

Phase II

ITO# 90-0184

11/17/89 - 1/17/90

Passive Recovery

11/17 - 12/17/89



Groundwater
& Environmental Services, Inc.

*A Full Service Environmental Consulting
and Contracting Company*



**PRELIMINARY PHASE I
Investigation Report/
Recommendations
Main Post Gas Station**

14 November 1989

Prepared For:

E-Systems, Inc./SAI
P.O. Box 369
Building 1209
Fort Monmouth, NJ 07703-5000

Prepared By:

Anthony A. Kull
Principal Hydrogeologist, P.G.

Groundwater & Environmental
Services, Inc.
437 Newman Springs Road
Lincroft, NJ 07738



**Groundwater
& Environmental Services, Inc.**

437 Newman Springs Rd. • Suite B-1 • Lincroft, NJ 07738 • (201) 530-4787 • FAX (201) 530-5884

November 13, 1989

Joseph M. Fallon
E - Systems Inc./SAI
P.O. Box 369,
Building 1209
Fort Monmouth N.J. 07703 - 5000

RE: Phase I Investigation/One week Pilot study-preliminary report
on the Main Post Gas Station - Fort Monmouth

Dear Mr. Fallon:

The purpose of this letter is to provide a preliminary report on the **Phase One Investigation** and one week pilot study performed by Groundwater and Environmental Services, Inc. (GES) at the above referenced site. The report details the findings of the investigation thus far and provides a status report with regard to the free product recovery situation.

Recommendations are provided based on the preliminary investigation with regard to further definition of site subsurface environmental conditions, hydrocarbon vapor investigations, continued free-phase product recovery and procurement of discharge permits required for water table depression.

We have also provided a section on the mechanics of hydrocarbon recovery dynamics which is designed to hopefully shed some light on the current situation.

Please call me if you have any questions or comments. We would welcome the opportunity to provide a verbal update to all of the concerned parties.

Sincerely,

Anthony A. Kull
Principal Hydrogeologist, P.G.



1.0 INTRODUCTION

Pursuant to a request by E - Systems Inc./SAI on October 25, 1989, GES conducted a one week Pilot study/Phase I investigation at the Post Main Gas Station, located in Fort Monmouth, Monmouth County, N.J. The location of the subject site is shown on Figure 1.

These efforts were conducted in response to the inadvertent loss of several thousand gallons of free-phase product as a result of a supply line loss.

This loss was discovered during the routine installation of Phase Two Vapor Recovery System components. Investigative and remedial efforts performed to date include the recovery of 2100 gallons of free-phase product from the spill area, the installation of two product recovery points and the installation of four groundwater monitoring wells.

2.0 SITE CONDITIONS

The post gasoline service station is situated on Saltzman Avenue which is a thoroughfare through the actual base of Fort Monmouth. The station has six, 10,000-gallon underground storage tanks which store various grades of gasoline product. These products are distributed from two pumping islands.

Currently there are three, three-inch diameter monitoring wells, two, four-inch diameter recovery points and four, four-inch diameter monitoring wells installed within the immediate vicinity of the tank field area (Figure 2). In addition there is also one, twenty-four-inch diameter telephone utility manhole located within Saltzman Avenue also in close proximity to the tank field.

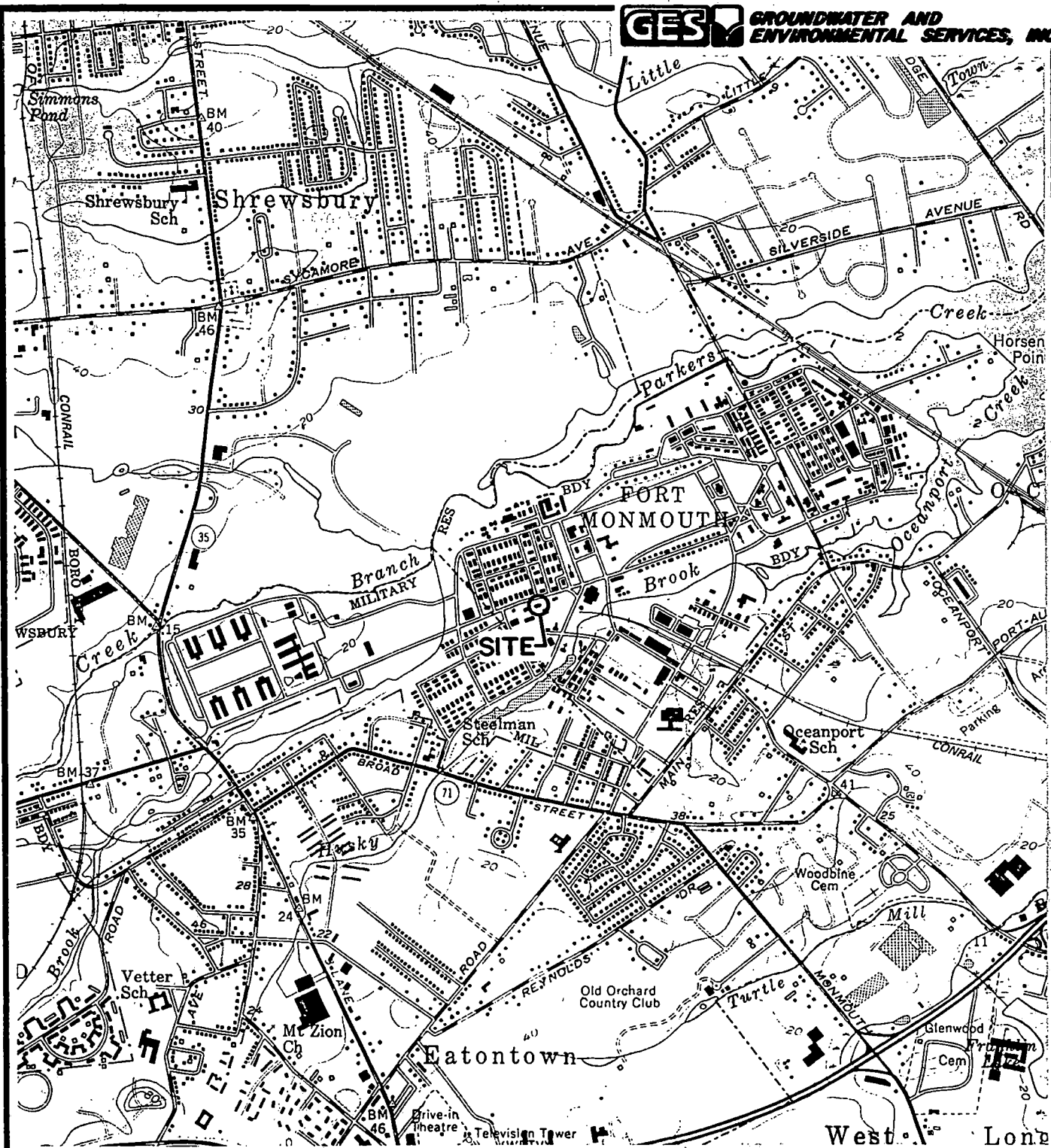
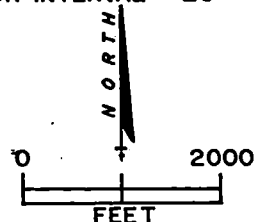
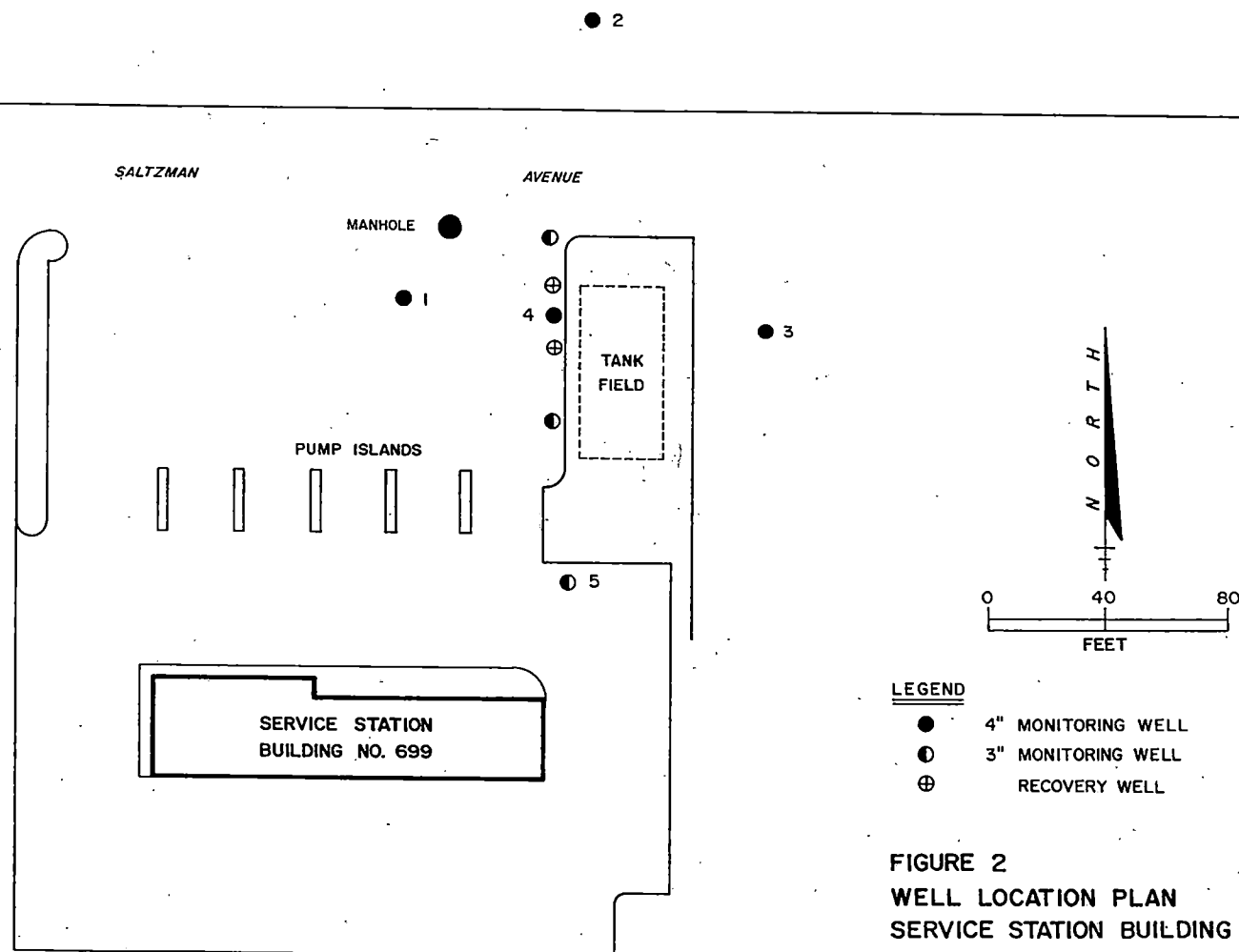


