurface soil data indicate the presence of fill materials containing wastes to a depth up to 4 feet at boreholes BH1-93, BH2-93, BH3-93, and BH6-93 and test pits TP-15 and TP-9 in the northwestern portion of the Site. A lesser amount of waste material was identified at TP-12 located in the northcentral portion of the Site. Chemicals with the highest concentrations in the fill, relative to background levels or NYSDEC Soil Cleanup Objectives are phthalates, ethylbenzene, xylenes, phenol, naphthalene, 2-methylnaphthalene, PCBs, aluminum, barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc. The concentrations of these parameters in soils underlying the fill are at least an order of magnitude lower than the concentrations in the fill.

Elevated chemical concentrations relative to background levels were not found at boreholes BH4-93 or BH7-93, although these areas were identified as potentially containing high chemical concentrations based on the 1990 Soil Gas Survey or the 1990 Geophysical Survey. Similarly, elevated chemical concentrations were not found at boreholes BH8-96, BH9-96, BH10-96, BH11-96, and BH12-96 which were sampled to investigate potential VOC presence indicated by the 1993 Soil Gas Survey results.

Elevated concentrations of PAHs relative to background levels were reported present in the fill along Fletcher Road at borehole BH5-93. This location is immediately adjacent to the paved surface of Fletcher Road. Based on available data, it appears that the elevated PAH concentrations found in BH5-93 are not related to former on-Site activities. This sampling location is in close proximity to asphalt and has higher PAH concentrations than the concentrations reported at the on-Site locations.

Samples were collected from the on-Site waste materials and contaminated soils at BH2-93 and analyzed using the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP results are summarized in Table 6.4. These data indicate that these materials are not hazardous based on toxicity characteristics.

Additional details regarding the data for each borehole location and test pit location are presented in the following paragraphs.

BH1-93 and BH2-93

Boreholes BH1-93 and BH2-93 are located in the northwestern corner of the Site in an area identified as a potential drum burial area by the 1990 Geophysical Survey. The purpose of these boreholes was to define the stratigraphy at these locations and to allow sample collection from the intervals with the highest potential for chemical presence. The sample analytical data were used to:

- define chemical constituents related to waste disposal activities at the Site;
- develop the SSPL for Round 2 groundwater sampling;

- develop appropriate test pitting procedures to further investigate the potential for buried drums in these areas;
- define the vertical distribution of chemicals in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Samples were collected from each of these boreholes over the depth intervals of 2 to 4 ft and 4 to 6 ft as the screening information indicated that these samples had the highest potential for chemical presence. Fill containing paint waste or paint chips was identified to depths of 4 feet and 2 feet at BH1-93 and BH2-93, respectively. No evidence of buried drums was identified during the drilling and sampling of boreholes BH1-93 or BH2-93.

The data for organic parameters (presented on Figure 6.3) indicate concentrations of xylenes, ethylbenzene and toluene (BH1-93 only) were detected in the samples from these locations. The highest concentrations (maximum of 50,000 µg/kg for xylene) are reported in the shallow sample from BH2-93. SVOCs, primarily naphthalene, 2-methylnaphthalene, phenanthrene, and phenol were reported present in the samples from the 2 to 4 ft range. The highest concentrations of these parameters were reported in the shallow, 2 to 4 ft, sample from BH2-93. Two PCB compounds, aroclor-1254 and aroclor-1260 (maximum concentration of 68P µg/kg) were reported present in the shallow sample from BH2-93. The only organic parameters detected in the deeper samples are ethylbenzene, xylenes, toluene (BH1-93 only), phenol (BH2-93 only) and naphthalene (BH2-93 only). The concentrations of all parameters in the deeper 4 to 6 ft samples are at least an order of magnitude lower than the corresponding concentrations in the shallow samples. Only xylenes (4,200 µg/kg) and phenol (61J µg/kg) in the 4 to 6 ft sample from BH2-93 exceed the NYSDEC Soil Cleanup Objectives.

The inorganic parameter results are listed in Table 6.2. Selected inorganic parameter results are presented on Figure 6.4. Only one parameter, beryllium at 0.43 F mg/kg, was detected at a concentration slightly exceeding the background levels in the shallow sample from BH1-93. No inorganic parameters were detected above the background levels in the deeper sample from this borehole. Lead (31.8 mg/kg), and zinc (87.2 mg/kg) were the only parameters with concentrations exceeding the background levels in the shallow sample from BH2-93 and selenium (0.70 JF mg/kg) was the only parameter exceeding background levels for the deeper sample from BH2-93.

Based upon these data it is concluded that:

- the depth of fill at these locations ranges from 2 to 4 feet;

- the chemicals with the highest concentrations above background are ethylbenzene, toluene, xylene, phenol, naphthalene, 2-methylnaphthalene, phenanthrene, and lead. Of these parameters only ethylbenzene, xylenes, and phenol exceed the NYSDEC Soil Cleanup Objectives; and

- the concentrations of the above noted parameters were at least an order of magnitude lower in the samples collected over the depth interval from 4 to 6 ft relative to the shallower samples from 2 to 4 feet.

These data will be used to define the extent of chemical contamination at the Site and develop exposure concentrations for the Baseline Health Risk Evaluation.

BH3-93

Borehole BH3-93 is located in the northcentral portion of the Site in an area previously identified by the 1990 Geophysical Survey as potentially containing buried drums. The purpose of this borehole was to define the stratigraphy at this location and to allow sample collection from the intervals with the highest potential for chemical presence. The sample data were used to:

- define chemical constituents related to waste disposal activities at the Site;
- develop the SSPL for Round 2 groundwater samples;

- develop appropriate test pitting procedures to further investigate the potential for buried drums in this area;
- define the vertical distribution of chemicals in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Samples were collected over the depth intervals from 0 to 2 ft and 2 to 4 ft. Fill containing some waste was identified at this location to a depth of 1.7 ft. No evidence of buried drums was identified during the drilling and sampling of borehole BH3-93.

The TCL organic parameters detected in the shallow, 0 to 2 ft, sample from this borehole are di-n-butylphthalate (720 µg/kg), bis (2-ethylhexyl) phthalate (3,500 µg/kg), aroclor-1254 (5,200D µg/kg), and aroclor-1260 (13,000DP µg/kg). Aroclor-1260 (11JP µg/kg) was the only TCL organic parameter detected in the sample from 2 to 4 ft.

No inorganic parameters were reported present at concentrations greater than the background levels in the sample from 2 to 4 ft. For the sample from 0 to 2 ft, several inorganic parameters were reported at concentrations greater than the range for the background samples. The primary inorganic parameters reported at concentrations greater than the background levels are barium (3,440 mg/kg), cadmium (44.9 mg/kg), chromium (655 mg/kg), copper (234 mg/kg), cyanide (41.7 mg/kg), lead (6,290 mg/kg), and zinc (4,130 mg/kg).

Based upon these data it is concluded that:

- the depth of fill at this location is 1.7 ft;
- the chemicals present at the highest concentrations relative to background at this location are phthalates, PCBs, barium, cadmium, chromium, copper, cyanide, lead, and zinc; and
- the concentrations of all of the above parameters decrease rapidly with depth. Only one compound (aroclor-1260 at 11 JP µg/kg) was reported above background concentrations in the deeper sample from 2 to 4 ft.

These data are used to define the extent of chemical contamination at the Site and develop exposure concentrations for the Baseline Health Risk Evaluation.

<u>BH4-93</u>

Borehole BH4-93 is located approximately 100 feet east of BH3-93. This area was identified during the 1990 Geophysical Survey as potentially containing contaminated fill or groundwater. The purpose of this borehole was to define the stratigraphy at this location and to allow sample collection from the intervals with the highest potential for chemical presence. The sample data were used to:

- define chemical constituents related to waste disposal activities at the Site;
- develop the SSPL for Round 2 groundwater samples;
- develop appropriate test pitting procedures to further investigate the potential for buried drums in this area;
- define the vertical distribution of chemicals in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Samples selected for chemical analyses were from depth intervals of 2 to 4 ft and 4 to 6 ft. Fill containing some waste was identified at this location to a depth of approximately 1 ft. Visual screening and organic vapor readings did not indicate chemical presence in any of the samples from this borehole.

No TCL organic parameters were detected in the sample collected over the depth interval from 4 to 6 ft. The only TCL organic parameter detected in the shallow sample from 2 to 4 ft was Aroclor 1254 at a very low concentration of 7JP µg/kg.

No inorganic parameters in either sample from this borehole were reported at concentrations above the range for the background samples.

Based upon these data, the following conclusions were formulated:

- the depth of fill at this location is 1 ft; and
- chemical concentrations in the samples from 2 to 4 ft and 4 to 6 ft do not indicate a Site related impact.

BH5-93

Borehole BH5-93 is located immediately south of the entrance road, next to Fletcher Road. The east side Fletcher Road ditch lies between this borehole location and the Site. This area was identified during the 1990 Soil Gas Survey as having the highest level of total aromatic hydrocarbons. The purpose of this borehole was to define the stratigraphy at this location and to allow sample collection from the intervals with the highest potential for chemical presence. The analytical data for this sampling location were used to:

- verify or deny the chemical presence suggested by the 1990 Soil Gas Survey;
- define the vertical distribution of chemicals, if present, in the subsurface soils; and
- evaluate if chemical presence at this location is related to disposal activities at the Site.

Fill consisting of clay, silt and roots was identified at this location to a depth of 1 ft. No paint waste or paint chips were reported present in the fill. Samples from the depth intervals of 0 to 2 ft and 2 to 4 ft were submitted for chemical analyses.

No TCL VOCs were detected in either of the samples from this location.

No TCL SVOCs were detected in the deeper, 2 to 4 ft, sample from this location. SVOCs, primarily PAH compounds with concentrations up to 1,900 μg/kg for fluoranthene, were detected in the shallow, 0 to 2 ft, sample from this location. Some of these PAH compounds are also reported present in other boreholes and test pits located within the former waste disposal area (i.e., BH1-93, BH2-93, BH3-93, BH6-93, TP-9, TP-15, and TP-12) and at other locations at the Site (i.e., BH9-96 and BH11-96). However, the highest concentrations are reported at BH5-93. This indicates that the high PAH concentrations at this location could not be the result of migration from the former disposal area at the Site. PAH compounds are components of asphalt and their presence at BH5-93 may be a result of asphalt chips in the sample or leaching from the paved surface of Fletcher Road.

Pesticide compounds were detected at low concentrations (maximum value of 3.8 JP µg/kg for endrin) in the deeper sample from this borehole. Some of these compounds were also detected at low concentrations in some of the test pit samples collected from the waste disposal area.

No inorganic parameter concentrations were reported present at concentrations greater than the background levels in the sample from 2 to 4 ft. Several inorganic parameters were reported present in the shallow, 0 to 2 ft, sample from BH5-93 at concentrations slightly exceeding the range for the background soil samples. These parameters are aluminum, barium, beryllium, chromium, copper, lead, potassium, sodium, vanadium, and zinc. The concentrations of these parameters are very similar to the concentrations reported in the surface soil samples SS-1 and SS-2 which are located outside of the identified former waste disposal area (see Section 6.1).

Based upon these data the following conclusions were developed:

- fill at this location is 1 ft deep and does not contain any identifiable waste material related to the Site (e.g., paint waste or paint chips);
- chemical data for the shallow (0 to 2 ft) sample confirms the presence of PAHs at concentrations up to 1,900 µg/kg;
- the reported high concentrations of PAH compounds at this location are not related to disposal activities at the Site; and

- inorganic parameter concentrations in the shallow sample (0 to 2 ft) are similar to the concentrations reported for on-Site surface soil samples that are not located within the waste disposal area.

BH6-93

Borehole BH6-93 is located approximately 80 feet east of the Site entrance in an area identified as exhibiting relatively high levels of total aromatic hydrocarbons during the 1990 Soil Gas Survey. The purpose of this borehole was to define the stratigraphy at this location and to allow sample collection from the intervals with the highest potential for chemical presence. The sample data was used to:

- confirm or deny the chemical presence suggested by the 1990 Soil Gas Survey;
- develop the SSPL for Round 2 groundwater samples;
- define the vertical distribution of chemicals, if present, in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Fill consisting of silt, clay, roots and some waste was identified to a depth of 2 feet at BH6-93. Samples were collected from the depth intervals of 0 to 2 ft and 2 to 4 ft.

No TCL VOCs were detected in either sample collected from this borehole.

No TCL SVOCs were detected in the deeper (2 to 4 ft) sample from BH6-93. SVOCs were reported present in the shallow sample from this location with the highest concentrations reported for bis(2-ethylhexyl)phthalate (1,800B µg/kg). The majority of the other SVOCs detected were PAH compounds at relatively low levels (maximum concentration of 140J µg/kg for benzo(b)fluoranthene and benzo(k)fluoranthene). Benzo(A)pyrene (69Jµg/kg) was the only parameter reported at a concentration exceeding the NYSDEC Soil Cleanup Objectives.

PCBs were reported present in the shallow sample from BH6-93 (aroclor-1254 at 4,200D µg/kg and aroclor-1260 at 4,100D µg/kg) and at much lower concentrations (maximum value of 31J µg/kg) in the deeper sample collected from 2 to 4 ft.

Several inorganic parameters were reported present in the shallow sample at concentrations greater than the reported background soil levels. The primary inorganic parameters are barium (4,710 mg/kg), cadmium (78.3 mg/kg), chromium (1,200 mg/kg), cobalt (102 mg/kg), copper (331 mg/kg), cyanide (76.0 mg/kg), lead (8,860 mg/kg), and zinc (4,720 mg/kg). Only manganese and selenium were reported in the sample from 2 to 4 ft at concentrations slightly exceeding the background levels.

Based upon these data, the following conclusions were formulated:

- fill containing some waste was identified at this location to a depth of 2 feet;
- chemical data for the shallow (0 to 2 ft) sample confirms the presence of PAHs at concentrations up to 140 J µg/kg;
- the primary chemicals present at this location are bis (2-ethylhexyl) phthalate, PAHs, PCBs, barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc; and
- elevated concentrations of the above noted parameters were only present in the shallow sample (0 to 2 ft) collected from the fill unit and not in the soil sample collected directly beneath the fill (2 to 4 ft).

These data are used to define the extent of chemical contamination at the Site and develop exposure concentrations for the Baseline Health Risk Evaluation.

<u>BH7-93</u>

Borehole BH7-93 is located in the southern part of the Site in an area reported to have relatively high levels of total aromatic hydrocarbons during the 1990 Soil Gas Survey. The purpose of this borehole was to define the stratigraphy at this location and to allow sample collection from the intervals with the highest potential for chemical presence. The sample data were used to:

- confirm or deny the chemical presence at this location suggested by the 1990 Soil Gas Survey;
- define the vertical distribution of chemicals, if present, in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

No fill was identified at this location and organic vapor readings from all soil samples were below 1 ppm.

No TCL organic parameters were detected in the deeper soil sample from this borehole. Only one TCL organic compound, (tetrachloroethene at 2J µg/kg) was detected at a very low concentration in the sample from 0 to 2 ft.

Selenium at 0.45JF mg/kg in the sample from 0 to 2 ft depth was the only inorganic parameter at this location reported at a concentration which slightly exceeds the range for the background samples. Both background samples did not contain detectable concentrations of selenium.

Based upon these data it is concluded that:

- BH7-93 is located outside of the waste disposal area; and
- concentrations of inorganic and organic compounds at this location are similar to background levels and do not support the elevated levels reported during the 1990 Soil Gas Survey.

BH8-96, BH9-96, and BH10-96

Boreholes BH8-96, BH9-96, and BH10-96 are located in the western portion of the Site at locations reported to have elevated levels of VOCs during the 1993 Soil Gas Survey. The purpose of these boreholes was to allow sample collection from the intervals with the highest potential for chemical presence. The sample data collected were used to:

- confirm or deny the chemical presence at these locations suggested by the 1993 Soil Gas Survey;
- define the vertical distribution of chemicals, if present, in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Approximately 2.5 ft of fill material containing paint waste, metal, and glass was identified at borehole BH10-96. Fill material was not identified at boreholes BH8-96 or BH9-96.

No TCL VOCs were detected in any of the samples from these boreholes. Diethylphthalate (maximum concentration of 17J µg/kg) was reported present in each of the samples. Low levels of PAH compounds (maximum concentration of 53J µg/kg) were reported present in the sample from BH9-96.

Aroclor-1260, at a low concentration of 3.6JP µg/kg, was detected in the sample from BH9-96. PCBs were not detected in the samples from BH8-96 or BH10-96.

Based on these data it is concluded that:

- boreholes BH8-96 and BH9-96 are located outside the waste disposal area;
- a small amount (2.5 ft) of fill material containing paint waste was identified at borehole BH10-96; and
- concentrations of organic compounds at these locations do not support the elevated levels reported in the 1993 Soil Gas Survey.

BH11-96 and BH12-96

Boreholes BH11-96 and BH12-96 are located along the eastern side of the Site at locations reported to have elevated levels of VOCs during the 1993 Soil Gas Survey. The purpose of these boreholes was to allow sample collection from the intervals with the highest potential for chemical presence at each location. The sample data collected were used to:

- confirm or deny the chemical presence at these locations suggested by the 1993 Soil Gas Survey;
- define the vertical distribution of chemicals, if present, in the subsurface soils; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Fill material was not identified at either of these borehole locations.

No TCL VOCs were detected in the samples from these boreholes. Diethylphthalate (maximum concentration of 14J µg/kg) was reported present in each of the samples. Low levels of PAH compounds (maximum concentration of 15J µg/kg) were reported present in the sample from BH11-96.

Aroclor-1260, at a low concentration of 5.8JP µg/kg, was detected in the sample from BH11-96. PCBs were not detected in the sample from BH12-96.

Based on these data it is concluded that:

- boreholes BH11-96 and BH12-96 are located outside the waste disposal area; and
- concentrations of organic compounds at these locations do not support the elevated levels reported in the 1993 Soil Gas Survey.

Test Pits TP-9, TP-12, and TP-15

Samples were collected from the waste materials identified at test pits TP-9, TP-12, and TP-15. The samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, and cyanide. The purpose of these trenches was to define the vertical and areal limits of waste disposal and to allow collection of any waste materials identified to be distinctly different from other materials sampled during the borehole program. The sample data were used to :

- define chemical concentrations in the on-Site waste material; and
- develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Fill materials were identified to depths ranging from approximately 1.0 ft at TP-9 and TP-12 to 2.5 ft at TP-15.

Only one VOC, chloroform at 8J µg/kg, was detected at a low concentration in the sample from TP-9. No VOCs were detected in the sample from TP-15. Xylenes at 620,000 µg/kg and ethylbenzene at 94,000 µg/kg were reported present in the sample from TP-12. Low concentrations of PAHs (maximum of 60J µg/kg) were reported present in the samples from TP-9 and TP-15. SVOCs detected in the sample from TP-12 included 2,4,5-trichlorophenol at 740J µg/kg, PAHs at a maximum concentration of 29,000 µg/kg and phthalates at maximum concentration of 4,600 J µg/kg. PCBs were detected at low concentrations (maximum of 120P µg/kg), in the samples from TP-12 and TP-15. No PCBs were detected in the sample from TP-9.

Pesticides were reported at low concentrations (maximum of 70P µg/kg) in each of the samples.

Several inorganic parameters were reported at concentrations greater than the background levels and/or NYSDEC Soil Cleanup Objectives. These parameters are aluminum, antimony, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, lead, mercury, selenium, silver, sodium, and zinc. The most significant exceedances are lead and zinc for the sample from TP-12.

Based upon these data, it is concluded that:

- fill materials at TP-9, TP-12, and TP-15 range in depth from 1.0 to 2.5 ft; and
- the chemicals with the highest concentration relative to background levels were present in TP-12 and included ethylbenzene, xylenes, 2,4,5-trichlorophenol, naphthalene, lead, and zinc.

These data will be used to develop estimated exposure point concentrations for the Baseline Health Risk Evaluation.

TCLP Results

One waste sample and one contaminated soil sample from BH1-93, over the depth interval of 2 to 4 ft, were collected in September 1993 and analyzed for TCLP VOCs, SVOCs, and metals. The TCLP analysis was conducted to determine the leaching potential for Site-related chemicals given the seasonal flooding and high water table at the Site.

The TCLP analytical results are presented in Table 6.4. The QA/QC data validation is presented in Appendix I.

The analytical results for the waste and soil samples indicate that TCLP compounds were not detected with the exception of total cresol (0.050 mg/L) and lead (1.4 mg/L) in the waste sample. These concentrations are significantly below the regulatory levels of 200 mg/L for total cresol and 5.0 mg/L for lead (40 CFR 261, 1992).

The results for the acid extractable compounds (total cresol, pentachlorophenol, 2,4,5-trichlorophenol and 2,4,6-trichlorophenol) were qualified by CRA as unusable for the sample from BH1-93. This qualification was necessary as the surrogate percent recoveries violated the acceptance criteria for acid extractable compounds (see Appendix I). A soil sample was also collected from this same interval and analyzed for

TCL VOCs, SVOCs, pesticides/PCBs and TAL parameters (see previous discussion for BH1-93). The TCLP compounds that required qualification were not detected during the TCL SVOC analysis and would, therefore, not be expected in the TCLP samples.

The TCLP results for the sample from BH1-93 are consistent with the TCL/TAL results for this sample. None of the VOCs or SVOCs on the TCLP list were detected by the TCL analysis. Arsenic (1.2-JF mg/kg), barium (47.0 mg/kg), chromium (9.5 mg/kg) and lead (15.7 J mg/kg) were reported present at low concentrations in the TAL analysis of this sample. These metals were not detected by the TCLP analysis due to the low concentrations in the soil.

Based upon these data it is concluded that:

- the leaching potential of the Site-related compounds is not significant; and
- the TCLP analyses of the waste and contaminated soil samples submitted indicate that these materials are not hazardous based on toxicity characteristics.

6.3 GROUNDWATER

Round 1 samples were collected from all new groundwater monitoring wells at the Site and from the two existing wells during the period from October 18 to October 20, 1993. A second round of groundwater sampling was conducted during the period from June 25, 1996 to June 28, 1996. The first round samples were analyzed for TCL VOCs, SVOCs, Pesticides/PCBs, TAL metals (total and dissolved) and cyanide. Samples from the second round were analyzed for TCL VOCs, SVOCs, and TAL metals (total and dissolved). The analytical results are presented in Table J.3 in Appendix J and the data validation is presented in Appendix I.

The chemical data for these samples were used to:

- determine the background groundwater quality;

- determine the distribution of Site related chemicals in the groundwater that exceed the applicable Federal or State Standards;
- evaluate the potential for chemical migration from the Site via groundwater flow;
- develop exposure point concentrations for the Baseline Health Risk Evaluation.

These data are also used, to calculate the potential chemical flux from the Site via the groundwater flow pathway.

Based upon the groundwater flow directions in the Upper and Lower Sand Units as presented in Section 4.0, it is concluded that well nests MW1 and MW3 are located either cross-gradient or upgradient of the former waste disposal area. Data for these wells are used to define background groundwater concentrations for comparison purposes.

Several organic compounds were reported present in the groundwater samples, including the background samples, at estimated concentrations that are below the method detection limits. A summary of the detected organic parameters in the groundwater samples is presented in Table 6.5. The Class GA Groundwater Criteria (NYSDEC, 1993) are presented in Table 6.5 for comparison purposes. The results for the detected organic compounds are presented on Figure 6.5.

The data presented in Table 6.5 and Figure 6.5 indicate that organic chemical concentrations at wells MW1A-93, MW2B-93, MW3A-93, MW3B-93, MW4A-93, and the existing deep and shallow wells are below the Class GA Groundwater Standards.

Phenol, reported at an estimated concentration of 2J µg/L in the first round sample from MW1B-93, slightly exceeds the standard for this parameter which is 1 µg/L. Phenol was not detected in the second round sample collected from this well.

The reported concentrations of benzene (52 µg/L), ethylbenzene (40 µg/L), xylene (350 µg/L), and 2,4-dimethylphenol (2J µg/L) in the second round sample from MW2A-93 exceed the standards for these parameters. The second round concentrations for benzene, ethylbenzene, and xylenes at well MW2A-93 are significantly higher than the corresponding concentration of these parameters in the first round sample from this well. The screened interval for this well is between 4.9 and 14.9 ft BGS and the top of the sand pack is at a depth of 3.9 ft BGS. This is approximately 2 feet beneath the fill material containing waste at this location. Due to the close proximity of the well screen and sandpack to the waste material, it is possible that leachate from the waste may have entered this well between the first and second monitoring event.

No pesticides or PCBs were detected in the first round groundwater samples. Based on these results, the second round groundwater samples were not analyzed for pesticides or PCBs.

Groundwater samples from both sampling rounds were analyzed for both total and dissolved TAL metals and cyanide. The analytical results are summarized in Table 6.5. The results for selected inorganic parameters, namely barium, cadmium, chromium, cobalt, copper, lead, and zinc, which are the most prevalent inorganic compounds found in the waste material at the Site, are presented in Figure 6.6.

A comparison of the total and dissolved concentrations for inorganic parameters at individual wells can be used to assess the impact of sediments on the sample results. Based upon the data presented in Table 6.5, it is apparent that the total and dissolved concentrations for the inorganic parameters are similar for each well and therefore it is concluded that the samples were relatively sediment free. The only parameters for which the total concentrations are significantly higher than the dissolved concentrations are aluminum (first round samples), chromium (for some wells) and iron (for some wells).

The differences in reported total and dissolved concentrations for these parameters at individual wells is generally less for the second round samples. Also, the reported concentrations of inorganic parameters at most locations are lower for the second round which indicates that the second round samples likely contained less sediment.

Utilizing wells MW1A-93, MW1B-93, MW3A-93, and MW3B-93 as representative of background conditions, the following parameters were identified as exceeding background levels and the Class GA Groundwater Standards:

Parameter	*Monitoring Well*
iron (dissolved)	MW2A-93, MW4A-93
iron (total)	MW2A-93, MW4A-93, Well-D
magnesium (dissolved)	MW2A-93, MW4A-93, Well-D
magnesium (total)	MW2A-93, MW4A-93, Well-D
manganese (dissolved)	MW4A-93
manganese (total)	MW4A-93
selenium (dissolved)	MW4A-93
selenium (total)	MW4A-93
sodium (dissolved)	Well-D, Well-S
sodium (total)	Well-D, Well-S
zinc (total)	Well-S

A summary of the identified exceedances are presented in Table 6.6.

These data indicate that the inorganic parameters detected at the highest concentration in the fill materials (i.e., lead, barium, cadmium, chromium, copper, zinc, and cyanide) are generally not found at concentrations exceeding background levels or water quality criteria in the groundwater samples. The only exception is the second round total zinc concentration reported for the existing shallow well (Well-S). However, the dissolved zinc concentration in this sample was reported to be significantly lower indicating that the high total concentration is likely due to sediments in the sample.

The "shallow" well is actually completed below the Lower Sand Unit and is in an upgradient location relative to the waste disposal area. The "shallow" well was previously cut off at the ground surface and had a perforated cap. As flooding has been observed at the Site, it is concluded that surface water previously entered this well. Considering the relatively low permeability of the soils at the Site and the general absence of a Site impact on other deep wells at the Site, it is concluded that the minor impact reported at the "shallow" well is most likely due to surface water infiltration. Surface water infiltration is a more direct route for chemical migration to this well than the groundwater flow. In accordance with the Work Plan this well was retrofitted with a 3-foot high casing extension on September 16, 1993 to prevent future infiltration of surface water runoff.

Based upon these data, the following conclusions were formulated:

- the following organic parameters were detected at concentrations greater than the Federal or State standards at shallow well MW2A-93, benzene, ethylbenzene, xylene, and 2,4-dimethylphenol;
- the inorganic constituents detected at the highest concentrations in the soils and waste materials are not found at concentrations exceeding background levels and the Federal or State standards in the groundwater samples; and
- no organic or inorganic parameters were detected at concentrations greater than background levels and the Federal or State standards in any of the deep wells.

These data will be used to evaluate the potential for chemical migration from the Site via groundwater flow (see Section 7.0) and develop exposure point concentrations for the Baseline Health Risk Evaluation.

6.4 SEDIMENT

Sediment samples were collected from eight sampling locations which include the on-Site ditches and the ditches along the east and west sides of Fletcher Road. The chemical data for all sediment samples are presented in Table J.4 in Appendix J. The results for the detected organic parameters are presented on Figure 6.7 and summarized in Table 6.7. Selected inorganic parameter results are presented on Figure 6.8.

On-Site Ditches

Sampling locations SW-1, SW-2, and SW-3 are all located in the on-Site ditches. SW-1 is located in the northeastern corner of the Site. SW-2 is located in the northcentral portion of the Site adjacent to the former waste disposal area. SW-3 is located approximately 200 ft south of SW-2.

If chemical concentrations are detected in the on-Site ditches they would provide an indication of both past and current chemical migration via stormwater runoff and/or flooding. The chemical data for the sediment samples are evaluated to determine:

- the distribution and concentrations of any Site-related chemicals in the on-Site ditches; and
- estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Based upon the results presented on Figure 6.7, it is apparent that methylene chloride was the only VOC detected in any of the sediment samples collected from the on-Site ditches. This compound was detected at very low concentrations of 7J µg/kg and 4J µg/kg at locations SW-2 and SW-3, respectively. These levels are below the method detection limit (10 µg/kg) for methylene chloride as specified in the QAPP. Methylene chloride is a common laboratory contaminant and reported concentrations at these low levels are not considered to be a result of on-Site disposal activities. Methylene chloride was not reported present in any of the soil or waste samples collected from within the former waste disposal area.

Phthalates were reported present at locations SW-1, SW-2 and SW-3, also at low concentrations (maximum value of 440J µg/kg at SW-2).

PCBs were reported present at low concentrations in samples from SW-1 and SW-2. The total PCB concentrations at SW-1 and SW-2 are 166 µg/kg and 558 µg/kg, respectively.

The inorganic parameter concentrations at locations SW-1 and SW-3 are similar to the inorganic parameter concentrations reported present in the surface soil samples SS-1 and SS-2, which are located outside of the waste disposal area. At location SW-2, barium (326 mg/kg), chromium (51.6J mg/kg), cadmium (6.6 mg/kg), lead (338J mg/kg), and zinc (487J mg/kg) were reported at concentrations higher than the levels reported at locations SS-1 and SS-2. SW-2 is located close to the former disposal area where elevated inorganic parameters were also detected in the subsurface soil samples.

Based upon these data, the following conclusions were formulated:

- methylene chloride was reported at low concentrations below the method detection limit in two of the three sediment samples, but these concentrations are not considered to be a result of on-Site disposal activities;
- very low SVOC parameter concentrations are present in the sediments in the on-Site ditches; and
- elevated concentrations of barium, chromium, cadmium, lead and zinc are present in the sediments from the ditch located in close proximity to the waste disposal area. The localized nature of this contamination indicates that it is a result of stormwater runoff from the waste disposal area versus widespread flooding of the Site. Widespread flooding of the Site would be expected to result in a more uniform distribution of chemicals associated with the waste materials at the Site.

Fletcher Road Ditches

Chemical concentrations in the sediments in the Fletcher Road ditches are evaluated to determine:

- if elevated concentrations of Site-related chemicals are present in the ditches adjacent to the Site, relative to concentrations reported at the upstream sampling locations SW-8, SW-7, and SW-10; and
- estimated exposure point concentrations for the Baseline Health Risk Evaluation.

Sampling locations SW-8 and SW-7 are located on the west and east side of Fletcher Road, respectively, approximately 500 feet north of the Site. Sampling location SW-10 is located approximately 700 ft north of the Site on the east side of Fletcher Road. These ditches flow in a southerly direction and therefore these sampling locations are considered upstream of the Site and represent background conditions for Fletcher Road ditches.

Sampling locations SW-4 and SW-5 are located adjacent to the Site on the east side of Fletcher Road and location SW-6 is located in the ditch on the west side of Fletcher Road. Sampling location SW-9 is located on the east side of Fletcher Road approximately 200 feet south of the Site property boundary. The organic results for these sampling locations are presented on Figure 6.7. The results for selected inorganic parameters are presented on Figure 6.8.

The data presented on Figure 6.7, indicate the presence of primarily PAHs in the Fletcher Road ditch sediments. The presence of these compounds at similar or higher concentrations in the background samples (SW-7, SW-8, and SW-10) than the samples collected from the ditch adjacent to the Site indicate that their presence is not a result of waste disposal activities at the Site. Although flooding has been observed at the Site, this could not have caused the elevated PAH levels reported at the upstream locations SW-7, SW-8, and SW-10. If the PAH concentrations detected at locations SW-7, SW-8, and SW-10 were due to flooding and chemical migration from the Site, it is reasonable to assume that concentrations of these compounds would be higher at sampling locations closer to the Site (i.e., SW-4). However, the highest PAH concentrations were reported at sampling location SW-7. Also, the reported PAH concentrations at SW-7 are higher than the concentrations of the same parameters in the samples collected from the former waste disposal area. This further supports the conclusion that the on-Site waste disposal area is not the source for PAHs reported present in the Fletcher Road ditch sediment samples.

Low levels of PCBs (maximum value of 140P µg/kg aroclor-1260) were reported at locations SW-4, SW-5, and SW-9

The inorganic parameter concentrations in the sediment samples from the ditch on Fletcher Road indicate similar concentrations in both the background samples and the samples collected next to Site, with the exception of elevated levels of barium (2,570 mg/kg), chromium (229 mg/kg), lead (943J mg/kg), and zinc (1,560J mg/kg) reported present at location SW-4. SW-4 is located close to the former waste disposal area in the northern portion of the Site.

The presence of Site related parameters (i.e., barium, lead, chromium, zinc and PCBs) at higher concentrations in the ditch sample collected close to the Site (SW-4) than at the background sampling locations SW-7, SW-8, and SW-10, further supports the conclusion that the PAHs reported at the upstream sampling locations (SW-7, SW-8, and SW-10) are not related to the Site. It is inconceivable that PAHs would be selectively transported from the Site to locations SW-7, SW-8, and SW-10 at high concentrations, without also transporting other Site-related parameters in measurable quantities.

Based upon these data the following conclusions were formulated:

- the only parameters detected at concentrations greater than background levels are barium, lead and zinc at location SW-4, which is located adjacent to the former waste disposal area;

- the concentrations of the above noted parameters are at background levels at the downstream sampling location SW-5, located at the southern property boundary; and
- PCBs were detected at low concentrations at locations SW-4, SW-5, and SW-9.

These data indicate that the Site related impact on sediments in the Fletcher Road ditches is minimal and restricted to the area close to the waste disposal area.

6.5 SURFACE WATER

Surface water samples were collected from the same locations as the sediment samples discussed in Section 6.4 with the exception of sampling locations SW-9 and SW-10. Surface water samples were not collected from these two locations. The analytical results are presented in Table J.5 in Appendix J. The results for detected organic parameters are summarized in Table 6.8 and presented on Figure 6.9. The results for selected inorganic parameters are presented on Figure 6.10.

These data are evaluated to assess the potential chemical migration from the Site via surface water runoff. These data will also be used to develop potential exposure point concentrations for the Baseline Health Risk Evaluation.

The data presented on Figure 6.9 indicate very low concentrations of phthalates, phenols and acetone in the surface water samples. Similar concentrations of these parameters were reported in the background samples from the Fletcher Road ditches; the sample from the ditch along the western side of Fletcher Road; samples from the downstream locations in the Fletcher Road ditch and samples collected from the on-Site ditches. If these detections were a result of chemical migration from the Site, the samples collected from the on-Site ditches and the Fletcher Road ditch adjacent to the Site would have higher concentrations than samples collected from the other locations. This is not the case and therefore the presence of these parameters is concluded not to be related to the waste disposal activities at the Site.

The inorganic results for the surface water samples do not demonstrate a trend of higher concentrations for the downstream samples from the Fletcher Road ditches or the on-Site ditches relative to the other sampling locations. The highest concentrations for many of the inorganic parameters were reported at background sampling location SW-7, located 500 ft upstream of the Site along Fletcher Road. Therefore, it is concluded that these detections are also unrelated to disposal activities at the Site.

Based upon these data, the following conclusion is presented:

- surface water runoff is not a significant chemical migration mechanism for the Site.

The elevated concentrations of inorganic compounds reported present the sediment in adjacent to the former disposal (see Section 6.4) area are expected to be due to a combination of the following factors:

- surface water runoff from the disposal area during the period of active waste disposal; and
- an accumulation of these parameters in the sediments over a prolonged period of time resulting from a low chemical loading in the surface water runoff.

7.0 CHEMICAL FATE AND TRANSPORT

Site-related chemicals have been detected in the shallow groundwater, surface soil, subsurface soil, sediment, and surface water at the Site as discussed in Section 6.0. As presented in Section 6.0, the organic compounds reported at concentrations exceeding applicable criteria for one or more media include the BTEX compounds (benzene, ethylbenzene, and xylene), PAHs (benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and naphthalene), phenolic compounds (phenol, 2,4-dimethylphenol, and 2,4,5-trichlorophenol), and PCBs (aroclor-1254 and aroclor-1260). Inorganic parameters reported at significant concentrations above naturally occurring background levels and/or applicable criteria include barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc.

The potential migration pathways which exist at the Site include:

- shallow overburden (Upper Sand Unit) groundwater flow;
- deep overburden (Lower Sand Unit) groundwater flow;
- surface water runoff; and
- atmospheric dispersion from surface water and surface soils.

A general description of the physical and chemical properties of the Site-related compounds which were detected at concentrations exceeding applicable criteria and the influence of these properties on their fate and transport is presented in Section 7.1. The chemical migration potential for each of the identified pathways are evaluated in Section 7.2.

7.1 CHEMICAL FATE

7.1.1 Physical and Chemical Properties of Site-Related Compounds

Contaminant mobility, a factor in contaminant migration, is dependent upon the physical and chemical properties of both the contaminants and the media in which they are identified. Properties which affect contaminant mobility include, but are not limited to, solubility, liquid density, vapor pressure and chemical affinity. The partitioning of chemicals between media is controlled by a variety of factors such as adsorption, absorption, volatilization, solubility, and chemical affinity.

Chemicals released to a soil medium may be adsorbed by the soil until the adsorptive capacity of the soil is reached. Under continued release(s) of the chemicals, the chemicals may migrate both horizontally and vertically, expanding the area of contaminated soils as the adsorptive capacity of the soil in the vicinity of the release is attained. Similarly, infiltration of precipitation or release(s) of other chemicals may cause the initial chemical to migrate at a rate primarily controlled by the adsorptive capacity of the soil and by the solubility of the initial chemical in the transport media.

Chemicals which have migrated to the groundwater may solubilize in the groundwater to the aqueous solubility limit of the chemical. The solubilized chemical may migrate with the groundwater and adsorb onto adjacent soils. Under continued migration to the groundwater from the soils above the water table, the extent of groundwater contamination may expand as the adsorptive capacity of the soils beneath the water table in the vicinity of the release is attained.

When chemicals migrate from soils above the water table to the groundwater at a rate greater than the solubility capacity of the groundwater, the migration of the excess chemicals will result in a separate non-aqueous phase liquid (NAPL). The migration of NAPL is governed primarily by its density. If the chemical's density is less than one, it will tend to float on the surface of the groundwater and may migrate horizontally in the direction of groundwater flow. If the chemical's density is greater than one, it may tend to migrate vertically downward until a low-permeability geologic unit is encountered, at which point the chemical may tend to migrate horizontally in the direction of the surficial slope of the geologic unit. The extent of chemical migration, above or below the water table, may expand as the sorption capacity of the respective geologic unit is attained. It is noted that NAPL was not identified in any of the borehole, monitoring well, or test pit locations, and hence will not be further considered in this evaluation.

The physical and chemical properties of the Site-related chemicals detected in the different media at concentrations exceeding applicable criteria at the Site are presented in Table 7.1. The chemical properties include: molecular weight, aqueous solubility, vapor pressure, Henry's law constant, sorption coefficient, and specific density.

The molecular weight of a compound is useful for many calculations including: weight/volume unit conversions, molar volume determinations, and estimating Henry's Law Constants. In general, heavier weight compounds such as the PAHs are less mobile.

Aqueous solubility is an important factor in estimating a chemical's fate and transport in groundwater and surface water. Compounds with high aqueous solubilities have a tendency to desorb from soils and sediment, are less likely to volatilize from water, and are susceptible to biodegradation. Compounds with a high solubility will generally enter the water table more readily than less soluble compounds. Aqueous solubility is affected by temperature, pH, and other dissolved constituents. Site-related compounds with relatively high solubilities include BTEX compounds (benzene, ethylbenzene, and xylene), and phenolic compounds (2,4-dimethylphenol, phenol, and 2,4,5-trichlorophenol) with aqueous solubilities ranging from 174 mg/L for ethylbenzene to 80,700 mg/L for phenol. The PAHs detected at the Site have relatively low solubilities ranging from 0.005 mg/L to 30 mg/L. PCBs have low aqueous solubilities ranging from 0.057 mg/L to 0.080 mg/L for aroclor-1254 and aroclor-1260, respectively. The solubility of inorganics is dependent upon the form of the compound, the pH and salt content of water and the organic carbon content of the soil.

The sorption coefficient (K_{OC}) indicates the tendency of an organic compound to partition between particles containing organic carbon and water. The sorption coefficient is inversely related to aqueous solubility such that a compound that binds strongly to organic carbon will have a low solubility. Compounds that adsorb onto organic materials in an aquifer are retarded in their movement in groundwater such that the compound migrates at a linear velocity less than the groundwater flow velocity. Site-related VOCs have relatively low K_{OC} values ranging from 78 to 240 mL/g. SVOCs have a much higher adsorptive capacity with K_{OC} values ranging from 1.4×10^3 to 5.5×10^6 mL/g with the exception of the phenolic compounds which range from 21.6 to 708. Pesticides and PCBs have high K_{OC} values ranging from 4.1×10^5 to 2.63×10^6 mL/g and will bind strongly to soils. Inorganics bind strongly to organic matter and may also be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in soil.

The specific density of a compound is equivalent to the density of the substance relative to the density of water. Hydrophobic (low aqueous solubility) compounds with a specific density greater than one will generally tend to sink through the water table as dense non-aqueous phase liquids. Hydrophobic compounds with a specific density less than one will generally tend to float on the water table. Hydrophilic compounds (high aqueous solubility) behave differently as the solubility of a substance must be considered in conjunction with its specific density. Moderately soluble Site-related compounds include benzene, ethylbenzene, xylene, and the phenolic compounds. Hydrophobic compounds with a low aqueous solubility include PAHs and PCBs.

The vapor pressure of a compound provides a semi-quantitative rate at which volatilization will occur from soil and/or water to the atmosphere and/or soil gas. Generally, the Site-related BTEX compounds have relatively high vapor pressures ranging from 10 mm Hg to 95.2 mm Hg. The Site-related PAHs and phenolic compounds have low vapor pressures and a low potential for volatilization with values ranging from 1.0×10^{-10} mm Hg to 0.35 mm Hg. PCBs have a very low potential for volatilization, with vapor pressures ranging from 4.05×10^{-5} mm Hg to 7.71×10^{-5} mm Hg. The inorganics, with the exception of cyanide, are non-volatile. Cyanide is volatile in the form of hydrogen cyanide.

Henry's Law Constants provide an indication of the relative volatility of a compound from water to air. For VOCs, Henry's Law Constants (5.48 x 10^{-3} to 7.24 x 10^{-3} atm-m^3/mol) indicate a relatively rapid rate of volatilization. PAHs, phenolic compounds, and PCBs have relatively low rates of volatilization as indicated by their Henry's Law Constants (7.26 x 10^{-20} to 2.7 x 10^{-3} atm-m^3/mol). Inorganics with the exception of hydrogen cyanide, are not volatile from water to air.

7.1.2 BTEX Compounds

The Site-related BTEX compounds detected at concentrations exceeding applicable criteria for one or more media include benzene, ethylbenzene, and xylene. BTEX compounds released to the environment are subject to environmental fate processes including volatilization, sorption, and biodegradation.

BTEX compounds have relatively low K_{OC} values (78 to 240 mL/g) and high vapor pressures (10 to 95.2 mm Hg) and, therefore, are subject to transport from a soil medium into the atmosphere or the water column via volatilization or leaching, respectively. Of the BTEX compounds, benzene has the highest potential for mobility from the soil medium (K_{OC} of 78 mL/g, vapor pressure of 95.2 mm Hg, Henry's Law Constant of 5.48 x 10^{-3} atm-m^3/mol) whereas xylenes have the lowest potential mobility (K_{OC} of 240 mL/g, vapor pressure of 10 mm Hg, Henry's Law Constant of 7.04 x 10^{-3} atm-m^3/mol).

Due to their volatility, BTEX compounds do not persist to any significant extent in surface water. The rate of volatilization from surface waters is dependent upon the turbulence and water depth of the surface water body. It has been estimated, for example, that the volatilization half-life for benzene is 4.81 hours for a 1 metre deep body of water at 25°C. BTEX compounds, as a group, also have a low potential for adsorption to sediment, and bioconcentration to any significant extent in aquatic organisms.

BTEX compounds, present in the groundwater, can also be attenuated via volatilization into the vadose zone and ultimately the atmosphere. As discussed previously, BTEX compounds have relatively high Henry's Law Constant values and vapor pressures. Therefore, volatilization to the vadose zone can be a significant process for reducing chemical concentrations in the groundwater.

BTEX compounds present in the atmosphere are subject to degradation processes such as reaction with hydroxyl radicals (benzene, ethylbenzene) or phototransformations (xylenes).

BTEX compounds are biodegradable in soils under aerobic conditions and in surface water and groundwater. BTEX compounds present in the groundwater readily biodegrade with reported half-life values ranging from 11-37 days (xylenes) to 68-110 days (benzene) in naturally occurring soil-groundwater systems (Dragun, 1988). Hence, under conditions with sufficient oxygen and nutrient sources, biological degradation can be a significant mechanism for removal of BTEX from groundwater, surface water, and soils.

In summary, BTEX compounds in soils are relatively mobile and subject to transport via groundwater and/or volatilization to the atmosphere. However, natural attenuation processes such as biological degradation are significant for reducing concentrations of BTEX compounds in the environment.

7.1.3 PAHs

The Site-related PAH compounds detected at concentrations exceeding applicable criteria for one or more media include benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and naphthalene.

Some of the transport and partitioning characteristics of the PAHs are roughly correlated to their relatively high molecular weights (128.18 to 278.36 g/mol).

PAHs released to the atmosphere are present in the gaseous phase or sorbed to particulates; are subject to short- and long-range transport; and are removed by wet and dry deposition. The atmospheric residence time and transport distance depend on the size of the particles to which PAHs are adsorbed. The larger the particulate size, the shorter the residence time and transport distance. PAHs can undergo photochemical oxidation with the formation of nitrated PAHs, phenols, and other compounds. Atmospheric half lives are generally less than 30 days.

PAH compounds tend to be removed from the water column by volatilization to the atmosphere, photodegradation, oxidation, adsorption to particulates or sediments, and biodegradation by aquatic organisms. The low molecular weight PAHs such as naphthalene have Henry's Law Constants in the range of 10^{-3} to 10^{-5} atm-m^3/mol which is associated with significant volatilization. High molecular weight PAHs (benzo(a)pyrene, chrysene, and dibenzo(a,h)anthracene) have Henry's Law Constants that are less than 10^{-6} atm-m^3/mol which indicate very limited volatilization from water. Half-lives for volatilization of dibenzo(a,h)anthracene and benzo(a)pyrene (high molecular weight PAHs) from water have been estimated to be greater than 100 hours.

The low molecular weight PAHs such as naphthalene have K_{OC} values in the range of 10^3 to 10^4, which indicates a moderate potential to be adsorbed to organic carbon in the soil and sediments. High molecular weight PAHs have K_{OC} values in the range from 10^5 to 10^6 which indicates strong tendencies to adsorb to organic carbon. Due to their low water solubilities, PAHs are primarily found adsorbed to soils or sediments that either have settled to the bottom or are suspended in the water column. Adsorption of PAHs to soils and sediments is a function of organic carbon content and particle size. The tendency of PAHs to sorb to soil and sediment increases with increasing organic carbon content and is also directly dependent on particle size.

The environmental fate of PAHs is described by the U.S. EPA in the document "Ambient Water Quality Criteria for Polynuclear Aromatic Hydrocarbons" (U.S. EPA, 1979) which states:

"PAH will adsorb strongly onto suspended particulates and biota and their (PAH) transport will be determined largely by the hydrogeologic condition of the aquatic system. PAH dissolved in the water column will probably undergo direct photolysis at a rapid rate. The ultimate fate of those which accumulate in the sediment is believed to be biodegradation and biotransformation by benthic organisms."

This is restated in the U.S. EPA document "Health Effects Assessment for Polycyclic Aromatic Hydrocarbons (PAHs)" which states:

"The predominant mechanism that is likely to dictate the fate of most PAHs in aquatic media is sorption to particulate matter and subsequent sedimentation and microbial degradation."

Since PAHs are most likely to stay in the sediment or soil, microbial degradation is the most likely ultimate environmental fate in contrast to photolysis and volatilization. Compounds with four cyclic rings or less are most amenable to microbial degradation. Benzo(a)pyrene (five cyclic rings) has a half life in soil inoculated with bacteria of less than eight days.

7.1.4 Phenolic Compounds

Phenolic compounds detected at concentrations exceeding applicable criteria in one or more media include phenol, 2,4-dimethylphenol, and 2,4,5-trichlorophenol.

Adsorption of the phenolic compounds to soil is relatively low as the Koc values for these compounds range from 21.6 to 708 mL/g. The phenolic compounds are, therefore, relatively mobile in soil and may leach to groundwater as indicated by the relatively high aqueous solubilities (1,190 to 80,700 mg/L).

If phenolic compounds are released to water, volatilization is not expected to be very rapid due to the relatively low Henry's Law Constants (1.76×10^{-7} to 6.55×10^{-6} atm-m3/mol) for these compounds. The primary removal mechanism for phenolic compounds in an aqueous environment will be biodegradation which will generally be rapid under aerobic conditions in comparison to anaerobic conditions. 2,4-Dimethylphenol will degrade primarily due to biodegradation with a half-life of hours to days. The average half-life for 2,4,5-trichlorophenol in river water has been reported to be 6.3 days. Aerobic biodegradation of phenol is rapid. Under anaerobic conditions, biodegradation of phenol may take a few weeks.

Biodegradation of phenolic compounds in soil is relatively rapid (2 to 5 days). Biodegradation of 2,4-dimethylphenol has been reported to be completed within 4 days. It is expected that biodegradation rates will be much slower under anaerobic conditions than under aerobic conditions.

If released to the atmosphere, the phenolic compounds are expected to exist almost entirely in the vapor phase. The predominant removal mechanisms for phenolic compounds in the atmosphere are photodegradation and photochemical reaction with hydroxyl radicals. An estimated half-life of 8 hours has been reported for 2,4-dimethylphenol and 15 hours for phenol.

Evaporation, hydrolysis, adsorption to sediment, or bioconcentration in aquatic organisms are not significant removal mechanisms for the phenolic compounds.

7.1.5 PCBs

The PCB compounds detected at the Site at concentrations exceeding applicable criteria in one or more media include aroclor-1254 and aroclor-1260.

The low water solubilities (0.057 to 0.080 mg/L) and high koc values (4.1×10^5 to 2.63×10^6 mL/g) of the PCBs, and demonstrated strong adsorption of PCBs to soils and sediment indicate that leaching should not occur in soil under most conditions. Volatilization occurs slowly, the rate being greater from soil with low organic carbon and with increasing moisture. Biodegradation of PCBs in soil is slow, especially in soils that have high organic carbon content (ATSDR, 1992).

In water, adsorption to sediments or other organic matter is a major fate process for PCBs. Redissolution into the water column has been shown to occur in the environment. As the values for the estimated Henry's Law Constants (3.36×10^{-4} to 2.7×10^{-3} atm-m3/mol) for aroclors indicate, volatilization may occur for PCBs dissolved in natural water. However, PCBs were not detected in groundwater or surface water samples during the investigation. Therefore, volatilization of PCBs from water is not expected to be significant. PCBs are expected to bioconcentrate and bioaccumulate in aquatic organisms. Photolysis appears to be the only viable chemical degradation process in water (ATSDR, 1992).

In the atmosphere, the vapor-phase reaction of PCBs with hydroxyl radicals may be the dominant transformation process. Photolytic degradation of PCBs in the atmosphere is also possible (ATSDR, 1992).

7.1.6 Inorganics

The behavior of the Site-related inorganic parameters in the environment is dependent upon numerous factors including water chemistry, pH, redox potential, cation exchange capacity, and the content of clay minerals, carbonate minerals, oxides, organic matter, and oxygen.

The Site-related inorganic parameters are all relatively insoluble. They may form complex species by combining with inorganic ions such as HCO_3^-, CO_3^{2-}, SO_4^{2-}, Cl^-, F^-, and NO_3^- or with organic compounds which may affect the solubilities of the inorganic parameters. The concentration of the inorganic parameters that remain in solution in water is dependent upon the pH of the water and the dissolved salt content. The solubility of the inorganics is, generally, higher at lower pHs.

The inorganic parameters strongly sorb to organic matter in soil and sediment and do not readily leach. The inorganics may also be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil. However, the inorganics may enter surface water as a result of erosion of inorganic-containing salt particulates. In addition, some heavy metals such as cadmium are more mobile in aquatic environments than most other heavy metals such as lead.

Inorganics, with the exception of cyanide are all relatively non-volatile. The volatile form of cyanide, hydrogen cyanide, may be a significant loss mechanism for cyanide from soil and water. However, the concentrations of cyanide reported for soil and waste samples are low (maximum concentration of 75 mg/kg). Cyanide was not detected in groundwater or surface water samples and only at a maximum concentration of 2 J mg/kg for sediment. Volatilization is, therefore, not considered to be a significant loss mechanism for cyanide or the other inorganics at the Site.

The transport of inorganics in air is dependent upon particle size and density and meteorological conditions such as wind and rainfall. The subsequent transport of inorganics from the atmosphere to soil and surface water occurs as a result of bulk deposition (gravitational settling), dry deposition (inertial impaction characterized by a deposition velocity), and wet deposition (attachment to water droplets).

Uptake by aquatic organisms is an important potential removal mechanism for most of the Site-related inorganics. The simple metal cyanides and hydrogen cyanide do not bioconcentrate in aquatic organisms. There is no evidence of biomagnification of cyanides or zinc in the food chain.

7.2 CHEMICAL TRANSPORT

7.2.1 Groundwater

7.2.1.1 Upper Sand Unit

The predominant potential pathway for chemical migration in the groundwater is the shallow Upper Sand Unit. Shallow monitoring wells MW1A-93, MW2A-93, and MW4A-93 are completed in this shallow water bearing zone.

As discussed in Section 4.7.1.1, the water table in the Upper Sand Unit is close to the ground surface and is controlled by ground surface topography and the Fletcher Road drainage ditch along the western perimeter of the Site. Groundwater flow in the Upper Sand Unit is in a southwesterly direction and the shallow component of flow in the Upper Sand Unit discharges to the Fletcher Road drainage ditch.

The groundwater flux in the Upper Sand Unit was estimated to be approximately 1.2 ft^3/day (0.006 gpm) across the entire downgradient (western) property boundary.

For the purpose of this evaluation, the total concentration of organic compounds present in the Upper Sand Unit is conservatively estimated to be 530 µg/L. This value is based on the maximum result for each detected compound for the two rounds of groundwater monitoring for well MW2A-93. Well MW2A-93 is installed within 20 ft of the western boundary of the Site and is completed within the former waste disposal area. The sand pack for this well is within 2 ft of the base of fill. The analytical results for well MW2A-93 were the highest at the Site for the groundwater monitoring wells. Although the chemical concentrations observed in the groundwater at well MW2A-93 are elevated by the chemical presence within the fill area, and are not considered to be representative of the shallow groundwater quality concentration upgradient of the entire western property boundary, these data were used for this evaluation to maintain a conservative approach. Furthermore, the total organic compound concentration also includes all tentatively identified compounds that were reported for well MW2A-93. The tentatively identified compounds are estimated concentrations and may include naturally occurring organic compounds.

Based on the calculated groundwater flux of 1.2 ft^3/day and the estimated total organic compound concentration of 530 µg/L, the mass flux of organic compounds migrating in the shallow groundwater in the Upper Sand Unit across the western perimeter of the Site is estimated to be 6.3 g/year (0.014 lb/year). Based on the very conservative nature of this estimate and the resulting low value, chemical migration of organic compounds in the shallow groundwater is not considered to be a significant pathway.

7.2.1.2 Lower Sand Unit

The Lower Sand Unit (deep water bearing zone) is separated from the Lower Sand Unit by the Glaciolacustrine Clay Unit and is not hydraulically connected to the Upper Sand Unit. Deep monitoring wells M1B-93, MW2B-93, and MW3B-93 are completed within the Lower Sand Unit.

As discussed in Section 4.7.1.2, groundwater flow in the Lower Sand Unit flows in a northerly or northwesterly direction.

The groundwater flux in the Lower Sand Unit was estimated to be approximately 0.06 ft^3/day (0.0003 gpm) across the entire downgradient northern boundary of the Site.

The total concentration of organic compounds present in the Lower Sand Unit is conservatively estimated to be 155 µg/L. This value is based on the maximum result for each detected compound for the two rounds of groundwater monitoring for wells MW2B-93 and MW3B-93 which are installed within 25 ft and 35 ft of the northern property boundary, respectively. The chemical concentrations observed at wells MW2B-93 and MW3B-93 are, therefore, considered to be representative of the groundwater chemistry upgradient of the northern property boundary. The total organic compound concentration also includes all tentatively identified compounds that were reported for wells MW2B-93 and MW3B-93. It is to be noted that the tentatively identified compounds account for approximately 88 percent of the total organic compound concentration.

Based on the calculated groundwater flux of 0.06 ft^3/day and the estimated total organic compound concentration of 155 µg/L, the mass flux of organic compounds migrating in the deep groundwater within the Lower Sand Unit across the downgradient northern perimeter of the Site is conservatively estimated to be 0.09 g/year (0.0002 lb/year). Chemical migration of organic compounds in the deep groundwater is, therefore, also not considered to be a significant pathway.

7.2.2 Atmospheric Dispersion

Atmospheric dispersion of chemicals at the Site may potentially occur via the release of chemicals from surface water and exposed surface soil and sediment in both the vapor phase and by dispersion of contaminants adsorbed to airborne particulates. The release of chemicals to the atmosphere is affected by the volatilization potential and/or the atmospheric entrainment of chemicals adsorbed onto particulate matter (dust).

Organic compounds detected in surface soils at concentrations exceeding soil cleanup objectives include benzo(a)pyrene, phenol, and aroclor-1254. Organic compounds were not detected in surface water or sediments above applicable criteria or background levels. Benzo(a)pyrene and aroclor-1254 have very high sorption coefficients and low vapor pressures and these compounds will, therefore, not appreciably volatilize to the atmosphere from the surface soils. These organic compounds may be dispersed on particulate matter due to their high affinity for adsorption. Phenol has a moderate vapor pressure and a low sorption coefficient and is expected to exist almost entirely in the vapor phase.

The average concentrations of these organics for air particulates are conservatively estimated to be:

benzo(a)pyrene	4.24×10^{-5} µg/m^3
aroclor-1254	1.88×10^{-4} µg/m^3
phenol	4.45×10^{-5} µg/m^3

Inorganic parameters are non-volatile but may disperse to the atmosphere by adsorption onto airborne particulates from surface soils. The average concentrations of air particulates for the principal inorganic parameters are estimated to be:

barium	6.49×10^{-2} µg/m^3
cadmium	1.63×10^{-3} µg/m^3
chromium	2.63×10^{-2} µg/m^3
cobalt	3.00×10^{-3} µg/m^3
copper	8.67×10^{-3} µg/m^3
cyanide	1.19×10^{-3} µg/m^3
lead	2.21×10^{-1} µg/m^3
zinc	1.95×10^{-1} µg/m^3

These air particulate concentrations are based on a particulate concentration of 0.04 mg/m^3, the highest concentration measured during the two rounds of air monitoring (see Section 3.2.15). For the purpose of calculating particle concentrations, it was conservatively assumed that the concentrations of compounds adsorbed to particulates are equal to the average concentrations reported for surface soil and shallow borehole and test pit samples within the fill area. Since the air particulate concentrations are based on the average results for surficial soil samples collected within the limits of the fill area, they are considered to be very conservative.

The calculated concentrations of organic and inorganic parameters adsorbed to air particulates are less than the Short-Term Guideline Concentrations (SGCs) presented in New York State Air Guide 1, 1991. The calculated air particulate concentrations are also less than the more stringent Annual Guideline Concentrations (AGCs) with the exception of cadmium which slightly exceeds the AGC of 5×10^{-4} $\mu g/m^3$ for this parameter.

7.2.3 Surface Water Runoff

Chemicals present in surface soil and sediments are potentially subject to transport via surface water runoff. Migration may occur by physical transport of the soils or sediment or by dissolution of the chemicals. In addition, shallow groundwater at the Site discharges from the Upper Sand Unit to the eastern ditch along Fletcher Road due to the shallow water table. Chemicals discharging from the Upper Sand Unit to the drainage ditch may potentially be transported via surface water flow along the ditch in a southerly direction. However, as presented in Section 7.2.1, the mass flux of organic chemicals migrating from the Site in the Upper Sand Unit is minuscule. Therefore, the principal sources of Site-related chemicals that may potentially be transported via surface water runoff are from the surface soils and sediment.

The elevated levels of site related chemicals reported in the sediment samples from the on-Site ditch and the Fletcher Road ditch indicate that transport of contaminated surface soils from the waste disposal area via surface water runoff was likely a significant transport mechanism in the past. However, under existing conditions, where active disposal is no longer taking place and a healthy vegetative cover is present over the waste disposal area, the potential for surface water runoff to be a significant transport mechanism is greatly reduced. This is supported by the results for the surface water samples collected during the Site Investigation.

PCBs, Site-related VOCs and PAHs were not detected in surface water samples collected during the Site Investigation.

2-Methylphenol and 4-methylphenol were reported at estimated concentrations (2J µg/L) below the detection limit and below applicable surface water criteria. Surface water runoff is, therefore, not expected to be a significant pathway for the transportation of organic compounds from the Site.

The principal inorganic parameters detected in surface soil and sediment were not reported in the surface water samples at concentrations above surface water criteria values, with the exception of copper. The reported concentration of copper slightly exceeded its Class D surface water criterion of 22 µg/L at on-Site location SW-2 (24.3 F µg/L) and sampling locations along the ditch on the eastern side of Fletcher Road (SW-4, SW-5, and SW-7) where copper was reported at concentrations ranging from 25 to 46.6 µg/L. As these values are very close to the Class D surface water criterion, it is concluded that surface water runoff is not a significant pathway for the transportation of inorganic parameters from the Site.

8.0 BASELINE HEALTH RISK EVALUATION

8.1 INTRODUCTION

This Baseline Health Risk Evaluation (BHRE), presented herein, is intended to characterize potential current and future threats, if any, to human health associated with Site-related chemical residuals in soil, air, groundwater, surface water, and/or sediments, as appropriate. Information developed during the BHRE will be utilized in the development, evaluation, and selection of appropriate remedial action alternatives including the "no-action" alternative.

The BHRE will follow the general format proposed in U.S. EPA guidance for Superfund risk assessments, as well as other guidance and reference materials cited in the text. Specific U.S. EPA guidance utilized in the development of the BHRE includes:

i) EPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A) (RAGS), EPA/540/1-89/002, December 1989;
ii) Supplemental Guidance, Standard Default Exposure Factors (Supplemental Guidance), OSWER Directive 9285.6-03, March 25, 1991;
iii) NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM) on Determination of Soil Cleanup Objectives and Cleanup Levels, HWR-94-4046, January 24, 1994; and
iv) additional guidance, criteria, and reference documents as applicable and as referenced herein.

8.1.1 Scope And Organization Of The BHRE

The BHRE has been prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 1990) and applicable U.S. EPA guidance.

The BHRE utilizes all validated analytical data collected during the current and previous Site investigations. The BHRE evaluates the potential present and future health risks and hazards related to exposure by humans to residual chemicals identified as related to the activities at the Site. When applicable, an attempt was made to differentiate Site-specific chemicals from chemicals which are possibly or more likely from sources other than the Site (i.e., off Site, or natural background).

Examination of environmental data indicates a variety of chemical constituents and similar conditions of use over the Site area. Therefore, the BHRE was performed on the Site as a whole.

Reported chemical concentrations in the environmental media will change over time due to various transport and degradation processes (i.e., migration, dilution, sorption, dispersion, volatilization, biodegradation, chemical degradation, and photodegradation). These processes and the resultant decrease or increase in concentrations were not quantified for this BHRE. In addition, various exposure scenarios were constructed in accordance with applicable guidance. These approaches and guidance are conservative and, as such, may exaggerate stated exposures and result in significantly higher calculated risks and hazards than are likely to occur.

The BHRE incorporates the following major components:

i) <u>Identification of Chemicals of Concern (COC)</u> - the presence, distribution, concentration, and toxicity of chemicals detected and identified as potentially Site-related, were evaluated to identify those chemicals which are most likely to pose the majority of the potential health risks;

ii) <u>Exposure Assessment</u> - potential exposure pathways were assessed to identify potential receptors, and determine how and in what media the chemicals of concern could reach potential receptors, estimation of the exposure point concentrations, daily intakes for receptors, and the uncertainties related to these exposures;

iii) Toxicity Assessment - potential health effects associated with the chemicals of concern were identified; and

iv) Risk Characterization - estimates of potential carcinogenic and non-carcinogenic risks were calculated for each potential exposure pathway based on the exposure and toxicity assessments.

The BHRE process utilizes the information obtained during the current and previous Site investigations to complete the exposure assessment and quantify human exposure. The exposure quantification and toxicity information are then utilized to estimate the theoretical potential for adverse human health effects.

The process applies several theoretical assumptions to determine a numerical expression of the risk to human health. The potential for both carcinogenic effects and non-carcinogenic effects are evaluated. The health risk assessment characterizes potential carcinogenic effects in terms of probabilities that an individual will develop cancer over a lifetime of exposure to hazardous constituents related to the Site. The potential for non-carcinogenic effects is evaluated by comparing an estimated dose level from potential exposures to a reference dose which is defined as the dose level at which a receptor can be exposed through their entire lifetime without experiencing appreciable adverse health effects. The results of the evaluation of carcinogens and non-carcinogens are compared to acceptable levels developed by U.S. EPA and/or regulatory agencies.

Agency guidelines require that the estimates of potential carcinogenic risk and non-carcinogenic hazard be based on the reasonable maximum exposure (RME) which could result from the presence of reported residues of Site-related hazardous constituents.

8.1.2 Site Description

The Site history and description are presented in detail in Sections 1.0 to 3.0 of this report.

The primary Site-related facts applied to the BHRE are summarized as follows:

i) The Site is located in the town of Newstead, in Erie County, New York.

ii) The entire Site occupies approximately 6.6 acres and is located in an area that is zoned rural agricultural.

iii) The Site is covered almost entirely with grass and shrub vegetation with a few small areas covered by concrete footings for former buildings.

iv) The Site was used for waste disposal between 1948 and 1954.

v) The Site is currently not used for any purpose or activity, and it is expected to remain as such in the future.

vi) The adjacent land use is rural agriculture, unused shrub brush, and woodlots. The surrounding area is zoned as rural agricultural.

vii) The Site is comparatively flat and surface drainage from the Site flows to a system of ditches. Surface water from the Site discharges across Fletcher Road and through a network of ditches for ultimate discharge to Tonawanda Creek, approximately 2 miles west-southwest of the Site.

viii) Surface water bodies near the Site include Tonawanda Creek, approximately 3,000 feet north of the Site. Fourteen State regulated wetlands are located within the 2 mile radius of the Site (see Section 9.0). None of the wetlands are on or adjacent to the Site.

ix) Although Tonawanda Creek lies approximately 3,000 feet north of the Site, the Site is located within the floodplain of the Creek.

x) The overburden contains a saturated fine grained sand and clay in combination with weathered shale. The movement of the shallow groundwater is generally to the southwest. The deeper groundwater flows to the northwest.

xi) The closest residence to the Site is approximately 300 yards south of the Site along Fletcher Road.

xii) The closest groundwater well used as a potable water source is located approximately 300 yards south of the Site.

8.1.3 Data Evaluation

Validated analytical data for soil, groundwater, surface water, sediments, and air collected during the current and previous Site investigations were examined to evaluate the chemicals present, their distribution and concentrations. Data used to identify COCs and calculate exposure concentrations are discussed in Section 6.0 and are presented in Appendix J.

Analytical data were reviewed for validation qualifiers on concentration values and sample duplicates. Rejected samples ("R" qualifiers) were not included in the database for the BHRE. Non-detect results were included only if other results for a given chemical in a particular medium/area indicated the chemical was probably present. In these instances, half the reported detection limit was used as the estimated concentration for samples having non-detect results. Estimated results, usually indicated by a "J" qualifier, were included in the evaluation. Duplicate samples were averaged and considered as one sample.

For evaluation of surface soil exposure scenarios under current Site conditions, surface soil samples were defined as samples collected from 0 to 2 feet below ground surface (BGS).

To evaluate potential exposure to soil under future Site conditions, all available soil data were used, regardless of depth.

The use of all soil data to evaluate the potential future soil exposure scenarios maximizes the data set available and recognizes the possibility that future excavation and construction activities could result in redistributing subsurface soil at the Site.

8.1.4 IDENTIFICATION OF BACKGROUND SAMPLE LOCATIONS

Background locations were defined to be locations outside known areas of impact from the Site; and locations least apt to be impacted by Site activities; based on Site-specific information (e.g., groundwater flow direction). Therefore, the samples from these locations were believed to represent areas not impacted by Site activities.

