NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION

NYSDEC SUPERFUND CONTRACT
NO. D003826

REMEDIAL SYSTEM OPTIMIZATION PILOT STUDY

WORK ASSIGNMENT NO. D003826-10

NOW CORPORATION SITE
CLINTON, NY
SITE NO. 314008

Submitted to:

New York State Department of Environmental Conservation
Albany, New York

Submitted by:
MACTEC Engineering and Consulting, P.C.
Portland, Maine
Project Number 3612042018

NOVEMBER 2005

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REMEDIAL SYSTEM OPTIMIZATION PILOT STUDY

NOW CORPORATION SITE

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1.0 INTRODUCTION

MACTEC Engineering and Consulting, P.C. (MACTEC) has performed a Remedial Systems Optimization (RSO) evaluation for the NOW Corporation Site (Site) in Clinton Corners, New York. This work was done for the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment No. D0003826-10 of the July 1997 Superfund Standby Contract Number D003826 between the NYSDEC and MACTEC. The NYSDEC has assigned the NOW Corporation Site the Code No. 314008. The site is currently classified as a Class 4 site that has been substantially remediated but requires continued operation, maintenance and monitoring. An active groundwater extraction and treatment system (GWETS) and vapor extraction system (VES) are in operation.

1.1 SITE OVERVIEW

Various manufacturing and warehousing activities have been conducted at the Site since the early 1960s. In 1983 there were allegations of on-site disposal of tank rinsing solutions which were investigated by the NYSDEC. In February 1989, following a fire in the warehouse, samples of runoff water contained low levels of fuel and chlorinated solvent compounds. Sampling of homeowner wells in April 1989, detected the presence of several volatile organic compounds (VOCs). Point-of-entry water treatment systems at each home were initiated along with investigation activities leading to a Record of Decision (ROD) for groundwater in 1995 and a ROD for soil in 1996. Soil excavation and treatment, installation of a VES, and installation of a (GWETS) were completed by 1998. The VES and GWETS have operated since installation.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORK

The NYSDEC operates and maintains many remedial actions involving active remediation systems such as groundwater pump and treat systems and soil vapor extraction systems. These operations are a significant annual cost to the NYSDEC. In order to manage annual costs and optimize these systems, the NYSDEC decided to conduct a pilot program for RSO evaluations at three of its superfund sites. This report presents the results of the RSO evaluation for the NOW Corporation Site under the pilot program.

The overall objectives of the RSO evaluations under the pilot program are to review: current regulatory requirements; remedial action objectives and closure strategies; subsurface performance; equipment performance and maintenance; and current costs to develop recommendations that will accelerate site closure, improve performance, and/or reduce costs. The scope of work generally consists of a records review, interviews, and site visit. The records review included review, as available, of: remedial investigation, feasibility study, design and construction documents, operation and maintenance manual and records, appropriate permits, and performance data. The work is not intended to be a detailed and extensive review of all the work that has been and is currently being conducted at the Site. This work will identify additional work necessary to achieve cost reductions.

The RSO evaluation for the NOW Corporation Site focuses on not only the operational performance and maintenance of the VES and GWETS but also whether the VES and GWETS need to continue to operate.

MACTEC staff visited the Site on June 10, 2004 and conducted interviews with NYSDEC personnel affiliated with the Site and operators of the Site treatment facility from NYSDEC's operations contractor for the Site, EarthTech. In conjunction with the site visit, a file and records review was conducted at the NYSDEC office in Albany. A Site Visit Report is included in Appendix A.

1.3 REPORT OVERVIEW

Section 2.0 of this report provides a description of the remedial action systems for the Site. Section 3.0 presents the findings and observations from MACTEC's site visit and file review. Section 4.0 presents recommendations for modifications to the remedial system and additional or alternate remedial actions to support the eventual shutdown of the VES and GWETS.

2.0 REMEDIAL ACTION DESCRIPTION

This section presents a summary of the site history, investigation results, clean-up goals, previous remedial actions, and current treatment systems. The information contained in this section is based on MACTEC's site visit and the following primary documents:

- RI/FS Report (Engineering Science, 1995);
- ROD, OU 1 (NYSDEC, 1995);
- ROD, OU 2 (NYSDEC, 1996);
- Preliminary Design Submittal (Rust Environment and Infrastructure of New York, Inc., 1995).
- Record Documents (Earth Remediation Systems, 1998);
- Operation, Maintenance, and Monitoring Plan (EarthTech, 2002.);
- Monthly Operation Reports; and
- Monthly Summary Report – February 2004 and Six-Year Progress Report (EarthTech, 2004);

2.1 SITE LOCATION AND HISTORY

The Site is located at an active manufacturing and warehousing facility, adjacent to NYS Highway 9G in the Town of Clinton, Dutchess County, New York (Figure 2-1).

The property was purchased by Mr. Robert Fried in August 1957. Since the early 1960s, various businesses have operated on the Site including: Modern Machine and Tools (1961-1971), Virginia Chemicals, Inc. (1969-1977, bought out by Hoechst Celanese in 1981), NOW Corporation (1970s and 1980s), NOW Plastics (1982-1988 according to Mr. Fried), K&K Carpet, Tiffany Marble of New York, South American Development Corporation, and B&R Specialties, Inc. (current tenant).

In 1983 there were allegations of on-site disposal of tank rinsing solutions which were investigated by the NYSDEC. In February 1989, following a fire in the warehouse, samples of runoff water contained low levels of benzene, toluene, ethylbenzene, trichloroethene (TCE) and 1.1,1-trichloroethane (1,1,1-TCA). Sampling of homeowner wells in April 1989, detected the presence of several VOCs. From 1989, to the present, one of these wells has consistently shown contamination with VOCs.

2.2 REGULATORY HISTORY AND REQUIREMENTS

Regulatory history pertaining to the Site is summarized as follows:

- The first investigation of the Site, in 1975, consisted of sampling an on-site well by the Dutchess County Health Department. The samples collected were analyzed for metals and general water chemistry parameters only. Sample results showed only manganese at levels exceeding the State Sanitary Code. The manganese was found to be naturally present in the groundwater due to the surrounding soils.

- The Site was added to the Registry in December 1983, as a Class 2a site (insufficient information data available) due to allegations of on-site disposal of "tank rinsing solution".

- A Phase I investigation was conducted by the NYSDEC in 1983. The Phase I investigation attempted to establish a Hazard Ranking Score (HRS) to better evaluate the Site. A Phase II investigation was recommended to complete the HRS accurately, since the Phase I investigation did not include any groundwater, soil, or air sampling.

- In February 1989, a fire in the warehouse may have caused further contamination of the Site. Runoff water samples collected after the fire contained low levels of benzene, toluene, ethyl benzene, TCE, and 1,1,1-TCA. Subsequent residential well water samples, collected in April 1989, contained several VOCs.

- In 1989, granular activated carbon (GAC) filters were installed on two residences as an interim remedial measure (IRM).

- In August 1990, the Site was reclassified to Class 2 (Significant threat to the public health or environment - action required).

- A Remedial Investigation (RI) and Feasibility Study (FS) under the State Superfund Program was initiated in July 1992.

- The NYSDEC issued a ROD in March 1995 for Operable Unit (OU) 1-Groundwater Contamination, and in March 1996 for OU 2- Soil Contamination.

- Construction began in August, 1997. OU 2 soil remediation was completed in January, 1998, and consisted of excavation and on-site treatment of TCE contaminated soil and weathered bedrock.

- OU 1 groundwater remediation consisted of design and construction of the groundwater recovery, treatment and injection system, the VES, and the treatment building. The construction phases for OU l were substantially completed in February 1998, at which time weekly operation, maintenance and monitoring for the OU 1 remedial system commenced.

- In 1999 the Site was changed from a Class 2 (significant threat to the public health or environment – action required) to a Class 4 (site has been properly closed, requires continued management)

2.3 CLEAN-UP GOALS AND SITE CLOSURE CRITERIA

The remedial goals for OU l, as specified in the March 1995 ROD are as follows (NYSDEC, 1995):

1. Reduce to the extent practical, based on technological limitations, the impacts of contaminated groundwater to the environment;

2. Reduce, to the extent possible, migration of contaminants in the groundwater; and

3. Provide for attainment of groundwater quality as close to standards, criteria, and guidance for protecting human health and the environment, within the practical limits of remedial technology.

The ROD remedy for groundwater contamination (OU l) consists of five elements (NYSDEC, 1995):

1. Implementation of a groundwater pump and treatment system that will reduce, to the extent practical based on technological limitations, the impacts of contaminated groundwater to the environment. This system will also capture and treat vapors present in the bedrock. These actions will serve to control the migration of contaminants off-site.

2. Reinfiltration of a portion of the treated groundwater to help flush contamination from the upper bedrock zone and to reduce the impacts of the groundwater withdrawal on neighboring homeowner wells.

3. Institutional controls and restrictions to restrain the future use of groundwater at the Site. Such controls would be required until the groundwater has been restored to drinking water standards.

4. Continue maintenance or future addition of carbon filters on impacted homeowner wells, until the groundwater meets New York State drinking water standards.

5. Long-term monitoring would be carried out to assess the effectiveness of the selected remedy.

The ROD remedy for soil contamination (OU 2) consists of three elements (NYSDEC, 1996):

1. The excavation and on site treatment of soils with over 700 [parts per billion (ppb)] of trichloroethene, located near the northeast corner of the building (area A), along the drainage ditch near the northern corner of the building (area B); and the south corner of the concrete pad (area C);

2. The excavation and on site treatment of weathered bedrock with over 700 ppb of trichloroethene, located near the northeast corner of the building (area A), and along the drainage ditch near the northern corner of the building (area B).

3. The on site treatment of these soils and weathered bedrock by a low temperature thermal desorption unit or comparable technology.

2.4 PREVIOUS REMEDIAL ACTIONS

IRMs consisting of installation of point of entry GAC filtration systems for homeowner wells were implemented upon discovery of contaminants in these wells.

The remediation of both OUs was implemented concurrently under a single set of contract documents. The contract documents were issued in April 1997. On August 27, 1997, the NYSDEC issued a notice to proceed to Earth Remediation Services. The contract was substantially completed in February 1998, and final punch list and restoration items were completed in June 1998. OU 2 actions consisted of excavation and treatment of contaminated soil and weathered bedrock from areas of previous release.

2.5 Description of Existing Extraction and Treatment System

Currently, there is a GWETS and the VES in operation at the facility. The following subsections provide a summary of these systems.

2.5.1 System Goals and Objectives

The specific remedial action goals as presented in the ROD were previously described in Subsection 2.3. In general, the purpose of the GWETS is to contain groundwater with elevated concentrations of VOCs on site and reduce VOC concentrations in groundwater. The long-term goal for groundwater is to reduce concentrations, "to the extent practical based on technological limitations," to below Standards, Criteria and Guidelines (SCGs). The groundwater treatment plant itself is designed to remove VOCs and suspended solids to meet groundwater injection and surface water treatment criteria prior to discharge.

The purpose of the VES is to remove VOCs from the unsaturated bedrock. With significant groundwater draw downs in extraction wells, a significant portion of weathered bedrock is exposed to vapors and the VES is intended to remove VOCs from this zone. The VES includes off-gas treatment equipment intended to meet air discharge requirements.

2.5.2 System Description

Based on the site visit and a review of design drawings from 1996 and 1997, this treatment system consists of the following primary elements:

- Groundwater recovery wells;
- Groundwater treatment system;
- Groundwater injection/discharge system;
- Vapor extraction and treatment system

The following paragraphs briefly describe the components listed above in greater detail:

<u>Groundwater Recovery Wells</u>: The groundwater recovery system consists of the three recovery wells (TW-1, TW-2A and TW-3) which pump contaminated groundwater to the treatment system. Recovery well pumps are reportedly Goulds Model 18GS10412 submersible pumps. Each is equipped with a water level transducer (Omega Model PX-439). The operation of the pumps is controlled to maintain a desired set point elevation. The combined flow rate from all three wells is generally less than 20 gallons per minute

(gpm) on average. The treatment system was designed based on a maximum 30 gpm flow rate.

Groundwater Treatment System: Treatment of the groundwater includes an air stripper, settling tank, and multimedia filter. The air stripper is a Carbtrol multi-stage diffuser (Model MSD-8-100) system with exhaust gas discharging directly to ambient air via a discharge stack though the roof of the treatment building.

Exhaust gases from the air stripper formerly flowed via a second (booster) blower through two 2,000-lb GAC absorbers for air emission control. This emission control system has been abandoned since January 2000 and exhaust gases are permitted to exit directly to ambient air. As a rule-of-thumb per NYSDEC standards, vapor treatment is not required for ½ pound per hour (lb/hr) or less of VOCs discharged.

The air stripper effluent flows to a three-chamber, concrete settling tank located in the floor of the treatment building. The chambers are approximately 3 to 4 feet deep. The second chamber has a spare effluent pump and bypass around the third (last) basin. Downstream of the settling tank is a 30-inch diameter by 72-inch tall multimedia particulate filter, manufactured by Miami Tank Manufacturing, Inc. This filter has been taken out of service due to scaling issues.

Groundwater injection/discharge system: Water is pumped by a centrifugal transfer pump controlled by high and low level switches in the third chamber of the settling tank. Water is pumped into a pre-cast concrete effluent distribution and meter pit located approximately 300 feet north of the treatment building. From the distribution pit, water is intended to flow by gravity to the infiltration wells (IW-1 and IW-2). When effluent flow rates exceeds the infiltration capacity of the injection wells, water rises in the distribution pit and overflows by gravity to a permitted outfall on Crum Elbow Creek. In the meter pit, discharge lines are equipped with flow meters and control valves to allow tracking and control of flows to the injection wells and to surface water discharge. Sampling for compliance with surface water and groundwater discharge limits is performed.

Vapor Extraction System: The VES is a skid mounted system located inside the groundwater treatment building, which extracts vadose zone vapors from two of the groundwater recovery wells (TW-1 and TW-2A) and two shallow bedrock vapor extraction wells (VE-1 and VE-2). VE-1 and VE-2 are frequently flooded with water and not consistently used for vapor extraction. The vapor skid is equipped with a moisture separator (knock-out tank), air filter, blower, heat exchanger, and instrumentation. The extraction blower is an MD Pneumatics Model 3204-67L3 positive displacement blower by Tuthill Corp. The design flow rate is approximately 40 standard cubic feet per minute (scfm). The system exhaust is treated through two 55-gallon drums of vapor-phase GAC located outside the treatment building. Treated vapors are discharged to the atmosphere.

2.5.3 Operation and Maintenance Program

The following summarizes the current operation and maintenance program:

- The property is currently rented by B&R Specialties Inc.

- The treatment systems are operated and maintained by EarthTech out of Latham, NY. The facility has operated since February 1998.

- Earth Tech typically makes two visits per month to maintain the system. System operation is monitored daily off site via remote control technology (telephone link) using the ProControl Series II. Operational parameters are faxed every 24 hours or upon alarm.

- Groundwater treatment system sampling (influent and effluent) is performed monthly for VOCs, site-specific inorganics, total suspended solids, total dissolved solids, and oil & grease.

- Vapor extraction off-gas sampling (influent, between carbon canisters, and effluent) for VOCs is performed monthly using Tedlar bags.

- Water levels in monitoring wells are monitored and reported on a monthly basis.

- Groundwater sampling from 15 observation wells is performed on an annual basis.

- Groundwater extraction wells TW-1, TW-2A, and TW-3 typically pump approximately 3 gpm, 13 gpm, and 5 to 6 gpm, respectively. At the time of MACTEC's site visit, TW-3 was experiencing transducer problems, was set on manual, and flow was restricted to approximately 2 gpm.

- The settling tank is cleaned approximately every 6 months.

- Vapor-phase carbon drums cost approximately $500 each (excluding pick-up and disposal costs).

- Excluding utility costs, operation and maintenance costs for the treatment systems is approximately $93,000/year. Utility costs are estimated to be about $15,000.

3.0 FINDINGS AND OBSERVATIONS

The following subsections summarize the information and data gathered by MACTEC staff during the Site visit on June 10, 2004 and interviews conducted with NYSDEC personnel and operators affiliated with the Site. During the site visit operations personnel were interviewed concerning operational procedures, operational problems, and ideas for cost savings or improving the operation and performance of the treatment system.

In conjunction with the site visit, a file and records review was conducted at the NYSDEC office in Albany. The results of this review have been included in the following subsections and recommendations section of this report. The Site Visit Report is contained in Appendix A. Photographs from the site visit are included in Appendix B.

3.1 SUBSURFACE PERFORMANCE

The following discusses the subsurface performance of the groundwater system and VES:

- A review of the 6-Year Progress Report by Earth Tech dated April 5, 2004 shows that there appears to be adequate containment of groundwater (See Figure 3-1). There has been a decline in contaminant concentrations in two of the three recovery wells (See Figures 3-2 through 3-4). Well TW-1 is the exception where there does not seem to be an observable trend after 6 years of groundwater capture. MACTEC has estimated the cumulative total VOCs removed from the system during the operating period of the groundwater extraction is approximately 682 pounds. Figure 3-5 shows a graph of the cumulative removal over time. From the graph it can be seen that the rate of removal was initially greater than 150 pounds per year and that the removal rate dropped around the year 2000 to a rate of about 60 pounds per year and has held steady at that rate.

- The Garden Center located across Route 9G from the Site continues (as of the December 2003 sampling event) to be impacted by VOCs which are characteristic of Site groundwater. MACTEC has not been able to determine in the available records why GAC treatment of the garden center well was not provided as an IRM.

