OCTOBER 2016

CLECO POWER LLC
Brame Energy Center

FLY ASH POND CCR LINER VERIFICATION

Prepared By:

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Project Number 002-191

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1.0 INTRODUCTION

Effective October 17, 2015, the U.S. Environmental Protection Agency (EPA) implemented final rule, 40 CFR 257, the Coal Combustion Residuals (CCR) regulations. Included in the final rule is 40 CFR 257.71, the liner requirements for CCR surface impoundments.

Cleco Power LLC (Cleco) has consulted with Providence Engineering and Environmental Group LLC (Providence) to determine if the bottom liner system in the Fly Ash Pond CCR surface impoundment at the Brame Energy Center in Lena, Louisiana meets the liner requirements of the newly promulgated CCR regulations.

A Site Location Map and a Site Plan showing the location of the Fly Ash surface impoundment within the facility is provided as **Figures 1** and **2**.

2.0 SUMMARY OF 40 CFR 257.71 LINER REQUIREMENTS

No later than October 17, 2016, the owner or operator of an existing CCR surface impoundment must document whether or not such unit was constructed with any one of the following:

a. A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec
b. A composite liner that meets the requirements of 257.70(b), or
c. An alternative composite liner that meets the requirements of 257.70(c)

The hydraulic conductivity of the compacted soil must be determined using recognized and generally accepted methods.

An existing CCR surface impoundment is considered to be an existing <u>unlined</u> CCR surface impoundment if either:

1. The owner or operator of the CCR unit is not constructed with a liner that meets the requirements of a, b, or c above, or
2. The owner or operator of the CCR unit fails to document whether the CCR unit was constructed with a liner that meets the requirements of a, b, or c above.

EPA defines a CCR surface impoundment in Part 257 as “a natural topographic depression, manmade excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores and disposes of CCR”.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer attesting that the documentation meets the requirements of 257.71.

3.0 FLY ASH POND FACTS

Historical documents relating to Cleco's Fly Ash Pond includes the following information:

- Per attached letter (**Attachment 1**) dated August 1, 1983, from J.T. Simms (Cleco) to Mr. John Koury (LDNR Solid Waste Division) the Fly Ash Pond permit issued under Louisiana Solid Waste Division on November 19, 1981, it was discovered by Cleco personnel that there appeared to be insufficient clay in certain areas of the Fly Ash Pond to meet the liner requirements of the Solid Waste Rules and Regulations. This was subsequently verified in the field and the cause was determined to be over-borrowing of the in-situ clay.
- The problem was explained to Mr. Koury in a meeting in his office on April 22, 1982 (noted in **Attachment 1**). A proposal was made to use a small area (ABIH) of the Fly Ash Pond (Drawing AP-13 in **Attachment 1**) which did have sufficient liner until a permanent solution could be formulated. Mr. Koury approved the temporary use of the small area in a letter dated May 11, 1982 (noted in **Attachment 1**).
- Alternative liner substances for the area not having sufficient liner were determined to be economically or administratively unacceptable.
- In a letter dated December 13, 1982, (noted in **Attachment 1**) Cleco proposed an alternative to enclose 30 acres of the original 104 acres with the construction of a new dike within the original perimeter dikes. Most of the 30 acres already contained an acceptable liner. Those that did not would be repaired to meet the liner specifications of the Solid Waste Rules and Regulations.
- Three feet of clay liner was added to the interior slope of the levee as well as areas of the bottom liner that needed repair.
- Drawings AP-10 and AP-11 (**Attachment 1**) shows the extension of the dike (approximately 1,685 ft.).

Below is from a letter from Cleco to LDNR Solid Waste Management Division dated December 22, 1983 referencing the Fly Ash Pond (**Attachment 2 Fly Ash Pond Modification Soil Borings**).

The new interior dike has been placed as close as possible to the existing in situ clay which allows use of the maximum area for disposal and required the least amount of construction effort. The three-foot layer of clay on the interior slope of the new dike was made continuous with the clay already on the bottom of the new active disposal area.

After the clay was placed on the slope of the new dike, soil borings were made to verify the continuity of the clay liner along the bottom of the new active area. The borings were made along the edge of the new dike near suspected silty areas. The borings were located from 100 to 300 feet apart which is sufficient to predict accurately the continuous clay liner. The latest soil borings, together with those taken in the Fly Ash Pond where it was first constructed, establish the fact that there is clay of sufficient thickness and premeability over the entire bottom of the new active disposal area.

4.0 FLY ASH POND LINER PERMEABILITIES

Cleco's 1981 Fly Ash Pond solid waste permit application states the following:

Section 6.4.3.C.3.bii of the solid waste permit application **(Attachment 3**)

- Beneath most of the Fly Ash Pond and underlying the top clay stratum is approximately 25 to 40 feet of clay
- Laboratory coefficient of permeability for the in situ clay at boring 232 is 1.1×10^{-8} cm/sec
- 3-foot-thick clay layer was placed over the bottom of the Fly Ash Pond
- The extent of the clay blanket was determined in the field by ensuring that the in situ clay had a minimum thickness of 3 feet
- Laboratory permeability tests on recompacted samples of the clay along the dike extension varied from 1.4×10^{-8} to 8.9×10^{-9} cm/sec
- Soils were classified as CH according to the Unified Soil Classification System, except for boring 231 which was SM (silty sand)
- Clay liner was placed in horizontal lifts of 8 to 10 inches and was compacted with "sheeps foot" compaction equipment

No additional permeability verification laboratory results are available for the general area of the Fly Ash Pond.

5.0 CLAY LINER SAMPLING ACTIVITIES

In order to verify the clay liner thickness and permeabilities in those locations that Cleco did not have enough verifiable information, six (6) Shelby tubes were installed in the Fly Ash Pond as shown in **Figure 3**.

The specific methods that were followed for the collection of the clay liner samples are summarized in the following sections.

5.1 Clay Liner Sampling

Providence contracted a Louisiana licensed driller to provide personnel and equipment, including a drilling rig mounted on a track propelled marsh buggy, to collect undisturbed samples of the clay liner in the bottom of the Fly Ash Pond. The marsh buggy was positioned at the sample locations based on survey data points.

A temporary surface casing was used to compliment sampling and retraction grouting procedures. The materials at the mud-line were hand probed. If soft unconsolidated material was present, a 4" nominal diameter temporary surface casing was lightly pressed into place. If harder materials were present, they were broken up in order to place the temporary surface casing. For mechanical breaking of the surface material, the driller utilized Geoprobe "pre-probing tools", followed by, or in combination with, a frost auger or other solid/hollow stem auger. The express intent of this action was to only break hardened sediments (and not significantly penetrate the clay liner) such that the surface casing could be installed.

As stated above, Cleco collected six (6) samples of the clay liner in the Fly Ash Pond. A temporary surface casing was used at each sampling location. Undisturbed Shelby tubes were pushed to collect unconsolidated and consolidated soil matrices from the bottom of the pond, not impoundment sediments. Shelby tube samples were collected in approximately two foot intervals.

All sample locations were plugged and abandoned using CETCO 3/8 diameter coated bentonite pellets. The coated pellets are designed to "drop" through water and hydrate once they "fall" in-place. The pellets were dropped through the temporary surface casing described above. The amount placed was calculated based on the diameter of the soil boring and depth of penetration below the sediment line. Once the pellets were in-place, the surface casing was removed.

5.2 Sample Collection and Handling

Sample Handling

The Shelby tubes containing the undisturbed soil samples were capped on the tops and bottoms, and retained in as vertical position as possible and the samples were handled with care in order to minimize disturbance. The Shelby tubes were not opened in the field but were brought to the contract geotechnical laboratory where they were opened and examined for overall sample quality. A representative sample of the material in the Shelby tube was collected for the permeability testing and Atterberg limit determination.

6.0 LABORATORY ANALYSES

Providence subcontracted to APS Engineering and Testing (APS) geotechnical testing laboratory to conduct Atterberg limit determinations for the clay liner material obtained from each sample from the bottom of the pond in accordance with ASTM D 4318 and to conduct hydraulic conductivity analysis (permeability) on the samples of the clay liner material obtained from the bottom of the pond in accordance with ASTM D 5084. The results of the Atterberg limit determinations and hydraulic conductivity analysis were compared to the liner requirements for CCR facilities contained in the recently promulgated regulations.

7.0 DATA EVALUATION AND REPORTING

The geotechnical data from the original application and follow-up information to LDNR is shown in **Table 1** below for the Fly Ash Pond.

Table 1 Fly Ash Pond Permeabilities (Historical)

Boring ID	Clay Type	Liquid Limit	Plastic Limit	Plasticity Index	Permeability cm/sec
SA-1	Brown Clay	71	25	46	3.3×10^{-9}
SA-2	Brown Clay	60	21	39	5.5×10^{-9}
SA-3	Brown Clay	42	16	26	7.8×10^{-9}
SA-4	Brown Clay	40	16	24	1.7×10^{-8}
SA-5	Brown Clay	39	16	23	6.6×10^{-9}
SA-7	Brown Clay	39	19	20	1.4×10^{-8}

These Boring ID locations are shown in **Attachment 3**.

APS completed the Atterberg limit determinations and the permeability analysis for the samples obtained from the Fly Ash Pond which is shown in **Attachment 4**. Photos depicting samples of the clay liner material obtained from the bottom of the Fly Ash pond are shown in **Attachment 5**. All of the samples tested met the permeability requirements as shown in **Table 2** below. Based on the sample specimens obtained, the liner met or exceeded the two feet of compacted clay required by the CCR regulations for the Fly Ash Pond. This data reinforces the data from the original permit application and any follow-up information provided to LDNR.

Table 2 Fly Ash Pond Permeabilities (Additional Data)

Boring ID	Clay Type	Liquid Limit	Plastic Limit	Plasticity Index	Permeability cm/sec
FA-1	Grayish Brown Clay	91	40	51	2.4×10^{-8}
FA-2	Grayish Brown Clay	118	28	90	4.9×10^{-8}
FA-3	Grayish Brown Clay	73	31	42	5.2×10^{-8}
FA-4	Grayish Brown Clay	117	38	79	8.9×10^{-8}
FA-5	Grayish Brown Clay	91	33	58	5.2×10^{-8}
FA-6	Grayish Brown Clay	87	30	57	3.5×10^{-8}

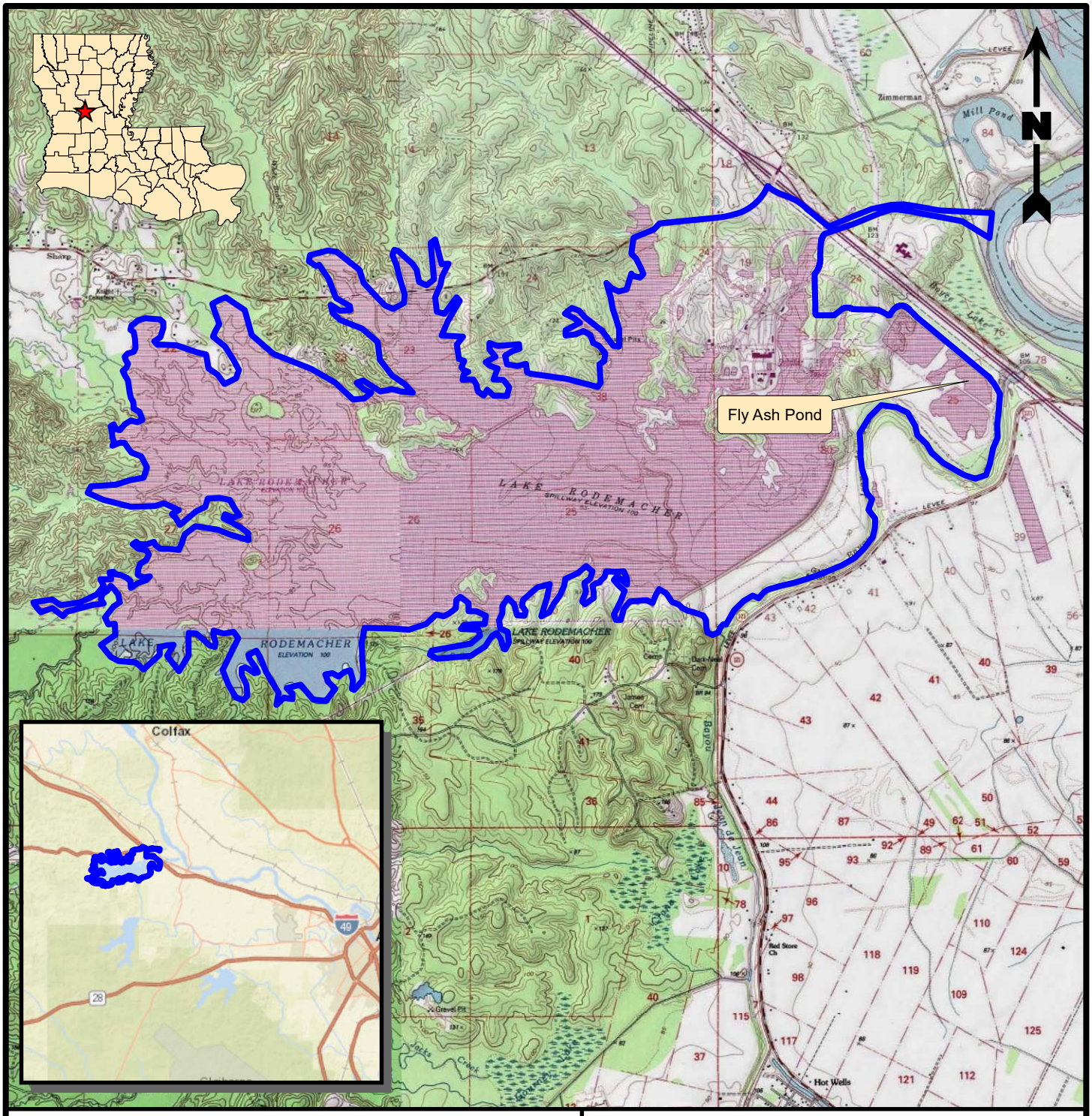
8.0 CONCLUSIONS

Providence reviewed the existing information that was completed when the Fly Ash Pond was constructed and noted that Cleco intended to have a three-foot "compacted" clay liner in place for the Fly Ash Pond that met the regulatory permeability requirements at the time of construction. Available information for the pond is noted in **Table 1**. Providence could not locate all of the laboratory permeability results for the liner in the Fly Ash Pond, therefore, additional undisturbed samples of the clay liner were obtained to verify the thickness of the clay liner and to verify the permeability of the bottom liner system. Based on the information in **Table 1**, along with the additional data in **Table 2**, Providence confirms that a liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec is in-place for the Fly Ash Pond at Brame Energy Center.

Based on the results for the liner verification, the existing clay liner for the Fly Ash Pond meets the liner verification requirements of the CCR regulations at 40 CFR 257.71. **Attachment 6** contains a P.E. Certification that attests to this assessment.

FIGURE 1

SITE LOCATION MAP



Legend

Property Boundary

Reference

Base map comprised of U.S.G.S. 7.5 minute topographic maps, "Lena, LA", "Boyce, LA", "Jericho, LA", and "Gardner, LA".

Site Location Map

Liner Verification - Fly Ash Pond
Boyce, Rapides Parish, Louisiana

Cleco Power LLC
Brame Energy Center

PROVIDENCE

Drawn By	LMM	10/04/16
Checked By	LMH	10/04/16
Approved By	CVH	10/04/16

Project Number	002-191
Drawing Number	002-191-A008
1	Figure

Providence Engineering and Environmental Group LLC

FIGURE 2

SITE MAP

N

Legend

Property Boundary

Reference

Base map comprised of Google Earth aerial imagery from 10/03/14.

1,000 500 0 1,000
Feet

Site Map

Liner Verification - Fly Ash Pond
Boyce, Rapides Parish, Louisiana

Cleco Power LLC
Brame Energy Center

PROVIDENCE

Drawn By	LMM	10/04/16
Checked By	LMH	10/04/16
Approved By	CVH	10/04/16

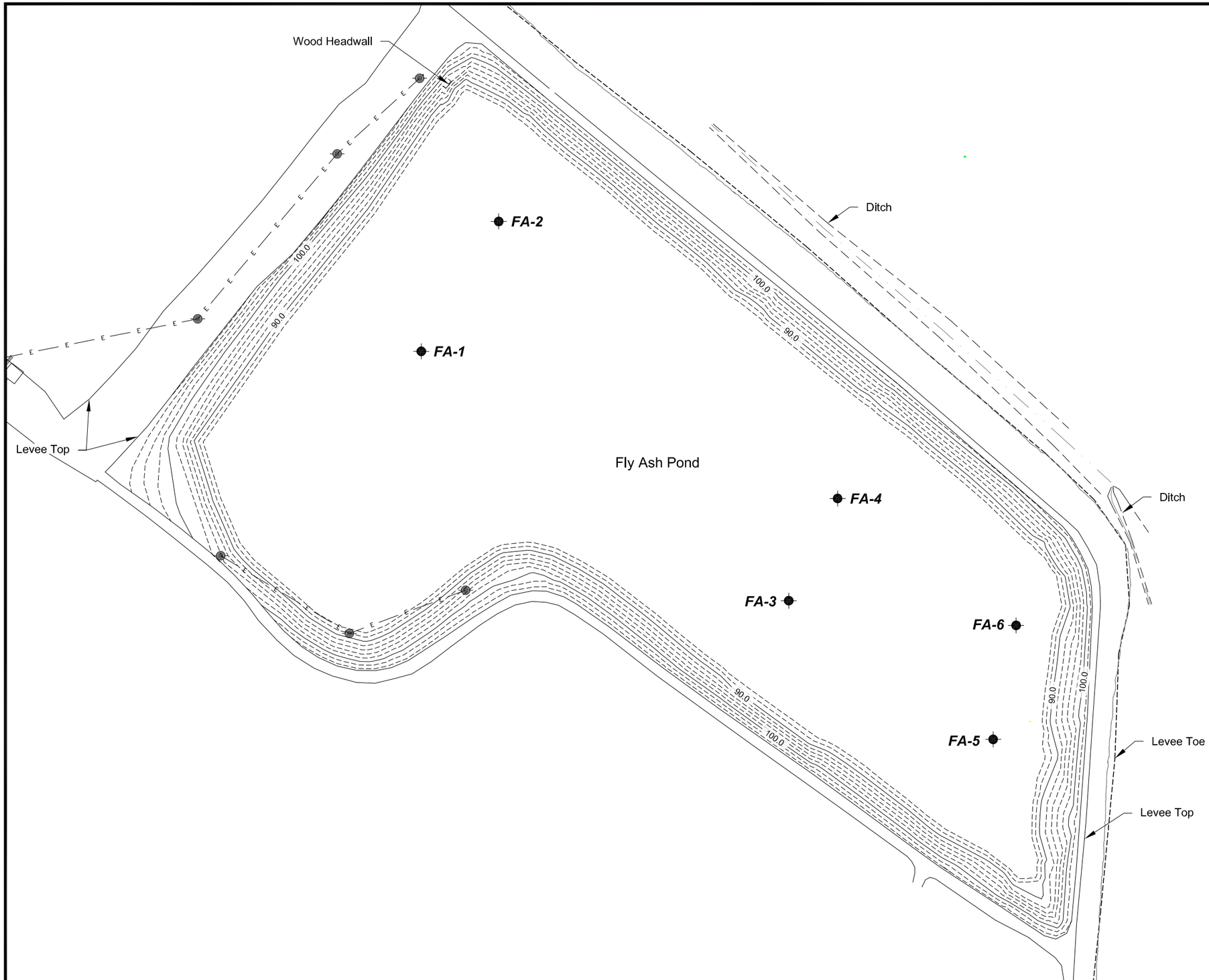
Project Number 002-191

Drawing Number 002-191-B009

2
Figure

FIGURE 3

FLY ASH POND LINER VERIFICATION



N

Legend

- Major Contour (10' Interval)
- Minor Contour (2' Interval)
- Water Line
- Power Pole
- Boring Location

Note

Above grade contours and features presented are comprised of survey data obtained in June of 2015. The survey contours for the ash material were removed to depict the bottom contours of the pond. The pond contours underneath the ash material and in the pond bottom are a combination of survey data collected in June of 2015 and elevation data obtained from historical figures.

200 0 200

Scale: 1" = 200'

Fly Ash Pond Liner Verification

Clay Liner Verification
Boyce, Rapides Parish, Louisiana

Cleco Power LLC
Brame Energy Center

PROVIDENCE

Drawn By	LMM	09/14/16
Checked By	LMH	09/14/16
Approved By	CVH	09/14/16

Project Number 002-191

Drawing Number 002-191-B005

3 Figure

ATTACHMENT 1

FLY ASH POND MODIFICATION FROM ORIGINAL CONSTRUCTION

CENTRAL LOUISIANA ELECTRIC COMPANY, INC.

August 1, 1983

Mr. John Koury, Administrator
Solid Waste Division
P. O. Box 44066
Baton Rouge, LA 70804

Dear Mr. Koury:

Enclosed please find three copies of a proposal which CLECO is submitting for the repair and rearrangement of the Fly Ash Pond at Rodemacher Power Station Unit 2. This is a request that you modify permit number P-0005 to reflect the information contained in the proposal. We trust that the information and drawings supplied are sufficient for a complete review by your staff.

It is important that construction of this project begin well in advance of the wet winter months. For this reason, we would appreciate an expeditious reply to this request.

Very truly yours,

J. T. Simms

J. T. Simms, Jr., Manager
Resource Development Division

JTSjr/PJT:aw
Enclosures

cc: Messrs. B. J. Guillory
L. G. Fontenot
K. B. Dickerson
T. G. Bonner
G. E. DeSoto
C. A. Strong

PO Box 510, Pineville, LA 71360 Telephone 318-445-8211

A PROPOSAL FOR FLY ASH POND REPAIR
RODEMACHER POWER STATION UNIT 2
CENTRAL LOUISIANA ELECTRIC COMPANY, INC.
AUGUST 1983

I. BACKGROUND

The Fly Ash Pond at Rodemacher Station is a 104-acre facility which is permitted under Louisiana Solid Waste Permit number P-0005. This permit was issued by the Solid Waste Division on November 19, 1981, for solid waste disposal facilities associated with Rodemacher Power Station Unit 2, including the Fly Ash Pond, Bottom Ash Pond, Clarifier Sludge Pond, and Unit 2 Boiler Cleaning Waste Pond.

