Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

West Side Corporation Site

Operable Unit No. 1 (On-Site)

Jamaica, Queens County

Site Number 2-41-026

July 2000

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

West Side Corporation Inactive Hazardous Waste Site
Operable Unit No. 1 (On Site)
Jamaica, Queens County, New York
Site No. 2-41-026

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the West Side Corporation Class 2 inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law. The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the West Side Corporation inactive hazardous waste site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the West Side Corporation Site and the criteria identified for evaluation of alternatives, the NYSDEC has selected Groundwater Extraction and Treatment, Soil Vapor Extraction and Treatment, and the use of chemical oxidants (e.g., Fenton's Reagent) to treat soils in Source Area 1. The components of the remedy are as follows:

- The installation of a groundwater extraction and treatment system. The extraction wells located at the downgradient site boundary will remove contaminated groundwater for treatment and provide for the containment of the groundwater on site.

- A soil vapor extraction and treatment system will be installed to treat the contaminated soils in Source Areas 1, 2, and 3. The remedy will include asphalt pavement in Source Areas 1, 2, and 3 to enhance the effectiveness of the Soil Vapor Extraction and Treatment (SVET) system.

- A pilot-scale study to assess the effectiveness of the application of Fenton's reagent (or other chemical oxidant, e.g., potassium permanganate) to reduce the volume of highly

contaminated PCE saturated soil and groundwater in Source Area 1 will be performed. This study will be expanded to full scale operation if feasible.

- Implementation of a long-term monitoring program to evaluate the effectiveness of the system will be instituted as a component of the O&M Plan for the site.

- To prevent future exposures to subsurface contaminants, the Department will seek to have restrictions placed upon the use of the site.

New York State Department of Health Acceptance

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

Declaration

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

7/31/00
Date

Michael J. OToole, Jr., Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

West Side Corporation Site
Operable Unit No. 1 (On-site)
Jamaica, Queens County
Site No. 2-41-026
June 2000

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health, has selected this remedy to address the significant threat to human health and/or the environment created by the presence of hazardous waste at the **West Side Corporation Site**, a Class 2 inactive hazardous waste disposal site. As more fully described in Sections 3 and 4 of this document, the site was used as a storage and distribution center for dry cleaning chemicals from approximately 1969 to 1992. Tetrachloroethene (also perchloroethylene or PCE) was unloaded from trucks and railroad cars into an on-site tank farm and transferred to 55-gallon drums for distribution to dry cleaning facilities. Improper handling of the chemicals resulted in the disposal of hazardous wastes, including PCE, at the site, some of which were released or have migrated from the site to surrounding areas, including the properties to the south and the east. 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 migration of contaminated groundwater off site in an aquifer used elsewhere as a source of potable water.

- a significant environmental threat associated with highly contaminated groundwater and the impacts of heavily contaminated soils that continue to release contaminants to groundwater.

In order to eliminate or mitigate the significant threats to public health and/or the environment that the hazardous wastes disposed at the West Side Corporation Site have caused, the following remedy has been selected:

- The installation of a groundwater extraction and treatment system. The extraction wells located at the downgradient site boundary will remove contaminated groundwater for treatment and provide for the containment of contaminated groundwater on site.

- A soil vapor extraction and treatment system will be installed to treat the contaminated soils in Source Areas 1, 2, and 3. The remedy will include asphalt pavement in Source Areas 1, 2, and 3 to enhance the effectiveness of the Soil Vapor Extraction and Treatment (SVET) system.

- A pilot-scale study to assess the effectiveness of the application of Fenton's reagent (or other chemical oxidant, e.g., potassium permanganate) to reduce the volume of highly contaminated PCE saturated soil and groundwater in Source Area 1 will be performed. This study will be expanded to full scale operation if feasible.

- Implementation of a long-term monitoring program to evaluate the effectiveness of the system will be instituted as a component of the O&M Plan for the site.

- To prevent future exposures to subsurface contaminants, the Department will seek to have restrictions placed upon the use of the site.

The selected 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 Record of Decision (ROD), in conformity with applicable standards, criteria, and guidance (SCGs).

SECTION 2: SITE LOCATION AND DESCRIPTION

The site consists of approximately 4.5 acres of land, located at 107-10 180th Street in Jamaica, New York (see Figures 1 & 2). The Site is owned by West Side Corp., and includes a brick structure, approximately 21,600 square feet (sf), currently leased by Atlantic Express Transportation (Atlantic), a school bus company. Contamination at the site does not present a threat to the workers or people using the buses. Atlantic has been using the facility for dispatching, repairing and maintaining school buses. The surrounding area is mixed commercial and residential. The Site is bordered to the west and south by a maintenance and storage yard owned by the New York City Department of Environmental Protection (NYCDEP). Formerly, the Jamaica Water Supply Company occupied this property west and south of the Site. Several production wells (Nos. 24, 24A, 24B, and 24C) now owned by NYCDEP (formally owned and operated by the Jamaica Water Supply Company) were located to the north, south and west of the site and not directly in line with the flow of groundwater from the site. These wells were used during periods of high demand, particularly during summer months. Historical data indicate that contaminated groundwater from the site was drawn toward these production wells when they were in operation. When contaminants were detected in these wells, the wells were taken out of service. This allowed natural groundwater flow patterns to reestablish until the wells were restarted. Well #24 was taken out of service in 1975. Wells 24A, 24B, and 24C were taken out of service in 1982.

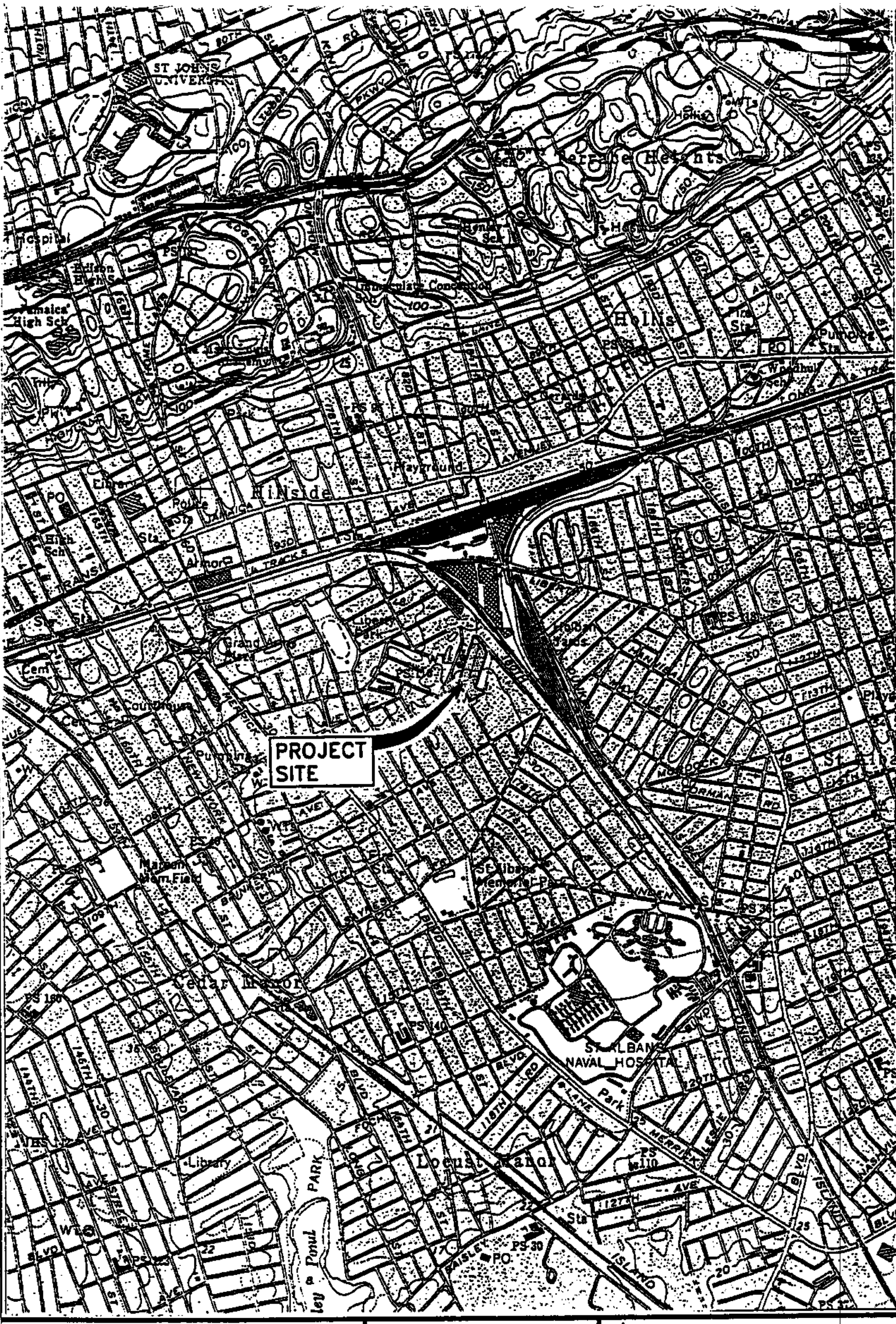
Operable Unit No. 1, which is the subject of this Record of Decision, consists of the site property itself. Operable Unit No. 2 includes areas where contaminated groundwater has migrated off site. An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The remaining operable unit for this site is described in Section 3.2 below.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The Site was used for the manufacture and distribution of ceramic pipes and fittings until 1969.

From about 1969 to 1992, the Site property was used as a storage and distribution center for laundromat supplies, hangers, plastic garment bags, and most notably dry cleaning chemicals including large quantities of tetrachloroethene (also known as perchloroethylene or PCE). The property was operated as the West Side Corporation.



NOTE:

BASE MAP ADAPTED FROM U.S.G.S. QUADRANGLE MAP JAMAICA, N.Y. – 1979.

DRAWN BY: DEW

DATE: JANUARY 2003

GZA GeoEnvironmental of New York

SCALE IN FEET

0 1000 2000 4000

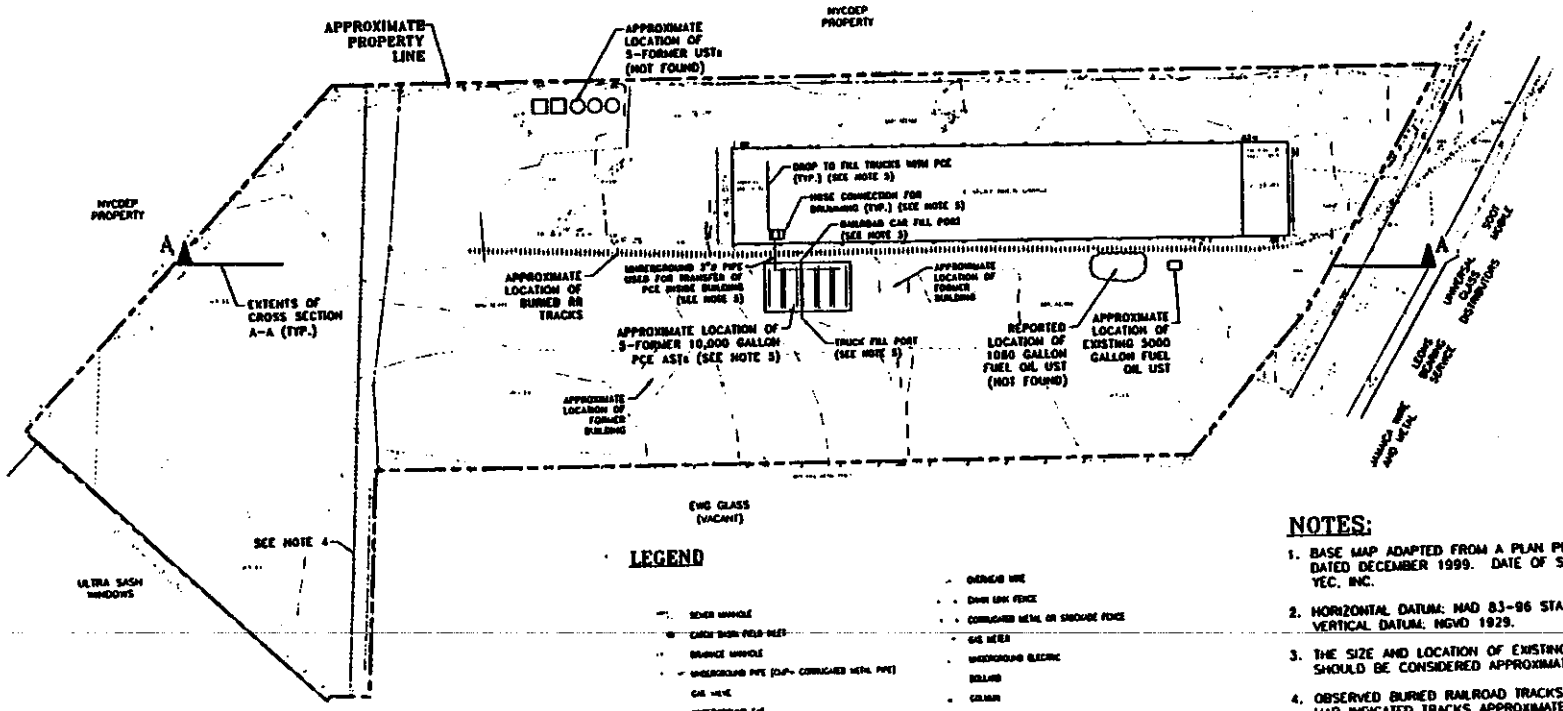
WEST SIDE CORPORATION
JAMAICA, NEW YORK

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

LOCUS PLAN

PROJECT No. 55265

FIGURE No. 1



LEGEND

- SEWER MANHOLE
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- UNDERGROUND PIPE (CAP= CORRUGATED METAL PIPE)
- GAS VALVE
- UNDERGROUND GAS
- WATER VALVE
- FIRE HYDRANT
- UTILITY POLE
- OVERHEAD WIRE
- CHAIN LINK FENCE
- CORRUGATED METAL OR STOCKADE FENCE
- GAS MAIN
- UNDERGROUND ELECTRIC
- BOLLARD
- CULVERT
- BAY
- CONCRETE LINE (1 FOOT WIDTH)

☼ Jamaica Water Supply (JWS) Company Pumping Well

NOTES:

1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED DECEMBER 1999. DATE OF SURVEY: OCTOBER 6, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: NAD 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM: NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES AND EXPLORATIONS SHOULD BE CONSIDERED APPROXIMATE.
4. OBSERVED BURIED RAILROAD TRACKS IN BORING MW-30. A 1974 SANBORN MAP INDICATED TRACKS APPROXIMATELY AS PRESENTED AS SHOWN ON FIGURE 3, A GEOPHYSICAL ANOMALY CORRILATES WITH THE RAILROAD TRACK LOCATION.
5. INFORMATION PERTAINING TO THE 5-FORMER 10,000 GALLON PCE ASTs AND THE ASSOCIATED TRANSFER LINES IS BASED ON A PLAN ENTITLED, "PERCHLORETHYLENE TANK INSTAL. FOR WEST SIDE CORP.", PREPARED BY RGJ CONTRACTING CO., INC., DATE UNKNOWN.

