# Site Investigation/Remedial Alternatives Report (SI/RAR)

for

# 815 River Road Site
# City of North Tonawanda

Prepared for

City of North Tonawanda,
Niagara County, New York

and

New York State
Department of Environmental Conservation

June 2008

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# SITE INVESTIGATION/REMEDIAL ALTERNATIVES REPORT (SI/RAR)

for

## 815 RIVER ROAD SITE

CITY OF NORTH TONAWANDA
NIAGARA COUNTY, NEW YORK

Prepared for

CITY OF NORTH TONAWANDA

and

NYSDEC


Prepared by

STEARNS & WHELER, LLC
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
UNIVERSITY CENTER
SUITE 100
415 NORTH FRENCH ROAD
AMHERST, NY 14228

June 2008

Project No. 61259

**SITE INVESTIGATION/REMEDIAL ALTERNATIVES REPORT (SI/RAR) 815 RIVER ROAD SITE**

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## 1.0 INTRODUCTION

This report will include both the Site Investigation and Remedial Alternatives Reporting for 815 River Road Site located in the City of North Tonawanda (City). The Site Investigation Report will delineate impacted soils as defined through subsurface sampling and analytical testing of soil and groundwater. The Remedial Alternatives Report will identify remedial alternatives necessary to remediate the delineated impacted soils as reported in the site investigation reporting. The most feasible and appropriate remedial technology will be selected and approved by the City and New York State Department of Environmental Conservation (NYSDEC). A site location map is presented in Figure 1-1.

An Interim Remedial Measures (IRM) was completed in November 2007 to remove impacted soils as delineated during the site investigation. The remediation was completed to the extent practical to enable reuse of the site as a commercial/industrial parcel. The property will be utilized as a concrete crushing recycling operation and business. Funding is provided for this project through the NYSDEC Brownfield Cleanup Program as created into law October 2003.

## 2.0 SITE BACKGROUND

The City of North Tonawanda acquired the 815 River Road parcel in 2000 through a tax foreclosure. This one-acre parcel of land is located directly across from the City's Wastewater Treatment Plant (WWTP). Prior to the City's acquisition of this property, a company that maintained school buses occupied this property. As part of this business, this company maintained fueling systems that included underground storage tanks (USTs) for gasoline and motor oil. City records indicated that the USTs were in-place for over 40 years.

A previous site investigation completed in January 2001 by Green Environmental Specialists, Inc. (Green) identified seven (7) buried USTs. Analytical testing detected the presence of benzene in two (2) USTs. Site reporting also indicated that the soil and groundwater surrounding the USTs may have been impacted through UST leakage. Shortly after the completion of Green's

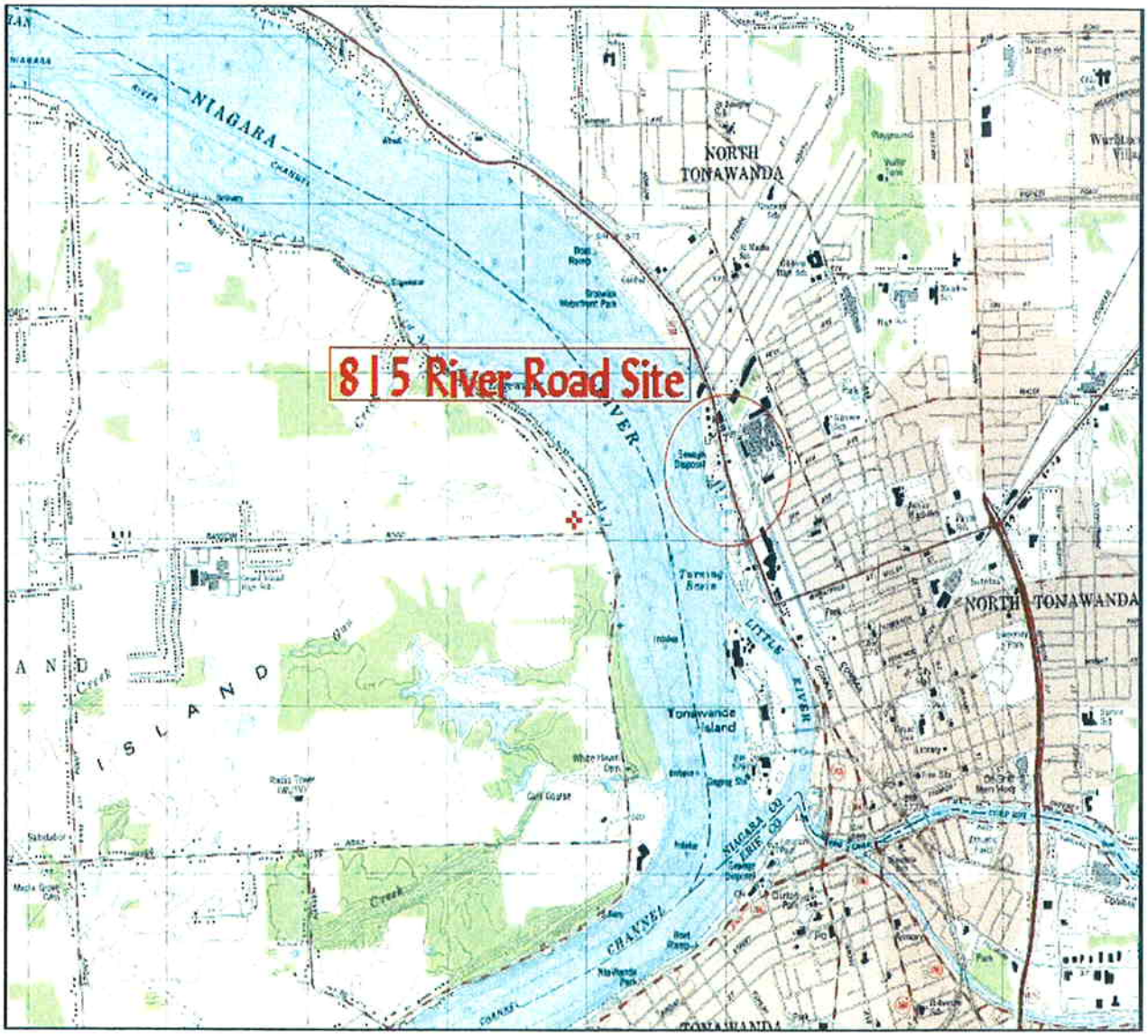


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**FIGURE 1-1**
**SITE LOCATION**

site investigation, remedial construction was initiated by a private entity interested in remediating and developing the property for commercial/industrial use. Remedial activities resulted in the removal of four (4) USTs.

In September 2002, an additional site investigation was completed by Parsons to delineate the extent of contamination and provide tank closure of the four (4) removed USTs from past remedial activities. The site investigation identified an additional eight (8) tanks. Under a site IRM, tank removal and closure was provided. Demolition of an on-site building was necessary for proper UST closure and to allow access to impacted soils beneath the building. Impacted soils were excavated and removed from the site for disposal to Tonawanda Landfill.

During the removal of impacted soils and surface water, IRM construction was halted by the City due to a contract dispute. All site activities were discontinued. Contract disputes could not be settled and construction contracts were terminated. The site was left with an unfinished open excavation with the potential of additional impact soils to be excavated. Reporting for the site investigation and IRM activities was not provided to the City. Existing site conditions are presented in Figure 2-1.

## 3.0 GEOLOGY

Surficial geologic maps of the site indicate that the shallow overburden at the site consists of lacustrine silts and clays as indicated in probe logs in Appendix A. Probe logs from the site confirm that this is the case. After a short interval of fill material from 3 to 6-feet below ground surface, there is a 4 to 9-feet thick sequence of grey silty clay followed by reddish brown clay unit. Field investigation probing stopped at a 12-feet depth at approximately the top of clay. Bedrock maps of the area indicate that the Camillus Shale of the Salina Group is found in this area.

The upper silty clay layer has various percentages of fine sand with wide ranges in moisture content, from damp to saturated. The damp or moist areas were mottled, suggesting that these are zones that are saturated during periods when the water table is elevated. Frequent fine sand lenses were evident. The clay layer was predominantly red brown and displayed a stiff hard clay with little sand and silts, which can be attributed to soil characteristics that contribute to the soil unit acting as a confining layer above the underlying till.

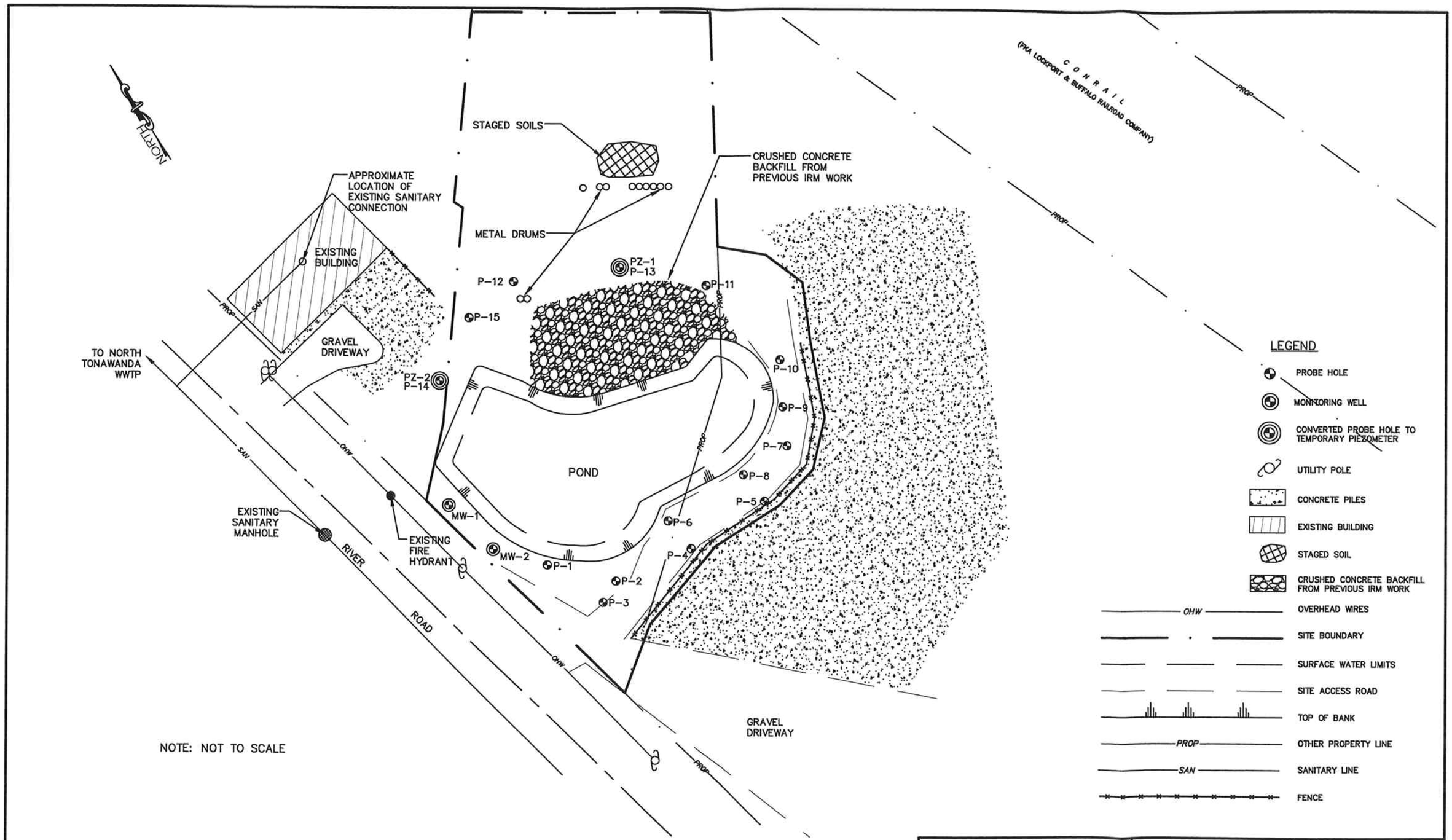


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FIGURE 2-1
SITE PLAN

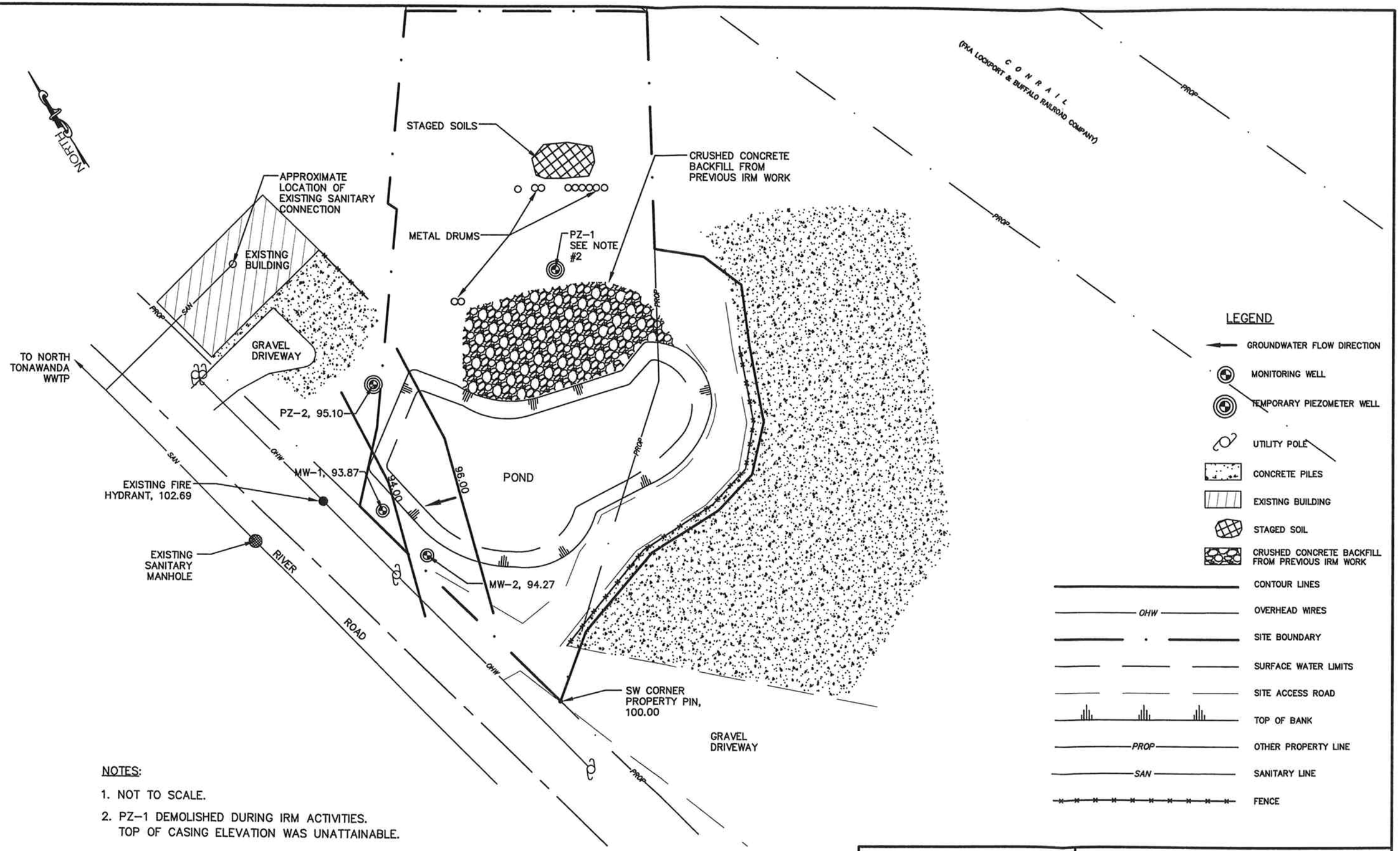
Water levels from two (2) upgradient piezometers and two (2) down gradient monitoring wells indicates groundwater flow to the west-southwest. Groundwater flow contours and direction are presented on Figure 3-1. One (1) upgradient piezometer (PZ-1) was demolished during IRM activities prior to surveying top of casing elevation. Water levels from piezometer (PZ-2), monitoring wells (MW-1, MW-2) were used to determine groundwater flow contours, direction and gradient.

The presence of the Niagara River located to the west of the site suggests that the river would act as the regional discharge zone. This is likely the case in a regional sense. Locally, however, groundwater is possibly intercepted by the sanitary sewer line located along River Road. The top of the silty clay unit that is consistent through out the site has been logged and recorded to range in depth between 4 to 5 feet. Standard sewer construction consists of a sewer pipe laid on a gravel pipe bedding material with the rest of the sewer trench filled with a gravel backfill. Since the 36-inch diameter sanitary sewer located along River Road is approximately 15-feet deep, the bottom of sewer trench is then deeper than the top of silty clay unit. Any groundwater emmiting from the site should follow the top of clay and infiltrate into the gravel backfilled sewer trench. Once in the trench, groundwater will enter the sewer through inflitration and be transmitted to the City's WWTP for treatment.

## 4.0 DESCRIPTION OF WORK COMPLETED

**4.1 Existing Conditions.** The existing site conditions prior to the completed IRM included an open excavation that is filled with water creating a pond that represents a marsh wetlands type environment. Mounds of concrete debris are scattered through out the site that is related to the concrete crushing recycling operation residing on the adjacent property. Additional mounds of concrete debris are located adjacent to the site. Excavated staged soils are present that were left from the past IRM remediation. Drums left from the previous investigation and IRM construction were staged on-site. Drums were reported to contain personnel protective clothing.

**4.2 Description of Site Investigation Activities.** The site investigation included the perimeter of the open excavation be investigated with a series of probe borings to identify the extent of additional or remaining impacted soils. Direct push probing equipment was utilized to complete a total of 15 probe holes that were located approximately 25-feet apart and pushed to a




NOTES:

1. NOT TO SCALE.
2. PZ-1 DEMOLISHED DURING IRM ACTIVITIES. TOP OF CASING ELEVATION WAS UNATTAINABLE.

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FIGURE 3-1
GROUNDWATER FLOW

depth of 12-feet. The depth to the top of clay was defined ranging between 9 to 11-feet. Probe hole locations are presented on Figure 2-1. Probe hole logs are presented in Appendix A.

Soil collected from probe holes were field screened for the presence of petroleum hydrocarbons using a photoionization detector (PID) meter. When elevated PID meter readings were encountered above established background PID meter readings during probing work, then soil samples were collected for analytical testing. Elevated PID meter readings were detected in soils collected from probe holes P-1, P-2, and P-3 ranging from 57 to 212 ppm. Upon the detection of elevated PID meter readings in soils collected from probe holes P-1 and P-2, an additional probe hole (P-3) was completed approximately 10-feet further away from the pond area and suspected impacted probe holes P-1 and P-2 to further delineate the impacted soil area.

Elevated PID readings were reported at probe hole P-1 between surface grade to 4-foot depth, probe hole P-2 between surface grade to 5-foot depth, and probe hole P-3 between surface grade to 9-foot depth. Background PID meter readings were detected in soils collected from probe holes P-4 through P-15. Based on soil probe information, approximately 2 to 3-feet of fill material has been identified as non-impacted soils.

Probe holes, P-13 and P-14, located as upgradient to the impacted zone were converted to temporary 1-inch PVC piezometers, PZ-1 and PZ-2. Two (2) down gradient monitoring wells, MW-1 and MW-2, located adjacent to River Road were drilled with hollow stem auger equipment to install 2-inch PVC monitoring wells. Monitoring wells were constructed of 5-feet of .010-inch slot size PVC well screen and riser casing that extended from the screened interval to 2-feet above existing grade. A protective steel locking well casing and cap was installed with matching locks. Well casings extended to a 12-foot depth to the top of clay. Monitoring and piezometers well locations are presented on Figure 2-1. Monitoring well installation logs are presented in Appendix B.