Prior to the final inspection by Solid Waste Division staff, it was discovered by CLECO personnel that there appeared to be insufficient clay in certain areas of the Fly Ash Pond to meet the liner requirements of the Solid Waste Rules and Regulations. This was subsequently verified in the field and the cause was determined to be over borrowing of the in-situ clay.

The problem was explained to Mr. John Koury in a meeting in his office on April 22, 1982, and a proposal was made to use a small area of the Fly Ash Pond which did have sufficient liner until a permanent solution could be formulated. Mr. Koury approved the temporary use of the small area in a letter dated May 11, 1982, provided that periodic progress reports of our plans for a permanent solution were made to him. The

substance of this meeting was confirmed in a letter to Mr. Koury dated April 16, 1982, and signed by J. T. Simms, Jr. Since this initial meeting and explanation, CLECO has used only the small area which was approved for the disposal of fly ash, and has made the required progress reports.

II. PROGRESS

Since the problem with the liner was discovered, CLECO has been actively seeking a solution to the problem. We have sought administrative relief from the requirement to have a complete liner; we have investigated the use of alternative liner substances including fly ash and soil bentonite combinations. These alternatives were found to be economically or administratively unacceptable. This left one alternative as the most practical approach to the problem. This alternative was explained to Mr. Koury in a letter dated December 13, 1982, and basically provides for the construction of a new dike within the original perimeter dikes. The new disposal area would enclose approximately 30 acres of the original Fly Ash Pond. Most of these 30 acres contain an acceptable liner. Those portions which do not have an acceptable liner will be repaired to meet the liner specifications of the Solid Waste Rules and Regulations.

Before this plan could be implemented, the weather began to cause a serious problem in the pond. Heavy rains during the winter of 1982 caused extensive flooding in the Fly Ash Pond. We were allowed to pump this water from the pond per the terms of an Administrative Order

issued by EPA in January of 1983. Spring rains have caused another large volume of water to accumulate in the pond. The water in the Fly Ash Pond has delayed the implementation of our plans and continues to trouble us as evaporation may not give sufficient relief before another wet season is upon us. The disposition of the water in the Fly Ash Pond has become a part of our overall plan, as explained below.

PROPOSED SOLUTION

CLECO's proposal to solve the problem in the Fly Ash Pond consists of two phases. Reference will be made to the following enclosed drawings to assist in understanding the proposal:

M-1	Property Plat of Rodemacher Station
M-2-1	Property Plat Showing Location of Monitor Wells
AP-10	Fly Ash Pond General Arrangement
AP-11 Sheet 1	Plan of Fly Ash Pond Disposal Enlargement
AP-11 Sheet 2	Fly Ash Pond Dike Section
AP-12 Sheet 1	Plan of Fly Ash Pond Discharge Pipe
AP-12 Sheet 2	Fly Ash Pond Discharge Pipe Section
AP-13	New Fly Ash Pond Arrangement

Drawing M-1 shows the relationship of the Fly Ash Pond to the area at Rodemacher Station. At present, fly ash is disposed of in the area ABIH as shown on drawing AP-13. There is a temporary dike which also serves as a road along line BDE. Phase 1 of the plan is to construct a new permanent dike along line GEDC. This new dike would enclose an area of approximately 30 acres. The general arrangement of the new disposal area is shown on drawing AP-10. The soil will be studied in this new area and any part of the bottom which is deficient in clay liner will be repaired to conform to

the Solid Waste Rules and Regulations. Construction details are shown on AP-11, sheets 1 and 2.

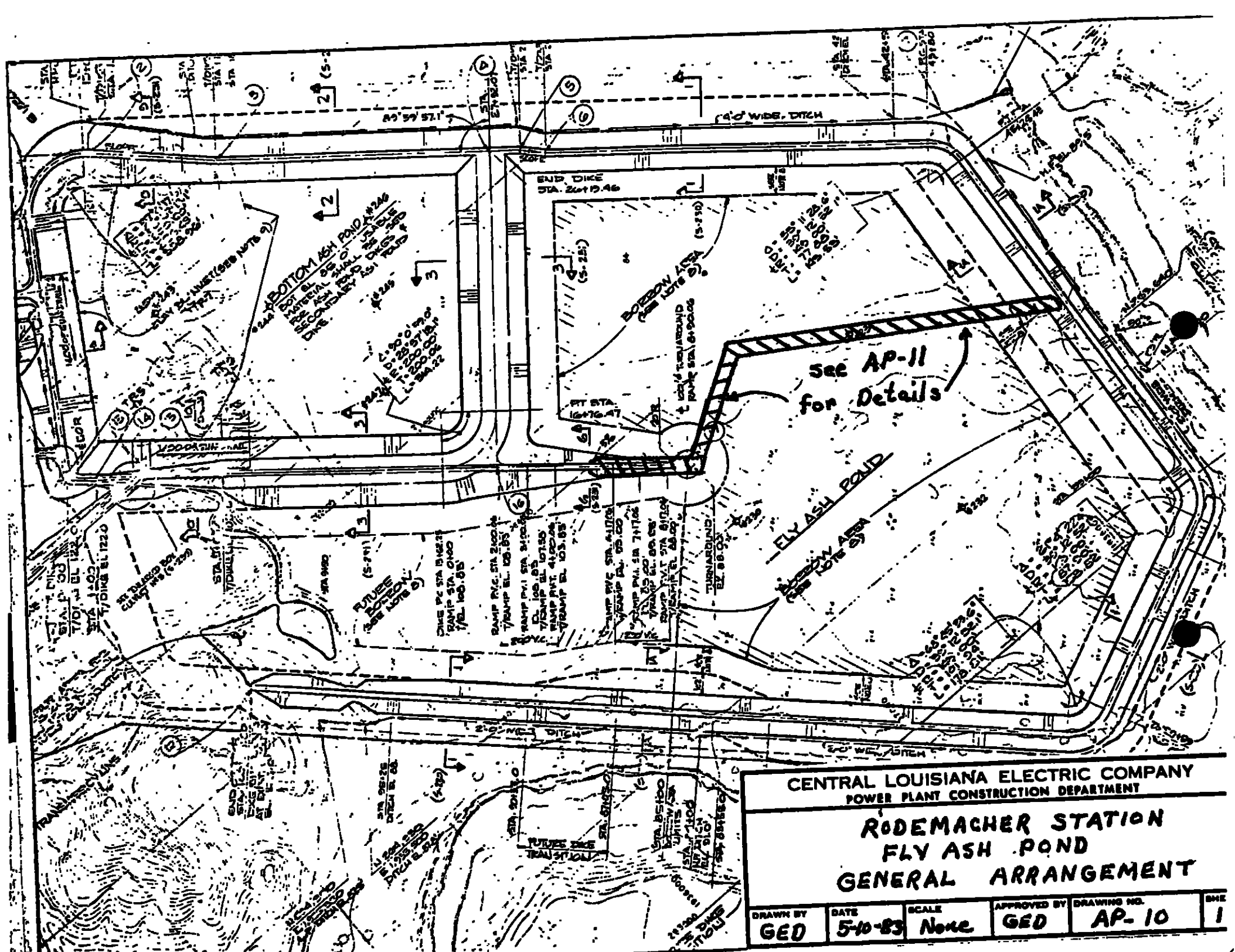
There is a substantial amount of water standing in the Fly Ash Pond except in the active disposal area (ABIH). In order for construction of the new dike to proceed, this water will be moved in the following manner. A temporary dike will be constructed from the present temporary dike at point D to a point C on the perimeter dike. Once completed, any remaining water within the area BCDI will be pumped to the inactive area. This water has never been in contact with fly ash and is essentially collected rainwater. Once this water is removed, soil samples will be taken to determine which areas within BCDI will require additional clay liner. Those areas requiring additional clay will be repaired and construction will begin on the new permanent dike (GEDC). The temporary dike from EDC will become part of the fill for the permanent dike (GEDC). The relationship of the temporary dike and the permanent dike is shown in cross section on drawing AP-11, sheet 2. Some water has collected near the present active disposal area (ABIH). At some point during or after the construction of the new permanent dike GEDC, this water will be released to the entire new disposal area (ABCDEFH). This will be accomplished by breaching the present temporary dike at some point along DIB. This action will not be taken until GEDC is sufficiently complete to prevent this water from getting to the inactive area. When the new dike (GEDC) is completed, fly ash will be disposed of only within area ABCDEFH. Runoff which falls in this area will be totally contained therein.

During the construction of the new permanent dike, GEDC, or shortly after its completion, Phase 2 will begin and will provide for the disposal of the water in the inactive area. Water which is presently in the inactive area has not been in contact with the disposed fly ash. A 12" steel discharge pipe will be pushed through the perimeter dike to allow rainwater which has collected in the inactive area to drain to Bayou Jean de Jean. If this work is completed before the new temporary dike (DC) is finished, water in area BCDI will drain naturally toward the inactive area, and will not have to be pumped. As mentioned earlier, the water which is presently in BCDI is merely rainwater runoff. The proposed location of the discharge pipe is shown on drawing AP-13. The arrangement of the discharge pipe in the perimeter dike is shown on AP-12, sheet 1. A cross section of the perimeter dike showing the discharge pipe is shown on drawing AP-12, sheet 2.

CLECO believes that this proposal is environmentally sound and will cause no adverse impacts. The provisions outlined in the original permit application are still applicable and no changes are required since this modification involves only a change in size of the disposal facility. The substantive provisions which demonstrate compliance with Section 6.4.3. of the Solid Waste Rules and Regulations are unchanged. Drawing M-2-1 shows the location of the groundwater monitoring wells at Rodemacher Station. The location of wells W-3, W-4 and W-5 is such that they will detect any groundwater contamination of the new proposed arrangement of the Fly Ash Pond.

CLECO wishes to reserve the right to use the inactive area for fly ash disposal at some future date. Should it become necessary in the future

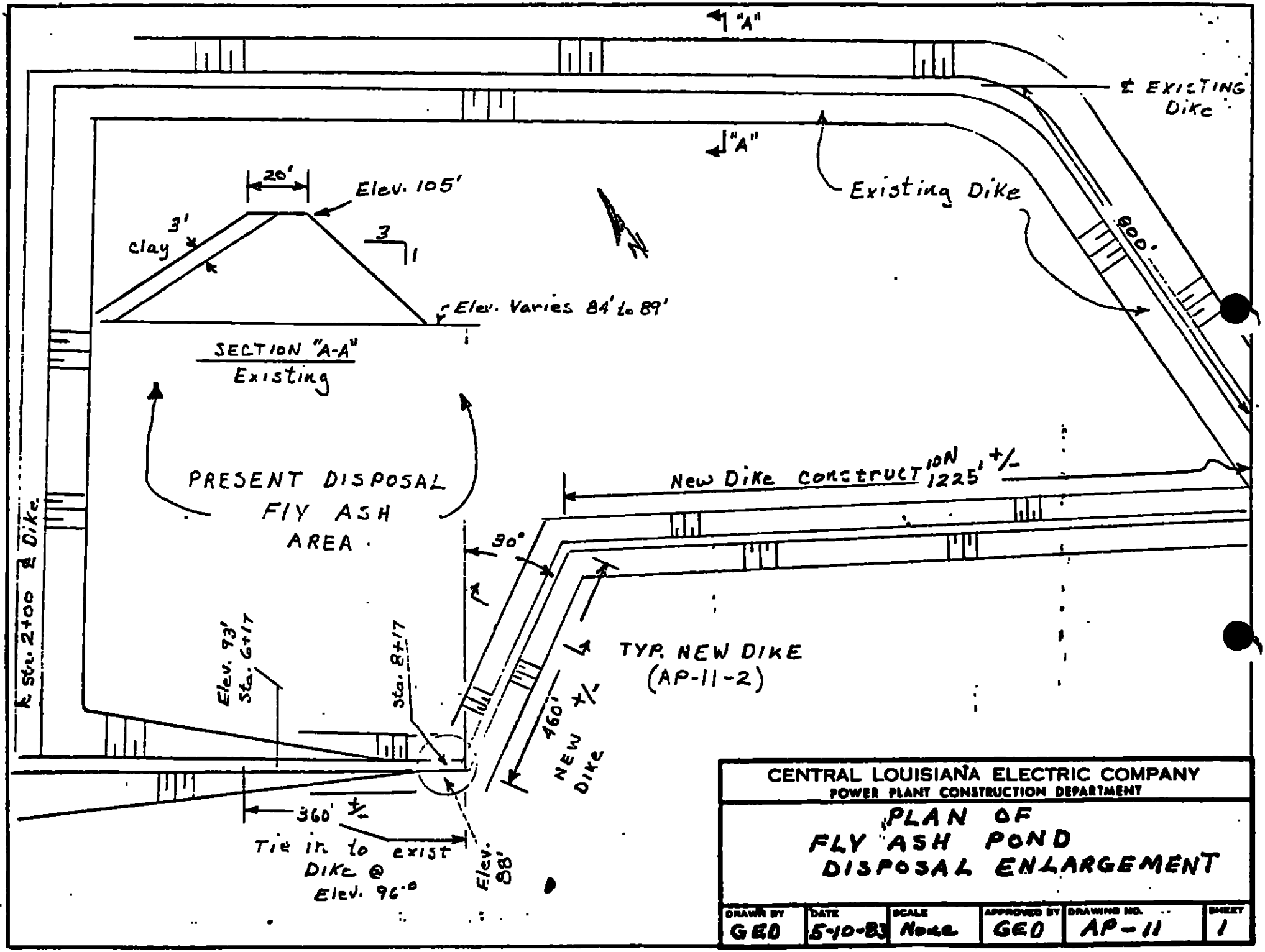
to use the inactive area, CLECO will make all repairs necessary so that the area complies fully with the applicable provisions of the Louisiana Solid Waste Rules and Regulations. Any plans to repair and use the inactive area for fly ash disposal will not begin without first obtaining the permission of the Solid Waste Division.



CENTRAL LOUISIANA ELECTRIC COMPANY
POWER PLANT CONSTRUCTION DEPARTMENT

RODEMACHER STATION
FLY ASH POND
GENERAL ARRANGEMENT

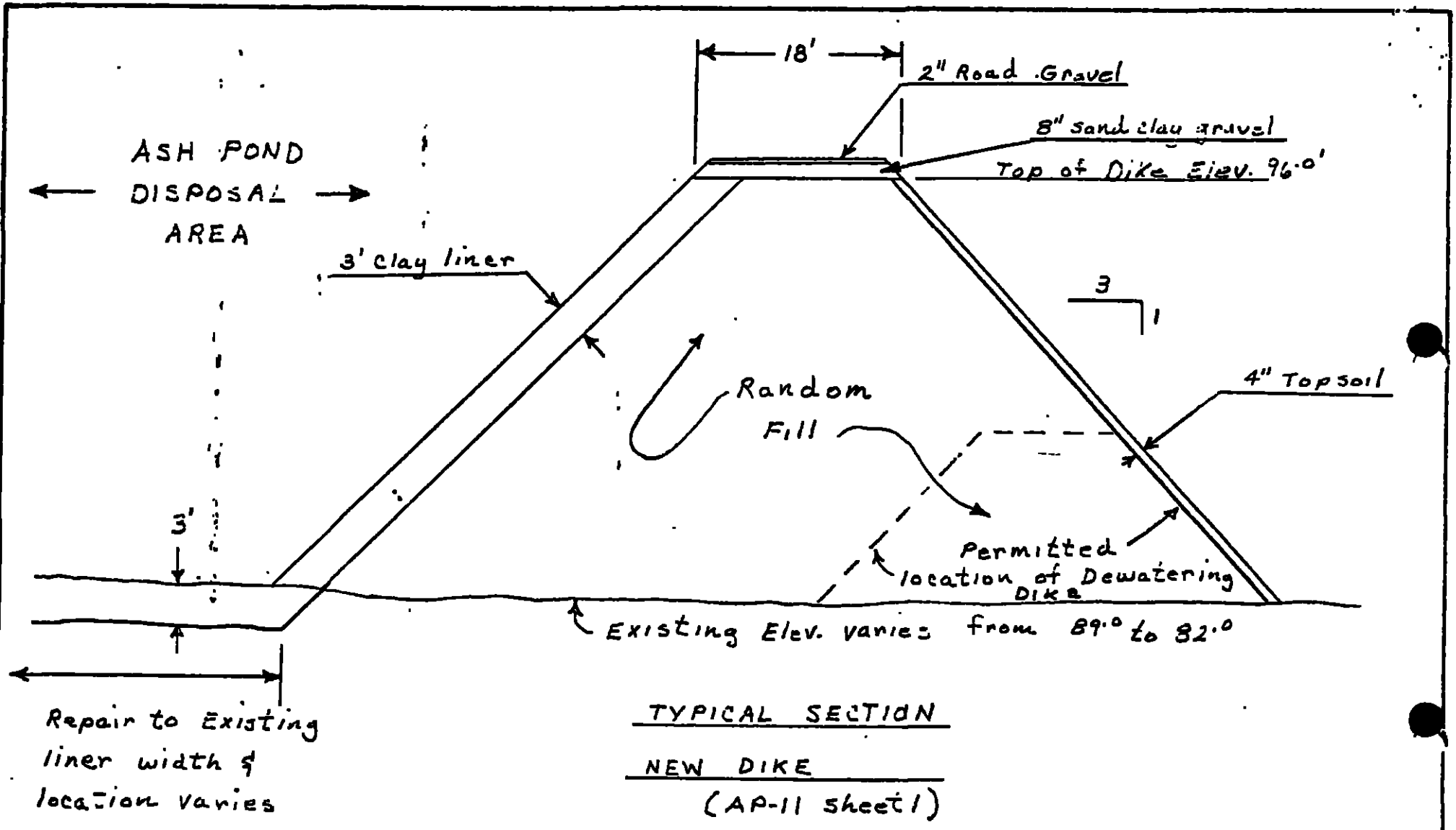
DRAWN BY	DATE	SCALE	APPROVED BY	DRAWING NO.	SHT
GED	5-10-83	None	GED	AP-10	1



CENTRAL LOUISIANA ELECTRIC COMPANY
POWER PLANT CONSTRUCTION DEPARTMENT

PLAN OF FLY ASH POND DISPOSAL ENLARGEMENT

DRAWN BY	DATE	SCALE	APPROVED BY	DRAWING NO.	SHEET
GEO	5-10-83	None	GEO	AP-11	1

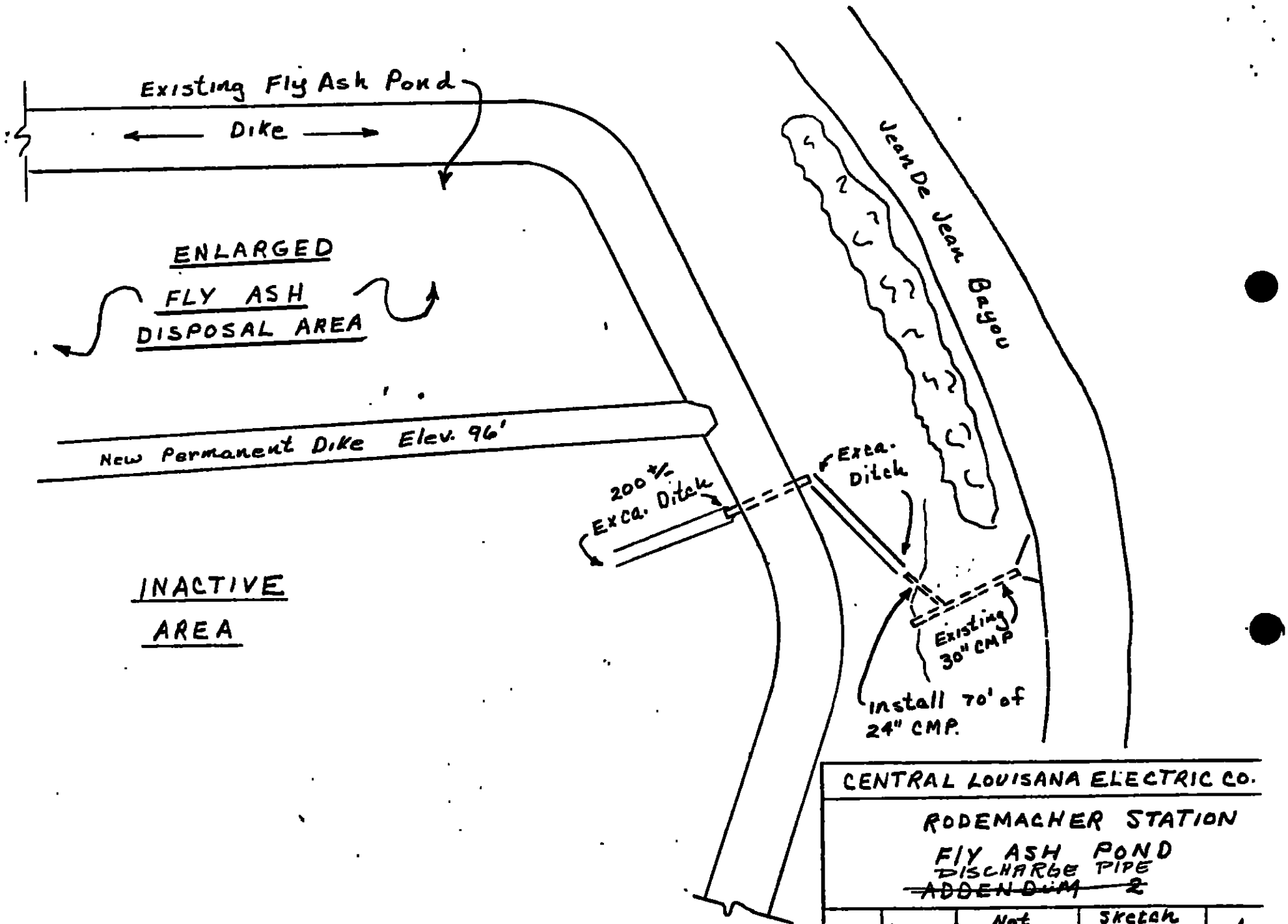


TYPICAL SECTION

NEW DIKE

(AP-11 sheet 1)

