ENVIRONMENTAL INVESTIGATION

EIS Brake Parts

West Bend, Wisconsin

Delta No. 10-87-285

Delta Environmental Consultants, Inc.

COPY

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November 16, 1987

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ENVIRONMENTAL INVESTIGATION

EIS Brake Parts
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1.0 INTRODUCTION

1.1 Purpose and Authorization

This report presents the results of Delta Environmental Consultants, Inc.'s (Delta's) environmental investigation completed at the Praefke Brake and Supply building site in West Bend, Wisconsin, in September and October, 1987. The purpose of this investigation, as stated in Delta's August 31, 1987 proposal, was to determine the presence and nature of ground water contamination at the site. Authorization to perform this work was received from Mr. Thomas D. Wall on September 4, 1987.

1.2 Scope of Services

The scope of services performed in regards to this project included:

- Advancing six borings to collect soil samples to determine soil lithology (type);
- Screening soil samples to determine the presence of volatile contamination;
- Surveying the locations and casing elevations of each of the monitoring wells;
- Obtaining representative ground water samples from the site's monitoring wells and chemically analyzing them for selected parameters;
- Preparing a factual report outlining the project results including our evaluation and recommendations;
- Conducting interviews with plant manager to obtain more data on site history and operations; and
- Reviewing previous investigation results to assist in focusing the current investigation.

2.0 BACKGROUND INFORMATION

2.1 Site Description

The site is located at 133 Oak Street in West Bend, Wisconsin (Figures 1 and 2). At the time of this investigation, Praefke Brake and Supply Company operated an asbestos brake shoe manufacturing facility at the site. The site is bounded on the north by Oak Street, on the east by the Chicago and Northwestern Railroad, on the west by Second Avenue and on the south by Decorah Road. One main building is actively used at the site. The brake shoe manufacturer operation occupies the northern two-thirds of the building and the southern one-third is empty (Figure 3). Two abandoned buildings are located on the south end of the site. A metal storage shed is located west of the main building. At the time of the field work, a 4,000 gallon gasoline tank had been removed and was lying on the ground near the metal shed. Several empty 55 gallon drums were located adjacent to the metal storage shed.

The site is paved on the northern property line adjacent to the main building; the western edge is wooded and slopes steeply upward to residential homes. The south end of the property, near the abandoned buildings, is undeveloped woods. Along the east side of the property, between the main building and the railroad, is a grassy lane.

2.2 Site History

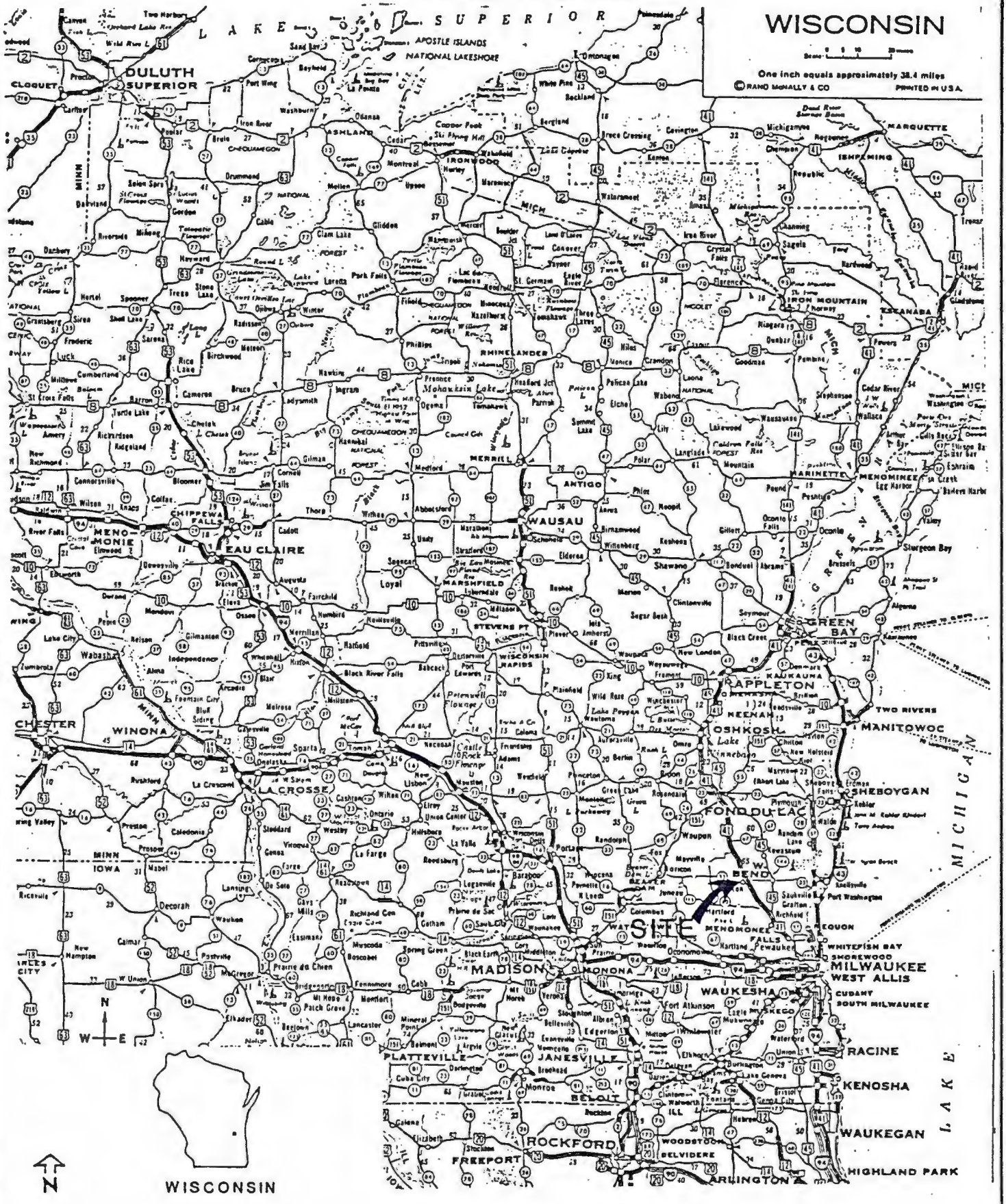
The site originally operated in the 1920's as a facility which finished wood for caskets. During the 1940's, the site housed an operation that varnished poles used for soldier's tents in World War II. Since the 1950's, the site has housed a brake shoe manufacturing operation which continues today.

Other operations have coexisted at this property at various times in the past. These include a metal painting firm (1985 to 1987), a garage door manufacturer, and a junk yard. This junk yard contained used cars, tractors, paper products, plastic wastes, and scrap metal. The junk yard was emptied in 1976 or 1977.

2.3 Previous Investigations

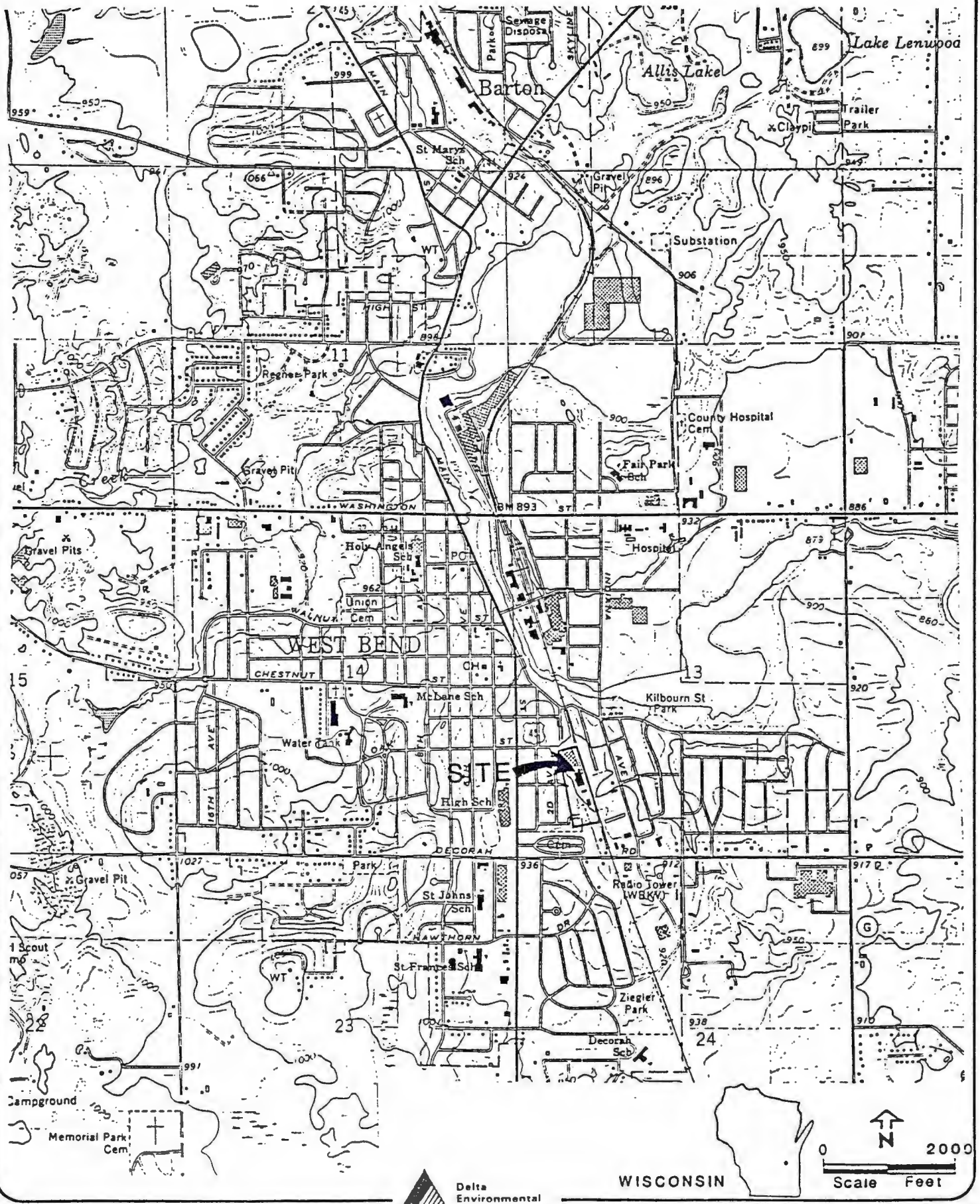
Several investigations have been conducted at this site in the past by Warzyn Engineering. A "walk-through" audit was performed on December 23, 1986 and additional work was done in January, 1987. The results of these investigations will be summarized here.

