Impact

Number of Injuries: _____ Number of Deaths: _____

Were there Evacuations? ___ (Y/N) Number Evacuated: _____

Need for offsite protective action (road closure, shelter in place, evacuation route)?

Was there any Damage? ___ (Y/N)

Damage in Dollars (approximate): _____

Medium Affected: _____

Description: _____

More Information about Medium: _____

_____

Additional Information

Any information about the incident not recorded elsewhere in the report: _____

_____

_____

_____

_____

_____

_____

_____

_____

Caller Notifications

EPA? ___ (Y/N) USCG? ___ (Y/N) State? ___ (Y/N)

Other? ___ (Y/N) Describe: _____

_____

1.0 ERAP INTRODUCTION

This section describes the emergency response structure, response procedures for various scenarios, and the clean-up and disposal procedures for each scenario.

2.0 EMERGENCY RESPONSE STRUCTURE

The on-site Emergency Response Coordinator (ERC), as identified in ERAP-1, is responsible for all activities by facility personnel during an emergency event. The ERC shall determine the level of response by an outside contractor based on the initial assessment of the event through the information provided by the first observer as relayed through that employee's Shift Supervisor. The information to be provided to the ERC is identified under Section 1.0, Internal Notification Procedures, of ERAP-2. Off-site contractor involvement shall be adjusted by the ERC based upon information gathered during the response operation. The ERC shall delegate the responsibilities for emergency response to qualified and properly trained off-site contractors.

Cleco personnel at the Rodemacher facility shall assist the ERC in responding to emergency situations in an effective manner. The facility personnel can only:

- If safe conditions warrant, render assistance to persons involved in the incident and remove them from exposure to a safe area if necessary
- Warn personnel in adjacent areas of any potential hazards to their safety
- Render immediate first-aid (appropriate measures include washing under a safety shower, administering oxygen and artificial resuscitation, and first-aid measures if indicated)

The ERC shall notify an off-site contractor if necessary to:

- Respond in an appropriate manner to emergency event (i.e., boom deployment, application of absorbent material, extinguish small fires with portable extinguisher, turn off nearby apparatus and remove combustible materials from area).

3.0 ON-SITE COMMAND CENTER / COMMUNICATION

The ERC shall designate an On-Site Command Center (OSCS) as necessary for each emergency event. The magnitude and location of the OSCS shall be commensurate with the magnitude of the event.

A Public Announcement (PA) System is located throughout the plant. This alarm may be easily activated by the ERC, or designated personnel. The PA System may be heard within the boundaries of the main plant facility.

4.0 RESPONSE PROCEDURES

The following are the emergency response procedures for various types of scenarios.

4.1 Oil Spill

An inventory of oil containers is included as **Appendix D** and the locations of the containers are shown in **Figure 2**.

The main focus of the initial response to an oil spill is to protect human health and safety, then the environment. Identification, containment, treatment and disposal assessment is part of the secondary phase.

In the event of a discovery of a process failure or an oil spill that cannot be quickly contained or controlled by personnel in the affected area, the notification procedures outlined in ERAP-2 shall be implemented. If immediate first aid is necessary, it may be necessary to send a fellow employee to provide the internal notification.

The information presented to the ERC, as listed in ERAP-4, shall be utilized to assess the emergency situation. If the situation is determined to be within the facility's emergency response capability, the ERC will determine if the off-site contractors should be activated and notify outside entities as required by law. Upon notification, the ERC will respond to the affected area by performing the tasks listed below.

ERC Procedures
1. Notify off-site spill response contractors, if required 2. Direct the provision of equipment and people, as necessary 3. Provide a determination of material disposal 4. Declare the end of the emergency

If the situation is determined to be beyond the facility's emergency response capabilities, the ERC will order an evacuation of any affected area to ensure employee, public and environmental safety, as necessary. Appropriate outside agencies and emergency contractors shall be contacted as required by law and as necessary for assistance. The oil spill response contractor (OSRC) has first responder responsibilities for this facility. They will provide all equipment other than that necessary for initial containment.

4.1.1 Disposal Plan

Cleco shall take appropriate actions to recover, reuse, or dispose of materials after a discharge has taken place. Materials shall be disposed at an offsite facility that has been properly permitted. The appropriate permits and manifests required to transport or dispose of recovered materials shall be obtained. Disposal will be in accordance with Federal [e.g., the Resource Conservation and Recovery Act (RCRA)], state and local regulations, where applicable. Materials what will be accounted for in the disposal process include:

- Recovered product
- Contaminated soil
- Contaminated equipment and materials, including drums, tank parts, valves, and shovels
- Personnel Protective Equipment (PPE)
- Decontamination solutions
- Adsorbents
- Spent chemicals

4.2 Chemical Releases

An inventory of chemical containers is included as **Appendix D**; the locations of the containers are shown in **Figure 2**.

4.2.1 Immediate Response Actions

The duties of the ERC will include performing the following activities:

1. Activation of alarms to notify all facility personnel
2. Notification of all response personnel, as needed
3. Identification of the source, character, amount and extent of the spill or release and other information necessary for notification
4. Notification of appropriate federal, state, and local authorities
5. Assessment of the interaction of the spilled material with the water or soil media it has come into contact with and notification of the response personnel of that assessment
6. Assessment of possible hazards to human health, property, and the environment from the spill or release and notification of the response personnel of that assessment

7. Implementation of prompt removal actions to contain and remove the spilled material, including notification and deployment of the emergency response contractor
8. Coordination of rescue and response actions with all response personnel
9. Utilization of company funds to initiate containment and cleanup activities,
10. Direct cleanup activities until properly relieved of this responsibility

4.2.2 Chlorine Release

In the event of a chlorine gas release, the Shift Supervisor shall:

1. Announce to all personnel in the plant area that a chlorine cylinder is leaking. He will give the location and advise plant personnel to move to an upwind area until the leak is contained
2. Advise Operations Supervisor and/or Plant Manager of the condition
3. The Operations Supervisor or Plant Manager shall contact the off-site cylinder repair contractor to contain the leak. The cylinder repair contractor will bring with them self-contained breathing apparatus, kit, and other equipment necessary to complete the work as expediently as possible
4. After the leak has been secured, the Shift Supervisor will announce over the PA system that the leak has been secured and normal work routine can commence
5. Within five working days, the Plant Manager will prepare an incident report to the Manager of Production describing the emergency and steps taken to alleviate the condition

4.3 Facility Diagram

A Site Location Map and Facility Plot Plan are provided as **Figure 1** and **Figure 2** respectively.

1.0 EVACUATION PROCEDURES

Based on the analysis of the facility, a facility-wide evacuation plan has been developed. In addition, plans to evacuate parts of the surrounding communities that are at a high risk of exposure in the event of a spill or other release have been developed. Evacuation routes are shown on the diagram of the facility (see Section 1.9). Consideration has been given to the following:

1. location of stored materials
2. hazard imposed by spilled material
3. spill flow direction
4. prevailing wind direction and speed
5. water currents
6. arrival routes of emergency response personnel and equipment
7. evacuation routes
8. alternative routes of evacuation
9. transportation of injured personnel to nearest emergency medical facility
10. location of alarm/notification systems
11. the need for a centralized check-in area for evacuation validation (roll call)
12. selection of a mitigation command center
13. location of shelter at the facility as an option to evacuation

The primary evacuation route for employees at the facility will be to exit through the main gate to State Route 8, proceed east to State Route 1, and then proceed south and east to the town of Boyce. A central check-in area can be established east of the plant in Boyce. Employees can check-in at the check-in area to confirm that everyone has been evacuated. In the event that the main access road is inaccessible, there is an alternate access road that exits directly to State Route 1.

In the event that it is necessary to evacuate all or part of Boyce, evacuation should follow the direction of local authorities but will generally be east along State Route 1 or Interstate 49 to Alexandria.

The evacuation routes for the facility are shown on **Figures 1 and 2**.

1.0 EMERGENCY RESPONSE EQUIPMENT

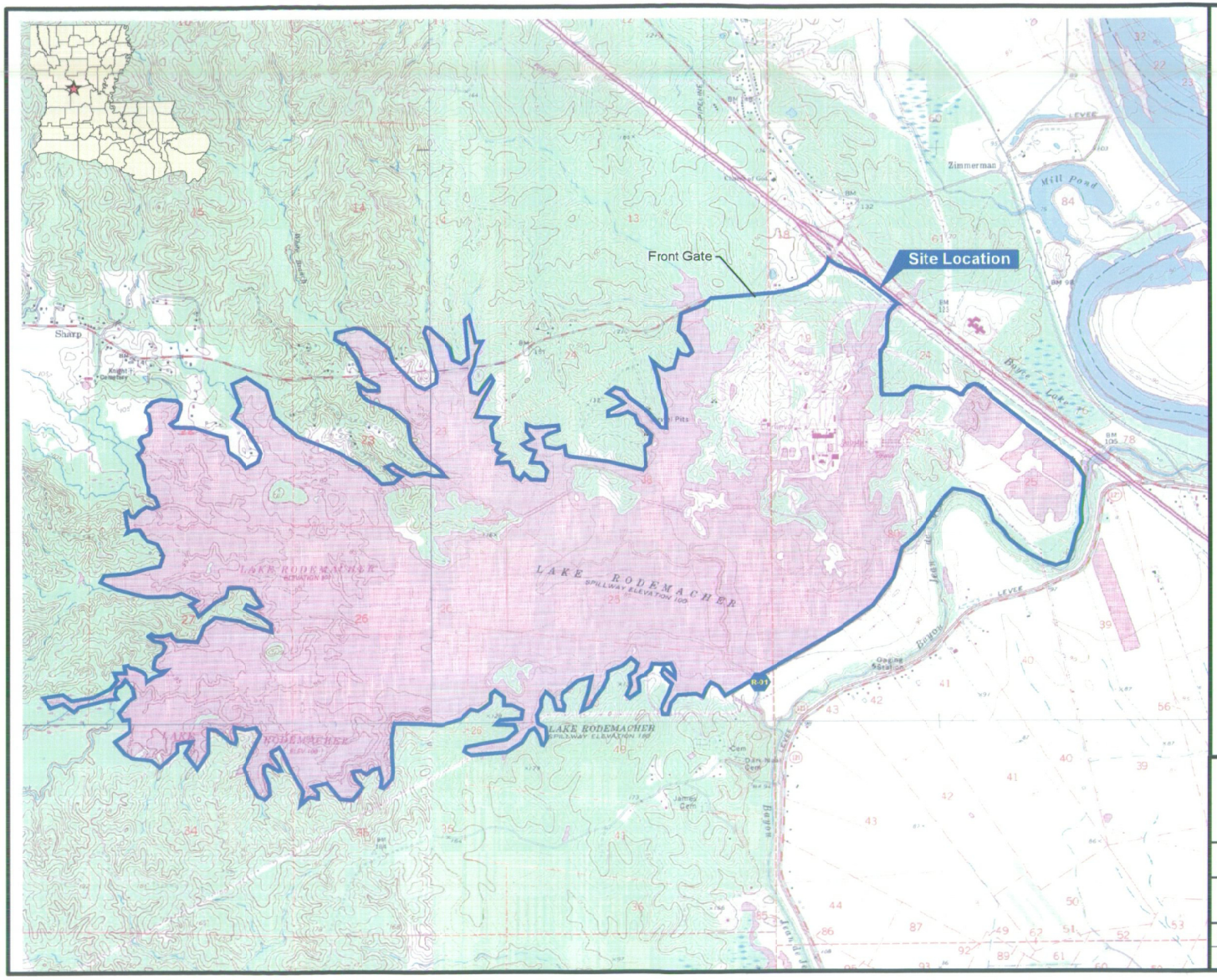
Spill response equipment is located in the Tool Room and the Coal Yard Warehouse. The items listed below are the typical spill response equipment maintained at the facility.

- Booms
- Oil Dry
- Absorbent Materials
- Sorbent Pads
- Pig Blankets
- Pig Socks

For additional response equipment contact the off-site spill response contractors listed in the contact list (ERAP-1) and see **Appendix B** of the FRP.

2.0 TESTING AND DEPLOYMENT

See **Appendix C** of the FRP for testing and deployment documentation for onsite emergency response equipment. See **Appendix K** of the FRP for documentation associated with the testing and deployment of emergency response equipment to be provided by spill response contractors.



N

Legend

R-01 LPDES Permitted Outfall

Reference

Base map comprised of U.S.G.S. 7.5 minute topographic maps, "Jencho, LA" 1954, revised 1993, "Gardner, LA" 1971, revised 1992, "Lena, LA" 1954, revised 1992 and "Boyce, LA" 1971, revised 1992.

2,500 1,250 0 2,500 Feet

Site Location Map

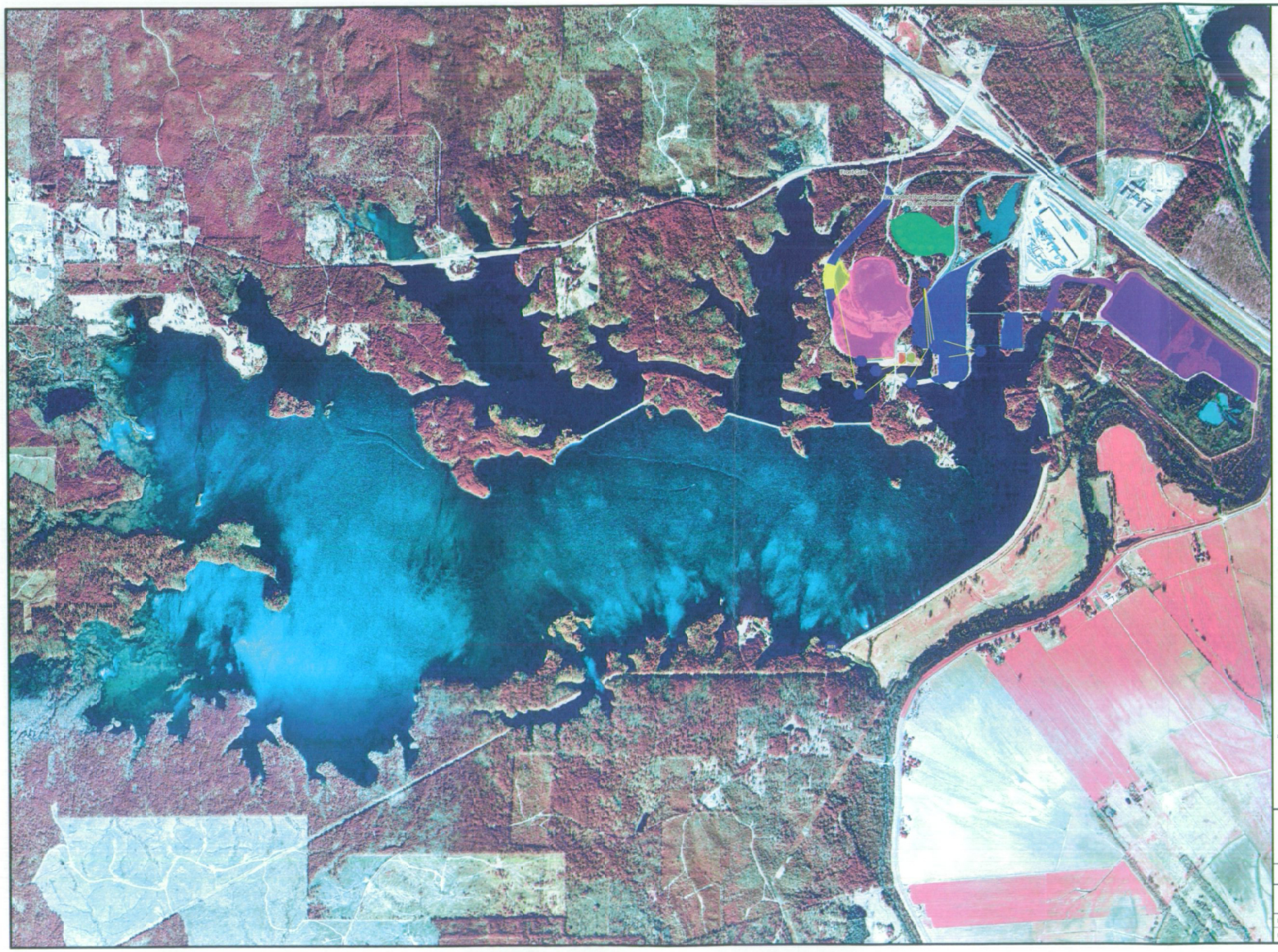
Facility Response Plan
Rapides Parish

Cleco Power, LLC
Rodemacher Power Station

PROVIDENCE
ENGINEERING & ENVIRONMENTAL GROUP LLC

Doc. Code:	002-023	Drawn: BFL Checked: Approved:	1
Dwg. No.:	002-023-B001	Date: 04/06/05	Figure

LDEQ-EDMS Document 35857654, Page 208 of 403



Legend

- Drainage Area to Lake Rodemacher
- Drainage Area to Lake Rodemacher
- Drainage Area to Lake Rodemacher
- Drainage Area to Lake Rodemacher
- Drainage Area to Lake Rodemacher
- No Discharge
- LPDES :LA0008036 Final Discharge Outfall Location
- Drainage Points

Note

All storm water runoff associated with industrial activity from the entire facility (with the exception of the Tank Farm area) drains into Lake Rodemacher which overflows into Bayou Jean de Jean at Outfall R01.

Reference

Base map comprised of 1998 aerial photograph.

900 450 0 900 Feet

Storm Water Drainage Map

Facility Response Plan
Rapides Parish

Cleco Power, LLC
Rodemacher Power Station

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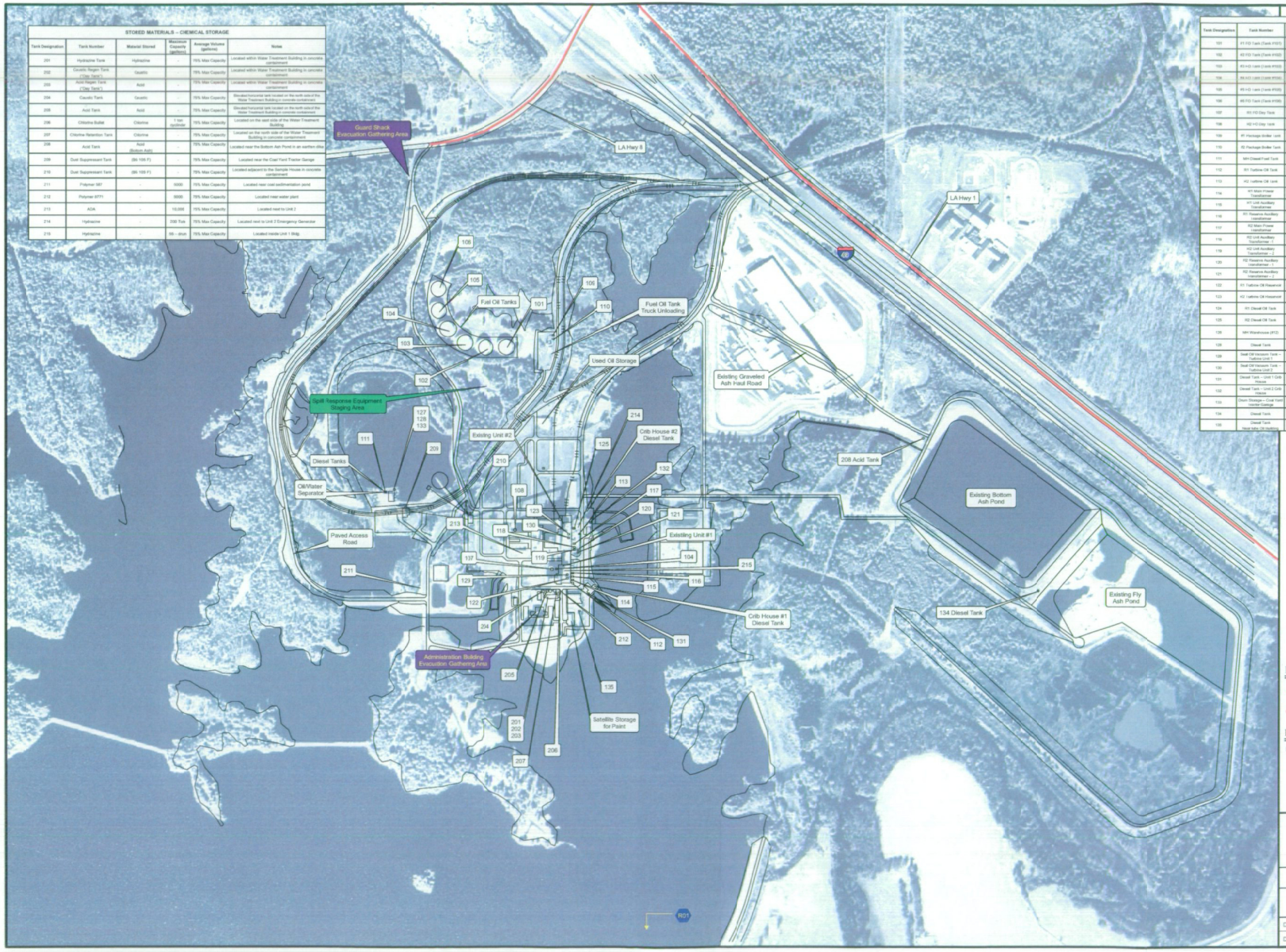
	Approved:		
	Date: 04/06/05	Figure	



STORED MATERIALS – CHEMICAL STORAGE

Tank Designation	Tank Number	Material Stored	Maximum Capacity (gallons)	Average Volume (gallons)	Notes
201	Hydrazine Tank	Hydrazine	-	75% Max Capacity	Located within Water Treatment Building in concrete containment
202	Caustic Regen Tank (Day Tank)	Caustic	-	75% Max Capacity	Located within Water Treatment Building in concrete containment
203	Acid Regen Tank (Day Tank)	Acid	-	75% Max Capacity	Located within Water Treatment Building in concrete containment
204	Caustic Tank	Caustic	-	75% Max Capacity	Elevated horizontal tank located on the north side of the Water Treatment Building in concrete containment
205	Acid Tank	Acid	-	75% Max Capacity	Elevated horizontal tank located on the north side of the Water Treatment Building in concrete containment
206	Chlorine Bullet	Chlorine	1 ton cylinder	75% Max Capacity	Located on the east side of the Water Treatment Building
207	Chlorine Retention Tank	Chlorine	-	75% Max Capacity	Located on the north side of the Water Treatment Building in concrete containment
208	Acid Tank (Bottom Ash)	Acid	-	75% Max Capacity	Located near the Bottom Ash Pond in an earthen dike
209	Dust Suppressant Tank	(Bi 105 F)	-	75% Max Capacity	Located near the Coal Yard Tractor Garage
210	Dust Suppressant Tank	(Bi 105 F)	-	75% Max Capacity	Located adjacent to the Sample House in concrete containment
211	Polymer 587	-	5000	75% Max Capacity	Located near coal sedimentation pond
212	Polymer 8771	-	5000	75% Max Capacity	Located near water plant
213	ADA	-	10,000	75% Max Capacity	Located next to Unit 2
214	Hydrazine		200 Tub	75% Max Capacity	Located next to Unit 2 Emergency Generator
215	Hydrazine		55 - drum	75% Max Capacity	Located inside Unit 1 Bldg.

STORED MATERIALS – OIL STORAGE

Tank Designation	Tank Number	Material Stored	Maximum Capacity (gallons)	Average Volume (gallons)	Notes
101	#1 FO Tank (Tank #101)	Fuel Oil	3,250,000	75% Max Capacity	earthen dike
102	#2 FO Tank (Tank #102)	Fuel Oil	3,250,000	75% Max Capacity	earthen dike
103	#3 FO Tank (Tank #103)	Fuel Oil	3,250,000	75% Max Capacity	earthen dike
104	#4 FO Tank (Tank #104)	Fuel Oil	3,250,000	75% Max Capacity	earthen dike
105	#5 FO Tank (Tank #105)	Fuel Oil	3,250,000	Empty	earthen dike
106	#6 FO Tank (Tank #106)	Fuel Oil	3,250,000	Empty	earthen dike
107	#1 FO Day Tank	Fuel Oil	604,000	75% Max Capacity	Steel Berm
108	#2 FO Day Tank	Fuel Oil	630,000	-	Not in Service
109	#1 Package Boiler Tank	Diesel Oil	16,800	-	Not in Service
110	#2 Package Boiler Tank	Diesel Oil	16,800	-	Not in Service
111	MH Diesel Fuel Tank	Diesel Oil	10,000	75% Max Capacity	Cinder Block Containment
112	#1 Turbine Oil Tank	Lubricating Oil	10,000	75% Max Capacity	concrete containment (infrared squeeze)
113	#2 turbine Oil tank	transformer Oil	10,000	75% Max Capacity	concrete containment (infrared squeeze)
114	#1 Main Power Transformer	transformer Oil	15,000	75% Max Capacity	concrete containment
115	#1 Unit Auxiliary Transformer	transformer Oil	1,120	75% Max Capacity	concrete containment
116	#1 Reserve Auxiliary transformer	transformer Oil	2,010	75% Max Capacity	concrete containment
117	#2 Main Power transformer	transformer Oil	13,250	75% Max Capacity	concrete containment
118	#2 Unit Auxiliary Transformer - 1	transformer Oil	3,790	75% Max Capacity	concrete containment
119	#2 Unit Auxiliary Transformer - 2	transformer Oil	3,790	75% Max Capacity	concrete containment
120	#2 Reserve Auxiliary transformer - 1	transformer Oil	12,079	75% Max Capacity	concrete containment
121	#2 Reserve Auxiliary transformer - 2	transformer Oil	12,079	75% Max Capacity	concrete containment
122	#1 Turbine Oil Reservoir	Lubricating Oil	5,450	75% Max Capacity	floor drain (infrared squeeze)
123	#2 turbine Oil Reservoir	Lubricating Oil	7,450	75% Max Capacity	floor drain (infrared squeeze)
124	#1 Diesel Oil Tank	Diesel Oil	550	75% Max Capacity	Emergency Generator
125	#2 Diesel Oil Tank	Diesel Oil	550	75% Max Capacity	Emergency Generator
126	MH Warehouse (#12)	Waste Continuous W. Lubricating Oil and Sludge Oil	2,000	75% Max Capacity	concrete containment
128	Diesel Tank	Diesel Oil	300	75% Max Capacity	- located overhead of Coal Yard Warehouse in earthen dike
129	Shaft Oil Vacuum Tank – Turbine Unit 1	Lubricating Oil	-	75% Max Capacity	concrete containment
130	Shaft Oil Vacuum Tank – Turbine Unit 2	Lubricating Oil	-	75% Max Capacity	concrete containment
131	Diesel Tank – Unit 1 Crib House	Diesel Oil	500	75% Max Capacity	Elevated tank used for fuel storage for Generator pump
132	Diesel Tank – Unit 2 Crib House	Diesel Oil	500	75% Max Capacity	Elevated tank used for fuel storage for Generator pump
133	Drum Storage – Coal Yard Tractor Garage	Used Oil	approx. 4 55 gallon drums	75% Max Capacity	concrete curbing
134	Diesel Tank	Diesel	250	75% Max Capacity	Located adjacent to Bottom Ash Pond in an earthen dike
135	Diesel Tank (near fuel oil heating)	Diesel Oil	500	75% Max Capacity	Located Near Maintenance Warehouse. Used Oil Service Area

Legend

LPDES Permitted Outfall

Evacuation Route

Reference

Base map comprised of 1998 aerial photograph.

