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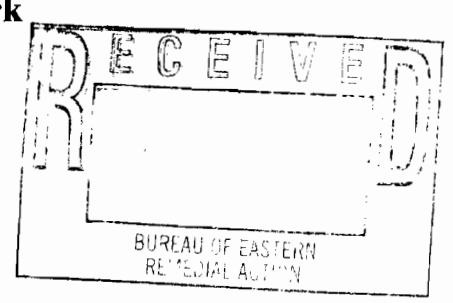
Plan for Pulse Pumping the Soil Vapor Extraction System

Operable Unit 01-Soil and Groundwater On-Site

Westbury Valet Dry Cleaners
123 Post Avenue
Westbury, New York



Site No. 1-30-088

Prepared for:

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September 5, 2002

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1.0 Introduction

This document is the proposed plan for pulse pumping the soil vapor extraction system (SVES) installed at Westbury Valet Dry Cleaners, 123 Post Avenue, Westbury, New York. The on-site SVES was installed and made operational during May 2001 and has been operating continuously since June 1, 2001. The recent indoor air and influent data indicate that the SVES, under current operational parameters, has achieved asymptotic conditions.

On August 1, 2002, Anson Environmental Ltd. (AEL) submitted to NYSDEC a request to terminate operation of the SVES at the Westbury Valet Dry Cleaners site (Appendix 1). In response to that request, NYSDEC directed AEL to submit a proposal to operate the SVES in a pulsed (cycled ON and OFF for a specific time periods). This request was delivered to AEL in NYSDEC letter dated August 9, 2002 (Appendix 1). On August 15, 2002 AEL submitted a plan for operating the SVES in pulsed modes (Appendix 1). On August 21, 2002, NYSDEC conditionally accepted the AEL plan for operating the SVES in pulsed modes and requested that AEL submit a revised work plan (Appendix 1).

This document is the revised work plan for operating the Westbury Valet Dry Cleaners SVES in a pulsed mode.

1.1 Site History

The following is a brief summary of historical activities that have taken place at the Westbury Valet Dry Cleaners site.

1949 Application for plumbing permit issued to John C. Leonardo and the building was constructed.

1957 Certificate of Occupancy issued for storage room as addition to dry cleaning business to Westbury Valet Co., Inc., John Leonardo, Vice President.

1979-1980 Subject property connected to municipal sewer system.

1987 Business purchased by Westbury Valet Dry Cleaners, Inc., and began operating the new business at the site as Westbury Top Cleaners. The property is owned by Choe Realty, LLC.

1996 Nassau County Department of Health (NCDH) identified two floor drains for sampling and closure under the EPA Underground Injection Control (UIC) Class V Injection Well closure program (Figure 1). AEL sampled two floor drains inside the on-site building. The sediment in the drains was determined to be contaminated with tetrachloroethylene. AEL recommended delineation of the contamination.

1997 Apex Environmental conducted Phase I and II investigations of a downgradient parcel, located on the south side of the Long Island Rail Road tracks, at 117 Post Avenue. It was determined that tetrachloroethylene and its breakdown products were present in the groundwater beneath that location. Apex Environmental determined the direction of groundwater to be southwesterly.

1998 The Westbury Valet Dry Cleaners was contacted again by the EPA and NCDH to submit a plan and perform the UIC closure. AEL conducted further sampling of Floor Drain #2 in order to delineate the vertical extent of the contamination (Figure 1). In August, the on-site two floor drains were cleaned out and endpoint samples collected. Based on these sample results, a work plan for further on-site investigation was submitted. In December 1998, the site was included in the NYS Registry of Inactive Hazardous Waste Sites.

1999 In March, AEL installed three on-site groundwater monitoring wells (Figure 1). The upgradient well, located to accommodate the denial of access by the property owner immediately adjacent to the north, was installed adjacent to the northeast corner of the Westbury Valet Dry Cleaners building. Two groundwater monitoring wells were installed downgradient of the inside floor drain locations. The groundwater was sampled and it was confirmed that tetrachloroethylene was present in all three wells at concentrations above the NYSDEC groundwater standards (see Table 1).

2000 On October 4, 2000, groundwater samples were collected at approximately 40-feet, 60-feet and 80-feet below grade surface (bgs) at three on-site locations down gradient of the building (Figure 1). The purpose of the sampling was to determine the vertical and horizontal extent of groundwater contamination with tetracholorethylene and its breakdown

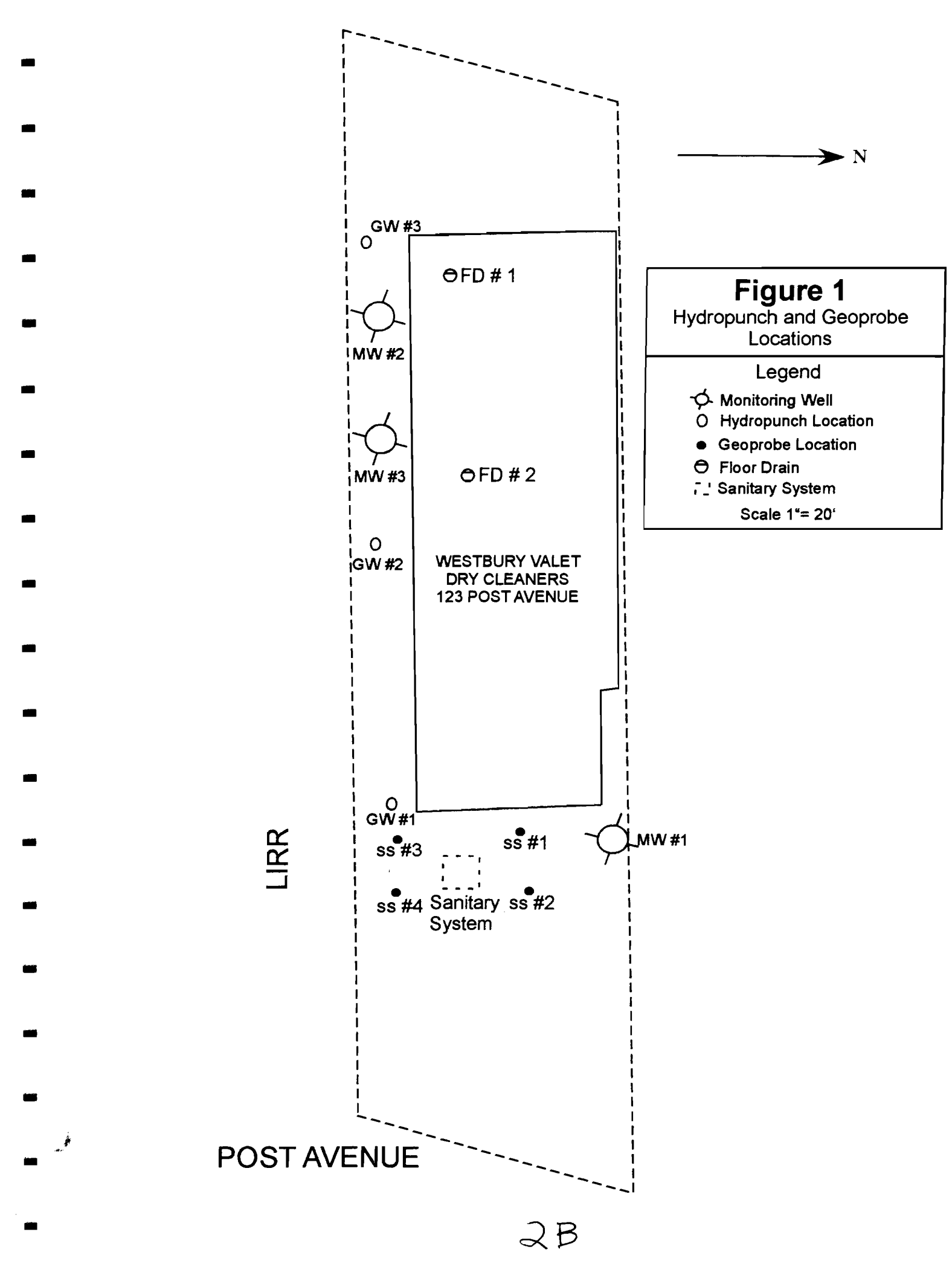
Table 1

Summary of Analytical Detections in Groundwater Samples
for VOC's from Monitoring Wells
Westbury Valet Dry Cleaners
Sample Date: March 31, 1999

Sample ID Depth in Feet	MW # 1 31.18 Feet bgs	MW #2 33.93 Feet bgs	MW #3 33.36 Feet bgs	NYSDEC Values
Volatile Organics (EPA Method 601)				
Units	ug/L	ug/L	ug/L	ug/L
1,2 Dichloroethene	2	**13**	**98**	5
Trichloroethene	N/A	N/A	N/A	5
Trichloroethylene	3	<1	11	5
Tetrachloroethene	**95**	**690**	**20,000**	5
Methylene Chloride	<1	<1	<1	5
Acetone	N/A	N/A	N/A	50
cis-1-2-Dichloroethene	N/A	N/A	N/A	5
Chloroethane	<1	<1	<1	5
Ethylbenzene	N/A	N/A	N/A	5
Xylene	N/A	N/A	N/A	5
Toluene	N/A	N/A	N/A	5

Notes:
<1: Indicates compound analyzed but not detected
N/A: Not Applicable
ug/L: micrograms per liter or parts per billion
Numbers in bold indicates concentrations exceeding NYSDEC TOGS* levels

*NYSDEC Technical and Operational Guidance Series (1.1.1)
Ambient Water Quality Standards and Guidance Values; June 1998


N
GW #3
FD # 1
MW #2
MW #3
FD # 2
GW #2
WESTBURY VALET
DRY CLEANERS
123 POST AVENUE
GW #1
ss #3
ss #1
MW #1
ss #4
Sanitary
System
ss #2
LIRR
POST AVENUE
Figure 1
Hydropunch and Geoprobe Locations
Legend
Monitoring Well
Hydropunch Location
Geoprobe Location
Floor Drain
Sanitary System
Scale 1"= 20'

2B

products. In summary, the most significant contamination is located in the vicinity of and downgradient of Floor Drain #2. The contamination is highest between approximately 30 to 50-feet bgs. The plume of contamination leaving the Westbury Valet Dry Cleaners site appears to be approximately 40 feet wide.

The October investigation also included the collection of soil samples from the vicinity of the former on-site abandoned sanitary system (Figure 1). None of the samples contained tetrachloroethylene or its break down products. The laboratory analytical data sheets are in the site Remedial Investigation Report, dated December 2000.

2001 The NYS Department of Health started analyzing indoor air samples for tetrachloroethylene in February 2001. Elevated concentrations of tetrachloroethylene were detected at 125 and 129 Post Avenue. AEL installed four shallow Soil Vapor Extraction (SVE) wells starting in May 2001. The shallow SVE system was made operational in May 2001 and has operated continuously since June 1, 2001.

The sampling of indoor air indicated that the concentrations of tetrachloroethylene had declined significantly according to the June 2001 sampling.

2002 NYSDEC collected groundwater samples from the three on-site monitoring wells on June 27, 2002.

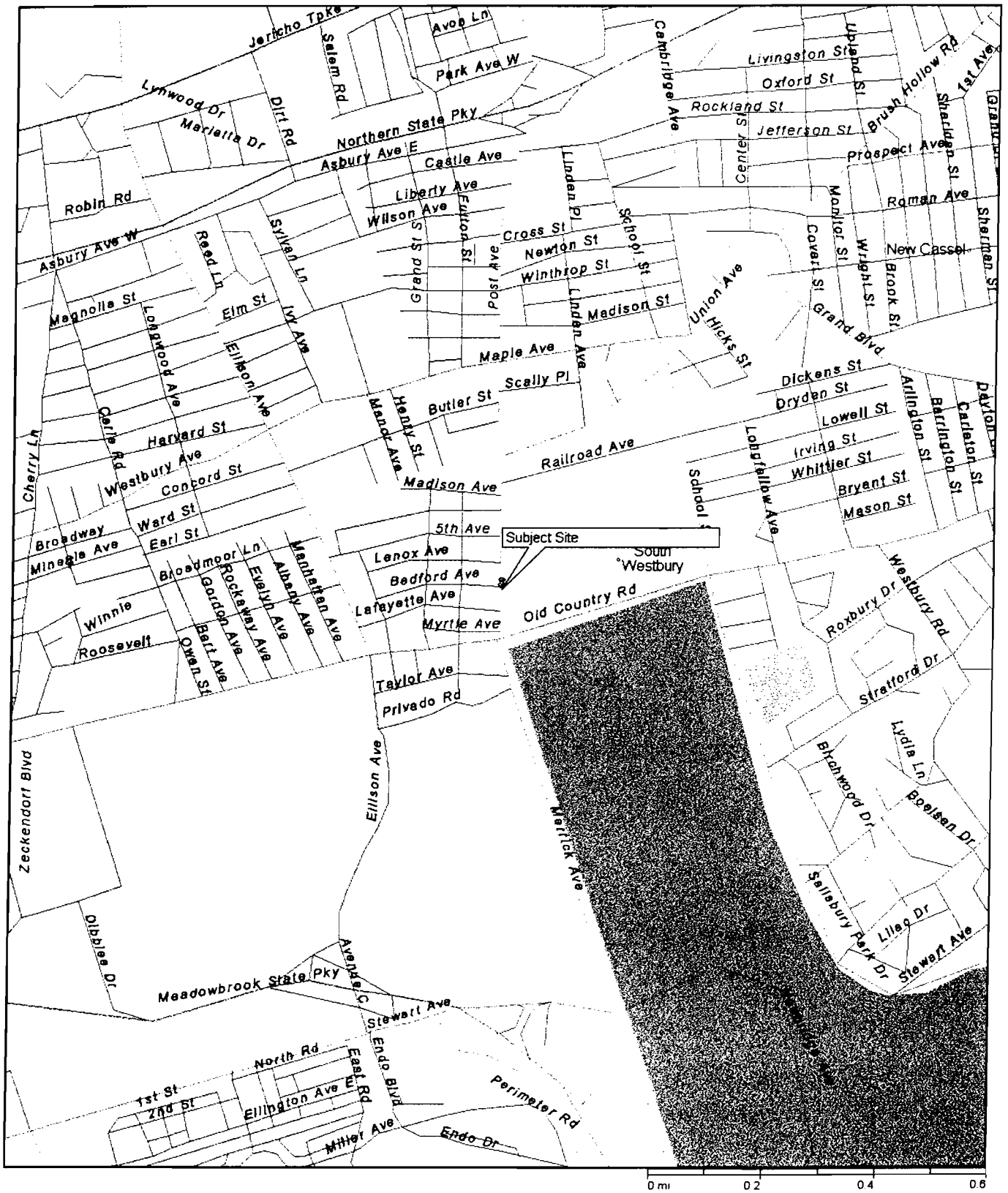
The following documents concerning this site were prepared for NYSDEC, and it is recommended that they be reviewed for additional details about the Westbury Valet Dry Cleaners property:

- AEL, April 26, 2001 Interim Remedial Measure Work Plan
- Dvirka and Bartilucci, December 2000. Remedial Investigation/Feasibility Study Work Plan. Operable Unit II 123 Post Avenue, Westbury, Nassau County, New York.
- AEL, December 2000. Remedial Investigation Report.
- AEL, August 30, 2000 Remedial Investigation/Feasibility Study Work Plan.

2.0 Physical Site Characteristics

2.1 Site Description

The building located at 123 Post Avenue is a stand-alone building that is occupied by Westbury Valet Dry Cleaners for the purposes of dry cleaning clothing and washing shirts (Figure 2). The



Streets Plus

Figure # 2
Westbury Valet Dry Cleaners

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property is owned by Choe Realty, LLC, which purchased the property in 1987. The previous occupant of the property was Westbury Valet Co.

As part of their dry cleaning process, Westbury Valet Dry Cleaners uses tetrachloroethylene to clean clothing.

2.2 Physical Layout of Building

The property is rectangular in shape and measures approximately 50-feet in the north/south direction and 189-feet in the east/west direction (Figure 1). The property contains a single-story concrete block and masonry building that is approximately 3,494 square feet in size. The building was built in 1949 and was renovated in 1954. It is built on a concrete slab and has no basement. The building has been operated as a dry cleaner since the 1950s and is the only type of business in the building. The building is currently connected to the municipal water and sewer systems.

The building is located on the northern property boundary and is approximately 20-feet from the concrete wall/rail bed for the Long Island Rail Road on the south. A single two-story commercial building is located on the north side of the subject property northern boundary. The two-story building contains three business operations including a chiropractor and a delicatessen.

Building plans on file at the Town of North Hempstead Building Department and Village of Westbury indicate that the original construction included on-site cesspools for wastewater disposal. These cesspools were located below the parking lot on the east side (Post Avenue side) of the building (Figure 1). The subject property building was connected to the municipal sewer line below Post Avenue sometime between 1979 and 1980 and the on-site cesspools were soon after abandoned by Westbury Valet Dry Cleaners. As Choe Realty did not occupy this building prior to 1980, information regarding the volume and composition of the wastewater discharged to these abandoned cesspools is not available.

There were two floor drains located inside the building (Figure 1). Floor Drain No. 1 (FD#1) was located in the boiler room on the southwestern corner of the building. Floor Drain No. 2 (FD#2) was located in the vicinity of the dry cleaning machines near the center and the south side of the building. Both floor drains terminated in the soils below the floor of the building.

A review of the building plans on file at the aforementioned agency building departments did not reveal the earlier existence of on-site storm drains or rainwater drainage devices. None of these drainage devices exist on-site at this time.

Presently, Westbury Valet Dry Cleaners uses tetrachloroethylene to clean clothing. Bulk tetrachloroethylene is received in 55-gallon drums and stored indoors on a concrete floor. Tetrachloroethylene contaminated wastes such as sludge and lint are placed into properly

placarded 30-gallon drums and stored indoors on the concrete floor until Safety Kleen Corp. removes the waste for disposal off-site. There are no signs of spillage observed at the drum storage area.

2.3 Geologic Setting

The site is located near the southern perimeter of the Town of North Hempstead. The groundwater reservoir underlying the Town of North Hempstead is composed of unconsolidated local deposits of Holocene age, glacial deposits of Pleistocene Age, and coastal-plain deposits of continental and marine origin of the Late Cretaceous Age. The deposits consist of clay, silt, and bedrock. Weathered and crystalline bedrock of Low Paleozoic and/or Precambrian Age underlies the unconsolidated deposits and forms the virtually impermeable base of the groundwater reservoir.

From oldest (deepest) to youngest (shallowest) these sediments have been identified and divided into a series of hydrogeologic units: the Lloyd aquifer; the Raritan clay confining unit; the Magothy aquifer, and the Upper Glacial aquifer.

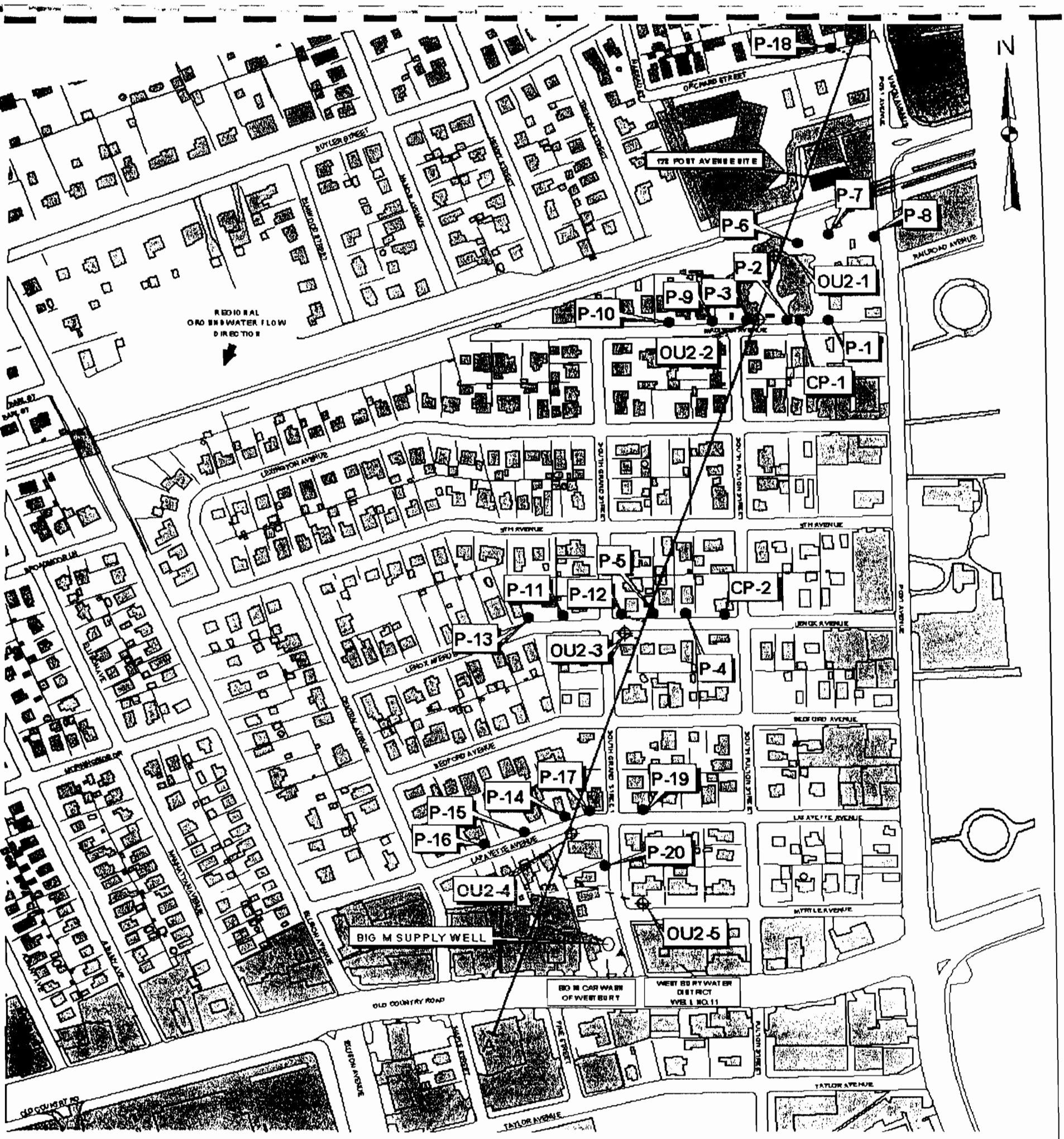
The Upper Glacial aquifer consists of late Pleistocene and Holocene age sand, gravel, silt, and clay deposits. The upper surface of the upper glacial deposits comprise present day land surface except in areas such as the Westbury site where they are overlain by recent Holocene deposits and/or fill materials. The water table at the site is found in this aquifer at a depth of approximately 35 feet below grade.