FIGURE 1
SITE LOCATION MAP
EIS BRAKE PARTS
WEST BEND, WISCONSIN
DELTA NO. 10-87-285



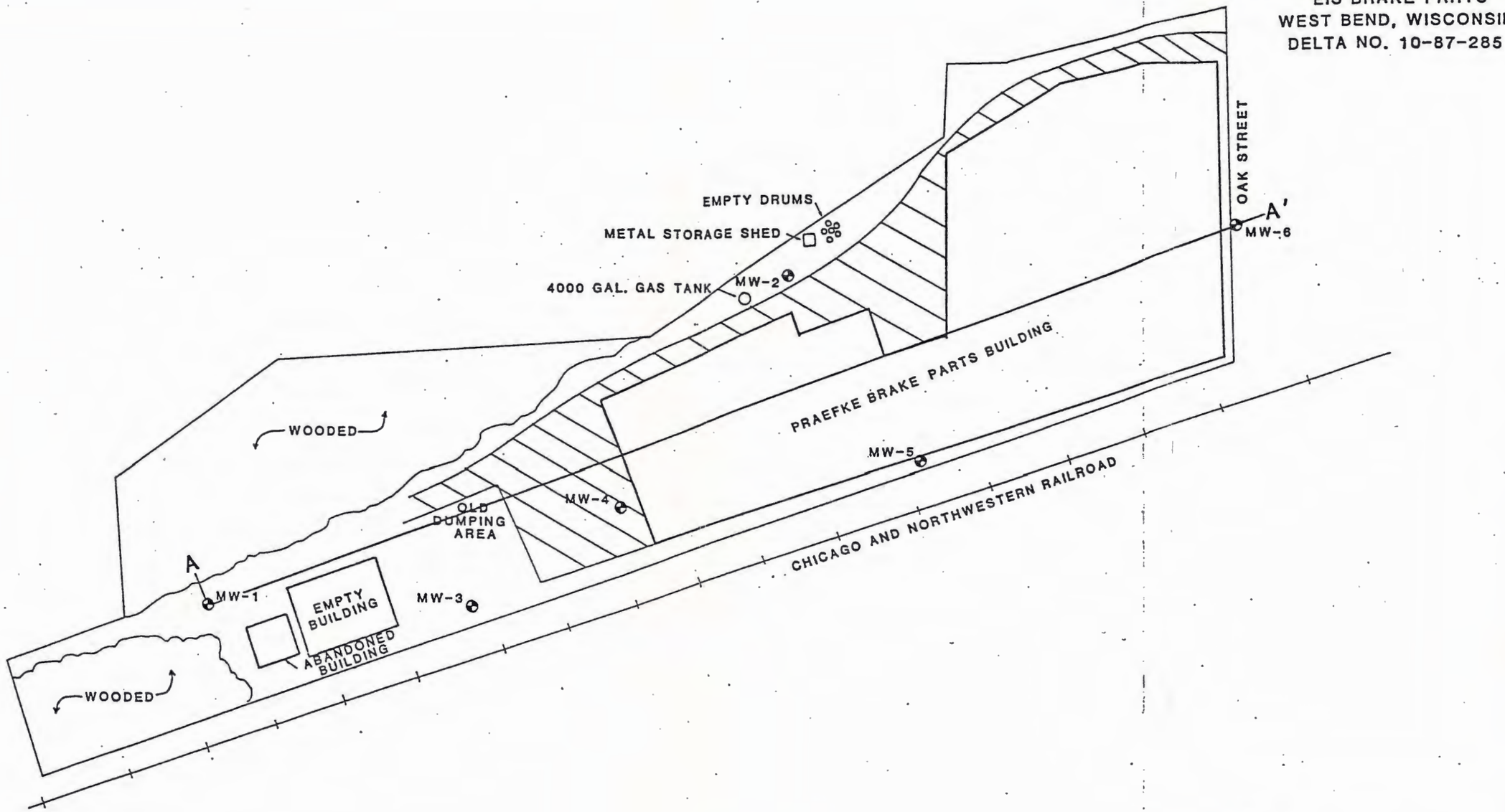
Delta Environmental Consultants, Inc.

FIGURE 2
TOPOGRAPHIC MAP OF SITE
EIS BRAKE PARTS
WEST BEND, WISCONSIN
DELTA NO. 10-87-285



Delta Environmental Consultants, Inc.

FIGURE 3
SITE MAP
CROSS SECTION LOCATION MAP
EIS BRAKE PARTS
WEST BEND, WISCONSIN
DELTA NO. 10-87-285



The audit identified several locations which could potentially contain hazardous chemicals or present potential environmental problems. These included several buried tanks, a metal storage shed which contains solvents and stamping dyes, and an area at the back of the property where a scrap metal yard once existed. Warzyn recommended soil sampling at various locations to further investigate the presence of contaminants.

In January, 1987, Warzyn performed an initial remedial investigation which consisted of seven test pits, three soil borings, two floor corings, and three surface soil samples (Figure 4). This work identified several environmental problem areas and identified areas of specific soil contamination. Test pits 1, 2, 6, and 7 were dug north of the abandoned building. Test pits 4 and 5 were dug south of the abandoned building while test pit 3 was dug west of the abandoned building. Two core samples were taken through the floor in the main buildings. Three soil borings were drilled near the gas tank, storage shed, and fuel tank, respectively. Three additional surface soil samples were collected on the grassy area along the railroad tracks.

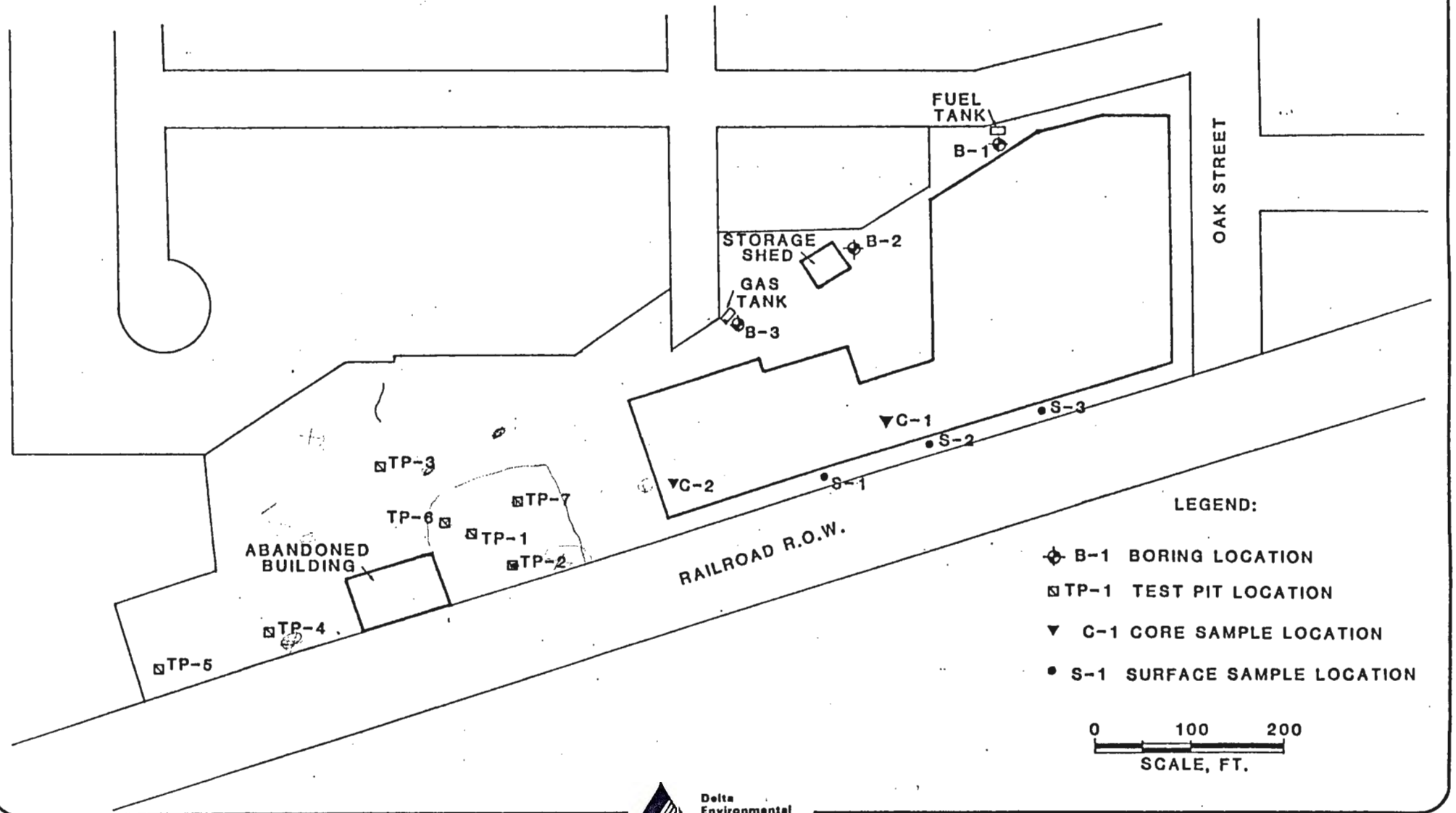
The investigation results indicated relatively high concentration of 1,1,1-trichloroethane, carbon tetrachloride, chloroform, ethylbenzene, tetrachloroethane, toluene, 1,1,1-trichloroethene, and xylene in the soil. The major areas of concern, based upon Warzyn's data, was near test pits 1, 2, 6, 7, and the northwest side of the site where the soil borings B-1, B-2, and B-3 were taken. Other borings and test pit samples detected little contamination. No ground water quality data was collected during the Warzyn investigation.

2.4 Water Supply Inventory

The immediate study area is supplied by the city of West Bend water supply system. Delta contacted the city of West Bend Water Utilities Department and obtained the following information regarding West Bend's municipal wells. Presently, the city of West Bend utilizes 10 wells to supply water to the area (Figure 5). These wells (numbered 4 to 13) are screened in both the shallow sand and gravel aquifer and the deeper dolomite aquifer (see Section 4.1 for further discussion of these aquifers). The city has used three deep wells in the past (wells 1, 2, and 3) but has since abandoned these wells. Efforts to obtain more information concerning the city water supply wells, specifically the locations of wells 3 and 10, are beyond the scope of this study.

FIGURE 4

SAMPLING LOCATIONS
FOR WARZYN'S INVESTIGATION
EIS BRAKE PARTS
WEST BEND, WISCONSIN
DELTA NO. 10-87-285



Delta Environmental Consultants, Inc.

No private water wells were identified during the investigation. It is possible that non-potable shallow wells may be present within the residential areas adjacent to the site.

