PROPOSED REMEDIAL ACTION PLAN
Dambrose Cleaners
City of Schenectady, Schenectady County, New York
Site No. 447030

July 2007

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Dambrose Cleaners site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, sloppy housekeeping and/or improper disposal have resulted in the disposal of hazardous wastes, including tetrachloroethene, a dry cleaning solvent. These wastes have contaminated the groundwater, soil, and subsurface soil vapor at the site, and have resulted in:

- a significant threat to human health associated with current and potential exposure to groundwater, soil, and soil vapor intrusion.

- a significant environmental threat associated with the current impacts of contaminants to the groundwater resource.

To eliminate or mitigate these threats, the Department proposes soil vapor extraction, institutional controls, and site use restrictions.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the March 2006 "Remedial Investigation Report" (RI), the January 2007 "Feasibility Study" (FS), and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Schenectady County Public Library
Reference Desk
99 Clinton Street
Schenectady, NY 12305-2083
Hours: M-Th 9:00 a.m. - 9:00 p.m., F-Sa 9:00 a.m. - 5:00 p.m., Su 1:00 p.m. - 5 :00 p.m.
Phone: (518) 388-4511

NYSDEC Region 4 Office
1130 North Westcott Road
Schenectady, NY 12306
Hours: Monday - Friday 8:30 - 4:00
Appointment requested; contact Allan Geisendorfer at (518) 357-2390

NYSDEC Central Office
625 Broadway, 12th Floor
Albany, NY 12233-7016
Hours: Monday - Friday 8:30 - 4:30
Appointment requested; contact Larry Alden, Project Manager, at (518) 402-9767

The Department seeks input from the community on all PRAPs. A public comment period has been set from July 31, 2007 to August 29, 2007 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for August 14, 2007 at the McChesney Room at the main branch of the Schenectady County Public Library, 99 Clinton Street, Schenectady, beginning at 7:00 p.m.

At the meeting, the results of the RI/FS will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Alden at the above address through August 29, 2007.

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Dambrose Cleaners site is located at 1517 Van Vranken Avenue in Schenectady, New York, and is bounded by Van Vranken Avenue to the east and by residential properties to the north, west, and south (Figure 1). The approximately 0.11-acre parcel is located in a portion of the city that consists primarily of residential dwellings and some non-manufacturing commercial businesses. The primary structure at the site is a two-story wood and masonry building. The grounds of Union College are located across Nott Street to the south. The off-site investigation included the block bounded by Nott Street, Van Vranken Avenue, Hattie Street, and Carrie Street (Figure 2). The topography of the site is relatively level, sloping gently to the northwest in the direction of the Mohawk River. The area is served by municipal water and sewer.

With the exception of fill, unconsolidated deposits of glacial origin overlie the bedrock throughout most of the site. The unconsolidated deposits consist of fill material, silty clay deposits, and till. Based on soil borings, the total thickness of the unconsolidated deposits ranged from 11 to 16 feet. The discontinuous cultural fill layer observed throughout the majority of the site predominantly consists of brown silt, sand, and gravel mixed with varying amounts of brick, cobbles, cinders, and coal. The fill layer ranged in thickness from 2.8 to 6.5 feet. The fill layer is underlain by a mottled, brown-gray unit, generally consisting of silt and clay fining downward to silty clay. A discontinuous layer of weathered till was observed below the silty clay. In some of the soil borings, weathered shale fragments were observed at depths ranging from 11 to 16 feet below ground surface. Drilling refusal was observed at several soil borings, which is assumed to represent the top of the shale bedrock. The site overlies the upper Middle Ordovician Schenectady Formation, consisting of black and gray clayey shale interbedded with greywacke (clayey sandstone) and sandstones of variable texture.

Two geologic cross-sections (Figures 3 and 4) illustrate the relationship between the glacial deposits and the underlying bedrock. The location and orientation of the cross-sections are shown on Figure 2.

The primary groundwater unit at the site is an unconfined aquifer located within the unconsolidated fill and the silty clay, extending downward to the interface between the silty clay or till of lower permeability. Monitoring wells at the site are generally screened across both the unconsolidated fill and the underlying silty clay material, where present.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

Currently, the site operates as a dry cleaner drop-off location and no dry cleaning takes place at the site. The on-site building was used as a two-family residence from the early 1900s through at least 1954, when Albert and Mary Dambrosio purchased the property. In the late 1950s, the Dambrosios converted the first floor into a dry cleaning operation. In 1976, George and Dolores Hebert purchased the property from the Dambrosios. Mr. Hebert was an employee of Dambrose Cleaners prior to taking ownership of the business, and operated the business from 1976 to 1993, and again from 1995 to 2000 when dry cleaning operations ended on the site. The building was sold to the current owners in 2001.

Mr. Hebert alleged that in about 1989, a small amount of tetrachloroethene (a dry cleaning solvent also known as perchloroethene, or PCE) was spilled on the ground near the rear of the building as drums were being delivered. Poor operational practices over a period of more than 20 years may have caused additional onsite PCE contamination.

Historically, the first floor of the building was used for dry cleaning operations and the second floor as an apartment residence. The first floor was the former location of the dry cleaning machine, distillation tank, air filter unit, and PCE storage tanks. An addition on the back of the building constructed in 1984 is currently used as an apartment. The now-demolished garage located behind the building in the present day parking area was the former location of a solvent storage area.

Clough, Harbour & Associates completed a Phase I Environmental Assessment in October 1997 as part of a proposed property ownership transfer. The use and storage of PCE was identified in this investigation. This initial investigation was followed up with a Phase II Site Assessment completed in December 1997 by Northeast Environmental Technologies Corporation for Mr. Hebert. This investigation identified concentrations of PCE and related degradation products above standards in soil and groundwater samples.

3.2: Remedial History

A Preliminary Site Assessment was performed by Northeast Environmental Technologies Corporation for the property owner under an Order of Consent with the Department signed on July 1, 1999. This investigation further defined a PCE groundwater plume; however, the horizontal extent of the contamination was not fully identified. Indoor air sampling by the New York State Department of Health identified elevated levels of PCE and related degradation products in indoor air. On May 5, 2000, Mr. Hebert entered into the Voluntary Cleanup Program to remediate the site. However, he did not have the financial means to complete the cleanup, and the Department assumed responsibility for the site in June 2001.

In 2001, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

SECTION 4: ENFORCEMENT STATUS

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

The PRPs for the site, documented to date, include the former operator/owner, Mr. George Hebert. However, Mr. Hebert settled with the Department in 2001, when the site was listed as a Class 2 site. Therefore, the Department will evaluate the site for further action under the State Superfund.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health.

5.1: Summary of the 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 between September 2004 and April 2005. The field activities and findings of the investigation are described in the RI report.