Well -24C

DRAFT

WEST SIDE CORPORATION
JAMAICA, NEW YORK

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SITE AND CROSS SECTION A-A

REV No.	DESCRIPTION	BY	DATE

SCALE IN FEET
0 40 80 160

DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No.
55265

GeoEnvironmental of New York

Five 10,000 gallon Aboveground Storage Tanks (ASTs) were located outside the southeast portion of the Site building and were used for the storage of PCE (see Figure 2). These tanks were filled from truck tankers and railroad tanker cars. Railroad tracks were located between the building and the ASTs. The piping from the ASTs extended into the southern portion of the building where PCE was dispensed into 55-gallon drums for distribution to dry cleaning establishments. Improper handling of the chemicals has resulted in the disposal of hazardous wastes, primarily PCE, at the site, some of which were released or have migrated in groundwater from the site to surrounding areas, including the properties to the south and east.

Several USTs were reportedly located around the Site building. These tanks apparently contained diesel and gasoline fuel for delivery and Site vehicles. Exploratory investigations (test-pits excavated along the west property line where the tanks were believed to have been installed) indicated that the tanks have been removed. The current occupant is using natural gas for heating the building. However, a partially filled heating oil underground tank exists at the site.

3.2: Remedial History

The site was first listed in the Registry in August 1997, on the basis of information contained in a subsurface investigation report provided to the Department by the New York City Corporation Counsel. The report was prepared by EEA, Inc., apparently for a potential purchaser. Groundwater was found to contain up to 50,000 ppb of tetrachloroethylene (PCE) and soil up to 3,100,000 ppb of PCE according to the report prepared by EEA.

The current owner(s) of the site declined to undertake the remediation of the site. Therefore, a remedial investigation/feasibility study (RI/FS) was initiated by NYSDEC in July 1998 under the NYS superfund program.

During the investigation of the site, it was determined that groundwater contamination extends downgradient of the site to the south-southwest. Rather than delay work on site while the extent of off-site groundwater contamination is defined, a second Operable Unit that includes off-site contaminated groundwater was established. The off-site investigation and evaluation of cleanup alternatives will be completed while steps are taken to begin the design of the on-site remedy.

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present at the site and to evaluate alternatives to address the significant threat to human health and the environment 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 in two phases. The first phase was conducted between February and April 1999 and the second phase between September and October 1999. A report entitled Remedial Investigation,

West Side Corporation Site, dated July 2000 has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- *Geophysical survey to locate the presence or absence of metallic materials (e.g., drums, tanks, utilities, etc.).*
- *Soil Vapor Survey to detect the presence of VOCs in the soil.*
- *Installation of Geoprobe® soil borings and monitoring wells for analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions.*
- *Excavation of test pits to locate underground utilities, tanks, etc.*

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Westside Corporation 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.

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), parts per million (ppm), For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: Site Geology and Hydrogeology

The overburden deposits encountered at the Site generally consist of fill materials, glacial outwash, and clay soil. The fill deposit encountered at the site ranged in thickness from approximately 0.5 feet to 10 feet below ground surface and comprised of brown sandy silt, brown silty sands and gravelly sands with fragments of ceramic, glass, plastic pellets, and metal debris.

Glacial outwash deposits consisting primarily of gravelly sand underlies the fill and/or the silt at the Site. This glacial sediment was observed up to depths of approximately 70 feet below ground surface (bgs) as shown in Figure 3. The groundwater table is approximately 12 feet bgs.

The Gardiners Clay was encountered underneath the upper glacial sands at the Site at an average depth of about 65 feet bgs. The clay layer is believed to be approximately 30 feet thick. The clay surface beneath the Site may act as a basin for the groundwater and soils above.

Based on regional topography, the general flow of groundwater in the Jamaica area is southerly toward Jamaica Bay, located approximately 3 miles south of the Site.

As discussed in Sections 2 and 3.2, the extent of groundwater contamination downgradient of the site will be determined during the investigation of Operable Unit No. 2.

4.1.2: Nature of Contamination

As described in the RI report, many soil and groundwater samples were collected at the site to characterize the nature and extent of contamination. The main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs).

The VOC contaminants of concern are tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene (1,2-DCE), 1,1-DCE, acetone, 2-butanone, ethylbenzene, vinyl chloride, and xylenes. Several SVOC petroleum-related compounds including benzo(a)pyrene, chrysene, and benzo(a)anthracene were detected at concentrations exceeding SCGs.

4.1.3: Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in overburden groundwater, surface soil, subsurface soil, cesspool soil and cesspool water and compares the data with the SCGs for the site. The following paragraphs summarize the media investigated and the findings of the investigation.

Surface Soil

Twelve surface soil samples were collected from locations at the Site and the adjacent property east of the Site. Five surface soil samples were collected from three perimeter locations at the Site (including two duplicate samples). Twelve VOC compounds were detected in the 17 surface soil samples analyzed, however, none of the compounds exceeded the SCGs. PCE was identified with the highest concentrations. The concentrations ranged from 360 to 920 ppb which are below the soil guidance value of 1400 ppb. PCE concentrations at the remaining 12 surface soil sample locations ranged from not detected to 170 ppb. Surface soil is not considered a significant threat at the site.

Subsurface Soil

Three areas of VOC subsurface soil contamination are apparent at the Site and have been designated Source Area 1, Source Area 2 and Source Area 3 as shown on Figure 4. Subsurface soil samples with compounds identified exceeding cleanup goals were generally located at depths ranging from 1 to 8 feet below ground surface. These depths are from the unsaturated portion of the Site soils.

The on-site subsurface soil samples were reported to contain six VOCs exceeding cleanup goals. The compounds include PCE, TCE, 1,2-DCE, 1,1-DCE, acetone, and 2-butanone. Two VOCs, ethylbenzene, and xylenes, were detected at a location north of the site (upgradient) at concentrations greater than objectives. PCE was detected most frequently and at the highest concentrations.

PCE concentrations in Source Area 1 (where ASTs were located) were as high as 5,900,000 ppb in shallow soils and as high as 7,100,000 ppb in deep soils. Dense non-aqueous phase liquid (DNAPL) exists based upon the PCE concentrations and dye testing. However, direct observation of free product was not noted in soil samples collected from the unsaturated zone. PCE is present in an area estimated to be 31,600 square feet at a depth of about 1 foot to 12 feet below ground surface (bgs).

PCE concentrations in Source Area 2 were as high as 890,000 ppb. The area of contamination is approximately 5,000 square feet. The depth of PCE contamination extends to the water table, about 12 feet. The higher levels of PCE were detected in the upper 4 feet of the soils.

PCE concentrations in Source Area 3 were as high as 120,000 ppb. The area of contamination is approximately 2,000 square feet. The depth of the contamination was typically less than 4 feet.

Groundwater

Nineteen VOC compounds were detected in the 70 groundwater samples collected. Seven compounds were identified at concentrations exceeding the groundwater standards. These compounds include PCE, TCE, 1,2-DCE, vinyl chloride, toluene, chloroform, and xylene (total).

PCE in groundwater exceeded the Class GA groundwater standard (PCE concentration of 5 ppb) over much of the Site. The most prominent area of shallow groundwater contamination appeared to originate in Source Area 1 near MW-8S. This area corresponds to the area of highest VOC contamination in the unsaturated soil. The concentration of PCE in MW-8S was reported at 210,000 ppb with decreasing concentrations identified downgradient.

Elevated concentrations of PCE, significantly higher than the groundwater standards, are also evident in the deep groundwater samples collected. The highest concentration of contaminants in deep groundwater was identified at MW-8D at 25,000 ppb. The data suggests that the bulk of the PCE contamination is in the upper 20 to 30 feet of the aquifer. The analytical data also indicates PCE contamination in groundwater north of the Site (i.e., PCE at 510 ppb in shallow ground water and 1300 ppb in deep ground water). The source of this contamination will be investigated as part of the work for Operable Unit No. 2. The PCE concentrations contour map for the shallow and the deep groundwater are shown in Figures 5 and 6 respectively.

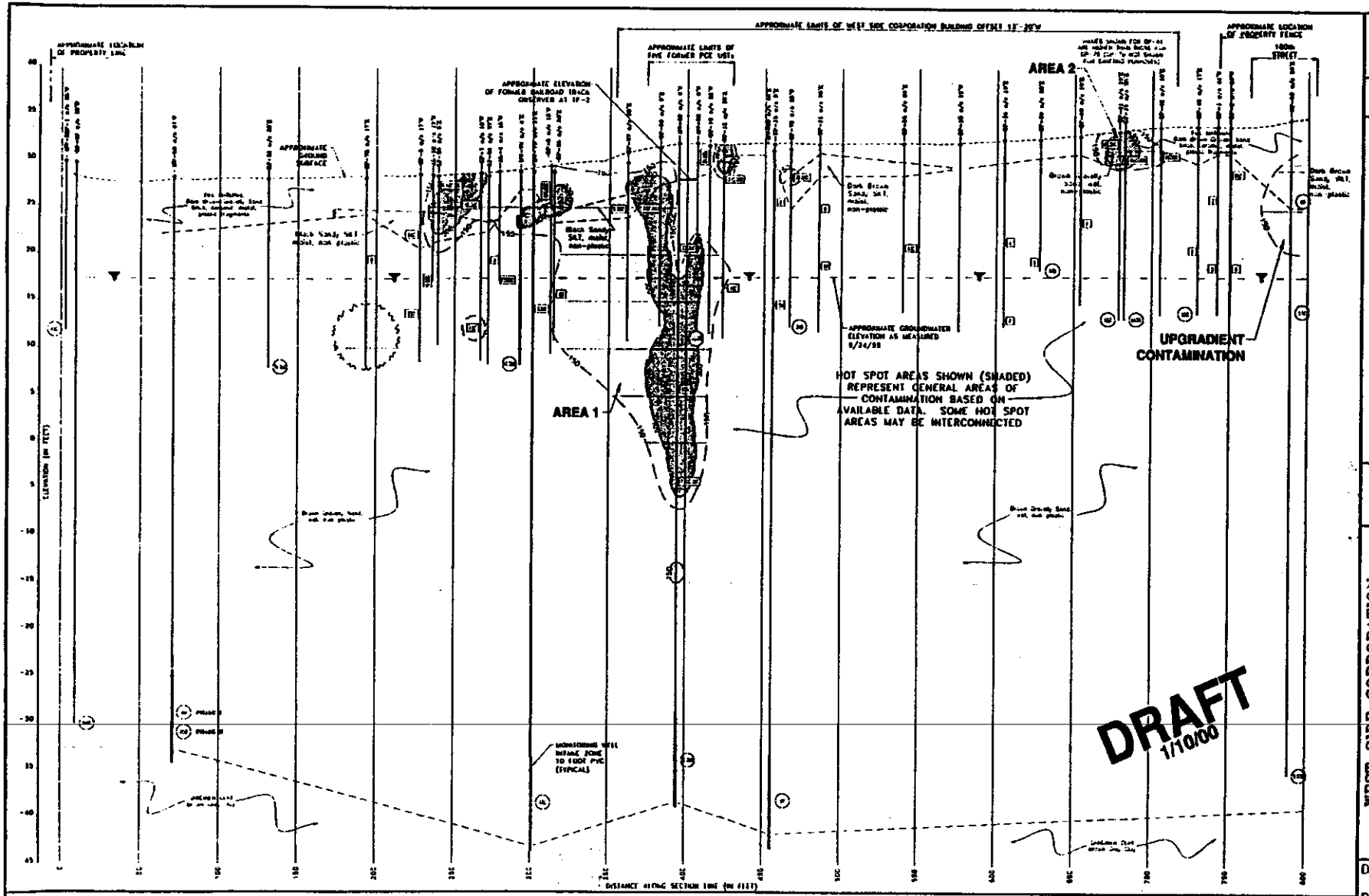
Elevated concentrations of PCE were also detected in deep groundwater samples collected from off-site Geoprobe® soil borings near the former Jamaica Water supply well 24C. These PCE concentrations, averaging about 1,000 ppb, were observed to be typically ten times higher than the closest on-site deep groundwater PCE concentrations. These elevated PCE levels appear to be residual Site contamination that migrated from past supply well pumping activities.

Degradation compounds of PCE (TCE, 1,2-DCE and vinyl chloride) at concentrations exceeding their respective groundwater standards, were detected in both shallow and deep locations throughout the Site.

