Tronox LLC, Columbus

General Information

ID	Branch	SIC	County	Basin	Start	End
1696	Chemical	2491	Lowndes	Tombigbee River	10/27/1992	

Address

Physical Address (Primary)	Mailing Address
2300 14th Avenue North Columbus, MS 39701	PO Box 268859 Oklahoma City, OK 731268859

Telecommunications

Type	Address or Phone
Work phone number	(405) 775-5129

Alternate / Historic AI Identifiers

Alt ID	Alt Name	Alt Type	Start Date	End Date
2808700020	Tronox LLC, Columbus	Air-AIRS AFS	10/12/2000	06/01/2002
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Construction	06/12/1998	
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Synthetic Minor Operating	06/06/1997	06/01/2002
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Synthetic Minor Operating	06/12/1998	06/01/2002
MSR220010	Kerr McGee Chemical Corporation, Columbus	GP-Wood Treating	10/27/1992	07/13/1997
MSD990866329	Kerr McGee Chemical Corporation, Columbus	Hazardous Waste-EPA ID	10/12/2000	
MSD990866329	Kerr McGee Chemical Corporation, Columbus	Hazardous Waste-TSD	06/11/2001	04/12/2006
MSD990866329	Tronox LLC, Columbus	Hazardous Waste-TSD	04/13/2006	05/31/2011
1696	Kerr McGee Chemical Corporation	Historic Site Name	10/27/1992	04/10/2006
1696	Tronox, LLC	Official Site Name	04/10/2006	
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	10/11/1994	10/10/1999
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	08/23/2000	07/31/2005
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	10/31/2005	04/12/2006
MSP090021	Tronox LLC, Columbus	Water-Pretreatment	04/13/2006	09/30/2010

Regulatory Programs

Program	SubProgram	Start Date	End Date
Air	NSPS Subpart Dc	09/12/1990	06/01/2002
Air	SM	06/06/1997	06/01/2002
Hazardous Waste	Large Quantity Generator	04/01/1997	
Hazardous Waste	TSD - Not Classified	06/11/2001	
Water	PT CIU	10/11/1994	09/01/2003
Water	PT CIU - Timber Products	10/11/1994	09/01/2003

	Processing (Subpart 429)		
Water	PT NCS	09/01/2003	
Water	PT SIU	10/11/1994	

Locational Data

Latitude	Longitude	Metadata	S / T / R	Map Links
33 ° 30 ' 38 .51 (033.510697)	88 ° 24 ' 34 .02 (088.409450)	**Point Desc:** PG - Plant entrance (General) Data collected by Louis Crawford on 7/11/00. PG - Plant Entrance (General) Data collected by Clift Jeter on 6/13/02. LAT 33deg 30min 36.6sec LON 88deg 24min 35.1sec **Method:** GPS Code (Psuedo Range) Differential **Datum:** NAD83 **Type:** MDEQ	Section: Township: Range:	SWIMS TerraServer Map It

10/13/2006 10:29:50 AM

Kerr McGee Chemical Corporation, Columbus

General Information

ID	Branch	SIC	County	Basin	Start	End
1696	Chemical	2491	Lowndes	Tombigbee River	10/27/1992	

Address

Physical Address (Primary)	Mailing Address
2300 14th Avenue North Columbus, MS 39701	PO Box 25861 Oklahoma City, OK 73125

Telecommunications

Type	Address or Phone
Work phone number	(405) 270-2625

Alternate / Historic AI Identifiers

Alt ID	Alt Name	Alt Type	Start Date	End Date
08700020	Kerr McGee Chemical Corporation, Columbus	Air-AIRS AFS	10/12/2000	
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Construction	06/12/1998	
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Synthetic Minor Operating	06/06/1997	06/01/2002
168000020	Kerr McGee Chemical Corporation, Columbus	Air-Synthetic Minor Operating	06/12/1998	06/01/2002
MSR220010	Kerr McGee Chemical Corporation, Columbus	GP-Wood Treating	10/27/1992	07/13/1997
MSD990866329	Kerr McGee Chemical Corporation, Columbus	Hazardous Waste-EPA ID	10/12/2000	
MSD990866329	Kerr McGee Chemical Corporation, Columbus	Hazardous Waste-TSD	06/11/2001	05/31/2011
1696	Kerr McGee Chemical Corporation	Official Site Name	10/27/1992	
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	10/11/1994	10/10/1999
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	08/23/2000	07/31/2005
MSP090021	Kerr McGee Chemical Corporation, Columbus	Water-Pretreatment	10/31/2005	09/30/2010

Regulatory Programs

Program	SubProgram	Start Date	End Date

Air	NSPS Subpart Dc	09/12/1990	
Air	SM	06/06/1997	
Hazardous Waste	TSD - Not Classified	06/11/2001	
Water	PT CIU	10/11/1994	09/01/2003
Water	PT CIU - Timber Products Processing (Subpart 429)	10/11/1994	09/01/2003
Water	PT NCS	09/01/2003	
Water	PT SIU	10/11/1994	

Locational Data

Latitude	Longitude	Metadata	S / T / R	Map Links
33 ° 30 ' 38 .51 (033.510697)	88 ° 24 ' 34 .2 (088.409450)	**Point Desc:** PG - Plant entrance (General) Data collected by Louis Crawford on 7/11/00. PG - Plant Entrance (General) Data collected by Clift Jeter on 6/13/02. LAT 33deg 30min 36.6sec LON 88deg 24min 35.1sec **Method:** GPS Code (Psuedo Range) Differential **Datum:** NAD83 **Type:** MDEQ	Section: Township: Range:	SWIMS TerraServer Map It

Report Date: 11/16/2005 7:36:49 AM

PHASE I DRILLING RESULTS
KERR-MCGEE CHEMICAL CORPORATION
FOREST PRODUCTS DIVISION
COLUMBUS, MISSISSIPPI

June 21, 1988

Prepared by:

Stephen F. Loosbrock
Senior Hydrologist

KERR-McGEE CHEMICAL CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

June 21, 1988

Mississippi Department of
Natural Resources
Bureau of Pollution Control
2380 Highway 80
Jackson, Mississippi 39204

Re: Kerr-McGee Chemical Corporation, Forest Products Division, Columbus, Mississippi Facility
EPA ID No. MSD990866329

Dear Sir:

Enclosed are three (3) copies of the report entitled, "Phase I Drilling Results" for the Kerr-McGee Chemical Corporation, Forest Products Division's facility located in Columbus, Mississippi. Additional assessment activities for Phase II will be proposed upon evaluation of the analytical data yet to be received from the laboratory. Should you have any questions, please call me at 405/270-2391.

Sincerely,

KERR-MCGEE CORPORATION
FOREST PRODUCTS DIVISION

Jeffrey H. Bull /SFL

Jeffrey H. Bull, Manager
Environmental Control and
Regulatory Affairs

JHB/SFL/gk

Enclosures

cc: E. L. Creeknore
S. M. Logan
J. K. Roseman

FOREST PRODUCTS

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PHASE I DRILLING RESULTS
KERR-McGEE CHEMICAL CORPORATION
FOREST PRODUCTS DIVISION
COLUMBUS, MISSISSIPPI

INTRODUCTION

Kerr-McGee Chemical Corporation, Forest Products Division (KMCC-FPD) owns and operates a creosote wood preserving facility in Columbus, Mississippi. The facility previously maintained two hazardous waste surface impoundments as part of the wastewater treatment system. These impoundments operated in series and settled out solids and preservatives from the process wastewater before final discharge to the city POTW. The impoundments collected a hazardous waste designated as K001, which is defined in the Federal Register as "bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote". The two impoundments were closed in accordance with an approved closure plan in the summer of 1986. Closure was accomplished by the excavation and removal of all visually contaminated soils and replacing those soils with low permeability backfill material (i.e. soils with a permeability coefficient of 10^{-7} cm/sec or less). This report describes the results of recent work completed as Phase I of a site groundwater assessment plan approved by the Mississippi Department of Natural Resources in February, 1988. The report also provides the basis for additional assessment work.

GROUNDWATER MONITORING SYSTEM

KMCC-FPD installed a groundwater monitoring system at the Columbus, Mississippi wood preserving facility in July, 1981. This monitoring system represented a first level detection system for the facility's hazardous waste management area and fulfilled the Environmental Protection Agency's (EPA) groundwater monitoring requirements of the Resource Conservation and Recovery Act (RCRA) as specified in Subpart F of 40 CFR 265.

On September 9, 1983, KMCC-FPD notified the Mississippi Department of Natural Resources (MDNR), that the groundwater analytical data yielded a statistically significant difference for the indicator parameters of pH and specific conductivity. These statistical differences were confirmed by the second semi-annual sampling results which were submitted to MDNR in February, 1984. As a result, KMCC-FPD submitted a groundwater quality assessment plan (GWQAP) to the MDNR in March, 1984, to determine the cause or source of the statistical differences.

1984 Groundwater Quality Assessment Plan

The GWQAP proposed in 1984 included drilling an additional upgradient monitor well to replace CMW-1 which continually showed unusually low pH values (~4.2) not indicative of natural alluvial waters of the area. This was completed in June 1984, when CMW-1A was drilled. It was subsequently learned that original upgradient well CMW-1 had been situated in an area where pole peeling and debarking once occurred, and the accumulation of sawdust, bark and waste wood probably led to the release of low pH strength acid into the soil. The pH values for the replacement upgradient well CMW-1A averaged 5.53 units during 1986.

Downgradient monitor well CMW-5 was also drilled in conjunction with the GWQAP and added as part of the groundwater monitoring system in May, 1985, to more clearly define the chemical quality of the groundwater between the surface impoundment and monitor well CMW-3.

Monitor well CMW-5 was sampled May 16, 1985 and analyzed for the Appendix VII K001 constituents using a GC/MS scan. No K001 constituents were found to be present in CMW-5 and the conclusion was made that the regulated impoundment was not the cause of napthalene and flouranthene present in CMW-3. A report detailing these results was submitted to the Mississippi Department of Natural Resources on June 17, 1985.

1987 Groundwater Quality Assessment Plan

On September 21, 1987, KMCC-FPD notified the Mississippi Department of Natural Resources, Bureau of Pollution Control (MBPC) of the presence of dissolved K001

constituents, primarily naphthalene, in downgradient monitor well CMW-4. A groundwater quality assessment plan was submitted to MBPC on September 25, 1987 and approved by the MBPC on February 9, 1988. The groundwater quality assessment plan outlined a phased drilling and sampling program which would ultimately characterize and delineate any contaminant plume(s) in the alluvial materials in both a horizontal and vertical direction.

Phase I drilling of the groundwater quality assessment program was initiated on March 14, 1988 at the Columbus facility. This work included the establishment of four (4) stainless steel monitor wells near the closed impoundment area for long term compliance monitoring. Also, an additional eight (8) PVC cased monitor wells were strategically located through the production process area to detect any contaminant plumes and further characterize the site hydrogeology.

Groundwater samples were collected in April, 1988 from the four (4) new stainless steel monitor wells (CMW-1AR, CMW-6, CMW-7, CMW-8) and from five (5) new PVC cased monitor wells (CMW-10, CMW-11, CMW-12, CMW-14, CMW-15)(Figure 1). The analytical results are pending from the analytical laboratory ETC, Inc. which is located in Edison, New Jersey.

PHASE I DRILLING

Soil Borings - Soil borings and monitor well drilling and installation for Phase I was conducted by TTL, Incorporated, a geotechnical consulting firm with an office in Tuscaloosa, Alabama. All drilling, soil sampling and monitor well installation was conducted under the direct supervision of a Kerr-McGee hydrologist.

A total of twelve (12) soil borings were drilled and completed as monitor wells during this phase of the groundwater quality assessment program and ranged in depth from 15.5 feet to 23.5 feet in depth. The locations of the monitor wells drilled during Phase I and the previously existing monitor wells are shown in Figure 1.

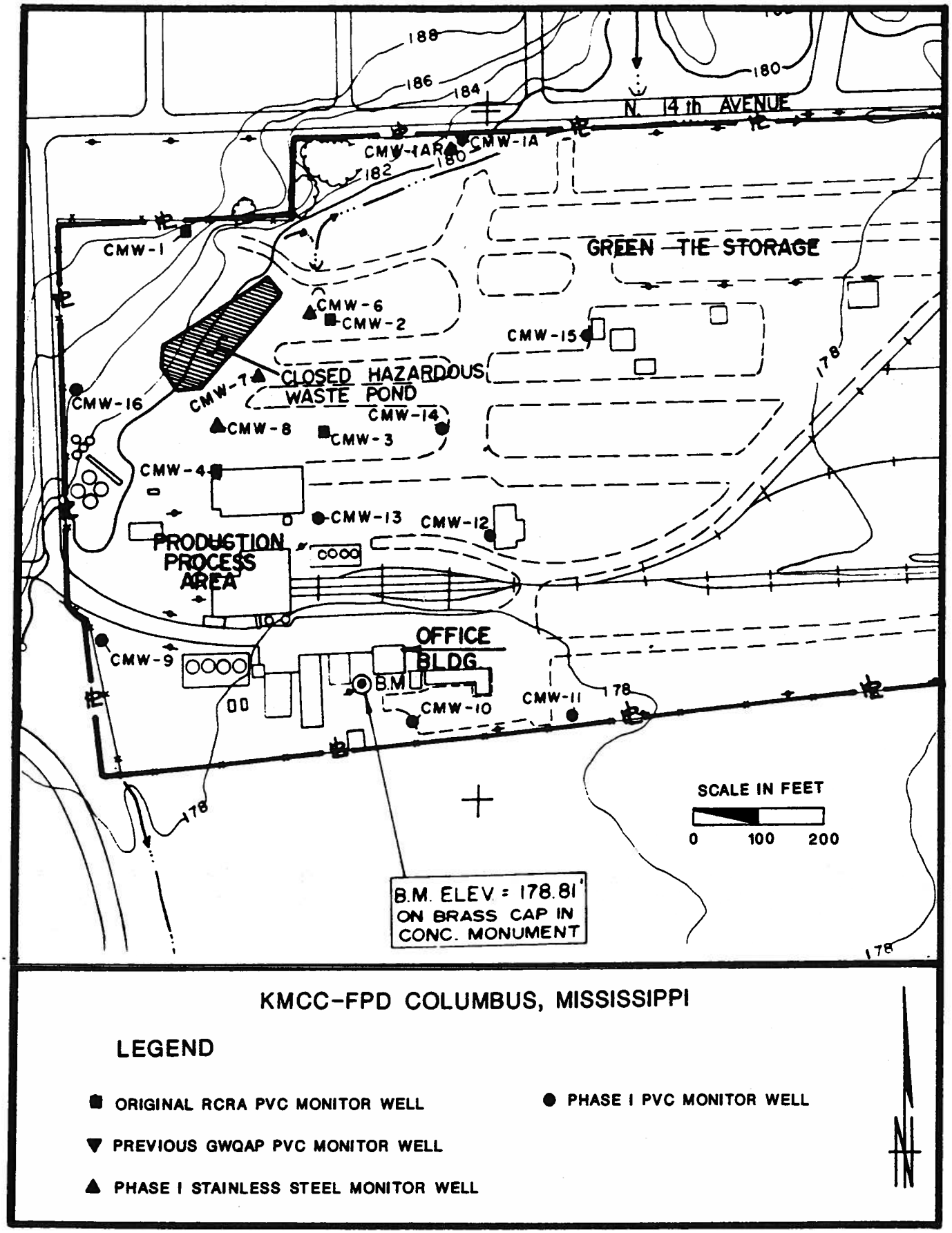


Figure 1: Map Showing the Present Groundwater Monitoring Network at the KMCC-FPD Facility in Columbus, Mississippi.

Each soil boring was drilled using the hollow stem auger method and soil samples were collected either using a CME continuous sampler which collects 2.25 inch diameter samples in 5 foot increments, or the split barrel method which collects 1.25 inch diameter samples in 2.5 foot increments. The Kerr-McGee onsite hydrologist described the lithology from these continuous samples and completed the information required on the soil boring logs. Representative samples of lithology and contaminated soils from each soil boring were sealed in glass jars and have been retained for future inspection at the facility. The detailed soil boring logs are contained in Appendix A.

An H-NU model 101 photoionizer with an 11.7 eV potential lamp was used to determine relative concentrations of any organic vapors in the soil sample retrieved from the CME continuous sampler or split barrel sampler. The retrieved soil samples were cut apart on 1 foot centers and the H-NU probe was used to test the fresh sample face for organic vapors. The H-NU response readings were then recorded at the appropriate depth on the soil boring logs. Good correlation was established between a higher than background H-NU response and visible contamination in the soil samples.

Figure 2 is a preliminary map showing soil borings that had indications of contamination while being drilled. The determination of an uncontaminated soil boring versus a contaminated soil boring was made based on visual observations and the olfactory senses. The soil boring logs contained in Appendix A provide additional details on the degree and depth at which any contamination was noted. Confirmation of any contamination will be substantiated or refuted by the groundwater analytical data when it becomes available from the analytical laboratory.

Monitor Well Installation - Six monitor wells had been drilled at the Columbus facility prior to the establishment of the monitor wells drilled during the recently completed Phase I of the groundwater assessment plan. Monitor wells CMW-1, CMW-2, CMW-3, and CMW-4 were established as original RCRA wells in July, 1981. Monitor wells CMW-1A and CMW-5 were established during subsequent groundwater assessment activities conducted in 1984.

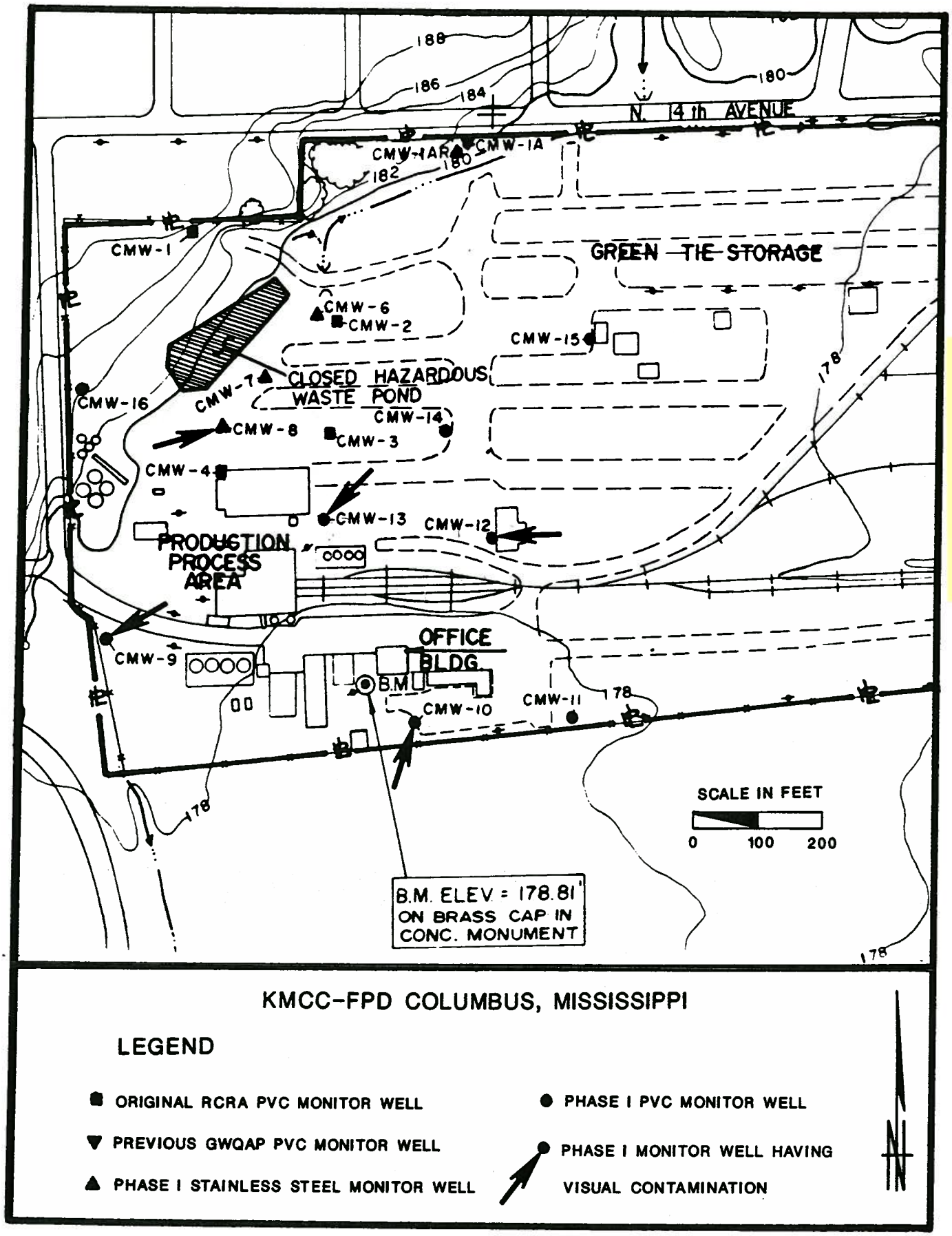


Figure 2: Map Showing Soil Borings that had Indications of Contamination While Being Drilled at the KMCC-FPD Facility in Columbus, Mississippi.

During Phase I drilling activities conducted in March, 1988, an additional (12) monitor wells were established. Monitor wells CMW-1AR, CMW-6, CMW-7, and CMW-8 are constructed of 2-inch diameter screw coupled stainless steel 304 casing with 10-slot factory wound screen. Monitor wells CMW-9 through CMW-16 are constructed of 2-inch diameter screw coupled schedule 40 PVC casing with 10-slot factory milled screen. An inventory of all the groundwater monitor wells at the Columbus facility is presented in Table 1.

All the PVC and stainless steel cased monitor wells drilled during Phase I were constructed according to specifications presented in the RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (1986). Typically, a graded filter pack extends 2 feet above the top of the well screen with a 2 foot thick bentonite plug composed of 1/4-inch bentonite pellets tamped into place. A cement/bentonite grout mixture was pumped through a tremie pipe from the top of the bentonite seal to within 2 feet of the surface. A protective locking steel casing was set and concrete poured to form a 4' X 4' pad at the surface. Construction details for each monitor well are presented in Appendix A.

Decontamination of all drilling augers, sampling equipment and the drilling rig was completed between each drilling location using a high pressure hot water wash. All wash water was collected and processed through the facilities wastewater treatment system.

Each new stainless steel and PVC cased monitor well was developed by hand pumping using a conventional pitcher pump. All development water was pumped into 55-gallon drums and returned to the facilities wastewater treatment system for processing. Details of development time and purged water observations are included on the well completion forms presented in Appendix A.

Laboratory Soils Testing - Grain size distribution curves were determined for nine soil samples collected from soil boring CMW-14 and considered to be a typical representati of the alluvial materials underlying the facility. One sample from boring CMW-15 was a representation of the upper surficial material. Grain size distribution of the soil samples were determined by mechanical sieve and hydrometer analysis in accordance with testing procedure ASTM D-422 by TTL, Inc. of Tuscaloosa, Alabama.

INVENTORY OF GROUNDWATER MONITOR WELLS
KMCC-FPD
Columbus, Mississippi

Well Number	Depth of Well Below Ground Surface (ft.)	Height of Casing Above Grade (ft.)	Screened Interval (ft.)	Elevation Top of Eutaw (ft.)	Top of Casing Elevation (ft.)	Surveyors Pin Elevation (ft.)	Surface Elevation (ft.)
CMW-1	23.0	4.35	8.0-23.0	159.58	192.93	NA	188.58
CMW-1A	18.0	2.52	8.0-18.0	164.89	186.79	NA	180.39
*CMW-1AR	17.0	3.05	5.5-15.5	164.89	183.61	181.06	180.56
CMW-2	25.0	3.22	8.0-25.0	152.66	180.88	NA	177.66
CMW-3	24.0	3.76	6.0-24.0	152.06	181.82	NA	178.06
CMW-4	20.0	3.63	6.0-24.0	155.54	182.83	NA	178.54
CMW-5	27.5	0.20	7.5-27.5	154.93	178.93	NA	178.73
*CMW-6	20.0	3.29	8.5-18.5	159.27	181.06	178.21	177.77
*CMW-7	22.5	3.40	11.0-21.0	156.87	181.27	178.37	177.87
*CMW-8	22.0	3.39	10.5-20.5	157.74	181.63	178.71	178.24
CMW-9	24.0	3.58	14.0-23.0	156.14	182.92	179.98	179.34
CMW-10	22.5	3.07	12.5-21.5	156.87	181.44	178.81	178.37
CMW-11	22.5	3.55	12.5-21.5	157.46	182.51	179.68	178.96
CMW-12	24.5	3.65	14.5-23.5	156.87	184.02	181.00	180.37
CMW-13	24.5	3.54	14.5-23.5	155.42	182.46	179.58	178.92
CMW-14	24.0	3.69	14.0-23.0	154.67	181.86	178.78	178.17
CMW-15	17.5	3.21	7.5-16.5	163.19	182.60	180.06	179.39
CMW-16	24.5	3.29	14.5-23.5	160.80	187.59	184.86	184.30

* Denotes stainless steel cased monitor well

Table 1: Inventory of Monitor Wells at the KMCC-FPD facility in Columbus, Mississippi.

The TTL laboratory report is included as Appendix B and contains the grain size distribution curves along with textural classification according to the Unified Soil Classification System.

Elevation and Location Coordinates Survey

The four (4) new stainless steel cased monitor wells (CMW-1AR, CMW-6, CMW-7, CMW-8) and the eight (8) new PVC cased monitor wells were surveyed by J. W. Kemp & Associates of Meridian, Mississippi. The survey determined: (1) x-coordinates (north) and y-coordinates (east) for location, (2) ground surface elevation, (3) surveyor's pin elevation and, (4) top of well casing elevation. All new and existing monitor wells were drafted on a new facility map at a scale of 1" = 200'. The facility map has been included as Appendix C.

Potentiometric Surface Map

Depth to water measurements were recorded from all the Columbus facilities' monitor wells on April 23, 1988 by the Kerr-McGee Water Quality Specialist and subsequently converted to a groundwater elevation. The resulting potentiometric surface map shown in Figure 3 shows the groundwater flow in the alluvial sediments to be almost due east across the facility. The configuration of the potentiometric surface remains essentially the same throughout the year with the groundwater elevation fluctuating on a seasonal basis.

Local discharge for the alluvial groundwater system is into Luxapalila Creek located approximately one mile east of the facility.