Utilizing information from four existing monitoring wells, groundwater in the presumed downgradient direction was screened to look for dry cleaning solvents. This was followed up by installation of permanent groundwater monitoring wells. Soil vapor, sub-slab soil vapor, and indoor air samples were collected to evaluate vapor intrusion. Finally, soil samples were collected from beneath the slab of the former Dambrose structure.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the groundwater, soil, and indoor air contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater and drinking water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Remedial Program Soil Cleanup Objectives found in 6 NYCRR Part 375.

- Concentrations of volatile organic compounds (VOCs) in air were evaluated using the air guidelines provided in the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006. Air Matrix 2 was referenced for PCE guidelines.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, groundwater, soil, and air samples were collected to characterize the nature and extent of contamination. As seen in Figures 5 and 6, the main categories of contaminants that exceed their SCGs are VOCs. For comparison purposes, where applicable, SCGs are provided for each medium.

Chemical concentrations are reported in micrograms per liter (µg/l, equivalent to parts per billion [ppb]) for water, and milligrams per kilogram (mg/kg, equivalent to parts per million [ppm]) for soil. Air and soil vapor samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Figure 6 summarizes the degree of contamination for the contaminants of concern in groundwater and soil vapor. The following are the media which were investigated and a summary of the findings of the investigation.

Subsurface Soil

Soil samples were collected from beneath the building slab at three locations selected based on previous soil vapor sampling results. SS-1 was collected from the west end of the basement, where the sub-slab soil vapor sample was collected. SS-3 was collected from beneath the stairs along the north wall of the building. The 1997 Phase II Site Assessment identified high concentrations of VOCs in soil vapor outside the building at this location. SS-2 was collected from a location between the other two samples.

PCE and some of its breakdown products (chemicals formed by partial degradation of PCE - trichloroethene [TCE], trans-1,2-dichloroethene [trans-DCE], and cis-1,2-dichloroethene [cis-DCE]) were detected in all three samples. Total VOC concentrations in the samples were as follows: SS-1 - 0.225 mg/kg, SS-2 - 1.036 mg/kg, and SS-3 - 11.216 mg/kg. However, only PCE in sample SS-3 (11 mg/kg) was above the SCGs for unrestricted (1.3 mg/kg) and residential (5.5 mg/kg) use.

Even though there was only one sample exceeding cleanup objectives, PCE is present beneath the slab and this could result in vapor intrusion in the building. Therefore, subsurface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

Groundwater

Groundwater samples were collected from sixteen groundwater screening locations during the first part of the RI. VOCs were found in only three screening samples (GWS-8, GWS-10, and GWS-13), but this was enough to confirm the groundwater flow direction. Figure 5 shows the screening locations and analytical results.

Based on the screening results, seven new groundwater monitoring wells were installed to supplement the four existing monitoring wells. Water samples were also collected from basement sumps in the Dambrose building and from one residence downgradient of the site. The results are shown on Figure 6. As seen in this figure, the highest VOC concentrations were found in the sump of the Dambrose building (total VOCs just over 1,000 µg/l). The water standards for each of the individual VOCs is 5 ppb, with the exception of vinyl chloride, which has a standard of 2 ppb. The groundwater flow direction is shown in Figure 7. As seen in Figure 6, the VOC concentrations in groundwater quickly drop to below the standards about two hundred feet west (downgradient) of the site.

Groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor/Air

Sub-slab soil vapor and indoor air were sampled at the Dambrose building in September 2004. The analytical results of this event are shown in Table 1. As directed by the New York State Department of Health's Air Matrix 2, comparison of the sub-slab PCE concentration with that in the basement air called for mitigation actions. Indoor air at the dry cleaner drop-off location is affected by the cleaned clothes brought in for pick-up; therefore, the contribution attributable to vapor intrusion could not be determined. However, the sub-slab PCE concentration was high enough (1,200,000 $\mu g/m^3$) that regardless of the source of PCE in indoor air, a sub-slab depressurization system was installed as an interim remedial measure before the Feasibility Study was completed.

Additionally, soil vapor samples were collected from points adjacent to each of the groundwater monitoring wells in December 2004. The intent was to see if there was a correlation between the magnitude of the soil

vapor and groundwater contaminant concentrations. Even though PCE was detected in some of the soil vapor samples, the analytical results, seen on Figure 6, did not reveal a good correlation.

Sub-slab and indoor air samples were collected from the two adjacent buildings and a building downgradient at Carrie Street. Low concentrations of VOCs were detected, but not at levels which would warrant mitigation.

Soil vapor and indoor air contamination at the Dambrose building identified during the RI/FS will be addressed in the remedy selection process.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS.

Based on the 2004 indoor air and sub-slab soil vapor samples, mitigation measures were taken at the Dambrose building in 2005 to address current and potential human exposures (via inhalation) to volatile organic compounds associated with soil vapor intrusion. A sub-slab depressurization system with three suction points was installed to create a negative pressure gradient between the basement and the area beneath the building slab. Additionally, cracks and seams in the slab were sealed and the sump was capped and sealed. Vapor from beneath the slab is vented above the roofline of the Dambrose building.

Indoor air samples were collected from the Dambrose building again in February 2006, after the depressurization system had been operating for several months. The VOC concentrations in the indoor air samples were lower than in the samples collected in September 2004 (see Table 1). A sample was also collected from the depressurization system's exhaust vent. The PCE concentration of the exhaust sample was 3,900 $\mu g/m^3$, significantly below the initial sub-slab concentration of 1,200,000 $\mu g/m^3$. These results could indicate that the depressurization system is effectively lowering the indoor air and sub-slab VOC concentrations, but without additional sampling to verify any trend, these results could be attributable to seasonal variation or other factors.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 9 of the RI report. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

- On-site workers and construction workers involved in subsurface excavation may come in direct contact with PCE-contaminated subsurface soil and also inhale associated vapors.

- The potential for future inhalation and direct contact exposures to contaminants in on-site and off-site groundwater is unlikely due to the availability of a public water supply.

- Workers in the on-site business and occupants of the two apartments may be exposed via inhalation to PCE-associated soil vapors accumulating in air if the current sub-slab depressurization system were to stop operating in the future. Currently, there are no on-site inhalation exposure concerns related to soil vapor as long as the sub-slab depressurization system operates as intended.

- Currently, there are no known inhalation exposures associated with the off-site migration of contaminated soil vapor. However, additional off-site investigations are warranted and proposed during the remedial design in order to fully evaluate this exposure pathway.

5.4: Summary of Environmental Assessment

Site contamination has impacted the groundwater resource in the unconfined surficial aquifer. However, the affected area is served by municipal water and sewer.

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

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to volatile organic compounds in subsurface soil and groundwater

- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards, and

- the release of contaminants from subsurface soil under the Dambrose building into indoor air through soil vapor intrusion

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Dambrose Cleaners site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present

worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated soil, groundwater, soil vapor, and air at the site. Alternatives are broken into two types: those dealing with soil contamination (e.g., S1), and those dealing with groundwater (e.g., G1).

