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toxic technology services inc.

November 27, 1990
File No. 90-4

Mr. Jack Worthington
Durham Transportation
P.O. Box 948
Rosemead, California 91770

Subject: Phase II Report for
Durham Transportation
19984 Meekland Avenue, Hayward, California

Dear Mr. Worthington:

CTTS, Inc. (Toxic Technology Services) is pleased to present this report on the Phase II investigation at 19984 Meekland Avenue, in the unincorporated area of Alameda County, near Hayward, California.

This report contains the following elements:

Introduction
History of Site Activities
Hydrogeologic Setting
Soil Gas Testing
Trenching Activities
Groundwater Monitoring Well Installation and Sampling
Well Abandonment
Monthly Monitoring of Groundwater Elevations
Quarterly Monitoring Well Sampling and Analysis
Summary and Recommendations

The purpose of this investigation was to determine the lateral and vertical extent of soil and groundwater contamination on the subject site. Additionally, a goal of this phase of work was to investigate potential shallow sources of contamination other than the fuel tanks that were removed in August, 1989.

Groundwater on the subject site is significantly contaminated with petroleum hydrocarbons, particularly Benzene. Soil is contaminated with the same constituents throughout the site beginning at a depth of approximately twenty feet, with shallow contamination around the perimeter of the fuel tank pit. Soil contamination appears to be a result of the migration of the groundwater contamination.

The chemical data indicates that a groundwater remediation program is called for and that soils from the fuel tank

excavations should be remediated.

A remediation plan for the subject site is currently being prepared. This document will be presented to Durham Transportation by the end of December.

A copy of this report should be sent to Ms. Pam Evans of the Alameda County Health Care Services Agency as soon as possible. An extra copy has been provided for this purpose.

It is a pleasure to provide Durham Transportation with these environmental services. If you have any questions, please contact either of the undersigned at (415) 799-1140.

Sincerely,

Lisa A. Polos, REA
Senior Scientist
Toxic Technology Services
CTTS, Inc.

John N. Alt, CEG #1136
Consulting Geologist
Toxic Technology Services
CTTS, Inc.

LAP/JNA/lap

PHASE II REPORT
FOR THE
EVALUATION OF EXTENT OF CONTAMINATION

19984 MEEKLAND AVENUE
HAYWARD, CALIFORNIA

Prepared For:

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INTRODUCTION

The following is the report of the Phase II activities for the evaluation of the lateral and vertical extent of soil and groundwater contamination at 19984 Meekland Avenue, in the unincorporated area of Alameda County, near Hayward, California.

The purpose of this investigation was two fold; to assess the vertical and lateral extent of soil and groundwater contamination and the characterize the contamination with regards to constituents and concentration.

HISTORY OF SITE ACTIVITIES

The subject site is located at the northeast corner of the intersection of Meekland Avenue and Blossom Way in the unincorporated area of Alameda County near the City of Hayward.

According to Mr. Brad Austin, a long-time resident of the area who owns the adjacent property east of the subject site, the subject site was a family run service station in the 1940's. In the 1950's, a petroleum company built a larger station.

Alameda County Building Department files support Mr. Austin's information. Plate 1 is a site plan of how the subject site appeared in May of 1946. This plate is a recreation of the County file map. It appears that the subject site was two parcels, with the house occupying the north side and the service station occupying the south side.

The station had two 1000 gallon fuel tanks located in the southwest region of the site. In the southeast region there was also an old lube rack which contained a sump. The County file contained a blueprint of the sump specifications, which indicated that it was a two-stage system.

The County file also contained a site plan from 1954 describing a proposed service station. Plate 2 is a recreation of this site plan. This proposed station was in fact the layout of the subject site as it existed until demolition in March 1990. A third fuel tank (5000 gallon gasoline) was added in 1972.

A waste oil tank was located behind the service station building. This tank was removed in 1989, along with the three fuel tanks (Plate 3). The 1954 County site plan did not show a waste oil tank in this or any other location. The installation date of this tank is therefore unknown.

It was originally thought that tanks 1 & 2 (Plate 2) were

installed in 1947, but in fact these tanks were installed in approximately 1954.

The County file contained no information on the status of the original fuel tanks and sump from 1946.

Three fuel tanks and one waste oil tank were removed in August of 1989 by Toxic Technology Services. The gas station as built in 1954 was demolished in March of 1990. The site is vacant and was secured with cyclone fence panels. Each panel was chained and locked.

On March 23, 1990, the sump under the washrack on the north side of the subject site was sampled by Lisa A. Polos and John Alt of Toxic Technology Services.

