

# **SITE CHARACTERIZATION REPORT**

**BARTHELMES MANUFACTURING COMPANY, INC.  
15 CAIRN STREET  
CITY OF ROCHESTER, NEW YORK  
BCP SITE NO. C828122  
INDEX B8-0607-02-01**

Prepared For:

**Barthelmes Manufacturing Company, Inc.  
15 Cairn Street  
Rochester, New York 14611**

Prepared By:

**Leader Professional Services, Inc.  
271 Marsh Road, Suite 2  
Pittsford, NY 14534**

**October 2006**

**555.001**

# Table of Contents

---

|         |  |    |
|---------|--|----|
| 1.0     | Introduction.....  | 1  |
| 2.0     | Objectives .....   | 1  |
| 3.0     | Historical Background .....  | 1  |
| 3.1     | Site History .....   | 1  |
| 3.2     | Previous Investigations.....   | 2  |
| 3.2.1   | Phase II Findings.....   | 2  |
| 3.2.1.1 | <i>Volatile Organic Compounds</i> .....                                  | 2  |
| 3.2.1.2 | <i>Semivolatile Organic Compounds</i> .....                              | 2  |
| 3.2.1.3 | <i>Metals</i> .....  | 3  |
| 3.2.1.4 | <i>Groundwater Flow</i> .....  | 3  |
| 4.0     | Physical Setting.....  | 3  |
| 5.0     | Site Characterization Field Activities .....                             | 4  |
| 5.1     | Installation of Additional Overburden-Bedrock Interface Monitoring Wells | 4  |
| 5.2     | Monitoring Well Sampling .....   | 5  |
| 5.3     | Sediment Sampling.....   | 5  |
| 5.4     | Paint Booth Discharge Soil Sampling.....                                 | 6  |
| 5.5     | Delineation of Sewer and Process Water Discharges .....                  | 6  |
| 5.6     | Investigation Derived Waste Characterization and Drum Labeling.....      | 6  |
| 6.0     | Findings.....  | 6  |
| 6.1     | Installation of Additional Overburden-Bedrock Interface Monitoring Wells | 6  |
| 6.2     | Monitoring Well Sampling .....   | 7  |
| 6.3     | Sediment Sampling.....   | 9  |
| 6.4     | Paint Booth Discharge Soil Sampling.....                                 | 10 |
| 6.5     | Delineation of Sewer and Process Water Discharges .....                  | 11 |
| 6.6     | Investigation Derived Waste Characterization and Drum Labeling.....      | 12 |
| 7.0     | Nature and Extent of Contamination .....                                 | 12 |
| 8.0     | Potential Receptors and Qualitative Risk Assessment.....                 | 14 |
| 8.1     | Potential Receptors .....  | 14 |
| 8.1.1   | Surface Soil.....  | 14 |
| 8.1.2   | Subsurface Soil .....  | 15 |
| 8.1.3   | Groundwater .....  | 15 |

## Table of Contents

---

|      |                                 |    |
|------|---------------------------------|----|
| 9.0  | Potential Remedial Actions..... | 16 |
| 9.1  | Storm Water Swale .....         | 17 |
| 9.2  | Surface Soil.....               | 17 |
| 9.3  | Subsurface Soil .....           | 17 |
| 9.4  | Groundwater .....               | 18 |
| 10.0 | Conclusions.....                | 19 |

## Figures

|           |  |
|-----------|--|
| Figure 1  | Site Location Map  |
| Figure 2  | Site and Vicinity Map 1911                                     |
| Figure 3  | Site and Vicinity Map 1935                                     |
| Figure 4  | 2004 Aerial Photograph   |
| Figure 5  | LaBella Soil Results   |
| Figure 6  | LaBella Groundwater Results                                    |
| Figure 7  | LaBella Groundwater Flow                                       |
| Figure 8  | Site Topography  |
| Figure 9  | Former Tank Farm Locations                                     |
| Figure 10 | Monitoring Well Locations                                      |
| Figure 11 | Storm Water Basin Sample Locations                             |
| Figure 12 | Paint Booth Discharge Sampling                                 |
| Figure 13 | Overburden Groundwater Contours                                |
| Figure 14 | Interface Groundwater Contours                                 |
| Figure 15 | Overburden Groundwater Chlorinate Compounds Results            |
| Figure 16 | Interface and Bedrock Groundwater Chlorinate Compounds Results |
| Figure 17 | Facility Discharges  |

## Appendices

|            |  |
|------------|--|
| Appendix A | LaBella Phase II Environmental Site Assessment – Site Characterization |
| Appendix B | LaBella Boring Logs  |
| Appendix C | Laboratory Data  |

## Tables

|         |  |
|---------|--|
| Table 1 | Groundwater Sample Results                                     |
| Table 2 | Summary of Groundwater Elevations                              |
| Table 3 | Sediment Sample Results from Storm Water Swale                 |
| Table 4 | Summary of Soil Sample Results from Paint Booth Discharge Area |
| Table 5 | Surface Soil Analytical Results                                |
| Table 6 | Subsurface Soil Results  |

## **1.0 Introduction**

This site characterization report discusses the investigation activities completed at the Barthelmes Manufacturing Company, Incorporated (“Barthelmes”) property located at 15 Cairn Street, Rochester, in Monroe County (see Figure 1). Barthelmes completed the site characterization activities in partial fulfillment of their Brownfield Cleanup Agreement with the New York State Department of Environmental Conservation (“NYSDEC”). The Barthelmes property is also known by its Brownfield Cleanup Program (“BCP”) Site Index Number V00517-8

## **2.0 Objectives**

The objectives of the site characterization were designed to provide the following:

- Historical background for property;
- Establish the physical setting for the property;
- Summarize previous investigations;
- Identify sources of contamination and the nature of the contamination;
- Extent of contamination and potential receptors to the contaminated media;
- Prepare a qualitative risk assessment for those receptors; and
- Provide a list of potential remedial solutions.

The work involved to achieve these objectives was completed following the procedures in the NYSDEC approved project Work Plan dated February 2003.

## **3.0 Historical Background**

### **3.1 Site History**

The Barthelmes property has been used for commercial or industrial purposes since at least 1900. Based on a review of Sanborn fire insurance maps, Platt maps, and aerial photographs, the site has changed little since approximately 1911 when the first fire insurance maps were prepared for the area. In 1911, the property was used by the American Fruit Products Company (“AFPC”) and their canning factory and vinegar works. At this time the site had two buildings, a foundation for a three-story building under construction, a vinegar tank farm, and a reservoir. One of the two former AFPC buildings is used currently by Barthelmes (see Figure 2).

In 1921 Barthelmes began operating from the southern-most AFPC building and started removing the northern-most building, the unfinished building foundation, and the vinegar tank farm (see Figures 3). Figure 4 shows a 2006 aerial photograph of the site area and shows that little has changed since 1935. Barthelmes originally manufactured aluminum products, but now is in the sheet metal fabrication business.

Neighboring properties have also been used for industrial purposes since at least 1911 when the T.H. Symington Company operated on the property to the east. As early as 1935, Pfaudler Company, Pennsylvania Glass Sand Company (Consolidated Feldspar Corporation), and General Railway Signal Company were also established in the area. Railroads were also present on the east and west sides of the site and rail spurs entered the property from the north and paralleled the west side of the Barthelmes building.

In the early 1980s a fire engulfed the shipping department of the building and storage yard, both areas are located on the south side of the building. The fire department responded and put out the fire. The fire investigation found that water used to put out the fire also entered the Trichloroethylene (“TCE”) vapor degreaser tank and displaced the TCE onto the building floor, floor drains and soil. As a result, the fire and water used to extinguish the fire influenced the migration of contaminants in the subsurface more than the typical migration mechanisms in the unsaturated and saturated zones of the environment.

## **3.2 Previous Investigations**

In 2004 Barthelmes entered into the New York State BCP. In February 2003, Barthelmes’ consultant at the time prepared a work plan for the characterization of the site, which supplemented a Phase II Environmental Site Assessment completed in October 2001. Subsequent to the October 2001 report, the consultant also collected and analyzed samples until 2005 as part of their completion of a Site Characterization Study. Those laboratory results are discussed with the Leader’s Site Characterization results.

### **3.2.1 Phase II Findings**

The Phase II investigation included the completion of soil borings and the installation of monitoring wells, sampling the storm water swale sediment, and discharges from the sewer. A copy of the consultant’s Phase II Environmental Site Assessment – Site Characterization is provided as Appendix A. The analytical results are shown with results collected by Leader on Tables 1 and 5. Figures 5 and 6 also summarize the results.

#### ***3.2.1.1 Volatile Organic Compounds***

In general, the results show that TCE and its daughter products (1,2-Dichloroethene and Vinyl Chloride) are the primary volatile organic compounds (“VOCs”) present in the subsurface. Acetone, p-Isopropyltolene, Methylene Chloride, Tetrachloroethene, Trimethylbenzene and Xylene were also found, but at lower concentrations.

#### ***3.2.1.2 Semi-volatile Organic Compounds***

The semi-volatile organic compounds (“SVOCs”) found are those often associated with petroleum products or combustion and these include: Napthalene, Acenapthalene, Fluorene, Fluoranthene, Anthracene, Phenanthrene, Benzo (a) anthracene, Chrysene,

Pyrene, Benzo (b) fluorathene, Benzo (k) fluorathene, Benzo (g,h,i) perylene, Benzo (a) pyrene, Dibenzo (a,h) anthracene, and Indeno (1,2,3-cd) pyrene. The SVOCs were primarily found in the soil at boring B-7 within the fenced in area at the southeast corner of the building. This fenced yard area is referred to as a former drum storage area by LaBella Associates.

### ***3.2.1.3 Metals***

Metals found at elevated concentrations during the previous consultant's investigation included Barium, Cadmium, Chromium, Lead, and Silver in a sample collected at soil boring B-7, and Chromium in a sample of the storm water swale sediment. The sample was also tested using a TCLP extraction. This testing found that the Chromium was not leachable; the extract containing less than 0.05 micrograms per Liter ("ppm") of Chromium.

LaBella also collected one sample from the groundwater in a sump within the building's basement and from the wastewater leaving the plant. Both of these samples found TCE, and cis-1,2-Dichloroethene, a daughter product of TCE, was also found in the sump water sample.

### ***3.2.1.4 Groundwater Flow***

The monitoring wells installed by the previous consultant's to determine the groundwater quality and to estimate the direction of groundwater flow are shown on Figure 7. Monitoring wells identified as "MW" were installed into the overburden using direct push sampling tools and were terminated at a point of refusal, which range in depth from 15 to 19.5 feet below the ground surface. Monitoring wells identified as "RW" are overburden-bedrock inter face wells, which range in depth from 30 to 37 feet below the ground surface. The RW monitoring wells found bedrock at a depth ranging from 23 to 26 feet below the ground surface. Interface monitoring wells have screens which begin at a depth ranging from 21 to 27 feet below the ground surface and terminate at a depth ranging from 30 to 37 feet below the ground surface.

LaBella also prepared a groundwater flow drawing for the site showing the groundwater flow direction as north to south in the overburden.

## **4.0 Physical Setting**

The property is located in the City of Rochester within Monroe County. The general area is in a highly industrialized portion of the city. Fire Insurance maps of the area show that the site and the surroundings were used for industrial purposes since at least 1911.

The topography of the site area is shown on Figure 8 and depicts the site as being at a lower elevation compared to the surrounding properties to the east and south. Although not shown on the scale of the topographic map, the site is slightly lower than the neighboring property to the north. This location makes the site a receptor of storm water

runoff from the street, access roads and the neighboring properties. On the west side of the property, the site has a storm water swale, which was created by the expansion of the property to the north. The property owner north of Barthelmes filled in their portion of the drainage swale, which cut off the site's only storm water conveyance and created an area of standing water at various times during the year. On the west side of the swale there is an unused railroad spur, which separates the site from the neighboring Pfaudler property.

In addition to being at a lower elevation compared to the neighboring properties, the site is also bounded by railroad spurs, which accesses the former General Railway Signal property to the northeast and the Pfaudler Company to the west. In the early 1900s, the site had its own railroad spur that paralleled the west side of the plant building. In addition, and as shown on Figure 9, the vacant property to the south was once used as a tank farm.

Additional significant physical feature in the site area includes the New York State Barge Canal located west of the site. The canal was excavated into the bedrock and the bedrock remains exposed on the canal's sidewalls. The canal could be a local discharge point for groundwater flow. Borings logs prepared by LaBella show the bedrock is approximately 23 to 26 feet below the ground surface. Above the bedrock the overburden is reported by LaBella as consisting of sand with some intervals of clay, silt and gravel. Borings completed inside the plant experienced different sampling conditions. The Geoprobe sampling tools were stopped at a depth ranging from 16 to 18 feet below the ground surface. LaBella identified this as the top of bedrock during sampling. Based on information from other sampling locations it is likely that this was actually the limit of the sampling equipment since other on-site borings found sands and gravel at this depth.

## **5.0 Site Characterization Field Activities**

As a part of entering the BCP, Barthelmes prepared a work plan for additional site characterization activities. These activities included:

- Installation and sampling of three additional bedrock monitoring wells (RW-4, RW-5, and RW-6);
- Completion of a total sampling of all on-site monitoring wells;
- Sampling of the storm water swale sediment;
- Sampling the soil in the area beneath the paint room discharge vents;
- Delineation of sewer and process water discharge points from the plant; and
- Characterization and labeling the investigation derived waste.

### **5.1 Installation of Additional Overburden-Bedrock Interface Monitoring Wells**

The previous consultant installed three overburden-bedrock interface monitoring wells at locations as shown on Figure 10. No boring logs were provided to Leader for these

monitoring wells, but based on the depth of the monitoring wells, the design may be similar to that used in the previous three RW monitoring wells (see Table 1).