CENTRAL LOUISIANA ELECTRIC COMPANY POWER PLANT CONSTRUCTION DEPARTMENT					
Dike Section					
DRAWN BY GEO	DATE 5-10-83	SCALE None	APPROVED BY GEO	DRAWING NO. AP-11	SHEET 2

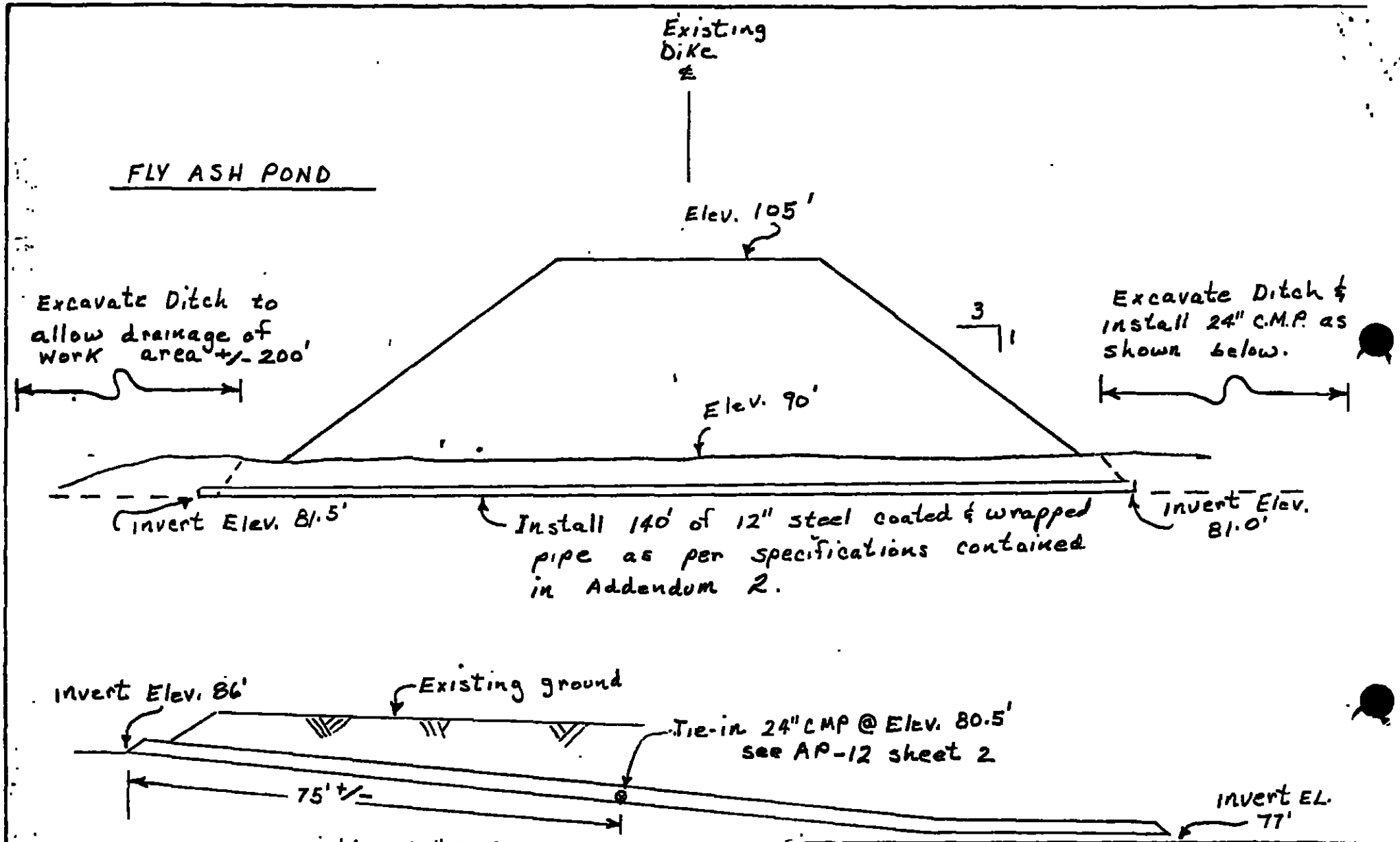


CENTRAL LOUISANA ELECTRIC CO.

RODEMACHER STATION

FLY ASH POND
~~DISCHARGE~~ PIPE
~~ADDENDUM 2~~

GED	7-28-83	Not to SCALE	Sketch AP-12	1



CENTRAL LOUISIANA ELECTRIC CO.

RODEMACHER STATION

FLY ASH POND

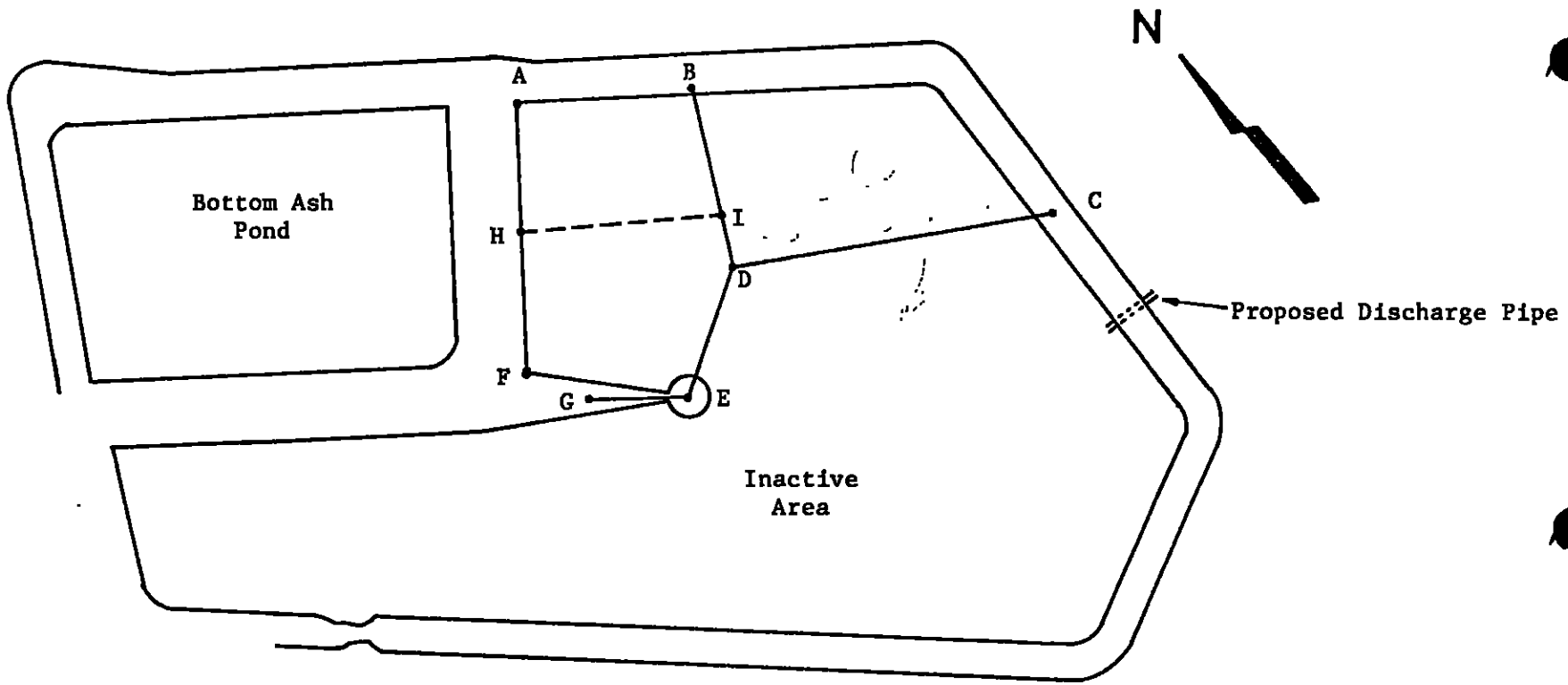
DISCHARGE PIPE SECTION

~~ADDENDUM 2~~

GED	7-28-83	Not to SCALE	sketch AP-12	2

LEGEND:

ABIH - Present Disposal Area
EDB - Present Temporary Dike and Road
DC - Proposed New Temporary Dike
GEDC - Proposed New Permanent Dike
ABCDEFH - Proposed New Permanent Disposal Area



CENTRAL LOUISIANA ELECTRIC COMPANY, INC.				
NEW FLY ASH POND ARRANGEMENT				
PJT	7/29/83	NTS	AP-13	1

ATTACHMENT 2

FLY ASH POND MODIFICATION SOIL BORINGS

CENTRAL LOUISIANA ELECTRIC COMPANY, INC.

December 22, 1983

Mr. John Koury, Administrator
Solid Waste Management Division
P. O. Box 44066
Baton Rouge, LA 70804-4066

Dear Mr. Koury:

Rodemacher Power Station Unit 2
Fly Ash Pond Rearrangement

Central Louisiana Electric Company, Inc. is in the process of rearranging the Fly Ash Pond at Rodemacher Power Station in Rapides Parish. As you are aware, the need for this rearrangement came about when it was discovered that there was insufficient acceptable clay liner in certain parts of the original Fly Ash Pond. The problem was first brought to your attention in a letter dated April 16, 1982. In that letter, we requested that we be allowed to use a small corner of the original pond which met the criteria of the Solid Waste Rules and Regulations until a permanent solution could be implemented. Permission was given to use that corner and to this date, all fly ash has been disposed of in that area.

In a December 13, 1982 letter to you, a preliminary plan for solving the problem was outlined. This letter made the first mention of rearranging the Fly Ash Pond and using only that area with sufficient acceptable clay liner for fly ash disposal. A final, more detailed plan for the rearrangement was submitted to your office on August 1, 1983. Your acceptance of the final plan dated August 22, 1983, obliged us to advise your office prior to placing any fly ash in the reworked areas of the pond and to keep you advised of our progress. This letter is intended to advise you of our progress and to request permission to begin using the rearranged area for fly ash disposal.

Construction work began in the Fly Ash Pond on September 9, 1983, to rearrange the disposal area according to the August 1, 1983 proposal. Progress has been satisfactory, but it soon became apparent that the entire project could not be completed before wet weather caused all construction activity to stop. The following has been accomplished to date:

1. Installation of a 12-inch drain pipe through the perimeter dike in order to drain the inactive area of the Fly Ash Pond.

2. Began construction of the new interior dike which defines the new active disposal area. Placed random fill to a height of 4 - 5 feet for the dike. Placed three feet of acceptable clay liner on interior slope of the new dike.

P.O Box 510, Pineville, LA 71360 Telephone 318-445-8211

3. Made soil borings from new active disposal area at the edge of the new interior dike.

The new interior dike has been placed as close as possible to the existing in situ clay which allows use of the maximum area for disposal and required the least amount of construction effort. The three-foot layer of clay on the interior slope of the new dike was made continuous with the clay already on the bottom of the new active disposal area.

After the clay was placed on the slope of the new dike, soil borings were made to verify the continuity of the clay liner along the bottom of the new active area. The borings were made along the edge of the new dike near suspected silty areas. The borings were located from 100 to 300 feet apart which is sufficient to predict accurately the continuous clay liner. The latest soil borings, together with those taken in the Fly Ash Pond where it was first constructed, establish the fact that there is clay of sufficient thickness and premeability over the entire bottom of the new active disposal area.

The new dike has been constructed to a height of approximately five feet. We will not be able to complete construction on this dike until the spring. When completed, the new dike will be approximately eleven feet above existing ground level.

After the borings were made and soil from them sent for analysis, we requested an inspection of this completed work by a member of your staff. The inspection was requested at that time in order to obtain approval to use the new active area for disposal as soon as the soil boring analysis verified the permeability of the clay liner. Also, it was important that the reworked areas of the Fly Ash Pond be inspected prior to the onset of wet weather. Once covered by rain water, some of the newly constructed areas might not be as accessible again. On November 29, 1983, Mr. Claude Chachere toured the Fly Ash Pond and inspected the completed facilities mentioned above. After his inspection, Mr. Chachere indicated to us that he was satisfied with the construction which had been completed and that we should make a progress report to you once we received the soil boring data.

We have recently received the last of the soil data from the laboratory and include the following for your review:

Attachment 1 - Plan of Fly Ash Pond Showing Soil Boring Locations
Attachment 2 - Dike Section Showing Proximity of Soil Borings
Attachment 3 - Summary of Laboratory Data
Attachment 4 - Lab Results of Clay Placed on Slope of New Dike
Attachment 5 - Lab Results from Soil Borings SA-1, SA-2, SA-3, SA-4, SA-4-1, SA-4-2, SA-5, SA-6, SA-7, SA-8, CB-1

As the laboratory data demonstrates, the permeabilities of the in situ clay from all borings meet or exceed the 1 x 10-7 cm/sec required. The Atterburg limits also show that the clay which was placed on the interior slope of the new dike meets the permeability requirements of the Solid Waste Rules and Regulations.

As mentioned earlier, the wet weather has caused a cessation of construction activity. However, the only remaining item to be completed is to build up the dike to its final height of approximately eleven feet. We expect to be able to complete this task in early spring. Since the top of the new dike will have no effect on disposal in the new active disposal area, and the liner in the new disposal area has been shown to meet the requirements of the Solid Waste Rules and Regulations, we are requesting that we be allowed to begin disposal of fly ash in the new area. Your concurrence will be appreciated.

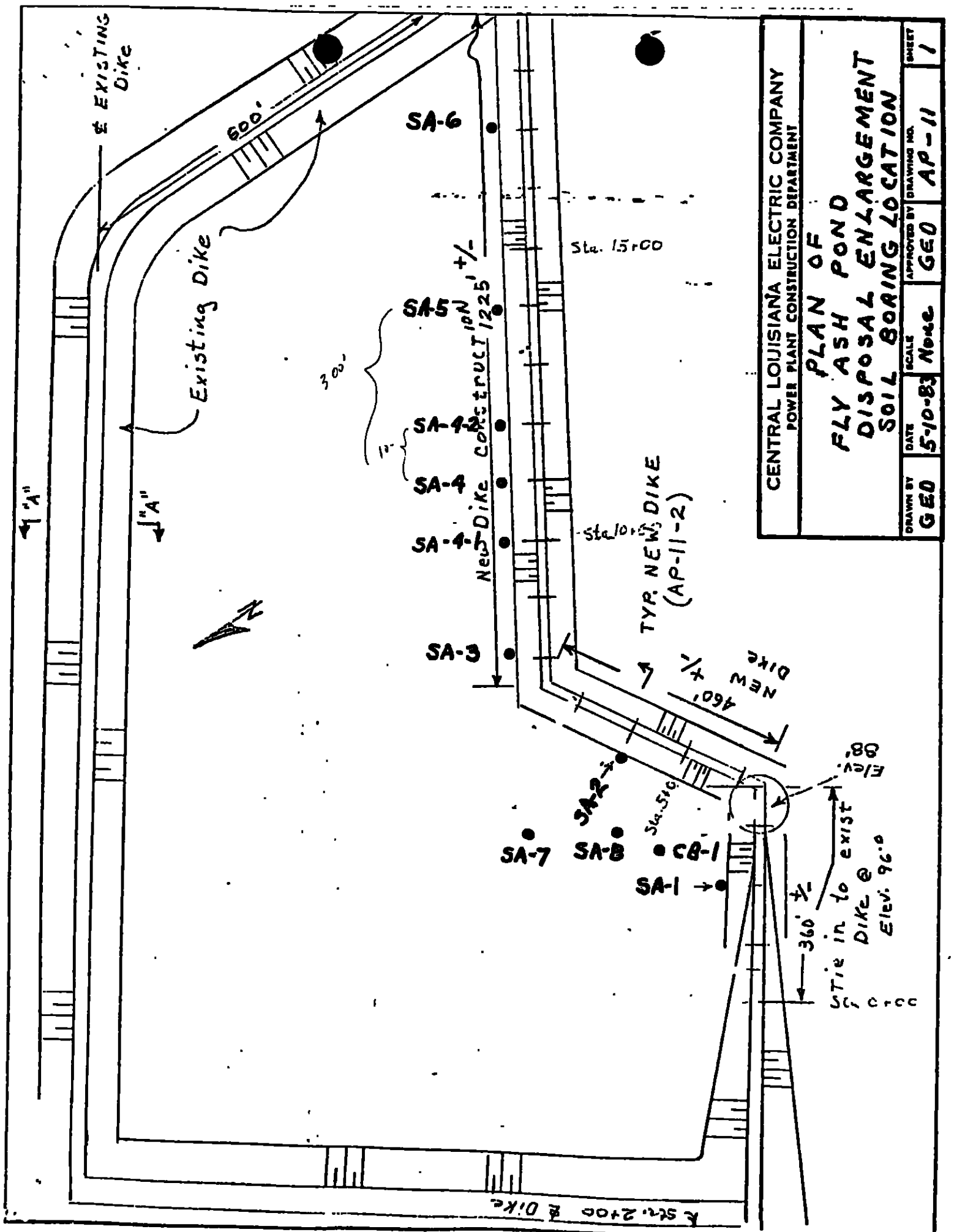
Should you require additional information in this matter, do not hesitate to contact us. An expeditious reply would be appreciated.

Very truly yours,

J. T. Simms, Jr., Manager
Resource Development Division

JTSjr/PJT:aw
Enclosures

cc: Messrs. B. J. Guillory
L. G. Fontenot
K. B. Dickerson
G. E. DeSoto
C. A. Strong



CENTRAL LOUISIANA ELECTRIC COMPANY
POWER PLANT CONSTRUCTION DEPARTMENT

PLAN OF FLY ASH POND DISPOSAL ENLARGEMENT SOIL BORING LOCATION

DRAWN BY	DATE	SCALE	APPROVED BY	DRAWING NO.	SHEET
GEO	5-10-83	None	GEO	AP-11	1

ATTACHMENT 3: SUMMARY OF LABORATORY DATA

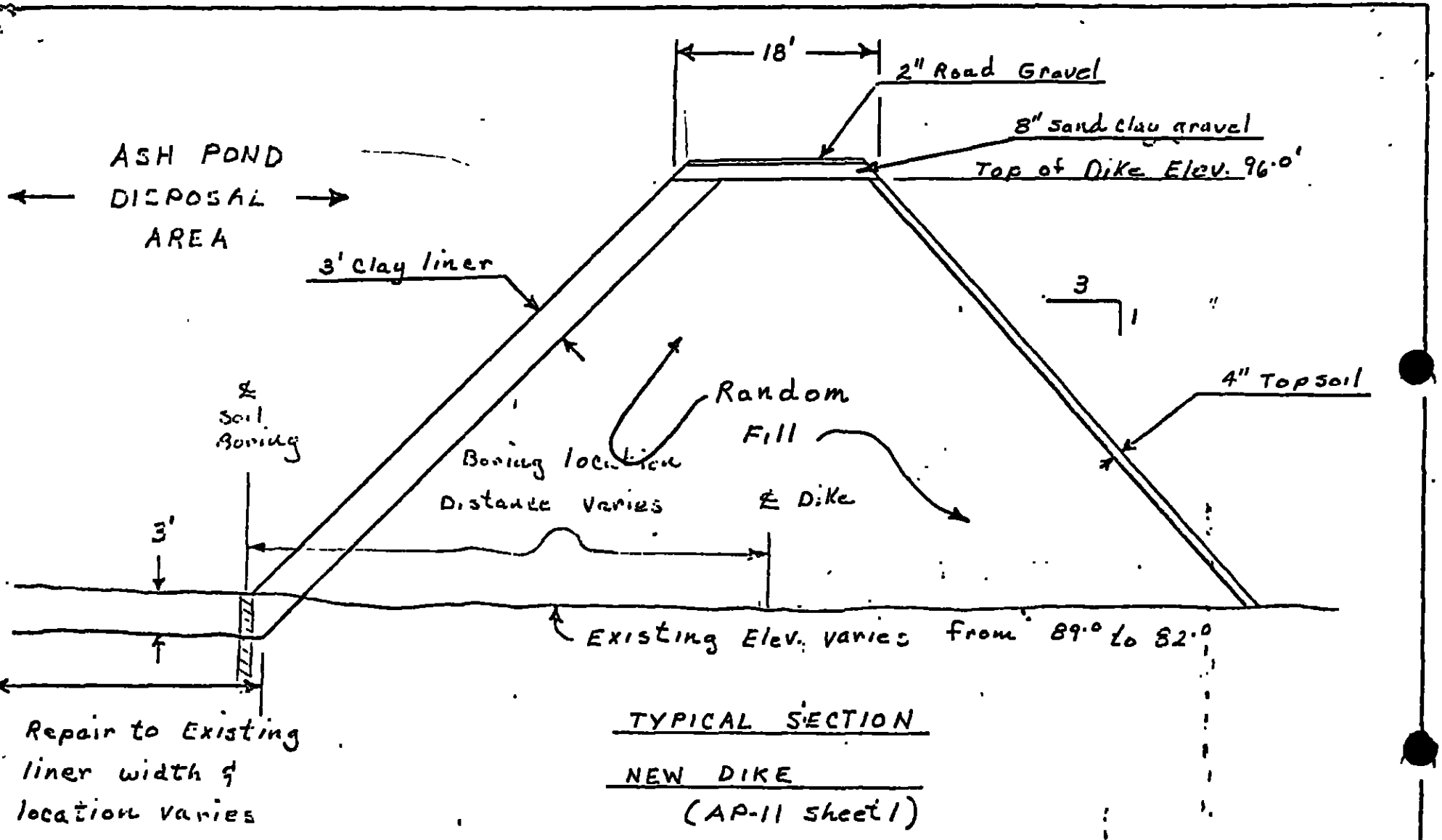
SUMMARY OF LABORATORY TEST DATA

PROJECT 83-2844

DATE November 29, 1983

BORING NO	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY PCF	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF	STRAIN %	LATERAL PRESSURE PSF	TYPE FAILURE	Coefficient of Permeability Cm/sec.
SA-1	0-2	Brown Clay	35	85	71	25	46					3.3×10^{-9}
SA-2	2-4	Brown Clay	18	104	60	21	39					5.5×10^{-9}
SA-3	2-4	Brown Clay	49	76	42	16	26					7.8×10^{-9}
SA-4	2-4	Brown Clay	22	102	40	16	24					1.7×10^{-8}
SA-5	0-2	Brown Clay	24	101	39	16	23					6.6×10^{-9}
SA-7	4-6	Brown Clay	24	101	39	19	20					1.4×10^{-8}
CB-6	0-2	Brown Sandy Clay	33	90								8.9×10^{-9}

SOUTHWESTERN LABORATORIES



CENTRAL LOUISIANA ELECTRIC COMPANY POWER PLANT CONSTRUCTION DEPARTMENT					
Dike Section					
DRAWN BY GEO	DATE 5-10-83	SCALE None	APPROVED BY GED	DRAWING NO. AP-11	SHEET 2

ATTACHMENT 2: DIKE SECTION SHOWING PROXIMITY OF SOIL BORINGS

ATTACHMENT 4 [redacted]AB RESULTS OF CLAY PLACED ON [redacted]E OF NEW DIKE

[redacted] LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3753

LOCATION Sta 4 + 00

Date 11-18-83

Boring No. _____ Sample Depth _____

Tested by R.L.

