STREAMLINED REMEDIATION SYSTEM EVALUATION (RSE-LITE)

CIRCUITRON CORPORATION SUPERFUND SITE
EAST FARMINGDALE, NEW YORK

Report of the Streamlined Remediation System Evaluation,
Conference Call Conducted
August 12, 2004

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Circuitron Corporation Superfund Site
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EXECUTIVE SUMMARY

A Streamlined Remediation System Evaluation (SRSE or "RSE-lite") involves a team of expert hydrogeologists and engineers, independent of the site, conducting a third-party evaluation of site operations. It is a broad evaluation that is based on the Remediation System Evaluation (RSE) process that was developed by the U.S. Army Corps of Engineers. Both the RSE and RSE-lite processes consider the goals of the remedy, site conceptual model, above-ground and subsurface performance, and site exit strategy. An RSE includes reviewing site documents, conducting a visit at the site for up to 1.5 days, and compiling a report that includes recommendations to improve the system. An RSE-lite reduces the resources and time committed for an evaluation by using a conference call with the site stakeholders in place of the site visit. Additional conference calls and/or email exchanges can be used for further communication. RSE or RSE-lite recommendations with cost and cost savings estimates are provided in the following four categories:

- improvements in remedy effectiveness
- reductions in operation and maintenance costs
- technical improvements
- gaining site closeout

The recommendations are intended to help the site team identify opportunities for improvements. In many cases, further analysis of a recommendation, beyond that provided in this report, may be needed prior to implementation of the recommendation. Note that the recommendations are based on an independent evaluation by the RSE-lite team, and represent the opinions of the RSE-lite team. These recommendations do not constitute requirements for future action, but rather are provided for the consideration of all site stakeholders.

The Circuitron Corporation Superfund Site is located at 82 Milbar Boulevard, East Farmingdale, Suffolk County, New York. The site is situated on a 1-acre lot in an industrial/commercial area that is surrounded by similar small manufacturers and the State University of New York Agricultural and Technical College campus in Farmingdale. The site consists of an abandoned 23,500 square foot building that was used between 1961 and 1986 for the manufacture of electronic circuit boards.

A pump and treat (P&T) system to address VOCs and metals began operation in 2000. There are three pumping wells, with an average long-term extraction rate for the total system of approximately 35 gpm. VOC concentrations have declined over time since P&T began. In the shallow aquifer, VOC impacts are limited to just a few constituents with relatively low concentrations, with the exception of well MW-4S, which has a moderate concentration of 1,1,1-TCA of 190 ug/L. Similarly, in the deep aquifer, VOC impacts are limited to just a few constituents at concentrations only slightly above cleanup levels at a few wells (note that MW-19D, the furthest downgradient well, has the highest concentrations but those concentration levels are relatively low (i.e., within approximately one order of magnitude of the cleanup levels). URS suggests in the 2003 Annual Performance Monitoring Report that most or all of the impacts at MW-19D likely originate at a source upgradient of the subject property, and this interpretation was generally supported by the site regulators during the RSE-Lite call.

Several inorganic parameters have historically exceeded water quality criteria (e.g., iron, manganese, chromium). It was reported during the RSE-Lite phone call that total chromium was the major concern with respect to inorganics in ground water. Recent sampling (April 2003) was performed using filtering, and all of the chromium results for the filtered samples were "not-detected". Therefore, it appears that the elevated chromium was being caused by high turbidity in the samples, and that dissolved chromium is not an issue. Inorganics are no longer a concern regarding ground water cleanup, and monitoring for inorganics in ground water has since been terminated. However, inorganics are still a major factor at this site because elevated iron and manganese are the cause of much of the labor and maintenance in the treatment plant.

The RSE-Lite team recognizes and applauds recent efforts to reduce the long term monitoring by determining that elevated total chromium is apparently due to high sample turbidity (thus eliminating the need to monitor for metals in the future), and also reducing the monitoring frequency for VOCs to annual. There appears to be a good working relationship between the EPA and the State, and between the site contractor, the EPA RPM, and EPA Region 2 support staff. The observations and recommendations contained in this report are not intended to imply a deficiency in the work of either the system designers or operators but are offered as constructive suggestions in the best interest of the EPA, the public, and the facility. These recommendations have the obvious benefit of being formulated based upon operational data unavailable to the original designers.

The RSE-Lite team suggests the following recommendation to improve system effectiveness:

- periodically (e.g., every one or two years) verify that existing institutional controls remain in place and continue to afford adequate protection of potential receptors.

To the extent that pumping continues the RSE-Lite team suggests the following recommendations for cost reduction:

- eliminate liquid phase GAC given that VOCs are not detected after the air stripper
- sample extraction wells, and potentially eliminate pumping at RW-2 and RW-3 because they extract negligible mass
- revise the bag filter configuration to use more bags in parallel to reduce the changeout frequency, allowing for system operation that does not require daily labor
- reduce operator labor to 2-3 days per week as a result of these other recommendations

The RSE-Lite team also believes project management labor cost is relatively high compared to similar sites, and should be reduced (especially after these other recommendations are implemented). A recommendation is also made to consider reducing pump sizes in the treatment plant, but that will only be cost-effective if pumping continues for more than three years.

The RSE team suggests the following recommendations for technical improvement:

- clarify reporting of flow rates (instantaneous versus average)
- continue with current infiltration approach (jetting every 3-5 months) rather than replacing with a new trench or using an acid drip

With respect to site closeout, the RSE-Lite team favors an approach at this site that attempts to identify and remediate any remaining source term to the extent such efforts are kept below a threshold cost, followed by cessation of active pumping if the site team achieves consensus to do so (e.g., perhaps based on a Technical Impracticability waiver or some other form of “monitoring only” remedy). The RSE-Lite team recommends that, at this site, air sparging in conjunction with SVE in the MW-4S area might be a more cost-effective approach than other potential alternatives such as nutrient injection (e.g., HRC) or chemical oxidation, because it can be implemented with little additional characterization and pilot testing, and equipment may be available from a nearby site (SMS Instruments). Less than $500,000 should be expended on aggressive source removal efforts, given that an effective effort can be implemented for this amount and a modified P&T system might operate for under $300,000 per year (and only for a few years). The RSE-Lite team is not recommending that multiple source removal strategies be pilot tested or substantial characterization be performed, because that would likely drive costs beyond the $500,000 level identified above.

Once aggressive source removal is attempted, a non-pumping approach (perhaps based on a Technical Impracticability waiver) likely affords equivalent protectiveness compared to continued P&T. Technical Impracticability is pertinent given the general agreement that off-site sources of contamination are present, and those impacts are not going to be addressed by the current pumping remedy. The annual cost without active pumping would likely be less than $100,000 per year. A change to a non-pumping approach may require a ROD Amendment, but may only require an Explanation of Significant Differences (ESD) based on language in the existing ROD (see Section 3.1).

A suggested approach to prioritizing implementation of these recommendations is provided. A table summarizing the recommendations, including estimated costs and/or savings associated with those recommendations, is presented in Section 7.0 of this report.

PREFACE

This report was prepared as part of a project conducted by the United States Environmental Protection Agency (U.S. EPA) Office of Superfund Remediation and Technology Innovation. The objective of this project is to conduct Remediation System Evaluations (RSEs) or Streamlined Remediation System Evaluations (RSE-Lites) at selected pump and treat (P&T) systems that are jointly funded by EPA and the associated State agency. The project contacts are as follows:

Organization	Key Contact	Contact Information
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1.0 INTRODUCTION

1.1 PURPOSE

During fiscal years 2000, 2001, and 2002, Remediation System Evaluations (RSEs) were conducted at 24 Fund-lead pump and treat (P&T) sites (i.e., those sites with pump and treat systems funded and managed by Superfund and the States). Due to the opportunities for system optimization that arose from those RSEs, EPA OSRTI has incorporated RSEs into a larger post-construction complete strategy for Fund-lead remedies. To evaluate sites in a more timely and cost-effective manner, EPA OSRTI is also utilizing a Streamlined RSE (RSE-lite) process. An independent EPA contractor is conducting these RSEs and RSE-lites, and representatives from EPA OSRTI are participating as observers.

The Remediation System Evaluation (RSE) process was developed by the U.S. Army Corps of Engineers (USACE) and is documented on the following website:

http://www.environmental.usace.army.mil/library/guide/rsechk/rsechk.html

The RSE-lite is based on the RSE process. Both RSEs and RSE-lites involve a team of expert hydrogeologists and engineers, independent of the site, conducting a third-party evaluation of site operations. They are broad evaluations that consider the goals of a remedy, site conceptual model, above-ground and subsurface performance, and site exit strategy. The RSE includes reviewing site documents, visiting the site for 1 to 1.5 days, and compiling a report that includes recommendations to improve the system. An RSE-lite reduces the resources and time committed for an evaluation by using a conference call with the site stakeholders in place of the site visit. Additional conference calls and/or email exchanges can be used for further communication. RSE and RSE-lite recommendations with cost and cost savings estimates are provided in the following four categories:

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The recommendations are intended to help the site team identify opportunities for improvements. In many cases, further analysis of a recommendation, beyond that provided in this report, might be needed prior to implementation of the recommendation. Note that the recommendations are based on an independent evaluation by the RSE-lite team, and represent the opinions of the RSE-lite team. These recommendations do not constitute requirements for future action, but rather are provided for the consideration of all site stakeholders.