The southernmost part of the Town is underlain by highly permeable glacial outwash consisting of stratified sand and gravel and occasional thin clay beds. The deposits forming the Upper Glacial Aquifer range in thickness from 6 feet to more than 350 feet. The extreme variation in thickness results from the highly eroded surface upon which these materials were deposited and the irregularity of their upper surface that is the present land surface. The outwash deposits range in thickness from 14 feet to about 165 feet.

The Magothy Aquifer is the principal aquifer underlying the Town of North Hempstead. It consists mainly of lenticular bed of very fine to medium sand that are interbedded with beds of clay, sandy clay, silt and some sand and gravel. The aquifer reaches a maximum thickness in the southeast corner of the Town, where its thickness is about 530 feet.

2.4 Public Water Supply Wells

Previous investigations concerning the subject property identified three public water supply wells. Wells numbered 101 and 7785 are located north and upgradient of the subject site. The downgradient Well 5654 is located on Old Country Road west of Post Avenue and is indicated in Figure 3.



BASE MAP COPYRIGHT, 1993 COUNTY OF NASSAU, NY.

LEGEND

CP-1 ● SOIL CONDUCTIVITY PROBE HOLE LOCATION AND DESIGNATION
P-1 ● GROUNDWATER PROBE HOLE-SAMPLE LOCATION AND DESIGNATION
OU2-1 ⊕ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
A'—A' LINE OF GEOLOGIC CROSS SECTION

200 0 200 Feet

123 POST AVENUE RI/FS OPERABLE UNIT 2
WESTBURY, NEW YORK

LOCATIONS OF SUBSURFACE DATA POINTS

Figure 3

Dvirka and Bartilucci CONSULTING ENGINEERS

5A

The following information was provided by United States Geological Survey (USGS) in conjunction with the Nassau County Department of Public Works (NCDPW).

Well No.	Year Completed	Depth of well	Screen length	Aquifer
101 (well 6)	1970	341	61	Magothy
5654 (well 11)	1956	340	60	Magothy
7785 (well 7)	1965	404	70	Magothy

Water quality data has been secured from the Westbury Water District for the three listed wells covering quarterly sampling by H2M Labs for the last five years. Concentrations of individual volatile organic compounds (VOCs) have not exceeded the groundwater standards in the wells in question. The aforementioned water quality data is included in the Remedial Investigation / Feasibility Study (RI/FS) dated December 2000, and submitted to NYSDEC by Dvirka and Bartilucci, Consulting Engineers. The RI/FS also contains additional information about the above listed wells.

2.5 Identification and Remediation of Suspect Source Areas

The site investigations determined tetrachloroethylene and its breakdown products are the primary contaminants of concern that were detected in the soil samples that were collected in the two floor drains on-site (Figure 1). No other sources of contamination have been identified in the soils on-site.

2.5.1 Floor Drain No. 1

Floor Drain No. 1 (FD#1) was constructed using a short pipe installed perpendicular to the on-site building floor. The short pipe emptied into the soils below the floor. The soils below FD#1 contained elevated concentrations of tetrachloroethylene.

A large commercial vehicle equipped with a high power vacuum ("SuperSucker") was used to clean out the contaminated soils in FD#1 to one-foot bgs. Subsequently, endpoint samples were collected and laboratory analysis determined that the remaining soils met the NYSDEC standards. No further remedial action is required in this area of the site.

2.5.2 Floor Drain No. 2

Floor Drain No. 2 (FD#2) was originally constructed as a hole in the concrete floor. Sampling of the soils beneath the concrete determined that tetrachloroethylene had contaminated the soils. Before attempting to cleanout FD#2, the surrounding concrete floor was broken up to gain access to the deeper soils below the floor drain. Thereafter, a

SuperSucker, was used to excavate the soils below the floor drain to 6-feet bgs and 4-feet wide.

Endpoint samples collected after the SuperSucker cleanout activity, determined that the remaining soils exceeded NYSDEC standards.

On March 31, 1999, to determine the vertical extent of the contamination in soils below FD#2, AEL used a Geoprobe unit to collect soil samples inside the floor drain at 10 to 11-feet, 20 to 22-feet, 30 to 32-feet and 36 to 40-feet bgs. The sample collected at 36 to 40-feet bgs was collected in groundwater. Each sample was submitted to EcoTest Laboratories, North Babylon, New York and analyzed for concentrations of VOCs using EPA Method 8260. The results of the laboratory analysis are summarized in the following table. Samples were screened in the field using a photoionization detector (PID).

VOCS Detected in Soil Samples Collected from Floor Drain No. 2

Detected Compounds	10-11 (ft)	20-22 (ft)	30-32 (ft)	36-40 (ft)	Standard
	ppb	ppb	ppb	ppb	ppb
tetrachlorethene	270,000	53	17	62	1,400
1,4-dichlorobenzene	<1,000	2	<1	<1	
1,2,4-trichlorobenzene	<1,000	52	<1	<1	
naphthalene	<1,000	1	<1	<1	
hexachlorobutadiene	<1,000	3	<1	<1	
PID headspace (ppm)	1,192	1,928	231	no reading	

The aforementioned information relating to FD#2 was presented to Nassau County Department of Health in the AEL Environmental Investigation of Class V Well Report for the site dated May 30, 1999.

The vertical extent of the soil contamination was determined by installing a soil boring outside the building wall directly south of FD#2.

3.0 Summary of Groundwater Sampling and Analysis

The following work was performed to investigate the groundwater quality below the Westbury Valet Dry Cleaners at 123 Post Avenue, Westbury, New York.

3.1 Installation of On-Site Groundwater Monitoring Wells

Three 2-inch diameter PVC groundwater monitoring wells were installed on-site and were first sampled on March 31, 1999. The location of these wells is indicated on Figure 1. The survey elevation and depth of each well is listed in Table 2. Construction details of the three monitoring wells are contained in Appendix 2.

Monitoring Well No. 1 (MW#1), a slightly upgradient well, is installed near the northeast corner of the building as shown on Figure 1. Monitoring Well No. 2 (MW#2) and Monitoring Well No. 3 (MW#3), both downgradient wells, are installed on the south side of the property. MW#3 is located directly south of Floor Drain No. 2. MW#2 is installed west of MW#3.

3.2 Groundwater Monitoring Well Sampling

Groundwater samples were collected from the three on-site monitoring wells on the dates listed below:

March 31, 1999 October 3, 2000 July 18, 2001 October 31, 2001

Before collecting a groundwater sample from a monitoring well, at least 3 to 5 volumes of standing liquid was purged from the well. The purged liquid was stored on-site for appropriate disposal at a later date.

The collected groundwater samples were submitted to a certified laboratory where they were analyzed for concentrations of VOCs. Tables 1, 3, 4 and 5 summarize the concentrations of VOCs that the laboratory detected in the samples. With the exception of the October 2001 sampling, the data are consistent and indicate that MW#3 is the most contaminated.

Table 2

Water Table Elevation Survey
Westbury Valet Dry Cleaners
Survey Date October 31, 2001

Well Number	Well Casing Material	Elevation of Well Casing	Depth To Bottom of Well	Depth to Water	Water Height in Well	Volume of Water in Well	Elevation of Groundwater
MW # 1	2-Inch Sch 40 PVC	95.71 Feet	40.45 Feet bgs	34.8 Feet bgs	5.65 Feet	1.2 Gallons	62.60 Feet
MW # 2	2-Inch Sch 40 PVC	98.13 Feet	43.46 Feet bgs	37.3 Feet bgs	6.16 Feet	1.2 Gallons	62.21 Feet
MW # 3	2-Inch Sch 40 PVC	98.06 Feet	43.95 Feet bgs	37.5 Feet bgs	6.45 Feet	1.2 Gallons	62.28 Feet

Notes:
Elevation recorded to nearest 0.01 foot.
Elevation recorded at north edge of PVC casing.

The following table lists the concentrations of tetrachloroethene detected in the groundwater samples collected on the aforementioned dates.

Concentrations of Tetrachloroethene Detected In Laboratory Samples

Sample Date	MW#1 (ug/L)	MW#2 (ug/L)	MW#3 (ug/L)
3/31/99 (Table 1)	95	690	20,000
10/03/00 (Table 3)	1,200	5,800	16,000
7/18/01 (Table 4)	90	6,200	23,000
10/31/01 (Table 5)	24	26	86

The reduced concentrations of tetrachloroethene detected in the groundwater samples collected on October 31, 2001 are not consistent with those collected on the previous collection dates. On June 27, 2002, to resolve this apparent ambiguity, AEL assisted NYDEC in their collection of new groundwater samples. The NYSDEC laboratory analytical results have not been released to AEL. However, communications with NYSDEC indicate that the laboratory results are approximately the same as those resulting from the samples collected on October 31, 2001.

Table 3 contains the laboratory data used to delineate the vertical extent of tetrachloroethylene in the groundwater.

3.3 Geoprobe Groundwater Sampling

On October 4, 2000, using a vehicle mounted Geoprobe unit, AEL collected groundwater samples at the locations designated GW#1, GW#2 and GW#3 (Figure 1). At each location groundwater samples were collected at the depths below grade surface (bgs) listed as follows:

GW#1	36-40 feet,	56-60 feet	76-80 feet
GW#2	40-44 feet,	56-60 feet	76-80 feet
GW#3	40-44 feet,	56-60 feet	76-80 feet

Table 3

Summary of Analytical Detections in Groundwater Samples
for VOC's from Monitoring Wells
Westbury Valet Dry Cleaners
Sample Date: October 3, 2000

Sample ID Depth in Feet	MW # 1 32.95 Feet bgs	MW #2 35.42 Feet bgs	MW #3 36.00 Feet bgs	NYSDEC Values
Volatile Organics (EPA Method 8260)				
Units	ug/L	ug/L	ug/L	ug/L
1,2 Dichloroethene	<60***	<150***	<600***	5
Trichloroethene	<60***	<150***	<600***	5
Trichloroethylene	N/A	N/A	N/A	5
Tetrachloroethene	**1,200**	**5800**	**16,000**	5
Methylene Chloride	**84****	**210****	<600***	5
Acetone	<200***	<500***	<2000***	50
cis-1-2-Dichloroethene	<60***	<150***	<600***	5
Chloroethane	<60***	<150***	<600***	5
Ethylbenzene	<60***	<150***	<600***	5
Xylene	<60***	<150***	<600***	5
Toluene	<60***	<150***	<600***	5

Notes:
<: Indicates compound analyzed but not detected
N/A: Not Applicable
ug/L: micrograms per liter or parts per billion
Numbers in bold indicates concentrations exceeding NYSDEC TOGS* levels
**= Possible contamination from field/laboratory
***= The presence of other target analyte(s) precludes lower detection limits

*NYSDEC Technical and Operational Guidance Series (1.1.1)
Ambient Water Quality Standards and Guidance Values; June 1998

Table 4

Summary of Analytical Detections in Groundwater Samples
for VOC's from Monitoring Wells
Westbury Valet Dry Cleaners
Sample Date: July 18, 2001

Sample ID Depth in Feet	MW # 1 33.11 Feet bgs	MW #2 35.92 Feet bgs	MW #3 35.78 Feet bgs	NYSDEC Values
Volatile Organics (EPA Method 8260)				
Units	ug/L	ug/L	ug/L	ug/L
1,2 Dichloroethene	10 U	**65**	10 U	5
Trichloroethene	3 J	**11**	**9 J**	5
Trichloroethylene	N/A	N/A	N/A	5
Tetrachloroethene	**90**	**6,200 D**	**23,000 D**	5
Methylene Chloride	10 U	10 U	10 U	5
Acetone	10 UJ	10 UJ	10 UJ	50
cis-1-2-Dichloroethene	N/A	N/A	N/A	5
Chloroethane	10 U	10 U	10 U	5
Ethylbenzene	5 J	10 U	10 U	5
Xylene	2 J	10 U	10 U	5
Toluene	10 U	10 U	10 U	5

Notes:

U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

D: The analyte was detected at a secondary dilution factor.

N/A: Not Applicable

ug/L: micrograms per liter or parts per billion

Numbers in bold indicates concentrations exceeding NYSDEC TOGS* levels

*NYSDEC Technical and Operational Guidance Series (1.1.1)
Ambient Water Quality Standards and Guidance Values; June 1998

Table 5

Summary of Analytical Detections in Groundwater Samples
for VOC's from Monitoring Wells
Westbury Valet Dry Cleaners
Sample Date: October 31, 2001

Sample ID Depth in Feet	MW # 1 34.8 Feet bgs	MW #2 37.3 Feet bgs	MW #3 37.5 Feet bgs	NYSDEC Values
Volatile Organics (EPA Method 8260)				
Units	ug/L	ug/L	ug/L	ug/L
1,2 Dichloroethene	10 U	10 U	10 U	5
Trichloroethene	10 U	10 U	10 U	5
Trichloroethylene	N/A	N/A	N/A	5
Tetrachloroethene	**24**	**26**	**86**	5
Methylene Chloride	10 U	10 U	10 U	5
Acetone	10 UJ	10 UJ	10 UJ	50
cis-1-2-Dichloroethene	N/A	N/A	N/A	5
Chloroethane	10 U	10 U	10 U	5
Ethylbenzene	**6 J**	10 U	10 U	5
Xylene	10 U	10 U	**9 J**	5
Toluene	10 U	10 U	10 U	5

Notes:

U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

D: The analyte was detected at a secondary dilution factor.

N/A: Not Applicable

ug/L: micrograms per liter or parts per billion

Numbers in bold indicates concentrations exceeding NYSDEC TOGS* levels

*NYSDEC Technical and Operational Guidance Series (1.1.1)
Ambient Water Quality Standards and Guidance Values; June 1998

The samples were collected by initially advancing the Geoprobe rods to a depth of approximately 80-feet bgs at each location. The rods were then raised one-foot to permit groundwater to enter the sampling tube containing the 4-feet long screen assembly and a groundwater sample was collected using new poly tubing and a stainless steel check valve. The probe was then raised to a depth of 60-feet bgs and the sample collection process repeated. A final groundwater sample was collected by raising the probes to a depth of 40-feet bgs and repeating the sampling process.

All samples were collected by purging the probe rods and then pumping the groundwater directly into laboratory-issued 40 milliliter glass vials. The groundwater samples were delivered to an ELAP-certified laboratory and analyzed for chlorinated volatile organics using EPA Method 8260.

The laboratory data for these nine groundwater samples are summarized in Table 6.

3.4 Water Table Elevation Survey

On-site groundwater monitoring well casings and the water table were surveyed to the nearest 0.01 foot (see Table 2). According to the USGS for the Westbury area, the surface elevation of the site is approximately 100-feet above mean sea level.

Based on the March 1999 depth to groundwater measurements (Table 1), the direction of groundwater flow is toward the south-southwest.

The depth to groundwater in MW#3 has varied from 33.36 to 37.5 feet below grade between March 1999 and October 2001. Measurement of other wells on-site illustrated similar variation during this time period.

MW#1 is up and cross gradient of the contamination sources Floor Drains #1 and #2. MW#2 is down gradient of Floor Drain #1 and MW#3 is down gradient of Floor Drain #2.

3.5 Evaluation of Ground Water Analytical Data March 1999 and October 2001

To aid in the evaluation of the groundwater quality performed for this project, the concentrations of tetrachloroethylene detected in the samples collected from the on-site monitoring wells and from the Geoprobe borings were evaluated for the 40-foot, 60-foot and 80-foot depth horizons. The detected concentrations for the various analyzed samples are tabulated in Table 6.

A review of the laboratory analysis of groundwater samples collected from MW#1, MW#2 and MW#3 indicates that tetrachloroethylene was detected at elevated

Table 6

Summary of Analytical Detections in Groundwater Samples
for VOC's from Hydropunch Sampling
Westbury Valet Dry Cleaners
Sample Date: October 4, 2000

Sample ID / Depth in Feet	GW # 1 76-80 Feet bgs	GW # 1.2 55-60 Feet bgs	GW # 1.3 36-40 Feet bgs	GW # 2 76-80 Feet bgs	GW # 2.2 55-60 Feet bgs	GW # 2.3 40-44 Feet bgs	GW # 3 76-80 Feet bgs	GW # 3.2 55-60 Feet bgs	GW # 3.3 40-44 Feet bgs	NYSDEC Values
Volatile Organics (EPA Method 8260)										
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1,2 Dichloroethene	<3	<3	<3	<3	<3	<150***	<3	<3	<3	5
Trichloroethene	4	<3	<3	<3	<3	<150***	<3	<3	<3	5
Trichloroethylene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5
Tetrachloroethene	4	**6**	**64**	**23**	**24**	**3,700**	4	**8**	**16**	5
Methylene Chloride	<3	3**	4**	**6****	**6****	**250****	<3	<3	<3	5
Acetone	<10	<10	<10	<10	<10	<500***	<10	<10	22**	50
cis-1-2-Dichloroethene	**8**	<3	<3	<3	<3	<150***	<3	<3	<3	5
Chloroethane	<3	<3	<3	<3	<3	<150***	<3	<3	<3	5
Ethylbenzene	<3	<3	<3	<3	<3	<150***	<3	<3	<3	5
Xylene	<3	<3	<3	<3	<3	<150***	<3	<3	<3	5
Toluene	<3	<3	<3	<3	<3	<150***	<3	<3	**8**	5
									<3	5

Notes:
<: Indicates compound analyzed but not detected
N/A: Not Applicable
ug/L: micrograms per liter or parts per billion
Numbers in bold3 indicates concentrations exceeding NYSDEC TOGS* levels
**= Possible contamination from field/laboratory
***= The presence of other target analyte(s) precludes lower detection limits

*NYSDEC Technical and Operational Guidance Series (1.1.1)
Ambient Water Quality Standards and Guidance Values; June 1998

concentrations in all three monitoring wells on-site. The on-site slightly upgradient and cross gradient well MW#1 has contained elevated levels of tetrachloroethylene that have ranged from 24 to 1,200 micrograms per liter (ug/L), indicating that there is a possible off-site source of contamination.

MW#2 also has elevated concentrations of tetrachloroethylene ranging from 26 to 6,200 ug/L. MW#3 has the most elevated concentrations, 86 to 20,000 ug/L. Based on the vertical extent of soil contamination in FD#2, the source of this downgradient groundwater contamination is most likely Floor Drain #2.

The Geoprobe groundwater samples confirmed that the greatest level of contaminated groundwater is between approximately 33 and 50-feet bgs. The groundwater samples collected at 55-feet bgs indicate that the concentration of tetracholorethylene up and down gradient of the site is approximately the same.

4.0 SVES System Design

A block diagram of the soil vapor extraction system installed and operating on-site is in Figure 4. The SVES is designed to collect and treat the remaining tetrachloroethylene and tetrachloroethylene degradation products from the vadose zone below the site. The SVES was installed to capture the shallow volatile organic vapors in the soils on and off-site. This system has been very effective in reducing the soil contamination on-site and controlling the contaminated soil vapors affecting adjacent properties.

4.1 Existing Soil Vapor Extraction System

The existing SVES for this site includes four shallow SVE wells (RW-1S, RW-2S, RW-3S and RW-4S) that are screened as indicated in Appendix 2. Each of the SVE wells was completed at grade with a regulating ball valve arranged in a manifold such that each SVE extraction well can be operated independently. The extraction wells are connected to a 2-inch diameter PVC manifold located in the SVE equipment shed (Figure 5).

The soil vapor is extracted using a 5-horsepower regenerative blower located in the SVE equipment shed. Under the influence of a vacuum created by the blower, the soil vapor passes through a moisture separator drum and a particulate filter and into the blower. The blower exhaust under comparatively low pressure then flows through two air purification canisters connected in series. The output of air purification canisters is fed to the SVE exhaust stack that is vented to the atmosphere above the Westbury Valet Dry Cleaners building.

Each air purification canister is filled with granulated carbon and weighs approximately 600-pounds. The 4-inch diameter PVC exhaust stack is attached to the side of the building with the stack discharge point at a height of 8-feet above the building roof.