Table 1
Nature and Extent of Contamination

MEDIUM	CATEGORY	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs	SCG (ppb)
Overburden Groundwater	Volatile Organic Compounds (VOCs)	Tetrachloroethene (PCE)	1 to 210,000	64 of 70	5
		1,2-Dichloroethene (total DCE)	1 to 3,400	45 of 70	5
		Trichloroethene (TCE)	1 to 1,200	43 of 70	5
		Vinyl Chloride	1 to 290	11 of 70	2
Subsurface Soil	Volatile Organic Compounds (VOCs)	Tetrachloroethene (PCE)	1 to 7,100,000	26 of 95	1,400
		1,2-Dichloroethene (total)	1 to 28,000	9 of 95	300
		Trichloroethene	1 to 14,000	10 of 95	700
		Ethylbenzene	1 to 11,000	2 of 95	5,500
		Xylene (total)	1 to 22,000	2 of 95	1,200
On-Site Sanitary Cesspool/ Stormwater Drainage Structure Soil	Volatile Organic Compounds (VOCs)	Tetrachloroethene (PCE)	1 to 12,000	2 of 11	1,400
On-Site Sanitary Cesspool/ Stormwater Drainage Structure Water	Volatile Organic Compounds (VOCs)	Tetrachloroethene (PCE)	2 to 220	4 of 7	5
		1,2-Dichloroethene (total DCE)	2 to 500	3 of 7	5

Notes: SCGs are based on either NYSDEC Class GA groundwater standards as promulgated in 6 NYCRR 703, dated June 1998 or TAGM 4046 (Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives Levels", prepared by NYSDEC, January 24, 1994) values.



LEGEND:

- (xx) ANALYTICAL SOIL PCE CONCENTRATION MEASURED IN ppb
- (x) ANALYTICAL GROUNDWATER PCE CONCENTRATION MEASURED IN ppb
- APPROXIMATE LIMIT OF ORGANIC VAPOR METER READING CONTOUR MEASURED IN ppm
- o/s = OFFSET

NOTES:

1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED MAY 1999. DATE OF SURVEY: MARCH 29, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: NAD 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM: NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES AND EXPLORATIONS SHOULD BE CONSIDERED APPROXIMATE.

REV No.	DESCRIPTION	BY	DATE

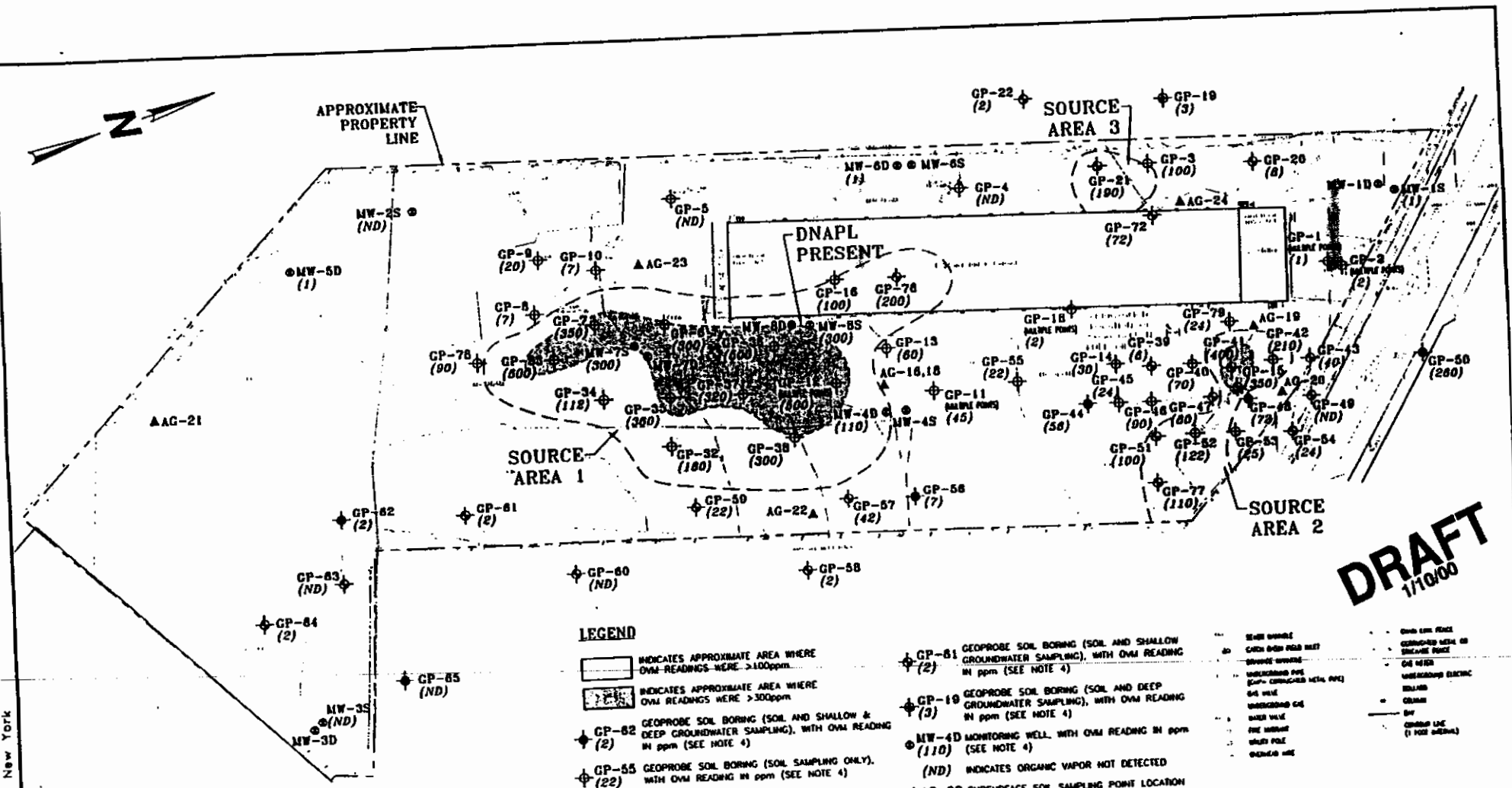
SCALE IN FEET
HORIZONTAL 0 30 60 120
VERTICAL 0 5 10 20

GZA GeoEnvironmental of New York

WEST SIDE CORPORATION
JAMAICA, NEW YORK
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

GEOLOGIC AND ANALYTICAL CROSS SECTION A-A

DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No. 55265
FIGURE No. 3



LEGEND

- INDICATES APPROXIMATE AREA WHERE OVM READINGS WERE >100ppm
- INDICATES APPROXIMATE AREA WHERE OVM READINGS WERE >300ppm
- GP-62 (2) GEOPROBE SOIL BORING (SOIL AND SHALLOW & DEEP GROUNDWATER SAMPLING), WITH OVM READING IN ppm (SEE NOTE 4)
- GP-55 (22) GEOPROBE SOIL BORING (SOIL SAMPLING ONLY), WITH OVM READING IN ppm (SEE NOTE 4)
- GP-61 (2) GEOPROBE SOIL BORING (SOIL AND SHALLOW GROUNDWATER SAMPLING), WITH OVM READING IN ppm (SEE NOTE 4)
- GP-19 (3) GEOPROBE SOIL BORING (SOIL AND DEEP GROUNDWATER SAMPLING), WITH OVM READING IN ppm (SEE NOTE 4)
- MW-4D (110) MONITORING WELL, WITH OVM READING IN ppm (SEE NOTE 4)
- (ND) INDICATES ORGANIC VAPOR NOT DETECTED
- AG-22 SUBSURFACE SOIL SAMPLING POINT LOCATION

NOTES:

1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED DECEMBER 1999. DATE OF SURVEY: OCTOBER 6, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: NAD 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES AND EXPLORATIONS SHOULD BE CONSIDERED APPROXIMATE.

WEST SIDE CORPORATION
JAMAICA, NEW YORK

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

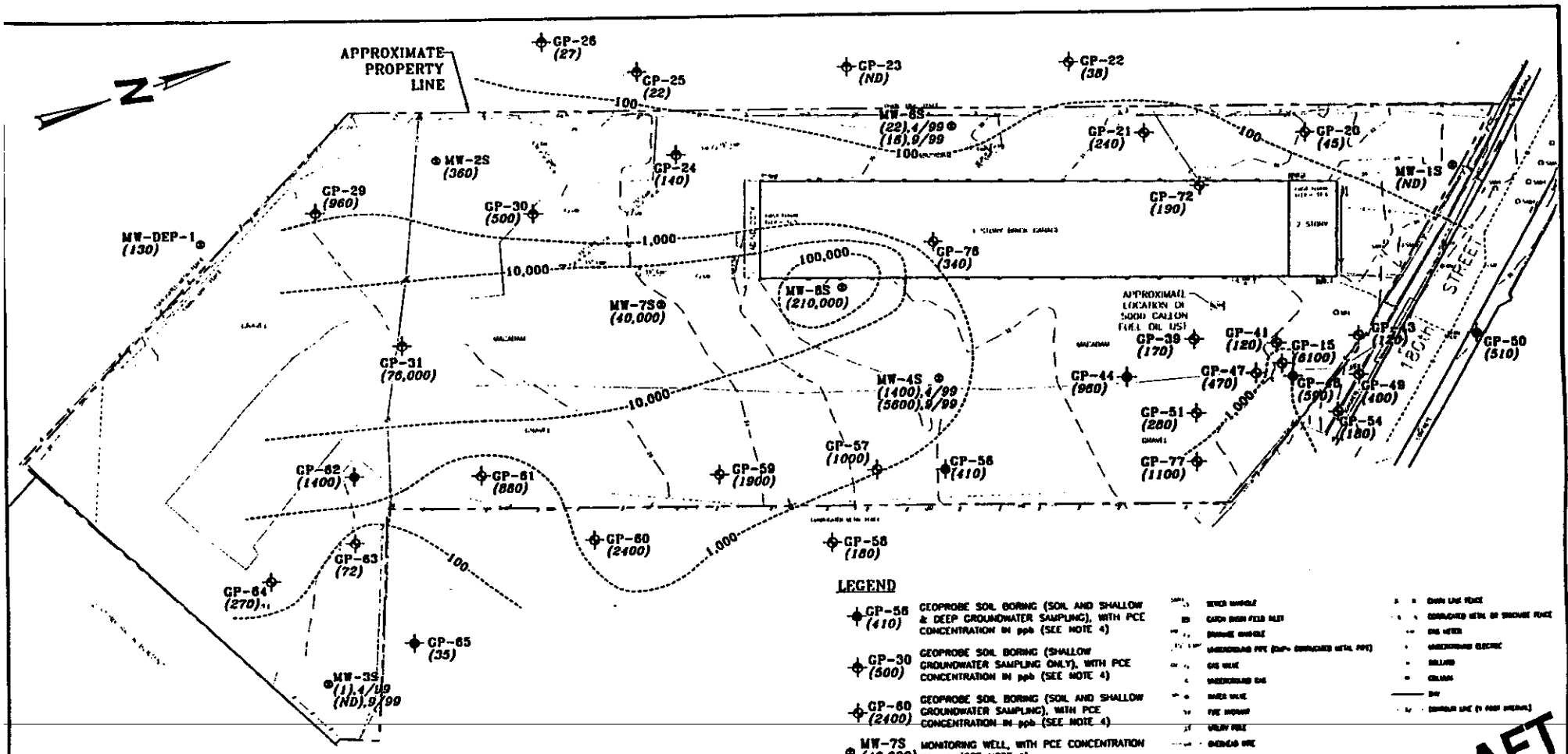
POTENTIAL HOT SPOT /

REV No.	DESCRIPTION	BY	DATE

SCALE IN FEET
0 30 60 120

DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No. 55265

A GeoEnvironmental of New York



LEGEND

- GP-56 (410) — GEOPROBE SOIL BORING (SOIL AND SHALLOW & DEEP GROUNDWATER SAMPLING), WITH PCE CONCENTRATION IN ppb (SEE NOTE 4)
- GP-30 (500) — GEOPROBE SOIL BORING (SHALLOW GROUNDWATER SAMPLING ONLY), WITH PCE CONCENTRATION IN ppb (SEE NOTE 4)
- GP-60 (2400) — GEOPROBE SOIL BORING (SOIL AND SHALLOW GROUNDWATER SAMPLING), WITH PCE CONCENTRATION IN ppb (SEE NOTE 4)
- MW-7S (40,000) — MONITORING WELL, WITH PCE CONCENTRATION IN ppb (SEE NOTE 4)
- (ND) — INDICATES PCE NOT DETECTED
- 1,000 — CONTOUR LINE INDICATING ANALYTICAL PCE CONCENTRATIONS IN ppb

NOTES:

1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED DECEMBER 1999. DATE OF SURVEY: OCTOBER 6, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: NAD 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM: NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES AND EXPLORATIONS SHOULD BE CONSIDERED APPROXIMATE.
4. GROUNDWATER SAMPLES FROM GEOPROBE SOIL BORINGS WERE COLLECTED BETWEEN SEPTEMBER 14, 1999 AND OCTOBER 1, 1999, WITH THE EXCEPTION OF GP-15 WHICH WAS COLLECTED MARCH 12, 1999. GROUNDWATER SAMPLES FROM MONITORING WELLS WERE COLLECTED BETWEEN APRIL 14, 1999 AND APRIL 16, 1999 (UNLESS