All of the RW monitoring wells use two-inch diameter PVC monitoring well risers and presumably PVC monitoring well screens. The monitoring wells were completed with flush mounted roadboxes. On August 17, 2006, each monitoring well was purged and sampled using a flow sampling pump. Prior to sampling, the purge water was monitored for pH, conductivity, total dissolved solids (“TDS”), oxidation reduction potential (“ORP”) and turbidity. Once these parameters yielded consistent results (three consecutive measurement within 10% of each other over a 10 minute time span), the groundwater was collected for VOC analysis.

## **5.2 Monitoring Well Sampling**

Leader completed a sampling of all of the site’s monitoring wells on August 17, 2006. Each sample was collected using the following procedure:

- Water levels in each monitoring well were collected and referenced to the top of the monitoring well roadbox.
- Each monitoring well was checked by dipping the water column with a clear bailer to determine if there was a visible light or dense non-aqueous liquid present.
- Each monitoring well was purged using a low flow sampling pump using a dedicated sample tube. During purging the following chemical characteristics were measured: pH, conductivity, TDS, ORP and turbidity.
- When characteristics were stable (three measurements within 10% of each other over a 10 minute period), a sample was collected in a laboratory provided glass vial for VOCs analysis.
- Each sample was analyzed following NYSDOH Analytical Services Protocol (“ASP”) method for VOCs.
- Trip blank, duplicates and matrix spike samples were also submitted for analysis.

During the monitoring well sampling, Leader also collected rising head data from two monitoring wells to calculate an estimated hydraulic conductivity for the site. This testing was completed after sampling and using the low flow sample pump to drop the static water level down to one to two feet below the static water level. The rising water level was measured using a water level meter.

## **5.3 Sediment Sampling**

On September 26, 2006, Leader collected four sediment samples from the storm water swale located on the west side of the site (see Figure 11). Sample locations were determined by located areas of visual contamination, the swale’s former discharge point, at the discharge pipe from the plant, or from areas accessible to sampling. The samples



were collected by scooping the sediment directly into the sampling jar. Each sample was analyzed using ASP Methods for VOCs and RCRA Metals. Trip blank, duplicate, and matrix spike samples were also collected.

#### **5.4 Paint Booth Discharge Soil Sampling**

The previous consultant collected five samples from the soil below the paint booth discharge vents located on the south side of the building on May 4, 2005. Four test borings were completed using Geoprobe direct push sampling tools. A sample of the soil was collected from three of the test borings and two surface soil locations. Figure 12 shows the locations on the sampling and Appendix B provides copies of the boring logs. Samples were selected on measurements using an organic vapor analyzer with photoionization detector. Each sample was analyzed using USEPA Method 8260 for Target Compound Listed VOCs and Method 8021 for NYSDEC STARS listed VOCs, and USEPA Target Analyte Listed metals.

#### **5.5 Delineation of Sewer and Process Water Discharges**

Leader completed a delineation of sewer and process water discharges from the plant. Leader and Barthelmes staff completed the delineation by visual inspection of the drains, introducing flowing water, and dye tracing.

#### **5.6 Investigation Derived Waste Characterization and Drum Labeling**

Leader opened each of the drums of investigation-derived waste and collected samples of each matrix. A composite sample from each of the six drums of soil were collected using a hand auger through the drummed material. Each composite was placed into a five-gallon pail then mixed. A composite sample was then collected from the pail and analyzed for RCRA characteristics and TCLP VOCs, SVOCs, PCBs and RCRA Metals. A composite sample was collected from the purge water collected during Leader's sampling of the monitoring wells. The composite sample was collected using a dedicated bailer and dipping it into the drum. The liquid sample was analyzed for RCRA Characteristics, VOCs, TCLP listed SVOC, PCBs and RCRA Metals.

### **6.0 Findings**

#### **6.1 Installation of Additional Overburden-Bedrock Interface Monitoring Wells**

LaBella completed at least two phases of monitoring wells installation. The later phase of monitoring well installation included the placement of 3 overburden-bedrock interface monitoring wells (monitoring wells RW-4, RW-5 and RW-6) to add data points to collect water level measurements and groundwater quality data. Figure 10 provides the location of the monitoring wells. Table 2 provides a list of the monitoring wells, ground surface elevations and water level elevations. It should be noted that monitoring well MW-3 could not be found for surveying or sampling.

The hydrogeology of the site appears to be typical of the Rochester area, stratified soils and a dense almost till-like unit that can separate the overburden into separate flow zones. In addition, the top of rock is often broken and has characteristics like the overburden. The interpretation of the site flow zones and directions are also complicated by the building space. Buildings and their infrastructure often interrupt groundwater flow by either intercepting flow or by impacting recharge.

Leader's interpretation of the direction of groundwater flow is shown in Figures 13 and 14. Figure 13 shows the elevations of the overburden flow zone and our interpretation of the direction of groundwater flow. Since monitoring well MW-3 appears to have been lost, the data is grouped to the center of the site and this appears to be driving the interpretation, which suggests groundwater may be flowing away from a groundwater mound that appears to be present beneath the plant.

The overburden-bedrock zone is as complicated as the overburden suggesting a trough or trench-like feature where groundwater is flowing to the northwest. This interpretation is based only on the fact that monitoring wells RW-2 and RW-3 have lowest groundwater elevations.

The groundwater also appears to have a downward flow component as suggested by the water level in the shallow production well, PW-S compared to the overburden-bedrock water level data. The design and construction of the production well is unknown, however, and this could impact our interpretation. What is known is the bottom of the shallow production well is at approximately 30.5 feet below the ground surface. This is similar to the bottom of the interface monitoring wells. The difference between the water levels in the interface (RW-3 at 76.82 ft.) and the shallow production well (water level at 72.02 ft.) suggests that the well is entirely in the bedrock zone and this supports our interpretation of a downward groundwater flow (see Figure 14).

## **6.2 Monitoring Well Sampling**

The results for the monitoring well sampling completed by Leader on August 17, 2006 and by the previous consultant on February 14, 2001 and May 14, 2005 (monitoring wells RW-4, RW-5 and RW-6 only) are shown on Table 1. A copy of the laboratory data is provided as Appendix C. Each monitoring well, with the exception of monitoring well MW-3, was sampled twice for TCL VOCs. In addition to VOCs, the following monitoring wells were also analyzed for selected metals Methane, Ethane, Ethene, Chloride, Total Organic Carbon, and Sulfate: MW-5, RW-4, RW-5 and RW-6. This series of parameters are useful to determine if natural attenuation of VOCs is occurring and if there are any obstacles to bioremediation of the VOCs.

In general the VOCs found in the monitoring wells consist of aromatics, ketones, and chlorinated ethenes, but our interest is in TCE and its breakdown products because these are the most abundant and have the highest concentration. In the 2001 sampling, TCE was found in overburden monitoring wells at concentrations ranging from 225 ppb at

MW-10 to 15,600 ppb at MW-5. The sample from monitoring well MW-3 did not have TCE and the sample from monitoring well MW-2 had TCE at a concentration of 257 ppb. This distribution of TCE shows that there are elevated concentrations of TCE beneath the building and beneath the yard area.

In comparison, the 2001 and 2005 data for the interface monitoring wells shows TCE concentrations ranging from 5 ppb in monitoring well RW-4 to 1,500 ppb in monitoring well RW-6. Monitoring wells RW-1 and RW-2, did not have TCE in 2001.

In the bedrock wells, the shallow production well, PW-S, had TCE at a concentration of 2,110 ppb, and the nearby monitoring well MW-8, had TCE at a concentration of 1,990 ppb. In the deeper production well, PW-D, TCE was found at a concentration of 3.6 ppb.

The 2006 data from the site was similar to 2001. Six of the 10 monitoring well results showed a decrease in TCE concentration. In the overburden monitoring wells TCE was found to range in concentration from 11 ppb in monitoring well MW-10 to 9,800 ppb in monitoring well MW-5. Figure 15 and Figure 16 present the groundwater sample results.

Among the interface monitoring wells, the TCE concentrations did not show a trend when the 2001, 2005, and 2006 data was compared. The largest TCE concentration change occurred at monitoring well RW-6 where the TCE concentration dropped from 1,500 ppb in 2005 to 69 ppb in 2006.

There are two bedrock wells on the property that have been identified as a shallow production well and a deep production well. The shallow production well, PW-S, had a TCE concentration of 3,400 ppb in 2006, which was an increase from the 2001 concentration of 2,110 ppb. Other contaminants of concern found in PW-S include: 1,1-Dichloroethene found only in 2006 at a concentration of 3.9 ppb; cis 1,2-Dichloroethane found in 2001 at a concentration of 325 ppb and in 2006 at a concentration of 690 ppb; Trans 1,2-Dichloroethene which was found only in 2006 at a concentration of 40 ppb; Tetrachloroethene which was found only in 2006 at a concentration of 1.5 ppb; and 1,1,2-Trichloroethane which was found only in 2006 at a concentration of 0.77 ppb. The deeper production well, PW-D, sample did not contain TCE in 2006 and only 3.6 ppb in 2001.

The groundwater samples were also analyzed for selected metals in 2001 and 2005. In 2001 only the sample from monitoring well MW-5 was analyzed for RCRA metals. In this sample only Barium at a concentration of 0.281 ppm, Chromium at a concentration of 0.047 ppm, and Lead at a concentration of 0.065 ppm were found. In 2005 monitoring wells RW-4, RW-5 and RW-6 were analyzed for iron and manganese and the following was found:

- Iron was found at a concentration of 0.507 ppm at monitoring well RW-6 2.67 ppm at monitoring well RW-5, and 3.59 ppm at monitoring well RW-4.

- Manganese was found at a concentration of 0.106 ppm at monitoring well RW-5, 0.216 ppm at monitoring well RW-6, and 0.285 ppm at monitoring well RW-4.

Samples from monitoring wells RW-4, RW-5 and RW-6 were also analyzed for Methane, Ethane, and Ethene in 2005. These compounds are end products of the bioremediation of chlorinated VOCs and also indicators of the path of the bioremediation process. Only Methane was found in samples from RW-4 and RW-5. At monitoring well RW-4, Methane was found at a concentration of 1.4 ppm and at monitoring well RW-5, Methane was found at a concentration of 5.6 ppm. The presence of Methane is a positive indicator of the bioremediation process, but also a sign that the microbes are producing Methane instead of completely breaking down the chlorinated compounds to produce Ethane and Ethene.

Chloride, Total Organic Carbon, and Sulfate were also analyzed in 2005 on samples from monitoring wells RW-4, RW-5 and RW-6. Like Iron and Manganese, these parameters are indicators of how well bioremediation will proceed and what compounds are available that might compete with the VOCs in the bioremediation process. Chloride was found in each monitoring wells, RW-4, RW-5 and RW-6, at concentrations of 15.5, 219, and 6.2 ppm, respectively. Total Organic Carbon was only found in the sample from monitoring well RW-4 at a concentration of 6.5 ppm. Sulfate was found in each monitoring wells (RW-4, RW-5 and RW-6) at the following concentrations: RW-4 at a concentration of 15.6 ppm, at monitoring well RW-5 at a concentration of 121 ppm, and at monitoring well RW-6 at a concentration of 18.8 ppm. In general, the concentrations of these parameters were found to be conducive to a bioremediation process. It also shows some weakness, but this is to be expected in nature. But more importantly, these initial measurements are helpful to define the baseline conditions from which change can be monitored.

### **6.3 Sediment Sampling**

Two sampling events were completed to collect and analyze sediment samples from the site's storm water swale. In 2000 one sample was collected from the storm water swale bottom at a location below a pipe outfall from the plant and the samples were analyzed for TCL and STARS Listed VOCs, STARS listed SVOCs and RCRA metals. In addition to these analyses, the sample was analyzed for Chromium following a TCLP extraction of the sample. In 2006 Leader collected four samples from around the storm water swale and had the samples analyzed for TCL and STARS Listed VOCs and RCRA Metals. The sample results are shown on Table 3 and the locations are shown on Figure 11.

The 2000 sample analysis did not find any VOCs or SVOCs, but did find several metals including: Arsenic at a concentration of 1.45 ppm; Barium at a concentration of 90.2 ppm; Cadmium at a concentration of 0.905 ppm; Chromium at a concentration of 151 ppm; and Lead at a concentration of 36.5 ppm. The result of the TCLP analysis showed that Chromium was not leachable.

Leader's 2006 samples showed that the following VOCs were found in the sediment: 1,4-Dichlorobenzene, Acetone, Dichlorodifluoromethane, Methylene Chloride, p-Cymene, and Toluene. 1,4-Dichlorobenzene and Dichlorodifluoromethane were found in each sample but at concentrations which were lower than the reporting limits. Methylene Chloride was found in every sample but also in the laboratory blanks and qualified as a laboratory contaminant. Acetone was found in each sample ranging in concentration from 22 ppb (below the reporting limit) in sample P-3 to 80 ppb in sample P-2. p-Cymene was found in 3 of 4 samples ranging in concentration from 5 ppb (below the reporting limit) in sample P-4 to 27 ppb in sample P-1. Toluene was found in each sample ranging in concentration from 5 ppb (below the reporting limit) to 250 ppb in sample P-2.

The only RCRA metals found in the sediment samples include: Barium, Chromium, and Lead. Barium was found in each sample at a concentration ranging from 11.9 ppm in sample P-3 to 61.9 ppm in sample P-2. Chromium was found in each sample, but qualified because spike sample recovery was not within quality control limits. Chromium concentrations ranged from 11.5 ppm in sample P-3 to 247 ppm in sample P-2.

#### **6.4 Paint Booth Discharge Soil Sampling**

Five samples were collected from the soil below the paint booth discharge vents on May 4, 2005. Each sample was analyzed for TCL and STARS listed VOCs, and TAL metals. The sample results are shown on Table 4 and sample locations are shown on Figure 12.