3.0 PROJECT RESULTS

3.1 Soil Borings

On September 15 through 17, 1987, five soil borings were drilled at the EIS Division site and later completed as monitoring wells (Figure 3). A sixth boring was drilled (associated with MW-5) on September 25. The first five borings, B-1, B-2, B-3, B-4, and B-6 were drilled with eight inch diameter hollow stem auger and split spoon soil sampling techniques. Soil samples were taken every 2.5 feet to the water table. The recovered samples were scanned with a TIP photoionization detector (see section 6.5) to screen for volatile chemicals. The sixth soil boring, B-5, consisted of auguring a hole to install monitoring well MW-5. Although split-spoon samples were not collected due to the overhead power lines, the soils were logged adequately to determine the stratigraphy. The cuttings from B-5 were tested with a TIP. All equipment was steam cleaned between borings to minimize the chance of cross contamination. The lithologic logs of the borings are provided in Appendix A.

The soils at the EIS Brake Parts site primarily consist of fine grained silty-sand to fine sand (Figure 6). Some clay was observed in boring B-2 at a depth of about 8 feet and silty clay at a depth of about 18 feet. The silty-sand to fine-sand consistently observed in all of the other borings was tan to reddish-brown, moderately well-sorted, with varying concentrations of fines as silts and clay. Occasionally gravel was encountered in the borings.

3.2 Monitoring Wells

After the soil borings were drilled, they were completed as monitoring wells. The wells MW-1, MW-2, MW-3, MW-4, and MW-6 were installed September 15 to 17 and MW-5 was installed September 25. The monitoring well construction details are provided in Appendix B. The wells were constructed of two inch diameter Schedule 40 PVC riser pipe with 10 foot screens. The well was sand packed to two feet above the screen followed by a three foot bentonite seal and grouted to the surface with a neat cement-bentonite grout. The wells were finished at the surface with a protective casing and locking cap. All well materials were cleaned before installation. Care was taken at each well site to

prevent outside contamination from contacting the well materials. All wells were screened at the water table. The wells were developed with a bailer after installation. Each well was surveyed for location and top of riser elevation.

3.3 Ground Water Sampling

On September 25 and 26, 1987 samples of ground water in the monitoring wells were collected. Sampling and storage techniques were in accordance with Wisconsin Department of Natural Resources (DNR) and United States Environmental Protection Agency requirements. Three to five well volumes were evacuated prior to sampling with a clean stainless steel bailer. A dedicated bailer was used for each well. Strict QA/QC sampling procedures were followed including chain of custody documentation for sample shipment. Samples were submitted to the laboratory and analyzed for purgeable halocarbons/aromatics (EPA Method 601 & 602), phenols (EPA Method 604), phthalate esters (EPA Method 606), total cyanide and cadmium.

4.0 DISCUSSION OF RESULTS

4.1 Regional Geology

Southeastern Wisconsin's geology consists of surficial glacial deposits underlain by eastward dipping Paleozoic sedimentary units over Precambrian bedrock. The three major aquifers found in southeastern Wisconsin are the sand and gravel aquifer, the Silurian dolomite, and the sandstone aquifers. The Precambrian basement rocks are utilized as a source of water but will not be included in this discussion.

The sand and gravel aquifer consists primarily of unconsolidated deposits of sand and gravel within the glacial drift that comprises the interlobate Kettle Moraine area. The Kettle Moraine is a large deposit of silt, sand, and gravel associated with the Wisconsinan glacial stage. The city of West Bend is located at the edge of this moraine.

The sand and gravel aquifer is essentially continuous but varies in thickness over the region from 50 to 400 feet. In the West Bend area, the sand and gravel aquifer consists of about 100 feet of sand, gravel, and silt deposits.

The top of the Silurian dolomite is an erosional surface; therefore, its thickness can vary from 0 to over 200 feet (Mikulic, 1977). The Silurian dolomite aquifer is a light gray to brown-gray dolomite, fractured, and is a source of water for over 56 wells in Washington County (Kammerer, 1981).

The lowest main aquifer in southeastern Wisconsin is the sandstone aquifer composed of Cambrian and Ordovician sandstones and dolomites (Kammerer, 1981). The sandstone aquifer provides water to nine wells in Washington County.

Regionally, ground water within the sand and gravel aquifer flows northwestward from Big Cedar Lake (a recharge area) towards the Milwaukee River (a discharge area). Based upon well data, bedrock beneath West Bend consists of the Silurian dolomite of the Niagrarn series at a depth of about 100 feet.

4.2 Hydrogeology

Ground water is shallow at this site and was encountered in the monitoring wells between 10 and 20 feet from the ground surface. Ground water elevations in the wells were measured on September 25, 1987 (Table 1 and Figure 7). Ground water flow direction is in a northerly direction towards the Milwaukee River (Figure 2). Figure 7 indicates that the ground water contours east of MW-3 trend in a southeasterly direction. This is consistent with the land surface. Close examination of the 900 foot surface contour line (Figure 2) indicates a small valley and an ephemeral stream east of MW-3. It is likely that the local ground water table in the vicinity of MW-3 is influenced by this valley and has a slight easterly flow component.

The regional discharge zone for ground water at the site is the Milwaukee River. The river is located approximately 750 feet north of the site. A local seasonal discharge zone may be expressed by the ephemeral stream located east of the site.

The horizontal hydraulic gradient on September 25 at the site was 0.0156 feet/feet. The vertical flow component was not determined during this investigation. Ranges of hydraulic conductivity can be estimated based upon published literature (Freeze & Cherry, 1979 Table 2.2). More accurate hydraulic conductivity valves could be determined if necessary by conducting an aquifer evaluation test.

The average linear ground water flow velocity can be determined using the relationship.

$$v = \frac{K}{n} dh/dl$$

where

v = Average linear flow velocity
dh/dl = hydraulic gradient
K = hydraulic conductivity = 3.28×10^{-5} ft/s to 3.28×10^{-3} ft/s for silty sands to fine-sands
n = effective porosity = 30% to 50% for sands

A range of values for the ground water flow velocity would be from 1.0×10^{-6} ft/s to 1.7×10^{-4} ft/s. Using the values cited above, an estimated average linear flow velocity of 8.55×10^{-5} feet/sec (7.39 feet/day) is obtained. This value can be used for a general ground water contaminant travel time analysis. Actual contaminant transport is influenced by many factors including chemical,

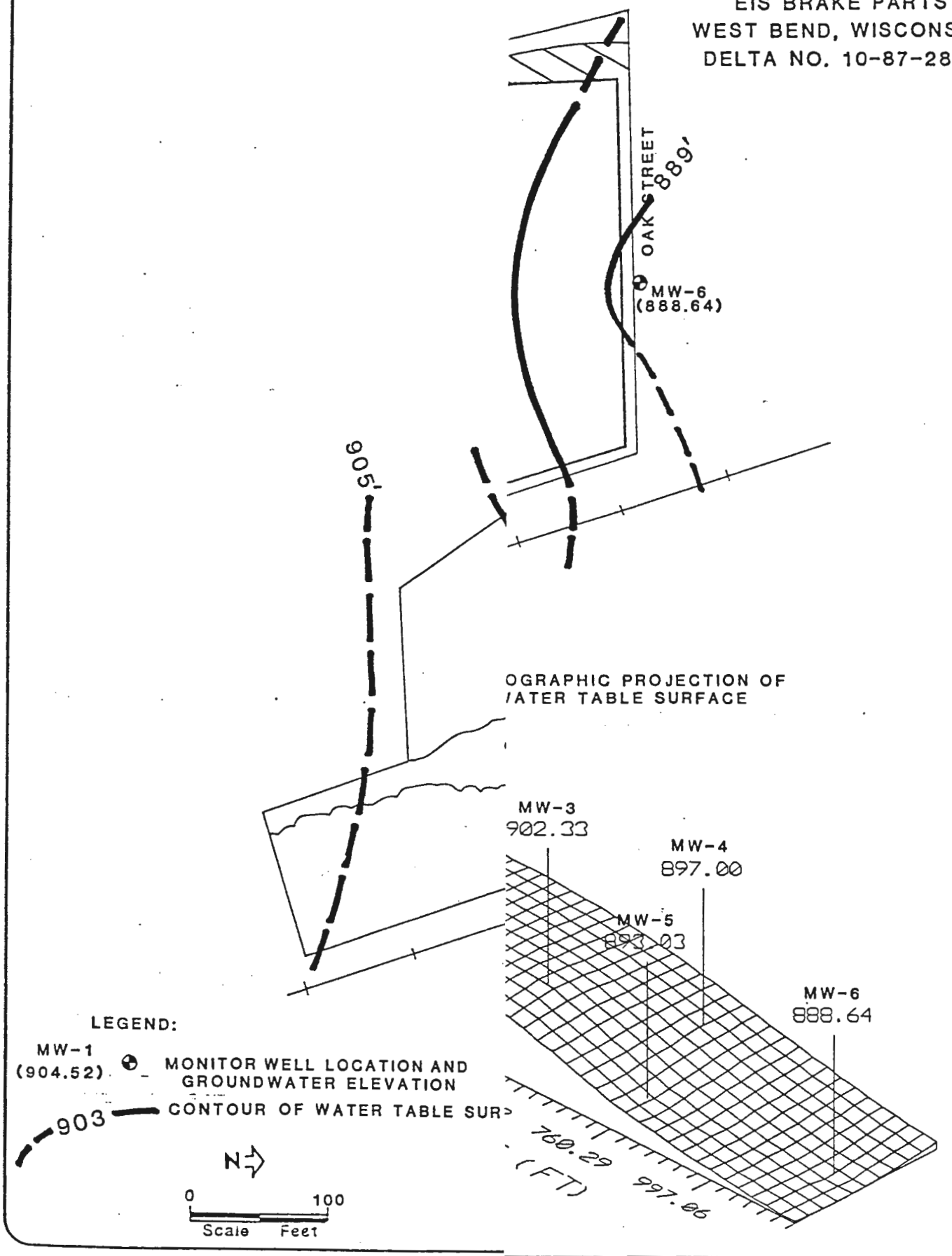
TABLE 1

Water Level Measurements
September 25, 1987
EIS Brake Parts
Division of Standard Motor Products
West Bend, Wisconsin
Delta No. 10-87-285

Well	Top of Riser Elevation (feet above Sea Level)	Depth to Ground Water (feet)	Ground Water Elevation (feet)
MW-1	915.35	10.83	904.52
MW-2	909.88	12.88	897.00
MW-3	914.50	11.69	902.81
MW-4	906.16	3.93	902.23
MW-5*	907.82	14.79	893.03
MW-6	906.96	18.32	888.64

* Monitoring well MW-5 remeasured September 26, 1987

FIGURE 7
CONTOUR MAP OF
WATER TABLE SURFACE (9-25-87)
EIS BRAKE PARTS
WEST BEND, WISCONSIN
DELTA NO. 10-87-285



physical, and biological interaction which would retard contaminant migration. In addition, aquifer properties may vary off-site which may act to retard or increase contaminant migration rates.