FIGURE 1
SITE LOCATION
SERVICE STATION BUILDING NO. 699
SALTZMAN AVENUE
FORT MONMOUTH, NEW JERSEY

SOURCE: USGS 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE 1954
LONG BRANCH, NEW JERSEY
CONTOUR INTERVAL = 20'





LEGEND

- 4" MONITORING WELL
- ⊙ 3" MONITORING WELL
- ⊕ RECOVERY WELL

FIGURE 2
WELL LOCATION PLAN
SERVICE STATION BUILDING NO. 699
SALTZMAN AVENUE
FORT MONMOUTH, NEW JERSEY



3.0 PURPOSE AND SCOPE OF SERVICES:

3.1 PURPOSE

The purpose of the one week pilot study was to determine the possible magnitude and recoverability of the free-phase product present floating atop the water table in the vicinity of the existing monitoring wells.

The pilot test would determine if passive recovery of free-phase gasoline product was feasible, and based on the amount of free-phase product recovered, if future water table depression measures would be required to enhance free-product recovery. Based on the data collected from this study, GES would recommend the most cost-efficient and technically effective remedial program.

The purpose of the Phase One Investigation was to determine the possible horizontal extent of the free and dissolved-phase product plume onsite. This would be accomplished through the installation of four, groundwater monitoring wells. These wells would be tested to determine the presence of free-phase product or, the degree of groundwater impact with regard to the chemical components of gasoline that readily dissolve in the groundwater. Typical gasoline indicator compounds include Benzene, Toluene, Ethylbenzene and Xylenes (BTEX). According to the New Jersey Department Of Environmental Protection (NJDEP) Underground Storage Tank testing parameters these wells would also be tested for octane booster additive compounds which include Methyl tertiary butyl ether (MTBE) and Tertiary butyl alcohol (TBA).



3.2 SCOPE OF SERVICES

To accomplish the objectives of the investigation, the following scope of services was performed:

3.2.1 Free Phase Pilot Study

On October 25, 1989, GES deployed one shallow well Scavenger pump and one float-type Scavenger pump, into an already existing, on site 3" monitoring. The majority of available free-phase product recovery equipment is currently designed for four-inch diameter or larger wells. As such GES modified an older free-product recovery pump to fit into the existing monitoring wells. In order to deploy additional pumps to enhance free-product recovery, GES proposed to install two additional 4" recovery points. On October 27, 1989 two 4" recovery wells were installed to a depth of 8 feet. Installation of the recovery wells were accomplished with the use of a backhoe, under the supervision of a New Jersey licensed well driller. After the wells were allowed to equilibrate, one shallow well Scavenger Pump and a small diameter (4") recovery pump were deployed.

3.2.2 Monitoring Well Installation

The locations of the monitoring wells were selected by a GES hydrogeologist in order to assess the groundwater conditions below the site to determine the possible extent of the free and dissolved-phase gasoline plume. One of these wells, well 4, was placed in front of the tank field in the event that it would later be utilized for water table depression. The monitoring wells were installed at the locations shown in Figure 2. All wells were constructed in accordance with NJDEP monitoring well specifications for unconsolidated formations.



The total depths and screened intervals of the wells were chosen in the field by observing where groundwater was first encountered. The screened intervals for the wells were designed to be 2 feet above and 10 feet below the water level, in order to account for water level fluctuations. The total depth of MW-1 is 15.00 feet below grade. The total depth of MW-2 is 17.00 feet below grade. The total depth of MW-3 is 15 feet below grade and the total depth of MW-4 is 20.00 feet below grade. Well logs, detailing the lithologies recorded from the well construction are presented in Appendix A.

3.2.3 Relative Elevation Survey

On November 7, 1989, GES conducted a relative elevation survey to provide vertical control for the four monitoring wells installed by GES, the survey also included the monitoring wells already present on site. A relative vertical control is required to correlate static water levels measured in the monitoring wells. A known fixed point was chosen as an arbitrary reference point. The reference point is the northeast corner of the tank field, located near Saltzman avenue. Measurements were made of the elevation of the monitoring well casings, relative to the reference point, using an autolevel and standard surveying equipment.

Static liquid levels within the four wells were measured from the elevation of the PVC casing after installation and well development. Relative elevation of liquid levels (including product thickness, if any) were calculated and adjustments were estimated for the density of free product depressing the water table. From this data, an adjusted groundwater contour map was constructed to assess groundwater flow direction.