Two samples were collected; one of the supernatant and one of the heavy bottom sludge. All samples were collected by dipping a glass jar into the appropriate layer.

The supernatant was a clear liquid, thin in consistency and had a petroleum hydrocarbon odor. The bottom sludge was a black, thick semi-solid, that had a stronger odor of petroleum hydrocarbon than the supernatant. After the sludge layer had been disturbed by sample collection, a sewage odor was detectable.

The supernatant was composed of predominately heavy oil and white spirits. There was also notable amounts of Benzene, Toluene and Xylenes (BTX).

White Spirits are defined in the 10th edition of the Merck Index as a petroleum distillate known as Stoddard solvent. Stoddard is a common degreasing solvent and is not atypical for the automotive industry.

The bottom sludge contained higher concentrations of the same basic constituents as the supernatant.

Other compounds were found in both the supernatant and the sludge. These compounds are typically found in the automotive industry, but in this case are not in concentrations high enough to raise a concern.

DDT, a chlorinated pesticide, was found in both phases of the sump contents. This is an unusual compound to find on this site, and appears to be an isolated incident. Concentrations of DDT found in the sump were not high enough to deem the waste a pesticide waste.

The sump contents are a hazardous waste by virtue of the petroleum hydrocarbon constituents and not the level of pesticides, specific semi-volatile organics or heavy metals. The

certified TMA/Norcal report was presented in the July 1, 1990 progress report and is on file with Alameda County.

On July 12, 1990, Erickson, Inc. of Richmond, California was on-site to dispose of the contents of the sump located on the north side of the subject site (Plate 3). The operation was supervised by Lisa Polos of Toxic Technology Services.

Erickson, Inc, is a California licensed hazardous waste hauler. Based on analytical data performed on the sump contents in March, 1990, Erickson arranged for the waste to be sent to Gibson Oil for recycling. The chemical data was reported in Progress Report #1, dated July 2, 1990.

Erickson personnel vacuumed out the sump waste, then pressure cleaned the concrete sump with hot water supplied by the local municipal system and a detergent called Zepride E. The sump and the piping between the concrete stages were cleaned until the rinse water stood clear in both sides of the sump. Approximately 600 gallons of waste and rinse water were hauled away.

The waste oil line/sump leading to the waste oil tank (Plate 3) was also scheduled to be drained and cleaned, however, upon inspection, the piping leading to the waste oil tank excavation was so deteriorated that pressure rinsing could have lead to contaminating the soil around the line and in the waste oil tank excavation. The loose piping was removed and left on-site for proper cleaning and disposal at a later date. The waste oil trap and remaining piping was left in place.

On April 6, 1990 a Work Plan and a Health and Safety Plan were prepared by CTTS, Inc. and reviewed by Durham Transportation. These documents were received by the Alameda County Health Care Services Agency, Hazardous Materials Division on April 17, 1990.

Verbal correspondence with Ms. Pam Evans of the above mentioned agency indicated that initial work plan tasks could proceed upon the receipt of some minor clarifications. Ms. Evans also requested that additional information be provided before any deep trenching takes place on the site.

This conversation was confirmed in writing in a letter dated April 20, 1990 to Lisa Polos of CTTS, Inc. from Mr. Ed Howell, Section Chief.

On April 27, 1990, Ms. Polos responded to issues in this letter pertaining specifically to soil gas testing, so that these tasks could commence.

Based on data that was gathered between April and August, the Work Plan and Health and Safety Plan were amended. This

amendment is dated August 6, 1990 and is on file with Alameda County.

Copies of the Work Plan, Health and Safety Plan the Amendment and the additional correspondence are available upon request.

On September 17, 1990, Pam Evans of Alameda County informed Lisa Polos of CTTS, Inc. that the Meekland Avenue site had apparently been vandalized. Ms. Evans had been contacted by Chief James Ferdinand of the Eden Fire District.

According to Chief Ferdinand, a group of men in a flat bed truck were seen, by Eden Fire District personnel, disassembling the temporary fence on the subject site on or about September 13, 1990. Fire District personnel thought that the site remediation had been completed and called Alameda County for verification of site sign-off. It was then realized that the fence had been stolen.

On September 18, 1990, Lisa Polos of CTTS, Inc. determined that the only item missing was the temporary fencing. Jack Worthington of Durham Transportation was notified. Oakland Fence was also contacted that day to arrange for a new fence.

Before the installation of permanent fencing, the gasoline dispensers that were awaiting disposal, were stolen. The new fence was installed in the beginning of October.

