

Work Plan

for

Soil Vapor Extraction System

at

**Nassau Uniform Services, Inc.
525 Ray Street
Freeport, New York 11520**

Site No. 130063

Date: February 3, 2000

Prepared by:

**Anson Environmental Ltd.
771 New York Avenue
Huntington, New York 11743**

"Your Environmental Partner"

Table of Contents

- 1.0 Introduction and Purpose of Soil Excavation and Disposal Work Plan
- 2.0 Summary of Existing and Background Information
 - 2.1 Site Location, Ownership and Access
 - 2.2 Site Description
 - 2.3 Background Information
 - 2.3.1 Geology
 - 2.3.2 Previous Investigations
- 3.0 Conclusions Based on Groundwater and Soil Sampling at Nassau Uniform Services Property
- 4.0 Proposed Soil Vapor Extraction System
 - 4.1 Soil Vapor Extraction Effectiveness
 - 4.2 Soil Vapor Extraction Design
 - 4.3 Soil Vapor Extraction System Operation and Monitoring
- 5.0 Quality Assurance/Quality Plan
- 6.0 Health and Safety Plan
- 7.0 Project Schedule

Figures

- Figure 1 Site Drawing – Horizontal Extent of Soil Contamination

1.0 Introduction and Purpose of the Soil Vapor Extraction System

This work plan describes a plan for installation and operation of a Soil Vapor Extraction System (SVES) inside the building on the property known as Nassau Uniform Services, Inc., 525 Ray Street, Freeport, Town of Hempstead, Nassau County, New York.

The installation of a SVES is proposed to remediate the high concentrations of volatile organic compounds (VOCs) present in the soils below the building at 525 Ray Street. Elevated concentrations of numerous VOCs were detected in the soil samples collected from borings below the building floor. Three of the most significant detected VOCs are tetrachloroethene, trichloroethene and cis-1, 2-dichloroethene. The later two compounds are break-down products of tetrachloroethene, a liquid commonly called PERC and widely used in the dry cleaning industry.

After completing a feasibility study, Anson Environmental Ltd. (AEL) has concluded that the installation and operation of a SVES at 525 Ray Street will effectively remediate the on-site soil contamination to concentration levels that will be acceptable by NYSDEC.

The area of contamination addressed by the proposed SVES is located below the floor and near the center of the building at 525 Ray Street (Figure 1).

2.0 Summary of Existing and Background Information

2.1 Site Location, Ownership and Access

In 1993, NYSDEC designated Nassau Uniform Services an Inactive Hazardous Waste Disposal Site. The size of the subject site location is approximately three-quarters of an acre. Nassau Uniform Services is designated Site Number 130063 on the New York State Registry of Inactive Hazardous Waste Disposal Sites.

The subject property is owned by Nassau Industrial Dry Cleaning Corp., 525 Ray Street, Freeport, New York 11520.

2.2 Site Description

Nassau Uniform Services property contains one large building and an asphalt paved parking lot (Figure 1). The primary access to the unfenced property is from Ray Street.

According to Nassau County Land and Tax Map information, the Nassau Uniform Services property is designated as follows:

Section 54

Block: 315

Lots: 98 through 107

2.3 Background Information

2.3.1 Geology

The geology of the Nassau Uniform Services property is generally defined to a depth of 12-feet at its western portion. Groundwater Technologies Inc. (GTI) installed the borings that define the aforementioned western portion of the property on September 23, 1994 (Appendix 1).

The lithologic description of the soil borings indicates that the following soil types are present at the Nassau Uniform Services property:

<u>Depth Below Grade (ft)</u>	<u>Soils Description</u>
0 to 4	mostly brown fine sand, poorly sorted, some gravel, trace clay and fill material.
4 to 8	mostly black organic marsh deposits to approximately 7-feet depth below grade (DBG), then transitions to fine sands and clay material.
8 to 12	gray and brown fine sands to approximately 10-feet DBG, then transitions to orange sand.

In general, the area surrounding Nassau Uniform Services consists of marsh associated with nearby Millburn Creek. The marshlands have been developed by covering them with clean fill and are now occupied by residential and commercial buildings and properties.

