American Drive-In Cleaners

Operable Unit 1

Levittown, Nassau County, New York

Site No. 1-30-049

PROPOSED REMEDIAL ACTION PLAN

February 2001

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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AMERICAN DRIVE-IN CLEANERS

Operable Unit 1
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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health is proposing a remedy to address the significant threat to human health and/or the environment created by the presence of hazardous waste at American Drive-In Cleaners Operable Unit 1, a Class 2 inactive hazardous waste disposal site. As more fully described in Sections 3 and 4 of this document, the discharge of dry cleaning solvent into on-site cesspools has resulted in the disposal of hazardous wastes, primarily tetrachloroethene (PCE), at the site, some of which have migrated from the site to surrounding areas including groundwater downgradient of the site. These disposal activities have resulted in the following significant threats to the public health and/or the environment:

- A significant threat to human health associated with the presence of PCE in groundwater which could potentially impact drinking water supply wells in the future;
- A significant threat to human health associated with subsurface soils contaminated by PCE. The potential for human exposure to these contaminated soils exists if future excavations were to occur in the contaminated areas;
- A significant threat to human health associated with the potential for human exposure to PCE vapors that may migrate into buildings or basements; and
- A significant threat to the environment associated with the environmental damage to a groundwater resource. PCE contamination from the site affects groundwater beneath and hydraulically downgradient of the site, impacting its value as a sole source aquifer.

In order to eliminate or mitigate the significant threats to the public health that the hazardous wastes disposed at the American Drive-In Cleaners site have caused, the following remedy is proposed:

- In-situ chemical oxidation, where a chemical oxidant would be injected into subsurface soils and groundwater near the contaminated cesspools in the alley at the east end of the building on the American Drive-In Cleaners site;

- Soil vapor extraction (SVE) wells to collect volatile contaminants from the unsaturated zone. An asphalt pavement cover would be constructed over on-site areas not currently paved to provide a surface seal to enhance SVE performance and limit the infiltration of precipitation;

- On-site groundwater extraction and treatment to prevent further migration of contaminated groundwater from the site;

- A long-term groundwater monitoring program would be established; and

- Institutional controls in the form of existing use and development restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the Nassau County Department of Health (NCDOH) from the affected areas.

The proposed remedy, discussed in detail in Section 7 of this document, is intended to attain the remediation goals selected for this site in Section 6 of this Proposed Remedial Action Plan (PRAP), in conformity with applicable standards, criteria, and guidance (SCGs).

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

The NYSDEC has issued this PRAP as a component of the citizen participation plan developed pursuant to the New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in greater detail in the Remedial Investigation (RI), Feasibility Study (FS) and other relevant reports and documents, available at the document repositories.

To better understand the site and the investigations conducted, the public is encouraged to review the project documents at the following repositories:

NYSDEC Region 1 Office
Environmental Remediation Unit
SUNY Campus, Building 40,
Stony Brook, NY 11790
Phone: (631) 444-0249
Hours: Monday through Friday
8:30 a.m. - 4:45 p.m.

Island Trees Public Library
38 Farmedge Road
Island Trees, NY 11756
Reference Section (516) 731-2211
Hours 9:30 a.m. - 9:00 p.m. M, W ,Th
9:30 a.m. - 5:00 p.m. Tu, F, Sa

Robert Filkins, Project Manager
NYS Dept. of Envir. Conservation
50 Wolf Road, Albany, NY 12233-7010
Telephone 518-457-7924 or 1-800-342-9296
Hours: Monday through Friday
8:30 a.m. - 4:45 p.m.

The NYSDEC seeks input from the community on all PRAPs. A public comment period has been set from February 23, 2001 to March 25,2001 to provide an opportunity for public participation in the remedy selection process for this site. A public meeting is scheduled for March 13, 2001 at the Island Trees High School 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 you can submit verbal or written comments on the PRAP.

The NYSDEC may modify the preferred alternative 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 responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision is the NYSDEC's final selection of the remedy for this site. Written comments may be sent to Mr. Filkins at the above address through March 25, 2001.

SECTION 2: SITE LOCATION AND DESCRIPTION

The American Drive-in Cleaners site consists of approximately 16,000 square feet, or 0.37 acres, located at 3801 Hempstead Turnpike, Levittown, Nassau County, New York (see Figures 1 and 2). The site is located on the north side of Hempstead Turnpike, several hundred feet east of it's intersection with Wantagh Avenue. The area around the site consists of commercial properties along Hempstead Turnpike, with Island Trees schools and residential areas on side streets nearby.

The site includes a 4,800 square foot masonry block building occupied by tenants including American Drive-In Cleaners, Christine's Alteration Shop, Willie Mae Bicycles (recently closed), Robert's Barber Shop, and Blimpie Restaurant (see Figure 2). There is an 8,000 square foot parking area on the south side of the building and small, unpaved areas on the east, north and west sides.

Operable Unit 1, which is the focus of this PRAP, consists of the area of contamination north of Hempstead Turnpike. This area is primarily the 3801 Hempstead Turnpike property, with some small impacted areas of adjacent properties included. An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate a release, threat of release or exposure pathway resulting from the site contamination. The remaining operable unit for this site, Operable Unit 2, consists of the off-site groundwater contamination plume south of Hempstead Turnpike and is described in Section 3.2 below.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The site was developed and the current building constructed in the mid 1950's. American Drive-In Cleaners has occupied the building since it was constructed and was the sole occupant at one time. Prior to 1981, wastewater from the building drained into one of several cesspools located north and east of the building. PCE, or wastewater containing PCE, was apparently disposed of in drains leading to the two cesspools on the east side of the building at some time before 1981. The building was connected to the public sewer system in 1981. In addition, a small area of soil contaminated by PCE is present near the northwest corner of the building at the surface. This area of contamination is likely due to a small PCE spill or improper disposal of PCE contaminated waste at an unknown time.

In late 1997, a 5,000 gallon fuel oil underground storage tank was removed from an unpaved area west of the site building.

3.2: Remedial History

In September of 1990, the Nassau County Department of Public Works (NCDPW) installed five monitoring wells on a then vacant piece of property directly across the street and hydraulically downgradient from the American Drive-In Cleaners site. Groundwater from some of these monitoring wells was found to be contaminated by PCE. NCDPW then asked the Nassau County Department of Health (NCDOH) to investigate American Drive-In Cleaners as a possible source of the contamination. In December 1990, NCDOH conducted a soil vapor survey and collected a surface soil sample near the northwest corner of the building on the American Drive-In Cleaners property. The vapor samples indicated PCE contamination and the soil sample was found to contain 1,500 parts per million (ppm) of PCE.

The site was then referred to NYSDEC and in December of 1991 was listed as a Class 2 inactive hazardous waste disposal site based on the NCDOH findings. A Class 2 site is one which presents a significant threat to the public health or the environment.

In January 2001 the site was split into two operable units. Operable Unit 1, the area north of Hempstead Turnpike, and Operable Unit 2, the area south of and beneath Hempstead Turnpike. The contamination of concern in Operable Unit 2 is the off-site groundwater PCE plume. Further off-site groundwater monitoring data is necessary to better define the off-site PCE plume before a remedial action can be selected. The decision to divide the site into two operable units was made by NYSDEC and NYSDOH to enable the process toward remediation of the on-site source areas and contaminated groundwater to proceed while the necessary additional data is being gathered concerning the off-site groundwater plume.

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present at the site and to evaluate alternatives to address the significant threat to human health posed by the presence of hazardous waste, the NYSDEC has recently conducted a Remedial Investigation/Feasibility Study (RI/FS).

4.1: 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 1997 and November 2000. A report entitled "Remedial Investigation, American Drive-In Cleaners, November 2000 has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- Research of historical information
- Assessment of previously installed monitoring wells
- Soil vapor survey
- Test boring program
- Soil Sampling
- Installation of monitoring wells
- Hydraulic conductivity testing
- Groundwater sampling
- Test pit excavations
- Survey of the site
- Groundwater well user survey
- Groundwater level measurements
- Baseline qualitative health assessment

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the RI analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the American Drive-In Cleaners site are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of New York State Sanitary Code. For soils, NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 provides soil cleanup guidelines for the protection of groundwater, background conditions, and health-based exposure scenarios. In addition, for soils, site specific background concentration levels can be considered for certain classes of contaminants. Guidance values for evaluating contamination in sediments are provided by the NYSDEC "Technical Guidance for Screening Contaminated Sediments".

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 below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb), and parts per million (ppm). For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: Site Geology and Hydrogeology

Overburden deposits encountered at the site consist of glacial outwash, in some cases covered by 1 to 7 feet of sandy silt fill. The two deposits pertinent to the site are the upper glacial outwash deposit and the Magothy Formation.

From the surface to a depth of approximately 85 feet is the upper glacial outwash deposit.

The upper glacial outwash consists of brown gravelly sand. The water bearing unit within this deposit, beginning at a depth of approximately 34 feet, is known as the upper glacial aquifer. In Nassau County the upper glacial aquifer is generally used only for irrigation. Groundwater flow in the Upper Glacial aquifer is generally to the south (see Figure 3) in the vicinity of the site.

Below 85 feet is the Magothy Formation. As the deepest borings at the site were completed to a maximum depth of 121 feet, this investigation did not determine the lower extent of the Magothy Formation. However, the Magothy Formation is typically at least several hundred feet thick on much of Long Island. The observed portion of the Magothy Formation consisted of brown, silty, fine to medium grained sand. The Magothy aquifer is a very productive groundwater source, and is the primary source of potable drinking water in Nassau County.

4.1.2: Nature of Contamination

As described in the RI report, many soil, groundwater and sediment samples were collected at the site to characterize the nature and extent of contamination. The main category of contaminants which exceed their SCGs are volatile organic compounds (VOCs). The primary contaminant of concern is tetrachloroethene, also known as perchloroethene, "perc" or PCE. Two related VOCs, trichloroethene (TCE) and dichloroethene (DCE), also exceeded SCGs in groundwater in several locations. TCE and DCE are formed when PCE breaks down, and at each location where they were found, PCE was found at greater concentrations.

4.1.3: Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in soil and groundwater and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Soil

The analysis for volatile organic compounds (VOCs) was completed on twenty-eight subsurface soil samples taken in January of 1998, at the locations indicated in Figure 4. PCE was the only volatile organic compound found in soils which exceeded soil cleanup guidelines. PCE concentrations exceeded soil cleanup guideline of 1.4 ppm in 5 of the 28 soil samples analyzed (see Table 1).

Test pit TP-1 uncovered the tops of two cesspools on the east side of the building on the American Drive-In Cleaners site property. The vicinity of the more southern of these two cesspools was found to have the greatest concentration of PCE found at this site.

