APPENDIX B

THE TORRINGTON COMPANY, "ENVIRONMENTAL ASSESSMENT," MARCH 11, 1985

ENVIRONMENTAL ASSESSMENT

TORRINGTON COMPANY
HEAVY BEARINGS FACILITY
SOUTH BEND, INDIANA

Submitted By:
The Torrington Company

March 11, 1985

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INTRODUCTION

The Torrington Company operated a bearing manufacturing facility in South Bend, Indiana, until 1984. At that time, the company made a decision to close the South Bend manufacuturing plant. Since the facility was a hazardous waste generator, the Torrington Company initiated a series of environmental investigations to determine if hazardous materials remained at the site. The purpose of this report is to summarize the background and history of the facility through the closure date, and also to summarize the environmental evaluations performed at the site.

Report Organization

In addition to this Introduction, this report is organized in four major sections as follows:

- . The Background Section presents:
 - 1. A discussion of the plant history through the time of closure.
 - 2. The sequence of environmental investigations performed at the site.
 - 3. The general approach followed in completing the investigations.
- . The Site-Specific Evaluation Procedures Section includes the following:
 - 1. Site-Specific Field Methods
 - 2. Site-Specific Laboratory Methods

- . The Presentation of Data/Results Section includes the following:
 - 1. General Geologic and Hydrogeologic Conditions
 - 2. EIS Environmental Engineers Study
 - 3. Investigations by Canonie Engineers
 - 4. Data Interpretation
 - 5. Conclusions
- . The Remedial Action Recommendations Section presents recommendations based on data interpretation.

BACKGROUND

This section of the report presents the history of manufacturing at the South Bend facility, the events leading to the environmental investigations, and the general approach to those investigations. Figure 1 shows the location of the Torrington facility within the City of South Bend. Figure 2 and Plate 1 (located in the pocket at the back of the report) are detailed site plans of the facility.

Plant History

The history of manufacturing at the present 3702 West Sample Street location of South Bend, Indiana, prior to 1928 is unknown. On or about 1928, the Bantam Ball Bearings Company, from Bantam, Connecticut, built or bought at the above address. At that time, the name was changed to the Bantam Bearings Corporation. In December, 1935, the Torrington Company purchased that company which manufactured ball, thrust, radial, tapered, and cylindrical roller bearings. The location retained the identity of the Bantam Ball Bearings Corporation until May/June, 1943, when it became the Torrington Company, Bantam Bearings Division. At some later date, it became the Torrington Company, Heavy Bearings Division.

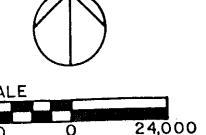
The physical facility grew in size as various additions were constructed following the original building in 1928. By 1967, the plant had reached its present-day size which included the main buildings, a foundry, and three out buildings (Sheds A, B, and C, see Figure 2). In the mid-1970's, property identified as 3602 West Sample Street was purchased. The front half of this building was converted to an office complex and the southern portion housed

Mapped, edited, and published by the Geological Survey Revised in cooperation with Indiana Department of Natural Resources Control by USGS, NOS/NOAA, and Indiana Flood Control and Water Resources Commission

Planimetry by photogrammetric methods from aerial photographs taken 1952. Topography by planetable surveys 1957-1958

SOUTH BEND EAST, IND. N4137.5-W8607.5/7.5 SOUTH BEND WEST, IND.

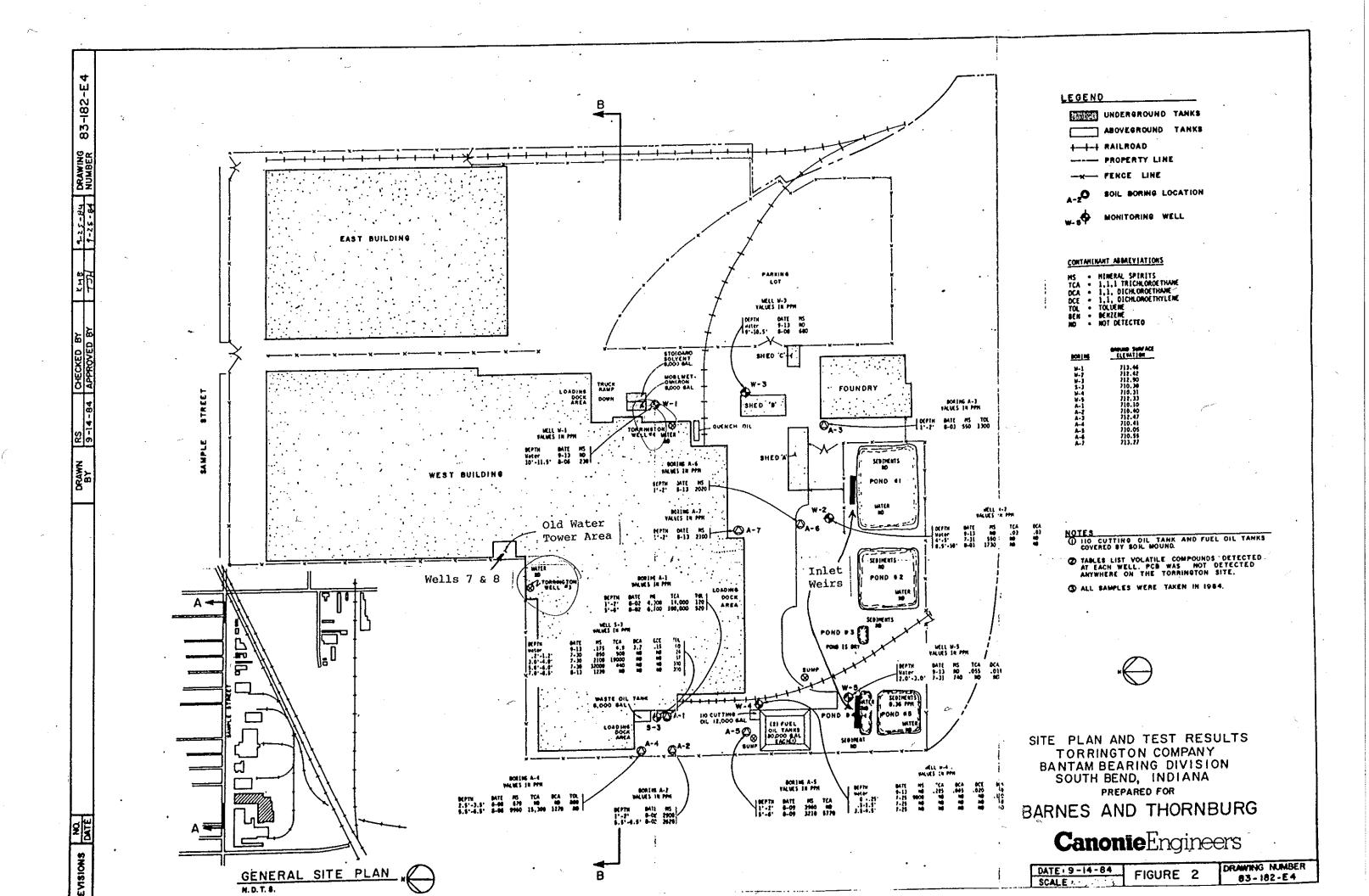
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SITE LOCATION TORRINGTON COMPANY BANTAM BEARING DIVISION SOUTH BEND, INDIANA

AND THORNBURG FIGURE

Canonie Engineers



functions which included the shipping and receiving area, a storage area, and machine repair. There were no manufacturing operations performed in this building. For these reasons, the 3602 West Sample Street facility is not included in these environmental evaluations.

In June, 1984, the ownership of the 3602 address was transferred to the City of South Bend and eventually to the American Royal Company, a furniture manufacturer. In addition, subsequent to June, 1984, the American Royal Company purchased from the Torrington Company, and moved to its property, the out buildings previously known as Sheds A and B.

Approach to the Environmental Investigations

As shown on Figure 2, there are five surface water ponds located on the Torrington site. The surface drainage from roof and pavement areas on this site is discharged to Ponds 1 and 4 via catchbasins located on the site. There are box inlet weirs prior to discharge to Ponds 1 and 4. Pond 4 receives discharge from a sump located near the fuel oil tanks at the southwest corner of the west building (see Figure 2). Surface drainage collected from this area of the site was drained to the sump and ultimately to the ponds.

Initial concern regarding the possible presence of hazardous materials on the site centered on the ponds because of the long-term discharge of surface water and the possibility of small spills which may have occurred throughout the years of operation at the facility. Therefore, the Torrington Company contracted with EIS Environmental Engineers to perform pond water and sediment sampling in each of the five ponds.

These samples were obtained in the winter of 1983/84. The results of these preliminary analyses showed low concentrations of trace organic compounds and non-detectable concentrations of PCBs. At approximately the same time, an anonymous complaint was made to the State Board of Health, and a representative (Mr. Dave Berry) visited the site to look at the ponds and the general site conditions.

As a result of the initial work, Canonie Engineers was contracted by the local attorneys for Torrington (Barnes and Thornburg) to conduct additional testing and environmental investigations. An initial Work Plan was prepared and a meeting was held with the State Board of Health. In a letter dated August 21, 1984, the Work Plan to perform a site-specific soil and groundwater investigation was approved. The scope of work as described in the Work Plan was completed by Canonie Engineers and, based on those results, a more detailed evaluation was performed in the area of the waste oil tank. Also, two (2) additional monitoring wells, Wells 7 and 8, were constructed in addition to those proposed in the original Work Plan. The results of the completed investigation were reviewed both by the Torrington Company and Capsule Environmental Engineering. This report has been prepared based on the results of all of the investigations completed to date and data presented.

SITE-SPECIFIC EVALUATION PROCEDURES

This section describes the field and laboratory procedures used during the environmental investigations. It includes both the site-specific field methods and the site-specific laboratory methods. This section primarily describes the methods used in the detailed investigations conducted by Canonie Engineers. More information regarding the EIS portion of the project is discussed in the Presentation of Data/Results Section.

Site-Specific Field Methods

This section provides a general description of the field and sampling procedures used in completing the site-specific investigations. These include the following:

- 1. Soil Sampling Procedures
- 2. Monitoring Well Construction Procedures
- 3. Well Development Procedures
- 4. Groundwater Sampling Procedures
- 5. Pond Sampling Procedures

These topics are briefly discussed in the paragraphs that follow:

1. Soil Sampling Procedures:

The investigations began with a generalized approach and, as the results of each investigation were reviewed, the sampling program became more detailed and specific. EIS Environmental Engineers initially performed analyses on grab samples of the sediment and pond water obtained during the winter. Using more exacting methodologies, the subsequent investigation conducted by Canonie Engineers used split barrel sampling

procedures with cleanup of the sampling equipment between samples in order to provide more detailed information regarding the vertical distribution of contaminants which may be present in the soil samples. Canonie's sampling procedure utilized either unlined or brass-lined, two-inch split spoons to sample the soil column at each of the selected locations (identified as A-1 through A-7). These sampling locations are shown on Figure 2. The boring logs for all shallow soil borings and all monitoring wells are shown in Appendix A.

As the specific areas of concern were more precisely identified, the soil sampling program focused on the area between the waste oil tank and the three oil tanks to the south (see Figure 3). The sampling was performed on a grid pattern using the same split barrel sampling procedures (locations identified as A-8 through A-21, and Wells 7 and 8). These are additional soil borings and were not included in the original Work Plan submitted to the State in the summer of 1984.

2. Monitoring Well Construction Procedures:

As part of the scope of the original Work Plan, six monitoring wells were constructed at the Torrington site. The well locations are shown on Figure 2 and are numbered W-1 through W-5 and S-3. The bore holes were drilled with a hand auger from the ground surface to the groundwater table. Soil samples were recovered at each bore hole during hand augering using a 1-inch diameter, hand-sample tube with an acetate liner. The samples obtained below the groundwater table were recovered using a standard 2-inch O.D. split spoon sampler with brass liners. The boring logs for all monitoring wells and Torrington Production Wells 3 and 4 are presented in Appendix A.

LEGEND:

- O SOIL BORING
- MONITORING WELL
- DRAIN
- ⊗ SUMP
- -- UNDERGROUND PIPE

SOIL BORING LOCATIONS
TORRINGTON COMPANY
BANTAM BEARING DIVISION
SOUTH BEND, INDIANA

BARNES AND THORNBURG FIGURE 3

CanonieEngineers

All six monitoring wells were installed using a cable tool drill rig and 8-inch diameter casing. Wells W-1 and W-3 extend to the clay layer (65 feet and 61 feet, respectively). Three of the wells, W-2, W-4, and W-5 extend to a depth of approximately 35 feet. The sixth well, S-3, is completed at a depth of 24 feet. Wells W-1 through W-5 are constructed with 5-inch, Schedule 40 PVC pipe with threaded joints. Well S-3 is constructed with 4-inch, Schedule 40 PVC pipe with threaded joints. A 5-foot section of machine-slotted No. 10 PVC screen is attached to the base of each of the PVC well casings. The wells are sealed with a mixture of Type 1 Portland cement and bentonite. Wells W-1 and W-3 are sealed to a depth of 45 feet and 39 feet, respectively. Wells W-2, W-4, W-5, and S-3 are sealed from the ground surface to the water table. A protective steel casing with locking cap is grouted in place around each well casing and a bentonite/concrete surface seal was placed at each well. Wells W-1 and W-3 were drilled in the paved, dry area and are installed flush with the ground surface. Manhole covers are installed over the protective casing to prevent damage to these wells.

After completing the original scope of work, two additional monitoring wells were constructed (Wells 7 and 8). Well 7 was completed to a depth of 32 feet with a 5-foot, 10-slot, 4-inch diameter PVC screen. Well 8 was constructed to a depth of 59 feet with a 5-foot, 10-slot, 4-inch diameter PVC screen using revert drilling fluid and a rotary drilling procedure.

In addition to the monitoring wells constructed on the site, the existing production wells (Torrington Well Nos. 3 and 4) were also sampled. Detailed drawings of each of the

monitoring wells and the available construction diagrams for Torrington Production Wells 3 and 4 are shown in Appendix B.

3. Well Development Procedures:

After completion of the monitoring wells, it was necessary to develop the wells, both to maximize production and to obtain representative formation samples to minimize the possibility of measuring contaminants introduced through the drilling process. Each of the six new monitoring wells and the two on-site production wells (Torrington Well Nos. 3 and 4) were developed by overpumping prior to obtaining the groundwater samples. A volume of water in excess of 300 gallons was purged from each of the wells during development. Once the well development was completed, the wells were ready for groundwater sampling.

4. Groundwater Sampling Procedures:

After completing well development, each of the monitoring wells and the two on-site production wells were sampled. Prior to sampling, the wells were evacuated using a stainless steel bailer to remove approximately two casing volumes of water. After evacuation was completed, the wells were sampled using a stainless steel bailer. A 40-milliliter vial (for volatile organic analysis) and a 1-liter bottle (for PCB analysis) were obtained from each of the wells and returned to Gulf Coast Laboratories for chemical analysis. The analytical parameters and procedures are discussed in the next subsection (Site-Specific Laboratory Methods).

5. Pond Sampling Procedures:

Both water samples and sediment samples were obtained from the five ponds located behind the Torrington Plant. A water sample was not recovered from Pond No. 3 since the pond was dry at the time of sampling. Water samples were obtained in both 40-milliliter vials and 1-liter bottles, for volatile organic and PCB analysis, respectively. Undisturbed sediment samples were obtained in brass tubes and composite sediment samples were obtained in mason jars. The undisturbed brass tube samples were recovered at the inlet to each pond and were submitted to Gulf Coast Laboratories for volatile organic analysis. The composite sediment samples obtained in mason jars were submitted to the laboratory for PCB The specific laboratory procedures and parameters analysis. analyzed for are discussed in the next subsection (Site-Specific Laboratory Methods).

Site-Specific Laboratory Methods

Soil samples submitted for analysis were obtained from two sources as follows:

- 1. Soil sediment samples obtained from Pond Nos. 1 through 5.
- 2. Granular soil samples obtained from the unsaturated zone above the upper aquifer at Monitoring Well Nos. W-1 through W-5 and S-3, and from Soil Boring Nos. A-1 through A-7.

At least one soil sample was selected from each location for analysis for both volatile organic compounds and PCBs.

The water samples were obtained from four sources as follows:

- 1. Surface water samples were obtained from Pond Nos. 1, 2, 4, and 5 (No. 3 was dry at the time of sampling).
- 2. Groundwater samples from the upper aquifer were obtained from Well Nos. W-1 through W-5, and S-3 and W-7.
- 3. Groundwater samples from the lower aquifer were obtained from Torrington Production Wells 3 and 4, and W-8.
- 4. Samples of municipal water available at the site and used in drilling were taken from the drinking water fountain in the Guard House for background analysis and to determine that no contaminants were added in the drilling process.

Two samples were (generally) obtained at each sampling location, one in 40-milliliter vials for volatile organic analysis, and a second collected in a 1-liter bottle for PCB analysis.

1. Soil Analysis:

Gulf Coast Laboratories used a hexane/acetone extraction procedure for all of the soil samples. The PCB analyses were performed using a gas chromatograph with an electron capture detector. Gulf Coast Laboratories states a 5 ppm detection limit using this procedure for soil samples.

The soil samples for volatile organics were analyzed using EPA Methods 601 and 602 after the extraction procedure was completed. Gulf Coast stated a detection limit of 0.1 ppm for all soil samples. The results of these analyses are presented in Tables 3 and 4 in the next section (Presentation of Data/Results).

2. Water Analysis:

The PCB analyses for the water samples were performed using a hexane/methylene chloride extraction for the samples. The analysis was performed using a gas chromatograph with an electron capture detector. Gulf Coast Laboratories stated the detection limit for the water samples as 0.0001 ppm.

The water samples obtained for volatile organic analysis were analyzed using EPA Methods 601 and 602 (Method 624 without a mass spectrometer). Gulf Coast stated the detection limit for this method was 0.010 ppm. The results of these analyses are summarized in Tables 5 through 7 in the following section (Presentation of Data/Results).

PRESENTATION OF DATA/RESULTS

This section of the report begins by describing the general geologic and hydrogeologic conditions in the South Bend vicinity to provide a general frame of reference for the site-specific information. It further presents the data gathered from the environmental investigations conducted at the Torrington, South Bend, site. The presentation of the data reflects the sequence of increasing detail from the initial pond sediment and water analysis performed by EIS Environmental Engineers, the Work Plan and subsequent study by Canonie Engineers, follow-up soil sampling and monitoring well construction by Canonie Engineers, and verification analyses performed by Pollution Control Systems/Encotech, Mead Compuchem, and Canonie Engineers. This section is divided into the following topics:

- 1. General Geologic and Hydrogeologic Conditions
- 2. EIS Environmental Engineers Study
- 3. Investigations by Canonie Engineers
- 4. Data Interpretation
- 5. Conclusions

The data is presented in the same sequence in which the investigations were performed with the soil data first and the water data second. The analytical data incorporated into this section includes chemical analysis for the following:

- 1. Soil samples collected on-site.
- 2. Sediment samples collected from the five surface water ponds.
- 3. Groundwater samples collected from monitoring wells constructed at the site.
- 4. Surface water samples collected from the surface water ponds.

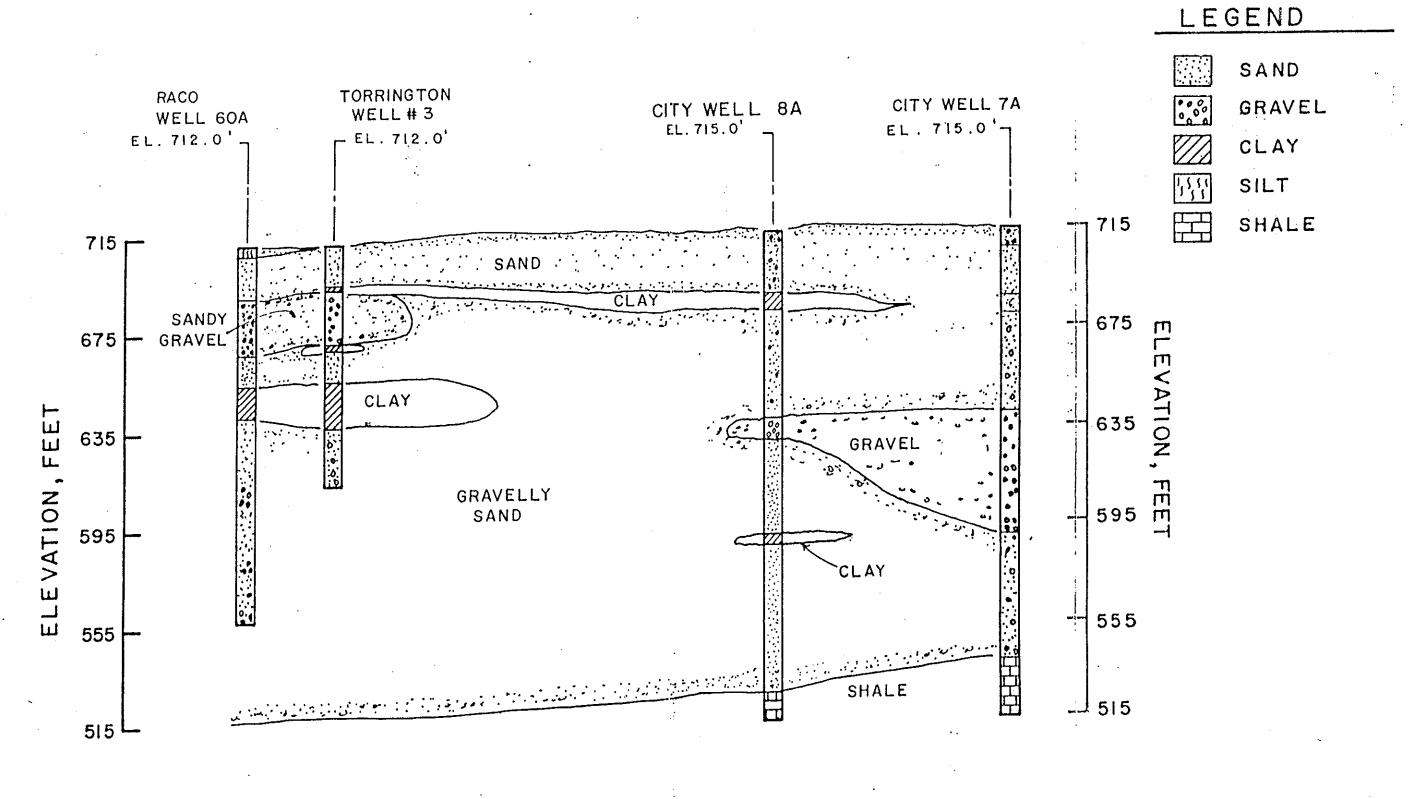
GRAN

For the analytical data reported in the tables, results are shown only when a compound was present in at least one sample. However, all the parameters shown in Table 2 were analyzed for, as well as PCBs.

General Geologic and Hydrogeologic Conditions

Sand and gravel deposits in the glacial drift are the major source of water supply for the South Bend area. In addition to the private and municipal wells located in these deposits, the Torrington Company has two production wells which are also in the sand and gravel aquifer. The generalized cross sections in Figures 4 and 5 show the presence of a clay layer at approximately 60 feet which is generally continuous in the South Bend area; however, some windows are present where this clay layer grades laterally into sand and gravel or was eroded out as a result of post-glacial stream action. The specific lines of cross section are shown on Figure 2 and Plate 1.