HYDROGEOLOGIC SETTING

The subject site is underlain by generally fine-grained alluvial fan and flood plain deposits derived from the hills located approximately two miles east of the site. The deposits are late Quaternary in age and overlie rock of the Franciscan Assemblage at an unknown but probably great depth.

Three to four feet of fill generally overlies the Quaternary deposits at the site. The fill consists primarily of a clayey to sandy gravel.

The native deposits underlying the fill consist primarily of silty clay to clayey silt with minor and varying amounts of sand and gravel. Lenses of silty sand and gravel, approximately 3 to 4 inches thick, were encountered in the two borings. No other significant bedding or stratification of the units was observed to the depth explored (45 feet) and the deposits are considered to be homogeneous for hydrologic considerations.

SOIL GAS TESTING

NET Pacific, Inc., of Santa Rosa, California was contracted to perform soil gas testing as outlined in the work plan of April 6, 1990, which is on file with Alameda County. Testing was conducted from April 30, 1990 through May 3, 1990.

The soil gas results were used as a qualitative indicator of areas of contamination. Analyses requested were:

- Petroleum Hydrocarbons (gasoline) which was measured as Hexane,
- Volatile Halogenated Hydrocarbons by Method 8010
- Benzene, Toluene, Ethylbenzene and Xylenes by Method 8020

Samples were collected by pounding a 1 inch probe into the desired depth with a pneumatic hammer. The probe allowed for a sampling interval of up to 6 feet. A vacuum was drawn on each sampling hole and a soil vapor sample collected in an evacuated glass globe. Before the sampling probe was pulled out, the vapor was monitored with a portable vapor analyzer. Samples were kept on ice until analysis.

Analysis was conducted on-site via a mobile laboratory. The mobile lab is equipped with two gas chromatographs and three detectors; Flame Ionization Detector (FID), Hall Detector and a Photoionization Detector. Analytical standard curves and sample duplicates were run throughout the testing period.

After the sample was taken, each sampling hole was filled with concrete grout. A permit from Zone 7 was obtained for this work. A copy of this permit is presented under Appendix C.

Plate 4 shows the soil gas testing locations. Volatile halogenated hydrocarbon levels were non-detected for all soil gas locations tested. Plate 4 also presents petroleum hydrocarbon values plotted for each location. Results indicate pockets of contamination, but give no clear-cut source or plume.

A complete analytical report from NET Pacific is presented as Appendix D of Progress Report #1, dated July 2, 1990.

TRENCHING ACTIVITIES

On June 20, 1990, shallow exploratory trenching activities were conducted. This was prompted by additional information regarding the site. The 1946 site plan (Plate 1) shows a lube garage containing a sump in the southeast corner of the property and two 1000 gallon tanks in the southwest quadrant of the site.

Several unsuccessful attempts were made to get a soil gas sample in the southwest part of the site, where the tanks were located. At approximately six feet below grade, the probe struck an object or objects that were impenetrable.

Plate 5 shows the locations of the shallow trenches. No trench was greater than a depth of 5 feet. No staining or odor was detected from any of the trenches, so soils were put back in the respective trench.

Test Pit #1 was a 5 foot deep cut through the area where the old gasoline tanks were located as per the 1946 site plan (Plate 1). No tanks were located. The pit had been backfilled with construction debris presumably from the demolition of the original service station.

Test Pit #2 was a 5 foot deep cut in the southeast corner of the site. According to the 1946 site plans, this was the location of a lube garage which contained a two-stage, concrete sump. No sign of a sump was found in this trench.

Test Pit #3 was a 5 foot deep cut in the southeast corner of the site, approximately 5 feet south of Trench #2. In this trench was a concrete basin, thought to be one stage of the old two stage sump. A clay sewer pipe also ran north/south in this trench. The sewer pipe was dry and had not been used in some time. Attempts made to locate the other stage of the sump were unsuccessful. It is assumed that it has been removed.

Test Pit #4 was a three foot deep cut on the west side of the concrete sump located on the north side of the property. This sump is from the service station built sometime after 1954. The purpose of this trench was to assess whether or not there are any lines leading from the sump to the west. No such lines were located. The soil in this area was composed of a top layer of fill, approximately a foot deep, the remainder being previously undisturbed native soil.

In summary, results from the shallow trenching activities indicate that the original gasoline tanks from 1946 had been removed and the pit filled with construction rubble. The original sump in the southeast corner of the site was found as evidenced by the concrete basin and the adjacent sewer pipe. This sump apparently was cleaned out and filled in with dirt.

None of the areas trenched had notable visible contamination or odor.

On September 4, 1990, shallow trenches were excavated in specific locations on the subject site as per the amendment to the Phase II Plan (Plate 6). A minimum of one soil sample was taken from each trench. No significant contamination was found in any of

the trenches.