4.3 Extent of Contamination

As the soil borings were advanced, all recovered soil samples were scanned with a TIP (Section 6.5). The results are presented in Table 2. Examination of Table 2 reveals that only slight concentrations of volatile vapors were observed in the soil samples from borings 2 and 3.

After installation of the monitoring wells, each of the six wells were sampled using stainless steel bailers. These samples were analyzed in the laboratory for the parameters listed previously. The results of the chemical analysis are given in Table 3 and Appendix C.

The chemical analysis of the water samples identified numerous volatile organic chemicals (Table 3). The highest number of contaminants as well as the highest concentrations of the contaminants are found in wells MW-3 and MW-6. MW-3 has significant concentrations of 1,1-dichloroethylene, 1,1-dichloroethane, chloroform, 1,1,1-trichloroethane, carbon tetrachloride, 2,4-dichlorophenol, and pentachlorophenol. Some of these contaminants are included in Chapter NR 140 of the Wisconsin Administration Code, effective October 1, 1987. Specifically, 1,1-dichloroethylene, carbon tetrachloride, 1,1,2-trichloroethylene, and benzene exceed Wisconsin or Federal EPA water quality enforcement standards. Other contaminants, i.e., 1,2-dichloroethane and 1,1,1-trichloroethane, exist in concentrations close to the Wisconsin or Federal EPA limits. Pentachlorophenol, a common wood preservative, exceeds the EPA Health Advisor Guideline (Office of Drinking Water Quality, 1986) of 220 ug/l; a concentration of 590 ug/l was detected in MW-3.

The placement of the monitoring wells were chosen based upon the topography of the site, accessibility, and the boundaries of the property. Contamination was primarily found in MW-3 and MW-6. A more complete definition of the lateral extent of contamination cannot be made due to the sparsity of monitoring wells.

We can however, make some general observations. The ground water flows in a northerly direction with some northeasterly flow occurring near MW-3. The wells which appear contaminated are MW-3 and MW-6.

TABLE 2

Results of TIP Screening Program
EIS Brake Parts
Division of Standard Motor Products
West Bend, Wisconsin
Delta No. 10-87-285

Boring 1 (MW-1)		Boring 2 (MW-2)		Boring 3 (MW-3)		Boring 4 (MW-4)		Boring 6 (MW-6)	
Depth	TIP	Depth	TIP	Depth	TIP	Depth	TIP	Depth	TIP
2.5	0	2.5	0	2.5	0	2.5	0	2.5	0
5.0	0	5.0	0	5.0	0	5.0	0	5.0	0
10.0	0	7.5	9	7.5	0	7.5	0	7.5	0
12.5	0	10.0	0	10.0	2	10.0	0	10.0	0
15.0	0	12.5	0	12.5	15	12.5	0	12.5	0
17.5	0	15.0	0	15	5			15	0
		17.5	5	17.5	3			17.5	0
		20.0	0	20.0	4			20.0	0
								22.5	0
								25	0

MW-5 was not sampled with split spoon due to overhead electrical lines.

TABLE 3

Results of Ground Water Sampling
(Concentrations in ug/L)

Parameter	MDL	NR[1]	EPA[2]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	Dup	Trip Blk
Chloroethane	1.0	---	---	---	---	1.2	---	---	---	---	---
Methylene Chloride	1.0	150	---	2.0	1.3	2.5	1.3	---	1.1	1.8	1.8
1,1-dichloroethylene	0.3	.24	7	---	---	5.7	---	---	2.7	---	---
1,1-dichloroethane	0.2	---	---	---	---	66[3]	---	---	1.1	---	---
Chloroform	0.5	---	---	0.6	---	30	0.6	---	1.2	0.7	1.4
1,2-dichloroethane	0.2	.5	5	---	---	0.3	---	---	---	---	---
1,1,1-Trichloroethane	0.5	200	200	---	0.6	180[3]	---	---	180[4]	0.5	---
Carbon Tetrachloride	0.3	---	5	---	---	33	---	---	---	---	---
1,1,2-Trichloroethylene	0.5	1.8	5	---	---	2.8	---	---	230[4]	---	---
Benzene	1.0	.67	5	---	---	---	---	---	---	3.4	---
Toluene	1.0	343	---	---	---	4.9	---	---	---	---	---
Ethyl Benzene	1.0	---	---	---	---	2.4	---	---	---	---	---
2,4-Dichlorophenol	2.4	---	---	---	---	13	---	---	---	---	---
Pentachlorophenol	9.3	---	---	---	---	590	---	---	---	---	---
Bis(2-ethyl hexyl) phthalate	5.0	---	---	6.1	---	---	---	---	---	---	---

MDL - Method Detection Limit

1 - Ground Water Enforcement Standards for Wisconsin. (Preventive Action Limits are lower. Administrative Code NR 140, Ground Water Quality effective October 1, 1987

2 - EPA Maximum Contaminant Levels (MCL) from EPA final rules on Volatile Organic Compounts (52FR25690)

3 - MDL is 2 times higher due to sample dilution

4 - MDL is 5 times higher due to sample dilution

Wells MW-1, MW-2, MW-4, and MW-5 are relatively clean. This indicates that the source of contamination is on site.

We also suggest that there are two source areas of contamination. This is supported by the variation in contamination found and variation in concentrations in the wells MW-3 and MW-6. This, combined with the ground water flow analyses, indicate the source area for MW-3 must be upgradient; probably in the old dumping area or scrap metal yard (Figure 3). The source area for MW-6 must also be upgradient but may be anywhere between MW-2 (which is relatively clean) and MW-6. Likely source locations would include the area around the metal storage shed and the empty drums, behind or within the building. Other source areas may exist.

In summary, our initial investigation has determined that the ground water beneath the EIS Brake Parts property is contaminated with organic chemicals. Many of these chemicals have been identified as being of concern to health standards and therefore are regulated by the state of Wisconsin and/or the Federal Environmental Protection Agency. The two main sources of these contaminants appears to be located on the EIS Brake Parts property. Additional minor sources of contamination may exist that produce localized ground water contamination which was not detected due to the locations of the wells. No conclusions regarding the extent or magnitude of contamination off-site (especially with respect to West Bend water supply wells) or vertically on-site can be determined based upon the data generated during this project except to say that off-site contamination has probably occurred.

5.0 RECOMMENDATIONS

The findings of this project indicate that shallow ground water contamination is present at the EIS Brake Parts property. These contaminants are at levels which exceed Wisconsin Department of Natural Resources and Environmental Protection Agency limits. The ground water contamination appears to be originating from two separate sources on-site.

We recommend that the ground water chemistry results be verified to determine if the observed concentrations are consistent with time. If contamination is confirmed to be present, we recommend that the vertical and lateral extent of contamination be defined. To accomplish this objective, additional monitoring wells downgradient of the site as well as several deep monitoring wells would be necessary. These wells would be developed and sampled in the same manner as the initial six wells that were installed. The water level data would be collected to determine variations of ground water flow off-site and seasonally. The results of this additional work would then be incorporated into a study to determine the feasibility of possible remedial actions. Possible remedial measures could potentially range from no action or long term monitoring of the ground water to installation of pumping wells to extract the contaminated water and source removal. Potential remedial measures would be determined by the extent and magnitude of the contamination.

We recommend that EIS Brake Parts contact the Wisconsin Department of Natural Resources regarding this matter. It has been our experience in the past that close coordination with regulatory agencies is of benefit to all parties involved.

6.0 METHODS AND PROCEDURES

6.1 Soil Classification

As the samples were obtained in the field, they were visually and manually classified by the crew chief in accordance with ASTM:D 2488-84. Representative portions of the samples were then returned to the laboratory for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various strata, the N value, water level information and pertinent information regarding the method of maintaining and advancing the drill hole are attached. Charts illustrating the soil classification procedure, the descriptive terminology and symbols used on the boring logs are also attached.

6.2 Soil Sampling

Soil sampling was done in accordance with ASTM:D 1586-84. Using this procedure, a two inch O.D. split barrel sampler is driven into the soil by a 140 pound weight falling 30 inches. After an initial set of six inch, the number of blows required to drive the sampler an additional 12 inches is known as the penetration resistance, or the "N" value. The N value is an index of the relative density of cohesionless soils and the consistency of cohesive soils.

6.3 Ground Water Sampling

All monitoring wells were sampled from suspected cleanest to most contaminated according to the following steps:

Step 1 Measure water level.

Step 2 Evacuate three to five volumes with stainless steel bailer.

Step 3 Collect water samples using stainless steel bailer

Step 4 Cool water samples to 4° C and transport to laboratory, following all documentation and Chain of Custody procedures.

Step 5 Clean equipment. Water level measurement equipment is to be cleaned with clean tap water followed by deionized water rinse.

All pertinent information was recorded on a sampling information form.

6.4 Water Level Measurements

All ground water level measurements are obtained by using an electronic measuring device which indicates when a probe is in contact with the ground water in the well. Measurements are obtained by lowering the divide into the well until it indicates that the water surface has been encountered and by measuring the distance from the top of the inside riser pipe to the probe. All of the measurements are recorded to the nearest 0.01'; however, the manufacturer's reported accuracy for the instrument is 0.04'.

6.5 TIP Scan

The following discussion describes the TIP analytical instrument and follows PHOTOVAC, Inc's User Manual dated October, 1986.

A TIP is an analytical instrument designed to sense certain important impurities in air and other gases. The name TIP stands for "Total Ionizable Present"; this implies that the instrument senses any "ionizable" chemicals. In the case of the TIP, "ionizable" actually means photoionizable. The TIP relies on an internal ultraviolet lamp which photoionizes molecules of certain chemicals. The TIP's ultraviolet lamp has an energy of about 10.6 electron volts (eV) and can detect organic chemicals which enter the air as gases or vapors and have ionization potentials below 10.5 eV, that is, the vast majority of those compounds which are regulated as "Pollutants". Gasoline vapors are included in the group of gases detected by the TIP. We utilize the TIP to detect the presence and concentration of organic vapors in soil samples or other samples at the site.

7.0 REMARKS

The recommendations contained in this report represent our professional opinions. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by DELTA ENVIRONMENTAL CONSULTANTS, INC.