The St. Joseph River to the northeast of the Torrington site (see Figure 1) is the primary regional control for groundwater flow in the South Bend area. This is based on information presented in U.S. Geological Survey (USGS) studies which have previously been completed (Appendix D). Because of the presence of the clay-confining layer, groundwater conditions in the sand and gravel aquifer are occasionally artesian rather than water table. The USGS has measured transmissivities in this aquifer to be on the order of 500,000 gallons per day per foot. Based on these conditions, a relatively flat hydraulic gradient would be expected in the area. This is confirmed by the USGS studies which show gradients in the range of 16 to 35 feet per mile.



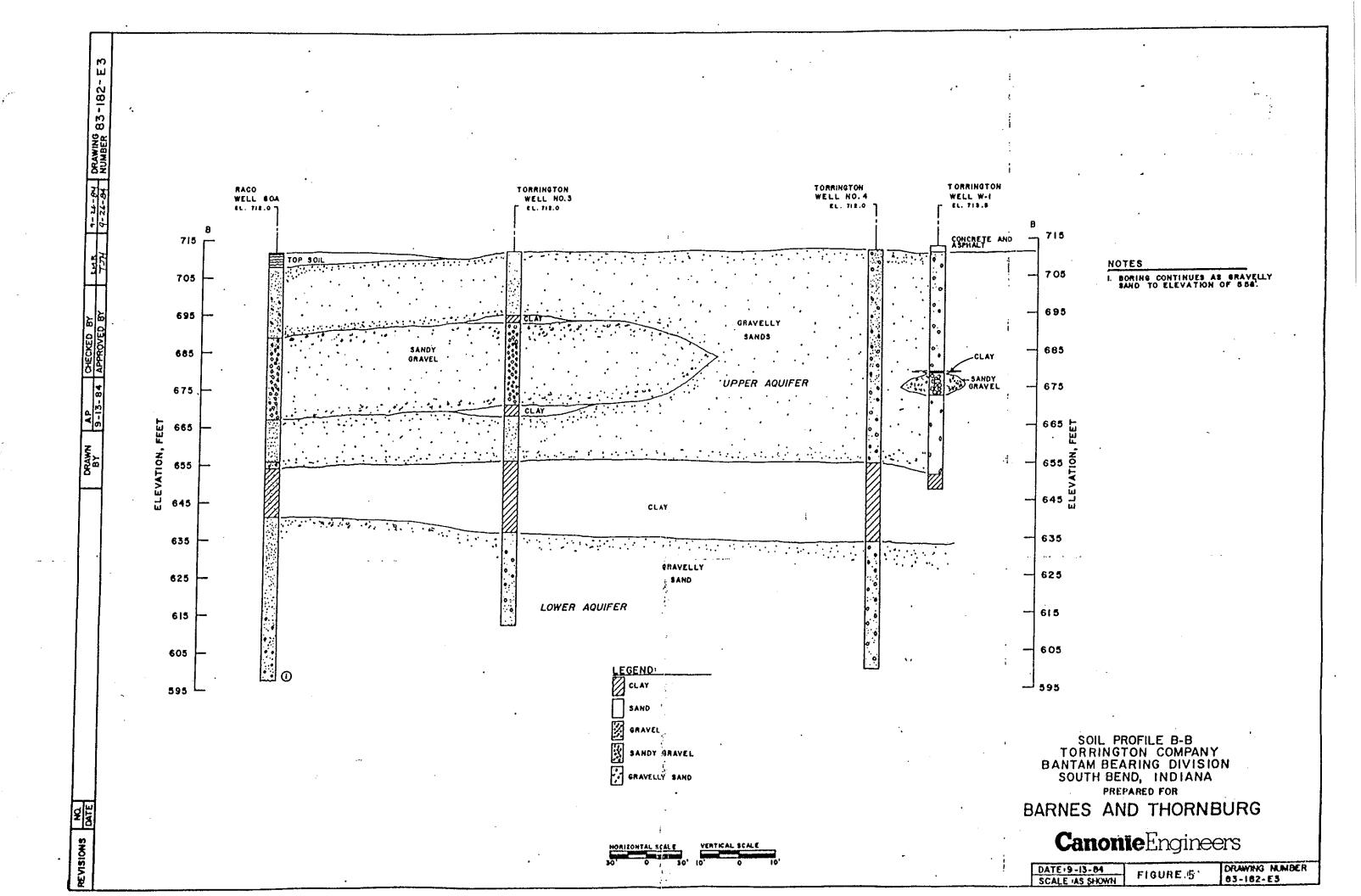
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HORIZONTAL SCALE VERTICAL SCALE

600' 0 600' 40' 0 40'

SOIL PROFILE A-A
TORRINGTON COMPANY
BANTAM BEARING DIVISION
SOUTH BEND, INDIANA
BARNES AND THORNBURG
FIGURE 4

CanonieEngineers



The Oliver Park Well Field (see Figure 1) is located approximately 4,000 feet east of the Torrington Company facility. The Oliver Park Well Field was contaminated as a result of spills by a local chemical manufacturer in the area. The well field is currently inactive and is not being pumped. The studies completed by the USGS show that the Torrington Company site is outside the radius of influence of the Oliver Park Well Field even if it were in operation.

Surface water drainage in the South Bend area is controlled by storm sewers which ultimately discharge to the St. Joseph River.

EIS Environmental Engineers Study

EIS Enviornmental Engineers was engaged by Torrington Company, South Bend, to perform initial water and sediment sampling from the surface water ponds on-site. The results of the analyses are shown in Table 1. The water and sediment data showed trace concentrations of volatile organic compounds. In addition, EIS sampled the two Torrington production wells on-site (Well Nos. 3 and 4). These wells also showed very low concentrations of tetrachloroethylene and methylene chloride.

Investigation by Canonie Engineers

As a result of the EIS investigation, Canonie Engineers was engaged to perform additional environmental investigations at the South Bend site. A Work Plan was submitted to the Indiana Board of Health, reviewed, and approved. The scope of work outlined in the Work Plan was completed by Canonie Engineers. The scope of work included the following:

TABLE 1

EIS Lab Results

EIS Environmental Engineers

Concentrations in Parts Per Million (ppm)

Pond	#1	#2	#3	#4	#5	#1
Type of Sample	Water	Water	Water	Water	Water	Sediments
1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane	ND ND ND ND ND	ND ND ND ND	ND .0015 ND ND ND	ND .0044 ND ND ND	ND .0057 ND .00053 ND	ND ND ND ND ND
Tetrachloroethylene Benzene Toluene Bromodichloromethane Dibromochloromethane Methylene Chloride Chloroform Bromoform	.0008 ND ND ND ND .032 ND	.0012 ND ND ND ND .024 ND	.0063 ND ND ND ND .023 ND	ND ND ND ND ND .016 ND	.0041 ND ND ND ND .0097 ND	ND ND ND ND 2.8 ND
Chloroethane Vinyl Chloride PCBs	ND ND	ND ND	ND ND	ND ND	ND ND	ND ND <2

Pond	#2	#3	#4	#5	Torrington Well #3	Torrington Well #4
Type of Sample	Sediments	Sediments	Sediments	Sediments	Water	Water
1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Teterchloroethylene Benzene Toluene Bromodichloromethane Dibromochloromethane Methylene Chloride	ND ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND ND ND	ND 70.0 ND 1.9 ND ND ND ND ND ND	ND ND ND ND ND ND ND ND ND ND	ND ND ND ND .0026 ND ND ND ND	ND ND ND IID .0031 ND _ ND ND ND
Chloroform Bromoform Chloroethane Vinyl Chloride PCB's	ND ND ND ND <2	ND ND ND ND <2	ND ND ND ND <2	ND ND ND ND <2	ND ND ND ND	ND ND ND ND

ND = Not Detectable

- = Not Performed

- 1. Soil sampling near underground storage tanks.
- 2. Sediment samples from the five surface water ponds.
- 3. Near-surface (ground surface to three or four feet) soil sampling at four or five locations. The locations were chosen in the field to correspond to areas where surface oil staining existed.

**

- 4. The construction of five monitoring wells at the site, including two wells which extend to the dividing clay layer (approximately 60 feet) and three shallower monitoring wells.
- 5. Chemical analyses of both soil and water samples.

After completing the scope of work originally outlined in the Work Plan, it was decided to conduct more detailed soil sampling in the area of the waste oil tank (see Figure 3), and that two additional down-gradient monitoring wells be constructed (Wells 7 and 8). This work was completed in November and December, 1984.

Tables 2 through 7 in this section present the chemical analytical data for the soil borings, soil samples, pond sediment, groundwater, and pond water. The list of volatile organic parameters shown in Table 2 were analyzed for in all samples. In addition, PCB analyses were performed on all groups of samples.

Results from the bore hole and surface soil sampling performed in accordance with the original Work Plan (Table 3) identified volatile organic compounds at a number of soil sampling locations in the area of the waste oil tank. Samples at other locations on the site did not reveal anything of significance. In addition, undifferentiable hydrocarbons are present at several locations. These undifferentiable hydrocarbons probably indicate the presence

TABLE 2

VOLATILE ORGANIC COMPOUNDS INCLUDED IN METHOD 624

Acrolein

Acrylonitrile

Benzene

Bis (Chloromethyl) Ether

Bromoform

Carbon Tetrachloride

Chlorobenzene

Chlorodibromomethane

Chloroethane

2-Chloroethylvinyl Ether

Chloroform

Dichlorobromomethane

Dichlorodifluoromethane

1,1-Dichloroethane

1,2-Dichloroethane

1,1-Dichloroethylene

1,2-Dichloropropane

1,3-Dichloropropylene

Ethylbenzene

Methyl Bromide

Methyl Chloride

Methylene Chloride

1,1,2,2-Tetrachloroethane

Tetrachloroethylene

Toluene

1,2-Trans-Dichloroethylene

1,1,1-Trichloroethane

1,1,2-Trichloroethane

Trichloroethylene

Trichlorofluoromethane

Vinyl Chloride

TABLE 3 (According to Original Work Plan) Soil Results - Soil Borings Gulf Coast Laboratories Concentrations in Parts Per Million (ppm)

W-2

8.5-10.5

1730

W-3

9.0-10.5

680

W-4

0.5 - 1.5

ND

W-4

0.0-.25

 \mathcal{I}

9000

W-2

4.0-5.0

550

W-1

10.0-11.5

230

	1,1,1 Trichloroethylene 1,1,1 Trichloroethylene 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene PCBs	ND ND ND ND ND ND ND	ND ND ND ND ND ND ND	ND ND ND ND ND ND ND	ND ND ND ND ND ND ND	ND ND ND ND ND O. 17 ND <5	ND ND ND ND ND ND <5
					3		
•	Boring	W-4	W-5	S-3	S-3	S - 3	S - 3
	Depth (ft)	3.5-4.5	2.0-3.0	0.2-1.2	3.0-4.0	5.0-6.0	7.0-8.5
	Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene PCBs	ND ND ND ND ND ND ND ND	740 ND ND ND ND ND ND ND ND	850 / ND 500 ND ND ND ND ND 24 <5	2100 ND 19000 ND ND ND ND ND 57 <5	32000 ND 440 ND ND ND ND ND ND 340 <5	1220 ND ND ND ND ND ND HD 360 <5

ND = Not Detectable

Boring

Depth (ft)

Undifferentiable Hydrocarbons

TABLE 3 (Continued)

(According to Original Work Plan) Soil Results - Soil Borings Gulf Coast Laboratories Concentrations in Parts Per Million (ppm)

Boring	A-1	A-1	A-2	A-2	A-3	A-4
Depth (ft)	1.0-2.0	5.0-6.0	1.0-2.0	5.5-6.5	1.0-2.0	2.5-3.5
Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene PCB's	4300 ND 14000 ND ND ND ND ND 120 <5	6700 ND 1000000 ND ND ND ND ND ND 520 <5	2900 ND ND ND ND ND ND ND ND	2620 ND ND ND ND ND ND ND	550 ND ND ND ND ND ND 1300	670 ND ND ND ND ND ND ND 880 <5

Boring	A-4	A-5	A-5	A-6	A-7
Depth (ft)	5.5-6.5	1.0-2.0	5.0-6.0	1.0-2.0	1.0-2.0
Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene PCB's	9950 ND 15300 V ND 1270 ND ND ND ND	3960 ND ND ND ND ND ND ND ND	3210 ND 5770 ND ND ND ND ND ND ND	2020 ND ND ND ND ND ND ND ND	2100 ND ND ND ND ND ND ND

TABLE 3 (Continued)

(According to Original Work Plan) Soil Results - Pond Sediments Gulf Coast Laboratories Concentrations in Parts Per Million (ppm)

Pond	#1	#2	#3	#4	#5
Depth (ft)	0-1	0-1	0-1	0-1	0-1
Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene PCBs	ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND	.36 ND ND ND ND ND ND ND

of oil as a result of occasional spills on the site. It was not possible for Gulf Coast Laboratories to separate these hydrocarbons and positively identify them through their analytical procedures. The volatile organic compounds are generally present to a maximum depth of five to six feet. In the case of S-3, which is located immediately adjacent to the waste oil tank, trace organics are present to a depth of 8-1/2 feet. However, since the soil boring was unknowingly drilled through an area of high volatile organic compound concentration, it is possible that some contamination may have been carried down during the drilling process in this area.

Table 3 also shows the data for the pond sediment samples. No significant concentrations of volatile organics were present in the pond sediment samples. In addition, no detectable levels of PCBs were found in these samples.

As a result of the volatile organic compounds found in the test borings and the soil samples, additional soil sampling in the vicinity of the waste oil tank was desirable. The additional soil sampling in this area showed the presence of volatile organic compounds (Table 4), primarily in the upper three feet. However, in the area of Samples A-17, A-18, A-19, and A-20, low levels of volatile organics are present to a depth of 8-1/2 feet.

Table 5 presents the groundwater analyses for Wells 1 through 5, S-3, Wells 7 and 8, and the two Torrington productions wells, 3 and 4. Low concentrations of some volatile organic compounds were found in some of the wells (see the tables). However, PCBs were not found in any of the groundwater samples. Since Well S-3 was located in the area of greatest soil contamination, the highest concentrations of volatile organic compounds were found in water samples from that well.

TABLE 4

(Additional Sampling)

Soil Results - Soil Borings

Gulf Coast Laboratories

Concentrations in Parts Per Million (ppm)

Boring	A-8	A-8	A-8	A-9	A-9	A-9	A-10	A-10	A-1
Depth (ft)	2.5	5.5	8.5	2.5	5.5	8.5	2.5	5.5	8.5
Undifferentiable									
Hydrocarbons	ND	3.2	1.8	11	15	350	4.1	8.1	13
1,1,1 Trichloroethylene	D	ND	ND	ND	ИD	115	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	DM	ND	ND	ND	ND .	ND	ND
1,1 Dichloroethylene	ND	ND	DM	ND	ND :	2.5	ND	ND	ND
1,1 Dichloroethane	ם מ	ND	ND	ND .	ND	2.3	ND	ND	DN
1,1,2,2 Tetrachloroethane	ND	ND	מא	ND	DN	7.9	ND	ND	ND.
Benzene	ND	ND	DN	ND	ND	1.9	ND	ND	ND
Toluene	ND	ND	DN	ND	ND	3.0	ND	ND	ND
Dibromochloromethane	ND	ND	DN	ND	ND	6.6	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	DN
Chloroform	ND	ND	ND	ND	ND	DN	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCBs	<5	<5	<5	<5	<5	<5	<5 │	<5	<5
	l <u></u> '	1'	'	l <u>"</u>	·	`'			

Boring	A-11	A-11	A-11	A-12	A-12	A-12	A-13	A-13	A-1
Depth (ft)	2.5	5.5	8.5	2.5	5.5	8.5	2.5	5.5	8.5
Undifferentiable									
Hydrocarbons	12	ND	RD	1000	ND	ND	85	ND	4.6
1,1,1 Trichloroethylene	14	ND	ND	580	ND	DИ	ND	ND	ND
1,1,1 Trichloroethane	ND	DN	ND	ND	ND	DM	ND	ND	ND
1,1 Dichloroethylene	ND	ND	ND	6.4	2.1	ND	ND	ND	DM
1,1 Dichloroethane	ND	ND	ND	8.8	ND	ND	4.2	ND	ND
1,1,2,2 Tetrachloroethane	ND	. ND	ND	23	ND	ND	ND	ND	ND
Benzene] ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	DN	6.9	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	13	ND	35	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ДИ	ND	ND	ND	ND	ND	ND
PCBs	<5	<5	<5	<5	<5	< 5	<5	<5	< 5

TABLE 4 (Continued)

(Additional Sampling) Soil Results - Soil Borings Gulf Coast Laboratories Concentrations in Parts Per Million (ppm)

	Boring	A-14	A-14	A-14	A-15	A-15	A-15	A-16	A-16	A-16
	Depth (ft)	2.5	5.5	8.5	2.5	5.5	8.5	2.5	5.5	8.5
	Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene Dibromochloromethane Methylene Chloride Chloroform Bromoform PCBs	320 ND ND 12 ND ND ND ND ND ND ND	295 ND ND ND ND ND ND ND ND ND ND	8.7 ND ND ND ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND ND ND ND	1.1 ND ND ND ND ND ND ND ND ND ND	ND N	1.9 ND ND ND ND ND ND ND ND ND ND	4 ND ND ND ND ND ND ND ND ND
Γ	Boring	A-17	A-17	A-17	A-18	A-18	A-18	A-19	A-19	A-19
	Depth (ft)	2.5	5.5	8.5	2.5	5.5	8.5	2.5	5.5	8.5
	Undifferentiable Hydrocarbons 1,1,1 Trichloroethylene 1,1,1 Trichloroethane 1,1 Dichloroethylene 1,1 Dichloroethane 1,1,2,2 Tetrachloroethane Benzene Toluene Dibromochloromethane Methylene Chloride Chloroform Bromoform PCBs	ND ND ND ND ND ND ND ND ND	120 ND ND 11 ND ND 93 9.3 ND ND 15 ND	80 9.9 ND ND 6.6 ND 24 1.9 ND ND ND ND	61 ND ND 7.1 ND ND ND ND ND ND ND	21 ND ND ND ND ND ND ND ND ND ND	175 79 ND ND 18 ND 92 4.1 ND ND ND ND ND	330 ND ND ND ND ND ND ND ND ND	235 ND ND 30 19 ND ND ND ND ND ND ND	220 18 ND ND ND ND ND ND ND ND ND

TABLE 4 (Continued)

(Additional Sampling) Soil Results - Soil Borings Gulf Coast Laboratories Concentrations in parts per million (ppm)

			A-21	W-7	W-7
2.5	5.5	8.5	2.5	5.0	8.5
540 27 ND 39 ND ND 8.6 6.2 ND ND 73	5.3 ND ND 15 ND ND ND ND ND ND	45 ND ND 14 8.4 ND ND ND ND ND	66 ND ND ND 6.7 ND ND ND ND	5 ND ND ND ND ND ND ND ND	ND ND ND ND ND ND ND ND
	540 27 ND 39 ND ND 8.6 6.2 ND	540 5.3 27 ND ND ND 39 15 ND ND ND ND 8.6 ND 6.2 ND ND ND ND ND ND ND	540 5.3 45 27 ND ND ND ND 39 15 14 ND ND ND 8.4 ND ND ND 8.6 ND ND 6.2 ND N	540 5.3 45 66 27 ND ND ND ND ND ND ND ND 39 15 14 ND ND ND ND ND ND ND ND ND 8.6 ND ND ND ND 6.2 ND 73 ND ND ND	540 5.3 45 66 5 27 ND 39 15 14 ND 8.6 ND ND ND ND ND 8.6 ND 73 ND ND ND ND

TABLE 5

Groundwater Analysis
Units all ppm Unless Otherwise Specified

VOLATILE ORGANIC COMPOUNDS	<u>W-1</u>	<u>W-2</u>	<u>W-3</u>	<u>W-4</u>	<u>W-5</u>
1,1 Dichloroethane 1,1 Dichloroethylene 1,1,1 Trichloroethane	- - -	.030	- -	.065 .020 .285	.014 - .055
OTHER PARAMETERS					
PCBs Undifferentiable Hydrocarbons, mg/l	ND <0.100	ND <0.100	ND <0.100	ND <0.100	ND <0.100

TABLE 5

Groundwater Analysis
Units all ppm Unless Otherwise Specified

	<u>S-3</u>	<u>W-7</u>	<u>W-8</u>	<u>T-3</u>	<u>T-4</u>
VOLATILE ORGANICS					
Chloroethane 1,1 Dichloroethane 1,1 Dichloroethylene 1,1,1 Trichloroethane 1,1,2 Trichloroethane Trichloroethylene Vinyl Chloride	.075 .940 .025 1.30 - .002 <.010	.016 .001 ND ND ND	- ND ND ND ND	ND ND ND ND ND	.065 .020 .285 -
OTHER PARAMETERS					
Total PCBs, μg/l Unidfferentiable Hydrocarbons	ND ND	- ND	ND ND	<0.1	<0.1 <.100

Table 6 shows the results of the pond water analysis. No significant levels of volatile organic compounds or PCBs were found. Table 7 shows comparative analyses for Wells S-3 and W-7. These comparative analyses were performed as a follow-up to the initial sampling of each of these wells in order to verify the presence or absence of specific volatile organic compounds. The analyses that are shown in Table 5 present the most recent verified results for each of these wells. For Well S-3, the Pollution Control Systems (PCS) data (11/20/84) is data reported for S-3. The Canonie Engineers data (12/7/84) is the data reported for W-7.

Data Interpretation

This subsection presents the interpretation of the geologic, hydrogeologic, and chemical data. Site-specific geologic cross sections are presented to show the site-specific geologic conditions and to provide general information regarding depths of volatile organic contamination at the specific soil boring locations. There are six cross sections shown for the area of the waste oil tank; three of these cross sections are drawn in an east/west direction (Figure 6) and three in a north/south direction (Figure 7). specific lines of cross section are shown on Figure 8. addition to the cross sections in the area of the waste oil tank, a more general cross section was drawn from Well 1 through Well 5 (Figure 9), and all wells were projected perpendicularly into the line of cross section. The line of cross section is shown on Plate 1.