8.1.4.1 Soil Background

Soil samples from BH-W1 were collected from a location considered not to be impacted by the Site (see Figure 3.2). Therefore, the samples from this location were believed to represent natural soil conditions not contaminated by Site activities (i.e., background).

The detection frequencies, mean, maximum and 95 percent Upper Confidence Level (95 percent UCL) of the mean concentrations for background soil are presented in Table 8.1. This is based on soil data collected from background location BH-W1 at depth intervals of 2 to 6 feet BGS and 10 to 14 feet BGS. All data from location BH-W1 were combined and used as background data.

8.1.4.2 Groundwater Background

Groundwater monitoring well locations MW1A-93, MW1B-93, MW3A-93, and MW3B-93, were identified as cross-gradient or upgradient of potential impact from Site activities and are considered to represent background conditions. Shallow groundwater flow at the Site is generally towards the southwest and the deeper groundwater flow towards the north.

All background groundwater data from both shallow and deep monitoring wells were combined. The detection frequencies, mean, maximum and 95% UCL concentrations for background groundwater are presented in Table 8.2.

8.1.4.3 Sediment Background

Sediment sampling locations SW-7, SW-8, and SW-10, are located in the Fletcher Road drainage ditch upgradient of the Site. Therefore, the samples collected from these locations were believed to represent background conditions.

The detection frequencies, mean, maximum, 95% UCL concentrations for background sediments in the Fletcher Road drainage ditch are presented in Table 8.3.

8.1.4.4 Surface Water Background

Surface water sampling locations SW-7 and SW-8, are located in the Fletcher Road drainage ditch, upgradient of the Site. Therefore, the samples collected from these locations were believed to represent background conditions.

The detection frequencies, mean, maximum, 95% UCL concentrations for background surface water in the drainage ditch are presented in Table 8.4.

8.2 PROCEDURE FOR THE IDENTIFICATION OF POTENTIAL COCs

This section presents the procedures used to identify the Site-related chemicals which have the greatest potential to impact human health and the environment.

Frequency of detection, comparison to background levels, maximum detected concentrations, and toxicity were evaluated for each chemical reported, for each medium. The data for each medium were evaluated to determine which chemicals were present at concentrations which appeared to be significantly above background concentrations, and were present at a frequency and concentration which would indicate they may be Site-related chemicals. All chemicals which were determined to be present at concentrations above background, at a frequency which did not suggest a sporadic or occasional occurrence were considered potential COCs.

The comparison to background levels was performed by comparing calculated mean concentrations to available mean background concentrations from each media. The mean concentrations were calculated including both detected and non-detected results with non-detects equal to one-half the detection limit. Duplicate samples were averaged and considered as one sample. It should be noted that strict adherence to this methodology results in a very conservative evaluation as elevated detection levels in one or more samples can significantly increase the estimated mean concentration for a parameter, even when the reported detected concentration is very low.

Organics were compared to background concentrations and all organic parameters with calculated mean concentrations which exceeded the mean background chemical concentrations were identified as potential COCs. For inorganics, calculated mean concentrations were compared to twice the background mean concentrations. This is consistent with U.S. EPA Guidance (U.S. EPA, 1989a) which states reported concentrations of COCs should be "significantly elevated above naturally occurring levels of the same chemicals".

The results of the potential COC selection process are summarized in Tables 8.5 through 8.12, inclusive, for surface soil, soil, air, groundwater, sediments and surface water, respectively. The potential COCs identified by this selection process for each media evaluated are summarized in Table 8.13.

8.2.1 Potential COCs in Surface Soils

Soil data for samples collected from 0 to 2 feet BGS were used to identify potential COCs in surficial soils. The detection frequencies, the range of reported concentrations for detected parameters, the calculated mean and 95% UCL concentrations are summarized in Table 8.5. For organics, the calculated mean concentrations for each detected parameter were compared to the Site-specific mean background concentrations. For inorganics, the calculated mean concentrations for each detected parameter were compared to twice the Site-specific mean background concentrations. If the calculated mean concentration for the parameter exceeded this criteria, then the chemical is identified as a potential COC.

Table 8.5 summarizes this evaluation and identifies potential COCs in surface soils.

8.2.2 Potential COCs in Soils

All available soil data, regardless of depth, were used to identify potential COCs in soils. The detection frequencies, the range of reported concentrations for detected parameters, the calculated mean and 95% UCL concentrations are summarized in Table 8.6. For organics, the calculated mean concentrations for each detected parameter were compared to the Site-specific mean background concentrations. For inorganics, the calculated mean concentrations for each detected parameter were compared to twice the Site-specific mean background concentrations. If the calculated mean concentration for the parameter exceeded this criteria, then the chemical is identified as a potential COC.

There were greater than 20 samples analyzed for the entire soil data set. As such, U.S. EPA Guidance (U.S. EPA, 1989a) states that if a parameter was detected in less than 5 percent of the total samples, where there were 20 or greater samples analyzed, then the parameter can be eliminated from further evaluation in the risk assessment. Hence, for the entire soil data set, a parameter must be detected in at least two samples to be considered a potential COC.

Table 8.6 summarizes this evaluation and identifies potential COCs in soils.

8.2.3 Potential COCs in Air

Two rounds of air monitoring for particulates were conducted at the Site; one during August 1996 and the other during September 1996. For each round of particulate air monitoring, three particulate monitors were zeroed in accordance with the manufacturer's guidelines and placed four feet above the ground surface at the following three locations:

1. at the property boundary upwind of the former waste disposal area;
2. immediately downgradient of the former waste disposal area; and
3. at the nearest property boundary downwind of the former waste disposal area.

The locations of the air particulate monitors for each particulate air monitoring program are identified on Figures 3.7 and 3.8. The details of the air particulate monitoring program are discussed in Section 3.2.15 of this report.

The air monitoring results indicated that particulates in ambient air downwind at the Site property boundary are 0.02 mg/m^3 and 0.025 mg/m^3 for Rounds 1 and 2, respectively. The particulates in ambient air immediately downwind of the former waste disposal area are 0.04 mg/m^3

and 0.02 mg/m^3 for Rounds 1 and 2, respectively. To evaluate the inhalation exposure of residents living off Site under the current and future Site conditions, the higher value (0.025 mg/m^3) of the particulate air monitoring results taken downwind at the Site property boundary was used. To evaluate the inhalation exposure of residents living on Site under the future Site conditions, the higher value (0.04 mg/m^3) of the particulate air monitoring results taken downwind of the former waste disposal area was used.

To evaluate potential exposure to Site-related chemicals adhered to particulates, the same potential COCs identified in surficial soils were evaluated for the air particulates. This is reasonable since dust or particulates would be generated from surficial soils at the Site.

The detection frequencies, the range of reported concentrations, the calculated mean and 95% UCL concentrations for identified potential COCs in surficial soils are summarized in Table 8.7. The calculated mean and 95% UCL concentrations are based on surficial soil data (0 to 2 feet BGS) from sampling locations on the former waste disposal areas. These surficial soil sampling locations are TP-9, TP-12, BH-3, BH-6, and SS-3, from the current investigation and S-1, S-8, S-9, S-10, S-11, S-12, S-13, and S-18 from the historical data. Utilizing surficial soil data taken from the area of highest reported concentrations maintains a very conservative approach.

The concentrations of potential COCs adhered to particulates were calculated based on the following equation:

$$\text{COC}_{\text{air}} = \text{Air Particulate Level (mg/m}^3\text{)} \times \text{Surface Soil Conc. } (\mu\text{g/kg}) \times 10^{-6} \text{ (kg/mg)}$$

The calculated concentrations of potential COCs adhered to particulates utilized in the evaluation of exposure to air on and off Site under the current and future Site conditions are also presented in Table 8.7.

It should be noted that this approach results in a conservative estimate of potential chemical concentrations in the air at the Site as particulate measurements likely included non-contaminated particulates such as pollen and dispersion would rapidly reduce contaminant concentrations off Site.

8.2.4 COCs in Groundwater

Two rounds of groundwater data from both the shallow and deep wells were combined in the identification of potential COCs. The detection frequencies, the range of reported concentrations for detected parameters, the calculated mean and 95% UCL concentrations are summarized in Table 8.8. To be identified as a potential COC, the mean concentration of a detected organic parameter must exceed the Site-specific mean background concentration. For inorganics, the calculated mean concentrations for each detected parameter were compared to twice the Site-specific mean background concentrations.

Table 8.8 summarizes this evaluation and identifies potential COCs in groundwater.

8.2.5 Potential COCs in Sediments

Sediment sampling locations SW-1, SW-2, and SW-3, are located in shallow ditches on Site. Sediment data from the above noted sampling locations in the on-Site ditches were used in the identification of potential COCs. The detection frequencies, the range of reported concentrations for each detected parameter, the calculated mean and 95% UCL concentrations for the on-Site sediments are summarized in Table 8.9.

Sediment sampling locations SW-4, SW-5, SW-6 and SW-9, are located in the Fletcher Road drainage ditch west of the Site. Sediment data from the above noted sampling locations in the off-Site ditch were used in the identification of potential off-Site sediment COCs. The detection frequencies, the range of reported concentrations for each detected parameter, the calculated mean and 95% UCL concentrations for the off-Site sediments are summarized in Table 8.10.

To be identified as a potential COC, the mean concentration of a detected organic parameter must exceed the Site-specific mean background concentration. For inorganics, the calculated mean concentrations for each detected parameter were compared to twice the Site-specific mean background concentrations.

8.2.6 Potential COCs in Surface Water

Surface water sampling locations SW-1, SW-2, and SW-3, are located in the shallow ditches on Site. Surface water data from the above noted sampling locations were used in the identification of potential COCs. The detection frequencies, the range of reported concentrations for each detected parameter, the calculated mean and 95% UCL concentrations for the on-Site surface water are summarized in Table 8.11.

Surface water sampling locations SW-4, SW-5, and SW-6, are located in the Fletcher Road drainage ditch west of the Site. Surface water data from the above noted sampling locations were used in the identification of potential off-Site surface water COCs. The detection frequencies, the range of reported concentrations for each detected parameter, the calculated mean and 95% UCL concentrations for the off-Site surface water are summarized in Table 8.12.

To be identified as a potential COC, the mean concentration of a detected organic parameter must exceed the Site-specific mean background concentration. For inorganics, the calculated mean concentrations for each detected parameter were compared to twice the Site-specific mean background concentrations.

8.2.7 Summary of Identification of Potential COCs

The evaluation of the database and comparison with background concentrations identified potential COCs in surface soils, soils, groundwater and on- and off-Site drainage ditch/swales sediments and surface water. The potential COCs for all media are summarized in Table 8.13. The identified list of COCs does not include all the chemicals reported in each media but the potential COCs that are expected to account for the vast majority (>95 percent) of the potential adverse effects on human health and the environment from any probable exposure It should be noted that identification of a parameter as a potential COC does not necessarily imply that the parameter will result in adverse impacts to human health or the environment. It only indicates that the potential exposure to that parameter will be further evaluated in the BHRE.

8.3 EXPOSURE ASSESSMENT

8.3.1 Potential Pathways of Human Exposure

To determine whether an exposure to potential COCs remaining in a medium exists, the environmental and human components that lead to human exposure must be evaluated.

An exposure pathway consists of four necessary elements:

i) source and mechanism of chemical release to the environment;
ii) an environmental transport medium;
iii) a point of potential human contact within the impacted medium (exposure point); and
iv) a human exposure route (ingestion, dermal contact, or inhalation) at the contact point.

Exposure pathways are classified as complete, potential, or eliminated. For an exposure pathway to be complete, the aforementioned four elements must be present, which indicates that the exposure has occurred in the past, is presently occurring or may occur in the future. Potential exposure pathways have one element temporarily missing, which indicates that the exposure pathway may have been complete in the past or may be complete in the future. Eliminated exposure pathways have one or more elements missing which will never be present and the pathway is not complete and will never be complete in the future.

8.3.1.1 Soils

Potential routes of human exposure to impacted soil are the following:

i) Incidental ingestion of soil;
ii) Dermal contact with soil; and
iii) Inhalation of airborne dust or volatiles.

8.3.1.2 Particulates

Inhalation was evaluated as a potential exposure pathway for airborne particulates.

The Site which occupies 6.6 acres, is covered almost entirely by shrub and grass vegetation. Under existing conditions, there is low potential for a dust source on Site and inhalation of airborne particulates is not expected to be a significant exposure route on Site. However, at the request of the U.S. EPA, this route is evaluated.

8.3.1.3 Groundwater

Potential routes of human exposure to groundwater are the following:

i) Ingestion of groundwater;
ii) Dermal exposure to groundwater while showering/bathing; and
iii) Inhalation of volatiles from groundwater while showering/bathing.

8.3.1.4 Sediments

Potential routes of human exposure to impacted sediment are the following:

i) Incidental ingestion of sediment; and
ii) Dermal contact with sediment.

8.3.1.5 Surface Water

Potential routes of human exposure to impacted surface water are the following:

i) Incidental ingestion of surface water; and
ii) Dermal contact with surface water.

8.3.2 Potentially Exposed Populations

The Site area is zoned rural agricultural. The Site is privately owned and therefore, future use of the Site property would be controlled. The present owner of the Site does not intend to develop or sell the property in the future. Therefore, there is no reason to believe that the current land use, (i.e., inactive area) will change in the future. However, to maintain a conservative approach for the BHRE, a future residential Site use scenario was evaluated using existing chemical concentrations to develop the exposure scenario. It should be noted that it is very unlikely that the Site would be developed for residential use without first implementing remedial actions to minimize exposure to contaminated media. Hence, this evaluation represents an unlikely worst-case scenario.

The populations potentially exposed to the various media at the Site are identified in the following paragraphs.

Soils

As stated previously, the Site is presently inactive. A chain-link fence extends along the property boundary adjacent to Fletcher Road. The Site is accessible via a locked gate on Fletcher Road. Access to the Site from a direction other than Fletcher Road is difficult due to heavy scrub brush and other vegetation growing in areas surrounding the Site. As such, current potential exposure to impacted surface soils within the Site is limited to persons who gain unauthorized access (e.g., trespassers). For this exposure scenario, two receptor populations were evaluated: adults and older children (9 to 18 years old).

To maintain a conservative approach for the BHRE, the future potential exposure scenario assumes residential usage of the Site. This represents the worst-case exposure scenario for on-Site exposure to soil.

Air

There are currently no residents immediately adjacent to the Site. Therefore, under current conditions, off-Site exposure to airborne particulates from the Site would be very remote and is not considered to be a complete pathway. However, to maintain a conservative approach for the BHRE, it was assumed that off-Site residents could potentially by exposed to the airborne particulates with chemical concentrations estimated for the downwind property boundary.

The potential inhalation exposure of particulates by residents living on Site was evaluated as the worst-case future condition.

Groundwater

There are currently no on-Site wells used as a potable water source. The potential use of on-Site groundwater as a potable water source was evaluated as a worst-case future scenario.

Surface Water and Sediments

The on-Site shallow ditches are considered not accessible by young children, between the ages of 1 to 6 years. This is based on the rationale that the Site is 300 yards away from the nearest residence, access to the Site is restricted and young children between the ages of 1 to 6 years would not be without adult supervision. However, older children between the ages of 9 to 18 years old, who live near the Site, may potentially trespass onto the Site property and play in the on-Site ditches. Hence, these older children could come into direct contact with the sediments and surface water in the shallow ditches on Site. As such, the potential exposure to on-Site ditch sediments and surface water by older children trespassing on-Site was evaluated. Adult trespassers are not anticipated to spend a significant amount of time in the on-Site ditches. Therefore, exposure to on-Site ditch sediments and surface water by adult trespassers were not evaluated.

To maintain a conservative approach for the BHRE, the future potential exposure scenario assumes residential usage of the Site. As such, exposure to on-Site ditch sediments and surface water by future residents was evaluated.

The drainage ditch located west of the Site, along Fletcher Road, is about 2 to 3 feet deep and approximately four feet wide. This drainage ditch drains the Site and surrounding areas, and contains some water most of the year. Potential exposure to the drainage ditch sediments and surface water could occur if older children (between the ages of 9 to 18 years old), who live in and around the vicinity of the Site, come in direct contact with the ditch sediments and surface water during recreational or play activities. As such, the potential exposure to off-Site ditch sediments and surface water by older children playing was evaluated as a potential exposure scenario.

8.3.3 Identification of Potential Exposure Pathways

The potential exposures under the current and future land use are summarized as follows:

Media	*Potential Exposure Pathways*	*Receptor Population*	*Present/Future*
Surface Soil	Dermal Contact Incidental Ingestion	Trespasser	Current
Soil	Dermal Contact Incidental Ingestion	On-Site Resident	Future
Soil-to-Air Particulates	Inhalation	Off-Site Resident On-Site Resident	Current Future
Groundwater	Ingestion Dermal Contact Inhalation	On-Site Resident	Future
On Site Ditch • surface water/ sediments	Dermal Contact Incidental Ingestion	Trespasser On-Site Resident	Current Future
Fletcher Road Drainage Ditch • surface water/ sediments	Dermal Contact Incidental Ingestion	Off-Site Residents On-Site Resident	Current Future

8.3.4 Exposure Point Concentrations

Tables 8.5 to 8.12, inclusive, present the arithmetic mean of the concentrations in all samples, the maximum detected concentration and the 95th percent upper confidence limit (95% UCL) of the mean for each potential COC, in each media evaluated.

For all exposure scenarios, a most likely exposure scenario (Mean) and a Reasonable Maximum Exposure (RME) scenario were evaluated to provide a range of potential impacts. The exposure point concentrations used for the Mean and RME exposure scenarios were calculated in a manner consistent with U.S. EPA Guidance (U.S. EPA, 1989a).

U.S. EPA has defined the mean or average concentration as appropriate for the exposure concentration for the most likely exposure scenario (Mean). For this evaluation, the average concentration was calculated by averaging results for all samples using the detected concentrations and counting all non-detects (NDs) as half the detection limit for constituents which were reported as both positive and non-detect in different samples from a single study area. In the event that duplicate samples were analyzed, duplicate samples were averaged and considered as one sample.

U.S. EPA has defined the RME concentration as the 95 percent upper confidence limit (95% UCL) of the mean of concentrations reported in the media being evaluated. The 95% UCL was calculated following the equation outlined below for a normally-distributed data set.

$$95\%\ \mathrm{UCL} = \bar{x} + t \bullet \frac{s}{\sqrt{n}}$$

where:

95% UCL = upper confidence limit of the mean;
$\bar{x}$ = mean of the untransformed data;
t = student t-statistic;
s = standard deviation of the untransformed data; and
n = number of samples.

This equation is consistent with U.S. EPA "Supplemental Guidance to RAGS: Calculating the Concentration Term", 9285.7-081, May 1992. The RME exposure scenario should be considered a very conservative exposure scenario. Due to variability within the data points or the limited number of data, the 95% UCL concentration may exceed the maximum concentration detected. In these cases, the maximum concentration was used as the exposure point concentration for the RME or Level 2. This approach is consistent with U.S. EPA Guidance (U.S. EPA, 1989a) and is regarded as a conservative approach.

8.3.5 Quantification of Exposure

For each exposure scenario, two levels of assumptions are presented. The Mean or Level 1 assumptions present the average or mean value for the assumptions approximating the average expected exposure conditions. The RME or Level 2 presents assumptions which are more conservative, approximating the reasonable maximum exposure. The Level 2 assumptions are based on the 90th or 95th percentile confidence level for factors such as exposure duration, ingestion rates, and total exposed skin surface areas.

To quantify exposures, potential exposure scenarios were developed using exposure assumptions presented in the U.S. EPA documents entitled, "Risk Assessment Guidance for Superfund (RAGS), Part I: Human Health Evaluation Manual", EPA/540/1-89/002, December 1989; "RAGS Supplemental Guidance Standard Default Exposure Factors", OSWER Directive 9285.6-03, March 25, 1991; "Exposure Factors Handbook", EPA/600/P-95/002A, June 1995; "Dermal Exposure Assessment: Principles and Applications", EPA/600/8-91/011B, January 1992; and "Superfund Exposure Assessment Manual", EPA/540/1-88/001, April 1988. In some instances, where the U.S. EPA documents did not present necessary assumptions, and where specific appropriate exposure information were not available, professional judgment was applied to develop conservative assumptions which are protective of human health.

8.3.6 ESTIMATION OF INTAKE

8.3.6.1 Generic Estimation of Intake

To quantify exposures or intakes of environmental chemicals, the following general equation is applied:

$$\text{Intake} \quad = \quad \frac{CM * ER * ET * EF * ED * CF}{BW * AT} \times PTF$$

where:

Intake = Average daily intake of chemical (mg/kg/day)
CM = Concentration in specific media (mg/kg or mg/L)
ER = Exposure rate (mg/day or mg/hour)
This factor involves several factors depending on the media and route of exposure.
ET = Exposure time (hours/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF = Conversion Factors as needed
PTF = Percentage Time Factor (adjustment for time receptor is exposed to impacted media)
BW = Body weight of receptor (kg)
AT = Averaging time to develop average daily intake (25,550 days per lifetime or 365 days per year)

The individual factors will be discussed further as necessary for the specific exposures which can be reasonably expected at the Site.

8.3.6.2 Soil Exposure Scenarios

Exposure to chemicals in soil is via inadvertent ingestion of soil, generally due to hand-to-mouth contact, dermal contact with chemicals from soiling skin, and inhalation of chemicals on airborne dust or chemical vapors from soil. Exposure rate is therefore a combination of the daily sum of the amount ingested plus the amount absorbed through the skin, plus the amount inhaled on dust particulates. Ingestion and dermal contact represent the major exposure to soil. Inhalation exposure to dust particulates will be discussed in Section 8.3.6.3.

a) Current Trespasser Exposure to Surface Soil

Trespasser exposure to surface soils at the Site were evaluated under the present Site condition. The following conservative and health-protective assumptions were used to calculate exposures, as appropriate:

- For the present Site condition, the exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.

  Note: All surface soil results (0 to 2 feet BGS) were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

- Two receptor populations were evaluated: adults and older children (9 to 18 years old).

- The inadvertent soil ingestion rate assumed for older children and adult trespassers is 100 milligram (mg) of soil per event for both the Mean and RME.

- The direct dermal contact is based on variations of amount of clothing cover provided during different times of the year and include the use of 2,000 cm^2 (Mean) and 5,300 cm^2 (RME) for adults, and 3,675 cm^2 (Mean) and 4,525 cm^2 (RME) for older children.

- The conversion factor is 0.000001 kg/mg.

- The soil-to-skin adherence factor is 0.2 mg/cm^2 (Mean) and 1.0 mg/cm^2 (RME).

- The absorption efficiency following ingestion is assumed to be 100 percent for all potential COCs.

- When chemical-specific information is not available, the absorption efficiency applicable to dermal contact is assumed to be 25 percent for volatile organic compounds, 10 percent for semi-volatile organics and 1 percent for other organic chemicals, pesticides, or inorganics. Note that the absorption efficiencies via dermal contact is assumed to be 13.2 percent (Mean and RME) for polycyclic aromatic hydrocarbons (PAHs), 6 percent (Mean and RME) for PCBs, and 0.1 percent (Mean) and 1 percent (RME) for cadmium.

- The exposure period assumes a time frame of seven months supported by the amount of time that soil is exposed and there is no snow cover.
- The individual (older child and adult) would gain unauthorized access onto the Site property once a week for a 7-month period (between the months of April through to October) for a total of 30 days per year (Mean) and, twice a week for a 7-month period for a total of 60 days per year (RME).
- The exposure duration of 9 years (Mean) and 30 years (RME) is assumed for adults and, 9 years (Mean and RME) for older children.
- A body weight of 70 kg is assumed for adult trespassers and 57.1 kg for older children.
- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.
- The averaging time for non-carcinogens is 365 times the exposure duration (ED).
- The Percentage Time Factor (PTF) is assumed to be 1.0 for both the Mean and RME. This factor is based upon the conservation assumption that surficial contamination is uniform across the Site area.

The exposure scenario details and risk calculation tables for the current potential exposure to surface soils by trespassers are presented in Appendix K, Tables 1 through 8, inclusive.

b) Future Residential Exposure to Soils

To maintain a conservative approach for the BHRE, the future potential exposure scenario assumes residential usage of the Site.

An exposure scenario was developed for an individual who lives in the same residence on Site for 9 years (Mean) and 30 years (RME) of his lifetime. The following conservative and health-protective assumptions were used to calculate exposures, as appropriate:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: All soil results, regardless of depth were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

- The individual ingestion rates are 200 mg/day and 100 mg/day for young children (0 to 6 years) and, older children and adults, respectively.

- The direct dermal contact is based on variations of amount of clothing cover provided during different times of the year will include the use of 2,000 cm^2 (Mean) and 5,300 cm^2 (RME) for older children and adults, and 1,660 cm^2 (Mean) and 1,910 cm^2 (RME) for young children.

- The resident is exposed for 350 days per year for both Mean and RME, assuming that the individual takes a 2-week vacation away from his home.

- The number of years exposed equals 9 years (Mean) and 30 years (RME), of which 6 years are as a young child. The exposure duration of 9 years and 30 years represents the national average (50th percentile) and upper bound (90th percentile) time at one residence.

- The conversion factor is 0.000001 kg/mg.

- The soil-to-skin adherence factor is 0.2 mg/cm^2 (Mean) and 1.0 mg/cm^2 (RME).

- The absorption efficiency following ingestion is assumed to be 100 percent for all potential COCs.

- When chemical-specific information is not available, the absorption efficiency applicable to dermal contact is assumed to be 25 percent for volatile organic compounds, 10 percent for semi-volatile organics and 1 percent for other organic chemicals, pesticides, or inorganics. Note that the absorption efficiencies via dermal contact is assumed to be 13.2 percent (Mean and RME) for polycyclic aromatic hydrocarbons (PAHs), 6 percent (Mean and RME) for PCBs, and 0.1 percent (Mean) and 1 percent (RME) for cadmium.

- A body weight of 70 kg is assumed for older children and adults, and 16 kg for young children.

- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.

- The averaging time for non-carcinogens is 365 times the exposure duration (ED).

- The percentage Time Factor (PTF) is assumed to be 1.0 for both the Mean and RME. This factor is based upon the premise that contamination is uniform across the Site area.

The exposure scenario details and risk calculation tables for the future potential residential exposure to soils are presented in Appendix K, Tables 9 through 12, inclusive.

8.3.6.3 Air Exposure Scenarios

a) Current Exposure Off Site

The potential inhalation of particulates by human receptors was evaluated. Under the present Site conditions, the nearest resident is located approximately 300 yards south of the Site.

An exposure scenario was developed for an individual who lives in the same residence off Site for 9 years (Mean) and 30 years (RME) of his lifetime. The following conservative and health-protective assumptions were used to calculate exposures, as appropriate:

- The exposure point concentrations for potential COCs were calculated based on surficial soil data from sample locations on the former waste disposal area, and the higher value (0.025 mg/m^3) of the particulate air monitoring results taken downwind at the Site property boundary. It should be noted that this is a very conservative assumption given the fact that the nearest residence is located 300 yards south of the Site.
- The individual inhalation rates are 11 m^3/day and 20 m^3/day for young children (0 to 6 years) and, older children and adults, respectively.
- The resident is exposed for 350 days per year for both Mean and RME, assuming that the individual takes a 2-week vacation away from his home.
- The number of years exposed equals 9 years (Mean) and 30 years (RME), of which 6 years are as a young child. The exposure duration of 9 years and 30 years represents the national average (50th percentile) and upper bound (90th percentile) time at one residence.
- The absorption efficiency following inhalation is assumed to be 100 percent for all potential COCs.

- A body weight of 70 kg is assumed for older children and adults, and 16 kg for young children.

- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.

- The averaging time for non-carcinogens is 365 times the noncarcinogen exposure duration (ED) of 6 years. This is evaluated for a child who is the most sensitive population.

The exposure scenario details and risk calculation tables for the current potential exposure to air particulates by off-Site residents are presented in Appendix K, Tables 37 through 40, inclusive.

b) <u>Future Residential Exposure On Site</u>

The Site could be potentially developed for residential purposes in the future. As such, potential inhalation of particulates by residents living on Site is possible. Therefore, the potential inhalation exposure of on-Site residents was evaluated as a worst-case future scenario.

The same exposure factor assumptions as outlined in Section 8.3.6.3 (a) are utilized to evaluate the future residential exposure to air particulates on Site, with the following exception:

- The exposure point concentrations for potential COCs were calculated based on surficial soil data from sample locations on the former waste disposal area, and the higher value (0.04 mg/m^3) of the particulate air monitoring results taken immediately downwind of the former waste disposal area.

The exposure scenario details and risk calculation tables for the future potential residential exposure to air particulates on Site are presented in Appendix K, Tables 33 through 36, inclusive.

8.3.6.4 Groundwater Exposure Scenarios

A worst-case potential future exposure scenario was developed for an individual who lives in the same residence on Site for 9 years (Mean) and 30 years (RME) of his lifetime. During this time, it is assumed that this individual is exposed to groundwater via ingestion, and inhalation of volatiles and dermal contact while showering or bathing.

a) Future Residential Exposure - Ingestion of Drinking Water

The scenario for the consumption of groundwater assumes the residential use of groundwater without attenuation of groundwater concentrations, and includes the following conservative assumptions:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.

- The individual ingestion rates are 1 L/day (Mean and RME) for young children (0 to 6 years old), and 1.4 L/day (Mean) and 2 L/day (RME) for older children (over 6 years old) and adults.

- The resident is exposed for 350 days per year for both Mean and RME, assuming that the individual takes a 2-week vacation away from his home.

- The number of years exposed equals 9 years (Mean) and 30 years (RME), of which 6 years are as a young child. The exposure duration of 9 years and 30 years represents the national average (50th percentile) and upper bound (90th percentile) time at one residence.

- A body weight of 70 kg is assumed for older children and adults, and 16 kg for young children.

- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.
- The averaging time for non-carcinogens is 365 times the exposure duration (ED).

b) Future Residential Exposure - Showering/Bathing

A bath and shower factor is included in the residential water use scenario to account for the bathing exposure. Because of the uncertainties related to existing models used for estimating potential exposures related to showering or bathing, the potential exposure and resulting exposure risk from bathing will be assumed to be 100 percent (Mean and RME) for volatile chemicals, and 50 percent (Mean and RME) for semi-volatile chemicals, of the exposure from ingestion by drinking the water. This is consistent with the conclusions published by John C. Little (Little, 1992) where he states: "The inhalation in the shower stall for most volatile compounds is equivalent to approximately 1.5 times that incurred through ingestion of 2 L of the same water". The factor used is believed to represent a conservative approach and accounts for most volatile organic chemicals, and the semi-volatile organics where exposure may be predominantly by the inhalation route. Inorganic chemicals are, for the most part, non-volatile and in general, are not expected to be absorbed at a measurable level from bath water.

The exposure scenario details and risk calculation tables for future potential residential exposure to groundwater are presented in Appendix K, Tables 13 through 16, inclusive.

8.3.6.5 Sediment Exposure

Exposure to chemicals in sediment is via dermal contact and inadvertent ingestion of sediments, generally due to hand-to-mouth and dermal contact with chemicals from soiled skin. Exposure rate is therefore a combination of the daily sum of the amount ingested plus the amount absorbed through skin.

a) Current Trespasser Exposure to Sediments on Site

Trespasser exposure to sediments within the on-Site drainage ditch areas was evaluated under the present Site condition. The receptor population that would likely trespass and play in the on-Site shallow drainage ditches are older children between the ages of 9 to 18 years old, who live near the Site. These older children may come in direct contact with the sediments in the ditches on Site. Adult trespassers are not anticipated to spend a significant amount of time in the on-Site ditches. Therefore, exposure to on-Site ditch sediments by adult trespassers was not evaluated.

The following conservative and health-protective assumptions were used to calculate exposures, as appropriate:

- For the present Site condition, the exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: Sediment data from sampling locations SW-1, SW-2, and SW-3 were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

- Inadvertent soil ingestion rate assumed for older children is 100 milligram (mg) of soil per event for both the Mean and RME.

- The direct dermal contact is based on variations of amount of clothing cover provided during different times of the year and includes the use of 3,675 cm^2 (Mean) and 4,525 cm^2 (RME) of exposed surface skin area for older children.

- The conversion factor is 0.000001 kg/mg.

- The soil-to-skin adherence factor is 0.2 mg/cm^2 (Mean) and 1.0 mg/cm^2 (RME).

- The absorption efficiency following ingestion is assumed to be 100 percent for all potential COCs.

- When chemical-specific information is not available, the absorption efficiency applicable to dermal contact is assumed to be 25 percent for volatile organic compounds, 10 percent for semi-volatile organics and 1 percent for other organic chemicals, PCBs, pesticides, or inorganics. Note that the absorption efficiencies via dermal contact is assumed to be 13.2 percent (Mean and RME) for polycyclic aromatic hydrocarbons (PAHs), 6 percent (Mean and RME) for PCBs, and 0.1 percent (Mean) and 1 percent (RME) for cadmium.

- The exposure period assumes a time frame of 7 months supported by the amount of time that soil is exposed and there is no snow cover.

- The older child would gain unauthorized access onto the Site property once a week for a 7-month period (between the months of April through to October) for a total of 30 days per year (Mean) and, twice a week for a 7-month period for a total of 60 days per year (RME).

- The exposure duration of 9 years is assumed for older children.

- A body weight of 57.1 kg is assumed for older children.

- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.

- The averaging time for non-carcinogens is 365 times the exposure duration (ED).

- The percentage Time Factor (PTF) is assumed to be 1.0 for both the Mean and RME.

The exposure scenario details and risk calculation tables for the current potential exposure to on-Site shallow drainage ditch sediments are presented in Appendix K, Tables 17 through 20, inclusive.

b) Future Residential Exposure to Sediments on Site

To maintain a conservative approach for the BHRE, the future potential exposure scenario assumes residential usage of the Site. As such, exposure to on-Site ditch sediments by future residents was evaluated.

The same exposure factor assumptions as outlined in Section 8.3.6.2(b) (i.e., future residential exposure to soils) were utilized with the following exception:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95 percent UCL or the maximum detected, whichever is lower, for the RME exposure scenario. Note: Sediment data from sampling locations SW-1, SW-2, and SW-3 were used to calculate the mean (Mean) and 95 percent UCL (RME) concentrations.

- The individual is assumed to be exposed to affected sediments about 2.5 times a week for a 7-month period (between the months of April through to October) for a total of 70 days per year (Mean), and five times a week for a 7-month period for a total of 140 days per year (RME).

The exposure scenario details and risk calculation tables for the future potential residential exposure to on-Site shallow drainage ditch sediments are presented in Appendix K, Tables 41 through 44, inclusive.

c) Current Exposure to Sediments Off Site

For the drainage ditch west of the Site, along Fletcher Road, the exposure to potential COCs in sediment by local residents was evaluated. The receptor population that would likely play in the drainage ditch west of the Site are older children between the ages of 9 to 18 years old, who live in the vicinity of the Site. These older children could come in direct contact with the sediments in the drainage ditches along Fletcher Road. Adults are not anticipated to spend a significant amount of time in the ditch areas. Therefore, exposure to off-Site drainage ditch sediments by adults was not evaluated.

The same exposure factor assumptions as outlined in Section 8.3.6.5 (a) (i.e., current trespasser exposure to sediments on Site) were utilized with the following exception:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: Sediment data from sampling locations SW-4, SW-5, SW-6, and SW-9 were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

The exposure scenario details and risk calculation tables for the current potential exposure to off-Site drainage ditch sediments by older children are presented in Appendix K, Tables 21 through 24, inclusive.

d) Future Residential Exposure to Sediments Off Site

In the event that the Site is developed for residential purposes in the future, exposure to off-Site ditch sediments by future residents would occur.

The same exposure factor assumptions as outlined in Section 8.3.6.2 (b) (i.e., future residential exposure to soils) were utilized with the following exceptions:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95 percent UCL or the maximum detected, whichever is lower, for the RME exposure scenario.

Note: Sediment data from sampling locations SW-4, SW-5, SW-6, and SW-9 were used to calculate the mean (Mean) and 95 percent UCL (RME) concentrations.

- The individual is assumed to be exposed to affected sediments about 2.5 times a week for a 7-month period (between the months of April through to October) for a total of 70 days per year (Mean), and five times a week for a 7-month period for a total of 140 days per year (RME).

The exposure scenario details and risk calculation tables for the future potential residential exposure to off-Site drainage ditch sediments are presented in Appendix K, Tables 49 through 52, inclusive.

8.3.6.6 Surface Water Exposure

Exposure to chemicals in surface water is via inadvertent ingestion of water, generally due to hand-to-mouth contact and dermal contact with chemicals from wetting skin, and inhalation of volatilized chemicals. Exposure rate is therefore a combination of the daily amount ingested plus the amount absorbed through the skin, plus the amount inhaled as vapors. At the low levels of chemical constituents present in the surface water evaluated, ingestion and dermal contact represent the major exposure mechanisms for surface water. Inhalation exposure will not be quantified in the surface water exposure scenarios.

a) Current Trespasser Exposure to Surface Water On Site

Trespasser exposure to surface water within the on-Site shallow ditches was evaluated under the present Site condition. The receptor population that may trespass and play in the on-Site shallow drainage ditches are older children between the ages of 9 to 18 years old, who live near the Site. These older children may come in direct contact with the surface waters in the shallow ditches. Adult trespassers are not anticipated to spend a significant amount of time in the on-Site ditch areas. Therefore, exposure to on-Site ditch surface waters by adult trespassers was not evaluated.

The following conservative and health-protective assumptions were used to calculate exposures, as appropriate:

- For the present Site condition, the exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.

  Note: Surface water data from sampling locations SW-1, SW-2, and SW-3 were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

- The individual inadvertently ingests 0.5 mL of water per hour for both the Mean and RME. Note that this value of 0.5 mL/hr assumed that 1 percent of 50 mL (default value for ingestion of surface water while swimming) is inadvertently ingested during the trespassing event.

- The direct dermal contact is based on variations of amount of clothing cover provided during different times of the year and includes the use of 3,675 cm^2 (Mean) and 4,525 cm^2 (RME) of exposed surface skin area for older children.

- The chemical movement across the skin is proportional to the water permeability constant of 0.00016 cm/hr. This assumes that the chemical is absorbed through the skin with water.

- The exposure time of 0.5 and 1 hour per event is assumed for the Mean and RME, respectively.

- The conversion factor is 0.001 L/mL.

- The exposure period assumes a time frame of seven months supported by the amount of time that soil is exposed and there is no snow cover.

- The older child would gain unauthorized access onto the Site property once a week for a 7-month period (between the months of April through to October) for a total of 30 days per year (Mean) and, twice a week for a 7-month period for a total of 60 days per year (RME).

- The exposure duration of 9 years is assumed for older children.
- A body weight of 57.1 kg is assumed for older children.
- The carcinogenic averaging time is 70 years times 365 days per year or 25,550 days.
- The averaging time for non-carcinogens is 365 times the exposure duration (ED).

The exposure scenario details and risk calculation tables for the current potential exposure to on-Site shallow drainage ditch surface water are presented in Appendix K, Tables 25 through 28, inclusive.

b) Future Residential Exposure to Surface Waters On Site

To maintain a conservative approach for the BHRE, the future potential exposure scenario assumes residential usage of the Site. As such, exposure to on-Site ditch surface waters by future residents was evaluated.

The same exposure factor assumptions as outlined in Section 8.3.6.2 (b) (i.e., future residential exposure to soils) were utilized with the following exceptions:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95 percent UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: Surface water data from sampling locations SW-1, SW-2, and SW-3 were used to calculate the mean (Mean) and 95 percent UCL (RME) concentrations.

- The individual inadvertently ingests 0.5 mL of water per hour for both the mean and RME. Note that this value of 0.5 mL/hr assumes that 1 percent of 50 mL (default value for ingestion of surface water while swimming) is inadvertently ingested during the exposure event.

- The chemical movement across the skin is proportional to the water permeability constant of 0.00016 cm/hr. This assumes that the chemical is absorbed through the skin with the water.

- The exposure time of 0.5 and 1 hour per event is assumed for the Mean and RME, respectively.

- The conversion factor is 0.001 L/mL.

- The individual is assumed to be exposed to affected surface waters about 2.5 times a week for a 7-month period (between the months of April through to October) for a total of 70 days per year (Mean), and five times a week for a 7-month period for a total of 140 days per year (RME).

The exposure scenario details and risk calculation tables for the future potential residential exposure to on-Site drainage ditch surface waters are presented in Appendix K, Tables 45 through 48, inclusive.

c) Current Exposure to Surface Water Off Site

For the drainage ditch west of the Site, along Fletcher Road, the potential exposure to COCs in surface water by local residents was evaluated. The receptor population that would likely play in the drainage ditch west of the Site are older children between the ages of 9 to 18 years old, who live near the Site. These older children may come in direct contact with the surface waters in the drainage ditch west of the Site. Adults are not anticipated to spend a significant amount of time in the drainage ditch areas. Therefore, exposure to off-Site drainage ditch surface waters by adult was not evaluated.

The same exposure factor assumptions as outlined in Section 8.3.6.6 (a) (i.e., current trespasser exposure to surface waters on Site) were utilized with the following exceptions:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95% UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: Surface water data from sampling locations SW-4, SW-5, and SW-6 were used to calculate the mean (Mean) and 95% UCL (RME) concentrations.

The exposure scenario details and risk calculation tables for the current potential exposure to off-Site drainage ditch surface water by older children are presented in Appendix K, Tables 29 through 32, inclusive.

d) Future Residential Exposure to Surface Water Off Site

In the event that the Site is developed for residential purposes in the future, exposure to off-Site ditch sediments by future residents could occur.

The same exposure factor assumptions as outlined in Section 8.3.6.6 (b) (i.e., future residential exposure to soils) were utilized with the following exceptions:

- The exposure point concentrations are the mean concentrations for the Mean or most likely exposure scenario and, the 95 percent UCL or the maximum detected, whichever is lower, for the RME exposure scenario.
  Note: Surface water data from sampling locations SW-4, SW-5, SW-6, and SW-9 were used to calculate the mean (Mean) and 95 percent UCL (RME) concentrations.

The exposure scenario details and risk calculation tables for the future potential residential exposure to off-Site drainage ditch surface waters by future residents are presented in Appendix K, Tables 53 through 56, inclusive.

8.4 TOXICITY ASSESSMENT

Table 8.14 presents the physical and chemical characteristics of the potential COCs evaluated. Table 8.14 also presents the toxicity factors (i.e., CSF and RfD values) used to estimate the incremental carcinogenic risk and potential non-carcinogenic hazard.

A Cancer Slope Factor (CSF) is applied to estimate the potential risk of cancer from an exposure. A Reference Dose (RfD) is applied to estimate the potential for non-carcinogenic effects to occur from the exposure.

The CSF is expressed as $(mg/kg/day)^{-1}$ and when multiplied by the lifetime average daily dose expressed as mg/kg/day will provide an estimate of the probability that the dose will cause cancer during the lifetime of the exposed individual. This increased cancer risk is expressed by terms such as 1E-06 or 1×10^{-6}. This is a hypothetical estimate of the upper limit of risk based on very conservative or health-protective assumptions and statistical evaluations of data from animal experiments or from epidemiological studies. To state that a chemical exposure causes a 1E-06 added upper limit risk of cancer means that if 1,000,000 people are exposed, one additional incident of cancer is expected to occur. The calculations and assumptions yield an upper limit estimate which indicates that no more than one case is expected and, in fact, there may be no additional cases of cancer. U.S. EPA policy has established that an upper limit cancer risk falling below or within the range of 1E-06 to 1E-04 is acceptable. A risk level of 1E-04 is the point below which action is generally not warranted, however, the Agency may decide to attain the 1E-06 level once the decision has been made to take action (U.S. EPA, 1991). Since U.S. EPA values for CSFs are 95% upper confidence levels, risks are 95% upper bound estimates. Thus, actual risks associated with exposure to a potential carcinogen are not likely to exceed the risks estimated using CSFs, but may be lower.

In the Federal Register publication (FR Vol. 52, No. 130, page 25700) in which U.S. EPA promulgated MCLs for certain VOCs, it is stated that "the target reference risk range for carcinogens is 10^{-6} to 10^{-4}", and the maximum contaminants levels U.S. EPA is promulgating in this notice generally fall in this range. U.S. EPA considers these to be safe levels and protective of public health. This is supported by the concept expressed by the "Guidelines for Drinking Water Quality" (WHO, 1984), where it selected a 10^{-5} guideline value, and then explained that the application could vary by a factor of ten (i.e., 10^{-4} to 10^{-6}). This acceptable range of risk is applied to the general population in the U.S.A. when used as limits to develop Federal MCLs. This range of 1×10^{-6} to 1×10^{-4} which U.S. EPA considers protective of public health for drinking water was used as the target range in this evaluation of exposures to Site-related chemicals.

These cancer risk estimates are further explained by the following chart:

Estimate of Excess Cancer Risk	Maximum Number of Cancers Expected	Number of People in the Exposed Population
1×10^{-6}	1	1,000,000
1×10^{-5}	1	100,000
1×10^{-4}	1	10,000

When these figures are applied in an evaluation of hypothetical human exposures to suspect carcinogens, one should always remember that in a population of 1,000,000 people, the background level of expected cancer cases, or the actual number of people which will be afflicted with cancer in their lifetime, is approximately 250,000 or one in every four people.

Known or suspect human carcinogens are evaluated and identified by the Carcinogen Assessment Group with U.S. EPA's Weight-of-Evidence classification for carcinogenicity. The chemicals of potential concern for the Site are classified utilizing U.S. EPA's system.

The U.S. EPA classification is based on an evaluation of the likelihood that the agent is a human carcinogen. The evidence is characterized separately for human and animal studies as follows:

Group A - Known Human Carcinogen (sufficient evidence of carcinogenicity in humans);

Group B - Probable Human Carcinogen (Group B1 - limited evidence of carcinogenicity in humans; and Group B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans);

Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data);

Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence); and

Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in animal studies).

For substances suspected to cause noncarcinogenic chronic effects, the health criteria are usually expressed as chronic intake levels or RfDs (in units of mg/kg-day) below which no adverse effects are expected. In contrast with the underlying toxicological model used by U.S. EPA to assess carcinogenic risk, which assumes no threshold, the noncarcinogenic dose-response model postulates a "threshold." In other words, there is a level of exposure to a chemical below which virtually no effects are expected.

In this Baseline Health Risk Evaluation, chronic RfDs are used as the toxicity values for noncarcinogenic health effects. A chronic RfD is defined as an estimate (with uncertainty spanning an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Uncertainty factors have been incorporated into the RfDs to account for extrapolations from animal data, quality of the data and to protect sensitive subpopulations. The basis of an RfD derivation by the U.S. EPA is usually the highest dose level administered to laboratory animals which did not cause observable adverse effects, the No-Observed Adverse Effect Level (NOAEL), after chronic (usually lifetime) exposure. The NOAEL is then divided by an uncertainty (safety) factor, and sometimes an additional modifying factor, to obtain the RfD. In general, an uncertainty factor of 10 is used to account for interspecies variation and another factor of 10 to account for sensitive human populations. Additional factors of 10 are included in the uncertainty factor if the RfD is based on the Lowest-Observed Adverse Effect Level (LOAEL) instead of the NOAEL, or data inadequacies such as an experiment that includes a less than lifetime exposure.

Appendix M presents qualitative discussions of the toxicological characteristics of the identified potential COCs in all media evaluated.

8.5 RISK CHARACTERIZATION

Exposure situations may involve the potential exposure to more than one carcinogen. To assess the potential for carcinogenic effects posed by exposure to multiple carcinogens, it is assumed in the absence of information on synergistic or antagonistic effects that carcinogenic risks are additive. This approach is based on Guidelines for Health Risk Assessment of Chemical Mixtures (U.S. EPA, 1986a) and Guidelines for Cancer Risk Assessment (U.S. EPA, 1986b).

The estimated carcinogenic risk is calculated using the following formula:

Risk = Intake x CSF

where:

Risk = Estimated upper bound added risk of additional cancer in a population exposed to the estimated dose for a lifetime. For example, a risk of 1.0E-06 refers to a risk of one additional cancer in a lifetime for a population of 1,000,000 people exposed.

Intake = Chemical exposure calculated by applying the scenarios noted above and expressed as mg/kg/day. This exposure is the daily exposure for the exposure duration averaged over the individuals expected lifetime of 70 years.

CSF = Cancer Slope Factor which is a factor expressing the potential for carcinogenic response based on a theoretical model. This factor is expressed as 1/(mg/kg/day).

The U.S. EPA cancer classification and the cancer slope factor (CSFs) for identified potential COCs for the Site are presented in Table 8.14.

The individual risks from several chemicals for the same exposure scenario are considered additive. This is a conservative assumption suggested by U.S. EPA guidance. The estimated risks from more than one exposure scenario which can reasonably be assumed to happen to a single individual person are also considered additive.

The hazard of non-carcinogenic adverse effects from exposure to a chemical is expressed as the Hazard Quotient (HQ) and is calculated as follows:

$$\text{Hazard Quotient (HQ)} = \frac{\text{Intake}}{\text{RfD}}$$

where:

Hazard Quotient (HQ) = The relationship between the calculated dose of a chemical and a reference dose which is not expected to cause adverse effects from a lifetime exposure. A hazard quotient below 1.0 is considered protective of health if exposure is to a single chemical.

Intake = Chemical exposure calculated by applying the scenarios noted above and expressed as mg/kg/day. This intake is the average intake for the expected period of exposure or exposure duration.

RfD = Reference Dose which is a daily dose based on experimental study and/or human experience and is believed to not cause an adverse effect from even a lifetime exposure.

The RfD values for identified potential COCs for the Site are presented in Table 8.14.

The Hazard Index (HI) for an exposure situation is the sum of the Hazard Quotients for the individual chemical exposures presented by the several exposure scenarios which can reasonably occur to the same individual. A hazard index below 1.0 is considered health protective for a lifetime exposure and is therefore not an exposure of concern. If the HI exceeds 1.0 it is appropriate to reevaluate the toxicities of the individual potential COCs to determine if individual chemicals have the same or differing biological targets which would support conclusions that the HQs should or should not be added.

Table 8.15 summarizes the estimated additional lifetime cancer risks and hazard indices for all exposure scenarios evaluated.

8.5.1 Soil Exposures

a) Current Trespasser Exposure to Surface Soils

The estimated lifetime cancer risks associated with the current potential exposure to on-Site surface soils by adult trespassers range from 3.1E-07 (Mean) to 6.6E-06 (RME). These estimated lifetime cancer risks fall below and within the acceptable cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. The hazard indices range from 1.5E-02 (Mean) to 7.5E-02 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated lifetime cancer risks associated with the current potential exposure to on-Site surface soils by older children trespassing range from 4.8E-07 (Mean) to 2.1E-06 (RME). These estimated lifetime cancer risks fall below and within the acceptable cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. The hazard indices range from 1.8E-02 (Mean) to 8.7E-02 (RME). These HIs are well below 1.0, the level of potential concern.

b) Future Residential Exposure to Soils

The estimated lifetime cancer risks associated with the future potential residential exposure to soils on Site range from 8.3E-06 (Mean) to 5.9E-05 (RME). These estimated lifetime cancer risks fall within the acceptable cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. It should be noted that approximately ninety-nine percent (98.7%) of the total Mean cancer risk is attributable to PCBs (16%), benzo(a)pyrene (44%), other carcinogenic PAHs (13.7%) and beryllium (25%). Ninety-nine percent of the total RME cancer risk is attributable to PCBs (27%), benzo(a)pyrene (50.5%), other carcinogenic PAHs (13.5%) and beryllium (8%).

The hazard indices range from 1.7 (Mean) to 6.0 (RME). These HIs are above 1.0, the level of potential concern. Note that the Mean HI is primarily driven by PCBs (42.8%), cadmium (31.3%), barium (10.2%), and antimony (7.8%). The RME HI is primarily driven by PCBs (70%), cadmium (15.8%), barium (5%), and antimony (4%).

8.5.2 Future Residential Exposure to Groundwater

The estimated lifetime cancer risks associated with the future potential residential exposure to groundwater on Site range from 7.6E-05 (Mean) to 9.8E-05 (RME). These estimated lifetime cancer risks fall within the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA. Ninety-nine percent of the total Mean cancer risk is attributable to 1,1-dichloroethene (13%), benzene (2.6%), vinyl chloride (42.9%) and, 2,4-/2,6-dinitrotoluene (40.5%). The total RME cancer risk is attributable to 1,1-dichloroethene (1.8%), benzene (14.9%), vinyl chloride (22.5%) and, 2,4-/2,6-dinitrotoluene (60.8%). Note that 1,1-dichloroethene, vinyl chloride and 2,4-/2,6-dinitrotoluene were reported to be present in one out of a total of 10 samples. The maximum reported levels and the calculated Mean and RME concentrations for 1,1-dichloroethene and 2,4-/2,6-dinitroluene are below their respective Ambient Groundwater Quality criteria of 5 μg/L and 5 μg/L, respectively. The calculated Mean (5.61 μg/L) and RME (17.3 μg/L) concentrations for benzene exceeded the NYS Ambient Groundwater Quality Criterion of 5 μg/L. The maximum reported concentration for vinyl chloride of 0.4 μg/L did not exceed the Ambient Groundwater Quality Criterion of 2 μg/L. However, the calculated RME (3.59 μg/L) concentration for vinyl chloride exceeded the Ambient Groundwater Quality Criteria of 2 μg/L due to elevated detection limits in the other samples which were included in the calculation of the RME.

The hazard indices range from 1.0 (Mean) to 2.0 (RME). These HIs are at or above 1.0, the level of potential concern. Note that the RME HI is primarily driven by 2,4-/2,6-dinitrotoluene (16.6%), manganese (11.7%) and selenium (69%). Note that the calculated mean and RME concentrations for 2,4-/2,6-dinitrotoluene and manganese are below their respective Ambient Water Quality criteria of 5 μg/L and 300 μg/L, respectively. The calculated mean and RME concentrations for selenium exceeded the Ambient Water Quality Criteria of 10 μg/L.

8.5.3 Exposure to Air Particulates

The estimated lifetime cancer risks associated with the current potential exposure to air particulates by residents off Site range from 4.7E-07 (Mean) to 1.9E-06 (RME). These estimated lifetime cancer risks fall below or within the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA.

The hazard indices range from 8.3E-03 (Mean) to 1.6E-02 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated lifetime cancer risks associated with the future potential exposure to air particulates by residents on Site range from 7.5E-07 (Mean) to 3.1E-06 (RME). These estimated lifetime cancer risks fall below or within the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA.

The hazard indices range from 1.3E-02 (Mean) to 2.5E-02 (RME). These HIs are well below 1.0, the level of potential concern.

8.5.4 Sediment Exposures

On-Site Sediments

The estimated lifetime cancer risks associated with the current potential exposure to on-Site drainage ditch sediments by older children trespassing range from 7.5E-09 (Mean) to 7.9E-08 (RME). These estimated lifetime cancer risks fall well below the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA.

The hazard indices range from 3.8E-03 (Mean) to 3.6E-02 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated lifetime cancer risks associated with the potential future residential exposure to on-Site drainage ditch sediments range from 6.8E-08 (Mean) to 8.2E-07 (RME). These estimated lifetime cancer risks fall well below the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA.

The hazard indices range from 5.2E-02 (Mean) to 2.9E-01 (RME). These HIs are well below 1.0, the level of potential concern.

Off-Site Sediments

The estimated lifetime cancer risks associated with the current potential exposure to off-Site drainage ditch sediments along Fletcher Road by older children playing range from 2.4E-09 (Mean) to 2.6E-08 (RME). These estimated lifetime cancer risks fall well below the target cancer risk range of 1.0E-06 to 1.0E-4, as established by U.S. EPA.

The hazard indices range from 2.7E-03 (Mean) to 2.2E-02 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated lifetime cancer risks associated with the future potential residential exposure to off-Site drainage ditch sediments range from 2.2E-08 (Mean) to 2.7E-07 (RME). These estimated lifetime cancer risks fall well below the target cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA.

The hazard indices range from 4.1E-02 (Mean) to 2.3E-01 (RME). These HIs are well below 1.0, the level of potential concern.

8.5.5 Surface Water Exposures

On-Site Surface Water

There are no known or suspected carcinogenic COCs identified in the on-Site drainage ditch surface water. Therefore, the carcinogenic risks associated with the current and future potential exposure to on-Site drainage ditch surface water were not determined.

The estimated hazard indices for the current exposure scenario range from 3.2E-05 (Mean) to 1.8E-04 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated hazard indices for the future potential residential exposure scenario range from 8.8E-06 (Mean) to 5.5E-05 (RME). These HIs are well below 1.0, the level of potential concern.

Off-Site Surface Water

There are no known or suspected carcinogenic COCs identified in the off-Site drainage ditch surface water. Therefore, the carcinogenic risks associated with the current and future potential exposure to the off-Site drainage ditch surface water were not determined.

The estimated hazard indices for the current exposure to off-Site surface water along the Fletcher Road ditch range from 1.5E-06 (Mean) to 1.3E-05 (RME). These HIs are well below 1.0, the level of potential concern.

The estimated hazard indices for the future potential residential exposure scenario range from 5.8E-06 (mean) to 4.6E-05 (RME). These HIs are also well below 1.0, the level of potential concern.

8.5.6 Risk Associated with Exposure To Lead

Toxicological criteria for lead are not available and therefore risks from exposure to lead cannot be assessed using standard methods. U.S. EPA's position is that current data are insufficient to determine an RfD or RfC for lead. According to the U.S. EPA, the primary threat to human health from exposure to lead is subtle neurological effects in young children. For this reason, U.S. EPA has not derived a cancer slope factor for lead, despite the chemical's Group B2 status as a probable human carcinogen.

The best available quantitative tool for evaluating health effects from exposure to lead is the Integrated Exposure Uptake Biokinetic (IEUBK) model (U.S. EPA, 1994). The IEUBK Model was developed to recognize the multimedia nature of lead exposure, incorporate important absorption and pharmacokinetic information; and allow the risk manager to consider the potential distributions of exposure and risk likely to occur at the Site (the model goes beyond providing a single point estimate output).

The IEUBK Model uses current information on the uptake of lead following exposure from different routes, the distribution of lead among various internal body compartments, and the excretion of lead, to predict impacts of lead exposure on blood lead (PbB) concentrations in young children. The predicted PbB concentrations can then be compared with target PbB concentration associated with subtle neurological effects in children. Because children are thought to be most susceptible to the adverse effects of lead, protection of this age group is assumed to also protect older individuals. The IEUBK Model is a simulation model which uses mathematical equations to estimate the PbB in a child (or population of children) up to 7 years of age who has (or have) exposure to lead in soil, dust, air, food, water and other sources. Protection of young children is considered achieved when the model predicts that less than 5 percent of children will have blood lead levels greater than 10 µg/dL (U.S. EPA, 1994).

The IEUBK Model (version 0.99d) is used to evaluate potential risks from exposure to lead associated with the Site. Young children who may live on Site in the future are evaluated for potential exposures to lead in soil and groundwater. Children ranging in age from one month to 84 months are evaluated. Input parameters for the IEUBK Model are shown in Table 8.16 and are discussed below.

The RME exposure point concentrations for lead in air (adhered to particulates), surface soil and groundwater are used as input parameters for the IEUBK Model. The RME exposure point concentrations for lead in air, surface soil and groundwater are 0.395 µg/m^3, 6,290 mg/kg and 6.49 µg/L, respectively. The default concentrations for air, soil and tap water in the IEUBK Model are 0.1 µg/m^3, 200 mg/kg and 4 µg/L, respectively. All other input parameters, including inputs for dietary intake and maternal blood contribution, are left as default values. Default values used in the model are also provided in Table 8.16.

8.5.6.1 IEUBK Modeling Results

Results from the IEUBK Modeling runs are presented in Appendix L and the probability plot for blood lead concentrations is presented in Appendix L, Figure L.1. Using model input as described in Table 8.16, the IEUBK Model predicts a geometric mean blood lead level of 31.0 µg/dL with 98.7 percent of children with blood lead levels above 10 µg/dL (Appendix L, Figure L.1). Generally, U.S. EPA (1994) considers risks from exposure to lead unacceptable if more than 5 percent of children have blood lead levels in excess of 10 µg/dL. Thus, risks from lead exposure is considered to be unacceptable for future residents on Site.

8.5.7 Summation of Incremental Cancer Risk and Non-Carcinogenic Hazard

A given population may be exposed to a chemical from several exposure routes. The purpose of this section is to identify the risks associated with a population which may be exposed to a combination of the pathways which were evaluated.

RAGS (pg. 8-15) provides that risks should be combined across exposure pathways only where the following occurs:

a) reasonable exposure pathway combinations are identified; and
b) it appears likely that the <u>same</u> individuals would <u>consistently</u> face the "reasonable maximum exposure" ("RME") by more than one pathway.

As opposed to encouraging the calculation of combined risks from across exposure pathways, RAGS cautions (at pg. 8-16) that each RME estimate includes many conservative assumptions and combining estimates is not appropriate unless the combination itself is a RME:

> *"For real world situations in which contaminant concentrations vary over time and space, the same individual may or may not experience the RME for more than one pathway over the same period of time. One individual might face the RME through one pathway, and a different individual face the RME through a different pathway. Only if you can explain why the key RME assumptions for more than one pathway apply to the same individual or subpopulation should the RME risks for more than one pathway be combined.*
>
> *In some situations, it may be appropriate to combine one pathway's RME risks with other pathways' risk estimates that have been derived from more typical exposure parameter values". (Emphasis added).*

Under the present and future Site conditions, exposure of individuals residing in the vicinity of the Site is considered.

The following combined scenarios were evaluated:

A. Current Conditions

It is improbable that the same person would experience all potential exposures the same number of times or over the periods of years specified in the individual reasonable maximum exposure (RME) scenarios. As a result, it may be inappropriate to sum these risks and hazards. RMEs for the summed pathways may exaggerate an appropriate RME for the summed combined pathway exposures. The summation of mean values may be the more appropriate representation of the cumulative RME. However, to maintain a conservative approach, RMEs for the cumulative exposure for current exposure scenarios are also presented.

For adult trespassers who live in the vicinity of the Site, the estimated cumulative lifetime cancer risk from potential exposure to on-Site surface soils and air particulate scenarios range from 7.8E-07 (Mean) to 8.5E-06 (RME). This estimated range of cancer risk is below or within the target cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. The range of cumulative hazard index is 2.3E-02 (Mean) to 9.1E-02 (RME), and is below 1.0, which is considered the level of potential concern.

For older children who live in the vicinity of the Site and engage in trespassing activities onto the Site property, the estimated cumulative lifetime cancer risk for potential exposure to on-Site surface soil, sediments and surface waters in the on-Site shallow ditches/swales, sediments and surface waters in the off-Site ditch, and air particulates scenarios range from 9.5E-07 (Mean) to 4.2E-06 (RME). This estimated range of cancer risk is below or within the target cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. The range of cumulative hazard index is 3.3E-02 (Mean) to 1.6E-01 (RME), and below 1.0, which is considered the level of potential concern.

B. Future Conditions

As discussed for the current conditions scenario, it is improbable that the same person would experience all potential exposures the same number of times or over the periods of years specified in the individual reasonable maximum exposure (RME) scenarios. However, to maintain a conservative approach, RMEs for the cumulative exposure for future exposure scenarios are presented along with the mean values.

For on-Site residents, the estimated cumulative lifetime cancer risk for the on-Site soil, groundwater, surface water, sediments and air particulate scenarios range from 8.5E-05 (Mean) to 1.6E-04 (RME). This estimated cancer risk is within or marginally above the target cancer risk range of 1.0E-06 to 1.0E-04, as established by U.S. EPA. The range of cumulative hazard index is 2.9 (Mean) to 8.5 (RME), and is above 1.0, which is considered the level of potential concern.

8.6 IDENTIFICATION OF UNCERTAINTIES

The purpose of this Section is to provide a summary evaluation and discussion regarding the uncertainties associated with the final characterization of risk. The various uncertainties are discussed in the following sections.

8.6.1 Exposure Scenario Assumptions

The purpose of this evaluation is to discuss the uncertainty associated with the primary exposure scenario assumptions such as land use and frequency of exposure.

Because the assumptions used in the scenarios are generally not based on objective test data but are subjective estimates based on judgment and experience applied to the data available, the tendency is to select conservative, health-protective values to guard against under-estimating exposure (and associated risk). This leads to a general over-estimating in all assumptions. When more than one over-estimate of individual assumptions are included in the scenario equations, they are multiplied. This exaggerates the over-estimation of each assumption and overstates the total exposure to an even greater degree. The exposure scenarios are therefore conservative in nature thereby providing the necessary factor of safety which is protective of health.

The intent of this Baseline Health Risk Evaluation was to estimate the potential exposure point intakes for both the average (Mean) and the reasonable maximum exposure (RME) exposure scenarios. In order to accomplish this goal, a series of standardized U.S. EPA exposure assumptions were utilized (when available). In the absence of available U.S. EPA guidance on exposure assumptions or where Site specific information allowed, professional judgment was used to establish necessary assumptions which are protective of health.

The Mean exposure scenario represents the "average" exposure scenario which may reasonably be expected to occur.

The RME exposure scenario represents the Reasonable Maximum Exposure (RME) expected to occur. The RME exposure scenario presented in this BHRE was developed in conformance with the U.S. EPA RAGS.

The exposure scenarios (Mean and RME) were developed to estimate the exposures expected to occur under both current and future land use conditions.

The major uncertainties utilized in the BHRE regarding the physical exposure scenarios are summarized as follows:

- Because of the limited data set, the mean values and the 95% UCL values may not represent actual Site conditions. In some instances maximum concentrations were used. Although the use of maximum values is generally recognized only as an appropriate screening approach, this is consistent with U.S. EPA guidance. It should be recognized that this procedure may overestimate the actual exposure by orders of magnitude.
- The actual frequency of exposure related to an occasional visitor, such as trespassers, is unknown. As a result, professional judgment based upon Site-specific conditions was used to conservatively estimate exposure frequency and duration.
- The future land use conditions of the Site and its environs were assumed to be developed for residential purposes. As discussed previously, the Site area is zoned rural agricultural, however, historical land usage involved the use of the Site property for waste disposal between 1948 and 1954. The Site is privately owned and therefore, future land use of the Site property would be controlled. The present owner of the Site does not intend to

develop or sell the property in the future. Therefore, there is no reason to believe that the current land use will change in the future. Evaluation of the future development of the Site for residential purposes without implementation of remedial measures to minimize exposure to Site contaminants maintains a very conservative approach.

- The utilization of present exposure point concentrations for future exposure scenarios is conservative due to the fact that source material is not being added to the Site and some of the Site-related constituents will naturally degrade with time. Natural processes which can decrease environmental concentrations include dilution by uncontaminated media, adsorption of contaminants from groundwater, dispersion of contaminated groundwater in uncontaminated water, volatilization, biodegradation, chemical degradation, and photodegradation. The use of steady-state contaminant concentrations generally overestimates future exposures.

- This BHRE has assumed 100 percent absorption of chemicals which have been ingested. Actual absorption rates from ingested contaminants may vary from 5 to 100 percent. Therefore, assuming 100 percent absorption of ingested contaminants may overestimate the associated risks.

- It is assumed that the exposed individual will be exposed to contaminated media for the entire exposure period. Since much of the area surface soil and sediment is not contaminated, and wind conditions would greatly affect average concentrations in air at the exposure point, assuming continuous exposure overestimates related risks and hazards.

8.6.2 Dose Response

One of the major uncertainties in the quantification of risk involves the application of toxicity information. Examples of the uncertainties associated with the toxicity values are presented as follows:

- Chemicals may be assumed to be human carcinogens based on animal studies even when there is limited or no available evidence that the chemical is a human carcinogen. Such chemicals may not be carcinogenic in humans;

- CSFs are derived from study data on animals dosed with high concentrations and therefore may not be applicable to evaluation of low concentration exposures. High levels of chemicals may override the detoxification or excretion capabilities and allow the chemical to impact the target cells;

- CSFs are developed in a conservative manner. The model used by U.S. EPA makes a number of conservative assumptions which may over estimate carcinogenic potency, by several orders of magnitude; and

- RfDs are also established with conservative factors of safety in comparison to actual studies which may be in error. For example, it is assumed that all chemicals are more toxic for man than the test animals studied while the opposite may be true for the two species.

8.6.3 The Theoretical Nature of Risk Estimates

As indicated previously, the results of a health risk assessment assigns a numerical value to the probability of a case of cancer developing in a population exposed to a specific amount of chemical which is a known or suspect carcinogen. This numerical value is presented as an upper limit excess cancer risk such as 1×10^{-6}, or one additional cancer case in a million people exposed to the designated chemical and at the designated chemical concentration for their entire lifetime, assumed to be 70 years. The model that is applied to calculate this numerical risk value is intentionally biased to give a high value so the true value would not likely be greater and, in fact, may be zero. The Cancer Risk Model and the assumptions used to estimate exposure are considered protective of the most sensitive populations.

To demonstrate this concept, assume that one hundred people who live in 30 houses are exposed to a chemical, a suspect carcinogen, at a concentration that is reported to cause an estimated cancer risk of 1×10^{-6} or one in a million. The one hundred people would have a 1 in 10,000 chance of developing a single cancer in any one individual during one lifetime. In other words, these 30 houses could be occupied for 10,000 lifetimes, or 10,000 generations, and always have the same chemical concentration available for the exposure in question, and the probability indicates there would be no more than one additional case of cancer expected to develop in this entire population of one million people from the chemical exposure. In contrast to the theoretical single added case of cancer from the chemical exposure, there would be approximately 250,000 cases of cancer in the same population due to the known cancer incidence in our population. The present cancer incidence in the United States is approximately one cancer case during the lifetime of every four individuals.

8.6.4 Synergistic Effects and Additivity

Site-related potential COCs are treated as if they affect the receptor in a similar location. In other words, their potential incremental risk and their hazard ratios are additive.