Test Pits #5-#7 were excavated where the hydraulic lifts were located. The purpose of these excavations was to investigate shallow contamination from hydraulic oil. One sample from each trench was taken at the location of the bottom of the trench. No odor or staining was found in any of these trenches. Samples were analyzed for Total Oil and Grease, Total Petroleum Hydrocarbons as Diesel and Motor Oil and Stoddard Solvent. Data for Test Pits #5 and #6 were none detected. Data for Test Pit #7 are reported in Table 1.

Test Pit #8 was located through the waste oil sump that lead to the waste oil tank. At a depth of eight feet, a slight odor was detected. Samples were collected at depths of 2.5' and 8.0' and analyzed for Total Oil and Grease, Volatile Chlorinated Hydrocarbons, Total Petroleum Hydrocarbons as Gasoline, Diesel and Motor Oil, BTEX and Stoddard Solvent.

Test Pit #9 was on the east side of the washrack sump. The purpose of this trench was to investigate the outlet of the sump. The sump emptied into an old sewer line. There was no odor or staining detected. A soil sample was collected at 7.0' and analyzed for Total Petroleum Hydrocarbons as Gasoline, Diesel, Stoddard Solvent and BTEX.

Test Pit #10 was through the center of the waste oil tank excavation. The purpose of this trench was to confirm that this area is not a shallow source of contamination. A sample was taken at 7.5' and analyzed for Total Oil and Grease,Volatile Chlorinated Hydrocarbons, Total Petroleum Hydrocarbons as Gasoline, Diesel and Motor Oil, BTEX and Stoddard Solvent.

Test Pit #11 was between monitoring wells MW-3 and MW-6. A trench was placed in this location because a high soil gas reading was obtained in this area. The possibility of a shallow source of contamination had to be investigated. One sample was taken at a depth of 7.5' and analyzed for Total Oil and Grease, Volatile Chlorinated Hydrocarbons, Total Petroleum Hydrocarbons as Gasoline, Diesel and Motor Oil, BTEX and Stoddard Solvent. A slight odor was detected in this trench between 4' and 8'.

All test pits were backfilled with the respective soils that had been excavated. Appendix A presents logs for all test pits excavated. Table 1 is a summary of positive results from test pit sampling. Appendix B presents the laboratory reports for the test pit sampling.

GROUNDWATER MONITORING WELL INSTALLATION AND SAMPLING

On November 28, 1989, two groundwater monitoring wells,

identified as MW-3 and MW-4, were installed at the subject site by HEW Drilling, Inc., using a CME 55 drill rig with hollow stem augers. Mr. John Alt, CEG and Ms. Lisa Polos supervised the installation. The locations of the wells are shown on Plate 2. Augers were steam cleaned prior to the drilling of the wells. A standard split barrel sampler with 2-5/8" OD and 2" ID was used for soil sampling. It had the capacity for obtaining an 18 inch sample using three six-inch long brass liners. Prior to obtaining each sample, the disassembled sampler and the brass liners were washed in a solution of TSP in water. Each piece was triple rinsed, with the final rinse being distilled water.

A boring log was prepared for each well. Copies of these logs are presented in Appendix C. Blow counts were recorded for each six inches of penetration of the sampler, and the time at which each sample was taken was noted on the field log. Soil samples were collected at five foot intervals during the drilling. The lower-most sample liner (next to the shoe) was retained for any required chemical analysis. The soil exposed in the ends of the tube was quickly noted, and the ends were then sealed with teflon tape and snug-fitting plastic caps. The edges of the caps were sealed with plastic tape. The cap was labeled with the sample number, depth, date, and project name. The soil samples were placed in a chilled ice chest as they were collected, and selected soil samples were marked to be sent to TMA/Norcal, a State certified hazardous waste laboratory for analysis. The second and third samples were inspected and used for the sample description.

Two-inch (ID) Schedule 40 PVC pipe was used for the well casings. Each well was screened with slotted (0.020 inch openings) casings in the lower 15 feet of the well and capped at the bottom with a slip on cap. The 8-inch diameter borings were filled in the annular space between the casing and bore wall with clean #3 sand to a depth of approximately 2 feet above the top of the slotted casing. Above the sand-pack, at least two feet of bentonite pellets was used as a seal, and the remainder of the annulus was filled with cement grout. Monitoring Well Installation Reports with more detailed information on each of the well installations were recorded and are in the files.