DRAFT 1/10/00

WEST SIDE CORPORATION
JAMAICA, NEW YORK

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

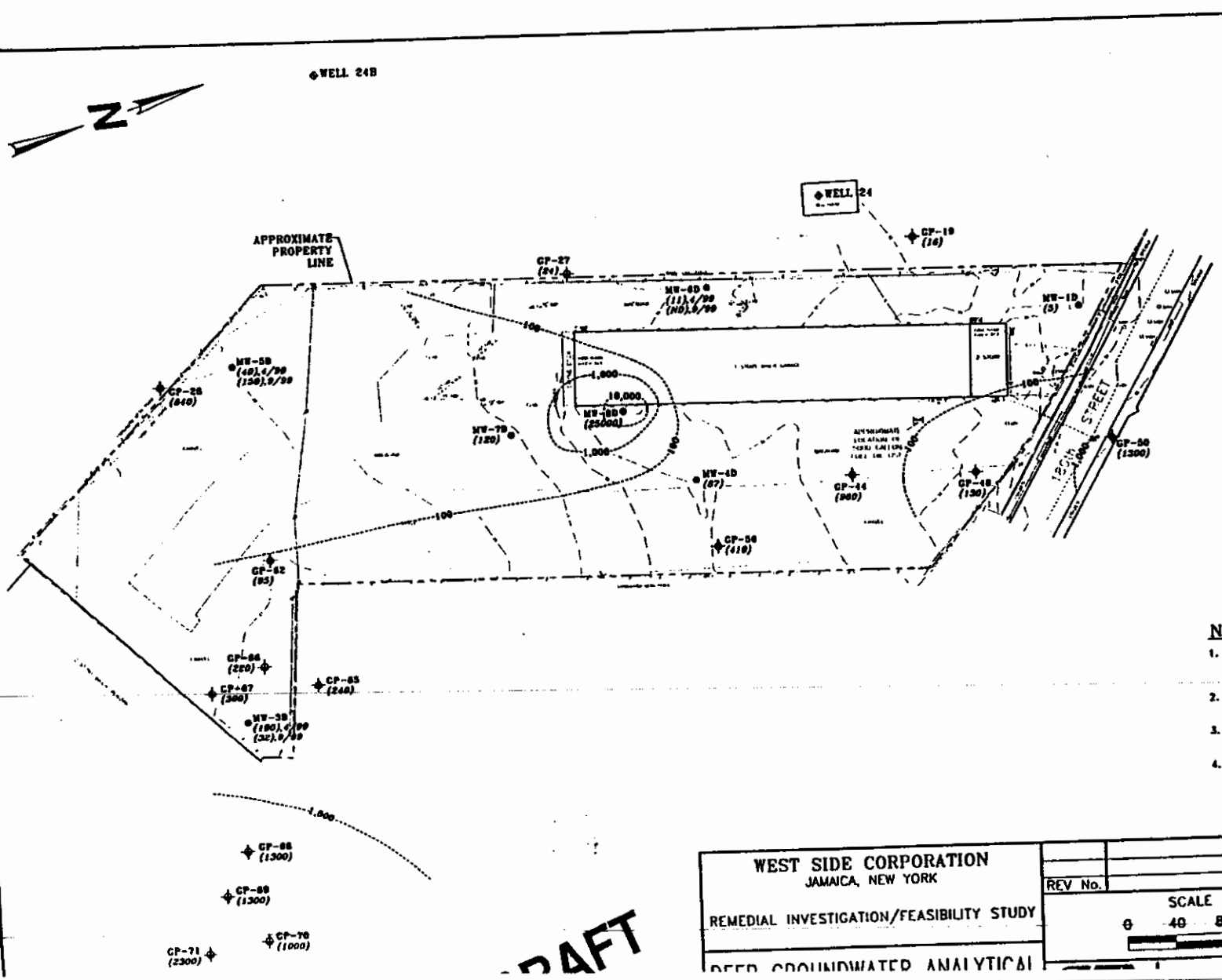
SHALLOW GROUNDWATER ANALYTICAL PCE CONCENTRATIONS CONTOUR MAP

REV No.	DESCRIPTION	BY	DATE

SCALE IN FEET
0 30 60 120

GZA

DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No. 55265
FIGURE No. 5


WELL 24B
WELL 24A
WELL 24
APPROXIMATE PROPERTY LINE
CP-27 (84)
MW-6D (11),4/99 (ND),9/99
CP-19 (16)
MW-1D (5)
MW-5D (40),4/99 (150),9/99
CP-28 (640)
MW-7D (120)
MW-8D (25000)
1,000
10,000
100
MW-4D (87)
CP-14 (960)
CP-48 (130)
CP-50 (1300)
CP-50 (410)
CP-62 (85)
CP-64 (220)
CP-67 (500)
CP-65 (240)
MW-3D (190),4/99 (32),9/99
CP-66 (1300)
CP-69 (1300)
CP-70 (1000)
CP-71 (2300)
1,000
100
150
STREET
LEGEND
NOTES:
1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED DECEMBER 1999. DATE OF SURVEY: OCTOBER 6, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: NAD 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM: NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES AND EXPLORATIONS SHOULD BE CONSIDERED APPROXIMATE.
4. GROUNDWATER SAMPLES FROM GEOPROBE SOIL BORINGS WERE COLLECTED BETWEEN SEPTEMBER 21, 1999 AND OCTOBER 1, 1999. GROUNDWATER SAMPLES FROM MONITORING WELL WERE COLLECTED BETWEEN APRIL 14, 1999 AND APRIL 16, 1999 (UNLESS OTHERWISE NOTED NEXT TO PCE CONCENTRATION.
WEST SIDE CORPORATION
JAMAICA, NEW YORK
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
DEEP GROUNDWATER ANALYTICAL
REV No.
DESCRIPTION
BY
DATE
SCALE IN FEET
0 40 80 160
DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No.
55265
DRAFT

4.2: 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 R.I. 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. Therefore exposure pathways that could exist in the future include:

- ingestion, inhalation of vapors, or dermal contact with contaminated groundwater extracted for use.
- ingestion, inhalation, or dermal contact with contaminated subsurface soils by maintenance workers or construction workers.
- ingestion, inhalation, or dermal contact with contaminated Cesspool/Drainage structure soil and water by maintenance workers.

Currently, there are no completed human exposure pathways at the site. Subsurface soils and groundwater are highly contaminated but on site groundwater is not used and soil excavation would be necessary to expose people to contaminated soils.

4.3: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures and ecological risks which may be presented by the site.

The West Side Site and the areas surrounding the Site are primarily urban with commercial and industrial land use. There are no surface waters (lakes, ponds, streams etc.) or wetlands in the vicinity of the site, which could be impacted by the contamination from the site. Therefore, there are no fish and wildlife concerns at this site.

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 Potentially Responsible Parties (PRP) for the site, documented to date, include: West Side Corporation. The site is currently owned by West Side Corporation and was operated by West Side Corporation during the time that PCE was handled at the Site.

The PRP declined to implement the RI/FS at the site when requested by the NYSDEC. Therefore, the RI/FS is being conducted 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, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria and NYSDOH drinking water standards.*
- *Eliminate, to the extent practicable, future direct contact with the contaminated soils and groundwater.*
- *Eliminate, to the extent practicable, the continuing release of contaminants from on-site soil to groundwater.*
- *Reduce, to the extent practicable, the level of groundwater contamination on site, particularly the designated source areas.*

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 West Side Corporation site were identified, screened and evaluated in the report entitled Feasibility Study West Side Corporation Site, dated July 2000.

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 contaminants of concern in soils and groundwater at the site.

Alternative 1. ***No Action***

Present Worth: ..... *$ 95,00(*

Capital Cost: ..... *$ 0*
Annual O&M: ..... *$ 6,200*
Time to Implement ..... *0 months*

The No Action alternative is evaluated 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. This alternative assumes that annual groundwater monitoring would be conducted in existing on-site wells for 30 years. During each monitoring event, ten wells would be purged and sampled, and water levels in the fourteen on-site wells would be measured. Groundwater samples would be analyzed for VOCs.

Alternative 2. ***Soil Vapor Extraction and Groundwater Extraction and Treatment***

Present Worth: ..... *$ 4,234,000*
Capital Cost: ..... *$ 1,470,000*
Annual O&M: ..... *$ 180,000*
Time to Implement ..... *6 months - 9 months*

Groundwater extraction and ex-situ treatment are components of this alternative. Extraction wells would be located at the downgradient Site boundary and within Source Area 1 (see Figure 7). The extraction wells would be operated for the purposes of containment of impacted Site groundwater, and to prevent further migration of the highly contaminated groundwater associated with Source Area 1. The pretreatment system would be operated for long-term groundwater control (i.e., 30 years) by extracting water at approximately 20 gallons per minute (gpm), or 5 gallons per minute per well. Extraction wells would extend to the top of clay (approximately 65 feet bgs). A pump test and a treatability study would be performed to collect data for the design of the extraction wells (to confirm the number of wells needed and the flow rate) and the components (air stripper, granular activated carbon system, catalytic oxidation system for destruction of air emissions or other acceptable components to be refined during the design phase) of the treatment system. This alternative also provides for treatment of impacted soil associated with Source Areas 1, 2 and 3 using Soil Vapor Extraction (SVE). Construction of an asphalt cover in impacted areas and unpaved locations would be needed to enhance the effectiveness of the SVE system. Excavation of selected "hot spots" would be considered further during detailed design. The cost of SVE system operation and maintenance would be compared with and without "hot spot" soil removal. This alternative is considered a traditional approach to Site remediation.

Alternative 3. ***Groundwater Extraction and Treatment, Soil Vapor Extraction and Treatment, and Fenton's Reagent (or other chemical oxidant) Application in Source Area 1.***

Present Worth: ..... *$ 4,576,000*
Capital Cost: ..... *$ 2,153,000*
Annual O&M: ..... *$ 158,000*
Time to Implement ..... *12 months - 18 months*

As in Alternative No. 2, groundwater extraction and ex-situ treatment are components of this alternative. However, as opposed to Alternative No. 2, extraction wells are located only at the downgradient Site boundary, and would be operated for the purposes of containment of impacted Site groundwater. To

address the highly contaminated groundwater/DNAPL associated with Source Area 1, the injection of Fenton's reagent (or other chemical oxidant) is included (see Figure 8). Fenton's reagent, an innovative technology, is an aggressive approach to treating this highly contaminated saturated area where DNAPL is present. Fenton's reagent would be applied to reduce the volume of highly contaminated saturated soil, highly contaminated groundwater and DNAPL. Fenton's reagent consists of an oxidizer (hydrogen peroxide) with an iron catalyst capable of oxidizing complex organic compounds such as PCE. Residual hydrogen peroxide decomposes into water and oxygen, and the iron precipitates. Heat is generated in the process. The process must be controlled carefully and insufficient mixing may reduce the effectiveness of the treatment. Fenton's reagent would be applied in four to five phases approximately 30 days apart. A pilot-scale treatability study would be conducted to collect the parameters (volume, concentration, rate of application of the reagents, etc.) for designing the system.

If found effective, the pilot study would be expanded to full-scale operation. Only a limited number of vendors are available to implement this technology. Different vendors use different concentrations of reagents. Using high concentrations of reagents may make the process difficult to control and may require portions of the site to be closed during the use of the reagent. Using dilute solutions would not require shutdown of the Site, however, this would further limit the number of vendors available for this application.

This alternative also provides for the treatment of impacted soil associated with Source Areas 1, 2 and 3 using SVE and construction of an asphalt cover in impacted areas and unpaved locations, as in Alternative 2. Excavation of Source Areas 2 and 3 would be further considered during the detailed design.

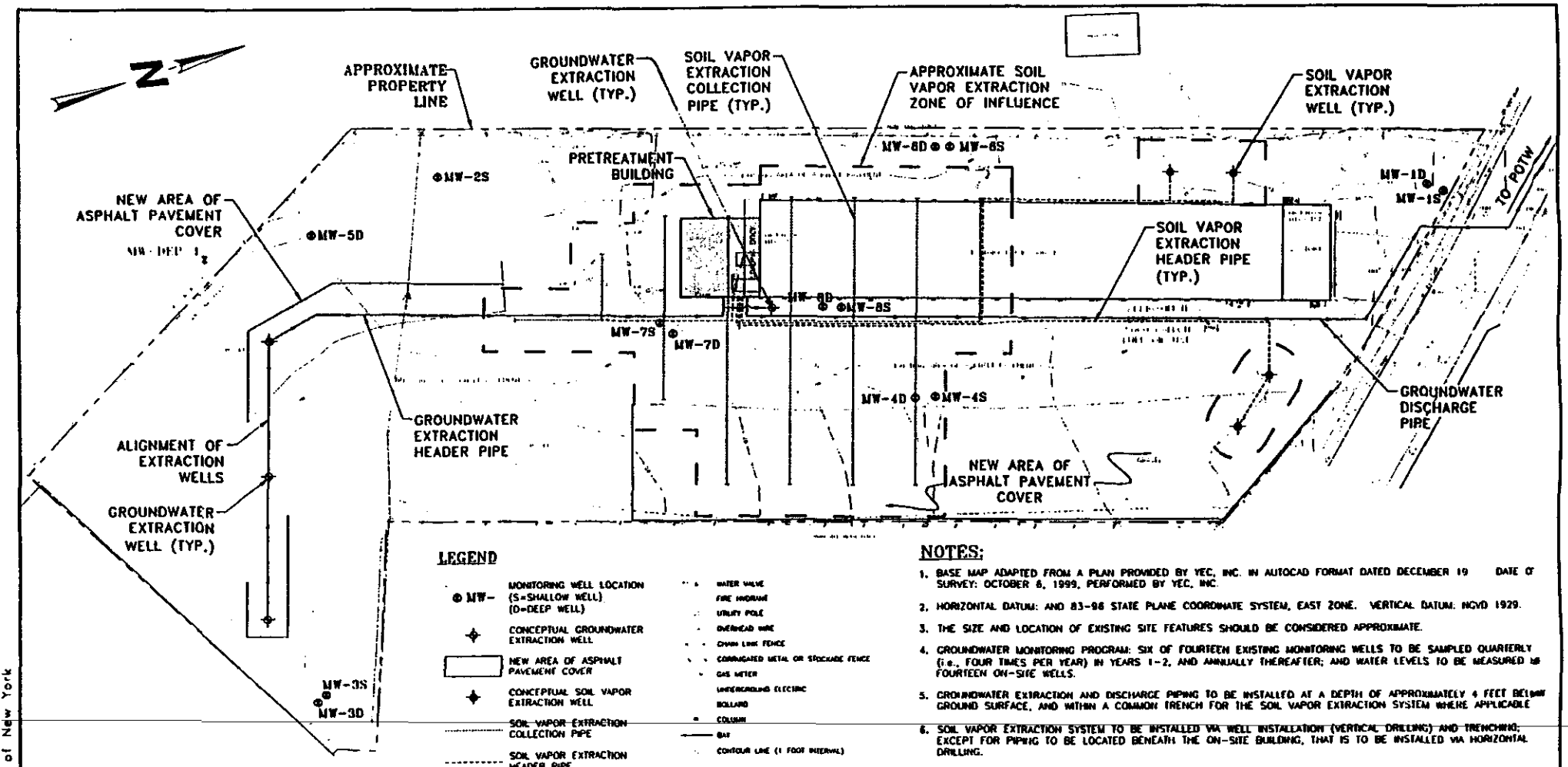
Alternative 4. ***Fenton's Reagent (or other chemical oxidant) and Soil Vapor Extraction***