Contractor Clecp

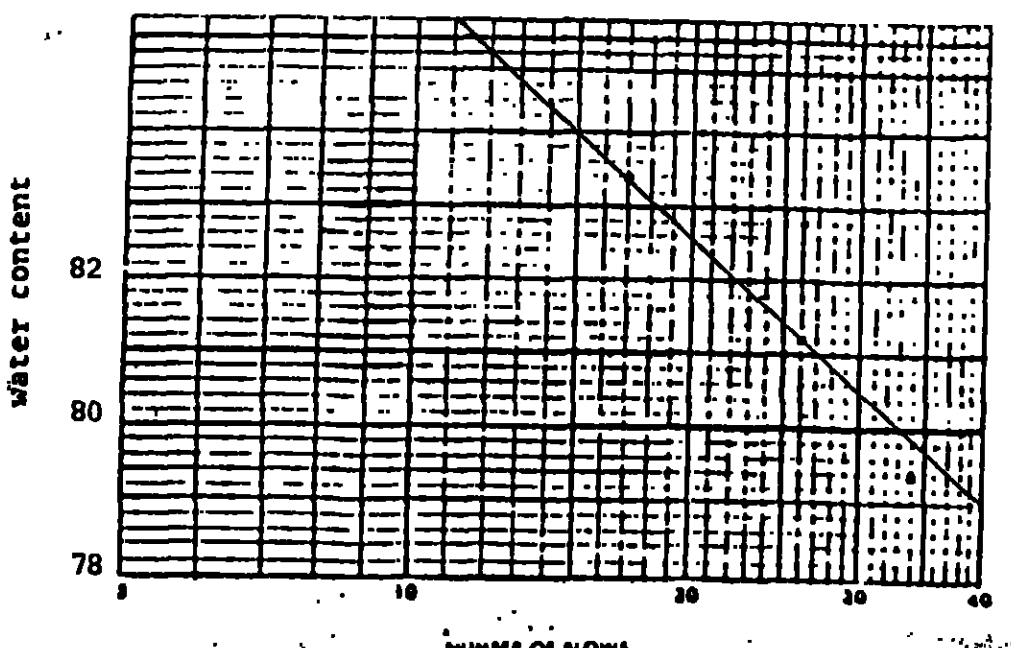
PLASTIC LIMIT

Can No.	A-15			
Wet Wt.	8.58			
Dry Wt.	7.0			
Wt. Water	1.58			
T.W.	1.54			
Wt. Dry Soil	5.46			
% Water	28.9			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	34	26	17
Can No.	AL	A-7	A-5
Wet Wt.	13.01	15.61	14.49
Dry Wt.	7.97	9.35	8.64
Wt. Water	5.04	6.26	5.85
T.W.	1.54	1.54	1.54
Wt. Dry Soil	6.43	7.81	7.1
% Water	78.4	80.2	82.4



LL 81

PI 29

PI 52

Symbol from plasticity chart

[illegible] LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3753

LOCATION Sta 6 + 00 Date 11-18-83

Boring No. _____ Sample Depth _____ Tested by R.L.

Contractor Cleco

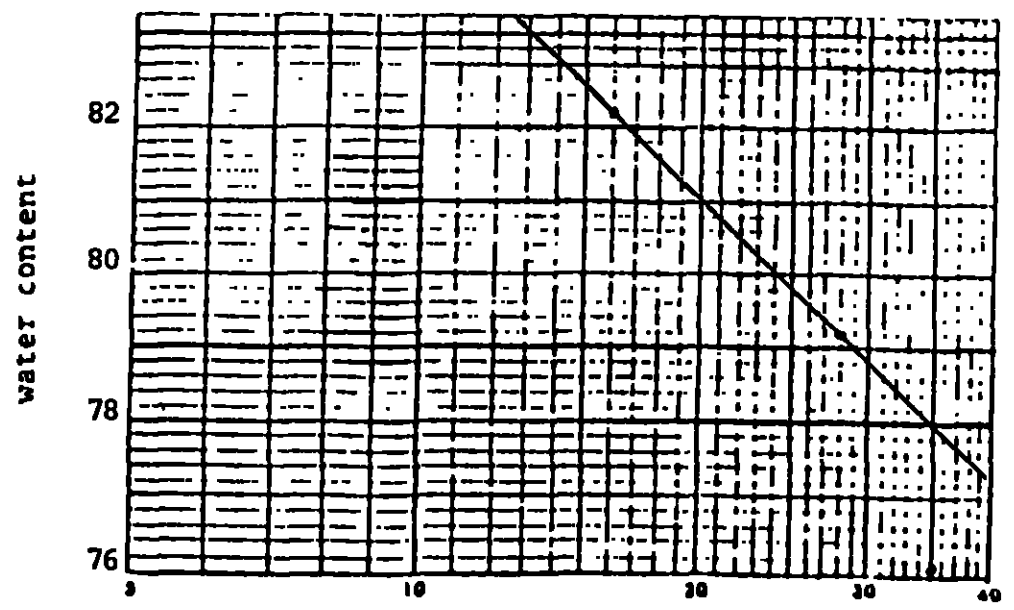
PLASTIC LIMIT

Can No.	AV		
Wet Wt.	10.09		
Dry Wt.	8.37		
Wt. Water	1.72		
T.W.	1.54		
Wt. Dry Soil	6.83		
% Water	25.2		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	28	16
Can No.	A-21	AA	A-12
Wet Wt.	15.03	16.02	15.26
Dry Wt.	9.2	9.62	9.07
Wt. Water	5.83	6.4	6.19
T.W.	1.54	1.54	1.54
Wt. Dry Soil	7.66	8.08	7.53
% Water	76.1	79.2	82.2



LL 80

PL 25

PI 55

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

CONSTRUCTION MATERIALS TESTING DIVISION

FILE NUMBER 9101550

DATE 12-02-83

TO: Cleco

REPORT OF: LABORATORY SIEVE ANALYSIS OF Material finer than #200
(AND) PLASTICITY INDEX

FOR: Cleco

IDENTIFICATION MARKS
(PROJECT TITLE & LOCATION) Fly Ash Pond Enlargement Sta #8 + 50

A (REPRESENTATIVE) SAMPLE OF Brown Clay

[illegible] WAS DELIVERED TO THE LABORATORY) BY [illegible]

[illegible] Contractor in Alexandria, LA ON December 2, 1983

TO DETERMINE THE GRADATION AND PLASTICITY INDEX. THE TEST RESULTS ARE AS FOLLOWS:

U. S. SIEVE SIZE		% RETAINED/PASSING	SPEC. REQUIREMENTS
#10	0	0/100	
#40	4.8	4.9/95.1	
#200	12.6	12.9/82.2	
-200	80.5	82.2	

WT. OF TOTAL SAMPLE 97.9

ATTERBERG LIMITS DETERMINATION
(ASTM D-424)

REMARKS:

		REQUIREMENTS
TECHNICIAN: Roxanne Lawson	LIQUID LIMIT: 67	%
	PLASTICITY INDEX: 47	%

LAB. NO. 13-3760

SOUTHWESTERN LABORATORIES

BOB ADAIR, Manager

SOUTHWESTERN LABORATORIES

CONSTRUCTION MATERIALS TESTING DIVISION

FILE NUMBER 9101550

DATE 12-02-83

TO: Cleco

REPORT OF: LABORATORY SIEVE ANALYSIS OF Material Finer than #200
(AND) PLASTICITY INDEX

FOR: Cleco

IDENTIFICATION MARKS
(PROJECT TITLE & LOCATION) Fly Ash Pond Enlargment Sta # 6 + 25

A (REPRESENTATIVE) SAMPLE OF Brown Clay

(WAS SECURED FROM, WAS DELIVERED TO THE LABORATORY) BY [redacted] contractor in Alexandria, LA ON December 2, 1983

TO DETERMINE THE GRADATION AND PLASTICITY INDEX. THE TEST RESULTS ARE AS FOLLOWS:

U. S. SIEVE SIZE		% RETAINED/PASSING	SPEC. REQUIREMENTS
#10	0	0/100	
#40	7.6	6.2/93.8	
#200	16.8	13.6/80.2	
-200	98.7	80.2	

WT. OF TOTAL SAMPLE 123.1

ATTERBERG LIMITS DETERMINATION
(ASTM D-424)

REMARKS:

		REQUIREMENTS
TECHNICIAN: Roxanne Lawson	LIQUID LIMIT: 63	%
	PLASTICITY INDEX: 43	%

LAB. NO. 13-3760

SOUTHWESTERN LABORATORIES

BOB ADAIR, Manager

SOUTHWESTERN LABORATORIES

CONSTRUCTION MATERIALS TESTING DIVISION

FILE NUMBER 9101550

DATE 12-02-83

TO: CLECO

REPORT OF: LABORATORY SIEVE ANALYSIS OF Material Finer than #200
(AND) PLASTICITY INDEX

FOR: CLECO

IDENTIFICATION MARKS
(PROJECT TITLE & LOCATION) Fly Ash Pond Enlargement Sta 12 + 50

A (REPRESENTATIVE) SAMPLE OF Brown Clay

(WAS SECURED FROM WAS DELIVERED TO THE LABORATORY) BY (Contractor in Alexandria, LA. ON 12-02-83

TO DETERMINE THE GRADATION AND PLASTICITY INDEX. THE TEST RESULTS ARE AS FOLLOWS:

U. S. SIEVE SIZE	% RETAINED/PASSING	SPEC. REQUIREMENTS
#10 0	0/100	
#40 3.6	3.5/96.5	
#200 10.9	10.5/86.0	
-200 89.8	86.0	

WT. OF TOTAL SAMPLE 104.3

ATTERBERG LIMITS DETERMINATION
(ASTM D-424)

REMARKS:

		REQUIREMENTS
TECHNICIAN: Roxanne Lawson	LIQUID LIMIT: 74	%
	PLASTICITY INDEX: 49	%

LAB. NO. 13-3760

SOUTHWESTERN LABORATORIES

BOB ADAIR, Manager

ATTACHMENT 5: LAB RESULTS FROM SOIL BORINGS SA-1, SA-2, SA-3, SA-4, SA-4-1, SA-4-2, SA-5, SA-6, SA-7, SA-8, CB-1

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-1
LOCATION: Rodemacher Power Sta.

Date: 10-25-83 Type: Auger Ground Elevation: 86.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
			Brown Clay.
5			Brown Clay.
		X	1-2-2 (4 B/F) Tan and Brown Silty Sand.
10		X	
			BOTTOM OF HOLE - 10'
			WATER = 8'
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay Lab No. 13-3713

LOCATION SA-1 Date 10-26-83

Boring No. _____ Sample Depth 0-2 Tested by R.L.

Contractor Cleco

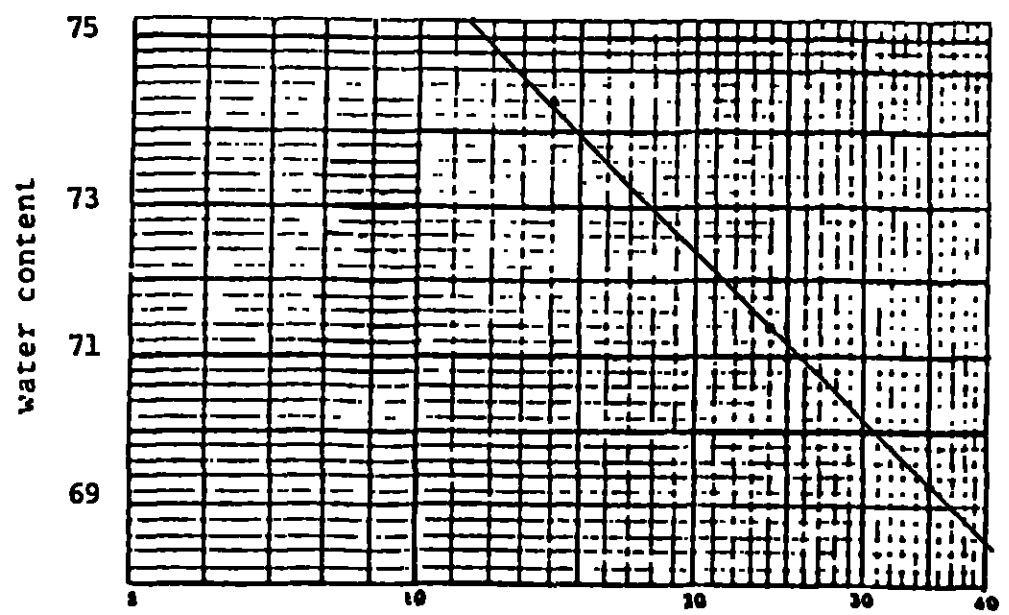
PLASTIC LIMIT

Can No.	A-14			
Wet Wt.	8.28			
Dry Wt.	6.94			
Wt. Water	1.34			
T.W.	1.54			
Wt. Dry Soil	5.4			
% Water	24.8			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	24	14		
Can No.	A-1	A-3	AK		
Wet Wt.	17.35	17.93	18.3		
Dry Wt.	10.88	11.1	11.15		
Wt. Water	6.47	6.83	7.15		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.34	9.56	9.61		
% Water	69.3	71.4	74.4		



LL 71

PL 25

PI 46

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-1

Boring No. _____ Sample Depth 2-4

Contractor Cleco

Date 10-26-83

Tested by R.L.

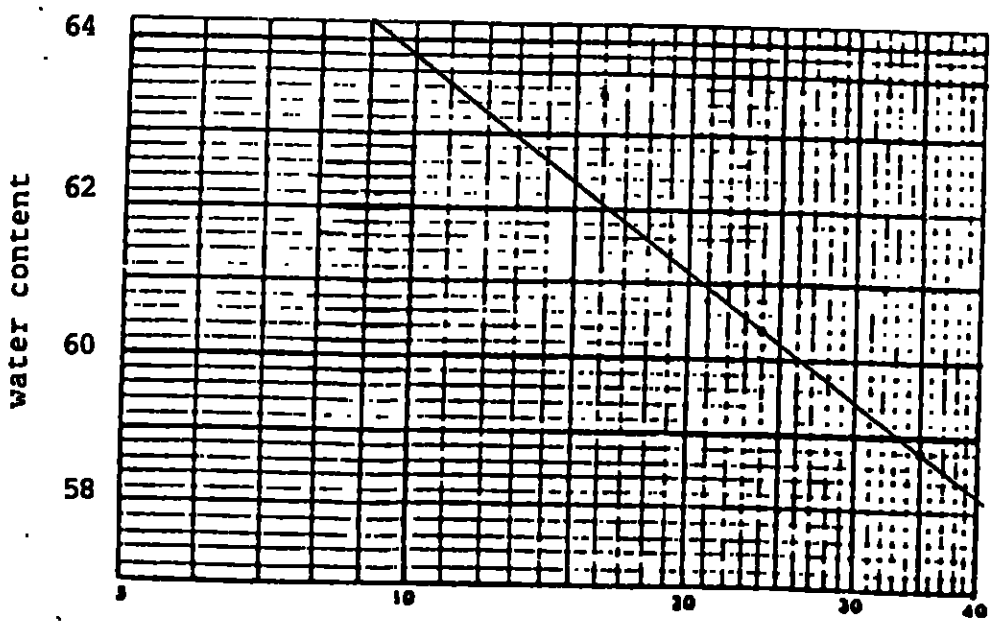
PLASTIC LIMIT

Can No.	A-16		
Wet Wt.	9.52		
Dry Wt.	8.25		
Wt. Water	1.27		
T.W.	1.54		
Wt. Dry Soil	6.71		
% Water	18.9		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	24	16		
Can No.	AX	AE	A-15		
Wet Wt.	17.4	18.11	18.29		
Dry Wt.	11.53	11.87	11.78		
Wt. Water	5.87	6.24	6.51		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.99	10.33	10.24		
% Water	58.8	60.4	63.5		



LL 60

PI 19

PI 41

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 17-3713

LOCATION SA-1

Date 10-26-83

Boring No. _____ Sample Depth 4-6

Tested by R.L.

Contractor Cleco

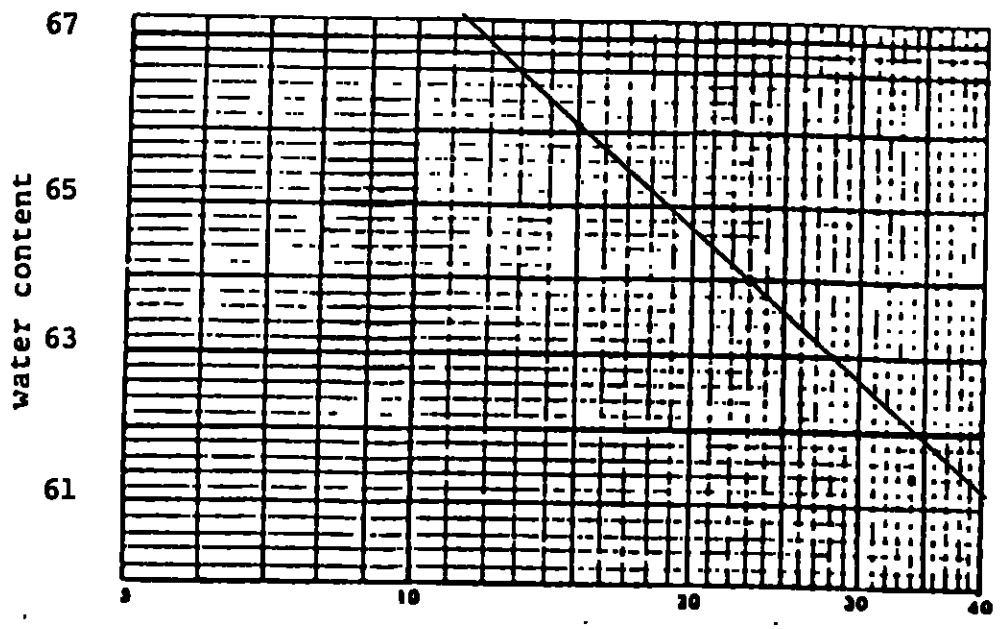
PLASTIC LIMIT

Can No.	A-5			
Wet Wt.	9.23			
Dry Wt.	7.98			
Wt. Water	1.25			
T.W.	1.54			
Wt. Dry Soil	6.44			
% Water	19.4			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	34	23	15		
Can No.	A-19	AW	A-4		
Wet Wt.	17.15	18.56	18.42		
Dry Wt.	11.21	11.92	11.7		
Wt. Water	5.94	6.64	6.72		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.67	10.38	10.16		
% Water	61.4	64.0	66.1		



LL 64

PI 19

PI 45

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-2
LOCATION: Rodemacher Power Sta.

Date: 10-25-83 Type: Auger Ground Elevation: 87.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
		■	Brown Clay
		■	Brown Clay.
5		■	Brown Clay.
		X	4-4-3-7 B/F Brown Clay.
10		X	3-4-5-9 B/F Brown Clay.
			Bottom of Hole - 10'
15			Free Water - 6'
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-2

Date 10-26-83

Boring No. _____ Sample Depth 0-2

Tested by _____

Contractor Cleco

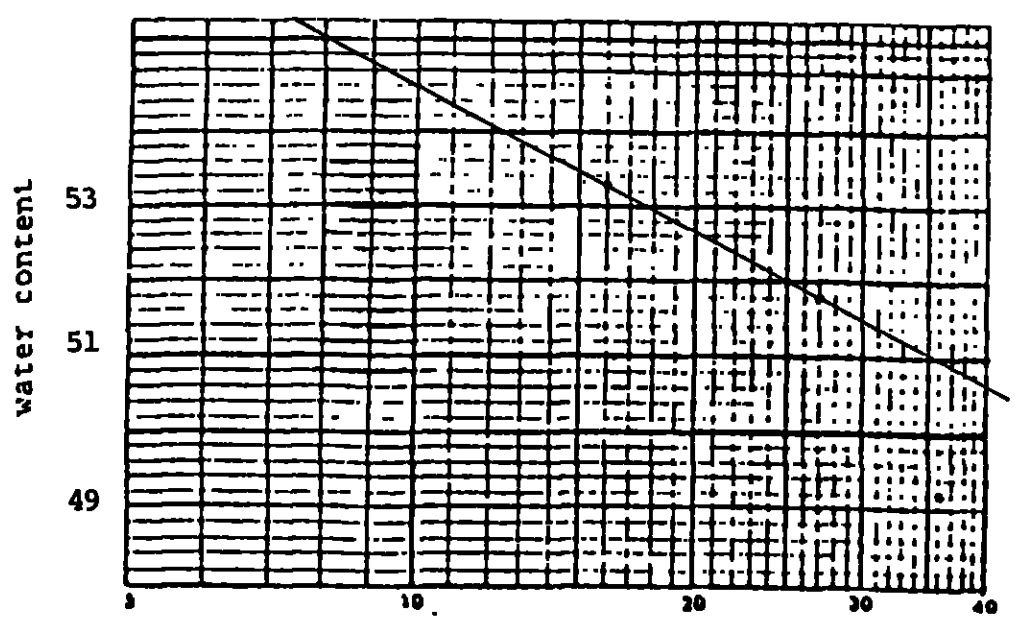
PLASTIC LIMIT

Can No.	AL		
Wet Wt.	10.02		
Dry Wt.	8.74		
Wt. Water	1.28		
T.W.	1.54		
Wt. Dry Soil	7.2		
% Water	17.8		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	27	16		
Can No.	A-2	AV	A-18		
Wet Wt.	19.04	19.64	20.08		
Dry Wt.	13.27	13.46	13.63		
Wt. Water	5.77	6.18	6.45		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	11.73	11.92	12.09		
% Water	49.2	51.8	53.3		



LL 52

PL 18

PI 34

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION Sa-2

Date 10-26-83

Boring No. _____ Sample Depth 2-4

Tested by R.L.

