

Prepared For:

GENERAL MOTORS CORPORATION
FISHER GUIDE DIVISION

GASOLINE CONTAMINATION ASSESSMENT IN SOIL SAMPLES TAKEN
AT THE FISHER GUIDE DIVISION'S TRENTON, NEW JERSEY, PLANT

October 1987

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8 October 1987
File No. 498-003

Mr. Terrence Senich
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Dear Mr. Senich:

Please find the enclosed draft report relating to the soil investigation conducted near the site of the former underground gasoline storage tank. The results indicate soil contamination near the top of the bedrock. The soils at this depth had some moisture with little groundwater yield, the one monitoring well installed has minimal water. The paragraphs below are descriptions and recommendations of statistical tests of upgradient versus downgradient conditions at the site in general, and specific recommendations relating to soil and groundwater contamination beneath the site.

UPGRADIENT/DOWNGRADIENT TESTING

Our 1986 groundwater investigation at your site included the installation of 12 monitoring wells specified to tap unconsolidated deposits (soils) at the site. The drilling and well construction work were completed and reported in April 1986. Several of the wells had very thin saturated zones, however the wells were installed as specified. During the installation Mr. Isbister, of our office, contacted Mr. Steve Anderson (NJDEP) and apprised him of the problem. Our notes indicate that Mr. Anderson was aware and understood the problem, and determined that he would assess the situation further as attempts to sample proceeded and data were developed. As a result of the very thin saturated zone in the soils (in combination with fine grained silty soils), upgradient data has been lacking for most of the monitoring quarters. Although we are not in possession of the monitoring data from the entire program (only the June 1986 results) we have several suggestions which have been helpful to other clients in dealing with agency requests for upgradient/downgradient testing and comparisons.

The simplest interpretation is likely to be the one that NJDEP staff will apply to the data to date. Namely, they will assume that background organic concentrations are near zero and that all downgradient concentrations represent evidence of groundwater contamination. We recommend that Fisher Guide or LMS apply the information on analytical variance (available from ETC) to interpret the downgradient data and assure that downgradient concentrations of

organic compounds that exceed groundwater standards are statistically significant (relative to analytical and normal sampling variance). A Students t-test or alternative procedure could be applied. A similar analysis could be applied to those inorganic parameters not occurring naturally (e.g., cyanide and hexavalent chromium).

An alternative interpretation that should be considered is using the lowest groundwater concentrations for any constituent as the "background" for the site. While support for this premise is qualitative at best, it is a reasonable approach to interpreting the available data. A more objective and statistically defensible approach would be to apply a discriminant or canonical analysis to the data pool. Such an analysis would consider the cross correlation among parameters and objectively classify wells using the composite set of analytical variables. Cross correlation analysis performed by LMS on the June 1986 data indicates that most of the parameters with highest concentrations are positively correlated with each other indicating that further evaluation and discussion of possible contaminant releases might be more focused than simply searching for multiple sources for a variety of contaminants. In conclusion, with or without Students t-tests comparing upgradient and downgradient data, the State will likely conclude on qualitative grounds (as we have), that strong evidence exists for downgradient shallow groundwater contamination on the site, and that no known upgradient contributors (other than Fisher Guide) exist.

ASSESSMENT OF CONTAMINANT MIGRATION POTENTIAL

All LMS site borings to date extended to refusal. All but two found the bedrock surface at 10 to 20 feet underlying the silty clay overburden. The remaining two intercepted steel or concrete above 10 feet. The bedrock (Stockton formation) represents a water supply aquifer to the nearby area. The presence of shallow groundwater contamination and gasoline product (near the site of the former gasoline storage tank) proximate to top of the Stockton formation will likely lead the NJDEP to require that Fisher Guide assess the extent of contamination in the bedrock beneath the site. A formation evaluation would assess the risks that such contamination might pose to the local population served by the Stockton aquifer.

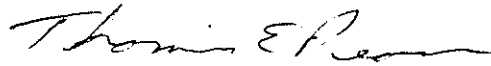
The Stockton is 2,300 to 3,100 feet thick and contains several lithologic units including yellow and red to brown sandstone, and a soft red shale, irregularly interbedded. The red/brown sandstone predominates the top of the formation beneath the Fisher Guide site. Since the formation is faulted and contains extensive fractures, particularly in the upper 500 feet, it is considered a reliable source of moderate to large supplies of groundwater in Mercer County. The enclosed table lists our preliminary identification of potable water supply wells in the Stockton, near the Fisher Guide site.

RECOMMENDATIONS

Since contaminants have been found near the top of the Stockton formation and gasoline contamination has been found in contact with the bedrock, we recommend that Fisher Guide propose a shallow bedrock investigation work scope to the NJDEP for their comment and approval. The work scope should include drilling of approximately five wells, 10 feet into the bedrock and/or through the water table, and isolating them (with bentonite seals) from the overburden. These wells should be tested for permeability, core samples collected during the drilling should be analyzed for dip and formation porosity (as well as contaminants). The field and laboratory data should then be interpreted to establish bedrock flow directions and rates. Potential for contaminant movement based on organic content and adsorption of selected constituents in the rock should also be evaluated. Analyses from the laboratory program and in subsequent groundwater monitoring from these wells should be focused on indicative constituents selected by statistical analysis of the existing data base. We anticipate the use of two to three selected parameters that have good laboratory precision and might pose a potential threat (in NJDEP's opinion) for the quantitative evaluation contaminant migration.

I suggest that we meet at your convenience to discuss these recommendations further. I am also available to respond to any questions by telephone. I look forward to speaking with you in the future.

Very truly yours,



Thomas E. Pease, Ph.D., P.E.
Project Manager

TEP:jms

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CHAPTER 1

INTRODUCTION

1.1 APPROACH

This report provides the interpretation and supporting data for a soil investigation at the former site of a 4000-gallon buried gasoline storage tank on the Fisher Guide tract (Figure 1). The work was accomplished by drilling a series of test borings to determine the presence or absence of adsorbed gasoline in the unsaturated zone or floating as a separate phase on the water table. Monitoring wells were to be installed at critical locations around the former gasoline tanks if saturated conditions were encountered above the bedrock. Selected soil samples from the soil borings were analyzed for evidence of gasoline contamination.

Lawler, Matusky & Skelly Engineers (LMS) made an inspection of the test area accompanied by representatives from Fisher Guide, New Jersey Department of Environmental Protection (NJDEP), and Environmental Drilling Inc. (EDI), the well drilling contractor. During the site inspection, locations of soil borings were selected and marked. In addition, preliminary locations of four monitoring wells were also selected and marked. During the site inspection, LMS considered accessibility for drilling equipment and a location for decontamination of the split-spoons and auger flights. Since the potential contaminant is gasoline, safety procedures were discussed with Fisher Guide and NJDEP to facilitate work once the drilling contractor had mobilized the equipment.

1.2 BACKGROUND

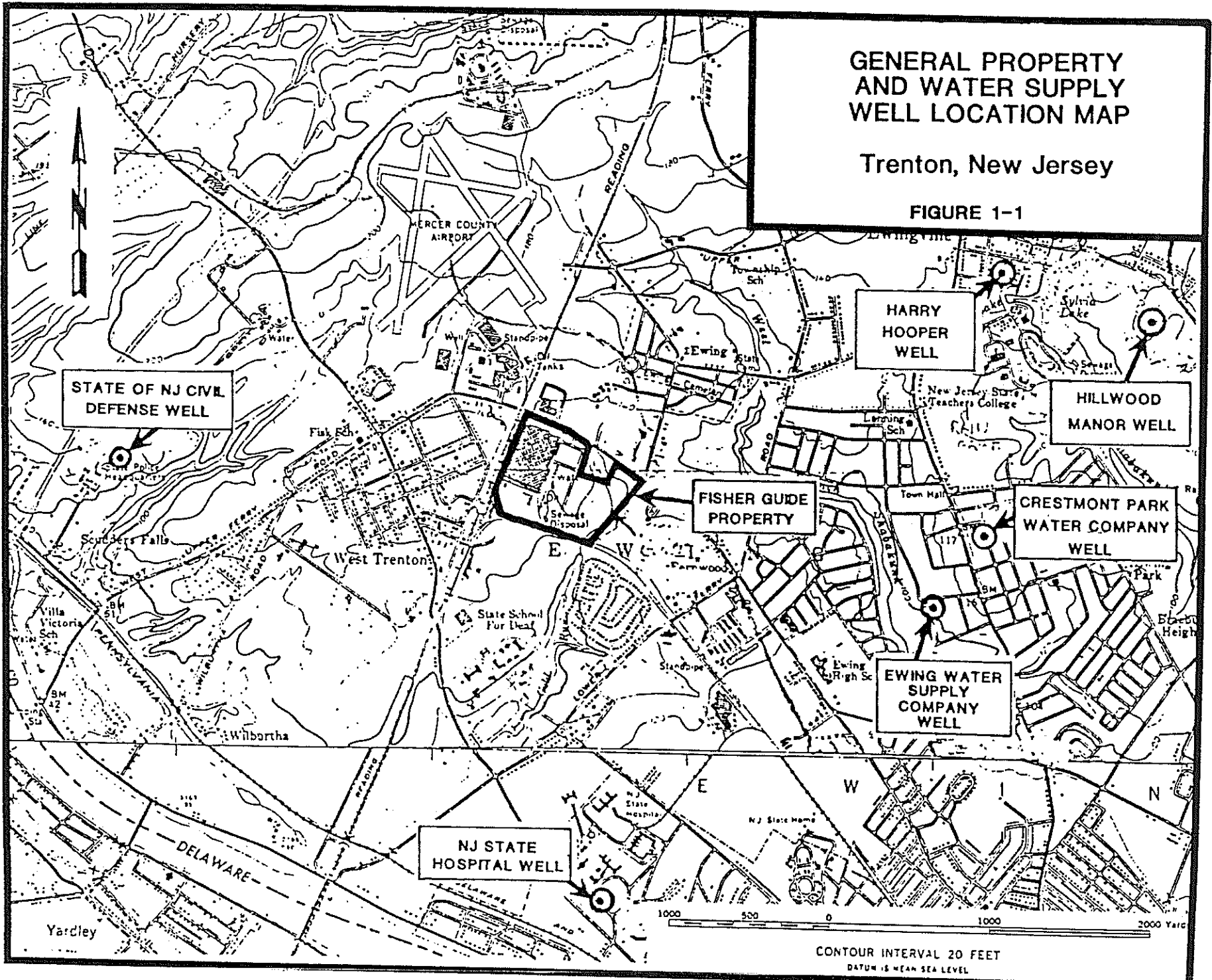
In March 1986 LMS inspected the installation of 12 monitoring wells on the Fisher Guide plant upgradient and downgradient of the sludge

GENERAL PROPERTY AND WATER SUPPLY WELL LOCATION MAP

Trenton, New Jersey

FIGURE 1-1

1-1A



drying beds and the oil skimming tanks. During the drilling and subsequent sampling of these wells, information was developed that showed the water table occurred either a few inches above the bedrock surface or coincident with the bedrock surface. Four monitoring wells were proposed to have been installed down-gradient of the former gasoline tank location at the same Fisher Guide plant site as the prior 12 monitoring wells. Similar dry-hole conditions were encountered at the former gasoline tank location as at the sludge drying beds and settling tank location. One monitoring well (MW-13) was installed at LMS's discretion because this location indicated the greatest probability of producing groundwater. However, only several inches of water entered into the well, making water samples turbid and unreliable for valid analytical results.

The former gasoline tank location constitutes surficial material, up to 19 ft of soil, and Stockton Formation bedrock. The surficial material consists of railroad cinders, concrete, and occasional fill material (asphalt, glass). The soil consists of interbedded layers of brown-red silty clay with some organic matter, red-brown sandy clay, gray clay, red sandstone, and green sandy clay. None of the drill logs indicate any zone to be saturated when sampled. The high clay content of the soil may preclude saturation due to the low permeability of clay. The soil overlies bedrock, considered to be the Stockton Formation.

The Stockton Formation, a member of the Newark Group, is of lower Triassic age. In Mercer County, New Jersey, the Stockton outcrops in a 3 mi. wide belt that trends in a northeast-southwest direction. The Stockton contains several lithologic units including a light yellow micaceous feldspathic sandstone, a light colored arkosic conglomerate, a red to brown fine-grained sandstone, and a soft red shale. The red-brown sandstone predominates toward the top of the formation where the Fisher Guide plant is located. Several of the soil borings drilled by LMS at the plant penetrated

the top foot of the bedrock. The samples from these borings showed the bedrock to be a reddish brown, fine-grained sandstone, confirming the presence of the Stockton Formation. The formation has been faulted and contains extensive fractures. Vertical fractures or joints are quite common in the upper 500 ft of the Stockton.

CHAPTER 2

METHOD OF SAMPLING

A licensed New Jersey well driller (EDI) was retained by LMS to conduct the drilling and well construction work. Based on similar work conducted on the tract in 1986, a truck-mounted auger rig was used to drill the soil borings. Hollow-stem augers were used for the drilling, and continuous split-spoon samples were collected through the hollow stem as each hole was deepened.

All drilling equipment was decontaminated prior to the start of drilling. Split-spoons were decontaminated between each use and auger flights were decontaminated between borings. Split-spoon decontamination was accomplished by washing with detergent, rinsing with potable water, rinsing with acetone, and finally, rinsing with deionized water. The auger flights and other equipment were decontaminated with a steam generator.

All the work was conducted under the inspection of an LMS hydrogeologist who recorded the data, made field decisions, and interfaced with Fisher Guide and NJDEP as necessary during the course of the work. He also maintained contact with the LMS project manager by telephone as necessary.

Split-spoon samples were collected continuously until refusal in each of the soil borings and described by the LMS hydrogeologist. He also maintained a chronological log of significant facts during the drilling and prepared a geologist's log for each of the boreholes.

The borehole was periodically tested during the drilling for evidence of gasoline vapors by the LMS hydrogeologist using an HNU meter, and an Organic Vapor Analyzer (OVA). Each split-spoon sam-

ple was scanned with the HNU and OVA meter. All readings were noted in the chronological log and on the geologist's log sheet (Appendix A).

After describing the split-spoon samples, selected samples were placed in laboratory-cleaned glass jars, labeled, and preserved for selected volatile organic analysis. Other samples not scheduled for analysis were placed in on-site drums for disposal. The selected split-spoon samples were sent to Environmental Testing and Certification (ETC) for volatile organic analysis. The samples, selected by LMS and confirmed by Fisher Guide and NJDEP, were based on analysis of the field data from the boring program and the presence of any indications of gasoline contamination. The samples were analyzed for total petroleum hydrocarbon, benzene, O, M, and P xylenes, toluene, and methyl tertiary butyl ether (MTBE).

Upon completion of each borehole, any heavily contaminated drill cuttings were placed in drums for disposal by Fisher Guide. Each of the soil borings was backfilled using a cement bentonite slurry (5 lbs bentonite per 94-lb bag of cement mixed with 7 gal of water). Each boring location was marked at the surface by spray-painting the appropriate boring number.

Monitoring wells had been proposed if saturated conditions were encountered. Water accumulated in one borehole above the refusal depth (bedrock), but there were only a few inches of water in the borehole the following day. In hopes of obtaining downgradient water quality data from the soil, one monitoring well was installed in accordance with NJDEP specifications consistent with existing on-site monitoring wells.

The latitude and longitude of the soil borings and the well were then surveyed to the nearest 0.01 second. The land surface elevations were determined to the nearest 0.01 ft (Appendix B).