Present Worth: *$2,184,000*
Capital Cost: ..... *$ 1,423,000*
Annual O&M: ..... *$ 50,000*
Time to Implement ..... *12 months - 18 months*

As in Alternative No. 2 and 3, this alternative provides for treatment of impacted soil associated with Source Areas 1, 2 and 3 using SVE (and possibly limited "hot spot" excavation), and construction of an asphalt cover. Also, included with this alternative is the application of Fenton's reagent, an innovative technology, to treat the highly contaminated saturated soil, highly contaminated groundwater and DNAPL within Source Area 1, as described in Alternative 3. However, Site wide Alternative No. 4 does not include containment of impacted, on-site groundwater. Rather, impacted groundwater would be addressed as part of an off-site remedy.

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.



LEGEND

- ⊕ MW- MONITORING WELL LOCATION (S=SHALLOW WELL) (D=DEEP WELL)
- CONCEPTUAL GROUNDWATER EXTRACTION WELL
- NEW AREA OF ASPHALT PAVEMENT COVER
- CONCEPTUAL SOIL VAPOR EXTRACTION WELL
- SOIL VAPOR EXTRACTION COLLECTION PIPE
- SOIL VAPOR EXTRACTION HEADER PIPE
- GROUNDWATER EXTRACTION/ DISCHARGE PIPE WITH FLOW DIRECTION
- APPROXIMATE SOIL VAPOR EXTRACTION ZONE OF INFLUENCE
- APPROXIMATE PROPERTY LINE
- SEWER MANHOLE
- CATCH BASIN FIELD INLET
- DRAINAGE MANHOLE
- UNDERGROUND PIPE (CORRUGATED METAL PIPE)
- GAS VALVE
- UNDERGROUND GAS
- WATER VALVE
- FIRE HYDRANT
- UTILITY POLE
- OVERHEAD WIRE
- CHAIN LINK FENCE
- CORRUGATED METAL OR STOCKADE FENCE
- GAS METER
- UNDERGROUND ELECTRIC
- BOLLARD
- COLUMN
- BAY
- CONTOUR LINE (1 FOOT INTERVAL)

NOTES:

1. BASE MAP ADAPTED FROM A PLAN PROVIDED BY YEC, INC. IN AUTOCAD FORMAT DATED DECEMBER 19 DATE OF SURVEY: OCTOBER 6, 1999, PERFORMED BY YEC, INC.
2. HORIZONTAL DATUM: AND 83-96 STATE PLANE COORDINATE SYSTEM, EAST ZONE. VERTICAL DATUM: NGVD 1929.
3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
4. GROUNDWATER MONITORING PROGRAM: SIX OF FOURTEEN EXISTING 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 FOURTEEN ON-SITE WELLS.
5. GROUNDWATER EXTRACTION AND DISCHARGE PIPING TO BE INSTALLED AT A DEPTH OF APPROXIMATELY 4 FEET BELOW GROUND SURFACE, AND WITHIN A COMMON TRENCH FOR THE SOIL VAPOR EXTRACTION SYSTEM WHERE APPLICABLE
6. SOIL VAPOR EXTRACTION SYSTEM TO BE INSTALLED VIA WELL INSTALLATION (VERTICAL DRILLING) AND TRENCHING, EXCEPT FOR PIPING TO BE LOCATED BENEATH THE ON-SITE BUILDING, THAT IS TO BE INSTALLED VIA HORIZONTAL DRILLING.
7. APPROXIMATE LOCATIONS AND DIMENSIONS OF GROUNDWATER & SOIL VAPOR EXTRACTION SYSTEMS AND PRETREATMENT BUILDING ARE INDICATED. ACTUAL LOCATIONS AND DIMENSIONS MAY VARY DURING REMEDIATION, AS NECESSARY.

DRAFT 1/26/00

WEST SIDE CORPORATION
JAMAICA, NEW YORK

FEASIBILITY STUDY

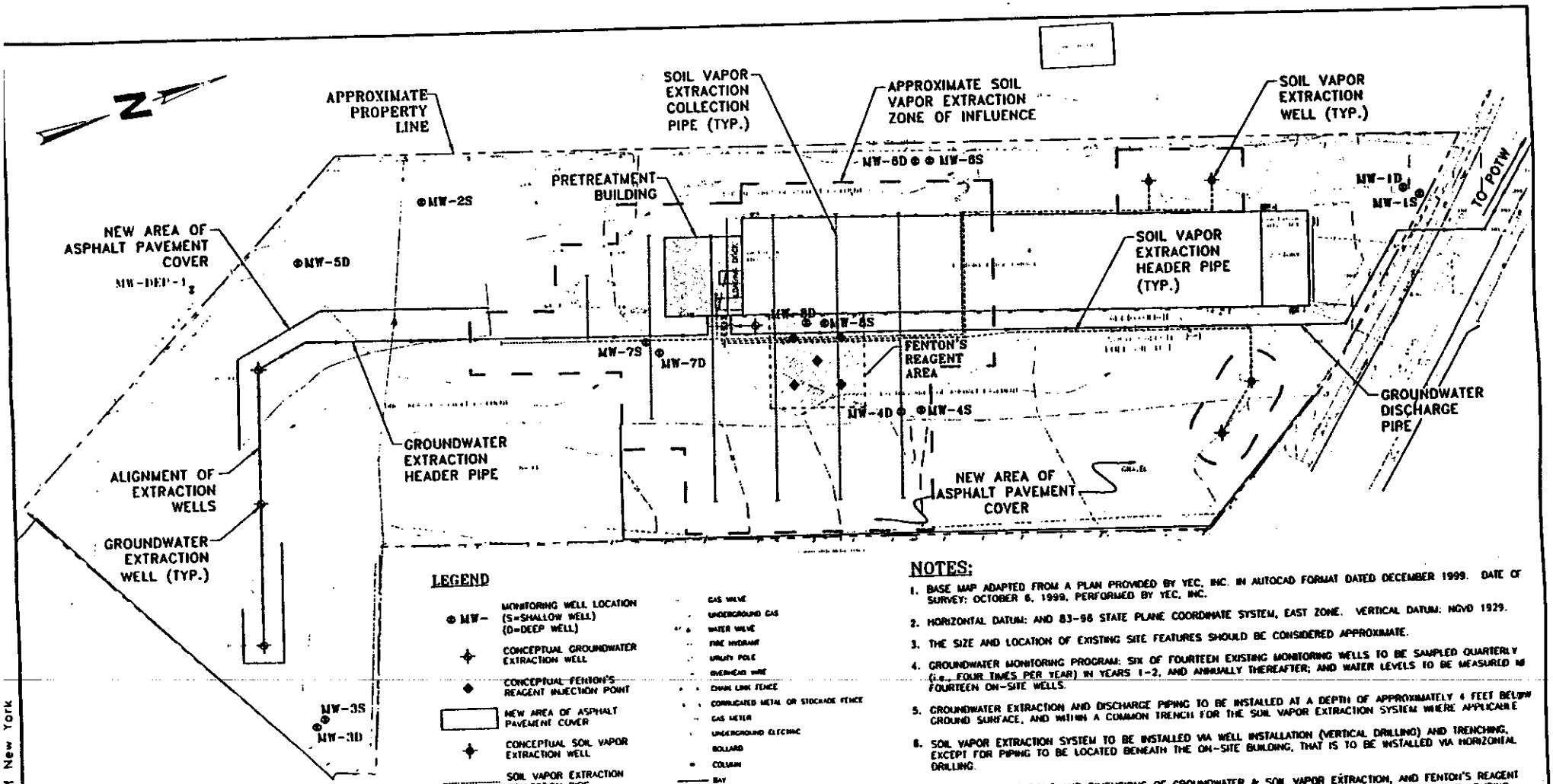
ALTERNATIVE 2
GROUNDWATER EXTRACTION & TREATMENT AND SOIL VAPOR EXTRACTION SYSTEMS LAYOUT

REV No.	DESCRIPTION	BY	DATE

SCALE IN FEET
0 30 60 120

DRAWN BY: DEW
DATE: JANUARY 200
PROJECT No. 55265
FIGURE No. 7

GZA GeoEnvironmental of New York



LEGEND

- MW- MONITORING WELL LOCATION (S=SHALLOW WELL) (D=DEEP WELL)
- CONCEPTUAL GROUNDWATER EXTRACTION WELL
- CONCEPTUAL FENTON'S REAGENT INJECTION POINT
- NEW AREA OF ASPHALT PAVEMENT COVER
- CONCEPTUAL SOIL VAPOR EXTRACTION WELL
- SOIL VAPOR EXTRACTION COLLECTION PIPE
- SOIL VAPOR EXTRACTION HEADER PIPE
- GROUNDWATER EXTRACTION/ DISCHARGE PIPE WITH FLOW DIRECTION
- APPROXIMATE SOIL VAPOR EXTRACTION ZONE OF INFLUENCE
- APPROXIMATE PROPERTY LINE
- SEWER MANHOLE
- GAS VALVE
- UNDERGROUND GAS
- WATER VALVE
- FIRE HYDRANT
- UTILITY POLE
- OVERHEAD WIRE
- CHAIN LINK FENCE
- CORRUGATED METAL OR STOCKADE FENCE
- GAS METER
- UNDERGROUND ELECTRIC
- BOLLARD
- COLUMN
- BAY
- CONTOUR LINE (1 FOOT INTERVAL)

NOTES:

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3. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
4. GROUNDWATER MONITORING PROGRAM: SIX OF FOURTEEN EXISTING 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 FOURTEEN ON-SITE WELLS.
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6. SOIL VAPOR EXTRACTION SYSTEM TO BE INSTALLED VIA WELL INSTALLATION (VERTICAL DRILLING) AND TRENCHING, EXCEPT FOR PIPING TO BE LOCATED BENEATH THE ON-SITE BUILDING, THAT IS TO BE INSTALLED VIA HORIZONTAL DRILLING.
7. APPROXIMATE LOCATIONS AND DIMENSIONS OF GROUNDWATER & SOIL VAPOR EXTRACTION, AND FENTON'S REAGENT SYSTEMS AND PRETREATMENT BUILDING ARE INDICATED. ACTUAL LOCATIONS AND DIMENSIONS MAY VARY DURING REMEDIATION, AS NECESSARY.

DRAFT 06/00

WEST SIDE CORPORATION
JAMAICA, NEW YORK

FEASIBILITY STUDY

ALTERNATIVE 3
GROUNDWATER EXTRACTION & TREATMENT

REV No.	DESCRIPTION	BY	DATE

SCALE IN FEET
0 30 60 120

DRAWN BY: DEW
DATE: JANUARY 2000
PROJECT No.
55265

A GeoEnvironmental of New York

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 would meet applicable environmental laws, regulations, standards, and guidance.

Chemical specific and Action-Specific SCGs are identified in Tables 3-1 through 3-6 of the FS report. The main SCGs identified for this site are: NYSDEC Class GA Groundwater standards as promulgated in 6 NYCRR 703, dated June 1998; TAGM 4046: "Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives Levels"; NYSDEC Part 212 (air emission controls), and Air Guide-1 ("Guidelines for the Control of Toxic Ambient Air Contaminants).

Alternative No. 1 would not achieve compliance with the chemical-specific SCGs for soil or groundwater. Alternatives Nos. 2 and 3 are expected to eventually achieve compliance with the chemical-specific SCGs. Since Alternative No. 3 would more aggressively treat contaminants in Source Area No. 1, it would have a better chance of achieving SCGs in a reasonable amount of time. Alternative No. 4 would be expected to achieve compliance with the chemical-specific SCGs for soils but not for groundwater because it lacks the groundwater collection and containment features given in Alternatives 2 and 3.

Each alternative evaluated would comply with action-specific SCGs; approvals necessary for implementing these alternatives would be obtained before initiating the remedial action. No location-specific SCGs were identified.

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.

Alternatives No. 2 and 3 would be protective of human health and the environment. The primary difference between the two alternatives lies in the approach to remediating DNAPL and highly contaminated soils in the saturated zone in Source Area 1. Alternative No. 2 uses the traditional extraction and treatment scenario at the source area, coupled with downgradient hydraulic containment via extraction wells. Alternative No. 3 uses an innovative technology (Fenton's reagent (or other chemical oxidant)) to remediate DNAPL and saturated soils, and is also coupled with downgradient hydraulic containment via extraction wells. It is expected that the Fenton's reagent (or other chemical oxidant) could remove more of the DNAPL mass than a traditional extraction well. However, in either approach it is likely that residual DNAPL would remain, thus serving as a continual source of groundwater contamination. The possible presence of localized "hot spots," if identifiable and removed for off-site thermal destruction, could reduce the lifetime and costs for the treatment systems.