Bedrock (Eutaw) Surface Contour Map

A bedrock surface contour map of the top of the Eutaw formation is depicted in Figure 4. Information concerning the depth of the Eutaw formation was provided from the soil borings completed during this phase of the groundwater investigation. The configuration of the bedrock surface shows a gradual bedrock slope to the southwest near monitor CMW-1AR forming a erosional valley feature in the production process

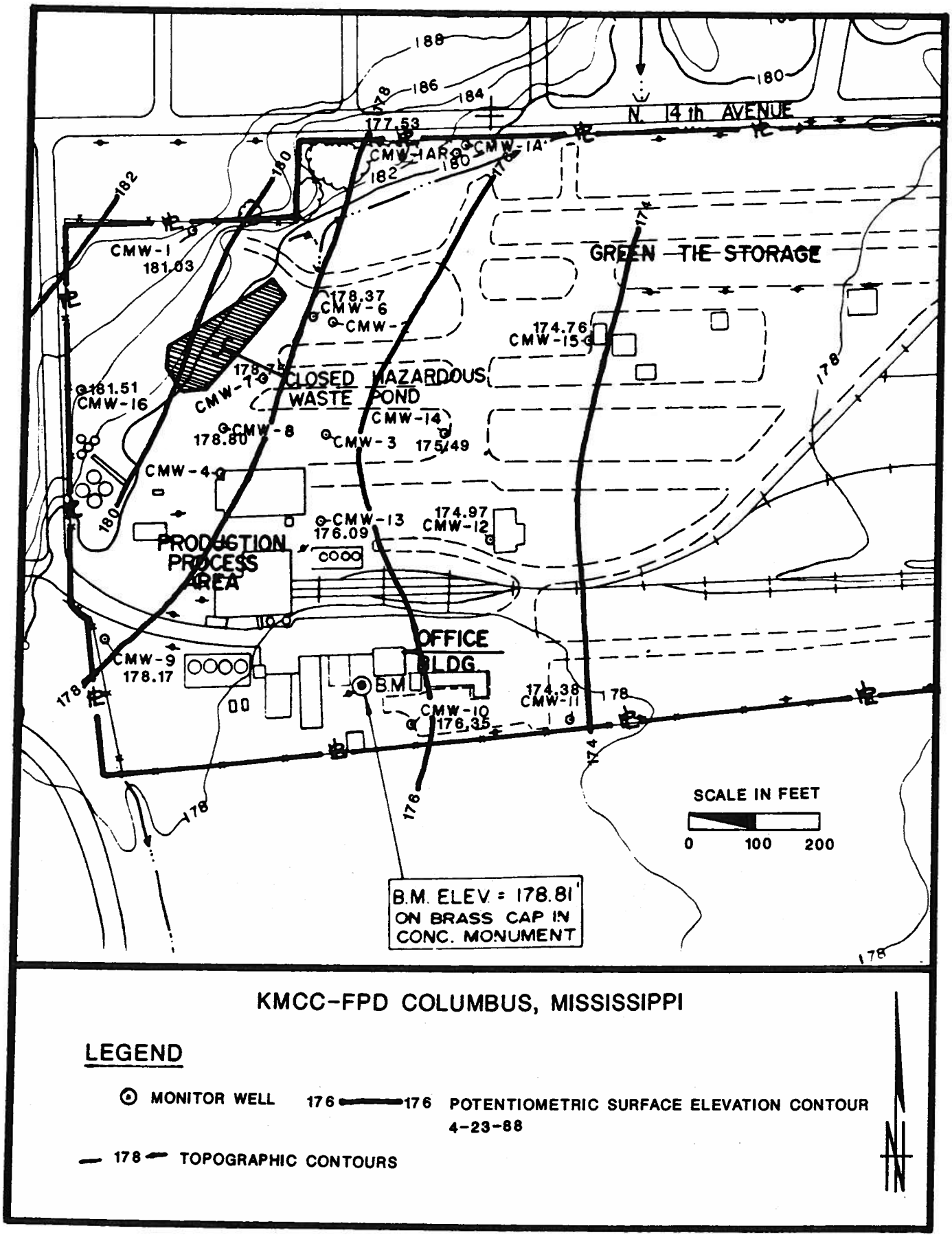


Figure 3: Map Showing the Potentiometric Surface for April 23, 1988 in the Alluvium Underlying the KMCC-FPD Facility in Columbus, Mississippi.

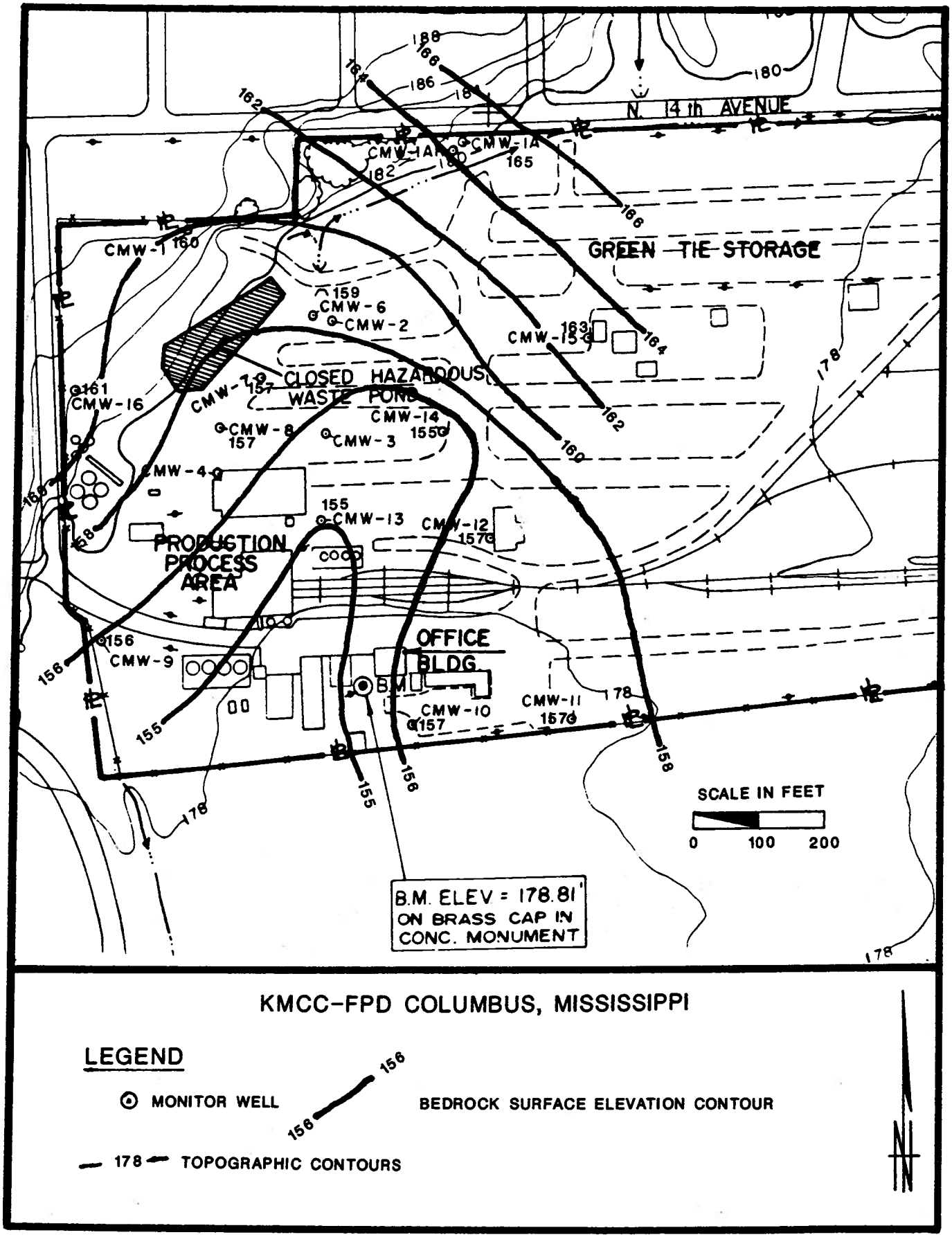


Figure 4: Map Showing the Elevation Contours for the Top of the Eutaw Formation at the KMCC-FPD Facility in Columbus, Mississippi.

area. The west side of this valley underlies the closed impoundment area and has its slope toward the southeast. The topography of the bedrock erosional surface does not influence groundwater flow in the alluvium which is in an easterly direction.

Geologic Cross-Sections

Two geologic cross-sections of the underlying alluvial sediments were constructed from the detailed lithologic descriptions of the soil borings drilled during Phase I of the groundwater assessment program. Geologic cross-section A-A' (Figure 5) is located on the east-west axis and geologic cross-section B-B' (Figure 6) is located on the north-south axis. The location of the lines of section are shown in Figure 7. These cross-sections show the typical alluvial deposits and generally show silts to silty clay overlying a sequence of sands and sands and gravel. These sediments are underlain by the Eutaw formation, a gluaconitic, fine to medium grained, very dense sand.

Future Groundwater Assessment Work

The analytical results of the April groundwater sampling of Phase I monitor wells is expected to be received from the laboratory by July 5, 1988. Upon evaluation of the data, KMCC-FPD will submit to the MBPC by August 12, 1988 a proposal for additional work concerning Phase II of the groundwater assessment plan at KMCC-FPD facility in Columbus, Mississippi.

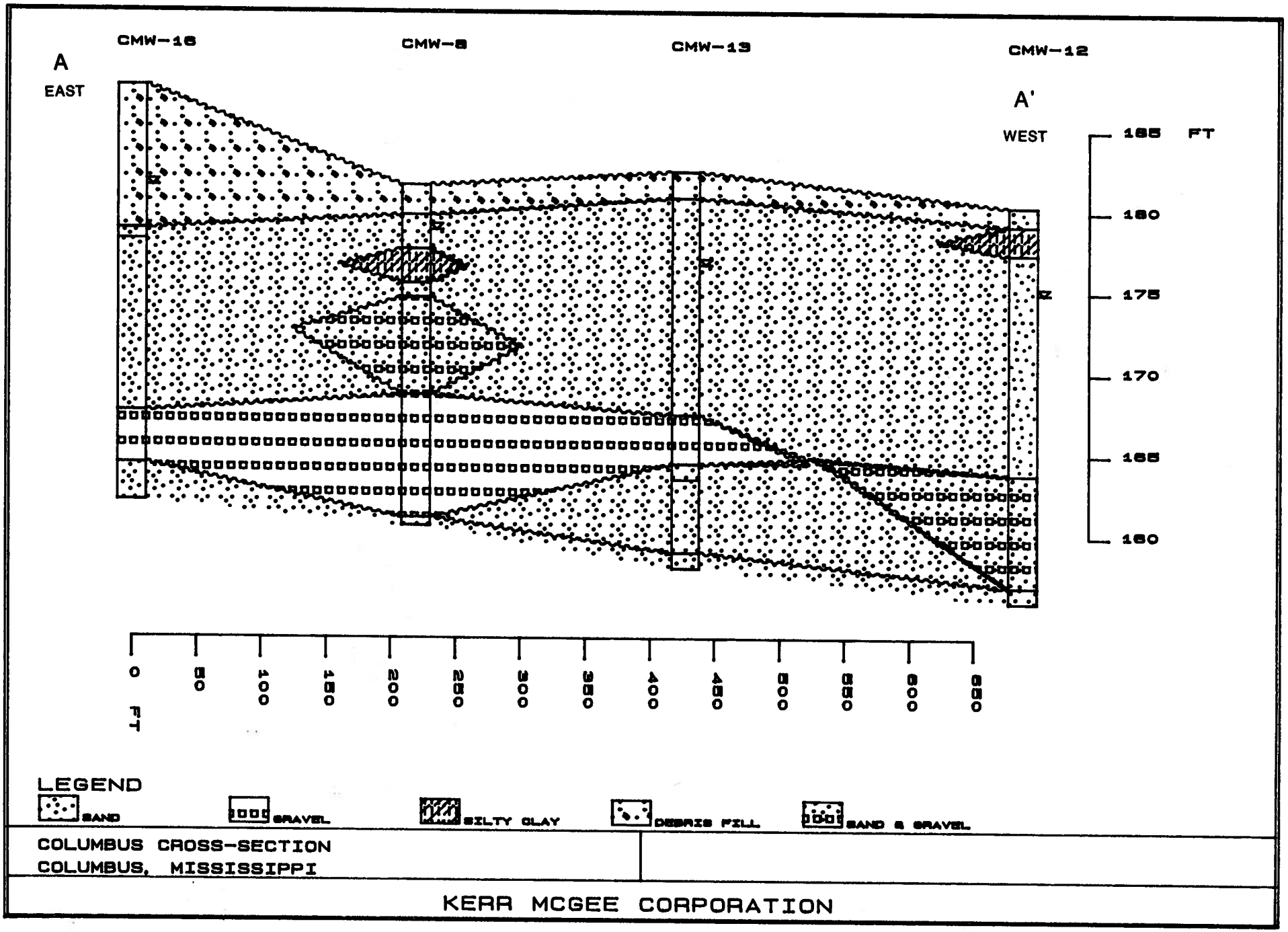


Figure 5: Geologic Cross-Section A-A' of the Alluvial Deposits at the KMCC-FPD Facility in Columbus, Mississippi.

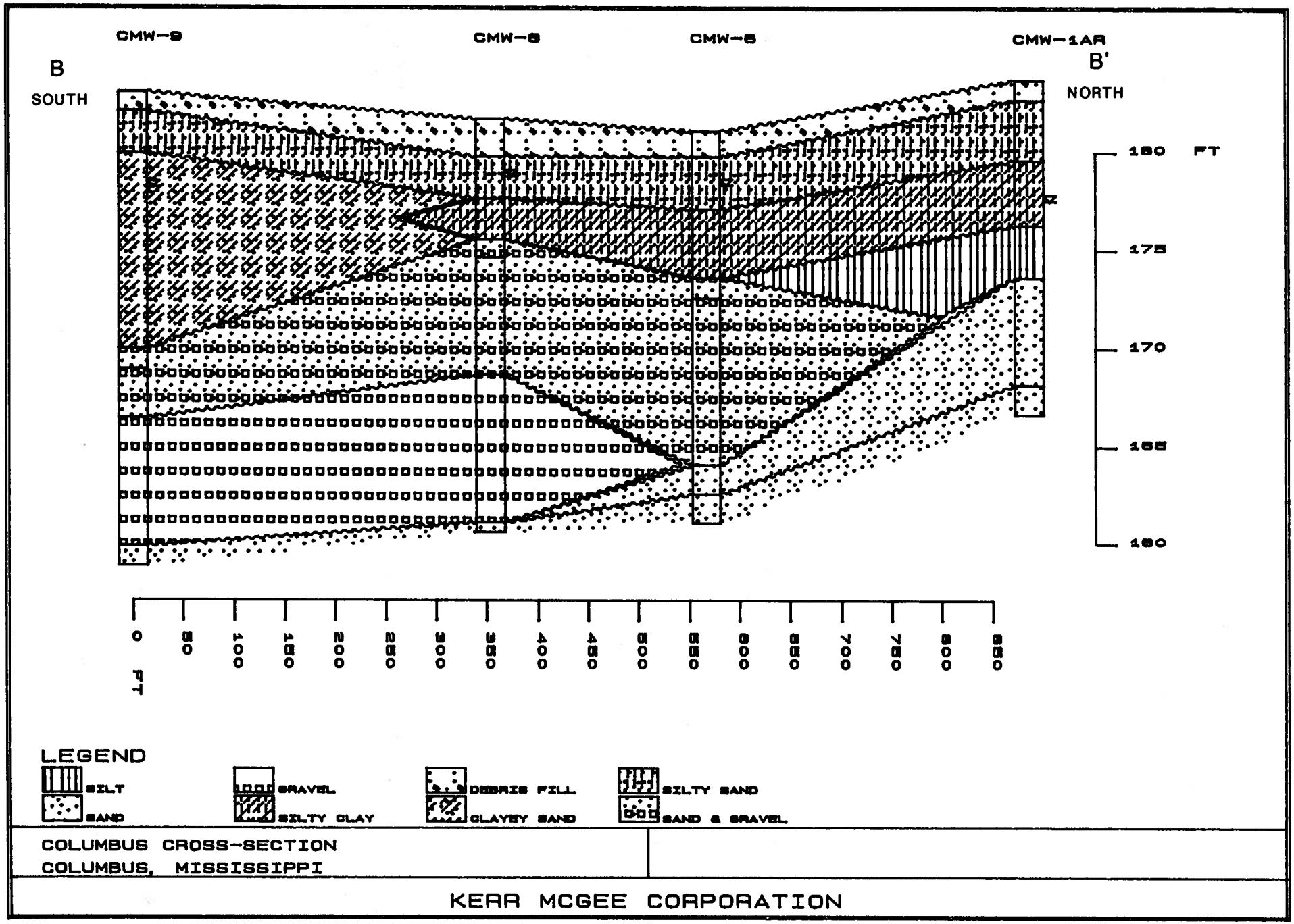


Figure 6: Geologic Cross-Section B-B' of the Alluvial Deposits at the KMCC-FPD Facility in Columbus, Mississippi.

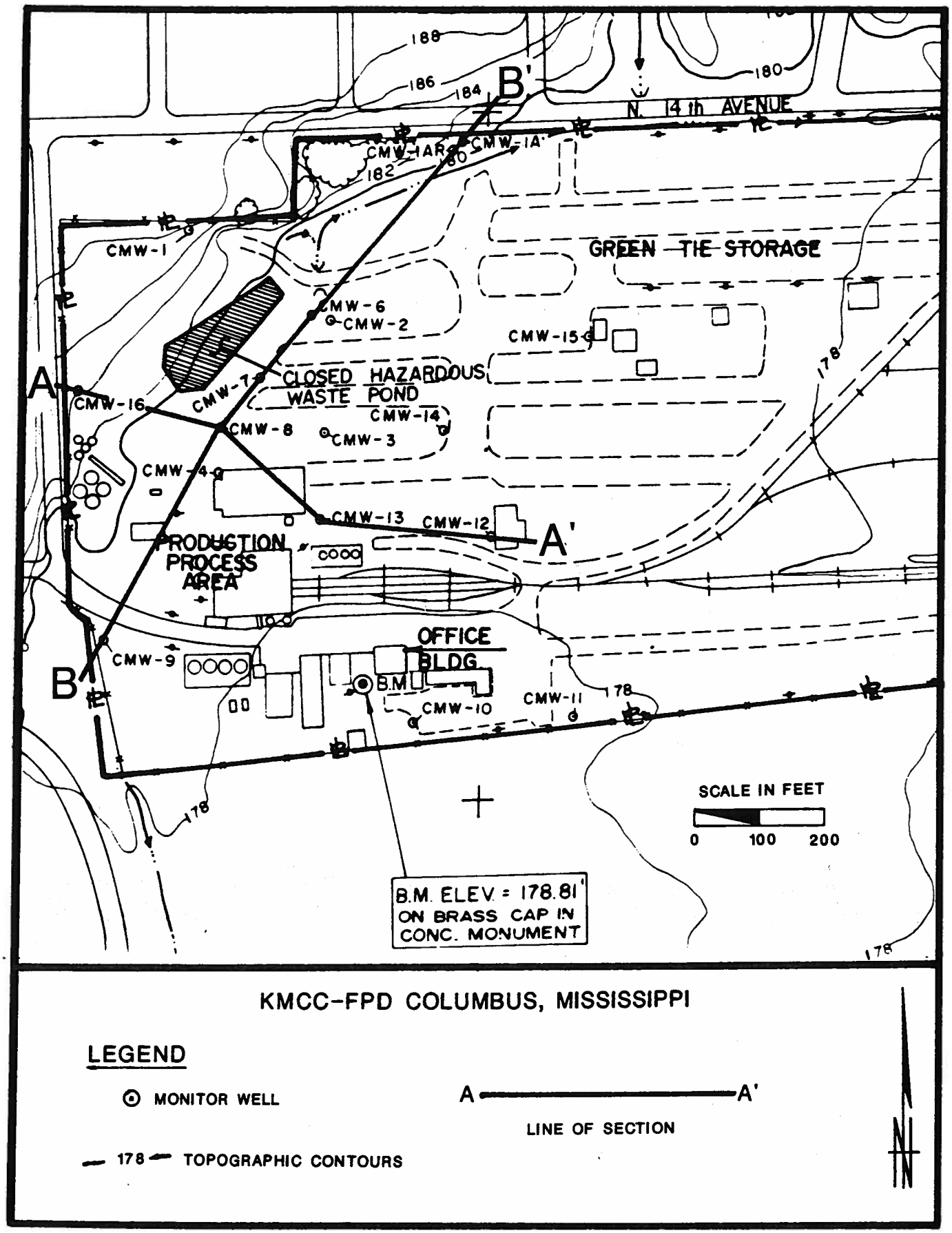


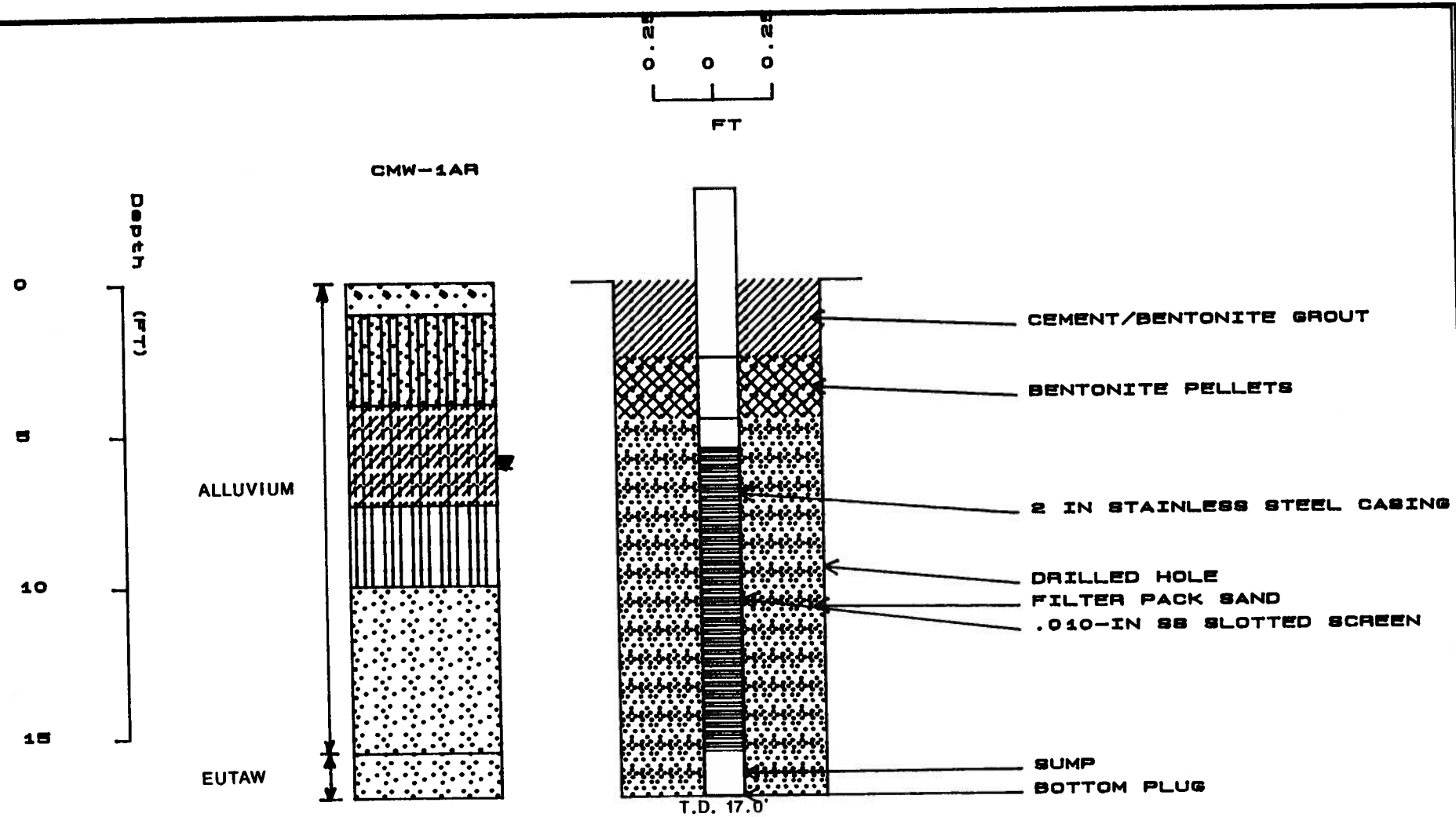
Figure 7: Map Showing the Location of Geologic Cross-Section A-A' and B-B' at the KMCC-FPD Facility in Columbus, Mississippi.

APPENDIX A

MONITOR WELL COMPLETION DETAILS
AND
SOIL BORING LOGS

MONITOR WELL

CMW-1AR



WATER LEVEL: 4-23-88

LEGEND

SILT | SAND | SILTY CLAY | DEBRIS FILL | SANDY SILT

COLUMBUS MONITOR WELL DIAGRAM - CMW 1AR
DATE DRILLED: 3-21-88

DRILLED BY: TTL. INC./LOGGED BY LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-1AR

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, dirt, cinders							0.4		
	SANDY SILT, Gry, Sl Cly, F Sd, Fm, Med Pl, wet at 4 - 4.5		ML		4 4	1			3.6	
5	SILTY CLAY, Gry, low Pl, Fm, Orng Mot.		CL		2 4 12	2		5.0	5.0	
	SILT, Gry, Fm, dry		ML		15 14			9.0		
10	SAND and GRAVEL					3		12.2	1.8	
	SAND, Gry, F - M SAND, Y, VC, Psrtd, subang, subrnd, Grv 25% 1/4" to 1"		GP		12			14.0		
15				25	4			14.1		No odors or creosote in any sample
	EUTAW at 15.5 Orng M Sd, glauconitic			60	3	4		16.5	1.4	
20										Soil Samples Collected
25										3-3.5 6.5-7 8.5-9 13.5-14 15.5-16

NOTE: TIP II Photovac used on boring readings seem high due to the lack of any creosote or odors.

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL | AUGER | ROCK CORE | THIN-WALLED TUBE | CONTINUOUS SAMPLER | NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY | DEBRIS FILL | SILT | HIGHLY ORGANIC (PEAT) | SAND | SANDY CLAY | GRAVEL | CLAYEY SAND | SILTY CLAY | CLAYEY SILT

DATE DRILLED	PAGE
3/22/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

DRILLED BY: TTL, Inc.