There is a concern for synergistic effects when a receptor is exposed to several chemicals at the same time. In other words, there is a concern that the several chemicals interact in the receptor to cause an effect significantly greater than the sum of effects of the individual chemicals. If synergism occurs, the simple addition of the risk or hazard scores would underestimate the actual effect. This condition is not likely.

Regarding additivity, there is no apparent reason to expect volatile organic compounds will have the same effect as the metals. Although the non-carcinogenic hazard ratios are added, there is no basis to suspect the toxic effects are additive. This suggests that the hazard index may be higher than the toxicological facts would support.

8.7 SUMMARY OF BHRE

To summarize, the BHRE evaluation for the Site incorporated the following major components:

- Identification of potential Chemicals of Concern (COC);
- Exposure Assessment;
- Toxicity Assessment; and
- Risk Characterization.

Potential Chemicals of Concern (COCs)

Parameters were identified as potential chemicals of concern (COC) if the maximum detected concentration was significantly above background and if the frequency of detection was greater than 5 percent of the total samples. Generally, for risk assessments, all parameters detected in various media are included in the risk assessment process unless they can be eliminated using a justifiable rationale for removing the contaminant from the qualitative risk characterization.

Following the selection procedure described above, the potential COCs identified in the various media evaluated included VOCs, PAHs, 2,4- and 2,6-dinitrotoluene, 4-methyl phenol, 2,4-dimethylphenol, PCBs (aroclor-1248, 1254 and 1260), and some metals.

It is important to note that there were only a limited number of chemicals that account for the vast majority of the total carcinogenic risks and hazards. For example, for surface soils, it was determined that approximately 80 to 90 percent of the total estimated carcinogenic risks and hazard for surface soils was attributable to benzo(a)pyrene, dibenz(a,h)anthracene, antimony, barium, beryllium, cadmium, and zinc. For soils, approximately 84 to 92 percent of the total estimated carcinogenic risks was attributable to benzo(a)pyrene, aroclor-1254, aroclor-1260, barium, beryllium and cadmium. Lead was also identified as a chemical of concern in both surface soils and soils in general.

For groundwater, potential COCs identified were primarily 1,1-dichloroethene, benzene, vinyl chloride, 2,4-dinitrotoluene, 2,6-dinitrotoluene, manganese, and selenium.

For sediments in on-Site ditches, the most significant COCs identified were aroclor-1248, aroclor-1254, aroclor-1260 and cadmium. For sediments in the off-Site ditch, the most significant COCs identified were aroclor-1254, aroclor-1260, barium and zinc.

Exposure Assessment

The populations identified as being potentially exposed to COCs were trespassers and off-Site residents under the current Site conditions. Under the future Site conditions, residents on Site were identified as being potentially exposed to COCs.

Toxicity Assessment

Exposure point concentrations were calculated for all media evaluated in the BHRE. The exposure point concentrations were calculated as the mean and the 95% upper confidence level (95% UCL) of the mean. The exposure point concentrations, along with the scenario assumptions, were used to estimate intake values that were in turn calculated with the individual toxicity factors to obtain risk and hazard estimates.

Risk Characterization

The results of the risk characterization are as follows:

i) Current Site Condition

The estimated cancer risks associated with the adult exposure to surface soil while trespassing and inhalation of particulates in air were within the U.S. EPA acceptable target cancer risk range of 1.0E-06 to 1.0E-04. The HIs associated with the adult exposure to surface soil while trespassing and inhalation of particulates in air were two orders of magnitude below 1.0, the level of potential concern.

The estimated cancer risks associated with the older child exposure to surface soil, on-and off-Site exposure to drainage ditch sediments and surface water, and inhalation of particulates in air were within the U.S. EPA acceptable target cancer risk range of 1.0E-06 to 1.0E-04. The HIs associated with the older child exposure to surface soil while trespassing, on- and off-Site exposure to drainage ditch sediments and surface water, and inhalation of particulates in air were below 1.0, the level of potential concern.

ii) Future Site Condition

The estimated cancer risks associated with the future residential exposure to soil, groundwater, on-Site drainage ditch sediments and surface water, and particulates in air were slightly above the upper end of the U.S. EPA acceptable cancer risk range of 1.0E-06 to 1.0E-04. The HIs associated with the future residential exposure to soil, groundwater, on-Site drainage ditch sediments and surface water, and particulates in air were above 1.0, the level of potential concern.

As stated previously, residential development of the Site without implementing remedial measures to minimize exposure to Site related contaminants is considered to be very unlikely worst-case scenario.

9.0 FISH AND WILDLIFE IMPACT ASSESSMENT

9.1 INTRODUCTION

The objective of this Fish and Wildlife Impact Assessment (FWIA) is to present an evaluation of the potential ecological impact, if any, posed by chemicals of concern in and around the vicinity of the Newstead Site (Site), located on Fletcher Road in the Town of Newstead, Erie County, New York.

Guidance for completing the FWIA is provided in the New York State Department of Environmental Conservation (NYSDEC) guidance document titled "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (FWIA), dated October 1994. This FWIA also follows the process presented in the U.S. EPA document entitled: "Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual", EPA/540/1-89/001, March 1989.

A field investigation that encompassed Step I of the FWIA, was completed during December 1993 by Beak Consultants Incorporated (Beak) to identify potential ecological resources within a 2-mile radius and a 0.5-mile radius of the Site.

The results of the field investigation/survey are presented in Appendix N and summarized in Section 9.2. The purpose of the survey was to provide a qualitative description of fish and wildlife resources in and around the vicinity of the Site.

Based on the information from the Beak survey, Site visits and data from the Site investigations, an assessment of the potential bioavailability and toxicity of selected contaminant groups to resident plant, animal and aquatic communities possibly existing on or in the vicinity of the Site was conducted (i.e., Step II Assessment). This assessment is presented in Section 9.3.

9.2 SITE DESCRIPTION (FWIA STEP I)

Beak Consultants Incorporated (Beak) completed a field investigation of selected areas in the vicinity of the Site during December 1993. The results of this field investigation/survey are presented in Appendix N and are summarized in the following subsections.

9.2.1 Topographical Map

The Site map (Figure 1.0 in Appendix N) as presented in the Beak report indicates the location of the Site and the area within 2 miles of the perimeter of the Site. Major documented natural features such as streams, open water and wetlands within this area were identified through consultation with NYSDEC (Region 9), New York State Natural Heritage Program; New York State Freshwater Wetlands Maps; National Wetland Inventory Maps; U.S. Fish and Wildlife; American Museum of Natural History (longear sunfish); and New York Botanical Gardens (museum collections). Agency resource information is presented in page 1 of the Beak report (Appendix N).

9.2.2 Fish and Wildlife Resources - Within 2-Mile Radius of the Site

No listed or proposed endangered or threatened species under the jurisdiction of the United States Department of Interior and the New York Natural Heritage Program were identified within a 2-mile radius of the Site (see Appendix A of the Beak report). The New York Natural Heritage Program did not identify special concern wildlife species; rare plant, animal or natural community occurrences; deer wintering areas; or significant habitats within the study area.

Natural resources identified within 2 miles of the Site include federal jurisdictional and state-regulated wetlands, and streams (Tonawanda Creek, Murder Creek, and Ledge Creek).

The 14 state-regulated wetlands located within the 2-mile radius study area are all classified as Class II and III wetlands. No state wetland is located on or immediately adjacent to the Site. All state-regulated wetlands are upgradient of the Site and do not receive drainage from the Site. Boundaries of mapped New York State (NYS) wetlands are shown on Figure 1.0 and summarized in Table 2 of Appendix N. State wetlands are classified according to a classification system set forth by NYSDEC. This system establishes four separate classes that rank wetlands according to their ability to perform wetland functions and provide wetland benefits. A more detailed description of this classification system is presented in Appendix C of the Beak report (see Appendix N).

A number of federal jurisdictional wetlands have also been mapped in this area. Many of these correspond to the state-regulated wetlands described in Appendix N, although their boundaries may be different. These areas are shown on Figure 2.0 of the Beak report (Appendix N).

Figure 1.0 of the Beak report shows streams, located within the 2-mile radius of the study area, which include Tonawanda Creek (Class B); Murder Creek and an unnamed stream (Class C); Ledge Creek (Class C); and Class D streams. These resources are listed in the Beak report (Appendix N).

The Beak report also lists numerous indigenous species of fish and identified a NYS threatened and protected species, the longear sunfish *(Lepomis megalotis)*. The Beak report states that there is a potential for the longear sunfish to occur in Tonawanda Creek within the study area although the presence of this species was not confirmed.

9.2.3 Fish and Wildlife Resources - Within 0.5-Mile Radius of the Site

The Beak report (Appendix N) presents a detailed description of fish and wildlife resources of natural communities that occur on the Site and within a 0.5-mile radius of the Site.

9.2.3.1 Description of Cover Types

A description of vegetation cover types is provided in the Beak report, Appendix N (page 5), and summarized in Table 3 of Appendix N.

Generally, cover types west of Fletcher Road are either in cultivation for row crops (corn or winter wheat) or in field crops (hay). Many of the areas dominated by the red maple/ash community were apparently abandoned farm fields.

Many of the cover types east of Fletcher Road and south of Tonawanda Creek Road are abandoned farm fields. Some are dominated by successional old field communities, and large areas are successional shrublands. Vegetations such as maple/ash and hemlock-northern hardwoods characterize portions of this area.

9.2.3.2 Description of Flora and Fauna Expected Within Each Covertype

A description of fauna expected within each cover type was included in the Beak report (Appendix N, Page 6-10) in accordance with Step I of the NYSDEC FWIA guidance document.

Plant species for each cover type are listed in Appendix F of the Beak report (Appendix N).

Migratory and/or resident species of birds, mammals, reptiles and amphibians are listed in Appendix G of the Beak report (Appendix N).

9.2.3.3 Description of Water Resources

Four watercourses; one stream, three ditches and the isolated oxbow of Tonawanda Creek are present in the 0.5-mile radius study area (see Figure 3.0 of Appendix N). Stream A is a headwater stream that begins in a farmed field west of Fletcher Road. It eventually drains into an isolated oxbow of Tonawanda Creek through a shallow, densely vegetated channel. Ditch B surrounds the Site on its eastern and southern sides and empties into the roadside ditch on the eastern side of Fletcher Road. Ditch C is a large, deep ditch that receives drainage from ditches on both sides of Fletcher Road and from Ditch B. It eventually drains to Tonawanda Creek about 2.5 miles from the Site. Ditch D is an abandoned farm ditch that receives Fletcher Road ditch drainage and eventually flows into Ditch C.

Beak examined the aforementioned watercourses for potential fisheries habitat. Since Stream A and the isolated oxbow are shallow, heavily vegetated and are not directly connected to Tonawanda Creek, they offer limited fisheries potential, although some aquatic organisms (i.e., reptiles, amphibians) are common.

Ditches B, C, and D were also examined by Beak for fisheries potential. Ditch B was shallow and is probably dry throughout most of the year; it appeared to have limited fisheries potential. Ditches C and D receive runoff from a larger area. Generally, the ditches are shallow and probably flow only during spring and the fall when they fill with spring-melt runoff or during heavy rain events. Ditches C and D appear to offer limited fisheries habitat, but, it is possible that fish may migrate into the ditches near the Site during spring spawning migrations.

The Site is surrounded by ditches on all sides except the northern side. Drainage from the Site flows to the roadside ditch along Fletcher Road. Water in the roadside ditch flows to the south for about 375 feet, where the ditch passes beneath Fletcher Road through a culvert to Ditch C that flows to the west. At a point north of the Site, the Fletcher Road ditch was observed flowing to the north. This part of the roadside ditch flows into the headwater stream, which eventually flows into the isolated oxbow of Tonawanda Creek.

9.2.3.4 Observations of Stress Potentially Related to Site Contaminants

The Beak report concluded that there were no observed stress to vegetation or wildlife and that there were no evidence of off-Site contamination observed during the field investigation (Appendix N, page 10).

9.2.4 Description of Value of Fish and Wildlife Resources

9.2.4.1 Value of the Habitat to Associated Fauna

A detailed description of resource values are provided in the Beak report, Appendix N. The investigation/survey completed by Beak indicated that the various cover types within 0.5-mile radius study area provide for a diverse ecosystem capable of providing habitat for a wide variety of plant and animal species. Present habitats range from active farm fields to abandoned farm fields that are currently succeeding to forested communities. The forested areas east of Fletcher Road have a high degree of interspersion due to the mixture of the hemlock forest with the red maple/ash communities. The Beak investigation concluded that generally, there do not appear to be any factors within the study area that would limit food, cover, breeding or roosting sites for any species. The only exception to this would be for waterfowl, since there is limited open water within the study area.

9.2.4.2 Value of the Habitat to Humans

Resources in the vicinity of the Site have recreational and economic value to humans. About half of the study area is used for farming. Hunters were observed during the field investigation and the variety of habitats may provide for abundant game animals. Limited logging is evident in the hemlock-northern hardwood areas. The powerline right-of-way is used for dirt bikes and other off-road vehicles. Hikers or cross country skiers may also use the easement. Snowmobile trails criss-cross the study area.

9.3 CONTAMINANT - SPECIFIC IMPACT ANALYSIS (STEP II)

The impacts on fish and wildlife resources are dependent on the distribution of the chemicals of potential concern (COCs), their concentrations in various media, the exposure of biota to contaminants, and toxicological effects. The discussions below will cover the following areas:

(1) exposure pathway analysis;
(2) criteria-specific analysis; and
(3) ecological risk characterization.

This analysis is conducted in accordance with Step II of the NYSDEC FWIA guidance document.

9.3.1 Pathway Analysis

The purpose of the pathway analysis is to identify fish and wildlife resources, contaminants of concern, source of contaminants, and potential pathways of contaminant migration and exposure. The pathway analysis is presented in this section.

Due to its rural setting, the Site could potentially support birds and small mammal populations of mice, moles and other rodents which are indigenous to this area. Therefore, exposure by migratory terrestrial animals and/or birds to reported levels of contaminants could potentially occur on Site. The Site is too small to support large mammals, however, large mammals such as white-tailed deer may pass through the Site. Based on correspondence with NYSDEC, Fish and Wildlife Division (letter dated January 7, 1992), there are no endangered or threatened species or significant habitats in the area of the Site.

Terrestrial animals could be exposed to soils and sediments via ingestion and dermal contact. Ingestion of soil and sediment would occur primarily by grooming actions which involve cleaning fur and paws by licking. Some soil and sediment particles could also be ingested with food (seeds and other plant materials) which may be contaminated with soil and sediment.

Birds could be exposed to Site-related chemicals in surface soils and sediments by the same routes as terrestrial mammals, namely, directly by ingestion and dermal contact and, indirectly by contaminated food sources. Ingestion from grooming actions would be minor for birds, but there would be a greater portion of soil and sediment ingested when birds feed on the ground or ingest insects and seeds contaminated with soil and sediment particles.

Food species, plants or animals, can take up chemicals from contaminated media and, in turn, expose terrestrial animals that consume them.

In the aquatic environment, sediment-dwelling or benthic organisms are at the base of the food chain. These organisms are in immediate contact with the sediments and any potential sediment-bound contaminants. However, due to their intermittent nature, it is not expected that the on-Site drainage ditches support a significant aquatic environment. The ditches along Fletcher Road obtain surface water runoff from a larger area and, hence, contain water for a greater portion of the year. However, based on the Step I results reported by Beak, it is expected that the Fletcher Road ditches next to the Site provide limited fisheries potential or aquatic habitat.

Based on the evaluation presented in Section 6.5, it was concluded that chemical concentrations in the surface water at the Site are similar to background levels. Hence, exposure to chemicals in the surface water is not considered to be a complete pathway and is not further evaluated in the FWIA.

Similarly, there is no potential exposure to groundwater beneath the Site or to subsurface soils on Site, except for burrowing animals. Therefore, these exposure pathways will also not be further evaluated.

To summarize, the potential existing exposure pathways that may be applied to terrestrial and/or aquatic animal populations include:

- direct contact with affected surface soil and/or sediments;
- ingestion of surface soil and sediment with food materials; and
- ingestion of affected terrestrial and/or aquatic animals and plants.

Potential chemicals of concern (COCs) in the surface soil and sediments at the Site are presented in Tables 9.1 and 9.2. These tables were developed using the same screening methodology used for the BHRE as presented in Section 8.2.

9.3.2 Criteria Specific Analysis

The purpose of this section is to determine if the COCs identified in the various media pose any threat to the natural environment at and around the Site. Through comparison of Site-related contaminant levels with applicable, relevant, and appropriate requirements (ARARs), and/or criteria guidelines, an assessment of the potential ecological impact can be estimated. If criteria are exceeded or do not exist, further analysis of toxic effects due to contaminant exposure may be required.

9.3.2.1 Surface Soil

Table 9.3 summarizes the mean, maximum, and background concentrations in addition to available screening benchmark values for COCs in surface soil. The availability of applicable soil screening values in the scientific literature is limited. The evaluation of surface soil COCs at the Site was conducted by comparison of COCs to available screening benchmark values derived by the Oak Ridge National Laboratory (ORNL,

1995) for the U.S. Department of Energy. Three types of screening benchmarks were derived for COCs in soils, and include those for the protection of terrestrial plants, those for the protection of soil-dwelling earthworms, and those for the protection of soil-dwelling microorganisms and microbial processes.

Benchmark values for the protection of terrestrial plants, earthworms, and microorganisms, were derived using the same methodology as was used in deriving the NOAA ER-L sediment screening values. Similar to the development of the ER-L values, the benchmark values for the protection of terrestrial plants, earthworms, and microorganisms are the tenth percentile of the distribution of various toxic effects thresholds for the three groups of organisms in soil.

Earthworms are chosen as a representative species because of their importance in maintaining soil fertility through burrowing and feeding activities. These activities break down organic matter, release nutrients, and improve aeration and drainage of soil. Earthworms are also important sources of food in the diet of higher order animals. Soil microorganisms are critical in nutrient cycling, and as primary consumers of soil organic matter, they convert nutrients into available forms and serve as food, for higher plants and animals. Many terrestrial plants actively uptake the chemicals present in the soil they are rooted in. Plants are critical in nutrient cycling between plant tissue and the soil and are a source of food in the diet of higher animals.

Confidence levels have been assigned to each screening benchmark derived by the ORNL and are included in Table 9.3. The criteria that best reflect levels of confidence for the benchmarks are as follows:

1. Low Confidence - Benchmarks based on fewer than 10 literature values.
2. Moderate Confidence - Benchmarks based on 10 to 20 literature values.
3. High Confidence - Benchmarks based on over 20 literature values.

Confidence in a benchmark based on more than 20 literature values may be reduced to moderate if the range of test species is narrow. From the data presented on Table 9.3, it is apparent that most of the available benchmarks have a low level of confidence. The only benchmarks that have any consistent moderate, or high degree of confidence are those for inorganic parameters that were derived to protect microorganisms. Also, there are few screening benchmark values available for organic contaminants. This limits the effectiveness of such a quantitative evaluation. The ORNL benchmark values were not used to evaluate surface soil COCs, but have been included in Table 9.3, only for comparative interest. For these reasons, a qualitative assessment of the potential impacts from organic contaminants in surficial soil to the environment was conducted. The results of the assessment are presented in Section 9.3.3.

9.3.2.2 Sediment

Table 9.4 summarizes the mean, maximum, and background concentrations in addition to the NYSDEC sediment quality criteria (SQC) for COCs in sediment. The SQC are taken from the NYSDEC guidance entitled "Technical Guidance for Screening Contaminated Sediments" (NYSDEC, 1994a).

Sediment concentrations were compared to the following NYSDEC screening criteria for sediment:

1) for non-polar organic COCs, the NYSDEC recommend sediment criteria/standards based on equilibrium partitioning; and

   This is a reflection of the varied environmental protection objectives of the ambient water standard or guidance value (AWQC/GV) used to calculate the criteria.

2) for inorganic COCs, the NYSDEC sediment criteria for metals which are as follows:

- the 'lowest effect' level; and
- the 'severe effect' level.

For non-polar organic chemicals, the methodology used for deriving sediment criteria is known as the equilibrium partitioning (EP) approach. It is based on the theory that toxics in sediments will exert their effect, either toxicity or bioaccumulation, to the extent that the chemical becomes freely bioavailable in the sediment interstitial (pore) water. The fundamental assumption of this approach is that the pore water and sediment concentrations exist in equilibrium and that the concentrations are related by the K_{OC}. In addition, this approach recognized that the exposure to the sediment pore water equilibrium system and the water-only exposure system are equal since chemical activity is the same in each system at equilibrium.

The EP-based sediment criteria are tied to water quality standards, guidance values. There are five primary levels of protection which are as follows:

- protection of human health from acute or chronic toxicity;
- protection of human health from toxic effects of bioaccumulation;
- protection of benthic aquatic life from acute toxicity;
- protection of benthic aquatic life from chronic toxicity; and
- protection of wildlife from toxic effects of bioaccumulation.

The EP-based SQC for protection of human health and benthic aquatic life are determined by setting the pore water concentration equal to the water quality standard or criterion and calculating back to the sediment concentration using the following equation:

$$\text{Sediment Quality Criterion} = (\text{AWQS/GV}, \mu\text{g/L}) \times (K_{OW} \times 1/\text{kg}) \times \frac{1\text{ kg}}{1000\text{g OC}}$$

(SQC in μg/g OC)

AWQS/GV = the ambient water quality standard or guidance value for a chemical,

K_{OW} = the octanol/water partition coefficient for the chemical; units are those for K_{OC}; and

$\frac{1\text{ kg}}{1000\text{g organic carbon (OC)}}$ = a unit conversion factor.

Note that in the calculation presented above, the K_{OW} is substituted for the K_{OC}. This is based on the NYSDEC Sediment Screening Guidance which states that few K_{OC}s are accurately known, but the K_{OW} (octanol/water partition coefficient) has been determined to be very nearly equal to K_{OC}.

For the Site, the average sediment organic carbon content was 4.61% or 46.1 g OC/kg of sediment.

The EP-based SQC for protection of wildlife from toxic effects of bioaccumulation, are derived following the same approach described above. However, the water quality criteria applied are derived by taking fish flesh criteria for protection of piscivorous wildlife and dividing by chemical-specific bioaccumulation factors. As stated in the Beak report, the drainage ditch areas offer limited fisheries habitat. It is unlikely that fish-eating animals would obtain any significant portion of their diet from fish caught in these ditches. As such, the EP-based SQC for the protection of wildlife from toxic effects of bioaccumulation were not used for screening purposes in this FWIA.

The EP-based SQC for protection of human health from toxic effects of bioaccumulation, are derived following the same approach described above. However, the water quality criterion applied are derived by applying the acceptable daily intake for humans from fish consumption and the chemical-specific bioaccumulation factor. The EP-based SQC for protection of human health was not used in the FWIA because it is derived in part, for protection of human health from eating fish. As was stated previously, the drainage ditch areas offer limited fisheries habitat. It is unlikely that humans would obtain any significant portion of their diets from fish caught in these ditches. Therefore, only those SQC that are protective of benthic aquatic life were used in the FWIA evaluation.

SQC were available for all sediment COCs except for butyl benzyl phthalate, diethyl phthalate, and naphthalene. SQC for these three SVOCs were calculated using U.S. EPA ambient water quality criteria (AWQC) and K_{OW} values from the scientific literature. The acute and chronic U.S. EPA AWQC, and the K_{OW} used in the SQC calculation for butyl benzyl phthalate were 940 µg/L, 3 µg/L, and 81283, respectively. The acute and chronic U.S. EPA AWQC, and the K_{OW} used in the SQC calculation for diethyl phthalate were 940µg/L, 3 µg/L, and 1995, respectively. The acute and chronic U.S. EPA AWQC, and the K_{OW} used in the SQC calculation for naphthalene were 2,300 µg/L, 620 µg/L, and 1950, respectively.

The SQC used to compare to concentrations of aroclor 1248, 1254, and 1260 was that for PCB.

The SQC for inorganic COCs are taken from two separate studies that derived sediment quality guidelines. The two studies are the National Oceanic and Atmospheric Administration (NOAA) and Ontario Ministry of the Environment and Energy (MOEE) sediment quality guidelines studies. New York State chose two levels of protection as a basis for sediment quality screening criteria, following the MOEE guideline definitions. The Lowest Effect Level (LEL) is defined as the level that can be tolerated by the majority of benthic organisms and the Severe Effect Level (SEL) is defined as the level at which pronounced disturbance of the sediment-dwelling community can be expected.

The NOAA values were determined by assembling available data from spiked-water bioassays, examining the distribution of the reported LC_{50} values (defined as the lethal concentration at which 50% of the test species die), and determining the lower 10- and 50-percentile concentrations among the ranges of values. In the NOAA Technical Memorandum entitled: "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (NOAA, 1991), the ER-L values were concentrations equivalent to the lower 10 percentile of the screened available data, and indicated the low end of the range of concentrations in which effects were observed or predicted. These values were used in the NOAA report as the concentrations above which adverse effects may begin or are predicted among sensitive life stages and/or species or as determined in sublethal tests. The ER-M values for the chemicals were the concentrations equivalent to the 50 percentile point in the screened available data. They were used in the NOAA report as the concentration above which biological effects were frequently or always observed or predicted among most species.

The Ontario guidelines were based on the Screening Level Concentration (SLC) approach. The SLC is an effects-based approach applicable mainly to benthic organisms. Both the Ontario LEL and SEL are derived "using field data on the co-occurrence in sediments of benthic infaunal species and different concentrations of contaminants (MOEE, 1993)". The Ontario LEL values are concentrations equivalent to the lower 5 percentile of the SLC data, and indicated the low end of the range of concentrations in which effects were observed or predicted. The SEL values are concentrations equivalent to the upper 95 percentile of the SLC data, and indicated the upper end of the range of concentrations in which effects were observed or predicted. As stated on page 3 of the Ontario guidance document, "The No Effect and Lowest Effect Guidelines compare closely with the lowest or no effect levels determined through a thorough review of sediment toxicity bioassay by National Oceanic and Atmospheric Administration (NOAA, 1991)".

The lowest concentration in each of the two effect levels between NOAA and the MOEE, was selected as the New York sediment screening criteria.

Comparison of Site-specific levels of COCs to numerical criteria provides an assessment of potential impact of chemicals present in the sediments. To evaluate the potential ecological impact of COCs, their mean concentrations were compared to the NYSDEC SQC and any exceedance of the SQC resulted in the retainment of that COC in the FWIA process. If a COC mean concentration falls below all applicable SQC, then it is assumed that the COC poses minimal threat to the resource. This is consistent with the FWIA Step II. It should be noted that the SQC are not clean-up criteria, but merely screening criteria that identify chemicals that may potentially adversely impact the environment.

9.3.3 Ecological Risk Characterization

The potential impact of COCs to terrestrial and aquatic biota was evaluated for each media by comparing observed concentrations of COCs in media to ARARs established to protect biota from harmful effects.

9.3.3.1 Surface Soil

The data presented on Table 9.3 indicate that several inorganic parameter concentrations exceed the soil screening bench marks. The most significant exceedances were for aluminum, barium, cadmium, chromium, cobalt, copper, lead, vanadium and zinc. It should be noted that the concentrations of aluminum and vanadium in the background samples also exceed the screening bench mark values for these parameters.

The majority of the exceedances identified in Table 9.3 occurred for surface soil samples collected from within the former waste disposal area, which occupies a relatively small portion of the entire Site. This would restrict potential exposure to these chemicals.

In the Beak report (Appendix N), it was reported that no stress to vegetation or wildlife was observed during field investigations. Additionally, no evidence of off-Site contamination was observed. Vegetative cover, which is predominant in and around the Site, will restrict potential exposure to COCs in surface soil to receptors that reside on or traverse through the Site.

9.3.3.2 Sediment

Comparison of COC mean concentrations in the ditch sediments to NYSDEC SQC is a very conservative approach. This is based on the following rationale:

i) the SQC are established by NYSDEC to ensure protection of benthic organisms;
ii) the physical conditions of these ditches is such that they offer limited wildlife resources; and
iii) concentrations of COCs in sediments is expected to decrease downstream due to adsorption to organic fines in sediments and/or precipitation.

When utilizing any criteria, it is important to keep in mind the purpose for which the criteria were established. The above-mentioned criteria do not represent cleanup goals.

The purpose of the NYSDEC SQC is clearly stated to be "screening". In other words, " to identify areas of sediment contamination and make a preliminary assessment of the risks posed (page iii)". It is further stated in the NYSDEC Guidance (page 2):

> *"While attainment of the EP-based sediment criteria will provide maximum assurance of environmental protection, it is not necessary in all cases and at all times to achieve these criteria through remediation efforts."*

If all established sediment criteria are met, one can be quite certain that no environmental effects will occur given the overly conservative methods used to establish the criteria. Risk management, as stated in the NYSDEC Guidance, must be applied after criteria have identified areas of concern:

> *"Once a sediment has been identified as contaminated (exceeds criteria), a site-specific evaluation procedure must be employed to*

quantify the level of risk, establish remediation goals, and determine the appropriate risk management actions (page 4)."

Table 9.4 presents the comparison of COC mean concentrations in the ditch sediments to NYSDEC SQC. The COCs identified in ditch sediments that exceeded the NYSDEC SQC included only metals namely, cadmium, chromium, lead, and zinc. Cadmium and chromium mean concentrations did not exceed the SEL and were towards the lower end of the range between the LEL and SEL values. This indicates exposure to cadmium and chromium would, at most, impact the more sensitive receptors in the sediment dwelling community. Both lead and zinc mean concentrations exceeded the LEL and SEL values. It should be noted the elevated mean concentrations for these two parameters are mainly due to high concentrations reported at two sediment sampling locations (i.e., SW-2 and SW-4). SW-2 is located in the on-Site ditch where minimal benthic communities are expected. SW-4 is located in the Fletcher Road ditch adjacent to the former waste disposal area. Due to the limited extent of these elevated parameters in the ditch, it is expected that the potential impact to benthic organisms will be minimal.

9.4 SUMMARY

This FWIA provides an evaluation of potential impacts to terrestrial and aquatic biota, based on a comparison to the available AWQC, SQC and ecotoxicology information.

The mean concentrations for several inorganic parameters in the surface soil samples exceed the screening benchmark values. The most significant exceedances occurred for aluminum, barium, cadmium, chromium, cobalt, copper, lead, vanadium, and zinc. The majority of these exceedances are for samples collected from within the former waste disposal area.

Due to the limited distribution of these exceedances, it is expected that the impact on terrestrial ecology is minimal. During the Phase I investigations no signs of plant or animal stress were observed in the Site vicinity.

The mean concentrations for several inorganic parameters in the sediment samples exceeded the NYSDEC SQC, namely, cadmium, chromium, lead, and zinc. The elevated concentrations of these parameters were primarily detected at two sediment sampling locations, SW-2 and SW-4. SW-2 is located in the on-Site drainage ditch where minimal benthic communities are expected. SW-4 is located in the Fletcher Road ditch. Due to the limited extent of these elevated parameters in the ditch, it is expected that the potential impact would be minimal.

Based upon this evaluation, it is concluded that the overall impact of the Site to terrestrial and aquatic biota would be minimal.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the data obtained during the Site Investigation, as presented in this document, the following general conclusions were formulated:

i) Former waste disposal activities were conducted in the north-western portion of the Site. Fill material in this area extends to a maximum depth of 4 feet below the ground surface. The estimated volume of fill at the site is approximately 2,300 cubic yards.

ii) Elevated concentrations of primarily ethylbenzene, xylenes, phenols, PAHs, PCBs, barium, cadmium, chromium, cobalt, copper, cyanide, lead, and zinc are associated with the fill material at the Site.

iii) The relatively low permeability of the native soils has minimized chemical migration from the former waste disposal area via groundwater flow. Only the shallow monitoring well located directly beneath the waste material demonstrated a significant impact from the Site.

iv) PAHs, PCBs, and metals were detected at elevated concentrations in the sediment samples collected from the on site ditches and the Fletcher Road ditch close to the former waste disposal area.

v) Analysis of surface water samples collected from the on-site ditches and the Fletcher Road ditch did not indicate a significant impact from the Site.

vi) The results of the Baseline Health Risk Evaluation indicate that, under current conditions, risks associated with the Site are within acceptable levels. The estimated risks for a future residential scenario exceed acceptable levels.

vii) The results of the Fish and Wildlife Impact Assessment indicate that the Site does not significantly impact the natural environment at or in the vicinity of the Site.

Based upon Site Investigation results, it is recommended that an Analysis of Alternatives be conducted in accordance with the Consent Order.

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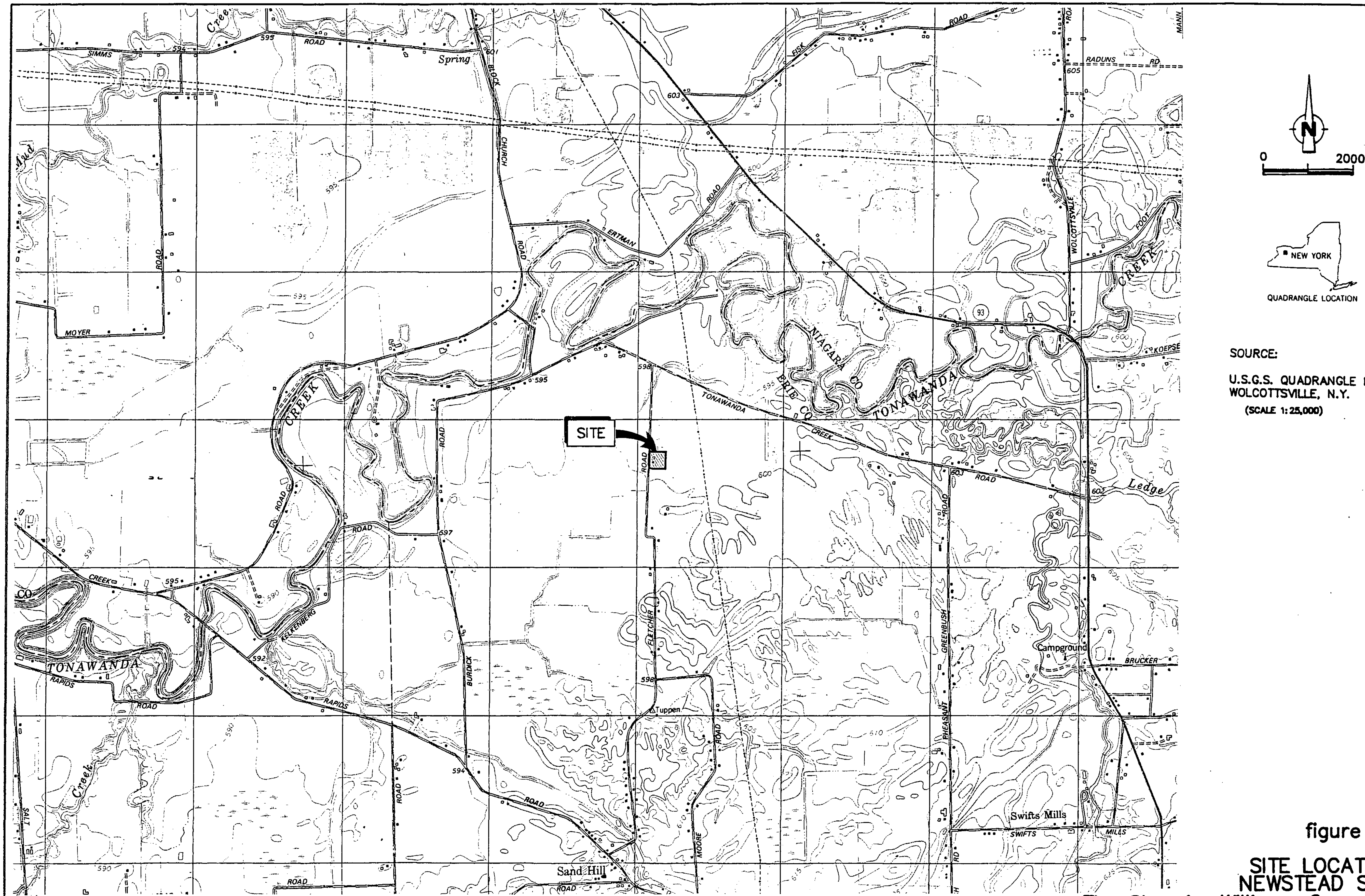


SOURCE:

U.S.G.S. QUADRANGLE MAP
WOLCOTTSVILLE, N.Y.
(SCALE 1:25,000)

figure 1.1

SITE LOCATION
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0

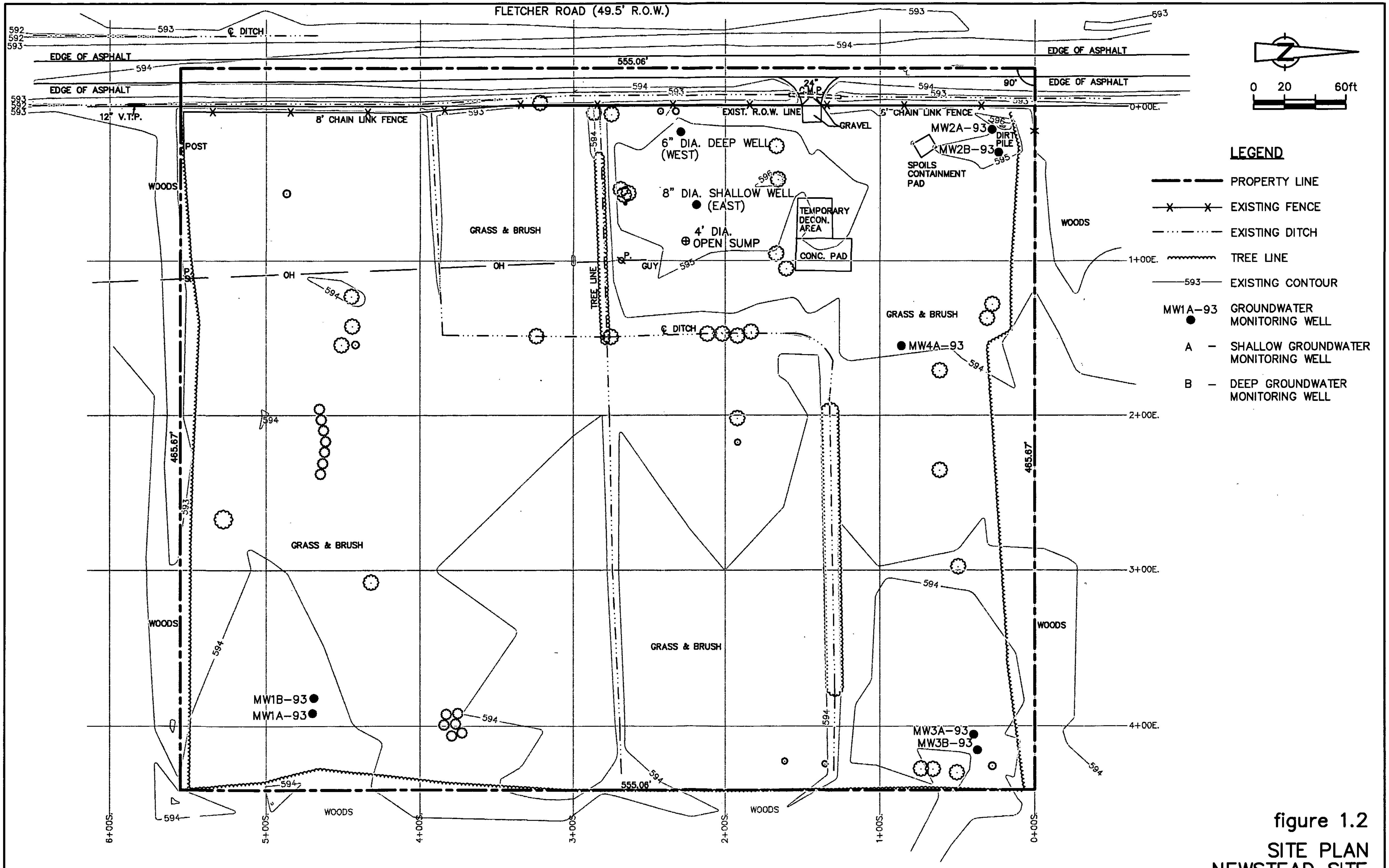


figure 1.2

SITE PLAN
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P–47)

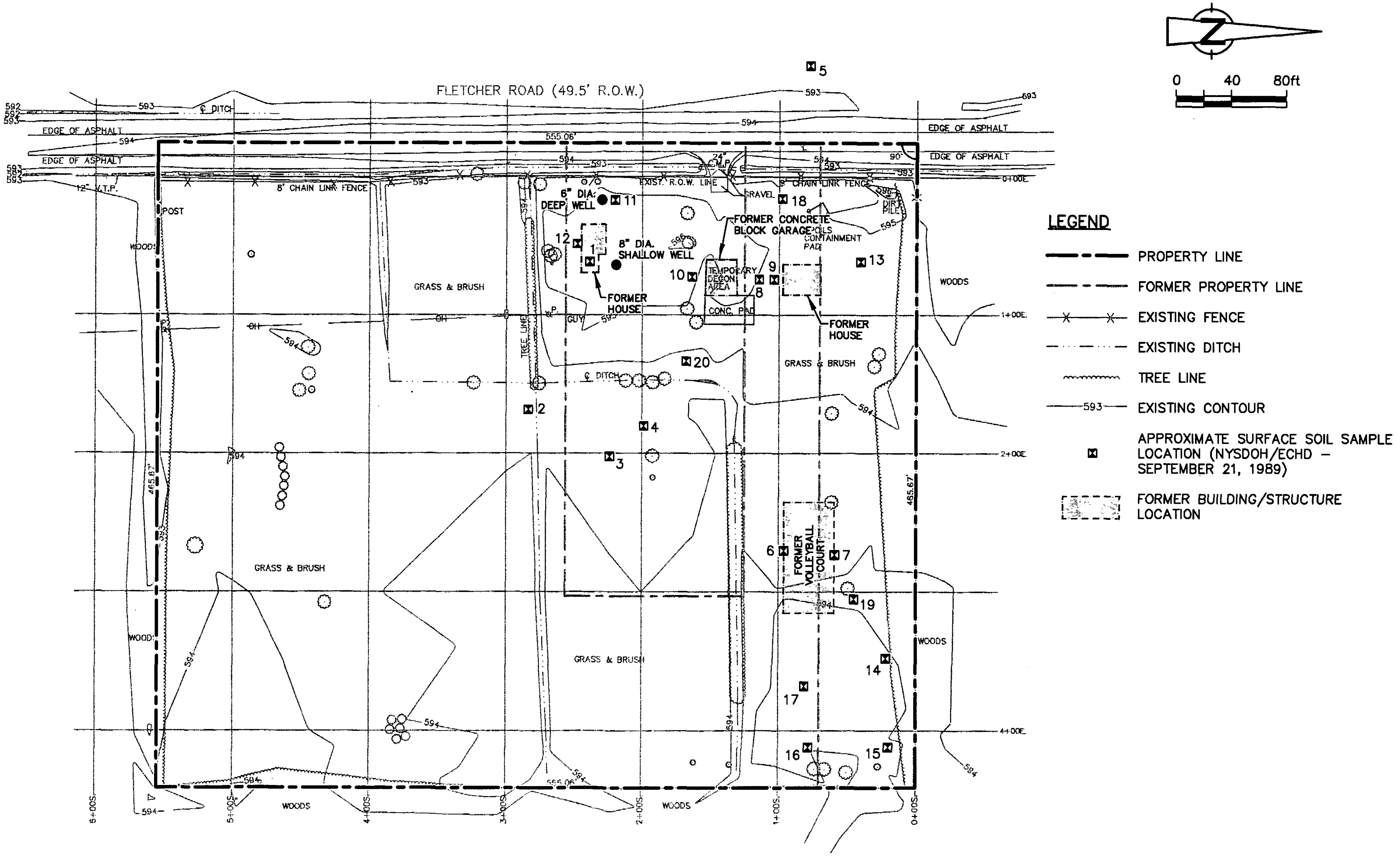
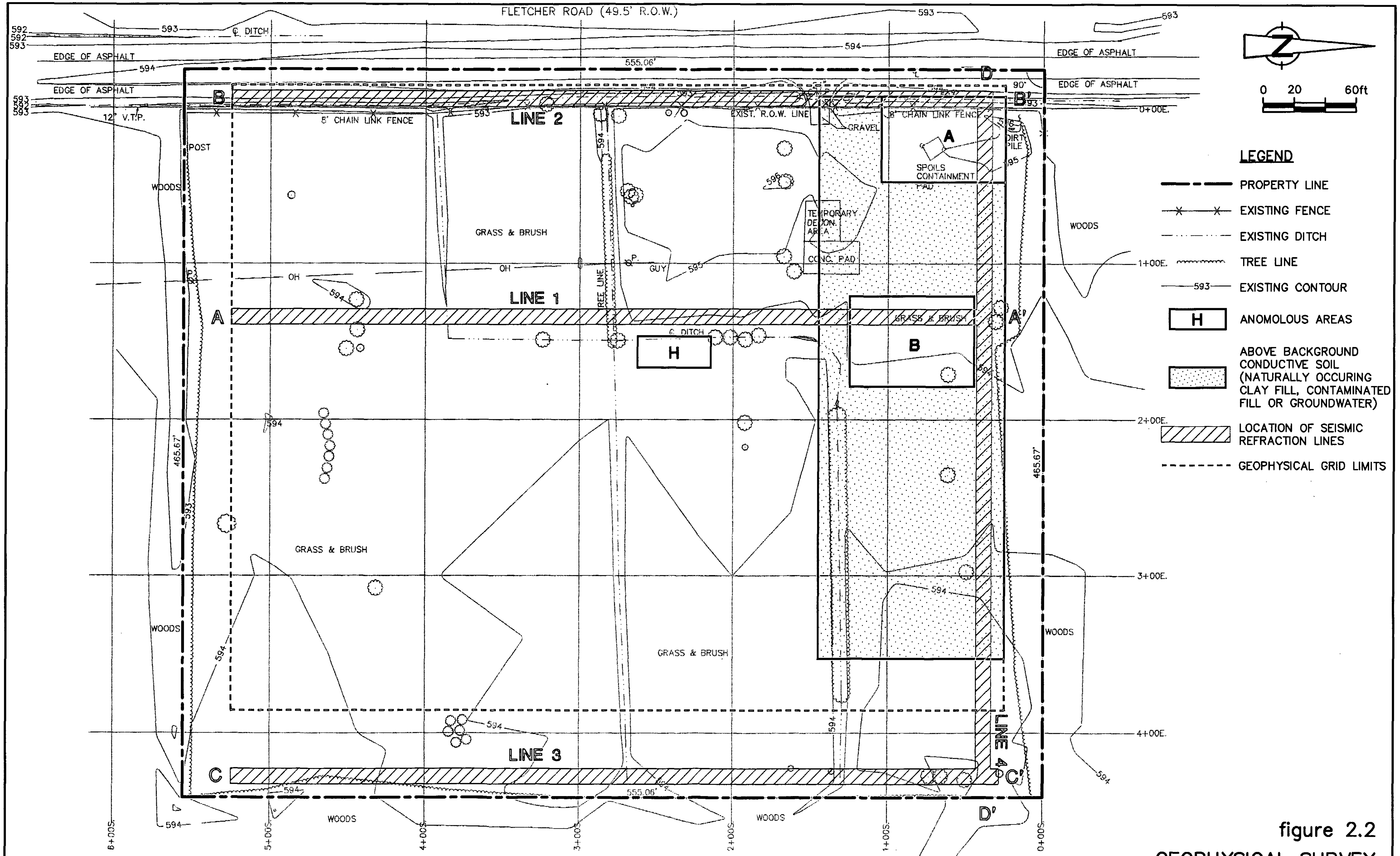


figure 2.1

HISTORIC SURFACE SOIL SAMPLE LOCATIONS
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 07/97(W) REV.0 (P–57)



SOURCE: GARTNER LEE INC.
AUGUST 1990

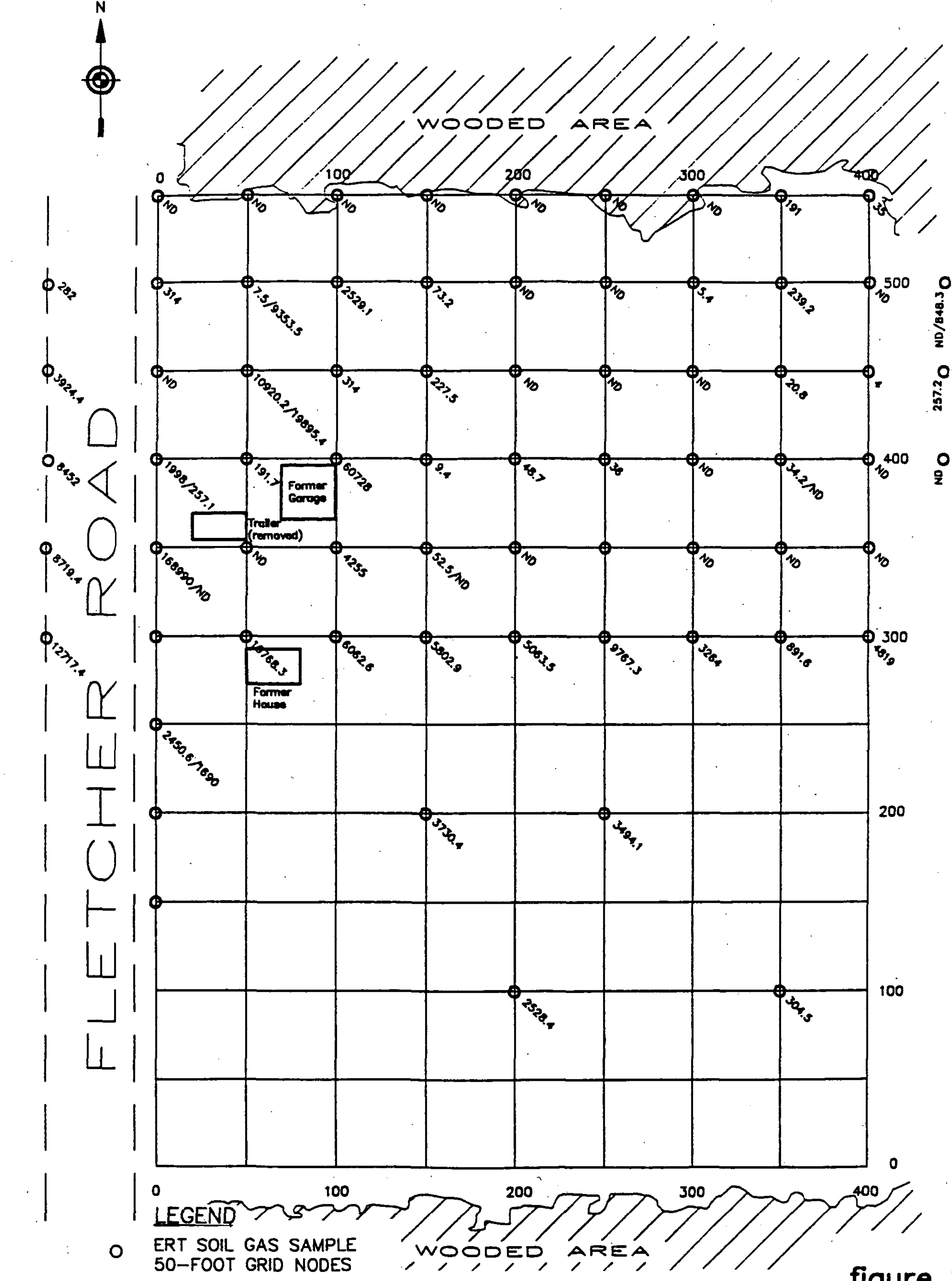
figure 2.2

GEOPHYSICAL SURVEY
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) DEC 10/96(W) REV.0 (P–56)

SOURCE: ROY F. WESTON INC. AUGUST 1990.



LEGEND

○	ERT SOIL GAS SAMPLE 50-FOOT GRID NODES
ND	COMPOUNDS WERE NOT DETECTED
3730.4	TOTAL TARGET AROMATIC COMPOUNDS (ppb)

figure 2.3

SOIL GAS SURVEY – JUNE 1990
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0

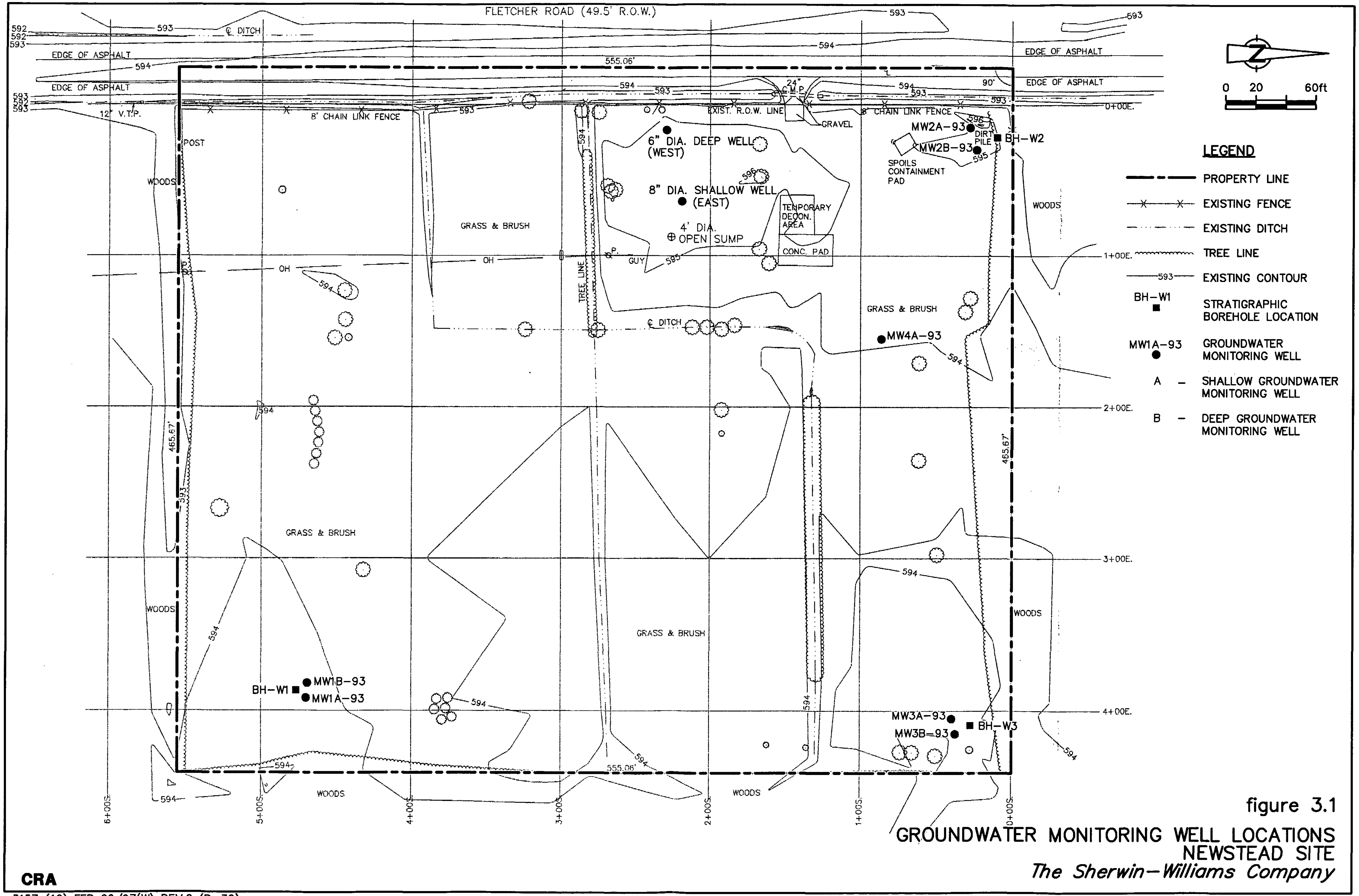


figure 3.1

GROUNDWATER MONITORING WELL LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

3157 (12) FEB 06/97(W) REV.0 (P-32)

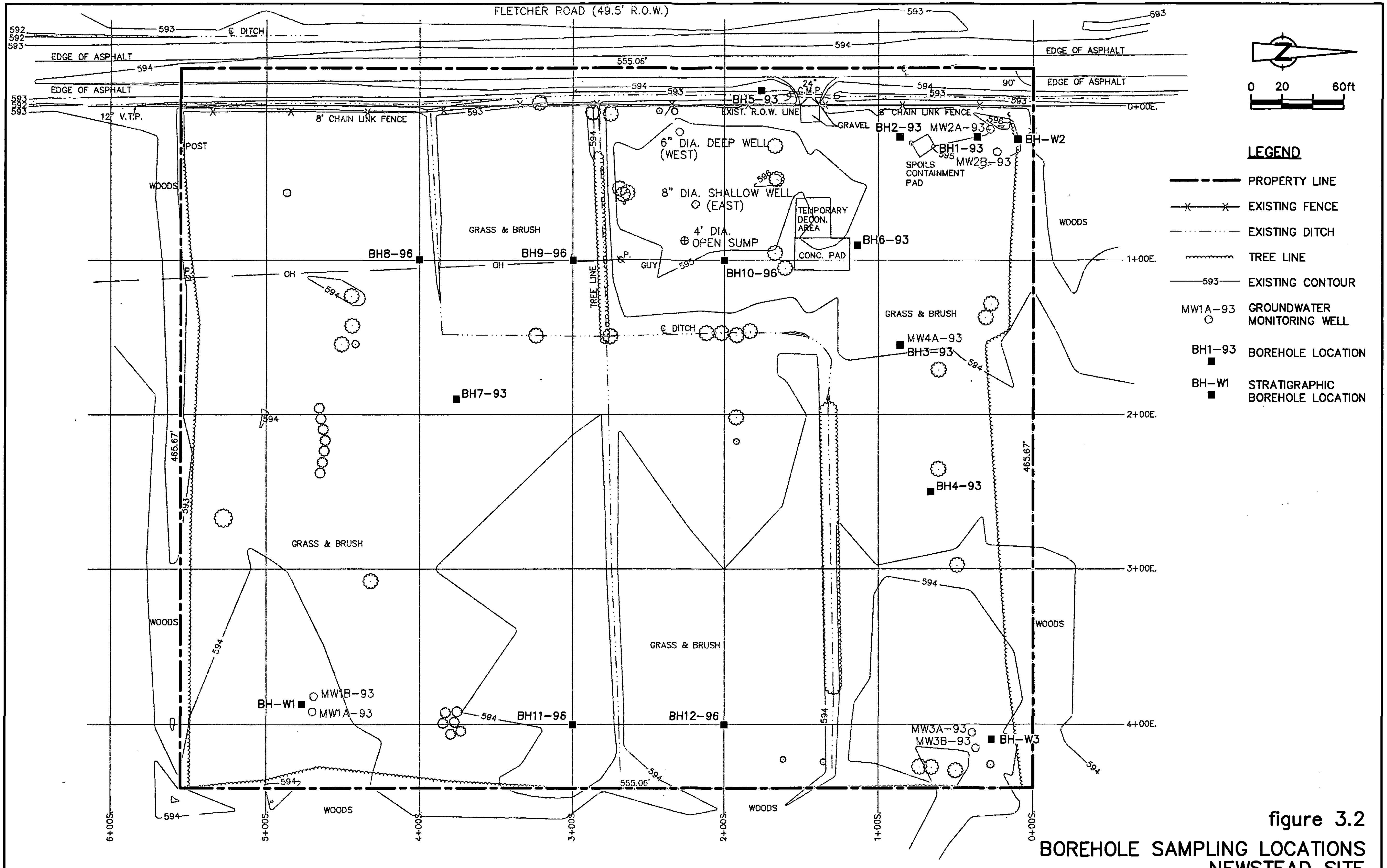


figure 3.2

BOREHOLE SAMPLING LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

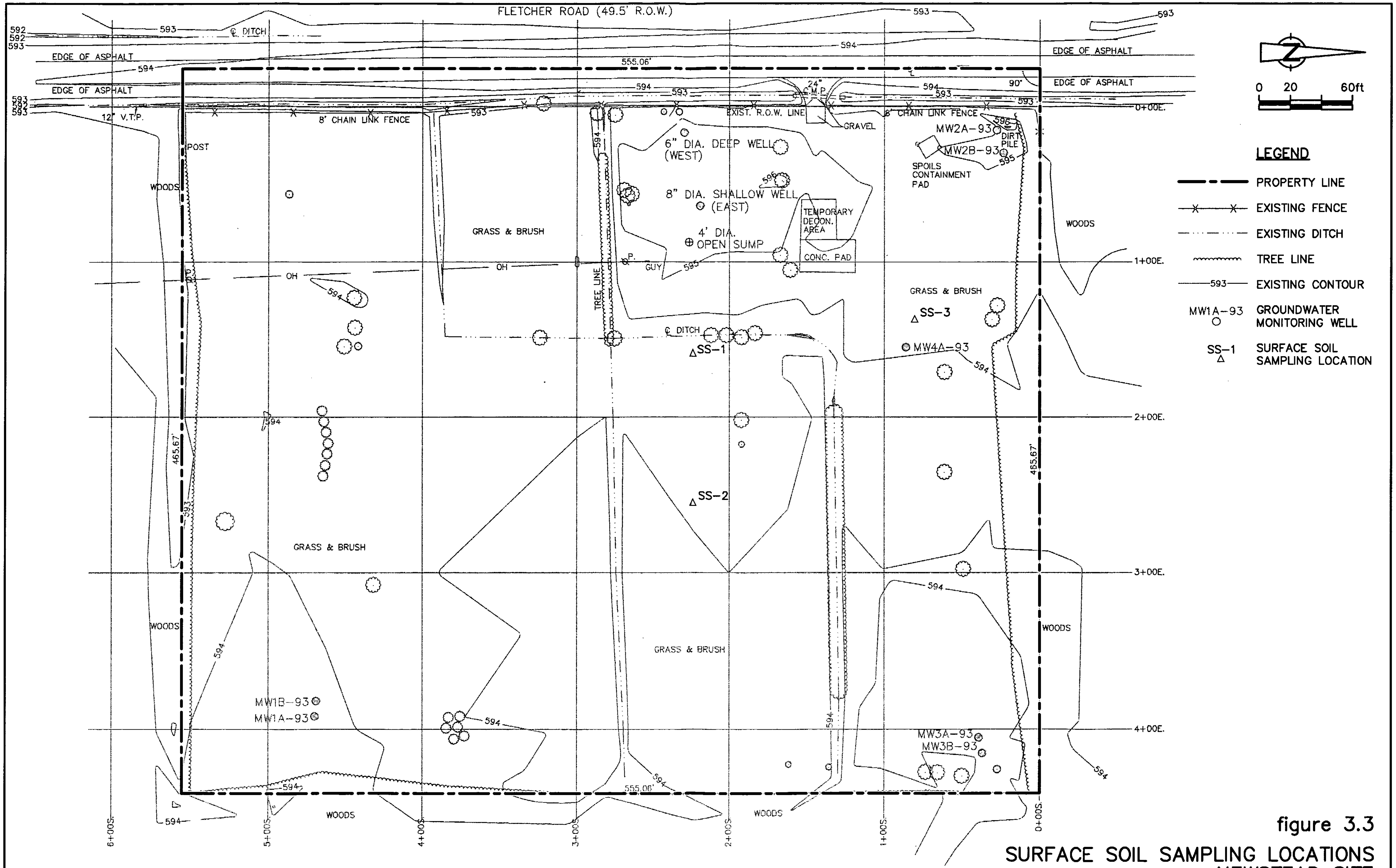


figure 3.3

SURFACE SOIL SAMPLING LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-33)

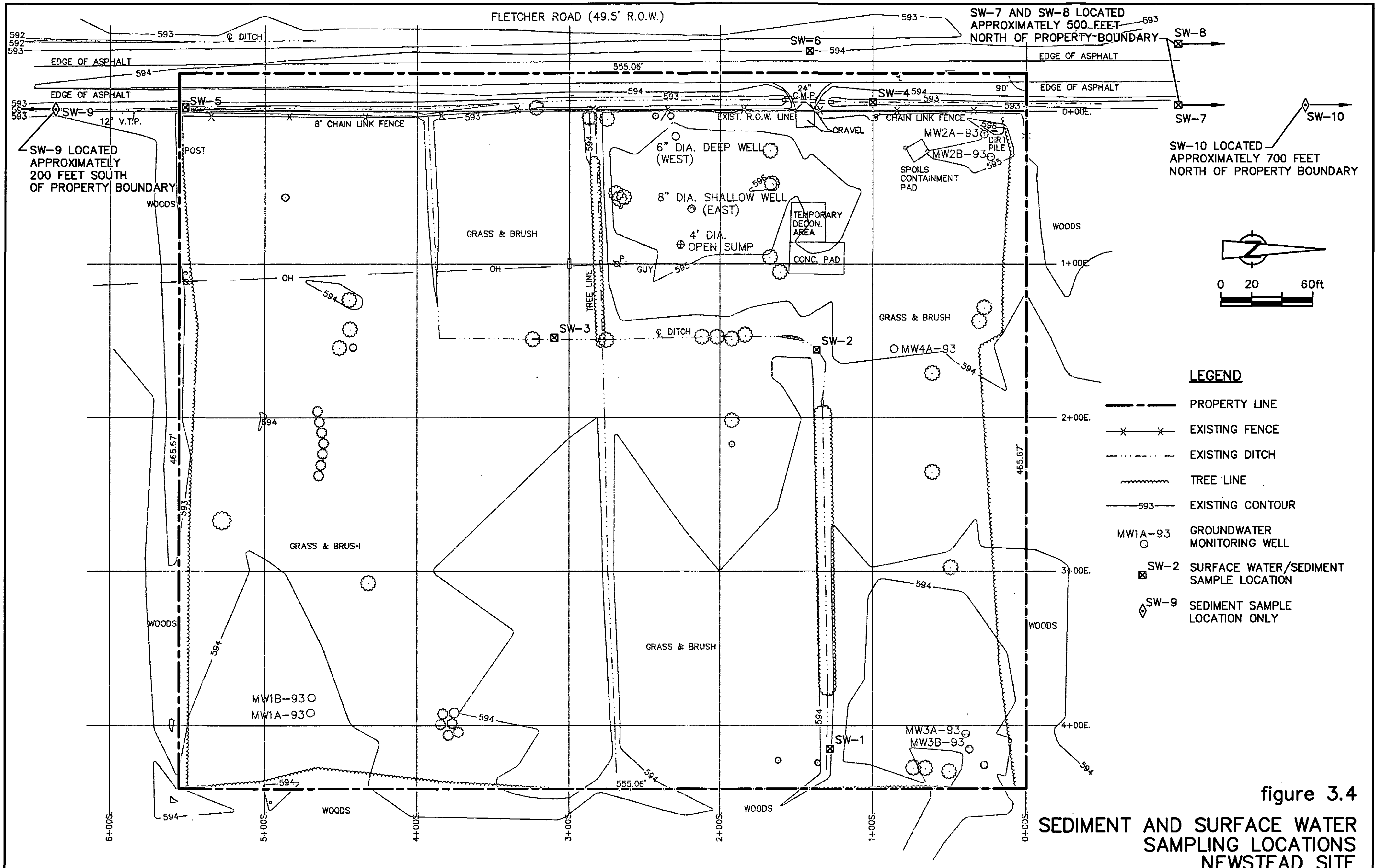


figure 3.4

SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-35)

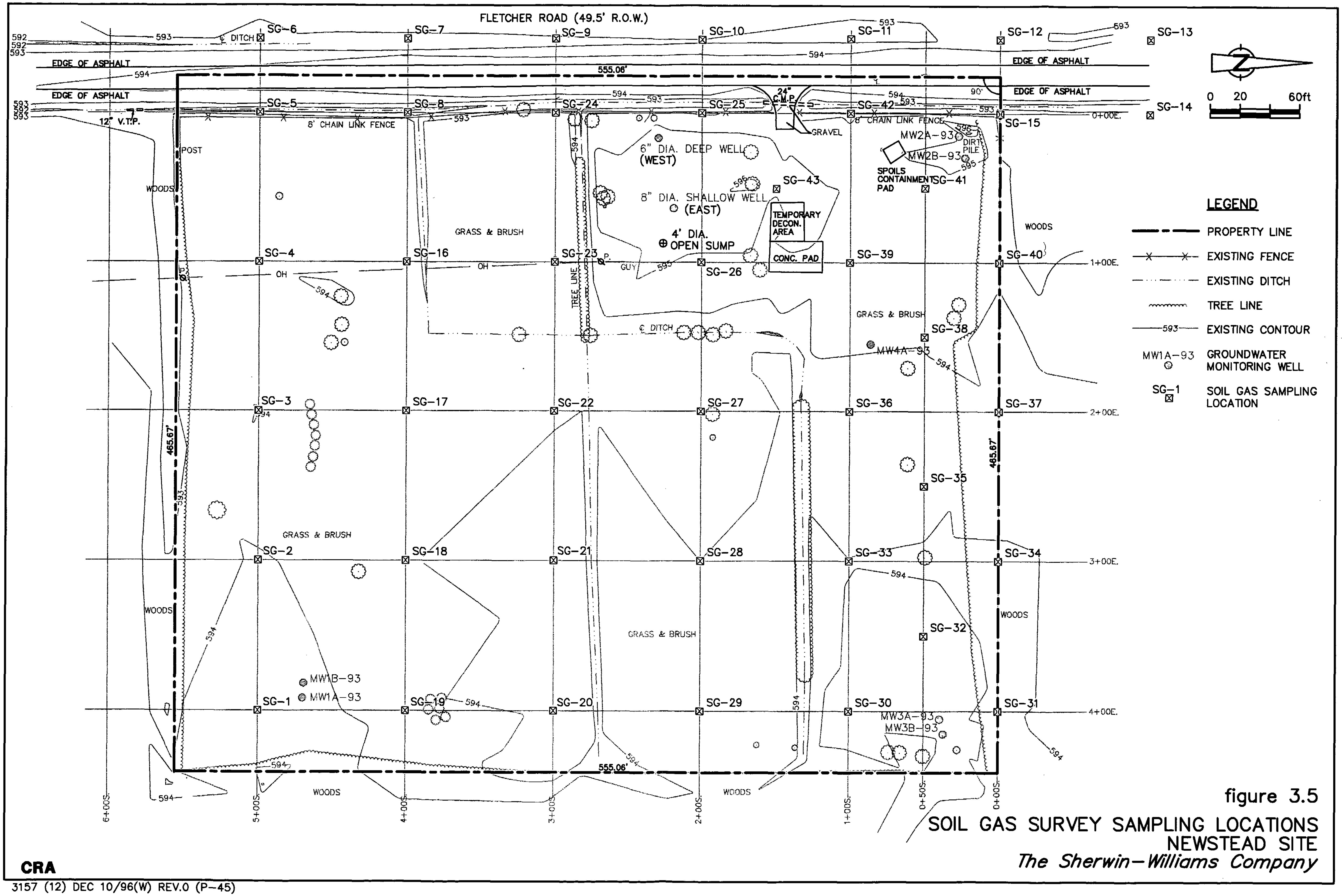


figure 3.5

SOIL GAS SURVEY SAMPLING LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) DEC 10/96(W) REV.0 (P-45)