CHAPTER 3

FIELD RESULTS

3.1 LITHOLOGY DESCRIPTION

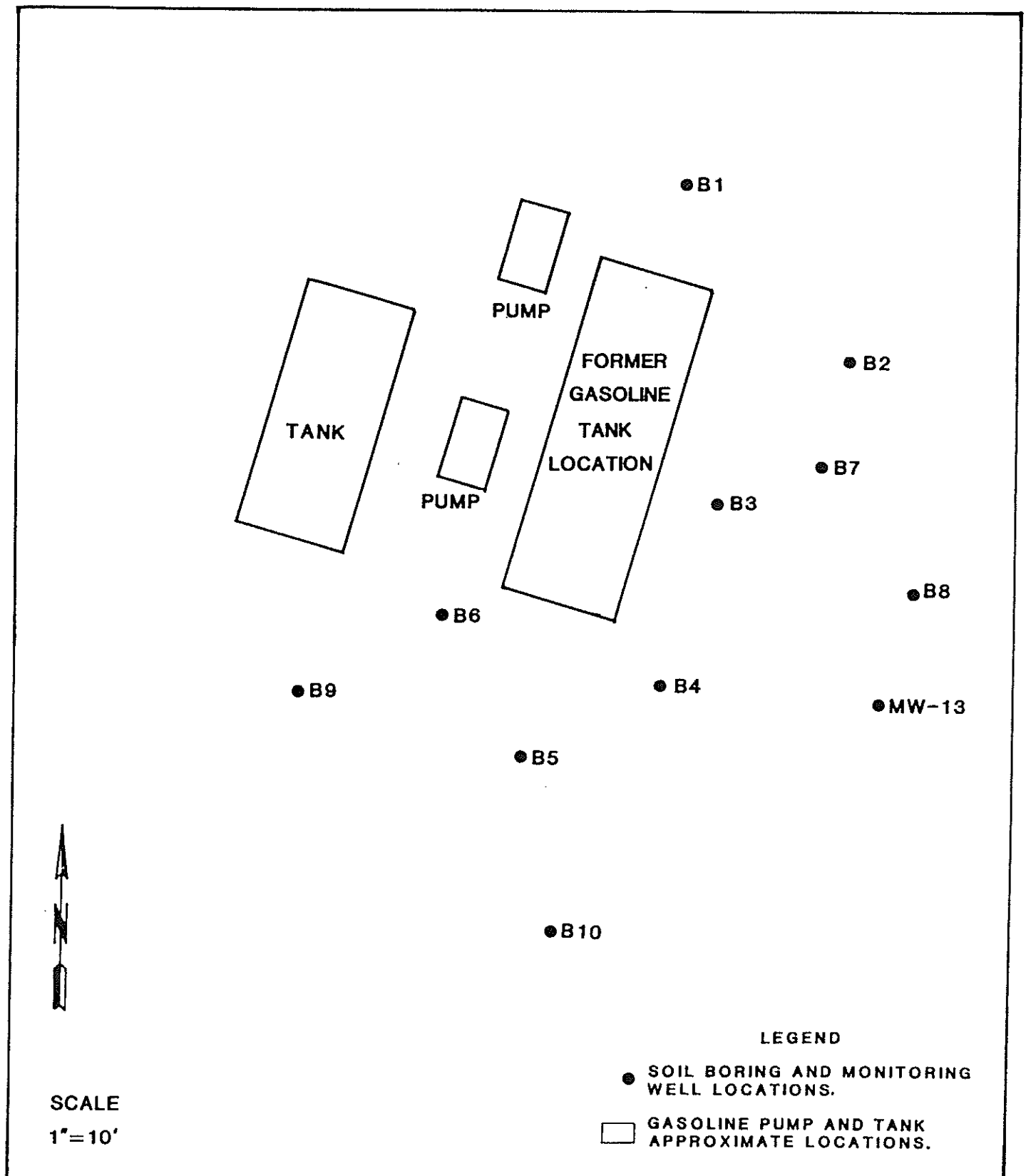
A total of ten borings and one monitoring well were drilled in the vicinity of the gasoline tank (Figure 3-1). Groundwater movement is inferred to migrate from east through southeast to south. All borings were drilled to approximately 17 ft except B-7 (5 ft), B-8 (2 ft), B-10 (19 ft), and MW-13 (13 ft). Lithology logs were recorded for all 10 soil borings and the monitoring well location (Appendix A).

The material encountered beneath the concrete consisted of red silty clay, brown silt, and interbedded green-gray to a brown-red clay with sandstone. Exceptions are material in B-7 that consisted of yellowish-red to reddish-yellow clay to 5 ft. Refusal was due to a flat metal surface. Material in B-8 consisted of large cobbles with refusal at 2 ft due to a large concrete object.

Bedrock was encountered from 15 to 19 ft and consisted of weathered red sandstone, tentatively identified as the Stockton Formation. Moisture was encountered between 4.5 and 10.5 ft in the soil, but saturated soils were identified only at borehole bottoms. The monitoring well has not been able to produce enough recoverable water for adequate samples.

Background field meter results, taken at selected intervals, are recorded on drilling logs in Appendix A. Combustible gas indicator (CGI) and HNU readings were not reliable when taken because of adverse field conditions. OVA readings were reliable and are recorded on each soil boring log (Appendix A).

FIGURE 3-1
GENERAL LOCATION MAP



3.2 MONITORING WELLS

The original program proposed the installation of four monitoring wells drilled at locations close to the former gasoline tank based on the results of the test boring program. Tentative locations were selected prior to the site inspection to be confirmed by the findings of the soil boring program. None of the boreholes contained significant amounts of water to achieve the stated purpose of wells at this time. Only one downgradient well was installed. Any future monitoring wells will have to penetrate bedrock to yield water and will be drilled and constructed in accordance with the NJDEP monitor well specifications.

The monitoring well (MW-13) was developed upon completion of construction following conventional development methods. A 4-in diameter PVC 20-slot screen was installed in the bottom half of the hole. PVC riser pipe was connected to the slotted screen downhole and a protective curb box at grade level. The riser pipe does not extend above grade but is flush with it. A 2-in. withdrawal hose was lowered to the bottom of the hole and connected to a gasoline-powered centripetal pump at grade level. The pump withdrew any water in the hole for approximately one hour. The purged water was sent to the water treatment facility for treatment. The well was not developed further due to very little water withdrawal from the hole. It should be noted that the unconsolidated overburden in most of the plant is weathered Stockton Formation and consists chiefly of silt and clay. Although these materials may be saturated with water, their extremely low permeability will probably prevent the completed well from having even a moderate yield. In addition, because of the extremely fine-grained texture of the formation, it may be impossible to produce water that is turbidity-free.

CHAPTER 4

LABORATORY RESULTS

4.1 SAMPLING

An LMS sampling team conducted soil sampling during the drilling program. Fisher Guide and NJDEP were notified in advance of the scheduling so that representatives could be present to observe the sampling and split samples if desired.

Sampling of soils and the monitoring well was accomplished in accordance with established LMS protocol (approved by NJDEP). The well sampling protocol included measurements of static water levels, purging three to five volumes of casing and sandpack water, and collection of samples using a PVC bailer. Prior to purging, the well was checked for the presence of liquid product or sheen and the results were reported on the sampling log.

4.2 ANALYTICAL METHODS

Field samples from the soil borings and the monitoring well were taken to ETC for analysis. Appendix C includes the chain-of-custody records that ensured sample integrity.

The soil sample analyses included a full volatile scan using EPA Method 624 with a forward library search to identify any significant additional 15 peaks besides normal contract laboratory volatiles. During the calibration for Method 624, a spike was added for ortho, meta, and para (O, M, P) xylenes, diisopropylether (DIPE), and methyl tertiary butyl ether (MTBE), so that if these compounds were identified in the Plus-15 scan, an accurate measure of the compounds could be made. Methanol and tertiary butyl alcohol (TBA) were analyzed in a separate GC/MS run using direct injec-

tion and a modified Method 624. Because methanol is used extensively in laboratory procedures, the detection limit was 100 ppm. The benzene, toluene, and xylenes (BTX) analyses would indicate gasoline contamination. The parameters tested in future rounds may be adjusted to target compounds based on the analyses in this report.

4.3 ANALYTICAL RESULTS

The laboratory data (Appendix D) for soil samples are summarized in Table 4-1. The data indicate that some soil samples contain elevated levels of: petroleum hydrocarbons, benzene, toluene, and M, O, P-xylenes. Samples 3626, 3903, 3904, and 3905 were diluted due to the high concentrations of some constituents. Those samples have method detection levels (MDL) 1000 higher than the other samples. The samples were diluted by 1000 to ensure results in the linear detection range of the analytical equipment.

Duplicate quality control samples, quality control blanks, spiked blanks, matrix spikes, and spiked samples replicated to $\pm 10\%$ of the initial concentrations were performed to ensure analytical reproducibility. Quality control replicate samples were completed on all eight samples. Samples 3627, 3628, 3629, and 3906 have good replication ($\pm 10\%$ of known values). Samples 3627, 3903, 3904, and 3905 also have good replication ($\pm 20\%$ of known values). Matrix spikes that deviate by more than 20% from their known values are 3626, 3903, 3904, and 3905, all for toluene and m-xylene.

The matrix spike analyses were performed on other ETC contract samples in these batches. Recoveries ranged from a low of 58% to a high of 113%. The upper limit variation of the known values are within 20%. The lower limit matrix spike variation is beyond the 20% confidence interval. A solid matrix surrogate recovery was performed to evaluate poor recovery on the matrix spikes and to

TABLE 4-1
FORMER GASOLINE TANK SOIL SAMPLES SUMMARY TABLE^a

SAMPLE NUMBER	LOCATION NUMBER	DEPTH INTERVAL (ft)	CONTAMINANT	METHOD DETECTION LEVEL	SAMPLE CONCENTRATION
B-1	3906	13-15	Petroleum		
B-1	3906	13-15	hydrocarbons	5000	<5000
B-1	3906	13-15	Benzene	4.4	106
B-1	3906	13-15	Toluene	6.0	29.5
B-1	3906	13-15	M-xylene	10	67.3
B-1	3906	13-15	O+P-xylenes	10	68.2
B-1	3906	13-15	MTBE	10	ND ^b
<i>No exceed.</i>					
B-2	3628	5-7	Petroleum		
B-2	3628	5-7	hydrocarbons	5000	7,000
B-2	3628	5-7	Benzene	4.4	ND
B-2	3628	5-7	Toluene	6.0	ND
B-2	3628	5-7	M-xylene	10	ND
B-2	3628	5-7	O+P-xylenes	10	ND
B-2	3628	5-7	MTBE	10	ND
B-2	3629	7-9	Petroleum		
B-2	3629	7-9	hydrocarbons	5000	<5000
B-2	3629	7-9	Benzene	4.4	ND
B-2	3629	7-9	Toluene	6.0	ND
B-2	3629	7-9	M-xylene	10	ND
B-2	3629	7-9	O+P-xylenes	10	ND
B-2	3629	7-9	MTBE	10	ND
B-3	3627	12-13	Petroleum		
B-3	3627	12-13	hydrocarbons	5000	15,000
B-3	3627	12-13	Benzene	4.4	757
B-3	3627	12-13	Toluene	6.0	1350
B-3	3627	12-13	M-xylene	10	2090
B-3	3627	12-13	O+P-xylenes	10	2400
B-3	3627	12-13	MTBE	10	ND
<i>No xyc.</i>					
B-3	3626	13-14	Petroleum		
B-3	3626	13-14	hydrocarbons	5000	160,000
B-3	3626	13-14	Benzene	4400 x	ND
B-3	3626	13-14	Toluene	6000	ND
B-3	3626	13-14	M-xylene	10000	BMDL ^c
B-3	3626	13-14	O+P-xylene	10000	BMDL
B-3	3626	13-14	MTBE	10000	ND
<i>ND</i>					
B-4	3903	15-16	Petroleum		
B-4	3903	15-16	hydrocarbons	5000	210,000
B-4	3903	15-16	Benzene	4400 x	ND
B-4	3903	15-16	Toluene	6000	16,800
B-4	3903	15-16	M-xylene	10000	40,200
B-4	3903	15-16	O+P-xylenes	10000	41,400
B-4	3903	15-16	MTBE	10000	ND
<i>21.6</i>					
B-5	3904	15-17	Petroleum		
B-5	3904	15-17	hydrocarbons	5000	110,000
B-5	3904	15-17	Benzene	4400 x	ND
B-5	3904	15-17	Toluene	6000	BMDL
B-5	3904	15-17	M-xylene	10000	BMDL
B-5	3904	15-17	O+P-xylenes	10000	BMDL
B-5	3904	15-17	MTBE	10000	ND
<i>ND</i>					
B-6	3905	15-17	Petroleum		
B-6	3905	15-17	hydrocarbons	5000	1,650,000
B-6	3905	15-17	Benzene	4400 x	41,300
B-6	3905	15-17	Toluene	6000	380,000
B-6	3905	15-17	M-xylene	10000	340,000
B-6	3905	15-17	O+P-xylenes	10000	354,000
B-6	3905	15-17	MTBE	10000	ND
<i>41.3</i> <i>794.0</i>					

^aAll data in ug/kg.

^bNone detected.

^cBelow method detection limit.

to recheck analytical methods. Toluene was the only compound out of the surrogate recovery suite results applicable to this study. The results (minimum 98%, maximum 101%) are within 5% of the original sample values. These values demonstrate that the samples do contain the selected compounds and the analytical results are reproducible.

CHAPTER 5

ASSESSMENT OF RESULTS

5.1 BACKGROUND

Gasoline contains over 100 hydrocarbon components with precise mixtures varying. The lightest constituent is isobutane and the heaviest components are substituted naphthalenes. Selected components added after refining are antiknock agents, dyes, oxidation inhibitors, rust inhibitors, carburetor detergents, and other additives.

These sections focus specifically on selected hydrocarbon components of gasoline as well as total petroleum hydrocarbons. Benzene, toluene, and xylenes are components that are slightly soluble in water and commonly used to detect gasoline contamination of soil. These constituents being evaluated are briefly discussed for their solubility to assess migration that occurs in the soil matrix and partially in the groundwater and their soil concentration at this site.

While no uncontaminated soil samples were collected to determine background constituent levels in the soil, samples from B1 and B2 contain no detectable quantities of selected constituents. These results should be reflective of hypothetical uncontaminated soil samples taken upgradient or physically outside the zone of contaminated soil.

While no qualitative soil remedial action levels (other than RCRA hazardous waste classifications) are directly applicable to gasoline spills, ECRA levels are frequently referred to by the NJDEP as relevant to their decision-making process and will be used for this discussion. As part of the ECRA program administered by BISE,

site-specific cleanup levels have been established for various constituents. They are: volatile organics (1000 ppb), base neutral (B/N) organics (10,000 ppb, depending on the compound), and petroleum hydrocarbon, (100,000 ppb). Although these cleanup action levels have been established on a site-by-site basis, generic cleanup target levels may be forthcoming. The soil concentration values may be used to show whether soils near the aquifer warrant removal or containment of the organic compounds.