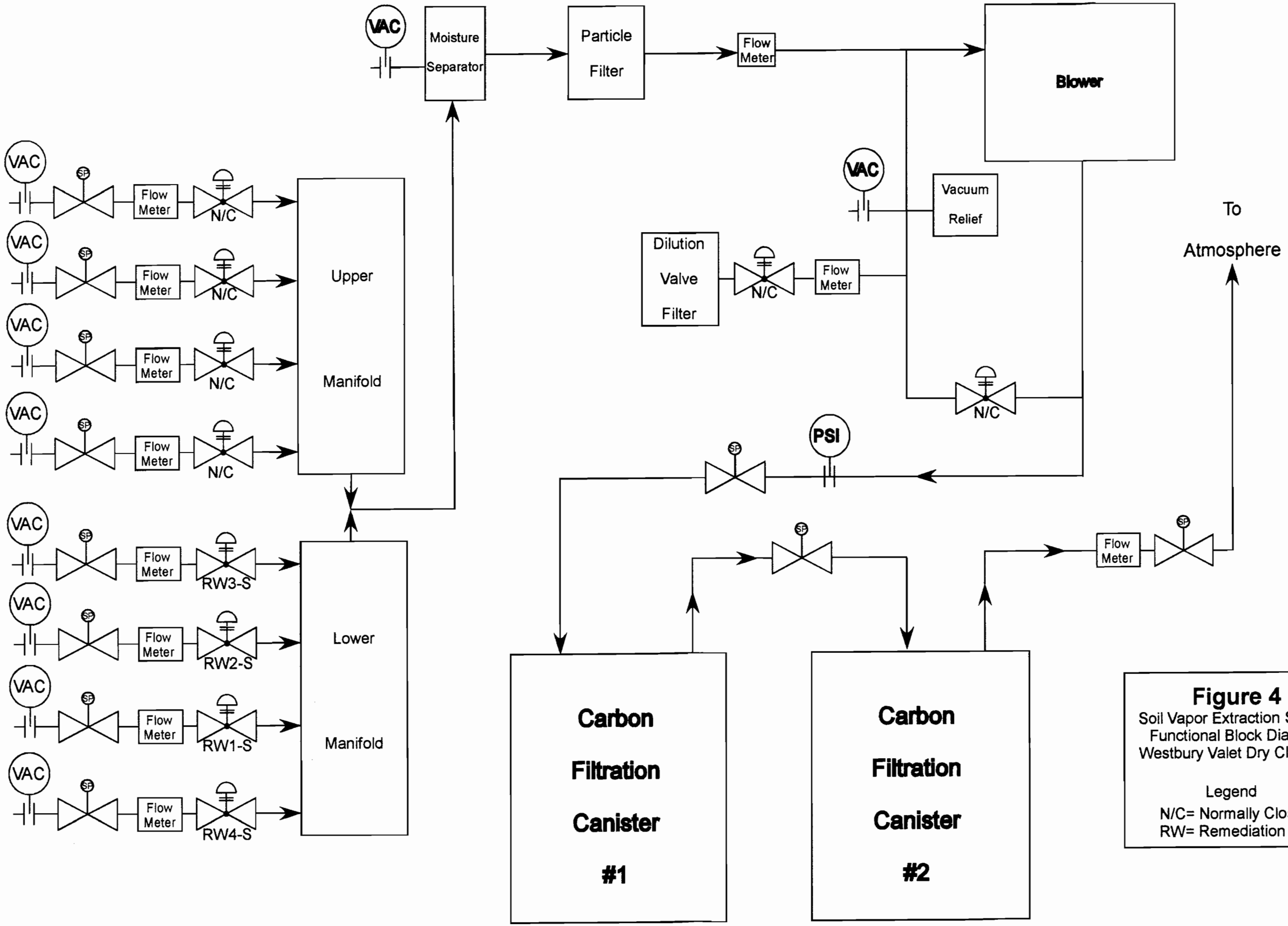
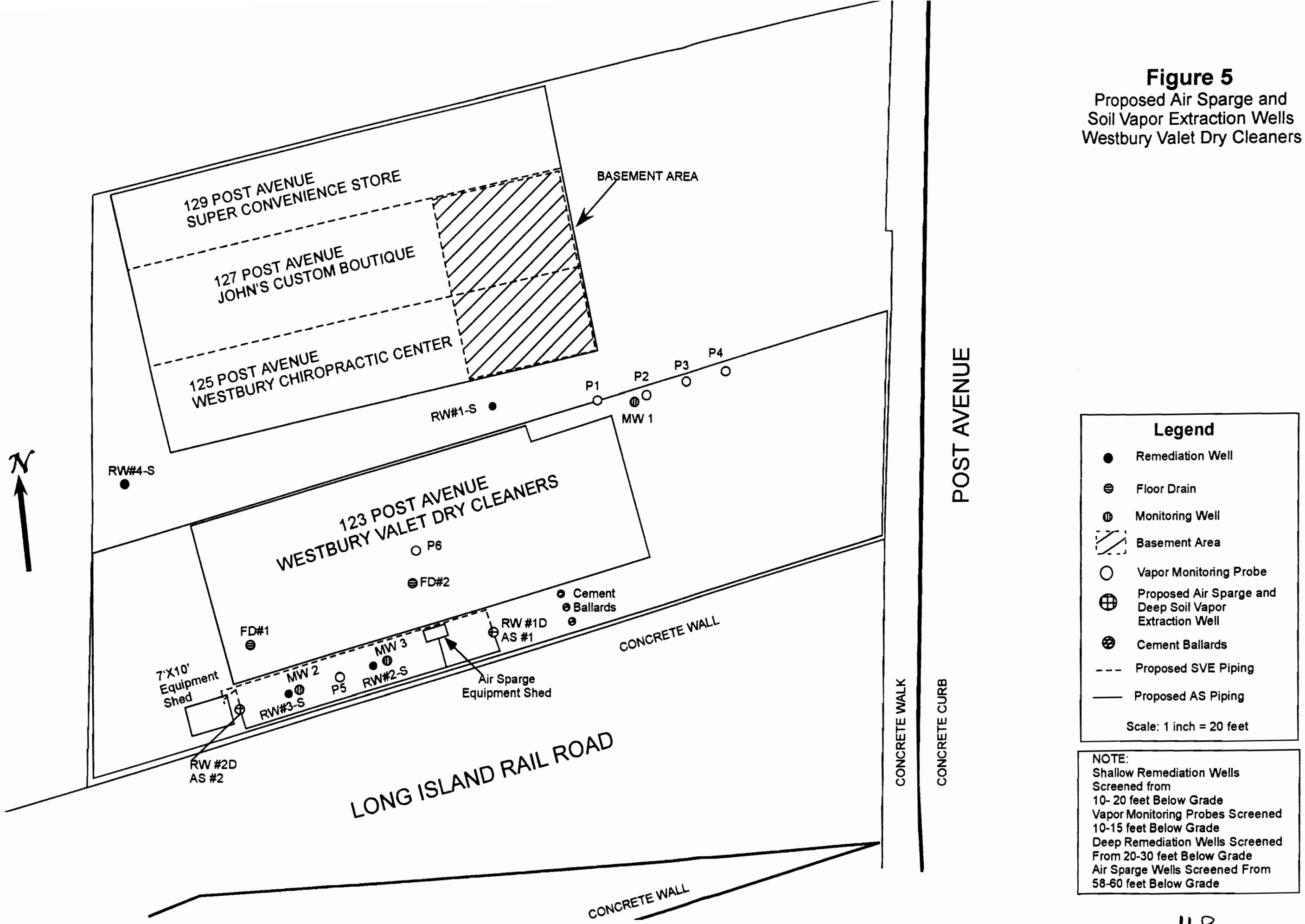


Figure 4
Soil Vapor Extraction System
Functional Block Diagram
Westbury Valet Dry Cleaners

Figure 5

Proposed Air Sparge and
Soil Vapor Extraction Wells
Westbury Valet Dry Cleaners



Legend

- Remediation Well
- Floor Drain
- Monitoring Well
- Basement Area
- Vapor Monitoring Probe
- Proposed Air Sparge and Deep Soil Vapor Extraction Well
- Cement Ballards
- Proposed SVE Piping
- Proposed AS Piping

Scale: 1 inch = 20 feet

NOTE:
Shallow Remediation Wells
Screened from
10- 20 feet Below Grade
Vapor Monitoring Probes Screened
10-15 feet Below Grade
Deep Remediation Wells Screened
From 20-30 feet Below Grade
Air Sparge Wells Screened From
58-60 feet Below Grade

Electrical power for the SVE blower is supplied from a dedicated distribution panel located inside the SVE shed.

Periodically, AEL various measurements on parameters of the SVE system and has determined that Radius of Influence (ROI) of the operating system is approximately 50-feet. The ROI of each extraction well is indicated by dashed circles in Figure 6.

5.0 SVES Pulsed Mode Operation

AEL plans to turn electrical power to the SVES off and on for three different pulsing cycles. The three cycles are described as follows:

Cycle 1:	SVES power OFF for one month	SVES power ON for one month
Cycle 2:	SVES power OFF for two months	SVES power ON for one month
Cycle 3	SVES power OFF for three months	SVES power ON for one month

AEL is aware that New York State Department of Health (NYSDOH) has been sampling ambient air at offsite locations on a monthly basis. Therefore, AEL will coordinate pulsing activities with NYSDOH each time that power to the SVES is scheduled for turn OFF/ON. The worst case scenario for ambient air measurements is assumed to be just before the SVES power is turned ON after a period of being OFF.

Monitoring During SVES Operation

The existing Operation and Maintenance (O&M) Checklist for SVE will be used to monitor SVES operation. Within one week after the SVES power is turned ON the checklist will be used to appraise the system parameters. On the day that the SVES power is scheduled to be turned OFF the checklist will again be used to appraise the system parameters. A copy of the O&M Checklist is in Appendix 3.

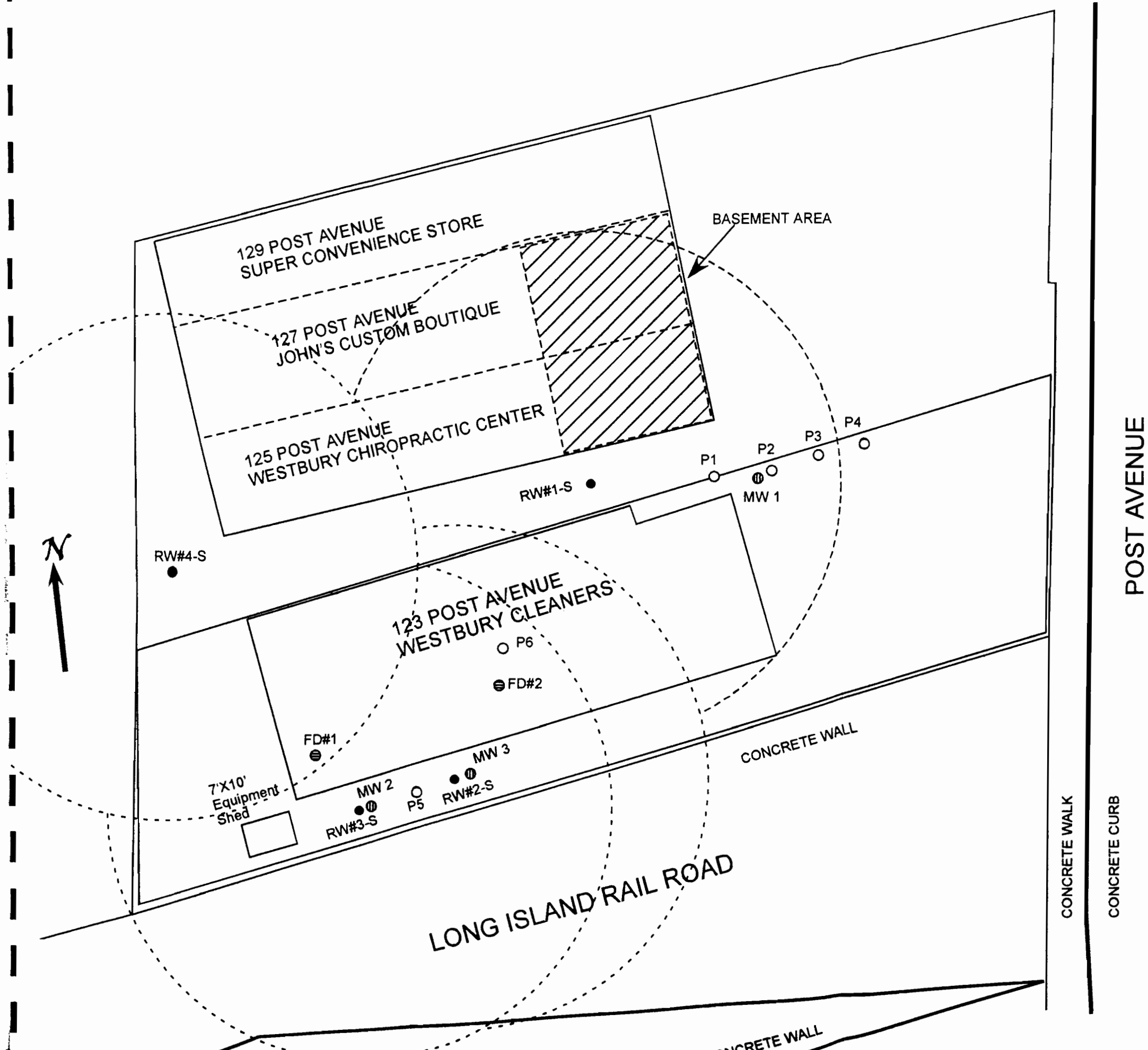
In addition, Tedlar air sampling bags will be collected before and after the air purification canisters whenever the O&M Checklist is used. The sampling bags will be delivered to Environmental Testing Laboratories, Inc., Farmingdale, New York, where they will be analyzed for concentrations of volatile organic compounds (VOCs) using EPA Method 8260.

Reports

A monthly report will be delivered to NYSDEC on the 15th of each month and will summarize the SVES activities for the previous month. The report will include all newly available laboratory analytical reports and AEL's interpretation of the data and field measurements collected using the O&M Checklist.

Figure 6

Radius of Influence
(for 50-feet ROI)
Westbury Valet Dry Cleaners



Legend

- Remediation Well
- Floor Drain
- Monitoring Well
- Radius of Influence
- Basement Area
- Vapor Monitoring Probe

Scale: 1 inch = 20 feet

NOTE:
Remediation Wells Screened from 10- 20 feet Below Grade
Vapor Monitoring Probes Screened From 10-15 feet Below Grade

12A

Cycle 3 Completion
Cycle 3 begins with the SVES power being turned OFF for three months and ends with the SVES power being ON for one month. If the O&M Checklist measurements and laboratory analytical reports indicate that no emission rebounding has occurred and the SVES VOCs emissions continue to remain at minimum concentrations, AEL will petition NYSDEC for site closure.

If the indoor air samples collected by NYSDOH show a significant rebound at the end of and OFF cycle, AEL will resume the operational sequence of the previous cycle. For example, if the air samples collected during the 2-month OFF period of Cycle 2 shows a significant rebound in VOC concentrations, AEL will immediately restart the SVES and return to Cycle 1 parameters. If Cycle 1 operation results in a similar rebound, continuous, non-pulsed mode operation of the SVES will be resumed.

Similarly, if the soil vapor concentrations show a significant rebound immediately after the system has been restarted following a particular cycle's shutdown period, AEL will resume the operational sequence of the previous cycle. If Cycle 1 operation results in a similar rebound, continuous, non-pulsed operation of the SVES will be resumed.

6.0 Maintenance and Monitoring Schedule for SVES Pulsed Mode Operation

6.1 Introduction
The Operations and Maintenance (O&M) section describes the operation of the SVES in pulsed mode at the Westbury Valet Dry Cleaners facility located at 123 Post Avenue, Westbury, New York. The O&M section addresses, component by component, the standard maintenance needed to operate the system according to equipment manufacturer's recommendations.

6.2 Maintenance Procedures

General

- The door to the equipment shed should be opened monthly and a brief check should be performed for possible air leaks, vacuum leaks, excessive temperatures, freezing conditions or other equipment related issues.

SVE Regenerative Blower

Monthly

- Check vacuum gauge at inlet and record value.

- Check rainwater reservoir at bottom of stack and drain as needed.

Moisture Knock-Out Drum

Monthly

- The liquid level in the drum should be checked once a month. Turn off the power to the blower using the circuit breakers marked on the electric panel. Place a container in front of the drain valve at the bottom of the drum and open the drain valve. If water flows out of the drum, the drum should be drained and the water stored in a suitable container with a water-tight lid. The system can then be restarted. Contact AEL to arrange for the proper disposal of the liquid.
- The moisture knock-out drum contains an air filter to prevent sediment from entering the blower. The filter should be checked every 6 months or after a significant increase in the measured vacuum at the inlet to the blower. The filter element should be either cleaned or replaced depending on the condition of the element.

Vacuum Relief Valve

- There are no periodic maintenance procedures recommended by the manufacturer.

Carbon Canisters

- The sampling ports on the discharge side of the blower should be monitored monthly using a PID meter and the values recorded. The pre-carbon, mid-carbon, and post carbon sampling ports will be monitored using a PID. Once the meter indicates breakthrough of the carbon, AEL should be contacted to arrange for replacement of the unit. Frequently, only one canister must be replaced at a time. Carbon canister breakthrough may also be indicated by the laboratory analysis of the air bag samples collected on a monthly schedule.
- There are no periodic maintenance procedures recommended by the manufacturer.

6.3 Records, Monitoring and Sampling

6.3.1 Records and Monitoring

A copy of the log sheet for the SVES at Westbury Valet Dry Cleaners is contained in Appendix 3. Blank copies of this log sheet will be placed in the SVE system equipment shed on a clip board. Completed copies of the log sheet will be returned to the AEL office where they will be placed in a dedicated file for future reference. Using the log sheets, the following information will be recorded.

Information	Frequency
Vacuum of blower	Monthly during pulsed mode operation
PID readings of vapor discharge	Monthly during pulsed mode operation
Any repairs, maintenance or adjustments as needed	

6.3.2 Sampling

Soil Vapor

- AEL will collect Tedlar air bag samples of the extracted soil vapor on a monthly schedule until the laboratory results for these samples indicate that a schedule change is warranted. At that time, the NYSDEC will be petitioned for a sampling schedule change. The samples will be analyzed for concentrations of VOCs including tetrachloroethylene using EPA Method 8260.

Groundwater

- The groundwater samples require the use of portable pumps. These sample collections will be performed by AEL on a quarter year schedule. The samples will be analyzed for concentrations of VOCs including tetrachloroethylene using EPA Method 8260.

Reporting

- The soil vapor and groundwater laboratory data will be summarized in quarterly reports that will be submitted to the NYSDEC. The reports will include tables and/or graphs presenting the baseline concentrations measured before startup of the system and the quarterly results acquired thereafter.

7.0 SVES Pulsed Mode Operation Monitoring and Termination Criteria

The monitoring schedule was developed for the operation and maintenance of the SVES during pulsed mode operation. Evaluation of historical plots of the data generated during the operation of this equipment will be used by NYSDEC and AEL to determine when it is appropriate to shut off the remediation equipment.

7.1 SVE Unit Monitoring and Termination Criteria

An initial "baseline" soil vapor sample will be collected of the untreated vapor stream between the exhaust side of the blower and the inlet side of the air purification canisters using a Tedlar air sampling bag. The air bag will be delivered to an ELAP-approved laboratory, where the vapor in the bag will be analyzed for concentrations of VOCs including tetrachloroethylene and its degradation products using EPA Method 8260. In addition, a PID meter will be used to screen the amount of total VOCs in the untreated air stream.

The PID that AEL plans to use during this remediation activity is manufactured by Thermo Environmental, OVM / Datalogger Model 580B. Selected sections of the Model 580B are presented in Appendix 4.

The PID will be used to measure and record total concentrations of VOCs within five (5) days after the SVES is turned ON after a pulsed mode OFF period.

Within one month of a SVES pulsed mode ON period PID readings will be collected to evaluate the progress of the cleanup activity. In addition to the PID readings, Tedlar air bag samples will be collected on a monthly basis until the laboratory analysis of the samples indicate that a change in sampling schedule is warranted. At that time, the NYSDEC will be petitioned for a change in sampling schedule.

As the operation of the SVE unit progresses, the PID data and the Tedlar air bag sample laboratory analysis will be plotted versus time of operation on graphs. Depending upon the concentration of total VOCs measured after the pulsing activity, the NYSDEC may be petitioned to suspend operation.

An asymptotic condition shall be defined as three consecutive quarterly concentrations with a net decrease of 10 percent or less of total VOCs. Graphs of the concentration of total VOCs versus time will be compiled after each round of monthly monitoring.

After the NYSDEC permits the suspension of system operation, a soil boring will be placed adjacent to each shallow SVE extraction well. Soil samples will be collected at 15 to 17-feet, 20 to 22-feet, 25 to 27-feet below grade and analyzed for concentrations of chlorinated VOCs. If the concentration of tetrachloroethylene and its degradation products in these samples do not exceed the NYSDEC TAGM Soil Cleanup Objectives,

the system will remain off and the cleanup of the unsaturated zone will be deemed complete. If the levels exceed the Cleanup Objectives, the SVE system will be restarted and the monitoring program will continue. The same criteria will be used to determine when additional soil samples should be collected.