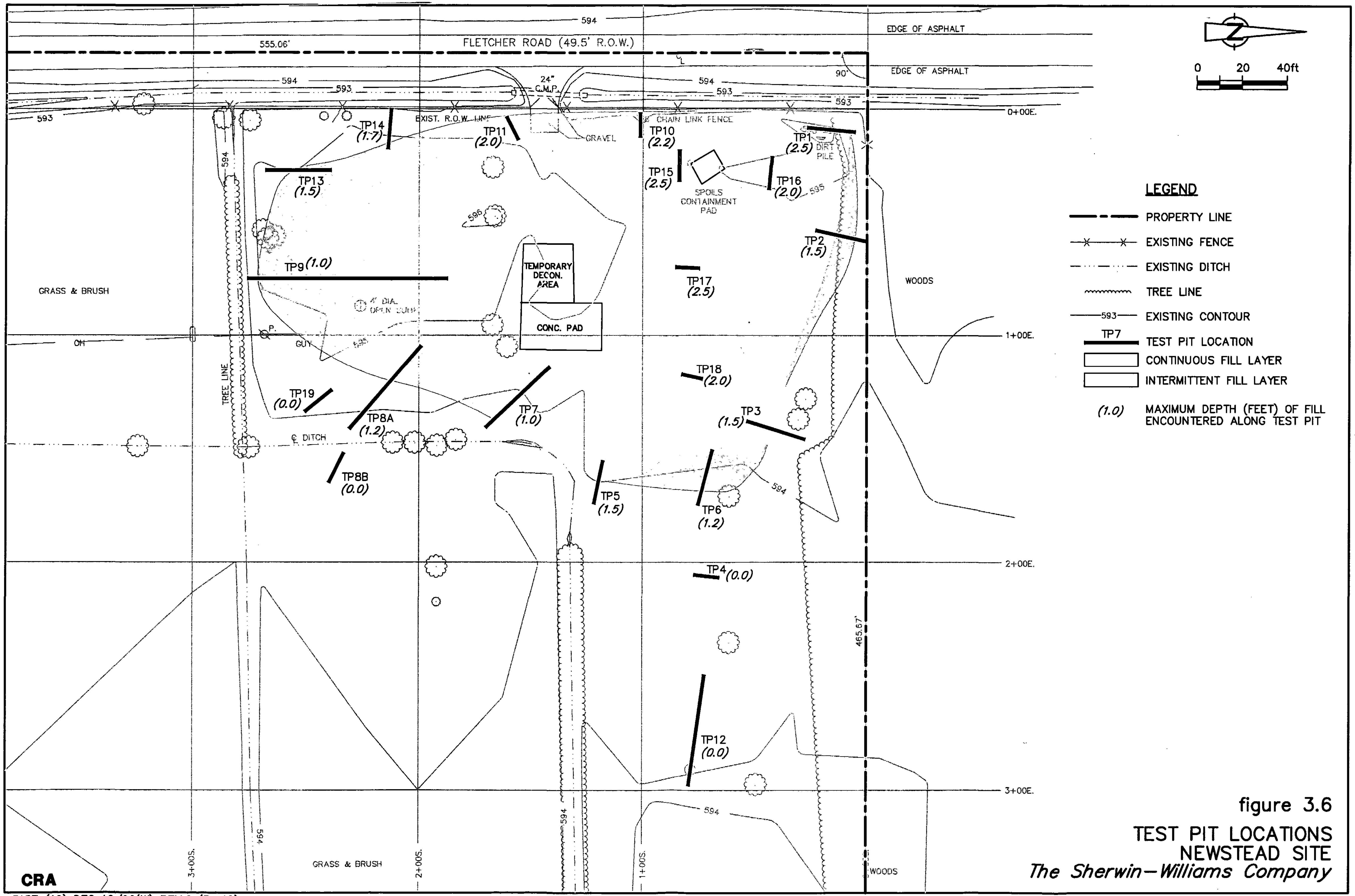


figure 3.6

TEST PIT LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

3157 (12) DEC 10/96(W) REV.0 (P-48)

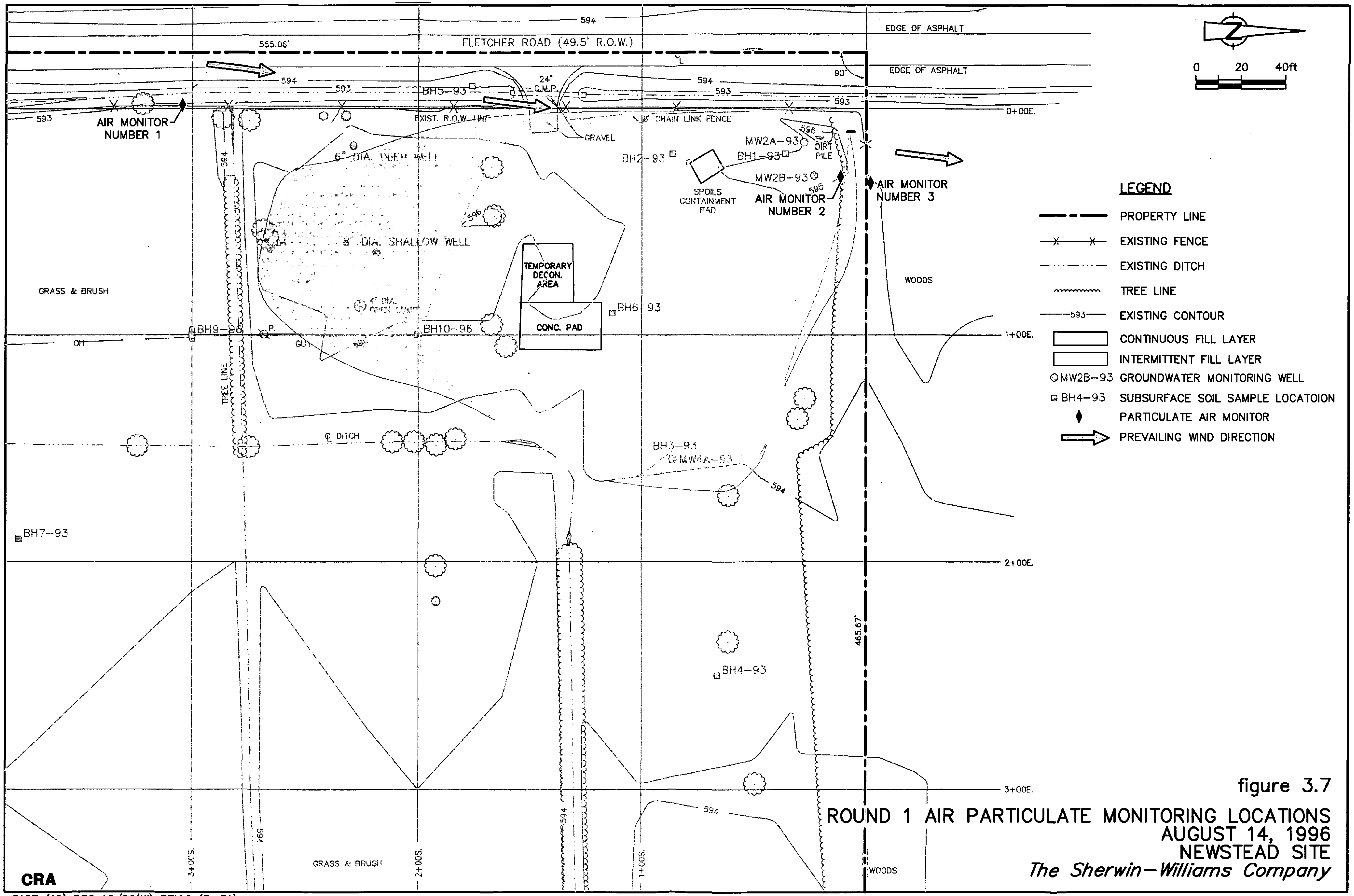


figure 3.7

ROUND 1 AIR PARTICULATE MONITORING LOCATIONS
AUGUST 14, 1996
NEWSTEAD SITE
The Sherwin-Williams Company

3157 (12) DEC 10/96(W) REV.0 (P-51)

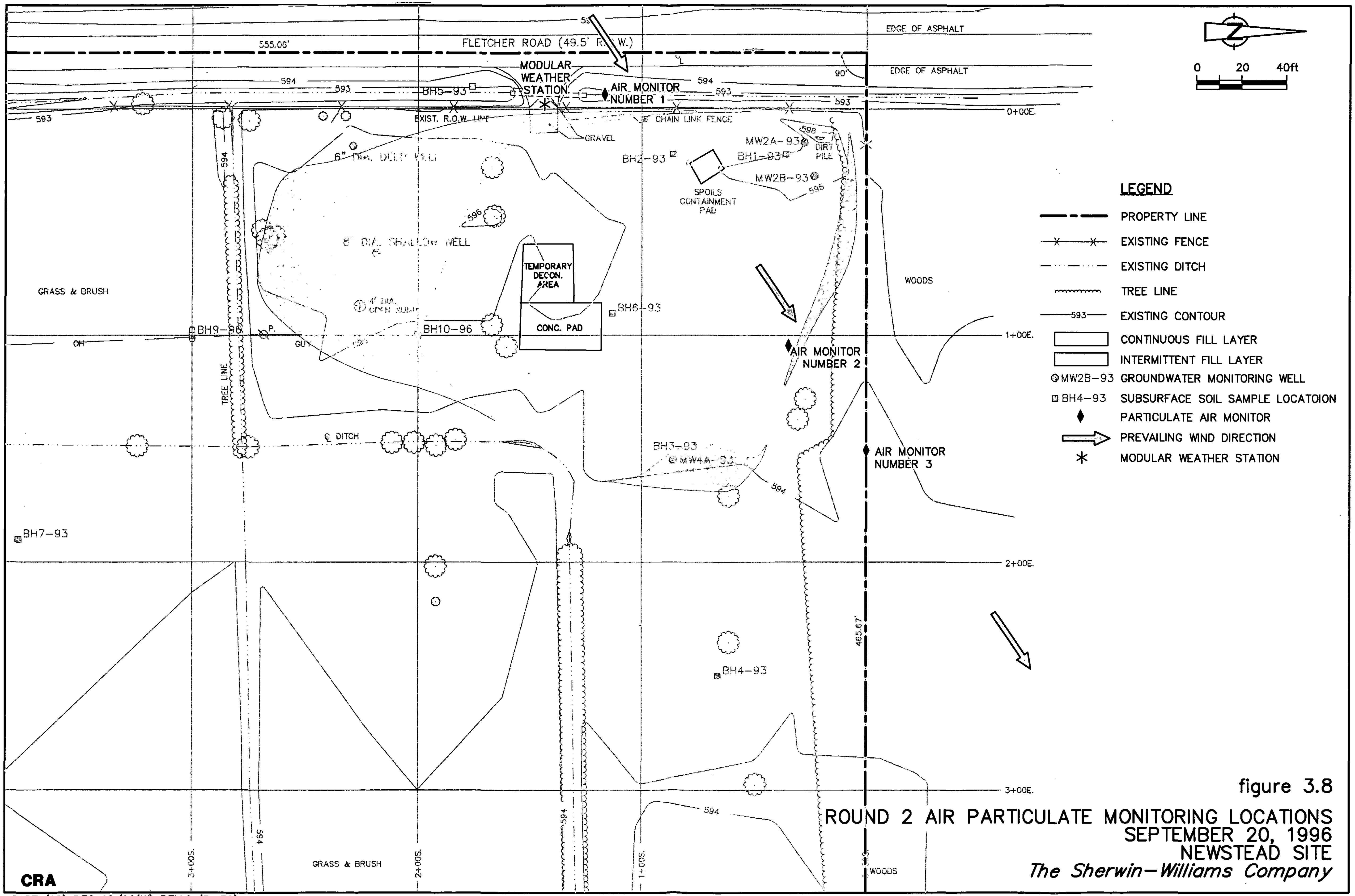


figure 3.8

ROUND 2 AIR PARTICULATE MONITORING LOCATIONS
SEPTEMBER 20, 1996
NEWSTEAD SITE
The Sherwin-Williams Company

3157 (12) DEC 10/96(W) REV.0 (P-52)

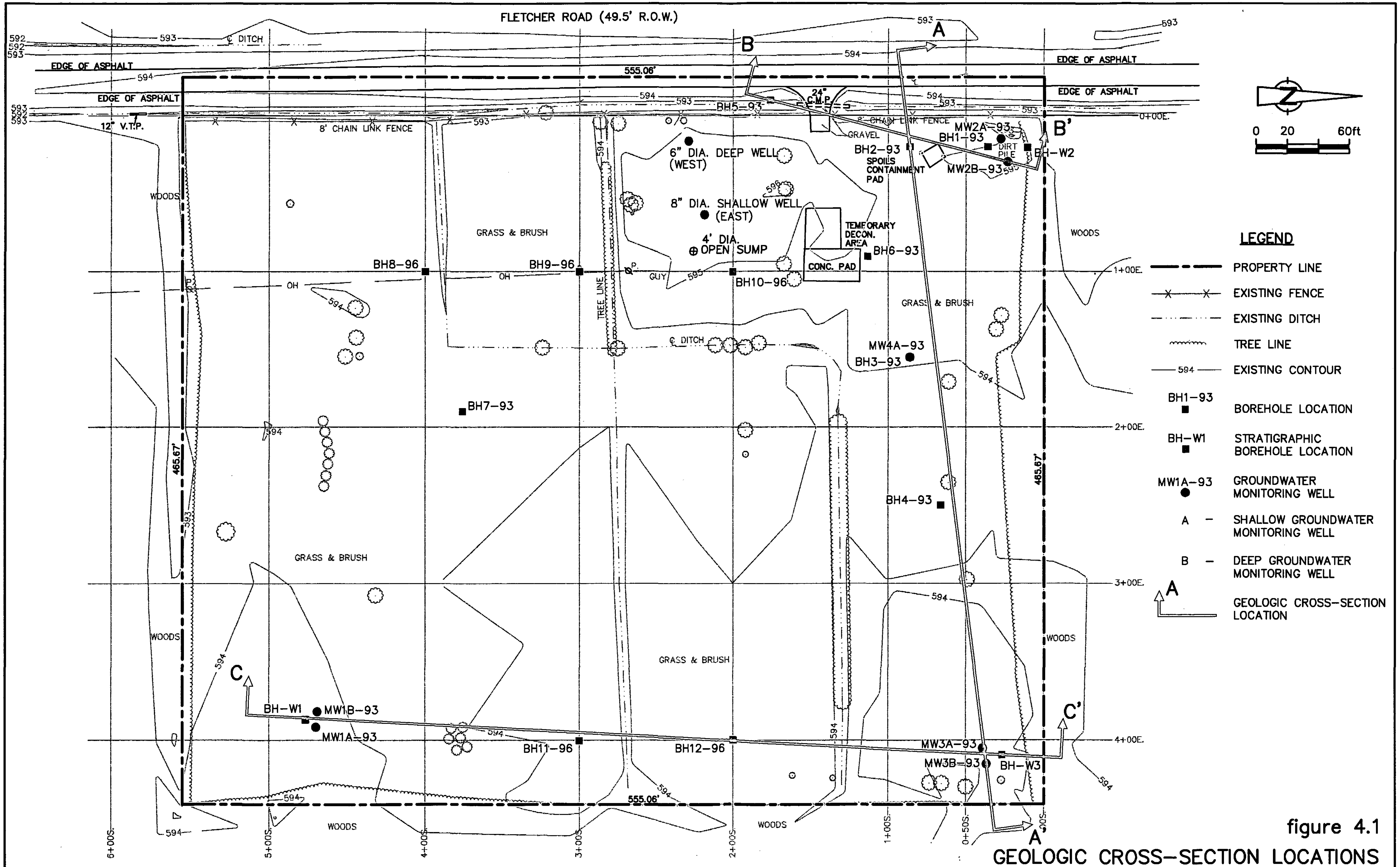


figure 4.1

GEOLOGIC CROSS-SECTION LOCATIONS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-49)

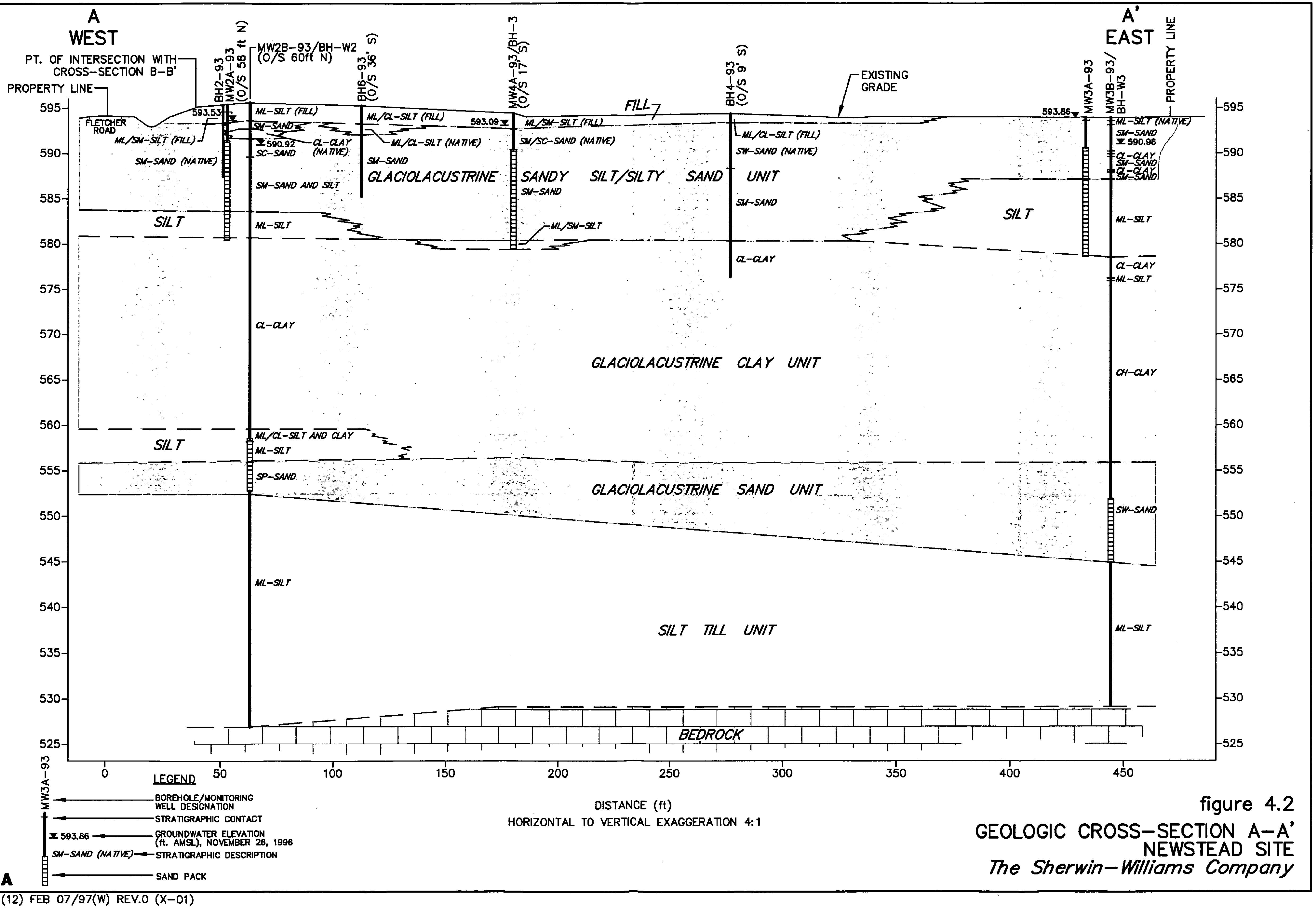


figure 4.2

GEOLOGIC CROSS-SECTION A–A'
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

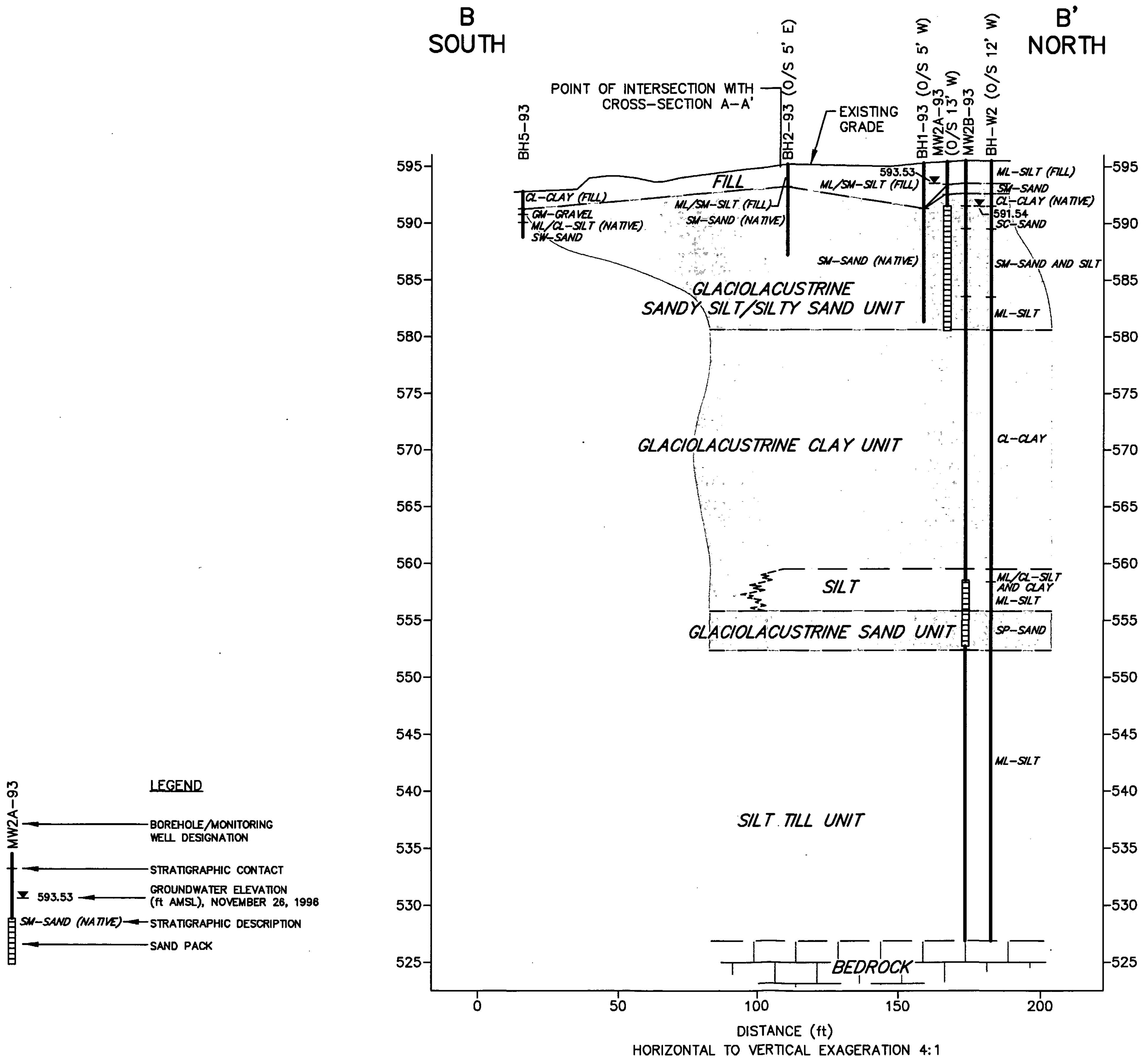


figure 4.3

GEOLOGIC CROSS-SECTION B-B'
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 07/97(W) REV.0 (X-02)

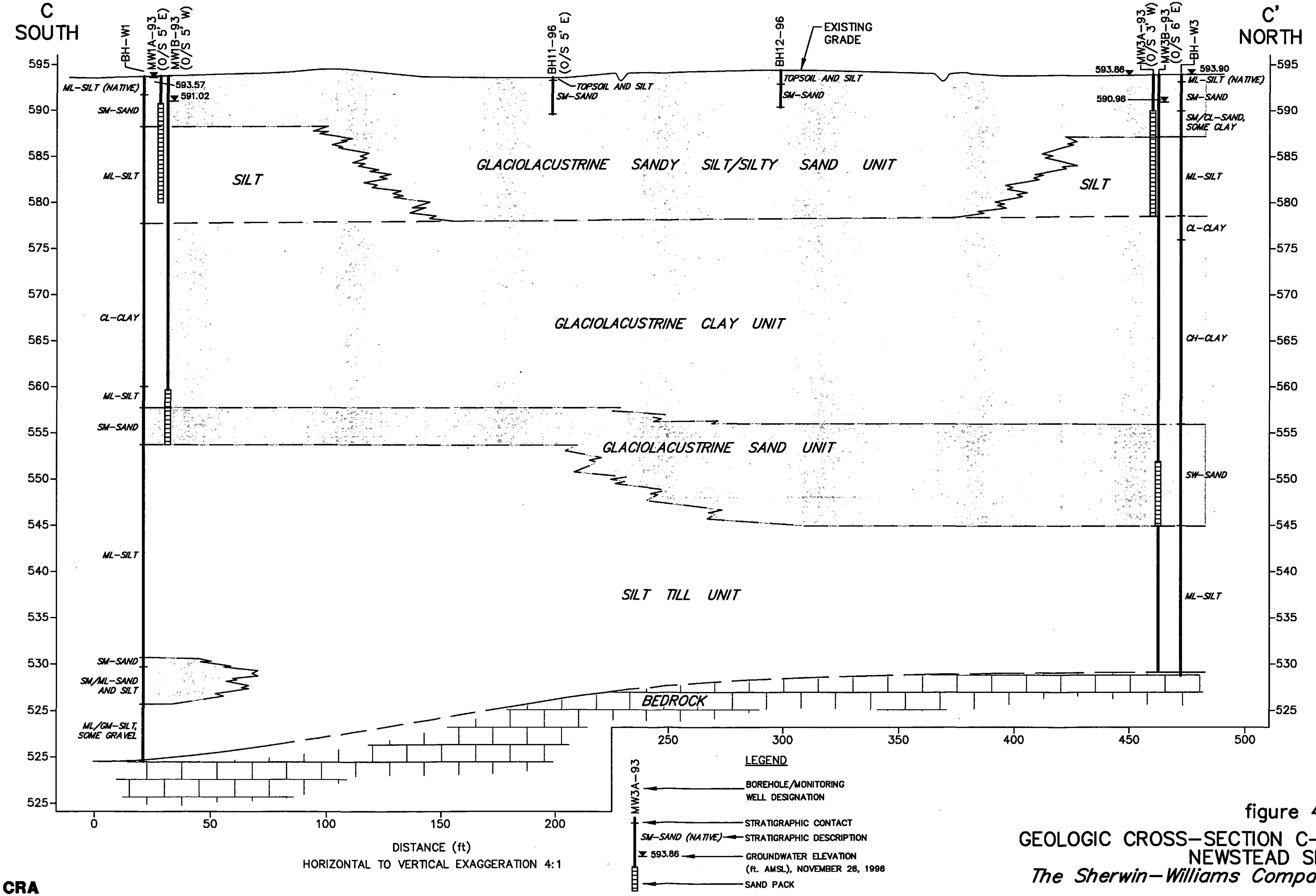


figure 4.4
GEOLOGIC CROSS-SECTION C-C'
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

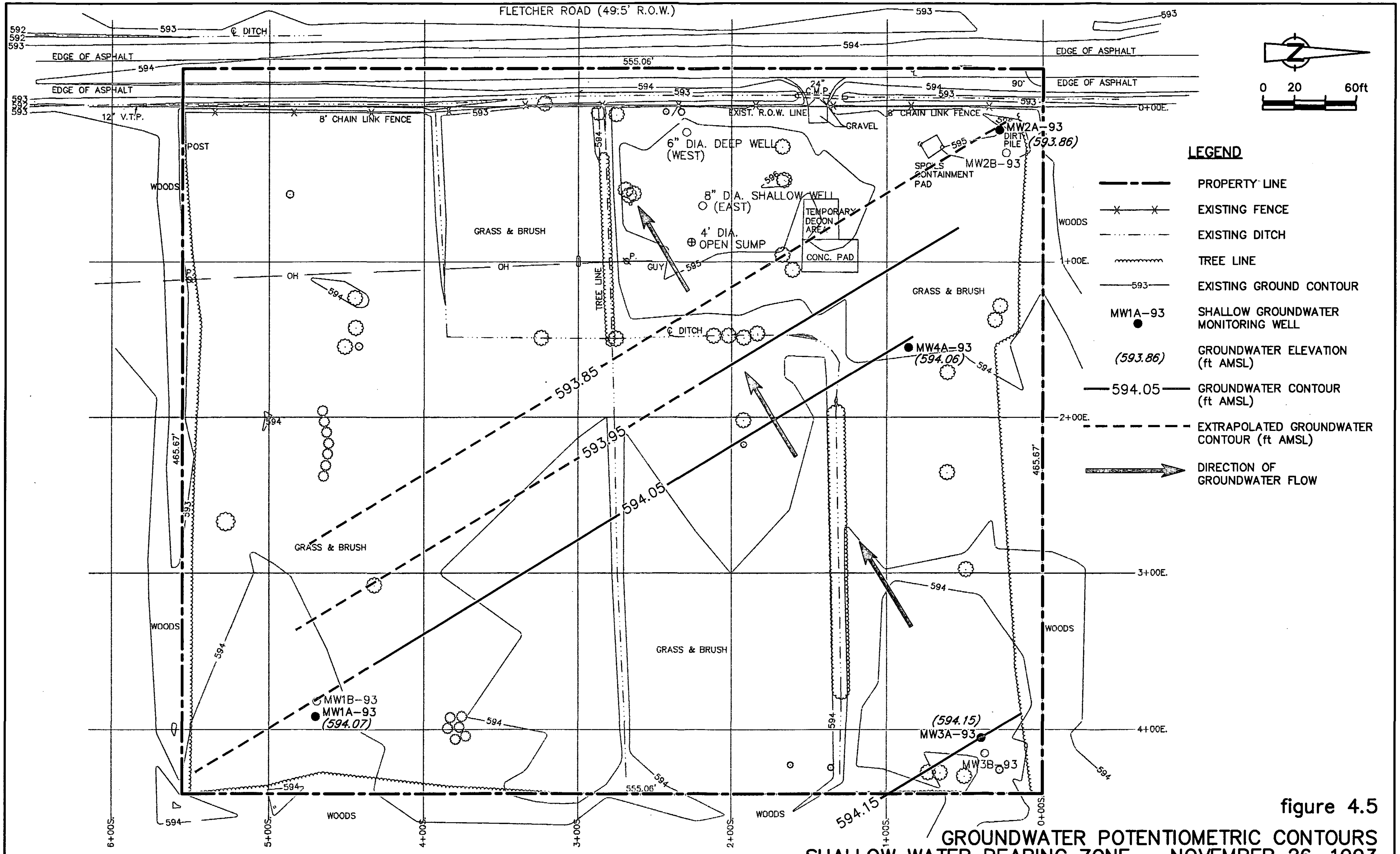


figure 4.5

GROUNDWATER POTENTIOMETRIC CONTOURS
SHALLOW WATER BEARING ZONE – NOVEMBER 26, 1993
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-38)

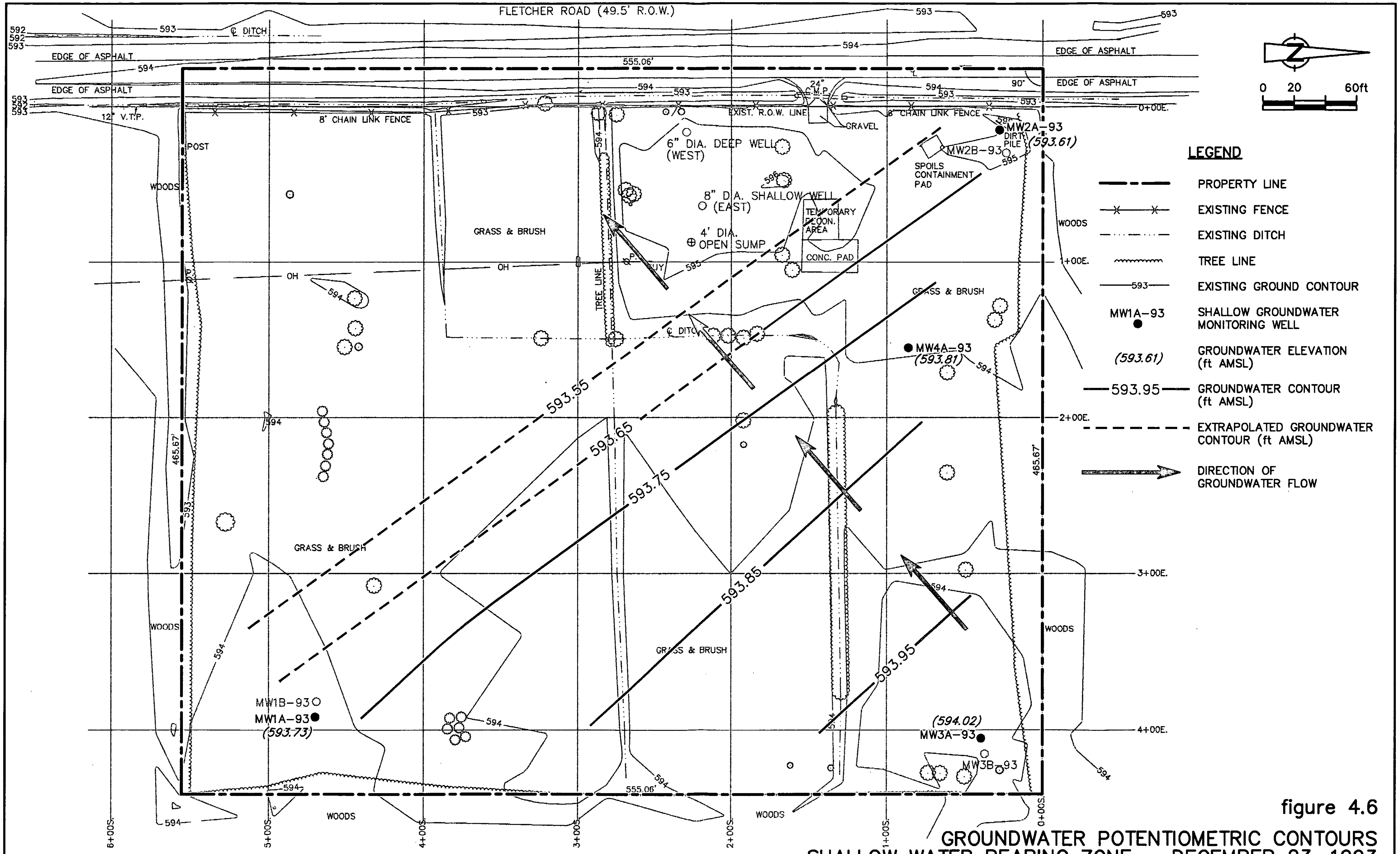
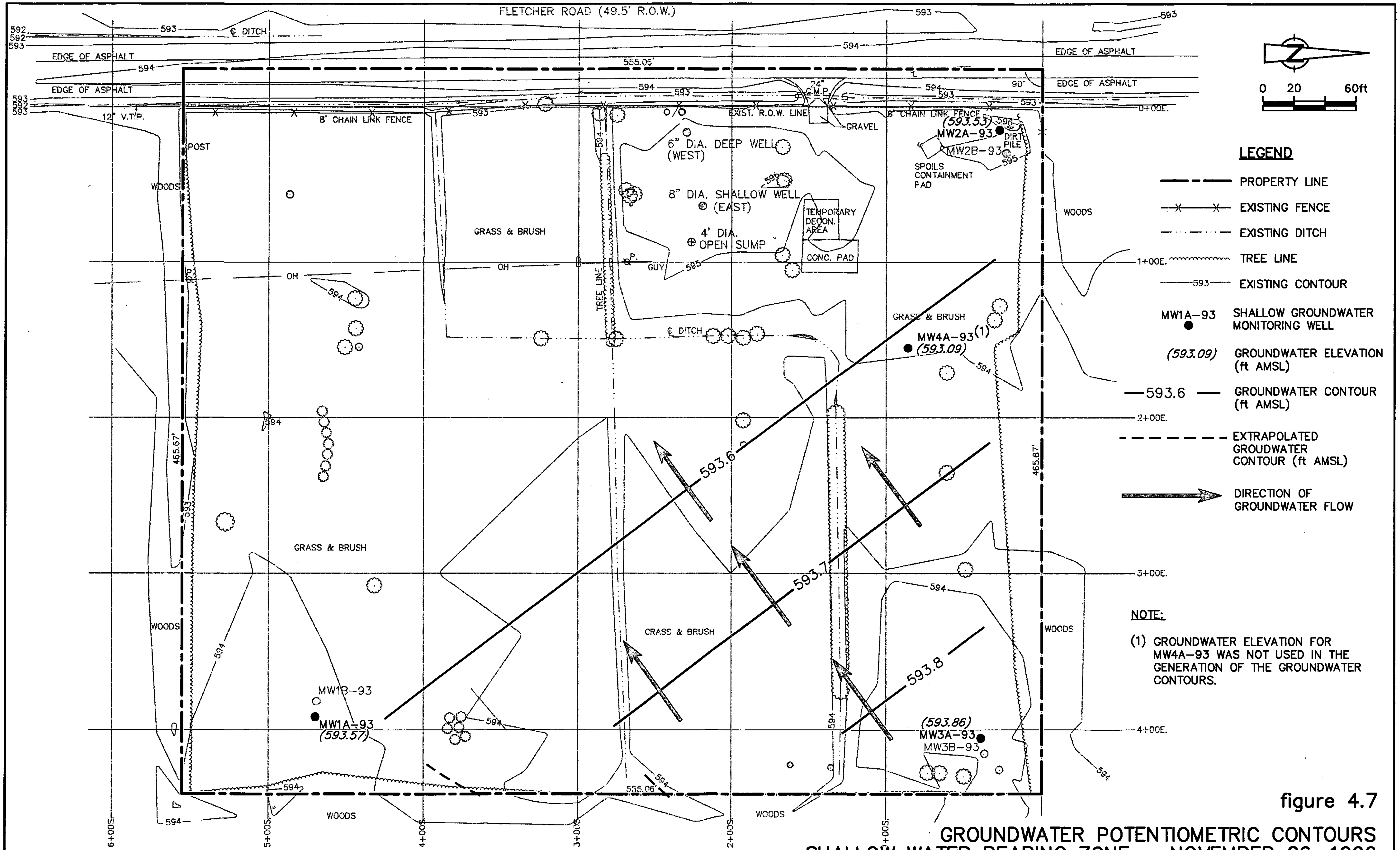


figure 4.6

GROUNDWATER POTENTIOMETRIC CONTOURS
SHALLOW WATER BEARING ZONE – DECEMBER 23, 1993
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-39)



NOTE:

(1) GROUNDWATER ELEVATION FOR MW4A-93 WAS NOT USED IN THE GENERATION OF THE GROUNDWATER CONTOURS.

figure 4.7

GROUNDWATER POTENTIOMETRIC CONTOURS
SHALLOW WATER BEARING ZONE – NOVEMBER 26, 1996
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-55)

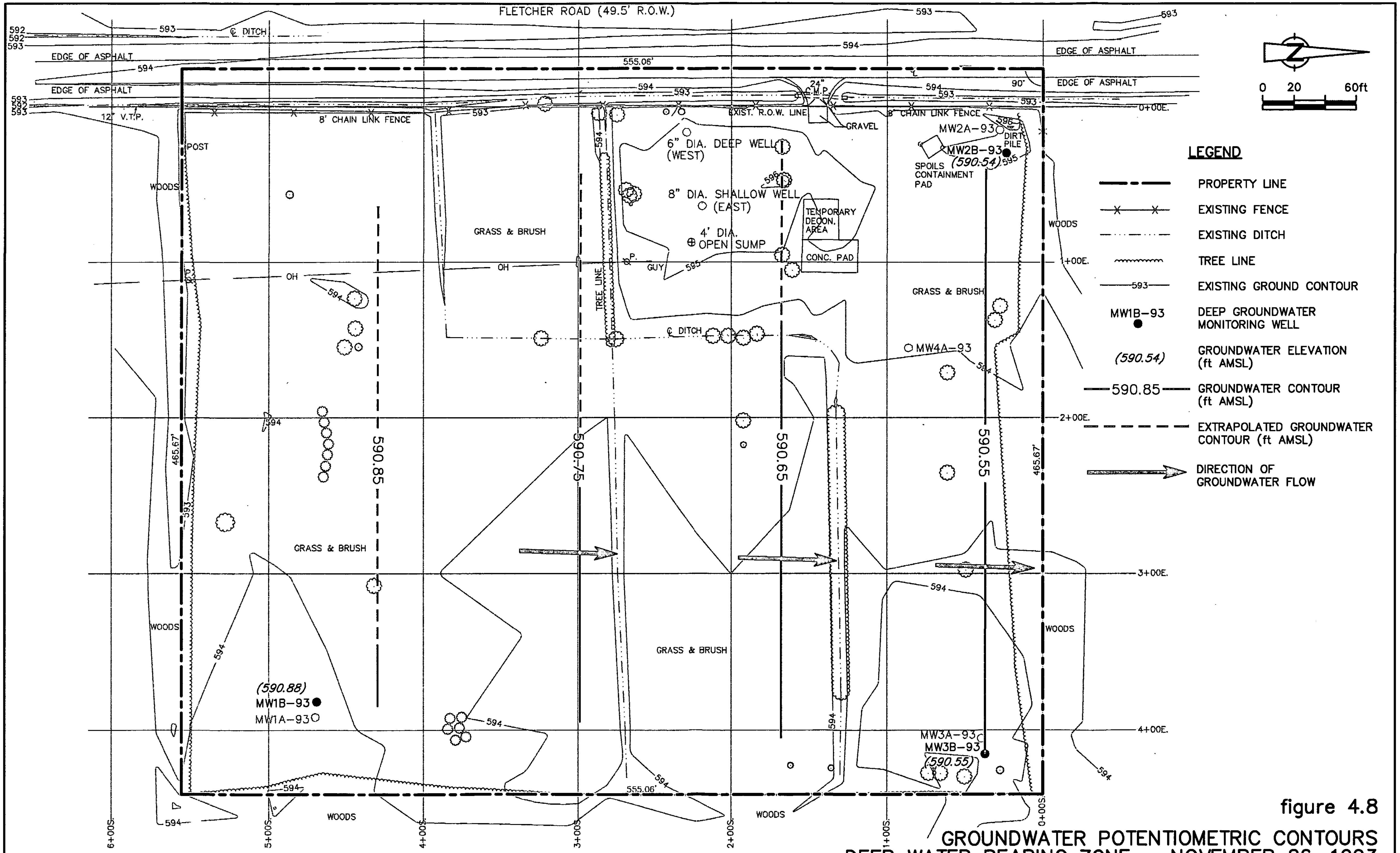


figure 4.8

GROUNDWATER POTENTIOMETRIC CONTOURS
DEEP WATER BEARING ZONE – NOVEMBER 26, 1993
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-40)

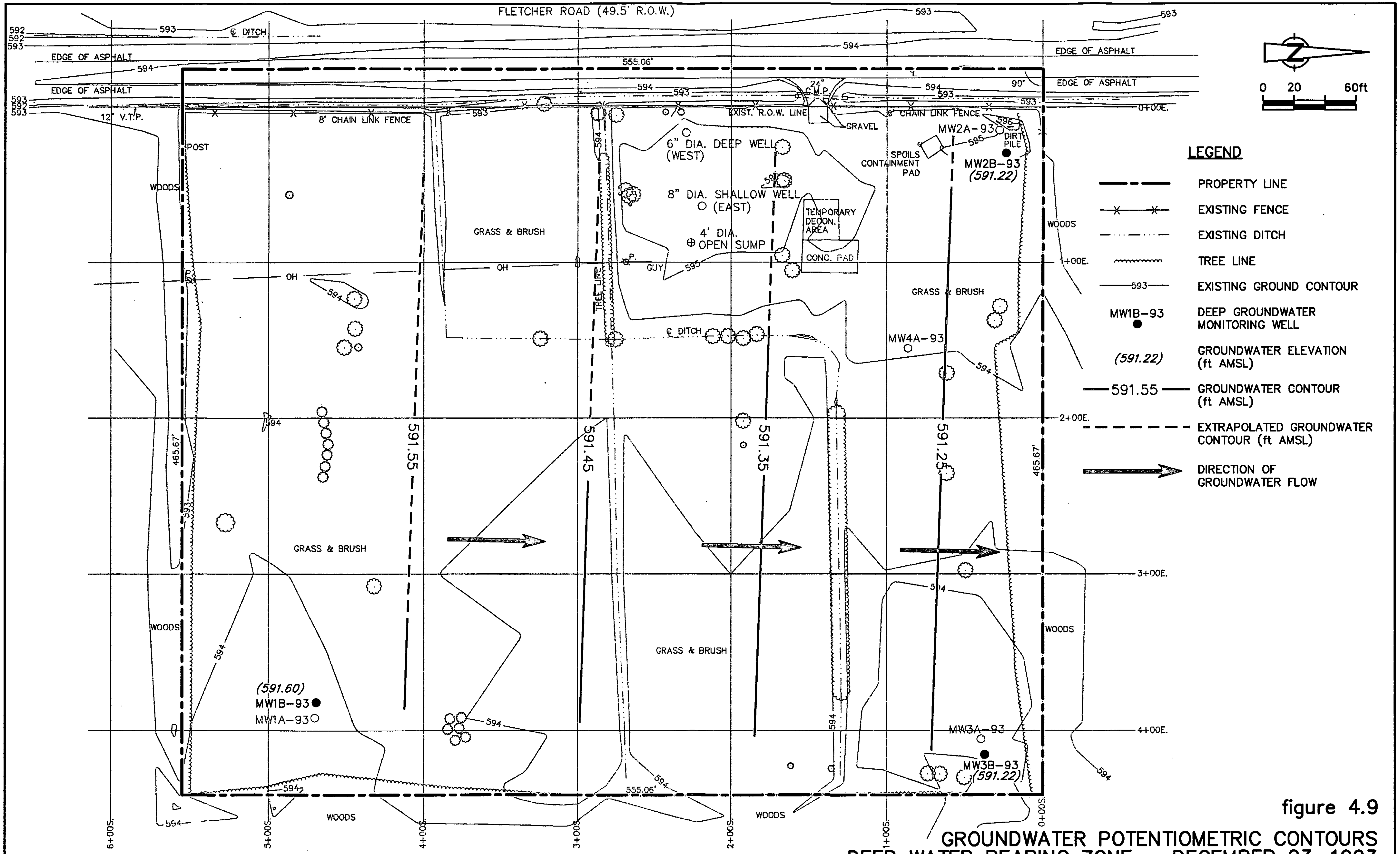


figure 4.9

GROUNDWATER POTENTIOMETRIC CONTOURS
DEEP WATER BEARING ZONE – DECEMBER 23, 1993
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

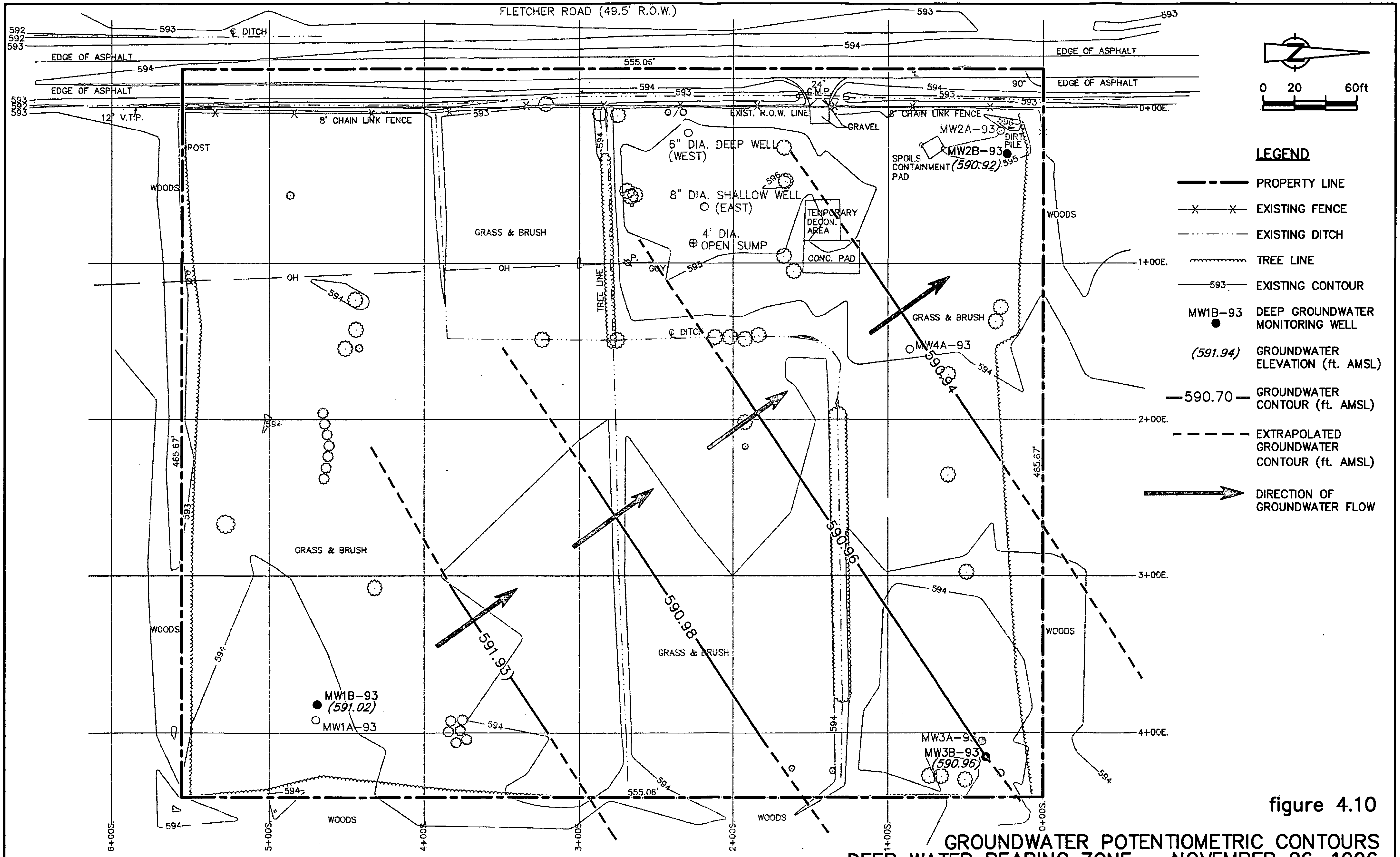


figure 4.10

GROUNDWATER POTENTIOMETRIC CONTOURS
DEEP WATER BEARING ZONE – NOVEMBER 26, 1996
NEWSTEAD SITE
The Sherwin–Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P–50)

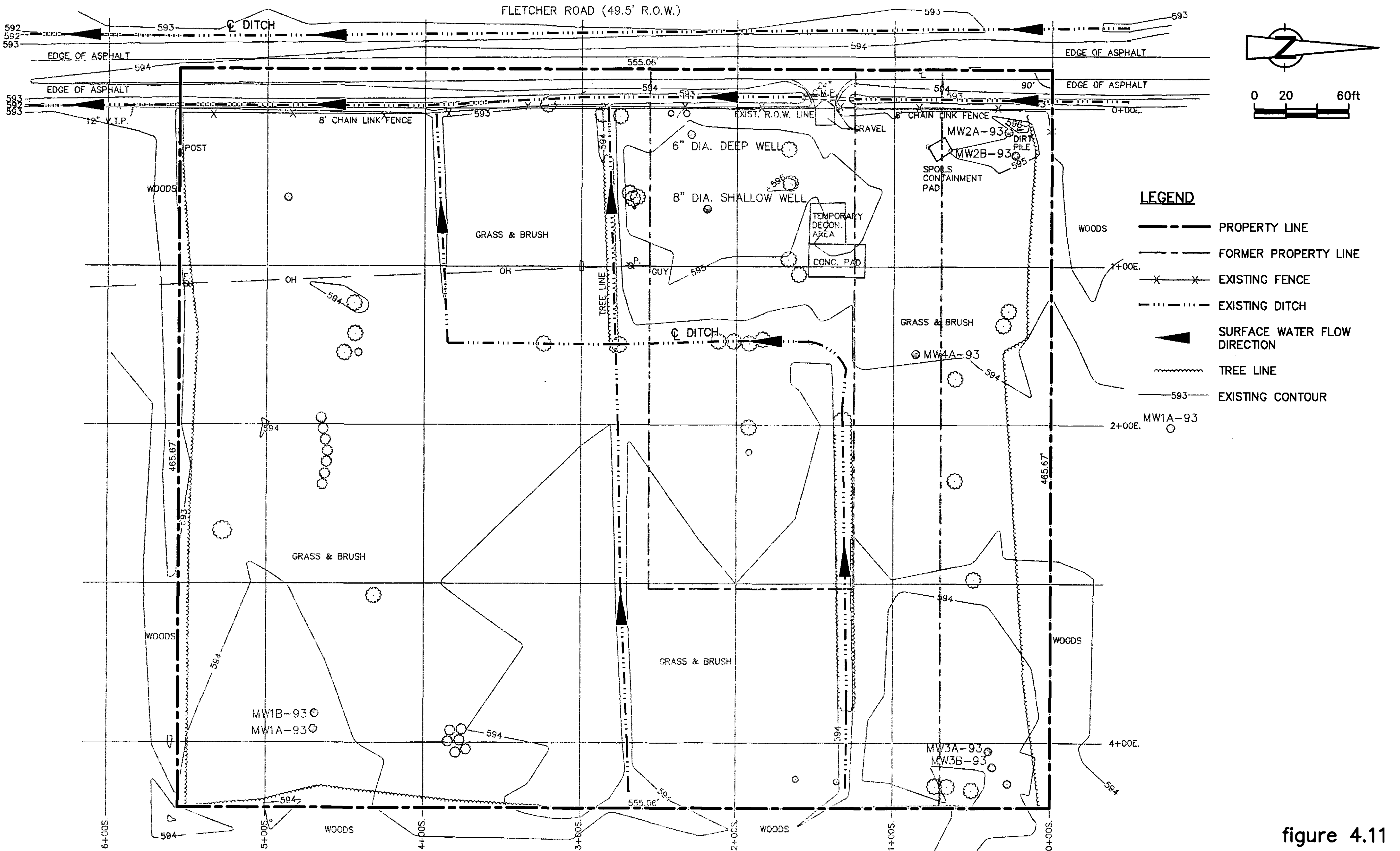
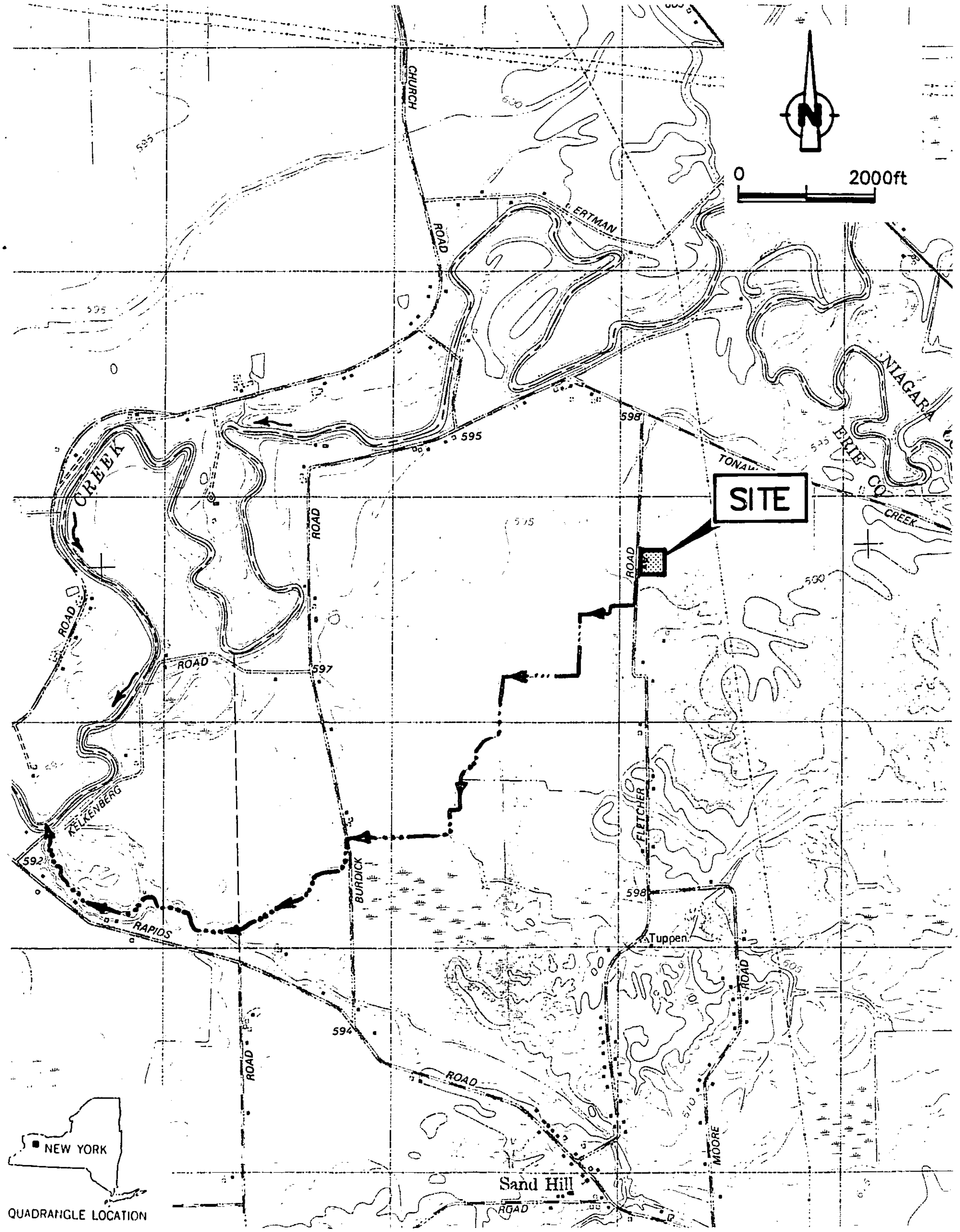


figure 4.11

SITE SURFACE WATER DRAINAGE DITCHES
NEWSTEAD SITE
The Sherwin–Williams Company

CRA



SOURCE:
WOLCOTTSVILLE, N.Y.
QUADRANGLE MAP, 7.5 Minute Series
STATE OF N.Y.
U.S. GEOLOGICAL SURVEY

CRA

figure 4.12

REGIONAL SURFACE WATER DRAINAGE
NEWSTEAD SITE
The Sherwin–Williams Company

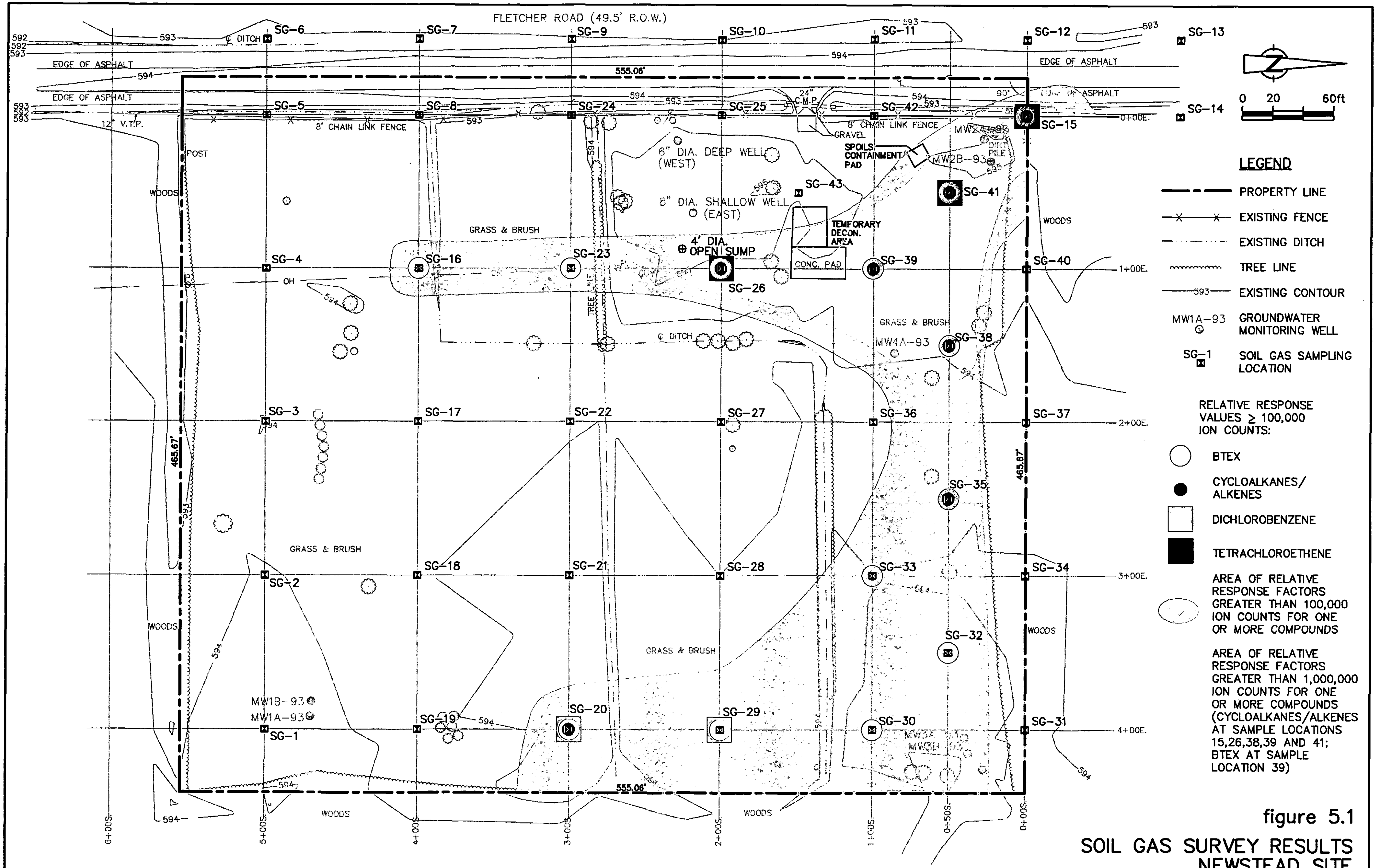
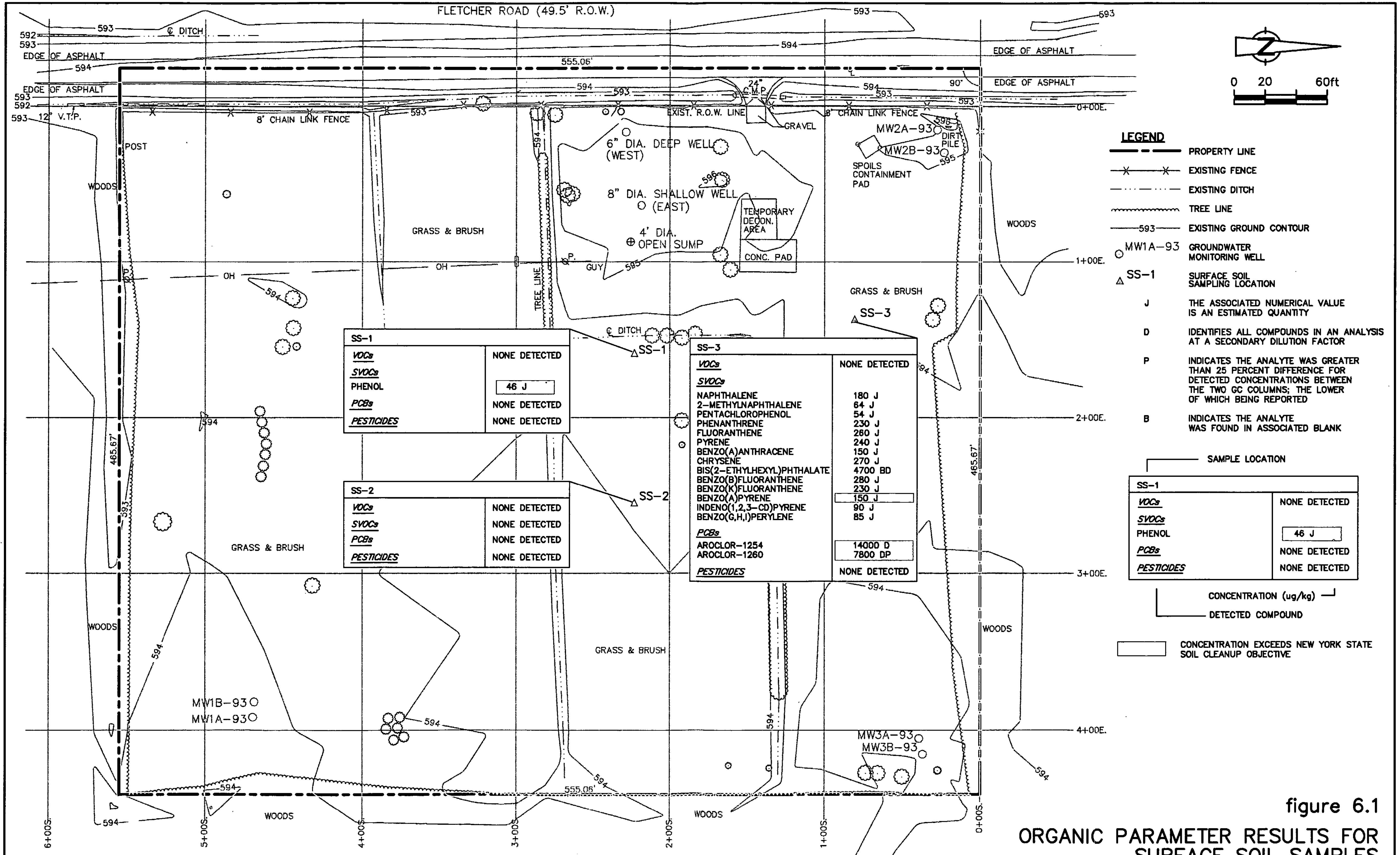


figure 5.1

SOIL GAS SURVEY RESULTS
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) DEC 10/96(W) REV.0 (P-46)



LEGEND

▬ ▬ ▬	PROPERTY LINE
—×—×—	EXISTING FENCE
— · · · —	EXISTING DITCH
~~	TREE LINE
—593—	EXISTING GROUND CONTOUR
○ MW1A-93	GROUNDWATER MONITORING WELL
△ SS-1	SURFACE SOIL SAMPLING LOCATION
J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
D	IDENTIFIES ALL COMPOUNDS IN AN ANALYSIS AT A SECONDARY DILUTION FACTOR
P	INDICATES THE ANALYTE WAS GREATER THAN 25 PERCENT DIFFERENCE FOR DETECTED CONCENTRATIONS BETWEEN THE TWO GC COLUMNS; THE LOWER OF WHICH BEING REPORTED
B	INDICATES THE ANALYTE WAS FOUND IN ASSOCIATED BLANK

SAMPLE LOCATION

SS-1	
VOCs	NONE DETECTED
SVOCs	
PHENOL	46 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

CONCENTRATION (ug/kg)

DETECTED COMPOUND

▭	CONCENTRATION EXCEEDS NEW YORK STATE SOIL CLEANUP OBJECTIVE

SS-1	
VOCs	NONE DETECTED
SVOCs	
PHENOL	46 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SS-2	
VOCs	NONE DETECTED
SVOCs	NONE DETECTED
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