Two VOCs were found, Methylene Chloride and TCE. Methylene Chloride was found only in sample TB-1 at a depth of 2.8 to 4 feet below the ground surface at a concentration of 87.6 ppb. TCE was found in three of five samples ranging in concentration from 12.2 ppb in the sample from TB-2 at a depth of 0 to 1 feet below the ground surface, to 51.5 ppb in the sample from TB-4 at a depth of 1.6 to 2.3 feet below the ground surface.

Seventeen of the 23 TAL metals were found in the analysis of samples including the following: Aluminum, Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Vanadium, and Zinc. Of these 17 metals only Barium, Chromium, and Zinc were found at concentrations, which are elevated compared to expected background concentrations.

Barium was found in two samples at elevated concentrations: surface soil sample SS-1 at a depth of 0 to 6 inches below the ground surface at a concentration of 577.0 ppm; and soil sample TB-2 at a depth of 0 to 1 foot below the ground surface at a concentration of 11,100 ppm. The expected Barium concentration is 300.0 ppm.

Chromium was found in all 5 samples at elevated concentrations ranging from 54.7 ppm, at surface soil sample SS-1 at a depth of 0 to 6 inches below the ground surface, to 273.0

ppm at SS-2 at a depth of 0 to 6 inches below the ground surface. The expected Chromium concentration is 10 ppm.

Zinc was found all 5 samples at elevated concentrations ranging from 50.0 ppm at surface soil sample SS-1, at a depth of 0 to 6 inches below the ground surface, to 486.0 ppm at TB-2 at a depth of 0 to 1 foot below the ground surface. The expected Zinc concentration is 20 ppm.

## **6.5 Delineation of Sewer and Process Water Discharges**

Leader completed a delineation of sewer and process water discharges of the plant. The different discharge routes are shown on Figure 17.

There are three processes within the plant that have a discharge: rinse tanks, tumbler, and welding. The rinse tanks discharge into the Monroe County sewer system. If a tank failure or a pump failure occurred, this wastewater would flow into an overflow pipe and into a collection pit, located on the west side of the plant, which ultimately discharges into the storm water swale. The tumbler discharges to a collection pit, located on the west side of the plant, which ultimately discharges into the storm water swale. The welding operation cooling water discharges to a collection pit located on the northwest corner of the plant. Some of the cooling water is also received into the deep production well also located off the northwest corner of the plant. It is unclear if the connection between the welding cooling water and the deep production well is a piped connection or a leak in the well casing which could receive water from the pit.

The plant's two compressors and one chiller unit also have discharges, but this is condensate produced from the compression or cooling of air. There is one compressor and chiller located on the north side of the building and they discharge their condensate to a floor drain which is piped to a discharge located on the building's north side. The discharge pipe is buried in gravel, which surrounds a perforated pipe location on the building's north side and ultimately discharges to the collection pit located off the northwest corner of the building. The second compressor is located on the south side of the building and it discharges its condensate to the floor where it evaporates.

In addition to these process or equipment discharges, the plant has two floor drains, which occasionally receive fluids. One floor drain is located on the north side of the building and the other is located in the loading dock on the south side of the building. The floor drain located on the building's north side is a dry well; it does not have a piped discharge to a different location. The drain was dry when it was inspected. The second location is on the south side of the building within the truck well. The drain could receive runoff from the drive way or spills occurring at the loading dock. The drain is piped to a catch basin located on the west side of the plant. The catch basin lid is elevated above the adjacent ground surface and does not receive runoff. Any precipitation or fluids from the drain entering the basin is pumped to the storm water swale.

The plant's sanitary waste discharges are discharged to Monroe County's sewer system by a pipe exiting the northeast corner of the plant with one exception. Sanitary waste from a urinal located in the center of the building is discharged to a collection pit on the west side of the plant and then to the storm water swale. This discharge pipe also collects wastewater from the tumbler and a drinking water fountain.

Outside the plant there is a system of buried drains, pipes and collection pits that gather storm water and limited discharges from the plant. In addition to these systems there are two dry wells located on the south side of the plant within the fenced yard area. On the east side of the plant there are three interconnected collection pits which collect storm water and direct it to a perforated pipe drain on the north side of the plant.

On the north side of the plant the perforated pipe is buried in gravel where it collects runoff and condensate from a compressor and chiller. The perforated pipe directs its flow to a collection pit located on the northwest corner of the plant.

On the west side of the plant there is a pipe which collects storm water from the roof downspouts and directs the flow to collection pits on the west side of the building. Each of the collection pits and a catch basin direct their flows to the storm water swale. Also on the west side of the plant there is a deep production well. The deep production well was originally used for cooling water purposes, but this practice was stopped because of water hardness. However, the production well still receives cooling water from the welding processes as evidenced by the appearance of dye in the well after it was placed in the welding coolant water discharge. Dye also appeared in the adjacent collection pit. It is unknown if the dye appeared in the well because of a pipe connection or a leak in the casing. A shallow well was also used for cooling water purposes, but it is no longer used.

## **6.6 Investigation-Derived Waste Characterization and Drum Labeling**

Leader opened each of the drums of investigation-derived waste and collecting samples of each matrix. A composite sample from each of the six drums of soil was collected using a hand auger to burrow through the drummed material. The results showed no leachable organic or metal contaminants, with the exception of Barium at a concentration of 1.46 milligrams per Liter or ppm. No hazardous waste characteristics were identified.

A composite sample was collected from the purge water collected during Leader's sampling of the monitoring wells. The composite sample was collected using a dedicated bailer and dipping it into the drum. This sample found only TCE at a concentration of 23.8 ppm. No other chemical contaminants or hazardous waste characteristics were identified.

## **7.0 Nature and Extent of Contamination**

Contaminants found in both soil and groundwater indicate the primary contaminants found on the site involve selected VOCs and metals. SVOCs were also found but

primarily in the drum storage area and could be related to historic fill or the plant's use of petroleum-based cooling and lubricating fluids.

VOCs of interest involve chlorinated solvents and their breakdown or daughter products. TCE, PCE, cis and trans-1,2-Dichloroethene, Vinyl Chloride, 1,1,1-Trichloroethane, and 1,1-Dichloroethene are those compounds of primary interest because of their frequency of detection in soil and groundwater samples. Other compounds have been found, but their frequency of detection is low, 1 to 2 appearances, make them less of a focal point of the investigation. These compounds include: Acetone, Bromoform, Bromodichloromethane, Chloroform, Dibromochloromethane, 1,4-Dichlorobenzene, p-Cymene (also known as p-Isopropyltoluene), 1,1,2-Trichloro-1,2,2-Trifluoroethane, 1,1,2-Trichloroethane, Trimethylbenzene, Toluene, and Xylene. Although infrequently found Bromoform, Bromodichloromethane, Chloroform, and Dibromochloromethane may be from potable, chlorinated water entering the groundwater through the collection pits or the deep production well.

Metals of interest found in the soil and groundwater include: Barium, Cadmium, Chromium, Lead, Silver, and Zinc; but Chromium is of interest because it has been found in the soil within the drum storage area and also in the storm water swale sediment.

The distribution of these contaminants of interest on the site has three closely related focal points: the area beneath the plant, the former drum storage area and the storm water swale. The three are related because the storm water swale has the ability to receive discharges from the plant. The plant and drum storage area are related because of the paint booth discharge and probable past waste management practices. But most importantly is the past fire, which most likely caused a release of many products including TCE degreasing fluids in the shipping department located on the south side of the plant.

Based on the premise the fire was the probable cause for the release of the majority of the contaminants, the distribution of contaminants can be related to seepage through the floor and flow through the various drains and discharges in the plant. Normal groundwater flow and the past use of production wells are main contributors to the distribution of VOCs in the groundwater.

The appearance of TCE and its daughter products in monitoring well RW-1 and RW-6, however, are not well explained by the conceptual model of groundwater flow, which assumes there is downward migration of contaminants from the source areas and groundwater flow is the primary mechanism for contaminant migration. Figures 13 and 14 show the groundwater elevations for overburden monitoring wells and interface monitoring wells. The overburden water table elevations indicate an outward flow from the drum storage area to the west, north and south. Among the interface monitoring wells, groundwater flow appears to flow from the south toward the northwest. Assuming this flow configuration, it would seem unlikely that TCE would be found in monitoring wells RW-5 and RW-6, and less likely in monitoring well RW-1.



Theoretical explanations for these observations might include:

- A second source of contamination. In the vicinity of the site there are multiple potential sources of contamination including those facilities currently operating and those with former operations. Those potential other sources include the former tank farm located to the south, the former Symington Gould Plant located to the southeast, the former Consolidated Feldspar Corporation (Pennsylvania Glass Sand Company) and the current automobile salvage yard, located north of the Barthelmes property, and use of railroad spurs on and off-site.
- The downward migration of TCE is greater than expected in the overburden and plays a larger role in the migration of TCE. Also, the overburden and interface groundwater zones are distinct as evidenced by the difference in hydraulic head. Monitoring well MW-2 has a groundwater elevation of +80.43 feet (local datum) compared to the adjacent monitoring well RW-2, which has a groundwater elevation of +76.89 feet. This is a difference of 3.54 feet and would promote the downward migration of the TCE. Additional evidence to downward flow component is the difference between the groundwater elevations in the interface monitoring wells and the shallow production well PW-S. These differences range from 9.9-feet to 11.34-feet. Since borehole logs are not available for some of the interface monitoring wells and the shallow production well, we have made the assumption that the well construction of the interface monitoring wells is consistent with the others on the site and the construction of the shallow production well is only within the upper bedrock zone.

## **8.0 Potential Receptors and Qualitative Risk Assessment**

### **8.1 Potential Receptors**

The contamination on the site was found in three places: surface soils, subsurface soils, and groundwater. The potential receptors to this contamination include plant workers, off-site workers, and contractors who might be on-site to make repairs or maintenance to the exterior of the building. Ecological resources and exposures are not considered because the storm water swale only receives storm water and does not discharge to another surface water, and there are no threatened or endangered species located in the site area.

#### **8.1.1 Surface Soil**

Potential receptors to surface soil contamination, 0 to 2 feet below the ground surface, include only workers on-site and workers visiting the site making repairs to the building or underground utilities. Off-site workers are not at risk because of the distance between the source and the off-site worker's location.

Exposures to contaminated surface soil can result from wind blown dust, dust created from vehicle traffic (forklift trucks), or excavating work within the drum storage area. The remaining property is grass or asphalt paved with the exception of the storm water swale area. The sediments with swale area are also a potential source, but this area is heavily covered with vegetation, the sediments are often wet and not susceptible to wind blown erosion, and the area is not used or maintained. As a result these conditions the sediments are not a potential source for exposure.

Comparing the surface soil data to Part 375 risk-based soil quality values for industrial properties (see Table 5), there is a potential risk from the following contaminants: TCE, SVOCs, Barium, Chromium, Lead, and Zinc. Fortunately, these surface soils are confined to the drum storage area with a limited means for migration. The drum storage area is surrounded with trees, grass and pavement. Runoff is likely to enter the drum storage area instead of flowing away from the area.

### **8.1.2 Subsurface Soil**

Potential receptors to subsurface soil contamination, at a depth greater than 2 feet below the ground surface, include only workers on-site who excavate or repair underground utilities. Exposures would include dermal contact, inhalation of vapors and dust, and ingestion. The yard area of the site is the only confirmed area where contaminants have been found to exceed risk-based concentrations and soil clean up recommendations. There is also a potential for areas beneath the plant to be contaminated. Table 6 shows the results of subsurface soil sample analysis. Comparing the sample results to Part 375 Restricted Use for Industrial Property and Groundwater Protection shows that SVOCs in the sample from location B-7, at a depth of 12-14 feet below the ground surface (and also below the water table), exceed only soil guidelines for the protection of groundwater. The sample from location SB-25, at a depth of 4 to 6 feet below the ground surface, exceeds the TCE concentration for soil and the protection of ground water. Since the site is known to be contaminated, any subsurface work must include a health and safety plan and awareness training, which should reduce these risks; as a result, the risk of exposure is not significant.

### **8.1.3 Groundwater**

Potential receptors to contaminated groundwater impacts are limited to only those exposed to potential vapors from contaminated groundwater. There is no threat from groundwater contamination, as a drinking water source, because it is not used for potable purposes on-site or in the site area. Vapors from contaminated groundwater could potentially impact workers in the plant or workers excavating to repair utilities. It is unlikely that utility workers would be endangered from vapors, because of the depth to groundwater outside the building area and dilution of the potential vapors with outdoor air. For plant workers, the Johnson-Ettinger soil vapor model was used to predict indoor air vapor concentrations. The Johnson-Ettinger vapor concentration ranges from 107.1 to 112.1 micrograms per cubic meter (“ $\mu\text{g}/\text{M}^3$ ”). Model inputs for the Barthelmes building

included a groundwater TCE concentration of 535 ppb (from LaBella's sampling of the basement sump) and a complete slab on grade building foundation. The slab on grade construction provides a worst-case in-door air concentration for the plant. OSHA's permissible exposure level for TCE is 100 ppm or approximately 537 milligrams per cubic meter. It is doubtful that the indoor air will be impacted at this level based on Johnson-Ettinger model, but air sampling should resolve this issue.

## **9.0 Potential Remedial Actions**

Remedial actions that could be potentially used on the site need to address sediment, soil, and groundwater contaminants. Storm water swale sediments are contaminated with metals, primarily Chromium. Soils are contaminated with metals and TCE. The groundwater is contaminated with TCE.