The units encountered in the borings for monitoring wells MW-3 and MW-4 are shown on the boring logs (Appendix B). The soil samples collected from MW-3 had no odor above a depth of 20 feet The sample at 20 feet had a slight solvent odor. The sample was moist and was probably within the capillary fringe of the groundwater table. The sample at a depth of 25 feet had a very strong odor of gasoline. Below 25 feet the samples were from the saturated zone and had a slight odor of gasoline. The sample at 25 feet is probably within the zone of groundwater fluctuation and the contamination in the soil was deposited during a period of a higher groundwater level.

The soil samples from MW-4 had a slight odor of gasoline from a depth of 20 feet to the bottom of the boring. A very slight odor was detected in the sample from a depth of 15 feet.

During the well installation, Mr. Tom Peacock of the Alameda County Health Agency, Hazardous Materials Division, visited the site. He requested that a water sample be taken from the well that was to be abandoned and submitted for chemical analysis.

On November 29, 1989, Mr. John Alt and Ms. Lisa Polos developed the wells by evacuating 15 gallons of water from each well by bailing prior to sampling. After the wells were developed, groundwater samples were collected using separate three-foot disposable bailers.

The first sample from each well was retrieved from the surface of the water, and the contents of the bailer were inspected to assess whether or not there was any floating product present. Groundwater from both wells had odor and sheen, but both were more noticeable in MW-3. Sample vials and jars, provided by the laboratory, were filled from the bailer.

MW-1, which was installed in 1986, was not sampled at this time, however, upon opening the well cap and checking the water level, a strong odor was detected. A sheen was observed on the water purged from this well in August 1989.

In August and October, 1990, three additional monitoring wells were installed. These are identified as MW-5, MW-6 and MW-7 (Plate 6). These wells were placed to a depth of 45 feet and were installed, sampled and developed in a manner identical to MW-3 and MW-4, with one exception; the newer wells are four inches in diameter. This was done with the intention of using these wells for groundwater extraction during the remediation phase.

During the drilling of MW-7, strong hydrocarbon odor and sheen were noted on the auger flights. This occurred after the drilling was completed to 45' and the auger was being withdrawn from the bore hole. A sample of the soil from the auger flights was taken and analyzed. Results are reported on Table 2. It is thought that this contamination was being brought up from the watertable and did not represent shallow soil contamination.

Additionally, on October 1, 1990, a boring, identified as B-1, was placed to a depth of 25' in the area where the fuel tanks from the 1940's were located (Plate 6). This was done to evaluate this area as a shallow source of contamination. Soil samples were taken every 5'. Samples from 5', 15' and 25' were sent to NET laboratory for analysis. After sample collection, the bore hole was filled with concrete to grade as required by

Zone 7.

The highest levels of contamination were found in the soil borings from MW-5, Boring B-1, starting at a depth of approximately 20'. The sample taken from the MW-7 auger flights also showed significant hydrocarbon contamination, but as stated earlier, it appears that this was a result of the groundwater contamination as the MW-7 boring profile indicated much lower levels of contamination.

Appendix C presents boring logs for all monitoring wells installed during this investigation and Boring B-1. Table 2 summarizes the chemical data from soil samples analyzed at the time of installation. A complete data package is presented as Appendix D.

WELL ABANDONMENT

A water well was located at the northeast corner of the building and connected to a holding tank inside the building by a galvanized surface pipe. Previous attempts to activate the pump to sample the well were not successful.

Alameda County Public Works Department has no record of a well at the subject site prior to the 1986 installation of one monitoring well by Applied Geosystems. No data were available regarding the total depth, screened interval or condition of the well. Because of the potential that the well could act as a conduit for downward migration of the near surface contamination, it was decided that the well should be grouted and abandoned.

The grouting was done on December 12, 1989 by HEW Drilling, Inc.

The well head and surface piping was removed and the pump was then taken out of the well. The well was four inches in diameter with a PVC casing. The total depth of the well was measured at 67.9 feet to the ground surface. The top of the casing was approximately one foot below the ground surface.
The depth to standing water in the well was measured at 29.9 feet from the ground surface. The well was purged by bailing and a water sample collected. The initial bailer of water had no odor, sheen or product. After bailing approximately 2 gallons, a solvent odor was detected. The odor increased in intensity as more water was extracted from the well, however, the samples collected had no noticeable odor. The sample was shipped in a cooled ice chest to TMA/Norcal and analyzed for Volatile Halogenated Hydrocarbons, Total Petroleum Hydrocarbons as gasoline and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX). Results are as follows:

Benzene	200	ug/L (ppb)

Toluene	18	ug/L
Ethylbenzene	24	ug/L
Xylenes	34	ug/L
1,2-Dichloroethane	1.5	ug/L
Gasoline	1.8	mg/L (ppm)

The well was pressured grouted using a tremie pipe starting from the bottom and continuing upward. The grout mix was one 90lb. sack of Lonestar Cement Type I & II per five gallons of water. A total of 22 sacks of cement were used to grout the well. The level of the cement grout was brought up to where it overflowed the top of the casing.