The highest concentrations were found in a sediment sample of white fiber material from the bottom of the southern cesspool uncovered by test pit TP-1. This sample, taken from a depth of 11-12 feet below grade, contained 130,000 ppm of PCE, or 13% PCE. This fiber material is thought to be laundry related waste. Due to the extremely high concentration of PCE in this sample an Interim Remedial Measure (IRM) was undertaken to remove this material. The IRM is described in section 4.2 of this document.

Soil samples were taken at depth via a direct push sampling technology known as

Geoprobe. A Geoprobe soil sample (GP-7) taken at a depth of 14 to 16 feet immediately adjacent to the southmost of the two cesspools exposed by test pit TP-1 contained 25,000 ppm, or 2.5% by weight, of PCE (see Figure 4). A soil sample was taken by hand auger from the bottom of the more northern of the two cesspools at TP-1. This sample contained 6.4 ppm of PCE, still above the soil cleanup guideline for PCE of 1.4 ppm, but only a small fraction of what was found near the southern cesspool. Test pits were also dug in three locations north of the site building where three additional inactive cesspool clusters with a total of 10 cesspools are located. None of the samples taken from within these cesspools exceeded soil cleanup guidelines.

Near the northwest corner of the on-site building a soil sample taken from a depth of 4 to 6 feet at Geoprobe location GP-3 was found to contain 36 ppm of PCE. On the west side of the building, at location GP-1C, a soil sample taken from a depth of 4 to 6 feet was found to contain PCE at a concentration of 11 ppm.

Other than these five samples, none of the other soil samples taken during the Remedial Investigation exceeded the soil cleanup guideline of 1.4 ppm for PCE. The highest PCE concentration found in any of the other soils sampled was 0.14 ppm.

Groundwater

Groundwater samples were taken from 16 monitoring wells and an irrigation well at Island Trees High School (see Figure 5). Five of these wells, the three-well MW-7 cluster immediately downgradient of the cesspool source area and the upgradient MW-6 pair of background wells, are within Operable Unit 1. Two of the five Operable Unit 1 monitoring wells were shallow, water table wells of about 40 feet in depth. Those wells are identified with an "S" after the well number. Two of the Operable Unit 1 monitoring wells were of intermediate depth, approximately 80 feet deep, and are identified with an "I". The remaining monitoring well is a deep well, approximately 120 feet deep, and is identified with a "D".

The results of groundwater sampling and analysis indicate a plume of contamination from the site heading just east of due south. PCE was the primary contaminant found in all the impacted wells, though in MW-7S two breakdown products of PCE, trichloroethene (TCE) and dichloroethene (DCE), were also found in concentrations above groundwater standards. The groundwater standard for all three of these compounds is 5 ppb. The highest concentrations of these contaminants were found in the shallow monitoring wells and concentrations decreased with depth. Toluene was also detected in monitoring well MW-7I at a concentration of 18 ppb. However, since groundwater samples from MW-7S did not contain toluene this contamination is not likely attributable to the site.

Shallow monitoring well MW-7S, located approximately 50 feet downgradient from the highly contaminated cesspool on the east side of the on-site building, was the most contaminated well. MW-7S was sampled four times between March of 1998 and January of 2000. The results indicated PCE contamination ranging from a low of 3,400 ppb in January 2000 to a high of 16,000 ppb in February 1999. In the January 2000 sample TCE and DCE were also present at 230 ppb and 140 ppb respectively. These high

concentrations of PCE in groundwater indicated that undissolved PCE is likely present in the saturated soils of this area. This undissolved PCE is known as dense, non-aqueous-phase liquid, or DNAPL.

Concentrations of PCE in intermediate depth monitoring well MW-7I were lower than in MW-7S, but have gradually increased over time from a low of 120 ppb in March 1998 to 1,600 ppb in January 2000. The deep well at this location, MW-7D, contained 2 ppb of PCE, less than the groundwater standard of 5 ppb.

The shallow background well, MW-6S, also contained groundwater with PCE concentrations above groundwater standards. Since this well is hydraulically upgradient of the American Drive-In Cleaners site, it is unlikely that the PCE concentrations of up to 34 ppb found in this well are due to contamination from the site. However, these relatively low concentrations would not have significantly contributed to the site related groundwater plume which is at much greater concentrations. The intermediate depth background well contained tetrachloroethane at a concentration of 11 ppb. The groundwater standard for tetrachloroethane is 5 ppb.

Private Well Survey

A private well survey was conducted within a ½ mile radius of the site. No private wells were identified in the area surveyed.

Air

In September of 2000, air monitoring samples were taken from four of the five businesses on-site, Christine's Alteration Shop, Willie Mae Bicycles, Robert's Barber Shop, Blimpie Subs, and off-site at Discount Beverage Center just east of the site. The active American Drive-In Cleaners declined to have air monitoring conducted in their portion of the building. Samples were taken using passive organic vapor monitoring badges. The samples taken were analyzed for PCE contamination.

The results of this sampling indicated each of the on-site businesses were impacted by PCE vapors. Concentrations of PCE ranged from 5500 micrograms/cubic meter (ug/m^3) in Willie Mae Bicycles to 800 ug/m^3 in Blimpie Subs. According to the New York State Department of Health guidelines for PCE in indoor and outdoor air, concentrations of PCE over 100 ug/m^3 require action be taken to reduce those concentrations, and concentrations over 1000 ug/m^3 require that such action be taken immediately. PCE concentrations in Willie Mae Bicycles, Christine's Alterations, and Robert's Barber Shop all exceeded the 1000 ug/m^3 level. PCE concentrations in Discount Beverage Center were below 100 ug/m3. The business managers were notified of the air sampling results and provided with the NYSDOH fact sheet, *Tetrachloroethene (PERC) in Indoor and Outdoor Air*. Employees at the site were also provided with contacts at the NYSDOH to answer questions regarding activities at the site and exposures to PCE

At the request of the NYSDOH, the NYSDEC Region 1 Air program and NCDOH conducted an immediate inspection of the on-site building and found that the American Drive-In Cleaners business had several violations of 6 NYCRR Part 232, Perchlroethylene Dry Cleaning Facilities, which regulates dry cleaning operations.

In order to immediately reduce levels of PCE within the shopping plaza, the on-site dry cleaning machine was disconnected and its contents emptied. This was completed in the presence of a NYSDEC conservation officer and air inspector. The NCDOH then collected a second round of air samples at the site. PCE concentrations in the on-site businesses remained elevated, ranging from 1420 ug/m^3 to 2860 ug/m^3. The air sample taken from the Discount Beverage Center contained 2050 ug/m^3 of PCE. Additional air samples were taken in January 2001. The results indicated that PCE concentrations in indoor air remain high at the impacted businesses. Concentrations of PCE indoor air ranged from a low of 1458 ug/m^3 in the dry cleaner to a high of 5370 ug/m^3 in the Blimpie Sub shop. Based on these results, an emergency soil vapor extraction system is being installed along with measures to seal any openings where soil vapor could possibly enter the buildings. These actions serve as temporary measures to reduce PCE concentrations in indoor air until the permanent remedial measures are in place.

4.2: 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.

As described in Section 4.1.3, very high concentrations of PCE were found in a white fiber material found in the bottom of a cesspool located on the east side on the on-site building. In August of 1999, as much of this material as was possible was removed from the drywell bottom. First a vacuum truck, and then an excavator capable of being used within the cesspool were used to remove approximately two cubic yards of material. When the excavation presented a danger of undermining the cesspool, which could subsequently threaten to undermine the adjacent buildings, work was halted. PCE impacted soils still remain in and below the cesspool structure.

4.3: 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 health risks can be found in Section 6.0 of the RI report.

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Pathways which are known to or may exist at the site include:

- Exposures to PCE vapors in excess of the NYSDOH guideline for PCE in indoor air have occurred within on-site businesses. Immediate actions were taken to reduce these exposures by ceasing active dry-cleaning operations at the site. ;
- Air samples collected after the on-site dry-cleaning equipment was decommissioned indicate that vapors

from site related soil and groundwater contamination are migrating into the on-site buildings and neighboring beverage center. An emergency response action, consisting of a soil vapor extraction system and sealing of possible soil vapor entry points, was undertaken immediately following receipt of these results to reduce levels of contaminants in indoor air. Future excavation and trenching work at the site could expose utility or construction workers to volatile vapors;

- Ingestion of contaminated drinking water. For ingestion of contaminated groundwater, contaminated groundwater would have to reach a well being used for human consumption. A private well survey was conducted within one half-mile of the site, and no private drinking water supply wells were identified. Also, no public drinking water supply wells exist within one half-mile downgradient of the site. Public drinking water supply wells further downgradient of the site are tested regularly, so that only water meeting NYSDOH drinking water standards is distributed to the public. Therefore, exposures to contaminated drinking water via ingestion are unlikely, unless drinking water supply wells are installed within the contaminant plume. Installation of new water supply wells is regulated by the Nassau County Department of Health, which reduces the likelihood for this to occur; and

- Dermal contact to or ingestion of contaminated sub-surface soils. This would require those soils to be brought to the surface, where commercial workers or patrons of the businesses on-site could come in contact with the soil. This likelihood is considered low. However, these subsurface soils present a potential future threat to utility or construction workers who may need to excavate subsurface soils in these areas.

4.4: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental or ecological exposures and ecological risks which may be presented by the site. The following pathways for environmental exposure and/or ecological risks have been identified:

- There is a significant threat to the environment associated with the environmental damage to a groundwater resource. PCE contamination from the site affects groundwater beneath and hydraulically downgradient of the site, impacting its value as a sole source aquifer.

SECTION 5: 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 Potential Responsible Parties (PRP) for the site, documented to date, include: the

Kasper Irrevocable Trust, Sanderina Kasper, and Parviz Nezami.

The PRPs declined to implement the RI/FS at the site when requested by the NYSDEC. Therefore, the investigation was completed under the State Superfund program. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the NYSDEC will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State has incurred.

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 meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. 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 goals selected for this site are:

- *Eliminate the potential for ingestion of groundwater affected by the site that does not attain NYSDOH Standards for public drinking water suppies.*
- *Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.*
- *Eliminate, to the extent practicable, migration of DNAPL through removal and hydraulic management.*
- *Eliminate migration of volatile organic vapors into buildings, basements, foundations and utilities.*
- *Eliminate, to the extent practicable, source areas of volatile organic compounds within subsurface soils.*

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 laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the American Drive-In Cleaners site were identified, screened and evaluated in the report entitled Focused Feasibility Study, Operable Unit 1, American Drive-In Cleaners Site, January 2001.

The Feasibility Study is focused in nature due to widespread experience of NYSDEC and it's consultants in remediating dry cleaner related inactive hazardous waste disposal sites. Three common, proven remedies at such sites, groundwater extraction and treatment, air sparging, and soil vapor extraction, were evaluated. Discussions between NYSDEC and it's consultants resulted in in-situ chemical oxidation being evaluated as the

innovative technology most likely to be successful at this site.