The primary contaminant in the storm water swale is Chromium and sampling to date does not suggest that the Chromium is leachable. The storm water swale sediments are confined to the storm water swale and in the swale's current condition, the sediments do not represent a potential for contaminant migration off-site or a potential exposure problem for on or off-site workers. Remedial actions for the swale sediments might include:

1. Excavation
2. No action, institutional controls to limit access to the area

The surface soil is contaminated with metals, SVOCs and TCE, whereas the subsurface soil is contaminated with TCE. Remedial solutions for the soils include:

1. Excavation
2. Capping
3. Bioremediation for organics only
4. No action, institutional controls to limit access to the area

The subsurface soil is contaminated with SVOCs and TCE, whereas the subsurface soil is contaminated with TCE. Remedial solutions for the soil include:

1. Excavation
2. Capping
3. Bioremediation
4. No action, institutional controls to limit access to the area

The groundwater is contaminated with TCE and remedial techniques for the groundwater include:

1. Air sparging and soil vapor extraction
2. Bioremediation
3. Groundwater pumping and treatment

4. No action, institutional controls to limit access to the groundwater

## **9.1 Storm Water Swale**

To remove or reduce the concentration of Chromium in the storm water swale area will require excavation of the sediment and disposal of the material as a non-hazardous waste. However, since Chromium in the sediment was found during the Phase II not to be leachable, it is not a hazardous waste. The best solution is to manage the storm water swale area by restricting access. Fencing around the storm water swale is a reasonable solution.

## **9.2 Surface Soil**

The contaminated surface soils are located only in the fenced yard area of the site, which is the only portion of the site with restricted access. Although surrounding fence provides some protection to workers coming onto the site and working potential hazardous conditions, it is not a long term solution. The soils in this area are contaminated with metals, SVOCs and VOCs. The presence of this mix of contaminants limits some of the remedial solutions, because few methods are appropriate for all three contaminant types.

Potential long term solutions for this the fenced yard area include capping and removal. Capping provides the restricted access and controls dust, which could potentially be a risk to on site workers when weather conditions make the surface dry and dusty. Capping however, does not provide a benefit by removing or reducing the waste mass, but does limit the downward migration of potentially leachable contaminants. Capping not only will benefit surface soil but also subsurface soil, which are deeper than can reasonably be removed by excavation.

Excavation is a method to reduce the mass of the contaminants within the fenced yard area and can also be used during the same event to remove deeper contaminated soil. Excavation does have limitations and these include cost and not being able to remove all of the contaminated soil. If all of the contaminated soil can not be removed, because the excavation may jeopardize the building stability or it involves pumping groundwater, then removal may not benefit project more than capping.

## **9.3 Subsurface Soil**

The contaminated subsurface soils are located in the fenced yard area and beneath the plant building. The contaminants present include SVOCs and VOCs. By the nature of their location in the subsoil, many of these contaminants are confined and workers are not directly exposed to their hazards. The contaminants present in the yard area are still susceptible to migration from runoff infiltrating into the soil. Soil located beneath the plant and in the yard area could potentially be impacted by water table fluctuations, which mobilize some of the contaminants.

Potential longer-term solutions to the subsoil contamination issues include two basic techniques: soil vapor extraction (“SVE”) and bioremediation. For soil located beneath the fenced yard, area excavation is also an option. SVE is primarily a technique used on VOCs and can have a small effect on some SVOCs, but enhanced with heating elements or steam injection, the effect on SVOCs can be improved. Enhancements like heating elements or steam injection also increase the cost of the technique.

Bioremediation has been successful on both SVOCs and VOCs. The technique is also flexible and can be manipulated by injecting microbes and nutrients (proprietary chemicals, oxygen, propane, and water).

Excavation can also be used on the subsurface soil in the fenced yard area and is only limited by the location of the contaminants, building, and water table. Bioremediation can also play a part in the excavation plan by providing a conduit to introduce microbes or nutrients, and also treating the excavation waste on the site to lower its toxicity.

No action is another feasible method of managing the subsurface soil, since it is unlikely that the contamination will be a hazard to others. The soil contamination could potentially be a continued source of groundwater contamination, but this will be the case in whatever remedial action is used or at least until the soil is either cleaned up or meets the NYSDEC’s criteria for no further action. Unless the soil is remediated to an unrestricted use criteria, the property will remain zoned for industrial or commercial usage in affect putting a use restriction on the property.

## **9.4 Groundwater**

The groundwater is contaminated with TCE and other VOCs and remedial techniques suitable for these contaminants include:

1. Air sparging and SVE
2. Bioremediation
3. Groundwater pumping and treatment
4. No action, institutional controls to limit access to the groundwater

Air sparging and SVE relies on the ability of the contaminant to be air stripped from the groundwater into a vapor or gas phase, then to be collected in a vapor extraction system. The technique is often successful to reduce large contaminant concentrations, but as the concentrations lessen, the efficiency of the technique is also lowered. At times the system must be manipulated by cycling (turning the system on and off) to increase the efficiency in the closing stages of the project. Site geology also influences the efficiency of the system. With some contaminants, there is often a secondary benefit of the system operation as a result of bioremediation being enhanced. Since the contaminants of concern are not known to be successfully remediated under aerobic conditions (conditions where oxygen is increased in the groundwater), the sparging unit would require modification so it could be used to introduce propane or another hydrocarbon gas to enhance the bioremediation properties.

Bioremediation can also be used to treat the soil and groundwater. The presence of TCE breakdown products in the groundwater indicated some intrinsic bioremediation is occurring without enhancements. The addition of nutrient enhancement will make the bioremediation process work more rapidly and more efficiently; however, like other mechanical remediation systems, the bioremediation process will have to be monitored and managed. In some cases as the bioremediation process degrades the contaminants to different chemicals, the nutrients used may require modification to ensure complete breakdown of the chemicals.

Groundwater pumping and treatment can be used to control the migration of contaminants and clean up the groundwater zone. The technique is independent of the contaminant type until the groundwater requires treatment then the treatment system would be designed accordingly. Ideally, the untreated groundwater could be pumped to the Monroe County Division of Pure Waters sewer system. If on-site treatment is required, chemical, physical and biological treatment can be utilized. Under certain circumstances the treatment groundwater can be injected back into the groundwater to facilitate contaminant removal or enhance bioremediation.

## **10.0 Conclusions**

The Barthelmes property and the surrounding properties have been used for commercial and industrial purposes since at least 1911, when the property first operated as the American Fruit Products Company. In 1921 Barthelmes began its operation from the property manufacturing aluminum products. In the 1980s, a fire at the Barthelmes plant destroyed portions of the facility including a TCE degreaser. It is suspected that the fire and the water used to extinguish the fire spread contaminants through out the building and the former drum storage area.

The site characterization found that the soil, storm water swale sediment and ground water have been impacted by contaminants. TCE and its breakdown products are the primary contaminants of concern, but SVOCs and metals have also been found at concentrations that are greater than NYSDEC's soil clean values and TOGs groundwater quality criteria.

TCE has been found in the surface soil and subsurface soil in beneath the building and inside the former drum storage area. TCE contaminated groundwater has been in both the overburden and interface monitoring well samples. The extent of groundwater contamination based on groundwater samples and the direction of groundwater flow, appears to extend from the center of the building to near the southern most property line. TCE was also found on the north side of the property, but this appearance may be due to off-site sources of contamination.

SVOCs have been found only in the surface soil, subsurface soil and storm water swale sediments. The appearance of SVOCs could be from the historic fill or the use of petroleum-based lubricants in during manufacturing process.

Metals found during sampling have been found in the surface soil, subsurface soil, and storm water swale sediment. Chromium is the primary metal of concern, although Barium and Zinc have also been found at elevated concentrations. Chromium has been found in the surface soil and swale sediment. Barium and Zinc have been confined to the surface soil in the fenced yard area.

To address the contamination, multiple solutions will probably be used because not every technique is usable in soil as it is in groundwater. Similarly, the diversity of the contamination also requires different remedial methods to be employed. Based on a preliminary review of remedial options and risks associated with the contamination present, it appears the following remedial actions may be appropriate:

Surface and subsurface soil in the fenced yard area can be successfully addressed by capping. This approach will reduce direct contact and inhalation risks to workers and reduce the migration of contaminants caused by storm water runoff and infiltration. To cap the area, limited excavation will be useful to remove stained soil and sloping the ground surface to assist with runoff.

Subsurface soil beneath the plant is effectively capped and is not a hazard to workers. To reduce the mass of contaminants in the soil, vapor extraction methods could be utilized in high concentration areas, but it is likely that the technique will have only limited success because of the relatively low VOC concentrations present. Depending on soil moisture, bioremediation may be a better solution and can be applied to address the groundwater contamination present simultaneously.

Storm water swale sediments have been impacted by VOCs and Chromium. Although the Chromium is at an elevated concentration, it does not leach under TCLP conditions so its threat as a groundwater contaminant is small. Since the storm water swale's standing water is a creation of the neighboring property owner, it has no value as an ecological resource, the only reason to address it would be to remove the potential hazard Chromium represents. This risk is also very small because the area is lush with vegetation, often wet, and not visited by workers. Further restricting access would be an appropriate response to the level of contamination present.

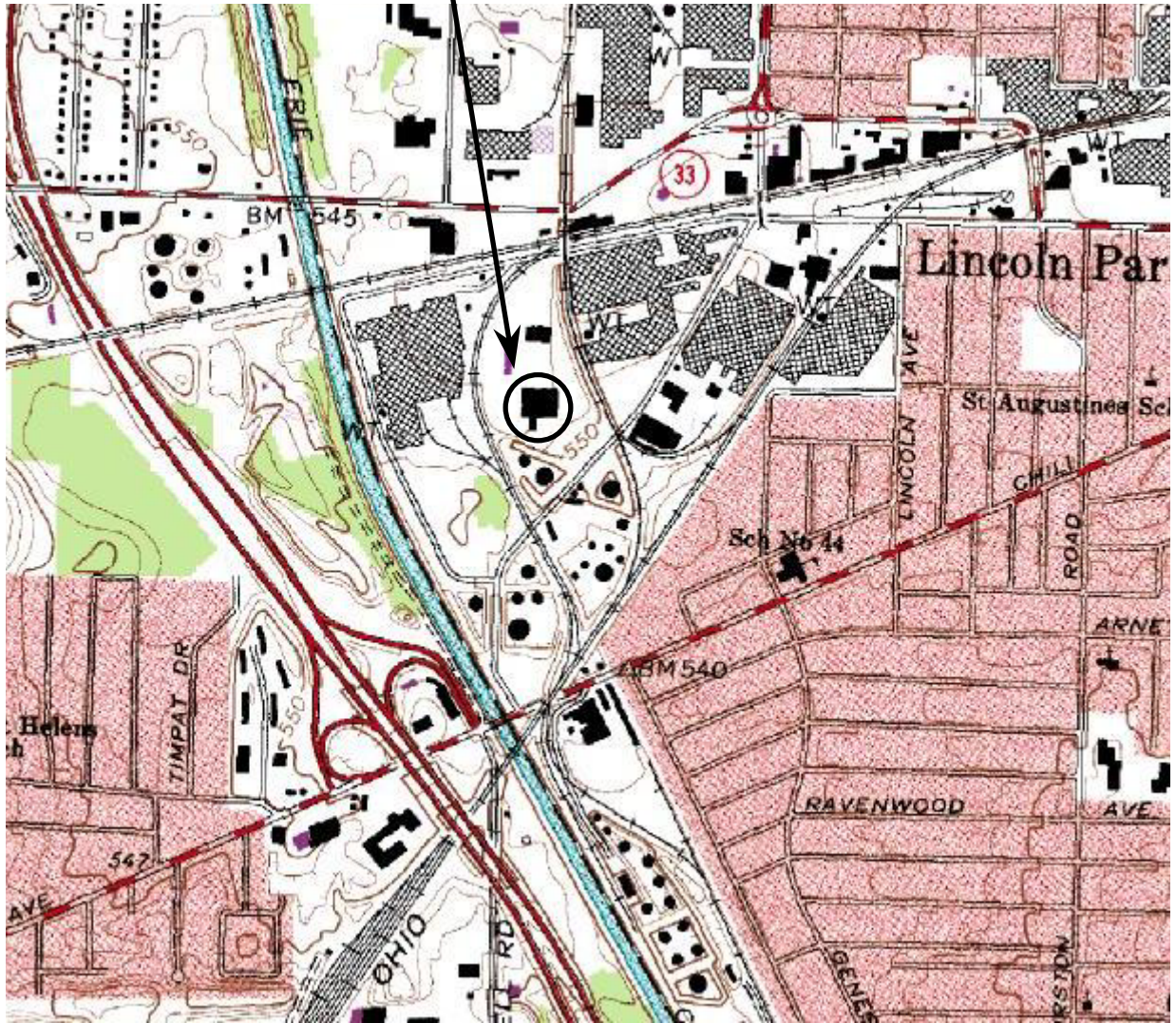
Groundwater contamination is present in both the overburden and interface groundwater zones of the property. The groundwater is contaminated with TCE and its breakdown products. The presence of breakdown products is significant because it indicates the presence of intrinsic bioremediation processes. As a result, the contamination may be best remediated using bioremediation techniques. Since contaminants like 1,2-Dichloroethane, Vinyl Chloride, Methane, and Sulfate are present, there appears to be a limited resources available to fully dechlorinate TCE. As a result, Methane and Sulfate are being formed over the consumption of 1,2-Dichloroethane and Vinyl Chloride. Additional nutrient resources are needed by the microbes to completely breakdown the contaminants and these can be supplied by a variety of commercial products.