400 200 0 400 Feet

Facility Plot Plan

Facility Response Plan
Rapides Parish

Cleco Power, LLC
Rodemacher Power Station

PROVIDENCE
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Dwg. No.: 002-023-C005	Approved:		Figure
	Date: 04/06/05		

APPENDIX F

REGIONAL GEOLOGIC AND HYDROGEOLOGIC DATA

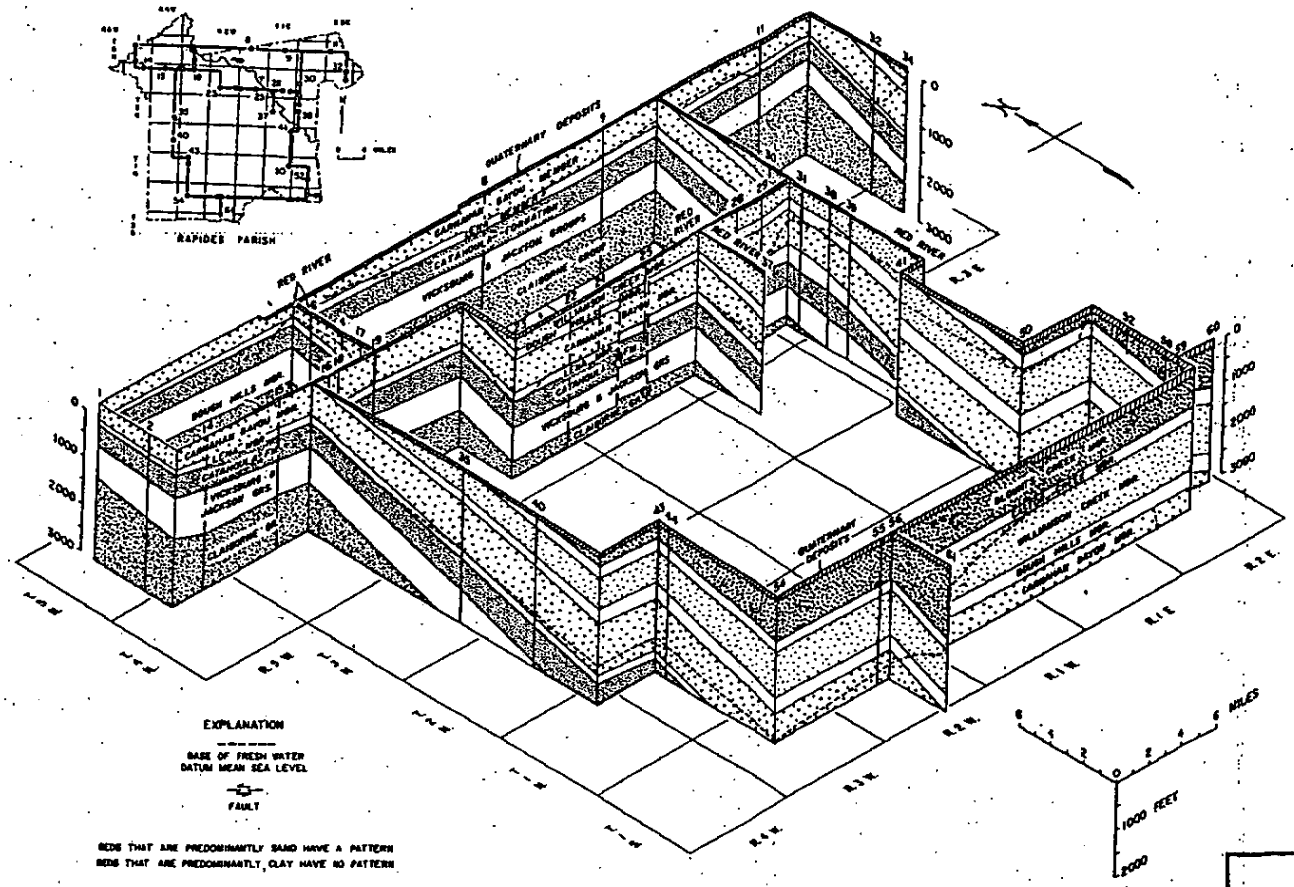

FIGURE 4

RODEMACHER POWER STATION
Solid Waste Management Plan
Permit Application

~~EXHIBIT 5~~

FENCE DIAGRAM SHOWING DEPTHS OF GEOLOGICAL UNITS IN RAPIDES PARISH

LDEQ-EDMS Document 35857654, Page 212 of 403

(ALL TERMS ESTABLISHED FROM SURFACE STUDIES UNLESS OTHERWISE INDICATED)

System	Series	Group	Formation	Member	Zone
QUATERNARY	RECENT	ALLUVIUM			
QUATERNARY	PLEISTOCENE	TERRACE DEPOSITS (Terraces, gravel, clays, sand, silt, clay)	LATE WISCONSIN PEORIAN EARLY WISCONSIN SANGAMON ILLINOIAN YARMOUTH KANSAN AFTONIAN NEBRASKAN	PRAIRIE Unconformity MONTGOMERY Unconformity BENTLEY Unconformity WILLIANA Unconformity	
TERTIARY	PLIOCENE				
TERTIARY	MIOCENE	GRAND GULF	FLEMING	BLOUNTS CREEK CASTOR CREEK WILLIAMSON CREEK DOUGH HILLS CARNAHAN BAYOU LENA	RANGIA JOHNSONI (Subsurface) POTLINDES WATSONI
TERTIARY	MIOCENE	GRAND GULF	CATAHOULA	Subsurface (Howe, 1934): UPPER CHICKASAWHAY LOWER CHICKASAWHAY	Subsurface: DISCORBIS HETEROSTEGINA MARGINULINA
TERTIARY	OLIGOCENE	VICKSBURG	Fish, Gastrod, Bat Brachiopod, Echinoid, Foraminifera (Cooke, 1923): BYRAM GLENDON MARIANNA FOREST HILL RED BLUFF		TEXTULARIA TIMOLUNI: BYRAM MARL FAUNA TEXTULARIA WARRENI MINT SPRING MARL FAUNA
TERTIARY	EOCENE	JACKSON	Fish, Gastr: DANVILLE LOG BEDS YAZOO CLAY MOODYS BRANCH MARL	VERDA TULLOS	MASSALINA PRATTI TEXTULARIA HOCKLEYENSIS TEXTULARIA DIBOLLENSIS CAMERINA MOODYBRANCHENSIS
TERTIARY	EOCENE	CLAIBORNE	COCKFIELD COOK MOUNTAIN SPARTA CANE RIVER	LITTLE MATCHES SALINE BAYOU WILMS DOUSON	Sub-surface: NONIONELLA COCKFIELDENSIS DISCORBIS YEGUAENSIS EPONIDES YEGUAENSIS CERATOBULIMINA EXIMIA SIPHONELLA CLAIBORNENSIS DISCOCYCLINA PERPUSILLA OPERCULINOIDES SABINENSIS LEPIDOCYCLINA GARDNERAE CYCLAMMINA SP HEMICHISTELLARIA (?) MUDICOSTATA DISCOCYCLINA ADVENA
TERTIARY	EOCENE	SABINE	WILCOX MANSFIELD	Lithol. by Howe, 1933 (Subsurface): Alabama Subsurface Unit HATCHETIGBEE BASHI TUSCAHOMA NANAFALIA	OSTREA THIRSAE
TERTIARY	PALEOCENE	MIDWAY	EXPOSED ONLY AROUND SALT DOMES IN NORTH LOUISIANA		
CRETACEOUS			EXPOSED ONLY AROUND SALT DOMES IN NORTH LOUISIANA		

CENOZOIC

MESOZOIC

FIGURE 22

RODEMACHER POWER STATION
Solid Waste Management Plan
Permit Application

~~EXHIBIT 6~~

LOUISIANA STRATIGRAPHIC COLUMN

OFFICE	DRAWN BY		CHECKED BY	APPROVED BY	DRAWING NUMBER
BTR	B. Holt	7/18/05			CLECOR_CDR-07

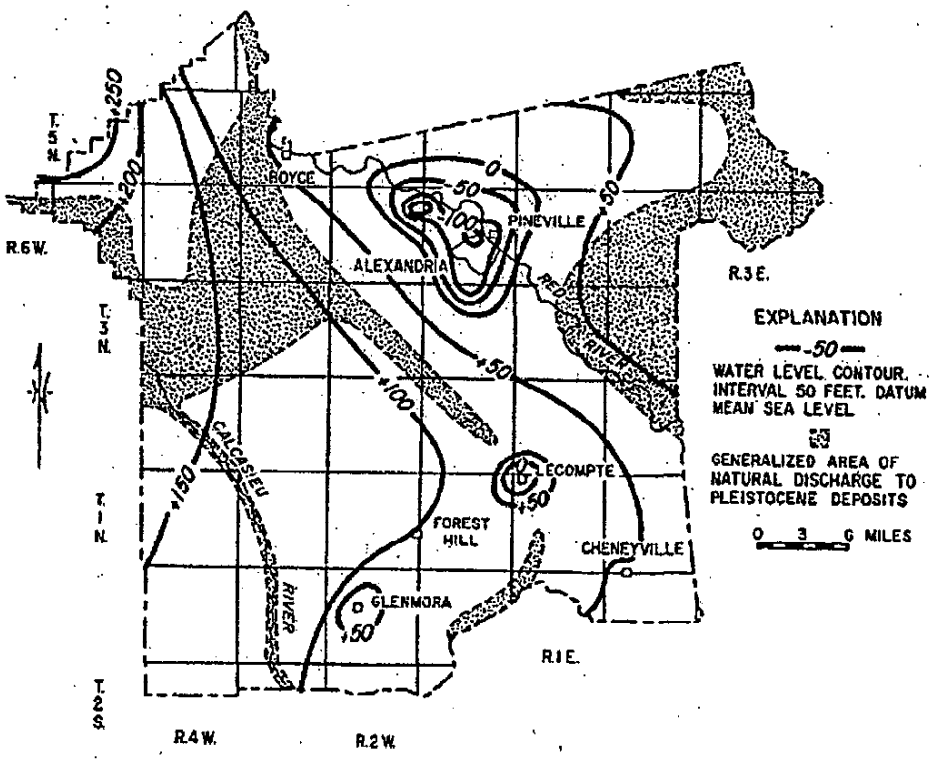

Figure 3. Ground water in Miocene aquifers was moving into overlying Pleistocene aquifers and toward other areas of discharge in 1962.

REFERENCE:
Figure 3, Water Resources of Rapides Parish, Louisiana, Water Resources Bulletin No. 8, Department of Conservation, Louisiana Geological Survey, and Louisiana Department of Public Works, April 1966.

Shaw®

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CLECO POWER, LLC
PINEVILLE, LOUISIANA

APPENDIX D

1962 POTENTIOMETRIC MAP OF MIOCENE SANDS

SOLID WASTE PERMIT APPLICATION
RODEMACHER POWER STATION
BOYCE, RAPIDES PARISH, LOUISIANA

Aquifer Systems

- ALLUVIAL
- CHICOT / TERRACES of central and north Louisiana
- SOUTHEAST LOUISIANA

1 0 1

Scale: 1" = 1 Mile

Note:

Modified from "Map #8/Aquifer Recharge Potential of the Alexandria Quadrangle, 1988".

CLECO Power LLC

Rodemacher Power Station

Aquifer Recharge Map

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL GEOTECHNICAL, INC.

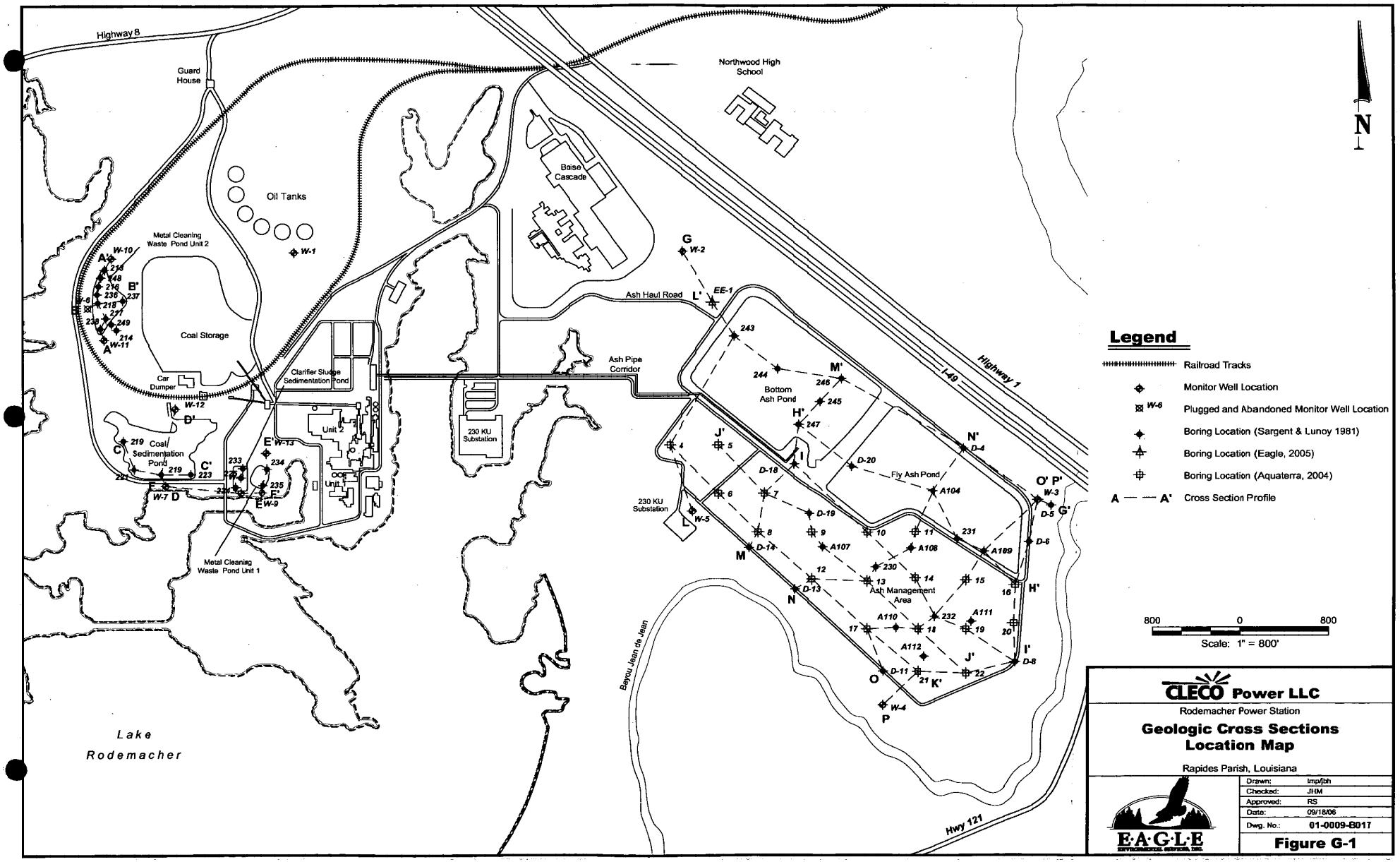
Drawn:	jbh
Checked:	JHM
Approved:	RS
Date:	04/19/05
Dwg. No.:	01-0009-C013

Figure F-1

LDEQ-EDMS Document 35857654, Page 215 of 403

APPENDIX G

GEOLOGIC CROSS SECTIONS AND ISOMETRIC SOIL PROFILES



CLECO Power LLC

Rodemacher Power Station

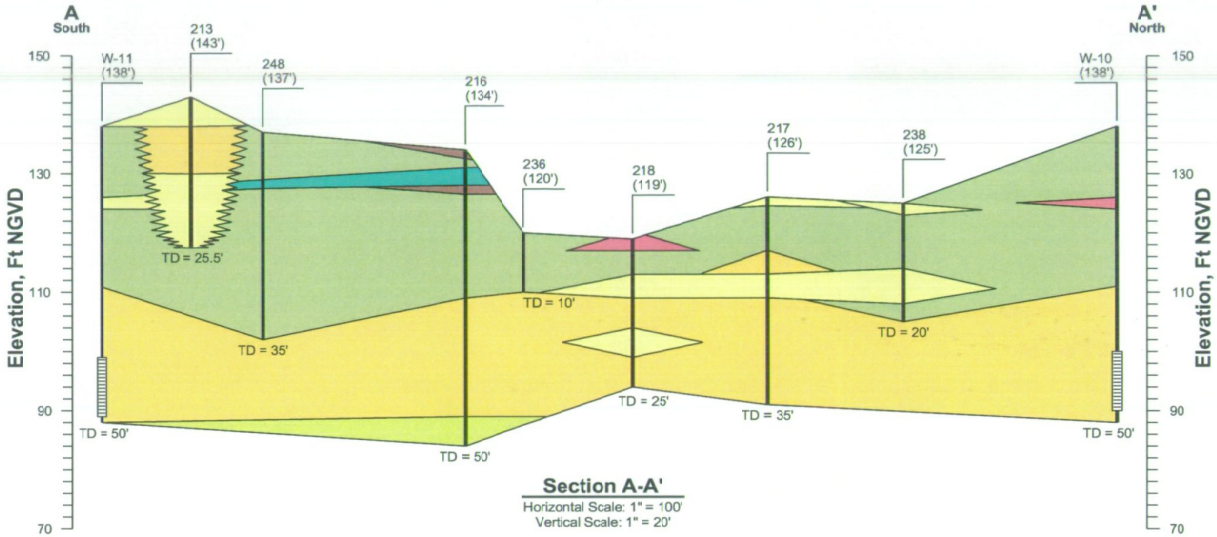
Geologic Cross Sections Location Map

Rapides Parish, Louisiana

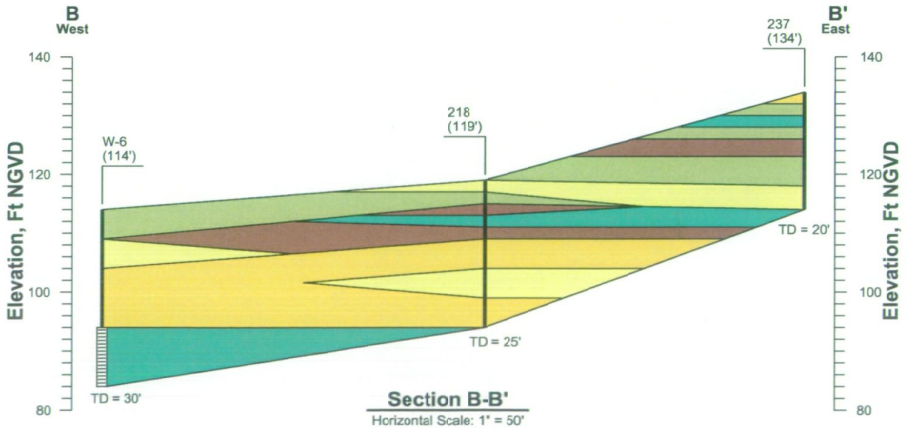
E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	tmp/jbh
Checked:	JHM
Approved:	RS
Date:	09/18/06
Dwg. No.:	01-0009-B017

Figure G-1



Section A-A'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'



Section B-B'
Horizontal Scale: 1" = 50'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Sections A-A' and B-B'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL GEOSCIENCE, INC.

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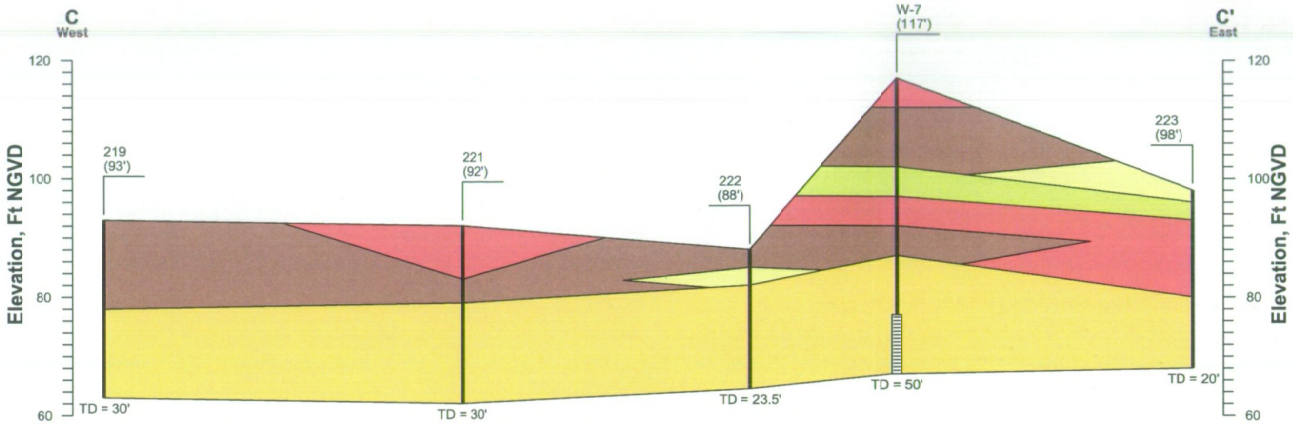
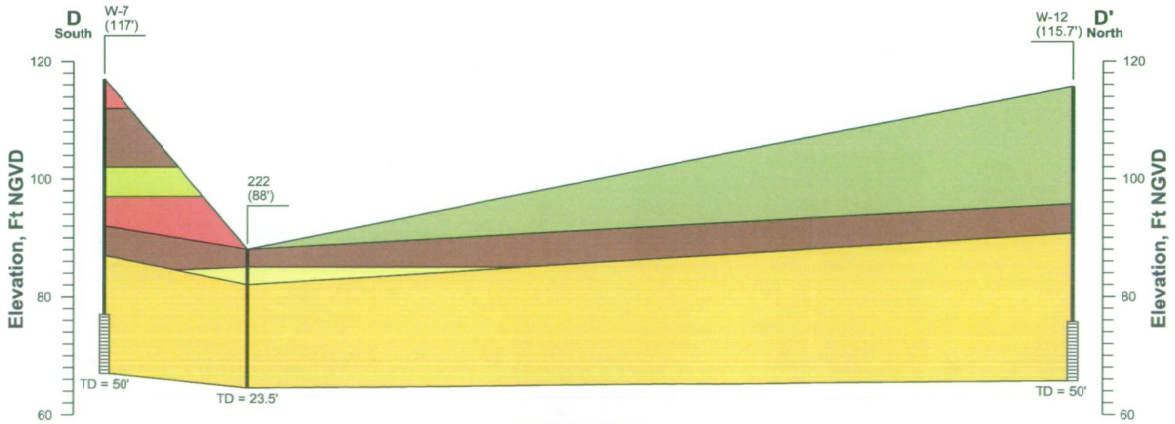
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B005

Figure G-2



Section C-C'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'



Section D-D'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Sections C-C' and D-D'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

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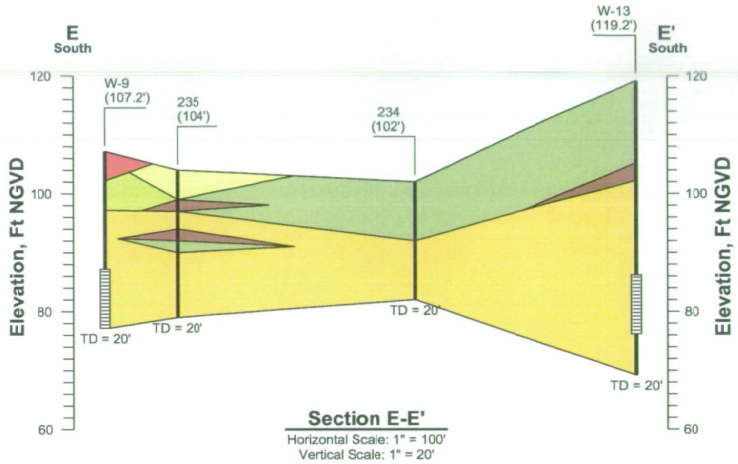
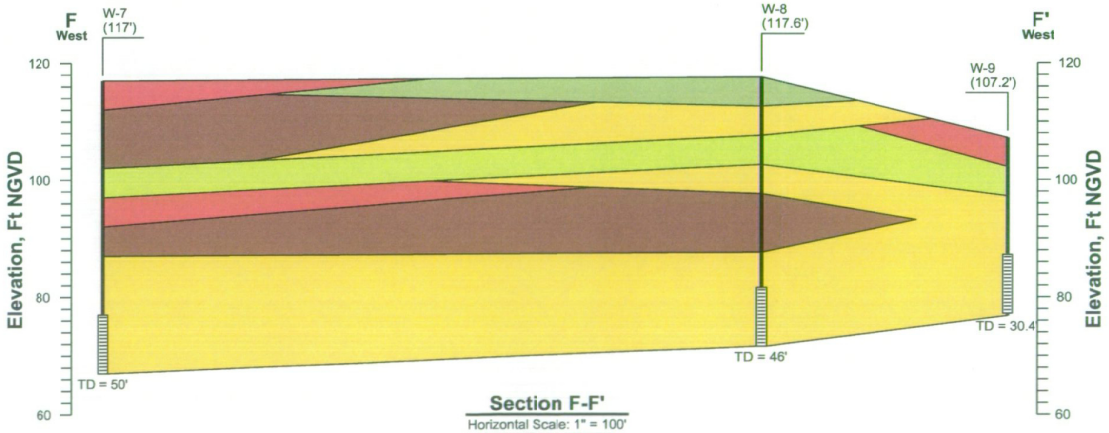
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B006

Figure G-3



Section E-E'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'



Section F-F'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Sections E-E' and F-F'

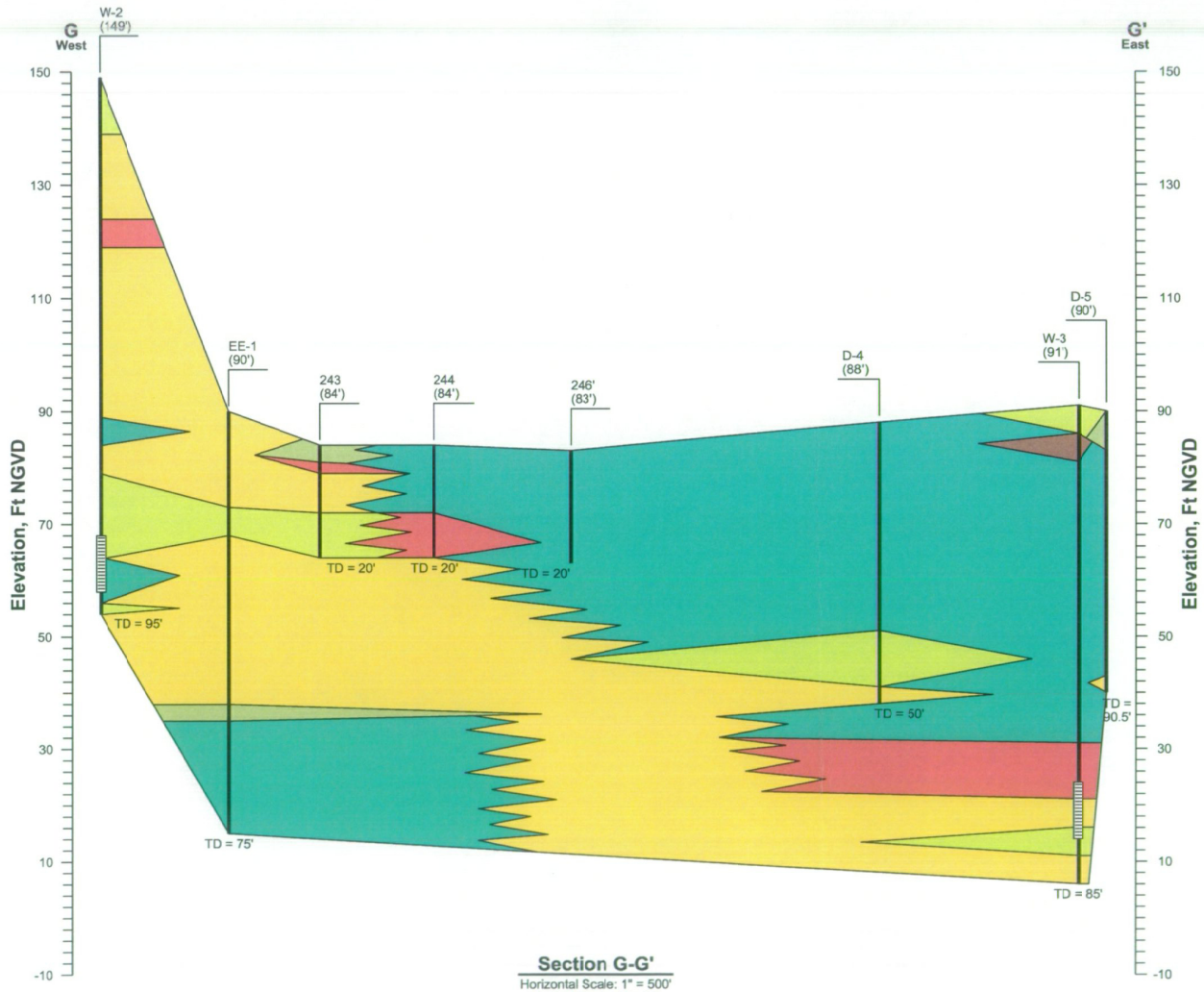
Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B007

Figure G-4

LDEQ-EDMS Document 35857654, Page 221 of 403



Section G-G'
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC
Rodemacher Power Station

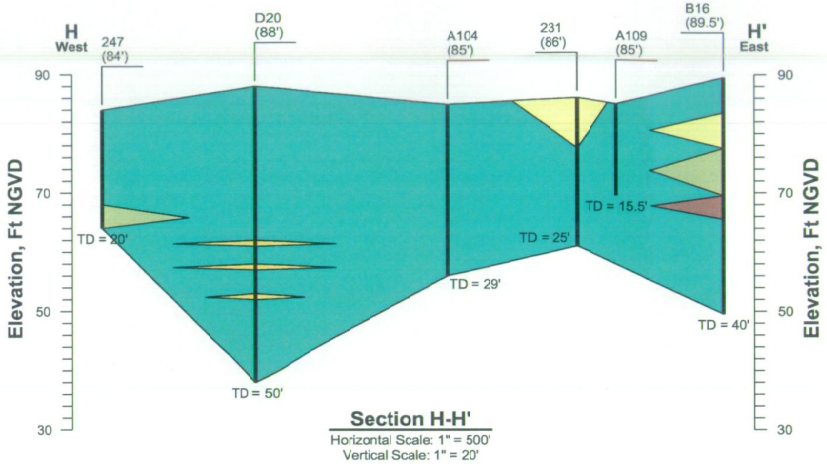
Geologic Cross Sections G-G'

Rapides Parish, Louisiana

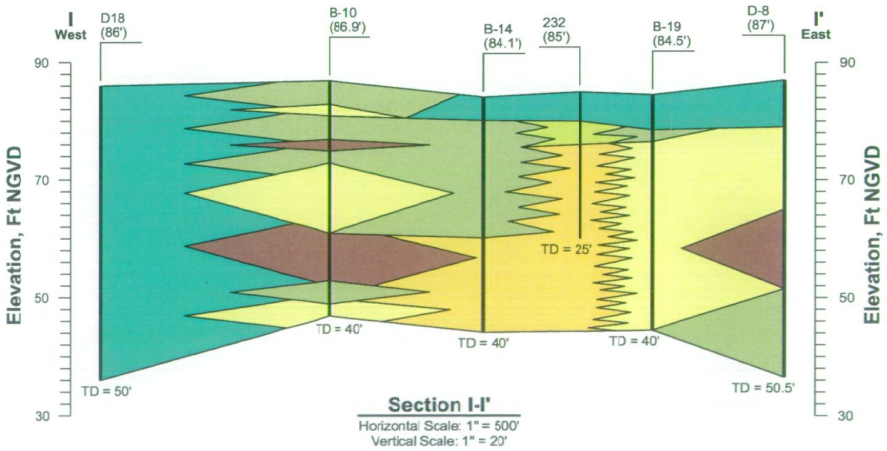
E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B008

Figure G-5



Section H-H'
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'



Section I-I'
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Sections H-H' and I-I'

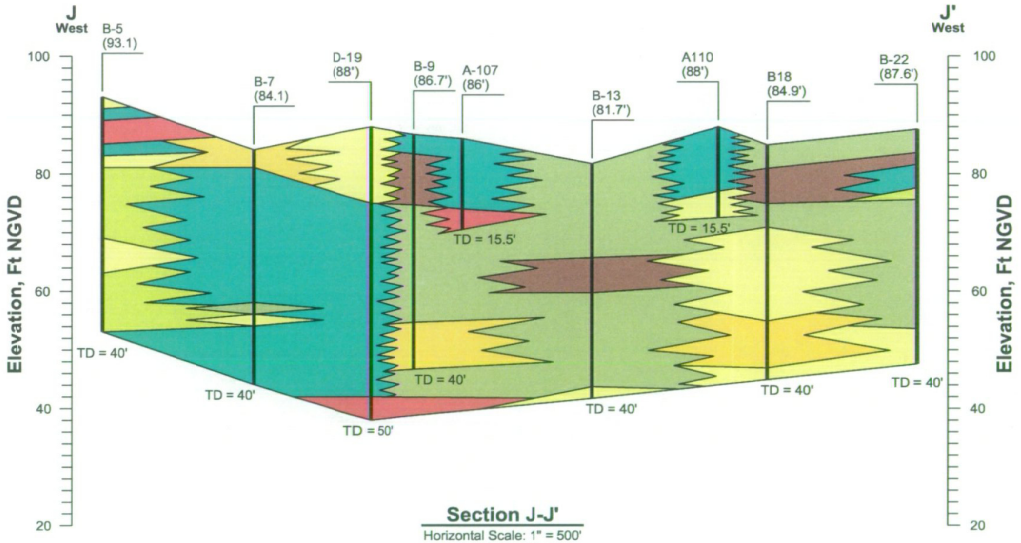
Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B009

Figure G-6

LDEQ-EDMS Document 35857654, Page 223 of 403



Section J-J'
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC
Rodemacher Power Station

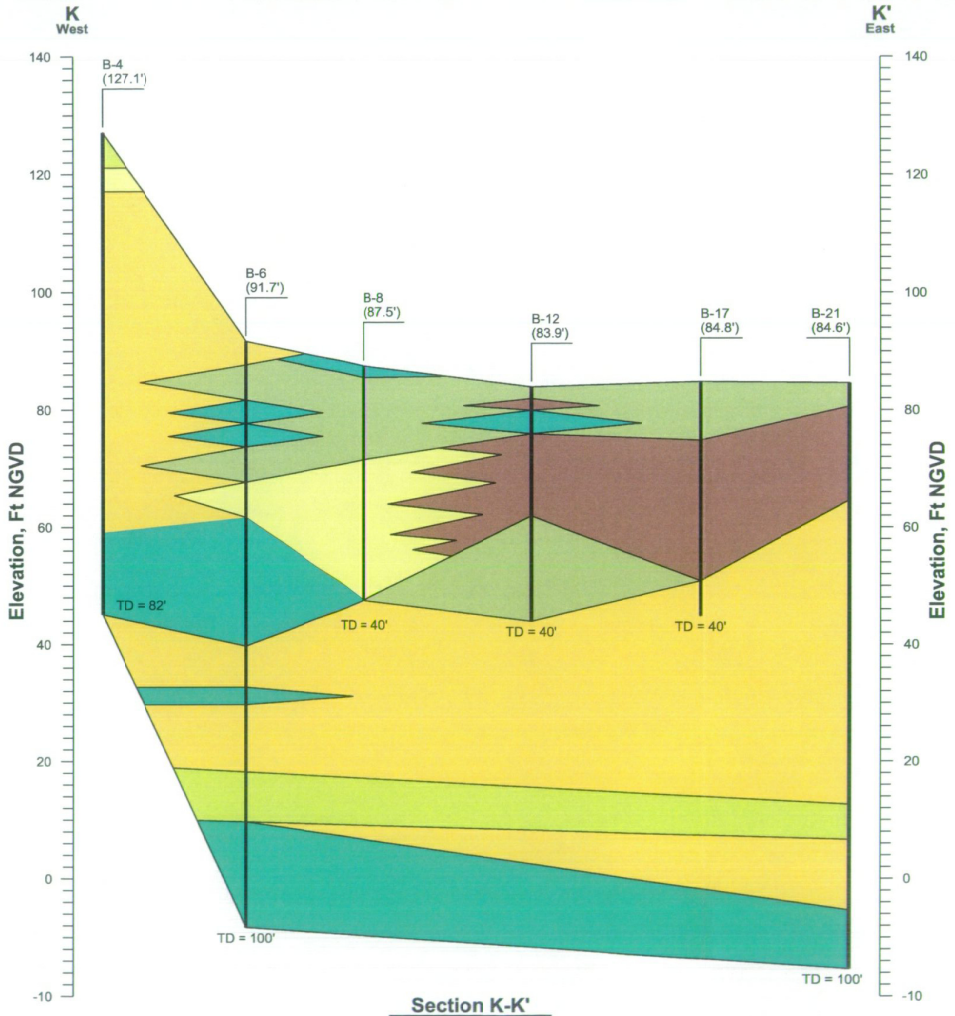
Geologic Cross Section J-J'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B010