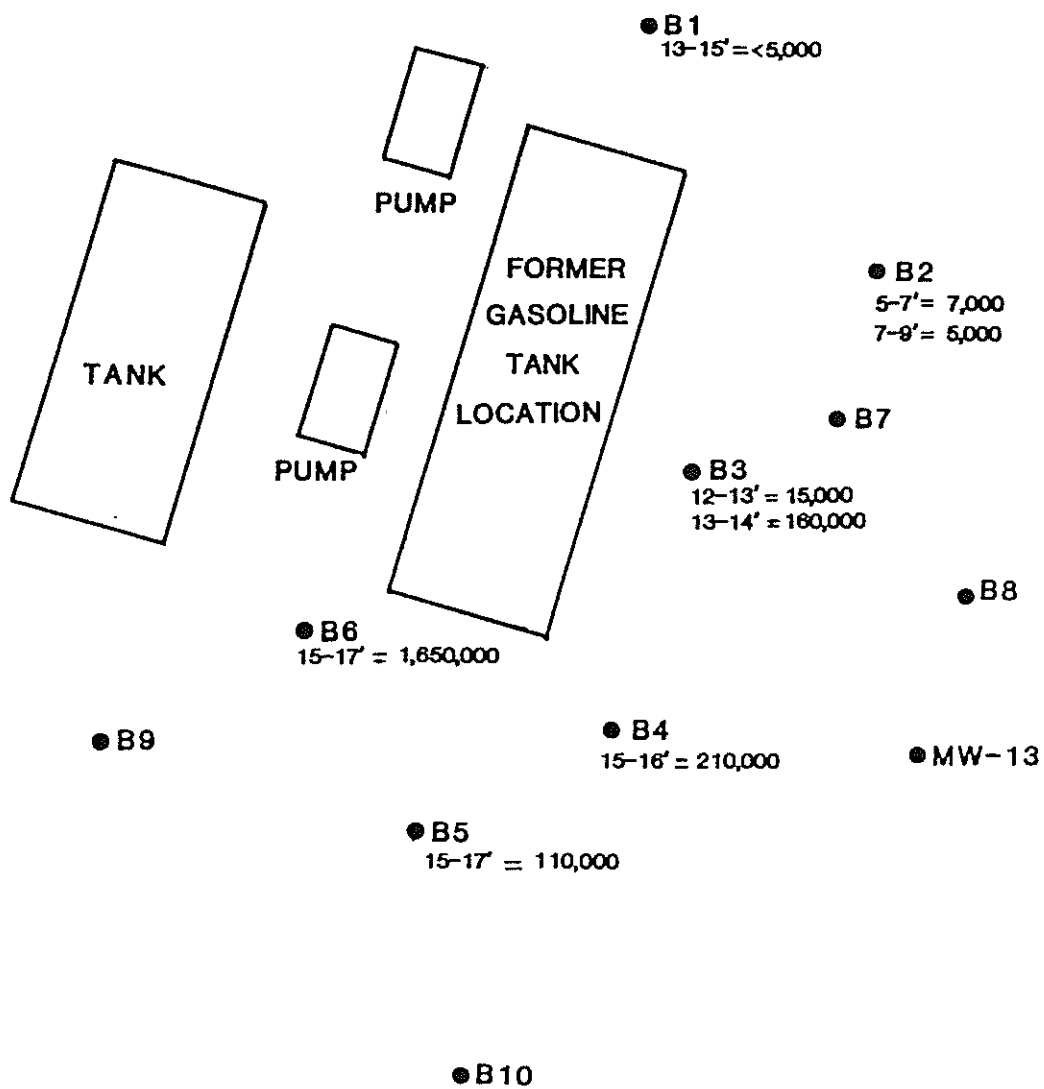
Petroleum hydrocarbons (PHC) are present in the soil as gasoline. These hydrocarbons emanated from the former leaky gasoline tank. Figure 5-1 illustrates the location of soils analyzed for PHC and their concentrations. Soil boring B3 at 13-14 ft; B4 at 15-16 ft; B5 at 15-17 ft; and B6 at 15-17 ft have elevated PHC above 100,000 ppb (ug/kg). The highest concentration is in B6 with 1,650,000 ppb. The elevated concentrations are primarily located around the southern edge of the former tank location. The analyzed intervals selected by field meter and odor are also near the bottom of the hole, near the water table, and close to the bedrock surface that underlies the soil.

Benzene, an aromatic, is present in gasoline in quantities of 1.8 to 5% by weight. Once benzene is dissolved in the aqueous phase, it constitutes 59% of the soluble gasoline constituents. Benzene has a water solubility of 1740-1800 mg/l and is present in three of the eight samples analyzed (Figure 5-2). Unlike PHC, benzene appears to be elevated in the soil borings to the north as well as south of the former underground tank location. The highest concentration surface (41,300 ppb) is in B6 at the 15 to 17 ft depth that is close to the bedrock.

Toluene, an aromatic, is contained in gasoline from 4.7 to 7% by weight and constitutes 33% of the aqueous soluble components gasoline produced in the aqueous phase. Toluene has a water solubility of 500 to 627 mg/l and is present above the method detection limit

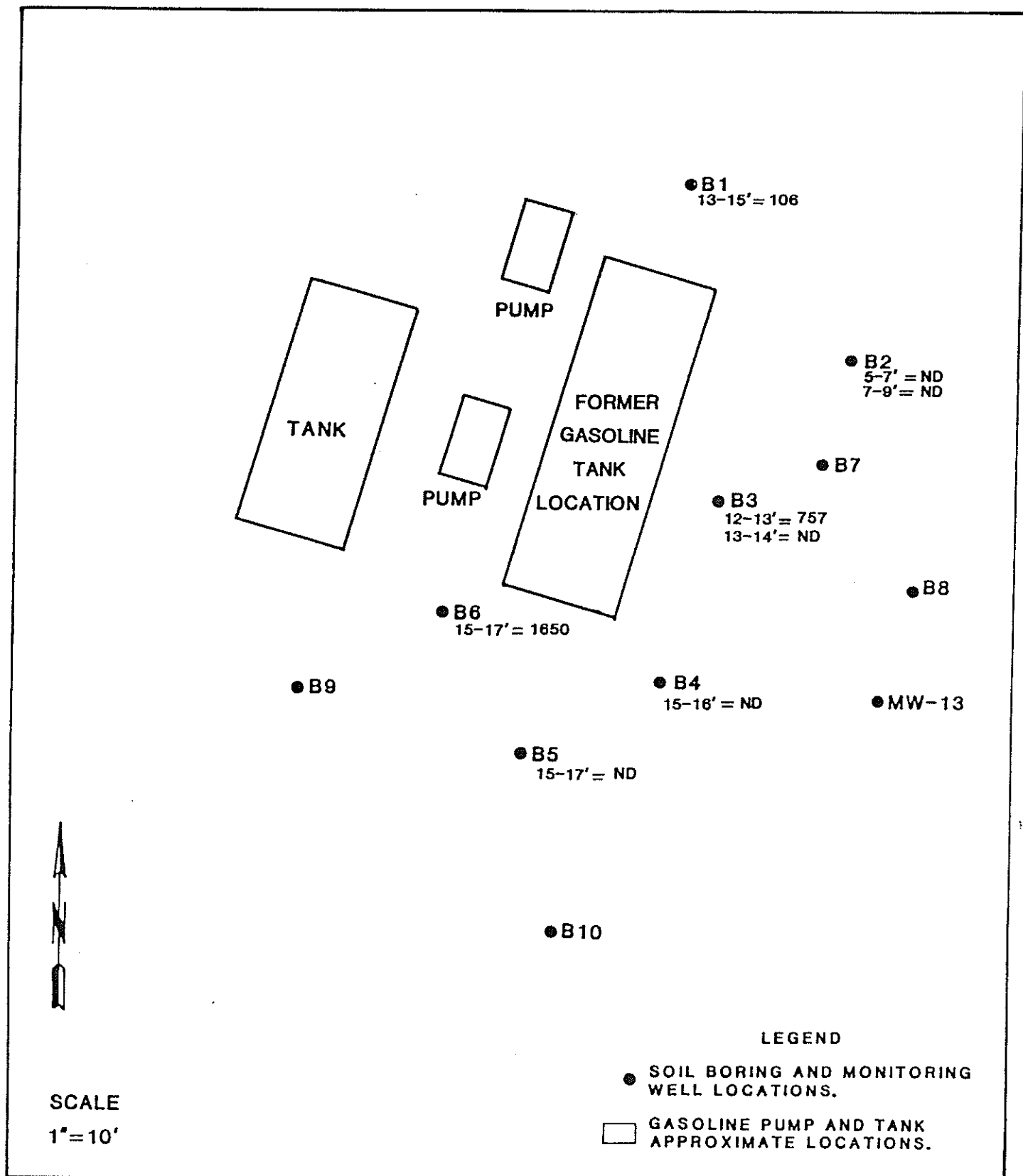
FIGURE 5-1

PETROLEUM HYDROCARBON SOIL CONCENTRATIONS ($\mu\text{g}/\text{kg}$)



SCALE
1"=10'

FIGURE 5-2
BENZENE SOIL CONCENTRATIONS ($\mu\text{g/kg}$)



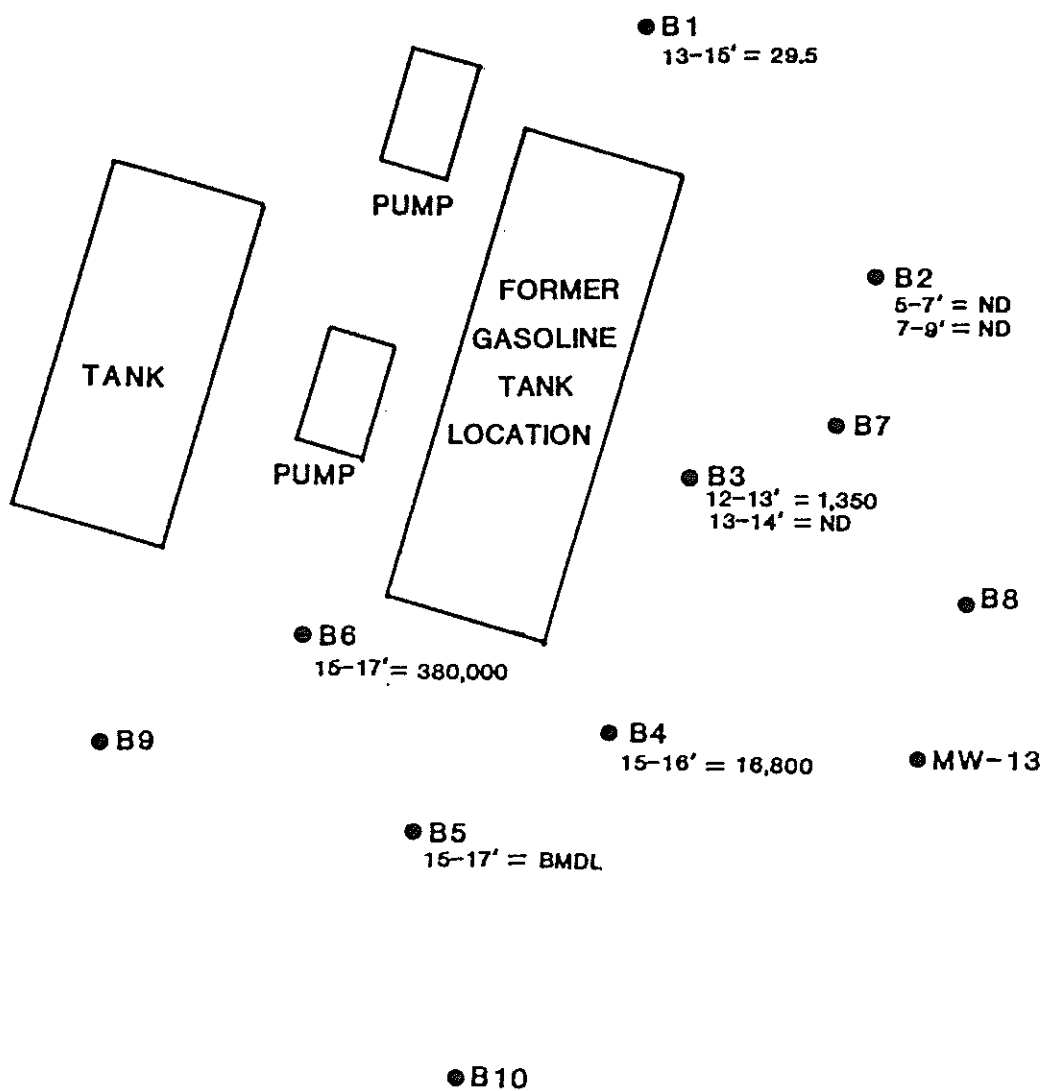
in five of the eight samples (Figure 5-3). Some toluene concentrations were sufficiently elevated so that the analytical sample had to be diluted to ensure accurate results. The elevated detection levels are set at 10,000 ppb. The sample results reported as BMDL (below method detection limit) are below the 10,000 ppb threshold but present in unquantifiable amounts possibly above the 1,000 ppb ECRA soil action levels used as reference concentration limits. Similar to the PHC pattern, toluene has the highest concentrations to the south of the former tank location.

Xylenes compose approximately 8.5% by weight in gasoline. The three components of xylene are (1) o-xylene (about 2%), (2) m-xylene (about 5.5%), and (3) p-xylene (approximately 1%). Xylenes, as a group, have a lower solubility than either benzene (the highest) or toluene. Xylenes aqueous solubilities range from a low of 134-167 mg/l to a high of 196 to 213 mg/l.

M-xylene is present in six of the eight samples (Figure 5-4). Two samples (B3 at 13-14 ft and B5) have such high concentrations of m-xylene that the analytical threshold had to be raised to 10,000 ppb to ensure a valid result. This indicates that there is less than 10,000 ppb m-xylene in the sample. The highest detectable concentrations in the other samples are above 1,000 ppb (ECRA soil action levels for combined volatile organics). Similar to toluene and PHC the highest soil concentrations are south of and adjacent to the former tank location.

O- and p-xylenes are present in elevated concentrations in six of eight samples (Figure 5-5). Soil borings B3 (13-14 ft) and B5 contained very high o- p-xylenes quantities such that the method detection threshold had to be raised from 4 ppb to 10,000 ppb. The samples contain less than 10,000 ppb o- and p-xylenes. Similar to m-xylene, o- and p-xylenes are found above 1000 ppb in the southern area of the former tank location.

FIGURE 5-3
TOLUENE SOIL CONCENTRATIONS ($\mu\text{g}/\text{kg}$)



LEGEND

● SOIL BORING AND MONITORING WELL LOCATIONS.

□ GASOLINE PUMP AND TANK APPROXIMATE LOCATIONS.

SCALE
1"=10'

FIGURE 5-4

M-XYLENE SOIL CONCENTRATIONS ($\mu\text{g/kg}$)