Kenneth Shimko Date: 11/16/87

Kenneth Shimko
Hydrogeologist/Project Manager

Reviewed by:

James P. Prieur Date: 11/16/87

James P. Prieur, M.S.
Principal Hydrogeologist/Project Manager

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WISCONSIN TEST DRILLING, INC. — **FIELD BORING LOG** — Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION West Bend, WI — Elev.

Job No. 1127

Boring No. MW-1

GROUND WATER	While drilling	9.5'	Time after drilling	¼ hr.
	Before casing removal		Depth to water	9.2'
	After casing removal		Depth to cave-in	

Start 9-15-87
Unit D-50
Chief PD

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						ASPHALT 0.3'						6¼" HSA
1	M		7			Tan to Brown Silty SAND Very Fine						
		7	12	1.3	19							
2	M	10	10									
		12		1.5	22							
3	W		8									
		11	9	1.2	20							
4	W	15	8									
		11		.4	19	11.0'						
5	W		15			Tan to Brown SAND M-F						
		17	22	1.1	39							
6	W	4	18									
		22		1.5	40							
7	W		15									
		10	11	1.5	21	Tan to Brn Silty SAND 18.0' Very Fine						
						E.O.B. @ 19.0'						
						Well Set @ 18.0'						

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION West Bend, WI — Elev.

Job No. 1127

Boring No. MW- 2

GROUND WATER	While drilling	13.5'	Time after drilling	½ hr.	
	Before casing removal	--	Depth to water	13.0'	
	After casing removal	--	Depth to cave-in	--	

Start 9-16-87
Unit D-50
Chief DD

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS
						Tan to Brown SAND M-F W/Silt W/Clay
1	D		6			
		6	10	.5	16	
2	D	5	12			5.5'
		12		1.1	24	Tan to Brn. SAND M-F, W/Organics
						7.0'
3	D		2			Tan to Brn. SAND M-F
		2	4	.3	6	Clay till layer.
4	M	6	8			
		11		1.3	19	
5	W		8			13.0'
		13	15	1.0	28	Tan to Brown Silty SAND
6	W	8	15			
		16		.9	31	
7	W		6			18.0'
		7	6	.9	13	Gray Silty CLAY
8	W	7	8			20.5'
		27		.7	35	Alot of gravel Tan to Brn SAND M-F
						E.O.B. @ 22.5'
						Well Set @ 22.3'

Casing/Probe
Weight 140#
Drop 30"

Unconfined Strength | Boulders | Blows on Casing Size | Blows on Probe Size | Drilling Method 6¼" HSA

5 10 15 20 25 30 35 40 45

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION West Bend, WI — Elev.

Job No. 1127

Boring No. MW-3

GROUND WATER	While drilling	13.4'	Time after drilling	½ hr.	
	Before casing removal	--	Depth to water	9.8'	
	After casing removal	9.8'	Depth to cave-in	--	

Start 9-15-87
Unit D-50
Chief PD

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS
						Tan to Brown SAND M-F W/Trc. Silt
1	D	3	4			
		6		1.1	10	
2	D	4	8			Layers of gray sand M-F
		9		1.0	17	Some Gravel
3	D		7			
		7	10	1.2	17	
4	D	4	6			
		8		.9	14	
5	W		8			
		10	10	.8	20	
6	W	6	7			
		12		0	19	
7	W		16			Silt Layer
		15	11	1.2	26	
8	W	4	5			
		5		1.2	10	
						E.O.B. @ 22.0'
						Well Set @ 19.1'

Casing/Probe
Weight 140#
Drop 30"

Unconfined Strength | Boulders | Blows on Casing Size | Blows on Probe Size | Drilling Method 6¼" HSA

5 10 15 20 25 30 35 40 45 50

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION — West Bend, WI — Elev.

Job No. 1127

Boring No. MW-4

GROUND WATER	While drilling	8.3'	Time after drilling	¼ hr.	
	Before casing removal	--	Depth to water	4.9'	
	After casing removal	--	Depth to cave-in	--	

Start 9-16-87
Unit D-50
Chief PD

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe Weight 140# Drop 30"					
						ASPHALT 0.3'					6¼" HSA
						Tan to Brown Silty SAND Medium to Fine					
1	D		6								
		7	9	1.1	16						
2	W	8	15								
		19		1.2	34	← Gravel Layer					
3	W		9			← Blk Sand layer 1' thick					
		6	7	.8	13						
4	W	8	6			Gravel layers					
		7		.9	13						
5	W		2								
		3	6	.7	9						
						E.O.B. @ 16.0'					
						Well Set @ 15.5'					

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION West Bend, WI — Elev.

Job No. 1127

Boring No. MW-5

GROUND WATER	While drilling	--	Time after drilling	½ hr.	
	Before casing removal	--	Depth to water	13.0'	
	After casing removal	--	Depth to cave-in	--	

Start 9-25-87
Unit B-45
Chief LE

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						(Fill)						HSA
						Silty SAND M-F Red to Brown						
						←Wood Railroad Tie						
						7.0'						
						Sandy SILT Red to Brown Uniform Fine						
						17.5'						
						SAND Red to Brown Uniform Fine						
						E.O.B. @ 21.0'						
						Well Set @ 20.6'						

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR Delta — West Bend Monitoring Wells

LOCATION — West Bend, WI — Elev.

Job No. 1127

Boring No. MW-6

GROUND WATER	While drilling	17.0'	Time after drilling	½ hr	
	Before casing removal	--	Depth to water	17.9'	
	After casing removal	--	Depth to cave-in	--	

Start 9-16-87
Unit D-50
Chief PD

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS
						ASPHALT 0.2'
						Tan to Brown SAND Medium to Fine
1	D		5			
		12	17	1.1	29	
2	D	12	25			
		40		1.2	65	
3	D		7			
		6	10	.9	16	
4	D	7	9			
		20		1.0	29	
5	D		7			
		9	20	1.5	29	
6	D	10	14			
		19		1.5	33	
7	W		6			
		12	15	.8	27	
8	W	8	12			
		18		1.1	30	
9	W		5			
		20	47	1.5	67	
10	W	8	9			
		20		1.5	29	
						E.O.B. @ 27.0'
						Well Set @ 26.6'

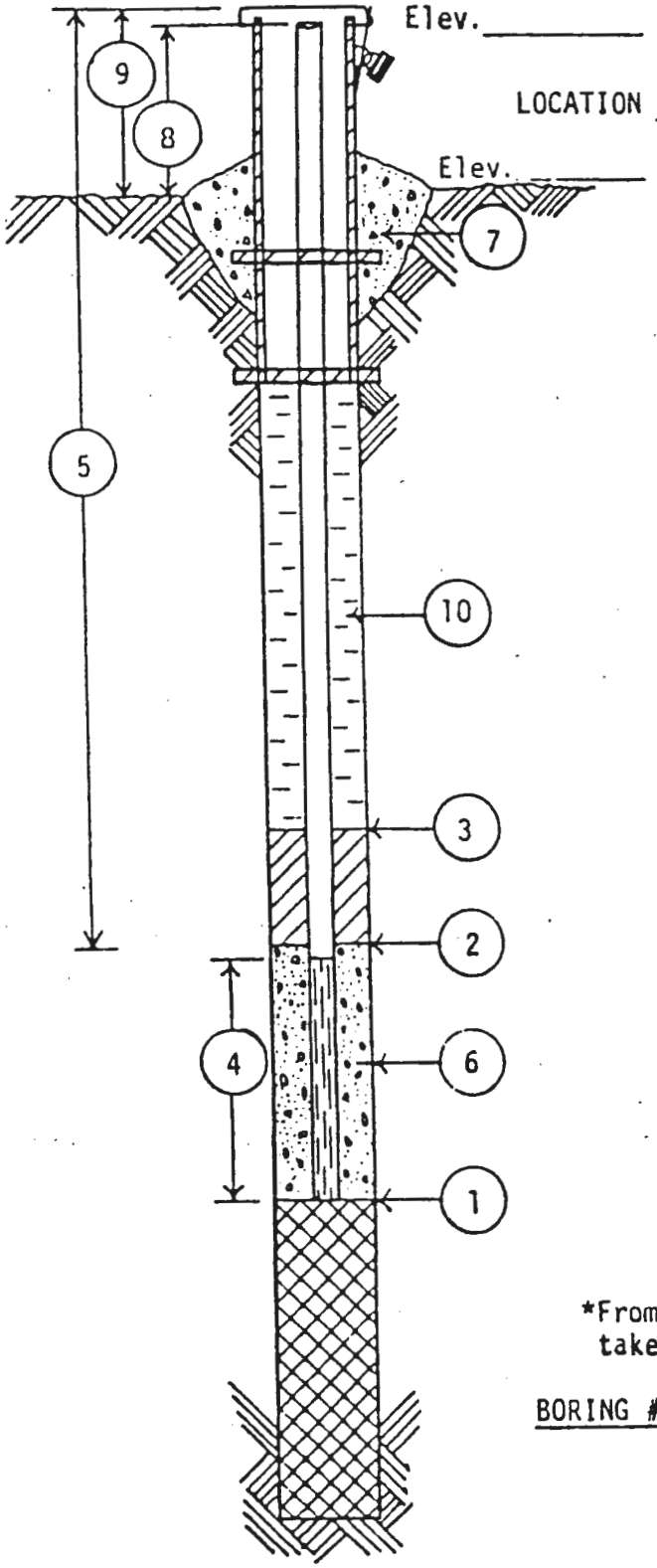
Casing/Probe
Weight 140#
Drop 30"

Unconfined Strength | Boulders | Blows on Casing Size | Blows on Probe Size | Drilling Method

Drilling Method: 6¼" HSA

5 10 15 20 25 30 35 40 45 50

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW-1

DATE 9-15-87

CHIEF P.D.