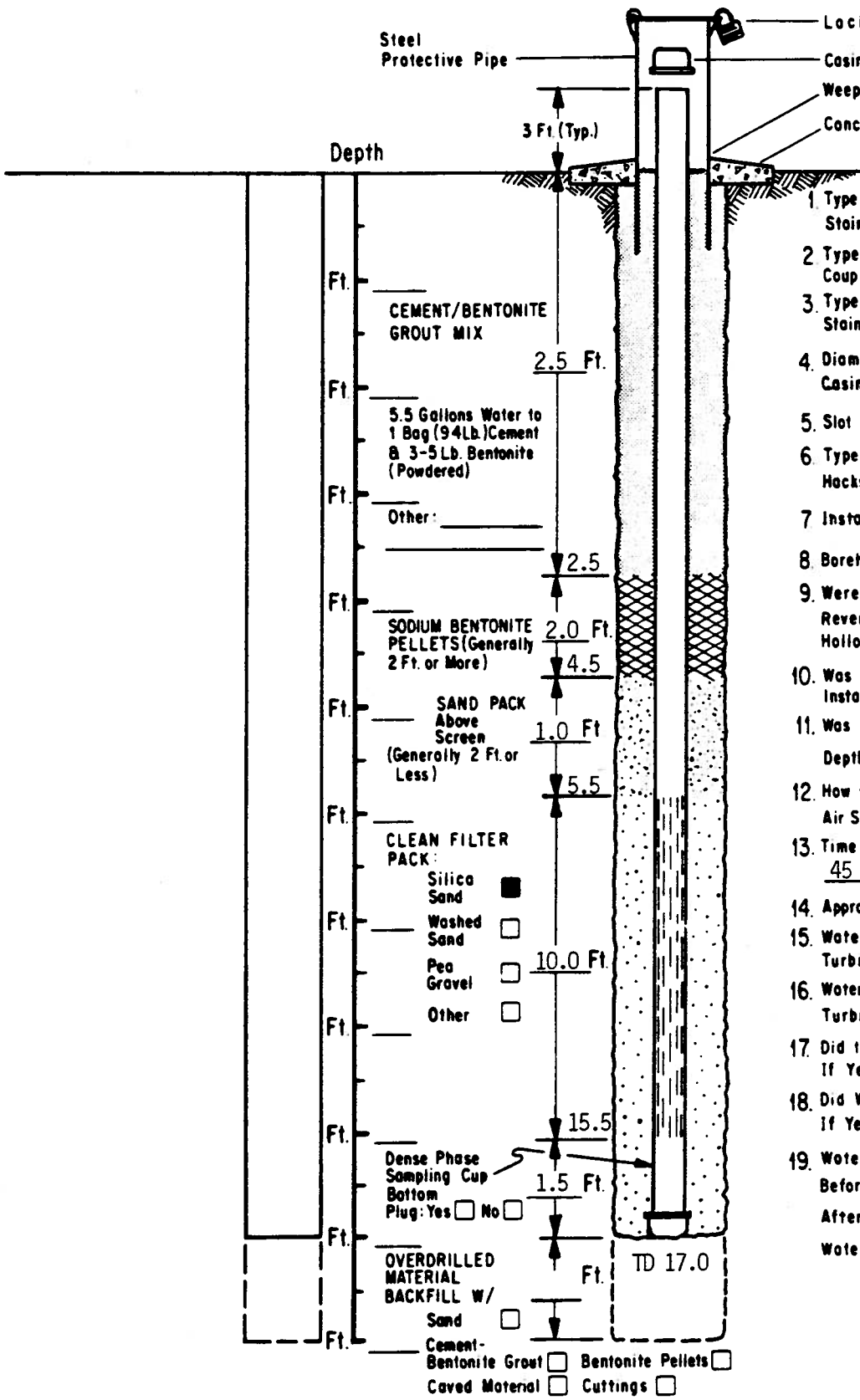
LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT AMSL): 180.56

LOCATION OR GRID COORDINATES: N4944.40 E5947.24

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

LITHOLOGY | ***WELL*** | ***SPECIFICATIONS***



Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

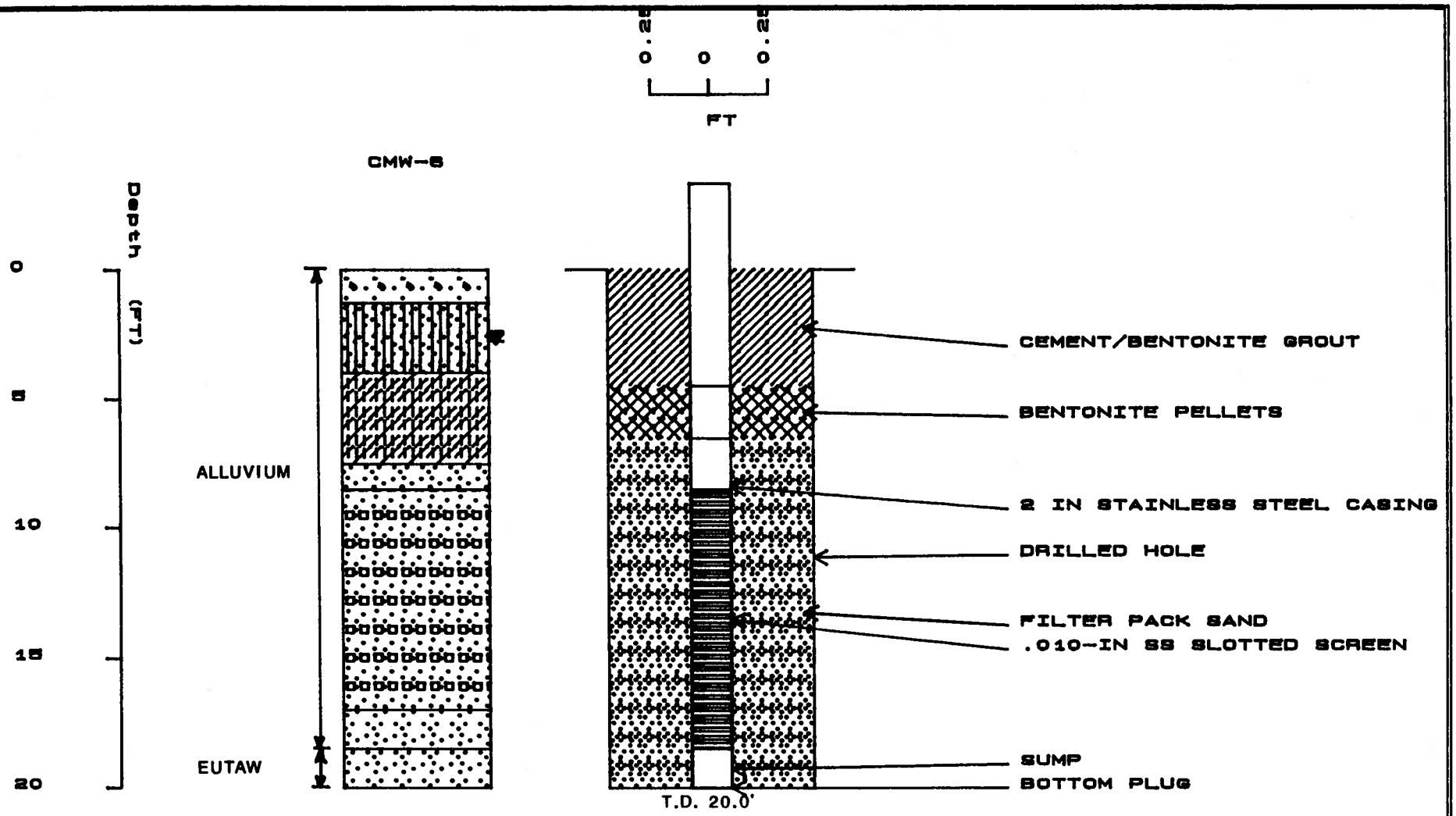
1. Type of Casing: PVC ☐ Galvanized ☐ Teflon ☐ Stainless ■ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ☐ Galvanized ☐ Stainless ■ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ☐ Hacksaw ☐ Drilled ☐ Other ☐ WOUND
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 45 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ■ Opaque ☐
16. Water Clarity After Development? Clear ☐ Turbid ■ Opaque ☐
17. Did the Water have Odor? Yes ☐ No ■ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe _____
19. Water Level Summary (From Top of Casing) Before Development 6.15 Ft. Date 3/23/88 After Development _____ Ft. Date _____ Water Level _____ Ft. Date _____ _____ Ft. Date _____

Well No. CMW-1AR | Date Installed 3-21-88 | Drill Rig Type CME-55

Driller/Firm TTL, INC. | Drill Crew CURTIS LEE | Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-6



WATER LEVEL: 4-23-88

LEGEND

SAND | SILTY CLAY | DEBRIS FILL | SANDY SILT | SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 6	DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK
DATE DRILLED: 3-21-88	DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-6

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	Fill, Rock and Cinders				1			0.4		
	SANDY SILT, Wht to Gry, V F Sd, D		SM		1 1	1		4.0	3.6	
5	SILTY CLAY, Gry, So, Mst		CL	2 6	27 18	2		4.7 6.5	1.8	
	SAND, Gry, Med Gr, D		SW	15 23	2 1	3		7.0 9.0	2.0	
10	SAND and GRAVEL, Y, F-C, Grv subrnd, subang. to 3/4" Grv 25% SAND, Crs, wsrtd, Grv 10% to 1/4" subrnd. Crs.-Vcrs Grv 10% to 1/2" subrnd		GP	17 19	10 9	4		9.5 11.5	2.0	
				15 18	14 10	5		12.0 14.0	2.0	
15	SAND, med-Vcrs, Grv 25% to 1/2", subrnd, psrtd.			9 13	40 35	6		14.8 16.5	1.7	
	SAND, Gry, med, D, subrnd CLAY, seam 4" slks		SW	22 55	20 20	7		17.2 19.0	1.8	
20	EUTAW Formation									No odors or visible creosote in any samples
25	NOTE: A TIP II photoionization instrument was used to determine PID. Readings seem very high due to the absence of odor or creosote in samples.									Soil Samples Collected 3.5 - 4 6 - 6.5 8.5 - 9 11 -11.5 13.5 -14 16 -16.5 18 -18.5

EXPLANATION

- ▼ Water Table (24 Hour)
- ▽ Water Table (Time of Boring)
- PID Photoionization Detection (ppm)
- NO. Identifies Sample by Number
- TYPE Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

DEPTH Depth Top and Bottom of Sample
REC. Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	PAGE
3/21/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

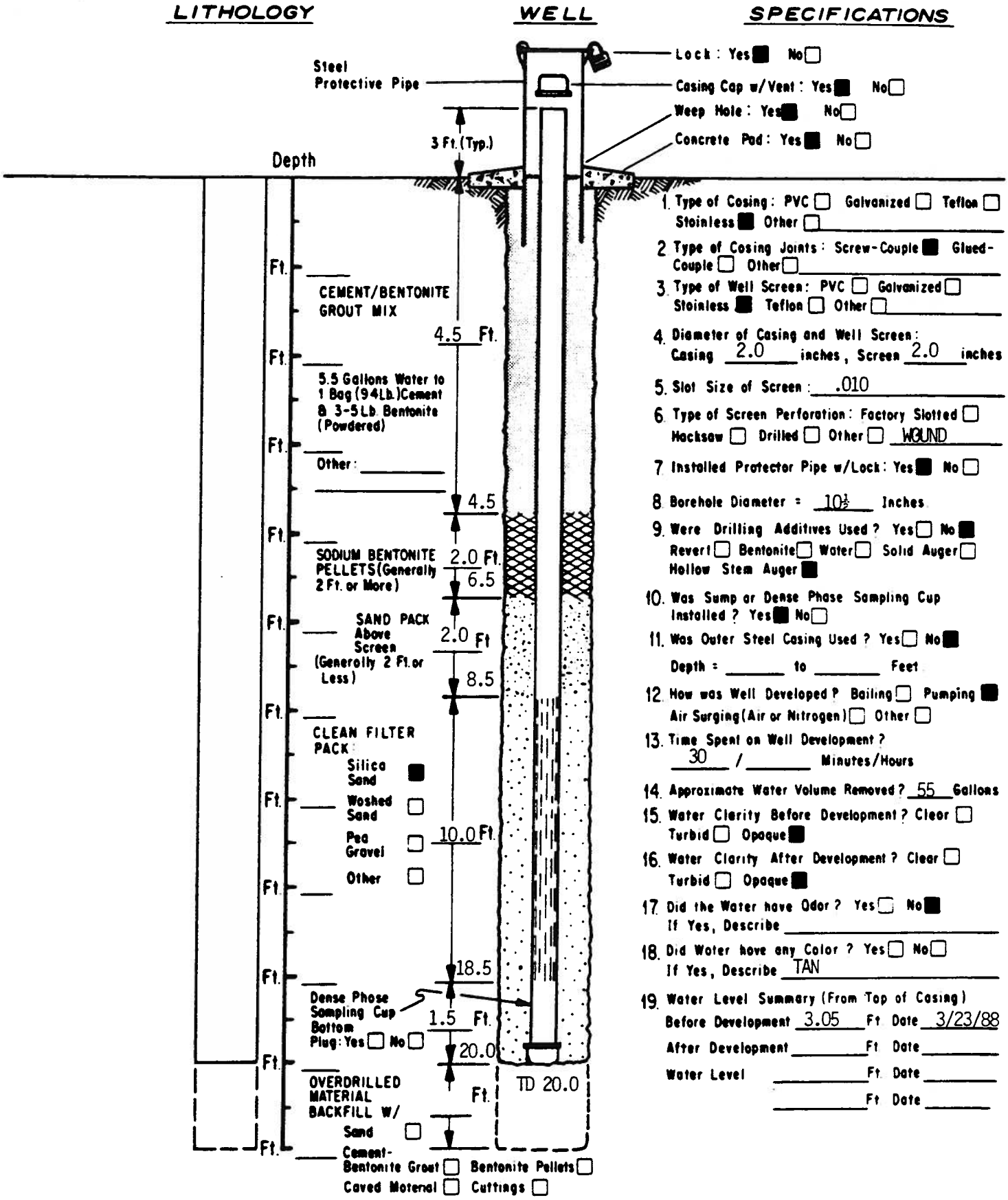
DRILLED BY: TTL, Inc.

LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 177.77

LOCATION OR GRID COORDINATES: N4707.01 E5734.43

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

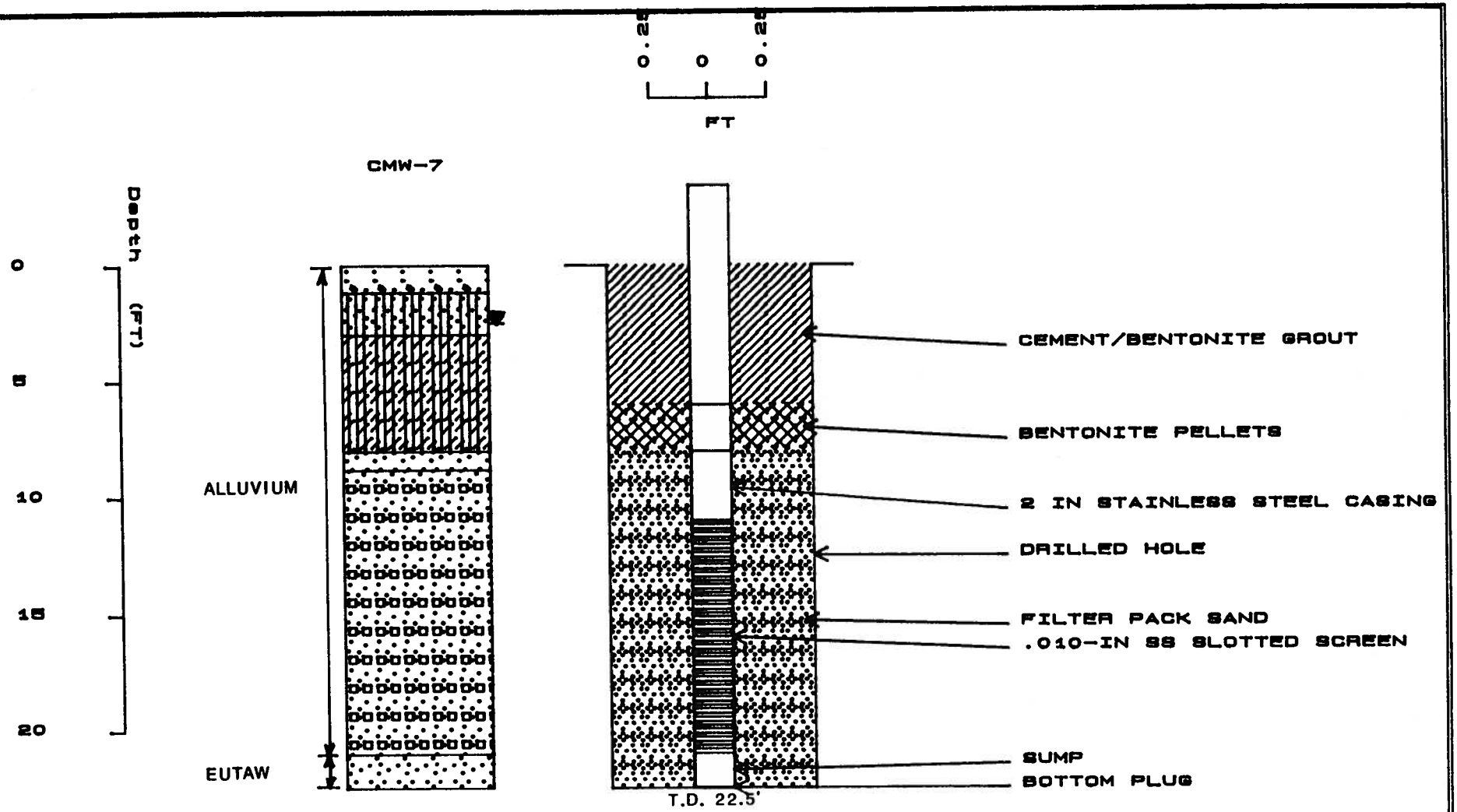


Well No. CMW-6 Date Installed 3/21/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-7



WATER LEVEL: 4-23-88

LEGEND

SAND | CLAYEY SILT | DEBRIS FILL | SANDY SILT | SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 7
DATE DRILLED: 3-21-88

DRILLED BY: TTL. INC./LOGGED BY LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM—5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-7

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	Fill, cinders, gravel				15			0.2		
	SANDY SILT, wht to gry, firm				10	1			3.8	
					10			4.0		
	CLAYEY SILT, Gry, V firm									
5				4	1	2		4.8	1.7	
				9	1			6.5		
				25	1			7.5		
						3			1.5	
	SAND, Gry, Med, Trc Grv Rnd to 1/4"			21	1			9.0		
10				20	3	4		9.5	2.0	
	SAND and GRAVEL, Brn to Orng. Crs Sd, Grv 50% to 1/2" subrnd, subang. Grv 20% to 1/2" subrnd more Orng, Grv 10% to 3/4" subrnd.			23	1			11.5		
				9	9	5		12.0	2.0	
15				16	8			14.0		
				16	7	6		14.7	1.8	
	SAND and GRAVEL, Drk Gry to Lt Gry, Orng, Sd F Wht to multicolored, Crs. Grv. 50% to 1/2" subrnd subang. Becoming Orng. Grv. 20% to 1/2"			19	3			16.5		
				9		7		18.5	0.5	
				26	1			19.0		
20				1	1	8		20.5	1.0	No creosote or odors in any of the samples
				1	1			21.5		
	EUTAW Formation, Sd, Wsrtd, glauconitic, Gry with Grn tinge.									
25										
										Soil Samples collected 3.5 - 4 5.5 - 6.5 8.5 - 9 11 - 11.5 13.5-14 16 - 16.5 18.5- 19 20.5- 21 21 - 21.5
	NOTE: TIP II Photoionization meter used on this boring									

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL; AUGER; ROCK CORE; THIN-WALLED TUBE; CONTINUOUS SAMPLER; NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY; SILT; SAND; GRAVEL; SILTY CLAY; CLAYEY SILT; DEBRIS FILL; HIGHLY ORGANIC PEAT; SANDY CLAY; CLAYEY SAND

DATE DRILLED	PAGE
3/21/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

DRILLED BY: TTL, Inc.

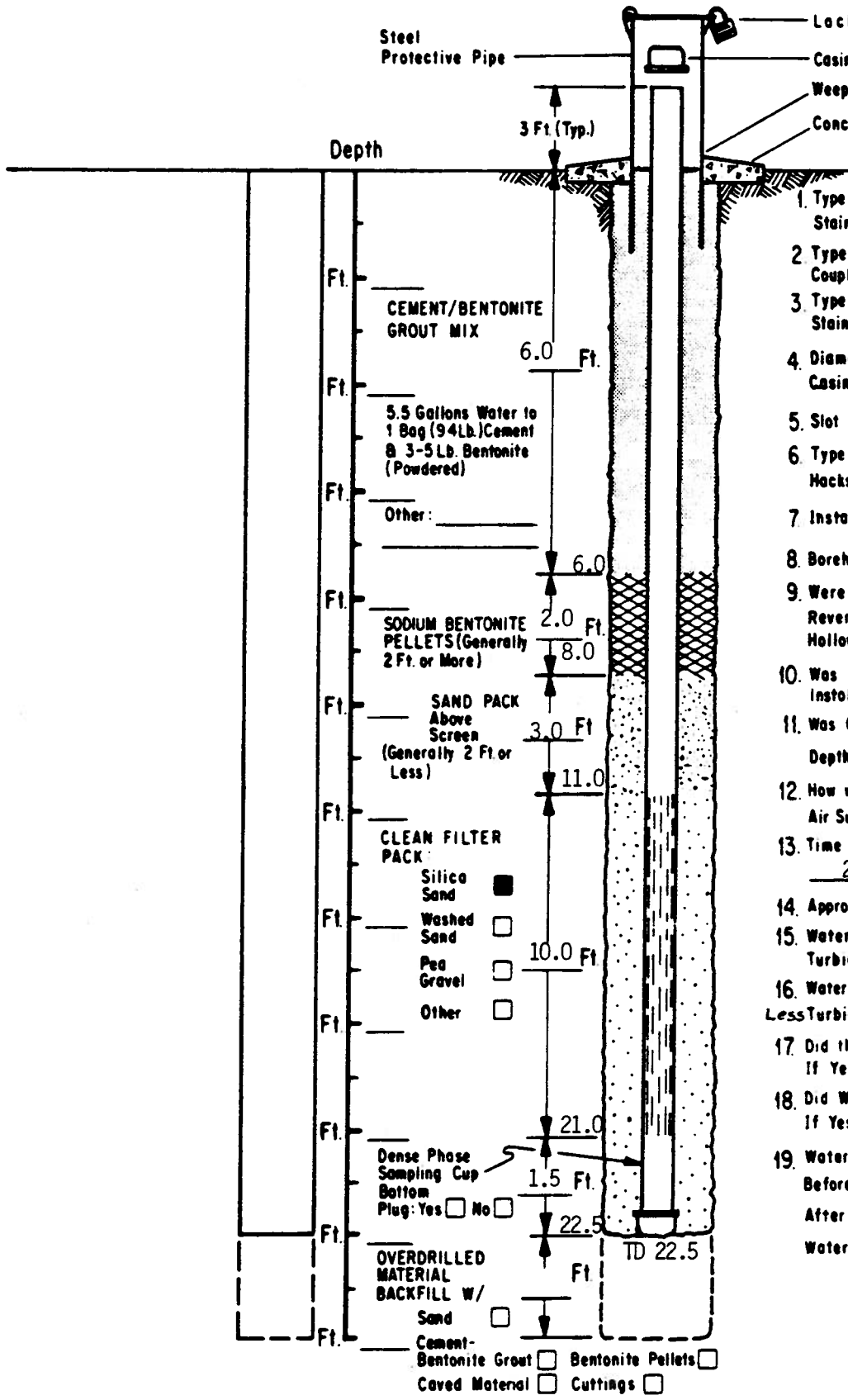
LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT AMSL): 177.87

LOCATION OR GRID COORDINATES: N4617.82 E5660.02

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

LITHOLOGY | ***WELL*** | ***SPECIFICATIONS***



Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

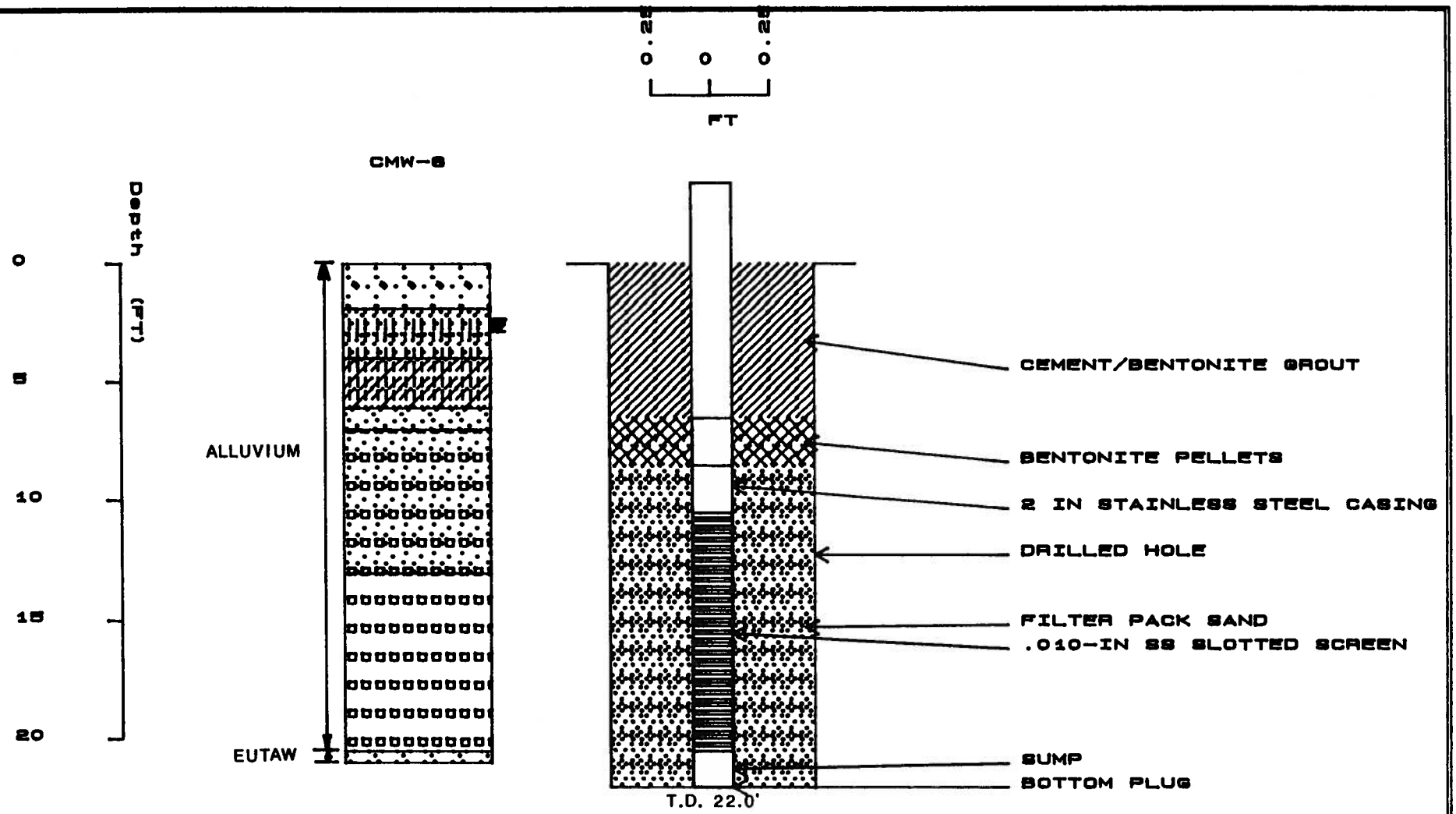
1. Type of Casing: PVC ☐ Galvanized ☐ Teflon ☐ Stainless ■ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ☐ Galvanized ☐ Stainless ■ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ☐ Hacksaw ☐ Drilled ☐ Other ☐ WOUND
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 28 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ■ Opaque ☐
16. Water Clarity After Development? Clear ☐ Less Turbid ■ Opaque ☐
17. Did the Water have Odor? Yes ☐ No ■ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe TAN
19. Water Level Summary (From Top of Casing)
    Before Development 2.78 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft. Date _____
    _____ Ft Date _____