**4.3 Analytical Testing.** Soil samples were collected for analytical testing from probe holes P-1, P-2, and P-3. At the request of the NYSDEC, soil samples were collected for analytical testing from probe holes P-12, P-13, P-14, and P-15. Probe holes 13 and P-14 were later converted into piezometers PZ-1 and PZ-2. Each collected soil sample was analyzed by a New York State Certified Laboratory under CLP protocols with ASP Deliverable B test results. Soil samples were analyzed for volatiles and semi-volatiles as listed on the Target Compound Listing

(TCL). Reporting results for the analytical testing were received in (5) five days. Data Usability Summary Reporting (DUSRs) was completed and is presented in Appendix C.

After monitoring well development, groundwater was collected and sampled from wells MW-1, MW-2, PZ-1, and PZ-2 and analyzed by a New York State Certified Laboratory under CLP protocols with ASP Deliverable B test results. Samples were analyzed for volatiles, semi-volatiles, pesticides/PCBs, and metals on the TCL. Reporting results for the analytical testing was received in a standard time period of 30 days. Data Usability Summary Reporting (DUSRs) was completed and is presented in Appendix C.

One (1) soil sample from probe hole P-2 which exhibited elevated PID meter readings and one (1) additional composite soil sample from the staged soil pile were collected and tested for the following analytical testing for soil characterization and disposal acceptance criteria: pH, Petroleum Hydrocarbons, Ignitability, TCLP Metals, TCLP Volatiles, TCLP Semi Volatiles, and PCBs. Staged soils that have been excavated and handled in past remediation are by definition a solid industrial waste and must be managed in accordance with Part 360 and transported in accordance with Part 364 regulations.

Surface water from the open excavation/pond was sampled and tested by the City's WWTP personnel. Analytical testing included specific parameters defined by WWTP discharge permit requirements. Analytical testing provided non-detectable results. Surface water was pre-approved by North Tonawanda for discharge to the sanitary sewer during the proposed construction period.

**4.4 Site Survey and Environmental Easement.** An environmental easement is required for the imposition of a deed restriction that requires compliance with the approved soils management plan and the future use of groundwater from the site. The soils management plan will be a part of the site completion report which will dictate deed restrictions to be instituted that prohibits the installation of potable wells at the site. Any future use of groundwater at the site will be prohibited.

Annually, the future owners will be required to certify to the NYSDEC that the implemented remedy has been maintained in accordance with the soils management plan. The Site Environmental Easement is a requirement of the Site Management Plan and will be presented in the Site Completion Report.

Potential/future property owners will be subject to the Site Environmental Easement. The following items have been included as part of the environmental easement:

- An updated title report.
- An updated metes and bounds description of the property.
- An updated boundary survey of the site and survey endorsement.
- Site survey locating existing conditions. The site survey was utilized for SI/RAR reporting and site planning for IRM contruction plans and specifications.

## 5.0 PRESENTATION OF FINDINGS

**5.1 Soil Samples Analytical Results.** A total of seven (7) soils samples were collected for analytical testing. Elevated field PID readings were detected in soil samples S-1, S-2, and S-3 that represent the soils from probe holes P-1, P-2, and P-3. Volatile chemical compounds that were detected in these soil samples included: xylene and ethylbenzene. Semivolatile chemical compounds that were detected included: naphthalene and 2-methylnaphthalene. All concentrations reported were below the Restricted Commercial Use Soil Cleanup Objectives as listed in NYSDEC Regulation Part 375, Table 375.6.8(b). Analytical results are presented in Tables 5.1 and 5.2.

Elevated field PID readings were not detected in soil samples S-4, S-5, S-6, and S-7 that were collected from probe holes P-12, P-13, P-14, and P-15. Analytical testing reported non detectable results for all volatile and semivolatile parameters. Analytical results are presented in Tables 5.1 and 5.2.

Two (2) soil samples were collected and analyzed for soil characterization disposal acceptance criteria for proposed soils to be excavated and from the staged soil pile. Samples were tested for: petroleum hydrocarbons, TCLP metals, TCLP volatiles, TCLP semi-volatiles, and PCBs, ignitability, and corrosivity. All parameter concentrations were lower than the TCLP regulatory limits defining soil waste as non-hazardous. Soil waste was accepted by Modern Landfill in accordance with Part 360 as a solid industrial waste prior to excavation. Pre-acceptance of wastes will result in the direct waste loading from the excavation eliminating the staging of soil wastes. Analytical results are presented in Table 5.7.

**5.2 Groundwater Analytical Results.** A total of four (4) groundwater samples were collected for analytical testing from monitoring wells MW-1 and MW-2 and piezometers PZ-1 and PZ-2. Volatile concentrations of xylene, and ethylbenzene were detected in groundwater collected from monitoring well MW-1. Concentrations reported were below the groundwater standards as listed in NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Volatile concentrations of benzene, 1,2-dichloropropane, toluene, xylene, and ethylbenzene were detected in groundwater collected from monitoring well MW-2 that exceed groundwater standards. Analytical testing reported non-detectable volatile results in both upgradient piezometers PZ-1 and PZ-2. Analytical results are presented in Table 5.3.

Analytical testing reported non-detectable semi-volatile results in monitoring well MW-1. Semivolatile concentrations of bis(2-ethylhexyl)phthalate, 2,4-dimethylphenol, and methylphenol were detected in groundwater collected from monitoring well MW-2. Detected concentrations were reported above the groundwater standards. Analytical testing reported non-detectable volatile results in both upgradient piezometers PZ-1 and PZ-2. Analytical results are presented in Table 5.4.

Analytical testing reported non-detectable pesticide and PCB results in both monitoring wells MW-1 and MW-2. Analytical results are presented in Table 5.5.

Elevated concentrations of metals in groundwater were detected and reported above the groundwater standards at both monitoring wells MW-1 and MW-2. The following metals were detected in the groundwater sample MW-1: aluminum, beryllium, cadmium, chromium, iron, lead, magnesium, and manganese. The following metals were detected in the groundwater sample MW-2: arsenic aluminum, chromium, iron, lead, magnesium, and manganese. Analytical results are presented in Table 5.6.

## 6.0 SITE INVESTIGATION SUMMARY

In review of the completed site investigation activities, the following summary of the site investigation has been reported providing conclusions and delineation of existing impacted soils and groundwater as defined through analytical testing of subsurface soils and groundwater.

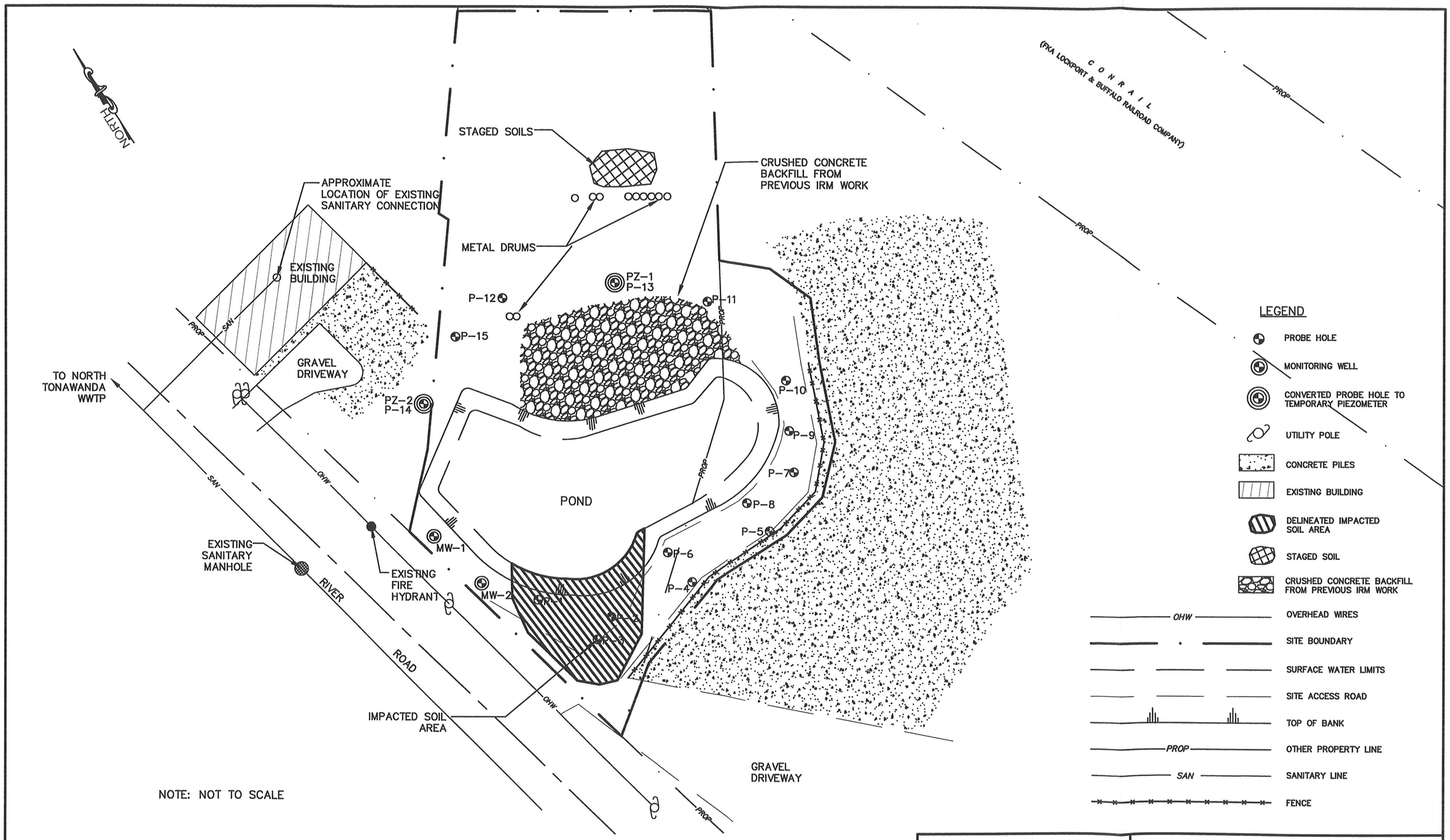
1. As stated in Section 5.0, Presentation of Findings, elevated PID readings were recorded in subsurface soils during the field logging of probe holes P-1, P-2, and P-3. Analytical test results indicated that concentrations of both volatile and semivolatile compounds were detected in subsurface soils. All concentrations reported were below the Restricted Commercial Use Soil Cleanup Objectives. Volatile concentrations that appear to be the most impacting include xylene and ethylbenzene. Semi-volatile concentrations to a lesser degree were detected to include naphthalene.

2. Analytical test results indicated that concentrations in groundwater of volatile, semivolatile, and metal compounds were detected above groundwater standards. Analytical test results indicated that groundwater sampled from monitoring well MW-2 had the highest chemical concentrations and exceeded groundwater standards. Volatile concentrations that appear to be the most impacting include: benzene, 1,2-dichloropropane, toluene, xylene, and ethylbenzene. Analytical test results indicated that groundwater from monitoring well MW-1 only exceeded groundwater standards for metals.

3. Piezometers wells PZ-1 and PZ-2 installed as upgradient wells can be concluded as up gradient due to groundwater contouring as presented in Figure 3-1. Volatile and semivolatile analytical testing reported non-detectable results in both piezometer wells PZ-1 and PZ-2.

4. Even though the soil analytical test results detected concentrations of both volatile and semivolatile compounds below the Restricted Commercial Use Soil Cleanup Objectives, the delineated impacted area should be removed due to groundwater exceedences to the groundwater standard. The removal of impacted soil will eliminate and/or reduce the amount of impacted soils that have been identified as a source area. Removal of the source area should reduce the reported chemical concentrations that contribute to the groundwater standard exceedences.

5. The impacted area has been delineated as defined and presented in Figure 6-1 to include the area surrounding probe holes P-1, P-2, and P-3. The impacted area as defined in soil sampling and testing has been estimated in depth to range from 4 to 9-feet. The possibility exists that impacted soils extend to the top of clay with an approximate depth ranging between 10.5 to 11.5-feet. Based on soil probe information, approximately




NOTE: NOT TO SCALE

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FIGURE 6-1
DELINEATION OF IMPACTED AREA

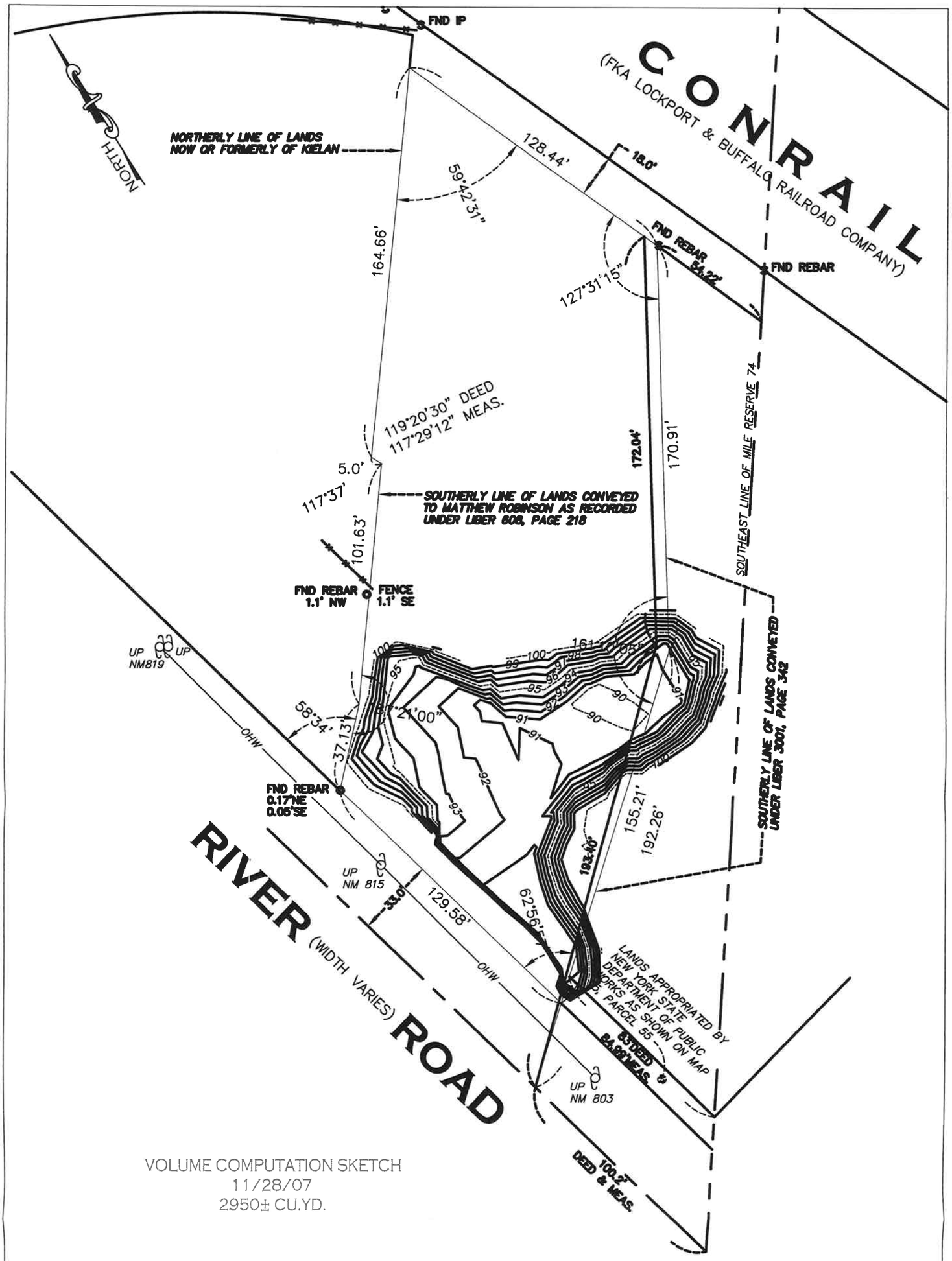
2 to 3-feet of fill material across the site has been identified as non-impacted soils. Since the IRM completed in 2002 removed impacted soils to the top of clay, it is a good indication that the delineated area will be removed to the top of clay. The volume of impacted soil proposed to be removed has been estimated at 640 cubic yards or 950 tons.

6. It is apparent that impacted soils exist on River Road's Right-of-Way (ROW) property. Both monitoring wells MW-1 and MW-2 were installed in close proximity of the ROW property. The westerly boundary of the impacted area as presented as the proposed impacted area to be removed is not the westerly lateral limits of the impacted area. The impacted soils that may exist on the ROW property is recommended to be left in place due to the close proximity of underground utilities.

## 7.0 INTERIM REMEDIAL MEASURE (IRM)

An IRM was conducted in November 2007 that included the excavation and disposal of 1,500 tons of impacted and staged soils. This IRM construction completed the excavation and removal of impacted soils that was halted by the City in 2004. The excavation followed the delineation of impacted soils as defined during the investigation as reported in Section 5.0. The removal of impacted soils extended to the south to a minor extent onto the adjacent property as presented in Figure 7-1. IRM excavation limits were brought to within approximately 5-feet of the River Road Right-of-Way(ROW). Depth of excavation limits was to the top of clay. Excavated impacted soils were pre-approved for disposal at Modern Landfill and directly loaded into trucks from the excavation. Confirmatory soil samples were collected from the previously impacted area. After confirmatory soils sampling analytical test results were reported below the Restricted Commercial Use Soil Cleanup Objectives, backfill of the excavation was completed.

Confirmatory soil samples were collected from the bottom of the IRM excavation, bottom of the pond (2002 IRM excavation), pond sidewalls, IRM excavation sidewalls, and IRM ROW excavation sidewalls. Confirmatory soil sample analytical results are presented in Tables 7.1, 7.2, 7.3, and 7.4. The confirmatory soil sample collected from the IRM ROW excavation sidewalls, referred to as CSS-5, is located on the excavation sidewall along the River Road ROW. Analytical test results of confirmatory soil sample CSS-5 detected concentrations of toluene, ethylbenzene, and xylene above Unrestricted Use Soil Cleanup Objectives.

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| MAP COVER: | SUB LOT: | | | BLK: |
| LOCATED IN: CITY OF NORTH TONAWANDA, COUNTY OF NIAGARA, STATE OF NEW YORK | | | | |

# FIGURE 7-1: IMPACTED AREA IRM REMOVAL

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ENGINEERING
LAND SURVEYING
WM. SCHUTT & ASSOCIATES, P.C.
37 CENTRAL AVE.
LANCASTER, NY 14086-2143
PH. 716-683-5961
FAX 716-683-0169
WWW.WMSCHUTT.COM
SUSTAINING MEMBER - THE NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS

A report under separate cover will be prepared to provide the required project closeout and documentation reporting. As-built plans and approved modifications and changes will be reported. Analytical testing data, disposal manifests, contract quantities and daily reports will be included in the closeout report.

## 8.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

**8.1 Introduction.** The goal of the remedy selection process is to select a remedy for this site that is fully protective of public health and the environment, taking into account the current, intended and reasonably anticipated future land use of the site. The remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles. This site has been identified by an end user who intends to expand a commercial concrete recycling facility on the site. The end user is presently operating a successful recycling facility on an adjacent property to the site.

**8.2 Remedial Action Objectives.** Remedial action objectives are developed by specifying contaminants, media of interest, exposure pathways, and remediation goals for the protection of public health and the environment and based on contaminant specific soil cleanup objectives. The information required for the alternative analysis of Remedial Alternative Report (RAR) includes the identification of the nature and extent of the contamination and the potential for the contamination to adversely affect a potential receptor. This information was presented in the site investigation portion of this report and can be referenced in Sections 1.0 through 6.0. This identification of the nature and extent of the contamination is used to help identify action technologies that are appropriate for the site.