The Circuitron Corporation Superfund site was selected by EPA OSRTI based on a recommendation from the associated EPA Region. This report provides a brief background on the site and current operations, a summary of the observations made by the review team, and recommendations for changes and additional studies. The cost impacts of the recommendations are also discussed.

1.2 TEAM COMPOSITION

The team conducting the RSE-lite consisted of the following individuals:

Rob Greenwald, Hydrogeologist, GeoTrans, Inc.
Peter Rich, Civil and Environmental Engineer, GeoTrans, Inc.
Doug Sutton, Water Resources Engineer, GeoTrans, Inc.

The following individuals participated as observers:

- Jennifer Griesert from EPA OSRTI
- Waleskska Nieves-Munoz from EPA OSRTI
- Wayne Kellogg from Dynamac Corporation

1.3 DOCUMENTS REVIEWED

Author	Date	Title
U.S. EPA	3/29/1991	Record of Decision for OU I
Roy F. Weston, Inc.	7/13/1994	Final Draft Focused Feasibility Study Second Operable Unit
U.S. EPA	9/30/1994	Record of Decision for OU II
U.S. EPA	9/30/1996	Remedial Action Report, Building Demolition
U.S. EPA	3/31/1997	Remedial Action Report, Contaminated Sediment and Soil Removal
Radian International	7/13/1999	Final Report, OU#2 Ground Water Investigation, Ground Water Screening and Monitoring Well Installation
Radian International	~ 2000	Final O&M Manual
U.S. EPA	9/22/2000	Preliminary Site Close Out Report
Radian International	4/30/2001	Interim Remedial Action Report, Groundwater Treatment System
URS	3/1/2004	2003 Annual Performance Monitoring Report
URS	3/15/2004	Monthly Progress Report for O&M, January 1, 2004 to January 31, 2004
URS	5/15/2004	Monthly Progress Report for O&M, March 1, 2004 to March 31, 2004
URS	6/16/2004	Monthly Progress Report for O&M, April 1, 2004 to April 30, 2004
URS	7/15/2004	Monthly Progress Report for O&M, May 1, 2004 to May 31, 2004

1.4 PERSONS CONTACTED

The following individuals associated with the site were present for the conference call:

Sharon Trocher, Remedial Project Manager, EPA Region 2
Jeff Trad, NYSDEC
Rob Alvey, EPA Region 2 (Hydrogeologist and Project Liaison)
Shewan Bian, USACE
Ann Fung, Radian International (URS)
Greg Gangemi, Plant Operator

1.5 SITE LOCATION, HISTORY, AND CHARACTERISTICS

1.5.1 LOCATION

The Circuitron Corporation Site is located at 82 Milbar Boulevard in East Farmingdale (Suffolk County), New York, near the Nassau County-Suffolk County border in central Long Island. The site is situated just east of Route 110 and the State University of New York Agricultural and Technical College campus. A site location map is presented in Figure 1-1. The site encompasses approximately 1-acre in an industrial-commercial area. The site is generally flat. It is surrounded by similar small manufacturers and is several miles away from any residential area. Except for the State University, there are no schools or any recreational facilities in the immediate vicinity.

The Circuitron Corporation Site consisted of an abandoned 23,500 square foot building that was used between 1961 and 1986 for the manufacture of electronic circuit boards. Approximately 95% of the site was paved or covered by the building. Circuitron Corporation ceased operation and vacated the site some time between May and June 1986, during which time all equipment of value was removed.

Two leaching pools that existed below the building and two leaching pools beneath the parking lot in front of the building were used for the disposal of hazardous substances. Two sanitary cesspools located below the parking lots were also used for disposal of hazardous materials. A line of interconnected storm drains existed on the western portion of the site. Three catch basins are also present at the site.

The investigative and remedial activities conducted at the site include the following:

1987 - EPA initiated an emergency removal of some of the more than 100 chemical containers and storage tanks on-site.

1988-89 - EPA conducted another emergency cleanup action and removed approximately 20 waste drums from inside the building, three aboveground tanks, the contents of seven underground storage tanks, two below-surface treatment basins, and several leaching basins.

1989 - EPA included the site on the National Priorities List (NPL).

1988-91 - EPA performed a Remedial Investigation/Feasibility Study (RI/FS) for the operable unit one (OU-1). The contaminants of concern present in soils and sediments were identified.

1991 - A Record of Decision (ROD) was issued for OU-1. The ROD identified soil vapor extraction (SVE), sediment excavation, decontamination of the building, and re-paving of the site as remedies for OU-1.

1992-94 - EPA conducted a focused feasibility study (FFS) for OU-2. The contaminants of concern present in ground water were identified.

1994 - A Record of Decision (ROD) was issued for OU-2. The ROD called for the treatment of ground water consisting of pump-and-treat with metals precipitation and air stripping followed by reinjection of the treated ground water.

1995 - A geoprobe soil sampling and analysis event was conducted. The results revealed that the VOCs were below cleanup levels and as such, soil treatment via SVE was not warranted.

1995-96 - Remedial Design (RD) was completed for the OU-2 ground water treatment system.

1996-97 - Remedial activities for OU-1 were conducted, and the final inspection determined that the remedial activities were completed.

1999-2000 - The construction of OU-2 ground water pump-and-treat system was completed, and the system began operation.

2000 - EPA, NYSDEC, and USACE conducted a pre-final inspection and final inspection. During the pre-final inspection, punch list items were identified. The completion of the punch list items was verified during the final inspection.

This RSE-Lite report pertains to the operating P&T system and other site conditions that directly affect the performance of this system.

1.5.2 POTENTIAL SOURCES

The site had several potential contaminant source areas:

- more than 100 chemical containers and storage tanks that were removed in 1987
- about 20 drums, three above-ground tanks, seven underground storage tanks, two below-surface treatment basins, and several leaching basins that were removed and excavated in 1989
- leaching pits, cesspools, and storm drains outside and inside the building that were excavated in 1996
- seven dry wells that were excavated in 1999

Approximately 100 cubic yards of contaminated soil and debris, 50 drums of hazardous liquid, and an additional 2,000 to 3,000 gallons of tanked hazardous liquids were removed and disposed during the 1989 removal action. During remedial activities for OU-1, approximately 50 tons of contaminated sediments and 1,200 tons of contaminated soils were removed. During construction activities for the ground water treatment system, seven dry wells were uncovered in the northeastern portion of the site. Approximately 340 tons of contaminated soils and sediments were removed from the seven dry wells.

In June 1995, a geoprobe soil sampling and analysis study revealed that the VOCs from a total of 179 soil samples were below cleanup levels specified in the 1991 ROD, and it was determined that soil treatment via SVE system was not warranted.

1.5.3 HYDROGEOLOGIC SETTING

The site is generally flat and has a slight slope up to southeast of less than 1 percent. The site elevation is approximately 85 to 90 feet above MSL. The site is located on the outwash plain of Long Island.

The uppermost aquifer, the Upper Glacial aquifer, is estimated to be 80 feet thick beneath the site. The depth to the water table is approximately 30 feet below grade. The saturated portion of the Upper Glacial aquifer, with a thickness of approximately 50 feet, begins at the water table and extends down to approximately 80 feet below grade. According to the OU-2 Ground Water Investigation report (1999), the outwash deposits of the Upper Glacial aquifer are highly permeable (hydraulic conductivity of approximately 175 feet per day) and yield large quantities of water. During the RI and FFS, a hydraulic gradient of 0.0026 feet per foot (to the south or just east of south) was determined for the Upper Glacial aquifer.

The Upper Glacial aquifer is underlain by the Magothy aquifer which is approximately 700 feet thick in the vicinity of the site. According to the OU-2 Ground Water Investigation report (1999), the Magothy aquifer is the main aquifer of use in the area, and yields prolific amounts of water. Hydraulic conductivity of approximately 70 feet per day was reported. Ground water flow direction was reported to be southeastward, with a hydraulic gradient magnitude of 0.0026 feet per foot.

Recharge to the hydrologic system beneath the site occurs from infiltrating precipitation and subsurface inflow of ground water from upgradient areas. Discharge of ground water beneath the site occurs through evapotranspiration and subsurface outflow. Most of the subsurface outflow from the outwash unit continues downgradient and ultimately discharges into creeks approximately five miles south of the site.

1.5.4 POTENTIAL RECEPTORS

The primary potential receptors are water supply wells. According to the OU-2 Ground Water Investigation report (1999), there were 19 public supply wells located within two miles of the site, of which 17 were screened in the Magothy aquifer. At the time of the OU-2 ROD (1994), the closest two downgradient public water supply wells were located approximately 1,500 feet south of the site and were completed within the Magothy aquifer at 191-268 and 524-585 feet below grade. During the RSE-Lite conference call it was stated that, while some wellheads are present near the site, they do not represent a major concern at the current time due to relatively low concentrations of contaminants remaining in ground water at the site.