## **FIGURES**





### Site Location



Title: Site Location Map  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



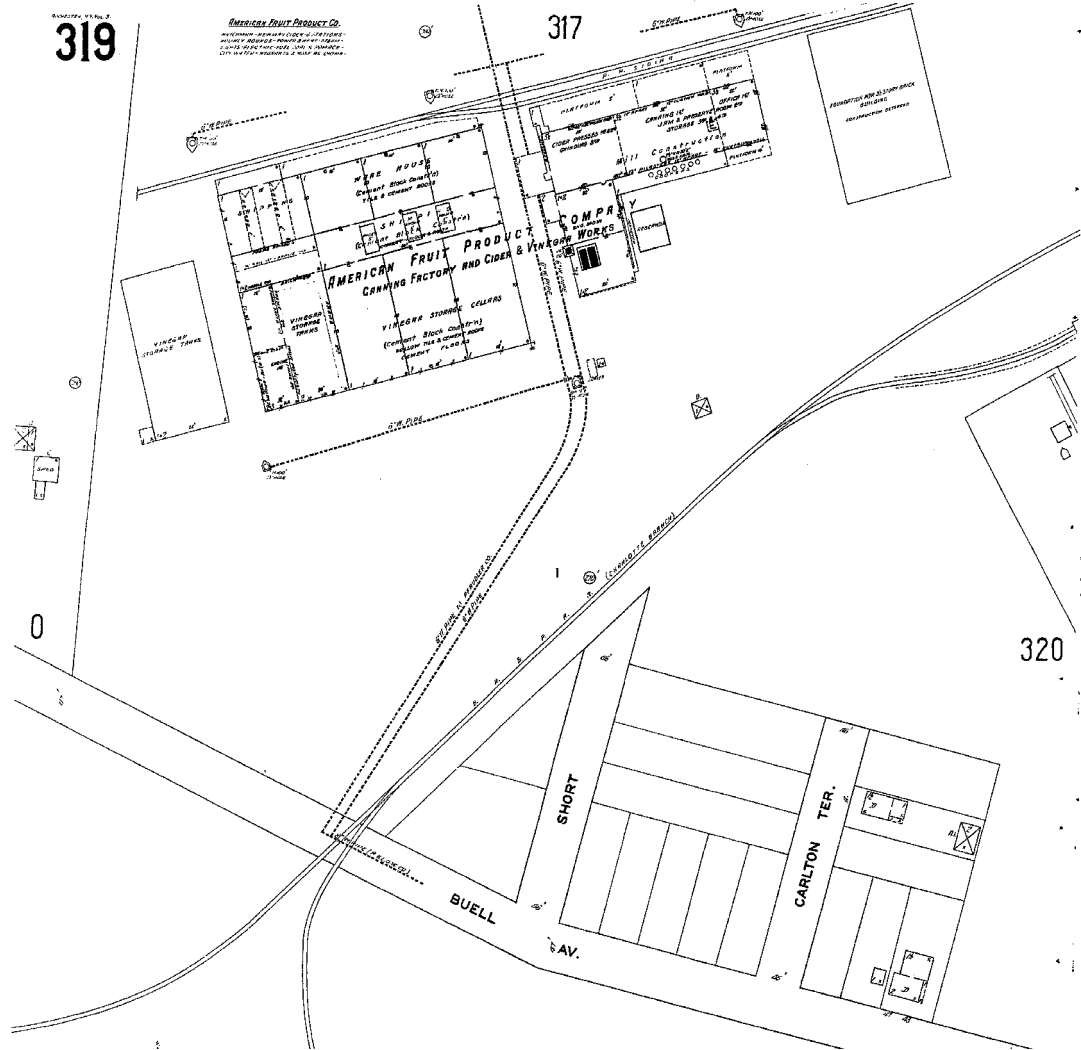
Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project: 555.001  
Date: 11/06  
Scale: Unknown

Drawn: PVS  
Checked: MPR  
File Name: Site Map

Figure

1



Title: 1911 Site and Vicinity Map  
15 Cairn Street, Rochester, New York

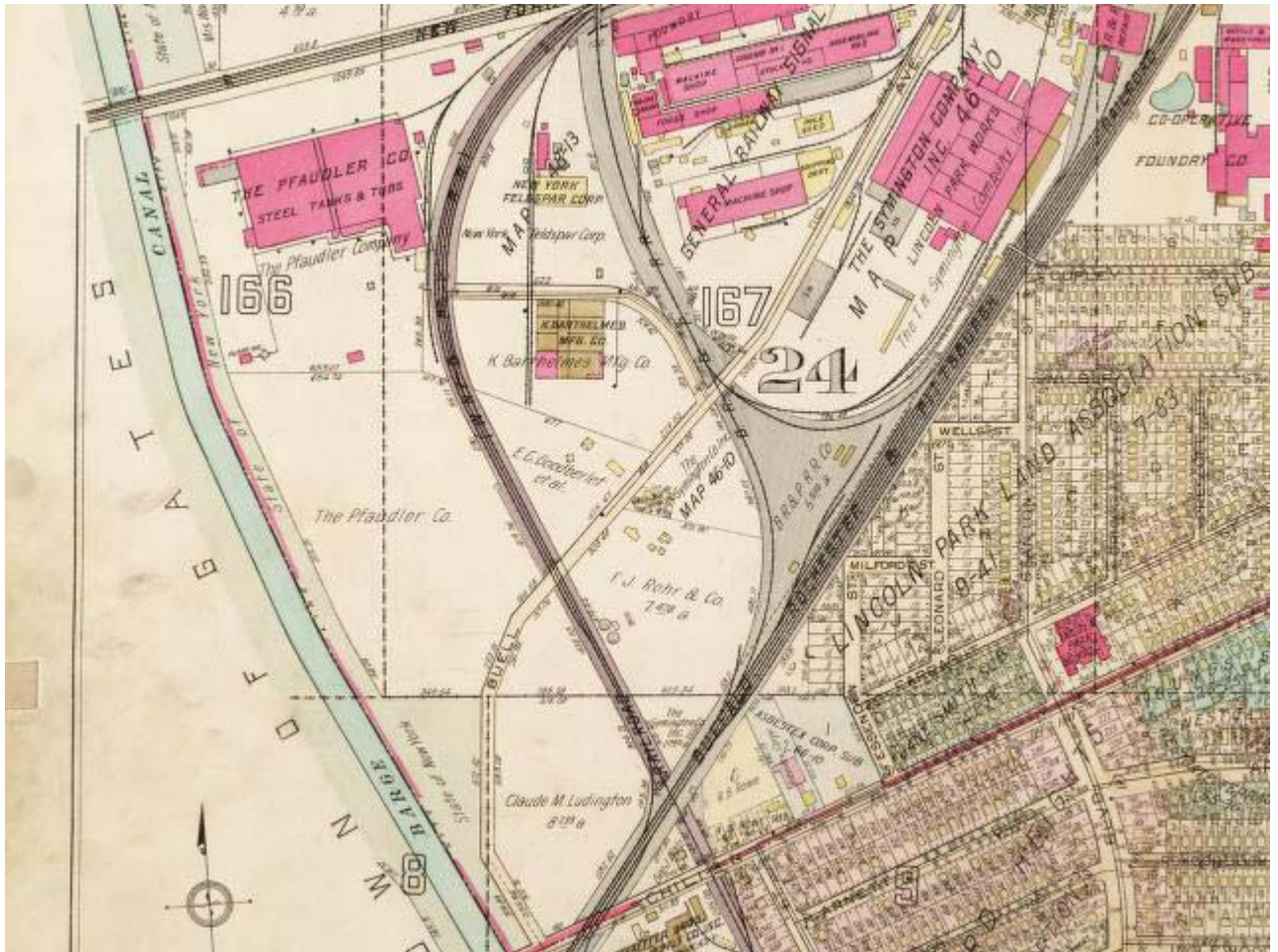
Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York

Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project: 555.001  
Date: 11/06  
Scale: Unknown

Drawn: PVS  
Checked: MPR  
File Name: Site Map

Figure: 2



Title: 1935 Site and Vicinity Map  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project  
555.001

Date

11/06

Scale

Unknown

Drawn  
PVS

Checked

MPR

File Name

Site Map

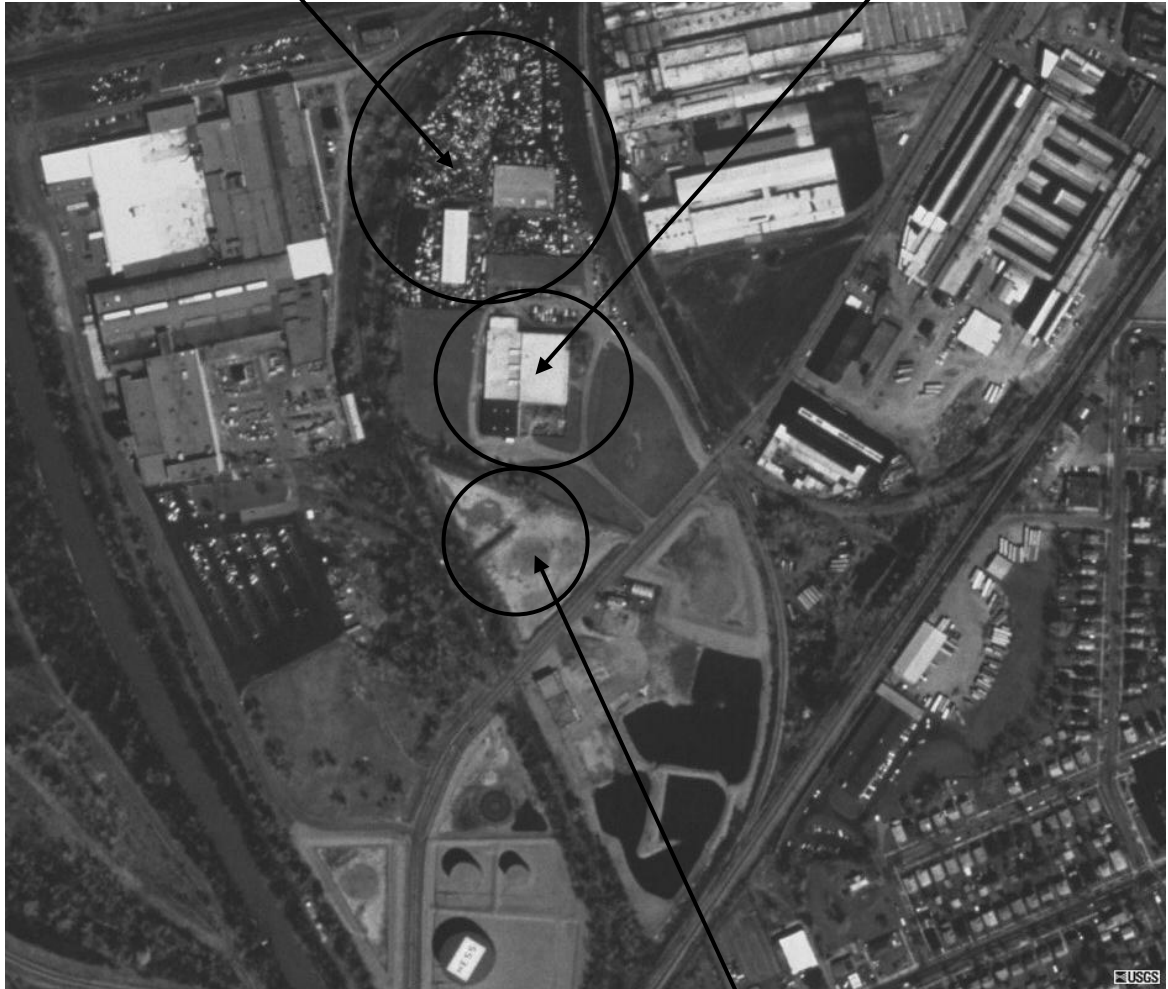
Figure

3



Salvage Yard

Site Building



Former Above Ground Tanks

Title: 2004 Aerial Photograph of Site  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



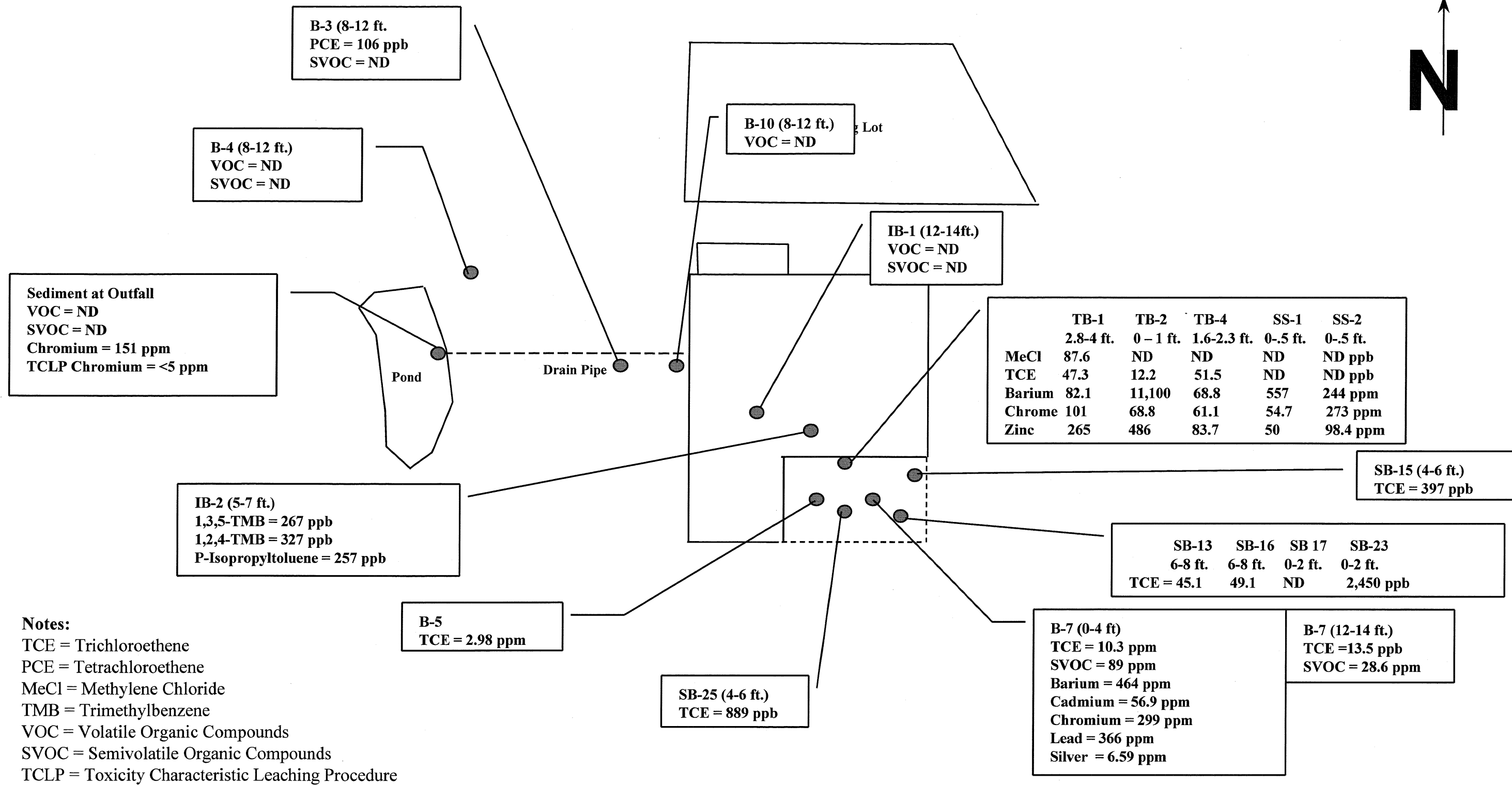
Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project: 555.001  
Date: 11/06  
Scale: Unknown