MONTHLY MONITORING OF GROUNDWATER ELEVATIONS

As stated in previous reports, the groundwater gradient at the site is essentially flat. The elevation of the groundwater has been measured in the monitoring wells on-site by surveying the elevation of the top of the casing and measuring the depth to groundwater using an electronic probe. The elevations are based on Alameda County benchmark BLO-MEEK located in the middle of the intersection of Blossom Way and Meekland Avenue. The depth to groundwater was measured December of 1989 and January of 1990.

Measurements have been taken monthly since March of 1990. The data are presented on Table 1. They indicate a very low westward to northwestward gradient. The elevations of groundwater in the three wells are within 0.1 foot and are about at the level of error in the measuring techniques. Therefore an exact gradient was not calculated.

The data also indicates that the groundwater table rose approximately 0.9 feet over the first four months of measurement, then flattened out. Characteristic with the dry season, the groundwater table is now receding.

Table 3 presents the groundwater elevations over the course of this investigation.

QUARTERLY MONITORING WELL SAMPLING AND ANALYSIS

Groundwater monitoring well sampling has taken place on a quarterly basis. Sampling dates are:

- November, 1989 (MW-3, MW-4)
- March, 1990 (MW-1, MW-3, MW-4)
- July, 1990 (MW-1, MW-3, MW-4)
- October, 1990 (MW-1, MW-3, MW-4, MW-5, MW-6, MW-7)

Well locations are presented under Plate 6. Each well was purged prior to sampling and samples were collected using a new, disposable, plastic bailer for each well.

The first sample from each well was retrieved from the surface of the water, and the contents of the bailer were inspected to assess whether or not there was any floating product present.

Collected samples were put into a cooled ice chest and transported to the analytical laboratory for analysis.

Floating product was found in MW-1 during the July and October samplings. In July, the floating product measured approximately 0.05 feet and in October, approximately 0.1 feet.

In summary, contaminant levels of Benzene, Toluene and 1,2-Dichloroethane have exceeded regulatory limits consistently during the sampling period. Gasoline is also a persistent problem.

The State Action Level for Toluene in drinking water is 100 ppb (0.1 ppm). The Maximum Contaminant Level allowed in drinking water for Benzene is 1 ppb (0.001 ppm) and for 1,2-Dichloroethane is 0.5 ppb (0.0005 ppm).

A complete analytical report of the groundwater monitoring well data is presented under Appendix E. Table 4 is a summary of analytical data from the groundwater samples collected.

SUMMARY AND RECOMMENDATIONS

Through the course of this Phase II investigation, the data indicates that the subject site contains significant groundwater contamination, mainly Benzene. The soil appears to be contaminated sporadically throughout the site starting at an approximate depth of twenty feet. We feel that this soil contamination is a result primarily of the groundwater contamination migrating through the site.

Potential shallow sources of contamination were investigated. It

appears that the primary source of contamination was the three fuel tanks that were removed in 1989. There is evidence of shallow soil contamination around the north and west walls of the excavation.

The soil that was excavated from the tank removals in 1989 and shallow soil from the excavation mentioned above should be remediated.

It is our recommendation that no other soil remediation be performed and that the proper groundwater remediation technology will over time remediate the soil.

We recommend that no further subsurface is necessary prior to the preparation of the Remediation Plan. The Remediation Plan will be prepared and delivered to you in ~~December.~~ January - per Lisa Polos

TABLE 1
SUMMARY OF RESULTS FROM
TEST PIT SAMPLING

Test Pit #7 - 9.0'	
Oil and Grease	57 mg/kg (ppm)
Total Petroleum Hydrocarbons (Motor Oil)	16 mg/kg (ppm)
Test Pit #8 - 2.5'	
Toluene	69 ug/kg (ppb)
Total Petroleum Hydrocarbons (Motor Oil)	20 mg/kg (ppm)
Test Pit #8 - 8.0'	
Toluene	17 ug/kg (ppb)
Test Pit #9 - 7.0'	
Toluene	24 ug/kg (ppb)
Test Pit #10 - 7.5'	
Toluene	5 ug/kg (ppb)
Test Pit #11 - 7.5'	
Toluene	34 ug/kg (ppb)

TABLE 2
ANALYTICAL SUMMARY OF SOIL BORING SAMPLES

MW-3 is located at the northwest corner of the subject site.