Figure G-7



Section K-K'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

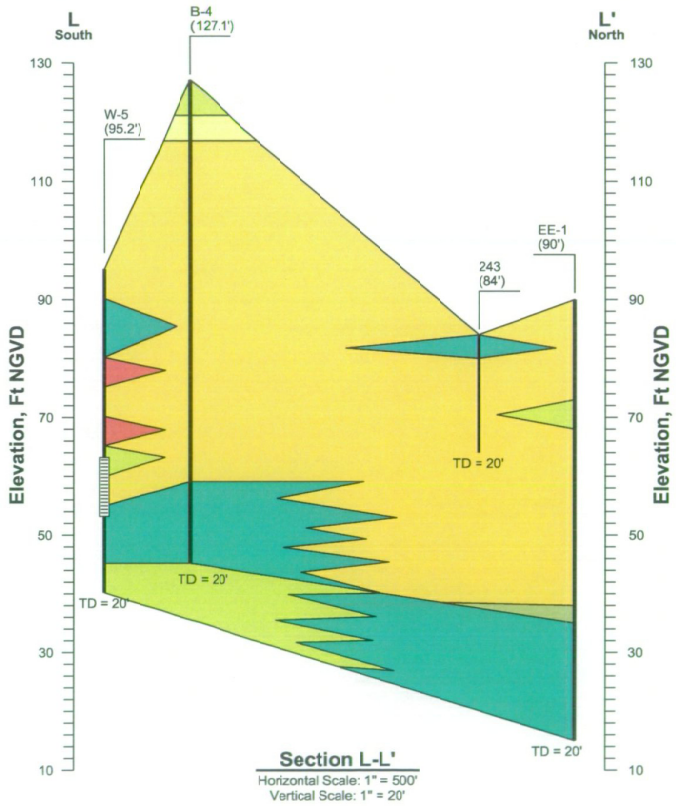
Geologic Cross Section K-K'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B011

Figure G-8



Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Section L-L'

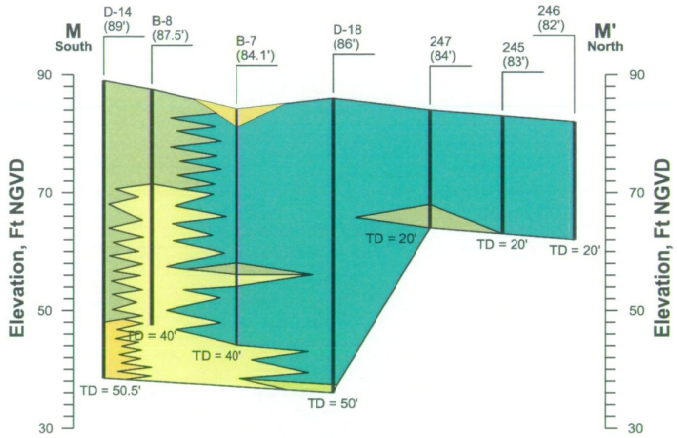
Rapides Parish, Louisiana

E·A·G·L·E Environmental Services, Inc.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B012

Figure G-9

LDEQ-EDMS Document 35857654, Page 225 of 403



Section M-M'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114) Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Section M-M'

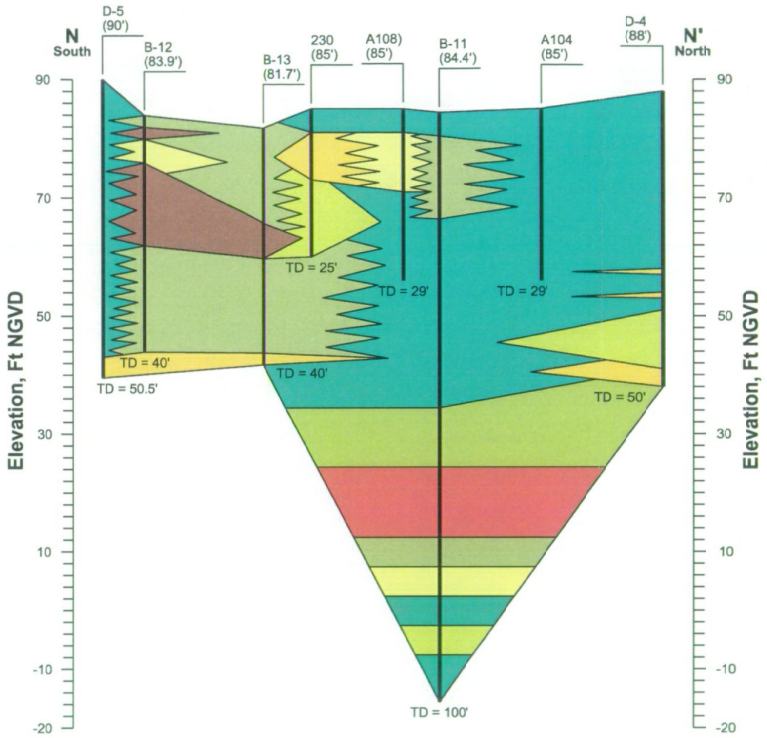
Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL GEOPHYSICAL, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B013

Figure G-10

LDEQ-EDMS Document 35857654, Page 226 of 403



Section N-N'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Wood / Clay
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

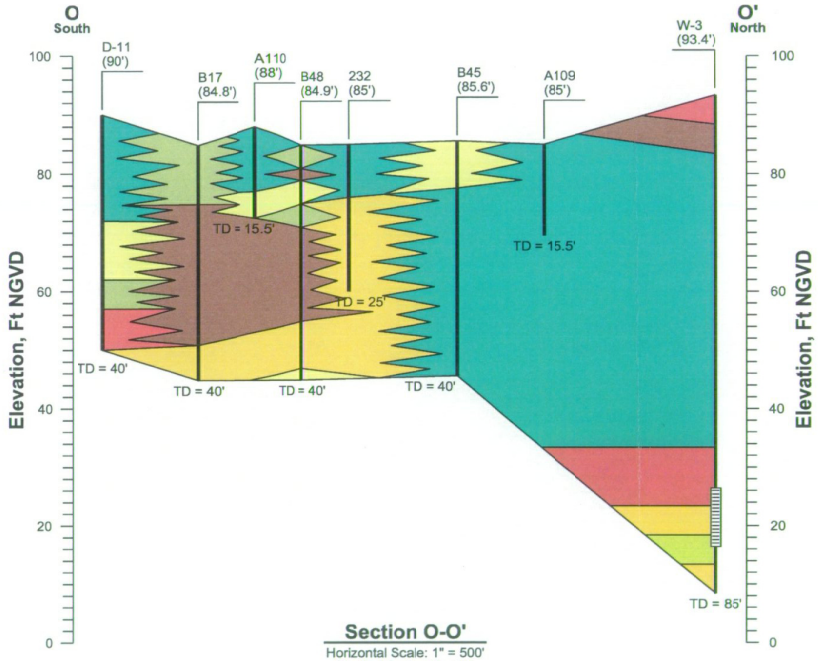
Geologic Cross Section N-N'

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/15/05
Dwg. No.:	01-0009-B014

Figure G-11



Section O-O'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Section O-O'

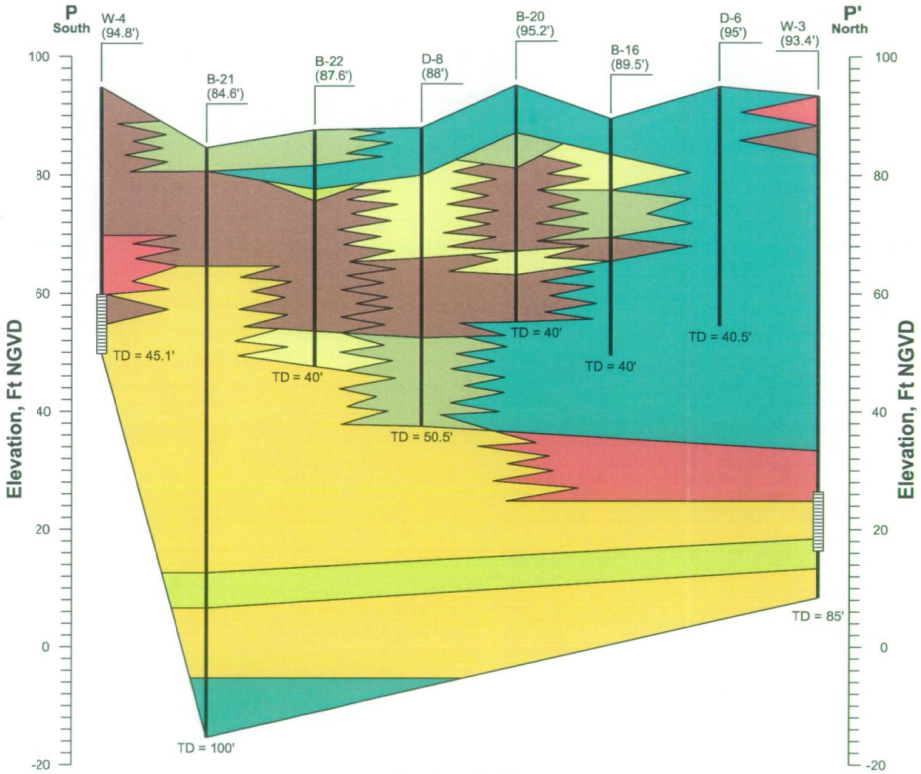
Rapides Parish, Louisiana

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B015

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Figure G-12

LDEQ-EDMS Document 35857654, Page 228 of 403



Section P-P'

Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- (114') Elevation, Ft NGVD
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Geologic Cross Section P-P'

Rapides Parish, Louisiana

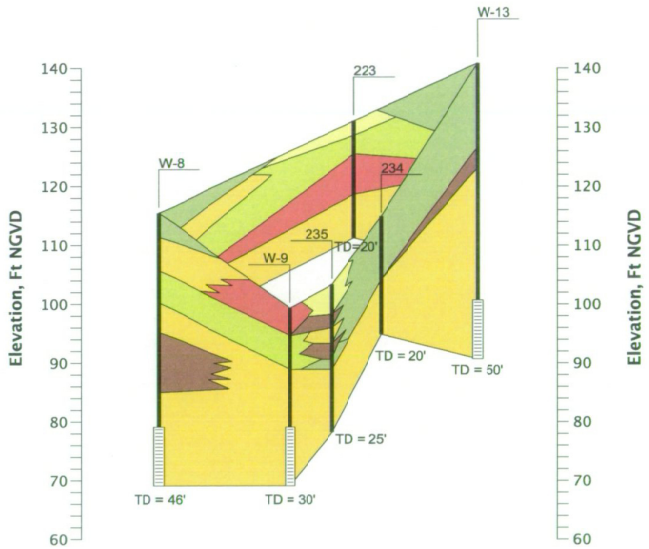
E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	Imp
Checked:	JHM
Approved:	RS
Date:	06/10/05
Dwg. No.:	01-0009-B016

Figure G-13

LDEQ-EDMS Document 35857654, Page 229 of 403

N



Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- TD Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

Cross-Section

Horizontal Scale: 1" = 200'
Vertical Scale: 1" = 20'

CLECO Power LLC

Rodemacher Power Station

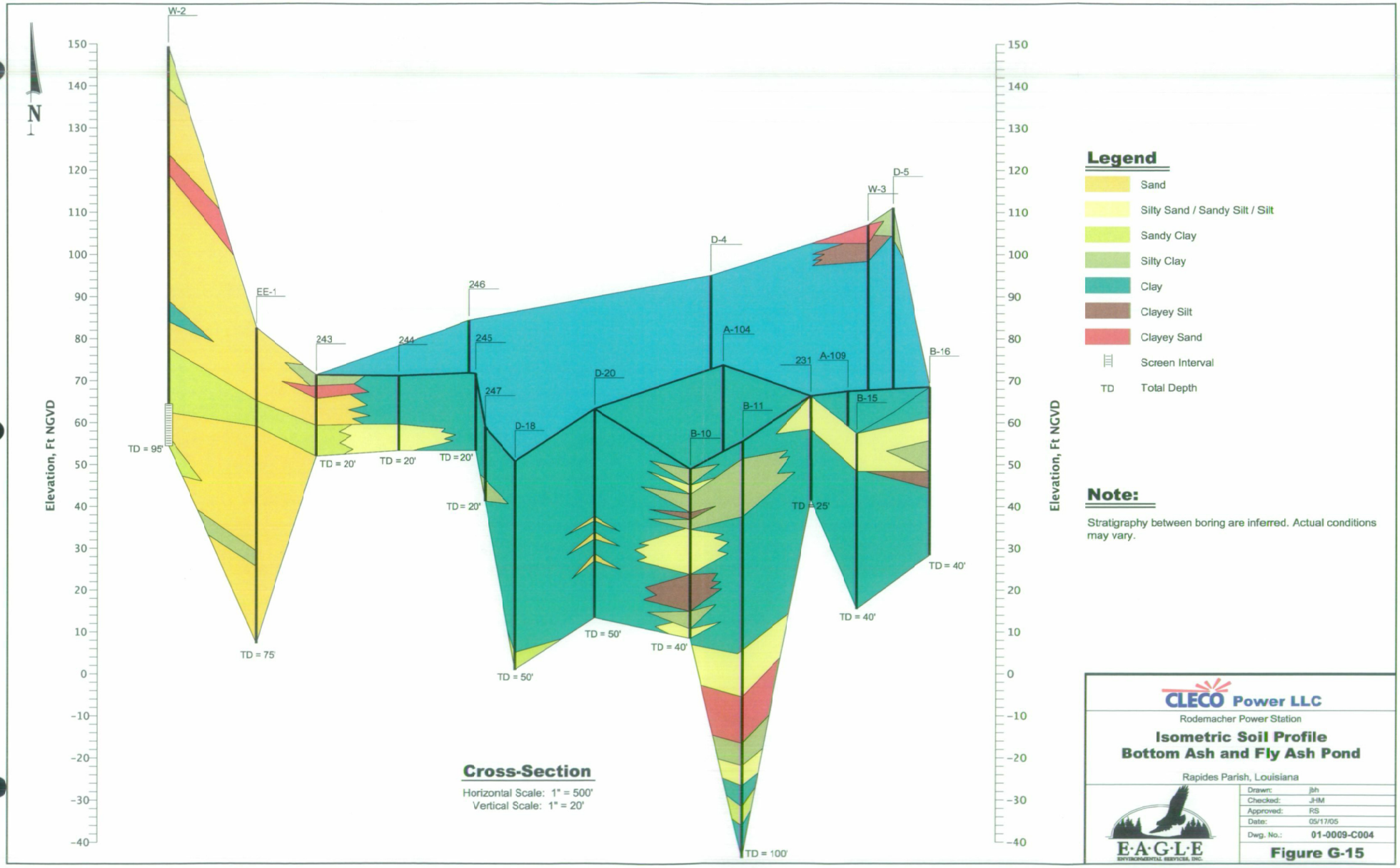
Isometric Soil Profile
Metal Cleaning Waste
Pond Unit #1

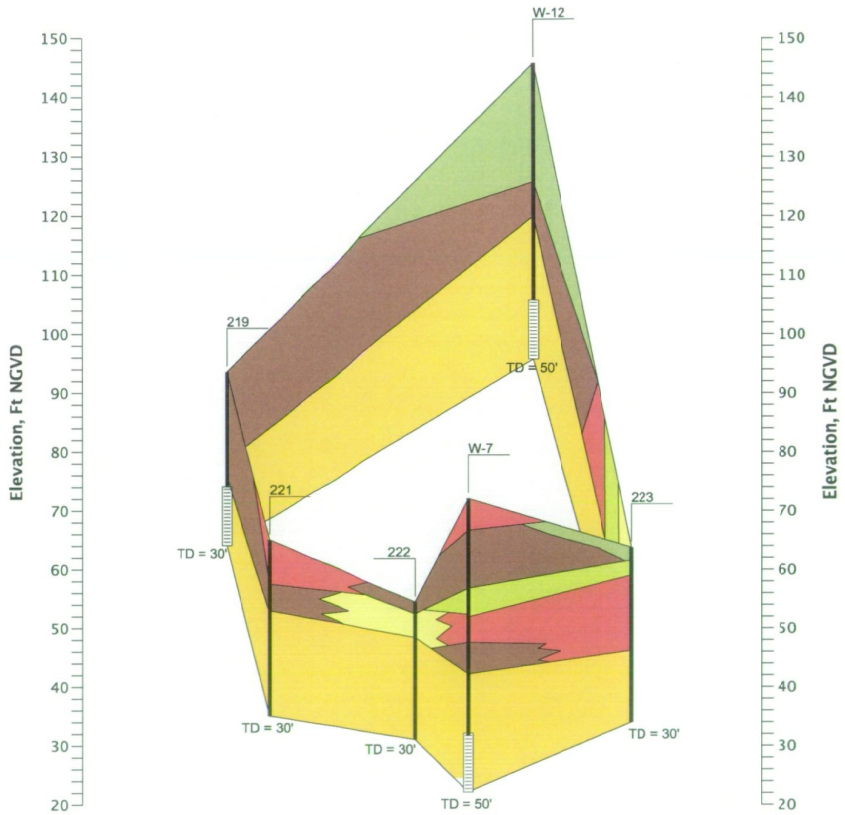
Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	jbh
Checked:	JHM
Approved:	RS
Date:	05/17/05
Dwg. No.:	01-0009-C002

Figure G-14


N
Elevation, Ft NGVD
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
W-2
EE-1
243
244
246
245
247
D-18
D-20
D-4
A-104
B-10
B-11
231
A-109
B-15
W-3
D-5
B-16
TD = 95'
TD = 75'
TD = 20'
TD = 20'
TD = 20'
TD = 20'
TD = 50'
TD = 50'
TD = 40'
TD = 100'
TD = 25'
TD = 40'
TD = 40'
Legend
Sand
Silty Sand / Sandy Silt / Silt
Sandy Clay
Silty Clay
Clay
Clayey Silt
Clayey Sand
Screen Interval
TD Total Depth
Cross-Section
Horizontal Scale: 1" = 500'
Vertical Scale: 1" = 20'
Note:
Stratigraphy between boring are inferred. Actual conditions may vary.
CLECO Power LLC
Rodemacher Power Station
Isometric Soil Profile
Bottom Ash and Fly Ash Pond
Rapides Parish, Louisiana
E·A·G·L·E
Drawn: jjh
Checked: JHM
Approved: RS
Date: 05/17/05
Dwg. No.: 01-0009-C004
Figure G-15



Cross-Section

Horizontal Scale: 1" = 200'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- TD — Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

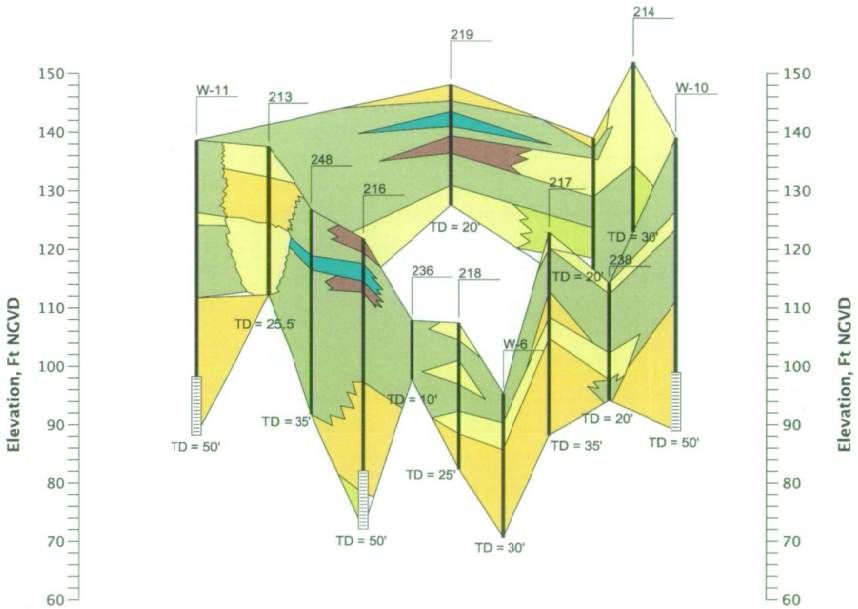
Isometric Soil Profile
Coal Sedimentation Pond

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	jbh
Checked:	JHM
Approved:	RS
Date:	05/17/05
Dwg. No.:	01-0009-C001

Figure G-16



Cross-Section

Horizontal Scale: 1" = 200'
Vertical Scale: 1" = 20'

Legend

- Sand
- Silty Sand / Sandy Silt / Silt
- Sandy Clay
- Silty Clay
- Clay
- Clayey Silt
- Clayey Sand
- Screen Interval
- TD — Total Depth

Note:

Stratigraphy between boring are inferred. Actual conditions may vary.

CLECO Power LLC

Rodemacher Power Station

Isometric Soil Profile
Metal Cleaning Waste
Pond Unit #2

Rapides Parish, Louisiana

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

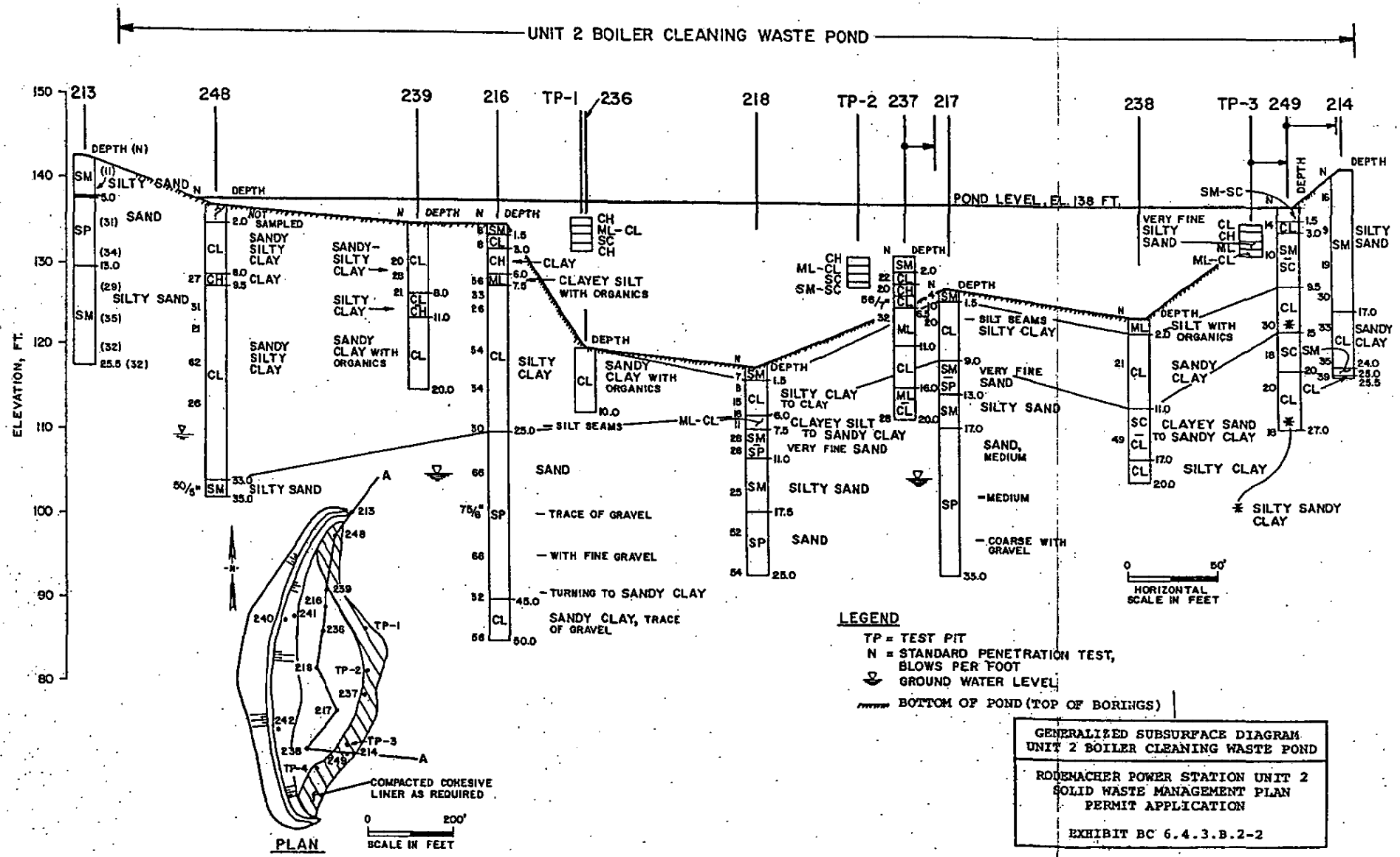
Drawn:	jbh
Checked:	JHM
Approved:	RS
Date:	05/17/05
Dwg. No.:	01-0009-C003

Figure G-17

APPENDIX H

HISTORICAL GEOLOGIC DATA

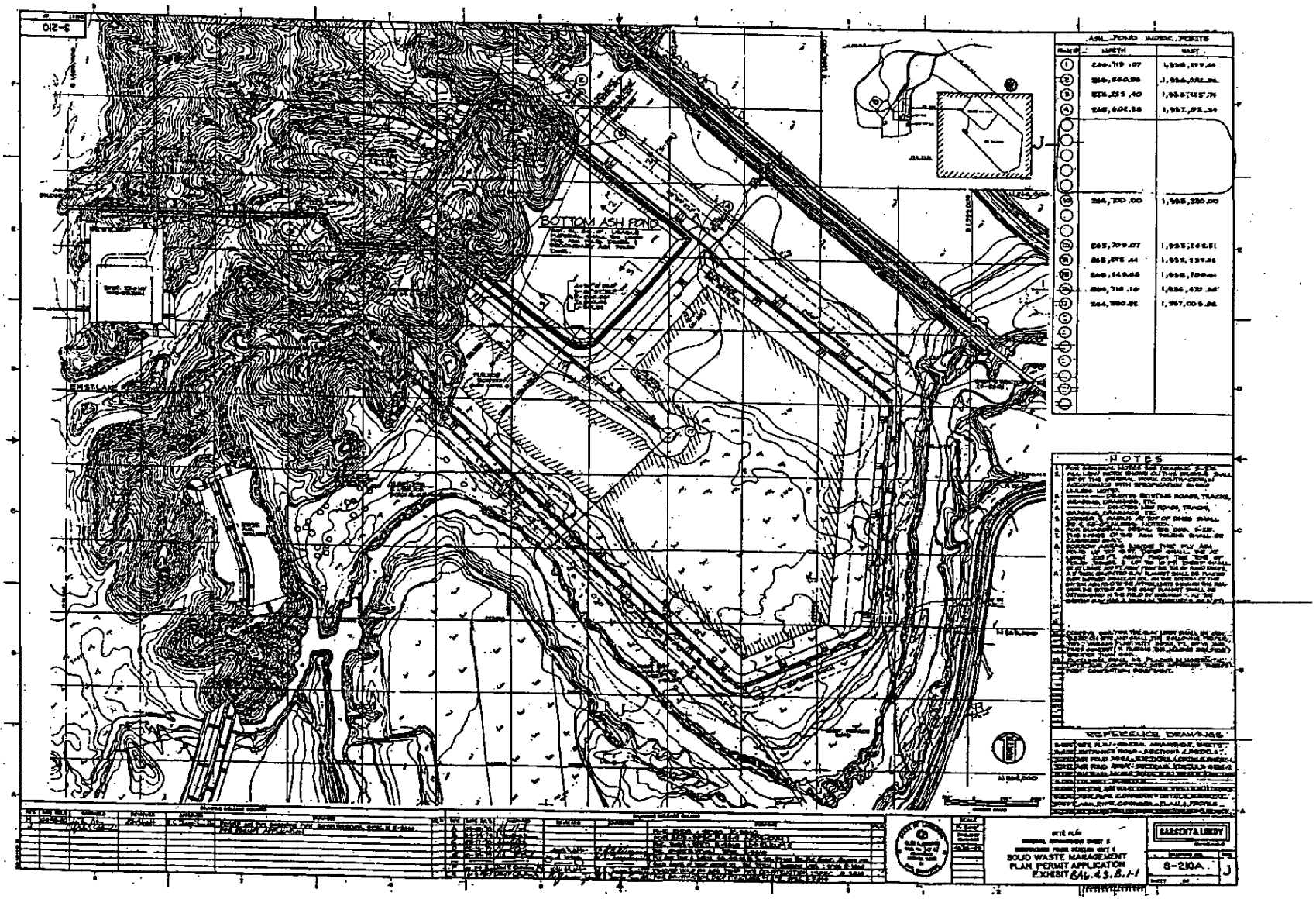
LDEQ-EDMS Document 35857654, Page 235 of 403