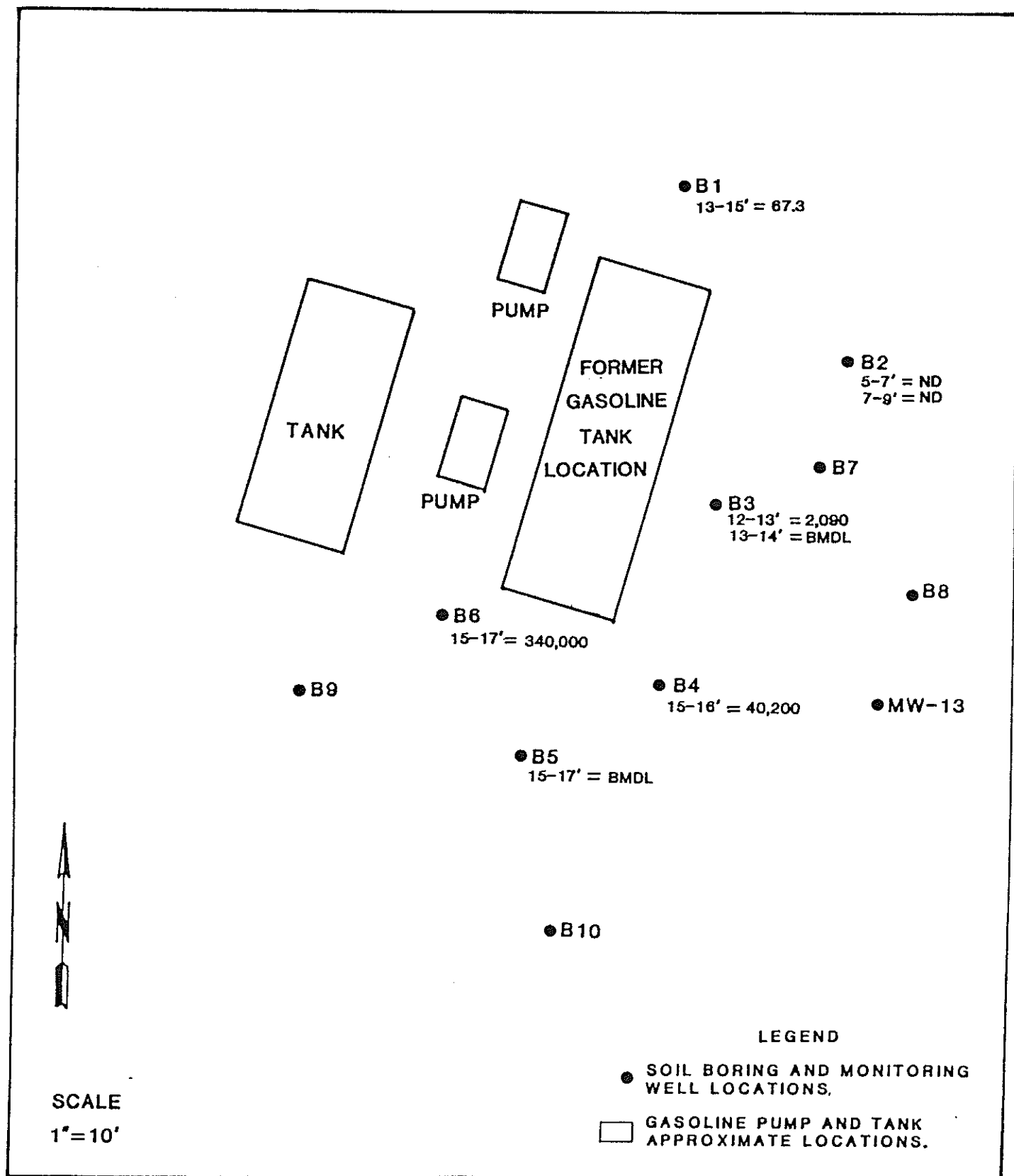
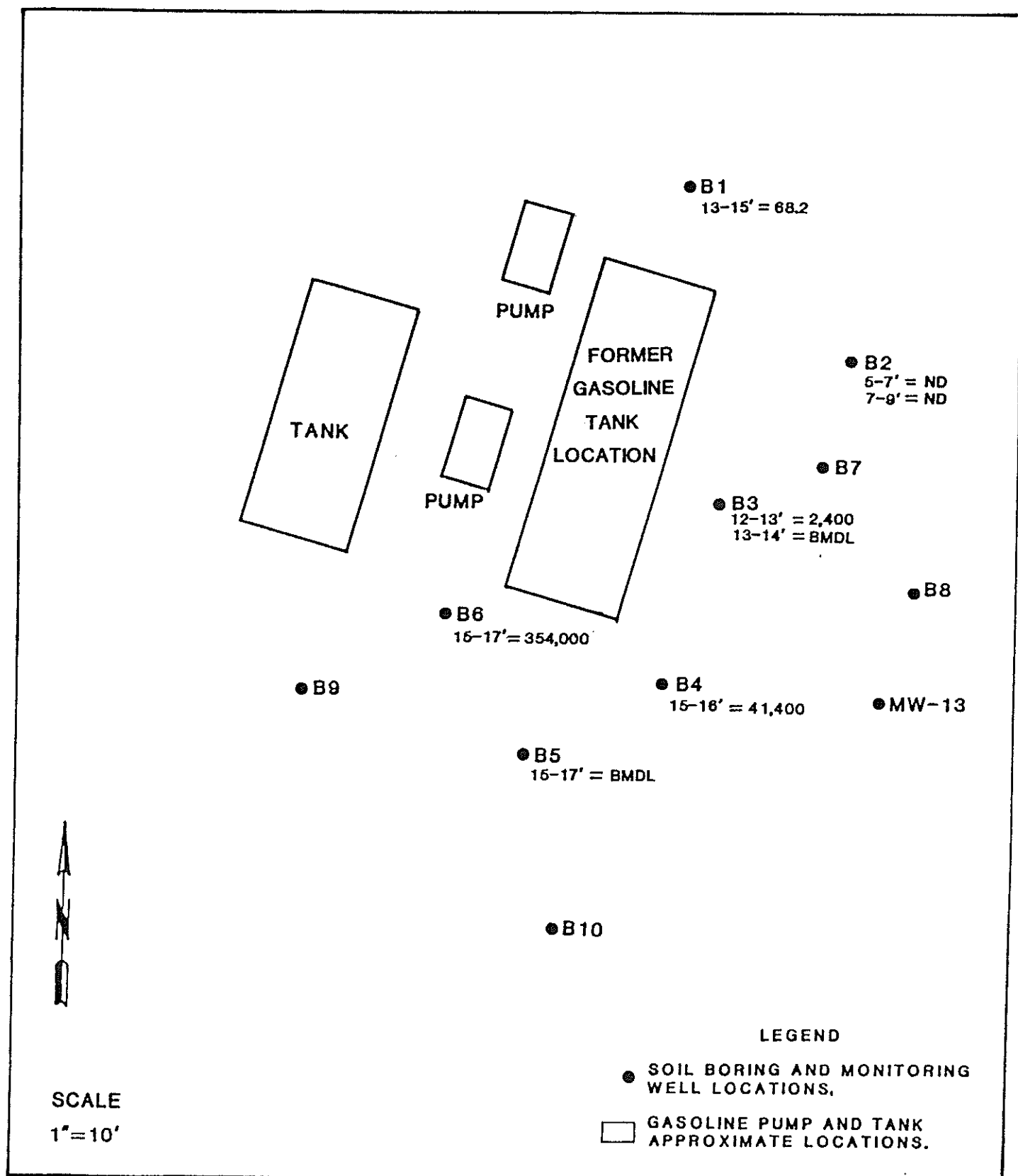


FIGURE 5-5
O+P-XYLENES SOIL CONCENTRATIONS ($\mu\text{g/kg}$)



MTBE was not detected in any of the analyzed soil samples (Figure 5-6).

Soil stratigraphy logs (Appendix A), recorded at each boring location (Figure 3-1), show the soil overlying local bedrock consists of interbedded brown, red, and yellow-red silty clay, and is 12-14 ft thick. Bedrock consists of a red Stockton sandstone with some conglomerate locally. Depth to bedrock varies from 15-19 ft.

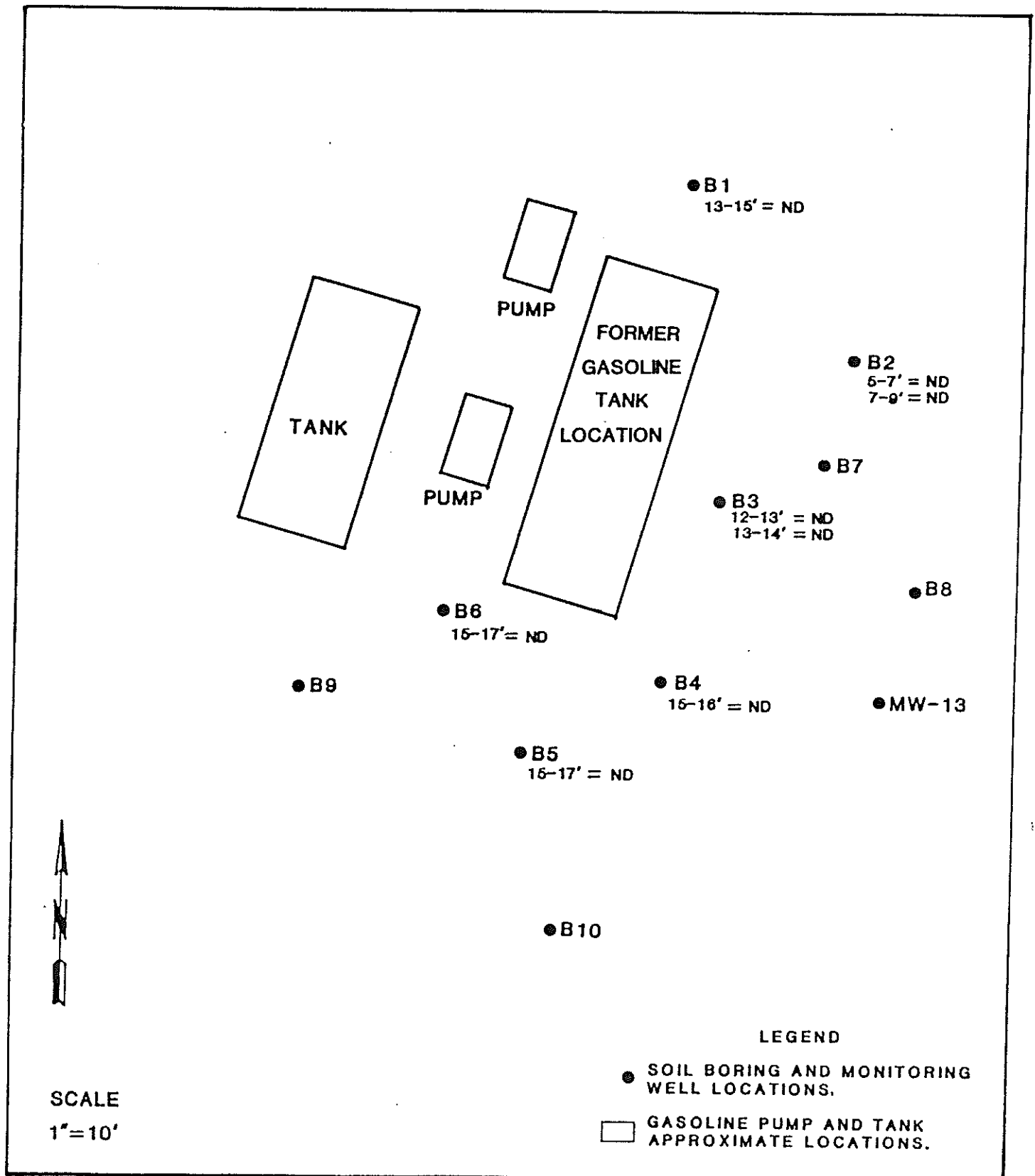
5.2 TRANSPORT MECHANISMS

Gasoline is lighter than water and will migrate at the water table downgradient to some release point. Three major components (described in Section 5.1) will dissolve to some extent in the infiltrate and may dissolve into the groundwater.

Temperature of the ground, product, and groundwater affect hydrocarbon solubility. Benzene solubility increases as the temperature is reduced to 0°C while toluene and m- and p-xylene increase in solubility and o-xylene decrease. While subsurface waters are cooler than surface waters, gasoline would be entering the aqueous phase in warmer water and be carried to cooler water. Pressure may affect hydrocarbon solubility. What little data there is indicates most hydrocarbon solubilities are not affected by pressure up to five atmospheres. At the present time, pH appear to have no significant effect on hydrocarbon solubility. Future investigations may include analytic evaluation of the above mentioned parameters (pH, temperature, and pressure).

Product mixing may affect final aqueous solubility of gasoline components but results are conflicting. One study concludes that constituent solubility increases 6 to 35% in the presence of other hydrocarbons (Brookman et al. 1985a). Another study found inter-constituent solubility unaffected or both decreasing and increasing

FIGURE 5-6
MTBE SOIL CONCENTRATIONS ($\mu\text{g}/\text{kg}$)



in certain instances (Brookman et al. 1985a). The interaction of constituents is complex and beyond the scope of this report but may be evaluated in future work.

Molecular substitution is the process of atomic exchange between nitrogens and oxygens in the soil and carbons in the petroleum components. Mobility is affected as other elements are exchanged into and out of the compound. Future work should individually evaluate each compound to correctly determine if molecular substitution would enhance or retard aqueous solubility and hence act as an effective attenuation mechanism.

5.3 CONTAMINANT ATTENUATION

Although PHC and its components have been detected deep in the soil to the top of the bedrock, various attenuation mechanisms may reduce some of the contaminant concentrations.

Volatilization of benzene-toluene-xylene (BTX) gasoline components into the atmosphere from the soil is an attenuation mechanism that may reduce local contamination. The selected components (BTX) have high (above 0.52) volatilization rates (benzene - 0.38, toluene - 0.65, m- and p-xylene 0.65, and o-xylene - 0.59 [Brookman 1985a]). Current lack of data would preclude correct estimation of product volatilized from the soil. The concrete pavement in the area may minimize the effects of volatilization and rainwater infiltration.

Adsorption of groundwater contaminants by carbon or organic soils is reported to be an effective attenuation mechanism for aromatic components present in gasoline (Versar 1979). The amount of soil carbon has been found to be proportional to gasoline attenuation, that is, the higher the percentage of organic carbon, the greater the percentage of gasoline that is attenuated. This attenuation

mechanism may be evaluated in the future through log octanol-water partition coefficients. The organic content of the topsoil determines the efficiency of adsorption. Natural organic soils have multiple constituents which selectively adsorb, so that site-specific soil tests are needed to quantify this process. Within the unsaturated zone, the soil permeability and adsorption will determine the removal rate per unit volume. At some sites, peat soil, loam, or surface vegetation will effectively remove contaminants from the pumped groundwater (assuming contamination) until equilibrium concentrations are reached. Gradual desorption to infiltrating precipitation and volatilization to the atmosphere would then dissipate the constituents.

Soil sorption of gasoline and hydrocarbon components has been reviewed in the literature and found to be a viable attenuation mechanism (Brookman et al. 1985a). Specific soil components that would affect soil attenuation would be pH, organic content, soil moisture, and soil consistency. The presence of high gasoline levels near the bedrock surface south of the former underground tank suggests the soil has not effectively attenuated the gasoline in this case.

Biodegradation is the process by which bacteria degrade gasoline components into less toxic or harmful products. Bacteria absorb the components as a nutrient and reproduce, using the gasoline components as a nutrient. The bacteria then die and decompose. Past bacterial tests (McKee et al. 1972) have found Pseudomonas and Arthrobacter species to be ubiquitously present in natural soil samples. These bacteria rapidly decay gasoline compounds in the aeration zone and act slower in saturated soil or rock. Gasoline products are degraded within a few years but may last up to 70 years. A more recent review of literature (Brookman et al. 1985a) reports other bacteria species to be effective in gasoline attenuation. One of the studies reviewed indicates that bacteria atte-

nuate 100% of the aromatics (BTX included) and does so within several years.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Borings and soil analyses were performed adjacent to the site of a former leaking underground gasoline storage tank at the Fisher Guide site. Petroleum contaminated soil has been identified with concentrations in excess of 1000 ppb. The contaminants include benzene, toluene, m-xylene, and o- and p-xylenes from petroleum hydrocarbon present in the soil. The field data and the analyzed soil samples demonstrate that contamination is predominantly at the 12 to 16 ft depth near the bedrock interface. The old hydrocarbon storage tank has been removed so no additional contamination is being introduced into the environment. The area impacted is southeast of the tank site. The existing data indicate contamination to the top of the bedrock, which approximately coincides with the water table. Five bedrock wells should be drilled and monitoring wells installed southeast of the former tank location. Those data would define the lateral extent of contamination at the top of the rock and allow collection of groundwater samples. A sixth well should be installed upgradient (northwest) of the site for control. During this program, soil samples above the bedrock should be analyzed to evaluate attenuation mechanisms. Analyses should include bacteria identification, pH, organic carbon content, sand, silt, clay content, porosity, permeability, soil moisture, and temperature and soil consistency. In addition, adherence of gasoline, water, and water/gasoline mixture in the soil should be evaluated for vadose zone flushing as the potential for a contaminants being mobilized into the groundwater from the soil.

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(continued)

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APPENDIX A
DRILL AND SAMPLE LOGS

b: 498-003
 Fisher Guide
 Began: 7/9/87
 Completed: 7/9/87
 Instruction Completed: N/A
 Instrument Method/Completed: N/A
 N/A
 Depth: 16.33 feet
 Refusal: 16.33 feet
 Interval: N/A
 N/A

Boring No.: B-1
 Permit No.:
 SWL (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casing: N/A
 Latitude:
 Longitude:
 Hole Dia.: 7.25 inches
 Monitoring Tube: N/A

Blows on Sampler			Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNU* (ppm)	CGI OXYGEN/EXPLOS.	Stratigraphic Column	Description
6" 12" 18"	12" 18" 24"									
						BACKGROUND				CONCRETE
						0	0.1	20.5%		Yellow-Red CLAY, little Silt, trace Red Shale (0.5ft) DRY
5										Yellow CLAY, little Silt, trace Red Shale (0.7ft) DRY
	4					0.5	0.1	20.5%		Red CLAY, little Red sandstone (0.2ft) DRY
	5		1.2							Brown Silt, some fine Sand (0.4ft) DRY
7						B-15				Red-brown CLAY, little Silt, little Red sandstone (0.7ft) DRY
	7					15	0.1	20.5%		Brown SAND, little Clay (0.4ft) MOIST
	9		0.2							Red-brown CLAY, little Sand (0.8ft) DRY
2						B-5				Green-grey CLAY (0.4ft) MOIST
	7					15	0.6	20.5%		Brown-Red CLAY, little Silt (0.8ft) DRY
	6		1.1							Green CLAY, trace Shale (0.3ft) MOIST
	5					B-5	8-0.5			Grey-green CLAY, little Silt (1.0ft) MOIST
	4		1.6			6	0.5	20.5%		Brown CLAY, little Silt (0.6ft) MOIST
4										Grey-green CLAY, little Silt (0.4ft) MOIST
	3					B-8	8-1			Grey-green CLAY, little Silt, trace Gravel, trace Red sandstone (1.7ft) MOIST
	4		1.1			8	1	20.5%		Brown-red CLAY, little Silt, trace Sand (0.3ft) MOIST
3										
	4					B-7	8-1.2			
	6		2.0			8/14	1.2	20.5%		
3										
	5					B-3	B-1.2			
	8		2.0			5	1.2	20.5%		

if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.