Groundwater at the Nassau Uniform Services property has been measured at approximately 5-feet DBG. However, the groundwater on the property is directly influenced by the tidal fluctuations that can range between 5 and 7-feet DBG.

2.3.2 Previous Investigations

The following is a brief chronological summary that reflects some of the events that have occurred at or near the Nassau Uniform Services property:

<u>1925 to 1962</u>	Information from the Village of Freeport files indicates that the building now occupied by Nassau Uniform Services was constructed in 1925. This information was obtained from a property diagram that was updated in 1965. No additional information was revealed about the property prior to 1962.
<u>1962 to 1965</u>	Historical aerial photographs taken in 1962 and 1965 illustrated that an addition to the Nassau Uniform Services building was constructed

between those years. The addition is placed at the western end of the original building and extends to the adjoining bulkhead.

1964

During December 1964, Nassau Industrial Services agrees to purchase from American Permac, Inc. the following equipment:

- Two 120 pound SE Industrial dry cleaning machines
- One Titan 700 Industrial dry cleaning machine
- One Model 200 Activated Carbon Recovery Unit

The aforementioned equipment was delivered and installed in 1965.

1965

In August 1965, Nassau Industrial Uniform Services agrees to purchase a Permac Industrial Cleaning Machine (330 SE).

1975

A letter dated October 6, 1975 confirms the Nassau Uniform Services purchase of a Brill X-40 oil skimmer. The skimmer was supplied by Western Environmental Engineering.

1982

In May 1982, oily waste from the on-site oil/water separator accidentally discharged into the property soils and Millburn Creek. Oil washed from soiled clothing is collected in the oil/water separator and the remaining wastewater is discharged into the local sewer system. Subsequently, the oil-contaminated soil was excavated for disposal by Nassau Uniform Services.

1983

On July 5, 1984, a hydrostatic test was performed on a 2,000-gallon underground gasoline storage tank located at the eastern side of the Nassau Uniform Services building near the front door. The tank test failed and was reported to NYSDEC and Spill Number 84-0959 was assigned to the event. The subsequent site remediation included the removal of the storage tank and the installation of three groundwater monitoring wells on-site

When the storage tank was excavated from the ground, it was reported that several holes were observed in the tank. The three monitoring wells are installed in the Nassau Uniform Services parking lot at the corner of Ray Street and West End Avenue. One monitoring well is installed at the center of the former tank location. The other two monitoring wells are located to the northwest and southeast of the former tank location. One of these two monitoring wells could not be located during recent site inspections.

Nassau County Department of Health (NCDH) inspected the spill location on October 20, 1984. According to NYSDEC database

information, Spill Number 84-0959 was closed to their satisfaction on December 30, 1998.

1988

On February 1, 1988, NCDH issued a permit to Nassau Uniform Services to maintain the storage of the following items:

<u>Tank/Storage Area Number</u>	<u>Tank Capacity (gallons)</u>	<u>Type of Toxic/Hazardous Material Stored</u>
1	260	multiple chemical stored
2	2,000	oil, fuel No. 2
3	30	multiple chemicals stored
4	2,000	oil, fuel No. 2
5	2,000	tetrachloroethylene
6	500	tetrachloroethylene

The expiration date for the aforementioned permit was February 1, 1993.

1989

On April 27, 1990, a 2,000-gallon waste oil/tetrachloroethylene tank was excavated and removed after being in place for approximately 12 years. Prior to removal, the tank was reported to be leaking. Subsequently, NCDH collected soil samples from the tank excavation for laboratory analysis. The laboratory analysis of the collected soil samples identified high concentrations of tetrachloroethylene (9,000,000 parts per billion (ppb)), trichloroethene (34,000 ppb), c-1,2-dichloroethylene (67,000 ppb) and other VOCs.

A letter from NCDH dated June 1, 1990, directed Nassau Uniform Services to perform site remediation as soon as possible.