1.5.5 DESCRIPTION OF GROUND WATER PLUME

VOCs are the primary contaminant of concern for this site. Total VOC concentrations in April 2003 are summarized in the following figures:

- Figure 1-2 - Shallow aquifer
- Figure 1-3 - Deep aquifer

In April 2003, the following wells had contamination that exceeded cleanup criteria for specific VOCs:

Media	Well	Contaminant Exceeding Standard	April 2003 Concentration (ug/L)	Cleanup Standard (ug/L)
Shallow Ground water	MW-4S	1,1,1-trichloroethane Tetrachloroethene	190 26	5 5
	MW-6S	1,1,1-trichloroethane	19	5
	MW-13	1,1,1-trichloroethane	30	5
	MW-19S	1,1,1-trichloroethane	6	5
Deep Ground water	MW-1D	1,1-dichloroethene 1,1,1-trichloroethane	7 8	5 5
	MW-4D	1,1,1-trichloroethane	8	5
	MW-6D	1,1,1-trichloroethane Trichloroethene	6 6	5 5
	MW-19D	1,1-dichloroethene 1,1,1-trichloroethane 1,2-dichloroethene (total) Chloroform Tetrachloroethene Trichloroethene	11 16 8 19 57 33	5 5 5 7 5 5

These data indicate that, in the shallow aquifer, VOC impacts are limited to just a few constituents with relatively low concentrations, with the exception of well MW-4S which has a moderate concentration of 1,1,1,-TCA of 190 ug/L. Similarly, in the deep aquifer, VOC impacts are limited to just a few constituents at concentrations only slightly above cleanup levels at a few wells (note that MW-19D, the furthest downgradient well, has the highest concentrations but those concentration levels are still not very high). URS suggests in the 2003 Annual Performance Monitoring Report that most or all of the impacts at MW-19D likely originate at a source upgradient of the subject property, and this interpretation was generally supported by the site regulators during the RSE-Lite call. The RSE-Lite team agrees that, based on information we have reviewed, it is likely that some of the impacts at MW-19D are not site-related.

Several inorganic parameters have historically exceeded water quality criteria (e.g., iron, manganese, chromium). It was reported during the RSE-Lite phone call that total chromium in ground water was the major concern with respect to inorganics in ground water. Recent sampling (April 2003) was performed using filtering, and all of the chromium results for the filtered samples were “not-detected”. Therefore, it appears that the elevated chromium was being caused by high turbidity in the samples, and that dissolved chromium is not an issue. As discussed later, sampling for inorganics has since been terminated. This suggests that VOCs are the primary concern with respect to ground water cleanup moving forward. It is important to note that iron and manganese, while not a major concern with respect to ground water cleanup, do in fact cause significant problems within the ground water treatment plant (discussed later).

2.0 SYSTEM DESCRIPTION

2.1 SYSTEM OVERVIEW

The ground water treatment system began operation on June 28, 2000 (2003 Annual Performance Monitoring Report) and the Operational and Functional date was May 2001 as reported by the RPM. The major components of the ground water remedy include the following:

- extraction of impacted ground water from three extraction wells screened in the shallow portion of the saturated Upper Glacial Aquifer

- treatment of the impacted ground water, via filtration, air stripping, and carbon adsorption

- re-injection of the treated ground water into the Upper Glacial Aquifer via an infiltration gallery

- disposal of treatment residuals at a Resource Conservation Recovery Act (RCRA) Subtitle C Facility

The design flow rate is reported differently in different documents. In the OU-2 ROD, the selected alternative had a simulated total flow rate from the extraction wells of 135 gpm, and the treatment plant was to be designed for 150 gpm. In the Interim Remedial Action Report (April 2001) it was reported that the three wells could produce 80 gpm, and the design flow rate of the plant would be kept at 150 gpm. In reality, the extraction wells pump intermittently, so that the long term average total extraction rate for the wells is on the order of 35 gpm (though instantaneous rates are higher when the wells actually pump). The actual instantaneous flow rates through the treatment plant, and instantaneous flow rates to the discharge gallery, are higher than the long-term average extraction rate, as managed within the plant.

High concentrations of iron are of significant note for this system. As discussed in more detail below, the iron is the cause of much of the labor associated with the treatment system, and the cause of much of the system down time.

2.2 EXTRACTION SYSTEM

The ground water extraction system consists of three extraction wells (RW-1, RW-2, and RW-3) each equipped with a submersible pump and piping that discharges ground water to an on-site treatment plant. The extraction well locations are presented on Figure 1-1:

- RW-1 is furthest north, closest to the Circuitron property
- RW-2 is approximately 300 feet south of RW-1
- RW-3 is approximately 600 feet south of RW-2

The bottom of the well screens for RW-1, RW-2, and RW-3 were installed at depths of 56 feet, 56 feet, and 54 feet bgs, respectively.

The manner in which the flow rates are reported is somewhat confusing. This results from the fact that the wells operate intermittently, and therefore there is a significant difference between instantaneous flow rates and long-term average flow rates. Based on information provided in the monthly reports, instantaneous flow rates at each of the extraction typically range from 30 to 60 gpm. However, based on daily flow meter readings during January to March 2004, the RSE team calculates long term average flow rates as follows:

Extraction Well	Reading 2-Jan-04 (gallons)	Reading 31-Mar-04 (gallons)	Change in ~89 days (gallons)	Long-Term Rate (gpm)
RW-1	22187174	23917094	1729920	13.5
RW-2	8832669	9805485	972816	7.6
RW-3	20553691	22407274	1853583	14.5

Thus, the long-term total extraction rate is on the order of 35 gpm.

The influent concentrations of specific constituents is not measured at the individual extraction wells, so they cannot be reported herein. However, the combined influent concentrations of VOCs is extremely low (generally between 10 and 20 ug/L). Based on a long-term extraction rate of 35 gpm, and VOC influent of 15 ug/L, the mass of VOCs removed by the treatment plant can be calculated as follows:

$$\frac{35\text{ gal.}}{\text{min.}} \times \frac{15\text{ ug}}{\text{L}} \times \frac{1{,}440\text{ min.}}{\text{day}} \times \frac{3.785\text{ L}}{\text{gal.}} \times \frac{\text{kg}}{10^{9}\text{ ug}} \times \frac{2.2\text{ lbs.}}{\text{kg}} = \frac{0.006\text{ lbs.}}{\text{day}}$$

Based on the distribution of VOCs in monitoring wells, it is likely that the vast majority of influent VOCs are produced by RW-1. It is possible that both RW-2 and RW-3 are producing water below the ground water cleanup criteria for VOCs.

2.3 TREATMENT SYSTEM

The treatment system is housed in a 60 foot by 40 foot metal building, and consists of the following components:

- equalization tank with air diffusers (air supplied by a compressor)
- pre-filtration system with the use of two sets of 10-micron bag filters in parallel followed by two sets of 5-micron bag filters in parallel
- tray stripper with 99% design efficiency
- final filtration system with the use of two sets of 5-micron filter bags, in parallel
- two 4,000 pound liquid phase GAC units, in parallel
- effluent tank
- reinjection trench
- waste disposal

Flow through the treatment plan is regulated by levels in the equalization tank, and therefore does not equal the instantaneous pumping rate. During the RSE-Lite conference call, it was stated that flow rate through the treatment plant is generally on the order of 50 gpm, which is lower than the design flow rate of the plant (150 gpm). Influent concentrations of VOCs (the primary contaminants of concern with respect to ground water cleanup) are much lower than design values. For instance, according to Table 1 of the O&M plan, the expected influent concentration for 1,1,1-TCA is 800 ug/L, whereas the actual influent concentration of total VOCs has been approximately 10-20 ug/L for the last several years (and always less than 100 ug/L)

2.4 MONITORING PROGRAM

Currently, there is a network of 19 monitoring wells located at and around the Circuitron site that are used for ground water monitoring of the OU-2 remedy. Shallow wells (screened in the shallow portion of the Upper Glacial Aquifer) are 34 to 40 feet deep. Deep wells (screened in the deep Upper Glacial Aquifer or Magothy Aquifer) are 99 to 101 feet deep. Of the 19 monitoring wells, 12 are shallow and 7 are deep. For the performance monitoring period of June 2000 to December 2003, water level data and ground water quality data were collected from each well in the network. Water levels were measured monthly from each well and ground water samples were collected quarterly for VOCs and semi-annually for inorganic analyses. At present, well sampling has been reduced to annual frequency for VOC and no sampling for inorganics.

Several inorganic parameters have historically exceeded water quality criteria (e.g., iron, manganese, chromium). It was reported during the RSE-Lite phone call that elevated total chromium had been the reason for continued metals sampling. Recent sampling (April 2003) was performed using filtering, and all of the chromium results for the filtered samples was “not-detected”. Therefore, it appears that the elevated chromium was being caused by high turbidity in the samples, and that dissolved chromium is not an issue. Therefore, it was reported during the RSE-Lite phone call that sampling for metals at the monitoring wells will be discontinued in the future.

Process samples analyzed monthly include influent and effluent samples for VOCs, metals, TDS, O&G, pH, nitrate and temperature. A post filtration sample is also analyzed for metals and a post air stripper sample is analyzed for VOCs.

3.0 SYSTEM OBJECTIVES, PERFORMANCE AND CLOSURE CRITERIA

3.1 CURRENT SYSTEM OBJECTIVES AND CLOSURE CRITERIA

The OU-2 ROD specified the following "Remedial Action Objectives" for the ground water remedy:

- prevent potential future ingestion of site-related contaminated ground water
- restore the quality of the ground water contaminated from the site-related activities to levels consistent with the State and Federal drinking water and ground water quality standards
- mitigate the off-site migration of the site-related contaminated ground water.