- The ROD states that a portion of the treated groundwater is to be reinfiltrated to help flush contamination from the upper bedrock zone and to reduce the impacts of the groundwater withdrawal on neighboring homeowner wells. However, it is not clear from existing operation and maintenance procedures and data, how much flow is required or if this is an important parameter to be maintained. Figure 3-6 shows an estimate of the average gallons per day injected in each of the injection wells compared to the total discharge. It can be seen that the injection rate is very low.

- A review of the 6-Year Progress Report by EarthTech dated April 5, 2004 shows that influent vapor concentrations for the VES are slightly reduced compared to initial concentrations at startup. Influent total VOC concentrations are generally in the 20 to 200 parts per billion by volume (ppbv) range. This is significantly lower than the anticipated potential VOC concentrations. In the RI/FS it was reported that significant VOC vapors were observed in well TW-1 during an aquifer pumping test (ES, 1995). The anticipated total VOC concentration that was used in the preliminary design and initial air permit application was 129,000 ppbv (Rust, 1995). Data is not available to estimate detailed removal rates over time; however, based on the current peak VOC concentrations of around 200 ppbv and a 40 scfm flow rate, the removal rate would be less than 1.5 pounds per year.

3.2 TREATMENT SYSTEM PERFORMANCE

The following problems and/or issues with the operation of the collection and treatment system have been identified.

- The treatment system currently runs without significant down time. The treatment systems were inoperable for many months in 2000 and 2001 due to electrical problems. More recently individual wells pumps have been inoperable or put on manual control. These issues have generally been resolved in 15-30 days. The VES was temporarily down in August/September 2003 for a rebuilt motor.

- Earth Tech has reported problems associated with scale build-up in piping and equipment down stream of the air stripper. A section of 2-inch pipe was cut off the particulate filter during the site visit as evidence of the problem. The pipe was filled with ¼ to ½ inch of tan sand colored scale (gritty) within the full circumference of the pipe, which may be associated with a combination of iron and calcium fouling. Flow meters and miscellaneous equipment have been successfully cleaned of this scale buildup by Earth Tech using muriatic acid. A sample of the scale was analyzed for the RSO (See Appendix C). The results show the scale contains primarily calcium with small amounts of iron, magnesium and manganese. Based on this result, the scale appears to be a calcium carbonate deposit.

- The multi-media particulate filter, manufactured by Miami Tank Manufacturing, Inc. has been taken out of service due to scale problems. Earlier attempts to clean the filter (i.e., cutting access holes and manually cleaning) the scale build-up have been discontinued and the filter has been bypassed.

- Air stripper. The air stripper has generally performed well, although periodic cleaning of scale is required.

- Settling Tank. Settling tanks are cleaned periodically as necessary. Sump pumps in these tanks require periodic cleaning or replacement due to scale buildup.

- Multimedia Filter. The multimedia filter is not operational due to scaling issues. Bypass of the filter has not created issues with meeting discharge permit conditions; however, it is likely that it accelerated plugging of the injection wells due to solids.

- Controls. The control system generally meets the objectives for the treatment plant. There have been several failures of the pressure transducers that control the groundwater extraction pump operation.

- Injection wells. There is considerable potential for fouling of the infiltration wells and piping downstream from the air stripper due to the scale problem (possibly iron and calcium) and lack of filtration.

- VES. The VES is working properly following a motor rebuild in 2003. Extraction from wells VE-1 and VE-2 is intermittent. It is generally reported that these wells are intermittently submerged with groundwater preventing vapor extraction; however, in the February 2004 progress report it was also suggested that the piping to these wells may have been damaged.

- Sanitary Facilities. It was noted that the treatment plant lacks sanitary facilities and they are not readily available in the vicinity.

3.3 REGULATORY COMPLIANCE

The groundwater treatment system is typically in compliance with discharge requirements. For the monthly reports that MACTEC had available to review, there were only exceedances of the zinc limitations in May 1999 and July 1999.

The VES air discharge limitations are not specifically listed in any of the information that MACTEC obtained during site visits and file reviews. Typically, air concentrations of chlorinated solvents are detected in single digit ppbv levels in the discharge. On one occasion in August 2001, total VOCs discharged were greater than 1,000 ppbv indicating breakthrough of the second GAC filter had occurred. Given the design flow rate for the blower and the observed concentrations it appears that VES emissions are significantly below the ½ lb/hr limit for which treatment is required.

Drums of expended GAC are stored on-site until a sufficient quantity has accumulated to warrant pickup and disposal. This is done to minimize the cost of pickup of individual drums. Initially, MACTEC identified that the 90-day storage limitation of hazardous waste may be a concern; however, we have subsequently verified with the operator that the spent GAC is not classified as a hazardous waste.

3.4 MAJOR COST COMPONENTS OR PROCESSES

Total annual costs for operation of the treatment systems and completion of all the required monitoring is approximately $109,000. Major cost components are broken down as follows:

- Labor and Project Management $69,000
- Analytical $17,000
- Electrical $12,000
- Materials and Supplies $4,000
- Telephone $3,000
- Spent GAC disposal $900
- Propane $700
- Miscellaneous (e.g., shipping, plowing, electrician) $2,400

3.5 SAFETY RECORD

There have been no recorded accidents or incidences reported due to operation and maintenance of this treatment facility. MACTEC did not note any safety concerns based on observations during the site visit.

4.0 RECOMMENDATIONS

This section presents MACTEC's recommendation for implementation of measures to: 1) achieve or accelerate site closure; 2) improve system performance; and/or 3) reduce operating costs. Some of the recommendations can be placed in more than one category, but are described in only one. Where appropriate, simple payback or return on investment costs are provided. In preparing and evaluating capital, annual, and life-cycle costs, the following unit prices and factors were used:

- Labor costs $50/hour
- Life cycle 20 years
- Interest rate 4%
- Power costs $0.10/kilowatt-hour
- Engineering and contingencies of 30%

At the end of this section the overall recommended strategy for implementation is presented that organizes the recommendations and provides a general strategy for implementation. Cost evaluations of the recommendations are provided in Appendix D.

4.1 RECOMMENDATIONS TO ACHIEVE OR ACCELERATE SITE CLOSURE

Recommendations to achieve or accelerate site closure generally cover additional site analysis and/or remedial actions that could potentially accelerate cleanup or development of alternative cleanup criteria that are protective of human health and the environment such that site closure can be achieved sooner than would otherwise be possible. These measures generally require an initial investment of additional capital for site characterization, equipment, or additional remedial actions with the goal of reducing life-cycle costs by eliminating future operation and maintenance costs. Site closure refers to a site condition in which protection of human health and the environment has been achieved and will be maintained without further monitoring or remedial actions.

4.1.1 Source Reduction/Treatment

1. TW-1 area. No soil samples were collected in the area of the TW-1 groundwater extraction well during the RI. This well has generally not shown any decrease in concentrations of VOCs in the extracted groundwater since initiation of the groundwater extraction and treatment. The other groundwater extraction wells located near areas of previous soil excavation have shown a downward trend in groundwater concentrations. This suggests that there may be a source of VOC contamination in the TW-1 area. MACTEC recommends experimenting with increasing pumping rates at this well in an attempt to accelerate removal of contaminants. If pumping from TW-1 proves ineffective at reducing groundwater concentrations in this area additional source area investigation in the vicinity of

TW-1 to identify if additional remedial actions in this area may be warranted. The cost of increasing the pump rate from TW-1 is estimated to be $1,000 annually.

4.1.2 Sampling

1. Additional Source Investigation. A review of the RI/FS for the Site revealed the following potential areas that may warrant further investigation to determine whether additional source material remains that may limit long-term groundwater cleanup.

   - Beneath building. During the RI soil gas sampling and soil sampling were completed around the perimeter of the building. No samples of soil gas or soil were collected from beneath the building. From the information available, it is unclear whether the possibility of discharges inside the building was eliminated from consideration. MACTEC recommends additional investigation of the historical building use to identify whether potential sumps, floor drains, or other features existed where a release inside the building could have occurred. Based on the findings, collection of soil gas samples and indoor air samples may be necessary to identify whether contaminants are present beneath or inside the building. MACTEC estimates these activities could be completed for about $16,000.

   - Main parking lot area. In the RI/FS the main parking area to the northwest of the concrete pad was noted to have chlorinated organics in soil gas and soil. Remedial actions were proposed for this area in the RI/FS; however, this area was not included in the scope of work in the ROD. From the information available to MACTEC, it is unclear why remedial action was eliminated in this area or whether there may be an on-going source in this area. Groundwater concentrations in this area are generally lower than other areas suggesting that there is not a significant source; however, MACTEC recommends that the documentation for the rationale of eliminating this area be located and reviewed. If the rationale is not located or found to be unacceptable additional investigation and/or soil treatment in this area may be warranted. MACTEC estimates the cost for this review would be $5,000.

4.1.3 Conceptual Site Model (Risk Assessment)

This subsection describes potential additional risk assessment or site analysis to refine the site conceptual model and develop alternative clean-up concentrations.

1. Vapor Intrusion/Indoor Air Evaluation. Although, this recommendation will not serve to accelerate site closure, MACTEC identified this evaluation as a potential

additional human health risk at the Site. The RI/FS for this Site did not evaluate a vapor intrusion/indoor air inhalation exposure pathway (ES, 1995). Since the RI/FS was completed, additional research and guidance on vapor intrusion has been developed that has shown this exposure pathway to be more prevalent than previously believed. Peak shallow soil gas concentrations observed during the RI for 1,1,1-TCA (12,460 ppbv) and TCE (2,262 ppbv) significantly exceed the generic screening levels (4,000 ppbv and 0.041 ppbv respectively) as presented in the USEPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soils (USEPA, 2002). In addition, the current TCE concentrations in groundwater near the main building (approximately 100 to 200 exceed the generic screening level of 5 µg/L. MACTEC performed a preliminary scoring of the Site according to a draft NYSDEC program policy on evaluating vapor intrusion (NYSDEC, 2004). Based on the information available, MACTEC estimates that the Site would receive a score of 9 or higher for soil and 15 or higher for groundwater. These scores could be used for comparison with other sites relative to setting the priority for additional investigations at this site. It may be that soil remediation and VES operation have adequately addressed any potential indoor air exposure risks; however, additional investigation and evaluation is recommended. It is estimated that an evaluation of the indoor air exposure pathway risk could be completed for approximately $6,500 assuming that additional soil gas and indoor air data is available (see earlier recommendation)

4.2 RECOMMENDATIONS TO IMPROVE PERFORMANCE

Recommendations to improve performance cover those measures that can be implemented to improve the operation and maintenance of the facility. These may include maintenance improvements, facility modifications, monitoring changes, and process changes.

4.2.1 Maintenance Improvements

1. Rehabilitate infiltration wells. Injection wells IW-1 and IW-2 appear to show a decreased ability to accept injected water. Given the observed scaling, the bypass of the multimedia filter, and the minimal reinjection rates (see Figure 3-6), these injection wells are in need of redevelopment to improve their performance and increase the volume of injected water. The estimated cost to rehabilitate the injection wells is $7,000.

2. Repair vacuum to wells VE-1 and VE-2. In the February 2004, Monthly Summary Report and Six Year Review it is noted that there was no vacuum at wells VE-1 and VE-2. It was suggested that the buried vacuum lines may have

been severed during excavation in the area in the summer of 2003 and that the situation would be investigated when standing water in the area dries up. In March the wells were again reported as off-line and in need of repair. In April and May the wells were reported as off-line because the intakes at the wells were submerged. It is unclear whether the potential damage to the buried lines was investigated. If the wells are inoperable for a reason other than submerged screens, they should be repaired. The cost of repairs would be dependent on the extent of damage and the scope of the repair; however, it is likely that repairs, if needed could be completed for around $5,000.

3. Rehabilitate multi-media filter. Elimination of the multimedia filter from the treatment process is incompatible with the effective reinjection of treated groundwater. Treated groundwater that is not filtered will lead to the rapid plugging of the reinjection wells. If meaningful reinjection is to continue, the multimedia filter should be rehabilitated and brought back on line. A separate recommendation is made for control of scaling to reduce the maintenance issues associated with scaling in the multi-media filter. The estimated cost to rehabilitate the multi-media filter is $6,000.

4.2.2 Monitoring Improvements

1. Monitor vacuum and velocity at extraction wells. The January 2002 Operation, Maintenance and Monitoring Checklist (EarthTech, 2002) includes recording air velocities at each of the VES wells and the total system flow with dilution air; however, there is no indication in the monthly reports that this information is collected. In the February 2004 Monthly Report and Six Year Progress Report it was discovered that VES wells VE-1 and VE-2 may not be operating correctly and it was postulated that previous excavations in the area may have disrupted the pipes to these wells. More routine vacuum and/or velocity measurements would serve to identify such problems in a more reasonable time frame. Velocity and vacuum could be monitored using hand held instruments during routine site visits. It is not believed that any additional capital costs would be incurred for this monitoring. Additional costs for operator time to conduct and record the readings are estimated to be $650/year.

2. Monitor discharge air flow of VES. There are currently no measurements of the air flow rate of the VES. The collection of VES flow rates will allow for tracking of the mass of VOCs released. This information would be useful for evaluating VES performance and would be essential for monitoring for compliance with air discharge regulations if the vapor-phase carbon treatment is discontinued (i.e., in order to estimate the pounds of VOCs per hour released). Ideally, this would be implemented with the addition of a gas flow meter with a totalizer to capture flow changes caused by groundwater table elevation changes that affect flow from VE-

1 and VE-2. However, at a minimum, readings using hand-held instruments during routine site visits are recommended. A permanent flow meter would likely consist of a pitot tube with a differential pressure transmitter or a velocity transmitter connected to a totalizer. Purchase and installation of such a flow meter would be about $3,000.

4.2.3 Process Modifications

1. Install scale control system. The buildup of scale on the pipes, air stripper, multimedia filter, valves, meters, and other components creates maintenance requirements for cleaning critical components and may lead to long-term reductions in flow capacity of the system as the available open area in the piping is reduced. Based on a visual inspection of the scale MACTEC believes the scale is a calcite deposit with iron and/or manganese mixed in. Calcite scales are often encountered in remediation systems with air strippers. In such circumstances the groundwater typically contains elevated carbonates (i.e., above equilibrium with air) and carbon dioxide is removed from the groundwater in the air stripper. This removal changes the equilibrium chemistry of the water such that calcium carbonate solubility is exceeded and precipitates out of the system as calcite scale at and downstream of the air stripper. MACTEC has requested from NYSDEC specific analyses of the treatment plant influent to confirm these conditions; however, the results are not yet available. Potential methods to address this scaling issue are described below. A thorough comparison of the alternatives requires additional influent data.

   - pH adjustment by acid addition. In some cases the precipitation of calcium carbonate can be prevented by lowering the solution pH. A lower pH water will have a higher solubility for calcium carbonate. The specific pH required can be estimated once water chemistry data is obtained. This is generally a good solution if the scale can be prevented with a small shift in pH. If a large shift is required the cost of acids may be excessive and the pH required to prevent scaling may be lower than the discharge permit limit.

   - Magnetic or electromagnetic devices. There are numerous vendors that offer devices based on magnetic forces that claim to prevent and remove scaling. The scientific principles behind these devices are not well established in the literature of peer-reviewed journals. There are anecdotal indication that they do work effectively is some circumstances, but not all. Researchers at Cranfield University in England, based on a review of literature, reached the conclusion that most successful applications for these systems are on recirculating systems (heating or cooling loops) (see www.cranfield.ac.uk/sims/water/magnets.htm. The anti-scaling effect appears primarily to occur by changes in crystallization behavior causing precipitation in the bulk liquid rather than adherent scales. Due to the uncertainty of its effectiveness, MACTEC does not recommend this type of scale control. If implemented, some sort of long-term pilot test should be conducted or a performance guarantee should be obtained from the vendor.

- Carbon Dioxide Injection. Carbon dioxide can be injected to return some or all of the carbon dioxide removed during the air stripping. This would reduce the pH and shift the equilibrium such that calcium carbonate no longer precipitates. Carbon dioxide would be injected after the air stripper and would be effective for downstream enclosed piping and equipment.

- Sequestering Agent Addition. Polyphosphate sequestering agents have been shown to be effective at preventing bulk precipitation and scale formation. A small about of polyphosphate solution is metered into the water proportional to the flow. There is a potential permitting concern at this Site with the addition of phosphorus because the discharge is to a surface water. Phosphorus is often a limiting nutrient in surface water bodies and addition of phosphorus can sometimes lead to algae blooms.

MACTEC estimated the costs for a hydrochloric acid (HCl) metering system to adjust pH and reduce scaling. Complete chemistry data to estimate the quantity of HCl required was not available. Based on the use of drums and an assumed dosage rate of 50 mg/L, the estimated capital cost of the HCl metering system would be $8,500. HCl would cost an estimated $2,500 annual but may lead to savings in labor as result of fewer scale maintenance issues. If two hours less maintenance per week are required, the HCl system would save an estimated $2,700 annually.

4.3 RECOMMENDATIONS TO REDUCE OPERATING COSTS

Recommendations to reduce costs cover those measures that can be implemented to reduce the cost of routine operation and maintenance of the facility. These may include supply management changes and process changes.

4.3.1 Supply Management

1. No site-specific supply management cost reduction opportunities have been identified; however, bundling the operation and maintenance labor and laboratory analytical costs with procurements at other sites may result in reduced unit costs. Implementation of this recommendation would consist of assessing whether costs reductions are possible by bundling contract operation and maintenance activities, laboratory services, or supplies for this facility with others. If opportunities exist, solicit proposals and implement contracts. Due to the unknown scope of potential cost savings, a cost analysis for this recommendation was not completed.

