Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Bowe Systems and Machinery
Hicksville, Nassau County
Site Number 1-30-048

March 1999

New York State Department of Environmental Conservation

GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Bowe Systems and Machinery
Hicksville, Nassau County, New York
Site No. 1-30-048

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Bowe Systems and Machinery inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Bowe Systems and Machinery Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site have been addressed by implementing the interim response actions identified in this ROD. The removal of contaminated soil from the site has significantly reduced the threat to public health and the environment. Therefore, a groundwater monitoring program will be implemented to monitor the effectiveness of previous remedial actions in preventing further contamination of the groundwater.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Bowe Systems and Machinery site and the criteria identified for evaluation of alternatives, the NYSDEC has selected no further action with continued groundwater monitoring. The components of the remedy are as follows:

- Sampling and analysis of groundwater quality and flow direction from eight existing groundwater monitoring wells on a quarterly basis for a minimum of three years and up to ten years.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/16/99
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) has selected the remedy for the Bowe Systems and Machinery (Bowe) site. As more fully described in Sections 3 and 4 of this document, the testing of commercial dry cleaning machinery resulted in the disposal of the hazardous waste, tetrachloroethylene (PCE), at the site, some of which migrated from the site in the groundwater. These disposal activities resulted in the following significant threats to the public health and/or the environment:

- a significant threat to human health associated with exposure to contaminated soil and/or groundwater.

During the course of the investigation certain actions, known as Interim Remedial Measures (IRMs), were undertaken at the Bowe site in response to the threats identified above. IRMs are conducted at sites when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS. The IRMs undertaken at this site were the excavation of contaminated soil from four separate source areas.

Based upon the success of the above IRMs, the findings of the investigation of this site indicate that the removal of contaminated soil has significantly reduced the threat to public health and the environment. Therefore, No Further Action with groundwater monitoring was the remedy for this site. The groundwater monitoring program will be implemented to monitor the effectiveness of previous remedial actions in preventing further contamination of the groundwater. The NYSDEC will reclassify the site from a Class 2 to a Class 4 on the New York State Registry of Inactive Hazardous Waste Disposal Sites. A Class 4 site is a site that has been properly closed but requires continued operation, maintenance, and/or monitoring.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Bowe site #1-30-048 is located at 200 Frank Road in the City of Hicksville, Town of Oyster Bay, Nassau County, New York. The facility is located on a 2.1 acre parcel of land. The site is paved on the east and south sides and contains a one story masonry building approximately 25,000 square feet in size. Adjacent to the site to the north and west are light industrial and commercial facilities. Residential homes are situated to the southeast of the site. A site location map is presented in Figure 1.

Two inactive hazardous waste disposal sites are located within 0.25 miles of the site. They are:

- Magnusonic Devices, Inc., Site Number 1-30-031, 0.2 miles northeast

- Alsy Manufacturing, Site Number 1-30-027, 0.25 miles northeast

A public water supply wellfield is located approximately 4000 feet south of the site. The wellfield is operated by the Hicksville Water District. Residential homes and businesses are connected to the public water supply. There are no known private drinking water wells utilized in the area.

SECTION 3: SITE HISTORY

3.1: OPERATIONAL/DISPOSAL HISTORY

Bowe occupied the site from 1990 until 1991. The company vacated the facility in 1991 before returning again in 1994. Bowe sells automated mail processing equipment. American Permac, a subsidiary of Bowe, imported, assembled and tested dry cleaning machinery at the site during the late 1980s. American Permac ceased operations in 1990. During the testing of dry cleaning machinery, PCE was used. During routine operation and testing, PCE was not discharged at the site. However, in 1989, a spill of approximately 10 - 15 gallons of PCE occured into the floor drain system which discharged into an on-site leaching pool system (Figure 2, Area 1).

Prior to 1990: Site occupied by American Permac.

1990 - 1991: Site occupied by Bowe Systems and Machinery.

1991 - 1994: Building vacant.

1994 - 1998: Site occupied by Bowe Systems and Machinery.

3.2: REMEDIAL HISTORY

The following is a chronological listing of investigations performed at the site.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm).

December 1989: An environmental assessment was conducted in response to an accidental discharge of PCE at the site. The investigation revealed elevated concentrations of PCE in the soil in three on-site leaching pools DW-1, DW-2 and DW- 3 at 2400 ppm, 0.14 ppm and 10 ppm, respectively. Soil beneath a former spray paint booth was also found to be impacted by volatile organic compounds (VOCs). Four groundwater monitoring wells were installed on-site (MW-1, 2, 3, 4). Sampling and analysis of the monitoring wells detected PCE at 130 ppb and 8100 ppb in downgradient monitoring wells MW-3 and MW-4, respectively (Figure 2). Site specific groundwater flow direction was determined to be nearly due south.

March 1991: The NYSDEC oversaw the excavation and removal of approximately 450 tons of contaminated soil from leaching pools DW-1, DW-2 and DW-3 (Area 1, Figure 2). These leaching pools were connected in series and were the pools which received the documented spill of PCE. The soil was removed by a licensed waste hauler to an approved Treatment, Storage and Disposal Facility (TSDF). The final excavation extended to a maximum depth of 29 feet below land surface (bls) along the north side of the excavation and 17 feet bls along the south side. Upon completion of the excavation, a total of nine confirmatory soil samples were acquired for laboratory analysis. Three confirmatory soil samples were taken from the bottom of the excavation, two from the east sidewall, two from the west sidewall and one from the south sidewall. Laboratory analysis of the confirmatory soil samples revealed PCE concentrations below 1 ppm in all samples. NYSDEC Technical Administrative Guidance Memorandum (TAGM) #4046 recommends a soil cleanup level of 1.4 ppm for PCE for the protection of human health and the environment. Upon completion of the excavation, the piping from the building to the leaching pool system was disconnected and sealed.