3.2.4 Groundwater Sampling and Analysis

Collection of groundwater samples for the purpose of laboratory analysis will be performed on all GES site wells that are devoid of gasoline product. Sampling procedures will be conducted according to the NJDEP field procedures manual (February, 1988). The groundwater samples will be analyzed for EPA method 624 modified to include xylenes, MTBE, and TBA using laboratory methods mandated by the NJDEP. Laboratory analytical services for this project will be provided by Lancaster Laboratories, Lancaster, Pennsylvania.



4.0 INVESTIGATIVE FINDINGS

4.1 Free Product Recovery

On October 25, 1989, GES initiated removal of free phase product from the Main Post Gas Station, utilizing an already existing monitoring well and a telephone utility manhole. After recovering only 100 gallons of free product over a twenty-four hour period, GES installed two, 4" recovery points to a depth of 8 feet, in an effort to expedite recovery of free product. After installation, the recovery points were pumped and approximately 1000 gallons of product were removed in a 30 hour period. Subsequent to monitoring well installation, the pumps were deployed in wells 3 and 4 which exhibited the highest accumulations of free-phase product. The pumps are now being moved within the wells which exhibit the highest accumulations of free product to expedite recovery.

At the present time, approximately 2100 gallons of free product has been recovered by GES.

4.2 Subsurface Conditions

Subsurface materials encountered during the installation of MW-1 through MW-4 are detailed on the boring logs presented in Appendix A. At three of the four locations (MW-1, MW-3 and MW-4) the ground surface is underlain by 1 to 2 feet of asphalt, gravel and concrete. At MW-3, the ground surface is underlain by 3 feet of loose unconsolidated fill. This layer consists of a brown silty clay with little fine sand. Sediments of the Hornerstown Marl were found underlying these sediments. The sediments consisted of green (glaucous) to orange brown medium to fine sand mixed with clay. Hornerstown sediments were encountered to the completion depths of all site wells.



4.3 Groundwater Conditions

Static liquid levels within the five monitoring wells were measured from the surveyed points on November 9, 1989. Free product was observed in monitoring wells 1, 3 and 4 ranging from .29 to 2.30 feet in thickness. Relative elevations of the groundwater levels were calculated from the static water levels and relative elevation survey data and adjusted for the presence of free product (if any). A groundwater contour map was constructed from these adjusted levels.

During the collection of the liquid levels, pumping of free product was occurring at MW-4. Therefore, these measurements were not used in constructing the groundwater contour map, due to the lowering of the liquid level created by pumping. Since pumping of free product was occurring at the time of the collection of the liquid levels, the groundwater contour map constructed may not be representative of the shallow groundwater gradient and flow direction. Table 1 presents a summary of the groundwater elevation data. Liquid level data sheets are included in Appendix B.

Figure 3 is the adjusted groundwater contour map constructed from liquid levels measured on October 30, 1989. Based on the comparative liquid level data, the groundwater flow pattern appears to be to the south, southeast towards Husky Brook.

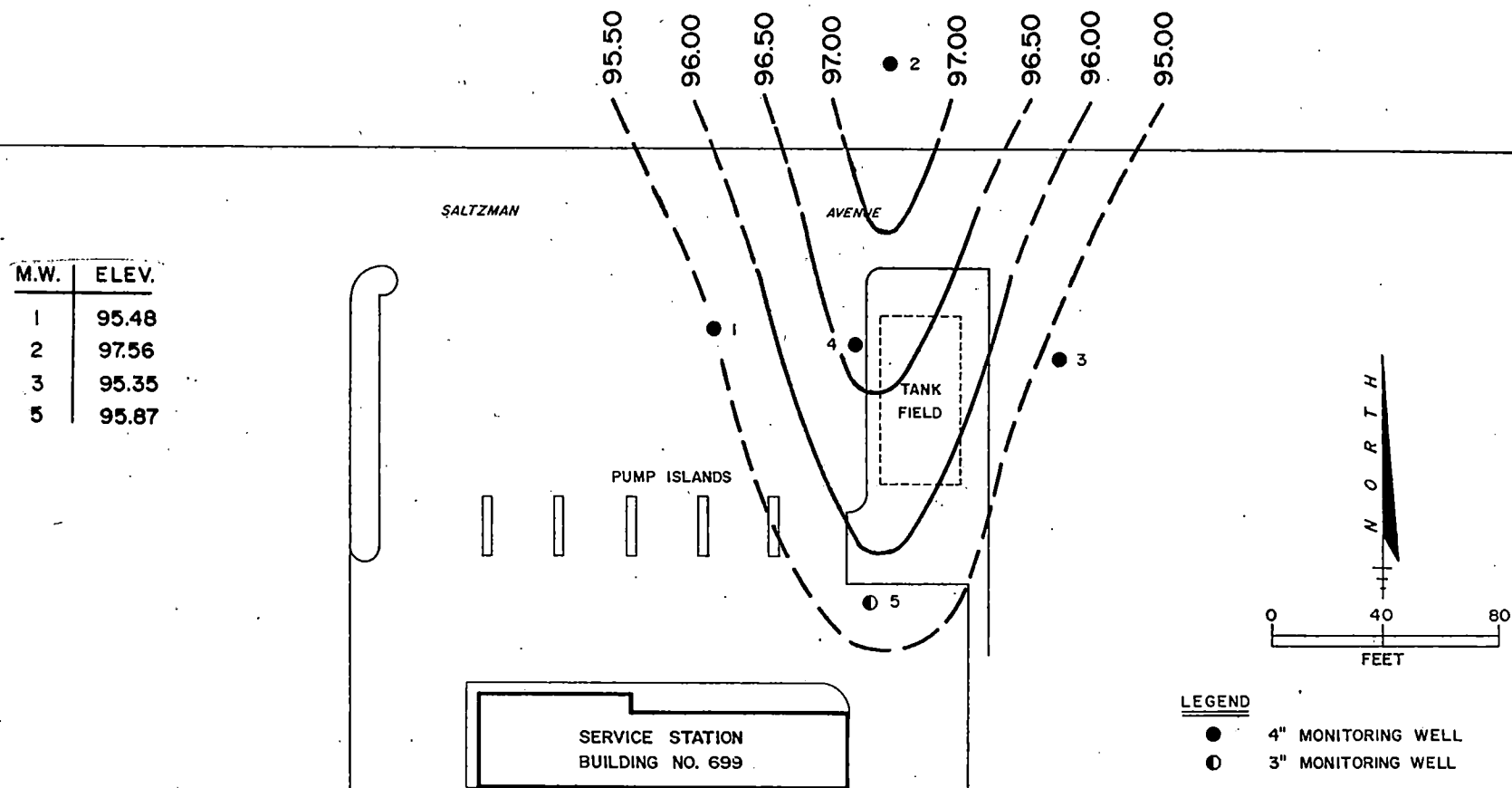


FIGURE 3
GROUNDWATER TABLE GRADIENT MAP (FT.)
9, NOVEMBER 1989
SERVICE STATION BUILDING NO. 699
SALTZMAN AVENUE
FORT MONMOUTH, NEW JERSEY



