SITE INVESTIGATION/REMEDIAL ALTERNATIVES REPORT WORKPLAN

Former Provan Ford Facility
146-172 Mill Street
Newburgh, New York

Prepared for:

City of Newburgh
83 Broadway
Newburgh, New York 12550

Prepared by:

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July 2000

Project No. PROVA001

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INTRODUCTION

First Environment Inc., (First Environment) was retained by the City of Newburgh to conduct site investigation and remediation activities at the Former Provan Ford facility located at 146-172 Mill Street Newburgh, New York. The activities outlined in this workplan are based on a site investigation conducted in October 1999 by First Environment as well as proposed investigation and remediation activities resulting from a site meeting held on February 8, 2000 where First Environment met with members of the New York Department State of Environmental Conservation (NYSDEC) and McGoey Hauser and Edsall. In attendance were Mssrs. David Camp and Larry Ricci of the NYSDEC, Mr. William Hauser of McGoey, Hauser and Edsall and Mssrs. Thomas Bambrick and Scott Green of First Environment.

The City of Newburgh is conducting the activities under the Municipal Assistance Environmental Restoration Projects "Brownfields Program". The following workplan details the site investigation and remedial investigation activities either conducted or proposed for the Former Provan Ford site. The activities include: the disposal of stockpiled soil; excavation and disposal of impacted soil related to USTs; the sampling, excavation and disposal of surface soil impacted by petroleum materials; the characterization and disposal to stored drums; the collection and analysis of soil samples; the installation, sampling and analysis of groundwater monitoring wells; the closure of underground storage tanks and piping; sealing interior drain connections; and the preparation of a Site Investigation/Remedial Alternatives Report (SI/RAR). All work will be performed in accordance with applicable state and local requirements.

ENVIRONMENTAL SETTING

GENERAL INFORMATION

The Former Provan Ford Facility is located at 146-172 Mill Street, Newburgh, New York. The adjoining properties east of the subject property and across Mill Street are residential. The adjacent to and properties across Route 9-W (Robinson Street) include several commercial companies, including Marjam Building Supply, Levinson Used Car Dealer and a car wash. The adjacent property south of the Former Provan facility is occupied by the Orange County Plumbing Supply Company. A Dairy Cone Ice Cream Store and an old warehouse/commercial building now occupied by a Limousine Service are located adjacent to and northwest of the subject property. The adjoining property north of the Former Provan Ford facility across Dickson Street is a vacant brick warehouse/light manufacturing building which appears to be several decades old.

The subject property, comprises approximately 3.5 acres, is located on the northwest corner of Mill Street and Deyo Place in Newburgh, New York. The land on which the facility lies is covered approximately 20% by the facility building. The remaining portion of the property is covered with gravel and/or concrete. Some portions of the northeast and west areas of the property are covered with earthen fill and vegetation. Two concrete pads, where trucks were formerly washed are also present immediately west of the facility building. The property is located in a mixed commercial and residential use area.

The Former Provan Ford building consists of one slab-on-grade concrete structure. This building encompasses approximately 18,000 square feet and is used primarily for garage and storage space. The building is segregated in two halves; the northern half, which was built in the 1940s and is now used exclusively for garbage storage; and the southern half, which was added to the original structure in the 1950s and is used for petroleum and parts storage as well on-going truck repair operations. According to the

current site occupant, the site building had been occupied by Former Provan Ford since its construction. Prior to the construction of the facility, the site was undeveloped. The boundaries of the site are delineated by Route 9-W (Robinson Street) on the west, The Orange County Plumbing Supply Company on the south, Dickson Street on the north and Mill Street on the east. The location of the facility is illustrated on the Newburgh Quadrangle United States Geological Survey (USGS) 7.5 Minute Topographic Map (revised 1977) as Figure 1.

SITE HISTORY

Gary's Heavy Truck repair was the occupant from March 1998 to March 2000. The City of Newburgh became the owner in March 1998 after it foreclosed on the former Provan-owned property and has subsequently evicted Gary's Heavy Truck Repair (March 2000). At the time of its operation, Gary's Heavy Truck repair activities included the service and maintenance of heavy trailer-trucks in the southern garage area. The facility also includes a large amount of petroleum and refuse storage on-site, however, these were not included in the Truck repair activities.

Prior to 1998, Former Provan Ford had occupied the property for approximately fifty years. Former Provan's on-site operations included the washing, service and maintenance of Ford tanker trucks.

The Former Provan facility consisted of two attached garage maintenance areas, a small office area and an external wash rack which was located on a concrete pad and attached to the western wall of the garage. Empty tanker trucks would arrive at the site, where they would be cleaned in the wash rack, then serviced and fueled before they were sent back on the road for petroleum distribution.

TOPOGRAPHY AND DRAINAGE

The USGS 7.5 Minute Topographic Quadrangle Map for the Site is included in Figure 1 and shows the area in which the Former Provan Ford Facility is located. The Facility is approximately 500 feet above mean sea level and the surrounding topography slopes to the southeast toward the Quassaick Creek approximately 1/8 mile south of the site area.

WATER/WASTEWATER AND STORMWATER

Only sanitary wastewater is discharged from the subject property. Stormwater on the subject site flows overland with the topographical gradient (east/southeast) and discharges to either Mill Street or one of several storm drains located on the paved portions of the subject property.

GEOLOGY AND HYDROGEOLOGY

The Former Provan property lies within the Valley and Ridge Physiographic Province. The predominant features associated with this province are narrow valleys and ridges formed as a result of differential erosion of the underlying sandstone and shale formations. Specifically, the Newburgh area is characterized by alluvial deposits underlain by meta-sedimentary and sedimentary bedrock formations.

Alluvium in the area is comprised of flood plain sediments (sand, silt and clay) associated with the Hudson River. Glacial deposition in the area consists primarily of till and unsorted outwash. The outwash is predominantly a mixture of gravel, sand, silt and clay. The bedrock underlying this region consists of middle Ordovician Taconic Sequence, primarily shales and graywackes.

Soil borings conducted at the property indicate the upper 2 to 3 feet is primarily composed of fill material. A sand and gravel layer extends from approximately 2 to 8 feet below grade and is underlain by a lower permeability layer of silt. The above-

mentioned unconsolidated soil overlies weathered bedrock at approximately 15 feet below grade. The water table varies between 8 to 14 feet below grade. Groundwater is believed to flow to the east/southeast in the direction of the topographic gradient.

PREVIOUS WORK SUMMARY

An initial investigation was initiated by First Environment on October 19 to 22, 1999. During the investigation, soil borings and soil samples were collected for analysis; in addition, the installation sampling and analysis of groundwater monitoring wells was conducted to provide a baseline for soil and groundwater quality at the site.

In total, First Environment installed 27 geoprobe soil borings, of which, soil samples were collected at 15 locations for laboratory analysis. Using a geoprobe, soil borings were installed at or immediately adjacent to each of the six known USTs, the exterior Oil Water-Separator and associated pipeline, the Truck Wash Rack and associated drains as shown in Figure 2. These areas present the potential for the greatest environmental concern due to the former contents, associated handling practices, and age of the above-referenced tanks and pipelines. Geoprobe soil analytical results adjacent to USTs and the oil/water separator are summarized in Table 1. These results indicate 12 of 15 soil samples exceed the NYSDEC TAGM recommended soil clean up objectives for various volatile organic compounds and/or semi-volatile organic compounds.

Five surface soil samples were collected from 0 to 6-inches below grade adjacent to the Wash Rack Area, Oil/Water Separator, the UST tank islands, as well as the former Truck Parking Area as shown in Figure 3. Soil collection was biased toward areas that contain visible petroleum stained soil. Each soil sample exceeds the NYSDEC TAGM recommended soil clean up objective for various volatile organic compounds and/or semi-volatile organic compounds as shown in Table 2.

A total of seven temporary one-inch piezometers (PZ-1 to PZ-7) were installed using a Geoprobe to assess the water quality at each of the former UST locations and the

oil/water separator as illustrated in Figure 4. The water table was encountered from approximately 8 to 14 feet below grade and petroleum product was detected on the water table at five of the seven wells. Groundwater samples were collected at each piezometer for laboratory analysis in attempt to establish a baseline for VOC concentrations at each UST location and at the oil water separator. Six of seven piezometer locations indicate the groundwater quality has been impacted above the NYSDEC groundwater standard for volatile organic compounds. The groundwater analytical results are summarized in Table 3. Attachment A includes the well construction logs for piezometers (PZ-1 to PZ-7). All drilling, well installation, soil and groundwater sampling procedures are included in the Quality Assurance/Quality Control Plan (QA/QC) provided in Attachment B.

In addition, at the request of the NYSDEC approximately 60.8 tons of surface soil was stockpiled for disposal. This soil was sampled by First Environment on December 15, 1999 for waste characterization. Stockpiled soil was identified as non-hazardous and disposed of by TPS technologies, Inc. on February 8, 2000.

Also, during the February 8, 2000 site walk between First Environment and the NYSDEC, a limited number of drums were identified that pose a threat to the environment. Therefore, on February 24, 2000, a total of 9 drums were overpacked by CODE Environmental prior to pending off-site disposal.

PROPOSED SCOPE OF WORK FOR
AREAS OF ENVIRONMENTAL CONCERN

UST REMOVAL, SOIL SAMPLING AND GROUNDWATER ACTIVITIES

Six USTs have been identified for removal at the Former Provan Ford Facility, including: 1) 20,000-gallon diesel tank, 2) 10,000-gallon diesel tank, 3) 8,000-gallon heating oil tank, 4) 4,000-gallon gasoline tank, 5) 3,000-gallon waste oil tank, and 6) 550-gallon heating oil tank. The NYSDEC case manager will be notified at least one (1) week in advance to the removal of the USTs. In addition, the NYSDEC will inspect all tank excavations prior to backfilling.

During the previous investigation, First Environment discovered each UST has impacted soil immediately adjacent to the tank. Furthermore, floating product was detected in wells adjacent to all but one UST. In order to better evaluate potential soil excavation limits and water quality, First Environment will install 9 additional monitoring wells prior to removing the USTs. Eight of the nine wells will be installed downgradient of the existing USTs and one well will be installed upgradient of the existing USTs and operations building. The upgradient well will establish background water quality levels.

The UST/piping excavation, removal and disposal activities will include pumping residual petroleum material, excavation of significantly impacted soil, and removal of existing concrete pads that overlie the USTs. Prior to removing the USTs and associated piping, each tank and piping run will be inerted, pumped, and cleaned of any residual petroleum materials as described in First Environment UST activities and procedures included as Attachment C. First Environment estimates approximately 5,000 gallons of residual petroleum and water will be pumped from the USTs prior to removal. After the USTs have been removed, any significant accumulation of product in the excavation will be removed from the excavation using a VAC truck prior to backfilling. Once the USTs have been cleaned, they will be removed and examined for

holes and then taken to a scrap-metal facility for disposal. During the removal, First Environment estimates between 15 to 30 cubic yards of contaminated soil per tank will be excavated and stockpiled for waste classification and disposal. As part of the excavation process, excavated soil will be field screened and visually inspected to determine potential re-use. Once field screened, the soil will be segregated into piles consisting of a petroleum contaminated and non-contaminated soil. At which time, waste characterization samples will be collected for the impacted soil pile for purpose of classifying the soil for disposal. In addition, a total of 70 cubic yards of concrete pad will be removed and disposed.

Subsequent to excavating any highly contaminated soil, post excavation soil samples will be collected at each of the UST excavations in accordance with NYSDEC STARS Memo #1 and SPOTs Memo #14. A total of six post-excavation soil samples will be collected at each UST excavation base, consisting of at least one composite sample from each of the four sidewalls and two from the excavation base. At tank area 5 & 6, First Environment will combine the post excavation sampling due to their close proximity to one another. If visually impacted soil remains subsequent to excavating soil, a grab sample will be collected pursuant to SPOTs Memo #14. Also, one sample per 20 linear feet of piping run will be collected and analyzed. Upon completion of soil excavation and post-excavation sampling, clean distinguishable soil will be backfilled in each excavation to grade. Figure 5 illustrates the approximate area of each UST excavation and the proposed location of post excavation soil samples. The Health and Safety Plan for these activities is provided in Attachment D.

In accordance with the STARS document, soil impacted by gasoline compounds, will be analyzed for VOCs and MTBE using Method 8021. For soil impacted by fuel oil, samples will be analyzed for both VOCs and base/neutral compounds using Methods 8021 and 8270, respectively. In areas impacted by waste oil, soil will be analyzed for VOCs plus TICs (Method 8260) and SVOCs plus TICs (Method 8270) as well as PCBs using Method 8082 plus sulfuric acid clean up and TAL metals.

A total of nine monitoring wells are proposed by First Environment. Eight 2–inch PVC flush mounted monitoring wells will be used to delineate the extent of groundwater contamination associated with the USTs as well as the installation of one upgradient well to provide background water quality data. The proposed well locations are illustrated in Figure 6. As per Section 5.5.3.2 – "Permanent Monitoring Wells," of the NYSDEC Sampling Guidelines and Protocols, the 2-inch wells will installed using hollow stem augers or continuous flight augers. Casings with well screens shall be installed in unconsolidated and semi-consolidated soils to prevent soil and other foreign material from entering the well during pumping. The annular space surrounding the screen will be backfilled with sand and filter pack and the remainder of the annular space surrounding the casing above the screen will be backfilled with bentonite, and/or cement bentonite grout, depending on the conditions of the site. A typical well construction diagram for unconsolidated material has been provided as Figure 7.

Once the wells have been installed, they will be developed to a sediment free discharge. Following a two-week period to allow the wells to stabilize, an initial round of groundwater samples will be collected at all 16 wells that exist at the site.

All 16 wells onsite will be surveyed and then sampled for chemical constituents consistent with NYSDEC STARS guidance document. These include for gasoline compounds, groundwater analysis for VOCs and MTBE using Method 8021. For groundwater impacted by fuel oil, STARS recommends analysis for both VOCs and base/neutral compounds using Methods 8021 and 8270, respectively. At the former waste oil tank, groundwater will be analyzed for VOCs using Method 8260 plus TICs and SVOCs using Method 8270 plus TICs as well as PCBs (Method 8082) and TAL metals.

First Environment will conduct rising and falling head slug tests at each of the 16 wells in an effort to determine the permeability of the water-bearing zone. This data will be used to characterize the Hydrogeology at the site and will be included in the SI/RAR.

SURFACE SOIL SAMPLING

Soil staining has been observed at five areas on the property. First Environment has identified that surfical soil concentrations, exceed NYSDEC recommended soil clean up objectives for PAHs, metals and/or VOCs at each of the five areas. As a result, First Environment recommends additional investigation at each of the five areas.

At each area, four additional sample locations will be sampled at 0-6 inches and 6 to 12-inches below grade to horizontally and vertically delineate the extent of contamination. In addition, two background samples will be collected and analyzed from 0 to 6 inches at "Clean Areas" away from Former Provan Operations. Surficial soil sample locations are illustrated in Figure 8. Soil samples will be collected and analyzed for base neutrals (Method 8270), PCBs, and metals, since the petroleum stained soil is likely the result of waste oil leaks associated with heavy truck transport. Samples collected at 6 to 12-inches below grade will also be analyzed for VOCs (Method 8021). Based on the results, the need to excavate soil for remedial purposes will be evaluated. The QA/QC Plan summarizing the soil sampling procedures is provided in Attachment B. The Health and Safety Plan for these activities is provided in Attachment D.

DRUM CHARACTERIZATION & DISPOSAL

The Former Provan facility does not currently generate any hazardous waste or petroleum oil waste which requires disposal. However, 81 drums (56 outside; 25 inside) of waste oil, hydraulic oil and other miscellaneous petroleum products are currently staged on at the Former Provan property. The 56 drums, which are located outside, are on the western portion of the property beneath the truck cleansing rack. The drums were staged at this location as part of NYSDEC's initial stabilization of the property after drums of spilled oil were discovered in June, 1998. According to the site representative, the interior 25 drums have been undisturbed since Former Provan vacated the property.

During the February 8, 2000 site walk between First Environment and the NYSDEC, a number of dented and rusted drums were observed as well as one drum that was leaking petroleum material. Drums that were identified as a potential threat to the environment were overpacked. On February 24, 2000, a total of 9 drums were overpacked by CODE Environmental.

Based on initial screening, the drums at Provan site contain petroleum products and waste oils. Drums will be characterized by a field chemist based on using physical methods with confirmation samples taken whenever necessary. The physical method includes: identifying drum markings, visual inspection of drum contents utilizing a glass drum sleeve, and obtaining MSDS's when possible. An OVA will also be utilized to monitor organic vapors. The field chemist will perform field screening for pH using pH paper and will perform field flash point tests in the field. Lastly, the chemist will perform field solubility and reactivity screening to determine solubility and/or reactivity of the petroleum contents.

Confirmation composite sampling for PCB's, Total Organic Halides, and Flashpoint will be conducted on drums that contain waste oil and petroleum contaminated solids. The analytical methods used for drum characterization will be as follows: total organic halides using EPA SW-846 method 3540A/9020A; Ignitability using SW-846 methods 1020; PCBs using SW-846 methods 3540A/9020A. A composite sample will be taken from no more than 10 drums for the analyses. Any drums failing the field screening for field ignitability will be analyzed to confirm the flash point by certified laboratory. We have selected Integrated Analytical Laboratories, a New York State Department of Health & Environmental Laboratory Approval Program (NYSDOH ELAP) certified laboratory to perform lab analyses.

Prior to drum disposal, each drum will be characterized by a field chemist. Based on preliminary testing, we expect 10% of the drum to be hazardous and the other 90%, non-hazardous.

PIPE AND DRAIN ASSESSMENT

Based on historical maps (provided by the City of Newburgh or site owners and operators) and site observations, First Environment will develop a map that illustrates the on-site pipeline and drains.

OIL/WATER SEPARATOR PUMP-OUT, CLEANING AND DISPOSAL

First Environment will pump-out, clean, and dispose of the contents of both the interior and exterior oil/water separators. First Environment estimates a total of 2,500 gallons of petroleum material and sludge will be pumped out of the oil/water separators and disposed. The interior separator will be cleaned and disposed at a scrap-metal yard along with its associated piping. All inside building drains that lead to the exterior separator will be sealed with concrete. Prior to sealing, the drains each will be cleaned. Once the exterior separator has been cleaned, it will be visually inspected to determine its integrity. Also, a sample of the groundwater from the well immediately downgradient of the separator will be collected and analyzed to determine if there has been any adverse impacts resulting from past use of the separator. Since the separator is relatively new, if the integrity is sound and there are no identifiable impacts from past use, then the separator will be left in place, as is, for potential future use. The exterior drains will also be cleaned of petroleum materials along with exterior oil/water separator.

SITE INVESTIGATION/REMEDIAL ALTERNATIVE REPORT

First Environment will provide an SI/RAR that documents the findings of the site investigation and proposed remedial alternative activities, including results of the UST excavation, removal and subsequent post-excavation soil sampling activities, soil disposal activities, groundwater monitoring results and recommendations consistent with 6NYCRR Part 375-1.10(c)(1-7); in addition to, remediation recommendations in accordance with guidelines specified in STARS for the management of excavated

contaminated soil as well as active groundwater remediation alternatives, including but not limited to, Risk Based Corrective Action Measures.

PROJECT SCHEDULE

A project schedule illustrating the major tasks is provided on Figure 9. The completion of these tasks are subject to receiving a fully executed contract.

WELL CONSTRUCTION LOGS

First Environment's well construction logs are included as Attachment A.

QUALITY ASSURANCE/QUALITY CONTROL PLAN

First Environment's Quality Assurance/Quality Control Plan is included as Attachment B.

UST ACTIVITIES AND PROCEDURES

First Environment UST Removal Procedures are included as Attachment C.

HEALTH AND SAFETY PLAN

First Environment's site-specific health and safety plan for the activities to be performed at the Provan Ford site is included as Attachment D.

CITIZEN PARTICIPATION PLAN

First Environment's Citizen Participation Plan is included as Attachment E.

COST SUMMARY & QUOTATIONS

First Environment's Cost Summary is included as Attachment F.

TABLE 1

SOIL BORING ANALYTICAL RESULTS
PROVAN FORD, NEWBURGH NEW YORK

SAMPLE ID	RECOMMENDED	GS-1	GS-2	GS-3	GS-4	GS-5	GS-6	GS-7	GS-8	GS-9	GS-10	GS-11	GS-12	GS-13	GS-14	GS-15	GS-16
SAMPLE LOCATION	SOIL	G-1	G-2	G-8	G-6	G-9	G-12	G-14	G-15	G-16	G-18	G-20	G-23	G-25	G-25	G-26	G-27
SAMPLE DEPTH (feet below grade)	CLEANUP	7-8	7-8	11-12	11-12	11-12	7-8	11-12	11-12	11-12	1-1.5	11-12	11-12	7-8	11-12	11-12	11-12
SAMPLE DATE	OBJECTIVE	10/19/99	10/19/99	10/19/99	10/19/99	10/21/99	10/21/99	10/21/99	10/21/99	10/21/99	10/21/99	10/21/99	10/22/99	10/22/99	10/22/99	10/22/99	10/22/99
Volatile Organic Compounds - 8021 List																	
Benzene	60	u	u	u	u	u	u	4,970	u	u	--	u	u	u	u	u	u
Toluene	1,500	u	u	5,540 J	u	u	1,010 J	74,900	62,000	65,400	--	u	16,700	3 J	u	1030 J	9,120
Ethylbenzene	5,500	26 J	2,700	6,840	561	2,440	6,580	29,900	36,700	40,300	--	804 J	6,850	u	u	3,080	16,200
Total Xylenes	1,200	26 J	1,960	43,300	2,130	9,470	33,600	151,000	216,000	202,000	--	850 J	36,500	2 J	u	17,400	55,800
Isopropylbenzene	n/a	u	1,450	u	128 J	1,310	338 J	4,260	5,740	6,300	--	662.0 J	1,420	u	u	950 J	6,260
n-Propylbenzene	n/a	14 J	2,630	4,460 J	256 J	3,830	u	18,600	23,100	24,200	--	3,410	3,300	u	u	2,990	15,200
1,3,5-Trimethylbenzene	n/a	20	1,910	11,700	769	7,460	407 J	39,600	50,400	48,400	--	3,540	11,100	u	u	7,900	31,400
tert-Butylbenzene	n/a	u	u	u	u	u	u	u	u	u	--	u	u	u	u	u	u
1,2,4-Trimethylbenzene	n/a	61	3,700	35,900	1,550	23,200	u	116,000	129,000 *	130,000 *	--	11,300	27,400	u	u	26,500	106,000 *
sec-Butylbenzene	n/a	11	u	u	u	2,970	u	u	u	u	--	u	1,630	u	u	u	u
4-Isopropyltoluene	n/a	u	2,150	u	u	5,610	u	u	u	u	--	u	3,570	u	u	u	4,230
n-Butylbenzene	n/a	u	u	u	u	u	u	u	u	u	--	u	u	u	u	u	u
Naphthalene	13,000	11	3,350	5,470 J	992	6,860	5,020	9,140	10,600	11,800	--	792	4,270	u	u	3,820	16,800
Semivolatile Organic Compounds																	
Naphthalene	13,000	u	3,430	927	9,420	6,000	--	--	--	--	u	84 J	1,540	--	--	2,930	12,700
2-Methylnaphthalene	36,400	u	14,300	1,810	9,450	16,700	--	--	--	--	u	252	4,830	--	--	11,500	31,000
Acenaphthylene	41,000	u	275	u	108 J	235 J	--	--	--	--	300	u	432	--	--	u	u
Acenaphthene	50,000	u	614	u	137	515	--	--	--	--	205 J	u	744	--	--	553 J	1,260
Dibenzofuran	6,200	u	869	u	184 J	u	--	--	--	--	u	u	605 J	--	--	u	u
Diethylphthalate	7,100	u	1,180	u	u	u	--	--	--	--	u	u	u	--	--	u	u
Fluorene	50,000	u	774	u	254	977	--	--	--	--	241	u	827	--	--	686 J	1,870
N-Nitrosodiphenylamine	n/a	u	u	u	u	2,160	--	--	--	--	455	u	1,510	--	--	2,050	6,530
Phenanthrene	50,000	u	2,270	u	1,220	3,240	--	--	--	--	2,340	212	3,850	--	--	2,330	6,800
Anthracene	50,000	u	222	u	211	660	--	--	--	--	609	u	1,240	--	--	567 J	1,200
Di-n-butylphthalate	8,100	u	u	u	u	u	--	--	--	--	u	u	u			2,470	1,280
Fluoranthene	50,000	u	241	u	420	402	--	--	--	--	2,300	182	3,710	--	--	u	735 J
Pyrene	50,000	u	409	u	432	781	--	--	--	--	3,840	191	4,100	--	--	u	755 J
Butylbenzylphthalate	50,000	u	u	u	u	u	--	--	--	--	u	u	u			u	12,100
Benzo[a]anthracene	224	u	121	u	233	203 J	--	--	--	--	1,350	103 J	1,940	--	--	u	u
Chrysene	400	u	106 J	u	161	157 J	--	--	--	--	1,660	71 J	1,820	--	--	u	u
bis(2-Ethylhexyl)phthalate	50,000	u	362	u	u	u	--	--	--	--	141 J	141	30,300	--	--	94,400	169,000
Di-n-octylphthalate	50,000	u	u	u	u	u	--	--	--	--	u	u	u			u	1,230
Benzo[b]fluoranthene	1,100	u	112	u	177	143 J	--	--	--	--	1,660	70 J	2,180	--	--	u	u
Benzo[k]fluoranthene	1,100	u	u	u	80 J	u	--	--	--	--	535	u	739	--	--	u	u
Benzo[a]pyrene	61	u	63 J	u	166	129 J	--	--	--	--	1,170	69 J	1,480	--	--	u	u
Indeno[1,2,3-cd]pyrene	3,200	u	u	u	90 J	u	--	--	--	--	276	u	935	--	--	u	u
Dibenz[a,h]anthracene	14	u	u	u	u	u	--	--	--	--	130 J	u	354 J	--	--	u	u
benzo[g,h,i]perylene	50,000	u	u	u	116	u	--	--	--	--	317	83 J	1,100	--	--	u	u
TOTAL BN's	n/a	u	25368 J	2,737	22859 J	32332 J	--	--	--	--	17019 J	1458 J	64016 J	--	--	117486 J	246460 J
TOTAL TIC's	n/a	u	92,070	17,091	192,400	139,460	--	--	--	--	40,950	5,780	169,090	--	--	190,940	375,700
TOTAL BN's & TIC's	n/a	u	117438 J	19,828	215,259	171792 J	--	--	--	--	57969 J	7238 J	233106 J	--	--	308426 J	622160 J
Polychlorinated Biphenyls (PCBs)	10,000	u	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:

BN = Semivolatile Compound
TIC = Tentatively Identified Compound
-- = Not analyzed
J = The concentration was detected at a value below the MDL
u = Analyzed for but not detected at the MDL
SHADED = Analyte detected in excess of recommended soil cleanup objective
* = Results from diluted analysis
All compounds measured in parts per billion (ppb)

TABLE 2

SURFACE SOIL ANALYTICAL RESULTS
PROVAN FORD, NEWBURGH NEW YORK

SAMPLE ID	RECOMMENDED	SS-1	SS-2	SS-3	SS-4	SS-5
SAMPLE LOCATION	SOIL	SS-1	SS-2	SS-3	SS-4	SS-5
SAMPLE DEPTH (feet below grade)	CLEANUP	0-6"	0-6"	0-6"	0-6"	0-6"
SAMPLE DATE	OBJECTIVE	10/22/99	10/22/99	10/22/99	10/22/99	10/22/99
Volatile Organic Compounds - 8021 List						
Total Xylenes	1,200	1,950	–	–	–	–
1,3,5-Trimethylbenzene	n/a	1,610	–	–	–	–
1,2,4-Trimethylbenzene	n/a	3,510	–	–	–	–
Naphthalene	13,000	1,190	–	–	–	–
Semivolatile Organic Compounds						
Naphthalene	13,000	372	409 J	u	u	u
2-Methylnapthalene	36,400	2,160	501 J	u	u	u
Acenaphthylene	41,000	147 J	2,590	422	1,920	4,660
Acenaphthene	50,000	291	2,190	u	2,770	u
Dibenzofuran	6,200	372 J	1,410	u	u	u
Fluorene	50,000	523	3,220	u	2,400	u
N-Nitrosodiphenylamine	n/a	1,640	6,030	u	u	u
Phenanthrene	50,000	2,440	37,800	309	54,200	2,720
Anthracene	50,000	406	7,340	345	8,630	3,130
Carbazole	n/a	u	2,900	u	5,650	u
Fluoranthene	50,000	137 J	92,000	1,690	167,000	24,600
Pyrene	50,000	224	92,300	1,730	110,000	42,800
Benzo[a]anthracene	224	u	30,400	1,370	47,200	16,600
Chrysene	400	u	33,100	1,260	50,900	18,000
bis[2-Ethylhexyl]phthalate	50,000	u	85,100	317	4,540	2,570
Benzo[b]fluoranthene	1,100	u	59,100	2,830	102,000	47,800
Benzo[k]fluoranthene	1,100	u	15,800	1,050	37,100	17,800
Benzo[a]pyrene	61	u	24,900	1,300	48,700	36,000
Indeno[1,2,3,-cd]pyrene	3,200	u	6,230	683	14,700	13,700
Dibenz[a,h,]perylene	14	u	2,040	299	4,720	4,410
Benzo[g,h,i]perylene	50,000	u	6,290	658	13,300	15,200
TOTAL BN's	n/a	8712 J	511650 J	14,263	675,730	249,930
TOTAL TIC's	n/a	94,700	3,565,700	6,728	280,650	139,620
TOTAL BN's & TIC's	n/a	103412 J	4077350 J	20,991	956,380	389,550
Metals						
Arsenic	7,500	3,630	4,860	20,800	4,300	6,960
Barium	300,000	42,300	58,100	43,200	88,200	124,000
Cadmium	1,000	u	956	438	5,420	2,720
Chromium	10,000	17,800	17,000	16,500	22,500	21,100
Lead	350,000	11,000	80,500	43,300	120,000	240,000
Mercury	100	23	36	66	76	61
Selenium	2,000	u	u	u	u	u
Silver	N/A	u	u	u	u	u
Polychlorinated Biphenyls (PCBs)	10,000	–	–	–	u	

NOTES:

BN = Semivolatile Compound
TIC = Tentatively Identified Compound
– = Not analyzed
J = The concentration was detected at a value below the MDL
u = Analyzed for but not detected at the MDL
SHADED = Analyte detected in excess of recommended soil cleanup objective
* = Results from diluted analysis
All compounds measured in parts per billion (ppb)

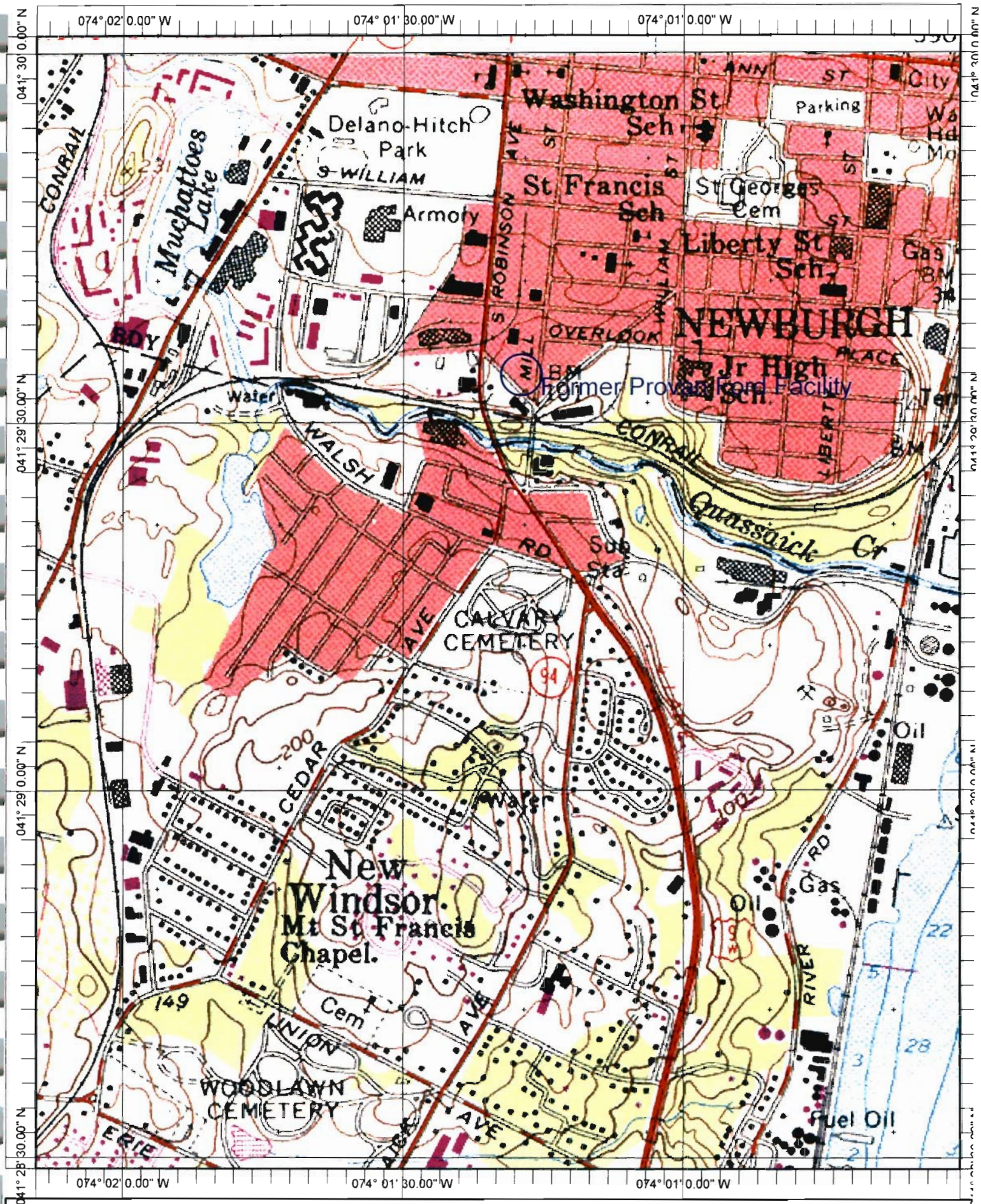
TABLE 3

GROUNDWATER ANALYTICAL RESULTS
PROVAN FORD, NEWBURGH NEW YORK

WELL ID/SAMPLE ID SAMPLE DATE	RECOMMENDED GROUNDWATER CLEANUP OBJECTIVE	PZ-1 10/21/99	PZ-2 10/21/99	PZ-3 10/21/99	PZ-4 10/21/99	PZ-5 10/21/99	PZ-6 10/22/99	PZ-7 10/22/99
Volatile Organic Compounds								
Vinyl Chloride	2	5,230	u	11	u	u	88	1,240
1,1-Dichloroethene	5	224	u	u	u	u	u	479
Methylene Chloride	5	406	u	u	u	u	u	u
Methyl-t-Butyl Ether (MTBE)	n/a	247	u	1	7,070	u	u	769
1,1-Dichloroethane	5	568	u	1	u	u	145	2,610
Chloroform	7	123	u	u	u	u	u	u
1,1,1-Trichloroethane	5	2,600	u	u	u	u	u	7,140
1,2-Dichloroethane(EDC)	5	u	u	38	u	u	152	16,400 *
Benzene	0.7	160	10,200	10	13,100 *	u	73	374
Trichloroethene	5	13,300 *	u	11	u	u	u	u
Toluene	5	597	28,000 *	2	45,000 *	u	478	2,050
Tetrachloroethene	5	1,290	u	4	u	u	u	u
Ethylbenzene	5	260	2,530	4	4,860	u	958	683
Total Xylenes	5	317	14,200	7	19,600	u	3,340	2,340
TOTAL VO's	n/a	25,322	54,930	89	89,630	u	5,233	34,065
TOTAL TIC's	n/a	34,500	48,020	109	43,140	u	22,200	45,910
TOTAL VO'c & TIC's	n/a	59,822	102,950	197	132,770	u	27,433	79,975
Metals								
Lead	n/a	10	611	--	206	--	--	--

NOTES:

VO = Volatile Compound
TIC = Tentatively Identified Compound
-- = Not analyzed
J = The concentration was detected at a value below the MDL
u = Analyzed for but not detected at the MDL
SHADED = Analyte detected in excess of recommended soil cleanup objective
* = Results from diluted analysis
All compounds measured in parts per billion (ppb)



Name: CORNWALL
Date: 8/1/100
Scale: 1 inch equals 1000 feet

Location: 041° 29' 15.2" N 074° 01' 20.0" W
Caption: FIGURE 1 - Site Location Map
Former Provan Ford Facility
Newburgh, NY

ROBINSON STREET

N 13° 57' E 125.5'

N 34° 32' W 173.99

DEYO PLACE

BEGIN TOP OF CURB ELEV. 501.00

END TOP CURB ELEV. 499.80

ORANGE COUNT PLUMBING SUPPLY CO.

317.45

N 76° 00' W

6"ø DRAIN

NEW OPEN GRATE DROP INLET TOP 487.0 NEW MANHOLE

G-22

S 15° 10' W 435.17'

TOP GRATE 487.50

MILL STREET

RIM 484.29 INV. 475.29

NEW 12"ø DRAIN ARMED TRUSS PIPE TO (O.A.E.) EXISTING MANHOLE

4" GAS MAIN 7'± OFF FACE OF CURB (CONTINUOUS) DEPTH 2'-3" TO BE LOCATED BY C.H.G.&E.

8"ø WATER (CONTINUOUS)

DRIVE WELLER GAS STA.

IP

IP

OVERLOOK PLACE

RIM 481.52 INV. 471.22

G-26 G-25 G-24

WASH RACK

BURIED 8,000 GAL. TANK

OUTSIDE STAIRWAY

G-27

G-23

OIL/WATER SEPARATOR

4"ø DRAIN

PROP. CONCRETE PAD FOR WASHRACK (BY OTHERS) N.I.C.

FLOOR DRAIN

PROVAN OPERATIONS BUILDING

GARAGE & MAINT. SHOPS

DRUM WASTE OIL &SCRAP STORAGE AREA

BURIED 3,000 GAL. WASTE OIL

G-4

G-1

G-3

G-2

NEW OIL & WATER SEPARATOR – 3,800 GAL.

G-11

G-13

HEATING OIL 500 GAL. UST

G-12

FUEL ISLES

BURIED GASOLINE 4,000 GAL. TANK

G-5

G-15

G-17

G-16

G-6

NEW 6ø DRAIN

G-21

G-14 G-10

BURIED TOP OF TANK DIESEL FUEL 20,000 GAL.(ACTIVE)

G-19

G-18

10,000 GAL

G-9

G-7

G-8

G-20

DRIVEWAY

DICKSON STREET

207.75'

S 76° 02' E

LEGEND

G-1 ● SOIL BORINGS

SCALE:

0 30 60 120

(IN FEET)

PROVAN FORD

NEWBURGH NEW YORK

SOIL BORING LOCATION MAP

FIGURE 2

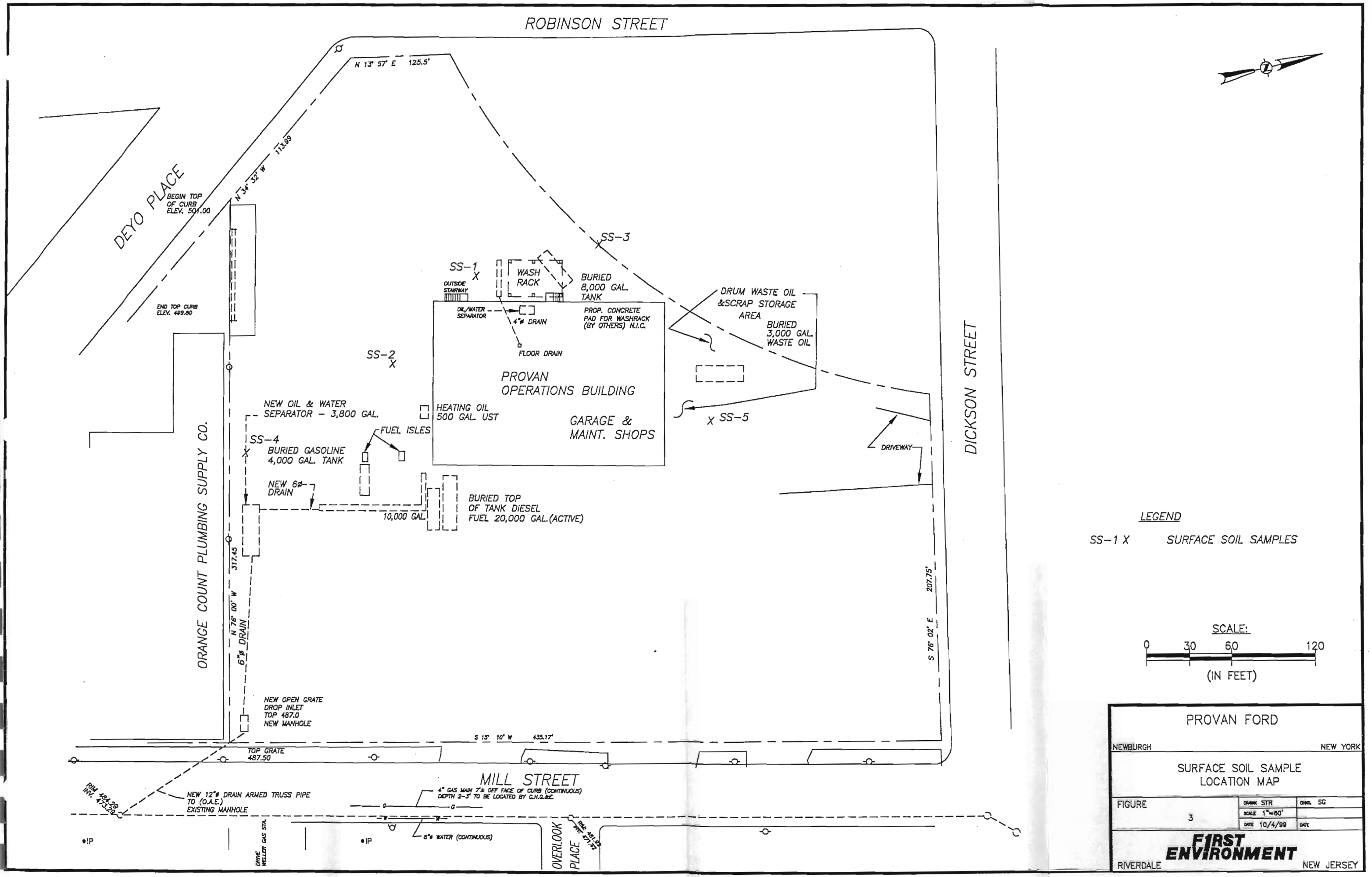
DRAWN STR CHKD. SG

SCALE 1"=60'

DATE 10/4/99 DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY



LEGEND

SS-1 X SURFACE SOIL SAMPLES

SCALE:

0 30 60 120

(IN FEET)

PROVAN FORD

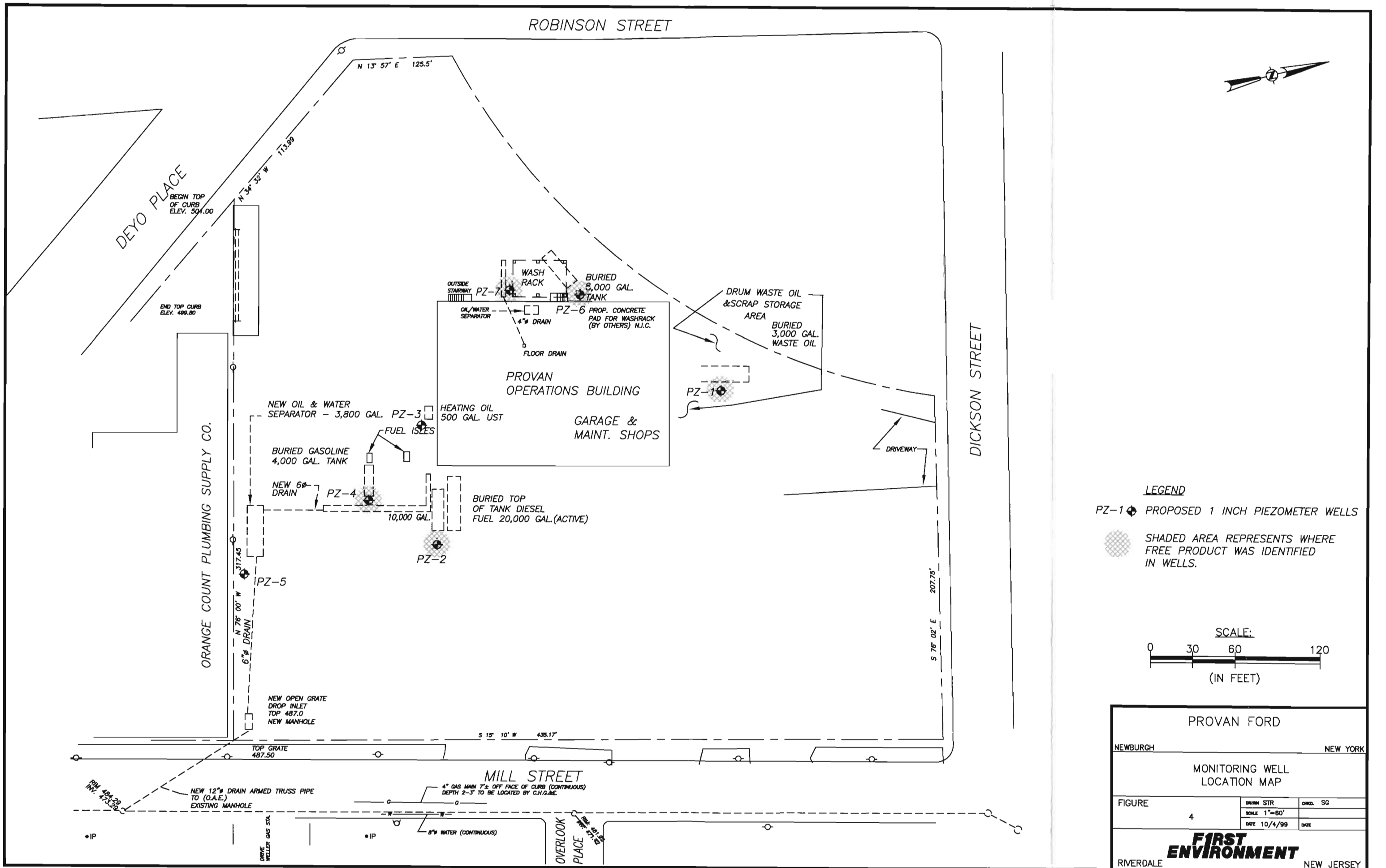
NEWBURGH NEW YORK

SURFACE SOIL SAMPLE LOCATION MAP

FIGURE	DRAWN STR	CHKD SG
3	SCALE 1"=60'	
	DATE 10/4/99	DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY



LEGEND

PZ-1 ⊕ PROPOSED 1 INCH PIEZOMETER WELLS

SHADED AREA REPRESENTS WHERE FREE PRODUCT WAS IDENTIFIED IN WELLS.

SCALE:

0 30 60 120

(IN FEET)

PROVAN FORD

NEWBURGH NEW YORK

MONITORING WELL LOCATION MAP

FIGURE	DRAWN STR	CHKD. SG
4	SCALE 1"=60'	
	DATE 10/4/99	DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY

ROBINSON STREET

N 13° 57' E 125.5'

N 34° 32' W 173.99

DEYO PLACE

BEGIN TOP OF CURB ELEV. 504.00

END TOP CURB ELEV. 499.80

TANK AREA 1

WASH RACK

BURIED 8,000 GAL. TANK

OUTSIDE STAIRWAY

OIL/WATER SEPARATOR

4"ø DRAIN

FLOOR DRAIN

PROP. CONCRETE PAD FOR WASHRACK (BY OTHERS) N.I.C.

DRUM WASTE OIL &SCRAP STORAGE AREA

BURIED 3,000 GAL. WASTE OIL

TANK AREA 2

PROVAN OPERATIONS BUILDING

GARAGE & MAINT. SHOPS

NEW OIL & WATER SEPARATOR – 3,800 GAL.

HEATING OIL 500 GAL. UST

FUEL ISLES

TANK AREA 3

DRIVEWAY

DICKSON STREET

BURIED GASOLINE 4,000 GAL. TANK

NEW 6ø DRAIN

10,000 GAL

BURIED TOP OF TANK DIESEL FUEL 20,000 GAL.(ACTIVE)

TANK AREA 4

TANK AREA 5 & 6

ORANGE COUNT PLUMBING SUPPLY CO.

317.45

N 76° 00' W

6"ø DRAIN

207.75'

S 76° 02' E

NEW OPEN GRATE DROP INLET TOP 487.0 NEW MANHOLE

S 15° 10' W 435.17'

TOP GRATE 487.50

MILL STREET

RIM 484.20 INV. 477.20

NEW 12"ø DRAIN ARMED TRUSS PIPE TO (O.A.E.) EXISTING MANHOLE

4" GAS MAIN 7'± OFF FACE OF CURB (CONTINUOUS) DEPTH 2'-3" TO BE LOCATED BY C.H.O.&E.

8"ø WATER (CONTINUOUS)

IP

IP

DRIVE WELLER GAS STA.

OVERLOOK PLACE

RIM 481.58

LEGEND

- UST POST EXCAVATION SAMPLE LOCATION
- ESTIMATED EXCAVATION AREA

SCALE:

0 30 60 120

(IN FEET)

PROVAN FORD

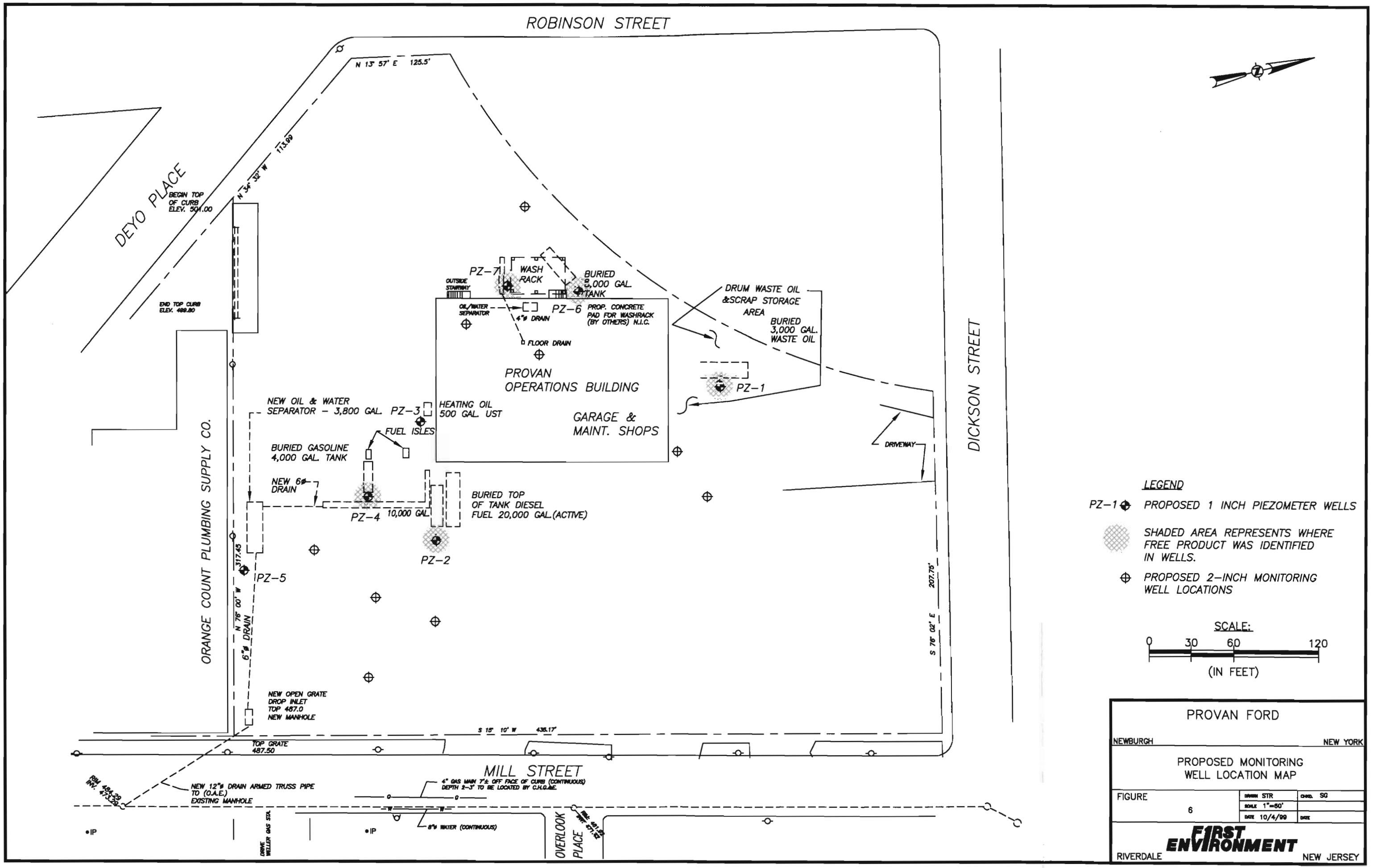
NEWBURGH NEW YORK

TANK EXCAVATION & POST EXCAVATION SOIL SAMPLE LOCATIONS

FIGURE	DRAWN STR	CHKD. SG
5	SCALE 1"=80'	
	DATE 10/4/99	DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY



LEGEND

PZ-1 ⊕ PROPOSED 1 INCH PIEZOMETER WELLS

SHADED AREA REPRESENTS WHERE FREE PRODUCT WAS IDENTIFIED IN WELLS.

⊕ PROPOSED 2-INCH MONITORING WELL LOCATIONS

SCALE:

0 30 60 120

(IN FEET)

PROVAN FORD

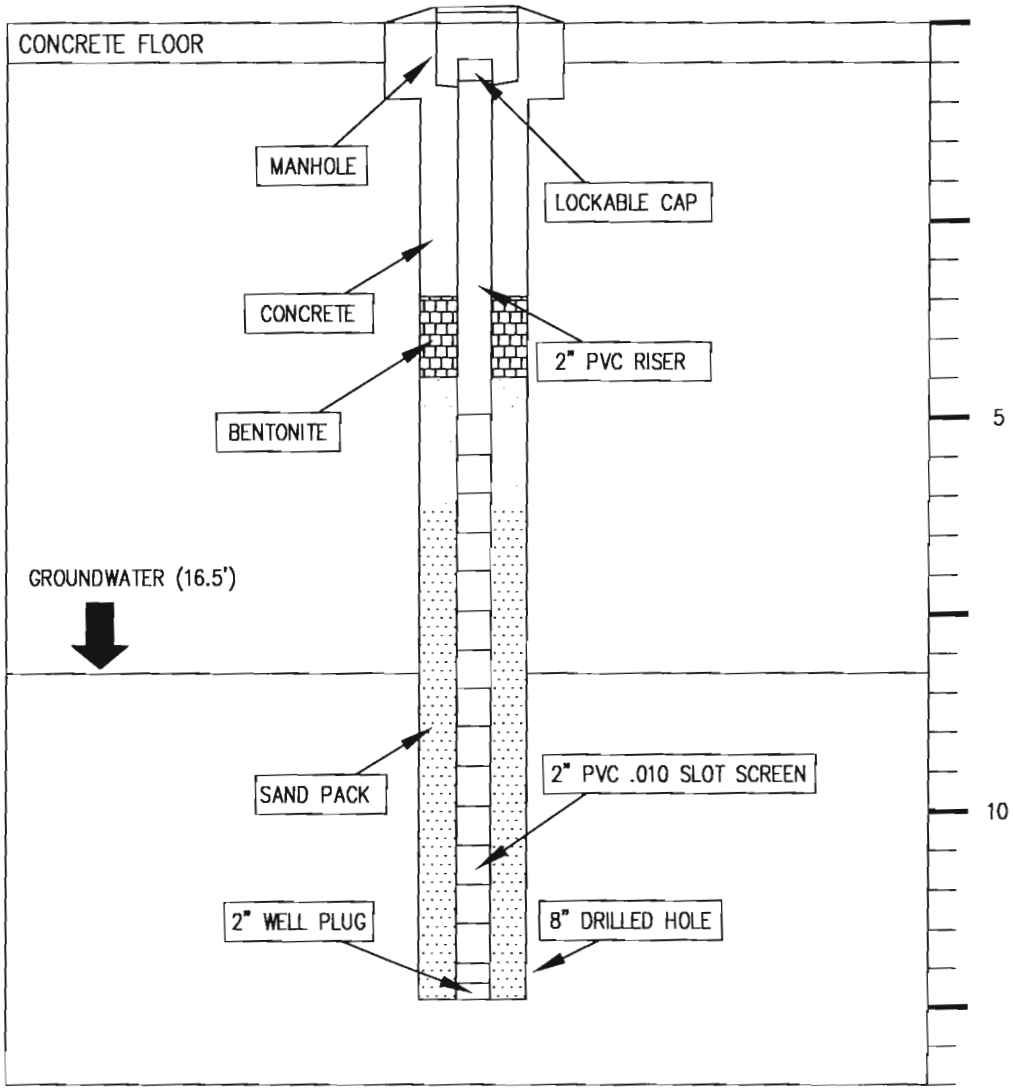
NEWBURGH NEW YORK

PROPOSED MONITORING WELL LOCATION MAP

FIGURE	DRAWN STR	CHKD. SG
6	SCALE 1"=60'	
	DATE 10/4/99	DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY



PROVAN FORD

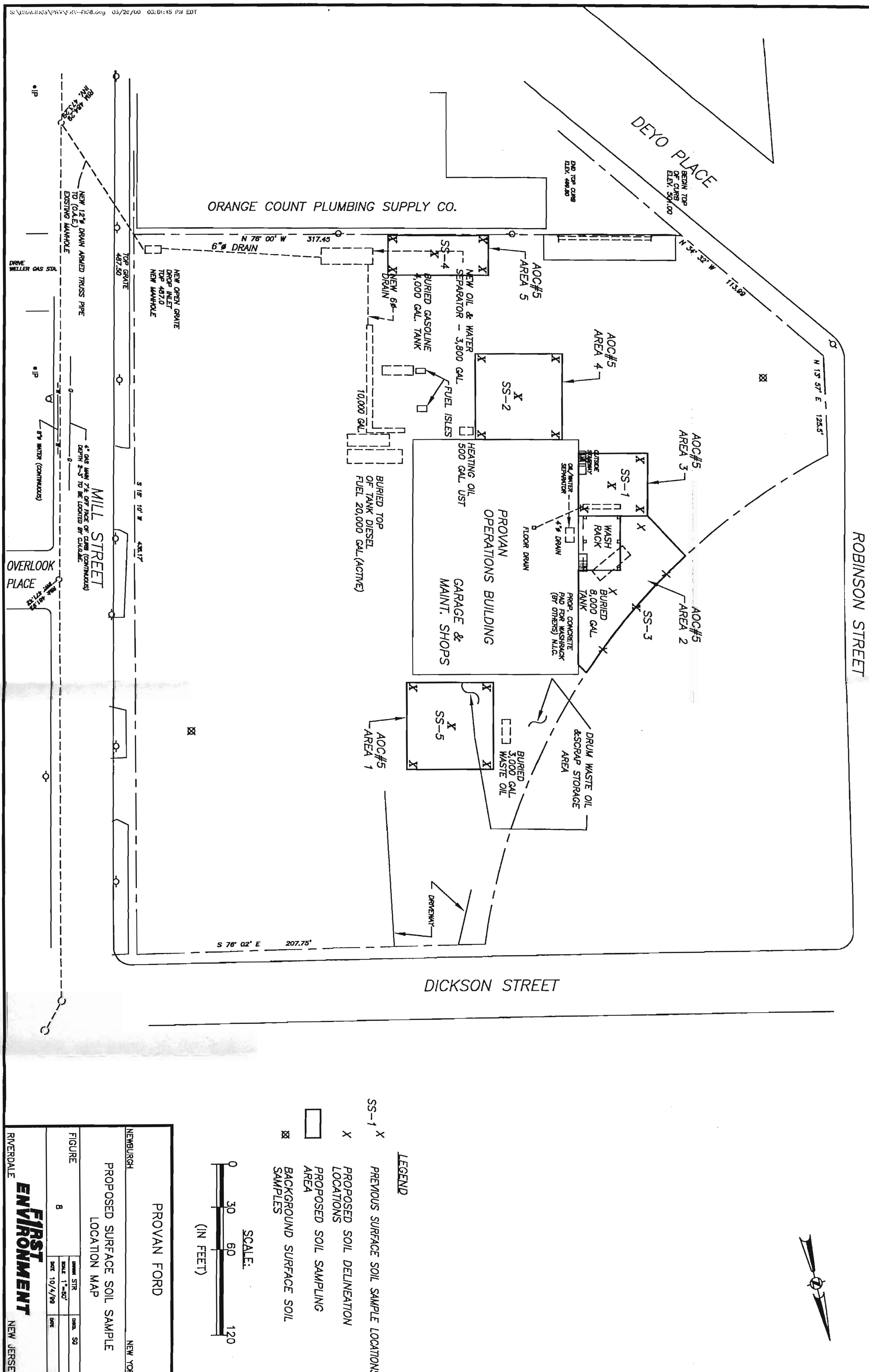
NEWBURGH NEW YORK

WELL CONSTRUCTION DIAGRAM

FIGURE	DRAWN CSN/STR	CHKD. TB
7	SCALE NTS	
	DATE 8/12/99	DATE

FIRST ENVIRONMENT

RIVERDALE NEW JERSEY



DEYO PLACE
ROBINSON STREET
DICKSON STREET
MILL STREET
OVERLOOK PLACE
ORANGE COUNT PLUMBING SUPPLY CO.
PROVAN OPERATIONS BUILDING
GARAGE & MAINT. SHOPS
N 76° 00' W 317.45
S 76° 02' E 207.75'
S 15° 10' W 435.17'
N 13° 57' E 125.5'
N 34° 32' W 113.99
6"ø DRAIN
NEW OIL & WATER SEPARATOR - 3,800 GAL
BURIED GASOLINE 4,000 GAL. TANK
NEW 6ø DRAIN
FUEL ISLES
10,000 GAL
BURIED TOP OF TANK DIESEL FUEL 20,000 GAL.(ACTIVE)
HEATING OIL 500 GAL UST
WASH RACK
FLOOR DRAIN
4"ø DRAIN
BURIED 8,000 GAL TANK
PROP. CONCRETE PAD FOR WASHRACK (BY OTHERS) N.I.C.
BURIED 3,000 GAL WASTE OIL
DRUM WASTE OIL &SCRAP STORAGE AREA
DRIVEWAY
AOC#5 AREA 1
AOC#5 AREA 2
AOC#5 AREA 3
AOC#5 AREA 4
AOC#5 AREA 5
SS-1
SS-2
SS-3
SS-4
SS-5
NEW OPEN GRATE DROP INLET TOP 487.0 NEW MANHOLE
TOP GRATE 487.50
NEW 12"ø DRAIN ARMED TRUSS PIPE TO (O.A.E.) EXISTING MANHOLE
DRIVE WELLER GAS STA.
LEGEND
SS-1 X PREVIOUS SURFACE SOIL SAMPLE LOCATIONS
X PROPOSED SOIL DELINEATION LOCATIONS
PROPOSED SOIL SAMPLING AREA
BACKGROUND SURFACE SOIL SAMPLES
SCALE:
0 30 60 120
(IN FEET)
NEWBURGH NEW YORK
PROVAN FORD
PROPOSED SURFACE SOIL SAMPLE LOCATION MAP
FIGURE 8
SCALE 1"=50'
DATE 10/4/99
FIRST ENVIRONMENT
RIVERDALE NEW JERSEY

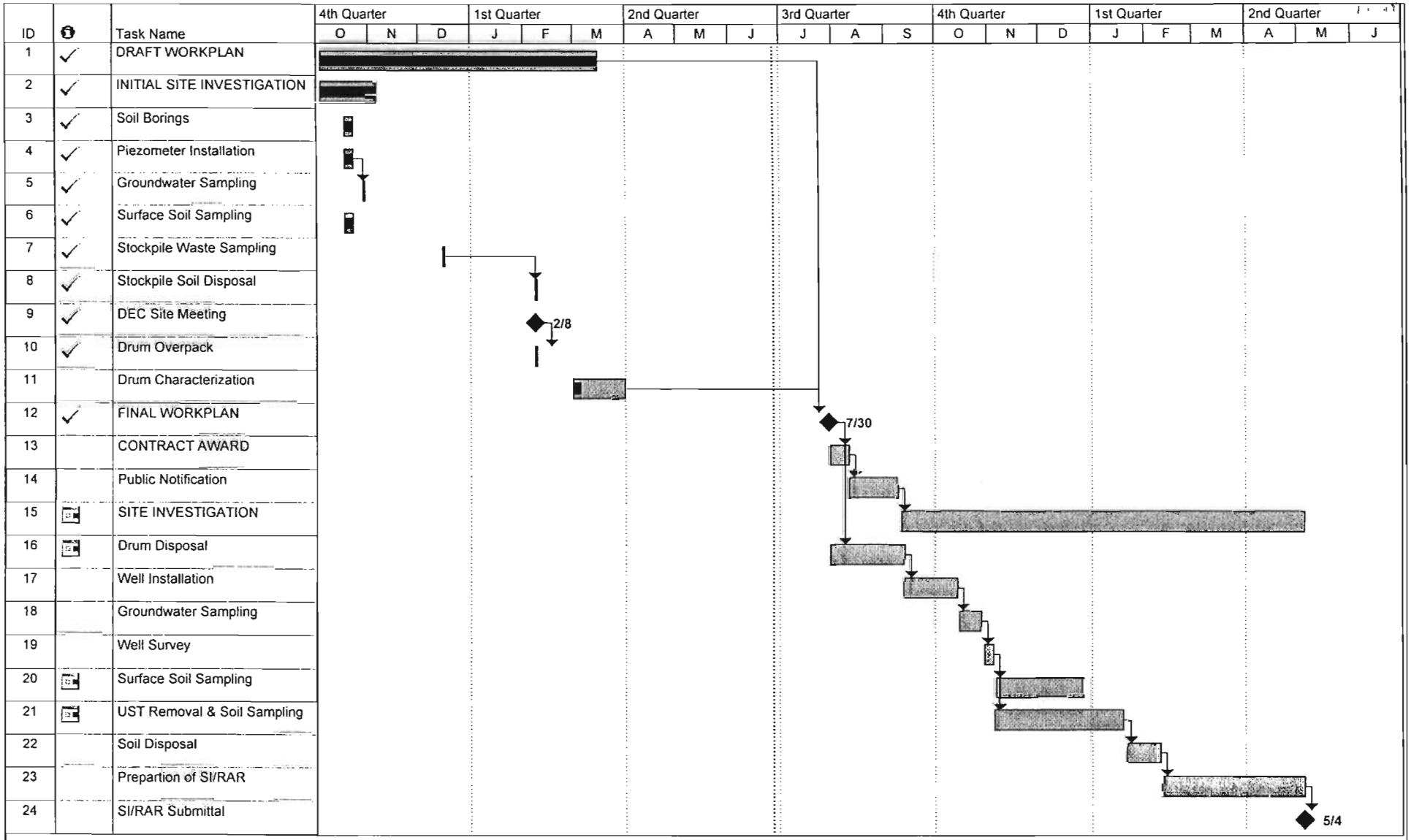


FIGURE 9

Project: Provan schedule
Date: Tue 6/27/00

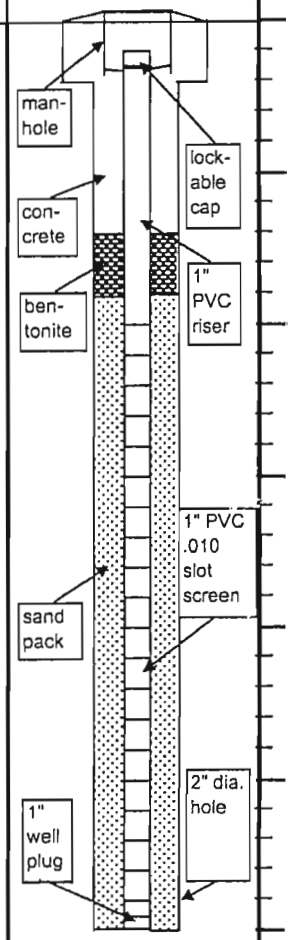
Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-1_____

t __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
te Started ___10/19/99_____ Date Completed __10/19/99_____
evation (TC) _____ (GS) _____
Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

(ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" / 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Concrete fill, asphalt Brown Sand, little Silt Little Gravel		0-4				28	50		
	5	Green Sand and Gravel		4-8			x	36	600	▼	
	10	Silt and Clay, tr. F Sand		8-12				41	500		
	15	TD at 14.65 ft below grade Product Detected on Water Table									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◧ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

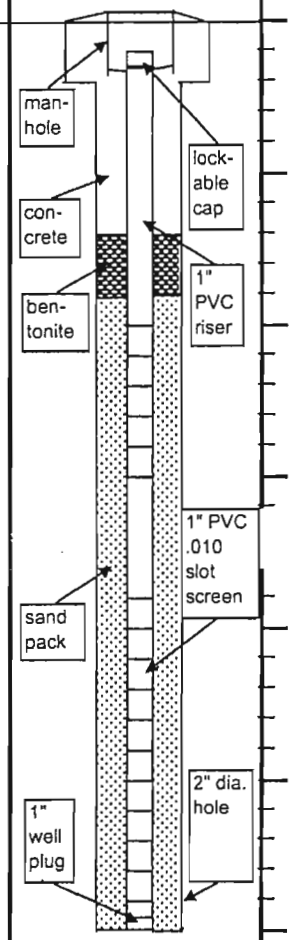
Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-2_____

Client __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
Date Started ___10/21/99_____ Date Completed __10/21/99_____
Elevation (TC) _____ (GS) _____
Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0"-6"-12"-18" 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Concrete fill, asphalt									
		some Brown Sand, little clay		0-4				42	40		
	5	Green Sand, little Gravel		4-8				36	765		
	10	Gr./green Silt and Clay		8-12			x	28	1000	▼	
	15	Weather Rock TD at 15.15 ft below grade Product Detected on Water Table									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◧ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-3_____

Client __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____

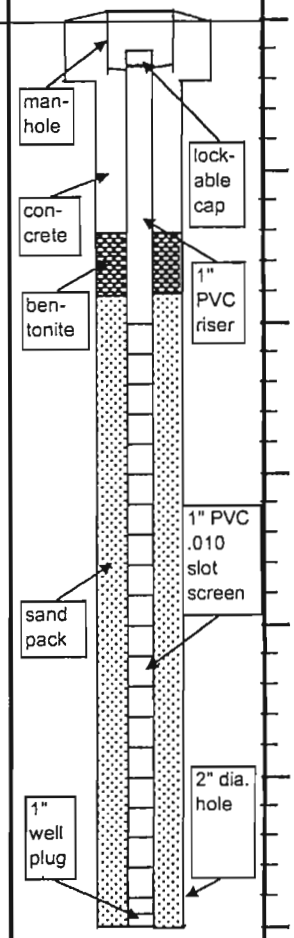
__Newburgh, NY_____ Sheet _1__ of _1__

Date Started ___10/21/99_____ Date Completed __10/21/99_____

Elevation (TC) _____ (GS) _____

Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" / 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Cinder of asphalt, Rock fill Some Sand & Silt		0-4				24	20		
	5	Green Sand, little Gravel and some fill		4-8			x	48	75		
	10	Green Silt and Clay layer		8-12				46	0	▼	
	15	Weather Rock TD at 14.75 ft below grade									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◨ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

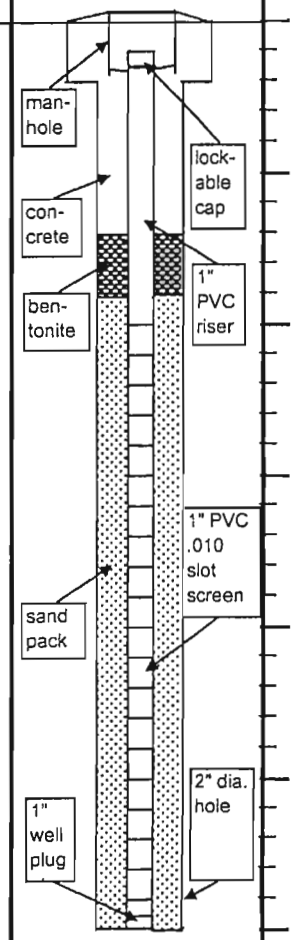
Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-4_____

nt __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
ate Started ___10/21/99_____ Date Completed __10/21/99_____
levation (TC) _____ (GS) _____
Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" / 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Cinder of asphalt, Rock fill Some Sand, little silt,tr gravel		0-4				40	575		
	5	Green Sand, some gravel, little clay		4-8				34	1418		
	10	Green Silt, Rock frags,and small cobbles		8-12			x	36	1500	▼	
	15	Weather Rock TD at 14.6 ft below grade Product was detected on Water table									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◨ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

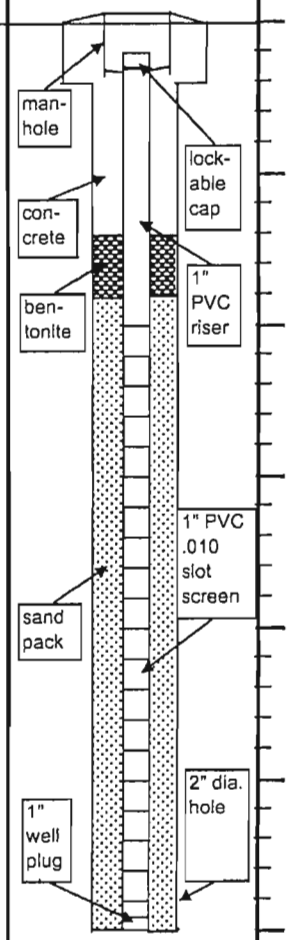
Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-5_____

nt __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
te Started ___10/20/99_____ Date Completed __10/20/99_____
levation (TC) _____ (GS) _____
Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Cinders, stained soil		0-4				48	15		
		F. Sand and Gravel									
	5	Green Sand/silt,little clay little Gravel		4-8				24	20		
	10	Green Silt layer, Rock frags		8-12			x	38	141	▼	
	15	TD at 11.55 ft below grade									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◨ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

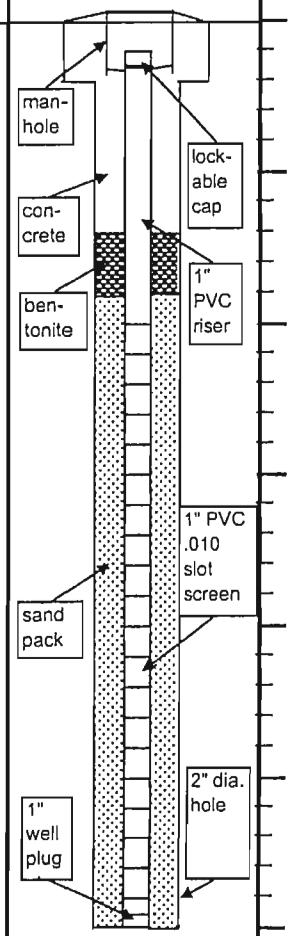
Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-6_____

nt __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
ate Started ___10/22/99_____ Date Completed __10/22/99_____
levation (TC) _____ (GS) _____
Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" / 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Cinders, heavy stained soil F. Sand and Gravel		0-4				40	2500		
	5	F-M Sand and Gravel sheen petr. Odor		4-8				48	3700		
	10	Green/silt, stained soil		8-12			x	36	4200	▼	
	15	TD at 14.36 ft below grade Product on Water Table									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◨ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

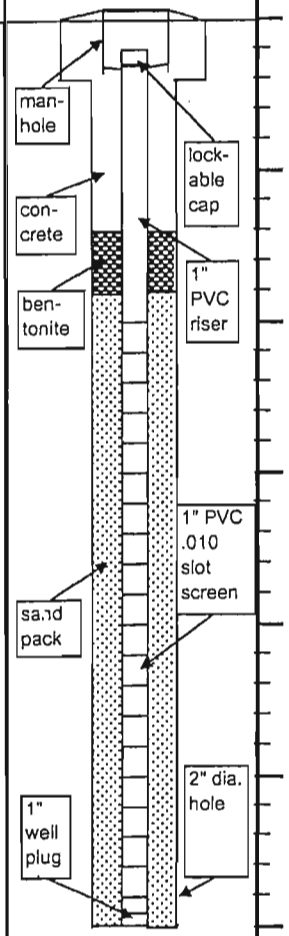
Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

FIRST ENVIRONMENT
DRILLING LOG

Boring No. __PZ-7_____

Client __PROVAN_____ Project No. Prova001____ Permit No. _n/a_____
__Newburgh, NY_____ Sheet _1__ of _1__
Date Started ___10/22/99_____ Date Completed __10/22/99_____
Elevation (TC) _____ (GS) _____
Hole Diameter __2"_____ Boring Method __Direct-Push____ Development Method __P_____

Elev. (ft.)	Depth (ft.)	Description	Strata Column	Sample	Moisture Content	Blows on Sampler 0" 6" 12" 18" 6" 12" 18" 24"	Sample No.	Recovery	Instrument Reading	Water Level (Data)	Well Construction
	0	Cinders, heavy stained soil Gravel & Sand		0-4				39	302		
	5	F-M Sand and Gravel little clay		4-8				48	1200	▼	
	10	Green Silt and Clay, little gravel product encountered		8-12			x	48	1500		
	15	TD at 12.2 ft below grade Product on Water Table									



Sampler Type
- ☒ Driven Split Spoon
- ☐ Pressed Shelby Tube or Macro
- ◨ Rock Core
- NR No Recovery

Development Method
- AL - Air Lift
- P - Pumping
- J - Jetting
- SB - Surge Block

Boring Method
- HSA - Hollow Stem Auger
- CFA - Continuous Flight Auger
- DC - Driving Casing
- MD - Mud Drilling

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

The soil, groundwater, surface water and sediment sampling techniques to be employed at the Provan facility in Newburgh, New York, are detailed below. All efforts will be made to eliminate sample contamination and maximize the reliability to the analytical results. These efforts include proper use and cleaning of sampling equipment and sample containers to eliminate sample contamination, use of a quality assurance program to maximize accuracy and precision of the analytical results, proper installation of groundwater monitoring wells and the use of chain-of-custody procedures to track the samples from source to analysis and minimize the opportunity for tampering.

SAMPLING EQUIPMENT AND PROCEDURES

SAMPLING EQUIPMENT AND CLEANING PROCEDURES

The sample containers, glass jars with Teflon™ lined-plastic screw-on lids, will be provided by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Certified Laboratory. Containers used to collect soil and water samples will be specifically designed for that purpose. The containers will be cleaned prior to shipment by the laboratory, using standard, in-house procedures.

Soil samples will be collected with either a hand auger, split-spoon sampler or Geoprobe Macrocore device. If a split-spoon sampler or Macrocore device is used, a drill rig will be used to drive the sampler to the required depth and obtain soil samples. The split-spoon sampler will be 24 inches in length and in accordance with ASTM D1586-67. The Macrocore will be 48 inches in length. The Macrocore sampler will be equipped with a sample retention device and acetate liner to ensure sample quality.

All soil sampling equipment will be cleaned with a wire or bristle brush to remove any clinging soils or materials. This will be followed by a washing with a phosphate-free detergent and water. The equipment will then be rinsed with clean water, distilled water, methanol (used to avoid contaminating soils with acetone), and finally, distilled water. The drilling tools will be cleaned with a steam cleaner prior to use and between work on individual boreholes.

Prior to sampling groundwater, wells will be purged by bailing or pumping, depending on well productivity. If bailing is used, one PVC bailer will be dedicated to each well for use in purging and one stainless steel, Polyethylene, or Teflon™ bailer will be dedicated to each well for use in sampling.

All purge/sampling equipment will be cleaned before transporting to the field. Bailers will be cleaned by the certified laboratory using standard in-house procedures. After drying, the bailers will be wrapped in aluminum foil for transportation to the field. Pumps used to purge wells prior to sampling will be cleaned by rinsing with detergent, potable water, distilled water, methanol and distilled water.

USE OF QUALITY ASSURANCE SAMPLES (BLANKS, DUPLICATES)

Travel blank samples, duplicates and blank samples generated in the field will serve as an independent check on the laboratory and field sampling techniques. These samples will be coded to minimize the chance of laboratory identification.

The following QA/QC samples will be collected:

- Duplicate samples will be collected for each media sampled. The number of duplicates will, at a minimum, equal five percent of the samples collected for that media.
- One travel/trip blank, consisting of distilled water as prepared by the laboratory will be and analyzed for VOCs for each two days of sampling.

- One field blank for each media sampled that day will be submitted for analysis for volatile organics.

SAMPLING METHODOLOGY

All subsurface work will be conducted in a manner that produces reliable information of subsurface conditions and representative soil, sediment, surface water and groundwater samples for analysis. A First Environment degreed hydrogeologist, geologist, engineer or equivalent will supervise all drilling and sampling procedures.

Soil Sample Collection Methodology

Soil Samples.

The location of each borehole will be referenced by a grid system or some other survey control. A drill rig/Geoprobe or hand auger will be used to produce boreholes at the proper depths at each predetermined sampling location. Sample depths will be measured to ensure they are correct. Samples will be taken by driving a split-spoon sampler, Macrocore or hand auger into the undisturbed material below the bottom of the borehole. The sampler will be equipped with a sample retention device.

Prior to sample collection, sample depths will be screened with Photoionzation Detector (PID) to insure that collected samples are representative of actual soil conditions. This will be accomplished through head space analysis. The PID will be calibrated to 100 ppm isobutylene prior to each days activities.

A soil sample will be collected from the appropriate sampler or hand auger. To prevent contamination of sample bottle by windblown soils, each bottle will remain sealed until sample collection. Upon soil collection, the sample will be split in two bottles for headspace analysis and laboratory analysis. The sample containing the highest

headspace PID reading at each boring location will be submitted to the laboratory for analysis. This sample will bottle have the following information recorded on it:

- Job Name and Location
- Sample Location
- Time and Date of Sampling
- Depth of Sampling
- Analysis
- Boring Number

The jar will then be placed in a cooler and kept at 4°C until transported to the laboratory. This procedure will be repeated at each sample location and for successive samples at the same location.

Each sample device will be examined in the field to aid in evaluation of site stratigraphy. If boreholes are located at or near the water table, they will be sealed with a cement bentonite grout acceptable for use in monitoring wells.

Monitoring Well Installation Technique and Design

To ensure that representative samples of the groundwater are obtained, monitoring wells will be installed in accordance with NYSDEC monitoring well installation and design specifications for unconsolidated material as presented in Section 5.5.3.2 of the NYSDEC Sampling Guidelines and Protocols. All wells will be constructed of threaded, flush joint, schedule 40 PVC wells materials, supplied by the drilling contractor and will be installed using auger drilling techniques.

Upon completion of the borings, an appropriate length of 2-inch PVC, 0.010-inch slotted well screen will be installed through the hollow stem augers from approximately 10 feet

below to 5 feet above the water table. Should the water table be encountered within 7 feet or less of the ground surface, the well screen will extend to within 2 feet of the ground surface. The remainder of the well will consist of 2-inch PVC casing which will extend over the ground surface. Filter sand will be placed in the annulus between the screen and the borehole to a level of at least 6 inches above the top of the screen. A bentonite pellet seal will be placed on top of the filter sand. The remainder of the annulus will be grouted with a cement bentonite ground acceptable for use in monitoring wells. The surface protection will consist of a lockable steel casing, extending approximately 2 feet above the ground surface and anchored in cement. In areas accessible to vehicular traffic, road boxes may be installed.

To complete the monitoring well installation, each well will be developed by pumping, bailing or an equivalent method. This will remove fines generated during the installation and ensure that hydraulic continuity is established between the well and the aquifer.

Groundwater Flow Direction

A New York registered land surveyor will survey the reference elevation of the top of the PVC monitoring well casings. Water level measurements will be recorded to within 0.01 feet, using an electric water-level indicator. This information will be used to determine groundwater flow direction and construct groundwater contour maps.

Groundwater Sample Collection Methodology

Water samples will be collected no sooner than two weeks after development of the monitoring wells. Prior to sample collection, a minimum of three well volumes will be evacuated using a pump of dedicated bailer depending on well production. After purging, a bailer will be submerged beneath the water column in the well, filled and raised to the surface. The sample collection jar will be filled directly from the bailer. Bailing will continue until each sample jar is filled and closed. Care will be taken to ensure that samples tested for volatile organics have no air space. Sample jars will be

kept closed until the time of collection, to prevent airborne contamination of the sample container. Specific conductance and pH will be measured in the field.

After closing the sample jar, the following information will be recorded on the sample container:

- Job Name
- Sample Media
- Sample Location
- Time and Date of Sampling
- Analysis

The sample will then be placed in a cooler and kept at 4°C until transported to the laboratory for analysis. This process will be repeated for each well.

A field log will also be kept and the following information recorded for each sample:

- Time and Date of Sampling
- Weather
- Name of Sampler
- Water Level Prior to Purge
- Total Well Depth
- Volume Purged
- Purging Method
- Sampler Type
- Presence and Description of any Free Product
- pH and Specific Conductance
- Other Characteristics (odor, color, etc.)
- Turbidity

CHAIN-OF-CUSTODY PROCEDURES

Each sample will be recorded separately on the chain-of-custody manifest as part of the sampling procedure. The information obtained for each sample will include the following:

- Sample Identification
- Sampler's Name
- Time and Date of Sampling
- Sample Laboratory Number
- Analysis to be Performed
- Laboratory Name

Chain-of-Custody procedures will include the following:

- All samples will be listed on a chain-of-custody manifest.
- All personnel responsible for sampling, transporting and receiving samples will sign the chain-of-custody manifest.
- Analyst's name and laboratory will be recorded on the chain-of-custody manifest.
- Samples will be transported in a secured container with the chain-of-custody manifest attached.
- Samples will be kept in a locked vehicle or within sight of a custodian until received by the laboratory.

PROVISIONS FOR SPLIT SAMPLES

Approximately one week prior to soil and groundwater sampling, the department will be notified of the sampling times and dates. It will then have the option of observing or obtaining split samples.

ANALYTICAL LABORATORY AND METHODS

ANALYTICAL LABORATORY

INTEGRATED ANALYTICAL LABORATORIES (IAL)

Randolph, New Jersey 07869

ANALYTICAL METHODS

For soil impacted by gasoline compounds, the STARS guidance document specifies analysis for VOCs and MTBE using Method 8021. For soil impacted by fuel oil, STARS recommends analysis for both VOCs and base/neutral compounds using Methods 8021 and 8270, respectively. In areas impacted by waste oil, soil will be analyzed for VOCs (method 8260) plus TICs and SVOCs (Method 8270) plus TICs as well as PCBs (method 8082) plus sulfuric acid clean up for PCBs and TAL metals. The analytical methods to be used for drum characterization are as follows: total organic halides - EPA SW- 846 method 3540A/9020A; Ignitability - SW-846 method 1020; and PCBs - SW-846 methods 3540A/9020A. The detection limits are attached to this Plan.

VOLATILE COMPOUNDS

	TCL	Instrument Average MDL - Aqueous (ppb)	Reported MDL, Soil (ppb)	Reported MDL, Methanol Soil (ppb)	
Acetone	x	1.640	20	2500	
Benzene	x	0.450	5	625	
Bromochloromethane	x	0.540	5	625	
Bromodichloromethane	x	0.370	5	625	
Bromoform	x	0.310	5	625	
Bromomethane	x	0.560	5	625	
2-Butanone(MEK)	x	0.730	20	2500	
Carbon disulfide	x	0.230	5	625	
Carbon tetrachloride	x	0.540	5	625	
Chlorobenzene	x	0.200	5	625	
Chloroethane	x	0.370	5	625	
Chloroform	x	0.390	5	625	
Chloromethane	x	0.730	5	625	
cis-1,2-Dichloroethene	x	0.390	5	625	
cis-1,3-Dichloropropene	x	0.370	5	625	
Cyclohexane	x				x MDL not available
1,2-Dibromo-3-chloropropane	x	0.650	5	625	
Dibromochloromethane	x	0.230	5	625	
1,2-Dibromoethane/Ethylene dibromide(EDB)	x	0.230	5	625	
1,2-Dichlorobenzene	x	0.480	5	625	
1,3-Dichlorobenzene	x	0.510	5	625	
1,4-Dichlorobenzene	x	0.370	5	625	
Dichlorodifluoromethane	x	0.620	5	625	
1,1-Dichloroethane	x	0.450	5	625	
1,2-Dichloroethane(EDC)	x	0.420	5	625	
1,1-Dichloroethene	x	0.280	5	625	
1,2-Dichloropropane	x	0.680	5	625	
Ethylbenzene	x	0.370	5	625	
2-Hexanone	x	0.620	20	2500	
Isopropylbenzene **(see note)	x	0.370	5	625	
Methyl acetate	x				x MDL not available
Methylcyclohexane	x				x MDL not available
4-Methyl-2-pentanone/Methyl Isobutyl Ketone (MIB	x	0.420	20	2500	
Methylene Chloride	x	0.420	5	625	
Methyl-tertiary-butyl ether(MTBE)	x	1.270	5	625	
Styrene	x	0.200	5	625	
1,1,2,2-Tetrachloroethane	x	0.390	5	625	
Tetrachloroethene (PERC)	x	0.310	5	625	
Toluene	x	0.510	5	625	
Total Xylenes	x	1.160	5	625	
trans-1,2-Dichloroethene	x	0.540	5	625	
trans-1,3-Dichloropropene	x	0.310	5	625	
1,2,4-Trichlorobenzene	x	0.390	5	625	
1,1,1-Trichloroethane	x	0.730	5	625	
1,1,2-Trichloroethane	x	0.450	5	625	
Trichloroethene	x	0.340	5	625	
Trichlorofluoromethane	x	0.480	5	625	
1,1,2-Trichlor-1,2,2-trifluorethane	x				x MDL not available
Vinyl Chloride	x	0.420	5	625	

TCL from EPA Internet site 6/8/99. TCL changed 1/1/00, RR confirmed.

Printed 6/23/009:42 AM

SEMIVOLATILE COMPOUNDS

	TCL	Instrument MDL, C (Aqueous)	Reported MDL's, Soil (ppb)	
Acenaphthene	x	0.111	33.3	
Acenaphthylene	x	0.176	33.3	
Acetophenone	x			X - MDL Not Available
Anthracene	x	0.182	33.3	
Atrazine	x			X - MDL Not Available
Benzaldehyde	x			X - MDL Not Available
Benzo[a]anthracene	x	0.249	33.3	
Benzo[a]pyrene	x	0.335	33.3	
Benzo[b]fluoranthene	x	0.545	33.3	
Benzo[g,h,i]perylene	x	0.546	33.3	
Benzo[k]fluoranthene	x	0.690	33.3	
1,1-Biphenyl	x			X - MDL Not Available
Bis(2-chloroethoxy)methane	x	0.161	33.3	
Bis(2-chloroethyl)ether	x	0.167	33.3	
Bis(2-chloroisopropyl)ether **	x	0.548	33.3	** Compound also known as 2,2-oxybis (1-Chloropropane
Bis(2-ethylhexyl)phthalate	x	0.732	33.3	
4-Bromophenyl-phenylether	x	0.447	33.3	
Butylbenzylphthalate	x	0.570	33.3	
Caprolactam	x			X - MDL Not Available
Carbazole	x	0.289	33.3	
4-Chloro-3-methylphenol	x	0.432	33.3	
4-Chloroaniline	x	0.563	33.3	
2-Chloronaphthalene	x	0.295	33.3	
2-Chlorophenol	x	0.167	33.3	
4-Chlorophenyl-phenylether	x	0.442	33.3	
Chrysene	x	0.402	33.3	
Dibenz[a,h]anthracene	x	0.421	33.3	
Dibenzofuran	x	0.168	33.3	
3,3'-Dichlorobenzidine	x	0.337	33.3	
2,4-Dichlorophenol	x	0.516	33.3	
Diethylphthalate	x	0.297	33.3	
Dimethylphthalate	x	0.248	33.3	
2,4-Dimethylphenol	x	0.260	33.3	
Di-n-butylphthalate	x	0.478	33.3	
4,6-Dinitro-2-methylphenol	x	0.887	33.3	
2,4-Dinitrophenol	x	0.405	33.3	
2,4-Dinitrotoluene	x	0.864	33.3	
2,6-Dinitrotoluene	x	0.444	33.3	
Di-n-octylphthalate	x	0.629	33.3	
Fluoranthene	x	0.409	33.3	
Fluorene	x	0.372	33.3	
Hexachlorobenzene	x	0.502	33.3	
Hexachlorobutadiene	x	0.418	33.3	
Hexachlorocyclopentadiene	x	0.332	33.3	
Hexachloroethane	x	0.415	33.3	
Indeno[1,2,3-cd]pyrene	x	0.623	33.3	
Isophorone	x	0.259	33.3	
2-Methylnaphthalene	x	0.184	33.3	

TCL from EPA Internet, TCL changed 1/1/00, confirmed RR

SEMIVOLATILE COMPOUNDS

	TCL	Instrument MDL, C (Aqueous)	Reported MDL's, Soil (ppb)
2-Methylphenol (o-Cresol)	x	0.252	33.3
4-Methylphenol (p-Cresol)	x	0.285	33.3
Naphthalene	x	0.132	33.3
2-Nitroaniline	x	0.510	33.3
3-Nitroaniline	x	0.696	33.3
4-Nitroaniline	x	0.929	33.3
Nitrobenzene	x	0.414	33.3
2-Nitrophenol	x	0.819	33.3
4-Nitrophenol	x	0.687	33.3
N-Nitroso-di-n-propylamine	x	0.245	33.3
N-Nitrosodiphenylamine	x	0.338	33.3
Pentachlorophenol	x	0.751	33.3
Phenanthrene	x	0.146	33.3
Phenol	x	0.269	33.3
Pyrene	x	0.262	33.3
2,4,5-Trichlorophenol	x	0.445	33.3
2,4,6-Trichlorophenol	x	0.583	33.3

TCL from EPA Internet, TCL changed 1/1/00, confirmed RR.

PCB's

COMPOUNDS	TCL 8082	Reported Aq (ppb) MDL's	Reported Soil (ppb) MDL's
Aroclor 1016	X	0.2	6.68
Aroclor 1221	X	0.2	6.68
Aroclor 1232	X	0.2	6.68
Aroclor 1242	X	0.2	6.68
Aroclor 1248	X	0.2	6.68
Aroclor 1254	X	0.2	6.68
Aroclor 1260	X	0.2	6.68

PESTICIDES

COMPOUNDS	TCL 8081A	Reported Aq (ppb) MDL's	Reported Soil (ppb) MDL's
4,4'-DDD	X	0.005	0.167
4,4'-DDE	X	0.005	0.167
4,4'-DDT	X	0.005	0.167
Aldrin	X	0.005	0.167
alpha-BHC	X	0.005	0.167
alpha-Chlordane	X	0.005	0.167
beta-BHC	X	0.005	0.167
delta-BHC	X	0.005	0.167
Dieldrin	X	0.005	0.167
Endosulfan I	X	0.005	0.167
Endosulfan II	X	0.005	0.167
Endosulfan sulfate	X	0.005	0.167
Endrin	X	0.005	0.167
Endrin aldehyde	X	0.005	0.167
Endrin Ketone	X	0.005	0.167
gamma-BHC (Lindane)	X	0.005	0.167
gamma-Chlordane	X	0.005	0.167
Heptachlor	X	0.005	0.167
Heptachlor Epoxide	X	0.005	0.167
Methoxychlor	X	0.005	0.167
Toxaphene	X	0.025	0.835

TCL from EPA Internet site, TCL site revised 1/1/00

COMPOUNDS	Aqueous - MDL (ppm) - ICP 6010	Monitoring Well - MDL (ppm) - ICP/MS 200.8	Soil MDL (ppm) - ICP/MS 6020
Aluminum	0.1	0.1	2.0
Antimony	0.1	0.008	2.0
Arsenic	0.1	0.004	0.2
Barium	0.01	0.02	5.0
Beryllium	0.02	0.004	0.2
Cadmium	0.005	0.0006	0.2
Calcium	0.4	0.8	20.0
Chromium	0.01	0.02	0.6
Cobalt	0.02	0.04	0.4
Copper	0.02	0.04	0.4
Iron	0.05	0.10	3.0
Lead	0.004/0.029	0.004/0.029	2.0
Magnesium	0.10		20.0
Manganese	0.005	0.01	0.4
Mercury	☒	☒	☒
Nickel	0.01	0.02	0.6
Potassium	0.1		20.0
Selenium	0.1	0.008	2.0
Silver	0.02	0.0004	
Sodium	0.1		20.0
Thallium	0.004	0.008	0.08
Vanadium	0.015	0.03	0.3
Zinc	0.01	0.02	1.0

☒ = MDL for TCLP, Wastewater & Monitoring Well is 0.0005 by ColdVapor and 0.0125 for Soil by Cold Vapor.

COMPOUNDS	**SOIL** - Reported MDL	**AQUEOUS** - Reported MDL	Aqueous Method	Soil Method	Holding Times
Cyanide, Total (ppm)	1.00	0.05	335.2	9010	14 days

UST ACTIVITIES & PROCEDURES

The following activities will be conducted as part of the underground storage tank and piping removal process.

- All work will be performed in accordance with the appropriate industry standard, American Petroleum Institute publication API 1604; ANSI, NFPA and all other applicable government regulations;

- Acquisition of all required permits including notification for the appropriate oversight authority;

- Overseeing the activities required to ensure proper closure of the tank including excavation, cleaning, safety monitoring, and backfilling to grade;

- Soil sampling the tank excavation (in accordance with NYSDEC STARs and SPOTs Memos)

- Preparing the required closure documentation.

Upon receipt of the required state and local permits, the following tank decommissioning procedures will be employed at the site.

TANK DECOMMISSIONING PROCEDURES

Upon receipt of all permits and approvals, the underground storage tanks and associated piping will be scheduled for removal. Tank decommissioning will be implemented following the appropriate industry standards, as stated above. The tank decommissioning procedures are described below.

TANK PREPARATION

Prior to excavation, the following activities will be performed:

- Underground utilities will be identified by knowledgeable persons.
- Before initiating work in the tank areas, a monitoring instrument will be used to assess vapor and oxygen concentrations in the work area.
- All material transfer piping will be drained, cut and plugged with an impermeable material, or capped to avoid any spillage.
- Residual product found in the tanks will be pumped out and containerized for proper off-site disposal or recycling. (A unit price for disposal is provided in the cost estimate below).

TANK & IMPACTED SOIL REMOVAL PROCEDURES

The following tank removal procedures will be conducted:

- After removing or disconnecting the transfer piping, the soils around the tank will be excavated.
- The excavation will conform to the applicable trenching and shoring requirements.
- Upon removal, the tanks will be placed on plastic and secured prior to inspection and cleaning.
- The tanks will be labeled "do not re-use" after removal from the ground and before removal from the site.

- The tank will be removed from the site as promptly as possible.

- All transfer piping will be removed and properly disposed of.

- Excavated soil will be segregated into piles consisting of a pile petroleum contaminated and non-contaminated soil. Soils will be segregated as potentially clean and contaminated based in visual, olefactory and PID criteria. Soil samples for waste characterization will be collected prior to off-site disposal of impacted soil in accordance with methods described by STARS and SPOTs. Once the soil has been characterized, the soil will disposed of at an appropriate facility.

SITE ASSESSMENT

Site assessment activities, required by the NYSDEC, will be performed to determine if the previous operation of the underground storage tanks or piping has impacted the underlying soils or groundwater at the site. The site assessment activities will include visually inspecting the tanks, excavating soil and collecting post excavation soil samples for certified laboratory analysis as required by the NYSDEC.

SAMPLING AND ANALYSIS

First Environment will field screen all excavated soil with a portable photoionization detector to evaluate potential soil contamination. In accordance with NYSDEC STARS & SPOTS Guidance Documents, one post excavation soil sample will be collected at each side-wall and two composite samples at the tank base. One soil sample will be collected six-inches below the transfer piping for every 20 feet of transfer piping. If visually impacted soil remains subsequent to excavating soil, a grab sample will be collected pursuant to SPOTs Memo #14. Soil samples will be collected by First

Environment and submitted to a NYSDOH ELAP certified laboratory for analysis per STARS and SPOTS requirements depending on the tank contents.

SITE HEALTH AND SAFETY PLAN
FIRST ENVIRONMENT, INC.

SITE NAME Provan Ford

SITE ADDRESS Route 9W and Deyo Place

Newburgh, New York 12550

SITE PHONE

CLIENT City of Newburgh

PROJECT # PROVA001

REVISION # DATE 6/26/2000

CONTACT Bill Hauser (City of Newburgh)

CONTACT PHONE (914)-562-8642

OBJECTIVES: (Summarize below)

Removal of Diesel, gasoline & waste oil underground storage tanks, the installation of soil borings and groundwater monitoring wells, waste drum removal, and excavation, stockpiling and disposal of contaminated soil.

TYPE OF SITE: (Check as many as applicable)

( )Active (X)Secure ( )Enclosed space ( )Uncontrolled ( )Recovery (X)Remediation ( )Unknown

(X)Inactive ( )Unsecure ( )Landfill ( )Industrial ( )Well Field ( )Other: (specify)

DESCRIPTION AND FEATURES: Summarize below. Include principal operations and unusual features (size, containers, buildings, dikes, power line, terrain, etc.).

Site is currently occupied by Gary's Trucking Repair Service.

SURROUNDING AREA/DIRECTION: (X)Residential ( )Industrial (X)Commercial ( )Rural ( )Urban ( )Other:

DISTANCE TO NEAREST ENVIRONMENTALLY SENSITIVE RECEPTORS:

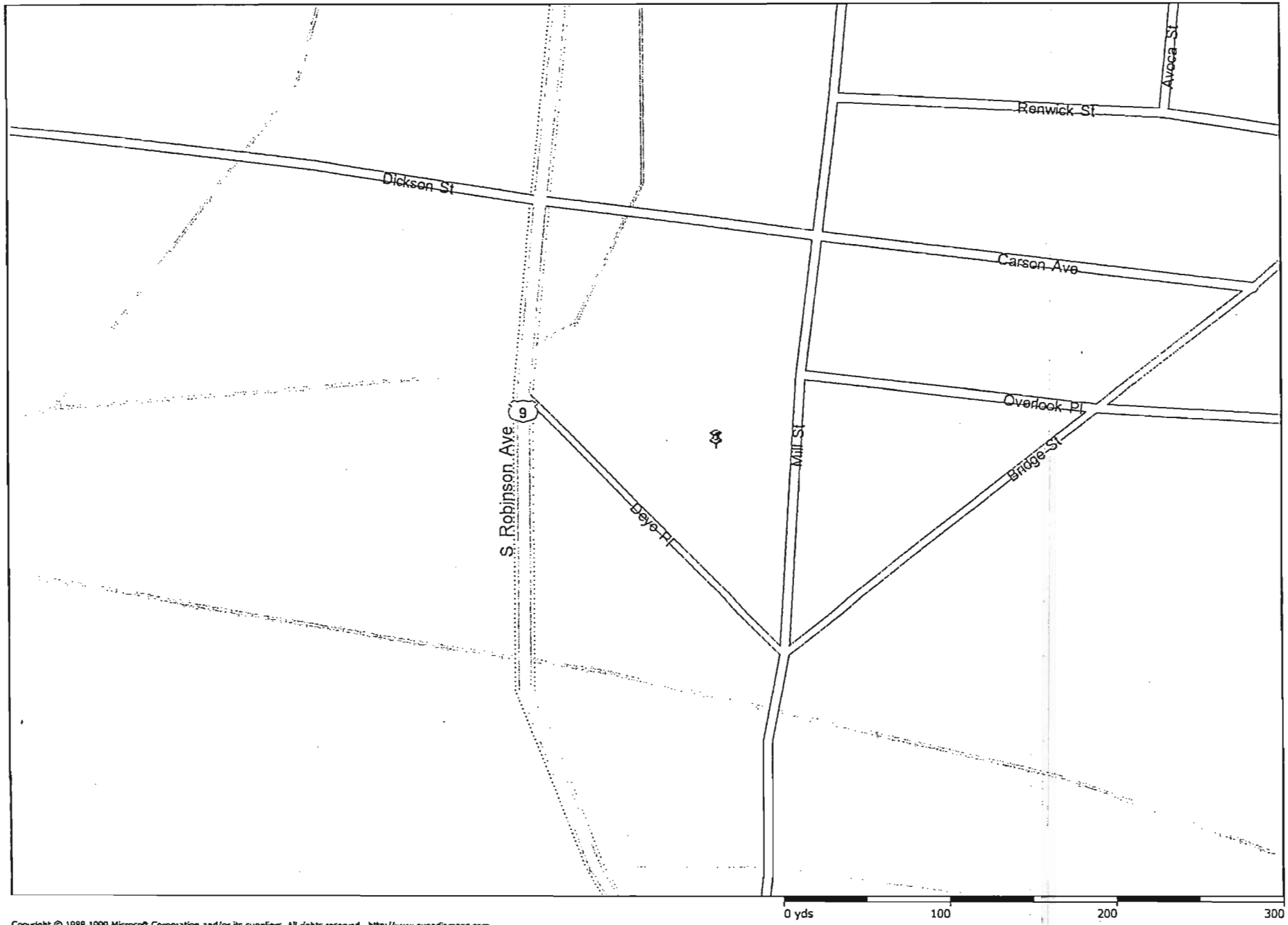
Water Body 1/8 Mile Wetlands Potable Well School Residence

Hospital 1.0 Mile Public Building Other Depth to Groundwater

Water Body (Quassaick Creek); Hospital (St. Luke's Hospital)

THIS PAGE RESERVED FOR MAP & EVACUATION ROUTE

EVACUATION



HISTORY: (Summarize below. In addition to history, include complaints from public, previous agency actions, known exposures or injuries, etc.) Former tanker truck cleaning & filling station for commercial trucks. Site has approx. 75 drums containing primarily oils. 50% of drums have been overpacked.

WASTE TYPES: (X) Liquid (X) Solid (X) Soil (X) Sludge ( ) Gas ( ) Unknown ( ) Other: (specify)

WASTE CHARACTERISTICS: (Check as many as applicable.)

( ) Corrosive	(X) Flammable	( ) Radioactive
( ) Toxic	(X) Volatile	( ) Reactive
(X) Inert	( ) Unknown	( ) Other: (specify)

Potential for unknown contaminants during soil excavation

PRINCIPAL DISPOSAL METHODS AND PRACTICES:

Tank contents will be pumped out and transported off site for disposal by a licensed waste hauler. Drums and excavated soil will Be transported off site by a licensed waste hauler and disposed of off site. All waste will be disposed of at NYSDEC licensed Facilities.

HAZARDS OF CONCERN:

(X) Heat Stress (attach guidelines)	(X) Noise	( ) Biological (animals,insects,plants)
(X) Cold Stress (attach guidelines)	( ) Inorganic Chemicals	(X) Physical (terrain, water bodies)
(X) Explosive/Flammable	(X) Organic Chemicals	(X) Electrical
(X) Oxygen Deficient	( ) Radiological	(X) Mechanical (machinery/euipment)
( ) Other: (specify)		

Heat Stress/Cold Stress hazards depend on current temperatures during work activities.

HAZARDOUS MATERIAL SUMMARY: (Circle waste type and estimate amounts by category.)

CHEMICALS: Amount/Units:	SOLIDS: Amount/Units:	SLUDGES: Amount/Units:	SOLVENTS: Amount/Units:	OILS: Amount/Units:	OTHER: Amount/Units:
Acids	Asbestos	Aluminum	Halogenated Solvents	Oily Wastes	Hospital
Caustics	Ferrous Smelter	Metals	Non-Halogenated Solvents	Other (specify): **Waste Oil/Sludge**	Laboratory
Cyanides	Flyash	Paint Pigments	Other (specify):		Municipal
Dyes/Inks	Milling/Mine Tailings	POTW Sludge			Radiological
Halogens	Non-Ferrous Smelter	Refinery			Other (specify): **55-Gallon Drums & Stockpiled Soil**
Metals	Paint Chips	**Tank Bottoms**			
PCBs	Other (specify):	Other (specify):			
Pest/Herbicide					
Phenols					
Pickling Liquors					
Other (specify): **Tank Bottoms**					

OVERALL HAZARD EVALUATION: ( ) High (X) Medium ( ) Low ( ) Unknown (Where tasks have different hazards, evaluate each.)

JUSTIFICATION:

There are unknown contaminant concentrations within the tank bottoms and contaminated soil to be excavated. Contaminant concentrations Typical from petroleum based UST's rarely are hazardous so an interim medium hazard evaluation has been designated.

FIRE/EXPLOSION POTENTIAL: ( ) High (X) Medium ( ) Low ( ) Unknown

Fire/explosion hazards do exist when removing gasoline USTs. The gasoline USTs to be removed will be inerted prior to removal.

RISK ANALYSIS:

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION (specify units and media)	PEL/TLV ppm or mg/m^3 (specify)	IDLH ppm or mg/m^3 (specify)	SYMPTOMS/EFFECTS OF ACUTE EXPOSURE
(VOLATILES)				
Benzene (MSDS attached)		1 ppm	1,000 ppm	See MSDS
Toluene (MSDS attached)		100 ppm	2,000 ppm	See MSDS
Ethylbene (MSDS attached)		100 ppm	2,000 ppm	See MSDS
Xylenes (MSDS attached)		100 ppm	1,000 ppm	See MSDS
(SEMI-VOLATILES)				
Acenapthene (MSDS attached)				
Benzo(a)pyrene (MSDS attached)				
Bromodichloromethane (MSDS attached)				
Methyl Ethyl Ketone (MSDS attached)				
Dichlorodifluoromethane (MSDS attached)				
1,2-Dichloroethane (MSDS attached)				
1,2-Dichloroethylene (MSDS attached)				
Dichlorobenzene (MSDS attached)				
Naphthalene (MSDS attached)				
Phenanthrene (MSDS attached)				
Pyrene (MSDS attached)				

NA = Not Available	S = Soil	A = Air	D = Drums
NE = None Established	GW = Groundwater	F = Flyash	TK = Tanks
U = Unknown	SW = Surface Water	SL = Sludge	L = Lagoon

FIELD ACTIVITIES COVERED UNDER THIS PLAN

TASK DESCRIPTION/SPECIFIC TECHNIQUE/STANDARD OPERATING PROCEDURES/SITE LOCATION (Attach additional sheets as necessary.)	TYPE	LEVEL OF PROTECTION PRIMARY	CONTINGENCY	SCHEDULE
TASK 1	**Intrusive**	A B C D	A B **C** D	
UST Removal	Non-Intrusive	Modified	Modified	
TASK 2	**Intrusive**	A B C D	A B **C** D	
Soil Borings/Well Installations	Non-Intrusive	Modified	Modified	
TASK 3	Intrusive	A B C D	A B **C** D	
Drum Removal	**Non-Intrusive**	Modified	Modified	
TASK 4	**Intrusive**	A B C D	A B **C** D	
Soil Excavation/Stockpiling/Disposal	Non-Intrusive	Modified	Modified	

PROTECTIVE EQUIPMENT: (Specify by task.) **UST REMOVAL**

TASKS: 1 2 3 4 (X) Primary (XX) Contingency

LEVEL: A B C D Modified

RESPIRATORY: (X) Not Needed

( ) SCBA, Airline: _____

( ) APR: _____

(XX) Cartridge: _____

( ) Escape Mask: _____

( ) Other: _____

HEAD AND EYE: ( ) Not Needed

(X) Safety Glasses: (XX) _____

( ) Face Shield: _____

( ) Goggles: _____

(X) Hard Hat: (XX) _____

(X) Ear Protection: (XX) _____

( ) Other: _____

BOOTS: ( ) Not needed

Boots: (X), (XX) - Steel Toe _____

Overboots: _____

PROTECTIVE CLOTHING: (X) Not Needed

( ) Encapsulating Suit: _____

( ) Splash Suit: _____

( ) Apron: _____

(XX) Tyvek Coverall: _____

( ) Saranex Coverall: _____

( ) Coverall: _____

( ) Other: _____

GLOVES: ( ) Not Needed

( ) Undergloves: _____

(X) Gloves: (XX) - Nitrile and/or latex

( ) Overgloves: _____

OTHER: (specify)

PROTECTIVE EQUIPMENT: (Specify by task.) **SOIL BORING/WELL INSTALLATION**

TASKS: 1 **2** 3 4 (X) Primary (X) Contingency

LEVEL: A B C **D** Modified

RESPIRATORY: (X) Not Needed

( ) SCBA, Airline: _____

( ) APR: _____

(XX) Cartridge: _____

( ) Escape Mask: _____

( ) Other: _____

HEAD AND EYE: ( ) Not Needed

(X) Safety Glasses: (XX) _____

( ) Face Shield: _____

( ) Goggles: _____

(X) Hard Hat: (XX) _____

(X) Ear Protection: (XX) _____

( ) Other: _____

BOOTS: ( ) Not needed

Boots: (X), (XX) - steel toe _____

Overboots: _____

PROTECTIVE CLOTHING: (X) Not Needed

( ) Encapsulating Suit: _____

( ) Splash Suit: _____

( ) Apron: _____

(XX) Tyvek Coverall: _____

( ) Saranex Coverall: _____

( ) Coverall: _____

( ) Other: _____

GLOVES: ( ) Not Needed

( ) Undergloves: _____

(X) Gloves: (XX) - nitrile and/or latex

( ) Overgloves: _____

OTHER: (specify)

PROTECTIVE EQUIPMENT: (Specify by task.) **DRUM REMOVAL**

TASKS: 1 2 **3** 4 (X) Primary (XX) Contingency

LEVEL: A B C D Modified

RESPIRATORY: (X) Not Needed

( ) SCBA, Airline: _____

( ) APR: _____

(XX) Cartridge: _____

( ) Escape Mask: _____

( ) Other: _____

HEAD AND EYE: (X) Not Needed

(XX) Safety Glasses: _____

( ) Face Shield: _____

( ) Goggles: _____

(XX) Hard Hat: _____

(XX) Ear Protection: _____

( ) Other: _____

BOOTS: ( ) Not needed

Boots: (X), (XX)

Overboots: _____

PROTECTIVE CLOTHING: (X) Not Needed

( ) Encapsulating Suit: _____

( ) Splash Suit: _____

( ) Apron: _____

(XX) Tyvek Coverall: _____

( ) Saranex Coverall: _____

( ) Coverall: _____

( ) Other: _____

GLOVES: ( ) Not Needed

( ) Undergloves: _____

(X) Gloves: (XX) - nitrile and/or latex

( ) Overgloves: _____

OTHER: (specify)

PROTECTIVE EQUIPMENT: (Specify by task.) **SOIL EXCAVATION/STOCKPILING/DISPOSAL**

TASKS: 1 2 3 **4** (X) Primary (XX) Contingency

LEVEL: A B C D Modified

RESPIRATORY: (X) Not Needed

( ) SCBA, Airline: _____

( ) APR: _____

(XX) Cartridge: _____

( ) Escape Mask: _____

( ) Other: _____

HEAD AND EYE: ( ) Not Needed

(X) Safety Glasses: (XX) _____

( ) Face Shield: _____

( ) Goggles: _____

(X) Hard Hat: (XX) _____

(X) Ear Protection: (XX) _____

( ) Other: _____

BOOTS: ( ) Not needed

Boots: (X), (XX) _____

Overboots: _____

PROTECTIVE CLOTHING: (X) Not Needed

( ) Encapsulating Suit: _____

( ) Splash Suit: _____

( ) Apron: _____

(XX) Tyvek Coverall: _____

( ) Saranex Coverall: _____

( ) Coverall: _____

( ) Other: _____

GLOVES: ( ) Not Needed

( ) Undergloves: _____

(X) Gloves: (XX) - nitrile and/or latex

( ) Overgloves: _____

OTHER: (specify)

MONITORING EQUIPMENT: (Specify by task.)

INSTRUMENT	TASK	ACTION GUIDELINES		COMMENTS
Combustible Gas Indicator	1 2 3 **4**	<10% LEL	Continue monitoring.	( ) Not Needed
		10-20% LEL	Potential explosion hazard, notify SHSC	
		>20% LEL	Explosion hazard; interrupt task/evacuate	
		21.0% 0_2	Oxygen normal	
		<21.0% 0_2	Oxygen Deficient, notify SHSC	
		<19.5% 0_2	Interrupt task/evacuate	
Radiation Survey Meter	1 2 3 4	3 x Background:	Notify SHSC	( ) Not Needed
		>2 mr/hr	Interrupt task/evacuate	
		Note: Annual exposure not to exceed 100 mrem/yr or 50 .rem/hr average		
Photoionization Detector	**1 2 3 4**	Specify:		( ) Not needed
( )11.7 ev (X)10.6 ev ( )10.2 ev ( )9.8 ev ( )____ev				
Type: _____				
Flame Ionization Detector	1 2 3 4	Specify:		( ) Not Needed
Type: _____				
Personal Gas Detector	1 2 3 4	Specify:		( ) Not Needed
Type: _____				
Dust Monitor	1 2 3 4	Specify:		( ) Not Needed
Type: _____				
Other, Specify:	1 2 3 4	Specify:		
Type: _____				
Discharge Control Measures:				
Drainage Structures	**1** 2 3 **4**	Specify:	Hay bails(if needed)	( ) Not Needed
Surface Water	**1 2** 3 **4**	Specify:	Booms(if necessary)	( ) Not Needed
Groundwater	1 2 3 4	Specify:		(X) Not Needed
Soil	1 2 3 4	Specify:		(X) Not Needed
Dust	1 2 3 4	Specify:		(X) Not Needed
Vapors	1 2 3 4	Specify:		(X) Not Needed

DECONTAMINATION PROCEDURES:

All equipment that comes in contact with contaminated soil/material will be decontaminated on-site prior to removal from the site. If necessary, decontamination water will be drummed on-site for future disposal.

PERSONNEL DECONTAMINATION:

All PPE that comes in contact with contaminated soil/materials will be removed on-site and disposed of along with the contaminated Soils/materials generated on-site.

Containment and Disposal Method: ( ) Not Needed

SAMPLING EQUIPMENT DECONTAMINATION:

All sampling equipment used will be disposable (one time use only) and will be disposed of following use. When split spoons are used, During soil borings and well installation, the spoon will be decontaminated with DI water and alconox detergeant. If necessary, the decontamination water will be drummed on-site for future disposal.

Containment and Disposal Method: ( ) Not Needed

HEAVY EQUIPMENT DECONTAMINATION:

All equipment that comes in contact with contaminated soil/materials will be decontaminated on-site prior to removal from the site. If necessary, decontamination water will be drummed on-site for future disposal.

Containment and Disposal Method: ( ) Not Needed

EMERGENCY RESPONSE EQUIPMENT: (check all that apply) / (attach map indicating location)

(XX)	20 lb ABC Fire Extinguisher	( )	Shower
(XX)	First Aid Kit	(XX)	PPE
( )	Stretcher or Blanket	( )	SCBA
(XX)	Potable Water	(XX)	Spill Control Equipment
( )	Eye Wash	(XX)	Radio/Phone
( )	Other		

EMERGENCY CONTACTS:	PHONE
Water Supply:	
Telephone:	
Gas:	
Electric:	
Sewer Authority	
Dept of Public Works:	
DOT Hazardous Materials Information:	202-366-4488
National Response Center Hotline:	800-424-8802
CMA Chemical Referral Center:	800-262-8200
CHEMTREC:	800-424-9300
Other:	

CONTINGENCY PLANS:

See First Environment, Inc. Emergency Response Plan.

NOTE: This Health and Safety Plan has been written for the use of First Environment, Inc. and its employees. The plan is written for specific trained personnel who are under medical surveillance. The plan is applicable for the specific purposes, and objectives stated and is representative of conditions believed to exist at the time of its preparation. First Environment, Inc., claims no responsibility for its use by others.

HEALTH AND SAFETY PLAN APPROVALS

Prepared by _____ Date 2-28-2000

Reviewed by _____ Date 3-8-00

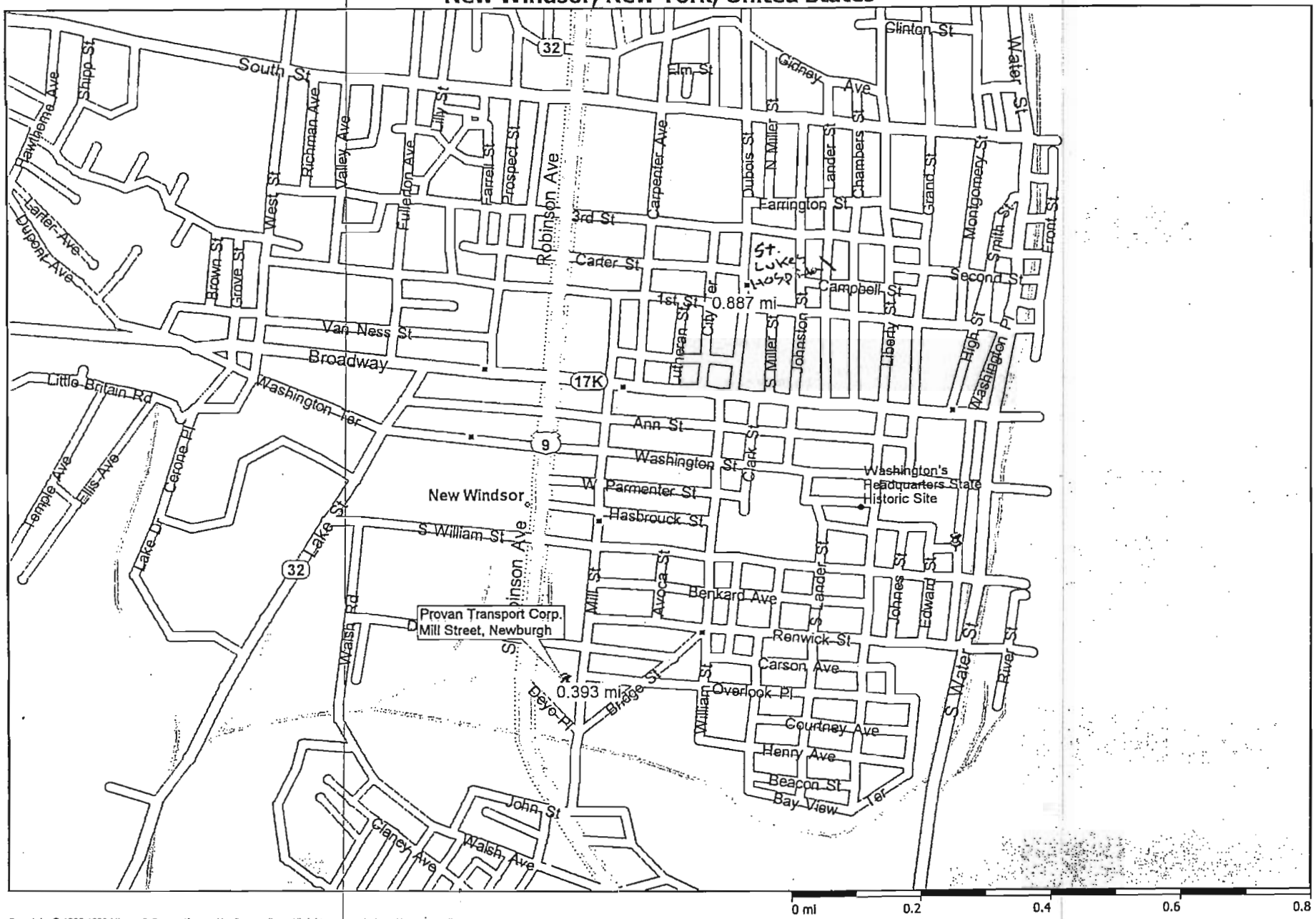
HSM Signature B. Tod Delaney Date 3-13-00

EMERGENCY CONTACTS:	NAME	PHONE
24-Hour Emergency Line:		
Health and Safety Manager:	B. Tod Delaney	973-616-9700
Site Supervisor:	Corey Nachshen	973-616-9700
Site H & S Coordinator:	Corey Nachshen	973-616-9700
Project Manager:	Scott Green	973-616-9700
Personnel Manager	BettyJo Armstrong	973-616-9700
Site Owner:		
Site Operator:	Vacant	
EPA Contact:		
State Environmental Agency:		800-457-7362
State Spill Contractor:		
Fire Department:		914-562-1212
Police Department:		914-562-1133
State Police:		
Health Department:		914-632-3701
Poison Control Center:		800-462-6642

MEDICAL EMERGENCY

Ambulance:		
Paramedic:		
Medical Consultant:		
Hospital Name:	St. Luke's Hosp.	914-561-4400
Hospital Address:	70 Dubois St.	
Name of Contact at Hospital:		
Distance to Hospital: (Attach map and description of route to hospital)	1.0 mile	

New Windsor, New York, United States



PERSONNEL & RESPONSIBILITIES: (Attach additional sheets as necessary.)

NAME	FIRM	HEALTH/TRAINING CLEARANCE	RESPONSIBILITIES	SITE TASK	SIGNATURE	DATE
1. Scott Green	First Environment	YES	Project Manager	(1) (2) (3) (4)	[signature]	3-8-00
2. Corey Nachshen	First Environment	Yes	Site Supervisor	1 2 3 4		
3.				1 2 3 4		
4.				1 2 3 4		
5.				1 2 3 4		
6.				1 2 3 4		
7.				1 2 3 4		
8.				1 2 3 4		
9.				1 2 3 4		
10.				1 2 3 4		

UTILITY MARK-OUT: Date notified: _____ Confirmation Number: _____ Initials: _____

All First Environment personnel assigned to work on-site have attended a 40-hour hazardous materials site operations and safety training course or have met the equivalent experience and training provision of 29 CFR 1910.120, and have been certified medically fit by a qualified occupational physician to work on hazardous sites and to wear a respirator.

By signing above, employees and subcontractors acknowledge that they have read and understand this Site Health and Safety Plan. All site workers under the direction of First Environment must sign this sheet before commencing the site tasks to which they have been assigned for this site.

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 4-2.

TABLE 4-2
WIND CHILL TEMPERATURE CHART

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and Immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Lin Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- ***Frost Nip or Incipient Frostbite*** - characterized by suddenly blanching or whitening of skin.
- ***Superficial Frostbite*** - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- ***Deep Frostbite*** - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires spec attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, personnel must wear protective clothing appropriate for the level of cold and physical activi In addition to protective clothing, preventive safe work practices, additional training, and warming regimens m be utilized to prevent cold stress.

Safety Precautions for Cold Stress Prevention

- For air temperature of 0°F or less, the hands should be protected by mittens. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.
- At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.
- If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. If wet, field personnel must change into dry clothes prior to entering the cold area.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.
- Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

Safe Work Practices

- Direct contact between bare skin and cold surfaces ($\leq$ 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.
- For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.
- Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing.
- Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are the one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should not be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in the Table 4-1. Additional personnel must be provided to allow appropriate rest to prevent heat-related illness, as necessary to maintain required production and job continuity.

TABLE 4-1
WORK/REST SCHEDULE

Adjusted Temperature[b]	*Work-Rest Regimen Normal Work Ensemble*[c]	*Work-Rest Regimen Impermeable Ensemble*
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (30.8°-32.2°C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)
[b] Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
[d] The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

In order to determine if the work rest cycles are adequate for the personnel and specific project site conditions additional monitoring of individuals heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period

Additional one or more of the following control measures can be used to help control heat stress and are mandatory if any worker has a heart rate (measure immediately prior to rest period) exceeding of 115 beats per minute:

- Workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F) .
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.

- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Personnel should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Personnel must not be assigned to other tasks during breaks.
- Personnel must remove impermeable garments during rest periods. This includes white Tyvek-type garments.
- All personnel must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

Material Safety Data Sheet

From Genium's Reference Collection
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GENIUM PUBLISHING CORP.

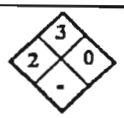
No. 316

BENZENE
(Revision D)
Issued: November 1978
Revised: April 1988

SECTION 1. MATERIAL IDENTIFICATION

25

Material Name: BENZENE



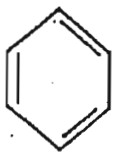
Description (Origin/Uses): Used in the manufacture of medicinal chemicals, dyes, linoleum, airplane dopes, varnishes, and lacquers; and as a solvent for waxes, resins, and oils.

Other Designations: Benzol; Phene; Phenylhydride; C_6H_6; NIOSH *RTECS* No. CY1400000; CAS No. 0071-43-2

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS			
H	2		
F	3	R	1
R	0	I	4
PPG*		S	2
*See sect. 8		K	4

SECTION 2. INGREDIENTS AND HAZARDS

SECTION 2. INGREDIENTS AND HAZARDS	%	EXPOSURE LIMITS
Benzene, CAS No. 0071-43-2  *See NIOSH, *RTECS*, for additional data with references to irritative, mutagenic, tumorigenic, and reproductive effects.	Ca 100	OSHA PEL 8-Hr TWA: 1 ppm 15-Min Ceiling: 5 ppm Action Level: 0.5 ppm ACGIH TLV, 1987-88 TLV-TWA: 10 ppm, 30 mg/m³ Toxicity Data* Human, Inhalation, LC_{Lo}: 2000 ppm/5 Min Human, Oral, TD_{Lo}: 130 mg/kg Human, Inhalation, TC_{Lo}: 210 ppm

SECTION 3. PHYSICAL DATA

Boiling Point: 176°F (80°C)
Melting Point: 42°F (5.5°C)
Vapor Pressure: 75 Torrs at 68°F (20°C)
Vapor Density (Air = 1): >1

Water Solubility (%): Slight
% Volatile by Volume: 100
Molecular Weight: 78 Grams/Mole
Specific Gravity (H_2O = 1): 0.87865 at 68°F (20°C)

Appearance and Odor: A colorless liquid; characteristic aromatic odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
12°F (-11.1°C) CC	928°F (498°C)	% by Volume	1.3%	7.1%

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to put out benzene fires. Water may be ineffective as an extinguishing agent because it can scatter and spread the fire. Use water to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.
Unusual Fire or Explosion Hazards: Benzene vapor is heavier than air and can collect in low-lying areas such as sumps or wells. Eliminate all sources of ignition there to prevent a dangerous flashback to the original liquid benzene. **Danger:** Explosive and flammable benzene vapor-air mixtures can easily form at room temperature; always use this material in a way that minimizes dispersion of its vapor into general work areas.
Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Benzene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Hazardous chemical reactions involving benzene and the following materials are reported in Genium reference 84: bromine pentafluoride, chlorine, chlorine trifluoride, chromic anhydride, nitryl perchlorate, oxygen, ozone, perchlorates, perchloryl fluoride and aluminum chloride, permanganates and sulfuric acid, potassium peroxide, silver perchlorate, and sodium peroxide.

Conditions to Avoid: Avoid all exposure to sources of ignition and to incompatible chemicals.

Hazardous Products of Decomposition: Toxic gases like carbon monoxide (CO) may be produced during benzene fires.

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Material Safety Data Sheets Collection:
Sheet No. 317
Toluene
Issued: 8/79 Revision: E, 9/92 Errata: 2/94

Section 1. Material Identification

Toluene ($C_6H_5CH_3$) Description: Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

R 1 NFPA
I 3
S 2*
K 3
* Skin absorption

Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

HMIS
H 2- Chronic effects
F 3
R 0
PPE-Sec. 8

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high centrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs
8-hr TWA: 100 ppm (375 mg/m³)
15-min STEL: 150 ppm (560 mg/m³)

1990 IDLH Level
2000 ppm

1990 NIOSH RELs
TWA: 100 ppm (375 mg/m³)
STEL: 150 ppm (560 mg/m³)

1992-93 ACGIH TLV (Skin)
TWA: 50 ppm (188 mg/m³)

1990 DFG (Germany) MAK*
TWA: 100 ppm (380 mg/m³)
Half-life: 2 hr to end of shift
Category II: Substances with systemic effects
Peak Exposure Limit: 500 ppm, 30 min average value, 2/shift

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 100 ppm caused hallucinations, and changes in motor activity and changes in psychophysiological tests.
Human, oral, LD_{Lo}: 50 mg/kg; toxic effects not yet reviewed
Human, eye: 300 ppm caused irritation.
Rat, oral, LD_{50}: 5000 mg/kg
Rat, liver: 30 µmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.
†See NIOSH, *RTECS* (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 °F (110.6 °C)
Melting Point: -139 °F (-95 °C)
Molecular Weight: 92.15
Density: 0.866 at 68 °F (20/4 °C)
Surface Tension: 29 dyne/cm at 68 °F (20 °C)
Viscosity: 0.59 cP at 68 °F (20 °C)
Refraction Index: 1.4967 at 20 °C/D

Water Solubility: Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)
Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial acetic acid, petroleum ether, and carbon disulfide.
Vapor Pressure: 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0797 lb/ft³ or 1.2755 kg/m³
Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 °F (4.4 °C) CC	Autoignition Temperature: 896 °F (480 °C)	LEL: 1.27% v/v	UEL: 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. Water spray may be ineffective as toluene floats on water and may actually spread fire. Unusual Fire or Explosion Hazards: Concentrated vapors are heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluenes' burning rate = 5.7 mm/min and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be imminent. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization can't occur. Chemical Incompatibilities: Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen tetroxide, silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. Conditions to Avoid: Contact with heat, ignition sources, or incompatibles. Hazardous Products of Decomposition: Thermal oxidative decomposition of toluene can produce carbon dioxide, and acrid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list toluene as a carcinogen. Summary of Risks: Toluene is irritating to the eyes, nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidney damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in urine. The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is synergistic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to 23 mg/cm²/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably due to lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leucopenia with biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzene contaminants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunction, attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short palpebral fissures, with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence that toluene causes an autoimmune illness in which the body produces antibodies that cause inflammation of its own kidney.

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Material Safety Data Sheets Collection:

Sheet No. 385
Ethylbenzene

Issued: 8/78 Revision: B, 9/92

Section 1. Material Identification

Ethylbenzene ($C_6H_5C_2H_5$) Description: Derived by heating benzene and ethylene in presence of aluminum chloride with subsequent distillation, by fractionation directly from the mixed xylene stream in petroleum refining, or dehydrogenation of naphthenes. Used as a solvent, an antiknock agent in gasoline; and as an intermediate in production of synthetic rubber, styrene, cellulose acetate, diethylbenzene, acetophenone, ethyl anthraquinone, propyl oxide, and α-methylbenzol alcohol.
Other Designations: CAS No. 100-41-4, ethylbenzol, EB, phenylethane, NCI-C56393.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

R 1
I 3
S 2*
K 4
* Skin absorption

NFPA

HMIS
H 2†
F 3
R 0
PPE - Sec. 8
† Chronic effects

Cautions: Ethylbenzene is a skin and mucous membrane irritant considered the most irritating of the benzene series. Inhalation causes acute and chronic central nervous system (CNS) effects. It is highly flammable and forms explosive mixtures with air.

Section 2. Ingredients and Occupational Exposure Limits

Ethylbenzene, ca >99.0%. Impurities include ~ 0.1% *meta* & *para* xylene, ~ 0.1% cumene, and ~ 0.1% toluene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m³)
15-min STEL: 125 ppm (545 mg/m³)
Action Level: 50 ppm (217 mg/m³)

1990 IDLH Level
2000 ppm

1990 NIOSH REL
TWA: 100 ppm (435 mg/m³)
STEL: 125 ppm (545 mg/m³)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m³)
STEL: 125 ppm (545 mg/m³)

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m³)
Category 1: local irritants
Peak Exposure Limit: 200 ppm, 5 min momentary value, max of 8/shift
Danger of cutaneous absorption

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 100 ppm/8 hr caused eye effects, sleep, and respiratory changes.
Human, lymphocyte: 1 mmol/L induced sister chromatid exchange.
Rat, oral, LD_{50}: 3500 mg/kg; toxic effects not yet reviewed
Rat (female), inhalation, TC_{Lo}: 1000 ppm/7 hr/day, 5 days/wk, for 3 wk prior to mating and daily for 19 days of gestation produced pups with high incidence of extra ribs.[179]

* See NIOSH, *RTECS* (DA0700000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 277 °F (136 °C)
Melting Point: -139 °F (-95 °C)
Surface Tension: 31.5 dyne/cm
Ionization Potential: 8.76 eV
Viscosity: 0.64 cP at 77 °F (25 °C)
Refraction Index: 1.4959 at 68 °F (20 °C)
Relative Evaporation Rate (ether = 1): 0.0106
Bulk Density: 7.21 lb/Gal at 77 °F (25 °C)
Critical Temperature: 651 °F (343.9 °C)
Critical Pressure: 35.6 atm

Molecular Weight: 106.16
Density: 0.863 at 77 °F (25 °C)
Water Solubility: Slightly, 14 mg/100 mL at 59 °F (15 °C)
Other Solubilities: Miscible in alcohol, ether; soluble in carbon tetrachloride, benzene, sulfur dioxide, and many organic solvents; insoluble in ammonia
Odor Threshold: 2.3 ppm
Vapor Pressure: 7.1 mm Hg at 68 °F (20 °C); 10 mmHg at 78.62 °F (25.9 °C); 100 mm Hg 165.38 °F (74.1 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0768 lb/ft³ or 1.2298 kg/m³

Appearance and Odor: Colorless, flammable liquid with a pungent odor.

Section 4. Fire and Explosion Data

Flash Point: 64 °F (18 °C) CC	Autoignition Temperature: 810 °F (432 °C)	LEL: 1.0% v/v	UEL: 6.7% v/v

Extinguishing Media: Class 1B Flammable liquid. For small fires, use dry chemical, carbon dioxide, or 'alcohol-resistant' foam. For large fires, use fog or 'alcohol-resistant' foam. Use water only if other agents are unavailable; EB floats on water and may travel to an ignition source and spread fire. **Unusual Fire or Explosion Hazards:** Burning rate = 5.8 mm/min. Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. EB poses a vapor explosion hazard indoors, outdoors, and in sewers. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Cool container sides with water until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from area and let fire burn. Withdraw immediately if you hear rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Ethylbenzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Reacts vigorously with oxidizers.
Conditions to Avoid: Exposure to heat and oxidizers.
Hazardous Products of Decomposition: Thermal oxidative decomposition of EB can produce acrid smoke and irritating fumes.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,[164] NTP,[169] and OSHA[164] do not list EB as a carcinogen. **Summary of Risks:** Occupational exposure to EB alone is rare since it is usually present together with other solvents. EB is irritating to the eyes, skin, and respiratory tract. Vapor inhalation produces varying degrees of CNS effects depending on concentration. The liquid is absorbed through the skin but vapors are not. 56 to 64% of inhaled ethylbenzene is retained and metabolized. Urinary metabolites following exposure to 23 to 85 ppm for 8 hr are mandelic acid (64%), phenylglyoxylic acid (25%), and methylphenylcarbinol/1-phenyl ethanol (5%). Concurrent exposure to xylene and ethylbenzene causes slower excretion of EB metabolites. Based on the rat LD_{50}, one manufacturer gives 3 to 4 oz. as the lethal dose for a 100 lb person.

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Material Safety Data Sheets Collection:

Sheet No. 318
Xylene *(Mixed Isomers)*

Issued: 11/80 Revision: E, 9/92 Errata: 12/94

Section 1. Material Identification

Xylene (Mixed Isomers) (C_8H_{10}) Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*- xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

R	1
I	2
S	2
K	3

NFPA

HMIS
H 2†
F 3
R 0
PPE ‡
† Chronic Effects
‡ Sec. 8

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and small quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m^3)
15-min STEL: 150 ppm (655 mg/m^3)

1990 IDLH Level
1000 ppm

1990 NIOSH RELs
TWA: 100 ppm (435 mg/m^3)
STEL: 150 ppm (655 mg/m^3)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m^3)
STEL: 150 ppm (651 mg/m^3)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m^3)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and other changes involving the lungs, thorax, or respiration.
Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed.
Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted.
Rat, oral, LD_{50}: 4300 mg/kg; toxic effect not yet reviewed.
Rat, inhalation, LC_{50}: 5000 ppm/4 hr; toxic effects not yet reviewed.

* See NIOSH, *RTECS* (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)*
Boiling Point: *ortho:* 291 °F (144 °C); *meta:* 281.8 °F (138.8 °C); *para:* 281.3 °F (138.5 °C)
Freezing Point/Melting Point: *ortho:* -13 °F (-25 °C); *meta:* -53.3 °F (-47.4 °C); *para:* 55 to 57 °F (13 to 14 °C)
Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)
Saturated Vapor Density (Air = 1.2 kg/m^3): 1.23 kg/m^3, 0.077 lbs/ft^3
Appearance and Odor: Clear, sweet-smelling liquid.
* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16
Specific Gravity: 0.864 at 20 °C/4 °C
Water Solubility: Practically insoluble
Other Solubilities: Miscible with absolute alcohol, ether, and many other organic liquids.
Octanol/Water Partition Coefficient: logKow = 3.12-3.20
Odor Threshold: 1 ppm
Viscosity: <32.6 SUS

Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) CC | **Autoignition Temperature:** 982 °F (527 °C) (*m*-) | **LEL:** 1.1 (*m*-, *p*-); 0.9 (*o*-) | **UEL:** 7.0 (*m*-, *p*-); 6.7 (*o*-)

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2), water spray or regular foam. For large fires, use water spray, fog or regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors or liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated static electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire area. Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozzles fo massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound from venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, and coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

arcinogenicity: The IARC,[164] NTP,[169] and OSHA[164] do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at high concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur with xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, but it is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as blood dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with xylenes. Chronic exposure to high concentrations of xylene in animal studies have demonstrated mild reversible decrease in red and white cell counts as well as increases in platelet counts.

Continue on next page

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Material Safety Data Sheet Collectio

Acenaphthene MSDS No. 975

Date of Preparation: 10/95

Section 1 - Chemical Product and Company Identification 47

Product/Chemical Name: Acenaphthene
Chemical Formula: $C_{10}H_6(CH_2)_2$
CAS Number: 83-32-9
Synonyms: 1,2-dihydroacenaphthylene; 1,8-dihydroacenaphthalene; 1,8-ethylenenaphthalene; ethylenenaphthalene; naphthyleneethylene; periethylenenaphthalene
Derivation: By passing ethylene and benzene or naphthalene through a red hot tube; by heating tetrahydroacenaphthene with sulfur to 356 °F (180 °C); or by reacting acenaphthenone or acenaphthenequinone by high-pressure hydrogenation in decalin with nickel at 356 to 464 °F (180 to 240 °C). Occurs as a by-product in coal tar production during the high-temperature carbonization or coking of coal.
General Use: Used as an intermediate for dyes, pharmaceuticals, insecticides, fungicides, and plastics.
Vendors: Consult the latest *Chemical Week Buyers' Guide.* (73)

Section 2 - Composition / Information on Ingredients

Acenaphthene, ca 98 %wt

OSHA PEL	ACGIH TLV*	NIOSH REL	DFG (Germany) MAK
Nuisance Particulates	*Nuisance Particulates*	None established	None established
8-hr TWA: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable fraction)	TWA: 10 mg/m^3		

* Notice of intended change to 10 mg/m^3 (*inhalable*), 3 mg/m^3 (*respirable*).

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Acenaphthene exists as white, needle-like crystals. There is very limited information on the toxicity of acenaphthene. It is irritating to the skin, eyes, and mucous membranes and may cause vomiting if large amounts are ingested. Animal studies indicate possible mutagenic activity. It is combustible.

Wilson Risk Scale	
R	1
I	2
S	2
K	1

HMIS	
H	1
F	1
R	0

PPE*
*Sec. 8

Potential Health Effects

Primary Entry Routes: Inhalation, skin and eye contact.
Target Organs: Eyes, skin, respiratory tract.
Acute Effects
Inhalation: Irritation of the respiratory tract may occur.
Eye: Irritation may occur.
Skin: Irritation may occur.
Ingestion: Ingestion of large amounts may cause vomiting. Irritation of the gastrointestinal tract may occur.
Carcinogenicity: IARC, NTP, and OSHA do not list acenaphthene as a carcinogen.
Medical Conditions Aggravated by Long-Term Exposure: Pre-existing skin disorders.
Chronic Effects: None reported.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.
Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water. Consult a physician or ophthalmologist if pain or irritation persist.
Skin Contact: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water followed by a thorough soap and water wash.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water to dilute. Vomiting may be spontaneuos if large amounts are ingested.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians: Treatment is symptomatic and supportive.

Section 10 - Stability and Reactivity

Stability: Acenaphthene is stable at room temperature in closed containers under normal storage and handling conditions.
Polymerization: Hazardous polymerization does not occur.
Chemical Incompatibilities: Acenaphthene reacts with molecular oxygen in the presence of alkali-earth metal bromides to form acenaphthequinone; reacts with ozone in the presence of alkali-earth metal hydroxides to form 1,8-naphthaldehyde carboxylic acid; and is oxidized to aromatic alcohols and ketones by reaction with transition metal catalysts.
Conditions to Avoid: Exposure to heat, ignition sources, and incompatibles.
Hazardous Decomposition Products: Thermal oxidative decomposition of acenaphthene can produce carbon oxide(s) and thick, acrid smoke.

Section 11 - Toxicological Information

Toxicity Data:*

Acute Effects:
Rat, intraperitoneal, LD_{50}: 600 mg/kg

Mutagenicity:
Microorganisms (species unspecified): 3 mg (-S9) caused mutation.

* See NIOSH, *RTECS* (AB1000000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: *Pimephales promelas* (fathead minnow), LC_{50} = 1700 µg/L/72 hr, 1600 µg/L/96 hr; *Salmo gairdneri* (rainbow trout), LC_{50} = 1570 µg/L/24 hr, 1130 µg/l/48 hr, 800 µg/L/72 hr, 670 µg/L/96 hr.
Environmental Fate: In soil, acenaphthene will biodegrade under aerobic conditions with a half-life of 10 to 60 days. A soil absorption coefficient of 2065 to 3230 indicates slight mobility. In water, biodegradation will occur under aerobic conditions with a half-life of 1 to 25 days, as well as photolysis in direct sunlight. Volatilization is another means of removal with half-lives of 11 hr from a model river and 39 days from a model pond which considers the effect of adsorption. In air, acenaphthene reacts with photochemically-produced hydroxyl radicals with a half-life of 7.2 hr.

Section 13 - Disposal Considerations

Disposal: Acenaphthene is a good candidate for rotary-kiln incineration. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name:
Environmentally Hazardous Substances, solid, n.o.s.
Shipping Symbols: –
Hazard Class: 9
ID No.: UN3077
Packing Group: III
Label: Class 9
Special Provisions (172.102): 8, B54, N50

Packaging Authorizations
a) **Exceptions:** 173.155
b) **Non-bulk Packaging:** 173.213
c) **Bulk Packaging:** 173.240

Quantity Limitations
a) **Passenger, Aircraft, or Railcar:** None
b) **Cargo Aircraft Only:** None

Vessel Stowage Requirements
a) **Vessel Stowage:** A
b) **Other:** –

Section 15 - Regulatory Information

EPA Regulations:
RCRA Hazardous Waste (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4) listed per CWA, Sec. 307(a)
CERCLA Reportable Quantity (RQ), 100 lb (45.4 kg)
SARA Toxic Chemical (40 CFR 372.65): Not listed
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed
OSHA Regulations:
Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed*

*Not listed as acenaphthene but does fall under the category *Nuisance Particulates, not otherwise specified.*

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Benzo(a)pyrene **MSDS No. 164**

Date of Preparation: 2/94

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Benzo(a)pyrene
Chemical Formula: $C_{20}H_{12}$; a polynuclear aromatic hydrocarbon
CAS No.: 50-32-8
Synonyms: BaP; 3,4-benz(a)pyrene; BP; 3,4-benzopyrene; 3,4-benzpyrene. Formerly called 1,2-benzpyrene.
Derivation: Synthesized from pyrene and succinic anhydride.
General Use: Benzo(a)pyrene is no longer used or produced commercially in the US. In its pure form, benzo(a)pyrene may be used as a research laboratory reagent. It also occurs in combustion products of coal, oil, petroleum, wood and other biological matter; in motor vehicle and other gasoline and diesel engine exhaust; in charcoal-broiled foods; in cigarette smoke and general soot and smoke of industrial, municipal, and domestic origin. It occurs naturally in crude oils, shale oils, coal tars, gases and fly ash from active volcanoes and forest fires. **Vendors:** Consult the latest *Chemical Week Buyers' Guide*. (73)

Section 2 - Composition / Information on Ingredients

Benzo(a)pyrene, ca 100 %wt; except in laboratories, benzo(a)pyrene is usually mixed with other coal tar pitch chemicals. Consider exposure limits for coal tar pitch volatiles as a guideline. However, because benzo(a)pyrene is considered a probable carcinogen to humans, it is recommended that exposures to carcinogens be limited to the lowest feasible concentration.

OSHA PELs
Coal tar pitch volatiles
8-hr TWA: 0.2 mg/m^3

ACGIH TLVs
A2: Suspected Human Carcinogen

NIOSH REL
10-hr TWA: 0.1 mg/m^3
Carcinogen; coal tar pitch volatile, cyclohexane extractable fraction.

DFG (Germany) MAK
None established

IDLH Level
700 mg/m^3
Coal tar pitch volatiles (benzene soluble fraction)

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Benzo(a)pyrene is a pale yellow, crystalline solid or powder that is irritating to the skin, eyes, and respiratory tract. It is a carcinogen and mutagen. Handle with extreme caution!

Wilson Risk Scale	
R	1
I	4
S	4
K	1

HMIS	
H	2*
F	1
R	0

* Chronic Effects
PPE† †See. 8

Potential Health Effects

Primary Entry Routes: Inhalation, ingestion. **Target Organs:** Respiratory system, bladder, kidneys, skin.
Acute Effects: Inhalation: Respiratory tract irritation. **Eye:** Irritation and/or burns on contact. **Skin:** Irritation with burning sensation, rash, and redness; dermatitis on prolonged exposure. Sunlight enhances effects (photosensitization). **Ingestion:** None reported.
Carcinogenicity: IARC, NTP, NIOSH, ACGIH, EPA, and MAK list benzo(a)pyrene as: an IARC 2A (probably carcinogenic to humans: limited human evidence, sufficient evidence in experimental animals), an NTP-2 (reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals), a NIOSH-X (carcinogen defined with no further categorization); an ACGIH TLV-A2 (suspected human carcinogen: carcinogenic in experimental animals, but available epidemiological studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans); an EPA-B2 (sufficient evidence from animal studies, inadequate evidence or no data from epidemiological studies); and an MAK-A1 (capable of inducing malignant tumors as shown by experience with humans) carcinogen, respectively.
Medical Conditions Aggravated by Long-Term Exposure: Respiratory system, bladder, kidney, and skin disorders.
Chronic Effects: Inhalation: Cough and bronchitis. **Eye:** Photosensitivity and irritation. **Skin:** Skin changes such as thickening, darkening, pimples, loss of color, reddish areas, thinning of the skin, and warts. Sunlight enhances effects (photosensitization). **Other:** Gastrointestinal (GI) effects include leukoplakia (a pre-cancerous condition characterized by thickened white patches of epithelium on mucous membranes, especially of the mouth). Cancer of the lung, skin, kidneys, bladder, or GI tract is also possible. Smoking in combination with exposure to benzo(a)pyrene increases the chances of developing lung cancer. Persons with a high degree of inducibility of the enzyme aryl hydrocarbon hydroxylase may be a high risk population.
Comments: Pregnant women may be especially susceptible to exposure effects of benzo(a)pyrene; exposure may damage the fetus. In general, polyaromatic hydrocarbons such as benzo(a)pyrene tend to localize primarily in body fat and fatty tissues (for ex. breasts) and are excreted in breast milk. Benzo(a)pyrene may also affect the male reproductive system (testes and sperm).

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

annual basis for employees 45 yr of age or older or with 10 or more years of exposure to coal tar pitch volatiles. Train workers about the hazards of benzo(a)pyrene and the necessary protective measures to prevent exposure. Periodically inspect lab atmospheres, surfaces such as walls, floors, and benches, and interior of fume hoods and air ducts for contamination. Post appropriate signs and labels on doors leading into areas where benzo(a)pyrene is used.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. The following respirator recommendations are for coal tar pitch volatiles. For any unknown concentration, wear any SCBA with a full facepiece and operated in a pressure-demand or other positive pressure mode, or any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive pressure mode. For escape, wear any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or any appropriate escape-type SCBA. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. In animal laboratories, wear protective suits (disposable, one-piece and close-fitting at ankles and wrists), gloves, hair covering, and overshoes. In chemical laboratories, wear gloves and gowns. Wear protective eyeglasses or chemical safety, gas-proof goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy.

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Shower and change clothes after exposure or at the end of the workshift. Separate contaminated work clothes from street clothes. Launder before reuse. Remove benzo(a)pyrene from your shoes and clean personal protective equipment. Use procedures to ensure laundry personnel are not exposed.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance and Odor: Pale yellow monoclinic needles with a faint, aromatic odor.

Vapor Pressure: >1 mm Hg at 68 °F (20 °C)

Formula Weight: 252.30

Specific Gravity (H_2O=1, at 4 °C): 1.351

Water Solubility: Insoluble; 0.0038 mg (+/- 0.00031 mg) in 1 L at 77 °F (25 °C)

Other Solubilities: Ether, benzene, toluene, xylene, concentrated hydrosulfuric acid; sparingly soluble in alcohol, methanol.

Boiling Point: >680 °F (>360 °C); 540 °F (310 °C) at 10 mm Hg

Melting Point: 354 °F (179 °C)

Octanol/Water Partition Coefficient: log Kow= 6.04

Section 10 - Stability and Reactivity

Stability: Benzo(a)pyrene is stable at room temperature in closed containers under normal storage and handling conditions. It undergoes photo-oxidation when exposed to sunlight or light in organic solvents and is also oxidized by chromic acid and ozone.

Polymerization: Hazardous polymerization cannot occur.

Chemical Incompatibilities: Strong oxidizers (chlorine, bromine, fluorine) and oxidizing chemicals (chlorates, perchlorates, permanganates, and nitrates).

Conditions to Avoid: Avoid heat and ignition sources and incompatibles.

Hazardous Decomposition Products: Thermal oxidative decomposition of benzo(a)pyrene can produce carbon monoxide and carbon dioxide.

Section 11 - Toxicological Information

Toxicity Data:*

Tumorigenic Effects:

Rat, oral: 15 mg/kg produced gastrointestinal and musculoskeletal tumors.

Mouse, inhalation: 200 ng/m^3/6 hr administered intermittently over 13 weeks produced tumors of the lungs.

Rabbit, skin: 17 mg/kg administered intermittently over 57 weeks produced tumors of the skin and appendages.

Teratogenicity:

Rat, oral: 2 g/kg administered 28 days prior to mating and 1-22 days of pregnancy produced a stillbirth.

Rat, oral: 40 mg/kg on the 14th day of pregnancy caused changes in the extra embryonic structures.

Mouse, oral: 75 mg/kg administered to the female during the 12-14 day of pregnancy produced biochemical and metabolic effects on the newborn.

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Bromodichloromethane **MSDS No. 973**

Date of Preparation: 10/95

Section 1 - Chemical Product and Company Identification 47

Product/Chemical Name: Bromodichloromethane
Chemical Formula: $CHBrCl_2$
CAS Number: 75-27-4
Synonyms: BDCM; dichlorobromomethane; methane, bromodichloro-; monobromodichloromethane
Derivation: Produced by treating the chlorine analog with hydrogen bromide in the presence of an aluminum halide catalyst. Bromodichloromethane is found in treated (chlorinated) water at levels significantly higher than untreated water.
General Use: Used in research as a laboratory reagent or for chemical synthesis. Formerly used as a flame retardant, in fire extinguishers, as a solvent for waxes, fats, and resins, and to separate minerals from salts.
Vendors: No longer produced or used commercially in the US.

Section 2 - Composition / Information on Ingredients

Bromodichloromethane, ca 98+ % vol

OSHA PEL	ACGIH TLV	NIOSH REL	DFG (Germany) MAK
None established	None established	None established	None established

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Bromodichloromethane exists as a colorless, volatile liquid. It is toxic to the central nervous system, resulting in sleep disturbances and fatigue. Liver and kidney damage may also occur. Bromodichloromethane is considered to be a potential human carcinogen based on animal studies. It is nonflammable as indicated by its former use as a flame retardant.

Wilson Risk Scale	
R	1
I	3
S	1
K	1

HMIS	
H	2*
F	0
R	0

*Chronic Effects
PPE†
†Sec. 8

Potential Health Effects

Primary Entry Routes: Inhalation
Target Organs: Central nervous system (CNS), blood, liver, kidneys.
Acute Effects
Inhalation: CNS effects including fatigue, sleep disturbances, and incoordination. Methemoglobinemia (lack of oxygenated blood in body tissues), evident by a bluish tint to skin, lips, and fingernails, is also likely.
Eye: No effects reported.
Skin: No effects reported.
Ingestion: CNS effect may occur as via inhalation.
Carcinogenicity: IARC (Group 2B, possible human carcinogen with limited human evidence in the absence of animal evidence) and NTP (Group 2, probable human carcinogen with sufficient animal evidence and insufficient human evidence).
Medical Conditions Aggravated by Long-Term Exposure: None reported.
Chronic Effects: Repeated exposure to bromodichloromethane has resulted in liver and kidney carcinogenicity in animals. It is not known whether or not chronic exposure will produce cancer in humans. Human mutation data has been reported (Sec. 11).
Other: Bromodichloromethane is metabolized to carbon monoxide in the liver. Therefore, toxic effects to the nervous system are due to carbon monoxide formation. This also explains why the liver can be adversely affected. Exposure to acetone and chlordecone potentiates liver toxicity.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.
Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 min.
Skin Contact: *Quickly* remove contaminated clothing. Rinse with plenty of water followed by a thorough soap and water wash.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water to dilute. Inducement of vomiting should *not* be necessary except in cases of large ingestions.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians: Treatment is symptomatic and supportive.

Section 10 - Stability and Reactivity

Stability: Bromodichloromethane is stable at room temp. in closed containers under normal storage and handling conditions.
Polymerization: Hazardous polymerization does not occur.
Chemical Incompatibilities: None reported.
Conditions to Avoid: Exposure to elevated temperatures.
Hazardous Decomposition Products: Thermal oxidative decomposition of bromodichloromethane can produce chlorine, bromine, phosgene, and carbon oxide(s) gases.

Section 11 - Toxicological Information

Toxicity Data:*

Acute Oral Effects:
Rat, oral, LD_{50}: 430 mg/kg caused somnolence, tremor, and liver changes.
Mouse, oral, LD_{50}: 450 mg/kg caused changes in circulation, fatty liver degeneration, and hemorrhage.
Mutagenicity:
Human, lymphocyte: 400 µmol/L caused sister chromatid exchange.
Mouse, lymphocyte: 180 mg/L (+S9) caused mutation.

Multiple Dose Toxicity Data:
Rat, oral: 5670 mg/kg administered continuously for 4 weeks resulted in changes in liver weight and serum composition, and weight loss or decreased weight gain.
Tumorigenicity:
Rat, oral: 25.5 g/kg administered continuously for 2 years produced gastrointestinal and kidney tumors.
Mouse, oral: 38.25 g/kg administered continuously for 2 years produced liver tumors.

* See NIOSH, *RTECS* (PA5310000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Data not found.
Environmental Fate: If released to soil, bromodichloromethane is expected to volatilize due to its high vapor pressure. Because it is highly mobile in soil, leaching will occur and biodegradation will occur under anaerobic conditions. In water, volatilization is expected to be relatively rapid with a typical half-life from streams and rivers of 35 hr. Bioconcentration is not expected to be significant (BCF = 0.72 to 1.37). In air, bromodichloromethane is expected to exist almost entirely in the vapor phase and react with hydroxyl radicals in the troposphere (half-life = 6.65 months). This persistent half-life indicates that long-range global transport is possible. Any bromodichloromethane that does not undergo reaction with hydroxyl radicals can reach the stratosphere, where it will be destroyed via photolysis.

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Environmentally Hazardous Substance, liquid, n.o.s.
Shipping Symbols: –
Hazard Class: 9
ID No.: UN3082
Packing Group: III
Label: Class 9
Special Provisions (172.102): 8, N50, T1

Packaging Authorizations
a) **Exceptions:** 173.155
b) **Non-bulk Packaging:** 173.203
c) **Bulk Packaging:** 173.241

Quantity Limitations
a) **Passenger, Aircraft, or Railcar:** None
b) **Cargo Aircraft Only:** None

Vessel Stowage Requirements
a) **Vessel Stowage:** A
b) **Other:** –

Section 15 - Regulatory Information

EPA Regulations:
RCRA Hazardous Waste (40 CFR 261.33): Not listed
Listed as a CERCLA Hazardous Substance (40 CFR 302.4) per CWA, Sec. 307(a)
CERCLA Reportable Quantity (RQ), 5000 lb (2270 kg)
Listed as a SARA Toxic Chemical (40 CFR 372.65)
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed
OSHA Regulations:
Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

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Material Safety Data Sheets Collection:
Sheet No. 303
Methyl Ethyl Ketone
Issued: 9/79 Revision: D, 5/93

Section 1. Material Identification

41

Methyl Ethyl Ketone ($CH_3CH_2COCH_3$) Description: Derived by dehydrogenation or selective oxidation of *sec*-butyl alcohol; from mixed *n*-butylenes and sulfuric acid, followed by distillation to separate *sec*-butyl alcohol and then dehydrogenation; or by controlled oxidation of butane. Used as a solvent for printing inks and cellulose compounds (nitrocellulose in particular), constituent of dewaxing compositions; in the manufacture of acrylic and vinyl surface coatings, paint removers, cements and adhesives, artificial leather, cosmetics, lubricating oils, pharmaceuticals, smokeless powder and explosives, and cleaning fluids.

Other Designations: CAS No. 78-93-3, 2-butanone, ethyl methyl ketone, methylacetone, 2-oxobutane.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Methyl ethyl ketone is a flammable liquid. Vapors are irritating to the eyes and respiratory tract. It potentiates the neurotoxic potential of other chemicals and some findings suggest it may be neurotoxic itself.

R 1
I 2
S 2*
K 4
* Skin absorption

NFPA
3
1 0
–

HMIS
H 2
F 3
R 0
PPE†
† Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Methyl ethyl ketone, ca 100%

1992 OSHA PELs
Transitional Limit
8-hr TWA: 200 ppm (590 mg/m³)
Final Rule Limits
8-hr TWA: 200 ppm (590 mg/m³)
15-min STEL: 300 ppm (885 mg/m³)

1992 NIOSH RELs
TWA: 200 ppm (590 mg/m³)
STEL: 300 ppm (885 mg/m³)

1993-94 ACGIH TLVs
TWA: 200 ppm (590 mg/m³)
STEL: 300 ppm (885 mg/m³)

1991 DFG (Germany) MAK
TWA: 200 ppm (590 mg/m³)
Half-Life: < 2 hr
Category II: Substances with systemic effects
Peak Exposure Limit: 400 ppm, 30 min. average value, 4/shift

1992 Toxicity Data*
Rabbit, skin: 500 mg/24 hr caused severe irritation.
Rat, oral, LD_{50}: 2737 mg/kg
Rat, inhalation, TC_{Lo}: 3000 ppm/7 hr from 6 to 15 days of pregnancy caused craniofacial abnormalities (including nose and tongue) as well as developmental abnormalities of the urogenital system and homeostasis.
Human, inhalation, TC_{Lo}: 100 ppm/5 min caused eye irritation and respiratory changes.

1990 IDLH Level
3000 ppm

* See NIOSH, *RTECS* (EL6475000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)
Melting Point: -122.6 °F (-85.9 °C)
Vapor Pressure: 71.2 mm Hg at 68 °F (20 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.085 lb/ft³ or 1.368 kg/m³
Bulk Density: 6.71 lb/gal
Refraction Index: 1.379 at 68 °F (20 °C)
Critical Temperature: 504 °F (262 °C)
Critical Pressure: 41 atm

Molecular Weight: 72.1
Density: 0.8045 g/mL at 68 °F (20 °C)
Water Solubility: MEK in water = 28%; water in MEK = 12.5%
Other Solubilities: Soluble in alcohol, benzene, ether, and fixed oils.
Surface Tension: 24.6 dyne/cm at 68 °F (20 °C)
Ionization Potential: 9.54 eV
Viscosity: 0.4 cP at 77 °F (25 °C)
Relative Evaporation Rate (ether = 1): 2.7
Octanol/Water Partition Coefficient: log Kow = 0.26 to 0.29

Appearance and Odor: Colorless, volatile, liquid with a sweet mint or acetone-like odor. The odor threshold is 25 ppm.

Section 4. Fire and Explosion Data

Flash Point: 16 °F (-9 °C)	Autoignition Temperature: 759 °F (404 °C)	LEL: 1.4% at 200 °F (93 °C)	UEL: 11.4% at 200 °F (93 °C)

Extinguishing Media: A Class 1B flammable liquid. For small fires, use dry chemical, carbon dioxide, water spray, or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam.
Unusual Fire/Explosion Hazards: Vapors may travel to ignition source and flash back. Container may explode in fire. Burning rate = 4.1 mm/min.
Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighters' protective clothing provides only limited protection. If possible without risk, move container from fire area. Apply cooling water to container sides until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw and let fire burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways; dike for proper disposal.

Section 5. Reactivity Data

Stability/Polymerization: Methyl ethyl ketone is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Include chlorosulfonic acid, oleum (fuming sulfuric acid), potassium-*t*-butoxide, hydrogen peroxide + nitric acid, 2-propanol (forms explosive peroxides), chloroform + alkali, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines, and strong oxidizers. MEK will soften or dissolve some plastics.
Conditions to Avoid: Exposure to heat, ignition sources, and incompatibles.
Hazardous Products of Decomposition: Thermal oxidative decomposition of MEK can produce carbon dioxide gas and acrid smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(183) NTP,(169) and OSHA(183) do not list methyl ethyl ketone as a carcinogen.
Summary of Risks: MEK vapors are irritating to the eyes and respiratory tract. Inhalation causes varying degrees of central nervous system depression. Approximately 75% of inhaled MEK is absorbed in humans. It is absorbed readily through the skin.

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Material Safety Data Sheets Collection:

Sheet No. 308
Dichlorodifluoromethane

Issued: 11/77 Revision: D, 9/92

Section 1. Material Identification

Dichlorodifluoromethane (CCl_2F_2) Description: Derived by reacting carbon tetrachloride and hydrogen fluoride in the presence of an antimony halide catalyst, or by high temperature chlorination of vinylidene fluoride. Formerly used as an aerosol propellant but due to it's role in ozone depletion, this use was banned by the USEPA on 12/15/78. Still used as a refrigerant, leak detection agent, blowing agent for polymeric foams, a foaming agent in fire extinguishers, a solvent or diluent in fumigants for food and medical equipment sterilization; in the manufacture of glass bottles, preparing frozen tissue sections, in paint and varnish removers, water purification, and in thermal expansion valves.

Other Designations: CAS No. 75-71-8, Algofrene type 2, Arcton, difluorodichloromethane, Eskimon-12, FC-12, fluorocarbon-12, Freon-12, Genetron-12, Halon, Isotron-12, propellant-12, refrigerant-12, Ucon-12.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

R	1
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HMIS	
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PPE*	

* Sec. 8

Cautions: Dichlorodifluoromethane is considered low in toxicity but is a simple asphyxiant and produces weak irritative and narcotic effects in high concentrations. It may also induce serious cardiac arrythmias at high concentrations and in susceptible individuals. Contact with the liquid can cause frostbite.

Section 2. Ingredients and Occupational Exposure Limits

Dichlorodifluoromethane, ca 99.9%

1991 OSHA PEL
8-hr TWA: 1000 ppm (4950 mg/m³)

1990 IDLH Level
50,000 ppm

1990 NIOSH REL
10-hr TWA: 1000 ppm (4950 mg/m³)

1992-93 ACGIH TLV
TWA: 1000 ppm (4950 mg/m³)

1990 DFG (Germany) MAK
TWA: 1000 ppm (5000 mg/m³)
Category IV: Substances eliciting very weak effects.
Peak Exposure Limit: 2000 ppm, 60 min momentary value,* 3/shift

1985-86 Toxicity Data†
Human, inhalation, TC_{Lo}: 200,000 ppm/30 min caused conjunctival irritation, fibrosing alveolitis, and changes in the liver.
Rat, inhalation, LC_{50}: 80 pph/30 min; toxic effects not yet reviewed
Rabbit, inhalation, LC_{Lo}: 80 pph/30 min; toxic effects not yet reviewed

* The momentary value is the level which should never be exceeded.
† See NIOSH, *RTECS* (PA8200000), for additional toxicity data.

Section 3. Physical Data

Boiling Point: -22 °F (-29.8 °C)
Freezing Point: -252 °F (-158 °C)
Vapor Pressure: 5.7 atm at 68 °F (20 °C)
Vapor Density (Air = 1): 4.16
Surface Tension: 9 dyne/cm
Viscosity: 0.262 cP at 70 °F (21 °C)
Ionization Potential: 11.75 eV
Molecular Weight: 120.9
Density (liquid): 1.486 at -22 °F (-29.8 °C)
Water Solubility: Nearly insoluble, 0.03% at 77 °F (25 °C)
Other Solubilities: Soluble in most organic solvents, such as alcohol, ether, benzene, amyl chloride, bromobenzene, bromoform, *n*-butyl alcohol, butyl butyrate, carbon tetrachloride, and chloroform.
Critical Temperature: 232.7 °F (111.5 °C)
Critical Pressure: 43.2 atm

Appearance and Odor: Colorless, practically odorless (smells like ether at 20% in air) gas.

Section 4. Fire and Explosion Data

Flash Point: Nonflammable	Autoignition Temperature: Nonflammable	LEL: None reported	UEL: None reported

Extinguishing Media: Use extinguishing media suitable for surrounding fire.
Unusual Fire or Explosion Hazards: Cylinder may explode in heat of fire.
Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. If possible without risk, move container from fire area. Apply cooling water to sides of containers until well after fire is out. Stay away from ends of tanks. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Dichlorodifluoromethane is stable until 1022 °F (550 °C) above which it begins to decompose. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Chemically active metals such as sodium, potassium, calcium and powdered aluminum, zinc, or magnesium.
Conditions to Avoid: Exposure to excessive heat and contact with incompatibles.
Hazardous Products of Decomposition: Thermal oxidative decomposition of dichlorodifluoromethane can produce carbon dioxide (CO_2), and toxic phosgene, chlorine, hydrogen chloride, hydrogen fluoride, and fluorine gases.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list dichlorodifluoromethane as a carcinogen.
Summary of Risks: Dichlorodifluoromethane is relatively low in toxicity but is a simple asphyxiant when oxygen levels decline to 15 to 16%, and produces unconsciousness at 6 to 8% oxygen. It also produces weak narcotic-like effects (when 10% mixture is inhaled) and eye irritation at high concentrations. Bursts of compressed gas or liquid can cause frostbite.
Medical Conditions Aggravated by Long-Term Exposure: Pre-existing ventricular ectopy.
Target Organs: Cardiovascular system and the central and peripheral nervous systems.

Continue on next page

Material Safety Data Sheet

From Genium's Reference Collection
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GENIUM PUBLISHING CORP.

No. 359
ETHYLENE DICHLORIDE
(Formerly 1,2-Dichloroethane)
(Revision C)
Issued: November 1978
Revised: August 1987

SECTION 1. MATERIAL IDENTIFICATION

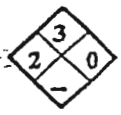
CHEMICAL NAME: ETHYLENE DICHLORIDE (Changed to reflect common industrial practice)

DESCRIPTION (Origin/Uses): Made from acetylene and HCl. Used as a degreaser, a scavenger in leaded gasoline, as an intermediate in the manufacture of vinyl chloride, in paint removers, in wetting and penetration agents, in ore flotation processes, as a fumigant, and as a solvent for fats, oils, waxes, and gums.

OTHER DESIGNATIONS: 1,2-Dichloroethane; *sym*-Dichloroethane; Dutch Liquid; Dutch Oil; EDC; Ethane Dichloride; Ethylene Chloride; 1,2-Ethylene Dichloride; Glycol Dichloride; $C_2H_4Cl_2$; NIOSH *RTECS* KI0525000; CAS #0107-06-2

MANUFACTURERS/SUPPLIERS: Available from several suppliers, including:
Dow Chemical USA, 2020 Dow Center, Midland, MI 48640; Telephone: (517) 636-1000

COMMENTS: Ethylene dichloride is a flammable, toxic liquid.



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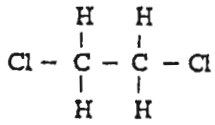
* See Sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

Ethylene Dichloride, CAS #0107-06-2; NIOSH *RTECS* #KI0525000



*The maximum allowable peak concentration (above the ceiling level value) of ethylene dichloride is 200 ppm for 5 minutes in any 3-hour period.
COMMENTS: Additional data concerning toxic doses and tumorigenic, reproductive, and mutagenic effects is listed (with references) in the NIOSH *RTECS* 1983-84 supplement, pages 865-66.

%	HAZARD DATA
100	ACGIH Values 1987-88 TLV-TWA: 10 ppm, 40 mg/m^3 OSHA PEL* 1986-87 8-Hr TWA: 50 ppm; Ceiling: 100 ppm (15 Min.) NIOSH REL 1986-87 10-Hr TWA: 1 ppm Ceiling: 2 ppm (15 Min.) Toxicity Data Man, Inhalation, TC_{Lo}: 4000 ppm/1 Hr Human, Oral, TD_{Lo}: 428 mg/kg Man, Oral, TD_{Lo}: 892 mg/kg Man, Oral, LD_{Lo}: 714 mg/kg Rat, Oral, LD_{50}: 670 mg/kg

SECTION 3. PHYSICAL DATA

Boiling Point ... 182.3°F (83.5°C)
Vapor Pressure ... 87 Torr at 77°F (25°C)
Water Solubility ... Soluble in about 120 Parts Water
Vapor Density (Air = 1) ... 3.4
Evaporation Rate (n-BuAc = 1) ... Not Listed
Specific Gravity ... 1.2569 at 69°F (20°C)
Freezing Point ... -31.9°F (-35.5°C)
Molecular Weight ... 98.96 Grams/Mole

Appearance and odor: Colorless, clear liquid. Sweet, chloroformlike odor is typical of chlorinated hydrocarbons. The recognition threshold (100% of test panel) for ethylene dichloride is 40 ppm. Odor detection probably indicates an excessive exposure to vapor. High volatility and flammability, coupled with its toxicity and carcinogenic potential, make this material a major health hazard.

COMMENTS: Ethylene dichloride is miscible with alcohol, chloroform, and ether.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
See Below	775°F (413°C)	% by Volume	6.2	15.9

EXTINGUISHING MEDIA: Use chemical, carbon dioxide, alcohol foam, water spray/fog, or dry sand to fight fires involving ethylene dichloride. Direct water sprays may be ineffective extinguishing agents, but they may be successfully used to cool fire-exposed containers. Use a smothering effect to extinguish fires involving this material. UNUSUAL FIRE/EXPLOSION HAZARDS: Ethylene dichloride is a dangerous fire and explosion hazard when exposed to sources of ignition such as heat, open flames, sparks, etc. Its vapors are heavier than air and can flow along surfaces to distant, low-lying sources of ignition and flash back. If it is safe to do so, remove this material from the fire area. Ethylene dichloride burns with a smoky flame. SPECIAL FIRE-FIGHTING PROCEDURES: Wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or another positive-pressure mode.

COMMENTS: Flash Point and Method: 56°F (13°C) CC; 65°F (18°C) OC.

OSHA Flammability Class (29 CFR 1910.106): IB. DOT Flammability Class (49 CFR 173.115): Flammable Liquid

SECTION 5. REACTIVITY DATA

Ethylene dichloride is stable. Hazardous polymerization cannot occur.

CHEMICAL INCOMPATIBILITIES include strong oxidizing agents. Explosions have occurred with mixtures of this material and liquid ammonia or dimethylaminopropylamine. Finely divided aluminum or magnesium metal may be hazardous in contact with ethylene dichloride.

CONDITIONS TO AVOID: Eliminate sources of ignition such as excessive heat, open flames, or electrical sparks, particularly in low-lying areas, because the explosive, heavier-than-air vapors will concentrate there.

PRODUCTS OF HAZARDOUS DECOMPOSITION can include vinyl chloride, chloride fumes, and phosgene. Phosgene is an extremely poisonous gas. Products of thermal-oxidative degradation (i.e., fire conditions) must be treated with appropriate caution.

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Material Safety Data Sheets Collection:

Sheet No. 703
1,2-Dichloroethylene

Issued: 4/90

Section 1. Material Identification

1,2-Dichloroethylene Description: An industrial solvent composed of 60% cis- and 40% trans-isomers. Both isomers, cis and trans, are made by partial chlorination of acetylene. Used as a general solvent for organic materials, lacquers, dye extraction, thermoplastics, organic synthesis, and perfumes. The trans-isomer is more widely used in industry than either the cis-isomer or the mixture. Toxicity also varies between the two isomers.

Other Designations: CAS No. 0540-59-0; $C_2H_2Cl_2$; acetylene dichloride; *cis*-1,2-dichloroethylene; *sym*-dichloroethylene; *trans*-1,2-dichloroethylene, dioform.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(TM) for a suppliers list.

R 1
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S 2
K 1

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Section 2. Ingredients and Occupational Exposure Limits

1,2-Dichloroethylene, ca 100%

OSHA PEL
8-hr TWA: 790 mg/m³, 200 ppm

ACGIH TLV, 1989-90
TLV-TWA: 790 mg/m³, 200 ppm

NIOSH REL, 1987
790 mg/m³, 200 ppm

Toxicity Data*
Rat, oral, LD_{50}: 770 mg/kg; toxic effects not yet reviewed
Frog, inhalation, TC_{Lo}: 117 mg/m³ inhaled for 1 hr affects the peripheral nerve and sensation (flaccid paralysis without anesthesia); behavior (excitement); lungs, thorax, or respiration (respiratory depression)

* See NIOSH, *RTECS* (KV9360000), for additional toxicity data.

Section 3. Physical Data

Boiling Point: 119 °F/48 °C
Melting Point: -56 to -115 °F/-49 to -82 °C/
Vapor Pressure: 180 to 264 torr at 68 °F/20 °C
Vapor Density (Air = 1): 3.4

Molecular Weight: 96.95 g/mol
Specific Gravity (H_2O = 1 at 39 °F/4 °C): 1.27 at 77 °F/25 °C
Water Solubility: Insoluble

Appearance and Odor: A colorless, low-boiling liquid with a pleasant odor.

Section 4. Fire and Explosion Data

Flash Point: 37 °F/2.8 °C, CC	Autoignition Temperature: 860 °F/460 °C	LEL: 5.6% v/v	UEL: 12.8% v/v

Extinguishing Media: Use dry chemical, CO_2, halon, water spray, or standard foam. Water may be ineffective unless used to blanket the fire.
Unusual Fire or Explosion Hazards: This material's vapors are a dangerous fire hazard and moderate explosion hazard when exposed to any heat or ignition source or oxidizer.
Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepie operated in the pressure-demand or positive-pressure mode and a fully encapsulating suit. Vapors may travel to heat or ignition sources and flash back. Stay upwind and out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: This material is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: This material is incompatible with alkalies, nitrogen tetraoxide, difluoromethylene, strong oxidizers, and dihypofluorite. When in contact with copper or copper alloys or by reaction with potassium hydroxide, explosive chloroacetylene may be released.
Conditions to Avoid: Addition of hot liquid to cold 1,2-dichloroethylene may cause sudden emission of vapor that could flash back to an ignition source.
Hazardous Products of Decomposition: Thermal oxidative decomposition of 1,2-dichloroethylene can produce highly toxic fumes of chlorine (Cl).

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Material Safety Data Sheets Collection:

Sheet No. 514
p-Dichlorobenzene

Issued: 10/83 Revision: A, 11/90

Section 1. Material Identification

p-Dichlorobenzene ($C_6H_4Cl_2$) Description: Derived by chlorinating monochlorobenzene. Used as a general insecticide; a moth repellent; a germicide; a chemical intermediate in the production of polyphenylene sulfide; a plastic used in the electrical and electronics industries; a space deodorant in products such as room deodorizers, urinal and toilet bowl blocks, and diaper pail deodorizers; and in producing 1,2,4 trichlorobenzene.

Other Designations: CAS No. 0106-46-7, 1,4-dichlorobenzene, dichlorocide, Evola,® NCI-c 54955, Paracide,® Paracrystals, Paradi,® paradichlorobenzol, Paramoth,® *p*-chlorophenyl chloride, PDB,® Santochlor.®

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*[73] for a suppliers list.

R 1
I 3
S 1
K 2

NFPA

HMIS
H 2
F 2
R 0
PPG*
* Sec. 8

Cautions: *p*-Dichlorobenzene vapor is an eye and upper respiratory tract irritant. *It is toxic to the liver*. Prolonged exposure to high concentrations may cause weakness, dizziness, and weight loss. Flammable when exposed to heat, flame, or oxidizers.

Section 2. Ingredients and Occupational Exposure Limits

p-Dichlorobenzene, ca 100%

1989 OSHA PELs
8-hr TWA: 75 ppm, 450 mg/m³
15-min STEL: 110 ppm, 675 mg/m³

1990-91 ACGIH TLVs
TWA: 75 ppm, 451 mg/m³
STEL: 110 ppm, 661 mg/m³

1988 NIOSH REL
None established

1985-86 Toxicity Data*
Human, oral, TD_{Lo}: 300 mg/kg produced sense organs and special senses (other eye effects); lungs, thorax, or respiration (other changes); and gastrointestinal (hypermotility, diarrhea) effects
Human, eye: 80 ppm

1987 IDLH Level
1000 ppm

* See NIOSH, *RTECS* (CZ4550000), for additional irritative, mutative, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 345 °F (174 °C) at 760 mm Hg
Melting Point: 127.6 °F (53.1 °C)
Vapor Pressure: 10 mm Hg at 130.6 °F (54.8 °C)
Vapor Density (Air = 1): 5.08

Molecular Weight: 147.01
Specific Gravity: 1.248 at 131 °F (55 °C)
Water Solubility: Insoluble

Appearance and Odor: Volatile, white crystals with a distinctive mothball-like odor that becomes very strong at concentrations between 30 and 60 ppm. At concentrations of 80 to 160 ppm, vapors are painful to the eyes and nose. Odors and irritating effects are good warnings against overexposure to *p*-dichlorobenzene; however, individuals may develop tolerance to high concentrations.

Section 4. Fire and Explosion Data

Flash Point: 150 °F (66 °C), CC	Autoignition Temperature: None reported	LEL: 1.7% v/v	UEL: None reported

Extinguishing Media: Use dry chemical, carbon dioxide, alcohol foam, or water spray. Use water spray to cool fire-exposed container, to disperse vapors, or to blanket a pool fire.

Unusual Fire or Explosion Hazards: Explosive and toxic mixtures may form in air when this material is heated, such as in a fire.

Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective clothing. Thoroughly decontaminate firefighting equipment after use. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: *p*-Dichlorobenzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: *p*-Dichlorobenzene is incompatible with strong oxidizers and oxidizing agents.

Conditions to Avoid: Avoid incompatibilities and heat or ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of *p*-dichlorobenzene includes carbon monoxide, chlorides, and chlorine.

Material Safety Data Sheet

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No. 624

NAPHTHALENE

Issued: November 1987

SECTION 1. MATERIAL IDENTIFICATION

24

Material Name: NAPHTHALENE

Description (Origin/Uses): Used as a moth repellant and in many industrial processes.

Other Designations: Naphthalin; Naphthene; Tar Camphor; $C_{10}H_8$;
NIOSH RTECS No. QJ0525000; CAS No. 0091-20-3

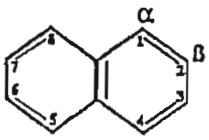
Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyer's Guide* (Genium ref. 73) for a list of suppliers.

HMIS
H 2
F 2
R 0
PPG*
*See sect. 8

R 1
I 4
S 1
K 2

SECTION 2. INGREDIENTS AND HAZARDS

	%	EXPOSURE LIMITS
Naphthalene, CAS No. 0091-20-3	ca 100	IDLH* Level: 500 ppm **ACGIH TLVs, 1987-88** TLV-TWA: 10 ppm, 50 mg/m³ **OSHA PEL** 8-Hr TWA: 10 ppm, 50 mg/m³ **Toxicity Data**** Child, Oral, LD_{Lo}: 100 mg/kg Man, Unknown, LD_{Lo}: 74 mg/kg Rat, Oral, LD_{50}: 1250 mg/kg



*Immediately dangerous to life and health
**See NIOSH *RTECS* for additional data with references to irritative, mutagenic, reproductive, and tumorigenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 424°F (218°C)
Vapor Density (Air = 1): 4.4
Vapor Pressure: 0.087 Torr at 77°F (25°C)
Water Solubility: Insoluble

Specific Gravity (H_2O = 1): 1.162 at 68°F (20°C)
Melting Point: 176°F (80°C)
Molecular Weight: 128 Grams/Mole
% Volatile by Volume: ca 100

Appearance and Odor: White crystalline flakes; strong coal tar odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
		% by Volume		
174°F (79°C) OC; 190°F (88°C) CC	979°F (526°C)		0.9	5.9

Extinguishing Media: Use water spray, dry chemical, or carbon dioxide to fight fires involving naphthalene. **Caution:** Foam or direct water spray applied to molten naphthalene may cause extensive foaming.

Unusual Fire or Explosion Hazards: Naphthalene is a volatile solid that gives off flammable vapor when heated (as in fire situations). This vapor is much denser than air and will collect in enclosed or low-lying areas like sumps. In these areas an explosive air-vapor mixture may form, and extra caution is required to prevent any ignition sources from starting an explosion or fire.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Naphthalene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Naphthalene is incompatible with strong oxidizing agents, chromic anhydride, and mixtures of aluminum trichloride and benzoyl chloride.

Conditions to Avoid: Ignition sources like open flame, unprotected heaters, excessive heat, lighted tobacco products, and electric sparks must not occur in work areas where naphthalene vapor may become concentrated.

Hazardous Products of Decomposition: Toxic gases like carbon monoxide are produced during fire conditions. Irritating, flammable vapor forms below the melting point because even solid naphthalene has a significant vapor pressure.

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Material Safety Data Sheet Collection

Phenanthrene MSDS No. 905

Date of Preparation: 6/94

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Phenanthrene
Chemical Formula: $(C_6H_4CH)_2$
CAS No.: 85-01-8
Synonyms: Phenantrin
Derivation: A polynuclear aromatic hydrocarbon found as a component of coal tar pitch volatiles (products of bituminous coal distillation). Produced from toluene, bibenzil, 9-methyl fluorene or stilbene by passage through red hot tubes or by diene synthesis of 1-vinyl naphthalene and maleic anhydride.
General Use: Used in the manufacture of dyestuffs and explosives; in biological research or drug synthesis.
Vendors: Consult the latest *Chemical Week Buyers' Guide.* (73)

Section 2 - Composition / Information on Ingredients

Phenanthrene, ca 100 % wt

OSHA PEL*
8-hr TWA: 0.2 mg/m^3

ACGIH TLV*
TWA: 0.2 mg/m^3

NIOSH REL*
10-hr TWA: 0.1 mg/m^3, *cyclohexane extractable fraction*

DFG (Germany) MAK
None established

*Coal tar pitch volatiles (benzene soluble)

Section 3 - Hazards Identification

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Phenanthrene exists as shiny crystals with a faint, aromatic odor. It can cause photosensitization of the skin. Phenanthrene is combustible and reacts dangerously with oxidizers.

Wilson Risk Scale	
R	1
I	3
S	3
K	1

HMIS	
H	1
F	1
R	0

PPE*
*Sec. 8

Potential Health Effects

Primary Entry Routes: Skin contact.
Target Organs: Skin.
Acute Effects
Inhalation: Effects not reported.
Eye: Effects not reported.
Skin: Can cause photosensitization of the skin.
Ingestion: Effects not reported.
Carcinogenicity: Although it has produced skin cancer in experimental animals, the results were not statistically significant and IARC has assigned phenanthrene a Class 3 (unclassifiable as to carcinogenicity) designation. The NTP and OSHA do not list phenanthrene as a carcinogen.
Medical Conditions Aggravated by Long-Term Exposure: Skin disorders.
Chronic Effects: None reported.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.
Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin Contact: *Quickly* remove contaminated clothing. Rinse exposed area with flooding amounts of water to remove loose material and then move quickly to a soap and water wash. For reddened or blistered skin, consult a physician.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water, then induce vomiting.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians: Treatment is symptomatic and supportive.

Section 10 - Stability and Reactivity

Stability: Phenanthrene is stable at room temperature in closed containers under normal storage and handling conditions.
Polymerization: Hazardous polymerization does not occur.
Chemical Incompatibilities: Strong oxidizers.
Conditions to Avoid: Phenanthrene dust generation and exposure to heat ignition sources, or oxidizers.
Hazardous Decomposition Products: Thermal oxidative decomposition of phenanthrene can produce carbon oxide(s).

Section 11- Toxicological Information

Toxicity Data:*

Acute Oral Effects:
Mouse, oral, LD_{50}: 700 mg/kg

Carcinogenicity:
Mouse, skin: 71 mg/kg produced tumors at site of application.

Mutagenicity:
Rat, liver cell: 3 mmol/L caused DNA damage
Human, lymphocyte: 100 µmol/L caused mutation

* See NIOSH, *RTECS* (SF7175000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: *Neanhes arenaceodentata*, TLm = 0.6 ppm/96 hr, sea water at 71.6 °F (22 °C)
Environmental Degradation: If released to soil, some phenanthrene may biodegrade but the majority will bind to the soil without much leaching to groundwater. Volatilization is not expected to be significant. In water, it will adhere to particulates and sediment. Photolysis may occur near the surface producing toxic substances. Photolysis/photooxidation half-life = 8.4 hr. In the air, it will react with photochemically generated hydroxyl radicals (half-life = 1.67 days).
Soil Absorption/Mobility: Phenanthrene absorbs strongly to soil and sediment in water.

Section 13 - Disposal Considerations

Disposal: For treatment of phenanthrene contaminated water, the particulate bound portion can be removed by sedimentation, flocculation, and filtration. Chlorination is not recommended as it has been shown to produce mutagenic substances. The dissolved portion requires oxidation for partial removal. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name:
Environmentally hazardous substances, solid, n.o.s.*
Shipping Symbols: —
Hazard Class: 9
ID No.: UN3077
Packing Group: III
Label: Class 9
Special Provisions (172.102): 8, B54, N50

Packaging Authorizations
a) **Exceptions:** 173.155
b) **Non-bulk Packaging:** 173.213
c) **Bulk Packaging:** 173.240

Quantity Limitations
a) **Passenger, Aircraft, or Railcar:** None
b) **Cargo Aircraft Only:** None

Vessel Stowage Requirements
a) **Vessel Stowage:** A
b) **Other:** —

* Classified as a hazardous substance when phenanthrene is in a quantity, in one package, which equals or exceeds the RQ of 5000 lb (2270 kg)

Section 15 - Regulatory Information

EPA Regulations:
RCRA Hazardous Waste Number: Not listed
Listed as a CERCLA Hazardous Substance (40 CFR 302.4) per CWA, Sec. 307(a)
CERCLA Reportable Quantity (RQ), 5000 lb (2270 kg)
SARA 311/312 Codes: 1
SARA Toxic Chemical (40 CFR 372.65): Not listed
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed
OSHA Regulations:
Listed (coal tar pitch volatiles) as an Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A)

Section 16 - Other Information

References: 23, 73, 103, 124, 132, 133, 136, 139, 159, 164, 187, 190
Prepared By.....M Gannon, BA
Industrial Hygiene Review .....PA Roy, MPH, CIH

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 711
Pyrene

Issued: 4/90

Section 1. Material Identification

Pyrene Description: A condensed ring, polyaromatic hydrocarbon compound derived from coal tar. Also synthesized from o,o'-ditolyl. Used in biochemical research and as starting material for synthesizing benzo(a)pyrene. An ingredient of smoked and broiled meat, tobacco smoke, and air pollution.
Other Designations: CAS No. 0129-00-0; $C_{16}H_{10}$; beta-pyrene; benzo(d,e,f)phenanthrene; benzo(d,e,f)phenathrene.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(TM) for a suppliers list.

R 1
I 3
S 2*
K -
* Skin absorption

Genium

HMIS
H 2
F 1
R 0
PPG†
† Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Pyrene, ca 100%

OSHA PEL	ACGIH TLV, 1989-90	NIOSH REL, 1987	Toxicity Data*
8-hr TWA: 0.2 mg/m³	None established	None established	Rat, oral, LD_{50}: 2700 mg/kg ingested produces conjunctiva irritation, excitement, and muscle contraction Rat, inhalation, LC_{50}: 170 mg/m³ inhaled produces conjunctiva irritation, excitement, and muscle contraction Gene mutation in mammalian cells; human cell types: 12 µmol/l

* See NIOSH, *RTECS* (UR2450000), for additional mutative, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 759 °F/404 °C
Melting Point: 313 °F/156 °C
Vapor Pressure: 6.85 x 10^{-7} torr at 68 °F/20 °C
Molecular Weight: 202.26 g/mol
Specific Gravity (H_2O = 1 at 39 °F/4 °C): 1.271 at 73 °F/23 °C
Water Solubility: Insoluble (0.135 mg/l)

Appearance and Odor: Colorless solid or a slight blue florescent solution. Tetracene impurities give pyrene a yellow color.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: Use foam, dry chemical, and CO_2 to extinguish fire.
Unusual Fire or Explosion Hazards: Pyrene is a flammable and combustible material that heat and ignition sources may ignite. It burns rapidly with a flare-like effect.
Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode. Avoid skin contact. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Pyrene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Hazardous Products of Decomposition: Thermal oxidative decomposition of pyrene can emit irritating fumes and acrid smoke.

Citizen Participation Plan
for the
Site Investigation/Remedial Alternatives Report Workplan
Former Provan Ford Facility
Environmental Protection Project B-00127-3

Prepared for
City of Newburgh
83 Broadway
Newburgh, NY 12550

July 2000

Project No. PROVA001

TABLE OF CONTENTS

INTRODUCTION

Citizen participation is an important and integral component of remedial programs in New York State. Integration of individuals and organizations into the remedial program helps ensure outcomes that account for both technical and human concerns for **protecting public health and the environment**. In order for this integration to be accomplished, a project-specific plan is needed to inform and involve community residents, public and private leaders, and other stakeholders. This Citizen Participation Plan (CPP) addresses this need by documenting the planned project-specific public outreach activities and resources organized for the remedial program associated with the Former Provan Ford Site in Newburgh, NY (Provan Site).

The primary purpose of this CPP is to outline a variety of communication methods that, based on applicable New York State law and New York State Department of Environmental Conservation (NYSDEC) guidance, provide for constructive communication of program activities among the stakeholders and other interested parties. This CPP includes methods intended to inform interested parties of program developments, elicit responses and public involvement and provide a central point of contact for inquiries regarding the remedial program for the Provan Site. Given this context, this CPP presents the planned communication and outreach activities, describes how interested individuals and groups can participate in the remedial program, and provides a variety of reference materials to facilitate gaining access to project-specific information and management personnel.

BASIC SITE INFORMATION

Site Description/Location/Brief History

The City of Newburgh took ownership of the Provan Ford Site in 1998 after it foreclosed on this 3.5 acre property. The City has leased the site for the past two years but has requested that the current occupant leave the site in the first quarter of the year 2000.

The Provan Ford Site is located at 146-172 Mill Street Avenue in Newburgh, NY. The approximate boundaries of the site include Route 9-W (Robinson Street) on the West, the Orange County Plumbing Supply Company on the South, Dickson Street on the North and Mill Street on the East. This is a mixed use area where the primary uses are commercial but some residential properties are located across Mill Street to the East.

Prior to 1998, Provan Ford had occupied the property for approximately fifty years. Prior to the construction of Provan Ford, the site was undeveloped. Provan's on-site operations included the washing, service and maintenance of Ford tanker trucks. This was a large truck dealership/repair facility and a petroleum/industrial tanker cleaning facility. It consisted of two attached garage maintenance areas, a small office area and an external wash rack which was located on a concrete pad and attached to the western wall of the garage. Empty tanker trucks would arrive at the site, where they would be cleaned out in the wash rack, then serviced and fueled before they were sent back on the road for petroleum distribution.

During Provan Ford's ownership of this site, the City of Newburgh's Building, Public Works and Fire Department's had on several occasions responded to the facility for various incidents involving discharges of petroleum/other substances, to the City's municipal sewer system from various portions of the site. The on-site drainage system is connected to the City of Newburgh's combined sewer system which ultimately discharges to the Hudson River. The neighborhood surrounding this property is on the City's Water and Sewer service.

An existing oil/water separator is located on the southeast portion of the site. The existing oil/water separator has not been properly maintained since it's installation and is currently full of sediments and petroleum products. The facility has in the past violated the City of Newburgh's Pretreatment Ordinance for oil and grease discharge of potentially flammable products to the City of Newburgh's sewer collection system. Several years ago several large explosions and fires were reputedly attributed to discharges from the project site. A structure immediately adjacent to the facility was destroyed by fire after a series of explosions within the City's sewer system. The New York State Department of Environmental Conservation Police have also responded to the facility on several occasions in the past. The combination of surface discharge of petroleum products along with the discharge to the City's storm sewer collection system impacted the property, surrounding areas and the receiving waters for many years.

Status of Current Site Investigations

In October of 1999 First Environment, Inc., an environmental engineering firm, was hired by the City of Newburgh to investigate the environmental problems at the site and completed an initial investigation in October 1999. This site investigation was continued in order to evaluate potential areas of environmental concern identified in the initial investigation. A second round of soil and groundwater sampling identified four areas of environmental concern: (1) the areas where the six underground storage tanks are located; (2) the area of the exterior oil/water separator and associated pipelines, (3) the truck wash rack area/drum storage and adjacent drains (4) and several areas of potential surface soil contamination. These areas of concerns are discussed more fully in the next section of this report as well as in the Site Investigation/Remedial Alternatives Report Workplan. A site location map (Figure 1) for Provan Ford Site as well as a site map which locates the areas of environmental concern (Figure 2) are included in this CPP. See Figures following page 16.

Petroleum contamination was identified in the second round of sampling. Additional sampling will be performed over the next twelve months as part of the Site Investigation

to further define the extent of both soil and groundwater contamination so that the remedial action plan developed will specifically address the concentration and movements of contamination identified for the site.

These site investigation activities will be completed as part of the Remedial Alternatives Workplan which this CPP is part of. Full reports on all data collected will be discussed in associated public meetings and documents.

The City of Newburgh is conducting these site investigations and remedial activities under the Municipal Assistance Environmental Restoration Projects or "Brownfield Program", included in the 1996 Clean Water/Clean Air Bond Act.

REMEDIAL PROGRAM DESCRIPTION

New York State Remedial Program Overview

The Municipal Assistance Environmental Restoration Projects "Brownfield Program" follows the typical process for investigating and remediating hazardous waste sites in New York State. This process begins when the Phase I and Phase II Preliminary Site Assessments (PSAs) are performed. The Phase I PSA generally involves a review of historical records and information that may serve to document any past uses of a site. The follow up Phase II PSA typically goes a step further by including some form of site sampling and investigation to characterize the present condition of a site, including an early determination of any potential hazard posed by materials or conditions encountered. The former Provan Ford Site Project is at this stage in the remedial program process. A Site Investigation/Remedial Alternatives Report (SI/RAR) will be completed based on the findings and the results of the Site Investigation/Remedial Alternatives Report Workplan of which this CPP is a part.

Description of the Completed and Proposed Project Investigations

An initial Site Investigation is complete and the results of this investigation are briefly outlined below:

- 27 soil borings were installed adjacent to the areas of environmental concern i.e., the six underground tank sites, the site of exterior oil/water separator and associated pipelines, and the site of the truck wash rack and associated drains. 16 soil samples were sent to an analytical laboratory and 12 of these samples showed petroleum contamination that exceeds NYSDEC allowable limits for volatile organic compounds and/or semi-volatile organic compounds.

- 5 soil surface samples were collected from 0-6 inches below grade at the same areas of concern and where soil staining was visible. Each of these samples exceeded NYSDEC samples for semi-volatile organic compounds and/or volatile organic compounds.

- 7 temporary monitoring wells were installed: Again, these were located adjacent to the six underground storage tanks and the exterior oil/water separator. The water table was encountered from 8 feet to 14 feet below grade and petroleum was detected on the water table at five of the seven wells. Laboratory analysis of samples from six of the seven wells show that the groundwater has been contaminated.

- Prior to the initial investigation activities at this site, NYSDEC had requested that 60 tons of soil be stockpiled for disposal. As part of the initial investigation, this stockpiled soil was sampled for waste characterization. The sampling results showed the stockpiled soil was not hazardous and it was properly disposed of by TPS Technologies on February 8, 2000.

- On February 24, 2000, 9 drums were overpacked by the firm Code Environmental prior to pending off-site disposal. These nine drums are part of the drums stored in a fenced area on-site. The nine were dented and rusted and had been identified as being a potential threat to the environment.

Additional investigation work as well as remediation work is planned for the next 12 months. The objectives of this work are to thoroughly investigate and clearly define the extent, concentrations and movement of the contamination in the groundwater and soil at this site and the impacts of this contamination on the environment. Additional objectives of this site investigation include the definition of the extent to which contamination may have migrated or can be expected to migrate in the future both on and off-site and the identification of population and environmental receptors at risk. At the same time, remediation activities which are clearly required to reduce the already identified contamination will be carried out.

These proposed site investigation and remediation activities are briefly outlined below:

- The six underground storage tanks will be cleaned out and removed. Additional contaminated soil will be sampled, classified and removed. Additional soil samples will be collected and sent for analysis.

- Eight additional monitoring wells will be installed downgradient of the removed underground storage tanks. All 16 wells (9 new: 7 old) will be sampled for chemical constituents as required by NYSDEC.

- The initial Investigation had identified five areas on the property where surface soil may be contaminated. Additional sampling for poly-nuclear aromatic hydrocarbons (PAHs), metals and VOC is recommended for all five areas.

- 81 drums containing miscellaneous petroleum products (56 outside: 25 inside) are stored on this site. These drums will be properly disposed of off-site and prior to disposal each drum will be characterized by a field chemist.

- A map will be developed that illustrates historic and current on-site pipelines and drains.

- Both existing oil/water separators and drains will pumped out, cleaned, and petroleum products disposed of. All building drains inside the building will be sealed.

A Site Investigation/Remedial Alternatives Report will be prepared that will document the additional findings from this investigation and will also propose additional remediation activities. These results and recommendations will be discussed and presented at a public meeting. The Report itself will be available in the document repository.

The key decision points (milestones) and Project Schedule for the Provan Ford Site Investigation/Remedial Alternatives Report Workplan is available. See Provan Project Schedule following page 16.

CITIZEN PARTICIPATION ACTIVITIES

This section presents the specific citizen participation and outreach activities planned for implementation during the remedial program. Operating under overarching project-specific citizen participation goals, clearly defined objectives will be achieved by implementing a range of communication tools and methods. The planned activities are geared toward making project-specific information (e.g., work plans, technical reports, data, information sheet summaries) available to the public; facilitating communication among stakeholders (e.g., contact list, public meetings, comment periods); and notifying the public of document availability, public meetings, comment periods, and major program milestones.

Building locations where project-related documents will be available are provided in Appendix B. The community contact list is provided in Appendix C, while the Provan Ford Project management contacts (NYSDEC, New York State Department of Health [NYSDOH], and City of Newburgh representatives and Project officials are provided in Appendix D.

Goals and Objectives

The central goal of this CPP is to achieve effective, open communication between the City of Newburgh (owner of the former Provan Ford site), the citizens of Newburgh, the NYSDEC, and other stakeholders and interested parties. Corollary goals include:

- Communicate program goals and major milestones, actions, and outcomes;
- Inform citizens and others of on-going project activities, status, and progress,
- Provide citizens (and all stakeholders) a forum for input and comment;
- Engender a public understanding of the constituents of interest (chemicals observed in the project area), their potential risks to human health and the environment, and appropriate responses to mitigate those risks; and
- Inform the community about the duration and complexity of the remedial program.

In order to accomplish these goals, the following specific objectives will be pursued through the implementation of this CPP:

- Consistently communicate goals, accomplishments, and status of the project to the contact list (including community leaders, public officials, and the wider community, as necessary) through appropriate means;
- Maintain, update, and utilize the contact list,
- Educate the community, in lay terms, about the nature and magnitude of potential project area risks, including instructions for mitigating risk (if

appropriate) and assurances that the environment and worker/public health and safety are protected;

- Provide interested parties the opportunity to review and comment on technical reports generated through the remedial program (e.g., public comment periods and document repository as required);
- Provide interested parties the opportunity to present opinions and ideas during the remedial program (e.g., conduct a public meeting/comment period and availability session as required);
- Provide response to public review and comment (e.g., prepare a responsiveness summary as required);
- Provide the news media with interviews or press releases, as available, to ensure accurate coverage of remedial program activities; and
- Periodically review the effectiveness of the citizen participation and outreach activities during the remedial program and make adjustments in this CPP's methods and/or activities, if necessary.

Tools and Methods

There are many ways to reach and communicate with the community of Newburgh as this CPP is implemented over the course of the remedial program. A variety of outreach tools and methods will be used because "The Community" is not a single entity, but comprised of various organizations, public an business leaders, and a diverse assemblage of individuals of all ages, education backgrounds, and cultures.

Interested parties will be informed and invited to participate in the planned citizen participation activities through appropriate means such as mailings to the contact list, press releases, or information sheets and other documents made available in the document repository.

The following specific public participation activities will be implemented to facilitate public involvement in the Provan Ford Project. Depending upon the nature of work

ongoing at the site, the NYSDEC and City of Newburgh may decide to use any or all of the following citizen participation tools and methods.

Contact List

The contact fist includes the names, addresses, and/or telephone numbers of individuals, groups, organizations, and/or media interested in or affected by the Provan Ford Project The contact list is periodically updated with the contact information of any individual, group, organization, or business that has an interest in the project and wishes to receive public mailings or announcements published regarding project activities. Names are added to the contact list as they are received from public meeting sign-in sheets or from any public inquiry requesting to be included on the list. When specific citizen participation activities are scheduled, the contact list is used to notify interested parties as to how and where they can participate in project decision-making. For example, when the NYSDEC prepares its PRAP, the contact list will be used to inform interested parties of the availability of the PRAP for public review and comment, and of the date, time, and location of the PRAP public meeting and public comment period. The first activity proposed for the Provan Project will be to mail an announcement concerning the availability of the Site Investigation/Remedial Alternatives Report Workplan to the contact list.

The contact list is provided as Appendix C of this CPP.

Document Repository

Document repositories will be established in publicly accessible locations that have the accommodations necessary to house and make project related documents available for community reference and review. The use of document repositories is intended to maximize public access to site information while minimizing abuse, destruction, of project documentation. The document repositories for the Provan Ford Project are:

NYSDEC Region 3 Office

21 South Putt Comers Road
New Paltz, NY 12561-1696
Phone: (845) 256-3154
Hours: 9:00 a.m. to 4:30 p.m.

Newburgh Free Library
Head of Reference Department
124 Grand Street
Newburgh, NY 12550
Phone: (845) 561-1985
Hours: 9:00 a.m. to 9:00 p.m. Monday through Thursday 9:00 am. to 5:00 p.m. Friday and Saturday
1:00 p.m. to 5:00 p.m. Sunday

The following documents, as **available**, will be placed in the repositories and made available for public reference and use:

- Site Investigation/Remedial Alternatives Workplan;
- Quality Assurance/Quality Control Plan;
- Health and Safety Plan (HASP);
- Citizen Participation Plan (CPP);
- Site Investigation/Remedial Alternatives Report (SI/RAR);
- Proposed Remedial Action Plan (PRAP);
- Record of Decision and Responsiveness Summary; Remedial Design Documents (including design Plans and Specifications), and
- Other Materials (e.g., Information Sheets, Notices, etc.).

Public Meeting and Comment Period

After completion of the SI/RAR, the preferred remedy for the site will be presented in a Proposed Remedial Action Plan (PRAP) and be subject to public review and comment.

A public meeting and comment period will be held at a convenient time and location to gather public comments on the PRAP. A 45-day comment period will also be established to gather additional comments and questions from interested parties. During the public meeting, NYSDEC and City of Newburgh project managers will be on hand to summarize the findings of the SI/RAR and answer questions regarding project area characterization, data, activities, remedial alternatives, the preferred remedy presented in the PRAP, costs, implementation schedules, and criteria used in evaluating the preferred remedy. Note that representatives from the NYSDOH, City of Newburgh, or other public entities also may be available to answer questions at the public meeting.

Following discussion of the project's status, citizens and others have the opportunity to ask questions and provide comment on the RI/RAR findings and the PRAP. After the public meeting and comment period end, NYSDEC will review all public comments and, where applicable, incorporate the comments into the final remedial action decisions embodied in the Record of Decision (ROD). The ROD describes the remedial action to be taken at the project area, the rationale used to select a particular remedial alternative, and a summary of public comments with corresponding NYSDEC and/or NYSDOH responses.

Responsiveness Summary

Public questions, comments, and concerns voiced during the public meeting and collected during the comment period will be addressed by the NYSDEC and published in the ROD's Responsiveness Summary. Agency responses are to address both the broad general concerns and the significant specific questions communicated by the interested parties.

Availability Sessions

After the ROD is issued, implementation of the selected remedial action is planned and formally designed. Upon completion of the design documents that specify the exact

details of the remedial action, a fact sheet is prepared and an availability session is typically held. Availability sessions are less formal settings intended to provide an opportunity for NYSDEC, City of Newburgh, citizens, and other interested parties to discuss the remedial design and its implementation. For instance, before construction begins (if some form of construction is part of the design), citizens can learn of planned health and safety measures and other site controls intended to minimize such things as noise, traffic, and potential risk to human health and the environment.

During the availability session, project officials typically do not make formal presentations. However, by having project managers directly accessible to the community, the public participants have an opportunity to speak with project personnel on a near one-to-one basis. Availability sessions can be held on an as-needed basis throughout the project.

Fact Sheets

Fact sheets will be prepared and distributed to the contact list in order to announce major project milestones and accomplishments throughout the remedial program (e.g., start of construction, major report completion, etc.). Written in lay terms, information sheets will describe and summarize the project area's history, review the goals of the project, update the status of project plans and/or results, list opportunities for citizen involvement, list key contacts, and list the location of the document repositories.

SUMMARY

Guided by the goals and objectives of this CPP, implementation of the planned public outreach and citizen participation activities will ensure the timely communication of important program information of interest to the stakeholders of the Provan Ford Project Site and the City of Newburgh. Moreover, citizen involvement and interaction in the remedial program will be facilitated through specific opportunities such as public meetings, public comment periods, availability sessions, and use of the document repositories. Throughout the remedial program, this CPP and its specific outreach tools and methods will be monitored and, as required and agreed by the NYSDEC and City of Newburgh, will be adjusted to improve its effectiveness in responding to community needs.

FIGURES

1 Provan Project Site Location Map (Figure 1)

2 Provan Project Site Map Identifying Locations of Environmental Areas of Concern (Figure 2)

3 Proposed Project Schedule for the implementation of the Provan Ford Site Investigation/Remedial Alternatives Report Workplan and the production of the Site Investigation/Remedial Alternatives Report

APPENDICES

A Glossary of Key Citizen Participation Terms and Major Program Elements
B Identification of Document Repositories and List of Available Documents
C Identification of Interested Parties (Contact List)
D Identification of Project Management Contacts

Appendix A
Hazardous Waste Site Program
Glossary and Acronyms

GLOSSARY

This glossary defines terms associated with New York's hazardous waste site citizen participation program, and important elements of the hazardous waste site remedial program. Words in **bold** in the definitions are defined elsewhere in the glossary. A list of acronyms often used in the remedial program begins on page D-7.

Administrative Record — Part of a site's **Record of Decision** which lists and defines documents used in the development of NYSDEC's decision about selection of a remedial action.

Availability Session — A scheduled gathering of program staff and members of the public in a casual setting, without a formal presentation or agenda but usually focusing on a specific aspect of a site's remedial process.

Citizen Participation — A program of planning and activities to encourage communication among people affected by or interested in hazardous waste sites and the government agencies responsible for investigating and remediating them.

Citizen Participation Plan — A document which must be developed at a site's **Remedial Investigation** stage. A CP plan describes the citizen participation activities that will be conducted during a site's remedial process.

Citizen Participation Record — A document prepared at a major remedial stage which describes the citizen participation activities required at that stage. A CP Record also directs a scoping process to determine if additional citizen participation activities are appropriate and feasible.

Citizen Participation Specialist — A staff member from an NYSDEC central office or regional office who has specialized training and experience to assist a **project manager** and to plan, conduct and site-specific citizen participation program.

Classification

A process to place a hazardous waste site within a category which defines its hazardous waste status and its threat or potential threat to public health and the environment. Sites are listed along with their classifications in the **Registry of Inactive Hazardous Waste Disposal Sites.**

Class 1 causing or representing an imminent danger of causing irreversible or irreparable damage to public health or environment -- immediate action required.
Class 2 - significant threat to public health or environment -- action required.
Class 2a - temporary classification assigned to a site for which there is inadequate or insufficient data for inclusion in any other classification.
Class 3 - does not present a significant threat to public health or environment -- action may be deferred.
Class 4 - site properly closed -- requires continued management.
Class 5 - site properly closed -- no further action required.
Delisted - site no longer considered an inactive hazardous waste disposal site.

Comment Period

A time period for the public to review and comment about various documents and DER actions. For example, a 45-day comment period is provided when DER issues a **Proposed Remedial Action Plan (PRAP),** and when DER proposes to Delist a site from the **Registry of Inactive Hazardous Waste Disposal Sites.**

Consent Order

A legal and enforceable agreement negotiated between NYSDEC and a **responsible party.** The order sets forth agreed upon terms by which a responsible party will undertake site investigation and/or cleanup, or pay for the costs of those activities. The order includes a description of the remedial actions to be taken by the responsible party with NYSDEC oversight, and a schedule for implementation.

Contact List

Names, addresses and/or telephone numbers of individuals, groups organizations, government officials and media affected by or interested in a particular

hazardous waste site. The size of a contact list and the categories included are influenced by population density, degree of interest in a site, the stage of the remedial process and other factors. It is an important tool needed to conduct outreach activities.

Delist

Action by which DER removes a hazardous waste site from the **Registry of Inactive Hazardous Waste Disposal Sites** upon determination that the site contains inconsequential amounts of hazardous waste; or that a remediated site no longer requires **Operation and Maintenance;** or that a remediated site does not require Operation and Maintenance. A proposal to delist a site triggers a public notification and **comment period** process.

Division of Environmental Enforcement (DEE)

A unit within the New York State Department of Environmental Conservation which works with the **Division of Environmental Remediation** and others to negotiate with **responsible parties** to achieve agreements for the investigation and remediation of hazardous waste sites. A negotiated agreement is contained in a **consent order.**

Division of Environmental Remediation

Formerly the **Division of Hazardous Waste Remediation**, a major program unit within the New York State Department of Environmental Conservation created to manage the hazardous waste site remedial program from site discovery through **Operation and Maintenance** activities. Staff include: engineers, geologists, chemists, attorneys, citizen participation specialists, environmental program specialists and support staff.

Division of Hazardous Waste Remediation

(See **Division of Environmental Remediation.)**

Document Repository

A file of documents pertaining to a site's remedial and citizen participation programs which is made available for public review. The file generally is maintained in a public building near the hazardous waste site to provide access at times and a location convenient to the public.

Enforcement

NYSDEC's efforts, through legal action if necessary, to compel a **responsible party** to perform or pay for

site remedial activities. NYSDEC may perform this effort by itself or in concert with other agencies.

Environmental Quality Bond Act (EQBA)

The 1986 Environmental Quality Bond Act which gives New York State bonding authority of up to $1.2 billion to fund the State's share of the total cost of remediating hazardous waste sites in New York State.

Fact Sheet

A written discussion about part or all of a site's remedial process, prepared and provided by DER to the public. A fact sheet may focus on: a particular element of the site's remedial program; opportunities for public involvement; availability of a report or other information, or announcement of a **public meeting or comment period.**

Interim Remedial Measure (IRM)

A discrete action which can be conducted at a site relatively quickly to reduce the risk to people's health and the environment from a well-defined hazardous waste problem. An IRM can involve removing contaminated soil and drums, providing alternative water supplies or securing a site to prevent access.