Drawn: PVS  
Checked: MPR  
File Name: 2004

Figure

4



**Notes:**  
 TCE = Trichloroethene  
 PCE = Tetrachloroethene  
 MeCl = Methylene Chloride  
 TMB = Trimethylbenzene  
 VOC = Volatile Organic Compounds  
 SVOC = Semivolatile Organic Compounds  
 TCLP = Toxicity Characteristic Leaching Procedure

**Title** Summary of LaBella Soil Sample Results  
 Barthelmes Manufacturing  
 Rochester, NY

**Prepared For** Barthelmes Manufacturing  
 15 Cairn Street  
 Rochester, NY



Leader Professional Services, Inc  
 271 Marsh Road-Suite 2  
 Pittsford, New York 14534  
 (585) 248-2413  
 FAX (585) 248-2834

**Project** 555.001

---

**Date** 11/06

---

**Drawn By** PVS

---

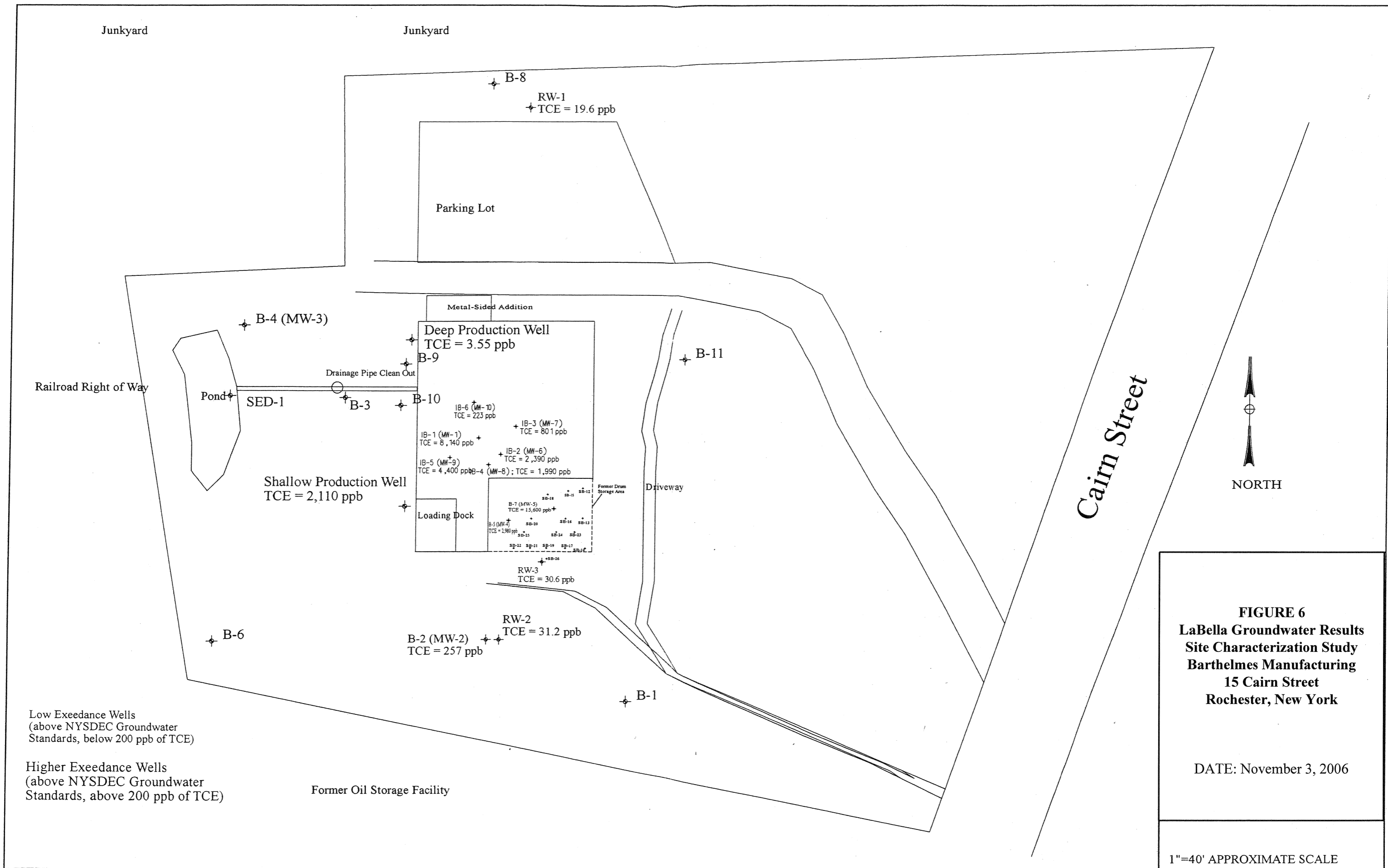
**Checked By** MPR

---

**File Name**

**Figure**

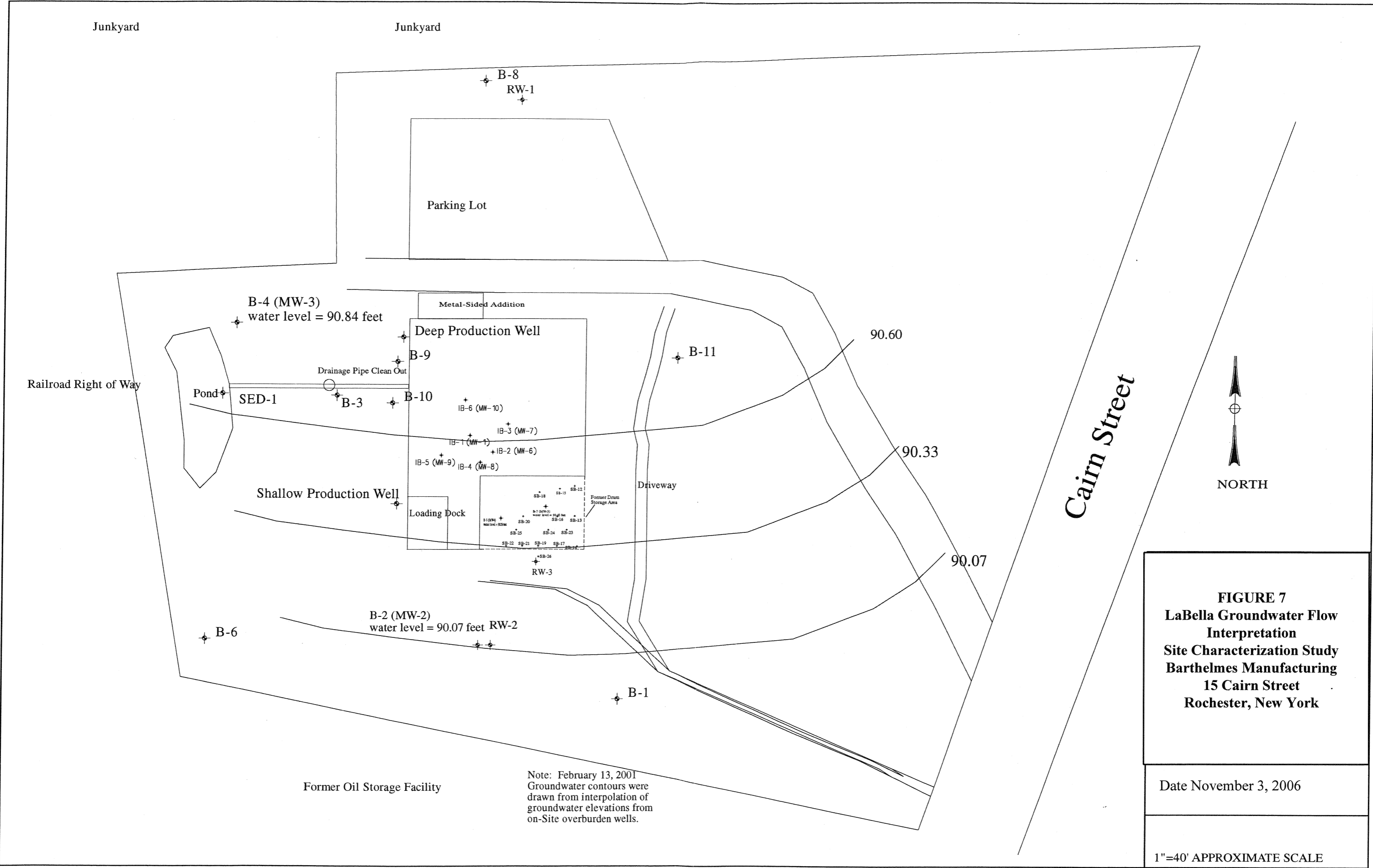
5



**FIGURE 6**  
**LaBella Groundwater Results**  
**Site Characterization Study**  
**Barthelmes Manufacturing**  
**15 Cairn Street**  
**Rochester, New York**

DATE: November 3, 2006

1"=40' APPROXIMATE SCALE



**FIGURE 7**  
**LaBella Groundwater Flow**  
**Interpretation**  
**Site Characterization Study**  
**Barthelmes Manufacturing**  
**15 Cairn Street**  
**Rochester, New York**

Date November 3, 2006

1"=40' APPROXIMATE SCALE

Note: February 13, 2001  
 Groundwater contours were  
 drawn from interpolation of  
 groundwater elevations from  
 on-Site overburden wells.



Title: Site Topography  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project  
555.001

Date

11/06

Scale

Unknown

Drawn  
PVS

Checked

MPR

File Name

Site Map

Figure

8





Site Building



Former Above Ground Tanks

Title: Former Tank Farm Locations  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project  
555.001