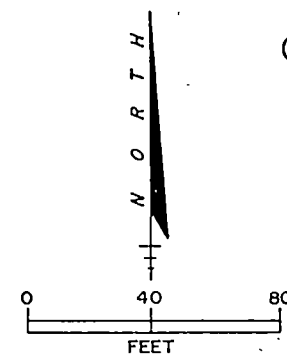
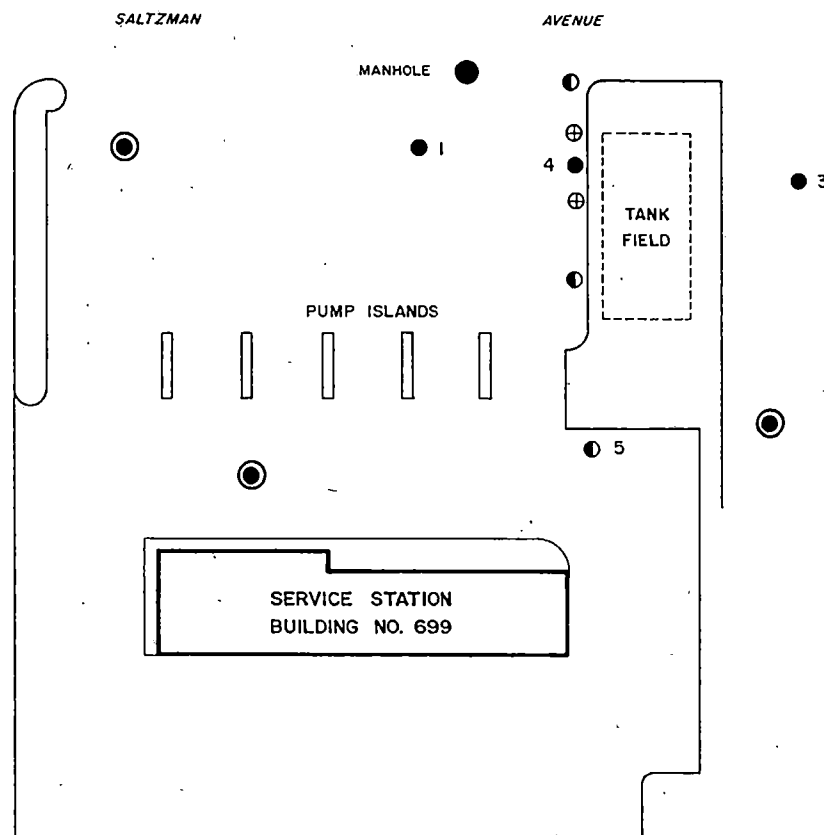
6.0 RECOMMENDATIONS

6.1 Monitoring Well Installation

We recommend that four additional monitoring wells be installed in an effort to determine the horizontal extent of the free and dissolved-phase product plumes. These wells will be installed per the locations which are depicted on Figure 4. Once the wells are installed and determinations are made as to the presence of free-phase product, all non-product bearing wells will be sampled for dissolved hydrocarbon content.

6.2 Free-Phase Product Recovery Discussion

Free-phase product which has been released into the subsurface will vertically saturate the open pore spaces of the subsurface sediments until it reaches a barrier, which in this case is the already saturated sediments of the water table. Once this barrier is encountered, the free-phase product will migrate horizontally on the water table (Figure 5), primarily in the downgradient direction. In some instances, in the event of a catastrophic loss, or on a relatively flat water table, the product will mound and actually saturate some sediments in the upgradient direction of the water table. Essentially, however, free-phase gasoline is a liquid and will conform to the characteristics which govern fluid flow. The free-phase product will follow gravity and the path of least resistance which will be along the water table and into areas of increased permeabilities such as the coarse backfill which is routinely utilized in utility trenches and stormwater and sanitary sewer systems.



LEGEND

- 4" MONITORING WELL
- ⊙ 3" MONITORING WELL
- ⊕ RECOVERY WELL
- ⊙ PROPOSED MONITORING WELL

FIGURE 4
PROPOSED MONITORING WELL LOCATIONS
SERVICE STATION BUILDING NO. 699
SALTZMAN AVENUE
FORT MONMOUTH, NEW JERSEY

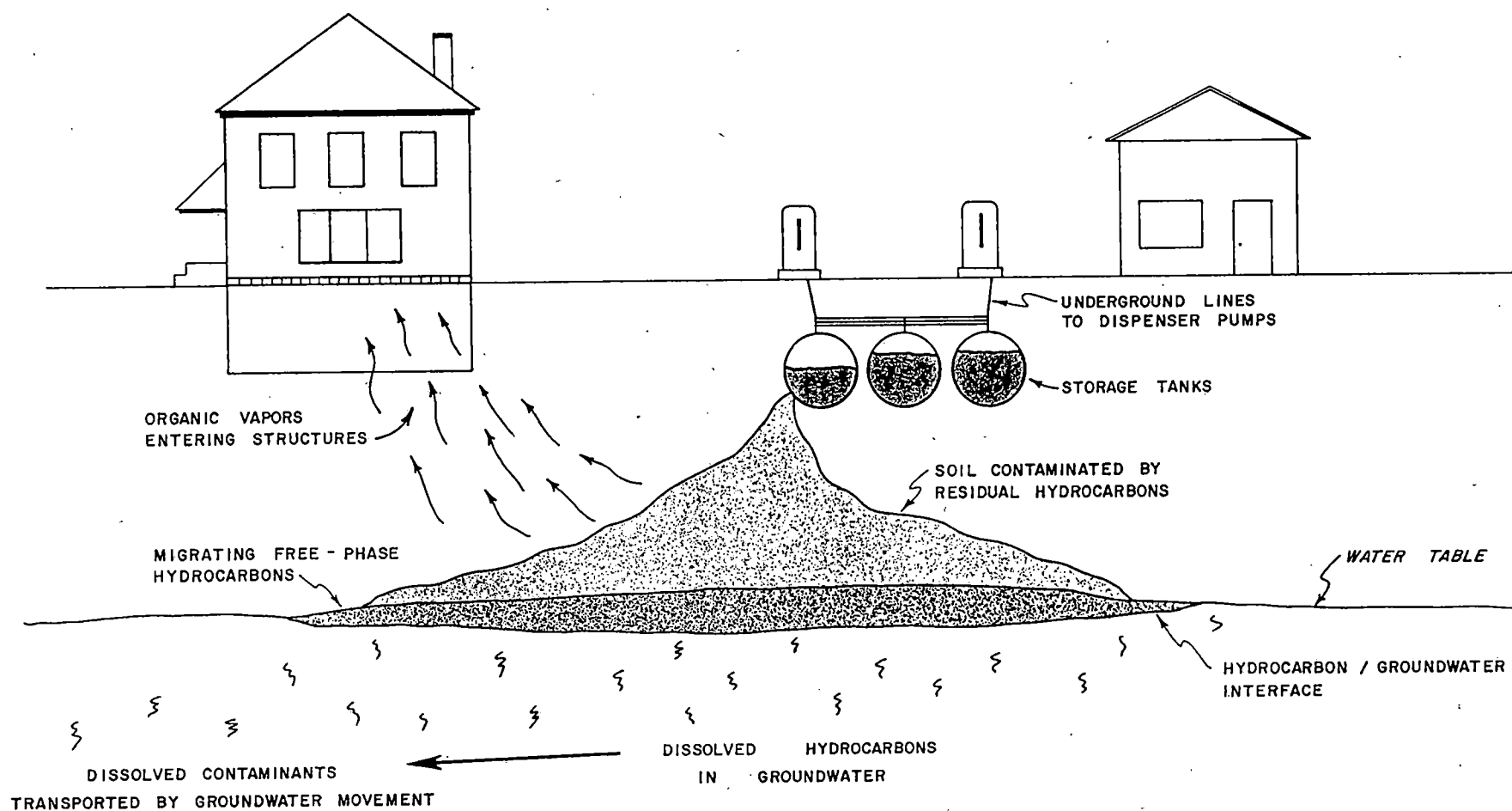


FIGURE 5
TYPICAL IMPACTS OF SUBSURFACE LEAKS
FROM UNDERGROUND TANKS and LINES

The rate of flow of the free-phase product will be governed, taking into account viscosity and product density considerations, the hydraulic conductivity of the underlying sediments. Hydraulic conductivity is defined as the capacity of porous medium to transmit water or fluid. More simply put, it is the measure of how long it takes one particle of water or liquid to move from point A to point B. A very important factor in the rate of movement of liquid is the hydraulic gradient, or how steep the water table is between two points. In formations similar to the one underlying the site, rates of groundwater movement can range from a few feet to a few tens of feet per month. To increase the rate of liquid movement, the gradient or the steepness has to be increased. Or, in order to move liquids through the underlying sediments faster, we have to increase the forces of gravity.