4.3.2 Process Improvements or Changes

1. Shut down VES. The original intent of the VES was to address significant vapor VOC concentrations observed in bedrock during a pumping test when groundwater was depressed. The currently observed vapor concentrations (typically less than 300 ppbv total VOCs) are substantially less than design basis concentrations (129,000 ppbv total VOCs). Further, only about 3% of the contaminants are being removed by the VES when compared to the GWETS contaminant removal rate. Shutdown of the VES would reduce labor requirements, eliminate air samples, and eliminate GAC purchase and disposal. The VES is not required to maintain groundwater containment. If shut down of the VES reduced weekly labor by two hours and with a reduction in materials and electricity required, the annual savings could be $8,700.

2. Eliminate VES off-gas treatment (if VES continues). If the VES continues to operate, the activated carbon treatment could be eliminated. As stated earlier the rule of thumb per NYSDEC standards is that treatment is not required for emissions less than ½ lb/hr. For the preliminary design basis of the VES at 40 scfm and 129,000 ppbv of total VOCs the estimated emissions rate was 0.12 lb/hr (Rust, 1995). Current concentrations are a small fraction (less the 0.2 %) of the design basis. Eliminate of the off-gas treatment is estimated to save $2,800 annually.

3. Eliminate reinjection of groundwater. The original intent of reinjecting treated waster was to help flush contaminants from the upper bedrock and to reduce impacts of the groundwater withdrawal on neighboring homeowner wells (NYSDEC, 1995). As illustrated in Figure 3-6 the average daily volume of water reinjected in early 2000 was around 5,000 gallons per day or about 15% of the total water discharged. However, since July 2001 the percentage of total water discharged that has been reinjected has always been 4% or less and most of the time has been less than 1%. Recently, the average volume of water reinjected has been around 100 gallons per day. This indicates that the capacity of reinjection wells to accept water has been significantly diminished and that it has been diminished for several years. At the same time there has not been any reported adverse effect on the water supply available in residential wells and groundwater elevation contours shown in Figure 3-1 do not show residential wells to be within the cone of depression for the extraction wells. This would suggest that discontinuation of reinjection would not have an adverse effect on neighboring homeowner wells. Furthermore, the second objective of the reinjection, to flush contaminants from the upper bedrock is not supported by analytical data presented in the RI (i.e., no data is presented that shows contamination in this area). Elimination of the reinjection would not have a significant impact on

operational costs; however, it would avoid well redevelopment costs in the immediate and long-term future. Elimination of reinjection would also raise a few permit discharge limits (i.e., those parameters for which groundwater discharge limits are lower than surface water discharge limits); however, the effect on treatment system operation would be negligible. Shutdown of reinjection could be accomplished by simply turning off the valves to each of the injection wells. Elimination of the reinjection is not expected to have any cost impact by itself; however, without injection, rehabilitation of the multi-media filters would not be necessary.

4. Add system to prevent scale. This option was discussed previously as a maintenance improvement. Implementation of such a system may also reduce costs associated with cleaning and possible replacement of piping, equipment and infiltration wells.

4.3.3 Optimize Monitoring Program

1. Reduce sampling parameters for groundwater influent to quarterly. Groundwater influent to the treatment plant is monitored monthly for the same parameters required for effluent sampling. This includes VOCs, inorganics, cyanide, total dissolved solids, total suspended solids, oil & grease, and pH. VOCs, which are the primary contaminants of concern are also monitored monthly from the individual extraction wells. The VOC concentrations from the individual wells can be used to estimate the treatment plant influent on a monthly basis. The other parameters are not essential to collect on a monthly basis; therefore, it is recommended that the combined influent sampling be reduce to quarterly. It is estimated that these monitoring reductions would save approximately $750 annually.

4.4 RECOMMENDATIONS FOR IMPLEMENTATION

This subsection presents MACTEC’s proposed strategy for implementation of recommendations. Several of the recommendations should only be implemented following additional data collection and evaluation. In addition, several recommendations should only be implemented if it is determined that other recommendations can not be implemented (e.g., don’t implement process changes unless collection and treatment can not be shut down). Figure 4-1 illustrates MACTEC’s proposed implementation plan. The figure lists all of the recommendations, the conditions that should be met prior to implementing each recommendation, and the approximate time frame that each will be implemented. It is anticipated that not all of the recommendations will be appropriate. Figure 4-1 should serve as a road map for evaluation and implementation or elimination of recommendations.

In the short-term, MACTEC recommends shut down of the VES, elimination of groundwater reinjection as a remedy component, increased pumping rate at TW-1 and additional investigations. MACTEC also recommends several plant maintenance and improvement items that can be implemented once decisions on VES shut down and reinjection are made.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

FS	Feasibility Study
GAC	granular activated carbon
gpm	gallons per minute
GWETS	groundwater extraction and treatment system
HCl	hydrochloric acid
HRS	Hazard Ranking Score
IRM	Interim Remedial Measure
lb/hr	pounds per hour
MACTEC	MACTEC Engineering and Consulting, P.C.
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
ppb	parts per billion (micrograms per Liter)
ppbv	parts per billion by volume
RI	Remedial Investigation
ROD	Record of Decision
RSO	Remedial System Optimization
scfm	standard cubic feet per minute
Site	NOW Corporation Site
SCGs	Standards, Criteria, and Guidelines
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VES	vapor extraction system
VOCs	volatile organic compounds

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NYSDEC, 1996. Record of Decision, NOW Corporation Site, Operable Unit 2, Site Number 3-14-008, Town of Clinton, Dutches County. March.

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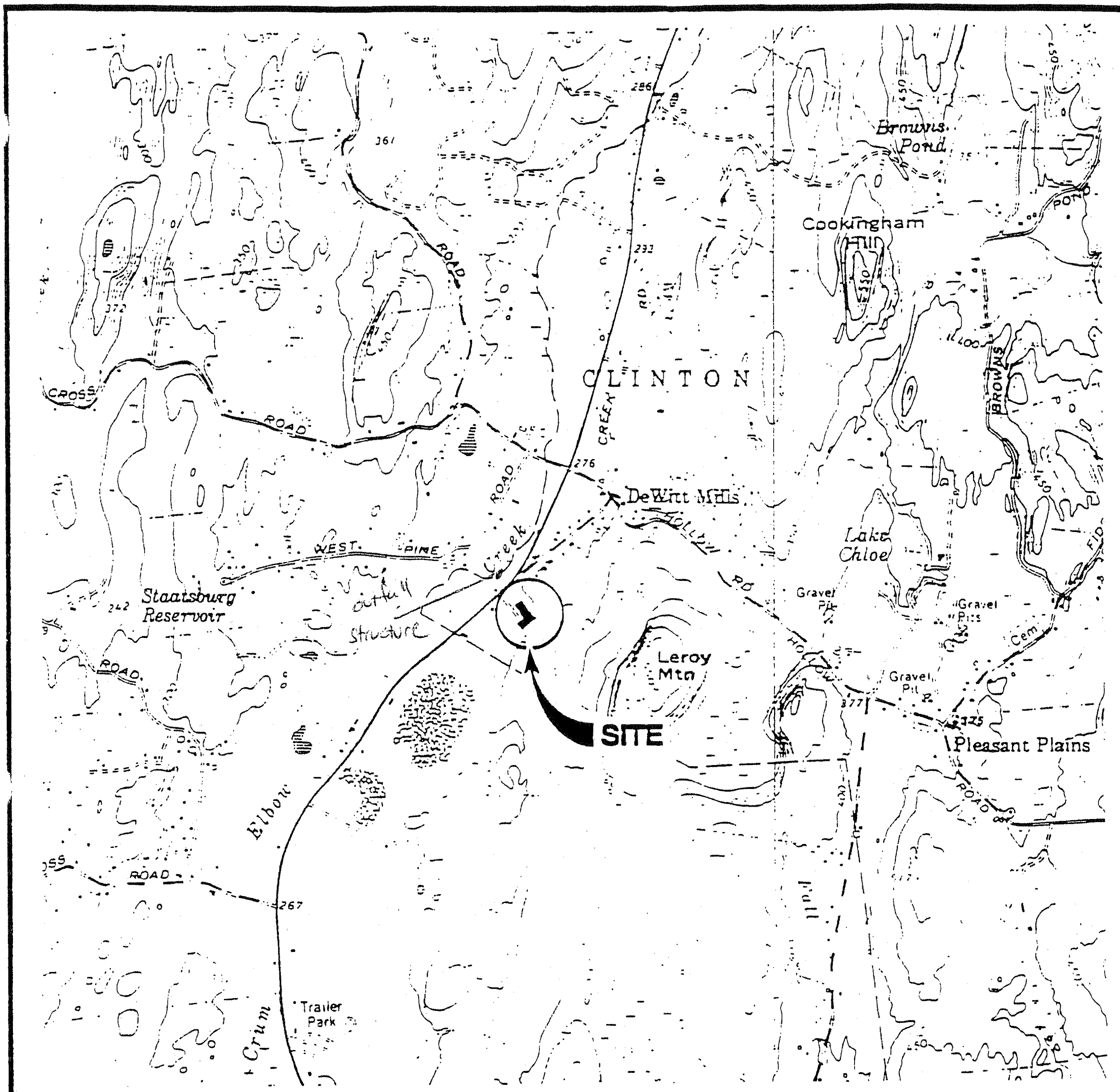
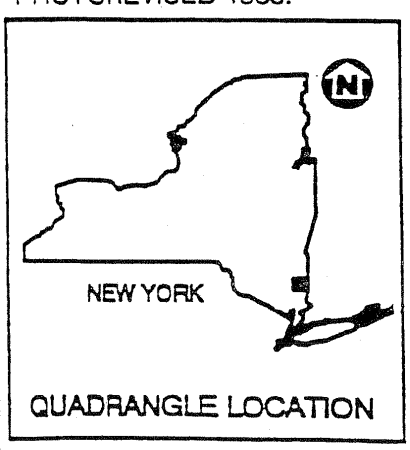
FIGURES

FIGURE 2.1



SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAPS; SALT POINT, N.Y. (1963) AND HYDE PARK, N.Y. (1963) PHOTOREVISED 1983.



LATITUDE: 41°51'00"
LONGITUDE: 73°52'45"

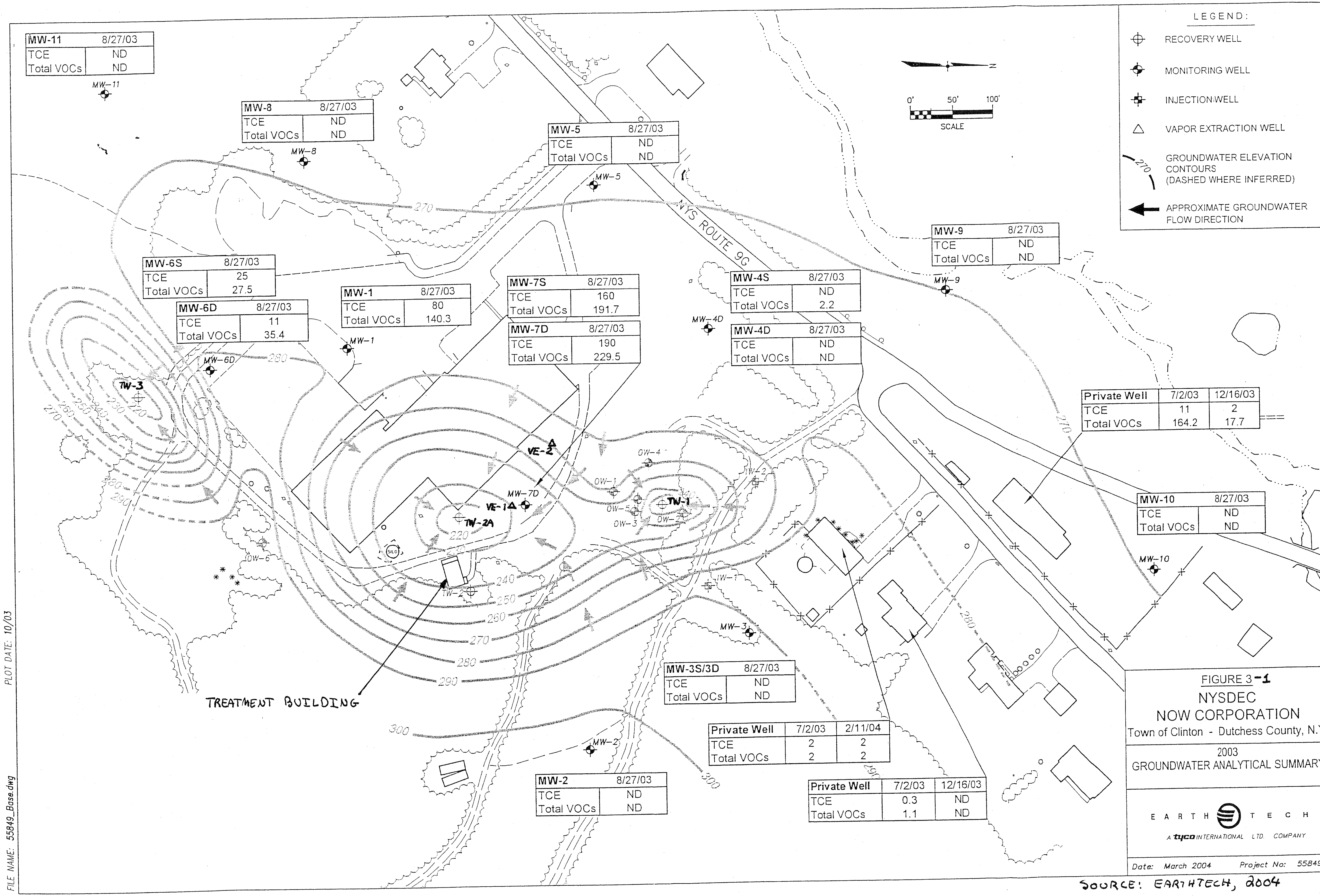
SCALE
0 2000 4000 FT.
2000 FT.