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

7.1: Description of Remedial Alternatives

The potential remedies are intended to address the contaminated soils and groundwater at the site.

Alternative 1: No Further Action

Present Worth:	*$ 92,000*
Capital Cost:	*$ 0*
Present Worth of O&M:	*$ 92,000*
Time to Implement	*not applicable*

This alternative recognizes remediation of the site conducted under a previously completed IRM. Only continued monitoring is necessary to evaluate the effectiveness of the remediation completed under the IRM.

This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment. This alternative would include annual groundwater monitoring for a time period of 30 years.

Alternative 2: Groundwater Extraction and Treatment and Soil Vapor Extraction

Present Worth:	*$ 3,221,000*
Capital Cost:	*$ 887,000*
Present Worth of O&M:	*$ 2, 334,000*
Time to Implement	*6 months to 1 year*

This alternative would include groundwater extraction consisting of two extraction wells, screened from the top of the water table at approximately 30 feet to a depth of 80 feet. The wells would be located proximate to and downgradient of the contaminated cesspools (see Figure 6). The extraction system would be operated for long term groundwater control, estimated to be 30 years in duration, by extracting water at approximately 10 to 20 gallons per minute (gpm), or 5 to 10 gpm for each well.

The groundwater extracted by these wells would be pumped to a treatment building. Due to severe space limitation on site, NYSDEC would attempt to reach an agreement with an adjacent property owner, such as Frank's Nursery and Crafts, to locate this building just outside the American Drive-In Cleaners site property. The building would house an air stripper for groundwater treatment, as well as the soil vapor extraction equipment.

Groundwater monitoring would be performed for 30 years to evaluate the extent to which the remedial action objectives are being met at the American Drive-In Cleaners southern boundary and downgradient of the site. If remedial objectives are not met, the NYSDEC will evaluate whether additional measures are required to mitigate the groundwater plume. Quarterly groundwater monitoring would be performed for an estimated two years, with annual groundwater monitoring in years 3 through 30.

This groundwater remedy would not remediate any of the DNAPL beneath the site

directly, but it would capture and treat the groundwater impacted by this DNAPL.

Soil contamination would be addressed by the abandonment and closure of the on-site cesspools and the installation of a soil vapor extraction system. All conduits, drains and other piping connected with the cesspools would be sealed or plugged with grout. The cesspools would then be backfilled with clean soil to within one foot of the ground surface, and a one foot layer of concrete would be installed flush with the ground surface.

The soil vapor extraction (SVE) system would consist of approximately ten vertical SVE wells, installed above the water table at depths of approximately 10 feet on the north and west sides of the building and 30 feet on the east and south sides of the building (See Figure 6). Piping would connect these wells to the treatment building where a vacuum would be applied to the system to draw air contaminated by VOCs, primarily PCE in this case, from the subsurface soils. The contaminants in the air would be treated with a catalytic oxidation system before release. The same catalytic oxidation system would be used to treat emissions from the groundwater treatment system's air stripper.

An asphalt pavement cover would be constructed over all on-site areas not currently paved, generally within the limits of the SVE zone of influence adjacent to the on-site building. This cover would reduce precipitation infiltration and enhance the effectiveness of the SVE system by reducing air infiltration.

Based on the nature and extent of the PCE soils contamination, it is estimated that the SVE system would operate on a long term basis. A five year period of operations is assumed for cost purposes.

Alternative 3: Air Sparging and Soil Vapor Extraction

Present Worth:	*$ 2,536,000*
Capital Cost:	*$ 791,000*
Present Worth of O&M:	*$ 1,745,000*
Time to Implement	*6 months to 1 year*

Under this Alternative groundwater would be treated in-situ via air sparging. The air sparging system would consist of approximately 16 sparge wells, installed to a depth of 45 to 65 feet, located downgradient of the source area (see Figure 7). Air would be injected into these wells and would enter the groundwater through screens at the bottom of these wells. Contaminants such as PCE are volatilized into the air as it rises up through the groundwater. The air containing volatile contaminants would then be captured by an SVE system once it rose above the water table. It is assumed that the air sparging system would need to be operated on a long term basis, estimated at 30 years.

However, since air sparging would not be as effective at preventing contaminated groundwater from leaving the site as the extraction and treatment in Alternative 2, it would be more likely that an off-site extraction system would be required for Operable Unit 2, and also increase the likelihood that such a system would have to operate for the long term to provide downgradient containment of the plume.

As was the case with Alternative 2, this groundwater remedy would not remediate any of the DNAPL beneath the site directly, but it

would capture and treat the groundwater impacted by this DNAPL.

The SVE system, including the asphalt cover, would be the same as in Alternative 2 with approximately six additional soil vapor extraction wells installed in the air sparging area in the southeast corner of the site (see Figure 7) to capture vapors associated with the operation of the air sparging system. The eight soil vapor extraction wells closest to the building could be shut down after 1 to 10 years (estimated at 5 years for cost purposes) as in Alternative 2. However, the portion related to the operation of the air sparging system would have to operate as long as that system, an estimated 30 years.

As in Alternative 2, the NYSDEC would attempt to reach an agreement with a adjacent property owner, such as Frank's Nursery and Crafts, to locate a small building on their parcel to house the equipment required for the air sparging and SVE systems. Groundwater monitoring would also be conducted as described in Alternative 2.

The on-site cesspools would be abandoned and closed as described in Alternative 2.

Alternative 4: Groundwater Extraction and Treatment, In-Situ Chemical Oxidation and Soil Vapor Extraction

Present Worth:	*$ 2,721,000*
Capital Cost:	*$ 1,484,000*
Present Worth of O&M:	*$ 1,237,000*
Time to Implement	*6 months to 1 year*

Under this alternative groundwater would be extracted and treated as in Alternative 2. Additionally, groundwater, subsurface soils and, to some extent, DNAPL, would be treated under this alternative via in-situ chemical oxidation. The chemical oxidizers commonly used in this technology include Fenton's Reagent and potassium permanganate. For the purpose of this discussion Fenton's Reagent, which consists of hydrogen peroxide with an iron catalyst, will be the oxidizer evaluated. When this Reagent comes into contact with organic compounds such as PCE, a oxidation reaction occurs breaking down the organic compounds to relatively benign compounds such as carbon dioxide and water. This reaction is exothermic, meaning heat is generated.

Fenton's Reagent (or a similar chemical oxidizer) would be applied in the areas illustrated in Figure 8, through shallow (15 to 35 feet deep) injection wells in unsaturated soils, where DNAPL is located in the eastern site alley. Reagent would also be applied through deep (35 to 65 feet deep) injection wells to treat saturated soils containing DNAPL as well as groundwater, both in the alley and the parking lot south of the alley. This is to target groundwater with PCE concentrations in excess of 1 ppm.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies would be conducted to more clearly define design. Between the pilot and the full scale implementations, it is estimated that 8 shallow and 12 deep injection points would be installed. It is estimated that the chemical oxidant would be injected during approximately six separate events over several months. During these implementations subsurface temperature would be monitored.

An SVE system as described in Alternative 2, including paving of unpaved portions of the site, would be installed under this alternative.

Vapors captured by the SVE system above the chemical oxidation injection points would be monitored to track changes in subsurface conditions. In areas where chemical oxidation would not take place, the SVE system would treat any PCE contamination present.

As in Alternative 2, NYSDEC would attempt to reach an agreement with a adjacent property owner, such as Frank's Nursery and Crafts, to locate a small building on their parcel to house the equipment required for the groundwater extraction and treatment and SVE systems. Groundwater monitoring would also be conducted as described in Alternative 2.

The chemical oxidation technology has the greatest potential to eliminate the on-site source of groundwater contamination, which would then result in the cessation of groundwater extraction and treatment much sooner than in the other alternatives. For cost estimation purposes, it is assumed that groundwater extraction and treatment could be discontinued after 10 years.

The on-site cesspools would be abandoned and closed as described in Alternative 2.

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 (6 NYCRR 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. For the American Drive-In Cleaners site the most pertinent SCGs are the groundwater standards identified in NYSDEC TOGS 1.1.1, which sets the groundwater standards for PCE at 5 ppb, and the recommended soil cleanup objectives identified in NYSDEC TAGM 4046, which sets the cleanup objective for PCE in soils at 1.4 ppm.

Alternative 1 would not meet these SCGs and therefore does not meet the threshold criteria.

Alternatives 2, 3 and 4 all have the potential to meet the SCGs for unsaturated soils within 10 years.

Alternatives 2 would not likely meet groundwater SCGs on-site, between the cesspool source area and the on-site extraction wells, within 30 years. However, this Alternative would likely meet SCGs for groundwater leaving the site within 30 years.

Alternative 3 would not likely meet groundwater SCGs either on or down gradient of the site.

Alternative 4 would likely meet groundwater SCGs for groundwater leaving the site within 30 years, and may reach groundwater SCGs on-site within 30 years.

2. 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.

Alternative 1 would not be not protective of human health and the environment.

Alternatives 2 and 4 are considered to be protective of human health and the environment. Alternative 3 would not be entirely protective of human health and the environment because groundwater SCGs would not be met.

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.

Alternative 1 would have no short term impacts, but would not be effective in achieving remedial objectives.

Alternative 2 would present some minor short term impacts. Releases of PCE vapors could occur during cesspool closure and installation of the SVE and groundwater extraction piping on-site. Perimeter monitoring would be required during remedial activities. Disruption to on-site businesses could occur during construction activities.

Alternative 2 would be effective in the short term in containing groundwater contamination, though high concentrations of PCE would still be present in on-site groundwater. It is anticipated Alternative 2 would be effective at treating unsaturated soil within a 1 to 10 year time frame.

Alternative 3 would also present some minor short term impacts, and require perimeter air monitoring during construction. Releases of PCE vapors could occur during cesspool closure and installation of the SVE and air sparging piping on-site. Disruption to on-site businesses could occur during construction activities.

At a minimum, Alternative 4 would be effective in the short term in containing groundwater contamination on the site, though some concentrations of PCE above SCGs could still be present in on-site groundwater. This alternative is the only one which attempts to treat the DNAPL. Though its effectiveness at meeting SCGs is uncertain, this technology would at least reduce the quantity of DNAPL present, and may be able to meet the remedial action objective for groundwater of 5 ppb on-site. Due to the aggressive treatment of contaminated soils in combination with SVE under this alternative, it is anticipated that Alternative 4 would be effective at treating unsaturated soil in a somewhat shorter time frame than the 1 to 10 years estimated for Alternatives 2 and 3.