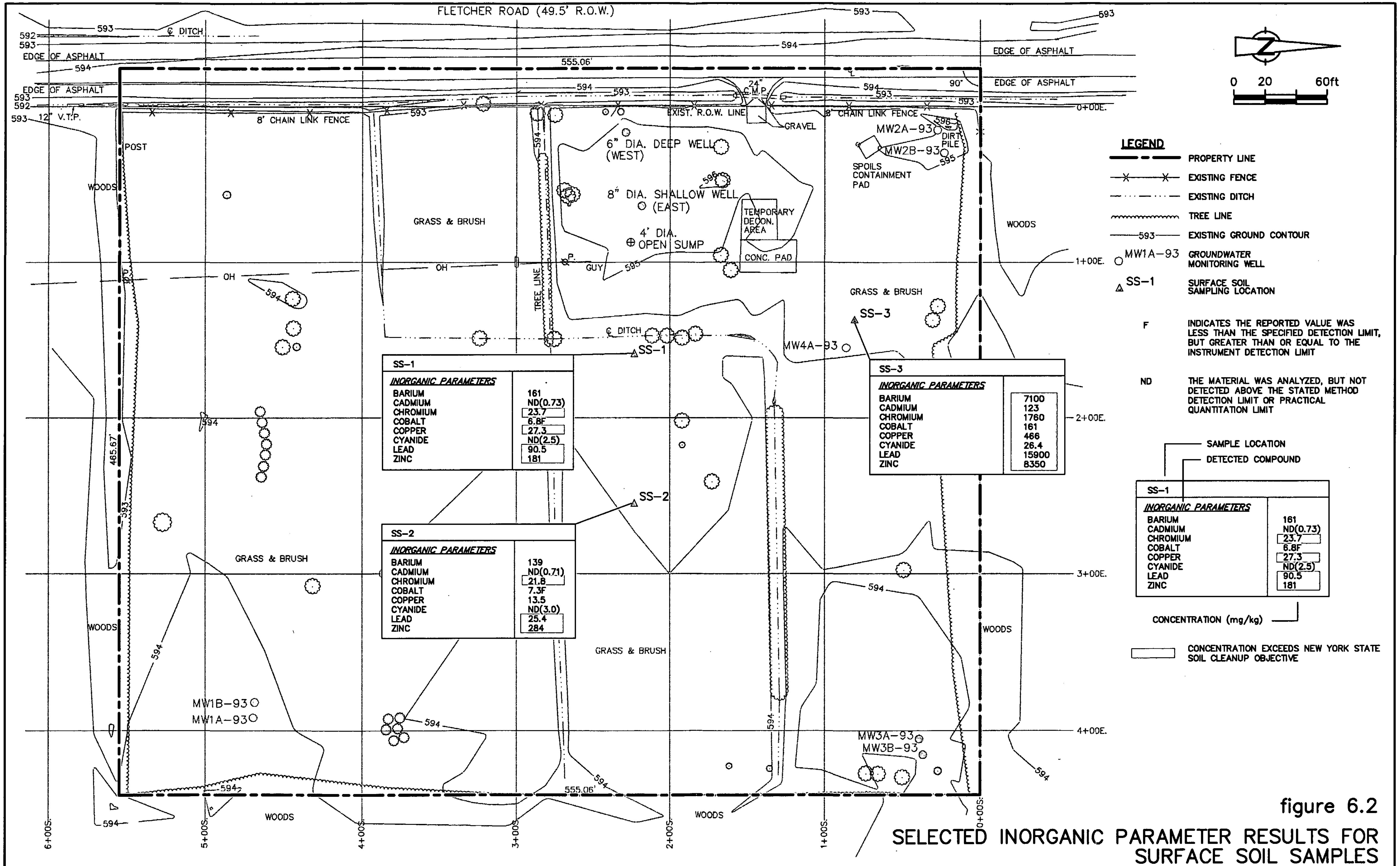
SS-3	
VOCs	NONE DETECTED
SVOCs	
NAPHTHALENE	180 J
2-METHYLNAPHTHALENE	64 J
PENTACHLOROPHENOL	54 J
PHENANTHRENE	230 J
FLUORANTHENE	260 J
PYRENE	240 J
BENZO(A)ANTHRACENE	150 J
CHRYSENE	270 J
BIS(2-ETHYLHEXYL)PHTHALATE	4700 BD
BENZO(B)FLUORANTHENE	280 J
BENZO(K)FLUORANTHENE	230 J
BENZO(A)PYRENE	150 J
INDENO(1,2,3-CD)PYRENE	90 J
BENZO(G,H,I)PERYLENE	85 J
PCBs	
AROCLOR-1254	14000 D
AROCLOR-1260	7800 DP
PESTICIDES	NONE DETECTED

figure 6.1

ORGANIC PARAMETER RESULTS FOR
SURFACE SOIL SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-36)



SS-1	
INORGANIC PARAMETERS	
BARIUM	161
CADMIUM	ND(0.73)
CHROMIUM	23.7
COBALT	6.8F
COPPER	27.3
CYANIDE	ND(2.5)
LEAD	90.5
ZINC	181

SS-2	
INORGANIC PARAMETERS	
BARIUM	139
CADMIUM	ND(0.71)
CHROMIUM	21.8
COBALT	7.3F
COPPER	13.5
CYANIDE	ND(3.0)
LEAD	25.4
ZINC	284

SS-3	
INORGANIC PARAMETERS	
BARIUM	7100
CADMIUM	123
CHROMIUM	1760
COBALT	161
COPPER	466
CYANIDE	26.4
LEAD	15900
ZINC	8350

figure 6.2

SELECTED INORGANIC PARAMETER RESULTS FOR SURFACE SOIL SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

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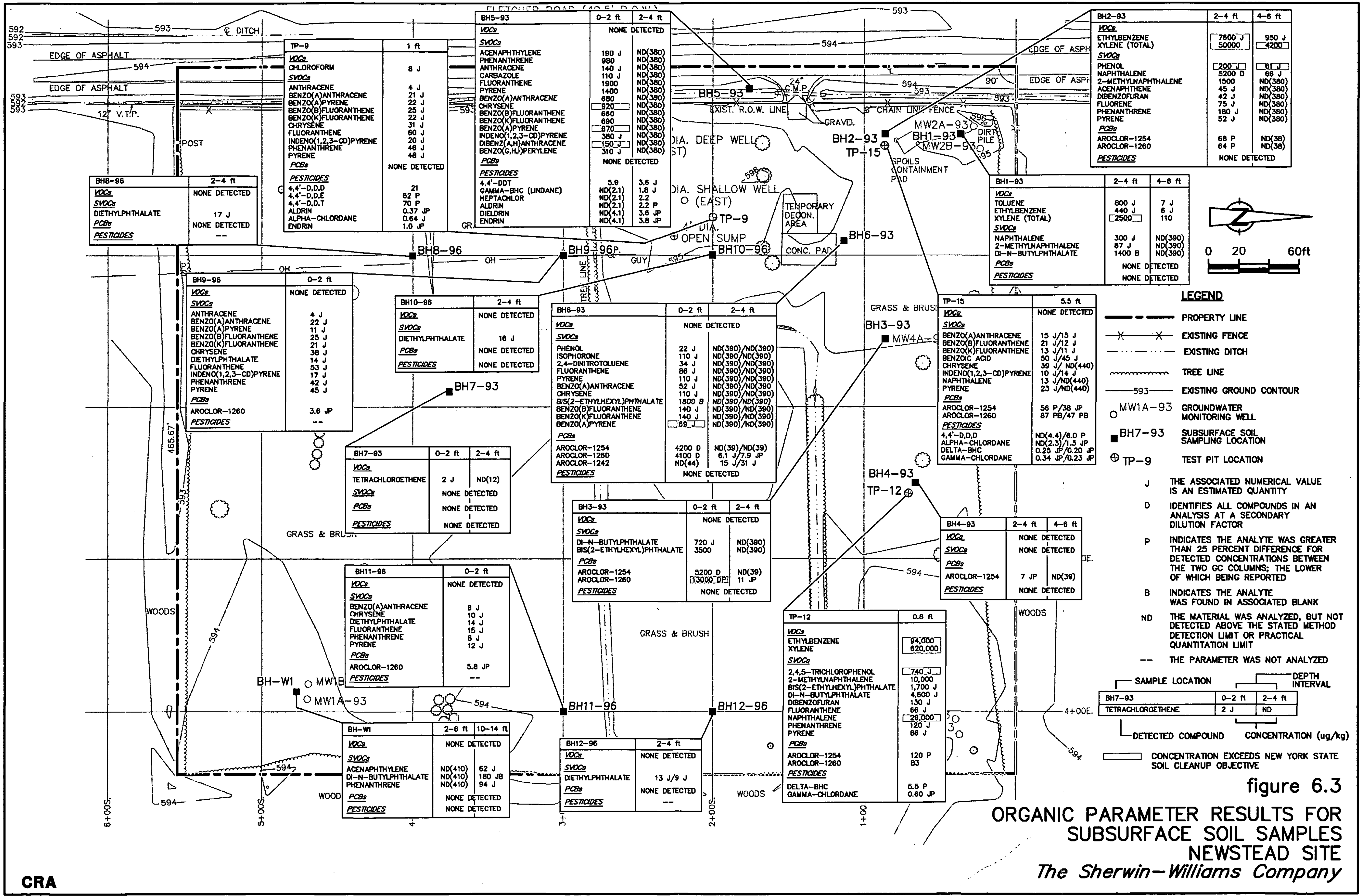

BH5-93	0-2 ft	2-4 ft
VOCs	NONE DETECTED	
SVOCs		
ACENAPHTHYLENE	190 J	ND(380)
PHENANTHRENE	980	ND(380)
ANTHRACENE	140 J	ND(380)
CARBAZOLE	110 J	ND(380)
FLUORANTHENE	1900	ND(380)
PYRENE	1400	ND(380)
BENZO(A)ANTHRACENE	680	ND(380)
CHRYSENE	920	ND(380)
BENZO(B)FLUORANTHENE	660	ND(380)
BENZO(K)FLUORANTHENE	690	ND(380)
BENZO(A)PYRENE	670	ND(380)
INDENO(1,2,3-CD)PYRENE	380 J	ND(380)
DIBENZ(A,H)ANTHRACENE	150 J	ND(380)
BENZO(G,H,I)PERYLENE	310 J	ND(380)
PCBs	NONE DETECTED	
PESTICIDES		
4,4'-DDT	5.9	3.6 J
GAMMA-BHC (LINDANE)	ND(2.1)	1.8 J
HEPTACHLOR	ND(2.1)	2.2
ALDRIN	ND(2.1)	2.2 P
DIELDRIN	ND(4.1)	3.6 JP
ENDRIN	ND(4.1)	3.8 JP

TP-9	1 ft
VOCs	
CHLOROFORM	8 J
SVOCs	
ANTHRACENE	4 J
BENZO(A)ANTHRACENE	21 J
BENZO(A)PYRENE	22 J
BENZO(B)FLUORANTHENE	25 J
BENZO(K)FLUORANTHENE	22 J
CHRYSENE	31 J
FLUORANTHENE	60 J
INDENO(1,2,3-CD)PYRENE	20 J
PHENANTHRENE	46 J
PYRENE	48 J
PCBs	NONE DETECTED
PESTICIDES	
4,4'-D,D,D	21
4,4'-D,D,E	62 P
4,4'-D,D,T	70 P
ALDRIN	0.37 JP
ALPHA-CHLORDANE	0.64 J
ENDRIN	1.0 JP

BH2-93	2-4 ft	4-6 ft
VOCs		
ETHYLBENZENE	7600 J	950 J
XYLENE (TOTAL)	50000	4200
SVOCs		
PHENOL	200 J	61 J
NAPHTHALENE	5200 D	66 J
2-METHYLNAPHTHALENE	1500	ND(380)
ACENAPHTHENE	45 J	ND(380)
DIBENZOFURAN	42 J	ND(380)
FLUORENE	75 J	ND(380)
PHENANTHRENE	180 J	ND(380)
PYRENE	52 J	ND(380)
PCBs		
AROCLOR-1254	68 P	ND(38)
AROCLOR-1260	64 P	ND(38)
PESTICIDES	NONE DETECTED	

BH1-93	2-4 ft	4-6 ft
VOCs		
TOLUENE	800 J	7 J
ETHYLBENZENE	440 J	6 J
XYLENE (TOTAL)	2500	110
SVOCs		
NAPHTHALENE	300 J	ND(390)
2-METHYLNAPHTHALENE	87 J	ND(390)
DI-N-BUTYLPHTHALATE	1400 B	ND(390)
PCBs	NONE DETECTED	
PESTICIDES	NONE DETECTED	

BH8-96	2-4 ft
VOCs	NONE DETECTED
SVOCs	
DIETHYLPHTHALATE	17 J
PCBs	NONE DETECTED
PESTICIDES	--

BH9-96	0-2 ft
VOCs	NONE DETECTED
SVOCs	
ANTHRACENE	4 J
BENZO(A)ANTHRACENE	22 J
BENZO(A)PYRENE	11 J
BENZO(B)FLUORANTHENE	25 J
BENZO(K)FLUORANTHENE	21 J
CHRYSENE	38 J
DIETHYLPHTHALATE	14 J
FLUORANTHENE	53 J
INDENO(1,2,3-CD)PYRENE	17 J
PHENANTHRENE	42 J
PYRENE	45 J
PCBs	
AROCLOR-1260	3.6 JP
PESTICIDES	--

BH10-96	2-4 ft
VOCs	NONE DETECTED
SVOCs	
DIETHYLPHTHALATE	16 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

BH6-93	0-2 ft	2-4 ft
VOCs	NONE DETECTED	
SVOCs		
PHENOL	22 J	ND(390)/ND(390)
ISOPHORONE	110 J	ND(390/ND(390)
2,4-DINITROTOLUENE	34 J	ND(390)/ND(390)
FLUORANTHENE	86 J	ND(390)/ND(390)
PYRENE	110 J	ND(390)/ND(390)
BENZO(A)ANTHRACENE	52 J	ND(390)/ND(390
CHRYSENE	110 J	ND(390)/ND(390)
BIS(2-ETHYLHEXYL)PHTHALATE	1800 B	ND(390/ND(390)
BENZO(B)FLUORANTHENE	140 J	ND(390)/ND(390)
BENZO(K)FLUORANTHENE	140 J	ND(390)/ND(390)
BENZO(A)PYRENE	69 J	ND(390)/ND(390)
PCBs		
AROCLOR-1254	4200 D	ND(39)/ND(39)
AROCLOR-1260	4100 D	6.1 J/7.9 JP
AROCLOR-1242	ND(44)	15 J/31 J
PESTICIDES	NONE DETECTED	

BH7-93	0-2 ft	2-4 ft
VOCs		
TETRACHLOROETHENE	2 J	ND(12)
SVOCs	NONE DETECTED	
PCBs	NONE DETECTED	
PESTICIDES	NONE DETECTED	

TP-15	5.5 ft
VOCs	NONE DETECTED
SVOCs	
BENZO(A)ANTHRACENE	15 J/15 J
BENZO(B)FLUORANTHENE	21 J/12 J
BENZO(K)FLUORANTHENE	13 J/11 J
BENZOIC ACID	50 J/45 J
CHRYSENE	39 J/ ND(440)
INDENO(1,2,3-CD)PYRENE	10 J/14 J
NAPHTHALENE	13 J/ND(440)
PYRENE	23 J/ND(440)
PCBs	
AROCLOR-1254	56 P/38 JP
AROCLOR-1260	87 PB/47 PB
PESTICIDES	
4,4'-D,D,D	ND(4.4)/6.0 P
ALPHA-CHLORDANE	ND(2.3)/1.3 JP
DELTA-BHC	0.25 JP/0.20 JP
GAMMA-CHLORDANE	0.34 JP/0.23 JP

BH3-93	0-2 ft	2-4 ft
VOCs	NONE DETECTED	
SVOCs		
DI-N-BUTYLPHTHALATE	720 J	ND(390)
BIS(2-ETHYLHEXYL)PHTHALATE	3500	ND(390)
PCBs		
AROCLOR-1254	5200 D	ND(39)
AROCLOR-1260	13000 DP	11 JP
PESTICIDES	NONE DETECTED	

BH4-93	2-4 ft	4-6 ft
VOCs	NONE DETECTED	
SVOCs	NONE DETECTED	
PCBs		
AROCLOR-1254	7 JP	ND(39)
PESTICIDES	NONE DETECTED	

BH11-96	0-2 ft
VOCs	NONE DETECTED
SVOCs	
BENZO(A)ANTHRACENE	6 J
CHRYSENE	10 J
DIETHYLPHTHALATE	14 J
FLUORANTHENE	15 J
PHENANTHRENE	8 J
PYRENE	12 J
PCBs	
AROCLOR-1260	5.8 JP
PESTICIDES	--

BH-W1	2-6 ft	10-14 ft
VOCs	NONE DETECTED	
SVOCs		
ACENAPHTHYLENE	ND(410)	62 J
DI-N-BUTYLPHTHALATE	ND(410)	180 JB
PHENANTHRENE	ND(410)	94 J
PCBs	NONE DETECTED	
PESTICIDES	NONE DETECTED	

BH12-96	2-4 ft
VOCs	NONE DETECTED
SVOCs	
DIETHYLPHTHALATE	13 J/9 J
PCBs	NONE DETECTED
PESTICIDES	--

TP-12	0.8 ft
VOCs	
ETHYLBENZENE	94,000
XYLENE	620,000
SVOCs	
2,4,5-TRICHLOROPHENOL	740 J
2-METHYLNAPHTHALENE	10,000
BIS(2-ETHYLHEXYL)PHTHALATE	1,700 J
DI-N-BUTYLPHTHALATE	4,600 J
DIBENZOFURAN	130 J
FLUORANTHENE	66 J
NAPHTHALENE	29,000
PHENANTHRENE	120 J
PYRENE	86 J
PCBs	
AROCLOR-1254	120 P
AROCLOR-1260	83
PESTICIDES	
DELTA-BHC	5.5 P
GAMMA-CHLORDANE	0.60 JP

LEGEND

━ ━ ━	PROPERTY LINE
—×——×—	EXISTING FENCE
— · · — · ·	EXISTING DITCH
∿∿∿∿	TREE LINE
—593—	EXISTING GROUND CONTOUR
○ MW1A-93	GROUNDWATER MONITORING WELL
■ BH7-93	SUBSURFACE SOIL SAMPLING LOCATION
⊕ TP-9	TEST PIT LOCATION
J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
D	IDENTIFIES ALL COMPOUNDS IN AN ANALYSIS AT A SECONDARY DILUTION FACTOR
P	INDICATES THE ANALYTE WAS GREATER THAN 25 PERCENT DIFFERENCE FOR DETECTED CONCENTRATIONS BETWEEN THE TWO GC COLUMNS; THE LOWER OF WHICH BEING REPORTED
B	INDICATES THE ANALYTE WAS FOUND IN ASSOCIATED BLANK
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT
--	THE PARAMETER WAS NOT ANALYZED

SAMPLE LOCATION — DEPTH INTERVAL

BH7-93	0-2 ft	2-4 ft
TETRACHLOROETHENE	2 J	ND

DETECTED COMPOUND — CONCENTRATION (ug/kg)

▭	CONCENTRATION EXCEEDS NEW YORK STATE SOIL CLEANUP OBJECTIVE

figure 6.3

ORGANIC PARAMETER RESULTS FOR SUBSURFACE SOIL SAMPLES NEWSTEAD SITE

The Sherwin-Williams Company

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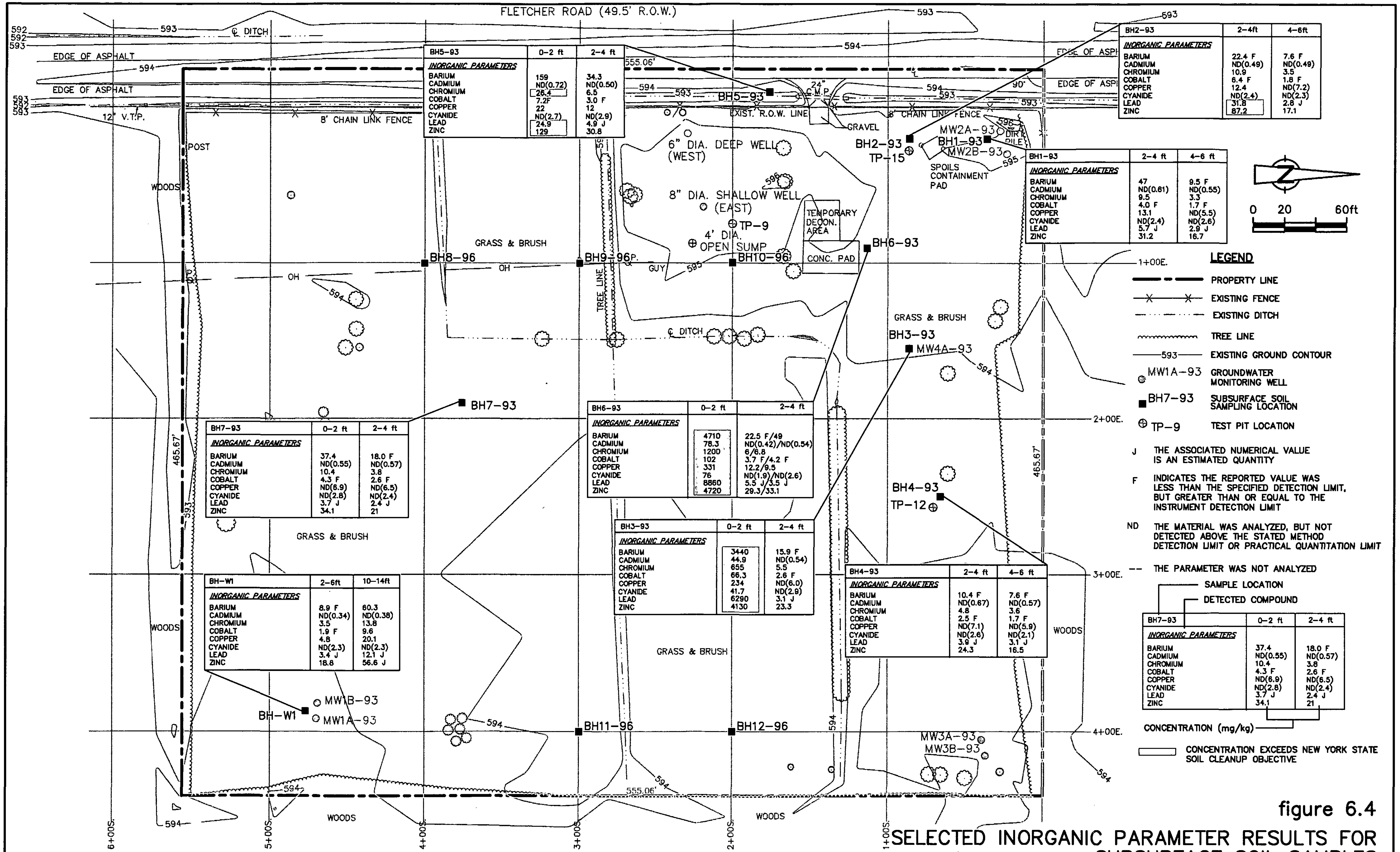

BH5-93	0-2 ft	2-4 ft
INORGANIC PARAMETERS		
BARIUM	159	34.3
CADMIUM	ND(0.72)	ND(0.50)
CHROMIUM	26.4	6.5
COBALT	7.2F	3.0 F
COPPER	22	12
CYANIDE	ND(2.7)	ND(2.9)
LEAD	24.9	4.9 J
ZINC	129	30.8

BH2-93	2-4ft	4-6ft
INORGANIC PARAMETERS		
BARIUM	22.4 F	7.6 F
CADMIUM	ND(0.49)	ND(0.49)
CHROMIUM	10.9	3.5
COBALT	6.4 F	1.8 F
COPPER	12.4	ND(7.2)
CYANIDE	ND(2.4)	ND(2.3)
LEAD	31.8	2.8 J
ZINC	87.2	17.1

BH1-93	2-4 ft	4-6 ft
INORGANIC PARAMETERS		
BARIUM	47	9.5 F
CADMIUM	ND(0.61)	ND(0.55)
CHROMIUM	9.5	3.3
COBALT	4.0 F	1.7 F
COPPER	13.1	ND(5.5)
CYANIDE	ND(2.4)	ND(2.6)
LEAD	5.7 J	2.9 J
ZINC	31.2	16.7

BH7-93	0-2 ft	2-4 ft
INORGANIC PARAMETERS		
BARIUM	37.4	18.0 F
CADMIUM	ND(0.55)	ND(0.57)
CHROMIUM	10.4	3.8
COBALT	4.3 F	2.6 F
COPPER	ND(6.9)	ND(6.5)
CYANIDE	ND(2.8)	ND(2.4)
LEAD	3.7 J	2.4 J
ZINC	34.1	21

BH6-93	0-2 ft	2-4 ft
INORGANIC PARAMETERS		
BARIUM	4710	22.5 F/49
CADMIUM	78.3	ND(0.42)/ND(0.54)
CHROMIUM	1200	6/6.8
COBALT	102	3.7 F/4.2 F
COPPER	331	12.2/9.5
CYANIDE	76	ND(1.9)/ND(2.6)
LEAD	8860	5.5 J/3.5 J
ZINC	4720	29.3/33.1

BH3-93	0-2 ft	2-4 ft
INORGANIC PARAMETERS		
BARIUM	3440	15.9 F
CADMIUM	44.9	ND(0.54)
CHROMIUM	655	5.5
COBALT	66.3	2.6 F
COPPER	234	ND(6.0)
CYANIDE	41.7	ND(2.9)
LEAD	6290	3.1 J
ZINC	4130	23.3

BH-W1	2-6ft	10-14ft
INORGANIC PARAMETERS		
BARIUM	8.9 F	60.3
CADMIUM	ND(0.34)	ND(0.38)
CHROMIUM	3.5	13.8
COBALT	1.9 F	9.6
COPPER	4.8	20.1
CYANIDE	ND(2.3)	ND(2.3)
LEAD	3.4 J	12.1 J
ZINC	18.8	56.6 J

BH4-93	2-4 ft	4-6 ft
INORGANIC PARAMETERS		
BARIUM	10.4 F	7.6 F
CADMIUM	ND(0.67)	ND(0.57)
CHROMIUM	4.8	3.6
COBALT	2.5 F	1.7 F
COPPER	ND(7.1)	ND(5.9)
CYANIDE	ND(2.6)	ND(2.1)
LEAD	3.9 J	3.1 J
ZINC	24.3	16.5

LEGEND

▬ ▬ ▬	PROPERTY LINE
—X—X—	EXISTING FENCE
— · · —	EXISTING DITCH
〰〰	TREE LINE
——593——	EXISTING GROUND CONTOUR
MW1A-93	GROUNDWATER MONITORING WELL
■ BH7-93	SUBSURFACE SOIL SAMPLING LOCATION
⊕ TP-9	TEST PIT LOCATION
J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
F	INDICATES THE REPORTED VALUE WAS LESS THAN THE SPECIFIED DETECTION LIMIT, BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT
--	THE PARAMETER WAS NOT ANALYZED

SAMPLE LOCATION

DETECTED COMPOUND

BH7-93	0-2 ft	2-4 ft
INORGANIC PARAMETERS		
BARIUM	37.4	18.0 F
CADMIUM	ND(0.55)	ND(0.57)
CHROMIUM	10.4	3.8
COBALT	4.3 F	2.6 F
COPPER	ND(6.9)	ND(6.5)
CYANIDE	ND(2.8)	ND(2.4)
LEAD	3.7 J	2.4 J
ZINC	34.1	21

CONCENTRATION (mg/kg)

▭ CONCENTRATION EXCEEDS NEW YORK STATE SOIL CLEANUP OBJECTIVE

figure 6.4

SELECTED INORGANIC PARAMETER RESULTS FOR SUBSURFACE SOIL SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

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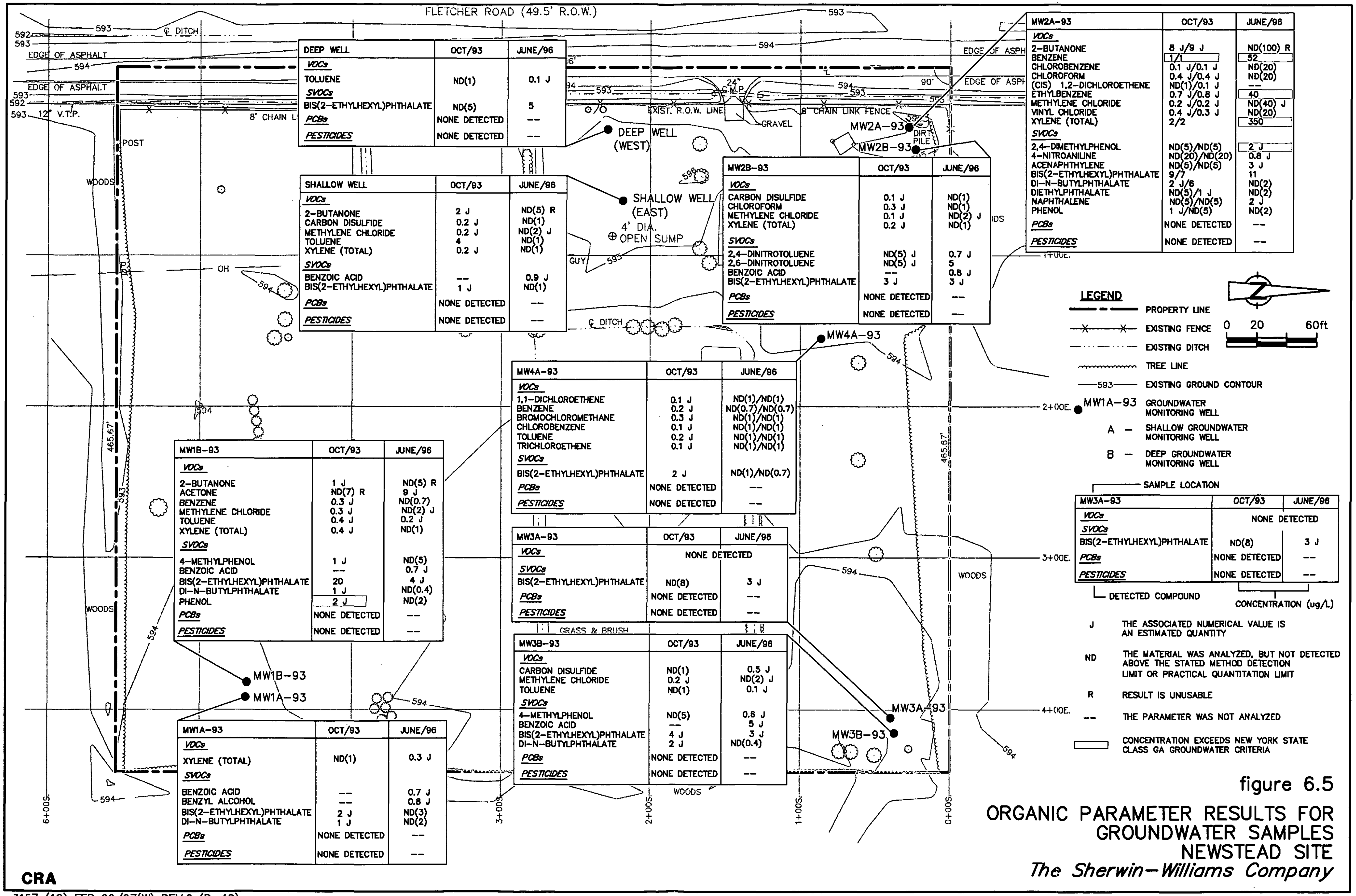

DEEP WELL	OCT/93	JUNE/96
VOCs		
TOLUENE	ND(1)	0.1 J
SVOCs		
BIS(2-ETHYLHEXYL)PHTHALATE	ND(5)	5
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

SHALLOW WELL	OCT/93	JUNE/96
VOCs		
2-BUTANONE	2 J	ND(5) R
CARBON DISULFIDE	0.2 J	ND(1)
METHYLENE CHLORIDE	0.2 J	ND(2) J
TOLUENE	4	ND(1)
XYLENE (TOTAL)	0.2 J	ND(1)
SVOCs		
BENZOIC ACID	--	0.9 J
BIS(2-ETHYLHEXYL)PHTHALATE	1 J	ND(1)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW2A-93	OCT/93	JUNE/96
VOCs		
2-BUTANONE	8 J/9 J	ND(100) R
BENZENE	1/1	52
CHLOROBENZENE	0.1 J/0.1 J	ND(20)
CHLOROFORM	0.4 J/0.4 J	ND(20)
(CIS) 1,2-DICHLOROETHENE	ND(1)/0.1 J	--
ETHYLBENZENE	0.7 J/0.8 J	40
METHYLENE CHLORIDE	0.2 J/0.2 J	ND(40) J
VINYL CHLORIDE	0.4 J/0.3 J	ND(20)
XYLENE (TOTAL)	2/2	350
SVOCs		
2,4-DIMETHYLPHENOL	ND(5)/ND(5)	2 J
4-NITROANILINE	ND(20)/ND(20)	0.8 J
ACENAPHTHYLENE	ND(5)/ND(5)	3 J
BIS(2-ETHYLHEXYL)PHTHALATE	9/7	11
DI-N-BUTYLPHTHALATE	2 J/6	ND(2)
DIETHYLPHTHALATE	ND(5)/1 J	ND(2)
NAPHTHALENE	ND(5)/ND(5)	2 J
PHENOL	1 J/ND(5)	ND(2)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW2B-93	OCT/93	JUNE/96
VOCs		
CARBON DISULFIDE	0.1 J	ND(1)
CHLOROFORM	0.3 J	ND(1)
METHYLENE CHLORIDE	0.1 J	ND(2) J
XYLENE (TOTAL)	0.2 J	ND(1)
SVOCs		
2,4-DINITROTOLUENE	ND(5) J	0.7 J
2,6-DINITROTOLUENE	ND(5) J	5
BENZOIC ACID	--	0.8 J
BIS(2-ETHYLHEXYL)PHTHALATE	3 J	3 J
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW4A-93	OCT/93	JUNE/96
VOCs		
1,1-DICHLOROETHENE	0.1 J	ND(1)/ND(1)
BENZENE	0.2 J	ND(0.7)/ND(0.7)
BROMOCHLOROMETHANE	0.3 J	ND(1)/ND(1)
CHLOROBENZENE	0.1 J	ND(1)/ND(1)
TOLUENE	0.2 J	ND(1)/ND(1)
TRICHLOROETHENE	0.1 J	ND(1)/ND(1)
SVOCs		
BIS(2-ETHYLHEXYL)PHTHALATE	2 J	ND(1)/ND(0.7)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW1B-93	OCT/93	JUNE/96
VOCs		
2-BUTANONE	1 J	ND(5) R
ACETONE	ND(7) R	9 J
BENZENE	0.3 J	ND(0.7)
METHYLENE CHLORIDE	0.3 J	ND(2) J
TOLUENE	0.4 J	0.2 J
XYLENE (TOTAL)	0.4 J	ND(1)
SVOCs		
4-METHYLPHENOL	1 J	ND(5)
BENZOIC ACID	--	0.7 J
BIS(2-ETHYLHEXYL)PHTHALATE	20	4 J
DI-N-BUTYLPHTHALATE	1 J	ND(0.4)
PHENOL	2 J	ND(2)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW3A-93	OCT/93	JUNE/96
VOCs	NONE DETECTED	
SVOCs		
BIS(2-ETHYLHEXYL)PHTHALATE	ND(8)	3 J
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW3B-93	OCT/93	JUNE/96
VOCs		
CARBON DISULFIDE	ND(1)	0.5 J
METHYLENE CHLORIDE	0.2 J	ND(2) J
TOLUENE	ND(1)	0.1 J
SVOCs		
4-METHYLPHENOL	ND(5)	0.6 J
BENZOIC ACID	--	5 J
BIS(2-ETHYLHEXYL)PHTHALATE	4 J	3 J
DI-N-BUTYLPHTHALATE	2 J	ND(0.4)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

MW1A-93	OCT/93	JUNE/96
VOCs		
XYLENE (TOTAL)	ND(1)	0.3 J
SVOCs		
BENZOIC ACID	--	0.7 J
BENZYL ALCOHOL	--	0.8 J
BIS(2-ETHYLHEXYL)PHTHALATE	2 J	ND(3)
DI-N-BUTYLPHTHALATE	1 J	ND(2)
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

LEGEND

▬ ▬ ▬	PROPERTY LINE
—×——×—	EXISTING FENCE
—···—···—	EXISTING DITCH
﹏﹏﹏	TREE LINE
—593—	EXISTING GROUND CONTOUR
● MW1A-93	GROUNDWATER MONITORING WELL
A –	SHALLOW GROUNDWATER MONITORING WELL
B –	DEEP GROUNDWATER MONITORING WELL

SAMPLE LOCATION

MW3A-93	OCT/93	JUNE/96
VOCs	NONE DETECTED	
SVOCs		
BIS(2-ETHYLHEXYL)PHTHALATE	ND(8)	3 J
PCBs	NONE DETECTED	--
PESTICIDES	NONE DETECTED	--

DETECTED COMPOUND

CONCENTRATION (ug/L)

J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT
R	RESULT IS UNUSABLE
--	THE PARAMETER WAS NOT ANALYZED
▭	CONCENTRATION EXCEEDS NEW YORK STATE CLASS GA GROUNDWATER CRITERIA

figure 6.5

ORGANIC PARAMETER RESULTS FOR GROUNDWATER SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

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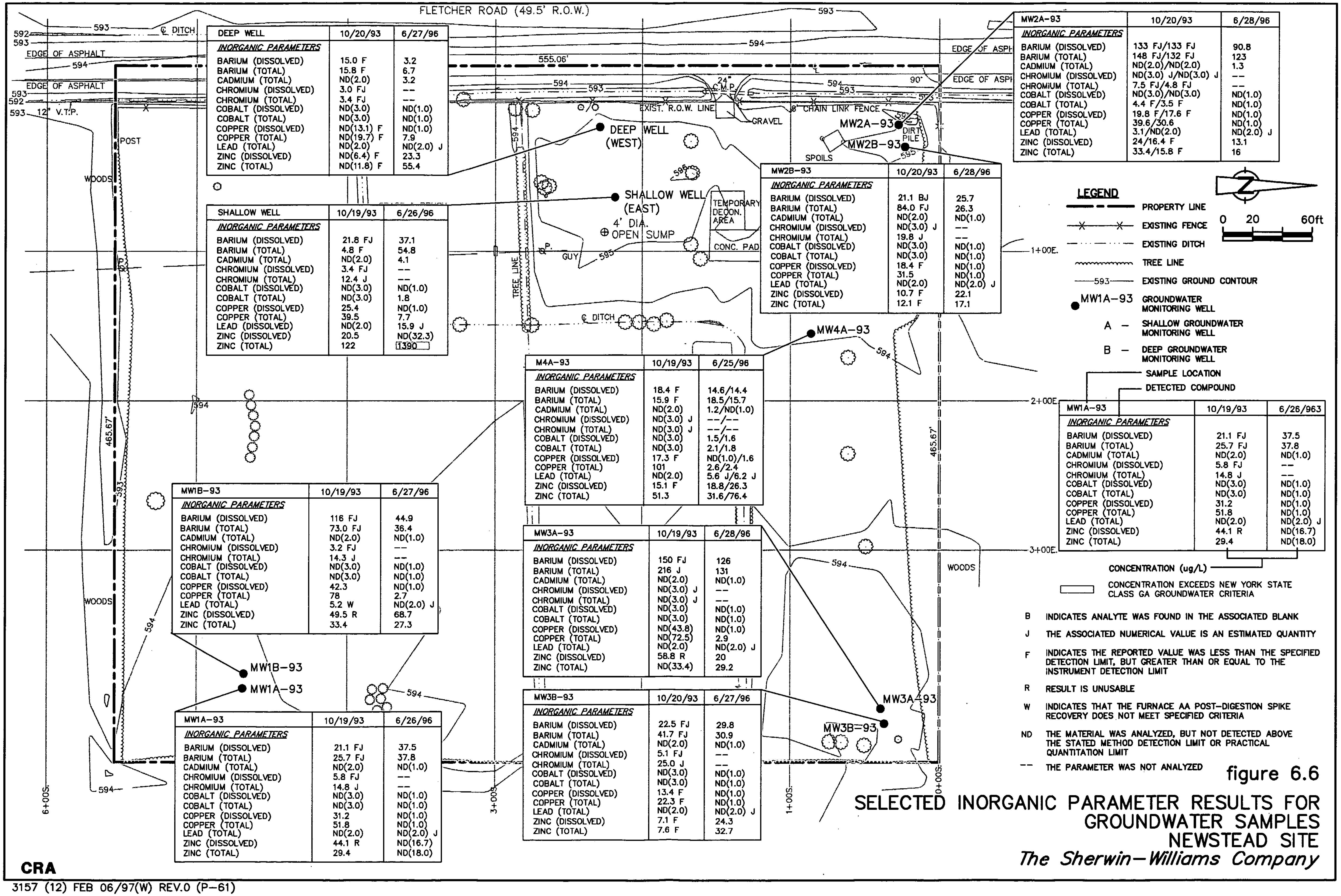
3157 (12) FEB 06/97(W) REV.0 (P-42)



DEEP WELL	10/20/93	6/27/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	15.0 F	3.2
BARIUM (TOTAL)	15.8 F	6.7
CADMIUM (TOTAL)	ND(2.0)	3.2
CHROMIUM (DISSOLVED)	3.0 FJ	--
CHROMIUM (TOTAL)	3.4 FJ	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	ND(13.1) F	ND(1.0)
COPPER (TOTAL)	ND(19.7) F	7.9
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	ND(6.4) F	23.3
ZINC (TOTAL)	ND(11.8) F	55.4

SHALLOW WELL	10/19/93	6/26/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	21.8 FJ	37.1
BARIUM (TOTAL)	4.8 F	54.8
CADMIUM (TOTAL)	ND(2.0)	4.1
CHROMIUM (DISSOLVED)	3.4 FJ	--
CHROMIUM (TOTAL)	12.4 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	1.8
COPPER (DISSOLVED)	25.4	ND(1.0)
COPPER (TOTAL)	39.5	7.7
LEAD (DISSOLVED)	ND(2.0)	15.9 J
ZINC (DISSOLVED)	20.5	ND(32.3)
ZINC (TOTAL)	122	1390

MW2A-93	10/20/93	6/28/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	133 FJ/133 FJ	90.8
BARIUM (TOTAL)	148 FJ/132 FJ	123
CADMIUM (TOTAL)	ND(2.0)/ND(2.0)	1.3
CHROMIUM (DISSOLVED)	ND(3.0) J/ND(3.0) J	--
CHROMIUM (TOTAL)	7.5 FJ/4.8 FJ	--
COBALT (DISSOLVED)	ND(3.0)/ND(3.0)	ND(1.0)
COBALT (TOTAL)	4.4 F/3.5 F	ND(1.0)
COPPER (DISSOLVED)	19.8 F/17.6 F	ND(1.0)
COPPER (TOTAL)	39.6/30.6	ND(1.0)
LEAD (TOTAL)	3.1/ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	24/16.4 F	13.1
ZINC (TOTAL)	33.4/15.8 F	16

MW2B-93	10/20/93	6/28/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	21.1 BJ	25.7
BARIUM (TOTAL)	84.0 FJ	26.3
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	ND(3.0) J	--
CHROMIUM (TOTAL)	19.8 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	18.4 F	ND(1.0)
COPPER (TOTAL)	31.5	ND(1.0)
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	10.7 F	22.1
ZINC (TOTAL)	12.1 F	17.1

M4A-93	10/19/93	6/25/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	18.4 F	14.6/14.4
BARIUM (TOTAL)	15.9 F	18.5/15.7
CADMIUM (TOTAL)	ND(2.0)	1.2/ND(1.0)
CHROMIUM (DISSOLVED)	ND(3.0) J	--/--
CHROMIUM (TOTAL)	ND(3.0) J	--/--
COBALT (DISSOLVED)	ND(3.0)	1.5/1.6
COBALT (TOTAL)	ND(3.0)	2.1/1.8
COPPER (DISSOLVED)	17.3 F	ND(1.0)/1.6
COPPER (TOTAL)	101	2.6/2.4
LEAD (TOTAL)	ND(2.0)	5.6 J/6.2 J
ZINC (DISSOLVED)	15.1 F	18.8/26.3
ZINC (TOTAL)	51.3	31.6/76.4

MW1B-93	10/19/93	6/27/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	116 FJ	44.9
BARIUM (TOTAL)	73.0 FJ	36.4
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	3.2 FJ	--
CHROMIUM (TOTAL)	14.3 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	42.3	ND(1.0)
COPPER (TOTAL)	78	2.7
LEAD (TOTAL)	5.2 W	ND(2.0) J
ZINC (DISSOLVED)	49.5 R	68.7
ZINC (TOTAL)	33.4	27.3

MW3A-93	10/19/93	6/28/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	150 FJ	126
BARIUM (TOTAL)	216 J	131
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	ND(3.0) J	--
CHROMIUM (TOTAL)	ND(3.0) J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	ND(43.8)	ND(1.0)
COPPER (TOTAL)	ND(72.5)	2.9
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	58.8 R	20
ZINC (TOTAL)	ND(33.4)	29.2

MW1A-93	10/19/93	6/26/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	21.1 FJ	37.5
BARIUM (TOTAL)	25.7 FJ	37.8
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	5.8 FJ	--
CHROMIUM (TOTAL)	14.8 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	31.2	ND(1.0)
COPPER (TOTAL)	51.8	ND(1.0)
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	44.1 R	ND(16.7)
ZINC (TOTAL)	29.4	ND(18.0)

MW3B-93	10/20/93	6/27/96
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	22.5 FJ	29.8
BARIUM (TOTAL)	41.7 FJ	30.9
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	5.1 FJ	--
CHROMIUM (TOTAL)	25.0 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	13.4 F	ND(1.0)
COPPER (TOTAL)	22.3 F	ND(1.0)
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	7.1 F	24.3
ZINC (TOTAL)	7.6 F	32.7

LEGEND

▬ ▬ ▬	PROPERTY LINE
—×—×—	EXISTING FENCE
— · · —	EXISTING DITCH
~~	TREE LINE
—593—	EXISTING GROUND CONTOUR
● MW1A-93	GROUNDWATER MONITORING WELL
A –	SHALLOW GROUNDWATER MONITORING WELL
B –	DEEP GROUNDWATER MONITORING WELL

SAMPLE LOCATION

DETECTED COMPOUND

MW1A-93	10/19/93	6/26/963
INORGANIC PARAMETERS		
BARIUM (DISSOLVED)	21.1 FJ	37.5
BARIUM (TOTAL)	25.7 FJ	37.8
CADMIUM (TOTAL)	ND(2.0)	ND(1.0)
CHROMIUM (DISSOLVED)	5.8 FJ	--
CHROMIUM (TOTAL)	14.8 J	--
COBALT (DISSOLVED)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ND(3.0)	ND(1.0)
COPPER (DISSOLVED)	31.2	ND(1.0)
COPPER (TOTAL)	51.8	ND(1.0)
LEAD (TOTAL)	ND(2.0)	ND(2.0) J
ZINC (DISSOLVED)	44.1 R	ND(16.7)
ZINC (TOTAL)	29.4	ND(18.0)

CONCENTRATION (ug/L)

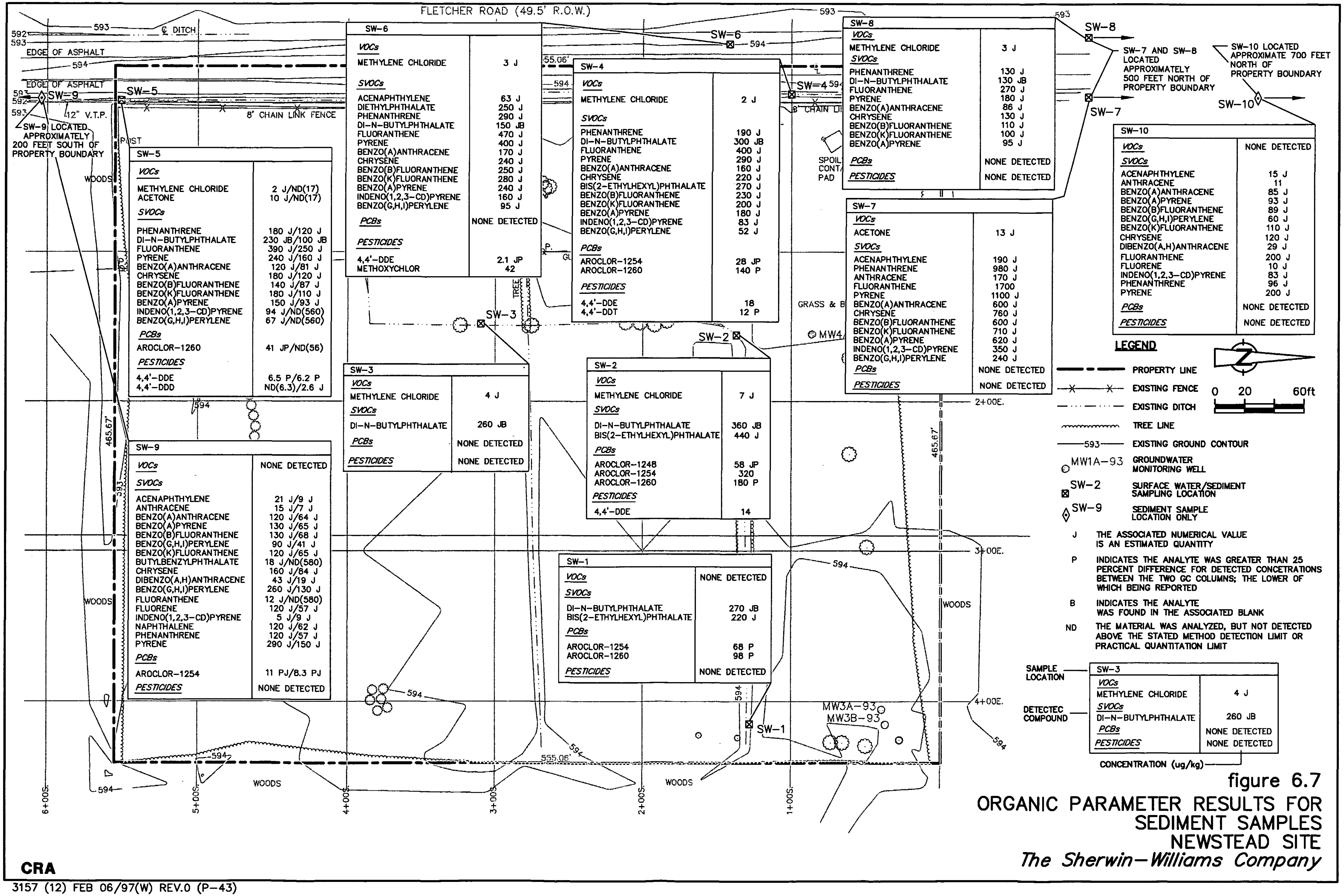
▭ CONCENTRATION EXCEEDS NEW YORK STATE CLASS GA GROUNDWATER CRITERIA

B	INDICATES ANALYTE WAS FOUND IN THE ASSOCIATED BLANK
J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
F	INDICATES THE REPORTED VALUE WAS LESS THAN THE SPECIFIED DETECTION LIMIT, BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT
R	RESULT IS UNUSABLE
W	INDICATES THAT THE FURNACE AA POST-DIGESTION SPIKE RECOVERY DOES NOT MEET SPECIFIED CRITERIA
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT
--	THE PARAMETER WAS NOT ANALYZED

figure 6.6

SELECTED INORGANIC PARAMETER RESULTS FOR GROUNDWATER SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

CRA



SW-5	
VOCs	
METHYLENE CHLORIDE	2 J/ND(17)
ACETONE	10 J/ND(17)
SVOCs	
PHENANTHRENE	180 J/120 J
DI-N-BUTYLPHTHALATE	230 JB/100 JB
FLUORANTHENE	390 J/250 J
PYRENE	240 J/160 J
BENZO(A)ANTHRACENE	120 J/81 J
CHRYSENE	180 J/120 J
BENZO(B)FLUORANTHENE	140 J/87 J
BENZO(K)FLUORANTHENE	180 J/110 J
BENZO(A)PYRENE	150 J/93 J
INDENO(1,2,3-CD)PYRENE	94 J/ND(560)
BENZO(G,H,I)PERYLENE	67 J/ND(560)
PCBs	
AROCLOR-1260	41 JP/ND(56)
PESTICIDES	
4,4'-DDE	6.5 P/6.2 P
4,4'-DDD	ND(6.3)/2.6 J

SW-9	
VOCs	NONE DETECTED
SVOCs	
ACENAPHTHYLENE	21 J/9 J
ANTHRACENE	15 J/7 J
BENZO(A)ANTHRACENE	120 J/64 J
BENZO(A)PYRENE	130 J/65 J
BENZO(B)FLUORANTHENE	130 J/68 J
BENZO(G,H,I)PERYLENE	90 J/41 J
BENZO(K)FLUORANTHENE	120 J/65 J
BUTYLBENZYLPHTHALATE	18 J/ND(580)
CHRYSENE	160 J/84 J
DIBENZO(A,H)ANTHRACENE	43 J/19 J
BENZO(G,H,I)PERYLENE	260 J/130 J
FLUORANTHENE	12 J/ND(580)
FLUORENE	120 J/57 J
INDENO(1,2,3-CD)PYRENE	5 J/9 J
NAPHTHALENE	120 J/62 J
PHENANTHRENE	120 J/57 J
PYRENE	290 J/150 J
PCBs	
AROCLOR-1254	11 PJ/8.3 PJ
PESTICIDES	NONE DETECTED

SW-6	
VOCs	
METHYLENE CHLORIDE	3 J
SVOCs	
ACENAPHTHYLENE	63 J
DIETHYLPHTHALATE	250 J
PHENANTHRENE	290 J
DI-N-BUTYLPHTHALATE	150 JB
FLUORANTHENE	470 J
PYRENE	400 J
BENZO(A)ANTHRACENE	170 J
CHRYSENE	240 J
BENZO(B)FLUORANTHENE	250 J
BENZO(K)FLUORANTHENE	280 J
BENZO(A)PYRENE	240 J
INDENO(1,2,3-CD)PYRENE	160 J
BENZO(G,H,I)PERYLENE	95 J
PCBs	NONE DETECTED
PESTICIDES	
4,4'-DDE	2.1 JP
METHOXYCHLOR	42

SW-3	
VOCs	
METHYLENE CHLORIDE	4 J
SVOCs	
DI-N-BUTYLPHTHALATE	260 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-4	
VOCs	
METHYLENE CHLORIDE	2 J
SVOCs	
PHENANTHRENE	190 J
DI-N-BUTYLPHTHALATE	300 JB
FLUORANTHENE	400 J
PYRENE	290 J
BENZO(A)ANTHRACENE	160 J
CHRYSENE	220 J
BIS(2-ETHYLHEXYL)PHTHALATE	270 J
BENZO(B)FLUORANTHENE	230 J
BENZO(K)FLUORANTHENE	200 J
BENZO(A)PYRENE	180 J
INDENO(1,2,3-CD)PYRENE	83 J
BENZO(G,H,I)PERYLENE	52 J
PCBs	
AROCLOR-1254	28 JP
AROCLOR-1260	140 P
PESTICIDES	
4,4'-DDE	18
4,4'-DDT	12 P

SW-2	
VOCs	
METHYLENE CHLORIDE	7 J
SVOCs	
DI-N-BUTYLPHTHALATE	360 JB
BIS(2-ETHYLHEXYL)PHTHALATE	440 J
PCBs	
AROCLOR-1248	58 JP
AROCLOR-1254	320
AROCLOR-1260	180 P
PESTICIDES	
4,4'-DDE	14

SW-1	
VOCs	NONE DETECTED
SVOCs	
DI-N-BUTYLPHTHALATE	270 JB
BIS(2-ETHYLHEXYL)PHTHALATE	220 J
PCBs	
AROCLOR-1254	68 P
AROCLOR-1260	98 P
PESTICIDES	NONE DETECTED

SW-8	
VOCs	
METHYLENE CHLORIDE	3 J
SVOCs	
PHENANTHRENE	130 J
DI-N-BUTYLPHTHALATE	130 JB
FLUORANTHENE	270 J
PYRENE	180 J
BENZO(A)ANTHRACENE	86 J
CHRYSENE	130 J
BENZO(B)FLUORANTHENE	110 J
BENZO(K)FLUORANTHENE	100 J
BENZO(A)PYRENE	95 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-7	
VOCs	
ACETONE	13 J
SVOCs	
ACENAPHTHYLENE	190 J
PHENANTHRENE	980 J
ANTHRACENE	170 J
FLUORANTHENE	1700
PYRENE	1100 J
BENZO(A)ANTHRACENE	600 J
CHRYSENE	760 J
BENZO(B)FLUORANTHENE	600 J
BENZO(K)FLUORANTHENE	710 J
BENZO(A)PYRENE	620 J
INDENO(1,2,3-CD)PYRENE	350 J
BENZO(G,H,I)PERYLENE	240 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-10	
VOCs	NONE DETECTED
SVOCs	
ACENAPHTHYLENE	15 J
ANTHRACENE	11
BENZO(A)ANTHRACENE	85 J
BENZO(A)PYRENE	93 J
BENZO(B)FLUORANTHENE	89 J
BENZO(G,H,I)PERYLENE	60 J
BENZO(K)FLUORANTHENE	110 J
CHRYSENE	120 J
DIBENZO(A,H)ANTHRACENE	29 J
FLUORANTHENE	200 J
FLUORENE	10 J
INDENO(1,2,3-CD)PYRENE	83 J
PHENANTHRENE	96 J
PYRENE	200 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

LEGEND

PROPERTY LINE
EXISTING FENCE
EXISTING DITCH
TREE LINE
—593— EXISTING GROUND CONTOUR
MW1A-93 GROUNDWATER MONITORING WELL
☒ SW-2 SURFACE WATER/SEDIMENT SAMPLING LOCATION
◇ SW-9 SEDIMENT SAMPLE LOCATION ONLY

J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
P	INDICATES THE ANALYTE WAS GREATER THAN 25 PERCENT DIFFERENCE FOR DETECTED CONCETRATIONS BETWEEN THE TWO GC COLUMNS; THE LOWER OF WHICH BEING REPORTED
B	INDICATES THE ANALYTE WAS FOUND IN THE ASSOCIATED BLANK
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT

SAMPLE LOCATION — SW-3
DETECTEC COMPOUND

SW-3	
VOCs	
METHYLENE CHLORIDE	4 J
SVOCs	
DI-N-BUTYLPHTHALATE	260 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

CONCENTRATION (ug/kg)

figure 6.7

ORGANIC PARAMETER RESULTS FOR SEDIMENT SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

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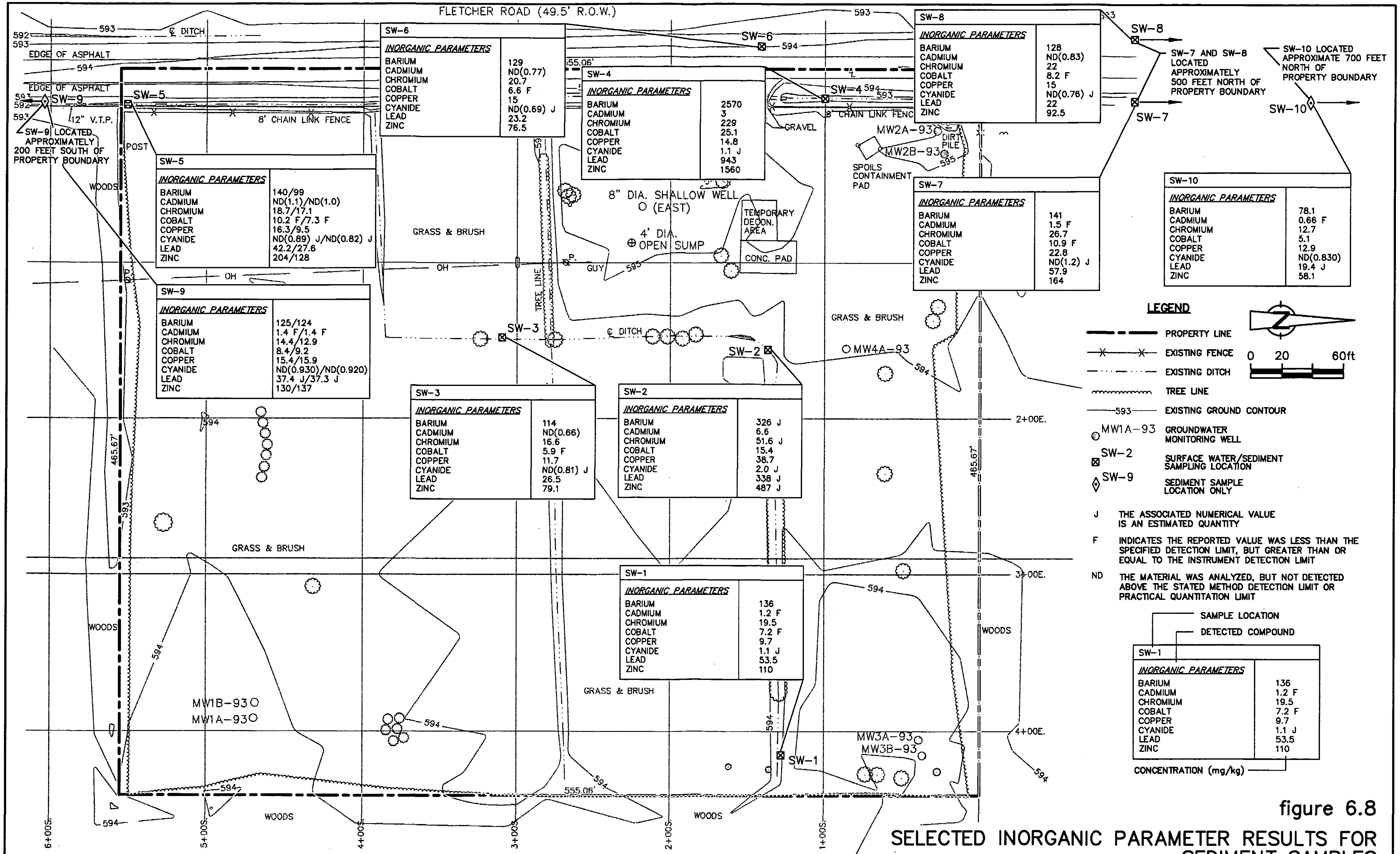
3157 (12) FEB 06/97(W) REV.0 (P-43)



SW-6	
INORGANIC PARAMETERS	
BARIUM	129
CADMIUM	ND(0.77)
CHROMIUM	20.7
COBALT	6.6 F
COPPER	15
CYANIDE	ND(0.69) J
LEAD	23.2
ZINC	76.5

SW-4	
INORGANIC PARAMETERS	
BARIUM	2570
CADMIUM	3
CHROMIUM	229
COBALT	25.1
COPPER	14.8
CYANIDE	1.1 J
LEAD	943
ZINC	1560

SW-8	
INORGANIC PARAMETERS	
BARIUM	128
CADMIUM	ND(0.83)
CHROMIUM	22
COBALT	8.2 F
COPPER	15
CYANIDE	ND(0.76) J
LEAD	22
ZINC	92.5

SW-5	
INORGANIC PARAMETERS	
BARIUM	140/99
CADMIUM	ND(1.1)/ND(1.0)
CHROMIUM	18.7/17.1
COBALT	10.2 F/7.3 F
COPPER	16.3/9.5
CYANIDE	ND(0.89) J/ND(0.82) J
LEAD	42.2/27.6
ZINC	204/128

SW-7	
INORGANIC PARAMETERS	
BARIUM	141
CADMIUM	1.5 F
CHROMIUM	26.7
COBALT	10.9 F
COPPER	22.8
CYANIDE	ND(1.2) J
LEAD	57.9
ZINC	164

SW-10	
INORGANIC PARAMETERS	
BARIUM	78.1
CADMIUM	0.66 F
CHROMIUM	12.7
COBALT	5.1
COPPER	12.9
CYANIDE	ND(0.830)
LEAD	19.4 J
ZINC	58.1

SW-9	
INORGANIC PARAMETERS	
BARIUM	125/124
CADMIUM	1.4 F/1.4 F
CHROMIUM	14.4/12.9
COBALT	8.4/9.2
COPPER	15.4/15.9
CYANIDE	ND(0.930)/ND(0.920)
LEAD	37.4 J/37.3 J
ZINC	130/137

SW-3	
INORGANIC PARAMETERS	
BARIUM	114
CADMIUM	ND(0.66)
CHROMIUM	16.6
COBALT	5.9 F
COPPER	11.7
CYANIDE	ND(0.81) J
LEAD	26.5
ZINC	79.1

SW-2	
INORGANIC PARAMETERS	
BARIUM	326 J
CADMIUM	6.6
CHROMIUM	51.6 J
COBALT	15.4
COPPER	38.7
CYANIDE	2.0 J
LEAD	338 J
ZINC	487 J

SW-1	
INORGANIC PARAMETERS	
BARIUM	136
CADMIUM	1.2 F
CHROMIUM	19.5
COBALT	7.2 F
COPPER	9.7
CYANIDE	1.1 J
LEAD	53.5
ZINC	110

SW-1	
INORGANIC PARAMETERS	
BARIUM	136
CADMIUM	1.2 F
CHROMIUM	19.5
COBALT	7.2 F
COPPER	9.7
CYANIDE	1.1 J
LEAD	53.5
ZINC	110

J THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

F INDICATES THE REPORTED VALUE WAS LESS THAN THE SPECIFIED DETECTION LIMIT, BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT

ND THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT

figure 6.8

SELECTED INORGANIC PARAMETER RESULTS FOR SEDIMENT SAMPLES
NEWSTEAD SITE
The Sherwin-Williams Company

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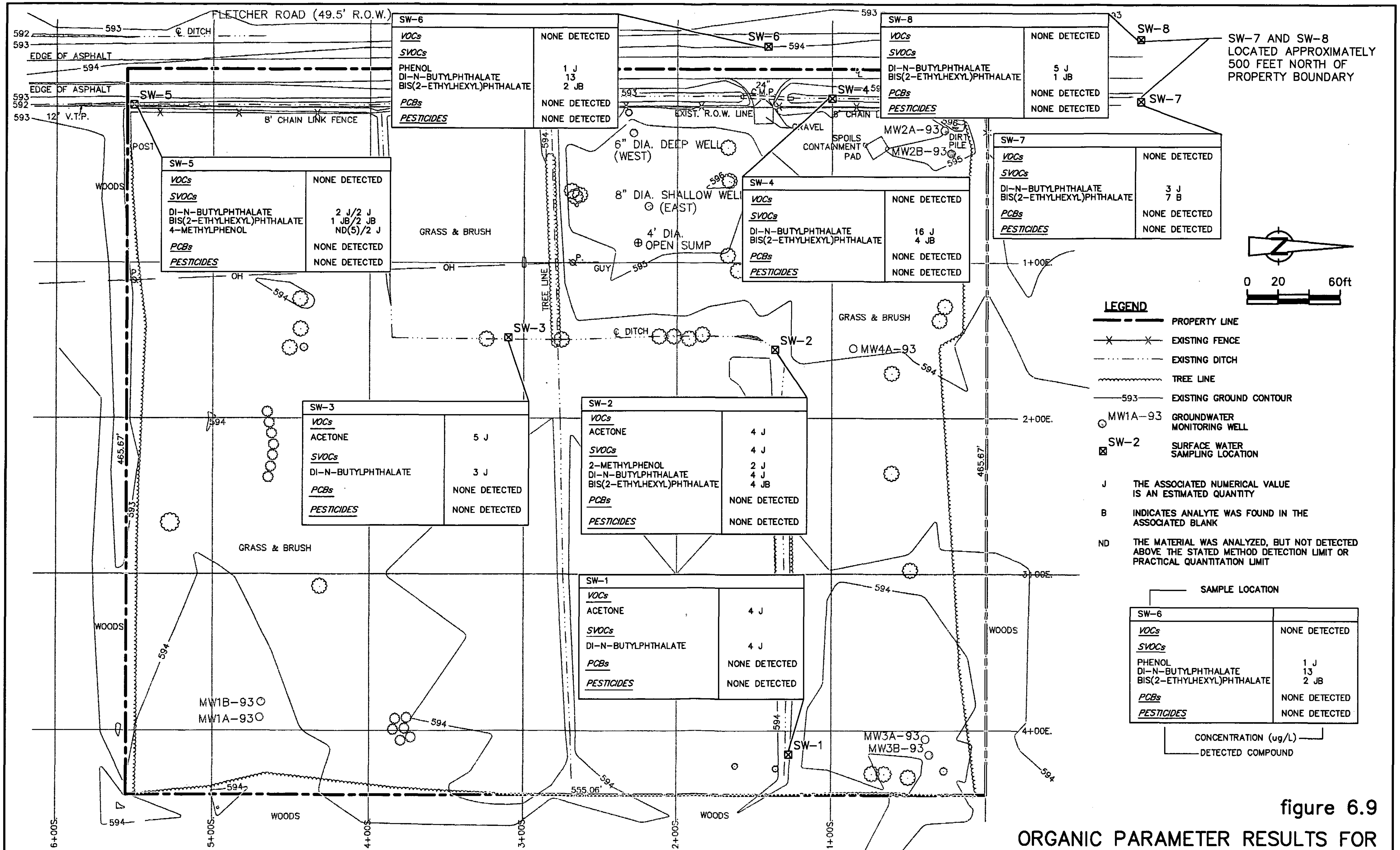
3157 (12) FEB 06/97(W) REV.0 (P-63)



SW-6	
VOCs	NONE DETECTED
SVOCs	
PHENOL DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	1 J 13 2 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-8	
VOCs	NONE DETECTED
SVOCs	
DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	5 J 1 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-7	
VOCs	NONE DETECTED
SVOCs	
DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	3 J 7 B
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-5	
VOCs	NONE DETECTED
SVOCs	
DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE 4-METHYLPHENOL	2 J/2 J 1 JB/2 JB ND(5)/2 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-4	
VOCs	NONE DETECTED
SVOCs	
DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	16 J 4 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-3	
VOCs	
ACETONE	5 J
SVOCs	
DI-N-BUTYLPHTHALATE	3 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-2	
VOCs	
ACETONE	4 J
SVOCs	4 J
2-METHYLPHENOL DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	2 J 4 J 4 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

SW-1	
VOCs	
ACETONE	4 J
SVOCs	
DI-N-BUTYLPHTHALATE	4 J
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