The free-phase product at the site is currently being recovered at the in absence of water table depression. The free-phase product pumps are recovering product which is migrating into the wells under the force of the natural hydraulic gradient at the site. When these pumps remove free-phase product from the well, they create a limited increased gradient which most likely does not extend to a few feet past the well bore. This is the reason that free-phase product recovery is limited at the site. The reason for diminishing product recovery may be due to the fact that when the recovery started, the free-phase product was mounded (Figure 5), which caused an increased hydraulic gradient around the pumping wells. Now that the product thickness, or mound has been reduced, the hydraulic gradient caused by the mounding has flattened.



Based on this information, it would follow that we need to increase the hydraulic gradient at the site in order to enhance free-phase product recovery. This can be accomplished through water table depression. Specifically, if groundwater is pumped from a well a reversed cone is created which surrounds the well bore (Figure 6). This pumping creates an accentuated hydraulic gradient toward the pumped well. The groundwater and any free-phase product floating on top of the groundwater will be accumulated in the well. The water, depending on discharge standards, will be pumped to the sanitary or stormwater sewer systems. There may have to be pre-treatment of the groundwater prior to discharge, also depending upon discharge standards.

Once the free-phase product plume is defined by the next round of monitoring wells, we recommend that a dual-pump (one water pump, one product pump) recovery system be designed and installed at the site to enhance free product recovery.

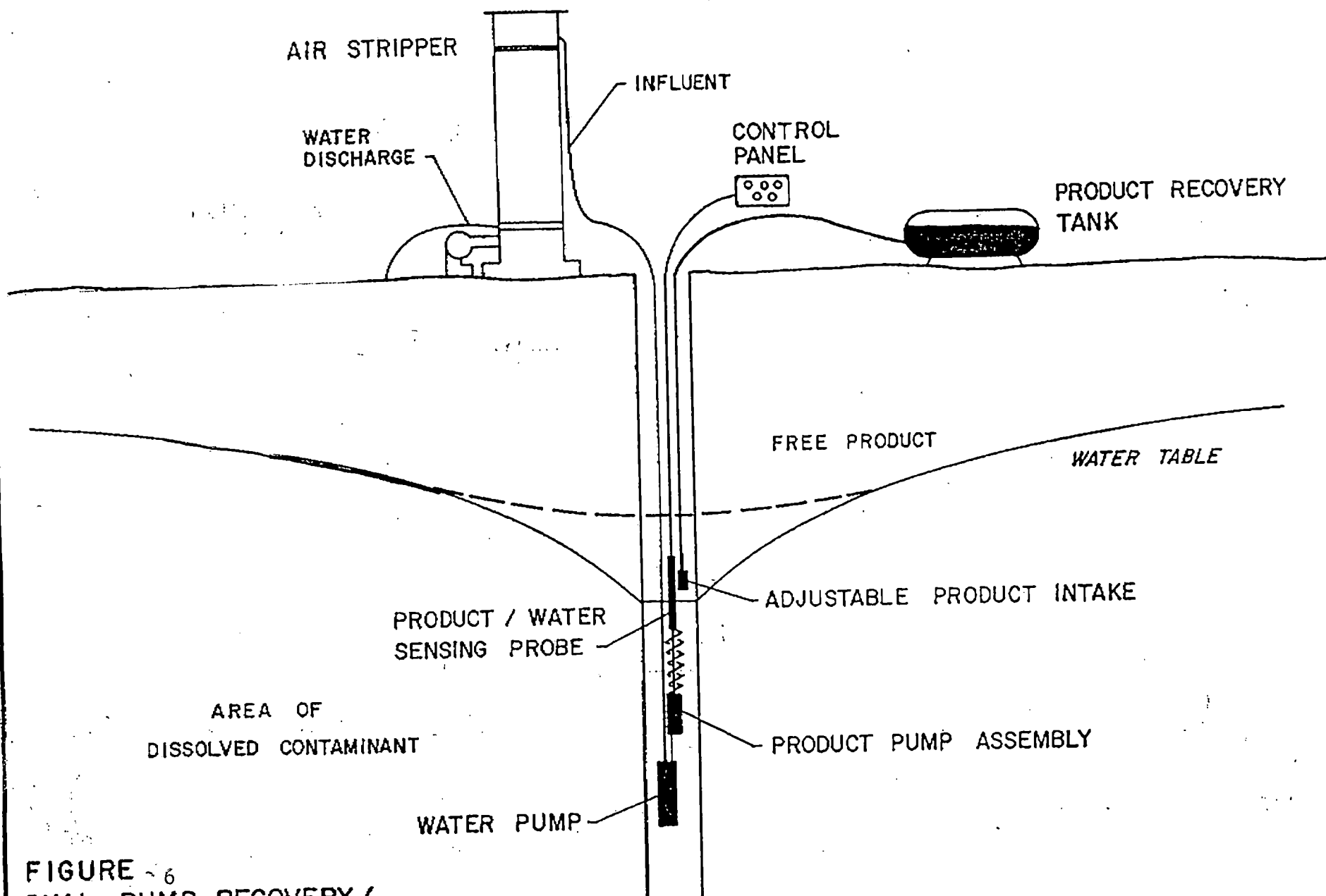


FIGURE 6
DUAL PUMP RECOVERY /
TREATMENT SYSTEM



6.3 Free Product Recovery System

We also recommend that the current free-phase product recovery be continued until December 17 1989. This program would entail the use of three, free-phase product recovery pumps which would be deployed in monitoring wells 3, 4 and one of the 4" recovery points. The pumps would be checked twice daily for the thirty day period. A brief, one-page report will be filed weekly and will serve as an update report. This report will summarize the weeks product recovery situation as well as the progress of the second phase of the investigation. This program will be run for thirty days or until such time that passive free-product recovery is no longer effective. Or if approvals are received to install a dual-pump recovery system.

6.4 Utility Manhole Hydrocarbon Vapor Investigation

Based on the data collected to date, it is apparent that hydrocarbon vapors are present within two telephone utility manholes which are in close proximity to the service station. One manhole is located adjacent to the station property and the second is located in Saltzman Avenue near the Military Branch Finance Building (#659). These two twenty-four inch manholes are connected by a 4" PVC conduit. These manholes extend to below the water table level and are constructed of porous materials which allow the seepage of groundwater. During rainfall, the free-product also accumulates in the manhole located adjacent to the station. We suspect that the product migrates within or along the four-inch conduit which connects the two manholes and this is the reason for the free product in the second manhole.



The accumulated free-product in these manholes creates a source of hydrocarbon vapors. These vapors will migrate along the more permeable conduits and placement trenches. At present, GES is not aware if these conduits are connected to any buildings or structures which may allow for the accumulation of hydrocarbon vapors. We strongly recommend that GES conduct a hydrocarbon vapor investigation to determine the likelihood of impact from these vapors. This investigation would entail review of the telephone conduit run plans to determine where they may connected to any sensitive receptors. Once this information is determined, GES will conduct building vapor investigations using a hand-held, portable organic vapor detector and explosimeter. We would also like to conduct a short-term pilot test at one of the manholes to determine the feasibility of controlling the hydrocarbon vapors directly from the manholes.