ENGINEERING-SCIENCE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION RI/FS INVESTIGATION

SITE LOCATION MAP
NOW CORPORATION SITE

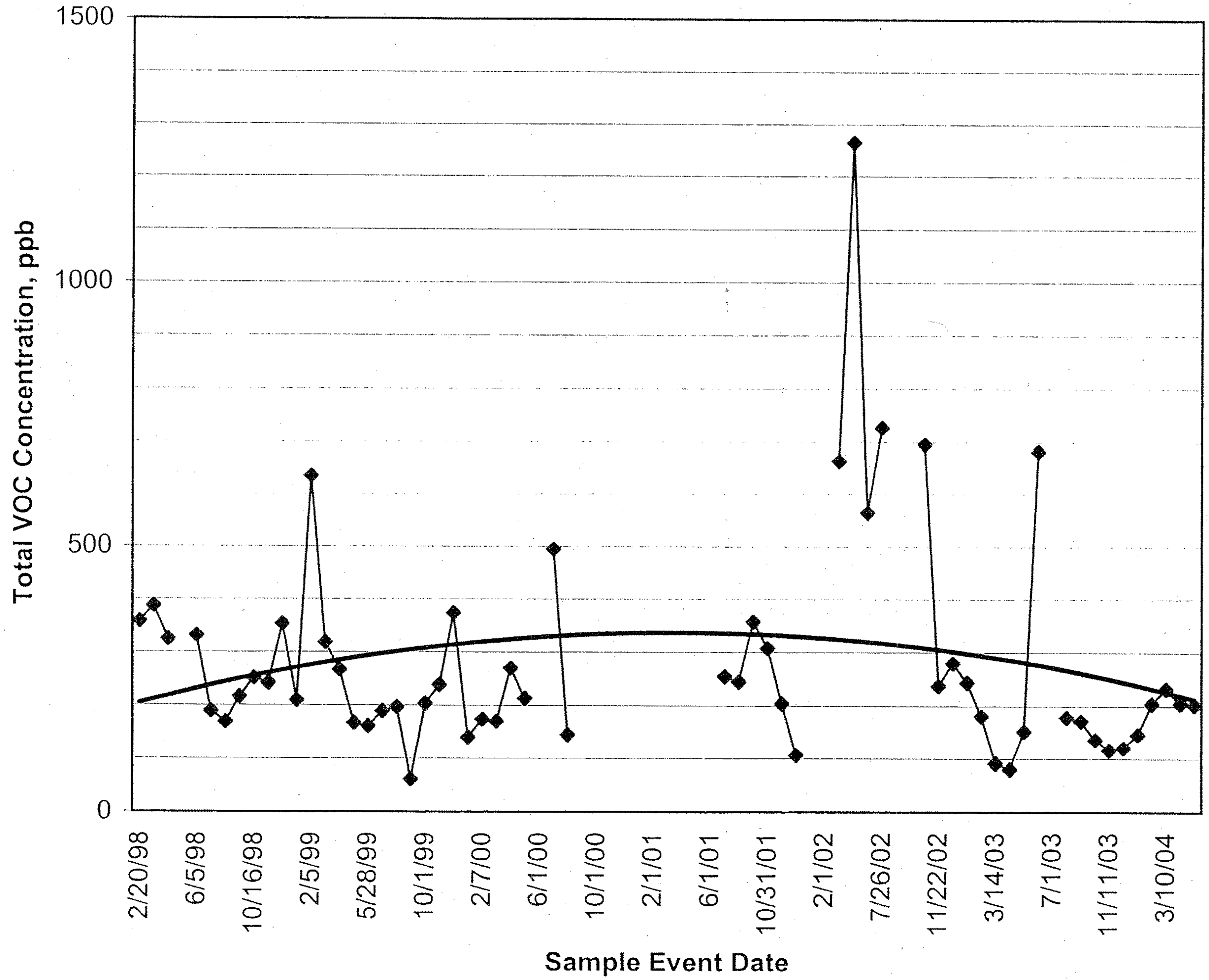
SOURCE: Engineering Science, 1995



FILE NAME: 55849_Base.dwg PLOT DATE: 10/03

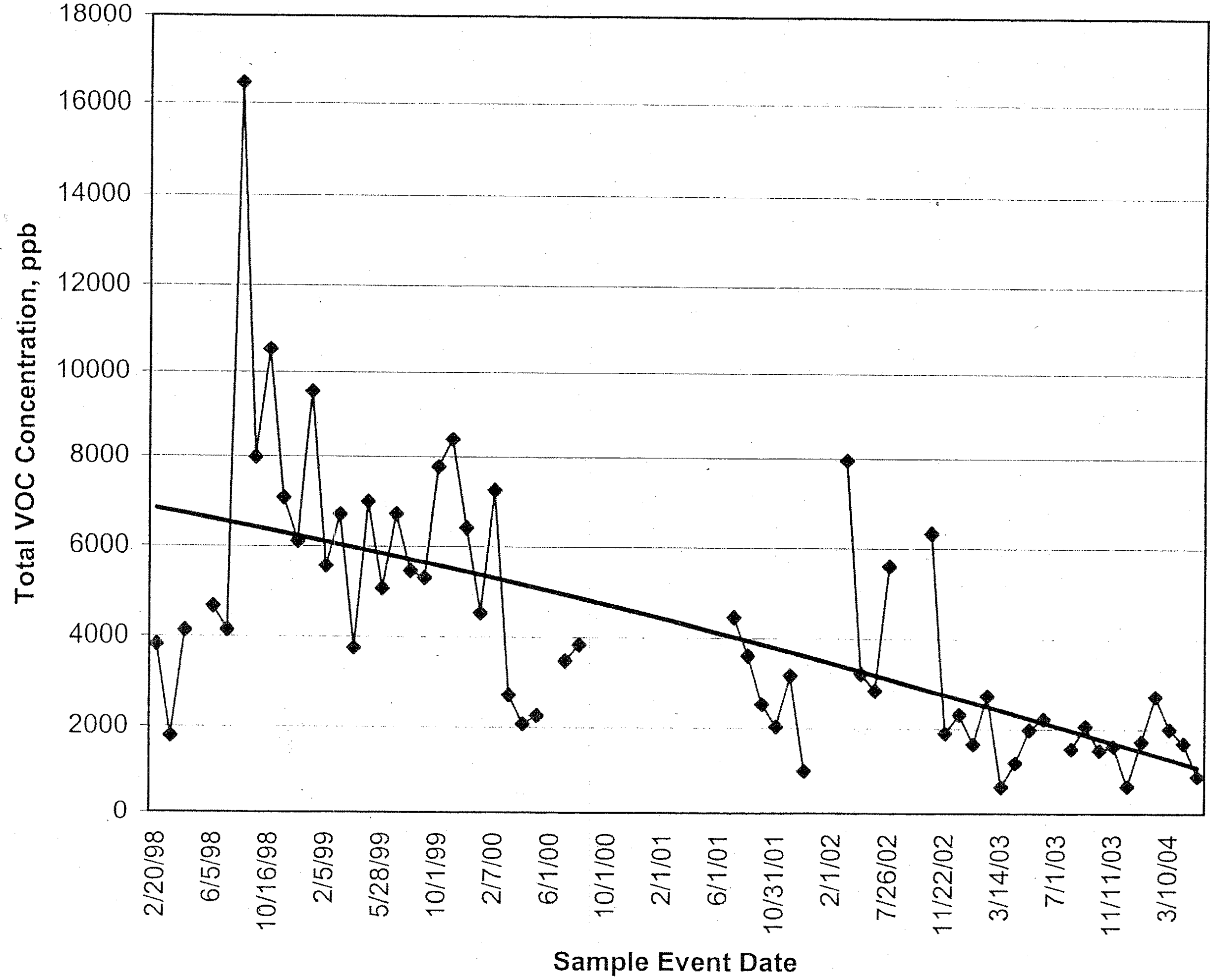
SOURCE: EARTHTECH, 2004

Figure 3-2
NOW Corporation P&T System - TW-1 Influent



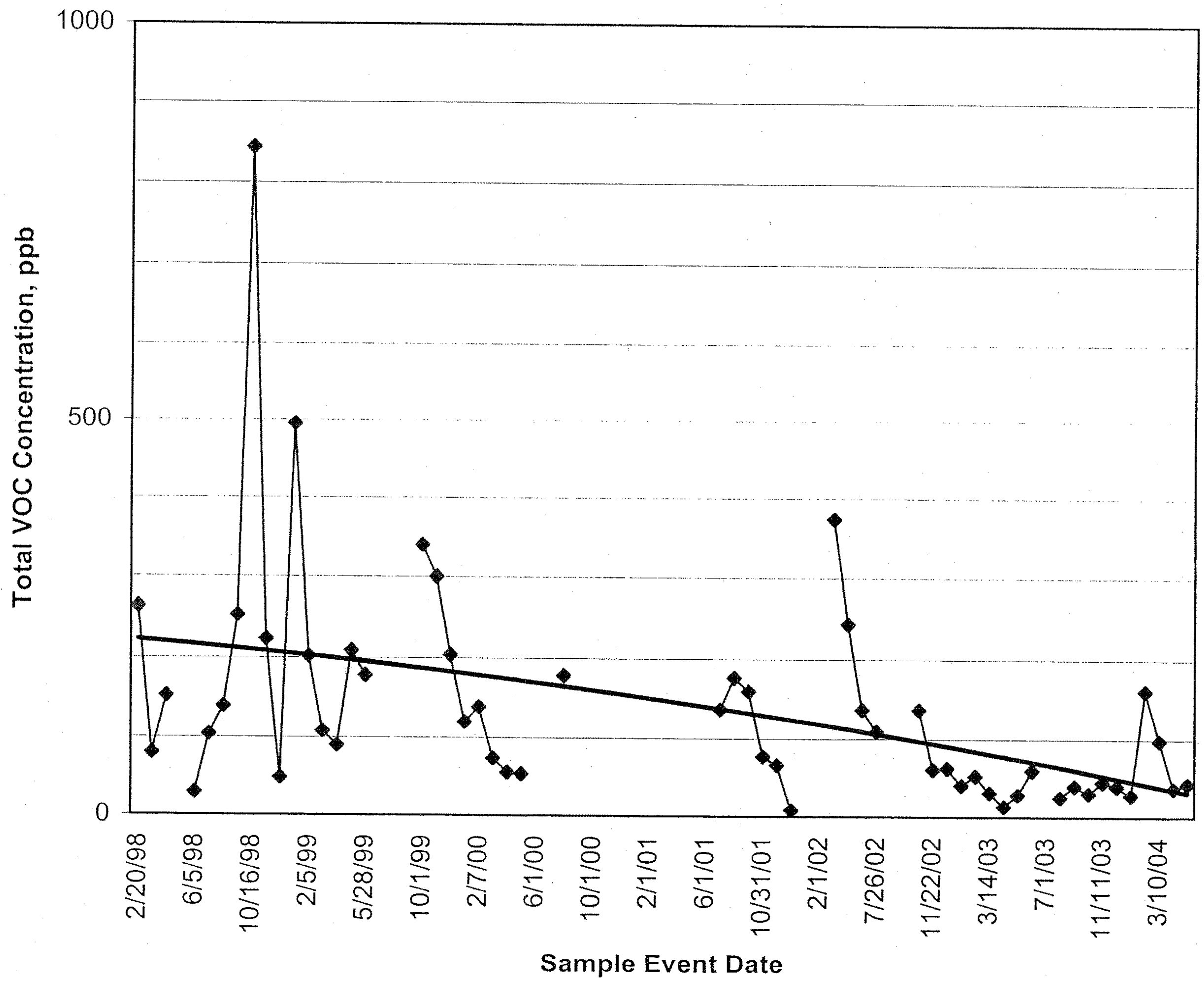
SOURCE: EARTHTECH, 2004

Figure ~~a~~ 3-3
NOW Corporation P&T System - TW-2A Influent



SOURCE: EARTHTECH, 2004

Figure ~~X~~ 3-4
NOW Corporation P&T System - TW-3 Influent



SOURCE: EARTHTECH, 2004

Figure 3-5
Cumulative Pounds of VOCs Removed

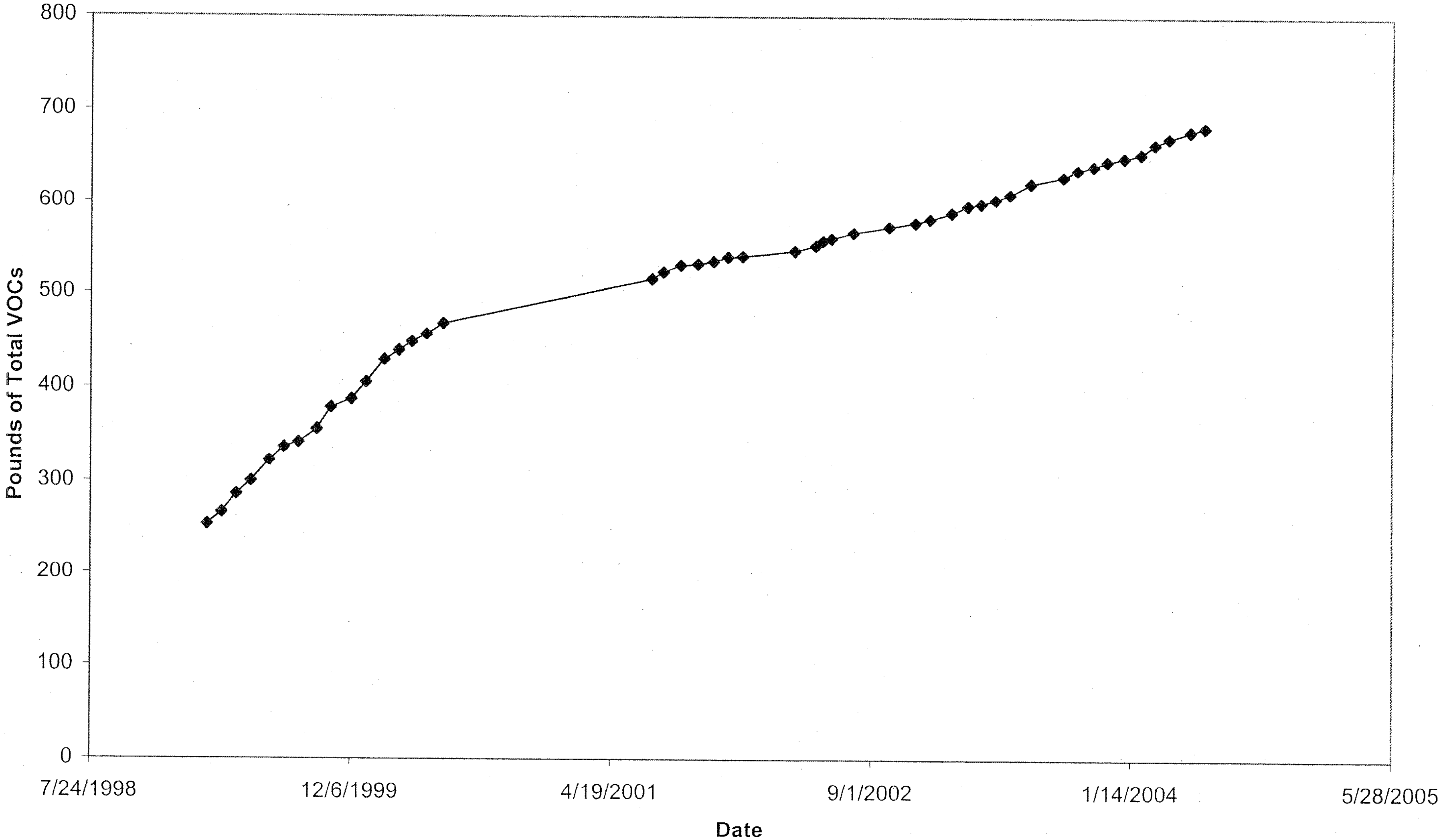
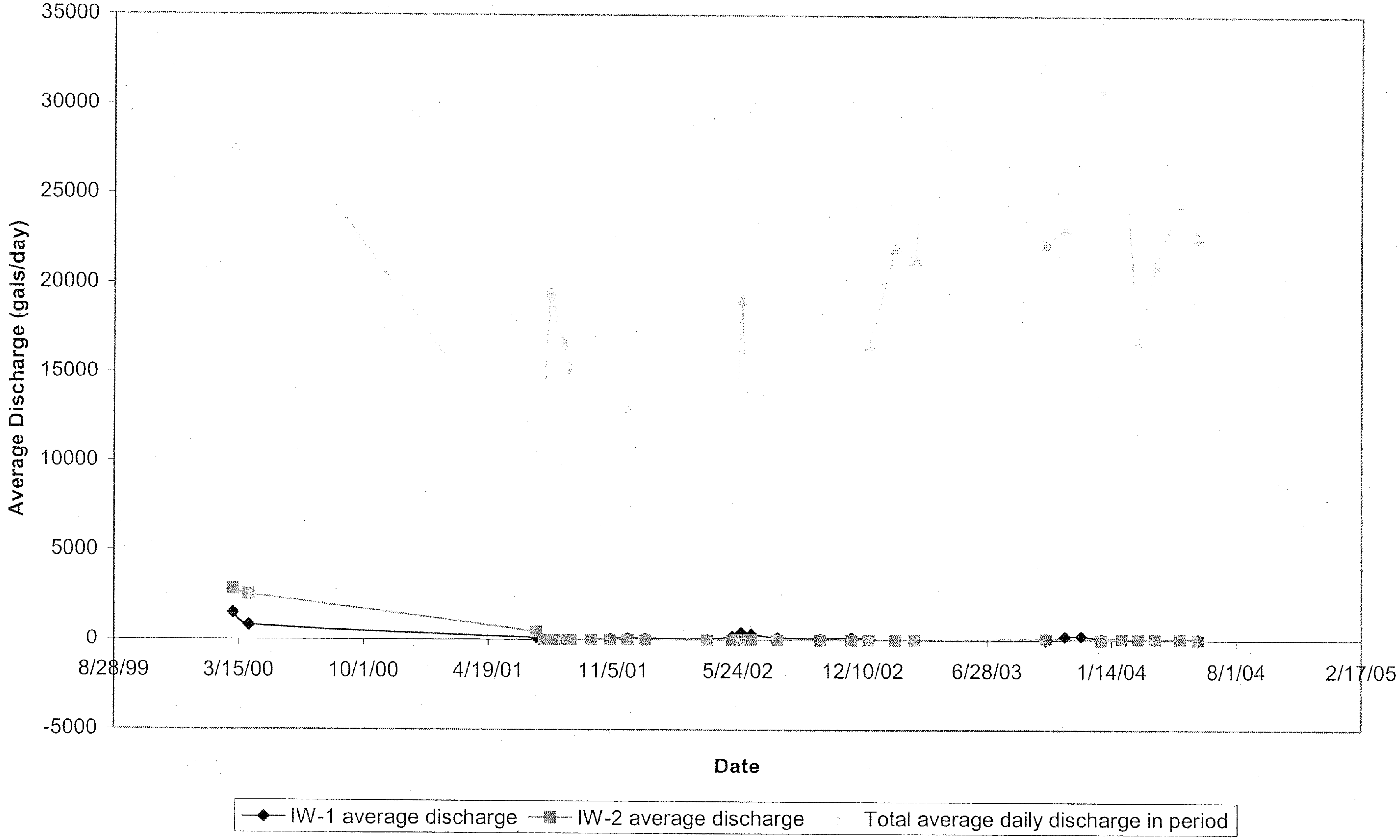


Figure 3-6
Discharge Rates



APPENDIX A

SITE VISIT REPORT

SITE VISIT REPORT
State Superfund Standby Contract
Work Assignment #D003829-10
New York State Department of Environmental Conservation

GENERAL SITE INFORMATION

Site Name:	NOW Corporation	Site Code:	314008
Site Location:	Route 9-G	EPA ID Number:	NYD010968014
	Clinton, NY	Classification:	02
		DEC Region:	3
Date of Site Visit:	June 10, 2004	Report Date:	June 16, 2004
HLA Job No.:	3612042018 Task	Report Prepared By:	RDJ/RET

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DISCUSSION

This report summarizes the information and data gathered during the site visit for the above listed site. This report includes information on the treatment system; current operations procedures; and observations. During the site visit operations personnel were interviewed concerning operational procedures, operational problems, and ideas for cost savings or improving the operation and performance of the facility.

In conjunction with the site visit, a file and records review was conducted at New York State Department of Environmental Conversation (NYSDEC) office in Albany. The results of this review will be included in the final report. This site visit report identifies information, reports, etc. that were unavailable during the file and records review.

1. GENERAL TREATMENT SYSTEM DESCRIPTION

1.1. This treatment system consists of a groundwater recovery, treatment, and injection/discharge system; and soil vapor extraction and treatment system to reduce contamination in soil and weathered bedrock. Systems treat volatile organic contaminants associated with former onsite disposal of "tank rinsing solution" and a 1989 fire that may have caused further contamination of the site.