Date  
11/06

Scale  
Unknown

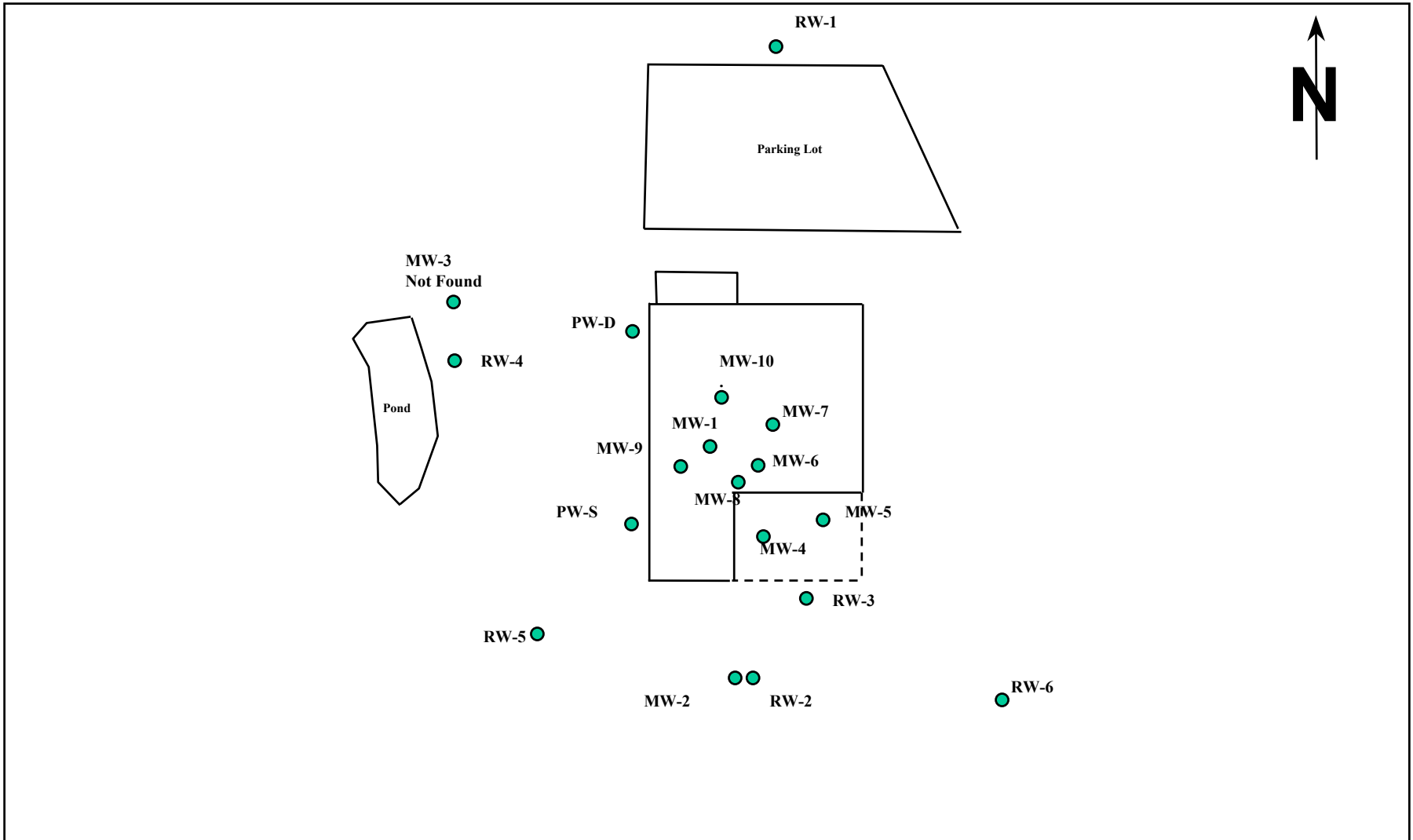
Drawn  
PVS

Checked  
MPR

File Name  
Site Map

Figure

9



Title  
 Monitoring Well Locations  
 Barthelmes Manufacturing  
 Rochester, NY

Prepared For  
 Barthelmes Manufacturing  
 15 Cairn Street  
 Rochester, NY



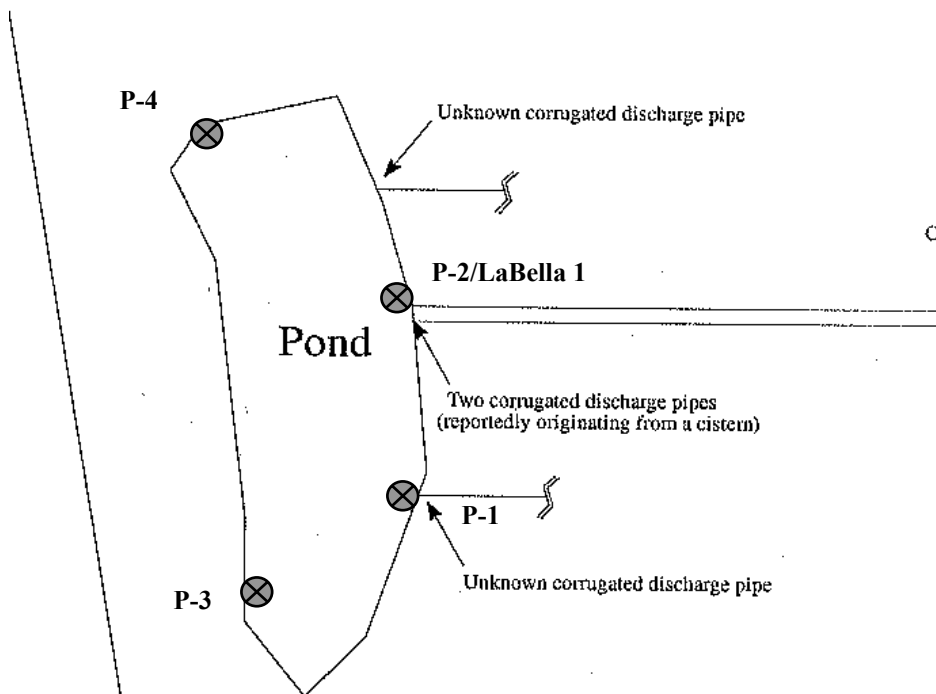
Project  
 555.001  
 Date  
 09/06  
 Scale  
 NTS

Drawn  
 PVS  
 Checked  
 MPR  
 File Name  
 Site Plan

Figure  
 10



⊗ **Approximate Sediment Sample Location**



| <b>Volatile Organic Compounds (ug/Kg)</b> | P-1  | P-2  | P-3  | P-4  | LaBella #1 |
|---|------|------|------|------|------------|
| 1,4-Dichlorobenzene                       | 4    | 2    | 1    | 2    | ND         |
| Acetone                                   | 73   | 80   | 22   | 49   | ND         |
| Dichlorodifluoromethane                   | 4    | 6    | 5    | 3    | ND         |
| p-Cymene                                  | 27   | ND   | 11   | 5    | ND         |
| Toluene                                   | 130  | 250  | 8    | 5    | ND         |
| <b>Metals (mg/Kg)</b>                     |      |      |      |      |            |
| Arsenic                                   | ND   | ND   | ND   | ND   | 1.45       |
| Barium                                    | 32.4 | 61.9 | 11.9 | 46.9 | 90.2       |
| Cadmium                                   | ND   | ND   | ND   | ND   | 0.905      |
| Chromium                                  | 29.4 | 247  | 11.5 | 35.4 | 151        |
| Lead                                      | ND   | 38.1 | ND   | ND   | 36.5       |

Title: Storm Water Basin Sample Locations  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York

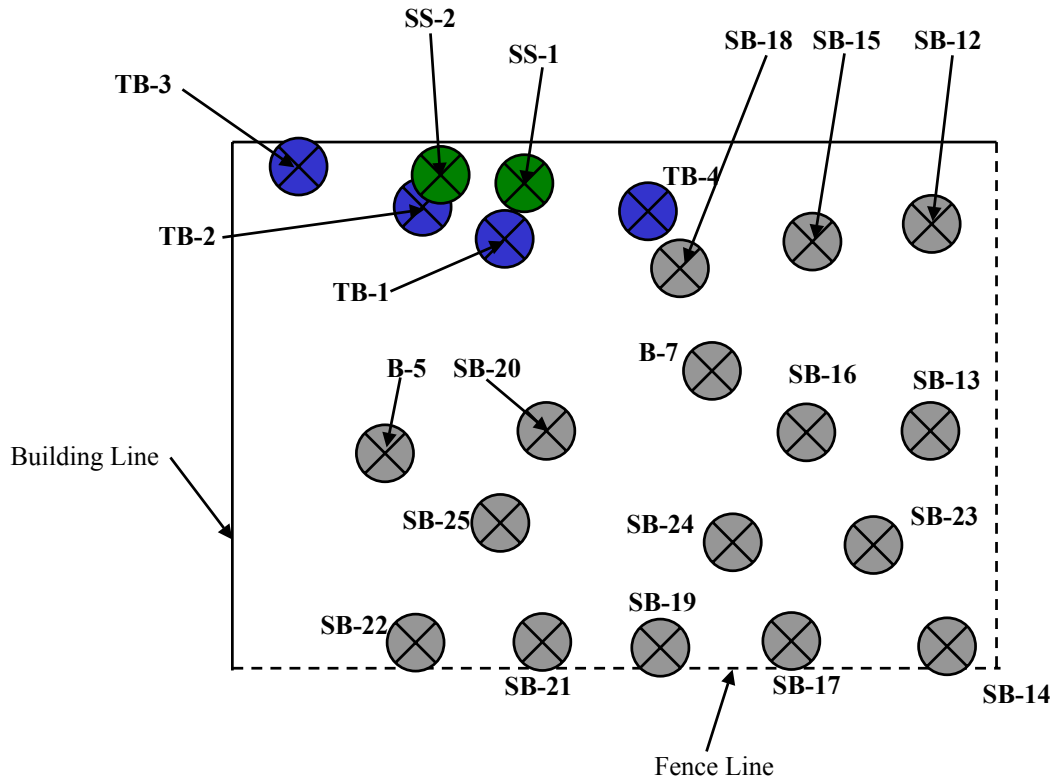


Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

Project: 555.001  
Date: 11/06  
Scale: Unknown

Drawn: PVS  
Checked: MPR  
File Name: Site Map

Figure  
**11**



Surface Soil Sample Location



Test Borings



Soil Borings and Monitoring Wells

Title: Paint Booth Discharge Sampling  
15 Cairn Street, Rochester, New York

Prepared For: Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York



Leader Professional Services  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
Fax (585) 248-2834

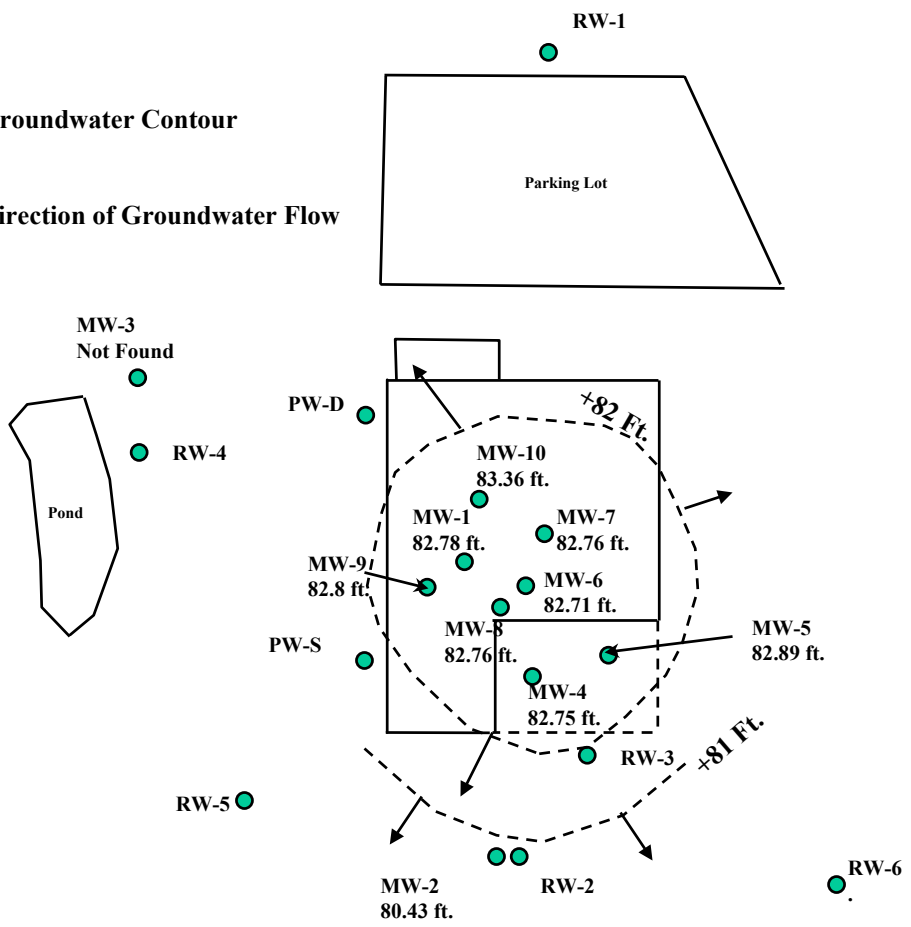
Project: 555.001  
Date: 11/06  
Scale: Unknown

Drawn: PVS  
Checked: MPR  
File Name: Site Map

Figure

12

----- Interpreted Groundwater Contour  
 → Interpreted Direction of Groundwater Flow



Title  
 Overburden Groundwater Contours  
 Barthelmes Manufacturing  
 Rochester, NY

Prepared For  
 Barthelmes Manufacturing  
 15 Cairn Street  
 Rochester, NY

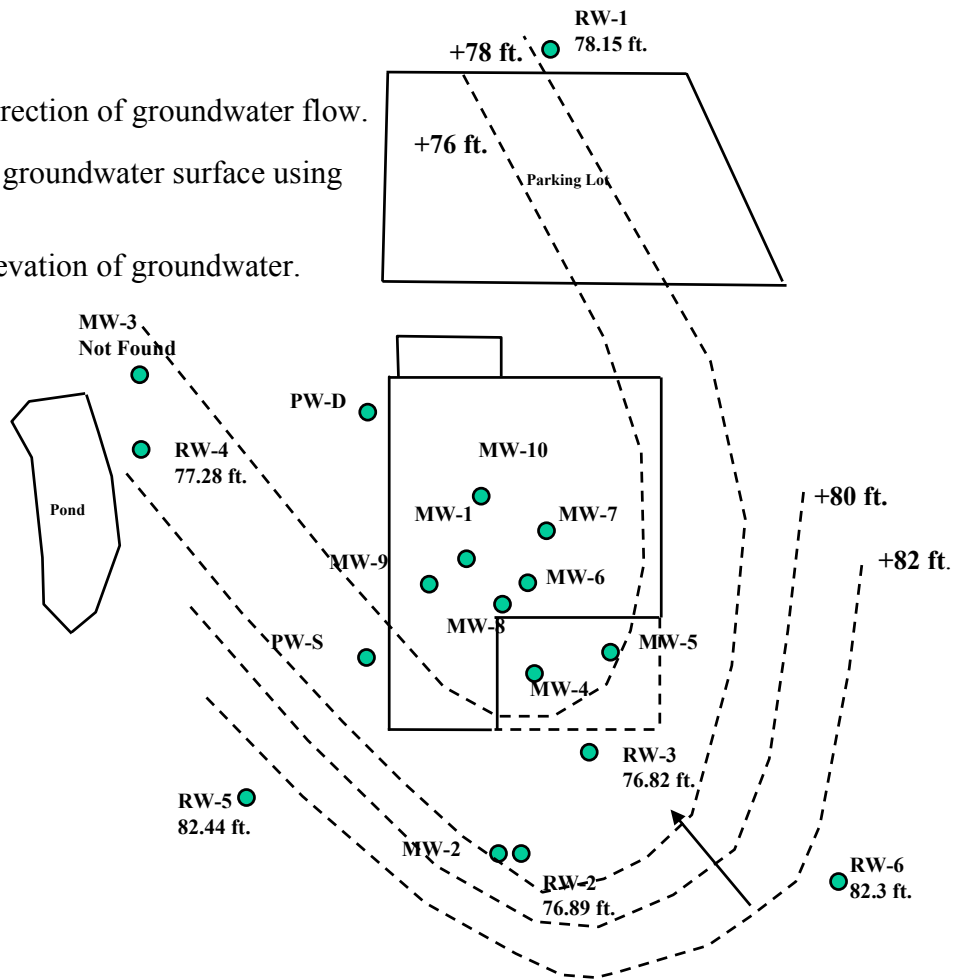


Project  
 555.001  
 Date  
 09/06  
 Scale

Drawn  
 PVS  
 Checked  
 MPR  
 File Name  
 Site Plan

Figure  
 13

- Estimated direction of groundwater flow.
- +80 ft. Elevation of groundwater surface using local datum.
- - - - Estimated elevation of groundwater.