Alternative S1: No Action

The No Action Alternative is evaluated for subsurface soil as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: *$0*

Alternative S2: Institutional Controls

This alternative would employ an environmental easement, with concomitant site management plan and periodic certification requirements, to prevent human exposure to contaminated subsurface soil by limiting intrusive activities at the site without appropriate controls. The site would be restricted to residential use, which would also permit commercial or industrial uses. Thirty years of annual certification of the easement are included in this alternative.

Present Worth: *$14,000*
Capital Cost: *$5,000*
Annual Costs: *$500*

Alternative S3: Soil Vapor Extraction (Hot Spot Area)

In this alternative, the sub-slab depressurization system would continue operating, acting as a soil vapor extraction system to vent the contaminated soil beneath the building slab. Vapor samples from the exhaust would be periodically tested to determine the effectiveness of the system. Contaminated subsurface soil would not otherwise be treated, nor would contaminated soil any place other than beneath the slab be addressed. The small cost of electricity to run the existing system is negligible. This extraction system would be expected to operate for five years.

Present Worth: *$18,000*
Capital Cost: *$0*
Annual Costs: *$4,000*

Alternative S4: Soil Vapor Extraction (Plume)

This alternative would employ a vacuum system to vent the soil in the vicinity of the Dambrose building. This system would be tied into the existing sub-slab depressurization system. A vapor phase carbon adsorption system could be used for off-gas treatment, if necessary. This extraction system would be expected to operate for five years.

Present Worth: *$235,000*
Capital Cost: *$130,000*

Annual Costs: *$23,000*

Alternative G1: No Action

The No Action Alternative is evaluated for groundwater as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: *$0*

Alternative G2: Institutional Controls

This alternative would employ an environmental easement, with concomitant site management plan and periodic certification requirements, to prohibit use of groundwater at the site, preventing human exposure. Thirty years of annual groundwater sampling and certification of the easement are included in this alternative.

Present Worth: *$74,000*
Capital Cost: *$5,000*
Annual Costs: *$4,000*

Alternative G3: Groundwater Extraction and Treatment (Hot Spot Area)

In this alternative, groundwater from the Dambrose property (the area with the highest contaminant concentrations) would be pumped from the ground and treated on-site with activated carbon, then discharged to the sanitary sewer. An extraction rate of five gallons per minute is assumed. Though the system could operate for far less time, for costing purposes it is assumed that the system would operate for 30 years.

Present Worth: *$685,000*
Capital Cost: *$160,000*
Annual Costs: *$30,000*

Alternative G4: Groundwater Extraction and Treatment (Plume)

In this alternative, groundwater with contaminant concentrations above groundwater standards would be pumped from the ground and treated on-site with activated carbon, then discharged to the sanitary sewer. This would encompass an area approximately 200 feet long by 30 feet wide to the west of the Dambrose building. An extraction rate of ten gallons per minute is assumed. Though the system could operate for far less time, for costing purposes it is assumed that the system would operate for 30 years.

Present Worth: *$950,000*
Capital Cost: *$223,000*
Annual Costs: *$42,000*

The following two alternatives combine soil and groundwater treatment

Alternative S5/G5: Dual Phase Extraction and Treatment (Hot Spot)

In this alternative, contaminated groundwater and soil vapor would be collected from the same wells. After going through an air/water separator, the vapor phase would be treated with a carbon adsorber and the water

phase would be treated by bag filters and carbon adsorbers, then discharged to the sanitary sewer. The sub-slab depressurization system would be connected to the vapor phase treatment system. This would address an area roughly bound by the Dambrose property, where the highest levels of soil vapor and groundwater contamination exist. Extraction rates of five gallons per minute (water) and 300 cubic feet (vapor) per minute are assumed. Though the system could operate for far less time, for costing purposes it is assumed that the system would operate for 30 years.

Present Worth: *$1,160,000*
Capital Cost: *$235,000*
Annual Costs: *$54,000*

Alternative S6/G6: Dual Phase Extraction and Treatment (Plume)

As with the previous alternative, contaminated groundwater and soil vapor would be collected from the same wells. After going through an air/water separator, the vapor phase would be treated with a carbon adsorber and the water phase would be treated by bag filters and carbon adsorbers, then discharged to the sanitary sewer. The sub-slab depressurization system would be connected to the vapor phase treatment system. This would address an area approximately 200 feet long by 30 feet wide to the west of the Dambrose building, where any contaminated groundwater above groundwater standards exists. Extraction rates of 10 gallons per minute (water) and 300 cubic feet per minute (vapor) are assumed. Though the system could operate for far less time, for costing purposes it is assumed that the system would operate for 30 years.

Present Worth: *$1,490,000*
Capital Cost: *$280,000*
Annual Costs: *$70,000*

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

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.

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 engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

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.

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

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

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 PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative G2, Institutional Controls as the remedy for the groundwater and Alternative S4, Soil Vapor Extraction (Plume) as the remedy for the soil at this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS. VOCs were found in high concentrations in the three soil samples collected from beneath the building slab. Additionally, the concentrations of VOCs in the sump water and in the sub-slab vapor samples promotes the position that the worst contamination is beneath the building. Due to the nature of the property (i.e., located in a residential/commercial area) and the known history of the site, it is not likely that contaminated soil exists in areas outside the footprint of the building, with the possible exception of beneath the slab of the former garage behind the main building.

The extent of groundwater contamination downgradient of the site is rather limited, and the concentrations rapidly diminish to below the groundwater standard at a distance of about 200 feet from the rear of the building. Also, indoor air in the two properties adjacent to the Dambrose building and in one downgradient property on Carrie Street did not reveal significant vapor intrusion.

The "no action" alternatives would not be protective of human health. Institutional controls alone (i.e., environmental easements) would be protective of on-site workers, but would do nothing to address the contaminated soil.

The treatment alternatives (S3, S4, G3, G4, S5/G5, and S6/G6) would be effective in both the short term and long term and would, to various degrees, reduce the toxicity, mobility, and volume of hazardous wastes at the site. They would differ, however, in implementability and cost effectiveness. The alternatives that treat groundwater would be more difficult to implement since they would necessitate a more complex

treatment system and would require a place to discharge the treated effluent, probably the local sewer system. Due to the nature of the site's geology (silt and clay with low permeability), these alternatives could also operate for many years, treating only a small volume of contaminated water, and not necessarily have a noticeable effect on the overall groundwater quality.

Based on the concentrations of contaminants in existing groundwater, and given that groundwater is not used, any treatment of it in general would not be particularly cost effective. Therefore, contaminated water can be addressed through institutional controls, and the Department proposes Alternative G2 to address the groundwater.

Treatment of the contaminated soil, however, is warranted because it is a continuing VOC source to the groundwater and potentially to indoor air through soil vapor intrusion. Treatment of the soil at this site is best done via non-intrusive methods because the close quarters and small property size in the neighborhood. In addition, extraction of VOCs from the overlying soil would likely result in a decrease in the VOCs in the shallow overburden aquifer at the site without the need to actively treat the groundwater.