The overall remedial action objective for 815 River Road Site; is to provide for protection of public health and the environment by minimizing potential contact with, and the migration potential of, site-related contaminants. Remedial actions must conform to soil cleanup objectives that are generally applicable, consistently applied and promulgated, or that are relevant and appropriate for the site. Included as soil cleanup objectives for the site are statutory requirements which establish cleanup levels for protection of public health and the environment.

The use of this site has been identified as a restricted commercial use site. Restricted use is defined as a use with imposed restrictions, such as environmental easements, which as part of the remedy selected for the site require a site management plan which relies on institutional controls or engineering controls to manage exposure to contamination remaining at a site. Restricted Use Soil Cleanup Objectives, specifically commercial use, have been identified for this site for the protection of public health where contamination has been identified in soil above the Unrestricted Use Soil Cleanup Objectives included in 6 NYCRR Subparts 375-6.8, and remediation has been determined necessary to protect public health.

The soil cleanup objective's for the protection of groundwater is not applicable at a restricted use site when the following exception criteria apply as regulated in Part 375-6.5. Since the following criteria apply to this site soil cleanup objectives for the protection of groundwater does not apply.

- An environmental easement will be put in place which provides for a groundwater use restriction on the site;
- Migration of groundwater is likely to be intercepted by the existing River Road sewer. Sewer discharge is to the City's WWTP located approximately 50-feet to the north of the site;
- Groundwater quality will improve over time due to impacted soil source removal;
- The contravention of groundwater standards at the site is determined to be the result of an off-site source.

The soil cleanup objectives for the protection of ecological resources as applied to upland soils at sites where terrestrial flora and fauna and the habitats that support them objectives do not apply to sites where the condition of the land precludes the existence of an ecological resource which constitutes an important component of the environment as regulated in 375-6.6.

Since impacted soils remain on site after the IRM, then as regulated in Part 375-4.8, where soil contamination above Unrestricted Use Soil Cleanup Objectives is identified by the site investigation, the alternatives analysis will develop and evaluate one or more alternatives that achieve the Unrestricted Use Soil Cleanup Objectives.

Once the remedial action objectives are refined for the site, alternatives are assembled that will satisfy the objectives. The assembled alternatives should provide a range of options and sufficient information to provide comparison. Remedial action will include the removal of

contamination and/or reduce or eliminate exposure to the contaminants reported above soil cleanup objectives. At a minimum, removal should include the source of contamination and any grossly contaminated soils to the extent technically and feasible.

In the following evaluations, the no further action alternative is retained for all impacted media to serve as a basis of comparison. Impacted media include soil and groundwater. The need for groundwater control actions should be assessed since impacted groundwater has been identified at the site.

**8.3 Impacted Soil Description.** During the site investigation activities, an area of impacted soil was identified. In addition, impacted staged soils exist from a past IRM remediation event. The impacted soil was found to contain elevated concentrations of ethylbenzene, xylene, naphthalene, and 2-methylnaphthalene from soil samples collected from the subsurface ranging from 4 to 9-feet in depth. Based on soil probe information, approximately 2 to 3-feet of fill material has been identified as non-impacted soils across the site. Tables 5.1 and 5.2 summarizes the concentrations of volatile and semi-volatile compounds in soil samples.

Concentrations of detected compounds do not exceed the Restricted Commercial Use Soil Cleanup Objectives as referenced in Part 375. Even though the soil analytical test results detected concentrations of both volatile and semivolatile compounds below the Restricted Commercial Use Soil Cleanup Objectives, the impacted soils were removed under an IRM source removal. The impacted soil contributed to the impacting of groundwater to concentrations reported above the groundwater standard. Therefore, implementation of the reported IRM in Section 7.0 for management of the impacted soil was appropriate.

As reported in Section 7.0, the impact to remaining soils have been reported through IRM confirmatory sampling and testing. Concentrations of toluene, ethylbenzene, and xylene were reported below Restricted Commercial Use Soil Cleanup Objectives and above Unrestricted Use Soil Cleanup Objectives in the confirmatory sample CSS-5 located along the excavation sidewall of River Road ROW.

**8.3.1 Development of Remedial Action Objectives.** The remedial action objective for the site is to provide for protection of public health and the environment by minimizing potential contact with, and the migration potential of, site-related contaminants. The following remedial action objectives have been further refined for impacted soils:

1. Prevent direct contact with the subsurface soil;
2. Prevent or minimize the possible leaching of contaminants from the soil into the groundwater.

**8.3.2 Identification of Response Actions and Technology Options.** Technology options for fulfilling response actions are identified. Response actions include: no further action, institutional controls, and excavation/disposal.

1. *No further action* response includes leaving the impacted surface soil in place. Impacted soils have contributed to impacting groundwater to concentrations above the groundwater standard. If the site was redeveloped and site access improved, it is likely that more people would have access to the impacted soil through the excavation and installation of foundations and utilities of new structures associated with redevelopment of the site.

2. *Institutional controls* for management include implementing access restrictions for the site. The remaining impacted soils from the completed IRM on the River Road ROW would remain in place. A perimeter fence would be required with locking gates at all access points. Some form of security would be required in order to prevent unauthorized use in addition to the fencing. An environmental easement would be required. This option would be comparatively easy to implement and represent a moderate cost.

3. *Excavation/Disposal* includes the excavation of the contaminated soil and disposing off-site to a permitted Part 360 facility or on-site disposal in a specially constructed land disposal cell. The impacted soil would need to be waste characterized and excavated. The limits of excavation would include soils on the River Road ROW property. River Road utilities and road locations does not provide an easy access for the removal of these impacted soils. This option is effective for long-term management of the impacted soils.

**8.3.3 Initial Screening of Technology Options.** The initial screening of response action options focuses on effectiveness, reliability, and cost. Those options that are obviously ineffective, unreliable, or too costly are rejected from further consideration.

- Although the no further action response option is obviously ineffective for preventing contact with the contaminants in the soil and would not prevent or minimize leaching into

the groundwater, it is required for comparison to all other options. This alternative will not meet the remedial objectives of the project and will not be implemented. It is retained in the evaluation for comparison purposes only.

- The option that includes creating a waste disposal cell on the site has been rejected due to the difficulty to implement. The site is approximately 1 acre in area. Physical constraints of the site will not allow a on-site waste disposal cell. Most of the site has been planned to be utilized as commercial property.

- Institutional controls are possible. Future use of the property would be limited to commercial use. Future property owners would be restricted to the environmental easement and site management plan.

**8.3.4 Remedial Action Impacted Soil Alternatives.** Therefore, the options to be retained following this initial screening for impacted soil remedial alternatives include:

1. No further action (for comparison basis only);
2. Excavation with off-site disposal;
3. Institutional controls.

**8.4 Impacted Groundwater Description.** During the site investigation activities, groundwater from monitoring well MW-2 located along the southwesterly boundary of the site was found to be impacted with concentrations of volatile and semi-volatile compounds that exceed groundwater standards. Groundwater in this portion of the site has been reported to flow west-southwest toward the sanitary sewer line that is located along the River Road. Water levels from piezometer (PZ-2), monitoring wells (MW-1, MW-2) were used to determine groundwater flow contours, direction and gradient. Upgradient piezometer wells have reported no impacted groundwater. Tables 5.3, 5.4, 5.5, and 5.6 summarizes the analytical test results of groundwater.

Implementation of the reported IRM in Section 7.0, has removed the impacted soil source area that has contributed to the impacting of groundwater. The quality of groundwater is expected to improve with the removal of the impacted source area.

**8.4.1 Development of Remedial Action Objectives.** The remedial action objective for the River Road Site is to provide for protection of public health and the environment by minimizing

potential contact with, and the migration potential of, site-related contaminants. The following remedial action objectives have been further refined for impacted groundwater:

1. Prevent exposure to contaminants in groundwater;
2. Minimize the migration of dissolved contaminants through groundwater;
3. Provide for attainment of groundwater standards, to the extent possible, at the property boundary.

**8.4.2 Identification of Response Actions and Technology Options.** Technology options for fulfilling response actions are identified for initial screening. Response actions include no further action, institutional measures, and groundwater collection/treatment.

1. The no further action response includes allowing impacted groundwater to go unattended. This is the most easily implemented option for management of the groundwater impacts. Concentrations of VOCs exceeding standards have only been detected in samples from monitoring well MW-2. Samples from other wells were not found to contain any of the same compounds, indicating that the groundwater source is not widespread. There is indication that the groundwater is presumably flowing toward the River Road sanitary sewer. It is possible that the groundwater is being collected by the sewer and ultimately treated in the City's WWTP. Because neighboring properties are connected to municipal water, there are presently no groundwater users in the area of the impacted groundwater. Therefore, no further action response is possibly effective in achieving remedial objectives for the site. The no further action response has been retained for comparison purposes.

2. Institutional controls can be used to prevent future exposure to the impacted groundwater. Although there are no identified groundwater users in the vicinity of the impacted groundwater, it is possible that a well could be installed in the future. To prevent this from occurring, the City has enacted an environmental easement that groundwater use is restricted on the site and prohibits the installation of potable wells. Groundwater from down gradient monitoring wells on-site will require sampling and analytical testing on an annual basis for a minimum of 30 years. If this sampling program determines that significant off-site migration of groundwater contamination is occurring, contingency plans must be in place and implemented.

3. Groundwater collection and treatment can be completed through the use of recovery wells that can be installed in the area of impacted groundwater. Groundwater can then be pumped to an on-site treatment unit. Activated carbon or air stripping could be used to remove contaminants of concern and then discharged to the ground or to the City's sewers. This option is relatively easy to implement, as equipment is readily available for collecting, storing, and treating groundwater with low concentrations of VOCs. On-site treatment and discharge would need to be combined with a monthly monitoring program to verify that acceptable treatment is being achieved.

**8.4.3 Initial Screening of Technology Options.** The initial screening of response action options focuses on effectiveness, reliability, and cost. Those options that are obviously ineffective, unreliable, or too costly are rejected from further consideration.

- The no further action response option may be both effective and appropriate for achieving remedial action objectives for the limited area of impacted groundwater. Besides being required for comparison to all other options, the River Road sewer appears to be serving as a groundwater collection system that is already providing collection of impacted groundwater with treatment at the City's WWTP.

- Institutional controls will include an environmental easement that will be administered for the imposition of a deed restriction that requires compliance with an approved soils management plan and the future use of groundwater from the site. The soils management plan will dictate deed restrictions that prohibits the installation of potable wells at the site. Any future use of groundwater at the site will be prohibited. Annually, future owners will be required to certify to the NYSDEC that the implemented remedy has been maintained in accordance with the soils management plan.

- Groundwater collection and treatment has been rejected due to a costly treatment option that would require an extensive operation, maintenance and monitoring program and groundwater recovery wells located on the River Road ROW property. Since the reported IRM impacted source area has been removed, it is likely that the impact to groundwater will be reduced.

**8.4.4 Remedial Action Impacted Groundwater Alternatives.** Therefore, the options to be retained following this initial screening for impacted groundwater remedial alternatives include:

1. No further action (for comparison basis only);
2. Institutional controls.

## 9.0 DEVELOPMENT AND ANALYSIS OF ALTERNATIVES

**9.1 Introduction.** Each identified and retained alternative for both impacted soils and impacted groundwater is evaluated and compared against the following seven (7) evaluation criteria specified for environmental restoration under the Brownfields program to enable selection of a preferred remedial alternative at the site.

1. Protection of Public Health and the Environment;
2. Compliance with Standards, Criteria and Guidance;
3. Long-term Effectiveness and Permanence;
4. Reduction of Toxicity, Mobility, and Volume with Treatment;
5. Short-term Effectiveness and Impacts;
6. Implementability;
7. Cost Effectiveness.

**9.2 Impacted Soil.** The impacted soil was found to contain elevated concentrations of ethylbenzene, xylene, naphthalene, and 2-methylnaphthalene from soil samples collected from the subsurface ranging from 4 to 9-feet in depth. Impacted soils are delineated in depth ranging from 4 to 9-feet. Based on soil probe information, approximately 2 to 3-feet of fill material has been identified as non-impacted soils across the site. The volume of impacted soil was identified and estimated in the site investigation to be approximately 640 cubic yards or 950 tons. In addition, impacted staged soils exist from a past remediation event that have been estimated to be approximately 135 cubic yards or 200 tons. The completed IRM excavated and removed approximately 1,500 tons of impacted and staged soils.

The remaining impacted soils located along the IRM excavation sidewalls near the River Road ROW are represented by confirmatory soil sample CSS-5. Concentrations of detected

compounds in confirmatory soil sample CSS-5 do not exceed the Restricted Commercial Use Soil Cleanup Objectives, however, do exceed the Unrestricted Use Soil Cleanup Objectives. Since impacted soils remain on site after the IRM, then as regulated in Part 375-4.8, where soil contamination above Unrestricted Use Soil Cleanup Objectives is identified by the site investigation, the alternatives analysis will develop and evaluate one or more alternatives that achieve the Unrestricted Use Soil Cleanup Objectives.

All parameter concentrations were lower than the TCLP regulatory limits defining soil waste as non-hazardous. Soil waste has been accepted by Modern Landfill and Tonawanda Landfill in accordance with Part 360 as a solid industrial waste prior to the IRM excavation. Analytical results are presented in Table 5.7.

**9.2.1 Impacted Soils Alternative 1: No Further Action.** The no further action alternative is required in order to provide a baseline for comparison purposes. This alternative would allow the impacted soil to remain in place. Periodic inspections would be required.

1. *Protection of Public Health and the Environment.* The impacted soils have been identified at a depth ranging from 4 to 9-feet. Surface soils of approximately 2 to 3-feet in depth of fill material have been identified as non-impacted soils across the site. The remaining impacted soils would be covered by non-impacted soils. It does not appear to be a potential risk to public health by leaving the impacted soil in place since surface soils have been identified as non-impacted. However, impacted soil has resulted in the migration and impacting of groundwater in exceedences of the groundwater standard. Therefore, the no further action alternative is not protective of public health and the environment since the impacted soil has resulted in the migration and contamination of groundwater.

2. *Compliance with Standards, Criteria and Guidance.* The analytical results of soil samples obtained from the soils indicated that no soil samples exceeded the Restricted Commercial Use Soil Cleanup Objectives. However, analytical results of groundwater samples detected concentrations above the groundwater standard. Allowing the impacted soils to remain would provide a potential contaminant source that would further the migration of groundwater underlying the site.

3. *Long-Term Effectiveness and Permanence.* The no further action alternative would not be effective in the long term due to the likelihood that the contaminants in the impacted soils may eventually migrate further by leaching into groundwater.

4. *Reduction of Toxicity, Mobility, or Volume.* This alternative would provide no reduction of toxicity, mobility, or volume of potential and identified impacting substances at the site.

5. *Short-Term Effectiveness and Impacts.* The no further action remedy could be implemented immediately; however, this option does not prevent the continued migration of groundwater from the impacted soil source area.

6. *Implementability.* The no further action remedy is implementable. There is no difficulty or technical feasibility required to carry out this alternative.

7. *Cost Effectiveness.* The no further action remedy is cost effective and would be expected to be the most economical alternative.

**9.2.2 Impacted Soils Alternative 2: Excavation/Off-Site Disposal.** The excavation and off-site disposal of impacted soils would include the removal of all remaining impacted soil as identified along the River Road ROW. The impacted soils would be disposed in a permitted Part 360 landfill.

1. *Protection of Public Health and the Environment.* This alternative is protective of public health and the environment if properly implemented. The removal and proper disposal of the impacted soils would prevent potential leaching into groundwater.

2. *Compliance with Standards, Criteria and Guidance.* Implementation of this alternative would comply with remedial objectives.

3. *Long-Term Effectiveness and Permanence.* This alternative would provide permanent remediation.

4. *Reduction of Toxicity, Mobility, or Volume.* This alternative would provide off-site disposal of the impacted soils effectively reduce the toxicity, volume, and mobility of potential and identified impacting substances.

5. *Short-Term Effectiveness and Impacts.* This alternative may allow for adverse short-term impacts to the community due to increased truck traffic during removal operations. Traffic relocation would result in detouring truck traffic through a commercial/residential community. Utility interruptions and relocation would provide service shutdown for commercial and industrial users. Potential environmental impacts stemming from the off-site disposal of the impacted soils include the potential for dust migration to neighboring properties.

6. *Implementability.* The excavation and off-site disposal alternative is difficult to technically implement. Remaining impacted soils have been identified near the River Road ROW property line. The existing utilities and the location of River Road make the implementation of this alternative a complicated remediation both administratively in providing ROW access approvals and technically.

7. *Cost Effectiveness.* This alternative would be the most costly alternative when comparing the three impacted soil alternatives.

**9.2.3 Impacted Soils Alternative 3: Institutional Controls.** Institutional controls for management include implementing access restrictions for the site. A perimeter fence would be required with locking gates at all access points. An environmental easement would be required.

1. *Protection of Public Health and the Environment.* This alternative with an environmental easement in place will result in the protection of public health within the limits of the easement.

2. *Compliance with Standards, Criteria and Guidance.* The analytical results of soil samples obtained from the soils indicated that no soil samples exceeded the Restricted Commercial Use Soil Cleanup Objectives.

3. *Long-Term Effectiveness and Permanence.* This alternative would be effective in the long term due institutional controls being administered through the placement of an

environmental easement. Future owners will be required to certify to the NYSDEC that the implemented remedy has been maintained in accordance with an approved soils management plan.

4. *Reduction of Toxicity, Mobility, or Volume.* This alternative would provide no reduction of the toxicity, mobility, or volume of potential and impacting substances at the site. The reduction of continued migration of groundwater from the remaining impacted soils through the existing sewer intercept with groundwater flow has been reported.

5. *Short-Term Effectiveness and Impacts.* This alternative could be implemented immediately and would be effective with the administering an environmental easement.

6. *Implementability.* This alternative is implementable. There is no difficulty or technical feasibility required to carry out this alternative.

7. *Cost Effectiveness.* This alternative is cost effective. The environmental easement which is included in the site investigation represents minor costs.

**9.3 Impacted Groundwater.** During the investigation, groundwater at the River Road ROW was found to be impacted with low concentrations of volatile and semi-volatile compounds. Groundwater in this area is flowing southwest toward the sanitary sewer line along River Road. Groundwater was impacted from the impacted source area removed during the reported IRM. Upgradient piezometer wells have reported no impacted groundwater. Analytical results are presented in Table 5.3.

Analytical testing reported non-detectable semi-volatile results in monitoring well MW-1. Semivolatile concentrations of bis(2-ethylhexyl)phthalate, 2,4-dimethylphenol, and methylphenol were detected in groundwater collected from monitoring well MW-2. Detected concentrations were reported above the groundwater standards. Analytical testing reported non-detectable volatile results in both upgradient piezometers PZ-1 and PZ-2. Analytical results are presented in Table 5.4.

Analytical testing reported non-detectable pesticide and PCB results in both monitoring wells MW-1 and MW-2. Elevated concentrations of metals in groundwater were detected and reported

above the groundwater standards at both monitoring wells MW-1 and MW-2. Analytical results are presented in Tables 5.5 and 5.6

**9.3.1 Impacted Groundwater Alternative 1: No Further Action.** The no further action response includes allowing groundwater impacts to go unattended. Impacted groundwater was only detected in monitoring well MW-2. Samples from other wells were not found to contain any of the same compounds, indicating that the groundwater source is not widespread. There is indication that the groundwater is presumably flowing toward the River Road sanitary sewer. It is possible that the groundwater is being collected by the sewer and ultimately treated in the City's WWTP. Because neighboring properties are connected to municipal water, there are presently no groundwater users in the area of the impacted groundwater. Therefore, no further action response is possibly effective in achieving remedial objectives for the site.