LEGEND

▬ ▬	PROPERTY LINE
—×—×—	EXISTING FENCE
—··—··—	EXISTING DITCH
∿∿∿	TREE LINE
—593—	EXISTING GROUND CONTOUR
○ MW1A-93	GROUNDWATER MONITORING WELL
⊠ SW-2	SURFACE WATER SAMPLING LOCATION
J	THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
B	INDICATES ANALYTE WAS FOUND IN THE ASSOCIATED BLANK
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT

SAMPLE LOCATION

SW-6	
VOCs	NONE DETECTED
SVOCs	
PHENOL DI-N-BUTYLPHTHALATE BIS(2-ETHYLHEXYL)PHTHALATE	1 J 13 2 JB
PCBs	NONE DETECTED
PESTICIDES	NONE DETECTED

CONCENTRATION (ug/L)
DETECTED COMPOUND

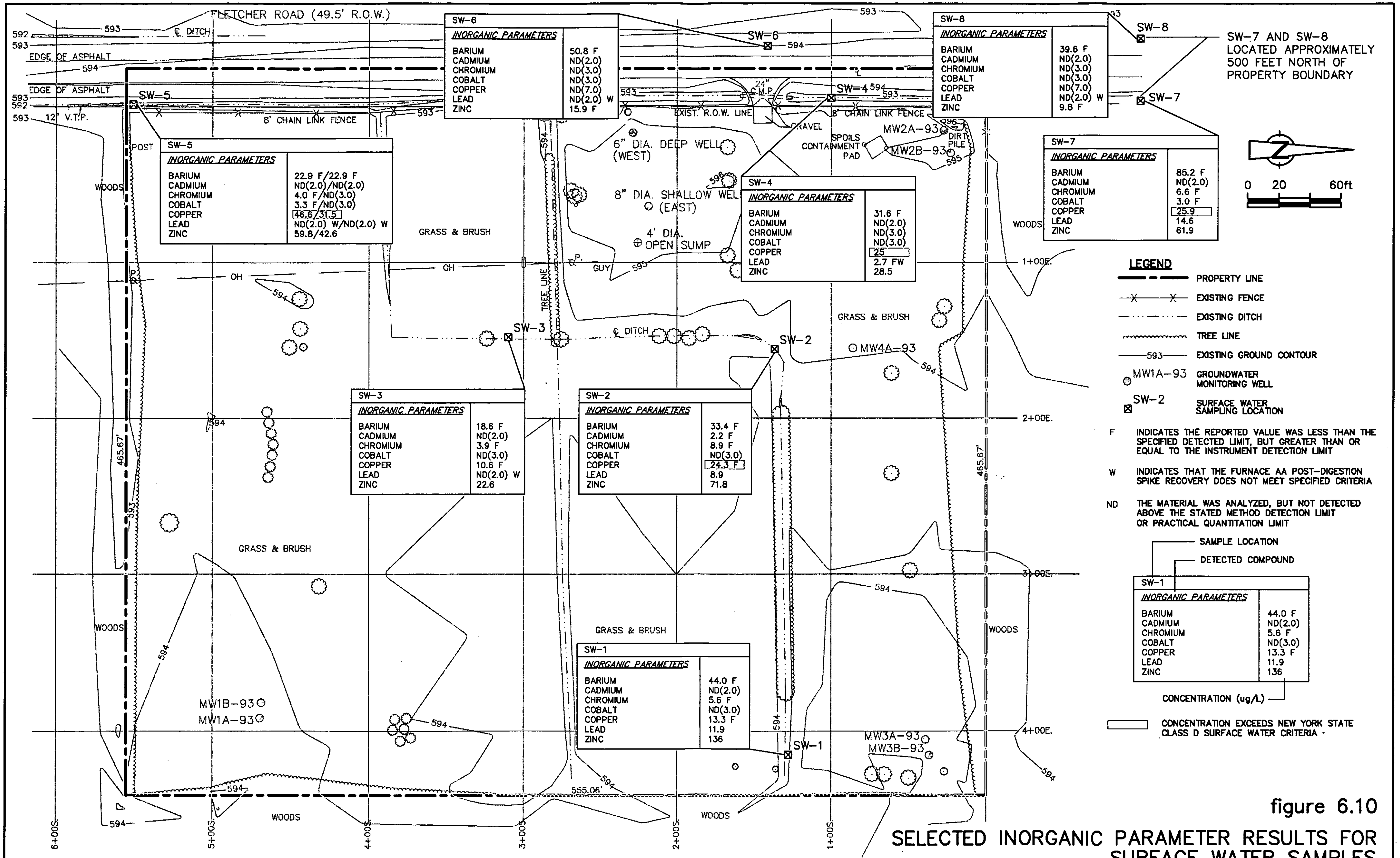
figure 6.9

ORGANIC PARAMETER RESULTS FOR SURFACE WATER SAMPLES NEWSTEAD SITE

The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-44)



SW-5

INORGANIC PARAMETERS	
BARIUM	22.9 F/22.9 F
CADMIUM	ND(2.0)/ND(2.0)
CHROMIUM	4.0 F/ND(3.0)
COBALT	3.3 F/ND(3.0)
COPPER	46.6/31.5
LEAD	ND(2.0) W/ND(2.0) W
ZINC	59.8/42.6

SW-6

INORGANIC PARAMETERS	
BARIUM	50.8 F
CADMIUM	ND(2.0)
CHROMIUM	ND(3.0)
COBALT	ND(3.0)
COPPER	ND(7.0)
LEAD	ND(2.0) W
ZINC	15.9 F

SW-8

INORGANIC PARAMETERS	
BARIUM	39.6 F
CADMIUM	ND(2.0)
CHROMIUM	ND(3.0)
COBALT	ND(3.0)
COPPER	ND(7.0)
LEAD	ND(2.0) W
ZINC	9.8 F

SW-4

INORGANIC PARAMETERS	
BARIUM	31.6 F
CADMIUM	ND(2.0)
CHROMIUM	ND(3.0)
COBALT	ND(3.0)
COPPER	25
LEAD	2.7 FW
ZINC	28.5

SW-7

INORGANIC PARAMETERS	
BARIUM	85.2 F
CADMIUM	ND(2.0)
CHROMIUM	6.6 F
COBALT	3.0 F
COPPER	25.9
LEAD	14.6
ZINC	61.9

SW-3

INORGANIC PARAMETERS	
BARIUM	18.6 F
CADMIUM	ND(2.0)
CHROMIUM	3.9 F
COBALT	ND(3.0)
COPPER	10.6 F
LEAD	ND(2.0) W
ZINC	22.6

SW-2

INORGANIC PARAMETERS	
BARIUM	33.4 F
CADMIUM	2.2 F
CHROMIUM	8.9 F
COBALT	ND(3.0)
COPPER	24.3 F
LEAD	8.9
ZINC	71.8

SW-1

INORGANIC PARAMETERS	
BARIUM	44.0 F
CADMIUM	ND(2.0)
CHROMIUM	5.6 F
COBALT	ND(3.0)
COPPER	13.3 F
LEAD	11.9
ZINC	136

LEGEND

PROPERTY LINE

EXISTING FENCE

EXISTING DITCH

TREE LINE

593 EXISTING GROUND CONTOUR

MW1A-93 GROUNDWATER MONITORING WELL

SW-2 SURFACE WATER SAMPLING LOCATION

F	INDICATES THE REPORTED VALUE WAS LESS THAN THE SPECIFIED DETECTED LIMIT, BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT
W	INDICATES THAT THE FURNACE AA POST-DIGESTION SPIKE RECOVERY DOES NOT MEET SPECIFIED CRITERIA
ND	THE MATERIAL WAS ANALYZED, BUT NOT DETECTED ABOVE THE STATED METHOD DETECTION LIMIT OR PRACTICAL QUANTITATION LIMIT

SAMPLE LOCATION

DETECTED COMPOUND

SW-1

INORGANIC PARAMETERS	
BARIUM	44.0 F
CADMIUM	ND(2.0)
CHROMIUM	5.6 F
COBALT	ND(3.0)
COPPER	13.3 F
LEAD	11.9
ZINC	136

CONCENTRATION (ug/L)

▭ CONCENTRATION EXCEEDS NEW YORK STATE CLASS D SURFACE WATER CRITERIA

figure 6.10

SELECTED INORGANIC PARAMETER RESULTS FOR SURFACE WATER SAMPLES NEWSTEAD SITE

The Sherwin-Williams Company

CRA

3157 (12) FEB 06/97(W) REV.0 (P-62)

TABLE 2.1

ANALYTICAL DATA SUMMARY
NYSDEC WASTE MATERIAL SAMPLING RESULTS - SEPTEMBER 1987
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sample Matrix:	*Tar*	*Soil/Paint Sludge*	*Soil Waste*
Sample Date:	*09/09/87*	*09/09/87*	*09/09/87*
Sampler:	*NYSDEC*	*NYSDEC*	*NYSDEC*
Sample ID:	*A987253-03*	*A987253-04*	*A987253-05*
Organic Parameters (ppb)			
Benzene	279.01	8521.79	2.68
Toluene	165.13	ND	1.85
Ethylbenzene	848.92	ND	ND
Xylenes (total)	2045.80	ND	ND
Trans-1,2-Dichloroethene	ND	808.5	ND
2-Butanone	ND	659.45	ND
Trichloroethene	ND	165.1	18.70
Tetrachloroethene	ND	218.6	ND
Chloroform	ND	ND	1.86
Naphthalene	44.15	ND	ND
2-Methylnaphthalene	6.21	ND	ND
Dimethyl Phthalate	288.82	296.06	ND
Di-n-Butylphthalate	18.58	ND	ND
Isophorone	ND	258.44	ND
Inorganic Parameters (ppm)			
Aluminum	303.3	3763	5027/5632
Antimony	<0.060	<0.060	<0.060/<0.060
Arsenic	0.53	4.39	11.7/8.9
Barium	383	2590	13100/13200
Beryllium	0.0225	0.232	0.352/0.296
Cadmium	4.38	5.67	6.62/7.60
Chromium	8.980	5210	901/1590
Cobalt	159	<0.050	29.6/35.2
Copper	7.9	78.6	119.7/161.9
Iron	408.7	4021.7	8307.2/10010.8
Lead	831.0	32200	3190/5570
Magnesium	986	4150.0	27300/11300
Manganese	238.18	167.52	494.14/518.09
Mercury	<0.0002	0.1235	1.160/--
Nickel	3.37	2.58	9.85/12.67
Potassium	107.9	317	695.5/665.8

TABLE 2.1

ANALYTICAL DATA SUMMARY
NYSDEC WASTE MATERIAL SAMPLING RESULTS - SEPTEMBER 1987
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sample Matrix:	***Tar***	***Soil/Paint Sludge***	***Soil Waste***
Sample Date:	*09/09/87*	*09/09/87*	*09/09/87*
Sampler:	*NYSDEC*	*NYSDEC*	*NYSDEC*
Sample ID:	*A987253-03*	*A987253-04*	*A987253-05*
Inorganic Parameters (ppm) (cont'd)			
Selenium	<0.005	0.309	0.113/<0.005
Silver	0.0337	0.0258	0.113/0.0986
Sodium	280.8	696.1	506.9/506.9
Thallium	0.124	0.0902	0.197/0.183
Tin	14.24	<0.040	<0.040/<0.040
Vanadium	1.213	10.196	15.784/13.629
Zinc	104.9	409.28	6649/7788

Note:

ND - Compound not detected. Detection limit not stated.
-- - Compound was not analyzed.

TABLE 2.2

ANALYTICAL DATA SUMMARY
GROUNDWATER SAMPLING RESULTS - DETECTED ORGANIC COMPOUNDS, NYSDEC/NYSDOH, 1987 AND 1988
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sample Location:	*Shallow Well (39')*		*Deep Well (93')*			*Rinsate Blank*
Sample Date:	*09/09/87*	*09/21/88*	*09/09/87*	*09/21/88*	*09/21/88*	*09/21/88*
Sampler:	*NYSDEC*	*NYSDOH*	*NYSDEC*	*NYSDOH*	*NYSDOH*	*NYSDOH*
Sample ID:	*A98725306*	*883445*	*A98725307*	*883444* *(Untreated)*	*883443* *(Treated)*	*883446*
Organic Compounds (ppb)						
Methylene Chloride	10.45	<0.5	15.79	<0.5	<0.5	<0.5
2-Butanone	26.93	--	ND	--	--	--
Trichloroethene	1.92	<0.5	ND	<0.5	<0.5	<0.5
Benzene	3.52	<0.5	1.62	<0.5	<0.5	<0.5
Toluene	9.78	7.0	ND	<0.5	<0.5	<0.5
Ethylbenzene	3.08	0.8	ND	<0.5	<0.5	<0.5
Xylenes (total)	10.66	--	ND	--	--	--
p-Xylene	--	0.7	--	<0.5	<0.5	<0.5
m-Xylene	--	1	--	<0.5	<0.5	<0.5
o-Xylene	--	2	--	<0.5	<0.5	<0.5
1,3,5-Trimethylbenzene		1		<0.5	<0.5	<0.5
1,2,4-Trimethylbenzene		3		<0.5	<0.5	<0.5
Chloroform		<0.5		<0.5	4	2
Bromodichloromethane		<0.5		<0.5	4	<0.5
Dibromochloromethane		<0.5		<0.5	6	<0.5
Bromoform		<0.5		<0.5	6	<0.5
Dimethyl Phthalate	0.95	--	ND	--	--	--
Diethylphthalate	2.15	--	ND	--	--	--
Di-n-Butylphthalate	2.65	--	ND	--	--	--
Acenaphthylene	0.03	--	ND	--	--	--

Notes:

ND - Not detected - detection limit not stated.

-- - Compound was not analyzed.

TABLE 2.3

ANALYTICAL DATA SUMMARY
GROUNDWATER SAMPLING RESULTS - DETECTED METALS, NYSDEC/ECHD, 1987 AND 1988
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sample Location:	*Shallow Well (39')*		*Deep Well (93')*	
Sample Date:	*09/09/87*	*09/21/88*	*09/21/88*	*09/21/88*
Sampler:	*NYSDEC*	*ECHD*	*ECHD*	*ECHD*
Sample ID:	*A98725306*	*88-487*	*88-489* *(Untreated)*	*88-488* *(Treated)*
Inorganic Parameters (ppb)				
Aluminum	1,300	–	–	–
Antimony	<60	–	–	–
Arsenic	<10	<10.0	<10.0	<10.0
Barium	4,400	<200	<200	<200
Beryllium	<5	–	–	–
Cadmium	20	20	1.0	2.0
Chromium	<10	<10	<10.0	<10.0
Cobalt	<50	–	–	–
Copper	<25	–	–	–
Iron	15,400	–	–	–
Lead	33	33.0	<10.0	<10.0
Magnesium	<5,000	–	–	–
Manganese	270	–	–	–
Mercury	<0.20	0.48	<0.4	<0.4
Nickel	<40	–	–	–
Potassium	6,690	–	–	–
Selenium	<5	<1.0	<1.0	<1.0
Silver	<10	–	–	–
Sodium	8,500	–	–	–
Thallium	<10	–	–	–
Tin	<40	–	–	–
Vanadium	<50	–	–	–
Zinc	2,200	1,700	110.0	260.0

Note:

-- - Analyte was not analyzed for.
NS - no standard is available.

TABLE 2.4

ANALYTICAL DATA SUMMARY
SOIL SAMPLING RESULTS
NYSDOH/ECHD - SEPTEMBER 21, 1988
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sample ID	*S-1*	*S-2*	*S-3*	*S-4*	*S-5*	*S-6*	*S-7*	*S-8*	*S-9*	*S-10*
Organic Compounds (mg/kg)										
Benzene	0.03(PL)	0.03(PL)	0.03	0.06	<0.03	0.07	0.05	0.07	0.03	0.10
Toluene	<0.03	<0.03	0.04	<0.03	<0.03	0.05	0.03 (PL)	0.03 (PL)	<0.03	0.03 (PL)
o-Xylene	<0.03	<0.03	<0.03	<0.03	<0.03	0.03 (PL)	<0.03	<0.03	<0.03	<0.03
Tert-butylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	0.63	0.43	<0.03	<0.03	<0.03
1,3,5-Trimethylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	0.62	0.43	<0.03	<0.03	0.03 (PL)
1,2,4-Trimethylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	0.29	0.28	<0.03	<0.03	0.05
p-Cymene	<0.03	<0.03	<0.03	<0.03	<0.03	0.70	0.04	<0.03	<0.03	0.03 (PL)
Cyclopropylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	0.40 (EE)	0.04 (EE)	<0.03	<0.03	<0.03
n-Propylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	0.03 (PL)	<0.03
m-Xylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Sec-butylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Metals										
Arsenic	2.91	2.51	2.66	3.19	2.77	3.97	5.06	3.67	4.24	2.59
Barium	101.0	63.8	70.7	359.0	88.6	5160.0	7240.0	857.0	3940.0	155.0
Cadmium	2.0	0.4	0.6	9.0	0.3	83.0	165.0	17.0	175.0	8.0
Chromium	33.9	14.0	17.0	112.0	20.0	1360.0	1730.0	211.0	1760.0	98.0
Lead	95.8	13.0	59.9	1130.0	11.0	11600.0	18200.0	3260.0	16200.0	1520.0
Mercury	0.22	<0.2	0.44	0.26	<0.2	0.98	1.01	<0.2	1.02	0.22
Selenium	<0.1	<0.1	<0.1	0.2	<0.1	5.6	10.5	0.74	7.2	0.2
Zinc	396.0	95.8	129.0	734.0	79.0	7020.0	11400.0	2560.0	10100.0	1620.0

Note:
Qualifiers are undefined in source document.

TABLE 2.4

ANALYTICAL DATA SUMMARY
SOIL SAMPLING RESULTS
NYSDOH/ECHD - SEPTEMBER 21, 1988
NEWSTEAD SITE, NEWSTEAD, N.Y.

Sample ID	*S-11*	*S-12*	*S-13*	*S-14*	*S-15*	*S-16*	*S-17*	*S-18*	*S-19*	*S-20*
Organic Compounds (mg/kg)										
Benzene	0.03	0.03	<0.03	0.03 (PL)	0.03 (PL)	<0.03	0.03 (PL)	0.03 (PL)	<0.03	<0.03
Toluene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.38	0.67	0.14
o-Xylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	INTER	<0.03	<0.03
Tert-butylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	INTER	<0.03	<0.03
1,3,5-Trimethylbenzene	<0.03	<0.03	0.03 (PL)	0.03 (PL)	0.03 (PL)	0.03 (PL)	0.03 (PL)	0.55	0.03 (PL)	0.03 (PL)
1,2,4-Trimethylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	1.4	<0.03	<0.03
p-Cymene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	INTER	<0.03	<0.03
Cyclopropylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	INTER	<0.03	<0.03
n-Propylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	INTER	<0.03	<0.03
m-Xylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	<0.03
Sec-butylbenzene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	2.2 (EE)	<0.03	<0.03
Metals										
Arsenic	3.86	2.59	3.37	2.85	3.00	3.94	2.10	3.30	3.22	2.55
Barium	88.1	81.8	108.0	116.0	119.0	212.0	224.0	149.0	2920.0	2050.0
Cadmium	2.0	2.0	3.0	2.0	0.7	3.0	4.0	71.0	53.0	39.0
Chromium	30.0	18.0	30.0	32.0	43.0	78.0	78.0	2680.0	582.0	283.0
Lead	85.0	17.0	71.9	105.0	121.0	388.0	800.0	19200.0	5760.0	3680.0
Mercury	<0.2	<0.2	<0.2	<0.2	<0.2	0.31	0.53	0.53	0.79	0.66
Selenium	<0.1	0.1	0.4	0.1	0.1	<0.1	<0.1	0.6	2.4	2.0
Zinc	206.0	279.0	263.0	218.0	174.0	317.0	375.0	25500.0	3580.0	3010.0

Note:
Qualifiers are undefined in source document.

TABLE 3.1

MONITORING WELL CONSTRUCTION DETAILS
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Well ID	*Date Completed*	*Site Coordinates*		*Ground Surface Elevation (ft. AMSL)*	*Hydraulic Unit Monitored*	*Depth of 10-inch Steel Outer Casing (ft. BGS)*	*Depth of 2-inch Stainless Steel Riser Pipe (ft. BGS)*	*Screened Interval*	
								(ft. BGS)	*(ft. AMSL)*
MW1A-93	September 8, 1993	470S	392E	594.4	Upper Waterbearing Zone	NA	3.8	3.8 - 13.8	580.6. - 590.6
MW1B-93	September 10, 1993	469S	382E	594.4	Lower Waterbearing Zone	16.8	36.0	36.0 - 40.0	554.4 - 558.4
MW2A-93	September 15, 1993	28S	15E	595.2	Upper Waterbearing Zone	NA	4.9	4.9 - 14.9	580.3 - 590.3
MW2B-93	September 16, 1993	23S	30E	595.3	Lower Waterbearing Zone	16.9	38.8	38.8 - 42.8	552.5 - 556.5
MW3A-93	September 9, 1993	39S	405E	593.9	Upper Waterbearing Zone	NA	4.4	4.4 - 14.4	579.5 - 589.5
MW3B-93	September 13, 1993	37S	415E	593.9	Lower Waterbearing Zone	17.4	44	44.0 - 49.0	544.9 - 549.9
MW4A-93	September 17, 1993	89S	155E	594.4	Upper Waterbearing Zone	NA	5.0	5.0 - 15.0	579.4 - 589.4

Notes:

BGS	Below Ground Surface
NA	Not Applicable.

TABLE 3.2

WELL DEVELOPMENT SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Well ID	*Calculated Well Volume (gallons)*	*Volume Evacuated (gallons)*	*Volume Evacuated (Well Volume)*	*Comments*
MW1A-93	1.9	58.5	30.8	- turbidity >200 NTU
MW1B-93	5.7	36.6	6.4	- bailed dry 5 consecutive days, turbidity >200 NTU
MW2A-93	1.8	48	26.7	- turbidity >200 NTU
MW2B-93	5.7	109.7	19.2	- turbidity >200 NTU
MW3A-93	1.8	44.5	24.7	- turbidity >200 NTU
MW3B-93	7.2	106.5	15.6	- turbidity >200 NTU
MW4A-93	1.7	50	29.4	- turbidity >200 NTU
Shallow Well	80.3	400	5	- turbidity = 33.5 NTU
Deep Well	82	494	6	- turbidity = 2.23 NTU

TABLE 3.3

GROUNDWATER SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

			Analytical Parameters						
Sampling Location	*Sample ID*	*Date Sampled*	*VOCs*	*SVOCs*	*Pesticides*	*PCBs*	*Total Metals*	*Dissolved Metals*	*Cyanide*
Round 1 (October, 1993)									
MW1A-93	MW-1A-1093JW	10/19/93	X	X	X	X	X	X	X
MW1B-93	MW-1B-1093JW	10/19/93	X	X	X	X	X	X	X
MW2A-93	MW-2A-1093JW/ MW-5A-1093JW	10/20/93	X	X	X	X	X	X	X
MW2B-93	MW-2B-1093JW	10/20/93	X	X	X	X	X	X	X
MW3A-93	MW-3A-993JW	10/19/93	X	X	X	X	X	X	X
MW3B-93	MW-3B-1093JW	10/21/93	X	X	X	X	X	X	X
MW4A-93	MW-4A-1093JW	10/19/93	X	X	X	X	X	X	X
Shallow Well	59 -FT-1093JW	10/19/93	X	X	X	X	X	X	X
Deep Well	67-FT-1093JW	10/20/93	X	X	X	X	X	X	X
Round 2 (June, 96)									
MW1A-93	GW-3157-062696-003	6/26/96	X	X			X (1)	X (1)	
MW1B-93	GW-3157-062796-006	6/27/96	X	X			X (1)	X (1)	
MW2A-93	GW-3157-062896-010	6/28/96	X	X			X (1)	X (1)	
MW2B-93	GW-3157-062896-011	6/28/96	X	X			X (1)	X (1)	
MW3A-93	GW-3157-062896-009	6/28/96	X	X			X (1)	X (1)	
MW3B-93	GW-3157-062796-008	6/27/96	X	X			X (1)	X (1)	
MW4A-93	GW-3157-062596-001/ GW-3157-062596-002	6/25/96	X	X			X (1)	X (1)	
Shallow Well	GW-3157-062796-005	6/27/96	X	X			X (1)	X (1)	
Deep Well	GW-3157-062796-007	6/27/96	X	X			X (1)	X (1)	

Notes:

(1) Round 2 groundwater samples were analyzed for the Site Specific Parameter List (SSPL) metals only (aluminum, barium, cadmium, calcium, cobalt, copper, iron, lead, manganese, magnesium, selenium, sodium, and zinc).
VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls

TABLE 3.4

SUBSURFACE SOIL SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Borehole ID	*Grid Coordinates*	*Depth Interval (ft BGS)*	*Sample ID*	*Date Sampled*	*Analytical Parameters* *VOCs*	*SVOCs*	*Pesticides*	*PCBs*	*TCLP*	*Metals*	*Cyanide*
BH1-93	0+36S 0+20E	2-4	BH-1B-993JW	9/22/93	X	X	X	X	X	X	X
		4-6	BH-1C-993JW	9/22/93	X	X	X	X		X	X
BH2-93	0+86S 0+20E	2-4	BH-2B-993JW	9/22/93	X	X	X	X		X	X
		4-6	BH-2C-993JW	9/22/93	X	X	X	X		X	X
BH3-93	0+86S 1+55E	0-2	BH-3A-993JW	9/17/93	X	X	X	X		X	X
		2-4	BH-3B-993JW	9/17/93	X	X	X	X		X	X
BH4-93	0+66S 2+50E	2-4	BH-4B-993JW	9/20/93	X	X	X	X		X	X
		4-6	BH-4C-993JW	9/20/93	X	X	X	X		X	X
BH5-93	1+76S 0-10E	0-2	BH-5A-993JW	9/23/93	X	X	X	X		X	X
		2-4	BH-5B-993JW	9/23/93	X	X	X	X		X	X
BH6-93	1+26S 0+90E	0-2	BH-6A-993JW	9/21/93	X	X	X	X		X	X
		2-4	BH-6B-993JW/BH-8B-993JW	9/21/93	X	X	X	X		X	X
BH7-93	3+76S 1+90E	0-2	BH-7A-993JW	9/20/93	X	X	X	X		X	X
		2-4	BH-7B-993JW	9/20/93	X	X	X	X		X	X
BH8-96	4+00S 1+00E	2-4	BH-3157-070996-007	7/9/96	X	X		X			
BH9-96	3+00S 1+00E	0-2	BH-3157-070996-005	7/9/96	X	X		X			
BH10-96	2+00S 1+00E	2-4	BH-3157-070996-006	7/9/96	X	X		X			
BH11-96	3+00S 4+00E	0-2	BH-3157-070996-009	7/9/96	X	X		X			
BH12-96	2+00S 4+00E	2-4	BH-3157-070996-008/ BH-3157-070996-010	7/9/96	X	X		X			

Notes:

VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls
TCLP - Toxicity Characteristic Leaching Procedure

TABLE 3.5

SURFACE SOIL SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sampling Location	*Sample I.D.*	*Grid Coordinates*	*Date Sampled*	*Analytical Parameters* *VOCs*	*SVOCs*	*Pesticides*	*PCBs*	*Metals*	*Cyanide*
SS-1	SS1	2+23S 1+59E	9/22/93	X	X	X	X	X	X
SS-2	SS2	2+23S 2+55E	9/22/93	X	X	X	X	X	X
SS-3	SS3	0+81S 1+37E	9/23/93	X	X	X	X	X	X

Notes:

VOCs - Volatile Organic Compounds

SVOCs - Semi-Volatile Organic Compounds

PCBs - Polychlorinated Biphenyls

TABLE 3.6

SEDIMENT SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sampling Location	*Sample I.D.*	*Date Sampled*	*Analytical Parameters*						
			VOCs	*SVOCs*	*Pesticides*	*PCBs*	*Metals*	*Cyanide*	*TOC*
SW-1	Sed-1-993JW	9/29/93	X	X	X	X	X	X	X
SW-2	Sed-2-993JW	9/29/93	X	X	X	X	X	X	X
SW-3	Sed-3-993JW	9/29/93	X	X	X	X	X	X	X
SW-4	Sed-4-993JW	9/29/93	X	X	X	X	X	X	X
SW-5	Sed-5-993JW/Sed-9-993JW	9/29/93	X	X	X	X	X	X	X
SW-6	Sed-6-993JW	9/29/93	X	X	X	X	X	X	X
SW-7	Sed-7-993JW	9/29/93	X	X	X	X	X	X	X
SW-8	Sed-8-993JW	9/29/93	X	X	X	X	X	X	X
SW-9	Sed-3157-062796-010/	6/27/96		X (1)		X	X	X	X
	Sed-3157-062796-011	6/27/96		X (1)		X	X	X	X
SW-10	Sed-3157-062796-009	6/27/96		X (1)		X	X	X	X

Notes:

(1) - Samples collected in 1996 were analyzed for base/neutral SVOCs only.
VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls

TABLE 3.7

SURFACE WATER SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sampling Location	*Sample I.D.*	*Date Sampled*	*Analytical Parameters*						
			VOCs	*SVOCs*	*Pesticides*	*PCBs*	*Metals*	*Cyanide*	*Hardness*
SW-1	SW-1-993JW	9/29/93	X	X	X	X	X	X	X
SW-2	SW-2-993JW	9/29/93	X	X	X	X	X	X	X
SW-3	SW-3-993JW	9/29/93	X	X	X	X	X	X	X
SW-4	SW-4-993JW	9/29/93	X	X	X	X	X	X	X
SW-5	SW-5-993JW/ SW-9-993JW	9/29/93	X	X	X	X	X	X	X
SW-6	SW-6-993JW	9/29/93	X	X	X	X	X	X	X
SW-7	SW-7-993JW	9/29/93	X	X	X	X	X	X	X
SW-8	SW-8-993JW	9/29/93	X	X	X	X	X	X	X

Notes:

VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls

TABLE 3.8

TEST PIT SAMPLING SUMMARY
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Sampling Location	*Sample I.D.*	*Sample Depth (ft bgs)*	*Date Sampled*	*Analytical Parameters*						
				VOCs	*SVOCs*	*Pesticides*	*PCBs*	*Metals*	*Grain Size*	*Atterburg Limits*
TP-9	S-3157-062496-001	1	6/24/96	X	X	X	X	X		
TP-12	S-3157-062696-005	0.8	6/26/96	X	X	X	X	X		
TP-14 (Fill)	TP-14 Fill	0 - 2	6/26/96						X	X
TP-14 (Native)	TP-14 Native	2-3	6/26/96						X	X
TP-15	S-3157-062496-003/ S-3157-062496-004	5.5	6/24/96	X	X	X	X	X		
TP-17 (Fill)	TP-17 Fill	0 - 2.5	6/26/96						X	X
TP-17 (Native)	TP-17 Native	2.5 - 3.5	6/26/96						X	X

Notes:

VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls

TABLE 4.1

GROUNDWATER ELEVATION MEASUREMENTS
NEWSTEAD SITE, NEWSTEAD, N.Y.

Monitoring Well ID	*Measuring Point (ft AMSL)*	*Water Levels*							
		11/18/93		*11/26/93*		*12/23/93*		*6/26/96*	
		(ft BTOC)	*(ft AMSL)*	*(ft BTOC)*	*(ft AMSL)*	*(ft BTOC)*	*(ft AMSL)*	*(ft BTOC)*	*(ft AMSL)*
MW1A-93	597.45	4.02	593.43	3.38	594.07	3.72	593.73	4.62	592.83
MW1B-93	597.22	7.65	589.57	6.34	590.88	5.62	591.60	4.83	592.39
MW2A-93	597.98	4.55	593.43	4.12	593.86	4.37	593.61	4.98	593.00
MW2B-93	598.05	8.86	589.19	7.51	590.54	6.83	591.22	6.51	591.54
MW3A-93	596.58	3.07	593.51	2.43	594.15	2.56	594.02	2.98	593.60
MW3B-93	596.22	7.00	589.22	5.67	590.55	5.00	591.22	5.81	590.41
MW4A-93	597.32	3.70	593.62	3.26	594.06	3.51	593.81	3.66	593.66
Shallow Well	598.90	9.64	589.26	8.28	590.62	6.47	592.43	7.15	591.75
Deep Well	597.42	8.22	589.20	6.85	590.57	7.94	589.48	6.34	591.08

TABLE 4.2

SUMMARY OF SLUG TEST RESULTS
NEWSTEAD SITE, NEWSTEAD, NEW YORK

Well No.	*Test (1)*	*Hydraulic Conductivity (cm/sec)*	*Screened Interval (3) (ft AMSL)*	*Static Water Level (4) (ft AMSL)*	*Screened Material*
Upper Sand Unit (2)					
MW1A-93	Falling	2.4E-04	591.4 - 580.6	594.07	sand and silt
MW1A-93	Rising	2.4E-04	591.4 - 580.6	594.07	sand and silt
MW2A-93	Falling	9.3E-05	591.3 - 580.3	593.86	sand and silt
MW2A-93	Rising	8.5E-05	591.3 - 580.3	593.86	sand and silt
MW3A-93	Falling	2.1E-05	590.5 - 578.6	594.15	sand and silt
MW3A-93	Rising	1.6E-05	590.5 - 578.6	594.15	sand and silt
MW4A-93	Falling	1.0E-05	590.4 - 579.4	594.06	sand and silt
MW4A-93	Rising	3.7E-05	590.4 - 579.4	594.06	sand and silt
MW4A-93	Rising	1.7E-05	590.4 - 579.4	594.06	sand and silt
	Geometric Mean =	4.6E-05			
Lower Sand Unit (5)					
MW1B-93	Falling	4.1E-06	560.4 - 554.4	590.88	sand and silt
MW1B-93	Rising	4.6E-05	560.4 - 554.4	590.88	sand and silt
MW2B-93	Falling	5.8E-05	558.5 - 552.5	590.54	sand and silt
MW2B-93	Rising	5.3E-05	558.5 - 552.5	590.54	sand and silt
MW3B-93	Falling	1.3E-05	551.9 - 544.5	590.55	sand and silt
MW3B-93	Rising	1.2E-05	551.9 - 544.5	590.55	sand and silt
	Geometric Mean =	2.1E -05			

Notes:

(1) Single well resposne tests conducted November 29 and 30, 1993.
(2) Data analyzed with AQTESOLV computer software using the Bouwer & Rice solution.
(3) Screened interval includes sandpack.
(4) Static water levels measured November 26, 1993.
(5) Data analyzed with AQTESOLV computer software using the Cooper et al. solution for a confined aquifer. Hydraulic conductivity calculated using the relation T=Kb.

TABLE 4.3

SUMMARY OF GROUNDWATER VERTICAL GRADIENTS
NEWSTEAD SITE, NEWSTEAD, N.Y.

Monitoring Well Pair	*Vertical Gradient*			
	11/18/93	***11/26/93***	***12/23/93***	***6/26/96***
MW1A/B-93	-0.13	-0.11	-0.07	-0.02
MW2A/B-93	-0.14	-0.11	-0.08	-0.05
MW3A/B-93	-0.12	-0.1	-0.08	-0.09

Note:

a) - The "-" indicates a downward vertical gradient.

TABLE 6.4

TCLP ANALYTICAL RESULTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Compounds	*U.S. EPA Regulatory Level (mg/L)*	*BH1-92 (2 - 4 ft)*	*Waste-1-993JW*
Benzene	0.50	ND (0.010)	ND (0.025)
2-Butanone	200	ND (0.020)	ND (0.50)
Carbon Tetrachloride	0.50	ND (0.010)	ND (0.025)
Chlorobenzene	100	ND (0.010)	ND (0.025)
Chloroform	6.0	ND (0.010)	ND (0.025)
1,2-Dichlorothane	0.50	ND (0.010)	ND (0.025)
1,1-Dichloroethene	0.70	ND (0.010)	ND (0.025)
Tetrachloroethene	0.70	ND (0.010)	ND (0.025)
Trichloroethene	0.50	ND (0.010)	ND (0.025)
Vinyl Chloride	0.20	ND (0.020)	ND (0.050)
1,4-Dichlorophenzene	7.5	ND (0.020)R	ND (0.040)
2,4-Dinitrotolunene	0.13	ND (0.020)R	ND (0.040)
Hexachlorobutadiene	0.5	ND (0.020)R	ND (0.040)
Hexachloroethane	3.0	ND (0.020)R	ND (0.040)
Total Cresol	200	ND (0.020)R	0.050
Nitrobenzene	2.0	ND (0.020)R	ND (0.040)
Pentachlorophenol	100	ND (0.10)R	ND (0.020)
Pyridine	5.0	ND (0.020)	ND (0.040)
2,4,5-Trichlorophenol	400	ND (0.020)R	ND (0.040)
2,4,6-Trichlorophenol	2.0	ND (0.020)R	ND (0.040)
Hexachlorobenzene	0.13	ND (0.020)	ND (0.040)
Mercury			
Selenium	0.2	ND (0.020)	ND (0.020)
Silver	1.0	ND (0.010)	ND (0.10)
Arsenic	5.0	ND (0.050)	ND (0.50)
Barium	5.0	ND (0.050)	ND (0.50)
Cadmium	100	ND (10)	ND (10)
Chromium	1.0	ND (0.10)	ND (0.10)
Lead	5.0	ND (0.050)	ND (0.50)
	5.0	ND (0.050)	1.4

Notes:

ND - Not detected.
R - Result is unusable.

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW1A-93*		*MW1B-93*		*MW2A-93*		*MW2B-93*	
Date Sampled:			*10/19/93*	*6/26/96*	*10/19/93*	*6/27/96*	*10/20/93*	*6/28/96*	*10/20/93*	*6/28/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*								
Volatile Organics										
1,1-DICHLOROETHENE	ug/l	5 (S)	ND(1)	ND(1) J	ND(1)	ND(1)	ND(1) / ND(1)	ND(20)	ND(1)	ND(1)
2-BUTANONE	ug/l	50 (G)	ND(5) R	ND(5) R	1 J	ND(5) R	8 J / 9 J	ND(100) R	ND(5) R	ND(5) R
ACETONE	ug/l	50 (G)	ND(5) R	ND(5) R	ND(7) R	9 J	ND(6) R / ND(6) R	ND(100) R	ND(5) R	ND(5) R
BENZENE	ug/l	0.7 (S)	ND(1)	ND(.7)	0.3 J	ND(.7)	1 / 1	52	ND(1)	ND(.7)
BROMOCHLOROMETHANE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(20)	ND(1)	ND(1)
CARBON DISULFIDE	ug/l	NS/G (2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(20)	0.1 J	ND(1)
CHLOROBENZENE	ug/l	5 (S)	ND(1)	ND(1) J	ND(1)	ND(1)	0.1 J / 0.1 J	ND(20)	ND(1)	ND(1)
CHLOROFORM	ug/l	7 (S)	ND(1)	ND(.1)	ND(1)	ND(1)	0.4 J / 0.4 J	ND(20)	0.3 J	ND(1)
CIS-1,2-DICHLOROETHENE	ug/l	5 (S)	ND(1)	–	ND(1)	–	ND(1) / 0.1 J	–	ND(1)	–
ETHYLBENZENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.7 J / 0.8 J	40	ND(1)	ND(1)
METHYLENE CHLORIDE	ug/l	5 (S)	ND(2)	ND(.3)	0.3 J	ND(2) J	0.2 J / 0.2 J	ND(40) J	0.1 J	ND(2) J
TOLUENE	ug/l	5 (S)	ND(1)	ND(1)	0.4 J	.2 J	ND(1) / ND(1)	ND(20)	ND(1)	ND(1)
TRICHLOROETHENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(20)	ND(1)	ND(1)
VINYL CHLORIDE	ug/l	2 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.4 J / 0.3 J	ND(20)	ND(1)	ND(1)
XYLENE (TOTAL)	ug/l	5 (S) (3)	ND(1)	.3 J	0.4 J	ND(1)	2 / 2	350	0.2 J	ND(1)
TIC Volatile Organic Compounds										
CYCLOTETRASILOXANE, OCTAMETH	ug/l	NS/G	–	–	–	–	– / –	13 JN	–	–
HEXANE	ug/l	NS/G	–	–	5 NJ	–	2 J / 10 NJ	–	–	–
Semi-Volatile Organics										
2,4-DIMETHYLPHENOL	ug/l	1 (S) (4)	ND(5) J	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	2 J	ND(5) J	ND(5)
2,4-DINITROTOLUENE	ug/l	5 (S)	ND(5) J	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	ND(5)	ND(5) J	.7 J
2,6-DINITROTOLUENE	ug/l	5 (S)	ND(5) J	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	ND(5)	ND(5) J	5
4-METHYLPHENOL	ug/l	1 (S) (4)	ND(5) J	ND(5)	1 J	ND(5)	ND(5) / ND(5)	ND(5)	ND(5) J	ND(5)
4-NITROANILINE	ug/l	5 (S)	ND(20) J	ND(20)	ND(20)	ND(20)	ND(20) / ND(20)	.8 J	ND(20) J	ND(20)
ACENAPHTHYLENE	ug/l	NS/G	ND(5) J	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	3 J	ND(5) J	ND(5)
BENZOIC ACID	ug/l	NS/G	–	.7 J	–	.7 J	– / –	ND(5) J	–	.8 J
BENZYL ALCOHOL	ug/l	NS/G	–	.8 J	–	ND(5) J	– / –	ND(5) J	–	ND(5) J
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	50 (S)	2 J	ND(3)	20	4 J	9 / 7	11	3 J	3 J
DI-N-BUTYLPHTHALATE	ug/l	50 (G)	1 J	ND(2)	1 J	ND(.4)	2 J / 6	ND(2)	ND(6) J	ND(.9)
DIETHYLPHTHALATE	ug/l	50 (G)	ND(5) J	ND(1)	ND(5)	ND(.2)	ND(5) / 1 J	ND(2)	ND(5) J	ND(.3)
NAPHTHALENE	ug/l	10 (G)	ND(5) J	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	2 J	ND(5) J	ND(5)
PHENOL	ug/l	1 (S)	ND(5) J	ND(2)	2 J	ND(2)	1 J / ND(5)	ND(2)	ND(5) J	ND(2)

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW1A-93*		*MW1B-93*		*MW2A-93*		*MW2B-93*	
Date Sampled:			*10/19/93*	*6/26/96*	*10/19/93*	*6/27/96*	*10/20/93*	*6/28/96*	*10/20/93*	*6/28/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*								
TIC Semi-Volatile Organics										
2-CYCLOHEXEN-1-OL	ug/l	NS/G	--	8 JNB	--	4 JNB	-- / --	--	--	5 JNB
2-CYCLOHEXEN-1-ONE	ug/l	NS/G	--	7 JNB	--	3 JNB	-- / --	--	--	4 JNB
BENZENEACETIC ACID	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
BUTANOIC ACID, BUTYL ESTER	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
CYCLOPENTANONE	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
DIETHYLTOLUAMIDE	ug/l	NS/G	--	28 JN	--	18 JN	-- / --	--	--	2 JN
ETHANOL, 2- (2-BUTOXYETHOXY)-	ug/l	NS/G	--	3 JN	--	--	-- / --	--	--	--
ETHANOL, 2-BUTOXY-	ug/l	NS/G	--	20 JN	--	--	-- / --	--	--	--
ETHANOL, 2-PHENOXY-	ug/l	NS/G	--	6 JN	--	--	-- / --	--	--	--
HEXADECANOIC ACID	ug/l	NS/G	--	--	17 XNJ	--	-- / --	--	--	--
HEXANEDIOIC ACID, BIS(2-ETHY	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
OCTADECANOIC ACID	ug/l	NS/G	--	--	13 NJ	--	-- / --	--	--	--
OCTANOIC ACID	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
PHTHALIC ANHYDRIDE	ug/l	NS/G	--	--	--	--	31 NJ / --	--	--	--
SULFUR, MOL. (S8)	ug/l	NS/G	--	--	--	--	-- / --	--	--	--
TETRADECANOIC ACID	ug/l	NS/G	--	--	15 NJ	--	-- / --	--	--	--
Metals										
ALUMINUM (DISS)	ug/l	NS/G	ND(37.0)	ND(20.0)	551	201	ND(37.0) / ND(37.0)	ND(20.0)	41.4 F	ND(23.0)
ALUMINUM (TOTAL)	ug/l	NS/G	1400	74.1	792 J	407	2150 J / 643 J	ND(23.3)	495 J	ND(24.4)
ANTIMONY (DISS)	ug/l	3 (G)	ND(3.0)	--	3.2 F	--	ND(3.0) / ND(3.0)	--	ND(3.0)	--
ANTIMONY (TOTAL)	ug/l	3 (G)	ND(3.0)	--	8.8 FW	--	ND(3.0) W / ND(3.0) W	--	ND(3.0) W	--
ARSENIC (DISS)	ug/l	25 (S)	ND(1.0)	--	4.0 F	--	11.8 / 11.3	--	10.5	--
ARSENIC (TOTAL)	ug/l	25 (S)	ND(1.0)	--	4.8 F	--	15.1 / 14.4	--	11.2	--
BARIUM (DISS)	ug/l	1,000 (S)	21.1 FJ	37.5	116 FJ	44.9	133 FJ / 133 FJ	90.8	21.1 BJ	25.7
BARIUM (TOTAL)	ug/l	1,000 (S)	25.7 FJ	37.8	73.0 FJ	36.4	148 FJ / 132 FJ	123	84.0 FJ	26.3
CADMIUM (TOTAL)	ug/l	10 (S)	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(2.0) / ND(2.0)	1.3	ND(2.0)	ND(1.0)
CALCIUM (DISS)	ug/l	NS/G	90500 E	80800	81200 E	33400	165000 E / 166000 E	176000	9970 E	14200
CALCIUM (TOTAL)	ug/l	NS/G	84800 E	80000	73500 E	42600	174000 E / 159000 E	179000	11500 E	14600
CHROMIUM (DISS)	ug/l	50 (S)	5.8 FJ	--	3.2 FJ	--	ND(3.0) J / ND(3.0) J	--	ND(3.0) J	--
CHROMIUM (TOTAL)	ug/l	50 (S)	14.8 J	--	14.3 J	--	7.5 FJ / 4.8 FJ	--	19.8 J	--
COBALT (DISS)	ug/l	NS/G	ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)	ND(3.0) / ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ug/l	NS/G	ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)	4.4 F / 3.5 F	ND(1.0)	ND(3.0)	ND(1.0)
COPPER (DISS)	ug/l	200 (S)	31.2	ND(1.0)	42.3	ND(1.0)	19.8 F / 17.6 F	ND(1.0)	18.4 F	ND(1.0)
COPPER (TOTAL)	ug/l	200 (S)	51.8	ND(1.0)	78	2.7	39.6 / 30.6	ND(1.0)	31.5	ND(1.0)
IRON (DISS)	ug/l	300 (S)	94.6 F	ND(29.0)	184	ND(29.0)	2340 / 2310	ND(29.0)	ND(87.0)	ND(29.0)
IRON (TOTAL)	ug/l	300 (S)	2140 R	116 J	286	74.6 J	8010 R / 4670 R	13400 J	677	ND(29.0)
LEAD (TOTAL)	ug/l	25 (S)	ND(2.0)	ND(2.0) J	5.2 W	ND(2.0) J	3.1 / ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0) J
MAGNESIUM (DISS)	ug/l	35,000 (G)	24200 E	20500	58.2 FE	2550	53500 E / 54200 E	56900	8540 E	8210
MAGNESIUM (TOTAL)	ug/l	35,000 (G)	23100 EJ	20200	826 FEJ	1350	57000 EJ / 52300 EJ	56700	8550 EJ	8470

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW1A-93*		*MW1B-93*		*MW2A-93*		*MW2B-93*	
Date Sampled:			*10/19/93*	*6/26/96*	*10/19/93*	*6/27/96*	*10/20/93*	*6/28/96*	*10/20/93*	*6/28/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*								
Metals (Cont'd)										
MANGANESE (DISS)	ug/l	300 (S)	11.4 F	ND(1.0)	ND(2.0)	ND(1.0)	207 / 206	95.8	ND(2.0)	3.8
MANGANESE (TOTAL)	ug/l	300 (S)	56.1 R	5.3	4.9 F	2.1	304 R / 218 R	104	14.6 F	3.7
NICKEL (DISS)	ug/l	NS/G	ND(11.0)	--	ND(11.0)	--	ND(11.0) / 13.2 F	--	ND(11.0)	--
POTASSIUM (DISS)	ug/l	NS/G	ND(473)	--	41700	--	1300 F / 1360 F	--	4440 F	--
POTASSIUM (TOTAL)	ug/l	NS/G	612 F	--	41200	--	2110 F / 1460 F	--	4510 F	--
SELENIUM (DISS)	ug/l	10 (S)	ND(2.0)	4.0 J	ND(2.0)	4.9 JF	ND(2.0) W / ND(2.0) W	4.0 J	ND(2.0) W	5.0 J
SELENIUM (TOTAL)	ug/l	10 (S)	ND(2.0) W	4.0 J	ND(2.0) W	4.0 J	ND(2.0) W / ND(2.0) W	6.9 J	ND(2.0) W	4.0 J
SODIUM (DISS)	ug/l	20,000 (S)	6810	11600 EJ	86800	71600 EJ	40400 / 41000	40400 EJ	64200	52300 EJ
SODIUM (TOTAL)	ug/l	20,000 (S)	5650	11400 EJ	82800	76000 EJ	40100 / 39100	40300 EJ	62700	53500 EJ
VANADIUM (TOTAL)	ug/l	NS/G	16.7 F	--	25.2 F	--	ND(16.0) / ND(16.0)	--	ND(16.0)	--
ZINC (DISS)	ug/l	300 (S)	44.1 R	ND(16.7)	49.5 R	68.7	24 / 16.4 F	13.1	10.7 F	22.1
ZINC (TOTAL)	ug/l	300 (S)	29.4	ND(18.0)	33.4	27.3	33.4 / 15.8 F	16	12.1 F	17.1
General Chemistry										
HARDNESS	mg/l		330	--	230	--	730 / 710	--	78	--

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW3A-93*		*MW3B-93*		*MW4A-93*		*WELL-D*		*WELL-S*	
Date Sampled:			*10/19/93*	*6/28/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/25/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/26/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*										
Volatile Organics												
1,1-DICHLOROETHENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.1 J	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
2-BUTANONE	ug/l	50 (G)	ND(5) R	ND(5) R	ND(5) R	ND(5) R	ND(5) R	ND(5) R / ND(5) R	ND(5) R	ND(5) R	2 J	ND(5) R
ACETONE	ug/l	50 (G)	ND(5) R	ND(5) R	ND(5) R	ND(5) R	ND(5) R	ND(5) R / ND(5) R	ND(5) R	ND(2) R	ND(5) R	ND(5) R
BENZENE	ug/l	0.7 (S)	ND(1)	ND(.7)	ND(1)	ND(.7)	0.2 J	ND(.7) / ND(.7)	ND(1)	ND(.7)	ND(1)	ND(.7)
BROMOCHLOROMETHANE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.3 J	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
CARBON DISULFIDE	ug/l	NS/G (2)	ND(1)	ND(1)	ND(1)	.5 J	ND(1)	ND(1) / ND(1)	ND(1)	ND(5)	0.2 J	ND(1)
CHLOROBENZENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.1 J	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
CHLOROFORM	ug/l	7 (S)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
CIS-1,2-DICHLOROETHENE	ug/l	5 (S)	ND(1)	--	ND(1)	--	ND(1)	-- / --	ND(1)	--	ND(1)	--
ETHYLBENZENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
METHYLENE CHLORIDE	ug/l	5 (S)	ND(2)	ND(2) J	0.2 J	ND(2) J	ND(2)	ND(2) J / ND(2) J	ND(2)	ND(1) J	0.2 J	ND(2) J
TOLUENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	.1 J	0.2 J	ND(1) / ND(1)	ND(1)	.1 J	4	ND(1)
TRICHLOROETHENE	ug/l	5 (S)	ND(1)	ND(1)	ND(1)	ND(1)	0.1 J	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
VINYL CHLORIDE	ug/l	2 (S)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
XYLENE (TOTAL)	ug/l	5 (S) (3)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1) / ND(1)	ND(1)	ND(1)	0.2 J	ND(1)
TIC Volatile Organic Compounds												
CYCLOTETRASILOXANE, OCTAMETH	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
HEXANE	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
Semi-Volatile Organics												
2,4-DIMETHYLPHENOL	ug/l	1 (S) (4)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
2,4-DINITROTOLUENE	ug/l	5 (S)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
2,6-DINITROTOLUENE	ug/l	5 (S)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
4-METHYLPHENOL	ug/l	1 (S) (4)	ND(5)	ND(5)	ND(5)	.6 J	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
4-NITROANILINE	ug/l	5 (S)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20) J	ND(20) / ND(20)	ND(20)	ND(20)	ND(20) J	ND(20)
ACENAPHTHYLENE	ug/l	NS/G	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
BENZOIC ACID	ug/l	NS/G	--	ND(5) J	--	5 J	--	ND(5) J / ND(5) J	--	ND(5) J	--	.9 J
BENZYL ALCOHOL	ug/l	NS/G	--	ND(5) J	--	ND(5) J	--	ND(5) J / ND(5) J	--	ND(5) J	--	ND(5) J
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	50 (S)	ND(8)	3 J	4 J	3 J	2 J	ND(1) / ND(.7)	ND(5)	5	1 J	ND(1)
DI-N-BUTYLPHTHALATE	ug/l	50 (G)	ND(5)	ND(.9)	2 J	ND(.4)	ND(5) J	ND(.6) / ND(.7)	ND(5)	ND(.3)	ND(6) J	ND(.5)
DIETHYLPHTHALATE	ug/l	50 (G)	ND(5)	ND(.3)	ND(5)	ND(.2)	ND(5) J	ND(.2) / ND(.2)	ND(5)	ND(.2)	ND(5) J	ND(.3)
NAPHTHALENE	ug/l	10 (G)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) J	ND(5) / ND(5)	ND(5)	ND(5)	ND(5) J	ND(5)
PHENOL	ug/l	1 (S)	ND(5)	ND(2)	ND(5)	ND(2)	ND(5) J	ND(2) / ND(2)	ND(5)	ND(2)	ND(5) J	ND(2)

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW3A-93*		*MW3B-93*		*MW4A-93*		*WELL-D*		*WELL-S*	
Date Sampled:			*10/19/93*	*6/28/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/25/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/26/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*										
TIC Semi-Volatile Organics												
2-CYCLOHEXEN-1-OL	ug/l	NS/G	--	5 JNB	--	17 JNB	--	5 JNB / 6 JNB	--	5 JNB	--	5 JNB
2-CYCLOHEXEN-1-ONE	ug/l	NS/G	--	5 JNB	--	7 JNB	--	5 JNB / 5 JNB	--	5 JNB	--	4 JNB
BENZENEACETIC ACID	ug/l	NS/G	--	--	--	12 JN	--	-- / --	--	--	--	--
BUTANOIC ACID, BUTYL ESTER	ug/l	NS/G	--	3 JN	--	--	--	-- / --	--	--	--	--
CYCLOPENTANONE	ug/l	NS/G	--	6 JN	--	--	--	-- / --	--	--	--	--
DIETHYLTOLUAMIDE	ug/l	NS/G	--	32 JN	--	--	--	-- / 2 JN	--	3 JN	--	5 JN
ETHANOL, 2- (2-BUTOXYETHOXY)-	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
ETHANOL, 2-BUTOXY-	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
ETHANOL, 2-PHENOXY-	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
HEXADECANOIC ACID	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
HEXANEDIOIC ACID, BIS(2-ETHY	ug/l	NS/G	--	2 JN	--	--	--	2 JN / 2 JN	--	3 JN	--	2 JN
OCTADECANOIC ACID	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
OCTANOIC ACID	ug/l	NS/G	--	--	--	100 JN	--	-- / --	--	--	--	--
PHTHALIC ANHYDRIDE	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
SULFUR, MOL. (S8)	ug/l	NS/G	--	--	--	--	--	-- / --	450 NJ	--	--	--
TETRADECANOIC ACID	ug/l	NS/G	--	--	--	--	--	-- / --	--	--	--	--
Metals												
ALUMINUM (DISS)	ug/l	NS/G	ND(37.0)	ND(20.0)	ND(37.0)	287	ND(37.0)	ND(20.0) / ND(20.0)	ND(37.0)	ND(20.0)	ND(37.0)	ND(20.0)
ALUMINUM (TOTAL)	ug/l	NS/G	83.0 F	983	393 J	342	145 F	357 / 90	41.8 F	ND(34.2)	67.6 F	2780
ANTIMONY (DISS)	ug/l	3 (G)	ND(3.0)	--	ND(3.0)	--	ND(3.0)	-- / --	ND(3.0)	--	ND(3.0)	--
ANTIMONY (TOTAL)	ug/l	3 (G)	ND(3.0) W	--	ND(3.0) W	--	ND(3.0) W	-- / --	ND(3.0) W	--	ND(3.0) W	--
ARSENIC (DISS)	ug/l	25 (S)	21.2	--	5.4 F	--	1.9 F	-- / --	ND(1.0)	--	ND(1.0)	--
ARSENIC (TOTAL)	ug/l	25 (S)	24.3	--	5.7 F	--	1.9 FW	-- / --	ND(1.0)	--	1.4 F	--
BARIUM (DISS)	ug/l	1,000 (S)	150 FJ	126	22.5 FJ	29.8	18.4 F	14.6 / 14.4	15.0 F	3.2	21.8 FJ	37.1
BARIUM (TOTAL)	ug/l	1,000 (S)	216 J	131	41.7 FJ	30.9	15.9 F	18.5 / 15.7	15.8 F	6.7	4.8 F	54.8
CADMIUM (TOTAL)	ug/l	10 (S)	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(2.0)	1.2 / ND(1.0)	ND(2.0)	3.2	ND(2.0)	4.1
CALCIUM (DISS)	ug/l	NS/G	63200 E	62400	12900 E	17200	393000 E	395000 / 383000	97500 E	12400	28700 E	76000
CALCIUM (TOTAL)	ug/l	NS/G	61700 E	63700	14300 E	18800	370000 E	391000 / 394000	92400 E	13500	27000 E	75200
CHROMIUM (DISS)	ug/l	50 (S)	ND(3.0) J	--	5.1 FJ	--	ND(3.0) J	-- / --	3.0 FJ	--	3.4 FJ	--
CHROMIUM (TOTAL)	ug/l	50 (S)	ND(3.0) J	--	25.0 J	--	ND(3.0) J	-- / --	3.4 FJ	--	12.4 J	--
COBALT (DISS)	ug/l	NS/G	ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)	ND(3.0)	1.5 / 1.6	ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)
COBALT (TOTAL)	ug/l	NS/G	ND(3.0)	ND(1.0)	ND(3.0)	ND(1.0)	ND(3.0)	2.1 / 1.8	ND(3.0)	ND(1.0)	ND(3.0)	1.8
COPPER (DISS)	ug/l	200 (S)	ND(43.8)	ND(1.0)	13.4 F	ND(1.0)	17.3 F	ND(1.0) / 1.6	ND(13.1) F	ND(1.0)	25.4	ND(1.0)
COPPER (TOTAL)	ug/l	200 (S)	ND(72.5)	2.9	22.3 F	ND(1.0)	101	2.6 / 2.4	ND(19.7) F	7.9	39.5	7.7
IRON (DISS)	ug/l	300 (S)	734	280 J	ND(87.0)	ND(29.0)	618	2410 J / 3100 J	150	ND(29.0)	ND(87.0)	ND(29.0)
IRON (TOTAL)	ug/l	300 (S)	1200 R	2240 J	540	38.3 J	949 R	5970 J / 5120 J	4590 R	21500 J	2300 R	12600 J
LEAD (TOTAL)	ug/l	25 (S)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0) J	ND(2.0)	5.6 J / 6.2 J	ND(2.0)	ND(2.0) J	ND(2.0)	15.9 J
MAGNESIUM (DISS)	ug/l	35,000 (G)	25100 E	25800	5370 E	149	52000 E	68600 / 71600	38300 E	4020	167 FE	10200
MAGNESIUM (TOTAL)	ug/l	35,000 (G)	24700 EJ	26100	5510 EJ	307	49200 EJ	68900 / 67400	36100 EJ	4430	180 FE	10400

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Well No.:			*MW3A-93*		*MW3B-93*		*MW4A-93*		*WELL-D*		*WELL-S*	
Date Sampled:			*10/19/93*	*6/28/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/25/96*	*10/20/93*	*6/27/96*	*10/19/93*	*6/26/96*
Parameter	*Units*	*Ambient Groundwater Quality Criteria (1)*										
Metals (Cont'd)												
MANGANESE (DISS)	ug/l	300 (S)	55.9	19.6	2.0 F	ND(1.0)	129	369 / 436	13.9 F	1.7	4.2 F	2.8
MANGANESE (TOTAL)	ug/l	300 (S)	54.9 R	50.5	14.0 F	ND(1.0)	124 R	400 / 358	25.2 R	65.9	14.2 F	84
NICKEL (DISS)	ug/l	NS/G	29.1 F	--	ND(11.0)	--	ND(11.0)	-- / --	11.5 F	--	ND(11.0)	--
POTASSIUM (DISS)	ug/l	NS/G	895 F	--	1210 F	--	542 F	-- / --	2570 F	--	15600	--
POTASSIUM (TOTAL)	ug/l	NS/G	670 F	--	1510 F	--	663 F	-- / --	2340 F	--	15000	--
SELENIUM (DISS)	ug/l	10 (S)	ND(2.0) W	4.0 J	ND(2.0) W	4.0 J	327 S	72.2 J / 46.5 J	ND(2.0) W	4.0 J	ND(2.0)	4.0 J
SELENIUM (TOTAL)	ug/l	10 (S)	ND(2.0) W	4.0 J	ND(2.0) W	4.0 J	246	62.4 J / 66.9 J	ND(2.0) W	5.3 J	ND(2.0) W	7.2 J
SODIUM (DISS)	ug/l	20,000 (S)	28000	26000 EJ	62600	53700 EJ	39000	36700 EJ / 37200 EJ	183000	121000 EJ	27400	112000 EJ
SODIUM (TOTAL)	ug/l	20,000 (S)	27900	25100 EJ	60400	53200 EJ	37300	35000 EJ / 35000 EJ	175000	120000 EJ	25400	110000 EJ
VANADIUM (TOTAL)	ug/l	NS/G	ND(16.0)	--	ND(16.0)	--	20.9 F	-- / --	ND(16.0)	--	ND(16.0)	--
ZINC (DISS)	ug/l	300 (S)	58.8 R	20	7.1 F	24.3	15.1 F	18.8 / 26.3	ND(6.4) F	23.3	20.5	ND(32.3)
ZINC (TOTAL)	ug/l	300 (S)	ND(33.4)	29.2	7.6 F	32.7	51.3	31.6 / 76.4	ND(11.8) F	55.4	122	1390
General Chemistry												
HARDNESS	mg/l		270	--	73	--	1200	-- / --	430	--	79	--

TABLE 6.5

SUMMARY OF DETECTED COMPOUNDS - GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Notes:

(1)	The noted concentrations are obtained from "Ambient Water Quality Standards and Guidance Values", Technical and Operations Guidance Series (TOGS) 1.1.1, Division of Water, New York State Department of Environmental Conservation, Albany, New York, October 1993. (S) - Standard (G) - Guidance Value
(2)	NS/G - No standard or guidance values have been established.
(3)	Refers to each isomer (1,2-, 1,3-, and 1,4-) individiually.
(4)	Refers to sum of all phenols (phenolic compounds).
J	The associated numerical value is an estimated quantity.
--	The parameter was not analyzed.
ND	The material was analyzed, but not detected above the stated method detection limit or practical quantitation limit.
R	Result is unusable.
B	Indicates analyte was found in the associated blank.
D	Identifies all compounds in an analysis at a secondary dilution factor.
N	Indicates presumptive evidence of the compound.
X	Generated from extraction artifacts.
E	Indicates an estimated value due to the presence of interference.
W	Indicates that the Furnace AA post-digestion spike recovery does not meet specified criteria.
F	Indicates the reported value was less than the specified detection limit, but greater than or equal to the Instrument Detection Limit.
S	The reported value was determined by the use of the Method of Standard Additions.
P	Indicates the analyte was greater than 25 percent difference for detected concentrations between the two GC columns. The lower of which being reported.
Y	Indicates the presence of siloxane. A typical result of column bleed.
▨	Concentration exceeds NYS Class GA groundwater criteria.

TABLE 6.6

SUMMARY OF GROUNDWATER INORGANIC PARAMETER EXCEEDANCES
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Monitoring Well	*Parameter*	*Maximum Background (1)*	*Ambient Groundwater Quality Criteria (2)*	*Concentrations*	
				Round 1	*Round 2*
		µg/L	*µg/L*	*µg/L*	*µg/L*
MW2A-93	Iron (Dissolved)	734	300	2,340/2,310	ND
	Iron (Total)	2,240 J	300	–	13,400 J
	Magnesium (Dissolved)	25,100 E	35,000	53,500 E/54,200 E	56,900
	Magnesium (Total)	24,700 EJ	35,000	57,000 EJ/52,300 EJ	56,700
MW4A-93	Iron (Dissolved)	734	300	618	2,410 J/3,100 J
	Iron (Total)	2,240 J	300	–	5,970 J/5,120 J
	Magnesium (Dissolved)	25,100 E	35,000	52,000 E	68,600/71,600
	Magnesium (Total)	24,700 EJ	35,000	49,200 EJ	68,900/67,400
	Manganese (Dissolved)	19.6	300	129	369/436
	Manganese (Total)	50.5	300	–	400/358
	Selenium (Dissolved)	4.0 J	10	3,275	72.2 J/46.5 J
	Selenium (Total)	4.0 J	10	246	62.4 J/66.9 J
Well-D	Iron (Total)	2,240 J	300	–	21,500 J
	Magnesium (Dissolved)	25,100 E	35,000	38,300 E	4,020
	Magnesium (Total)	24,700 EJ	35,000	36,100 EJ	4,430
	Sodium (Dissolved)	62,600	20,000	183,000	121,000 EJ
	Sodium (Total)	60,400	20,000	175,000	120,000 EJ
Well-S	Iron (Total)	2,240 J	300	–	12,600 J
	Sodium (Dissolved)	62,600	20,000	27,400	112,000 EJ
	Sodium (Total)	60,400	20,000	25,400	110,000 EJ
	Zinc (Total)	33.4	300	122	1,390

Notes:

(1) Maximum background concentrations are based on wells MW1A-93, MW1B-93, MW3A-93 and MW3B-93.
(2) The noted concentrations are obtained from "Ambient Water Quality Standards and Guidance Values", Technical and Operations Guidance Series (TOGS) 1.1.1, Division of Water, New York State Department of Environmental Conservation, Albany, New York, October 1993.
(S) - Standard
(G) - Guidance Value
J The associated numerical value is an estimated quantity.
E Indicates an estimated value due to the presence of interference.
– The parameter was not analyzed.
ND The material was analyzed, but not detected above the stated method detection limit or practical quantitation limit.
▨ Concentration exceeds maximum background level and Ambient Groundwater Quality Criteria.