Of the two alternatives that would treat the soil only, Alternative S4 would be favored over S3 because a larger area would be addressed with S4, resulting in greater reduction of contaminants. Also, Alternative S4 would be more efficient at extracting the VOCs from the soil because it would operate at a higher vacuum than the existing sub-slab depressurization system (S3).

Because the garage was used for storage of PCE, it is possible that spills contaminated the soil beneath the slab. Pre-design sampling would be necessary to determine if the soil beneath the slab is a source of contamination or if the slab is acting to confine contaminated soil vapor. Alternative S4 would be designed to effectively treat the area beneath the former garage slab, which is not addressed by the existing system. The existing sub-slab system would be tied into the soil vapor extraction system.

Alternative S4 would be expected to be implemented quickly and operated for about five years. It has a lower cost than the alternatives that treat the groundwater, and would have a low cost to operate and maintain. Lastly, a soil vapor extraction system would not be obtrusive in the residential setting of the site. The technology used for soil vapor extraction is inexpensive and proven through numerous applications across the country.

The estimated present worth cost to implement the remedy is $309,000. The cost to construct the remedy is estimated to be $135,000 and the estimated average annual cost for the first 5 years is $27,000, and $4,000 per year for the next 25 years.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Prior to remedial design, pre-design sampling of soil and soil vapor would be undertaken adjacent to the Dambrose building to identify any areas with high concentrations of VOCs. If any VOC source areas are found, contaminated soil could be removed. Additionally, indoor air and sub-slab soil vapor in homes on adjacent streets would need to be sampled to ensure that soil vapor intrusion is not occurring. This includes monitoring and/or mitigation of structures as necessary.

2. Soil vapor extraction wells would be installed in the area below ground surface but above the water table. At the Dambrose Cleaners site this zone extends to a depth of approximately 6 feet. A vacuum would be applied to the extraction wells to draw air through the contaminated soils. The VOCs would vaporize from the soil into the air and the air containing the VOCs would be drawn into the extraction wells. If necessary, the contaminated air from the extraction wells could then be run through an activated carbon treatment system to remove the volatile contaminants before the air is discharged to the ambient air.

3. Imposition of an institutional control in the form of an environmental easement that would require (a) limiting the use and development of the property to residential use, which would also permit commercial or industrial uses; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

4. Development of a site management plan which would include the following institutional and engineering controls: (a) continued evaluation of the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (b) continued operation of the sub-slab depressurization system at the Dambrose building whenever it is occupied; (c) monitoring of groundwater and soil vapor; (d) identification of any use restrictions on the site; and (e) provisions for the continued proper operation and maintenance of the components of the remedy.

5. The property owner would provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. An environmental easement which will trigger periodic certifications can only be amended or extinguished by the Commissioner. This submittal would: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

6. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

7. Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program would be instituted. This program would allow the effectiveness of the soil vapor extraction system to be monitored and would be a component of the long-term management for the site.

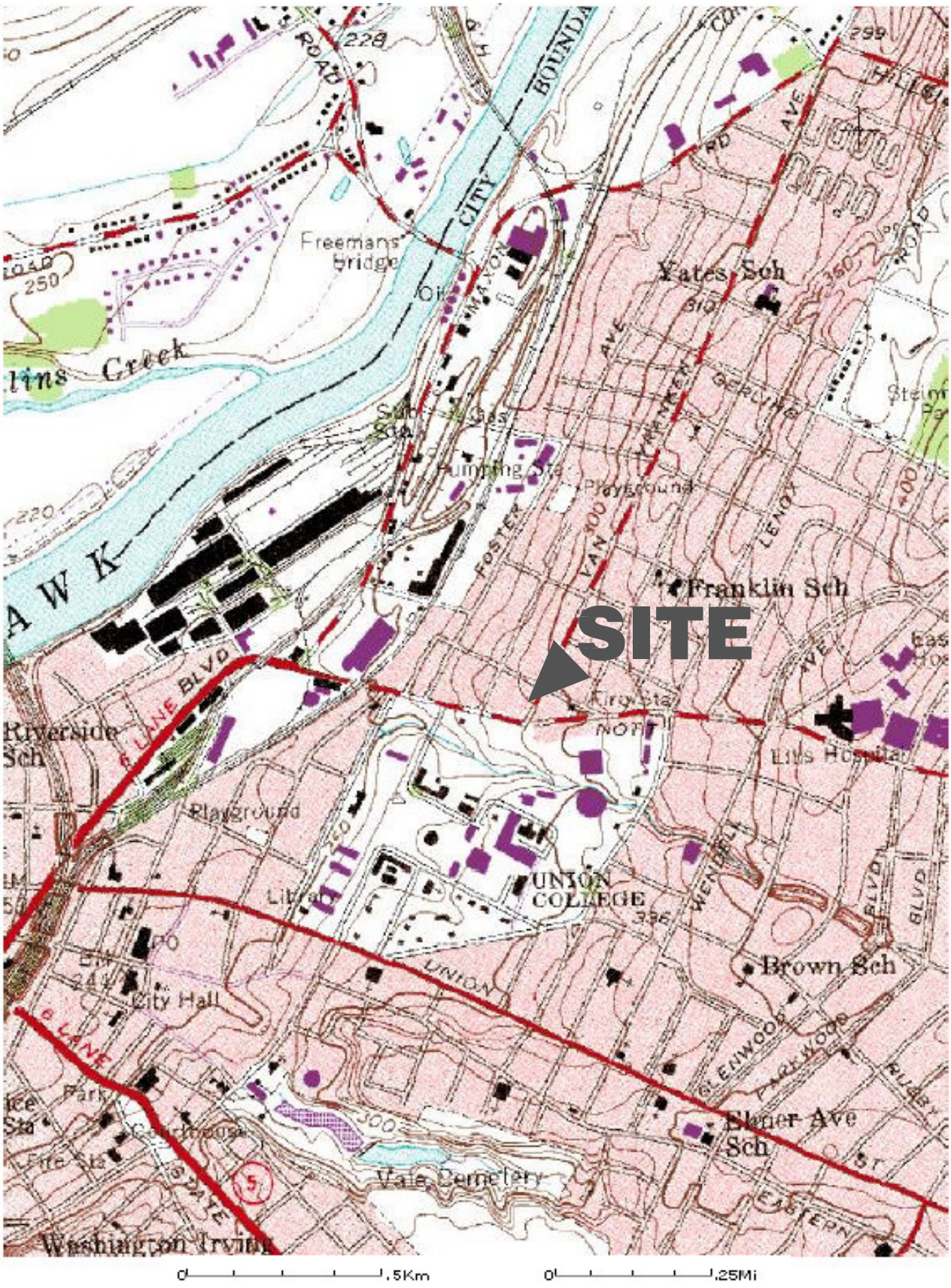
Table 1
Indoor Air Sampling Results from the Dambrose Building
(concentrations in $\mu g/m^3$)