1990

Soil samples were collected by NCDH on December 17, 1991 from 14-feet beneath the ground surface at the former tank excavation location. Laboratory analysis of the collected soil samples reported the following contaminant concentrations:

tetrachloroethylene	2,900,000 ppb
1,1,2-trichloroethene	130,000 ppb
1,2-dichloroethylene	38,000 ppb

Laboratory analysis of groundwater samples taken the same day downgradient of the former tank location also reported contaminant concentrations as follows:

tetrachloroethylene	20,000 ppb
---------------------	------------

1,1,2-trichloroethene	3,600 ppb
1,2-dichloroethylene	10,000 ppb
vinyl chloride	1,200 ppb

1994

On September 23, 1994, Groundwater Technology, Inc. (GTI) supervised the installation of six Geoprobe points designated GP-1, GP-2, GP-3, GP-4, GP-5 and GP-6. These Geoprobe points were installed for the collection of soil and groundwater samples. A site map showing the locations of the six Geoprobe points is in Figure 2.

Laboratory analysis of the soil samples collected at 2 to 4-feet DBG at GP-2 and GP-3 reported concentrations of contaminants that exceeded NYDEC recommended Soil Cleanup Objectives for 1,2-dichloroethene, trichloroethene, tetrachloroethylene and for total VOCs. Laboratory analysis of the soil samples collected from GP-5 also reported elevated levels of trichloroethene that exceeded NYSDEC Recommended Soil Cleanup Objectives

Laboratory analysis of groundwater samples collected on the same day reported concentrations above NYSDEC Class GA Standards for the following compounds:

- tetrachloroethylene
- vinyl chloride
- 1,2-dichloroethene
- chlorobenzene
- 1,1-dichloroethene
- 1,1,1-trichloroethane

Laboratory analysis of groundwater samples collected upgradient of Nassau Uniform Services reported no elevated concentrations of chemical compounds.

1995

On February 1, 1996, representatives from NYSDEC and Anson Environmental Ltd. performed a site reconnaissance at Nassau Uniform Services. The purpose of the site reconnaissance was to observe the Nassau Uniform Services plant operations, the physical constraints of the property and to determine future sampling locations.

Currently, Nassau Uniform Services plant operations include the washing and dry cleaning of commercial uniforms and industrial cleaning rags. Wastewater from the plant operations flows into open troughs that are located in the plant floor and into an oil/water

separator. The oil/water separator discharges into the Nassau County sewer system. In plant dry cleaning is performed in two machines manufactured by Spencer (Model GT 165) and Bowe, respectively. Safety Kleen, a permitted waste disposal company, collects lint and sludge waste that is contaminated with tetrachloroethylene for disposal off-site. Safety Kleen also supplies Nassau Uniform Services with raw materials for cleaning, including tetrachloroethylene.

The major portion of the cleaning performed at Nassau Uniform Services involves the machine washing of industrial uniforms and rags. A smaller amount of the cleaning operations require dry cleaning.

1996

On December 4, 1996 Freedom of Information requests were submitted to Nassau County Department of Health. Access to these records was performed on January 22, 1997.

1997

On July 22, 1997, Anson Environmental Ltd. (AEL) collected soil samples from 22 boring locations on the Nassau Uniform Services property. The collected soil samples were delivered to Accredited Laboratories, Inc.; Cateret, New Jersey where they were analyzed for concentrations of VOCs using EPA Method 8240. Copies of the laboratory analytical reports for the collected soil samples are contained in Appendix 3, Section 3 of the Draft Final Focused Remedial Investigation (FRI) Report prepared for NYSDEC by AEL, dated October 15, 1998 and revised January 27, 1999.

On August 28, 1997, AEL collected a wastewater sample from the floor trough inside the Nassau Uniform Services building. The collected wastewater sample was delivered to Accredited Laboratories, Inc.; Cateret, New Jersey where it was analyzed for concentrations of VOCs using EPA Method 8240. A copy of the laboratory analytical report for the collected wastewater sample is contained in Appendix 3, Section 4 of the Draft Final Focused Remedial Investigation (FRI) Report prepared for NYSDEC by AEL, dated October 15, 1998 and revised January 27, 1999.