The OU-2 ROD also provides the following "Remediation Goals":

> "The goal of the selected remedy is to restore the ground water to drinking water quality. Based on information obtained during the FFS and on a careful analysis of remedial alternatives, NYSDEC and EPA believe that the selected remedy will achieve this goal. The extracted ground water will be treated until all organic and inorganic contaminant concentrations have been reduced such that they are equal to or less than their respective State and Federal drinking water and ground water quality standards prior to reinjection. In addition, State and Federal drinking water and ground water quality standards will also be met in the treatment system effluent prior to reinjection...
>
> However, it may become apparent, during implementation or operation of the ground water extraction system, that contaminant levels have ceased to decline and are remaining constant at levels higher that the drinking-water standards over some portion of the contaminate plume. In this case, the system performance standards and/or the remedy may be re-evaluated...
>
> During the performance of the long-term monitoring, NYSDEC and EPA may determine that the remedial action objective has been met. Periodic monitoring will be used to re-assess the time frame and the technical practicability of achieving cleanup standards. Upon meeting all remedial objectives, or determining that the Site has been sufficiently purged of contaminants so that public health is no longer threatened by exposure to the Site, EPA will initiate proceedings to delete the Site from the NPL."

Therefore, the goal of the remedy is cleanup to drinking water quality, but the ROD does establish a basis for shutting down the system prior to reaching those standards if it is determined that contaminant levels will remain at sufficiently low and relatively constant levels for an extended period of time and public health will not be threatened.

The ground water quality criteria for contaminants of concern are as follows:

Constituent	NY Water Quality Criteria (ug/L)
VOCS:	
1,1-DCA	5
1,1-DCE	5
1,1,1-TCA	5
1,2-DCE(total)	5
Acetone	
Chloroform	7
Methylene Chloride	5
PCE	5
Toluene	5
TCE	5
METALS:	
Antimony	3
Arsenic	25
Beryllium	3
Chromium	50
Copper	200
Iron	300
Lead	15
Manganese	300
Mercury	0.7
Nickel	100

3.2 TREATMENT PLANT OPERATION STANDARDS

The treatment plant is subject to effluent criteria established in a letter from NYDEC dated December 27, 1999 (see attachment 7 of the "Interim Remedial Action Report"). The following criteria are listed in the permit equivalent:

Parameter	Effluent Criteria	Parameter	Effluent Criteria
Flow	220,000 gpd (153 gpm)	Lead	50 ug/L
pH	6.5 to 8.5	Mercury	1.4 ug/L
Nitrate (as N)	10 mg/L	Nickel	200 ug/L
Oil & Grease	15 mg/L	Methylene Chloride	5 ug/L
TDS	500 mg/L	1,1-Dichloroethane	5 ug/L
Antimony	6 ug/L	1,1,1-Trichloroethane	5 ug/L
Arsenic	50 ug/L	Tetrachloroethane	5 ug/L
Beryllium	3 ug/L	Toluene	5 ug/L
Chromium	100 ug/L	Cloroform	7 ug/L
Copper	1000 ug/L		

Note that there is no effluent criteria for iron or manganese. Monitoring frequency for effluent is monthly. Also note that the effluent standard is higher than the groundwater cleanup standard for some constituents.

4.0 FINDINGS AND OBSERVATIONS FROM THE RSE SITE VISIT

4.1 FINDINGS

The observations provided below are not intended to imply a deficiency in the work of the system designers, system operators, or site managers but are offered as constructive suggestions in the best interest of the EPA and the public. These observations obviously have the benefit of being formulated based upon operational data unavailable to the original designers. Furthermore, it is likely that site conditions and general knowledge of ground water remediation have changed over time.

The primary issues facing the site team are as follows:

- Although iron and manganese are not constituents of particular concern from a ground water remediation standpoint, they are a primary focus in running the treatment plant and are the cause for much of the labor and system maintenance.

- If P&T continues, can the system be improved to reduce clogging of the infiltration trench, reduce impacts of iron and manganese with respect to treatment plant operation, and reduce costs?

- The concentrations of VOCs, while above ground water standards, are only slightly elevated and there may be reason to consider terminating the P&T. As discussed in Section 3, the ROD indicates that "upon meeting all remedial objectives, *or determining that the Site has been sufficiently purged of contaminants so that public health is no longer threatened by exposure to the Site*, EPA will initiate proceedings to delete the Site from the NPL".

These issues are further explored in the discussion below.

4.2 SUBSURFACE PERFORMANCE AND RESPONSE

4.2.1 WATER LEVELS

Water levels are monitored monthly. Several potentiometric surface maps over time were presented in the 2003 Annual Performance Monitoring Report. The water levels at recovery wells are not utilized because of well losses at those wells, and the RSE team concurs with not using the water levels at recovery wells. There appears to have been a decline in water levels of approximately 6 feet between June 2000 (pre-pumping) and August 2002. Some of that may be due to remedy pumping and some may be due to the drought that occurred in the region over that period. In April 2003, water levels intermediate to those measured in June 2000 and August 2003 were observed.

4.2.2 CAPTURE ZONES

Capture evaluation at the site is limited to the Upper Glacial Aquifer, because that is the zone where active remediation is targeted. EPA Region 2 indicated in comments on the 2003 Annual Performance Monitoring Report that they are pleased with the analysis provided by URS that compares simulated versus observed capture zones, and generally concur with URS that site related constituents are generally being captured by the existing system (though some gaps in capture, such as near MW-19S, are possible).

It is not clear that a specific "Target Capture Zone" has been documented. During the RSE-Lite call, the EPA and State regulators indicated that some gaps in capture, if present, are not a major concern at this time due to the low remaining concentrations in ground water and lack of nearby receptors. It was also noted during the RSE-Lite call that impacts in the deep aquifer at downgradient well MW-19D (assumed to be mostly or completely due to sources upgradient of the site) are not likely captured by the P&T system.

4.2.3 CONTAMINANT LEVELS

Locations where individual VOC constituents exceeded ground water standards in April 2003 were previously summarized in Section 1.5. Trends in total VOCs since June 2000 (when P&T began) are presented below.

Total VOCs 2000 - 2003

Well Type	Monitoring Well	Jun 2000	Oct 2000	Jan - Feb 2001	Apr - May 2001	Jul - Aug 2001	Oct 2001	Jan - Feb 2002	Jul - Aug 2002	Apr 2003
Shallow	MW-1S	16	ND	5	ND	56	4	8	ND	5
Shallow	MW-3S	20	13	5	7	8	8	6	*4	4
Shallow	MW-4S	1155	915	720	279	93	328	347	NS	219
Shallow	MW-6S	15	374	119	89	*112	107	64	NS	19
Shallow	MW-7S	ND	*2	*2	ND	ND	11	NS	NS	ND
Shallow	MW-13	154	397	124	47	41	31	35	*14	34
Shallow	MW-14	30	10	17	13	14	15	21	1	6
Shallow	MW-15	68	*1	*35	29	ND	5	*2	ND	ND
Shallow	MW-16	ND	ND	ND	*	ND	1	3	ND	ND
Shallow	MW-17	44	71	37	11	14	32	26	8	4
Shallow	MW-18	ND	ND	13	13	*	10	ND	ND	ND
Shallow	MW-19S	17	34	21	14	13	16	5	5	10
Deep	MW-1D	61	52	45	*41	7	*53	57	45	27
Deep	MW-3D	5	2	7	4	5	5	8	1	1
Deep	MW-4D	*94	57	49	50	41	38	43	37	*23
Deep	MW-5D	*10	30	4	7	4	8	ND	ND	ND
Deep	MW-6D	30	24	35	14	20	31	17	37	25
Deep	MW-7D	30	35	29	36	23	32	*28	19	*8.5
Deep	MW-19D	133	139	136	158	176	*180	214	199	146

- All concentrations in µg/L.
- ND: No VOCs detected.
- Values marked with an asterisk are the arithmetic mean of normal and duplicate samples.
- NS: Not Sampled.

These data indicate that peak concentrations in the shallow aquifer have declined significantly (e.g., MW-4S, MW-6S, MW-13, MW-15) since 2000. Concentrations in the deep aquifer have also generally declined, except at downgradient well MW-19D, where total VOC concentrations have remained relatively steady since 2000.

Recent influent 1,1,1-TCA concentrations have been in the 7 to 15 ug/L range (12ug/L in April 2004 and 9 ug/L in May 2004). Samples from individual extraction wells have not been collected.

4.3 COMPONENT PERFORMANCE

4.3.1 EXTRACTION SYSTEM WELLS, PUMPS, AND HEADER

Information on individual extraction wells, including extraction rates, was presented in Section 2.1 and 2.2 (including discussion regarding the intermittent nature of pumping over the course of a day). Header piping is double wall HDPE. Types and sizes of pumps in the extraction wells were not identified in material reviewed by the RSE-Lite team.

4.3.2 EQUALIZATION/INFLUENT TANK

The size of this tank was not identified in material reviewed by the RSE-Lite team. Flow through the treatment system is controlled by a flow control valve, adjusted to approximately 50 gpm to keep the system operating 24 hours per day, 7 days per week. Cleaning is performed approximately twice per year.

4.3.3 METALS REMOVAL SYSTEM (FILTRATION)

The system has a high influent iron concentration (17,900 ug/L in April 2004 and 13,600 in May 2004). These values are higher than the design value of 5,894 ug/L. The site contractor notes that influent iron concentrations as high as 217,000 ug/L have been observed twice in the past four years. On a normal basis, three to four times the design iron concentrations are observed.