8.0 References

- AEL, April 26, 2001 Interim Remedial Measure Work Plan
- Dvirka and Bartilucci, December 2000. Remedial Investigation/Feasibility Study Work Plan, Operable Unit II 123 Post Avenue, Westbury, Nassau County, New York.
- AEL, December 2000. Remedial Investigation Report.
- AEL, August 30, 2000. Remedial Investigation/Feasibility Study Work Plan.
- AEL, May 30, 1999. Environmental Investigation of Class V Well.

9.0 Health and Safety Plan

The health and safety plan currently in effect at the site will continue during the performance of the described work.

10.0 Quality Assurance Plan

The quality assurance plan currently in effect at the site will continue during the performance of the described work.

11.0 Citizen's Participation Plan

The citizens' participation plan currently in effect at the site will continue during the performance of the described work.

Appendix 1

NYSDEC and AEL Letters Concerning SVES Pulsed Mode Operation

ANSON ENVIRONMENTAL LTD.

771 New York Avenue
Huntington, New York 11743
631-351-3555
Fax: 631-351-3615
www.AnsonLtd.com

August 1, 2002

Thomas Gibbons
Bureau of Eastern Remedial Action
NYSDEC
625 Broadway 11th Floor
Albany, NY 12233-7015

Re: Soil Vapor Extraction System Termination
Westbury Valet Cleaners- 123 Post Ave
Site Id # 130088
Operable Unit 1

Dear Mr. Gibbons,

AEL has reviewed the NYSDOH indoor air sampling results, the laboratory data for the SVES air sampling as well as the field meter (OVM) data from the SVES. Based on this data (see attached charts), AEL recommends that operation of the system temporarily be terminated. The operation of the system will be re-evaluated after the quarterly round of NYSDOH perc badge data is reviewed in October 2002.

Anson Environmental Ltd. (AEL) recommends terminating the operation of the soil vapor extraction system (SVES) at the above referenced site.

AEL will notify the NYSDEC of the schedule for the collection of on-site groundwater samples in September. If the increase of perc is detected during either of these sampling events AEL will revaluate the operation of the SVES.

If you have any questions please feel free to contact myself at 631-351-3555 x15 or Dean Anson at x12.

Respectively submitted,

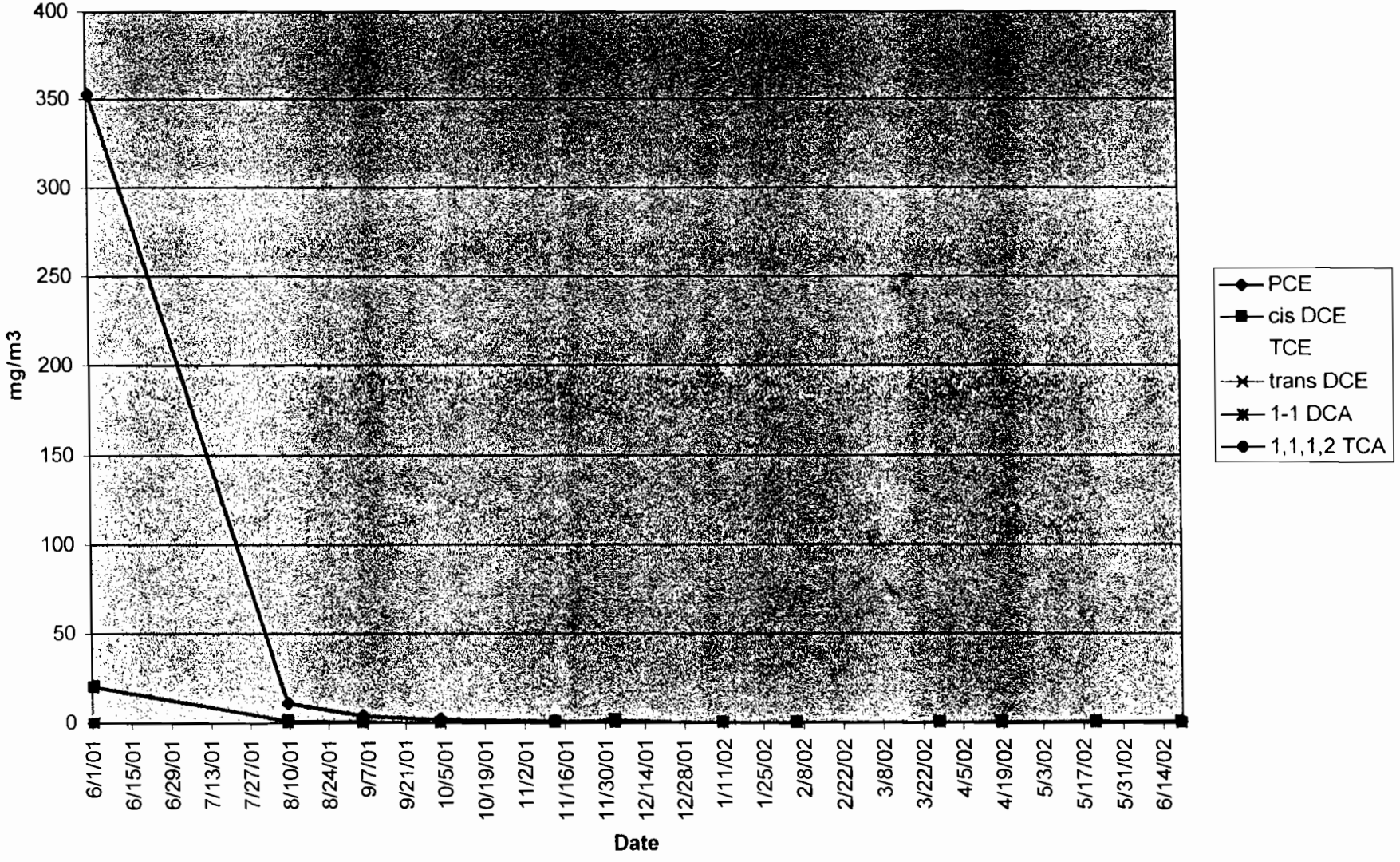
Matthew F. Schieferstein
Environmental Scientist

123 Post Ave (ID #130088)
NCDH Indoor Air Sampling for Tetrachloroethene
February, March, April, May and June 2001

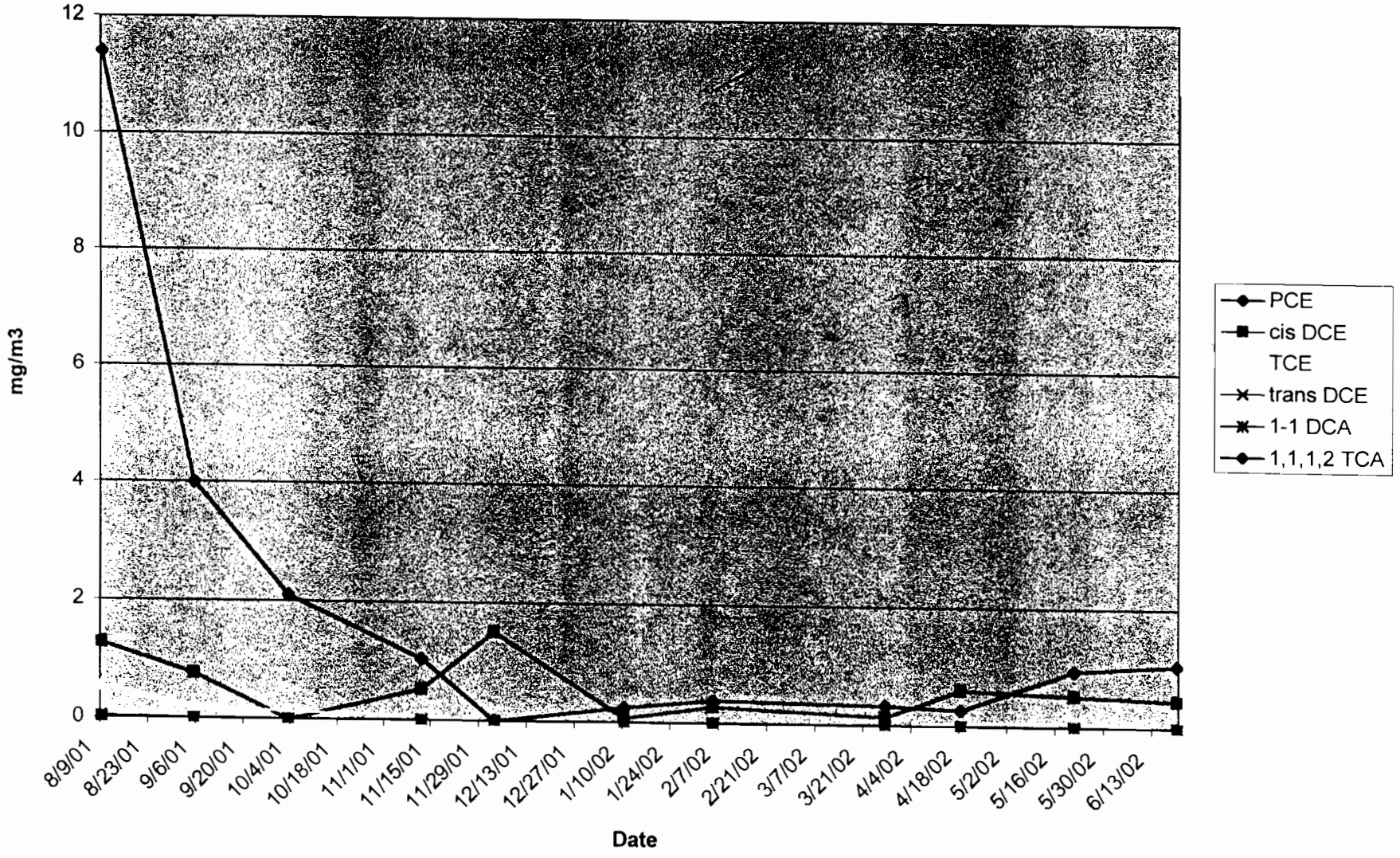
Sampling location		Result (mcg/m³) 02/20-21/2001	3/27-28/2001	4/18-19/2001	5/16-17/2001	6/27-28/2001	9/10-11/2001	11/29-30/2001	3/19-20/2002	6/12-14/2002
Westbury Chiropractic Center	125 Post Ave.									
1st Floor Waiting Room		1,520 and 1,580	NS	NS	192	44	NS	NS	5 and 5	14 and 14*
1st Floor Rear Office		1,770	NS	NS	192	50	NS	NS	5	NS
Super Super Convenience Store	129 Post Ave.									
1st Floor Counter Area		400	NS	NS	NS	14	NS	7	5 [PL]	7
Rear of Store		NS	NS	NS	45.3	NS	NS	NS	NS	NS
Common Basement		1,900 and 1,930	NS	NS	831 and 1,020	86 and 96	NS	15 and 16	5 and 8 [SU]	20
John's Custom Tailor	127 Post Ave.									
1st Floor Work Room		NS	1540	NS	203	NS	NS	NS	NS	NS
1st Floor Near Counter		NS	NS	NS	NS	51	NS	10	7	20
Westbury Terrace Condominiums	135 Post Ave.									
1st Floor - Manager's Office		NS	500	NS	NS	NS	NS	NS	NS	NS
1st Floor Workshop		NS	NS	29.3	3.2	NS	NS	NS	NS	NS
1st Floor - Hall Outside Supt's Apt.		NS	NS	664	NS	NS	NS	8	NS	NS
Boiler Room, South Wing		NS	< 5	NS	NS	NS	NS	NS	NS	NS
1st Floor Lobby		NS	95	NS	61.6	5 [PL]	NS	16	8	2
6th Floor Stairwell Landing		NS	NS	NS	93.6	5 [PL]	NS	9	5 [PL]	NS
Hallway outside Apt. 3R		NS	NS	NS	66.4	5 [PL]	NS	5	5 [PL]	NS
Apt. 2R - Living Room		NS	NS	NS	5.1	NS	NS	NS	NS	NS
1st Floor Meter Room		NS	NS	NS	6.3 and 5.4	NS	NS	NS	NS	NS
Gomez Residence	135 Post Ave.									
1st Floor - Supt's Living Room		NS	7,300	7,400	464	12	10	NS	9 and 10	5 and 6*
1st Floor - Daughter's Bedroom		NS	NS	NS	233	NS	12	NS	NS	NS
1st Floor - Supt's Master Bedroom		NS	NS	4,800	NS	17	12	NS	12	7
1st Floor - 3rd (Far) Bedroom		NS	NS	NS	NS	11	NS	NS	9	7
Selassel Residence	125A Post Ave.									
2nd Floor Kitchen		NS	750	NS	98.8	7	NS	NS	NS	NS
Hernandez Residence	125B Post Ave.									
2nd Floor Bedroom		NS	700	NS	NS	18	NS	NS	NS	14
Outdoor sample		15	15 and 16	NS	1.4	5 [PL]	NS	5 [PL]	5 [PL]	3
Trip Blank		0.008 mcg	0.01 mcg	0.17 mcg	0.015	0.01 mcg	0.02 mcg	< 0.01 mcg	0.01 mcg	NS

Notes: The symbol "<" means "less than." A concentration preceded by this symbol means that the compound was not detected in the sample.
The [PL] notation indicates that the compound was present in the sample, but at a concentration less than the detection limit.
The [SU] notation indicates that the reported concentration is suspect.
* Duplicate sample.

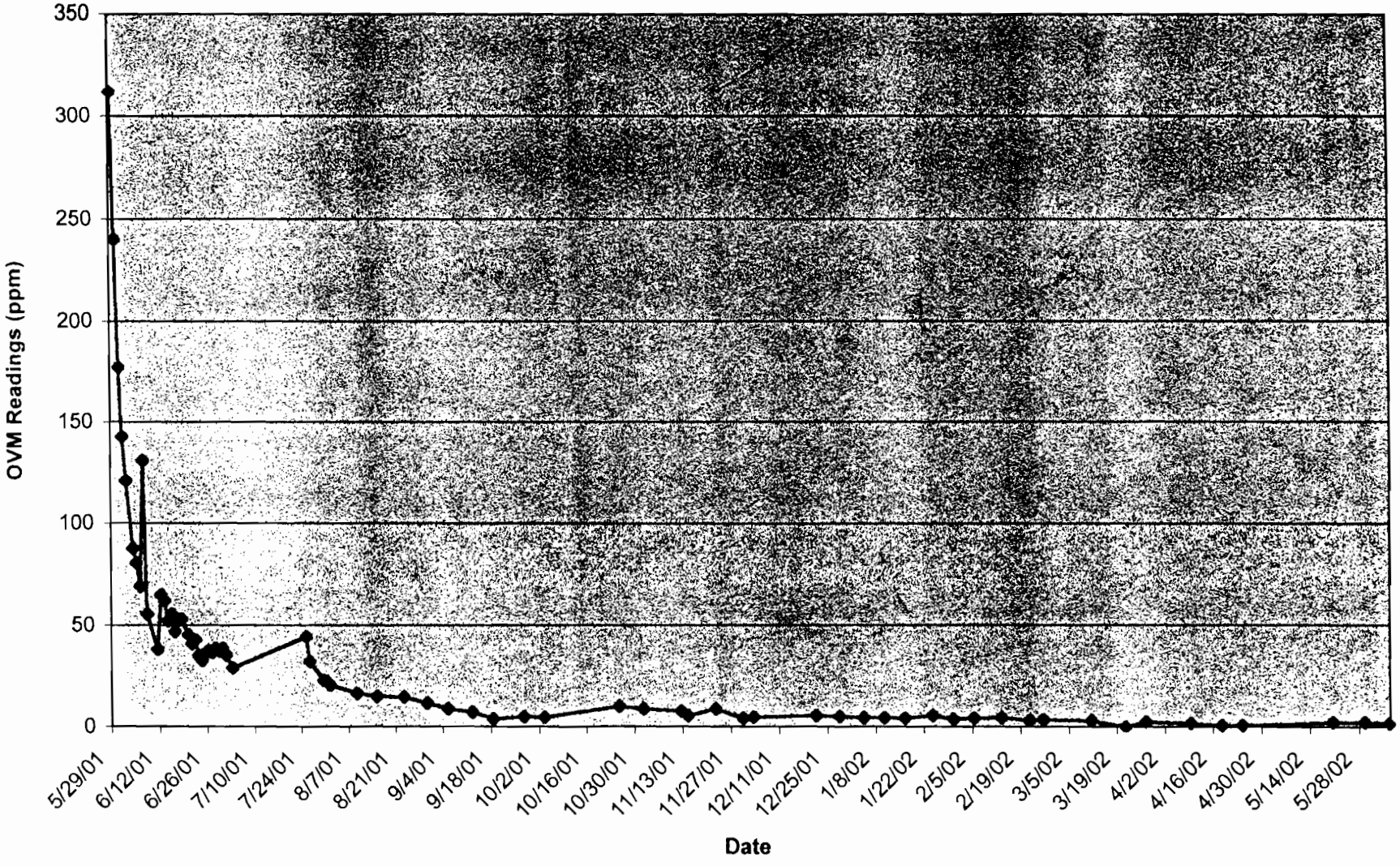
Air Bag Chart (mg/m3)



Air Bag Chart (mg/m3)



Pre-Carbon OVM Readings (ppm)



New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Eastern Remedial Action, 11th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9622 • **FAX:** (518) 402-9022
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

August 9, 2002

Mr. Dean Anson II
Anson Environmental LTD
771 New York Avenue
Huntington, New York 11743

Re: 123 Post Avenue Site
Westbury Valet Cleaners (130088)
Operable Unit 1
Operation of SVE System

Dear Mr. Anson:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed your August 1, 2002 request to terminate operation of the soil vapor extraction (SVE) system for Operable Unit 1 (OU-1) of the 123 Post Avenue (Westbury Valet Cleaners) site.

The most recent indoor air data, dated June 2002, and most recent SVE influent data, dated June 2002, indicates that the SVE system, under the current operational parameters, has achieved asymptotic conditions. At this stage of the remedial process, it must be determined if permanent system shutdown conditions have been reached. When data indicates that asymptotic removal rates may have been achieved, the remedial treatment system is "pulsed" (cycled on and off for specific time periods) to evaluate the influence that a period of inactivity has on contaminant concentrations, and how quickly the system can equalize to the pre-shutdown concentrations when it is restarted. If concentrations increase when the system is restarted after a period of shutdown, additional operation is indicated. If concentrations do not increase and the system is no longer removing significant levels of contaminants, NYSDEC may elect to shut the system down. At the point when system performance has achieved asymptotic conditions, collection of soil samples from borings drilled in the source area, and comparison to Recommended Soil Cleanup Objectives (RSCOs) is required. If soil samples are below RSCOs, NYSDEC may elect to shut the system down. If RSCOs are not achieved, further remedial action will likely be necessary. This may include continued system operation or, if necessary, system optimization (system modifications, additional wells, etc.) until RSCOs are achieved.

The operation of this "pulsed" phase of the SVE remedial system should be coordinated with the quarterly indoor air sampling program such that indoor air sampling events occur during "worse-case" indoor air conditions. These conditions will most likely be achieved at the end of the shutdown cycle, right before the SVE system is pulsed on.

Please submit a work plan to address this next remedial phase of the 123 Post Avenue Interim Remedial Measure (IRM). In addition to submitting three copies to my attention, please forward copies of this revised document directly to NYSDOH to the attention Rebecca Mitchell and the Nassau County Department of Health (NCDOH) to the attention of Mike Alarcon. In the meantime, if you have any questions, don't hesitate to call me at 518-402-9622.

Sincerely,

Thomas Gibbons
Remedial Section C
Bureau of Eastern Remedial Action
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
M. Mason
T. LeBarron
A. Tamuno (DEE, Tarrytown)
R. Mitchell (NYSDOH)
M. Alarcon (NCDOH)
W. H. Choe (Westbury Cleaners)

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August 15, 2002

Mr. Thomas Gibbons
NYSDEC
Remedial Section C
Division of Environmental Remediation
Bureau of Eastern Remedial Action, 11th Floor
625 Broadway
Albany, New York 12233-7015

Subject: Site ID No. 13-0-088
Westbury Valet Cleaners
Operable Unit 1
123 Post Avenue
Westbury, New York 11590

Reference: NYSDEC letter to Dean Anson II dated August 9, 2002

Dear Mr. Gibbons:

The referenced letter requests that Anson Environmental Ltd. (AEL) develop a plan to pulse the Soil Vapor Extraction System (SVES) installed at the subject site. This letter describes the AEL methodology that will be used during the SVES pulsing period.

AEL proposes to turn electrical power to the SVES off and on for three different pulsing cycles. The three cycles are described as follows:

Cycle 1:	SVES power OFF for one month	SVES power ON for one month
Cycle 2:	SVES power OFF for two months	SVES power ON for one month
Cycle 3	SVES power OFF for three months	SVES power ON for one month

AEL is aware that New York State Department of Health (NYSDOH) has been sampling ambient air at offsite locations on a monthly basis. Therefore, AEL will coordinate pulsing activities with NYSDOH each time that power to the SVES is scheduled for turn OFF/ON. The worst case scenario for ambient air measurements is assumed to be just before the SVES power is turned ON after a period of being OFF.

Monitoring During SVES Operation
The existing Operation and Maintenance (O&M) Checklist for SVE will be used to monitor SVES operation. One week after the SVES power is turned ON the checklist will be used to appraise the system parameters. On the day that the SVES power is scheduled to be turned OFF the checklist will again be used to appraise the system parameters. A copy of the O&M Checklist is in Attachment 1.