On December 30, 1997, AEL collected a wastewater sample from the floor trough inside the Nassau Uniform Services building. The collected wastewater sample was delivered to EcoTest Laboratories, Inc.; North Babylon, New York where it was analyzed for concentrations of VOCs using EPA Method 624. A copy of the

laboratory analytical report for the collected wastewater sample is contained in Appendix 3, Section 4 of the Draft Final Focused Remedial Investigation (FRI) Report prepared for NYSDEC by AEL, dated October 15, 1998 and revised January 27, 1999.

1998

On April 21, 1998, AEL collected soil samples from 20 borings at the Nassau Uniform Services property. The collected soil samples were delivered to Environmental Testing Laboratories, Inc. Farmingdale, New York where they were analyzed for concentrations of VOCs using EPA Method 8010 and RCRA metals.

On April 22, 1998, AEL collected groundwater samples from two monitoring wells and eight piezometers at the Nassau Uniform Services property. The collected groundwater samples were delivered to Environmental Testing Laboratories, Inc. Farmingdale, New York where they were analyzed for concentrations of VOCs using EPA Method 601.

On April 23, 1998, AEL collected a groundwater sample from Piezometer No. 6 (P #6) at the Nassau Uniform Services property. The collected groundwater sample was delivered to Environmental Testing Laboratories, Inc., Farmingdale, New York where it was analyzed for concentrations of RCRA metals.

Copies of the complete laboratory analytical reports for the groundwater and soil samples collected in 1998 and noted above are contained in Appendix 4 of the Draft Final Focused Remedial Investigation (FRI) Report prepared for NYSDEC by AEL, dated October 15, 1998 and revised January 27, 1999.

1999

On November 23, 1999, AEL excavated approximately 50-tons of contaminated soil from a location at the northwest corner of the property at 525 Ray Street. Horwith Trucks, Inc. transported the contaminated soil to Michigan Disposal, Inc., Bellville, Michigan for disposal in the landfill at that location.

Laboratory analysis of the six end-point samples collected from the excavation indicated that four of the samples contained elevated concentrations of VOCs and Semi-VOCs that exceed NYSDEC soil cleanup objectives. The aforementioned VOCs are as follows:

acetone	920 ppb
methylene chloride	700 ppb
trans-1,2-dichloroethene	370 ppb

cis-1,2-dichloroethene	52,000 ppb
trichloroethene	4,800 ppb
tetrachloroethene	30,000 ppb

The full TCL analysis of the collected soil samples indicated that the soil remaining at the excavation site is also contaminated with elevated concentrations of semi-VOCs and metals.

A description of the work performed during the excavation of the contaminated soil is found in the Project Report letter for soil excavation and disposal at Nassau Uniform Services, Inc. dated February 3, 2000.

3.0 Conclusions Based on Groundwater and Soil Sampling at Nassau Uniform Services Property

The Draft Final Focused Remedial Investigation (FRI) Report prepared for NYSDEC by AEL, dated October 15, 1998 and revised January 27, 1999, Section 7.0 Summary describes the primary source areas of contamination at Nassau Uniform Services Property; namely:

- The former waste PCE tank
- The soils in the vicinity of the garbage container
- Former hole in the compressor floor
- Former supply well
- Dry cleaning machines
- Sample 19-I Location. Location 19-I is near the center of the building adjacent to the washing machines.

4.0 Proposed Soil Vapor Extraction System

The installation of a SVES is proposed to remediate the elevated concentrations of VOCs present in the soils below the building at 525 Ray Street. Significant concentrations of at least three VOCs, namely: tetrachloroethene, trichloroethene and cis-1, 2-dichloroethene, were detected in soil samples collected from borings below the building floor. The later two compounds are break-down products of tetrachloroethene.

AEL plans to install an on-site SVES consisting of 13 vertical extraction wells, appropriate manifold piping, a moisture separator, a particulate filter and a 5.5-horsepower vapor extraction blower. Pressure indicators, flow control valves and meters will be installed at numerous strategic system locations to control and monitor SVES functional operations. To meet NYSDEC clean air standards it is anticipated that the exhaust air from the SVES will be processed through drums of granular activated carbon (GAC). The 2-inch diameter PVC vertical extraction wells will be installed to a depth

below the building floor of approximately 4-feet. The extraction wells will be screened from approximately 1 to 4 feet below the floor.