The ROD had indicated that metals precipitation would be a remedy component, but ultimately only filtration was implemented. This was likely a cost-effective choice. There are filters both before and after the air stripper:

- filtration prior to the air stripper uses two sets of 10-micron bag filters in parallel followed by two sets of 5-micron bag filters in parallel

- filtration after the air stripper uses one set of two 5-micron filter bags in parallel

Due to the high iron level, frequent bag filter changes are required. The pre-stripper bag filter change-outs in April 2004 included 78 10-micron bags and 18 5-micron bags, and post-stripper change-outs included 60 5-micron bags. In May 2004 the pre-stripper change-outs were 60 10-micron bags and 42 5-micron bags, and post-stripper change-outs included 12 5-micron bags. Therefore, bags are essentially changed every day. Pipes and vessels associated with filters are cleaned quarterly. The pre-stripper filtration uses four 20-horsepower pumps, and the post-stripper filtration uses two 15-horsepower pumps.

4.3.4 AIR STRIPPER

The tray stripper is designed to be 99 percent efficient for VOC treatment. The blower is 20 horsepower. Influent concentrations of VOCs are quite low (approximately 15 ug/L). As discussed in Section 2.2, at about 35 gpm these concentrations yield about 0.006 pounds per day, or approximately 2 pounds per year. Based on monthly reports reviewed by the RSE-Lite team, VOCs are reduced to non-detect by the stripper.

The air stripper is powerwashed approximately once per month. The emissions are treated with vapor phase GAC and are monitored by FID/PID per the 12/28/99 permit acceptance letter.

4.3.5 GAC

Two 4000-pound GAC units are operated in parallel. Given that the effluent from the air stripper is apparently non-detect for VOCs, the need for GAC for treatment of VOCs is questionable. Backwashing occurs once per week, and changeouts have occurred approximately three times per year (each changeout takes one day). Since loading from VOCs is not likely an issue, the carbon is likely being replaced due to fouling by inorganics.

4.3.7 EFFLUENT TANK AND DISCHARGE

The size of the effluent tank was not identified in documents reviewed by the RSE-Lite team. A 20-horsepower pump is utilized for discharge to the reinjection trench. Cleaning of the effluent tank occurs approximately twice per year. Water is conveyed to a reinjection trench (located on Figure 1-1). There have been problems with the reinjection trench not draining quickly enough. It is difficult to clean due to limited access. A 10,000 PSI water jet is utilized to clean the laterals (requires less than one day), and cleaning is then not needed for another 3-5 months. While this has been an adequate solution in the short-term, it may not be adequate for the long-term if fouling gets progressively worse. Other options may include installing a new drain, using an acid wash to reduce fouling, or discharge to the town sewer.

4.3.8 WASTE DISPOSAL

Waste disposal primarily consists of filter bags and sludge from plant cleaning. These are disposed of as non-hazardous waste.

4.3.9 SYSTEM CONTROLS

System controls were not evaluated during the RSE-Lite call.

4.4 COMPONENTS OR PROCESSES THAT ACCOUNT FOR MAJORITY OF MONTHLY COSTS

The following information was provided by the RPM. Costs are approximately $400,000 per year.

O&M Category	Actual Annual Costs for FY03	Actual Annual Costs for FY04	Projected Annual Costs for FY05
Labor: project management, reporting,	$105,214	$110,000	$115,000
Labor: system operation	$150,118	$155,059	$160,000
Labor: groundwater sampling	$11,598	$6,000	$6,000
Utilities: electricity	$37,424	$38,712	$40,000
Utilities: other	$6,646	$6,500	$6,500
Consumables (GAC, chemicals, etc.)	$22,831	$23,916	$25,000
Discharge or disposal costs	$19,838	$20,919	$22,000
Analytical costs	$11,845	$13,422	$15,000
Other (parts, routine maintenance, etc.)	$20,599	$25,300	$30,000
O&M Total	**$386,113**	**$399,828**	**$419,500**

Additional details regarding costs are provided below.

4.4.1 UTILITIES

The power costs of approximately $40,000 per year (2005 projection) are very high considering that the system is relatively simple. At about $0.12 per KW-hr the average load is about 38 KW. The motors in operation include the 20- HP air stripper blower, four 20-HP pre-stripper pumps (loaded to 80 psi), two 15-HP post-stripper pumps, and a 20-HP effluent pump. These pumps are likely oversized, and could probably be replaced by smaller (i.e., 5-HP) transfer pumps.

4.4.2 NON-UTILITY CONSUMABLES AND DISPOSAL COSTS

These include liquid GAC costs and bag filters. LGAC (two 4,000-pound vessels) is currently changed three times per year. Given that VOCs are non-detect after the stripper, LGAC and associated costs could potentially be avoided.

4.4.3 LABOR

This consists of system operation labor, project management labor, and ground water sampling labor. These combined costs are the largest component of system cost (almost 60%).

System operation labor costs are $160,000 per year (2005 projection). The operator duties include vessel and pipe cleaning, backwashing the LGAC weekly, power washing the air stripper monthly and changing the bag filters as required (daily). Also included are monthly water levels, inspections and monthly reports, changing the carbon, power jetting the infiltration trench, grounds maintenance, and other maintenance. Man-hours worked in April and May were 301 and 241.5 respectively. The $160,000 per year roughly translates to 1.5 FTEs at $50 per hour, or 1 FTE at $80 per hour.

Project management costs are projected at $115,000 for combined URS and Army COE costs. This roughly translates to 0.5 FTEs at $110 per hour. This cost is higher (percentage-wise and dollar-wise) than similar systems with similar good management and reporting observed in previous RSEs. However, it is noted that this system has had significant operational issues resulting from the metals, which may account for some increased management cost.

4.4.4 CHEMICAL ANALYSIS

For ground water sampling, analysis for metals has recently been eliminated, and VOC sampling has been reduced to annual. Given there are 19 monitoring wells, and allowing for trip blanks, field blanks, and duplicates, analytical costs for ground water sampling should be less than $4,000.

Process samples analyzed monthly include influent and effluent samples for VOCs, metals, TDS, O&G, pH, nitrate and temperature. A post filtration sample is also analyzed for metals and a post air stripper sample is analyzed for VOCs. These analytical costs are likely on the order of $10,000 per year.

4.5 RECURRING PROBLEMS OR ISSUES

The major recurring issues are the result of the high metals concentrations (iron, manganese) which cause frequent changing of bag filters, and also fouling of the injection trench.

4.6 REGULATORY COMPLIANCE

No issues were identified during the RSE-Lite call.

4.7 TREATMENT PROCESS EXCURSIONS AND UPSETS, ACCIDENTAL CONTAMINANT/REAGENT RELEASES

None identified during the RSE-Lite call.

4.8 SAFETY RECORD

No issues were identified during the RSE-Lite call.

5.0 EFFECTIVENESS OF THE SYSTEM TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT

5.1 GROUND WATER

During the RSE-Lite call there did not appear to be any concern among the EPA and State regulators with respect to system protectiveness. This is the result of relatively low VOC concentrations in ground water (though above cleanup standards) that have declined over time and a lack of nearby receptors of immediate concern. It is also the opinion of the site team that deeper contamination observed at MW-19D results from an upgradient source and not this site.

The RSE-Lite team agrees, to the extent there are no nearby receptors that are using the ground water, that the system is likely protective. However, the system is likely doing little or nothing to enhance protectiveness, and a non-pumping approach be equally protective, at reduced cost (see Section 6.4).

5.2 SURFACE WATER

No nearby surface water bodies (or issues) were identified during the RSE-Lite call.

5.3 AIR

No issues were identified during the RSE-Lite call.

5.4 SOILS

Soils were not discussed in detail during the RSE-Lite call, which focused on the ground water remedy. However, it was briefly discussed that there could potential be a small continuing source of ground water contamination in the unsaturated zone near MW-4S, given the moderate concentrations of 1,1,1-TCA that remain at that well.

5.5 WETLANDS AND SEDIMENTS

No issues were identified during the RSE-Lite call.

6.0 RECOMMENDATIONS

Cost estimates provided herein have levels of certainty comparable to those done for CERCLA Feasibility Studies (-30/+50%), and these cost estimates have been prepared in a manner consistent with EPA 540-R-00-002, *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, July 2000.

The RSE-Lite team recognizes and applauds recent efforts to reduce the long term monitoring by determining that elevated total chromium is apparently due to high sample turbidity (thus eliminating the need to monitor for metals in the future), and also reducing the monitoring frequency for VOCs to annual. There appears to be a good working relationship between the EPA and the State, and between the site contractor, the EPA RPM, and EPA Region 2 support staff.

The recommendations below are not intended to imply a deficiency in the work of either the system designers or operators but are offered as constructive suggestions in the best interest of the EPA and the public. These recommendations have the obvious benefit of being formulated based upon operational data unavailable to the original designers.

6.1 RECOMMENDATIONS TO IMPROVE EFFECTIVENESS

6.1.1 PERIODICALLY EVALUATE IF EXISTING INSTITUTIONAL CONTROLS REMAIN SUFFICIENT

The Region indicated to the RSE-Lite team that two separate provisions of New York state law preclude the installation of wells on Long Island (where the site is located) without appropriate permits. Additionally, the site is located in an area which is currently zoned for light industrial use and has an existing municipal water supply. These existing institutional controls, combined with a continuing federal presence at the site, provide adequate current protection of potential receptors. The RSE-Lite team recommends that the site team periodically (e.g., every one or two years) verify that these existing institutional controls remain in place and continue to afford adequate protection of potential receptors. The annual cost of this effort should be less than $1,000.