In addition, Tedlar air sampling bags will be collected before and after the air purification canisters whenever the O&M Checklist is used. The sampling bags will be delivered to Environmental Testing Laboratories, Inc., Farmingdale, New York, where they will be analyzed for concentrations of volatile organic compounds (VOCs) using EPA Method 8260.

Reports
A monthly report will be delivered to NYSDEC on the 15th of each month and will summarize the SVES activities for the previous month. The report will include all newly available laboratory analytical reports and AEL's interpretation of the data and field measurements collected using the O&M Checklist.

Cycle 3 Completion
Cycle 3 begins with the SVES power being turned OFF for three months and ends with the SVES power being ON for one month. If the O&M Checklist measurements and laboratory analytical reports indicate that no emission rebounding has occurred and the SVES VOCs emissions continue to remain at minimum concentrations, AEL will petition NYSDEC for site closure.

If you have any questions about this or any other matter, please call me at 631-351-3555, extension 12.

Very truly yours,

Dean Anson II

Attachment 1: O&M Checklist For SVE

Copies: Rebecca Mitchell, NYSDOH
Mike Alarcon, NCDOH

123 Post Ave
Westbury, NY 11590

O&M CHECKLIST FOR SVE

Date _____ Inspected By: _____

Control Panel	Arrival	Departure
System	On / Off	On / Off
SVE Relief Valve	Open / Closed	cfm

SVE SYSTEM INSIDE TRAILER

Was Moisture Separator Emptied?	Yes / No
Moisture Disposal Drum	F / 75 / 50 / 25 / E

SVE WELL READINGS (INSIDE TRAILER)

SVE WELL #	Flow	PID Readings	Vacuum	Ball Valve
RW1-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW2-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW3-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW4-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW1-D	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW2-D	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C

SVE SYSTEM FLOW

	Pre-Blower	Post Blower	Exhaust	Moisture Separ.
Vacuum	inch of water			inch of Water
Pressure		psi		
Flow	cfm	cfm	cfm	

CARBON SYSTEM

	Pre-Carbon	Between Carbon	Post Carbon	Notes
PID	ppm	ppm	ppm	
Temp	degrees F	degrees F	degrees F	

SVE Radius of Influence

Piezometer ID	Vacuum (inches of water)	Piezometer ID	Vacuum (inches of water)	Notes
P-1		P-6		
P-2		MW # 1		
P-3		MW # 2		
P-4		MW # 3		
P-5				

ATTACHMENT 1

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Eastern Remedial Action, 11th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9622 • **FAX:** (518) 402-9022
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

August 21, 2002

Mr. Dean Anson II
Anson Environmental LTD
771 New York Avenue
Huntington, New York 11743

Re: 123 Post Avenue Site
Westbury Valet Cleaners (130088)
Operable Unit 1
Operation of SVE System

Dear Mr. Anson:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed your August 15, 2002 response to our August 9, 2002 request to develop a work plan for pulse pumping of the soil vapor extraction (SVE) system currently operating at Operable Unit 1 (OU-1) of the 123 Post Avenue (Westbury Valet Cleaners) site. The Department's August 9, 2002 letter was in response to AEL's August 1, 2002 request to terminate operation of the SVE system.

AEL's August 15, 2002 proposal is acceptable unless the following conditions arise:

1. If indoor air data shows a significant rebound at the end of an off cycle, AEL must resume the operational sequence of the previous cycle. For example, if the air samples collected during the 2-month off period of Cycle 2 show a significant rebound in VOC concentrations, AEL should immediately restart the SVE system and return to Cycle 1 parameters. If Cycle 1 operation results in a similar rebound, continuous, non-pulsed operation should be resumed.

2. Similarly, if soil vapor concentrations show a significant rebound immediately after the system has been restarted following a particular cycle's shutdown period, AEL should resume the operational sequence of the previous cycle. If Cycle 1 operation results in a similar rebound, continuous, non-pulsed operation should be resumed.

3. The August 15, 2002 proposal does not include the required soil sampling as outlined in the Department's letter of August 9, 2002. Soil sampling is required as stated in this letter as follows:

"At the point when system performance has achieved asymptotic conditions, collection of soil samples from borings drilled in the source area, and comparison to Recommended Soil Cleanup Objectives (RSCOs) is required. If soil samples are below RSCOs, NYSDEC may elect to shut the system down. If RSCOs are not achieved, further remedial action will likely be necessary. This may include continued system operation or, if necessary, system optimization (system modifications, additional wells, etc.) until RSCOs are achieved."

Prior to any change in the operational parameters as proposed in your letter of August 15, 2002, AEL must provide NYSDEC with all analytical data and a justification for either advancing to the next cycle or petitioning for system shutdown. The Department will evaluate this information to determine whether the conditions have been met for advancing to the next operational stage, including system shutdown.

Please submit a revised work plan to address the above comments. In addition to submitting three copies to my attention, please forward copies of this revised document directly to NYSDOH to the attention Rebecca Mitchell and the Nassau County Department of Health (NCDOH) to the attention of Mike Alarcon. In the meantime, if you have any questions, don't hesitate to call me at 518-402-9622.

Sincerely,

Thomas Gibbons
Remedial Section C
Bureau of Eastern Remedial Action
Division of Environmental Remediation

cc: R. Cozzy/File
T. Gibbons
M. Mason
T. LeBarron
A. Tamuno (DEE, Tarrytown)
R. Mitchell (NYSDOH)
M. Alarcon (NCDOH)
W. H. Choe (Westbury Cleaners)

Appendix 2

Construction Details

For

Groundwater Monitoring Wells

Soil Vapor Extraction Wells

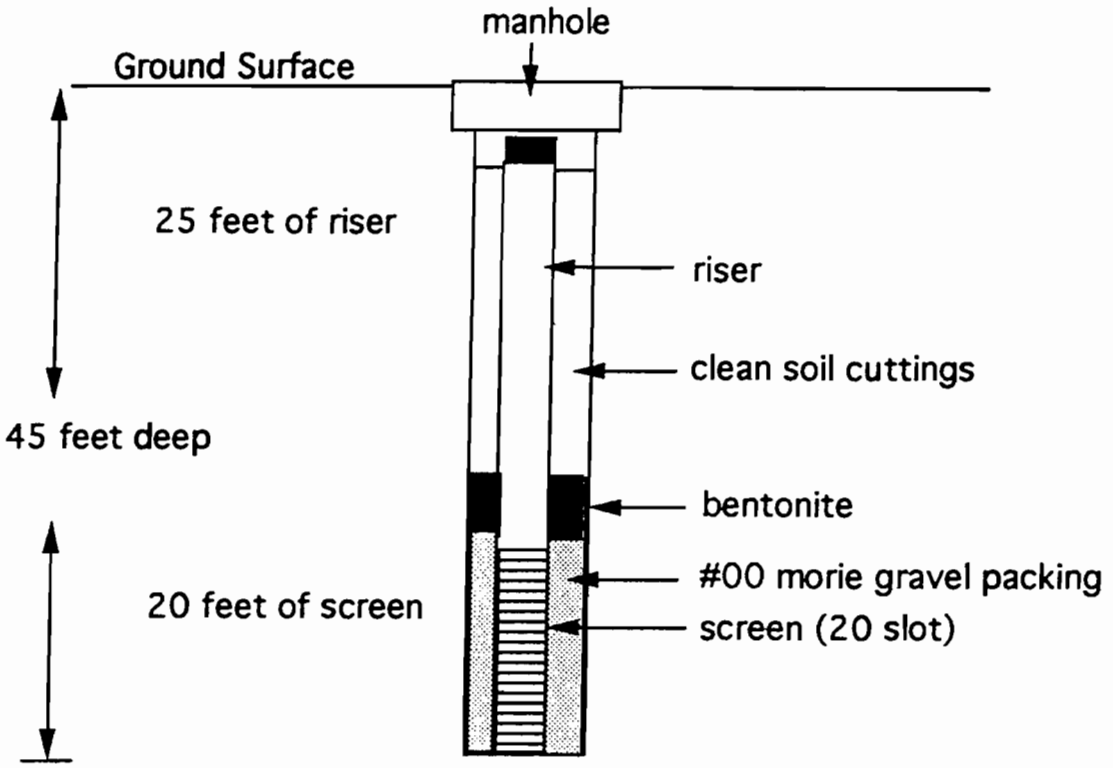
Vapor Monitoring Piezometers

Construction Details For
Groundwater Monitoring Wells and
Soil Vapor Extraction Wells
Westbury Valet Dry Cleaners

Well ID #	Vapor or Monitoring	Total Depth	Screen Interval (s)	Slot Size	Date Installed	Intermediate Seals/Depths
MW # 1	Monitoring Water	40.55 ft bgs	25-40.55 ft	# 20	3/17/99	# 2 Morie/40.55-25 ft Gravel Pack/ 25-23 ft Clean Cuttings to Grade
MW # 2	Monitoring Water	44.21 ft bgs	25-44.21 ft	# 20	3/17/99	# 2 Morie/44.21-25 ft Gravel Pack/ 25-23 ft Clean Cuttings to Grade
MW # 3	Monitoring Water	44.6 ft bgs	25-44.6 ft	# 20	3/17/99	# 2 Morie/44.60-25 ft Gravel Pack/ 25-23 ft Clean Cuttings to Grade
RW-1S	Vapor	21 ft bgs	11-21 ft	# 10	7/19/01	# 0 Morie/ 21-9.75 ft # 00 Morie/ 9.75-8.75 ft Bentonite Pellets/ 8.75-7.75 ft 10 Gallons H2O to Hydrate Pellets # 00 Morie/ 7.75-6.75 ft Bentonite Slurry/ 5.75-2.5 ft Clean Sand to Grade
RW-2S	Vapor	21 ft bgs	11-21 ft	# 10	7/19/01	# 0 Morie/ 21-9.5 ft # 00 Morie/ 9.5-9ft Bentonite Pellets/ 9-8ft 10 Gallons H2O to Hydrate Pellets # 00 Morie/ 8-6.25 ft Bentonite Slurry/ 6.25ft-2.5 ft Clean Sand to Grade
RW-3S	Vapor	21 ft bgs	11-21 ft	# 10	7/19/01	# 0 Morie/ 21-10ft # 00 Morie/ 10-8.5 ft Bentonite Pellets/ 8.5-7.0 ft 10 Gallons H2O to Hydrate Pellets # 00 Morie/ 7.0-5.75 ft Bentonite Slurry/ 5.75-2 ft Clean Sand to Grade
RW-4S	Vapor	21t bgs	11-21 ft	# 10	7/19/01	# 0 Morie/ 21-10 ft # 00 Morie/ 10-8ft Bentonite Pellets/ 8-7 ft 10 Gallons H2O to Hydrate Pellets # 00 Morie/ 7-6 ft Bentonite Slurry/ 6-2.5 ft Clean Sand to Grade

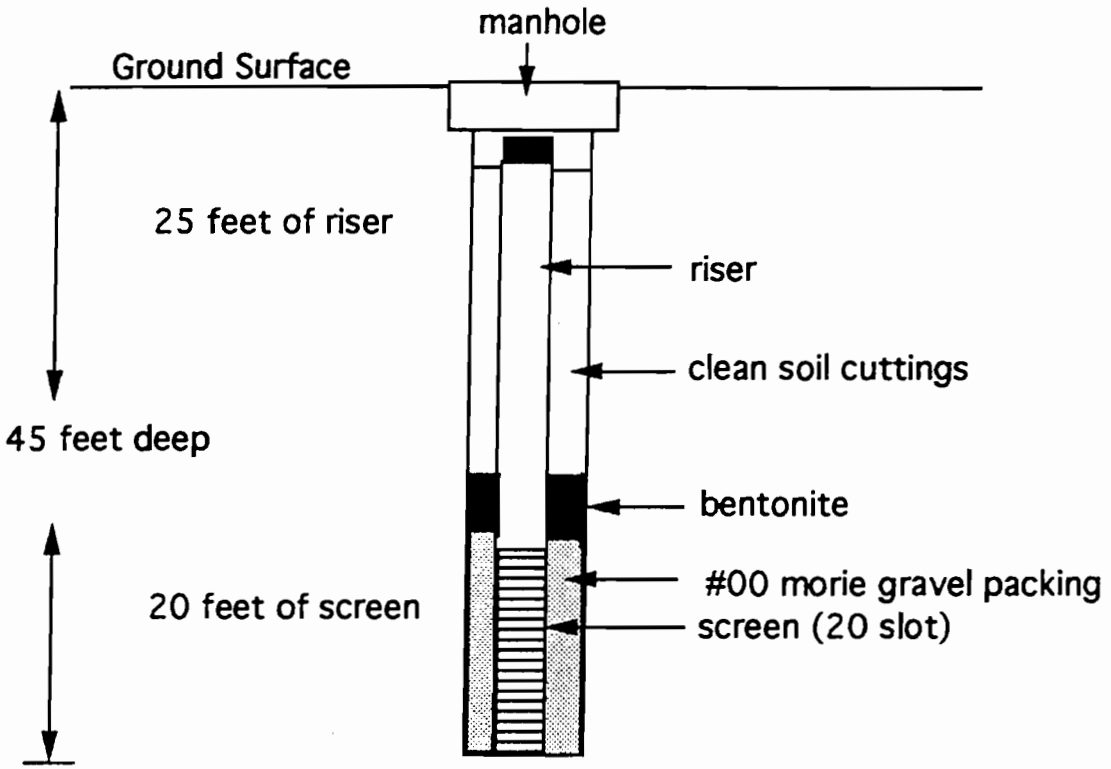
Construction Details For
Vapor Monitoring Piezometers
Westbury Valet Dry Cleaners

Well ID #	Vapor or Monitoring	Total Depth	Screen Interval (s)	Slot Size	Date Installed	Intermediate Seals/Depths
P-1	Monitoring Vapor	15 ft bgs	15-10 ft	# 10	7/20/01	# 0 Morie/ 15-9 ft # 00 Morie/ 9-7.5 ft Bentonite Pellets/ 7.5-6 ft 10 Gallons H2O to Hydrate Pellets Bentonite Slurry/ 6-2 ft Clean Sand to Grade
P-2	Monitoring Vapor	15.5 ft bgs	10.5-15.5 ft	# 10	7/20/01	# 0 Morie/ 15.5-9 ft # 00 Morie/ 9-8 ft Bentonite Pellets/ 8-6 ft 10 Gallons H2O to Hydrate Pellets Bentonite Slurry/ 6-2ft Clean Sand to Grade
P-3	Monitoring Vapor	15.5 ft bgs	10.5-15.5 ft	# 10	7/20/01	# 0 Morie/ 15.5-9 ft # 00 Morie/ 9-8.25 ft Bentonite Pellets/ 8.25-7.50 ft 10 Gallons H2O to Hydrate Pellets Bentonite Slurry/ 7.50-2 ft Clean Sand to Grade
P-4	Monitoring Vapor	15.5 ft bgs	10.5-15.5 ft	# 10	7/20/01	# 0 Morie/ 15.5-8.75 ft # 00 Morie/ 8.75-8.00 ft Bentonite Pellets/ 8-7ft 10 Gallons H2O to Hydrate Pellets Bentonite Slurry/ 7-2 ft Clean Sand to Grade
P-5	Monitoring Vapor	16 ft bgs	11-16 ft	# 10	7/19/01	# 0 Morie/ 16-9.5 ft # 00 Morie/ 9.5-8.5 ft Bentonite Pellets/ 8.5-7.0 ft 10 Gallons H2O to Hydrate Pellets # 00 Moire/ 7.0-5.75 ft Bentonite Slurry/ 5.75-2 ft Clean Sand to Grade
P-6	Monitoring Vapor	14.5 ft bgs	9.5-14.5 ft	# 10	5/10/01	Installed Via Direct Push Bentonite Slurry at Grade



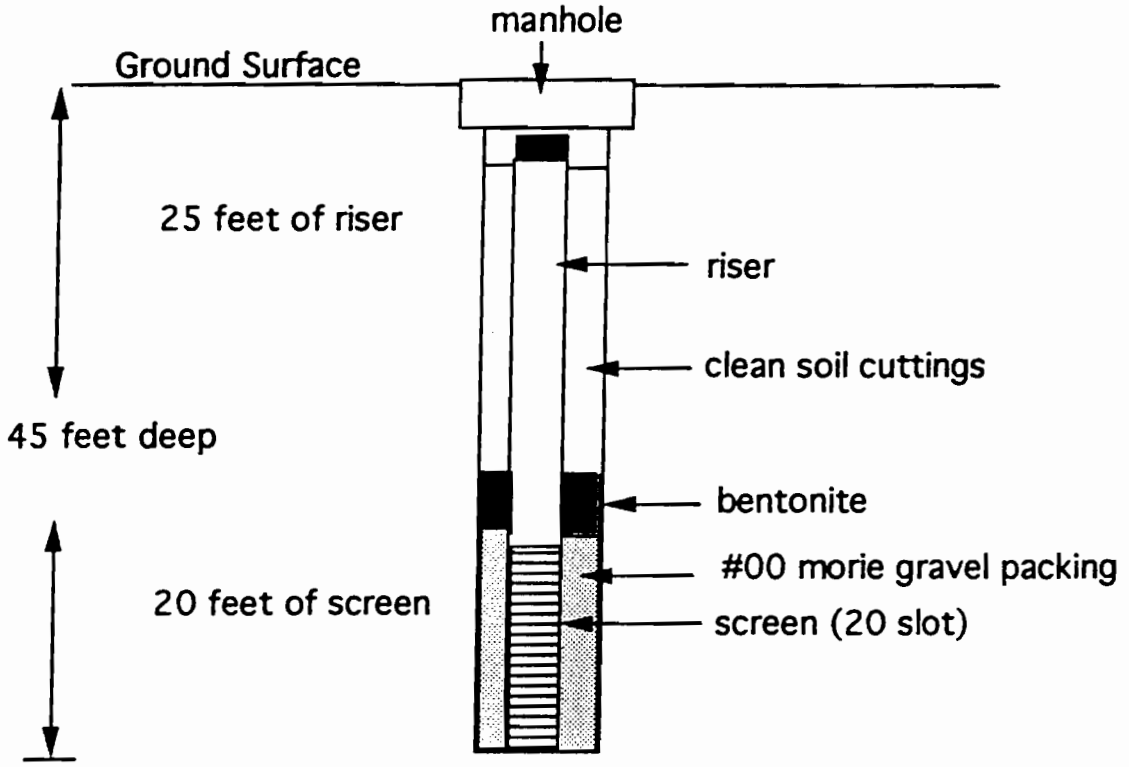
Monitoring Well MW-1 Construction Diagram
Westbury Valet Cleaners
123 Post Avenue
Westbury, New York

Anson Environmental Ltd.



Monitoring Well MW-2 Construction Diagram
Westbury Valet Cleaners
123 Post Avenue
Westbury, New York

Anson Environmental Ltd.



Monitoring Well MW-3 Construction Diagram
Westbury Valet Cleaners
123 Post Avenue
Westbury, New York

Anson Environmental Ltd.

Appendix 3

O & M Checklist for SVE

123 Post Ave
Westbury, NY 11590

O&M CHECKLIST FOR SVE

Date _____ Inspected By: _____

Control Panel	Arrival	Departure
System	On / Off	On / Off
SVE Relief Valve	Open / Closed	cfm

SVE SYSTEM INSIDE TRAILER

Was Moisture Separator Emptied?	Yes / No
Moisture Disposal Drum	F / 75 / 50 / 25 / E

SVE WELL READINGS (INSIDE TRAILER)

SVE WELL #	Flow	PID Readings	Vacuum	Ball Valve
RW1-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW2-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW3-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW4-S	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW1-D	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
RW2-D	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C
	cfm	ppm	inches of Water	O / 75 / 50 / 25 / C

SVE SYSTEM FLOW

	Pre-Blower	Post Blower	Exhaust	Moisture Separ.
Vacuum	inch of water			inch of Water
Pressure		psi		
Flow	cfm	cfm	cfm	

CARBON SYSTEM

	Pre-Carbon	Between Carbon	Post Carbon	Notes
PID	ppm	ppm	ppm	
Temp	degrees F	degrees F	degrees F	

SVE Radius of Influence

Piezometer ID	Vacuum (inches of water)	Piezometer ID	Vacuum (inches of water)	Notes
P-1		P-6		
P-2		MW # 1		
P-3		MW # 2		
P-4		MW # 3		
P-5				

Appendix 4

Instruction Manual

Model 580B OVM / Datalogger

Selected Manual Sections

INSTRUCTION MANUAL

OVM / DATALOGGER

MODEL 580B

Thermo Environmental Instruments, Inc. MODEL 580B

CLASSIFIED BY UNDERWRITERS LABORATORIES, INC.
AS TO ELECTRICAL SHOCK AND EXPLOSION HAZARD ONLY FOR USE IN
CLASS 1, DIVISION 2, GROUPS A,B,C&D
HAZARDOUS LOCATIONS

70X0

THERMO ENVIRONMENTAL INSTRUMENTS INC.

8 WEST FORGE PARKWAY . FRANKLIN, MA 02038

TEL: (508) 520-0430 . TELEX: 200205 THEMO UR

FAX: (508) 520-1460

P/N 16860

REVISED 9/91

SECTION I

INTRODUCTION

1 INTRODUCTION

The 580B is a portable Organic Vapor Meter (OVM), which detects and quantitates most organic vapors with a highly sensitive photoionization detector (PID). The 580B has an operating range of 0-2000 parts per million (ppm) with a minimum detectable of 0.1 ppm. No support gases are required.