- Background level

LMS DRILLING LOG

Page 2 of 2

Project: Fisher Guide *

Boring No.: B-1

Project No.: 498-003

Permit No.:

[illegible]

* if / is shown $\rightarrow$ 1st reading is from the entire sample; 2nd reading is from the nose cone.

B - Background level

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/8/87
 Drilling Completed: 7/8/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 16.8 ft
 Depth to Refusal: 16.8 ft
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-2
 Permit No.:

SW (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casing: N/A
 Latitude:
 Longitude:
 Hole Dia.: 7.25 inches
 Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	ETC # Sample No.	Instrument Reading OVA* (ppm)	HNL* (ppm)	CGI OXYGEN/EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"								
0								BACKGROUND				CONCRETE
1								13	0.2	20.77%/oz		
2		7										Brown-red CLAY, trace concrete (0.25 ft)
3			16			.25	14	0.2	20.87%/oz			
4		5										Brown-red CLAY (0.33 ft)
5			4			.33	14	0.2	20.87%/oz			
6		2										Brown-red CLAY (0.33 ft) DRY
7			5				3628	B-17				Brown-red CLAY (0.33 ft) WET
8				3		1.67		18	0.2	20.87%/oz		Red-brown CLAY (1.0 ft) DAMP
9		4					3629					Red-brown CLAY (0.25 ft) DAMP
10			4					B-20				Red-brown CLAY, some silt (0.5 ft) WET
11				5		1.25		21	0.2	20.67%/oz		Black-yellow CLAY (0.5 ft) DAMP
12		3										Red-brown CLAY (0.2 ft)
13			3					B-33				Red-brown CLAY, some silt (0.67 ft)
14				5		1.1		34	0.8	20.54%/oz		Red-brown SAND, some clay, trace white sandstone (0.2 ft)
15		3										Red-brown CLAY, some silt, trace red sandstone (0.8 ft)
16			4					B-36				Grey CLAY, some silt (1.1 ft)
17				3		1.9		37	0.2	20.47%/oz		Red-brown CLAY, some sand (0.5 ft)
18		1										Brown-grey CLAY, little silt, trace gravel (1.5 ft)
19			2					B-38				
20				1		2.0		38	0.1	20.54%/oz		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.
 B - Background level

UFG DRILLING LOG

Page 2 of 2

Project: *Fisher Guide*

Boring No.: B-2

Project No.: 498-003

Permit No.:

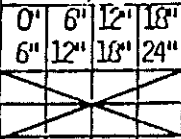
[illegible]

LMS DRILLING LOG

Page 1 of 2

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/8/87
 Drilling Completed: 7/8/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 16.92 feet
 Depth to Refusal: 16.92 feet
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-3
 Permit No.:
 SWL (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casing: N/A
 Latitude:
 Longitude:
 Hble Dia.: 7.25 inches
 Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	ETC # Sample No.	Instrument Reading OVA* (ppm)	H/NLC* (ppm)	CGI OXYGEN/EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"								
0								BACKGROUND				CONCRETE
								29	0.1	20.8%/O ₂		
4		4										Brown-orange Clay, some Silt, trace Sand, trace Gravel (1.0 ft) DRY
2			5									Red-orange Silt, some Clay, little Sand, little Gravel (0.3 ft) DRY
				23		1.3		29	0.1	20.8%/O ₂		
6												Red SANDSTONE
4		8										
			7									
				32		.3		29	0.1	20.8%/O ₂		
14												Yellow-red CLAY, trace Sand
6		10										
			12									
				8		.3		29	0.1	20.8%/O ₂		
4												Red-yellow CLAY, trace Sand, trace red Sandstone, MOIST
8		4										
			4				B-28					
				6		1.5		28	0.1	20.8%/O ₂		
4												Red CLAY, trace Sand, trace red sandstone, trace Concrete
10		4										
			4				B-26					
				4		.3		26	0.1	20.8%/O ₂		
3												Red-brown CLAY, trace Sand (0.5 ft)
12		2										Grey-brown CLAY, some Silt (1.5 ft) MOIST Petroleum odor in bottom 0.5 ft
			4				B-24					
				3		2.0	3627	25	120	20.8%/O ₂		Red-brown CLAY, trace Sand, trace Gravel (0.8 ft) Grey-brown CLAY, trace Sand (1.0 ft)
14		1										Red CLAY, trace Sand (0.2 ft) Petroleum odor
			2									
15				5		2.0	3626	182	190	20.8%/O ₂		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.
 B - Background level

LMS DRILLING LOG

Page 2 of 2

Project: Fisher Guide

Boring No.: B-3

Project No.: 498-003

Permit No.:

[illegible]

Hole No.: 498-003

Boring No.: B-4

Fisher Guide

Permit No.:

Log Began: 7/9/87

SWL (date): N/A

Log Completed: 7/9/87

Elevation, Ground Surface:

Construction Completed: N/A

Elevation, Top of Casings: N/A

Log Method/Completed: N/A

Latitude:

N/A

Longitude:

Depth: 16.42 Feet

Hole Dia.: 7.25 inches

to Refusal: 16.42 Feet

Monitoring Tube: N/A

Log Interval: N/A

Log: N/A

Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNU* (ppm)	CGI	OXYGEN/EXPLOS.	Stratigraphic Column	Description
0'	6"	12"	18"									
6"	12"	18"	24"									
							BACKGROUND					CONCRETE
							10	0.1	20.6%	0%		
9												Black-grey ASPHALT (0.2 ft)
	9											Red-brown CLAY, some Silt, little Sand (1.3 ft)
		8										
			9		1.5		10	0.1	20.6%	0%		Red-brown-yellow CLAY, some Silt, little Red Sandstone, trace Sand (1.1 ft)
7												
	8						B-11					
		13					12	0.2	20.6%	0%		
			9		1.1							Red-brown CLAY, some Silt (0.3 ft) DRY
7												Red-brown CLAY, some Silt (0.4 ft) WET
												White-yellow medium-grained SANDSTONE (0.2 ft)
		13					B-15	B-0.2	B-20.7%			Red-brown CLAY, some Silt (0.5 ft) DRY
			13		1.4		15	0.3	20.7%	0%		
8												Brown CLAY, some Silt (0.3 ft) MOIST
	5											Red-orange CLAY, trace Silt, trace decayed Shale (0.5 ft) DRY
		4					B-16	B-0.3	B-20.7%			
			4		0.8		17	0.3	20.7%	0%		
3												Red-brown CLAY, little Silt, trace Sand
	2											
		2					B-20	B-0.3	B-20.7%			
			3		1.1		20	0.4	20.7%	0%		Red-brown CLAY, little Red Sandstone, little Sand (1.4 ft)
3												Grey-black CLAY, little Red Sandstone (0.1 ft)
	4						B-23	B-0.3	B-20.7%			Petroleum odor
		4										
			5		1.5		22	2.5	20.6%	0%		Red-brown CLAY, little Silt (0.3 ft)
2												Grey CLAY (0.8 ft) Petroleum odor
	2											
		1					B-24	B-0.3				
			3		1.1		60	130	20.7%	0%		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.

B - Background level

LMS DRILLING LOG

Page 2 of 2

Project: Fisher Guide

Boring No.: B-4

Project No.: 498-003

Admit No.:

[illegible]

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/9/87
 Drilling Completed: 7/9/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 16.75 Feet
 Depth to Refusal: 16.75 Feet
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-5
 Permit No.:

SWL (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casing: N/A
 Latitude:
 Longitude:
 Hole Dia.: 7.25 inches
 Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNL* (ppm)	CGI OXYGEN/EXPLOS.	Strati- graphic Column	Description
	0' 6"	6' 12"	12' 18"	18' 24"								
0	~~XXXXXXXXXX~~							BACKGROUND				CONCRETE
								44	0.1	20.67%/0%		Black ASPHALT (0.4 ft)
2	12	26										Orange CLAY, some Silt (0.2 ft)
			30									Grey-black SILT (0.4 ft)
				20		1.0		43	0.2	20.67%/0%		Red SANDSTONE in nose
4	5											Red-brown CLAY, trace Silt (0.1 ft) DRY
	14	9						B-41				Red SANDSTONE (0.1 ft) DRY
				27		.2		41	0.1	20.67%/0%		Red-brown-black CLAY, little Asphalt, little Red Sandstone, trace sand (0.4 ft) DRY
6	4	2										Red-brown CLAY, trace sand (0.8 ft) DRY
			2					B-40				Brown-yellow CLAY, trace sand (0.4 ft) WET
				8		1.9		40	0.2	20.67%/0%		Red-brown CLAY, trace sand (0.3 ft) DRY
8	4											Red-black CLAY, little Asphalt (0.2 ft) DRY
	6											Red-brown CLAY, little sand (0.4 ft) DRY
		8						B-40				Red-brown CLAY, little sand, trace red sandstone (0.7 ft) MOIST
			7			1.3		41	0.2	20.77%/0%		Brown CLAY, trace Silt (0.5 ft) DRY
10	6											Red-brown CLAY, little red Sandstone, trace sand (0.9 ft) MOIST
		5						B-41				
			5			1.4		41	0.2	20.77%/0%		Red-brown CLAY, trace sand, trace mica, trace red sandstone, trace gravel MOIST
12	3											
		3										
			3					B-41				
				4		1.7		45	0.2	20.77%/0%		Red-brown CLAY (0.6 ft)
14	4											Grey CLAY, little red sandstone, trace organic matter (1.3 ft)
		5						B-45				
15			7			1.9		47	0.4	20.52%/0%		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.
 B - Background level

UFG DRILLING LOG

Page 2 of 2

st: Fisher Guide

Boring No.: B-5

File No.: 498-003

Permit No.:

[illegible]

LWS DRILLING LOG

Page 1 of 2

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/9/87
 Drilling Completed: 7/9/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 17 feet
 Depth to Refusal: 17 feet
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-6
 Permit No.:
 SWL (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casings: N/A
 Latitude:
 Longitude:
 Hole Dia.: 7.25 inches
 Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	H/NL* (ppm)	CGI OXYGEN/EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"								
0								BACKGROUND				CONCRETE
1	14							34	0.1	20.2/0%		Grey-black CLAY, little Sand, trace Coal, trace Glass (0.5 ft)
2		12								B-20.2		Orange-brown CLAY, trace Silt, trace Sand, trace red Sandstone (1.0 ft)
3			8			1.5		34	0.1	20.3/0%		Orange CLAY, some Silt (0.35 ft)
4				8								Red-brown CLAY, some Silt, some decayed Sandstone (0.4 ft)
5		13						B-31		B-20.5		Red SANDSTONE (0.25 ft) Tan SANDSTONE (0.1 ft)
6			15			1.2		31	0.1	20.5/0%		Red CLAY, some Silt (0.1 ft) DRY
7		3										Red-brown-yellow CLAY, trace Sand, trace red Sandstone DRY
8			5					B-18		B-20.4		
9				8		1.2		18	0.1	20.4/0%		Red-yellow CLAY, trace Sand (0.4 ft) DRY
10		10										Red-black CLAY, little Asphalt (0.3 ft) DRY
11			7					B-13		B-20.5		Red-brown CLAY, little Sand (1.3 ft) DRY
12				8		2.0		13	0.1	20.5/0%		Red-brown CLAY, little Silt (0.6 ft) DRY
13		3										Red-brown-yellow CLAY, little Silt (0.6 ft) MOIST
14			3					B-7		B-20.5		
15				3		1.2		7	0.1	20.5/0%		Red-yellow-brown CLAY, little Silt (0.3 ft) DRY
16		3										Red-brown-yellow CLAY, little Silt, trace red Sandstone, trace Organic matter (1.6 ft) MOIST
17			3					B-3.5		B-20.6		
18				4		1.9		18/14	0.1/1.0	20.6/0%		Red-yellow CLAY, little Silt (0.6 ft) DRY
19		4							20.2/0%			Grey-red CLAY, little Sand, trace Organic matter (1.4 ft) petroleum odor
20			3					B-0	B-0.1	B-20.6		
21				6		2.0		35/40	8.0/6.0	20.6/0%		

* if / is shown ---> 1st reading is from the entire sample; 2nd reading is from the nose cone.
 B - Background level

LMS DRILLING LOG

Page 2 of 2

Project: Fisher Guide

Boring No.: B-6

Project No.: 498-003

Permit No.:

[illegible]

LMS DRILLING LOG

Page 1 of 1

No: 498-003

Fisher Guide

ng Bagan: 7/10/87

Completed: 7/10/87

Instruction Completed: N/A

inent Method/Completed: N/A

N/A

Depth: 5.0 feet

Refusal: 5.0 feet

Interval: N/A

: N/A

Boring No.: B-7

Admit No.:

SWL (date): N/A

Elevation, Ground Surface:

Elevation, Top of Casing: *N/A*

Latitude:

Longitude:

Hole Dia.: 7.25 inches

Monitoring Tube: N/A

[illegible]

if / is shown $\rightarrow$ 1st reading is from the entire sample; 2nd reading is from the nose cone.
- Background level

LMS DRILLING LOG

Page 1 of 1

Project No: 498-003

Client: Fisher Guide

Drilling Began: 7/19/87

Drilling Completed: 7/19/87

Well Construction Completed: N/A

Development Method/Completed: N/A

Yield: N/A

Total Depth: 2 ft

Depth to Refusal: 2 ft

Screened Interval: N/A

Aquifer: N/A

Boring No.: B-8

Permit No.:

S/L (date): N/A

Elevation, Ground Surface:

Elevation, Top of Casing: N/A

Latitude:

Longitude:

Hole Dia.: 12 inches

Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNL* (ppm)	CGI OXYGEN/EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"								
0								BACKGROUND			00-0. 00-0. 0000 0000 000-0.	Black-grey COBBLES, some Sand, little Silt (2.0 ft)
2												Refusal at 2 ft. Hit large concrete object
4												
6												
8												
10												
12												
14												
15												

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.
B - Background level

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/13/87
 Drilling Completed: 7/13/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 17 feet
 Depth to Refusal: 17 feet
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-9

Permit No.:

SWL (date): N/A

Elevation, Ground Surface:

Elevation, Top of Casing: N/A

Latitude:

Longitude:

Hole Dia.: 7.25 inches

Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNU* (ppm)	CGI	OXYGEN/ EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"									
0	<del> </del>							BACKGROUND					CONCRETE
1	9							14	0	20.4	0%		
2	9												Brown-red CLAY, little Silt, trace Organic matter DRY
3		9											
4			20			1.1		14	0	20.4	0%		Brown-red CLAY, little Silt (0.1 ft) DRY Red SANDSTONE in nose cone (0.1 ft) DRY
5	6												
6	10												
7		21											
8			21			0.2		14	-	20.4	10%		Brown-red CLAY, little Silt, trace Gravel, trace scrap meta (1.0 ft) DRY
9	2												Brown-red CLAY, little Silt (0.5 ft) DAMP Green-red SAND (0.3 ft) MOIST
10	3												Brown-red CLAY, little Silt (0.1 ft) DAMP
11		2											Red-brown CLAY, little Silt, trace red Sandstone (0.9 ft) DRY
12			11			1.9		14	-	20.5	10%		Red-brown CLAY, little Silt, trace red Sandstone (0.5 ft) MOIST
13	6												Red-yellow CLAY, little Silt (0.6 ft)
14	7												
15		7				2.0		14	-	20.5	10%		Brown CLAY, little Silt (0.8 ft) DRY
16	6												Red-brown CLAY, little Silt (0.8 ft) DAMP
17	5							B-15					Red-brown CLAY, little Silt (0.2 ft) MOIST-WET
18		7				1.8		15	-	20.5	10%		Red-brown CLAY, little Silt, trace red Sandstone (1.4 ft) MOIST
19	3												
20	3												
21		3						B-15					
22			4			1.4		15	-	20.5	10%		Red-brown CLAY, little Silt (0.4 ft) DAMP
23	4												
24	5												
25		6						B-15					
26			11			0.4		15	-	20.5	10%		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.