6.2 RECOMMENDATIONS TO REDUCE COSTS

The following cost reduction recommendations assume continued P&T operation. As discussed in Section 5.1, the RSE-Lite team actually favors an alternate approach where P&T is discontinued at this site, and that approach is further detailed in Section 6.4 ("Considerations for Gaining Site Closeout").

6.2.1 ELIMINATE LIQUID PHASE GAC

The LGAC units are not necessary given that the air stripper has 99% design efficiency and influent 1,1,1- TCA concentrations are only slightly above discharge standards. System operations sampling shows that VOCs are removed to non-detect prior to the GAC. The GAC requires considerable time and cost to operate and maintain. The GAC is changed-out about three times per year due to sediment fouling. The annual GAC change-out cost is likely greater than $20,000, and additionally a large portion of $22,000 disposal cost is reported to be for GAC disposal. So the total cost savings (not including labor) are about $40,000 per year. The operator also spends considerable time backwashing the GAC, but labor costs are considered separately below. This change would likely not require an Explanation of Significant Differences (ESD) or ROD Amendment.

6.2.2 SAMPLE EXTRACTION WELLS, AND POTENTIALLY ELIMINATE PUMPING AT RW-2 AND RW-3

Ground water has not been sampled at the individual extraction wells. However, based on the system influent concentrations and the recovery well locations, it is very likely that RW-2 and RW-3 are pumping water at concentrations below cleanup goals. Sampling should be conducted to verify this hypothesis (estimated one-time cost of approximately $2,000). If impacts at either of these wells is sufficiently low in the opinion of the site team (presumably at or near cleanup levels for all constituents), the site team should consider eliminating pumping either or both of these wells. The site team has indicated that there are no nearby receptors of immediate concern, the threat of continued contaminant migration beyond these wells is minimal, and the amount of mass being recovered by these wells is likely negligible. This reduced flow rate in the treatment plant will reduce load on the bag filters and the drainage problems at the reinjection trench, which ultimately will reduce costs. Electrical costs will also be reduced. Specific cost reductions from this recommendation are quantified as part of other recommendations (6.2.3 and 6.2.4). These wells could subsequently be added to the monitoring program after shutdown, but existing monitoring wells likely provide sufficient spatial coverage.

6.2.3 REVISE BAG FILTER CONFIGURATION

Once the liquid GAC (and associated backwashes) are eliminated, and the flow rate is potentially decreased by eliminating pumping at RW-2 and RW-3, the number of bag change-outs should decrease. To further optimize the system, the site team may want to consider modifications to the bag sizing and configuration. The goal should be to decrease bag filter change-out frequency so that it can be done less frequently than daily, thus eliminating the need to have the system staffed daily.

For both the pre-stripper and post-stripper filtration we recommend one bag size with all filters in parallel. Additional bag filter housings beyond the four existing pre-stripper and two existing post-stripper housings could be added to reduce the frequency of changeouts. For example having eight pre-stripper bags and six post-stripper bags in parallel in April 2004 and May 2004 would have allowed change-outs on a schedule of every two to three days. With reduced flow (See section 6.2.2) and no carbon backwash (see Section 6.2.1), it could be even less frequent. Each additional filter housing installed should require approximately $2,000 so approximately $16,000 might be needed for the configuration above. Cost savings for this recommendation are associated with operator costs discussed below. No impacts to plant automation or control logic are anticipated.

If the GAC vessel needs to be removed due to space limitations, an additional cost of $15,000 might be incurred. This has been added as a potential capital cost for recommendation. The RSE-Lite team does not recommend removing the GAC vessel unless absolutely necessary to house the additional bag filters.

6.2.4 REDUCE OPERATOR LABOR

The system has been operated with 1.0 to 1.5 FTEs. This seems mainly due to bag filter change-out requirements. By implementing recommendations 6.2.1 to 6.2.3, regular maintenance at the site should be reduced to 2 to 3 days per week. This should cut operator labor by 25 to 50%, a potential savings of $40,000 to $80,000 per year (estimate $60,000 per year savings).

6.2.5 REDUCE PROJECT MANAGEMENT LABOR

The URS/Army Corps reports are good and the system has been running successfully, but this has come with very high project management and reporting costs of $115,000 per year (2005 projection) for what is a relatively simple plume and a relatively simple treatment system. The system (especially when simplified as recommended) should require very little ongoing management, and analysis of ground water data is straightforward. The reports are well done but monthly efforts to update them should be minimal. The RSE team sees no reason that more than 40 hours per month of management and monthly reporting time would be necessary. This should translate to approximately $55,000 per year (at a rate of approximately $100 per hour). Adding on an additional budget of $25,000 for an annual report would bring the total to approximately $80,000, a $35,000 per year savings. This would be more in line with similar sites.

6.2.6 CONSIDER PUMP REPLACEMENT (SMALLER PUMP SIZES)

Replacing the existing pumps with 5 HP pumps would likely decrease electrical use at the site by at least 25% based on pump sizes reported during the RSE-Lite call. The savings from these changes would be approximately $10,000 per year. The capital cost to replace up to seven pumps would be about $25,000. Given that the system may only operate for a few more years, or be discontinued in favor of a non-pumping approach, this change may not be cost-effective. If the site team believes the system will operate for more than three years, then this change should be considered, and the larger horsepower pumps could continue to be used as backups.

6.3 MODIFICATIONS INTENDED FOR TECHNICAL IMPROVEMENT

6.3.1 CLARIFY REPORTING OF FLOW RATES

As discussed in Sections 2.1 and 2.2, the discussion of flow rates from the pumping wells is confusing in site reports. We recommend that discussion be added to each report clarifying instantaneous versus average rates at the pumping wells. Additionally, a clear discussion of how flow rates are regulated through the treatment plant (i.e., from the equalization tank and from the effluent tank), with both average and instantaneous rates, should be added.

6.3.2 CONSIDERATIONS REGARDING THE INFILTRATION TRENCH

The site team is considering using an acid drip system for the reinjection trench. Also a sequestering agent to reduce bag filter change-outs and reinjection trench and other system fouling could be considered. Based on the current operation and projected future improvements (no liquid GAC, reduced influent flow, and additional bag filters) we do not recommend these type of systems as they require additional maintenance and rarely result in significant operator time savings.

Discharging to the storm drain may be possible but stormwater is infiltrated and the required capacity may not be obtainable. This should only be examined further if the P&T system flow rate is maintained and the existing trench can no longer be used due to fouling or must be cleaned more frequently than once per month. The other alternative for discharge would be installing an additional trench; we do not recommend this option unless the existing trench cannot be used as discussed above. In fact, any system changes must be evaluated against a short term return on investment due to the minimal remaining contamination at the site and potential discontinuation of pumping in the near future.

6.4 CONSIDERATIONS FOR GAINING SITE CLOSE OUT

With respect to site closeout, the RSE-Lite team favors an approach at this site that attempts to identify and remediate any remaining source term to the extent such efforts are kept below a threshold cost, followed by cessation of active pumping if the site team achieves consensus to do so (e.g., perhaps based on a Technical Impracticability waiver or some other form of "monitoring only" remedy).

The RSE-Lite team recommends that, at this site, air sparging in conjunction with SVE in the MW-4S area might be a more cost-effective approach than other potential alternatives such as nutrient injection (e.g., HRC) or chemical oxidation, because it can be implemented with little additional characterization and pilot testing. This could accelerate the progress towards closure by reducing concentrations in and around MW-4S, whether or not pumping subsequently continues. A system with multiple air sparge points and vapor extraction with temporary equipment could be set up and run intermittently for a 3 to 5 months for approximately $100,000. The RSE-Lite team notes that similar source removal effort using air sparging is underway at the SMS Instruments site on Long Island, with much of the work provided by the EPA Region 2 Emergency Response Team. These efforts did not require a ROD amendment or ESD at the SMS instruments site. Equipment being purchased for the SMS Instruments site may be available by late 2005, contact RPM Mark Dannenberg for more information.

Limited characterization of the source area in the vicinity of MW-4S is warranted. The water level monitoring has shown a variation in the water table of roughly 6-8 feet, and soil contaminants may have accumulated in this zone. Delineation can be via use of direct push technology as well as a review of site drawings to assess if there was any underground piping, tank, or drywell in the vicinity. In any case, however, less than $500,000 should be expended on aggressive source removal efforts and any related characterization, given that an effective effort can be implemented for this amount and a modified P&T system might operate for under $300,000 per year (and only for a few years). The RSE-Lite team is not recommending that multiple source removal strategies be pilot tested or substantial characterization be performed, because that would likely drive costs beyond the $500,000 level identified above.

Once aggressive source removal is attempted, a non-pumping approach (whether or not based on a Technical Impracticability waiver) likely affords equivalent protectiveness compared to continued P&T. Technical Impracticability is pertinent given the general agreement that off-site sources of contamination are present, and those impacts are not going to be addressed by the current pumping remedy. The annual cost without active pumping would likely be less than $100,000 per year. A change to a non-pumping approach may require a ROD Amendment, but may only require an ESD based on language in the existing ROD (see Section 3.1).