October 18, 1991: Site is listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site.

August 1992: Prior to the initiation of the RI/FS, the PRP conducted a site screening investigation (SSI). The objectives of the SSI were to investigate the following areas of concern: Area 1 (DW-1, 2, 3); Area 2 (DW-8 in loading dock); Area 3 (former spray paint booth); Area 4 (sanitary leaching pool system on north side of building) (Figure 2). The results of the SSI are as follows:

- Area 1: VOC analysis of soil beneath Area 1 revealed the following detections: DW-1 (30'-32' bls) <1ppm total VOCs, (40'-42' bls) <1ppm total VOCs; DW-2 (14'-16' bls) <1ppm total VOCs; DW-3 (23'-25' bls) <1ppm total VOCs (Figure 2).

- Area 2: VOC analysis of the soil from DW-8 revealed the following detection: (10'-12' bls) 0.081 ppm of PCE.

- Area 3: A soil gas survey revealed elevated concentrations of VOCs. Two samples were acquired from locations exhibiting the highest photoionization detector (PID) responses and were analyzed for VOCs revealing the following detections: SB-1 (2'-4' bls) 2.3 ppm PCE; SB-2 (2'-4' bls) 0.91 ppm PCE (Figure 2).

- Area 4: sludge samples were acquired for VOC analysis from the bottom of the two sanitary leaching pool (LP-1, LP-2) and a septic tank (ST) and revealed the following detections: LP-1 <1ppm total VOCs; LP-2 1.98ppm total VOCs; ST <1ppm total VOCs (Figure 2).

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present at the site and to evaluate alternatives to address the significant threat to human health and the environment, Bowe Systec, Inc. conducted a Remedial Investigation/Feasibility Study (RI/FS)

4.1: SUMMARY OF REMEDIAL INVESTIGATION

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted in two phases. The Phase I RI was conducted beginning in September, 1992. The Phase II RI began in September, 1993. A report entitled Remedial Investigation/Feasibility Study dated November, 1998 has been prepared which describes the field activities and findings of the RI in detail.

The Phase I RI and Phase II RI included the following activities:

- *Background information review.*

- *Advance soil borings in areas of concern and acquire soil samples for laboratory analysis.*

- *Install two additional on-site groundwater monitoring wells. Acquire groundwater samples for laboratory analysis and water levels to confirm groundwater flow direction.*

- *Install seven temporary off-site groundwater monitoring wells downgradient of the site. Acquire groundwater samples at discrete depth intervals to ascertain the areal extent of groundwater contamination.*

- *Install and sample one permanent off-site downgradient groundwater monitoring well.*

- *Conduct aquifer characteristics testing to further define groundwater flow conditions in the vicinity of the site.*

To determine which media (groundwater and soil) contain contamination at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater SCGs identified for the Bowe Systems and Machinery site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of the NYS Sanitary Code. Soil quality data was compared to NYSDEC TAGM #4046.

Based upon the results of the remedial investigation, in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site require further monitoring. These are summarized below. More complete information can be found in the RI report.

For comparison purposes, where applicable, SCGs are provided for groundwater.

4.1.1: NATURE OF CONTAMINATION

As described in the RI report, soil and groundwater samples were collected at the site to characterize the nature and extent of contamination. Based upon past environmental investigations, PCE is the contaminant associated with past disposal practices.

Soil Quality:

- In order to determine soil quality in potential source areas which had not been previously investigated, a total of eight additional soil borings were conducted.

Groundwater Quality:

- In order to help further define the extent of groundwater contamination on-site, two additional groundwater monitoring wells (MW-8, MW-9) were installed (Figure 2). In order to evaluate the areal extent of groundwater contamination which may have migrated off-site, one permanent (OW-1) and seven temporary groundwater monitoring wells (EW-2, 3, 4, 5, 7, 8, 9) were installed (Figure 3).

4.1.2: EXTENT OF CONTAMINATION

The following are the media which were investigated during the RI and a summary of the findings of the investigations.

Soil Quality:

Confirmatory soil samples previously acquired from drywells DW-1, 2 and 3 (Area 1, Figure 2) revealed that the IRM conducted in March, 1991 was successful in reducing PCE concentrations to levels below those prescribed in TAGM #4046.

Soil borings advanced through drywells DW-4, 5, 6, 7 and 8 (Figure 2) revealed PCE concentrations below TAGM #4046 in all cases. Drywells DW-4, 5, 6, and 7 had not been investigated prior to the RI. DW-8 was the subject of an IRM conducted in September, 1992.

In order to determine the extent of contamination remaining around the former spray paint booth, a soil gas survey was conducted, two soil borings performed and two surface soil samples were acquired via hand auger. The highest concentration of PCE observed in any of these samples was 0.14 ppm, demonstrating the IRM was successful in removing soil contamination.

Based upon prior sampling of the sanitary leaching pool system (Area 4, Figure 2), leaching pool LP-2 was found to contain elevated levels of VOCs and was the subject of an IRM. A soil boring was advanced through this pool during the RI and revealed no detections of VOCs.

Groundwater Quality:

To help further define on-site groundwater quality, two additional monitoring wells (MW-8, MW-9) were installed during the Phase I RI to supplement previously installed wells (Figure 2). The VOC of concern was PCE which was detected at levels above the NYS groundwater standard of 5 ppb (Table 2).

In order to ascertain the areal extent of groundwater contamination which may have migrated off-site, one permanent and seven temporary groundwater monitoring wells were installed downgradient of the site during the Phase II RI. Temporary exploratory wells EW-2, 3 and 4 were installed and sampled in July, 1993. Temporary exploratory wells EW-5, 7, 8 and 9 were installed and sampled in July, 1995. Permanent monitoring well OW-1 was installed and sampled in July, 1997. The data and locations of these wells are presented Table 3 and Figure 3, respectively.