1. *Protection of Public Health and the Environment.* Based on the results of the investigation, the area of impacted groundwater appears to be located in the immediate vicinity of the southwestern corner of the site. The groundwater from that area appears to be flowing towards River Road and a sewer line. At the present time, all adjacent properties are served by municipal water. This alternative may be protective of public health and the environment.

2. *Compliance with Standards, Criteria and Guidance.* The detected concentrations in the groundwater in the monitoring well MW-2 exceeded the groundwater standards.

3. *Long-Term Effectiveness and Permanence.* The no further action alternative may be effective in the long term due to the low volatile concentration, the isolated area of impacted groundwater, the removal of the soil source area, and the lack of potential groundwater users immediately down gradient. Any long-term risks would be limited to the immediate area surrounding monitoring well MW-2. If a private well was installed, this remedy would not provide long-term protection.

4. *Reduction of Toxicity, Mobility, or Volume.* This alternative may provide for the reduction of the toxicity, mobility, or volume of the potential contaminants due to natural dilution and attenuation. Additionally, if the River Road sanitary sewer is intercepting impacted groundwater and conveying it to the City's WWTP, the toxicity, mobility, and

volume of the potential impacted substances associated with impacted groundwater may be further reduced.

5. *Short-Term Effectiveness and Impacts.* Although this alternative does not provide for active remedial actions, the environmental impacts are likely to be insignificant given the low volatile concentration, the isolated area of impacted groundwater, and the lack of potential groundwater users immediately down gradient. The no further action remedy could be implemented immediately.

6. *Implementability.* The no further action remedy is implementable. There is no difficulty or technical feasibility required to carry out this alternative.

7. *Cost Effectiveness.* The no further action remedy is cost effective and would be expected to be the most economical alternative.

**9.3.2 Impacted Groundwater Alternative 2: Institutional Controls.** Institutional controls can be used to prevent future exposure to the impacted groundwater. Although there are no identified groundwater users in the vicinity of the impacted groundwater, it is possible that a well could be installed in the future. To prevent this from occurring, the City has enacted an environmental easement that groundwater use is restricted on the site and prohibits the installation of potable wells. Groundwater from down gradient monitoring wells on-site will require sampling and analytical testing on an annual basis for a minimum of 30 years. If this sampling program determines that significant off-site migration of groundwater contamination is occurring, contingency plans must be in place and implemented.

1. *Protection of Public Health and the Environment.* This alternative is protective of public health if properly implemented and controlled. The deed restrictions would prevent future use of the impacted groundwater. This alternative is not actively protective of the environment. However, as stated previously, the impacted groundwater appears to be located to an immediate vicinity of MW-2. Since the groundwater appears to flow towards a sanitary sewer, impacted groundwater that flows off-site may be intercepted and conveyed to the City's POTW, thus providing protection of the environment.

2. *Compliance with Standards, Criteria and Guidance.* The detected concentrations in the groundwater in the monitoring well MW-2 exceeded the groundwater standards.

3. *Long-Term Effectiveness and Permanence.* This alternative may be effective in the long term due to the low volatile concentration, the isolated area of impacted groundwater, the removal of the soil source area, and the lack of potential groundwater users immediately down gradient. Any long-term risks would be limited to the immediate area surrounding monitoring well MW-2. The environmental easement would restrict groundwater use and provide a contingency plan should future groundwater sampling indicates a significant increase in the extent of impacted groundwater.

4. *Reduction of Toxicity, Mobility, or Volume.* This alternative may provide for the reduction of the toxicity, mobility, or volume of the potential contaminants due to natural dilution and attenuation. Additionally, if the River Road sanitary sewer is intercepting impacted groundwater and conveying it to the City's WWTP, the toxicity, mobility, and volume of the potential impacted substances associated with impacted groundwater may be further reduced.

5. *Short-Term Effectiveness and Impacts.* It is anticipated that this alternative could be implemented quickly. The environmental impacts are likely to be insignificant given the low volatile concentration, the isolated area of impacted groundwater, and the lack of potential groundwater users immediately down gradient. Short-term impacts are negligible.

6. *Implementability.* There is no difficulty or technical feasibility required to carry out this alternative.

7. *Cost Effectiveness.* This alternative is cost effective. The environmental easement which is included in the site investigation represents minor costs.

## 10.0 COMPARATIVE ANALYSIS SUMMARY

The following summarizes the selection of appropriate management alternatives for each impacted media. Table 10.1 summarizes the costs for each management alternative. Present

worth values have been calculated to reflect costs over 30 years of operations and maintenance at an annual 3% interest rate.

**10.1 Impacted Soil Alternative Analysis.** The no further action alternative is not suited to site conditions. The site currently is accessible to the public, allowing for potential direct contact with the impacted soils through the development of future uses. The no further action alternative may be easily implemented, requires no specialized services or materials, and would not incur short-term costs, but the long-term costs in terms of liability may be unacceptable.

The excavation and disposal of remaining impacted soils left behind from the completed IRM is well suited to achieving Unrestricted Use Soil Cleanup Objectives. The site's soil cleanup objectives qualify as restricted commercial use. The completed IRM has achieved the regulated soil cleanup objectives. The excavation and disposal of remaining impacted soils is not feasible due to its difficult technical and administrative implementablity and high remediation cost.

The institutional controls alternative has been selected as the most feasible alternative for the management of the remaining impacted soils at the site. The completed IRM has achieved the reported Restricted Commercial Soil Cleanup Objectives. An environmental easement will be administered for the imposition of a deed restriction that requires compliance with an approved soils management plan and the future use of groundwater from the site. The soils management plan will dictate deed restrictions that prohibit the installation of potable wells at the site.

**10.2 Impacted Groundwater Alternative Analysis.** The no further action alternative is well suited to the planned redevelopment of the site. The no further action alternative may be easily implemented, requires no specialized services or materials, and would not incur any capital costs. However, future development and possible groundwater use will result in not meeting the criteria of the protection of public health and the environment.

The institutional controls alternative has been selected as the most feasible alternative for the management of the impacted groundwater at the site. An environmental easement will be administered for the imposition of a deed restriction that requires compliance with an approved soils management plan and the future use of groundwater from the site. The soils management plan will dictate deed restrictions that prohibit the installation of potable wells at the site.

# TABLES

STEARNS & WHELER LLC
Environmental Engineers and Scientists

**Table 5.1**
**Soil Sample Volatile Analytical Test Results**

| Location ID | | SS-1 | SS-2 | SS-3 | SS-4 | SS-5 | SS-6 | SS-7 | FD (SS-1) |
|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Criteria*** | | | | | | | | |
| Chloromethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | 13 | ND | ND | ND | ND | ND | ND | ND | ND |
| Bromomethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Chloroethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Acetone | 500[b] | ND | ND | ND | 0.013 | ND | ND | 0.015 | ND |
| 1,1-Dichloroethene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Methylene chloride | - | ND | ND | ND | ND | ND | ND | 0.004 J | 0.03 J |
| trans-1,2-Dichloroethene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | 240 | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Butanone | - | ND | ND | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Chloroform | 350 | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Carbon tetrachloride | 22 | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzene | 44 | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | 30 | ND | ND | ND | ND | ND | ND | ND | ND |
| Trichloroethene | 200 | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | - | ND | ND | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Toluene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| trans-1,3-Dichloropropene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Tetrachloroethene | 150 | ND | ND | ND | ND | ND | ND | ND | ND |
| Dibromochloromethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Ethylbenzene | 390 | ND | 63 | 13 | ND | ND | ND | ND | 0.02 J |
| m,p-Xylene | 500[b] | 0.07 J | 120 | 24 | ND | ND | ND | ND | 0.086 |
| o-Xylene | - | ND | 1 J | 0.7 J | ND | ND | ND | ND | 0.02 J |
| Styrene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Bromoform | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | - | ND | ND | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives.
Analytical results report in ppm.
b - The soil cleanup objectives for commercial use were capped at a maximum value of 500 ppm.
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 5.2**
**Soil Sample Semi-Volatile Analytical Test Results**

| Location ID | | SS-1 | SS-2 | SS-3 | SS-4 | SS-5 | SS-6 | SS-7 | FD |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Criteria* | DF 10 | DF 10 | DF 10 | | | | | DF 2 |
| Phenol | 500[b] | ND | ND | ND | 0.06 J | 0.05 J | 0.04 J | 0.05 J | 0.05 J |
| bis(2-chloroethyl) ether | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Methylphenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| N-Nitrosodi-n-propylamine | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Nitrobenzene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Isophorone | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| bis(2-chloroethoxy) methane | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Naphthalene | 500[b] | 4.2 | 4.4 | 9.6 | ND | ND | ND | ND | 10 |
| 4-Chloroaniline | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | - | 2 J | ND | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | - | 4.8 | 3 J | 10 | ND | ND | ND | ND | 11 |
| Hexachlorocyclopentadiene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Chloro-phthalene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Nitroaniline | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Acenaphthene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | - | ND | ND | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives.

b - The soil cleanup objectives for commercial use were capped at a maximum value of 500 ppm.
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 5.2 (continued)**
**Soil Sample Semi-Volatile Analytical Test Results**

| Location ID | | SS-1 | SS-2 | SS-3 | SS-4 | SS-5 | SS-6 | SS-7 | FD |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Criteria* | DF 10 | DF 10 | DF 10 | | | | | DF 2 |
| Dibenzofuran | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Diethyl phthalate | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenyl ether | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Fluorene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Nitroaniline | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenyl ether | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Hexachlorobenzene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | 6.7 | ND | ND | ND | ND | ND | ND | ND | ND |
| Phenanthrene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Anthracene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Carbazole | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Fluoranthene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Pyrene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| Butyl benzyl phthalate | - | ND | ND | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Benz(a)anthracene | 5.6 | ND | ND | ND | ND | ND | ND | ND | ND |
| Chrysene | 56 | ND | ND | ND | ND | ND | ND | ND | ND |
| bis(2-ethylhexyl) phthalate | - | 0.05 J | ND | ND | 0.2 J | 0.05 J | 0.1 J | 0.05 J | ND |
| Di-n-octyl phthalate | - | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzo(b)fluoranthene | 5.6 | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | 56 | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzo(a)pyrene | 1[f] | ND | ND | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | 5.6 | ND | ND | ND | ND | ND | ND | ND | ND |
| Dibenz(a,h)anthracene} | 0.56 | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzo(g,h,i) perylene | 500[b] | ND | ND | ND | ND | ND | ND | ND | ND |
| (3+4)-Methylphenol | - | ND | ND | ND | ND | ND | ND | ND | ND |
| bis(2-chloroisopropyl) ether | - | ND | ND | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives (ppm).
Analytical results reported in ppm
b - The soil cleanup objectives for commercial use were capped at a maximum value of 500 ppm.
f - For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and the Department of Health rural soil survey, the rural soil background concentration is as the Track 2 SCO value for this use of the site.
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 5.3**
**Groundwater Sample Volatile Analytical Test Results**

| Location ID | | | PZ-1 | PZ-2 | MW-1 | MW-2** | FD (MW-2)*** |
|---|---|---|---|---|---|---|---|
| Parameter | Units | Criteria* | | | | DF 10 | DF 50 |
| Chloromethane | µg/L | - | ND | ND | ND | ND | ND |
| Vinyl chloride | µg/L | 2.0 | ND | ND | ND | ND | ND |
| Bromomethane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Chloroethane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Acetone | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 1,1-Dichloroethene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Carbon disulfide | µg/L | 60.0 | ND | ND | ND | ND | ND |
| Methylene chloride | µg/L | 5.0 | ND | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 2-Butanone | µg/L | 50.0 | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Chloroform | µg/L | 7.0 | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Carbon tetrachloride | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Benzene | µg/L | 1.0 | ND | ND | ND | 140 | 200 J |
| 1,2-Dichloroethane | µg/L | 0.6 | ND | ND | ND | ND | ND |
| Trichloroethene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | µg/L | 1.0 | ND | ND | ND | 40 J | ND |
| Bromodichloromethane | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | µg/L | - | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | µg/L | 0.4 | ND | ND | ND | ND | ND |
| Toluene | µg/L | 5.0 | ND | ND | ND | 70 J | 100 J |
| trans-1,3-Dichloropropene | µg/L | 0.4 | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | µg/L | 1.0 | ND | ND | ND | ND | ND |
| 2-Hexanone | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Tetrachloroethene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Dibromochloromethane | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Chlorobenzene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Ethylbenzene | µg/L | 5.0 | ND | ND | 2 J | 460 | 780 |
| m,p-Xylene | µg/L | 5.0 | ND | ND | 4 J | 480 | 1,700 |
| o-Xylene | µg/L | 5.0 | ND | ND | ND | 40 J | 70 J |
| Styrene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Bromoform | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | µg/L | 5.0 | ND | ND | ND | ND | ND |

*Criteria - NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Class GA.
ND - Not detected for at or above reporting limit
NS - Not specified
J - Analyte detected below quantitation limits

**Table 5.4**
**Groundwater Sample Semi-Volatile Analytical Test Results**

| Location ID | | | PZ-1 | PZ-2 | MW-1 | MW-2 | FD (MW-2) |
|---|---|---|---|---|---|---|---|
| Parameter | Units | Criteria* | DF 10 | DF 10 | DF 10 | DF 10 | DF 10 |
| Phenol | µg/L | 1.0 | ND | ND | ND | ND | ND |
| bis(2-chloroethyl) ether | µg/L | 1.0 | ND | ND | ND | ND | ND |
| 2-Chlorophenol | µg/L | - | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | µg/L | 3.0 | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | µg/L | 3.0 | ND | ND | ND | ND | ND |
| 2-Methylphenol | µg/L | - | ND | ND | ND | ND | ND |
| N-Nitrosodi-n-propylamine | µg/L | - | ND | ND | ND | ND | ND |
| Hexachloroethane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Nitrobenzene | µg/L | 0.4 | ND | ND | ND | ND | ND |
| Isophorone | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 2-Nitrophenol | µg/L | - | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | µg/L | 50.0 | ND | ND | ND | ND | 20 J |
| bis(2-chloroethoxy) methane | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | µg/L | 1.0 | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | µg/L | - | ND | ND | ND | ND | ND |
| Naphthalene | µg/L | 10.0 | ND | ND | ND | ND | ND |
| 4-Chloroaniline | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | µg/L | 0.5 | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | µg/L | - | ND | ND | ND | ND | ND |
| 2-Methyl-phthalene | µg/L | - | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | µg/L | - | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | µg/L | - | ND | ND | ND | ND | ND |
| 2-Chloro-phthalene | µg/L | 10.0 | ND | ND | ND | ND | ND |
| 2-Nitroaniline | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Dimethyl phthalate | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Acenaphthylene | µg/L | - | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 3-Nitroaniline | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Acenaphthene | µg/L | 20.0 | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | µg/L | 10.0 | ND | ND | ND | ND | ND |
| 4-Nitrophenol | µg/L | - | ND | ND | ND | ND | ND |
| Dibenzofuran | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Diethyl phthalate | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenyl ether | µg/L | - | ND | ND | ND | ND | ND |
| Fluorene | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 4-Nitroaniline | µg/L | 5.0 | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | µg/L | - | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenyl ether | µg/L | - | ND | ND | ND | ND | ND |
| Hexachlorobenzene | µg/L | 0.04 | ND | ND | ND | ND | ND |
| Pentachlorophenol | µg/L | 1.0 | ND | ND | ND | ND | ND |
| Phenanthrene | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Anthracene | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | µg/L | 0.002 | ND | ND | ND | ND | ND |
| Carbazole | µg/L | - | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Fluoranthene | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Pyrene | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Butyl benzyl phthalate | µg/L | 50.0 | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | µg/L | 5.0 | ND | ND | ND | ND | ND |
| Benz(a)anthracene | µg/L | 0.002 | ND | ND | ND | ND | ND |
| Chrysene | µg/L | 0.002 | ND | ND | ND | ND | ND |

*Criteria - NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Class GA
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 5.4 (continued)**
**Groundwater Sample Semi-Volatile Analytical Test Results**

| Location ID | | | PZ-1 | PZ-2 | MW-1 | MW-2 | FD (MW-2) |
|---|---|---|---|---|---|---|---|
| Parameter | Units | Criteria* | DF 10 | DF 10 | DF 10 | DF 10 | DF 10 |
| bis(2-ethylhexyl) phthalate | µg/L | 5.0 | ND | ND | ND | 10 J | 10 J |
| Di-n-octyl phthalate | µg/L | 50.0 | ND | ND | ND | ND | ND |
| Benzo(b)fluoranthene | µg/L | 0.002 | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | µg/L | 0.002 | ND | ND | ND | ND | ND |
| Benzo(a)pyrene | µg/L | NS | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | µg/L | 0.002 | ND | ND | ND | ND | ND |
| Dibenz(a,h)anthracene) | µg/L | - | ND | ND | ND | ND | ND |
| Benzo(g,h,i) perylene | µg/L | - | ND | ND | ND | ND | ND |
| (3+4)-Methylphenol | µg/L | - | ND | ND | ND | 10 J | ND |
| bis(2-chloroisopropyl) ether | µg/L | - | ND | ND | ND | ND | ND |

*Criteria - NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Class GA
ND - Not detected for at or above reporting limit
NS - Not specified
J - Analyte detected below quantitation limits

**Table 5.5**
**Groundwater Sample PCBs & Pesticides Analytical Test Results**

| Location ID | | | MW-1 | MW-2 | FD (MW-2) |
|---|---|---|---|---|---|
| Parameter | Units | Criteria* | | | |
| 4,4'-DDD | µg/L | 0.3 | ND | ND | ND |
| 4,4'-DDE | µg/L | 0.2 | ND | ND | ND |
| 4,4'-DDT | µg/L | 0.2 | ND | ND | ND |
| Aldrin | µg/L | - | ND | ND | ND |
| alpha-BHC | µg/L | - | ND | ND | ND |
| alpha-Chlordane | µg/L | - | ND | ND | ND |
| Aroclor 1016 | µg/L | - | ND | ND | ND |
| Aroclor 1221 | µg/L | - | ND | ND | ND |
| Aroclor 1232 | µg/L | - | ND | ND | ND |
| Aroclor 1248 | µg/L | - | ND | ND | ND |
| Aroclor 1254 | µg/L | 0.09 | ND | ND | ND |
| Aroclor 1260 | µg/L | 0.09 | ND | ND | ND |
| beta-BHC | µg/L | - | ND | ND | ND |
| delta-BHC | µg/L | - | ND | ND | ND |
| Dieldrin | µg/L | 0.004 | ND | ND | ND |
| Endosulfan I | µg/L | - | ND | ND | ND |
| Endosulfan II | µg/L | - | ND | ND | ND |
| Endosulfan sulfate | µg/L | - | ND | ND | ND |
| Endrin | µg/L | - | ND | ND | ND |
| Endrin aldehyde | µg/L | 5 | ND | ND | ND |
| Endrin ketone | µg/L | 5 | ND | ND | ND |
| gamma-BHC | µg/L | - | ND | ND | ND |
| gamma-Chlordane | µg/L | - | ND | ND | ND |
| Heptachlor | µg/L | 0.04 | ND | ND | ND |
| Heptachlor epoxide | µg/L | 0.03 | ND | ND | ND |
| Methoxychlor | µg/L | 35 | ND | ND | ND |
| Toxaphene | µg/L | 0.06 | ND | ND | ND |

*Criteria - NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Class GA.