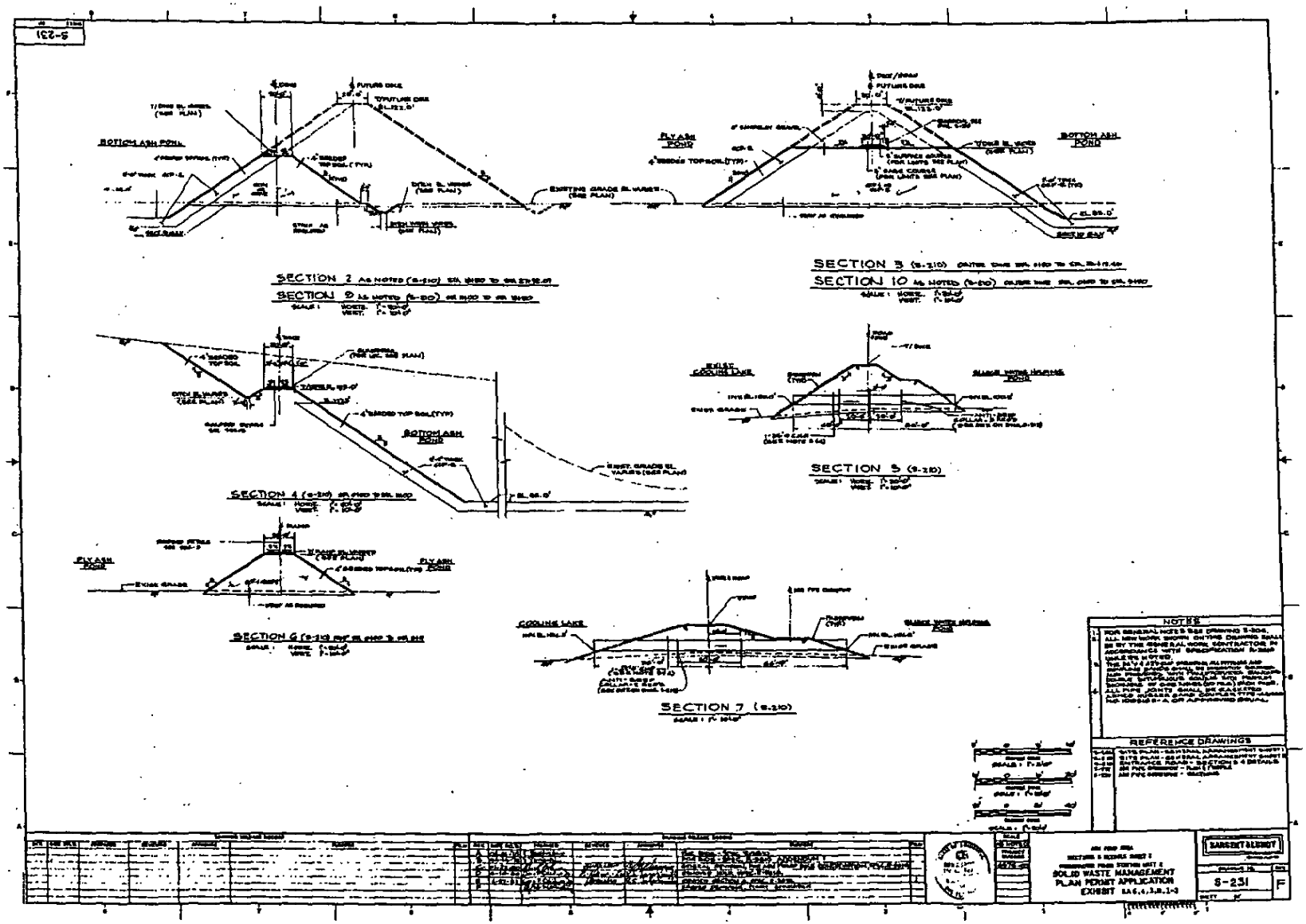


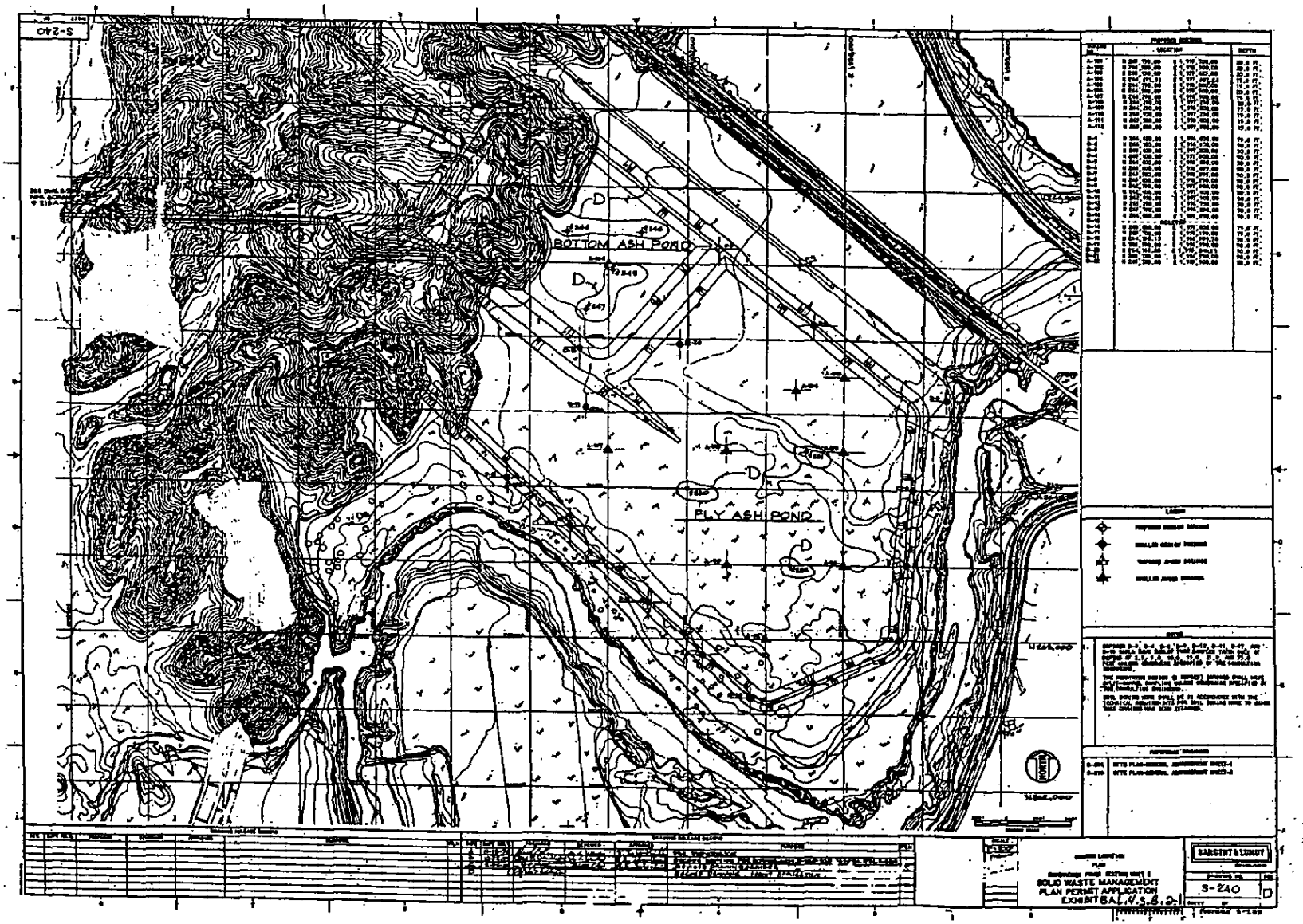
GENERALIZED SUBSURFACE DIAGRAM
UNIT 2 BOILER CLEANING WASTE POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

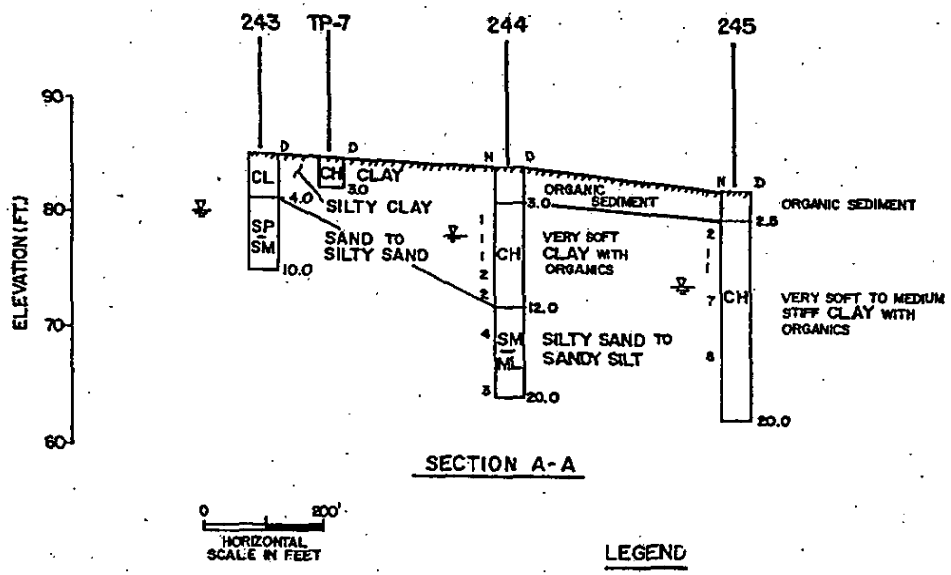
EXHIBIT BC 6.4.3.B.2-2


S-210
BOTTOM ASH POND
ASH POND WORK POINTS
NORTH
EAST
NOTES
REFERENCE DRAWINGS
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT
SARGENT & LUNDY
S-210A
J

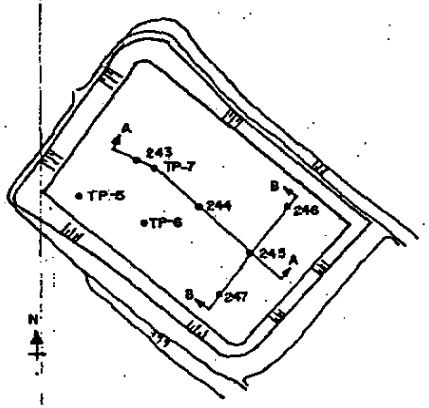

S-231
SECTION 2
SECTION 9
SECTION 3
SECTION 10
SECTION 4
SECTION 5
SECTION 6
SECTION 7
BOTTOM ASH POND
FLY ASH POND
COOLING LAKE
NOTES
REFERENCE DRAWINGS
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
EXHIBIT
S-231
F



LDEQ-EDMS Document 35857654, Page 238 of 403



SECTION A-A



PLAN
N.T.S.

LEGEND

TP = TEST PIT

D = DEPT IN FEET

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

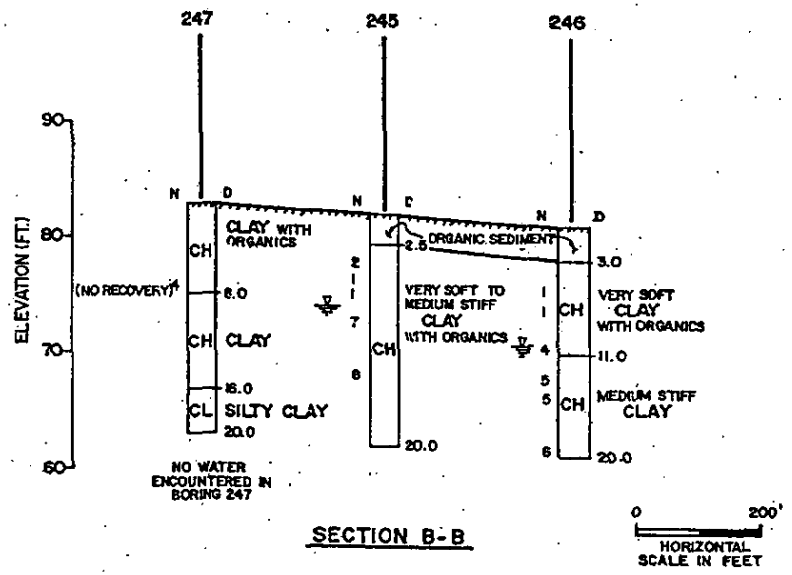
= GROUND WATER LEVEL

= BOTTOM OF POND (TOP OF BORINGS)

GENERALIZED SUBSURFACE DIAGRAM - SECTION A-A
BOTTOM ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT BA 6.4.3.B.2-2



SECTION B-B

LEGEND

D = DEPTH IN FEET

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

= GROUND WATER LEVEL

= BOTTOM OF POND (TOP OF BORINGS)

NOTE

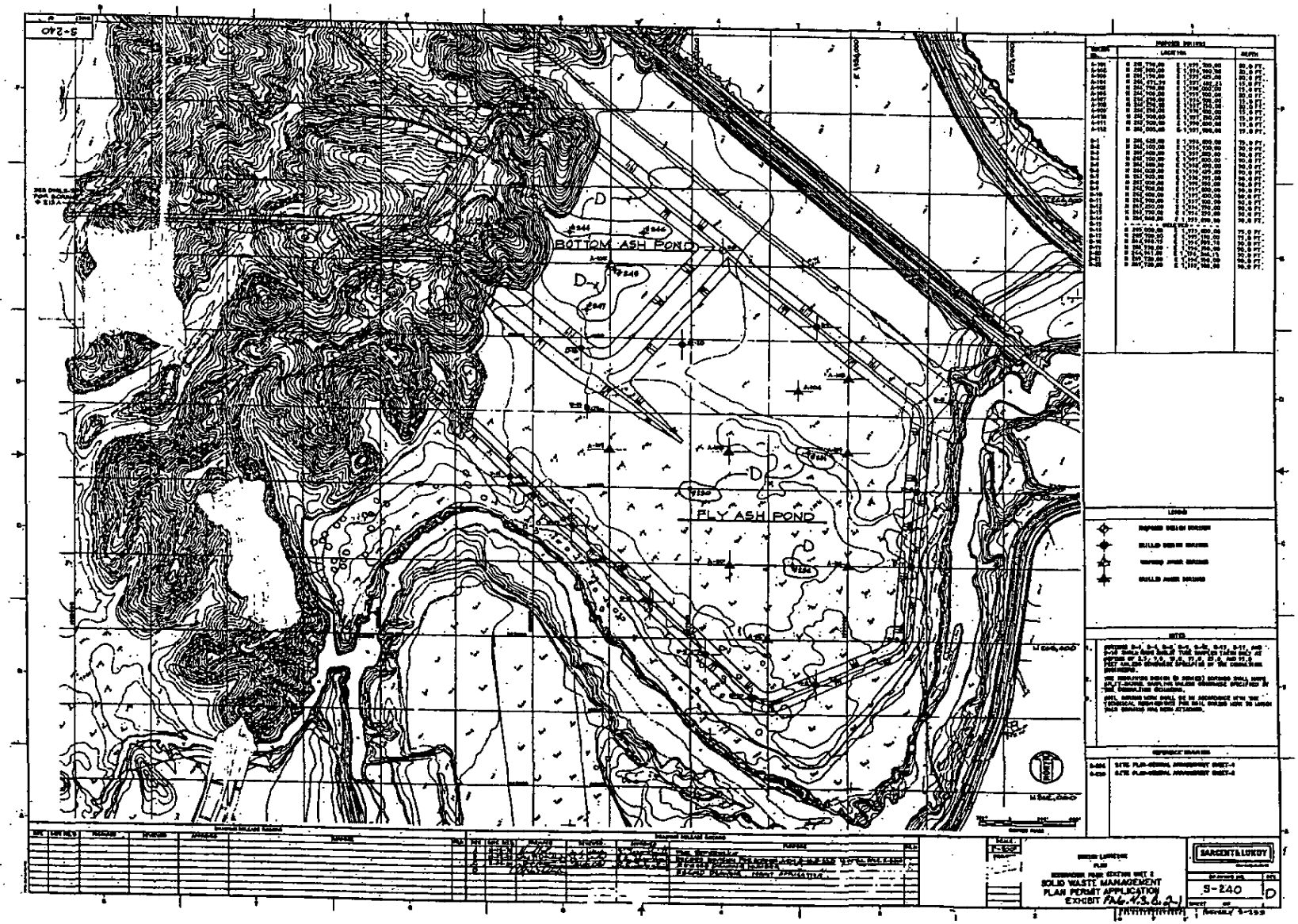
1. FOR BORING LOCATION PLAN, SEE SECTION A-A.

GENERALIZED SUBSURFACE DIAGRAM - SECTION B-B. BOTTOM ASH POND

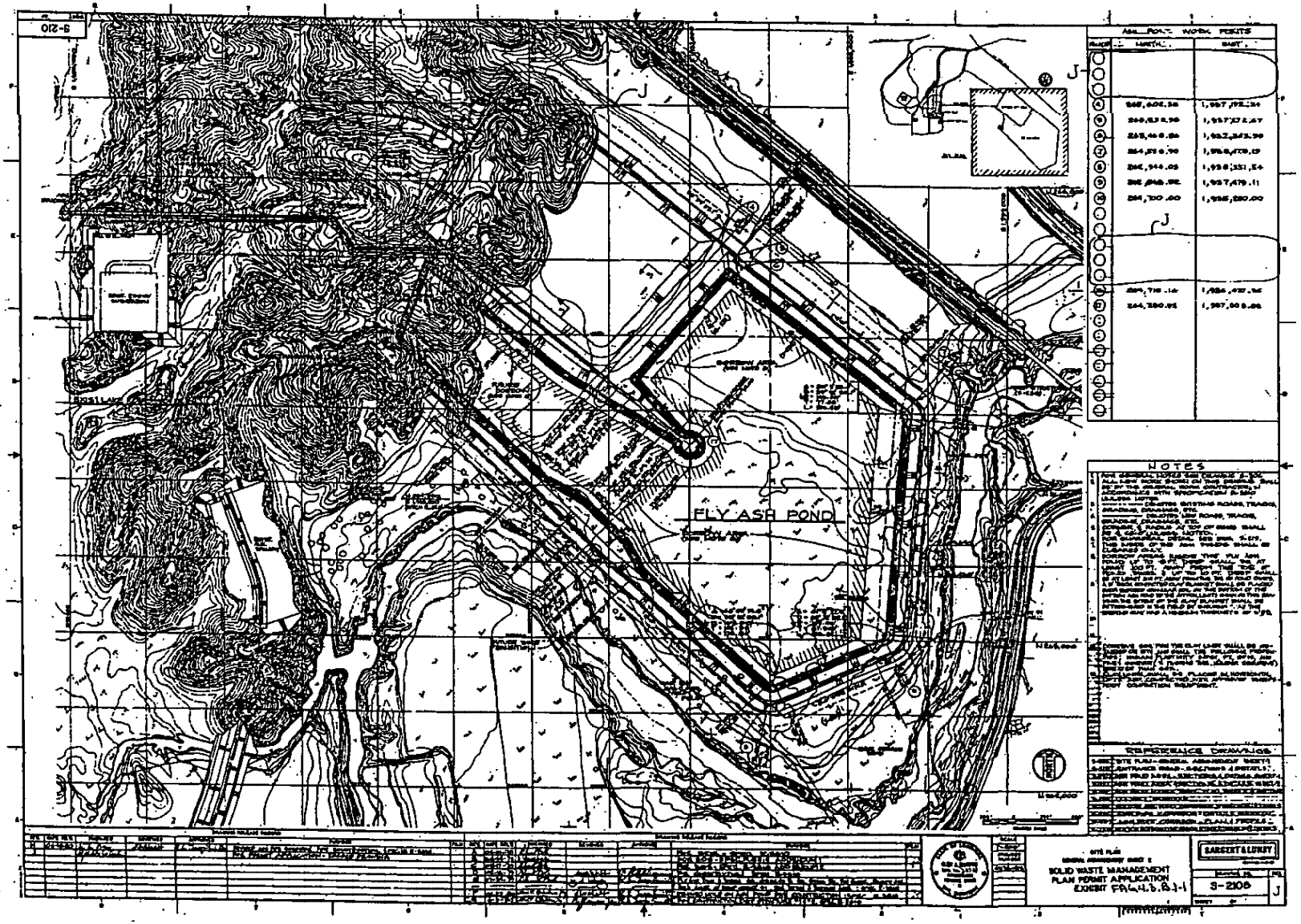
RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT BA 6.4.3.B.2-3

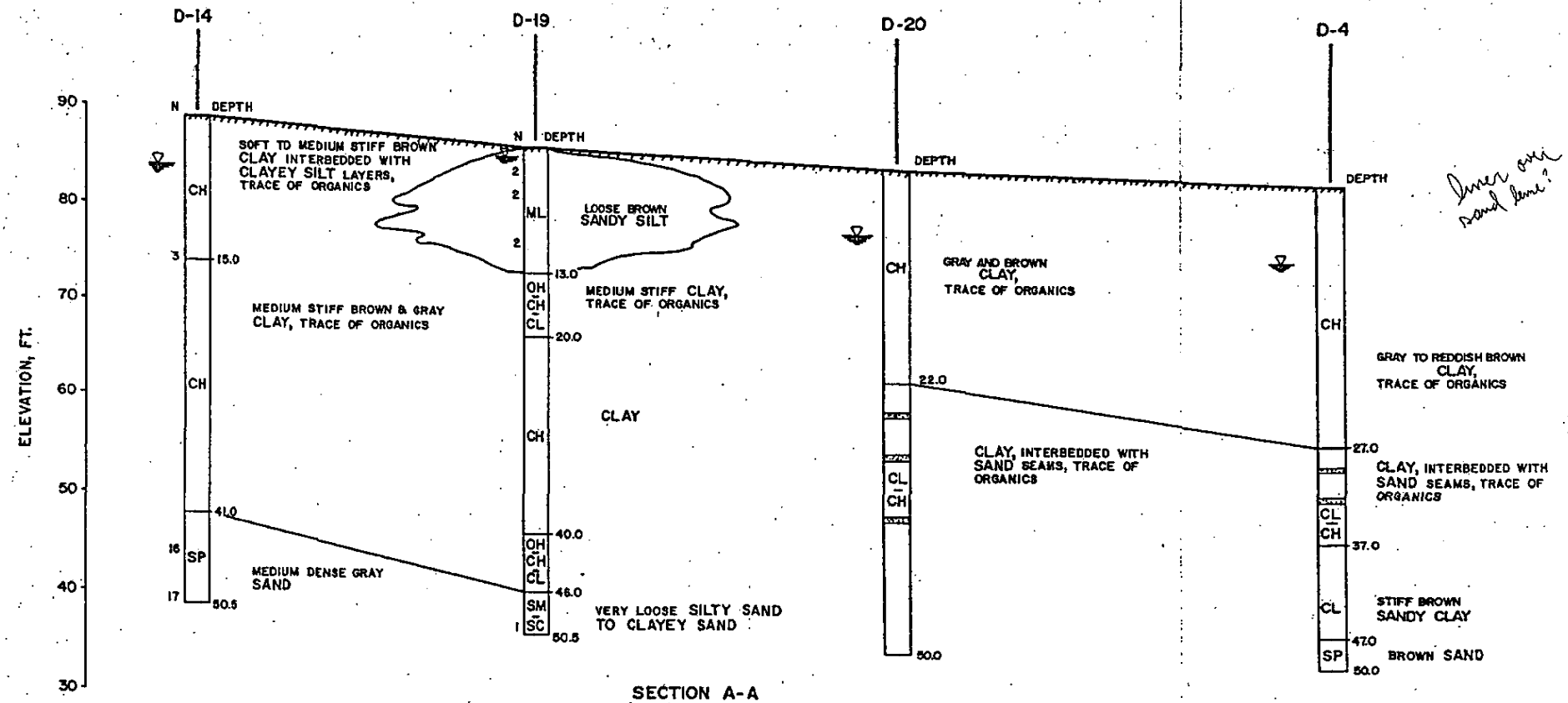
LDEQ-EDMS Document 35857654, Page 240 of 403



LLDEQ-EDMS Document 35857654, Page 241 of 403



LDEQ-EDMS Document 35857654, Page 242 of 403



SECTION A-A

0 200'
HORIZONTAL SCALE IN FEET

LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

= GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

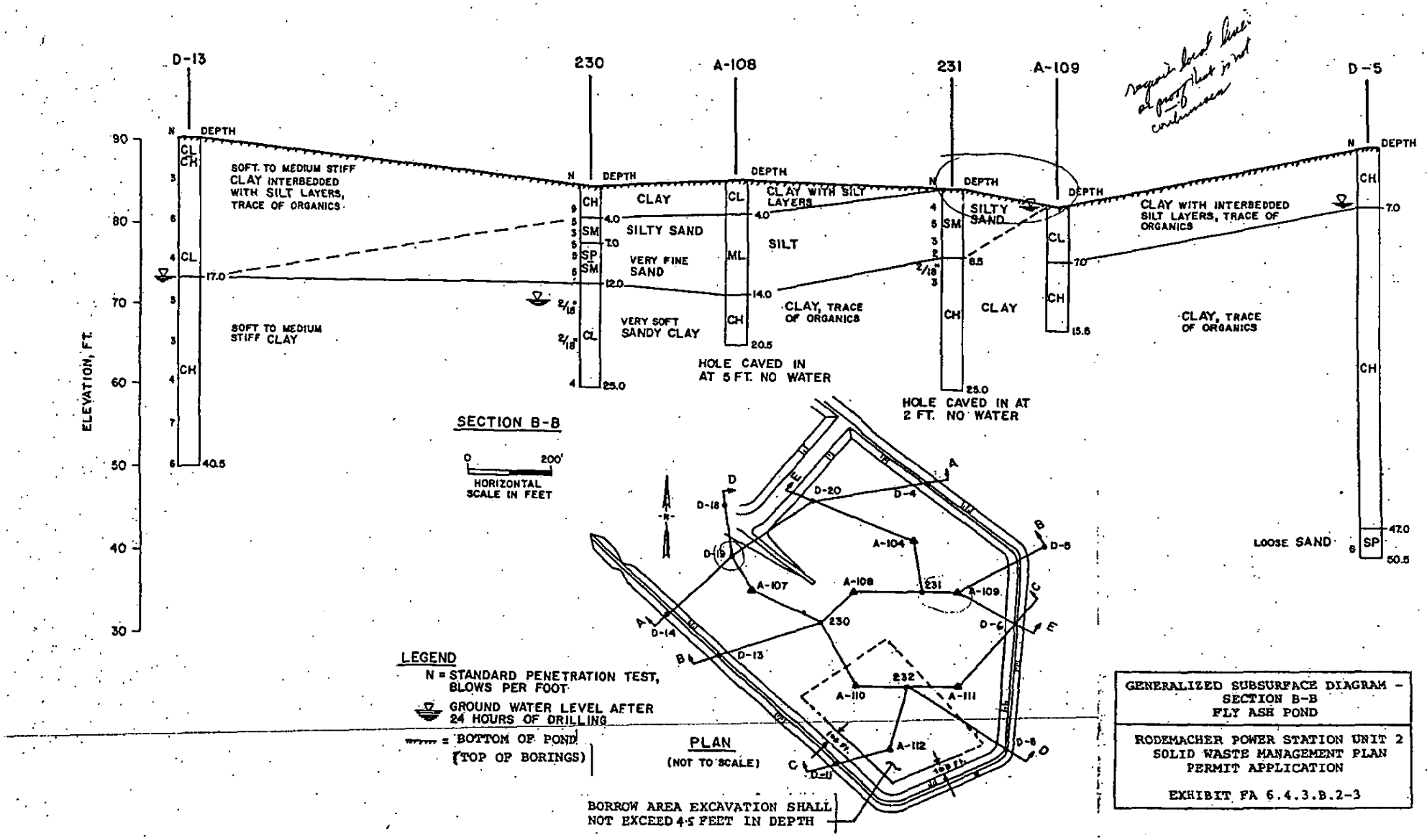
= BOTTOM OF POND (TOP OF BORINGS)

NOTE:
FOR BORING LOCATION PLAN SEE SECTION B-B

GENERALIZED SUBSURFACE DIAGRAM - SECTION A-A
FLY ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

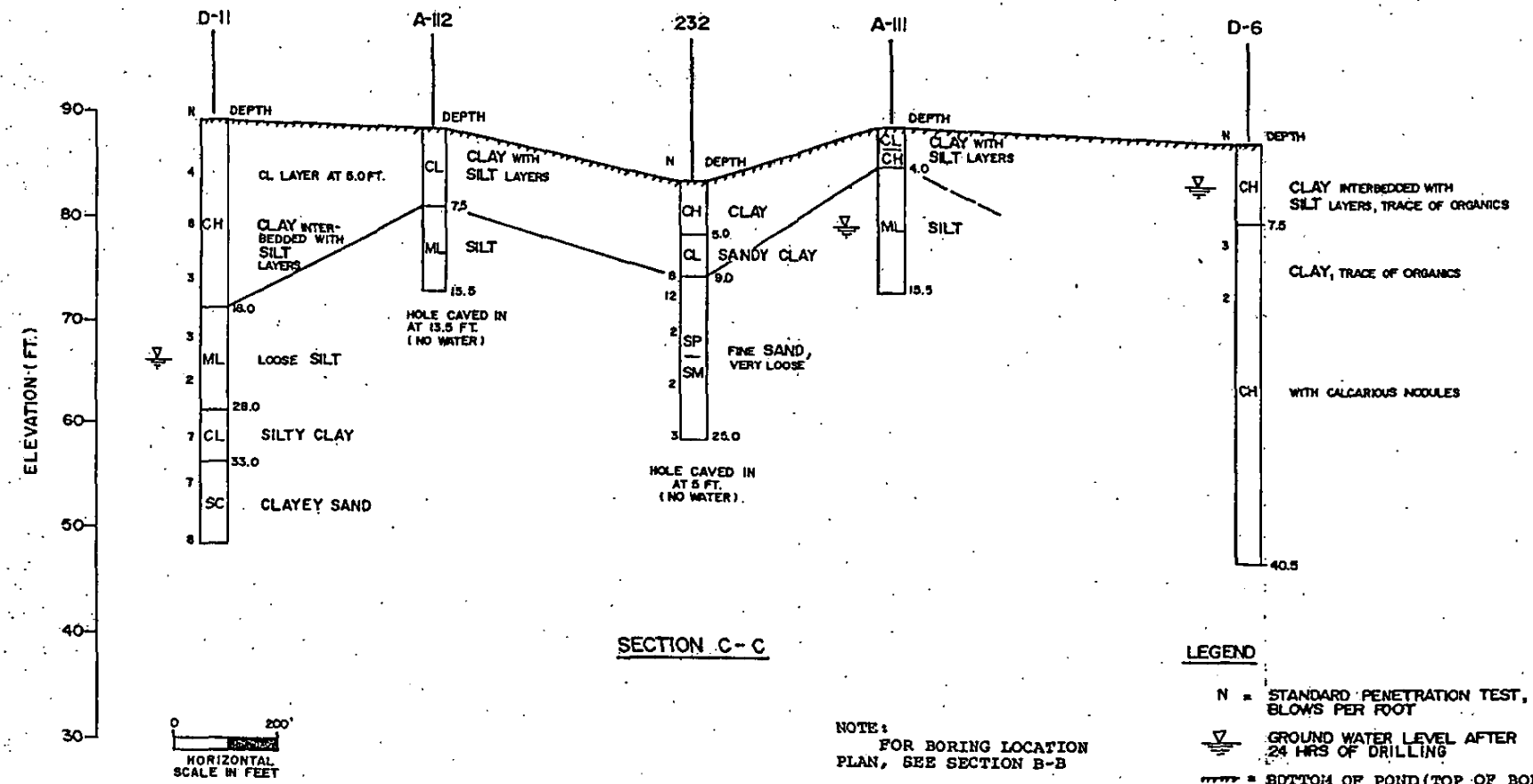
EXHIBIT FA 6.4.3.B.2-2



GENERALIZED SUBSURFACE DIAGRAM - SECTION B-B
FLY ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT FA 6.4.3.B.2-3



SECTION C-C

NOTE:
FOR BORING LOCATION PLAN, SEE SECTION B-B

LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

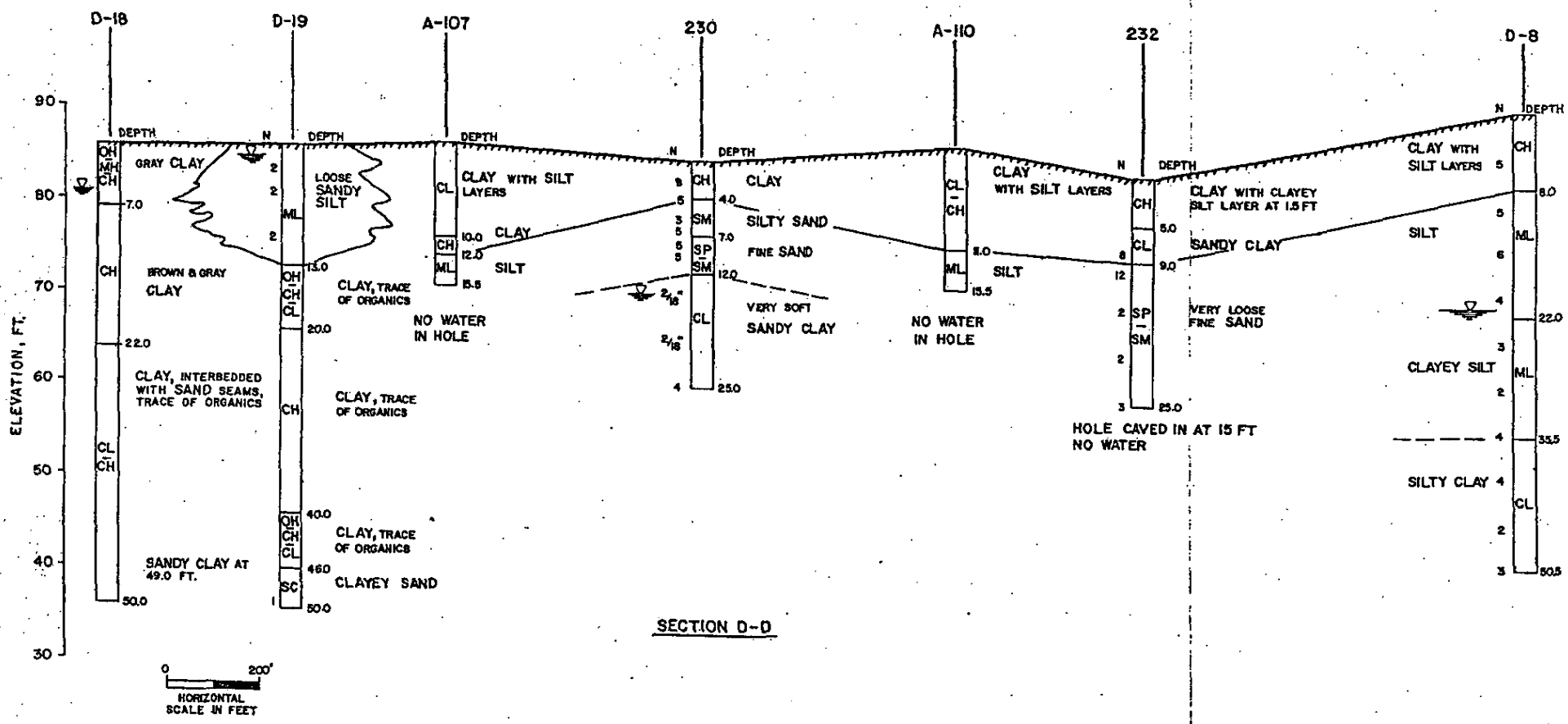
GROUND WATER LEVEL AFTER 24 HRS OF DRILLING