Alternatives No. 1 and 4 do not provide for adequate protection of the environment regarding on-site contaminated groundwater.

Alternative 3, with its combination of aggressive source area treatment and hydraulic containment, is believed to best able to achieve the remedial action objectives given in Section 6.

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.

Alternatives No. 2, 3 and 4 involve intrusive work, which could cause releases of contamination during installation of the remedial systems. These alternatives would require excavation of trenches for piping, which may pose disruptions to Atlantic. Under Alternatives 2, 3 & 4, trench excavation for the SVE system could generate dust and vapors that could migrate around the site causing potential risks to the workers via the inhalation pathway. Suppression measures would be used to decrease the generation of dust, and air quality monitoring would be used to determine if additional personal protective equipment would be necessary. During the design of the remedy, a Community Health and Safety Plan would be developed to insure that residents living in the vicinity would not be affected by remedial activities. Alternative No. 1 would not cause releases of contamination or disruption to Atlantic operations.

Alternative 2 would take approximately 6 to 9 months to construct. Alternative 3 and 4 would take about 12 to 18 months for the construction of the remedy.

Application of Fenton's reagent (or other chemical oxidant) (Alternatives 3 and 4) would generate heat, vapors, and could possibly make contaminants more mobile if not controlled properly. By first applying the process on a small scale, monitoring frequently, installing and operating a vapor collection and treatment system, and using dilute concentrations of the reagent, it is believed that these risks can be kept to a minimum.

Alternatives No. 2 and 3 are expected to achieve the remedial action objectives within a 30-year timeframe; although, as noted previously, there could be areas on site where these objectives may not be met. However, if the use of Fenton's reagent is able to greatly reduce the DNAPL mass, then Alternative No. 3 may be able to more effectively meet the remedial action goals than Alternative No. 2. Alternatives No. 1 and 4 are not expected to achieve these objectives. Alternative No. 4, however, if augmented by groundwater remedial actions for the off-site Operable Unit, may also achieve these objectives.

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

Alternatives 2 and 3 employ a combination of containment and permanent treatment to achieve the remedial goals for the site. Alternative 3 would provide a greater degree of permanent treatment by using Fenton's reagent, because the use of Fenton's reagent would likely treat a larger quantity of PCE than what would be removed under Alternative 2. Given an unlimited amount of time, however, the amount of PCE removed from the aquifer by Alternative 2 could approach the amount treated in-situ by the use

of Fenton's reagent. Alternative 4 includes the same level of permanent treatment as Alternative 3 but lacks the groundwater containment features.

Alternatives 2 and 3 rely, in part, upon the long-term operation of the groundwater containment system to achieve the remedial action objectives. Although these systems are reliable, they can break down and require regular inspection and maintenance. Due to the presence of residual DNAPL, the aquifer may remain impacted for an indefinite period. Alternative 3 would be more aggressive at removing these residuals.

Alternative No. 1 would rely upon natural attenuation as the only mechanism for achieving the remedial goals. Since this would not occur in a reasonable amount of time and releases of contaminated groundwater to off-site areas would continue, it is not considered effective.

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.

Alternatives No. 3 and 4 provide for the greatest reduction of toxicity and volume (mass) of on-site contaminants, as the Fenton's reagent (or other chemical oxidant) would reduce contaminant concentrations in the highly contaminated Source Area 1.

Alternatives No. 2 and 3 provide for the greatest reduction of mobility of on-site contaminants, as the downgradient groundwater pumping would eliminate, to the extent practicable, migration of the groundwater that does not attain SCGs.

Alternative No. 4 would provide moderate benefit for the reduction of toxicity, mobility and volume of on-site contaminants, as the alternative would reduce contaminant concentrations in soil and groundwater in Source Area 1 and in soils in Source Areas 2 and 3.

Alternative No. 1 would not reduce the toxicity, mobility and volume of on-site contaminants, except as occurs through natural attenuation.

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.

Alternatives No. 1, 2, 3 and 4 are technically implementable with available methods, equipment, materials, and services. Alternatives 3 and 4 would require use of Fenton's reagent (or other chemical oxidant). Currently, there are only a few vendors available who have patented rights to apply Fenton's reagent and this may limit competitive bidding. This could also be a reason for using a different chemical oxidant (e.g., potassium permanganate). Physical implementation issues associated with the use of Fenton's reagent include the prevention of the production of potentially explosive vapors, insufficient mixing or contact, pH adjustments, and determining the correct concentrations of the reagent to use. These can be resolved by the pilot-scale study.

Alternatives No. 1, 2, 3, and 4 are also administratively implementable.

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.

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

8. **Community Acceptance** - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the Department's response to the concerns raised. In general the public comments received were supportive of the selected remedy. Most of the comments received focused on concerns about potential health effects from exposures that may have occurred up until 1982 when the surrounding water supply wells from the former Jamaica Water Supply System were still in use.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative 3: Groundwater Extraction and Treatment, Soil Vapor Extraction and Treatment, and Fenton's reagent (or other chemical oxidant) application in Source area 1 as the remedy for this site.

This selection is based on the evaluation of the four alternatives developed for this site. The site is highly contaminated with VOCs (PCE in particular) and a significant release of contaminants to the groundwater is continuing. The contaminated groundwater is migrating off site. Therefore, the "No Action" alternative is not protective of the environment and is not selected.

Alternatives 2, 3, and 4 all provide for the treatment of unsaturated soils within Source Areas 1, 2, and 3 using soil vapor extraction and treatment and construction of an asphalt covering in the impacted areas. Alternative No. 4 does not include containment of impacted, on-site groundwater. Rather, it is assumed that impacted groundwater would be allowed to naturally attenuate or would be contained as part of an off-site remedy. The migration of the groundwater at significant levels of contamination would continue for many years under Alternative 4.

The excessive depth to a confining layer at the site precludes installation of barrier walls. However, Alternatives No. 2 and 3 would provide hydraulic containment through groundwater pumping. Alternatives No. 2 and 3 would be protective of human health and the environment. The primary difference between the two alternatives lies in the approach to remediating groundwater, DNAPL and soils in the saturated zone in Source Area 1. Alternative No. 2 would use a traditional extraction and treatment scenario in the source area, coupled with downgradient hydraulic containment using extraction wells. Alternative No. 3 uses an innovative technology (Fenton's reagent (or other chemical oxidant)) to remediate the saturated source area and is also coupled with downgradient hydraulic containment using extraction wells. It is expected that the Fenton's reagent (or other chemical oxidant) could remove more of the DNAPL mass than a traditional extraction well. However, in either approach it is likely that residual DNAPL will remain, thus serving as a continuing source of groundwater contamination.

Table 2
Remedial Alternative Costs [1]

Remedial Alternative	Capital Cost	Average Annual O&M [2]	Total Present Worth
Alt. 1- No Action [3]	$0	$6,200	$95,000
Alt. 2 - Groundwater Extraction and Treatment and Soil Vapor Extraction	$1,470,000	$180,000	$4,234,000
Alt. 3 - Groundwater Extraction and Treatment and Soil Vapor Extraction with Fenton's Reagent [4]	$2,153,000	$158,000	$4,576,000
Alt. 4- Fenton's Reagent [4] and Soil Vapor Extraction [5]	$1,423,000	$50,000	$2,184,000

NOTES:

(1) Costs are rounded to the nearest $1,000. Cost estimate assumptions are presented in the "Draft Feasibility Study, West Side Corporation Site, Site No. 2-41-026", prepared by TAMS Consultants, Inc. and GZA GeoEnvironmental of New York, dated January 2000.

(2) Average Annual O&M Cost Estimates are based on the estimated total present worth of O&M costs, calculated as an annual cost for a 30-year timeframe and a 5% discount rate.

(3) The No Action alternative includes groundwater monitoring at the Site for 30 years.

(4) Fenton's reagent is an innovative technology that is provided as an aggressive approach to treating the highly contaminated saturated soil and groundwater within Source Area 1.

(5) This alternative does not include containment of on-site groundwater. Rather, it is assumed that impacted groundwater will be allowed to naturally attenuate or will be contained as part of an off-site remedy.

For consistency, the cost estimates are based on the assumption that operation and maintenance of the remedies will continue for a period of 30 years. The high concentration of PCE (as high as 210,000 ppb in groundwater and as high as 7,100,000 ppb in soil, in Source Area 1) would likely require the traditional pump and treat process (Alternative 2) to continue beyond 30 years. This would make the cost effectiveness of Alternative 2 less than is indicated by the calculations based upon 30 years. The use of Fenton's reagent, is provided as an aggressive approach to treating the highly contaminated saturated Source Area 1. Using Fenton's reagent to remediate the chlorinated VOCs and DNAPLs is promising, rapid, and expected to reduce the contaminants in groundwater to acceptable levels within a more reasonable time. Therefore, Alternative 3 is preferred over Alternative 2.

As discussed in section 7 above, there are technical concerns with the use of the Fenton's reagent. Subsurface heterogeneities may inhibit the reagents from contacting the PCE, dissolved phase in water, and PCE DNAPL. The process can produce explosive gases. The change in chemistry may result in precipitation of metals, which could promote aquifer plugging. Since the site will continue to be used by the current tenant (Atlantic) during remediation, a dilute solution of the reagent will be applied in four to five phases for safety reasons. A pilot-scale treatability study will be necessary to assess the system design and address the effectiveness and safety of the Fenton's reagent process. The pilot-scale study will be expanded to full scale application only after all technical and safety concerns are resolved. If the use of the reagent is to be terminated based on the pilot-scale study, the traditional pump and treat method as described in Alternative 2 will be used to treat the high level of contamination in Source Area 1. Provision will be made in design to install additional wells in the source areas and pump and treat the additional volume of groundwater.

The estimated present worth cost to implement the remedy is $4,576,000. The cost to construct the remedy is estimated to be $2,153,000 and the estimated average annual operation and maintenance cost for 30 years is $158,000.

The elements of the selected 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 will be resolved.
2. A pump test and a treatability study to provide information to efficiently design the groundwater extraction and treatment system.
3. Design and implement a pilot-scale treatability study to assess the effectiveness of the Fenton's reagent (or other chemical oxidant) application. If feasible, the pilot study will be expanded to a full scale operation. If the use of the reagent is to be terminated based on the pilot-scale study, the design will be modified to include the traditional pump and treat methods described in Alternative 2 to treat the high level of contamination in Area 1. Before Fenton's reagent (or other chemical oxidant) application, hydraulic containment will be in place.
4. Design and implement a pilot test for the SVE system to confirm the effectiveness of the technology and to evaluate full-scale system design.
5. Installation of a groundwater extraction and treatment system, including extraction wells, piping and pre-treatment system.
6. Installation of a soil vapor extraction and treatment system, including piping and pre-treatment system.
7. Construction of an on-site pre-treatment building. The building will house the groundwater extraction and treatment system and soil vapor extraction and treatment system equipment.

8. Install an asphalt pavement cover over on-site Source Areas 1, 2, and 3 not currently paved, to provide a surface seal to enhance the effectiveness of the SVE system, and protect the groundwater extraction and SVE system piping from traffic.
9. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. Groundwater and soil samples will be collected and analyzed regularly. This program will allow the effectiveness of the groundwater extraction and treatment system and soil vapor extraction and treatment system to be monitored and will be a component of the operation and maintenance for the site.
10. To prevent future exposures to subsurface contaminants, the Department will seek to have restrictions placed upon the use of the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

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

- A repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.
- A fact sheet was mailed in June 1999.
- A fact sheet and a notice of the public meeting to present the proposed remedial action plan was mailed in February 2000.
- A public meeting to present the proposed remedy was held on March 8, 2000.
- The public comment period was extended 30 days to allow for another public meeting and additional time to review the site documents.
- A follow-up public meeting was held on April 3, 2000.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

West Side Corporation Site - Operable Unit No. 1 (On Site)
Proposed Remedial Action Plan
Jamaica, Queens County
Site No. 2-41-026

The Proposed Remedial Action Plan (PRAP) for Operable Unit No. 1 (OU-1) of the West Side Corporation Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on February 23, 2000. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and groundwater at the West Side Corporation Site. The preferred remedy included installation of a groundwater extraction and treatment system to remove contaminated groundwater for treatment and provide for the containment of groundwater on site; a Soil Vapor Extraction and Treatment (SVET) system to treat the contaminated soils in Source Areas 1, 2, and 3; asphalt pavement in Source Areas 1, 2, and 3 to enhance the effectiveness of the SVET system; a pilot-scale study to assess the effectiveness of the application of Fenton's reagent (or other chemical oxidant, e.g., potassium permanganate) to reduce the volume of highly contaminated PCE saturated soil and groundwater in Source Area 1 (to be expanded to full scale operation if feasible); and a long-term operation, maintenance, and monitoring program.

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

A public meeting was held on March 8, 2000 which included a presentation of the results of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. In response to a written request, the comment period was extended 30 days from March 24 to April 24,2000. In response to requests at the March 8 public meeting, a second public meeting was held on April 3, 2000 to present information about site to those who were not able to attend the March 8, 2000 meeting. Comments received at those meetings and in writing have become part of the Administrative Record for this site. This Responsiveness Summary responds to all questions and comments raised at the March 8, 2000 public meeting, April 3, 2000 public information meeting and to the written comments received.