TABLE 6.7

SUMMARY OF DETECTED COMPOUNDS - SEDIMENT
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Sample Location: *Date Sampled:*		*SW-1* *9/29/93*	*SW-2* *9/29/93*	*SW-3* *9/29/93*	*SW-4* *9/29/93*	*SW-5* *9/29/93*	*SW-6* *9/29/93*	*SW-7* *9/29/93*	*SW-8* *9/29/93*	*SW-9* *6/27/96*	*SW-10* *6/27/96*
Parameter	*Units*										
Volatile Organics											
ACETONE	ug/kg	ND(16) J	ND(21)	ND(15)	ND(14)	10 J / ND(17)	ND(15)	13 J	ND(17)	– / –	–
METHYLENE CHLORIDE	ug/kg	ND(16) J	7 J	4 J	2 J	2 J / ND(17)	3 J	ND(27)	3 J	– / –	–
TIC Volatile Organic Compounds											
ETHANOL	ug/kg	–	–	–	54 NJ	52 NJ / 19 NJ	–	48 NJ	–	– / –	–
Semi-Volatile Organics											
ACENAPHTHYLENE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	63 J	190 J	ND(570)	21 J / 9 J	15 J
ANTHRACENE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	ND(500)	170 J	ND(570)	15 J / 7 J	11 J
BENZO(A)ANTHRACENE	ug/kg	ND(520)	ND(680)	ND(500)	160 J	120 J / 81 J	170 J	600 J	86 J	120 J / 64 J	85 J
BENZO(A)PYRENE	ug/kg	ND(520)	ND(680)	ND(500)	180 J	150 J / 93 J	240 J	620 J	95 J	130 J / 65 J	93 J
BENZO(B)FLUORANTHENE	ug/kg	ND(520)	ND(680)	ND(500)	230 J	140 J / 87 J	250 J	600 J	110 J	130 J / 68 J	89 J
BENZO(G,H,I)PERYLENE	ug/kg	ND(520)	ND(680)	ND(500)	52 J	67 J / ND(560)	95 J	240 J	ND(570)	90 J / 41 J	60 J
BENZO(K)FLUORANTHENE	ug/kg	ND(520)	ND(680)	ND(500)	200 J	180 J / 110 J	280 J	710 J	100 J	120 J / 65 J	110 J
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	220 J	440 J	ND(500)	270 J	ND(630) / ND(560)	ND(500)	ND(1200)	ND(570)	ND(51) / ND(47)	ND(53)
BUTYLBENZYLPHTHALATE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	ND(500)	ND(1200)	ND(570)	18 J / ND(580)	ND(560)
CHRYSENE	ug/kg	ND(520)	ND(680)	ND(500)	220 J	180 J / 120 J	240 J	760 J	130 J	160 J / 84 J	120 J
DI-N-BUTYLPHTHALATE	ug/kg	270 JB	360 JB	260 JB	300 JB	230 JB / 100 JB	150 JB	ND(1200)	130 JB	ND(66) / ND(41)	ND(51)
DIBENZO(A,H)ANTHRACENE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	ND(500)	ND(1200)	ND(570)	43 J / 19 J	29 J
DIETHYLPHTHALATE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	250 J	ND(1200)	ND(570)	ND(18) / ND(11)	ND(14)
FLUORANTHENE	ug/kg	ND(520)	ND(680)	ND(500)	400 J	390 J / 250 J	470 J	1700	270 J	260 J / 130 J	200 J
FLUORENE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	ND(500)	ND(1200)	ND(570)	12 J / ND(580)	10 J
INDENO(1,2,3-CD)PYRENE	ug/kg	ND(520)	ND(680)	ND(500)	83 J	94 J / ND(560)	160 J	350 J	ND(570)	120 J / 57 J	83 J
NAPHTHALENE	ug/kg	ND(520)	ND(680)	ND(500)	ND(470)	ND(630) / ND(560)	ND(500)	ND(1200)	ND(570)	5 J / 9 J	ND(560)
PHENANTHRENE	ug/kg	ND(520)	ND(680)	ND(500)	190 J	180 J / 120 J	290 J	980 J	130 J	120 J / 62 J	96 J
PYRENE	ug/kg	ND(520)	ND(680)	ND(500)	290 J	240 J / 160 J	400 J	1100 J	180 J	290 J / 150 J	200 J
TIC Semi-Volatile Organics											
2-CYCLOHEXEN-1-ONE	ug/kg	–	–	–	–	– / –	–	–	–	340 JNB / 230 JNB	270 JNB
DIETHYLTOLUAMIDE	ug/kg	–	–	–	–	– / –	–	–	–	– / –	1400 JN
HEXADECANOIC ACID	ug/kg	–	–	–	–	– / –	480 XNJ	–	–	– / –	–
HEXADECANOIC ACID, HEXADECYL	ug/kg	–	–	–	–	– / –	–	–	–	– / 220 JN	–
PHENOL, 4-METHYL-	ug/kg	–	–	–	–	– / –	–	–	–	– / –	440 JN
STIGMAST-4-EN-3-ONE	ug/kg	–	–	–	–	– / –	–	–	–	700 JN / 440 JN	–
TETRADECANOIC ACID, HEXADECY	ug/kg	–	–	–	–	– / –	–	–	–	– / 200 JN	–
PCBs											
AROCLOR-1248	ug/kg	ND(51)	58 JP	ND(50)	ND(48)	ND(63) / ND(56)	ND(50)	ND(120)	ND(57)	ND(61) / ND(58)	ND(56)
AROCLOR-1254	ug/kg	68 P	320	ND(50)	28 JP	ND(63) / ND(56)	ND(50)	ND(120)	ND(57)	11 PJ / 8.3 PJ	ND(56)
AROCLOR-1260	ug/kg	98 P	180 P	ND(50)	140 P	41 JP / ND(56)	ND(50)	ND(120)	ND(57)	ND(61) / ND(58)	ND(56)
Pesticides											
4,4'-DDD	ug/kg	ND(5.1)	ND(6.9)	ND(5.0)	ND(4.8)	ND(6.3) / 2.6 J	ND(5.0)	ND(12)	ND(5.7)	– / –	–
4,4'-DDE	ug/kg	ND(5.1)	14	ND(5.0)	18	6.5 P / 6.2 P	2.1 JP	ND(12)	ND(5.7)	– / –	–
4,4'-DDT	ug/kg	ND(5.1)	ND(6.9)	ND(5.0)	12 P	ND(6.3) / ND(5.6)	ND(5.0)	ND(12)	ND(5.7)	– / –	–
METHOXYCHLOR	ug/kg	ND(26)	ND(35)	ND(26)	ND(24)	ND(32) / ND(29)	42	ND(60)	ND(29)	– / –	–

TABLE 6.7

SUMMARY OF DETECTED COMPOUNDS - SEDIMENT
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Sample Location:		*SW-1*	*SW-2*	*SW-3*	*SW-4*	*SW-5*	*SW-6*	*SW-7*	*SW-8*	*SW-9*	*SW-10*
Date Sampled:		*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*6/27/96*	*6/27/96*
Parameter	*Units*										
Metals											
ALUMINUM (TOTAL)	mg/kg	9140	13900 J	11200	10300	10900 / 11100	16300	18000	17100	8770 J / 7620 J	7420 J
ANTIMONY (TOTAL)	mg/kg	ND(4.7)	ND(4.7) J	ND(4.4)	ND(4.7)	ND(7.2) / ND(6.9)	ND(5.2)	ND(9.8)	ND(5.5)	ND(1.8) JF / 1.9 J	1.8 J
ARSENIC (TOTAL)	mg/kg	2.1	2.2 J	4	2.4	3.8 / 2	2.3	5	3.1	4.1 / 5.8	2.3
BARIUM (TOTAL)	mg/kg	136	326 J	114	2570	140 / 99	129	141	128	125 / 124	78.1
BERYLLIUM (TOTAL)	mg/kg	0.65 F	0.66 F	0.65 F	0.52 F	0.58 F / 0.56 F	0.75 F	0.97 F	0.80 F	ND(0.61) / ND(0.56)	ND(0.57)
CADMIUM (TOTAL)	mg/kg	1.2 F	6.6	ND(0.66)	3	ND(1.1) / ND(1.0)	ND(0.77)	1.5 F	ND(0.83)	1.4 F / 1.4 F	0.66 F
CALCIUM (TOTAL)	mg/kg	3560	6540	3710	8750	4750 / 3180	4620	33000	4680	10600 J / 19800 J	3680 J
CHROMIUM (TOTAL)	mg/kg	19.5	51.6 J	16.6	229	18.7 / 17.1	20.7	26.7	22	14.4 / 12.9	12.7
COBALT (TOTAL)	mg/kg	7.2 F	15.4	5.9 F	25.1	10.2 F / 7.3 F	6.6 F	10.9 F	8.2 F	8.4 / 9.2	5.1
COPPER (TOTAL)	mg/kg	9.7	38.7	11.7	14.8	16.3 / 9.5	15	22.8	15	15.4 / 15.9	12.9
CYANIDE	mg/kg	1.1 J	2.0 J	ND(0.81) J	1.1 J	ND(0.89) J / ND(0.82) J	ND(0.69) J	ND(1.2) J	ND(0.76) J	ND(0.930) / ND(0.920)	ND(0.830)
IRON (TOTAL)	mg/kg	17200	15400	14000	14000	18500 / 15000	14300	24000	19300	19600 J / 21100 J	11900 J
LEAD (TOTAL)	mg/kg	53.5	338 J	26.5	943	42.2 / 27.6	23.2	57.9	22	37.4 J / 37.3 J	19.4 J
MAGNESIUM (TOTAL)	mg/kg	2210	2640	2280	2890	2560 / 2200	2890	19800	3210	5970 / 11000	2310
MANGANESE (TOTAL)	mg/kg	75.6	202	145	299	919 / 326	153	270	202	287 / 363	124
MERCURY (TOTAL)	mg/kg	ND(0.14)	ND(0.14)	ND(0.16)	ND(0.14)	ND(0.17) / ND(0.17)	ND(0.14)	ND(0.25)	ND(0.17)	0.16 / 0.15	0.15
NICKEL (TOTAL)	mg/kg	11.3	17.4	13.1	13.1	13.3 F / 13.4 F	16.3	21.1	18.2	ND(13.5) / ND(12.1)	ND(11.8)
POTASSIUM (TOTAL)	mg/kg	519 F	1480	1140	776 F	1370 F / 1270 F	1770	2470	2030	619 J / 522 J	586 J
SELENIUM (TOTAL)	mg/kg	1	2	0.52 F	0.43 F	ND(0.75) / ND(0.54)	ND(0.57)	ND(0.82)	0.89 F	1.8 J / 1.5 JF	7.9 J
SILVER (TOTAL)	mg/kg	ND(0.93)	ND(0.93)	0.97 F	ND(0.95)	ND(1.4) / ND(1.4)	ND(1.0)	ND(2.0)	ND(1.1)	ND(0.29) J / ND(0.32) J	ND(0.30) J
SODIUM (TOTAL)	mg/kg	62.2 F	114 F	62.7 F	84.5 F	99.6 F / 97.5 F	91.6 F	401 F	79.9 F	118 / 104	84.8
THALLIUM (TOTAL)	mg/kg	ND(0.40)	ND(0.58)	ND(0.52)	ND(0.43)	ND(0.75) / ND(0.54)	ND(0.57)	ND(0.82)	ND(0.53)	1.7 / 1.9	1.8
VANADIUM (TOTAL)	mg/kg	23.3	24.1	19.4	18.8	21.1 / 21.7	25.1	32.1	27.3	19.5 / 17.7	19.2
ZINC (TOTAL)	mg/kg	110	487 J	79.1	1560	204 / 128	76.5	164	92.5	130 / 137	58.1
General Chemistry											
TOTAL ORGANIC CARBON	mg/kg	59000	70000	42000	37000	32000 / 16000	30000	73000	35000	81200 / 40000	45600

Notes:

J	The associated numerical value is an estimated quantity.
--	The parameter was not analyzed.
ND	The material was analyzed, but not detected above the stated method detection limit or practical quantitation limit.
R	Result is unusable.
B	Indicates analyte was found in the associated blank.
D	Identifies all compounds in an analysis at a secondary dilution factor.
N	Indicates presumptive evidence of the compound.
X	Generated from extraction artifacts.
E	Indicates an estimated value due to the presence of interference.
W	Indicates that the Furnace AA post-digestion spike recovery does not meet specified criteria.
F	Indicates the reported value was less than the specified detection limit, but greater than or equal to the Instrument Detection Limit.
S	The reported value was determined by the use of the Method of Standard Additions.
P	Indicates the analyte was greater than 25 percent difference for detected concentrations between the two GC columns. The lower of which being reported.
Y	Indicates the presence of siloxane. A typical result of column bleed.

TABLE 6.8

SUMMARY OF DETECTED COMPOUNDS - SURFACE WATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Sample Location: *Date Sampled:* *Parameter*	*Units*	*Ambient Surface Water Quality Criteria (1)*	*SW-1* *9/29/93*	*SW-2* *9/29/93*	*SW-3* *9/29/93*	*SW-4* *9/29/93*	*SW-5* *9/29/93*	*SW-6* *9/29/93*	*SW-7* *9/29/93*	*SW-8* *9/29/93*
Volatile Organics										
ACETONE	ug/l	NS/G	4 J	4 J	5 J	ND(5)	ND(5) / ND(5)	ND(5)	ND(5)	ND(5)
Semi-Volatile Organics										
2-METHYLPHENOL	ug/l	5 (S)	ND(5)	2 J	ND(5)	ND(5)	ND(5) / ND(5)	ND(5)	ND(5)	ND(5)
4-METHYLPHENOL	ug/l	5 (S)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) / 2 J	ND(5)	ND(5)	ND(5)
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	NS/G (2)	ND(5)	4 JB	ND(5)	4 JB	1 JB / 2 JB	2 JB	7 B	1 JB
DI-N-BUTYLPHTHALATE	ug/l	NS/G	4 J	4 J	3 J	16	2 J / 2 J	13	3 J	5 J
PHENOL	ug/l	5 (S)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5) / ND(5)	1 J	ND(5)	ND(5)
TIC Semi-Volatile Organics										
1,3-CYCLOHEXADIENE, 1-METHYL	ug/l	NS/G	--	--	--	--	-- / 13 NJ	--	--	--
Metals										
ALUMINUM (TOTAL)	ug/l	NS/G	824	1010	1290	201	465 / 443	2170	3880	582
ARSENIC (TOTAL)	ug/l	360 (S)	ND(1.0)	1.4 F	ND(1.0)	ND(1.0)	ND(1.0) / ND(1.0)	ND(1.0)	2.7 F	ND(1.0)
BARIUM (TOTAL)	ug/l	NS/G	44.0 F	33.4 F	18.6 F	31.6 F	22.9 F / 22.9 F	50.8 F	85.2 F	39.6 F
CADMIUM (TOTAL)	ug/l	5 (S)(3)	ND(2.0)	2.2 F	ND(2.0)	ND(2.0)	ND(2.0) / ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
CALCIUM (TOTAL)	ug/l	NS/G	32100	17300	7610	35600	36000 / 35400	46700	60100	57300
CHROMIUM (TOTAL)	ug/l	2,110 (S)(4)	5.6 F	8.9 F	3.9 F	ND(3.0)	4.0 F / ND(3.0)	ND(3.0)	6.6 F	ND(3.0)
COBALT (TOTAL)	ug/l	110 (G)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	3.3 F / ND(3.0)	ND(3.0)	3.0 F	ND(3.0)
COPPER (TOTAL)	ug/l	22 (S)(5)	13.3 F	24.3 F	10.6 F	25	46.6 / 31.5	ND(7.0)	25.9	ND(7.0)
IRON (TOTAL)	ug/l	300 (S)	1440	1100	1290	634	537 / 456	2020	8560	654
LEAD (TOTAL)	ug/l	112 (S)(6)	11.9	8.9	ND(2.0) W	2.7 FW	ND(2.0) W / ND(2.0) W	ND(2.0) W	14.6	ND(2.0) W
MAGNESIUM (TOTAL)	ug/l	NS/G	7250	4380 F	2420 F	6860	7960 / 7810	10300	13500	12200
MANGANESE (TOTAL)	ug/l	NS/G	273	70.4	20.4	185	11.3 F / 10.8 F	16	342	4.5 F
POTASSIUM (TOTAL)	ug/l	NS/G	6370	11400	4560 F	2740 F	4160 F / 4200 F	658 F	5860	783 F
SELENIUM (TOTAL)	ug/l	NS/G	ND(2.0)	ND(2.0) W	ND(2.0)	6.6	4.2 F / 4.8 F	ND(2.0)	ND(2.0)	ND(2.0)
SILVER (TOTAL)	ug/l	6 (S)(7)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	10.7 / ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
SODIUM (TOTAL)	ug/l	NS/G	5200	2550 F	677 F	11300	6720 / 6660	7910	14900	5380
VANADIUM (TOTAL)	ug/l	190 (S)	ND(16.0)	ND(16.0)	ND(16.0)	ND(16.0)	ND(16.0) / ND(16.0)	ND(16.0)	23.1 F	ND(16.0)
ZINC (TOTAL)	ug/l	145 (S)(8)	136	71.8	22.6	28.5	59.8 / 42.6	15.9 F	61.9	9.8 F

TABLE 6.8

SUMMARY OF DETECTED COMPOUNDS - SURFACE WATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

Sample Location:			*SW-1*	*SW-2*	*SW-3*	*SW-4*	*SW-5*	*SW-6*	*SW-7*	*SW-8*
Date Sampled:			*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*	*9/29/93*
Parameter	*Units*	*Ambient Surface Water Quality Criteria (1)*								
General Chemistry										
HARDNESS	mg/l	NS/G	100	63	32	120	130 / 130	160	220	190

Notes:

(1)	Class D surface water criteria are derived from "Ambient Water Quality Standards and Guidance Values", Division of Water Technical and Operational Guidance Series 1.1.1, NYSDEC, October 1993. (S) - Standard (G) - Guidance Value
(2)	NS/G - No standard or guidance values have been established.
(3)	Cadmium standard = exp (1.128[ln(ppm hardness)]-3.828) where hardness = 126.9 ppm
(4)	Chromium standard = exp (0.819[ln(ppm hardness)]+3.688) where hardness = 126.9 ppm
(5)	Copper standard = exp (0.9422[ln(ppm hardness)]-1.464) where hardness = 126.9 ppm
(6)	Lead standard = exp (1.266[ln(ppm hardness)]-1.416) where hardness = 126.9 ppm
(7)	Silver standard = exp (1.72[ln(ppm hardness)]-6.52) where hardness = 126.9 ppm
(8)	Zinc standard = exp (0.85[ln(ppm hardness)]+0.86) where hardness = 126.9 ppm
J	The associated numerical value is an estimated quantity.
--	The parameter was not analyzed.
ND	The material was analyzed, but not detected above the stated method detection limit or practical quantitation limit.
R	Result is unusable.
B	Indicates analyte was found in the associated blank.
D	Identifies all compounds in an analysis at a secondary dilution factor.
N	Indicates presumptive evidence of the compound.
X	Generated from extraction artifacts.
E	Indicates an estimated value due to the presence of interference.
W	Indicates that the Furnace AA post-digestion spike recovery does not meet specified criteria.
F	Indicates the reported value was less than the specified detection limit, but greater than or equal to the Instrument Detection Limit.
S	The reported value was determined by the use of the Method of Standard Additions.
P	Indicates the analyte was greater than 25 percent difference for detected concentrations between the two GC columns. The lower of which being reported.
Y	Indicates the presence of siloxane. A typical result of column bleed.
▨	Concentration exceeds NYS Class D surface water criteria.

TABLE 7.1

PHYSICAL AND CHEMICAL PROPERTIES OF SITE-RELATED ORGANIC COMPOUNDS(1)
NEWSTEAD SITE
NEWSTEAD, NEW YORK

	Molecular Weight (g/mol)	*Aqueous Solubility @ 25°C (mg/L)*	*Vapor Pressure @ 25°C (mm Hg)*	*Henry's Law Constant @ 25°C (atm-m³/mol)*	*Koc (ml/g)*	*Specific Density*
VOCs						
Benzene	78.11	1,770	95.2	5.48×10^{-3}	78	0.877
Ethylbenzene	106.17	174	10	7.24×10^{-3}	157	0.867
Xylenes (total)	106.17	198	10	7.04×10^{-3}	240	0.864
SVOCs						
Benzo(a)pyrene	252.32	0.004	5.6×10^{-9}	1.55×10^{-6}	5.5×10^{6}	1.351
Chrysene	228.30	0.0018	6.3×10^{-9}	7.26×10^{-20}	2.5×10^{5}	1.274
Dibenzo(a,h)anthracene	278.36	0.0005	1.0×10^{-10}	7.33×10^{-9}	1.7×10^{6}	1.282
2,4-Dimethylphenol	122.17	7,868	0.098	6.55×10^{-6}	118	0.9650
Naphthalene	128.18	30	0.23	4.7×10^{-4}	1,368	1.162
Phenol	94.11	80,700	0.35	3.97×10^{-7}	21.6	1.071
2,4,5-Trichlorophenol	197.45	1,190	0.022	1.76×10^{-7}	708	1.678
PCBs						
Aroclor - 1254	328.4	0.057	7.71×10^{-5}	2.7×10^{-3}	4.1×10^{5}	1.505
Aroclor - 1260	375.7	0.080	4.05×10^{-5}	3.36×10^{-4}	2.63×10^{6}	1.566

Notes:

(1) Chemical and physical properties are based on:

(a) "Groundwater Chemicals Desk Reference", J.H. Montgomery and L.M. Welkom, Lewis Publishers Inc., Chelsea, Michigan, 1990.

(b) "Handbook of Environmental Data on Organic Chemicals", second edition, K. Verschueran, Van Nostrand Reinhold, N.Y., 1983.

(c) "Superfund Public Health Evaluation Manual", EPA/540/1-86/060 (OSWER Directive 9285.4-1). United States Environmental Protection Agency, October 1986.

TABLE 8.1

SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS FOR BACKGROUND SOILS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)*	*RANGE OF DETECTS*	*MEAN*	*95% UCL*
		Detects / Total	*Min. - Max.*		
VOCs					
CHLOROFORM	ug/kg	0 / 2	ND	–	–
ETHYLBENZENE	ug/kg	0 / 2	ND	–	–
TETRACHLOROETHENE	ug/kg	0 / 2	ND	–	–
TOLUENE	ug/kg	0 / 2	ND	–	–
XYLENE (TOTAL)	ug/kg	0 / 2	ND	–	–
SVOCs					
2,4,5-TRICHLOROPHENOL	ug/kg	0 / 2	ND	–	–
2,4-DINITROTOLUENE	ug/kg	0 / 2	ND	–	–
2-METHYLNAPHTHALENE	ug/kg	0 / 2	ND	–	–
ACENAPHTHENE	ug/kg	1 / 2	62 J	1.34E+02	1.04E+03
ACENAPHTHYLENE	ug/kg	0 / 2	ND	–	–
ANTHRACENE	ug/kg	0 / 2	ND	–	–
BENZO(A)ANTHRACENE	ug/kg	0 / 2	ND	–	–
BENZO(A)PYRENE	ug/kg	0 / 2	ND	–	–
BENZO(B)FLUORANTHENE	ug/kg	0 / 2	ND	–	–
BENZO(G,H,I)PERYLENE	ug/kg	0 / 2	ND	–	–
BENZO(K)FLUORANTHENE	ug/kg	0 / 2	ND	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	0 / 2	ND	–	–
CARBAZOLE	ug/kg	0 / 2	ND	–	–
CHRYSENE	ug/kg	0 / 2	ND	–	–
DI-N-BUTYLPHTHALATE	ug/kg	1 / 2	180 JB	1.93E+02	3.51E+02
DIBENZ(A,H)ANTHRACENE	ug/kg	0 / 2	ND	–	–
DIBENZOFURAN	ug/kg	0 / 2	ND	–	–
DIETHYLPHTHALATE	ug/kg	0 / 2	ND	–	–
FLUORANTHENE	ug/kg	0 / 2	ND	–	–
FLUORENE	ug/kg	0 / 2	ND	–	–
INDENO(1,2,3-CD)PYRENE	ug/kg	0 / 2	ND	–	–
ISOPHORONE	ug/kg	0 / 2	ND	–	–
NAPHTHALENE	ug/kg	0 / 2	ND	–	–
PENTACHLOROPHENOL	ug/kg	0 / 2	ND	–	–
PHENANTHRENE	ug/kg	1 / 2	94 J	1.50E+02	8.55E+02
PHENOL	ug/kg	0 / 2	ND	–	–
PYRENE	ug/kg	0 / 2	ND	–	–
PESTICIDES/PCBs					
4,4'-DDD	ug/kg	0 / 2	ND	–	–
4,4'-DDE	ug/kg	0 / 2	ND	–	–
4,4'-DDT	ug/kg	0 / 2	ND	–	–
ALDRIN	ug/kg	0 / 2	ND	–	–
ALPHA-CHLORDANE	ug/kg	0 / 2	ND	–	–
DELTA-BHC	ug/kg	0 / 2	ND	–	–
DIELDREN	ug/kg	0 / 2	ND	–	–
ENDRIN	ug/kg	0 / 2	ND	–	–
GAMMA-BHC	ug/kg	0 / 2	ND	–	–
GAMMA-CHLORDANE	ug/kg	0 / 2	ND	–	–
HEPTACHLOR	ug/kg	0 / 2	ND	–	–
AROCLOR-1242	ug/kg	0 / 2	ND	–	–
AROCLOR-1254	ug/kg	0 / 2	ND	–	–
AROCLOR-1260	ug/kg	0 / 2	ND	–	–

TABLE 8.1

SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS
FOR BACKGROUND SOILS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)	*RANGE OF DETECTS*	*MEAN*	*95% UCL*
PARAMETERS	*UNITS*	*Detects / Total*	*Min. - Max.*		
METALS					
ALUMINUM	mg/kg	2 / 2	1830 - 8660	5.25E+03	4.86E+04
ANTIMONY	mg/kg	0 / 2	ND	--	--
ARSENIC	mg/kg	2 / 2	1.6 A - 5.9	3.75E+00	3.11E+01
BARIUM	mg/kg	2 / 2	8.9 A - 60.3	3.46E+01	3.61E+02
BERYLLIUM	mg/kg	1 / 2	0.33 A	2.08E-01	1.76E+00
CADMIUM	mg/kg	0 / 2	ND	--	--
CALCIUM	mg/kg	2 / 2	37500 - 48300	4.29E+04	1.12E+05
CHROMIUM	mg/kg	2 / 2	3.5 - 13.8	8.65E+00	7.41E+01
COBALT	mg/kg	2 / 2	1.9 A - 9.6	5.75E+00	5.47E+01
COPPER	mg/kg	2 / 2	4.8 - 20.1	1.25E+01	1.10E+02
IRON	mg/kg	2 / 2	4600 - 18200	1.14E+04	9.78E+04
LEAD	mg/kg	2 / 2	3.4 J - 12.1 J	7.75E+00	6.30E+01
MAGNESIUM	mg/kg	2 / 2	11200 - 16500	1.39E+04	4.75E+04
MANGANESE	mg/kg	2 / 2	174 J - 435	3.05E+02	1.96E+03
MERCURY	mg/kg	0 / 2	ND	--	--
NICKEL	mg/kg	2 / 2	2.6 A - 20	1.13E+01	1.22E+02
POTASSIUM	mg/kg	2 / 2	348 A - 1480	1.09E+03	1.06E+04
SELENIUM	mg/kg	0 / 2	ND	--	--
SILVER	mg/kg	0 / 2	ND	--	--
SODIUM	mg/kg	2 / 2	119 A - 192 A	1.56E+02	6.19E+02
THALLIUM	mg/kg	0 / 2	ND	--	--
VANADIUM	mg/kg	2 / 2	5.1 A - 15.9	1.05E+01	7.91E+01
ZINC	mg/kg	2 / 2	18.8 - 56.6 J	3.77E+01	2.78E+02
CYANIDE	mg/kg	0 / 2	ND	--	--

(1) Based on data collected from Background location BH-W1.

Notes :

-- - Not Available
ND - Not Detected
J - Value is estimated.
B - Compound was found in the associated laboratory blank.
A - Compound was detected above instrument detection limit, but below contract required detection limit.

TABLE 8.2
SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS
FOR BACKGROUND GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN*	*95 % UCL*
VOCs					
1,1-DICHLOROETHENE	ug/l	0 / 8	ND	–	–
2-BUTANONE	ug/l	1 / 1	1 J	1.00E+00	–
ACETONE	ug/l	1 / 1	9 J	9.00E+00	–
BENZENE	ug/l	1 / 8	0.3 J	4.00E-01	4.71E-01
BROMOCHLOROMETHANE	ug/l	0 / 8	ND	–	–
CARBON DISULFIDE	ug/l	1 / 8	0.5 J	5.00E-01	5.00E-01
CHLOROBENZENE	ug/l	0 / 8	ND	–	–
CHLOROFORM	ug/l	0 / 8	ND	–	–
CIS-1,2-DICHLOROETHENE	ug/l	0 / 4	ND	–	–
ETHYLBENZENE	ug/l	0 / 8	ND	–	–
METHYLENE CHLORIDE	ug/l	2 / 8	0.2 J - 0.3 J	7.06E-01	1.05E+00
TOLUENE	ug/l	3 / 8	0.1 J - 0.4 J	4.00E-01	5.34E-01
TRICHLOROETHENE	ug/l	0 / 8	ND	–	–
VINYL CHLORIDE	ug/l	0 / 8	ND	–	–
XYLENE (TOTAL)	ug/l	2 / 8	0.3 J - 0.4 J	4.63E-01	5.25E-01
SVOCs					
2,4-DIMETHYLPHENOL	ug/l	0 / 8	ND	–	–
2,4-DINITROTOLUENE	ug/l	0 / 8	ND	–	–
2,6-DINITROTOLUENE	ug/l	0 / 8	ND	–	–
4-METHYLPHENOL	ug/l	2 / 8	0.6 J - 1 J	2.08E+00	2.74E+00
4-NITROANILINE	ug/l	0 / 8	ND	–	–
ACENAPHTHYLENE	ug/l	0 / 8	ND	–	–
BENZOIC ACID	ug/l	3 / 4	0.7 J - 5 J	2.23E+00	5.46E+00
BENZYL ALCOHOL	ug/l	1 / 4	0.8 J	2.08E+00	3.43E+00
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	6 / 8	2 J - 20	5.19E+00	1.03E+01
DI-N-BUTYLPHTHALATE	ug/l	3 / 8	1 J - 2 J	1.04E+00	1.74E+00
DIETHYLPHTHALATE	ug/l	0 / 8	ND	–	–
NAPHTHALENE	ug/l	0 / 8	ND	–	–
PHENOL	ug/l	1 / 8	2 J	1.69E+00	2.32E+00
TOTAL METALS					
ALUMINUM	ug/l	8 / 8	74.1 - 1400	5.59E+02	9.46E+02
ANTIMONY	ug/l	1 / 4	8.8 FW	3.33E+00	9.13E+00
ARSENIC	ug/l	3 / 4	4.8 F - 24.3	8.83E+00	2.56E+01
BARIUM	ug/l	8 / 8	25.7 FJ - 216 J	7.41E+01	1.30E+02
CADMIUM	ug/l	0 / 8	ND	–	–
CALCIUM	ug/l	8 / 8	14300 E - 84800 E	5.49E+04	7.75E+04
CHROMIUM	ug/l	3 / 4	14.3 J - 25 J	1.39E+01	2.92E+01
COBALT	ug/l	0 / 8	ND	–	–
COPPER	ug/l	5 / 8	2.7 - 78	2.44E+01	4.85E+01
IRON	ug/l	6 / 6	38.3 J - 2240 J	5.49E+02	1.44E+03
LEAD	ug/l	1 / 8	5.2 W	1.53E+00	2.77E+00
MAGNESIUM	ug/l	8 / 8	307 - 26100	1.28E+04	2.26E+04
MANGANESE	ug/l	5 / 6	2.1 - 50.5	1.29E+01	3.28E+01
POTASSIUM	ug/l	4 / 4	612 F - 41200	1.10E+04	4.30E+04
SELENIUM	ug/l	4 / 8	4 J	2.50E+00	3.84E+00
SODIUM	ug/l	8 / 8	5650 - 82800	4.28E+04	6.73E+04
VANADIUM	ug/l	2 / 4	16.7 F - 25.2 F	1.45E+01	2.76E+01
ZINC	ug/l	6 / 8	7.6 F - 33.4	2.32E+01	3.19E+01

TABLE 8.2
SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS FOR BACKGROUND GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)	*RANGE OF DETECTS*	*MEAN*	*95 % UCL*
PARAMETERS	*UNITS*	*Detects / Total*	*Min. - Max.*		
DISSOLVED METALS					
ALUMINUM	ug/l	3 / 8	201 - 551	1.39E+02	3.04E+02
ANTIMONY	ug/l	1 / 4	3.2 F	1.93E+00	3.28E+00
ARSENIC	ug/l	3 / 4	4 F - 21.2	7.78E+00	2.24E+01
BARIUM	ug/l	8 / 8	21.1 FJ - 150 FJ	6.85E+01	1.13E+02
CALCIUM	ug/l	8 / 8	12900 E - 90500 E	5.52E+04	8.05E+04
CHROMIUM	ug/l	3 / 4	3.2 FJ - 5.8 FJ	3.90E+00	6.99E+00
COBALT	ug/l	0 / 8	ND	–	–
COPPER	ug/l	3 / 8	13.4 FJ - 42.3	1.39E+01	2.76E+01
IRON	ug/l	4 / 8	94.6 F - 734	1.72E+02	3.78E+02
MAGNESIUM	ug/l	8 / 8	58.2 FE - 25800	1.30E+04	2.29E+04
MANGANESE	ug/l	4 / 8	2 F - 55.9	1.14E+01	2.75E+01
NICKEL	ug/l	1 / 4	29.1 F	1.14E+01	3.02E+01
POTASSIUM	ug/l	3 / 4	895 F - 41700	1.10E+04	4.36E+04
SELENIUM	ug/l	4 / 8	4 J - 4.9 JF	2.61E+00	4.07E+00
SODIUM	ug/l	8 / 8	6810 - 86800	4.34E+04	6.80E+04
ZINC	ug/l	4 / 5	7.1 F - 68.7	2.57E+01	5.69E+01

(1) Based on data collected from Background locations : MW-1A, MW-1B, MW-3A, MW-3B.

Notes :

– = Not Available
ND = Not Detected
J = Associated value is estimated.
E = Associated value is estimated due to interference.
F = The associated value is less than the specified detection limit but greater than or equal to the instrument detection limit.
W = Indicated the Furnace AA post-digestion spike recovery does not meet specified criteria.

TABLE 8.3

SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS FOR BACKGROUND SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN*	*95% UCL*
VOCs					
ACETONE	ug/kg	1 / 2	13 J	1.08E+01	3.93E+01
METHYLENE CHLORIDE	ug/kg	1 / 2	3 J	8.25E+00	7.50E+01
SVOCs					
ACENAPHTHYLENE	ug/kg	2 / 3	15 J - 190 J	1.63E+02	5.04E+02
ANTHRACENE	ug/kg	2 / 3	11 J - 170 J	1.55E+02	4.97E+02
BENZO(A)ANTHRACENE	ug/kg	3 / 3	85 J - 600 J	2.57E+02	9.95E+02
BENZO(A)PYRENE	ug/kg	3 / 3	93 J - 620 J	2.69E+02	1.02E+03
BENZO(B)FLUORANTHENE	ug/kg	3 / 3	89 J - 600 J	2.66E+02	9.85E+02
BENZO(G,H,I)PERYLENE	ug/kg	2 / 3	60 J - 240 J	1.95E+02	4.91E+02
BENZO(K)FLUORANTHENE	ug/kg	3 / 3	100 J - 710 J	3.07E+02	1.17E+03
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	0 / 3	ND	–	–
BUTYLBENZYLPHTHALATE	ug/kg	0 / 3	ND	–	–
CHRYSENE	ug/kg	3 / 3	120 J - 760 J	3.37E+02	1.25E+03
DI-N-BUTYLPHTHALATE	ug/kg	1 / 3	130 JB	2.52E+02	1.01E+03
DIBENZO(A,H)ANTHRACENE	ug/kg	1 / 3	29 J	3.05E+02	1.02E+03
DIETHYLPHTHALATE	ug/kg	0 / 3	ND	–	–
FLUORANTHENE	ug/kg	3 / 3	200 J - 1700	7.23E+02	2.83E+03
FLUORENE	ug/kg	1 / 3	10 J	2.98E+02	1.03E+03
INDENO(1,2,3-CD)PYRENE	ug/kg	2 / 3	83 J - 350 J	2.39E+02	5.85E+02
NAPHTHALENE	ug/kg	0 / 3	ND	–	–
PHENANTHRENE	ug/kg	3 / 3	96 J - 980 J	4.02E+02	1.65E+03
PYRENE	ug/kg	3 / 3	180 J - 1100 J	4.93E+02	1.80E+03
PESTICIDES/PCBs					
4,4'-DDD	ug/kg	0 / 2	ND	–	–
4,4'-DDE	ug/kg	0 / 2	ND	–	–
4,4'-DDT	ug/kg	0 / 2	ND	–	–
METHOXYCHLOR	ug/kg	0 / 2	ND	–	–
AROCLOR-1248	ug/kg	0 / 3	ND	–	–
AROCLOR-1254	ug/kg	0 / 3	ND	–	–
AROCLOR-1260	ug/kg	0 / 3	ND	–	–
METALS					
ALUMINUM	mg/kg	3 / 3	7420 J - 18000	1.42E+04	2.87E+04
ANTIMONY	mg/kg	1 / 3	1.8 J	3.15E+00	7.10E+00
ARSENIC	mg/kg	3 / 3	2.3 - 5	3.47E+00	6.91E+00
BARIUM	mg/kg	3 / 3	78.1 - 141	1.16E+02	1.98E+02
BERYLLIUM	mg/kg	2 / 3	0.8 F - 0.97 F	6.85E-01	1.57E+00
CADMIUM	mg/kg	2 / 3	0.66 F - 1.5 F	8.58E-01	2.27E+00
CALCIUM	mg/kg	3 / 3	3680 J - 33000	1.38E+04	5.51E+04
CHROMIUM	mg/kg	3 / 3	12.7 - 26.7	2.05E+01	3.82E+01
COBALT	mg/kg	3 / 3	5.1 - 10.9 F	8.07E+00	1.53E+01
COPPER	mg/kg	3 / 3	12.9 - 22.8	1.69E+01	2.99E+01
CYANIDE	mg/kg	0 / 3	ND	–	–
IRON	mg/kg	3 / 3	11900 J - 24000	1.84E+04	3.36E+04
LEAD	mg/kg	3 / 3	19.4 J - 57.9	3.31E+01	8.66E+01
MAGNESIUM	mg/kg	3 / 3	2310 - 19800	8.44E+03	3.29E+04
MANGANESE	mg/kg	3 / 3	124 - 270	1.99E+02	3.80E+02
MERCURY	mg/kg	1 / 3	0.15	1.20E-01	2.01E-01

TABLE 8.3

SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS
FOR BACKGROUND SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN*	*95% UCL*
METALS (cont.)					
NICKEL	mg/kg	2 / 3	18.2 - 21.1	1.51E+01	3.51E+01
POTASSIUM	mg/kg	3 / 3	586 J - 2470	1.70E+03	4.14E+03
SELENIUM	mg/kg	2 / 3	0.89 F - 7.9 J	3.07E+00	1.35E+01
SILVER	mg/kg	0 / 3	ND	--	--
SODIUM	mg/kg	3 / 3	79.9 F - 401 F	1.89E+02	6.46E+02
THALLIUM	mg/kg	1 / 3	1.8	8.25E-01	2.93E+00
VANADIUM	mg/kg	3 / 3	19.2 - 32.1	2.62E+01	4.24E+01
ZINC	mg/kg	3 / 3	58.1 - 164	1.05E+02	2.39E+02

(1) Based on data collected from Background locations : SW-7, SW-8, SW-10.

Notes :

-- = Not Available
ND = Not Detected
J = Associated value is estimated.
B = Analyte was found in the associated blank.
F = The associated value is less than the specified detection limit but greater than or equal to the instrument detection limit.

TABLE 8.4

SUMMARY OF MEAN, 95% UCL AND MAXIMUM CONCENTRATIONS
FOR BACKGROUND SURFACE WATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN*	*95% UCL*
<u>VOCs</u>					
ACETONE	ug/l	0 / 2	ND	–	–
<u>SVOCs</u>					
2-METHYLPHENOL	ug/l	0 / 2	ND	–	–
4-METHYLPHENOL	ug/l	0 / 2	ND	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	2 / 2	1 JB - 7 B	4.00E+00	4.21E+01
DI-N-BUTYLPHTHALATE	ug/l	2 / 2	3 J - 5 J	4.00E+00	1.67E+01
PHENOL	ug/l	0 / 2	ND	–	–
<u>METALS</u>					
ALUMINUM	ug/l	2 / 2	582 - 3880	2.23E+03	2.32E+04
ARSENIC	ug/l	1 / 2	2.7 F	1.60E+00	1.56E+01
BARIUM	ug/l	2 / 2	39.6 F - 85.2 F	6.24E+01	3.52E+02
CADMIUM	ug/l	0 / 2	ND	–	–
CALCIUM	ug/l	2 / 2	57300 - 60100	5.87E+04	7.65E+04
CHROMIUM	ug/l	1 / 2	6.6 F	4.05E+00	3.65E+01
COBALT	ug/l	1 / 2	3 F	2.25E+00	1.18E+01
COPPER	ug/l	1 / 2	25.9	1.47E+01	1.57E+02
IRON	ug/l	2 / 2	654 - 8560	4.61E+03	5.48E+04
[illegible]EAD	ug/l	1 / 2	14.6	7.80E+00	9.42E+01
MAGNESIUM	ug/l	2 / 2	12200 - 13500	1.29E+04	2.11E+04
MANGANESE	ug/l	2 / 2	4.5 F - 342	1.73E+02	2.32E+03
POTASSIUM	ug/l	2 / 2	783 F - 5860	3.32E+03	3.56E+04
SELENIUM	ug/l	0 / 2	ND	–	–
SILVER	ug/l	0 / 2	ND	–	–
SODIUM	ug/l	2 / 2	5380 - 14900	1.01E+04	7.06E+04
VANADIUM	ug/l	1 / 2	23.1 F	1.56E+01	1.11E+02
ZINC	ug/l	2 / 2	9.8 F - 61.9	3.59E+01	3.67E+02

(1) Based on data collected from Background locations : SW-7, SW-8.

<u>Notes :</u>

J = The associated value is estimated.

B = Indicates analyte was found in associated method blank.

F = The associated value is less than the specified detection limit but greater than or equal to the instrument detection limit.

TABLE 8.5

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	UNITS	DETECTION FREQUENCY (1) Detects / Total	RANGE OF DETECTS Min. - Max.	MEAN (1)	95% UCL (1)	BACKGROUND (2) MEAN	BACKGROUND (2) 95% UCL	POTENTIAL CHEMICALS OF CONCERN
VOCs								
CHLOROFORM	ug/kg	1 / 11	8 J	1.60E+03	5.14E+03	ND	ND	X
ETHYLBENZENE	ug/kg	1 / 11	94000	8.55E+03	2.76E+04	ND	ND	X
TETRACHLOROETHENE	ug/kg	1 / 11	2 J	1.60E+03	5.14E+03	ND	ND	X
XYLENE (TOTAL)	ug/kg	1 / 11	620000	5.64E+04	1.82E+05	ND	ND	X
SVOCs								
2,4,5-TRICHLOROPHENOL	ug/kg	1 / 11	740 J	6.46E+02	8.07E+02	ND	ND	X
2,4-DINITROTOLUENE	ug/kg	1 / 11	34 J	6.23E+02	1.52E+03	ND	ND	X
2-METHYLNAPHTHALENE	ug/kg	2 / 11	64 J - 10000	1.11E+03	3.09E+03	ND	ND	X
ACENAPHTHYLENE	ug/kg	1 / 11	190 J	6.38E+02	1.53E+03	ND	ND	X
ANTHRACENE	ug/kg	3 / 11	4 J - 140 J	5.93E+02	1.50E+03	ND	ND	X
BENZO(A)ANTHRACENE	ug/kg	6 / 11	6 J - 680	6.03E+02	1.51E+03	ND	ND	X
BENZO(A)PYRENE	ug/kg	5 / 11	11 J - 670	6.22E+02	1.53E+03	ND	ND	X
BENZO(B)FLUORANTHENE	ug/kg	5 / 11	25 J - 660	6.41E+02	1.54E+03	ND	ND	X
BENZO(G,H,I)PERYLENE	ug/kg	2 / 11	85 J - 310 J	6.14E+02	1.52E+03	ND	ND	X
BENZO(K)FLUORANTHENE	ug/kg	5 / 11	21 J - 690	6.38E+02	1.54E+03	ND	ND	X
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	4 / 11	1700 J - 4700 BD	1.16E+03	2.24E+03	ND	ND	X
CARBAZOLE	ug/kg	1 / 7	110 J	2.31E+02	3.15E+02	ND	ND	X
CHRYSENE	ug/kg	6 / 11	10 J - 920	6.44E+02	1.55E+03	ND	ND	X
DI-N-BUTYLPHTHALATE	ug/kg	2 / 11	720 J - 4600 J	6.67E+02	1.56E+03	1.93E+02	3.51E+02	X
DIBENZO(A,H)ANTHRACENE	ug/kg	1 / 11	150 J	6.34E+02	1.53E+03	ND	ND	X
DIBENZOFURAN	ug/kg	1 / 11	130 J	2.29E+02	2.75E+02	ND	ND	X
DIETHYLPHTHALATE	ug/kg	2 / 11	14 J	5.82E+02	1.49E+03	ND	ND	X
FLUORANTHENE	ug/kg	7 / 11	15 J - 1900	3.18E+02	6.79E+02	ND	ND	X
INDENO(1,2,3-CD)PYRENE	ug/kg	4 / 11	17 J - 380 J	6.04E+02	1.51E+03	ND	ND	X
ISOPHORONE	ug/kg	1 / 11	110 J	6.30E+02	1.53E+03	ND	ND	X
NAPHTHALENE	ug/kg	2 / 11	180 J - 29000	2.85E+03	8.68E+03	ND	ND	X
PENTACHLOROPHENOL	ug/kg	1 / 11	54 J	2.58E+03	7.02E+03	ND	ND	X
PHENANTHRENE	ug/kg	6 / 11	8 J - 980	2.46E+02	4.27E+02	1.50E+02	8.55E+02	X
PHENOL	ug/kg	2 / 11	22 J - 46 J	6.06E+02	1.51E+03	ND	ND	X
PYRENE	ug/kg	7 / 11	12 J - 1400	2.72E+02	5.36E+02	ND	ND	X
PESTICIDES/PCBs								
4,4'-DDD	ug/kg	1 / 9	21	4.48E+00	9.27E+00	ND	ND	X
4,4'-DDE	ug/kg	1 / 9	62 P	9.04E+00	2.43E+01	ND	ND	X
4,4'-DDT	ug/kg	2 / 9	5.9 - 70 P	1.04E+01	2.76E+01	ND	ND	X
ALDRIN	ug/kg	1 / 9	0.37 JP	1.15E+00	1.50E+00	ND	ND	X
ALPHA-CHLORDANE	ug/kg	1 / 9	0.64 J	1.18E+00	1.49E+00	ND	ND	X
DELTA-BHC	ug/kg	1 / 9	5.5 P	1.73E+00	2.85E+00	ND	ND	X
ENDRIN	ug/kg	1 / 9	1 JP	2.26E+00	2.89E+00	ND	ND	X
GAMMA-CHLORDANE	ug/kg	1 / 9	0.6 JP	1.19E+00	1.50E+00	ND	ND	X
AROCLOR-1254	ug/kg	4 / 11	120 P - 14000 D	2.15E+03	5.08E+03	ND	ND	X
AROCLOR-1260	ug/kg	6 / 11	3.6 JP - 13000 DP	2.28E+03	5.21E+03	ND	ND	X

TABL

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)		*RANGE OF DETECTS*				*BACKGROUND (2)*		*POTENTIAL CHEMICALS OF CONCERN*
PARAMETERS	*UNITS*	*Detects*	*/ Total*	*Min.*	*- Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN*	*95% UCL*	
METALS										
ALUMINUM	mg/kg	9	/ 9	7130	- 25200	1.34E+04	1.79E+04	5.25E+03	4.86E+04	X
ANTIMONY	mg/kg	4	/ 9	1.8 J	- 27.6 J	7.57E+00	1.46E+01	ND	ND	X
ARSENIC	mg/kg	27	/ 29	2 F	- 5.06	3.24E+00	3.53E+00	3.75E+00	3.11E+01	
BARIUM	mg/kg	29	/ 29	37.4	- 7240	1.39E+03	2.23E+03	3.46E+01	3.61E+02	X
BERYLLIUM	mg/kg	9	/ 9	0.29 F	- 1.5	7.01E-01	9.72E-01	2.08E-01	1.76E+00	X
CADMIUM	mg/kg	25	/ 29	0.3	- 175	3.08E+01	4.99E+01	ND	ND	X
CALCIUM	mg/kg	9	/ 9	2500	- 80200	2.31E+04	4.47E+04	4.29E+04	1.12E+05	
CHROMIUM	mg/kg	29	/ 29	10.4	- 2680	4.47E+02	7.24E+02	8.65E+00	7.41E+01	X
COBALT	mg/kg	9	/ 9	4.3 F	- 161	4.46E+01	8.73E+01	5.75E+00	5.47E+01	X
COPPER	mg/kg	8	/ 9	13.5	- 466	1.28E+02	2.60E+02	1.25E+01	1.10E+02	X
CYANIDE	mg/kg	4	/ 9	4	- 76	1.71E+01	3.74E+01	ND	ND	X
IRON	mg/kg	9	/ 9	8750	- 38900	1.99E+04	2.70E+04	1.14E+04	9.78E+04	
LEAD	mg/kg	29	/ 29	3.7 J	- 19200	3.93E+03	6.29E+03	7.75E+00	6.30E+01	X
MAGNESIUM	mg/kg	9	/ 9	1670	- 9910	3.62E+03	5.53E+03	1.39E+04	4.75E+04	
MANGANESE	mg/kg	9	/ 9	112 J	- 1310 J	4.05E+02	7.01E+02	3.05E+02	1.96E+03	
MERCURY	mg/kg	18	/ 29	0.14 J	- 1.02	3.68E-01	4.96E-01	ND	ND	X
NICKEL	mg/kg	9	/ 9	8	- 47	2.20E+01	3.21E+01	1.13E+01	1.22E+02	
POTASSIUM	mg/kg	9	/ 9	630 F	- 2820	1.25E+03	1.77E+03	1.09E+03	1.06E+04	
SELENIUM	mg/kg	20	/ 29	0.1	- 12.8 J	2.15E+00	3.48E+00	ND	ND	X
SILVER	mg/kg	5	/ 9	0.57	- 2.5	9.82E-01	1.58E+00	ND	ND	X
SODIUM	mg/kg	9	/ 9	72.3 F	- 802 F	2.80E+02	4.76E+02	1.56E+02	6.19E+02	
VANADIUM	mg/kg	9	/ 9	11.3	- 36.1	2.53E+01	3.22E+01	1.05E+01	7.91E+01	X
ZINC	mg/kg	29	/ 29	34.1	- 25500	3.15E+03	5.19E+03	3.77E+01	2.78E+02	X

(1) Based on data collected from sampling locations : Current Investigation - BH-3, BH-5, BH-6, BH-7, BH-9, BH-11, SS-1, SS-2, SS-3, TP-9, TP-12
Previous Investigation - S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20.

(2) Based on data collected from Background location BH-W1.

TABLE 8.6

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)	RANGE OF DETECTS			BACKGROUND (2)		POTENTIAL CHEMICALS OF CONCERN
PARAMETERS	*UNITS*	*Detects / Total*	*Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN*	*95% UCL*	
VOCs								
CHLOROFORM	ug/kg	1 / 25	8 J	1.04E+03	2.57E+03	ND	ND	
ETHYLBENZENE	ug/kg	5 / 25	6 J - 94000	4.12E+03	1.19E+04	ND	ND	X
TETRACHLOROETHENE	ug/kg	1 / 25	2 J	1.04E+03	2.57E+03	ND	ND	
TOLUENE	ug/kg	2 / 24	7 J - 800 J	3.60E+02	9.64E+02	ND	ND	X
XYLENE (TOTAL)	ug/kg	5 / 25	110 - 620000	2.71E+04	7.82E+04	ND	ND	X
SVOCs								
2,4,5-TRICHLOROPHENOL	ug/kg	1 / 25	740 J	5.70E+02	6.56E+02	ND	ND	
2,4-DINITROTOLUENE	ug/kg	1 / 25	34 J	3.83E+02	7.51E+02	ND	ND	
2-METHYLNAPHTHALENE	ug/kg	4 / 25	694 J - 10000	6.47E+02	1.46E+03	ND	ND	X
ACENAPHTHENE	ug/kg	1 / 25	45 J	3.85E+02	7.52E+02	1.34E+02	1.04E+03	
ACENAPHTHYLENE	ug/kg	1 / 25	190 J	3.90E+02	7.57E+02	ND	ND	
ANTHRACENE	ug/kg	3 / 25	4 J - 140 J	3.70E+02	7.39E+02	ND	ND	X
BENZO(A)ANTHRACENE	ug/kg	6 / 25	6 J - 680	3.75E+02	7.46E+02	ND	ND	X
BENZO(A)PYRENE	ug/kg	6 / 25	11 J - 670	3.75E+02	7.46E+02	ND	ND	X
BENZO(B)FLUORANTHENE	ug/kg	6 / 25	11 J - 660	3.83E+02	7.53E+02	ND	ND	X
BENZO(G,H,I)PERYLENE	ug/kg	2 / 25	85 J - 310 J	3.71E+02	7.40E+02	ND	ND	X
BENZO(K)FLUORANTHENE	ug/kg	6 / 25	11 J - 690	3.82E+02	7.53E+02	ND	ND	X
BENZOIC ACID	ug/kg	1 / 8	45 J - 50 J	3.27E+03	9.77E+03	ND	ND	X
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	4 / 25	1700 J - 4700 BD	5.93E+02	1.07E+03	ND	ND	X
CARBAZOLE	ug/kg	1 / 17	110 J	2.08E+02	2.38E+02	ND	ND	X
CHRYSENE	ug/kg	7 / 25	10 J - 920	3.89E+02	7.62E+02	ND	ND	X
DI-N-BUTYLPHTHALATE	ug/kg	3 / 25	720 J - 4600 J	4.21E+02	8.03E+02	1.93E+02	3.51E+02	X
DIBENZO(A,H)ANTHRACENE	ug/kg	1 / 25	150 J	3.88E+02	7.55E+02	ND	ND	
DIBENZOFURAN	ug/kg	2 / 25	42 J - 130 J	2.04E+02	2.28E+02	ND	ND	X
DIETHYLPHTHALATE	ug/kg	5 / 25	9 J - 17 J	3.44E+02	7.16E+02	ND	ND	X
FLUORANTHENE	ug/kg	7 / 25	15 J - 1900	2.49E+02	3.95E+02	ND	ND	X
FLUORENE	ug/kg	1 / 25	75 J	3.86E+02	7.53E+02	ND	ND	
INDENO(1,2,3-CD)PYRENE	ug/kg	5 / 25	10 J - 380 J	3.67E+02	7.37E+02	ND	ND	X
ISOPHORONE	ug/kg	1 / 25	110 J	3.86E+02	7.54E+02	ND	ND	
NAPHTHALENE	ug/kg	6 / 25	13 J - 29000	1.56E+03	3.95E+03	ND	ND	X
PENTACHLOROPHENOL	ug/kg	1 / 25	54 J	1.42E+03	3.24E+03	ND	ND	
PHENANTHRENE	ug/kg	7 / 25	8 J - 980	2.17E+02	2.90E+02	1.50E+02	8.55E+02	X
PHENOL	ug/kg	4 / 25	22 J - 200 J	3.71E+02	7.40E+02	ND	ND	X
PYRENE	ug/kg	9 / 25	12 J - 1400	2.19E+02	3.26E+02	ND	ND	X
PESTICIDES/PCBs								
4,4'-DDD	ug/kg	2 / 20	6 P - 21	3.19E+00	5.17E+00	ND	ND	X
4,4'-DDE	ug/kg	1 / 20	62 P	5.14E+00	1.14E+01	ND	ND	
4,4'-DDT	ug/kg	3 / 20	3.6 J - 70 P	5.82E+00	1.29E+01	ND	ND	X
ALDRIN	ug/kg	2 / 20	0.37 JP - 2.2 P	1.13E+00	1.32E+00	ND	ND	X
ALPHA-CHLORDANE	ug/kg	2 / 20	0.64 J - 1.3 JP	1.09E+00	1.22E+00	ND	ND	X
DELTA-BHC	ug/kg	2 / 20	0.2 JP - 5.5 P	1.29E+00	1.78E+00	ND	ND	X
DIELDRIN	ug/kg	1 / 20	3.6 JP	2.25E+00	2.53E+00	ND	ND	

TABLE 8.6

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	UNITS	DETECTION FREQUENCY (1)	RANGE OF DETECTS	MEAN (1)	95% UCL (1)	BACKGROUND (2)		POTENTIAL CHEMICALS OF CONCERN
		Detects / Total	Min. - Max.			MEAN	95% UCL	
PESTICIDES/PCBs (cont.)								
ENDRIN	ug/kg	2 / 20	1 JP - 3.8 JP	2.18E+00	2.50E+00	ND	ND	X
GAMMA-BHC (LINDANE)	ug/kg	1 / 20	1.8 J	1.16E+00	1.30E+00	ND	ND	
GAMMA-CHLORDANE	ug/kg	2 / 20	0.23 JP - 0.6 JP	1.04E+00	1.20E+00	ND	ND	X
HEPTACHLOR	ug/kg	1 / 20	2.2	1.18E+00	1.34E+00	ND	ND	
AROCLOR-1242	ug/kg	1 / 25	15 J - 31 J	2.15E+01	2.34E+01	ND	ND	
AROCLOR-1254	ug/kg	7 / 25	7 JP - 14000 D	9.60E+02	2.20E+03	ND	ND	X
AROCLOR-1260	ug/kg	10 / 25	3.6 JP - 13000 DP	1.02E+03	2.27E+03	ND	ND	X
METALS								
ALUMINUM	mg/kg	20 / 20	1760 - 25200	8.24E+03	1.13E+04	5.25E+03	4.86E+04	
ANTIMONY	mg/kg	6 / 20	1.6 J - 27.6	4.41E+00	7.49E+00	ND	ND	X
ARSENIC	mg/kg	37 / 40	0.66 F - 5.06	2.81E+00	3.13E+00	3.75E+00	3.11E+01	
BARIUM	mg/kg	40 / 40	7.6 F - 7240	1.01E+03	1.65E+03	3.46E+01	3.61E+02	X
BERYLLIUM	mg/kg	14 / 20	0.21 F - 1.5	4.37E-01	6.09E-01	2.08E-01	1.76E+00	X
CADMIUM	mg/kg	26 / 40	0.3 - 175	2.24E+01	3.67E+01	ND	ND	X
CALCIUM	mg/kg	20 / 20	1490 - 80200	2.18E+04	3.17E+04	4.29E+04	1.12E+05	
CHROMIUM	mg/kg	40 / 40	3.3 - 2680	3.26E+02	5.33E+02	8.65E+00	7.41E+01	X
COBALT	mg/kg	16 / 20	1.7 F - 161	2.20E+01	4.15E+01	5.75E+00	5.47E+01	X
COPPER	mg/kg	13 / 20	9.5 - 466	6.18E+01	1.21E+02	1.25E+01	1.10E+02	X
CYANIDE	mg/kg	4 / 20	4 - 76	8.34E+00	1.72E+01	ND	ND	X
IRON	mg/kg	20 / 20	3240 - 38900	1.23E+04	1.68E+04	1.14E+04	9.78E+04	
LEAD	mg/kg	40 / 40	2.4 J - 19200	2.85E+03	4.63E+03	7.75E+00	6.30E+01	X
MAGNESIUM	mg/kg	20 / 20	1020 - 10900	5.20E+03	6.92E+03	1.39E+04	4.75E+04	
MANGANESE	mg/kg	20 / 20	35.7 J - 1310 J	2.63E+02	4.00E+02	3.05E+02	1.96E+03	
MERCURY	mg/kg	19 / 40	0.11 J - 1.02	2.83E-01	3.85E-01	ND	ND	X
NICKEL	mg/kg	20 / 20	3.2 F - 47	1.36E+01	1.92E+01	1.13E+01	1.22E+02	
POTASSIUM	mg/kg	20 / 20	384 F - 2820	8.60E+02	1.13E+03	1.09E+03	1.06E+04	
SELENIUM	mg/kg	23 / 40	0.1 - 12.8 J	1.69E+00	2.67E+00	ND	ND	X
SILVER	mg/kg	5 / 20	0.57 - 2.5	6.32E-01	9.14E-01	ND	ND	X
SODIUM	mg/kg	20 / 20	72.1 F - 802 F	1.81E+02	2.70E+02	1.56E+02	6.19E+02	
VANADIUM	mg/kg	20 / 20	4.9 F - 36.1	1.65E+01	2.14E+01	1.05E+01	7.91E+01	
ZINC	mg/kg	40 / 40	16.5 - 25500	2.29E+03	3.82E+03	3.77E+01	2.78E+02	X

(1) Based on data collected from sampling locations : Current Investigation - BH-1, BH-2, BH-3, BH-4, BH-5, BH-6, BH-7, BH-8, BH-9, BH-10, BH-11, BH-12
Previous Investigation - SS-1, SS-2, SS-3, TP-9, TP-12, TP-15, S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20.

(1) Based on data collected from Background location BH-W1.

TABLE 8.7

SUMMARY OF POTENITAL CHEMICALS OF CONCERN FOR AIR PARTICULATES
NEWSTEAD SITE
NEWSTEAD, NEW YORK

	DETECTION FREQUENCY (1)	RANGE OF DETECTS			ESTIMATED FUTURE (ON-SITE)		ESTIMATED CURRENT & FUTURE (OFF-SITE)		POTENTIAL
PARAMETERS	*Detects / Total*	*Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN ug/m3*	*95% UCL ug/m3*	*MEAN ug/m3*	*95% UCL ug/m3*	*CHEMICALS OF CONCERN*
VOCs (ug/kg)									
CHLOROFORM	1 / 5	8 J	3.51E+03	1.32E+04	1.40E-04	5.29E-04	8.76E-05	3.30E-04	X
ETHYLBENZENE	1 / 5	94000	1.88E+04	7.10E+04	7.52E-04	2.84E-03	4.70E-04	1.77E-03	X
XYLENE (TOTAL)	1 / 5	620000	1.24E+05	4.68E+05	4.96E-03	1.87E-02	3.10E-03	1.17E-02	X
SVOCs (ug/kg)									
2,4,5-TRICHLOROPHENOL	1 / 5	740 J	8.08E+02	1.16E+03	3.23E-05	4.65E-05	2.02E-05	2.91E-05	X
2,4-DINITROTOLUENE	1 / 5	34 J	1.11E+03	3.57E+03	4.46E-05	1.43E-04	2.79E-05	8.93E-05	X
2-METHYLNAPHTHALENE	2 / 5	64 J - 10000	2.19E+03	7.61E+03	8.76E-05	3.04E-04	5.47E-05	1.90E-04	X
ANTHRACENE	1 / 5	4 J	1.10E+03	3.57E+03	4.42E-05	1.43E-04	2.76E-05	8.93E-05	X
BENZO(A)ANTHRACENE	3 / 5	21 J - 150 J	1.06E+03	3.56E+03	4.23E-05	1.42E-04	2.64E-05	8.90E-05	X
BENZO(A)PYRENE	3 / 5	22 J - 150 J	1.06E+03	3.56E+03	4.24E-05	1.42E-04	2.65E-05	8.90E-05	X
BENZO(B)FLUORANTHENE	3 / 5	25 J - 280 J	1.10E+03	3.57E+03	4.41E-05	1.43E-04	2.76E-05	8.93E-05	X
BENZO(G,H,I)PERYLENE	1 / 5	85 J	1.08E+03	3.56E+03	4.30E-05	1.43E-04	2.69E-05	8.91E-05	X
BENZO(K)FLUORANTHENE	3 / 5	21 J - 230 J	1.09E+03	3.57E+03	4.37E-05	1.43E-04	2.73E-05	8.92E-05	X
BIS(2-ETHYLHEXYL)PHTHALATE	4 / 5	1700 J - 4700 BD	2.35E+03	4.58E+03	9.39E-05	1.83E-04	5.87E-05	1.14E-04	X
CHRYSENE	3 / 5	31 J - 270 J	1.10E+03	3.57E+03	4.38E-05	1.43E-04	2.74E-05	8.92E-05	X
DI-N-BUTYLPHTHALATE	2 / 5	720 J - 4600 J	1.29E+03	3.63E+03	5.17E-05	1.45E-04	3.23E-05	9.08E-05	X
DIBENZOFURAN	1 / 5	130 J	2.48E+02	3.77E+02	9.92E-06	1.51E-05	6.20E-06	9.42E-06	X
FLUORANTHENE	4 / 5	60 J - 260 J	1.77E+02	3.72E+02	7.10E-06	1.49E-05	4.44E-06	9.29E-06	X
INDENO(1,2,3-CD)PYRENE	2 / 5	20 J - 90 J	1.08E+03	3.56E+03	4.32E-05	1.43E-04	2.70E-05	8.91E-05	X
ISOPHORONE	1 / 5	110 J	1.13E+03	3.58E+03	4.52E-05	1.43E-04	2.83E-05	8.94E-05	X
NAPHTHALENE	2 / 5	180 J - 29000	6.01E+03	2.20E+04	2.40E-04	8.79E-04	1.50E-04	5.49E-04	X
PENTACHLOROPHENOL	1 / 5	54 J	5.06E+03	1.72E+04	2.02E-04	6.87E-04	1.27E-04	4.29E-04	X
PHENANTHRENE	3 / 5	46 J - 230 J	2.06E+02	3.79E+02	8.25E-06	1.52E-05	5.16E-06	9.47E-06	X
PHENOL	1 / 5	22 J	1.11E+03	3.57E+03	4.45E-05	1.43E-04	2.78E-05	8.93E-05	X
PYRENE	4 / 5	48 J - 240 J	1.80E+02	3.66E+02	7.19E-06	1.46E-05	4.50E-06	9.15E-06	X
PESTICIDES/PCBs (ug/kg)									
4,4'-DDD	1 / 5	21	6.39E+00	1.66E+01	2.56E-07	6.63E-07	1.60E-07	4.14E-07	X
4,4'-DDE	1 / 5	62 P	1.46E+01	4.75E+01	5.84E-07	1.90E-06	3.65E-07	1.19E-06	X
4,4'-DDT	1 / 5	70 P	1.62E+01	5.35E+01	6.48E-07	2.14E-06	4.05E-07	1.34E-06	X
ALDRIN	1 / 5	0.37 JP	1.20E+00	1.99E+00	4.82E-08	7.96E-08	3.01E-08	4.97E-08	X
ALPHA-CHLORDANE	1 / 5	0.64 J	1.26E+00	1.94E+00	5.03E-08	7.76E-08	3.15E-08	4.85E-08	X
DELTA-BHC	1 / 5	5.5 P	2.25E+00	4.56E+00	9.00E-08	1.83E-07	5.63E-08	1.14E-07	X
ENDRIN	1 / 5	1 JP	2.39E+00	3.79E+00	9.56E-08	1.52E-07	5.98E-08	9.47E-08	X
GAMMA-CHLORDANE	1 / 5	0.6 JP	1.27E+00	1.97E+00	5.08E-08	7.86E-08	3.18E-08	4.92E-08	X
AROCLOR-1254	4 / 5	120 P - 14000 D	4.71E+03	1.18E+04	1.88E-04	4.71E-04	1.18E-04	2.95E-04	X
AROCLOR-1260	4 / 5	83 - 13000 DP	5.00E+03	1.18E+04	2.00E-04	4.74E-04	1.25E-04	2.96E-04	X

TABLE 8.7

SUMMARY OF POTENITAL CHEMICALS OF CONCERN FOR AIR PARTICULATES
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	DETECTION FREQUENCY (1) Detects / Total	RANGE OF DETECTS Min. - Max.	MEAN (1)	95% UCL (1)	ESTIMATED FUTURE (ON-SITE) MEAN ug/m3	ESTIMATED FUTURE (ON-SITE) 95% UCL ug/m3	ESTIMATED CURRENT & FUTURE (OFF-SITE) MEAN ug/m3	ESTIMATED CURRENT & FUTURE (OFF-SITE) 95% UCL ug/m3	POTENTIAL CHEMICALS OF CONCERN
METALS (mg/kg)									
ALUMINUM	5 / 5	7330 - 15100	1.13E+04	1.58E+04	4.51E-01	6.32E-01	2.82E-01	3.95E-01	X
ANTIMONY	5 / 5	1.8 J - 27.6 J	1.18E+01	2.51E+01	4.73E-04	1.00E-03	2.96E-04	6.28E-04	X
ARSENIC	11 / 13	2.2 - 4.24	3.27E+00	3.66E+00	1.31E-04	1.46E-04	8.17E-05	9.15E-05	
BARIUM	13 / 13	81.8 - 7100	1.62E+03	3.05E+03	6.49E-02	1.22E-01	4.06E-02	7.62E-02	X
BERYLLIUM	5 / 5	0.4 J - 1.5	7.36E-01	1.28E+00	2.94E-05	5.13E-05	1.84E-05	3.21E-05	X
CADMIUM	13 / 13	2 - 175	4.09E+01	7.47E+01	1.63E-03	2.99E-03	1.02E-03	1.87E-03	X
CALCIUM	5 / 5	6800 - 80200	3.73E+04	7.65E+04	1.49E+00	3.06E+00	9.33E-01	1.91E+00	
CHROMIUM	13 / 13	16.4 J - 2680	6.56E+02	1.20E+03	2.63E-02	4.80E-02	1.64E-02	3.00E-02	X
COBALT	5 / 5	5.2 F - 161	7.51E+01	1.49E+02	3.00E-03	5.97E-03	1.88E-03	3.73E-03	X
COPPER	5 / 5	24.6 J - 466	2.17E+02	4.55E+02	8.67E-03	1.82E-02	5.42E-03	1.14E-02	X
CYANIDE	4 / 5	4 - 76	2.97E+01	6.81E+01	1.19E-03	2.72E-03	7.42E-04	1.70E-03	X
IRON	5 / 5	13400 J - 38900	2.38E+04	3.69E+04	9.54E-01	1.47E+00	5.96E-01	9.21E-01	
LEAD	13 / 13	17 - 19200	5.54E+03	9.87E+03	2.21E-01	3.95E-01	1.38E-01	2.47E-01	X
MAGNESIUM	5 / 5	2040 - 9910	4.37E+03	8.36E+03	1.75E-01	3.34E-01	1.09E-01	2.09E-01	
MANGANESE	5 / 5	277 - 1310 J	6.10E+02	1.13E+03	2.44E-02	4.53E-02	1.52E-02	2.83E-02	
MERCURY	9 / 13	0.14 J - 1.02	3.79E-01	5.91E-01	1.52E-05	2.37E-05	9.48E-06	1.48E-05	X
NICKEL	5 / 5	11.7 J - 47	2.85E+01	4.66E+01	1.14E-03	1.86E-03	7.14E-04	1.16E-03	
POTASSIUM	5 / 5	630 F - 1630	9.82E+02	1.48E+03	3.93E-02	5.93E-02	2.45E-02	3.70E-02	
SELENIUM	11 / 13	0.1 - 12.8 J	3.02E+00	5.52E+00	1.21E-04	2.21E-04	7.55E-05	1.38E-04	X
SILVER	4 / 5	0.57 - 2.5	1.28E+00	2.44E+00	5.14E-05	9.78E-05	3.21E-05	6.11E-05	X
SODIUM	5 / 5	124 J - 802 F	4.07E+02	7.58E+02	1.63E-02	3.03E-02	1.02E-02	1.89E-02	
VANADIUM	5 / 5	11.3 - 36.1	2.47E+01	3.83E+01	9.86E-04	1.53E-03	6.17E-04	9.57E-04	X
ZINC	13 / 13	206 - 25500	4.88E+03	9.11E+03	1.95E-01	3.64E-01	1.22E-01	2.28E-01	X

(1) Based on data collected from surficial soil sampling locations : BH-3, BH-6, SS-3, TP-9, TP-12, S-1, S-8, S-9, S-10, S-11, S-12, S-13, S-18.