B - Background level

UFG DRILLING LOG

Page 2 of 2

ct: Fisher Guide

Boring No.: B-9

ct No.: 498-003

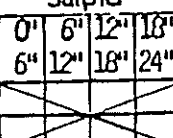
Permit No.:

[illegible]

Project No: 498-003
 Client: Fisher Guide
 Drilling Began: 7/13/87
 Drilling Completed: 7/13/87
 Well Construction Completed: N/A
 Development Method/Completed: N/A
 Yield: N/A
 Total Depth: 19 feet
 Depth to Refusal: 19 feet
 Screened Interval: N/A
 Aquifer: N/A

Boring No.: B-10
 Permit No.:

SWL (date): N/A
 Elevation, Ground Surface:
 Elevation, Top of Casing: N/A
 Latitude:
 Longitude:
 Hole Dia.: 7.25 inches
 Monitoring Tube: N/A

Depth in feet	Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	H/NL* (ppm)	CGI OXIGEN/EXPLOS.	Strati- graphic Column	Description
	0" 6"	6" 12"	12" 18"	18" 24"								
0								BACKGROUND				CONCRETE
								17	-	20.4/0%		
2		6										Grey CINDERS (0.6 ft) DRY
			7									Brown-yellow-red CLAY, little Silt, trace red Sandstone (1.0 ft) DRY
4				9		1.6		17	-	20.4/0%		Brown-yellow CLAY, little Silt (0.5 ft) DRY
		6										Brown-yellow CLAY, little Silt, little red Sandstone, trace Sand (0.5 ft) DRY
			9									Brown-red CLAY, little Silt, little red Sandstone (0.5 ft) DRY
				7		1.5		17	-	20.4/0%		Brown-grey CLAY and CINDERS (0.5 ft) DRY
6		2						B-22				Red SAND, little Clay (0.3 ft) DRY
			1									Red-brown CLAY, little Silt (0.3 ft) MOIST
												Yellow SANDSTONE, little Clay (0.1 ft) DRY
				7		1.3		22	-	20.2/0%		Red-brown CLAY, little Silt (0.1 ft) DRY
8		13										Red CLAY, little Silt, little Sand (0.5 ft) MOIST
			6					B-23				Red CLAY, little Silt (0.5 ft) DRY
				8		1.0		23	-	20.3/0%		
10		2										Red-brown CLAY, little Silt, trace red Sandstone (1.3 ft) DRY
			5					B-30				
				5		1.3		30	-	20.2/0%		Red-yellow CLAY, little Sand, little red Sandstone, little Silt (1.6 ft)
12		3										
			4					B-30				
				4		1.6		32	-	20.1/0%		Brown-red CLAY (0.4 ft) DRY
14		2										Grey CLAY, trace Silt, trace red Sandstone, trace Organic matter (1.5 ft) MOIST
			2					B-33				
15				4		1.9		34	-	20.0/0%		

* if / is shown --> 1st reading is from the entire sample; 2nd reading is from the nose cone.

B - Background level

LMS DRILLING LOG

Page 2 of 2

Project: Fisher Guide

Boring No.: B-10

Project No.: 498-003

Permit No.:

[illegible]

LMS DRILLING LOG

Page 1 of 1

No: 498-003

Fisher Guide

ng Began: 7/10/87

Completed: 7/10/87

Instruction Completed: 7/10/87

ment Method/Completed: 7/13/87

0.05 gpm

Depth: 75 ft.

b Refusal: 15 ft

d Interval: 4.5 - 14.5

∴ overburden

Boring No.: MW-13

Permit No.: 27-09193

SWL (date): 13.17 ft 7/13/87

Elevation, Ground Surface:

Elevation, Top of Casing:

Latitude:

Longitude:

Hole Dia.: 12 inches

Monitoring Tube: 4 inch SCH 20 PVC

Blows on Sampler				Retained Sample	Recovery (ft.)	Sample No.	Instrument Reading OVA* (ppm)	HNLL* (ppm)	CGI	OXYGEN/EXPLOS.	Stratigraphic Column	MONITOR WELL CONSTRUCTION	Description
0" 6"	6" 12"	12" 18"	18" 24"										
							BACKGROUND				000.		Black-grey COBBLES, Railroad Balast (3.0ft)
							13	.8	20.6%/oz.	0000			
							HAND DUG				0000		Red-brown CLAY, little red Sandstone, little Silt (0.7ft)
											0000		
3											0000		Red CLAY, little Silt, trace Gravel (0.5ft)
3											0000		
4											0000		Red CLAY, little Sand, little Silt (0.7ft) WET Red CLAY, little Silt, trace red Sandstone (0.7ft) DRY Grey CLAY, little Silt, trace Organic matter (0.1ft) DRY
8				.70	13	.8	20.6%/oz.				0000		
2							8-15	B-0			0000		Grey-red CLAY, trace Silt, trace Cinders (0.6ft)
3							15	0	20.6%/oz.		0000		
5				.5							0000		Grey CLAY, trace Silt, trace Organic matter (1.6ft)
5							B-15	B-0			0000		
5				1.5			15	0	20.6%/oz.		0000		Red-brown CLAY, trace Sand, trace Gravel (0.6ft) WET Red-brown CLAY, trace Sand (0.3ft) DRY, dense Red CLAY, some red Sandstone (0.4ft) DRY REFUSAL AT 15 FEET
5											0000		
3							B-16	B-0			0000		
2				.6			20	0	20.6%/oz.		0000		
3											0000		
4							B-16				0000		
4				1.6			22	0	20.7%/oz.		0000		
3											0000		
3											0000		
7							B-17				0000		
28				1.3			19	0	20.7%/oz.		0000		

* if / is shown $\rightarrow$ 1st reading is from the entire sample; 2nd reading is from the nose cone.

B - Background level

2 - Background level

APPENDIX B
SURVEYORS REPORT



Thomas Tyler Moore Associates, Inc.

67 SCOTCH RD., W. TRENTON, N.J. 08628
(609) 883-2313

THOMAS TYLER MOORE, Pres., P.E., P.L.S., P.P.
JOSEPH M. MAHAN, JR., Vice Pres., P.E.
DOROTHEA L. LANTZ, Secy., Treas., N.P.
PATRICIA C. DERR
DONALD H. KAMP, P.L.S.
MALCOLM D. LOWENHAUPT, P.L.S.
DAVID G. McALEESE, P.P.
CARL A. RETTENBERGER, P.E., P.L.S.

SUMMARY OF ELEVATIONS AND COORDINATES FOR MONITORING WELLS AND BORINGS AT FISHER BODY PLANT TRENTON, NEW JERSEY

<u>MONITORING WELL</u>	<u>GROUND ELEVATION</u>	<u>RIM OF CASTING</u>	<u>RIM OF PEIZOMETER TUBE</u>
MW-13	130.7	130.76	130.48

<u>WELL AND BORINGS</u>	<u>GROUND ELEVATION</u>	<u>NORTH COORDINATE</u>	<u>EAST COORDINATE</u>
MW-13	130.7	520,664.74	1,960,302.15
B-1	131.8	520,703.33	1,960,288.21
B-2	131.4	520,689.79	1,960,300.05
B-3	131.6	520,679.59	1,960,290.20
B-4	131.8	520,666.92	1,960,285.80
B-5	132.1	520,661.83	1,960,275.28
B-6	132.2	520,672.13	1,960,269.59
B-7	131.4	520,682.44	1,960,298.08
B-8	130.8	520,673.26	1,960,305.07
B-9	132.2	520,666.51	1,960,258.99
B-10	132.0	520,649.11	1,960,277.24

ELEVATIONS ARE IN NATIONAL GEODETIC VERTICAL DATUM.

COORDINATES ARE IN THE NEW JERSEY PLANE COORDINATE SYSTEM.

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: Fisher Body Division, General Motors Corp.

Name of Facility: Same as Permittee

Location: Trenton, Ewing Twp., Mercer County

NJPDES Number: NJ 0053295

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Water Allocation Section, 609-984-6831):

2 7 - 0 9 . 1 9 - 3

This number must be permanently affixed to the well casing.

Longitude (one-tenth of a second):

West 74° 48' 32.07"

Latitude (one-tenth of a second):

North 40° 15' 45.70"

Elevation of Top of Casing (cap off)

130.76

(one-hundredth of a foot):

Owners Well Number (As shown on the application or plans):

MW-13

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

John M. Dura

PROFESSIONAL LAND SURVEYOR'S NAME

(Please print or type)

SEAL

N.J.P.L.S. #28525

PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

APPENDIX C
CHAIN OF CUSTODY

ORIGINAL

Date Sealed 08 JULY 1987

By: DW/

Attn.: LEONARD BILLINGSLEY

Facility/Site:

Phone:

Address:

$$G_{mFB} + JST$$

facility:

~~G M F B T A N J P D~~

Facility/Site Code

(Optional Sample Point Descriptions)

Simple Point:

1: 5-6-4

$$15 - 16 + 17$$

| 8 | 7 | 0 | 7 | 0 | 7

0	7	0	7
---	---	---	---

Source Code
(from below)

Your Sample Point ID
(left justify)

Start Date
(YY/MM/DD)

Start Time
(2400 hr. clock)

Elapsed Hours
(composite)

Source Codes:

Well ..(W) Outfall(O) Bottom Sediment(B) Surface Impoundment.....(I) Leachate Collection Sys.....(C) Other(X)

Soil(S) River/Stream....(R) Generation Point(G) Treatment Facility(T) Lake/Ocean(L) Specify _____

SHUTTLE CONTENTS

[illegible]

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>LARRY Butlien</u> Signature: _____	Date: <u>7/9/87</u> Seal #: <u>0035331</u>	Time: <u>0830</u> Intact: <u>✓</u>
2.	I have received these materials in good condition from the above person. Name: <u>Larry Butlien</u> Date: <u>7/9/87</u> Time: <u>0900</u>		Signature: <u>Larry Butlien</u> Remarks: _____
3.	I have received these materials in good condition from the above person. Name: _____ Date: _____ Time: _____		Signature: _____ Remarks: _____
4.	Shuttle Sealed By: (print) <u>Larry Butlien</u> Signature: <u>Larry Butlien</u>	Date: <u>7/9/87</u> Seal #: <u>0085332</u>	Time: <u>1730</u> Intact: <u>✓</u>
LAB USE ONLY Opened By: <u>C. M. M. M.</u> Date: <u>7/10/87</u> Time: <u>11:00 am</u> SHUTTLE # <u>0081</u> TEMP. °C <u>13</u> SEAL # <u>85332</u> COND. <u>2.100</u>			



ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # BB 3903

Sample Point

5

Source Code

B-14 115T-1617

Sample Point I.D.

FIELD PROCEDURES

817161709PURGE DATE
(YY MM DD)091005START PURGE
(2400 Hr Clock)

ELAPSED HRS

 WATER VOL. IN CASING
(Gallons) VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Compositing

Y/N

Procedural Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

 1st (STD)
ph1st um/cm
spec. cond. at 25 ° C (other parameter) value units2nd (STD)
ph2nd um/cm
spec. cond. at 25 ° C (other parameter) value units3rd (STD)
ph3rd um/cm
spec. cond. at 25 ° C (other parameter) value units4th (STD)
ph4th um/cm
spec. cond. at 25 ° C (other parameter) value units (°C)
Sample Temp NTU
Turbidity

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

(Print)

LARRY BUTLIEN

Employer:

LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

7/9/87

(Date)

Larry Butlien

(Signature)

FIELD PARAMETER FORM (CC2)

Sample Point 151 A-151 Source Code 151 Sample Point I.D. 151

FIELD PROCEDURES

870709

PURGE DATE
(YY MM DD)

11110

START PURGE
(2400 Hr Clock)

ELAPSED HRS

WATER VOL. IN CASING
(Gallons)

VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type ☐ A-Submersible Pump ☐ D-Dipper/Bottle
☐ B-ISCO ☐ E-Bailer
☐ C-Bladder Pump ☐ F-Scoop/Shovel
X-Other _____ (SPECIFY OTHER)

Sampler Material ☐ A-Teflon ☐ C-PVC
☐ B-Metal ☐ D-Plastic
X-Other _____ (SPECIFY OTHER)

Tubing Material ☐ A-Teflon ☐ C-Polyethylene
☐ B-Tygon ☐ D-Silicon
X-Other _____ (SPECIFY OTHER)

Sample Compositing ☐ Y/N _____

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

1st <u> </u> (STD)	1st <u> </u> spec. cond.	um/cm at 25°C	<u> </u> (other parameter)	<u> </u> value	<u> </u> units
2nd <u> </u> (STD)	2nd <u> </u> spec. cond.	um/cm at 25°C	<u> </u> (other parameter)	<u> </u> value	<u> </u> units
3rd <u> </u> (STD)	3rd <u> </u> spec. cond.	um/cm at 25°C	<u> </u> (other parameter)	<u> </u> value	<u> </u> units
4th <u> </u> (STD)	4th <u> </u> spec. cond.	um/cm at 25°C	<u> </u> (other parameter)	<u> </u> value	<u> </u> units
<u> </u> ph	<u> </u> Sample Temp (°C)	<u> </u> Turbidity NTU			

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: LARRY BUTLER (Print) Employer: LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

7/9/87 (Date) Larry Butler (Signature)

ORIGINAL

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Date Sealed 08 JULY 1987 By: DW/

Company: LMS-FISHERBODY WORKS

Attn: LEONARD BILLINGSLEY

Facility/Site:

Phone:

Address:

SAMPLE IDENTIFICATION

Facility: G M F B T U S I
Facility/Site Code

Facility/Site Code

(Optional Sample Point Descriptions)

Sample Point: 15-18-16 15-17FT 870709 1420

Source Code (from below) Your Sample Point ID (left justify) Start Date (YY/MM/DD) Start Time (2400 hr. clock) Elapsed Hours (composite)

Source Code
(from below)

Your Sample Point ID
(left justify)

Start Date
(YY/MM/DD)

Start Time
(2400 hr. clock)

Elapsed Hours
(composite)

Source Codes:

Well (W)	Outfall (O)	Bottom Sediment (B)	Surface Impoundment (I)	Leachate Collection Sys. (C)	Other
----------------	-------------------	--------------------------	-------------------------------	-----------------------------------	-------------

Soil ... (S) River/Stream ... (R) Generation Point ... (G) Treatment Facility ... (T) Lake/Ocean ... (L) Specify _____

SHUTTLE CONTENTS

[illegible]

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>Larry Butlien</u>	Date: <u>7/9/87</u>	Time: <u>0800</u>
	Signature: <u>Larry Butlien</u>	Seal #: <u>0085331</u>	Intact: <u>✓</u>

2. I have received these materials in good condition from the above person.
Name: Larry Butlier Signature: Larry Butlier
Date: 7/9/87 Time: 1420 Remarks:

3.	I have received these materials in good condition from the above person.		
	Name: _____		Signature: _____
	Date: _____	Time: _____	Remarks: _____

4.	Shuttle Sealed By: (print) <u>Larry Butlien</u>	Date: <u>7/9/87</u>	Time: <u>1730</u>
	Signature: <u>Larry Butlien</u>	Seal #: <u>408538</u>	Intact: <u>✓</u>