Contractor Cleco

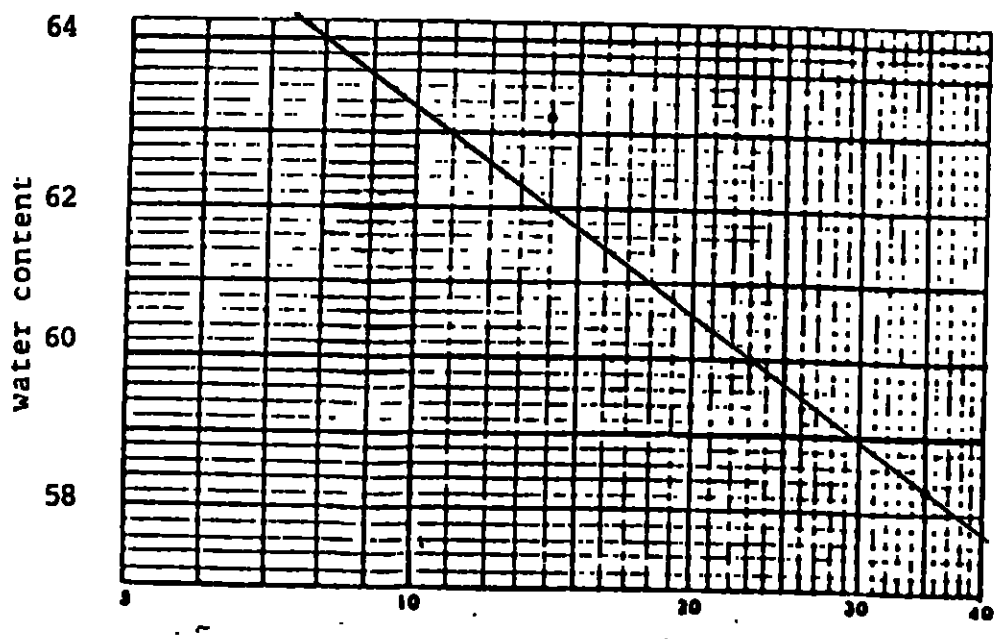
PLASTIC LIMIT

Can No.	A-12		
Wet Wt.	7.34		
Dry Wt.	6.33		
Wt. Water	1.01		
T.W.	1.54		
Wt. Dry Soil	4.79		
% Water	21.1		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	23	14		
Can No.	AE	AH	AI		
Wet Wt.	15.28	15.73	16.21		
Dry Wt.	10.22	10.41	10.53		
Wt. Water	5.06	5.32	5.68		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	8.68	8.87	8.99		
% Water	58.3	60.0	63.2		



LL 60

PL 21

PI 39

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-3
LOCATION: Rodemacher Power Sta.

Date: 10-25-83 Type: Auger Ground Elevation: 85.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Dark Brown Clay.
			Brown Clay.
5			Brown Clayey Silt.
			Brown Clayey Silt.
10			Brown Clay.
			Bottom of Hole = 10'
			Free Water - 6'
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Dark Brown Clay

Lab No. 13-3713

LOCATION SA-3

Date 10-26-83

Boring No. _____ Sample Depth 0-2

Tested by R.L.

Contractor Cleco

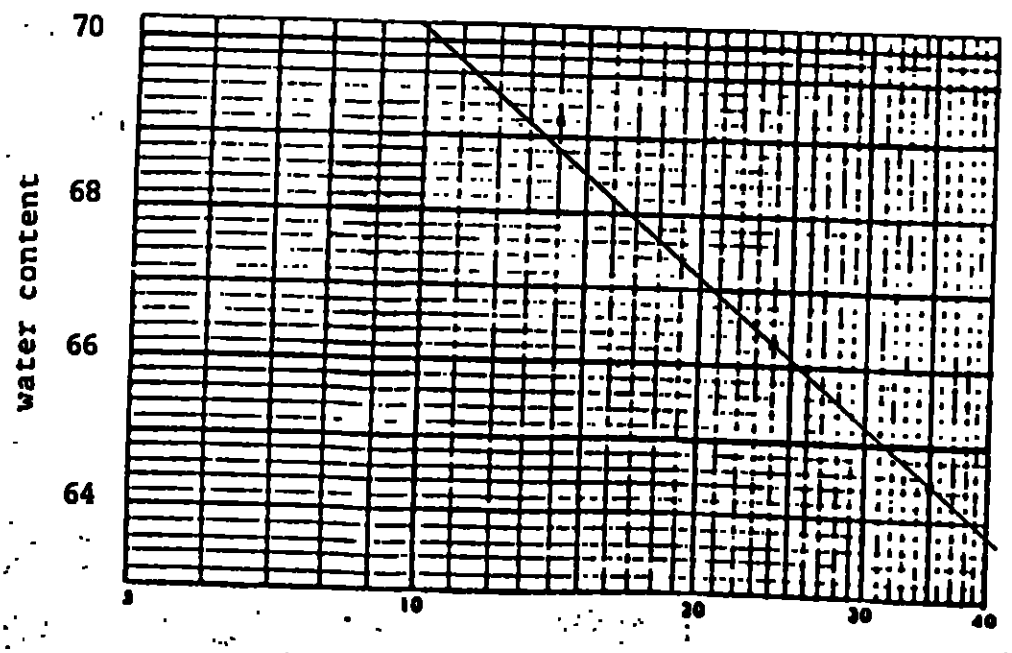
PLASTIC LIMIT

Can No.	AX		
Wet Wt.	9.01		
Dry Wt.	7.55		
Wt. Water	1.46		
T.W.	1.54		
Wt. Dry Soil	6.01		
% Water	24.3		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	24	14		
Can No.	A-1	AA	A-14		
Wet Wt.	13.53	14.13	14.7		
Dry Wt.	8.83	9.11	9.32		
Wt. Water	4.7	5.02	5.38		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	7.29	7.57	7.78		
% Water	64.5	66.3	69.2		



LL 66

PL 24

PI 42

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-3

Date 10-26-83

Boring No. _____ Sample Depth 2-4

Tested by R.L.

Contractor Cleco

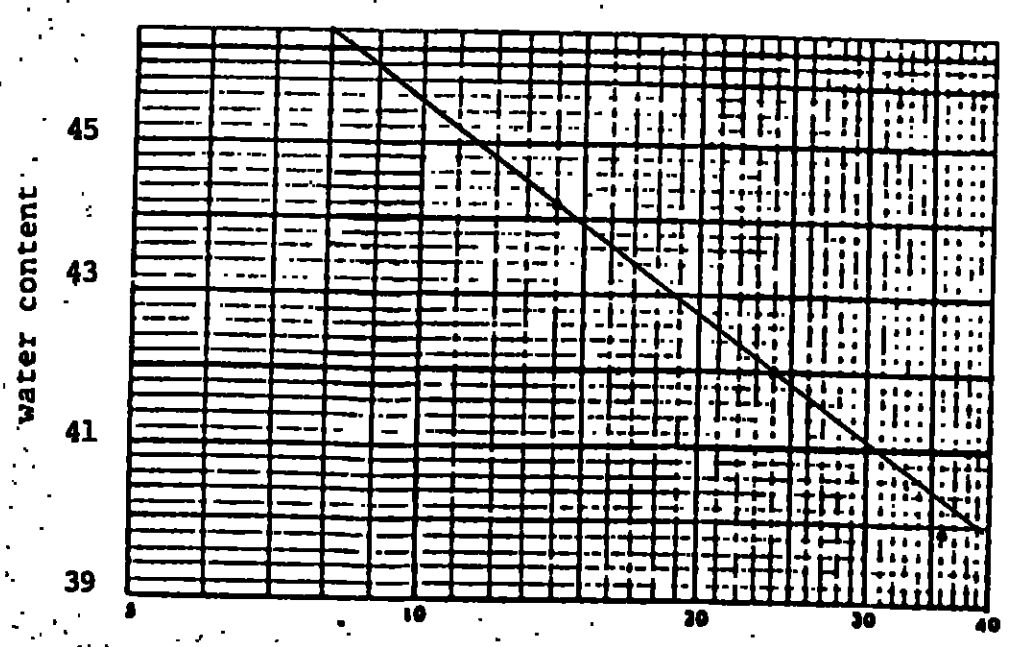
PLASTIC LIMIT

Can No.	A-1		
Wet Wt.	9.17		
Dry Wt.	8.12		
Wt. Water	1.05		
T.W.	1.54		
Wt. Dry Soil	6.58		
% Water	16.0		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	24	14		
Can No.	A-16	A-3	A-7		
Wet Wt.	15.54	15.94	16.35		
Dry Wt.	11.55	11.68	11.81		
Wt. Water	3.99	4.26	4.54		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	10.01	10.14	10.27		
% Water	39.9	42.0	44.2		



LL 42

PL 16

PI 26

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clayey Silt

Lab No. 13-3713

LOCATION SA-3

Date 10-26-83

Boring No. _____ Sample Depth 4-6

Tested by R.L.

Contractor Cleco

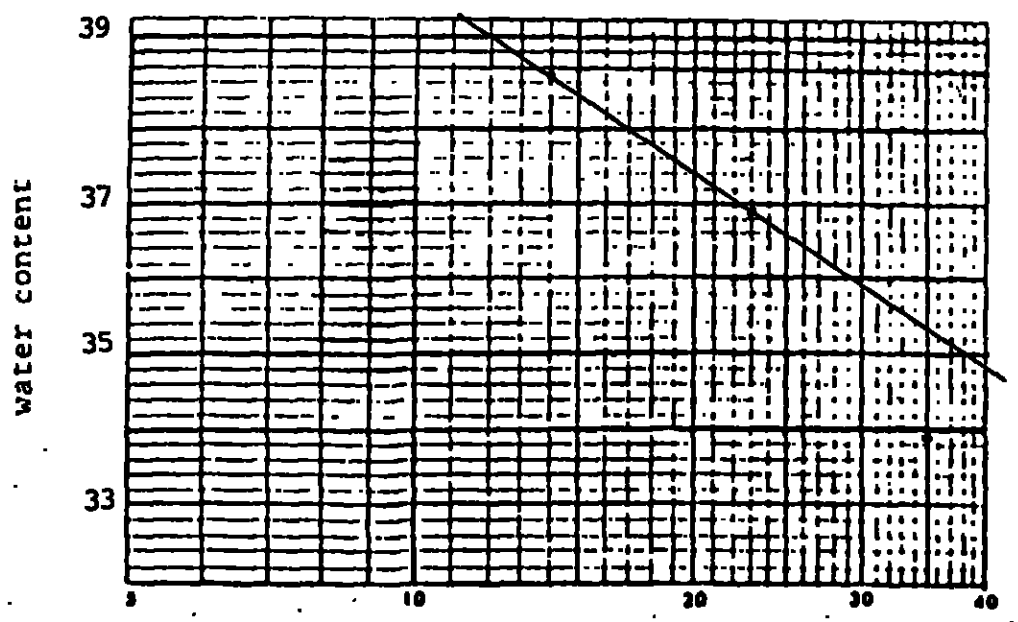
PLASTIC LIMIT

Can No.	AL			
Wet Wt.	10.22			
Dry Wt.	9.11			
Wt. Water	1.11			
T.W.	1.54			
Wt. Dry Soil	7.57			
% Water	14.7			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	23	14		
Can No.	AP	AI	A-26		
Wet Wt.	19.37	19.53	20.06		
Dry Wt.	14.86	14.68	14.89		
Wt. Water	4.51	4.85	5.17		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	13.32	13.14	13.35		
% Water	33.9	36.9	38.7		



LL 37

PI 15

PI 22

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-4
LOCATION: Rodemacher Power Sta.

Date: 10-25-83 Type: Auger Ground Elevation: 85.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
			Brown Clay.
5			5-9-9-18 B/F Brown and Tan Sand.
			4-4-4-8 B/F Brown and Tan Silty Sand.
10			1-2-2-4 B/F Brown and Gray Clay.
			BOTTOM OF HOLE = 10'
15			WATER = 8'
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay Lab No. 13-3713

LOCATION SA-4 Date 10-26-83
Boring No. _____ Sample Depth 2'-4' Tested by R.L.
Contractor Cleco

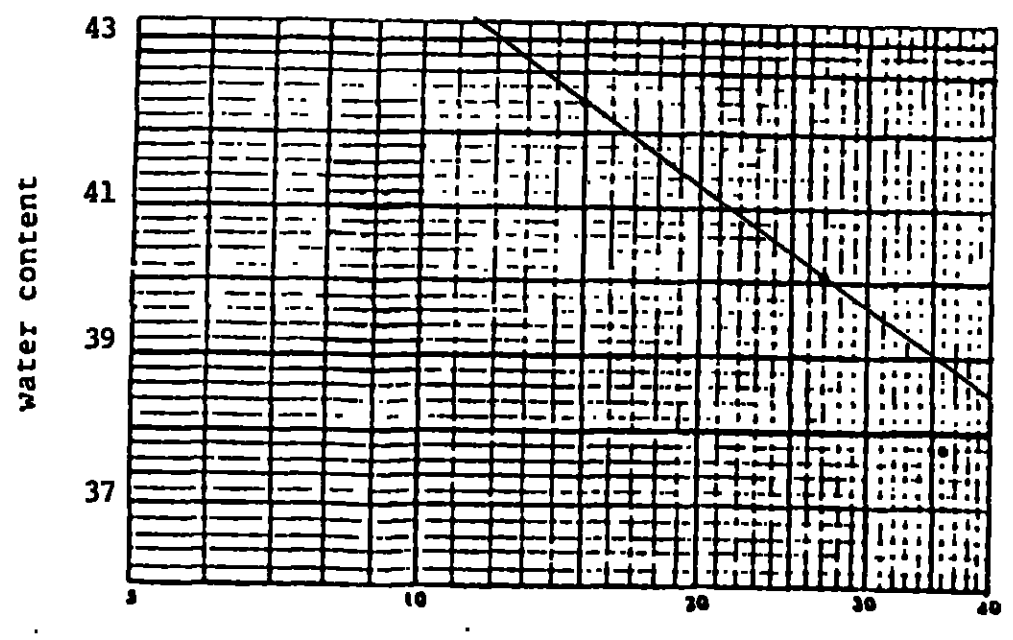
PLASTIC LIMIT

Can No.	AX		
Wet Wt.	9.79		
Dry Wt.	8.66		
Wt. Water	1.13		
T.W.	1.54		
Wt. Dry Soil	7.12		
% Water	15.9		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	27	15		
Can No.	A-24	AD	AF		
Wet Wt.	17.46	18.46	19.04		
Dry Wt.	13.09	13.67	13.83		
Wt. Water	4.37	4.84	5.21		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	11.55	12.08	12.29		
% Water	37.8	40.1	42.4		



LL 40
PL 16
PI 24

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-4-1
LOCATION: Rodemacher Power Sta.

Date: 10-25-83 Type: Auger Ground Elevation: 85.°

Legend:
■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
			Brown Clayey Sand.
5			Brown Clay.
			Brown Silty Clay.
10		X	1-2-2-4- B/F Brown and Tan Sandy Clay.
			BOTTOM OF HOLE = 10'
15			WATER = 9'
20			
25			
30			
35			
40			
45			
50			

36

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-4-1

Date 10-26-83

Boring No. _____ Sample Depth 0-2

Tested by R.L.

Contractor Cleco

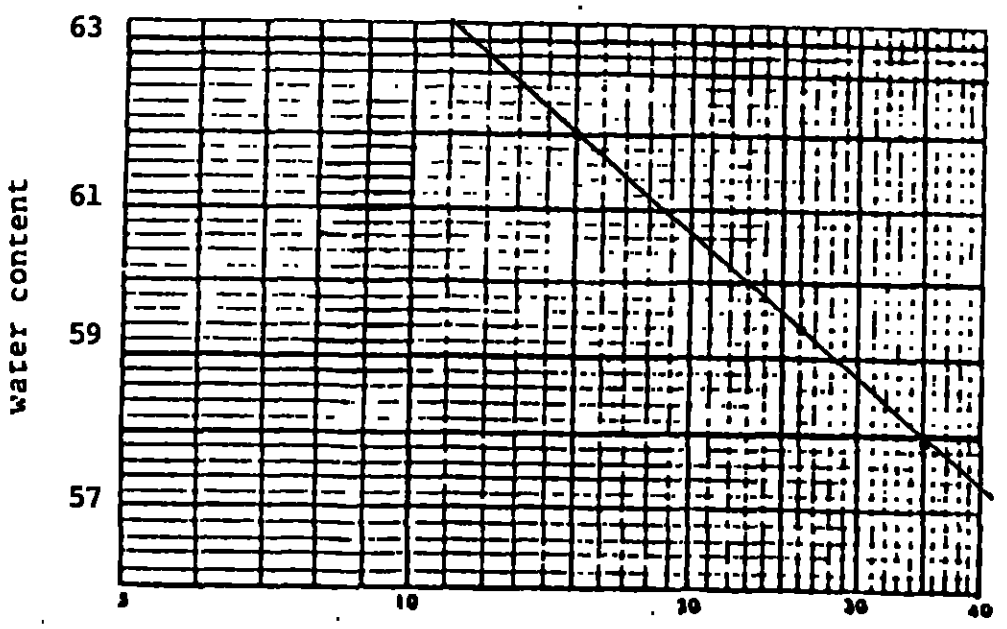
PLASTIC LIMIT

Can No.	A-1			
Wet Wt.	9.64			
Dry Wt.	8.31			
Wt. Water	1.33			
T.W.	1.54			
Wt. Dry Soil	6.77			
% Water	19.6			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	26	15		
Can No.	A-19	A-23	AC		
Wet Wt.	16.35	17.19	17.46		
Dry Wt.	10.93	11.36	11.37		
Wt. Water	5.42	5.83	6.09		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.36	9.82	9.83		
% Water	57.9	59.4	62.0		



LL 60

PI 20

PI 40

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clayey Sand Lab No. 13-3713

LOCATION SA-4-1 Date 10-26-83

Boring No. _____ Sample Depth 2' - 4' Tested by R.L.

Contractor Cleco

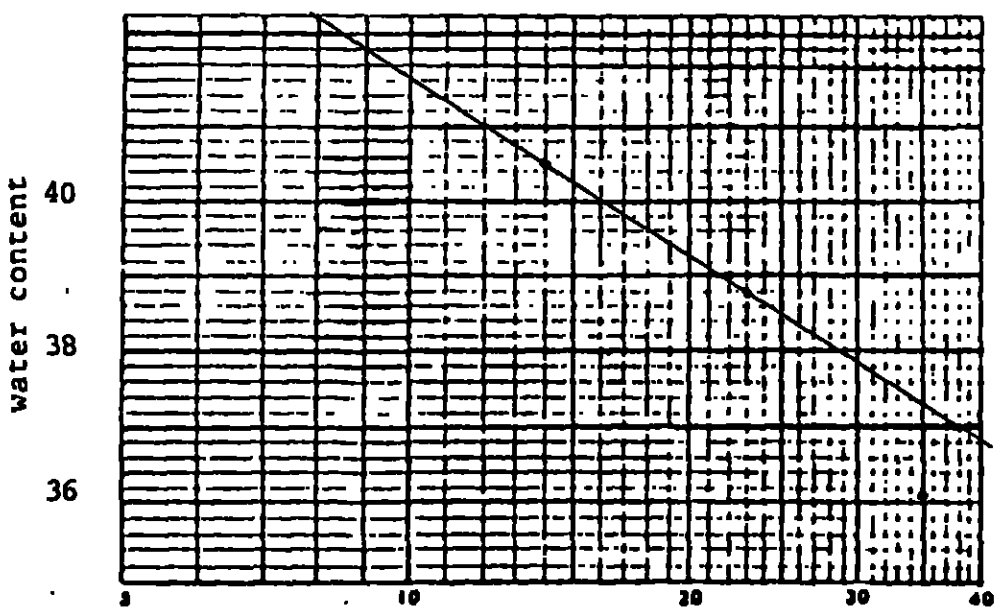
PLASTIC LIMIT

Can No.	AC		
Wet Wt.	10.74		
Dry Wt.	9.34		
Wt. Water	1.4		
T.W.	1.54		
Wt. Dry Soil	7.8		
% Water	17.9		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	23	14		
Can No.	A-16	AH	AX		
Wet Wt.	23.09	24.03	22.8		
Dry Wt.	17.37	17.74	16.67		
Wt. Water	5.72	6.29	6.13		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	15.83	16.2	15.13		
% Water	36.1	38.8	40.5		



LL 39

PL 18

PI 21

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay Lab No. 13-3713

LOCATION SA-4-1 Date 10-26-83

Boring No. _____ Sample Depth 4-6 Tested by R.L.