4.2: INTERIM REMEDIAL MEASURES

Interim Remedial Measures (IRMs) are conducted at sites when a source of contamination or exposure route can be effectively addressed before the completion of the RI/FS.

As a result of a site screening investigation (SSI) conducted in August, 1992 the following IRMs were undertaken in September, 1992. Area 1 (Figure 2) was the subject of an earlier IRM overseen by NYSDEC and discussed earlier in this document.

1. Area 2: In September, 1992, the bottom five feet of soil/sediment was removed from DW-8 (Figure 2). The contaminated soil was transported to Athens Hocking Reclamation Center, an approved TSDF. A confirmatory soil sample detected PCE below 1 ppm.

2. Area 3: In September, 1992, approximately 27 cubic yards of soil was excavated from the location of the former spray paint booth (Figure 2). The excavation measured approximately 4 feet deep x 12 feet wide x 15 feet long. Confirmatory soil samples revealed total VOCs below 1 ppm at the base of the excavation. The excavated soil was transported to the Athens Hocking Reclamation Center.

3. Area 4: In September, 1992, approximately 3000 gallons of sanitary liquid was removed from the sanitary leaching pool system and discharged with approval to the local publicly owned treatment works (Cedar Creek). A vacuum truck was utilized to remove the bottom three feet of sludge/sediment from leaching pool LP-2 (Figure 2). Confirmatory soil samples revealed total VOCs below 1 ppm in the bottom of the sanitary leaching pools. Thereafter, the facility was connected to the municipal sewer system.

4.3: SUMMARY OF HUMAN EXPOSURE PATHWAYS

This section discusses the potential pathways of exposure for people living near the Bowe site. A more detailed discussion of the exposure pathways can be found is Section 7 of the RI/FS Report.

An exposure pathway is how an individual may come in contact with a contaminant. The elements of an exposure pathway include: the source of contamination; the contaminated environmental media (i.e., soil, water, and air); the manner the contaminant migrates from the source; the location where one may be exposed to the contamination; how the contaminant enters the body (i.e., inhalation, ingestion, or absorption through the skin); and the population exposed to the contamination.

The potential pathways of exposure of concern at the Bowe site include the ingestion of contaminated groundwater and contact with contaminated soil. PCE associated with the site has been detected in on-site groundwater and subsurface soil.

The potential for exposure to site related contamination in soil has been significantly reduced since all areas of soil contamination identified during site investigations have been excavated and removed off-site. Residual soil contamination is located subsurface and the majority of the site is either paved or covered by the factory building, thus limiting the possibility of contact with on-site soil. Furthermore, residual levels of VOCs in on-site soils are below those levels identified in TAGM #4046 as protective of human health and the environment.

Exposure to site related contaminants in drinking water is not expected since homes and businesses near the site are connected to public water. The nearest public drinking water supply wells are located approximately 4000 feet downgradient from the site and are owned and operated by the Hicksville Water District. The public water supply is sampled on a quarterly basis and must meet New York State Department of Health (NYSDOH) drinking water standards.

The excavation and removal of contaminated soil from the Bowe site has significantly reduced the level of site related PCE in the groundwater. Based upon these observations it is highly unlikely that the low levels of PCE migrating from the site in groundwater could have a significant impact on the Hicksville Water District's wellfield.

4.4: SUMMARY OF ENVIRONMENTAL EXPOSURE PATHWAYS

There are no known environmental exposure pathways at this site.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRP) are those who may be legally liable for the contamination at a site. This may include past or present owners and operators, waste generators and haulers.

The following is the enforcement history of this site.

Orders on Consent

Date	Index	Subject
9/24/92	W1-0587-92-03	RI/FS/IRM

The NYSDEC and Bowe Systec, Inc. entered into a Order on Consent on September 24, 1992. The Order obligates the responsible party to implement a RI/FS. Upon issuance of the Record of Decision, the PRP will enter into an Order on Consent to implement the selected remedy.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to restore the site to pre-disposal conditions, to the extent feasible as authorized by law.

At a minimum, the remedy selected should eliminate or mitigate all significant threats to the public health and to the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Mitigate the impacts of contaminated groundwater to the environment or human health.
- Provide for the attainment of SCGs for groundwater quality at the limits of the area of concern (AOC) to the extent practicable.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Bowe Systems and Machinery site were identified, screened and evaluated in the report entitled Remedial Investigation/Feasibility Study Report, November, 1998.

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to construct the remedy, and does not include the time required to design the remedy, procure contracts for the design and construction or to negotiate with responsible parties for the implementation and operation of the remedy.

7.1: DESCRIPTION OF REMEDIAL ALTERNATIVES

Alternative 1: No Further Action with Long Term Monitoring

Present Worth: $ 83,010
Capital Cost: $ None
Annual O&M: $ 10,750
Time to Implement: Immediately

This alternative recognizes remediation of the site conducted under previously completed IRMs and the effects of natural attenuation. Based upon RI/FS data, continued groundwater monitoring would be required to evaluate the effectiveness of past remedial activities at the site. Groundwater samples would be acquired from monitoring wells MW-1, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8 and off-site well OW-1 on a quarterly basis for up to ten years. Groundwater levels would be taken during each sampling event in order to calculate and confirm groundwater flow direction.