Like Alternatives 2 and 3, Alternative 4 would also present some minor short term impacts. Releases of PCE vapors could occur during cesspool closure and installation of the SVE and chemical oxidation piping on-site. Disruption to on-site businesses could occur during construction activities.

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.

Alternative 1 would not be effective in the long term.

Alternative 2 would effectively treat on-site soils, and would adequately and reliably, though not permanently, contain the DNAPL and contaminated groundwater on-site.

Alternative 3 would effectively treat on-site soils. Alternative 3 would be less effective in treating contaminated groundwater and would not address DNAPL.

Alternative 4 would effectively treat on-site soils, and at a minimum would adequately and reliably contain the DNAPL and contaminated groundwater on-site. This alternative would also permanently reduce the amount of DNAPL present, perhaps to such a degree that groundwater standards may be met both on and off-site.

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.

Alternative 1 would not reduce the toxicity, mobility or volume of contamination.

Alternative 2 would reduce the toxicity, mobility or volume of contamination via groundwater extraction and treatment and SVE. The volume of DNAPL present would not be reduced.

Alternative 3 would reduce the toxicity, mobility or volume of contamination via air sparging and SVE, though not as effectively as Alternative 2. The volume of DNAPL present would not be reduced.

Alternative 4 would reduce the toxicity mobility or volume of contamination via chemical oxidation, groundwater extraction and treatment and SVE. This alternative has the potential to greatly reduce the volume of DNAPL present.

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.

Alternative 1 would be readily implementable. Alternatives 2 and 3 would also be readily implementable both technically and administratively. These alternatives would present some disruption of current site operations.

Alternatives 4 would also be considered readily implementable, though there would be some limitations on the ability to obtain competitive bids since some chemical oxidation technologies are proprietary

processes. This alternative would present some disruption of current site operations.

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 2.

Alternative 1 would be the least expensive at $92,000. Alternative 2 would be priced at $3.2 million, Alternative 3 at $2.5 million, and Alternative 4 at $2.7 million.

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 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

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is proposing Alternative 4 as the remedy for this site. Under this alternative, in-situ chemical oxidation, in which a chemical oxidant would be injected into subsurface soils and groundwater near the contaminated cesspools in the alley at the east end of the building on the American Drive-In Cleaners site, is proposed. The oxidant will react with organic compounds such as PCE, breaking them down to relatively harmless chemicals such as carbon dioxide, water, and chloride ions. Prior to the installation of this system a pilot study would be conducted to confirm the feasibility of in-situ chemical oxidation at the site and gather design data. Soil vapor extraction (SVE) wells would collect and, if necessary, treat off gases from the unsaturated zone. Groundwater extraction and treatment would be conducted to prevent further migration of contaminated groundwater off-site. An asphalt pavement cover would be constructed over on-site areas not currently paved to provide a surface seal to enhance SVE performance and limit the infiltration of precipitation. A long-term groundwater monitoring program would be established.

This selection is based on a comparison of the alternatives. Alternative 1 was not protective of human health and was thus eliminated from consideration. Alternative 3 was not as effective in treating on-site groundwater as Alternatives 2 and 4 and offered no advantages compared to those alternatives. Alternative 2 is a proven, conservative approach to this type of contamination. It would safely treat on-site soils and contain groundwater contamination. Alternative 4 would include all the same elements as Alternative 2, with the addition of on-site chemical oxidation. The chemical oxidation used in Alternative 4 would aggressively attempt to treat source areas, unlike

Alternative 2, and would result in the removal of a greater contaminant mass than Alternative 2. It is estimated that groundwater extraction and treatment could be discontinued after 10 years under Alternative 4, as opposed to an estimated 30 years for Alternative 2.

The estimated present worth cost to implement the remedy is $2,721.000. The cost to construct the remedy is estimated to be $1,484,000 and the estimated present worth cost for operation and maintenance is $1,237,000 for 10 years.

The elements of the proposed remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS would be resolved.

2. A laboratory and pilot scale study would be conducted to confirm that conditions at the site are suitable for remediation by chemical oxidation.

3. If the results of the pilots study are favorable, a full scale phased application of the chemical oxidation would be implemented. This would include installation of an estimated 8 shallow and 10 deep injection wells for the oxidant to be injected into subsurface soils and groundwater. It is estimated that 6 applications would be required.

4. If the results of the laboratory and pilot studies indicate the technology is not suitable for technical or safety reasons, this alternative would proceed without chemical oxidation, which would make it the same as Alternative 2.

5. A monitoring program would be implemented during the chemical oxidation process, to track changes in subsurface conditions.

6. A soil vapor extraction system, consisting of ten vapor extraction wells, would be installed surrounding the building. The SVE system would be used to collect any off gases from the chemical oxidation process and in other areas would remove PCE concentrations from subsurface soils.

7. On-site groundwater extraction and treatment would be performed to prevent the most contaminated groundwater from leaving the site.

8. The cesspools on the east side of the on-site building would be sealed, backfilled, and capped.

9. An asphalt pavement cover would be installed on all site areas not currently paved to reduce the infiltration of precipitation and enhance the effectiveness of the SVE system.

10. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program would be instituted. Eight monitoring and extraction wells and the Island Trees irrigation well would be

sampled quarterly for 2 years and annually thereafter. The samples would be analyzed for volatile organic contaminants. This program would allow the effectiveness of the chemical oxidation, SVE and groundwater extraction and treatment systems to be monitored and would be a component of the operation and maintenance for the site. Monitoring the Island Trees irrigation well would aid in future decision making regarding continued use of that well.

11. Institutional controls in the form of existing use and development restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the Nassau County Department of Health (NCDOH) from the affected areas.

Table 1

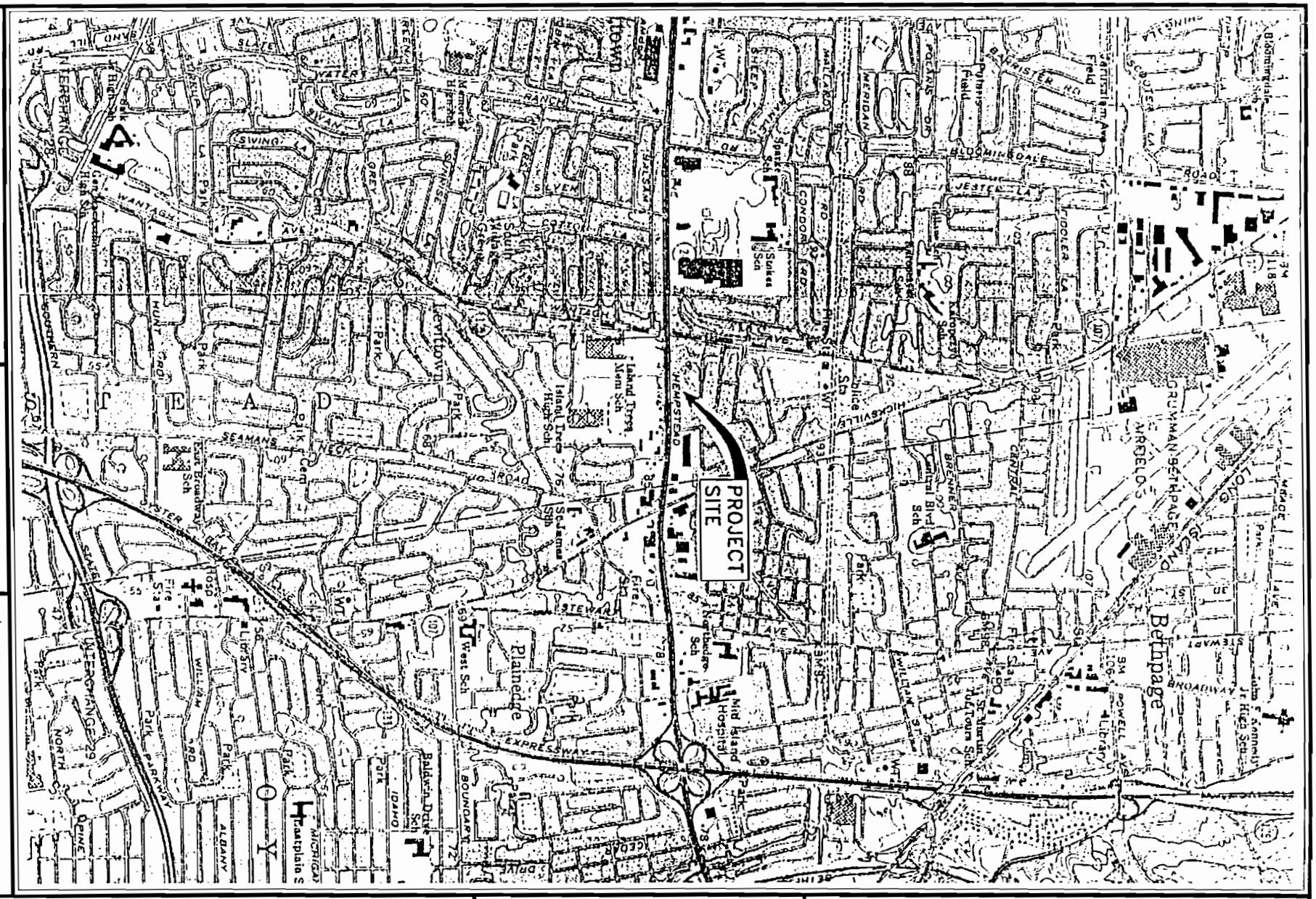
Nature and Extent of Contamination

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE	FREQUENCY of EXCEEDING SCGs	SCG
Groundwater (ppb)	Volatile Organic Compounds (VOCs)	Tetrachloroethene	ND to 16,000	10 of 15	5
		Trichloroethene	ND to 230	1 of 15	5
		Dichloroethene (total)	ND to 140	1 of 15	5
		Toluene	ND to 18	1 of 15	5
Soils (ppm)	Volatile Organic Compounds (VOCs)	Tetrachloroethene	ND to 130,000	5 of 28	1.4

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	O&M Present Worth	Total Present Worth
1. No Further Action	$0	$92,000	$92,000
2. Groundwater Extraction and Treatment and On-Site Soil Vapor Extraction	$887,000	$2,334,000	$3,221,000
3. On- Site Groundwater Air Sparging, and Soil Vapor Extraction	$791,000	$1,745,000	$2,536,000
4. In-Situ Chemical Oxidation, Groundwater Extraction and Treatment and Soil Vapor Extraction	$1,484,000	$1,237,000	$2,721,000

NOTE:
BASE MAP ADAPTED FROM U.S.G.S. QUADRANGLE MAPS FREEPORT, N.Y. - 1969 & AMITYVILLE, N.Y. - 1969.



AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK

FOCUSED FEASIBILITY STUDY

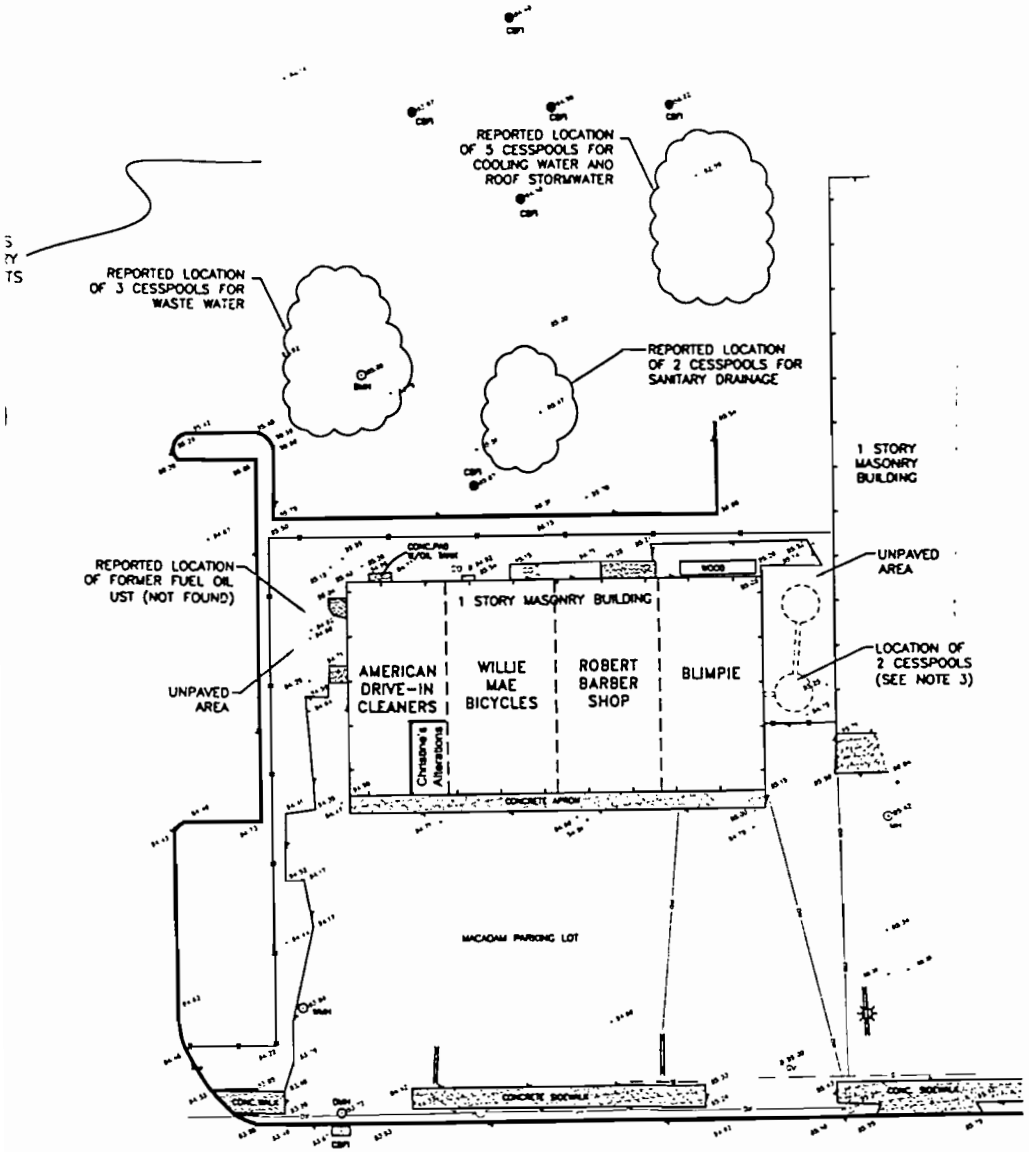
LOCUS PLAN

SCALE IN FEET
0 1000 2000 4000

DRAWN BY: DEW
DATE: NOVEMBER 2000

PROJECT No. 55172
FIGURE No. 1

GZA GeoEnvironmental of New York



DISCOUNT BEVERAGE CENTER

N

LEGEND:

- MACADAM
- CURB
- DROP CURB
- CONCRETE
- FENCE
- BOLLARD
- SIGN
- LIGHT POLE
- UTILITY POLE
- OVERHEAD WIRES
- MANHOLE
- CLEANOUT
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- GAS PAINT MARK
- GAS VALVE
- WATER MANHOLE
- WATER PAINT MARK
- SPOT ELEVATION

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "AMERICAN DRIVE-IN CLEANERS; LEVITTOWN, LONG ISLAND, NASSAU COUNTY, NEW YORK", PREPARED BY YEC, INC, DATED MAY 1998.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
3. THE TWO CESSPOOLS IDENTIFIED IN THE EASTERN PORTION OF THE SITE WERE OBSERVED WITH A DRAIN PIPE LEADING FROM THE SITE BUILDING AS SHOWN. THE ORIGIN OF THE PIPE IS UNKNOWN (i.e., FLOOR DRAIN, ROOF DRAIN, SANITARY, etc.).

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW

DATE: NOVEMBER 2000

SCALE IN FEET 0 15 30 60

GZA GeoEnvironmental of New York

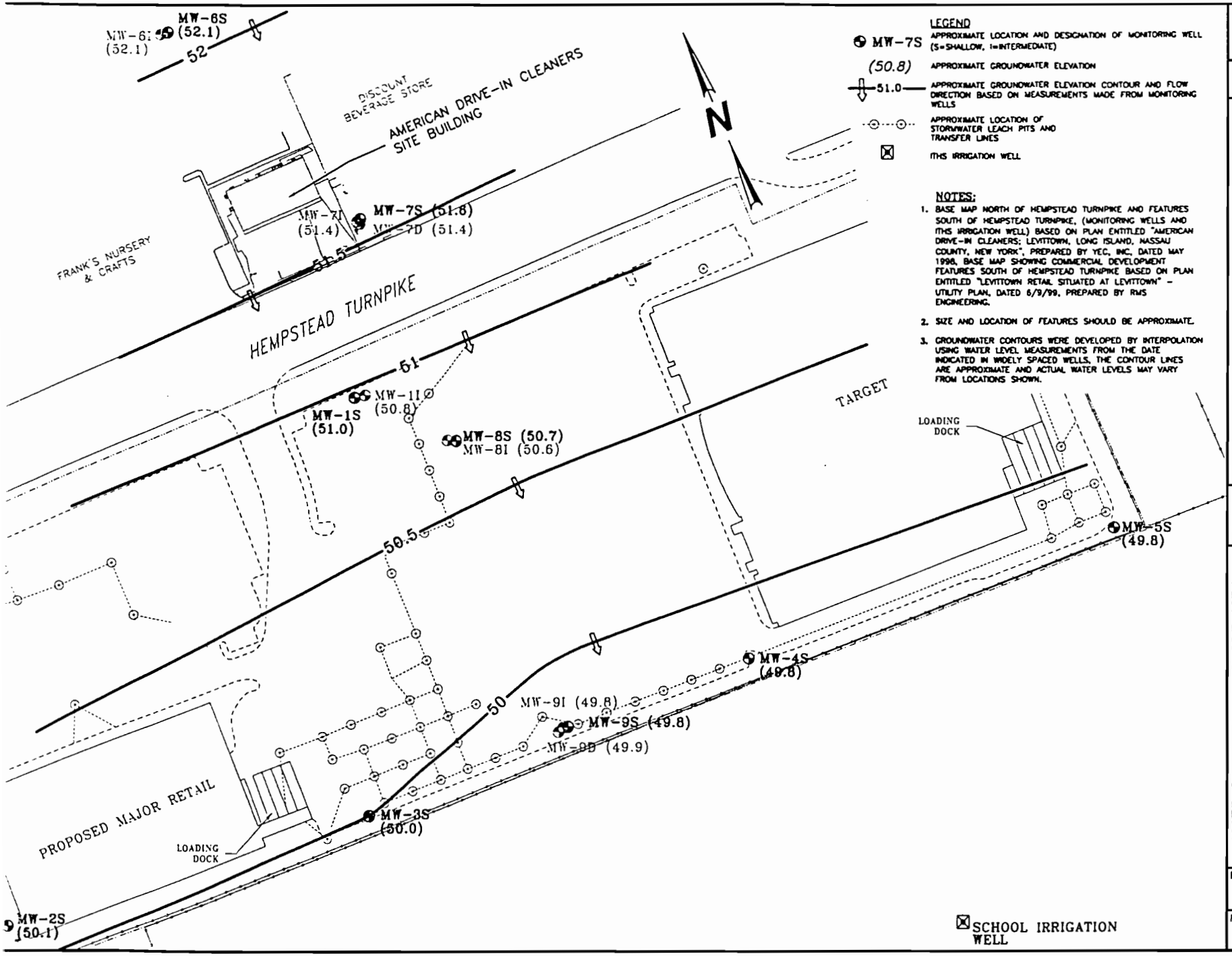
AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK

FOCUSED FEASIBILITY STUDY

SITE PLAN

PROJECT No. 55172

FIGURE No. 2



REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW

DATE: NOVEMBER 2000

SCALE IN FEET 0 50 100 200

GZA GeoEnvironmental of New York

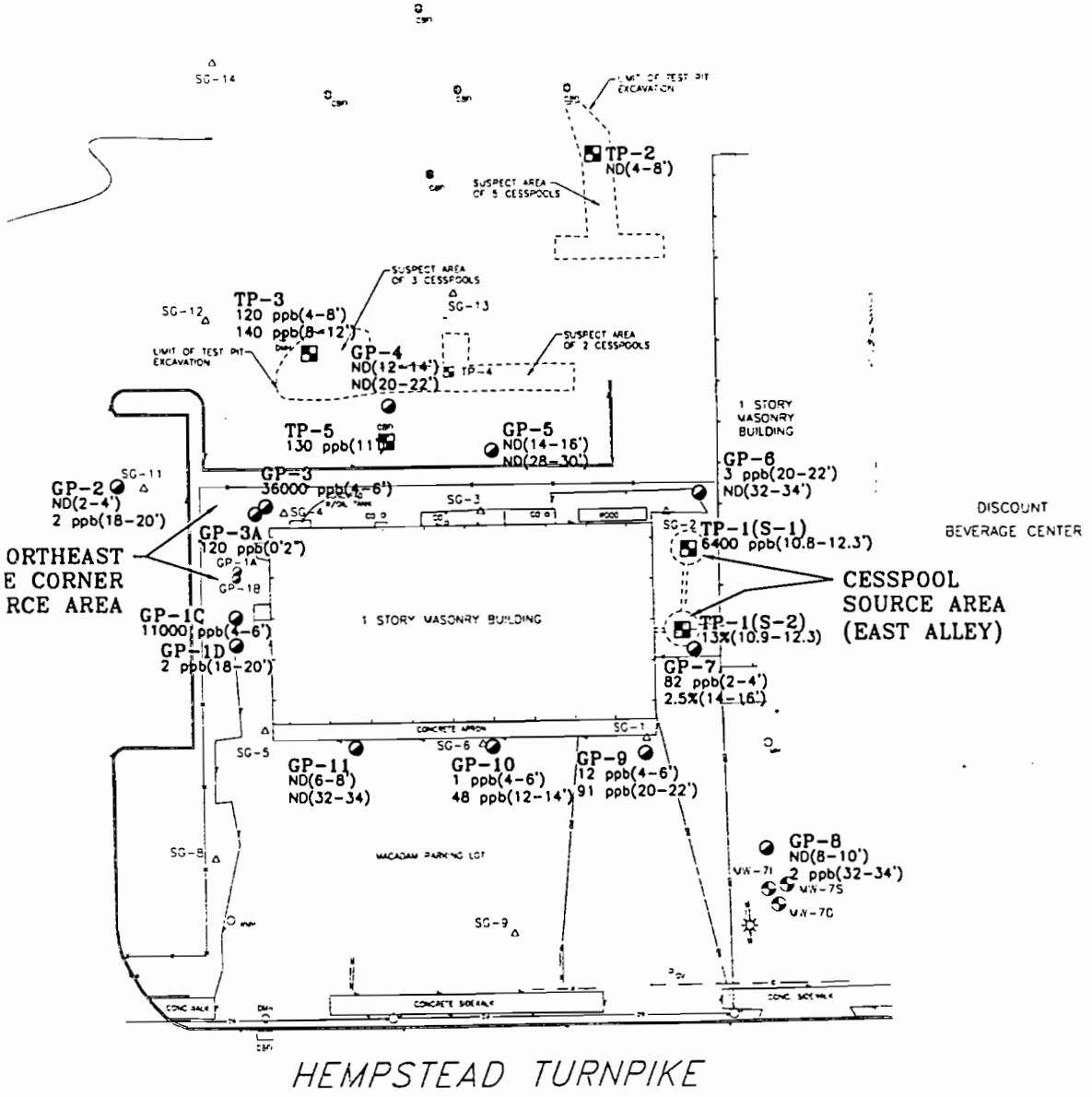
AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK

FOCUSED FEASIBILITY STUDY

GROUNDWATER CONTOUR PLAN
SHALLOW MONITORING WELLS
(2/2/99)

PROJECT No. 55172

FIGURE No. 3



LEGEND:

- MACADAM
- CURB
- DROP CURB
- CONCRETE
- FENCE
- BOLLARD
- SIGN
- LIGHT POLE
- UTILITY POLE
- OVERHEAD WIRES
- MANHOLE
- CLEANOUT
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- GAS PAINT MARK
- GAS VALVE
- WATER MANHOLE
- WATER PAINT MARK
- SG-10 △ SOIL GAS PROBE LOCATION
- GP-10, 1 ppm(4-6') — GEOPROBE SOIL BORING LOCATION; 1 ppm = TOTAL VOLATILE ORGANIC VAPOR IN PARTS PER MILLION AND DEPTH
- TP-3, 120 ppm(4-8') — TEST PIT SAMPLE LOCATION; 40 ppm = TOTAL VOLATILE ORGANIC VAPOR IN PARTS PER MILLION AND DEPTH
- MW-7D — MONITORING WELL LOCATION; S=SHALLOW, I=INTERMEDIATE, D=DEEP
- LIMIT OF TEST PIT EXCAVATION

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "AMERICAN DRIVE-IN CLEANERS; LEVITTOWN, LONG ISLAND, NASSAU COUNTY, NEW YORK", PREPARED BY YEC, INC, DATED MAY 1998.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
3. THE TWO CESSPOOLS IDENTIFIED IN THE EASTERN PORTION OF THE SITE WERE OBSERVED WITH A DRAIN PIPE LEADING FROM THE SITE BUILDING AS SHOWN. THE ORIGIN OF THE PIPE IS UNKNOWN (i.e., FLOOR DRAIN, ROOF DRAIN, SANITARY, etc.).

N

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW

DATE: NOVEMBER 2000

SCALE IN FEET: 0, 15, 30, 60

GZA GeoEnvironmental of New York

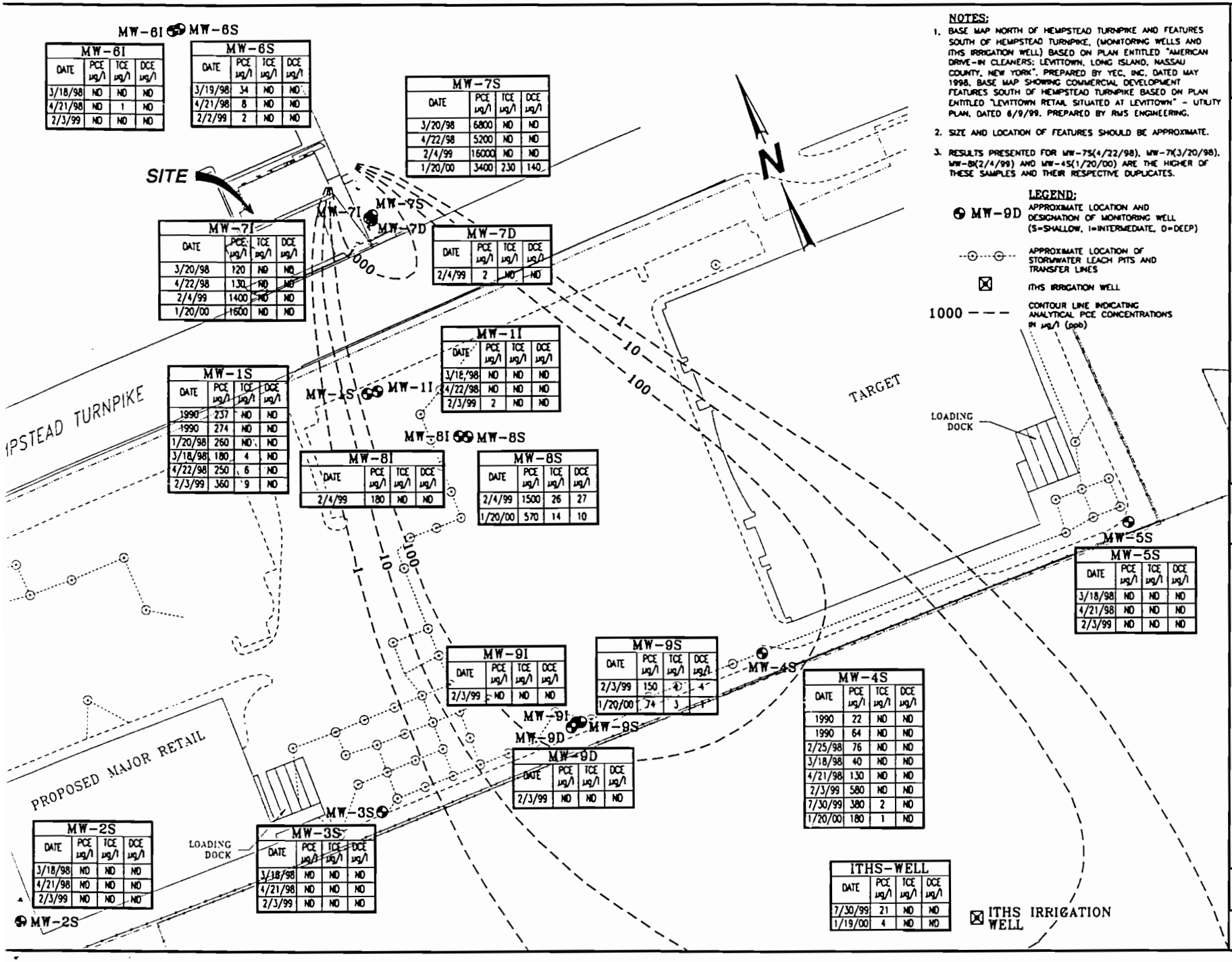
AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK

FOCUSED FEASIBILITY STUDY

SUMMARY OF DETECTED VOC COMPOUNDS IN SOIL SAMPLES (PCE DETECTED LOCATIONS ONLY)

PROJECT No.
55172

FIGURE No.
4



MW-6I

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/18/98	ND	ND	ND
4/21/98	ND	1	ND
2/3/99	ND	ND	ND

MW-6S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/19/98	34	ND	ND
4/21/98	8	ND	ND
2/2/99	2	ND	ND

MW-7S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/20/98	6800	ND	ND
4/22/98	5200	ND	ND
2/4/99	16000	ND	ND
1/20/00	3400	230	140

MW-7I

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/20/98	120	ND	ND
4/22/98	130	ND	ND
2/4/99	1400	ND	ND
1/20/00	1600	ND	ND

MW-7D

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/4/99	2	ND	ND

MW-1I

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/18/98	ND	ND	ND
4/22/98	ND	ND	ND
2/3/99	2	ND	ND

MW-1S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
1990	237	ND	ND
1990	274	ND	ND
1/20/98	260	ND	ND
3/18/98	180	4	ND
4/22/98	250	6	ND
2/3/99	360	9	ND

MW-8I

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/4/99	180	ND	ND

MW-8S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/4/99	1500	26	27
1/20/00	570	14	10

MW-5S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/18/98	ND	ND	ND
4/21/98	ND	ND	ND
2/3/99	ND	ND	ND

MW-9I

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/3/99	ND	ND	ND

MW-9S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/3/99	150	4	4
1/20/00	74	3	1

MW-4S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
1990	22	ND	ND
1990	64	ND	ND
2/25/98	76	ND	ND
3/18/98	40	ND	ND
4/21/98	130	ND	ND
2/3/99	580	ND	ND
7/30/99	380	2	ND
1/20/00	180	1	ND

MW-9D

DATE	PCE µg/l	TCE µg/l	DCE µg/l
2/3/99	ND	ND	ND

MW-2S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/18/98	ND	ND	ND
4/21/98	ND	ND	ND
2/3/99	ND	ND	ND

MW-3S

DATE	PCE µg/l	TCE µg/l	DCE µg/l
3/18/98	ND	ND	ND
4/21/98	ND	ND	ND
2/3/99	ND	ND	ND

ITHS-WELL

DATE	PCE µg/l	TCE µg/l	DCE µg/l
7/30/99	21	ND	ND
1/19/00	4	ND	ND

NOTES:

1. BASE MAP NORTH OF HEMPSTEAD TURNPIKE AND FEATURES SOUTH OF HEMPSTEAD TURNPIKE, (MONITORING WELLS AND ITHS IRRIGATION WELL) BASED ON PLAN ENTITLED "AMERICAN DRIVE-IN CLEANERS; LEVITTOWN, LONG ISLAND, NASSAU COUNTY, NEW YORK". PREPARED BY YEC, INC. DATED MAY 1998. BASE MAP SHOWING COMMERCIAL DEVELOPMENT FEATURES SOUTH OF HEMPSTEAD TURNPIKE BASED ON PLAN ENTITLED "LEVITTOWN RETAIL SITUATED AT LEVITTOWN" - UTILITY PLAN, DATED 6/9/99. PREPARED BY RWS ENGINEERING.
2. SIZE AND LOCATION OF FEATURES SHOULD BE APPROXIMATE.
3. RESULTS PRESENTED FOR MW-7S(4/22/98), MW-7I(3/20/98), MW-8I(2/4/99) AND MW-4S(1/20/00) ARE THE HIGHER OF THESE SAMPLES AND THEIR RESPECTIVE DUPLICATES.