Contractor Cleco

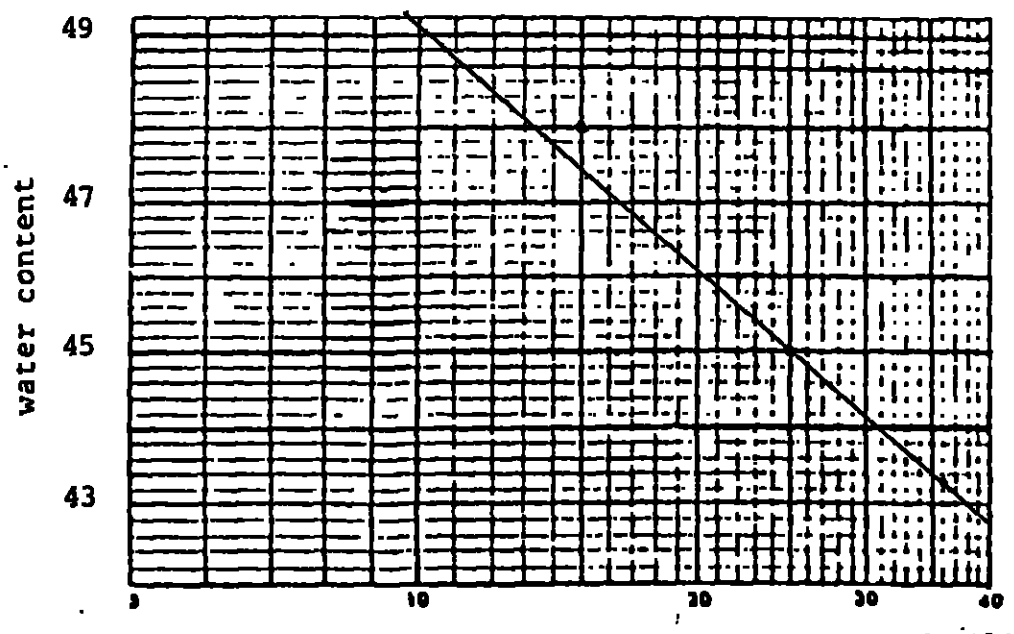
PLASTIC LIMIT

Can No.	A-7		
Wet Wt.	10.53		
Dry Wt.	9.39		
Wt. Water	1.14		
T.W.	1.54		
Wt. Dry Soil	7.85		
% Water	14.5		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	25	15		
Can No.	AM	A-26	A-5		
Wet Wt.	20.22	20.84	21.5		
Dry Wt.	14.58	14.85	15.03		
Wt. Water	5.64	5.99	6.47		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	13.04	13.31	13.49		
% Water	43.3	45.0	48.0		



LL 45

PI 15

PI 30

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-4-2
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 84.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet -	Symbol	Sample	Description of Stratum
			Brown Clay.
			Brown Clay.
5			Brown Clay.
		X	4-4-5-9 B/F Brown Silty Sand.
10		X	3-3-3-6 B/F Brown Silty Sand.
			BOTTOM OF HOLE - 10'
			WATER = 4'
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-4-2

Date 10-26-83

Boring No. _____ Sample Depth 0-2

Tested by R.L.

Contractor Cleco

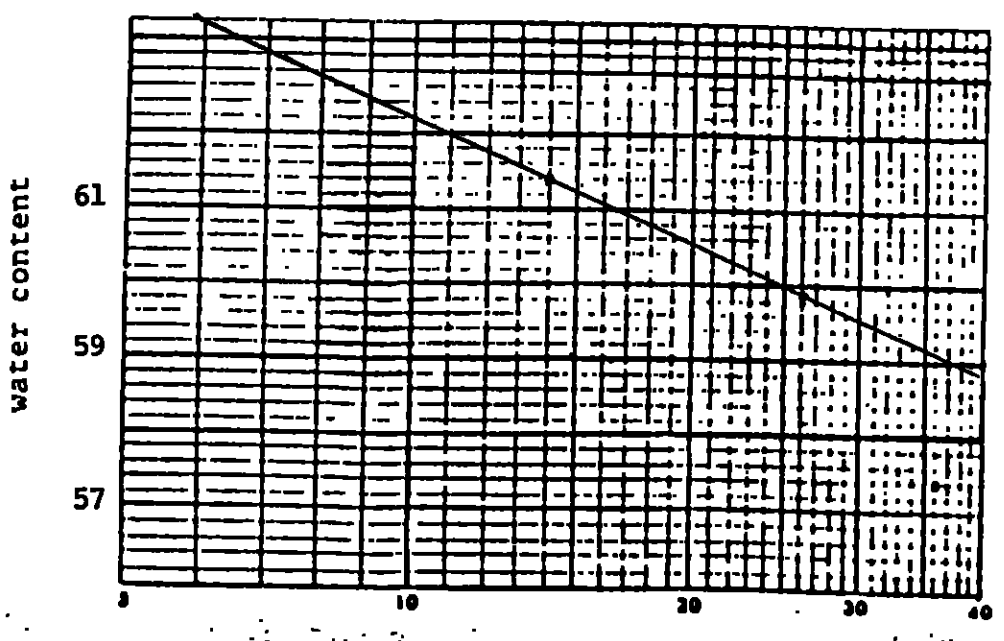
PLASTIC LIMIT

Can No.	AW		
Wet Wt.	9.1		
Dry Wt.	7.61		
Wt. Water	1.49		
T.W.	1.54		
Wt. Dry Soil	6.07		
% Water	24.5		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	26	14		
Can No.	A-26	A-11	A-32		
Wet Wt.	15.77	16.2	16.07		
Dry Wt.	10.58	10.71	10.54		
Wt. Water	5.19	5.49	5.53		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.04	9.17	9.0		
% Water	57.4	59.9	61.4		



LL 60

PL 25

PI 35

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-5
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 84.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
			Brown Clayey Silt.
5		X	4-8-12-20 B/F Brown Sand.
		X	2-8-14-22 B/F Brown Silty Sand.
10		X	2-7-12-19 B/F Brown Silty Sand.
			BOTTOM OF HOLE = 10'
15			WATER = 8'
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay Lab No. 13-3713

LOCATION SA-5 Date 10-26-83
Boring No. _____ Sample Depth 0-2 Tested by R.L.
Contractor Cleco

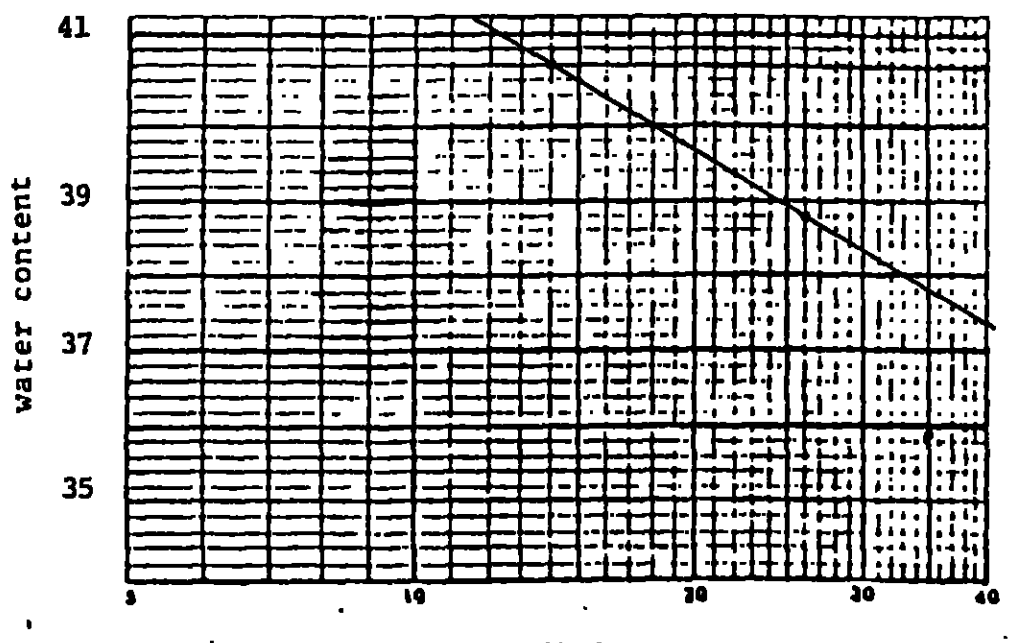
PLASTIC LIMIT

Can No.	AG		
Wet Wt.	8.39		
Dry Wt.	7.43		
Wt. Water	.96		
T.W.	1.54		
Wt. Dry Soil	5.89		
% Water	16.3		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	26	14		
Can No.	AX	AY	A-3		
Wet Wt.	21.22	19.47	19.1		
Dry Wt.	16.29	14.46	14.01		
Wt. Water	4.93	5.01	5.09		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	14.75	12.92	12.47		
% Water	35.9	38.8	40.8		



LL 39

PL 16

PI 23

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clayey Silt Lab No. 13-3713

LOCATION SA-5 Date 10-26-83
Boring No. _____ Sample Depth 2-4 Tested by R.L.
Contractor Cleco

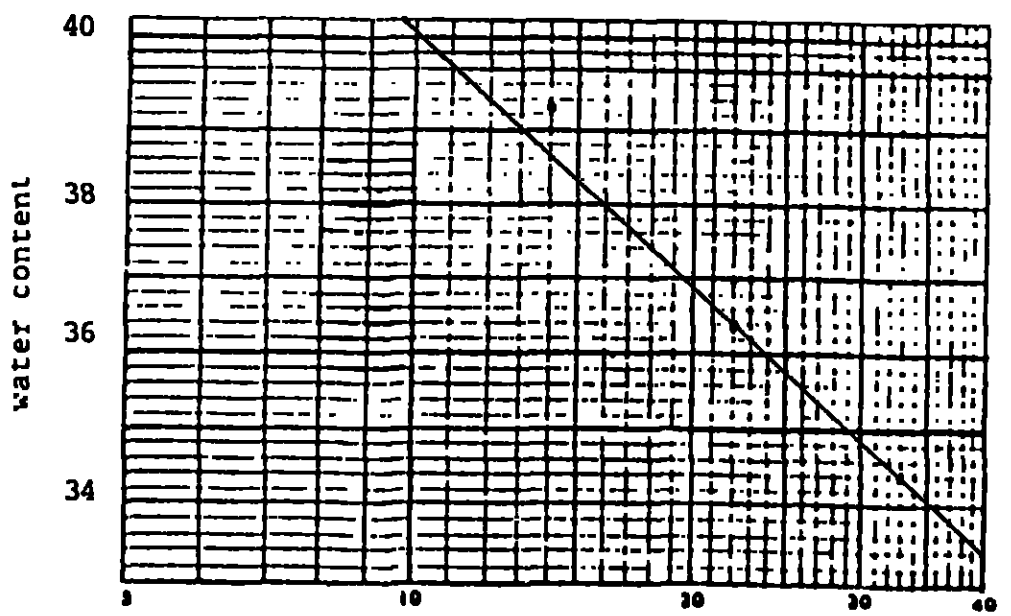
PLASTIC LIMIT

Can No.	A-24		
Wet Wt.	10.48		
Dry Wt.	9.33		
Wt. Water	1.15		
T.W.	1.54		
Wt. Dry Soil	7.79		
% Water	14.8		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	33	22	14		
Can No.	A-10	A-2	AS		
Wet Wt.	14.99	15.37	15.43		
Dry Wt.	11.55	11.68	11.51		
Wt. Water	3.44	3.69	3.92		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	10.01	10.14	9.97		
% Water	34.4	36.4	39.3		



LL 36
PL 15
PI 21
Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-6
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 82.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
5			Brown Sand.
10			Brown Clay.
			BOTTOM OF HOLE - 10'
15			NO WATER
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE : Brown Clay

Lab No. 13-3713

LOCATION SA-6

Date 10-26-83

Boring No. _____ Sample Depth 0-3

Tested by R.L.

Contractor Cleco

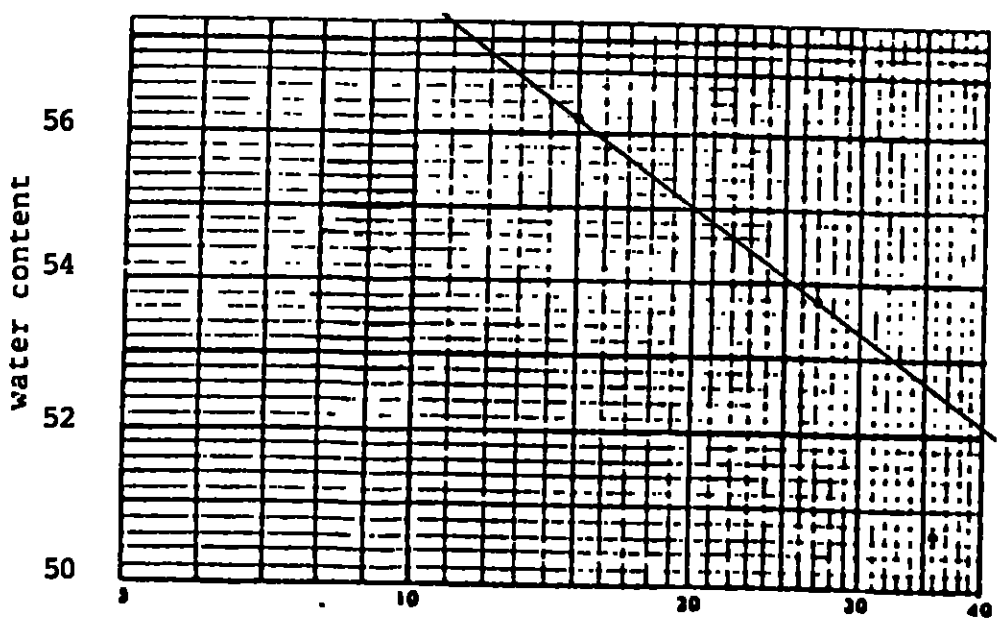
PLASTIC LIMIT

Can No.	AJ		
Wet Wt.	8.06		
Dry Wt.	6.79		
Wt. Water	1.27		
T.W.	1.54		
Wt. Dry Soil	5.25		
% Water	24.2		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	27	15		
Can No.	AB	A-3	A-9		
Wet Wt.	16.78	16.87	17.83		
Dry Wt.	11.65	11.51	11.97		
Wt. Water	5.13	5.36	5.86		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	10.11	9.97	10.43		
% Water	50.7	53.8	56.2		



LL 54

PL 24

PI 30

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-6

Date 10-26-83

Boring No. _____ Sample Depth 6-10

Tested by R.L.

Contractor Cleco

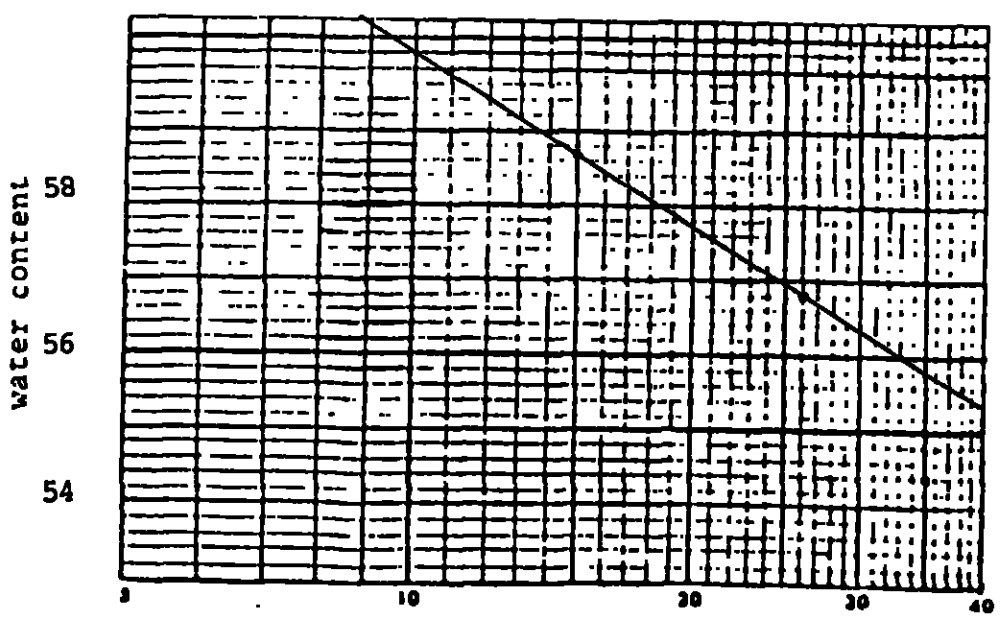
PLASTIC LIMIT

Can No.	AW			
Wet Wt.	8.85			
Dry Wt.	7.65			
Wt. Water	1.2			
T.W.	1.54			
Wt. Dry Soil	6.11			
% Water	19.6			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	26	15		
Can No.	AF	AE	AT		
Wet Wt.	14.96	15.56	16.11		
Dry Wt.	10.23	10.48	10.72		
Wt. Water	4.73	5.08	5.39		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	8.69	8.94	9.18		
% Water	54.4	56.8	58.7		



LL 57

PL 20

PI 37

Symbol from plasticity chart

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-7
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 84.°

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Tan Sandy Ash.
			Brown Clay.
5			Brown Clay.
			Brown Clay.
			Brown Clay.
10			Brown Clay.
15			BOTTOM OF HOLE = 12'
			NO WATER
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay Lab No. 13-3713

LOCATION SA-7 Date 10-26-83

Boring No. _____ Sample Depth 2-4 Tested by R.L.

Contractor Cleco

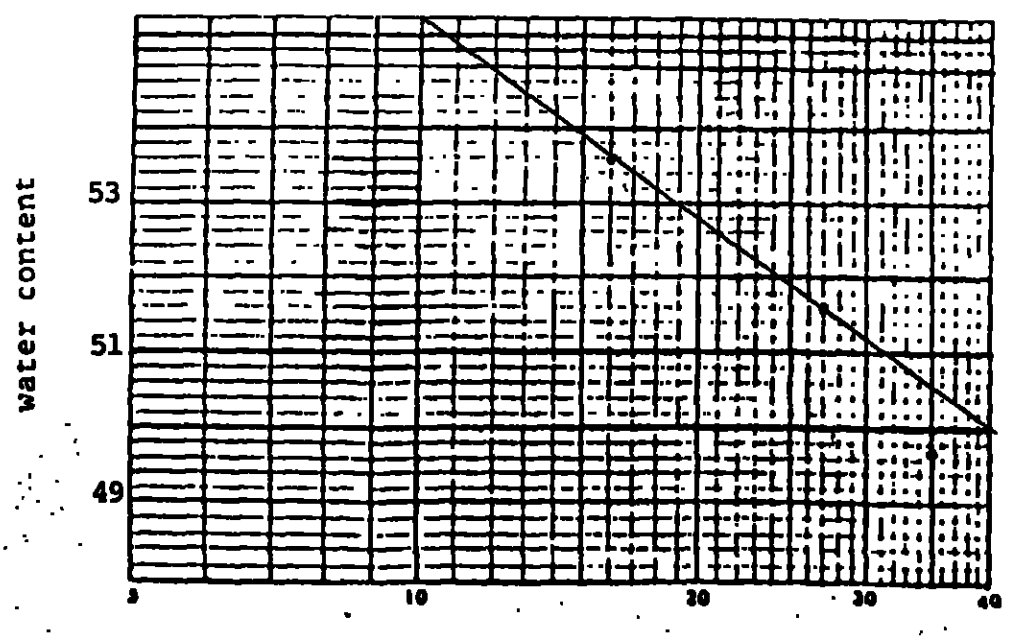
PLASTIC LIMIT

Can No.	AW			
Wet Wt.	10.05			
Dry Wt.	8.44			
Wt. Water	1.61			
T.W.	1.54			
Wt. Dry Soil	6.9			
% Water	23.3			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	27	16		
Can No.	AS	A-6	AP		
Wet Wt.	17.38	17.15	17.84		
Dry Wt.	12.12	11.84	12.15		
Wt. Water	5.26	5.31	5.69		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	10.58	10.3	10.61		
% Water	49.7	51.6	53.6		



LL 52

PL 23

PI 29

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Brown Clay

Lab No. 13-3713

LOCATION SA-7

Date 10-26-83

Boring No. _____ Sample Depth 4-6

Tested by _____

Contractor Cleco

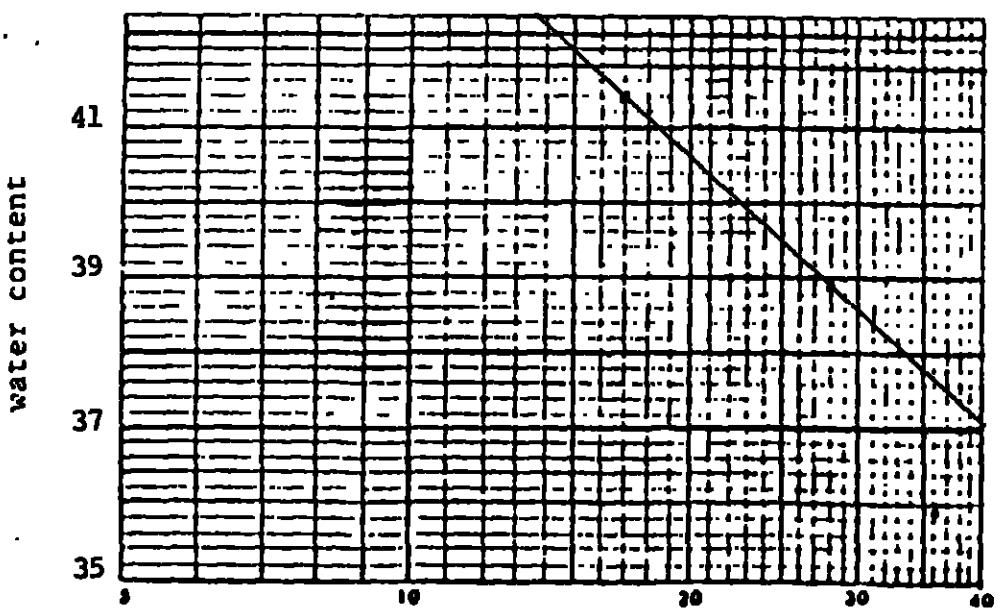
PLASTIC LIMIT

Can No.	A-14			
Wet Wt.	9.74			
Dry Wt.	8.46			
Wt. Water	1.28			
T.W.	1.54			
Wt. Dry Soil	6.92			
% Water	18.5			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	36	28	17		
Can No.	A-19	A-12	AZ		
Wet Wt.	15.59	15.56	16.09		
Dry Wt.	11.88	11.63	11.83		
Wt. Water	3.71	3.93	4.26		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	10.34	10.09	10.29		
% Water	35.9	38.9	41.4		



LL 39

PL 19

PI 20

Symbol from plasticity chart

_____

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: SA-8
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 83.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay.
5			Brown Clay.
			Brown Clay.
10			Brown Clay.
15			Bottom of Hole = 12'
			NO WATER
20			
25			
30			
35			
40			
45			
50			

LOG OF BORING

PROJECT: 9101550
CLIENT: Cleco

BORING NO.: CB-1
LOCATION: Rodemacher Power Sta.