1.2. The groundwater system consists of the three recovery wells (TW-1, TW-2A and TW-3) which pump contaminated groundwater to an air stripper for treatment. Treated effluent is pumped to a distribution pit from which water flows by gravity to two injection wells (IW-1 and IW-2). When effluent exceeds the infiltration capacity of the wells, water rises in the distribution pit and overflows by gravity to an outfall on Crum Elbow Creek. Sampling for compliance with surface water and groundwater discharge limits is performed. Specifics of the system are as follows:

1.2.1. Recovery well pumps are reportedly Goulds Model 18GS10412 submersible pumps. Each is equipped with water level transducer (Omega Model PX-439)

1.2.2. Air Stripper: Carbtrol multi-stage diffuser (Model MSD-8-100) systems (2) with exhaust gases discharging directly to ambient air via discharge stack though the roof.

1.2.3. Air stripper effluent flows to a 3-chamber, concrete settling tank located in the floor of the treatment building. The chambers are approximately 3 to 4 feet deep. The second chamber has a spare effluent pump and bypass around the 3rd (last) basin.

1.2.4. Downstream of the settling tank is a 30-inch diameter by 72-inch tall multi-media particulate filter, manufactured by Miami Tank Manufacturing, Inc. This filter has been taken out of service (see Section 4, Current Operational Issues).

1.2.5. Water is pumped by a centrifugal transfer pump controlled by high and low level indicators in the 3rd chamber of the settling tank into a precast concrete effluent distribution and meter pit located approximately 300 feet north of the treatment building.

1.2.6. From the distribution pit, water flows by gravity to the infiltration wells and Crum Elbow Creek surface water outfall. In the meter pit, discharge lines are equipped with flow meters and control valves to allow tracking and control of flows to the injection wells and to surface water discharge.

1.3. The soil vapor extraction system is a skid mounted system located inside the groundwater treatment building, which extracts vadose zone vapors from two of the groundwater recovery wells (TW-1 and TW-2A) and two shallow bedrock vapor extraction wells (VE-1 and VE-2). VE-1 and VE-2 are frequently flooded with water and not consistently used for vapor extraction. Specifics of this system are as follows:

1.3.1. The vapor skid is equipped with a moisture separator, (knock-out tank), air filter, blower, heat exchanger, and instrumentation.
1.3.2. SVE blower is a U-D Pneumatics Model 3204-67L3 positive displacement blower by Tuthill Corp.
1.3.3. System exhaust is treated through two 55-gallon drums of vapor phase GAC located outside the treatment building.

2. CURRENT OPERATIONS PROCEDURES

2.1. The property is currently rented by B&R Specialties Inc.
2.2. The treatment systems are operated and maintained by Earth Tech out of Latham, NY. The facility has operated since February 1998.
2.3. Earth Tech typically makes two visits per month to maintain the system. System operation is monitored daily off-site via remote control (telephone link) technology using the ProControl Series II). Operation parameters are faxed every 24 hours or upon alarm.
2.4. Groundwater treatment system sampling (influent and effluent) is performed monthly for volatile organic compounds (VOCs) and site specific inorganics, total suspended solids, total dissolved solids and oil & grease.
2.5. Vapor extraction off-gas sampling (influent, between carbon canisters, and effluent) for VOCs is performed monthly using Tedlar bags.
2.6. Water levels in monitoring wells are reported on a monthly basis.
2.7. Groundwater sampling from 15 observation wells are performed on an annual basis.
2.8. Groundwater extraction wells TW-1, TW-2A and TW-3 typically pump approximately 3 gpm, 13 gpm and 5 to 6 gpm respectively. At the time of this site visit, TW-3 was experiencing transducer problems and was set on manual and flow restricted to approximately 2 gpm.
2.9. Exhaust gases from the stripper formerly flowed via a second (booster) blower through two 2,000 lb granular activated carbon (GAC) absorbers for air emission control. This emission control system has been abandoned since January 2000 and exhaust gases are permitted to exit directly to ambient air through a stack through the roof. As a rule-of-thumb per NYSDEC standards, vapor treatment is not required for ½ lb / hr or less of VOCs discharged.
2.10. The settling tank is cleaned every 6 months.
2.11. Vapor-phase carbon drums cost approximately $500 each (excluding pick-up and disposal costs).
2.12. Excluding utility costs, operation and maintenance costs for the treatment systems is approximately $92,000/year.

3. OBSERVATIONS

3.1. There is considerable potential for fouling of the infiltration wells and down-stream piping from the air stripper due to the scale problem (possibly iron and calcium).

3.2. There currently are no measurements of air flow rates from the soil vapor extraction system to allow for computing rate of contaminant removal in lbs / day. This computation would allow for assessment of whether continued vapor treatment of the SVE system off-gas is required prior to discharge to the atmosphere.

3.3. A review of the 6-Year Progress Report by Earth Tech dated April 5, 2004 shows that there has been a potential decline in contaminant concentrations in two of the three recovery wells. Well TW-1 is the exception where there does not seem to be an observable trend after 6years of groundwater capture.

3.4. The ROD states that a portion of the treated groundwater is to be reinfiltrated to help flush contamination from the upper bedrock zone and to reduce the impacts of the groundwater withdrawal on neighboring homeowner wells. However, it is not clear from existing operation and maintenance procedures and data, how much flow is required or if this is an important parameter to be maintained.

3.5. The Garden Center located across Route 9G from the site continues (as of the December 2003 sampling event) to be impacted by VOCs which are characteristic of Site groundwater.

3.6. The facility appears to be well operated and maintained.

3.7. Drums of expended GAC are stored on-site until a sufficient quantity has accumulated to warrant pickup and disposal. This is done to minimize the cost of pickup of individual drums. It may be appropriate to consider the 90-day storage limitation of hazardous waste.

3.8. There currently are no sanitary facilities or signage for noise protection at the treatment building.

4. CURRENT OPERATIONAL ISSUES

4.1. Earth Tech has reported problems associated with scale build-up in piping and equipment down-stream of the air stripper. A section of 2-inch pipe was cut of the particulate filter during this visit as evidence of the problem. The pipe was filled with ¼ to ½ inch of tan sand colored scale (gritty) within the full circumference of the pipe, which may be associated with a combination of iron and calcium fouling. Flow meters and miscellaneous equipment have been successfully cleaned of this scale buildup by Earth Tech using muriatic acid.

4.2. The multi-media particulate filter, manufactured by Miami Tank Manufacturing, Inc. has been taken out of service due to scale problems. Earlier attempts to clean the filter (i.e., cutting access holes and manually cleaning) the scale build-up have been discontinued and the filter has been bypassed.

5. POTENTIAL COST SAVINGS IDEAS

5.1. Assess the need to continue treatment of SVE system off-gas.

5.1.1. Collect air velocity rates using an anemometer or magnehelic gage and calculate flow volume based on pipe size at measured point.

5.1.2. Estimate total mass removal rate of VOCs based on current and historic (past 1 to 2 years) of VOC influent data.

5.2. Assess options for minimizing scale build-up, thereby minimizing potential maintenance costs associated with cleaning and possible replacement of piping, equipment and infiltration wells.

5.3. Investigate optimizing extraction flow rates, capture areas, and infiltration flow rates to minimize operational costs of the existing groundwater treatment system.

5.4. Assess alternative treatment/containment alternatives that would either augment or replace the existing groundwater extraction system to hasten cleanup and reduce overall costs.

6. OUTSTANDING ISSUES

6.1. The following documents are needed from NYSDEC:

6.1.1. RI/FS for OU-1 (groundwater).

6.1.2. RI/FS and Remedial Action Report for OU-2 (soil) to review source areas information.

6.1.3. Pumping Test Data Report (referenced in the O&M Plan)

6.1.4. Design documents or basis of design for the groundwater extraction and injection components.

6.1.5. Current Operation, Maintenance and Monitoring Plan (January 2002)

6.1.6. O&M Reports for April, May and June 2004 (when available)

6.1.7. O&M Reports for January through May 2003

6.1.8. O&M Reports (all of 2002).

6.1.9. NYSDEC utility bills for the treatment facility (2003 and 2004).

6.1.10. SPDES and groundwater injection permits.

APPENDIX B

SITE VISIT PHOTOGRAPHS

Treatment facility control panel

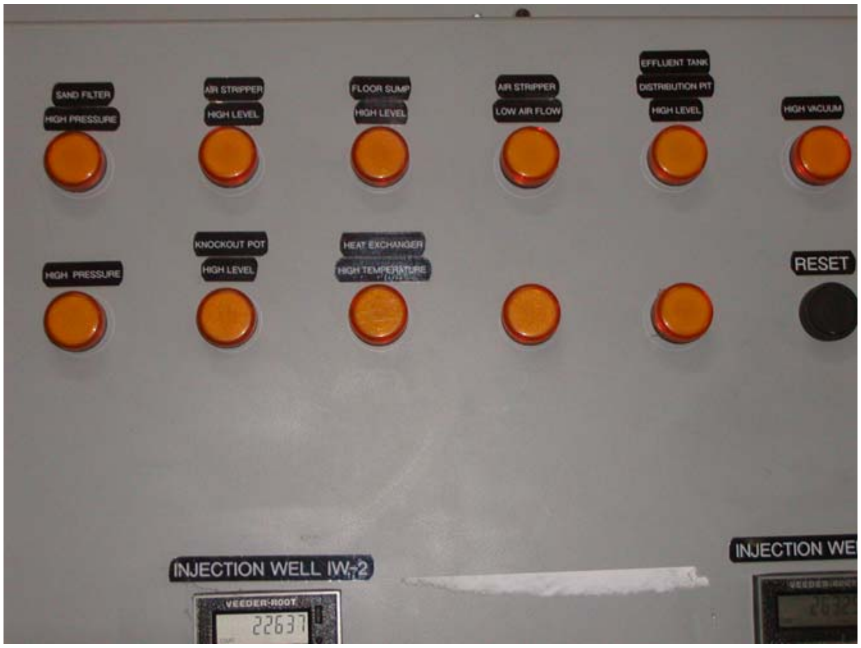
Control panel close-up; TW-1 and TW-2A totalizer, flow, and water level

Control panel close-up; TW-1 and TW-2A totalizer, flow, and water level, different angle

Control panel close-up; TW-3 totalizer, flow and water level (transducer is down and needs repair during this visit); main effluent pump

Control panel close-up; air stripper blower, booster blower (not needed any more)

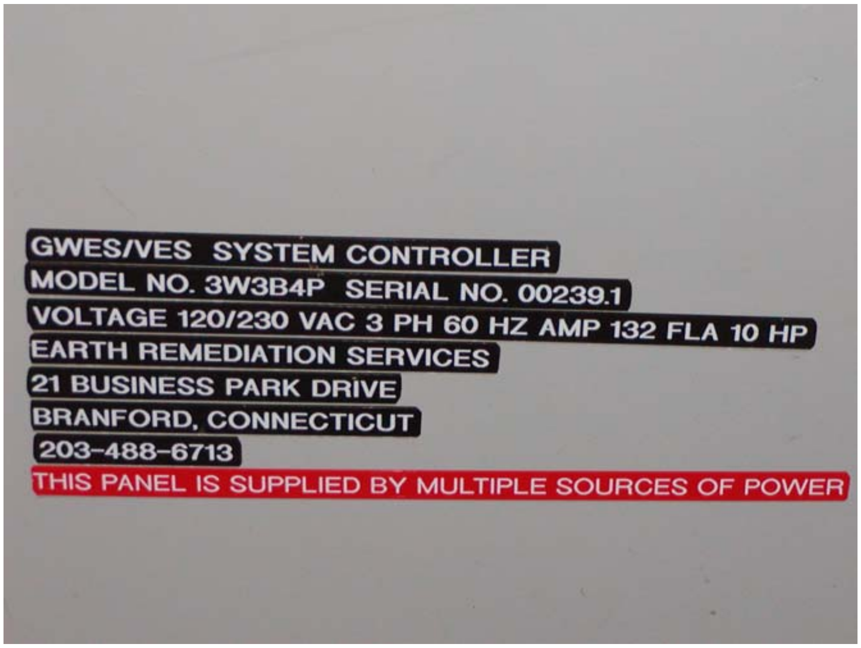
Control panel (top left side) trouble lights



Control panel (top left side) trouble lights (different view)

Control panel (top left side); injection well total flows for IW-2 and IW-1; window for PLC

Control panel (bottom left side); vapor extraction blower condensate pump, heat exchange run lights and switches