Well No. CMW-7 | Date Installed 3/21/88 | Drill Rig Type CME-55

Driller/Firm TTL, INC. | Drill Crew CURTIS LEE | Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-8



WATER LEVEL: 4-23-88

LEGEND

SAND | GRAVEL | SILTY CLAY | DEBRIS FILL | SILTY SAND | SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 8 DATE DRILLED: 3-22-88	DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM—5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-8

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, rock and cinders				3	1		0.5	3.5	
	SILTY SAND, Gry, VF, D, becoming Cly		SM		1 1			4.0		
5	SILTY CLAY, Gry, trace F Sd, some Orng Mot. V Cly			2 5	3 1	2		4.7 6.5	1.8	
	SAND, Wht, M Gr			21	3	3		7.1	1.9	
10	SAND and GRAVEL, Orng. psrtd, F - C Sd, gravel 50% to 3/4" subrnd SD, M - C, Y, wsrtd GRAVEL, 20% 1/4"-1/2" subrnd		SP	31 24 26	3 8 8	4		9.0 10.0 11.5	1.5	slight creosote odor
				15 18	7 7	5		12.2 14.0	1.8	
15	GRAVEL, 80% to 1", subrnd, subang, w/F Wht Sd, F - C, Y Sd. GRAVEL - 100% GRAVEL, 80% w/CYSd.		GP	20 20	4 4	6		15.0 16.5	1.5	slight odor
				3 21	2 2	7		18.0 19.0	1.0	slight creosote odor
20				22 22	2 2	8		19.8 21.5	1.7	
	EUTAW Formation, 20.5' Wea, Gry and Orng, M Sd, slks									
25										
	NOTE: TIP II Photovac used to determine PID readings									Soil Samples collected 3.5 - 4 6 - 6.5 8.5 - 9 11 -11.5 13.5 -14 16 -16.5 18.5 -19 19.5 -20.5 20.5 -21.5

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

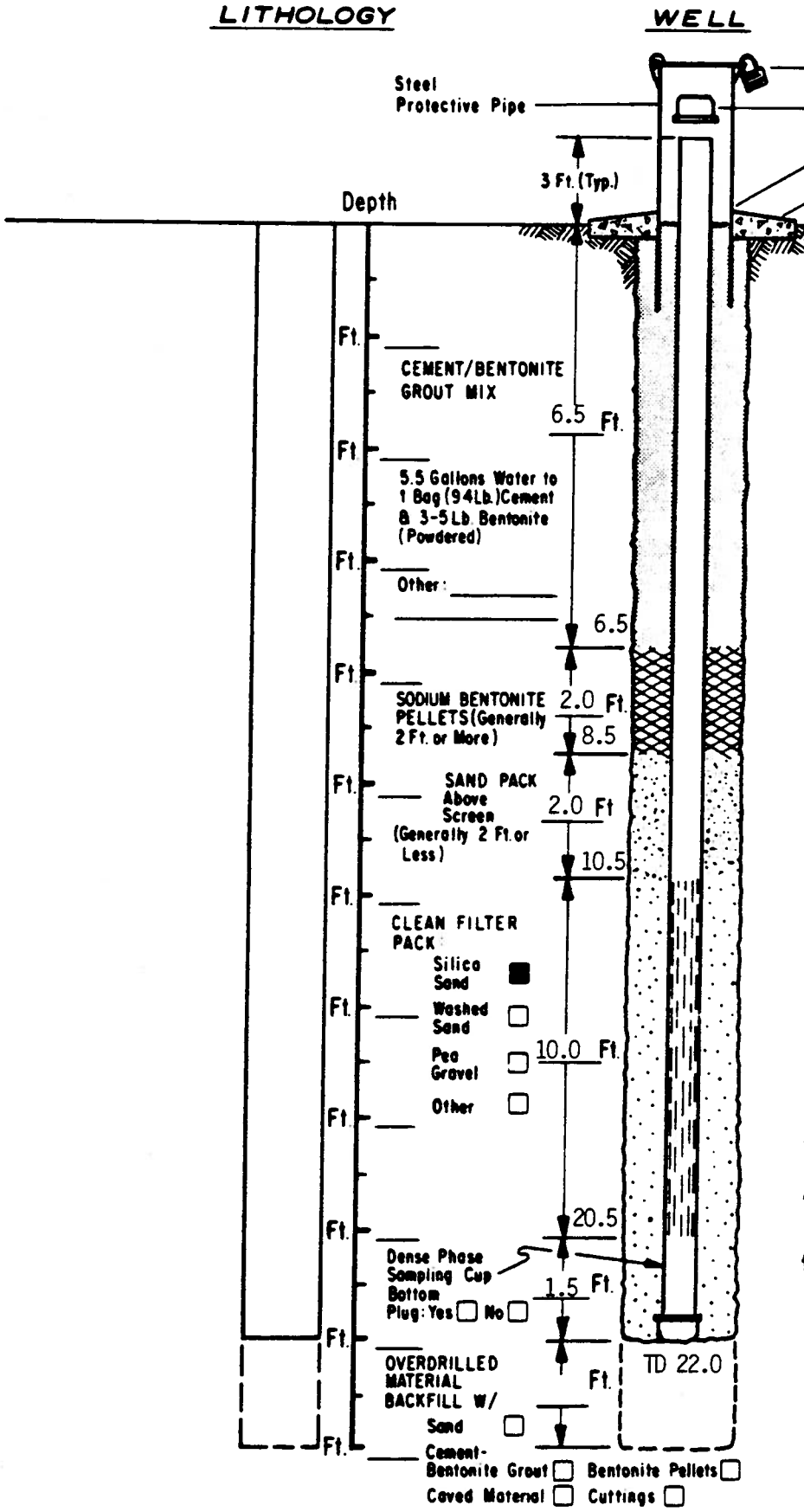
DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	3/22/88
PAGE	1 of 1
DRILLING METHOD	Hollow Stem Auger
DRILLED BY	TTL, Inc.
LOGGED BY	S. F. Loosbrock
EXISTING GRADE ELEVATION (FT. AMSL)	178.24
LOCATION OR GRID COORDINATES	N4543.79 E5596.93

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

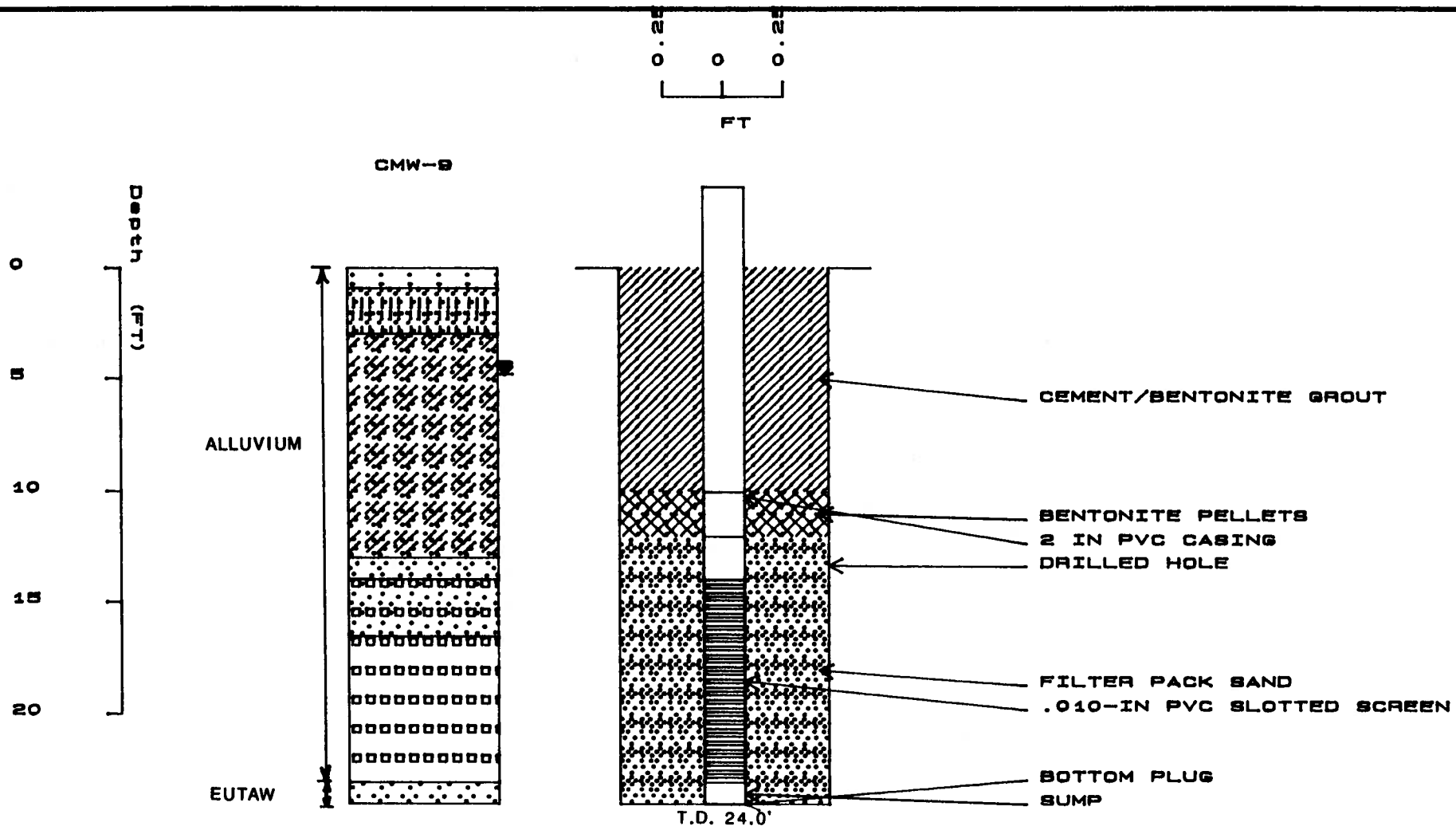
1. Type of Casing: PVC ☐ Galvanized ☐ Teflon ☐ Stainless ■ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ☐ Galvanized ☐ Stainless ■ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ☐ Hacksaw ☐ Drilled ☐ Other ☐ WOUND
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 22 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ■ Opaque ☐
16. Water Clarity After Development? Clear ☐ Turbid ■ Opaque ☐
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe creosote(slightly)
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe TAN
19. Water Level Summary (From Top of Casing)
    Before Development 3.00 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft. Date _____
    _____ Ft Date _____

Well No. CMW-8 Date Installed 3/22/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-9



WATER LEVEL: 4-23-88

LEGEND

SAND | GRAVEL | DEBRIS FILL | CLAYEY SAND | SILTY SAND | SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 9
DATE DRILLED: 3-14-88

DRILLED BY: TTL, INC.\LOGGED BY: LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION COLUMBUS, MS	BORING NUMBER CMW-9

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	Fill, Gravel									
	SILTY SAND, lt. brn, VF, becoming gry, sawdust 2-3		SC		1 1 1 1	1		0.9 4.0	3.1	Slight Creosote staining and odor
5	CLAYEY SAND, gry. V moist, so, slightly sticky		SC		1 1 2	2		6.0 9.0	3.0	Small creosote oil pockets in the sand
10								8.0	1.0	
	SAND, lt gry, VF, wsrtd		SW		5	3		9.0		
15	SAND and GRAVEL, orng, F - C, psrtd, grv to 1"			18 14	5 11	4		14.3 16.5	1.2	odor 1" creosote seam at 16.2
	GRAVEL, tan to orng, psrtd, subang.		GP	24 24	1 2	5		17.9 19.0	1.1	Very faint creosote odor, no visible oil
20	with F sd, grv to 1/2" subang to ang			18 14	1 2	6		20.0 21.5	1.5	No creosote No odors
				30 35	1 1 1	7		22.2 24.0	1.8	No creosote No odors
25	FUTAW Formation lt. gry. FSD, glauconitic									
	NOTE: H·Nu meter used to determine PID readings									Soil Samples collected @ 7.0' 14.0' 16'-16.5' 19.0' 21'-21.5' 23'-24'

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	PAGE
3/14/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

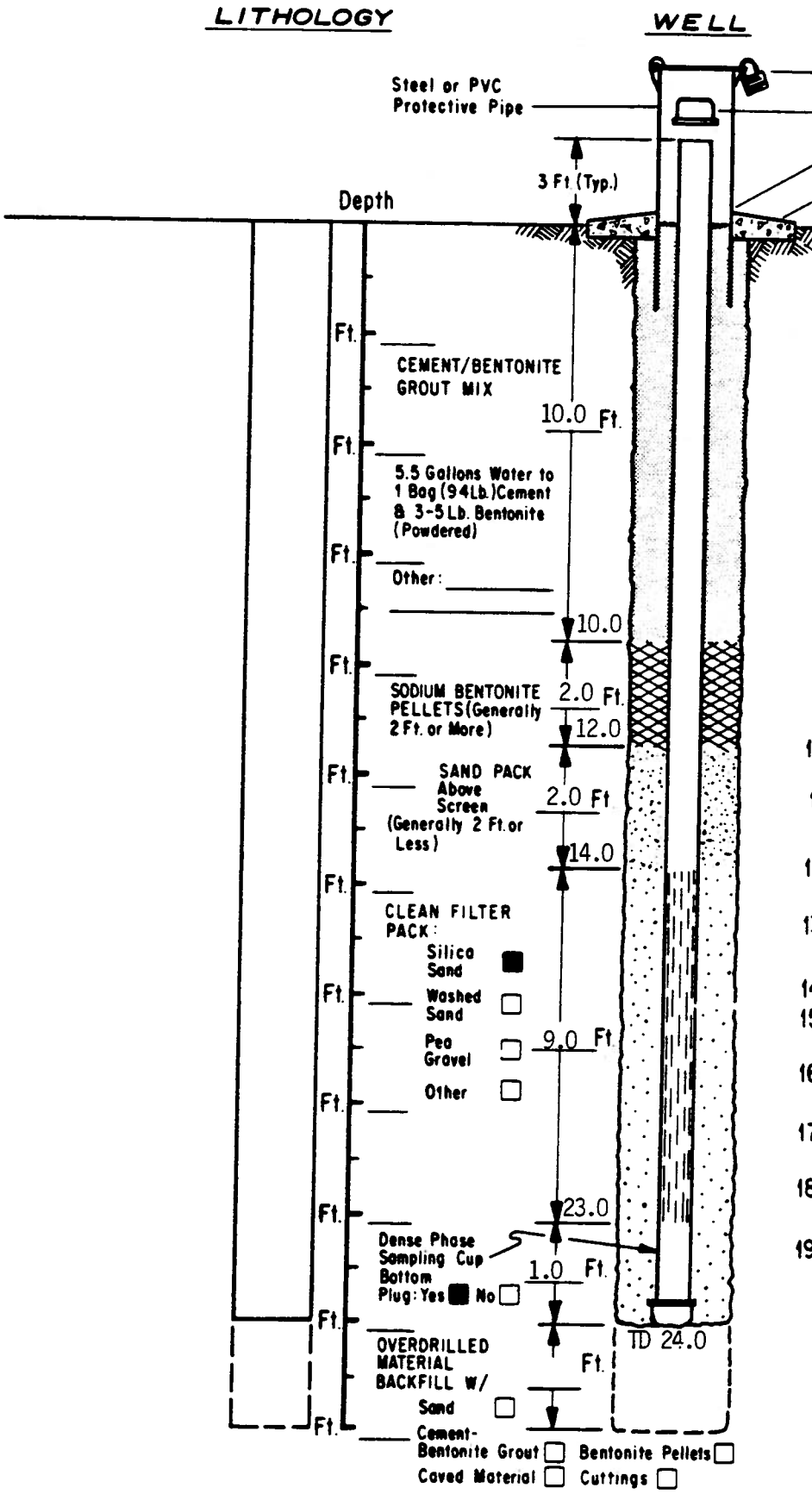
DRILLED BY: TTL, Inc.

LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 179.34

LOCATION OR GRID COORDINATES: N4232.73 E5428.74

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

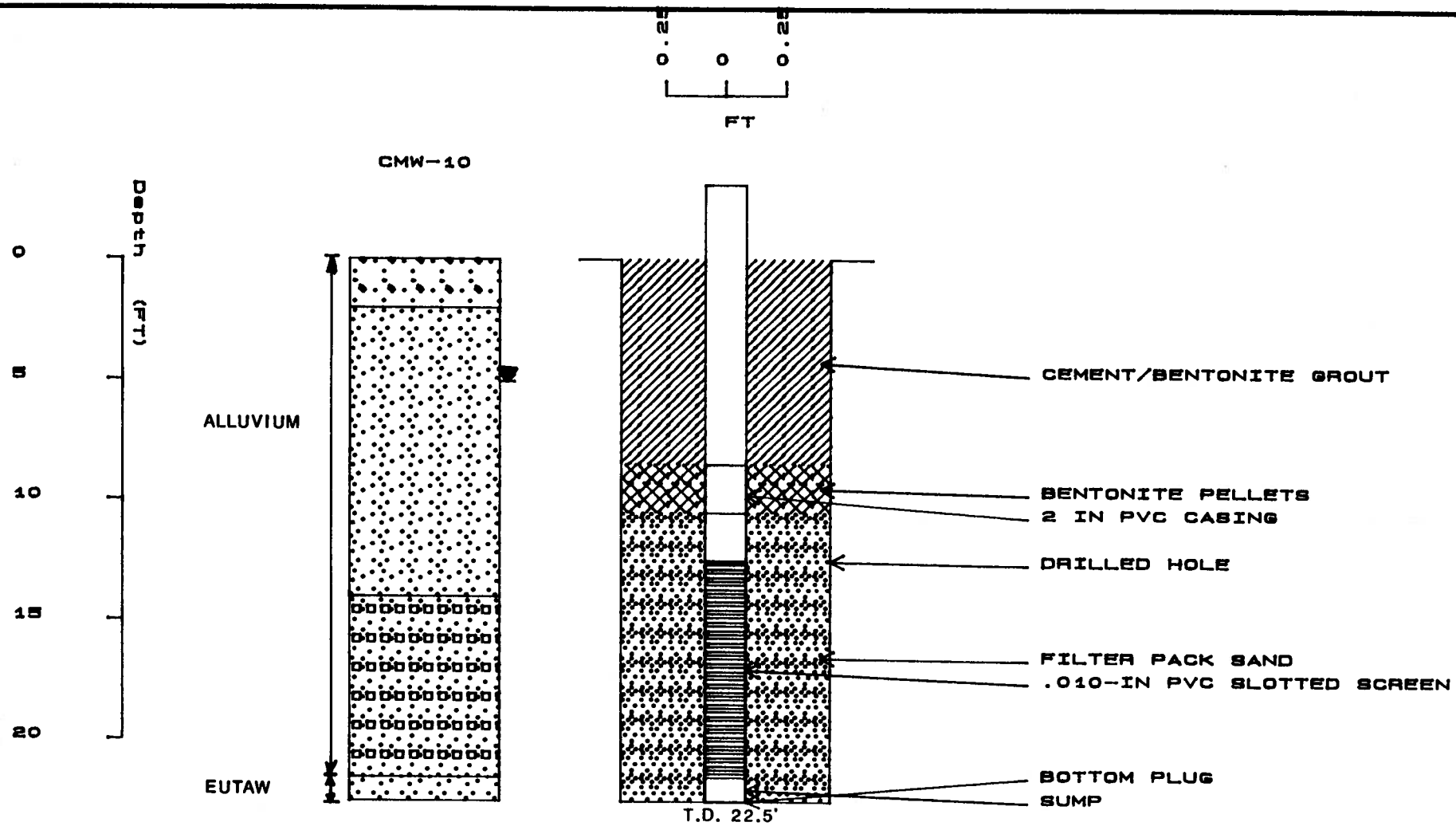
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 45 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ☐ Opaque ■
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe creosote smell
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe TAN
19. Water Level Summary (From Top of Casing) Before Development 4.83 Ft. Date 3/23/88 After Development _____ Ft. Date _____ Water Level _____ Ft. Date _____ _____ Ft. Date _____

Well No. CMW-9 Date Installed 3/14/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-10



WATER LEVEL: 4-23-88

LEGEND

SAND DEBRIS FILL SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 10
DATE DRILLED: 3-15-88

DRILLED BY: TTL. INC.\LOGGED BY: LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION COLUMBUS, MS	BORING NUMBER CMW-10

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, Sd, slag, Grv									
▼	SAND, Gry, F - M, trace Cl lt. Brn w/Gry, Cly, Grw. 5% to 1/4"					1		1.0 4.0	3.0	
5	Crs Sd, Orng Brn, Wsrtd F - M Sd, Msrtd, F Wht Sd, 5-5.5 becoming C w/depth lt Orng tan Sd, C, Psrtd w/Grv to 1/2", Rnd, Ang wet		SP to GP		1 1	2		6.5 9.0	2.5	
10				16 14	1 1	3		11.5	1.0	
				21 27	1 1	4		12.8 14.0	1.2	
15	SAND & GRAVEL, Brn Grv, Gry V F Sd, Psrtd, Ang to Rnd Grv to 1/4"		GP	21 25	1 1	5		15.3 16.5	1.2	Very, Very Faint Odor of Creosote
				33 28	4	6		17.9 19.0	1.1	
20				15 15	1	7		21.5	0.2	
	EUTAW Formation @ 21.5			50 50	1	8		22.5 23.5	1.0	
25	NOTE: An H·Nu meter used to determine PID readings									Soil Samples Collected 6 14 16-16.5 18.5-19 22-22.5

EXPLANATION

- ▼ Water Table (24 Hour)
- ▽ Water Table (Time of Boring)
- PID Photoionization Detection (ppm)
- NO. Identifies Sample by Number
- TYPE Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

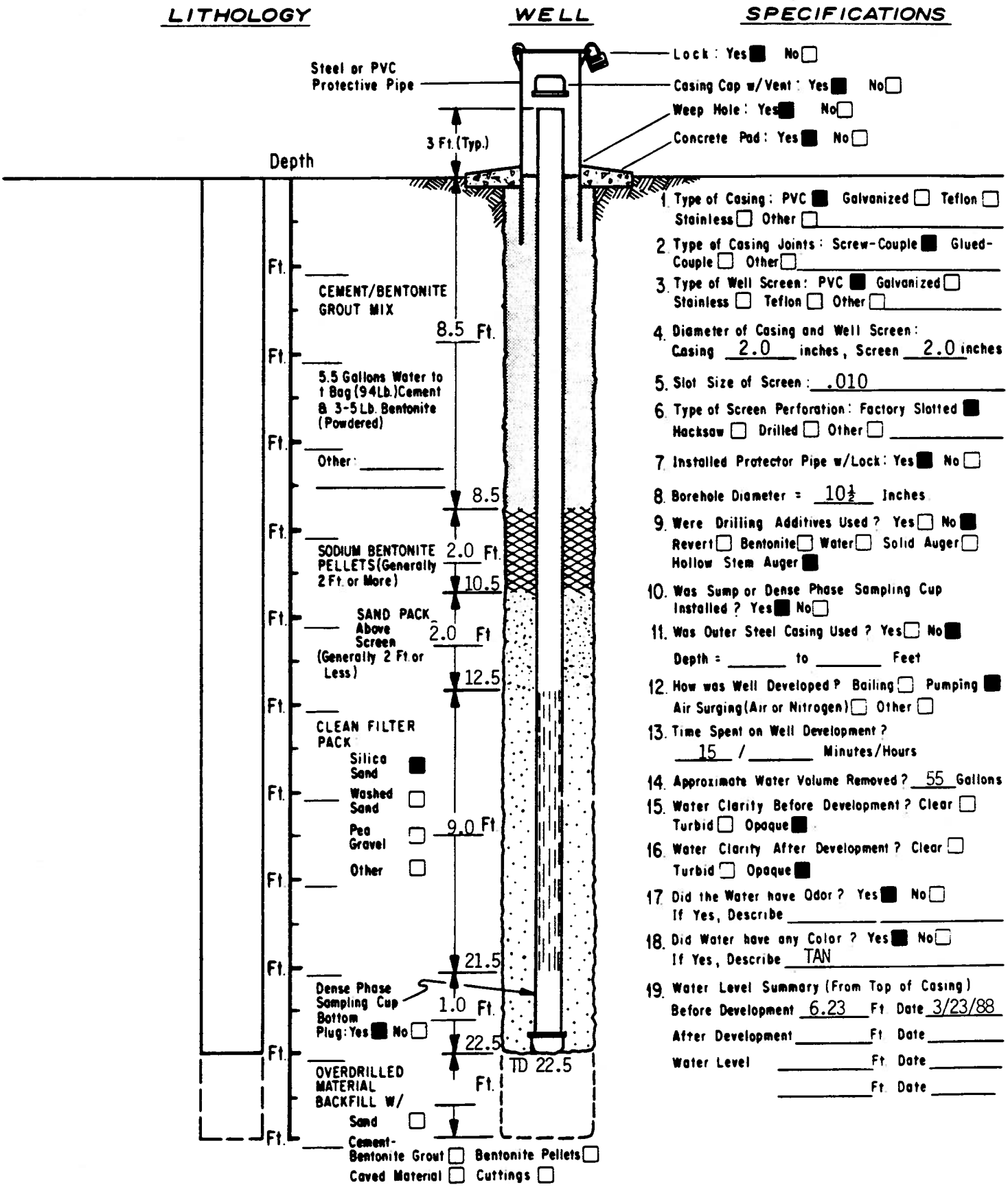
DEPTH Depth Top and Bottom of Sample
REC. Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	3/15/88
PAGE	1 of 1
DRILLING METHOD	Hollow Stem Auger
DRILLED BY	TTL, Inc.
LOGGED BY	S. F. Loosbrock
EXISTING GRADE ELEVATION (FT. AMSL)	178.37
LOCATION OR GRID COORDINATES	N4113.39 E5900.60