Alternative 2a: Groundwater Extraction and Treatment by Air Stripping

Present Worth: $ 899,370
Capital Cost: $ 175,925
Annual O&M: $ 93,690
Time to Implement: 6 - 12 months

Under this alternative groundwater treatment would be provided by a counter-current packed tower air stripper. Untreated groundwater would be pumped to the top of a packed column which contains a specified height and cross sectional area of inert packing material along with water distribution and collection systems. The column would receive ambient air under pressure in an upward vertical direction from the bottom of the column as the groundwater flows downward. This desorption process involves the mass transfer of contaminants from the liquid phase to the gaseous phase.

Groundwater recovery wells would be installed in the vicinity of MW-6, where the highest concentrations of PCE have been observed. On-site discharge of treated groundwater would require the installation of recharge basins to accommodate the daily volume of treated groundwater to be recharged. Remedial effectiveness would be evaluated through a groundwater monitoring program.

Alternative 2b: Groundwater Extraction and Treatment by Carbon Adsorption

Present Worth: $ 1,147,390
Capital Cost: $ 196,075
Annual O&M: $ 123,200
Time to Implement: 6 - 12 months

Groundwater treatment would be provided by a series of granular activated carbon (GAC) adsorption units. Based upon the estimated pumping rates and projected VOC loading, three 1000 pound carbon filters would be required. Two carbon units set in series would be on-line at any given time. A third unit would be in standby mode until the first unit requires regeneration.

Adsorption is a natural process in which molecules of a liquid or gas are attracted to and then held at the surface of a solid. Contaminants in the untreated water adsorb onto the GAC. The adsoptive capacity of the carbon varies with the nature and concentration of the contaminants. As the contaminant loading on the carbon reaches the adsorptive capacity of the carbon near the top of the filter, the interface between the saturated and the clean carbon moves downward through the carbon bed inside the pressure vessel. Once the carbon in the filter vessel is fully loaded with contaminants, carbon regeneration is necessary.

Groundwater recovery wells would be installed in the vicinity of MW-6, where the highest concentrations of PCE have been observed. On-site discharge of treated groundwater would require the installation of recharge basins to accommodate the daily volume of treated groundwater to be recharged. A groundwater monitoring program would be necessary to evaluate the effectiveness of the remedial alternative.

Alternative 2c: Groundwater Extraction and Treatment by UV Oxidation

Present Worth: $ 1,618,450
Capital Cost: $ 334,025
Annual O&M $ 166,340
Time to Implement: 6 - 12 months

Using ultraviolet (UV) oxidation, the groundwater treatment system would consist of a hydrogen peroxide feed system in conjunction with an oxygen or air source and a UV oxidation reactor. The combination of UV light and a chemical oxidant, such as hydrogen peroxide, breaks down VOCs by photochemical oxidation.

Based upon estimated pumping rates and VOC loading, a single UV lamp, 30 kilowatt unit, would be required. Pilot testing would be required during the design to determine the exact equipment sizing and whether any pretreatment would be required to remove naturally occurring metals which might impede the transmission of UV radiation.

Groundwater recovery wells would be installed in the vicinity of MW-6, where the highest concentrations of PCE have been observed. On-site discharge of treated groundwater would require the installation of recharge basins to accommodate the daily volume of treated groundwater to be recharged. A groundwater monitoring program would be necessary to evaluate the effectiveness of the remedial alternative.

Alternative 3: Groundwater Treatment by In-Situ Air Sparging

Present Worth: $ 501,410
Capital Cost: $ 137,020
Annual O&M: $ 47,190
Time to Implement: 6 months

Under this alternative, groundwater beneath the site would be treated using a series of air sparge points and vapor extraction wells. Air sparging is a process where air is introduced under pressure below the water table to increase the rate of volatilization of VOCs in the saturated zone. Air sparging is most commonly used at sites with unconsolidated overburden such as sand and gravel, or other relatively permeable formations. It is generally used in conjunction with vapor extraction to effectively capture VOCs volatilized from the saturated zone as well as reduce VOC levels in the unsaturated zone.

Air sparge wells would be installed in the vicinity of MW-6, where the highest concentrations of PCE have been observed. As with the groundwater pump and treatment alternatives, this alternative would also require a groundwater monitoring program to evaluate the effectiveness of the remedial alternative.

7.2: EVALUATION OF REMEDIAL ALTERNATIVES

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1 would not immediately meet the SCGs for groundwater quality standards. However, natural attenuation would restore the aquifer to the groundwater quality standards over a period of several years. The existing public water supply regulations are in effect to ensure that the drinking water standards are met within the public water supply distribution system. This would be the same regardless of the alternative selected. The existing wellhead treatment at the North Stewart Avenue wellfield ensures compliance with the NYS drinking water standards. Alternative 1, while not immediately meeting SCGs, would be an acceptable alternative given the relatively low concentrations of PCE recently observed in the downgradient monitoring wells on and off the site. Additionally, source removal, conducted under previous IRMs, will prevent further contamination of the groundwater.

Alternatives 2a, 2b, 2c and 3 would also result in groundwater eventually complying with the applicable SCGs.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

All remedial alternatives would be protective of human health and the environment. These alternatives rely upon the NYSDOH Part 5 drinking water requirements which must be met by community water suppliers. There are no drinking water wells on-site utilizing groundwater and there are no private residential drinking water wells in the surrounding area.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Worker exposure to contaminated groundwater during implementation of Alternatives 1, 2a, 2b, 2c or 3 would be controlled through the implementation of a site specific health and safety plan.

While all the alternatives pose little risk to public health, Alternatives 2a, 2b and 3 have the potential to require emission control systems if pilot testing of the alternative indicates that air emissions exceed SCGs.

The length of time it would take to maintain the remedial objectives utilizing any of the described alternatives is difficult to project. However, a period of no longer than ten years would be anticipated to meet and maintain current remedial objectives. Alternatives 2a, 2b and 2c would prevent further migration of PCE in groundwater.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2a, 2b, 2c and 3 would provide long term effectiveness and permanence. Under these alternatives, treated groundwater would have to meet applicable SCGs prior to being recharged to the aquifer. A groundwater monitoring program would evaluate the effectiveness of the remedial alternative.