20.5':	Trichloroethene	200 ug/kg (ppb)
	Benzene	130 ug/kg
	Toluene	22 ug/kg
25.5'	Benzene	440 ug/kg
	Toluene	480 ug/kg
	Ethylbenzene	200 ug/kg
	Xylenes	930 ug/kg
	Gasoline	52 ug/g (ppm)
30.5'	Benzene	540 ug/kg
	Toluene	188 ug/kg
	Ethylbenzene	210 ug/kg
	Xylenes	400 ug/kg
	Gasoline	23 ug/g

MW-4 is located at the southwest corner of the subject site.

15.5'	Benzene	20 ug/kg (ppb)
	Toluene	19 ug/kg
	Ethylbenzene	13 ug/kg
20.5'	Benzene	75 ug/kg
	Toluene	20 ug/kg
	Ethylbenzene	26 ug/kg
	Xylenes	15 ug/kg

MW-5 is located approximately 15' northwest of MW-1.

5.5'	Toluene	3.9 ug/kg
10.5'	1,2-Dichloroethane	2.4 ug/kg
	Benzene	37 ug/kg
	Ethylbenzene	3.5 ug/kg
	Toluene	16 ug/kg
	Xylenes	19 ug/kg
20.5	1,2-Dichloroethane	61 ug/kg
	Gasoline	560 mg/kg (ppm)
	Benzene	9600 ug/kg
	Ethylbenzene	7400 ug/kg
	Toluene	22000 ug/kg
	Xylenes	45000 ug/kg
	Diesel	6.4 mg/kg (ppm)

TABLE 2 (cont.)
ANALYTICAL SUMMARY OF SOIL BORING SAMPLES

45.5'	Benzene	14	ug/kg
	Ethylbenzene	7.3	ug/kg
	Toluene	21	ug/kg
	Xylenes	34	ug/kg

MW-6 is located approximately 20' east of MW-3.

20.5'	Benzene	46	ug/kg
30.5'	1,2-Dichloroethane	5.7	ug/kg
	Gasoline	23	mg/kg (ppm)
	Benzene	70	ug/kg
	Ethylbenzene	60	ug/kg
	Toluene	96	ug/kg
	Xylenes	59	ug/kg
	Diesel	5.3	mg/kg (ppm)
45.5'	Gasoline	1.2	mg/kg (ppm)
	Benzene	20	ug/kg
	Ethylbenzene	15	ug/kg
	Toluene	35	ug/kg
	Xylenes	56	ug/kg

MW-7 is located approximately 10' west of the waste oil tank excavation.

15.5'	Toluene	15	ug/kg
25.5'	Benzene	43	ug/kg
	Ethylbenzene	3.4	ug/kg
	Toluene	4.4	ug/kg
	Xylenes	10	ug/kg
35.5'	Toluene	27	ug/kg
	Xylenes	5.7	ug/kg
45.5'	Gasoline	1.1	mg/kg (ppm)
	Benzene	7.1	ug/kg
	Ethylbenzene	12	ug/kg
	Toluene	36	ug/kg
	Xylenes	56	ug/kg

TABLE 2 (cont.)
ANALYTICAL SUMMARY OF SOIL BORING SAMPLES

MW-7 Auger Flights			
	1,2 Dichloroethane	5.9	ug/kg
	Gasoline	120	mg/kg (ppm)
	Benzene	310	ug/kg
	Ethylbenzene	1700	ug/kg
	Toluene	1400	ug/kg
	Xylenes	6900	ug/kg
	Diesel	23	mg/kg (ppm)
B-1 is a soil boring located approximately 30' southwest of MW-5.			
5.5'	Toluene	36	ug/kg
	Motor Oil	13	mg/kg (ppm)
15.5'	1,2-Dichloroethane	14	ug/kg
	Benzene	40	ug/kg
	Ethylbenzene	5.8	ug/kg
	Toluene	34	ug/kg
	Xylenes	25	ug/kg
25.5'	1,2-Dichloroethane	41	ug/kg
	Gasoline	150	mg/kg (ppm)
	Benzene	1200	ug/kg
	Ethylbenzene	2100	ug/kg
	Toluene	2400	ug/kg
	Xylenes	8400	ug/kg
	Diesel	3.7	mg/kg (ppm)