Based on the above-referenced cross sections, the site-specific conditions consist primarily of a sand and gravel zone above the deeper clay layer (at approximately 60 feet). This upper zone is relatively permeable. Therefore,

TABLE 6
Pond Water Analysis

	<u>PW-1</u>	<u>PW-2</u>	<u>PW-3</u>	<u>PW-4</u>	<u>PW-5</u>
OTHER PARAMETERS					
Total PCBs, µg/l Undifferentiable Hydrocarbons	<0.1 ND	<0.1 ND	* ND	<3 <.1	<0.1 .36

^{*}Pond was dry at time of sampling; no samples obtained

TABLE 7

Comparison Laboratory Analysis Wells W-7 and S-3

WELL S-3 (ppm)

	:	(date)/la	aboratory	
	(9/13/84)/Gulf	(10/29/84)/Gulf	(10/29/84)/Mead	(11/20/84)/PCS
Mineral Spirits ¹ Vinyl Chloride Trichloroethylene 1.1 Dichloroethylene Chloroethane 1,1,1-Trichloroethane 1,1-Dichloroethane Dichlorobromomethane PCBs (ug/1)	0.175 ND ND 0.15 ND 4.9 3.2 ND <.1	0.012 ND ND 0.170 ND 6.0 3.1 0.22 <.1	_2 ND ND 0.029 .180 1.3 0.740	0.003 0.002 0.025 0.075 1.3 0.940 ND

WELL W-7 (ppm)

Compound

•		(date)/	laboratory	
w	(10/29/84)/Gulf	(11/20/84)/PCS	(12/7/84)/Gulf	(12/7/84)/Canonie
Mineral Spirits ¹	0.510	-	0.265	-
Trichloroethylene	ND	0.001	ND	ND
1,1-Dichloroethylene	0.028	0.002	0.055	0.0013
Trans 1,2-Dichloroethylene	ND	0.003	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	0.020	ND
1,1,1-Trichloroethane	0.072	0.012	0.083	ND
1,1-Dichloroethane	0.097	0.012	0.065	0.016
Toluene	ND	0,010	ND	ND
PCBs	<.1	_3	<.1	_3

- Gulf Coast Laboratories (detection limit 0.010 ppm) Gulf - Pollution Control Systems (detection limit 0.001 ppm)

Mead - Mead Compuchem (detection limit 0.010 ppm)

Canonie- Canonie Engineers, Inc. (detection limit 0.0005 ppm)

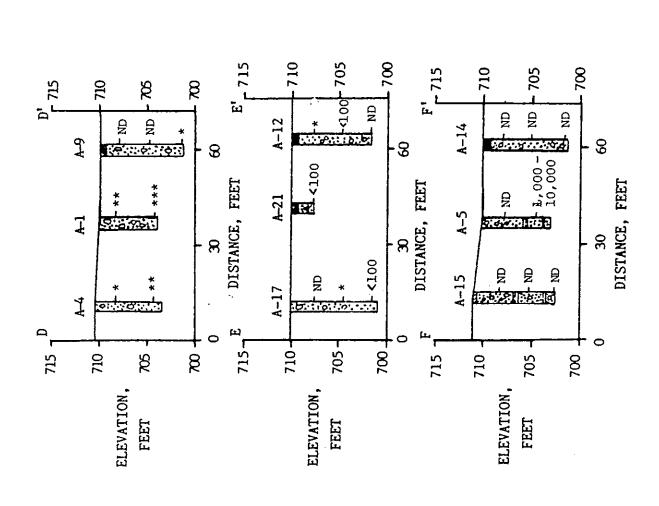
 1 Mineral spirits reported by Gulf Coast only not standard parameter under EPA 601-602.

Three peaks on MS identified as 1,3-Dioxolane (0.004 ppm), Ethane,1,1-Oxybis (0.003 ppm), and 2-Butanol, 2-Methyl (0.015 ppm). Ly liston

31. 164AF Cabusidad Kan have Not tested.

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SCALE
VERTICAL: 1"= 10'
HORIZONTAL: 1"= 30'
VERTICAL EXAGERATION: 3X

GRAVEL

SAND

CLAY

CONCRETE

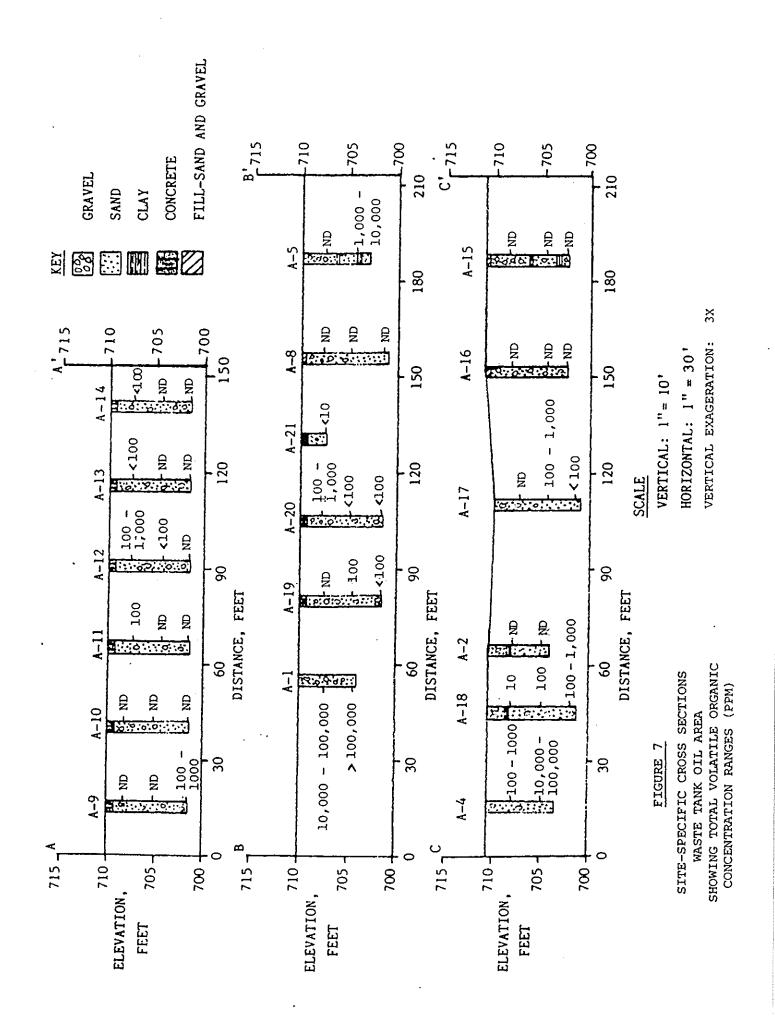
CONCRETE

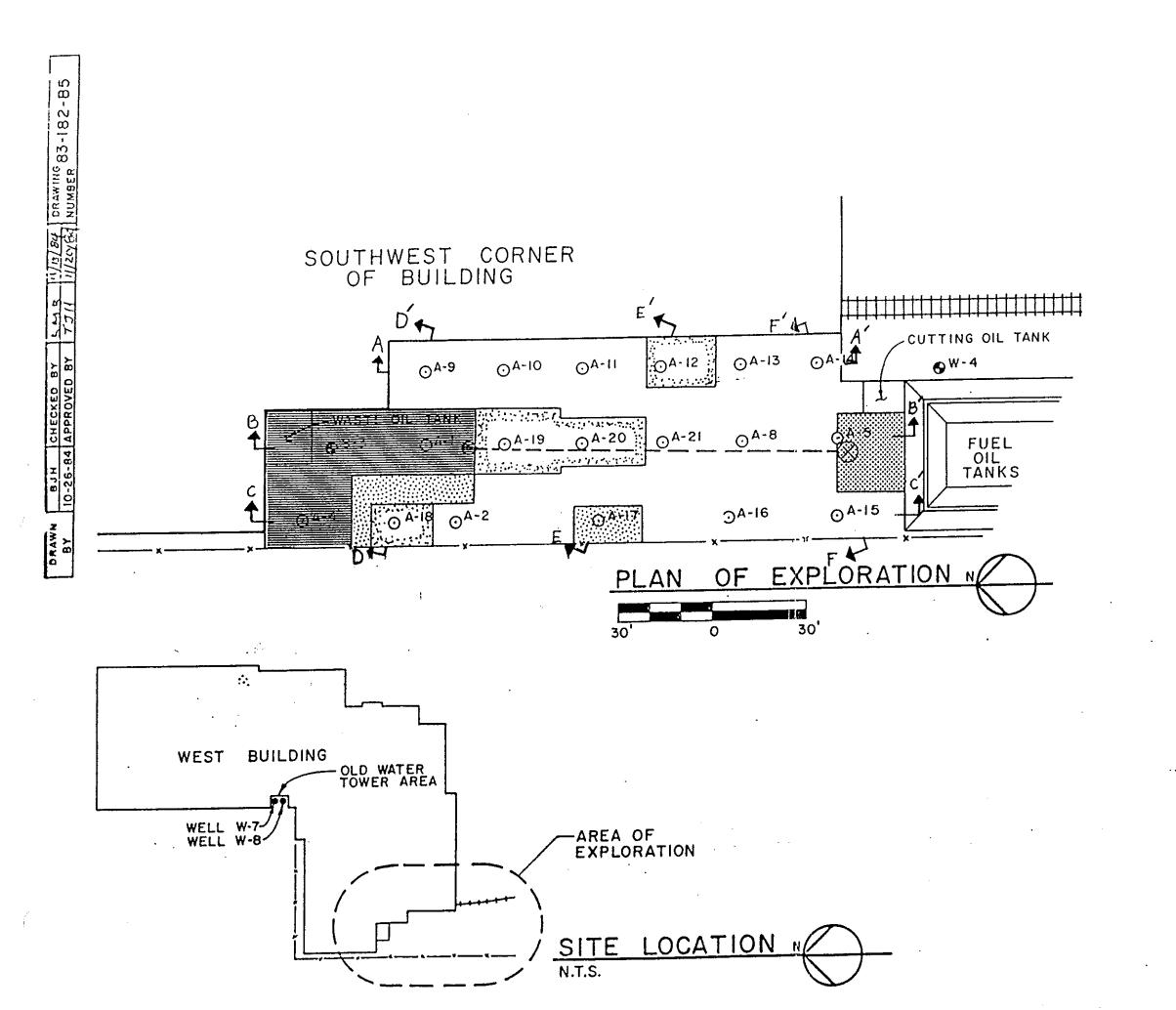
* 100 - 1,000

** 10,000 - 100,000

** > 100,000 - 100,000

SITE-SPECIFIC CROSS SECTIONS
WASTE OIL TANK AREA
SHOWING TOTAL VOLATILE ORGANIC
CONCENTRATION RANGES (PPM)



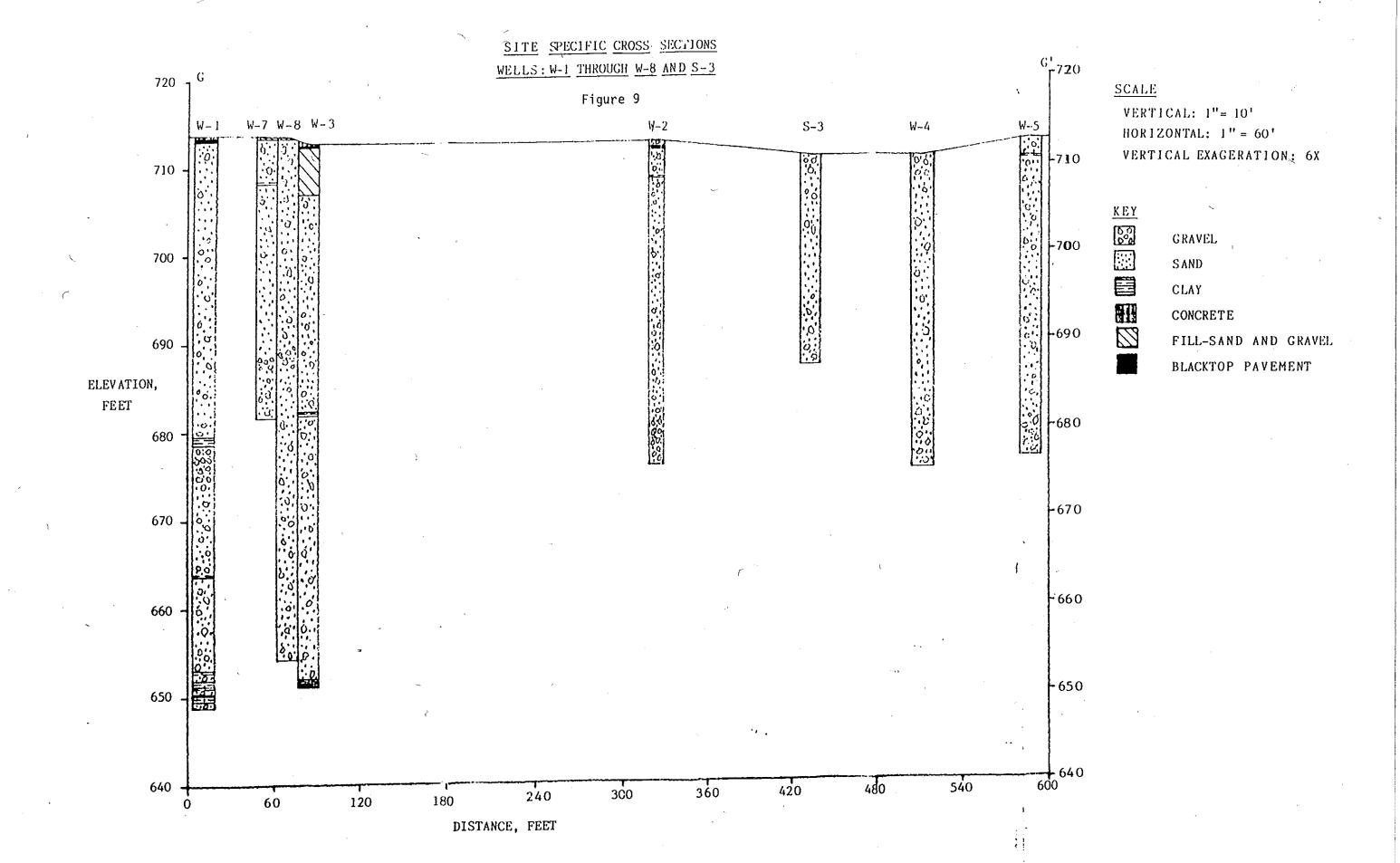


LEGEND:

- O SOIL BORING
- MONITORING WELL
- **⊕** DRAIN
- \otimes SUMP
- -- UNDERGROUND PIPE
- 0-10 PPM
- 💹 10-100 PPM
- 100-1,000 PPM
- [1,000-10,000 PPM
- >10,000 PPM

TOTAL VOLATILE
ORGANIC CONCENTRATIONS
3.0'-6.0' INTERVAL
SOIL BORING LOCATIONS
TORRINGTON COMPANY
BANTAM BEARING DIVISION
SOUTH BEND, INDIANA

BARNES AND THORNBURG FIGURE 8 Canonie Engineers



surface water runoff and precipitation can infiltrate the ground surface, potentially carrying surface contaminants deeper into the soil column. The analytical data shows that the major contamination with volatile organic compounds in this area has penetrated to depths of less than 7 feet in most cases, and in some cases as deep as 8-1/2 feet. borings A-19 and A-20 are located adjacent to the pipe which connects a surface catchbasin with the sump near the buried There is some contamination in this area to fuel oil tanks. depths as great as 8-1/2 feet. However, the degree of contamination in this area is not as severe as in the area north of the catchbasin as represented by soil samples A-1 and A-4 and Well S-3. Specific areas and relative degree of contamination with volatile organic compounds are shown on Figure 8.

No significant quantities of either oils or volatile organic compounds were found in the test borings and soil samples obtained at other selected locations around the site.

The groundwater levels at the site varied so little that it was not possible to construct a water level contour map.

The groundwater sampling data shows that there are no wells which contain significant concentrations of volatile organic compounds other than in the area of Well S-3. Since Well S-3 is located in the area of greatest soil contamination, the groundwater quality results from this area may not be representative of actual groundwater quality. Volatile organic compounds were at or below detection limits for all other wells on the site. In addition, the pond water and sediment samples obtained in the Canonie investigation show no significant concentrations of volatile organic compounds or PCBs.

Conclusions

Based on the soil, sediment, groundwater, and surface water data, the only identified area of localized contamination exists in the vicinity of the waste oil tank (see Figure 8) at the South Bend site. The soil in this area is contaminated with significant concentrations of volatile organic compounds and oil.

A review of the groundwater data shows that significant groundwater contamination has not occurred at the South Bend site. However, since a localized area has soil contaminated with concentrations of oils and volatile organic compounds, it is necessary to eliminate this area as a potential source of groundwater contamination prior to final closure of the Torrington facility.

REMEDIAL ACTION RECOMMENDATIONS

This section of the report provides recommendations for remedial action at the Torrington, South Bend, site. Based on the test results and conclusions, the Torrington plant site is generally free of potential environmental problems. The presence of volatile organics in the area of the waste oil tank, however, warrants preventative action and further monitoring. To meet this objective, the following steps are recommended:

- 1. Soil removal in the area of the waste oil tank.
- 2. Additional on-site testing as work proceeds to monitor and evaluate the extent of contamination.
- 3. Assess the groundwater immediately under the potential source for two years to assure all parties that groundwater under the site is not a potential source of adverse impact.
- 4. Assess the groundwater down-gradient of the potential source to assure all parties that no adverse or side affects are occurring.

Based on Figure 8, the area of greatest contamination is in the immediate vicinity of the waste oil tank (S-3, A-1 and A-4), and in the area of the sump just north of the three buried oil tanks. We propose to excavate these two areas in order to remove the total volatile organic concentrations to a level of less than 1,000 ppm. It is anticipated that the soil excavation will remove 95% of the organics potentially present in the area. This will require the removal of contaminated soil to a depth of three feet except for isolated pockets. As the excavation in these two areas proceeds, it is proposed to take additional soil samples as necessary for gross chemical analysis to determine relative levels of contamination. In addition, we will have a field meter on-site to monitor the approximate levels of total volatile organic compounds.

Prior to excavation in these areas, we intend to further evaluate the most effective means of disposal for the contaminated soil. We will evaluate alternatives to hauling this material to a secure landfill for disposal.

Since Well S-3 will be eliminated during soil removal, we recommend replacing it after the site has been backfilled. We propose to sample monitoring wells W-4, W-7, W-8 and the replacement well for S-3 for two years to determine if groundwater contamination is occurring at the site. This will also serve to evaluate the source elimination carried out during the remedial action.

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APPENDIX A ON-SITE BORING LOGS

Boring Log

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													BORING No. W-1	
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*PLANT COORDINATES

Boring Log

PROJECT No. ____CE 83-182

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Boring Log

													BORING No. W-2	
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									ŞP				BROWN MEDIUM SAND, SOME GRAVEL.	
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,		по	2.0	0.0				12					GRAY MEDIUM SAND, TRACE OF GRAVEL. OVA = 0 PPM.	
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											}		OVA METER	П

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													PAGE _1 OF _2_	
PRO	JEC.	ΓΝ	AME	T	ORRI	NGTO	N RE	ARING	BANTAM	DIVIS	10И			
													SURFACE ELEV. 712.90	
													ART 8/8/84 FINISH 8/10/84	
			MPLE			3L0								<u> </u>
DEPTH			INTE	RVAL		OUN	T	SS	SOIL	SE	TSF	PT	SOIL DESCRIPTION AND REMARKS	E 20
꿈	No.	TYPE	FROM		6	_	18	E S	U.S.C.S. SOIL TYPE	P. Š	1 3	8 8	AND NEWARKS	PE
													REINFORCED CONCRETE.	
	Ъ-	HS	2.0	2.0				3				.8	BLACKTOP PAVEMENT.	-
									SP				BROWN GRAVELLY SAND FILL.	-
5	2	HS	5.0	6.0				12	SM-SP				DARK BROWN MEDIUM SAND, TRACE OF	
[GRAVEL, SILT, AND CLAY.	
				-										
	1	SS	9.0	10.5	15	22	26	16	SP				LIGHT BROWN MEDIUM TO COARSE SAND,	-
10							- Y		Ŭ.				TRACE OF GRAVEL.	
							<u> </u>							
									,				WATER ENCOUNTERED AT APPROXIMATELY	-
													8.5 FT.	<u> </u>
15														
														-
							-							<u> </u>
20														j
			·											
													LIGHT GRAY MEDIUM TO COARSE SAND,	
25													SOME GRAVEL.	
														<u> </u>
30									i				TRACE OF CLAY.	
					•			ŀ						
35														
														-
												***************************************	NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED	\dashv
٠,													WITH A CENTURY FLAME TONIZING	
40		_						j					OVA METER.	
				 	\dashv									\dashv

PRILLER J. BLATZ. PERRLESS-MIDWEST DATE: START 8/8/84 FINISH 8/10/84 SAMPLE COUNT BUSC.S. SOIL DESCRIPTION AND REMARKS OF TYPE INTERVAL O 6 12 18 22 TYPE SOIL DESCRIPTION AND REMARKS SP LIGHT GRAY MEDIUM TO COARSE SAND WITH SOME GRAVEL. SP LIGHT GRAY MEDIUM TO COARSE SAND WITH SOME GRAVEL. CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREMOLE MONITORED MITH A CENTURY FLAME IONIZING OVA METER.	ORI	NG	LOC	ATIO	N <u> </u>	417	3,35	, <u>E</u>	6103,					SURFACE ELEV712.90
SP LIGHT GRAY MEDIUM TO COARSE SAND WITH SOME GRAVEL. 50 51.0 CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED HITH A CENTURY FLAME IONIZING	ALL.					_	_	_	RLESS ≿ S	-MIDWEST	ا س بر			
SP LIGHT GRAY MEDIUM TO COARSE SAND WITH SOME GRAVEL. 50 51.0 CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED HITH A CENTURY FLAME IONIZING	DEPTH	No.	TYPE	INTE	RVAL	0	6	12	RECOVER	U.S.C.S. SOIL TYPE	PERCEN MOISTUR	qu TSF	CONTAC	SOIL DESCRIPTION AND REMARKS
S5 CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	45													LIGHT GRAY MEDIUM TO COARSE SAND
61.0 CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	50													
CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	55							·						
CL VERY STIFF GRAVELLY SANDY CLAY. TERMINATED BORING AT 62.0 FT. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	60				•							:	61.0	
Note: OVA Value is Organic Vapor Level from Borehole Monitored With a Century Flame Ionizing										CL				VERY STIFF GRAVELLY SANDY CLAY.
LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING														
						,								LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING

^{*}PLANT COORDINATES

Boring Log

PROJEC	T No	CE 83	<u>-182</u>	
BORING	No	W-4		
	PAGE	1	OF	_1

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									FARING D				SURFACE ELEV. 710.31	
									MIDWEST	_			ART 7/27/84 FINISH 7/30/84	_
			MPLE		- {	SLOV			U.S.C.S. SOIL TYPE		qu	TACT	SOIL DESCRIPTION	PIEZO.
ОЕРТН	No.	TYPE	INTE FROM		0	6	12 18	RECO IN IN	TYPE	PER(MOIS	TSF	CON	AND REMARKS	PIE
	3	HS HS	0 5	.25 1.5				3 12	SP	•			OILY BLACK SAND WITH GRAVEL. OVA = 80 PPM. BROWN MEDIUM TO COARSE SAND,	\dashv
5	1 2		3.5 4.5					12 12					TRACE OF GRAVEL GRAY MEDIUM TO COARSE SAND,	
		110	3,2										TRACE OF GRAVEL. OVA = 0.0 PPM.	
		00	10.0	11 6				9						
10	_1_	SS	10.0	11.5				, ,					·	
	2	SS	11.5	13.0	4	4_	5	9						
15														
20														
												24.0		
25]	GP			24.0	BROWNISH-GRAY GRAYEL AND MEDIUM TO COARSE SAND.	
													·	
30														
35												34.0	BORING TERMINATED AT 34.0 FT.	
													NOTE: OVA VALUE IS ORGANIC VAPOR	F
									The second secon				LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME TONIZING	
													OVA METER.	F

NOTE: NO FREE OIL LAYER WAS VISIBLE ON THE WATER TABLE.