6.5 SUGGESTED APPROACH TO IMPLEMENTATION

The recommendation to sample extraction wells and potentially eliminate pumping at RW-2 and RW-3 (6.2.2), and to clarify the reporting of flow rates (6.3.1) should be done immediately. Source removal efforts near MW-4S (6.4) also should be started as soon as possible. Recommendations to reduce costs within the treatment train (6.2.1, 6.2.3, 6.2.4) should only be considered if pumping is likely to continue for more than an additional six months, and will require further evaluation based on the initial items addressed. Reduced project management labor (6.2.5) could be realized after these other recommendations are implemented. The recommendation to consider smaller transfer replacement pumps (6.2.6) is only pertinent if pumping is expected to continue for more than three years. Evaluating if existing institutional controls remain in effect and are protective should occur periodically (e.g., every one to two years).

7.0 SUMMARY

The observations and recommendations contained in this report are not intended to imply a deficiency in the work of either the system designers or operators but are offered as constructive suggestions in the best interest of the EPA and the public. These recommendations have the obvious benefit of being formulated based upon operational data unavailable to the original designers.

The RSE-Lite team recognizes and applauds recent efforts to reduce the long term monitoring by determining that elevated total chromium is apparently due to high sample turbidity (thus eliminating the need to monitor for metals in the future), and also reducing the monitoring frequency for VOCs to annual. There appears to be a good working relationship between the EPA and the State, and between the site contractor, the EPA RPM, and EPA Region 2 support staff.

The RSE-Lite team suggests the following recommendation to improve system effectiveness:

- periodically (e.g., every one or two years) verify that existing institutional controls remain in place and continue to afford adequate protection of potential receptors.

To the extent that pumping continues the RSE-Lite team suggests the following recommendations for cost reduction:

- eliminate liquid phase GAC given that VOCs are not detected after the air stripper
- sample extraction wells, and potentially eliminate pumping at RW-2 and RW-3 because they extract negligible mass
- revise the bag filter configuration to use more bags in parallel to reduce the changeout frequency, allowing for system operation that does not require daily labor
- reduce operator labor to 2-3 days per week as a result of these other recommendations

The RSE-Lite team also believes project management labor cost is relatively high compared to similar sites, and should be reduced (especially after these other recommendations are implemented). A recommendation is also made to consider reducing pump sizes in the treatment plant, but that will only be cost-effective if pumping continues for more than three years.

The RSE team suggests the following recommendations for technical improvement:

- clarify reporting of flow rates (instantaneous versus average)
- continue with current infiltration approach (jetting every 3-5 months) rather than replacing with a new trench or using an acid drip

With respect to site closeout, the RSE-Lite team favors an approach at this site that attempts to identify and remediate any remaining source term to the extent such efforts are kept below a threshold cost, followed by cessation of active pumping if the site team achieves consensus to do so (e.g., perhaps based on a Technical Impracticability waiver or some other form of “monitoring only” remedy). The RSE-Lite team recommends that, at this site, air sparging in conjunction with SVE in the MW-4S area might be a more cost-effective approach than other potential alternatives such as nutrient injection (e.g., HRC) or chemical oxidation, because it can be implemented with little additional characterization and pilot testing, and equipment may be available from a nearby site (SMS Instruments). Less than $500,000 should be expended on aggressive source removal efforts, given that an effective effort can be implemented for this amount and a modified P&T system might operate for under $300,000 per year (and only for a few years). The RSE-Lite team is not recommending that multiple source removal strategies be pilot tested or substantial characterization be performed, because that would likely drive costs beyond the $500,000 level identified above.

Once aggressive source removal is attempted, a non-pumping approach (perhaps based on a Technical Impracticability waiver) likely affords equivalent protectiveness compared to continued P&T. Technical Impracticability is pertinent given the general agreement that off-site sources of contamination are present, and those impacts are not going to be addressed by the current pumping remedy. The annual cost without active pumping would likely be less than $100,000 per year. A change to a non-pumping approach may require a ROD Amendment, but may only require an Explanation of Significant Differences (ESD) based on language in the existing ROD (see Section 3.1).

Table 7-1 summarizes the costs and cost savings associated with each recommendation. Both capital and annual costs are presented. Also presented is the expected change in life-cycle costs over a 7-year period for each recommendation both with discounting (i.e., net present value) and without it. The 7-year time frame for the cost summary is based on a suggestion from the site team during the RSE-Lite call. This is not a firm timeframe, but is simply considered to be a useful timeframe for the purpose of this cost summary.

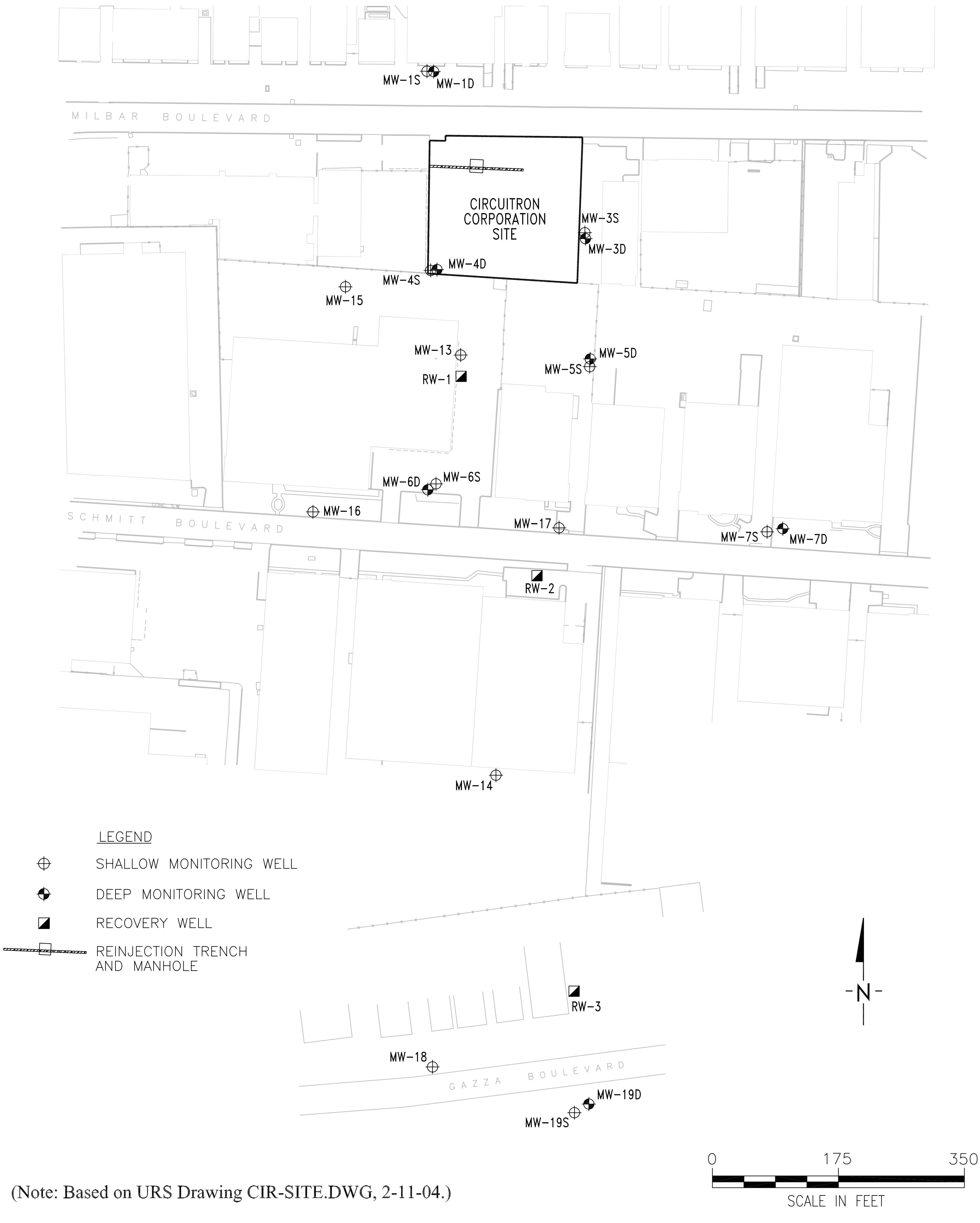
Table 7-1. Cost Summary Table

Recommendation	Reason	Additional Capital Costs ($)	Estimated Change in Annual Costs ($/yr)	Estimated Change In Life-cycle Costs ($) *	Estimated Change In Life-cycle Costs ($) **
6.1.1 Periodically Evaluate if Existing Institutional Controls Remain Sufficient	Effectiveness	$0	$1,000	$7,000	$6,000
6.2.1 (conditional) Eliminate LGAC	Cost Reduction	$0	($40,000)	($280,000)	($243,000)
6.2.2 Sample Extraction Wells, and Potentially Eliminate Pumping at RW-2 and RW-3	Cost Reduction	$2,000	included in 6.2.4	included in 6.2.4	included in 6.2.4
6.2.3 (conditional) Revise Filter Bag Configuration	Cost Reduction	$16,000 + $15,000 (if GAC vessels removed)	included in 6.2.4	included in 6.2.4	included in 6.2.4
6.2.4 (conditional) Reduce Operator Labor	Cost Reduction	$0	($60,000)	($420,000)	($366,000)
6.2.5 (conditional) Reduce PM Labor	Cost Reduction	$0	($35,000)	($245,000)	($213,000)
6.2.6 Consider Replacing Pumps (Only if Extraction to Continue Three Years or More)	Cost Reduction	$25,000	($10,000)	($45,000)	($36,000)
6.3.1 Clarify reporting of Flow Rates	Technical Improvement	$0	$0	$0	$0
6.3.2 Continue with Current Jetting for Infiltration Trench	Technical Improvement	$0	$0	$0	$0
6.4*** Recommendations for Site Closeout (Aggressive Source Removal, Potential Cessation of Pumping)	Site Closeout	$100,000 to $500,000	($300,000)	($1,600,000) to ($2,000,000)	($1,300,000) to ($1,700,000)

Costs in parentheses imply cost reductions.
* assumes 7 years of operation with a discount rate of 0% (i.e., no discounting)
** assumes 7 years of operation with a discount rate of 5% and no discounting in the first year
***in lieu of other cost-saving recommendations, assume that cost of non-pumping approach is less than $100,000 per year, versus approximately $400,000 per year for current system
Recommendations indicated as "conditional" are only pertinent if pumping is likely to continue for six months or more, and will require further evaluation based on the initial items addressed.