(2) Based on data collected from Background location BH-W1.

TABLE 8.8

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN IN GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)	*RANGE OF DETECTS*			*BACKGROUND (2)*		*POTENTIAL CHEMICALS*
PARAMETERS	*UNITS*	*Detects / Total*	*Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN*	*95% UCL*	*OF CONCERN*
VOCs								
1,1-DICHLOROETHENE	ug/l	1 / 10	0.1 J	1.41E+00	3.57E+00	ND	ND	X
2-BUTANONE	ug/l	2 / 2	2 J - 9 J	5.25E+00	4.65E+01	1.00E+00	--	X
BENZENE	ug/l	3 / 10	0.2 J - 52	5.61E+00	1.73E+01	4.00E-01	4.71E-01	X
BROMOCHLOROMETHANE	ug/l	1 / 10	0.3 J	1.43E+00	3.58E+00	ND	ND	X
CARBON DISULFIDE	ug/l	2 / 10	0.1 J - 0.2 J	1.58E+00	3.75E+00	5.00E-01	5.00E-01	X
CHLOROBENZENE	ug/l	2 / 10	0.1 J	1.37E+00	3.54E+00	ND	ND	X
CHLOROFORM	ug/l	2 / 10	0.3 J - 0.4 J	1.42E+00	3.58E+00	ND	ND	X
CIS-1,2-DICHLOROETHENE	ug/l	1 / 5	0.1 J	4.55E-01	5.80E-01	ND	ND	X
ETHYLBENZENE	ug/l	2 / 10	0.7 J - 40	4.48E+00	1.34E+01	ND	ND	X
METHYLENE CHLORIDE	ug/l	3 / 10	0.1 J - 0.2 J	2.60E+00	6.98E+00	7.06E-01	1.05E+00	X
TOLUENE	ug/l	3 / 10	0.1 J - 4	1.73E+00	3.96E+00	4.00E-01	5.34E-01	X
TRICHLOROETHENE	ug/l	1 / 10	0.1 J	1.41E+00	3.57E+00	ND	ND	X
VINYL CHLORIDE	ug/l	1 / 10	0.3 J - 0.4 J	1.44E+00	3.59E+00	ND	ND	X
XYLENE (TOTAL)	ug/l	4 / 10	0.2 J - 350	3.55E+01	1.15E+02	4.63E-01	5.25E-01	X
SVOCs								
2,4-DIMETHYLPHENOL	ug/l	1 / 10	2 J	2.45E+00	2.56E+00	ND	ND	X
2,4-DINITROTOLUENE	ug/l	1 / 10	0.7 J	2.32E+00	2.73E+00	ND	ND	X
2,6-DINITROTOLUENE	ug/l	1 / 10	5	2.75E+00	3.32E+00	ND	ND	X
4-NITROANILINE	ug/l	1 / 10	0.8 J	9.08E+00	1.12E+01	ND	ND	X
ACENAPHTHYLENE	ug/l	1 / 10	3 J	2.55E+00	2.66E+00	ND	ND	X
BENZOIC ACID	ug/l	2 / 5	0.8 J - 0.9 J	1.84E+00	2.96E+00	2.23E+00	5.46E+00	
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	7 / 10	1 J - 11	3.64E+00	6.11E+00	5.19E+00	1.03E+01	
DI-N-BUTYLPHTHALATE	ug/l	1 / 10	2 J - 6	1.72E+00	2.74E+00	1.04E+00	1.74E+00	X
DIETHYLPHTHALATE	ug/l	1 / 10	1 J	1.33E+00	2.14E+00	ND	ND	X
NAPHTHALENE	ug/l	1 / 10	2 J	2.45E+00	2.56E+00	ND	ND	X
PHENOL	ug/l	1 / 10	1 J	1.68E+00	2.21E+00	1.69E+00	2.32E+00	
TOTAL METALS								
ALUMINUM	ug/l	7 / 10	41.8 F - 2780	5.19E+02	1.16E+03	5.59E+02	9.46E+02	
ARSENIC	ug/l	4 / 5	1.4 F - 15.1	5.95E+00	1.41E+01	8.83E+00	2.56E+01	
BARIUM	ug/l	10 / 10	4.8 F - 148 FJ	4.88E+01	8.46E+01	7.41E+01	1.30E+02	
CADMIUM	ug/l	4 / 10	1.2 - 4.1	1.50E+00	2.33E+00	ND	ND	X
CALCIUM	ug/l	10 / 10	11500 E - 394000	1.34E+05	2.37E+05	5.49E+04	7.75E+04	X
CHROMIUM	ug/l	4 / 5	3.4 FJ - 19.8 J	8.65E+00	1.79E+01	1.39E+01	2.92E+01	
COBALT	ug/l	3 / 10	1.8 - 4.4 F	1.52E+00	2.25E+00	ND	ND	X
COPPER	ug/l	7 / 10	2.4 - 101	2.36E+01	4.58E+01	2.44E+01	4.85E+01	
IRON	ug/l	5 / 6	677 - 21500 J	8.96E+03	1.77E+04	5.49E+02	1.44E+03	X
LEAD	ug/l	3 / 10	3.1 - 15.9	3.09E+00	6.49E+00	1.53E+00	2.77E+00	X
MAGNESIUM	ug/l	10 / 10	180 FE - 68900	2.97E+04	4.82E+04	1.28E+04	2.26E+04	X
MANGANESE	ug/l	6 / 7	3.7 - 400	9.51E+01	2.16E+02	1.29E+01	3.28E+01	X
POTASSIUM	ug/l	5 / 5	663 F - 15000	4.86E+03	1.21E+04	1.10E+04	4.30E+04	
SELENIUM	ug/l	6 / 10	4 J - 246	3.38E+01	8.89E+01	2.50E+00	3.84E+00	X
SODIUM	ug/l	10 / 10	25400 - 175000	6.99E+04	1.05E+05	4.28E+04	6.73E+04	
VANADIUM	ug/l	1 / 5	20.9 F	1.06E+01	1.77E+01	1.45E+01	2.76E+01	
ZINC	ug/l	9 / 10	12.1 F - 1390	1.75E+02	4.81E+02	2.32E+01	3.19E+01	X

TABLE 8.8

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN IN GROUNDWATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	UNITS	DETECTION FREQUENCY (1) Detects / Total	RANGE OF DETECTS Min. - Max.	MEAN (1)	95% UCL (1)	BACKGROUND (2) MEAN	BACKGROUND (2) 95% UCL	POTENTIAL CHEMICALS OF CONCERN
DISSOLVED METALS								
ALUMINUM	ug/l	1 / 10	41.4 F	1.67E+01	2.36E+01	1.39E+02	3.04E+02	
ARSENIC	ug/l	3 / 5	1.9 F - 11.8	4.99E+00	1.19E+01	7.78E+00	2.24E+01	
BARIUM	ug/l	10 / 10	3.2 - 133 FJ	3.81E+01	6.74E+01	6.85E+01	1.13E+02	
CALCIUM	ug/l	10 / 10	9970 E - 395000	1.36E+05	2.42E+05	5.52E+04	8.05E+04	X
CHROMIUM	ug/l	2 / 5	3 FJ - 3.4 F	2.18E+00	3.35E+00	3.90E+00	6.99E+00	
COBALT	ug/l	1 / 10	1.5 - 1.6	1.11E+00	1.48E+00	ND	ND	X
COPPER	ug/l	5 / 10	1.6 - 25.4	8.94E+00	1.60E+01	1.39E+01	2.76E+01	
IRON	ug/l	4 / 10	150 - 3100 J	5.99E+02	1.35E+03	1.72E+02	3.78E+02	X
MAGNESIUM	ug/l	10 / 10	167 FE - 71600	3.02E+04	4.92E+04	1.30E+04	2.29E+04	X
MANGANESE	ug/l	9 / 10	1.7 - 436	8.61E+01	1.80E+02	1.14E+01	2.75E+01	X
NICKEL	ug/l	2 / 5	11.5 F - 13.2 F	7.47E+00	1.09E+01	1.14E+01	3.02E+01	
POTASSIUM	ug/l	5 / 5	542 F - 15600	4.90E+03	1.25E+04	1.10E+04	4.36E+04	
SELENIUM	ug/l	6 / 10	4 J - 327 S	4.07E+01	1.14E+02	2.61E+00	4.07E+00	X
SODIUM	ug/l	10 / 10	27400 - 183000	7.17E+04	1.08E+05	4.34E+04	6.80E+04	
ZINC	ug/l	8 / 10	10.7 F - 26.3	1.67E+01	2.13E+01	2.57E+01	5.69E+01	

(1) Based on data collected from sampling locations : MW-2A, MW-2B, MW-4A, MW-4B, WELL-D, WELL-S.
(2) Based on data collected from Background locations : MW-1A, MW-1B, MW-3A, MW-3B.

TABLE 8.9

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR ON-SITE SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

		DETECTION FREQUENCY (1)	RANGE OF DETECTS			BACKGROUND (2)		POTENTIAL CHEMICALS OF CONCERN
PARAMETERS	*UNITS*	*Detects / Total*	*Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN*	*95% UCL*	*OF CONCERN*
VOCs								
METHYLENE CHLORIDE	ug/kg	2 / 3	4 J - 7 J	6.33E+00	1.15E+01	8.25E+00	7.50E+01	
SVOCs								
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	2 / 3	220 J - 440 J	3.03E+02	6.00E+02	ND	ND	X
DI-N-BUTYLPHTHALATE	ug/kg	3 / 3	260 JB - 360 JB	2.97E+02	4.33E+02	2.52E+02	1.01E+03	X
PESTICIDES/PCBs								
4,4'-DDE	ug/kg	1 / 3	14	6.35E+00	2.28E+01	ND	ND	X
AROCLOR-1248	ug/kg	1 / 3	58 JP	3.62E+01	8.31E+01	ND	ND	X
AROCLOR-1254	ug/kg	2 / 3	68 P - 320	1.38E+02	5.34E+02	ND	ND	X
AROCLOR-1260	ug/kg	2 / 3	98 P - 180 P	1.01E+02	2.94E+02	ND	ND	X
METALS								
ALUMINUM	mg/kg	3 / 3	7620 J - 13900	1.14E+04	1.73E+04	1.42E+04	2.87E+04	
ANTIMONY	mg/kg	0 / 3	ND	ND	ND	3.15E+00	7.10E+00	
ARSENIC	mg/kg	3 / 3	2.1 - 4	2.77E+00	5.42E+00	3.47E+00	6.91E+00	
BARIUM	mg/kg	3 / 3	114 - 326 J	1.92E+02	4.82E+02	1.16E+02	1.98E+02	
BERYLLIUM	mg/kg	3 / 3	0.65 F - 0.66 F	6.53E-01	6.68E-01	6.85E-01	1.57E+00	
CADMIUM	mg/kg	2 / 3	1.2 F - 6.6	2.71E+00	1.11E+01	8.58E-01	2.27E+00	X
CALCIUM	mg/kg	3 / 3	3560 - 6540	4.60E+03	8.77E+03	1.38E+04	5.51E+04	
CHROMIUM	mg/kg	3 / 3	16.6 - 51.6 J	2.92E+01	7.75E+01	2.05E+01	3.82E+01	
COBALT	mg/kg	3 / 3	5.9 F - 15.4	9.50E+00	2.23E+01	8.07E+00	1.53E+01	
COPPER	mg/kg	3 / 3	9.7 - 38.7	2.00E+01	6.03E+01	1.69E+01	2.99E+01	
CYANIDE	mg/kg	2 / 3	1.1 J - 2 J	1.17E+00	3.16E+00	ND	ND	X
IRON	mg/kg	3 / 3	14000 - 17200	1.55E+04	1.95E+04	1.84E+04	3.36E+04	
LEAD	mg/kg	3 / 3	26.5 - 338 J	1.39E+02	5.68E+02	3.31E+01	8.66E+01	X
MAGNESIUM	mg/kg	3 / 3	2210 - 2640	2.38E+03	2.95E+03	8.44E+03	3.29E+04	
MANGANESE	mg/kg	3 / 3	75.6 - 202	1.41E+02	2.98E+02	1.99E+02	3.80E+02	
MERCURY	mg/kg	0 / 3	ND	ND	ND	1.20E-01	2.01E-01	
NICKEL	mg/kg	3 / 3	11.3 - 17.4	1.39E+01	1.84E+01	1.51E+01	3.51E+01	
POTASSIUM	mg/kg	3 / 3	519 F - 1480	1.05E+03	1.73E+03	1.70E+03	4.14E+03	
SELENIUM	mg/kg	3 / 3	0.52 F - 2	1.17E+00	2.24E+00	3.07E+00	1.35E+01	
SILVER	mg/kg	1 / 3	0.97 F	6.33E-01	1.05E+00	ND	ND	X
SODIUM	mg/kg	3 / 3	62.2 F - 114 F	7.96E+01	1.22E+02	1.89E+02	6.46E+02	
THALLIUM	mg/kg	0 / 3	ND	ND	ND	8.25E-01	2.93E+00	
VANADIUM	mg/kg	3 / 3	19.4 - 24.1	2.23E+01	2.58E+01	2.62E+01	4.24E+01	
ZINC	mg/kg	3 / 3	79.1 - 487 J	2.25E+02	5.46E+02	1.05E+02	2.39E+02	X

(1) Based on data collected from sampling locations: SW-1, SW-2, SW-3.
(2) Based on data collected from Background locations : SW-7, SW-8, SW-10.

TABLE 8.10

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR OFF-SITE SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)*	*RANGE OF DETECTS*	*MEAN (1)*	*95% UCL (1)*	*BACKGROUND (2)*		*POTENTIAL CHEMICALS OF CONCERN*
		Detects / Total	*Min. - Max.*			*MEAN*	*95% UCL*	
VOCs								
ACETONE	ug/kg	1 / 3	10 J	7.92E+00	2.76E+01	1.08E+01	3.93E+01	
METHYLENE CHLORIDE	ug/kg	3 / 3	2 J - 3 J	3.42E+00	1.19E+01	8.25E+00	7.50E+01	
SVOCs								
ACENAPHTHYLENE	ug/kg	2 / 4	9 J - 63 J	1.53E+02	3.95E+02	1.63E+02	5.04E+02	
ANTHRACENE	ug/kg	1 / 4	7 J - 15 J	1.98E+02	5.14E+02	1.55E+02	4.97E+02	X
BENZO(A)ANTHRACENE	ug/kg	4 / 4	64 J - 170 J	1.31E+02	3.38E+02	2.57E+02	9.95E+02	
BENZO(A)PYRENE	ug/kg	4 / 4	65 J - 240 J	1.60E+02	4.14E+02	2.69E+02	1.02E+03	
BENZO(B)FLUORANTHENE	ug/kg	4 / 4	68 J - 250 J	1.73E+02	4.49E+02	2.66E+02	9.85E+02	
BENZO(G,H,I)PERYLENE	ug/kg	4 / 4	41 J - 95 J	9.65E+01	2.50E+02	1.95E+02	4.91E+02	
BENZO(K)FLUORANTHENE	ug/kg	4 / 4	65 J - 280 J	1.79E+02	4.65E+02	3.07E+02	1.17E+03	
BIS(2-ETHYLHEXYL)PHTHALATE	ug/kg	1 / 4	270 J	2.11E+02	5.45E+02	ND	ND	X
BUTYLBENZYLPHTHALATE	ug/kg	1 / 4	18 J	2.34E+02	6.07E+02	ND	ND	X
CHRYSENE	ug/kg	4 / 4	84 J - 240 J	1.83E+02	4.74E+02	3.37E+02	1.25E+03	
DI-N-BUTYLPHTHALATE	ug/kg	3 / 4	100 JB - 300 JB	1.60E+02	4.16E+02	2.52E+02	1.01E+03	
DIBENZO(A,H)ANTHRACENE	ug/kg	1 / 4	19 J - 43 J	2.03E+02	5.27E+02	3.05E+02	1.02E+03	
DIETHYLPHTHALATE	ug/kg	1 / 4	250 J	1.97E+02	5.12E+02	ND	ND	X
FLUORANTHENE	ug/kg	4 / 4	130 J - 470 J	3.46E+02	8.97E+02	7.23E+02	2.83E+03	
FLUORENE	ug/kg	1 / 4	12 J	2.70E+02	6.99E+02	2.98E+02	1.03E+03	
INDENO(1,2,3-CD)PYRENE	ug/kg	4 / 4	57 J - 160 J	1.30E+02	3.36E+02	2.39E+02	5.85E+02	
NAPHTHALENE	ug/kg	1 / 4	5 J - 9 J	1.97E+02	5.11E+02	ND	ND	X
PHENANTHRENE	ug/kg	4 / 4	62 J - 290 J	1.80E+02	4.67E+02	4.02E+02	1.65E+03	
PYRENE	ug/kg	4 / 4	150 J - 400 J	2.78E+02	7.19E+02	4.93E+02	1.80E+03	
PESTICIDES/PCBs								
4,4'-DDD	ug/kg	1 / 3	2.6 J	2.59E+00	9.03E+00	ND	ND	X
4,4'-DDE	ug/kg	3 / 3	2.1 JP - 18	8.82E+00	3.07E+01	ND	ND	X
4,4'-DDT	ug/kg	1 / 3	12 P	5.83E+00	2.03E+01	ND	ND	X
METHOXYCHLOR	ug/kg	1 / 3	42	2.31E+01	8.04E+01	ND	ND	X
AROCLOR-1254	ug/kg	2 / 4	8.3 JP - 28 JP	2.31E+01	5.99E+01	ND	ND	X
AROCLOR-1260	ug/kg	2 / 4	41 JP - 140 P	5.73E+01	1.48E+02	ND	ND	X

TABLE 8.10

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR OFF-SITE SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	UNITS	DETECTION FREQUENCY (1)	RANGE OF DETECTS	MEAN (1)	95% UCL (1)	BACKGROUND (2)		POTENTIAL CHEMICALS OF CONCERN
		Detects / Total	Min. - Max.			MEAN	95% UCL	
METALS								
ALUMINUM	mg/kg	4 / 4	7620 J - 16300	1.14E+04	2.97E+04	1.42E+04	2.87E+04	
ANTIMONY	mg/kg	1 / 4	1.9 J	2.47E+00	6.40E+00	3.15E+00	7.10E+00	
ARSENIC	mg/kg	4 / 4	2 - 5.8	3.14E+00	8.13E+00	3.47E+00	6.91E+00	
BARIUM	mg/kg	4 / 4	99 - 2570	7.36E+02	1.91E+03	1.16E+02	1.98E+02	X
BERYLLIUM	mg/kg	3 / 4	0.52 F - 0.75 F	5.33E-01	1.38E+00	6.85E-01	1.57E+00	
CADMIUM	mg/kg	2 / 4	1.4 F - 3	1.33E+00	3.44E+00	8.58E-01	2.27E+00	
CALCIUM	mg/kg	4 / 4	3180 - 19800 J	8.13E+03	2.11E+04	1.38E+04	5.51E+04	
CHROMIUM	mg/kg	4 / 4	12.9 - 229	7.03E+01	1.82E+02	2.05E+01	3.82E+01	X
COBALT	mg/kg	4 / 4	6.6 F - 25.1	1.23E+01	3.19E+01	8.07E+00	1.53E+01	
COPPER	mg/kg	4 / 4	9.5 - 15.9	1.46E+01	3.78E+01	1.69E+01	2.99E+01	
CYANIDE	mg/kg	1 / 4	1.1 J	5.84E-01	1.51E+00	ND	ND	X
IRON	mg/kg	4 / 4	14000 - 21100 J	1.64E+04	4.24E+04	1.84E+04	3.36E+04	
LEAD	mg/kg	4 / 4	23.2 - 943	2.60E+02	6.73E+02	3.31E+01	8.66E+01	X
MAGNESIUM	mg/kg	4 / 4	2200 - 11000	4.16E+03	1.08E+04	8.44E+03	3.29E+04	
MANGANESE	mg/kg	4 / 4	153 - 919	3.50E+02	9.07E+02	1.99E+02	3.80E+02	
MERCURY	mg/kg	1 / 4	0.15 - 0.16	9.50E-02	2.46E-01	1.20E-01	2.01E-01	
NICKEL	mg/kg	3 / 4	13.1 - 16.3	1.23E+01	3.18E+01	1.51E+01	3.51E+01	
POTASSIUM	mg/kg	4 / 4	522 J - 1770	1.11E+03	2.87E+03	1.70E+03	4.14E+03	
SELENIUM	mg/kg	2 / 4	0.43 F - 1.8 J	6.72E-01	1.74E+00	3.07E+00	1.35E+01	
SILVER	mg/kg	0 / 4	ND	ND	ND	ND	ND	
SODIUM	mg/kg	4 / 4	84.5 F - 118	9.64E+01	2.50E+02	1.89E+02	6.46E+02	
THALLIUM	mg/kg	1 / 4	1.7 - 1.9	6.56E-01	1.70E+00	8.25E-01	2.93E+00	
VANADIUM	mg/kg	4 / 4	17.7 - 25.1	2.10E+01	5.43E+01	2.62E+01	4.24E+01	
ZINC	mg/kg	4 / 4	76.5 - 1560	4.84E+02	1.25E+03	1.05E+02	2.39E+02	X

(1) Based on data collected from sampling locations: SW-4, SW-5, SW-6, SW-9.
(2) Based on data collected from Background locations : SW-7, SW-8, SW-10.

TABLE 8.11

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR ON-SITE SURFACE WATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*BACKGROUND (2)* *MEAN*	*BACKGROUND (2)* *95% UCL*	*POTENTIAL CHEMICALS OF CONCERN*
VOCs								
ACETONE	ug/l	2 / 3	4 J	4.33E+00	5.77E+00	ND	ND	X
SVOCs								
2-METHYLPHENOL	ug/l	1 / 3	2 J	2.33E+00	3.05E+00	ND	ND	X
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	1 / 3	4 JB	3.00E+00	5.15E+00	4.00E+00	4.21E+01	
DI-N-BUTYLPHTHALATE	ug/l	3 / 3	3 J - 4 J	3.67E+00	5.10E+00	4.00E+00	1.67E+01	
METALS								
ALUMINUM	ug/l	3 / 3	824 - 1290	1.04E+03	1.62E+03	2.23E+03	2.32E+04	
ARSENIC	ug/l	1 / 3	1.4 F	8.00E-01	2.09E+00	1.60E+00	1.56E+01	
BARIUM	ug/l	3 / 3	18.6 F - 44 F	3.20E+01	6.37E+01	6.24E+01	3.52E+02	
CADMIUM	ug/l	1 / 3	2.2 F	1.40E+00	3.12E+00	ND	ND	X
CALCIUM	ug/l	3 / 3	7610 - 32100	1.90E+04	4.96E+04	5.87E+04	7.65E+04	
CHROMIUM	ug/l	3 / 3	3.9 F - 8.9 F	6.13E+00	1.24E+01	4.05E+00	3.65E+01	
COBALT	ug/l	0 / 3	ND	ND	ND	2.25E+00	1.18E+01	
COPPER	ug/l	3 / 3	10.6 F - 24.3 F	1.61E+01	3.41E+01	1.47E+01	1.57E+02	
IRON	ug/l	3 / 3	1100 - 1440	1.28E+03	1.70E+03	4.61E+03	5.48E+04	
LEAD	ug/l	2 / 3	8.9 - 11.9	7.27E+00	2.13E+01	7.80E+00	9.42E+01	
MAGNESIUM	ug/l	3 / 3	2420 F - 7250	4.68E+03	1.07E+04	1.29E+04	2.11E+04	
MANGANESE	ug/l	3 / 3	20.4 - 273	1.21E+02	4.54E+02	1.73E+02	2.32E+03	
POTASSIUM	ug/l	3 / 3	4560 F - 11400	7.44E+03	1.62E+04	3.32E+03	3.56E+04	X
SELENIUM	ug/l	0 / 3	ND	ND	ND	ND	ND	
SILVER	ug/l	0 / 3	ND	ND	ND	ND	ND	
SODIUM	ug/l	3 / 3	677 F - 5200	2.81E+03	8.45E+03	1.01E+04	7.06E+04	
VANADIUM	ug/l	0 / 3	ND	ND	ND	1.56E+01	1.11E+02	
ZINC	ug/l	3 / 3	22.6 - 136	7.68E+01	2.18E+02	3.59E+01	3.67E+02	

(1) Based on data collected from sampling locations : SW-1, SW-2, SW-3.
(2) Based on data collected from Background locations : SW-7, SW-8.

TABLE 8.12

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR OFF-SITE SURFACE WATER
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*UNITS*	*DETECTION FREQUENCY (1) Detects / Total*	*RANGE OF DETECTS Min. - Max.*	*MEAN (1)*	*95% UCL (1)*	*MEAN (2)*	*95% UCL (2)*	*POTENTIAL CHEMICALS OF CONCERN*
SVOCs								
4-METHYLPHENOL	ug/l	1 / 3	2 J	2.42E+00	2.78E+00	ND	ND	X
BIS(2-ETHYLHEXYL)PHTHALATE	ug/l	3 / 3	1 JB - 4 JB	2.50E+00	5.79E+00	4.00E+00	4.21E+01	
DI-N-BUTYLPHTHALATE	ug/l	3 / 3	2 J - 16	1.03E+01	2.86E+01	4.00E+00	1.67E+01	X
PHENOL	ug/l	1 / 3	1 J	2.00E+00	4.15E+00	ND	ND	X
METALS								
ALUMINUM	ug/l	3 / 3	201 - 2170	9.42E+02	3.60E+03	2.23E+03	2.32E+04	
ARSENIC	ug/l	0 / 3	ND	ND	ND	1.60E+00	1.56E+01	
BARIUM	ug/l	3 / 3	22.9 F - 50.8 F	3.51E+01	7.06E+01	6.24E+01	3.52E+02	
CADMIUM	ug/l	0 / 3	ND	ND	ND	ND	ND	
CALCIUM	ug/l	3 / 3	35400 - 46700	3.93E+04	5.52E+04	5.87E+04	7.65E+04	
CHROMIUM	ug/l	1 / 3	4 F	1.92E+00	3.71E+00	4.05E+00	3.65E+01	
COBALT	ug/l	1 / 3	3.3 F	1.80E+00	3.09E+00	2.25E+00	1.18E+01	
COPPER	ug/l	2 / 3	25 - 46.6	2.25E+01	6.70E+01	1.47E+01	1.57E+02	
IRON	ug/l	3 / 3	456 - 2020	1.05E+03	3.14E+03	4.61E+03	5.48E+04	
LEAD	ug/l	1 / 3	2.7 FW	1.57E+00	4.01E+00	7.80E+00	9.42E+01	
MAGNESIUM	ug/l	3 / 3	6860 - 10300	8.35E+03	1.27E+04	1.29E+04	2.11E+04	
MANGANESE	ug/l	3 / 3	10.8 F - 185	7.07E+01	3.17E+02	1.73E+02	2.32E+03	
POTASSIUM	ug/l	3 / 3	658 F - 4200 F	2.53E+03	6.93E+03	3.32E+03	3.56E+04	
SELENIUM	ug/l	2 / 3	4.2 F - 6.6	4.03E+00	1.11E+01	ND	ND	X
SILVER	ug/l	1 / 3	10.7	2.62E+00	9.57E+00	ND	ND	X
SODIUM	ug/l	3 / 3	6660 - 11300	8.63E+03	1.46E+04	1.01E+04	7.06E+04	
VANADIUM	ug/l	0 / 3	ND	ND	ND	1.56E+01	1.11E+02	
ZINC	ug/l	3 / 3	15.9 F - 59.8	3.19E+01	7.63E+01	3.59E+01	3.67E+01	

(1) Based on data collected from sampling locations : SW-4, SW-5, SW-6.
(2) Based on data collected from Background locations : SW-7, SW-8.

TABLE 8.13

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR EACH MEDIA
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*GROUNDWATER*	*SURFACE SOIL*	*SOIL*	*SURFACE WATER*		*SEDIMENT*		*AIR*
				On-Site	*Off-Site*	*On-Site*	*Off-Site*	
VOCs								
1,1-DICHLOROETHENE	X							
2-BUTANONE	X							
ACETONE				X				
BENZENE	X							
BROMOCHLOROMETHANE	X							
CARBON DISULFIDE	X							
CHLOROBENZENE	X							
CHLOROFORM	X	X						X
CIS-1,2-DICHLOROETHENE	X							
ETHYLBENZENE	X	X	X					X
METHYLENE CHLORIDE	X							
TETRACHLOROETHENE		X						
TOLUENE	X		X					
TRICHLOROETHENE	X							
VINYL CHLORIDE	X							
XYLENE (TOTAL)	X	X	X					X
SVOCs								
2,4,5-TRICHLOROPHENOL		X						X
2,4-DIMETHYLPHENOL	X							
2,4-DINITROTOLUENE	X	X						X
2,6-DINITROTOLUENE	X							
2-METHYLNAPHTHALENE		X	X					X
2-METHYLPHENOL				X				
4-METHYLPHENOL					X			
4-NITROANILINE	X							
ACENAPHTHYLENE	X	X						
ANTHRACENE		X	X				X	X
BENZO(A)ANTHRACENE		X	X					X
BENZO(A)PYRENE		X	X					X
BENZO(B)FLUORANTHENE		X	X					X
BENZO(G,H,I)PERYLENE		X	X					X
BENZO(K)FLUORANTHENE		X	X					X
BENZOIC ACID			X					
BIS(2-ETHYLHEXYL)PHTHALATE		X	X			X	X	X
BUTYL BENZYL PHTHALATE							X	
CARBAZOLE		X	X					
CHRYSENE		X	X					X
DI-N-BUTYLPHTHALATE	X	X	X		X	X		X
DIBENZO(A,H)ANTHRACENE		X						
DIBENZOFURAN		X	X					X
DIETHYLPHTHALATE	X	X	X				X	
FLUORANTHENE		X	X					X
INDENO(1,2,3-CD)PYRENE		X	X					X
ISOPHORONE		X						X
NAPHTHALENE	X	X	X				X	X
PENTACHLOROPHENOL		X						X
PHENANTHRENE		X	X					X
PHENOL		X	X		X			X
PYRENE		X	X					X
PESTICIDES/PCBs								
4,4'-DDD		X	X				X	X
4,4'-DDE		X				X	X	X
4,4'-DDT		X	X				X	X
ALDRIN		X	X					X
ALPHA-CHLORDANE		X	X					X
DELTA-BHC		X	X					X
ENDRIN		X	X					X
GAMMA-CHLORDANE		X	X					X
METHOXYCHLOR							X	
AROCLOR-1248						X		
AROCLOR-1254		X	X			X	X	X
AROCLOR-1260		X	X			X	X	X

TABLE 8.13

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR EACH MEDIA
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*GROUNDWATER*	*SURFACE SOIL*	*SOIL*	*SURFACE WATER*		*SEDIMENT*		*AIR*
				On-Site	*Off-Site*	*On-Site*	*Off-Site*	
TOTAL METALS								
ALUMINUM		X						X
ANTIMONY		X	X					X
BARIUM		X	X				X	X
BERYLLIUM		X	X					X
CADMIUM	X	X	X	X		X		X
CALCIUM	X							
CHROMIUM		X	X				X	X
COBALT	X	X	X					X
COPPER		X	X					X
CYANIDE		X	X			X	X	X
IRON	X							
LEAD	X	X	X			X	X	X
MAGNESIUM	X							
MANGANESE	X							
MERCURY		X	X					X
POTASSIUM				X				
SELENIUM	X	X	X		X			X
SILVER		X	X		X	X		X
VANADIUM		X						X
ZINC	X	X	X			X	X	X
DISSOLVED METALS								
CALCIUM	X							
COBALT	X							
IRON	X							
MAGNESIUM	X							
MANGANESE	X							
SELENIUM	X							

TABLE 8.14

SUMMARY OF PHYSICOCHEMICAL PROPERTIES AND TOXICITY DATA FOR POTENTIAL CHEMICALS OF CONCERN

NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETER	*Molecular Weight (g/mole)*	*Water Solubility (mg/L)*	*Vapor Pressure (mm Hg)*	*Henry's Law Constant (atm.m3/mol)*	*Koc (ml/g)*	*Log Kow*	*RfD Oral (mg/kg - day)*	*CSF Oral (1/mg/kg - day)*
<u>VOC</u>								
1,1-DICHLOROETHENE	9.70E+01	2.25E+03	6.00E+02	3.40E-02	6.50E+01	1.84E+00	9.00E-03	6.00E-01
2-BUTANONE	7.21E+01	2.56E+01	7.75E+01	4.66E-05	1.23E+00	2.60E-01	6.00E-01	NA
ACETONE	5.80E+01	1.00E+06	2.70E+02	2.06E-05	2.20E+00	-2.40E-01	1.00E-01	NA
BENZENE	7.80E+01	1.75E+03	9.52E+01	5.59E-03	8.30E+01	2.12E+00	NA	2.90E-02
BROMOCHLOROMETHANE	1.29E+02	1.29E-01 M	1.41E+02	1.44E-03	2.69E+01	1.41E+00	NA	NA
CARBON DISULFIDE	7.61E+01	1.70E+03	3.60E+02	1.33E-02	2.40E+02	1.84E+00	1.00E-01	NA
CHLOROBENZENE	1.13E+02	4.66E+02	1.17E+01	3.72E-03	3.30E+02	2.84E+00	2.00E-02	NA
CHLOROFORM	1.19E+02	9.30E+03	1.98E+02	3.20E-03	4.37E+01	1.97E+00	1.00E-02	6.10E-03
CIS-1,2-DICHLOROETHENE	9.70E+01	3.50E+03	2.08E+02	7.58E-03	4.90E+01	7.00E-01	1.00E-02	NA
ETHYLBENZENE	1.06E+02	1.52E+02	7.00E+00	6.43E-03	1.10E+03	3.15E+00	1.00E-01	NA
METHYLENE CHLORIDE	8.49E+01	2.00E+04	3.49E+02	2.00E-03	8.71E+00	1.30E+00	6.00E-02	7.50E-03
TETRACHLOROETHENE	1.66E+02	1.50E+02	1.78E+01	2.59E-02	3.64E+02	2.60E+00	1.00E-02	5.10E-02
TOLUENE	9.21E+01	5.35E+02	2.81E+01	6.73E-03	3.00E+02	2.73E+00	2.00E-01	NA
TRICHLOROETHENE	1.31E+02	1.10E+03	5.79E+01	9.10E-03	1.26E+02	2.38E+00	NA	1.10E-02
VINYL CHLORIDE	6.30E+01	2.67E+03	2.66E+03	8.19E-02	5.70E+01	1.38E+00	NA	1.90E+00
XYLENE (TOTAL)	1.06E+02	1.30E+02	1.10E+01	NA	NA	3.16E+00	2.00E+00	NA
<u>SVOCs</u>								
2,4,5-TRICHLOROPHENOL	1.97E+02	1.19E+03	2.20E-02	1.76E-07	7.08E+02	3.72E+00	1.00E-01	NA
2-METHYLNAPHTHALENE	1.42E+02	2.46E+01	NA	NA	8.51E+03	4.11E+00	NA	NA
2,4-DIMETHYL PHENOL	1.22E+02	6.20E+03	9.80E-02	6.30E-07	4.25E+02	2.30E+00	2.00E-02	NA
2,4-DINITROTOLUENE	1.82E+02	2.70E+02	5.10E-03	8.67E-07	6.17E+01	1.98E+00	2.00E-03	6.80E-01
2,6-DINITROTOLUENE	1.82E+02	3.00E+02	1.80E-02	2.17E-07	6.17E+01	2.00E+00	1.00E-03	6.80E-01
4-METHYLPHENOL	1.08E+02	2.30E+04	1.20E-01	7.92E-07	4.90E+01	1.67E+00	5.00E-03	NA
4-NITROANILINE	1.38E+02	7.28E+02	1.50E-03	1.14E-08	1.20E+01	1.39E+00	NA	NA
ACENAPHTHYLENE	1.52E+02	3.93E+00	2.90E-02	2.80E-04	4.79E+03	4.07E+00	NA	NA
ANTHRACENE	1.78E+02	4.50E-02	1.95E-04	1.40E-03	1.86E+04	4.45E+00	3.00E-01	NA
BENZO(A)ANTHRACENE	2.28E+02	1.40E-02	1.10E-07	6.60E-07	1.38E+06	5.61E+00	NA	7.30E-01
BENZO(A)PYRENE	2.52E+02	3.80E-03	5.49E-09	2.40E-06	3.98E+05	5.99E+00	NA	7.30E+00
BENZO(B)FLUORANTHENE	2.52E+02	1.40E-02	5.00E-07	1.20E-05	5.50E+04	6.57E+00	NA	7.30E-01
BENZO(G,H,I)PERYLENE	2.76E+02	2.60E-04	1.01E-10	1.40E-07	7.76E+06	7.10E+00	NA	NA
BENZO(K)FLUORANTHENE	2.52E+02	5.50E-04	9.59E-11	1.04E-03	4.37E+06	6.85E+00	NA	7.30E-02

TABLE 8.14

SUMMARY OF PHYSICOCHEMICAL PROPERTIES AND TOXICITY DATA FOR POTENTIAL CHEMICALS OF CONCERN
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETER	*Molecular Weight (g/mole)*	*Water Solubility (mg/L)*	*Vapor Pressure (mm Hg)*	*Henry's Law Constant (atm.m3/mol)*	*Koc (ml/g)*	*Log Kow*	*RfD Oral (mg/kg - day)*	*CSF Oral (1/mg/kg - day)*
SVOCs (cont.)								
BENZOIC ACID	1.22E+02	2.70E+03	4.50E-03	7.00E-08	NA	1.87E+00	4.00E+00	NA
BIS(2-ETHYLHEXYL)PHTHALATE	3.91E+02	4.00E-01	6.20E-08	1.10E-05	1.00E+05	4.20E+00	2.00E-02	1.40E-02
BUTYL BENZYL PHTHALATE	3.12E+02	2.90E+00	8.60E-06	1.30E-06	6.76E+01	4.78E+00	2.00E-01	NA
CARBAZOLE	1.67E+02	NA	400 @ 323oC	NA	NA	3.29E+00	NA	2.00E-02
CHRYSENE	2.28E+02	6.00E-03	6.30E-09	7.26E-20	2.45E+05	5.60E+00	NA	7.30E-03
DI-N-BUTYLPHTHALATE	2.78E+02	4.00E+02	1.40E-05	6.30E-05	1.38E+03	4.31E+00	1.00E-01	NA
DIBENZ(A,H)ANTHRACENE	2.78E+02	5.00E-04	1.00E-10	7.33E-09	1.66E+06	6.36E+00	NA	7.30E+00
DIBENZOFURAN	1.68E+02	1.00E+01	NA	NA	8.13E+03	4.17E+00	NA	NA
DIETHYL PHTHALATE	2.22E+02	8.96E+02	3.50E-03	1.14E-06	1.42E+02	2.50E+00	8.00E-01	NA
FLUORANTHENE	2.02E+02	2.65E-01	5.00E-06	1.69E-02	4.17E+04	5.22E+00	4.00E-02	NA
INDENO(1,2,3-CD)PYRENE	2.76E+02	6.20E-02	1.00E-10	2.96E-20	3.09E+07	7.70E+00	NA	7.30E-01
ISOPHORONE	1.38E+02	1.20E+04	3.80E-01	5.80E-06	3.84E+02	2.22E+00	2.00E-01	9.50E-04
NAPHTHALENE	1.28E+02	3.00E+01	2.30E-01	4.60E-04	5.49E+02	2.74E+00	4.00E-02	NA
PENTACHLOROPHENOL	2.66E+02	2.50E+01	1.70E-05	3.40E-06	8.91E+02	5.01E+00	3.00E-02	1.20E-01
PHENANTHRENE	1.78E+02	1.00E+00	9.60E-04	2.26E-04	1.41E+04	4.45E+00	NA	NA
PHENOL	9.41E+01	9.30E+04	3.41E-01	4.54E-07	1.42E+01	1.46E+00	6.00E-01	NA
PYRENE	2.02E+02	1.35E-01	6.85E-07	1.09E-05	4.57E+04	4.88E+00	3.00E-02	NA
PESTICIDES/PCBs								
4,4'-DDD	3.20E+02	1.60E-01	1.02E-06	2.16E-05	4.37E+04	5.99E+00	NA	2.40E-01
4,4'-DDE	3.19E+02	6.50E-02	6.49E-06	2.34E-05	1.00E+06	5.83E+00	NA	3.40E-01
4,4'-DDT	3.54E+02	3.10E-03	1.00E-07	3.80E-05	2.40E+05	6.36E+00	NA	3.40E-01
ALDRIN	3.65E+02	1.01E+00	2.31E-05	1.40E-06	4.07E+02	5.52E+00	3.00E-05	1.70E+01
ALPHA-CHLORDANE	4.10E+02	5.10E-02	NA	NA	3.72E+05	5.93E+00	NA	NA
DELTA-BHC	2.91E+02	3.14E+01	1.70E-05	2.50E-07	1.90E+03	4.14E+00	NA	NA
ENDRIN	3.81E+02	2.60E-01	7.00E-07	5.00E-07	8.32E+03	4.56E+00	3.00E-04	NA
GAMMA-CHLORDANE	4.10E+02	NA	NA	NA	3.02E+05	8.69E+00	NA	NA
METHOXYCHLOR	3.46E+02	1.00E-01	NA	NA	7.94E+04	4.30E+00	5.00E-03	NA
AROCLOR-1248	3.00E+02	6.00E-02	4.94E-04	2.80E-03	NA	6.20E+00	2.00E-05 (1)	1.00E+00 (1)
AROCLOR-1254	3.28E+02	5.70E-02	7.71E-05	2.00E-03	NA	6.50E+00	2.00E-05 (1)	1.00E+00 (1)
AROCLOR-1260	3.76E+02	2.70E-03	4.05E-05	4.60E-03	NA	6.80E+00	2.00E-05 (1)	1.00E+00 (1)

TABLE 8.14

SUMMARY OF PHYSICOCHEMICAL PROPERTIES AND TOXICITY DATA FOR POTENTIAL CHEMICALS OF CONCERN

NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETER	*Molecular Weight (g/mole)*	*Water Solubility (mg/L)*	*Vapor Pressure (mm Hg)*	*Henry's Law Constant (atm.m3/mol)*	*Koc (ml/g)*	*Log Kow*	*RfD Oral (mg/kg - day)*	*CSF Oral (1/mg/kg - day)*
METALS								
ALUMINUM	2.70E+01	NA	0.00E+00	NA	NA	NA	NA	NA
ANTIMONY	1.22E+02	NA	0.00E+00	NA	NA	NA	4.00E-04	NA
ARSENIC	7.50E+01	NA	0.00E+00	NA	NA	NA	3.00E-04	1.50E+00
BARIUM	1.37E+02	NA	0.00E+00	NA	NA	NA	7.00E-02	NA
BERYLLIUM	9.01E+00	NA	0.00E+00	NA	NA	NA	5.00E-03	4.30E+00
CADMIUM	1.12E+02	NA	0.00E+00	NA	NA	NA	5.00E-04	NA
CALCIUM	4.01E+01	NA	0.00E+00	NA	NA	NA	NA	NA
CHROMIUM	5.20E+01	NA	0.00E+00	NA	NA	NA	1.00E+00	NA
COBALT	5.89E+01	NA	0.00E+00	NA	NA	NA	NA	NA
COPPER	6.40E+01	NA	0.00E+00	NA	NA	NA	3.70E-02	NA
CYANIDE	2.70E+01	NA	0.00E+00	NA	NA	NA	2.00E-02	NA
IRON	5.60E+01	NA	0.00E+00	NA	NA	NA	NA	NA
LEAD	2.07E+02	NA	0.00E+00	NA	NA	NA	NA	NA
MAGNESIUM	2.43E+01	NA	0.00E+00	NA	NA	NA	NA	NA
MANGANESE	5.50E+01	NA	0.00E+00	NA	NA	NA	4.67E-02	NA
MERCURY	2.01E+02	NA	2.00E-03	NA	NA	NA	NA	NA
SELENIUM	7.90E+01	NA	0.00E+00	NA	NA	NA	5.00E-03	NA
SILVER	1.08E+02	NA	0.00E+00	NA	NA	NA	5.00E-03	NA
VANADIUM	5.09E+01	NA	0.00E+00	NA	NA	NA	7.00E-03	NA
ZINC	6.50E+01	NA	0.00E+00	NA	NA	NA	3.00E-01	NA

Notes :
NA = Not Available
(1) PCBs RfD and CSF substituted, USEPA Integrated Risk Information System Database (IRIS), October 1996.

References :
1) U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry.
2) Handbook of Environmental Fate and Exposure Data, Volume I, Volume II, Volume III. Philip H. Howard. Lewis Publishers, Inc.. 1990, 1991.
3) Groundwater Chemicals Desk Reference, Volume 1, Volume 2. John H. Montgomery. Lewis Publishers, Inc.. 1990, 1991
4) USEPA Integrated Risk Information System Database (IRIS), October 1996.
5) Health Effects Assessment Table (HEAST), 9200.6-303 (95-2), EPA 540-R-95-142, PB 95-921101, November 1995.

TABLE 8.15
SUMMARY OF ADDITIONAL LIFETIME CANCER RISKS AND HAZARD INDICES
NEWSTEAD SITE
NEWSTEAD, NEW YORK

SCENARIO		*ADDITIONAL LIFETIME CANCER RISK*		*HAZARD INDEX*	
		MEAN	RME	MEAN	RME
CURRENT SITE CONDITIONS :					
Adults					
1. Trespass on Site	Surface Soil	3.10E-07	6.58E-06	1.46E-02	7.47E-02
2. Residential Off-Site	Air	4.66E-07	1.91E-06	8.32E-03	1.59E-02
	TOTAL :	**7.76E-07**	**8.49E-06**	**2.29E-02**	**9.06E-02**
Older Children					
1. Trespass on Site	Surface Soil	4.75E-07	2.13E-06	1.83E-02	8.67E-02
	Drainage Ditch/Swale Sediments	7.54E-09	7.90E-08	3.79E-03	3.62E-02
	Drainage Ditch/Swale Surface Water	0.00E+00	0.00E+00	3.16E-05	1.76E-04
2. Recreational Off-Site	Drainage Ditch Sediment	2.42E-09	2.61E-08	2.73E-03	2.23E-02
	Drainage Ditch Surface Water	0.00E+00	0.00E+00	1.50E-06	1.34E-05
3. Residential Off-Site	Air	4.66E-07	1.91E-06	8.32E-03	1.59E-02
	TOTAL :	**9.51E-07**	**4.15E-06**	**3.32E-02**	**1.61E-01**
FUTURE SITE CONDITIONS :					
1. Residential On-Site	Soil	8.28E-06	5.88E-05	1.72E+00	5.99E+00
	Groundwater	7.60E-05	9.81E-05	1.03E+00	1.98E+00
	Drainage Ditch/Swale Sediments	6.78E-08	8.21E-07	5.16E-02	2.90E-01
	Drainage Ditch/Swale Surface Water	0.00E+00	0.00E+00	8.78E-06	5.45E-05
	Air	7.45E-07	3.05E-06	1.33E-02	2.54E-02
2. Residential Off-Site	Drainage Ditch Sediment	2.15E-08	2.70E-07	4.05E-02	2.30E-01
	Drainage Ditch Surface Water	0.00E+00	0.00E+00	5.83E-06	4.62E-05
	TOTAL :	**8.51E-05**	**1.61E-04**	**2.86E+00**	**8.52E+00**

TABLE 8.16

IEUBK MODEL INPUT PARAMETERS

AIR CONCENTRATIONS: RME Conc. =0.395 ug/m^3

Indoor Air Pb Concentrations: 30.0 percent of outdoor
Other Air Parameters:

Age (Years)	Time Outdoors (Hours)	Ventilation Rate (m3/day)	Lung Absorption (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

SOIL AND DUST

SOIL (Constant Concentration): RME Conc. = 6,290 ug Pb/g
DUST: Multiple Source Average

Age (Years)	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	6,290	4,403
1-2	6,290	4,403
2-3	6,290	4,403
3-4	6,290	4,403
4-5	6,290	4,403
5-6	6,290	4,403
6-7	6,290	4,403

DIETARY INTAKE		DRINKING WATER CONCENTRATION RME Conc. = 6.49 ug/L	
		Water Consumption	
Age (Years)	(ug/day)	Age (Years)	(L/day)
0-1	5.53	0-1	0.2
1-2	5.78	1-2	0.5
2-3	6.49	2-3	0.52
3-4	6.24	3-4	0.53
4-5	6.01	4-5	0.55
5-6	6.34	5-6	0.58
6-7	7	6-7	0.59

ABSORPTION METHODOLOGY: Non-Linear Active - Passive

PAINT INTAKE : 0.00 ug Pb/day

MATERNAL CONTRIBUTION : Infant Model
Maternal Blood Concentration: 2.50 ug Pb/dL

TABLE 9.1

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*DETECTION FREQUENCY (1)* *Detects / Total*	*RANGE OF DETECTS* *Min. - Max.*	*MEAN (2)*	*BACKGROUND MEAN (3)*	*POTENTIAL CHEMICALS OF CONCERN*
<u>VOCs (ug/kg)</u>					
CHLOROFORM	1 / 11	8 J	1.60E+03	ND	X
ETHYLBENZENE	1 / 11	94000	8.55E+03	ND	X
TETRACHLOROETHENE	1 / 11	2 J	1.60E+03	ND	X
XYLENE (TOTAL)	1 / 11	620000	5.64E+04	ND	X
<u>SVOCs (ug/kg)</u>					
2,4,5-TRICHLOROPHENOL	1 / 11	740 J	6.46E+02	ND	X
2,4-DINITROTOLUENE	1 / 11	34 J	6.23E+02	ND	X
2-METHYLNAPHTHALENE	2 / 11	64 J - 10000	1.11E+03	ND	X
ACENAPHTHYLENE	1 / 11	190 J	6.38E+02	ND	X
ANTHRACENE	3 / 11	4 J - 140 J	5.93E+02	ND	X
BENZO(A)ANTHRACENE	6 / 11	6 J - 680	6.03E+02	ND	X
BENZO(A)PYRENE	5 / 11	11 J - 670	6.22E+02	ND	X
BENZO(B)FLUORANTHENE	5 / 11	25 J - 660	6.41E+02	ND	X
BENZO(G,H,I)PERYLENE	2 / 11	85 J - 310 J	6.14E+02	ND	X
BENZO(K)FLUORANTHENE	5 / 11	21 J - 690	6.38E+02	ND	X
BIS(2-ETHYLHEXYL)PHTHALATE	4 / 11	1700 J - 4700 BD	1.16E+03	ND	X
CARBAZOLE	1 / 7	110 J	2.31E+02	ND	X
CHRYSENE	6 / 11	10 J - 920	6.44E+02	ND	X
DI-N-BUTYLPHTHALATE	2 / 11	720 J - 4600 J	6.67E+02	1.93E+02	X
DIBENZO(A,H)ANTHRACENE	1 / 11	150 J	6.34E+02	ND	X
DIBENZOFURAN	1 / 11	130 J	2.29E+02	ND	X
DIETHYLPHTHALATE	2 / 11	14 J	5.82E+02	ND	X
FLUORANTHENE	7 / 11	15 J - 1900	3.18E+02	ND	X
INDENO(1,2,3-CD)PYRENE	4 / 11	17 J - 380 J	6.04E+02	ND	X
ISOPHORONE	1 / 11	110 J	6.30E+02	ND	X
NAPHTHALENE	2 / 11	180 J - 29000	2.85E+03	ND	X
PENTACHLOROPHENOL	1 / 11	54 J	2.58E+03	ND	X
PHENANTHRENE	6 / 11	8 J - 980	2.46E+02	1.50E+02	X
PHENOL	2 / 11	22 J - 46 J	6.06E+02	ND	X
PYRENE	7 / 11	12 J - 1400	2.72E+02	ND	X
<u>PESTICIDES/PCBs (ug/kg)</u>					
4,4'-DDD	1 / 9	21	4.48E+00	ND	X
4,4'-DDE	1 / 9	62 P	9.04E+00	ND	X
4,4'-DDT	2 / 9	5.9 - 70 P	1.04E+01	ND	X
ALDRIN	1 / 9	0.37 JP	1.15E+00	ND	X
ALPHA-CHLORDANE	1 / 9	0.64 J	1.18E+00	ND	X
DELTA-BHC	1 / 9	5.5 P	1.73E+00	ND	X
ENDRIN	1 / 9	1 JP	2.26E+00	ND	X
GAMMA-CHLORDANE	1 / 9	0.6 JP	1.19E+00	ND	X
AROCLOR-1254	4 / 11	120 P - 14000 D	2.15E+03	ND	X
AROCLOR-1260	6 / 11	3.6 JP - 13000 DP	2.28E+03	ND	X

TABLE 9.1

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*DETECTION FREQUENCY (1)*		*RANGE OF DETECTS*		*MEAN (2)*	*BACKGROUND MEAN (3)*	*POTENTIAL CHEMICALS OF CONCERN*
	Detects	*Total*	*Min.*	*Max.*			
<u>METALS (mg/kg)</u>							
ALUMINUM	9	9	7130	25200	1.34E+04	5.25E+03	X
ANTIMONY	4	9	1.8 J	27.6 J	7.57E+00	ND	X
ARSENIC	27	29	2 F	5.06	3.24E+00	3.75E+00	
BARIUM	29	29	37.4	7240	1.39E+03	3.46E+01	X
BERYLLIUM	9	9	0.29 F	1.5	7.01E-01	2.08E-01	X
CADMIUM	25	29	0.3	175	3.08E+01	ND	X
CALCIUM	9	9	2500	80200	2.31E+04	4.29E+04	
CHROMIUM	29	29	10.4	2680	4.47E+02	8.65E+00	X
COBALT	9	9	4.3 F	161	4.46E+01	5.75E+00	X
COPPER	8	9	13.5	466	1.28E+02	1.25E+01	X
CYANIDE	4	9	4	76	1.71E+01	ND	X
IRON	9	9	8750	38900	1.99E+04	1.14E+04	
LEAD	29	29	3.7 J	19200	3.93E+03	7.75E+00	X
MAGNESIUM	9	9	1670	9910	3.62E+03	1.39E+04	
MANGANESE	9	9	112 J	1310 J	4.05E+02	3.05E+02	
MERCURY	18	29	0.14 J	1.02	3.68E-01	ND	X
NICKEL	9	9	8	47	2.20E+01	1.13E+01	
POTASSIUM	9	9	630 F	2820	1.25E+03	1.09E+03	
SELENIUM	20	29	0.1	12.8 J	2.15E+00	ND	X
SILVER	5	9	0.57	2.5	9.82E-01	ND	X
SODIUM	9	9	72.3 F	802 F	2.80E+02	1.56E+02	
VANADIUM	9	9	11.3	36.1	2.53E+01	1.05E+01	X
ZINC	29	29	34.1	25500	3.15E+03	3.77E+01	X

<u>Notes:</u>

J - The associated value is estimated.

B - Indicates analyte was found in associated method blank.

D - Identifies associated value at a secondary dilution factor.

F - The associated value is less than the specified detection limit but greater than or equal to the instrument detection limit.

(1) - Detection frequency based on the number of positive contaminant identifications from the number of samples analyzed.

(2) - Based on data collected from sampling locations : BH-3, BH-5, BH-6, BH-7, BH-9, BH-11, SS-1, SS-2, SS-3, TP-9, TP-12 S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20.

(3) - Based on data collected from Background location BH-W1.

TABLE 9.2

SUMMARY OF POTENTIAL CHEMICALS OF CONCERN FOR SEDIMENTS
NEWSTEAD SITE
NEWSTEAD, NEW YORK

PARAMETERS	*DETECTION FREQUENCY (1)*	*RANGE OF DETECTS*	*MEAN (2)*	*BACKGROUND MEAN (3)*	*POTENTIAL CHEMICALS OF CONCERN*
	Detects / Total	*Min. - Max.*			
VOCs (ug/kg)					
ACETONE	1 / 6	10 J	8.29E+00	1.08E+01	
METHYLENE CHLORIDE	5 / 6	2J - 7 J	4.88E+00	8.25E+00	
SVOCs (ug/kg)					
ACENAPHTHYLENE	2 / 7	9 J - 63 J	2.09E+02	1.63E+02	
ANTHRACENE	1 / 7	7 J - 15 J	2.35E+02	1.55E+02	
BENZO(A)ANTHRACENE	4 / 7	64 J - 170 J	1.96E+02	2.57E+02	
BENZO(A)PYRENE	4 / 7	65 J - 240 J	2.13E+02	2.69E+02	
BENZO(B)FLUORANTHENE	4 / 7	68 J - 250 J	2.20E+02	2.66E+02	
BENZO(G,H,I)PERYLENE	4 / 7	41 J - 95 J	1.77E+02	1.95E+02	
BENZO(K)FLUORANTHENE	4 / 7	65 J - 280 J	2.24E+02	3.07E+02	
BIS(2-ETHYLHEXYL)PHTHALATE	3 / 7	220 J - 440 J	2.50E+02	ND	X
BUTYLBENZYLPHTHALATE	1 / 7	18 J	2.55E+02	ND	X
CHRYSENE	4 / 7	84 J - 240 J	2.26E+02	3.37E+02	
DI-N-BUTYLPHTHALATE	6 / 7	100 JB - 360 JB	2.19E+02	2.52E+02	
DIBENZO(A,H)ANTHRACENE	1 / 7	19 J - 43 J	2.38E+02	3.05E+02	
DIETHYLPHTHALATE	1 / 7	250 J	2.34E+02	ND	X
FLUORANTHENE	4 / 7	130 J - 470 J	3.19E+02	7.23E+02	
FLUORENE	1 / 7	12 J	2.76E+02	2.98E+02	
INDENO(1,2,3-CD)PYRENE	4 / 7	57 J - 160 J	1.96E+02	2.39E+02	
NAPHTHALENE	1 / 7	5 J - 9 J	2.34E+02	ND	X
PHENANTHRENE	4 / 7	62 J - 290 J	2.24E+02	4.02E+02	
PYRENE	4 / 7	150 J - 400 J	2.80E+02	4.93E+02	
PESTICIDES/PCBs (ug/kg)					
4,4'-DDD	1 / 6	2.6 J	2.71E+02	ND	X
4,4'-DDE	4 / 6	2.1 JP - 18	7.58E+02	ND	X
4,4'-DDT	1 / 6	12 P	4.33E+02	ND	X
METHOXYCHLOR	1 / 6	42	1.88E+01	ND	X
AROCLOR-1248	1 / 7	58 JP	3.10E+01	ND	X
AROCLOR-1254	4 / 7	8.3 JP - 320	7.22E+01	ND	X
AROCLOR-1260	4 / 7	41 JP - 180 P	7.60E+01	ND	X
METALS (mg/kg)					
ALUMINUM	7 / 7	7620 J - 16300	1.14E+01	1.42E+04	
ANTIMONY	1 / 7	1.9 J	2.40E+00	3.15E+00	
ARSENIC	7 / 7	2 - 5.8	2.98E+00	3.47E+00	
BARIUM	7 / 7	99 - 2570	5.03E+02	1.16E+02	X
BERYLLIUM	7 / 7	0.52 F - 0.75 F	5.85E-01	6.85E-01	
CADMIUM	4 / 7	1.2 F - 6.6	1.92E+00	8.58E-01	X
CALCIUM	7 / 7	3180 - 19800 J	6.62E+03	1.38E+04	
CHROMIUM	7 / 7	12.9 - 229	5.27E+01	2.05E+01	X
COBALT	7 / 7	6.6 F - 25.1	1.11E+01	8.07E+00	
COPPER	7 / 7	9.5 - 38.7	1.69E+01	1.69E+01	
CYANIDE	3 / 7	1.1 J - 2 J	8.34E-01	ND	X
IRON	7 / 7	14000 - 21100 J	1.60E+04	1.84E+04	
LEAD	7 / 7	23.2 - 943	2.08E+02	3.31E+01	X
MAGNESIUM	7 / 7	2200 - 11000	3.40E+03	8.44E+03	
MANGANESE	7 / 7	75.6 - 919	2.60E+02	1.99E+02	
MERCURY	1 / 7	0.15 - 0.16	8.57E-02	1.20E-01	
NICKEL	6 / 7	11.3 - 17.4	1.30E+01	1.51E+01	
POTASSIUM	7 / 7	519 F - 1770	1.08E+03	1.70E+03	
SELENIUM	5 / 7	0.43 F - 2	8.87E-01	3.07E+00	
SILVER	1 / 7	0.97 F	5.33E-01	ND	X
SODIUM	7 / 7	62.2 F - 118	8.92E+01	1.89E+02	
THALLIUM	1 / 7	1.7 - 1.9	4.82E-01	8.25E-01	
VANADIUM	7 / 7	17.7 - 25.1	2.15E+01	2.62E+01	
ZINC	7 / 7	76.5 - 1560	3.73E+02	1.05E+02	X

Notes:

ND - Not Detected.
J - The associated value is estimated.
B - Indicates analyte was found in associated method blank.
F - The associated value is less than the specified detection limit but greater than or equal to the instrument detection limit.
P - Indicates the analyte was detected having greater than 25% difference between the two GC columns.
The lower of which being reported.
(1) - Detection frequency based on the number of positive contaminant identifications from the number of samples analyzed.
(2) - Based on data collected from sampling locations: SW-1, SW-2, SW-3, SW-4, SW-5, SW-6, SW-9..
(3) - Based on data collected from Background locations : SW-7, SW-8, SW-10.

TABLE 9.3

COMPARISON OF SOIL SCREENING BENCHMARKS WITH POTENTIAL COCs IN SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

	ORNL SCREENING BENCHMARK VALUES (1)								
PARAMETERS	*TERRESTRIAL PLANTS (2)*		*EARTHWORMS (3)*		*MICROORG. (3)*		*MEAN (4)*	*MAXIMUM*	*BACKGROUND MEAN (5)*
VOCs (ug/kg)									
CHLOROFORM	NA		NA		NA		1597	8	ND
ETHYLBENZENE	NA		NA		NA		8552	94000	ND
TETRACHLOROETHENE	NA		NA		NA		1597	2	ND
XYLENE (TOTAL)	NA		NA		NA		56370	620000	ND
SVOCs (ug/kg)									
2,4,5-TRICHLOROPHENOL	NA		9000	L	NA		646	740	ND
2,4-DINITROTOLUENE	NA		NA		NA		623	34	ND
2-METHYLNAPHTHALENE	NA		NA		NA		1111	10000	ND
ACENAPHTHYLENE	NA		NA		NA		638	190	ND
ANTHRACENE	NA		NA		NA		593	140	ND
BENZO(A)ANTHRACENE	NA		NA		NA		603	680	ND
BENZO(A)PYRENE	NA		NA		NA		622	670	ND
BENZO(B)FLUORANTHENE	NA		NA		NA		641	660	ND
BENZO(G,H,I)PERYLENE	NA		NA		NA		614	310	ND
BENZO(K)FLUORANTHENE	NA		NA		NA		638	690	ND
BIS(2-ETHYLHEXYL)PHTHALATE	NA		NA		NA		1159	4700	ND
CARBAZOLE	NA		NA		NA		231	110	ND
CHRYSENE	NA		NA		NA		644	920	ND
DI-N-BUTYLPHTHALATE	200000	L	NA		NA		667	4600	193
DIBENZO(A,H)ANTHRACENE	NA		NA		NA		634	150	ND
DIBENZOFURAN	NA		NA		NA		229	130	ND
DIETHYLPHTHALATE	100000	L	NA		NA		582	14	ND
FLUORANTHENE	NA		NA		NA		318	1900	ND
INDENO(1,2,3-CD)PYRENE	NA		NA		NA		604	380	ND
ISOPHORONE	NA		NA		NA		630	110	ND
NAPHTHALENE	NA		NA		NA		2849	29000	ND
PENTACHLOROPHENOL	3000	L	4000	L	50000	L	2579	54	ND
PHENANTHRENE	NA		NA		NA		246	980	150
PHENOL	70000	L	30000	L	100000	L	606	46	ND
PYRENE	NA		NA		NA		272	1400	ND
PESTICIDES/PCBs (ug/kg)									
4,4'-DDD	NA		NA		NA		4.48	21	ND
4,4'-DDE	NA		NA		NA		9.04	62	ND
4,4'-DDT	NA		NA		NA		10.36	70	ND
ALDRIN	NA		NA		NA		1.15	0.37	ND
ALPHA-CHLORDANE	NA		NA		NA		1.18	0.64	ND
DELTA-BHC	NA		NA		NA		1.73	5.50	ND
ENDRIN	NA		NA		NA		2.26	1	ND
GAMMA-CHLORDANE	NA		NA		NA		1.19	0.60	ND
AROCLOR-1254	40000*	L	NA		NA		2152	14000	ND
AROCLOR-1260	40000*	L	NA		NA		2282	13000	ND

TABLE 9.3

COMPARISON OF SOIL SCREENING BENCHMARKS WITH POTENTIAL COCs IN SURFACE SOIL
NEWSTEAD SITE
NEWSTEAD, NEW YORK

	ORNL SCREENING BENCHMARK VALUES (1)								
PARAMETERS	*TERRESTRIAL PLANTS (2)*		*EARTHWORMS (3)*		*MICROORG. (3)*		*MEAN (4)*	*MAXIMUM*	*BACKGROUND MEAN (5)*
METALS (mg/kg)									
ALUMINUM	50	L	NA		600	L	13400	25200	5250
ANTIMONY	5	L	NA		NA		7.57	27.60	ND
BARIUM	500	L	NA		3000	L	1390	7240	34.60
BERYLLIUM	10	L	NA		NA		0.70	1.50	0.21
CADMIUM	3	H	20	M	20	H	30.80	175	ND
CHROMIUM	1	M	0.4	L	10	H	447	2680	8.65
COBALT	20	L	NA		1000	L	44.60	161	5.75
COPPER	100	L	50	M	100	H	128	466	12.50
CYANIDE	NA		NA		NA		17.10	76	ND
LEAD	50	M	500	L	900	H	3930	19200	7.75
MERCURY	0.3	L	0.1	L	30	H	0.37	1.02	ND
SELENIUM	1	L	70	L	100	M	2.15	12.80	ND
SILVER	2	L	NA		50	M	0.98	2.50	ND
VANADIUM	2	L	NA		20	M	25.30	36.10	10.50
ZINC	50	M	200	L	100	H	3150	25500	37.70

Notes:

* - value is for PCBs.
NA - Not Available.
L - low confidence in benchmark.
M - moderate confidence in benchmark.
H - high confidence in benchmark.
(1) - Oak Ridge National Laboratory. Values prepared for the U.S. Department of Energy.
(2) - "Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants: 1995 Revision.
(3) - "Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: September 1995.
(4) - Based on data collected from sampling locations : BH-3, BH-5, BH-6, BH-7, BH-9, BH-11, SS-1, SS-2, SS-3, TP-9, TP-12 S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20.
(5) - Based on data collected from Background location BH-W1.
▨ - Exceeded one or more of the benchmark values.

TABLE 9.4

COMPARISON OF SEDIMENT CRITERIA WITH COCs IN SEDIMENT
NEWSTEAD SITE
NEWSTEAD, NEW YORK

	NYSDEC SEDIMENT CRITERIA (1)				
PARAMETERS	*BENTHIC ACUTE*	*BENTHIC CHRONIC*	*MEAN (2)*	*MAXIMUM*	*BACKGROUND MEAN (3)*
SVOCs (ug/kg)					
BIS(2-ETHYLHEXYL)PHTHALATE	-	9197	250	440	ND
BUTYLBENZYLPHTHALATE**	3500000	11240	255	18	ND
DIETHYLPHTHALATE**	86450	276	234	250	ND
NAPHTHALENE**	207000	55735	234	9	ND
PESTICIDES/PCBs (ug/kg)					
4,4'-DDD	50710	46.1	2.71	2.6	ND
4,4'-DDE	50710	46.1	7.58	18	ND
4,4'-DDT	50710	46.1	4.33	12	ND
METHOXYCHLOR	-	27.7	18.79	42	ND
AROCLOR-1248*	127000	890	31	58	ND
AROCLOR-1254*	127000	890	72.20	320	ND
AROCLOR-1260*	127000	890	76.04	180	ND
	NYSDEC SEDIMENT CRITERIA (1)				
METALS (mg/kg)	*LOWEST EFFECT LEVEL*	*SEVERE EFFECT LEVEL*			
BARIUM	-	-	503	2570	116
CADMIUM	0.6 (P)	9.0 (L)	1.92	6.6	0.86
CHROMIUM	26 (P)	110 (P)	52.71	229	20.50
CYANIDE	-	-	0.83	2	ND
LEAD	31 (P)	110 (L)	208	943	33.10
SILVER	1(L)	2.2 (L)	0.53	0.97	ND
ZINC	120 (P/L)	270 (L)	373	1560	105

Notes:

All SQC are based on a Site-specific organic carbon content of 46.1 gOC/kg sediment.

- \- - Not Available.
- ND - Not Detected.
- * - Sediment criteria are for PCB.
- ** - Sediment criteria for these parameters were calculated from USEPA AWQC using NYSDEC guidance.
- ▨ - Exceeded one or more of the sediment criteria.
- (1) - "Technical Guidance for Screening Contaminated Sediments", New York State Department of Environmental Conservation, July 1994.
  Benthic Acute - protection of benthic aquatic life - acute toxicity.
  Benthic Chronic - protection of benthic aquatic life - chronic toxicity.
  Lowest Effect Level - level of sediment contamination tolerated by majority of benthic organisms.
  Severe Effect Level - level of sediment contamination where pronounced adverse effects to benthic organisms can be expected.
  (L) - crierion adopted from Long and Morgon, 1990, NOAA. (P) = criterion adopted from Persaud et al., 1992, MOEE.
- (2) - Based on data collected from sampling locations: SW-1, SW-2, SW-3, SW-4, SW-5, SW-6, SW-9.
- (3) - Based on data collected from Background locations : SW-7, SW-8, SW-10.