6.5 Discharge Permit Procurement

Any discharge water which may be generated by the proposed water table depression program will have to be routed to either the sanitary or stormwater sewer system. A third option would be the re-infiltration of the discharge back into the groundwater system, however, the site water table is too shallow for this to be feasible.

A New Jersey Pollutant Discharge Elimination System (NJPDES) permit will be required for discharge to the stormwater sewer system. This permit is somewhat involved and will take anywhere from three to six months for approval.

Based on discussions and past experience with the Monmouth County Sewer Authority, we think that it is likely that discharge from the proposed recovery system will be allowed into their treatment works. A permit application will have to be filed along with analytical data which documents the concentrations of dissolved contaminants which are likely to be discharged into the system. In anticipation of this requirement, GES collected a discharge water sample during well development activities which was sent to the laboratory for analyses. The resultant data from this analyses should be sufficient such that the sewer authority can approve our application. The analyses results will be completed within ten days.



7.0 TANK/LINE TESTING

Per your request GES solicited bids to test the underground storage tankage and lines at the Post Gas Station. We recieved one, written and two verbal cost estimates. The written estimate is from Tank Test, Inc. (TTI). The bids are detailed in the cost estimate section in Appendix C. It should be noted that TTI informed us that the tank test they proposed actually tests the tightness of the whole system which includes tanks, valves and lines. If a leak is detected, this test will not isolate what section of the system is leaking. In order to test the tanks and lines seperately, the tanks have to be exposed so that the lines can be disconnected from them. This test is more involved and consequently more expensive. TTI has provided two written estimates reflecting both scenarios.



APPENDIX A



TABLE 1
WATER LEVEL MEASUREMENTS
POST MAIN GAS STATION
FORT MONMOUTH, NEW JERSEY

All results in feet

Date	Well No.	Casing Elev.	DIW Elev.	DTP	Water Elev.	Adjusted Water Elev.
09 Nov. 89	1	98.73	3.45	3.16	95.28	95.48
	2	99.59	2.03	----	97.56	97.56
	3	98.74	5.00	2.70	93.74	95.35
	4	98.72	3.97	3.21	94.75	95.28
	5	98.37	2.50	----	95.87	95.87

LIQUID LEVEL DATA SHEET



**Groundwater
& Environmental Services, Inc.**

DATE 9 November 1989

CLIENT E-Systems

TIME 11:15 a.m.

LOCATION Fort Monmouth, NJ

RECORDED BY F. Accorsi

PROJECT No. _____

[illegible]



APPENDIX B



Groundwater
& Environmental Services, Inc.

Sketch Map

Project Fort Monmouth Owner E- Systems, Inc.

Location Fort Monmouth Eatontown Permit No 2923677-1

Well Number 1 Total Depth 15' Diameter 10"

Casing Elevation Water Level: Initial 3.14' Static

Screen Diameter 4" Length 13' Slot Size .020"

Casing Diameter 4" Length 2' Type Sch .40 PVC

Drilling Method Auger Sample Method Continuous Split Spoon

Completion Details Flush mount, cement collar, Inner locking cap

Driller B.L. Myers

Log By J. Gallagher

Date Drilled 11/2/89

Depth (Ft)	Well Constr	HNu ppm	Lithological Description	Comments
1			ASPHALT & BALLAST	
2			SAND Dark Green medium (-) to fine, trace silt.	
3			Orange-tan-brown medium to fine sand, little clay.	PHC odor, slightly moist
4				
5			Dark green fine sand, trace silt alternating with orange brown medium to fine sand.	PHC odor, saturated
6				
7				
8			CLAY Gray-orange, trace fine sand	
9			SAND Orange-brown medium to fine, some clay, trace silt. Changing to Dark green-orange-medium to fine sand, little clay at 11.0'	
10				PHC odor, saturated
11				
12				
13		10		
14				
15			END HOLE	
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				



Groundwater
& Environmental Services, Inc.

Project Fort Monmouth Owner E-Systems, Inc

Location Fort Monmouth Eatontown Permit No 2923678-9

Well Number 2 Total Depth 17' Diameter 10"

Casing Elevation Water Level: Initial 3.14' Static

Screen Diameter 4" Length 15.5' Slot Size .020"

Casing Diameter 4" Length 1.5' Type Sch 40 PVC

Drilling Method Auger Sample Method Split Spoon every 5'

Completion Details Flush mount, cement collar, Inner locking cap

Driller B.L. Myers

Log By J. Gallagher

Date Drilled 11/2/89

Depth (Ft)	Well Constr	HNu ppm	Lithological Description		Comments	
--1--		0	SAND	Dark brown to black, trace clay and silt	Slightly moist, no odor.	
--2--			SAND	Dark green to black fine sand, little silt, trace clay.		
--3--						
--4--						
--5--		0	Dark green-fine, some clay	Saturated		
--6--						
--7--						
--8--						
--9--		0	CLAY	Black, little silt, trace fine sand	Saturated	
--10--						
--11--						
--12--						
--13--		0	END HOLE			
--14--						
--15--						
--16--						
--17--						
--18--						
--19--						
--20--						
--21--						
--22--						
--23--						
--24--						
--25--						

Sketch Map



Groundwater
& Environmental Services, Inc.

Project Fort Monmouth Owner E-Systems, Inc.

Location Fort Monmouth Eatontown Permit No 2923677-1

Well Number 3 Total Depth 15' Diameter 10"

Casing Elevation Water Level: Initial 3.14' Static

Screen Diameter 4" Length 13' Slot Size .020"

Casing Diameter 4" Length 2' Type Sch .40 PVC

Drilling Method Auger Sample Method Split Spoon every 5'

Completion Details Flush mount, with manhole cover, Inner locking cap

Driller B.L. Myers

Log By J. Gallagher

Date Drilled 11/2/89

Sketch Map

Depth (Ft)	Well Constr	HNu ppm	Lithological Description	Comments
1			ASPHALT, BALLAST	Definite PHC odor
2			SAND Dark green, some clay.	
3			SAND Dark green-gray medium to fine little clay	Water encountered @ 4'
4				
5				
6				
7				
8				
9				
10				
11				
12				
13			SAND Dark green-orange med to fine sand, some clay.	
14				
15				
16			END HOLE	
17				
18				
19				
20				
21				
22				
23				
24				
25				



Groundwater
& Environmental Services, Inc.

Sketch Map

Project Fort Monmouth Owner E-System, Inc.

Location Fort Monmouth Eatontown Permit No 2923680-7

Well Number 4 Total Depth 20' Diameter 10"

Casing Elevation Water Level: Initial 3.92' Static

Screen Diameter 4" Length 18' Slot Size .020"

Casing Diameter 4" Length 2' Type Sch .40 PVC

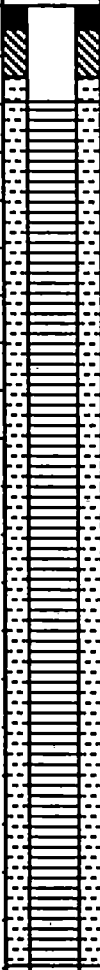
Drilling Method Auger Sample Method Continuous Split Spoon

Completion Details Flush mount, with manhole, Inner locking cap

Driller B.L. Myers

Log By J. Gallagher

Date Drilled 11/2/89

Depth (Ft)	Well Constr	HNu ppm	Lithological Description	Comments
1		185	ASPHALT, BALLAST	
2			SAND Dark green, some clay, odor	PHC odor
3			SAND Dark green, little clay	Saturated
4				
5		170		
6				
7				
8				
9				
10				
11			SAND Dark green to orange, little clay	Saturated
12				
13				
14				
15				
16			CLAY Black, little fine sand	Saturated
17				
18				
19				
20			END HOLE	
21				
22				
23				
24				
25				