4.1 Soil Vapor Extraction Effectiveness

During a pilot study performed inside the building at 525 Ray Street the radius of influence (ROI) from a temporary extraction well was determined to be 8-feet. The ROI is defined as the distance from the extraction well to a location where a vacuum of at least 0.1-inches of water is observed.

An examination of the soil boring logs associated with the installation of borings and monitoring wells at 525 Ray Street demonstrated that the soils immediately below the building floor are comprised of course sand to a depth of approximately 3-feet below the floor. At some interior boring locations, bog material was found from 3 to 4-feet below the floor. AEL concluded that soil vapor extraction could be effective in this type of soil.

An examination of the vapor pressure, boiling point and Henry's Law constant for tetrachloroethene and trichloroethene determined that soil vapor extraction can effectively remove these compounds from the soils below the building floor at 525 Ray Street.

4.2 Soil Vapor Extraction System Design

The design of the soil vapor extraction system is based on information gathered during a pilot study to determine the radius of influence (ROI) for a proposed SVES. The pilot study determined that the ROI of the proposed SVES at the subject site is 8-feet. Given this information, extraction wells would theoretically be spaced 16-feet on center. Normally, the 16-foot extraction well spacing would cover the entire spill area. However, the unique building construction characteristics at 525 Ray Street impact the traditional design of the SVES. The design of the SVES and location of extraction wells must consider the thickness of the building's poured concrete floor that ranges from 8-inches to 24-inches at some locations. Additionally, the western portion of the building is supported by numerous poured concrete footings that are supported by wood pilings that extend in excess of 25-feet below grade.

The proposed locations of the SVES extraction wells take into account the unique characteristics of the building construction at 525 Ray Street. The ideal position of certain extraction wells was changed to accommodate the building details.

The horizontal profile of the soil contamination at 525 Ray Street approximates a triangular shape. The base of the triangle measures approximately 85-feet in the northeast/southwest direction and the height of the triangle measures approximately 40-feet in the northwest/southeast direction. Based on this triangular approximation, the horizontal profile of the contaminated area is approximately 1700-square feet. Based on

the depth to groundwater of approximately 5-feet, the volume of soil contamination to be remediated by the SVES is 8,500-cubic feet.

During the ROI pilot test AEL determined the most effective wellhead vacuum to be approximately 50-inches of water. At this vacuum, a flow of approximately 300 feet/min was measured at the exhaust (Table 1).

TABLE 1

Vacuum Inches of Water	Influence 4-feet from extraction well	Influence 8-feet from extraction well	Influence 12- feet from extraction well	Influence 16- feet from extraction well	Influence 20- feet from extraction well	Flow Feet/Minute
38.25	1.23	.03	.01	0.0	0	400
40.0	1.40	.17	.02	.005	0	300
50.0	2.21	.21	.03	0	0	300
60.0	2.63	.29	.04	0	0	250
67.0	3.14	.30	.04	0	0	200

Given the ROI and the building construction limitations, AEL will install 13 SVE wells to address the soil contamination. The surface surrounding the SVE wells will be sealed using concrete. The wells will be 2-inches in diameter and be constructed of .10-inch slotted schedule 40 PVC and solid schedule 40 PVC riser pipe. The wells will be installed by breaking through the concrete foundation and removing the soil underneath the foundation with a post hole digger. After the soil is removed, the extraction piping will be fitted with a point and driven to the desired depth. The slotted section of the pipe will extend 4-feet below the floor surface (BFS) to 1-foot BFS. The solid riser pipe will be connected to the slotted pipe and extend from 1-BFS to the floor surface where it will be connected to a 4-inch PVC manifold pipe that will in-turn be connected to a regenerative electrical blower. The manifold piping will consist of 4-inch schedule 40 PVC pipe. The manifold piping coming out of the blower intake port will be metal and will extend for approximately 5-feet to avoid overheating that might occur to PVC piping.

More definitive details of the SVES will be determined after the initial readings are collected from the system effluent. After a vapor treatment system is installed, discharge calculations will be performed and compared to discharge limitation guidelines.

The proposed blower was sized using the pilot test information, head loss equations and IDEX Environmental Blower Application Software. Based on this information, a 5.5-HP 3-Phase electrical blower is proposed for 525 Ray Street. The blower unit will be combined with a replaceable polyester in-line filter, a moisture separator, pressure and vacuum gages and an in-line flow meter. A licensed electrician will install the blower unit for the SVES.

After the SVES initial startup pilot test, the type and quantity of exhaust treatment will be determined. Whether the exhaust has to be treated or not, the exhaust stack will run up the side of the building and extend at least 6 feet above the building roof line.

AEL reviewed the groundwater conditions at 525 Ray Street and is of the opinion that the use of groundwater depression pumps is impractical for this site.

4.3 Soil Vapor Extraction System Operation and Monitoring

After the installation and final testing of the SVES is complete, AEL will collect exhaust air samples on a monthly schedule. The collected air samples will be delivered to a New York State certified laboratory where they will be analyzed for concentrations of VOCs using EPA Method 8260. The results of the laboratory analysis will be included in a monthly report submitted to NYSDEC.

The installed SVES will be frequently monitored during the first few weeks of operation. Soon after the first few weeks, AEL anticipates that the frequency of SVES operational checks can be reduced to once per week.

During the operational checks, liquid collected in the SVES moisture separator will be removed and stored in a closed 55-gallon drum for proper disposal. Appropriate disposal of the drummed liquid will be determined by submitting samples of the liquid for laboratory analysis using EPA Method 8260.

5.0 Quality Assurance/Quality Control Plan

The Work Plan for the Installation and Operation of the Soil Vapor Extraction System will comply with the existing Quality Assurance/Quality Control Plan for the Nassau Uniform Services property as described in the Focused Remedial Investigation Work Plan filed with NYSDEC and dated March 25, 1997.

6.0 Health and Safety Plan

The Work Plan for the Installation and Operation of the Soil Vapor Extraction System will comply with the existing Health and Safety Plan for the Nassau Uniform Services property as described in the Focused Remedial Investigation Work Plan filed with NYSDEC and dated March 25, 1997.

7.0 Project Schedule

The following is a list of the project events and the schedule time in days to complete each event (weather and tide permitting). The schedule indicates that the first SVES Project Report will be submitted to NYSDEC 60 business days after Nassau Uniform Services, Inc. receives approval of the SVES Work Plan from the State. The schedule does not provide for delays caused by inclement weather or conflicting tides.

The project schedule consists of two phases. During Phase 1, the SVES is initially installed, tested and an exhaust air sample is collected for laboratory analysis. Results of the laboratory analysis for the first collected exhaust air sample are discussed in the first SVES Project report. During Phase 2 the SVES is considered to be fully operational and exhaust air samples are collected for laboratory analysis on a monthly schedule.

Work Schedule for Installation and Operation of the SVES at Nassau Uniform Services

ARA = after receipt of NYSDEC Work Plan approval

SVES Installation Schedule:

<u>Project Events</u>	<u>ARA + business days</u>
NYSDEC approves Work Plan	0
AEL and subcontractor install 13 extraction wells	15
AEL completes SVES installation	25
AEL completes SVES installation tests	30
AEL begins collection of monthly exhaust air samples	35
Tedlar air bag samples delivered to laboratory for analysis	35
First monthly laboratory analytical report received at AEL	50
First monthly Project Report delivered to NYSDEC	60

Total elapsed time to complete installation phase = 60 days

SVES Operational Schedule:

<u>Project Events</u>	<u>S/C + business days</u>
AEL collects monthly exhaust air samples	1
Tedlar air bag samples delivered to laboratory for analysis	1
Monthly laboratory analytical report received at AEL	15
Monthly Project Report delivered to NYSDEC	25

S/C = sample collection

Total elapsed time between S/C and project report submission = 25 days

West End Avenue

STA. 20, EL.= 100.00'

▲ "T" CUT IN CONC. S.W.