BOTTOM OF POND (TOP OF BORINGS)

GENERALIZED SUBSURFACE DIAGRAM - SECTION C-C
FLY ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT FA 6.4.3.B.2-4



LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

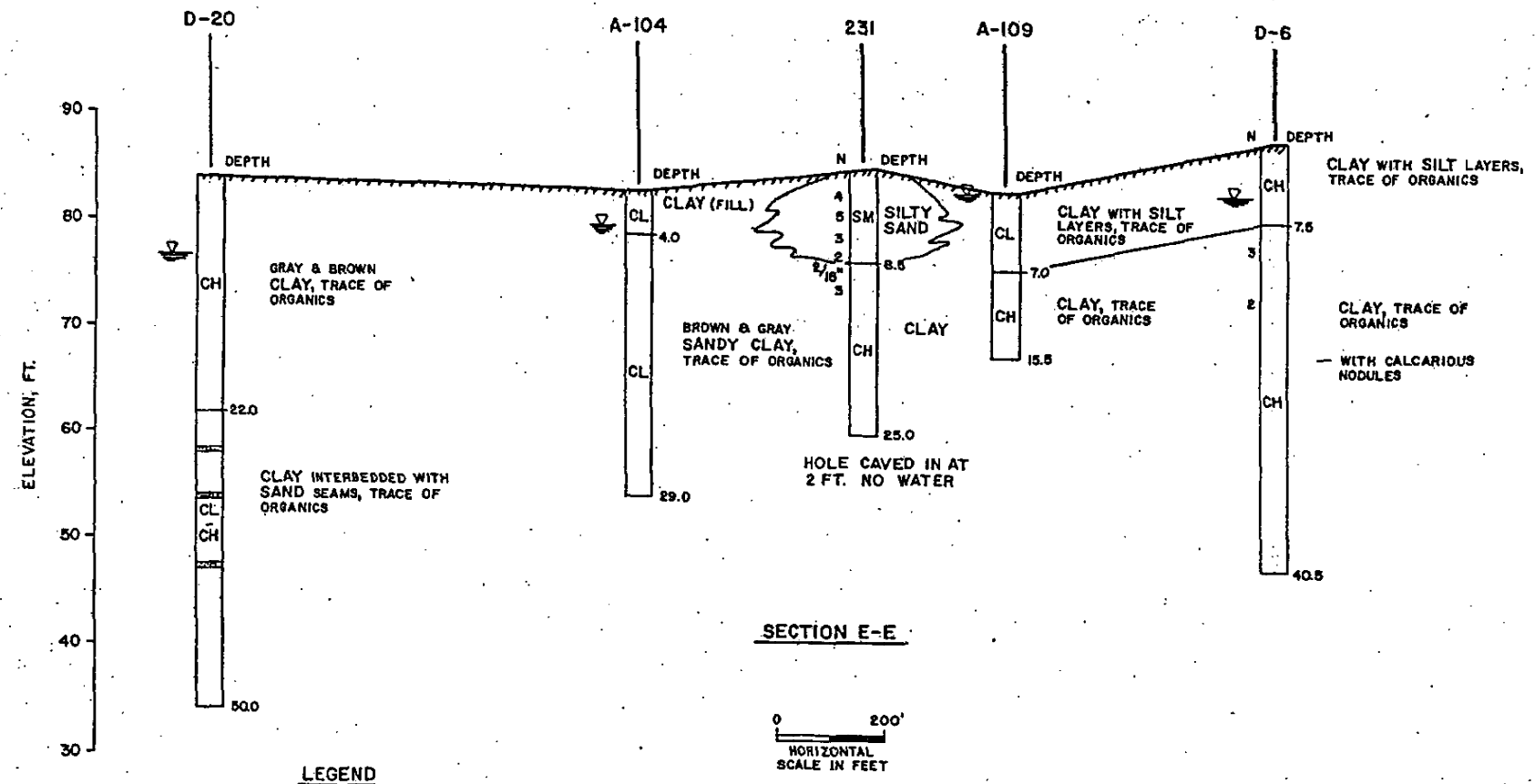
BOTTOM OF POND (TOP OF BORINGS)

NOTE: FOR BORING LOCATION PLAN, SEE SECTION B-B

GENERALIZED SUBSURFACE DIAGRAM - SECTION D-D
FLY ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT FA 6.4.3.B.2-5



LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

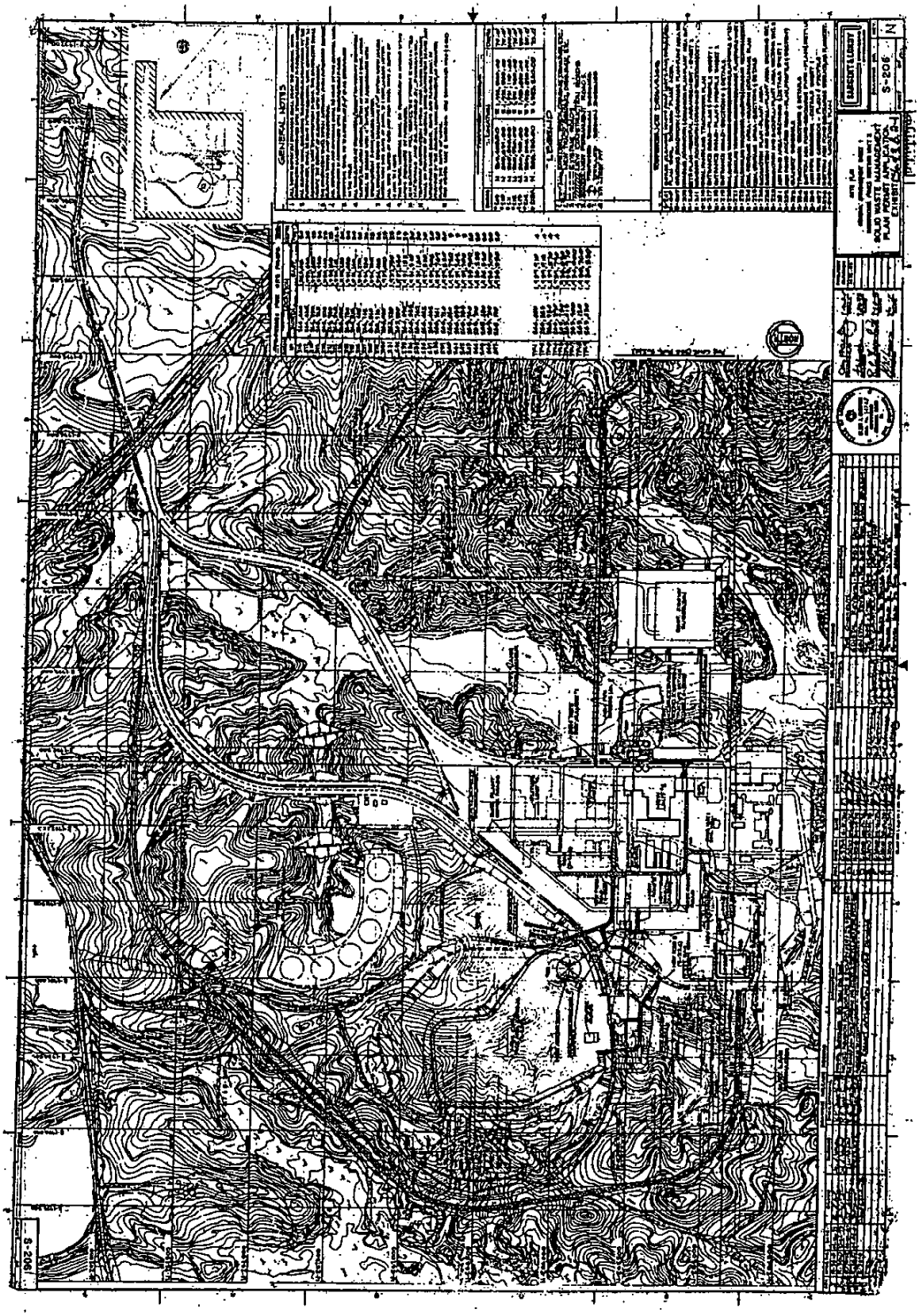
BOTTOM OF POND (TOP OF BORINGS)

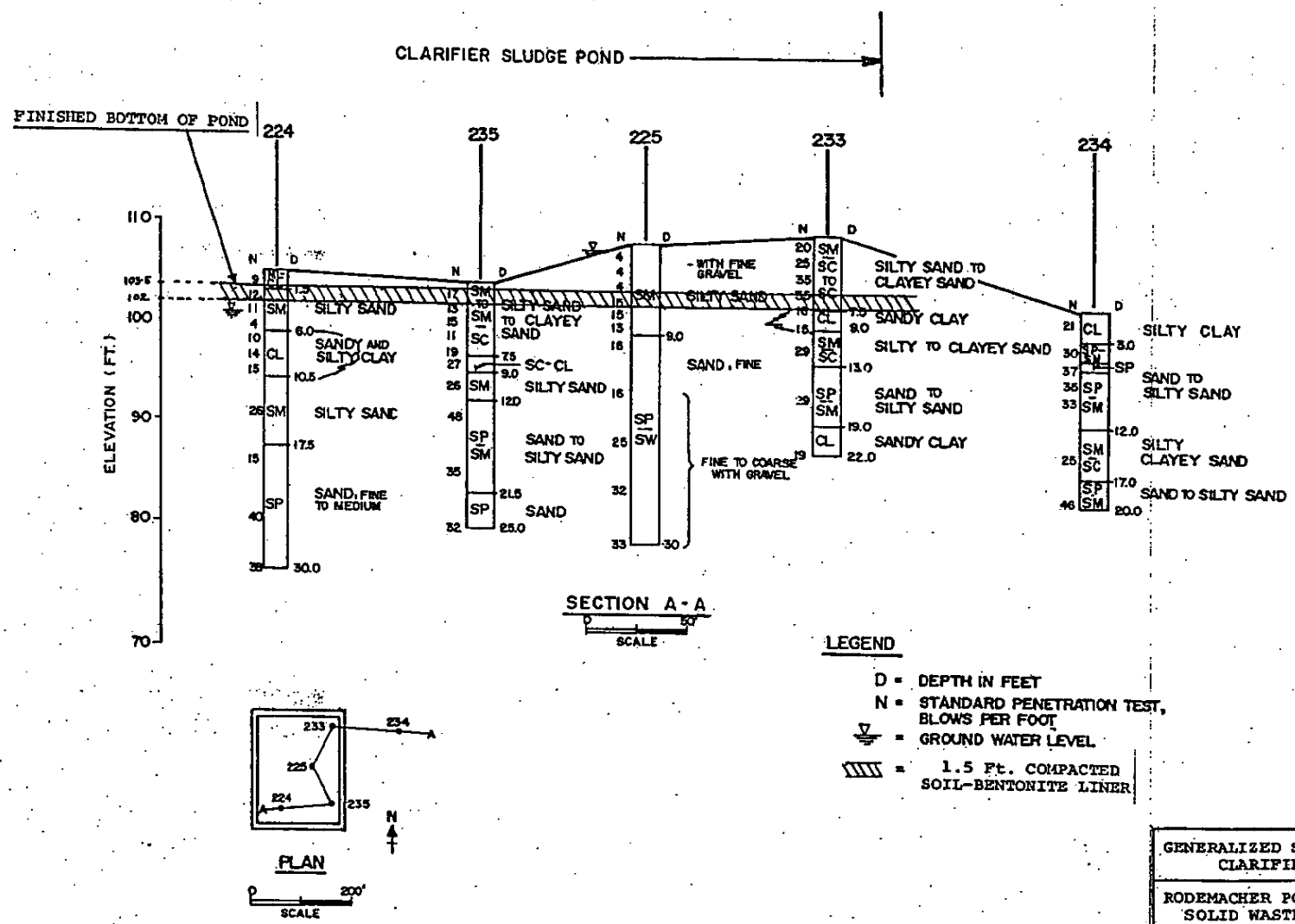
NOTE:
FOR BORING LOCATION PLAN, SEE SECTION B-B

GENERALIZED SUBSURFACE DIAGRAM - SECTION E-E
FLY ASH POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT FA 6.4.3.B.2-6


GENERAL NOTES
S-206
S-206



GENERALIZED SUBSURFACE DIAGRAM
CLARIFIER SLUDGE POND

RODEMACHER POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN
PERMIT APPLICATION

EXHIBIT CS 6.4.3.B.2-2

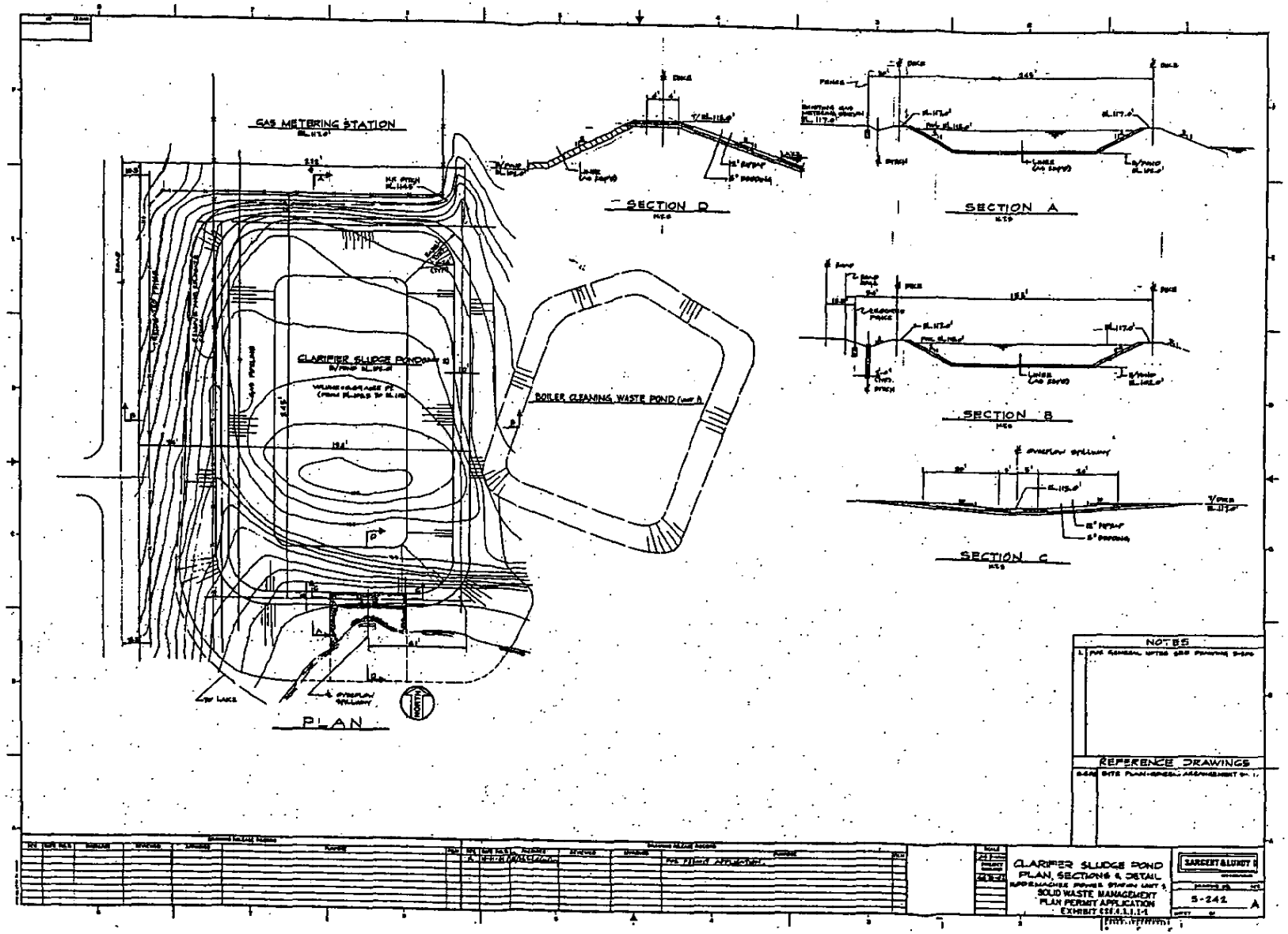

GAS METERING STATION
CLARIFIER SLUDGE POND
BOILER CLEANING WASTE POND
PLAN
SECTION D
SECTION A
SECTION B
SECTION C
NOTES
REFERENCE DRAWINGS
CLARIFIER SLUDGE POND
PLAN, SECTIONS & DETAIL
SOLID WASTE MANAGEMENT
PLAN PERMIT APPLICATION
SARGENT & LUNDY
S-241
A

TABLE BC 6.4.3.B.4-1

SUMMARY OF LABORATORY TESTS
BOILER CLEANING WASTE POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft^3	Laboratory Permeability (5) cm/sec
Unit 2 Boiler Cleaning Waste Pond	216, 2	3.0	-	-	-	61	36	17	19	CL	20.2	-	
	4	6.0	100	100	100	99	55	20	35	CH	34.0	84	1.1×10^{-8}
	7	10.5											
	8	15.0	100	100	100	82	37	18	19	CL	14.9		
	9	20.0											
	10	25.0											
	217, 2	3.0	-	-	-	79	41	20	21	CL	17.6		
	4	6.0	100	100	100	77	37	18	19	CL	14.5		
	6	9.0	-	-	-	93	44	19	25	CL	18.5		
	218, 3	4.5	-	-	-	94	45	19	26	CL	17.6		
	4	6.0											
	5	7.5	100	100	100	60	24	17	7	ML-CL	17.0		
	6	9.0											
	234, 1	2.0				84	36	17	19	CL	9.5		
	2A	3.0				85	36	18	18	CL	20.0		1.0×10^{-8}
	2B	4.0				85	36	18	18	CL	19.0		4.5×10^{-7}
	3	6.0				84	35	18	17	CL	18.4		
	4	8.0				75	37	17	20	CL	49.8		
	237, 1	2.0				43	23	N.P.	N.P.	SM	10.8		
	2	3.5				62	28	17	11	CL	17.2		
	3	5.0				99	55	20	35	CH	30.3		
	4	6.5				63	44	19	25	CL	7.9		
	5	8.0				66	19	N.P.	N.P.	ML	10.9		
	6	10.0				92	41	18	23	CL	17.0		5.8×10^{-8}
	7	15.0				92	41	19	22	CL	16.4		
	8	20.0				89	23	17	6	ML-CL	12.3		
	238, 2	4.6				64	40	19	21	CL	15.0		4.5×10^{-5}
	3	6.0				77	37	18	19	CL	16.6		
	4	6.0				86	42	19	23	CL	9.3		
	5	10.0	-	-	-	76	27	17	10	CL	14.6		
	6	15.0	-	-	-	51	27	17	10	SC-CL	9.9		
	7	20.0	-	-	-	100	33	17	16	CL	14.7		

TABLE BC 6.4.3.B.4-1 (Continued)

SUMMARY OF LABORATORY TESTS
BOILER CLEANING WASTE POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft^3	Laboratory Permeability (5) cm/sec
Unit 2 Boiler Cleaning Waste Pond (BCW Pond) (CONTD.)	239	2.0	-	-	-	67	52	20	32	CH	22.0		9.5×10^{-9}
		4.0	-	-	-	57	27	17	10	CL	24.9		
		6.0	-	-	-	91	32	17	15	CL	11.0		
		8.0	-	-	-	51	37	18	19	SC-CL	16.5		
		10.0	-	-	-	95	52	19	33	CH	15.3		
		15.0	-	-	-	83	40	19	21	CL	14.5		
	248	4.0				63	30	17	13	CL	19.2		
		6.0				99	31	17	14	CL	8.9		
		9.5				98	73	23	50	CH	31.1		
		12.5				79	35	17	18	CL	15.9		
		16.5				90	45	20	25	CL	19.8		
		20.5				91	38	18	20	CL	20.6		
		24.0				72	35	17	18	CL	13.1		
		29.0				96	38	18	20	CL	22.3		
		35.0				14	20	N.P.	N.P.	SM	14.9		
	249	3.0				74	27	17	10	CL	23.1		
		6.0				17	22	17	5	SM-SC	8.2		
		14.5				85	35	17	18	CL	17.1		
		18.0				46	49	20	29	SC	19.9		
		22.5				85	46	19	27	CL	22.3		
		27.0				88	38	17	21	CL	21.7		
Clay Lining on Dike Slope (BCW Pond)	240	3.0	-	-	-	97	46	20	26	CL		98.0	1.9×10^{-8}
	241	3.0	-	-	-	77	24	17	7	ML-CL			
	242	3.0	-	-	-	83	23	17	6	ML-CL		95.0	1.3×10^{-8}

TABLE BC 6.4.3.B.4-1 (Continued)

SUMMARY OF LABORATORY TESTS
BOILER CLEANING WASTE POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft³	Laboratory Permeability (5) cm/sec
Unit 2 Boiler Cleaning Waste Pond (CONTD.)	TP-1, 1	1.0	-	-	-	90	55	20	35	CH	24.8		2.8×10^{-8} (A)
	2	2.0	-	-	-	65	23	17	6	ML-CL	21.1		
	3	3.0	-	-	-	15	26	17	9	SC	23.6		See Note A
	4	4.0	-	-	-	99	76	24	52	CH	28.8		See Note A
	TP-2, 1	1.0	-	-	-	97	58	20	38	CH	30.3		
	2	2.0	-	-	-	64	23	17	6	ML-CL	18.0		
	3	3.0	-	-	-	47	27	18	9	SC	19.8		
	4	4.0	-	-	-	44	24	17	7	SM-SC	8.1		
	TP-3, 1	1.0	-	-	-	73	38	18	20	CL	22.5		2.4×10^{-8} (B)
	2	2.0	-	-	-	98	81	24	57	CH	27.1		
	3	3.0	-	-	-	76	N.P.(6)	N.P.	N.P.	ML	5.1		
	4	4.0	-	-	-	86	22	16	6	ML-CL	8.4		
	TP-4, 1	1.0	-	-	-	99	52	19	33	CH	33.9		See Note B
	2	2.0	-	-	-	61	27	18	9	CL	20.9		
	3	3.0	-	-	-	61	25	17	8	CL	20.8		
	4	4.0	-	-	-	99	37	17	20	CL	23.0		

GENERAL NOTES:

(1) Laboratory testing performed by Southwestern Laboratories, Inc., Shreveport, Louisiana
(2) Laboratory Particle Size Analysis Tests performed in accordance with ASTM D422 and ASTM D1140
(3) Laboratory Atterberg Limit Tests performed in accordance with ASTM D423 and ASTM D424.
(4) Laboratory Water Content Tests of Soils performed in accordance with ASTM D2216. Most of Water Content Tests performed on split-spoon samples.
(5) Laboratory Vertical Permeability Test performed on undisturbed Shelby tube samples unless otherwise noted. Samples tested using Falling Head Test procedure in accordance with EM 1110-2-1906.
(6) N.P.= Non Plastic

TABLE BA 6.4.3.B.4-1

SUMMARY OF LABORATORY TESTS
BOTTOM ASH POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing)[1] (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft³	Laboratory Permeability (5) cm/sec
Bottom Ash Pond	243	1.5				91	47	20	27	CL	21.8		
		3.0				89	47	19	28	CL	21.7		
		7.5				9	21	N.P.	N.P.	SP-CM	24.6		
	244, 2	4.5				96	69	22	47	CH	97.8 ?		
	3	6.0				97	81	23	58	CH	78.1		
	4	7.5				94	77	23	54	CH	79.2		
	5	9.0				98	69	22	47	CH	63.5		
	6	10.5				97	71	23	48	CH	65.4		
	8	15.0				50	20	17	3	SM-ML	18.2		
	9	20.0				50	19	N.P.(6)	N.P.	SM-ML	18.0		
	245, 2	4.0				93	81	22	59	CH			
	3	5.5				94	74	22	52	CH			
	4	7.0				100	65	21	44	CH			
	6	10.0				98	82	23	59	CH			
	7	15.0				98	-	-	-		63.3		
	246, 2	6.5				95	70	23	47	CH	82.3		
	3	8.0				97	60	21	39	CH	98.2		
	4	9.5				95	85	23	62	CH	40.9		
	5	11.0				?	69	22	47	CH	37.6	78.4	1.3×10^{-8}
	7	15.0				99	64	22	42	CH	32.5		
	8	20.0				100	69	22	47	CH	33.6		
	247, 2	4.0				100	78	21	57	CH	45.0		2.3×10^{-8}
	3	4.0				100	87	24	63	CH	66.0		3.5×10^{-8}
	5	10.0				98	54	20	34	CH	60.8		
	6	15.0				87	70	23	47	CH	30.6		
	7	20.0				98	40	20	20	CH	61.8		

TABLE BA 6.4.3.B.4-1 (Continued)

SUMMARY OF LABORATORY TESTS
BOTTOM ASH POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft³	Laboratory Permeability (5) cm/sec
Bottom Ash Pond (CONTD.)	TP-5, 1	1.0	-	-	-	96	60	20	40	CH	28.4		
	2	2.0	-	-	-	96	64	21	43	CH	28.0		
	3	3.0	-	-	-	99	60	21	39	CH	27.6		
	TP-6, 1	1.0	-	-	-	99	65	20	45	CH	24.8		
	2	2.0	-	-	-	99	61	22	39	CH	25.1		
	3	3.0	-	-	-	99	60	21	39	CH	22.4		
	TP-7, 1	1.0	-	-	-	93	58	21	37	CH	26.1		
	2	2.0	-	-	-	99	70	24	46	CH	33.4		
	3	3.0	-	-	-	93	65	22	43	CH	32.8		
													2.1×10^{-8} (A) 2.1×10^{-7} (A)
	230, 2	3.0	100	100	100	100	58	20	38	CH	25.6		
	4	6.0											
	6	9.0											
	8	15.0	-	-	100	66	27	19	8	CL	27.4		
	231, 2	3.0	-	-	-	37	N.P.(6)	N.P.	N.P.	SM	17.7	-	
	4	6.0	-	-	-	15	N.P.	N.P.	N.P.	SP	25.1		
	9	20.0	-	-	-	99	61	20	41	CH	18.9	-	
	232, 1	1.5	-	-	-	100	62	20	42	CH	35.3	-	
	3	4.5	100	100	100	98	58	19	39	CH	36	83	1.1×10^{-6}
	5	7.5	-	-	-	89	29	18	11	CL	24.1	-	

NOTE: A) Two Permeability Tests performed on composite material of all samples from TP-5, TP-6, and TP-7.

GENERAL NOTES:

(1) Laboratory testing performed by Southwestern Laboratories, Inc., Shreveport, Louisiana
(2) Laboratory Particle Size Analysis Tests performed in accordance with ASTM D422 and ASTM D1140
(3) Laboratory Atterberg Limit Tests performed in accordance with ASTM D423 and ASTM D424.
(4) Laboratory Water Content Tests of Soils performed in accordance with ASTM D2216. Most of Water Content Tests performed on split-spoon samples.
(5) Laboratory Vertical Permeability Test performed on undisturbed Shelby tube samples unless otherwise
[illegible] in accordance with EM 1110-2-1906.