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

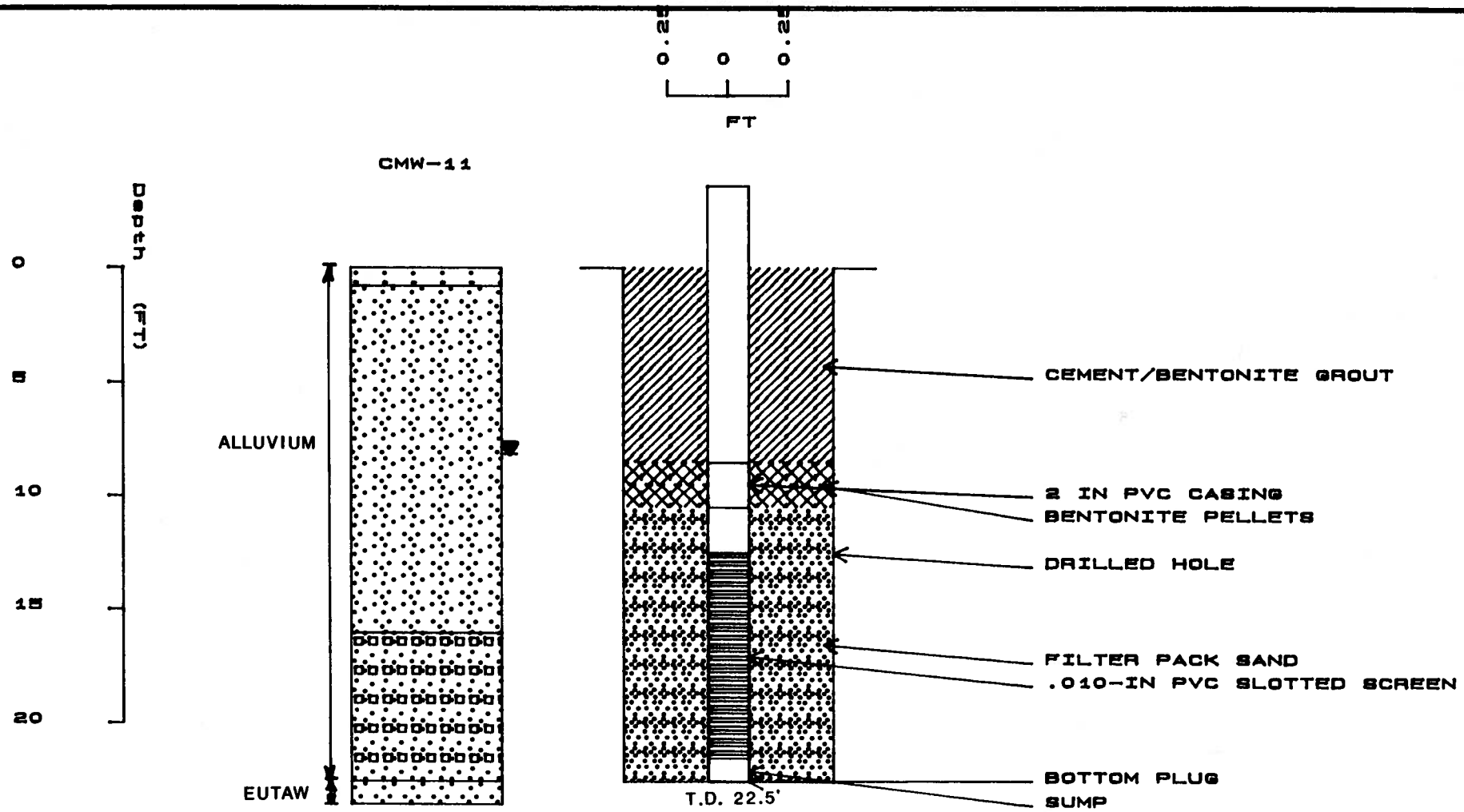


Well No. CMW-10 Date Installed 3/15/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-11



WATER LEVEL: 4-23-88

LEGEND

SAND DEBRIS FILL SAND & GRAVEL

COLUMBUS MONITOR WELL DIAGRAM - CMW 11 DATE DRILLED: 3-15-88	DRILLED BY: TTL, INC.\LOGGED BY: LOOSBROCK DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-11

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL									
	SAND, Dk Orng, Wsrtd SAND with GRAVEL, 20% to 3/4" Subrund		GM		1 1	1		2.1 4.0	1.9	
5	SAND, lt Y to Orng, wet, Wsrtd.					2		7.0 9.0	2.0	
	F - M, Wht Sd at 8 - 8.4		SW		1 1					
10	SAND, Orng, C, Wsrtd			10 10	1 1	3		10.2 11.5	1.3	
	SAND, with GRAVEL 10% to 1/2", subang, Wsrtd			7 17	1 1	4		12.6 14.0	1.4	
15				22 30	1 1	5		16.5	1.6	
	SAND and GRAVEL, Psrtd, grv 30% to Subang. F Sd grv 90% to 1", F Wht Sd		GM	17 16	1 1	6		18.0 19.0	1.0	
20				12 26	1 1	7		20.5 21.5	1.0	
	EUTAW Formation, Orng, F Sd, wea									No odors or creosote in any samples
25										
	NOTE: An H·Nu meter was used to determine PID readings									Soil Samples collected 8.5 - 9 11 - 11.5 13.5- 14 18.5- 19 21 - 21.5

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL; AUGER; ROCK CORE; THIN-WALLED TUBE; CONTINUOUS SAMPLER; NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY; SILT; SAND; GRAVEL; SILTY CLAY; CLAYEY SILT; DEBRIS FILL; HIGHLY ORGANIC PEAT; SANDY CLAY; CLAYEY SAND; _____; _____

DATE DRILLED	PAGE
3/15/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

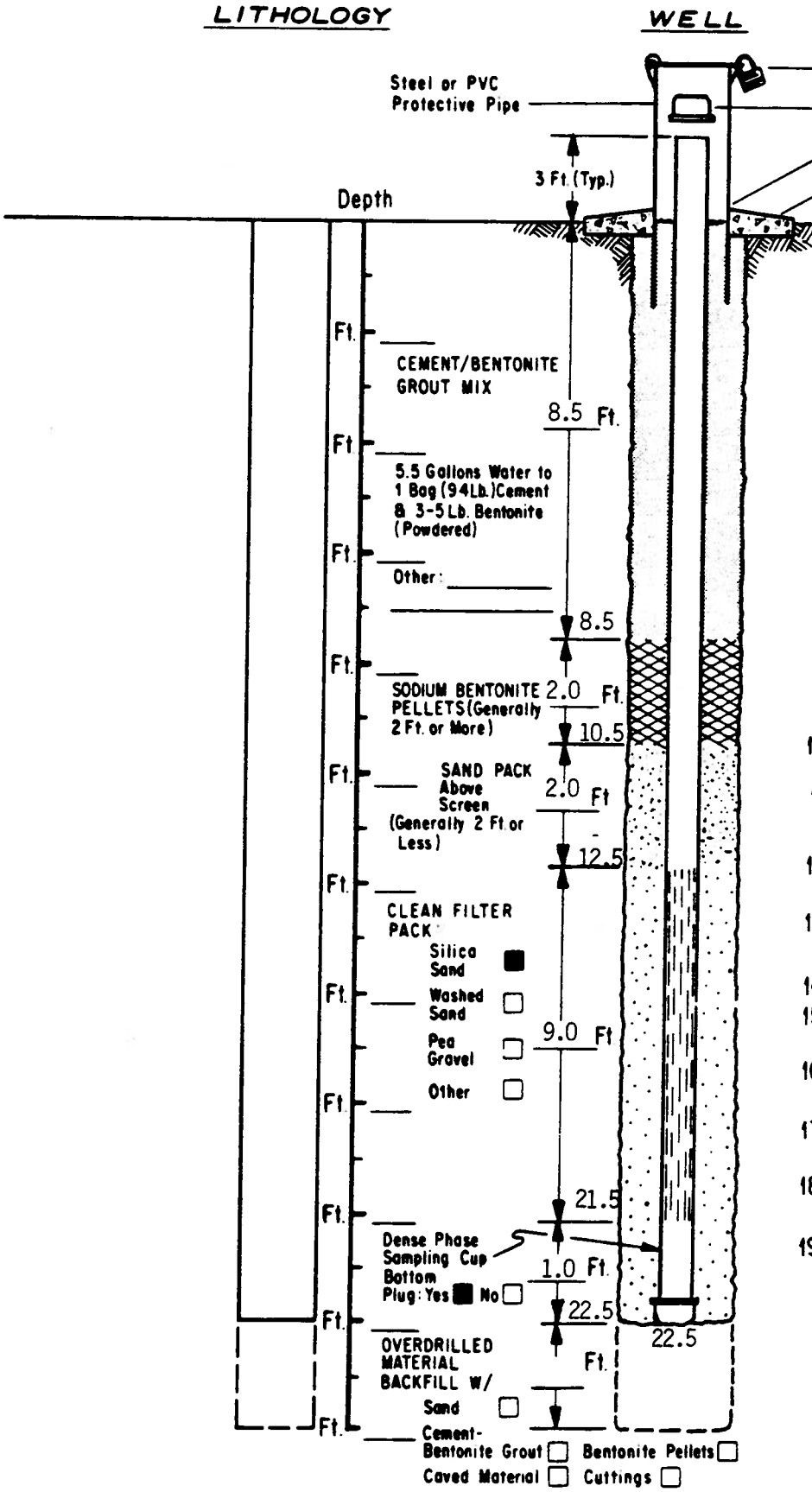
DRILLED BY: TTL, Inc.

LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 178.96

LOCATION OR GRID COORDINATES: N4122.96 E6146.28

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

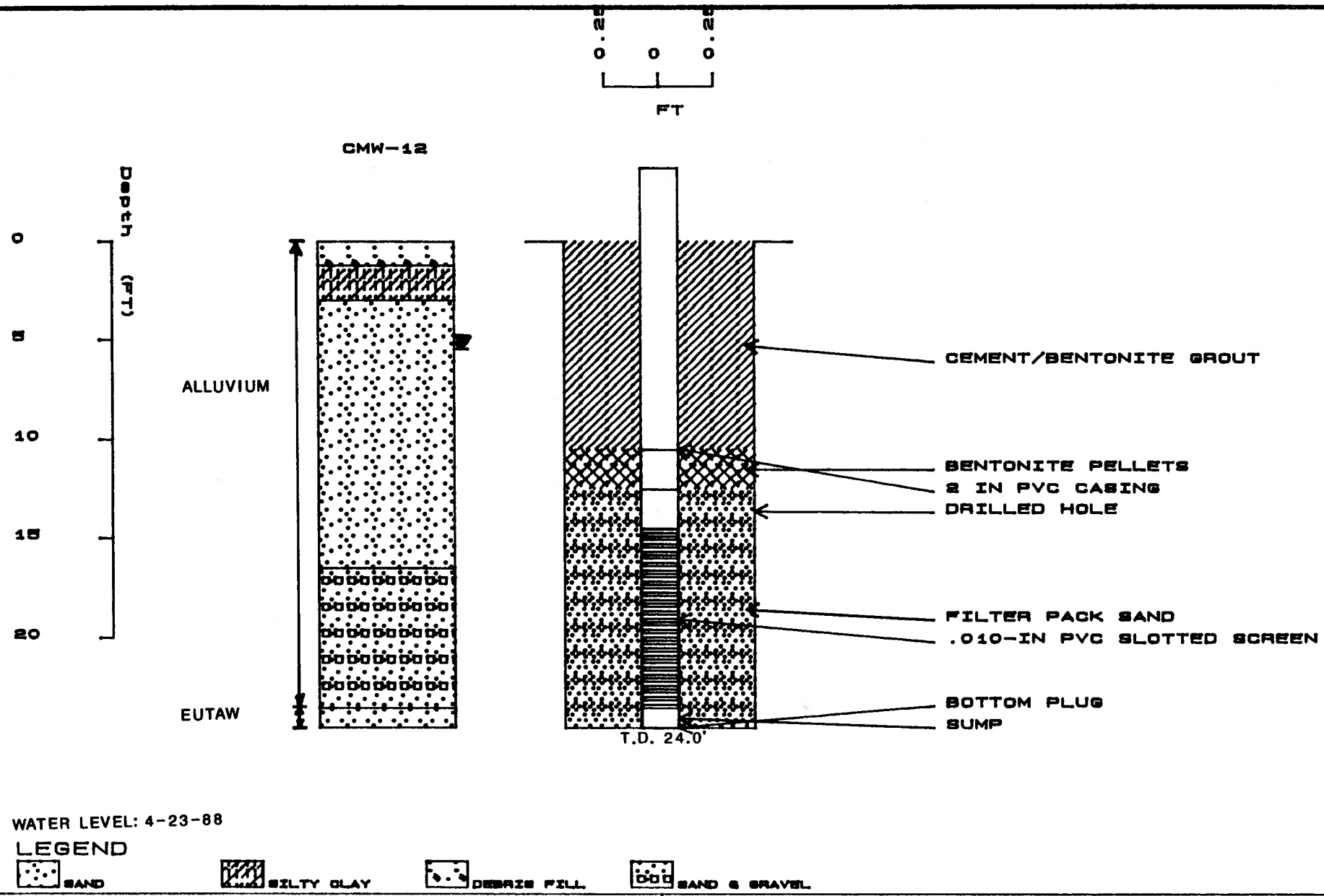
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 10 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ■ Turbid ☐ Opaque
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe TAN
19. Water Level Summary (From Top of Casing)
    Before Development 8.25 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft Date _____
    _____ Ft Date _____

Well No. CMW-11 Date Installed 3/15/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-12



COLUMBUS MONITOR WELL DIAGRAM - CMW 12
DATE DRILLED: 3-16-88

DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION COLUMBUS, MS	BORING NUMBER CMW-12

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
1.2	FILL, slag, rock, cinders				1					
	SILTY CLAY, Dk Grn, So, Homo		CL		1 1 1	1		0.5 4.0	3.5	
5	SAND, Gry, Sl Grn, Sl Cly, M, Wsrtd, Grv 5% to 1/4" Sd, Gry, w/Orng stains M - C Wht C Sd, 4" seam at 10		SW to GM	1 3	2 1	2		5.1 6.5	1.4	slight odor of creosote
				4 5	1 4	3		7.8 9.0	1.2	
10				20 20	3 3	4		9.5 11.5	2.0	slight creosote odor creosote stained 12.5-13
	SAND, Orng, C, Wsrtd, Grv 10% to 1/2"		SW to SP	13 17	5 5	5		12.5 14.0	1.5	
15	Grv 30% to 3/4"			25 25	2 2	6		14.7 16.5	1.8	
	GRAVEL and SAND, Psrtd, Grv 75% to 1", with F Wht Sd, Grv is Ang to Rnd		GP	12 2	3 2	7		18.0 19.0	1.0	
20				4 12	2 2	8		20.5 21.5	1.0	
	GRAVEL SAND with Gravel, C Sd			18 36	5 5	9		22.5 24.0	1.5	sand is saturated with creosote from 22.8-23.5
23.5	EUTAW Formation							TD 24.0		no creosote in Eutaw
	NOTE: An H·Nu meter was used to determine PID reading									Soil Samples Collected 3.5-4 8-9 12.5-13 18.5-19 23-23.5

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID Photoionization Detection (ppm)
- NO. Identifies Sample by Number
- TYPE Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

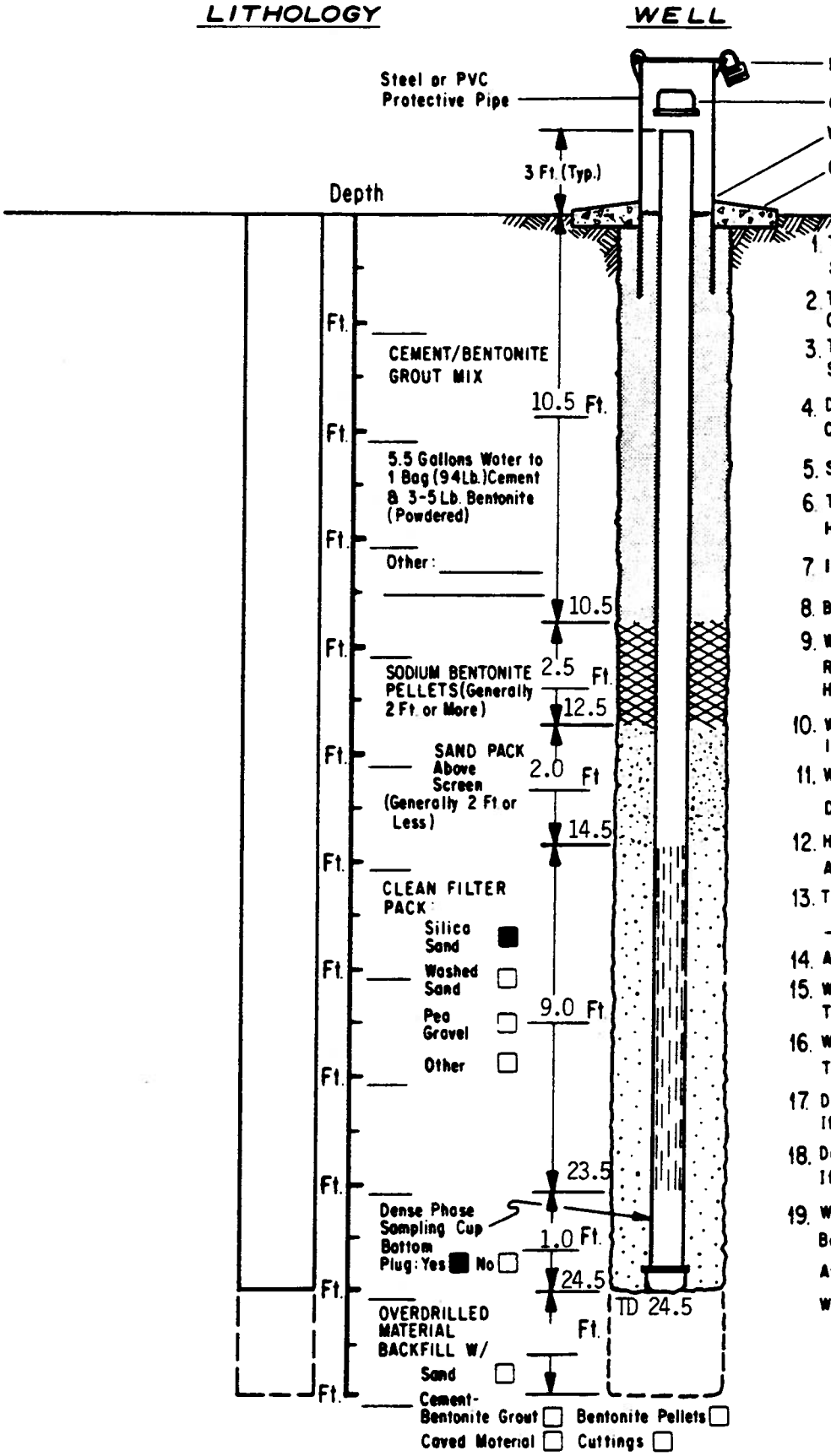
DEPTH Depth Top and Bottom of Sample
REC. Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	3/16/88
PAGE	1 of 1
DRILLING METHOD	Hollow Stem Auger
DRILLED BY	TTL Inc.
LOGGED BY	S. F. Loosbrock
EXISTING GRADE ELEVATION (FT. AMSL)	180.37
LOCATION OR GRID COORDINATES	N4385.22 E6014.32

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

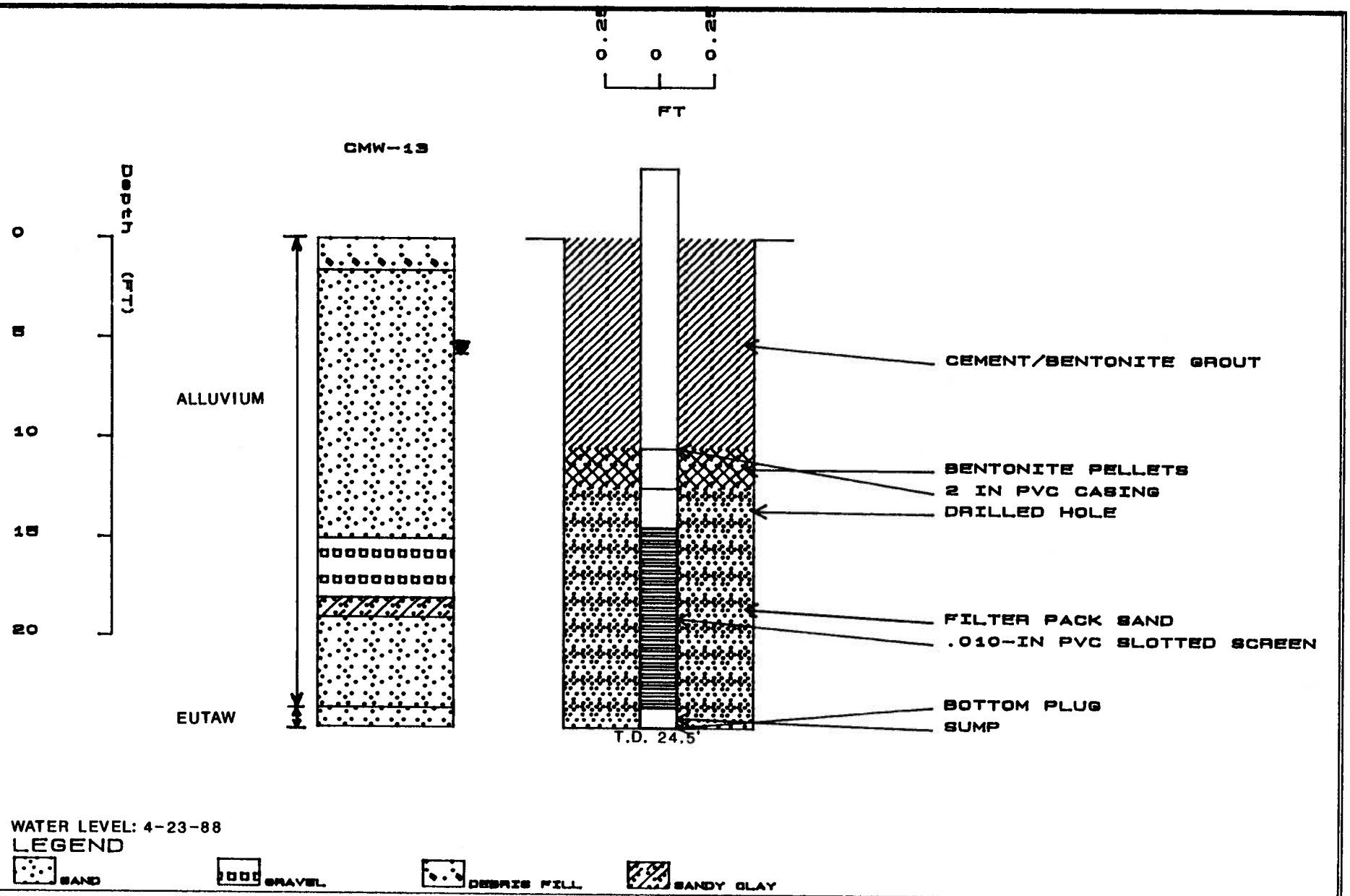
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 20 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ☐ Opaque ■
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe Creosote smell
18. Did Water have any Color? Yes ☐ No ☐ If Yes, Describe brown
19. Water Level Summary (From Top of Casing)
    Before Development 9.28 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft Date _____
    _____ Ft Date _____

Well No. CMW-12 Date Installed 3/16/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-13



COLUMBUS MONITOR WELL DIAGRAM - CMW 13
DATE DRILLED: 3-17-88

DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK
DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM—5655-A

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Colubus, MS	BORING NUMBER CMW-13

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
1.6	FILL, cinders				1			0.6		
	SAND, Gry, M, Wsrtd, w/Grv 5% to 1/4" Rnd.				1	1			3.4	
					1			4.0		
5	W/Grv 25% to 3/4" subrund, subang, slightly Cly			6	1	2		5.5	1.0	
				5	1			6.5		
	Sd, Gry, C, subrnd w/ Grv 10% to 1/2"		SP	7	1			7.7		
				10	1	3		9.0	1.3	
10	Becoming Y			20	1	4		9.5		
				15	1			11.5	2.0	
	Sd, Gry, C, 10% Grv to 1/4"			17	1					
	Sd, buff to Y, VC, Psrtd Grv 25% to 1/2"			17	1	5		12.0 14.0	2.0	
15	GRAVEL, 50% to 75% Ang, w/F Wht Sd, Rnd			17	1	6		15.1		
			GM	14	1			16.5	1.4	
				7	1					
	SAND CLAY GRAVEL, Gry, F Cl Sd Stf. w/Grv 20% to 1/2" subrnd		SC	12	1	7		17.2 19.0	1.8	
20				12	1	8		19.5	2.0	
				18	1			21.5		
	SAND, Gry, C, Psrtd w/Grv 50% to 3/4"		GM	9	1			22.5		
23.5				21	1	9		24.0	1.5	Creosote oil saturated from 23'-23.5'
25	EUTAW Formation at 23.5									

NOTE: An H·Nu meter was used to determine PID readings

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL | AUGER | ROCK CORE | THIN-WALLED TUBE | CONTINUOUS SAMPLER | NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY | DEBRIS FILL | SILT | HIGHLY ORGANIC PEAT | SAND | SANDY CLAY | GRAVEL | CLAYEY SAND | SILTY CLAY | CLAYEY SILT

DATE DRILLED	PAGE
3/17/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

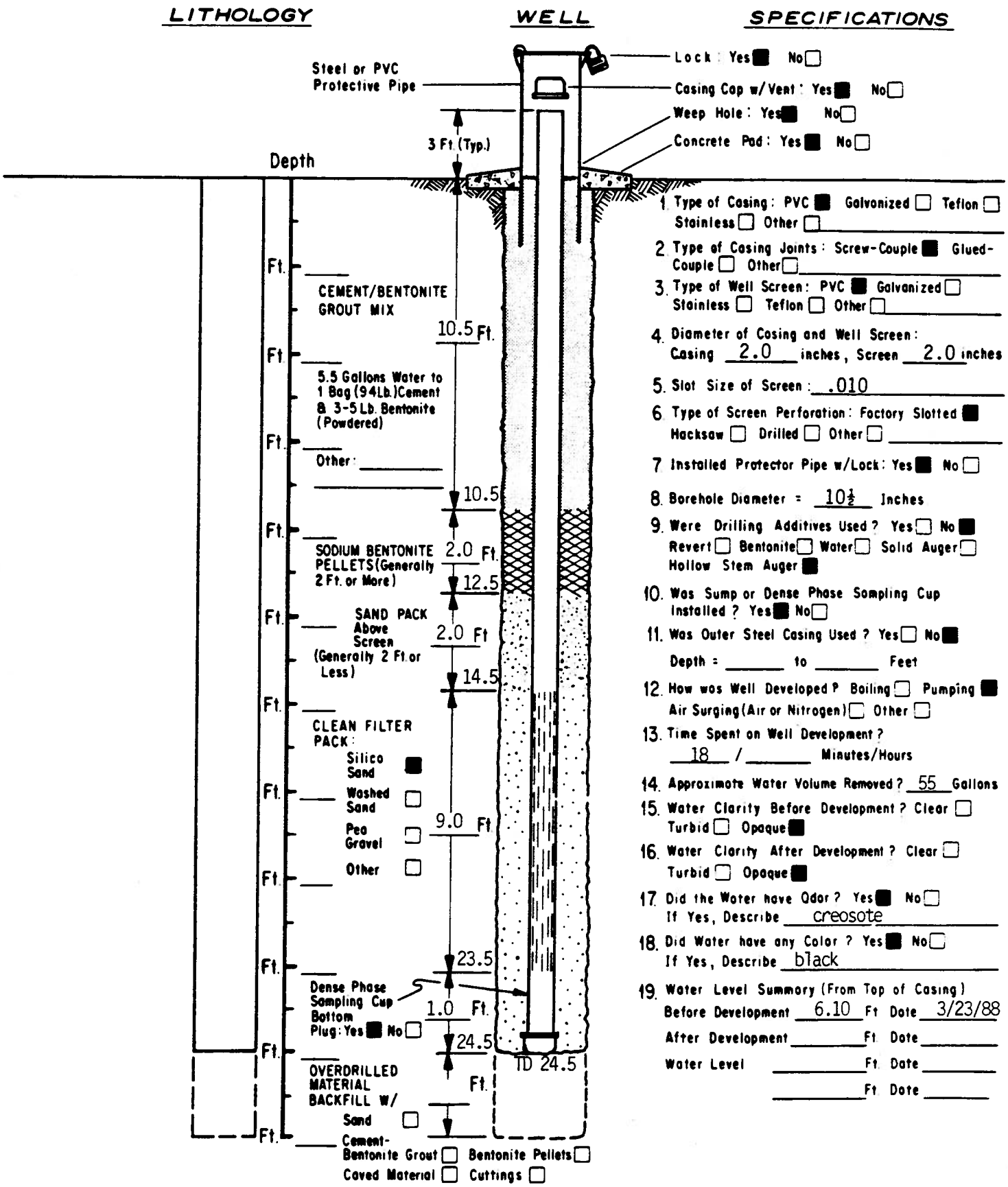
DRILLED BY: TTL, Inc.

LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 178.92

LOCATION OR GRID COORDINATES: N4409.18 E5755.48

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

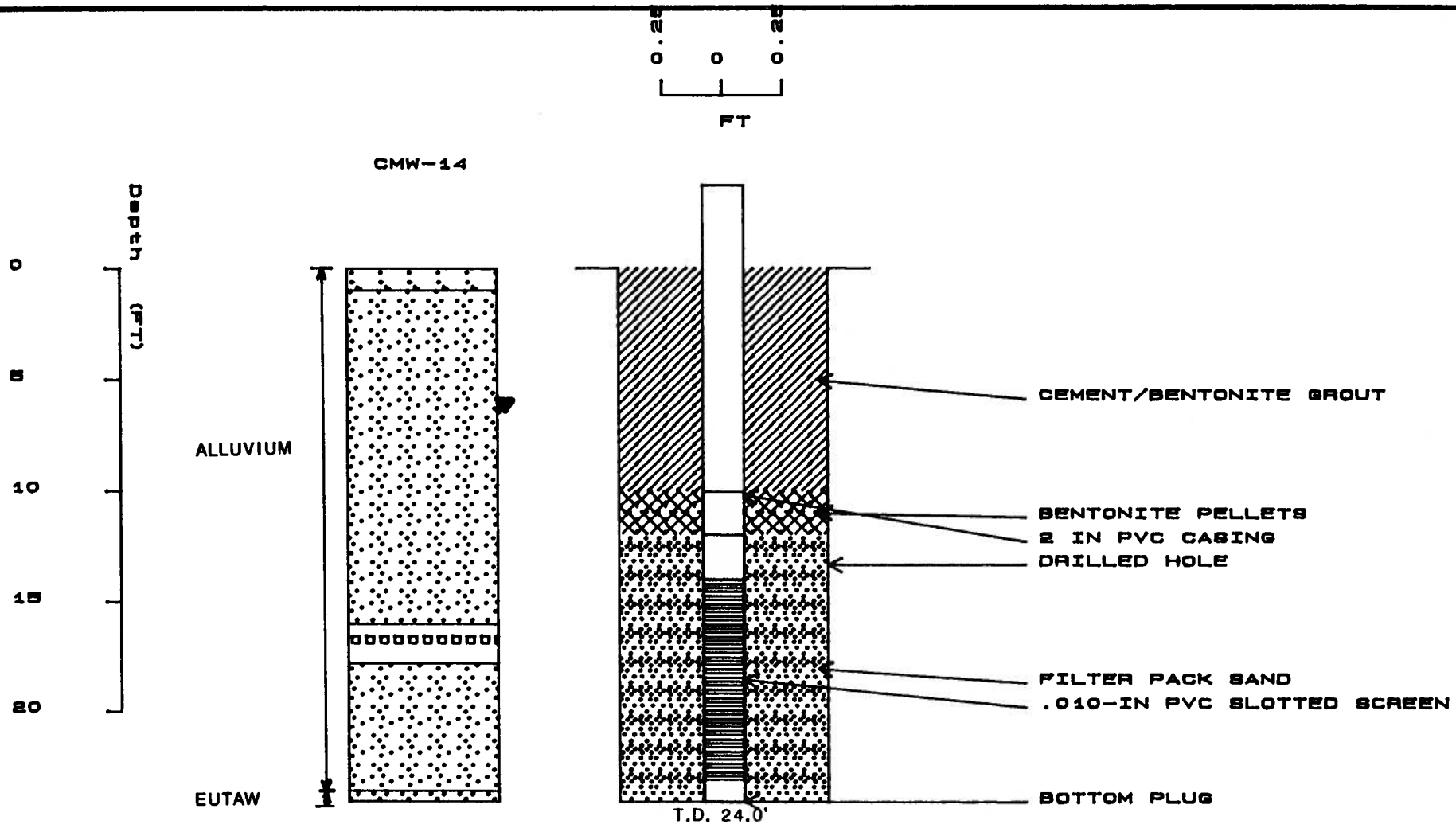


Well No. CMW-13 Date Installed 3/17/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-14



WATER LEVEL: 4-23-88

LEGEND

SAND GRAVEL DEBRIS FILL

COLUMBUS MONITOR WELL DIAGRAM - CMW 14

DATE DRILLED: 3-16-88

DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK

DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION COLUMBUS, MS	BORING NUMBER CMW-14

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, Slag, Grv, Sly Cl									H·Nu PID used
	SAND, lt. gry. Mgr, Msrtd Grv 10% to 1/2" subrnd Grv 40% to 3/4" subrnd				1 1 1	1		0.8 4.0	3.2	
5				10 8	1 1	2		5.7 6.5	0.8	
	Gry, Mgr, Grv 20% to 1/2" predom. less than 1/4"		SP	15 20	1 1	3		7.3 9.0	1.7	
10	Gry, M - C, Psrtd, Grv 10% to 1/4"			11 10	1 1	4		9.5 11.5	2.0	
	Gry Sd, Grv 25% to 1/2"			24 24	1 1	5		12.0 14.0	2.0	
15	Becoming tan			15 9	1 1	6		15.0 16.5	1.5	
	GRAVEL, Orng, 90% to 1" w/F - C sd, Psrtd, rnd		GP	12	1	7		17.7 19.0	1.3	
20	SAND, tan to Orng, C, Grv, 10%, 1" Cl lens at 17.5 Sd, Orng alternating Gry, C, Wsrtd Grv 5% to 1/4"		SP	14 7 7	1 1 1	8		19.9 21.5	1.6	
	VC Sd, 10% Grv to 1/4"			15 40	1 1	9		22.0 24.0	2.0	No odors or creosote in any samples
25	EUTAW, Orng, F, Wsrtd, Sd, glauconitic									Soil Samples Collected 8'-9' 10.5-11.5' 13'-14' 15.5'- 16.5' 18'-19' 20.5'-21.5' 22'-23' 23.5'-24

NOTE: An H·Nu meter was used to determine PID readings

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID Photoionization Detection (ppm)
- NO. Identifies Sample by Number
- TYPE Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

DEPTH Depth Top and Bottom of Sample
REC. Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · SILT · SAND · GRAVEL · SILTY CLAY · CLAYEY SILT · DEBRIS FILL · HIGHLY ORGANIC PEAT · SANDY CLAY · CLAYEY SAND

DATE DRILLED	PAGE
3/16/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

DRILLED BY: TTL. Inc.

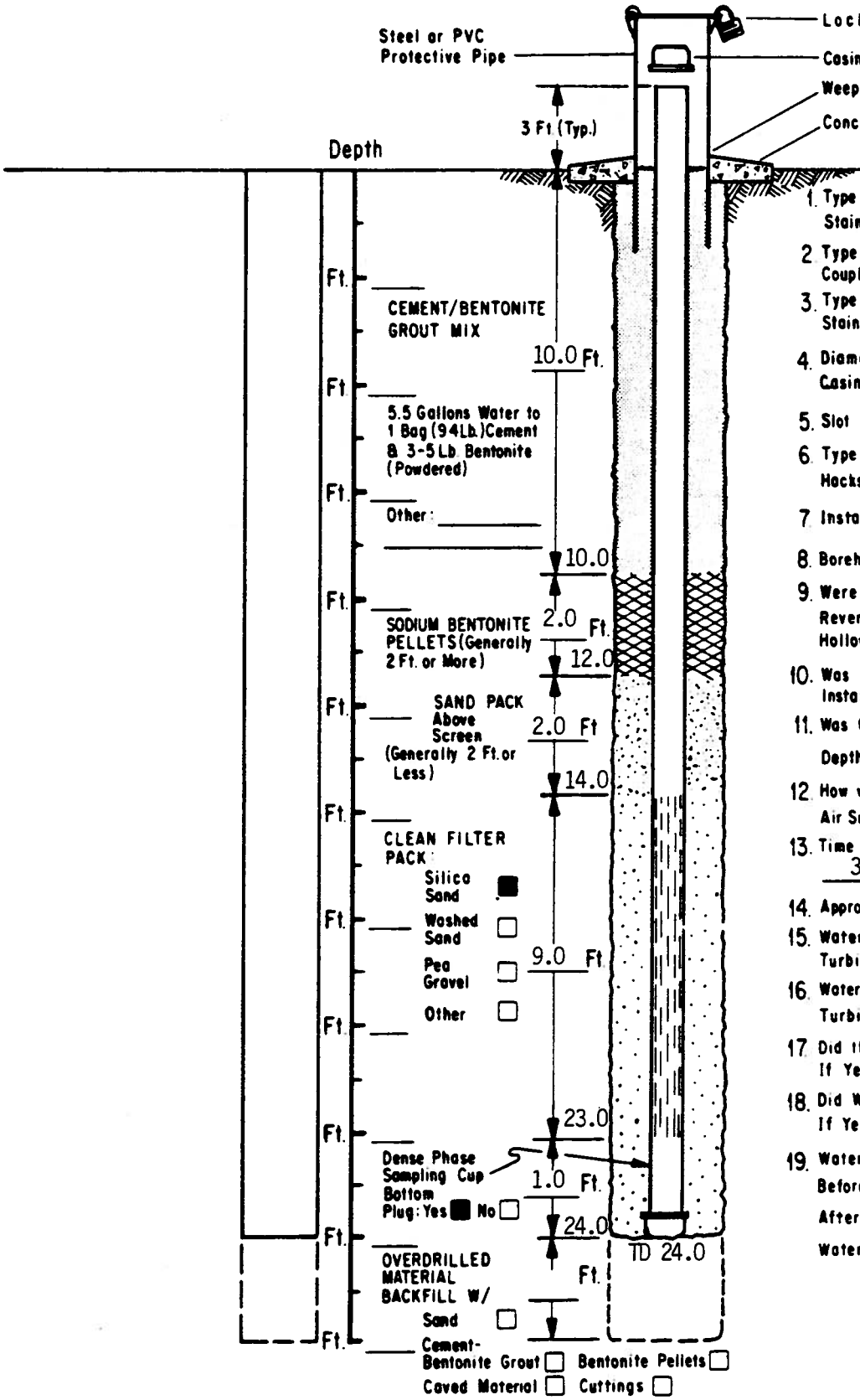
LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 178.17

LOCATION OR GRID COORDINATES: N4539.06 E5940.89

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

LITHOLOGY | ***WELL*** | ***SPECIFICATIONS***



Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

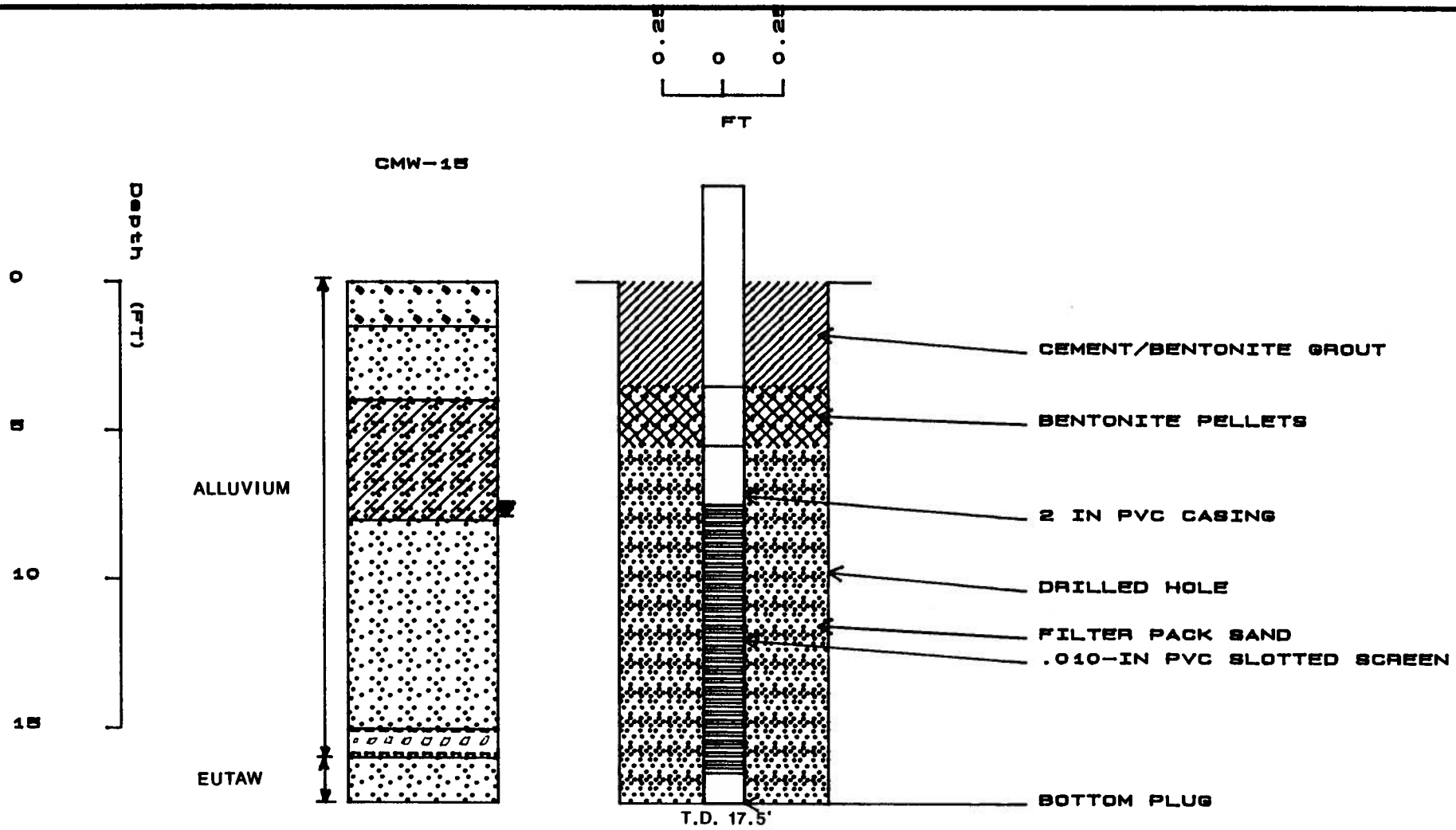
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 30 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ☐ Opaque ■
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe tan
19. Water Level Summary (From Top of Casing)
    Before Development 6.73 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft Date _____
    _____ Ft Date _____

Well No. CMW-14 | Date Installed 3/16/88 | Drill Rig Type CME-55

Driller/Firm TTL, INC. | Drill Crew CURTIS LEE | Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-15



WATER LEVEL: 4-23-88

LEGEND

SAND GRAVEL DEBRIS FILL SANDY CLAY

COLUMBUS MONITOR WELL DIAGRAM - CMW 15

DATE DRILLED: 3-17-88

DRILLED BY: TTL, INC./LOGGED BY LOOSBROCK

DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Columbus, MS	BORING NUMBER CMW-15

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, Rock, brick, slag, cinders									
	SAND, Gry to Wht, D, Wsrtd becoming Cly		SW		1 1 1	1		0.6 4.0	3.4	
5	SANDY CLAY, Gry Grn Fm, F Sd. Gry Orng, Orng Mot, Fm becoming Cly		CL	6 10	3 1	2		4.7 6.5	1.8	
				20 30	1 1	3		7.2 9.0	1.8	
10	SAND, Gry, C, subrnd Grv 5% to 1/4" psrtd becoming Orng. C Sd, buff to Orng. psrtd Grv 10% to 1/2" Grv 50% to 3/4" subrnd		SP	17 19	1 1	4		9.5 11.5	2.0	
				15 10	1 1	5		12.2 14.0	1.8	
15	GRAVEL, W F Wht Sd, Grv 75% to 1"		GP	23 18	1 1	6		14.8 16.5	1.7	
	EUTAW Formation at 16.2, Grn Orng, F Sd.			40 60	1 1	7		17.2 19.0	1.8	
20								TD 19.0		No odors or creosote in any samples
25	NOTE: An H·Nu meter was used to determine PID readings									Soil Samples Collected 3.5-4 8.9-9 13.5-14 15.5-16 18-19

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

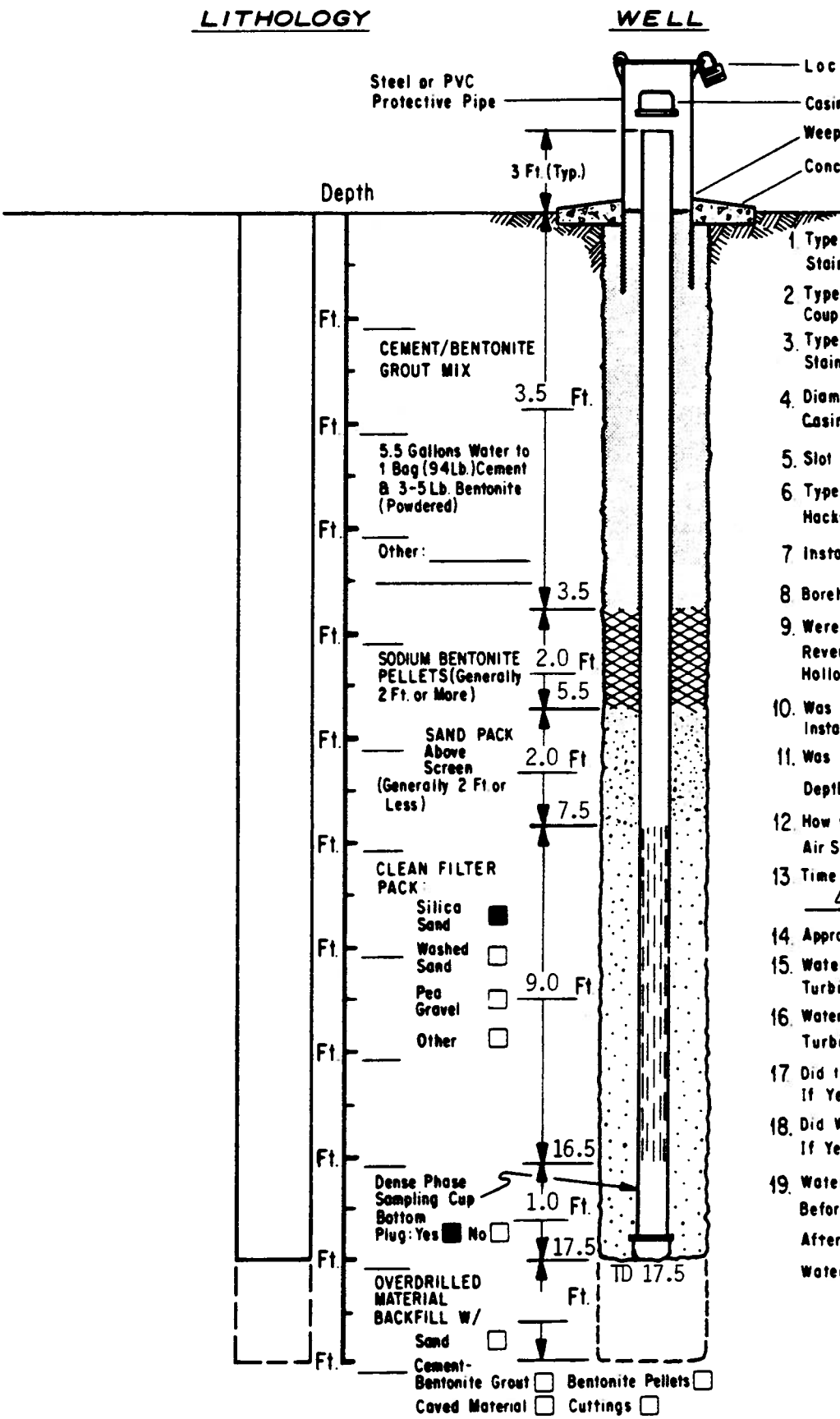
DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · DEBRIS FILL · SILT · HIGHLY ORGANIC PEAT · SAND · SANDY CLAY · GRAVEL · CLAYEY SAND · SILTY CLAY · CLAYEY SILT

DATE DRILLED	3/17/88
PAGE	1 of 1
DRILLING METHOD	Hollow Stem Auger
DRILLED BY	TTL. Inc.
LOGGED BY	S. F. Loosbrock
EXISTING GRADE ELEVATION (FT. AMSL)	179.39
LOCATION OR GRID COORDINATES	N4672.63 E6165.59

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

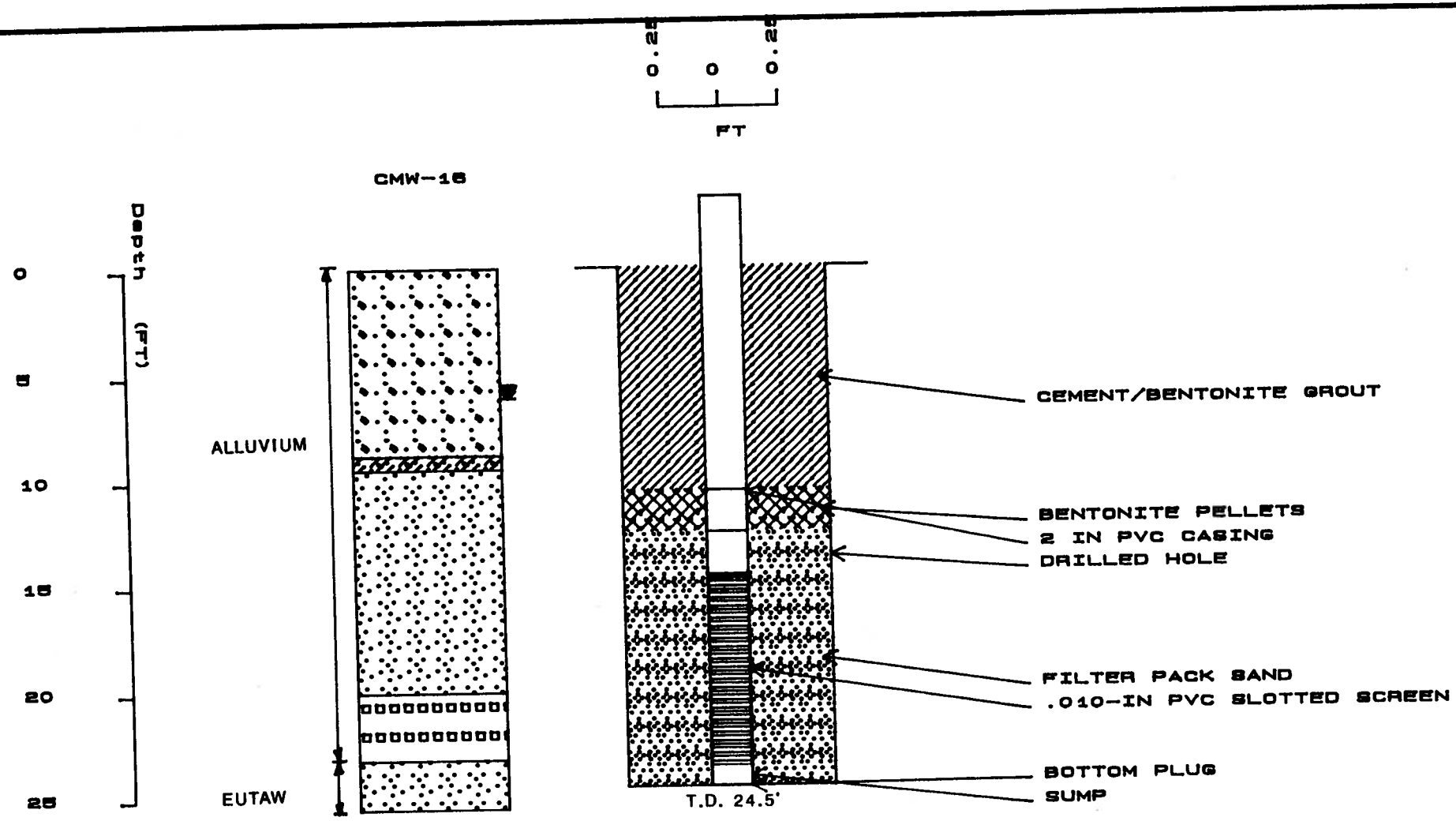
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 40 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ☐ Turbid ☐ Opaque ■
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe tan
19. Water Level Summary (From Top of Casing)
    Before Development 8.00 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft Date _____
    _____ Ft Date _____

Well No. CMW-15 Date Installed 3/17/88 Drill Rig Type CME-55

Driller/Firm TTL, INC. Drill Crew CURTIS LEE Kerr-McGee Hydrologist S.F. LOOSBROCK

MONITOR WELL

CMW-16



WATER LEVEL: 4-23-88

LEGEND

SAND GRAVEL DEBRIS FILL SANDY CLAY

COLUMBUS MONITOR WELL DIAGRAM - CMW 16

DATE DRILLED: 3-18-88

DRILLED BY: TTL. INC./LOGGED BY LOOSBROCK

DRILLING METHOD: HOLLOW STEM AUGER

KERR MCGEE CORPORATION

SOIL BORING LOG KM-5655

KERR-McGEE CORPORATION Hydrology Dept. Engineering Services	KM SUBSIDIARY KMCC-FPD	LOCATION Colubus, MS	BORING NUMBER CMW-16

DEPTH IN FEET	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	UNIFIED SOIL FIELD CLASS.	BLOWS PER FOOT	PID (ppm)	SOIL SAMPLE NO.	TYPE	DEPTH	REC.	REMARKS OR FIELD OBSERVATIONS
	FILL, slag, cinders, gravel, sawdust				See Note	1		1.7 4.0	2.3	N-NU photoionizer was malfunctioning during drilling
5				4 4		2		5.6	0.4	
				7 7		3		6.5 8.0 9.0	1.0	
10	SANDY CLAY, Gry and Brn, M, Wsrtd Sd, grv 5% to 1/2", any to subrnd.		SC	15 21		4		10.0 11.5	1.5	
	SAND, Gry, Psrtd, with Grv. 25% to 1" Srnd, becoming Orng.			38 32		5		12.2 14.0	1.8	
15	Grv 50% to 1" Srnd, Sang		SP	15 20		6		15.1 16.5	1.4	
	SAND, Wht, C, Wsrtd, Grv 10% to 1/2" Srnd.		SW	6 15		7		18.0 19.0	1.0	
20	GRAVEL, Psrtd, 90% to 1/2" in a 4" zone		GP	11 6		8		20.5 21.5	1.0	
	GRAVEL and Sand, Grv 75% Srnd to Sang. to 1"			16 19		9		22.5 24.0	1.5	
25	EUTAW, Orng, F, D, with Blk laminations			50 60		10		24.7 26.5	1.8	No creosote or odors in any samples
										Soil Samples collected 10.5 - 11.5 13 - 14 15.5 - 16.5 18 - 19 20.5 - 21.5 22.5 - 23.5 25.5 - 26.5

EXPLANATION

- Water Table (24 Hour)
- Water Table (Time of Boring)
- PID — Photoionization Detection (ppm)
- NO. — Identifies Sample by Number
- TYPE — Sample Collection Method

SPLIT-BARREL · AUGER · ROCK CORE · THIN-WALLED TUBE · CONTINUOUS SAMPLER · NO RECOVERY

DEPTH — Depth Top and Bottom of Sample
REC. — Actual Length of Recovered Sample in Feet

GRAPHIC LOG LEGEND

CLAY · SILT · SAND · GRAVEL · SILTY CLAY · CLAYEY SILT · DEBRIS FILL · HIGHLY ORGANIC PEAT · SANDY CLAY · CLAYEY SAND

DATE DRILLED	PAGE
3/18/88	1 of 1

DRILLING METHOD: Hollow Stem Auger

DRILLED BY: TTL, Inc.