Title  
 Interface Groundwater Contours  
 Barthelmes Manufacturing  
 Rochester, NY

Prepared For  
 Barthelmes Manufacturing  
 15 Cairn Street  
 Rochester, NY

**LEADER**  
 Leader Professional Services, Inc  
 271 Marsh Road-Suite 2  
 Pittsford, New York 14534  
 (585) 248-2413  
 FAX (585) 248-2834

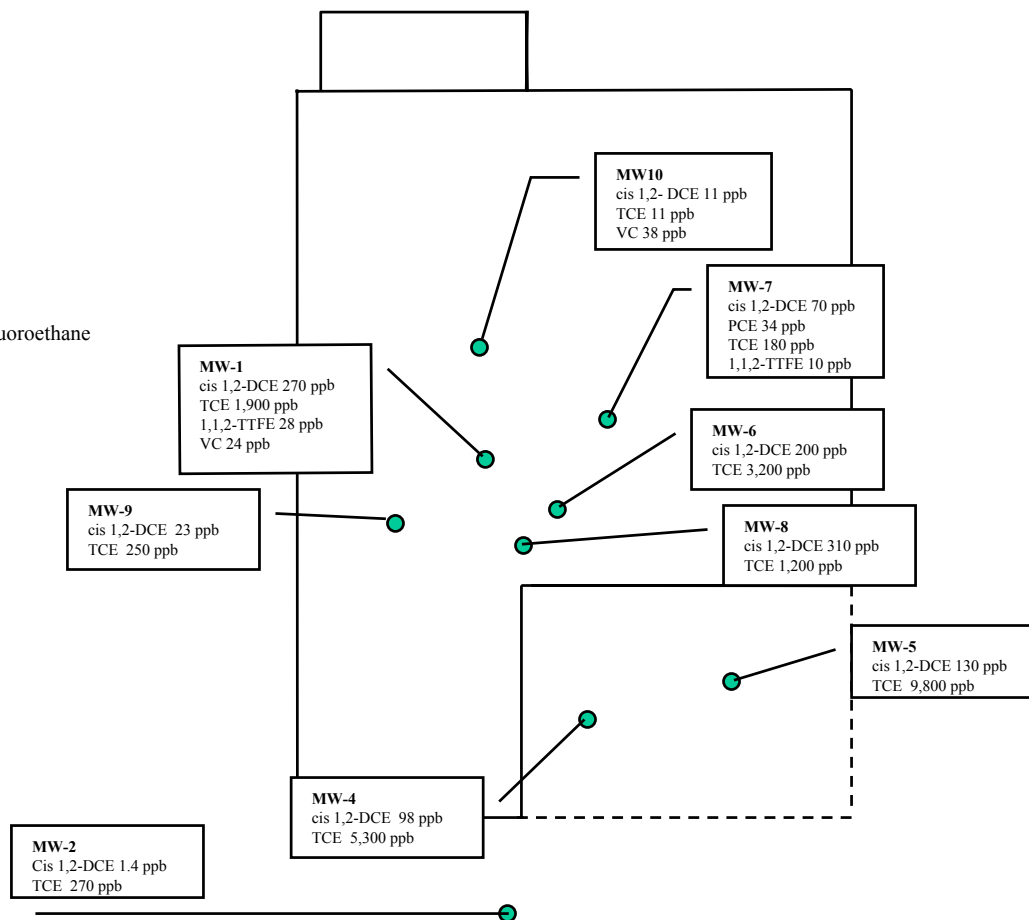
Project  
 555.001  
 Date  
 11/06  
 Scale

Drawn  
 PVS  
 Checked  
 MPR  
 File Name  
 Site Plan

Figure  
 14



**Notes:**  
BDCM = Bromodichloromethane  
DBCm = Dibromochloromethane  
cis 1,2-DCE = cis 1,2-Dichloroethene  
TCE = Trichloroethene  
PCE = Tetrachloroethene  
1,1,2-TTfE = 1,1,2-trichloro-1,2,2-trifluoroethane  
VC = Vinyl Chloride



Title Overburden Groundwater Chlorinate Compounds Results  
Barthelmes Manufacturing  
Rochester, New York

Prepared For Barthelmes Manufacturing  
15 Cairn Street  
Rochester, New York

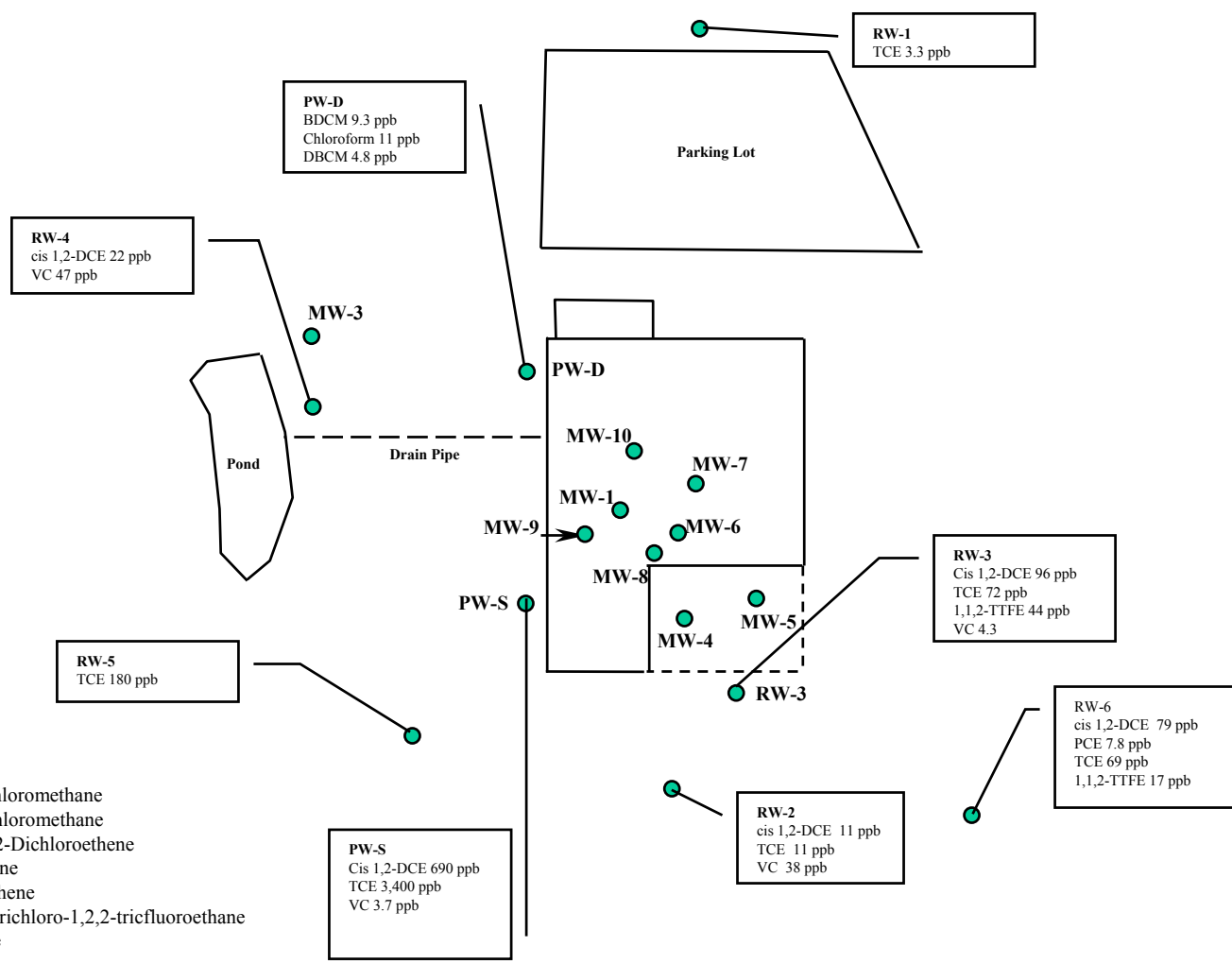


Leader Professional Services, Inc.  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
FAX (585) 248-2834

Project 555.001  
Date 09/01/06  
Scale

Drawn PVS  
Checked MPR  
File Name  
Site Plan

Figure 15



**Notes:**  
BDCM = Bromodichloromethane  
DBCM = Dibromochloromethane  
cis 1,2-DCE = cis 1,2-Dichloroethene  
TCE = Trichloroethene  
PCE = Tetrachloroethene  
1,1,2-TTFE = 1,1,2-trichloro-1,2,2-trifluoroethane  
VC = Vinyl Chloride

Title   Interface and Bedrock Groundwater Chlorinated Compound Results  
          Barthelmes Manufacturing  
          Rochester, NY

Prepared For                     Barthelmes Manufacturing  
                                      15 Cairn Street  
                                      Rochester, NY



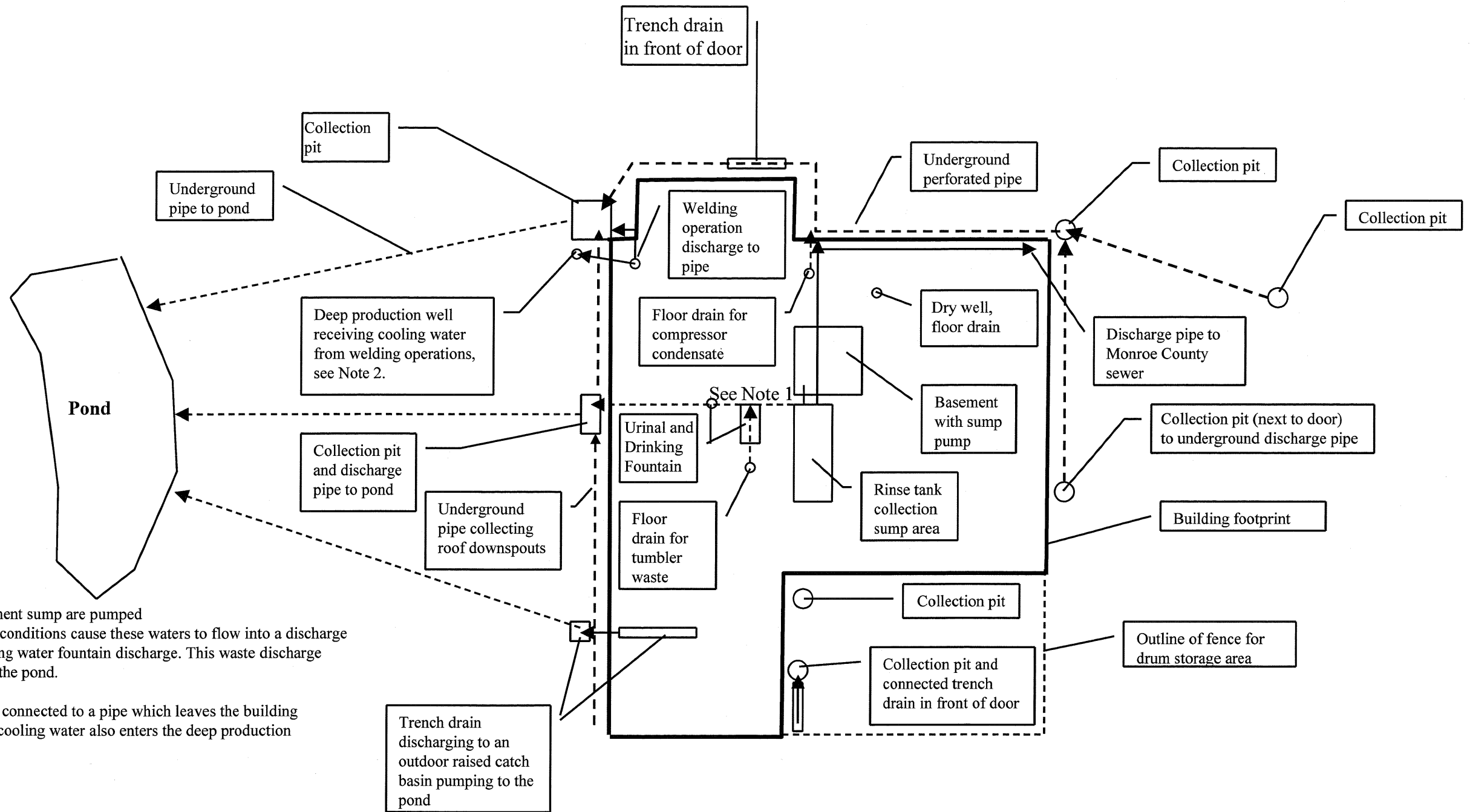
Leader Professional Services, Inc.  
271 Marsh Road-Suite 2  
Pittsford, New York 14534  
(585) 248-2413  
FAX (585) 248-2834

Project                                     555.001  
Date                                       09/06  
Scale

Drawn                                     PVS  
Checked  
MPR  
File Name  
Site Plan

Figure  
**16**





**Notes**

1. Effluent from the rinse tanks and basement sump are pumped to the Monroe County's sewer. Overflow conditions cause these waters to flow into a discharge connecting the urinal, tumbler, and drinking water fountain discharge. This waste discharge flows into the collection pit and then into the pond.

2. The welding operation cooling water is connected to a pipe which leaves the building and enters the collection pit. Some of the cooling water also enters the deep production well.

Title  
**Facility Discharges**  
**Barthelmes Manufacturing**  
**Rochester, NY**

Prepared For  
**Barthelmes Manufacturing**  
**15 Cairn Street**  
**Rochester, NY**



**LEADER**  
 Leader Professional Services, Inc  
 271 Marsh Road-Suite 2  
 Pittsford, New York 14534  
 (585) 248-2413  
 FAX (585) 248-2834

Project 555.001  
 Date 10/06  
 Scale \_\_\_\_\_

Drawn PVS  
 Checked MPR  
 File Name \_\_\_\_\_  
**Site Plan**

Figure  
**17**