ND - Not detected for at or above reporting limit

J - Analyte detected below quantitation limits

**Table 5.6**
**Groundwater Sample Metals Analytical Test Results**

| Location ID | | | MW-1 | MW-2 | FD (MW-2) |
|---|---|---|---|---|---|
| Parameter | Units | Criteria* | | | |
| Aluminum | µg/L | 2,000 | 72,200 | 63,100 | 63,900 |
| Anitmony | µg/L | 6 | ND | ND | ND |
| Arsenic | µg/L | 50 | 47.6 | 534 | 29.6 |
| Barium | µg/L | 2,000 | 495 | 534 | 610 |
| Beryllium | µg/L | 3 | 3.07 | ND | ND |
| Cadmium | µg/L | 10 | 11.7 | 5.63 | 7.31 |
| Calcium | µg/L | - | 282,000 | 225,000 | 243,000 |
| Chromium | µg/L | 50 | 111 | 96.8 | 107 |
| Cobalt | µg/L | - | 48.4 | 21.7 | 28.2 |
| Copper | µg/L | 1,000 | 135 | 79.3 | 105 |
| Iron | µg/L | 600 | 127,000 | 62,200 | 79,800 |
| Lead | µg/L | 50 | 70.8 | 58.7 | 77.4 |
| Magnesium | µg/L | 35,000 | 59,400 | 48,400 | 55,400 |
| Manganese | µg/L | 600 | 1,990 | 1,120 | 1,360 |
| Mercury | µg/L | 0.7 | 0.385 | ND | 0.398 |
| Nickel | µg/L | 200 | 112 | 63.8 | 76.7 |
| Potassium | µg/L | - | 14,900 | 13,400 | 13,200 |
| Selenium | µg/L | 10 | ND | ND | ND |
| Silver | µg/L | 50 | ND | ND | ND |
| Sodium | µg/L | - | 60,200 | 66,300 | 66,500 |
| Thallium | µg/L | 0.5 | ND | ND | ND |
| Vanadium | µg/L | - | 171 | 113 | 133 |
| Zinc | µg/L | 5,000 | 395 | 174 | 242 |

*Criteria - NYSDEC TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998. Class GA.

ND - Not detected for at or above reporting limit

J - Analyte detected below quantitation limits

**Table 5.7**
**Soil Waste Characterization Analytical Test Results**

| Location ID | | | SSW-1 | SSW-2 |
|---|---|---|---|---|
| **Parameter** | **Units** | **Criteria*** | | |
| **TOTAL PETROLEUM HYDROCARBONS** | | | | |
| Fuel #2 | mg/Kg-dry | - | ND | ND |
| Gasoline | mg/Kg-dry | - | ND | ND |
| Kerosene | mg/Kg-dry | - | ND | ND |
| Lube Oil | mg/Kg-dry | - | ND | ND |
| Unidentified Hydrocarbon | mg/Kg-dry | - | ND | ND |
| **PCBs** | | | | |
| Aroclor 1016 | mg/Kg-dry | - | ND | ND |
| Aroclor 1221 | mg/Kg-dry | - | ND | ND |
| Aroclor 1232 | mg/Kg-dry | - | ND | ND |
| Aroclor 1242 | mg/Kg-dry | - | ND | ND |
| Aroclor 1248 | mg/Kg-dry | - | ND | ND |
| Aroclor 1254 | mg/Kg-dry | - | ND | ND |
| Aroclor 1260 | mg/Kg-dry | - | ND | ND |
| Aroclor 1268 | mg/Kg-dry | - | ND | ND |
| **METALS** | | | | |
| Arsenic | mg/L | 5.0 | ND | ND |
| Barium | mg/L | 100.0 | 2.4 | 1.4 |
| Cadmium | mg/L | 1.0 | ND | 0.009 |
| Chromium | mg/L | 5.0 | ND | ND |
| Lead | mg/L | 5.0 | 0.32 | ND |
| Mercury | mg/L | 0.2 | ND | ND |
| Selenium | mg/L | 1.0 | ND | ND |
| Silver | mg/L | 5.0 | ND | ND |
| **SEMIVOLATILES** | | | | |
| 2,4,5-Trichlorophenol | mg/L | 400.0 | ND | ND |
| 2,4,6-Trichlorophenol | mg/L | 2.0 | ND | ND |
| 2,4-Dinitrotoluene | mg/L | 0.1 | ND | ND |
| Cresols, Total | mg/L | 200.0 | ND | ND |
| Hexachlorobenzene | mg/L | 0.1 | ND | ND |
| Hexachlorobutadiene | mg/L | 0.5 | ND | ND |
| Hexachloroethane | mg/L | 3.0 | ND | ND |
| Nitrobenzene | mg/L | 2.0 | ND | ND |
| Pentachlorophenol | mg/L | 100.0 | ND | ND |
| Pyridine | mg/L | 5.0 | ND | ND |
| **VOLATILES** | | | | |
| 1,1-Dichloroethene | mg/L | 0.7 | ND | ND |
| 1,2-Dichloroethane | mg/L | 0.5 | ND | ND |
| 1,4-Dichlorobenzene | mg/L | 7.5 | ND | ND |
| 2-Butanone | mg/L | 200 | ND | ND |
| Benzene | mg/L | 0.5 | 0.047 | ND |
| Carbon tetrachloride | mg/L | 0.5 | ND | ND |
| Chlorobenzene | mg/L | 100 | ND | ND |
| Chloroform | mg/L | 6.0 | ND | ND |
| Tetrachloroethene | mg/L | 0.7 | ND | ND |
| Trichloroethene | mg/L | 0.5 | ND | ND |
| Vinyl chloride | mg/L | 0.2 | ND | ND |
| **IGNITABILITY** | | | | |
| Ignitability | °C | <60 | >60 | >60 |
| **CORROSIVITY** | | | | |
| pH | SU | <2.0 or >12.5 | 6.71 | 8.53 |
| **PERCENT MOISTURE** | | | | |
| Percent Moisture | wt% | - | 32.7 | 28.7 |

*Criteria - TCLP Regulatory Limits
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 7.1**
**Confirmatory Soil Sampling**
**Volatile Analytical Test Results**

| | | | Location ID | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CSS-1 | CSS-2 | CSS-3 | CSS-4 | CSS-5 | FD (CSS-4) |
| Parameter | Restricted Use Soil Cleanup Objectives* | Unrestricted Use Soil Cleanup Objectives | Excavation Bottom | Pond Bottom | Pond Walls | Excavation Walls | ROW Excavation Walls | Excavation Walls |
| Chloromethane | - | - | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | 13 | 0.02 | ND | ND | ND | ND | ND | ND |
| Bromomethane | - | - | ND | ND | ND | ND | ND | ND |
| Chloroethane | - | - | ND | ND | ND | ND | ND | ND |
| Acetone | 500[b] | 0.05 | ND | 0.02 | ND | ND | ND | ND |
| 1,1-Dichloroethene | 500[b] | 0.33 | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | - | - | ND | ND | ND | ND | ND | ND |
| Methylene chloride | 500[b] | 0.05 | ND | ND | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | 500[b] | 0.19 | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | 240 | 0.27 | ND | ND | ND | ND | ND | ND |
| 2-Butanone | - | - | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | 500[b] | 0.25 | ND | ND | ND | ND | ND | ND |
| Chloroform | 350 | 0.37 | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | 500[b] | 0.68 | ND | ND | ND | ND | ND | ND |
| Carbon tetrachloride | 22 | 0.76 | ND | ND | ND | ND | ND | ND |
| Benzene | 44 | 0.06 | 0.066 | ND | ND | 0.005 J | ND | 0.006 J |
| 1,2-Dichloroethane | 30 | 0.02 | ND | ND | ND | ND | ND | ND |
| Trichloroethene | 200 | 0.47 | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | - | - | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | - | - | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-pentanone | - | - | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | - | - | ND | ND | ND | ND | ND | ND |
| Toluene | 500[b] | 0.7 | ND | ND | ND | 0.023 | 2 | 0.022 |
| trans-1,3-Dichloropropene | - | - | ND | ND | ND | ND | ND | ND |
| 1,1,2-Trichloroethane | - | - | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | - | - | ND | ND | ND | ND | ND | ND |
| Tetrachloroethene | 150 | 1.3 | ND | ND | ND | ND | ND | ND |
| Dibromochloromethane | - | - | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | 500[b] | 1.1 | ND | ND | ND | ND | ND | ND |
| Ethylbenzene | 390 | 1 | ND | ND | ND | 0.008 J | 5 | 0.007 J |
| m,p-Xylene | 500[b] | 0.26 | ND | ND | ND | 0.021 | 21 | ND |
| o-Xylene | 500[b] | 0.26 | ND | ND | ND | 0.004 J | 3.7 | 0.003 J |
| Styrene | - | - | ND | ND | ND | ND | ND | ND |
| Bromoform | - | - | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | - | - | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives (ppm).
b - The soil cleanup objectives for commercial use were capped at a maximum value of 500 ppm.
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 7.2**
**Confirmatory Soil Sampling**
**Semi-Volatile Analytical Test Results**

| | | | Location ID | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CSS-1 | CSS-2 | CSS-3 | CSS-4 | CSS-5 | FD (CSS-4) |
| Parameter | Restricted Use Soil Cleanup Objectives* | Unrestricted Use Soil Cleanup Objectives | Excavation Bottom | Pond Bottom | Pond Walls | Excavation Walls | ROW Excavation Walls | FD (Excavation Walls) |
| Phenol | 500[b] | 0.3 | ND | ND | ND | ND | ND | ND |
| bis(2-chloroethyl) ether | - | - | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | - | - | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | - | - | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | - | - | ND | ND | ND | ND | ND | ND |
| 2-Methylphenol | - | - | ND | ND | ND | ND | ND | ND |
| N-Nitrosodi-n-propylamine | - | - | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | - | - | ND | ND | ND | ND | ND | ND |
| Nitrobenzene | - | - | ND | ND | ND | ND | ND | ND |
| Isophorone | - | - | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | - | - | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | - | - | ND | ND | ND | ND | ND | ND |
| bis(2-chloroethoxy) methane | - | - | ND | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | - | - | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | - | - | ND | ND | ND | ND | ND | ND |
| Naphthalene | 500[b] | 12 | ND | ND | ND | ND | 11 E | ND |
| 4-Chloroaniline | - | - | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | - | - | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methylphenol | - | - | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | - | - | ND | ND | ND | ND | 8 E | ND |
| Hexachlorocyclopentadiene | - | - | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | - | - | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | - | - | ND | ND | ND | ND | ND | ND |
| 2-Chloro-phthalene | - | - | ND | ND | ND | ND | ND | ND |
| 2-Nitroaniline | - | - | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | - | - | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | 500[b] | 100 | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | - | - | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | - | - | ND | ND | ND | ND | ND | ND |
| Acenaphthene | 500[b] | 20 | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | - | - | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | - | - | ND | ND | ND | ND | ND | ND |
| Dibenzofuran | - | - | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | - | - | ND | ND | ND | ND | ND | ND |

**Table 7.2**
**Confirmatory Soil Sampling**
**Semi-Volatile Analytical Test Results**

| | | | Location ID | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CSS-1 | CSS-2 | CSS-3 | CSS-4 | CSS-5 | FD (CSS-4) |
| Parameter | Restricted Use Soil Cleanup Objectives* | Unrestricted Use Soil Cleanup Objectives | Excavation Bottom | Pond Bottom | Pond Walls | Excavation Walls | ROW Excavation Walls | FD (Excavation Walls) |
| Diethyl phthalate | - | - | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenyl ether | - | - | ND | ND | ND | ND | ND | ND |
| Fluorene | 500[b] | 30 | ND | ND | ND | ND | 0.2 J | ND |
| 4-Nitroaniline | - | - | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-methylphenol | - | - | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | - | - | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenyl ether | - | - | ND | ND | ND | ND | ND | ND |
| Hexachlorobenzene | - | - | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | 6.7 | 0.8 | ND | ND | ND | ND | ND | ND |
| Phenanthrene | 500[b] | 100 | ND | ND | 0.08 J | ND | 0.09 J | ND |
| Anthracene | 500[b] | 100 | ND | ND | ND | ND | ND | ND |
| Benzo(a)anthracene | - | - | ND | ND | ND | ND | ND | ND |
| Carbazole | - | - | ND | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | - | - | ND | 0.04 J | 0.06 J | ND | 0.06 J | 0.06 J |
| Fluoranthene | 500[b] | 30 | ND | ND | 0.08 J | ND | ND | ND |
| Pyrene | 500[b] | 100 | ND | ND | 0.3 J | ND | ND | ND |
| Butyl benzyl phthalate | - | - | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | - | - | ND | ND | ND | ND | ND | ND |
| Benz(a)anthracene | 5.6 | 1 | ND | ND | 0.07 J | ND | ND | ND |
| Chrysene | 56 | 1 | ND | ND | 0.06 J | ND | ND | ND |
| bis(2-ethylhexyl) phthalate | - | - | 0.3 J | 0.3 J | 0.4 J | 0.42 | 0.43 | 0.53 |
| Di-n-octyl phthalate | - | - | ND | 0.07 J | ND | ND | ND | ND |
| Benzo(b)fluoranthene | 5.6 | 1 | ND | ND | ND | ND | ND | ND |
| Benzo(k)fluoranthene | 56 | 0.8 | ND | ND | ND | ND | ND | ND |
| Benzo(a)pyrene | 1[f] | 1 | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | 5.6 | 0.5 | ND | ND | ND | ND | ND | ND |
| Dibenz(a,h)anthracene) | 0.56 | 0.33 | ND | ND | ND | ND | ND | ND |
| Benzo(g,h,i) perylene | 500[b] | 100 | ND | ND | ND | ND | ND | ND |
| (3+4)-Methylphenol | - | - | ND | ND | ND | ND | ND | ND |
| bis(2-chloroisopropyl) ether | - | - | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives (ppm).

b - The soil cleanup objectives for commercial use were capped at a maximum value of 500 ppm.

f - For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and the Department of Health rural soil survey, the rural soil background concentration is as the Track 2 SCO value for this use of the site.

ND - Not detected for at or above reporting limit

E - Value above quantitation range

J - Analyte detected below quantitation limits

**Table 7.3**
**Confirmatory Soil Sampling**
**PCBs & Pesticides Analytical Test Results**

| | | | Location ID | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CSS-1 | CSS-2 | CSS-3 | CSS-4 | CSS-5 | FD (CSS-4) |
| Parameter | Restricted Use Soil Cleanup Objectives* | Unrestricted Use Soil Cleanup Objectives | Excavation Bottom | Pond Bottom | Pond Walls | Excavation Walls | ROW Excavation Walls | Excavation Walls |
| 4,4'-DDD | 13 | 0.0033 | ND | ND | ND | ND | ND | ND |
| 4,4'-DDE | 62 | 0.0033 | ND | ND | ND | ND | ND | ND |
| 4,4'-DDT | 47 | 0.0033 | ND | ND | ND | ND | ND | ND |
| Aldrin | 0.68 | 0.005 | ND | ND | ND | ND | ND | ND |
| alpha-BHC | 3.4 | 0.02 | ND | ND | ND | ND | ND | ND |
| alpha-Chlordane | 24 | 0.094 | ND | ND | ND | ND | ND | ND |
| Aroclor 1016 | - | - | ND | ND | ND | ND | ND | ND |
| Aroclor 1221 | - | - | ND | ND | ND | ND | ND | ND |
| Aroclor 1232 | - | - | ND | ND | ND | ND | ND | ND |
| Aroclor 1248 | - | - | ND | ND | ND | ND | ND | ND |
| Aroclor 1254 | - | - | ND | ND | ND | ND | ND | ND |
| Aroclor 1260 | - | - | ND | ND | ND | ND | ND | ND |
| beta-BHC | 3.000 | 0.036 | ND | ND | ND | ND | ND | ND |
| delta-BHC | 500[b] | 0.04 | ND | ND | ND | ND | ND | ND |
| Dieldrin | 1.4 | 0.005 | ND | ND | ND | ND | ND | ND |
| Endosulfan I | 200[i] | 2.4 | ND | ND | ND | ND | ND | ND |
| Endosulfan II | 200[i] | 2.4 | ND | ND | ND | ND | ND | ND |
| Endosulfan sulfate | 200[i] | 2.4 | ND | ND | ND | ND | ND | ND |
| Endrin | 89 | 0.014 | ND | ND | ND | ND | ND | ND |
| Endrin aldehyde | - | - | ND | ND | ND | ND | ND | ND |
| Endrin ketone | - | - | ND | ND | ND | ND | ND | ND |
| gamma-BHC | - | - | ND | ND | ND | ND | ND | ND |
| gamma-Chlordane | - | - | ND | ND | ND | ND | ND | ND |
| Heptachlor | 15 | 0.042 | ND | ND | ND | ND | ND | ND |
| Heptachlor epoxide | - | - | ND | ND | ND | ND | ND | ND |
| Methoxychlor | - | - | ND | ND | ND | ND | ND | ND |
| Toxaphene | - | - | ND | ND | ND | ND | ND | ND |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives (ppm).
b - The soil cleanup objectives (SCOs) for commercial use were capped at a maximum value of 500 ppm.
i - This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.
ND - Not detected for at or above reporting limit
J - Analyte detected below quantitation limits

**Table 7.4**
**Confirmatory Soil Sampling**
**Metals Analytical Test Results**

| | | | Location ID | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CSS-1 | CSS-2 | CSS-3 | CSS-4 | CSS-5 | FD (CSS-4) |
| Parameter | Restricted Use Soil Cleanup Objectives* | Unrestricted Use Soil Cleanup Objectives | Excavation Bottom | Pond Bottom | Pond Walls | Excavation Walls | ROW Excavation Walls | FD (Excavation Walls) |
| Aluminum | - | - | 19,500 | 18,300 | 8,580 | 15,900 | 5,850 | 17,200 |
| Anitmony | - | - | ND | ND | ND | ND | ND | ND |
| Arsenic | 16[f] | 13 | 3.78 | 6.20 | 6.03 | 3.82 | 5.25 | 6.74 |
| Barium | 400 | 350 | 311.0 | 132.0 | 49.6 | 113.0 | 30.0 | 242.0 |
| Beryllium | 590 | 7.2 | 0.961 | 0.962 | ND | 0.74 | ND | 0.842 |
| Cadmium | 9.3 | 2.5 | 4.17 | 4.11 | 2.63 | 3.26 | 1.75 | 3.65 |
| Calcium | - | - | 31,400 | 35,500 | 8,010 | 43,600 | 18,100 | 52,000 |
| Chromium | - | 30 | 27.40 | 26.40 | 13.50 | 24.70 | 8.98 | 26.70 |
| Cobalt | - | - | 15.20 | 15.60 | 8.35 | 12.80 | 6.33 | 13.10 |
| Copper | 270 | 50 | 23.0 | 22.8 | 18.7 | 29.9 | 11.1 | 22.4 |
| Iron | - | - | 29,600 | 29,800 | 18,400 | 23,200 | 11,400 | 26,100 |
| Lead | 1,000 | 63 | 10.10 | 9.46 | 19.40 | 11.90 | 19.60 | 9.86 |
| Magnesium | - | - | 13,600 | 13,700 | 4,220 | 13,500 | 6,930 | 12,900 |
| Maganese | 10,000[d] | 1,600 | 631 | 552 | 307 | 464 | 314 | 512 |
| Mercury | 2.8[j] | 0.18 | ND | ND | ND | ND | ND | ND |
| Nickel | 310 | 30 | 33.60 | 33.40 | 19.70 | 30.60 | 14.00 | 29.50 |
| Potassium | - | - | 4,790 | 4,350 | 1,070 | 3,710 | 919 | 4,480 |
| Selenium | 1,500 | 3.9 | ND | ND | ND | ND | ND | ND |
| Silver | 1,500 | 2 | ND | ND | ND | ND | ND | ND |
| Sodium | - | - | ND | ND | ND | ND | ND | ND |
| Thallium | - | - | ND | ND | ND | ND | ND | ND |
| Vanadium | - | - | 36.1 | 34.7 | 21.2 | 33.2 | 12.3 | 35.5 |
| Zinc | 10,000[d] | 109 | 69.7 | 68.2 | 70.8 | 67.2 | 46.6 | 67.5 |

*Criteria - NYS DEC Regulation Part 375. Table 375.6.8(b): Restricted Commercial Use Soil Cleanup Objectives (ppm).

d - The SCOs for metals were capped at a maximum value of 10,000 ppm.

f - For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and the Department of Health rural soil survey, the rural soil background concentration is as the Track 2 SCO value for this use of the site.

j - This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).