Control panel label

Treatment building view

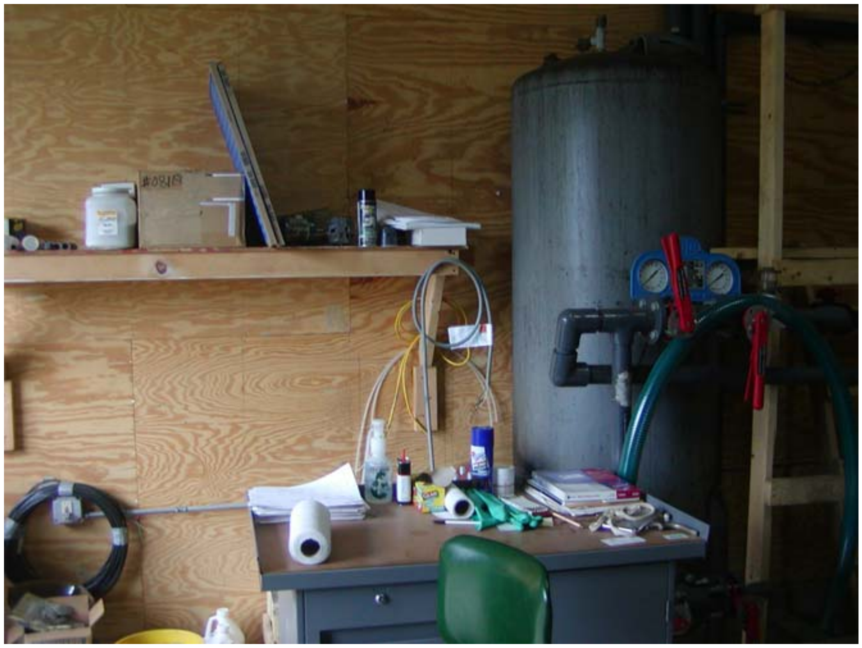
Air stripper, influent lines

Heat exchanger and dropout tank

Bypass line from middle tank

Effluent from 3rd tank

Multimedia filter



Multimedia filer

Stored carbon drums by overhead door

SVE GAC drums and stripper air intake

TW-3 influent line

Scale build-up in piping off sandfilter

Air strippers

Stack temperature and pressure gages on stack from stripper

Sampling port off stack of air stripper

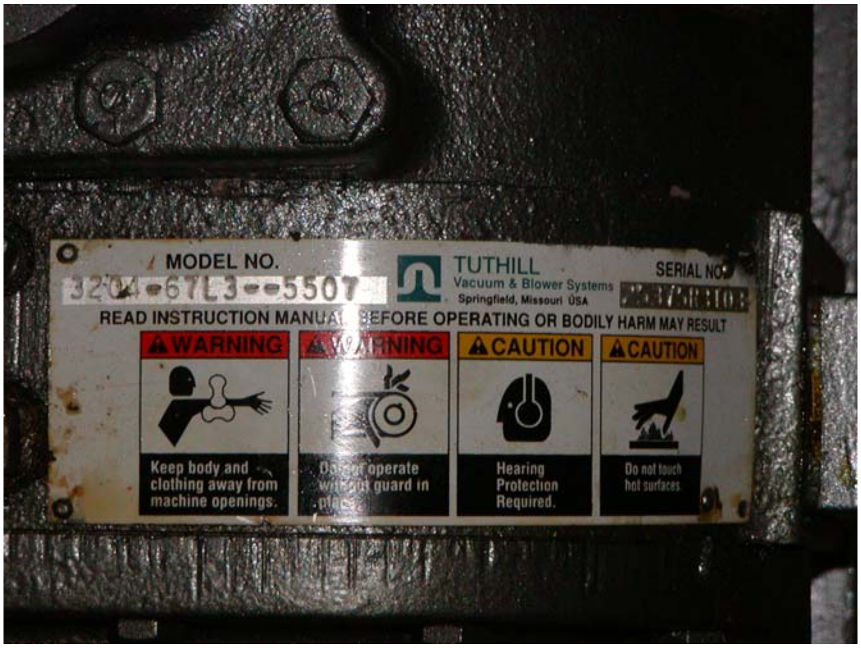
Baffle in Sediment Tank 1

Weir between Sediment Tanks 1 and 2

Effluent line from Tank 3

Drop-out tank and SVE vacuum/blower

SVE vacuum/blower



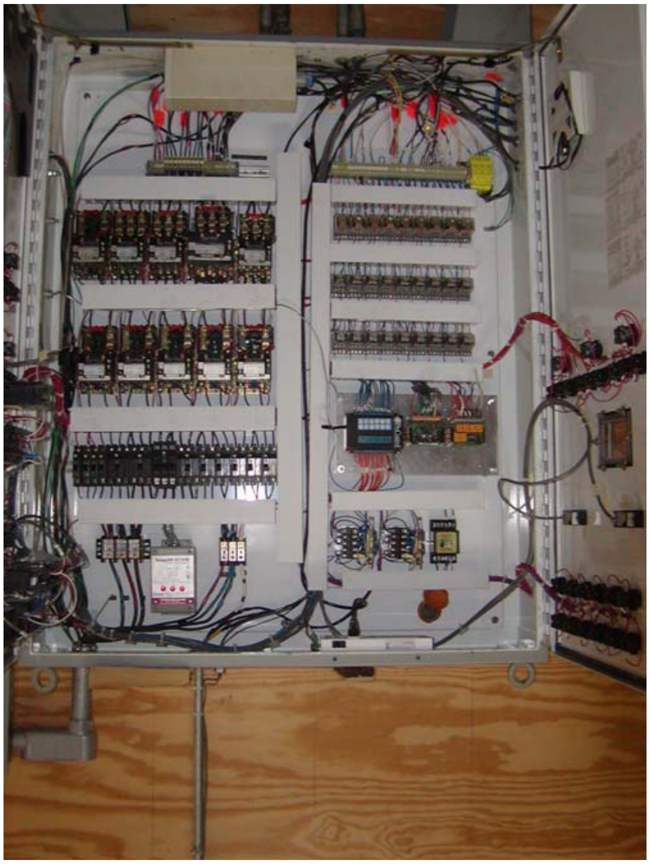
SVE vacuum name plate

Sample port influent GAC

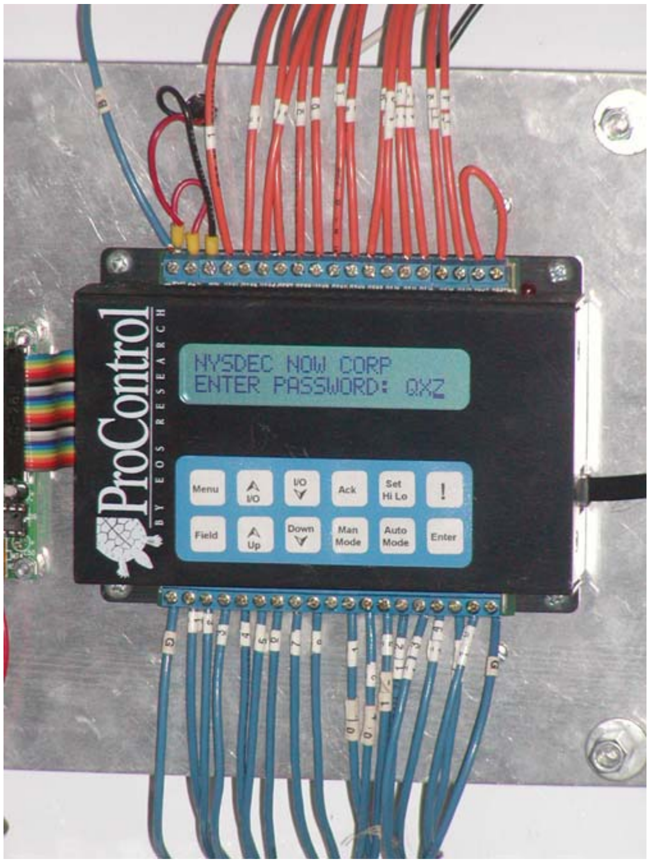
Heat exchanger (side view)

SVE vacuum skid

TW-2 extraction well outside building



Inside of control panel

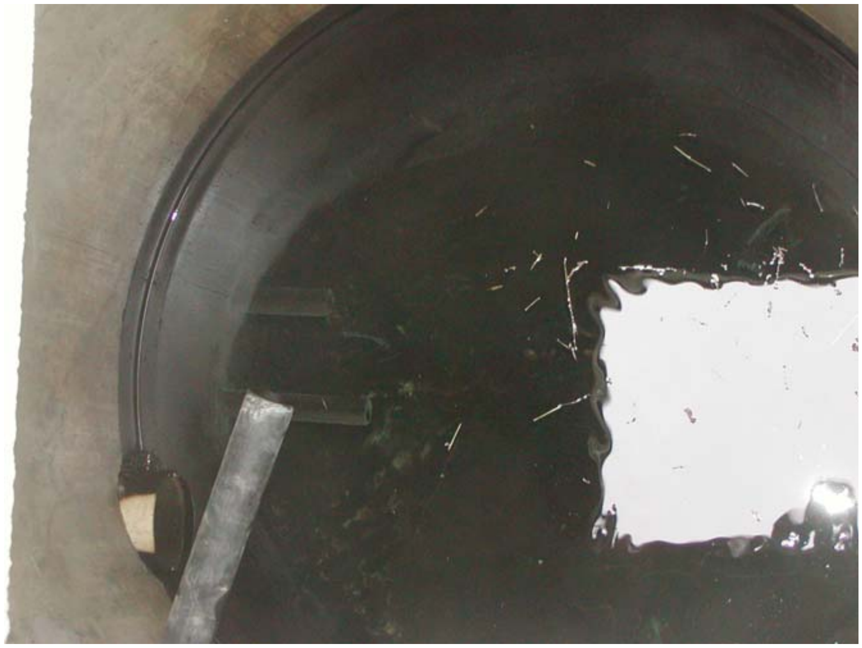


PLC inside control panel

TW-2A – looking west

VE-1, MW-7D and VE-2, looking northeast

Looking down inside meter pit (effluent lines to injection wells and to the creek)



Looking down inside effluent clearwell/ distribution box. Influent lines from treatment facility (longer pipe above water), two effluent lines to infiltration wells (submerged), effluent line to creek (lower left corner shorter stub).

Effluent meter pit

Infiltration well IW-1 (near effluent meter pit)

Distribution and meter pits and infiltration well, looking SE.

Infiltration well IW-2 (toward NYS Route 9G)

Effluent discharge at brook edge

Distribution and meter pits and infiltration well, looking NE

Well head of TW-1

APPENDIX C

ANALYTICAL RESULTS

OCT 2 0 2004

SAMPLE DATA SUMMARY PACKAGE

NYSDEC Albany
Case #: RA004
SDG #: 0916
STL Lab. #: 240601
Matrix: Water
1 of 1

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Inorganics

ICP

Sample Digestion

Samples number B04601 (240601-01) was digested and analyzed at the same time as laboratory sample number ZZZZZ (240586-01). Therefore all associated QC is reported from sample number ZZZZZ (240586-01).

Samples number B04601 (240601-02) was digested and analyzed at the same time as laboratory sample number ZZZZZ (240572-09). Therefore all associated QC is reported from sample number ZZZZZ (240572-09).

Matrix Spike

The percent spike recovery of manganese in spike sample number ZZZZZMS (240586-01MS) is outside of the established control limits. The data is qualified accordingly.

Serial Dilution

The percent difference of calcium in serial dilution sample number ZZZZZL (240586-01L) falls outside the control limit of 10%. As a result a chemical or physical interference may be suspected and the associated data is qualified with an "E".

The percent difference of calcium, potassium and sodium in serial dilution sample number ZZZZZL (240586-01L) falls outside the control limit of 10%. As a result a chemical or physical interference may be suspected and the associated data is qualified with an "E".

Sample Dilution

The following sample was diluted at the indicated amount and reanalyzed due to the interference of calcium on the undiluted sample at a concentration above the linear range of the instrument:

B04601 (240604-01): 5x

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Wet Chemistry

Alkalinity

Laboratory Control Sample

The percent recovery of alkalinity in the LCS is outside of the STL established limits. The percent recovery does fall within the manufacturer's limits.

Total Phosphorous

Matrix Spike/Duplicate

The matrix spike/duplicate was not performed on a sample from laboratory number 240601.

The percent spike recovery of total phosphorus in spike sample number ZZZZZMS (240610-04MS) is outside of the established limits.

Sulfate

Sample Dilution

Due to the results of the initial analysis, the following samples were diluted for sulfate at the indicated amount:

B04601 (240601-02): 4x
B04601MD (240601-02MD): 4x
B04601MS (240601-02MS): 4x

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

		Analytical Requirements					
Customer Sample Code	Laboratory Sample Code	*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*PEST PCBs Method #	*Metals	*Other
B04601	240601-01					55	124
B04601	240601-02					56	2, 16, 47, 103, 88, 99

000004

SUMMARY OF METHODOLOGY

Analysis	Aqueous	Ground Water Liquid/Solid Matrices
1 % Solid	EPA 160.3(A)	EPA 160.3(A)
2 Alkalinity-Tit.	SM182320-B(Q)	
3 Ammonia	SM184500-NH3E(Q)	
4 Ammonia	SM184500-NH3F(Q)	
5 Ammonia	LAC107061A(U)	
6 Antimony	EPA 204.2(A,D)	
7 Antimony	SM183113B(Q)	
8 Arsenic	EPA 206.2(A,D)	
9 Arsenic		SW846-7060A(B,D)
10 Arsenic	SM183113B(Q)	
11 Beryllium	SM183113B(Q)	
12 BOD	SM185210-B(Q)	
13 Bromide	EPA 300(A)	
14 Cadmium	SM183113B(Q)	
15 CBOD	SM185210-B(Q)	
16 Chloride	SM184500-CL-B(Q)	
17 Chloride(DW)	SM174500-CL-B(N)	
18 Chloride-IC	EPA 300(A)	
19 COD (high)	EPA 410.4(A)	
20 COD (low)	HACH 8000(W)	
21 Color	SM18 2120-B(Q)	
22 Coliform, Total-MF	SM18 9222B(Q)	
23 Coliform, Total	SM18 9223-MPN(Q)	
24 Conductivity	SM182510-B(Q)	
25 Cyanide	SM184500-CNE(Q)	
26 Cyanide		SW846-9010B(B)
27 Cyanide	LAC204001A(R)	
28 Cyanide, Amenable	SM184500-CNG(Q)	SW846-9010B(B)
29 Dissolved Oxygen	SM184500-O-C(Q)	
30 DRO		EPA DRO Draft Rev.5 (Y)
31 Enterococcus	ENTEROLERT	
32 E.Coli	SM18 9223-MPN(Q)	
33 Eptox		SW846-1310A(B)
34 Ethylene glycol	NYSDEC 89-9(M)	
35 ETPH	(AA)	
36 F. Coli-MF	SM189222C(Q)	
37 F. Coli-MF	SM189222D(Q)	
38 F. Coli-MPN	SM189221C(Q)	
39 Ferrous Iron	SM183500-FED(Q)	

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40 Flashpoint		SW846-1010(B)
41 Fluoride, Total	EPA 340.2(A)	EPA 340.2(A)
42 Fluoride, Total	EPA 300(A)	
43 Grease & Oil	SM185520-B(Q)	
44 Grease & Oil	EPA 413.1 (A)	
45 Grease & Oil	EPA 1664(A)	
46 GRO		EPA GRO Draft Rev. 5(Y)
47 Hardness, Total	EPA 200.7(A)	
48 Hardness, Total	EPA 130.2(A)	
49 Heat of Combustion	D2015(X)	
50 Herbicides		SW846-8151A(B)
51 Herbicides	EPA 515.1(L)	
52 Heterotropic Plate Count	SM18 9215B(Q)	SM18 9215B(Q)
53 Hex Chrome		SW846-7196A(B)
54 Hex Chrome	SM183500-Cr-D(Q)	
55 ICP Metals		SW846-6010B(B)
56 ICP Metals	EPA 200.7(A)	
57 Langlier Index	SM182330B(Q)	
58 Lead		SW846-7421(B,C)
59 Lead	EPA 239.2(A,D)	
60 Lead		SW846-7420(B,D)
61 Lead	SM183113B(Q)	
62 MBAS	SM185540-C(Q)	
63 Mercury		SW846-7470A(B)
64 Mercury		SW846-7471A(B)
65 Mercury	EPA 245.1(A)	
66 Mercury	EPA 245.2(A)	
67 Methanol	Modified 8015(B)	
68 Nitrate-AA	SM174500-NO3F(N)	
69 Nitrate-IC	EPA 300(A)	
70 Nitrate-Nitrite	SM184500-NO3F(Q)	
71 Nitrate-Nitrite	LAC107041A(T)	
72 Nitrite	EPA 354.1(A)	
73 Nitrite	SM184500-NO2-B(Q)	
74 Odor	SM182150(Q7)	
75 Organochlorine PSTs		SW846-8081A(B)
76 Organochlorine PSTs	EPA 608(F)	
77 Paint Filter Test		SW846-9095A(B)
78 PCB's	EPA 508(H)	
79 Pesticides/PCB's		SW846-8082(B)
80 Pesticides/PCB's	95.3(Z)	95.3(Z)
81 Pesticides/PCB's	EPA 505(H)	
82 pH		SW846-9045C(B)

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83 pH	SM184500-H-B(Q)	
84 Phenols		SW846-9065(B)
85 Phenols	EPA 420.A(A)	
86 Phenols	LAC210001A(S)	
87 Phosphate, Ortho	SM184500-PE(Q)	
88 Phosphate, Total	EPA 365.3(A)	
89 Propylene glycol	Modified 8015(B)	
90 Reactivity		SW846-7.3.2(B)
91 Selenium		SW846-7740(B,D)
92 Selenium	EPA 270.2(A,D)	
93 Selenium	SM183113B(Q)	
94 Semi-Volatiles		SW846-8270C(B)
95 Semi-Volatiles	EPA 625(E)	
96 Semi-volatiles	95.2(Z)	95.2(Z)
97 Semi-Volatiles	EPA 525.1(H)	
98 Specific Gravity		D1298-83
99 Specific Conductance	SM182510B(Q)	
100 SS	EPA 160.5(A)	
101 Sulfate		EPA 375.4(A)
102 Sulfate	EPA 375.4(A)	
103 Sulfate	EPA 300(A)	
104 Sulfide		SM184500-S2E(Q)
105 Sulfide	SM184500-S2D(Q)	
106 Sulfite	SM184500-SO3B(Q)	
107 Sulfite		SM184500SO3B(Q)
108 TCLP		SW846-1311(B)
109 TDS	EPA 160.1(A)	
110 TDS	SM182540C(Q)	
111 Temperature	EPA 170.1(A)	
112 Thallium		SW846-7841(B,D)
113 Thallium	EPA 279.2(A,D)	
114 Thallium	EPA 200.9(A)	
115 Tin	EPA 282.2 (A)	
116 TOC	SM185310-B(Q)	
117 Total Kjeldahl Nitrogen	SM184500NH3-F(Q)	
118 Total Kjeldahl Nitrogen	LAC107062D(V)	
119 TOX		SW846-9020B(B)
120 TPH	EPA 418.1(A)	
121 TPH 310.13		LOAC 310.13(P)
122 TPH	EPA 1664 (A)	
123 TPH-Calif.	Calif. DHS 8015	Calif. DHS 8015
124 TS	EPA 160.3(A)	
125 TSS	EPA 160.2(A)	

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126 TVS	EPA 160.4(A)	
127 Turbidity	SM182130-B(Q) and EPA 180.1(A)	
128 Volatiles Organics		SW846-8260B(B)
129 Volatiles Organics	EPA 624(E)	
130 Volatiles Organics	EPA 524.2(H)	
131 Volatiles Organics	EPA 502.2(K)	
132 Volatiles Organics	EPA 504.1(H)	
133 Volatiles Organics		SW846-8021B(B)
134 Volatiles Organics	EPA 601(F)	
135 Volatiles Organics	EPA 602(F)	
136 Volatiles Organics	95.1(Z)	95.1(Z)
137 Volatiles Organics	95.4(Z)	95.4(Z)
138 Volatiles Organics	OLC02.1(AB)	
139 Volatiles Organics	OLM03.2(AC)	
140 Suspended Sediment	USGS(AD)	USGS(AD)

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AC. USEPA CLP SOW for Organics Analysis Multi-Media, Multi-Concentration

AD. United States Geological Survey

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L A B O R A T O R Y   T E S T   R E S U L T S

Job Number: 240601

Date:10/19/2004

CUSTOMER: NYSDEC Albany   PROJECT: NOW CORP   ATTN: David Lis

Customer Sample ID: B04601
Date Sampled......: 09/16/2004
Time Sampled......: 13:32
Sample Matrix.....: Solid

Laboratory Sample ID: 240601-1
Date Received.......: 09/16/2004
Time Received.......: 15:58

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	IDL	RL	DILUTION	UNITS	DT	DATE	TECH
SW846 6010B	Metals Analysis (ICAP)										
	Calcium (Ca)*	334000		E	101	6700	5.000	mg/Kg		09/23/04	mad
	Iron (Fe)*	1660			25.3	134	5.000	mg/Kg		09/23/04	mad
	Magnesium (Mg)*	952	B		15.7	6700	5.000	mg/Kg		09/23/04	mad
	Manganese (Mn)*	4530		N	1.5	13.4	5.000	mg/Kg		09/23/04	mad

000046

* In Description = Dry Wgt.

Job Number: 240601

L A B O R A T O R Y   T E S T   R E S U L T S

Date:10/19/2004

CUSTOMER: NYSDEC Albany PROJECT: NOW CORP ATTN: David Lis

Customer Sample ID: B04601
Date Sampled......: 08/16/2004
Time Sampled......: 13:47
Sample Matrix.....: Water

Laboratory Sample ID: 240601-2
Date Received.......: 09/16/2004
Time Received.......: 15:58

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	IDL	RL	DILUTION	UNITS	DT	DATE	TECH
EPA 200.7	Hardness by calculation										
	Hardness, Total as CaCO3	244			2.5	2.5	1	mg/L		09/28/04	mwh
EPA 200.7	Metals Analysis (ICAP)										
	Calcium (Ca)	79500		E	51.7	5000	1	ug/L		09/28/04	mwh
	Iron (Fe)	532			18.9	100	1	ug/L		09/28/04	mwh
	Iron (Fe), Diss.	641			18.9	100	1	ug/L		09/28/04	mwh
	Magnesium (Mg)	11000			11.7	5000	1	ug/L		09/28/04	mwh
	Manganese (Mn)	190			1.1	10.0	1	ug/L		09/28/04	mwh
	Manganese (Mn), Diss.	258			1.1	10.0	1	ug/L		09/28/04	mwh
	Potassium (K)	1150	B	E	54.8	5000	1	ug/L		09/28/04	mwh
	Sodium (Na)	15300		E	130	5000	1	ug/L		09/28/04	mwh
EPA 200.7	Metals Analysis (ICP)										
	Silica	12400			37.4	500	1	ug/L		10/04/04	mad

000024

* In Description = Dry Wgt.