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

Site Related Comments:

1. Q. Where is the contamination moving? How widespread is the contamination?

   A. The contaminated groundwater from the site appears to be moving in a southerly direction. The site is located at 107-10 180th Street, south of 180th street. The focus of this part of the overall project has been on-site contamination and its proposed remedy. Off-site contamination will be investigated and addressed in the near future. On site, we have found that subsurface soil and groundwater have been contaminated by solvents used in the dry cleaning industry. The most significant soil contamination extends approximately 40 feet below the ground surface in Source Area No. 1 and generally less than 10 feet below grade in Areas 2 and 3. Surface soil is not significantly contaminated. Therefore, the contamination does not pose a threat to people

walking on the site or to the school buses parked on the site. Tetrachloroethene, also known as perchloroethylene (PCE), was found at the highest concentrations. PCE was found in groundwater at concentrations much higher than the groundwater standards near the location of the former above ground PCE storage tanks with decreasing concentrations identified downgradient. The extent of off-site contamination is not known at this time.

2. Q. When you say groundwater, do you mean the water that is free in the ground, or water from the pipes?

   A. By groundwater, we mean water that saturates the soil below what is often called the "water table." At this site, the water table is about 10 to 18 feet below the ground surface. This water can move slowly by gravity through the soil both horizontally and vertically. It can also be removed from the ground in large quantities using specially designed wells.

3. Q. Are there underground storage tanks?

   A. There were several underground storage tanks installed at the site for the storage of fuel oil and heating oil. Exploratory investigations (test-pits excavated along the west property line where the tanks were believed to have been installed) indicated that the tanks have been removed. The current occupant is using natural gas for heating the building. However, a partially filled heating oil underground tank exists at the site.

4. Q. Who is paying for all this work? What priority does this site have for cleanup? What are the chances that the site will be cleaned up? Will the West Side Corporation pay for the costs associated with cleaning up the site?

   A. The RI/FS has been conducted by NYSDEC under the State Superfund program, funded by the 1986 Environmental Quality Bond Act. At the completion of the investigation, the Department will seek to have the responsible parties remediate the site. If they do not, the remediation will be carried out using bond act money. After the completion of the remediation, cost recovery actions will be implemented. This site is a high priority site for the Department. After the completion of the OU-1 RI/FS, the next steps include completion of the off-site investigation and the design and construction of the on-site remedy. The completion of the off-site RI/FS should take less than one year. Completion of legal requirements and the remedial design is likely to take about two years. Although there is some uncertainty regarding whether future funding of the project will come from the State Superfund or from responsible parties, we do not expect any significant delays in beginning construction at this time. West Side Corporation is not paying for the work at the moment.

5. Q. If the value of the properties in the neighborhood go down due to the contamination, who will be responsible?

   A. The law contains provisions for people to seek recovery of damages by pursuing the responsible parties.

6. Q. When did you first discover the PCE problem?

   A. The first indication we are aware of came by a contact from the Corporation Counsel of the City of New York in November of 1995.

7. Q. What year was the site listed?

   A. The site was listed in the registry in August of 1997.

8. Q. What is an aquifer? How many aquifers are there in this area?

   A. Generally, an aquifer is one or more layers of rock or soil that is saturated and sufficiently permeable to yield economically significant quantities of water to wells or springs. An aquifer includes any geologic material that is currently used or could be used as a source of water. All geologic materials combined into one aquifer are referred to as a single hydrologic unit. We believe there are four aquifers in the area.

9. Q. How effective would the soil vapor extraction system be to clean up the contamination in the soil?

   A. Soil vapor extraction (SVE) systems are designed to remove contaminants that have a tendency to volatilize or evaporate easily. SVE removes volatile organic compounds (VOCs) and some semi-volatile compounds (SVOCs) from soils beneath the ground surface in the unsaturated zone, that part of the subsurface located above the water table. Vacuum is applied through a system of underground wells and pipes and contaminants are pulled to the surface and treated as necessary. Based on the soil and contaminant characteristics and the depth to the water table, we believe that SVE can remove a large percentage of the shallow soil contamination at this site.

10. Q. Have you taken into consideration the fact that the water table is very high in this area?

   A. We know that parts of Queens is experiencing problems with a high water table. Based on the many soil borings we have installed at this site and several water level measurements, we know that the depth to the water varies from about 10 to 18 feet below the surface. The design of the SVE system will take into consideration the location of the water table.

11. Q. What effect does the rising water table have on the contamination?

   A. The fluctuation in the water table may "smear" the contamination in soil as the water level varies. There is no evidence that water table could rise high enough at this site to create an exposure on the surface to contaminated groundwater.

12. Q. What is the effect of the site contamination on the major water supply aquifer beneath the clay layer?

   A. The clay layer starts at about 70 to 80 feet below ground surface. The thickness of the clay layer is approximately 30 feet. Significant levels of contamination are present in the shallow (up to 30 feet to 40 feet below surface) groundwater zone. The levels of contamination decreased significantly from the shallow to the deep (60 feet to 70 feet below surface) zone. Groundwater quality just above the clay layer is close to the drinking water standards. The clay layer was not penetrated during the RI since there is no indication of a threat to the aquifer below the clay and it is bad practice to penetrate a competent barrier layer without good cause and without taking great care in how that is done.

13. Q. How deep is the clay layer? Have you tested the clay? Have you tested the groundwater below clay layer?

   A. See answer to question 12 above.

14. Q. There should be a general repository for the documents for the public to see. Also there is a need to have another meeting with the community prior to the end of the comment period on April 24.

   A. A document repository for this site has been established and documents placed at the Queens

Borough Public Library, located at 89-11 Merrick Boulevard, Jamaica. Also, documents are available at NYSDEC region 2 Office, located at 47-40 21st Street in Long Island City. A follow-up meeting was held on April 3, 2000.

15. Q. Wouldn't it be better to propose an on-site remedy after the off-site investigation was completed?

    A. Based on the information available to us regarding the on-site contamination, we believe that it is best to avoid delay and move ahead now with the on-site remedy. Any off-site remedy that may be needed will either consist of elements independent of the on-site remedy or will be incorporated into the on-site remedy.

16. Q. There is another dry-cleaning industry across the street from the site. Why not investigate that site?

    A. We are aware of another dry cleaning product industry in the vicinity and we have already obtained some data from the area. As part of the off-site investigation, we will be looking into the possibility of any other sources of contamination.

17. Q. Why didn't some of the home owners in the area receive the fact sheet?

    A. The mailing list was limited to several blocks in the vicinity of the site. Due to the density of the population in the area, it was not practical to cover an extended area through direct mailing. NYSDEC also provides the fact sheets and meeting notices to the media in the area. The media generally reports the contents of the fact sheets and/or meeting notices.

18. Q. Have you planned periodic meetings for informing the public on the progress of the work? Approximately when?

    A. There will be an off-site study at the end of which there will be a similar public meeting to inform the public on the findings.

19. Q. Why cannot you give update of your progress as you go along?

    A. We would be glad to provide updates on the progress as soon as there is significant information to report.

20. Q. Quarterly progress reports and/or public meetings should be held.

    A. NYSDEC generally mails fact sheets once every six months or at important milestones. We would be glad to speak with interested individuals as often as they like and provide updates as they become available. Regarding formal public meetings, we suggest that they be held only when there is significant information to report.

21. Q. Are there any other contaminated sites in the area?

    A. There are four other Registry sites within about 5 miles of this site. Information on each of these sites was sent to the questioner in a letter dated April 12, 2000.

Jamaica Water Supply and Drinking Water Related Comments:

22. Q. In 1975, when it was found that Jamaica Water Supply (JWS) well number 24 was contaminated, why did it take so long to shut down the well?

    A. The Jamaica Water Supply Company operated the wells at Station 24 (well number 24, 24A, 24Band 24C) intermittently based on demand, generally during the summer season. In 1975, an

odor was detected in well 24. Water samples from well 24, well 24A and the storage tank (storage for finished water) were analyzed for organics and found to contain 17,100 ppb, 18 ppb and 1.3 ppb of PCE respectively. Well 24 was taken out of service immediately. Well 24A was closed in 1979, reopened in 1981 and last closed in 1982. Well 24B was last closed in 1982. Well 24C was also taken out of service in 1982. Drinking water standards for PCE were not created until after the Safe Drinking Water Act of 1978 and were initially set at 50 parts per billion (ppb). With the exception of well 24, the other wells were only used if the concentrations were below the standard.

23. Q. What are the sources of drinking water for the Jamaica area?

A. Approximately 90% of the drinking water supplied to the residents in Jamaica area comes from upstate surface water sources. The rest comes from groundwater wells in Jamaica area but not from wells near this site. All water regardless of source is tested and treated to insure that it is safe for consumption.

24. Q. Do water supply pipes go through the areas of contamination at the site?

A. No, water supply pipes do not go through the areas of contamination at the site.

25. Q. You said that the Jamaica Water Company wells were closed due to contamination. Why did we not know about it?

A. See answer to question 22 above. Also, water quality standards for PCE did not exist in 1975 and procedures for providing this type of information to community were not available.

26. Q. How big an area did the previous supply wells pull from?

A. We don't have the information needed to specifically answer the question but the data we have collected indicates that the capture zone of the previous supply wells (nos. 24, 24A, 24B and 24C) included the site area.

27. Q. The reason the JWS wells were closed was because of petroleum-related contamination from the runoff from JFK Airport. Where is that contamination going now?

A. The wells in the impacted area of the West Side Corporation site (nos. 24, 24A, 24B and 24C) were closed because of PCE contamination. JFK Airport is located at a considerable distance downgradient of the site and well outside of the area of influence of Station 24. Petroleum-related contamination from JFK Airport could not impact the wells in the vicinity of the site.

28. Q. How was the water mixed? When is the water tested, before mixing or after mixing? How often is the testing done?

A. Water from the production wells at Station 24 was pumped into the tanks located at Jamaica Water Supply property at 177th street where it was mixed and stored before distribution. Available information indicates that the testing was done from wells before mixing as well as from tanks after mixing and that there was no fixed schedule for testing.

Currently, samples for volatile organic chemicals are routinely collected from wells, not requiring treatment, on a quarterly frequency, and for wells that are being treated by air-stripping, on a monthly frequency.

29. Q. Where is pumping Station number 5 located?

A. Pumping Station number 5 is located on 199th Street just north of Jamaica Avenue. It is not affected by contamination from this site.

30. Q. There are several tanks located at Jamaica Water Supply property at 177th street. What are these tanks used for?

A. These tanks are used to store the water during off-peak hours.

31. Q. Is it true that the Jamaica area cannot receive upstate surface water for drinking water until water tunnel number 3 is complete?

A. No, currently approximately 90% of the drinking water supplied to the residents in Jamaica area comes from upstate surface water sources.

32. Q. You said that the wells were closed in 1975. Are all the wells in the Jamaica Water Company closed?

A. Well number 24 was closed in 1975. All other wells at Station 24 (well nos. 24A, 24B, and 24C) were taken out of service by 1982.

33. Q. What is the closest operating well?

A. Wells 5 and 5A are the closest active wells in the vicinity of the site. These wells are located at 93-02 199st Street in Hollis Queens. See answer to question 29 above. Other active wells are well #59 and well #14. Well #59 is located south east of the site at Springfield Boulevard, north of Lucas Street in Springfield Garden area. Well #14 is located south west of the site at 144th Street north of Foch Boulevard. These wells have been used regularly for the last several years and are taken off line only when system demand are met.

34. Q. What is the source of water supply for the school bus company currently operating at the site?

A. The school bus company located at the site is connected to the same public water supply as the surrounding area. Groundwater from the site is not used.

35. Q. Why is my drinking water murky and cloudy sometimes?

A. Whenever there is some unusual activity in the distribution system (water main breakdown or sudden heavy demand) the sediment deposits in the system is disturbed and makes the water murky and cloudy.

Cloudiness (milkiness) alone is often caused by air becoming entrapped in the water as it travels within the distribution system. This condition is not a public health concern. The cloudiness is temporary and clears quickly after the water is drawn from the tap and the excess air is released.

Health Related Comments:

36. Q. What can we do as homeowners to protect ourselves? Do we need filters for our water?

A. The contamination at the site is below ground and there is no threat of exposure to the public. The water supply to the community is not affected by site contamination and is tested and treated to insure that it meets NYS drinking water standards.

37. Q. What are the health impacts from the site today and why did it take so long to get to this point?

A. Because the contamination is below ground and no one is exposed to contaminated soil or

groundwater from the site, we do not believe there are any health impacts from the site today. There are indications that contaminated groundwater got into the water supply in the 1970s. It is not possible to say how much contaminated groundwater may have gotten to any particular user or what the concentration of contaminants in the water was at the time. The data we do have indicates that the concentrations were likely low and may have been below the current drinking water standards but these are only indications; specific data is not available. The length of time needed to get to this point is a reflection of many factors. These include the time needed to determine if the responsible parties are able and willing to undertake the work, the complexity of the site, the need to responsibly control the cost of the work (taking into consideration that there are no current exposures which lessens the urgency of the work), and the fact that the Department is simultaneously working on hundreds of similar sites.

38. Q. What is the implication of the groundwater contamination getting into the water supply? Are there any statistical analyses on the development of cancer and other diseases in the area?

A. The Center for Environmental Health will work with the Cancer Surveillance Program to evaluate cancer incidence in the census tract that include the areas most likely to have been affected by PCE from public water supply wells. The area is contained in six census tracts that have boundaries that coincide with Liberty Avenue to the north, 180th Street to the east, Linden Boulevard to the south and Merrick Boulevard to the west. Overall cancer rates and rates of specific types of cancer among men and women will be evaluated for the period 1980 to the most recent year available.

39. Q. What changes have there been in the water supply in the last 20 years?

A. There were no guidelines to look for organic chemicals prior to 1978 and the required analyses were primarily focused on bacterial contamination and hardness of water supplies. We have only been concerned with contamination from volatile organic contaminants such as PCE in the last 20 years. The water supply from the supply wells around the site were discontinued as soon as they were reported to have contaminants above acceptable health-based levels.