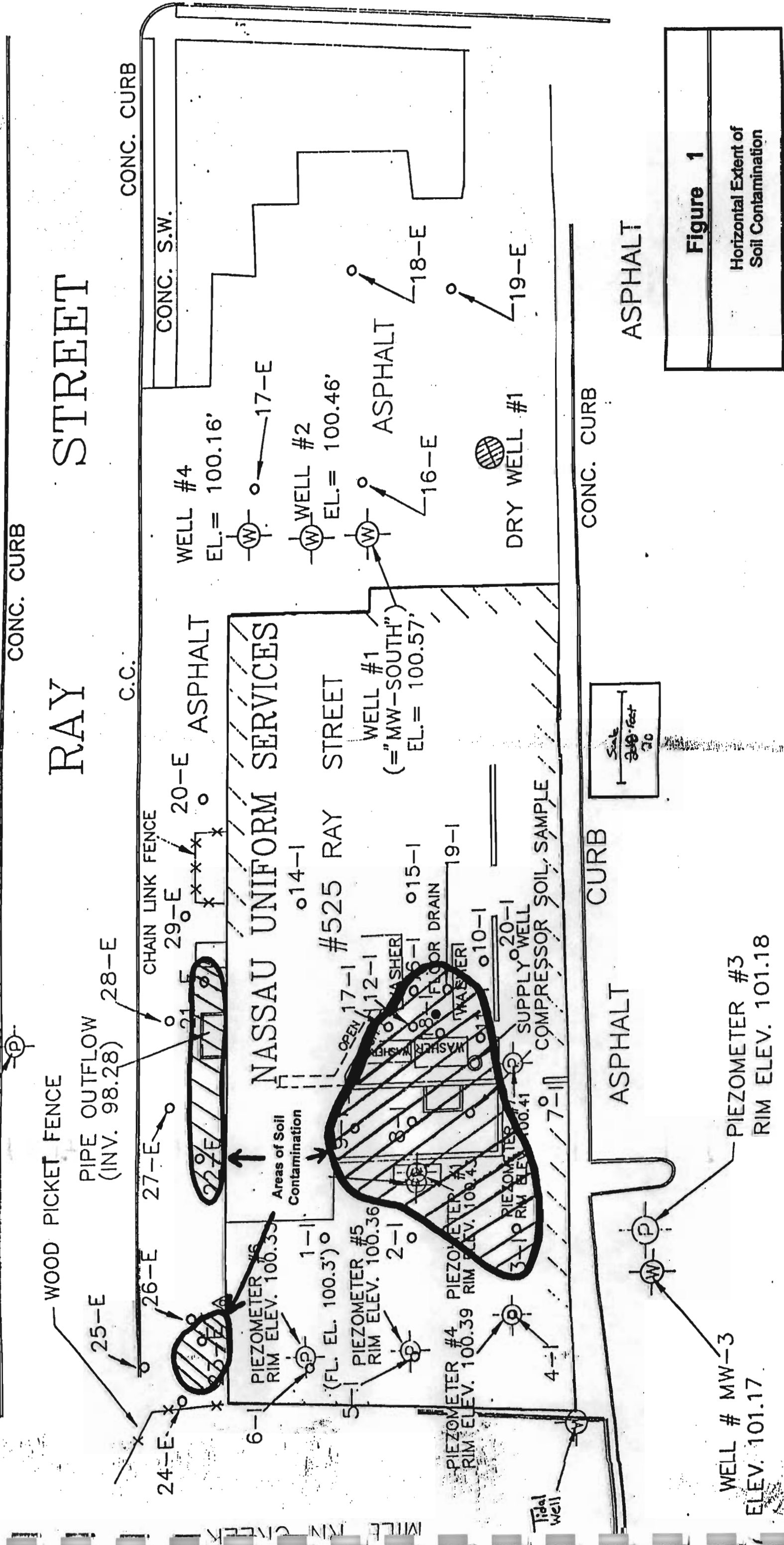


Figure 1

Horizontal Extent of Soil Contamination