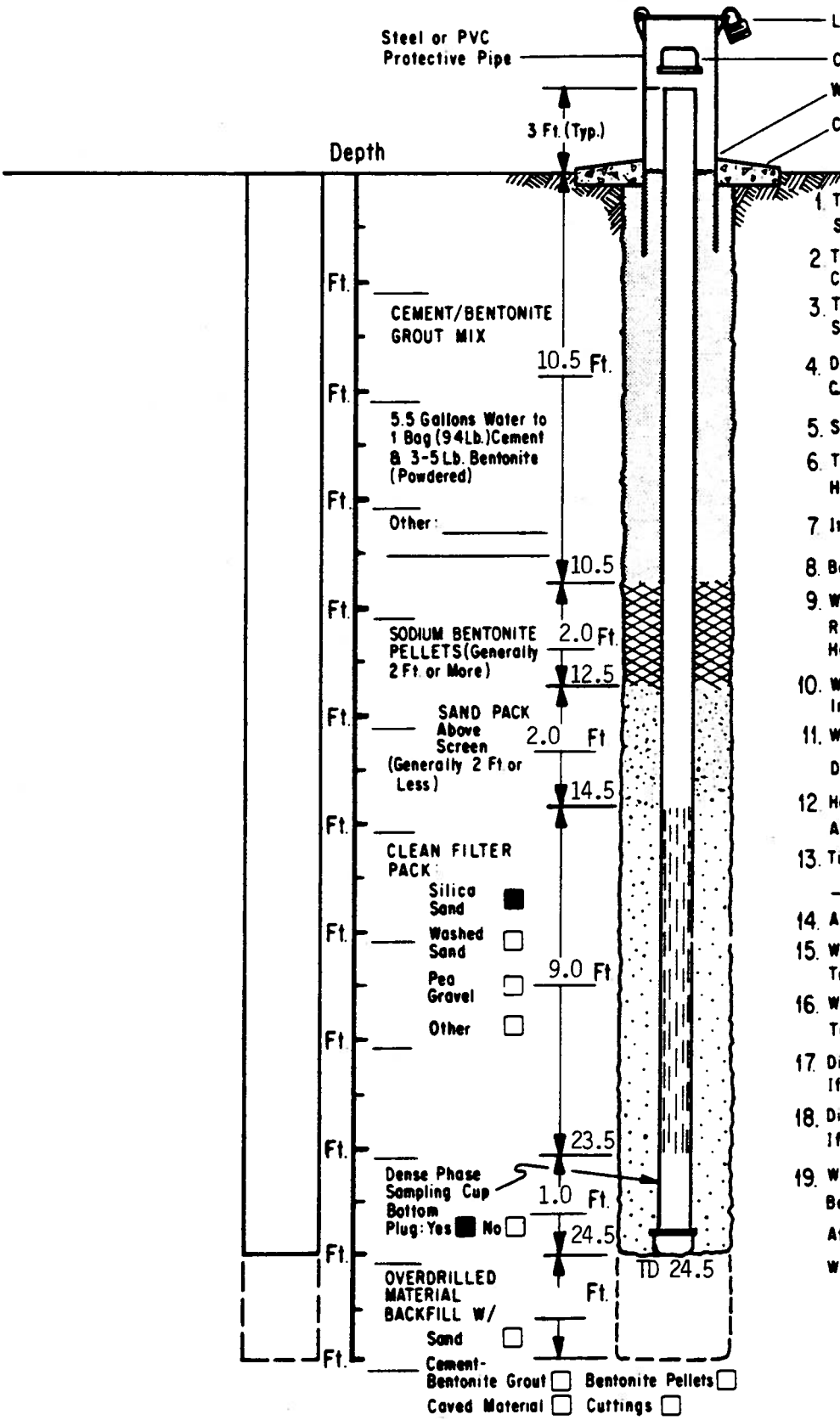
LOGGED BY: S. F. Loosbrock

EXISTING GRADE ELEVATION (FT. AMSL): 184.30

LOCATION OR GRID COORDINATES: N4598.36 E5384.25

KERR-McGEE CORPORATION
HYDROLOGY DEPARTMENT
MONITORING WELL INSTALLATION DIAGRAM

LITHOLOGY | ***WELL*** | ***SPECIFICATIONS***



Lock: Yes ■ No ☐

Casing Cap w/Vent: Yes ■ No ☐

Weep Hole: Yes ■ No ☐

Concrete Pad: Yes ■ No ☐

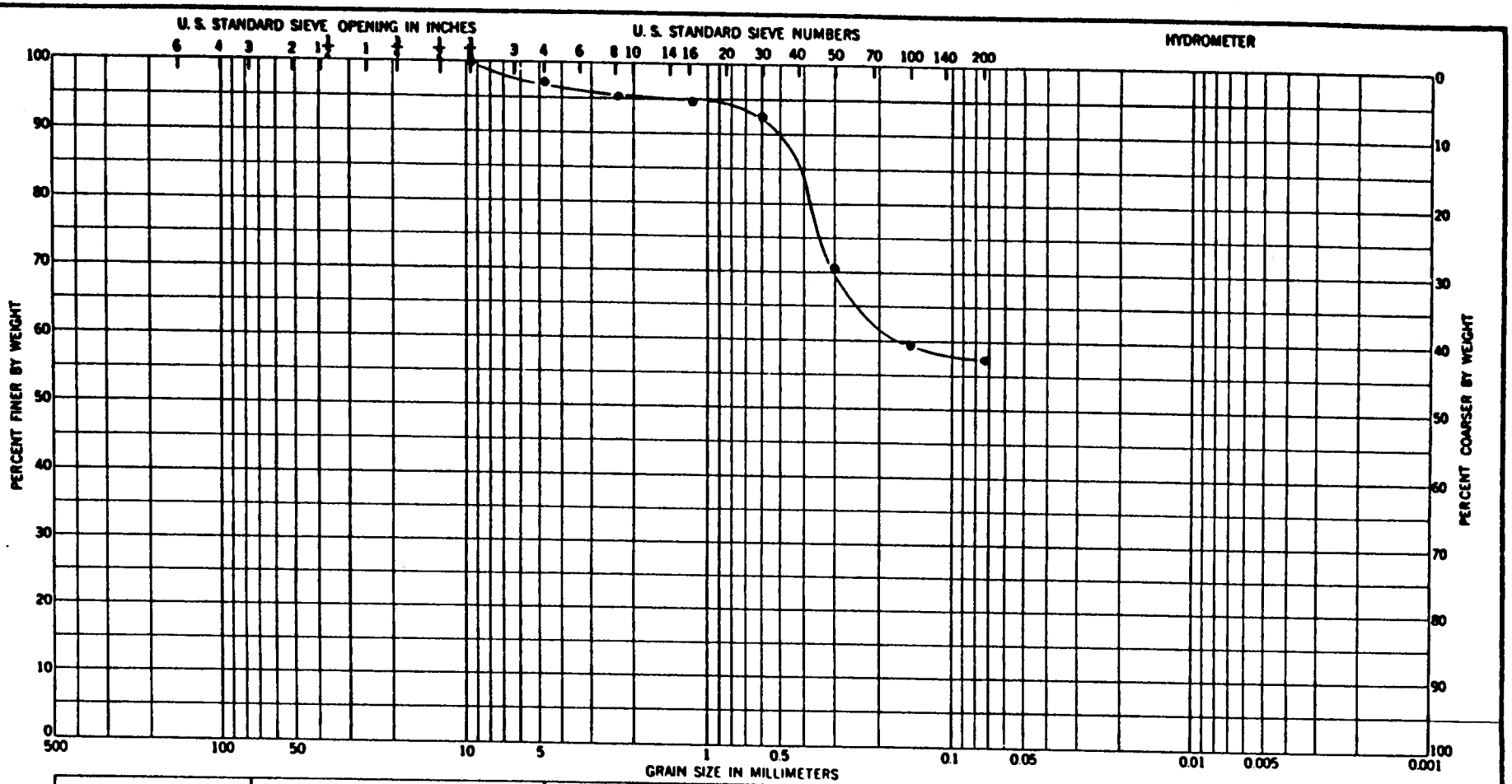
1. Type of Casing: PVC ■ Galvanized ☐ Teflon ☐ Stainless ☐ Other ☐ _____
2. Type of Casing Joints: Screw-Couple ■ Glued-Couple ☐ Other ☐ _____
3. Type of Well Screen: PVC ■ Galvanized ☐ Stainless ☐ Teflon ☐ Other ☐ _____
4. Diameter of Casing and Well Screen: Casing 2.0 inches, Screen 2.0 inches
5. Slot Size of Screen: .010
6. Type of Screen Perforation: Factory Slotted ■ Hacksaw ☐ Drilled ☐ Other ☐ _____
7. Installed Protector Pipe w/Lock: Yes ■ No ☐
8. Borehole Diameter = 10½ Inches
9. Were Drilling Additives Used? Yes ☐ No ■ Revert ☐ Bentonite ☐ Water ☐ Solid Auger ☐ Hollow Stem Auger ■
10. Was Sump or Dense Phase Sampling Cup Installed? Yes ■ No ☐
11. Was Outer Steel Casing Used? Yes ☐ No ■ Depth = _____ to _____ Feet
12. How was Well Developed? Bailing ☐ Pumping ■ Air Surging (Air or Nitrogen) ☐ Other ☐
13. Time Spent on Well Development? 10 / _____ Minutes/Hours
14. Approximate Water Volume Removed? 55 Gallons
15. Water Clarity Before Development? Clear ■ Turbid ☐ Opaque ☐
16. Water Clarity After Development? Clear ☐ Turbid ☐ Opaque ■
17. Did the Water have Odor? Yes ■ No ☐ If Yes, Describe _____
18. Did Water have any Color? Yes ■ No ☐ If Yes, Describe tan
19. Water Level Summary (From Top of Casing)
    Before Development 6.20 Ft Date 3/23/88
    After Development _____ Ft Date _____
    Water Level _____ Ft Date _____
    _____ Ft Date _____

Well No. CMW-16 | Date Installed 3/18/88 | Drill Rig Type CME-55

Driller/Firm TTL, INC. | Drill Crew CURTIS LEE | Kerr-McGee Hydrologist S.F. LOOSBROCK

APPENDIX B

GRAIN SIZE DISTRIBUTION CURVES



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-6	3.5'-4.0'	BROWN FINE SANDY SILT (ML)	13	17	15	2

Project: KMCC-FPD
KERR MCGEE CHEMICAL CORP.
Area: COLUMBUS, MS
Boring No.: CMW-15
Date: MARCH, 1988

GRADATION CURVES

GPO 926-250

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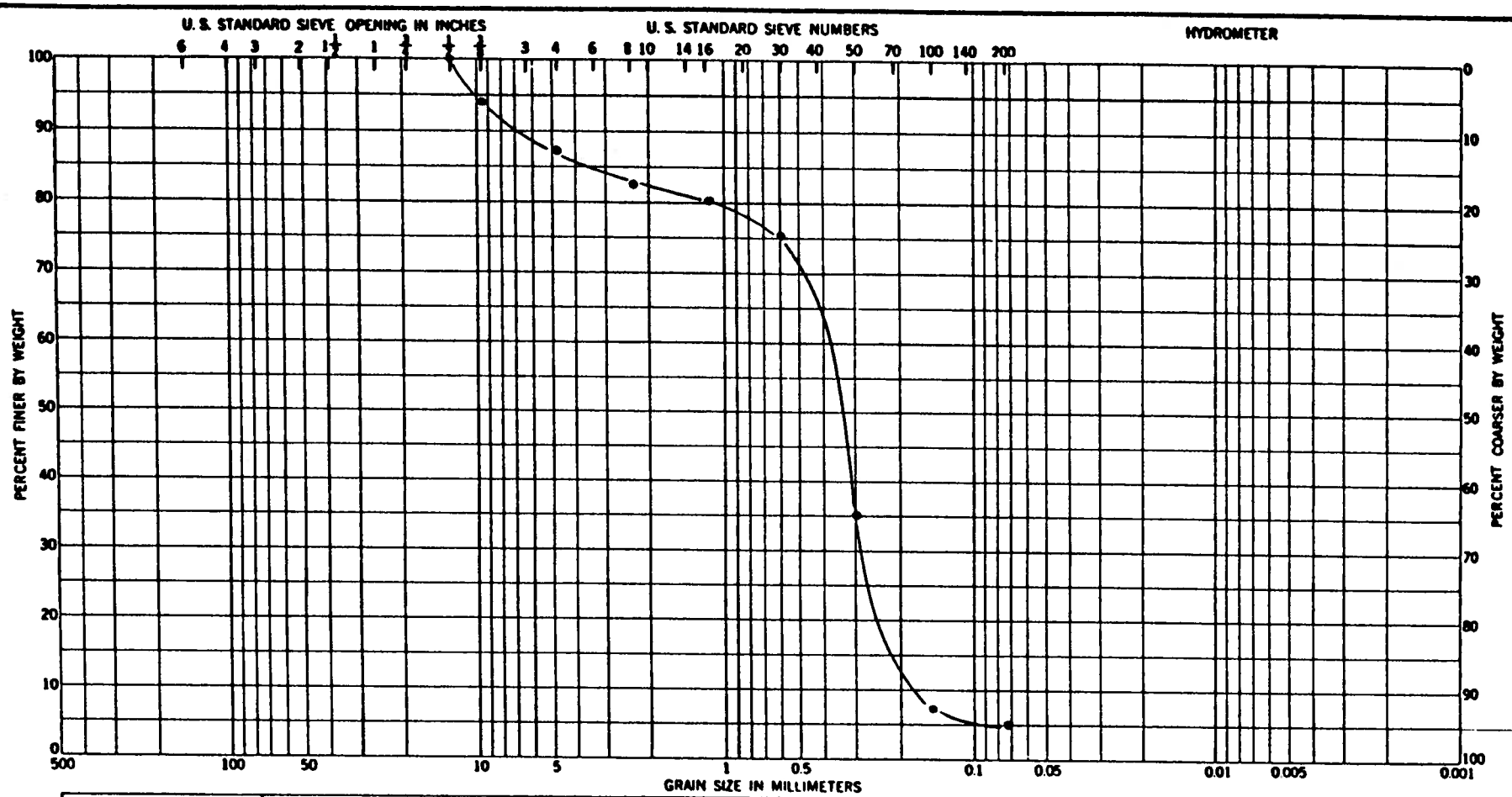

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	8.0'-9.0'	GRAYISH-TAN SILTY SAND W/GRAVEL (SP)	19	NON-PLASTIC		

Project KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area COLUMBUS, MS
Boring No. CMW-14
Date MARCH, 1988

GRADATION CURVES

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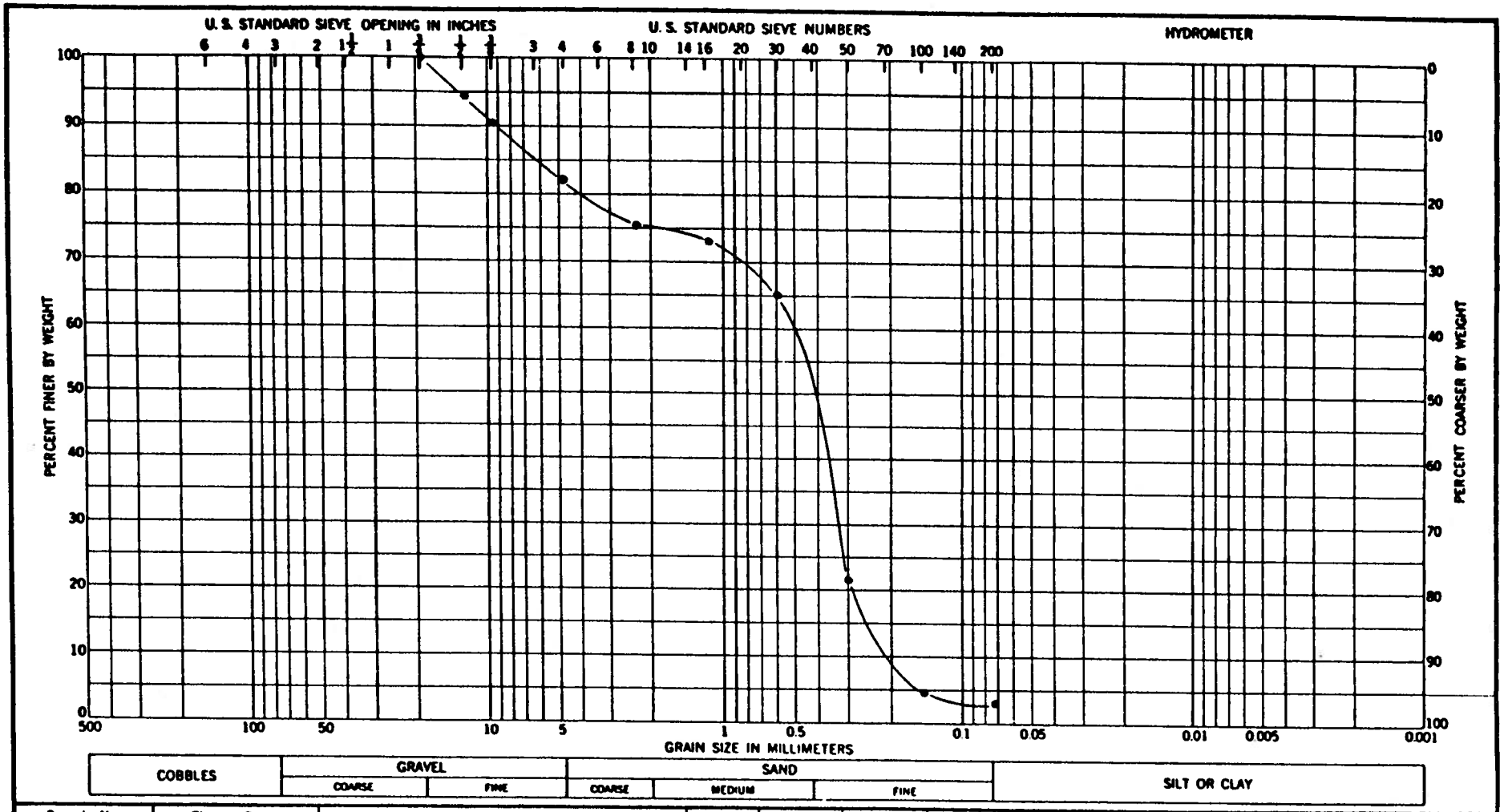

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	10.5'-11.5'	GRAY SILTY SAND W/GRAVEL (SP)	23	NON-PLASTIC		

Project: KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area: COLUMBUS, MS
Boring No.: CMW-14
Date: [illegible]

GRADATION CURVES

GPO 926-250

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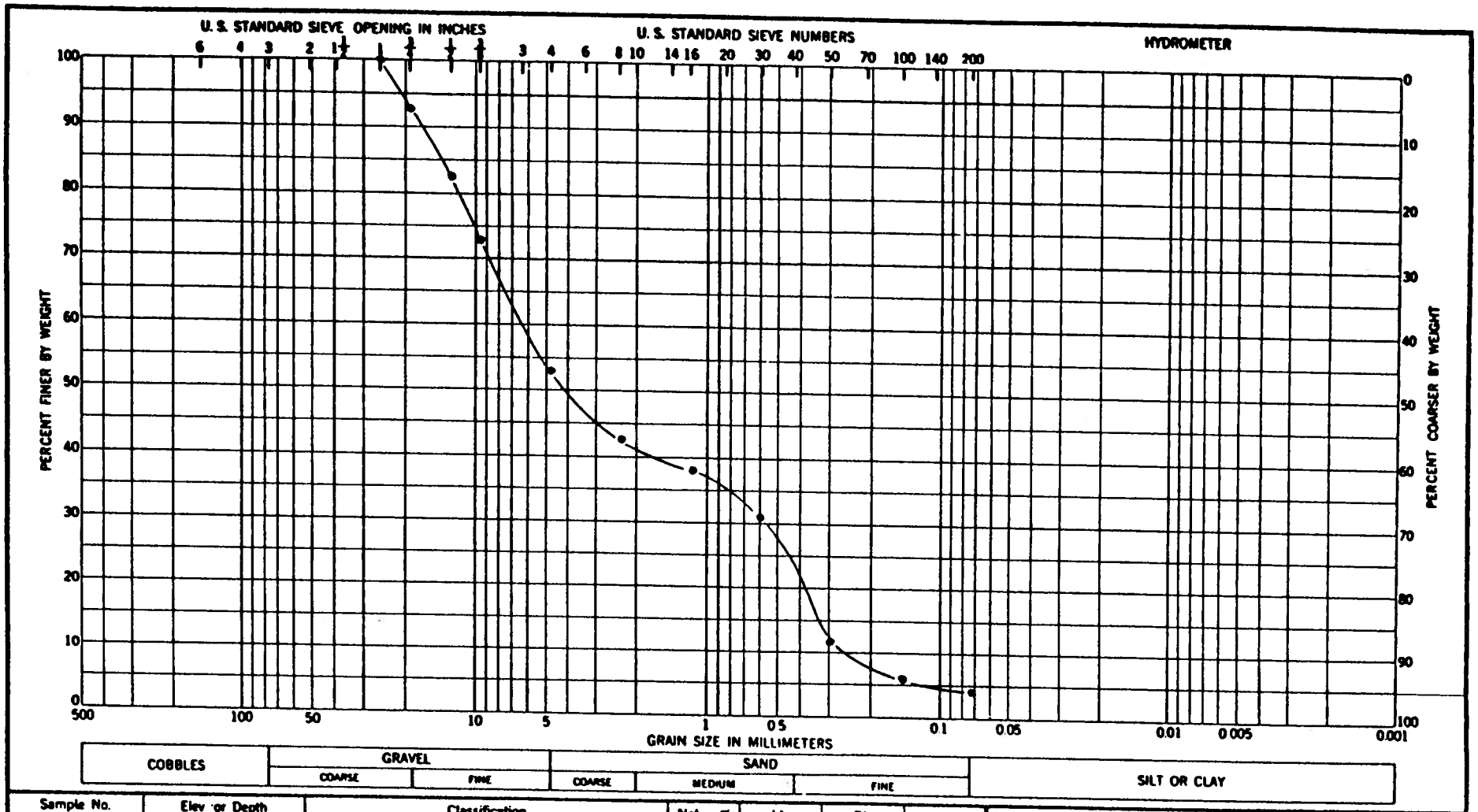

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	13.0'-14.0'	GRAYISH TAN SAND W/GRAVEL (SP)	16	NON-PLASTIC		

Project KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area COLUMBUS, MS
Boring No. CMW-14
Date [illegible]-14

GRADATION CURVES

GPO 926-250

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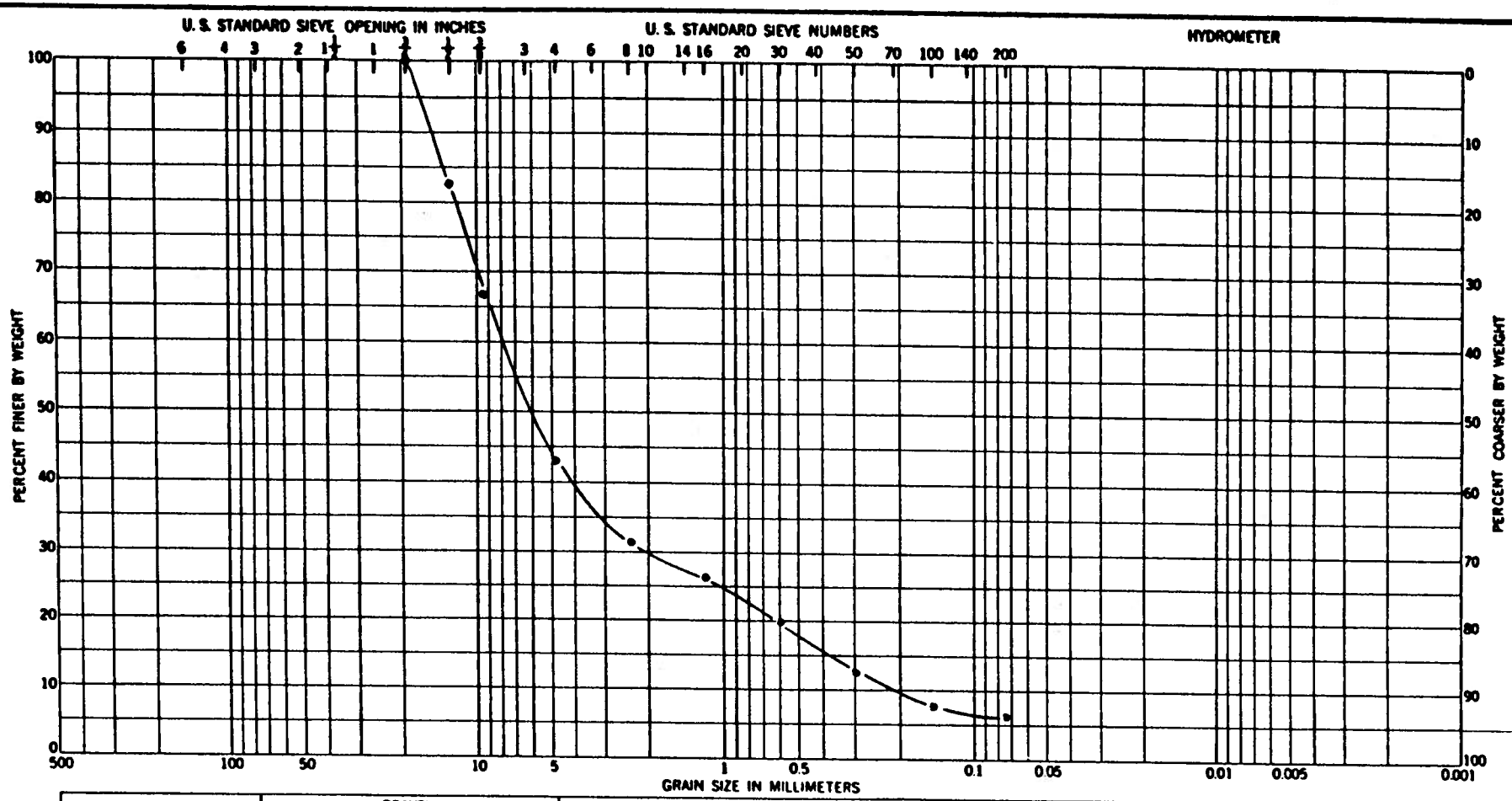