ND - Not detected for at or above reporting limit

J - Analyte detected below quantitation limits

**Table 10.1**
**Summary of Remedial Management Alternative Cost Estimates**

| ALTERNATIVES | CAPITAL COST | ANNUAL O&M COST | TOTAL COST (Present Worth) |
|---|---|---|---|
| **Impacted Soil** | | | |
| Alternative 1: No Further Action | 0 | 0 | $0 |
| Alternative 2: Institutional Controls | 5,000 | 1,000 | $58,000 |
| Alternative 3: Off-Site Disposal | 450,000 | 0 | $1,060,000 |
| | | | |
| **Impacted Groundwater** | | | |
| Alternative 1: No Further Action | 0 | 0 | $0 |
| Alternative 2: Institutional Controls | 2,000 | 6,000 | $244,000 |

Note: 30 years of O&M at an annual 3% interest rate

# APPENDICES

STEARNS & WHELER LLC
Environmental Engineers and Scientists

# APPENDIX A
## Probe Hole Logs

STEARNS & WHELER LLC
Environmental Engineers and Scientists

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-1**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 70°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD/DER
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| | S-1 | 85 | | No Soil Recovered 0.5' | PID = 212 ppm @ 3.8' |
| 1 | | | GM | Fill: Tan Gravelly Silt 1.0' | |
| 2 | | | | Fill: Grayish, Brown Gravelly Silt<br>- dry<br>- loose 2.5' | |
| 3 | | | OL | Fill: Brown Silty Clay<br>- grades to grayish, black silt<br>- gasoline odor | |
| 4 | | | | | |
| 5 | S-2 | 100 | | - water present 5.0' | PID = 2-3 ppm |
| 6 | | | | 6.0' | |
| 7 | | | CL | Tan-Gray Silt | |
| 8 | | | | 8.0' | |
| 9 | S-3 | 100 | SM | Silty Sand<br>- moist 9.0' | PID = 6 ppm |
| 10 | | | CL | Light Brown Silty Clay<br>- modeled with light orange | |
| 11 | | | | | |
| | | | | 11.5' | |
| 12 | | | CH | Reddish-brown Clay 12.0' | |
| | | | | Bottom of Hole = 12.0' | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Note: SS-1 + FD collected @ 4.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-2**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 70°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD/DER
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 100 | GM | Fill: Tan-brown Gravelly Silt 0.5' | PID = 126 ppm @ 2' |
| | | | | Fill: Gravel 1.0' | PID = 97.5 ppm @ 3' |
| 2 | | | ML | Fill: Light Brown Silt 2.0' | |
| 3 | | | | Fill: Black, Brown Silt - gasoline odor 3.0' | |
| 4 | | | CL | Light Gray Silty Clay - modeled brown with black staining | |
| 5 | S-2 | 100 | | - moist with a gasoline odor 4.5' | PID = 154 ppm @ 4.5' |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | | PID = 0-5 ppm |
| 10 | | | | | |
| 11 | | | | 10.5' Brown Clay - very moist | |
| 12 | | | | 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Note: SS-2 collected + MS/MSD @ 3.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-3**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 70°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD/DER
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 100 | GM | Fill: Tan, Brown Gravelly Silt<br>- dry, loose, with rocks 1.0' | PID = 108 ppm @ 2.5'<br>PID = 169 ppm @ 3.2' |
| 2 | | | | Fill: Gray Silt 1.5'<br>Fill: Gray-Black, Silt 2.0' | PID = 160 ppm @ 3.8' |
| 3 | | | | Fill: Gray Silt<br>- slightly moist @ 3' | |
| 4 | | | | 4.0' | |
| 5 | S-2 | 100 | ML | Gray Silt<br>- modeled with brown and black<br>- moist | PID = 57 ppm @ 6.7'<br>PID = 78 ppm @ 7.0' |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 8.5' | PID = 288 ppm @ 9.0' |
| 10 | | | | | |
| 11 | | | | 11.0' | |
| 12 | | | SM<br>CH | Silty Sand, loose 11.5'<br>Reddish-Brown Clay 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Note: SS-3 collected @ 4.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-4**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 75°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 58 | | No Soil Recovered | PID = 0 ppm |
| 2 | | | SM | Fill: Tan-Brownish, Silt, loose, dry 1.5' | |
| | | | | Fill: Gray Silt, loose, dry 2.0' | |
| 3 | | | GM | Fill: Gravely Silt<br>- with small concrete pieces | |
| 4 | | | CL | Grayish, Black Silty Clay 4.0' | |
| 5 | S-2 | 95 | GM | Fill: Brownish gray Gravelly Silt 4.5' | PID = 0 ppm |
| 6 | | | CL | Grayish Silty Clay 5.5'<br>- slightly moist<br>- modeled brown | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 8.5' | PID = 0 ppm |
| 10 | | | | - moist & modeled brown 10.0' | |
| 11 | | | | 11.0' | |
| 12 | | | CH | Reddish Brown Clay<br>- dry 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-5**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 75°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 43 | | No Soil Recovered | PID = 0 ppm |
| 2 | | | | 2.5' | |
| 3 | | | GM | Fill: Gravely Silt with concrete rocks | |
| 4 | | | | - fine & coarse<br>- loose | |
| | | | | - dry 4.5' | PID = 0.4 ppm |
| 5 | S-2 | 87 | OL | Black Silty Clay, dry 5.0' | |
| 6 | | | CL | Gray Clay<br>- modeled with light brown<br>- dry | |
| 7 | | | | - moist | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 8.5' | PID = 0 ppm |
| 10 | | | | 10.0' | |
| | | | GC | Gravel-Sand-Clay mixture, moist 10.5' | |
| 11 | | | CH | Reddish-Brown Clay | |
| 12 | | | | 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-6**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 75°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| | S-1 | 79 | | No Soil Recovered 0.5' | PID = 5 ppm |
| 1 | | | GW | Fill: Grayish Black Gravely Silt | |
| | | | | - with concrete fill | |
| 2 | | | | 2.5' | |
| 3 | | | GM | Fill: Black Brownish Gravel-Sand-Silt Mixture | |
| | | | | - loose 3.5' | |
| 4 | | | CL | Fill: Grayish Silty Clay | |
| | S-2 | 79 | | - modeled with brown | PID = 0 ppm |
| 5 | | | | 5.0' | |
| | | | GM | Fill: Black, brown Gravely-Sand-Silt Mixture 5.5' | |
| 6 | | | CL | Grayish Silty Clay | |
| | | | | - modeled with brown | |
| 7 | | | | | |
| 8 | | | | | |
| | S-3 | 42 | | - water present 8.5' | PID = 0 ppm |
| 9 | | | | | |
| 10 | | | | | |
| | | | | - Not as moist | |
| 11 | | | | | |
| | | | CH | Reddish-Brown Clay 11.5' | |
| 12 | | | | - dry, hard | |
| | | | | Bottom of Hole = 12.0' | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-7**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 80°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | | Comments |
|---|---|---|---|---|---|---|
| | S-1 | 79 | | No soil recovered | 0.5' | PID = 0 ppm |
| 1 | | | GM | Fill: Tan, Brown Gravel-Silt, coarse | 1.0' | |
| | | | | Fill: Gray, Black Gravel-Silt, coarse | 1.5' | |
| 2 | | | N/A | Fill: Concrete | 2.0' | |
| | | | | Fill: Black Silty Clay | 2.5' | |
| 3 | | | ML | Fill: Gray Silty Clay | | |
| | | | | - modeled with brown | | |
| 4 | | | | | | |
| | S-2 | 100 | | | 4.5' | PID = 0 ppm |
| 5 | | | GC | Fill: Gray Clayey Gravel | | |
| | | | | | 5.5' | |
| 6 | | | CL | Gray Silty Clay | | |
| | | | | - modeled with brown | | |
| 7 | | | | - moist | | |
| | | | | | | |
| 8 | | | | | | |
| | S-3 | 100 | | - water level | 8.5' | PID = 0 ppm |
| 9 | | | | | 9.0' | |
| | | | ML | Brownish Silty Clay | | |
| 10 | | | | - very moist | | |
| | | | | | 10.5' | |
| 11 | | | CL | Silty Clay | | |
| | | | | - with small gravel, moist | 11.5' | |
| 12 | | | CH | Reddish-brown Clay | 12.0' | |
| | | | | Bottom of Hole = 12.0' | | |
| 13 | | | | | | |
| | | | | | | |
| 14 | | | | | | |
| | | | | | | |
| 15 | | | | | | |
| | | | | | | |
| 16 | | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-8**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 80°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | | | | No Soil Removed 1.0' | PID = 0 ppm |
| 2 | S-1 | 75 | GP | Fill: Grayish-Brown Gravel Silt<br>- with concrete pieces<br>- loose<br>- dry | |
| 3 | | | | 3.5' | |
| 4 | | | ML | Fill: Grayish Silt, slightly moist 4.0' | |
| 5 | S-2 | 95 | GP | Fill: Brown Gravelly silt, loose, dry 4.5' | PID = 0 ppm |
| 6 | | | OL | Gray Silty Clay<br>- modeled with brown<br>- moist | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | | |
| 10 | | | | | |
| 11 | | | | 11.0' | |
| 12 | | | CH | Reddish-Brown Clay (CH) 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | Note: (1) "Pump" on LCD screen indicating "Pump Failure" causing all readings to be 0 ppm | |
| 16 | | | | (2) No odors detected | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-9**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 80°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 100 | GM | Fill: Brown-Gray Silty Gravel<br>- dry<br>- loose 1.5' | PID = 0 ppm |
| 2 | | | GW | Fill: Gravel<br>- dry | |
| 3 | | | | 3.0' | |
| 4 | | | OL | Fill: Grayish-Black Silt<br>- slightly moist | |
| | | | | 4.5' | |
| 5 | S-2 | 100 | GM | Fill: Black Gravelly Silt, loose, fine 5.0' | PID = 0 ppm |
| 6 | | | ML | Gray Silty Clay<br>- modeled with brown<br>- moist | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 8.5' | PID = 0 ppm |
| 10 | | | | | |
| | | | | 10.5' | |
| 11 | | | CH | Reddish-Brown Clay (CH) | |
| 12 | | | | 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-10**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 80°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 75 | | No Soil Recovered 1.0' | PID = 0 - 1.0 ppm |
| | | | OL | Fill: Grayish Silt, loose, dry 1.5' | |
| 2 | | | GC | Fill: Reddish Clayey Gravel | |
| | | | | - dry 2.5' | |
| 3 | | | GW | Fill: Black gravel possible petroleum contamination 3.0' | |
| 4 | | | ML | Grayish Silty Clay<br>- dry 4.0' | |
| | S-2 | 100 | | Grayish-Brown Silt, dry, loose 4.5' | PID = 0 - 1.0 ppm |
| 5 | | | CL | Gray Silty Clay | |
| 6 | | | | - moist<br>- modeled with brown | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 9.0' | PID = 0 ppm |
| | | | | 9.5' | |
| 10 | | | | 10.5' | |
| 11 | | | CH | Reddish-Brown Clay | |
| 12 | | | | - dry<br>- hard 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-11**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 85°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 93 | GW | Fill: Gravel<br>- dry, coarse 1.0' | PID = 0 ppm |
| | | | GM | Fill: Silty Gravel 1.5' | |
| 2 | | | | Fill: Grayish Silt<br>- with some clay | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | S-2 | 100 | CL | 4.5'<br>Gray Silty Clay<br>- modeled with brown<br>- slightly moist | PID = 0 ppm |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | - water present 8.0' | |
| 9 | S-3 | 100 | GM | 8.5'<br>Brown-Reddish Sandy Silt<br>- moist | PID = 0 ppm |
| 10 | | | | | |
| 11 | | | CL | 10.5'<br>Gray-Brown Silty Clay, wet 11.0' | |
| 12 | | | CH | Reddish-brown Clay<br>12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-12**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 85°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | | | | No Soil Recovered | PID = 0 ppm |
| | | | | 1.5' | |
| 2 | S-1 | 70 | GW | Fill: Silty Gravel | |
| | | | | - dry | |
| 3 | | | | - coarse, loose 3.0' | |
| 4 | | | CL | Gray Silty Clay | |
| | | | | - modeled with brown | |
| 5 | | | | | PID = 0 ppm |
| | S-2 | 83 | | | |
| 6 | | | | - moist 6.0' | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | S-3 | 100 | | - water present 8.5' | PID = 0 ppm |
| | | | | 9.5' | |
| 10 | | | CH | Reddish-Brown Clay (CH) | |
| 11 | | | | | |
| 12 | | | | 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Note: SS-4 Collected @ 6.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-13**

Page 1 of 1

Project No. 61259.11

Start Date: 07/12/07

Finish Date: 07/12/07

Weather: Sunny 85°

**Project Name:** 815 River Road, Env. Remediation

Drilling Co.: SJB Services

Driller: Randy Steiner

S&W Representative: BPD

Drill Rig Type:

Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 63 | | No Soil Recovered<br>1.5' | PID = 0 ppm |
| 2 | | | GP | Fill: Gravel<br>- coarse, dry, loose<br>2.5' | |
| 3 | | | GM | Fill: Grayish-Black Silty Gravel | |
| 4 | | | | 4.5' | |
| 5 | S-2 | 100 | CL | Brown Silty Clay, dry<br>5.0' | PID = 0 ppm |
| 6 | | | | Grayish Clay<br>- moist<br>6.5' | |
| 7 | | | | Grayish-Brown Silty Clay | |
| 8 | | | | - water present<br>8.0' | |
| 9 | S-3 | 100 | | | PID = 0 ppm |
| 10 | | | | | |
| 11 | | | | 11.0' | |
| 12 | | | CH | Reddish-Brown Clay, dry, hard<br>- dry, hard<br>12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Note: PZ-1 installed<br>SS-5 collected at 6.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-14**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 85°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| | S-1 | 91 | | No Soil Recovered 0.5' | PID = 0 ppm |
| 1 | | | GM | Fill: Brownish Silty Gravel, dry 1.0' | |
| | | | CL | Fill: Gray Silty Clay | |
| 2 | | | | - modeled with brown 2.0' | |
| | | | GP | Fill: Gravel, coarse, dry 2.5' | |
| 3 | | | GC | Fill: Gravely Clay 3.0' | |
| | | | CL | Fill: Grayish Clay, dry | |
| 4 | | | | 4.0' | |
| | S-2 | 100 | GC | Fill: Gravely Clay (GC) 4.5' | PID = 0 ppm |
| 5 | | | ML | Gray Clayey Silt | |
| | | | | - modeled with brown | |
| 6 | | | | | |
| | | | | | |
| 7 | | | | 7.0' | |
| | | | CL | Brown-Gray Silty Clay | |
| 8 | | | | - water present 8.0' | |
| | S-3 | 42 | | | PID = 0 ppm |
| 9 | | | | | |
| | | | | | |
| 10 | | | | | |
| | | | | 10.5' | |
| 11 | | | CH | Reddish-Brown Clay | |
| | | | | | |
| 12 | | | | 12.0' | |
| | | | | Bottom of Hole = 12.0' | |
| 13 | | | | | |
| | | | | | |
| 14 | | | | | |
| | | | | | |
| 15 | | | | | |
| | | | | Note: PZ-2 installed | |
| 16 | | | | SS-6 collected at 6.0' | |

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring: P-15**

Page 1 of 1

Project No. 61259.11
Start Date: 07/12/07
Finish Date: 07/12/07

Weather: Sunny 85°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: SEN
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Comments |
|---|---|---|---|---|---|
| 1 | S-1 | 69 | | No Soil Recovered<br>1.5' | PID = 0 ppm |
| 2 | | | GP | Fill: Gravel, coarse, dry, loose 2.0' | |
| 3 | | | ML | Fill: Black-Brown Silt-Clay<br>3.5' | |
| 4 | | | | Fill: Clay black, dry (ML) 4.0' | |
| 5 | S-2 | 100 | CL | Brown Silty Clay<br>- dry 5.0' | PID = 0 ppm |
| 6 | | | | Brown Clay<br>- wet | |
| 7 | | | | | |
| 8 | | | | - water present 8.0' | |
| 9 | S-3 | 100 | | Brown-Gray Silty Clay<br>- wet | PID = 0 ppm |
| 10 | | | | 10.0' | |
| 11 | | | CH | Black-Gray Clay<br>- very hard | |
| 12 | | | | 12.0' | |
| 13 | | | | Bottom of Hole = 12.0' | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | Notes: SS-7 Collected @ 6.0' | |

# APPENDIX B
# Well Installation Logs

STEARNS & WHELER LLC
Environmental Engineers and Scientists

**Site Investigation/Remedial Alternatives Report**
**Groundwater Well Data**
**City of North Tonawanda**

| Location | PZ-1 | PZ-2 | MW-1 | MW-2 |
|---|---|---|---|---|
| **Well Depth Top PVC (ft)** | 14.38 | 14.25 | 14.33 | 14.33 |
| **Well Depth Elevation (ft)** | * | 87.25 | 88.14 | 88.34 |
| **Depth to Static Water (ft)** | 7.90 | 6.40 | 8.60 | 8.40 |
| **Height of Water (ft)** | 6.48 | 7.85 | 5.73 | 5.93 |
| **Top PVC Elevation (ft)** | * | 101.50 | 102.47 | 102.67 |
| **Static Water Level Elevation (ft)** | * | 95.10 | 93.87 | 94.27 |
| **Well Casing Diameter (in)** | 1.0 | 1.0 | 2.0 | 2.0 |
| **Water Volume (gals)** | 0.58 | 0.71 | 0.92 | 0.95 |
| **Water Purged (gals)** | 1.75 | 2.12 | 2.75 | 2.85 |
| **Purging Method** | Peristalic Pump | Peristalic Pump | Disposable Bailer | Disposable Bailer |

Note: * PZ-1 well elevation was unattainable due to the well being demolished during IRM construction.