Date: 10-26-83 Type: Auger Ground Elevation: 87.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Brown Clay
5			Brown Sandy Clay.
			Brown Silty Sand.
10			Brown Silty Sand.
15			Bottom of Hole = 12'
			NO WATER
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Reddish Brown Clay Lab No. 13-3713

LOCATION CB-1 Date 10-26-83

Boring No. _____ Sample Depth 0-3 Tested by R.L.

Contractor Cleco

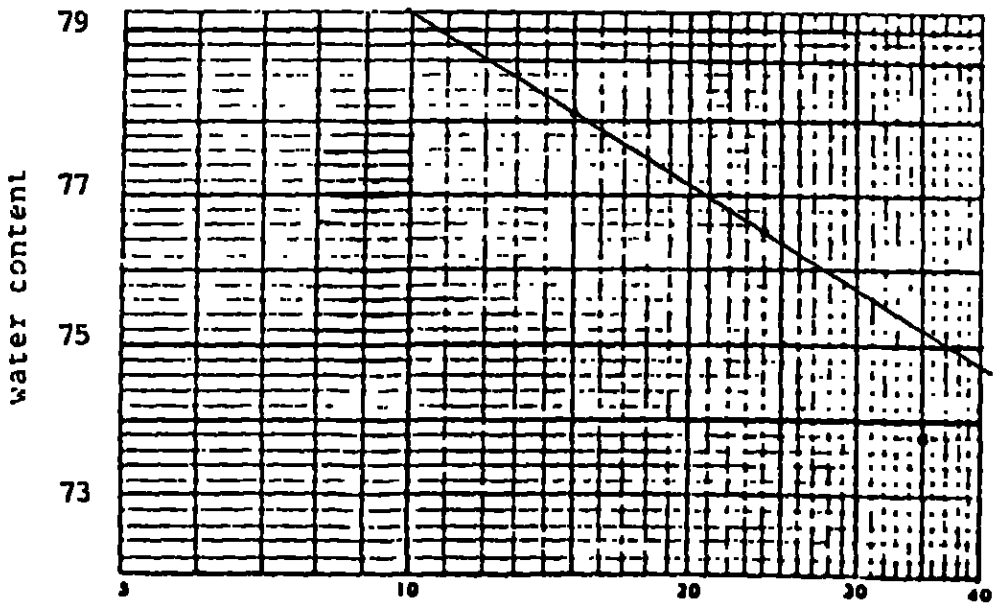
PLASTIC LIMIT

Can No.	A-4		
Wet Wt.	8.18		
Dry Wt.	6.9		
Wt. Water	1.28		
T.W.	1.54		
Wt. Dry Soil	5.36		
% Water	23.9		

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	24	15		
Can No.	AD	AM	A-26		
Wet Wt.	14.61	14.71	15.13		
Dry Wt.	9.06	9.0	9.17		
Wt. Water	5.51	5.71	5.96		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	7.52	7.46	7.63		
% Water	73.8	76.5	78.1		



LL 76

PL 24

PI 52

Symbol from plasticity chart

SOUTHWESTERN LABORATORIES

SOIL MECHANICS LABORATORY

ATTERBERG LIMITS

SOIL SAMPLE Reddish Brown Clayey Silt

Lab No. 13-3713

LOCATION CB-1

Boring No. _____ Sample Depth 3-6

Contractor Cleco

Date 10-26-83

Tested by R.L.

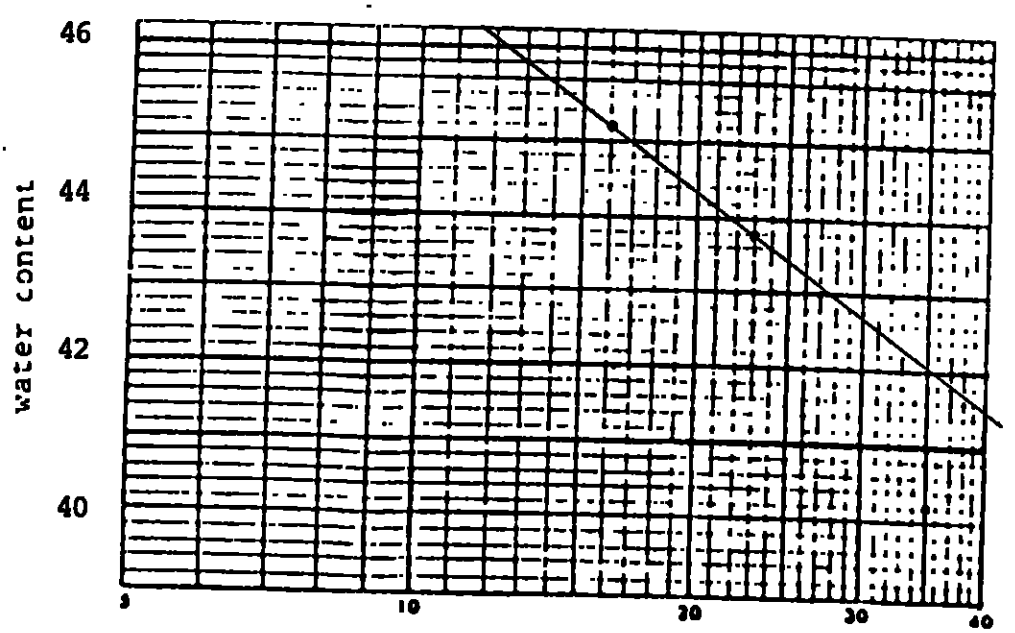
PLASTIC LIMIT

Can No.	AD			
Wet Wt.	9.64			
Dry Wt.	8.42			
Wt. Water	1.22			
T.W.	1.54			
Wt. Dry Soil	6.88			
% Water	17.7			

NATURAL WATER CONTENT

LIQUID LIMIT

No. of Blows	35	23	16		
Can No.	A-15	AN	AE		
Wet Wt.	14.83	14.81	15.41		
Dry Wt.	11.02	10.77	11.09		
Wt. Water	3.81	4.04	4.32		
T.W.	1.54	1.54	1.54		
Wt. Dry Soil	9.48	9.23	9.55		
% Water	40.2	43.8	45.2		



LL 43

PL 18

PI 25

Symbol from plasticity chart

ATTACHMENT 3

1981 PERMIT APPLICATION FLY ASH POND SECTION

6.4.3.B SITE MASTER PLAN - FLY ASH POND

6.4.3.B.1) Site Plan for Fly Ash Pond

a) Exhibit FA6.4.3.B.1-1 illustrates the Fly Ash Pond with original and final topographic contours. The Fly Ash Pond is located predominately in alluvial deposits of the Red River Valley. The pond was constructed by building a 20 foot wide dike around the area to be used. At elevation 103, the surface area of the pond will be 109 acres. The slope of the dikes are 3 horizontal to 1 vertical. The interior side of the dikes have a minimum 3 foot thick layer of compacted clay. There is an effective horizontal clay layer of about 10 feet.

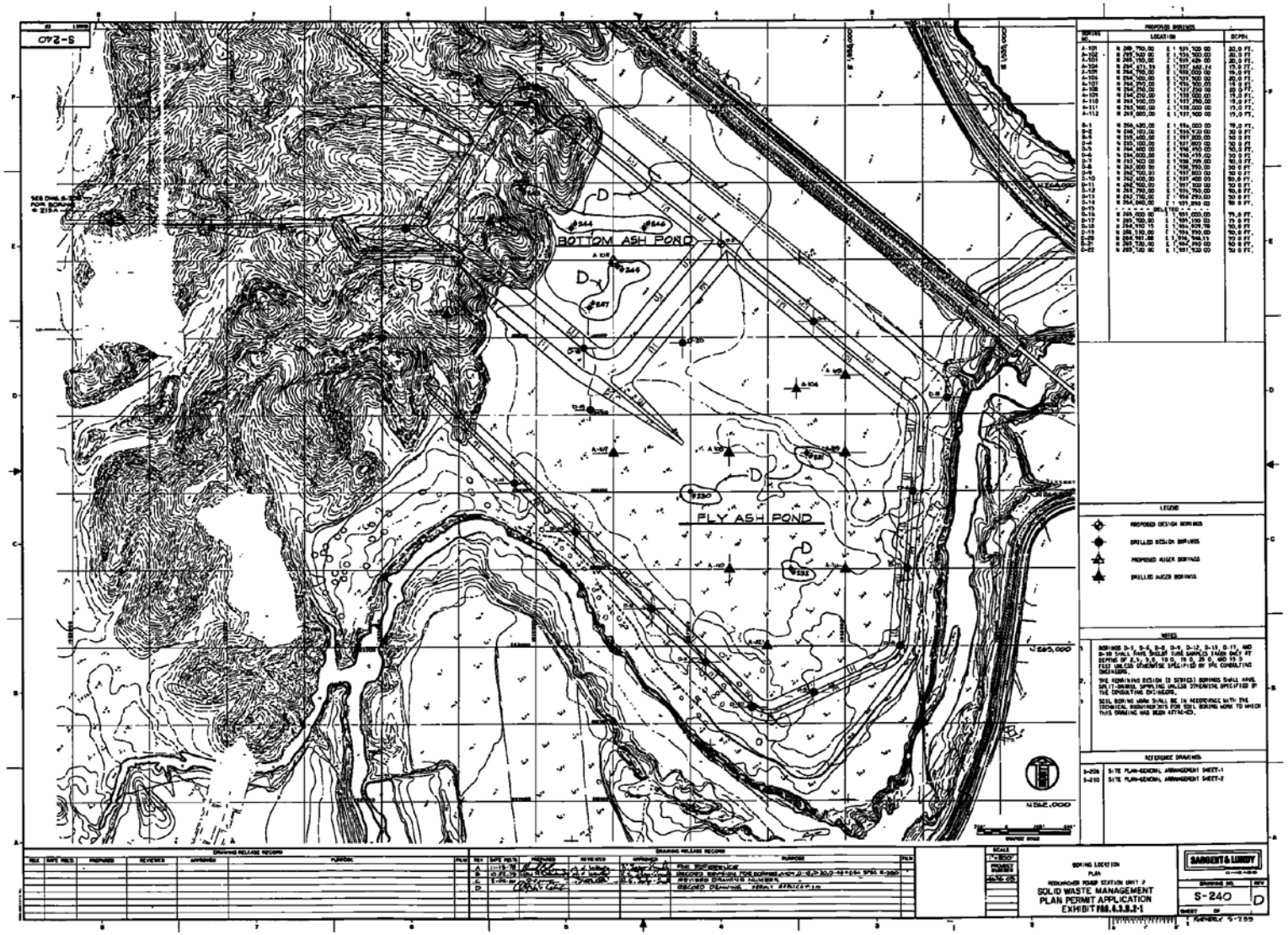
b) Peripheral fencing is not planned for the Fly Ash Pond since the disposal facility is within the station proper and access is controlled.

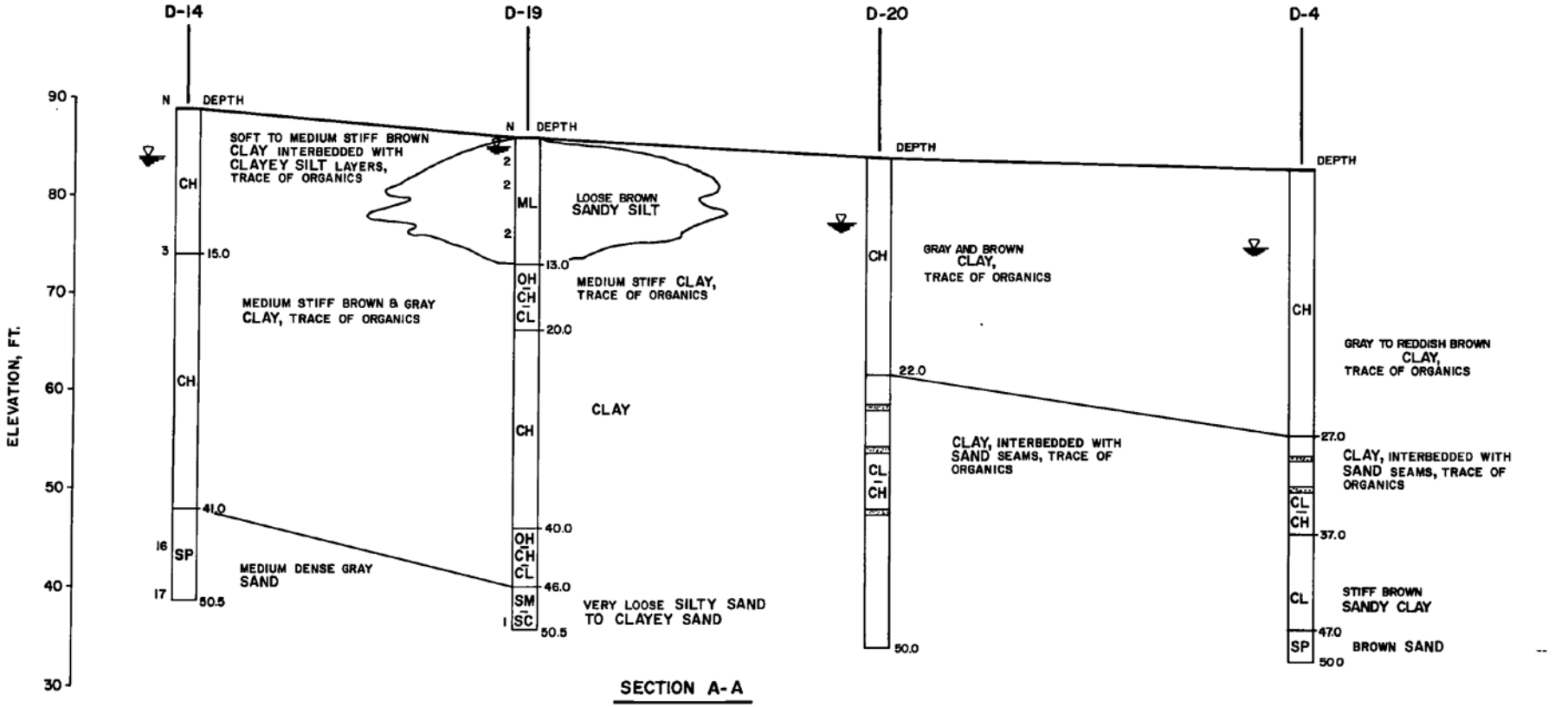
c) It is not planned to monitor the daily quantity of dry ash put into the ash pond beyond normal plant engineering practice of every few years recording an elevation of the top of the sludge and computing the remaining volume versus projected disposal volumes. The volume of fly ash will be computed by using the amount of coal burned. The size of the pond was designed to accommodate the fly ash expected to be generated over the life time of Unit 2.

d) The waste in the Fly Ash Pond is non-combustible, thus no special fire protection facilities are planned.

e) The storage volume of the Fly Ash Pond is 1,560 acre-feet at elevation 103. The fly ash will be transported from the storage bin to the disposal site by truck. At the pond, the fly ash will be spread and moistened with water to prevent dust and cause a pozzolanic reaction.

f) No leachate collection or treatment facilities are planned for the relatively dry waste spread in the Fly Ash Pond. The design of the facility incorporates an impermeable silty clay


S-240
BOTTOM ASH POND
FLY ASH POND
PROPOSED BORINGS
LOCATION
BORING NO.
DEPTH
DELETED
LEGEND
PROPOSED DESIGN BORINGS
DRILLED DESIGN BORINGS
PROPOSED AUGER BORINGS
DRILLED AUGER BORINGS
NOTES
1.
2.
3.
REFERENCE DRAWINGS
S-206 SITE PLAN-GENERAL ARRANGEMENT SHEET-1
S-250 SITE PLAN-GENERAL ARRANGEMENT SHEET-2
DRAWING RELEASE RECORD
REV
DATE REL'D
PREPARED
REVIEWED
APPROVED
PURPOSE
FILE
SCALE
1"=100'
PROJECT NUMBER
DATE
BORING LOCATION PLAN
ROCKINGHAM POWER STATION UNIT 2
SOLID WASTE MANAGEMENT PLAN PERMIT APPLICATION
EXHIBIT FIG. 2.3.2.2-1
SARGENT & LUNDY
DRAWING NO.
S-240
REV
D
SHEET
OF
FORMERLY S-255



SECTION A-A

0 200'
HORIZONTAL SCALE IN FEET

LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

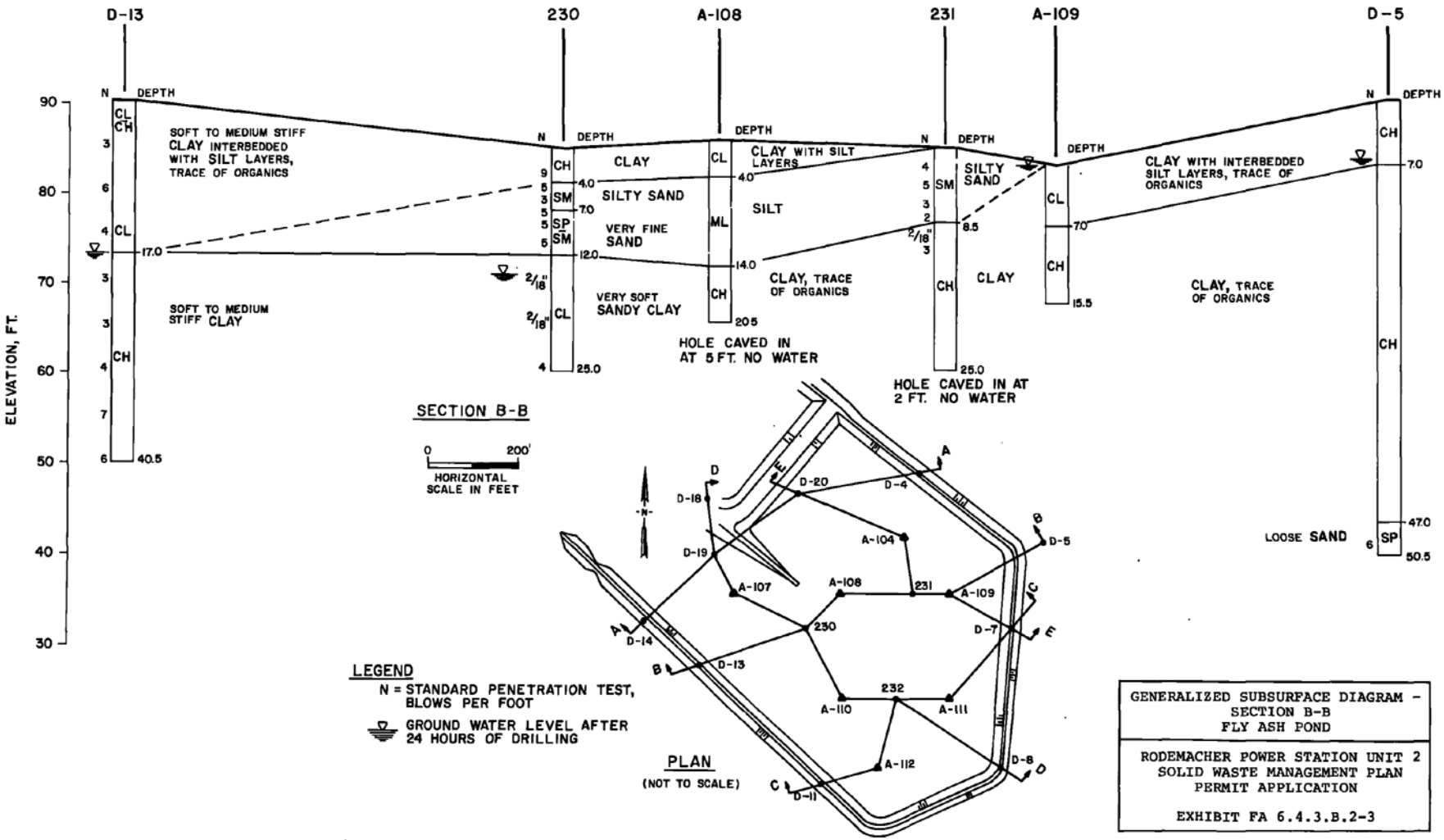
GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