LEGEND:

- MW-9D — APPROXIMATE LOCATION AND DESIGNATION OF MONITORING WELL (S=SHALLOW, I=INTERMEDIATE, D=DEEP)
- APPROXIMATE LOCATION OF STORMWATER LEACH PITS AND TRANSFER LINES
- ITHS IRRIGATION WELL
- 1000 — CONTOUR LINE INDICATING ANALYTICAL PCE CONCENTRATIONS IN µg/l (ppb)

SCALE IN FEET: 0, 50, 100, 200

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW

DATE: NOVEMBER 2000

GZA GeoEnvironmental of New York

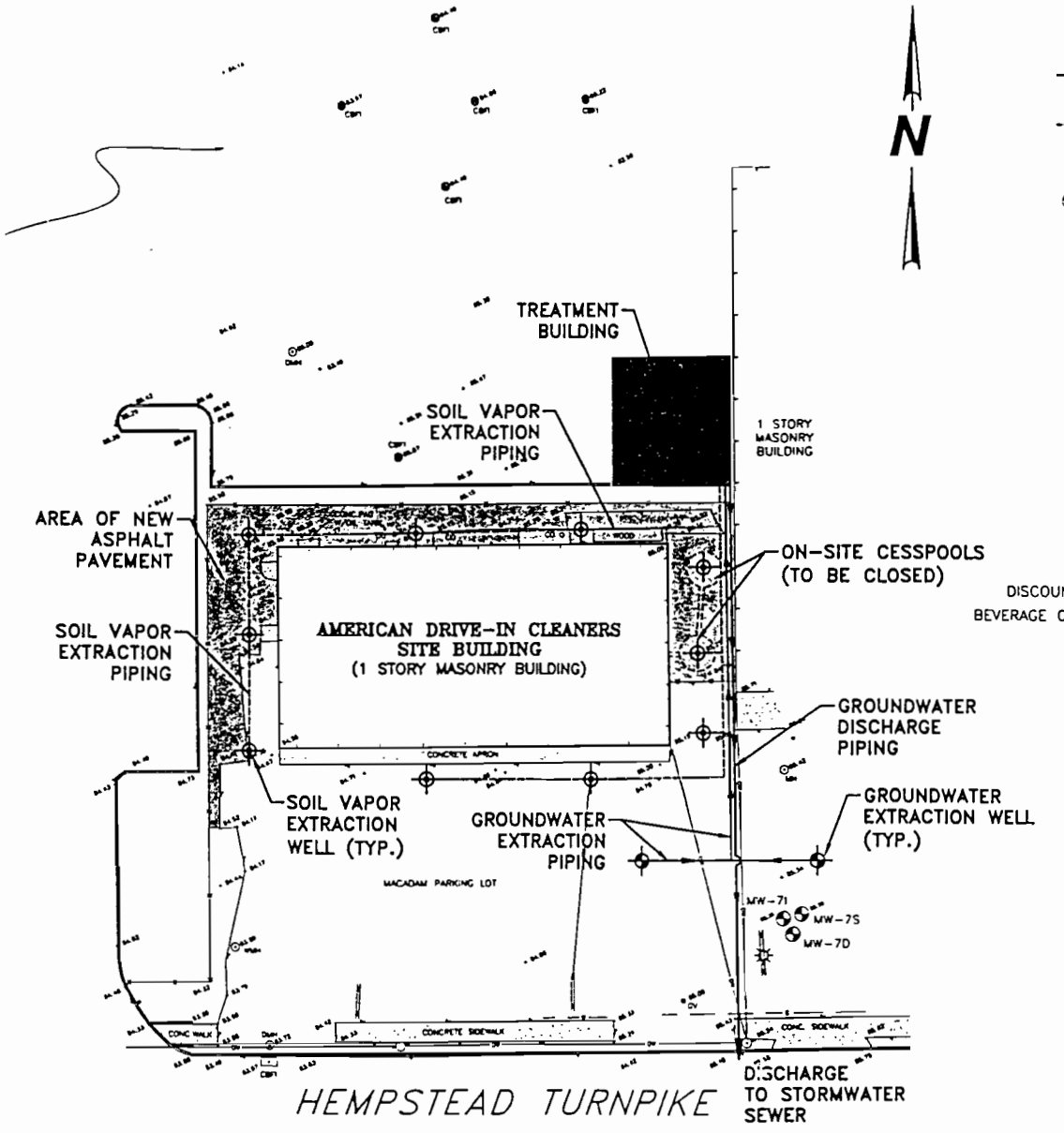
AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK

FOCUSED FEASIBILITY STUDY

GROUNDWATER TARGET COMPOUND VOC DETECTIONS & SHALLOW GROUNDWATER PCE CONCENTRATIONS CONTOUR MAP

PROJECT No. 55172

FIGURE No. 5



LEGEND:

- CONCEPTUAL GROUNDWATER EXTRACTION WELL
- CONCEPTUAL SOIL VAPOR EXTRACTION WELL
- APPROXIMATE LOCATION AND FLOW DIRECTION OF GROUNDWATER EXTRACTION/DISCHARGE PIPING
- APPROXIMATE LOCATION OF SOIL VAPOR EXTRACTION PIPING
- INDICATES APPROXIMATE AREA OF NEW ASPHALT PAVEMENT COVER
- MW-7D EXISTING MONITORING WELL LOCATION (S=SHALLOW) (I=INTERMEDIATE) (D=DEEP)
- MACADAM (EXISTING)
- CURB
- DROP CURB
- CONCRETE
- FENCE
- BOLLARD
- SIGN
- LIGHT POLE
- UTILITY POLE
- OVERHEAD WIRES
- MANHOLE
- CLEANOUT
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- GAS PAINT MARK
- GAS VALVE
- WATER MANHOLE
- WATER PAINT MARK
- SPOT ELEVATION

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "AMERICAN DRIVE-IN CLEANERS; LEVITTOWN, LONG ISLAND, NASSAU COUNTY, NEW YORK", PREPARED BY YEC, INC, DATED MAY 1998.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE. SEE FIGURE 1-2 FOR ADDITIONAL DETAILS OF SITE FEATURES.
3. REFER TO FIGURE 3-5 FOR OFF-SITE GROUNDWATER EXTRACTION SYSTEM LAYOUT.
4. GROUNDWATER MONITORING PROGRAM (SEE FIGURE 3-1): EIGHT MONITORING WELLS TO BE SAMPLED QUARTERLY (i.e., FOUR TIMES PER YEAR) IN YEARS 1-2, AND ANNUALLY THEREAFTER; AND WATER LEVELS TO BE MEASURED IN EXISTING MONITORING WELLS.
5. ON-SITE GROUNDWATER EXTRACTION SYSTEM (GWES) AND DISCHARGE PIPING TO BE INSTALLED AT A DEPTH OF APPROXIMATELY 4 FEET BELOW GROUND SURFACE, AND WITHIN A COMMON TRENCH WITH SOIL VAPOR EXTRACTION SYSTEM (SVES) PIPING, WHERE APPROPRIATE.
6. APPROXIMATE LOCATIONS AND DIMENSIONS OF GWES, SVES AND TREATMENT BUILDING ARE INDICATED. ACTUAL LOCATIONS AND DIMENSIONS MAY VARY FOR REMEDIAL DESIGN, AS NECESSARY.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW
DATE: NOVEMBER 2000