LAB USE ONLY Opened By: not Date: 7/10/87 Time: 11:00
12 SEAL # 85333 COND 100%

FIELD PARAMETER FORM (CC2)

ETC JOB # BA 3905
 Sample Point 15 15-161 1 BT-V7 ft
 Source Code _____ Sample Point ID _____

FIELD PROCEDURES

87107.99

PURGE DATE
(YY MM DD)

114210

START PURGE
(2400 Hr Clock)

ELAPSED HRS

WATER VOL. IN CASING
(Gallons)

VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type ☐ A-Submersible Pump D-Dipper/Bottle
☐ B-ISCO E-Bailer
☐ C-Bladder Pump F-Scoop/Shovel
 X-Other _____ (SPECIFY OTHER)

Sampler Material ☐ A-Teflon C-PVC
☐ B-Metal D-Plastic
 X-Other _____ (SPECIFY OTHER)

Tubing Material ☐ A-Teflon C-Polyethylene
☐ B-Tygon D-Silicon
 X-Other _____ (SPECIFY OTHER)

Sample Compositing ☐ Y/N _____

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____ Well Depth (ft) _____
 Depth to Ground water (ft) _____ Sample Depth (non-well) (ft) _____
 Groundwater Elevation (ft msl) _____

1st _____ (STD) ph	1st _____ spec. cond.	um/cm at 25 °C	_____	_____	_____
2nd _____ (STD) ph	2nd _____ spec. cond.	um/cm at 25 °C	_____	_____	_____
3rd _____ (STD) ph	3rd _____ spec. cond.	um/cm at 25 °C	_____	_____	_____
4th _____ (STD) ph	4th _____ spec. cond.	um/cm at 25 °C	_____	_____	_____
_____ (°C) Sample Temp	_____ NTU Turbidity				

FIELD COMMENTS

Sample Appearance: _____
 Weather Conditions: _____
 Other: _____

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: Larry Butlier (Print) Employer: LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

7/9/87 Larry Butlier
 (Date) (Signature)

Seal No. 6143535 ETC Job # 003906

CHAIN OF CUSTODY FORM (CC1) ORIGINAL

Date Sealed 08 JULY 1987 By: DW/

Company: LMS-FISHERBODY WORKS

Attn: LEONARD BILLINGSLEY

Facility/Site:

Phone:

Address:

SAMPLE IDENTIFICATION

acility:

G	m	F	B	T	U	S	T		
---	---	---	---	---	---	---	---	--	--

Facility/Site Code

(Optional Sample Point Descriptions)

ample Point:

LS-LB-11131-157

570707

11610 St

1 1 1

Source Code
(from below)

Your Sample Point ID
(left justify)

Start Date
(YY/MM/DD)

Start Time
(2400 hr. clock)

Elapsed Hours
(composite)

Source Codes:

Well ... (W)	Outfall (O)	Bottom Sediment (B)	Surface Impoundment (I)	Leachate Collection Sys. (C)	Other (X)
Soil ... (S)	River/Stream ... (R)	Generation Point (G)	Treatment Facility (T)	Lake/Ocean (L)	Specify _____

Soil . . . (S) River/Stream . . (R)

Generation Point (G)

Treatment Facility ☒

Lake/Ocean _____ (4)

Other (X)

Soil . . . {S}

River/Stream... (R)

Generation Point (G)

Treatment Facility ☒

Lake/Ocean

Other (X)
Specify:

SHUTTLE CONTENTS

[illegible]

CHAIN OF CUSTODY CHRONICLE

1.	Shuttle Opened By: (print) <u>Larry Butlier</u>	Date: <u>7/9/87</u>	Time: <u>0800</u>
	Signature: <u>Larry Butlier</u>	Seal #: <u>0085331</u>	Intact: <u>✓</u>

I have received these materials in good condition from the above person.

2. Name: Larry Butlien Signature: Larry Butlien
Date: 7/9/87 Time: 1605 Remarks: OK

I have received these materials in good condition from the above person.

3. Name: _____ Signature: _____
 Date: _____ Time: _____ Remarks: _____

4.	Shuttle Sealed By: (print) <u>Larry Butlien</u>	Date: <u>7/9/87</u>	Time: <u>1730</u>
	Signature: <u>Larry Butlien</u>	Seal #: <u>2085332</u>	Intact: <u>✓</u>

AB USE ONLY Opened By: W. Cole Date: 9/10/87 Time: 4:00a
HUTTLE # 087 TEMP. °C 13 SEAL # 85377 COND. Testal



ETC JOB #

BB 3906

FIELD PARAMETER FORM (CC2)

Sample Point

Source Code

Sample Point I.D.

FIELD PROCEDURES

8710709

PURGE DATE
(YY MM DD)

11605

START PURGE
(2400 Hr Clock)

ELAPSED HRS

WATER VOL. IN CASING
(Gallons)VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Composed

Y/N

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

1st (STD) ph1st um/cm at 25°C

(other parameter)

value

units

2nd (STD) ph2nd um/cm at 25°C

(other parameter)

value

units

3rd (STD) ph3rd um/cm at 25°C

(other parameter)

value

units

4th (STD) ph4th um/cm at 25°C

(other parameter)

value

units

 (°C)
Sample Temp NTU
Turbidity

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

(Print)

Larry Butlier

Employer:

LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

(Date)

7/9/87

(Signature)

Larry Butlier

ORIGINAL



FIELD PARAMETER FORM (CC2)

ETC JOB # BB 36 26

Sample Point

Source Code

Sample Point ID

FIELD PROCEDURES

8/7/07 08PURGE DATE
(YY MM DD)11799START PURGE
(2400 Hr Clock)

ELAPSED HRS

 WATER VOL. IN CASING
(Gallons) VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Compositing

☐ Y/N

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

1st

(STD)

ph

1st

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

2nd

(STD)

ph

2nd

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

3rd

(STD)

ph

3rd

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

4th

(STD)

ph

4th

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

 (*C)
Sample Temp NTU
Turbidity

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

(Print)

Larry Butlien

Employer:

LPMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

(Date)

7/8/87

(Signature)

Larry Butlien

FIELD PARAMETER FORM (CC2)

Sample Point

15 B-13 12-13 AAA

Source Code

Sample Point I.D.

FIELD PROCEDURES

8710708PURGE DATE
(YY MM DD)12010START PURGE
(2400 Hr Clock)

ELAPSED HRS

 WATER VOL. IN CASING
(Gallons) VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Compositing

Y/N

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

 1st (STD)

ph

1st um/cm
at 25°C

spec. cond.

(other parameter)

value

units

2nd (STD)

ph

2nd um/cm
at 25°C

spec. cond.

(other parameter)

value

units

3rd (STD)

ph

3rd um/cm
at 25°C

spec. cond.

(other parameter)

value

units

4th (STD)

ph

4th um/cm
at 25°C

spec. cond.

(other parameter)

value

units

 (°C)
Sample Temp NTU
Turbidity

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

(Print)

Larry Butlien

Employer:

LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

(Date)

(Signature)

2/8/87Larry Butlien

ORIGINAL

SUBCONTRACT
REQUEST FOR ANALYSIS
and SAMPLE CHAIN OF CUSTODY

LOGLINK: 22396

MATRIX: SOIL

NAME OF SUBCONTRACT LAB: Chyun

ETC JOB NUMBERS: B03606 B03627 B03628 B03629

TURNAROUND IN DAYS: NORM DATE DATA REQUIRED: 7-19-87
(If deadline cannot be met, contact ETC Subcontract Group).

Send invoice, bill and reports to : ETC Subcontract Group
(201)225-6746 or 6753

Please perform the analyses requested below:

☐ Acidity	☐ Alkalinity	☐ Ammonia(NH3)
☐ Ammonia(dist.)	☐ Bicarbonate	☐ BOD(5 day)
☐ Bromide	☐ Carbonate	☐ Chloride
☐ Chem.Oxygen Dem.	☐ Chromium+6	☐ Fecal Coliform
☐ Total Coliform	☐ Color,apparent	☐ Cyanide,total
☐ Fluoride	☐ Formaldehyde(UV)	☐ Hardness
☐ Nitrate(NO3)	☐ Nitrite(NO2)	☐ TKN
☐ Odor	☐ Oil & Grease(grav)	☐ T.Organic Carb.
☒ Pet.Hydro(IR)	☐ Pet.Hydro(grav)	☐ Phenolics,tot.
☐ Phenolics(5ug/l)	☐ Phosphate(ortho)	☐ Phosphate(total)
☐ Phosphorus(tot.)	☐ Silica(dissolved)	☐ Sulfate(SO4)
☐ Sulfide(S)	☐ Sulfite(SO3)	☐ Surfactant(MBAS
☐ Solids,Total	☐ Solids,Tot. Diss.	☐ Solids,Tot.Setl.
☐ Solids,Tot. Sus.	☐ Solids,Tot. Vol.	☐ Turbidity
☐ Gross Alpha,Beta	☐ Radium 226	☐ Radium 228

Others: _____

Chain of Custody Section for Courier Pick up at ETC

Sample(s) Relinquished by:(ETC) Travina Patel

Time: 6:20 Date: 7-9-87

Sample(s) Received by: John Schum

Time: 6:20 PM Date: 7-9-87

Chain of Custody Section for Sending Sample from ETC

Sample Shuttle sealed by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

Sample Shuttle opened by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

Was the Seal intact? _____ Are the shuttle contents in good condition? _____

Chain of Custody Section for Returning Sample to ETC

Sample Shuttle sealed by: _____

Date: ____/____/____ Time: _____ Seal Number: _____

Sample Shuttle opened by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

Was the Seal intact? _____ Are the shuttle contents in good condition? _____

Date Sealed 09 July 1987 By: EG

Attn: Leornard Billingsley

ity/Site:

Phone:

Address:

ity:

Facility/Site Code

(Optional Sample Point Descriptions)

le Point:

Source Code
(from below)

Your Sample Point ID
(left justify)

Start Date
(YY/MM/DD)

Start Time
(2400 hr. clock)

Elapsed Hours
(composite)

Use Codes:

(W) Outfall.....(O) Bottom Sediment....(B) Surface Impoundment.....(I) Leachate Collection Sys.....(C) Other.....(X)
(S) River/Stream....(R) Generation Point....(G) Treatment Facility.....(T) Lake/Ocean.....(L) Specify.....

[illegible]

Shuttle Opened By: (print) Larry Butlien Date: 7/8/87 Time: 1130
Signature: Larry Butlien Seal #: 0085511 Intact: ✓

I have received these materials in good condition from the above person.
Name: Larry Butlien Signature: Larry Butlien
Date: 7/8/87 Time: 1300 Remarks: _____

I have received these materials in good condition from the above person.
Name: _____ Signature: _____
Date: _____ Time: _____ Remarks: _____

Shuttle Sealed By: (print) _____ Date: _____ Time: _____
Signature: _____ Seal #: _____ Intact: _____

SE ONLY Opened By: Pravina Patel Date: 7/9/87 Time: 9:00
TLE # 1203 TEMP. °C 8 SEAL # 85512 COND. 0-K



FIELD PARAMETER FORM (CC2)

ETC JOB # BB 3628
Sample Point 15 B-12 15-7 WV
Source Code Sample Point I.D.

FIELD PROCEDURES

8.7.10.7.9.8PURGE DATE
(YY MM DD)1.3.90START PURGE
(2400 Hr Clock)

ELAPSED HRS

 WATER VOL. IN CASING
(Gallons) VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Composited

☐ Y/N

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

 1st (STD)
ph1st um/cm
spec. cond. at 25 ° C (other parameter) value units2nd (STD)
ph2nd um/cm
spec. cond. at 25 ° C (other parameter) value units3rd (STD)
ph3rd um/cm
spec. cond. at 25 ° C (other parameter) value units4th (STD)
ph4th um/cm
spec. cond. at 25 ° C (other parameter) value units (°C)
Sample Temp NTU
Turbidity

FIELD COMMENTS

Sample Appearance: Weather Conditions: Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

Larry Bublien
(Print)

Employer:

LMS

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

7/8/87
(Date)Larry Bublien
(Signature)

SUECONTRACT
REQUEST FOR ANALYSIS
and SAMPLE CHAIN OF CUSTODY

LOGLINK: 22396

MATRIX: SOIL

NAME OF SUBCONTRACT LAB: Chyun

ETC JOB NUMBERS: B03606 B03627 B03628 B03629

TURNAROUND IN DAYS: NORM DATE DATA REQUIRED: 7-19-87
(If deadline cannot be met, contact ETC Subcontract Group).

Send invoice, bill and reports to : ETC Subcontract Group
(201)225-6746 or 6753

Please perform the analyses requested below:

☐ Acidity	☐ Alkalinity	☐ Ammonia(NH3)
☐ Ammonia(dist)	☐ Bicarbonate	☐ BOD(5 day)
☐ Bromide	☐ Carbonate	☐ Chloride
☐ Chem.Oxygen Dem.	☐ Chromium+6	☐ Fecal Coliform
☐ Total Coliform	☐ Color, apparent	☐ Cyanide, total
☐ Fluoride	☐ Formaldehyde(UV)	☐ Hardness
☐ Nitrate(NO3)	☐ Nitrite(NO2)	☐ TKN
☐ Odor	☐ Oil & Grease(grav)	☐ T.Organic Carb.
☒ Pet.Hydro(IR)	☐ Pet.Hydro(grav)	☐ Phenolics, tot.
☐ Phenolics(5ug/l)	☐ Phosphate(ortho)	☐ Phosphate(total)
☐ Phosphorus(tot.)	☐ Silica(dissolved)	☐ Sulfate(SO4)
☐ Sulfide(S)	☐ Sulfite(SO3)	☐ Surfactant(MBAS
☐ Solids, Total	☐ Solids, Tot. Diss.	☐ Solids, Tot. Setl.
☐ Solids, Tot. Sus.	☐ Solids, Tot. Vol.	☐ Turbidity
☐ Gross Alpha, Beta	☐ Radium 226	☐ Radium 228

Others: _____

Chain of Custody Section for Courier Pick up at ETC

Sample(s) Relinquished by:(ETC) Travina Patel

Time: 6:20 Date: 7-9-87

Sample(s) Received by: Jahn Schum

Time: 6:20 PM Date: 7-9-87

Chain of Custody Section for Sending Sample from ETC

Sample Shuttle sealed by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

Sample Shuttle opened by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

Was the Seal intact? _____ Are the shuttle contents in good condition? _____

Chain of Custody Section for Returning Sample to ETC

Sample Shuttle sealed by: _____

Date: ____/____/____ Time: _____ Seal Number: _____

Sample Shuttle opened by : _____

Date: ____/____/____ Time: _____ Seal Number: _____

ETC JOB # BB 3629

FIELD PARAMETER FORM (CC2)

Sample Point

Source Code

Sample Point I.D.

FIELD PROCEDURES

8.7.10.7.10.8PURGE DATE
(YY MM DD)1.3.1.15START PURGE
(2400 Hr Clock)

ELAPSED HRS

 WATER VOL. IN CASING
(Gallons) VOLUME PURGED
(Gallons)

SAMPLING METHOD:

Sampler Type

☐A-Submersible Pump
B-ISCO
C-Bladder PumpD-Dipper/Bottle
E-Bailer
F-Scoop/Shovel

X-Other

(SPECIFY OTHER)

Sampler Material

☐A-Teflon
B-MetalC-PVC
D-Plastic

X-Other

(SPECIFY OTHER)

Tubing Material

☐A-Teflon
B-TygonC-Polyethylene
D-Silicon

X-Other

(SPECIFY OTHER)

Sample Composited

Y/N

Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Well Depth (ft)

Depth to Ground water (ft)

Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

 1st (STD)

ph

1st

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

2nd (STD)

ph

2nd

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

3rd (STD)

ph

3rd

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

4th (STD)

ph

4th

spec. cond.

um/cm
at 25 °C

(other parameter)

value

units

 (°C)

Sample Temp

Turbidity

NTU

FIELD COMMENTS

Sample Appearance:

Weather Conditions:

Other:

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler:

(Print)

Larry Butlien

Employer:

LM5

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

(Date)

7/8/87

(Signature)

Larry Butlien

ORIGINAL

SUBCONTRACT
REQUEST FOR ANALYSIS
and SAMPLE CHAIN OF CUSTODY

LOGLINK: 2239

MATRIX: SOIL

NAME OF SUBCONTRACT LAB: Chyun

ETC JOB NUMBERS: B03626 B03627 B03628 B03629

TURNAROUND IN DAYS: NORM DATE DATA REQUIRED: 7-19-87
(If deadline cannot be met, contact ETC Subcontract Group).