*PLANT COORDINATES

Boring Log

PROJEC	T No	CE 8	3 - 182	
BORING	No	₩-5		
	PAGE	1	ΛE	1

PROJ	ECT	٦N.	AME		RRIN	IGTON	BAN	TAM B	EARING D	IVIS	ON			
BORII													SURFACE ELEV712.33	
DRIL	LER			ل	_Bi_/	TZ,			MIDNEST		ATE	· ST	ART_7/30/84 FINISH_7/31/84	=
I		SAI	MPLE			BLO\ OUN	٧ T	ERY	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu	CONTACT DEPTH	SOIL DESCRIPTION	g
ОЕРТН	No.	TYPE	INTE	RVAL	0	6	12	S S S S S S S S S S S S S S S S S S S	SOIL	ERCI	TSF	ONT	AND REMARKS	PIEZO.
			FROM 5	το .5	6	12	18	₩ <u>≅</u> 3	SP	ჲ <u>≯</u>		ပ	BLACK MEDIUM TO COARSE SAND, TRACE	+-1
		HS HS		3.0				12	Ji				OF CLAY AND SOME GRAVEL.	口
			+										OVA = 0.0 PPM. Brown Medium to Coarse Sand, Some	
5	3	HS	5.0	6.0				12		i			GRAVEL.	
														Н
													ENCOUNTERED WATER AT 8.5 FT.	\Box
10	1_	SS	8.5	10.0				9					CASING WENT DOWN 1 FT, WHILE BAILING 3 IN.	H
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15	ļ	<u> </u>												\Box
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								1			<u> </u>	29,0		-
30	-	-			\vdash	 		-	GP				BROWN SANDY GRAVEL.	
														\vdash
	-	 												
35								}		 	ļ	35.0		+-
	H	-		-	-	┼	-	1					TERMINATED BORING AT 35.0 FT.	
													Note: OVA VALUE IS ORGANIC VAPOR	-
		$oldsymbol{oldsymbol{\perp}}$						}					LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	
]					OVA METER.	-
L	1	<u> </u>		1	1	1		1	1	<u> </u>	1	<u>i</u>	WOTE WE STOR ON A SUSE WAS VIOLEN	

NOTE: NO FREE OIL LAYER WAS VISIBLE ON THE WATER TABLE.

*PLANT COORDINATES

PROJEC	T No.		CE 8	3-182		_
BORING	No.		S-3	TT:		
	PΑ	GE.	1	OF.	1	_

PRO	JEC.	ΓN	AME		ORRI	NGTO	N BA	HTAM I	BEARING	DIVIS	ION			
													SURFACE ELEV. 710.38	
DRIL	LEF	`		J	. BL	ATZ,	PEE						ART_8/13/84 FINISH_8/13/84	
DEРТН		· · ·	MPLE		С	OUN SLO	T	OVERY	U.S.C.S. SOIL TYPE	RCENT STURE	qu TSF	NTACT PTH	SOIL DESCRIPTION AND REMARKS	PIEZO
G	No.	TYPE	FROM			12		REC	TYPE	Ē Š		82	AND NEMANNS	ᅙ
	2	HS HS		1.2				12 12				.2	BLACK SANDY GRAVEL, FILL (OIL STAINED).	
	3	HS		1.5				3	SP				BROWN MEDIUM SAND, SOME GRAVEL.	
5	5	HS HS		4.0 5.0				12					SEWAGE ODOR.	
	6			6.0				12					BLACK MEDIUM SAND, SOME GRAVEL, OVA = 200 PPM.	
								-					OVA = 500 PPM.	H
	1	SS	7.0	8.5				14					OVA = 700 PPM,	
10													DARK BROWN MEDIUM SAND. STRONG	
'*													ODOR. OVA > 1,000 ppm.	\vdash
														H
													GRAY MEDIUM TO COARSE SAND, SOME	
15										:			GRAVEL, OVA = 200 PPM.	\square
							_							H
		·							ĺ				BROWN MEDIUM TO COARSE SAND, SOME	H
													GRAVEL, OVA = 100 PPM,	
20										1	•			\vdash
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														П
25												24.0	Pontus Ispatuaten et 28 0 5-	Н
		_					\dashv			Ì			BORING TERMINATED AT 24.0 FT. WATER ENCOUNTERED AT APPROXIMATELY	$\vdash\vdash$
									•				6.5 FT,	\sqcap
	_					[I				口
			-+			\dashv		1					HOTE: OVA VALUE IS ORGANIC VAPOR	\square
													LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	\dashv
										Į			OVA METER.	
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PROJEC	T No	ÇE	83-182		
BORING	No		W-7		
	DAGE	1	OF	1	

					_				BEARING I				SURFACE ELEV713.30	<u>-</u>
DRIL	LER	: <u> </u>		Norm	EGEF	<u> </u>		<u></u>					ART <u>10/18/84</u> FINISH <u>10/18/84</u>	=
ОЕРТН	No	TYPE	MPLE INTE	RVAL	0		12 T	COVERY I INCHES	U.S.C.S. SOIL TYPE	ERCENT OISTURE	qu TSF	ONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
0			FROM	TO	6	12	18	2 ≤	GP	υ Σ		.2	GRAVEL FILL,	H
	1	SS	7 5	5.0	1	1	2	9	SP			,.	BROWN MEDIUM TO COARSE SAND, TRACE OF GRAVEL. OVA = 0 PPM.	
5		22	2.2	3.0				3					TRACE OF CLAY.	
	2	SS	8.0	9,5	7	9	11	12						
10														
15													GRAY MEDIUM TO COARSE SAND.	
20													OVA = 0 PPM.	
25			ļ			├						25.0		
"				ļ		1	_	1	GP				LAYER OF FINE GRAVEL.	H
									SP				GRAY MEDIUM TO COARSE SAND, SOME GRAVEL.	
30								1						
								1				31.8	Boring Terminated at 31.8 Feet.	
													NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH	
													A CENTURY FLAME IONIZING OVA METER.	
		-]						

PROJEC	T No.		CE	83-182	
BORING				W-8	
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PROJ	EC1	N	AME	T(ORRIN	IGTOR	BAI	ITAH E	EARING I	ivisi	ON	******	
BORII													SURFACE ELEV. 713.30
DRIL										C	ATE	· ST	ART 10/23/84 FINISH 10/23/84
рертн		SA	MPLE		С	OUN	T	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu Ter	CONTACT DEPTH	SOIL DESCRIPTION 023
E E	No.	TYPE	FROM		6	6	18	N K	TYPE	A Si	l Sr	S G	and nemarino
									GP SP			.2	GRAVEL FILL, BROWN MEDIUM TO COARSE SAND, SOME GRAVEL.
5													
10													
15													
20	·												GRAY MEDIUM TO COARSE SAND, TRACES OF GRAVEL.
25									GP SP			24.5 25.5	LAYER OF FINE GRAVEL.
30													
35													GRAY MEDIUM TO COARSE SAND, SOME
40	E							 				40.0	

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													SURFACE ELEV. 713.30
DRIL	LEF	₹		NORM	EGE	R				[DATE	: S	TART 10/23/84 FINISH 10/23/84
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ОЕРТН	<u> </u>				Ťċ	OUN	NT	Z Š Ž	U.S.C.S. SOIL TYPE	E E	qu	CONTACT DEPTH	SOIL DESCRIPTION
OE.	No.	TYPE	FROM	RVAL	6		18	-\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	TYPE	A S	TS⊦	N N N	SOIL DESCRIPTION AND REMARKS
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!] '	J.,	Ì			GRAVEL.
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PRO.	JEC	ΤN	AME		ORRI	NGTO	N BAI	MAT	BEARING	DIVIS	10N			
BORI	NG	LOC	OITA	N1	42	77.2	1, E	5550	.00 •		·		SURFACE ELEV. 710.10	
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l ₌		SA	MPLE			BLO	W	ES S	U.S.C.S. SOIL TYPE	N W	0	ĿΕ		
ОЕРТН	-	L	INTE	RVAL		6	12	ĮŠΩ	SOIL	STE	TSF	AP	SOIL DESCRIPTION AND REMARKS	PIE 20
ā	NO.	TYPE		то	_	12	18	문골	ITPE	₽ 8		용률	AND HEMANAS	<u>a</u>
	-	HS	1.0	2.0					GP				OILY BLACK SANDY GRAVEL, FILL,	
		нэ	1.0	_2.0				12	\$P			1.0	OVA = O PPM OIL AND WATER AT 0.9 FT.	
	2	HS	2,0	3.0				12					VIE AND WATER AT 0.3 FT.	
	<u> </u>	HS	7.0					:					OILY BLACK MEDIUM TO COARSE	
	-	no	3.0	4.0				12					GRAVELLY SAND WITH POCKETS OF BROWN SAND. OVA > 1,000 pph.	\square
	4	HS	4.0	5.0				12	:				BROWN SAME, OVA 7 17000 PPA.	H
5	5	uс	5.0	6.0				12	ļ				OILY BLACK MEDIUM SAND WITH BROWN	
· 1		no	٠.۷	0.0				12					SAND INCLUSIONS INCREASING FROM 25% TO 75% FROM 3.0 TO 6.0 Ft.	
												6.0		\vdash
									i				BORING TERMINATED AT 6.0 FT.	
									i				WATER ENCOUNTERED AT APPROXIMATELY	
		_											6.0 FT.	
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									REARING					
BOR	ING	LOC	CATIC)N _¥	426	2.42	, E	5524.	42 •				SURFACE ELEV. 710.40	
DRIL	LE	? =	Х. В	RISSE						(DATE	: ST	FART_ <u>8/2/84</u> FINISH <u>8/2/84</u>	
₌		SA	MPLE			BLO OUN	Ψ	RECOVERY IN INCHES	U.S.C.S.	F &	0.1	CONTACT DEPTH	SOIL DESCRIPTION	Ĺ
DEPTH	-		INTE	RVAL			15	Š Š Š	SOIL TYPE	ST	TSF	NT NT	AND REMARKS	P1E ZO
ā	-	}		RVAL TO	6	12	18	ĕ≥	TIPE	₩ δ		80		ā
	16	HS_		2.0	<u> </u>	 	<u> </u>	3	SM-SP				BLACK MEDIUM SAND, TRACE OF GRAVEL	
		HS	1.0	7_0	-			12	CL	<u> </u>	<u> </u>		AND CLAY, OVA = 0 PPM, ORANGISH-RED SOFT CLAY, SOME SAND.	\vdash
	3	HS	2.0	3.0				12	SP			1./	BROWN MEDIUM TO COARSE SAND.	
	-	110	7.0			-							OVA = 80 PPM, :	
	1	HS	2.0	4.0				12						\vdash
													LIGHT BROWN MEDIUM TO COARSE SAND.	\vdash
5													OVA = 100 PPH,	
, ,	_5	НS	5.5	6.5				12					GRAY MEDIUM TO COARSE SAND	\vdash
								,-					OVA = 100 PPM.	
						_						6.5		
													BORING TERMINATED AT 6.5 FT.	
													WATER ENCOUNTERED AT APPROXIMATELY	
													6.5 FT,	\sqcup
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PRO	JEC	T N	IAME		ORRI	NGTO	N RA	MTAM	BEAR ING	פועות	TON			
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DRIL	LFF	5 	טויהע	01005	<u>n 70</u>	07.0	0 / E	<u>ەررد</u>	.41		7 A T E		SURFACE ELEV712.47	
						BLO	w	> 0			JAIC	- 3	TART_ <u>8/3/84</u> FINISH <u>8/3/84</u>	
ΙΞ		SA	MPLE	•		OUN		E E	U.S.C.S. SOIL TYPE	N &	qu	ŞΞ	SOIL DESCRIPTION	
DEPTH	No	TYPE	INTE	RVAL	0	6	12	Θž	SOIL	5 7	TSF	E P	AND REMARKS	PIEZO
		ļ	FROM	TO	6	12	18	윤목	,,,,,	ਲੂ ≷		ပ္ပင		<u> </u>
														1.
	1	HS	1.0	2.0				12					BROWN MEDIUM SAND, SOME GRAVEL.	
	_		_		<u> </u>				SP				OVA = O PPM,	\vdash
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														-
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												4.0		
5		_			-								LARGE PIECES OF CONCRETE AT]
													APPROXIMATELY 4.0 FT,	<u> </u>
													BORING TERMINATED AT 4,0 FT.	
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ľ	_	_			-	_	\dashv	1]	1		NOTE: OVA VALUE IS ORGANIC VAPOR	
													LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	
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Boring Log

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									BEARING					
BOR	ING	LO	CATIC	N _N	431	5.37	E5:	526.2°	1 •				SURFACE ELEV. 710.41	
DRIL	LE	₹	Κ.	<u>Br 155</u>	ETTE								TART <u>8/8/84</u> FINISH <u>8/8/84</u>	
			MPLE			BLO	W	≿S		μШ				干
Ŧ					C	OUN	Τ	E K	U.S.C.S.	12,5	qu	S E	SOIL DESCRIPTION	0
ОЕРТН	No.	TYPE	INTE	RVAL	0	6	12	8≧	U.S.C.S. SOIL TYPE	18.8	qu TSF	Ϋ́	AND REMARKS	PIE20
0	1	ļ	FROM	TO	6	12	18	문목	_	2 ≥		80		٩
	 -	 	 			<u> </u>								⇈
	-	1110	1 5	2 5	 -	_							BROWN MEDIUM SAND, SOME BLACK OIL-	
	 - -	HŞ	1,5	2,5				12	SP				STAINED AREAS, TRACE OF GRAVEL.	$ldsymbol{ldsymbol{eta}}$
	2	HS	2.5	3.5				12			{		OVA = O PPH.	_
	 	 		7.7				12				l	LIGHT BROWN MEDIUM TO COARSE SAND,	╙
	3	HS	3,5	4.5				12					STRONG OILY ODOR. OVA = 30 PPM. OILY ODOR STRONGER AT APPROXI-	
		-								[MATELY 5.0 FT. OVA = 150 PPM.	\vdash
	4	HS	4,5	5.5				12		•			WET BLACK MEDIUM SAND.	┢
5	<u> </u>													
	5	HS	5.5	6.5				12						
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												7.0		
							\dashv						BORING TERMINATED AT 7.0 FT.	
							$\neg \neg$	- 1					WATER ENCOUNTERED AT APPROXIMATELY	\dashv
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								#					NOTE: OVA VALUE IS ORGANIC VAPOR	\dashv
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				<u> </u>	\dashv					1			WITH A CENTURY FLAME IONIZING	
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*PLANT COORDINATES

Boring Log

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													BORING NoA-5	
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									BEARING	DIVIS	SION			
							4, E	5548	.10 •				SURFACE ELEV710.05	
DRIL	LE	₹	K. B	RISSE	-						DAT	E: S	TART 8/9/84 FINISH 8/9/84	
F		SA	MPLE	:		BLO OUN		FRY FES	U.S.C.S SOIL TYPE	T Z		D I		Ē
DEPTH	-		INTE	RVAL	-		12	ĮŠŽ	SOIL	125	TSF	NA P	SOIL DESCRIPTION AND REMARKS	07 319
٥	WO.	TYPE	FROM	TO	6	12		₩2	ITPE	F S		182	AND INCHIARRY	ā
	-	НS	1.0	2.0			ļ							
	<u> </u>	no	1.0	<u> </u>	_		 	12	SP				BROWN MEDIUM SAND, SOME GRAVEL. OVA = 0 PPM.	
l	2	HS	2.0	3.0				12	, , , , , , , , , , , , , , , , , , ,				BLACK MEDIUM SAND, TRACES OF CLAY	
	<u> </u>	HS	7.0	14.0									AND GRAVEL, PIECES OF STEEL	_
	-	no	3.0	4.0				12					REINFORCING BAR. OVA = 0 PPM	_
1	4	HS	4.0	5.0				12						
5	5	HS	5 0	6.0										
	,	no	2.0	6.0				12						_
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									 -			7.0	BORING TERMINATED AT 7.0 FT.	_
													BORING PERHINATED AT 7,0 FT.	
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													WATER ENCOUNTERED AT APPROXIMATELY 7.0 Ft.	
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													OVA METER.	\dashv
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													BORING NoA-6	
													PAGE _1_ OF _1	
														
PRO.	JEC.	ΤN	AME	·	1990	NGTO	IN RA	NTAM	BEARING	nivic	NOT:			
													SUBFACE ELEVI 710 SE	
								20201	V2				SURFACE ELEV. 710.55	_
DAIL		`	K.	BRISS	_			J > (0		<u> </u>			TART <u>8/13/84</u> FINISH <u>8/13/84</u>	7
Ţ		SA	MPLE			BLO OUN	w ≀T	E H	U.S.C.S. SOIL TYPE	12.00	Qu	CONTACT DEPTH	SOIL DESCRIPTION	10
ОЕРТН	-	TYPE	INTE	RVAL	0		12	용일	SOIL	ST	TSF	FP	AND REMARKS	PIF ZO
ā	NO.	1177	FROM	TO	6	12	18	₩Z	1176	₩ 5	<u> </u>	ပ္ပင		12
													BLACK SANDY GRAVEL, FILL.	$oldsymbol{oldsymbol{oldsymbol{oldsymbol{\Box}}}$
	1	HS	1.0	2.0		-	_	12	SP				OVA = 5 PPM,	-
	2	HŞ	2 0	3.0		 	 	12			ļ		BROWN MEDIUM TO COARSE SAND. OVA = 5 ppm.	-
		110		۷,۷		-	 	1,2					OVA - 5 PPM.	\vdash
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						<u> </u>	<u> </u>							
	<u> </u>	-					-							\vdash
5						-	\vdash					5 0	OVA = O PPM.	\vdash
												٥,٠	BORING TERMINATED AT 5.0 FT.	╁
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										:			NOTE: OVA VALUE IS ORGANIC VAPOR	
		_	\longrightarrow	\longrightarrow									LEVEL FROM BOREHOLE MONITORED	
						-	\dashv						WITH A CENTURY FLAME IONIZING	
			-+			\dashv							OVA METER.	_
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													BORING NoA-7	
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PRO.	JEC'	ΤN	AME	. TO	ORR II	NGTO	i BAI	ITAM E	BEARING I	DIVIS	ION			
												********	SURFACE ELEV713.27	
			K.					-					ART 8/13/84 FINISH 8/13/84	
						BLO'	W	≿g		<u> </u>		<u> </u>		$\overline{\Box}$
Ξ			MPLE		С	OUN	T	P E	U.S.C.S. SOIL TYPE	SE SE	qu	TAC	SOIL DESCRIPTION	02
ОЕРТН	No.	TYPE	FROM	RVAL	0	6	12	S ≥	TYPE	OIS.	TSF	OE	AND REMARKS	PIE 20
			FROM	10	6	12	16	∞ =		⊕ ∑	<u> </u>		OILY BLACK GRAVELLY MEDIUM SAND.	+
	1	HS	1,0	2.0				12	SP			<u> </u>	OVA = O PPM.	Н
													BROWN MEDIUM TO COARSE SAND.	
	<u> </u>												OVA = 5 PPM.	
	<u> </u>											3.0	OVA = 0 PPM.	
												7.0	BORING TERMINATED AT 3.0 FT.	1
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													NOTE: OVA VALUE IS ORGANIC VAPOR	
													LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING	\vdash
													OVA METER.	
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PROJECT No. CE 83-182