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 18.0 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 7.5 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 5.2 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 10.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.1'.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

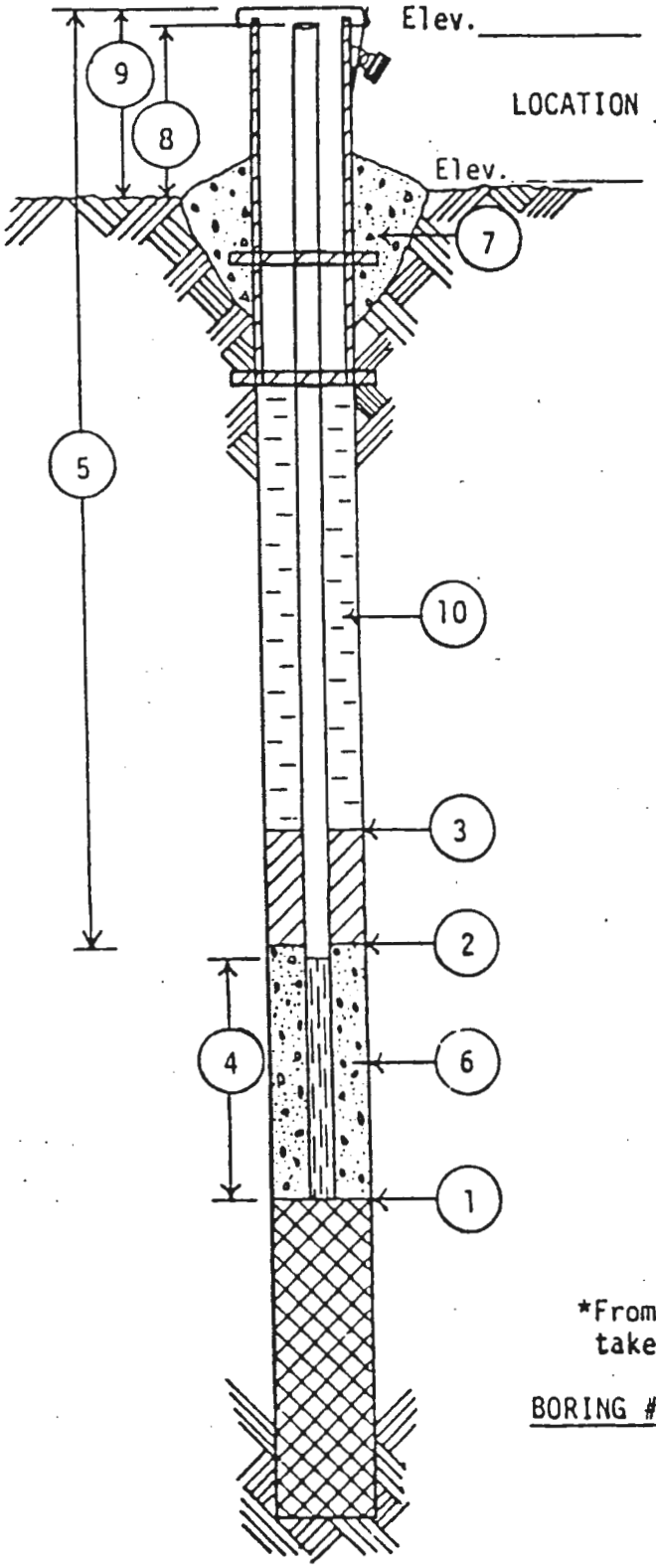
WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW- 2

DATE 9-16-87

CHIEF PD

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 22.3 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 11.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 9.8 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 14.3 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.1'.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

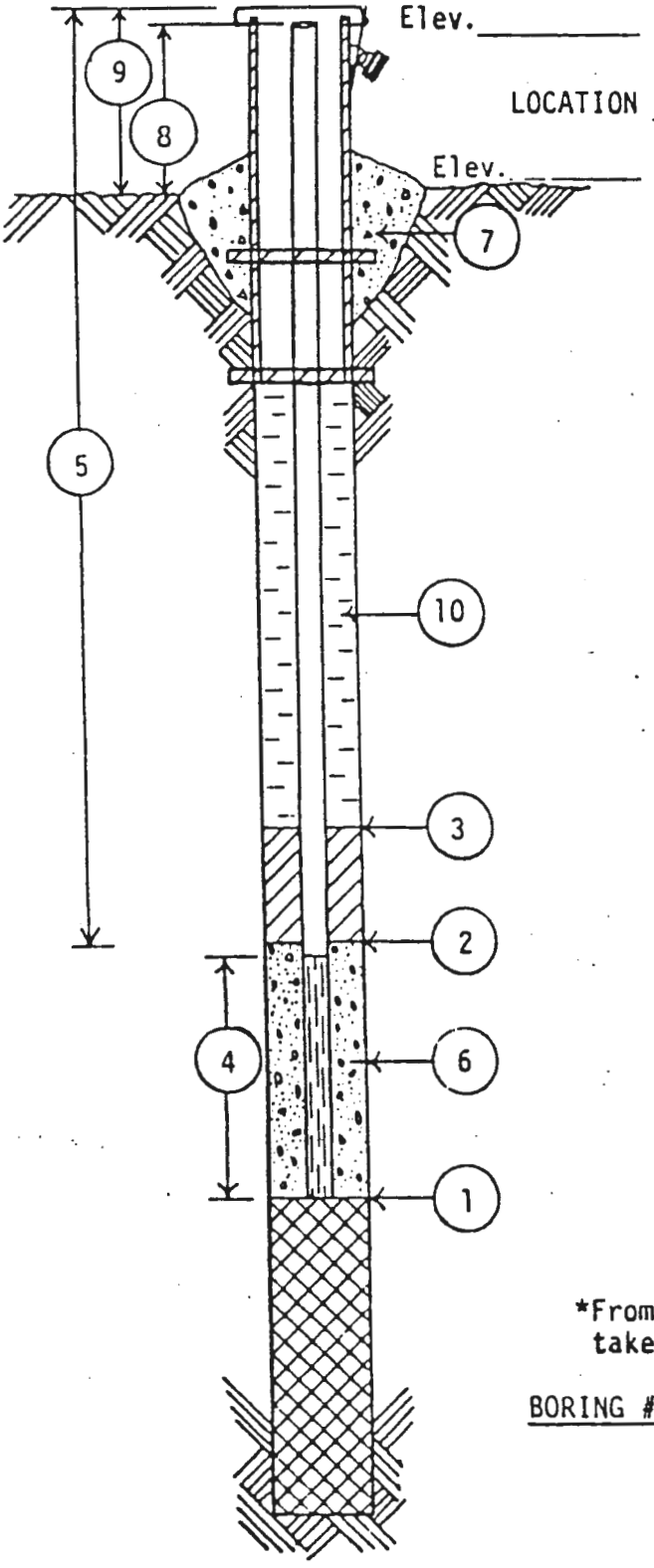
WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW- 3

DATE 9-15-87

CHIEF P.D.

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 19.1 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 8.3 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 6.9 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 11.1 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.1'.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

MONITORING WELL DEVELOPMENT

WELL NUMBER MW- 3

WELL DIAMETER 2"

TOTAL DEPTH 18.8' 18.5'

DEPTH TO WATER Before Dev. 9.9'
After Dev. 10.1'

PROJECT West Bend MW's

PROJECT NO. 1127

DATE 9-16-87

DEVELOPED BY M.M.

DESCRIPTION OF DEVELOPMENT METHOD

VOLUME OF WATER REMOVED FROM WELL 40 Gal.

CLARITY OF WATER IN WELL BEFORE DEVELOPMENT Black, very cloudy

CLARITY OF WATER IN WELL AFTER DEVELOPMENT Lt. Blk, Cloudy

VOLUME OF WATER ADDED TO WELL

SOURCE OF WATER ADDED TO WELL

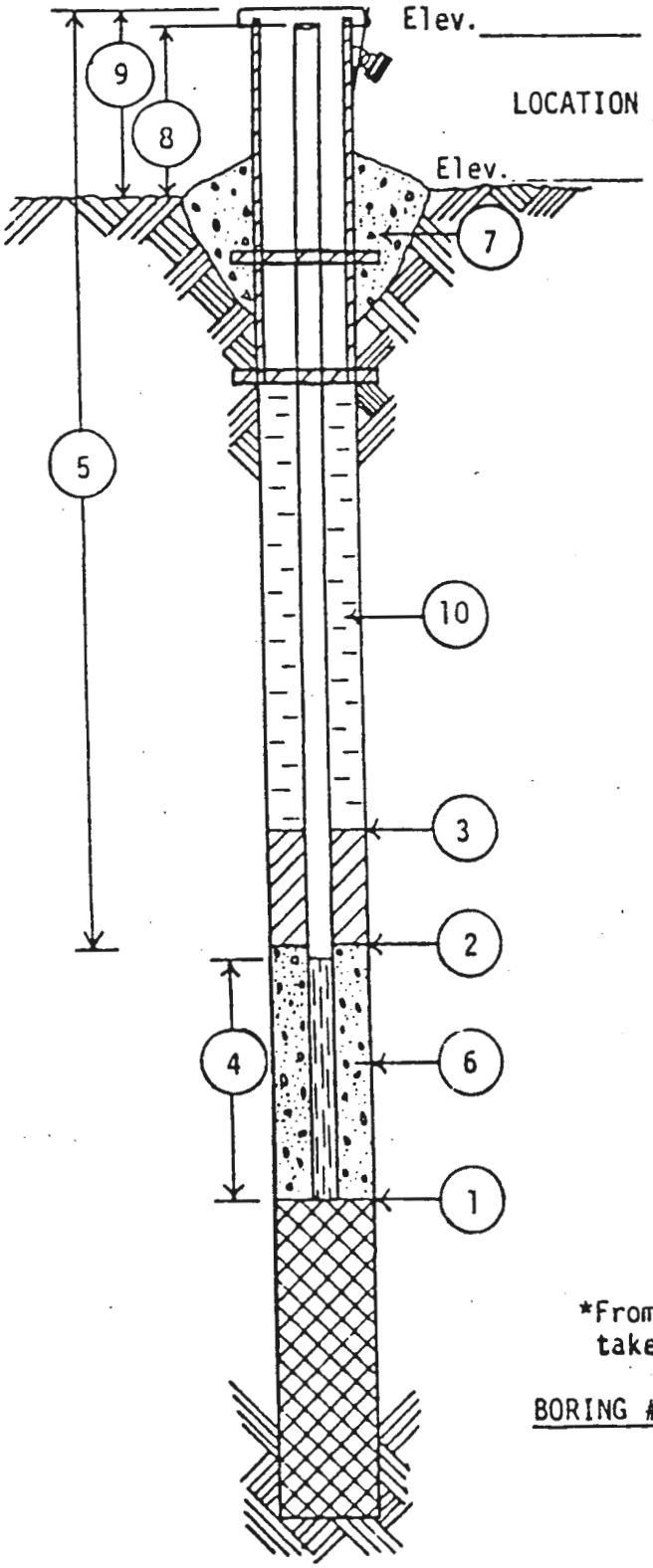
TIME SPENT FOR DEVELOPMENT: 45 Min.

COMMENTS:

WISCONSIN TEST DRILLING INC.
SOIL AND FONDATION EXPLORATION

101 ALDERSON
P. O. BOX 89
SCHOFIELD, WISCONSIN 54476
(715) 359-7090

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW-4

DATE 9-16-87

CHIEF P.D.