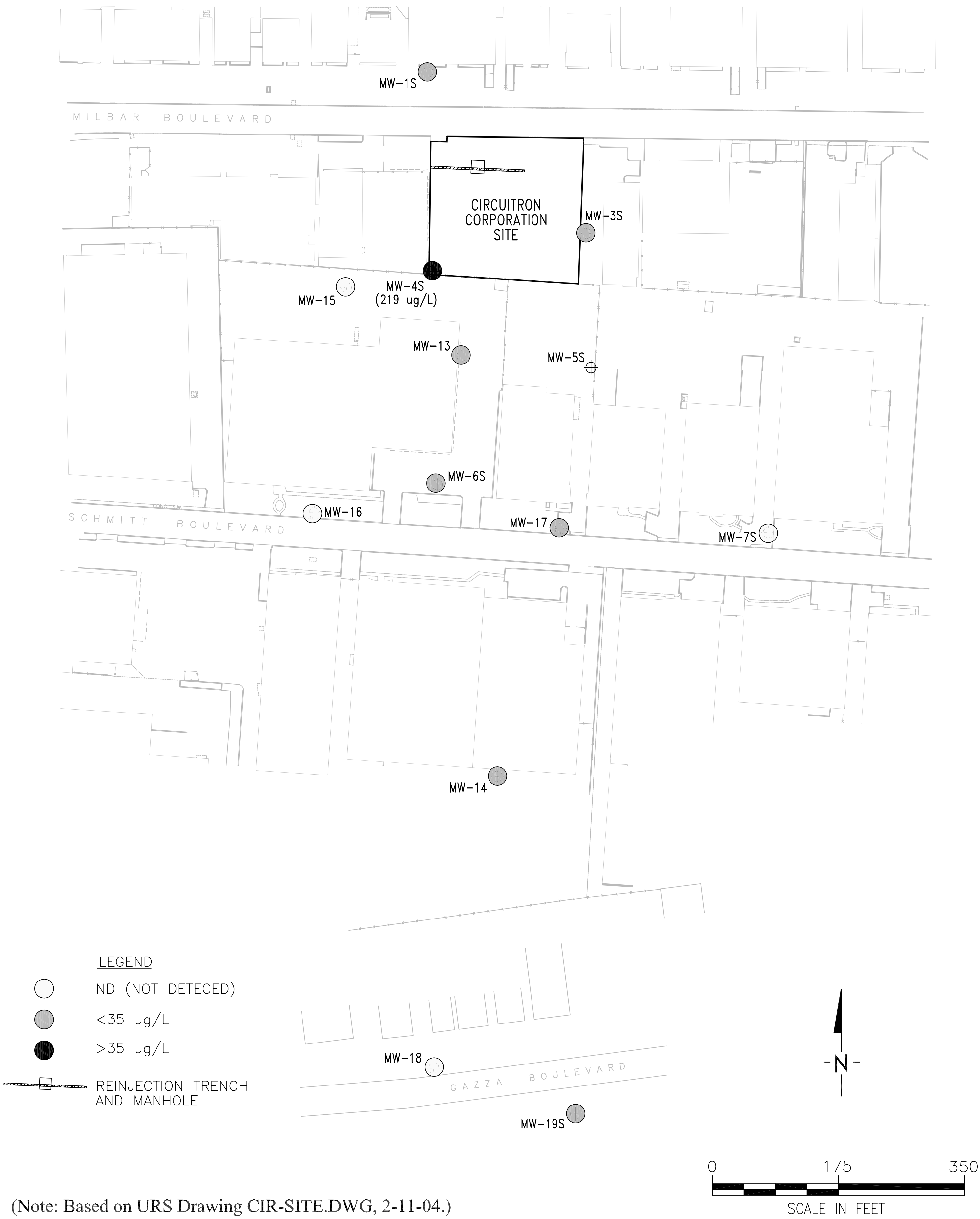
FIGURES

FIGURE 1-1. SITE MAP AND WELL LOCATIONS



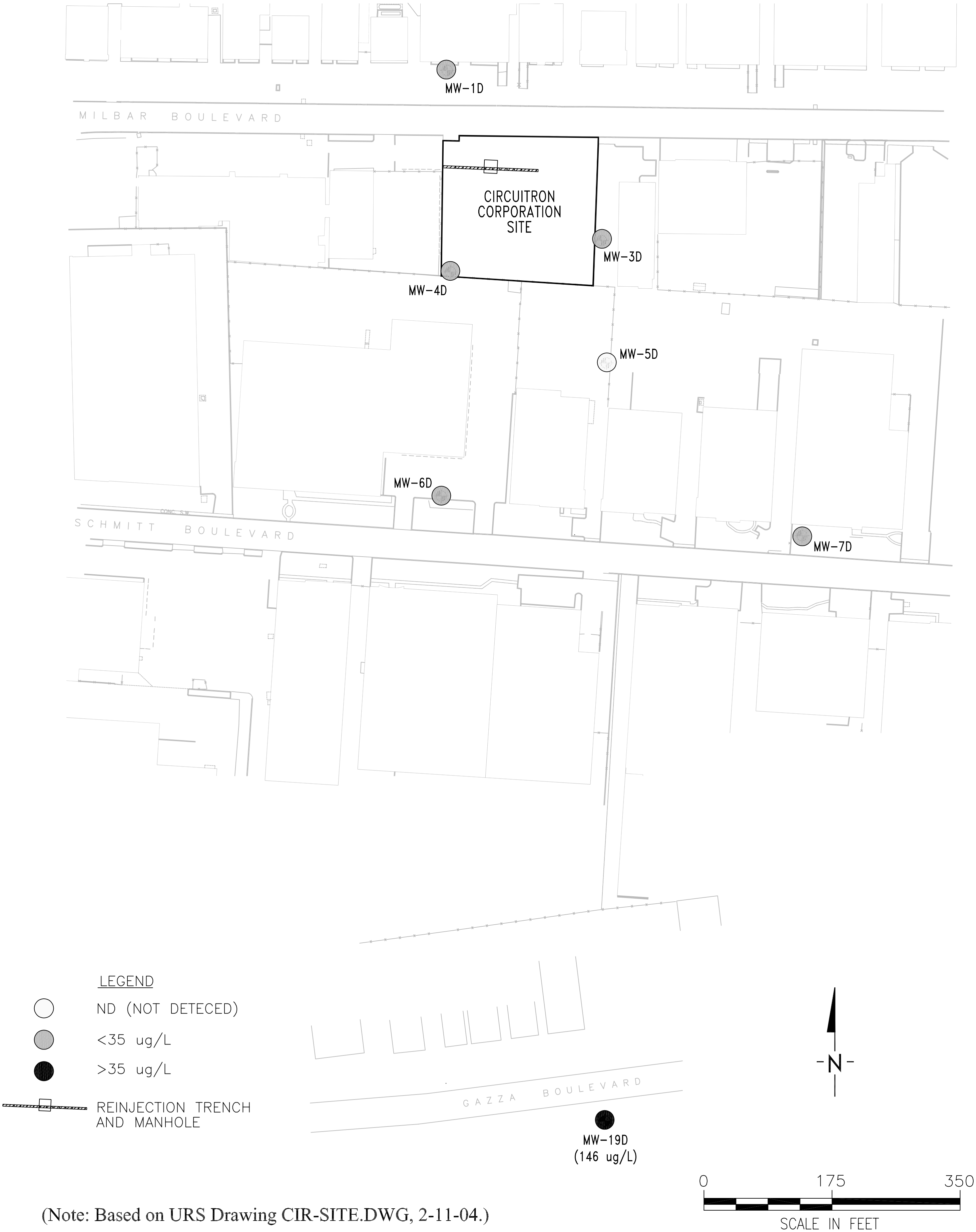
(Note: Based on URS Drawing CIR-SITE.DWG, 2-11-04.)

FIGURE 1-2. TOTAL VOCs, SHALLOW WELLS, APRIL 2003



(Note: Based on URS Drawing CIR-SITE.DWG, 2-11-04.)

FIGURE 1-3. TOTAL VOCs, DEEP WELLS, APRIL 2003



(Note: Based on URS Drawing CIR-SITE.DWG, 2-11-04.)