The no action alternative does not reduce risks nor implement controls to limit them. However, natural attenuation would reduce the concentration and mass of PCE in groundwater over time. The Bowe Systems and Machinery site and the surrounding community are utilizing public water supplied by the Hicksville Water District for potable uses.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

None of the alternatives (1, 2a, 2b, 2c or 3) would reduce the toxicity of groundwater contaminants at the site.

Alternatives 2a, 2b and 2c would reduce the concentrations, mobility and mass of groundwater contaminants.

Alternatives 1 and 2 would reduce the concentration and mass of groundwater contaminants.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc..

All alternatives are implementable and would require periodic groundwater sampling to evaluate the effectiveness of the remedial alternative.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 1.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. **Community Acceptance** - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A present the public comments received and the Department's response to the concerns raised. In general, the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative 1 as the remedy for this site.

While Alternative 1 does not immediately meet groundwater SCGs, the selection of this alternative is based upon the fact that four previously completed remedial actions have been successful in remediating on-site soil and will prevent further contamination of the groundwater. Groundwater samples acquired in April, 1997 continue to demonstrate decreasing concentrations of PCE as a result of source removal. The RI/FS also revealed that there are no private drinking water wells or environmental receptors downgradient of the site which are threatened by current or future groundwater conditions. The remedial actions were:

1. Under NYSDEC oversight, 450 tons of PCE contaminated soil were removed from leaching pools DW-1, DW-2 and DW-3. This source area was considered to be the major source of contamination affecting groundwater at the site.

2. Under NYSDEC oversight, approximately six cubic yards of VOC contaminated soil were removed from leaching pool DW-8.

3. Under NYSDEC oversight, approximately 27 cubic yards of VOC contaminated soil were excavated from an area which was the location of a former spray paint booth.

4. Under NYSDEC and NCDH oversight, approximately 3000 gallons of liquid were removed from the sanitary leaching pool system. Thereafter, three feet of sludge/sediment were removed from the bottom of leaching pool LP-2 by vacuum extraction.

Groundwater quality data generated during the RI reveals that remediation of on-site source areas has resulted in reducing the concentration of PCE in on-site groundwater.

Off-site groundwater quality data generated during the RI demonstrates that natural attenuation continues to reduce concentrations of VOCs to nearly the SCGs. Additionally, investigation of groundwater quality at depth within the aquifer reveals that VOCs do not pose a significant threat to public health or the environment.

The estimated present worth cost to implement the remedy is $83,010 if the program is required to extend the full ten years. The estimated average annual operation and maintenance cost for ten years of quarterly groundwater sampling is $10,750.

The elements of the selected remedy are as follows:

- Since the remedy results in untreated groundwater remaining at the site, a long term groundwater monitoring program will be instituted. This program will monitor the effectiveness of prior interim remedial measures and natural attenuation in reducing groundwater contaminant levels and will be a component of the operation and maintenance for the site. Additionally, the Department will reclassify the site from a Class 2 to a Class 4 on the New York State Registry of Inactive Hazardous Waste Disposal Sites. A Class 4 site is a site that has been properly closed but requires continued operation, maintenance, and/or monitoring.

- The RI confirmed the site specific groundwater flow direction. Based upon these results, groundwater samples will be acquired from monitoring wells MW-1, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8 and off-site well OW-1 on a quarterly basis for a minimum of three years or until groundwater standards are achieved. Groundwater samples will be analyzed for VOCs by a NYSDOH certified laboratory. Water levels will also be taken from this suite of monitoring wells for calculation and confirmation of groundwater flow direction. Data will be evaluated annually to ensure that a decreasing trend of groundwater contaminant concentrations will continue and eventually result in groundwater quality in compliance with applicable SCGs. If groundwater concentrations do not exhibit a decreasing trend, the Department may consider the need for further investigation and/or further remediation of the site. At the end of the three year monitoring period, a determination will be made as to whether to continue or modify the groundwater monitoring program.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners, local political officials local media and other interested parties.
- A RI Fact Sheet was distributed as per the site mailing list prior to the field implementation of the remedial investigation.
- A public meeting was held in February, 1999 to present the PRAP.
- In February, 1999 a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.

Table 1
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
1.No Further Action - Monitor Only	$0	$10,750	$83,010
2a. Pump & Treat - Air Stripping	$175,925	$93,690	$899,370
2b. Pump & Treat - Carbon Adsorption	$196,075	$123,200	$1,147,390
2c. Pump & Treat - UV Oxidation	$334,025	$166,340	$1,618,450
3. In-situ - Air Sparge	$137,020	$47,190	$501,410

Table 2: PCE in On-Site Groundwater December 1989 - April 1997

	December 1989	July 1991	June 1992	November 1992	February 1993	July 1993	January 1994	November 1995	April 1997
EW-1						110			
MW-1	ND		ND	ND					
MW-2	ND								
MW-3	130		19	95	340		2		ND
MW-4	8100	320						280	130
MW-5		47		130	ND			90	40
MW-6		180	430	450	370		200	200	250
MW-7		110	130	ND					
MW-8				ND	ND		ND		2
MW-9				ND	ND		ND		

Notes:

1. All results in ppb
2. ND - non detect
3. SCG for PCE is 5 ppb

Table 3: PCE in Off-Site Groundwater

	EW-2	EW-3	EW-4
55' - 60' bls	ND	ND	ND
80' - 85' bls	ND	ND	ND
105' - 110' bls	ND	ND	ND
130' - 135' bls	ND	ND	ND
155' - 160' bls	ND	ND	ND