LABORATORY TEST RESULTS

Job Number: 240601

Date: 10/19/2004

CUSTOMER: NYSDEC Albany | PROJECT: NOW CORP | ATTN: David Lis

Customer Sample ID: B04601
Date Sampled......: 09/16/2004
Time Sampled......: 13:32
Sample Matrix.....: Solid

Laboratory Sample ID: 240601-1
Date Received.......: 09/16/2004
Time Received.......: 15:58

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	REPORTING LIMIT	UNITS	ANALYZED	TECH
EPA 160.3	% Moisture	23.9			0.10	%	09/20/04	rdf
EPA 160.3	% Solids	76.1			0.10	%	09/20/04	rdf

000018

* In Description = Dry Wgt.

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L A B O R A T O R Y   T E S T   R E S U L T S

Job Number: 240601 Date: 10/19/2004

CUSTOMER: NYSDEC Albany PROJECT: NOW CORP ATTN: David Lis

Customer Sample ID: B04601
Date Sampled......: 08/16/2004
Time Sampled......: 13:47
Sample Matrix.....: Water

Laboratory Sample ID: 240601-2
Date Received.......: 09/16/2004
Time Received.......: 15:58

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	REPORTING LIMIT	UNITS	ANALYZED	TECH
SM18 2320B	Alkalinity, Total as CaCO3	282			5.00	mg/L	09/22/04	rmc
SM18 2510B	Specific Conductance at 25 degrees C	520			0.5	umhos/cm	09/21/04	rmc
EPA 365.3	Phosphorous, Total as P	0.100	U	N	0.100	mg/L	09/26/04	ne
SM18 4500Cl	Chloride	20			5.0	mg/L	09/20/04	rmc
EPA 300.0	Ion Chromatography Analysis							
	Sulfate	44.2			20.0	mg/L	09/22/04	rmc

000019

* In Description = Dry Wgt.

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U. S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.

ZZZZZMD a

Lab Name: STL Newburgh   Contract: ______

Lab Code: 10142   Case No.: RA004   SAS No.: ____   SDG No.: 0916

Matrix (soil/water): SOIL   Level (low/med): ____

% Solids for Sample: 89.61   % Solids for Duplicate: 89.61

Concentration Units (ug/L or mg/Kg dry weight): mg/Kg

Analyte	Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Calcium	1116	1652.4009		843.9618	B	64.8		P
Iron		10117.0708		10980.4038		8.2		P
Magnesium		926.1960	B	1057.7140	B	13.2		P
Manganese		201.2893		221.9955		9.8		P

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FORM VI - IN   ILM04.0

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6
DUPLICATES

EPA SAMPLE NO.

ZZZZZMD

Lab Name: STL Newburgh Contract: ______

Lab Code: 10142 Case No.: RA004 SAS No.: ______ SDG No.: 0916

Matrix (soil/water): Water Level (low/med): ______

% Solids for Sample: ______ % Solids for Duplicate: ______

Concentration Units (ug/L or mg/Kg dry weight): ug/L

Analyte	Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Calcium,H		92911.3243		93598.5641		0.7		P
Iron		4358.7465		4297.7902		1.4		P
Magnesium	5000.0	10248.5344		10192.8492		0.5		P
Manganese		1774.3326		1780.0212		0.3		P
Potassium	5000.0	5620.7944		5715.6966		1.7		P
Sodium		63561.3407		63815.6941		0.4		P

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FORM VI - IN ILM04.0

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6
DUPLICATES

EPA SAMPLE NO.

ZZZZZMD

Lab Name: STL Newburgh   Contract:

Lab Code: 10142   Case No.: RA004   SAS No.:   SDG No.: 0916

Matrix (soil/water): Water   Level (low/med):

% Solids for Sample: % Solids for Duplicate:

Concentration Units (ug/L or mg/Kg dry weight): ug/L

Analyte	Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Silicon		6571.5510		6613.3953		0.6		P

000045

FORM VI - IN   ILM04.0

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U. S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

ZZZZZMS

Lab Name: STL Newburgh Contract:

Lab Code: 10142 Case No.: RA004 SAS No.: SDG No.: 0916

Matrix (soil/water): SOIL Level (low/med):

% Solids for Sample: 89.61

Concentration Units (ug/L or mg/Kg dry weight): mg/Kg

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Calcium									NR
Iron									NR
Magnesium									NR
Manganese	75-125	343.0059		201.2893		109.41	129.5	N	P

Comments:

000040

FORM V - IN ILM04.0

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U. S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

ZZZZZMS

Lab Name: STL Newburgh Contract:

Lab Code: 10142 Case No.: RA004 SAS No.: SDG No.: 0916

Matrix (soil/water): Water Level (low/med):

% Solids for Sample:

Concentration Units (ug/L or mg/Kg dry weight): ug/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Calcium									NR
Iron		5378.2970		4358.7465		1000.00	102.0		P
Magnesium									NR
Manganese	75-125	2314.6740		1774.3326		500.00	108.1		P
Potassium									NR
Sodium									NR

Comments:

000041

FORM V - IN ILM04.0

U. S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

ZZZZZMS

Lab Name: STL Newburgh Contract:

Lab Code: 10142 Case No.: RA004 SAS No.: SDG No.: 0916

Matrix (soil/water): Water Level (low/med):

% Solids for Sample:

Concentration Units (ug/L or mg/Kg dry weight): ug/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Silicon		14930.8595		6571.5510		10000.00	83.6		P

Comments:

000042

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SEVERN TRENT STL
NYSDOH 10142 NJDEP 73015 CTDOHS PH-0554 EPA NY049 PA 68-378 M-NY049
STL Newburgh
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Fax (845) 562-0841

QUALITY CONTROL RESULTS

Job Number.: 240601 | Report Date.: 10/19/2004

CUSTOMER: NYSDEC Albany | PROJECT: NOW CORP | ATTN: David Lis

Test Method........: SM18 2320B | Batch..............: 77285 | Analyst...: rmc
Method Description.: Alkalinity | Units..............: mg/L | Test Code.: ALK
Parameter..........: Alkalinity, Total as CaCO3

QC	Lab ID	Reagent	QC Result	Q	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
MD	240601-2		277.92				281.63	1.3	8-8		09/22/2004	1556
MS	240601-2	W03ALKSPK1	303.87			20.00	281.63	111.2	60-139		09/22/2004	1556
ICV		W03ALKSTD1	87.90			100		87.9	87-119		09/22/2004	1556
CCV		W03ALKSTD2	55.62			50		111.2	87-119		09/22/2004	1556
ICB			0								09/22/2004	1556
LCS		W04ALKLCS2	40.05			34.2		117.1	80-114	*	09/22/2004	1556
CCB			0								09/22/2004	1556

Test Method........: SM18 4500Cl | Batch..............: 76028 | Analyst...: rmc
Method Description.: Chloride | Units..............: mg/L | Test Code.: CHL
Parameter..........: Chloride

QC	Lab ID	Reagent	QC Result	Q	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
MS	240601-2	W04CLSPK02	45.9857			25.0	19.5684	105.7	74-126		09/20/2004	1025
LCS		W04MINLCS2	77.2952			76.8		100.6	90-105		09/20/2004	1025
ICV		W04CLICV01	49.8994			50.0		99.8	92-109		09/20/2004	1025
MB			0.0000								09/20/2004	1025
MD	240601-2		18.5900				19.5684	5.1	19-19		09/20/2004	1025

Test Method........: EPA 365.3 | Batch..............: 76317 | Analyst...: ne
Method Description.: Phosphorus, Total | Units..............: mg/L | Test Code.: PTOT
Parameter..........: Phosphorous, Total as P

QC	Lab ID	Reagent	QC Result	Q	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
MB			0.000								09/26/2004	1250
CCB			0.000								09/26/2004	1250
CCV		W04OPOCCV1	0.200			0.200		100.0			09/26/2004	1250
CCB			0.000								09/26/2004	1250
RS		W04RSP0401	0.100			0.100		100.0	82-111		09/26/2004	1250
CCV		W04OPOCCV1	0.200			0.200		100.0			09/26/2004	1250
LCS		W03TPOLCS1	4.400			4.25		103.5	86-110		09/26/2004	1250
MS	240610-4	W04SPKTP01	0			0.200	0	0.0	74-126	N	09/26/2004	1250
MD	240610-4		0				0	0.0	10-10		09/26/2004	1250

Test Method........: SM18 2510B | Batch..............: 76024 | Analyst...: rmc
Method Description.: Specific Conductance @ 25 degrees C | Units..............: umhos/cm | Test Code.: 120.1
Parameter..........: Specific Conductance at 25 degrees C

QC	Lab ID	Reagent	QC Result	Q	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
MD	240601-2		515				520				09/21/2004	1005

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QUALITY CONTROL RESULTS

Job Number.: 240601 Report Date.: 10/19/2004

CUSTOMER: NYSDEC Albany PROJECT: NOW CORP ATTN: David Lis

Test Method.......: EPA 300.0 Batch.............: 76083 Analyst...: rmc
Method Description.: Ion Chromatography Analysis Units.............: mg/L Test Code.: SO4
Parameter..........: Sulfate

QC	Lab ID	Reagent	QC Result	Q	QC Result	True Value	Orig. Value	Calc. Result *	Limits	F	Date	Time
DI			0								09/22/2004	1109
ICV		W03ICICV02	20.19			20.0		101.0	90-110		09/22/2004	1119
ICB			0								09/22/2004	1129
LCS		W04ICLCS01	7.70			7.50		102.7	90-110		09/22/2004	1139
CCV		W03ICCCV02	20.16			20		100.8	90-110		09/22/2004	1322
CCB			0								09/22/2004	1332
CCV		W03ICCCV02	19.98			20		99.9	90-110		09/22/2004	1525
CCB			0								09/22/2004	1535
MD	240601-2		44.28				44.20	0.2	20-20		09/22/2004	1647
MS	240601-2	W03ICSPK01	84.24			10.0	44.20	100.1	80-120		09/22/2004	1657
CCV		W03ICCCV02	20.02			20		100.1	90-110		09/22/2004	1728
CCB			0								09/22/2004	1738
CCV		W03ICCCV02	19.88			20		99.4	90-110		09/22/2004	1931
CCB			0								09/22/2004	1942

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U. S. EPA - CLP

3
BLANKS

Lab Name: STL Newburgh Contract:

Lab Code: 10142 Case No.: RA004 SAS No.: SDG No.: 0916

Preparation Blank Matrix (soil/water): soil

Preparation Blank Concentration Units (ug/L or mg/kg): mg/Kg

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum	38.4	U	38.4	U	38.4	U	38.4	U			P
Calcium	391.6	B	302.0	B	288.8	B	337.6	B	69.7	B	P
Iron	18.9	U	18.9	U	18.9	U	18.9	U	3.8	U	P
Magnesium	11.7	U	11.7	U	11.7	U	11.7	U	3.6	B	P
Manganese	1.1	U	1.1	U	1.1	U	1.1	U	0.2	U	P

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FORM III - IN ILM04.0

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3
BLANKS

Lab Name: STL Newburgh Contract: ______

Lab Code: 10142 Case No.: RA004 SAS No.: ______ SDG No.: 0916

Preparation Blank Matrix (soil/water): ______

Preparation Blank Concentration Units (ug/L or mg/kg): ______

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum			38.4	U							P
Calcium			331.1	B							P
Iron			18.9	U							P
Magnesium			11.7	U							P
Manganese			1.1	U							P

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3
BLANKS

Lab Name: STL Newburgh Contract:

Lab Code: 10142 Case No.: RA004 SAS No.: SDG No.: 0916

Preparation Blank Matrix (soil/water): water

Preparation Blank Concentration Units (ug/L or mg/kg): ug/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum	38.4	U	38.4	U	38.4	U	38.4	U			P
Calcium,H	708.6	B	664.8	B	671.5	B	663.9	B	665.8	B	P
Iron	18.9	U	18.9	U	18.9	U	18.9	U	18.9	U	P
Magnesium	11.7	U	11.7	U	11.7	U	11.7	U	11.7	U	P
Manganese	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	P
Potassium	54.8	U	54.8	U	54.8	U	54.8	U	54.8	U	P
Sodium	761.3	B	749.2	B	749.3	B	779.0	B	1025.3	B	P

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3
BLANKS

Lab Name: STL Newburgh Contract: ______

Lab Code: 10142 Case No.: RA004 SAS No.: ______ SDG No.: 0916

Preparation Blank Matrix (soil/water): water

Preparation Blank Concentration Units (ug/L or mg/kg): ug/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum	-20.3	B	164.7	B	-18.6	B	189.5	B			P
Calcium	331.3	B	541.5	B	392.2	B	537.9	B			P
Iron	16.8	U	92.0	B	16.8	U	95.1	B			P
Magnesium	10.8	B	238.4	B	20.2	B	244.8	B			P
Silicon	17.5	U	17.5	U	-23.8	B	-25.5	B	17.5	U	P
Silicon											NR

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APPENDIX D

COST EVALUATIONS

RETURN ON INVESTMENT SUMMARY

Category and Item	Capital Cost	Annual Savings	Return on Investment (years)	Total Life Cycle Savings
Achieve or Accelerate Closure				
Pump Harder in TW-1 Area	$0	($1,000)	not applicable	($13,590)
Sample beneath building	$16,000	not applicable	not applicable	($16,000)
Evaluate parking lot	$5,000	not applicable	not applicable	($5,000)
Vapor intrusion evaluation	$6,500	not applicable	not applicable	($6,500)
Facility Modifications				
Redevelop injection wells	$7,000	$0	not applicable	($7,000)
Repair vacuum pipe	$5,000	$0	not applicable	($5,000)
Rehabilitate multi-media filter	$6,000	$0	not applicable	($6,000)
Monitoring Improvements				
Monitor vacuum and velocity at vapor wells	$0	($650)	not applicable	($8,834)
Monitor discharge velocity	$3,000	$0	not applicable	($3,000)
Process Modifications				
Install scale-control system	$8,500	$2,700	$3	$28,194
Recommendations to Reduce Costs				
Supply Management	not evaluated	not evaluated	not evaluated	not evaluated
Process Improvements or Changes				
Shut down VES	$0	$8,700	$0	$118,236
Eliminate off-gas treatment	$1,300	$2,800	$0	$36,753
Eliminate reinjection	$0	$0	not applicable	$0
Reduce influent sampling	$0	$760	$0	$10,329

Note:
Evaluations were conducted for 20 year life cycles.

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 1 of 3
SITE: Now Corporation Site	Prepared by: SCP / Date: 1/28/05
ALTERNATIVE NO./NAME: Pump Harder in TW-1 Area	Checked by: REO / Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$0
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$0**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	125000	$0.10	$12,500
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$6,100	$6,100
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$109,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON				MACTEC	
PROJECT: NYSDEC State Superfund RSO				SHEET NO. 2 of 3	
SITE: Now Corporation Site				Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Pump Harder in TW-1 Area				Checked by: REO	Date: 2/8/05
LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$0
Useful Life (Years)					
				INITIAL COST SAVINGS	$0
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$109,800
			Total Annual Costs	$108,800	$109,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,492,218
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,492,218
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	-$13,590
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,492,218
				TOTAL LIFE CYCLE SAVINGS	-$13,590

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Pump Harder in TW-1 Area	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

No investigation in TW-1 area.

ALTERNATIVE:

Investigate TW-1 area in attempt to better define source and identify why no concentration reduction occurring.

ADVANTAGES:	DISADVANTAGES:
Potential clarify source area which could lead to reduced time to closure.	Cost.

DISCUSSION:

High power consumption and poor maintenance history make this alternative unattractive if less expensive approach

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$0	$109,800	$1,492,218
SAVINGS	$0	-$1,000	**-$13,590**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO — **SHEET NO.** 1 of 3

SITE: Now Corporation Site — Prepared by: SCP — Date: 1/28/05

ALTERNATIVE NO./NAME: Sample Soil Gas Beneath Building — Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Research historical building use	ls			$0	1	$5,000	$5,000
Soil Gas/Indoor Air samples	ls			$0	1	$5,000	$5,000
Analyze samples	ls			$0	1	$2,308	$2,308
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$12,308
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$16,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON				MACTEC	
PROJECT: NYSDEC State Superfund RSO				SHEET NO. 2 of 3	
SITE: Now Corporation Site				Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Sample Soil Gas Beneath Building				Checked by: REO	Date: 2/8/05
LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$16,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$16,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
			Total Annual Costs	$108,800	$108,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,494,628
				TOTAL LIFE CYCLE SAVINGS	-$16,000

SUMMARY OF ALTERNATIVE		MACTEC	
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 3 of 3	
SITE: Now Corporation Site		Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Sample Soil Gas Beneath Building		Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:
Sources beneath building not investigated.

ALTERNATIVE:
Evaluate soil gas and indoor air

ADVANTAGES:
Identify if contaminants beneath building.