The 580B is controlled by a microprocessor which provides many features that were not previously available. Maximum signal hold, detector linearization, overrange lockout, IBM PC (or compatible) interface, extensive data logging capabilities and much more. With the many features provided by the 580B leak detection, head space measurements, and field survey are all easily accomplished. Completely portable, the 580B operates from internal batteries for eight hours in the field.

1.1 ABOUT THIS MANUAL

This manual is broken down into eight chapters. The first chapter (this one) provides a general overview of the 580B. Chapter two discusses, in great detail, the extensive facilities of the 580B. The focus of this chapter is on how to use the seven switches to access the various facilities. Chapter three explains, in detail, how to perform routine maintenance on the 580B. Chapter four is a technical discussion of calibration and methods for generating standards. Chapter five is a technical discussion of a few applications which illustrate some of the uses of the 580B. Chapter six is a technical discussion of methods for collecting a sample using the 580B. Chapter seven is a discussion of the communication facilities provided by the 580B. Chapter eight contains two flow charts which illustrate the 580B software flow. This chapter is a helpful tool for the new user. Appendix A is a detailed explanation of the 580B communication protocol. This chapter is provided in order to allow a programmer to develop specialized communication software for the 580B. There are several other addendums which contain miscellaneous information about the 580B.

1.2 INSTRUMENT OVERVIEW

This section describes various points of interest on the 580B. Each number refers to a number in Figure 1.1.

1. **POWER PLUG** - The power plug is used to run the instrument from its internal batteries. There is a chain attached to the power plug so that it will not be lost.

2. **RS-232 CONNECTOR** - This connector is used for communi-

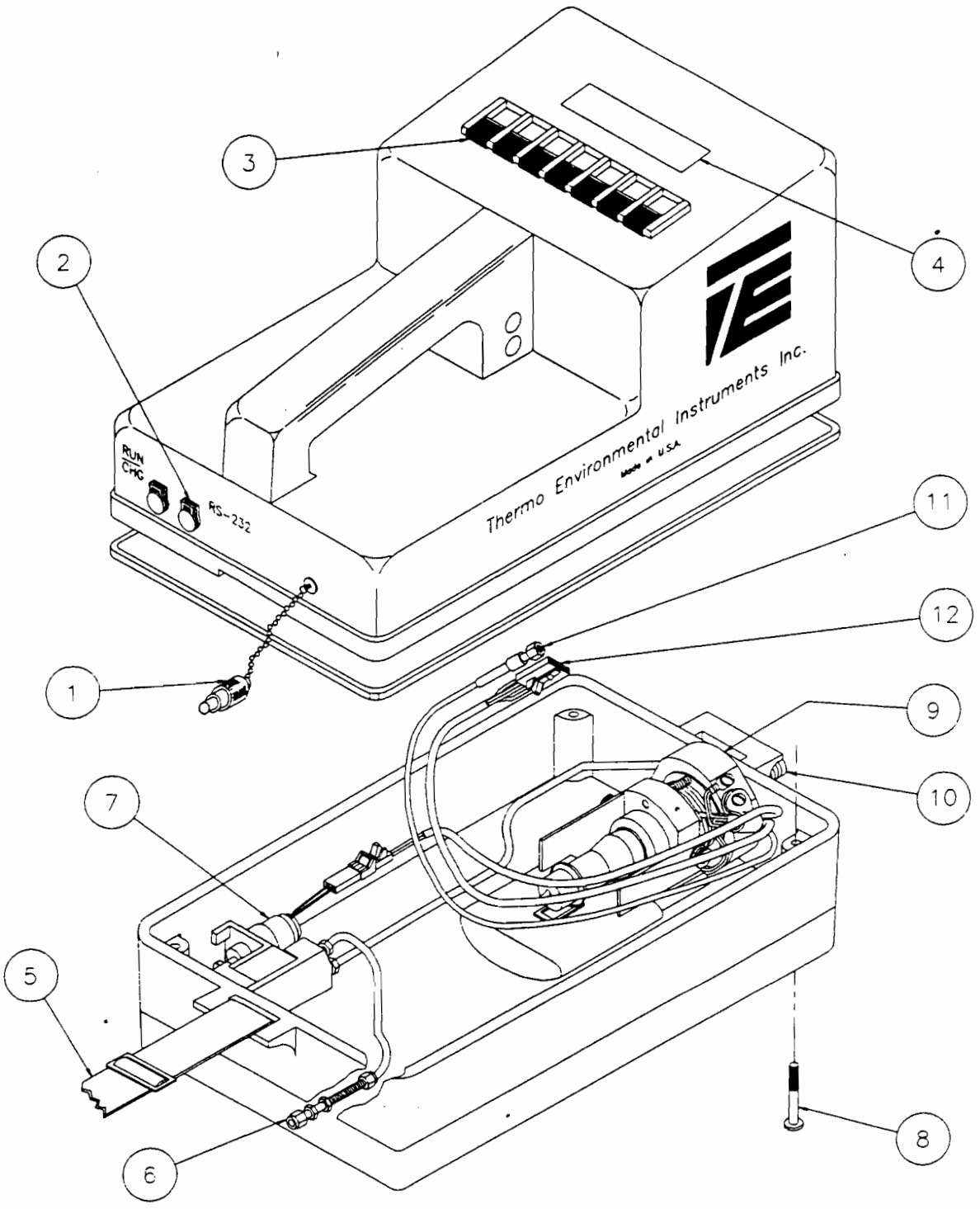


Figure 1.1
Instrument Assembly

cation with a serial printer or computer. A communication cable provided with the instrument fits into the receptacle.

3. **KEY PAD** - There are seven switches which operate the 580B. The switch marked ON/OFF is used to turn the pump and lamp on and off. The switch marked LIGHT will turn on backlighting for the two line display. The other five switches perform various functions. For a detailed description of the function of each switch see chapter two or the flow charts in chapter eight.

4. **DISPLAY** - The 580B has a two line by sixteen character display.

5. **SHOULDER STRAP** - There is an adjustable shoulder strap for carrying the 580B.

6. **SAMPLE EXIT PORT** - The 580B sample is drawn into the detector by a positive displacement pump and then sent back out through the exit port.

NOTE : The photoionization detector is a non destructive detector so the sample may be collected at the exit for further analysis (see Chapter Six).

7. **PUMP** - The 580B pump draws the sample into the detector.

8. **MOUNTING SCREWS** - There are four captive screws which hold the 580B top and bottom together. The screws are specially designed so that they do not fall out when they are loosened out of the case top.

9. **DETECTOR** - The photoionization detector is shown with the lamp and high voltage power supply.

10. **SAMPLE INLET** - Sample is drawn into the detector through the sample inlet at the front of the 580B.

11. **SIGNAL CABLE** - The PID signal is brought up to the microprocessor, for analysis, via the coaxial signal cable.

12. **BASE HARNESS** - The base harness plugs into a connector on the case top.

1.3 580B FEATURES

This section provides a brief overview of the various features of the 580B. After reading this section the user should have a good idea of what the instrument can do. Chapters two and three will explain, in detail, how each feature is selected.

TURNING ON PUMP AND LAMP - The pump and lamp are turned on by pressing the ON/OFF switch (the instrument power must already be on).

CALIBRATION - Calibration of the 580B is extremely impor-

tant. Chapter two explains how to calibrate the 580B in great detail. Chapter four discusses at length some of the basic theory and methods behind calibration. It is strongly suggested that this chapter be read in order to gain a deeper understanding of usage of the 580B. Chapter three also discusses calibration.

CONCENTRATIONS - Once the lamp and pump have been turned on the 580B begins to display the concentration of the incoming sample on the bottom line of the display. Normally the top line of the display will be a bar graph (logarithmic on a scale of zero to 2000). The operator may however select the MAX HOLD mode of operation. When in MAX HOLD, the top line of the display will show the highest concentration recorded.

LOGGING - The 580B provides extensive facilities for logging information. The operator may save a particular reading along with a six digit location code and a date and time stamp. If the 580B is in the MAX HOLD mode when logging is initiated then the max hold value will be logged.

AUTO LOGGING - Logging may be performed automatically by using the 580B's auto logging feature. Auto logging is not allowed while in the MAX HOLD mode. When auto logging is selected a LOGGING INTERVAL is selected (anywhere from one second to 99 minutes and 59 seconds). At the end of each logging interval the present concentration will be logged (the location code is automatically incremented each time).

AVERAGE - The 580B normally updates the concentration once per second. The operator has the option of setting the averaging time anywhere from one second up to four minutes.

NOTE : The bottom line of the display will be blank until the first averaging interval is completed. The top line will however be updated each second.

RESPONSE FACTOR - A response factor may be used in order to relate a particular gas to the calibration gas. When computing the displayed concentration the microprocessor multiplies the measured concentration by the response factor and displays the result. If the response factor is one, then the concentration is not changed. Chapters four and five explain some uses of the response factor.

LAMP SELECTION - The 580B allows for calibration data to be saved for one 10.0 eV lamp and one 11.8 eV lamp. This allows lamps to be switched in the field without requiring recalibration. A lamp serial number may also be entered.

ALARM - An alarm level may be selected. The 580B will sound an audible alarm (the top line will also indicate an alarm) whenever the concentration goes above the selected alarm level.

ACCESS - The 580B provides four access levels so that various features may be "locked out." User identification number

and instrument number are also provided.

CLOCK - The 580B has an internal clock which will run even when the instrument power is cut off.

COMMUNICATION - The 580B has a serial communication port for outputing data to a serial printer. Many of the 580B features may be accessed from a remote computer through the serial communication port (there is communication software available which will run on an IBM PC or clone).

DISPLAY LOGGED DATA - The logged data may be displayed on the 580B's two line display.

SECTION II

PRINCIPAL OF OPERATION

2.1 PHOTOIONIZATION DETECTOR OPERATION & THEORY

2.1.1 GENERAL

The sample is drawn into the ion chamber by a pump down stream of the detector. Here the sample is bombarded by ultra-violet light (UV) exciting the molecule. If the energy, (hU) of the UV light is greater than the ionization potential (IP) of the sample molecule (R) an electron will be removed, ionizing the molecule. A positively charged molecule and a free electron are produced, as :

$$R + hu \rightarrow R^+ + e^-$$

Several typical reactions follow:

C_6H_6 (benzene) + hu -> $C_6H_6^+ + e^-$ IP = 9.2 eV

$H_2C{=}CHCl$ (VCM) + hu -> $H_2C{=}CHCl^+ + e^-$ IP = 9.9 eV

C_3H_8 (propane) + hu -> $C_3H_8^+ + e^-$ IP = 10.9 eV

For this reason the ionization potential of the subject molecule plays an important role in selecting the lamp energy. Ionization potentials are expressed in electron volts (eV). A list of ionization potentials can be found in Appendix E of this manual or a more complete list in the CRC "Handbook of Chemistry and Physics".

2.1.2 LAMP ENERGIES

There are three lamps available from TEI, 10.0 eV, 10.6 eV, and 11.8 eV. The different energies are obtained by filling the lamp envelopes with different gases and selecting a window which will pass the wavelength produced when the gas is excited. The combination of gas and windows which produce these energies are listed below:

ENERGY	GAS	WINDOW	WAVELENGTH (nm)
10.0 eV	Krypton	MgF	123.6
10.6 eV	Krypton	MgF	117.4
11.8 eV	Argon	LiF	105.1

Though ionization potential will help the user select a lamp, it will not give any information as to the performance of

the detector in measuring a specific compound. The response of the system varies considerably from compound to compound even though they may have the same ionization potential. Some generalizations may help the user obtain a feeling for the difference in response between compounds.

2.1.3 COMPARATIVE RESPONSE

The following is an idealized response chart. No attempt is made to quantitate the relationship, it's a guideline.

Decreasing PID Response:
- Aromatic Compounds
- Unsaturated Compounds
- Saturated Compounds
- Ketones
- Alcohols
- Compounds with Sub Groups

It becomes obvious that sensitivity is influenced by the electronegativity of the molecule though this is not a predictable measure of performance. The only true test of performance is to measure the specific compound of interest and compare it to a good performing standard such as isobutylene.

2.1.4 RESPONSE FACTORS

This relative comparison with isobutylene mentioned above is a very effective way of measuring a variety of compounds without the need to recalibrate for each compound.

The development of a RESPONSE FACTOR allows the operator to correct the instrument's response given a one to one correspondence for all compounds measured, using isobutylene as the reference standard.

Note: Because there is variation in lamp production and hence performance, it is suggested that all calibration and subsequent development of response factors be done on the same lamp/instrument combination.

The preparation of standards and the development of response factors is discussed in subsequent sections of this manual. Once the response factor is generated, it is entered into the 580. The instrument automatically reports the concentration of the compound measured in relative units. It is important to recognize that all compounds measured at that time will be reported relative to the response factor entered in the instrument. For example, if we have calibrated the instrument on isobutylene and have entered a response factor for benzene, we will read concentrations with a one to one correspondence to benzene. If during these measurements toluene or any other compound is encountered, the instrument will report the concentration as if it was measuring benzene. For this reason care should be taken when using this facility.

The above discussion should give the reader a good overview of PID performance. To further understand the intricacies of the

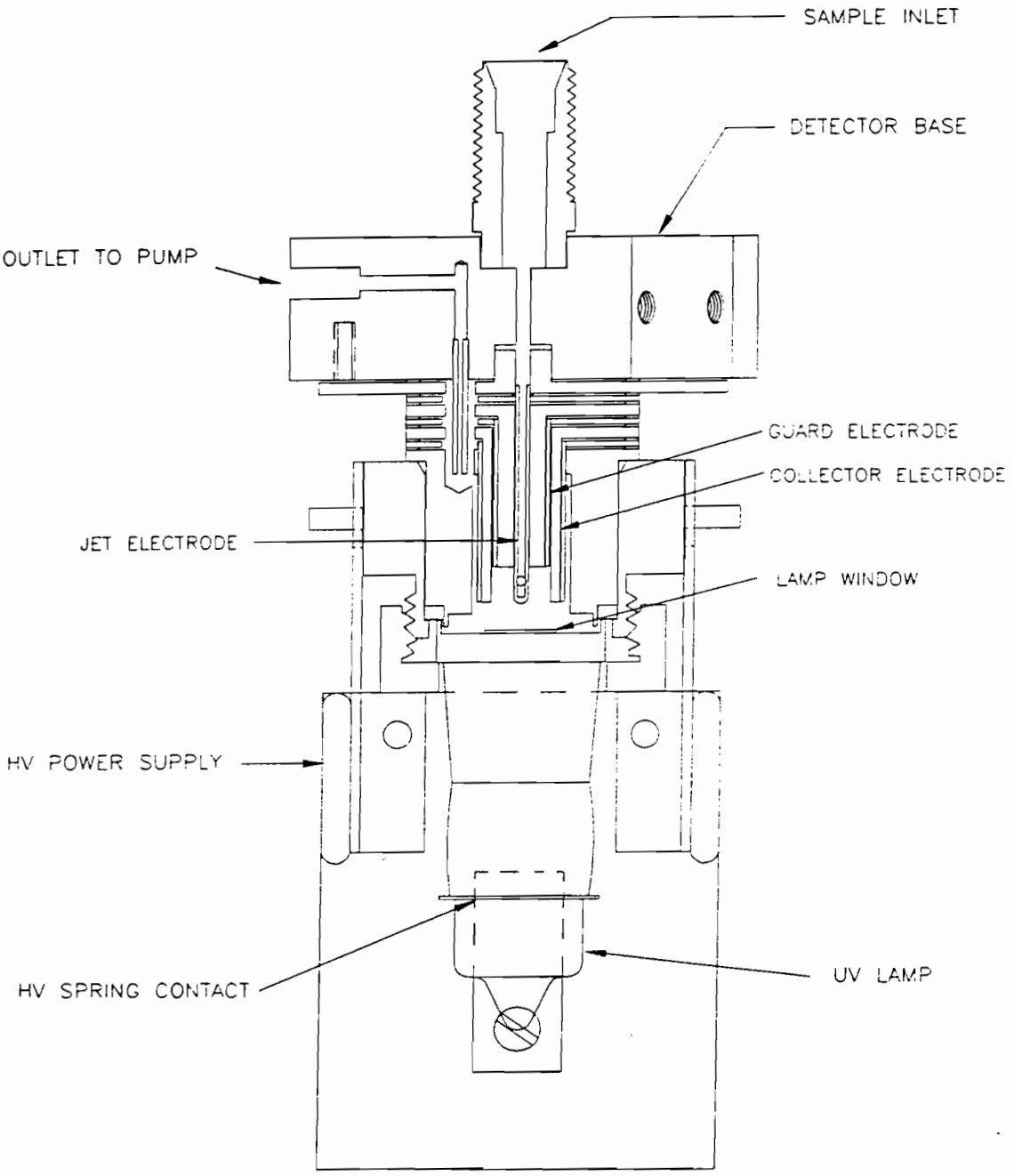


Figure 2.1
Photo Ionization Detector

instrument it is suggested that the user prepare a number of standards of different compounds and measure them relative tc isobutylene. Included in this comparison should be several mixtures of compounds such as gasoline, paint thinner, or cleaning solvent, etc. Through this type of study the inequity of the PID response will be better understood making the Model 580 a more effective tool. The use of the instrument is discussed in greater detail in subsequent sections.

2.1.5 PHOTOIONIZATION DETECTOR

The detector is constructed of Teflon and stainless steel to eliminate chemical interaction with the surfaces that are encountered by the sample. To further reduce possible interaction with the surfaces, the flow rate thru the detector is high, 400 - 500 cc/min developing a very dynamic transport of the sample.

Referring to Figure 2.1, the sample is drawn into the ionization chamber through the jet electrode where the UV radiation from the lamp ionizes the sample. A bias voltage of several hundred volts is applied to the jet to aid in the collection of ions. As a result of the ionization process and the impingement of the UV energy from the lamp on the sample, positively charged ions and free electrons are produced. The jet is negative relative to the collector where the electrons are collected.

Between the jet and the collector, separated on both sides by Teflon, is the guard electrode. Its function is to eliminate surface currents which could flow between the two active electrodes. When the Teflon surfaces become dirty during use, there can be the development of a conduction path on the Teflon, which increases in high humidity situations. The guard electrode eliminates this path. The collector electrode is connected to the electrometer which measures the ion current produced during the ionization process. The sample is moved through the detector by an external pump which is on the exit of the detector.

2.2 PROGRAM OPERATION

2.2.1 INTRODUCTION

The 580B has seven switches located just below the display. They are labeled:

ON/OFF MODE/STORE RESET LIGHT +/INC -/CRSR SPKR

The ON/OFF switch toggles the lamp and pump power between on and off. The MODE/STORE, RESET, +/INC, -/CRSR and SPKR switches all have various meanings (including none at all) depending upon the mode. The SPKR switch normally is used to toggle the instrument speaker between on and off. Pressing the MODE/STORE switch will cause the 580B to return to the Run mode, except when the 580B is already in this mode. In which case it will cause the 580B to enter the Log mode.

The LIGHT switch is used to illuminate the display.

The 580B has several modes. Some of the modes may have sub modes. The modes and sub modes are tabulated below.

Run mode
    Concentration meter normal
    Max hold
Log mode
Parameter mode
    Calibration mode
Access mode
Clock mode
Communication mode

The following sections will describe each mode and how to get to them and through them. It is strongly suggested that this section be carefully read and that the 580B be used along with the manual in order to re-enforce the manual.

2.2.2 POWER FOR LAMP AND PUMP

When the 580B is first turned on (see section 1.3) the display will indicate that the lamp is not lit. Pressing the ON/OFF switch will tell the microprocessor to turn on the lamp and the pump. The microprocessor will send power to the lamp and pump and then "look" to see if the lamp is actually lit. If it did not light then the microprocessor will try again.

If after fourteen seconds the lamp still will not light, then the microprocessor will indicate a lamp out condition.

In the event that the microprocessor is unable to light the lamp, check the seating of the lamp (see section 3.1). If the problem persists, call service.

Once the lamp is lit, the display will show the PPM (parts per million) on the bottom line. The top line will either be a bar graph or the maximum reading (see section 2.2.3).

To turn the lamp and pump off simply press the ON/OFF switch.

2.2.3 RUN MODES

The 580B has two run modes, Max Hold and Concentration meter. The run mode is selected in the Parameters section (see Section 2.4). In the concentration meter mode the top line of the display will be a bar graph. The bar graph is a logarithmic bar graph over the range of 0 to 2000 PPM. The bar graph is intended as a rough visual indication of the current PPM. The bottom line will indicate the exact PPM.

In the Max Hold mode the top line of the display will indicate the maximum reading. The bottom line of the display will indicate the current PPM. Whenever a new maximum is seen, the top line will be updated. The Max Hold reading may be reset by pressing the RESET switch while in the run mode.

2.2.4 LOG MODE

The ability to "log" data is one of the 580B's greatest

features. Readings may be stored for later analysis. Each reading will have a date and time as well as a location code associated with it. Up to over 700 readings may be stored. Logged data may even be sent to a printer or computer via an RS-232 serial communication port (see section 2.7).

The Log mode is entered from the Run mode by pressing the MODE/STORE switch. When this switch is pressed from the Run mode the display will show:

LOG THIS VALUE?

on the top line and either PPM or MAX PPM on the bottom line depending upon which run mode the 580B is currently in. By pressing the +/INC switch the display will then show:

LOC. CODE 000001

on the top line (the actual location code may not be 000001). The location code may now be entered. By pressing the +/INC switch the number above the cursor may be incremented. By pressing the -/CRSR switch the cursor may be moved to the next digit. The 580B automatically increments the location code each time a data point is logged.