	PCE		TCE		DCE	
Date	9/23/2004	2/16/2006	9/23/2004	2/16/2006	9/23/2004	2/16/2006
Sub-Slab*	1,200,000	3,900	13,000	42	7,400	ND
Basement	64	45	ND	ND	0.64	ND
Crawl Space	9,300	650	13,000	ND	ND	ND
Drop-off Area	360	220	ND	ND	ND	ND
Rear Apartment	120	66	ND	ND	ND	ND
Second Floor Apt.	130	49	0.93	ND	0.73	ND

PCE = Tetrachloroethene
TCE = Trichloroethene
DCE = cis 1,2-Dichloroethene
* = Soil vapor sample in 2004, depressurization system exhaust sample in 2006
ND = Not detected above the instrument quantitation limit

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
S1 - No Action	0	0	0
S2 - Institutional Controls	5,000	500	14,000
S3 - Soil Vapor Extraction (Hot Spot Area)	0	4,000	18,000
S4 - Soil Vapor Extraction (Plume)	130,000	23,000	235,000
G1 - No Action	0	0	0
G2 - Institutional Controls	5,000	4,000	74,000
G3 - Groundwater Extraction and Treatment (Hot Spot Area)	160,000	30,000	685,000
G4 - Groundwater Extraction and Treatment (Plume)	223,000	42,000	950,000
S5/G5 - Dual Phase Extraction and Treatment (Hot Spot)	235,000	54,000	1,160,000
S6/G6 - Dual Phase Extraction and Treatment (Plume)	280,000	70,000	1,490,000



O'BRIEN & GERE ENGINEERS INC.	**FIGURE 1** **SITE LOCATION MAP** **Former Dambrose Cleaners** **Schenectady, New York**	FILE NO. **34253.002** DATE **March 2005**

FIGURE 2

NORTH

HATTIE STREET

CARRIE STREET

NOTT STREET

VAN VRANKEN AVENUE

602 606 610 614 618 622 626

603 607 611 615 619 623 627

1534-36 1530-32 1526-28 1522-24 1529 1523 1517 1513 1505 631

SG-9 MW-9

SG-10 MW-10

SG-8 MW-8

SG-6 MW-6

SG-7 MW-7

SG-11 MW-11

SG-2 MW-02

SG-4 MW-04

SG-1 MW-01

SG-5 MW-05

SG-3 MW-03

A A'

B B'

0 25 50 100 150 200

FEET

LEGEND

Monitoring Well

Soil Gas Sampling Point

NYSDEC
State Superfund
Standby Contract
WA #D004090-15

Cross-section Location Map

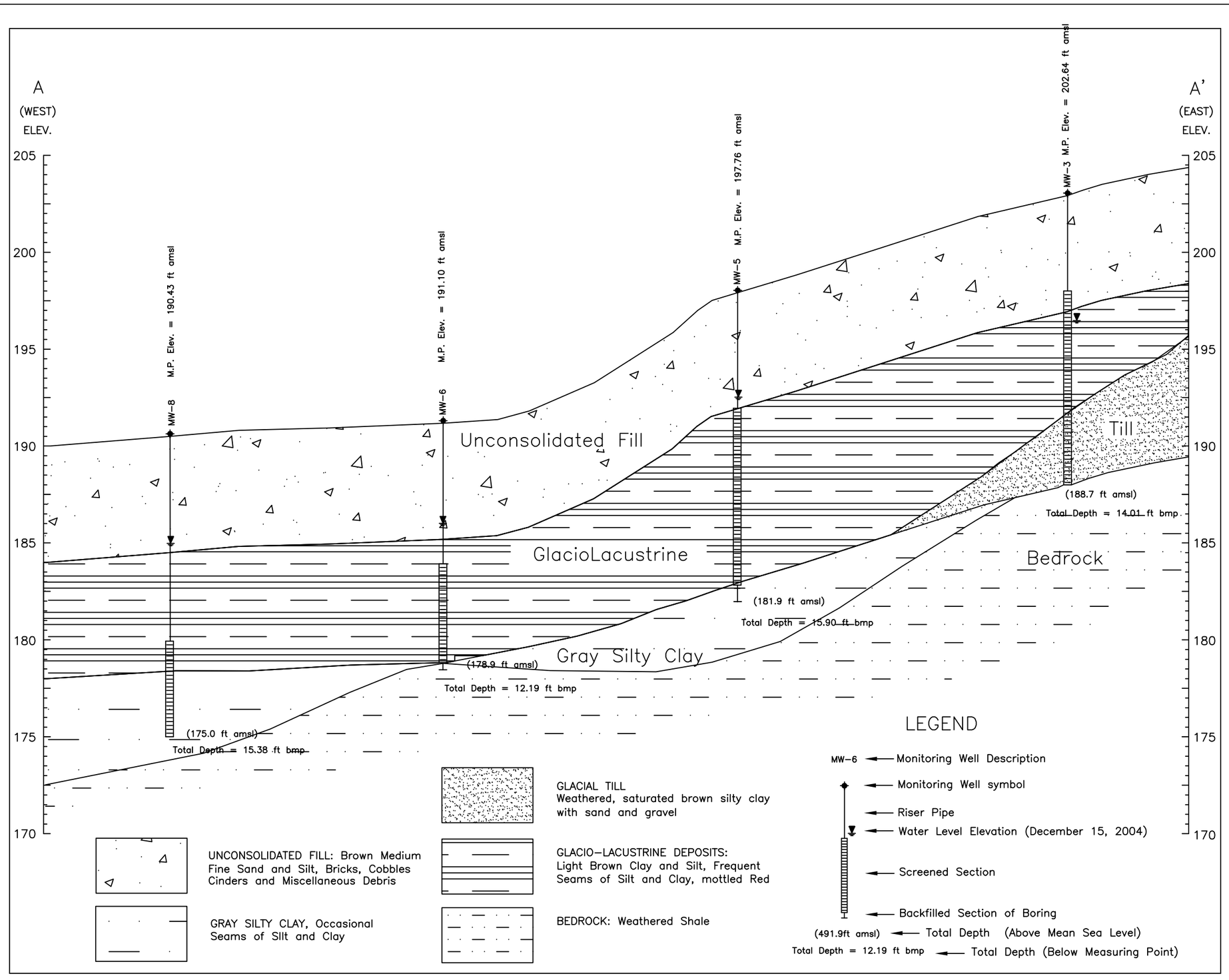
Dambrose Cleaners

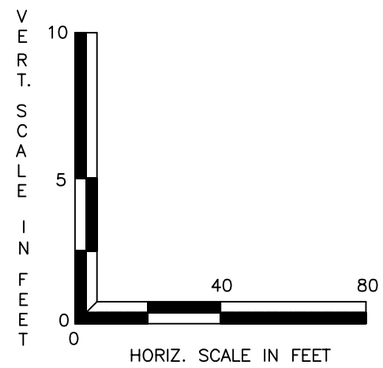
FILE NO. 34253.002.001
October 2005

O'BRIEN & GERE ENGINEERS, INC.