SCALE IN FEET
0, 15, 30, 60

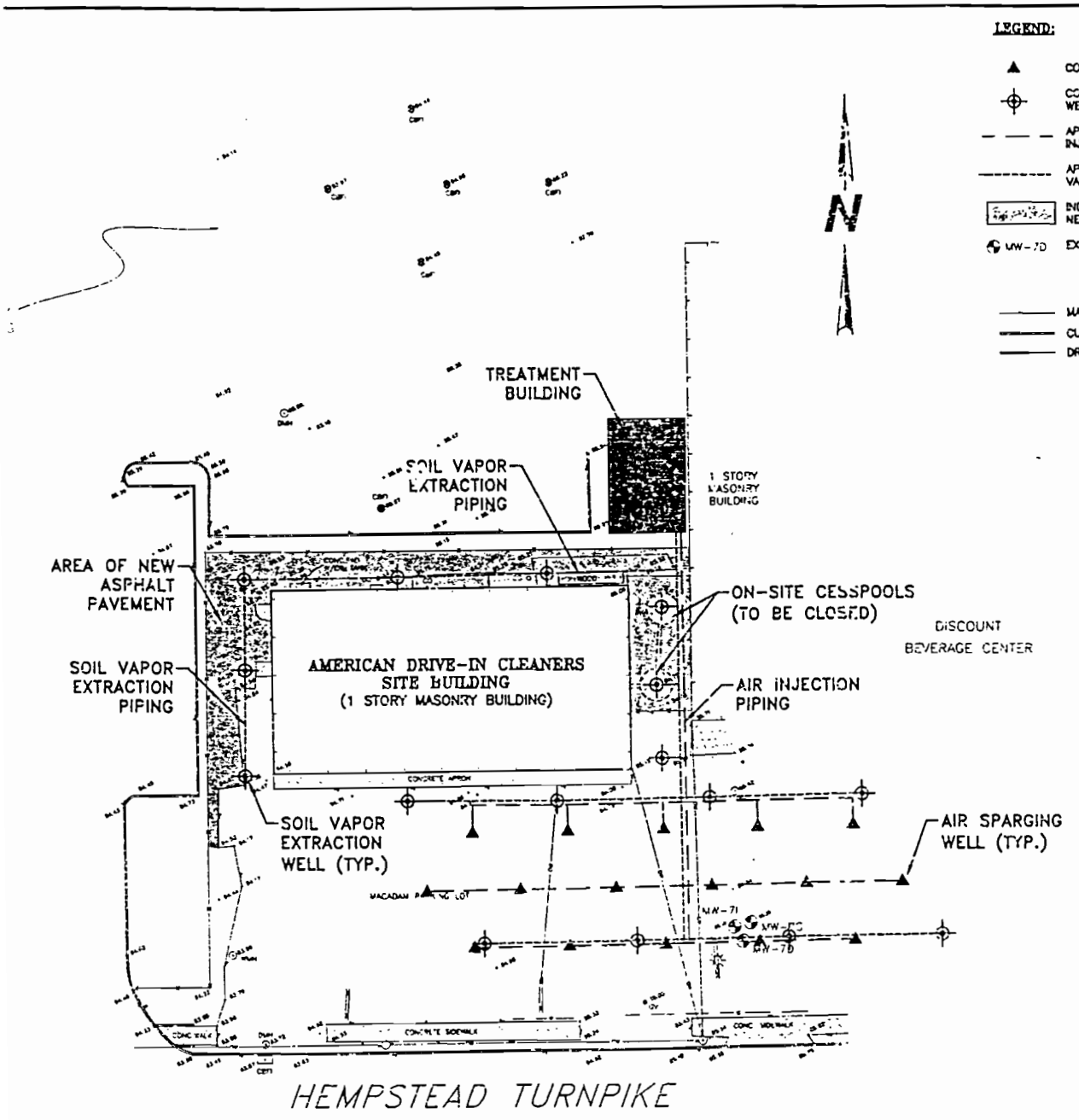
GZA GeoEnvironmental of New York

AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 2
ON-SITE GROUNDWATER EXTRACTION & TREATMENT AND SOIL VAPOR EXTRACTION SYSTEMS LAYOUT

PROJECT No.
55172

FIGURE No.
6



LEGEND:

- CONCEPTUAL AIR SPARGING WELL
- CONCEPTUAL SOIL VAPOR EXTRACTION WELL
- APPROXIMATE LOCATION OF AIR INJECTION PIPING
- APPROXIMATE LOCATION OF SOIL VAPOR EXTRACTION PIPING
- INDICATES APPROXIMATE AREA OF NEW ASPHALT PAVEMENT COVER
- MW-7D EXISTING MONITORING WELL LOCATION (S=SHALLOW) (I=INTERMEDIATE) (D=DEEP)
- MACADAM (EXISTING)
- CURB
- DROP CURB
- CONCRETE
- FENCE
- BOLLARD
- SIGN
- LIGHT POLE
- UTILITY POLE
- OVERHEAD WIRES
- MANHOLE
- CLEANOUT
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- GAS PAINT MARK
- GAS VALVE
- WATER MANHOLE
- WATER PAINT MARK
- SPOT ELEVATION

NOTES:

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2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE. SEE FIGURE 1-2 FOR ADDITIONAL DETAILS OF SITE FEATURES.
3. REFER TO FIGURE 3-5 FOR OFF-SITE GROUNDWATER EXTRACTION SYSTEM LAYOUT.
4. GROUNDWATER MONITORING PROGRAM (SEE FIGURE 3-1): EIGHT MONITORING WELLS TO BE SAMPLED QUARTERLY (i.e., FOUR TIMES PER YEAR) IN YEARS 1-2, AND ANNUALLY THEREAFTER; AND WATER LEVELS TO BE MEASURED IN EXISTING MONITORING WELLS.
5. IN-SITU AIR SPARGING SYSTEM (IASS) PIPING TO BE INSTALLED WITHIN A COMMON TRENCH WITH SOIL VAPOR EXTRACTION SYSTEM (SVES) PIPING, WHERE APPROPRIATE.
6. APPROXIMATE LOCATIONS AND DIMENSIONS OF IASS, SVES AND TREATMENT BUILDING ARE INDICATED. ACTUAL LOCATIONS AND DIMENSIONS MAY VARY FOR REMEDIAL DESIGN, AS NECESSARY.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW
DATE: NOVEMBER 2000

SCALE IN FEET: 0 15 30 60

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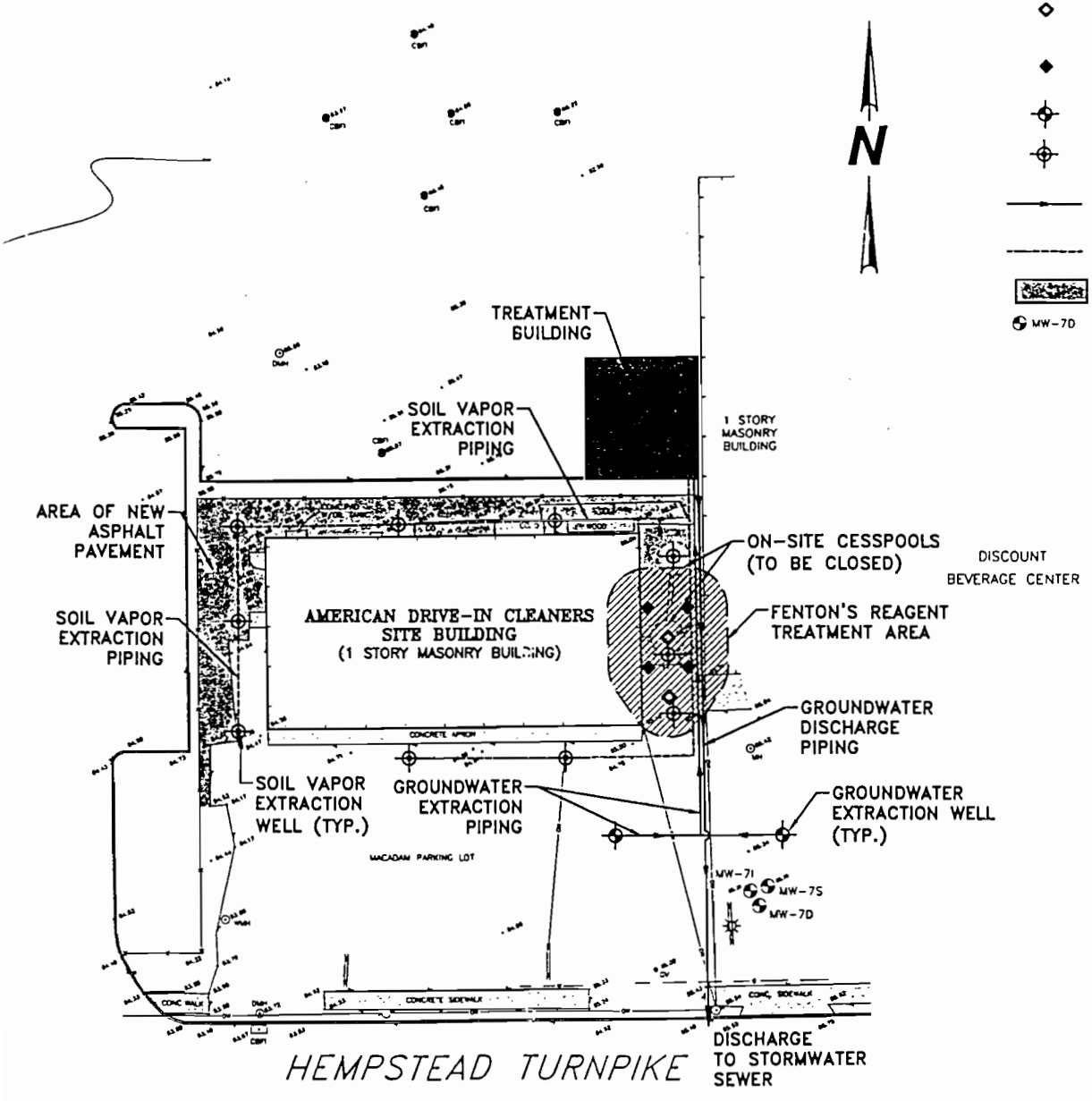
AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 3 ON-SITE IN-SITU AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEMS LAYOUT

PROJECT No. 55172

FIGURE No. 7



LEGEND:

- CONCEPTUAL DEEP FENTON'S REAGENT INJECTION POINT (35 TO 65 FEET DEEP)
- CONCEPTUAL SHALLOW FENTON'S REAGENT INJECTION POINT (15 TO 35 FEET DEEP)
- CONCEPTUAL GROUNDWATER EXTRACTION WELL
- CONCEPTUAL SOIL VAPOR EXTRACTION WELL
- APPROXIMATE LOCATION AND FLOW DIRECTION OF GROUNDWATER EXTRACTION/DISCHARGE PIPING
- APPROXIMATE LOCATION OF SOIL VAPOR EXTRACTION PIPING
- INDICATES APPROXIMATE AREA OF NEW ASPHALT PAVEMENT COVER
- MW-7D EXISTING MONITORING WELL LOCATION (S=SHALLOW) (I=INTERMEDIATE) (D=DEEP)
- MACADAM (EXISTING)
- CURB
- DROP CURB
- CONCRETE
- FENCE
- BOLLARD
- SIGN
- LIGHT POLE
- UTILITY POLE
- OVERHEAD WIRES
- MANHOLE
- CLEANOUT
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- GAS PAINT MARK
- GAS VALVE
- WATER MANHOLE
- WATER PAINT MARK
- SPOT ELEVATION

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "AMERICAN DRIVE-IN CLEANERS; LEVITTOWN, LONG ISLAND, NASSAU COUNTY, NEW YORK", PREPARED BY YEC, INC, DATED MAY 1998.
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3. REFER TO FIGURE 3-5 FOR OFF-SITE GROUNDWATER EXTRACTION SYSTEM LAYOUT.
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5. ON-SITE GROUNDWATER EXTRACTION SYSTEM (GWES) AND DISCHARGE PIPING TO BE INSTALLED AT A DEPTH OF APPROXIMATELY 4 FEET BELOW GROUND SURFACE, AND WITHIN A COMMON TRENCH WITH SOIL VAPOR EXTRACTION SYSTEM (SVES) PIPING, WHERE APPROPRIATE.
6. APPROXIMATE LOCATIONS AND DIMENSIONS OF GWES, SVES, FENTON'S REAGENT INJECTION SYSTEM AND TREATMENT BUILDING ARE INDICATED. ACTUAL LOCATIONS AND DIMENSIONS MAY VARY FOR REMEDIAL DESIGN, AS NECESSARY.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW

DATE: NOVEMBER 2000

SCALE IN FEET 0 15 30 60

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AMERICAN DRIVE-IN CLEANERS
LEVITTOWN, NEW YORK
FOCUSED FEASIBILITY STUDY

ALTERNATIVE 4
ON-SITE FENTON'S REAGENT INJECTION, SOIL VAPOR EXTRACTION, AND GROUNDWATER EXTRACTION & TREATMENT SYSTEMS LAYOUT

PROJECT No. 55172

FIGURE No. 8