APPENDIX C



Phase 2 Investigation/
Interim Remedial Program Costs
Fort Monmouth Service Station
13 November 1989

Monitoring Well Construction

Well Drilling Costs

- 4 Wells @ \$1300/well	\$5200.00
- Decontamination Between Wells	\$ 600.00
- Permits	\$ 60.00

Subtotal \$5860.00

Standard Subcontractor 15% Mark-up \$ 879.00

Total Drilling Costs \$6539.00

Professional Services \$5700.00

- Well Construction Supervision
- Phase 2 - Report Generation
- Recovery System Monitoring
- Recovery System Report Generation
- Discharge Permit Procurement
- Hydrocarbon Vapor Investigation/Pilot Study

Analytical Costs

8 groundwater samples @ \$270.00 \$2160.00
Includes 6 wells samples/one trip/one field blank

Equipment Rental

Free-phase product pumps - 3 @ \$1500/month \$4500

\$18,899

The total estimated cost for the scope of work outlined herein is \$18899. This estimated cost represents a not to exceed dollar figure based on time and materials. As such, it should be emphasized that this estimated cost is a budget figure based on present understanding of project requirements, which is believed sufficient to cover services herein described. However, no guarantee is made or implied. Only those costs incurred will be charged, but the estimate cost will not be exceeded without prior client approval. Invoices will be submitted monthly with payment expected in thirty days.



Tank/Line Testing

Cost Estimates

TankTest Inc. (TTI) - TTI has submitted a written bid. TTI requires several items that GES cannot provide. These items are listed below and should be handled by your organization:

- Page 2, paragraph 3 - The tanks will have to be filled with gas to within a few inches of the top of the fill pipe. Provide an additional 40-50 gallons of gasoline.
- Page 2, paragraph 5 - maintenance personnel will be needed for access to the tanks.

GES can handle the remaining items such as depth to groundwater and direction to the 110 volt power source. In an effort to conserve costs, GES will do daily morning checks of the tank testing progress, and will be on call at our office.

The costs for testing of the tanks by TTI are as follows:

- 6 tanks @ \$600/tank	\$3600.00
- 5% Insurance surcharge	\$180.00
	Subtotal \$3780.00
15% GES Subcontractor Handling Charge	\$ 567.00
Total Tank Testing Charge	\$4347.00
Total Tank Testing Program - TTI	\$4347.00
Fairfield Maintenance Company 6 tanks @ \$850/tank	\$5100.00
15% Subcontractor Handling Charge	\$765.00
	Total \$5865.00
Fuessel Tank Maintenance Services 6 tanks @ \$700/tank	\$4200.00
15% subcontractor Handling Charge	\$630.00
	Total \$4830.00

Tank and Line Testing Separately

The costs and details for separate tank and line testing is detailed on the attached proposal, however, the figure for this testing is as follows:

TTI	\$10,320.0
	15% \$1584.00
Total	\$11,866.00

TankTest Inc.

TTI

Post-It™ brand fax transmittal memo 7671 # of pages > 4

To	Anthony Kull	From	Kurt Garvey
Co.	Groundwater Env. Serv.	Co.	TTI
Dept.		Phone #	985 8800
Fax #	201 530 5884	Fax #	985 9200

Groundwater Environmental Services
437 Newman Springs Road
Lincroft, NJ 07738

Attention: Mr. Anthony Kull

Reference: Leak Testing of Underground Storage Tanks
TTI Proposal 89-409

Dear Mr. Kull:

In response to our recent conversation, TankTest, Inc. is pleased to provide you with this proposal. For your ease of review, the proposal is organized in the following manner:

- Our Understanding of the Task
- Our Approach to the Task
- Timing, Reporting and Costs

I. OUR UNDERSTANDING OF THE TASK

Groundwater Environmental Services, desires the leak testing of six (6) underground storage tanks. Groundwater Environmental Services, wants to know the integrity of the tanks in light of the new federal and state regulations regarding underground tanks. The tanks to be tested are as follows:

<u>Location</u>	<u>Qty</u>	<u>Gallons</u>	<u>Contents</u>
Clients Location Red Bank, New Jersey	6	10,000/ea.	Gasoline

Professional Leak Testing and Tank Management Services

Evesham Corporate Center, 4 East Stow Road, Marlton, New Jersey 08053 (609) 985-8800 FAX (609) 985-9700

II. OUR APPROACH TO THE TASK

TTI will provide a certified tank tester completely furnished with tank testing equipment. The tanks will be leak tested in accordance with Criterion 329 of the National Fire Protection Association.

This procedure known as the Petro Tite test, is an approved procedure of the EPA and the State of New Jersey Department of Environmental Protection. TTI is a tank testing firm listed by the States of New Jersey and New York.

Groundwater Environmental Services, will provide a 110 volt source of electrical power within 100 feet of the test locations. Groundwater Environmental Services, will also arrange to have the tanks filled to within a few inches of the top of the fill pipe, plus have available an extra 40-50 gallons (drum) of the material for use during the test. All truck traffic within 20 feet of the tank's location must be restricted and rerouted because of vibration and potential compressing of the underground tanks. Use of the storage tanks during the testing is not permitted. To insert the test equipment into the tanks, the tanks must be equipped with a 2, 3, or 4 inch opening.

A determination of the effect of ground water on the tanks is required for all tank testing. If no other information is available concerning ground water such as monitoring wells in the proximity of the tanks, soil borings will be made. Borings will be made to a depth equal to the depth of the bottom of the tanks. A determination of the presence of ground water will then be made. If ground water is present, TTI will compensate for the amount of ground water by adjusting Petro Tite monitoring conditions. This procedure is unique in its ability to correct for ground water levels, which if not done will produce false and unacceptable test results.

Groundwater Environmental Services, will provide maintenance personnel, if possible, to work with TTI's staff in providing access to the tank's contents. Of special concern is the isolation of the tanks and the elimination of leaks through manhole flanges, valves and fittings. In the case of fuel oil heating systems, TTI recommends disconnecting and capping off the feed and return lines to avoid a leak due to faulty valves.

We have enclosed Petro Tite Certificates of Completion for TTI's personnel covering advanced and basic training.

TankTest Inc.

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III. TIMING REPORTING AND COSTS

Timing - TTI is prepared to conduct the testing within five (5) days of notice. If necessary TTI can conduct the testing on weekends for a slight premium. The testing of the underground tanks will take approximately three (3) days.

Reporting - A detailed report with a summary of results will be issued within 10 days of the last day of field testing. All test information will be held in confidence and will not be released to anyone without the express and written authorization of Groundwater Environmental Services

Costs - Fees to conduct the leak testing are as follows:

Test (6) - 10,000 Gasoline USTs	@ \$600/UST	\$3,600.00
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Note 1: The fees quoted herein will remain in effect for a period of sixty (60) days from the date of this quotation. After this time period, TTI reserves the right to revise the quotation.

Note 2: Per diem expenses such as mileage, meals and lodging will not be charged.

Note 3: Liquid transfers are charged at the rate of \$75.00 per one thousand gallons, with a minimum charge of \$75.00.

Note 4: All invoices are subject to a 5% Insurance Surcharge. TTI will provide Groundwater Environmental Services, with a Certificate of Insurance if Groundwater Environmental Services, so requests.