													BORING NoA-8	
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								MATH	BEARING	DIVIS	ION			
			CATIO										SURFACE ELEV. 710.0*	
DRIL	LEF	₹		N	ORM	EGER					DATE	: ST	ART 10/19/84 FINISH 10/19/84	
Ę			MPLE		l c	BLO	٧T	/ERY	U.S.C.S.	C ENT	qu	ACT	SOIL DESCRIPTION	ç
ОЕРТН	No.	TYPE	INTE	RVAL	6	6	12	N KECO	U.S.C.S. SOIL TYPE	PERC	TSF	CONT	AND REMARKS	PIEZO
	1	SS	0.0		<u>. </u>			4	GP		 	0.5	GRAY SANDY GRAVEL FILL.	╁
]	SP				BROWN MEDIUM TO COARSE SAND, SOME	世
	2	SS	1.5	3.0	4	8	7	9					GRAVEL. OVA=O PPM	
	-	├	-			 	\vdash	1						-
	3	SS	3.0	4.5	5	4	4	12					TRACES OF GRAVEL. OVA=O PPM	
		<u> </u>]	-				,	
	-	SS	11 5	6.0	-	2	 ,	10						L
5		33	7.5	0.0	-	-	-	10					!	-
								1					GRAY MEDIUM TO COARSE SAND,	
	5	SS	6.0	7.5	1	1	2	9						
			 	\vdash	 	-]		_
	6	SS	7.5	9.0	1	1	1	9						\vdash
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			\longrightarrow		$\bigsqcup^{!}$		<u> </u>							
				 	 	\vdash	 					9,0	P 7	-
10													BORING TERMINATED AT 9.0 FT.	-
			 				<u> </u>						WATER ENTERED HOLE AT 4,0 FEET.	
	\vdash		, 			\vdash							PROBABLY SEEPAGE FROM PONDED WATER	ļ
				-									IN THE AREA.	
													NOTE: OVA VALUE IS ORGANIC VAPOR	
													LEVEL FROM BOREHOLE MONITORED WITH	
	-												A CENTURY FLAME TONIZING OVA	
					-	$\overline{}$					-		METER.	
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								NTAM	<u>BEARING</u>					
BOR													SURFACE ELEV. 710,0*	
DKIL	.LEI			N	~			- io		<u>_</u>	DATE	ST	ART 10/19/84 FINISH 10/19/84	—
ĮĘ		SA	MPLE			OUN	1T	YER!	U.S.C.S.	E E	ąυ	ACT	SOIL DESCRIPTION AND REMARKS	
ОЕРТН	No.	TYPE		RVAL	0	6	12	βŽ	TYPE	ER Sisteman	TSF	PE P	AND REMARKS	1
			I NOW	10	8	12	18	α €		0. ₹			REINFORCED CONCRETE,	Ť,
									ļ	 		1,73	RETHFUNCED CONCRETE,	Ł
	1	SS	1.0	2,5	4	7	12	10	SP	-			BROWNISH GRAY MEDIUM TO COARSE	F
	2	SS	2,5	4.0	10	12	17	10					SAND, TRACES OF GRAVEL.OVA=100 PPM	-
		-		<u> </u>		<u> </u>							GRAY MEDIUM TO COARSE SAND, TRACES	
	3	SS	4.0	5.5	9	8	6	10					OF GRAVEL, OVA>1000 PPM, OVA=900 PPM,	H
5														
	4	SS	5.5	7.0	2	2	2	10					OVA=900 PPM.	L
													WA-300 PPR	H
	5	SŞ	7.0	8.5	1	2	3	10					04-000	
				- V 1 P				i		. [OVA=900 PPM.	-
										-		8,5	BORING TERMINATED AT 8.5 FEET,	-
10					.									
][WATER ENCOUNTERED AT APPROXIMATELY 7.0 FEET,	
					_									_
							\dashv			1		l	NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH	
	[\Box						A CENTURY FLAME IONIZING OVA	
	_	-+	-										METER.	
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BOR	NG	1 00	ATIC		OKR)	INGTO	N RA	NTAM	BEARING					
DRIL)ATE		SURFACE ELEV. 710.0*	
			MPLE		_	BLO		≿Ω	T	<u>— ,</u>	JATE	_ · 3	TART <u>10/19/84</u> FINISH <u>10/19/84</u>	-
DEPTH				RVAL		100		SE	U.S.C.S. SOIL	E E	qu	TAC	SOIL DESCRIPTION	
ద	No.	TYPE		TO		12	12	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PER YOR	TSF	SO	AND REMARKS	1
	_	-											REINFORCED CONCRETE.	\pm
	1	SS	1.0	2.5	4	5	12	10	SP			†	PROMU HERMAN CAND CONT.	Ŧ
						-			01			•	BROWN MEDIUM SAND, SOME GRAVEL, OVA=70 PPM.	H
	2_	SS	2.5	4.0	9	16	20	10					0VA>1000 PPM.	
														\vdash
	3	SS	4.0	5.5	4	6	7	10					DARK GRAY MEDIUM TO COARSE SAND,	
5													TRACES OF GRAVEL, OVA>1000 PPM,	\vdash
	4	\$S	5,5	7.0	2	3	4	10					GRAY MEDIUM TO COARSE SAND.	
													OVA>1000 PPM.	\vdash
	5	SS	7.0	8.5	2	2	_10_	10		. 1				L
														-
							\dashv					8,5		
										l			BORING TERMINATED AT 8.5 FEET.	\vdash
10							\dashv							
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													NOTE: OVA VALUE IS ORGANIC VAPOR	—
-	\dashv	\dashv	\dashv			-	\dashv						LEVEL FROM BOREHOLE MONITORED WITH	_
	#												A CENTURY FLAME IONIZING OVA METER,	
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PROJECT No	CE	83-182		
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BOR	NG	LOC	CATIO	N _ <u>s</u>	EE F	IGUR	E 1						SURFACE ELEV. 710.0*	
DRIL	LEF	₹		N.	ORM	EGER							ART 10/23/84 FINISH 10/23/84	
ЭЕРТН		SA	MPLE	RVAL		Le Bro		RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	CENT	qu	ITACT PTH	SOIL DESCRIPTION	PIEZO.
B	No.	TYPE	FROM	_	6	12	-	REC IN I	TYPE	₽ Š	135	Sa	AND REMARKS	E
	<u> </u>												REINFORCED CONCRETE.	
	1	SS	1.0	2,5	7	8	11	10	SP				BLACK MEDIUM TO COARSE SAND, OVA=600 PPM.	H
	2	SS	2.5	4.0	8	15	16	10	:				BROWN MEDIUM TO COARSE SAND, TRACES OF GRAVEL.	
	3	SS	4.0	5,5	6	6	6	10					GRAY MEDIUM TO COARSE SAND, TRACE	
5	4	SS	5.0	7.0	3	2	2	9					OF GRAVEL, OVA>1000 PPM.	H
	5	cc	7.0	0.5	2	2	7							
		SS	7.0	8.5	<u></u>	2	3	9					OVA>1000 PPM.	H
												8.5		耳
													BORING TERMINATED AT 8.5 FEET.	H
10													WATER ENCOUNTERED AT APPROXIMATELY 6.5 FEET.	
													NOTE: OVA VALUE IS ORGANIC VAPOR	Н
													LEVEL FROM BOREHOLE MONITORED WITH A CENTURY FLAME IONIZING OVA	Н
													METER.	
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			CATIO							·			SURFACE ELEV. 710.0*	
DRIL	LE	R		No	ORM (EGER				[DATE	: ST	ART 10/23/84 FINISH 10/23/84	
ОЕРТН		SA	MPLE	RVAL	C	BLO	ΙT	OVERY	U.S.C.S. SOIL TYPE	CENT	qu TSE	TACT	SOIL DESCRIPTION	PIEZO
OE.	No.	TYPE	FROM			12		REC	TYPE	A Š	I SF	S	AND REMARKS	PIE
	-	ļ	-									.75	REINFORCED CONCRETE.	
	1	SS	1.0	2.5	7	15	27	8	SP				REACK MEDIUM TO COARSE SAND,	
	2	SS	2.5	4.0	17	23	29	10		·			BROWN MEDIUM TO COARSE SAND, SOME GRAVEL.	
	3	SS	4.0	5,5	6	6	6	9		į			GRAY MEDIUM TO COARSE SAND, TRACE OF GRAVEL.	
5	4	SS	5.0	7.0	3	3	4	9			:		PIECES OF FINE WIRE. (APPROX-IMATELY 20 GAGE)	
	5	SS	7.0	8.5	2	2	2	10						
												8.5		H
													RORING TERMINATED AT 8,5 FEET.	
10													WATER ENCOUNTERED AT APPROXIMATELY 6.5 FEET.	
													NOTE: OVA METER WAS BROKEN.	
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Boring Log

PROJECT No. ____CE 83-182_

			AME ATIO					MATH	BEARING	-		SURFACE ELEV710,0*
												ART 10/24/84 FINISH 10/24/84
ОЕРТН	No.		MPLE INTE	RVAL	0	BLO OUN 6	W 1T 12	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	 	CONTACT DEPTH	
												REINFORCED CONCRETE.
	2	SS		4.0			17	9	SP			RLACK MEDIUM TO COARSE SAND, TRACES OF GRAVEL. OVA=200 PPH, GRAY MEDIUM TO COARSE SAND, TRACES OF GRAVEL. OVA=200 PPM.
5		SS SS		5,5 7,0			6	10				OVA=200 PPM.
		SS		8.5		4	9	10		•		OVA=200 PPH.
											8.5	BORING TERMINATED AT 8.5 FEET.
10				`							•	WATER ENCOUNTERED AT APPROXIMATELY 6.5 FEET. NOTE: OVA VALUE IS ORGANIC VAPOR
												LEVEL FROM BOREHOLE MONITORED WITH AN AID MODEL 580 PHOTOIONIZING OVA METER.
						•						

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Boring Log

PROJECT No. ____CE_83-182

													BORING NoA-14	
													PAGE _1 OF _1_	
PRO	JEC	T N	LΔ AA F		^nn 1	MCTO	W 73.61	UTAN 1	BEARING	D. 1.1.1.0				
				N _s				TIAR					SURFACE ELEV 710.0*	
				N ₁									TART 10/24/84 FINISH 10/24/84	
Г			MPLE			BLO	W	R₹		<u> - </u>		<u></u>		T
DEPTH		1	INTE	RVAL	0	1 6		SE SE	0.5.C.S. SOIL	SEE	qu	A T	SOIL DESCRIPTION	PIF70
8	No.	TYPE	FROM		6	+	+	S N	U.S.C.S. SOIL TYPE	PE	1 31	555	AND REMARKS	ā
	-	-	-		-	_							REINFORCED CONCRETE.	T
	1	SS	1.0	2,5	2	2	2	12	SP				GRAY MEDIUM TO COARSE SAND, TRACES	}
	_	00	2.5	" ^		-	-						OF GRAVEL. OVA=200 PPM	
	٢	SS	2,3	4.0	1	3	6	9					OVA=300 PPM.	-
	ļ.,	CC		٠. د	_		40							
,	3	SS	4,0	5,5	ь	9_	12	9					OVA=300 PPH.	\vdash
5	4	SS		7.0			40							
	-4-	55	2.5	7.0	4	8	16	10					OVA=300 PPM.	\vdash
	5	SS	7.0	0.5										
	3	22	7.0	8.5	7	14	19	10						-
										-		8.5	BORING TERMINATED AT 8,5 FEET.	H
				- .									·•···	
10													WATER ENCOUNTERED AT APPROXIMATELY 6.5 FEET.	_
													NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM ROREHOLE MONITORED WITH	
			-					.		-			AN AID MODEL 580 PHOTOIONIZING OVA	_
													METER.	
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Boring Log

PROJECT No. _____CE 83-182

BORING LOCATION SEE FIGURE 1 SURFACE ELEV. 711.0*	PIEZO.
SURFACE ELEV. 711.0* SURFACE ELEV. 711.0*	PIEZO.
SAMPLE BLOW COUNT SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SP SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCR	PIEZO.
SAMPLE BLOW COUNT SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SP SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCRIPTION AND REMARKS SOIL DESCRIPTION SOIL DESCR	PIEZO.
SAMPLE BLOW COUNT WHY U.S.C.S. WHY TYPE INTERVAL O 6 12 18 WHY TYPE	PIEZO.
GP .3 SANDY GRAVEL FILL. 1 SS 1.0 2.5 0 SP BROWN MEDIUM TO COARSE SAND, SOME	7
GP .3 SANDY GRAVEL FILL. 1 SS 1.0 2.5 0 SP BROWN MEDIUM TO COARSE SAND, SOME	7
GP .3 SANDY GRAVEL FILL. 1 SS 1.0 2.5 0 SP BROWN MEDIUM TO COARSE SAND, SOME	7
1 SS 1.0 2.5 O SP BROWN MEDIUM TO COARSE SAND, SOME	1
· · · · · · · · · · · · · · · · · · ·	<u> </u>
: 2 SS 2.5 4.0 4	<u> </u>
	\vdash
3 SS 4.0 5.5 6	
	<u> </u>
5 4 SS 5.5 7.0 4 TRACES OF GRAVEL, OVA=O PPM.	-
4 33 3.3 7.0 4	
	_
5 SS 7.0 8.5 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	\vdash
8,5	
BORING TERMINATED AT 8.5 FEET.	
WATER ENCOUNTERED AT APPROXIMATEL	. $lacksquare$
7.5 FEET.	
MOTE: OVA VALUE IS ORGANIC VAPOR	-
LEVEL FROM BOREHOLE MONITORED WIT	
AN AID MODEL 580 PHOTOIONIZING OV	
METER.	-
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Boring Log

													BORING NoA-16	
													PAGE 1 OF _1_	
BORI	NG	LOC	OITA	N <u>S</u>	E F	IGURI	1	HAT!	SEARING I				SURFACE ELEV. 711.0*	
DRIL	L,EF	<u> </u>		No	_			1	В	[ART 10/24/84 FINISH 10/24/84	
ОЕРТН	No.	SA		RVAL	0	6 BLO	W T	ECOVERY INCHES	U.S.C.S. SOIL TYPE	ERCENT	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIF 70
			FROM	TO	6	12	18	ॡ ≤	GP	u. ∑			SANDY GRAVEL FILL.	├
	1	SS	1.0	2.5				0	SP				BROWN MEDIUM TO COARSE SAND, SOME GRAVEL. OVA-O PPM.	
	2	SS	2.5	4.0				4					OVA=50 PPM.	L
	3	SS	4.0	5.5				0					LARGE PIECE OF GRAVEL PREVENTED RECOVERY.	
5	4	SS	5.5	7.0				4					OVA=O PPM.	
	5	SS	7.0	8.5				4					OYA-U PPR.	
												8.5		_
					_								RORING TERMINATED AT 8.5 FEET.	_
10													WATER ENCOUNTERED AT APPROXIMATELY 7.5 FEET.	
											. •		NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM ROREHOLE MONITORED WITH	-
													AN AID MODEL 580 PHOTOIONIZING OVA Meter.	_
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Boring Log

PROJECT No. ____CE 83-182

													BORING No. A-17	
													PAGE _1 OF _1	
														
									BEARING	DIVIS	ION			
			CATIO										SURFACE ELEV. 710,0°	
DKIL	.L.E.!	<u>` </u>		<u>N</u>				T> (0	II.	 '	DATE	: ST	TART 10/24/84 FINISH 10/24/84	_
		ŞA	MPLE			BLO OUN		E E	U.S.C.S. SOIL TYPE	EN EN	qu	ACT	SOIL DESCRIPTION	ç
ОЕРТН	No.	TYPE		RVAL	0		12]8≅	TYPE	ERC OIST	TSF	ONT PEP	AND REMARKS	DIF70
-	1	SS	FROM 0.0		6	12	18	æ <u>≤</u>	SP	ը ₹	-	υ <u></u>		+
1				- 1.5				1 '	31				BROWN COARSE TO MEDIUM SAND, SOME GRAVEL.	-
	2	SS	1.5	3.0			_	9						_
			-		_			1					0VA=400 PPM.	\vdash
	3	SS	3.0	4.5				6					OVA=1200 PPM.	
	-	-					-							-
	4	SS	4.5	6,0				12					GRAY MEDIUM TO COARSE SAND.	
5						_							0VA=1700 PPM,	
	5	SS	6.0	7.5			_	6					-	\vdash
	_	20											0VA=1500 PPM.	
	6	SS	7.5	9.0				6						-
												9.0		
													BORING TERMINATED AT 9.0 FEET.	\vdash
10								-					WATER ENCOUNTERED AT APPROXIMATELY	
									į	1			7.0 FEET.	\vdash
													HOTE: OVA VALUE IS ORGANIC VAPOR	
													LEVEL FROM BOREHOLE MONITORED WITH	
													AN AID MODEL 580 PHOTOIONIZING OVA	\vdash
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Boring Log

													PROJECT NoCE 83-182	
													BORING No. A-18	
													PAGE 1 OF	1
											······			
איר	JEC	i Ti	MAN	<u> </u>	ORR	NGTO	N BA	MTAM	BEARING	DIVIS	ION			
3OR	ING	LO	CATIC)N <u> </u>	EE F	IGUR	<u>E 1</u>						SURFACE ELEV. 710.5*	
RIL	<u>.LE</u>	<u>R_</u>		Norm	Ege	R				(DATE	E: 51	TART 10/24/84 FINISH 10/24/84	_
-		SA	MPLE	 :		BLO		ES₩	U.S.C.S SOIL TYPE	<u></u>		<u> </u>	1072404	=
ОЕРТН	 			RVAL	0	OUN		실	SOIL	195	Qu	IS E	SOIL DESCRIPTION	
0	No.	TYPE	FROM		6	_	12		TYPE	H S	TSF	S H	AND REMARKS	
	1	SS	0.0				1.0	6	SP	- 2				
		_]	Ç.				BLACK DILY COARSE TO MEDIUM SAND, TRACES OF CLAY AND GRAVEL.	
	2	SS	1,5	3.0	<u> </u>			6		,			OVA = 1,100 PPM.	
	_	-	 					-					BROWN MEDIUM TO COARSE SAND,	
	3	SS	3.0	4.5				9					TRACES OF GRAVEL. OVA >2,000 PPM.	
													GRAY MEDIUM TO COARSE SAND, TRACE OF GRAVEL.	
		-											OVA >2,000 PPM.	-
5	4	SS	4.5	6.0				10						ŀ
	5	SS	6.0	7.5				8						į
											•		OVA >2,000 PPM.	ŀ
	6	SS	7,5	9.0										t
	٧	33	7,51	3.0				8						
							_		1	-	ĺ			-
	_											9.0		+
10							{						BORING TERMINATED AT 9.0 FEET.	†
``				-	-	-			Ī				W	
									1				WATER ENCOUNTERED AT APPROXIMATELY 7.0 FEET.	-
-						\Box			1			1	710 3 5 5 1 1	\mathbf{f}
╟	-	-	-+										NOTE: OVA VALUE IS ORGANIC VAPOR	f
		-		-	+	-	\dashv						LEVEL FROM BOREHOLE MONITORED WITH	
							ヿ						AN AID MODEL 580 PHOTOIONIZING OVA METER.	-
-		_			\Box								OVA SIETER,	ŀ
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Boring Log

PROJECT No	CE 83-182
BORING No	A-19
PAG	E_1 OF _1

PRO	JEC	T N	IAME		ORR [NGTO	N BA	NTAM I	BEARING	DIVIS	ION			
BOR	-		_	-	-		<u> 1</u>						SURFACE ELEV. 710.0*	
DRIL	LEF	₹		Norm	Ege	R							ART 10/24/84 FINISH 10/24/84	
ОЕРТН		SA	MPLE INTE			OUN		RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	STURE	qu TCE	TACT PTH	SOIL DESCRIPTION AND REMARKS	PIF70
8	No.	TYPE	FROM		6		18	REC	TYPE	A PE	I Sr	SO	AND REMARKS	۵
		<u> </u>											REINFORCED CONCRETE.	F
	ī	SS	1.0	2.5	10	10	10	12	SP				GRAY MEDIUM TO COARSE SAND, SOME	
	2	SS	2.5	4,0	5	14	14	12					GRAVEL. OVA * 30 PPM.	\vdash
													OVA = 100 PPM.	F
Ì	3	SS	4.0	5.5	4	ц	4	12					TRACES OF GRAVEL,	
5													OVA = 100 PPM.	
	4	SS	5,5	7.0	2	1	2	10					OVA = 100 ppm,	
	_	cc	7,0	0 5	2	2	2	10					VIA IVV FFRI	
		33	7.0	0.2			_	10						
												8,5		\vdash
					·								BORING TERMINATED AT 8.5 FEET.	F
10				·	٠				i I				WATER ENCOUNTERED AT APPROXIMATELY	
													6.5 FEET.	
						-							NOTE: OVA VALUE IS ORGANIC VAPOR	\vdash
											•		LEVEL FROM BOREHOLE MONITORED WITH AN AID MODEL 580 PHOTOIONIZING	
					_								OVA METER.	
														L
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Boring Log

PROJECT No. ____CE 83-182

													BORING NoA-20	
													PAGE _1 OF _1_	
	NG	LOC	OITAC	N _s	EE F	IGURI	E 1		BEARING				SURFACE ELEV710.0* "ART_10/24/84 FINISH_10/24/84	
						BLO	w	> \sigma	<u> </u>			. · . 3 ·	ART 10/24/84 TIMIST 10/24/84	=
DEPTH	No.	SA	MPLE INTE FROM	RVAL	0	NUO	12 18	RECOVER IN INCHE	U.S.C.S. SOIL TYPE	PERCEN	qu TSF	CONTAC	SOIL DESCRIPTION AND REMARKS	PIF70
												.75		
	1	SS		2.5			-	6	SP		_		BLACK MEDIUM TO COARSE SAND, SOME GRAVEL.	
	2	SS	2.5	4.0	16	17	17	12					HIT OBSTRUCTION AT 2.0 FEET. GRAY MEDIUM TO COARSE SAND, TRACES OF GRAVEL.	_
5	3	SŞ	4.0	5.5	5	7	6	9					OVA = 75 PPM.	
	¥	SS	5.5	7.0	ų	3	2	12					OVA = 25 PPM. OVA = 50 PPM.	
	5	SS	7.0	8.5	1	7	1	10						
												8.5	BORING TERMINATED AT 8.5 FEET,	
10					·								WATER ENCOUNTERED AT APPROXIMATELY	
													6.5 FEET. NOTE: OVA VALUE IS ORGANIC VAPOR	_
													LEVEL FROM BOREHOLE MONITORED WITH AN AID MODEL 580 PHOTOIONIZING	
													OVA METER.	
									•					
														_

Boring Log

													PROJECT NoCE 83-182 BORING NoA-21
					-		-					· · ·	PAGE _1 OF
ORIN	١G	LOC	ATIC	N _s	SEE F	IGUR	E_1_				DATE	¦∶ ST	SURFACE ELEV710.0* TART_10/24/84FINISH10/24/84
Ħ.			MPLE	RVAL	0	BLO OUN 6	12 12	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS
Ŀ													REINFORCED CONCRETE.
	1	SS	1.0	2.5	5	8	20	10	SP			2.5	BLACK MEDIUM TO COARSE SAND, TRACES OF GRAVEL. OVA = 50 PPM.
5													BORING TERMINATED AT 2.5 FEET. AN OBSTRUCTION WAS ENCOUNTERED AT 2.5 FEET. IT COULD NOT BE PENETRATED. NOTE: OVA VALUE IS ORGANIC VAPOR LEVEL FROM BOREHOLE MONITORED WITH AN AID MODEL 580 PHOTOIONIZING OVA METER.

INDIANA-MICHIGAN WATER DEVELOPMENT CO.

, 1912 So. Main St. SOUTH BEND 23, INDIANA Phone 3-8231

Log. 943

Well log for Torrington Company, South Bend, Indiana Sold three Solling Constr. Co.

Location of well North East Corner of New Building

Date completed 4-17-57

Well #3

Size or diameter 12"

Finished depth. Surface to bottom of screen 100\$

SCREEN

Diameter 12

Length (Exclusive of fittings) 188

Make and type Johnson Everaur

Opening or slot size 30 Slot

Fittings Stindard

Formations encountered

0-17 pry Sand	Book Analysic
17-19 Hard Pen	80/97
19-33 Coarse gravel	70/55
33-37 Coarse gravel	56/46
37-41 Gravel with Clay balls	611/29
41-lily Clay	60/33
44-56 Fine Sand	58/28
55-75 Clay & Hard Pan	50/23
75-80 Send & Gravel- Some Clay ballo	35/40
80-97 Send & Gravel	24/16
97-100 Fine Sand (Still in it)	12/14
	251 004 0

Total depth penetrated

751-801 Sine as Pot-971 but very aircy.

Static or normal water level fizhkhaskakhaskhaskhine 130

PUMPING TEST No test made .