DWG PATH: I:\ALBANY\PROJ\0612\NYDEC\34253-Dambrose\RPTS\RI\FIGURES\Figure 4-2 EW-XSEC.DWG 1:60

FIGURE 3





EAST/WEST
CROSS-SECTION
DAMBROSE CLEANERS
SCHENECTADY, NEW YORK

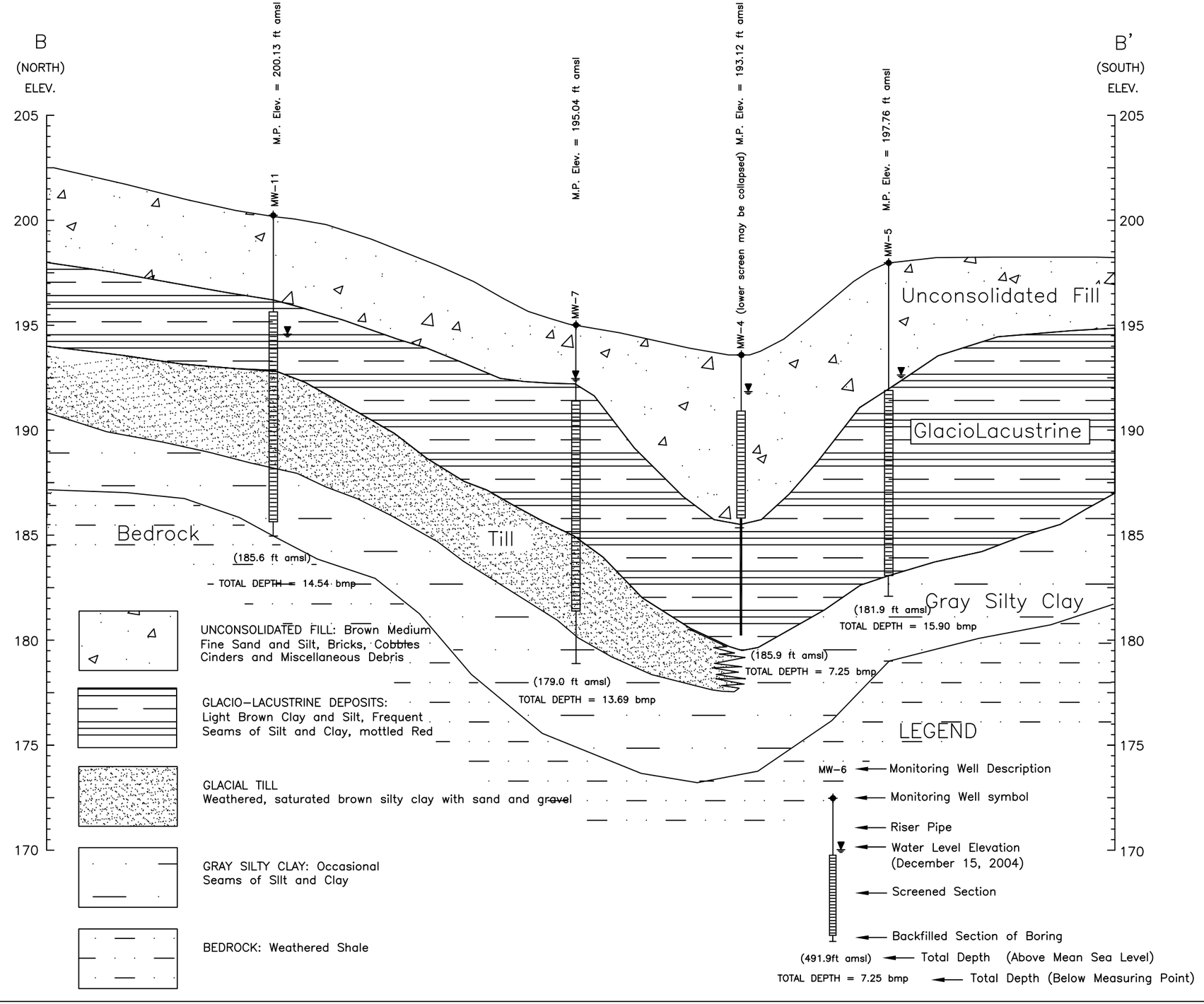
GEOLOGIC CROSS SECTION
LINE A-A'

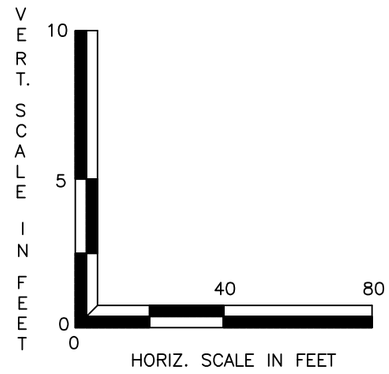
October 2005
34253.002.001

O'BRIEN & GERE
ENGINEERS INC.

3/8/05

FIGURE 4





SOUTH/NORTH
CROSS-SECTION
DAMBROSE CLEANERS
SCHENECTADY, NEW YORK

GEOLOGIC CROSS SECTION
LINE B-B'

October 2005
34253.002.001

O'BRIEN & GERE
ENGINEERS INC.