Once the desired location code has been entered, pressing the MODE/STORE switch will "log" the data point. This means that the reading displayed on the bottom line, along with the location code, the current date and the current time will be stored into the 580B's memory. The 580B will then return to the Run mode.

If for any reason logging is not desired, pressing the RESET switch rather than the MODE/STORE switch will cause the value not to be stored. The 580B will then go back to displaying:

LOG THIS VALUE?

Pressing the mode switch will now return the 580B to the Run mode.

It is possible, when attempting to log a data point, that rather than the display showing "LOC. CODE 000001" it will show "BAR CODE: ." Don't be alarmed. This has happened becouse the location mode selection is not properly set. Section 2.4.3 describes how to set this parameter. Pressing the mode/store switch will cancel the logging operation and return to the run mode. The location mode selection should be changed as described in section 2.4.3.

2.2.4A AUTO LOGGING MODE

The 580B may be instructed to automatically log data according to a predefined time interval. AUTO LOGGING is selected from within the Parameters section (see section 2.4). At the end of the logging interval (settable from 1 second up to 99 minutes and 59 seconds) the current average ppm value will be logged and the logging interval will be restarted.

NOTE: Auto logging is not allowed with the Max Hold mode.

2.2.5 SPEAKER

While the 580B is in the Run mode the speaker may be turned on. The speaker will generate a "clicking" which will increase in speed as the concentration increases. The purpose of the speaker is to give the operator an audible indication of the PPM. The speaker may be turned on or off by pressing the SPKR switch. The speaker rate may also be changed by changing the switches located inside of the instrument. Only one of the four speaker rate switches should be on (in the down position) at any time.

2.2.6 LOW BATTERY

The 580B will display a warning when the battery is low. The warning will be a flashing B in the left hand corner of the bottom line of the display when the 580B is in the Run mode. The 580B should be recharged when the low battery warning is activated.

2.2.7 OVERRANGE

The 580B will display an overrange warning if the concentration goes above 2000 PPM. The top line of the display will show:

OVERRANGE

Once an overrange condition occurs the instrument will "lock out". This means that the overrange warning will continue to be displayed until the instrument is brought to a "clean" area. A clean area is defined to be an area where the concentration of organic vapors is below 20 PPM. The 580B will continue to indicate PPM on the bottom line during an overrange condition.

2.2.8 ALARM

The 580B has an alarm which will sound if the PPM rises above the alarm setting. The alarm setting is entered in the Parameters mode (see section 2.4.3). If the speaker is not activated then the alarm will of course not be heard. Once the PPM drops below the alarm setting the alarm will turn off. The top line of the display will also indicate when there is an alarm condition.

2.3 MAIN MENU

By pressing the MODE/STORE switch from the Run mode and then pressing the -/CRSR switch when asked if logging is desired,

the 580B will display the main menu:

R/COMM -/PARAM
+/ACCESS S/CLOCK

The other four operating modes (Communication, Parameters, Access and Clock) may be entered from the Main menu. The operating mode may always be returned to by pressing the MODE/STORE switch.

2.4 PARAMETERS MODE

All of the 580B operating parameters are entered in the Parameters mode. The 580B is also calibrated from within the Parameters mode.

The Parameters mode may be entered by pressing the -/CRSR switch from the main menu.

There are nine different sections in the Parameters mode.

1. Run mode selection
2. Auto logging selection
3. Location mode selection
4. Average time selection
5. Alarm setting
6. Lamp selection
7. Response factor setting
8. Calibration
9. Free space indication

Pressing the +/INC switch will advance the 580B to the next section. Pressing the -/CRSR will advance the 580B to the previous section. Each section and any of its sub-sections will be described in the following pages. It is important to note that when the 580B is in a sub-section of any of the above sections that the +/INC and -/CRSR switches will have a different meaning. This may seem confusing at first but will become clear after stepping through each section.

2.4.1 RUN MODE SELECTION

There are two Run modes. Concentration meter normal and Max Hold (see Section 2.2.3). The top line of the display will show:

CONC. METER

the bottom line will show:

"RESET" TO CHG

the bottom line will alternate every two seconds with:

MAX HOLD

if the 580B is in the Max Hold mode. Pressing the RESET switch will cause the 580B to show:

MAX HOLD
+ = USE/ - = NO

if the +/INC switch is pressed then the Max Hold mode will be selected. If the -/CRSR switch is pressed then the Concentration meter normal mode will be selected. In either case the 580B will then return to the previous screen.

2.4.2 AUTO LOGGING SELECTION

The 580B can be configured to automatically log data points. The top line of the display will show:

AUTO LOGGING

The bottom line will alternate between "RESET TO CHG." and "ON" or "OFF". Pressing the RESET switch will cause the 580B to show:

AUTO LOGGING
+/ON -/OFF

Pressing the -/CRSR switch will turn auto logging off and return operation to the previous screen. Pressing the +/INC switch will enable auto logging and allow setting of the logging interval. The display will show:

INTERVAL 00:01
"RESET"WHEN DONE

The +/INC switch will increment the number above the cursor and the -/CRSR switch will move the cursor. The logging interval format is MM:SS (where M is minute and S is second). Pressing the RESET switch will return operation to the first auto logging screen.

2.4.3 LOCATION MODE SELECTION

The 580B may be configured to accept a six digit location code which is entered via the keypad. There is an alternate method for entering location codes however UL approval has not yet been obtained for this option. For updated information contact Thermo Environmental Instruments inc.

The display shows the currently selected location mode. For example the display will show:

Loc. code mode
"reset" to chg.

When the 580B is configured to enable operator editing of the location code, pressing the RESET switch causes the 580 to show:

Bar code mode
"reset" to chg.

The 580B is now configured for the alternate location mode (which is not presently available for use in hazardous locations). Pressing the reset switch will cause the 580B to be configured for location code mode.

2.4.4 AVERAGE TIME SELECTION

The 580B can be configured to display the average PPM from once a second up to once every four minutes. The display will show:

AVERAGE = 0:01
"RESET" TO CHG

Pressing the RESET switch will cause the 580B to show:

AVERAGE = 0:01
"RESET"WHEN DONE

The +/INC switch will increment the number above the cursor and the -/CRSR switch will move the cursor. The average time format is M:SS (where M is minutes and S is seconds).

NOTE: The maximum averaging interval is four minutes.

2.4.5 ALARM SETTING

The 580B will display the current alarm setting on the top line of the display. The setting may be changed by simultaneously pressing the RESET switch with either the +/INC switch to increment the digit above the cursor or the -/CRSR switch to move the cursor.

2.4.6 LAMP SELECTION

The 580B will display:

LAMP

on the top line. The bottom line will alternate every two seconds between:

"RESET" TO CHG

and the currently selected lamp setting and its associated serial number.
i.e.

11.8eV 000000

By pressing the RESET switch, the 580B will display:

+/10eV -/11eV

on the bottom line. Pressing the +/INC switch will select the 10.0 eV lamp. Pressing the -/CRSR switch will select the 11.8eV lamp. In either case the 580B will then allow editing of the lamp serial number. The display will show:

SERIAL # 000000
"RESET"WHEN DONE

The +/INC switch will increment the number above the cursor and the -/CRSR switch will move the cursor. Pressing the RESET switch will return operation to the original lamp screen.
When using a 10.0 eV lamp or a 10.6 eV setting should be selected. When using an 11.8 eV lamp the 11 eV setting should be selected.

2.4.7 RESPONSE FACTOR SETTING

The current Response Factor setting will be displayed on the top line of the display. The Response Factor may be changed by simultaneously pressing the RESET switch with either the +/INC switch to increment the digit above the cursor or the -/CRSR switch to move the cursor.

The response factor is used to equate the response of one organic vapor with that of the calibration gas. The current reading is always multiplied by the response factor in order to obtain the displayed concentration. A response factor of one will not change the displayed concentration.

2.4.8 CALIBRATION

The 580B will display:

"RESET" TO
CALIBRATE

The calibration mode may be entered by pressing the RESET switch.
The 580B will display:

RESTORE BACKUP
+ = YES

The previous calibration information may be restored by pressing the +/INC switch. The 580B will then return to the previous screen. If the backup is not desired, by pressing the -/INC switch the calibration routine will continue. The display will show:

ZERO GAS
RESET WHEN READY

Once zero gas has been introduced the RESET switch should be pressed. The 580B will then zero the instrument. The 580B will display:

MODEL 580B
ZEROING

Once the 580B has been zeroed the 580B will display:

SPAN PPM = 0000

The Span gas concentration may now be entered by simultaneously pressing the RESET switch and either the +/INC switch to increment the digit above the cursor or the -/CRSR switch to move the cursor. Once the span gas concentration has been entered the +/INC switch should be pressed.

The 580B will then display:

SPAN GAS
RESET WHEN READY

Once the span gas has been introduced the RESET switch should be pressed. The 580B will then calibrate the instrument. The 580B will display:

MODEL 580B
CALIBRATING

Once the 580B has been calibrated the 580B will go back to the beginning and display:

"RESET" TO
CALIBRATE

If during the zeroing or calibrating of the 580B a steady reading was not seen then the 580B will display:

CAL ERROR
RESET WHEN READY

Pressing the RESET switch will return the 580B to zeroing or calibrating (depending of course on which it came from).

See Section 4.1 for tips on calibrating the 580B.

2.4.9 FREE SPACE INDICATION

This section will give a rough indication of how much room is left for logging data points. The screen will display a bar graph on the top line and the amount of free space on the bottom line. The number indicates the total number of bytes which are available. Each data point takes fifteen bytes. Other bytes may also be needed in order to store other important information. This is why only a rough indication of room may be given.

2.5 ACCESS MODE

The Access mode is entered by pressing the +/INC switch from the main menu. The 580B has four access levels, zero through three. Level zero will only allow the operator to log data points and of course to change access levels (only if the access code is known). Level one will also allow the user to change the user identification number. Level two will allow the user complete access to the Parameters mode, and allow viewing of the date and time. Access level three allows complete access.

The access mode has three sections:

1. Access level
2. User identification number
3. Instrument number

Pressing the +/INC switch will advance the 580B to the next section. Pressing the -/CRSR switch will advance the 580B to the previous section.

TABLE OF ACCESS LEVELS

ACCESS LEVEL	OPERATIONS ALLOWED
0	Change access level Log data
1	All above operations View time and date View communication format Display logged data Change user I.D.
2	All above operations Change operating Parameters Reset logged data
3	All operations available

2.5.1 ACCESS LEVEL

The screen will display:

```
ACCESS LEVEL   3
"RESET" TO CHG
```

By pressing the RESET switch the 580B will display:

```
    KEY    00003
"RESET" WHEN DONE
```

Please note that in both screens the 3 indicates the current access level and may not necessarily be a three.

In order to change the access level the +/INC switch may be pressed to increment the digit above the cursor and the -/CRSR switch may be pressed to move the cursor. The desired access level should be entered in the right most digit. Note that only access levels between zero and three are legal. The remaining four digits are the access code. The access code will be 0000 when the instrument is shipped. The access code should then be entered. Once this is done press the RESET switch. The 580B will then return to the previous screen.

If the access code entered was not the proper access code, or if the access level was not a legal access level then the access level will not be changed.

The last and most important point regarding the access level is how to change the access code. The access code is the four rightmost digits of the instrument number. The instrument number is only viewable (and therefore only changeable) while in access level three.

2.5.2 USER IDENTIFICATION NUMBER

The screen will display:

```
I.D.# 014563977
"RESET" TO CHG
```

By pressing the RESET switch the 580B will display:

```
I.D.# 014563977
"RESET" WHEN DONE
```

The user identification number may be changed by pressing the +/INC switch to increment the digit above the cursor and the -/CRSR switch to move the cursor. The user identification number is a nine digit number (just right for fitting a social security number). Once the user identification number has been entered press the RESET switch and the 580B will return to the previous screen.

2.5.3 INSTRUMENT NUMBER

The screen will display:

```
INSTR #  000000
"RESET" TO CHG
```

By pressing the RESET switch the 580B will display:

```
INSTR #  000000
"RESET" WHEN DONE
```

The instrument number may be changed by pressing the +/INC switch to increment the digit above the cursor and the -/CRSR switch to move the cursor. Once the instrument number has been entered the RESET switch should be pressed. The 580B will then display the previous screen.

When the instrument number is changed it is very important that the last four digits be remembered. These digits are the access code and therefore will need to be known in order to change the access level.

2.6 CLOCK MODE

The Clock mode is entered from the Main menu by pressing the SPKR switch. The screen will display the date and time on the top line. The bottom line will display:

"RESET" TO CHG

By pressing the RESET switch the 580B will display:

"RESET" WHEN DONE

The date and time may be changed by pressing the +/INC switch to increment the number (or in the case of the month the months abbreviation) above the cursor. The -/CRSR switch will move the cursor. Once the proper month has been entered the RESET switch should be pressed. The 580B will return to the previous screen.

The date and time will be maintained even when the instrument is turned off! It is however advisable that the date and time periodically be checked to ensure that it is correct.

2.7 COMMUNICATION MODE

The Communication mode is entered from the main menu by pressing the RESET switch. The Communications mode has four sections.

1. Communicate with printer or computer
2. Display logged data
3. Reset logged data
4. Set communication parameters

Pressing the -/CRSR switch will advance the 580B to the next section.

NOTE: A detailed discussion of communication protocol is given in Appendix A. Further discussion of communication may be found in Section Seven.

2.7.1 COMMUNICATE WITH PRINTER OR COMPUTER

The 580B is capable of communicating with a computer or outputting logged data to a printer. The 580B will display:

COMMUNICATE?

"+" = YES

if the computer format is selected or it will display:

OUTPUT TO PRINTER
"+" = YES

if the printer format is selected. In either case pressing the +/INC switch will cause the 580B to try to establish communication. Pressing the -/CRSR switch instead will cause the 580B to advance to the next section.

2.7.2 DISPLAY LOGGED DATA

If at least one data point has been logged the 580B will dis

DISP. LOG DATA?
"+" = YES

By pressing the +/INC switch the 580B will display the first data point. The date and time which the data point was logged will be displayed on the top line. The bottom line will alternate between the location code and the PPM. Pressing the +/INC switch will advance to the next logged data point. This will continue until there are no more data points at which time the 580B will display:

NO DATA STORED

The MODE/STORE switch may be pressed to return to the Run mode.

2.7.3 RESET LOGGED DATA

The logged data can be erased so that more data points may be logged. The screen will display:

RESET LOG DATA?
"+" = YES

Pressing the +/INC switch will erase all of the logged data points. The 580B will then advance to the next section.

2.7.4 COMMUNICATIONS PARAMETERS

The 580B can be configured to communicate with a printer or a computer. The baud rate may also be set for 9600, 4800, 2400, 1200, 900, 600, 300, or 150 baud. The 580B will display the current communication format (computer or printer) on the top line and the current baud rate on the bottom line. Pressing the RESET switch will cause the 580B to display:

COMPUTER FORMAT
+ = USE - = NO

Pressing the +/INC switch will select the computer format and the 580B will advance to the baud rate screen (see below). Pressing the -/CRSR switch will cause the 580B to display:

PRINTER FORMAT
+ = USE - = NO

Pressing the +/INC switch will select the printer format and the 580B will advance to the baud rate screen (see below). Pressing the -/CRSR switch will cause the 580B to display the previous screen.

The baud rate screen will display the currently selected baud rate on the top line. The bottom line will display:

+ = USE - = NO

Pressing the +/INC switch will cause the displayed baud rate to be selected and the 580B to show the selected format on the top line and the baud rate on the bottom line. Pressing the -/CRSR switch instead will cause the next lowest baud rate to be displayed.

2.8 BATTERY / CHARGER

The model 580B uses a 1.2 amp hour lead acid (gel cell) battery. There is protection circuitry potted directly on top of the battery. The battery is rechargeable with the charger provided with the instrument. The charger is regulated so that there is no danger of "over charging" the battery. It is suggested that the 580B be charged over the weekend (as well as each evening) during periods of heavy usage in order to ensure maximum battery charge.

SECTION III

ROUTINE MAINTENANCE

The routine maintenance of the 580B involves the calibration of the instrument, the cleaning of the lamp window, and the maintaining of charge on the battery. The following pages give instructions for routine maintenance. Figure 3.1 illustrates the detector assembly.

3.1 LAMP INSERTION AND REMOVAL

3.1.1 REMOVAL

NOTE: The 580B must be off while removing the lamp.

In order to remove the lamp the four screws which hold the case top and bottom together must first be loosened. The case bottom should be placed flat on the table and the top placed on its side next to the bottom.

The high voltage power supply is removed next by loosening the thumb screws on each side and then pulling the power supply towards the rear of the instrument (see figure 3.1). The lamp may now be removed by loosening the lamp nut.

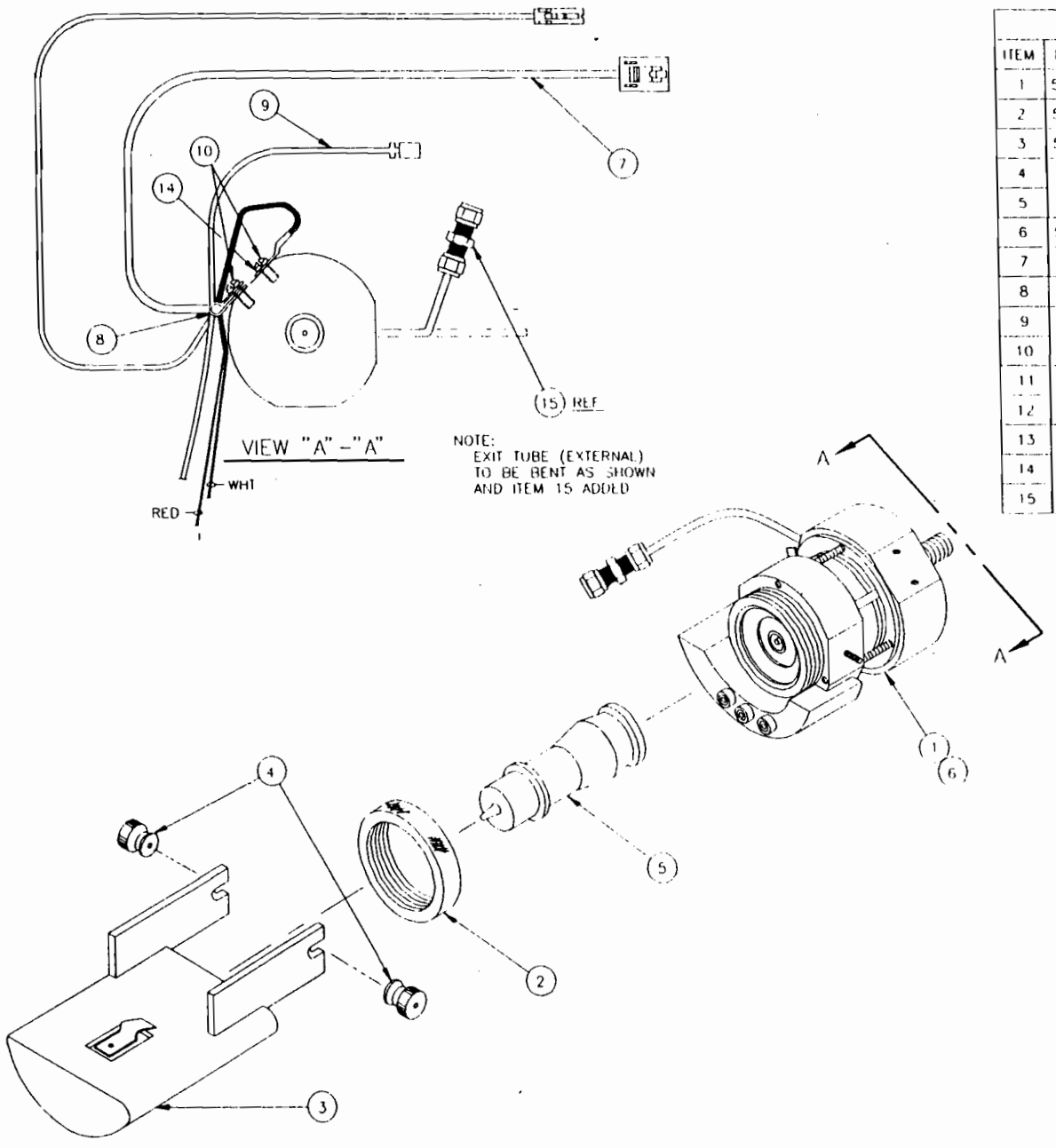
3.1.2 INSERTION

Insertion of the lamp is accomplished by performing the above tasks in the reverse order. The lamp should be placed flat against the o-ring and the lamp nut fastened down in order to create a proper seal. The high voltage power supply should then be inserted and the thumb screws fastened down. There are three pins protruding from the high voltage power supply which should fit snugly into connectors located beneath the detector. The lamp spring (mounted in the center of the high voltage power supply) should make contact with the lamp ring.

3.1.3 LAMP CLEANING

On occasion the lamp should be removed for cleaning. Cleaning of the lamp is accomplished by cleaning the lens surface of the UV lamp. This is accomplished by using the aluminum oxide scouring powder provided with the 580B.