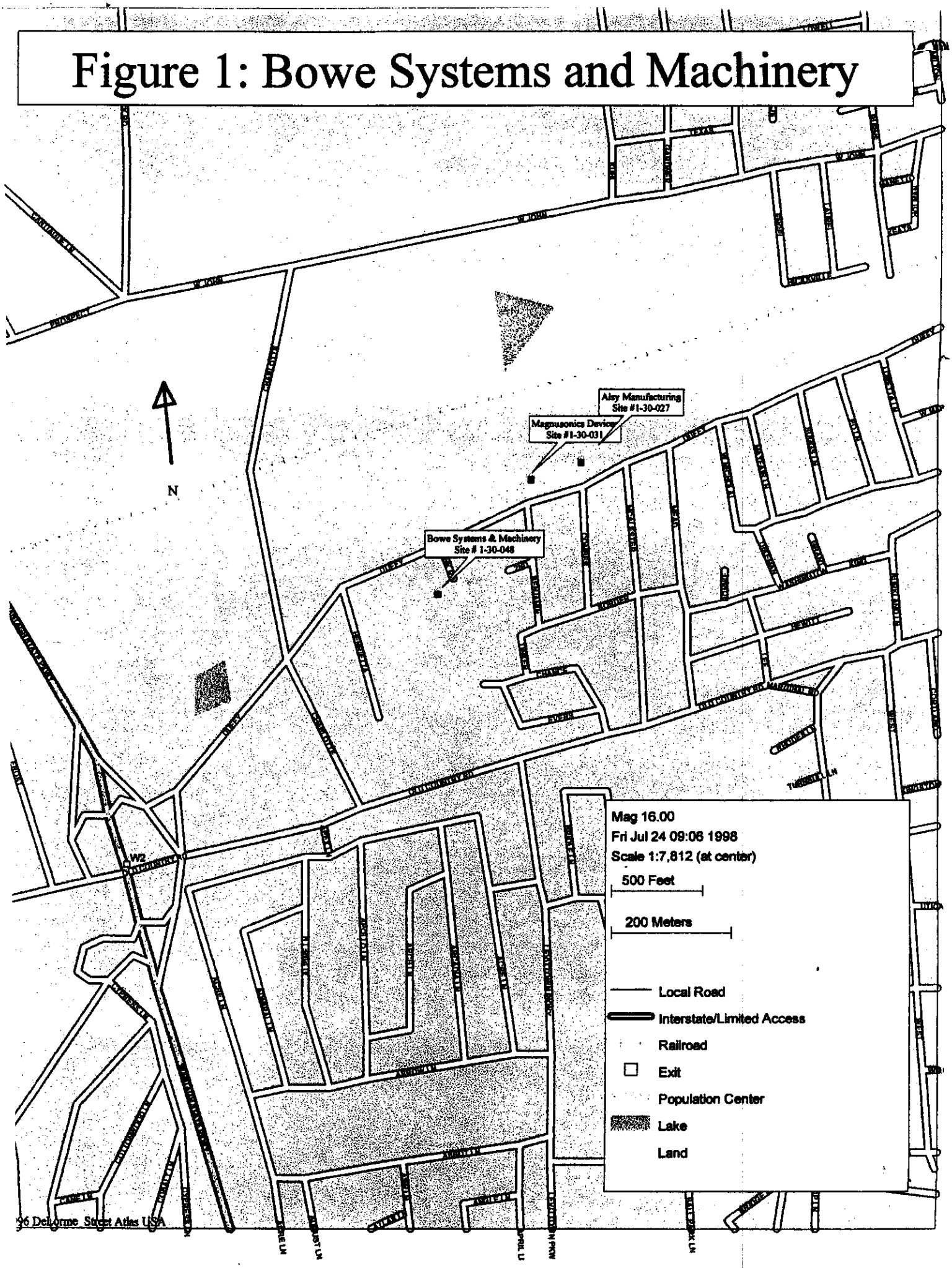
	EW-5	EW-7	EW-8	EW-9
65' bls	20	15	12	4
85' bls	8	10	5	5