40. Q. You said that the site is paved and there is no health risks. What about the residential areas surrounding the site which are not paved?

A. The data indicates that off-site contamination is only in groundwater that exists 10 feet or deeper below the ground surface and at relatively low concentrations. The goals of the off-site investigation to be completed over the summer include finding the full extent of the off-site groundwater plume of contamination, verifying the depth to water, and determining if there are any places where people could be exposed to contaminated groundwater. We will also obtain the data needed to evaluate possible off-site remedies.

41. Q. What if we are doing gardening, will we be exposed to contaminants?

A. No. The contamination in the off-site areas is in the groundwater which is about 10 feet below the surface. There is no exposure threat to performing near-surface activities.

42. Q. What is impact of the contaminations on our children? They grew up in the neighborhood. Is any research being done in this area? Is a cancer study planned? In any neighborhood do you keep watch how people die of a particular ailment? We request that a study be done.

A. There is no way to know the impact the PCE exposure may have had on the children living in this area in the 1970's. A request for a cancer study for the area has been made and is under

review. See answer to question 38 above.

43. Q. Several teachers at the local school located at 108-35 167th Street came down with cancer. There have been incidences of flooding of the basement at this school. Can water in the basement be the cause of the cancer? Can a cancer study be done among the teachers/students of the school?

A. The off-site investigation to determine the extent off-site plume is underway. Teachers/students at the school would be included in a cancer study providing they reside in the study area. See answer to question 38 above.

Written Comments:

A letter dated March 15, 2000 was received from Mrs. Valerie Lewis of Jamaica, New York, which included the following comments:

W-1. I am concerned about the report in The Queens Chronicle about the contamination at the Jamaica site about the toxin in the groundwater. Because a lot of people are getting cancer, I had my water tested on March 16, by the DEP. I haven't heard from them yet. The water smells and looks dirty and you can see things moving around in the water. Both me and my husband got cancer and I know a lot of other people have it. We used to live in that area. On my block a lot of neighbors die of cancer. I counted 20 people that have died just on my block. This is why I'm concerned.

Response: See answer to question 38 above. DEP has informed us that the laboratory test results were mailed to Ms. Lewis on March 27, 2000 and that the samples met all NYSDOH drinking water quality standards.

A letter dated March 20, 2000 was received from Monique Charlier of Jamaica, New York, which included the following comments:

W-2. I read the article in the Chronicle, March 9,2000, about a toxic spill in Jamaica. I live on 149th Street, Jamaica. I would like to know if that spill affects my area. My brother is a 78 year-old man, who had a lung operation about 3 years ago. Every time he goes out, he starts coughing. I thank Mr. Michael Sheridan, the assistant editor, about that article.

Response: The site is located on 180th Street. The source of the contamination is all below ground just on the site itself. To become exposed, people would have to dig into the soil on the site. There is an indication that contaminated groundwater extends to the south off-site but this water is approximately 10 feet below ground and we are not aware of any persons using groundwater in the area. It is very unlikely that the area of contaminated groundwater extends to 149th Street.

A letter dated March 18, 2000 was received from Marcella Young of Jamaica, New York, which included the following comments:

W-3. I am writing in regards to the PCE that was disclosed and found in our water in 1992. I am very much concerned about the damage to all of us that live in the area where PCE is located. As residents of this community we are right in the middle of a very serious health hazard. Many of

our residents have experienced all sorts of illness, which may be caused by these chemicals which may be found in the water in which we drink, and cook with. Its extremely important for you to act upon this dangerous situation. Just think of how many families are in jeopardy. Why has this problem not been taken care of before. Now it's the year 2000, and this problem still has not been act upon. It seems as if this problem does not affect others because its not in their neighborhood. But it does affect us. Please look into this matter immediately. Thank you.

Response: As described above, at the public meetings, and in the documents available at the document repositories, the results of our investigation indicate that no one is being exposed to contamination that exists on this site today. Because there cannot be a health hazard if there is no exposure to contamination, we do not believe that this site presents an imminent threat. There are, however, very high levels of contamination in the soil below the ground surface and in the groundwater that begins about 10 feet below the surface. The Department has proposed an aggressive remedy to clean up this contamination to insure that it does not continue to spread or create a future threat to public health or the environment. An investigation will be completed this year to determine the extent of the off-site contaminated groundwater and to make sure that no one is exposed to this groundwater.

A letter dated April 18, 2000 was received from Sheldon F. Schiff, owner of the West Side Corporation, which included the following comments:

W- 4. After reading the study and attending the public hearing on April 3, 2000, I have the following comments:

The West Side Corp. business operation was a very "clean" operation from the day it moved to Jamaica in 1969. All products arrived in resalable containers, ready for delivery except for one chemical, perchloroethylene. This arrived in bulk form, via rail car or tanker truck and was stored in an "above ground" tank complex, with a maximum holding capacity of 50,000 gallons. It was never filled to capacity since delivery was always available on a next day basis. This tank farm was repeatedly inspected on a daily basis for any possibility of a leak. The product was very expensive and had all the proper petrometers and measuring devices in place.

The entire storage system was designed by the major chemical companies i.e.: Dupont, Dow, PPG, Ethyl etc. These companies periodically inspected the premises. No product was ever "dumped" spilled or leaked. The above ground tanks never showed any leakage up until the last day that the company was in business. To say that 2 or 3 other areas seem affected, seems highly impossible. I wonder if this could be caused by the chemical company, "Chemisales" that was a tenant across the street on 180th Street or from their neighbor, "Sootmobile".

You announced that the water table was safe under the clay layer below ground. Why can't the contaminated soil, in the one area of the tank farm be removed physically and save the state these millions of dollars. The cost of the clean up is far in excess of the property value. Why not "watch" the other 2 areas and only treat the one spot.

Response: The remedial investigation conducted at the site during 1999 showed high concentrations of tetrachloroethylene (also known as PCE) in subsurface soils and groundwater at the site. PCE

was found at significant levels in subsurface soils and groundwater at source area 1, which is the location where above ground tanks were installed and PCE was stored. PCE was also found at significant levels in source areas 2 and 3. Aerial photographs indicated that source area 2 was used for tanker trucks unloading. Although it is possible for PCE to migrate in the dissolved phase in groundwater from one place to other, it is unlikely that the PCE in soils in areas 1, 2 and 3 could have come from any other source than the site. The Soil Vapor Extraction (SVE) is intended to clean the highly contaminated soils in source area 1. Since the soils in source areas 2 and 3 are also highly contaminated, the proposed remedy includes the cleanup of the soils in those areas with the same SVE system. This will require increasing the size of the SVE system slightly and extending the piping to source areas 2 and 3 at minimal cost. All of the piping will be installed with minimum disturbance to the current operation. The cost of excavation and disposal of the contaminated soil is exorbitantly high due to the quantities and depth of the soil involved. Therefore, to physically remove the soil from any area would not be cost effective. Also, any physical removal would disturb the current operation at the site.

A letter dated April 24, 2000 was received from Douglas S. Greeley, P.E., Deputy Commissioner and Director, Bureau of Water and Sewer Operation, New York City Department of Environmental Protection (NYCDEP), which included the following comments:

W-5. We understand that this is an abandoned hazardous waste site which has been placed in the New York Registry, and that the NYSDEC is taking the lead on the investigation and cleanup of the site. The PCE contamination that you have documented in the soil and groundwater is a great concern to us given the site's proximity to several permitted water supply wells which are part of the New York City Groundwater System. We appreciate your efforts to remediate this site, and offer the following comments:

We have already lost the use of the water supply wells at Station 24 due to the contamination at this site, and are concerned that the same contamination has, or will, impact our wells at Station 6 and 33. The NYCDEP regards the aquifers as a resource to be protected. Have you studied the impacts of these water supply due to the contamination at the West Side site, and have you considered the protection of these supply wells in the evaluation of your remedy? Additionally, have you considered the long-term effects of the proposed remedy on the NYCDEP's ability to renew pumping from the groundwater system in this area?

Have you conducted a thorough well inventory to identify all the public water supply wells and commercial/industrial pumping wells in the vicinity in the West Side site? Have you evaluated the impact that pumping at those locations will have on your proposed remedy, particularly your planned groundwater extraction system which is intended to prevent further migration on contaminants from the site?

Have you identified all the groundwater de-watering sites located in the vicinity of the West Side site which may influenced the movement of the plume of contaminated groundwater from the site? Among others, the junior high school (IS-8) is of particular concern, since it is directly downgradient of the West Side site and has a permanent, full time drain system used to alleviate groundwater flooding problems in the basement of the school. This and other dewatering sites could influence the direction of the groundwater flow and movement of the off-site PCE plume.

Have you considered hot spot removal to accelerate completion of the remedy? The NYCDEP is concerned about the time required to achieve the remediation goals, particularly since the off-site investigation has not yet been implemented. Considering that the NYSDEC has always maintained a policy of requiring source removal at contamination sites, how will that policy be applied here?

Has the Remedial Investigation and Feasibility Study provided a thorough characterization of aquifer conditions in the vicinity if the site? There is an abundance of information available, both published and unpublished, regarding pumping rates and the resulting water level drawdown. This information could be very useful in evaluation the effectiveness, or lack of effectiveness, of the proposed groundwater extraction system.

The NYCDEP is very interested in working together with the NYSDEC to arrive at the most effective and expedient remedy for the West Side Corporation site. We believe that there may be several options available to work in collaboration toward the successful completion of this remediation project, and we look forward to discussing this with you further.

Response: The remedial investigation conducted at the site during 1999 showed that significant amounts of PCE contamination are in soil and groundwater at the site. The groundwater flow direction is generally towards the south and southwest and there are indications that the contaminated groundwater is moving off-site in the direction of the groundwater flow. The highest concentrations of PCE in groundwater were found in source area 1, with rapidly decreasing concentrations at the south property line. Wells nos. 24, 24A, 24B and 24C at Station 24 are located around the site. The groundwater flow direction at the site was affected by the operation of these wells and contaminated groundwater was pulled towards these wells during 1970's. These wells have been closed for a number of years and the flow direction appears to have reoriented with natural conditions. The pump and treat remedy will prevent the off-site migration of significantly contaminated groundwater. An investigation will be completed this year to determine the extent of the contamination off site. We do not recommend the renewal of pumping of the wells at Station 24. Wells at Station 6 and 33 are located downgradient of the site. These wells are not directly in line with the groundwater flow from the site. However, any renewal of pumping for the purpose of lowering water table may pull the plume towards these wells and, if done, should be done in consultation with the NYSDEC. Pumped water may need to be treated before disposal if contaminated.

A well inventory in the vicinity of the site was done based on information from USGS, NYCDEP, and the NYSDEC Region 1 Office in Stony Brook. We do not believe that the continued operation of any existing commercial/industrial wells will have any appreciable impact on the proposed on-site remedy. A physical well inventory (by door-to-door survey or through mail) will be undertaken based on the evaluation of the off-site investigation (in area affected by the plume) if deemed necessary. The Junior High School (IS-8) is located about a mile southwest of the site. The full time drain system to alleviate the flooding problem at this school is not likely to impact the proposed on-site remedy. The impact of off-site dewatering systems upon any off-site remedy will be evaluated in the future.

We do consider this to be a source control remedy. The highly contaminated source areas will

be remediated by a combination of SVE and in-situ chemical oxidation. Excavation and off-site disposal of contaminated soils was considered but found to not be cost-effective due to the large quantities and depth of soil involved. Also, any physical removal would disturb the current operation at the site. Therefore, hot spot removal to accelerate completion of the remedy was not selected. Even with excavation, long-term groundwater controls would still be needed. Any available information, both published and unpublished, regarding aquifer conditions, local extraction, and other data will be considered during the design phase.

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APPENDIX B

Administrative Record

Administrative Record
Remedial Investigation/Feasibility Study
West Side Corporation Site
Operable Unit No. 1 (On-Site)
Site I.D. No. 2-41-026

1. File Index
2. Record of Decision - July 2000, prepared by NYSDEC.
3. Proposed Remedial Action Plan (PRAP), dated February 2000, prepared by NYSDEC.
4. Notice of site classification dated August 11, 1997, and Inactive Hazardous Waste Disposal Report Form.
5. Phase II Subsurface Report February 1992, prepared by EEA, Inc.
6. RI/FS Health and Safety Plan - Dated December 1998, prepared by TAMs Consultants.
7. RI/FS Field Activity Plan - Dated December 1998, prepared by TAMs Consultants.
8. RI/FS Quality Assurance Project Plan - Dated December 1998, prepared by TAMs Consultants.
9. RI/FS Project Management Plan - Dated January 1999, prepared by TAMs Consultants.
10. Work Plan Addendum - dated May 2000.
11. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs for NYSDEC (Volume 1).
12. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs, for NYSDEC (Volume 2).
13. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs, for NYSDEC (Volume 3).
14. Final Feasibility Study (FS) Report dated July 2000, prepared by TAMs, for NYSDEC.
15. Citizen's Participation Plan prepared by NYSDEC - May 1999.
16. Fact Sheets dated June 1999, February 2000, prepared by NYSDEC.
17. Letter dated July 22, 1998 from NYSDEC to TAMS Consultants, Inc., regarding work assignment.
18. Letter dated December 2, 1998 from NYSDEC to TAMS Consultants, Inc., regarding comments on work plan.
19. Letter dated March 13, 2000 from Mrs. Valerie Lewis to NYSDEC regarding comments on PRAP.
20. Letter dated March 20, 2000 from Monique Charlier to NYSDEC regarding comments on PRAP.
21. Letter dated March 18, 2000 from Marcella Young to NYSDEC regarding comments on PRAP.
22. Letter dated April 18, 2000 from Sheldon F. Schiff to NYSDEC regarding comments on PRAP.
23. Letter dated April 24, 2000 from New York City Department of Environment Protection to NYSDEC regarding comments on PRAP.

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