Drawdown (355 ft. at 325 GPM

Permanent well information, as installed

- Tested 830 by Roy with Permanent Pump- CV.D. 329

LAYNE-NORTHERN COMPANY

MISHAWAKA, INDIANA

☐ TEST			-	
→ PERMANENT			No. 1411,3	
	ch Bend County St. Joseph			
Owner Torrington Company				
	SectionSection			
Location .				
From Land Descriptionft. East and	fi. No	orth of SW	/ Corner o	of Sectio
From Street or Road On east side of bldg. approx.	. 15. SE of at	<u>anconed</u>	<u> </u>	<u> </u>
	FROM	IARUTAN N	GROUND	LEVEL
FORMATION FOUND — DESCRIBE FULLY	Depth te Top el Strotum	Depth is Bettom of Stratum	Thickness of Strutum	Signic Woter Level
Sandy & gravely fill	0	7	7	
Send	7	11	24	
Sand & gravel with boulders	11	57	46	
Sandy gravely clay	57	62	5	
Clay	62	78	16	,
Dirty Sand & gravel & black silt	78	92	14	
Sand & gravel clean	92	112	20	131
Stopped in clean send and gravel				
	•			1
	•			
	•			
•				
•				
		·	-	
30 inch diameter hole drilled by [] Ca	ble Tool 🛄 Rotar	y 🗌 Jettin	ıg	
Pipe left in hole 93' of 16" pipe				
Date Started 3/18/65 · Finished 4/5/65	George P	etz		

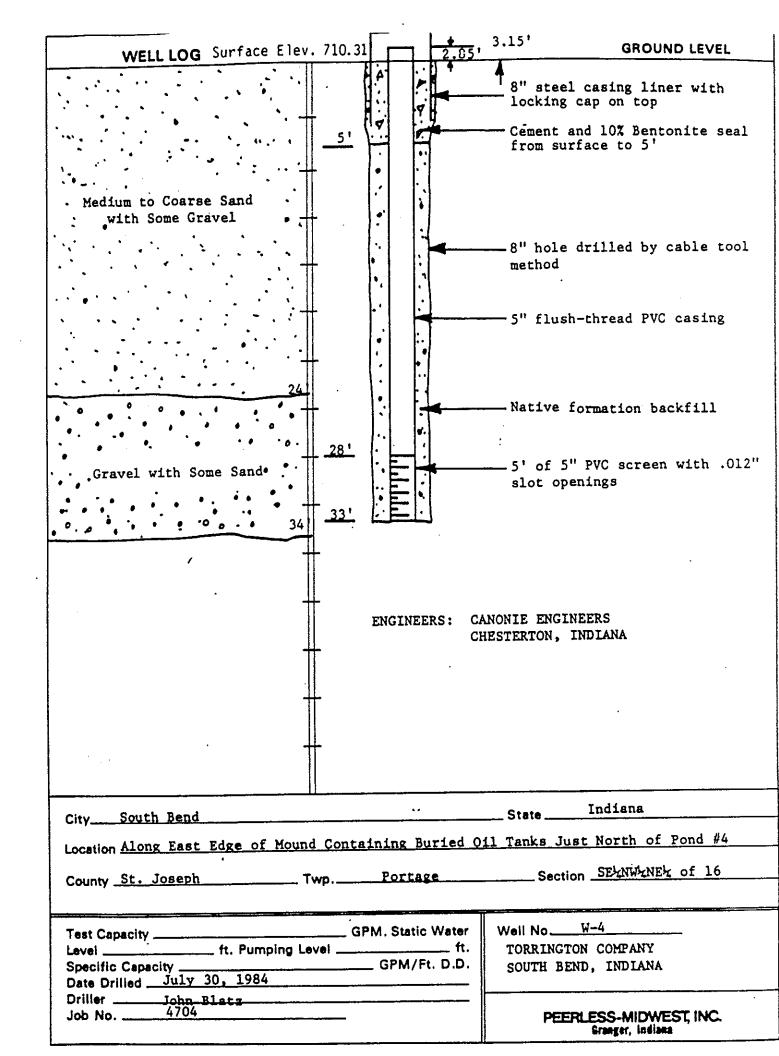
APPENDIX B

ON-SITE WELL CONSTRUCTION DIAGRAMS

WELL LOG Surface Elev. 713	3 46	Lid is .375" above surface GROUND LEVEL
Pelnforced Concrete : 0.4		Manhole cover flush with
Rlackton Pavement 8		existing concrete surface
	0/0/	8" steel casing liner
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
	1/ 1/2/	
• ` #	10.	8" hole drilled by cable tool method
Medium to Coarse Sand	1.0	tool method
with Some Gravel	12'	5" flush-thread PVC casing
	/ P	•
+	0 10	
	1. 1.	
	1/. 17.	
34	A . /	Cement and 10% Bentonite
Clay Lens / 34 5	1	seal from surface to 40'
Gravel with Some Med. Sand, 40 40	"/	
#	· • • • • • • • • • • • • • • • • • •	Native formation backfill
. Medium to Coarse Sand		
591		
61		5' of 5" PVC screen with
	1. El. 1	.012" slot openings
Gravelly Sandy Clay 64'	النال	
		ANONIE ENGINEERS
#	CI	HESTERTON, INDIANA
CitySouth_Rend	**	StateIndiana
Location Approximately 50' Fast of Wat	er Supply Well	#4
County St. Joseph Twp.	Portage	Section SEKNWKNEK of 16
Test Capacity G	PM. Static Water	Well No
Level ft. Pumping Level	ft.	TORRINGTON COMPANY
Specific Capacity Date Drilled August 7, 1984	GPM/Ft. D.D.	SOUTH BEND, INDIANA
Driller John Blatz		
Job No. <u>4704</u>		PEERLESS-MIDWEST, INC.

WELL LOG Surface Elev.	712.42		.70'	GROUND LEVEL
Brown Med. Sand w/Grave*, 1' Blacktop Pavement, 2'	À.	7	1 8'	steel casing liner with
	. 5' \	V I	—— Се	ement and 10% Bentonite seal
			fr	om surface to 5'
	. .' . •'			
Medium to Coarse Sand	_			hole drilled by cable tool
with Some Gravel			me	thod
			5"	flush-thread PVC casing
	- <u> </u> '.			,,
		-	Na	tive formation backfill
31	321		5'	of 5" PVC screen with .012"
Brown Sandy Gravel	37'		-	ot openings
	<u> </u>		·	
, ,				
	ENG	INEERS:		ENGINEERS TON, INDIANA
	-			
	•			
	•			
		••••		. Indiana
City South Bend Location Off NW Corner of Pond #1	ŧ		Sta	10
County St. Joseph Tw		rtage		Section SELNWLNEL of 16
				No W-2
/est Capacity ft. Pumping Lev Specific Capacity	GPM. S el GP	itatic Wate ft M/Ft. D.D	TOR	NoW-2 RINGTON COMPANY TH BEND, INDIANA
Specific Capacity			- SOU	IR BEND, INDIANA
Job No. 4704	-			PEERLESS-MIDWEST, INC.

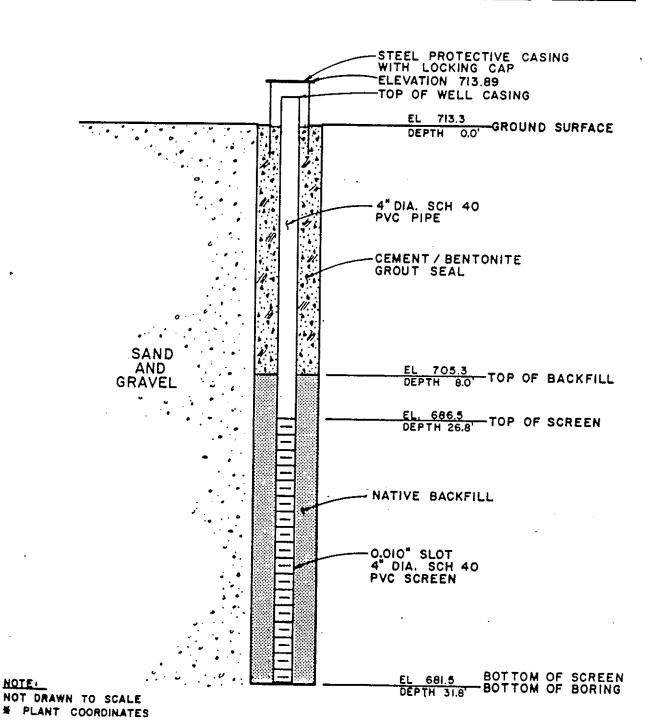
WELL LOG Surface Elev.	712.90) <u></u>		GROUND LEVEL
Reinforced Concrete : 0.4]	* r==		Manhole cover flush with
Blacktop Pavement	-		7 1	existing concrete surface
Rtown Gravelly Sand Filt 1.8		ا الح الإه	/	8" steel casing liner
, at Malowin Ozavasa	•].	/ ? [9	
	(7		•
	.		10,	
1: · · · · · · · · · · · · · · · · · · ·	· \	Δ	' / \	
	1	;	1.	
	-	b ·	P. /_	_8" hole drilled by cable
	1	-' /	/ [tool method
	•	_	• •	
· · · · · · · · · · · · · · · · · · ·]	7-2	p.	5" flush-thread PVC casing
	1	711	P .	:
	-	6	10	
	[· '•	· /	·
• • • • • • • • • • • • • • • • • • •	[7.	/ 1	
· . • • · 	•	/	. 1	
Medium to Coarse Sand	1	D · /		
with Some Gravel	.		·/ 	Cement and 10% Bentonite seal from surface to 40'
	\	المذ	• 🗸	sear from surface to 40
	40'	. /	- /	
`` `• . `	- 30- }			
	1	*.		
		,		Native formation backfill
	1	• •		
		• •		
· · · · · · · · · · · · · · · · · · ·	-			
]	•	1:1	
•		:	~	
l : '	- [,]	• .		
	56'	` -		5' of 5" PVC screen with
	-	· 、 三		.012" slot openings
61	61'	• F	•	
./././ / / //.				
Gravelly Sandy Clay	- 			
	:	ENGINEER		NONIE ENGINEERS
4	_		CH	ESTERTON, INDIANA
			:	
City South Bend		• • • •		State Indiana
l ·	5 NT 0			
Location Approximately 15' East o	I NE CC	rner or	Mainte	mance shed b
County St. Joseph Tv	VD	Portage	<u> </u>	Section SELNWINEL of 16
County				
70		M Contin	Water	Well No. W-3
Test Capacity ft. Pumping Lev	GP /el	IVI. STATIC	**************************************	TORRINGTON COMPANY
Specific Canacity		_ GPM/Ft	. D.D.	SOUTH BEND, INDIANA
Date Drilled August 10, 1984				
Driller John Blatz				
Job No4704				PEERLESS-MIDWEST, INC. Granger, Indiana .



WELL LOG Surface Elev. 710.3	8 1.8	- 2.3'	GROUND LEVEL
Sandy Gravel Fill		loci	steel casing liner with king cap on top ent and 10% Bentonite seal n surface to 5'
		8" } metl	nole drilled by cable tool nod
Medium to Coarse Sand with Some Gravel		4 ¹¹ 1	flush-thread PVC casing
		Nati	ive formation backfill
241 241			of 4" PVC screen with)" slot openings
		CANONIE ENC CHESTERTON	
•			
City South Bend	••	State	Indiana
	•	•	
Location Next to above ground quench of	•		
County St. Joseph Twp.	Portage	Sec	tion SEKNWKNEK of 16
Test Capacity GF Level ft. Pumping Level Specific Capacity	ft.		S-3 GTON COMPANY
Date Drilled August 13, 1984	GFW/FL D.D.	14	BEND, INDIANA
Job No. 4704		PE	ERLESS-MIDWEST, INC. Granger, Indiana

Observation Well Details

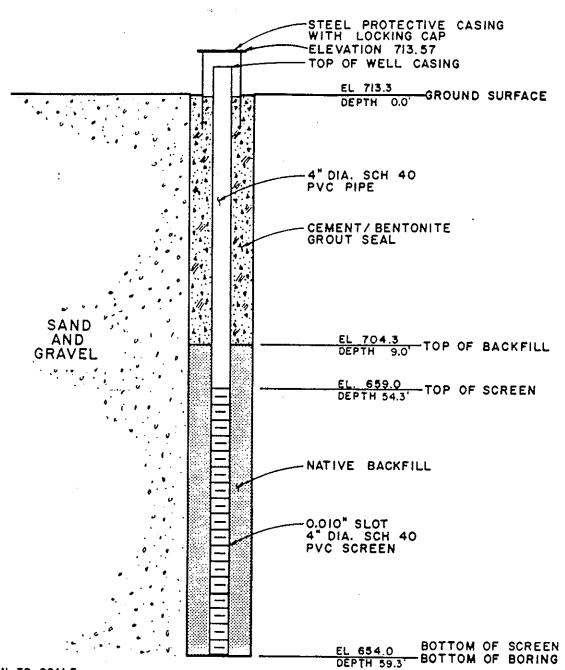
• • • • • • • • • • • • • • • • • • •	PROJECT No. 83-182
•	WELL No. W-7
PROJECT NAME BARNES AND THORNBURG	
BORING LOCATION N 4550.88 E 5855.74*	DATEIO-I8-84BYKMB





Observation Well Details

	PROJECT No. 83-182
	WELL No. W-8
PROJECT NAME BARNES AND THORNBUR	1G
BORING LOCATION N 4542.42 E 5855.85	# DATE 10-23-84 BY KMB



NOT DRAWN TO SCALE # PLANT COORDINATES

NOTE:

APPENDIX C REGIONAL GEOLOGIC LOGS

Incorporated COLVIEWIA

☑ TEST MISHAWAKA, INDIAN	AV			
☐ PERMANENT		Job 1	۷o. <u>۱</u> //102	70
WELL LOG No. 602 CITY South Bend	C	ounly St.	Joseph	
WELL LOG No. 604 CITY South Bend Owner Roach Appleton Company	Т	Township Portage		
	Se			
Location		ate <u>Inc</u>		
From Land Descriptionft. East andft. From Street or Road 36t W. of CL of S. Wellington	I. No	orth of SV	Corner of	of Secti
From Sireet of Rodd. 50. W. of Ct of S. Kerringwi	1 30 90.	2. OT C	, 01 1, 5	subte
	FROM	1 NATURAL	GROUND.	LEVEL
FORMATION FOUND — DESCRIBE FULLY	Dopt's te Top of Stratum	Depib to Bottom of Strotum	Thickness of Stratum	Sicile World Lave
Top Soil	0	14	4	16
Sand	L _t	12	8	
Dirty Sand & Gravel	12	23	11	
Será and Gravel (more gravel)	23	45	22	
Sand	45	56	11	
Sand and Gravel	56	58	2	
Sandy Clay	58	71	13	
Muddy Sand	71	97	26	
Muddy Sand & Gravel	97	104	7	•
Muddy Sand	104	123	19	
Sand and gravel (clean)	123	154	31	16
tonged in Sand & Gravel				
·				
·				
			- 	
•		<u>.</u>	· !	
	<u> </u>			
		1		,
6_ inch diameter hole drilled by [] Cable				

A. Folger

حنتة

Date Started _____July 27, 19607inished _Aug. 3, 1960

LAYNE-NORTHERN COMPANY

MISHAWAKA, INDIANA

IX TEST MISHAWARA, INDIA	NA			
PERMANENT		Job 1	۷o	
WELL LOG No. 7A CITY South Bend				Jose
Owner City Water Dept.		·=·		
	Se			
Location Sample St. just west of Olive St.	St			
From Land Description ft, East and		orth of SV	V Corner o	of Sect
From Street or Road		······································	·	
	FRON	A NATURAL	. GROUND	LEVEL
FORMATION FOUND — DESCRIBE FULLY	Depth le Top el Stretum	Depth to Settom of Strotum	Thickness of Strutum	Siction Works Level
Muck -	0	8		8.0
Light Sand and Gravel	8	20		
Light colored sand		28		<u></u>
Cerented send	28	35		
Sand and Gravel	35	47		
Sand and Gravel (somewhat coarser)	47-	75		
Good Mater bearing gravel	75	115		
Not quite as good as above	115	125		, <u>.</u>
Sand and some gravel	125	137		
Good water, sand and gravel	137	150		
Somewhat coarser S&G and better	150	176		
Blue Snae	176	184		
·				
•				
•				
inch dicmeter hole drilled by [Cable	Tool [7] Rolow	· □ Tetting		
Pips left in hole		پر ۲۰۱۱مر ہے۔۔۔۔۔		
le SicriedFinishedF		****		

DZF1F2

LAIME-MOUIUEUM COMENIAT

MISHAWAKA, INDIANA

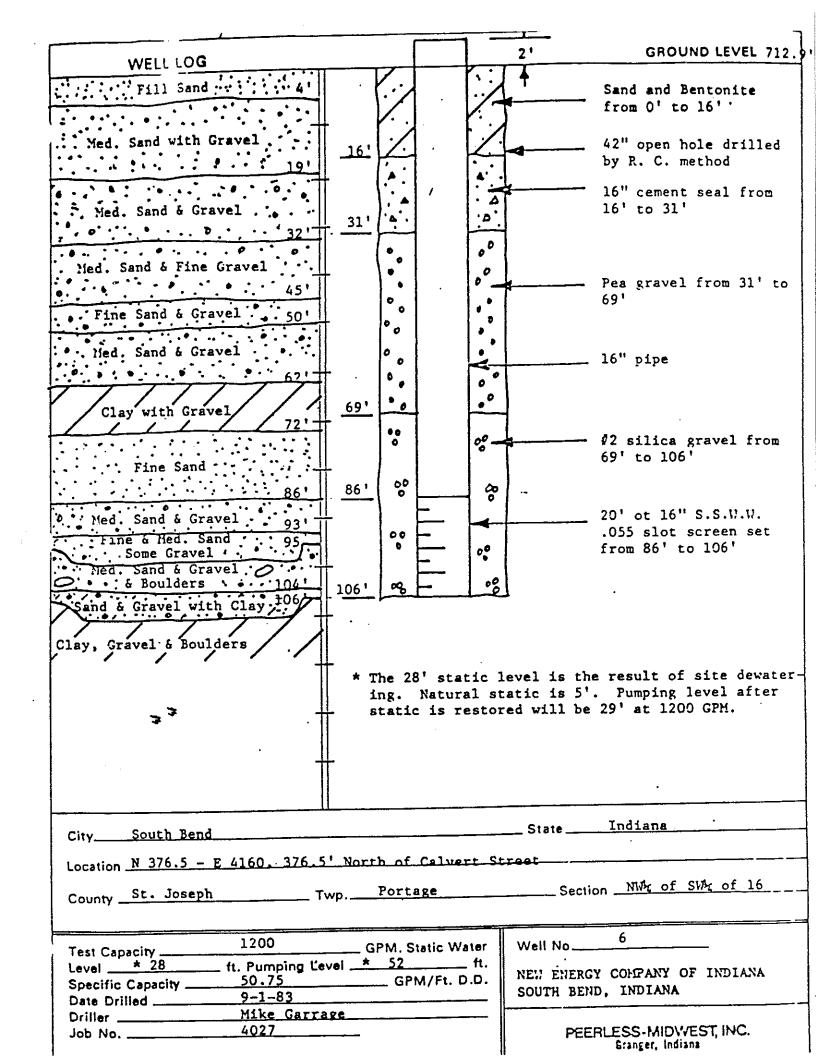
▼ TEST □ PERMANENT □		Job N	lo	
WELL LOG No. BA CITY South Bend	County St. Joseph			<u> </u>
WELL LOG No. 8A CITY South Bend Owner	То	waship/	forta	ge_
	Se	C11011		
Location Sample St. and Camden	StateIndiana			·
From Land Description		rth of SW	Corner of	of Section
From Street or Road	•			
	FROM	NATURAL	GROUND	LEVEL
FORMATION FOUND — DESCRIBE FULLY	Depth to Top of Stratum	Depth to Bottom of Stratum	Strotum	Statie . Wester Level
Top Soil	0	8		5.94
Sand and Gravel	8-	25		
Hard Pan	25	32		
Sand and Gravel	32	44	{ 	
Sand and Gravel and Boulders	144	66		
Sand and Gravel small boulders	66	77		
Gravel	77	85		
Fine Sand with some oravel	. 85	105		
Fine Sand	105	115		
Fine Sand	115	124		
Hard Pan	124	127		
Coarse Sand	127	141		
Coarse Water Sand	141	155		
Fine reducing to sand	155	165		<u> </u>
Fine Sand	165	170		
Finer Sand	170	180		
Fine Sand with some Clay	180	168		
Shale	188	194		
•				
				<u> </u>
inch diameter hole drilled by [] C	Cable Tool [Rota	īλ 🗌 je::	ing	
Pips left in hole				
Data Standard Finished 1921	·			

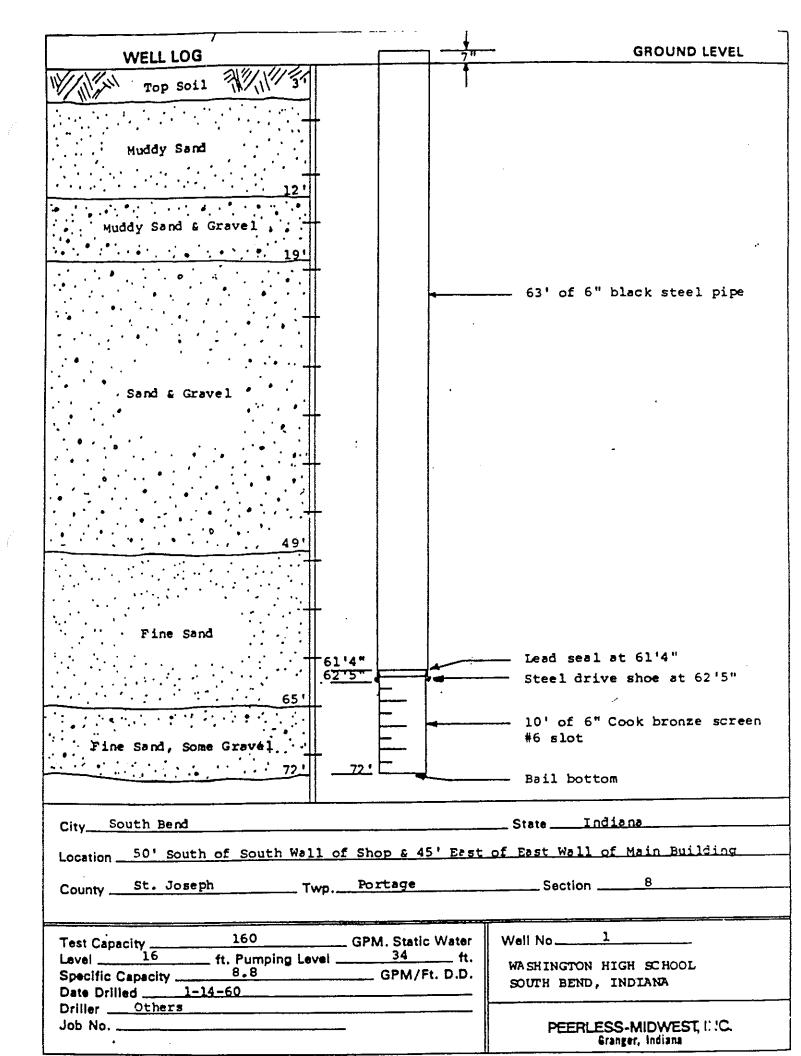
WELL LOG				GROUND LEVEL
Muck 3'				— 42" open hole drilled by Reverse Circulation method.
Fine to Medium Sand Some Gravel				- Sand and Bentonite fill 0' - 80'.
Sand & Gravel 461 Clay 501 Sand & Gravel 561				<pre> 16" welded steel cas- ing, 3/8" wall, from 2' above grade to 131' below grade.</pre>
Fine Sand	80'	۵.	6	- Neat cement seal 80' to 100'.
Clay with Sand & Gravel 107	100!		2	Sand and Bentonite pellets 100' to 115'.
Clay & Gravel Sand & Gravel Clay Traces . 131	131'	00	000	20 Yds. Northern #3 silica gravel pack.
O Sand & Gravel O	151.'	.:	• • •	- 20' of 16" P.S. John- son S.S.W.W. screen .070 slot.
Gravel & Clay 262	<u>163</u> '	00	-0:	- 12' of 16" blank.
Sand & Gravel (173') O O O O O O Clay with Gravel	<u>_173.</u> *	80		son S.S.W.W. screen .070 slot42" hole from 173" to
6 6 6 8 1296'	196'	//		196' backfilled with native material.
ENGINEERS: Shilts, Graves & Associates South Bend, Indiana				·
City South Bend			State	Indiana
City South Bend Davy-McKee Corp. Co-ord Location 785' N. of Calvert St.	inates N78 (extended)	85, E3860 8 1130' 9	A. of E. Li	ne Section 16
County St. Joseph Tw				
County (W	μ			
Test Capacity 2000 Level 5 ft. Pumping Level Specific Capacity 18.35 Date Drilled 2-18-81	ol114	ft.	New Ener	l gy Company of Indiana nd, Indiana
Driller <u>Mike Garrage</u> Job No. <u>2961</u>		· · · · · ·	PEE	RLESS-MIDWEST, INC. Granger, Indiana