TABLE 3
GROUNDWATER ELEVATION

Date	MW-1	MW-3	MW-4
Elevation top of casing	55.13	54.34	54.61
12/19/89	26.06	25.99	26.02
	(O)	(O)	(o)
1/29/90	26.35	26.34	26.43
3/23/90	26.91	26.83	26.90
	(O,S)	(O,-)	(o,-)
4/24/90	26.50	26.37	26.47
	(O,S)	(o,-)	(-,-)
Elevation top of casing	55.18	--	--
	(new collar for casing MW-1 only)		
5/31/90	26.50	26.44	26.52
	(O,S)	(-,-)	(-,-)
6/20/90	26.30	26.24	26.29
	(O,S)	(-,-)	(-,-)
7/12/90	25.78	25.83	25.92
	(O,S)	(O,-)	(-,-)
8/30/90	25.37	25.37	25.47
	(O,S)	(-,-)	(-,-)
9/28/90	25.03	25.10	25.20
	(O,S)	(-,-)	(-,-)
10/12/90	24.87	25.06	25.17
	(O,S)	(-,-)	(-,-)

Note: All measurements are in feet.
(O) = strong odor; (o) = slight odor; (S) = sheen;
(-) = non-detectable

TABLE 3 (cont.)
GROUNDWATER ELEVATION

Date	MW-5	MW-6	MW-7
Elevation top of casing	54.95	54.92	54.57
9/28/90	25.27 (O,-)	25.21 (O,S)	Not Installed
10/12/90	25.16 (O,-)	25.07 (O,-)	24.11 (O,S)

Note: All measurements are in feet.
(O) = strong odor; (o) = slight odor; (S) = sheen;
(-) = non-detectable

TABLE 4
SUMMARY OF GROUNDWATER DATA

All results are in mg/L (ppm).

CONSTITUENT	DATE	MW-1	MW-3	MW-4
Benzene	11/89	NA	4.6	0.033
	3/90	2.7	2.3	0.0074
	7/90	4.0	5.2	ND
	10/90	3.4	0.075*	ND
Toluene	11/89	NA	1.1	0.001
	3/90	0.84	0.3	0.002
	7/90	1.5	0.440	ND
	10/90	2.7	0.150	ND
Ethylbenzene	11/89	NA	0.7	0.0013
	3/90	0.491	0.059	0.002
	7/90	ND	ND	ND
	10/90	1.2	0.0075	ND
Xylenes	11/89	NA	1.1	0.0052
	3/90	0.80	0.490	0.0011
	7/90	4.4	0.480	ND
	10/90	5.3	0.250	ND
Gasoline	11/89	NA	29	ND
	3/90	27	12	ND
	7/90	27	7.3	ND
	10/90	43	6.2	ND
Diesel	11/89	NA	NA	NA
	3/90	NA	NA	NA
	7/90	11	0.99	ND
	10/90	8.5	0.97	ND
1,2-Dichloroethane	11/89	NA	0.036	NA
	3/90	ND	ND	ND
	7/90	0.062	0.067	0.0009
	10/90	0.026	0.048	0.0005
Trichloroethene	11/89	ND	ND	NA
	3/90	ND	ND	ND
	7/90	ND	ND	ND
	10/90	ND	ND	0.0007
Chlorobenzene	11/89	ND	ND	NA
	3/90	ND	ND	ND
	7/90	ND	ND	ND
	10/90	0.0014	ND	ND

TABLE 4 (cont.)
SUMMARY OF GROUNDWATER DATA

All results are in mg/L (ppm).

CONSTITUENT	DATE	MW-1	MW-3	MW-4
1,1-Dichloroethane	11/89	NA	ND	NA
	3/90	0.016	0.026	ND
	7/90	ND	ND	ND
	10/90	ND	ND	ND
Lead (Total)	11/89	NA	0.04	0.012
	3/90	NA	NA	NA
	7/90	NA	NA	NA
	10/90	0.009	ND	ND

NA = Not Analyzed; ND = None Detected; * = Suspect Data

TABLE 4 (cont.)
SUMMARY OF GROUNDWATER DATA

All results are in mg/L (ppm).

CONSTITUENT	DATE	MW-5	MW-6	MW-7
Benzene	10/90	1.2	2.7	0.390
Toluene	10/90	0.160	2.9	0.018
Ethylbenzene	10/90	0.070	0.450	ND
Xylenes	10/90	0.520	3.3	1.2
Gasoline	10/90	9.6	27	14
Diesel	10/90	1.9	4.7	2.7
1,2-Dichloroethane	10/90	0.022	0.040	0.014
Chloroform	10/90	ND	0.0004	ND
Tetrachloroethene	10/90	ND	ND	0.0013
Lead (Total)	10/90	0.003	0.009	0.011
Oil and Grease	10/90	5.4	ND	7.8

NA = Not Analyzed; ND = None Detected