TABLE CS 6.4.3.B.4-1

SUMMARY OF LABORATORY TESTS
CLARIFIER SLUDGE POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft^3	Laboratory Permeability (5) cm/sec
Clarifier Sludge Pond (CONTD.)	233	1.5				30	23	17	6	SM-SC	17.8		
		3.0				20	26	17	9	SC	8.9		
		4.5				21	25	17	8	SC	15.1		
		6.0				15	22	17	5	SM-SC	20.6		
		7.5				26	22	17	5	SM-SC	22.1		
		9.0				84	37	18	19	CL	21.1		
		12.0				18	21	16	5	SM-SC	14.8		
		17.0				8	21	N.P.	N.P.	SP-SM	13.7		
		22.0				66	41	20	21	CL	13.4		
	234	1.5				72	35	18	17	CL	20.9		
		3.0				70	35	17	18	CL	20.5		
		5.0				6	21	N.P.	N.P.	SP-SM	18.8		
		6.5				4	19	N.P.	N.P.	SP	14.4		
		8.0				7	19	N.P.	N.P.	SP-SM	11.6		
		9.5				8	18	N.P.	N.P.	SP-SM	14.9		
		16.0				19	24	17	7	SM-SC	14.8		
		20.0				7	22	N.P.	N.P.	SP-SM	14.5		
	235	1.5				40	19	N.P.	N.P.	SM	16.5		
		3.0				38	21	17	4	SM-SC	16.9		
		4.5				19	18	N.P.	N.P.	SM	30.6		
		6.0				18	22	17	5	SM-SC	20.5		
		7.5				19	23	17	6	SM-SC	23.8		
		9.0				50	39	18	21	SC-CL	19.7		
		10.5				25	18	N.P.	N.P.	SM	17.4		
		15.0				5	21	N.P.	N.P.	SP-SM	12.6		
		20.0				6	18	N.P.	N.P.	SP-SM	17.9		
		25.0				4	17	N.P.	N.P.	SP	15.0		

TABLE CS 6.4.3.B.4-1 (Continued)

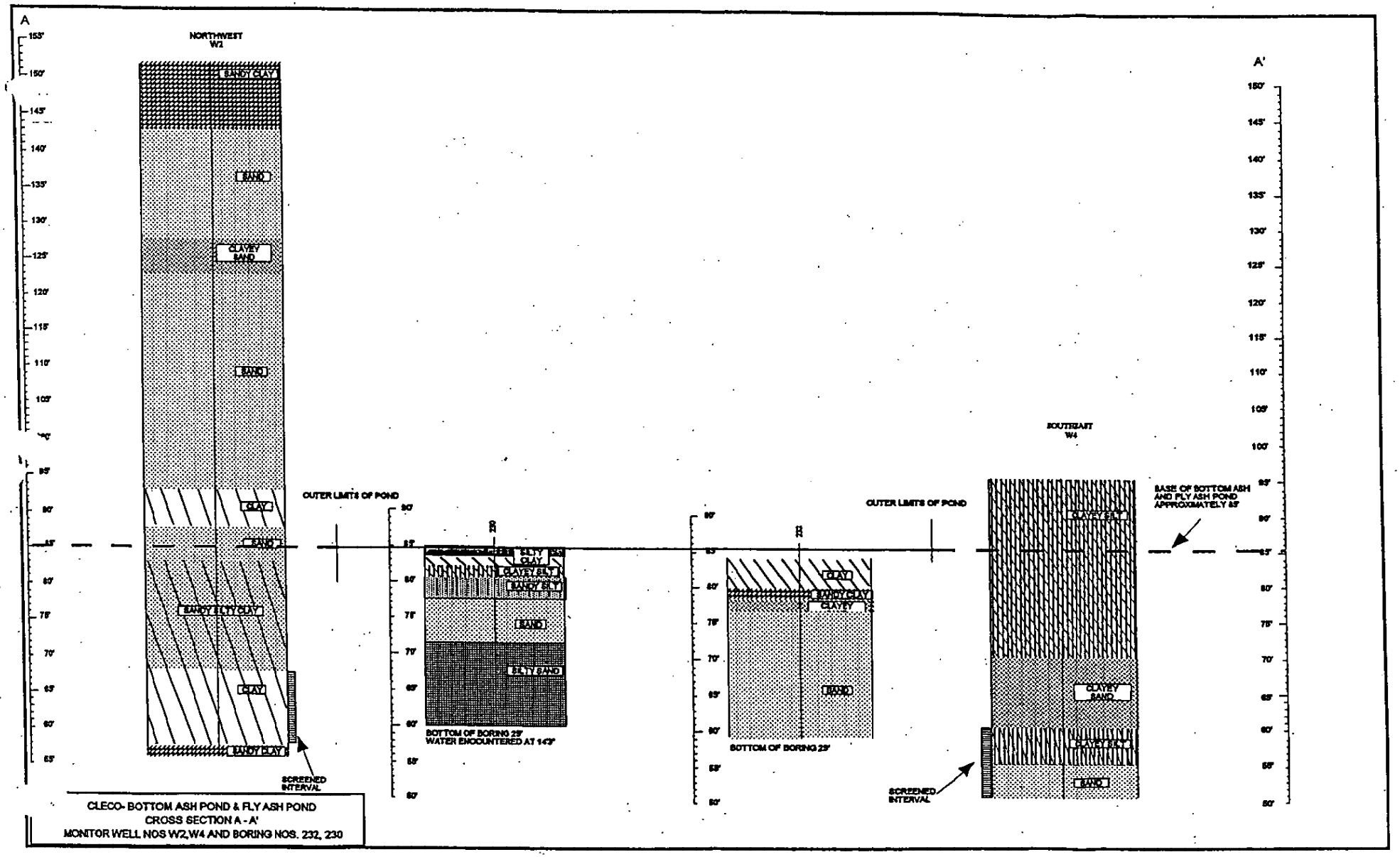
SUMMARY OF LABORATORY TESTS
CLARIFIER SLUDGE POND

Feature	Boring No. Sample No.	Bottom of Sample Depth, Ft.	Particle Size Analysis (% Passing) (2) No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Atterberg Limits (3) Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification Symbol	Natural Water Content (%) (4)	Dry Density lbs/ft^3	Laboratory Permeability (5) cm/sec
Clarifier Sludge Pond, Borrow Material for Pond Lining	TP-8, 1	4.5	-	-	99	18	25 24 26	17 17 17	8 9 9	SC			
	TP-9, 1	3.0	-	-	100	19	21 23 24	17 17 17	4 6 7	SM-SC			
Clarifier Sludge Pond, Soil-Bentonite Lining	Borrow Material from TP-9 and 5% Bentonite					22	35	20	15	SC			1.0×10^{-8} (A) 3.6×10^{-8} (A)
	Borrow Material from TP-9 and 7% Bentonite					25	45	20	25	SC			1.0×10^{-8} (A) 2.1×10^{-8} (A)
	Borrow Material from TP-9 and 9% Bentonite					27	55	21	34	SC			1.2×10^{-8} (A) 5.5×10^{-9} (A)

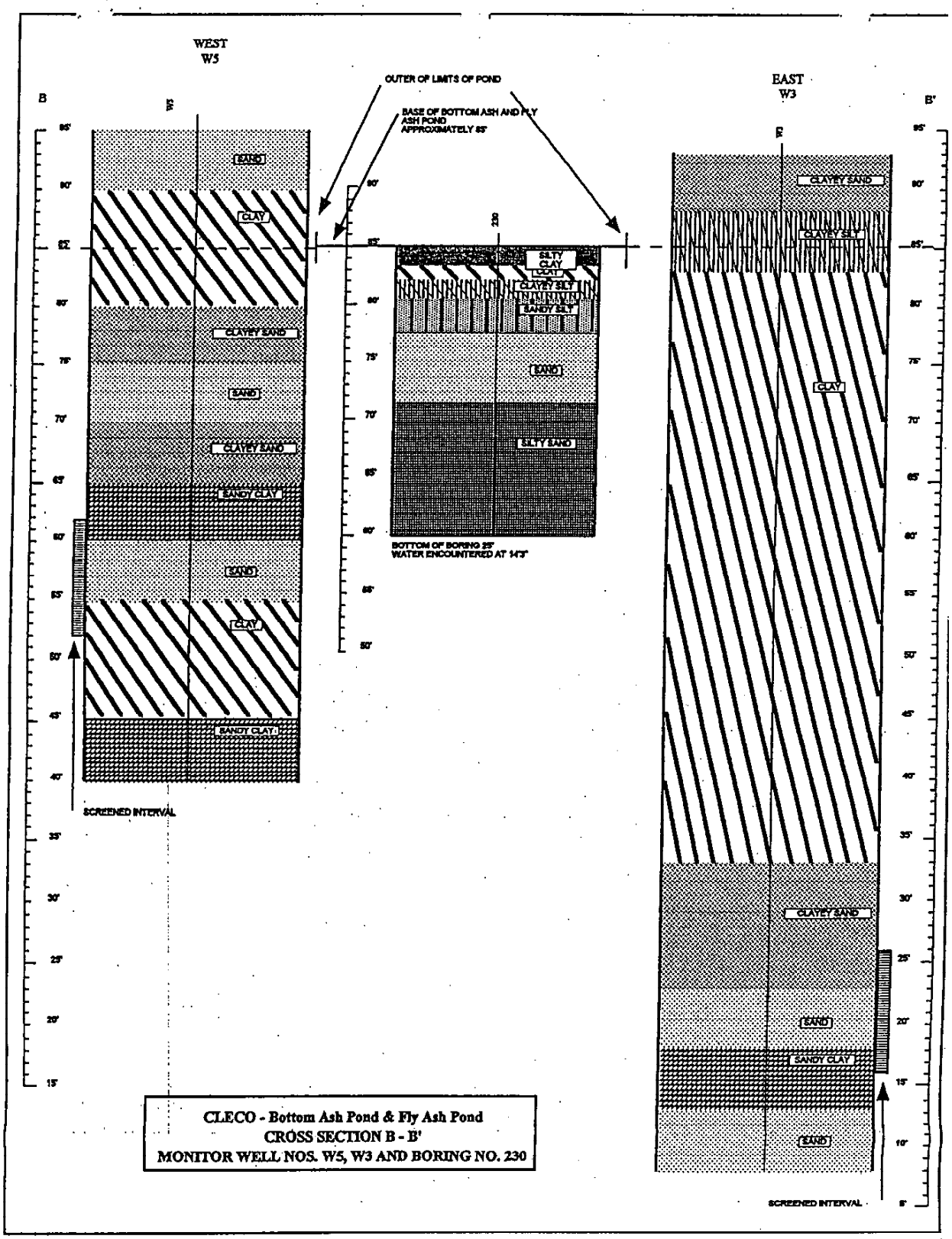
NOTE: A) Laboratory Permeability Tests performed on samples compacted to 95% Standard Proctor compaction (ASTM D698).

GENERAL NOTES:

(1) Laboratory testing performed by Southwestern Laboratories, Inc., Shreveport, Louisiana
(2) Laboratory Particle Size Analysis Tests performed in accordance with ASTM D422 and ASTM D1140
(3) Laboratory Atterberg Limit Tests performed in accordance with ASTM D423 and ASTM D424.
(4) Laboratory Water Content Tests of Soils performed in accordance with ASTM D2216. Most of Water Content Tests performed on split-spoon samples.
(5) Laboratory Vertical Permeability Test performed on undisturbed Shelby tube samples unless otherwise noted. Samples tested using Falling Head Test procedure in accordance with EM 1110-2-1906.
(6) N.P.= Non Plastic



CLECO- BOTTOM ASH POND & FLY ASH POND
CROSS SECTION A - A'
MONITOR WELL NOS W2,W4 AND BORING NOS. 232, 230

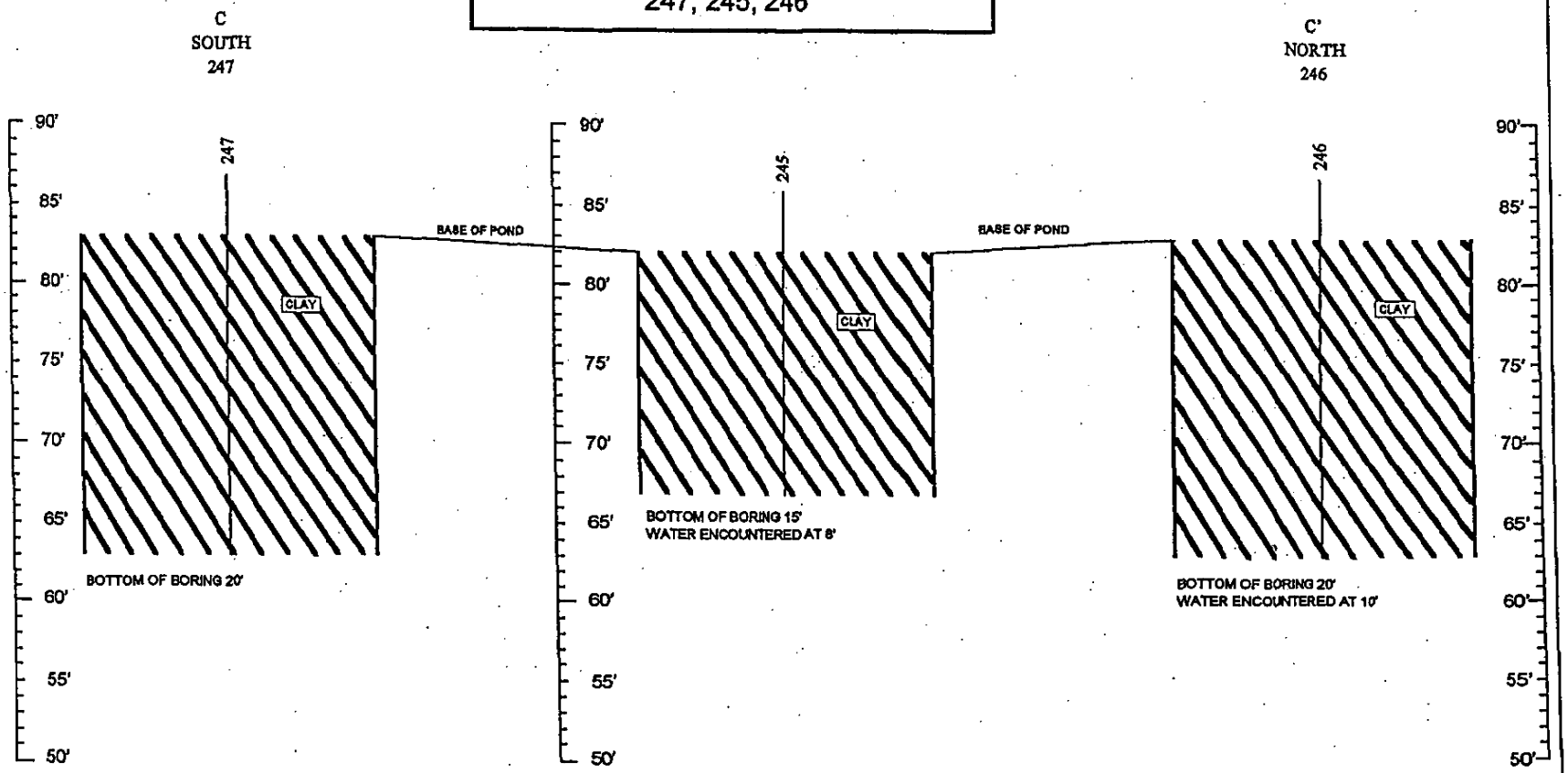


CLECO - Bottom Ash Pond & Fly Ash Pond
CROSS SECTION B - B'
MONITOR WELL NOS. W5, W3 AND BORING NO. 230

LDEQ-EDMS Document 35857654, Page 259 of 403

LDEQ-EDMS Document 35857654, Page 260 of 403

CROSS SECTION
C - C'
247, 245, 246



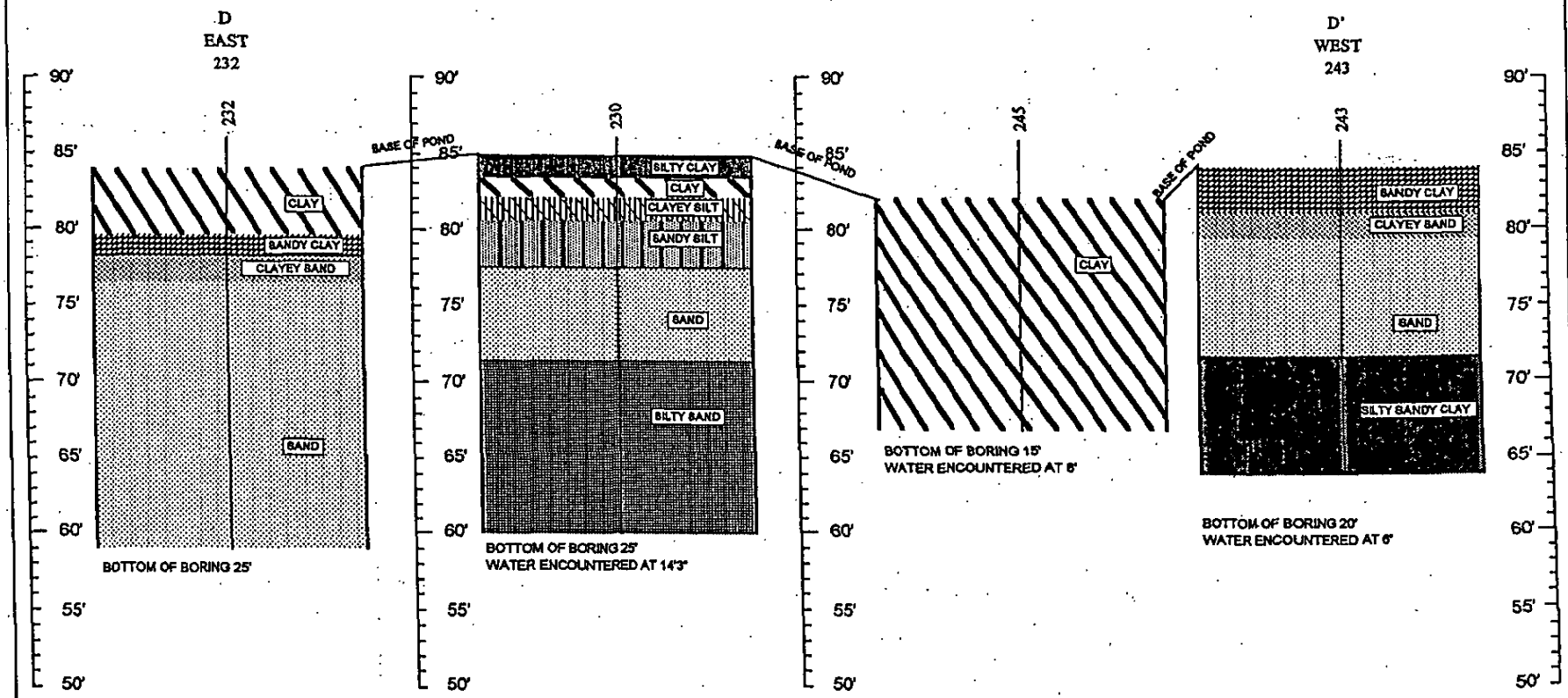
VERTICAL SCALE: 1" = 5'

DATE: 10/15/99

CLECO - Bottom Ash Pond
CROSS SECTION C - C'
BORING NOS. 247, 245, 246

LDEQ-EDMS Document 35857654, Page 261 of 403

CROSS SECTION
D - D'
232, 230, 245, 243

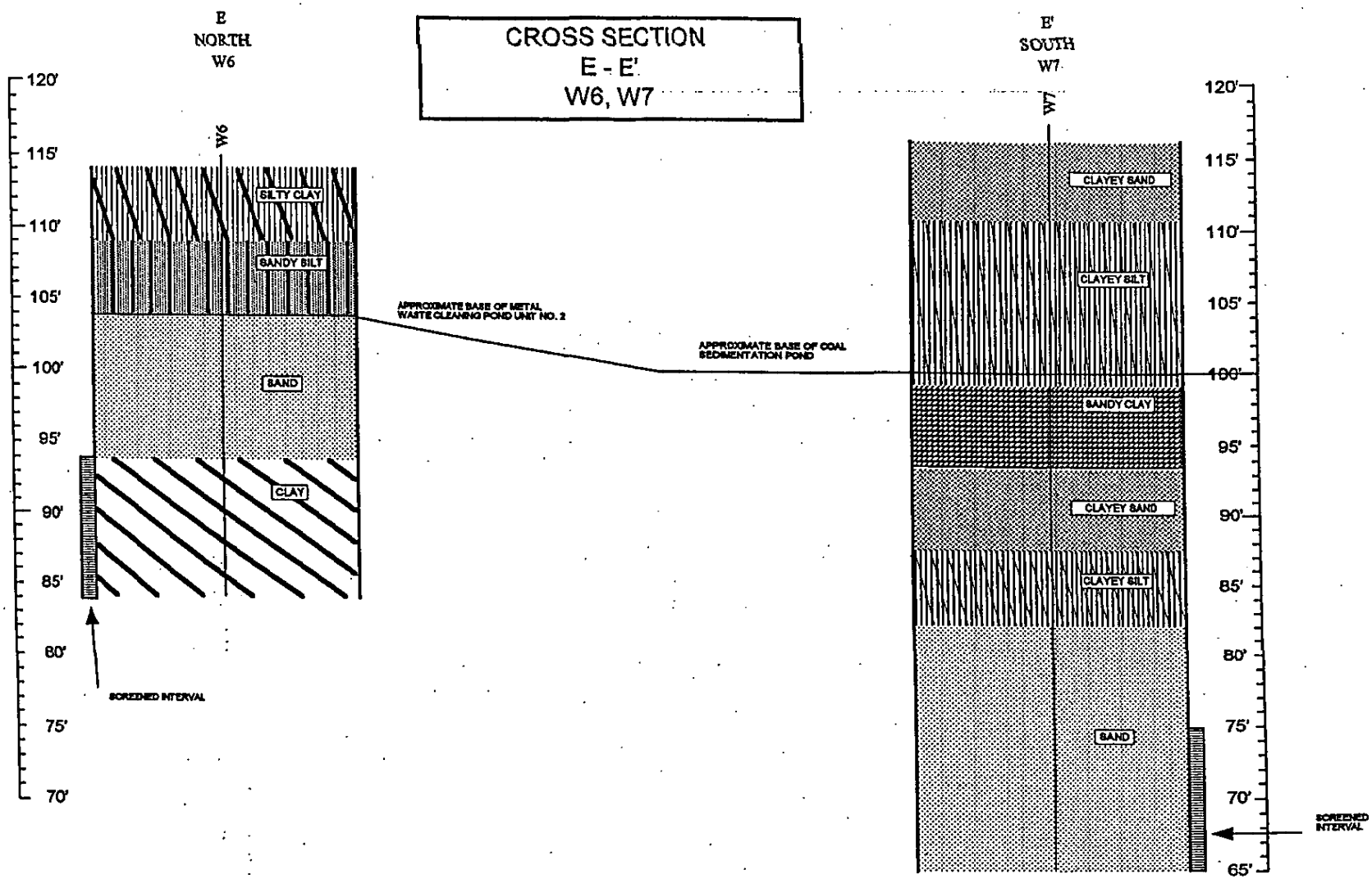


VERTICAL SCALE: 1" = 5'

CLECO - Fly Ash Pond & Bottom Ash Pond
CROSS SECTION D - D'
BORING NOS. 232, 230, 245, 243

DATE: 10/15/99

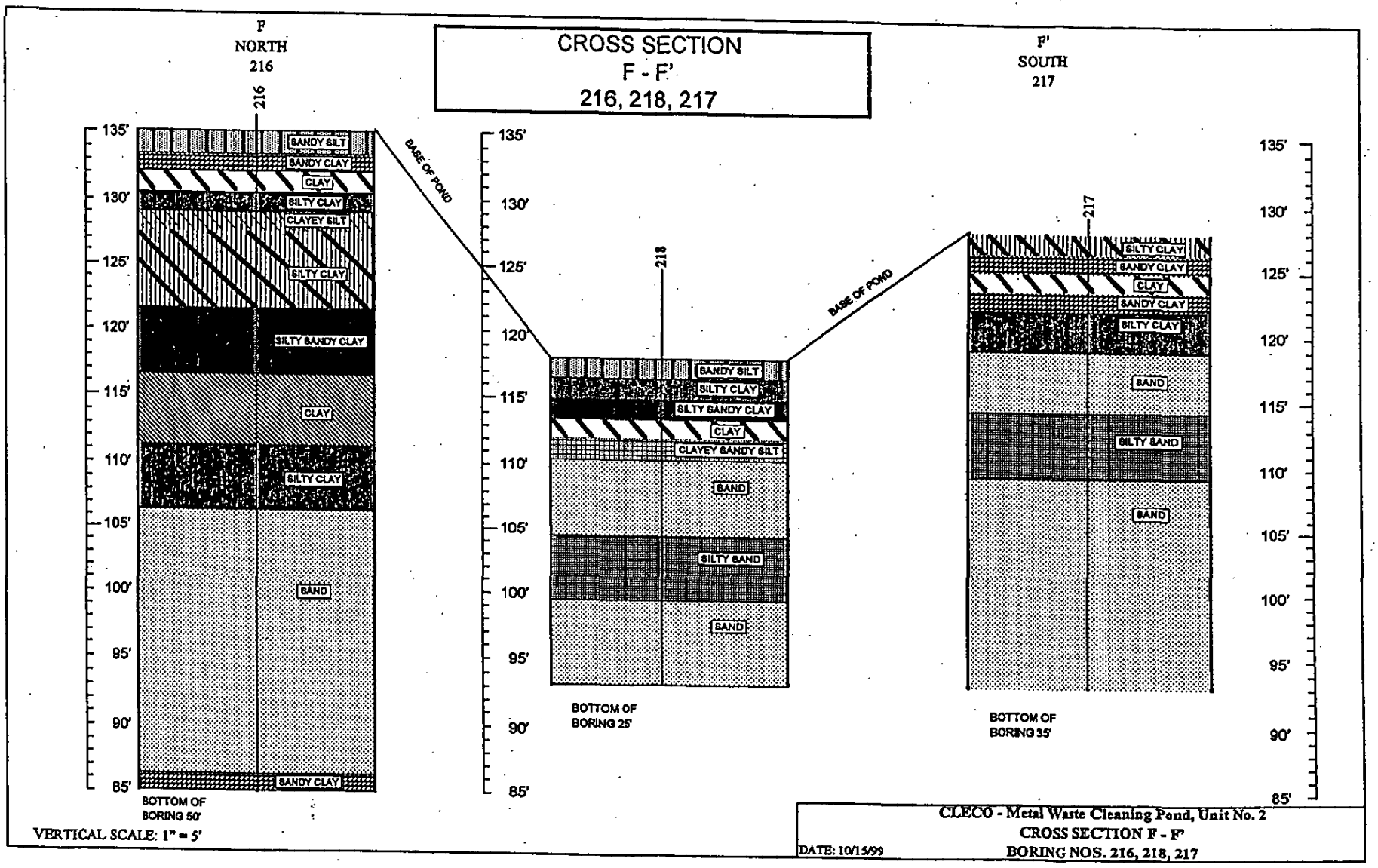
LDEQ-EDMS Document 35857654, Page 262 of 403



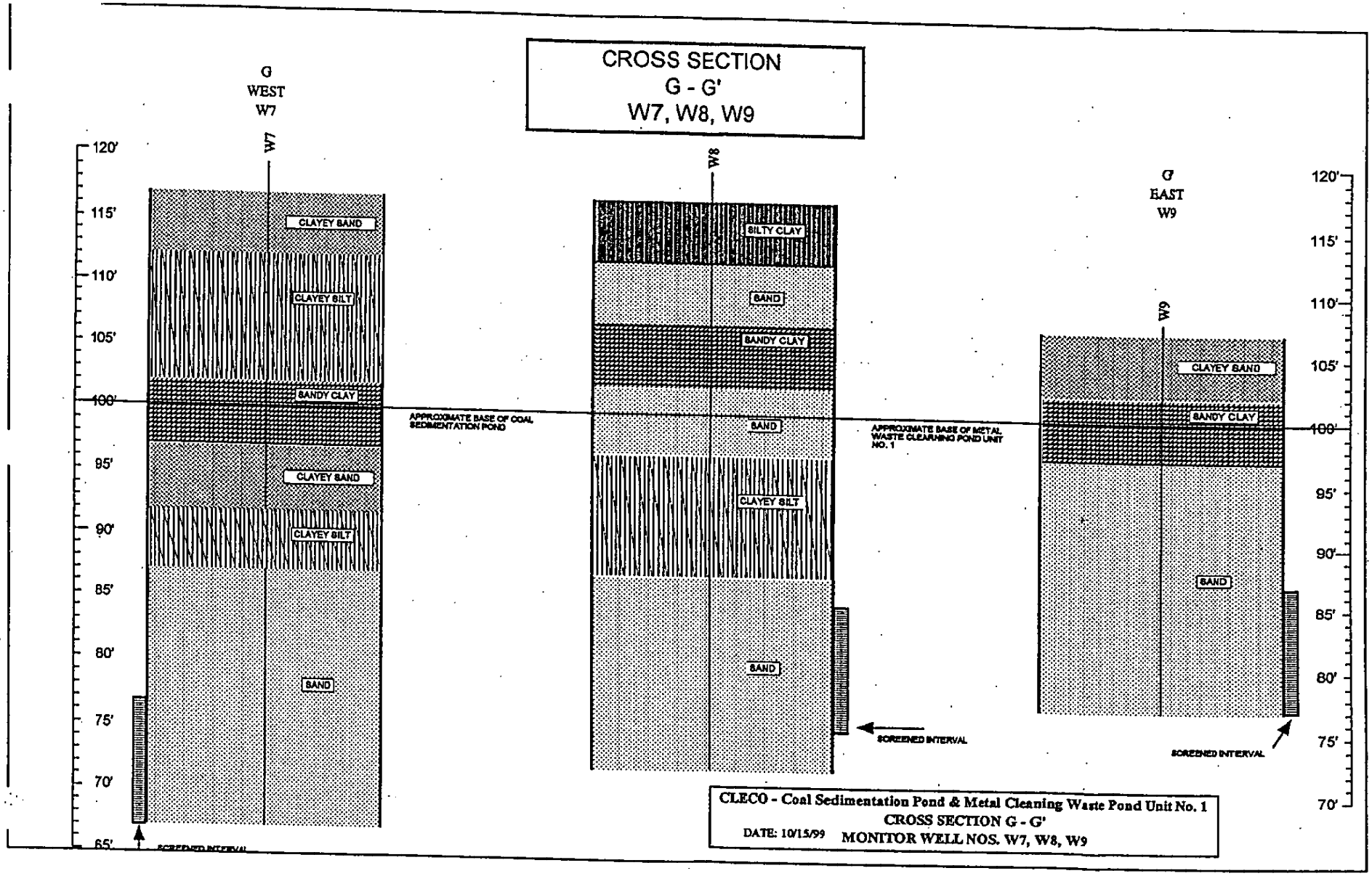
CLECO - Metal Waste Cleaning Pond, Unit No. 2 & Coal Sedimentation Pond
CROSS SECTION E - E'
MONITOR WELL NOS. W6, W7