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 15.5 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 4.3 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 3.1 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 50.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 0.6 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 0 (Flush Mount Top)
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

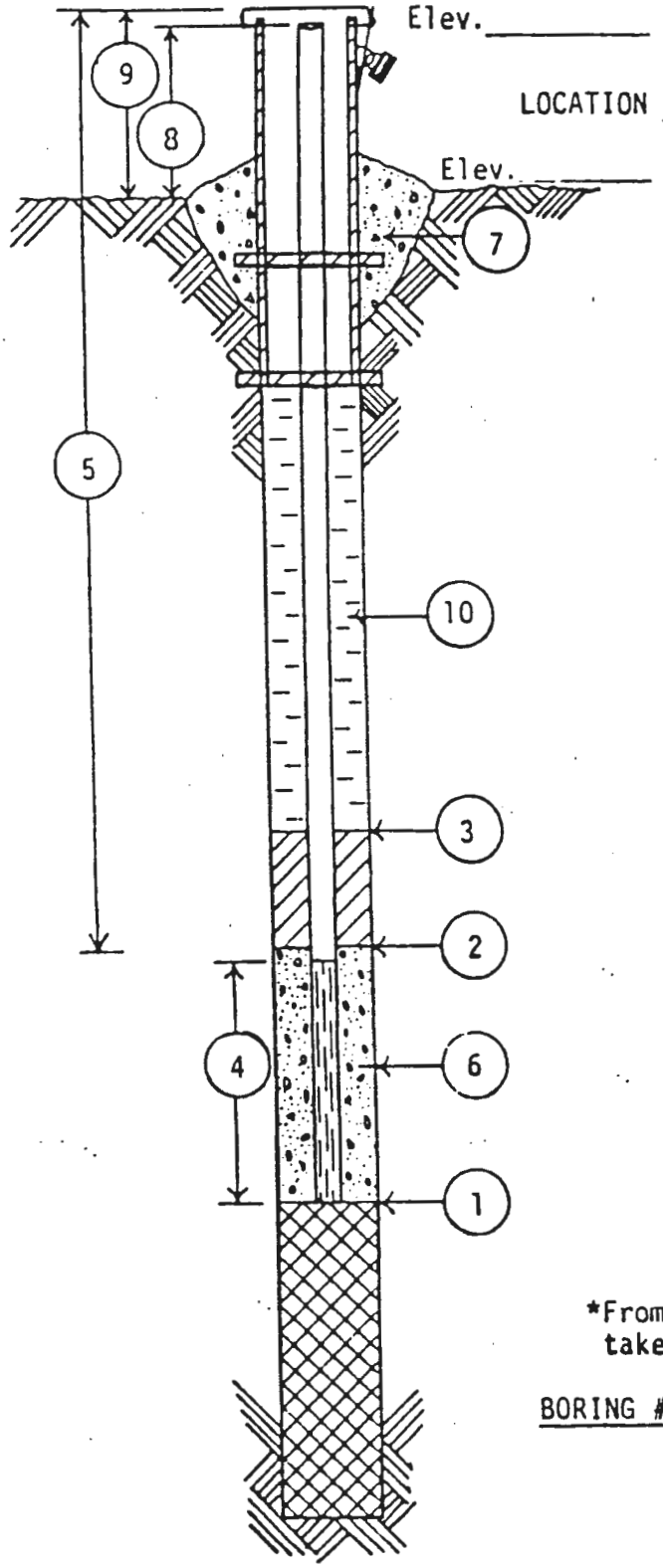
WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW-5

DATE 9-25-87

CHIEF L.E.

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 20.6 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 10.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 7.8 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 12.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.2'.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

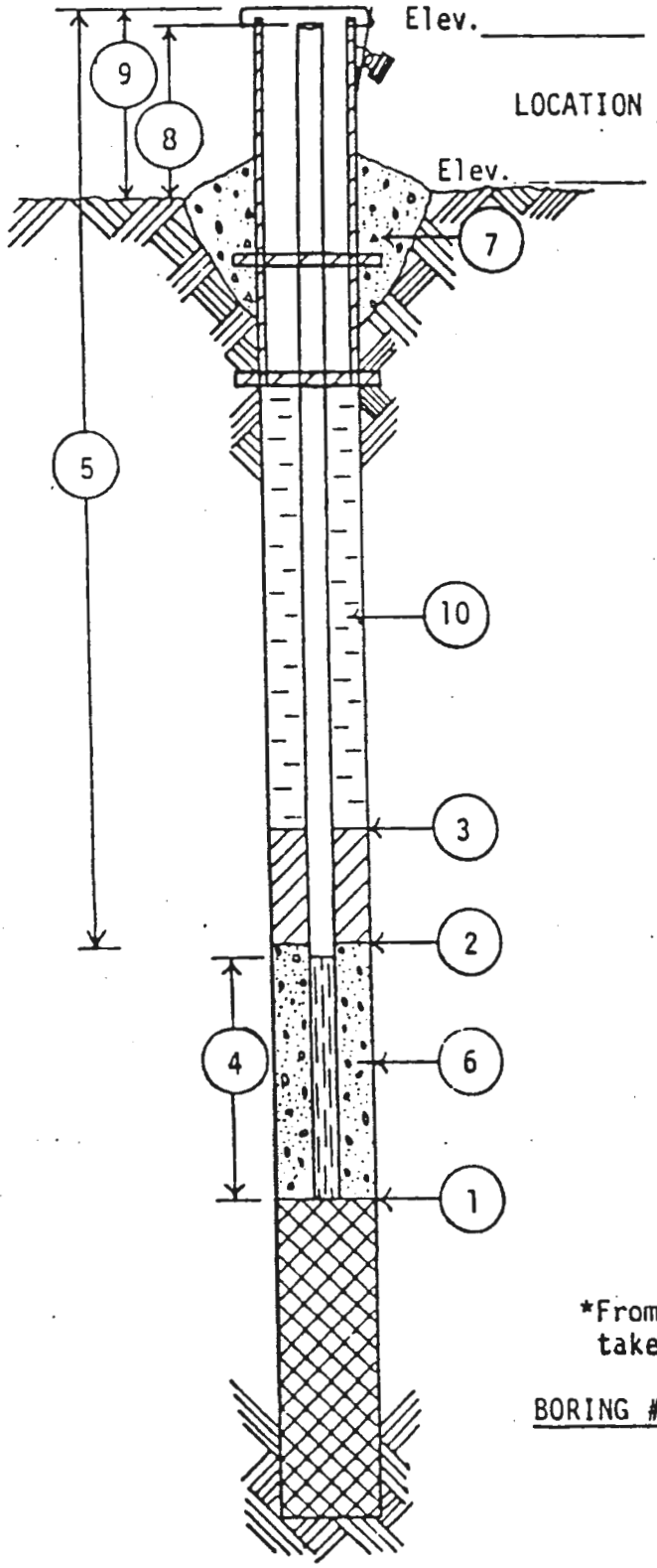
WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WELL DETAIL INFORMATION SHEET



JOB NO. 1127

BORING NO. MW-6

DATE 9-16-87

CHIEF P.D.

LOCATION West Bend Monitoring Wells

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 26.6 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 15.4 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 14.2 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 16.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 0.5 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 0 (Flush Mount Well To
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Grout

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

pace laboratories, inc

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa

REPORT OF LABORATORY ANALYSIS

Delta Environmental Consultants, Inc.
1801 Old Highway 8
Suite 123
New Brighton, MN 55112

October 16, 1987
PACE Project Number: 870928501

Attn: Mr. Kenneth Shimko

Project #10-87-285

Date Sample(s) Collected: 09/25/87
Date Sample(s) Received: 09/28/87

PACE Sample Number:			166680	166690	166700
Parameter	Units	MDL	MW-1	MW-2	MW-3
Cadmium	mg/L	0.01	ND	ND	ND
Cyanide, Total	mg/L	0.02	ND	ND	ND
Chloromethane	ug/L	1.0	ND	ND	ND
Bromomethane	ug/L	1.5	ND	ND	ND
Dichlorodifluoromethane(1)	ug/L	1.5	ND	ND	ND
Vinyl chloride(1)	ug/L	1.5	ND	ND	ND
Chloroethane	ug/L	1.0	ND	ND	1.2
Methylene chloride	ug/L	1.0	2.0	1.3	2.5
Trichlorofluoromethane	ug/L	0.4	ND	ND	ND
1,1-Dichloroethylene	ug/L	0.3	ND	ND	5.7
1,1-Dichloroethane	ug/L	0.2	ND	ND	66(3)
trans-1,2-Dichloroethylene	ug/L	0.3	ND	ND	ND
Chloroform	ug/L	0.5	0.6	ND	30
1,2-Dichloroethane	ug/L	0.2	ND	ND	0.3
1,1,1-Trichloroethane	ug/L	0.5	ND	0.6	180(3)
Carbon tetrachloride	ug/L	0.3	ND	ND	33
Bromodichloromethane	ug/L	0.2	ND	ND	ND
1,2-Dichloropropane	ug/L	0.2	ND	ND	ND
cis-1,3-Dichloro-1-propene	ug/L	0.5	ND	ND	ND
1,1,2-Trichloroethylene	ug/L	0.5	ND	ND	2.8
Benzene	ug/L	1.0	ND	ND	ND
Dibromochloromethane(2)	ug/L	1.0	ND	ND	ND
1,1,2-Trichloroethane(2)	ug/L	1.0	ND	ND	ND
trans-1,3-Dichloro-1-propene	ug/L	0.3	ND	ND	ND
2-Chloroethylvinyl ether	ug/L	5.0	ND	ND	ND
Bromoform	ug/L	1.0	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	1.0	ND	ND	ND

ND Not detected at or above the MDL.