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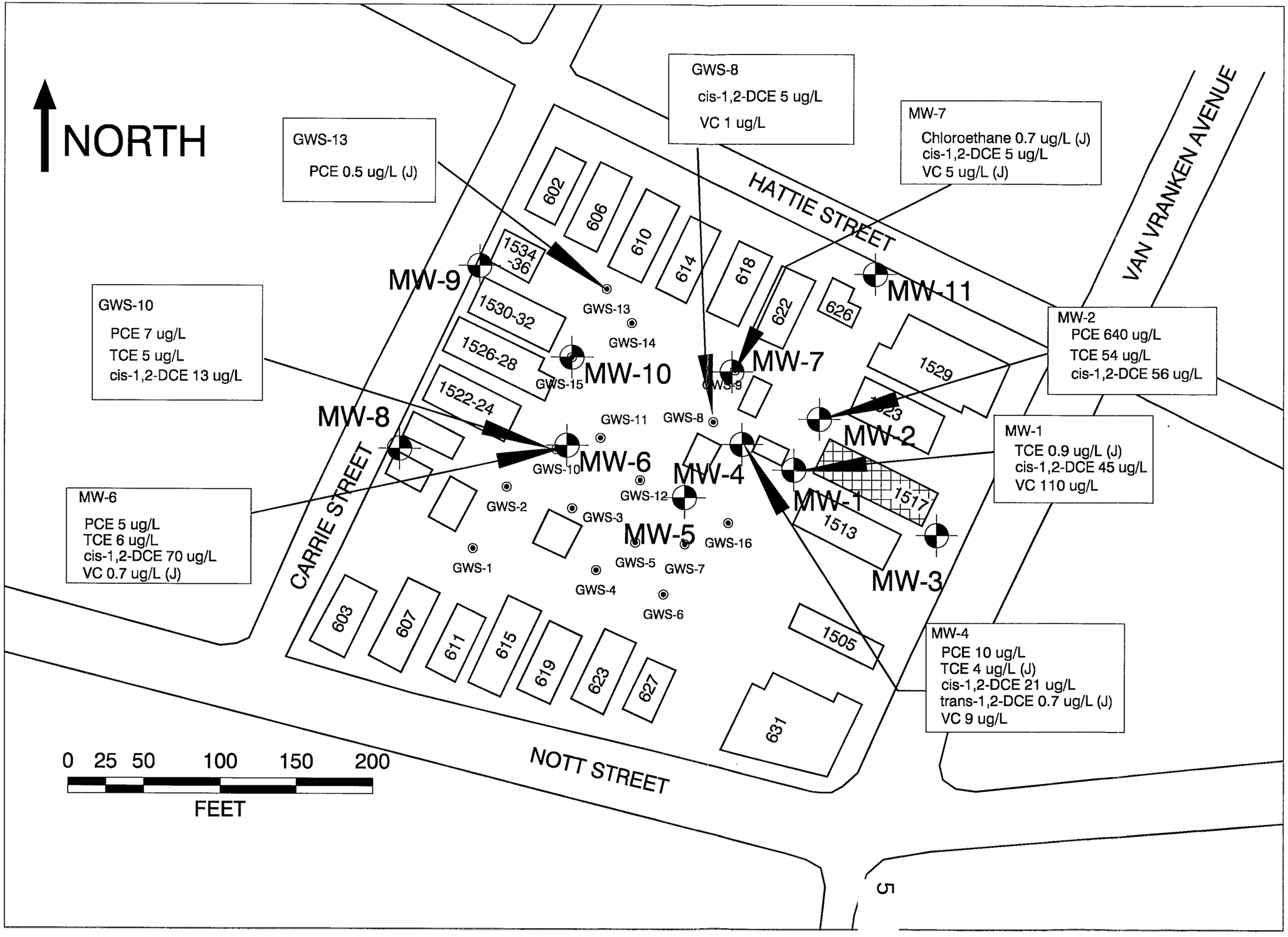
3/8/05

FIGURE 5



LEGEND

Ground Water Monitoring Well

Ground Water Screening Pt

PCE: Tetrachloroethene

DCE: Dichloroethene

TCE: Trichloroethene

VC: Vinyl Chloride

NYSDEC
State Superfund
Standby Contract
WA #D004090-15

Ground Water Screening (9/2004) and Sampling (12/2004) Results
Dambrose Cleaners

FILE NO. 34253.002.001
September 2005

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 6

NORTH

	MW-9 (ug/L)	SG-9 (ug/m3)
PCE	ND	1.3
TCE	ND	1.2
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-10 (ug/L)	SG-10 (ug/m3)
PCE	ND	2.1
TCE	ND	1.1
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-7 (ug/L)	SG-7 (ug/m3)
PCE	ND	.97 J
TCE	ND	1.0
cis-1,2-DCE	5	ND
trans-1,2-DCE	ND	ND
VC	5	ND
Chloroethane	0.7 J	

	MW-11 (ug/L)	SG-11 (ug/m3)
PCE	ND	ND
TCE	ND	0.87
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

1526 Carrie	SUMP (ug/L)	BAS-SS (ug/m3)
PCE	ND	0.97
TCE	ND	1.3
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-2 (ug/L)	SG-2 (ug/m3)
PCE	640	38000
TCE	54	2400
cis-1,2-DCE	56	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-6 (ug/L)	SG-6 (ug/m3)
PCE	5	3.2
TCE	6	1.5
cis-1,2-DCE	70	1.8
trans-1,2-DCE	ND	ND
VC	0.7 J	ND

	MW-8 (ug/L)	SG-8 (ug/m3)
PCE	ND	13
TCE	ND	1.9
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

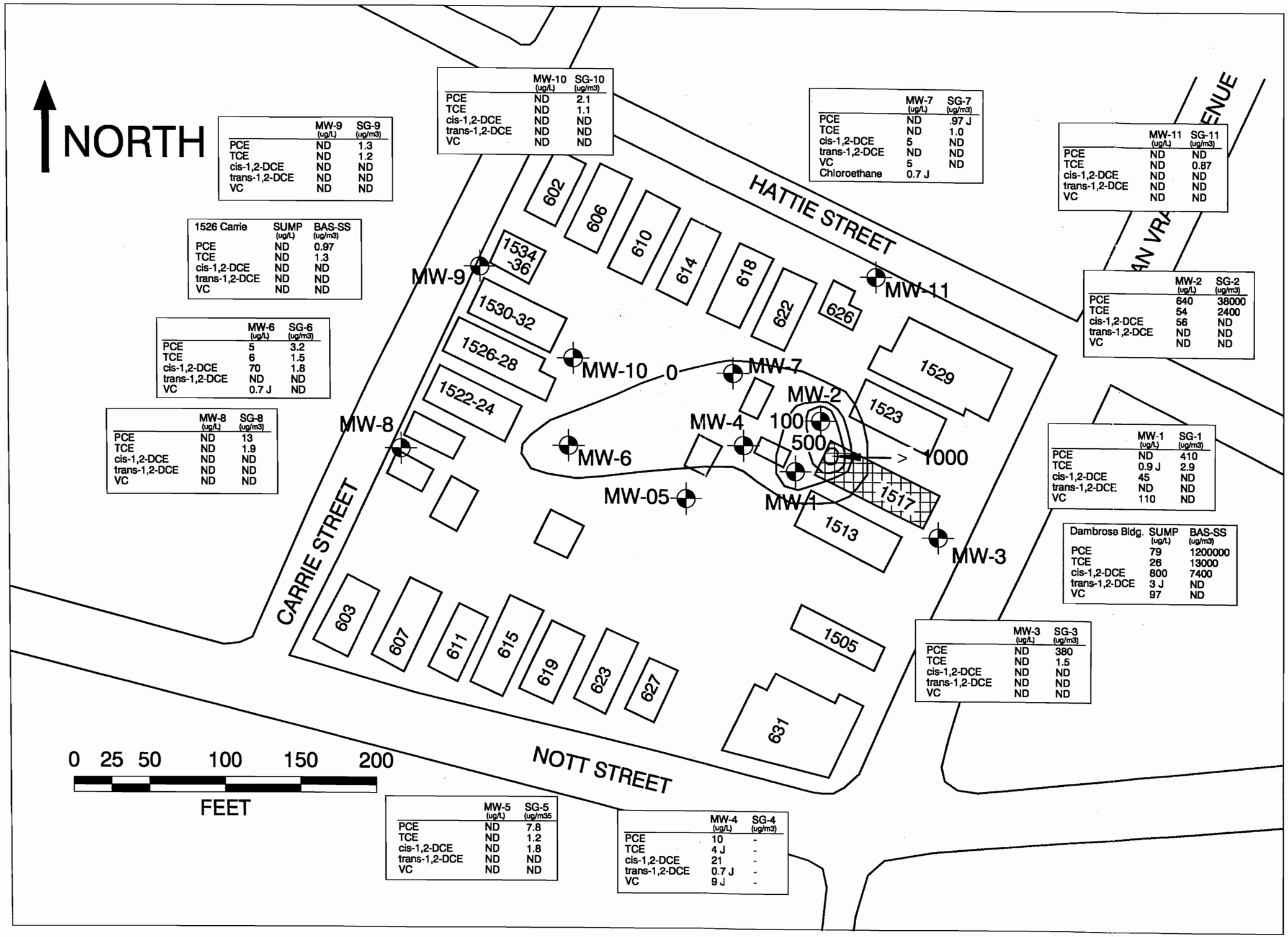
	MW-1 (ug/L)	SG-1 (ug/m3)
PCE	ND	410
TCE	0.9 J	2.9
cis-1,2-DCE	45	ND
trans-1,2-DCE	ND	ND
VC	110	ND