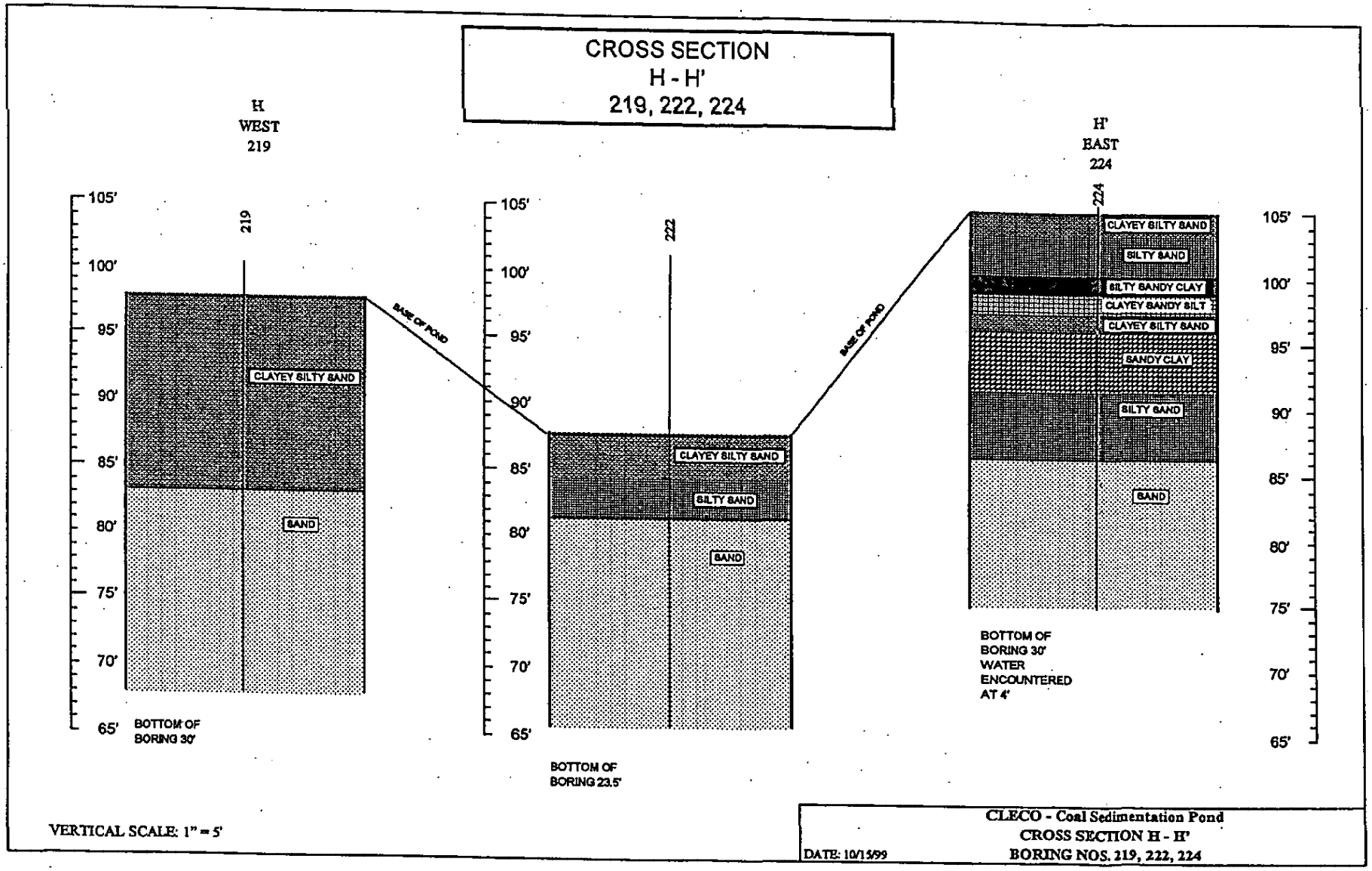
DATE: 10/15/99

LDEQ-EDMS Document 35857654, Page 263 of 403

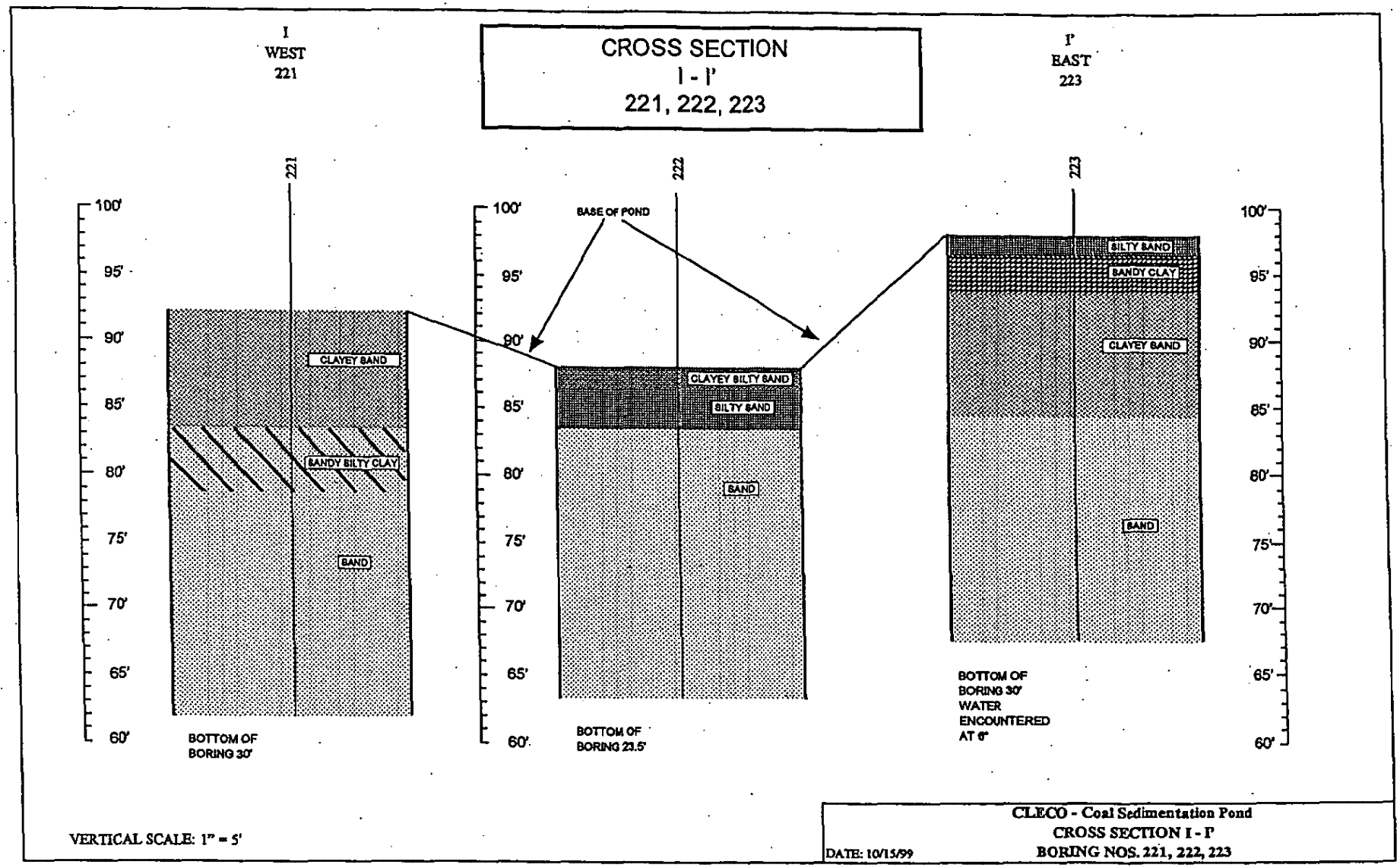


LDEQ-EDMS Document 35857654, Page 264 of 403



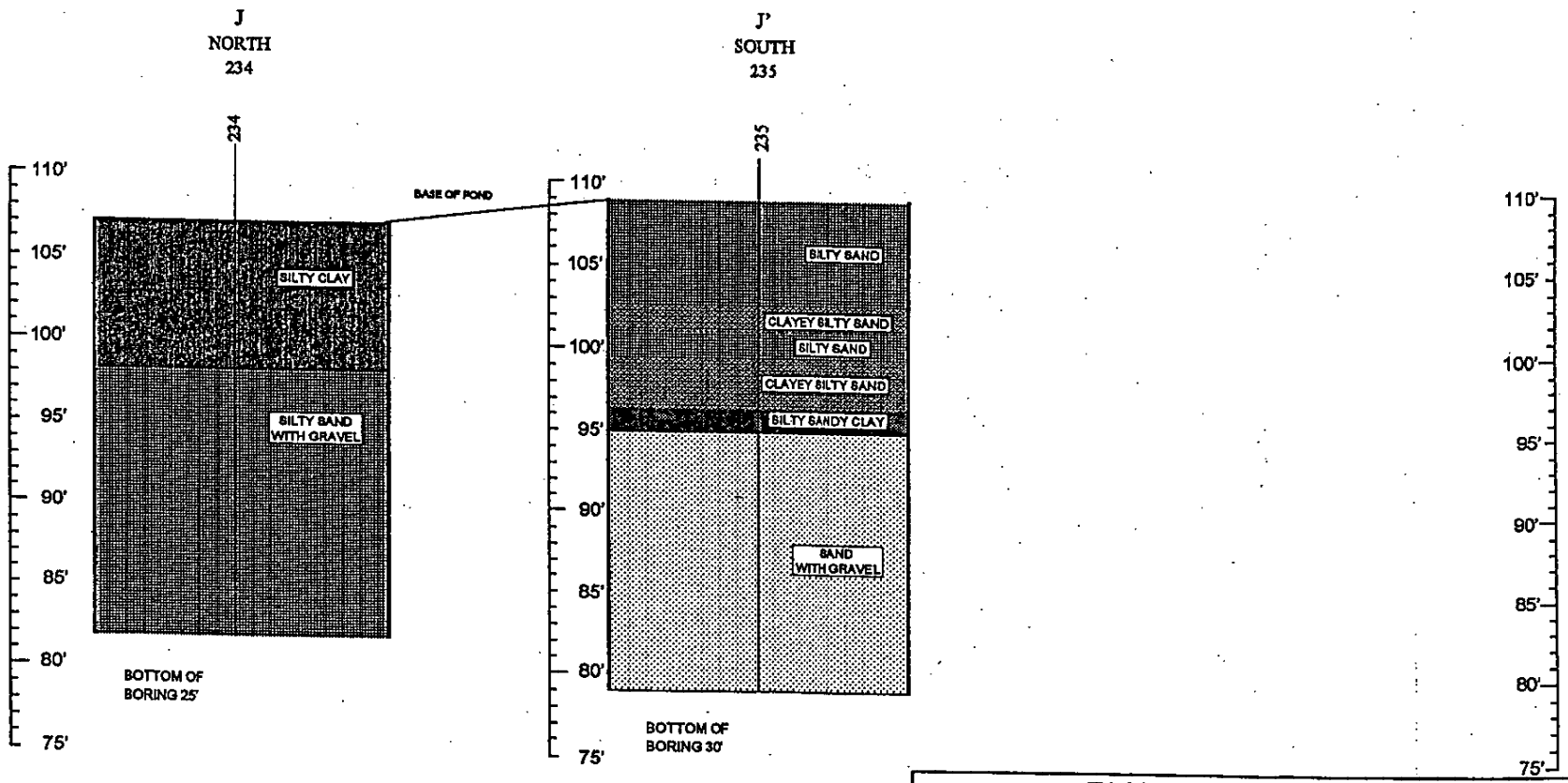

CROSS SECTION
H - H'
219, 222, 224
H
WEST
219
H'
EAST
224
105'
100'
95'
90'
85'
80'
75'
70'
65'
219
222
224
CLAYEY SILTY SAND
SAND
BASE OF POND
SILTY SAND
SILTY SANDY CLAY
CLAYEY SANDY SILT
SANDY CLAY
BOTTOM OF BORING 30'
BOTTOM OF BORING 23.5'
BOTTOM OF BORING 30' WATER ENCOUNTERED AT 4'
VERTICAL SCALE: 1" = 5'
CLECO - Coal Sedimentation Pond
CROSS SECTION H - H'
BORING NOS. 219, 222, 224
DATE: 10/15/99

LDEQ-EDMS Document 35857654, Page 266 of 403



LDEQ-EDMS Document 35857654, Page 267 of 403

CROSS SECTION
J - J'
234, 235



VERTICAL SCALE: 1" = 5'

CLECO - Metal Cleaning Waste Pond, Unit No. 1
CROSS SECTION J - J'
BORING NOS. 234, 235

DATE: 10/15/99

GEOTECHNICAL INVESTIGATION TO SUPPORT SOLID WASTE PERMITTING

REPORT DATE:

DECEMBER 31, 2004

PREPARED FOR:

CLECO CORPORATION

PINEVILLE, LOUISIANA

PREPARED BY:

AQUATERRA ENGINEERING, LLC
P. O. BOX 82160 • BATON ROUGE, LA 70884-2160
3499 I-10 FRONTAGE ROAD • PORT ALLEN, LOUISIANA
TEL: 225.344.6052 • FAX: 225.344.6346

VICTOR R. DONALD, P.E.

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December 31, 2004

Mr. Rick Nguyen
CLECO Corporation
2030 Donahue Ferry Road
P.O. Box 5000
Pineville, LA 71361-5000

RE: Geotechnical Investigation to Support Solid Waste Permitting
Rodemacher Power Station
AQT: 914206

Submitted herein are the results of our geotechnical investigation for the above-mentioned project. This letter provides a description of soil boring procedures and includes the resulting soil boring logs with all field and laboratory data collected.

1.0 Introduction

An expansion of the Rodemacher Power Station is anticipated. This expansion may require the utility of additional ash impoundment area, and a geotechnical investigation is necessary to support the solid waste permitting effort for this. This site is located at the existing Rodemacher Power Station near Boyce, Louisiana in Rapides Parish.

Aquaterra Engineering, LLC (Aquaterra) was retained by CLECO Corporation to conduct a geotechnical investigation for the proposed new expansion. This investigation was intended to provide an understanding of the subsurface conditions.

2.0 Field and Laboratory Investigation

This geotechnical investigation was conducted utilizing standard procedures developed by Aquaterra for investigations of this nature. The following paragraphs describe the field and laboratory procedures utilized. The soil boring logs which provide data collected and a description of soil and groundwater conditions is included as Appendix A. Also included within Appendix A is a legend that describes the terms and symbols used in the boring logs.

2.1 Field Investigation

The field investigation was conducted December 7-29, 2004. It included a site reconnaissance to document site characteristics pertinent to the geotechnical investigation and the conduct of a soil exploration program. The information collected during the field investigation was documented by an Aquaterra engineer and/or engineering technician.

2.1.1 Site Reconnaissance

The project engineer walked the project site and documented observations that are of significance to the geotechnical investigation. Such observations include: topography, vegetation, trees, drainage, other structures, surface soil conditions, and trafficability.

LDEQ-EDMS Document 35857654, Page 270 of 403

These observations were utilized in combination with the soil boring data to form the site characterization pertinent to the geotechnical and geological aspects of the site.

2.1.2 Soil Borings

Nineteen soil borings were advanced using an ATV-mounted drilling rig at the locations illustrated on Figure 1. Prior to Aquaterra's arrival, the boring locations were surveyed and staked. The following paragraphs provide the methodology utilized and present the data collected.

2.1.2.1 Soil Boring Advancement. The soil borings were initially advanced by rotating a four-inch diameter, short-flight earth auger with the drilling rig, removing the auger from the boring, and cleaning the cuttings from the auger before sampling or reinserting the auger into the boring. This technique allowed for the observation of soil cuttings and description of soil conditions encountered. This dry auger technique also allowed detection of free groundwater within the borings.

Below the groundwater, the soil borings were advanced using rotary wash boring techniques. In this case, the soil borings were advanced with a four-inch diameter drill bit, and cuttings from the bore hole were circulated to the ground surface using drilling fluids injected through the drill stem. The drilling fluids stabilized the bore hole during sampling procedures. This technique masks any detection of free groundwater measurements.

2.1.2.2 Soil Sampling. The soil sampling program included the collection of undisturbed and disturbed soil samples. Relatively undisturbed samples were obtained by pushing a three-inch diameter, Shelby tube sampler a distance of two feet into the soil in general accordance with ASTM D1587. Depths at which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the attached boring logs.

After the Shelby tube was removed from each boring, the samples were carefully extruded in the field and visually classified. Relative strength estimates of the sample were obtained by penetrometer readings. These penetrometer readings in units of tons per square foot are indicated by the symbol "(P)" in the "Field Test Results" column of the boring logs. Disturbed portions of the sample were discarded and the undisturbed samples were placed in a protective container for transportation to the laboratory.

In more granular conditions, the standard penetration test (SPT) was performed. In this case, a representative disturbed sample was obtained in a less cohesive soil by driving a two-inch OD split-spoon sampler a distance of 18 inches into the soil with blows from a 140-pound hammer falling a distance of 30 inches (ASTM D 1586). The depths at which split-spoon samples were taken are indicated by two crossed slashes in the "Samples" column of the boring logs. The number of blows required to drive the sampler for each six-inch increment was recorded. The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12 inches of penetration. Information related to the penetration resistance is presented in the "Field Test Results" column of the boring logs as the number of blows per foot (b/f). In some formations at this site, the relatively weak deposits allowed complete (18 inch) penetration of the formation with the hammer weight or with one hammer blow. These conditions are recorded on the soil boring logs as WOH (weight of hammer) or as 1b/18", respectively.

2.1.2.3 Groundwater Observations. During the soil boring advancement and sampling operation, observations for free groundwater were made. Information regarding water level observations is recorded in the "groundwater" column on the soil boring logs. Where free water was encountered, the depth of this observation is noted in that column as an open triangle. After encountering free water, boring operations were suspended for 15 minutes to

LDEQ-EDMS Document 35857654, Page 271 of 403

allow the water level to rise in the bore holes. The water level was again recorded and is illustrated on the attached boring logs as a triangle containing a vertical line.

2.1.2.4 Boring Abandonment. Upon completion of the field investigation phase of this study, the soil borings were sealed with a cement/bentonite grout using the tremie method.

2.2. Laboratory Testing

The soil samples were delivered to the Aquaterra laboratory for testing. The project engineer reviewed the soil boring log developed in the field and assigned laboratory testing on select samples to provide the data necessary for the anticipated designs.

Laboratory testing was accomplished to determine the engineering properties of the soils encountered. These procedures are discussed below.

2.2.1 Index Properties

2.2.1.1 Moisture Content. Moisture content tests were performed to better understand the classification and shrink/swell potential of the soils encountered. These tests were performed in general accordance with ASTM D 2216. The results of these tests are tabulated within the Laboratory Data section of the attached boring logs.

2.2.1.2 Atterberg Limits. Liquid limit (LL) and plastic limit (PL) determinations were performed to assist in classification by the Unified Soil Classification System (USCS). These tests were performed in general accordance with ASTM D 4318. The plasticity index (PI) was calculated as LL - PL for each Atterberg limit determination. The results of these tests are tabulated within the Laboratory Data section of the attached boring logs.

2.2.1.3 Grain Size Determinations. Selected granular soil samples were tested to determine the particle gradation to aid in classification and to further understand the engineering characteristics. These tests were performed in general accordance with AASHTO T 88 (ASTM D 422). The boring logs indicate the percent of the soil particles passing the No. 200 sieve (percent fines) in the appropriate column. Grain size distribution curves for representative soil samples are presented in Appendix A.

2.2.2 Strength Tests

2.2.2.1 Unconfined Compression. The undrained shear strength of selected undisturbed soil samples was determined by means of unconfined compression tests (ASTM D 2166). In an unconfined compression test, a cylindrical sample of soil is subjected to a uniformly increasing axial strain until failure develops. For cohesive soils, the undrained shear strength, or cohesion, is taken to be equal to one-half of the maximum observed normal stress on the sample during the test.

2.2.2.2 Triaxial Compression. The undrained shear strength of selected undisturbed soil samples was determined by means of unconsolidated, undrained triaxial (TX-UU) compression tests (ASTM D 4767). The TX-UU testing determines the shear strength of cylindrical soil samples that are confined under fluid pressure. The confining pressures allow for the development of the friction component of shear strength, thereby yielding higher shear strengths in granular soils.

The results of the unconfined and the triaxial compression tests are provided as undrained shear strength values within the Laboratory Data section of the attached boring logs. Also shown are the natural water contents and unit dry weights determined as a part of each unconfined compression test.

LDEQ-EDMS Document 35857654, Page 272 of 403

3.0 Site Conditions

The following paragraphs describe the site conditions pertinent to the geotechnical aspects of this project.

3.1 Physiography

The soil boring plan as shown on Figure 1 is produced on a recent (1999) aerial photograph. Although not apparent on the photograph, the area of the investigation is relatively flat but surrounded by a constructed levee which is obvious on the Figure. The northwest portion of the site is hilly and topographically elevated on the order of 40 feet above the remainder of the relatively flat site. The area is relatively densely wooded. The area is very poorly drained and many areas of standing water were present at the time of our investigation. In addition to these areas of standing water, several small ponds were present in the southeast part of the site. These ponds can be observed on the figure.

3.2 Geology

The surface geology of this area is illustrated on a reproduction of the Louisiana Geologic Map as Figure 2. As shown on that figure, the site is located very near the interface of five geologic units from two distinct geologic ages. Comparing the geologic maps to the soil boring data yields the following interpretation.

The southeast portion of the site is likely located within Holocene Age deposits, either natural levee (Qnl) or alluvium (Qal). These deposits have been placed as a result of meanders of the Red River and its tributaries in the general area. In areas of natural levee deposits, alluvium is likely present with depth. Holocene Age deposits are also termed Recent deposits because they are the youngest of the geologic sequences. As a result, the soils within the Holocene Age groups are commonly weak and normally consolidated.

The northwest portions of the site which are topographically higher are probably within Terrace deposits of Pleistocene Age; either Prairie (Qtp), Intermediate (Qti) or High (Qth). These are older and more competent geologic conditions relative to the Holocene deposits to the south and east. Prairie terrace deposits are characteristically tan and gray and are composed of silts clays and sands with little gravel, while the Intermediate and High terrace deposits are typically orange, red and gray and gravel depositions are more typical in these terrace formations.

3.3 Soil Conditions

The field and laboratory data from the soil borings were reviewed to develop an understanding of subsurface conditions. Figure 3 presents an isometric profile of these conditions.

The soil boring logs within Appendix A and the isometric profile indicate an extremely variable stratigraphy beneath the site. The upper 2 to 4 feet typically consisted of firm to very stiff clay (Unified Soil Classification Symbol - CH) or silty clay (CL). However, several of the borings encountered more granular conditions consisting of silty sands (SM) and sandy silts (ML). A very weak colluvial deposit of silty clays (CL), clayey and sandy silts (ML) and silty sands (SM) was present below the upper stratum, and this formation was typically present throughout the full depth of the 40 foot borings. The formation, when cohesive in nature (CL) was described as very soft to soft, and when semi cohesive (ML) or non cohesive (SM) was described as very loose to loose. As shown on the isometric profile (Figure 3), this general formation randomly varied between the various soil types described above.

LDEQ-EDMS Document 35857654, Page 273 of 403

The borings made in the northwestern portion of the site often encountered a very stiff to hard gray clay (CH) deposit in the lower portions of the boring. Soil boring B- 4 encountered a very dense sand (SP) with gravel below 32 feet and to a depth of 68 feet.

The 100 foot deep borings (B-6, B-11 and B-21) typically encountered intervening layers of medium dense to very dense sands (SM or SP) and very stiff to hard clays (CH), silty clays (CL) and sandy clays (CL). Boring B-11 encountered a wood deposit from 47 to 58 feet.

3.4 Groundwater Conditions

Groundwater level data pertinent to each boring are illustrated on the individual soil boring logs in Appendix A and this information is illustrated on the isometric soil profile (Figure 3). With the exception of B-4 which was made in the elevated portion of the site, the borings commonly encountered groundwater within the upper 10 feet.

This information, combined with the field reconnaissance and observations of numerous surface water bodies in the southeastern majority of the site, lead to the conclusion that groundwater levels within 2 to 5 feet of the ground surface is common throughout the majority of the site.

If you have any questions concerning this information please contact this office. It is our pleasure to serve CLECO Corporation on this project.

Sincerely,
Aquaterra Engineering, LLC

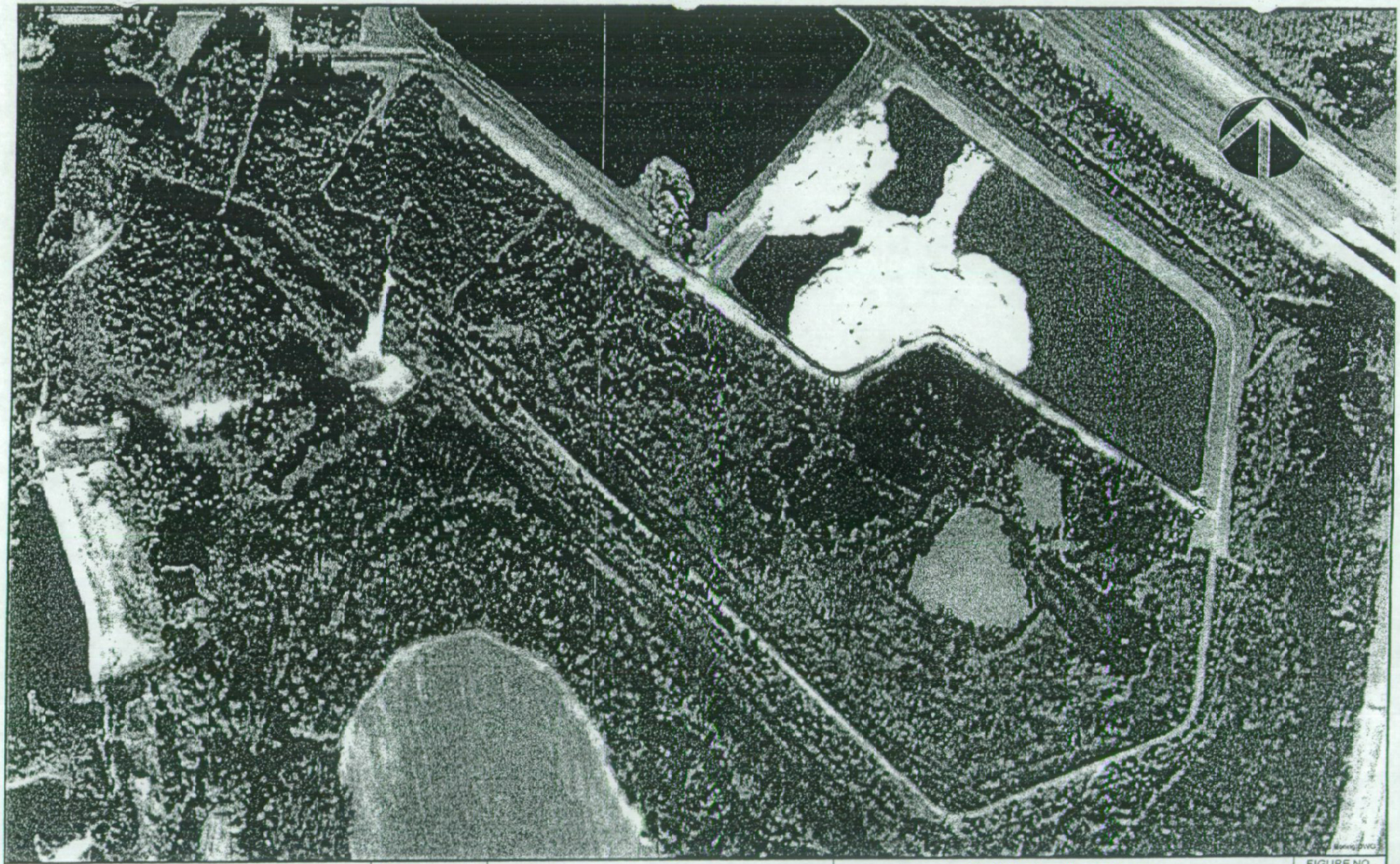
Victor R. Donald, P.E.

Enclosure
VRD/wlw

Geotechnical Investigation to Support Permitting
CLECO - Rodemacher Power Station
Boyce, Louisiana

Figures

LDEQ-EDMS Document 35857654, Page 275 of 403



LEGEND

SOIL BORING LOCATIONS

250 125 0 250 500 750

SCALE IN FEET

ENGINEER:	VRD
DRAWN:	PDM
CHECKED:	VRD
DATE:	12/28/04
PROJECT:	914206

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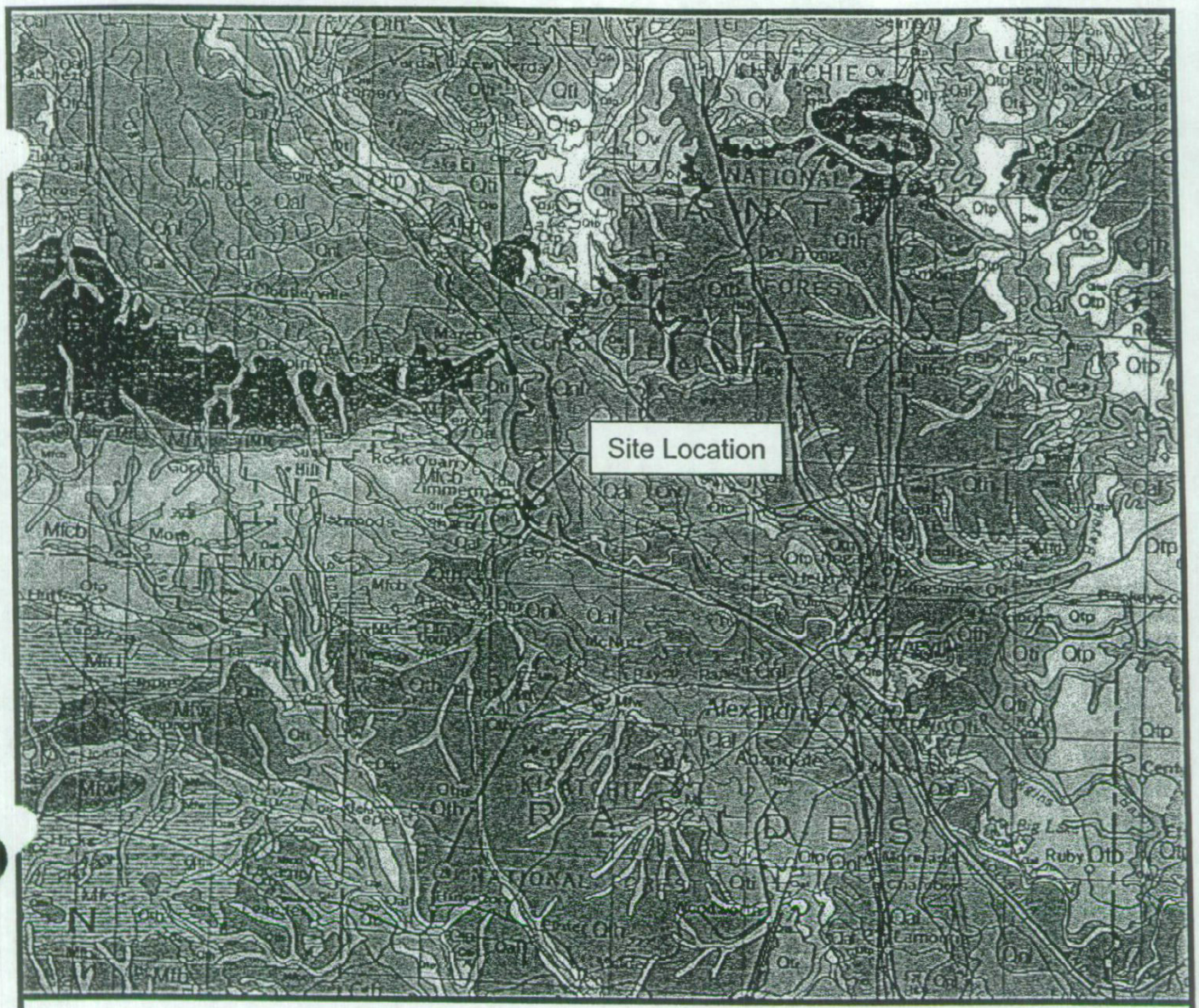
Soil Boring Locations

CLECO Rodemacher Expansion
Boyce, Louisiana

FIGURE NO.

1

BEST COPY OF THE NEXT 2 PAGES



Holocene Age Deposits

Qal

Alluvium — Gray to brownish gray clay and silty clay, reddish brown in the Red River Valley; some sand and gravel locally. Includes all alluvial valley deposits except natural levees of major streams.

Qnl

Natural Levees — Gray and brown silt, silty clay, some very fine sand, reddish brown along the Red River. Shown only on past and present courses of major streams.

Pleistocene Age Deposits

Qtp

Prairie Terraces — Light gray to light brown clay, sandy clay, silt, sand, and some gravel. Surfaces generally show little dissection and are topographically higher than the Deweyville. Three levels are recognized: two along alluvial valleys, the lower coalescing with its broad coastwise expression; the third, still lower, found intermittently gulfward.

Qti

Intermediate Terraces — Light gray to orange-brown clay, sandy clay, and silt; much sand and gravel locally. Surfaces show more dissection and are topographically higher than the Prairie. Composed of terraces formerly designated as Montgomery, Irene, and most of the Bentley.

Qth

High Terraces — Tan to orange clay, silt, and sand with a large amount of basal gravel. Surfaces are highly dissected and less continuous than lower terraces. Composed of terraces formerly designated as Williana, Citronelle, and the highest Bentley.