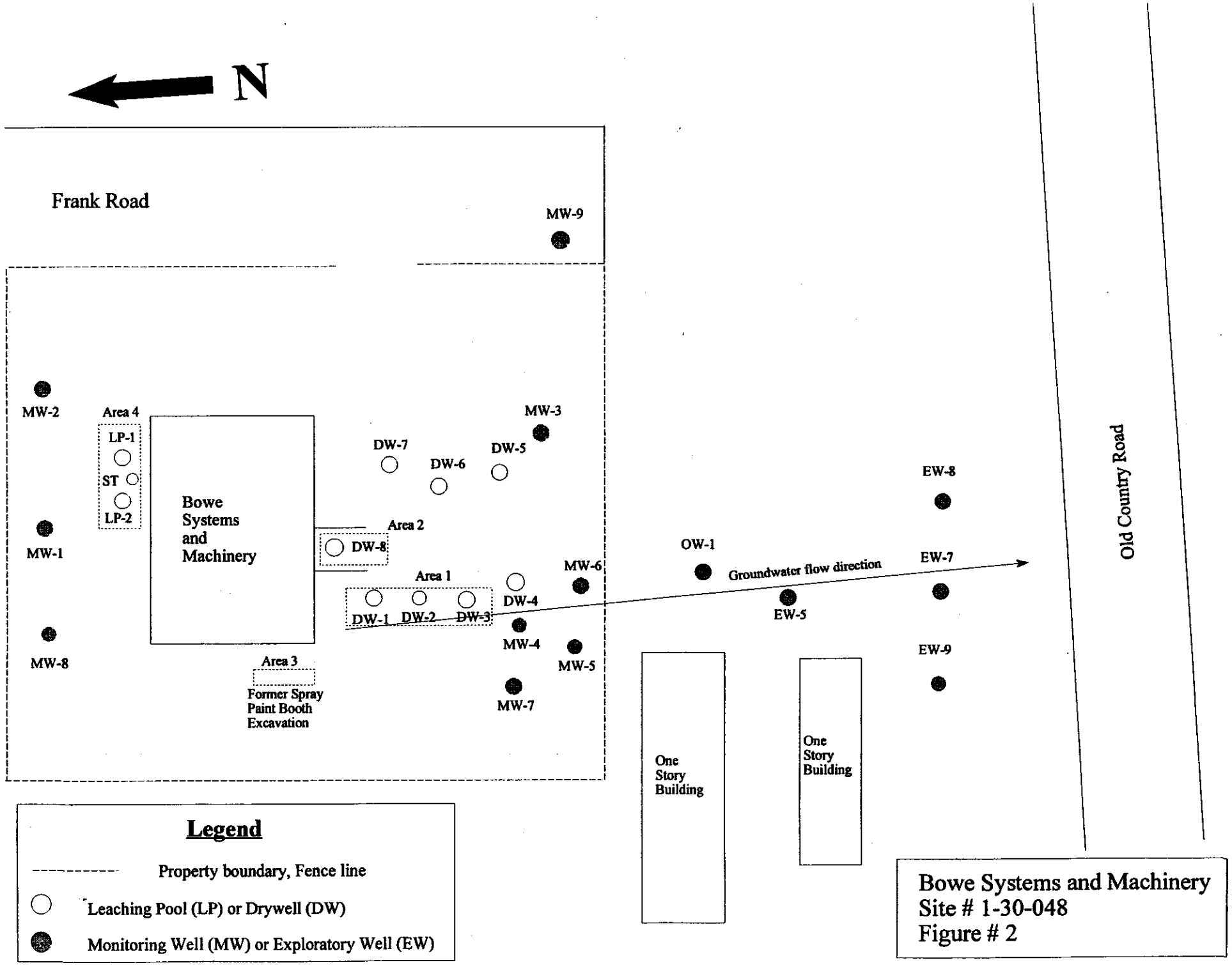
	OW-1
55' bls	34
77' bls	24
92' bls	ND

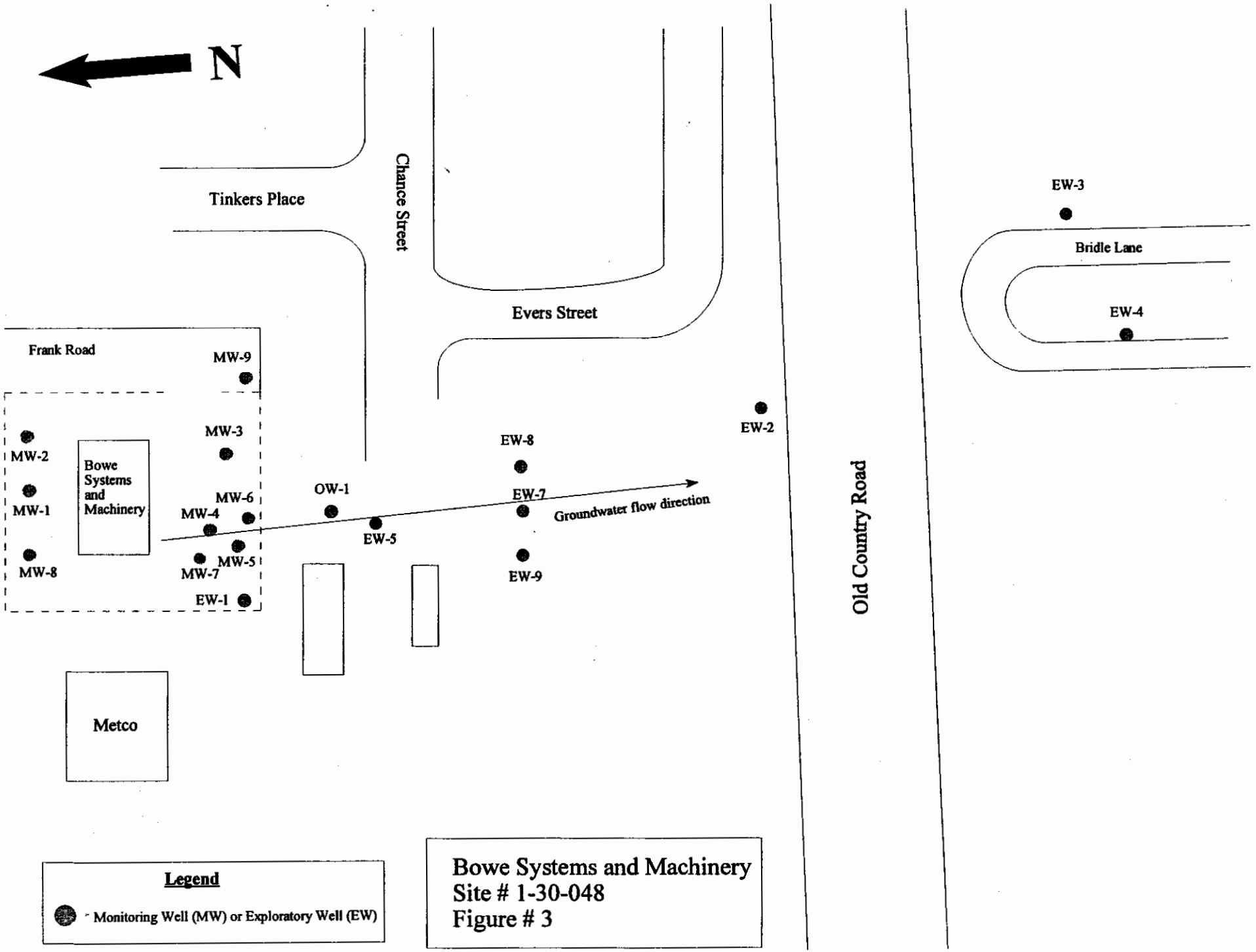
Notes:

1. Results in ppb
2. ND - non detect
3. bls - below land surface
4. SCG for PCE is 5 ppb
5. EW - Exploratory (temporary) Well

Figure 1: Bowe Systems and Machinery




N
Frank Road
MW-9
MW-2
Area 4
LP-1
ST
LP-2
MW-1
MW-8
Bowe
Systems
and
Machinery
Area 3
Former Spray
Paint Booth
Excavation
DW-7
DW-6
DW-5
MW-3
Area 2
DW-8
Area 1
DW-1
DW-2
DW-3
DW-4
MW-6
MW-4
MW-5
MW-7
OW-1
Groundwater flow direction
EW-5
EW-8
EW-7
EW-9
Old Country Road
One
Story
Building
One
Story
Building
Legend
Property boundary, Fence line
Leaching Pool (LP) or Drywell (DW)
Monitoring Well (MW) or Exploratory Well (EW)
Bowe Systems and Machinery
Site # 1-30-048
Figure # 2


N
Tinkers Place
Chance Street
Evers Street
Frank Road
MW-9
MW-2
MW-3
Bowe Systems and Machinery
MW-1
MW-6
MW-4
MW-8
MW-7
MW-5
EW-1
OW-1
EW-5
EW-8
EW-7
EW-9
Groundwater flow direction
EW-2
Old Country Road
EW-3
Bridle Lane
EW-4
Metco
Legend
Monitoring Well (MW) or Exploratory Well (EW)
Bowe Systems and Machinery
Site # 1-30-048
Figure # 3

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Bowe Systems and Machinery
Proposed Remedial Action Plan
Hicksville, Nassau County
Site No. 1-30-048

The Proposed Remedial Action Plan (PRAP) for the Bowe Systems and Machinery site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on January 21, 1999. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and groundwater at the Bowe Systems and Machinery site. The preferred remedy is No Further Action with continued groundwater monitoring.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on February 3, 1999 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. Written comments were received from Mr. & Mrs. Proffe, Ms. Theresa Mahoney, Mr. & Mrs. W. Resoluski, Mrs. Marie Grebe and Ms. Karen Blicker. The public comment period for the PRAP ended on February 24, 1999.

This Responsiveness Summary responds to all questions and comments raised at the February 3, 1999 public meeting and to written comments received.

The following are the comments received at the public meeting, with the NYSDEC's responses:

COMMENT 1: Is there any knowledge of misuse of RCRA regulated substances?

RESPONSE 1: The only known record of non-compliance regarding the facility was the spill of approximately 10-15 gallons of tetrachloroethylene in 1989.

COMMENT 2: A neighborhood resident did not remember seeing field activities associated with the various IRMs.

RESPONSE 2: NYSDEC staff oversaw the field work associated with the various IRMs. Additionally, a homeowner who attended the PRAP meeting and lives adjacent to the site recalled seeing the field activities which were undertaken during the IRMs.

COMMENT 3: Would contaminants in the groundwater sink through the aquifer as groundwater migrates off-site?

RESPONSE 3: Yes. Because PCE tends to sink in groundwater, samples were acquired at a variety of depths within the aquifer to ascertain whether or not contaminants were migrating vertically through the aquifer.

COMMENT 4: Is there a mechanism for tracking which chemicals a facility purchases, stores on-site, and ultimately disposes of ?

RESPONSE 4: Although the Department does not track chemical purchases by a facility, the Chemical Bulk Storage Program requires that facilities register their chemical storage tanks with the Department depending on tank size and the chemicals being stored. The Division of Solid and Hazardous Materials implements the Resource Conservation and Recovery Act (RCRA) program which tracks the hazardous waste a facility disposes of. This program requires facilities disposing of hazardous waste to have the waste removed by a licensed hauler to an approved treatment, storage and disposal facility. The Department is notified of this activity by way of a copy of a manifest which accompanies the shipping and disposal of the hazardous waste.

COMMENT 5: Several letters from Hicksville residents included the following comment: 'Though the contamination is below the recommended cleanup level, I recommend it be cleaned up in its entirety'.

RESPONSE 5: Excavation of the contaminated areas has reduced residual soil contamination to levels protective of human health and the environment. Additionally, any remaining soil contamination on-site is well below land surface where contact with humans is highly unlikely. PCE concentrations in off-site groundwater either meet or just slightly exceed SCGs and do not pose a threat to the public water supply. These concentrations will be monitored and are expected to decrease with time.

APPENDIX B

Administrative Record

1. Environmental Assessment Report, Bowe Systems and Machinery, Soil Mechanics Drilling Corp., January, 1990

2. Soil Excavation Report, Bowe Systems and Machinery, Fenley & Nicol Co. Inc., April, 1991

3. Site Screening Investigation Report, Bowe Systems and Machinery, H2M Group, August, 1992

4. Interim Remedial Measure Workplan, Bowe Systems and Machinery, H2M Group, September, 1992

5. Phase I Remedial Investigation Workplan, Bowe Systems and Machinery, H2M Group, September, 1992

6. Interim Remedial Measure Report, Bowe Systems and Machinery, H2M Group, February, 1993

7. Phase II Remedial Investigation Workplan, Bowe Systems and Machinery, H2M Group, September, 1993

8. Remedial Investigation/Feasibility Study Report, Bowe Systems and Machinery, H2M Group, November, 1998