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	15.5'-16.5'	ORANGE TO GRAY SILTY SAND W/GRAVEL (SW)	17	NON-PLASTIC		

Project KMCC - FPD
KERR MCGEE CHEMICAL CORP
Area COLUMBUS MS
Boring No. CMW-14
Date

GRADATION CURVES

GPO 926-250

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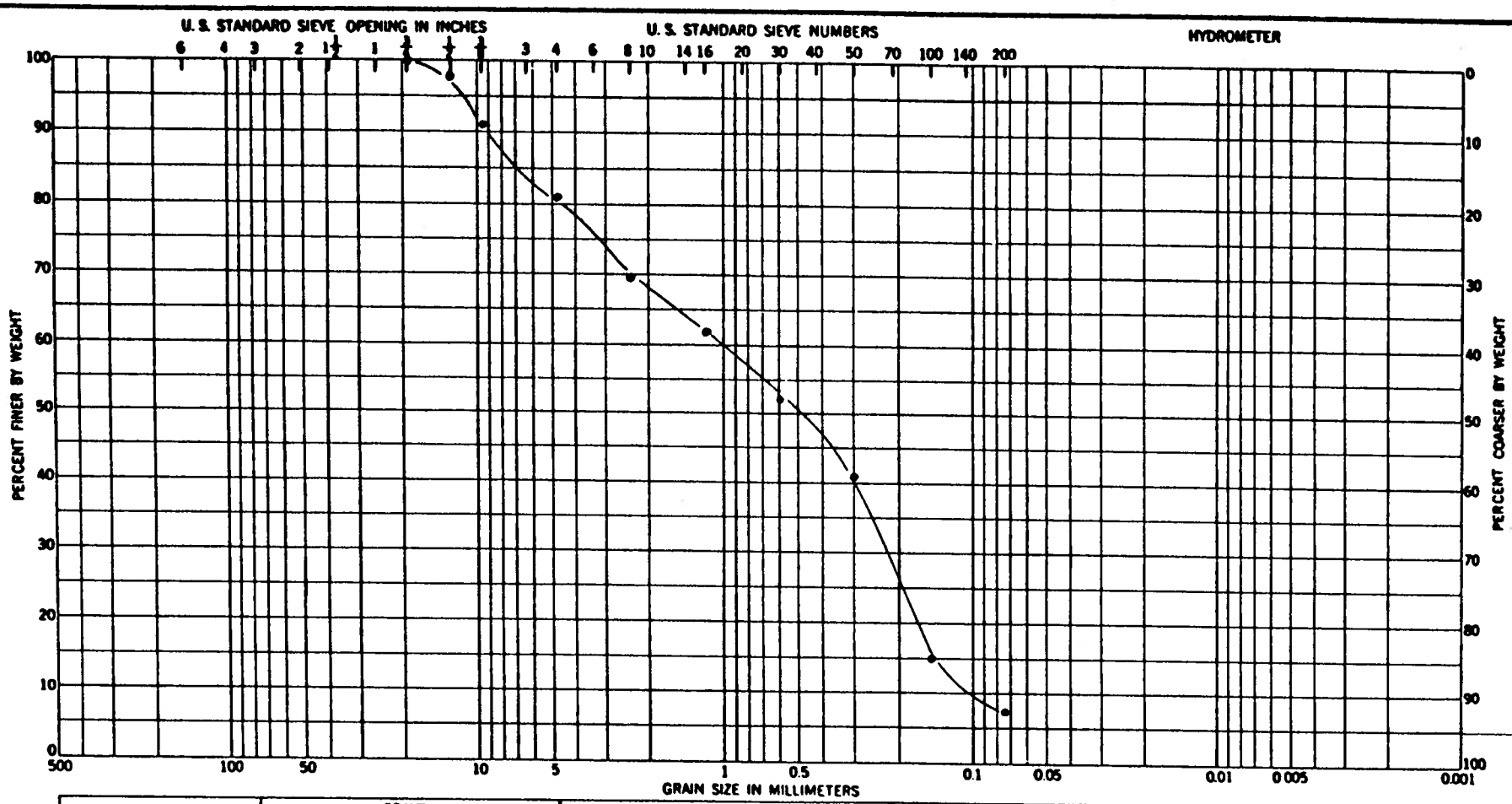


Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	18.0'-19.0'	ORANGISH GRAY SILTY SAND W/GRAVEL (SP-SM)	18	NON-PLASTIC		

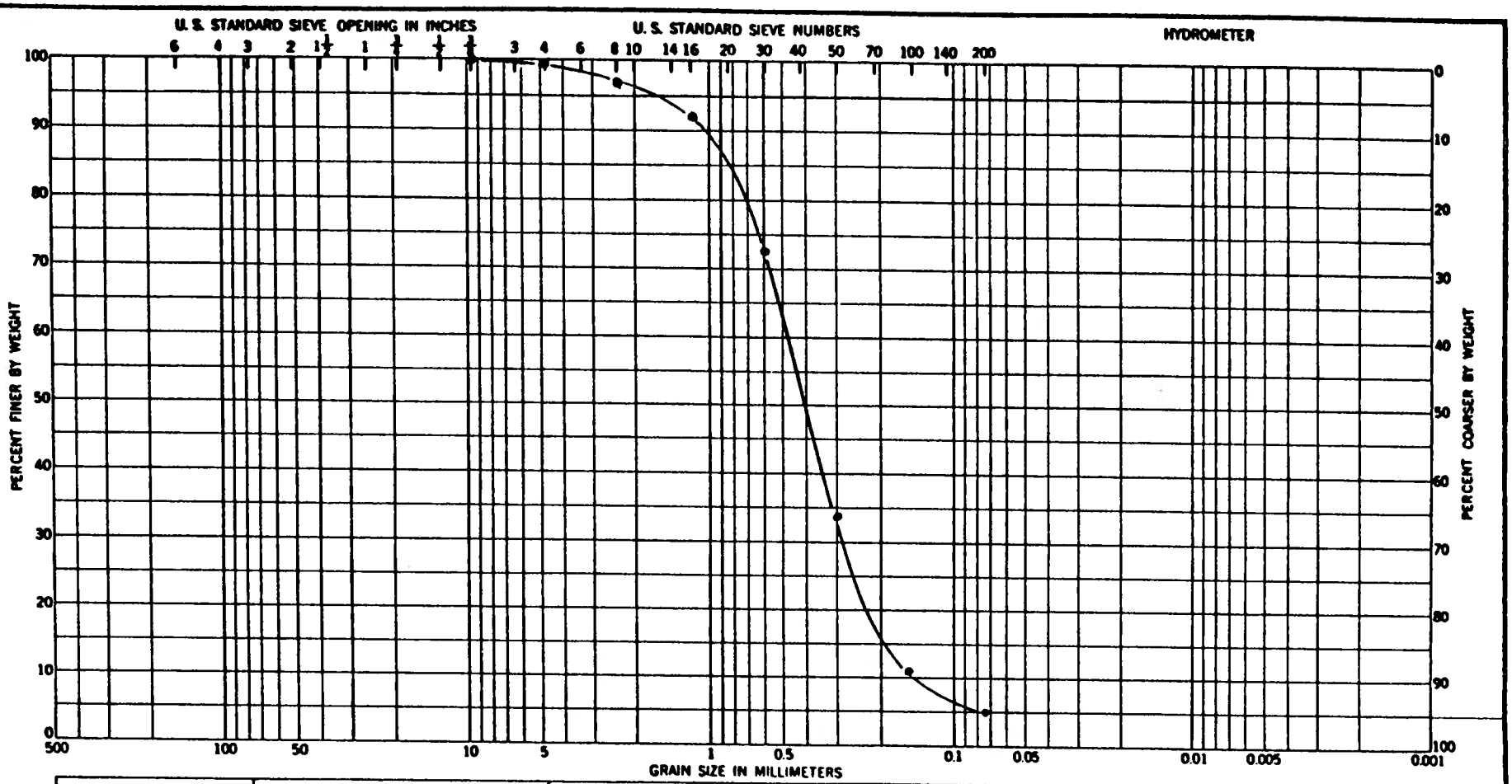
Project: KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area: COLUMBUS, MS
Boring No.: CMW-14
Date: [illegible]

GRADATION CURVES

GPO 926-250

TTL, Inc. A SERVICE ORGANIZATI(

ENVIRONMENTAL • GEOLOGICAL • MINERALOGICAL • GEOTE



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	20.5'-21.5'	TAN SILTY SAND (SP-SM)	24	NON-PLASTIC		

Project KMCC - FPD
KERR MCGEE CHEMICAL CORP
Area COLUMBUS, MS
Boring No. CMW-14
Date

GRADATION CURVES

GPO 926-250

TTL, Inc. A SERVICE ORGANIZATIC
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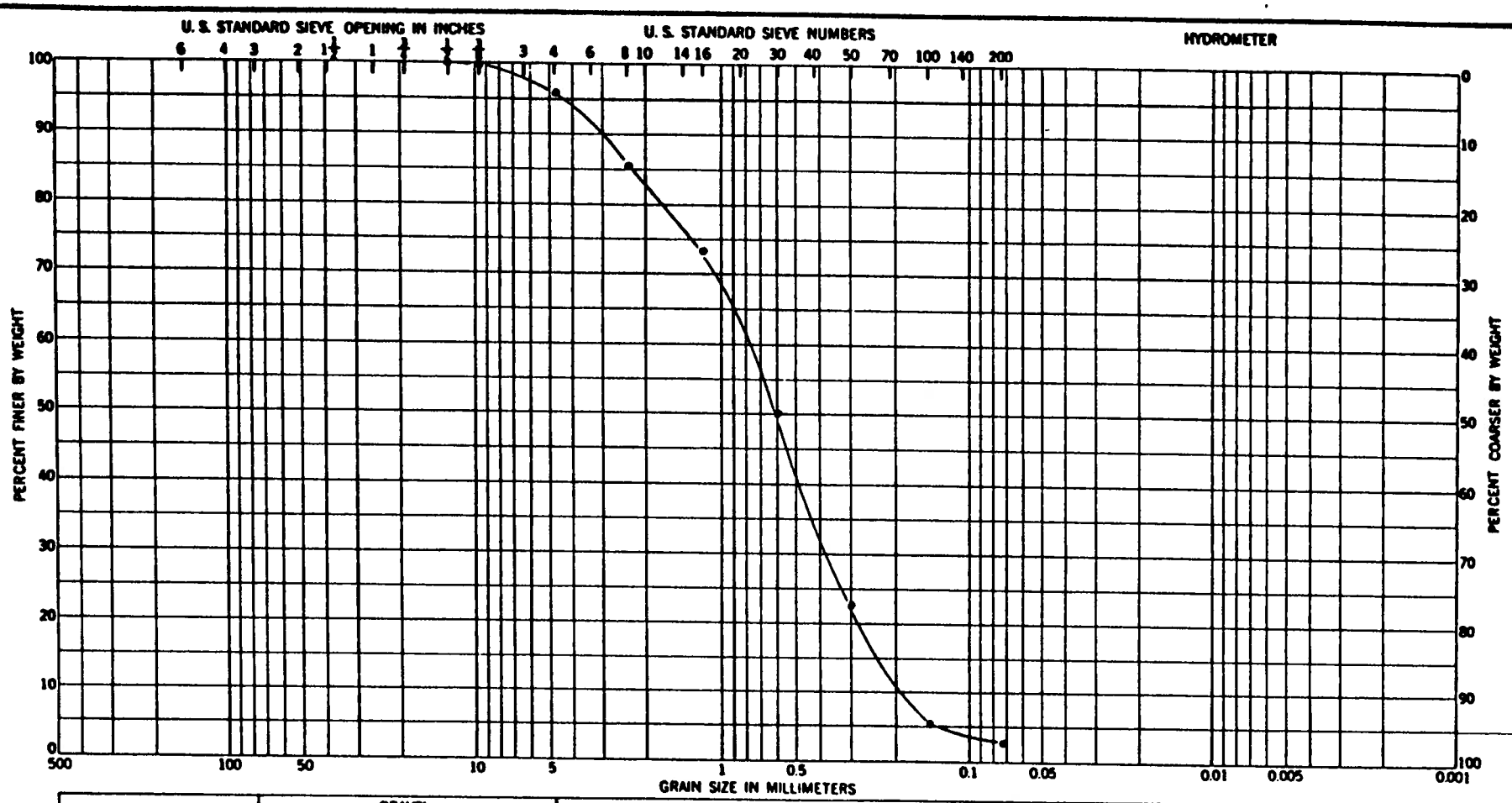


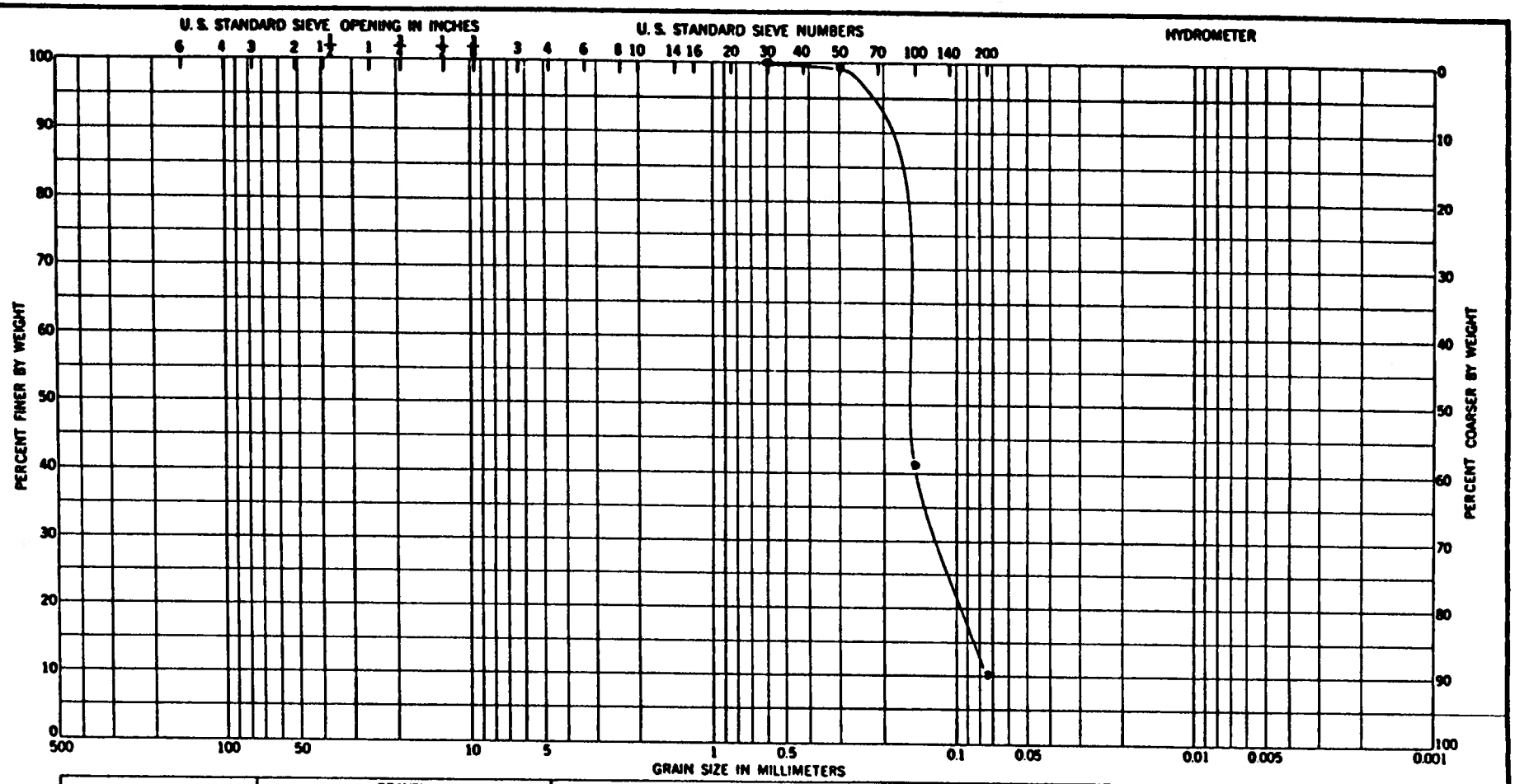
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	22.0'-23.0'	TAN SILTY SAND W/TRACE GRAVEL (SP)	18	NON-PLASTIC		

Project: KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area: COLUMBUS, MS
Boring No.: CMW-14
Date: [illegible]

GRADATION CURVES

TTL, Inc. A SERVICE ORGANIZATION
ENVIRONMENTAL • GEOLOGICAL • MINERALOGICAL • GEOTECH

GPO 926-250



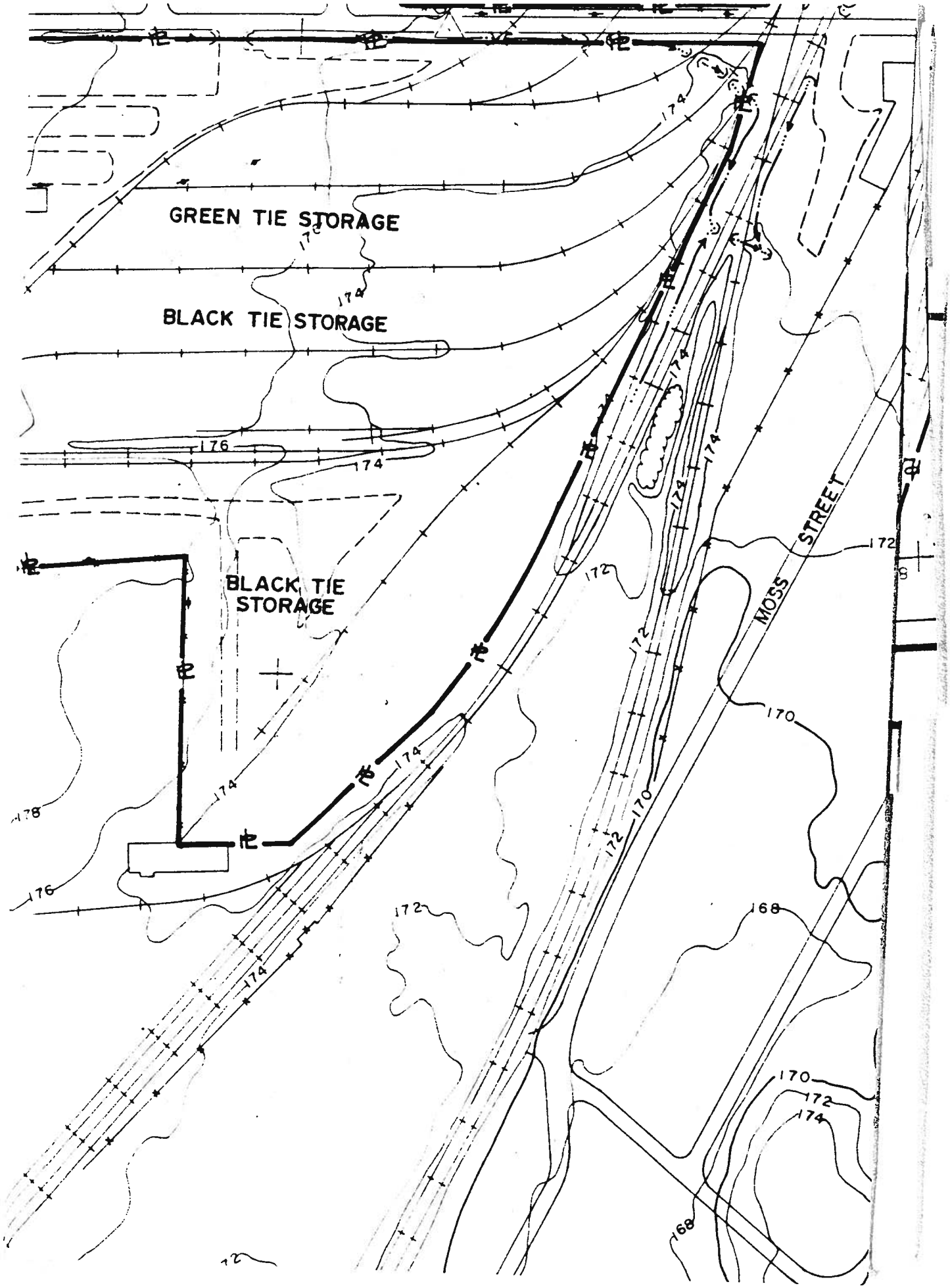
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
P-5	23.5'-24.0'	ORANGISH TAN SILTY FINE SAND (SP-SM)	27	NON-PLASTIC		

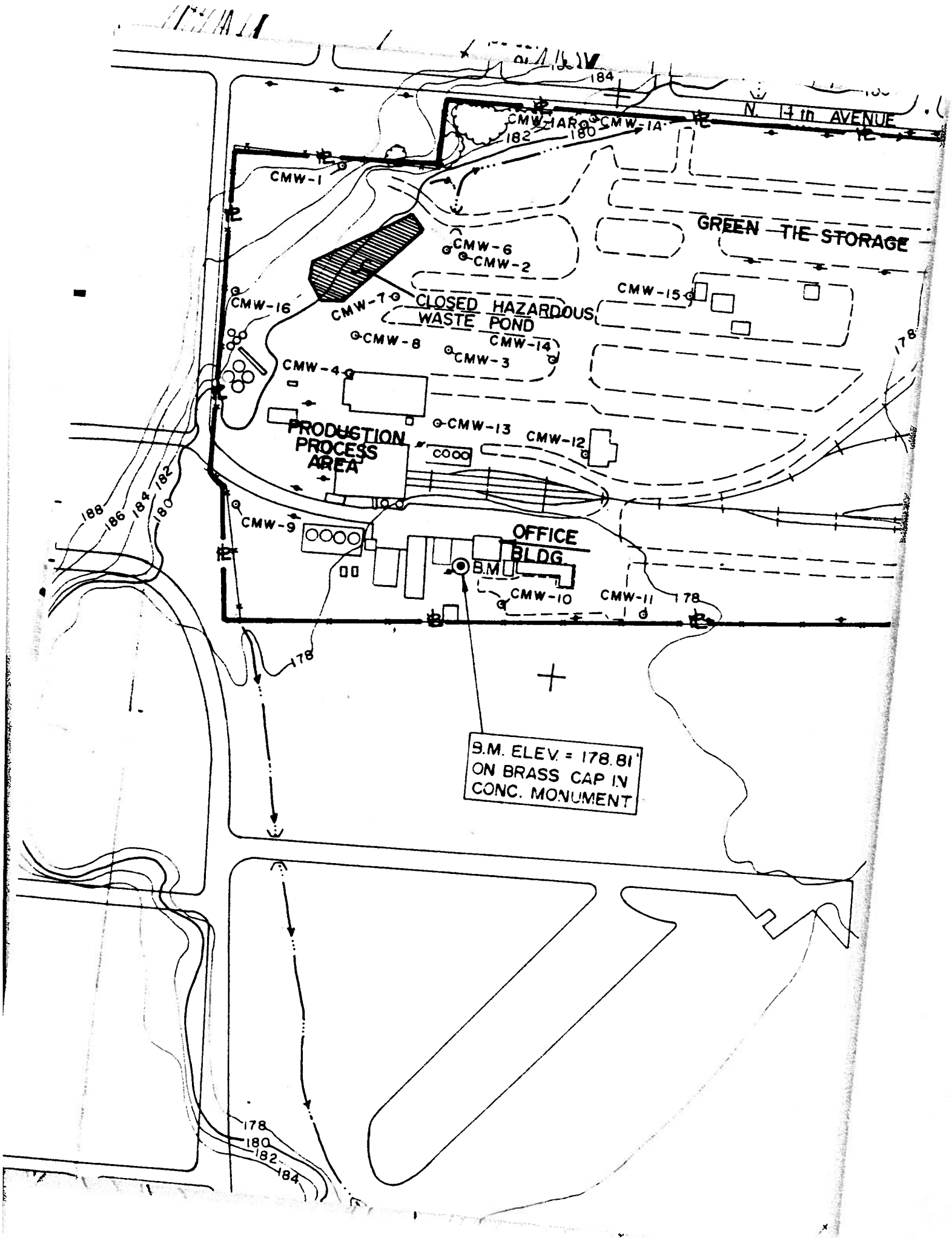
Project: KMCC - FPD
KERR MCGEE CHEMICAL CORP.
Area: COLUMBUS, MS
Boring No.: CMW-14
Date:

GRADATION CURVES

D 926-250

TTL, Inc. A SERVICE ORGANIZATION
ENVIRONMENTAL • GEOLOGICAL • MINERALOGICAL • GEOTECHN


GREEN TIE STORAGE
BLACK TIE STORAGE
BLACK TIE STORAGE
MOSS STREET
174
176
178
172
170
168


N. 14th AVENUE
CMW-1AR
CMW-1A
CMW-1
CMW-6
CMW-2
GREEN TIE STORAGE
CMW-15
CMW-16
CMW-7
CLOSED HAZARDOUS WASTE POND
CMW-8
CMW-14
CMW-3
CMW-4
PRODUCTION PROCESS AREA
CMW-13
CMW-12
CMW-9
OFFICE BLDG
B.M.
CMW-10
CMW-11
S.M. ELEV. = 178.81' ON BRASS CAP IN CONC. MONUMENT
184
182
180
178
188
186