# Stearns & Wheler, LLC

Environmental Engineers and Scientists

**Boring/Well: MW-1**

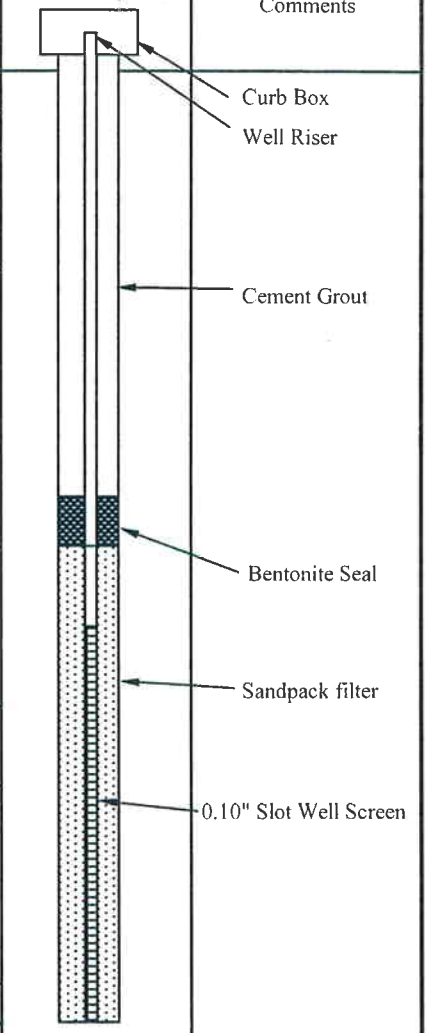
Page 1 of 1

Project No. 61259.11
Start Date: 07/13/07
Finish Date: 07/13/07

Weather: Overcast 74°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD/DER
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Well Schematic | Comments |
|---|---|---|---|---|---|---|
| | | | | No Soil Recovered 0.5' | | |
| 1 | | | GM | Fill: Tan Gravelly Silt 1.0' | | |
| | | | | Fill: Grayish, Brown Gravelly Silt | | |
| 2 | S-1 | 85 | | - dry | | |
| | | | | - loose 2.5' | | |
| 3 | | | OL | Fill: Brown Silty Clay | | |
| | | | | - grades to grayish, black silt | | |
| 4 | | | | - gasoline odor | | |
| | | | | | | |
| 5 | | | | - groundwater present 5.0' | | |
| | | | | | | |
| 6 | S-2 | 100 | | 6.0' | | |
| | | | CL | Tan-Gray Silt | | |
| 7 | | | | | | |
| | | | | | | |
| 8 | | | | 8.0' | | |
| | | | SM | Silty Sand | | |
| 9 | | | | - moist 9.0' | | |
| | | | CL | Light Brown Silty Clay | | |
| 10 | S-3 | 100 | | - modeled with light orange | | |
| | | | | | | |
| 11 | | | | | | |
| | | | | 11.5' | | |
| 12 | | | CH | Reddish-brown Clay 12.0' | | |
| | | | | Bottom of Hole = 12.0' | | |
| 13 | | | | | | |
| | | | | | | |
| 14 | | | | | | |
| | | | | | | |
| 15 | | | | | | |
| | | | | | | |
| 16 | | | | | | |



# Stearns & Wheler, LLC

Environmental Engineers and Scientists

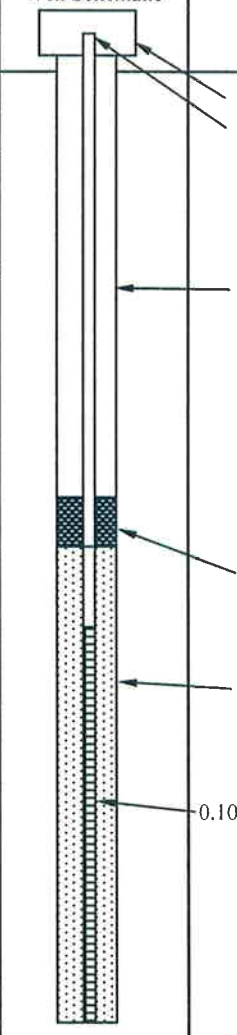
**Boring/Well: MW-2**

Page 1 of 1

Project No. 61259.11
Start Date: 07/13/07
Finish Date: 07/13/07

Weather: Overcast 74°

**Project Name:** 815 River Road, Env. Remediation
Drilling Co.: SJB Services
Driller: Randy Steiner
S&W Representative: BPD/DER
Drill Rig Type:
Drilling Method: Geoprobe

| Depth (ft) | Sample No. | Recovery (%) | USCS Classification | Sample Description | Well Schematic | Comments |
|---|---|---|---|---|---|---|
| | S-1 | 85 | | No Soil Recovered 0.5' |  | Curb Box |
| 1 | | | GM | Fill: Tan Gravelly Silt 1.0' | | Well Riser |
| 2 | | | | Fill: Grayish, Brown Gravelly Silt<br>- dry<br>- loose 2.5' | | |
| 3 | | | OL | Fill: Brown Silty Clay<br>- grades to grayish, black silt<br>- gasoline odor | | Cement Grout |
| 4 | | | | | | |
| 5 | S-2 | 100 | | - groundwater present 5.0' | | |
| 6 | | | | 6.0' | | Bentonite Seal |
| 7 | | | CL | Tan-Gray Silt | | |
| 8 | | | | 8.0' | | Sandpack filter |
| 9 | S-3 | 100 | SM | Silty Sand<br>- moist 9.0' | | |
| 10 | | | CL | Light Brown Silty Clay<br>- modeled with light orange | | 0.10" Slot Well Screen |
| 11 | | | | 11.5' | | |
| 12 | | | CH | Reddish-brown Clay 12.0' | | |
| 13 | | | | Bottom of Hole = 12.0' | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |

**STEARNS & WHELER, LLC**
**GROUNDWATER FIELD SAMPLING RECORD**

SITE 815 River Road DATE 07/16/07

Samplers: Brian Doyle SAMPLE ID MW-1; MS; MSD

Depth of well (from top of casing)..... 14.33 ft
Initial static water level (from top of casing).... 8.6 ft

Evacuation Method:

| | | | |
|---|---|---|---|
| Peristaltic | | Centrifugal | |
| Airlift | | Pos. Displ. | |
| Bailer | X | >>> No. of bails | |

Volume of water removed 2.75 gals.

> 3 volumes: **yes** no

dry: yes **no**

Well Volume Calculation

| | | | | |
|---|---|---|---|---|
| 2in. casing: | 5.73 | ft. of water x .16 = | 0.92 | gallons |
| 3in. casing: | | ft. of water x .36 = | | gallons |
| 4in. casing: | | ft. of water x .65 = | | gallons |

Field Tests:

| | | |
|---|---|---|
| Temp: | 17.2 | C |
| pH | 7.05 | |
| Conductivity | 0.995 | mS/cm |
| Turbidity | 11,354 | NTUs |
| Oxidation Reduction Potential (ORP) | 138.0 | mV |

Sampling: Time: 3:15 PM

Sampling Method:

| | |
|---|---|
| Peristaltic Pump | |
| Disposable Bailer | X |
| Disposable Tubing | |

Observations:

Weather/Temperature: Overcast, 75° F

Physical Appearance and Odor of Sample: No odor, very turbid

Comments: None

**STEARNS & WHELER, LLC**
**GROUNDWATER FIELD SAMPLING RECORD**

SITE 815 River Road DATE 07/16/07

Samplers: Brian Doyle SAMPLE ID MW-2; FD

Depth of well (from top of casing)..... 14.33 ft EL
Initial static water level (from top of casing).... 8.4 ft EL

Evacuation Method:

| | | | | | |
|---|---|---|---|---|---|
| Peristaltic | | Centrifugal | | | |
| Airlift | | Pos. Displ. | | | |
| Bailer | X | >>> No. of bails | | | |

Well Volume Calculation

| | | | |
|---|---|---|---|
| 2in. casing: | 5.93 ft. of water x .16 = | 0.95 | gallons |
| 3in. casing: | ft. of water x .36 = | | gallons |
| 4in. casing: | ft. of water x .65 = | | gallons |

Volume of water removed 2.85 gals.

> 3 volumes: **yes** no

dry: yes **no**

Field Tests:

| | | |
|---|---|---|
| Temp: | 17.0 | C |
| pH | 6.85 | |
| Conductivity | 1.358 | mS/cm |
| Turbidity | 2,338 | NTUs |
| Oxidation Reduction Potential (ORP) | 136.0 | mV |

Sampling: Time: 4:00 PM

Sampling Method:

| | |
|---|---|
| Peristaltic Pump | |
| Disposable Bailer | X |
| Disposable Tubing | |

Observations:

Weather/Temperature: Overcast, 75° F

Physical Appearance and Odor of Sample: No odor, very turbid

Comments: None

**STEARNS & WHELER, LLC**
**GROUNDWATER FIELD SAMPLING RECORD**

SITE 815 River Road DATE 07/16/07

Samplers: Brian Doyle SAMPLE ID PZ-1

Depth of well (from top of casing)..... 14.38 ft EL
Initial static water level (from top of casing).... 7.9 ft EL

Evacuation Method:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Peristaltic | X | Centrifugal | | 1 in. casing: | 6.5 | ft. of water x .09 = | 0.58 gallons |
| Airlift | | Pos. Displ. | | 2 in. casing: | | ft. of water x .16 = | gallons |
| Bailer | | >>> No. of bails | | 3 in. casing: | | ft. of water x .36 = | gallons |

Well Volume Calculation

Volume of water removed 1.75 gals.

> 3 volumes: yes [no]

dry: [yes] no

Field Tests:

| | |
|---|---|
| Temp: | 22.4 C |
| pH | 6.32 |
| Conductivity | 2.116 mS/cm |
| Turbidity | 1,044 NTUs |
| Oxidation Reduction Potential (ORP) | 52.0 mV |

Sampling: Time: 12:30 PM

Sampling Method:

| | |
|---|---|
| Peristaltic Pump | X |
| Disposable Bailer | |
| Disposable Tubing | X |

Observations:

Weather/Temperature: Overcast, 75° F

Physical Appearance and Odor of Sample: No odor, very turbid

Comments: Well purged to dry.

**STEARNS & WHELER, LLC**
**GROUNDWATER FIELD SAMPLING RECORD**

SITE 815 River Road DATE 07/16/07

Samplers: Brian Doyle SAMPLE ID PZ-2

Depth of well (from top of casing)..... 14.25 ft EL
Initial static water level (from top of casing).... 6.4 ft EL

Evacuation Method:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Peristaltic | X | Centrifugal | | 1 in. casing: | 7.9 | ft. of water x .09 = | 0.71 gallons |
| Airlift | | Pos. Displ. | | 2 in. casing: | | ft. of water x .16 = | gallons |
| Bailer | | >>> No. of bails | | 3 in. casing: | | ft. of water x .36 = | gallons |

Well Volume Calculation

Volume of water removed 2.12 gals.

> 3 volumes: yes [no]

dry: [yes] no

Field Tests:

| | |
|---|---|
| Temp: | 19.7 C |
| pH | 7.63 |
| Conductivity | 1.261 mS/cm |
| Turbidity | N/A NTUs |
| Oxidation Reduction Potential (ORP) | 67.0 mV |

Sampling: Time: 2:00 PM

Sampling Method:

| | |
|---|---|
| Peristaltic Pump | X |
| Disposable Bailer | |
| Disposable Tubing | X |

Observations:

Weather/Temperature: Overcast, 75° F

Physical Appearance and Odor of Sample: No odor, very turbid

Comments: Well purged to dry.

# APPENDIX C
# Data Usability Summary Reporting (DUSRs)

STEARNS & WHELER LLC
Environmental Engineers and Scientists

# DATA USABILITY SUMMARY REPORT FOR THE CITY OF NORTH TONAWANDA

# 815 RIVER ROAD SITE

*Prepared For:*

**Stearns & Wheler, LLC**
415 North French Road, Suite 100
Amherst, NY 14228

*Prepared By:*

**On-Site Technical Services, Inc.**
P.O. Box 54
Wellsville, NY 14895

**October 2007**

# SECTION 1

# DATA USABILITY SUMMARY

Surface soil and groundwater samples were collected from the 815 River Road Site in North Tonawanda, New York on July 12, 2007 through July 19, 2007. Analytical results from these project samples were validated and reviewed by On-Site Technical Services, Inc. (On-Site) for usability in accordance to the USEPA Region II SOPs for organic and inorganic data review and the NYSDEC Analytical Services Protocol (ASP) in order to comply with requirements mandated by the NYSDEC in the production of this data usability summary report (DUSR).

Surface soil and groundwater samples were collected from the 815 River Road Site and analyzed for target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and target analyte list (TAL) metals. The analytical laboratory for this project was Upstate Laboratories, Inc. (Upstate). Summaries of noncompliances with validation protocols or the ASP for these analyses are presented within this DUSR. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, and comparability (PARCC) are discussed for each analytical method by sample delivery group (SDG) in Section 2. The laboratory sample data were reviewed for usability with the validated laboratory sample data tabulated and presented in Attachment A. The validated laboratory sample data may be qualified with the following validation flags:

"U" – not detected at the value given,
"UJ" – estimated and not detected at the value given,
"J" – estimated at the value given,
"N" – presumptive evidence at the value given, and
"R" – unusable value.

The final data resulting from data validation are presented in the "Valid Result" and "Valid Qual" columns within this table. The following is a summary of this data validation and final data usage:

**Volatile Organic Analysis**

Surface soil and groundwater samples were collected from the site and analyzed by Upstate for TCL VOCs using the USEPA SW-846 8260B analytical method. Certain reported results for the volatile samples were qualified as estimated due to noncompliant initial and continuing calibrations and field duplicate precision. Certain reported results for the volatile samples were considered unusable and qualified "R" due to poor calibration linearity. Therefore, the final reported volatile analytical results were 93.9%

to 99.0% complete (i.e., usable) for the surface soil and groundwater data, respectively, as presented by Upstate. PARCC requirements were met overall.

**Semivolatile Organic Analysis**

Surface soil and groundwater samples were collected from the site and analyzed by Upstate for TCL SVOCs using the USEPA SW-846 8270C analytical method. Certain reported results for the semivolatile samples were qualified as estimated due to noncompliant GC/MS instrument performance, initial and continuing calibrations, and internal standard responses. Therefore, the final reported semivolatile analytical results were 100% complete (i.e., usable) for the surface soil and groundwater data presented by Upstate. PARCC requirements were met.

**Pesticide and PCB Organic Analysis**

Certain groundwater samples were collected from the site and analyzed by Upstate for pesticides and PCBs using the USEPA SW-846 8081A and 8082 analytical methods, respectively. Certain reported results for the pesticide samples were qualified as estimated due to noncompliant instrument calibrations. Therefore, the reported pesticide and PCB analytical results were 100% complete (i.e., usable) for the groundwater data presented by Upstate. PARCC requirements were met.

**Metals Analysis**

Certain groundwater samples were collected from the site and analyzed by Upstate for TAL metals using the USEPA 200.7 and 245.2 (mercury) analytical methods. Certain reported results for the metals samples were qualified as estimated due to noncompliant matrix spike recoveries, serial dilutions, calibration verification recoveries, and field duplicate precision. Therefore, the reported metals analytical results were 100% complete (i.e., usable) for the groundwater data presented by Upstate. PARCC requirements were met.

# SECTION 2

# DATA VALIDATION REPORTS

## DATA USABILITY REPORT FOR SDG # SW-10

A data usability review and validation has been completed for the data packages pertaining to the surface soil and groundwater samples analyzed by Upstate in SDG # SW-10. The specific samples contained within this SDG are the following:

| SAMPLE ID | SAMPLE DATE |
|---|---|
| SS-01 | 07/12/07 |
| SS-02 | 07/12/07 |
| SS-03 | 07/12/07 |
| SS-04 | 07/12/07 |
| SS-05 | 07/12/07 |
| SS-06 | 07/12/07 |
| FD | 07/12/07 |
| SS-01 | 07/13/07 |
| SS-02 | 07/13/07 |
| SS-03 | 07/13/07 |
| SS-04 | 07/13/07 |
| SS-05 | 07/13/07 |
| SS-06 | 07/13/07 |
| SS-07 | 07/13/07 |
| FD | 07/13/07 |
| PZ-1 | 07/16/07 |
| PZ-2 | 07/16/07 |
| MW-1 | 07/16/07 |
| MW-2 | 07/16/07 |
| FD | 07/16/07 |
| TRIP BLANK | 07/16/07 |
| MW-1 | 07/19/07 |
| MW-2 | 07/19/07 |
| FD | 07/19/07 |
| TRIP BLANK | 07/19/07 |

These samples were collected, properly preserved, shipped under a COC record, and received at Upstate within one to four days of sampling at 4.6-4.8°C. All samples were received intact and in good condition at Upstate. These samples were analyzed for TCL VOCs, TCL SVOCs, pesticides, PCBs, and/or TAL metals.

In order to determine data usability, data validation was performed for these samples in accordance with the most current editions of the USEPA Region II SOPs and

NYSDEC ASP. The validated laboratory data were tabulated and are presented in Attachment A.

**Volatile Organic Analysis For SDG # SW-10**

Seven surface soil samples, one surface soil QC field duplicate sample, six groundwater samples, one groundwater QC field duplicate sample, and two QC trip blank samples were analyzed for TCL VOCs. The following items were reviewed for compliancy in the volatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- GC/MS instrument performance
- Initial and continuing calibrations
- Laboratory method blank, laboratory holding blank, and trip blank contamination
- Internal standard responses
- Field duplicate precision
- Sample result verification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy, initial and continuing calibrations, blank contamination, and field duplicate precision.

MS/MSD Precision and Accuracy

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) measurements were compliant and within QC acceptance limits with the exception of the high MS/MSD recoveries for benzene (128%R/128%R; QC limit 76-127%R) and toluene (128%R/130%R; QC limit 76-125%R) and the high MSD recovery for trichloroethene (122%R; QC limit 71-120%R) during the spiked analyses of MW-1. Validation qualification of benzene, toluene, and trichloroethene was not warranted for the unspiked sample MW-1 since these compounds were not detected.

Initial and Continuing Calibrations

All initial calibration compounds were compliant with a minimum average relative response factor (RRF) of 0.05 and a maximum percent relative standard deviation (%RSD) of 30% with the exception of methylene chloride (31.7%RSD), acetone (RRF=0.034), and 2-butanone (RRF=0.034) in the initial calibration associated with samples SS-3, MW-2 (7/19/07), and TRIP BLANK (7/19/07); and 1,1,1-trichloroethane (49.7%RSD), cis-1,3-dichloropropene (53.9%RSD), and trans-1,3-dichloropropene

(54.3%RSD; RRF=0.017) in the initial calibration associated with samples SS-4, SS-5, SS-6, SS-7, and FD (7/12/07). Therefore, results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples. However, nondetected results for those noncompliant compounds where the average RRF was below criteria, were considered unusable and qualified "R" for the affected samples.

All continuing calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum percent difference (%D) of ±25% with the exception of cis-1,3-dichloropropene (-25.6%D), trans-1,3-dichloropropene (-30.3%D), tetrachloroethene (37%D), and m,p-xylene (55.6%D) in the continuing calibration associated with samples PZ-1, PZ-2, and MW-1 (7/16/07); chloromethane (31.1%D), bromomethane (25.4%D), and tetrachloroethene (33%D) in the continuing calibration associated with samples MW-2 (7/16/07), FD (7/16/07), and TRIP BLANK (7/16/07); chloromethane (29.2%D) and tetrachloroethene (31.1%D) in the continuing calibration associated with samples MW-1 (7/19/07), SS-1, and SS-2; acetone (RRF=0.032) and 2-butanone (RRF=0.037) in the continuing calibration associated with samples SS-3, MW-2 (7/19/07), and TRIP BLANK (7/19/07); and chloromethane (36%D), chloroethane (44.9%D), 1,1,1-trichloroethane (-117.4%D), cis-1,3-dichloropropene (-126.1%D), and trans-1,3-dichloropropene (-142.9%D; RRF=0.042) in the continuing calibration associated with samples SS-4, SS-5, SS-6, SS-7, and FD (7/12/07). Therefore, results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples. However, nondetected results for those noncompliant compounds where the RRF was below criteria or the %D exceeded 90%, were considered unusable and qualified "R" for the affected samples.

Blank Contamination

The laboratory method blank VBLK06 associated with samples SS-4, SS-5, SS-6, SS-7, and FD (7/12/07) contained acetone at a concentration of 4 µg/kg; and the laboratory holding blanks associated with all groundwater samples contained methylene chloride at concentrations of 2 and 3 µg/L. Therefore, all associated sample results less than the validation action concentrations were considered not detected and qualified "U" for these samples.