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TTI's payment terms are as follows:

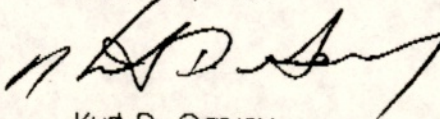
- Prepayment of 50% - \$1,800.00
- Final payment to be paid within ten (10) days of the invoice for testing.
- In the event Groundwater Environmental Services, cancels a scheduled test within 48 hours of the first day of testing, Groundwater Environmental Services, will be invoiced 50% of the expected test fee.
- Any delays caused by Groundwater Environmental Services, or employees of Groundwater Environmental Services, which in turn delays the tank testing, will cause TTI to bill Groundwater Environmental Services, at the rate of \$100./hour plus the fee for the scheduled test.
- Testing of tanks on weekends or at night will incur an added premium charge equal to 10% of the rates quoted.
- TTI charges a minimum of \$700./day plus expenses for professional leak testing services.

Please note acceptance of this proposal by signing the original and returning it to us. The enclosed copy is for your records.

We appreciate the opportunity to provide you with professional leak testing services. If you have any questions, please do not hesitate to contact us at any time.

Respectfully submitted,

TANKTEST, INC.



Kurt D. Garvey
Sales Manager
Tank Management Services

Acknowledged and accepted by Groundwater Environmental Services

Signature

Title

Date

File 2\Prop\89-409
Attachment: Petro Title Certificates

TankTest Inc. TTI

November 13, 1989

Groundwater Environmental Services
437 Newman Springs Road
Lincroft, NJ 07738

Attention: Mr. Anthony Kull

Reference: Underground Storage Tank Evaluation
TTI Proposal No. 89-409-R

Dear Mr. Kull:

In response to your request, TankTest, Inc., is pleased to provide you with this proposal. For your ease of review, the proposal is organized in the following manner:

- Our Understanding of the Task
- Our Approach to the Task
- Timing, Reporting and Costs

I. OUR UNDERSTANDING OF THE TASK

Groundwater Environmental Services desires the evaluation of six (6) underground storage tank systems. The tanks to be evaluated are:

<u>Location</u>	<u>Qty</u>	<u>Gallons</u>	<u>Contents</u>
Service Station Building # 699 Saltzman Avenue Fort Monmouth, New Jersey	6	10,000/ea.	Gasoline

Post-It™ brand fax transmittal memo 7671		# of pages ▶ 6
To: Anthony Kull	From: Kurt Garvey	
Co. Groundwater Environ H	Co. TTI	
Dept.	Phone #	
Fax # 201-530-5884	Fax # 985-9200	

TankTest Inc.

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II. OUR APPROACH TO THE TASK

TTI proposes a phased approach to evaluating the underground storage tank systems.

Phase I - Excavation and isolation of the underground storage tanks.

Phase II - Retesting of the underground storage tanks.

Phase III - Testing of product and vent lines.

Phase I

Excavation and isolation of the Underground Storage Tanks

Using a traemac air hammer, TTI will breakup the existing concrete covering the tank tops.

The concrete will be removed and disposed off site, at an appropriate disposal area.

The earth over the tanks will be removed using a backhoe, exposing the lines and fittings.

The tanks will be isolated by removing or cutting all existing lines.

The tanks will be plugged and all other potential sources or leaks will be sealed (manhead, extra bungs, sensor lines, etc.)

The concrete over the tank tops will be cut, making for a better repair at the conclusion of the testing.

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Phase II

Retesting of the Underground Storage Tank

TTI will provide a certified tank tester completely furnished with tank testing equipment. The tanks will be leak tested in accordance with Criterion 329 of the National Fire Protection Association.

This procedure known as the Petro Tite test, is an approved procedure of the EPA and the State of New Jersey Department of Environmental Protection. TTI is a tank testing firm listed by the States of New Jersey and New York.

Groundwater Environmental Services will provide a 110 volt source of electrical power within 100 feet of the test locations. Groundwater Environmental Services will also arrange to have the tanks filled to within a few inches of the top of the fill pipe, plus have available an extra 40-50 gallons (drum) of the material for use during the test. All truck traffic within 20 feet of the tank's location must be restricted and rerouted because of vibration and potential compressing of the underground tanks. Use of the storage tanks during the testing is not permitted. To insert the test equipment into the tanks, the tanks must be equipped with a 2, 3, or 4 inch opening.

A determination of the effect of ground water on the tanks is required for all tank testing. If no other information is available concerning ground water such as monitoring wells in the proximity of the tanks, soil borings will be made. Borings will be made to a depth equal to the depth of the bottom of the tanks. A determination of the presence of ground water will then be made. If ground water is present, TTI will compensate for the amount of ground water by adjusting Petro Tite monitoring conditions. This procedure is unique in its ability to correct for ground water levels, which if not done will produce false and unacceptable test results.

Enclosed are Petro Tite Certificates of Completion for TTI's certified personnel covering both advanced and basic training.

Phase III

Testing of Product and Vent Lines

TTI will test the lines associated with the underground storage tank system. This will include the product and vent lines. TTI utilizes the Petro Tite lines tester for evaluating underground pipe lines. An air pressure test can also be utilized.

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III. TIMING, REPORTING AND COSTS

Timing - TTI is prepared to conduct this project within five (5) days of notice. If necessary TTI can conduct the project on weekends for a slight premium. The project will take approximately six (6) days.

Reporting - A detailed report with a summary of results will be issued within seven (7) days of the last day of field testing. All test information will be held in confidence and will not be released to anyone without the express and written authorization of Groundwater Environmental Services

Costs - Fees to conduct the project are as follows:

Phase I

Backhoe Est. 3 days	@ \$250/day	\$ 750.00
Concrete Saw Est. 1 day	@ \$150/day	150.00
Traemac Est. 3 days	@ \$510/day	1,530.00
Dumptruck and Trailer Est. 3 days	@ \$150/day	450.00
1 Equipment Operator Est. 24 hours	@ \$55/hour	1,320.00
2 Field Technicians Est. 24 hours	@ \$80/hour	1,920.00

Phase II

Test (6) - 10,000 Gallon Gasoline USTs	@ \$550/UST	\$3,300.00
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Phase III

Test Estimated 18 lines	@ \$50/line	900.00
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Note: (actual number of lines will apply)

ESTIMATED PROJECT TOTAL

\$10,320.00

TankTest Inc.

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- Note 1: Actual time and material charges will apply.
- Note 2: The fees quoted herein will remain in effect for a period of sixty (60) days from the date of this quotation. After this time period, TTI reserves the right to revise the quotation.
- Note 3: Per diem expenses such as mileage, meals and lodging will not be charged.
- Note 4: Liquid transfers are charged at the rate of \$75.00 per one thousand gallons, with a minimum charge of \$75.00.
- Note 5: All invoices are subject to a 5% Insurance Surcharge. TTI will provide Groundwater Environmental Services with a Certificate of Insurance if Groundwater Environmental Services so requests.

TTI's payment terms are as follows:

- Final payment to be paid within 30 days of the invoice for testing.
- In the event Groundwater Environmental Services cancels a scheduled test within 48 hours of the first day of testing, Groundwater Environmental Services will be invoiced 50% of the expected test fee.
- Any delays caused by Groundwater Environmental Services or employees of Groundwater Environmental Services which in turn delays the tank testing, will cause TTI to bill Groundwater Environmental Services at the rate of \$100./hour plus the fee for the scheduled test.
- Testing of tanks on weekends or at night will incur an added premium charge equal to 10% of the rates quoted.
- TTI charges a minimum of \$700./day plus expenses for professional leak testing services.

TankTest Inc.

Groundwater Environmental Services

November 13, 1989

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Please note acceptance of this proposal by signing the original. The enclosed copy is for your records.

We appreciate the opportunity for allowing TTI to provide you with professional tank management services. If you have any questions, please do not hesitate to contact us at any time.

Respectfully submitted,

TankTest, Inc.



Kurt D. Garvey
Sales Manager
Tank Management Services

Acknowledged and accepted by Groundwater Environmental Services

Signature_____
Title_____
Date

KDG/jah

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