Send invoice, bill and reports to : ETC Subcontract Group
(201)225-6746 or 6753

Please perform the analyses requested below:

☐ Acidity	☐ Alkalinity	☐ Ammonia(NH3)
☐ Ammonia(dist)	☐ Bicarbonate	☐ BOD(5 day)
☐ Bromide	☐ Carbonate	☐ Chloride
☐ Chem.Oxygen Dem.	☐ Chromium+6	☐ Fecal Coliform
☐ Total Coliform	☐ Color, apparent	☐ Cyanide, total
☐ Fluoride	☐ Formaldehyde(UV)	☐ Hardness
☐ Nitrate(NO3)	☐ Nitrite(NO2)	☐ TKN
☐ Odor	☐ Oil & Grease(grav)	☐ T.Organic Carb.
☒ Pet.Hydro(IR)	☐ Pet.Hydro(grav)	☐ Phenolics, tot.
☐ Phenolics(5ug/l)	☐ Phosphate(ortho)	☐ Phosphate(total)
☐ Phosphorus(tot.)	☐ Silica(dissolved)	☐ Sulfate(SO4)
☐ Sulfide(S)	☐ Sulfite(SO3)	☐ Surfactant(MBAS)
☐ Solids, Total	☐ Solids, Tot. Diss.	☐ Solids, Tot. Set1.
☐ Solids, Tot. Sus.	☐ Solids, Tot. Vol.	☐ Turbidity
☐ Gross Alpha, Beta	☐ Radium 226	☐ Radium 228

Others: _____

Chain of Custody Section for Courier Pick up at ETC

Sample(s) Relinquished by: (ETC) Pravina Patel
Time: 6:30 Date: 7-9-87
Sample(s) Received by: John Schum
Time: 6:20 PM Date: 7-9-87

Chain of Custody Section for Sending Sample from ETC

Sample Shuttle sealed by : _____
Date: ____/____/____ Time: _____ Seal Number: _____
Sample Shuttle opened by : _____
Date: ____/____/____ Time: _____ Seal Number: _____
Was the Seal intact? _____ Are the shuttle contents in good
condition? _____

Chain of Custody Section for Returning Sample to ETC

Sample Shuttle sealed by: _____
Date: ____/____/____ Time: _____ Seal Number: _____
Sample Shuttle opened by : _____
Date: ____/____/____ Time: _____ Seal Number: _____

APPENDIX D
LABORATORY RESULTS

AUG 13, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports						
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
BB3903	GENERAL MOTORS	GMFBTUST	SB-4 15-16	870709	0900	

NPDES Number	Compound Acetaminophen and Acetylsalicylic acid values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg ^a	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
3V Benzene		ND	4400	266	228	ND	18.0	98	ND	90000	102
25V Toluene		16800	6000	563	629	ND	18.0	103	278000	90000	58
m-Xylene		40200	10000	30800	34800	ND	15.0	112	133000	75000	60
o+p-Xylenes		41400	10000	14200	17400	ND	30.0	110	99400	150000	85
Methyl tertiary butyl ether		ND	10000	ND	ND	ND	90.0	93	ND	450000	113
^a Sample required dilution, due to the nature of the matrix, which resulted in these elevated MDLs.											

ETC

TESTING and CERTIFICATION

SEP 2, 1987

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports						
BB3903	GENERAL MOTORS	GMFBTUST	SB-4 15-16	87070	0900	0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added ug	% Recovery	Control Limits.	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	97	81	117
p-Bromofluorobenzene	.250	99	74	121
1,2-Dichloroethane-D4	.250	104	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	12
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20..	150..
* IFB EPA Control Limits				
** Advisory Limits Only				

* IFB EPR Control Limits
 ** Advisory Limits Only

ETC Job # B63903

ite: 7-16-87

Sample Point:

□	—								
Source Code		(Sample Point ID)							

Date Sampled:

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 Time Sampled:

		:		
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Y Y M M D D H H M M

Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
19	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l			
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			
	PETROLEUM HYDROCARBONS		Hg/kg	2.10	5	MB-45 JW

ETCENVIRONMENTAL
TESTING and CERTIFICATION

SEP 2, 1987

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports					
BB3904	GENERAL MOTORS	GMFBTUST	SB-5 15-17	87070	1110 0
ETC Sample No.	Company	Facility	Sample Point	Date	Time Elapsed Hours

Compound	Amount added ug	% Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	101	81	117
p-Bromofluorobenzene	.250	103	74	121
1,2-Dichloroethane-D4	.250	107	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20..	150..

* 175 EPA Control Limits
** Advisory Limits Only

REV

ETC Job # BB3974

Date: 7-16-87

Sample Point: ☐ — ☐☐☐☐☐☐☐☐☐☐

Source Code (Sample Point) O

Time Sampled: :

[Signature]

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA
Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

B83905 GENERAL MOTORS

GMFBTUST

SB-6 15-17 870709 1420

ETC Sample No.

Company

Facility

Sample Point

Date _____

Time

Elapsed
Hours

NPDES Number	Compound Acetamin and Methylenechloride values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kgx	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
3V Benzene		41300	4400	266	228	ND	18.0	98	ND	90000	102
25V Toluene		380000	6000	563	629	ND	18.0	103	278000	90000	58
m-Xylene		340000	10000	30800	34800	ND	15.0	112	133000	75000	60
o+p-Xylenes		354000	10000	14200	17400	ND	30.0	110	99400	150000	85
Methyl tertiary butyl ether		ND	10000	ND	ND	ND	90.0	93	ND	450000	113
A Sample required dilution, due to the nature of the matrix, which resulted in these elevated MDLs.											

ETCENVIRONMENTAL
TESTING and CERTIFICATION

SEP 2, 1987

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports					
BB3905	GENERAL MOTORS	GMFBTUST	SB-6 15-17	87070	1420 0
ETC Sample No.	Company	Facility	Sample Point	Date	Time Elapsed Hours

Compound	Amount added ug	% Recovery	Control Limits,	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	98	81	117
p-Bromofluorobenzene	.250	110	74	121
1,2-Dichloroethane-D4	.250	107	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloredate	-	-	20..	150..
1 IFB EPA Control Limits ** Advisory Limits Only				

1 IFB EPA Control Limits
22 Advisory Limits Only

ETC

ENVIRONMENTAL
TESTING and CERTIFICATION

JUL 20, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Conventional Analysis Data (QR10)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3905 GENERAL MOTORS

GMFBTUST

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

NPDES Number	Results									
	Sample Concen. mg/kg	MDL mg/kg								
Petroleum Hydrocarbons (IR)	1650	5								

Subcontracted Analytical Results

ETC Job # 663976

Lab ID: 187886-63

Submitted by: SALAYON

Date: 7-16-87

Facility: _____
(Facility Code)

[illegible]

Date Sampled:

Y	Y	M	M	D

Time Sampled: :
 H H M M

[illegible]

ETC

ENVIRONMENTAL
TESTING and CERTIFICATION

AUG 7, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3906 GENERAL MOTORS

GMFBTUST SB-1 13-15 870709 1605

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

NPDES Number	Compound Acetone and Acrylonitrile values not screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concn. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concn. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concn. Added ug/kg	% Recov
3V Benzene		106	4.4	ND	ND	ND	18.0	102	ND	18.0	102
25V Toluene		29.5	6.0	ND	ND	ND	18.0	101	ND	18.0	98
m-Xylene		67.3	10	ND	ND	ND	15.0	108	ND	15.0	104
o+p-Xylenes		68.2	10	ND	ND	ND	30.0	109	ND	30.0	104
Methyl tertiary butyl ether		ND	10	ND	ND	ND	90.0	110	ND	90.0	90

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery – Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3906	GENERAL MOTORS	GMFBTUST	SB-1	13-15	87070	1605	0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed	Hours

Compound	Amount added ug	% Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	106	81	117
p-Bromofluorobenzene	.250	103	74	121
1,2-Dichloroethane-D4	.250	106	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20..	150..

* IFB EPA Control Limits
 ** Advisory Limits Only

ETC Job # BB3936

ib ID: 687886-EH

Submitted by: SN RHYUN

ate: 7-16-87

Facility: _____
(Facility Code)

Sample Point:

□	—	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>									
Source Code		(Sample Point ID)									

Date Sampled:

Y	Y	M	M	D	D

Time Sampled: :
 H H M M

[illegible]

AUG 13, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA									
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Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3626 GENERAL MOTORS

GMFBTUST SB-3 13-14 870708 1700

ETC Sample No.

Company

Facility

Sample Point

Date _____

Time

Elapsed
Hours

NPDES Number	Compound Acetamin and Acrylonitrile values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg ^a	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
3V Benzene	ND	4400	266	228	ND	18.0	98	ND	90000	102	
25V Toluene	ND	6000	563	629	ND	18.0	103	278000	90000	58	
m-Xylene	BMDL	10000	30800	34800	ND	15.0	112	133000	75000	60	
o+p-Xylenes	BMDL	10000	14200	17400	ND	30.0	110	99400	150000	85	
Methyl tertiary butyl ether	ND	10000	ND	ND	ND	90.0	93	ND	450000	113	
^a A Sample required dilution, due to the nature of the matrix, which resulted in these elevated MDLs.											

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports					
BB3626 GENERAL MOTORS		GMFBTUST SB-3 13-14 87070 1700 0			
ETC Sample No.	Company	Facility	Sample Point	Date	Time Elapsed Hours

Compound	Amount added ug	% Recovery	Control Limits .	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	100	81	117
p-Bromofluorobenzene	.250	96	74	121
1,2-Dichloroethane-D4	.250	106	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloredate	-	-	20..	150..
* 198 EPA Control Limits ** Advisory Limits Only				

ETC

Subcontracted Analytical Results

ETC Job # B B 3 6 2 6

Lab ID: 187864-Q1

Submitted by: PWCHUN

Date: 7-16-87

Facility: _____
(Facility Code)

Sample Point: ☐ — ☐☐☐☐☐☐☐☐☐☐

Source Code Sample Point: 0

Date Sampled:

Y	Y	M	M	D

Time Sampled:

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[illegible]

AUG 7, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA
Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports									
BB3627		GENERAL MOTORS			GMFBTUST		SB-3 12-13 870708 1700		
ETC Sample No.		Company			Facility		Sample Point		Elapsed Time Hours

NPDES Number	Compound Acetone and Acrylonitrile values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
3V	Benzene	757	4.4	ND	ND	ND	18.0	102	ND	18.0	102
25V	Toluene	1350	6.0	ND	ND	ND	18.0	101	ND	18.0	98
	m-Xylene	2090	10	ND	ND	ND	15.0	108	ND	15.0	104
	o+p-Xylenes	2400	10	ND	ND	ND	30.0	109	ND	30.0	104
	Methyl tertiary butyl ether	ND	10	ND	ND	ND	90.0	110	ND	90.0	90

August 6, 1987

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports					
BB3627					
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	86	81	117
Bromofluorobenzene	.250	0***	74	121
1,2-Dichloroethane-D4	.250	104	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)****				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20**	150**

■ IFB EPA Control Limits.

■* Advisory Limits Only.

■*** Recovery variable due to sample matrix interference.

* IFB EPA Control Limits.

** Advisory Limits Only.

*** Recovery variable due to sample matrix interference.

Subcontracted Analytical Results

ETC Job #

333427

187864-Q2

itted by: Richard

Facility:

(Facility Code)

Sample Point:

[Source Code](#)

(Sample Point) ID

Date Sampled:

1 2 3 4 5

Time Sampled:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

Y Y M M D D

H	H	M	M	

[illegible]

AUG 7, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3628 GENERAL MOTORS

GMFBTUST

SB-2 5-7

870708 1300

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

NPDES Number	Compound Acrolein and Acrylonitrile values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. ed ug/kg	% Recov
3V	Benzene	ND	4.4	ND	ND	ND	18.0	102	ND	18.0	102
25V	Toluene	ND	6.0	ND	ND	ND	18.0	101	ND	18.0	98
	m-Xylene	ND	10	ND	ND	ND	15.0	108	ND	15.0	104
	o+p-Xylenes	ND	10	ND	ND	ND	30.0	109	ND	30.0	104
	Methyl tertiary butyl ether	ND	10	ND	ND	ND	90.0	110	ND	90.0	90

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3628	GENERAL MOTORS	GMFBTUST	SB-2 5-7	87070	1300	0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added ug	% Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	101	81	117
p-Bromofluorobenzene	.250	101	74	121
1,2-Dichloroethane-D4	.250	89	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20..	150..

* 1PB EPH Control Limits
 ** Advisory Limits Only

ETC Job # BB3628

Time Sampled:
 H H M M

Petroleum Hydrocarbons (IR) mg/kg	7	5	10-15
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AUG 7, 1987

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

BB3629 GENERAL MOTORS

GMFBTUST

SB-2 7-9

870708 1315

ETC Sample No.

Company

Facility

Sample Point

Date

Time

Elapsed
Hours

NPDES Number	Compound Acrolein and Acrylonitrile values are screen only.	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
3V Benzene		ND	4.4	ND	ND	ND	18.0	102	ND	18.0	102
25V Toluene		ND	6.0	ND	ND	ND	18.0	101	ND	18.0	98
m-Xylene		ND	10	ND	ND	ND	15.0	108	ND	15.0	104
o+p-Xylenes		ND	10	ND	ND	ND	30.0	109	ND	30.0	104
Methyl tertiary butyl ether		ND	10	ND	ND	ND	90.0	110	ND	90.0	90

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery - Solid Matrices (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports					
BB3629					
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	.250	125***	81	117
Bromofluorobenzene	.250	120	74	121
1,2-Dichloroethane-D4	.250	119	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)****				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchloroendate	-	-	20**	150**

* IFB EPA Control Limits.
** Advisory Limits Only.
*** Recovery manually verified.

Subcontracted Analytical Results

ETC Job # B B 3 6 2 9

Lab ID: 28786A-07

Submitted by V. J. Cullen

File: 7-16-870

[illegible]

(Facility Code)

Sample Point:

Source Code

(Sample Point ID)

Date Sampled: / /

Y Y M M D D

Time Sampled:

1-3	4-5	6-7	8-9	10-11
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Line No.	Parameter	Table	Units Of Measure	Value	MDL	Comments
METALS						
1	Arsenic	QR 05, 41	ug/l		50	
2	Barium	QR 41	ug/l		150	
3	Cadmium	QR 05, 41	ug/l		10	
4	Chromium	QR 05, 41	ug/l		40	
5	Lead	QR 05, 41	ug/l		50	
6	Mercury	QR 05, 41	ug/l		0.2	
7	Selenium	QR 05, 41	ug/l		10	
8	Silver	QR 05, 41	ug/l		10	
9	Iron	QR 41	ug/l		30	
10	Manganese	QR 41	ug/l		20	
11	Sodium	QR 41	ug/l		10	
12	Antimony	QR 05	ug/l			
13	Beryllium	QR 05	ug/l		10	
14	Copper	QR 05	ug/l		20	
15	Nickel	QR 05	ug/l		60	
16	Thallium	QR 05	ug/l			
17	Zinc	QR 05	ug/l		5	
18	Boron		ug/l			
19	Calcium		ug/l			
20	Magnesium		ug/l			
21	Aluminum		ug/l			
22	Chromium, Hexavalent		ug/l			
23	Cobalt		ug/l			
24	Molybdenum		ug/l			
25	Potassium		ug/l			
26	Strontium		ug/l			
27	Tin		ug/l			
28	Vanadium		ug/l			
	<i>Petroleum Hydrocarbons (IR)</i>		<i>mg/kg</i>	<i><5</i>	<i>5</i>	<i>MS-45 RW</i>