The procedure for cleaning the lamp is as follows. First place a small amount of aluminum oxide scouring powder on the lens of the UV lamp. Next gently scour this lens with a soft tissue or cloth. Scour the lens in a rotary type motion. After scouring the lens surface, gently blow the remaining powder from the lens. Thoroughly wipe the lamp lens with a clean tissue to remove the last traces of cleaning powder. The lamp is now able to be inserted into the detector.



MATERIAL LIST			
ITEM	PART NO	DESCRIPTION	QTY
1	580B-6003	DETECTOR SUB ASSY	1
2	580S-2010	NUT - LAMP (13507)	1
3	580S-6019	PWR SUPPLY ASSY (13560)	1
4	12082	NUT - KNURLED	2
5	11929	U V LAMP 10 0	1
6	580S-6035	DETECTOR WIRING ASSY. (13575)	1
7	580B-6001	BASE HARNESS ASSY	1
8	4166	STRAIN RELIEF	1
9	580S-6028	SIGNAL CABLE (13568)	1
10	5814	#4-40 X 1/4" BINDER HD SCREW	2
11			
12			
13	5510	TEFLON TUBING 1/8" 6 5" LG	1
14	5588	#4 INT. TOOTH STAR WASHER	1
15	4417	UNION-2U-316	1

Figure 3.1
Detector Assembly

3.2 CALIBRATION

NOTE: Chapter four should be read before calibrating the 580B in order to gain a better understanding of the concepts behind calibration of the 580B.

The following is a brief discussion of calibration as it relates to different lamps. One of the parameters in the Parameters mode (see Section 2.4) allows selection of lamp setting. The two types of lamps are the 10.0 eV and the 11.8 eV lamp. Whenever a new lamp is used the 580B must be calibrated. This is true even if the new lamp is the same type, e.g., the new and old lamp are both 10.0 eV. This is due to the fact that each lamp will have a slightly different sensitivity.

It is important to note that the 11.8 eV lamp will in general be less sensitive than the 10.0 eV lamp. This is true despite the higher energy level of the 11.8 eV lamp. The 11.8 eV lamp will however "see" certain gases which the 10.0 eV lamp will not. See Table E.1 for a list of common organic vapors and their associated ionization potentials. Any questions regarding the use of the 580B should be directed to Thermo Environmental's Application Laboratory.

The 580B is quite simple to calibrate. A source of "zero air" and "span gas" are all that is needed to calibrate the 580B. The zero air is introduced to the 580B in order to determine the "background" signal. The concentration of the span gas is then selected. The span gas is finally introduced to the 580B. The instrument makes all of the necessary calculations (including linearization) to arrive at a "calibration constant." When in the Run mode the signal is multiplied by the calibration constant in order to arrive at the current PPM.

$$\text{CALIBRATION CONSTANT} = \frac{\text{SPAN PPM}}{\text{SPAN SIGNAL - ZERO SIGNAL}}$$

$$\text{PPM} = (\text{SPAN SIGNAL - ZERO SIGNAL}) \text{ CALIBRATION CONSTANT}$$

NOTE: The PPM is then multiplied by the RESPONSE FACTOR before being displayed. Chapter four explains the use of response factors when calibrating.

Section 2.4.8 gives a detailed explanation of which buttons to press in order to calibrate the 580B. The flow chart at the back of this manual may also be helpful.

3.3 CHARGE

When there is a flashing "B" in the lower left corner of the display (while in the run mode) the battery is low. The battery is recharged by plugging the charger into the RUN/CHARGE plug at the rear of the 580B. The instrument runs while it is charging.

SECTION IV

CALIBRATION

4.1 GENERAL

The Model 580B Organic Vapor Meter is indeed a quantitative instrument and can certainly be used as such. It makes use of the Photoionization Detection System using a lamp with an ionization energy of 10.0 eV which is standard in the Model 580B. Almost all organic materials will be ionized at this energy level. There are some organic materials, such as a few of the freons, methane, ethane and propane that are not ionized and thus will not be detected. The ionization potentials for the various organic materials will simply tell whether the material will be detected by the Photoionization Detector. It does not give any clue as to the sensitivity of the detector for that particular material. Certainly, different organic vapors will have different sensitivities. It is important to understand that the Model 580B does indeed sense most organic vapors and that its response to these different organic vapors will be different.

In this section of the manual, the aspects of calibrating the Model 580B for various vapors will be discussed. In the following section discussing applications, various ways of using the features of the Model 580B will be explained along with the various methods for calibration of the 580B. There will also be applications of the Model 580B in specific instances where the organic vapors or the mixtures of organic vapors are completely unknown. The 580B can be an extremely useful tool, even in areas such as those.

4.2 FACTORY CALIBRATION TEST OF THE MODEL 580B

The Model 580B has been tested for calibration and linearity tested at the factory. The particular gas chosen for this calibration is isobutylene. The Model 580B has good response for isobutylene. Isobutylene standards prepared in air are relatively stable with time, undergoing no serious adsorption or reaction problems. The test information is included in the instrument packet. In addition to the above test a benzene standard is also run. It is important to note that the instrument was not calibrated. It was tested for calibration. Therefore, it should be calibrated by the operator before use.

4.3 METHODS OF GENERATING CONCENTRATIONS OF VARIOUS MATERIALS IN AIR

This section is not intended to be all inclusive as far as the preparation of gas and vapor standards in air are concerned. Only those methods that have been found most practical for the calibration of the 580B are discussed here. There are basically two types of standards, cylinder and bag.

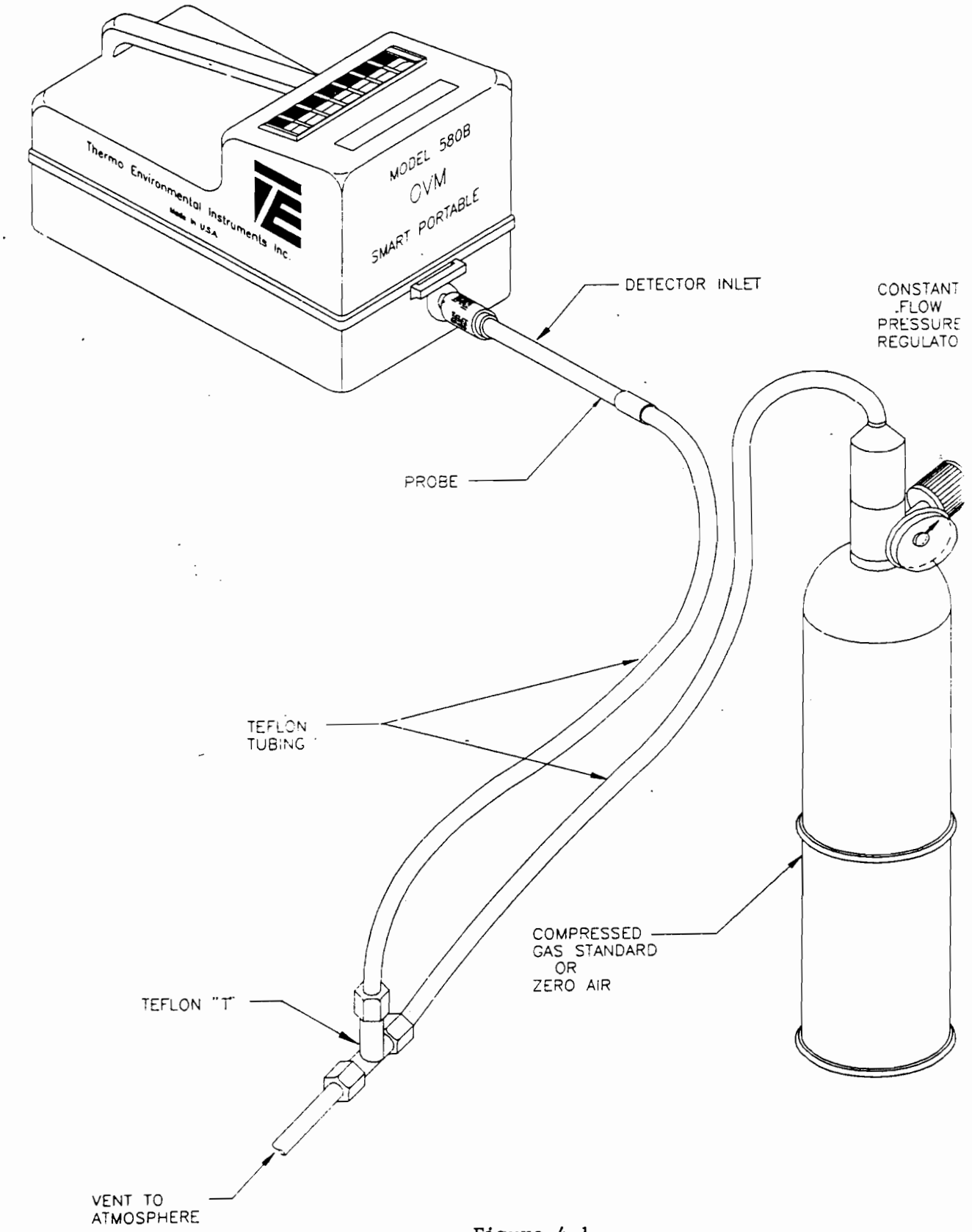


Figure 4.1
Cylinder Calibration

4.3.1 CYLINDER STANDARDS

Certainly commercially available standard cylinders of gaseous materials in air offer the most convenient method of calibration. However, these are static standards. Standards prepared in this fashion in air for vapors of various organic liquids often show concentration reduction with time due to adsorption problems. In general, gases when mixed with air will maintain their concentrations with time since adsorption is generally not a problem.

However, some gases are sufficiently reactive that chemical reaction of the gas will cause a reduction of it in air. These precautions must be observed when using commercially prepared standards for calibration of the Model 580B. It is for this reason that isobutylene in air was chosen as a reference standard for factory calibration. TEI offers a cylinder standard which includes both zero and isobutylene standards. A constant flow pressure regulator sets the flow needed for calibration of the 580B. Figure 4.1 illustrates the physical calibration procedure. The inlet to the 580B is connected to the "T" as shown. It is important that this connection is tangent to the gas flow. The "T" is connected to the regulator on the standard cylinder. It is important that a length of tubing is attached to the "T" location. This prevents diffusion of ambient air into sample line. The regulator and tubing assembly will have to be moved between both the zero air and standard cylinder.

4.3.2 BAG STANDARDS (ISOBUTYLENE)

Bag standards can be prepared in a laboratory and in general are reasonable ways of calibrating the Model 580B. However, it is important that these standards be used shortly after their preparation to reduce the significance of any adsorption problems. Static standards prepared for calibration of the Model 580B are best prepared in collapsible plastic bags. This is opposed to a fixed volume container. The sampling rate of the 580B, which is 500 ml/min, requires an appreciable amount of sample. Even one minute's sampling out of a fixed container will remove 500 ml/min from it. This should not significantly reduce the pressure inside the container. Thus, the collapsible bag provides the best means as opposed to a fixed volume. A 5 gallon polyethylene bag is a convenient size to use for the preparation of static standard.

A tube is inserted into the opened end of the bag and the bag opening then sealed around the tube. The tube should have a cutoff valve or some means of closing the volume of the bag. The volume of air introduced into the bag must be measured. This is most conveniently measured by a wet test meter. However, a source of air flowing through a flow meter can be used if the flow can be held constant, then time is a measure of the volume of the air placed into the bag. All air is expelled from the bag by completely collapsing it prior to connection to the source of air.

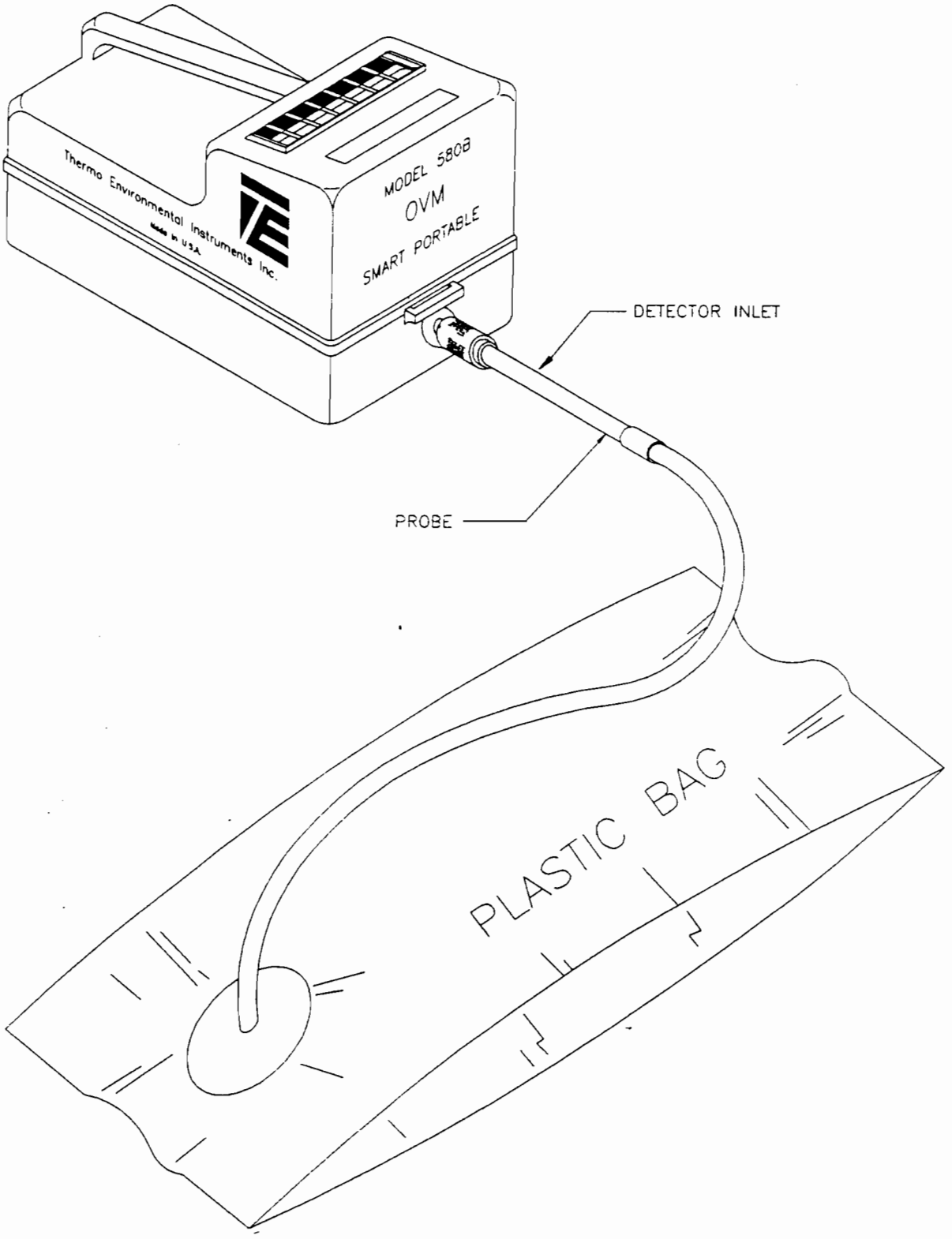


Figure 4.2
Bag Calibration

It can then be connected to a wet test meter or flow meter via a short length of rubber tubing hooked to the plastic tube of the bag. The air flow is started into the bag at a rate of approximately 5L/min. A total of 10 liters is a convenient volume for a 5 gallon bag. This would mean approximately 2 minutes for filling the bag. Figure 4.2 illustrates the physical configuration needed to develop bag standards.

For gaseous samples, the trace organic will be added via a glass hypodermic syringe. The 1 cc Tuberculin syringe is a convenient size. For an isobutylene standard, the 1 cc syringe is flushed with pure isobutylene and then filled to the 1cc mark. While the air is flowing into the plastic bag, the short piece of rubber tubing is pierced by the needle from the 1 cc syringe and the plunger slowly depressed such that the 1 cc of isobutylene is added to the air flowing into the plastic bag. When 10 liters of air have been added to the plastic bag, the flow is immediately stopped and the valve on the tube or the closing clamp is applied to contain the air and isobutylene within the plastic bag. It is best at this stage of the procedure not to rely solely on the diffusion of isobutylene to form a uniform mixture inside the plastic bag. Slight kneading of the plastic bag will hasten the mixing of the isobutylene in air. The plastic tube from the bag is then connected to the probe on the Model 580B via a short length of rubber tubing and the valve on the plastic tube immediately opened. The Model 580B withdraws a sample from the bag at the sampling rate of 500 ml/min. Thus, 10 liters of sample in the bag will provide approximately 20 minutes. Certainly the calibration of the 580B can be accomplished in a shorter period of time. The concentration of isobutylene in ppm by volume will be equal to the sample size, which was 1 cc, divided by the volume of the bag in liters, which would be 10 liters, times 1000. In this particular instance, the concentration would be:

$$\text{Conc (ppm by Vol)} = \frac{\text{1cc Isobutylene x 1000}}{\text{10 L Air}} = 100 \text{ ppm}$$

4.3.3 BAG STANDARDS (ORGANICS)

On occasion there is the need to prepare standards other than the normal calibration standard. As mentioned previously, isobutylene was chosen as a standard because of its stability. If other standards are to be used, it is best to develop a relation of the other standard to a standard of known stability like isobutylene. If this procedure is followed, a response factor can be developed by comparing the other organic standard to isobutylene this technique will be discussed in a later section. The following is a suggested technique for preparing other standards.

For organic materials, which are normally liquids at room temperature, the procedure is essentially the same except that an extremely small liquid sample is injected into the flowing air stream rather than the gas sample. This technique works well

only for relatively volatile organic materials. The flowing stream must vaporize all of the material or the calculation w be off. If the material is not rapidly volatile in that flow air stream, the liquid should be injected through the surface the plastic bag. Immediately after withdrawing the needle, hole in the plastic bag should be covered with a piece of plas tape.

Again, significant kneading of the bag will hasten evaporation of the sample and mixing of the vapor into the air provide homogeneous samples. The introduction of this sam into the 580B is the same as before. The calculation of concentration of the vapor in air is a two-step procedure wher the small volume of liquid injected into the air stream and i the plastic bag is converted to a volume of vapor. This vol of vapor is then used in the same manner as the volume of gas the case of isobutylene. The following equations apply:

$$\text{Volume Vapor (uL)} = \frac{\text{Liquid Volume (ul)} \times \text{Liquid Density} \times 24.}{\text{Molecular Weight}}$$

The above equation gives the vapor volume at atmospheric press (760 torr) and 25° C (77F).

Then:

$$\text{Concentration (ppm by Volume)} = \frac{\text{Vapor Volume (ul)} \times 1000}{\text{Air Volume (liters)}}$$

The following is a sample calculation for benzene:

Liquid Volume = 2 ul

Benzene Density = 0.879 g/cc

Molecular Weight Benzene = 78.1

Air Volume = 10 Liters

$$\text{Vapor Volume} = \frac{2 \times 0.879 \times 24.45 = 0.55 \text{ ul}}{78.1} \quad \text{Benzene Vapor}$$

$$\text{Conc} = \frac{0.55 \times 1000}{10} = 55 \text{ ppm (vol)}$$

The syringe used for the measurement of liquids in this partic lar instance is a small volume-type such as those manufactured the Hamilton Company. A convenient size syringe is the 10 micr liter volume.

4.4 580B CALIBRATION

The following procedure is applicable for both Cylinder and Bag Standards. The sequence requires both Zero gas and Span gas to be used. Span gas can be either contained as a cylinder or bag, in either case the exact concentration used must be known. This concentration will be entered to the 580 when the program provides its entry. With respect to Zero gas, there are several choices. Obviously a certified zero air standard in a cylinder presents no problem. Another choice would be to build a zero air standard in a bag. This can be simply accomplished with the set-up in Figures 4.1 and 4.2 using a charcoal scrubber to remove all the hydrocarbons present in the air. Charcoal does not absorb Methane; this does not cause a problem because the PID does not respond to it. Another approach which could be used in an emergency is to use room air unscrubbed.

This is acceptable if you know that there are no hydrocarbons present or they are exceptionally low in concentration. However, it is not recommended as a standard practice. The physical set up for cylinder calibration is illustrated in Figure 4.1; bag calibration in Figure 4.2.

4.4.1 CALIBRATION ROUTINE

(A) Set-up calibration assembly with zero air cylinder or bag as described in Figures 4.1 and 4.2.
(B) Model 580B set-up and zero calibration.

1. Power-up instrument using power plug.
2. Depress ON/OFF Key to ignite lamp and initiate sample pump.
3. Depress MODE/STORE Key.
4. Depress-/CRSR Key in response to LOG THIS VALUE? Prompt.
5. Depress-/CRSR Key to select Parameters Mode from the Main Menu.
6. Depress +/INC Key to advance thru the Run Mode selection parameter prompt.
7. Depress +/INC Key to advance thru the Auto Logging Mode selection parameter prompt.
8. Depress +/INC Key to advance thru the Average Time selection parameter prompt.
9. Depress +/INC Key to advance thru the Alarm Setting parameter prompt.
10. Depress +/INC Key to advance thru Lamp Selection parameter prompt.
11. Depress +/INC Key to advance thru Response Factor Setting parameter prompt.
12. Depress RESET Key to initiate calibration sequence.
13. Depress-/CRSR Key to decline restoration of the backup calibration.
14. Connect outlet of calibration tubing assembly to the Model 580B Detector Inlet as illustrated in Figure 4.2.
15. Introduce Zero Air to Model 580B by opening flow regulator.