Field Duplicate Precision

All field duplicate precision results were considered acceptable with the exception of the precision results for ethylbenzene (199.9%RPD), m,p-xylene (199.7%RPD), and o-xylene (194.2%RPD) for sample SS-2 and its field duplicate sample FD (7/12/07). Therefore, the positive results for these compounds were considered estimated and qualified "J" for these samples.

Usability

The volatile soil data presented by Upstate were 93.9% complete (i.e., usable) and the volatile groundwater data presented by Upstate were 99.0% complete (i.e., usable).

It was noted that samples SS-1, SS-2, and SS-3 were analyzed at medium level due to large concentrations of target compounds. As a result, detection limits for these samples were higher.

**Semivolatile Organic Analysis For SDG # SW-10**

Seven surface soil samples, one surface soil QC field duplicate sample, six groundwater samples, and one groundwater QC field duplicate sample were analyzed for TCL SVOCs. The following items were reviewed for compliancy in the semivolatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- GC/MS instrument performance
- Initial and continuing calibrations
- Laboratory method blank contamination
- Internal standard responses
- Field duplicate precision
- Sample result verification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries, MS/MSD precision and accuracy, LCS recoveries, GC/MS instrument performance, initial and continuing calibrations, blank contamination, and internal standard responses.

Surrogate Recoveries

There were many sample surrogates that recovered less than 10% for the soil and groundwater samples due to sample dilutions. Validation qualification of the data was not warranted as a result. However, the acid surrogate 2-fluorophenol recovered less than 10% in the undiluted sample SS-3 (6%R). Therefore, the acid fraction for sample SS-3 was considered unusable. The acid fraction results from the diluted reanalysis of SS-3 (SS-3DL) which were nondetects, were considered usable and reported for SS-3 in the validated laboratory data in Attachment A.

It was also noted that the acid surrogate 2,4,6-tribromophenol recovered below the QC limit 19-122%R in the reanalyzed sample SS-6RE (18%R). Validation qualification of this sample was not warranted since only one acid surrogate was noncompliant.

MS/MSD Precision and Accuracy

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) measurements were compliant and within QC acceptance limits with the exception of the high MS recovery for 4-nitrophenol (122%R; QC limit 11-114%R) and the high MSD recovery for N-nitrosodi-n-propylamine (138%R; QC limit 41-126%R) during the spiked analyses of SS-2; and the high MSD recoveries for 1,4-dichlorobenzene (106%R; QC limit 36-97%R), 1,2,4-trichlorobenzene (102%R; QC limit 39-98%R), and N-nitrosodi-n-propylamine (118%R; QC limit 41-116%R) during the spiked analyses of MW-1 (7/16/07). Validation qualification of the unspiked samples SS-2 and MW-1 (7/16/07) was not warranted since MS recoveries were compliant.

LCS Recoveries

All LCS recoveries were compliant and within QC acceptance limits with the exception of the high LCS recovery for 2,4-dinitrotoluene (100%R,110%R; QC limit 24-96%R) associated with sample MW-1 (7/19/07) and MW-2 (7/19/07). Validation qualification of these samples was not warranted since this compound was not detected.

It was noted that the LCS associated with the reanalyzed sample SS-4RE, SS-6RE, and SS-7RE experienced a low recovery for 4-chloro-3-methylphenol (21%R; QC limit 23-97%R). Since original sample results for 4-chloro-3-methylphenol were used for samples SS-4, SS-6, and SS-7, validation qualification was not warranted.

GC/MS Instrument Performance

All instrument performance checks were compliant and within QC acceptance limits and all samples were analyzed within 12 hours of the instrument check standard with the exception of the diluted sample FD DL (7/13/07) which exceeded the 12-hour criteria by 27 minutes. Therefore, positive results for this sample were considered estimated and qualified "J" while nondetected results were considered unusable.

Initial and Continuing Calibrations

All initial calibration compounds were compliant with a minimum average relative response factor (RRF) of 0.05 and a maximum percent relative standard deviation (%RSD) of 30% with the exception of 2,4-dinitrophenol (43%RSD), 4-nitrophenol (31.7%RSD), and di-n-octylphthalate (34.3%RSD) in the initial calibration associated with all samples except the reanalyzed samples SS-4RE, SS-6RE, SS-7RE, MW-2RE (7/16/07), and FD RE (7/16/07); and 2,4-dimethylphenol (31.3%RSD), hexachlorocyclopentadiene (62.9%RSD), and 4-nitrophenol (32.7%RSD) in the initial

calibration associated with the reanalyzed samples SS-4RE, SS-6RE, SS-7RE, MW-2RE (7/16/07), and FD RE (7/16/07). Therefore, results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

All continuing calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum percent difference (%D) of ±25% with the exception of 2,4-dinitrophenol (-40.8%D), 4-nitroaniline (-41.6%D), carbazole (-28.4%D), pyrene (-28.7%D), butylbenzylphthalate (28.2%D), bis(2-ethylhexyl)phthalate (56.3%D), and di-n-octylphthalate (57.2%D) in the continuing calibration associated with samples SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-7, and FD (7/13/07); butylbenzylphthalate (31.3%D), bis(2-ethylhexyl)phthalate (45.8%D), di-n-octylphthalate (54.1%D), and 3,3'-dichlorobenzidine (-40.9%D) in the continuing calibration associated with samples PZ-1, PZ-2, MW-1 (7/16/07), MW-2 (7/16/07), FD (7/16/07), SS-1DL, SS-2DL, SS-3DL, FD DL (7/13/07); and pentachlorophenol (31%D), pyrene (-42.8%D), bis(2-ethylhexyl)phthalate (39.6%D), di-n-octylphthalate (26.5%D), and 3,3'-dichlorobenzidine (-56.8%D) in the continuing calibration associated with samples MW-1 (7/19/07) and MW-2 (7/19/07). Therefore, results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

It was noted that samples SS-1, SS-2, SS-3, and FD (7/13/07) were diluted and reanalyzed due to exceedances in calibration ranges for certain compounds. Therefore, sample results from the diluted analysis where compounds exceeded the calibration range were used for SS-1, SS-2, SS-3, and FD (7/13/07) in the validated laboratory data table in Attachment A.

Blank Contamination

The laboratory method blank SVBLK03 associated with samples MW-1 (7/19/07) and MW-2 (7/19/07) contained di-n-octylphthalate at a concentration of 2 µg/L. Validation qualification of these samples was not warranted since this compound was not detected.

Internal Standard Responses

All internal standard (IS) responses were compliant and within QC limits with the exception of the low IS response for chrysene-d12 in samples SS-1, SS-3, SS-4, SS-6, SS-7, FD (7/13/07), and MW-2 (7/16/07); and the low IS response for perylene-d12 in samples MW-2 (7/16/07) and FD (7/16/07). Therefore, sample results associated with these noncompliant ISs were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples. Matrix effects were confirmed present in these samples since these samples were reanalyzed (e.g., SS-4RE, SS-6RE, SS-7RE, FD RE, and MW-2RE) or diluted and reanalyzed (e.g., SS-1DL, SS-3DL, and FD DL) with similar IS response noncompliances.

Usability

The final semivolatile data presented by Upstate were 100% complete for the soil and groundwater samples with all data considered usable and valid.

**Pesticide and PCB Organic Analysis For SDG # SW-10**

Two groundwater samples and one groundwater field QC sample were analyzed for pesticides and PCBs. The following items were reviewed for compliancy in the pesticide and PCB analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- GC instrument performance
- 4,4'-DDT/endrin breakdown
- Initial and continuing calibration verifications
- Laboratory method blank contamination
- Field duplicate precision
- Sample result verification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of LCS recoveries and continuing calibration verifications.

LCS Recoveries

All LCS recoveries were compliant and within QC acceptance limits with the exception of the high LCS recovery for endrin (160%R; QC limit 56-121%R) associated with all samples. Since endrin was not detected in these samples, validation qualification was not warranted for these samples.

Continuing Calibration Verifications

All continuing calibration verification compounds were compliant with precision results less than 25%RPD with the exception of 4,4'-DDT (28%RPD, 33%RPD) and methoxychlor (33%RPD, 28%RPD) in the continuing calibration associated with all samples. Therefore, the 4,4'-DDT and methoxychlor results which were nondetects, were considered estimated and qualified "UJ".

Usability

The pesticide and PCB data presented by Upstate were 100% complete with all data considered usable and valid.

**Metals Analysis For SDG # SW-10**

Two groundwater samples and one groundwater field QC sample were analyzed for TAL metals. The following items were reviewed for compliancy in the metals analysis:

- Custody documentation
- Holding times
- Matrix spike (MS) recoveries
- Laboratory control sample (LCS) recoveries
- Laboratory duplicate precision
- Initial and continuing calibration verifications
- Interference check sample
- Initial and continuing calibration blank, and laboratory preparation blank contamination
- ICP serial dilutions
- Field duplicate precision
- Sample result verification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of matrix spike recoveries, continuing calibration verifications, serial dilutions, and field duplicate precision.

MS Recoveries

All MS recoveries were compliant and within the 75-125%R QC limit with the exception of the MS recoveries for antimony (49.4%R) and manganese (137.1%R) associated with all samples. Therefore, the antimony results were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples. The positive manganese results were considered estimated, possibly biased high, and qualified "J" for the affected samples.

Continuing Calibration Verification

All continuing calibration verification (CCV) recoveries were compliant and within QC acceptance limits with the exception of the CCV recovery for antimony (113%R; QC limit 90-110%R) associated with all samples. Therefore, positive antimony results were considered estimated, possibly biased high, and qualified "J" for the affected samples.

ICP Serial Dilutions

All serial dilution results were compliant and within criteria with the exception of iron, magnesium, and manganese associated with all samples. Therefore, positive iron, magnesium, and manganese results greater than ten times the method detection limit were considered estimated and qualified "J" for the affected samples.

Field Duplicate Precision

All field duplicate results were considered acceptable for sample MW-2 and its field duplicate sample FD with the exception of the mercury results (nondetect and 0.4 µg/L, respectively). Therefore, these mercury results were considered estimated with the positive result qualified "J" and the nondetected result qualified "UJ".

Usability

The metals data presented by Upstate were 100% complete (i.e., usable) with all data considered usable and valid.

# ATTACHMENT A

# VALIDATED LABORATORY DATA

ValiData of Western New York
7288 Hayes Hollow Rd
West Falls, NY
(716)655-6530

## DATA VALIDATION SUMMARY

| | |
|---|---|
| Project Name: | Metzger Removal<br>815 River Rd<br>North Tonawanda, New York |
| Consultant Name: | Stearns & Wheler, LLC |
| Contact: | David Rowlinson – (716)691-8503 |
| Sampling Date: | November 9, 2007 |
| Matrix/Number of Samples: | Soil /6<br>Field blank / 0<br>Trip blank / 1<br>Field duplicate/ 1 |
| Analyzing Laboratory: | Upstate Laboratories, Syracuse, NY. |
| Analyses: | TCLP Volatile organic compounds (**VOCs**) by USEPA SW846 8260B<br>TCLP Semi VOCs (**SVOCs**) by USEPA SW846 8270C<br>Pesticides/PCBs by USEPA 8081/8082<br>TAL Metals by USEPA 200 Series |
| Laboratory Report No: METZ-001 | Date Analyzed: November 15, 2007 ValiData Job Number: 0801001 |

## ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

| | Reported | | Performance Acceptable | | Not |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | Required |
| 1. Sample results | | X | | X | |
| 2. Parameters analyzed | | X | | X | |
| 3. Method of analysis | | X | | X | |
| 4. Sample collection date | | X | | X | |
| 5. Laboratory sample received date | | X | | X | |
| 6. Sample analysis date | | X | | X | |
| 7. Copy of chain-of-custody form signed by lab sample custodian | | X | | X | |
| 8. Narrative summary of QA or sample problems provided | | X | | X | |

QA - quality assurance

Comments:

An ASP Category B validation was conducted on the data package and any qualification of the data was determined using the "Standard Operating Procedures for the Quality Assurance Data Validation of Analytical Deliverables – TCL – Organics (based on the USEPA SOW OLMO4.2 with Revisions)" SOP NO.: BEMQA 5.A.13 (October 2001, Revision No. 3); and "Standard Operating Procedures (SOP) for Analytical Data Validation of Target Analyte List (TAL) – Inorganics" SOP NO.: 5.A.2 (October 2001, Revision No. 4). Field data, field notes, and sampling logs were not reviewed.

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7288 Hayes Hollow Rd
West Falls, NY
(716)655-6530

## ORGANIC ANALYSES
## VOCS

| | Reported | | Performance Acceptable | | Not |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | Required |
| 1. Holding times | | X | | X | |
| 2. Blanks | | | | | |
| A. Method & Leachate blanks | | X | | X | |
| B. Trip blanks | | X | | X | |
| C. Field blanks | | | | | |
| 3. Matrix spike (MS) %R | | X | | X | |
| 4. Matrix spike duplicate (MSD) %R | | X | | X | |
| 5. MS/MSD precision/lab duplicate (RPD) | | X | | X | |
| 6. Blank & Leachate spike %R | | X | | X | |
| 7. Surrogate spike recoveries | | X | | X | |
| 8. Instrument performance check | | X | | X | |
| 9. Internal standard retention times and areas | | X | | X | |
| 10. Initial calibration RRF's and %RSD's | | X | | X | |
| 11. Continuing calibration RRF's and %D's | | X | | X | |
| 12. Compound identification | | X | | X | |
| 13. Tentatively identification compounds (TICs) | | X | | X | |
| 14. Field duplicates RPD | | X | | X | |

VOCs - volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Performance was acceptable with the following comments:

Calibration: The CC %D values for Tetrachloroethene, Carbon Tetrachloride, Ethylbenzene, m,p-Xylene and o-Xylene were outside QC limits for the opening CC, lab file C19822.D. The CC%D value for Tetrachloroethene was outside the QC limit for the closing CC, lab file C19839.D. Several target compounds were therefore manually integrated in the IC and CC. All other criteria were satisfied.

MS/MSD: The MS/MSD recovery for Benzene was greater than QC limits for sample CSS1. Ths MSD %RPD value for Benzene and Chorobenzene were outside QC limits. The MS/MSD was reanalyzed with similar recoveries for Benzene. Based on the actual recovery, this compound should be marked as estimated (J) if detected. All other criteria were satisfied.

Surrogates: The surrogate recovery for 1,2-Dichloroethene-d4 was greater than QC limits for the MS performed on sample location CSS1. The surrogate recoveries for sample location CSS1 and the MSD were within acceptable QC limits. All other criteria were satisfied.

Internal Standards: The internal standard recovery for the MS performed on sample location CSS1 were below QC acceptance limits. The internal standard recovery for 1,4-Dichlorobenzene-d4 was below QC acceptance limits for the sample location CSS6 and the MSD performed on sample location CSS1. The MS/MSD was reanalyzed with internal standard recoveries for 1,4-Dichlorobenzend-d4 below QC acceptance limits. All other criteria were satisfied.

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West Falls, NY
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## ORGANIC ANALYSES
## PESTICIDES/PCB (Arochlors)

| | Reported | | Performance Acceptable | | Not |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | Required |
| 1. Holding times | | X | | X | |
| 2. Blanks | | | | | |
| A. Method & Leachate blanks | | X | | X | |
| B. Field blanks | | | | | |
| 3. Matrix spike (MS) %R | | X | | X | |
| 4. Matrix spike duplicate (MSD) %R | | X | | X | |
| 5. MS/MSD precision (RPD) | | X | | X | |
| 6. Blank & Leachate spike %R | | X | | X | |
| 7. Surrogate spike recoveries | | X | | X | |
| 8. Instrument performance check | | X | | X | |
| 9. Internal standard retention times and areas | | X | | X | |
| 10. Initial calibration RRF's and %RSD's | | X | | X | |
| 11. Continuing calibration RRF's and %D's | | X | | X | |
| 12. Compound identification | | X | | X | |
| 13. Tentatively identification compounds (TICs) | | X | | X | |
| 14. Field duplicates RPD | | X | | X | |

SVOCs –Semi- volatile organic compounds %D - percent difference RRF - relative response factor
%R - percent recovery %RSD - percent relative standard deviation RPD - relative percent difference

Performance was acceptable with the following comments:

Calibration: The PEM %RPD values for Alpha-BHC, Beta-BHC, Lindane, 4,4-DDT and Methoxychlor were outside QC acceptance limits on GC column DB-XLB. The INDA and INDB %RPD values were listed as QC limits for GC column DB-XLB. Based on initial calibration data these compounds should be qualified as estimated (J) if detected. All other criteria were satisfied.

MS/MSD: MS/MSD recoveries were outside QC acceptance limits on sample CSS1 due to sample dilution. All other criteria were satisfied.

Surrogates: The surrogate recoveries for samples CSS3 and CSS6 were outside QC acceptance limits due to sample dilution. All other criteria were satisfied.

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7288 Hayes Hollow Rd
West Falls, NY
(716)655-6530

## INORGANIC ANALYSES
## TAL METALS

| | Reported | | Performance Acceptable | | Not |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | Required |
| 1. Holding times | | X | | X | |
| 2. Blanks | | | | | |
| A. Preparation and calibration blanks | | X | | X | |
| B. Field blank | X | | | | X |
| 3. Initial calibration verification %R | | X | | X | |
| 4. Continuing calibration verification %R | | X | | X | |
| 5. Interference check sample %R | | X | | X | |
| 6. Serial dilution check %D | | X | | X | |
| 7. Laboratory control sample (LCS) %R | | X | | X | |
| 8. Matrix Spike (MS) %R | | X | | X | |
| 9. Matrix spike duplicate (MSD) %R | | X | | X | |
| 10. MS/MSD precision (RPD) | | X | | X | |
| 11. Laboratory duplicate RPD | | X | | X | |
| 12. Field duplicate comparison | | X | | X | |
| 13. Total vs. dissolved metals | X | | | | X |

%R - percent recovery %D - percent difference RPD - relative percent difference

Performance was acceptable with the following comments:

Calibration: The initial CRDL standard recovery for Arsenic was slightly below QC acceptance limits for analytical sequence R29628. Based on initial calibration data Arsenic should be qualified as estimated (J) if detected. All other criteria were satisfied.

Method Blanks: Selenium was detected above the PQL in CBB1 for analytical sequence R29628. Zinc was detected above the PQL in CCB2 for analytical sequence R29628. All other criteria were satisfied.

Reference Sample: The LCS recovery for Calcium was slightly greater than QC acceptance limits. All other criteria were satisfied.

Matrix Spike: The MS recovery for Iron was outside QC acceptance limits for the MS performed on sample location CSS1. The concentration of Iron in sample CSS1 was greater than 4X the spike amount added; therefore, the data was considered valid. All other criteria were satisfied.

ValiData of Western New York
7288 Hayes Hollow Rd
West Falls, NY
(716)655-6530

## VALIDATION CHECKLIST
## SUMMARY AND DATA QUALIFIER CODES

**Job #: 0801001**

| Sample ID | Analyte(s) | Qualifier | Reason(s) |
|---|---|---|---|
| **VOCs** | | | |
| CSS1 | Benzene | J | The MS/MSD recovery for Benzene was greater than QC limits for sample CSS1. Ths MSD %RPD value for Benzene and Chorobenzene were outside QC limits. The MS/MSD was reanalyzed with similar recoveries for Benzene. |
| **SVOCs** | | | |
| Qualification of the data was not necessary. | | | |
| **Pesticides/PCBs** | | | |
| Qualification of the data was not necessary. | | | |
| **TAL Metals** | | | |
| Qualification of the data was not necessary. | | | |

VALIDATION PERFORMED BY & DATE: Erich Zimmerman January 13, 2008

VALIDATION PERFORMED BY SIGNATURE: