

Prepared for:

North Carolina Department of Transportation
Geotechnical Engineering Unit
GeoEnvironmental Section
1589 Mail Service Center
Raleigh, North Carolina, 27699-1589


Preliminary Site Assessment Report

Dawsey's Investment Property
Parcel # 62
265 Washington Street
Whiteville, Columbus County, North Carolina
US 701 Bypass from SR 1437 to US 74/76
TIP Number: R-5020B
WBS Element: 41499.1.3




Apex Companies, LLC
(dba Apex Engineering, PC)
10610 Metromont Parkway, Suite 206
Charlotte, North Carolina 28269

Prepared by:

DocuSigned by:

2D73445FB9455...

Troy L. Holzschuh
Assistant Project Manager

Reviewed by:

DocuSigned by:

3CB3ABA2358C407...

Eric Wysong, L.G.
Project Manager
NC Geologist License No. 2581



November 21, 2018

not considered final unless all signatures are completed

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Site History	1
1.2	Site Description.....	2
2.0	GEOLOGY	3
2.1	Regional Geology	3
2.2	Site Geology	3
3.0	FIELD ACTIVITIES	3
3.1	Preliminary Activities	3
3.2	Site Reconnaissance	4
3.3	Geophysics Survey Results	4
3.4	Well Survey.....	4
3.5	Soil Sampling.....	5
3.6	Groundwater Sampling	5
4.0	SAMPLING RESULTS	5
5.0	CONCLUSIONS	6
6.0	RECOMMENDATIONS	7

TABLES

Table 1 UVF Onsite Hydrocarbon Analytical Soil Data

FIGURES

Figure 1 Site Location Map
 Figure 2 Site Map with Soil Boring Locations
 Figure 3 Onsite UVF Hydrocarbon Analysis Results – Soil
 Figure 4 Site Map with Estimated Area of Groundwater Impact

APPENDICES

Appendix A Photograph Log
 Appendix B Historical Documentation
 Appendix C Boring Logs
 Appendix D Geophysical Report
 Appendix E UVF Hydrocarbon Analysis Results and Pace Analytical Laboratory Report

1.0 INTRODUCTION

This report presents the results of a Preliminary Site Assessment (PSA) for the North Carolina Department of Transportation (NCDOT) Dawsey's Investment Property performed by Apex Companies, LLC (Apex) (dba Apex Engineering PC) on behalf of the NCDOT. The subject site of this PSA report will be affected by the widening of the US 701 Bypass from SR 1437 to US 74/76. The Site is comprised of one parcel and is located at 265 Washington Street and is identified as Parcel 62, Dawsey's Investment Property, within the NCDOT R-5020B design project. The property is located southeast of the Washington Street and N JK Powell Boulevard intersection in Whiteville, Columbus County, North Carolina, as shown in the attached Site Location Map (**Figure 1**). The site investigation was conducted in accordance with Apex Company's Technical and Cost proposal dated May 15, 2018.

NCDOT contracted Apex to perform the PSA within the existing right-of-way (ROW) and/or easement of Parcel 62, the Dawsey's Investment property due to the potential presence of contamination at the site and because excavation and grading may occur within the area. The PSA was performed to evaluate if soils have been impacted as a result of past and present uses of the property within the proposed investigation area, if buried underground storage tanks (USTs) are present in the area of investigation, and if groundwater is impacted.

The following report presents the results of an electromagnetic (EM) and ground penetrating radar (GPR) evaluation to identify potential underground storage tanks (USTs) in the investigation area and describes the subsurface field investigation conducted. The report includes the evaluation of field screening, as well as field and laboratory analyses with regards to the presence or absence of soil and groundwater contamination within the area of investigation across the Dawsey's Investment Property. **Appendix A** includes a Photograph log for the site.

1.1 Site History

The Dawsey's Investment property has been identified with the address of 265 Washington Street. Based on a search of the North Carolina Department of Environmental Quality (NCDEQ) UST database registry, no active tanks were identified for the 265 Washington Street site. Apex observed a Hardee's Fast Food Restaurant during field activities. Apex personnel also reviewed the NCDEQ Incident Management Database and found the property to be identified with Facility ID Number 0-034119 and Incident Number 10813. Historical records were retrieved at the NCDEQ Wilmington office. All historical documentation can be found in **Appendix B**.

Gasoline UST's were reportedly removed in 1988 and the physical structures, including buildings, UST's, lines, and pump islands were removed from the site. The former tank pit was located directly east of Apex boring P62-SB2. No sampling was conducted as part of the closure process so in 1993, soil samples were collected to determine if a release had occurred. The sampling confirmed that soil and groundwater was impacted with gasoline constituents.

A combined Comprehensive Site Assessment (CSA) and Corrective Action Plan (CAP) was prepared by Clark Environmental Services, Inc. (Clark) and submitted to the North Carolina Department of Environmental Management (NCDEM) in 1994. Clark recommended utilizing vacuum sparging to address the groundwater impacts and included plans to install multiple sparge points within the plume area. The CAP was apparently not approved by the NCDEM. A copy of the report is included in **Appendix B**.

A revised CAP dated August 21, 1995 was submitted by Environmental Hydrogeological Consultants, Inc. (EHC). EHC stated that on May 25, 1990 five newly installed USTs were also removed when the new owner sold the property. A total of approximately 205 tons of impacted soil was removed at the time the USTs were removed, so remedial action focused on groundwater impacts. NCDEM approved the CAP in 1996 which recommended utilizing monitored natural attenuation to address the groundwater impact. The NCDEQ, UST Section issued a Notice of Regulatory Requirements on June 23, 2016 requesting that a Notice of Residual Petroleum (NORP) be filed so the site could be closed. The NORP which would prevent the future installation of water supply wells on the property, was to be filed within 30 days.

1.2 Site Description

The site is located in a mixed commercial and residential area of Whiteville in Columbus County, North Carolina. Washington Street followed by a fueling station border the subject property to the north. West Smith Street followed by a medical commercial office building border the subject property to the south. A back road, commercial property and residential properties border the subject property to the east. N. JK Powell Boulevard followed by a vacant commercial lot borders the subject property to the west. Parcel 62, Dawsey's Investment Property, does not appear on the NCDEQ UST database registry. The geophysical surveyor, Pyramid Environmental & Engineering, PC, (Pyramid) identified a groundwater remediation system, which was comprised of a series of interconnected vaults joined by PVC pipes. Pyramid stated the piping system was not connected to a surface treatment system. A total of 13 EM anomalies were identified. Pyramid concluded the geophysical data did not record any evidence of metallic USTs at Parcel 62.

2.0 GEOLOGY

2.1 Regional Geology

Parcel 62, the Dawsey's Investment property, is located within the Coastal Plain Physiographic Province. The Coastal Plain is the largest physiographic province in the state, covering about 45% of the land area. According to the US Geological Survey Hydrogeological framework of the North Carolina coastal plain, the geology consists of eastward-dipping and eastward-thickening series of sedimentary strata which range in age from Holocene to Cretaceous. The most common type of sediment types are sand and clay, although a significant amount of limestone occurs in the southern part of the coastal plain. The Site overlies surficial sediments (to approximately 30 to 40 feet bls), the PeeDee Confining unit (approximately 10 feet thick in this area), and the Late Cretaceous age Peedee Formation. The Peedee Formation is named for exposures along the great Peedee River, it preserves belemnites and foraminifera fossils dating from the Late Cretaceous. It generally consists of marine sand, clayey sand and clay (M.D. Winner Jr. and R.W. Coble, 1996, *Hydrogeologic Framework of the North Carolina Coastal Plain, Regional Aquifer-System Analysis – Northern Atlantic Coastal Plain*, USGS Professional Paper 1404-I).

2.2 Site Geology

Site geology was observed through the drilling and sampling of six direct push technology (DPT) soil borings (SB) onsite. **Figure 2** presents the boring locations and site layout. Borings did not exceed a total depth of five feet below ground surface (bgs) since that depth was the maximum excavation depth for proposed drainage features. Soil consisting predominantly of gray and black sand was observed across the parcel. The soils were unconsolidated and as a result the borings often collapsed. Boring logs are presented in **Appendix C**.

According to the historical groundwater assessment data, groundwater on the site flows toward the west, toward Apex P62-SB2. This portion of the site is a groundwater divide and groundwater from the adjacent parcel to the west flows southward toward this portion of the subject site as well. Borings P62-SB2 and P62-SB3 were placed along the investigation area to intercept potential impacted groundwater from the historic release on the property and the off-site parcel to the west.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was prepared to

include the site-specific health and safety information necessary for the field activities. North Carolina-One Call was contacted on May 25, 2018 to report the proposed drilling activities and notify affected utilities. Apex subcontracted Pyramid to locate subsurface utilities and other subsurface drilling hazards as well as to perform a geophysical survey. Carolina Soil Investigations, LLC (CSI) of Olin, North Carolina was retained by Apex to perform DPT borings for soil sampling. REDLAB, LLC (REDLAB) provided an ultraviolet fluorescence (UVF) Hydrocarbon Analyzer and Eastern Solutions provided a calibrated Flame Ionization/Photoionization Detector (FID/PID). Boring locations were strategically placed in a pattern within the area of investigation to maximize the opportunity to encounter potentially contaminated soil.

3.2 Site Reconnaissance

Apex personnel performed a site reconnaissance on June 7, 2018. During the site reconnaissance, the area was visually examined for the presence of potential USTs or areas/obstructions that could potentially affect the subsurface investigation. The proposed boring locations were marked based on the site inspection and geophysical survey results. Apex personnel also used the site visit as an opportunity to contact the property manager/owner to inform them of upcoming field activities.

3.3 Geophysics Survey Results

The geophysical survey of the site was conducted from May 29, 2018 to June 1, 2018. Pyramid performed an electromagnetic (EM) induction metal survey followed by a GPR survey. A copy of the Geophysical Report is presented in **Appendix D**. Thirteen EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. The series of well covers suggested that a potential groundwater remediation system was located on the property, but the piping did not appear to be connected to a treatment system located at the ground surface. EM Anomalies 2 and 12 were associated with unknown buried metal and were investigated. Pyramid recorded evidence of small hyperbolic reflectors that were suggestive of buried metallic debris and/or potential utilities. Pyramid concluded the geophysical data did not indicate the presence of metallic USTs at Parcel 62.

3.4 Well Survey

No water supply wells were observed on site, however multiple monitoring wells and remediation vaults were observed. Two of the remediation vaults were located within the assessment area of Parcel 62 with the GPS coordinates of 34.338514, -78.708213 and 34.338585 -78.708225.

3.5 Soil Sampling

Apex conducted drilling activities at the site on June 7, 2018. The purpose of soil sampling was to determine if a petroleum release has occurred within the investigation area, and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Apex drilling subcontractor, CSI, advanced six direct push soil borings within the proposed investigation area. These six boring locations were placed in a pattern to maximize the likelihood of identifying potential soil contamination that might exist in the area of future construction activities. **Figure 2** presents the Site Map with boring locations and site structures.

Soil sampling was performed utilizing hand auger and direct push methods accompanied by field screening of volatile organic vapors with the FID/PID unit and onsite quantitative analyses with the UVF Hydrocarbon Analyzer. One to two intervals of the soil boring, exhibiting the most elevated FID/PID readings, were selected for onsite quantitative analysis of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) in soil using the REDLAB UVF Hydrocarbon Analyzer. The analysis was performed onsite by Mr. Troy Holzschuh, a certified REDLAB UVF technician with Apex. The UVF results were generated concurrent with soil boring activities so that rapid assessment could be utilized for strategic boring placement.

3.6 Groundwater Sampling

Groundwater was encountered on site at a depth ranging from three to five feet bgs. However, contamination was not evident based on FID/PID field screening or UVF hydrocarbon analysis of soil sampling within the smear zone. There is no evidence of significant petroleum hydrocarbon contamination of groundwater onsite, within the area of investigation. Groundwater impacts have been documented at the property within the investigation area. The historical plume area has been included on **Figure 3** for reference.

4.0 SAMPLING RESULTS

Based on FID/PID field screening and onsite UVF hydrocarbon analysis from the June 2018 soil sampling there isn't significant evidence of petroleum hydrocarbon contamination onsite, within the area of investigation.

Elevated FID/PID readings, above ten parts per million (ppm), were observed in the borings conducted at the site above the smear zone. The FID readings ranged from 0.5 ppm to 720 ppm in soils above the smear zone and the PID readings ranged from 2 ppm to 30 ppm. The FID/PID field screening results are provided on the boring logs in **Appendix C**.

Soil concentrations of TPH gasoline range organics (GRO) and diesel range organics (DRO) measured using the onsite UVF unit are presented in **Table 1**, with instrument generated tables and chromatographs in **Appendix E**. **Figure 3** presents the GRO and DRO results at each boring.

Based on the UVF analyses, TPH-GRO concentrations were not detected above instrumental detection limits. TPH-DRO concentrations were identified in soils on the Dawsey's Investment property. Due to the shallow groundwater table, Apex personnel collected samples from above the smear zone and in the saturated zone to analyze with the onsite UVF. TPH-DRO concentrations above the smear zone ranged from below detection limits to 4.3 mg/kg in P62-SB6. TPH-DRO concentrations in the saturated zone ranged from below detectable levels to 4.1 mg/kg in P62-SB-6. Although saturated samples exhibited only minor impacts, due to documented historic release, there is the potential to encounter impacted groundwater on the property. The potential limits of impact are shown on **Figure 3**.

5.0 CONCLUSIONS

Based on site observations and onsite UVF analysis, the following bulleted summary is based upon Apex's evaluation of field observations and onsite quantitative analyses of samples collected from the Site on June 7, 2018.

- Results of the geophysical survey did not produce evidence of anomalies characteristic of USTs.
- Six soil borings were advanced onsite. Soil samples collected from each boring were analyzed in the field using a REDLAB UVF Hydrocarbon Analyzer.
- Soil samples analyzed using the UVF did not contain TPH-GRO concentrations above their respective NCDEQ Action levels of 50 mg/kg. Soil samples analyzed using the UVF did not contain TPH-DRO concentrations above their respective NCDEQ Action levels of 100 mg/kg.
- Groundwater was encountered on site at depths ranging from three to five feet bgs. Contamination was not evident based on FID/PID field screening or UVF hydrocarbon analysis. However, a Notice of Residual Petroleum has been placed on the property based on documented low-level groundwater impacts below health-based screening levels. Based on this historic data, the potential areas where this impact could be encountered has been delineated on **Figure 3**.

6.0 RECOMMENDATIONS

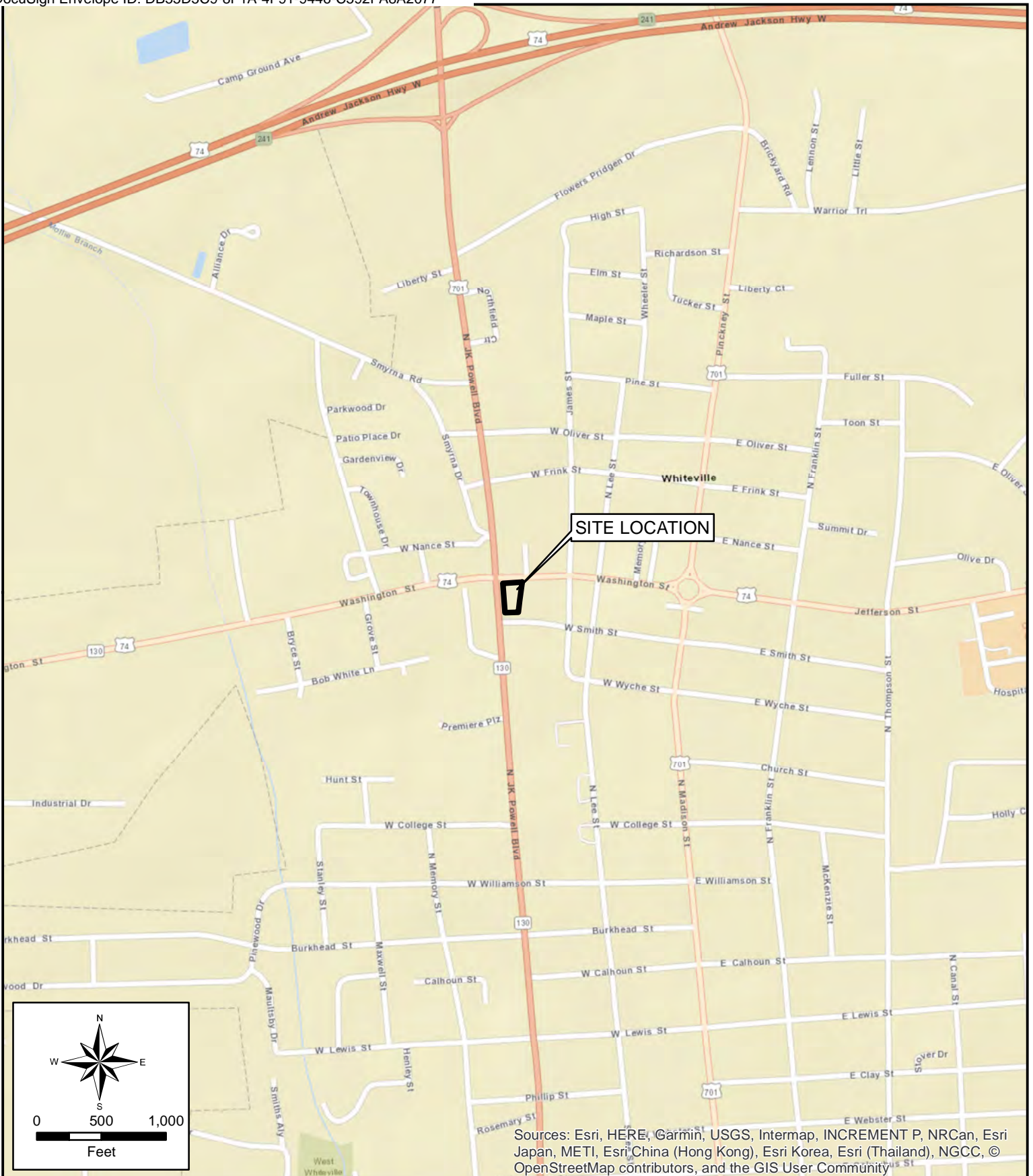
The subject property is designed as a cut and fill area. Based on these PSA results, NCDOT will likely encounter groundwater during excavation activities. Apex reviewed the historical documentation NC DEQ Wilmington Regional Office had on file. According to the historical documentation, a Notice of Residual Petroleum needed to be filed for the parcel in 2016. Based on this information, Apex recommends for the site to be monitored during excavation activities.

TABLES

Table 1
UVF Onsite Hydrocarbon Analytical Soil Data from June 2018
R-5020B, Parcel 62, Dawseys Investment Property
Whiteville, Columbus County, North Carolina

Sample ID Number	Sample Date	Sample Depth (ft bgs)	GRO (mg/kg) (C5-C10)	DRO (mg/kg) (C10-C35)
SOIL				
NCDEQ Action Level in mg/kg			50	100
P62-SB1*	6/7/2018	2 - 3	<0.42	3.4
P62-SB1	6/7/2018	4 - 5	<0.64	1.2
P62-SB2	6/7/2018	3 - 4	<0.5	<0.5
P62-SB2	6/7/2018	4 - 5	<0.52	<0.52
P62-SB3	6/7/2018	3 - 4	<0.65	<0.65
P62-SB3	6/7/2018	5 - 5.5	<0.64	0.64
P62-SB4	6/7/2018	3 - 4	<0.63	0.63
P62-SB4	6/7/2018	4 - 5	<0.52	0.79
P62-SB5	6/7/2018	3 - 4	<0.5	0.5
P62-SB5	6/7/2018	4 - 5	<0.45	4.1
P62-SB6	6/7/2018	2 - 3	<0.45	4.3
P62-DUP-1	6/7/2018	---	<0.42	3
NOTES: (mg/kg) = Milligrams per kilogram * = Duplicate sample was collected GRO = Gasoline Range Organics DRO = Diesel Range Organics ft bgs = feet below ground surface TPH - GRO values in exceedance of NCDEQ Action Level of 50 mg/kg are shown in Bold TPH - DRO values in exceedance of NCDEQ Action Level of 100 mg/kg are shown in Bold				

FIGURES



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

CHECK BY: TH
DRAWN BY: SP
DATE: 7/6/2018
SCALE: AS SHOWN
CAD NO.: NCDOT-001
PRJ NO.: NCDOT-001

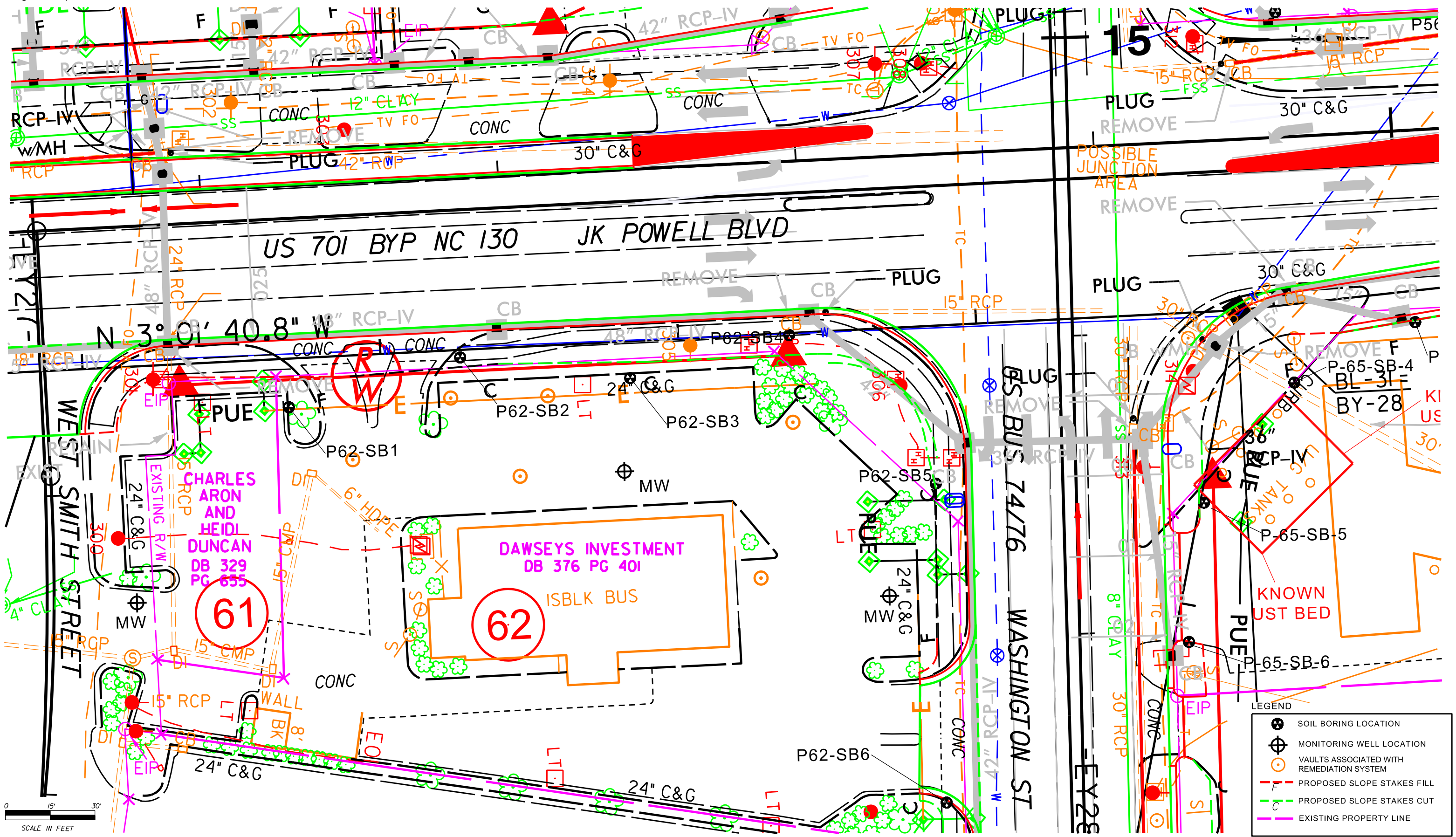
SITE LOCATION MAP

PARCEL #62
265 WASHINGTON STREET
WHITEVILLE, NORTH CAROLINA



FIGURE

1



LEGEND

	SOIL BORING LOCATION
	MONITORING WELL LOCATION
	VAULTS ASSOCIATED WITH REMEDIATION SYSTEM
	PROPOSED SLOPE STAKES FILL
	PROPOSED SLOPE STAKES CUT
	EXISTING PROPERTY LINE



FIGURE 2
 PARCEL 062
 265 WASHINGTON STREET
 SITE MAP WITH SOIL BORING
 LOCATIONS

Date:	6/6/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. #	NCDOT-001	
pc_062_fig 2.dgn		Project Title:
CAD File:		1" = 30'
Approx. Scale:		Drawn by: MJO
		NC DOT

Sample Identification	P62-SB1
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.42
THP DRO (mg/kg)	3.4
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.64
THP DRO (mg/kg)	1.2

Sample Identification	P62-SB2
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.5
THP DRO (mg/kg)	<0.5
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.65
THP DRO (mg/kg)	<0.65

Sample Identification	P62-SB3
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.65
THP DRO (mg/kg)	<0.65
Sample Depth (Feet bgs)	5-5.5
TPH GRO (mg/kg)	<0.64
THP DRO (mg/kg)	0.64

Sample Identification	P62-SB4
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.63
THP DRO (mg/kg)	0.63
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.52
THP DRO (mg/kg)	0.79

Sample Identification	P62-SB5
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.5
THP DRO (mg/kg)	0.5
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.45
THP DRO (mg/kg)	4.1

Sample Identification	P62-SB6
Sample Depth (Feet bgs)	2-3
TPH GRO (mg/kg)	<0.45
THP DRO (mg/kg)	4.3

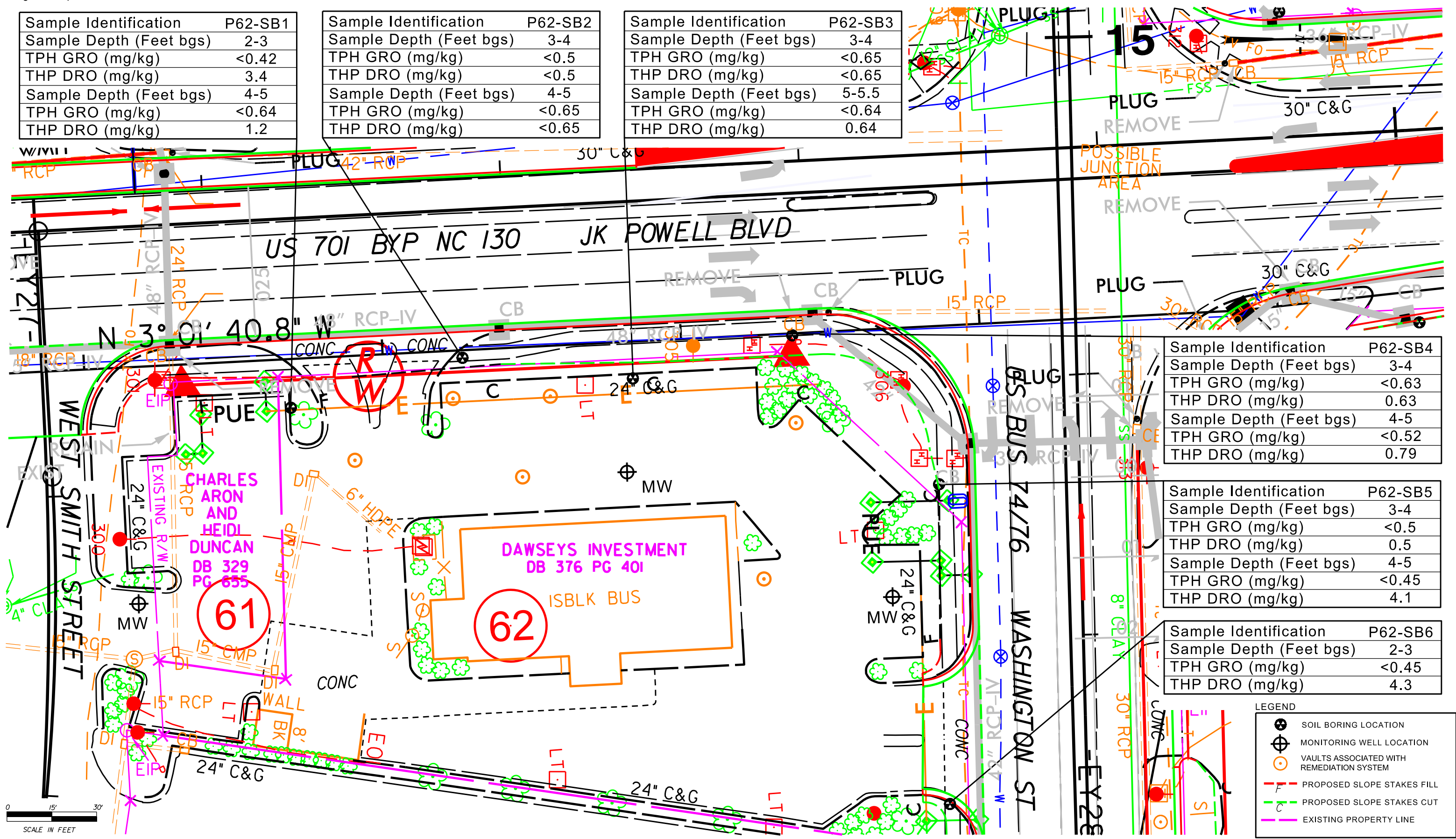


FIGURE 3
 PARCEL 062
 265 WASHINGTON STREET
 ONSITE UVF HYDROCARBON ANALYSIS RESULTS - SOIL
 6/7/18



Date:	7/24/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. #	NCDOT-001	
pc_062_fig 3.dgn		Project Title:
CAD File:		Approx. Scale:
1" = 30'	MJO	NC DOT
Drawn by:		Client:

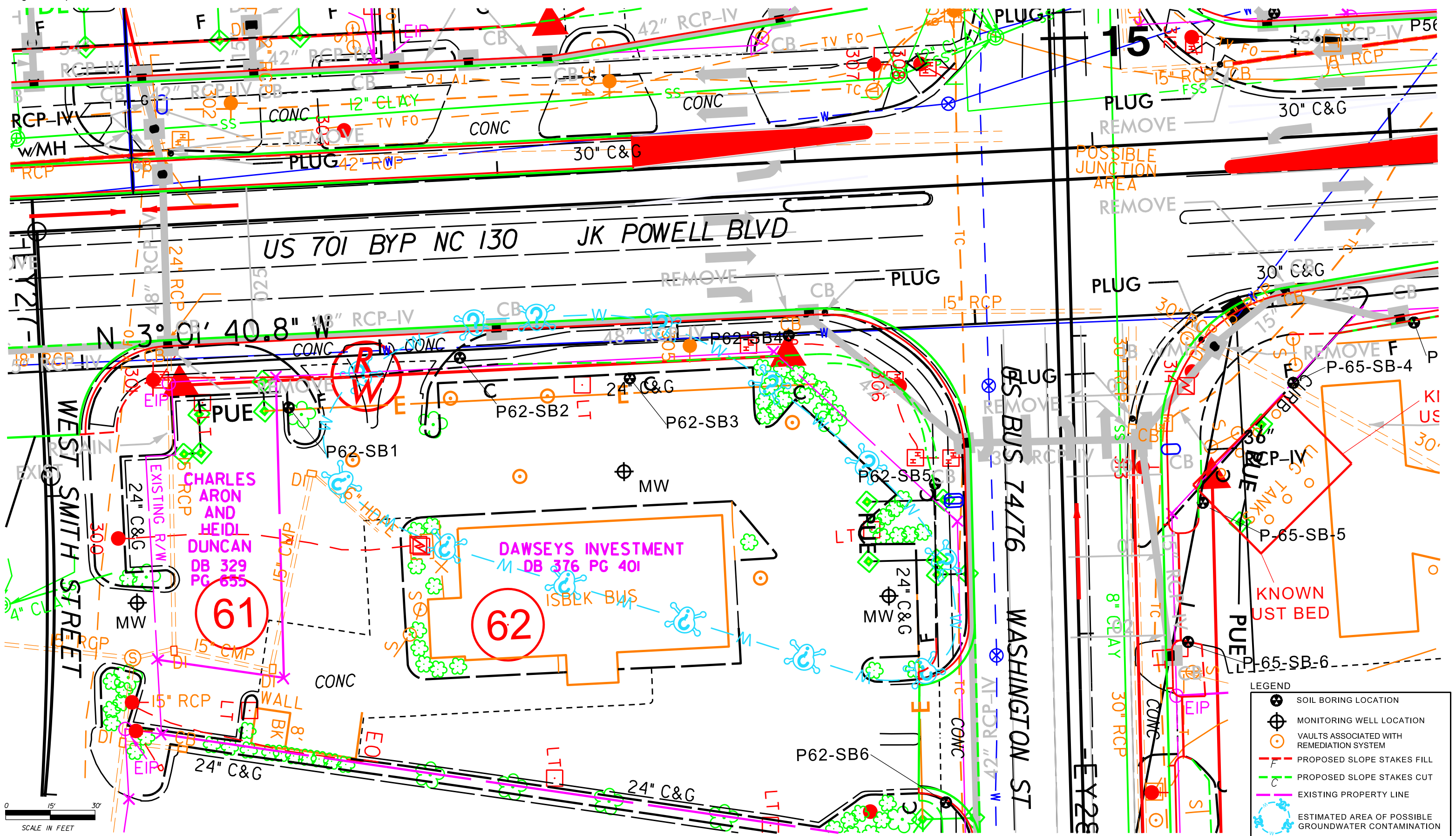


FIGURE 4
 PARCEL 062
 265 WASHINGTON STREET
 SITE MAP WITH ESTIMATED AREA OF GROUNDWATER IMPACT



Date:	8/21/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. #	NCDOT-001	
pc_062_fig 2.dgn		Project Title:
CAD File:		1" = 30'
Approx. Scale:		Drawn by: MJO
		Client: NC DOT

APPENDIX A
PHOTOGRAPH LOG



Photo 1

Overview of site prior to preliminary site assessment activities.



Photo 2

Photo of an onsite monitoring well used to determine static water level onsite prior to site assessment activities.

10610 Metromont Pkwy
Suite 206
Charlotte, NC 28269



WBS 41499.1.3
PROCESSED TLH
DATE June 2018

PHOTOGRAPHIC LOG
PSA Field Activities
Parcel 62
Dawseys Investment Property
Whiteville, NC



Photo 3

Photo of a remediation well vault located adjacent to JK Powell Blvd.



Photo 4

View of CSI clearing for utilities with a hand auger.

10610 Metromont Pkwy
Suite 206
Charlotte, NC 28269



WBS 41499.1.3
PROCESSED TLH
DATE June 2018

PHOTOGRAPHIC LOG
PSA Field Activities
Parcel 62
Dawseys Investment Property
Whiteville, NC

APPENDIX B
HISTORICAL DOCUMENTATION

Mayo, Deborah

From: Mayo, Deborah
Sent: Wednesday, May 11, 2016 9:14 AM
To: 'tdk@geologicalresourcesinc.com'
Subject: Dawsey's exxon data
Attachments: DOC051116autrydawsy.tif; DOC051116autrydsoil.tif

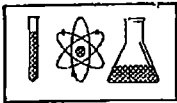
Terry, attached are 3 site maps I found that shows approximate tank locations, plume direction, plume size, and soil samples from the real estate assessment (location of soil samples is not noted. They were not likely placed in the tank pit areas. I hope this will assist Mr. Dawsey with a decision. The site can easily be closed with a NRP for soil and groundwater. A NRP for soil would not be required if current risk based soil samples show that the soil does not exceed the residential msccs. 20 cubic yards of soil were removed by Clark in 1993.

Deborah Mayo
Hydrogeologist
UST Section /Wilmington Regional Office
127 Cardinal Drive Ext., Wilmington, NC 28405
(910)796-7263, fax (910)350-2004
Note: new email address - deborah.mayo@ncdenr.gov

Note: EMAIL TO AND FROM THIS ADDRESS IS SUBJECT TO THE NORTH CAROLINA PUBLIC RECORDS LAW AND MAY BE DISCLOSED TO THIRD PARTIES.

UST Rules, Guidance, Updated GCLs, MSCCs, Trust Fund Info and more:
<http://portal.ncdenr.org/web/wm/ust/ustmain>
2010 Reasonable Rates and Pre-Approval documents
NON - UST Petroleum Releases:
<http://portal.ncdenr.org/web/wm/ust/nustmain>





HOLLOWELL TESTING

Alan G. Hollowell

Rt. 1 Box 47
Goldsboro, N.C. 27530
PHONE (919)-689-2114

APRIL 22, 1993

MR. RICK SHIVER
DEHNR
127 CARDINAL DRIVE
WILMINGTON, N.C. 28405-3845

SUBJECT: UST ABANDONMENT, 701 BYPASS WHITEVILLE, N.C.

SITE ID: 0-011686

DEAR MR. SHIVER,

HOLLOWELL TESTING WAS CONTRACTED TO PERFORM THE REQUIRED SITE ASSESSMENT AT THE ABOVE LOCATION. GASOLINE UST'S WERE REMOVED IN 1988 WITH NO WORK RECORDS AVAILABLE. THE ORIGINAL CONTRACTOR, MR. GERRY CLARK, IS NOW DECEASED. IT IS THE INTENTION OF THE OWNER, MR. AUTRY DAWSEY, TO INSURE THE FACILITY IS PROPERLY CLOSED TO FULFILL ALL STATE REGULATIONS.

ALL PHYSICAL STRUCTURES, INCLUDING BUILDINGS, UST'S, LINES AND PUMP ISLANDS HAVE BEEN REMOVED FROM THE SITE. MR. DAWSEY LOCATED THE TANK BED, PRODUCT LINES AND PUMP ISLANDS FOR SOIL SAMPLE COLLECTION.

SOIL SAMPLES WERE COLLECTED 4/8/93 AND ANALYZED 4/9/93 BY GC FID. CONTAMINATION WAS DISCOVERED IN THE TANK BED AND PRODUCT LINES. WE PROPOSE TO REMOVE AND DISPOSE OF THE CONTAMINATION AT OAK HILL FARMS (PERMIT # WQ 0004784), OWNED AND OPERATED BY MR. TOM HERRING. BEING UNFAMILIAR WITH THE PREVIOUS WORK PERFORMED, THE INSTALLATION OF AT LEAST ONE MONITOR WELL IS BEING CONSIDERED.

WE LOOK FORWARD TO HEARING FROM YOUR OFFICE AND WELCOME ANY ADVICE REGARDING THIS MATTER.

SINCERELY,

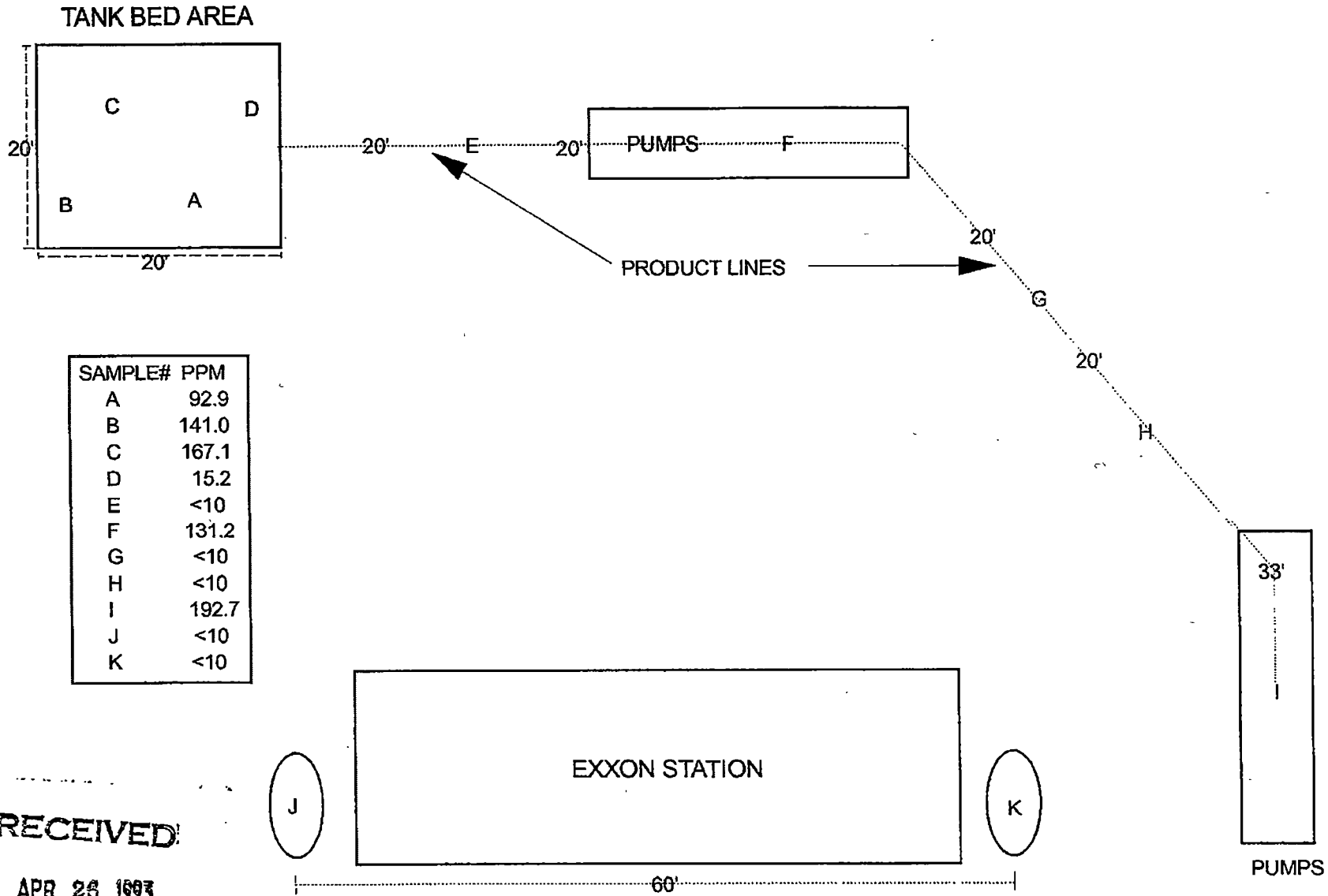
ALAN G. HOLLOWELL

RECEIVED

APR 26 1993

Wilmington Regional Office
DEM

HWY 701



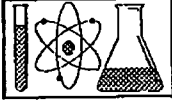
SAMPLE#	PPM
A	92.9
B	141.0
C	167.1
D	15.2
E	<10
F	131.2
G	<10
H	<10
I	192.7
J	<10
K	<10

RECEIVED

APR 26 1993

Wilmington Regional Office
DEM

SOIL SAMPLING MAP & APPROXIMATION MAP OF UST'S & PHYSICAL STRUCTURES



PETROCHEM ENVIRONMENTAL LABS

ALAN G. HOLLOWELL

1907 STATE ROAD 1243
GOLDSBORO, N.C. 27530
PHONE (919)-736-8002
(919)-689-2114

METHOD 5030

CLIENT ID	A	B	C	D	E
LAB ID	499301	499302	499303	499304	499305
MATRIX	SOIL	SOIL	SOIL	SOIL	SOIL
GASOLINE (PPM)	92.9	141.0	167.1	15.2	<10

CLIENT ID	F	G	H	I
LAB ID	499306	499307	499308	499309
MATRIX	SOIL	SOIL	SOIL	SOIL
GASOLINE (PPM)	131.2	<10	<10	192.7

JOB SITE: AUTRY DAWSEY/WHITEVILLE
ID NO. 0-011686

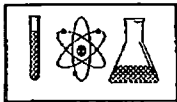
DATE REPORTED: 4/9/93

ANALYST

RECEIVED

APR 26 1993

Wilmington Regional Office
DEM



PETROCHEM ENVIRONMENTAL LABS

Alan G. Hollowell

1907 STATE RD 1243
GOLDSBORO, N.C.27530
PHONE (919)-736-8002

METHOD 3550

CLIENT ID	J	K
LAB ID	4139301	4139302
MATRIX	SOIL	SOIL

HEATING OIL (PPM)	<10	<10
-------------------	-----	-----

JOB SITE: AUTRY DAWSEY/WHITEVILLE
ID NO. 0-011686

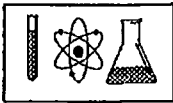
DATE REPORTED: 4/13/93

ANALYST:

RECEIVED

APR 26 1993

Wilmington Regional Office
DEM



PETROCHEM ENVIRONMENTAL LABS

Alan G. Hollowell

1907 STATE RD 1243
GOLDSBORO, N.C.27530
PHONE (919)-736-8002

SAMPLE SUBMISSION FORM

Company: Hollowell Testing

Date Submitted: 4/8/93

Submitted By: [Signature]

Phone: _____
Job No: Autry Dawsey - Whitesville

Recieved By: [Signature]

No. of Samples: 11

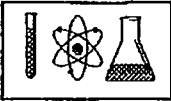
SAMPLE MATRIX	SAMPLE ID.	ANALYSIS	PPM LEVELS
Soil	A	Gasoline 5030	>10
	B		
	C		
	D		
	E		
	F		
	G		
	H		
	I		

Sample collection date 4/8/93 Time 9:30 AM

Special Instructions: _____

APR 10 1993

Wilmington Regional Office
DEM



PETROCHEM ENVIRONMENTAL LABS

Alan G. Hollowell

1907 STATE RD 1243
GOLDSBORO, N.C. 27530
PHONE (919)-736-8002

SAMPLE SUBMISSION FORM

Company: Hollowell Testing

Date Submitted: 4/8/93

Submitted By: [Signature]

Phone: _____
Job No: Anty Dauscy. Whiteville

Recieved By: [Signature]

No. of Samples: 2

SAMPLE MATRIX	SAMPLE ID.	ANALYSIS	PPM LEVELS
soil	J	Fudoil 3550	210
"	K	" "	210

Sample collection date 4/8/93 Time 10:30 Am

Special Instructions: _____

RECEIVED

APR 26 1993

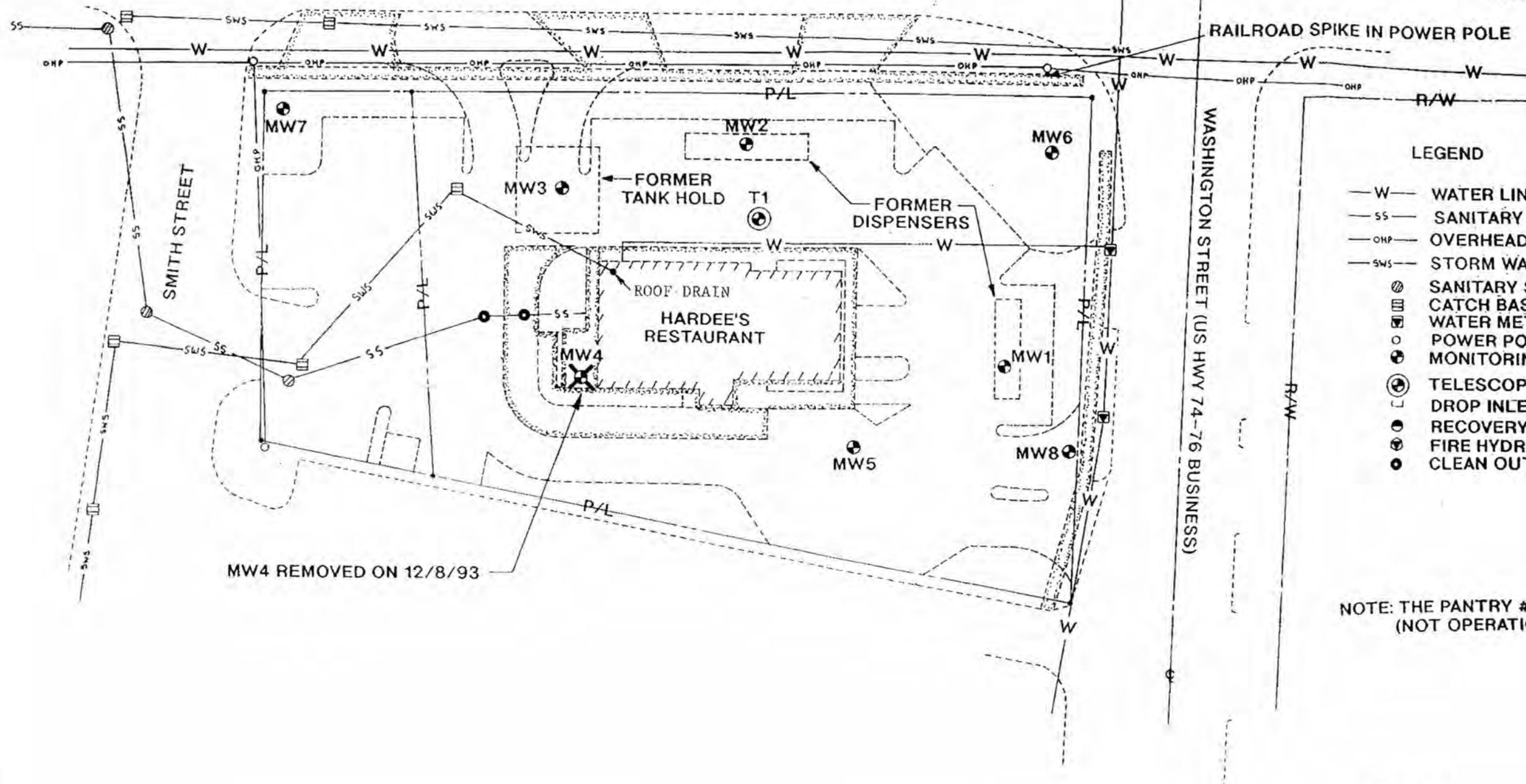
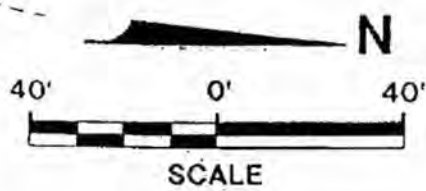
Wilmington Regional Office
DEM

FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

(US HWY 701 BYPASS) POWELL BLVD.

SEE NOTE



LEGEND

- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- ⊗ SANITARY SEWER CATCH BASIN
- ⊠ WATER METER
- POWER POLE
- ⊕ MONITORING WELL
- ⊕ TELESCOPING WELL
- ⊠ DROP INLET
- ⊕ RECOVERY WELL
- ⊕ FIRE HYDRANT
- ⊕ CLEAN OUT

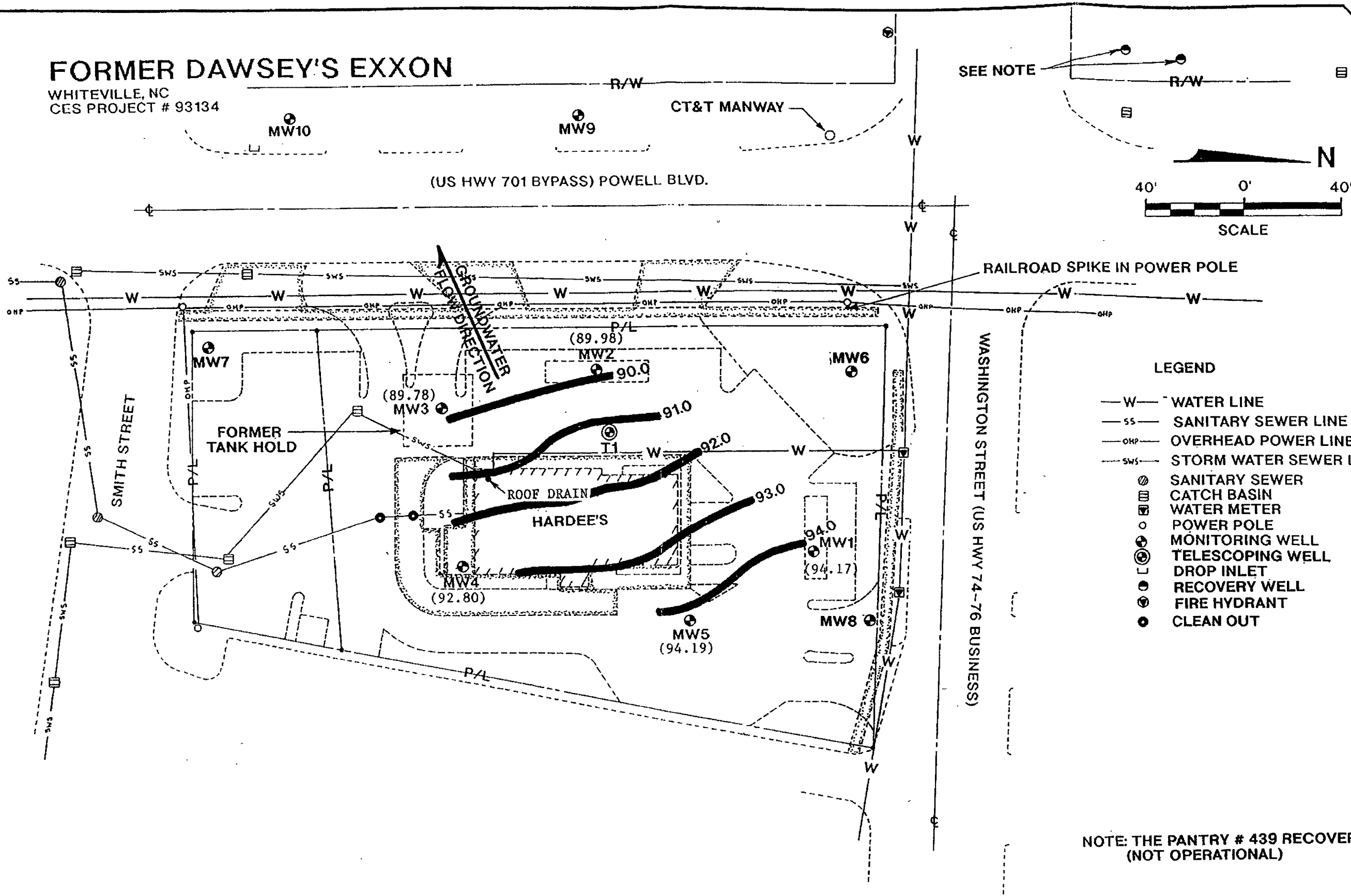
NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

SITE MAP
FIGURE 2



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



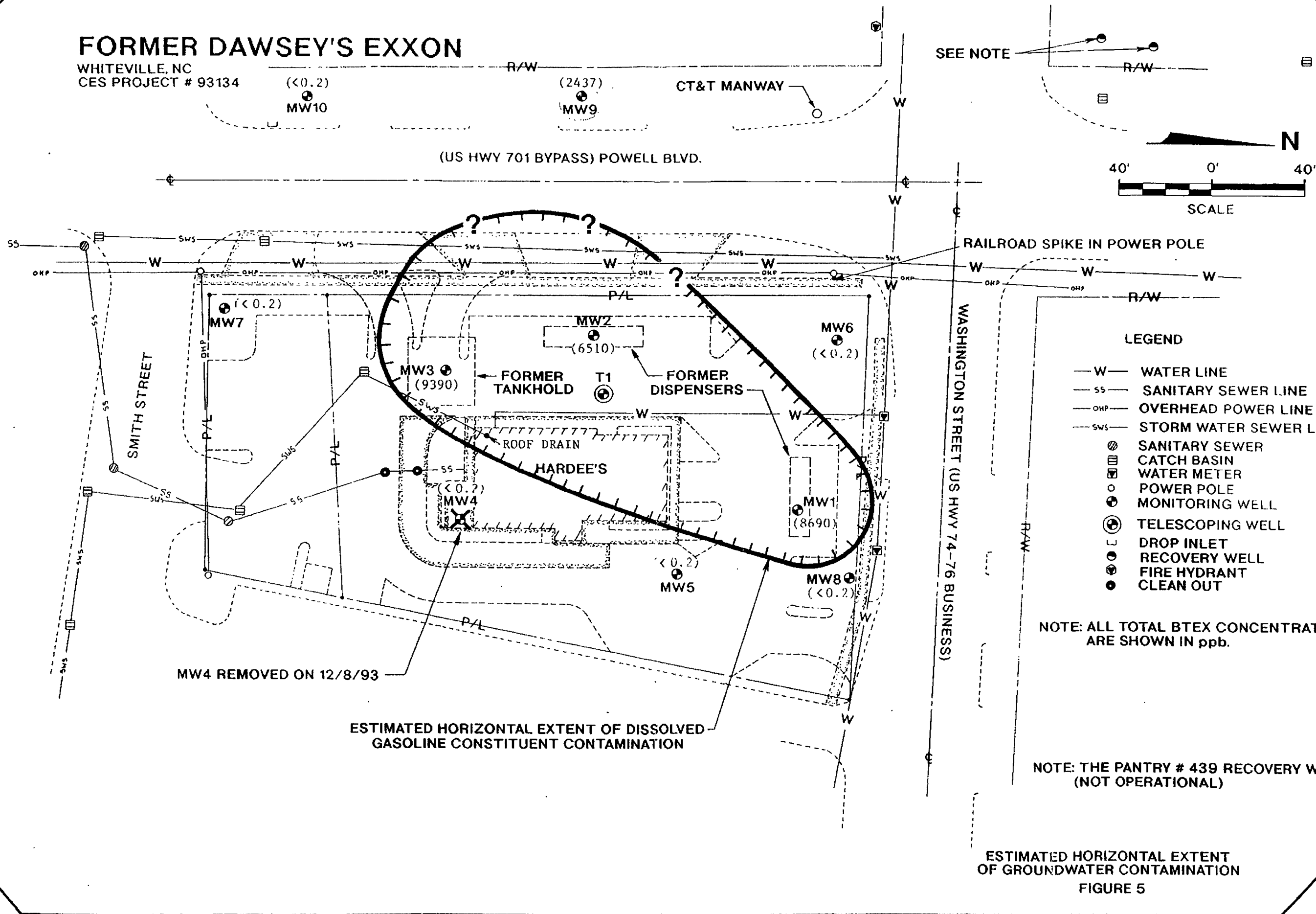
NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

WATER TABLE MAP
SEPTEMBER 16, 1993
FIGURE 3



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



ESTIMATED HORIZONTAL EXTENT OF DISSOLVED GASOLINE CONSTITUENT CONTAMINATION

ESTIMATED HORIZONTAL EXTENT OF GROUNDWATER CONTAMINATION
FIGURE 5



DIVISION OF ENVIRONMENTAL MANAGEMENT
CERTIFICATION FOR THE SUBMITTAL
OF A CORRECTIVE ACTION PLAN

Attached is the Corrective Action Plan for:

Responsible Party: MR. AUTRY DAWSEY
Address: P.O. BOX 396
City: WHITEVILLE, State: NC, Zip Code: 28472

Site Name: FORMER DAWSEY'S EXXON
Address: INTERSECTION OF US HWY 701 BYPASS AND US HWY 74/76 BUSINESS
City: WHITEVILLE, State: NC, Zip Code: -

I, R. PAUL CLARK, a Professional Engineer/Licensed Geologist
(circle one) for MR. AUTRY DAWSEY do hereby certify that the
information indicated below is enclosed as part of the requested Corrective Action Plan (CAP) and
that to the best of my knowledge the data, site assessments, engineering plans and other associated
materials are correct and accurate.

(Each item must be initialed by the certifying licensed professional)

RPC All notification requirements contained in 15A NCAC 2L .0106 have
been met.

RPC A Professional Engineer or Licensed Geologist has prepared, reviewed, or
certified all applicable parts of the CAP in accordance with 15A NCAC 2L
.0103(e).

RPC A site assessment is attached which provides the information required by
15A NCAC 2L .0106(g).

RPC A description of the proposed corrective action and supporting
justification is enclosed.

RPC Specific plans and engineering details for the restoration of groundwater
quality are enclosed and propose the use of the best available technology
for the restoration of groundwater quality to the levels of the groundwater
standards prescribed in 15A NCAC 2L .0202..

RPC A schedule for the implementation and operation of the CAP is enclosed.

RPC A monitoring plan is enclosed which has the capacity to evaluate the
effectiveness of the remedial activity and the movement of the
contaminant plume.

RPC The activity which resulted in the contamination incident is not permitted
by the State as defined in 15A NCAC 2L .0106(e)

(Please Affix Seal and Signature)



COMPREHENSIVE SITE ASSESSMENT

AND

CORRECTIVE ACTION PLAN

FOR THE

FORMER DAWSEY'S EXXON

WHITEVILLE, NORTH CAROLINA

CES PROJECT #93134

PREPARED FOR

MR. AUTRY DAWSEY

WHITEVILLE, NORTH CAROLINA

FEBRUARY 24, 1994



PREPARED BY

**CLARK ENVIRONMENTAL SERVICES, INC.
POST OFFICE BOX 10136
WILMINGTON, NORTH CAROLINA 28405
(910) 256-8894**

TABLE OF CONTENTS

		PAGE
1.0	INTRODUCTION	1
2.0	COMPREHENSIVE SITE ASSESSMENT REPORT	4
3.0	CORRECTIVE ACTION PLAN	16
4.0	LIMITATIONS	24

TABLE	SUMMARY OF LABORATORY ANALYSIS ON GROUNDWATER SAMPLES UTILIZING EPA METHOD 602 PLUS MTBE	
--------------	--	--

LIST OF FIGURES

FIGURE 1	VICINITY MAP
FIGURE 2	SITE MAP
FIGURE 3	WATER TABLE MAP SEPTEMBER 16, 1993
FIGURE 4	WATER TABLE MAP FEBRUARY 15, 1994
FIGURE 5	ESTIMATED HORIZONTAL EXTENT OF GROUNDWATER CONTAMINATION
FIGURE 6	LOCATIONS OF HYDROGEOLOGIC CROSS-SECTION A-A' AND B-B'
FIGURE 7	HYDROGEOLOGIC CROSS-SECTION A-A'
FIGURE 8	HYDROGEOLOGIC CROSS-SECTION B-B'
FIGURE 9	AS-BUILT VACUUM SPARGING (PATENT PENDING) WELL LAYOUT AND PIPING SCHEMATIC
FIGURE 10	ESTIMATED AREA INFLUENCED BY EACH VACUUM SPARGING (PATENT PENDING) WELL
FIGURE 11	TYPICAL TRENCH AND VAPOR RECOVERY WELL DETAIL

FIGURE 12 VACUUM SYSTEM EQUIPMENT SCHEMATIC

FIGURE 13 CONDENSATE COLLECTION CHAMBER

FIGURE 14 SPARGING SYSTEM EQUIPMENT SCHEMATIC

LIST OF APPENDICES

APPENDIX I STANDARD METHODS

APPENDIX II SAMPLING RECORDS/LABORATORY RESULTS/CHAIN OF CUSTODY FORMS

APPENDIX III MATERIAL SAFETY DATA SHEETS

APPENDIX IV SUMMARY OF CALCULATIONS

APPENDIX V EQUIPMENT SPECIFICATIONS

COMPREHENSIVE SITE ASSESSMENT

AND

CORRECTIVE ACTION PLAN

FOR THE

FORMER DAWSEY'S EXXON

WHITEVILLE, NORTH CAROLINA

CES PROJECT #93134

PREPARED FOR

MR. AUTRY DAWSEY

WHITEVILLE, NORTH CAROLINA

FEBRUARY 24, 1994

1.0 INTRODUCTION:

1.1 PURPOSE AND AUTHORIZATION:

The purpose of this report is to satisfy requirements under 40 CFR, Parts 280.65 and 280.66, as adopted in the North Carolina Administrative Code, Title 15A, Chapter 2, Subchapter 2N, Sections .0706 and .0707.

The collection and dissemination of data in this report was authorized by the property owner, Mr. Autry Dawsey of Whiteville, North Carolina.

1.2 LOCATION:

The site is located at the intersection of US Highway 701 Bypass and US Highway 74/76 Business in Whiteville, Columbus County, North Carolina. Figure 1 is a vicinity map and Figure 2 is a site map depicting pertinent site features. The former Exxon carries Facility ID #0-011686.

1.3 BACKGROUND INFORMATION/PREVIOUS REPORTS:

The documented release was apparently associated with an underground storage tank system and previous laboratory findings suggest soil and groundwater contaminants consistent with the composition of gasoline. Previous assessment work has been conducted by Petroleum Environmental Laboratories and Clark Environmental Services, Inc. (CES). The combined Initial Abatement Measures/Site Check and Initial Site Characterization Report dated September 22, 1993 is on file with the North Carolina Division of Environmental Management (NC-DEM), Wilmington Regional Office.

1.4 INITIAL REMEDIAL ACTIONS (IRA) SUMMARY:

1.4.1 Free Product:

No free product has been detected at this site.

1.4.2 Soils:

In February of 1993, approximately 20 yd³ of contaminated soils were removed from the site during lot clearing operations. These soils were land applied on two properties owned by Mr. Autry Dawsey. Documentation of this removal was provided on Form GW/UST-2 "Site Investigation Report for Permanent Closure or Change-in-Service of UST" submitted to the Wilmington Regional Office of the NC-DEM on September 9, 1993.

On January 11, 1994 approximately 172 yd³ of contaminated soils were excavated during grading of the site. These soils were temporarily staged on one of the aforementioned properties owned by Mr. Autry Dawsey. A Certificate of Approval for temporary storage of these soils was issued on January 12, 1993 by the NC-DEM, Wilmington Regional Office.

1.4.3 Groundwater:

No initial remedial actions were undertaken to address groundwater contamination.

1.5 NC TARGET REMEDIATION STANDARDS:

1.5.1 Free Product:

Free product must be removed in accordance with NCAC, Title 15A, Chapter 2, Subchapter 2N, Section .0705.

1.5.2 Soils:

Soils must be remediated to a condition of less than 10 ppm total petroleum hydrocarbons according to "Guidelines for Remediation of Soil Contamination by Petroleum", August 1990, NCDEHNR, Groundwater Section.

1.5.3 Groundwater:

Groundwater should be restored to a condition of compliance with 15A NCAC 2L standards.

2.0 COMPREHENSIVE SITE ASSESSMENT REPORT:

2.1 METHODS OF INVESTIGATION:

Comprehensive Site Assessment work was completed by conducting investigations pursuant to assessing the extent of groundwater contamination impact to surrounding areas. Groundwater contamination was assessed through the installation and sampling of 10 shallow monitoring wells and one telescoping well. Aquifer properties were characterized through surveying, temporally-spaced well measurements and slug tests. A preliminary exposure assessment was conducted utilizing existing information with regard to receptors, utilities, etc.

Standard Methods are attached as Appendix I. Appendix II includes sampling records, and laboratory data. Material Safety Data Sheets are located in Appendix III. Calculations are found in Appendix IV.

2.2 FINDINGS OF INVESTIGATION:

2.2.1 Site Data/Land Use:

The area in the vicinity of the site is primarily commercial and residential. All properties bordering the site are characterized by commercial activity. To the west, directly across US Highway 701 Bypass, is a full service auto repair and motor fuels outlet operation, Facility ID #0-011628. A convenience store motor fuels outlet is located on the northeast corner (Facility ID #0-011608) and a documented, yet undefined, release has occurred at The Pantry No. 439 (Facility ID #012311) located on the northwest corner of the intersection. Housing developments are located approximately 500 feet to the southwest and 1000 feet to the northwest of the site.

*Craig
Best
Amoco* →

*Time
Sweet
#1* →

Water supplies in the area of investigation are provided by the City of Whiteville municipal water supply.

2.2.2 Potential Receptor Identification:

Potential receptors were identified during this investigation. The following discussion generally summarizes each with reference to Figure 2.

2.2.2.1 City of Whiteville Municipal Water Supply:

Water lines for the municipal water supply extend in the North Carolina Department of Transportation (NC-DOT) right-of-way on the south side of US Highway 74/76 Business and in the right-of-way on the east side of US Highway 701 Bypass. Two water meters are located on the north boundary of the site. An on-site water line extends to the west side of the restaurant from one of these water meters. A fire hydrant is located on the north boundary of the property across US Highway 701 Bypass.

2.2.2.2 Stormwater Sewer System:

Surface runoff enters catch basins in the southwest corner of the site, on an adjacent property located immediately south of the site, along the south side of Smith Street, and along the east side of US Highway 701 Bypass. Stormwater sewer lines extend in the NC-DOT right-of-way on the east side of US Highway 701 Bypass, under Smith Street, through the adjacent property to the south, and through the south end of the site.

2.2.2.3 Sanitary Sewer System:

Two manholes for the sanitary sewer system are located along Smith Street, with a third one located on the property immediately south of the site. Sanitary sewer lines extend from the restaurant, between the manholes and south along the east side of US Highway 701 Bypass.

2.2.2.4 Surface Water:

Surface water occurs nearest the site as Mollie Branch which is located approximately 2200 feet west of the site. Mollie Branch discharges into Soules Swamp approximately 1.5 miles south.

2.3 SITE GEOLOGY AND HYDROGEOLOGY:

2.3.1 Regional Framework: (taken from Geology and Groundwater Resources of the Southport-Elizabethtown Area, NC, by R.R. Blankenship, GW Bulletin #6, NC Department of Water Resources 1965).

The site is situated in the Atlantic Coastal Plain Province, which slopes eastward at an overall rate of less than three feet per mile. This plain is basically flat in the interstream areas, but is broken by low escarpments adjacent to the stream valleys.

The geologic formations of the region include a basement rock composed of granite gneiss, schist, and metamorphosed volcanic slate which are overlain by a series of Upper Cretaceous, Tertiary and Quaternary sediments. The Tuscaloosa Formation lays unconformably over the basement complex. This formation consists of massive clay beds interbedded with poorly sorted arkosic sands. The Tuscaloosa Formation is unconformably overlain by the Black Creek Formation. This formation contains water-bearing beds of sand and massive black clay interbedded with consolidated calcareous sandstone and impure limestone. The Peedee Formation conformably overlies the Black Creek Formation and typically consists of unconsolidated silt, sand, and massive black clay interbedded with consolidated calcareous sandstone and impure limestone.

Above the Peedee Formation is the Duplin Marl which is of late Miocene age. The Duplin Marl consists of gray shells in a matrix of gray silt and fine to medium sand. The irregular distribution and thickness of this formation results from its deposition on the eroded surface of the Peedee Formation.

Undifferentiated deposits of late Tertiary to Recent age cover the Duplin Marl.

The most important aquifers in Columbus County are the Black Creek Formation, the Peedee Formation, and the surficial deposits. The water table is generally five to ten feet below the land surface.

2.3.2 Project Specific Subsurface Characteristics:

2.3.2.1 Description of Shallow Subsurface Geology:

The site is primarily underlain by silty and sandy clays with some clay, clayey sand and coarse sand. Generally, a reddish orange sandy clay exists from 0 to 8 feet. A gray clay exists in most areas from 8 to 12 feet. A greenish gray to tan silty clay exists from 10 to 14 feet. From 14 to 33 feet the subsurface is characterized by alternating layers of dark gray clay, brownish black sandy clay, and white to gray coarse sand, as observed during the installation of telescoping well T-1.

2.3.2.2 Depth of Groundwater:

According to measurements taken on September 16, 1993, October 12, 1993, December 9, 1993, February 8, 1994 and February 15, 1994, surficial groundwater occurs at approximately 3.1 to 9.2 feet below the ground surface.

2.3.2.3 Groundwater Flow Direction:

2.3.2.3.1 Horizontal Movement:

Figures 3 and 4 illustrate water table contours based on measurements taken on September 16, 1993 and February 15, 1994 respectively. The data indicates an apparent horizontal flow direction to the southwest.

2.3.2.3.2 Vertical Movement:

The measured static water level in the telescoping well, T-1, has an elevation similar to the water levels in the shallow monitoring wells,

suggesting little gravity inducement for downward vertical flow.

2.3.2.3.3

Properties of Aquifers Under Investigation:

On February 8, 1994 slug tests were performed on monitoring wells MW-1 and MW-2 and the data collected from these tests were used to calculate the hydraulic conductivity (Hvorslev Method) and horizontal flow velocity of the surficial aquifer. The average hydraulic conductivity was calculated to be 4.805 ft/day. The average horizontal flow velocity was calculated to be 0.475 ft/day. All calculations are located in Appendix IV.

2.3.2.4

Hydrologic Effects of Subsurface Utilities and Structures:

A water table trough appears to exist at or near the locations of stormwater sewer and water lines along US Highway 701 Bypass.

Measured invert elevations of two catch basins on the east side of US Highway 701 Bypass indicate that the stormwater sewer line in this area is within one foot of the water table as measured on February 15, 1994. This observation suggests that the stormwater sewer line may periodically intersect groundwater, therefore the more permeable backfill materials may locally influence groundwater flow and contaminant transport.

The elevation of water line construction is unknown at this time. However, if this structure is

constructed at an elevation which intersects groundwater, it may also have an effect on groundwater flow and contaminant migration.

2.4 EXTENT OF CONTAMINATION:

2.4.1 Free Product Contamination:

Free product has not been detected at the site.

2.4.2 Soil Contamination:

The extent of soil contamination was not specifically addressed due to the expectation that soil remediation will occur incidental to groundwater remediation during corrective actions utilizing Vacuum Sparging (patent pending).

2.4.3 Dissolved Groundwater Contamination:

2.4.3.1 Horizontal Extent:

Ten shallow monitoring wells were installed, developed and sampled utilizing EPA Method 602 (BTEX and MTBE). The results are summarized in the Table. Figure 5 illustrates the estimated horizontal extent of dissolved gasoline constituent contamination on the basis of laboratory results.

It must be noted that while MW-9 groundwater is contaminated above NC-DEM 2L standards, there is no conclusive proof that this impact was a result of the subject release. Please see Article 2.7 - Recommendations of this report.

2.4.3.2 Vertical Extent:

The telescoping well, T-1, was sampled December 9, 1993 and analyzed according to EPA Method 602 (BTEX and MTBE). Laboratory analysis determined all compounds to be below detection limits (Table). Figure 6 illustrates the location of cross-sections A-A' and B-B'. Figures 7 and 8 illustrate hydrogeological cross-sections A-A' and B-B', respectively.

2.5 SUMMARIZED PRELIMINARY EXPOSURE ASSESSMENT:

The following presents a discussion of the immediate and long-term potential for harmful effects to human life and other environmental receptors, based on information collected to date. The information presented is limited to findings made during this study, and draws heavily upon extrapolations and assumptions which are based upon varying degrees of confidence. Therefore, while it is useful to employ such information for various purposes, it is not intended that this information be utilized to represent a complete knowledge of conditions or possible scenarios which may be best understood through long-term monitoring. Therefore, the scope of this exposure assessment is purposely narrow and summarized.

The findings of this investigation present a scenario where an end-product group of refined petroleum has been released into the shallow soils and groundwater in a Coastal Plain hydrogeological environment. Although petroleum hydrocarbons have been widely utilized as fuel for various purposes in human society, the overall health effects to man and other life forms from the exposure to such is not completely understood.

Contamination at the site has been characterized primarily as constituents found in gasoline. Generally, gasoline is composed primarily of a volatile spectrum of aromatic hydrocarbon compounds. Several compounds which have been the subject of toxicological studies are commonly used for determining the extent of contamination. One compound, benzene, has been identified by the US EPA as a carcinogen. Many of the compounds contained in gasoline have not been individually studied in detail with regard to health effects to humans or other organisms in the environment. The State of North Carolina has established standard limits for hydrocarbons in groundwater (15A NCAC 2L). The Table lists all analytical data collected from the site in context with regulatory standards. Appendix III contains published material safety data sheets for three characteristic components of gasoline (benzene, ethyl benzene and xylenes).

Identified potential environmental pathways for human exposure at this site include the municipal water supply, the stormwater sewer system, the sanitary sewer system, and any future utilization of the surficial aquifer.

2.5.1 City of Whiteville Municipal Water Supply:

This receptor is considered a possible direct route to human exposure. The danger imposed by this scenario would be the possible erosion of the water line gaskets or glued joints by hydrocarbon constituents, and the possibility of the water supply becoming impacted. These dangers are possible, yet are unlikely

to occur if the water line is constructed of materials resistant to attack by the hydrocarbon constituents and/or if the line is constructed above the hydrocarbon contact zone. Monitoring is recommended.

2.5.2 Stormwater Sewer System:

Due to the observed occurrence of groundwater, the stormwater sewer lines may possibly periodically intersect groundwater. Also, surface runoff could possibly carry contamination to the system via storm drains. The danger imposed by hydrocarbon constituents finding a route into the storm sewer would be a fire potential if concentrations were sufficiently high. The danger above is not now suggested and is considered unlikely to occur if the sewer is constructed adequately to prevent groundwater infiltration. Monitoring of the stormwater sewer is recommended. The stormwater sewer system should be periodically monitored at the nearest discharge point.

2.5.3 Sanitary Sewer System:

The sanitary sewer lines are not presumed to intersect groundwater and are not currently proximate to the identified plume. The dangers imposed by hydrocarbon constituents infiltrating the sanitary sewer would be a fire potential if concentrations were sufficiently high and the impediment of the treatment plant operation which relies on the proliferation of bacteria. These dangers are not now suggested and are considered unlikely to occur if the sewer is constructed adequately to prevent groundwater infiltration and if the plume does not migrate into the vicinity of the sewer main. Again, monitoring is recommended.

2.5.4 Future Utilization of the Surficial Aquifer:

Other potential pathways to human exposure include any future utilization of the contaminated groundwater (surficial aquifer) at the site or the adjacent properties for consumption or by the unrestricted further migration of the identified plume to downgradient off-site areas and possible effects of such migration.

Off-site migration has already occurred along the west property line. Presumably, natural biodegradation is reducing concentrations at the edges of the plume.

Overall, at this time, there do not appear to be any immediate threats to human health or safety. Throughout the corrective action process, regular monitoring should be performed in order to detect and mitigate any adverse receptor impacts prior to such impacts becoming a threat.

2.6 REMEDIATION OPTIONS:

2.6.1 Free Product:

Free product has not been detected at this site.

2.6.2 Soils:

Several options are available for the soil remediation as follows:

2.6.2.1 Excavation and Disposal:

Based upon the estimated volume of impacted soils and the fact that the parking lot is now paved, the complete excavation of impacted soils is not considered a feasible or cost-effective option.

2.6.2.2 Excavation and On-Site Treatment:

This option requires obtaining a NC-DEM permit and involves the construction and maintenance of a soil reactor on-site. Due to the costs associated with monitoring, remediation and maintaining this reactor, the limited amount of available space, and the fact that the site parking lot is now paved, this is not considered a feasible option.

2.6.2.3 Excavation and Land Application:

This option requires obtaining an NC-DEM permit and involves the application of contaminated soils to existing land area. If the application exceeds one acre, an approved Sedimentation and Erosion Control Plan would also be required. Due to these factors, the estimated volume of impacted soils, and the fact that the site parking lot is now paved, this approach is not considered feasible at this time.

2.6.2.4 Vacuum Vapor Removal:

This option would require no excavation. A vacuum system would be designed, permitted and installed to remove soil vapors in-situ. Some groundwater remediation would occur incidental to the soil clean-up. This option is considered viable.

2.6.2.5 Integrated Vapor Removal:

This approach is incorporated into groundwater clean-up and will be discussed under Vacuum Sparging (patent pending).

2.6.3 Groundwater Contamination:

Five options are presented for the remediation of groundwater contamination.

2.6.3.1 Pump and Treat:

The most widely utilized technology for remediation of groundwater contamination involves the extraction of groundwater, treatment and discharge. Many variant approaches are possible, each requiring site specific testing, design and permitting prior to installation. A discharge permit associated with the discharge from a pump and treat system would be difficult to obtain and/or comply with. After installation and initiation of the system, constant maintenance and monitoring will be required to ensure that the system is functioning properly. It is generally estimated that costs associated with preparation (with design calculation and specifications), permitting, installation, operation and monitoring would make this option unattractive based upon the limited expected benefit over time.

2.6.3.2 Variance/Reclassification of Groundwater:

Based upon our current knowledge, it is not currently feasible to attempt this approach because it is unlikely to be granted. This possibility may be further evaluated through negotiation with the NC-DEM. Recent changes in the 15A NCAC 2L standards may eventually affect the overall degree of remediation required at this site.

2.6.3.3 Monitoring Only:

A monitoring only corrective action proposal would be least expensive but is unlikely to be approved by NC-DEM.

2.6.3.4 Air Sparging:

This technology involves subjecting contaminated groundwater to sparging (aeration) through air injection. The process facilitates hydrocarbon volatilization and provides an environment for enhanced aerobic biodegradation. This technology is considered a feasible approach to corrective action at this site.

2.6.3.5 Vacuum Sparging (patent pending):

This technology was developed by Clark Environmental Services, Inc. (CES) and provides for an integrated in-situ approach to groundwater remediation which, incidentally, also provides for soil contamination removal. It involves subjecting contaminated groundwater to sparging (aeration) through the utilization of differential pressure, while inducing convective flow to the contamination plume. The process involves mass transfer of contaminants and also facilitates an enhanced biodegradational environment. This technology is considered the most feasible approach to corrective action at this site.

2.7 RECOMMENDATIONS:

In accordance with the findings of this investigation, the following recommendations are made:

- 2.7.1 Submit this report to the NC-DEM.
- 2.7.2 Implement the CAP utilizing Vacuum Sparging (patent pending) detailed in Section 3.0 of this combined report.
- 2.7.3 Formally request that the NC-DEM, Wilmington Regional Office begin assessment of potential off-site contaminant sources which could have impacted MW-9.
- 2.7.4 Conduct interim monitoring of potential receptors.

3.0 CORRECTIVE ACTION PLAN:

This Corrective Action Plan details the Vacuum Sparging (patent pending) system which is currently being installed at the subject site. CES attempted to submit a previous design of this plan under a report entitled "Remedial Action Plan for Addressing On-Site Contaminants" dated November 10, 1993, but the plan was returned, presumably, unopened by the NC-DEM, Wilmington Regional Office due to the fact that it contained trade secret and proprietary information on CES's Vacuum Sparging (patent pending) technology.

The Vacuum Sparging (patent pending) process developed by CES is considered a proprietary trade secret and, as such is not available for public disclosure. In accordance with NC-DEM instructions, a confidential disclosure of the Vacuum Sparging (patent pending) process has been filed by CES with the Central Office in Raleigh, North Carolina. This disclosure details all technical aspects of the process, including the base theories, field testing procedures and design calculations and parameters. This disclosure is available for Regional Office review as supporting documentation to this CAP.

3.1 CORRECTIVE ACTION APPROACH:

3.1.1 Free Product:

Free product has not been detected at this site.

3.1.2 Soils and Groundwater:

The existing and proposed corrective actions involve the use of a Vacuum Sparging (patent pending) system due to its multi-media application in the remediation of both soil and groundwater. The process utilizes differential pressure and density to implement mass transfer of hydrocarbon constituents from the groundwater to the atmosphere through forced subsurface water convection and sparging. Soil venting occurs incidentally due to the method of system construction.

3.2 DESIGN BASIS AND CRITERIA:

Pilot testing was performed in order to facilitate the preparation of this plan. Hydropneumatic measurements were made utilizing a portable regenerative blower. The information gathered was utilized to prepare this design. All supporting calculations are contained in the Confidential Disclosure of the Vacuum Sparging (patent pending) Process for the In-situ Remediation of Contaminated Soils and Groundwater, dated January 1994, on file with the NC-DEM, Central Office. A summary of the design calculations results is contained

within Appendix IV. Actual pilot test data and design calculations are being retained at CES's Wilmington, North Carolina office.

3.2.1 Free Product:

No free product has been detected at this site.

3.2.2 Soils and Groundwater Contamination:

The design of Vacuum Sparging (patent pending) as a comprehensive solution to hydrocarbon remediation requires the evaluation of many contributing factors, including the following (a summary of calculation results are shown in Appendix IV):

3.2.2.1 Groundwater Flow Velocity:

In order to determine and assure that the rate and extent of contaminant capture will exceed natural transport rates, groundwater velocity must be estimated based upon slug test data. Computations suggest an average groundwater velocity in undisturbed soils of approximately 0.475 ft/day. The predicted zone of remedial influence should overcome migration rates through appropriate well spacing and overlapping effects should be certain to capture contaminants. Well spacing is discussed in more detail under section 3.2.2.6 of this plan.

3.2.2.2 Mass Transfer:

Remedial effects can be estimated using rates predicted by idealized equations. Using laboratory data, the mass transfer of hydrocarbon constituents between the groundwater and air bubbles is modeled after a gas-in-liquid system proposed by Matter-Muller (1981).

$$F = Q_G H (C_G/H - C_L) [1 - \exp (K_L a V_L / H Q_L)]$$

where Q_G is gas flow rate
 C_G is inlet gas concentration
 H is the dimensionless Henry Constant
 Q_L is the liquid flow
 $K_L a$ is the overall mass transfer coefficient
 V_L is the total liquid volume
 C_L is the concentration in the liquid

This model is based on the mass transfer flux derived from the assumption of bubbles rising in a completely mixed vessel. These calculations take actual contaminant concentrations and predict the removal efficiencies from the Vacuum Sparging (patent pending) process. A removal efficiency of 9.43% was calculated to occur during each groundwater recirculation event in the Vacuum Sparging (patent pending) wells.

3.2.2.3 Liquid/Liquid Diffusion:

In terms of an unmixed system, an appropriate/reliable equation for liquid/liquid diffusion was not found in the literature. In addition, because of convective mixing in the area adjacent to the sparging well, liquid/liquid diffusion would be meaningful only in areas beyond remedial influence, and because of the probability of an exceptionally slow calculated rate, it is ignored in this design.

3.2.2.4 Convection Rates, Extent and Outflow:

Predicting convection rates, extent, and outflow is very important for accurate design; however, these processes are impossible to measure directly and difficult to model.

The potential hydrogeologic flow was calculated to be approximately 0.24 ft³/min. per foot of screen. The Vacuum Sparging (patent pending) flow was calculated to be approximately 3.67 ft³/min. per foot of screen. Thus, the comparison of the two

flows theoretically illustrates the governing parameter to be the hydrogeologic flow.

3.2.2.5 Expected Biodegradational Effects:

With the addition of air into the contaminated area the amount of free oxygen is increased. Because aerobic bacteria require free oxygen to survive, the Vacuum Sparging (patent pending) process facilitates a more suitable environment for the aerobic bacteria to degrade petroleum products.

3.2.2.6 Radial Influence and Recovery Well Spacing:

One of the most important parameters in presenting Vacuum Sparging (patent pending) as a comprehensive solution is to predict the area affected by the Vacuum Sparging (patent pending) wells. Based upon field test data, this corrective action system incorporates 14 Vacuum Sparging (patent pending) wells laid out in a grid pattern and spaced on 30 foot centers. It is believed that this spacing should provide adequate overlapping radial influence to the system to facilitate efficient site remediation and prevent further migration of petroleum constituents in the groundwater.

Figure 9 shows the Vacuum Sparging (patent pending) system layout. Figure 10 depicts the estimated area influenced by each Vacuum Sparging (patent pending) well. The wells will work to arrest further migration of the dissolved contamination plume and to remediate soils and groundwater.

3.2.2.7 Temporal Framework:

The Corrective Action Plan presented herein will be monitored over at least a three year period of operation to document the effectiveness of the system. Many of the variables associated with Vacuum Sparging (patent pending) will assist in remediation; for example, convection, mass transfer, diffusion, and biodegradation. It is

estimated that the majority of clean-up at the site will occur within three years.

3.3 DESIGN PLANS AND SPECIFICATIONS:

3.3.1 Free Product Removal:

No free product has been detected at this site.

3.3.2 Soil and Groundwater Remediation:

The selected method of soil and groundwater remediation is the Vacuum Sparging (patent pending) system. Figure 9 is a site map depicting the layout of the Vacuum Sparging (patent pending) system.

3.3.2.1 Vacuum Blower and Accessories:

The EG&G Rotron EN14BK72WL regenerative blower is capable of producing a flow of 670 ft³/min. at an approximate vacuum pressure of 66 iwg. A total flow of 670 ft³/min. is calculated from both the airflow through the soils and the airflow through groundwater sparging. Additional bleed air will be added, as necessary, to conserve blower life.

A matching EG&G Rotron in-line (dual connection) particle filter will be installed on the influent side of the blower along with a FUJI model #VV9 vacuum relief valve. Should noise become a problem an in-line (dual connection) muffler will be installed on both the inlet and outlet sides of the blower. The equipment specifications and performance charts are located in Appendix V.

3.3.2.2 Sparging Blower:

The EG&G Rotron EN505AX72ML regenerative blower is capable of producing a flow of approximately 125 ft³/min. at a pressure of 29 iwg. A total flow of 105 ft³/min. is required for sparging. Additional bleed air will be added, as necessary, to conserve blower life.

A matching EG&G Rotron particle filter/silencer will be installed on the influent side of the blower along with a FUJI model #PV5 pressure relief valve. Figure 14 is a schematic depiction of the sparging equipment. The equipment specifications and performance charts are located in Appendix V.

3.3.2.3 Piping and Fittings:

All system piping is schedule 40 PVC, in 2, 3, 4, and 6-inch diameters. Galvanized piping is used for approximately the first six feet on both the inlet and outlet sides of the blower. Control valves are installed in each of the vacuum lines, to provide additional vapor flow control. Figure 9 is a schematic depiction of the piping layout.

3.3.2.4 Trenching:

The trenches in which the piping is buried are approximately 2.5 feet wide and constructed to a depth of approximately 2.0 feet below the ground surface. Each trench can accommodate multiple vacuum lines. Figure 11 is a typical detail of the trench and vapor recovery wells at this site.

3.3.2.5 Wells:

Each Vacuum Sparging (patent pending) well is constructed of 4-inch, schedule 40 PVC and will contain eight 3/8-inch polyethylene sparging lines. Each well has been constructed individually to conform to the specifics of the geological and hydrogeological conditions at the location it is installed. However, each well is constructed with at least 2.0 feet of screen above the static water table and screened to a total depth of 14.0 feet. Figure 11 is a typical detail of the trench and vapor recovery wells at this site.

3.3.2.6 Condensate Collection:

A condensate collection chamber will be placed within the influent piping of the vacuum system in order to trap, for recovery, any airborne liquids which are present in the vapor being recovered. A float switch within the chamber

will automatically shut down the system should the liquid level within the chamber become too high. The position of the condensate chamber within the system is shown on Figure 12. Figure 13 is a detail of the condensate chamber.

3.3.2.7 Electrical Power:

The selected EG&G Rotron EN14BK72WL is a 20 HP blower requiring 230 or 460 volt, three-phase current. This blower requires approximately 20,000 watts of input power running at the optimum pressure and air flow.

The selected EG&G Rotron EN505AX72ML is a 2 HP blower requiring 230 or 460 volt, three-phase current. This blower requires approximately 2000 watts of input power running at the optimum pressure and air flow.

3.3.2.8 Safety:

The selected EG&G Rotron blowers are explosion-proof. All electrical components will be mounted in weather-proof enclosures and those exposed to volatile vapors will also be explosion-proof.

3.4 ANTICIPATED ENVIRONMENTAL DISCHARGES:

The only environmental discharge associated with the Vacuum Sparging (patent pending) process is atmospheric emissions. Calculations indicate the predicted emissions to be 102 lbs. of gasoline per day.

3.5 REQUIRED PERMITS:

Discharge emissions have been registered with the Air Quality Section of the NC-DEM. According to the NC-DEM, Wilmington Regional Office, well permits are not required for Vacuum Sparging (patent pending) wells.

3.6 IMPLEMENTATION SCHEDULE:

This corrective action system is currently under construction and is scheduled to be activated prior to April 1, 1994.

3.7 INSTALLATION PROCEDURES:

The general procedure for installation of a Vacuum Sparging (patent pending) system is as follows:

- 3.7.1 Cut through concrete/asphalt and aggregate base coarse at the surface as necessary and excavate trenches.
- 3.7.2 Install Vacuum Sparging (patent pending) wells.
- 3.7.3 Set system piping and control valves.
- 3.7.4 Set traffic boxes.
- 3.7.5 Backfill trench.
- 3.7.6 Install system equipment.
- 3.7.7 Complete all electrical connections.
- 3.7.8 Start and test system.
- 3.7.9 Adjust sparging lines and control valves.

3.8 START-UP/ADJUSTMENTS/INITIAL MONITORING:

During the start-up of the Vacuum Sparging (patent pending) system, many adjustments and checks will be made including the following:

- 3.8.1 Depth of sparging lines.
- 3.8.2 Pressures at the blower and at the wells and other points within the system.
- 3.8.3 All airflows and velocities to maximize efficiency.

3.9 PROPOSED MONITORING PROGRAM/REEVALUATIONS:

After the construction and start-up of the Vacuum Sparging (patent pending) system, the following monitoring schedule is recommended:

3.9.1 Monthly:

- 3.9.1.1 Check for condensation collection, and check and clean float switch.
- 3.9.1.2 Read and record pressure gauges.
- 3.9.1.3 Check airflows and make adjustments to sparging blower and vacuum blower.
- 3.9.1.4 Check and clean particle filter.

3.9.2 Quarterly:

- 3.9.2.1 Measure groundwater depth in all monitoring wells and construct groundwater contour maps.
- 3.9.2.2 Sample/analyze all indicator wells.
- 3.9.2.3 Compile all data from previous bi-weekly and monthly monitoring trips.
- 3.9.2.4 Prepare/submit a Quarterly Monitoring Report.

3.10 **TERMINATION AND CLOSURE:**

The Vacuum Sparging (patent pending) system should continue to operate until the established target levels are achieved, or until closure is negotiated with the NC-DEM.

4.0 **LIMITATIONS:**

Information obtained and presented as part of this investigation is based on available data in an effort to understand and/or correct an existing problem. The validity of any resulting conclusions is limited by methodological constraints and by the lack of a statistically significant number of data points.

Therefore, there is no warranty, expressed or implied, that additional or new information and/or additional measures will not be required to ultimately solve the problem. Additionally, Clark Environmental Services, Inc. (CES) assumes no responsibility for the validity of subjective or interpolated interpretations, whether or not implied or indicated although an attempt is made to qualify such areas.

TABLE

**SUMMARY OF LABORATORY ANALYSIS ON GROUNDWATER SAMPLES
UTILIZING EPA METHOD 602 PLUS MTBE**



TABLE**SUMMARY OF LABORATORY ANALYSIS ON GROUNDWATER SAMPLES
UTILIZING EPA METHOD 602 PLUS MTBE**

FORMER DAWSEY'S EXXON
WHITEVILLE, NORTH CAROLINA
CES PROJECT #93134

WELL #	SAMPLING DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	TOTAL BTEX	MTBE	NCAC 2L GW QUALITY VIOLATION
MW-1	09/10/93	2480	3850	560	1800	8690	1360	YES
MW-2	09/10/93	2600	1970	520	1420	6510	1300	YES
MW-3	09/10/93	2800	3400	890	2300	9390	1460	YES
MW-4	09/10/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-4	12/08/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-5	09/10/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-6	10/12/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-7	12/09/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-8	12/09/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
MW-9	02/08/94	290.0	413.0	374.0	1,360.0	2,437.0	93.0	YES
MW-10	02/08/94	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
T-1	12/09/93	<0.2	<0.2	<0.2	<0.2	-	<0.2	NO
NCAC 2L STANDARDS	-	1.0	1000.0	29.0	530.0	-	200.0	-

NOTES:

ALL QUANTITIES ARE IN PARTS PER BILLION (ppb)

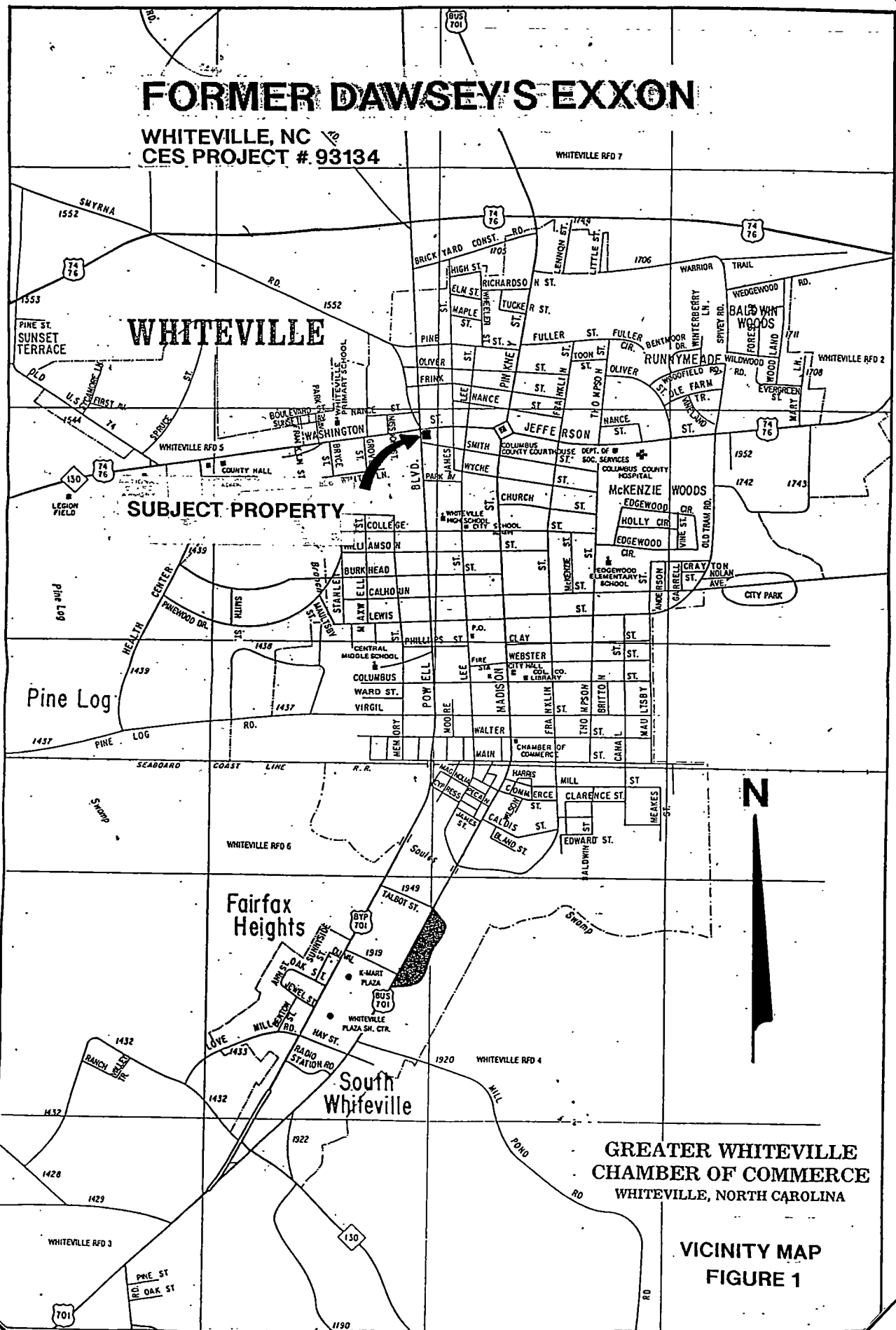
< = LESS THAN OR BELOW DETECTABLE LIMITS

FIGURES



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT #. 93134



WHITEVILLE

SUBJECT PROPERTY

Fairfax Heights

South Whiteville

**GREATER WHITEVILLE
CHAMBER OF COMMERCE**
WHITEVILLE, NORTH CAROLINA

**VICINITY MAP
FIGURE 1**



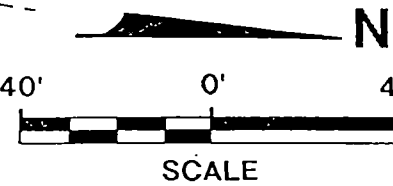
FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

R/W

CT&T MANWAY

SEE NOTE



(US HWY 701 BYPASS) POWELL BLVD.

RAILROAD SPIKE IN POWER POLE

WASHINGTON STREET (US HWY 74-76 BUSINESS)

LEGEND

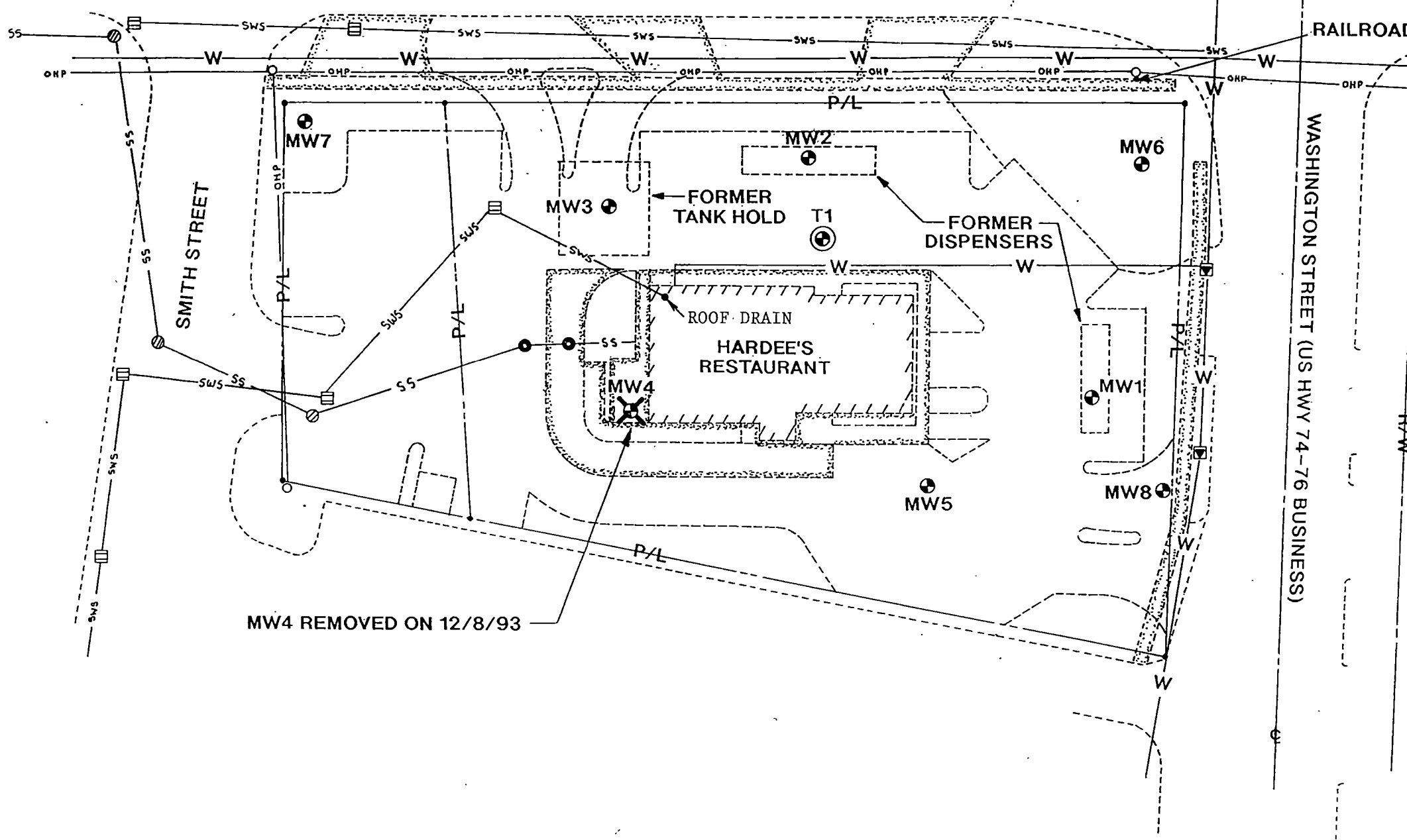
- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- ⊙ SANITARY SEWER
- ⊞ CATCH BASIN
- ⊠ WATER METER
- POWER POLE
- ⊕ MONITORING WELL
- ⊕ TELESCOPING WELL
- ⊞ DROP INLET
- ⊕ RECOVERY WELL
- ⊕ FIRE HYDRANT
- ⊕ CLEAN OUT

NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

SITE MAP
FIGURE 2

SMITH STREET

MW4 REMOVED ON 12/8/93

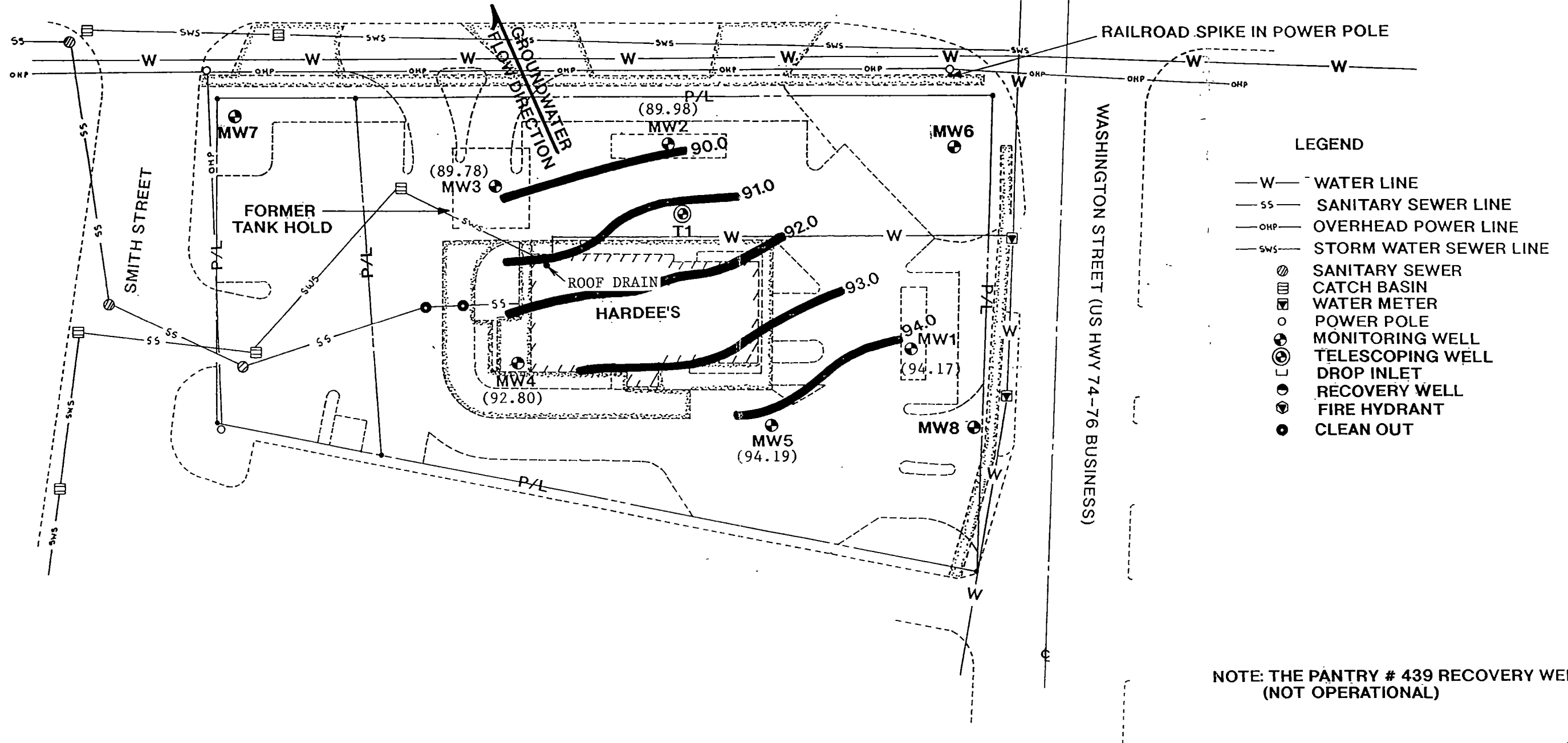
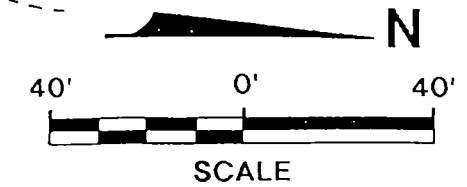


FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

(US HWY 701 BYPASS) POWELL BLVD.

SEE NOTE

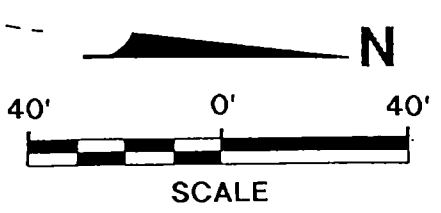
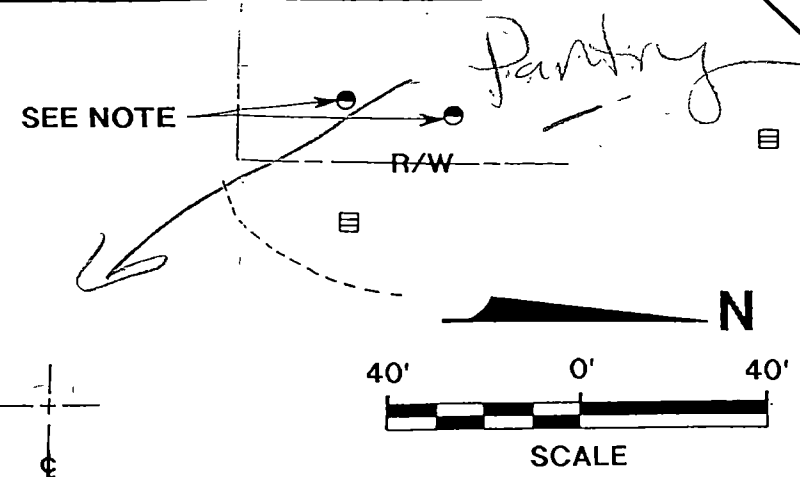
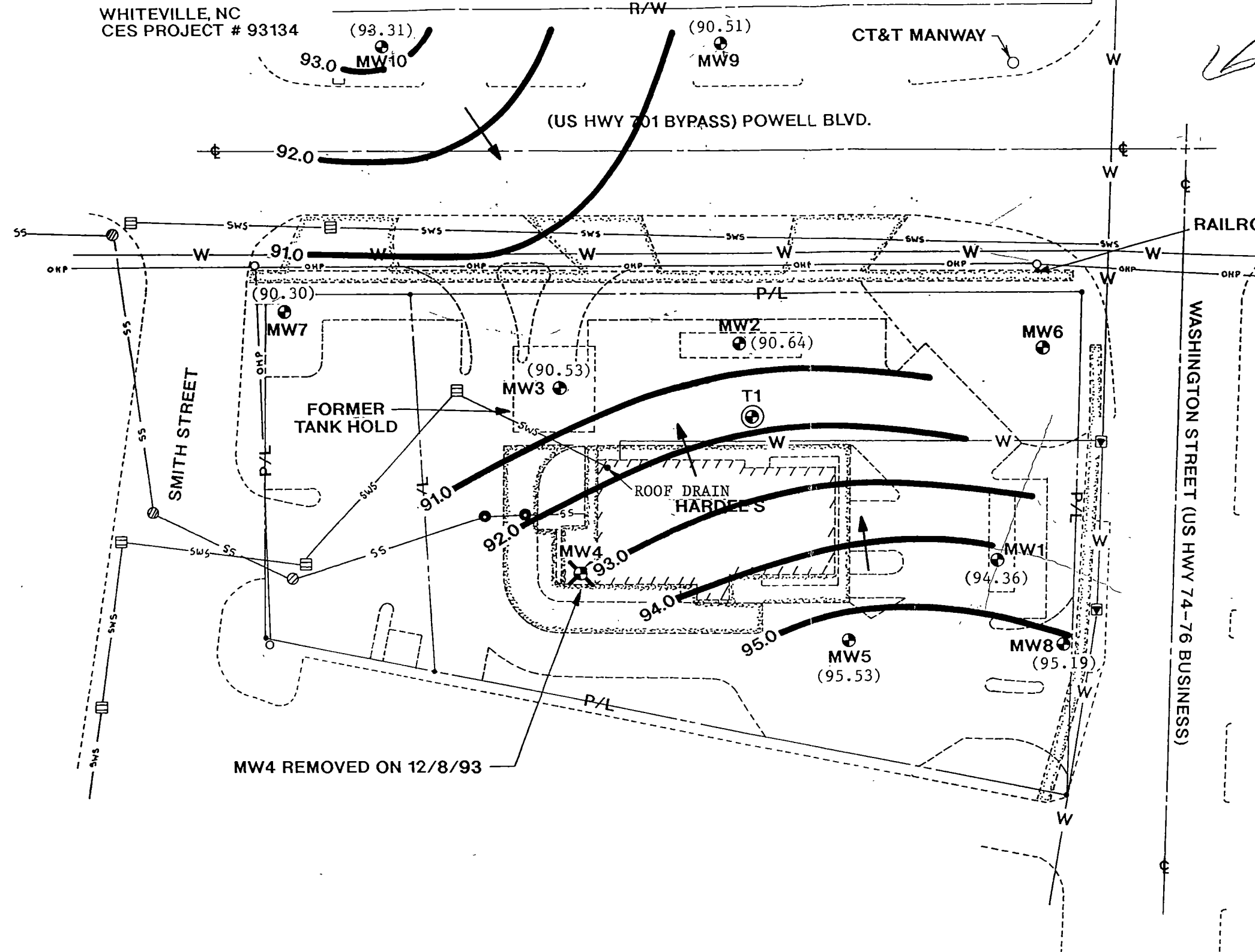


WATER TABLE MAP
SEPTEMBER 16, 1993
FIGURE 3



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



- LEGEND**
- W — WATER LINE
 - SS — SANITARY SEWER LINE
 - OHP — OVERHEAD POWER LINE
 - SWS — STORM WATER SEWER LINE
 - ⊙ SANITARY SEWER
 - ⊞ CATCH BASIN
 - ⊠ WATER METER
 - POWER POLE
 - MONITORING WELL
 - ⊕ TELESCOPING WELL
 - ⌋ DROP INLET
 - ⊙ RECOVERY WELL
 - ⊙ FIRE HYDRANT
 - CLEAN OUT
- CONTOUR INTERVAL = 1.0'
- ➔ DIRECTION OF APPARENT GROUNDWATER FLOW DIRECTION

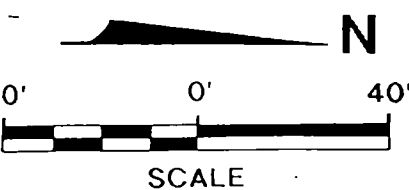
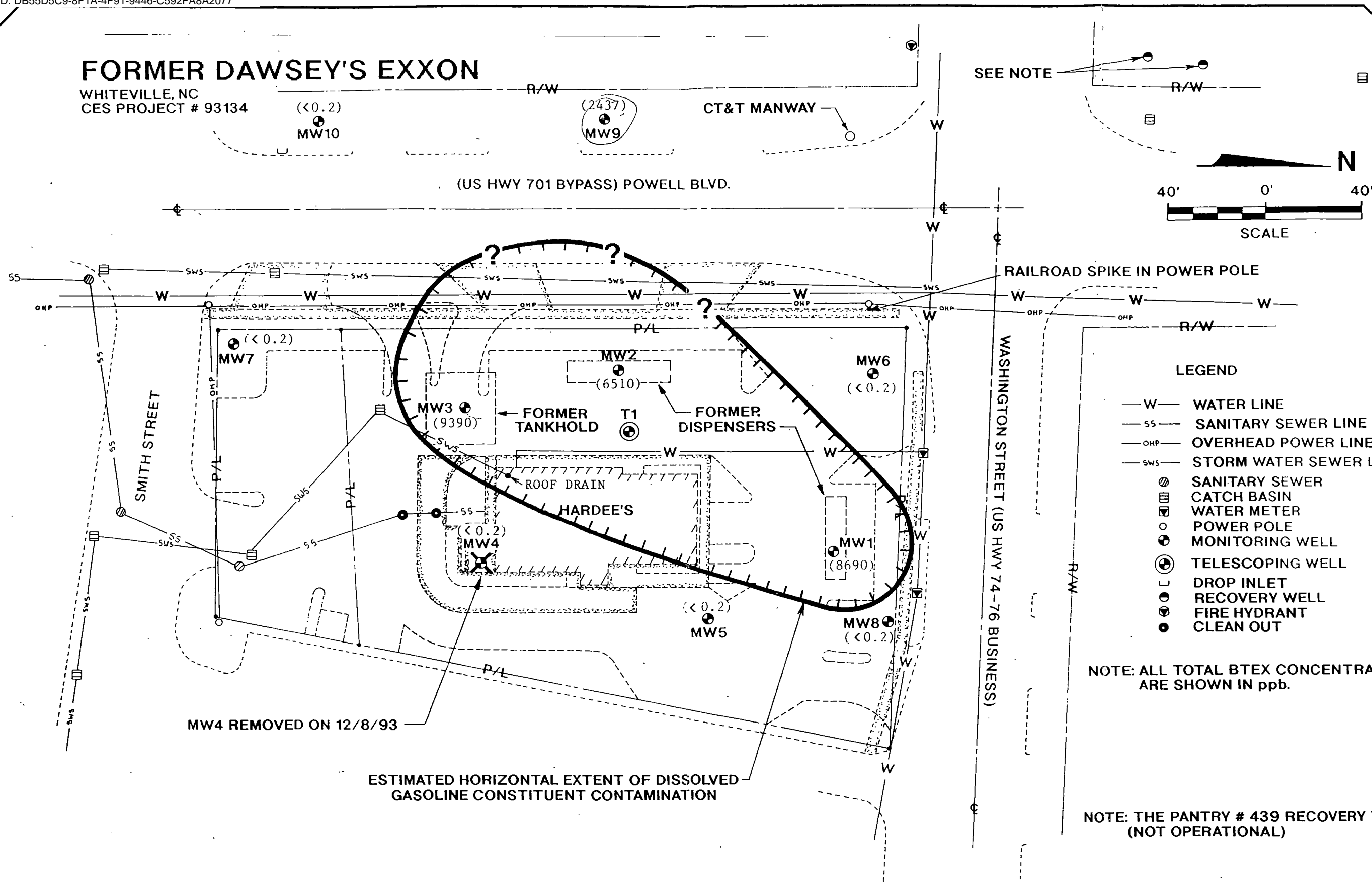
NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

WATER TABLE MAP
FEBRUARY 15, 1994
FIGURE 4



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



LEGEND

- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- ⊗ SANITARY SEWER CATCH BASIN
- ⊠ WATER METER
- POWER POLE
- ⊙ MONITORING WELL
- ⊕ TELESCOPING WELL
- ⌋ DROP INLET
- ⊖ RECOVERY WELL
- ⊙ FIRE HYDRANT
- CLEAN OUT

NOTE: ALL TOTAL BTEX CONCENTRATIONS ARE SHOWN IN ppb.

NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

MW4 REMOVED ON 12/8/93

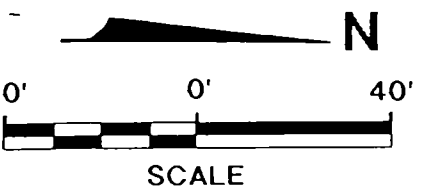
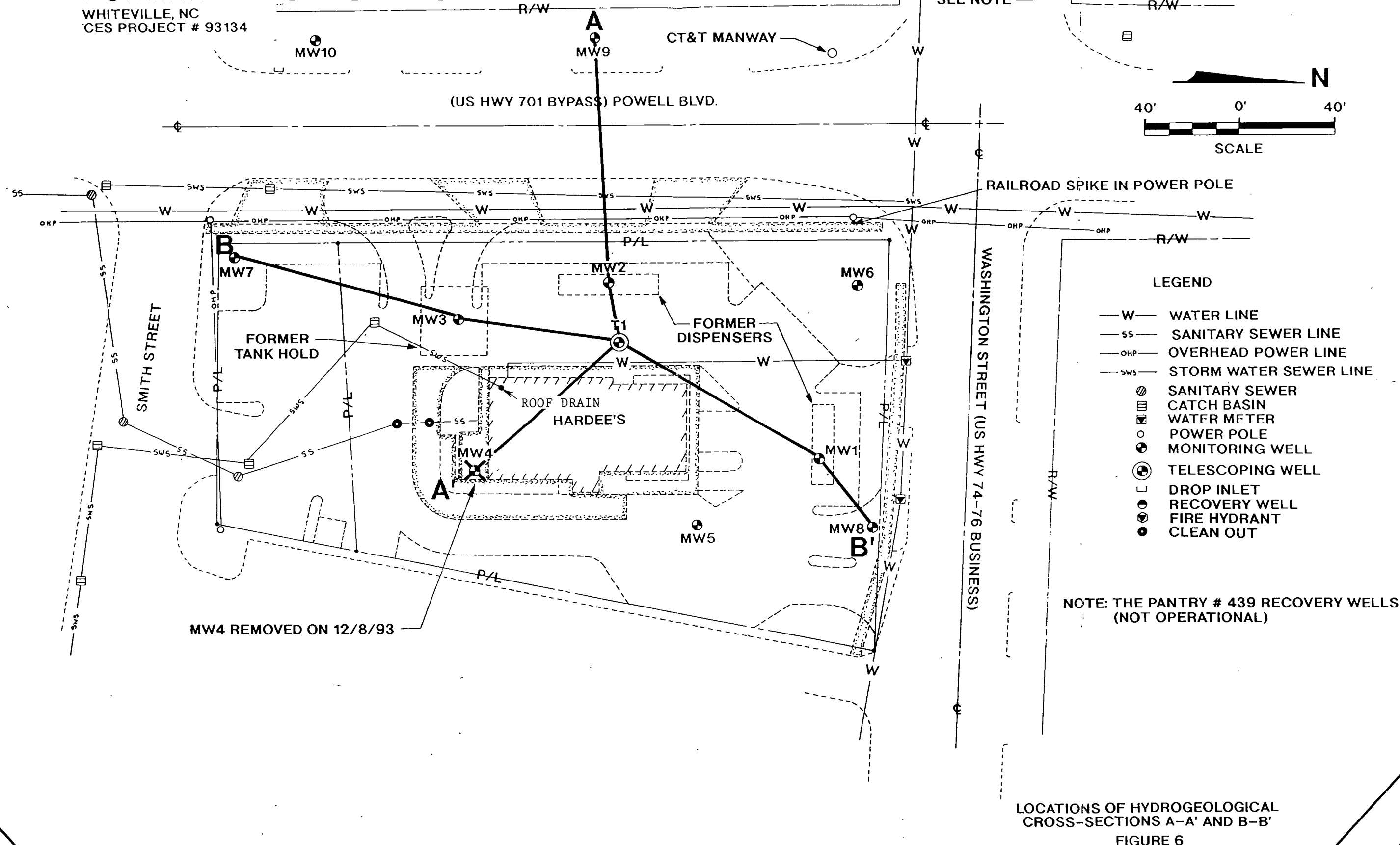
ESTIMATED HORIZONTAL EXTENT OF DISSOLVED GASOLINE CONSTITUENT CONTAMINATION

ESTIMATED HORIZONTAL EXTENT OF GROUNDWATER CONTAMINATION
FIGURE 5



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



- LEGEND**
- W — WATER LINE
 - SS — SANITARY SEWER LINE
 - OHP — OVERHEAD POWER LINE
 - SWS — STORM WATER SEWER LINE
 - ⊙ SANITARY SEWER CATCH BASIN
 - ⊠ WATER METER
 - POWER POLE
 - ⊕ MONITORING WELL
 - ⊕ TELESCOPING WELL
 - ⌋ DROP INLET
 - ⊙ RECOVERY WELL
 - ⊙ FIRE HYDRANT
 - CLEAN OUT

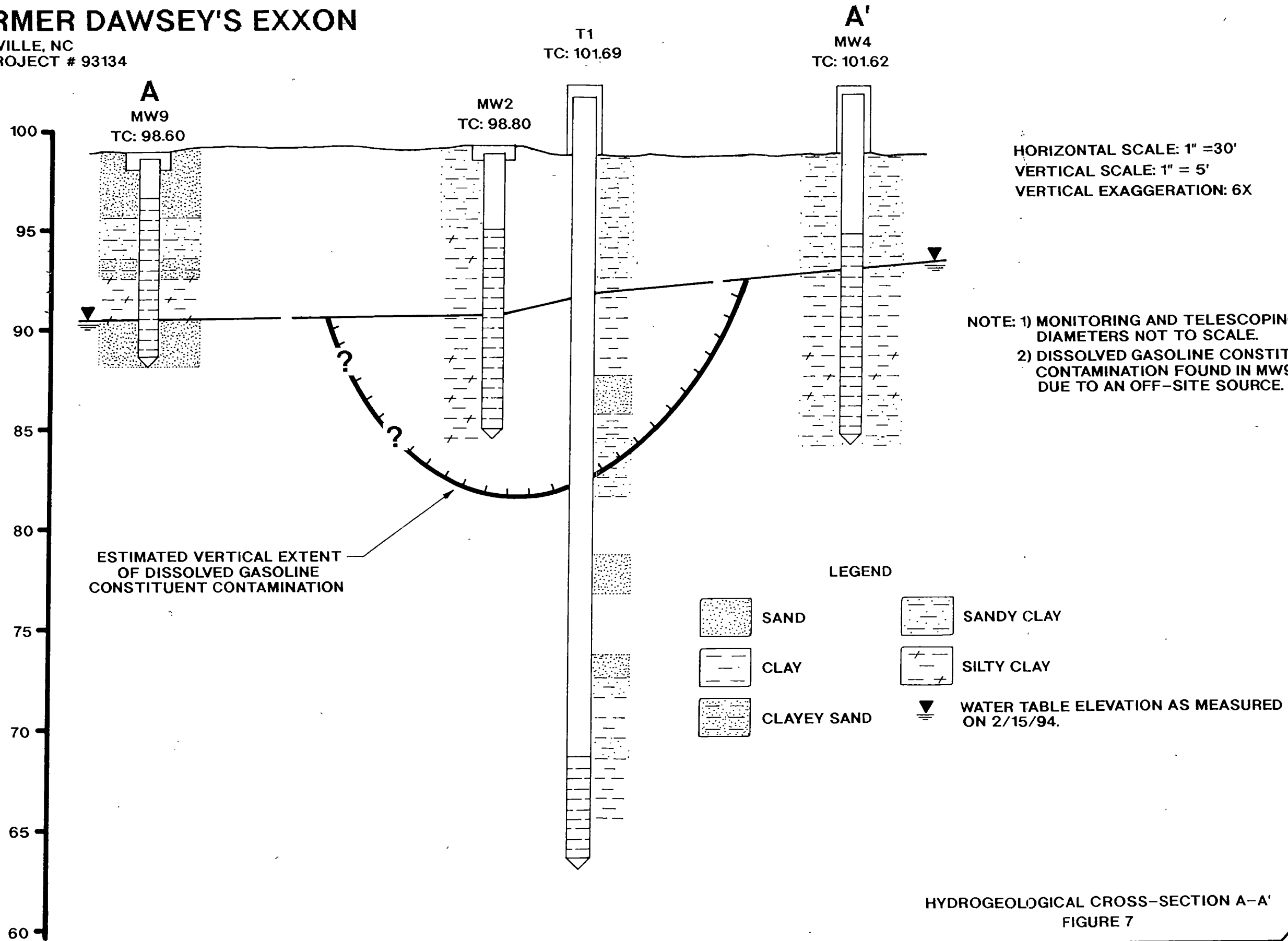
NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

LOCATIONS OF HYDROGEOLOGICAL CROSS-SECTIONS A-A' AND B-B'
FIGURE 6



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

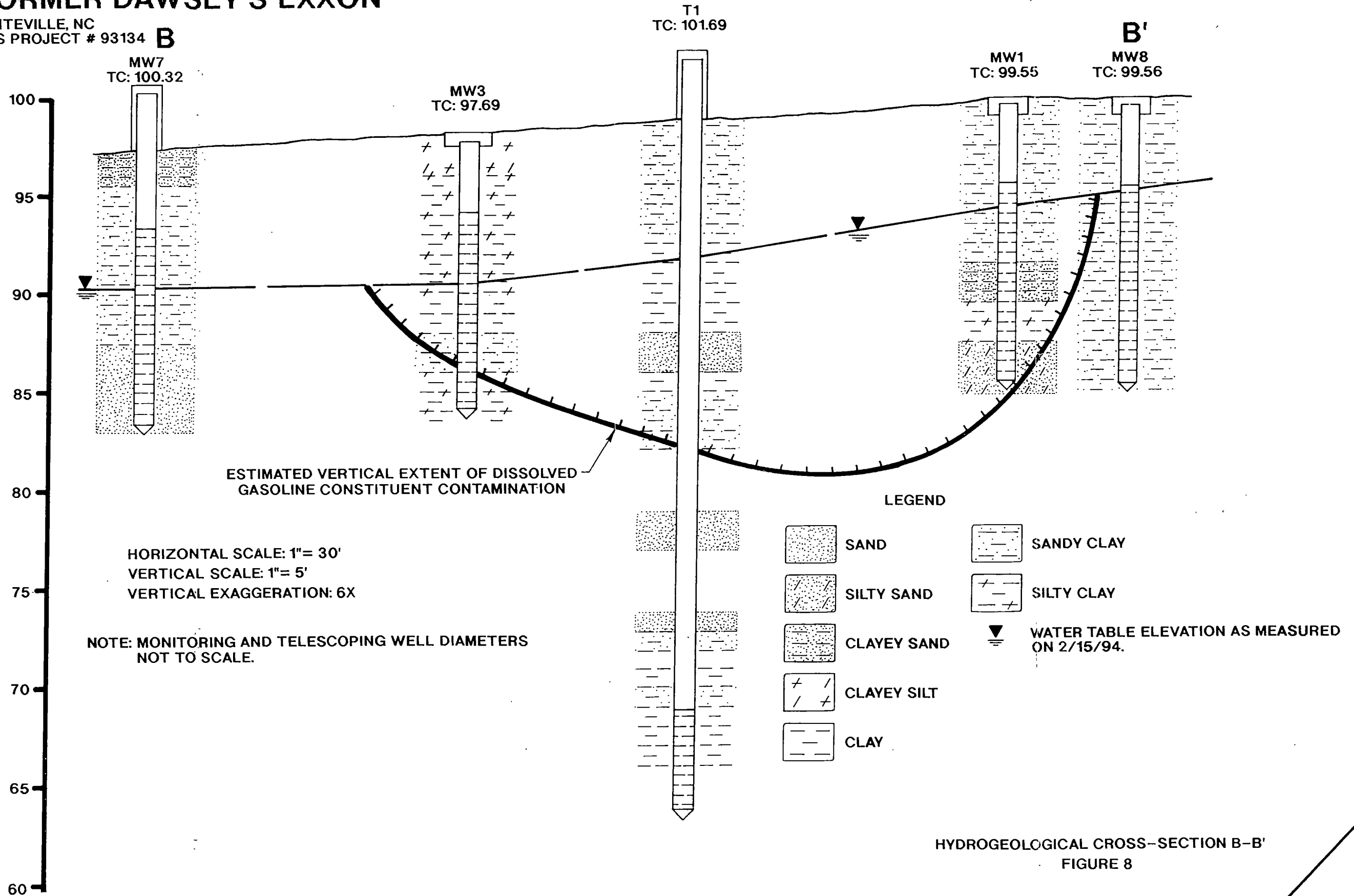


HYDROGEOLOGICAL CROSS-SECTION A-A'
FIGURE 7



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134 **B**



HORIZONTAL SCALE: 1"= 30'
 VERTICAL SCALE: 1"= 5'
 VERTICAL EXAGGERATION: 6X

NOTE: MONITORING AND TELESCOPING WELL DIAMETERS NOT TO SCALE.



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

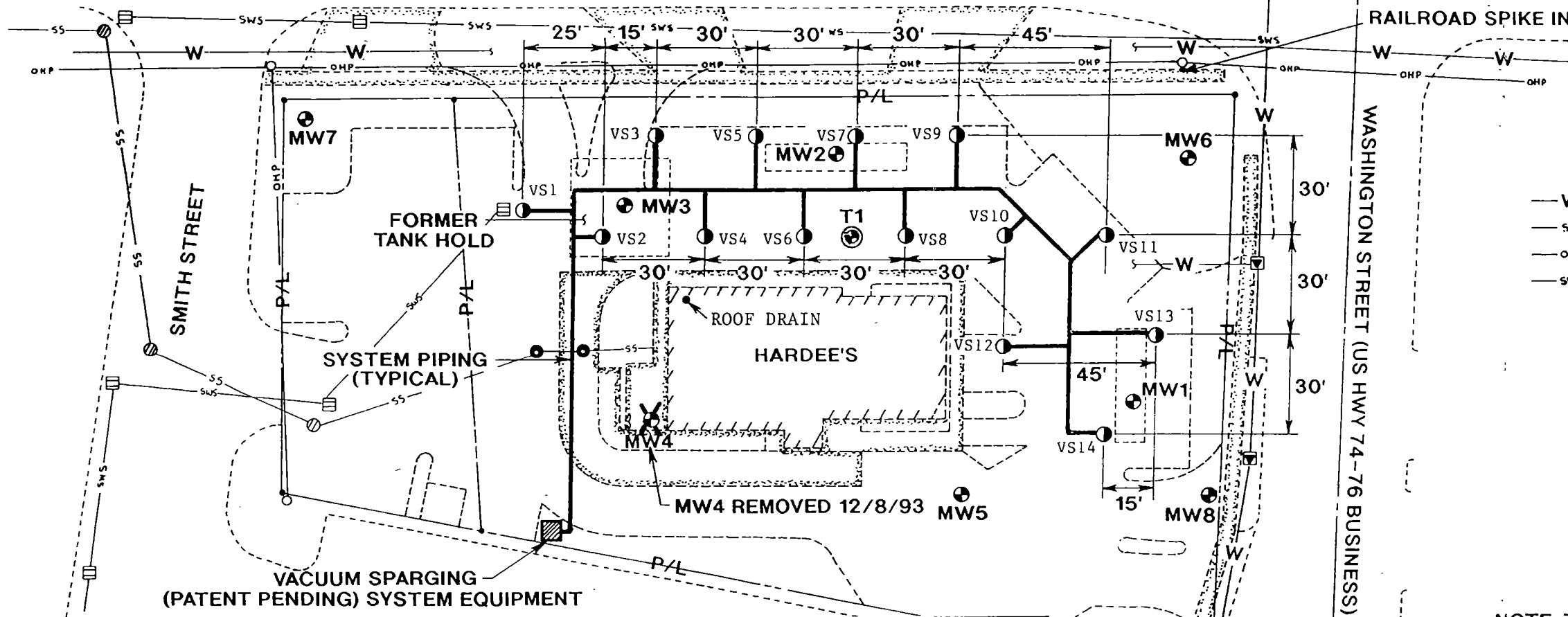
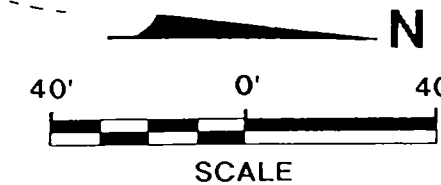
CT&T MANWAY

SEE NOTE

MW10

MW9

(US HWY 701 BYPASS) POWELL BLVD.



LEGEND

- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- SANITARY SEWER CATCH BASIN
- WATER METER
- POWER POLE
- MONITORING WELL
- VACUUM SPARGING WELL
- ⊙ TELESCOPING WELL
- ⌋ DROP INLET
- RECOVERY WELL
- FIRE HYDRANT
- CLEAN OUT

NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

VACUUM PIPING SCHEDULE		PRESSURE PIPING SCHEDULE	
VACUUM PIPING SIZE	LOCATION	PRESSURE PIPING SIZE	LOCATION
6"	VACUUM HEADER PIPING FROM BLOWER TO VS5	3"	PRESSURE HEADER PIPING FROM BLOWER TO VS5 AND ALL BRANCH LINES CONNECTING MAIN HEADER PIPING AND WELLS
4"	VACUUM HEADER PIPING FROM VS5 TO VS11		
3"	VACUUM HEADER PIPING FROM VS11 TO VS12	2"	PRESSURE HEADER PIPING FROM VS5 TO VS14 AND ALL BRANCH LINES CONNECTING MAIN HEADER PIPING AND WELLS
2"	VACUUM HEADER PIPING FROM VS12 TO VS14 AND ALL BRANCH LINES CONNECTING MAIN VACUUM HEADER PIPING AND WELLS		

NOTE: ALL PIPING IS SCHEDULE 40 PVC

AS-BUILT VACUUM SPARGING (PATENT PENDING) WELL LAYOUT AND PIPING SCHEMATIC

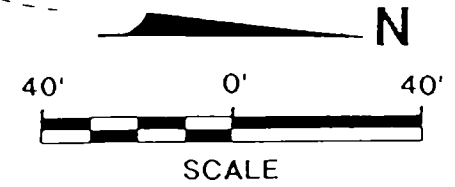
FIGURE 9



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

SEE NOTE: 2)



(US HWY 701 BYPASS) POWELL BLVD.

RAILROAD SPIKE IN POWER POLE

WASHINGTON STREET (US HWY 74-76 BUSINESS)

LEGEND

- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- ⊙ SANITARY SEWER
- ⊞ CATCH BASIN
- ⊠ WATER METER
- POWER POLE
- ⊕ MONITORING WELL
- ⊙ VACUUM SPARGING WELL
- ⊙ TELESCOPING WELL
-] DROP INLET
- ⊙ RECOVERY WELL
- ⊕ FIRE HYDRANT
- CLEAN OUT

NOTE: 1) EFFECTIVE AREA BASED ON AN ESTIMATED 15' RADIUS OF INFLUENCE.

2) THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

VACUUM SPARGING (PATENT PENDING) SYSTEM EQUIPMENT

MW4 REMOVED ON 12/8/93

LIMITS OF ESTIMATED RADIUS OF INFLUENCE (TYPICAL)

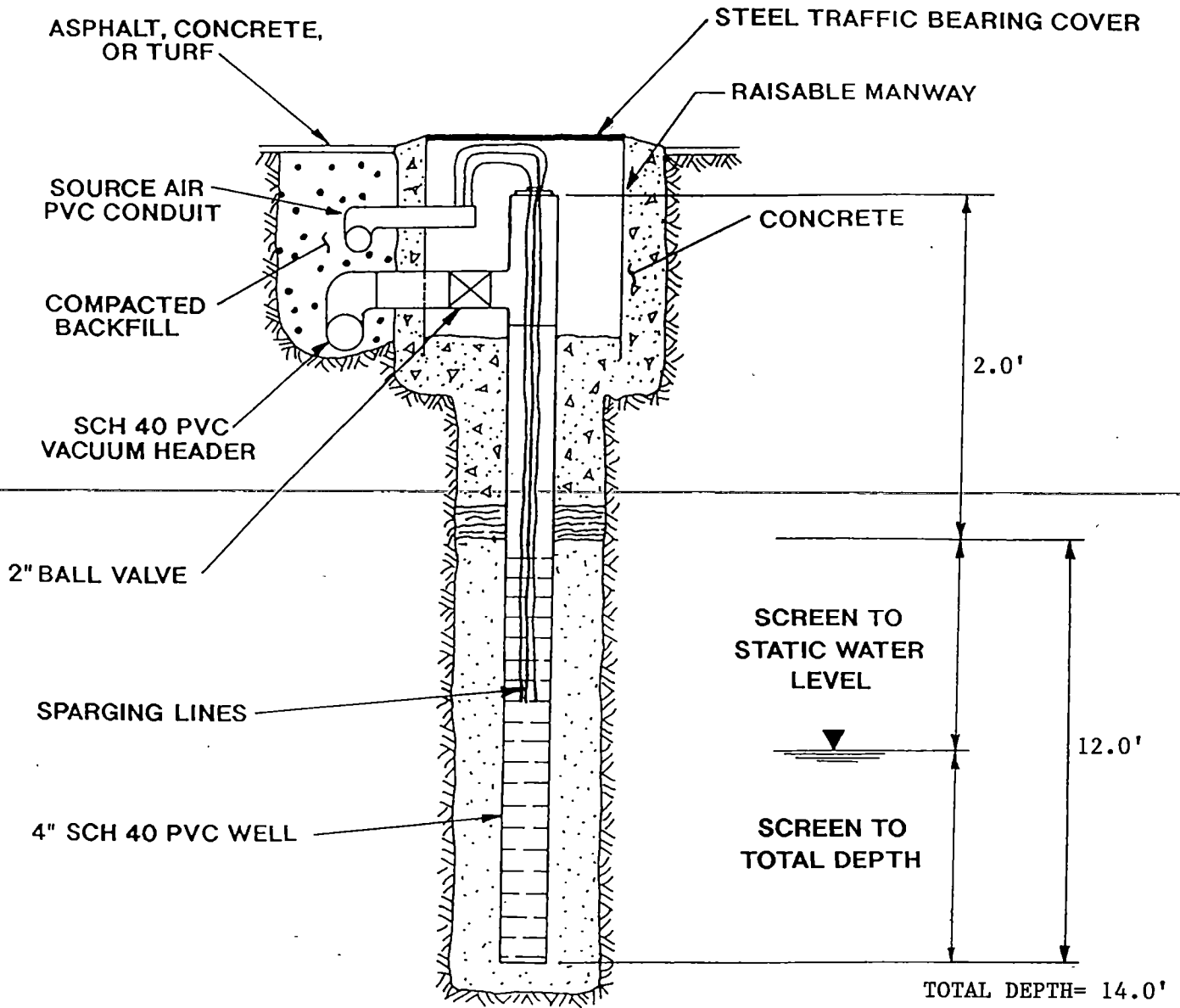
ESTIMATED AREA INFLUENCED BY EACH VACUUM SPARGING (PATENT PENDING) WELL

FIGURE 10



FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

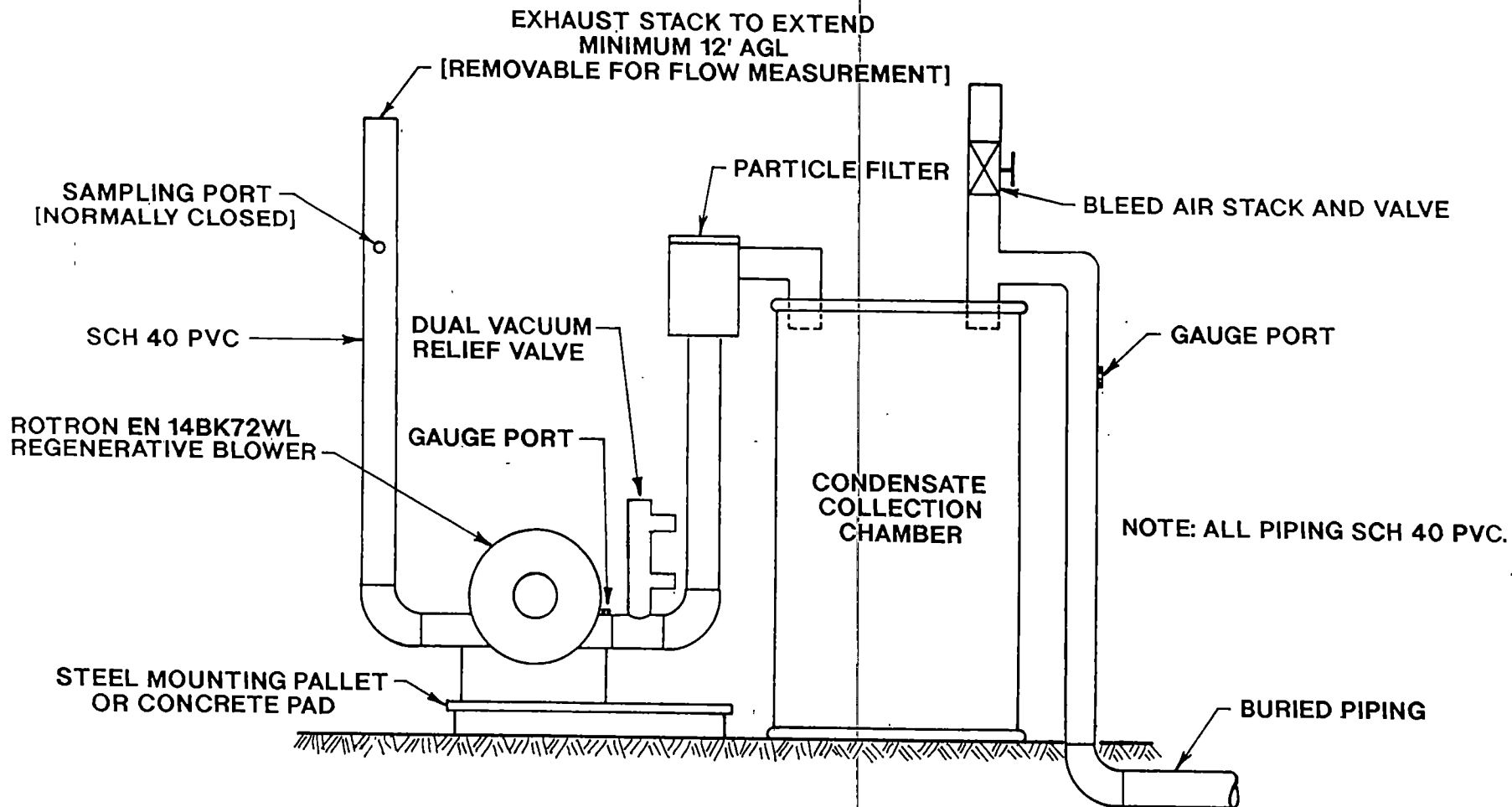


TRENCH AND VAPOR RECOVERY WELL DETAIL

NOT TO SCALE
FIGURE 11

FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



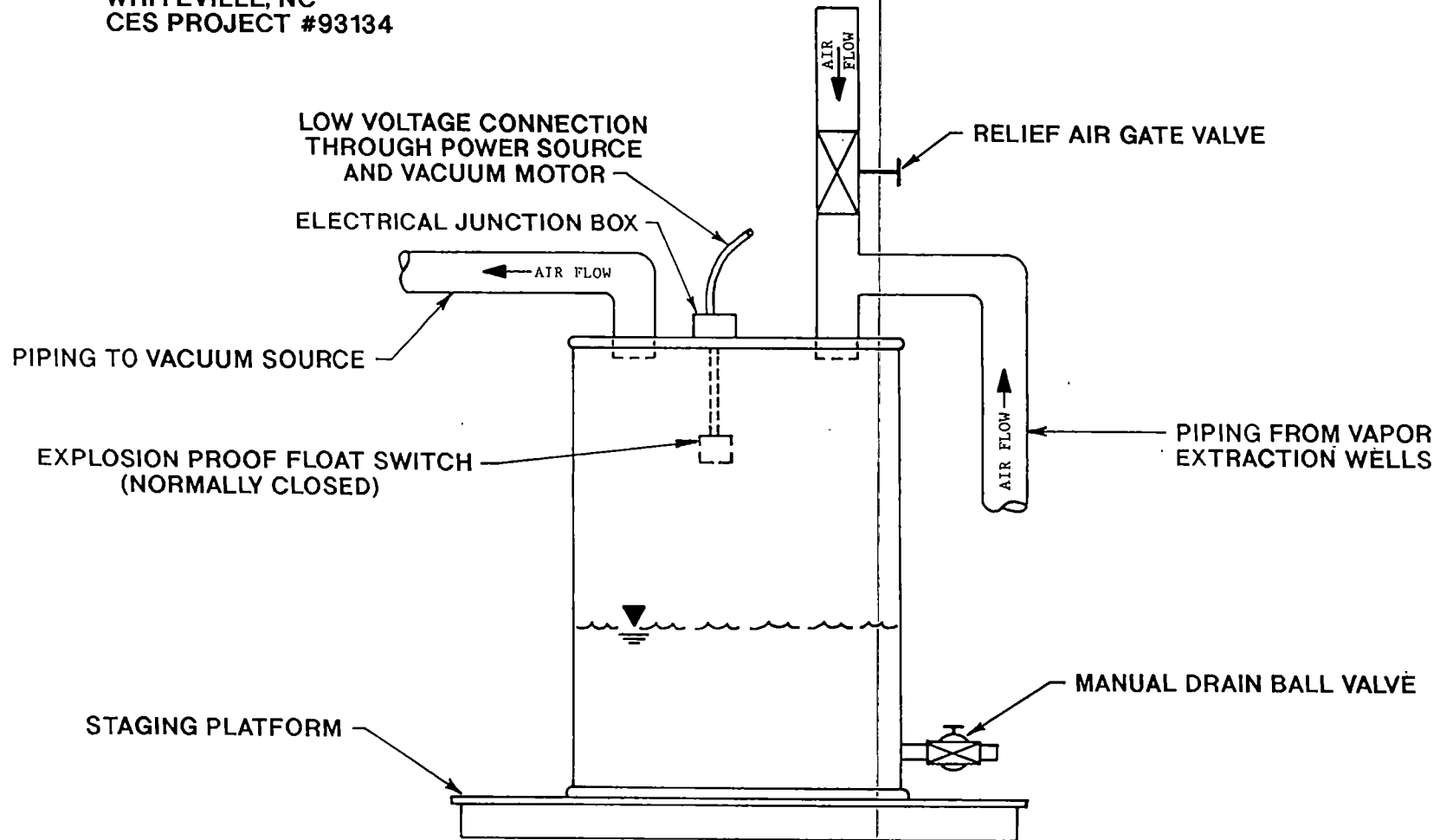
VACUUM SYSTEM EQUIPMENT SCHEMATIC

NOT TO SCALE

FIGURE 12

FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT #93134



CONDENSATE COLLECTION CHAMBER

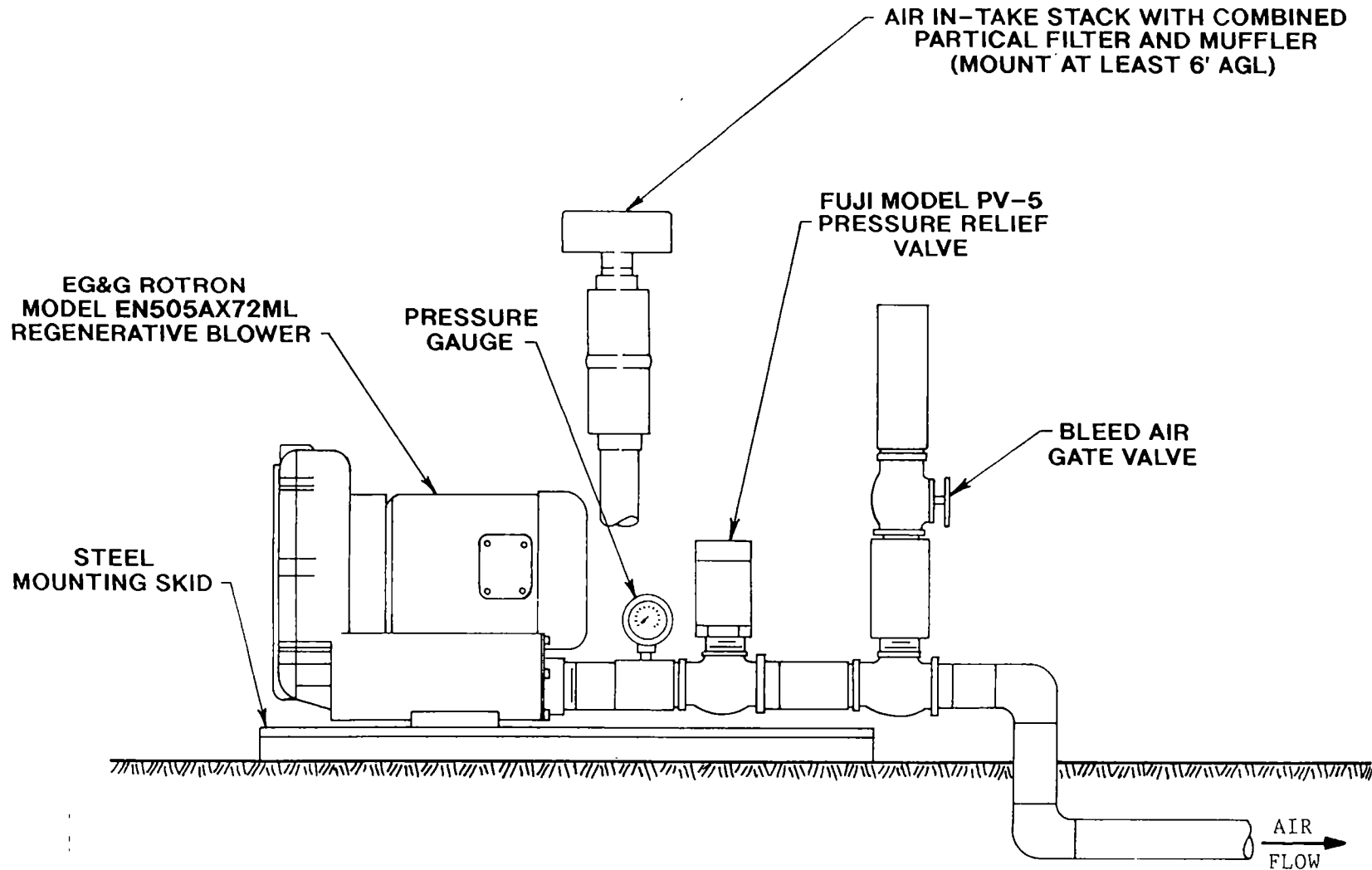
NOT TO SCALE

FIGURE 13

FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134

CLARK ENVIRONMENTAL SERVICES, INC.



SPARGING SYSTEM EQUIPMENT SCHEMATIC

NOT TO SCALE

FIGURE 14



APPENDICES



APPENDIX I
STANDARD METHODS



STANDARD METHODS FOR CONDUCTING SUBSURFACE ENVIRONMENTAL INVESTIGATIONS

1.0 DATA COLLECTION:

1.1 PROJECT BACKGROUND:

Historical information relevant to comprehensive subsurface investigation is generated through a wide spectrum of potential sources. Those most often utilized as credible sources include, but are not limited to, the following:

- 1.1.1 Correspondence and/or conversations with clients, regulatory officials and attorneys;
- 1.1.2 Regulatory mandates;
- 1.1.3 Pre-existing reports and other technical data;
- 1.1.4 Public records;
- 1.1.5 Documented eyewitness accounts;
- 1.1.6 Site reconnaissance.

1.2 POTENTIAL RECEPTOR SURVEYS:

Potential plume receptor data is generated on a site-specific basis. The scope of information is based upon the intended level of investigation. The availability of data is dependent, to differing degrees, upon the existence and accuracy of public and private record keeping, and on property ingress and egress. Generally, an attempt is made to facilitate a reasonable determination of possible environmental impacts in the context of the investigation being conducted, with the goal of adequate and appropriate site assessment and corrective action planning. Potential receptors are identified and surveyed/evaluated in the context of individual relevance and/or regulatory mandate or guidance.

1.3 SITE SURVEYS:

Physical surveys are utilized in the development of a horizontal and vertical project database. The data is often used to construct maps, to assist in making hydrogeologic determinations, and to aid in corrective action planning.

1.3.1 Horizontal Control:

Horizontal survey data is compiled using a possible combination of methods. Usually standard field and computational methods are employed. However, existing survey maps and/or photogrammetric techniques may be utilized, or a combination of existing data and field generated information may be used.

1.3.2 Vertical Control:

Vertical survey data is utilized primarily for establishing hydrogeologic control, and for evaluating topographic characteristics when necessary. The datum plane is generally assumed, except as otherwise noted. Assumed benchmarks are generally chosen to correspond with the approximate ground level, and vertical control is generally carried to an accuracy of +/- 0.01'.

1.4 DRILLING/HAND AUGERING AND MONITORING WELL/RECOVERY WELL/PIEZOMETER INSTALLATION:

Drilling, hand augering and subsurface installations are accomplished in accordance with site-specific requirements, regulatory requirements and feasibility considerations. The method employed at a specific site is tailored to the situation. Prior to any drilling or well construction activities, all necessary permits are obtained in accordance with federal, state and local requirements. All applicable licensing and bonding requirements are also fulfilled prior to beginning any work. Any boreholes purposely conducted at off-site locations are previously permitted through ingress/egress agreements with affected property owners or their agents.

1.4.1 Drilling Methods:

The following drilling methods are utilized:

1.4.1.1 Hand Augering:

Hand augering is commonly employed where economically, scientifically and/or situationally feasible. Hand augers typically produce 3" to 5" holes.

1.4.1.2 Auger Drilling:

Auger drilling is most often utilized in subsurface investigations. A truck or trailer mounted rig is usually employed and continuous five foot auger flights of varying configurations are used to produce the borehole. Sampling is often accomplished through hollow stem type augers. Auger selection is based on site-specific requirements.

1.4.1.3 Rotary Drilling:

Air or mud rotary drilling may be utilized for special applications where necessary or appropriate. Rotary drilling is usually preferred and often utilized for telescoping well installations.

1.4.1.4 Other Drilling Methods:

Other methods such as coring, cable tool, truck mounted bucket augering, hammer drilling, and reverse rotary are not commonly utilized except under special circumstances.

1.4.2 Decontamination:

Drilling tools are thoroughly cleaned between boreholes to prevent cross-contamination. Depending upon site-specific circumstances, cleaning methods may include steam cleaning, detergent wash, nitric acid rinsing and deionized water or analyte free water rinsing.

1.4.3 Soil Sample Collection/Borehole Monitoring:

Typically, soil samples are retrieved using a split-spoon device at five foot intervals. Cuttings and penetration rates are continuously monitored and additional samples are taken when appropriate. Grab samples may be obtained utilizing clean sampling equipment, new latex gloves, and are containerized in sealable plastic bags. The samples are then allowed to volatilize for approximately ten minutes prior to field screening. Composite samples may be obtained and a complete description of the collection procedure is recorded in the field book.

1.4.4 Well Installation:

Wells/piezometers are typically constructed utilizing threaded PVC casing and screen. Glues and cements are not used. Stainless steel or Teflon materials may also be used if site-specific conditions dictate.

Filter packs are selected to be compatible with screen slot characteristics. Bentonite is utilized to seal the borehole above the filter pack and grout is used to fill the remaining annulus. Well diameter and protective covers are chosen specific to site conditions. Well construction records are prepared from field notes. A well tag is affixed to the well head and includes the project name, driller's license number, borehole number, date of installation, total depth, casing depth, well diameter, screened-, sand-, bentonite-, and grout-interval and static water level. The well is secured with a locking cap.

1.4.5 Well Development:

Under appropriate circumstances, wells are developed by overpumping, surging or bailing. Any contaminated development water is temporarily stored on-site for proper disposal. For large volumes of contaminated water, other site-specific arrangements may be made. Sampling is conducted a minimum of 24 hours following well installation and development.

1.4.6 Boring Logs:

All boreholes are logged for geological properties. Boring logs include the project name, hole number, date of boring and on-site geologist's name. Soil classification, soil description, relative wetness and photoionization detection readings are recorded for all split-spoon and grab samples obtained to total depth.

1.5 HYDROGEOLOGIC DATA:

Many methods are utilized for obtaining hydrogeologic data. Those methods most commonly utilized are as generally described below:

1.5.1 Regional Framework:

Information relating to the regional geological scope are generally compiled from existing published literature; however, previous

technical reports, unpublished reports and personal communications with qualified Geologists may also be utilized.

1.5.2 Site Characteristics:

Most site information is generated through investigations on-site, although previous work proximal to the area of investigation may also be utilized. Borehole descriptions are important for making interpretations with respect to contacts, lithostratigraphic gradations, facies changes, fractures, faults, cleavage and diagenetic porosity and permeability modifications. Geophysical methods may also be employed.

1.5.3 Groundwater Measurements:

Groundwater measurements include physical and chemical qualitative and quantitative parameters. There are many procedures for making groundwater determinations in the field, including, but not limited to, those listed below:

1.5.3.1 Water Well Levels:

Water levels are primarily measured using pre-cleaned probes or tapes in conjunction with water and gas finding pastes. Measurements are usually made to an accuracy of +/- 0.01'. Floating products are measured and a specific gravity determination is made for each product type. A specific gravity adjustment is then used to calculate true hydraulic grade. Well measurements are combined with vertical survey data to calculate relative groundwater elevations. Transducers, bubbler lines or other methods may also be used under special circumstances to make water level measurements. All water level measuring equipment is decontaminated prior to measuring subsequent wells.

1.5.3.2 Aquifer Tests:

Various aquifer tests may be utilized to characterize aquifer parameters. These tests may include, but are not limited to, pumping tests, slug tests, recovery tests, tracer tests, specific capacity tests,

laboratory permeability tests, sieve and pipette analyses and drawdown tests. Vertical gradients are usually characterized through nested well configurations. Other methods, including fracture tracing, geophysical logging and resistivity surveys may be utilized on a site-specific basis.

1.5.3.3 Chemical Data:

Chemical data may be field measured using organic analyzers, pH meters or litmus paper, specific conductance meters, thermometers or other equipment.

1.6 CONTAMINATION DATA:

1.6.1 Collection Methods:

Depending upon the nature of contamination, many methods are utilized to collect information. The following are the most commonly utilized methods; however, the list is not inclusive:

- 1.6.1.1 Direct thickness measurements of phase (gravity) separated components.
- 1.6.1.2 Laboratory analyses of free phase products.
- 1.6.1.3 Specific gravity measurements of free phase products.
- 1.6.1.4 Field vapor or headspace analysis.
- 1.6.1.5 Laboratory analysis of vapor, soil and groundwater.
- 1.6.1.6 Visual observations.
- 1.6.1.7 Field analytical procedures including: temperature, conductance, pH, etc.
- 1.6.1.8 Geophysical methods.



1.6.2 Field Screening:

Field screening of soil samples is performed to determine the extent of soil contamination and to help direct the placement of permanent monitoring wells by providing relative contamination levels. Freshly retrieved samples are containerized, sealed and allowed to volatilize for a brief period prior to monitoring. Vapor readings are obtained from headspace within the container. All field measurements are recorded and reported in relevant reports.

A photoionization detector (PID) is utilized to conduct field screening. The instrument is routinely calibrated for measuring the suspected contaminant by following the manufacturer's instructions to insure proper functioning of the PID. The calibration procedure involves utilizing a pressurized tank of a sample gas (benzene equivalent) of known concentration which should produce a projected reading at a given intake pressure. At the recommended pressure, the PID is adjusted to the manufacturer's specified reading.

1.6.3 Field Sampling for Laboratory Analyses:

Field sampling methods are generally in accordance with the 1986 EPA SOP and QA Manual and state guidance documents. Duplicate samples are obtained during all major site investigations. Rigorous cleaning procedures are adhered to and quality control blanks are utilized. All sampling equipment is thoroughly cleaned and rinsed between boreholes. Sample containers are new, laboratory-prepared and are never reused by field personnel. Chain of custody is documented throughout the sample handling process and included with all laboratory reports. State licensed laboratories will be utilized. Generally, sampling procedures are as follows:

1.6.3.1 Products:

Pure product samples are refrigerated and shipped to the analytical laboratory.

1.6.3.2 Soil:

Soil samples are obtained utilizing pre-cleaned equipment, and quickly containerized. Samples are then immediately refrigerated and shipped to the

analytical laboratory.

1.6.3.3 Surface Water:

Grab samples are obtained with the sampler facing the upstream direction, if in a flowing body of water. Samples are refrigerated and shipped to the analytical laboratory.

1.6.3.4 Vapor:

Vapor samples are obtained utilizing either carbon tubes in conjunction with a calibrated pump, Tedlar bags, or by using a glass syringe. Samples are refrigerated and shipped to an analytical laboratory.

1.6.3.5 Water Supply Wells:

Water supply wells are difficult to properly purge and sample due to several factors including:

- A) availability of accurate construction records;
- B) inaccessibility;
- C) attached appurtenances such as tanks, treatment systems, etc.;
- D) agitation from pumping; and/or
- E) analyte-incompatible construction materials.

Generally, an attempt is made to obtain samples from as close to the wellhead as possible, and to completely purge the well and any attached equipment such as holding or pressure tanks. Also, prior to actual sample collection, flow is slowed to a trickle to minimize agitation. If possible, the sample is taken directly from the well using a bailer.



1.6.3.6 Monitoring Wells:

Monitoring wells are sampled according to a standard procedure, as follows:

- A) A total storage volume is calculated for each well.
- B) Three volumes are removed using a bailer or purging pump. If the well dries up during bailing, a minimum of one volume is removed.
- C) Samples are labeled.
- D) Samples are refrigerated and immediately preserved and/or containerized in accordance with protocol.
- E) Sampling records are completed.
- F) Chain of custody records are completed.
- G) A travel blank will be utilized. It will originate at the laboratory and will remain with all samples until returning to the laboratory.
- H) Samples are promptly shipped to the analytical laboratory.

1.7 CONSTRUCTION DATA:

Site conditions may warrant additional intrusions, excavations or construction to evaluate or remediate known or potential hazards at the site. All construction work will be conducted under the direct supervision of a senior technician or project manager. An as-built system survey will depict site constructions.

1.7.1 Excavations:

Access to excavations will be limited by use of traffic cones, lighted barricades, caution tape or some other apparatus. Open excavations will be backfilled promptly.



1.7.2 Electrical Equipment:

Choice of electrical equipment will be dependent on intended use and site-specific characteristics. Access to such equipment will be limited by the construction of a barricade or fenced enclosure.

1.7.3 Health and Safety Plan:

Personnel will carry a site-specific Health and Safety Plan to the site during every site visit.

2.0 DATA COMPILATION/EVALUATION:

Data is compiled and evaluated in accordance with generally accepted industry standards, which are summarized as follows:

2.1 BACKGROUND DATA:

Background information is utilized to develop an historical perspective relating to the identification of all potential sources or contributors.

2.2 RECEPTOR DATA:

Receptor information is evaluated with regard to the potential for past, current and future environmental impact.

2.3 SURVEY DATA:

Horizontal survey data is reduced and utilized in the development of site maps for use as a framework to provide a spacial context. Vertical survey data is utilized to provide a vertical datum for hydrogeologic and topographic characterizations. A licensed surveyor may be utilized to conduct the initial comprehensive survey and subsequent surveys may be conducted by the contractor.

2.4 DRILLING DATA:

Drilling information is compiled and presented in boring logs. The information is utilized for hydrogeologic characterizations.

2.5 WELL CONSTRUCTION:

Well construction information is utilized in the development of as-built well details and/or other well construction records and evaluated in terms of depths and screen settings as they relate to hydrogeologic and contaminant

characteristics.

2.6 CONTAMINATION/LABORATORY ANALYSES DATA:

Laboratory and other analyses data are utilized in the development of maps, calculations, models and other constructions and are used in developing and monitoring corrective actions.

2.7 GEOLOGICAL/HYDROGEOLOGICAL DATA:

Geological and hydrogeological data are used for developing maps, calculations and other constructions as they relate to making characterizations and developing and monitoring corrective actions.



APPENDIX II

**SAMPLING RECORDS/LABORATORY RESULTS/
CHAIN OF CUSTODY FORMS**



LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

919-762-7082 919-762-8956
FAX 919-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: DAWSEY EXXON #93134
DATE: 10/19/93
YOUR REF/P.O.: 101293-37-11

WATER SAMPLES FROM PROJECT: DAWSEY EXXON, WHITEVILLE, N.C. (Page 1 of 1)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME MATRIX
9760	10/12/93	1200	ROBERT THOMAS	10/12/93	1700 WA

CLIENT STATION ID: MW-6
LAB #: 9760

PURGEABLE AROMATICS

BENZENE	ug/L	<0.2
ETHYLBENZENE	ug/L	<0.2
TOLUENE	ug/L	<0.2
XYLENE	ug/L	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
METHYL TER-BUTYL ETHER)
< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bidwan

FILE

CLARK ENVIRONMENTAL SERVICES, INC.
GROUNDWATER WELL SAMPLING RECORD

PROJECT DAWSEY'S EXXON, WHITEVILLE, NC CES PROJECT # 93134

WELL # MW-6 DATE 10/12/93 PERSON THOMAS/DILLON TIME 1200

WEATHER OVERCAST AND COOL

A) WELL DIAMETER	<u>2"</u>	MEASURED
B) GALLONS/FOOT	<u>0.163</u>	FROM TABLE
C) TOTAL WELL DEPTH	<u>14.00</u>	MEASURED
D) DEPTH TO LIQUID	<u>9.48</u>	MEASURED
E) TOTAL LIQUID FEET IN WELL	<u>4.52</u>	C - D
F) NO. WELL VOLUMES DESIRED	<u>3</u>	SITE SPECIFIC (USUALLY 3)
G) TOTAL GALLONS TO PURGE	<u>2.21</u>	B x E x F
H) PURGING METHOD	<u>BAILER</u>	BAILER OR PUMP TYPE
I) BAILER VOLUME	<u>0.24</u>	MEASURED/CALCULATED
J) NO. BAILS REQUIRED	<u>9.21</u>	G DIVIDED BY I (IF BAILED)
K) NO. BAILS TAKEN	<u>10</u>	COUNTED
L) GALLONS PURGED	<u>2.4</u>	MEASURED/CALCULATED
M) COMMENTS		

TABLE	
PER FOOT WELL VOLUMES	
WELL DIAM. IN INCHES	GALLONS PER FT.
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

LAW & COMPANY
Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
 1711 Castle Street
 P.O. Box 629
 Wilmington, N.C. 28402

910-762-7082 910-762-8956
 FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
 P.O. BOX 10136
 WILMINGTON, NC 28405-
 Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON 93134
 DATE: 12/14/93
 YOUR REF/P.O.: 120893-36-11

WATER SAMPLE FROM PROJECT: DAWSEY'S EXXON CES #93134 (Page 1 of 1)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME MATRIX
10874	12/08/93	1020	RODNEY FOWLER	12/08/93	1315 WA

CLIENT STATION ID: 1
 LAB #: 10874
 MV-4

PURGEABLE AROMATICS

BENZENE	ug/L	<0.2
ETHYLBENZENE	ug/L	<0.2
TOLUENE	ug/L	<0.2
XYLENE	ug/L	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
 METHYL TER-BUTYL ETHER)

< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bidwan

CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: RF
 WEATHER: Sunny and Cool, 60°

WELL #: MW-4
 DATE: 12/08/93
 TIME: 10:20 AM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	17.0
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	8.0
E	TOTAL LIQUID FEET IN WELL (C-D)	9.0
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	4.40
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	18.34
K	NO. BAILS TAKEN (COUNTED)	19.0
L	GALLONS PURGED (MEASURED/CALCULATED)	5.0

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS:

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

910-762-7082 910-762-8956
FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON
DATE: 12/14/93
YOUR REF/P.O.: 121093-1-2

WATER SAMPLES FROM PROJECT: DAWSEY'S EXXON (Page 1 of 1)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME MATRIX
10954	12/09/93	1525	PAUL RICHTER	12/10/93	1305 WA
10955	12/09/93	1542	PAUL RICHTER	12/10/93	1305 WA
10956	12/09/93	1540	PAUL RICHTER	12/10/93	1305 WA

CLIENT STATION ID:	T-1	MW-7	MW-8
LAB #:	10954	10955	10956

PURGEABLE AROMATICS

Compound	ug/L	T-1	MW-7	MW-8
BENZENE	<0.2	<0.2	<0.2	<0.2
ETHYLBENZENE	<0.2	<0.2	<0.2	<0.2
TOLUENE	<0.2	<0.2	<0.2	<0.2
XYLENE	<0.2	<0.2	<0.2	<0.2
METHYL TER-BUTYL ETHER	<0.2	<0.2	<0.2	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
METHYL TER-BUTYL ETHER)

< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bedwan

LAW & COMPANY

Consulting and Analytical Chemists
ESTABLISHED 1903

1711 Castle Street • P.O. Box 629 • Wilmington, North Carolina 28402
Telephones (910) 762-7082 or (910) 762-8956
FAX (910) 762-8785

CHAIN OF CUSTODY RECORD

CUSTOMER: CLARK ENVIRONMENTAL

PROJECT ID: DAUSEY'S EXXON

PO # 121093-1-2

SAMPLE NUMBER	SAMPLE LOCATION	DATE	TIME	SAMPLE TYPE			NO. OF CONT.	ANALYSIS REQUIRED
				WATER		SOIL		
				COMP	GRAB			
1	T-1	12-9	3:25		✓		2	BTEX MTBE
2	Mu-7	12-9	3:42		✓		2	" "
3	Mu-8	12-9	3:40		✓		2	" "

Relinquished by: (Signature) <i>Paul Richter</i>	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Methods of Shipment	Received for Laboratory by: <i>James L. ...</i>	Date/Time 12/10/93 1:05
Conditions upon receipt <i>Good - on ice</i>	Remarks:	

CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: PR/CH
 WEATHER: Sunny, 68°

WELL #: T-1
 DATE: 12/09/93
 TIME: 3:25 PM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	38.0
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	12.01
E	TOTAL LIQUID FEET IN WELL (C-D)	25.99
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	12.70
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	52.95
K	NO. BAILS TAKEN (COUNTED)	53.0
L	GALLONS PURGED (MEASURED/CALCULATED)	12.70

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS:

CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: PR/CH
 WEATHER: Sunny, 68°

WELL #: MW-7
 DATE: 12/09/93
 TIME: 3:42 PM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	17.0
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	10.82
E	TOTAL LIQUID FEET IN WELL (C-D)	6.18
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	3.02
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	12.59
K	NO. BAILS TAKEN (COUNTED)	12
L	GALLONS PURGED (MEASURED/CALCULATED)	3.02

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS:

CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: PR/CH
 WEATHER: Sunny, 68°

WELL #: MW-8
 DATE: 12/09/93
 TIME: 3:40 PM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	17.0
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	8.61
E	TOTAL LIQUID FEET IN WELL (C-D)	8.39
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	4.10
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	17.09
K	NO. BAILS TAKEN (COUNTED)	17.0
L	GALLONS PURGED (MEASURED/CALCULATED)	4.10

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS:

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

910-762-7082 910-762-8956
FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: FORMER DAUSEYS EXXON
DATE: 02/10/94
YOUR REF/P.O.: 020894-36-11

WATER SAMPLES FROM PROJECT #93134 - FORMER DAWSEY'S EXXON (Page 1 of 1)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME MATRIX
12133	02/08/94	1140	KAREN THOMAS	02/08/94	1650 WA
12134	02/08/94	1140	KAREN THOMAS	02/08/94	1650 WA

CLIENT STATION ID:	1	2
LAB #:	12133	12134
	MW-9	MW-10

PURGEABLE AROMATICS

BENZENE	ug/L	290	<0.2
ETHYLBENZENE	ug/L	374	<0.2
TOLUENE	ug/L	413	<0.2
XYLENE	ug/L	1360	<0.2
METHYL TER-BUTYL ETHER	ug/L	93	<0.2

BENZENE, ETHYL BENZENE, TOLUENE, XYLENE, METHYL TER-BUTYL
ETHER - EPA METHOD 602
< = BELOW DETECTION LIMITS

LABORATORY DIRECTOR

Jolly Birkman

CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: D. Dillon
 WEATHER: Cold and Rainy

WELL #: MW-9
 DATE: 02/08/94
 TIME: 11:40 AM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	10.0
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	8.19
E	TOTAL LIQUID FEET IN WELL (C-D)	1.81
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	0.89
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	3.69
K	NO. BAILS TAKEN (COUNTED)	2
L	GALLONS PURGED (MEASURED/CALCULATED)	0.48

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS: Bailed well dry 2 times before sampling. Recharge was very slow.



CLARK ENVIRONMENTAL SERVICES, INC. GROUNDWATER WELL SAMPLING RECORD

PROJECT NAME: Dawsey's Exxon
 LOCATION: Whiteville, NC
 CES PROJECT #: 93134
 PERSONNEL: D. Dillon
 WEATHER: Cold and Rainy

WELL #: MW-10
 DATE: 02/08/94
 TIME: 11:40 AM

A	WELL DIAMETER (INCHES MEASURED)	2"
B	GALLONS/FOOT	0.163
C	TOTAL WELL DEPTH (MEASURED FEET/INCHES)	9.5
D	DEPTH TO LIQUID (MEASURED FEET/INCHES)	5.33
E	TOTAL LIQUID FEET IN WELL (C-D)	4.17
F	NO. WELL VOLUMES DESIRED (SITE SPECIFIC, USUALLY 3)	3
G	TOTAL GALLONS TO PURGE (B x E x F)	2.04
H	PURGING METHOD (BAILER OR PUMP TYPE)	Bailer
I	BAILER VOLUME (MEASURED/CALCULATED)	0.24
J	NO. BAILS REQUIRED (G ÷ I, IF BAILED)	8.5
K	NO. BAILS TAKEN (COUNTED)	2
L	GALLONS PURGED (MEASURED/CALCULATED)	0.72

PER FOOT WELL VOLUMES	
WELL DIAMETER (IN INCHES)	GALLONS PER FOOT
1.00	0.041
1.25	0.064
1.50	0.092
2.00	0.163
4.00	0.653
6.00	1.469
8.00	2.611
10.00	4.080
12.00	5.876
18.00	13.220
24.00	23.502
36.00	52.880

REMARKS: Bailed well dry 2 times before sampling. Recharge was very slow.

APPENDIX III
MATERIAL SAFETY DATA SHEETS



BENZENE
 BENZENE
 BENZENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
 CHEMICAL DIVISION
 1 REAGENT LANE
 FAIR LAWN NJ 07410
 (201) 796-7100

EMERGENCY CONTACTS:
 GASTON L. PILLORI: (201) 796-7100
 AFTER BUSINESS HOURS; HOLIDAYS:
 (201) 796-7523
 CHEMTREC ASSISTANCE: (800) 424-9300

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

SUBSTANCE IDENTIFICATION

CAS-NUMBER 71-43-2

SUBSTANCE: **BENZENE**

TRADE NAMES/SYNONYMS:

BENZOL; CYCLOHEXATRIENE; BENZOLE; PHENE; PYROBENZOL; PYROBENZOLE;
 CARBON OIL; COAL TAR NAPHTHA; PHENYL HYDRIDE; BENZOLENE;
 BICARBURET OF HYDROGEN; COAL NAPHTHA; MOTOR BENZOL; ANNULENE; (6)ANNULENE;
 RCRA U019; STCC 4908110; UN 1114;
 B-426; 13065; B-243; B-245-S; B-245; B-411; C6H6;

CHEMICAL FAMILY:
 HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C6-H6

MOLECULAR WEIGHT: 78.08

OSHA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1
 HFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: BENZENE

PERCENT: 99

OTHER CONTAMINANTS: 0.15% NON-AROMATICS; 1 PPM THIOPHENE

EXPOSURE LIMITS:

BENZENE:
 1 PPM OSHA TWA; 5 PPM OSHA 15 MINUTE STEL;
 0.5 PPM OSHA ACTION LEVEL
 10 PPM (30 MG/M3) ACGIH TWA;
 ACGIH A2-SUSPECTED HUMAN CARCINOGEN
 0.1 PPM (0.32 MG/M3) NIOSH RECOMMENDED 8 HOUR TWA;
 1 PPM (3.2 MG/M3) NIOSH RECOMMENDED 15 MINUTE CEILING

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY

WARNING RELEASE REQUIREMENTS- (FEBRUARY 27, 1987)



PHYSICAL DATA

DESCRIPTION: COLORLESS TO LIGHT YELLOW LIQUID WITH AN AROMATIC ODOR

BOILING POINT: 176 F (80 C) MELTING POINT: 42 F (6 C)

SPECIFIC GRAVITY: 0.877 VOLATILITY: 100%

VAPOR PRESSURE: 74.6 MMHG @ 20 C

EVAPORATION RATE: (CARBON TETRACHLORIDE = 1) 1.0

SOLUBILITY IN WATER: 0.18% @ 25 C ODOR THRESHOLD: 1.5-5.0 PPM

VAPOR DENSITY: 2.8

SOLVENT SOLUBILITY: ACETONE, ALCOHOL, CARBON DISULFIDE, ACETIC ACID,
CARBON TETRACHLORIDE, CHLOROFORM, ETHER, OILSVISCOSITY: 0.65 CPS @ 25 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 12 F (-11 C) (CC) UPPER EXPLOSIVE LIMIT: 7.9%

LOWER EXPLOSIVE LIMIT: 1.3% AUTOIGNITION TEMP.: 928 F (498 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH
WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK
ENGS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR
NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN
CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF

STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE WATER IN FLOODING QUANTITIES AS A FOG; SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER; APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING HAZARDOUS MATERIALS; KEEP UPWIND. EVACUATE TO A RADIUS OF 1500 FEET FOR UNCONTROLLABLE FIRES. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, EIGHTH EDITION).

FIRE FIGHTING PHASES: DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR THE MEN ATTEMPTING TO STOP THE LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

BENZENE:

IRRITATION DATA: 20 MG/24 HOURS SKIN-RABBIT MODERATE; 15 MG/24 HOURS OPEN SKIN-RABBIT MILD; 88 MG EYE-RABBIT MODERATE; 2 MG/24 HOURS EYE-RABBIT SEVERE.

TOXICITY DATA: 2000 PPM/5 MINUTES INHALATION-HUMAN LCLO; 2 PPH/5 MINUTES INHALATION-HUMAN LCLO; 65 MG/M3/5 YEARS INHALATION-HUMAN LCLO; 100 PPM INHALATION-HUMAN TCLO; 150 PPM/1 YEAR INTERMITTENT INHALATION-MAN TCLO; 20,000 PPM/5 MINUTES INHALATION-MAMMAL LCLO; 10,000 PPM/7 HOURS INHALATION-RAT LC50; 9980 PPM INHALATION-MOUSE LC50; 146,000 MG/M3 INHALATION-DOG LCLO; 170,000 MG/M3 INHALATION-CAT LCLO; 50 MG/KG ORAL-MAN LOLO; 3306 MG/KG ORAL-RAT LD50; 4700 MG/KG ORAL-MOUSE LD50; 2000 MG/KG ORAL-DOG LOLO; 88 MG/KG INTRAVENOUS-RABBIT LOLO; 2890 UG/KG INTRAPERITONEAL-RAT LD50; 340 MG/KG INTRAPERITONEAL-MOUSE LD50; 527 MG/KG INTRAPERITONEAL-GUINEA PIG LOLO; 194 MG/KG UNREPORTED-MAN LOLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC CLASS 1). THE RELATIONSHIP BETWEEN EXPOSURE TO BENZENE AND THE DEVELOPMENT OF ACUTE MYELOGENOUS LEUKEMIA HAS BEEN ESTABLISHED IN EPIDEMIOLOGICAL STUDIES.

LOCAL EFFECTS: IRRITANT- SKIN, EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY INHALATION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; BONE MARROW DEPRESSANT. POISONING MAY ALSO AFFECT THE IMMUNE, HEMATOPOIETIC AND NERVOUS SYSTEMS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CERTAIN IMMUNOLOGICAL TENDENCIES.
ADDITIONAL DATA: USE OF ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS.
USE OF STIMULANTS SUCH AS EPINEPHRINE MAY CAUSE CARDIAC ARRHYTHMIAS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

BENZENE:

NARCOTIC/BONE MARROW DEPRESSANT/CARCINOGEN.

ACUTE EXPOSURE- HIGH CONCENTRATIONS, AROUND 3000 PPM, MAY CAUSE RESPIRATORY TRACT IRRITATION, AND MORE SEVERE EXPOSURES MAY RESULT IN PULMONARY EDEMA. SYSTEMIC EFFECTS ARE MAINLY ON THE CENTRAL NERVOUS SYSTEM AND DEPEND ON THE CONCENTRATION AND EXPOSURE TIME. NO EFFECTS WERE NOTED AT 25 PPM FOR 8 HOURS, BUT SIGNS OF INTOXICATION BEGAN AT 50-150 PPM WITHIN 5 HOURS; AT 500-1500 PPM, WITHIN 1 HOUR; AT 7500 PPM, WITHIN 30 MINUTES; AND 20,000 PPM MAY BE FATAL WITHIN 5-10 MINUTES. EFFECTS MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, DROWSINESS, WEAKNESS, SOMETIMES PRECEDED BY A BRIEF PERIOD OF EXHILARATION OR EUPHORIA, IRRITABILITY, MALAISE, INCOHERENT SPEECH, STAGGERING, INCREASED PULSE RATE, CHEST PAIN AND TIGHTNESS WITH/BREATHLESSNESS, PALLOR, AND TINNITUS. IN SEVERE EXPOSURES THERE MAY BE BLURRED VISION, SHALLOW, RAPID BREATHING, DELIRIUM, CARDIAC ARRHYTHMIAS, UNCONSCIOUSNESS, DEEP ANESTHESIA, PARALYSIS, AND COMA CHARACTERIZED BY MOTOR RESTLESSNESS, TREMORS AND HYPERREFLEXIA, SOMETIMES PRECEDED BY CONVULSIONS. RECOVERY DEPENDS ON THE SEVERITY OF EXPOSURE. BREATHLESSNESS, NERVOUS IRRITABILITY AND UNSTEADY GAIT MAY PERSIST FOR 2-3 WEEKS; A PECULIAR YELLOW SKIN COLOR AND CARDIAC DISTRESS MAY PERSIST FOR 4 WEEKS. LIVER AND KIDNEY EFFECTS MAY OCCUR, BUT ARE USUALLY MILD, TEMPORARY IMPAIRMENTS. CHRONIC EFFECTS MAY ARISE AND PERSIST LONG AFTER AN ACUTE EXPOSURE. ALTHOUGH GENERALLY HEMATOXICITY IS NOT A SIGNIFICANT CONCERN IN ACUTE EXPOSURE, DELAYED HEMATOLOGIC EFFECTS, INCLUDING ANEMIA, HAVE BEEN REPORTED, AS HAVE PETECHIAL HEMORRHAGES, SPONTANEOUS BLEEDING, SECONDARY INFECTIONS, AND SKIN RASHES. IN FATAL EXPOSURES, DEATH MAY BE DUE TO CENTRAL NERVOUS SYSTEM DEPRESSION, CARDIAC OR RESPIRATORY FAILURE AND CIRCULATORY COLLAPSE, OR OCCASIONALLY, SUDDEN VENTRICULAR FIBRILLATION. IT MAY OCCUR WITHIN A FEW MINUTES TO SEVERAL HOURS, OR CARDIAC ARRHYTHMIA MAY OCCUR AT ANYTIME WITHIN 24 HOURS. ALSO, DEATH FROM CENTRAL NERVOUS SYSTEM, RESPIRATORY OR HEMORRHAGIC COMPLICATIONS MAY OCCUR UP TO 5 DAYS AFTER EXPOSURE. PATHOLOGIC FINDINGS HAVE INCLUDED RESPIRATORY INFLAMMATION WITH EDEMA AND HEMORRHAGE OF THE LUNGS, RENAL CONGESTION, CEREBRAL EDEMA, AND EXTENSIVE PETECHIAL HEMORRHAGES IN THE BRAIN, PLEURAE, PERICARDIUM, URINARY TRACT, MUCOUS MEMBRANES, AND SKIN. BENZENE CROSSES THE PLACENTAL BARRIER AND THEREFORE MAY AFFECT UNBORN CHILDREN.

CHRONIC EXPOSURE- LONGTERM EXPOSURE MAY CAUSE SYMPTOMS REFERABLE TO THE CENTRAL NERVOUS, HEMATOPOIETIC AND IMMUNE SYSTEMS. EARLY EFFECTS ARE VAGUE AND VARIED AND MAY INCLUDE HEADACHE, LIGHT-HEADEDNESS, DIZZINESS, NAUSEA, ANOREXIA, ABDOMINAL DISCOMFORT, AND FATIGUE. LATER THERE MAY BE DYSPNEA, PALLOR, SLIGHTLY INCREASED TEMPERATURE, DECREASED BLOOD PRESSURE, AND VISUAL DISTURBANCES. DIZZINESS WHEN COLO WATER IS PLACED IN THE EAR AND HEARING IMPAIRMENT HAVE BEEN REPORTED, AS HAVE DIFFUSE CEREBRAL ATROPHY ASSOCIATED WITH ATAXIA, TREMORS AND EMOTIONAL LABILITY. WORKERS EXPOSED TO BENZENE IN COMBINATION WITH OTHER SOLVENTS HAVE EXHIBITED POLYNEURITIS. HEMATOLOGIC EFFECTS VARY WIDELY AND MAY APPEAR AFTER A FEW WEEKS OR MANY YEARS OF EXPOSURE OR EVEN MANY YEARS AFTER EXPOSURE HAS CEASED. THE DEGREE OF EXPOSURE BELOW WHICH NO BLOOD EFFECTS WILL OCCUR CANNOT BE ESTABLISHED WITH CERTAINTY. IN THE EARLY STAGES, THERE MAY BE BLOOD CLOTTING DEFECTS

DUE TO FUNCTIONAL, MORPHOLOGICAL AND QUANTITATIVE PLATELET ALTERATION WITH
 RESULTANT BLEEDING FROM THE NOSE AND GUMS AND EASY BRUISING; LEUKOPENIA
 WITH PREDOMINANT LYMPHOCYTOPENIA OR NEUTROPENIA; AND ANEMIA WHICH MAY BE
 NORMOCHROMIC OR MACROCYTIC AND HYPOCHROMIC. HEMATOPOIESIS, BOTH IN THE
 BONE MARROW AND EXTRAMEDULLARY SITES, MAY BE HYPER- OR HYPOACTIVE WHICH
 MAY ACCOUNT FOR THE LACK OF CORRELATION, IN SOME CASES, BETWEEN THE BONE
 MARROW AND THE PERIPHERAL BLOOD PICTURES, ALSO, THE SYMPTOMS DO NOT ALWAYS
 PARALLEL THE LABORATORY FINDINGS. IF TREATED AT THIS STAGE, THE EFFECTS
 APPEAR REVERSIBLE. ALTHOUGH RECOVERY MAY BE PROTRACTED AND THERE MAY BE
 RELAPSES, HEMOLYSIS, DECREASED ERYTHROCYTE SURVIVAL, IRON METABOLISM
 DISTURBANCES, INTERNAL HEMORRHAGES, AND INCREASED SERUM BILIRUBIN LEVELS
 HAVE ALSO BEEN REPORTED. EXPOSURE TO HIGH DOSES FOR LONGER PERIODS MAY
 RESULT IN APLASIA AND FATTY DEGENERATION OF THE BONE MARROW WITH
 PANCYTOPENIA AND IS CONSIDERED TO BE IRREVERSIBLE. ENORMOUS VARIABILITY IN
 INDIVIDUAL RESPONSE, INCLUDING NON-DOSE DEPENDENT APLASIA, AND THE FINDING
 OF EOSINOPHILIA, SUGGESTS THAT IN SOME CASES, THE BLOOD DYSCRASIA MAY
 PARTIALLY BE AN ALLERGIC REACTION, IN A SERIES OF EPIDEMIOLOGICAL STUDIES
 THERE WAS A STATISTICALLY SIGNIFICANT EXCESS OF LEUKEMIAS, PREDOMINATELY
 MYELOGENOUS, IN PERSONS EXPOSED PRIMARILY TO BENZENE. ALSO, MANY CASE
 REPORTS AND SERIES HAVE DESCRIBED THE ASSOCIATION OF LEUKEMIA AND BENZENE
 EXPOSURE. MOST WERE ACUTE MYELOGENOUS, ALTHOUGH SOME WERE MONOCYTTIC,
 ERYTHROBLASTIC, OR LYMPHOCYTTIC; SOME LYMPHOMAS WERE NOTED ALSO. ALTHOUGH
 APLASTIC ANEMIA IS PROBABLY THE MORE LIKELY CONSEQUENCE OF LONGTERM
 EXPOSURE, IT IS NOT UNCOMMON FOR AN INDIVIDUAL SURVIVING THIS, TO GO
 THROUGH A PRELEUKEMIC PHASE INTO FRANK LEUKEMIA. CONVERSELY, LEUKEMIA
 WITHOUT PRECEDENT APLASTIC ANEMIA CAN OCCUR. IN ONE STUDY THE RANGE OF
 TIME FROM THE START OF THE EXPOSURE TO THE DIAGNOSIS OF LEUKEMIA WAS
 3-24 YEARS. IT HAS BEEN SUGGESTED THAT THE CHROMOSOMAL ABERRATIONS WHICH
 CAN ARISE IN PERIPHERAL BLOOD AND BONE MARROW CELLS AND PERSIST FOR A LONG
 TIME AFTER EXPOSURE CEASES, MAY BE ASSOCIATED WITH THE INCREASED INCIDENCE
 OF LEUKEMIA. THE IMMUNOSUPPRESSIVE EFFECT HAS ALSO BEEN SUGGESTED AS
 ASSOCIATED WITH THE LEUKEMIOGENESIS. ADVERSE EFFECTS ON THE IMMUNOLOGICAL
 SYSTEM HAVE BEEN SHOWN TO MAKE RABBITS MORE SUSCEPTIBLE TO TUBERCULOSIS
 AND PNEUMONIA AND MAY EXPLAIN WHY THE TERMINAL EVENT IN SOME CASES OF
 BENZENE INTOXICATION MAY BE OVERWHELMING INFECTION. MENSTRUAL DISTURBANCES
 HAVE BEEN REPORTED MORE FREQUENTLY IN EXPOSED WOMEN. REPRODUCTIVE EFFECTS
 HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
 HAS STOPPED, GIVE ARTIFICIAL RESPIRATION, MAINTAIN AIRWAY AND BLOOD
 PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND
 AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN
 SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION
 IMMEDIATELY.

SKIN CONTACT:
 BENZENE:
 IRRITANT

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION. EFFECTS MAY INCLUDE
 ERYTHEMA, A BURNING SENSATION, AND IN MORE SEVERE CASES, BLISTERING AND
 EDEMA. PROLONGED CONTACT MAY CAUSE LESIONS RESEMBLING 1ST- AND 2ND- DEGREE
 BURNS. UNDER NORMAL CONDITIONS, SIGNIFICANT SIGNS OF SYSTEMIC INTOXICATION
 ARE UNLIKELY FROM SKIN CONTACT ALONE, DUE TO THE SLOW RATE OF ABSORPTION
 AND THE HIGH VOLATILITY. APPLICATION TO GUINEA PIGS RESULTED IN INCREASED
 DERMAL PERMEABILITY.
 CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT DEPLETS THE SKIN AND MAY
 RESULT IN DERMATITIS WITH ERYTHEMA, SCALING, DRYNESS, VESICULATION, AND

FISSURING, POSSIBLY ACCOMPANIED BY PARESTHESIAS OF THE FINGERS WHICH MAY PERSIST SEVERAL WEEKS AFTER THE DERMATITIS SUBSIDES. SECONDARY INFECTIONS MAY OCCUR. TESTS ON GUINEA PIGS INDICATE SENSITIZATION IS POSSIBLE. ALTHOUGH STUDIES HAVE FAILED TO ESTABLISH A RELATIONSHIP BETWEEN SKIN CONTACT AND A CARCINOGENIC EFFECT, SOME PAPILOMAS AND HEMATOPOIETIC EFFECTS HAVE BEEN REPORTED.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

BENZENE:
IRRITANT.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS OF 3000 PPM ARE VERY IRRITATING, EVEN ON BRIEF EXPOSURE. DROPLETS CAUSE MODERATE BURNING SENSATION, BUT ONLY A SLIGHT, TRANSIENT EPITHELIAL INJURY WITH RAPID RECOVERY.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS. SEVERAL CASE REPORTS, ONE OF THEM AN ACUTE EXPOSURE, SUGGEST THAT SYSTEMIC EXPOSURE MAY BE ASSOCIATED WITH RETROBULBAR OR OPTIC NEURITIS. 50% OF RATS EXPOSED TO 50 PPM FOR MORE THAN 600 HOURS DEVELOPED CATARACTS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

BENZENE:
NARCOTIC/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE LOCAL IRRITATION AND BURNING SENSATION IN THE MOUTH, THROAT, AND STOMACH. SIGNS AND SYMPTOMS OF SYSTEMIC INTOXICATION MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, WEAKNESS, STAGGERING, CHEST PAIN AND TIGHTNESS, SHALLOW, RAPID PULSE, BREATHLESSNESS, PALLOR FOLLOWED BY FLUSHING, AND A FEAR OF IMPENDING DEATH. THERE MAY BE VISUAL DISTURBANCES AND CONVULSIONS. VIOLENT EXCITEMENT, EUPHORIA OR DELIRIUM MAY PRECEDE WEARINESS, FATIGUE AND SLEEPINESS FOLLOWED BY UNCONSCIOUSNESS, COMA AND DEATH. THOSE WHO SURVIVE THE CENTRAL NERVOUS SYSTEM EFFECTS MAY DEVELOP BRONCHITIS, PNEUMONIA, PULMONARY EDEMA, AND INTRAPULMONARY HEMORRHAGE. ASPIRATION MAY CAUSE IMMEDIATE PULMONARY EDEMA AND HEMORRHAGE. THE USUAL LETHAL DOSE IN HUMANS IS 10-15 MILLILITERS, BUT SMALLER AMOUNTS HAVE BEEN REPORTED TO CAUSE DEATH. A SINGLE EXPOSURE MAY PRODUCE LONGTERM EFFECTS WITH PANCYTOPENIA PERSISTING UP TO A YEAR.

CHRONIC EXPOSURE- DAILY ADMINISTRATION TO HUMANS OF 2-5 GRAMS IN OLIVE OIL HAS CAUSED HEADACHE, VERTIGO, BLADDER IRRITABILITY, IMPOTENCE, GASTRIC DISTURBANCES, AND RENAL DYSFUNCTION. IN FEMALE RATS TREATED WITH 132 SINGLE DAILY DOSES OVER 187 DAYS, NO EFFECTS WERE OBSERVED AT 1 MG/KG; SLIGHT LEUKOPENIA AT 10 MG/KG; AND BOTH LEUKOPENIA AND ANEMIA AT 50 AND 100 MG/KG. IN A 2 YEAR GAVAGE STUDY WITH RATS AND MICE, THERE WAS AN INCREASED INCIDENCE OF LYMPHOMAS AND TUMORS OF THE ORAL CAVITY, SKIN, LUNGS, OVARIES, AND MAMMARY, HARDERIAN, AND PREPUTIAL GLANDS. IN A ONE YEAR GAVAGE STUDY, RATS GIVEN 50 OR 250 MG/KG, 4-5 DAYS/WEEK FOR 52 WEEKS DID NOT EXHIBIT ACUTE OR SUBACUTE TOXIC EFFECTS, BUT A DOSE CORRELATED INCREASE OF LEUKEMIAS AND MAMMARY CARCINOMAS WAS OBSERVED. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. USE GASTRIC LAVAGE

WITH ACTIVATED CHARCOAL AND A CUFFED ENDOTRACHEAL TUBE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, IPECAC EMESIS CAN BE DONE. WHEN VOMITTING BEGINS, KEEP HEAD BELOW THE HIPS TO PREVENT ASPIRATION. AFTER VOMITTING STOPS, GIVE 30-60 MILLILITERS OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. MAINTAIN AIRWAY, BLOOD PRESSURE AND RESPIRATION. (GREISBACH, HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION. TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

BENZENE:

ACIDS (STRONG): INCOMPATIBLE.
ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE:
POSSIBLE EXPLOSION.
ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: EXPLOSIVE INTERACTION.
BASES (STRONG): INCOMPATIBLE.
BROMINE + IRON: INCOMPATIBLE.
BROMINE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD.
BROMINE TRIFLUORIDE: POSSIBLE EXPLOSION OR IGNITION.
CHLORINE: EXPLOSION IN THE PRESENCE OF LIGHT.
CHLORINE TRIFLUORIDE: VIOLENT REACTION WITH POSSIBLE EXPLOSION.
CHROMIC ANHYDRIDE (POWDERED): IGNITION.
DIBORANE: SPONTANEOUSLY EXPLOSIVE REACTION IN AIR.
DIOXYGEN DIFLUORIDE: IGNITION, EVEN AT REDUCED TEMPERATURES.
DIOXYGENYL TETRAFLUOROBORATE: IGNITION REACTION.
INTERHALOGEN COMPOUNDS: IGNITION OR EXPLOSION.
IODINE HEPTAFLUORIDE: IGNITION ON CONTACT.
IODINE PENTAFLUORIDE: VIOLENT INTERACTION ABOVE 50 C.
NITRIC ACID: VIOLENT OR EXPLOSIVE UNLESS PROPERLY AGITATED AND COOLED.
NITRYL PERCHLORATE: EXPLOSIVE INTERACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
OXYGEN (LIQUID): EXPLOSIVE MIXTURE.
OZONE: FORMATION OF EXPLOSIVE GELATINOUS OZONIDE.
PERCHLORATES (METAL): FORMATION OF EXPLOSIVE COMPLEX.
PERCHLORYL FLUORIDE + ALUMINUM CHLORIDE: FORMATION OF SHOCK SENSITIVE COMPOUND.
PERMANGANATES + SULFURIC ACID: POSSIBLE EXPLOSION.
PERMANGANIC ACID: EXPLOSION HAZARD.
PEROXODISULFURIC ACID: EXPLOSION HAZARD.
PEROXOMONOSULFURIC ACID: EXPLOSIVE INTERACTION.
POTASSIUM PEROXIDE: IGNITION.
SILVER PERCHLORATE: FORMATION OF EXPLOSIVE COMPLEX.
SODIUM PEROXIDE + WATER: IGNITION.
URANIUM HEXAFLUORIDE: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL
TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING
OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE
ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH
MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS
WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983,
RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE.
INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR
CABINET, SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS
DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF
HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U019.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS
MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY
RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.
DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH
AS POLYURETHANE OR CONCRETE.
USE CEMENT POWDER, FLY ASH, SAWDUST OR COMMERCIAL SORBENT TO ABSORB BULK
LIQUID.
REDUCE VAPOR AND FIRE HAZARD WITH FLUOROCARBON WATER FOAM.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL

BOOMS.
APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT TO THICKEN SPILLED MATERIAL.
APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.
IF DISSOLVED, APPLY ACTIVATED CARBON AT TEN TIMES THE SPILLED AMOUNT IN THE REGION OF 10 PPM OR GREATER CONCENTRATION.
USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.
USE DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE UP AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR1910, SUBPART Z.

BENZENE:**CONCENTRATION:****REQUIRED RESPIRATOR:**

LESS THAN OR
EQUAL TO 10 PPM- HALF-MASK AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE.

LESS THAN OR
EQUAL TO 50 PPM- FULL FACEPIECE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.
FULL FACEPIECE GAS MASK WITH CHIN STYLE CANISTER.

LESS THAN OR
EQUAL TO 100 PPM- FULL FACEPIECE POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CANISTER.

LESS THAN OR
EQUAL TO 1000 PPM- SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE IN POSITIVE-PRESSURE MODE.

GREATER THAN
1000 PPM OR
UNKNOWN
CONCENTRATION-

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE
IN POSITIVE-PRESSURE MODE.
FULL FACEPIECE POSITIVE-PRESSURE SUPPLIED-AIR RESPIRATOR
WITH AUXILIARY SELF-CONTAINED AIR SUPPLY.

ESCAPE-

ANY ORGANIC VAPOR GAS MASK.
ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL
FACEPIECE.

FIREFIGHTING-

FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS IN
POSITIVE-PRESSURE MODE.

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS
BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO
CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND
IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF
OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

AT ANY DETECTABLE CONCENTRATION:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION
WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED
IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE
OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE
DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND
OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY
SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER
POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

BENZENE:

PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE
EQUIPMENT IN 29CFR1910.1028(H).

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

BENZENE:
PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29CFR1910.1028(H).

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

BENZENE:
PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE CLOTHING AND EQUIPMENT IN 29CFR1910.1028(H).

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 10/11/84 REVISION DATE: 07/07/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

ETHYL BENZENE
ETHYL BENZENE
ETHYL BENZENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS:
GASTON L. PILLORI: (201) 796-7100
AFTER BUSINESS HOURS; HOLIDAYS:
(201) 796-7523
CHEMTREC ASSISTANCE: (800) 424-9300

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

SUBSTANCE IDENTIFICATION

CAS-NUMBER 100-41-4

SUBSTANCE: **ETHYL BENZENE**

TRADE NAMES/SYNONYMS:

EB; ETHYLBENZOL; PHENYLETHANE; STCC 4909163; UN 1175; 0-2751;

CHEMICAL FAMILY:

HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C₈-H₁₀

MOL WT: 106.18

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=0 PERSISTENCE=1

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ETHYL BENZENE

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ETHYL BENZENE:

100 PPM (435 MG/M³) OSHA TWA; 125 PPM (545 MG/M³) OSHA STEL

100 PPM (435 MG/M³) ACGIH TWA; 125 PPM (545 MG/M³) ACGIH STEL

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH AN AROMATIC ODOR

BOILING POINT: 277 F (136 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 0.8670 VAPOR PRESSURE: 7.1 MMHG @ 20 C

EVAPORATION TE: (BUAC = 1) (1 SOLUBILITY IN WATER: 0.015%

ODOR THRESHOLD: 140 PPM VAPOR DENSITY: 3.7

SOLVENT SOLUBILITY: ALCOHOL, ETHER, CARBON TETRACHLORIDE, BENZENE, SULFUR DIOXIDE; INSOLUBLE IN AMMONIA.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS; FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

FLASH POINT: 59 F (15 C) (CC) UPPER EXPLOSIVE LIMIT: 6.7%

LOWER EXPLOSIVE LIMIT: 1.0% AUTOIGNITION TEMP.: 810 F (432 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR ALCOHOL FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; US WATER IN FLOODING AMOUNTS AS A FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, EIGHTH EDITION).

FIRE FIGHTING PHASES: USE DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE, BUT WATER SHOULD BE USED TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROTECT THE MEN ATTEMPTING TO STOP A LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

ETHYL BENZENE:

IRRITATION DATA: 15 MG/24 HOURS OPEN SKIN-RABBIT MILD; 100 MG EYE-RABBIT.
TOXICITY DATA: 100 PPM/8 HOURS INHALATION-HUMAN TCLO; 4000 PPM/4 HOURS
INHALATION-RAT LCLO; 50 GM/M3/2 HOURS INHALATION-MOUSE LCLO; 10000 PPM
INHALATION-GUINEA PIG LCLO; 17800 MG/KG SKIN-RABBIT LD50; 3500 MG/KG
ORAL-RAT LD50; 2272 MG/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA
(RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYES.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY DERMAL
ABSORPTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE
LIVER.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN DISORDERS OR
IMPAIRED PULMONARY, RENAL, OR LIVER FUNCTION.

ADDITIONAL DATA: ETHYL BENZENE CROSSES THE PLACENTA. ETHYL BENZENE EXPOSED TO
PHOTO-OXIDATION IN THE PRESENCE OF OZONE AND NITROGEN DIOXIDE, AS IN THE
FORMATION OF SMOG, YIELDS PRODUCTS HAVING CONSIDERABLE IRRITANCY TO THE
HUMAN EYE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ETHYL BENZENE:

IRRITANT/NARCOTIC. 2000 PPM IS IMMEDIATELY DANGEROUS TO LIFE AND HEALTH.
ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION OF THE NOSE AND THROAT. ODOR IS
CONSIDERED AN ADEQUATE WARNING PROPERTY AT LEVELS BELOW SYSTEMIC TOXICITY.
AT HIGHER CONCENTRATIONS COUGH, FATIGUE, DEPRESSION, VERTIGO OR DIZZINESS,
DYSPNEA, SENSE OF CHEST CONSTRICTION, HEADACHE, NARCOSIS, AND COMA
MAY OCCUR. DEATH IS POSSIBLE FROM RESPIRATORY CENTER PARALYSIS.
EXPOSED ANIMALS EXHIBITED SIMILAR SYMPTOMS, AS WELL AS TREMOR OF THE
EXTREMITIES, STATIC AND MOTOR ATAXIA, STAGGERING GAIT, AND LOSS OF
RIGHTING REFLEX. LOSS OF CONSCIOUSNESS WAS FOLLOWED BY DEATH FROM
RESPIRATORY PARALYSIS. PATHOLOGIES INCLUDED EDEMA AND CONGESTION OF THE
BRAIN AND LUNGS, GENERALIZED VISCERAL HYPEREMIA, EPITHELIAL NECROSIS OF
THE RENAL TUBULES, AND HEPATIC DYSTROPHY. ODOR AND EYE IRRITATION ARE
CONSIDERED ADEQUATE WARNING PROPERTIES AT LEVELS BELOW SYSTEMIC TOXICITY.
REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

CHRONIC EXPOSURE- MAY CAUSE IRRITATION OF THE UPPER RESPIRATORY TRACT,
FATIGUE, SLEEPINESS, HEADACHE, IRRITABILITY, AND FUNCTIONAL NERVOUS
DISORDERS. CHRONIC INHALATION EXPOSURE IN ANIMALS HAS CAUSED UPPER
RESPIRATORY INFLAMMATION, NERVOUS SYSTEM DISORDERS, DYSTROPHIC CHANGES
IN THE LIVER AND KIDNEYS INCLUDING TOXIC HEPATITIS, CHANGES IN BLOOD
CHOLINESTERASE ACTIVITY, LEUKOCYTOSIS, AND RETICULOCYTOSIS. TESTICULAR
HISTOPATHOLOGY WAS OBSERVED IN RABBITS AND MONKEYS. REPRODUCTIVE
EFFECTS HAVE BEEN REPORTED IN ANIMALS; IN ONE CASE PREGNANT RATS EXPOSED
TO 100 OR 1000 PPM FOR 6 HOURS/DAY ON DAYS 1 TO 19 OF GESTATION HAD
OFFSPRING WITH A SIGNIFICANT INCREASE IN EXTRA RIB FORMATION.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:**ETHYL BENZENE:****IRRITANT/NARCOTIC.**

ACUTE EXPOSURE- LIQUID OR VAPOR MAY, DEPENDING ON CONCENTRATION AND LENGTH OF EXPOSURE, CAUSE IRRITATION, INFLAMMATION, AND POSSIBLY 1ST OR 2ND DEGREE BURNS. ETHYL BENZENE WAS ABSORBED AT A RATE OF 22-33 MG/CM²/HOUR ON THE HAND AND FOREARM OF HUMAN SUBJECTS AND COULD POSSIBLY CAUSE SYSTEMIC TOXICITY AS IN INHALATION. CONTACT WITH RABBIT SKIN BY THE LIQUID CAUSED ERYTHEMA, EXFOLIATION AND VESICULATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE RASH OR DERMATITIS BY DEFATTING THE SKIN. ADMINISTRATION TO RABBITS CAUSED EFFECTS RANGING FROM REDDENING AND MODERATE IRRITATION TO SLIGHT NECROSIS, EXFOLIATION, AND BLISTERING.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:**ETHYL BENZENE:****IRRITANT.**

ACUTE EXPOSURE- CAN CAUSE IRRITATION AT LEVELS OF 200 PPM WHICH USUALLY PROVIDES SOME WARNING OF DANGEROUS CONCENTRATIONS. IRRITATION AND LACRIMATION MAY OCCUR ABOVE 1000 PPM, WITH TOLERANCE DEVELOPING QUICKLY, AND MAY BE SEVERE ABOVE 2000 PPM. AT 5000 PPM, IRRITATION IS INTOLERABLE. 2 DROPS OF THE LIQUID IN THE EYE OF A RABBIT CAUSED SLIGHT CONJUNCTIVAL IRRITATION AND SLIGHT CORNEAL INJURY; GUINEA PIGS SHOWED EYE IRRITATION AFTER 8 MINUTES AT 1000 PPM AND AFTER 1 MINUTE AT 2000 PPM, WITH IMMEDIATE, INTENSE IRRITATION OF THE CONJUNCTIVA AT 5000-10000 PPM.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS; IN ONE REPORT WORKERS EXPOSED TO 0.8-1.2 MG/L AIR FOR MORE THAN EIGHTEEN MONTHS COMPLAINED OF REDUCED VISION IN DIM LIGHT.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:**ETHYL BENZENE:**

ACUTE EXPOSURE- MAY CAUSE ABDOMINAL PAIN, NAUSEA, AND VOMITING WHICH MAY LEAD TO ASPIRATION WITH EXTENSIVE EDEMA AND HEMORRHAGE OF LUNG TISSUE. ASPIRATION BY RATS CAUSED IMMEDIATE DEATH BY CARDIAC ARREST AND RESPIRATORY PARALYSIS.

CHRONIC EXPOSURE- INGESTION OF 408-680 MG/KG/DAY FOR 182 DAYS BY RATS CAUSED SLIGHT LIVER AND KIDNEY WEIGHT INCREASES WITH SLIGHT PATHOLOGICAL SIGNS.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. USE GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND A CUFFED ENDOTRACHEAL TUBE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, IPECAC EMESIS CAN BE DONE. WHEN VOMITING BEGINS, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION. AFTER VOMITING STOPS, GIVE 30-60 MILLILITERS OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. MAINTAIN AIRWAY, BLOOD PRESSURE AND RESPIRATION. (OREISBACH, HANDBOOK OF POISONING, 11TH ED.) TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES IN A CLOSED CONTAINER.

DUE TO LOW CONDUCTIVITY, SUBSTANCE MAY GENERATE ELECTROSTATIC CHARGE DUE TO FLOW AGITATION.

INCOMPATIBILITIES:

ETHYL BENZENE:

ACIDS (STRONG): POSSIBLE VIOLENT REACTION.

AMMONIA: POSSIBLE VIOLENT REACTION.

BASES (STRONG): POSSIBLE VIOLENT REACTION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PLASTICS: MAY BE ATTACKED.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

STORE IN ACCORDANCE WITH 29 CFR 1910.101.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE. INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR CABINET. ISOLATE FROM ACUTE FIRE HAZARDS AND OXIDIZING AGENTS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL. DO NOT QUENCH CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE AND TRAVEL A CONSIDERABLE DISTANCE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

MINIMIZE VAPOR AND FIRE HAZARD BY APPLICATION OF APPROPRIATE FOAM.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER SPILL:

USE NATURAL DEEP WATER POCKETS, EXCAVATED LAGOONS, OR SAND BAG BARRIERS TO TRAP MATERIAL AT BOTTOM. USE ACTIVATED CARBON AT 10 TIMES THE SPILLED AMOUNT IF IT IS DISSOLVED AT 10 PPM OR GREATER CONCENTRATION. REMOVE TRAPPED MATERIAL WITH SUCTION HOSES. USE MECHANICAL DREDGES OR LIFTS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.

APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, MTOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ETHYL BENZENE:

1000 PPM- ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).

2000 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ESCAPE- ANY AIR-PURIFYING FULL FACE-PIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 02/05/85 REVISION DATE: 06/27/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS

P-XYLENE
P-XYLENE
P-XYLENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS:
GASTON L. PILLORI: (201) 796-7100
AFTER BUSINESS HOURS; HOLIDAYS:
(201) 796-7523
CHEMFREC ASSISTANCE: (800) 424-9300

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

SUBSTANCE IDENTIFICATION

CAS-NUMBER 106-42-3

SUBSTANCE: **P-XYLENE**

TRADE NAMES/SYNONYMS:

BENZENE, 1,4-DIMETHYL-, P-DIMETHYLBENZENE; 1,4-DIMETHYLBENZENE;
P-METHYLTOLUENE; 4-METHYLTOLUENE; 1,4-XYLENE; P-XYLOL; UN 1307; 0-5082;
CBH10;

CHEMICAL FAMILY:
HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C8-H10

MOLECULAR WEIGHT: 106.17

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1
RFA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: P-XYLENE PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

XYLENE:
100 PPM (435 MG/M3) OSHA TWA; 150 PPM (655 MG/M3) OSHA STEL
100 PPM (435 MG/M3) ACGIH TWA; 150 PPM (655 MG/M3) ACGIH STEL
100 PPM (435 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA; 200 PPM (870 MG/M3)
NIOSH RECOMMENDED 10 MINUTE CEILING

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID, WITH A SWEET ODOR.

BOILING POINT: 281 F (138 C) MELTING POINT: 56 F (13 C)

SPECIFIC GRAVITY: 0.9 VAPOR PRESSURE: 8.6 MMHG @ 25 C

EVAPORATION RATE: (BUTYL ACETATE = 1) 0.7 SOLUBILITY IN WATER: INSOLUBLE

ODOR THRESHOLD: 0.47 PPM VAPOR DENSITY: 3.7

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, BENZENE, ACETONE, OTHER ORGANIC SOLVENTS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 81 F (27 C) (CC) UPPER EXPLOSIVE LIMIT: 7.0%

LOWER EXPLOSIVE LIMIT: 1.1% AUTOIGNITION TEMP.: 984 F (528 C)

FLAMMABILITY CLASS(DSHA): IC

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, EIGHTH EDITION).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101;
CLASSIFIABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E;
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

F-XYLENE:
TOXICITY DATA: 4550 PPM/4 HOURS INHALATION-RAT LC50; 15 GM/KG INHALATION-MOUSE
LC10; 5 GM/KG ORAL-RAT LD50; 3810 MG/KG INTRAPERITONEAL-RAT LD50; 2110 MG/KG
INTRAPERITONEAL-MOUSE LD50; REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYES.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT
THE HEART, BLOOD, NERVOUS SYSTEM, LIVER AND KIDNEYS.
LIVER AND KIDNEYS. ALCOHOL CONSUMPTION MAY ENHANCE THE TOXIC EFFECTS.
AT INCREASED RISK FROM EXPOSURE. PREGNANT WOMEN.
ADDITIONAL DATA: ALCOHOL CONSUMPTION MAY ENHANCE THE TOXIC EFFECTS.
STIMULANTS SUCH AS EPINEPHRINE AND EPHEDRINE MAY INDUCE VENTRICULAR
FIBRILLATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:
XYLENE:
IRRITANT/MARCOITIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- IRRITATION OF THE UPPER RESPIRATORY TRACT MAY OCCUR AT 200
PPM. EXPOSURE TO HIGHER CONCENTRATIONS MAY CAUSE MORE SEVERE IRRITATION
AND INITIAL CENTRAL NERVOUS SYSTEM EXCITATION FOLLOWED BY DEPRESSION.
SIGNS AND SYMPTOMS MAY INCLUDE RESPIRATORY DIFFICULTY AND SUBSTERNAL PAIN,
TRANSIENT EUPHORIA AND EMOTIONAL LABILITY, HEADACHE, NAUSEA, VOMITING,
ANOREXIA, ABDOMINAL PAIN, DIZZINESS, DROWSINESS, ATAXIA, AND STAGGERING.
THERE MAY BE SALIVATION, SLURRED SPEECH, BLURRED VISION, NYSTAGMUS,
TINNITUS, TREMORS, CONFUSION, AND FLUSHING OF THE FACE AND A FEELING OF
INCREASED BODY HEAT. IN SEVERE EXPOSURES, THERE MAY BE STUPOR, ANESTHESIA,
UNCONSCIOUSNESS, AND COMA WHICH MAY BE PUNCTUATED BY EPISODES OF
NEUROIRRITABILITY, BUT RARELY FRANK CONVULSIONS, EXCEPT IN TERMINAL
ASPHYXIA. LIVER AND KIDNEY DAMAGE MAY OCCUR, BUT ARE USUALLY MILD AND
TRANSIENT. A GROUP OF SUBJECTS WHO INHALED 12.3 UMOL/L OF XYLENE
WHILE EXERCISING BECAME SIGNIFICANTLY IMPAIRED ON 3 NEUROPSYCHOLOGICAL
TESTS. EXPOSURE OF 3 PATIENTS TO APPROXIMATELY 10 000 PPM FOR 18.5
HOURS RESULTED IN 1 DEATH FROM PULMONARY EDEMA AND PETECHIAL BRAIN
HEMORRHAGE. BOTH SURVIVORS WERE UNCONSCIOUSNESS FOR 19-24 HOURS AND
EXPERIENCED RETROGRADE AMNESIA, HYPOTHERMIA, AND LUNG CONGESTION. RENAL
AND HEPATIC IMPAIRMENT ALSO DEVELOPED. COMPLETE RECOVERY TOOK 15 DAYS.
HIGH CONCENTRATIONS MAY CAUSE DEATH FROM SUDDEN VENTRICULAR FIBRILLATION,
BUT MORE FREQUENTLY DEATH OCCURS FROM RESPIRATORY ARREST.
CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION OF VAPORS ABOVE 200 PPM
MAY CAUSE NAUSEA, VOMITING, ABDOMINAL PAIN, AND ANOREXIA. OTHER COMMON

COMPLAINTS INCLUDE HEADACHE, FATIGUE, LASSITUDE, IRRITABILITY, BREATHING DIFFICULTIES, AND FLATULENCE. EFFECTS ON THE NERVOUS SYSTEM MAY RESULT IN EXCITATION, FOLLOWED BY DEPRESSION, PARESTHESIAS, TREMORS, APPREHENSION, IMPAIRED MEMORY, INSOMNIA, VERTIGO, AND TINNITUS. EFFECTS ON REACTION TIME, MANUAL COORDINATION, BODY BALANCE AND EEG OCCURRED WITH REPEATED EXPOSURE TO 90 PPM OF M-XYLENE. SWEETISH TASTE IN THE MOUTH, DRY NOSE AND THROAT, STRONG THIRST, MUCOSAL HEMORRHAGE, AND ANEMIA HAVE BEEN REPORTED. EFFECTS ON THE LIVER, KIDNEY, CARDIOVASCULAR SYSTEM, AND THE BONE MARROW HAVE ALSO BEEN REPORTED, ALTHOUGH THE LATTER HAS BEEN QUESTIONED. EXPOSURE OF RABBITS TO 1150 PPM FOR 40-55 DAYS RESULTED IN A REVERSIBLE DECREASE IN THE RED AND WHITE CELL COUNTS AND AN INCREASE IN THE PLATELETS. ONE CASE OF AN APPARENT EPILEPTIFORM SEIZURE FOLLOWING A RELATIVELY BRIEF EXPOSURE HAS OCCURRED. WOMEN MAY DEVELOP MENSTRUAL DISORDERS, SUCH AS MENORRHAGIA OR METORRHAGIA, INFERTILITY, AND PATHOLOGICAL PREGNANCY CONDITIONS INCLUDING TOXICOSIS, DANGER OF MISCARRIAGE, AND HEMORRHAGING DURING DELIVERY. REPEATED EXPOSURE OF PREGNANT MICE, RATS AND RABBITS TO THE INDIVIDUAL OR THE MIXED ISOMERS HAS RESULTED IN MATERNAL EFFECTS AND EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, AND SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS ARE FETAL DEATH, FETOTOXICITY, PRE- AND POST-IMPLANTATION MORTALITY, ABORTION, CRANIOFACIAL AND MUSCULOSKELETAL ABNORMALITIES, AND EXTRA EMBRYONIC STRUCTURES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

XYLENE:

IRRITANT.

ACUTE EXPOSURE- LIQUID XYLENE IS A DEFATTING AGENT AND MAY CAUSE A BURNING SENSATION, DRYING, VASODILATION, ERYTHEMA, AND POSSIBLY BLISTERING. THE LIQUID IS READILY ABSORBED THROUGH INTACT OR BROKEN SKIN AT A RATE OF APPROXIMATELY 4-10 MG/CM²/HOUR, BUT SYSTEMIC EFFECTS HAVE NOT BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN WITH DRYING, ERYTHEMA, CRACKING, THICKENING AND BLISTERING. REPEATED APPLICATION OF 95% XYLENE TO RABBIT SKIN CAUSED MODERATE TO MARKED IRRITATION WITH ERYTHEMA AND MODERATE NECROSIS. ONE CASE OF ALLERGIC CONTACT URTICARIA HAS BEEN REPORTED.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

XYLENE:

IRRITANT.

ACUTE EXPOSURE- 200 PPM HAS CAUSED CONJUNCTIVAL IRRITATION IN HUMANS; AT HIGHER CONCENTRATIONS, IRRITATION MAY BE SEVERE. VAPOR EXPOSURE HAS ALSO CAUSED TEARING AND PHOTOPHOBIA. AN ACCIDENTAL SPLASH IN THE HUMAN EYE CAUSED TRANSIENT SUPERFICIAL DAMAGE WITH RAPID RECOVERY, ALTHOUGH REVERSIBLE CORNEAL BURNS HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO HIGH VAPOR

CONCENTRATIONS MAY CAUSE A BURNING SENSATION, CONJUNCTIVITIS AND BLURRED VISION; REVERSIBLE VACUOLAR, EPITHELIAL KERATOPATHY HAS BEEN REPORTED IN SOME WORKERS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

XYLENE: :
NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A BURNING SENSATION IN THE MOUTH AND STOMACH, SALIVATION, SEVERE GASTROINTESTINAL DISTRESS WITH NAUSEA AND VOMITING, POSSIBLY HEMATEMESIS, AND TOXIC EFFECTS INCLUDING SIGNS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND OTHER SYMPTOMS AS IN ACUTE INHALATION, INCLUDING VENTRICULAR FIBRILLATION AND LIVER AND KIDNEY INJURY. INGESTION OF SMALL QUANTITIES OF 90% XYLENE PLUS TOLUENE PRODUCED URINARY OXYTOSE AND UROBILINOGEN EXCRETION WITH TOXIC HEPATITIS, WHICH WAS REVERSIBLE IN 20 DAYS. A DOSE OF 15-30 MILLILITERS (ABOUT 1/2-1 OUNCE) IS THE EXPECTED HUMAN LETHAL DOSE. WITH ASPIRATION OF EVEN A FEW MILLILITERS INTO THE LUNGS, SEVERE COUGHING, DISTRESS, CHEMICAL PNEUMONITIS, RAPIDLY DEVELOPING PULMONARY EDEMA, AND HEMORRHAGE MAY OCCUR.

CHRONIC EXPOSURE- NO DATA AVAILABLE ON THE ORTHO-ISOMER. REPEATED INGESTION OF THE MIXED, META- OR PARA-ISOMERS BY PREGNANT WIFE RESULTED IN EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, OR SPECIFIC DEVELOPMENTAL ABNORMALITIES, INCLUDED AMONG THESE EFFECTS WERE FETOTOXICITY, LITTER SIZE, CRANIOFACIAL AND MUSCULOSKELETAL SYSTEM ABNORMALITIES, AND POST-IMPLANTATION MORTALITY.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. USE GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND A CUFFED ENDOTRACHEAL TUBE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, IPECAC EMESIS CAN BE DONE. WHEN VOMITING BEGINS, KEEP HEAD BELOW THE HIPS TO PREVENT ASPIRATION. AFTER VOMITING STOPS, GIVE 30-60 MILLILITERS OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. MAINTAIN AIRWAY. BLOOD PRESSURE AND RESPIRATION. (GREISBACH, HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION! TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

P-XYLENE:
ACETIC ACID + AIR; POSSIBLE EXPLOSION IN LIQUID PHASE OXIDATION OF P-XYLENE.
1,3-DICHLORO-5,5-DIMETHYL-2,4-IMIDAZOLIDINDIONE: POSSIBLE EXPLOSION.
NITRIC ACID: INTENSE REACTION.
OXIDIZERS (STRONG): POSSIBLE FIRE AND EXPLOSION.
SULFURIC ACID: INTENSE REACTION.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON AND

NITROGEN.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL
TEMPERATURES AND PRESSURES.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS
MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY
RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH
AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

IMMOBILIZE SPILL WITH UNIVERSAL GELLING AGENT.

REDUCE VAPOR AND FIRE HAZARD WITH APPROPRIATE FOAM.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL
BOOMS.

APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT.

APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE
EFFICIENCY OF REMOVAL.

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON
AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND
PRECIPITATES.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER
SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT
MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE
FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD
AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES

THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

XYLENE (O-, M-, AND P-ISOMERS):

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 12/19/84 REVISION DATE: 06/27/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

0-XYLENE
0-XYLENE
0-XYLENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS:
GASTON L. PILLORI; (201) 796-7100
AFTER BUSINESS HOURS; HOLIDAYS:
(201) 796-7523
CHEMTREC ASSISTANCE: (800) 424-9300

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

SUBSTANCE IDENTIFICATION

CAS-NUMBER 95-47-6

SUBSTANCE: **0-XYLENE**

TRADE NAMES/SYNONYMS:

BENZENE, 1,2-DIMETHYL-; O-DIMETHYLBENZENE; 1,2-DIMETHYLBENZENE;
O-METHYLTOLUENE; ORTHO-XYLENE; 1,2-XYLENE; O-XYLOL; UN 1307; O-5081; C8H10;

CHEMICAL FAMILY:

HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C8-H10

MOLECULAR WEIGHT: 106.17

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: XYLENE

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

XYLENE:

100 PPM (435 MG/M3) OSHA TWA; 150 PPM (655 MG/M3) OSHA STEL
100 PPM (435 MG/M3) ACGIH TWA; 150 PPM (655 MG/M3) ACGIH STEL
100 PPM (435 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA; 200 PPM (870 MG/M3)
NIOSH RECOMMENDED 10 MINUTE CEILING

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID, WITH A SWEET ODOR.

BOILING POINT: 292 F (144 C) MELTING POINT: -13 F (-25 C)

SPECIFIC GRAVITY: 0.9 VOLATILITY: 100% VAPOR PRESSURE: 5.2 MM @ 25 C
EVAPORATION RATE: (BUTYL ACETATE=1) 0.7 SOLUBILITY IN WATER: 0.0175% @ 20 C
ODOR THRESHOLD: <1 PPM VAPOR DENSITY: 3.7
SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, BENZENE, ACETONE, OTHER
ORGANIC SOLVENTS

FIRE AND EXPLOSTION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.
VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.
DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.
FLASH POINT: 90 F (32 C) (CC) UPPER EXPLOSIVE LIMIT: 7.0%
LOWER EXPLOSIVE LIMIT: 1.0% AUTOIGNITION TEMP.: 867 F (463 C)
FLAMMABILITY CLASS(OSHA): IC
FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).
FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING: |
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH
WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK
ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR
NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN
CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF
STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4,
GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG,
SOLO STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING QUANTITIES OF
WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE, AVOID BREATHING TOXIC VAPORS,
KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS,
EIGHTH EDITION).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

m-XYLENE:

TOXICITY DATA: 6125 PPM/12 HOURS INHALATION-RAT LCLO; 30 GM/H3
INHALATION-MOUSE LCLO; 5 GM/KG ORAL RAT LD50; 3617 MG/KG ORAL-RAT LD50
(PHILLIPS); 1364 MG/KG INTRAPERITONEAL-MOUSE LD50; REPRODUCTIVE EFFECTS DATA
(RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE
NERVOUS SYSTEM, LIVER AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PREGNANT WOMEN.

ADDITIONAL DATA: ALCOHOL CONSUMPTION MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS
SUCH AS EPINEPHRINE AND EPHEDRINE MAY INDUCE VENTRICULAR FIBRILLATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

XYLENE:

IRRITANT/NARCOTIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- IRRITATION OF THE UPPER RESPIRATORY TRACT MAY OCCUR AT 200
PPM. EXPOSURE TO HIGHER CONCENTRATIONS MAY CAUSE MORE SEVERE IRRITATION
AND INITIAL CENTRAL NERVOUS SYSTEM EXCITATION FOLLOWED BY DEPRESSION.
SIGNS AND SYMPTOMS MAY INCLUDE RESPIRATORY DIFFICULTY AND SUBSTERNAL PAIN,
TRANSIENT EUPHORIA AND EMOTIONAL LABILITY, HEADACHE, NAUSEA, VOMITING,
ANOREXIA, ABDOMINAL PAIN, DIZZINESS, DROWSINESS, ATAXIA, AND STAGGERING.
THERE MAY BE SALIVATION, SLURRED SPEECH, BLURRED VISION, NYSTAGMUS,
TINNITUS, TREMORS, CONFUSION, AND FLUSHING OF THE FACE AND A FEELING OF
INCREASED BODY HEAT. IN SEVERE EXPOSURES, THERE MAY BE STUPOR, ANESTHESIA,
UNCONSCIOUSNESS, AND COMA WHICH MAY BE PUNCTUATED BY EPISODES OF
NEUROIRRITABILITY, BUT RARELY FRANK CONVULSIONS, EXCEPT IN TERMINAL
ASPHYXIA. LIVER AND KIDNEY DAMAGE MAY OCCUR, BUT ARE USUALLY MILD AND
TRANSIENT. A GROUP OF SUBJECTS WHO INHALED 12.3 UMOL/L OF XYLENE
WHILE EXERCISING BECAME SIGNIFICANTLY IMPAIRED ON 3 NEUROPSYCHOLOGICAL
TESTS. EXPOSURE OF 3 PAINTERS TO APPROXIMATELY 10,000 PPM FOR 18.5
HOURS RESULTED IN 1 DEATH FROM PULMONARY EDEMA AND PETECHIAL BRAIN
HEMORRHAGE. BOTH SURVIVORS WERE UNCONSCIOUSNESS FOR 19-24 HOURS AND
EXPERIENCED RETROGRADE AMNESIA, HYPOTHERMIA, AND LUNG CONGESTION. RENAL
AND HEPATIC IMPAIRMENT ALSO DEVELOPED. COMPLETE RECOVERY TOOK 15 DAYS.
HIGH CONCENTRATIONS MAY CAUSE DEATH FROM SUDDEN VENTRICULAR FIBRILLATION,
BUT MORE FREQUENTLY DEATH OCCURS FROM RESPIRATORY ARREST.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION OF VAPORS ABOVE 200 PPM
MAY CAUSE NAUSEA, VOMITING, ABDOMINAL PAIN, AND ANOREXIA. OTHER COMMON
COMPLAINTS INCLUDE HEADACHE, FATIGUE, LASSITUDE, IRRITABILITY, BREATHING
DIFFICULTIES, AND FLATULENCE. EFFECTS ON THE NERVOUS SYSTEM MAY RESULT IN
EXCITATION, FOLLOWED BY DEPRESSION, PARESTHESIAS, TREMORS, APPREHENSION,
IMPAIRED MEMORY, INSOMNIA, VERTIGO, AND TINNITUS. EFFECTS ON REACTION
TIME, MANUAL COORDINATION, BODY BALANCE AND EEG OCCURRED WITH REPEATED
EXPOSURE TO 90 PPM OF m-XYLENE. SWEETISH TASTE IN THE MOUTH, DRY NOSE AND

THROAT, STRONG THIRST, MUCOSAL HEMORRHAGE, AND ANEMIA HAVE BEEN REPORTED. EFFECTS ON THE LIVER, KIDNEY, CARDIOVASCULAR SYSTEM, AND THE BONE MARROW HAVE ALSO BEEN REPORTED, ALTHOUGH THE LATTER HAS BEEN QUESTIONED. EXPOSURE OF RABBITS TO 1150 PPM FOR 40-55 DAYS RESULTED IN A REVERSIBLE DECREASE IN THE RED AND WHITE CELL COUNTS AND AN INCREASE IN THE PLATELETS. ONE CASE OF AN APPARENT EPILEPTIFORM SEIZURE FOLLOWING A RELATIVELY BRIEF EXPOSURE HAS OCCURRED. WOMEN MAY DEVELOP MENSTRUAL DISORDERS, SUCH AS MENORRHAGIA OR METRORRHAGIA, INFERTILITY, AND PATHOLOGICAL PREGNANCY CONDITIONS INCLUDING TOXICOSIS, DANGER OF MISCARRIAGE, AND HEMORRHAGING DURING DELIVERY. REPEATED EXPOSURE OF PREGNANT MICE, RATS AND RABBITS TO THE INDIVIDUAL OR THE MIXED ISOMERS HAS RESULTED IN MATERNAL EFFECTS AND EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, AND SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS ARE FETAL DEATH, FETOTOXICITY, PRE- AND POST-IMPLANTATION MORTALITY, ABORTION, CRANIOFACIAL AND MUSCULOSKELETAL ABNORMALITIES, AND EXTRA EMBRYONIC STRUCTURES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

XYLENE:
IRRITANT.

ACUTE EXPOSURE- LIQUID XYLENE IS A DEFATTING AGENT AND MAY CAUSE A BURNING SENSATION, DRYING, VASODILATION, ERYTHEMA, AND POSSIBLY BLISTERING. THE LIQUID IS READILY ABSORBED THROUGH INTACT OR BROKEN SKIN AT A RATE OF APPROXIMATELY 4-10 MG/CM²/HOUR, BUT SYSTEMIC EFFECTS HAVE NOT BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN WITH DRYING, ERYTHEMA, CRACKING, THICKENING AND BLISTERING. REPEATED APPLICATION OF 95% XYLENE TO RABBIT SKIN CAUSED MODERATE TO MARKED IRRITATION WITH ERYTHEMA AND MODERATE NECROSIS. ONE CASE OF ALLERGIC CONTACT URTICARIA HAS BEEN REPORTED.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

XYLENE:
IRRITANT.

ACUTE EXPOSURE- 200 PPM HAS CAUSED CONJUNCTIVAL IRRITATION IN HUMANS; AT HIGHER CONCENTRATIONS, IRRITATION MAY BE SEVERE. VAPOR EXPOSURE HAS ALSO CAUSED TEARING AND PHOTOPHOBIA. AN ACCIDENTAL SPLASH IN THE HUMAN EYE CAUSED TRANSIENT SUPERFICIAL DAMAGE WITH RAPID RECOVERY, ALTHOUGH REVERSIBLE CORNEAL BURNS HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO HIGH VAPOR CONCENTRATIONS MAY CAUSE A BURNING SENSATION, CONJUNCTIVITIS AND BLURRED VISION; REVERSIBLE VACUOLAR, EPITHELIAL KERATOPATHY HAS BEEN REPORTED IN SOME WORKERS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL

INGESTION:

XYLENE:

HARROTTIC

ACUTE EXPOSURE - MAY CAUSE A BURNING SENSATION IN THE MOUTH AND STOMACH, SALIVATION, SEVERE GASTROINTESTINAL DISTRESS WITH NAUSEA AND VOMITING, POSSIBLY HEMATEMESIS, AND TOXIC EFFECTS INCLUDING SIGNS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND OTHER SYMPTOMS AS IN ACUTE INHALATION, INCLUDING VENTRICULAR FIBRILLATION AND LIVER AND KIDNEY INJURY. INGESTION OF SMALL QUANTITIES OF 90% XYLENE PLUS TOLUENE PRODUCED URINARY DEXTROSE AND UROBILINOGEN EXCRETION WITH TOXIC HEPATITIS, WHICH WAS REVERSIBLE IN 20 DAYS. A DOSE OF 15-30 MILLILITERS (ABOUT 1/2-1 OUNCE) IS THE EXPECTED HUMAN LETHAL DOSE. WITH ASPIRATION OF EVEN A FEW MILLILITERS INTO THE LUNGS, SEVERE COUGHING, DISTRESS, CHEMICAL PNEUMONITIS, RAPIDLY DEVELOPING PULMONARY EDEMA, AND HEMORRHAGE MAY OCCUR.
CHRONIC EXPOSURE - NO DATA AVAILABLE ON THE ORTHO-ISOMER. REPEATED INGESTION OF THE MIXED, META-, OR PARA-ISOMERS BY PREGNANT WIFE RESULTED IN EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, OR SPECIFIC DEVELOPMENTAL ABNORMALITIES, INCLUDED AMONG THESE EFFECTS WERE FETOTOXICITY, LITTER SIZE, CRANIOFACIAL AND MUSCULOSKELETAL SYSTEM ABNORMALITIES, AND POST-IMPLANTATION MORTALITY.

FIRST AID - EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. USE GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND A CUFFED ENDOTRACHEAL TUBE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, IPPECAC EMESIS CAN BE DONE. WHEN VOMITING BEGINS, KEEP HEAD BELOW THE HIPS TO PREVENT ASPIRATION. AFTER VOMITING STOPS, GIVE 30-60 MILLILITERS OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. MAINTAIN AIRWAY, BLOOD PRESSURE AND RESPIRATION. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION. TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

O-XYLENE:
OXIDIZERS (STRONG): POSSIBLE FIRE AND EXPLOSION.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON AND NITROGEN.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

IMMORILIZE SPILL WITH UNIVERSAL GELLING AGENT.

REDUCE VAPOR AND FIRE HAZARD WITH APPROPRIATE FOAM.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT.

APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES, STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

XYLENE (O-, M-, AND P-ISOMERS):
1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 12/19/84 REVISION DATE: 06/27/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

M-XYLENE
M-XYLENE
M-XYLENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS:
GASTON L. PILLORI: (201) 796-7100
AFTER BUSINESS HOURS; HOLIDAYS:
(201) 796-7523
CHEMTREC ASSISTANCE: (800) 424-9300

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

SUBSTANCE IDENTIFICATION

CAS-NUMBER 108-38-3

SUBSTANCE: **M-XYLENE**

TRADE NAMES/SYNONYMS:

BENZENE, 1,3-DIMETHYL-; M-DIMETHYLBENZENE; 1,3-DIMETHYLBENZENE;
M-METHYLTOLUENE; 1,3-XYLENE; M-XYLOL; UN 1307; 0-5078; 0-5079; C8H10;

CHEMICAL FAMILY:

HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C8-H10

MOLECULAR WEIGHT: 106.17

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: M-XYLENE

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

XYLENE:

100 PPM (435 MG/M3) OSHA TWA; 150 PPM (655 MG/M3) OSHA STEL
100 PPM (435 MG/M3) ACGIH TWA; 150 PPM (655 MG/M3) ACGIH STEL
100 PPM (435 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA; 200 PPM (870 MG/M3)
NIOSH RECOMMENDED 10 MINUTE CEILING

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A SWEET ODOR

BOILING POINT: 282 F (139 C) MELTING POINT: -54 F (-48 C)

SPECIFIC GRAVITY: 0.9 VAPOR PRESSURE: 8.3 MMHG @ 25 C
EVAPORATION RATE: (BUTYL ACETATE=1) 0.7 SOLUBILITY IN WATER: INSOLUBLE
DORR THRESHOLD: 3.7 PPM VAPOR DENSITY: 3.7
SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, ACETONE, BENZENE, SOME ORGANIC SOLVENTS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 81 F (27 C) (CC) UPPER EXPLOSIVE LIMIT: 7.0%

LOWER EXPLOSIVE LIMIT: 1.1% AUTOIGNITION TEMP.: 982 F (527 C)

FLAMMABILITY CLASS(OSHA): IC

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE, AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS; EIGHTH EDITION).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

M-XYLENE:
IRITATION DATA: 10 UG/24 HOURS OPEN SKIN-RABBIT SEVERE; 20 MG/24 HOURS
SKIN-RABBIT MODERATE; 5 MG/24 HOURS EYE-RABBIT SEVERE,
TOXICITY DATA: 424 MG/M3/6 HOURS/6 DAYS INHALATION-MAN TCLO; 870 MG/M3/4 HOURS
INTERMITTENT INHALATION-MAN TCLO; 8000 PPM/4 HOURS INHALATION-RAT LCLO;
5 GM/KG DRAL-LD50; 14100 MG/KG SKIN-RABBIT LD50; 1739 MG/KG
INTRAPERITONEAL-MOUSE LD50; REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT
THE NERVOUS SYSTEM, LIVER, AND KIDNEYS.
AT INCREASED RISK FROM EXPOSURE; PREGNANT WOMEN.
ADDITIONAL DATA: ALCOHOL CONSUMPTION MAY ENHANCE THE TOXIC EFFECTS.
STIMULANTS SUCH AS EPINEPHRINE OR EPHEDRINE MAY INDUCE VENTRICULAR
FIBRILLATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

XYLENE:
IRRITANT/NARCOTIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- IRRITATION OF THE UPPER RESPIRATORY TRACT MAY OCCUR AT 200
PPM. EXPOSURE TO HIGHER CONCENTRATIONS MAY CAUSE MORE SEVERE IRRITATION
AND INITIAL CENTRAL NERVOUS SYSTEM EXCITATION FOLLOWED BY DEPRESSION.
SIGNS AND SYMPTOMS MAY INCLUDE RESPIRATORY DIFFICULTY AND SUBSTERNAL PAIN,
TRANSIENT EUPHORIA AND EMOTIONAL LABILITY, HEADACHE, NAUSEA, VOMITING,
ANOREXIA, ABDOMINAL PAIN, DIZZINESS, DROWSINESS, ATAXIA, AND STAGGERING.
THERE MAY BE SALIVATION, SLURRED SPEECH, BLURRED VISION, NYSTAGMUS,
TINNITUS, TREMORS, CONFUSION, AND FLUSHING OF THE FACE AND A FEELING OF
INCREASED BODY HEAT. IN SEVERE EXPOSURES, THERE MAY BE STUPOR, ANESTHESIA,
UNCONSCIOUSNESS, AND COMA WHICH MAY BE PUNCTUATED BY EPISODES OF
NEUROIRRITABILITY, BUT RARELY FRANK CONVULSIONS, EXCEPT IN TERMINAL
ASPHYXIA. LIVER AND KIDNEY DAMAGE MAY OCCUR, BUT ARE USUALLY MILD AND
TRANSIENT. A GROUP OF SUBJECTS WHO INHALED 12.3 UMO/L OF XYLENE
WHILE EXERCISING BECAME SIGNIFICANTLY IMPAIRED ON 3 NEUROPSYCHOLOGICAL
TESTS. EXPOSURE OF 3 PAINTERS TO APPROXIMATELY 10,000 PPM FOR 18.5
HOURS RESULTED IN 1 DEATH FROM PULMONARY EDEMA AND PATECHIAL BRAIN
HEMORRHAGE. BOTH SURVIVORS WERE UNCONSCIOUSNESS FOR 19-24 HOURS AND
EXPERIENCED RETROGRADE AMNESIA, HYPOTHERMIA, AND LUNG CONGESTION. RENAL
AND HEPATIC IMPAIRMENT ALSO DEVELOPED. COMPLETE RECOVERY TOOK 15 DAYS.
HIGH CONCENTRATIONS MAY CAUSE DEATH FROM SUDDEN VENTRICULAR FIBRILLATION,
BUT MORE FREQUENTLY DEATH OCCURS FROM RESPIRATORY ARREST.
CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION OF VAPORS ABOVE 200 PPM
MAY CAUSE NAUSEA, VOMITING, ABDOMINAL PAIN, AND ANOREXIA. OTHER COMMON
COMPLAINTS INCLUDE HEADACHE, FATIGUE, LASSITUDE, IRRITABILITY, BREATHING
DIFFICULTIES, AND FLATULENCE. EFFECTS ON THE NERVOUS SYSTEM MAY RESULT IN
EXCITATION, FOLLOWED BY DEPRESSION, PARESTHESIAS, TREMORS, APPREHENSION,

IMPAIRED MEMORY, INSOMNIA, VERTIGO, AND TINNITUS. EFFECTS ON REACTION TIME, MANUAL COORDINATION, BODY BALANCE AND EEG OCCURRED WITH REPEATED EXPOSURE TO 90 PPM OF M-XYLENE. SWEETISH TASTE IN THE MOUTH, DRY NOSE AND THROAT, STRONG TIRST, MUCOSAL HEMORRAGE, AND ANEMIA HAVE BEEN REPORTED. EFFECTS ON THE LIVER, KIDNEY, CAROTIDVASCULAR SYSTEM, AND THE BONE MARROW HAVE ALSO BEEN REPORTED, ALTHOUGH THE LATTER HAS BEEN QUESTIONED. EXPOSURE OF RABBITS TO 150 PPM FOR 40-55 DAYS RESULTED IN A REVERSIBLE DECREASE IN THE RED AND WHITE CELL COUNTS AND AN INCREASE IN THE PLATELETS. ONE CASE OF AN APPARENT EPILEPTIFORM SEIZURE FOLLOWING A RELATIVELY BRIEF EXPOSURE HAS OCCURRED. WOMEN MAY DEVELOP MENSTRUAL DISORDERS, SUCH AS MENORRHAGIA OR METRORRHAGIA, INFERTILITY, AND PATHOLOGICAL PREGNANCY CONDITIONS INCLUDING TOXICOSIS, DANGER OF MISCARRIAGE, AND HEMORRHAGING DURING DELIVERY. REPEATED EXPOSURE OF PREGNANT MICE, RATS AND RABBITS TO THE INDIVIDUAL OR THE MIXED ISOMERS HAS RESULTED IN MATERNAL EFFECTS AND EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, AND SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS ARE FETAL DEATH, FETOTOXICITY, PRE- AND POST-IMPLANTATION MORTALITY, ABORTION, CRANIOFACIAL AND MUSCULOSKELETAL ABNORMALITIES, AND EXTRA EMBRYONIC STRUCTURES.

FIRST AID- REMOVE EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT: XYLENE; IRRITANT. ACUTE EXPOSURE- LIQUID XYLENE IS A DEFATTING AGENT AND MAY CAUSE A BURNING SENSATION, DRYING, VASODILATION, ERYTHEMA, AND POSSIBLY BLISTERING. THE LIQUID IS READILY ABSORBED THROUGH INTACT OR BROKEN SKIN AT A RATE OF APPROXIMATELY 4-10 MG/CM2/HOUR, BUT SYSTEMIC EFFECTS HAVE NOT BEEN REPORTED. CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN WITH DRYING, ERYTHEMA, CRACKING, THICKENING AND BLISTERING. REPEATED APPLICATION OF 5% XYLENE TO RABBIT SKIN CAUSED MODERATE TO MARKED IRRITATION WITH ERYTHEMA AND MODERATE NECROSIS. ONE CASE OF ALLERGIC CONTACT URTICARIA HAS BEEN REPORTED.

SKIN CONTACT: XYLENE; IRRITANT. ACUTE EXPOSURE- LIQUID XYLENE IS A DEFATTING AGENT AND MAY CAUSE A BURNING SENSATION, DRYING, VASODILATION, ERYTHEMA, AND POSSIBLY BLISTERING. THE LIQUID IS READILY ABSORBED THROUGH INTACT OR BROKEN SKIN AT A RATE OF APPROXIMATELY 4-10 MG/CM2/HOUR, BUT SYSTEMIC EFFECTS HAVE NOT BEEN REPORTED. CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN WITH DRYING, ERYTHEMA, CRACKING, THICKENING AND BLISTERING. REPEATED APPLICATION OF 5% XYLENE TO RABBIT SKIN CAUSED MODERATE TO MARKED IRRITATION WITH ERYTHEMA AND MODERATE NECROSIS. ONE CASE OF ALLERGIC CONTACT URTICARIA HAS BEEN REPORTED.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IRITANT. XYLENE; EYE CONTACT: IRRITANT.

ACUTE EXPOSURE- 200 PPM HAS CAUSED CONJUNCTIVAL IRRITATION IN HUMANS; AT HIGHER CONCENTRATIONS, IRRITATION MAY BE SEVERE. VAPOR EXPOSURE HAS ALSO CAUSED TEARING AND PHOTOPHOBIA. AN ACCIDENTAL SPLASH IN THE HUMAN EYE CAUSED TRANSIENT SUPERFICIAL DAMAGE WITH RAPID RECOVERY, ALTHOUGH REVERSIBLE CORNEAL BURNS HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO HIGH VAPOR CONCENTRATIONS MAY CAUSE A BURNING SENSATION, CONJUNCTIVITIS AND BLURRED VISION; REVERSIBLE VASCULAR, EPITHELIAL KERATOPATHY HAS BEEN REPORTED IN SOME WORKERS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:**XYLENE:****NARCOTIC.**

ACUTE EXPOSURE- MAY CAUSE A BURNING SENSATION IN THE MOUTH AND STOMACH, SALIVATION, SEVERE GASTROINTESTINAL DISTRESS WITH NAUSEA AND VOMITING, POSSIBLY HEMATEMESIS, AND TOXIC EFFECTS INCLUDING SIGNS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND OTHER SYMPTOMS AS IN ACUTE INHALATION, INCLUDING VENTRICULAR FIBRILLATION AND LIVER AND KIDNEY INJURY. INGESTION OF SMALL QUANTITIES OF 90% XYLENE PLUS TOLUENE PRODUCED URINARY DEXTROSE AND UROBILINOGEN EXCRETION WITH TOXIC HEPATITIS, WHICH WAS REVERSIBLE IN 20 DAYS. A DOSE OF 15-30 MILLILITERS (ABOUT 1/2-1 OUNCE) IS THE EXPECTED HUMAN LETHAL DOSE. WITH ASPIRATION OF EVEN A FEW MILLILITERS INTO THE LUNGS, SEVERE COUGHING, DISTRESS, CHEMICAL PNEUMONITIS, RAPIDLY DEVELOPING PULMONARY EDEMA, AND HEMORRHAGE MAY OCCUR.

CHRONIC EXPOSURE- NO DATA AVAILABLE ON THE ORTHO-ISOMER. REPEATED INGESTION OF THE MIXED, META-, OR PARA-ISOMERS BY PREGNANT MICE RESULTED IN EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, OR SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS WERE FETOTOXICITY, LITTER SIZE, CRANIOFACIAL AND MUSCULOSKELETAL SYSTEM ABNORMALITIES, AND POST-IMPLANTATION MORTALITY.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. USE GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND A CUFFED ENDOTRACHEAL TUBE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, IPECAC EMESIS CAN BE DONE. WHEN VOMITING BEGINS, KEEP HEAD BELOW THE HIPS TO PREVENT ASPIRATION. AFTER VOMITING STOPS, GIVE 30-60 MILLILITERS OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. MAINTAIN AIRWAY, BLOOD PRESSURE AND RESPIRATION. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION. TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:**M-XYLENE:**

NITRIC ACID: INTENSE REACTION,
OXIDIZERS (STRONG): POSSIBLE FIRE AND EXPLOSION.
SULFURIC ACID: INTENSE REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON AND NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

IMMOBILIZE SPILL WITH UNIVERSAL GELLING AGENT.

REDUCE VAPOR AND FIRE HAZARD WITH APPROPRIATE FOAM.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT.

APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-9802 OR (202) 426-2675 IN THE

METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

XYLENE (O-, M-, AND P-ISOMERS):

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 12/19/84 REVISION DATE: 06/27/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

APPENDIX IV.
SUMMARY OF CALCULATIONS



SLUG TEST CALCULATIONS



Former Dawsey's Exxon

PROJECT: Whiteville, NC

COMPUTED BY: D. Dillon

DATE: Feb. 14, 1994

SHEET 1 OF 5 CHECKED BY: S. Creek

DATE: 2/23/94

DESCRIPTION: Slug Test Calculations: Averages

Well	K (ft/Day)	V (ft/Day)
------	------------	------------

MW1	1.92	0.21
-----	------	------

MW2	7.69	0.74
-----	------	------

Avg: $\frac{9.61}{2} = 4.805 \text{ ft/Day}$	Avg: $\frac{0.95}{2} = 0.475 \text{ ft/Day}$
--	--



Former Dawsey's Exxon
 PROJECT: Whiteville, NC COMPUTED BY: D. Dillon DATE: Feb. 14, 1994
 SHEET 2 OF 5 CHECKED BY: S. Clark DATE: 2/23/94
 DESCRIPTION: Slug Test Calculations MW1

$$4.81 \times 0.37 = 1.7797$$

<u>Elapsed Time (sec)</u>	<u>Depth to H₂O (ft)</u>	<u>Δ in H₂O level</u>
Static	4.82	—
0	9.63	4.81
15	8.55	3.73
30	7.87	3.05
45	7.40	2.58
60	6.91	2.09 ←
75	6.58	1.76

Interpolate to find t at which Δ in the H₂O level was 1.7797

60	2.09	$\frac{60-t}{60-75} = \frac{2.09-1.7797}{2.09-1.76}$
t	1.7797	
75	1.76	

$$t = 74.1 \text{ sec}$$

Use Hvorslev Method to Calculate Hydraulic Conductivity

$$K = \frac{r^2 \ln(L/R)}{2L\tau}$$

where: K = Hydraulic Conductivity (ft/Day)
 r = Radius of Well Casing (ft)
 L = Length of Well Screen (ft)
 R = Radius of Well Screen (ft)
 t = time (Days)

$$K = \frac{(0.083 \text{ ft})^2 \ln(10 \text{ ft} / 0.083 \text{ ft})}{2(10 \text{ ft})(74.1 \text{ sec})}$$

$$K = 2.227 \times 10^{-5} \text{ ft/sec} \times 8.64 \times 10^4 \text{ sec/day}$$

$$K = 1.92 \text{ ft/Day}$$

PROJECT: Former Dawsey's Exxon
Whiteville, NCCOMPUTED BY: D. DillonDATE: Feb. 14, 1994SHEET 3 OF 5 CHECKED BY: S. ClarkDATE: 2/23/94DESCRIPTION: Slug Test Calculations MW1Calculate Groundwater Velocity

$$V = \frac{K (dh/dl)}{n_e d}$$

where: V = Velocity (ft/Day) n_e = Porosity dh/dl = Gradient of Groundwater d = Darcian Pore Factor

$$V = \frac{(1.92 \text{ ft/Day})(0.04)}{(0.40)(0.90)}$$

$$V = 0.21 \text{ ft/Day}$$

PROJECT: Former Dawsey's Exxon Whiteville, NC COMPUTED BY: D. Dillon DATE: Feb. 14, 1994
 SHEET 4 OF 5 CHECKED BY: S. Clark DATE: 2/23/94
 DESCRIPTION: Slug Test Calculations MW 2

$$0.34 \times 0.37 = 0.1258$$

Elapsed Time (sec)	Depth to H ₂ O (ft)	Δ in H ₂ O level
static	8.29	—
0	8.63	0.34
15	8.43	0.14 ←
30	8.37	0.08
45	8.35	0.06

Interpolate to find t at which Δ in the H₂O level was 0.1258

15	0.14	
t	0.1258	$\frac{15-t}{15-30} = \frac{0.14-0.1258}{0.14-0.08}$
30	0.08	

$$t = 18.55$$

Use Hvorslev Method to Calculate Hydraulic Conductivity

$$K = \frac{r^2 \ln(L/R)}{2Lt}$$

where: K = Hydraulic Conductivity (ft/Day)
 r = Radius of Well Casing (ft)
 L = Length of Well Screen (ft)
 R = Radius of Well Screen (ft)
 t = time (Days)

$$K = \frac{(0.083 \text{ ft})^2 \ln(10 \text{ ft}/0.083 \text{ ft})}{2(10 \text{ ft})(18.55 \text{ sec})}$$

$$K = 8.897 \times 10^{-9} \text{ ft/sec} \times 8.64 \times 10^4 \text{ sec/Day}$$

$$K = 7.69 \text{ ft/Day}$$

PROJECT: Former Dawsey's Exxon
Whiteville, NC COMPUTED BY: D. Dillon DATE: Feb. 14, 1994
SHEET 5 OF 5 CHECKED BY: S. Clark DATE: 2/23/94
DESCRIPTION: Slug Test Calculations MW2

Calculate Groundwater Velocity

$$V = \frac{K (dh/dl)}{n_e d}$$

where: V = Velocity (ft/Day)

n_e = Porosity

dh/dl = Gradient of Groundwater

d = Darcian Pore Factor

$$V = \frac{(7.69 \text{ ft/Day})(0.04)}{(.45)(.93)}$$

$$V = 0.74 \text{ ft/Day}$$

SUMMARY OF CALCULATION RESULTS
FOR
TOTAL VAPOR FLOW FROM VACUUM SPARGING,
BLOWER SELECTION
AND
EMISSIONS ESTIMATE
FOR THE
FORMER DAWSEY'S EXXON
WHITEVILLE, NORTH CAROLINA
CES PROJECT #93134
FEBRUARY 23, 1994

- o **Average flow per foot of screen from pilot testing:**

$$Q_{AVG} = 16.2 \text{ cfm/ft}$$

- o **Total system vapor flow for design:**

- 1) **Vapor flow from soil venting:**

$$Q_{SOIL} = 567 \text{ cfm}$$

- 2) **Vapor flow from sparging:**

$$Q_{SPARG} = 103 \text{ cfm}$$

Total vapor flow:

$$Q_{TOTAL} = 670 \text{ cfm}$$

Total Vapor Flow From Vacuum Sparging,
Blower Selection and Emissions Estimate
93134
February 23, 1994
Page Two

o **Blower section:**

1) Design vacuum pressure: $P_o = 30 \text{ iwg}$

2) Calculated friction losses: $P_f = 36 \text{ iwg}$

Total Pressure:

$$P_T = 66 \text{ iwg}$$

Required Flow:

$$Q_{TOTAL} = 670 \text{ cfm}$$

*Use one EG&G Rotron model EN13BK72WL, 3-phase, explosion proof, 20 HP regenerative blower with associated in-line particle filter and silencers

o **Estimated emissions:**

$$E_{TOTAL} = 102 \text{ lbs/day}$$

**SUMMARY OF CALCULATION RESULTS
FOR
MASS TRANSFER RATE, PERCENTAGE
OF CONTAMINANT REMOVAL
AND
REMEDICATION TIME FRAME
FOR THE
FORMER DAWSEY'S EXXON
WHITEVILLE, NORTH CAROLINA
CES PROJECT #93134
FEBRUARY 23, 1994**

o AVERAGE MASS TRANSFER RATE:

- 1) Average mass transfer coefficient:

$$K_{La} = 0.260 \text{ min}^{-1}$$

- 2) Volume of liquid in contact with air:

$$V = 0.087 \text{ ft}^3$$

- 3) Average Henry's constant:

$$H = 268 \text{ (Dimensionless)}$$

- 4) Sparging air flow up the well:

$$Q_G = 7.33 \text{ cfm}$$

- 5) Average inlet air BTEX contamination concentration:

$$C_G = 0 \text{ lb/ft}^3$$

Summary of calculation results for
Mass Transfer Rate, Percentage of
Contaminant Removal and Remediation

Time Frame

93134

February 23, 1994

Page Two

- 6) Average inlet water BTEX contamination concentration:

$$C_L = 5.1 \times 10^{-4} \text{ lb/ft}^3$$

- 7) Groundwater flow up the well:

$$Q_L = 0.24 \text{ cfm}$$

Mass Transfer Rate:

$$F = 3.52 \times 10^{-4} \text{ lb/min}$$

- o Percentage of contaminant removal per pass:

$$n = 9.43\%$$

- o Estimated remediation time:

$$T = 2.83 \text{ years}$$

**CALCULATION OF REQUIRED SPARGING FLOW
AND BLOWER SELECTION**



PROJECT: DAWSEY'S EXXON WHITEVILLE, NC COMPUTED BY: RBT Thomas DATE: 24 FEB. 1994
 SHEET 1 OF 4 CHECKED BY: CS Bay DATE: 24 FEB 94
 DESCRIPTION: CALCULATION OF REQUIRED SPARGING FLOW AND BLOWER SELECTION

* CALCULATE REQUIRED SPARGING AIR FLOW:

- FROM THE PREVIOUS CALCULATIONS FOR VAPOR FLOW FROM GROUNDWATER SPARGING, WE KNOW THAT @ 30 IN. VACUUM WE CAN HANDLE APPROXIMATELY 103 CFM OF SPARGING AIR. IN ORDER TO SIMPLIFY OUR CALCULATIONS WE WILL ADJUST THIS SO THAT:

$$Q_{\text{AIR TOTAL}} = 105 \text{ CFM}$$

IS OUR TOTAL SPARGING AIR FLOW.

- BREAKING THIS FLOW DOWN TO THE REQUIRED AIR FLOW INTO EACH WELL WE FIND THAT:

$$Q_{\text{AIR WELL}} = 105 \text{ CFM} / 14 \text{ WELLS}$$

$$\therefore Q_{\text{AIR WELL}} = 7.5 \text{ CFM/WELL}$$

* PRESSURE BLOWER SELECTION:

- THE ATTACHED PLAN OF OUR SYSTEM (NOT TO SCALE) IS USED TO MEASURE THE PIPE LENGTHS, WHICH ARE TO DISTRIBUTE THE AIR TO THE WELLS, AND TO COUNT THE NUMBER OF FITTINGS INSTALLED IN THE SYSTEM.

NOTE: THE PIPING HAS ALREADY BEEN INSTALLED THEREFORE THE PIPE DIAMETERS ARE KNOWN ALONG WITH THE APPROXIMATE LENGTHS.

- FRICTION LOSSES ARE CALCULATED ON THE FOLLOWING WORKSHEETS AND A TOTAL FRICTION LOSS OBTAINED.



* SEE ATTACHED FRICTION LOSS CHART
BY E41g RETREAD FOR HEAD LOSSES.

FLOW (CFM)	PIPE DIAMETER (INCHES)	HEAD LOSS (FWG/FT)	REQUIRED FITTINGS	NUMBER OF FITTINGS	FITTING EQUIVALENT LENGTH BASED ON PIPE DIAMETER (FEET)	CALCULATED EQUIVALENT LENGTH (FEET)	TOTAL EQUIVALENT LENGTH AT REQUIRED FLOW (FEET)	TOTAL HEAD LOSS AT REQUIRED FLOW (FWG)
105.0	3	—	90°	3	7	21		
"	3	0.025	—	—	—	+ 90 =	111	2.8
97.5	3	—	90°	2	7	14	—	
"	3	0.021	—	—	—	+ 10 =	24	0.5
90.0	3	—	90°	2	7	14		
"	3	0.019	—	—	—	+ 45 =	59	1.1
82.5	3	—	90°	2	7	14		
"	3	0.016	—	—	—	+ 30 =	44	0.7
75.0	3	—	90°	2	7	14		
"	3	0.014	—	—	—	+ 30 =	44	0.6
67.5	2	—	90°	2	5	10		
"	2	0.082	—	—	—	+ 30 =	40	3.3
60	2	—	90°	2	5	10		
"	2	0.066	—	—	—	+ 30 =	40	2.6
52.5	2	—	90°	2	5	10		
"	2	0.050	—	—	—	+ 30 =	40	2.0

CONTINUED —

CES # 93134

PROJECT: WHITEVILLE, NC
COMPUTED BY: RB Thomas
DATE: 24 FEB. 1994

SHEET 2 OF 4
CHECKED BY: CS Bay
DATE: 24 FEB 94

DESCRIPTION: CALCULATION OF REQUIRED SPACING FLOW AND BLOWER SELECTION

PROJECT: DAWSEY'S EXXON WHITEVILLE, NC COMPUTED BY: RB Thomas DATE: 24 FEB. 1994
 SHEET 3 OF 4 CHECKED BY: C S BAY DATE: 24 FEB 94
 DESCRIPTION: CALCULATION OF REQUIRED SPARGING FLOW AND BLOWER SELECTION

* SEE ATTACHED FRICTION LOSS CHART BY EGIG BOTTOM FOR HEAD LOSS.

FLOW (CFM)	PIPE DIAMETER (INCHES)	HEAD LOSS (FWG/FT)	REQUIRED FITTINGS	NUMBER OF FITTINGS	FITTING EQUIVALENT LENGTH BASED ON PIPE DIAMETER (FEET)	CALCULATED EQUIVALENT LENGTH (FEET)	TOTAL EQUIVALENT LENGTH AT REQUIRED FLOW (FEET)	TOTAL HEAD LOSS AT REQUIRED FLOW (FWG)
430	2	-	90°	2	5	10		
"	2	0.035	-	-	-	+ 30 =	40	1.4
37.5	2	-	45°	1	2.5	2.5		
"	2	-	90°	2	5	+ 10		
"	2	0.024	-	-	-	+ 30 =	42.5	1.0
30.0	2	-	45°	1	2.5	2.5		
"	2	-	90°	2	5	+ 10		
"	2	0.016	-	-	-	+ 32 =	44.5	0.7
22.5	2	-	90°	2	5	10		
"	2	0.014	-	-	-	+ 45 =	55	0.8
15.0	2	-	90°	2	5	10		
"	2	0.014	-	-	-	+ 25 =	35	0.5
7.5	2	-	90°	2	5	10		
"	2	0.014	-	-	-	+ 35 =	45	0.6
TOTAL ESTIMATED FRICTION LOSS =								18.6

USE FRICTION LOSS = 19.0 FWG



PROJECT: DAUSEY'S EXHAUST
WHITEVILLE, NCCOMPUTED BY: PRT ThomasDATE: 24 FEB. 1994SHEET 4 OF 4 CHECKED BY: CS BayDATE: 24 FEB 94DESCRIPTION: CALCULATION OF REQUIRED SPARKING FLOW AND BLOWER SELECTION

- FROM THE CHART WE CAN EXPECT APPROXIMATELY 19 lwg LOSS IN PRESSURE ACROSS OUR SYSTEM. IN ORDER TO PROPERLY SIZE THE BLOWER, WE MUST CONSIDER THESE LOSSES IN COMBINATION WITH THE SELECTED MINIMUM PRESSURE WE WISH TO MAINTAIN WHICH IS 10 lwg FOR THIS SYSTEM.

THUS:

$$P_p = 10 \text{ lwg} + \sum \text{FRICTION LOSSES}$$

$$P_p = 10 \text{ lwg} + 19 \text{ lwg}$$

$$\therefore P_p = 29 \text{ lwg}$$

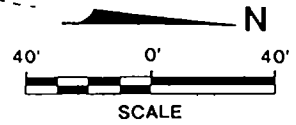
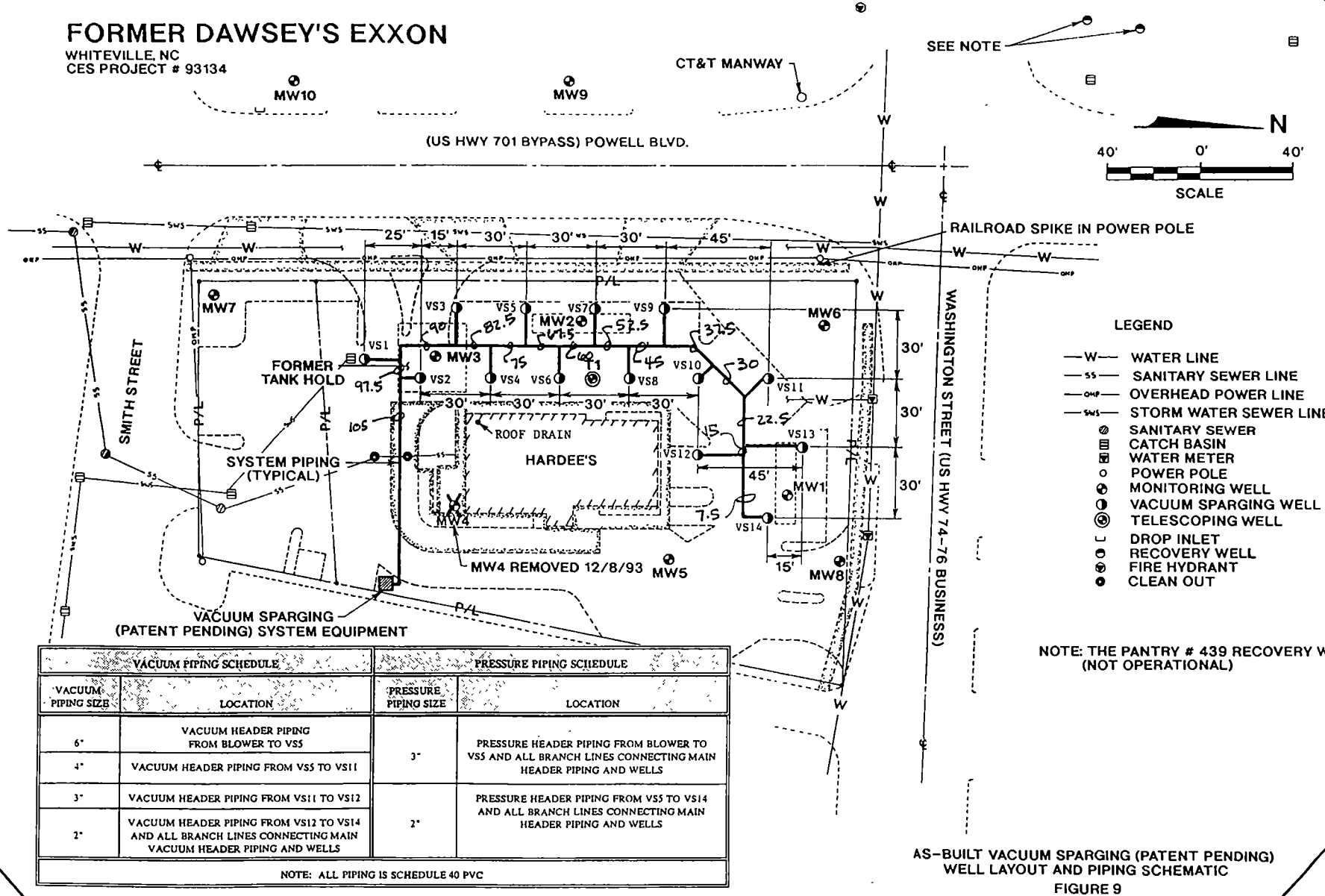
- THIS IS THE REQUIRED OPERATING PRESSURE TO MAINTAIN 7.5 CFM SPARKING AIR FOR WELL.

- DUE TO THE NATURE OF VOLATILE VAPORS, ONLY AN EXPLOSION-PROOF BLOWER IS CONSIDERED FOR THIS APPLICATION.
- A REVIEW OF THE EGIS ROTRON REGENERATIVE BLOWER CHARTS FOR EXPLOSION PROOF BLOWERS REVEALS THAT MODEL ENB05 CAN HANDLE APPROXIMATELY 125 CFM @ 29 lwg, THE REQUIRED OPERATING LEVEL.
- DUE TO THE FACT THAT 240V, 3-PHASE POWER IS AVAILABLE, A 3-PHASE MODEL IS CHOSEN.

USE ONE EGIS ROTRON MODEL ENB05SX12ML,
3-PHASE, EXPLOSION PROOF, 2 HP, REGENERATIVE
BLOWER WITH ASSOCIATED PAPERICAL FILTER, RELIEF
VALVE AND SILENCER IF REQUIRED.

FORMER DAWSEY'S EXXON

WHITEVILLE, NC
CES PROJECT # 93134



LEGEND

- W — WATER LINE
- SS — SANITARY SEWER LINE
- OHP — OVERHEAD POWER LINE
- SWS — STORM WATER SEWER LINE
- ⊗ SANITARY SEWER CATCH BASIN
- ⊠ WATER METER
- POWER POLE
- ⊙ MONITORING WELL
- ⊕ VACUUM SPARGING WELL
- ⊗ TELESCOPING WELL
- ⌋ DROP INLET
- RECOVERY WELL
- ⊕ FIRE HYDRANT
- CLEAN OUT

NOTE: THE PANTRY # 439 RECOVERY WELLS (NOT OPERATIONAL)

VACUUM PIPING SCHEDULE		PRESSURE PIPING SCHEDULE	
VACUUM PIPING SIZE	LOCATION	PRESSURE PIPING SIZE	LOCATION
6"	VACUUM HEADER PIPING FROM BLOWER TO VS5	3"	PRESSURE HEADER PIPING FROM BLOWER TO VS5 AND ALL BRANCH LINES CONNECTING MAIN HEADER PIPING AND WELLS
4"	VACUUM HEADER PIPING FROM VS5 TO VS11		
3"	VACUUM HEADER PIPING FROM VS11 TO VS12	2"	PRESSURE HEADER PIPING FROM VS5 TO VS14 AND ALL BRANCH LINES CONNECTING MAIN HEADER PIPING AND WELLS
2"	VACUUM HEADER PIPING FROM VS12 TO VS14 AND ALL BRANCH LINES CONNECTING MAIN VACUUM HEADER PIPING AND WELLS		

NOTE: ALL PIPING IS SCHEDULE 40 PVC

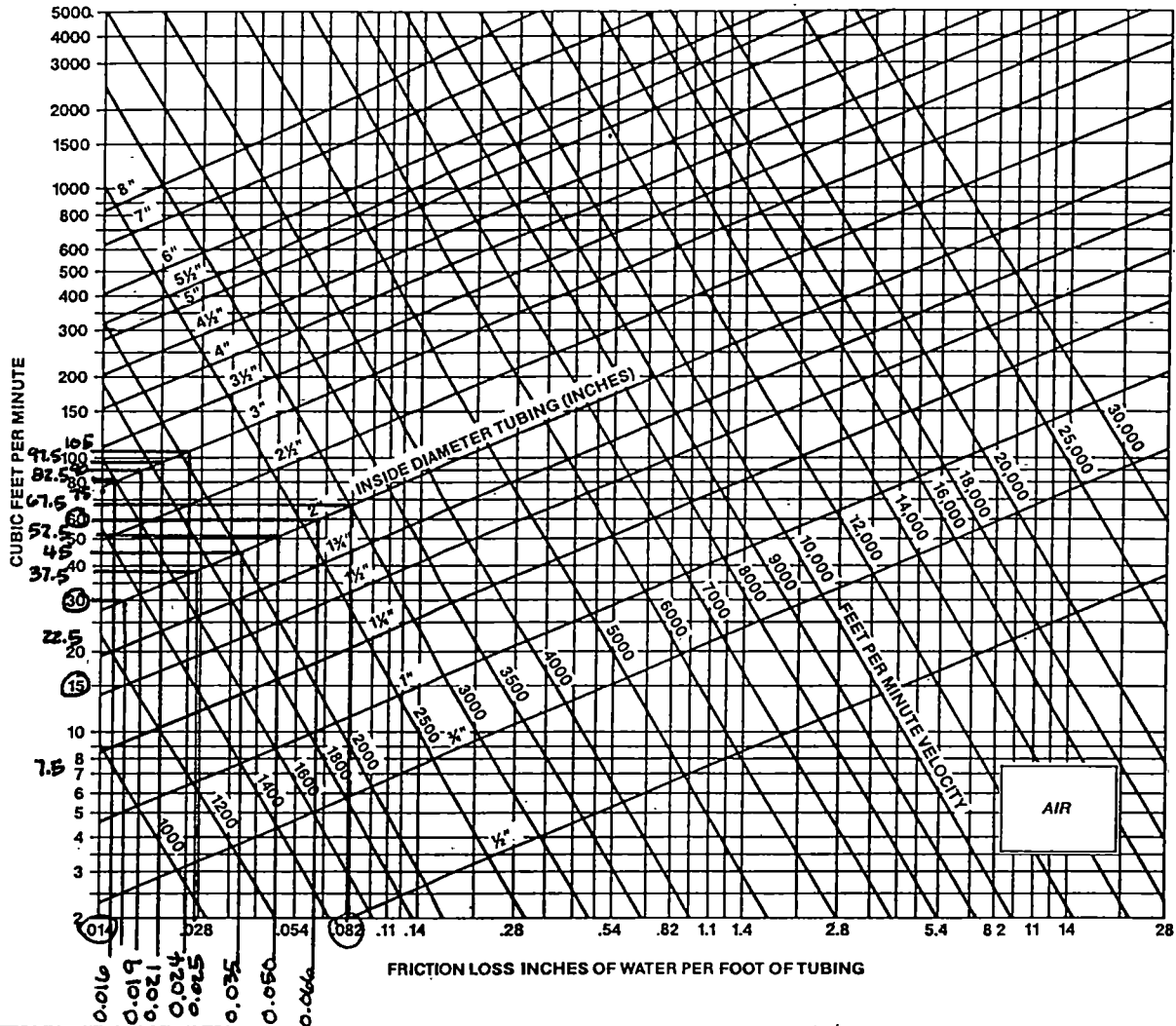
AS-BUILT VACUUM SPARGING (PATENT PENDING) WELL LAYOUT AND PIPING SCHEMATIC
FIGURE 9



FORMER DAWSEY'S EXXON
 WHITEVILLE, NC
 CES PROJECT # 93134

Application/Engineering

Friction Loss Per Foot of Tubing



Friction Loss in Fittings

To calculate friction loss in fittings use chart below. This chart will yield equivalent lengths (in feet) of tubing. Use this length with graph above to find friction loss in inches of water column.

NOMINAL PIPE SIZE (INCHES)	EQUIVALENT TUBING LENGTH (FEET)	
	90° EL	45° EL
1/4	3	1.5
1/2	4	2
2	5	2.5
2 1/2	6	3
3	7	4
4	10	5
5	12	6
6	15	7.5
8	20	10

APPENDIX V
EQUIPMENT SPECIFICATIONS



VACUUM SYSTEM EQUIPMENT



EN 14

DAWSEY'S EXXON
WHITEVILLE, NC
CES # 93134

FEATURES

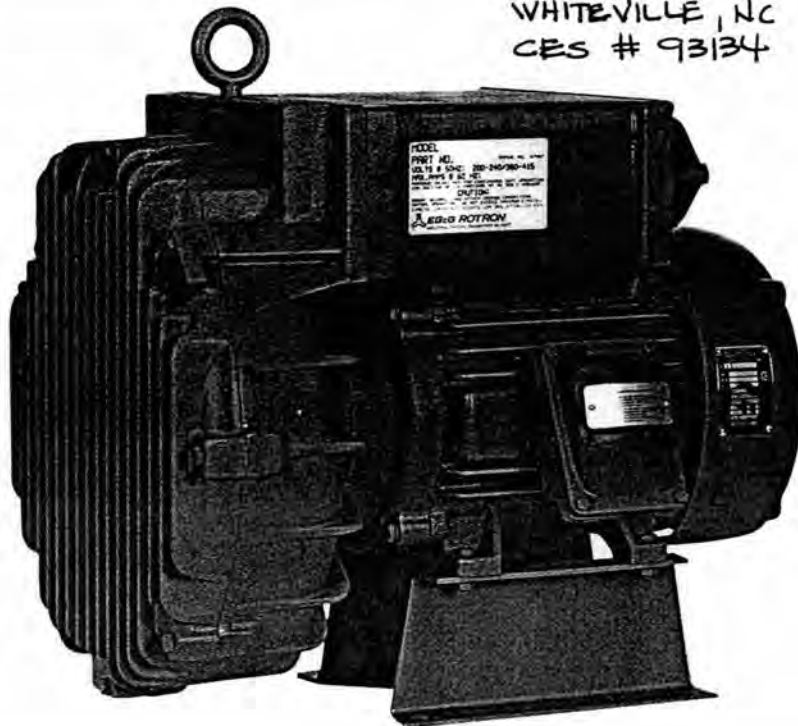
- Manufactured in the USA
- Maximum flow: 920 SCFM
- Maximum pressure: 144" WG
- Maximum vacuum: 115" WG
- Standard motor: 30 HP
- Blower construction — cast aluminum housing, impeller and cover
- UL & CSA approved motors for Class I, Group D atmospheres
- Sealed blower assembly
- Quiet operation within OSHA standards

OPTIONS

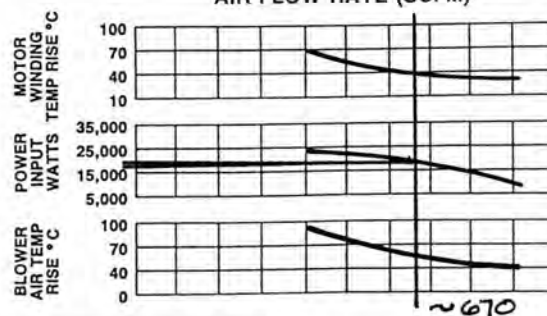
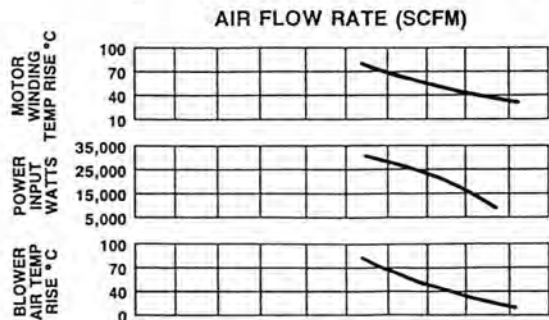
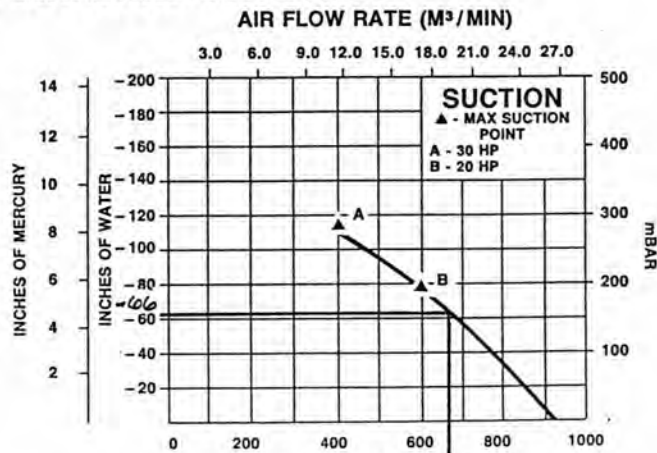
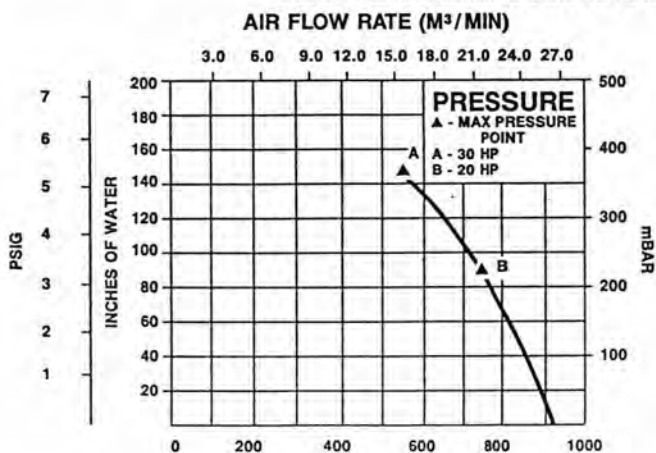
- 50 Hz motors
- International voltages
- Other HP motors
- Corrosion resistant surface treatments
- Remote drive (motorless) models

ACCESSORIES

- Moisture separators
- Explosion-proof motor starters
- In-line & inlet filters
- Vacuum & pressure gauges
- Relief valves
- External mufflers



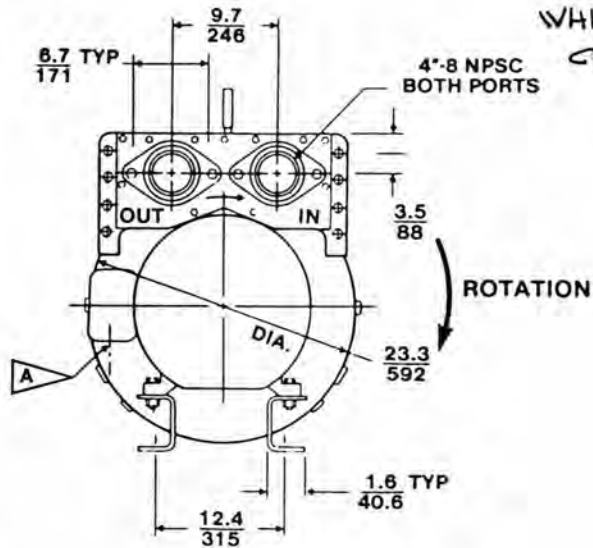
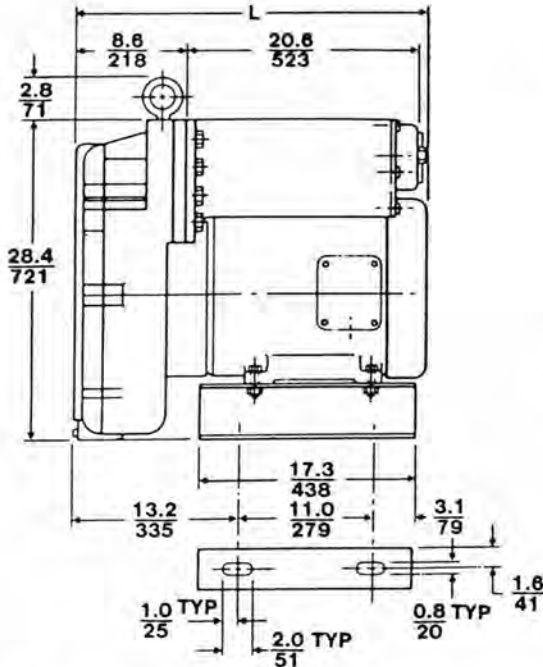
BLOWER PERFORMANCE AT STANDARD CONDITIONS





EN 14

EG&G ROTRON
 Industrial Division
 North Street
 Saugerties, NY 12477
 Tel: 914/246-3401
 Telefax: 914/246-3802
 Telex: 981511



DAWSEY'S EXXON
 WHITEVILLE, NC
 CES #93134

DIMENSIONS: IN
 MM
 TOLERANCES: .XX ± .1
 2.5
 (UNLESS OTHERWISE NOTED)

MODEL	L (IN)	L (MM)
EN14DX72WL	32.2	818
EN14BK72WL	30.5	775

A 1.25" NPT CONDUIT CONNECTION AT 6 O'CLOCK POSITION

SPECIFICATIONS

*** THIS MODEL CHOSEN ***

MODEL	EN14BK72WL		EN14DX72WL	
Part No.	038187		038188	
Motor Enclosure Type	Explosion-proof		Explosion-proof	
Horsepower	20		30	
Phase — Frequency	Three — 60 Hz		Three - 60 Hz	
Voltage	230	460	200-230	460
Motor Nameplate Amps	50	25	80-70	35
Maximum Blower Amps ¹	60	30	82	41
Inrush Amps	317	159	564	282
Starter Size	3	2	3	3
Service Factor	1.0		1.0	
Thermal Protection	Pilot Duty		Pilot Duty	
Bearing Type	Sealed, Ball		Sealed, Ball	
Shipping Weight	680 lb (309 kg)		816 lb (370 kg)	

BLOWER LIMITATIONS

Min. Flow @ Max. Suction	600 SCFM @ -80" WG	400 SCFM @ -115" WG
Min. Flow @ Max. Pressure	750 SCFM @ 90" WG	550 SCFM @ 144" WG

¹Corresponds to the performance point at which the blower and/or motor temperature rise reaches the limit of the thermal protection in the motor.

FORMER DAWSEY'S EXXON
WHITEVILLE, NC
CES PROJECT #93134
Accessories

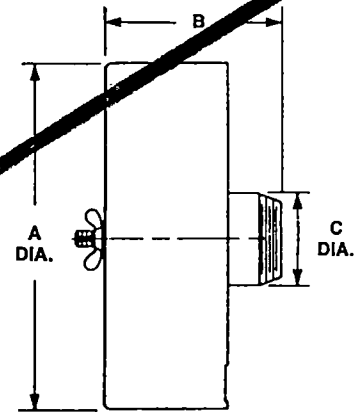
Blower Model Reference Key	
A =	E = EN 606, EN 6, EN 707
B = EN 101	F = EN 808, EN 8
C = EN 303	G = EN 12
D = EN 404, EN 454, EN 513, EN 505, EN 523	H = EN 14

Inlet Filter (Single Connection)

Inlet Filters protect the blower and the air distribution system from dust and other airborne particles and contaminants. Normally used in pressure systems.

SPECIFICATIONS:

- HOUSING — Steel
- MEDIA — Polyester
- EFFICIENCY — 97-98% (8 to 10 micron particle size)
- FILTER ELEMENT — Replaceable (see filter elements)
- NOTE: "Z" MEDIA (1 to 3 micron particle size) available



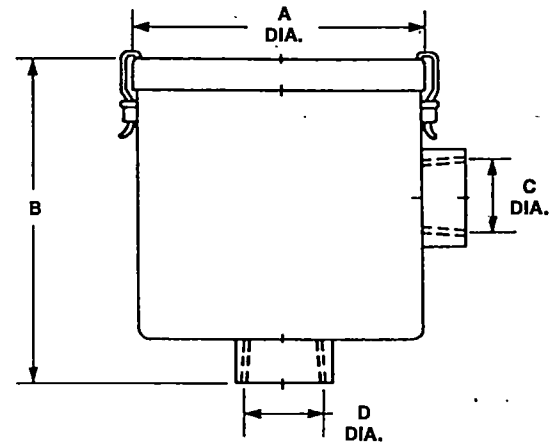
Part Number	Z Media Filter	Reference Blower Model	Connection Inlet	Dimensions (Inches)			Filter Element
				A	B	C	
516466	517865	B	1.00 NPT	6.00	6.50	1.00	515132
515122	517866	C,D	1.50 NPT	6.00	6.50	1.50	515132
515123	517867	E	2.00 NPT	7.75	7.25	2.00	515133
515124	517868	E	2.00 NPT	10.00	12.25	2.00	515134
515125	517869	F	2.50 NPT	10.00	12.50	2.50	515134
515145	517870	G	3.00 NPT	10.00	13.00	3.00	515134
515151	517871	H	4.00 NPT	10.00	14.00	4.00	515135
517611	517872	H	6.00 NPT	16.00	15.00	6.00	516515

Inline Filter (Dual Connection)

Inline Filters protect the blower from harmful dust and other particles that may be drawn into the blower through the air distribution system. Normally used in vacuum systems.

SPECIFICATIONS:

- HOUSING — Steel
- MEDIA — Polyester
- EFFICIENCY — 97-98% (8 to 10 micron particle size)
- FILTER ELEMENT — Replaceable (see filter elements)
- NOTE: "Z" MEDIA (1 to 3 micron particle size) available



➔ DESIGNATES MODEL CHOSEN

Part Number	Z Media Filter	Reference Blower Model	Connection		Dimensions (Inches)				Filter Element
			Inlet	Outlet	A	B	C	D	
516461	517886	B	1.00 NPSC	1.00 NPSC	7.25	6.50	1.00	1.00	516434
515254	517887	C,D	1.50 NPSC	1.50 NPSC	7.25	6.50	1.50	1.50	516434
515255	517888	E	2.00 NPSC	2.00 NPSC	8.00	10.25	2.00	2.00	516435
515256	517889	F	2.50 NPSC	2.50 NPSC	8.00	10.25	2.50	2.50	516435
516463	517890	G	3.00 NPSC	3.00 NPSC	14.00	26.50	3.00	3.00	515135
516465	517891	H	4.00 NPSC	4.00 NPSC	14.00	27.00	4.00	4.00	515135
517611	517892	H	6.00 NPSC	6.00 NPSC	18.00	28.00	6.00	6.00	516515

FORMER DAWSEY'S EXXON
WHITEVILLE, NC
CES PROJECT #93134

Blower Connection Key	
NPT	American National Standard Taper Pipe Thread (Male)
NPSC	American National Standard Straight Pipe Thread for Coupling (Female)
SO	Slip On (Smooth — No Threads)

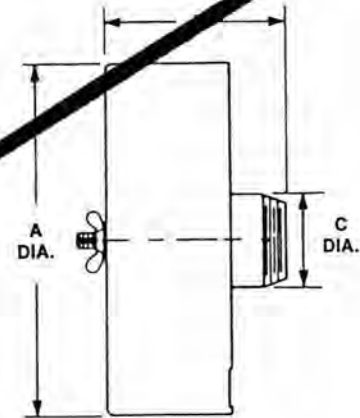
Accessories

Filter Silencers (Single Connection)

*For Supplemental silencing only. (Used to augment existing muffling systems.)
Filter/Silencers reduce noise levels while ensuring clean air is provided to the blower and the air distribution system. Normally used in pressure applications.

SPECIFICATIONS:

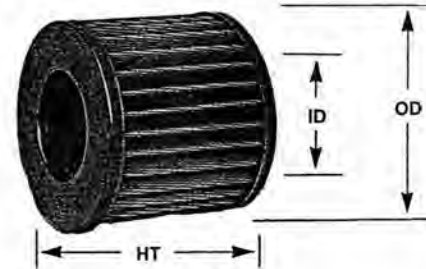
- HOUSING — Steel
- MEDIA — Polyester
- EFFICIENCY — 97-98% (8 to 10 micron particle size)
- FILTER ELEMENT — Replaceable (see filter elements)



Part Number	Z Media Filter	Reference Blower Model	Connection Inlet	Dimensions (Inches)			Filter Element
				A		C	
516487	517878	B	1.00 NPT	6.00	6.50	1.00	515132
516489	517879	C,D	1.50 NPT	6.00	6.50	1.50	515132
516491	517880	E	2.00 NPT	10.00	7.25	2.00	515133
516493	517881	E	2.00 NPT	10.00	12.25	2.00	515134
516495	517882	F	2.50 NPT	10.00	12.50	2.50	515134
516497	517883	G	3.00 NPT	10.00	12.50	3.00	515134
516499	517884	H	4.00 NPT	16.00	14.00	4.00	515135
516513	517885	H	6.00 NPT	16.00	15.50	6.00	515135

Filter Element

All Rotron Air Filters and Filter/Silencers have replaceable filter elements. The filter media is polyester designed for high efficiency over a wide spectrum of industrial applications. See filter element cross reference table.



FOR DR BLOWER MODELS

➔ DESIGNATES MODEL CHOSEN

515122	515132	515158	515134	516489	515132
		515254	516434	516491	515133
		515255	516435	516493	515134
515123	515133	515256	516435	516495	515134
515124	515134	516461	516434	516497	515134
515125	515134	516463	515135	516499	515135
515145	515134	516465	515135	516511	516515
515151	515135	516466	515132	516513	516515
515157	515133	516487	515133	517611	516515

Part Number	Z Media Filter	ID (Inches)	OD (Inches)	HT (Inches)	Area (Sq/Ft)
515132	517873	3.00	4.38	4.75	1.5
515133	517874	3.63	5.88	4.75	2.3
515134	517875	3.63	5.88	9.50	4.5
➔ 515135	517876	4.75	7.88	9.63	8.3
516434	517893	2.56	5.00	4.75	2.0
516435	517894	3.50	5.88	8.75	4.5
516515	517877	8.00	11.75	9.63	19.0

FORMER DAWSEY'S EXXON
 WHITEVILLE, NC
 CES PROJECT # 93134
Accessories

Blower Connection Key	
NPT	— American National Standard Taper Pipe Thread (Male)
NPSC	— American National Standard Straight Pipe Thread for Coupling (Female)
SO	— Slip On (Smooth — No Threads)

EG&G Rotron Industrial Division strives to maintain a complete inventory of accessories to complement the Rotron Regenerative Product Line. If there is an Accessory

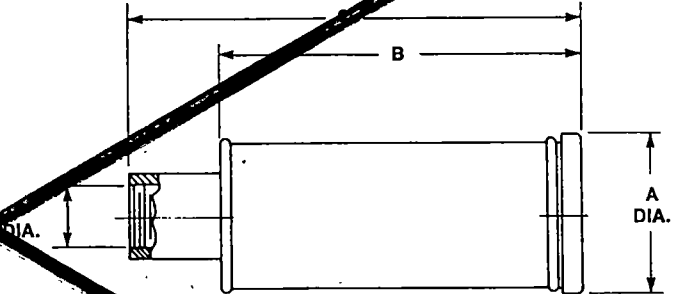
Product that is not listed in this Accessory Guide, please do not hesitate to contact EG&G Rotron Industrial's Application Engineering Department directly with your requirements.

Inlet/Outlet Muffler (Single Connection)

Mufflers lower blower noise in areas where reduced sound levels are required.

SPECIFICATIONS:

HOUSING — Steel
 MEDIA — Acoustical Material



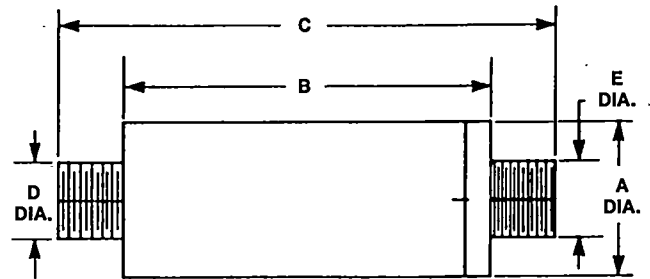
Part Number	Reference Blower Model	Connection		Dimensions (Inches)			
		Inlet		A	B	C	D
523627	B	1.0 NPT		4.00	10.93	13.98	1.00
516838	B	1.0 SO		1.90	5.16	6.23	1.00
523626	C	1.25 NPT		4.00	10.93	13.98	1.25
523625	D	1.50 NPT		4.00	10.93	13.98	1.50
523624	E	2.00 NPT		4.00	10.93	12.16	2.00
523623	E	2.00 NPSC		4.00	10.93	12.54	2.00
523622	E	2.00 NPT		4.00	15.93	17.16	2.00

Inline Muffler (Dual Connection)

Inline Mufflers are utilized for noise reduction in applications where piping systems are connected directly to both ends of the muffler.

SPECIFICATIONS:

HOUSING — Steel
 MEDIA — Acoustical Material



➔ DESIGNATES MODEL CHOSEN

Part Number	Reference Blower Model	Connection		Dimensions (Inches)				
		Inlet	Outlet	A	B	C	D	E
522948	E	2.0 NPT	2.0 NPSC	4.00	15.93	18.39	2.00	2.00
510050	E	2.00 NPSC	2.0 NPSC	4.38	10.38	12.62	2.00	2.00
523621	E	2.00 NPT	2.00 NPT	4.00	15.93	18.39	2.00	2.00
515185	F	2.50 NPT	2.50 NPSC	6.12	15.00	19.37	2.50	2.50
511569	G	3.00 NPT	3.0 NPSC	7.00	18.00	22.25	3.00	3.00
515210	G	4.00 NPT	4.0 NPSC	10.00	24.00	30.00	4.00	4.00
516264	H	4.00 NPT	4.0 NPSC	8.00	22.00	27.75	4.00	4.00
516265	H	6.00 NPT	6.0 NPSC	12.00	30.00	36.75	6.00	6.00

ACCESSORIES**VACUUM AND PRESSURE RELIEF VALVES**

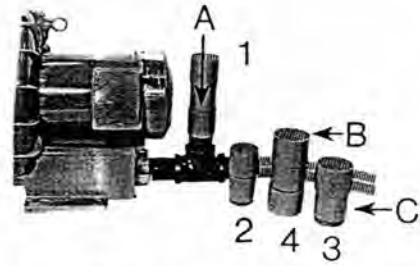
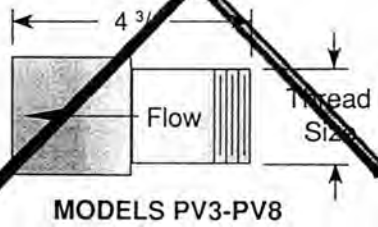
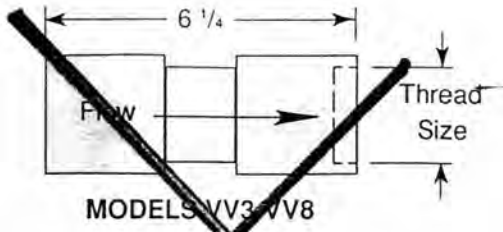
Most Fuji Ring Compressors cannot be operated in a "dead-head" condition. These relief valves are designed to protect the blowers from overheating when operating dead-headed, either under vacuum or pressure. The valves are preset to provide the proper protection for the appropriate model, which is approximately 90% of the dead-head vacuum or pressure level, and is adjustable to a lower pressure or vacuum setting.

Factory setting at points other than standard can be made if specified on the order. Please allow one extra week for delivery.

→ DESIGNATES MODEL CHOSEN

VACUUM RELIEF VALVES			
MODEL NO.	FOR USE WITH BLOWER MODEL:	FACTORY SETTING ("H ₂ O)	THREAD SIZE
VV3	VFC304	39	1 1/2" FPT
VV4	VFC404	42	1 1/2" FPT
VV5	VFC504	60	1 1/2" FPT
VV6	VFC604	86	2" FPT
VV7	VFC704	85	2" FPT
VV8	VFC804	100	2" FPT
→ VV9	VFC904	100	3" MPT ←

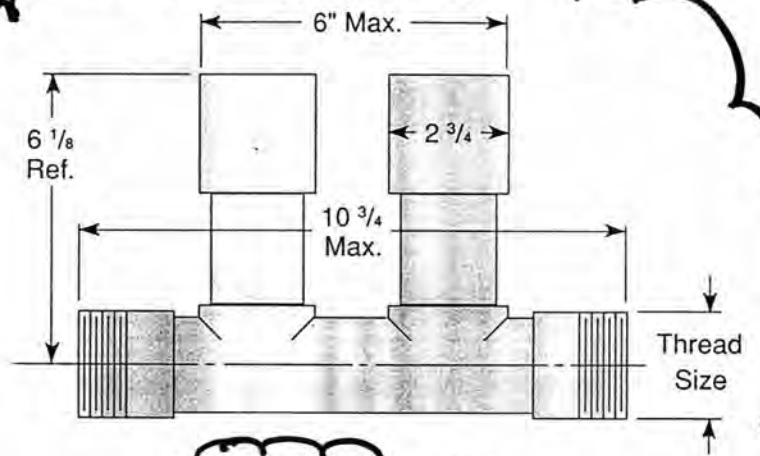
PRESSURE RELIEF VALVES			
MODEL NO.	FOR USE WITH BLOWER MODEL:	FACTORY SETTING ("H ₂ O)	THREAD SIZE
PV3	VFC304	42	1 1/2" MPT
PV4	VFC404	46	1 1/2" MPT
PV5	VFC504	68	1 1/2" MPT
PV6	VFC604	100	2" MPT
PV7	VFC704	98	2" MPT
PV8	VFC804	127	2" MPT
PV9	VFC904	127	3" MPT



(A) Vacuum flow; (B) Vacuum relief valve; (C) Pressure relief valve; (1) VV5; (2) PV4; (3) PV6; (4) VV8



Model VV9 and PV9



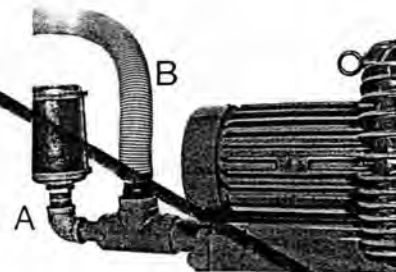
MODELS VV9 and PV9

VACUUM BOOSTER

The Vacuum Booster allows utilization of the Fuji Ring Compressor in a no-flow, or "dead-head", condition, when used in material handling, vacuum pick-up, and other industrial hold-down applications. The booster permits the necessary flow of cooling air through the blower and also boosts the critical "dead-head" operating pressure level by 10 to 15%. Please specify blower model.

Contact the Fuji applications engineering department for assistance in sizing.

VACUUM BOOSTER	
MODEL NO.	FOR USE WITH BLOWER MODEL
VB45	VFC404-VFC504
VB67	VFC604-VFC704



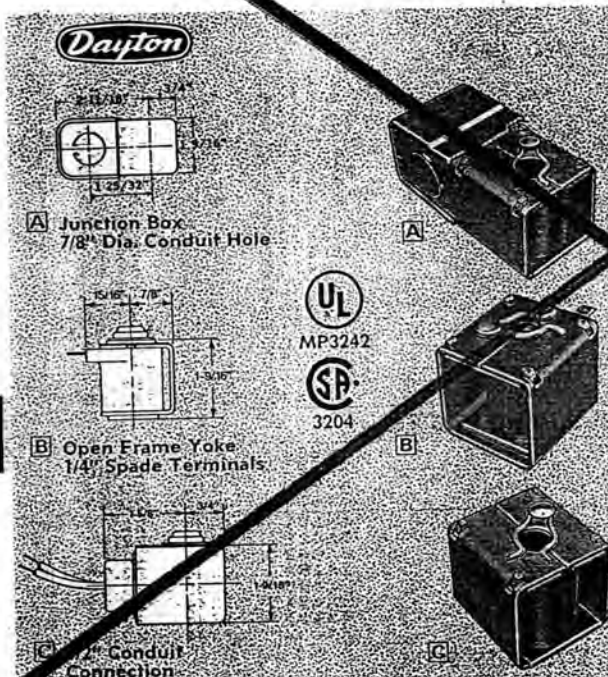
(A) Cooling air flow; (B) Main suction line (may be dead-headed)

FORMER DAWSEY'S EXXON / WHITEVILLE, NC / CES PROJECT #93134

ELECTRIC CONTROL AND DISTRIBUTION

SOLENOID VALVE COILS AND LIQUID LEVEL CONTROLS

SOLENOID COILS



- Continuous duty
- Class F, H, and B insulation
- Not for use in hazardous atmospheres
- For NEMA applications only
- Coils and valves UL Listed when assembled
- Coils are interchangeable with solenoid valve bodies on page 4

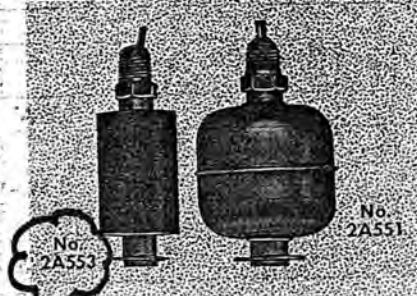
SOLENOID COIL ORDERING DATA

Key	Volts AC @ 50/60 Hz	Stock No.	List	Each	Shpg. Wt.
NEMA CLASS F (311°F)					
A	24	6X542	\$16.24	\$15.92	0.7
	120	6X543	16.24	15.92	0.8
	208/240	6X544	16.24	15.92	0.6
NEMA CLASS H (356°F)					
A	24	2A203	31.52	30.90	0.6
	120	2A204	31.52	30.90	0.6
	208/240	2A205	31.52	30.90	0.6
NEMA CLASS B (66°F)					
B	24	3A439	15.17	14.87	0.4
	120	3A440	15.17	14.87	0.4
	208/240	3A441	15.17	14.87	0.4
NEMA CLASS F (311°F)					
C	24	4A705	16.24	15.92	0.7
	120	4A706	16.17	15.85	0.7
	208/240	4A707	16.24	15.92	0.6

Madison LIQUID LEVEL CONTROLS



UL E54633
LR56150 (except No. 2A551)
LR26414



→ **DEPICTS MODEL CHOSEN**

All Models

- Magnetically actuated dry reed switch
- Used for alarm circuits controlling motor starters, contactors, solenoids, and relays
- Switches have 22 gauge, 24" leads
- User selectable normally open or normally closed switch operation

Watts	Voltage	Current (Resistive)*
30	220VAC	0.14A
	110VAC	0.28
	120VDC	0.07
	24VDC	0.28
60	220VAC	0.4
	110VAC	0.5
	120VDC	0.2
	24VDC	0.5

Nos. 2A554 and 2A552

- Polypropylene switch for general purpose applications and acidic conditions
- Seamless formed floats
- FDA approved materials

No. 2XC13

- Polypropylene float and stem
- For general purpose and highly acidic conditions
- Mounts inside tank or outside tank

No. 2A553

- BUNA-N float with brass stem for fuels
- Excellent for low specific gravity fluids
- Use with lubricating/hydraulic oils and many solvents

No. 2A551

- 316 stainless steel for high temperature, high pressure, or corrosive conditions
- Highly polished for applications such as food processing

(*) For inductive loads, use arc suppression to maximize control life

Float Material	Max. Temp.	Max. Pres.	Watts	Dimensions A B C D E	Madison Model	Stock No.	List	Each	Shpg. Wt.
Polypropylene	105°C	100 PSI	30	2 3/4" 1 1/2" 1" 1" 1/2" NPT	M8000	2A554	\$14.00	\$10.50	0.1
Polypropylene	105	100	60	3" 2" 2" 2" 1 1/2"	M8800	2A552	34.50	34.35	0.2
Polypropylene	100	100	30	See diagram	M8700	2XC13	19.00	14.25	0.1
BUNA-N	105	150	60	3" 2" 2" 2" 1 1/2"	M4300	2A553	27.00	26.90	0.4
116 SS	200	200	60	3" 2" 2" 2" 1 1/2"	M5600	2A551	38.50	38.35	0.4

Output VA*
250
500
750
1000
12000
Output VA
25
50
75
100
200
300
500
1000
Step cond
Step on na
Step
If l
If l

SPARGING SYSTEM EQUIPMENT





EN 505

Explosion-Proof Regenerative Blower For Environmental Remediation

FORMER DAWSEY'S EXXON
WHITEVILLE, NC
CES PROJECT #93134

FEATURES

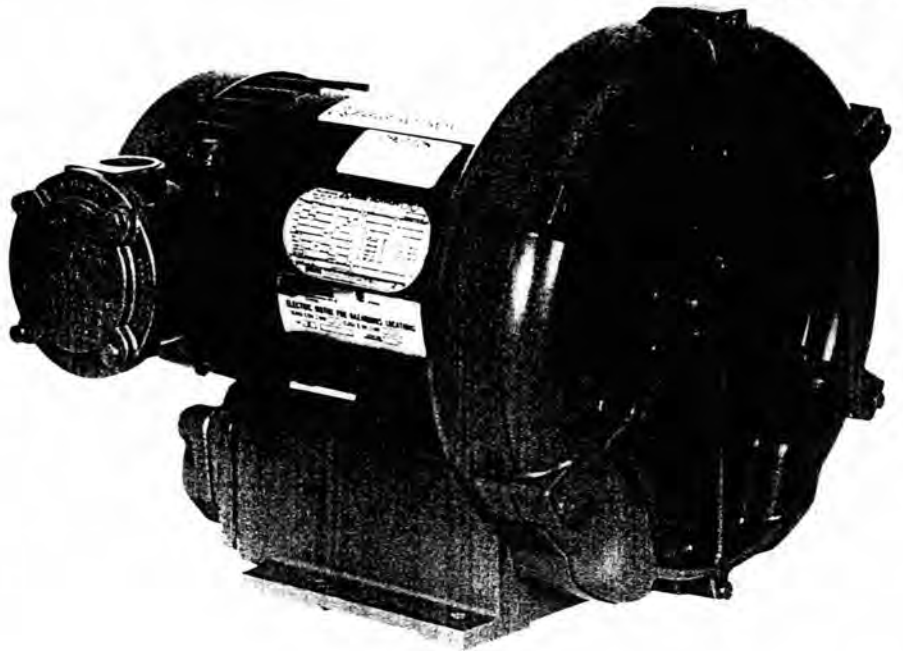
- Manufactured in the USA
- Maximum flow: 160 SCFM
- Maximum pressure: 62" WG
- Maximum vacuum: 60" WG
- Standard motor: 2.0 HP
- Blower construction — cast aluminum housing, impeller and cover
- UL & CSA approved motors for Class I, Group D atmospheres
- Sealed blower assembly
- Quiet operation within OSHA standards

OPTIONS

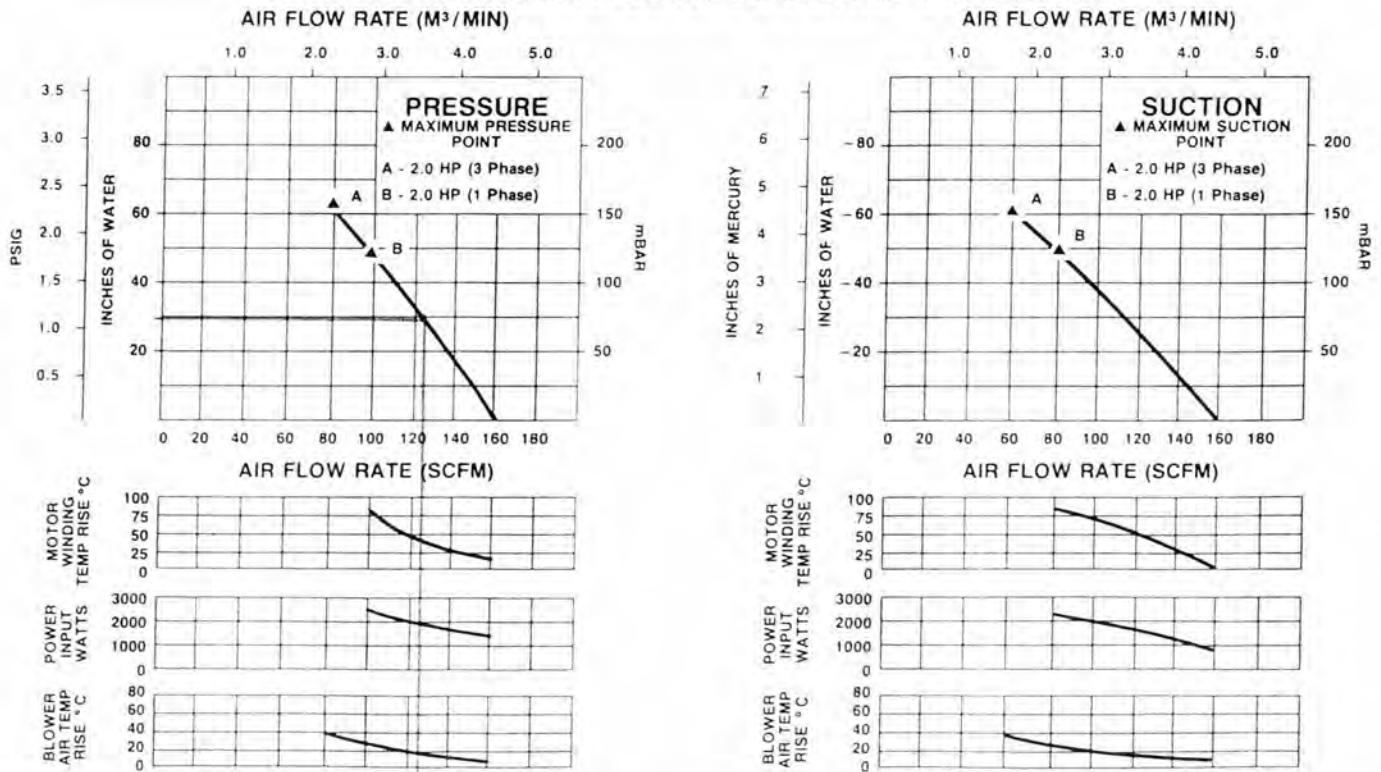
- 50 Hz motors
- International voltages
- Other HP motors
- Corrosion resistant surface treatments
- Remote drive (motorless) models

ACCESSORIES

- Moisture separators
- Explosion-proof motor starters
- Inline & inlet filters
- Vacuum & pressure gauges
- Relief valves
- External mufflers



BLOWER PERFORMANCE AT STANDARD CONDITIONS



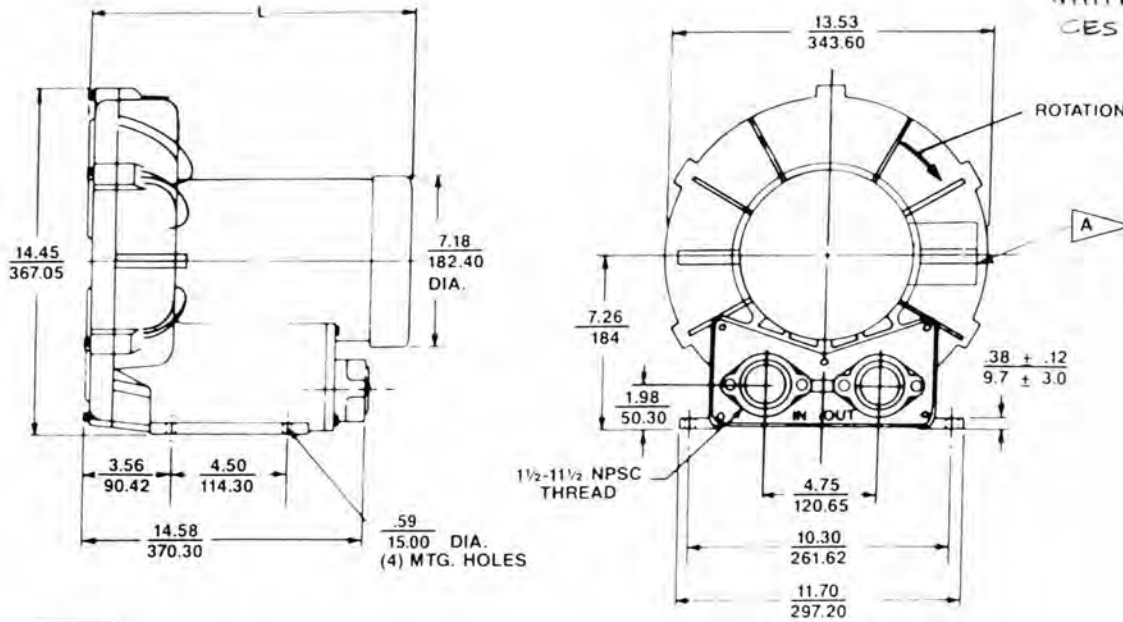
~125 CFM



EN 505

EG&G ROTRON
Industrial Division
 North Street
 Saugerties, NY 12477
 Tel: 914/246-3401
 Telefax: 914/246-3802
 Telex: 981511

FORMER DAWSEY'S EXXON
 WHITEVILLE, NC
 CES PROJECT # 93134



DIMENSIONS: IN
 MM
 TOLERANCES XX ± .08
 2.0
 XXX ± .030
 .800
 (UNLESS OTHERWISE NOTED)

MODEL	L (IN) ± .30	L (MM) ± 8
EN505AX72ML	16.72	425
EN505AX58ML	17.59	447

A 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

SPECIFICATIONS

** THIS MODEL CHOSEN **

MODEL	EN505AX58ML		EN505AX72ML	
Part No.	038177		038178	
Motor Enclosure Type	Explosion-proof		Explosion-proof	
Horsepower	2.0		2.0	
Phase — Frequency	Single — 60 Hz		Three - 60 Hz	
Voltage	115	230	230	460
Motor Nameplate Amps	18.8	9.4	6.2	3.1
Maximum Blower Amps ¹	22.0	11.0	6.2	3.1
Inrush Amps	138	69	35	17
Starter Size	1	0	0	0
Service Factor	1.0		1.0	
Thermal Protection	Pilot Duty		Pilot Duty	
Bearing Type	Sealed, Ball		Sealed, Ball	
Shipping Weight	94 lb (43 kg)		85 lb (39 kg)	

BLOWER LIMITATIONS

Min. Flow @ Max. Suction	80 SCFM @ -50" WG	60 IWG @ -60" WG
Min. Flow @ Max. Pressure	100 SCFM @ 50" WG	80 SCFM @ 62" WG

¹Corresponds to the performance point at which the blower and/or motor temperature rise reaches the limit of the thermal protection in the motor

FORMER DAUSEY'S EXXON
WHITEVILLE, NC
CES PROJECT # 93134

Accessories

Blower Connection Key

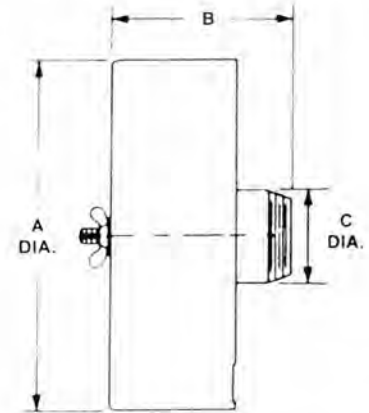
NPT — American National Standard Taper Pipe Thread (Male)
NPSC — American National Standard Straight Pipe Thread for Coupling (Female)
SO — Slip On (Smooth — No Threads)

Filter Silencers (Single Connection)

*For Supplemental silencing only (Used to augment existing muffling systems.)
Filter/Silencers reduce noise levels while ensuring clean air is provided to the blower and the air distribution system. Normally used in pressure applications.

SPECIFICATIONS:

- HOUSING — Steel
- MEDIA — Polyester
- EFFICIENCY — 97-98% (8 to 10 micron particle size)
- FILTER ELEMENT — Replaceable (see filter elements)



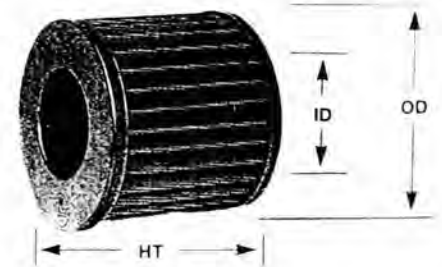
➔ DESIGNATES MODEL CHOSEN

Part Number	Z Media Filter	Reference Blower Model	Connection Inlet	Dimensions (Inches)			Filter Element
				A	B	C	
516487	517878	B	1.00 NPT	6.00	6.50	1.00	515132
516489	517879	C,D	1.50 NPT	6.00	6.50	1.50	515132
516491	517880	E	2.00 NPT	10.00	7.25	2.00	515133
516493	517881	E	2.00 NPT	10.00	12.25	2.00	515134
516495	517882	F	2.50 NPT	10.00	12.50	2.50	515134
516497	517883	G	3.00 NPT	10.00	12.50	3.00	515134
516499	517884	H	4.00 NPT	16.00	14.00	4.00	515135
516513	517885	H	6.00 NPT	16.00	15.50	6.00	516515

Filter Element

All Rotron Air Filters and Filter/Silencers have replaceable filter elements. The filter media is polyester designed for high efficiency over a wide spectrum of industrial applications. See filter element cross reference table.

➔ DESIGNATES MODEL CHOSEN



FOR DR BLOWER MODELS

515122	515132	515158 515254 515255	515134 516434 516435	516489 516491 516493	515132 515133 515134
515123	515133	515256	516435	516495	515134
515124	515134	516461	516434	516497	515134
515125	515134	516463	515135	516499	515135
515145	515134	516465	515135	516511	516515
515151	515135	516466	515132	516513	516515
515157	515133	516487	515133	517611	516515

Part Number	Z Media Filter	ID (Inches)	OD (Inches)	HT (Inches)	Area (Sq/Ft)
515132	517873	3.00	4.38	4.75	1.5
515133	517874	3.63	5.88	4.75	2.3
515134	517875	3.63	5.88	9.50	4.5
515135	517876	4.75	7.88	9.63	8.3
516434	517893	2.56	5.00	4.75	2.0
516435	517894	3.50	5.88	8.75	4.5
516515	517877	8.00	11.75	9.63	19.0

ACCESSORIES

VACUUM AND PRESSURE RELIEF VALVES

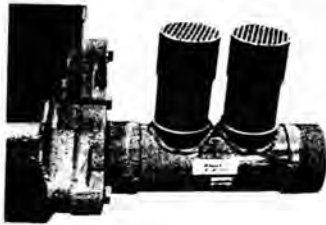
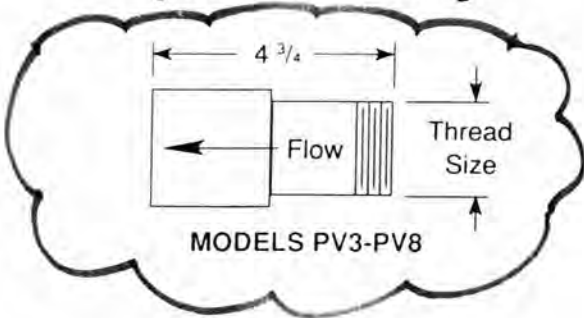
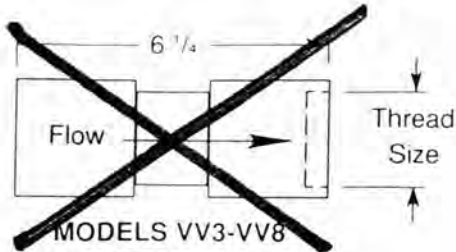
Most Fuji Ring Compressors cannot be operated in a "dead-head" condition. These relief valves are designed to protect the blowers from overheating when operating dead-headed, either under vacuum or pressure. The valves are preset to provide the proper protection for the appropriate model, which is approximately 90% of the dead-head vacuum or pressure level, and is adjustable to a lower pressure or vacuum setting.

Factory setting at points other than standard can be made if specified on the order. Please allow one extra week for delivery.

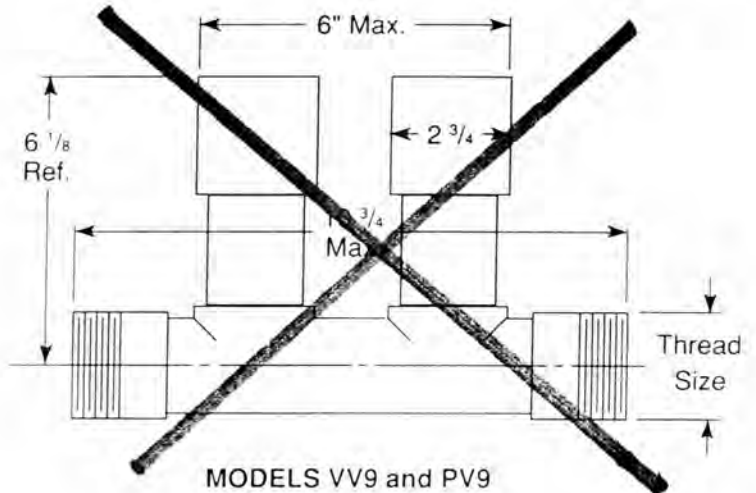
VACUUM RELIEF VALVES			
MODEL NO.	FOR USE WITH BLOWER MODEL:	FACTORY SETTING ("H ₂ O)	THREAD SIZE
VV3	VFC304	39	1 1/2" FPT
VV4	VFC404	42	1 1/2" FPT
VV5	VFC504	60	1 1/2" FPT
VV6	VFC604	86	2" FPT
VV7	VFC704	85	2" FPT
VV8	VFC804	100	2" FPT
VV9	VFC904	100	3" MPT

➔ DENOTES MODEL CHOSEN

PRESSURE RELIEF VALVES			
MODEL NO.	FOR USE WITH BLOWER MODEL:	FACTORY SETTING ("H ₂ O)	THREAD SIZE
PV3	VFC304	42	1 1/2" MPT
PV4	VFC404	46	1 1/2" MPT
➔ PV5	VFC504	68	1 1/2" MPT
PV6	VFC604	100	2" MPT
PV7	VFC704	98	2" MPT
PV8	VFC804	127	2" MPT
PV9	VFC904	127	3" MPT



Model VV9 and PV9



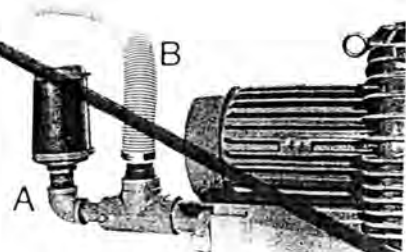
(A) Vacuum flow; (B) Vacuum relief valve; (C) Pressure relief valve; (1) VV5; (2) PV4; (3) PV6; (4) VV8

VACUUM BOOSTER

The Vacuum Booster allows utilization of the Fuji Ring Compressor in a no-flow, or "dead-head", condition, when used in material handling, vacuum pick-up, and other industrial hold-down applications. The booster permits the necessary flow of cooling air through the blower and also boosts the critical "dead-head" operating pressure level by 10 to 15%. Please specify blower model.

Contact the Fuji applications engineering department for assistance in sizing.

VACUUM BOOSTER	
MODEL NO.	FOR USE WITH BLOWER MODEL:
VB45	VFC404-VFC504
VB67	VFC604-VFC704

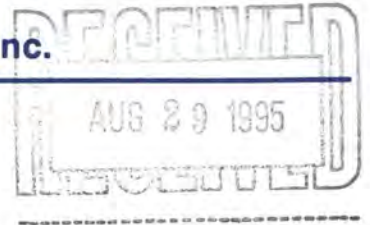


(A) Cooling air flow; (B) Main suction line (may be dead-headed)

"Over 30 Years Experience"

Environmental Hydrogeological Consultants, Inc.

Post Office Box 902
207 West Fourth Avenue
RED SPRINGS, NORTH CAROLINA 28377
Telephone (910)843-4456
Fax (910)843-5376



CORRECTIVE ACTION PLAN

Dawsey Investment Company - Former Exxon Station
Powell Boulevard & Washington Street
Whiteville, Columbus County, North Carolina
15A NCAC 2L .0106 (L)

August 21, 1995

PREPARED FOR:

Dawsey Investment Company
P.O. Box 396
Whiteville, North Carolina 28472

PREPARED BY:

William E. Bright, R.P.G.

ENVIRONMENTAL HYDROGEOLOGICAL CONSULTANTS, INC.

P.O. Box 902
Red Springs, North Carolina 28377

A handwritten signature in black ink, appearing to be "W. Bright".

CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 LOCATION	1
3.0 SITE SPECIFIC CONDITIONS	1
4.0 SITE OWNERS(CHAIN OF TITLE)	4
5.0 SOURCES OF CONTAMINATION -- ONSITE	5
5.1 NON-AQUEOUS PHASE LIQUID	5
5.2 USTs	5
5.3 PRODUCT LINES	5
5.4 PUMPS & PUMP ISLANDS	5
5.5 FIRE, EXPLOSION OR SPREAD OF NOXIOUS FUMES	6
5.6 ABATEMENT, CONTAINMENT OR CONTROL OF THE MIGRATION OF CONTAMINATION	6
5.7 REMOVAL, TREATMENT OR CONTROL OF SECONDARY POLLUTION SOURCES	6
6.0 SOURCES OF CONTAMINATION -- OFF SITE	6
6.1 AMOCO GASOLINE STATION	6
6.2 PANTRY #439	7
6.3 ETNA CONVENIENCE STORE	7
6.4 TIME SAVER #1	7
7.0 DELINEATION OF SOIL CONTAMINATION	8
8.0 DELINEATION OF CONTAMINATED GROUNDWATER	8
9.0 FEATURES INFLUENCING THE MOVEMENT, CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE CONTAMINATION	9
10.0 CAPACITY OF CONTAMINANTS TO DEGRADE	10

CONTENTS CONT

11.0	GROUNDWATER FLOW VELOCITY	13
12.0	GROUNDWATER FLOW DIRECTION	14
13.0	CONTAMINANT PLUME	15
14.0	CONTAMINANT MIGRATION - ONE YEAR TRAVEL TIME	16
	UPGRADIENT ON AN EXISTING OR FORESEEABLE RECEPTOR	
15.0	SITE CONDITIONS	18
15.1	CONTAMINANT MIGRATION	18
15.2	WATER SUPPLY	19
16.0	EXISTING & FORESEEABLE RECEPTORS	19
16.1	UTILITY LINES	19
16.2	BASEMENTS	19
16.3	ELEVATOR SHAFTS	20
16.4	PUBLIC WATER SUPPLY	20
16.5	DOMESTIC SUPPLY WELLS	20
16.6	STREAMS	21
17.0	PROPERTY OWNER CONSENT	21
18.0	ADJACENT OWNERS AND SUPPLY WELLS	21
19.0	RELATIONSHIP OF CONTAMINANT PLUME TO	22
	SURFACE WATERS	
20.0	GROUNDWATER MONITORING PROGRAM	22
21.0	LETTERS OF ACCESS AGREEMENTS	24
22.0	PUBLIC NOTICE	24

CONTENTS CON'T

23.0 STATEMENT	24
REFERENCES	25

FIGURES

1. LOCATION MAP
2. SITE MAP
3. APPROXIMATE GROUNDWATER FLOW DIRECTION MAP
4. APPROXIMATE CONTAMINANT PLUME MAP

ATTACHMENTS

ANALYTICAL DATA CHART
LABORATORY ANALYSES (Clark Environmental Services)
LABORATORY ANALYSES (Environmental Hydrogeological Consultants, Inc.)
CHAINS-OF-CUSTODY
WELL RECORDS (Previously submitted to WiRO by Clark Environmental Services)
LETTER OF SOIL OWNERSHIP TRANSFER
CERTIFICATION
CHECKLIST FOR (L)
NOTICES TO PROPERTY OWNERS
NOTICE TO MAYOR OF WHITEVILLE
NOTICE TO COUNTY HEALTH DIRECTOR

1.0 INTRODUCTION

This proposed Corrective Action Plan(CAP) is based on 15A NCAC 2L .0106 (L). The information contained herein is presented in accordance with a checklist provided by the Department of Environment, Health and Natural Resources, Division of Environmental Management, Groundwater Section.

2.0 LOCATION

The site where this incident occurred, Dawsey Investment Company - Former Exxon Station, is located at the intersection of Powell Boulevard(Hwy. 701 Bypass) & Washington Street(Hwy. 74-76), Whiteville, Columbus County, North Carolina (Figure 1).

3.0 SITE SPECIFIC CONDITIONS

On or about 5/25/90, a total of five(5) underground storage tanks(USTs) were excavated and removed from the site by Greene Drainage Company, Cerro Gordo, North Carolina, as follows:

- (2) 4,000 Gallon - Regular Unleaded Gasoline
- (2) 4,000 Gallon - Supreme Unleaded Gasoline
- (1) 4,000 Gallon - Plus Unleaded Gasoline

Mr. Jerry Clark, Elizabethtown, North Carolina, who had initially been employed (Spring, 1990) by Dawsey Investment Company to excavate the USTs decided later not to because of his work schedule but did agree to obtain the necessary soil/groundwater samples from the tank pit subsequent to the excavation of the USTs.

(2)

Mr. Autry Dawsey, President, Dawsey Investment Company(site owner) who was residing in Knoxville, Tennessee, at that time, was told upon returning to Whiteville, North Carolina, that the samples showed no evidence of contamination and that the samples and results would be retained until needed, if ever.

Several years later(1993) when the Flagstar Corporation(Hardee's) wanted to be assured, before building on the site, that the site was environmentally suitable, Mr. Dawsey attempted to locate Mr. Jerry Clark and obtain the analytical results but was informed by Mrs. Clark that her husband was deceased and that she had no knowledge of the incident.

Based on Mr. Dawsey's inability to obtain the analytical results and Flagstar's request for assurance, Hollowell Testing, Goldsboro, North Carolina, was employed, on or about 4/8/93, to conduct the required site assessment which consisted of obtaining nine(9) soil samples from boreholes.

Based on the analytical results of these soil samples, Hollowell Testing notified the State's Division of Environmental Management, Wilmington Regional Office, (WiRO) on or about 4/14/93, that the site showed evidence of gasoline contamination.

(3)

Subsequently, on 6/15/93, Mr. Dawsey employed Clark Environmental Services, Inc.(CES), Wilmington, North Carolina, to conduct a Comprehensive Site Assessment and to respond to directives from the WiRO resulting in the following being submitted to the WiRO:

Phase I Environmental Site Assessment(Draft)
CES Project # 93134
July 12, 1993

Phase I Environmental Site Assessment
CES Project # 93134
July 23, 1993

Initial Abatement Measures/Site Check and Initial Site Characterization Report
CES Project # 93134
September 22, 1993

Remedial Action Plan for Addressing On-Site Contamination
CES Project # 93134
November 10, 1993

Comprehensive Site Assessment and Corrective Action Plan
CES Project # 93134
February 24, 1994

Although the status of the first four reports, as shown above, is unknown, according to the information available the Comprehensive Site Assessment and Corrective Action Plan(CAP) were not approved by the WiRO.

CES continued to attempt to obtain approval of the CAP until April, 1994, at which time CES stopped work at the site and filed suit against the facility owner.

(4)

During May, 1995, Dawsey Investment Company employed Environmental Hydrogeological Consultants, Inc.(EHC) to help with the assessment, to be available for the arbitration hearing during October, 1995 and to prepare an application for LPUST Cleanup Funds which was submitted to the State's Division of Environmental Management on August 9, 1995.

Finally, in a Notice of Violation to Mr. Autry Dawsey from Mr. Rick Shiver dated July 27, 1995, Dawsey Investment Company was cited for failure to submit a Corrective Action Plan that provided adequate protection of human health and the environment in accordance with 15A NCAC 2N .0707. The notice directed that a Corrective Action Plan, which follows, be submitted to the WiRO on or about August 29, 1995.

4.0 SITE OWNERS (CHAIN OF TITLE)

On August 25, 1959, Esso Standard Oil Company bought the site from Kate Oliver Gilmore.

On January 19, 1973, a certificate of merger was filed with the Secretary of State of North Carolina for Esso Standard Oil Company and Humble Oil Refining Company.

Daniel Norman Ward and wife acquired the site on November 7, 1984 and deeded the property to Dawsey Investment Company on August 22, 1986.

(5)

Subsequently, on June 1, 1989, Dawsey Investment Company purchased the five(5) USTs from Springer-Eubank Oil Company and discontinued the use of same when the facility was permanently closed on or about November 15, 1989. Dawsey Investment Company used these USTs for only about five(5) months.

5.0 SOURCES OF CONTAMINATION -- ON SITE

5.1 NON-AQUEOUS PHASE LIQUID

Reportedly, non-aqueous phase liquid was not observed during the USTs excavation.

5.2 USTs

A total of five(5) USTs have been excavated from this site and were not replaced(site now occupied by Hardee's).

5.3 PRODUCT LINES

Product lines have been excavated and removed.

5.4 PUMPS & PUMP ISLANDS

All pumps and pump islands have been removed.

(6)

5.5 FIRE, EXPLOSION OR SPREAD OF NOXIOUS FUMES

No fires, explosions or any noxious fumes have been observed or reported concerning this site.

5.6 ABATEMENT, CONTAINMENT OR CONTROL OF THE MIGRATION OF CONTAMINATION

There has been no evidence, at this site, of buried waste, waste stockpiles or surficial or subsurface accumulation of free product.

5.7 REMOVAL, TREATMENT OR CONTROL OF SECONDARY POLLUTION SOURCES

During February, 1993, 205.89 tons of impacted soil, excavated from both the USTs pit and pump islands were hauled to and properly disposed of at Oak Hill Farms, Inc., Autryville, North Carolina, on 3/1,4,7/94(soil ownership transfer attached).

6.0 SOURCES OF CONTAMINATION -- OFF SITE

6.1 AMOCO GASOLINE STATION

Although there are no known reports of subsurface contamination, at this site, monitor well(MW) #9, constructed for Dawsey Investment Company, showed a total BTEX concentration of 2437 parts per

(7)

billion on February 8, 1994 but showed below sample detection limits of BTEX on June 7, 1995. This site is located directly across Powell Boulevard from subject site(southwest corner of intersection).

6.2 PANTRY #439

Pantry #439(Texaco) is located in the northwest corner of the intersection and reportedly the groundwater has been impacted as evidenced by a remediation system at the site which reportedly, at this time, has never been utilized.

6.3 ETNA CONVENIENCE STORE

The ETNA Convenience Store which is located about three(3) blocks to the east(upgradient) reported free product, in the subsurface, as well as contaminated groundwater during March, 1993.

6.4 TIME SAVER #1

No known contamination incident has ever been reported at this site. Unless changed since 1993, there are four(4) 10,000 gallon and one(1) 3,000 gallon USTs at this site.

(8)

7.0 DELINEATION OF SOIL CONTAMINATION

Based on a letter dated 3/7/94 showing soil ownership transfer, 205.89 tons of impacted soil were excavated and properly disposed off at Oak Hill Farms, Inc., Autryville, North Carolina.

The 205.89 tons were, at the time, considered all that was necessary to be excavated because if there was any residual contamination, it would be remediated along with the groundwater by CES's sparging system which was never completely installed and consequently never functional.

Currently, the site is covered with asphalt and occupied by a Hardee's Restaurant.

8.0 DELINEATION OF CONTAMINATED GROUNDWATER

The approximate horizontal extent of groundwater contamination is shown in figure

4. The horizontal plume was based on data obtained from MWs #1, #2, #3, #5, #7, #8, #9, #10 and #T-1(Figure 2), all of which were constructed by CES. MWs #4 & 6 #6 have been destroyed and are no longer available.

↑
wells ND

The 8 shallow MWs range in depth from about 9.5' to about 18' and are 2" in diameter.

(9)

The telescoping MW #T-1 is 38' deep, 2" in diameter and screened from 33'-38' and, when laboratory analyzed, the groundwater sample obtained on 12/9/93 showed less than or below detectable limits of BTEX plus MTBE. When another sample was laboratory analyzed on 6/13/95, the only analyte above the sample detection limit was toluene 7.16 ug/l using method 602 & MTBE(could relate to cross-contamination or of construction method).

This would tend to indicate that the somewhat deeper groundwater had not been impacted eventhough this well is located close to the center of the approximate contaminant plume. Thus, it would seem that the contamination is restricted, on site, to the shallow groundwater at about 4' - 8' below land surface.

9.0 FEATURES INFLUENCING THE MOVEMENT, CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE CONTAMINATION

It is believed that the most important feature(permeability) influencing the movement of contamination, at this site, is the sediments are much more heterogenous than homogenous and very clayey.

More specifically, based on the available stratigraphic data this site is underlain predominately by multiple colored clays, sandy clay and silty clay. Such sediments

(10)

can greatly influence the movement of contaminants and even promote retardation resulting in actual groundwater velocities that may differ greatly from calculated velocities.

Another influence on contaminant transport, at this site, is the probable presence of a water table depression or groundwater discharge area that could be both partly on site & off site at an angle to Powell Boulevard as evidenced by figure 3 showing the direction of groundwater flow to Powell Boulevard from both subject site and from a westerly direction.

Based on relatively shallow static water levels which are in some places only about 4'-5' below land surface, the oxygen supply at this shallow depth would be greater than if the static water levels were deeper and should greatly enhance the natural biodegradation of the contaminants resulting in reducing the contaminants to carbon dioxide and water.

10.0 CAPACITY OF CONTAMINANTS TO DEGRADE

There are numerous technical publications that address the capacity of contaminants to degrade or attenuate within the valdose zone and groundwater.

Natural processes of degradation and attenuation include both aerobic and anaerobic bacteria, volatilization, sorption and dispersion.

(11)

The shallow water table(4'-5'), at this site, is considered to be conducive for both aerobic, anaerobic and facultative indigenous microorganisms to effectuate the degradation of petroleum hydrocarbon contaminants.

These indigenous microorganisms are considered the single most important factor relating to BTEX biodegradation.

There are studies that show natural aquifer biodegradation of aromatic hydrocarbons as high as 80 to 100 percent and some aerobic studies confirm that aromatic hydrocarbons can be completely degraded.

In addition to both the shallow water and sediments being conducive to natural processes of degradation and attenuation, another important factor is the type of contaminants which are, at this site, strictly gasoline compounds and not chlorinated solvents, etc., which would be more difficult to address.

Gasoline(low range hydrocarbons) are degradable as well as most, if not all, high range hydrocarbons when present in low concentrations in the groundwater(Nyer, 1985).

(12)

Thus, it appears that the contaminants, at this site, are suitable for natural biodegradation and attenuation and together with the following should hopefully merit consideration for approving monitoring at this site:

- 1) Shallow water table;
- 2) Shallow and limited residual impacted soil;
- 3) Town of Whiteville water available;
- 4) Relatively small contaminant plume;
- 5) The UST system has been removed from the site;
- 6) Impacted soil totalling 205.89 tons were excavated and removed from the site;
- 7) There is no known imminent threat or risk to the general public or to the environment; and
- 8) Although the USTs were removed in May, 1990, it is possible that subsurface contamination existed when the USTs were replaced at this site, in 1986, making it at least about 9 or more years since a problem originated and yet there is still no evidence of any kind of threat either to the environment or human health.

This site, because the nearest well is about 850' distant, and not in the direction of groundwater flow, further indicates that the site could be viewed as very low risk, if any at all.

(13)

11.0 GROUNDWATER FLOW VELOCITY

The velocity of the groundwater underlying this site was based on hydraulic conductivity and porosity values obtained from, "Groundwater and Waste Disposal in North Carolina", by Ralph C. Heath and Hugh B. Wilder, dated May, 1979. These values were used with the combination of Darcy's Law and the basic velocity equation of hydraulics.

There is evidence to suggest that groundwater velocities will vary depending on the source of values for hydraulic conductivities, porosities, etc. Moreover, velocities can also vary because of lithology, facie-changes, sediment depositional patterns, geological structures, etc., which can account for contaminants in groundwater not being detected at certain computed distances at calculated times. However, regardless of any of the heterogeneities that may be present, using values as referenced and the below formula, the groundwater velocity, at this site, was calculated as follows:

$$\begin{aligned}
 V &= kdh/ndl \\
 \text{where } k &= 30 \text{ ft/day} \\
 n &= 25\% \text{ by volume} \\
 dh/dl &= 1.92 \text{ ft/mi} \\
 V &= 30 \text{ ft/day} \times \frac{1.92 \text{ ft/mi}}{5280} \times \frac{1}{0.25\%}
 \end{aligned}$$

$$\text{Velocity} = 0.436 \text{ ft/day}$$

12.0 GROUNDWATER FLOW DIRECTION

The approximate groundwater flow direction, at this site, was determined to be generally to the southwest as determined on August 3, 1995(Figure 3). This flow direction was based on static water levels, relative geographic position of the monitor wells, the elevation of each well head and the distance between the monitor wells.

The flow direction shown in figure 3 is towards Powell Boulevard which is approximately 60' - 65' wide after recent highway construction. However, the flow direction on the west side of Powell Boulevard was determined also to be towards Powell Boulevard.

Thus, the data tends to indicate a water table depression or an area of groundwater discharge in that general area of Powell Boulevard and at subject site.

It is believed that this depression or discharge area could relate, as noted in CES's Comprehensive Site Assessment, dated February 24, 1994, to the stormwater sewer line during times when this line(located on the rear-side of Hardee's) intersects or is submerged in groundwater.

13.0 CONTAMINANT PLUME

The contaminant plume, based on the available data, is shown in figure 4. The plume is considered to be restricted mainly to the general area of the USTs pit and the pump islands.

Two of the most downgradient monitor wells(#7 & #10) were clean when analyzed on 12/10/93 and 2/8/94, respectively, and again when both were analyzed on 6/7/95, showed below sample detection limits of benzene, ethylbenzene, toluene, total xylenes and MTBE using method 602 plus MTBE except for MW #7 which showed 7.68 ug/l of MTBE.

The remaining "downgradient" monitor well(#9 - near Amoco Station) when analyzed on 2/8/94 showed, in ug/l, benzene 290, ethylbenzene 374, toluene 413, xylene 1360 and MTBE 93, but when analyzed on 6/7/95 showed below sample detection limits for these same analytes.

It is believed that the contamination shown in MW #9 on 2/8/94 more than likely was from an off-site source, possibly either the Amoco Station or the Pantry, both of which reportedly have experienced petroleum related contamination incidents.

It would appear that whatever the source, it may now be eliminated as evidenced by the analysis dated 6/7/95 and alluded to above.

14.0 CONTAMINANT MIGRATION - ONE YEAR TRAVEL TIME UPGRADIENT ON AN EXISTING OR FORESEEABLE RECEPTOR

The problem, at this site, was discovered on or about April 9, 1993, when boreholes were constructed by Hollowell Testing, Goldsboro, North Carolina, for the purpose of obtaining soil/groundwater samples for laboratory analysis. However, there is some concern, but no documentation, that a release may have occurred, at this site, as early as 1986.

Subsequent to reporting to the State's Division of Environmental Management's Wilmington Regional Office the discovery of contamination, a total of 11 monitor wells(10 shallow & 1 deep) were constructed for the purpose of sampling and obtaining other needed data for determining groundwater flow direction, velocity, contaminant plume, etc.

Because of extensive highway improvements along Powell Boulevard requiring highway right-of-way the erstwhile USTs basin is now only about 30' from Powell Boulevard. To date only 3 of the 11 monitor wells(#1, #2 & #3) have shown evidence of contamination since they were constructed on 9/2/93.

As mentioned earlier MW #7 and MW #10, both downgradient, have shown no significant evidence of impact. Currently, there are no downgradient wells along the property boundary from existing MWs #2 & #3, both of which have shown

(17)

evidence of contamination and consequently the extent of off site contaminants migration, if any, can not be determined downgradient from MWs #2 & #3.

Of the 3 impacted MWs, MW #1 showed significant reductions in analytes(ug/l) from the first analysis dated 9/10/93 to the most recent analysis dated 7/27/95 and MWs #2 & #3 showed changes, in ug/l, based on the attached analytical data chart, as follows:

Monitor Well #1 (Pump Island)

Benzene 2480 to 1060, toluene 3850 to 362, ethylbenzene 500 to 263, xylenes 1800 to 798 and MTBE 1360 to below sample detection limit.

Monitor Well #2(Pump Island)

Benzene 2600 to 1070, toluene 1970 to 2500, ethylbenzene 520 to 870, xylenes 1420 to 2870 and MTBE 1300 to below sample detection limit.

Monitor Well #3(USTs Basin)

Benzene 2800 to 3204, toluene 3400 to 264, ethylbenzene 890 to 426, xylenes 2300 to 809 and MTBE 1400 to 5670.

The data shows, as might be expected, that MWs #2 & #3 represent the "hot spots" at this site and that even if any contaminants migrate downgradient from these points

(18)

it is not likely to be far because of the aforementioned depression or groundwater discharge area.

Further, even if the groundwater depression or groundwater discharge area is not present the contaminants have only to migrate, from the tank pit, across Powell Boulevard to MW #10 a total of about 100' which at the rate of about 0.436 ft/day (groundwater velocity) should have impacted MW #10, but did not, in about 8-9 months, certainly within the 2 years (possibly 9) since the problem was discovered.

Thus, by continuing to monitor MWs #7 & #10, it would appear that one year travel time upgradient of an existing or foreseeable receptor can readily be determined.

15.0 SITE CONDITIONS

15.1 CONTAMINANT MIGRATION

Based on the available data it is reasonable to believe that if contaminants have migrated off-site, such migration would be limited perhaps to Powell Boulevard as evidenced by the analyses of MWs #7 & #10.

Additionally, if the aforementioned groundwater depression or groundwater discharge area is present near or along the property

(19)

boundary, as believed, then perhaps no off-site migration will or has occurred.

On 8/23/95, according to Mr. Kip McClary, Public Utilities Director/City Engineer, Town of Whiteville, North Carolina, there have been no problems at the town's wastewater treatment plant associated with gasoline contamination.

15.2 WATER SUPPLY

This site is served by the Town of Whiteville, North Carolina, and reportedly there has never been a supply well at this site.

16.0 EXISTING & FORESEEABLE RECEPTORS

16.1 UTILITY LINES

Municipal water lines, sanitary sewer lines and storm water sewer lines are located along the south side of Washington Street and along the right-of-way on the east side of Powell Boulevard.

16.2 BASEMENTS

There are no known basements in the general area.

16.3 ELEVATOR SHAFTS

There are no known elevator shafts in the general area.

16.4 PUBLIC WATER SUPPLY

Subject site as well as the surrounding area is served by the Town of Whiteville's water supply.

The town relies on wells that are reportedly screened in the Black Creek formation of Cretaceous Age and are about 300' deep. There are no plans, at this time, to drill additional wells.

There is a municipal water well that is approximately 900' - 1,000' upgradient near the intersection of Smith and Madison Streets.

Also, another water well is located approximately 850' from the site south along Powell Boulevard near the high school but not in the direction of groundwater flow.

16.5 DOMESTIC SUPPLY WELLS

There are no known domestic wells located in the general area.

16.6 STREAMS

The stream nearest this site, Mollie Branch, is located about 2,000' west and discharges into Soules Swamp which is located about 1.5 miles to the south.

17.0 PROPERTY OWNER CONSENT

There is no evidence, at this time, indicating that the contaminants have migrated off-site. If migration has occurred it is believed to be restricted to either the highway right-of-way or Powell Boulevard.

18.0 ADJACENT OWNERS AND SUPPLY WELLS

Adjacent owners to subject site are considered to be Wendy's Restaurant(upgradient) and Carodo's Restaurant(owner same as subject site owner). The other 3 corners in this intersection are occupied by Time Saver(convenient store), Pantry(convenient store) & an Amoco service station which is next to a closed Hardee's restaurant which in turn is next to a Kentucky Fried Chicken restaurant(Figure 2).

The most likely of these to be affected, if any, is thought to be Carodo's Restaurant which is separated from the site by Smith Street and is in a somewhat downgradient direction from the site.

(22)

It is believed that the mentioned groundwater depression or groundwater discharge area will prevent those properties across Powell Boulevard, from the site, from being impacted.

There are no supply wells at any of these sites as municipal water is available.

19.0 RELATIONSHIP OF CONTAMINANT PLUME TO SURFACE WATERS

The contaminant plume, as now defined, is not expected to intercept surface waters, in this area, as the nearest surface water, Mollie Branch, is more than 2,000' to the west-southwest.

20.0 GROUNDWATER MONITORING PROGRAM

Originally, there were a total of 11 monitor wells, however, MWs #4 & #6 have been destroyed and were not replaced leaving a total of 9 monitor wells.

Currently, there are 8 shallow monitor wells(#1, #2, #3, #5, #7, #8, #9 & #10) and one(1) deep monitor well(#T-1) at this site and only monitor wells #1, #2 & #3 have shown significant evidence of impact.

Based on the available data the only contaminants to reach the 2 downgradient MWs #7 & #10 has been 6.78 ug/l MTBE in MW #7 on 6/7/95 which was unimpacted

(23)

based on an analysis dated 9/10/93. This low level of MTBE is believed to be due to cross-contamination which will be determined by later sampling.

Because the groundwater velocity, at this site, was computed to be 0.436 ft/day the contaminants should conceivably have impacted MWs #7 & #10 within about 8-9 months but have not in approximately the 29 months since the problem was discovered and documented.

Based on either a velocity that is much slower than computed, for this site, or the contaminants will not move beyond the groundwater depression or groundwater discharge area which appears to be located between the USTs basin and MW #7 & #10 and the contaminants propensity for natural degradation and attenuation, the following monitoring schedule is recommended:

- Sample monitor wells #1, #2, #3, #7, #9 & #10 when authorized and then semi-annually for BTEX plus MTBE;
- Sample all 9 monitor wells annually for BTEX plus MTBE;
- Prepare & submit to the WiRO a contaminant plume map based on each sampling event;
- Prepare & submit to the WiRO a groundwater flow direction map based on each sampling event; and
- Such monitoring will continue until authorized to discontinue sampling.

21.0 LETTERS OF ACCESS AGREEMENTS

The only letter of access agreement for this site relates to MW #9 & MW #10 which were issued by the State's Department of Transportation to CES of Wilmington, North Carolina/Dawsey Investment Company.

22.0 PUBLIC NOTICE

Letters of notice have been mailed to the Mayor of Whiteville, the Columbus County Health Director, Wendy's, Time Saver, Pantry Store #439, Kentucky Fried Chicken, Amoco service station and Hardee's(facility closed).

23.0 STATEMENT

This submittal, to the best of my knowledge, is consistent with environmental laws.

Dawsey Investment Company
by Earty Dawsey President
Signature of Applicant

8-26-95
Date

William E. Bright
Signature of Consultant

8-26-95
Date

REFERENCES

- Barker, J.F., G.C. Patrick, and D. Major. 1987. Natural Attenuation of aromatic hydrocarbons in a shallow sand aquifer. *Ground Water Monit. Rev.* v. 7, pp. 64-71.
- Chiang, C.Y., J.P. Salanitro, E.Y. Chai, J.D. Colthart, and C.L. Klien. 1989. Aerobic biodegradation of benzene, toluene and xylene in a sandy aquifer - data analysis and computer modeling. *Ground Water.* v. 27, pp. 823-834.
- Davis, John W., Klier, Nancy J., and Carpenter, Constance L. 1994. Natural Biological Attenuation of Benzene in Ground Water Beneath a Manufacturing Facility. *Ground Water.* v. 32, pp. 215-226.
- Klecka, G.M., J.W. Davis, D.R. Gray, and S.S. Madsen. 1990. Natural bioremediation of organic contaminants in ground water: Cliffs-Dow Superfund site. *Ground Water.* v. 28, pp. 534-543.
- Nyer, Evan K. 1985. *Groundwater Treatment Technology*, pp. 84-109.
- Nyer, Evan K., Campbell, George and Ackart, Robert. 1989. Biological Methods for Petroleum Hydrocarbons Remediation. Third National Outdoor Action Conference on Aquifer Restoration. pp. 508-519
- Srinivasan, P. and J.W. Mercer. 1988. Simulation of biodegradation and sorption processes in ground water. *Ground Water.* v. 26, pp. 475-487.

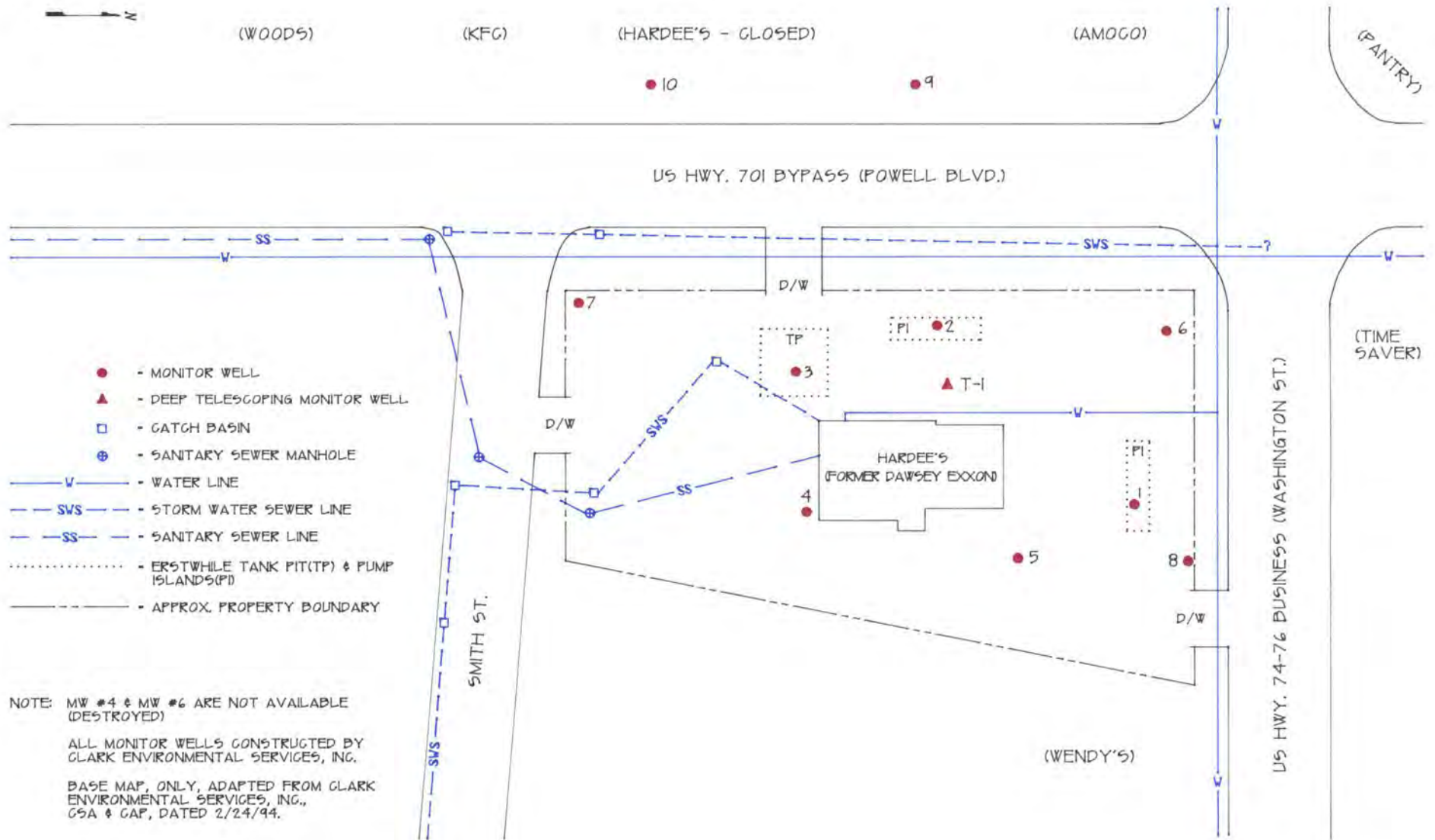


SCALE

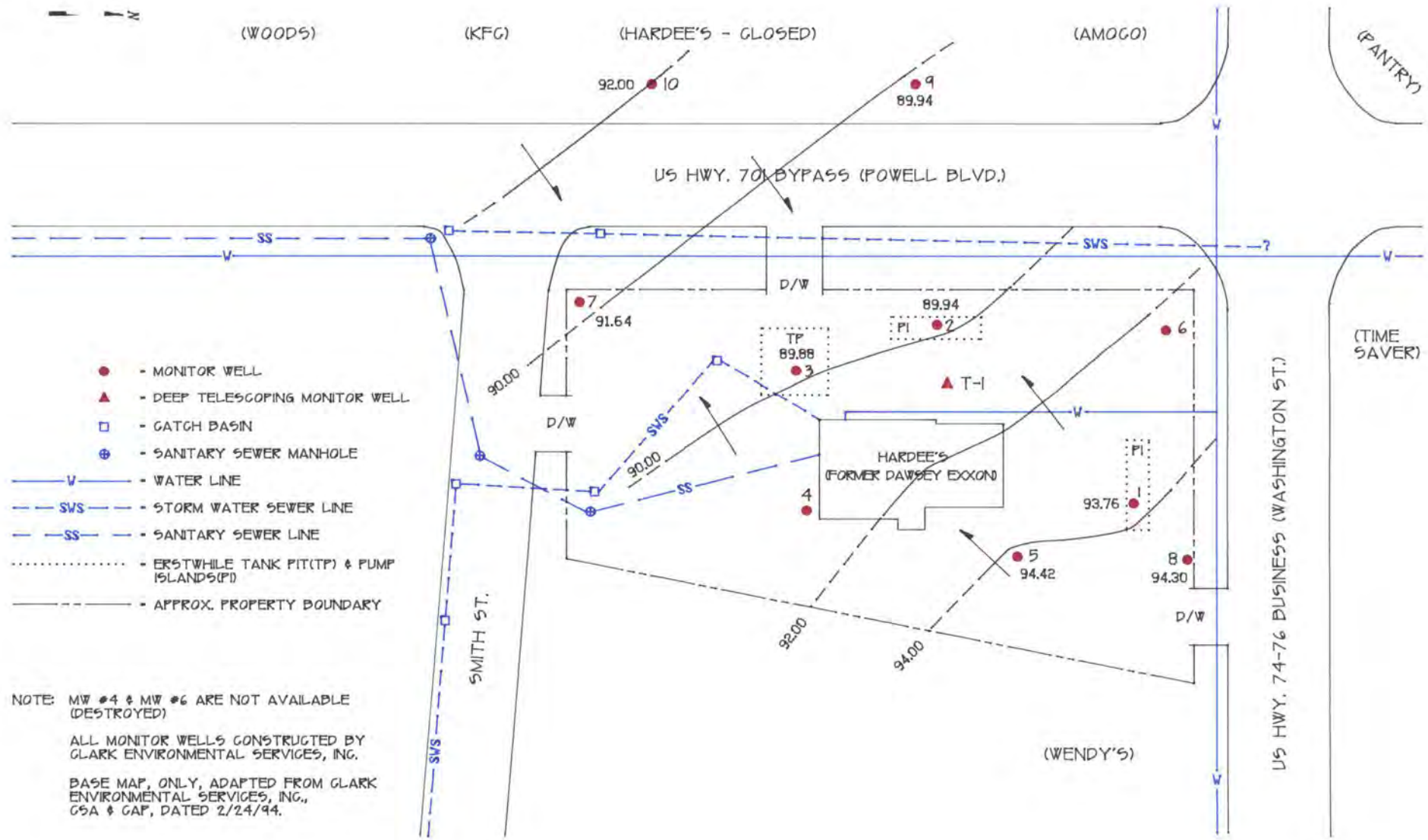


Figure 1

Dawsey Investment Company - Former Exxon Station
Powell Boulevard(Hwy. 701) & Washington St.(Hwy. 74-76)
Whiteville, Columbus County, North Carolina



SCALE: 1" = 65'	DATE: 8/21/95	EHC		TITLE: FIGURE 2 FORMER DAWSEY EXXON POWELL BLVD. & WASHINGTON ST. WHITEVILLE, COLUMBUS CO., NC 15A NGAC 2L .0106 (L)
		ENVIRONMENTAL HYDROGEOLOGICAL CONSULTANTS		
		HYDROLOGY • GEOLOGY • EXPLORATION • ANALYTICAL		



- - MONITOR WELL
- ▲ - DEEP TELESCOPING MONITOR WELL
- - CATCH BASIN
- ⊕ - SANITARY SEWER MANHOLE
- W - WATER LINE
- SWS - STORM WATER SEWER LINE
- SS - SANITARY SEWER LINE
- - ERSTWHILE TANK PIT(TP) & PUMP ISLANDS(PI)
- - - - - APPROX. PROPERTY BOUNDARY

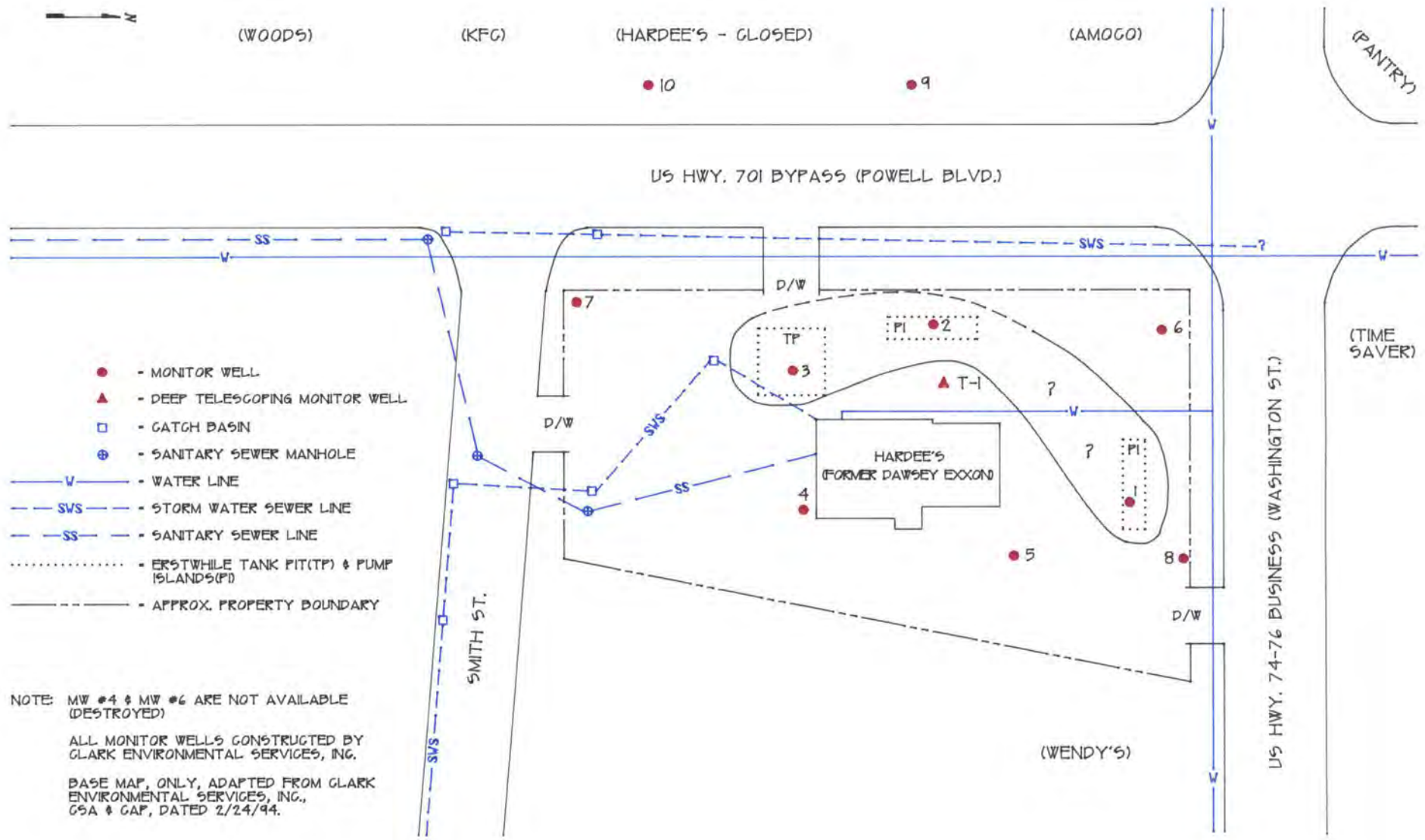
NOTE: MW #4 & MW #6 ARE NOT AVAILABLE (DESTROYED)

ALL MONITOR WELLS CONSTRUCTED BY GLARK ENVIRONMENTAL SERVICES, INC.

BASE MAP, ONLY, ADAPTED FROM GLARK ENVIRONMENTAL SERVICES, INC., GSA & GAP, DATED 2/24/94.

APPROX. GW-FLOW DIRECTION

EHC		ENVIRONMENTAL HYDROGEOLOGICAL CONSULTANTS	TITLE: FIGURE 3 FORMER DAWSEY EXXON POWELL BLVD. & WASHINGTON ST. WHITEVILLE, COLUMBUS CO., NC 15A NGAC 2L .0106 (L)
SCALE: 1" = 65'	DATE: 8/21/95		



APPROX. CONTAMINANT PLUME

EHC

<p>SCALE: 1" = 65'</p>	<p>DATE: 8/21/95</p>	<p>ENVIRONMENTAL HYDROGEOLOGICAL CONSULTANTS</p> <p>HYDROLOGY • GEOLOGY • EXPLORATION • ANALYTICAL</p>	<p>TITLE: FIGURE 4 FORMER DAWSEY EXXON POWELL BLVD. & WASHINGTON ST. WHITEVILLE, COLUMBUS CO., NC 15A NCAC 2L .0106 (L)</p>
------------------------	----------------------	--	---

ANALYTICAL DATA CHART

MW #	Well Depth (FT)	Elevation (LS)	Static Water Level (BLS)	GW-Flow Map Plot	BENZENE		ETHYLBENZENE		TOLUENE		TOTAL XYLENES		MTBE	
					9/10/93	6/7/95	9/10/93	6/7/95	9/10/93	6/7/95	9/10/93	6/7/95	9/10/93	6/7/95
1	17'	99.28	5.52	93.76	2480	1060	560	263	3850	362	1800	798	1360	297
2	17'	98.42	8.48	89.94	2600	1070	520	870	1970	2500	1420	2870	1300	BDL
3	17'	97.44	7.56	89.88	2800	3204	890	426	3400	264	2300	809	1460	5670
4	17'	-----	-----	-----	<0.2	-----	<0.2	-----	<0.2	-----	<0.2	-----	<0.2	-----
5	18'	98.62	4.20	94.42	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL
6	14'	-----	-----	-----	<0.2	-----	<0.2	-----	<0.2	-----	<0.2	-----	<0.2	-----
7	17'	97.50	5.86	91.64	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	6.78
8	17'	99.02	4.72	94.30	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL
9	10'	98.28	8.34	89.94	290	BDL	374	BDL	413	BDL	1360	BDL	93	BDL
10	9.5'	97.70	5.70	92.00	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL	<0.2	BDL
T-1	38'	98.52	8.52	90.00	<0.2	BDL	<0.2	BDL	<0.2	7.16	<0.2	BDL	<0.2	BDL

Constituents in ug/l(parts per billion)

LS = Land Surface
 BLS = Below Land Surface
 MTBE = Methyl-t-butylether
 BDL = Below Sample Detection Limit
 ----- = Not Available

NOTE: MW #4 & MW #6 have been destroyed.

Dawsey Investment Co. Former Exxon Station
 Powell Blvd. & Washington St.
 Whiteville, Columbus Co., N.C.

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

919-762-7082 919-762-8958
FAX 919-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON 93134
DATE: 09/16/93
YOUR REF/P.O.: 091093-36-11

WATER SAMPLES FROM PROJECT: DAWSEY'S EXXON, WHITEVILLE, N.C. (Page 1 of 2)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME
9137	09/10/93	1514	ROBERT THOMAS	09/10/93	1656
9138	09/10/93	1527	ROBERT THOMAS	09/10/93	1656
9139	09/10/93	1508	ROBERT THOMAS	09/10/93	1656

CLIENT STATION ID:	MW-1	MW-2	MW-3
LAB #:	9137	9138	9139

PURGEABLE AROMATICS

Compound	ug/L	MW-1	MW-2	MW-3
BENZENE	2480	2600	2800	
ETHYLBENZENE	560	520	890	
TOLUENE	3850	1970	3400	
XYLENE	1800	1420	2300	
METHYL TER-BUTYL ETHER	1360	1300	1460	

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
METHYL TER-BUTYL ETHER)

< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bealman

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

919-762-7082 919-762-8956
FAX 919-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON 93134
DATE: 09/16/93
YOUR REF/P.O.: 091093-36-11

WATER SAMPLES FROM PROJECT: DAWSEY'S EXXON, WHITEVILLE, N.C. (Page 2 of 2)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME
9140	09/10/93	1535	ROBERT THOMAS	09/10/93	1656
9141	09/10/93	1525	ROBERT THOMAS	09/10/93	1656

CLIENT STATION ID:	MW-4	MW-5
LAB #:	9140	9141

PURGEABLE AROMATICS

BENZENE	ug/L	<0.2	<0.2
ETHYLBENZENE	ug/L	<0.2	<0.2
TOLUENE	ug/L	<0.2	<0.2
XYLENE	ug/L	<0.2	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE, METHYL TER-BUTYL ETHER)

< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bidwan

LAW & COMPANY
Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
 1711 Castle Street
 P.O. Box 629
 Wilmington, N.C. 28402

910-762-7082 910-762-8956
 FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
 P.O. BOX 10136
 WILMINGTON, NC 28405-
 Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON 93134
 DATE: 12/14/93
 YOUR REF/P.O.: 120893-36-11

WATER SAMPLE FROM PROJECT: DAWSEY'S EXXON CES #93134 (Page 1 of 1)

LAB No.	SAMPLE		SAMPLER	DELIVERY TO LAB	
	DATE	TIME		DATE	TIME MATRIX
10874	12/08/93	1020	RODNEY FOWLER	12/08/93	1315 WA

CLIENT STATION ID: 1
 LAB #: 10874
 MW-4

PURGEABLE AROMATICS

BENZENE	ug/L	<0.2
ETHYLBENZENE	ug/L	<0.2
TOLUENE	ug/L	<0.2
XYLENE	ug/L	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
 METHYL TER-BUTYL ETHER)
 < = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR Jolly Bidwan

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

919-762-7082 919-762-8956
FAX 919-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: DAWSEY EXXON #93134
DATE: 10/19/93
YOUR REF/P.O.: 101293-37-11

WATER SAMPLES FROM PROJECT: DAWSEY EXXON, WHITEVILLE, N.C. (Page 1 of 1)

LAB No.	SAMPLE		SAMPLER	DELIVERY TO LAB	
	DATE	TIME		DATE	TIME MATRIX
9760	10/12/93	1200	ROBERT THOMAS	10/12/93	1700 WA

CLIENT STATION ID: MW-6
LAB #: 9760

PURGEABLE AROMATICS

BENZENE	ug/L	<0.2
ETHYLBENZENE	ug/L	<0.2
TOLUENE	ug/L	<0.2
XYLENE	ug/L	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
METHYL TER-BUTYL ETHER)
< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bidman

LAW & COMPANY
Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
 1711 Castle Street
 P.O. Box 629
 Wilmington, N.C. 28402

910-762-7082 910-762-8956
 FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
 P.O. BOX 10136
 WILMINGTON, NC 28405-
 Attn: PAUL CLARK

PROJECT NAME: DAWSEY'S EXXON
 DATE: 12/14/93
 YOUR REF/P.O.: 121093-1-2

WATER SAMPLES FROM PROJECT: DAWSEY'S EXXON (Page 1 of 1)

LAB No.	SAMPLE			DELIVERY TO LAB	
	DATE	TIME	SAMPLER	DATE	TIME MATRIX
10954	12/09/93	1525	PAUL RICHTER	12/10/93	1305 WA
10955	12/09/93	1542	PAUL RICHTER	12/10/93	1305 WA
10956	12/09/93	1540	PAUL RICHTER	12/10/93	1305 WA

CLIENT STATION ID:	T-1	MW-7	MW-8
LAB #:	10954	10955	10956

PURGEABLE AROMATICS

Compound	ug/L	T-1	MW-7	MW-8
BENZENE	ug/L	<0.2	<0.2	<0.2
ETHYLBENZENE	ug/L	<0.2	<0.2	<0.2
TOLUENE	ug/L	<0.2	<0.2	<0.2
XYLENE	ug/L	<0.2	<0.2	<0.2
METHYL TER-BUTYL ETHER	ug/L	<0.2	<0.2	<0.2

EPA METHOD #602 (BENZENE, ETHYL BENZENE, TOLUENE, XYLENE,
 METHYL TER-BUTYL ETHER)

< = BELOW DETECTION LIMITS.

LABORATORY DIRECTOR

Jolly Bedwan

LAW & COMPANY

Consulting and Analytical Chemists
ESTABLISHED 1903

1711 Castle Street • P.O. Box 629 • Wilmington, North Carolina 28402
Telephones (910) 762-7082 or (910) 762-8956
FAX (910) 762-8785

CHAIN OF CUSTODY RECORD

CUSTOMER: CLARK ENVIRONMENTAL

PROJECT ID: Dauscy's Exxon

PO # 121093-1-2

SAMPLE NUMBER	SAMPLE LOCATION	DATE	TIME	SAMPLE TYPE			NO. OF CONT.	ANALYSIS REQUIRED
				WATER		SOIL		
				COMP	GRAB			
1	T-1	12-9	3:25		✓		2	BTEX MTBE
2	Mu-7	12-9	3:42		✓		2	" "
3	Mu-8	12-9	3:40		✓		2	" "

Relinquished by: (Signature) <u>Paul Richter</u>	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Methods of Shipment	Received for Laboratory by: <u>[Signature]</u>	Date/Time <u>12/9/95 1:05</u>
Conditions upon receipt <u>Good - on ice</u>	Remarks:	

LAW & COMPANY

Consulting and Analytical Chemists

ESTABLISHED 1903

Main Office
1711 Castle Street
P.O. Box 629
Wilmington, N.C. 28402

910-762-7082 910-762-8956
FAX 910-762-8785

REPORT OF ANALYSES

CLARK ENVIRONMENTAL SERVICE
P.O. BOX 10136
WILMINGTON, NC 28405-
Attn: PAUL CLARK

PROJECT NAME: FORMER DAUSEYS EXXON
DATE: 02/10/94
YOUR REF/P.O.: 020894-36-11

WATER SAMPLES FROM PROJECT #93134 - FORMER DAWSEY'S EXXON (Page 1 of 1)

LAB No.	SAMPLE		SAMPLER	DELIVERY TO LAB	
	DATE	TIME		DATE	TIME MATRIX
12133	02/08/94	1140	KAREN THOMAS	02/08/94	1650 WA
12134	02/08/94	1140	KAREN THOMAS	02/08/94	1650 WA

CLIENT STATION ID:	1	2
LAB #:	12133	12134
	MW-9	MW-10

PURGEABLE AROMATICS

Compound	ug/L	ug/L
BENZENE	290	<0.2
ETHYLBENZENE	374	<0.2
TOLUENE	413	<0.2
XYLENE	1360	<0.2
METHYL TER-BUTYL ETHER	93	<0.2

BENZENE, ETHYL BENZENE, TOLUENE, XYLENE, METHYL TER-BUTYL
ETHER - EPA METHOD 602
< = BELOW DETECTION LIMITS

LABORATORY DIRECTOR

Dolly Bidwan

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC725A/DAWSEY SITE

 HYDROLOGIC PROJECT NUMBER: FL9512413
 HYDROLOGIC SAMPLE NUMBER: 9512413
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW #1
 DATE SAMPLED: 7/24/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 7/27/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	50.0	1060
Ethylbenzene	100-41-4	50.0	263
Toluene	108-88-3	50.0	362
Xylene (Total)	1330-20-7	50.0	798
MTBE		250	297
Surrogate Recovery: BFB			94%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: DILUTION FACTOR X 50

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510007
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-2
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	50.0	1070
Ethylbenzene	100-41-4	50.0	870
Toluene	108-88-3	50.0	2500
Xylene (Total)	1330-20-7	50.0	2870
MTBE		250	BDL
Surrogate Recovery: BFB			95%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: DILUTION FACTOR X 50

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC725A/DAWSEY SITE
 HYDROLOGIC PROJECT NUMBER: FL9512413
 HYDROLOGIC SAMPLE NUMBER: 9512414
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW #3
 DATE SAMPLED: 7/24/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 7/28/95

METHOD EPA 602/MIBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	50.0	3204
Ethylbenzene	100-41-4	50.0	426
Toluene	108-88-3	50.0	264
Xylene (Total)	1330-20-7	50.0	809
MIBE		250	5670
Surrogate Recovery: BFB			101%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: DILUTION FACTOR X 50

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510008
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-5
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	BDL
Surrogate Recovery: BFB			107%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510009
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-7
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	6.78
Surrogate Recovery: BFB			92%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510010
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-8
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	BDL
Surrogate Recovery: BFB			92%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510011
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-9
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	BDL
Surrogate Recovery:			
BFB			71%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510012
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-10
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/12/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	BDL
Surrogate Recovery: BFB			74%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

 H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Lumberton, Inc
 COMPANY PROJECT NUMBER: EHC608 A

 HYDROLOGIC PROJECT NUMBER: FL9510006
 HYDROLOGIC SAMPLE NUMBER: 9510006
 HYDROLOGIC LAB I.D. #: 399
 SAMPLE IDENTIFICATION: MW-T1
 DATE SAMPLED: 6/7/95
 DATE EXTRACTED: N/A
 DATE/TIME ANALYZED: 6/13/95

METHOD EPA 602/MTBE

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	7.16
Xylene (Total)	1330-20-7	1.0	BDL
MTBE		5.0	BDL
Surrogate Recovery: BFB			101%

BDL = Below Sample Detection Limit
 SDL = Sample Detection Limit

COMMENTS: _____

FAX: 671-8837

HYDR OGIC, INC.
2003 N. PINE ST., SUITE # 2
LUMBERTON, NC 28358

N.C. DEM CERT. NO. 37
DEHNR N 7716
S.C. DHEC NO. 99037

CHAIN OF CUSTODY RECORD

Client: EHC, Inc. NPDES# _____ Contact: Thomas Ammons Phone: (910)843-4456

Sampler:(Print Name): MIKE LAMM (Signature) Michael Lamm

Purchase Order Number: _____ Project Number: Dawsey Site Release Number: _____

--- For Lab Use Only---

Sample Location/ID	Collection Date	Time	Type Grab/Comp	# of Bottles	Analyses Required	Preservative	pH	Remarks
Dawsey Site MW #1	6/7/95	10:10 AM	✓	2	BTEX / MTBE	HCL		Groundwater
MW # 2		10:15	✓	2				
MW # 5		10:05	✓	2				
MW # 7		10:20	✓	2				
MW # 8		10:00	✓	2				
MW # 9		10:30	✓	2				
MW # 10		10:25	✓	2				

Relinquished By: _____ Date/Time: _____ Received By: _____ Temperature at Receipt: 4 °C

Relinquished By: _____ Date/Time: _____ Received By: _____

Relinquished By: Thomas Ammons Date/Time: 6-8-95 8:45 AM Received By: _____

Relinquished By: A. Eilens Date/Time: 6-8-95 9:30 AM Received For Laboratory By: CF Eilens 6-8-95 8:45 AM
Karen Taylor

Method of Shipment: (Circle One)
 Hand US Mail UPS FedEx Bus HydroLogic Courier Other _____

Comments: Fax: Hard Copy results (910)843-5376 (Fax)
Report in PPR.

Subcontractor: <u>HLI - Frankfurt</u> Contact Name: _____ Date Shipped: _____ Comments: <u>Dawsey Site -</u> <u>Report in PPB</u>	SUBCONTRACT COC Project Name/No: <u>EHC 608 A</u> Project Contact/Phone: _____ P.O. #: _____	Reporting Information: <u>INC.</u> Report To: <u>HYDROLOGIC, INC.</u> <u>2003 N. PINE STREET</u> <u>SUITE #2</u> <u>LUMBERTON, NC 28358</u> Invoice To: <u>HYDROLOGIC, INC.</u> <u>2003 N. PINE STREET</u> <u>SUITE #2</u> <u>LUMBERTON, NC 28358</u>	Verbal <input type="checkbox"/> Phone No: _____ Fax <input checked="" type="checkbox"/> Fax No: <u>671-8837</u> Typed Copy <input checked="" type="checkbox"/> Date: _____
---	--	---	---

F-75/10006

ONE CONTAINER PER LINE		SAMPLE TYPE											LAB USE ONLY				
Sample ID	Sample Location	comp	grab	date	time	gw	dw	ww	solid	oil	liquid	prsv	ex volume	Analysis & Method	ex cond	pH	
Dawsey	MW T#1		X	6/7/95	1010	X							HCL	2VOA	602 BTEX / MTBE		
"	MW 2		↓	↓	1015	↓							↓	↓	↓		
"	MW 5		↓	↓	1005	↓							↓	↓	↓		
"	MW 7		↓	↓	1020	↓							↓	↓	↓		
"	MW 8		↓	↓	1000	↓							↓	↓	↓		
"	MW 9		↓	↓	1030	↓							↓	↓	↓		
"	MW 10		↓	↓	1025	↓							↓	↓	↓		

Turn Around Time (Please Specify) Rush <input checked="" type="checkbox"/> Two Week <input type="checkbox"/> Three Week <input type="checkbox"/>	5 DAY TAT	QC Level: <input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> Project Specific _____	DISKETTES: Comma Delimited: _____ Standard ASCII: _____
Relinquished by: (Signature) <u>Karen Taylor</u> <u>6/8/95 1000</u>	Received by: (Signature) _____ Date/Time _____		Received for Laboratory by: <u>J. Ramsey</u> Date/Time <u>6/9/95 11:00</u>
Method of Shipment: <u>Fed Ex</u>			

FAX: (671-8837

HYDR OGIC, INC.
2003 N. PINE ST., SUITE # 2
LUMBERTON, NC 28358

EHC 725A

N.C. DEM CERT. NO. 37
DEHNR N 7716
S.C. DHEC NO. 99037

CHAIN OF CUSTODY RECORD

Client: *EHC* NPDES# _____ Contact: *Thomas Ammons* Phone: *843-4456*

Sampler:(Print Name): *Kevin Martin* (Signature) *Kevin Martin*

Purchase Order Number: _____ Project Number: *Autry Dawsey Site* Release Number: _____

--- For Lab Use Only---

Sample Location/ID	Collection		Type Grab/Comp	# of Bottles	Analyses Required	Preservative	pH	Remarks
	Date	Time						
<i>Dawsey MW #1</i>	<i>7-24-95</i>		<input checked="" type="checkbox"/>	<i>2</i>	<i>BTEX/MTBE</i>	<i>HCL</i>		
<i>MW #3</i>			<input checked="" type="checkbox"/>	<i>2</i>				

Relinquished By: *Kon [Signature]* Date/Time: *7/25/95 - 11:55 AM* Received By: *CZ Eless 7-25-95 11:55 AM* Temperature at Receipt _____

Relinquished By: *CZ Eless 7-25-95 12:25 PM* Date/Time: _____ Received By: _____ Temperature at Receipt *4* °C

Relinquished By: _____ Date/Time: _____ Received By: _____

Relinquished By: _____ Date/Time: *7/25/95 1225* Received For Laboratory By: *Pamela S. Hoste*

Method of Shipment: (Circle One) Hand US Mail UPS FedEx Bus <u>HydroLogic Courier</u> Other _____	Comments: <u><i>Report in PPB.</i></u>
--	--

Subcontractor: <u>HLI - Frank</u> Contact Name: _____ Date Shipped: _____ Comments: _____	SUBCONTRACT COC Project Name/No: <u>EH0725 A</u> Project Contact/Phone: _____	Reporting Information: Report To: _____ <u>HYDROLOGIC, INC.</u> <u>2003 N. PINE STREET</u> <u>SUITE #2</u> Invoice To: <u>LUMBERTON, NC 28358</u>	Verbal <input type="checkbox"/> Phone No: _____ Fax <input checked="" type="checkbox"/> Fax No: <u>671-8837</u> Typed Copy <input checked="" type="checkbox"/> Date: <u>ASAP</u>
--	--	--	---

F19512413

ONE CONTAINER PER LINE

SAMPLE TYPE

LAB USE ONLY

Sample ID	Sample Location	SAMPLE TYPE											Analysis & Method	ex cond	pH			
		comp	grab	date	time	gw	dw	ww	solid	oil	liquid	prpv				ex volume		
Dawsey Site	MW #1		X	7-24-95		X								HCL	2VOA	602BTEX / MTBE		
	MW #3		X	"		X								HCL	2VOA	602BTEX / MTBE		

Turn Around Time (Please Specify) <u>5 DAY TAT</u> Rush <input checked="" type="checkbox"/> Two Week <input type="checkbox"/> Three Week <input type="checkbox"/> Due <u>7/31/95</u>	QC Level: I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> Project Specific _____	DISKETTES: Comma Delimited: _____ Standard ASCII: _____
Relinquished by: (Signature) <u>Karen A. Taylor</u>	Received by: (Signature) _____	Date/Time _____
Method of Shipment: <u>Fed Ex</u>	Received for Laboratory by: <u>[Signature]</u>	Date/Time <u>7/26/95 11:00</u>

OAK HILL FARMS, INC.
P.O. BOX 220
AUTRYVILLE. N.C. 28318
[919] 531-3800

SOIL OWNERSHIP TRANSFER
N.C.D.E.M. PERMIT #SR0600039

THIS SOIL OWNERSHIP TRANSFER COVERS THE SOIL REPRESENTED BY OAK HILL FARMS, INC. NON-HAZARDOUS WASTE MANIFEST NUMBER 2100 THRU NUMBER 2103 AND NUMBER 2105 THRU NUMBER 2109.

OAK HILL FARMS, INC. ACCEPTS OWNERSHIP OF 205.89 TONS OF NON-HAZARDOUS VIRGIN PETROLEUM CONTAMINATED SOIL FROM THE AUTRY DAWSEY EXXON SITE ON POWELL BLVD AND WASHINGTON ST. IN WHITEVILLE, COLUMBUS COUNTY, N.C. FOR TREATMENT UNDER N.C.D.E.M. PERMIT #SR0600039.

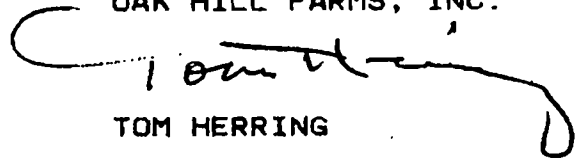
THIS AGREEMENT BECOMES BINDING ON OAK HILL FARMS, INC. UPON RECEIPT OF PAYMENT FOR SERVICES RENDERED.

THANKS FOR THE OPPORTUNITY TO SERVE !!!

INVOICE #5146 DATED MARCH 7, 1994.

March 7, 1994

OAK HILL FARMS, INC.

A handwritten signature in black ink, appearing to read "Tom Herring", is written over the printed name. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

TOM HERRING

DIVISION OF ENVIRONMENTAL MANAGEMENT
CERTIFICATION FOR THE SUBMITTAL OF A CORRECTIVE ACTION PLAN
UNDER 15A NCAC 2L.0106(1)

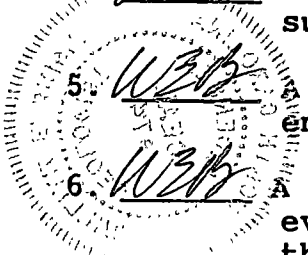
Responsible Party: Dawsey Investment Company
Address: P.O. Box 396
City: Whiteville, State: NC, Zip Code: 28472

Site Name: Dawsey Investment Company - Former Exxon Station
Address: Powell Blvd. & Washington St.
City: Whiteville, Co.: Columbus, Zip Code: 28472

Groundwater Section Incident Number: UNAssigned

I, William E Bright, a Professional Engineer (Licensed Geologist) (circle one) for EHC, INC do hereby certify that the information indicated below is enclosed as part of the required Corrective Action Plan (CAP) and that to the best of my knowledge the data, site assessments, engineering plans and other associated materials are correct and accurate.
(Each item must be initialed by hand by the certifying licensed professional)

1. WEB A listing of the names and addresses of those individuals required to be notified to meet the notification requirements of 15A NCAC 2L .0114(b) are enclosed. Copies of letters and certified mail receipts are also enclosed.
2. WEB A Professional Engineer or Licensed Geologist has prepared, reviewed, and certified all applicable parts of the CAP in accordance with 15A NCAC 2L .0103(e).
3. WEB A site assessment is attached or (on file) with the appropriate Regional Office which provides the information required by 15A NCAC 2L .0106(g).
4. WEB A description of the proposed corrective action and supporting justification is enclosed.
5. WEB A schedule for the implementation of the CAP is enclosed.
6. WEB A monitoring plan is enclosed which has the capacity to evaluate the effectiveness of the remedial activity and the movement of the contaminant plume, and which meets the requirements of 15A NCAC 2L .0110 and .0106(1).
7. WEB The activity which resulted in the contamination incident is not permitted by the State as defined in 15A NCAC 2L.0106(e).

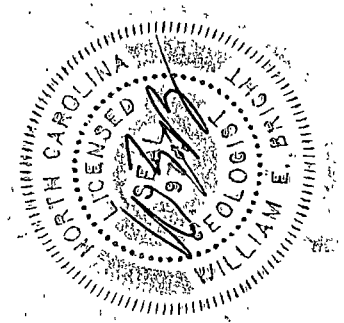


(OVER)

In addition, the undersigned also certifies that to the best of my knowledge and professional judgement and in accordance with the requirements of 15A NCAC 2L.0106(1), the following determinations have been made and are documented in the CAP:

8. WBB all free product has been removed to the extent practicable in accordance with 15A NCAC 2L .0106(f). (See guidance document).
9. WBB all sources of contamination have been removed or controlled in accordance with 15A NCAC .0106(f) and (1). (See guidance document).
10. WBB the contaminant has the capacity to degrade and attenuate under the site-specific conditions.
11. WBB the time and direction of contaminant travel can be predicted with reasonable certainty.
12. WBB the migration of the contaminant will not result in any violation of the standards specified in 15A NCAC 2L .0202 at any existing or foreseeable receptor.
13. WBB the contaminants have not and will not migrate onto adjacent properties, or adjacent properties are served by public water supplies which cannot be influenced by contaminants migrating off-site, or adjacent landowners have consented in writing to a request allowing the contaminant upon their property.
14. WBB all necessary access agreements needed to monitor groundwater quality have been or can be obtained.

(Please Affix Seal and Signature)



Note: Any modifications made to this form may result in the return of your submittal.

DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
Division of Environmental Management, Groundwater Section

~~CHECKLIST for 15A NCAC 2L .0106 (f)~~

The following checklist of items must be presented when a request is submitted to the Director, by any person who is required to implement an approved corrective action plan for a non-permitted site pursuant to 15A NCAC 2L .0106 (f) based upon natural processes of degradation and attenuation of contaminants. This rule does not apply if the corrective action plan requires any type of active remediation.

Information must be submitted in the order requested in the rules. Make sure that your request contains the information specified in this checklist by checking off each paragraph and then signing at the bottom of the checklist.

A description of site specific conditions is included with this report. Previous comprehensive site assessment (CSA), correction action plan (CAP), monitoring report(s) should be referenced; critical data should be summarized in figures and tables and included in this request.

1. All sources of contamination and free product have been removed or controlled pursuant to 15A NCAC 2L .0106 (f) (and 15A NCAC 2N .0703 and .0705, if applicable). Complete delineation of soil contamination and an acceptable plan for its remediation following CAP approval may be considered to indicate "control" of the secondary source of contamination. Show that the extent of contamination has been defined as explained in the Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater and 15A NCAC 2L .0106 (g). Capping is an option, but it would require some justification including a discussion or modelling of the changes in contaminant levels due to the seasonal changes in the water table and reasonable indication about the effectiveness of the cap over an extended period of time.

2. This submittal includes references to publication(s) to indicate that the contaminant has the capacity to degrade or attenuate and that it applies to the conditions at the site (benzene is degradable given appropriate site conditions, TCE may not readily degrade but may attenuate). Indicate which limiting factors for degradation or attenuation exist at the site.

3. Time and direction of contaminant travel can be predicted with reasonable certainty. Contamination in monitor wells is one way to determine the distance travelled over time (Rate of contaminant transport). Modelling, signed and sealed by a professional engineer/licensed geologist (PE/LG), will be acceptable

DRAFT
SUBJECT TO REVISIONS

PLEASE COMMENT BY
MAY 03 1994



DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
Division of Environmental Management, Groundwater Section

but monitoring may be required. Modelling is not acceptable for bedrock contamination except under site specific conditions which allow for the use of fracture traces.

A map (or maps) must be included identifying the location of the current plume. Also indicate the position of one year of groundwater travel time upgradient of an existing or foreseeable receptor. Provide the technical basis for this determination. Locate the current and proposed monitoring wells on the base map and provide an explanation of their purpose. The base map from the CSA should be used. Indicate and use rate and direction of groundwater flow for modelling and calculations.

A statement by a PE/LG is required to report any indication that the system is not performing according to the design or model that was proposed. Interim monitoring may be used to determine whether the proposed design or model is adequate.

All existing and foreseeable receptors have been identified on the base map. Indicate how this was established. Receptors include but are not limited to utility lines, basements, elevator shafts, public and domestic supply wells and streams. If a property is to be utilized in the future but is served by a public water supply, domestic supply wells to be constructed might not be considered as receptors.

5. This request demonstrates that (check off one or more of the following):

contaminants have not and will not migrate onto adjacent properties, or that

such properties are served by an existing public water supply system dependent on surface waters or hydraulically isolated groundwater, or

the owners of such properties have consented in writing to the request.

Use a base map and a tax map showing adjacent owners and supply wells from existing CSA. Indicate which owners are likely to be affected, and provide technical basis for this determination. Preferably, a letter from the utility company should be provided indicating which households are on public water supply. Certify whether public water supply is dependent on surface waters or hydraulically isolated groundwater. Indicate the plume boundaries on the map and the position of one

DRAFT
SUBJECT TO REVISIONS

PLEASE COMMENT BY
11th MARCH 1994

DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
Division of Environmental Management, Groundwater Section

10. Included with request is a statement indicating that to the best of your knowledge this report is consistent with all environmental laws.

A disclaimer to indicate that you cannot meet this requirement is not acceptable.

*DANSEX INVESTMENT Company
by E. Antay Dansey President*
Signature of Applicant

8-26-95

Date

William E. Wright
Signature of Consultant

8/26/95

Date

DRAFT
SUBJECT TO REVISIONS
PLEASE COMMENT BY
JUNE 03 1994

DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
Division of Environmental Management, Groundwater Section

year of travel time upgradient of an existing or foreseeable receptor.

- 6. The contaminant plume is expected to intercept surface waters (modelling calculations indicate a potential problem).

Yes
 No

If yes, analyses of samples taken upstream and downstream from any surface waters at or in close proximity to the contaminant plume discharge area are included in this report. Constituents which exceed the standards of surface waters as defined in 15A NCAC 2B .0200 have been identified.

- 7. A groundwater monitoring program sufficient to track the degradation and attenuation of contaminants and contaminant by-products is contained in this request. Monitoring wells must be indicated on the base map at either one of the two locations which is closer to the source:

- i) one year of groundwater travel time upgradient of an existing or foreseeable receptor or
- ii) five years of groundwater travel time downgradient of the edge of the plume boundary at the time the CAP is submitted.

- 8. Letters are included with this request to indicate that all necessary access agreements needed to monitor groundwater quality have been or can be obtained.

- 9. Public notice of the request has been provided in accordance with 15A NCAC 2L .0114(b). Attach a copy of the letters and the green cards of certified mail notification to all persons as specified. A copy of the tax map or equivalent form of verification of all property owners and occupants within or contiguous to the projected area as specified would suffice to demonstrate that all property owners potentially impacted have been identified.

DRAFT

SUBJECT TO REVISIONS

PLEASE COMMENT BY

JUNE 03 1994

"Over 30 Years Experience"

Environmental Hydrogeological Consult

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 28377
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 431
RETURN RECEIPT REQUESTED

Mr. Charlie Mullins, President
 Scottish Food System
 (Kentucky Fried Chicken, Whiteville, N.C.)
 P.O. Box 1469
 Laurinburg, N.C. 28353

Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472


Dear Mr. Mullins:


This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.

Z 101 028 431

Receipt for Certified Mail
 No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)



Sent to	Mr. Charlie Mullins
Street and No.	P.O. Box 1469
P.O., State and ZIP Code	Laurinburg, Nc 28353
Postage	\$ 52
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$ 2.52
Postmark or Date	

PS Form 3800, March 1993

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because of the distance from subject site and the probable presence of a groundwater depression or groundwater discharge area between your property and subject site, it is very unlikely that your property will be impacted.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.


Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,

A handwritten signature in black ink, appearing to read "W. E. Bright". The signature is stylized and written in cursive.

William E. Bright, R.P.G.
Hydrogeologist

"Over 30 Years Experience"

Environmental Hydrogeological Consu

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 2837
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 432
RETURN RECEIPT REQUESTED

Mr. Charlie Mullins, President
 Scottish Food System
 (Closed Hardee's Restaurant, Whiteville, N.C.)
 P.O. Box 1469
 Laurinburg, N.C. 28353

Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472

Dear Mr. Mullins:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.

LEAKING STORAGE LAGOONS • TANK AND LINE TESTING • LEAKING BURIED TANKS • UST REMOVAL/CLOSURES
 SOIL AND GROUNDWATER SAMPLES • MONITOR AND RECOVERY WELLS
 CONTAMINATED SOIL AND GROUNDWATER REMEDIATION • LAND APPLICATION OF SLUDGE & WASTEWATER
 PHASE I & II SITE ASSESSMENTS • WETLANDS • PERMITS • EXPERT WITNESS • REPORTS

Z 101 028 432



**Receipt for
 Certified Mail**

No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)

Sent to	Mr. Charlie Mullins
Street and No.	P.O. Box 1469
P.O. State and ZIP Code	Laurinburg, NC 28353
Postage	\$.32
Certified Fee	1.10
Special Delivery Fee	/
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	2.52
Postmark or Date	AUG 28 1995 RED SPRINGS NC 28377

PS Form 3800, March 1993

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because of the distance from subject site and the probable presence of a groundwater depression or groundwater discharge area between your property and subject site, it is very unlikely that your property will be impacted.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. E. Bright', is written over the typed name.

William E. Bright, R.P.G.
Hydrogeologist

EHC

"Over 30 Years Experience"

Environmental Hydrogeological Consu

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 2837
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 433
RETURN RECEIPT REQUESTED

Ms. Doris Bridges
 The Pantry Stores
 (The Pantry Store #439, Whiteville, N.C.)
 1801 Douglas Drive
 Sanford, North Carolina 27331


Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472

Dear Ms. Bridges:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.


Z 101 028 433



Receipt for Certified Mail
 No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)

Sent to	Ms. Doris Bridges	
Street and No.	1801 Douglas Drive	
P.O., State and ZIP Code	Sanford, NC 27331	
Postage	\$	32
Certified Fee		1.10
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to Whom & Date Delivered		1.10
Return Receipt Showing to Whom, Date, and Address		
TOTAL Postage & Fees		2.52
Postmark on Date		

PS Form 3800, March 1993



(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because your property is located upgradient from subject site it is very unlikely that your site will be impacted because of this incident.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.


Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,



William E. Bright, R.P.G.
Hydrogeologist

EHC

"Over 30 Years Experience"

Environmental Hydrogeological Consult

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 28377
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 434
RETURN RECEIPT REQUESTED

ATTN: Restaurant Manager
 Wendy's Restaurant
 311 Washington Street
 Whiteville, North Carolina 28472


Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472

Dear Sir or Mam:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.


Z 101 028 434



Receipt for Certified Mail
 No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)

Sort to	MANAGER, Wendy's Restaurant
Street and No.	311 Washington Street
R.O., State and ZIP Code	Whiteville, NC 28472
Postage	\$.32
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	1.10
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$ 2.52
Postmark or Date	

PS Form 3800, March 1993



(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because your property is located upgradient from subject site it is very unlikely that your site will be impacted because of this incident.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,

A handwritten signature in black ink, appearing to read "W. E. Bright". The signature is written in a cursive style with a large initial "W" and a stylized "Bright".

William E. Bright, R.P.G.
Hydrogeologist

"Over 30 Years Experience"

Environmental Hydrogeological Consu

Post Office Box 902
207 West Fourth Avenue
RED SPRINGS, NORTH CAROLINA 2837
Telephone (910)843-4456
Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 435
RETURN RECEIPT REQUESTED

Mr. Craig Best
Amoco Service Station
Powell Boulevard
Whiteville, North Carolina 28472

Z 101 028 435
Receipt for Certified Mail
No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sent to	Mr. Craig Best, Amoco Station	
Street and No	Powell Boulevard	
P.O., State and ZIP Code	Whiteville, NC 28472	
Postage		\$ 32
Certified Fee		1.10
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to Whom & Date Delivered		1.10
Return Receipt Showing to Whom, Date, and Addressee's Address		
TOTAL Postage & Fees		\$ 2.52
Postmark or Date		

PS Form 3800, March 1993

Subject: NOTICE CONCERNING THE REQUEST FOR A
CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
quality standards in 15A NCAC 2L .0202*
Dawsey Investment Company - Former Dawsey Exxon
Powell Boulevard & Washington Street
Whiteville, North Carolina 28472

Dear Mr. Best:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because your property is located upgradient from subject site it is very unlikely that your site will be impacted because of this incident.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

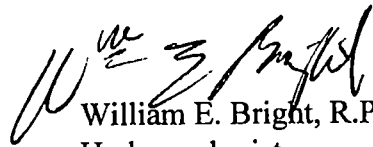
Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

EHC

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,



William E. Bright, R.P.G.
Hydrogeologist

"Over 30 Years Experience"

Environmental Hydrogeological Consult

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 28377
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 436
RETURN RECEIPT REQUESTED

ATTN: Store Manager
 Time Saver
 Washington Street
 Whiteville, North Carolina 28472

Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472

Dear Sir or Mam:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your area. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. Because you own property near where this incident occurred the law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.

Z 101 028 436



Receipt for Certified Mail

No Insurance Coverage Provided
 Do not use for International Mail
 (See Reverse)

Sent to	MANAGER, Time Saver
Street and No.	Washington Street
P.O., State and ZIP Code	Whiteville, NC 28472
Postage	\$ 2.20
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$ 2.52
Postmark or Date	

PS Form 3800, March 1993

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination. Because your property is located upgradient from subject site it is very unlikely that your site will be impacted because of this incident.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

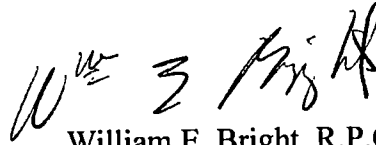
Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

EHC

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,

A handwritten signature in black ink, appearing to read "W. E. Bright". The signature is stylized and somewhat cursive.

William E. Bright, R.P.G.
Hydrogeologist

"Over 30 Years Experience"

Environmental Hydrogeological Consult

Post Office Box 902
207 West Fourth Avenue
RED SPRINGS, NORTH CAROLINA 28377
Telephone (910)843-4456
Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 438
RETURN RECEIPT REQUESTED

Mr. Horace Whitley, Mayor
City Hall
Madison Street
Whiteville, N.C. 28472



Z 101 028 438

Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sent to	Mr. Horace Whitley, Mayor
Street and No.	City Hall, Madison Street
P.O., State and ZIP Code	Whiteville, NC 28472
Postage	\$.32
Certified Fee	1.10
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.10
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$ 2.52
Postmark or Date	

PS Form 3800, March 1993



Subject: NOTICE CONCERNING THE REQUEST FOR A
CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
quality standards in 15A NCAC 2L .0202*
Dawsey Investment Company - Former Dawsey Exxon
Powell Boulevard & Washington Street
Whiteville, North Carolina 28472

Dear Honorable Mayor:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your city. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. The law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

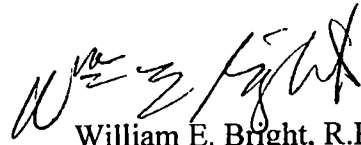
Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

EHC

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,



William E. Bright, R.P.G.
Hydrogeologist



"Over 30 Years Experience"

Environmental Hydrogeological Consu

Post Office Box 902
 207 West Fourth Avenue
 RED SPRINGS, NORTH CAROLINA 2837
 Telephone (910)843-4456
 Fax (910)843-5376

August 25, 1995

CERTIFIED MAIL Z 101 028 437
RETURN RECEIPT REQUESTED

Mr. Bill Horne, Health Director
 County of Columbus
 304 Jefferson Street
 Whiteville, N.C. 28472

Subject: NOTICE CONCERNING THE REQUEST FOR A
 CORRECTIVE ACTION PLAN
*without the requirement to meet groundwater
 quality standards in 15A NCAC 2L .0202*
 Dawsey Investment Company - Former Dawsey Exxon
 Powell Boulevard & Washington Street
 Whiteville, North Carolina 28472

Dear Mr. Horne:

This letter is being provided to inform you that the State's Division of Environmental Management is being requested to approve an environmental cleanup activity in your city. In accordance with the North Carolina General Statutes, a set of Groundwater Classifications and Standards has been put in place for the protection of all groundwaters across the State. The law requires that you be informed of the proposed activities.

Pursuant to the notification requirements of Title 15A NCAC 2L .0114(b), Environmental Hydrogeological Consultants, Inc., on behalf of Dawsey Investment Company is providing notice of the request for a corrective action plan under 15A NCAC 2L .0106(l). This property is located at the intersection of Powell Boulevard and Washington Street, Whiteville, North Carolina.



Z 101 028 437

Sent to		Mr. Bill Horne
Street and No.		304 Jefferson Street
P.O., State and ZIP Code		Whiteville, NC 28472
Postage		\$.32
Certified Fee	\$1.10	2.50
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to Whom & Date Delivered		1.10
Return Receipt Showing to Whom, Date, and Addressee's Address		
TOTAL Postage & Fees		\$ 2.52
Postmark or Date		

PS Form 3800, March 1993

(2)

Some of the constituents found in the groundwater at the above location are typical of gasoline and have been detected beneath this site in concentrations which exceed the Groundwater Quality Standards outlined in 15A NCAC 2L .0202. Environmental Hydrogeological Consultants, Inc., believes that if the proposed Corrective Action Plan is approved by the Division of Environmental Management, implementation will result in the following:

The problem, at this site, was first discovered on or about 4/9/93 and reported to the Wilmington Regional Office(WiRO) of the State's Division of Environmental Management on 4/14/93. Subsequently, a total of eleven(11) monitor wells were constructed to monitor both the groundwater quality and track contaminant migration, if any.

When these monitor wells were last sampled on 6/7/95 and 7/24/95 only monitor wells #1, #2 & #3(all on site) showed evidence of impact. Also, neither of the two(2) off site monitor wells(located near the Amoco station and the closed Hardee's) showed any evidence of contamination.

Because the contaminant plume appears to be restricted mainly to subject site it is believed that natural degradation, dilution, attenuation, adsorption/absorption, etc., will be effective, at this time, in lieu of a remediation system that may not be any more effective but yet could cost the State's Trust Fund perhaps as much as \$50,000.00 or more.

Lastly, in the approximate 29 months since the problem was discovered no reports, of any kind, have been brought to the attention of Dawsey Investment Company.

Any written comments concerning this request should be submitted within 30 days of receipt of this letter to Mrs. Deborah Mayo of the State's Division of Environmental Management, WiRO. In addition, the WiRO has this proposed Corrective Action Plan with detailed site information on record for public perusal. You may make copies of the information obtained at a charge of 10 cents per page. Please send written comments and requests to examine this proposed Corrective Action Plan to the following address:

Mrs. Deborah Mayo
NC-DEHNR-DEM
127 Cardinal Drive Extension
Wilmington, North Carolina 28405-3845
Telephone: (910) 395-3900

EHC

(3)

The WiRO staff may be contacted during normal weekday business hours to answer questions pertaining to this request. Notification of this request for corrective action is also being made by certified mail to the Columbus County Health Director and Mayor of Whiteville, North Carolina.

Sincerely,

A handwritten signature in black ink, appearing to read "W. E. Bright". The signature is written in a cursive style with a large initial "W" and a stylized "E".

William E. Bright, R.P.G.
Hydrogeologist

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



March 8, 1996

Mr. Autry Dawsey
Dawsey Investment Company
P.O. Box 396
Whiteville, NC 28472

RE: Final Approval - Corrective Action Plan (CAP)
Former Dawsey's Exxon
Columbus County, North Carolina
Groundwater Incident No. 10813

Dear Mr. Dawsey:

On February 2, 1996, the Groundwater Section of the Wilmington Regional Office received your proposed Corrective Action Plan (CAP) for the above-referenced site. As described in Title 15A North Carolina Administrative Code (NCAC), Subchapter 2L (Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina), the Division's final approval of a CAP is contingent upon consideration of public input received following notification in accordance with 15A NCAC 2L .0114. Certified mail receipts have been provided, showing proof of notification to property owners and occupants potentially affected by the approval of the proposed CAP submitted pursuant to 15A NCAC 2L .0106 (l) "using natural attenuation processes".

The Regional Office has considered any public comments received, and based on the staff's review and recommendations, I am hereby granting you final approval to implement the CAP as proposed. The Division's decision is based on the information submitted in the proposed CAP and supporting documents.

Mr. Autry Dawsey
Page 2
March 8, 1996

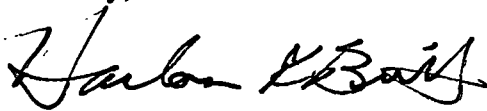
This CAP approval should not be considered an approval of any cost estimates presented in the CAP for reimbursement from the N.C Leaking Petroleum Underground Storage Tank Cleanup Funds. The Division may only reimburse corrective action costs which are determined to be reasonable and necessary in accordance with 15A NCAC 2P. (Rules for the Administration of the Leaking Petroleum Underground Storage Tank Cleanup Funds) and established guidelines.

Upon receiving additional information, I may require you to perform additional monitoring, conduct additional site assessment activities, assess the performance of the ongoing corrective action, and/or evaluate the technological and economical feasibility of implementing a new technology at the subject site.

Please be advised that you are required by 15A NCAC 2L .0114(c) to notify all interested parties, as specified in paragraph (b) of that rule, that approval of the CAP has been granted by the Director. This notification is required to be made by certified mail and must be done within 30 days of receipt of the Director's decision.

If you have any questions, please call Bruce Reed in the Wilmington Regional Office at (910)395-3900.

Sincerely,



A. Preston Howard, Jr., P.E.

APH/RO/

cc: Arthur Mouberry
Burrie Boshoff
✓ RO Files

Environmental Hydrogeological Consultants, Inc.
P.O. Box 902
207 West Fourth Avenue
Red Springs, NC 28377

bruce\dawsey.feb

Sent 6.24.16



PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

MICHAEL SCOTT
Acting Director

June 23, 2016

Mr. Autry Dawsey
Dawsey's Investment
1007 N. Powel Blvd.
Whiteville, NC 28472

Re: Notice of Regulatory Requirements
NCGS 143B-279.9 and 143B-279.11
Notice of Residual Petroleum

Dawsey's Exxon
Washington and J. K. Powel Blvd., Whiteville
Columbus County
Incident Number: 10813
Risk Classification: Low
Ranking: 125 D

Dear Mr. Dawsey:

North Carolina General Statute (NCGS) 143B-279.9 and 143B-279.11 require a Notice of Residual Petroleum (Notice) to be filed with the Register of Deeds in Columbus County, where the release is located, when a release from an underground storage tank has not been remediated to below "unrestricted use standards". The Notice is required either prior to conveyance of a contaminated property or prior to receiving a Notice of No Further Action. "Unrestricted use standards" for groundwater are the groundwater quality standards and interim standards contained in Title 15A NCAC 2L .0202, and "unrestricted use standards" for soil are the residential maximum soil contaminant concentrations (MSCCs) established in Title 15A NCAC 2L .0411.

The Notice must be prepared in accordance with the attached instructions and format. It must contain a legal description of the property containing the source of contamination and legal descriptions of any other properties which you own (or control) which are contaminated by the release. The Notice must also include appropriate land use restrictions for these properties. In addition, the Notice must identify all other properties (adjacent, adjoining, downgradient, etc.) on which contamination is known to exist at the time the Notice is prepared.

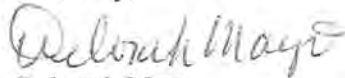
The Notice must be sent to this regional office of the UST Section within 30 days of the date of this letter for approval and notarization. The approved and notarized Notice must then be filed by you with the Register of Deeds, and a certified copy of the filed Notice must be submitted to this office within 30 days of its return to you.

If you do not wish to place a Notice on the soil and groundwater you must submit a report of soil and groundwater sampling within 30 days of the date of this letter.

Effective October 1, 2004, the Department of Environmental Quality requires that all work following the submittal of the Limited Site Assessment Report (Title 15A NCAC 2L .0405) be preapproved if State Trust Fund reimbursement is anticipated. To comply with this requirement, a completed Preapproval/Claim Authorization Form, encompassing the required remedial activities, must be received in this office within 14 days of the date of this letter. Upon completion of the preapproved activities, you should submit your claim promptly. Reimbursement funds are budgeted based on completed preapprovals, but lengthy delays in reimbursement can occur if claims are not submitted immediately following work completion.

Failure to comply with this letter is a violation of North Carolina law and may result in the assessment of civil penalties and/or the use of other enforcement mechanisms available to the state. If you have any questions regarding this letter, please contact Wayne Randolph at the address or telephone number listed below.

Sincerely,



Deborah Mayo
Hydrogeologist
Wilmington Regional Office
UST Section, Division of Waste Management, NCDEQ

Attachment: Instructions for Preparing Notice of Residual Petroleum

Cc: WiRO

Wilmington Regional Office | 127 Cardinal Drive Extension | Wilmington, NC 28405 | (910) 796-7215

APPENDIX C
BORING LOGS



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB1	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth BLS)	(ft)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1		0.5	14		0-3.5' Grass-Brown SAND .
2					
3		720	30		
4		1728	27		
5		251	31		3.5'-5' Gray SAND , saturated at 4'.
6					Boring terminated at 5 feet.
7					
8					
9					
10					
11					
12					
13					
14					

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB2	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth BLS)	(ft)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1		105	7		0-4' Grass-Brown SAND .
2					
3		126	7		
4		24	5		
5		10	4		
					4'-5' Gray SAND , odor, saturated.
					Boring terminated at 5 feet.
6					
7					
8					
9					
10					
11					
12					
13					
14					

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB3	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth (ft) BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	6		0-5' Grass-Brown SAND , loose, trace of clay at 3', slightly wet at 5'.
2				
3	38	8		
4	51	6		
5	7	6		
	5	10		
6				Boring terminated at 5.5 feet.
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB4	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth BLS)	(ft)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1		1	5		0-5' Grass-Tan SAND , wood debris at 5', saturated at 5'.
2					
3		1	5		
4		2	6		
5		60	6		
6					Boring terminated at 5 feet.
7					
8					
9					
10					
11					
12					
13					
14					

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB5	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth BLS)	(ft)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1		3	2		0-2' Tan SAND .
2					
3		5	3		2'-2.5' Gray SAND , 2.5'-4' Tan SAND .
4		6	2		
5		5	2		4'-5' Black SAND .
6					Boring terminated at 5 feet.
7					
8					
9					
10					
11					
12					
13					
14					

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:



Apex Companies, LLC

Boring Log

Boring/Well No.: P62-SB6	Site Name: Parcel 62
Date: 6/7/18	Location: Whiteville, Columbus County, NC
Job No.: NCDOT-001	Sample Method: Hand Auger and Direct Push
Apex Rep: Thomas Fisher	Drilling Method: Hand Auger and Direct Push
Drilling Company: Carolina Soil Investigations	Driller Name/Cert #: Danny Summers/2579

Remarks:

Depth (ft) BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	6		0-2.5' Tan SAND.
2				
3	1	5		2.5'-3' Gravel auger refusal at depth in this area.
4				Boring terminated at 3 feet.
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

APPENDIX D
GEOPHYSICAL REPORT



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2018-139)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 62
NCDOT PROJECT R-5020B (41499.1.3)

265 WASHINGTON ST., WHITEVILLE, NC

JUNE 22, 2018

Report prepared for: Katie Lippard
Apex Companies, LLC
1071 Pemberton Hill Rd., Suite 203
Apex, NC 27502

Prepared by: _____

A handwritten signature in black ink, appearing to read "E. Cross".

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

A handwritten signature in black ink, appearing to read "Doug Canavello".

Douglas A. Canavello, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406

P: 336.335.3174 F: 336.691.0648

C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 62 – 265 Washington St.
Whiteville, Columbus County, North Carolina

Table of Contents

Executive Summary 1
Introduction..... 2
Field Methodology..... 2
Discussion of Results..... 3
 Discussion of EM Results..... 3
 Discussion of GPR Results..... 4
Summary & Conclusions 5
Limitations 5

Figures

- Figure 1 – Parcel 62 Geophysical Survey Boundaries and Site Photographs
- Figure 2 – Parcel 62 EM61 Results Contour Map
- Figure 3 – Parcel 62 GPR Transect Locations and Images
- Figure 4 – Overlay of Geophysical Survey Boundaries on NCDOT Engineering Plans

LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Apex Companies, LLC at Parcel 62, located at 265 Washington St., in Whiteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 29 – June 1, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Parcel 62 includes a groundwater remediation system, which is composed of a series of interconnected wells joined by PVC pipes. There was no apparent structure that this system was connected to at the site.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of thirteen EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. Additionally, the series of well covers suggested that a potential groundwater remediation system was in operation at the property. EM Anomalies 2 and 12 were associated with unknown buried metal and were investigated further by GPR. GPR recorded evidence of small hyperbolic reflectors that were suggestive of buried metallic debris and/or potential utilities. Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 62.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Apex Companies, LLC at Parcel 62, located at 265 Washington St., in Whiteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 29 – June 1, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a restaurant surrounded by asphalt parking areas and grass medians. Parcel 62 includes a groundwater remediation system, which is composed of a series of interconnected wells joined by PVC pipes. There was no apparent structure that this system was connected to at the site. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at

approximately 0.8-foot intervals along north-south trending or east-west trending, generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on June 1, 2018, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the DF unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist’s discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Utilities	
2	Suspected Buried Metallic Debris	☑
3	Utility	
4	Vehicle	
5	Drop Inlet	
6	Well Cover	
7	Vehicle	
8	Signs	
9	Well Covers	
10	Sign	
11	Vehicle	
12	Suspected Buried Metallic Debris	☑
13	Sign	

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including utilities, vehicles, a drop inlet, well covers from the remediation system, and signs. Additionally, the series of well covers suggested that a potential groundwater remediation system was in operation at the property. EM Anomalies 2 and 12 were associated with unknown buried metal and were investigated further by GPR.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property, as well as the transect images. A total of four GPR transects were performed at the site. GPR Transects 1 – 4 were performed across EM Anomalies 2 and 12. These transects recorded evidence of small hyperbolic reflectors that were suggestive of buried metallic debris and/or potential utilities. No evidence of larger structures, such as USTs, was observed in these areas.

Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 62. **Figure 4** provides an overlay of the geophysical survey onto the NCDOT MicroStation engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 62 in Whiteville, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- Additionally, the series of well covers suggested that a potential groundwater remediation system was in operation at the property.
- EM Anomalies 2 and 12 were associated with unknown buried metal and were investigated further by GPR.
- GPR recorded evidence of small hyperbolic reflectors that were suggestive of buried metallic debris and/or potential utilities.
- Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 62.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Apex Companies, LLC in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the Parcel 62 – 265 Washington St. (NCDOT Project R-5020B)

conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area
(Facing Approximately North)



View of Survey Area
(Facing Approximately West)



503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

PROJECT
PARCEL 62
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT R-5020B

TITLE
PARCEL 62 - GEOPHYSICAL SURVEY
BOUNDARIES AND SITE PHOTOGRAPHS

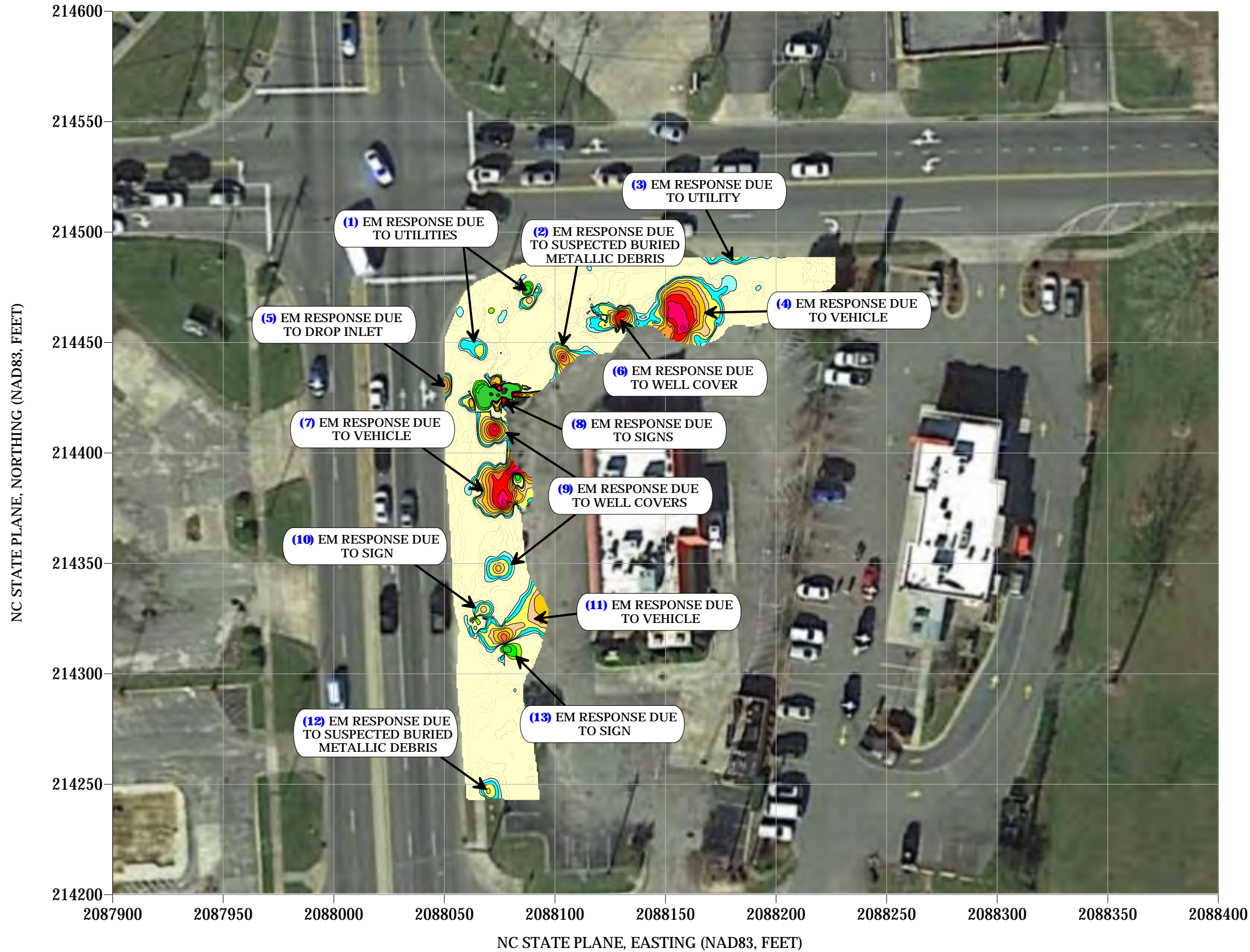
DATE
5/29/2018

PYRAMID PROJECT #:
2018-139

CLIENT
Apex Companies, LLC

FIGURE 1

EM61 METAL DETECTION RESULTS



NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on May 29, 2018, using a Geonics EM61 instrument. Verification GPR data were collected using a GSSI UtilityScan DF instrument with a dual frequency 300/800 MHz antenna on June 1, 2018.

EM61 Metal Detection Response (millivolts)



503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

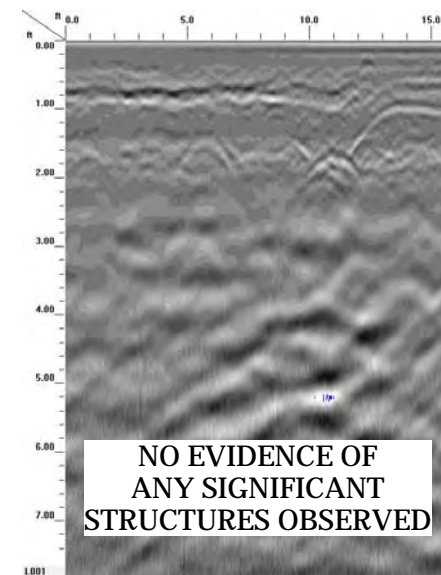
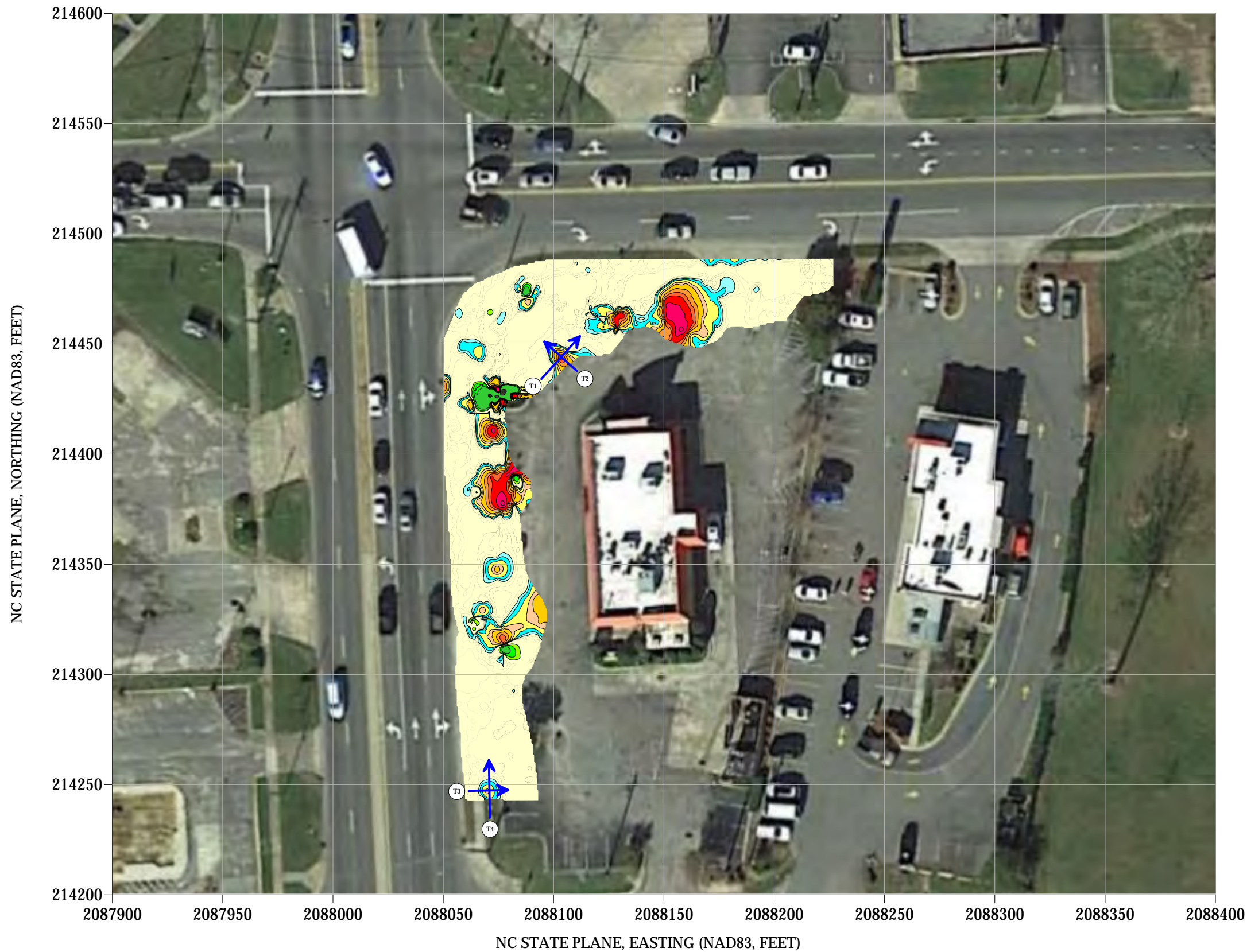
PROJECT
PARCEL 62
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT R-5020B

TITLE
**PARCEL 62 - EM61 METAL DETECTION
CONTOUR MAP**

DATE
5/29/2018
PYRAMID PROJECT #:
2018-139

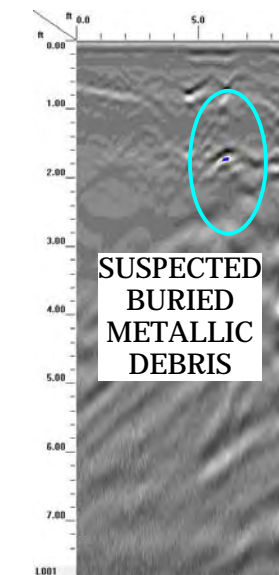
CLIENT
Apex Companies, LLC
FIGURE 2

LOCATIONS OF GPR TRANSECTS



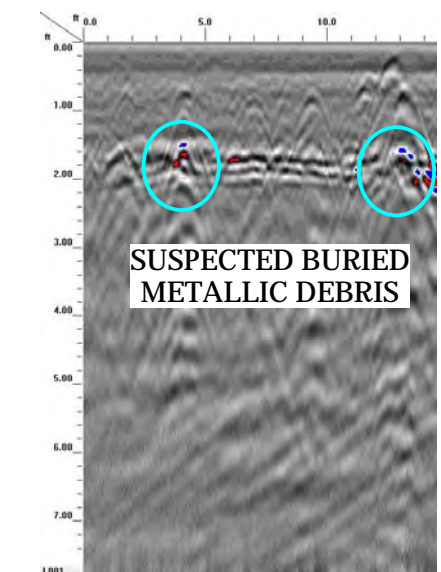
NO EVIDENCE OF ANY SIGNIFICANT STRUCTURES OBSERVED

GPR TRANSECT 1 (T1)



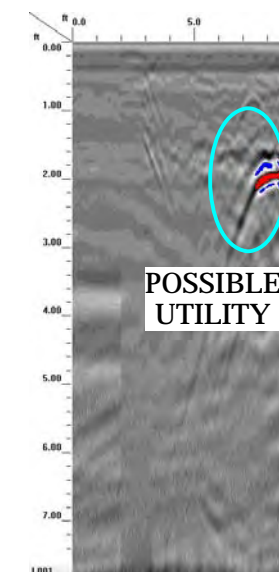
SUSPECTED BURIED METALLIC DEBRIS

GPR TRANSECT 2 (T2)



SUSPECTED BURIED METALLIC DEBRIS

GPR TRANSECT 3 (T3)



POSSIBLE UTILITY

GPR TRANSECT 4 (T4)



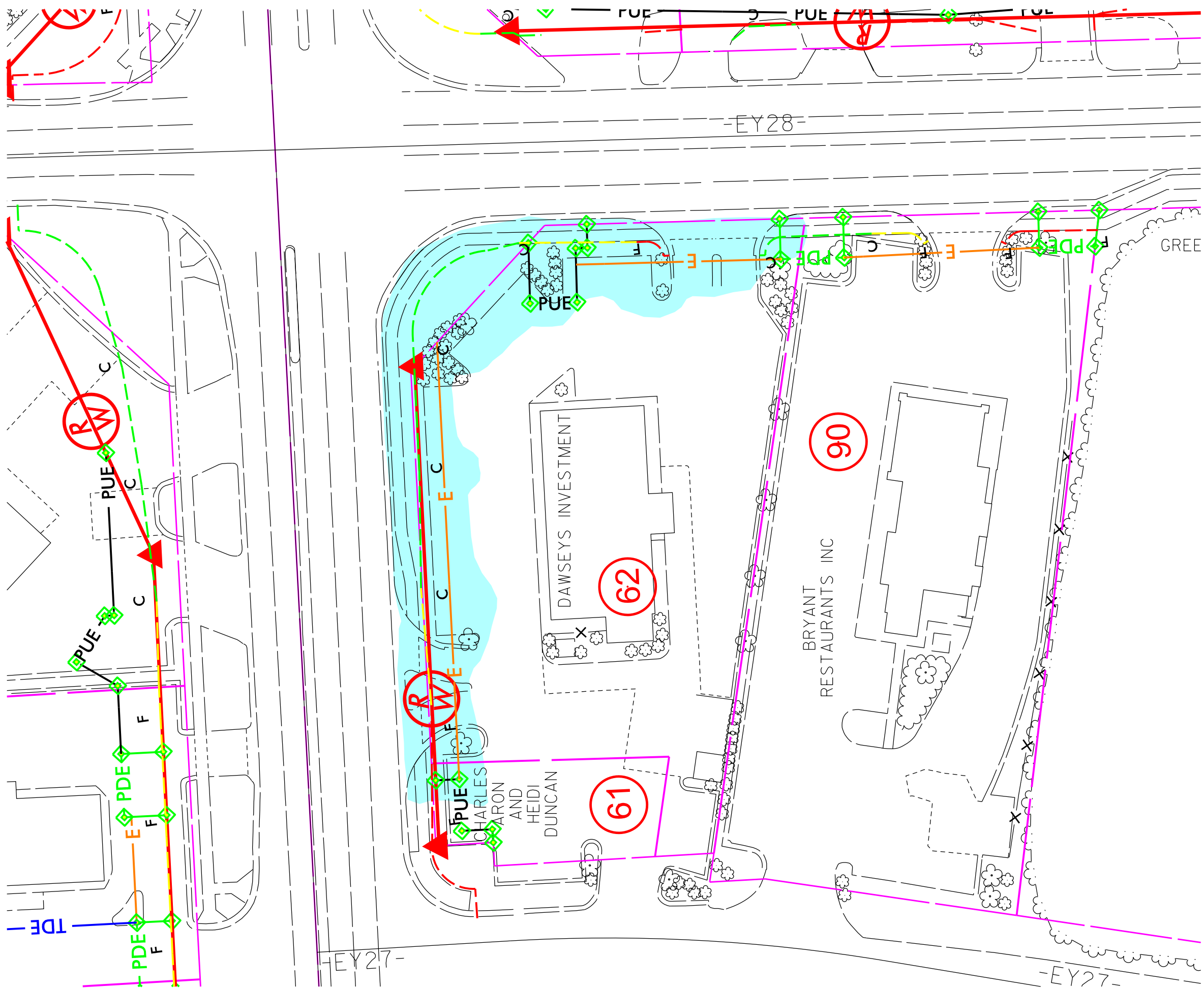
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

PROJECT
PARCEL 62
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT R-5020B

TITLE
PARCEL 62 - GPR TRANSECT LOCATIONS AND IMAGES

DATE
6/1/2018
PYRAMID PROJECT #:
2018-139

CLIENT
Apex Companies, LLC
FIGURE 3



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- TEMPORARY CONSTRUCTION EASEMENT
- PDE — PROPOSED PERMANENT DRAINAGE
- PUE — PROPOSED PERMANENT UTILITY
- - - PROPOSED SS CUT LINE
- - - PROPOSED SS FILL LINE
- GEOPHYSICAL SURVEY AREA

TITLE OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES ON NCDOT ENGINEERING PLANS	
PROJECT PARCEL 62 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT W-5020B	
503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology	
DATE: 06-26-2018	REVISION NO. 0
PYRAMID PROJECT NO. 2018-139	FIGURE NO. 4

APPENDIX E
UVF HYDROCARBON ANALYSIS RESULTS AND PACE ANALYTICAL
LABORATORY REPORT



Hydrocarbon Analysis Results

Client: NCDOT
Address: Parcel 62

Samples taken Thursday, June 7, 2018
Samples extracted Thursday, June 7, 2018
Samples analysed Thursday, June 7, 2018

Contact: Craig Haden

Operator Troy Holzschuh

Project: R-5020B Whiteville

										F03640			
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	P62-SB1 (2-3)	16.9	<0.42	<0.42	3.4	3.4	1.6	0.19	<0.017	0	78.4	21.6	Road Tar 91.7%,(FCM)
s	P62-DUP-1	16.9	<0.42	<0.42	3	3	1.4	0.16	<0.017	0	76.8	23.2	Road Tar 77.6%,(FCM)
s	P62-SB1 (4-5)	25.5	<0.64	<0.64	1.2	1.2	1.1	<0.2	<0.025	0	68	32	V.Deg.PHC 71.2%,(FCM)
s	P62-SB2 (3-4)	20.0	<0.5	<0.5	<0.5	<0.5	<0.1	<0.16	<0.02	0	0	0	PHC not detected
s	P62-SB2 (4-5)	20.8	<0.52	<0.52	<0.52	<0.52	<0.1	<0.17	<0.021	0	0	0	PHC not detected
s	P62-SB3 (3-4)	26.0	<0.65	<0.65	<0.65	<0.65	<0.13	<0.21	<0.026	0	0	0	PHC not detected,(BO)
s	P62-SB3 (5-5.5)	25.5	<0.64	<0.64	0.64	0.64	0.57	<0.2	<0.025	0	0	100	PHC not detected,(BO)
s	P62-SB4 (3-4)	25.0	<0.63	<0.63	0.63	0.63	0.51	<0.2	<0.025	0	37	63	Residual HC,(BO)
s	P62-SB4 (4-5)	20.6	<0.52	<0.52	0.79	0.79	0.75	<0.17	<0.021	0	0	100	PHC not detected,(BO)
Initial Calibrator QC check			OK			Final FCM QC Check			OK			96.3 %	

Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