Dambrosa Bldg.	SUMP (ug/L)	BAS-SS (ug/m3)
PCE	79	1200000
TCE	26	13000
cis-1,2-DCE	800	7400
trans-1,2-DCE	3 J	ND
VC	97	ND

	MW-3 (ug/L)	SG-3 (ug/m3)
PCE	ND	380
TCE	ND	1.5
cis-1,2-DCE	ND	ND
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-5 (ug/L)	SG-5 (ug/m35
PCE	ND	7.8
TCE	ND	1.2
cis-1,2-DCE	ND	1.8
trans-1,2-DCE	ND	ND
VC	ND	ND

	MW-4 (ug/L)	SG-4 (ug/m3)
PCE	10	-
TCE	4 J	-
cis-1,2-DCE	21	-
trans-1,2-DCE	0.7 J	-
VC	9 J	-



LEGEND

Ground Water Monitoring Well and Soil Gas Sampling Point

Contoured Total VOC Concentration

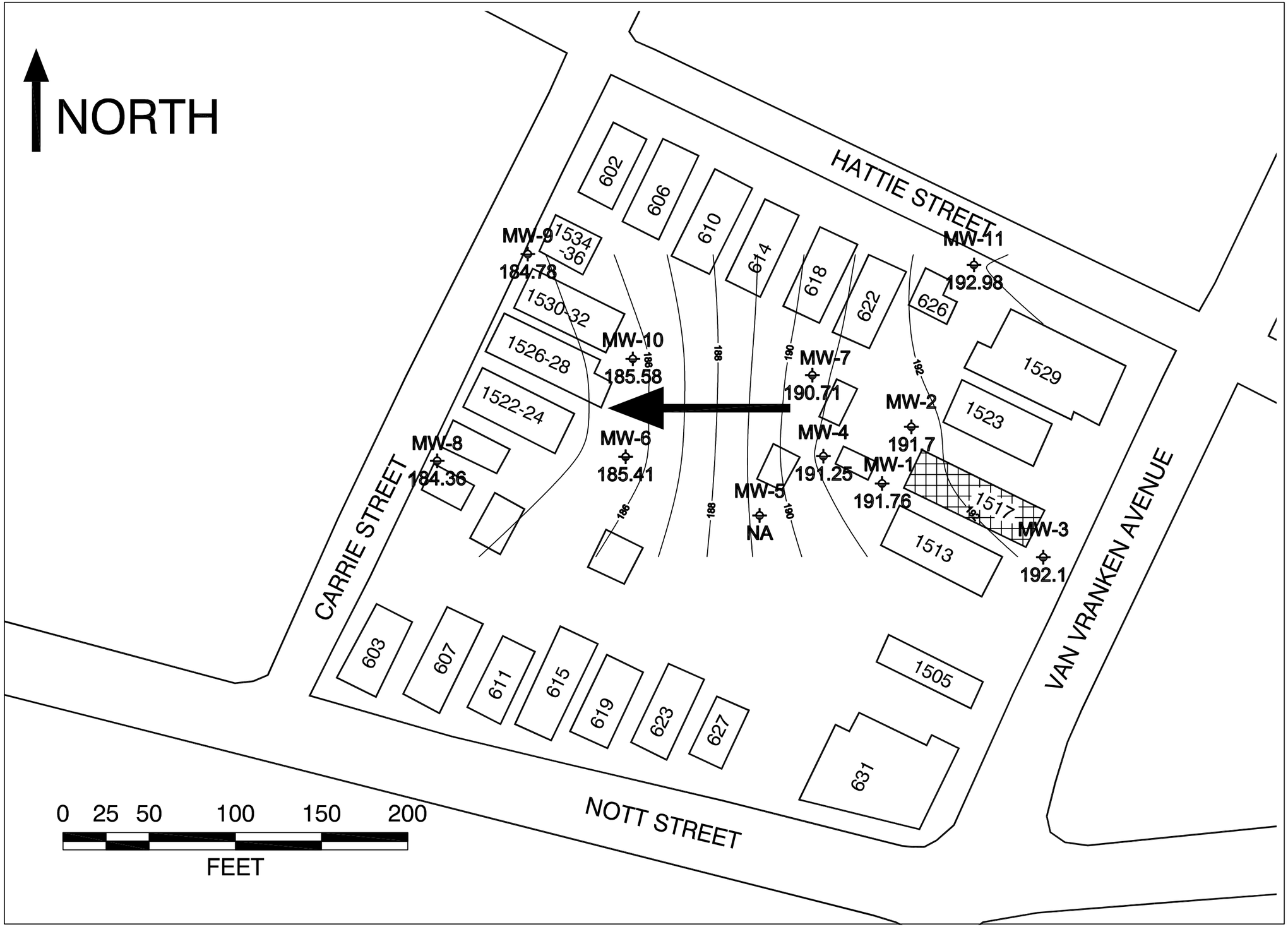
NYSDEC
State Superfund
Standby Contract
WA #D004090-15

Soil Gas & Ground Water Sampling Results December 2004 Dambrose Cleaners

FILE NO. 34253.002.001
October 2005

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 7



LEGEND

Direction of Ground Water Flow

MW-8 184.62 Monitoring Well w/ ground water elevation

190 Ground Water Elevation Contour

NYSDEC
State Superfund
Standby Contract
WA #D004090-15

Ground Water Potentiometric Surface
February 2005
Dambrose Cleaners

FILE NO. 34253.002.001
September 2005

O'BRIEN & GERE ENGINEERS, INC.