North

Ref: *Geologic Map of Louisiana*, Louisiana Geological Survey, 1984

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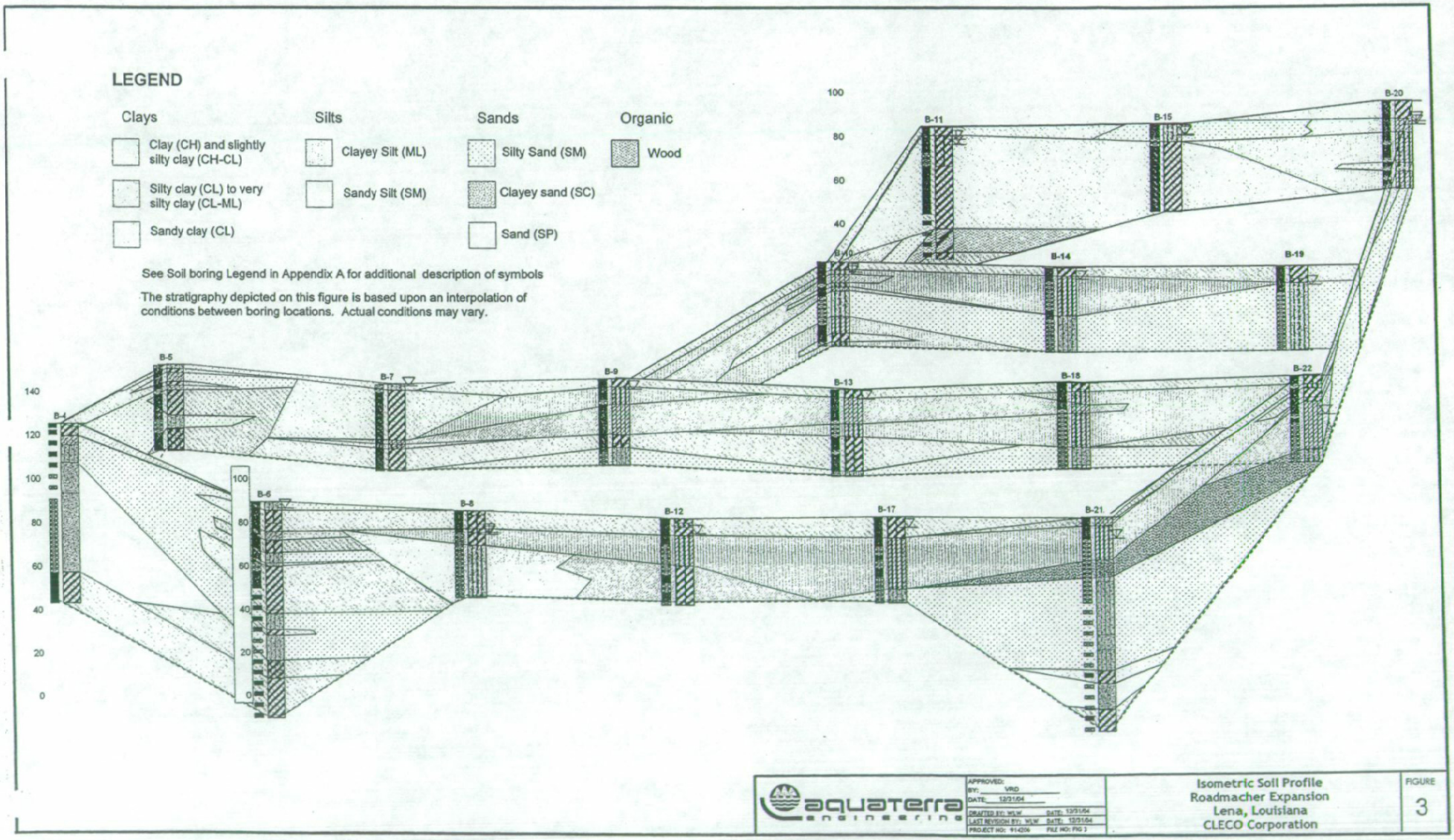
APPROVED:	
BY: VRD	
DATE: 12/28/04	
DRAFTED BY: WLW	DATE: 12/28/04
LAST REVISION BY: WLW	DATE: 12/28/04
PROJECT NO: 914206	FILE NO: FIG 3

Geologic Setting
Roadmacher Expansion
Lena, Louisiana
CLECO Corporation

FIGURE 2

LDEQ-EDMS Document 35857654, Page 278 of 403



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APPROVED:
BY: VRD
DATE: 12/31/04

DRAFTED BY: WLM DATE: 12/31/04
LAST REVISION BY: WLM DATE: 12/31/04
PROJECT NO: 91-4204 FILE NO: FIG 3

Isometric Soil Profile
Roadmacher Expansion
Lena, Louisiana
CLECO Corporation

FIGURE
3

Geotechnical Investigation to Support Permitting
CLECO - Rodemacher Power Station
Boyce, Louisiana

Appendix A
Soil Boring Logs
Grain Size Curves
Soil Boring Legend

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-4

SHEET 1 OF 2

FILE: 914206
DATE: Dec. 17, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 43.8"
Long. 92° 42' 28.2"

Surface Elevation: 127.1 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			2.75 (P)							Firm tan and gray very **SANDY CLAY** (CL-SC)		
5			3.50 (P)	0.55	122	108		11 / 13 / 25	14		6.0	
										Loose tan **CLAYEY SAND** (SC)		
10			0.75 (P)								10.0	
										Loose orange **SILTY fine SAND** (SM) - with gravel		
15			1.50 (P)								18.0	
20			N/A				9	5		Very loose orange and tan fine **SAND** (SP) - with gravel		
25			WOH									
30			WOH				51 (g)	27		- fine to medium below 28.5'	32.0	
35			49 b/f 14-24-25							Very dense orange and tan **SAND** (SP) - with gravel		
			50 b/f 12-20-30				6	20				
40			17 b/f 12-8-9									
			57 b/f 19-27-30				6					
			50 b/f 21-27-23									
45			50 b/f 23-31-19/4"									
			50+ b/f									
50			50+ b/f				6 (g)	11				

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

☒ No free water encountered

Advancement Method

Short-flight Auger: 0' - 20'
Rotary Wash: 20' - 82'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

WOH: weight of hammer
g: See attached grain size curves

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PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-4

SHEET 2 OF 2

FILE: 914206
DATE: Dec. 17, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 43.8"
Long. 92° 42' 28.2"

Surface Elevation: 127.1 ±

FIELD DATA				LABORATORY DATA								
Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
	X		39 b/f 22-17-22							Very dense orange and tan SAND (SP) - with gravel *(continued)* - with abundant gravel at 52' - 56'		
	X		57 b/f 19-27-30									
55	X		29 b/f 16-11-18									
	X		36 b/f 14-18-18				7 (g)	20				
60	X		38 b/f 14-16-22									
	X		39 b/f 15-17-22									
	X		34 b/f 14-16-18									
65	X		38 b/f 15-19-19									
	X		47 b/f 13-21-26								68.0	
70			3.00 (P)							Very stiff light gray CLAY (CH) - with fine sand seams		
			4.25 (P)	3.21	117	92		17 / 27 / 57	40			
			3.25 (P)									
5			4.50+ (P)									
			4.00 (P)									
80			4.00 (P)									
			2.50 (P)								82.0	
85										**Boring Terminated at 82 Feet.**		
90												
95												
100												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

☒ No free water encountered

Advancement Method

Short-flight Auger: 0' - 20'
Rotary Wash: 20' - 82'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

g: See attached grain size curves

aquaterra engineering

206.GPJ AQUATERR.GDT 1/3/05

AQ LOG SBLT

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-5

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 20, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 43.8"
Long. 92° 42' 23.0"
Surface Elevation: 93.1 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
	X									Tan **SILTY SAND** (SM)	2.0	
			1.25 (P)	0.98	114	84		18 / 36 / 41	53	Firm to stiff red and light gray **CLAY** (CH)	4.0	
5			0.00 (P)				22 (g)	21		Very loose tan and red **CLAYEY SAND** (SC) - with gravel and sandy clay layer		
			2.00 (P)								8.0	
			3.50 (P)	1.36	119	89		33		Stiff red **CLAY** (CH) - with gravel	10.0	
10							17	10		Loose red **CLAYEY, SILTY SAND** (SM-SC)	12.0	
	X		15 b/f 9-7-8							Stiff red and tan **SANDY CLAY** (CL)		
15			4.25 (P)									
			4.25 (P)									
			3.00 (P)	1.73	122	104		9 / 17 / 34	25			
20			2.00 (P)									
			2.25 (P)								24.0	
25										Very dense tan **SILTY SAND** (SM)		
	X		52 b/f 11-22-30									
	X		23 b/f 7-11-12				14	26			30.0	
30	X		22 b/f 7-10-12							Very stiff tan and red **SILTY, SANDY CLAY** (CL)		
			4.50 + (P)									
35			4.00 (P)	2.93	125	101		13 / 24 / 50	37	- gray, slightly silty clay (CL-CH) below 34'		
			4.25 (P)									
			2.50 (P)								40.0	
40										**Boring Terminated at 40 Feet.**		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

☒ Groundwater at surface

Advancement Method

Short-flight Auger: 0' - 2'
Rotary Wash: 2' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

g: See attached grain size curves

aquaterra engineering

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-6

SHEET 1 OF 2

FILE: 914206
DATE: Dec. 18, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 39.4"
Long. 92° 42' 23.0"

Surface Elevation: 91.7 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			1.25 (P)				18	14		Tan SILTY fine SAND (SM) - with gravel	4.0	
5			3.25 (P) 4.25 (P) 4.50+ (P)	2.59	123	102		14 / 21 / 41	27	Very stiff light gray and tan SILTY CLAY (CL) - with sand - very silty (CL-ML) at 8' - 10'	10.0	
10			2.50 (P) 1.75 (P)	1.28	120	95		16 / 26 / 53	37	Stiff tan CLAY (CH) - with fine sand seams at 12' - 14'	14.0	
15			1.00 (P) 2.00 (P)				43	15		Medium dense tan and light gray very CLAYEY SAND (SC-CL) - with sand layers	18.0	
20			4.50+ (P) 2.50 (P) 1.25 (P)	1.16	103	86		11 / 20 / 37	26	Stiff light gray SILTY CLAY (CL) - with sand layers	24.0	
25			1.00 (P) 0.00 (P)				17	19		Medium dense tan and red SILTY SAND (SM)	30.0	
30			23 b/f 5-7-16 24 b/f 7-11-13 4.5+ (P)					16 / 23 / 49	33	Very stiff gray CLAY (CH) - with silt traces and pockets		
35			4.5+ (P) 4.25 (P) 4.5+ (P)									
40												
45			4.5+ (P)	3.91	12	10		25		- with fewer silt pockets below 43'		
50			4.25 (P)								50.0	

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 3 ft.
Rose to 2 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 4'
Rotary Wash: 4' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

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208.GPJ AQUATERR.GDT 1/3/05
AQ LOG SBLC

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-6

SHEET 2 OF 2

FILE: 914206
DATE: Dec. 18, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 39.4"
Long. 92° 42' 23.0"
Surface Elevation: 91.7 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
										Very stiff gray **CLAY** (CH)	52.0	
55	■		0.25 (P)				21.3	24		Medium dense tan and gray very **SILTY** fine **SAND** (SM-ML)	59.0	
60	■		2.50 (P)							Very stiff gray **CLAY** (CH) - with silt traces	62.0	
65	☒		34 b/f 6-14-20				9 (g)	29		Very dense gray **SILTY fine SAND** (SM)		
70	☒		53 b/f 15-23-30								73.5	
5	■		3.00 (P)					13 27 20	14	Very stiff gray **SANDY, SILTY CLAY** (CL)		
80	■		3.75 (P)							- more sandy (CL-SC) at 78' - 80'	82.0	
85	■		4.50+ (P)							Very stiff gray **CLAY** (CH) - with silt pockets		
90	■		4.50+ (P)	3.21	114	88		25 54 30	29			
95	■		4.50+ (P)									
100	■		2.00 (P)							- stiff to very stiff at 98' - 100' **Boring Terminated at 100 Feet.**	100.0	

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 3 ft.
Rose to 2 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 4'
Rotary Wash: 4' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

g: See attached grain size curves

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'206.GPJ AQUATERR.GDT 1/3/05

AQ LOG

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-7

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 19, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 39.3"
Long. 92° 42' 17.8"
Surface Elevation: 84.1 ±

FIELD DATA				LABORATORY DATA								
Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
										Tan SILTY fine SAND (SM)	3.0	
			4 b/f 1-2-2				99	43		Soft to firm gray CLAY (CH) - with roots		
5			0.25 (P)									
			0.20 (P)	0.61	108	81		19 / 34 / 70	51			
			0.25 (P)									
10			0.25 (P)							- with wood at 10' - 12'		
			0.75 (P)							-reddish brown below 12'		
15			0.75 (P)	0.68	107	74		25 / 44 / 85	60			
			1.00 (P)							- light gray and tan, firm to stiff below 16'		
			1.50 (P)									
20			0.50 (P)									
			1.50 (P)							- soft, slightly silty (CH-CL) below 22'		
25			1.00 (P)							- firm to stiff below 24' - silty clay (CL) at 25' - 26'	26.0	
			0.00 (P)							Very soft gray very SILTY CLAY (CL)	28.0	
			0.20 (P)					24		Very loose gray CLAYEY, SANDY SILT (ML)	30.0	
30			0.75 (P)							Soft to firm gray CLAY (CH) - with roots and organic matter		
			0.25 (P)									
35			0.25 (P)	0.50	92	53		31 / 74 / 118	87			
			0.75 (P)							- firm to stiff below 36'		
			1.00 (P)							- gray and reddish brown at 38' - 40'	40.0	
40										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 1 ft.
No Change after 10 min.

Advancement Method

Short-flight Auger: 0' - 2'
Rotary Wash: 2' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

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1206.GPJ AQUATERR.GDT 1/3/05
AQ LOG

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-8

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 20, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 34.9"
Long. 92° 42' 17.9"
Surface Elevation: 87.5 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
	1.50 (P)							Firm brown CLAY (CH)	2.0	
	0.50 (P)					16 30 20	14	Firm brown SILTY CLAY (CL) - with sand layers		
5	0.50 (P)									
	0.00 (P)	0.54	114	92		24				
	0.25 (P)								10.0	
10	3 b/f 2-2-1							Very soft brown SILTY CLAY (CL) - with silt layers		
	1 b/18"					12 30 32	18			
15	1 b/18"								16.0	
	3 b/f 1-2-1							Loose to very loose brown SANDY SILT (ML)		
	7 b/f 1-2-5									
20	4 b/f 2-2-2									
	11 b/f 2-5-6									
25	1 b/18"				74	32				
	10 b/f 5-6-4							- medium dense at 26' - 28'		
	1 b/18"									
30	3 b/f 1-1-2									
	4 b/f 1-2-2									
35	6 b/f 2-3-3									
	3 b/f 1-1-2				80	30				
	6 b/f 1-1-5							- with silty clay (CL) layer at 39'	40.0	
40								Boring Terminated at 40 Feet.		
45										
50										

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 11 ft.
Rose to 10 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 12'
Rotary Wash: 12' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

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108.GPJ AQUATERR.GDT 1/3/05
AQ LOG SBLO

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-9

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 16, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 34.9"
Long. 92° 42' 12.7"
Surface Elevation: 86.7 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			1.75 (P)	0.56	103	69		24 – 49 – 95	71	Firm brown and gray **CLAY** (CH) - with roots	4.0	
			1.25 (P)									
5										Very loose red **CLAYEY SILT** (ML) - with sand		
			0.25 (P)				84	26				
			<0.25 (P)									
10			WOH					35		- with silty clay seams at 10' - 12'	12.0	
			0.50 (P)							Soft to firm red very **SILTY CLAY** (CL-ML)		
15			0.50 (P)									
			0.75 (P)									
			0.50 (P)									
20			1.25 (P)	0.53	116	90		15 – 29 – 40	25			
			0.50 (P)									
25			0.50 (P)								26.0	
			0.75 (P)	0.86	114	86		18 – 33 – 51	33	Firm red slightly **SILTY CLAY** (CL-CH) - with sand seams		
			1.00 (P)								30.0	
30			0.50 (P)							Soft to firm red very **SILTY CLAY** (CL)	32.0	
			0.50 (P)							Very loose red and gray **SILTY SAND** (SM)		
35			WOH									
			WOH				47	30				
			41 b/f 12-17-24							- dense at 38' - 40'	40.0	
40										**Boring Terminated at 40 Feet.**		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 5 ft.
Hole fell in 5 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

WOH: weight of hammer

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208.GPJ AQUATERR.GDT 1/3/05
AQ LOG SOIL

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

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Pineville, Louisiana

SOIL BORING LOG

No. B-10

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 21, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 34.9"
Long. 92° 42' 07.5"

Surface Elevation: 86.9 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			2.25 (P)							Firm to stiff brown **SILTY CLAY** (CL)		
			3.25 (P)					15 38 20	23		4.0	
5		▽	0.25 (P)							Very loose brown **SANDY SILT** (ML)	6.0	
			0.00 (P)							Very soft brown very **SILTY CLAY** (CL-ML) - with sand		
			0.00 (P)					17 30 28	13		10.0	
10	☒		1 b/18" 1-0-0							Very loose brown **SANDY, CLAYEY SILT** (ML)	12.0	
			0.00 (P)							Very soft brown very **SILTY CLAY** (CL-ML)	14.0	
15			0.00 (P)							Very loose brown **SANDY SILT** (ML)		
	☒		1 b/18" 1-0-0									
	☒		WOH									
20	☒		8 b/f 2-3-5				92	28				
	☒		2 b/f 2-1-1									
25	☒		2 b/ 18" 1-1-0								26.0	
	☒		2 b/ 18" 1-1-0							Very loose brown **CLAYEY SILT** (ML)		
	☒		3 b/f 1-1-2							- with clay layer at 29'		
30			0.00 (P)									
			0.25 (P)								34.0	
35			0.25 (P)					15 37 28	22	Very soft brown **SILTY CLAY** (CL)		
			0.00 (P)								38.0	
	☒		3 b/f 1-1-2							Very loose brown **CLAYEY, SANDY SILT** (ML)	40.0	
40										**Boring Terminated at 40 Feet.**		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 6 ft.
▽ Rose to 5 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 8'
Rotary Wash: 8' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

WOH: Weight of Hammer

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208.GPJ AQUATERR.GDT 1/3/05
AQ LOG Sheet

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-11

SHEET 1 OF 2

FILE: 914206
DATE: Dec. 28, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 34.9"
Long. 92° 42' 02.3"
Surface Elevation: 84.4 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			1.00 (P)							Stiff brown CLAY (CH) - with roots and organics		
			1.25 (P)	1.26	118	94		14 – 25 – 57	43		4.0	
5		▽	0.25 (P)							Soft to very soft brown SILTY CLAY (CL)		
		▽	0.00 (P)	0.30	115	89		29				
			0.00 (P)									
10			0.00 (P)									
	☒		2 b/18" 1-1-0							- more clayey (CL-CH) below 12'		
15	☒		1 b/18" 0-0-1					15 – 33 – 38	23			
	☒		1 b/18" 0-1-0								18.0	
			1.25 (P)							Firm to stiff gray CLAY (CH)		
20			1.00 (P)	0.64	106	75		18 – 42 – 86	68			
			0.75 (P)									
25			1.00 (P)									
			0.75 (P)									
			0.75 (P)							- dark gray below 28'		
30			1.25 (P)									
			1.25 (P)									
35			1.50 (P)									
			0.50 (P)									
			0.25 (P)					17 – 84 – 167	150			
40												
			0.25 (P)									
45											47.0	
	☒									WOOD with clay		
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 8 ft.
▽ Rose to 5.6 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

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208.GPJ AQUATERR.GDT 1/3/05
AQ LOG SBC

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-11

SHEET 2 OF 2

FILE: 914206
DATE: Dec. 28, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 34.9"
Long. 92° 42' 02.3"

Surface Elevation: 84.4 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth
55						92		WOOD with clay (continued)	58.0
60	0.50 (P)							Firm gray very SANDY CLAY to CLAYEY SAND (CL-SC)	
65	1.25 (P)					14 23 19	9		
70	1.00 (P)								72.0
75	0.50 (P)					17 22 23	5	Firm light gray SILTY CLAY (CL) - with sand	77.0
80	0.25 (P)				16	19		Medium dense light gray CLAYEY, SANDY SILT (ML)	79.5
								Gray SILTY SAND (SM)	82.0
85	2.50 (P)							Very stiff gray CLAY (CH)	87.0
90	4.50+ (P)							Very stiff gray very SANDY CLAY (CL-SC)	92.0
95	4.50+ (P)					23 27 52	29	Hard gray CLAY (CH)	
100	4.50+ (P)							Boring Terminated at 100 Feet.	100.0

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

- First encountered at 8 ft.
- Rose to 5.6 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

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AQ LOG 5... 1208.GPJ AQUATERR.GDT 1/3/05

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-12

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 15, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 30.4"
Long. 92° 42' 12.7"

Surface Elevation: 83.9 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			3.50 (P)							Stiff red SILTY CLAY (CL) - with roots	2.0	
			1.00 (P)							Loose red CLAYEY SILT (ML)	4.0	
5			2.00 (P)	0.70	112	85		20 / 31 / 54	34	Firm red CLAY (CH) - with silt seams		
		▽	1.25 (P)								8.0	
			0.75 (P)					19 / 24 / 28	9	Loose red CLAYEY SILT (ML)		
10			0.50 (P)									
			WOH							- with sand below 12'		
15			WOH									
			WOH				63	32				
			WOH									
20			WOH								22.0	
			WOH							Very soft to soft red and brown SILTY CLAY (CL)		
25			WOH									
			0.75 (P)									
			0.75 (P)	0.28 (t)	118	92		16 / 28 / 31	15			
30			WOH									
			WOH									
35			0.75 (P)									
			0.75 (P)	0.36 (t)	106	79		22 / 35 / 42	20			
			WOH								40.0	
40										**Boring Terminated at 40 Feet.**		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 7 ft.
No rise after 15 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

WOH: weight of hammer
t: Unconsolidated, undrained triaxial compression test at overburden pressure.

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206.GPJ AQUATERR.GDT 1/3/05

AQ LOG

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-13

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 16, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 30.4"
Long. 92° 42' 07.5"
Surface Elevation: 81.7 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			4.00 (P)							Firm to stiff red and brown **SILTY CLAY** (CL)		
			2.50 (P)	0.71	117	93		15 / 26 / 41	26		4.0	
5		▽	0.25 (P)							Very soft red and brown very **SILTY CLAY** (CL-ML)		
			<0.25 (P)					17 / 30 / 29	12			
			0.25 (P)									
10			0.50 (P)									
			0.50 (P)									
15	X		WOH								16.0	
	X		WOH				85	28		Very loose red and brown **CLAYEY SILT** (ML) - with sand		
	X		WOH									
20	X		WOH								22.0	
			0.50 (P)							Soft red and gray very **SILTY CLAY** (CL)		
25			0.75 (P)									
			0.25 (P)									
	X		WOH									
30			1.00 (P)	0.71	117	90		16 / 30 / 47	31		32.0	
			1.50 (P)							Firm red and brown **SILTY CLAY** (CL)		
35			1.00 (P)									
			1.00 (P)								38.0	
40	X		WOH				42	41		Very loose red and brown very **SILTY fine SAND** (SM-ML)	40.0	
										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 4.6 ft

Hole fell in 4.6 ft after 15 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

WOH: weight of hammer

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206.GPJ AQUATERR.GDT 1/3/05

AQ LOG SHEET

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-14

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 27, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 30.4"
Long. 92° 42' 02.3"
Surface Elevation: 84.1 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			3.00 (P)							Stiff brown **CLAY** (CH)		
			3.75 (P)								4.0	
5		▽	0.00 (P)					17 27 24	10	Very soft brown **SILTY CLAY** (CL) - with sand		
	X		1 b/18" 1-0-0									
	X		1 b/18" 1-0-0									
10	X		1 b/18" 1-0-0									
	X		1 b/18" 1-0-0				89	34				
15	X		1 b/18" 1-0-0									
	X		7 b/f 3-3-4							- loose at 16' - 18'		
	X		2 b/f 1-1-0									
20			0.00 (P)									
			0.00 (P)					15 29 23			23.0	
5	X		3 b/18" 1-2-0						14	Very loose red very **SILTY fine SAND** (SM)		
	X		4b/f 2-2-2									
	X		1 b/18" 1-0-0									
30	X		7 b/f 3-3-4									
	X		7 b/f 2-3-4							- with silty clay (CL) layer at 32'		
35	X		5 b/f 2-2-3							- less silty below 34'		
	X		19 b/f 4-7-12				19	24				
	X		24 b/f 10-12-12									
40											40.0	
										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 5.5 ft
No rise after 15 min.

Advancement Method

Short-flight Auger: 0' - 6'
Rotary Wash: 6' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

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AQUATERR.GPJ AQUATERR.GDT 1/3/05

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-15

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 29, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 30.4"
Long. 92° 41' 57.1"

Surface Elevation: 85.6 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			0.25 (P)							Loose red SANDY SILT (ML)		
			0.50 (P)				91	20				
5												
			5 b/18" 0-2-3								8.0	
			4 b/f 2-2-2							Soft to firm red CLAY (CH)		
10			0.50 (P)	0.86	108	76		30 – 43 – 91	61			
			1.00 (P)									
15			0.50 (P)							- with wood at 14' - 16'		
			1.25 (P)									
			1.00 (P)									
20			1.50 (P)					38				
			1.25 (P)									
25			1.50 (P)									
			0.50 (P)									
			0.25 (P)					21 – 42 – 105	84			
30			1.25 (P)							- with organic matter below 30'		
			1.00 (P)									
35			0.50 (P)									
			0.50 (P)					83				
			0.50 (P)								40.0	
40										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 5 ft
Hole fell in 4.5 ft after 15 min.

Advancement Method

Short-flight Auger: 0' - 6'
Rotary Wash: 6' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

aquaterra engineering

208.GPJ AQUATERR.GDT 1/3/05
AQ LOG SBL

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-16

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 13, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 30.4"
Long. 92° 41' 51.9"
Surface Elevation: 89.5 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			3.00 (P)							Stiff red and brown CLAY (CH)		
			2.75 (P)	1.00	116	93		24 – 25 – 62	38			
5			1.75 (P)							- firm at 4' - 6'	6.0	
			1.75 (P)							Loose red and brown SANDY SILT (ML)		
		▽					87	27				
10											12.0	
			1.00 (P)	0.36	120	98		16 – 23 – 43	27	Soft to firm red and gray SILTY CLAY (CL)		
15			2.75 (P)									
			3.00 (P)									
			2.00 (P)	0.87				25			20.0	
20												
			WOH							Very loose gray CLAYEY SILT (ML) - with sand		
							92	30			24.0	
25			1.75 (P)							Firm brown CLAY (CH)		
			2.00 (P)									
			1.50 (P)									
30			2.25 (P)									
			1.25 (P)	0.67	108							
35			0.75 (P)									
			1.50 (P)							- with wood at 36' - 38'		
			1.75 (P)									
40											40.0	
										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 9 ft.
No rise after 15 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

WOH: weight of hammer

aquaterra engineering

206.GPJ AQUATERR.GDT 1/3/05
AQ LOG SBC

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-17

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 14, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 26.0"
Long. 92° 42' 07.5"

Surface Elevation: 84.8 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			1.50 (P)							Firm to stiff red and brown slightly SILTY CLAY (CL-CH)		
			1.75 (P)									
5		▽	0.50 (P)	0.60	114	87		19 – 31 – 50	31			
			1.50 (P)									
			1.00 (P)								10.0	
10			0.00 (P)							Very loose brown CLAYEY SILT (ML) - with sand		
			0.00 (P)									
15			WOH				97 (g)	30				
			WOH									
			0.00 (P)							- more sandy (ML-SM) at 18' - 20'		
20			WOH									
			WOH				86	29				
25			0.00 (P)							- with silty clay (CL) layer at 25'		
			0.00 (P)									
			WOH									
30			WOH									
			WOH								34.0	
35			24 b/f 4-10-14				45 (g)	24		Medium dense red and gray SILTY fine SAND (SM)		
			35 b/f 8-17-18									
			23 b/f 11-13-10								40.0	
40										Boring Terminated at 40 Feet.		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 5 ft.

No rise after 15 min.

Advancement Method

Short-flight Auger: 0' - 10'
Rotary Wash: 10' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

g: see attached grain size curves

aquaterra engineering

706.GPJ AQUATERR.GDT 1/3/05
AQ LOG SH

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-18

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 19, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 26.0"
Long. 92° 42' 02.3"
Surface Elevation: 84.9 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			1.00 (P)							Firm red **SILTY CLAY** (CL)		
			0.75 (P)								4.0	
5			0.75 (P)	0.51	111	90		21 26 24	5	Loose red **CLAYEY SILT** (ML)	6.0	
			0.00 (P)							Very loose red **CLAYEY, SANDY SILT** (ML)		
			0.00 (P)				77 (g)	27			10.0	
10			0.00 (P)							Very soft red very **SILTY CLAY** (CL-ML)		
	X		WOH								14.0	
15	X		WOH							Very loose red **CLAYEY, SANDY SILT** (ML)		
	X		WOH									
	X		WOH				64	25				
20	X		WOH									
	X		1 b/f									
25	X		3 b/f									
	X		WOH									
	X		8 b/f 1-1-7				66	26		- loose at 28' - 30'	30.0	
30	X		27 b/f 7-13-14							Medium dense red **SILTY fine SAND** (SM)		
	X		4 b/f 3-1-3							- loose at 32' - 34'		
35	X		23 b/f 3-11-12					22				
	X		28 b/f 9-12-16								38.0	
	X		23 b/f 9-11-12				15	23		Medium dense red **SANDY SILT** (ML)	40.0	
40										**Boring Terminated at 40 Feet.**		
45												
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

☒ Water at ground surface

Advancement Method

Rotary Wash: 0' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

g: see attached grain size curves
WOH: weight of hammer

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AQ LOG SB... 08.GPJ AQUATERR.GDT 1/3/05

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-19

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 19, 2004
DRILLER: R. Warren
TECH.: M. Donald
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 26.0"
Long. 92° 41' 57.1"
Surface Elevation: 84.5 ±

FIELD DATA				LABORATORY DATA							
Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			4.50 (P)							Stiff to very stiff red **CLAY** (CH)		
			1.50 (P)									
5			1.25 (P)	1.27	111	83		18 – 34 – 72	54			
			0.25 (P)							Soft to firm red **SILTY CLAY** (CL)	6.0	
		▽	0.00 (P)							Very loose red **SANDY SILT** (ML) - with clay	8.0	
10			0.00 (P)				76	26				
	X		1 b/f 1-1-0									
15	X		1 b/18"									
	X		1 b/18"									
20	X		WOH				70	26				
	X		1 b/18" 1-1-0									
	X		WOH									
25	X		2 b/f 1-1-1									
	X		1 b/18" 1-1-0									
30	X		1 b/18" 1-1-0									
	X		5 b/f 2-2-3									
	X		2 b/f 1-1-1							- loose at 32' - 34'		
35	X		2 b/f 1-1-1									
	X		5 b/f 3-2-3							- loose at 36' - 38'		
40	X		3 b/f 1-2-1				52	27		- more sandy (ML-SM) at 38' - 40'	40.0	
45										**Boring Terminated at 40 Feet.**		
50												

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 9 ft
Rose to 8 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 12'
Rotary Wash: 12' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion

Notes

WOH: weight of hammer

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208.GPJ AQUATERR.GDT 1/3/05

AQ LOG

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-20

SHEET 1 OF 1

FILE: 914206
DATE: Dec. 14, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 25.9"
Long. 92° 41' 51.9"

Surface Elevation: 95.2 ±

Depth (feet)	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	Plasticity Index PI	DESCRIPTION	Strata Break Depth
	1.50 (P)					24 / 32 / 73	49	Firm to stiff red **CLAY** (CH) - with silt traces	
	0.75 (P)								
5	2.00 (P)	0.58	116	89		30			
	2.50 (P)								8.0
	1.25 (P)							Soft red very **SILTY CLAY** (CL-ML) - with sand	
10	0.50 (P)								
	0.75 (P)	0.46	117	93		19 / 26 / 26	9		14.0
15	0.75 (P)							Very loose to loose red **CLAYEY SILT** (ML) - with sand	
	0.50 (P)								
20	WOH				93 (g)	30			
	0.00 (P)								
	0.75 (P)								
5	0.00 (P)								
	WOH								28.0
30					65	22		Very loose red **SANDY SILT** (ML) - with clay	
	WOH								32.0
	1.25 (P)							Very loose red **CLAYEY SILT** (ML) - with sand	
35	WOH				80	28			
	0.50 (P)								
	WOH								40.0
40								**Boring Terminated at 40 Feet.**	
45									
50									

Soil Type

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

First encountered at 9 ft.
Hole fell in at 10.5 ft. after 10 min.

Advancement Method

Short-flight Auger: 0' - 12'
Rotary Wash: 12' - 40'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

g: See attached grain size curve

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AQ LOG

PROJECT: Geotechnical Investigation
CLECO - Rodemacher Expansion
Lena, Louisiana

CLIENT: CLECO Corporation
Pineville, Louisiana

SOIL BORING LOG

No. B-21

SHEET 1 OF 2

FILE: 914206
DATE: Dec. 15, 2004
DRILLER: R. Warren
TECH.: J. Rummler
ENGINEER: V. Donald

Location: See Figure 2.
Lat. 31° 23' 21.5"
Long. 92° 42' 02.3"

Surface Elevation: 84.6 ±

Depth (feet)	Samples	Groundwater Level	Field Test Results	Undrained Shear Strength (ksf)	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Percent Fines	Natural Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 20 40 60 80)	Plasticity Index PI	DESCRIPTION	Strata Break Depth	Soil Type
			3.50 (P)							Soft to firm red very **SILTY CLAY** (CL-ML)		
			1.00 (P)	0.49	112	94		17 27 19	10		4.0	
5			2.00 (P)							Loose red **CLAYEY SILT** (ML)		
			1.25 (P)					19				
		▽	0.75 (P)									
10										- very loose, with sand below 10'		
			WOH									
			WOH					26				
15			WOH									
			WOH									
			WOH							- sandy silt (ML) below 18'	20.0	
20			6 b/f 2-3-3				49 (g)	30		Loose to very loose red **SILTY fine SAND** (SM)		
			2 b/f 1-1-1									
5			WOH									
			WOH									
			WOH								30.0	
30			28 b/f 5-13-15							Medium dense tan **SILTY fine SAND** (SM)		
							23 (g)	28				
35												
40			22 b/f 6-8-14									
45			29 b/f 11-14-15									
50			15 b/f 7-8- -									

STRATA BOUNDARIES MAY NOT BE EXACT

Groundwater Level Data

▽ First encountered at 10 ft.
▽ Hole fell in at 10 ft. after 5 min.

Advancement Method

Short-flight Auger: 0' - 12'
Rotary Wash: 12' - 100'

Abandonment Method

Hole backfilled with cement/bentonite grout upon completion.

Notes

g: See attached grain size curves

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