DISADVANTAGES:
Cost

DISCUSSION:

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$16,000	$108,800	$1,494,628
SAVINGS	-$16,000	$0	**-$16,000**

ALTERNATIVE COST WORKSHEET	MACTEC
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Source in Parking Area	Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	**UNITS**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**
				$0			$0
Evaluated source data for parking	ls			$0	1	$3,846	$3,846
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$3,846
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$5,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	**UNITS**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC				
PROJECT: NYSDEC State Superfund RSO				SHEET NO. 2 of 3	
SITE: Now Corporation Site				Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Source in Parking Area				Checked by: REO	Date: 2/8/05
LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$5,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$5,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
			Total Annual Costs	$108,800	$108,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,483,627
				TOTAL LIFE CYCLE SAVINGS	-$5,000

SUMMARY OF ALTERNATIVE

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 3 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Source in Parking Area	Checked by: REO — Date: 2/8/05

ORIGINAL DESIGN:

No action taken beneath parking area.

ALTERNATIVE:

Reevaluate existing data to identify if additonal investigaiton/action is warranted.

ADVANTAGES:

Verify remedy is protective.

DISADVANTAGES:

Cost

DISCUSSION:

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$5,000	$108,800	$1,483,627
SAVINGS	-$5,000	$0	**-$5,000**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Vapor Intrusion Risks	Checked by: REO	Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Vapor Intrusion Evaluation	ls			$0	1	$5,000	$5,000
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$5,000
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$6,500**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Vapor Intrusion Risks	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$6,500
Useful Life (Years)					
				INITIAL COST SAVINGS	-$6,500
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
Total Annual Costs				$108,800	$108,800
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,485,128
				TOTAL LIFE CYCLE SAVINGS	-$6,500

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Evaluate Vapor Intrusion Risks	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

Indoor air not evaluated in RI.

ALTERNATIVE:

Evaluate indoor air pathway.

ADVANTAGES:

Identify is unacceptable exposure exists.

DISADVANTAGES:

Cost.

DISCUSSION:

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$6,500	$108,800	$1,485,128
SAVINGS	-$6,500	$0	**-$6,500**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 1 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Redevelop Injection Wells	Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Redevelop Injection Wells	ea	1		$0	2	$2,692	$5,385
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$5,385
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$7,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Redevelop Injection Wells	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$7,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$7,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
Total Annual Costs				$108,800	$108,800
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,485,627
				TOTAL LIFE CYCLE SAVINGS	-$7,000

SUMMARY OF ALTERNATIVE	MACTEC		
PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 3 of 3		
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05	
ALTERNATIVE NO./NAME: Redevelop Injection Wells	Checked by: REO	Date: 2/8/05	

ORIGINAL DESIGN:

Reinjection wells are fouled and accept minimal flow.

ALTERNATIVE:

Redevelop injection wells.

ADVANTAGES:

Reestablishes injection component of remedy.

DISADVANTAGES:

Wells may plug quickly again.

DISCUSSION:

Implement if reinjection is to continue.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$7,000	$108,800	$1,485,627
SAVINGS	-$7,000	$0	**-$7,000**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 1 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Repair Vacuum Pipe	Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	**UNITS**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**
				$0			$0
Excavate and Repair Pipes	ls			$0	1	$3,846	$3,846
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$3,846
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$5,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	**UNITS**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**	**NO. UNITS**	**COST/ UNIT**	**TOTAL**
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON				MACTEC	
PROJECT: NYSDEC State Superfund RSO				SHEET NO. 2 of 3	
SITE: Now Corporation Site				Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Repair Vacuum Pipe				Checked by: REO	Date: 2/8/05
LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$5,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$5,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
			Total Annual Costs	$108,800	$108,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,483,627
				TOTAL LIFE CYCLE SAVINGS	-$5,000

SUMMARY OF ALTERNATIVE	MACTEC		
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3		
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05	
ALTERNATIVE NO./NAME: Repair Vacuum Pipe	Checked by: REO	Date: 2/8/05	

ORIGINAL DESIGN:
Pipe to VE-1 and VE-2 may be damaged.

ALTERNATIVE:
Repair pipes.

ADVANTAGES:
VE-1 and VE-2 will work.

DISADVANTAGES:
Cost.

DISCUSSION:
Recommended if pipes are damaged and VES continues to operate.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$5,000	$108,800	$1,483,627
SAVINGS	-$5,000	$0	**-$5,000**

ALTERNATIVE COST WORKSHEET							MACTEC
PROJECT: NYSDEC State Superfund RSO					SHEET NO. 1 of 3		
SITE: Now Corporation Site					Prepared by: SCP		Date: 1/28/05
ALTERNATIVE NO./NAME: Rehabilitate Mulit-Media Filter					Checked by: REO		Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Remove/dispose old media	ls			$0	1	$500	$500
Replace Media	ls			$0	1	$2,000	$2,000
Acid clean internals	ls			$0	1	$2,115	$2,115
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$4,615
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$6,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 2 of 3		
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05	
ALTERNATIVE NO./NAME: Rehabilitate Mulit-Media Filter	Checked by: REO	Date: 2/8/05	

LIFE CYCLE PERIOD: 20 Years **INTEREST RATE:** 4.00%				**ORIGINAL**	**PROPOSED**
INITIAL COSTS					
A. INITIAL COST				$0	$6,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$6,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
Total Annual Costs				$108,800	$108,800
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	**Year**	**Amount**	**PW Factor**	**Present Worth**	**Present Worth**
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,484,627
				TOTAL LIFE CYCLE SAVINGS	-$6,000

SUMMARY OF ALTERNATIVE		MACTEC	
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 3 of 3	
SITE: Now Corporation Site		Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Rehabilitate Mulit-Media Filter		Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

Multi-media filter is not used due to fouling issues

ALTERNATIVE:

Rehabilitate multi-media filter and continue to use.

ADVANTAGES:

Protect injection wells from fouling.

DISADVANTAGES:

Filter must be maintained and scale control system needed to prevent reoccurance of fouling problems.

DISCUSSION:

Recommended if water reinjection is to continue.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$6,000	$108,800	$1,484,627
SAVINGS	-$6,000	$0	**-$6,000**

ALTERNATIVE COST WORKSHEET					MACTEC		
PROJECT: NYSDEC State Superfund RSO					SHEET NO. 1 of 3		
SITE: Now Corporation Site					Prepared by: SCP		Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor Vacuum Well Vacuum and Velocity					Checked by: REO		Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$0
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$0**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1053	$50	$52,650
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$109,450**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON		MACTEC	
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 2 of 3	
SITE: Now Corporation Site		Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor Vacuum Well Vacuum and Velocity		Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD:	**20 Years**			**ORIGINAL**	**PROPOSED**
INTEREST RATE:	**4.00%**				
INITIAL COSTS					
A. INITIAL COST				$0	$0
Useful Life (Years)					
			INITIAL COST SAVINGS		$0
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$109,450
			Total Annual Costs	$108,800	$109,450
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,487,461
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	**Year**	**Amount**	**PW Factor**	**Present Worth**	**Present Worth**
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,487,461
			ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS		-$8,834
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,487,461
			TOTAL LIFE CYCLE SAVINGS		-$8,834

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor Vacuum Well Vacuum and Velocity	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

Vacuum and velocity at vapor extraction wells not measured.

ALTERNATIVE:

Measure vacuum and velocity

ADVANTAGES:

Data availble for performance monitoring.

DISADVANTAGES:

None identified

DISCUSSION:

Recommended if VES operation continues.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$0	$109,450	$1,487,461
SAVINGS	$0	-$650	**-$8,834**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 1 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor VES Discharge Rate	Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Flow meter	ls			$0	1	$2,308	$2,308
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$2,308
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$3,000**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor VES Discharge Rate	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$3,000
Useful Life (Years)					
				INITIAL COST SAVINGS	-$3,000
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
			Total Annual Costs	$108,800	$108,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$0
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,481,628
				TOTAL LIFE CYCLE SAVINGS	-$3,000

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Monitor VES Discharge Rate	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

VES vapor discharge rate not monitored.

ALTERNATIVE:

Monitor VES discharge rate.

ADVANTAGES:

Additional data to assess performance.

DISADVANTAGES:

None identified

DISCUSSION:

Recommended if VES operation continues.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$3,000	$108,800	$1,481,628
SAVINGS	-$3,000	$0	**-$3,000**

ALTERNATIVE COST WORKSHEET	MACTEC
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3
SITE: Now Corporation Site	Prepared by: SCP — Date: 1/28/05
ALTERNATIVE NO./NAME: Install Scale-Control System	Checked by: REO — Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Metering Pump w/ pH Control	ls			$0	1	$4,500	$4,500
Drum Containment	ls			$0	1	$500	$500
In-line Mixer	ls			$0	1	$1,539	$1,539
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$6,539
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$8,500**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	936	$50	$46,800
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
Hydrochloric Acid	drum	0	$100	$0	25	$100	$2,500
TOTAL				**$108,800**			**$106,100**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Install Scale-Control System	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$8,500
Useful Life (Years)					
				INITIAL COST SAVINGS	-$8,500
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$106,100
Total Annual Costs				$108,800	$106,100
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,441,934
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,441,934
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$36,694
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,450,434
				TOTAL LIFE CYCLE SAVINGS	$28,194

SUMMARY OF ALTERNATIVE		MACTEC	
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 3 of 3	
SITE: Now Corporation Site		Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Install Scale-Control System		Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

No control of $CaCO_3$ scale.

ALTERNATIVE:

Add pH adjustment system to reduce scaling

ADVANTAGES:	DISADVANTAGES:
Reduced maintenance assoicated with scaling	Added cost of acid and added safety risk.

DISCUSSION:

Recommended to address problems with scale formation.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$8,500	$106,100	$1,450,434
SAVINGS	-$8,500	$2,700	**$28,194**

ALTERNATIVE COST WORKSHEET		MACTEC
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 1 of 3
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Shut Down VES	Checked by: REO	Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$0
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$0**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	100000	$0.10	$10,000
O&M labor	hrs	1040	$50	$52,000	936	$50	$46,800
O&M materials	ls	1	$5,600	$5,600	1	$4,100	$4,100
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$100,100**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON

MACTEC

PROJECT: NYSDEC State Superfund RSO				**SHEET NO.** 2 of 3	
SITE: Now Corporation Site				Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Shut Down VES				Checked by: REO	Date: 2/8/05
LIFE CYCLE PERIOD: 20 Years **INTEREST RATE:** 4.00%				**ORIGINAL**	**PROPOSED**
INITIAL COSTS					
A. INITIAL COST				$0	$0
Useful Life (Years)					
				INITIAL COST SAVINGS	$0
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$100,100
Total Annual Costs				$108,800	$100,100
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,360,392
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	**Year**	**Amount**	**PW Factor**	**Present Worth**	**Present Worth**
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,360,392
ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS					$118,236
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,360,392
TOTAL LIFE CYCLE SAVINGS					$118,236

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Shut Down VES	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

VES provided to remove contaminants from unsaturated bedrock

ALTERNATIVE:

Shut down VES

ADVANTAGES:

Cost savings

DISADVANTAGES:

Potential ROD change required.

DISCUSSION:

Minimial VOCs currently removed by VES. Cost-benefit of system does not favor continued treatment.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$0	$100,100	$1,360,392
SAVINGS	$0	$8,700	**$118,236**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Discontinue VES Off-Gas Treatment	Checked by: REO	Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
Air Permitting Documents				$0	1	$1,000	$1,000
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$1,000
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$1,300**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1014	$50	$50,700
O&M materials	ls	1	$5,600	$5,600	1	$4,100	$4,100
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$106,000**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Discontinue VES Off-Gas Treatment	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years INTEREST RATE: 4.00%				ORIGINAL	PROPOSED
INITIAL COSTS					
A. INITIAL COST				$0	$1,300
Useful Life (Years)					
				INITIAL COST SAVINGS	-$1,300
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$106,000
Total Annual Costs				$108,800	$106,000
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,440,575
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	Year	Amount	PW Factor	Present Worth	Present Worth
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,440,575
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$38,053
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,441,875
				TOTAL LIFE CYCLE SAVINGS	$36,753

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Discontinue VES Off-Gas Treatment	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

VES discharges through vapor phase granular activated carbon

ALTERNATIVE:

Discharge VES to atmosphere without treatment

ADVANTAGES:

Cost savings

DISADVANTAGES:

None identified

DISCUSSION:

VES concentrations appear to meet air limits without treatment.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$1,300	$106,000	$1,441,875
SAVINGS	-$1,300	$2,800	**$36,753**

ALTERNATIVE COST WORKSHEET	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Eliminate Reinjection	Checked by: REO	Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$0
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$0**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1040	$50	$52,000
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$17,000	$17,000
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,800**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON	MACTEC	
PROJECT: NYSDEC State Superfund RSO	**SHEET NO.** 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Eliminate Reinjection	Checked by: REO	Date: 2/8/05

LIFE CYCLE PERIOD: 20 Years **INTEREST RATE:** 4.00%				**ORIGINAL**	**PROPOSED**
INITIAL COSTS					
A. INITIAL COST				$0	$0
Useful Life (Years)					
			INITIAL COST SAVINGS		$0
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,800
			Total Annual Costs	$108,800	$108,800
			Present Worth (PW) Factor	13.59	13.59
			Present Worth of ANNUAL COSTS	$1,478,628	$1,478,628
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	**Year**	**Amount**	**PW Factor**	**Present Worth**	**Present Worth**
Salvage Value					
			Present Worth of SINGLE EXPENDITURES	$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,478,628
			ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS		$0
TOTAL LIFE CYCLE SAVINGS					
			E. TOTAL PRESENT WORTH COST (A + D)	$1,478,628	$1,478,628
			TOTAL LIFE CYCLE SAVINGS		$0

SUMMARY OF ALTERNATIVE		MACTEC	
PROJECT: NYSDEC State Superfund RSO		SHEET NO. 3 of 3	
SITE: Now Corporation Site		Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Eliminate Reinjection		Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

Plant effluent discharged to reinjection wells with excess to surface water.

ALTERNATIVE:

Plant effluent discharges to surface water only.

ADVANTAGES:	DISADVANTAGES:
Eliminates need to rehabilitate injection wells and media filter.	Goals for reinjection in ROD not met.

DISCUSSION:

Minimal volume is currently reinjected due to plugged wells with no significant hydrogeological impact. Cost to rehabiltate system to allow greater injection not justified by improved subsurface performance.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$0	$108,800	$1,478,628
SAVINGS	$0	$0	**$0**

ALTERNATIVE COST WORKSHEET

MACTEC

PROJECT: NYSDEC State Superfund RSO	SHEET NO. 1 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Reduce Frequency of Influent Sampling	Checked by: REO	Date: 2/8/05

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Sub-Total				$0			$0
Engineering, Contingencies, etc.				30%			30%
TOTAL				**$0**			**$0**

ANNUAL COST ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. UNITS	COST/ UNIT	TOTAL	NO. UNITS	COST/ UNIT	TOTAL
Electric power	kwhr	120000	$0.10	$12,000	120000	$0.10	$12,000
O&M labor	hrs	1040	$50	$52,000	1034.8	$50	$51,740
O&M materials	ls	1	$5,600	$5,600	1	$5,600	$5,600
Telephone	ls	1	$3,000	$3,000	1	$3,000	$3,000
Sample Analysis	ls	1	$17,000	$17,000	1	$16,500	$16,500
Project Management	hrs	192	$100	$19,200	192	$100	$19,200
TOTAL				**$108,800**			**$108,040**

NOTES:

LIFE-CYCLE ALTERNATIVE COMPARISON

MACTEC

PROJECT: NYSDEC State Superfund RSO	SHEET NO. 2 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Reduce Frequency of Influent Sampling	Checked by: REO	Date: 2/8/05

				ORIGINAL	PROPOSED
LIFE CYCLE PERIOD: 20 Years					
INTEREST RATE: 4.00%					
INITIAL COSTS					
A. INITIAL COST				$0	$0
Useful Life (Years)					
				INITIAL COST SAVINGS	$0
ANNUAL COSTS					
B. ANNUAL COSTS				$108,800	$108,040
Total Annual Costs				$108,800	$108,040
Present Worth (PW) Factor				13.59	13.59
Present Worth of ANNUAL COSTS				$1,478,628	$1,468,299
SINGLE EXPENDITURES					
C. SINGLE EXPENDITURES	**Year**	**Amount**	**PW Factor**	**Present Worth**	**Present Worth**
Salvage Value					
Present Worth of SINGLE EXPENDITURES				$0	$0
TOTAL ANNUAL/RECURRENT/SINGLE COSTS					
D. Total Recurrent Costs & Single Expenditures (B + C)				$1,478,628	$1,468,299
				ANNUAL COSTS & SINGLE EXPENDITURES SAVINGS	$10,329
TOTAL LIFE CYCLE SAVINGS					
E. TOTAL PRESENT WORTH COST (A + D)				$1,478,628	$1,468,299
				TOTAL LIFE CYCLE SAVINGS	$10,329

SUMMARY OF ALTERNATIVE	MACTEC	
PROJECT: NYSDEC State Superfund RSO	SHEET NO. 3 of 3	
SITE: Now Corporation Site	Prepared by: SCP	Date: 1/28/05
ALTERNATIVE NO./NAME: Reduce Frequency of Influent Sampling	Checked by: REO	Date: 2/8/05

ORIGINAL DESIGN:

Monthly influent sampling

ALTERNATIVE:

Quarterly influent sampling

ADVANTAGES:

Cost reduction

DISADVANTAGES:

Less data available.

DISCUSSION:

Influent data is not critical to track on a monthly basis.

COST SUMMARY	INITIAL COST	ANNUAL O&M COST	LIFE-CYCLE COST
ORIGINAL DESIGN	$0	$108,800	$1,478,628
ALTERNATIVE	$0	$108,040	$1,468,299
SAVINGS	$0	$760	**$10,329**