National Priorities List

The U.S. Environmental Protection Agency's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from a special trust fund.

New York State Department of Health

Agency within the executive branch of New York State government which: performs health-related inspections at suspected hazardouswaste sites; conducts health assessments to determine potential risk from environmental exposure; reviews Risk Assessments prepared during the **Remedial Investigation and Feasibility Study;** conducts health-related community outreach around sites; and reviews remedial actions to assure that public health concernsare adequately addressed.

New York State Department of Law

Agency within the executive branch of New York State government which takes the lead on hazardous waste sites requiring civil enforcement through court action. Litigation can involve negotiations and court action with **responsible** parties to clean upsites;

	natural resource damage claims, and recovery of remedialcosts.
New York State Registry of Inactive Hazardous Waste Disposal Sites	The "Registry." A document which NYSDEC is directed by law to maintain and which lists and provides information about everyhazardous waste site in New York State which meets criteriaestablished through a definition of hazardous waste and a **classification** system.
Operable Unit	A discrete part of an entire site that produces a release, threat of release, or pathway of exposure. An Operable Unit can receive specific investigation, and a particular remedy may be proposed. A **Record of Decision** is prepared for each Operable Unit.
Operation and Maintenance	A period in which remedial action may be conducted following construction at a site (for example, operation of a "pump and treat" system), or which is performed after a remedial action to assure its continued effectiveness and protection of people's health and the environment. Activities can include siteinspections, well monitoring and other sampling.
Preliminary Site Assessment (PSA)	A PSA is DER's first investigation of a site. A PSA is performed to determine if a site meets New York State's definition of an inactive hazardous waste disposal site by confirming the presence of hazardous waste and determining if the site poses a significant threat to public health or the environment.
Project Manager	An NYSDEC staff member within the **Division of Environmental Remediation** (usually an engineer, geologist or hydrogeologist) responsible for the day-to-day administration or remedial activities at, and ultimate disposition of, a hazardous waste site. The Project Manager works with legal, health, **citizen participation** and other staff to accomplish site-related goals and objectives.
Proposed Remedial Action Plan	An analysis by DER of each alternative considered for the remediation of a hazardous waste site and a rationale for selectionof the alternative it recommends. The PRAP is created based oninformation developed during the site's **Remedial**

	Investigation and Feasibility Study. The PRAP is reviewed by the public andother state agencies.
Public Meeting	A scheduled gathering of **Division of Environmental Remediation** staff with the affected/interested public to give and receive information, ask questions and discuss concerns about a site's remedial program. Staff from other NYSDEC divisions, legal and health staff, and staff from consultants and a responsible party often also attend. A public meeting, unlike an **availability session,** generally features a formal presentation and a detailed agenda.
Reclassification	A process by which DER redefines the threat posed by a hazardous waste site to public health and the environment by developing and assessing site information and, based on findings and conclusions, assigning a new **classification** code.
Record of Decision (ROD)	A document which provides definitive record of the cleanup alternative that will be used to remediate a hazardous waste site. The ROD is based on information and analyses developed during the **Remedial Investigation/Feasibility Study** and public comment.
Remedial Alternatives Report (RAR)	A report that contains an evaluation of options for the remediation of any contamination in, on, or under, or emanating from, a property that includes an analysis of data and other informationconcerning the nature and extent of that property's contamination and is generally performed concurrently, and in an interactivefashion, with the site investigation.
Remedial Construction	The physical development, assembly and implementation of the remedial alternative selected to remediate a site. Construction follows the **Remedial Design** stage of a site's remedial program.
Remedial Design	The process following finalization of a **Record of Decision** in which plans and specifications are developed for the **Remedial Construction** of the alternative selected to remediate a site.

Remedial Investigation/ Feasibility Study (RI/FS)

RI fully defines and characterizes the type and extent of hazardous waste contamination at the site. The FS, which may be which may be conducted during or after the RI, uses information developed during the RI to develop alternative remedial actions to eliminate or reduce the threat of hazardous waste contamination to public health and the environment.

Responsible Party

An individual or business who: currently owns or operates a hazardous waste site; or historically owned or operated a site when hazardous waste was disposed; or generated hazardous waste at a site; or transported hazardous waste to a site.

Responsiveness

A written summary of major oral and written comments received by DER during a **comment period** about key elelments of a site's remedial program, such as a **Proposed Remedial Action Plan,** and DER's response to those comments.

Site Investigation

A process undertaken to determine the nature and extent of contamination in, on, and under, and emanating from a property. The SI includes the gathering of sufficient information to determine the necessity for, and the selection of the appropriate method of, remediation of contamination in, on, or under, or emanating from a property.

Site Issues and Community Profile Scoping Sheet

A document prepared to support each **Citizen Participation Record**. Each Scoping Sheet identifies issues and information important to DER and the community and information that needs needs to be exchanged at a particular remedial stage. The Scoping Sheet also summarizes information about the surrounding community, including demographics, special needs, etc.

Superfund

The common name for the Federal program established by The Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended in 1986. The Superfund law authorizes the U.S. Environmental Protection Agency to investigate and cleanup sites nominated to the **National Priorities List.**

Title 3 Project

Remediation of a municipally owned site through the State Superfund Title 3 Program whereby New York State pays 75 percent of eligible costs for remediation and the municipality pays 25 percent.

Toll-Free "800" Number

An information line maintained by the **Division of Environmental Remediation** to provide convenient access for people who have questions, concerns or information about hazardous waste sites and their remedial programs.

ACRONYMS

AG	--	New York State Attorney General's Office
ARAR	--	Applicable, Relevant and Appropriate Requirement
C&D	--	Construction and Debris
CERCLA	--	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CO	--	Consent Order
CP	--	Citizen Participation
CPP	--	Citizen Participation Plan
CPS	--	Citizen Participation Specialist
CQC/CQA	--	Construction Quality Control/Construction Quality Assurance
DEE	--	Division of Environmental Enforcement
DER	--	Division of Environmental Remediation, formerly the Division of Hazardous Waste Remediation
DHWR	--	Division of Hazardous Waste Remediation, now the Division of Environmental Remediation
DOD	--	Department of Defense
DOL	--	Department of Law
DOW	--	Division of Water
ENB	--	Environmental Notice Bulletin
EQBA	--	1986 Environmental Quality Bond Act
EPA	--	Environmental Protection Agency
F&W	--	Division of Fish and Wildlife
FDA	--	Food and Drug Administration
FSF	--	Federal Superfund
FOIL	--	Freedom of Information Law
FS	--	Feasibility Study
FY	--	Fiscal Year
GPM	--	Gallons Per Minute
HeLP	--	Health Liaison Program
IRM	--	Interim Remedial Measure
mg/kg	--	milligrams per kilogram
NAPL	--	Non-Aqueous Phase Liquid

NPL	--	National Priorities List
NYSDEC	--	New York State Department of Environmental Conservation
NYSDOH	--	New York State Department of Health
O&M	--	Operation and Maintenance
OSHA	--	Occupational Safety and Health Administration
OU	--	Operable Unit
PAH	--	Poly-Aromatic Hydrocarbon
PCB	--	Poly-Chlorinated Biphenyl
PM	--	Project Manager
ppm/ppb/ppt	--	parts per million/parts per billion/parts per trillion
PRAP	--	Proposed Remedial Action Plan
PRP	--	Potentially Responsible Party
PRS	--	Priority Ranking System
PSA	--	Preliminary Site Assessment
QA/QC	--	Quality Assurance/Quality Control
RA	--	Remedial Action
RCRA	--	Resource Conservation and Recovery Act
RD	--	Remedial Design
RFP	--	Request for Proposals
RHWRE	--	Regional Hazardous Waste Remediation Engineer
RI	--	Remedial Investigation
RI/FS	--	Remedial Investigation/Feasibility Study
ROD	--	Record of Decision
RP	--	Responsible Party
SSF	--	State Superfund
TAGM	--	Technical and Administrative Guidance Memorandum
TCLP	--	Toxicity Characteristic Leaching Procedure
TSDF	--	Treatment, Storage and Disposal Facility
ug/l	--	micrograms per liter
USGS	--	U.S. Geological Service
VCP	--	Voluntary Cleanup Program
VOC	--	Volatile Organic Compound

Appendix B – Identification of Document Repositories and List of Available Documents

Two document repositories have been established to provide the public with access to important project documents and other information. This information will include reports, data and other information gathered and developed during the course of the Site Investigation/Remedial Alternatives Report as well as fact sheets, public meeting announcements, the Proposed Remedial Action Plan, and Record of Decision.

NYSDEC Region 3 Office
21 South Putt Corners Road
New Paltz, New York 12561
(845) 256-3154
Hours: Mon - Fri 8:30 am - 4:45 pm
Contact: Mike Knipfing, Citizen Participation Specialist

Newburgh Free Library
Head of Reference Department
124 Grand Street
Newburgh, NY 12550
(845) 561-1985
Hours: Mon - Thu 9:00 am - 9:00 pm
Fri, Sat 9:00 am - 5:00 pm
Sun 1:00 pm - 5:00 pm

AVAILABLE DOCUMENTS

At the start of the Site Investigation, copies of the following documents were placed in the repositories:

Site Investigation/Remedial Alternatives Report Workplan
Quality Assurance/Quality Control Plan
Health and Safety Plan (HASP)
Citizen Participation Plan (CPP)

When additional documents are developed during the Remedial Program, they will be made available in the repositories.

Appendix C – Identification of Interested Parties (Contact List)

The following contact list has been developed to help NYSDEC to keep the community informed about and involved in the SI/RAR process for the Provan Ford Site. The list includes adjacent/nearby property owners; local regional and state officials; local media; civic business and environmental organizations and others. The contact list will be reviewed periodically and updated as appropriate.

Provan Ford Contact List

Local Officials, Committees, and Boards

Mary L. Crabb, Mayor
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Stephen J. Rockafellow
Councilperson
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Nicholas Valentine
Councilperson
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Marlene A. Koisch
Councilperson
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Regina M. Angelo
Councilperson
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Harold J. Porr, III
City Manager
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Nancy D'Addio
City Clerk, Registrar
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

James Monell
Planning Board Chair
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

William F. Ketcham
Corporation Counsel
City of Newburgh
83 Broadway, City Hall
Newburgh, NY 12550

Head of Reference Dept.
Newburgh Free Library
124 Grand Street
Newburgh, NY 12550
(914) 561-1985

County/Regional Officials, Boards and Organizations

Joseph G. Rampe
Orange County Executive
255-275 Main Street
Goshen, NY 10924

Donna L. Benson
Orange County Clerk
255-275 Main Street
Goshen, NY 10924

Comissioner Peter Garrison
Orange County Department of Planning
124 Main Street
Goshen, NY 10924
(914) 291-2318

Commisioner Maxcy J. Smith, MD
Orange County Dept. of Health
124 Main Street
Goshen, NY 10924
(914) 291-2332

Richard L. Hansen, Sr.
Orange County Legislator
P.O. Box 201, Rt. 284
Unionville, NY 10988

Vincent Poloniak, Director
Community Development
223 Main Street
Goshen, NY 10924

Harvey J. Burger
Orange County Legislator
P.O. Box 208
252 Montgomery Street
Newburgh, NY 12550

Patrick J. Berardinelli, Sr.
Orange County Legislator
17 Hillside Court
Newburgh, NY 10950

Dino J. Sciamanna
Orange County Legislator
15th District
255-275 Main Street
Goshen, NY 10924

State and Federal Officials and Agencies

The Honorable William J. Larkin, Jr.
New York State Senator
1093 Little Britain Road
New Windsor, NY 12553

The Honorable Thomas J. Kirwan
New York State Assembly
190 South Plank Road
Newburgh, NY 12550

The Honorable Daniel P. Moynihan
United States Senator
189 Main Street
Oneonta, NY 13820

The Honorable Charles Schumer
United States Senator
26 Federal Plaza, Ste. 31-100
New York, NY 10728

The Honorable Maurice D. Hinchey
United States Representative
291 Wall Street
Kingston, NY 12401

Mark VanDeusen
NYS Department of Health
Flanigan Square
547 River Street
Troy, New York 12180

Ellen Stoutenburgh, Public Affairs Officer
NYSDEC
21 South Putt Corners Road
New Paltz, NY 12561

Michael J. Knipfing
Citizen Participation Specialist
NYSDEC
21 South Putt Corners Road
New Paltz, NY 12561

Richard Morse
Legislative Program Council's Staff
New York State Assembly, Room 520
State Capitol
Albany, NY 12224

Marc Moran, Director
Region 3, NYSDEC
21 South Putt Corners Road
New Paltz, New York 12561

Al Klauss
NYSDEC
21 South Putt Corners Road
New Paltz, New York 12561

David Camp
NYSDEC
50 Wolf Road
Albany, New York 12233-7010

Local/Regional Media:

City Editor
El Clarin
48 Broadway
Haverstraw, NY 10927

City Editor
Ellenville Press
P.O.Box 31
Ellenville, NY 12428

City Editor
Mid Hudson Times
P.O. Box 434
Walden, NY 12586

City Editor
Times Herald Record
126 Main Street
New Paltz, NY 12561

City Editor
Tri-State Gazette
84-88 Fowler Street
Port Jervis, NY 12771

City Editor,Greenwood Lake &West
Milford News
P.O.Box 1117
Greenwood Lake, NY 10925

City Editor
Hudson Valley Black Press
P.O.Box 2160
Newburgh, NY 12550

City Editor
Hudson Valley Business Journal
P.O.Box 339
Pine Island, NY 10969

City Editor
Independent Republican
P.O. Drawer A
Goshen, NY 10924-0628

City Editor
News of the Highlands
P.O.Box 278
Highland Falls, NY 10928

City Editor
Orange County Post
P.O.Box 500
Washingtonville, NY 10992

City Editor
Ottaway Newspapers, Inc.
P.O.Box 401
Campbell Hall, NY 10916

City Editor
Photo News
45 Gilbert Street
Monroe, NY 10950

City Editor
Strauss Newspapers
P.O.Box 190
Warwick, NY 10990

City Editor
The Sentinel
P.O.Box 406
Vails Gate, NY 12584

City Editor
The Cornwall Local
P.O.Box B
Cornwall, NY 12518

City Editor
The Warwick Valley Dispatch
P.O.Box 594
Warwick, NY 10990

City Editor
Times Herald Record
233 Broadway
Newburgh, NY 12550

City Editor
Times Herald Record
40 Mulberry Street
Middletown, NY 10940

City Editor
Warwick Advertiser
P.O.Box 190
Warwick, NY 10990

News Director
WALL/WKOJ
1 Broadcast Plaza
Middletown, NY 10940

News Director
WDLC/WTSX
P.O.Box 920
Port Jervis, NY 12771

News Director
WDST
118 Tinker Street
Woodstock, NY 12498

News Director
WELV/WTHN
12 Tucker Drive
Poughkeepsie, NY 12601

News Director
WGNY
P.O.Box 2307
Newburgh, NY 12550

News Director
WHUD/WLNA
Radio Terrace
Peekskill, NY 10566

News Director
WTBQ
62 N. Main Street
Florida, NY 10921

News Director
WZAD
P.O.Box 978
Wurstburo, NY 12790

News Director
Access 8 TV
P.O.Box 321
Port Jervis, NY 12780

News Director
Cable 6 TV
Industrial Drive
Middletown, NY 10940

News Director
Time Warner Cablevision
P.O.Box 887
Middletown, NY 10940

News Director
TKR Cable Co.
19 South Street
Warwick, NY 10990

News Director
WRNN TV
721 Broadway
Kingston, NY 12401

Adjacent/Nearby Residents, Businesses, Property Owners, and Other Interested Parties

Property	Owner's Name & Address
145-147 S. Robinson Ave.	Visconti, Frederick J. Jr. c/o Visconti Limosine Inc. P.O. Box 2666 Newburgh, NY 12550
149-155 S. Robinson Ave.	Same as above
157-161 S. Robinson Ave.	Gehler, John C. 3 Forshee St. Monroe, NY 10950
17-23 Dickson St.	Visconti, Frederick J. Jr. 17-23 Dickson St. Newburgh, NY 12550
Dickson St.	New York Central Lines LLC 500 Water St. (J-910) Jacksonville, FL 32202
20-32 Deyo Pl. & 184 Mill St.	M.J.S. Orange County Associates 34 Cottage St. Middletown, NY 10940
146-158 S. Robinson Ave.	Baltsas Stauros & Pitsinos Pano N. 160 S. Robinson Ave. Newburgh, NY 12550
160 S. Robinson Ave.	Same as above
162-170 S. Robinson Ave.	The Buller Limited Partnership 20 Rewe Street Brooklyn, NY 11211
170-172 S. Robinson Ave.	Levinson Enterprises Inc. P.O. Box 615 Cornwall, NY 12518
176-184 S. Robinson Ave.	Davel Properties, Inc. 91 N. 12th St. Brooklyn, NY 11211

Property Address	Owner's Name & Address
29-37 Deyo Place	O'Shea, Edward A. 430 Pearl St. Kingston, NY 12401
S. Robinson Ave.	Cannon, Robert J. 2689 Route 208 Walden, NY 12586
19-37 Deyo Place	M.J.S. Associates 270 Rte. 17S Mahwah, NJ 07430
Deyo Place	Same as above
139-143 S. Robinson Ave.	Feroli, Leonard P. & Ronald 224 Leslie Ave. Newburgh, NY 12550
133-137 S. Robinson Ave.	R & F Associates Inc. 135 S. Robinson Ave. Newburgh, NY 12550
Dickson St.	20 Dickson Street Corp. c/o Carlos Scheer 38 Dogwood Hills Rd. Newburgh, NY 12550
Carson Ave.	New York Central Lines LLC 500 Water St. (J-910) Jacksonville, FL 32202
136-144 Mill St.	Greenblatt, Charles & Samuel 110 Mill St. Newburgh, NY 12550
159 Mill St.	Weller, Fred 169 Mill St. Newburgh, NY 12550
157 Mill St.	Same as above
155 Mill St.	Same as above
153 Mill St.	Same as above

Property Address	Owner's Name & Address
145-151 Mill St.	Cohen, Kathleen V. 215 Carson Ave. Newburgh, NY 12550
137-143 Mill St.	Bermo, Gloria 137 Mill St. Newburgh, NY 12550
187-193 Mill St.	Fracasse, Richard E. c/o New Windsor Refrigeration & Air Cond. 187 Mill St. Newburgh, NY 12250
183-185 Mill St.	Smith, William & Edwards B. 183 Mill St. Newburgh, NY 12550
86-92 Bridge St.	Coen, Nancy 111 Larter Ave. Newburgh, NY 12550
169-175 Mill St.	Weller, Fred R. 169-175 Mill St. Newburgh, NY 12550
161-167 Mill St.	Woinicki, Mark L. & Maria Z. 167 Mill St. Newburgh, NY 12550

Environmental Groups

Scenic Hudson
9 Vassar Street
Poughkeepsie, NY 12601
(914) 473-440

Clearwater, Inc.
112 Market Street
Poughkeepsie, NY 12601
(914) 454-7673

Greenway Conservancy
Capitol Building
Capitol Station, Room 254
Albany, NY 12224
(518) 473-3835

The Nature Conservancy
P.O. Box 601
Pawling, NY 12564

Orange Environment
P.O. Box 25
Goshen, NY 10924
(914) 294-5852

Hudson River Pilots Assoc.
75 Alexander Street
Yonkers, NY 10701

Karl Coplan, Esq.
Pace/Riverkeeper
78 North Broadway
White Plains, NY 10603

Environmental Citizens Coalition
33 Central Ave.
Albany, NY 12210

Laura Haight
NY PIRG
107 Washington Avenue
Albany, NY 12210

Orange County Land Trust
Executive Director
John Gebhards
P.O. Box 2442
Middletown, NY 10940

Appendix D – Identification of Project Management Contacts

For additional information about the program to investigate the Provan/Ford Site, the public is encouraged to contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

NYSDEC Inactive Hazardous Waste Site Toll-Free Information Number: **1-800-342-9296**
(Calls recorded 24 hours a day. Calls are returned during business hours)

David Camp, P.E.
Project Engineer
NYSDEC
50 Wolf Road
Albany, New York 12233-7010
(518) 457-7924

Mike Knipfing
Citizen Participation Specialist
NYSDEC Region 3
21 South Putt Corners Road
New Paltz, New York 12561
(914) 256-3154

New York State Department of Health (NYSDOH):

Mark VanDeusen
Outreach Unit
NYS Department of Health
Flanigan Square
547 River Street
Troy, New York 12180
1-800-458-1158 ext. 27530

Teresa Foster
Health Specialist
NYS Department of Health
Flanigan Square
547 River Street
Troy, New York 12180
1-800-458-1158 ext. 27880

City of Newburgh/First Environment, Inc. PROVAN Project Staff

Scott Green, P.G.
Senior Hydrogeologist
First Environment, Inc.
90 Riverdale Road
Riverdale, NJ 07457
1-800-486-5869

Tom Bambrick
Geophysicist
First Environment, Inc.
90 Riverdale Road
Riverdale, NJ 07457
1-800-486-5869

	Rates/Hr.
Proj. Sci./Eng.	$120.00
Senior Scientist	$100.00
Scientist	$80.00
Technical/Drafting	$60.00

PHASE I

		Total Spent
Site Visit		$500.00
Report Writing		$2,500.00
	Subtotal:	$3,000.00

WORKPLAN/HASP/CP/PREPARATION

Site Visit with DEC		$500.00
Report Writing		$5,000.00
	Subtotal:	$5,500.00

PHASE II (work conducted to date)

	Personnel	Days/or Units	Well & Sam. #	Materials	Cost Per Day	Sample Cost	Cost
Geoprobe (27 Borings & 7 Piezometers)		***3***	***4***	***$5***	***$890***	***$0***	***$2,688***
Mobilization		***3***	***0***	***$0***	***$100***	***$0***	***$300***
Piezometer Well Materials (7 piezometers)		***0***	***7***	***$450***	***$0***	***$0***	***$3,150***
Labor & Oversight & Sampling	2	5	0	$0	$800	$0	$8,000
VO STARS		***0***	***23***	***$0***	***$0***	***$115***	***$2,645***
SVOC STARS		***0***	***15***	***$0***	***$0***	***$185***	***$2,775***
RCRA Metals		***0***	***5***	***$0***	***$0***	***$80***	***$400***
PCBs		***0***	***6***	***$0***	***$0***	***$65***	***$390***
Lead		***0***	***3***	***$0***	***$0***	***$65***	***$195***
Field Equipment		3	0	$0	$1,000	$0	$3,000
Travel & Food Expenses		5	0	$0	$50	$0	$250
						Subtotal:	**$23,793**

Subcontractor costs in italics.

	Personnel	Days/or Units	Well & Sam. #	Materials	Cost Per Day/Drum	Sample Cost	Cost
Soil Removal & Drum Overpack							
(work conducted to date)							
Soil Sampling Stockpile (ID 27 samp)	***0***	***0***	***1***	***$0***	***$0***	***$450***	***$450***
Soil Disposal per ton cost	***0***	***60.8***	***0***	***$0***	***$35***	***$0***	***$2,128***
Soil Loading per ton	***0***	***60.8***	***0***	***$0***	***$5***	***$0***	***$304***
Soil Trucking day per ton	***0***	***1***	***0***	***$0***	***$850***	***$0***	***$850***
FEI Labor & Oversight	1	1	0	$0	$800	$0	$800
Drum Overpack Chemist	***0***	***1***	***0***	***$0***	***$850***	***$0***	***$850***
Over Pack Cost per drum	***0***	***9***	***0***	***$0***	***$100***	***$0***	***$900***
FEI Labor & Oversight	1	1.5	0	$0	$800	$0	$1,200
Field Equipment	0	2	0	$0	$1,000	$0	$2,000
Travel & Food Expenses	0	2	0	$0	$50	$0	$100
						Subtotal:	**$9,582**
PHASE III (work to be conducted)							
Drum Characterization & Disposal							
Composite Samples	***0***	***20***	***0***	***$0***	***$0***	***$35***	***$700***
Drum Profile Cost	***0***	***8***	***0***	***$0***	***$0***	***$25***	***$200***
Transportation	***0***	***2***	***0***	***$0***	***$75***	***$0***	***$150***
Chemist Labor	***0***	***2***	***0***	***$0***	***$660***	***$0***	***$1,320***
Oversight Labor	0	2	0	$0	$800	$0	$1,600
Drum Disposal Cost (Haz)	***0***	***8***	***0***	***$0***	***$250***	***$0***	***$2,000***
Drum Disposal Cost (non-Haz)	***0***	***73***	***0***	***$0***	***$165***	***$0***	***$12,045***
Labor & Oversight	0	3	0	$0	$800	$0	$2,400
Field Equipment	0	2	0	$0	$1,000	$0	$2,000
Travel & Food Expense	0	5	0	$0	$50	$0	$250
						Subtotal:	**$22,665**
Surface Soil Delineation Sampling							
Geoprobe (20 surface soil borings)		1	20	$5	$890	$0	$890
Mobilization	0	1	0	$0	$100	$0	$100
Labor & Oversight & Sampling	2	1	0	$0	$800	$0	$1,600
SVOC STARS	***0***	***0***	***40***	***$0***	***$0***	***$185***	***$7,400***
RCRA Metals	***0***	***0***	***40***	***$0***	***$0***	***$80***	***$3,200***
PCBs	***0***	***0***	***40***	***$0***	***$0***	***$65***	***$2,600***
Field Equipment	***0***	***1***	***0***	***$0***	***$1,000***	***$0***	***$1,000***
Travel & Food Expense	2	1	0	$0	$50	$0	$100
						Subtotal:	**$16,890**

Subcontractor cost in italics

	Personnel	Days/or Units	Well & Sam. #	Materials	Cost Per Day	Sample Cost	Cost
Surface Soil Disposal							
Excavation	***0***	***2***	***0***	***$0***	***$850***	***$0***	***$1,700***
Mobilization/Demob	***0***	***2***	***0***	***$0***	***$100***	***$0***	***$200***
Soil Stockpile (ID 27 sample)	***0***	***0***	***3***	***$0***	***$0***	***$450***	***$1,350***
Labor & Oversight & Sampling	***1***	***2***	***0***	***$0***	***$800***	***$0***	***$1,600***
Soil Disposal per ton cost	***0***	***300***	***0***	***$0***	***$35***	***$0***	***$10,500***
Soil Loading per ton	***0***	***300***	***0***	***$0***	***$5***	***$0***	***$1,500***
Soil Trucking day per ton	***0***	***2***	***0***	***$0***	***$850***	***$0***	***$1,700***
FEI Labor & Oversight	1	2	0	$0	$800	$0	$1,600
Field Equipment	0	2	0	$0	$1,000	$0	$2,000
Travel & Food Expense	0	4	0	$0	$50	$0	$200
						Subtotal:	**$22,350**
UST Excavation, Backfill, Sampling & Soil Disposal							
UST Removal/Restoration	***0***	***10***	***0***	***$635***	***$5,000***	***$0***	***$50,635***
Labor & Oversight & Sampling	1	10	0	$0	$800	$0	$8,000
VO STARS (method 8021)	***0***	***0***	***30***	***$0***	***$0***	***$85***	***$2,550***
VOC (method 8240)	***0***	***0***	***7***	***$0***	***$0***	***$115***	***$805***
SVOC STARS (8027)	***0***	***0***	***30***	***$0***	***$0***	***$185***	***$5,550***
RCRA Metals	***0***	***0***	***5***	***$0***	***$0***	***$80***	***$400***
PCBs	***0***	***0***	***5***	***$0***	***$0***	***$65***	***$325***
Lead	***0***	***0***	***7***	***$0***	***$0***	***$25***	***$175***
Soil Disposal per ton cost	***0***	***240***	***0***	***$0***	***$35***	***$0***	***$8,400***
Soil Loading per ton	***0***	***240***	***0***	***$0***	***$5***	***$0***	***$1,200***
Soil Trucking day per ton	***0***	***2***	***0***	***$0***	***$850***	***$0***	***$1,700***
Soil Stockpile (ID 27 sample)	***0***	***0***	***3***	***$0***	***$0***	***$450***	***$1,350***
Labor & Oversight	1	2	0	$0	$800	$0	$1,600
Field Equipment	0	4	0	$0	$1,000	$0	$4,000
Travel & Food Expense	0	12	0	$0	$50	$0	$600
						Subtotal:	**$87,290**
Well Installation & Sampling							
Drilling Rig	***0***	***3***	***0***	***$0***	***$890***	***$0***	***$2,670***
Mobilization	***0***	***3***	***0***	***$0***	***$100***	***$0***	***$300***
Well Materials 8 wells	***0***	***8***	***0***	***$388***	***$0***	***$0***	***$3,104***
Well Survey 15 wells	***0***	***15***	***0***	***$0***	***$0***	***$0***	***$2,250***
Slug Tests & Interpretation	2	2	0	$0	$800	$0	$3,200
Labor & Oversight & Sampling	1	3	0	$0	$800	$0	$2,400

Subcontractor cost in italics

	Personnel	Days/or Units	Well & Sam. #	Materials	Cost Per Day	Sample Cost	Cost
Well Installation & Sampling (cont'd)							
GW VO STARS (method 8021)	***0***	***0***	***10***	***$0***	***$0***	***$85***	***$850***
GW VO (method 8240)	***0***	***0***	***5***	***$0***	***$0***	***$115***	***$575***
GW SVOC STARS (8027)	***0***	***0***	***15***	***$0***	***$0***	***$185***	***$2,775***
GW RCRA Metals	***0***	***0***	***15***	***$0***	***$0***	***$80***	***$1,200***
GW PCBs	***0***	***4***	***4***	***$0***	***$0***	***$65***	***$260***
GW Lead	***0***	***5***	***8***	***$0***	***$0***	***$25***	***$200***
Labor & Oversight	2	2	0	$0	$800	$0	$3,200
Field Equipment	0	3	0	$0	$1,000	$0	$1,600
Travel & Food Expense	0	7	0	$0	$50	$0	$350
						Subtotal:	**$26,330**
Pipe Draing & Assessment							
Document Search	2	1	0	$0	$800	$0	$1,600
Pipeline Survey	2	1	0	$0	$800	$0	$1,600
Map Production	1	2	0	$0	$600	$0	$1,200
Travel & Food Expense	2	1	0	$0	$50	$0	$100
						Subtotal:	**$4,500**
Water Separator Pump-out & Cleaning & Disposal						Cost Per Gal	
Pump Exterior Separator	***0***	***1500***	***0***	***$0***	***$800***	***$1***	***$2,225***
Pump Interior Separator	***0***	***1000***	***0***	***$0***	***$800***	***$1***	***$1,800***
Cleaning Separator	***1***	***2***	***0***	***$500***	***$800***	***$0***	***$2,100***
Separator Disposal	***0***	***1***	***0***	***$500***	***$500***	***$0***	***$1,000***
Cleaning Drain to Separator	***1***	***1***	***0***	***$100***	***$800***	***$0***	***$900***
Travel & Food Expense	2	1	0	$0	$50	$0	$100
						Subtotal:	**$8,125**
RI/RAW Report							
Labor	1	6	0	$0	$1,000	$0	$6,000
Materials	0	3	0	$100	$0	$0	$300
						Subtotal:	**$6,300**
						TOTAL:	**$227,825**

Subcontractor cost in italics