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa

October 16, 1987
PACE Project Number: 870928501

PACE Sample Number:			166680	166690	166700
Parameter	Units	MDL	MW-1	MW-2	MW-3
1,1,2,2-Tetrachloroethylene	ug/L	1.0	ND	ND	ND
Toluene	ug/L	1.0	ND	ND	4.9
Chlorobenzene	ug/L	1.0	ND	ND	ND
Ethyl benzene	ug/L	1.0	ND	ND	2.4
1,3-Dichlorobenzene	ug/L	4.0	ND	ND	ND
1,2-Dichlorobenzene	ug/L	4.0	ND	ND	ND
1,4-Dichlorobenzene	ug/L	4.0	ND	ND	ND
Phenol	ug/L	1.0	ND	ND	ND
2-Chlorophenol	ug/L	2.8	ND	ND	ND
2-Nitrophenol	ug/L	2.7	ND	ND	ND
2,4-Dimethylphenol	ug/L	1.8	ND	ND	ND
2,4-Dichlorophenol	ug/L	2.4	ND	ND	13
4-Chloro-3-methylphenol	ug/L	10	ND	ND	ND
2,4,6-Trichlorophenol	ug/L	7.3	ND	ND	ND
2,4-Dinitrophenol	ug/L	10	ND	ND	ND
4-Nitrophenol	ug/L	10	ND	ND	ND
2-Methyl-4,6-dinitrophenol	ug/L	13	ND	ND	ND
Pentachlorophenol	ug/L	9.3	ND	ND	590
Di-n-butyl phthalate	ug/L	1.0	ND	ND	1.7
Bis(2-ethyl hexyl)phthalate	ug/L	5.0	6.1	ND	ND
Di-n-octyl phthalate	ug/L	5.0	ND	ND	ND
Butyl benzyl phthalate	ug/L	1.0	ND	ND	ND
Diethyl phthalate	ug/L	1.0	ND	ND	ND
Dimethyl phthalate	ug/L	1.0	ND	ND	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

pace laboratories, inc

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa

REPORT OF LABORATORY ANALYSIS

October 16, 1987
PACE Project Number: 870928501

PACE Sample Number:			166710	166720	166730
Parameter	Units	MDL	MW-4	MW-5	MW-6
Cadmium	mg/L	0.01	ND	ND	ND
Cyanide, Total	mg/L	0.02	ND	ND	ND
Chloromethane	ug/L	1.0	ND	ND	ND
Bromomethane	ug/L	1.5	ND	ND	ND
Dichlorodifluoromethane(1)	ug/L	1.5	ND	ND	ND
Vinyl chloride(1)	ug/L	1.5	ND	ND	ND
Chloroethane	ug/L	1.0	ND	ND	ND
Methylene chloride	ug/L	1.0	1.3	ND	1.1
Trichlorofluoromethane	ug/L	0.4	ND	ND	ND
1,1-Dichloroethylene	ug/L	0.3	ND	ND	2.7
1,1-Dichloroethane	ug/L	0.2	ND	ND	1.1
trans-1,2-Dichloroethylene	ug/L	0.3	ND	ND	ND
Chloroform	ug/L	0.5	0.6	ND	1.2
1,2-Dichloroethane	ug/L	0.2	ND	ND	ND
1,1,1-Trichloroethane	ug/L	0.5	ND	ND	180(4)
Carbon tetrachloride	ug/L	0.3	ND	ND	ND
Bromodichloromethane	ug/L	0.2	ND	ND	ND
1,2-Dichloropropane	ug/L	0.2	ND	ND	ND
cis-1,3-Dichloro-1-propene	ug/L	0.5	ND	ND	ND
1,1,2-Trichloroethylene	ug/L	0.5	ND	ND	230(4)
Benzene	ug/L	1.0	ND	ND	ND
Dibromochloromethane(2)	ug/L	1.0	ND	ND	ND
1,1,2-Trichloroethane(2)	ug/L	1.0	ND	ND	ND
trans-1,3-Dichloro-1-propene	ug/L	0.3	ND	ND	ND
2-Chloroethylvinyl ether	ug/L	5.0	ND	ND	ND
Bromoform	ug/L	1.0	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	1.0	ND	ND	ND
1,1,2,2-Tetrachloroethylene	ug/L	1.0	ND	ND	ND
Toluene	ug/L	1.0	ND	ND	ND

MDL Method Detection Limit

ND Not detected at or above the MDL.

pace laboratories, inc

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa

REPORT OF LABORATORY ANALYSIS

October 16, 1987
PACE Project Number: 870928501

PACE Sample Number:			166710	166720	166730
Parameter	Units	MDL	MW-4	MW-5	MW-6
Chlorobenzene	ug/L	1.0	ND	ND	ND
Ethyl benzene	ug/L	1.0	ND	ND	ND
1,3-Dichlorobenzene	ug/L	4.0	ND	ND	ND
1,2-Dichlorobenzene	ug/L	4.0	ND	ND	ND
1,4-Dichlorobenzene	ug/L	4.0	ND	ND	ND
Phenol	ug/L	1.0	ND	ND	ND
2-Chlorophenol	ug/L	2.8	ND	ND	ND
2-Nitrophenol	ug/L	2.7	ND	ND	ND
2,4-Dimethylphenol	ug/L	1.8	ND	ND	ND
2,4-Dichlorophenol	ug/L	2.4	ND	ND	ND
4-Chloro-3-methylphenol	ug/L	10	ND	ND	ND
2,4,6-Trichlorophenol	ug/L	7.3	ND	ND	ND
2,4-Dinitrophenol	ug/L	10	ND	ND	ND
4-Nitrophenol	ug/L	10	ND	ND	ND
2-Methyl-4,6-dinitrophenol	ug/L	13	ND	ND	ND
Pentachlorophenol	ug/L	9.3	ND	ND	ND
Di-n-butyl phthalate	ug/L	1.0	ND	ND	ND
Bis(2-ethyl hexyl)phthalate	ug/L	5.0	ND	ND	ND
Di-n-octyl phthalate	ug/L	5.0	ND	ND	ND
Butyl benzyl phthalate	ug/L	1.0	ND	ND	ND
Diethyl phthalate	ug/L	1.0	ND	ND	ND
Dimethyl phthalate	ug/L	1.0	ND	ND	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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October 16, 1987
PACE Project Number: 870928501

PACE Sample Number:			166740	166750
Parameter	Units	MDL	Duplicate	Travel Blank
Cadmium	mg/L	0.01	ND	-
Cyanide, Total	mg/L	0.02	ND	-
Chloromethane	ug/L	1.0	ND	ND
Bromomethane	ug/L	1.5	ND	ND
Dichlorodifluoromethane(1)	ug/L	1.5	ND	ND
Vinyl chloride(1)	ug/L	1.5	ND	ND
Chloroethane	ug/L	1.0	ND	ND
Methylene chloride	ug/L	1.0	1.8	1.8
Trichlorofluoromethane	ug/L	0.4	ND	ND
1,1-Dichloroethylene	ug/L	0.3	ND	ND
1,1-Dichloroethane	ug/L	0.2	ND	ND
trans-1,2-Dichloroethylene	ug/L	0.3	ND	ND
Chloroform	ug/L	0.5	0.7	1.4
1,2-Dichloroethane	ug/L	0.2	ND	ND
1,1,1-Trichloroethane	ug/L	0.5	0.5	ND
Carbon tetrachloride	ug/L	0.3	ND	ND
Bromodichloromethane	ug/L	0.2	ND	ND
1,2-Dichloropropane	ug/L	0.2	ND	ND
cis-1,3-Dichloro-1-propene	ug/L	0.5	ND	ND
1,1,2-Trichloroethylene	ug/L	0.5	ND	ND
Benzene	ug/L	1.0	3.4	ND
Dibromochloromethane(2)	ug/L	1.0	ND	ND
1,1,2-Trichloroethane(2)	ug/L	1.0	ND	ND
trans-1,3-Dichloro-1-propene	ug/L	0.3	ND	ND
2-Chloroethylvinyl ether	ug/L	5.0	ND	ND
Bromoform	ug/L	1.0	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	1.0	ND	ND
1,1,2,2-Tetrachloroethylene	ug/L	1.0	ND	ND
Toluene	ug/L	1.0	ND	ND

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PACE Project Number: 870928501

PACE Sample Number:			166740	166750
Parameter	Units	MDL	Duplicate	Travel Blank
Chlorobenzene	ug/L	1.0	ND	ND
Ethyl benzene	ug/L	1.0	ND	ND
1,3-Dichlorobenzene	ug/L	4.0	ND	ND
1,2-Dichlorobenzene	ug/L	4.0	ND	ND
1,4-Dichlorobenzene	ug/L	4.0	ND	ND
Phenol	ug/L	1.0	ND	-
2-Chlorophenol	ug/L	2.8	ND	-
2-Nitrophenol	ug/L	2.7	ND	-
2,4-Dimethylphenol	ug/L	1.8	ND	-
2,4-Dichlorophenol	ug/L	2.4	ND	-
4-Chloro-3-methylphenol	ug/L	10	ND	-
2,4,6-Trichlorophenol	ug/L	7.3	ND	-
2,4-Dinitrophenol	ug/L	10	ND	-
4-Nitrophenol	ug/L	10	ND	-
2-Methyl-4,6-dinitrophenol	ug/L	13	ND	-
Pentachlorophenol	ug/L	9.3	ND	-
Di-n-butyl phthalate	ug/L	1.0	ND	-
Bis(2-ethyl hexyl)phthalate	ug/L	5.0	ND	-
Di-n-octyl phthalate	ug/L	5.0	ND	-
Butyl benzyl phthalate	ug/L	1.0	ND	-
Diethyl phthalate	ug/L	1.0	ND	-
Dimethyl phthalate	ug/L	1.0	ND	-

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PACE Project Number: 870928501

(1) These compounds co-elute.
(2) These compounds co-elute.
(3) MDL is 2 times higher due to sample dilution.
(4) MDL is 5 times higher due to sample dilution.

The data contained in this report were obtained using EPA or other approved methodologies. All analyses were performed by me or under my direct supervision.

Thomas L. Halverson
Inorganic Chemistry Manager

William Scruton STA

William H. Scruton
Organic Chemistry Manager

Sample Identification/Field Chain of Custody Record

DELTA
ENVIRONMENTAL CONSULTANTS, INC.

Project: Delta
Shipped by: Delta - Ken Shimko
Shipped to: PACE
Comments: Analysis: - EPA Method 601/602, 624/626, VOA's
Phenols, Cyanide, Cadmium (Please filter Cd samples)

W.O. # 10-87-285
Attention of:
Hazardous materials suspected? (yes/no)

Sampling Point	Location	Field ID #	Date	Sample Type	No. of Containers	Analysis Required
MW-1			9/25	water	6 -	3 VOA 1 metals (Cd)
MW-2			9/25		6	1 cyanide 1 GL (phenols, PAHs) 604 Esters 606
MW-3			9/25		6	
MW-4			9/25		6	
MW-5			9/26		6	
MW-6			9/25		6	
Duplicate			9/26		6	
Travel Blanks			9/25		2	601/602

Sampler(s) (signature) Kenneth Shimko 9/28/87

Field ID	Relinquished by: (signature)	Received by: (signature)	Date/Time	Comments
	Kenneth Shimko	[illegible]	9/28/87 9:10	

Sealed for shipment by: (signature) Kenneth Shimko Date/Time 9/28/87 8:00 am Shipment method: hand-delivered
Received for Lab by: (signature) [illegible] Date/Time 9/28/87 9:10 Comments

Receiving Laboratory: Please return original form after signing for receipt of samples.