· ·			Ţ		
WELL LOG			L	.	GROUND LEVEL
	Z		/	{	
Pine & Medium Sand			-	 	Sand and Bentonite from
Pine a redium cand	/ ;		<i>''/</i>	1	0' to 40'
	· ·		/ `	ĺ	
16'					
	/		1/-		16" pipe
La constant de la con	•		/ ::		
. Fine & Medium Sand (Trace of Gravel)	.:/	·	,		
· · · · · · · · · · · · · · · · · · ·	7:		./.	4	42" hole drilled by R.C.
	: <i>y</i> l				method
39' 40'	·/.		./		
			۵]	
The state of the s	•				
Medium Sand (Trace of Gravel)			6		
(Trace of Graver)	•				
	ı				
1.	•		4		Pea gravel from 40 to
V			0		981
Sandy Clay with Gravel	اه				***
Sandy Clay With Gravel				NOTE:	When static is restored to 5', pumping level at
	ه		0	1	1200 GPM will be 80',
Sand & Gravel 79					effect on #5 well is
% 37, Sand, Gravel & Clay. / 1831			0		62'-6".
Sand & Gravel 88		1			
	•	1	0		
Fine & Medium Sand	0	1	b	i .	
Sand & Gravel with Clay . 901		•		ł	
2/11/11/04		I		[
1 / S CIE, CIE, C DOCTETION OF	00			Ì	
(···/ 0 / · · / 0 / · 109' 109'	}		_	<u> </u>	10' of 16" SSWW .055
• • • Sand & Gravel		[••		slot screen set from
119	. 1	-	•		109' to 119'
Fine Sand 124'	00				10' of 16" blank
	.°	i			10 Of 10 Dimik
Sand & Gravel			00_4		Silica gravel from 98'
Sand a Graver	ł	-	٥		to 149'
	[-	-		20 149
(%	→ }	4-		20' of 16" SSWW .055 sld
		_	00	Í	screen set from 129' to
149' 149'		<u>- </u>	0		149'
/ / / Clay/ / /					7 1/
City South Bend				State	Indiana
Location N360 E3885					
					771 - 5 CT1 - 6 16
County St. Joseph Twp.	Por	ctage		Secti	on NW4 of SW4 of 16
1000			11		2
Test Capacity 1200 GPI				Well No	2
Level ft. Pumping Level 99 ft. Specific Capacity 16_0 GPM/Ft. D.D.				NEW ENE	RGY COMPANY OF INDIANA
Specific Capacity	G T M	1/FL U.	٠.		END, INDIANA
Driller Mike Garrage			<u> </u>		
Job No. 4027			_	. 555	RLESS-MIDWEST, INC.
				FEE	Granger, Indiana

WELL LOG			٦	712.75	GROUND LEVEL
Fill Sand 4 Fine Sand, Some Gravel 19' Medium Sand & Gravel 48' Clay Clay 55' Fine Sand 66' Coarse Sand & Gravel 80'				Sand o'-20 Neat o' -20 Neat o' -20 Neat o' -20 Neat o' -20 16" we 3/8" v 10' of 5.S.W060 s	pen hole by R. C. d to 127' and Bentonite seal cement 20'-35' ds Northern #2 a gravel 35'-84' elded steel casing vall 0'-70' 16" PS Johnson W. screen with lot 70'-80' 16" screen blank
Clay / Clay / City South Bend		tic is	5'. Pum e 32' at	ping leve	
CitySouth Bend Location_N520 - E4260, 520' Nort	h of Calvert	Street	State_	THATAN	
	-			\$17.1f.	of 51% - 5 35
County St. Joseph Tv	vp. Portag		Se	ection	of SW ₄ of 16
Level <u>* 24</u> ft. Pumping Lev Specific Capacity <u>76.2</u> Date Drilled <u>5-13-83</u> Driller Mike Garrage	GPM/F	ft.	;		ANY OF INDIANA IANA
Job No4027			P	EERLESS-N Granger	AIDWEST, INC.

		GROUND LE JEL
WELL LOG_		GROUND Et . EE
Fine & Medium Sand		42" hole drilled by R. C. method
Fine to Medium Sand with Gravel		Sand and Bentonite from
35'		0' to 35'
Medium Sand	0	16" pipe
Medium Sand & Gravel 56'	6	
Sandy Clay & Gravel 75	•	Pea gravel from 35' to 93' NOTE: When static is restored
Sand, Clay Gravel & Bouldergo, Sand & Gravel		to 5', pumping level at 1200 GPM will be 89', effect on #2 well is 62'
Fine Sand 92' 93' Fine Sand & Gravel 94' Sandy Clay & Gravel 100'	20	Silica gravel from 93'
Sand, Gravel & Clay 106' Sand & Gravel 116'		to 145'
Fine to Medium Sand (Some Gravel) 126		30' of 16" SSWW .055 slo
Sand & Gravel	000	
/ / Clay / / /		
CitySouth_Bend		StateIndiana
Location N345 E3885	<u> </u>	
County St. Joseph Twp. Po	ortage	Section NWW of SWW of 16
Level 24 ft. Pumping Level	M. Static Water 108 ft. GPM/Ft. D.D.	Well No5 NEW ENERGY COMPANY OF INDIANA SOUTH BEND, INDIANA
Driller <u>Mike Garrage</u> Job No. 4027		PEERLESS-MIDWEST, INC. Granger, Indiana





Division of Layne-Western Company, Inc.

INDIANAPOLIS . MISHAWAKA . LANSING

TEST MISSIANCE	•			
PERMANENT	: · · ·	Job 1	No. <u>ж</u> с1	.033
WELL LOG No. 79A CITY South Bend	c	ounty_St	. Josep	<u>h</u>
Owner Martin Blad	•	wnship_		
		ction		
Location	St	ate <u>I</u>	ndiana	
From Land Description <u>SEX, SEX, NWX</u> From Street or Road 5000' E. of Mayflower Rd. 2000	0' N. of U.	s. 20	Bypass	
	FROM	NATURAL	GROUND	LEV
FORMATION FOUND DESCRIBE FULLY	Doph to Tap of Stretum	Dapti to Bettern of Stratum	Thickness of Strotum	3
Black muck	0	4	4	
Brown medium sand to med. gravel	4	113_	109	4
Grey clay	113	115	2	<u> </u>
Brown medium sand to medium gravel	115	130	15	<u> </u>
Grey clay .	130	134	4	<u> </u>
Brown medium sand to medium gravel	134	140	6	<u> </u>
Brown medium to coarse sand	140	145	5	
Brown coarse sand, gravel and rocks	145	187	42	<u> </u>
Blue clay	187	192	5	<u> </u>
Blue shale	192	200		<u> </u>
				<u> </u>
				
<u> </u>				igg
				<u> </u>
				<u> </u>
•				<u> </u>
·				<u> </u>
ole 6½ ''Dia Drilled by: { Cable Tool Rotary X	Jetling		_	
plary Hole Grouted; Neat Cement Drilling Mud X	•			
asing 4 "OD From 24 "above ground to 165 feet bel				
reen 4 "Set from 165 to 170 feet Moke Layne	Type Pla	SEIC.	کال <u>ہ ۔۔۔ کا</u> کہ	<u>:</u>
rmping test 80 plus ox free drawdown to feet ofter		hours pur	mping	

Incorporated Control Land

MISHAWATA, INDIANA

PERMANENT LL LOG No A CITY South Bond	Cc	unly_St.	വം		
	Τ_	unchin '	D		
	Se	clion			
ration 155 W. of Mayflower Road-15 S. of £1 We. From Land Descriptionit. East and	11 punp house 	e <u>مح</u> رُر rth of SW	Corner of	o! Secti	
From Street of Round Level					
FORMATION FOUND — DESCRIBE FULLY	Depis le Top of Stratum	Depth to Bottom of Erretum	Taickness of Stratum		
7111		5₁	212	51-10	
	21	ć!).1	<u> </u>	
	6.	<u>5</u> ∱‡	131	***************************************	
Drown Sand Seme gravel	21.1	351	-111		
Cravel Sche Sand					
Brown Sand (Sine)		1,31	_5•		
Sond and Cravel	- 461	75.	24	†	
Good Sand & Grovet	1;21		261_	1 .	
•		<u> </u>	<u> </u>	 	
•			<u> </u>	<u> </u>	
•					
				1	
		 	1	+	
		<u> </u>	· -	!	
			<u> </u>	<u>i</u>	
•			-	ļ	
~		1	1	<u> </u>	
		<u> </u>	<u>·</u>		
			<u> </u>	<u> </u>	
			!		
inch diameter hole drilled by [] Ca	ble Tool 🔲 Rota	ry 🔲 Jetti	ກ໘		
Pipe left in hole				÷	

LAYNE-NORTHERN COMPAI.

MISHAWAYA INDIANA

] test] permanent	Job No. <u>#10399</u>					
VELL LOG No. 1 CITY Fo. Bord	County St. Jeseph					
wner Restin Blad Fesse	Township_FcrtagsSection19					
	Se	ction ateInd	-/ iona			
From Land Description				f Sect		
From Street or Road 200 Hast of Exflavor Road-50 B	est of 1	<u> </u>	ainage d	itch		
	FROM NATURAL GROUND LEVEL					
FORMATION FOUND — DESCRIBE FULLY	Dupik to Top of Eurotum	Depth to Bottom of Strotum		Stot Wot Lov		
Good Sand and orderal	49	70	21	_ _		
Light brown fine cond	70	75	5			
s fine toron and and proved (militar)	75	57	3			
Sandy Clay	73	90	12			
Cancy Clay some gravel	90	1C2	12			
Front (Groupl, most front (Glass)	102	103	3			
Unity Short, posts convel	105	115	10			
Eroum Cond and gravel	115	135	20			
Clean Common erroy sond and curvel	135	1ć0	25			
		<u> </u>				
•						
•						
Old smeen pulled and well drilled to 160 ft.		,				
			.			
•				•		
•						
inch diameter hole drilled by _:Cable To	ol [] Rotar	y 🔲 Jettir	ig			
Pipe left in hole	•••		 	- 1- '		

LAINE-NONINGMIN CONTRAINT

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MISHAWAKA, INDIANA

Ph. Alent			10000	-
WELL LOG No. 2 CITY SOUTH BEND	Cc	ounty_ <u>ST</u>	JUSEP	ر بر
Owner MARTIN BLAD FARAS	Tc	wnship	PORTAG 7./	<u>. </u>
Owner RARITH BLAD FARGS	Se	ction	TOTAL	
Location	SI.		THUI AN	<u>^ </u>
From Land Description	1t. No	orth of SW	Corner c	of Sect
From Street or Road 1/1 mile north of Praire Ave	enue and one :	nie ers	<u>t or</u>	
	FROM	NATURAL	GROUND	LEVEL
FORMATION FOUND — DESCRIBE FULLY	Depth to Top of Stratum	Depth te. Zollem ef Stretum	Thickness ed Stratum	Signi Work Lave
Muck	0	3_	3	
Sand and clay	3	12	9	•.
Fine sand	12	35	23	•
Coarse sand	35	50	15	•••
Fine sand	· 50	53	3	• •
Clay	53	·		
		,		• •
· · ·				
•				
· · · · · · · · · · · · · · · · · · ·				
•		-		
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•				•
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		-		•
			<u> </u> 	
		<u> </u> 	<u> </u>	
			<u> </u>	
inch diameter hole drilled by [] Co	able Tool 🔲 Rolar	y 🗀 Jetlir	ig	•
	Charl	es Kimbl	. 6	
Date Started Finished 1-26-48		בנסגם		•

lacorporated MISHAWAKA, INDIA	LNA	L-258	5		
WELLIOG No. 3 CITY South Bend	C	ounty St	t. Josei	ph	
Owner Martin Blad Farms	т	Township Portage			
	Se	ction	30.	:	
Location			iiena!		
From Land Descriptionft, East and		orth of SV	J Corner	of Section	
From Street or Road 751 West of Center Line of 3	entjamen gen	d and 31	South	<u>of</u>	
foundation of Boiler Fouse					
FORMATION FOUND DESCRIBE FULLY	Dopth te Top ei Straium	Depit te Zollom of Stratum	Thickness of Stratum	Statie Water. Level	
Sick	0	10	ומנ		
Very fine brown sand	10_	18	18	<u> </u>	
Course sand and fine gravel	18	30	12	5' 11	
Pine Sand	30	38	88		
Brown gumy clay	38	42	4		
Very fine brown send	J _! 2	1,5	3.		
Med. brown send, little gravel		54.	9		
Fine & Med. gravel and sand and (not clean)	5년	61	7	• .	
<u> </u>	,				
				· :.	
				•	
				•	
				•	

. Suck		10_	10	
Very fine brown sand	10_	18	18	<u>.</u>
Course sand and fine gravel	18	30	12	5' 11'
Fine Sand	30	38	8	
Brown gummy clay	38	42	4	·
Very fine brown send	J.2	45	3.	
Med. brown send, little gravel	- 1.5	54.	9	
Fine & Med. gravel and sand and (not clean)	54.	61	7	• .
]
	·			
• .				
		· .		
	-			
8inch diameter hole drilled by 🖺 Cable po left in hole	Tool [Rotar	y 🔲 Jettin	g	

Date Started 12/22/18 . Finished DECID

MISHAWAKA, INDIA:	₹Ā			
WELL LOG No. 1: CITY South Bond	C	ounty C ţ	<u> </u>	
Owner Firstin Blad Forms	То	wnship ${\it \perp}$	<u> </u>	100°
Location	•		cno	
From Street or Road Augrox'matchy .6 of mile Cest	ft. No	orth of SW Jerrylanic	Comer o	of Section
ft. South of N. Y. C. Reilrond	1			
	FROM Depth to	NATURAL	GROUND	LEVEL Signic
FORMATION FOUND DESCRIBE FULLY	Top of Stratum	Bollom of Strotum	ef Strutum	Water Level
Puok .	0	1,	<u></u>	11
Fine & Medium Sand (Muddy)	l ₂	12	3	
Hudium Red Sond	12	55	21,	
Sand & Gruvol	36	52	16_	
Fine sand	52	: မ် ဝ	8	
Clay-gray and turmy	60	76	15	-
Pedium & Fino Sand	76	. 95	19	•
Closs Course Sand, little gravel	95	118	· 23	
Course sand (cleen)	.118	125	5	
Course cond & gravel	123	150	. 7.	
Modium & Fino gravel still in formation	130	142	12	
•				
				•
· · · · · · · · · · · · · · · · · · ·	•			
•				. •
12 inch diameter bole drilled by ⊡ Cab	le Tool [] Rotar	y 🗌 Jettir	ng	
29-4.9 3-16-4.9 Date Started Finished	L.	#iess		

DRELLIEG

Incorporated

PER ATENT WELL LOG No. 1 CITY SOUTH BEND	Co	unty ST.	JOSEPH	
Owner MARTIN BLAD FARM	Township PORTAGE			
J # 1101	Sec	ction 19	}	
Location 50' SOUTH OF SOUTHWEST CORNER OF WAREHOUSE	State II DI AMA			
From Land Descriptionft. East and	ft. No	rth of SW	Corner c	f Secti
from Street or Road 2001 WEST OF MAYALOUER SOAD			•	
TOWNS TOUR DECORDS STULY	FROM Depth te		GROUND	
FORMATION FOUND—DESCRIBE FULLY	Top ed Stratum	Depth to Bottom of Stratum	Stratum	Slabe Wales Level
Top Soil	0'	61	61	
Fine Muddy Sand	61	281	221	61
Clay	281	301	21	. 51
Nedium sand and some gravel	301	39!	91	61
Coarse sand and some gravel	391	601	261	61
		:		
		:		· · ·
				I
			<u>.</u>	i .
•				
		!		
			!	•
		i		
		i		-
		:	1	
		<u></u>		•
		1		*
				•
,				
IX 12 inch diameter hole drilled by X Cable T	ool 🗀 Rota:	y [] Jeff	ng	:
Pipe left in hole 65'1"				•
Date Started 11-17-16 Finished 1-23-16	CHARLES	KI BLE		

LAINE-NUNIMENN CUMPANI

MISHAWAKA INDIANA

TEST WELL LOG No. 2 CITY SOUTH B	end	Cc	ounly_S	T, JOSE	. <u>=</u>
Owner L'ARTIN BLAD FARMS	wner L'ARTIN BLAD FARYSTownshi				
		Se	ctionI	NDLANA	
Location				17	
From Land Descriptionft.	East and	ft. No	orth of SW	Corner c	f Section
From Street or Road 8/10 mile N.E. of	highway 123 & 20) feet So	outh of	Large D	r <u>ein</u>
Ditch next to N.Y	.C. Pailroad	FROM	NATURAL	GROUND	LEV <i>E</i> L
formation found — describe fu	TLY	Depth to Top of Strotum	Depth to Bottom of Stratum	Thickness of Stratum	State Water Level
		0	8	. 8	•
_ Send		88	36	28	. _
Send & Gravel		36	_52	16	• •
Fine Send		52 .	60	8	••
Clay		60	76	16	·
Muddy Sand		7.6	_95	19	•
Sand & Gravel Formation		95	117	22	
Still in good formation		 			
·					
. :			4		
• • •	•				
					•
					•
					·
					·
					•
•					
				.	-
6inch dicmeter hole d	rilled by 🔁 Cable Too	ol [] Rotar	y 🔲 Jettir	ng	
Pipe left in hole			-	<u>-</u>	
Date Started 1/17/19 Finished	1/27/1.9		Esray No	\$5	

MISHAWAKA, INDIANA				
□ PERMANENT		Job 1	ง₀. <u>ห</u> –61	١33
WELL LOG No. 3 CITY SOUTH BEND	County ST. JOSEPH .			
Owner MARTIN BLAD	TownshipPORTAGE			<u> </u>
·	Se	ction_D	<u>X '</u>	·
Location 1862' WEST, AND 55' FOOT SOUTH OF POTATOE	State INDIANA			
From Land Descriptionft. East and		orth of SV	/ Comer	of Section
From Street or Road				-
·			GROUND	LEVEL 1 Static
FORMATION FOUND — DESCRIEE FULLY	Dopth to Top of Strotten	Depth to Bettem of Stratum	Straium	Wester Lovel
Muck	01	31	31	
Narrow	31	121	81	<u> </u>
Very fine sand	121	101	281	<u> </u>
Clay	401	51 '	11'	<u> </u>
Gravel	511	671	161	<u> </u>
Sandy clay with gravel strips	. 671	יב7	1,1	. :
Clay, rocks	71'	91'	201	
Clay, rocks	. 91 '	1001	91	
Clay, rocks	1001	יננו	121	<u>.</u>
Clay, with strips of sand	<u> </u>	121'	101	<u> </u>
Gravel	121 '	1601	391	151
Clay	1601	1711	1111	<u> </u>
]		ļ
				<u>.</u>
		· .		<u> </u>
				<u> </u>
		<u>, </u>	1	<u> </u>
·				<u> </u>
•				
				<u> </u>
6 inch diameter hole drilled by Cable	Tool F Roles	y 🗍 Jettin	g	•
Pipe left in hole				
Date Started 10-22-53 Finished 10-29-53	GRORDE P	: <u> </u>	_ ' •	

Incorporated

(----

MISHAWAKA, INDIANA		Cvar		
WELL LOG No. 1 CITY SOUTH BEND	C	ounty	ST. JOS	EPH
Owner MARTIN BLAD FARMS	Тс	aidanwo	PORTAGE	•
	S	ction	14	•
Location	Si	crte	INDI ANA	
From Land Description	t. No	orth of SV	V Corner o	of Sect
From Street or Road 15' North of County Drain Ditch				• •
5280' East of Mayflower Road	FRON	A NETHOS	L GROUND	I EVET
FORMATION FOUND - DESCRIBE FULLY	Depth to Top of Strature	Depth to Bottom of Stratum	Thickness of Strutum	
Luck	.0	4	4	
Red muck	4	10	6	4
Red send (not clean)	10	25	15	
Medium sand and a little gravel (cleaner)	25	33	8	· ·
Coarse sand (clean)	33	43	10	
Coarse sand and a little gravel	43	53	10	•
Fine sand (not clean)	53	56	3	•
Fine muddy sand	56_	60	4	•
Fire sand and muddy clay	60	86	26	
				<u>.</u>
				•
				•
				• •
· · · · · · · · · · · · · · · · · · ·				
		•		•
				•
				•
			-	
		-		
		İ		
8 x 6 inch diameter bolo drilled by ∑ Cable Tool	☐ Rotary		g .	
Pipe left in hole				

9-2-47 _ Finished_

Date Started 9-15-47

L. Ness

LAYNE-NORTHERN COMPANY Incorporated

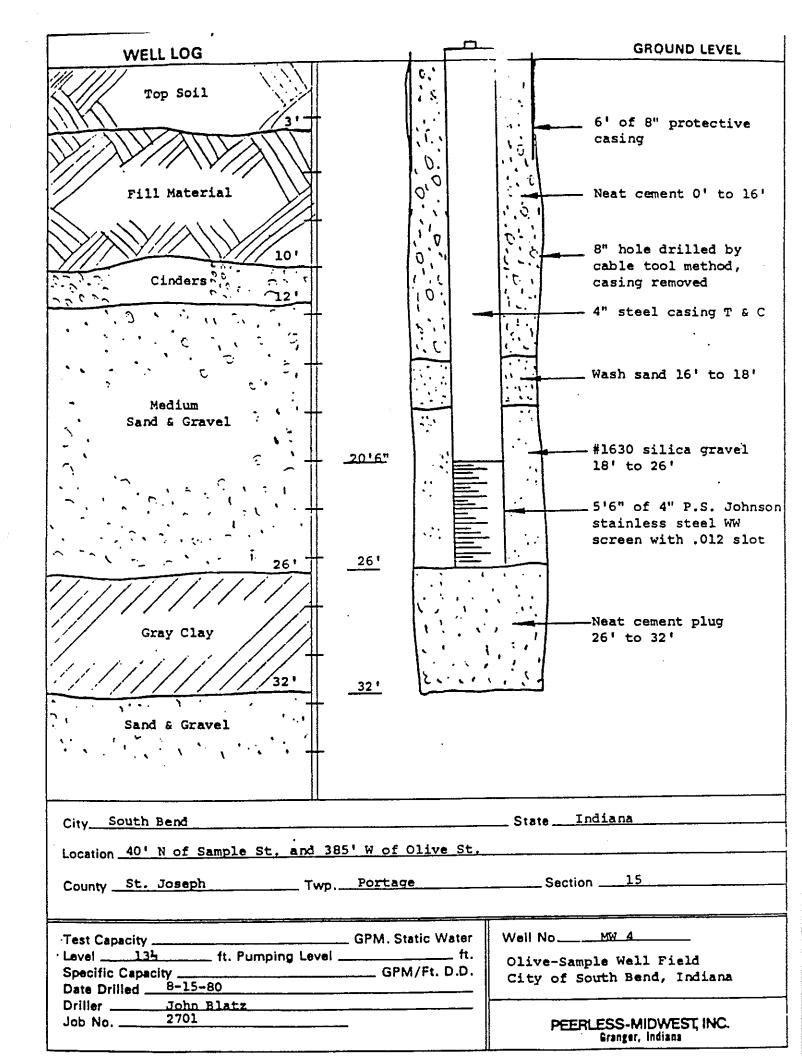
MISHAWAKA, INDIANA				
☐ TEST ☐ PERMANENT		Job N	o	•
· · · · · · · · · · · · · · · · · · ·	County St. Jos.			
Posch (ppleton Mer. Co.	T.		Postage	
RECORDED AS WELL 37/2-16 B5 in STATE BULL.* [196] Location	<i>15</i> Se	ction	9	
From Land Descriptionft. East and	ft. No	rth of SW	Corner o	f Section.
From Street or Road on East side of bldg. on inside bl	.do.	•		
	FROM	NATURAL	GROUND I	EVEL
formation found — describe fully	Depth is Top of Stratum	Depth to Bettom of Stretum	Thickness of Strutum	Static Water Level
Musk	0	9	9	
Sond & Gravel	9	70	31	
Clay & Gravel	70	60	20	<u></u>
Hard Pan	60	90	_30	
Clean Mater Sand & Gravel	90	120	30	121
Well was tested at 675 gpm with 29° of				
drawdown. Well is equipped with 20° of Johnson	Screen			
#30 slot.				
Peerless Pumo #50760 rated 350 cpm at 169: TDH w	ith			
20 HP motor and 1:01 of 5x1 col.			<u> </u>	
·				
	. 🔲 Rolæ	y 🗍 Jettin	g 	

Date Started Finished 1918 Ind. & Mich. Fater Day. Co.

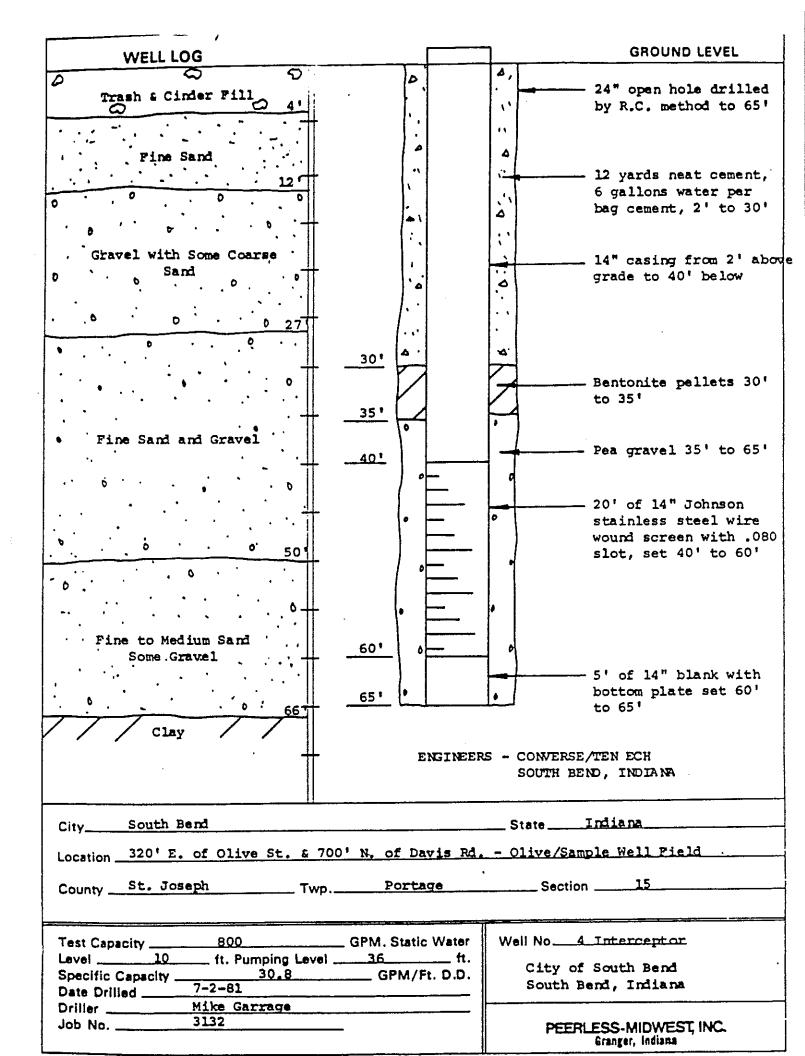
_ ,			ODOUND LE C
WELL LOG		 , 	GROUND LE 1L
Top Soil	0 (0, 1	' of 8" protective asing
Fill Material	0,0		eat cement 0' to 31' ,
Fine to Medium Sand & Gravel	0.0.0.0.0	, D C	" hole drilled by able tool method, asing removed
Coarse Sand & Gravel	0.0.0.0.0	' 0	" steel casing T & C
Medium Sand & Gravel O O O O O O O O O O O O O O O O O O O		W 3	ash sand 31' to 33' 1630 silica gravel 3' to 40' '6" of 4" P.S. Johnson
Stopped in Sand & Gravel	<u> </u>	1 4 1	tainless steel WW scree ith .012 slot
City South Bend		State_India	ana
Location 20' N of Well #4, approximately	•		
County St. Joseph Twp. Po			
Test Capacity GPM Level 14 ft. Pumping Level Specific Capacity Date Drilled 8-5-80 Driller John Blatz	ft.	Olive-Samp	L (Shallow) Le Well Field uth Bend, Indiana
Job No. 2701		PEERL	ESS-MIDWEST, INC. Granger, Indiana

WEL LOG	, . r		GROUND LEVEL
WEL COG	- Q ·	- ,	
Top Soil	10	0,0	6' of 8" protective
3	0'	0,	casing
	10	0,	
Fill Material	0.	0	
THI MALELLAN	(0')	0'	Neat cement 0' to 31'
	0,	0'6	
200	10	0',	
	lo'	10	÷
Fine to Medium	(0)	١٥١	8" hole drilled by cable
Sand & Gravel		. 6	tool method, casing removed
0.0000000000000000000000000000000000000	0	0.	
	, 0	0:	•
0, 0,0,0,0,0,0,0,0	0,0	0	
Coarse O'	0'		4" steel casing T & C
, 'S Sand & Gravel '10		0	
, o'	1.0	. 0	
0,0,0,0,0,0,0,0,0,0	6	6	
0 0 0 0 28	, 0	0	
010' 01 10, 10 10 10 10 10 10	0'0		
	1.0	لننا	Wash sand 31' to 33'
0,0,0			Wasii Baila 31 to 33
Medium 0 4 34	411"		
Sand & Gravel			#1630 silica gravel
0,	1 =		33' to 40'
			5'-6" of 4" P.S.
6,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	9'7" .		Johnson Stainless Steel WW screen with .012 slot
0,000			
o o Stopped in			
Sand & Gravel			
0,0,10,00,00,00,00			
#			
	•		te <u>Indiana</u>
Location Approx. 150' NE of Well #4. c	outside fence	approx.	140' W of Olive Street
County St. Joseph Twp.	Portage		Section 15
County IWP:			
			No_MW 2
Test Capacity G Level 14 ft. Pumping Level	irm, Static Wate f	.	
Specific Capacity	GPM/Ft. D.C	City	re-Sample Well Field r of South Bend, Indiana
Data Drillad 8-8-80		-	
Driller John Blatz Job No. 2701		-	DEEDI EGG ANDIMECT ING
000 (tg.,			PEERLESS-MIDWEST, INC. Granger, Indiana

			COOLING LEVE
WELL LOG	21 0:00	2.0	GROUND LEVEL 6' of 8" protective
Fill 7	1 ••••		casing.
Fine Sand & Gravel 12		19:41	Neat cement 0' 0 5'
10.00	(3.7)	(33)	
Coarse Sand & Gravel 40 27			Wash sand 5' - 90'
000,00000000000000000000000000000000000		144	•
699,00,00,00,00			8" hole drilled by
Fine to Medium		1:37	cable tool method. Casing removed.
Sand & Gravel			
Clay Traces At 27' & 40'			All wheel and a C
010000000000000000000000000000000000000			4" steel casing T & C
0000000000000000	16.5	. ::	
20.0.0.0.0.0.0.6.0.00	1:34	13.34	
0.0000000000000000000000000000000000000		[24]	
0,	۵, ۵۰	9.2	
Medium 600	60:1		
Sand & Gravel p 6			Neat cement 90' - 182'
0,00		17.0	
000000000000000000000000000000000000000	, 0.	p.9	
0,0,0,0,0,0,0,0,0,132	0,,	10.40	
Fine Sand'	١٠,٠٥	0,0	
Fine to Medium		1000	
Sand & Gravel	1: 70:	0	
۱ 158	0'''	0.0	
Fine Sand (162)	0.0.		
0,00,00,000,00	(0):1		Wash sand 182' - 183'
Medium	0	6 6	
	1851	- St	#1630 silica gravel
190	190'		182' - 190' 5' of nom. 4" Johnson
NOTE: Screen was set and			stainless steel WW
samples taken at the follow-			screen with .012 slot
ing depths in this well:		•	set 185' - 190'
, , , , , , , , , , , , , , , , , , , ,			
			·
City South Bend		State	Indiana
Location 12' N of Well #4, approx, 2	200' W of Olive St	treet	
County St. Joseph Twp	Portage	Section	on15
Test Capacity	GPM. Static Water	Well No_M	W l (Deep)
Level 13 ft. Pumping Level _	ft.		ple Well Field
Specific Capacity	GPM/Ft. D.D.	II .	outh Bend, Indiana
Date Drilled <u>8-20-80</u> Driller <u>Mike Garrage</u>			
Job No2701		PEF	RLESS-MIDWEST, INC.
			Granger, Indiana



WELL LOG		GROUND LEVEL
	6	24" open hole drilled
], ']	by R.C. method to 65'
Cimer Fill		
0 0 6		<u> </u>
		17 yards neat cement,
<u> </u>		6 gallons water per bag
Pine Sami Some Gravel o		cement, from 0' to 30'
	\ , \	
1	'	
0 18'	۵ ا	14" casing from 2' above
Scrap Metal Samd & Gravel	· ·	grade to 40' below
0	, , ,	 • .
• · · · · · · · · · · ·	\ \	· ·
];	
	30'	
• · · · · · · · · · · · · · · · · · ·	"	
Medium Sand & Gravel 6		Bentonite pellets 30'
Medium Sand & Grave,	35'	to 35'
1:	0	Pea gravel 35' to 65'
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	40' 6	Pea grave1 35 to 05
· · · · · · · · · · · · · · · · · · ·	40.	
	<i>l</i> . □	0 \ 001 -6 147 705-700
6 451	•	20' of 14" Johnson stainless steel wire
	•	wound screen with .080
		slot, set 40' to 60'
Fine to Medium Sand		•
531]]
• • • • • •]
		• \
Medium Sand and Gravel	60'	<u>.</u>
		5' of 14" blank with
	0	bottom plate set 60'
0 0 0 65'	65'	to 65'
Clay /		
		ers - converse/ten ech
Π	enginee	SOUTH BEND, INDIANA
City South Bend		State Indiana
•		
Location S.E. Corner of Grant & Day		
County St. Joseph Twp	Portage	Section15
County		
1200	CDM Cardle Marker	Well No 3 - Interceptor
Test Capacity 1200 Level 10 ft. Pumping Level		AABIL IAO
Specific Contains 92.3	GPM/Ft. D.D.	City of South Bend
Date Drilled 6-26-81		South Bend, Indiana
Driller Mike Garra Job No. 3132	ge	
Job No3132		PEERLESS-MIDWEST, INC. Granger, Indiana



LATIVE-NORTHERN CONTAINT

MISHAWARA, INDIANA

Fire Well

TEST	MISHAWAKA, INDIANA	1116 4617
☑ PERMANENT WELL LOG No. 1	CITY South Bend	Job No. M10270 County St. Joseph
Owner Roach Applet		Township Portage Section 19
Location	FIRE WIELL	State Indiana
	ionft. East and	
From Street or Road	8t E. of New Loading Dock - 601	S. OI SEMBLE SU.

	FROM NATURAL GROUND LEVEL						
FORMATION FOUND — DESCRIBE FULLY	Depth te Top el Stratum	Depth to Bottom ed Stratum	Thickness of Stratum	Static Wates Level			
Muck			4				
Sand & gravel with boulders	4	75	38	14			
Sand & Gravel	42	55	_13	14_			
Sand and Gravel with Clay	55	58	3				
Clay	58	63·	5				
Clay with Boulders	63	74	11				
Sand and Gravel with some clay	74_	78	4	14			
Sand & Gravel	7.8	152	7):	11:			
Stopped in sand and gravel							
				1			
·							
,							
30 inch dicmeter bole drilled by □ Cab	le Tool 📑 Rota	y 🔲 Jettir	ng				
30 inch diameter hole drilled by [] Cab	ole Tool [∑:Rolæ	y 🗌 Jettir	g				

___ Finished __9-9-50

C. Kimble

SEELE

Date Started ____8/11/60

old book 1921 porrowed crom S.S.W. NORTHERN CON PANY Incorporated

MISHAWAKA. INDIA	NA					
TEST		Job N	o			
☐ PERMANENT	Co	County St. Joseph				
WELL LOG No. 21 & CITY South Sens	То	Township fortinge				
☐ PERMANENT WELL LOG No. 2h A CITY South Bend Owner City of South Bend	Se	dion				
	Sto	iteInd	iana			
From Land Description	ft. No	rth of SW	Corner o	f Section		
From Street or Road Olive St. South of Sample						
Trois direct of field		NATURAL	GROUND I	LEVEL		
FORMATION FOUND — DESCRIBE FULLY	Depth to	Depth to Bettom el Strotum	Thickness el Strutum	Sictic Worles Level		
Top Soil	0	15.	•	12.20		
Very Coarse Sand & Gravel	15	30				
Imervious Clayey Sand=	30	90				
Fine Sand	90	110				
Sand	110	120				
	120_	130				
Sand Some Gravel Coarse Sand fine Gravel	130	135		<u> </u>		
Coarse Sand and Gravel	135.	170				
			ļ			
				<u> </u>		
		ļ		1		
				<u> </u>		
			<u> </u>			
				<u> </u>		
			<u> </u>			
		<u> </u>				
·			<u> </u>			
inch diameter hole drilled by	Cable Tool [] Rote	πλ []]e;	ing			
Pipe left in hole				<u></u>		
Date StartedFinished1921						

MISHAWAKA, INDIANA

J TEST				•			
☐ PERMANENT		Job N	₹o	<u> </u>			
WELL LOG No. 25-A CITY South Bend	County St. Joseph						
Owner	Township fortage						
	Se	ction					
Location		ate <u>I</u> r					
From Land Descriptionft. East and	ft; No	orth of SW	7 Corner o	of Section			
From Street or Road 2" well 200 ft. South of Sample &	Olive	·····					
	FROM	NATURAL	GROUND	LEVEL			
FORMATION FOUND DESCRIBE FULLY	FROM NATURAL GROUND LEVE Depth to Depth to Thickness Si Top of Boltom of Stratum Stratum Le						
Top Soil -	Ō	10.		10.40			
Fine Gravel and Some Sand	10	40					
Clay & Clay with Gravel (small amt)	40	50 100					
Very coarse sand & gravel. Some strata of very	coarse gr	vėl.					
Very coarse gravel (1/2" & over)	100	113		:			
Very coarse sand & gravel(some 2to 3" stones)	113	138					
Coarse sand with some pebbles	138	159					
This well was used for a pumping test							
•							
		-					
		<u> </u>		_			
	-						
			•				
•		<u> </u>					
		<u> </u>	<u> </u>	<u> </u>			
inch diameter hole drilled by [] Cable To	ooi ∏ yojat	y 📋 jettir	ig				
Date Started Finished							

212.1

Pipa left in hole

Date Started ______Finished _____Finished _____

1922 / LATINE-INORTHERIN CONTRAINT Incorporated

MISHAWAKA, INDIANA

x test D permanent	•	Job No
WELL LOG No LA	CITY South Bend	County St. Jos.
Gwner	City Water Dept.	Township Portinge
Owner		Section
Location	·	State Ind.
From Land Descripti	onft. East and	ft. North of SW Corner of Section
From Street or Road	Indiana and Olive Streets	
	•	

	FAOM NATURAL GROUND LE					
FORMATION FOUND DESCRIBE FULLY	Dopih le Top el Strolum	Depth to Bottom of Stratum	Thickness of Strotum			
Top Soil	0	50	20	_		
Fine Sand	20	43	23	lacksquare		
Shale .	. 143					
Boulder Clay & Gravel	43	(45)				
Clay	43	63	20			
Fine Send	63	90	33			
Sand and Fine Gravel	99	100	10	<u> </u>		
Coarse Sand (some small stones)	100	110	10	<u> </u>		
Very Course Sand	110	120	10	_		
Coarse Sand and Fine Gravel	120	133	13	_		
Very coarse sand and 1/hm oravel	133	11:0	7	L		
Medium Sand	143.	179	30			
Some Fine sand	(171)					
				L		
		•				
				_		
• .						
•						
•						
				\vdash		

DERIF

, = 010 200...

LAYNE-NORTHERN COMPANY

mishawaka, indiana				
☑ TEST ☐ PERMANENT WELL LOG No. 5-A CITY South Bend Owner City Water Dept.		Job N unty_St. wnship		
Location From Land Descriptionft. East and From Street or Road Olive St. (1/2 way between Indian	Sic ft. No a_and_Sa	rih of SW	Corner c	
FORMATION FOUND — DESCRIBE FULLY	FROM Dapth to Top of Strotum	NATURAL Depth to Bottom of Stratum	GROUND Thickness of Strutum	Static Water Level
	Į.	!		1 :

•			GROUND	LEVEL Statis
FORMATION FOUND - DESCRIBE FULLY	Dapis 10 Top of Stratum	Depth to Bottom of Stratum	Strutum	Wors
Top Soil	0	20	20	12.2
Fine Sand	20	43_	23	
Shale (about 2 ft. of heavy gravel and				
boulders at about 501)				
Clay	63			
Fine Sand	90			
Coarse Sand (some small stone)	100		<u> </u>	<u> </u>
Sand and Fine Gravel	110		1	<u> </u>
Very coarse sand	120	<u> </u>		<u> </u>
Coarse Sand & Fine Gravel	133			
Very coarse sand and 1/4" gravel	. 1113		<u> </u>	
Medium Sand	153	173	·	<u> </u>
Rock	17719			
			<u> </u>	<u> </u>
				<u> </u>
•				
		1		

	inch diemeter hole drilled by 🗌 Cable Tool 🗍 Rotary 🗍 Jetting
Pipa left in hole	•
Date Started	Finished 1921

MISHAWAF ! INDIANA

WELL LOG No. 1 City	,soc	m <u>h beld</u>				ST. JOSE		
OwnerCITY (` . ^	3,000 C	4 (7)	Townshi	p <u>POT.TÁG</u> , /=	Ē	-
Owner CITY (or south 321	<u> </u>	<u>.</u>	<u> </u>	Section _	IUDIAHA		-
ocation—From Land Description								- OUT
ocation—From Street or Road_					•	27.0	FERTY L	JKE -
FORMATION FOUND	THICKNESS OF • 3 STRATUM	DEPTH TO BOTTOM OF STRATUM	STATIC WATER LEVEL	TEMP.		REMARKS		
Soil	12:	ול.'1	1			· ·		
Sandy Clay	121	31						}
Sand	121	151					 	_
Coarse Sand	71	221						
Send	. 51	251					•	
Gravel Sand	201	1;5!						
Gravel Sand	411	S61			Ccerse			
Gravelly Clay	5'	911			•			
Gravelly Clay	271	118'						
Sand à Gravel	1.71	1651	2016"					
Shale	61	171'						

Set 6' screen at 151	16" with 10	1:16" or	1½"· Pi:	be. 5'	of 2" pi	oe. <u>59' o</u>	f 3"Pio	٠.
			•		<u> </u>	•	•	
7/8-1			•					
						····	·	
			,					
-				•				
		<u> </u>						

Date Started	10-15-1山	Finished	10-17-1년(CALVIII LEYIINLOS
			•	DRILLER

MISHAWAKA, INDIANA

TEST WELL LOG No. 2 City_		SOUTH BE	ND		County ST. JOSEPH
**************************************				 سندم ا	Section
Owner CITY OF	SOUTH BE	end <i>M</i>	1111 1	() () ()	Section
					State ENDIANA
Location-From Land Description_	ON EAST	CURB LI	E OF LO	PARDY	DRIVE PROPOSED.
ocation—From Street or Road 60	SOUTA 3	ed of s	idewale,	יים י <u>לד</u>	EST EASTLINE LOUBARDY DRI BLOCK SOUTH SAUPLE STREE
FORMATION FOUND	THICKNESS OF STRATUM	DEPTH TO SOTTOM OF STRATUM	STATIC WATER LEVEL	TEMP.	REMARKS
Soil	31	31		<u> </u>	
Sand Gravel	121	15'			
Gravel Sand	241	391	-		
Sandy Clay	17'	561	_		Hard drilled very slow.
Gravelly Clay	291	851			Drilled faster.
Gravelly Clay	431	1291			
Sand gravel	7'	1351	-91		•
Send gravel	261	161'			1
Shale	51	1661			Very hard. Had trouble
•				<u> </u>	getting started into it
· .					
	<u> </u>	;			
				\$ * · · · · · · · · · · · · · · · · · ·	
			<u>_</u>		**************************************
			1		
	- 1		<u>:</u>		
		<u>:</u>	<u>!</u>		
ate Started 10-26-14 Fi	nished 1	1 -1 -11		C	ALVIN REYHOLDS

DRILLER

TUTTISTICALITY CONTRACTOR Incorporated

MISHAWAEA, INDIA						
TEST WELL LOG No. 3 CITY SOUTH BEND	c	unly ST	JOSE -	<u> </u>		
ב אין אידוע מיץ אידוס	То	Township PORTAGE				
JWBVI	Section 15					
LODE COURT ON OFFICE CASENG CATTLOP	State INDIANA					
read Description (t East and	ft. No	it. North of SW Corner of S∞chor				
From Street or Road 200' WE'T OF GLIVE STREET, 20	3 <u>50 kthok 10</u>	OUTH FE	OPERTY I	DE.		
`		NATURAL				
FOEMATION FOUND — DESCRIBE FULLY	Depth to	Pepth te Bettem ed Strotum	Talekassa of Strotum			
Fill	01	7'	7'			
Clay	7'	16'	91	1		
Coarse gravel and sand	16'	1:71.	31'	18:10		
Nek	17	801.	33'			
Rusty Sand & Gravel	801	129.5	1791	18:10		
Clean gravel and sand	129'	21.31.	. 14'	13'10		
Sand and gravel	1/:31	1701	271	18'10		
Rusty sand and gravel	£50	191'	211	13'10		
Shale	191!	1931	21			
			1	1		
				<u> </u>		
•				<u> </u>		
	·		<u> </u>			
			<u> </u>	<u> </u>		
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			<u> </u>	<u> </u>		
•						
6inch diameter bole drilled by El Co	zble Tool 🗌 Roto	ay 🗌 Jetu	nd			
Pipo left in hole						
Data Started 9-3-16 Finished 9-6-16	CF: CT	ES KIVEL		 		

APPENDIX D

SECTIONS SHOWING GLACIAL GEOLOGY
IN THE SOUTH BEND AREA
CONTOURS OF PIEZOMETRIC SURFACE, 1945