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

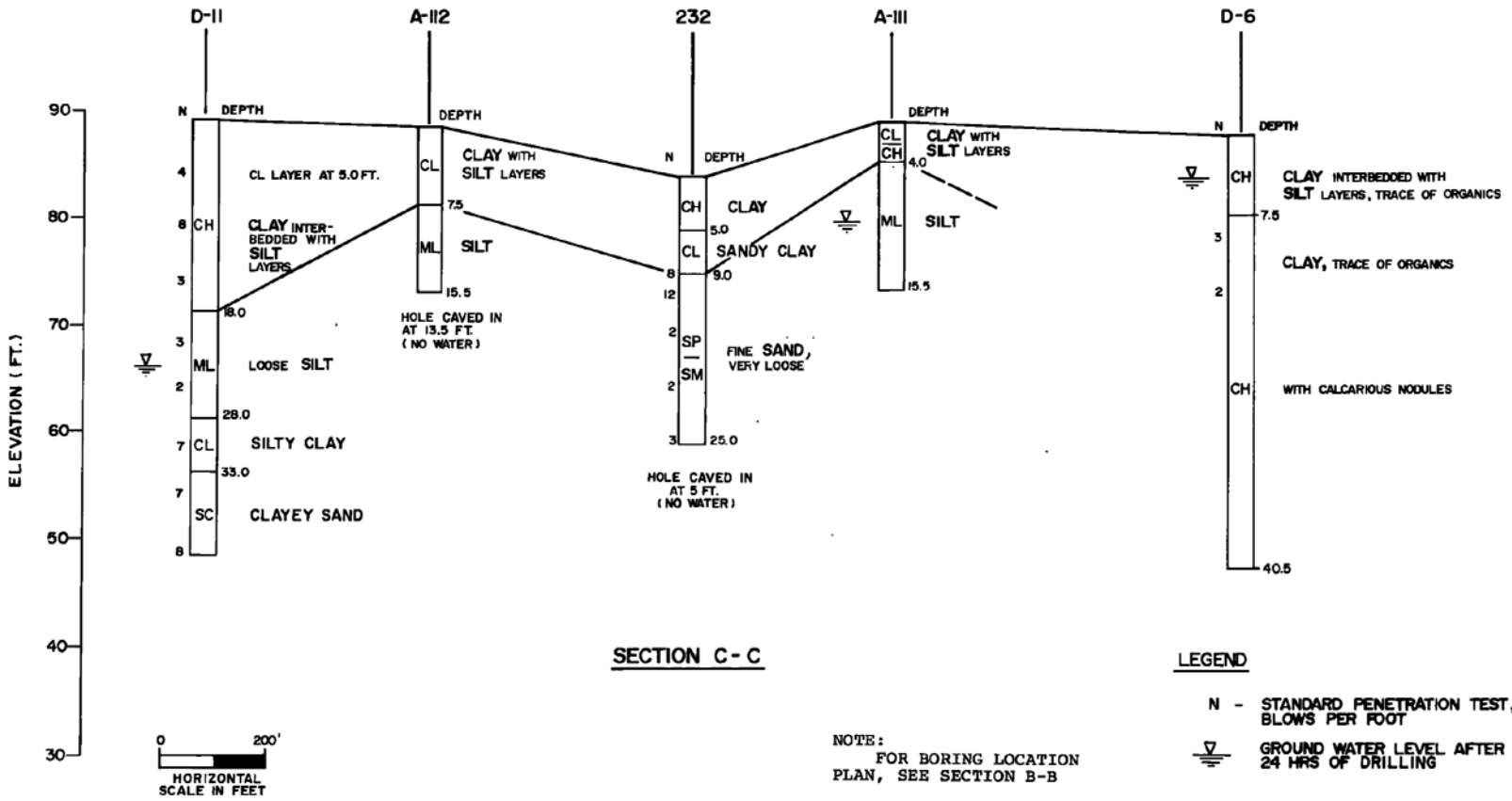
EXHIBIT FA 6.4.3.B.2-2



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

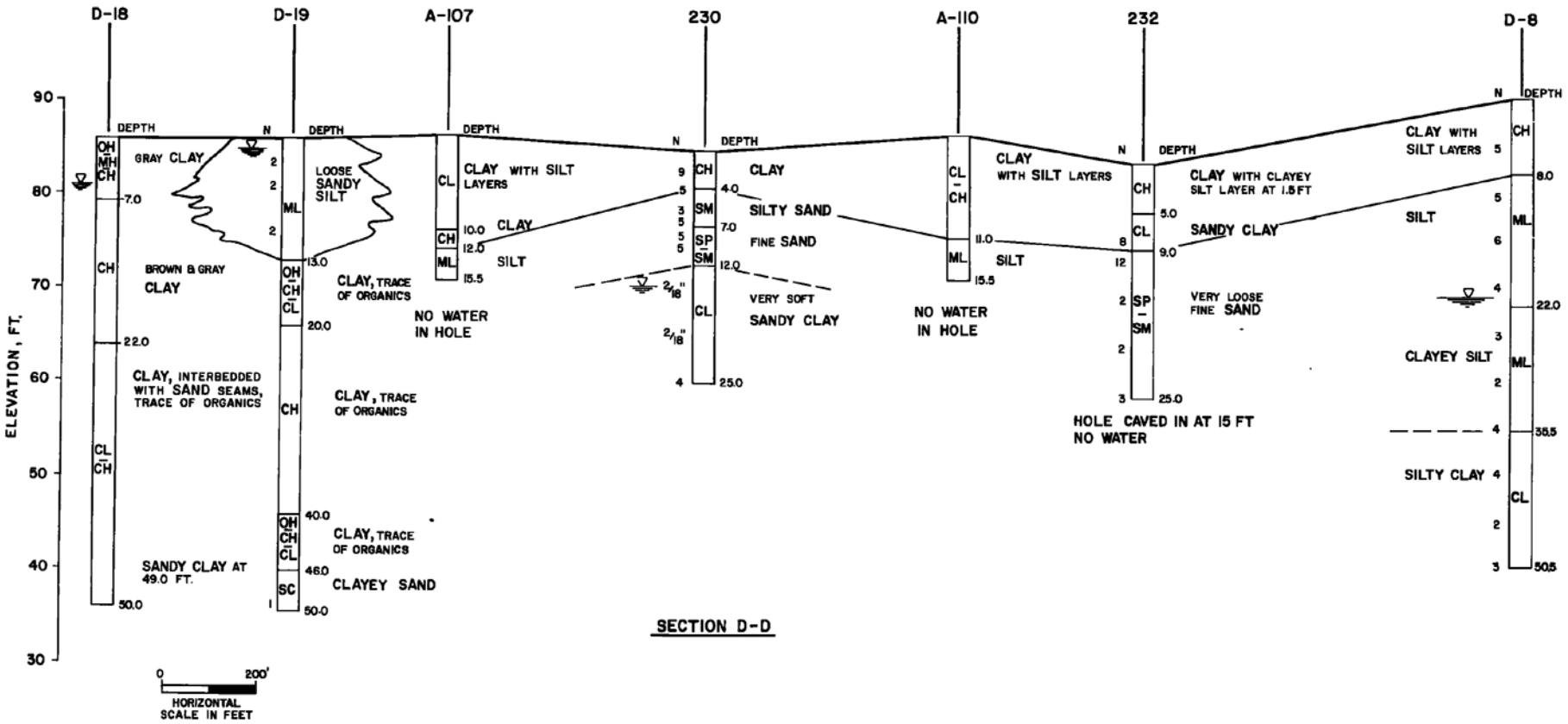
N - STANDARD PENETRATION TEST, BLOWS PER FOOT

GROUND WATER LEVEL AFTER 24 HRS OF DRILLING

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



SECTION D-D

LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

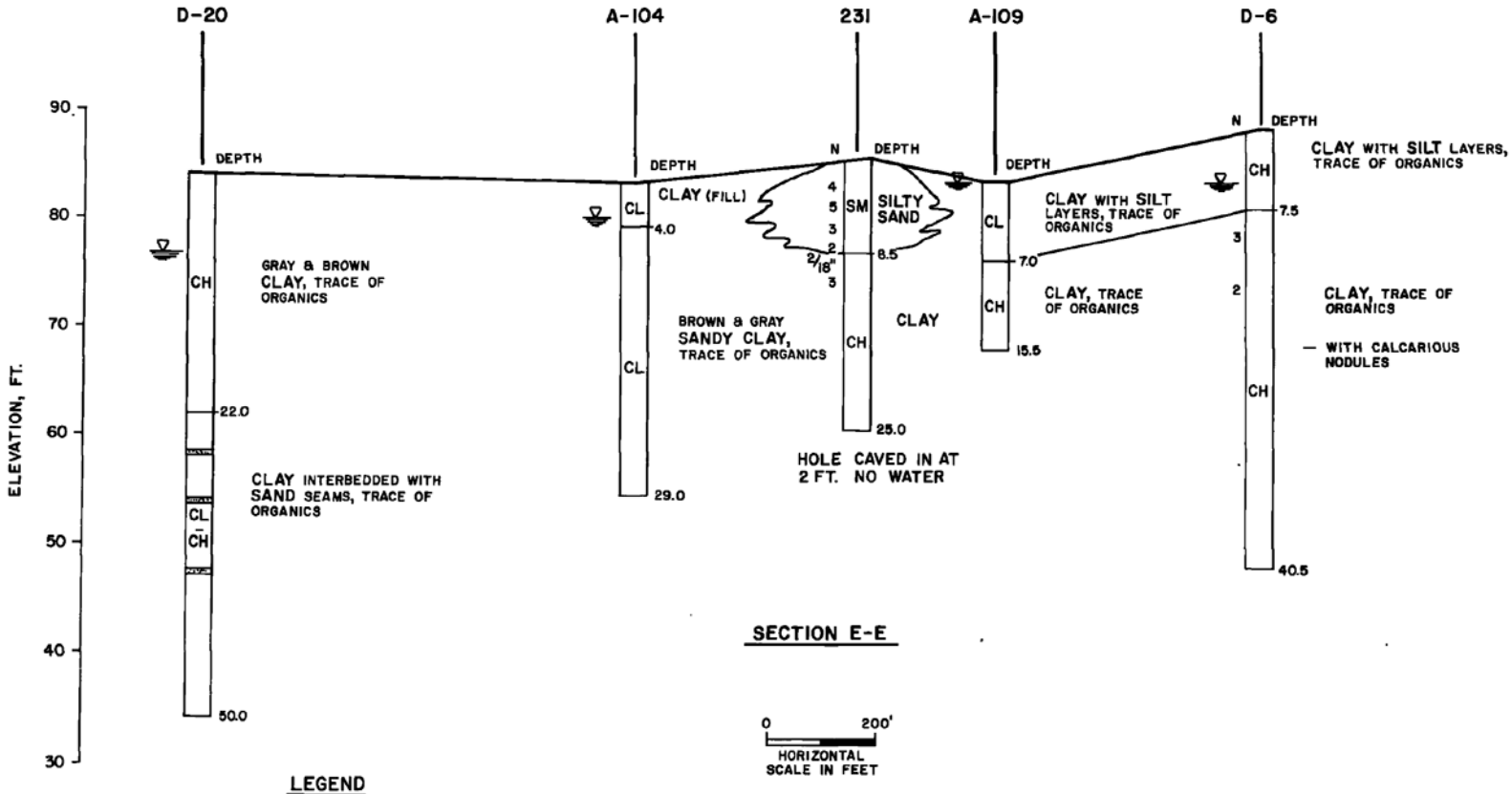
GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

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



SECTION E-E

LEGEND

N = STANDARD PENETRATION TEST, BLOWS PER FOOT

GROUND WATER LEVEL AFTER 24 HOURS OF DRILLING

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

6.4.3.B.4) Geological Characteristics

a) Exhibits FA 6.4.3.B.2-2 through 6 present representative soil conditions for the Fly Ash Pond. These borings were done before excavation of clay materials used to form a three foot thick compacted liner for the dikes. After excavation, the Fly Ash Pond will be underlain by a 3 foot to 13 foot top layer of reddish-brown clay to gray clay which grades in some areas to a silt/sandy silt. Beneath most of the Fly Ash Pond and underlying the top clay stratum is approximately 25 to 40 feet of clay below which are sands and clayey sands 10 feet or more in thickness. Laboratory permeability of the clay tested at 1.1×10^{-8} cm/sec. The Atterburg Limit values for Plasticity Index averaged 29 with an average liquid limit of 49 which classifies the clay as a CH according to the Unified Soil Classification System.

Compaction and Atterburg Limits tests were/and are being performed on the clay liner of the Fly Ash Pond dike. The minimum specified Plasticity Index is 15 with 60 percent passing the #200 seive and compaction is 95 percent of modified proctor test. The clay liner is being placed in 8 to 10 inch layers and compacted with "sheep's foot" equipment. Given these criteria and knowing the in situ characteristics of the clay which is being excavated (Average Plasticity Index 29), an effective protective layer should be present for the ground water.

Table FA 6.4.3.B.4-1 is a summary of representative laboratory tests on soils from the Fly Ash Pond area.

After clay liner material is borrowed from the Fly Ash Pond area, hand auger borings will be performed to confirm that a 3 foot thickness of clay remains over the bottom of the Fly Ash Pond.

TABLE FA 6.4.3.B.4-1

SUMMARY OF LABORATORY TESTS
FLY ASH POND

Feature	Boring No.[1] 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[4] Water Content (%)	Dry Density lbs/ft3	Laboratory[5] (Vertical) Permeability cm/sec
Fly Ash Pond (Dry) Storage Area	230, 2	3.0	100	100	100	100	58	20	38	CH	25.6	-	
	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.	SM	25.1	-	
	9	20.0	-	-	-	99	61	20	41	CH	38.9	-	
	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^{-8}
	5	7.5	-	-	-	89	29	18	11	CL	24.1	-	

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 of Soils performed in accordance with ASTM D423 and ASTM D424.
4 Laboratory Water Content Tests of Soils performed in accordance with ASTM D2216.
5 Laboratory Permeability Test performed on undisturbed Shelby to be sample.
6 Sample tested using Falling Head Test procedure in accordance with EM 1110-2-1906.
N.P. = Non Plastic

6.4.3.B.5) Environmental Characteristics for Fly Ash Pond:

a) There are no known historical or archaeological sites within 1000 feet of the Fly Ash Pond. No habitats for endangered species or other sensitive ecological species are within 1000 feet of the Fly Ash Pond.

The basis for these statements is the 1972-1973 ecological studies of the environment at the Rodemacher Station. The survey addressed in detail the terrestrial wildlife, the aquatic life, and vegetation in the area. Since that time the station and lake have been constructed and the immediate area of the station, including the Fly Ash Pond, is one of an industrial setting.

b) The operation of the Fly Ash Pond will have no adverse impact upon the use of the lake nor impair the quality of the lake environment.

6.4.3.C FACILITY PLANS AND SPECIFICATIONS - FLY ASH POND

1) Design, Plans, and Specifications: The plans submitted herein for the Fly Ash Pond were prepared and sealed by Professional Engineers with the required expertise in processing or disposing of solid waste as defined by the Solid Waste Management Plan.

2) Certification: Exhibit FA6.4.3.C.2-1 is a certification that the facility meets the requirements outlined in the state regulations.

3) Special Requirements:

a) Incineration. Incineration is not planned as a disposal option in the operation of the Fly Ash Pond.

b) Sanitary Landfills.

b.i) Typical cross sections of the Fly Ash Pond are similar to those of the adjacent Bottom Ash Pond and are shown in Exhibit FA6.4.3.B.1-2. The dry fly ash trucked to the pond will be spread and sprayed for dust control as well as for compaction by dozers spreading the material. Rain water

CERTIFICATE OF SARGENT & LUNDY ENGINEERS

I, Richard I. Gavin, make this certification as a registered Professional Engineer on behalf of Sargent & Lundy Engineers for the benefit of all persons interested in the application of Central Louisiana Electric Company, Inc. for a Solid Waste Disposal Permit from the Louisiana Department of Natural Resources, Office of Environmental Affairs.

I do hereby certify as follows:

1. I am a registered Professional Engineer in the State of Louisiana.

2. I have supervised preparation of the design, plans, and specifications for the Unit 2 Boiler Cleaning Waste Pond, Bottom Ash Pond, Fly Ash Pond, Clarifier Sludge Pond, and equipment associated with such waste ponds.

3. To the best of my knowledge, the design, plans, and specifications for the above mentioned waste disposal facilities at Rodemacher Power Station, Unit 2, meet applicable requirements of the Louisiana Solid Waste Rules and Regulations.

4. To the extent that this certification is based upon information and data prepared and analyzed by Sargent & Lundy personnel other than myself, I have reviewed this certification with such personnel to confirm its completeness and accuracy.

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of October, 1981.

Richard I. Gavin, Partner
Sargent & Lundy Engineers

STATE OF LOUISIANA
R. I. GAVIN
REG. NO. 11283
REGISTERED PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING

EXHIBIT FA 6.4.3.C.2-1

which will pond on the lowest sections of the Fly Ash Pond will be used for spraying the ash. The bottom of the Fly Ash Pond and completed dikes will have a minimum 3 foot thickness of relatively impermeable clay. This should protect the underlying ground water. Furthermore, the waste characteristics of the ash are such that no harmful effects should occur to the quality of ground water.

b.ii) Very plastic clay soils underlay the Fly Ash Pond and excavation of these soils is underway to form a 3 foot thick layer for the diked Fly Ash Pond. The soil liner is a CH material. Cross sections showing soil profiles are illustrated in Exhibits FA 6.4.3.B.2-2 through 6.

b.iii) Section 6.4.3.D.2 describes the characteristics of dry fly ash to be disposed of. Operation of the Fly Ash Pond should pose no harmful effects to the ground water.

b.iv) No cover material is planned during operation of the Fly Ash Pond. The dry ash will be spread and sprayed with water.

b.v) No special operations equipment will be needed for the disposal operations at the Fly Ash Pond.

b.vi) No leachate collection and/or treatment system is planned for the Fly Ash Pond since it is designed to contain liquids.

b.vii) As was discussed in Section 6.4.3.C.2.bvii for the Bottom Ash Pond, the ground water monitoring strategy for the Fly Ash and Bottom Ash Ponds is tied to down gradient monitoring wells. The proximity of these two ponds as shown on Exhibit FA 6.4.3.B.2-1 is such that the two monitoring wells shown on Exhibit 6.4.3.A.2-2 should serve as indicators if contamination should occur. This decision also considers the relatively clean characteristics of the bottom ash and fly ash waste and their relatively harmless influence on the environment. The two wells shown for the

ATTACHMENT 4

FLY ASH POND PERMEABILITY TESTS

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-1
Sample Length (inches):	39.0''
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	6/7
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content .Trimming moisture content =62.0 %
Assumed Specific Gravity:	2.70
Atterbergs:	LL: 91 PL: 40 PI: 51

Parameter	Initial	Final
Height, in	2.38	2.33
Diameter, in	2.90	2.85
Area, in^2	6.61	6.38
Volume, in^3	15.7	14.9
Mass, g	410	401
Bulk Density, pcf	99	103
Moisture Content, %	56.6	53.4
Dry Density, pcf	63.2	66.9
Degree of Saturation, %	92.0	95.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 89.98 **Cell Pressure Increment, psi : 4.98** **Increased Cell Pressure,psi : 94.96**

Sample Pressure, psi: 80.01 **Corresponding Sample Pressure, psi: 84.66** **B Coefficient: 0.93**

Sample Pressure Increment, psi: 4.65 **(β value did not increase with increase in pressure. Final degree of saturation > 95 %)**

FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/8	1	90	80	13.5	13.3	0.2	196	28.7	2.7E-08	20	1.000	2.7E-08
8/8	2	90	80	13.5	13.3	0.2	217	28.7	2.5E-08	20	1.000	2.5E-08
8/8	3	90	80	13.5	13.3	0.2	233	28.7	2.3E-08	20	1.000	2.3-08
8/8	4	90	80	13.5	13.3	0.2	255	28.7	2.1E-08	20	1.000	2.1E-08

TEST RESULTS: PERMEABILITY AT 20 °C: 2.4 x10^{-8} cm/sec (@ 10 psi effective stress)

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-2
Sample Length (inches):	24.0''
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	19/2
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content. Trimming moisture content =73.3 %
Assumed Specific Gravity:	2.70
Atterbergs:	LL: 118 PL: 28 PI: 90

Parameter	Initial	Final
Height, in	2.33	2.26
Diameter, in	2.91	2.80
Area, in^2	6.65	6.16
Volume, in^3	15.5	13.9
Mass, g	381	359
Bulk Density, pcf	93	98
Moisture Content, %	74.4	64.2
Dry Density, pcf	53.6	59.7
Degree of Saturation, %	94.0	95.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 91.99 **Cell Pressure Increment, psi : 6.18** **Increased Cell Pressure,psi : 98.17**

Sample Pressure, psi: 82.01 **Corresponding Sample Pressure, psi: 87.75** **B Coefficient: 0.93**

Sample Pressure Increment, psi: 5.74 **(β value did not increase with increase in pressure. Final degree of saturation > 95 %)**

FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/8	1	92	82	13.5	13.3	0.2	100	29.6	5.4E-08	20.2	0.995	5.4E-08
8/8	2	92	82	13.5	13.3	0.2	108	29.6	5.0E-08	20.2	0.995	5.0E-08
8/8	3	92	82	13.5	13.3	0.2	115	29.6	4.7E-08	20.2	0.995	4.7E-08
8/8	4	92	82	13.5	13.3	0.2	121	29.6	4.4E-08	2.02	0.995	4.4E-08

TEST RESULTS: PERMEABILITY AT 20 °C: 4.9 x10^{-8} cm/sec (@ 10 psi effective stress)

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-3
Sample Length (inches):	34.0''
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	6/7
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content. Trimming moisture content =77.2%
Assumed Specific Gravity:	2.70
Atterbergs:	LL: 73 PL: 31 PI: 42

Parameter	Initial	Final
Height, in	2.63	2.51
Diameter, in	2.86	2.81
Area, in^2	6.42	6.20
Volume, in^3	16.9	15.6
Mass, g	415	394
Bulk Density, pcf	93	96
Moisture Content, %	75.6	66.7
Dry Density, pcf	53.2	57.8
Degree of Saturation, %	95.0	95.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 90.01 **Cell Pressure Increment, psi : 4.97** **Increased Cell Pressure,psi : 94.98**

Sample Pressure, psi: 80.01 **Corresponding Sample Pressure, psi: 84.71** **B Coefficient: 0.95**

Sample Pressure Increment, psi: 4.71

FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/10	1	90	80	15.0	14.8	0.2	94	29.6	5.7E-08	19.6	1.010	5.7E-08
8/10	2	90	80	15.0	14.8	0.2	102	29.6	5.2E-08	19.6	1.010	5.3E-08
8/10	3	90	80	15.0	14.8	0.2	107	29.6	5.0E-08	19.6	1.010	5.0E-08
8/10	4	90	80	15.0	14.8	0.2	111	29.6	4.8E-08	19.6	1.010	4.9E-08

TEST RESULTS: PERMEABILITY AT 20 °C: 5.2 x10^{-8} cm/sec (@ 10 psi effective stress)

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-4
Sample Length (inches):	36.0''
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	11/1
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content .Trimming moisture content =103.0 %
Assumed Specific Gravity:	2.65
Atterbergs:	LL:117 PL: 38 PI: 79

Parameter	Initial	Final
Height, in	2.69	2.55
Diameter, in	3.01	2.95
Area, in^2	7.12	6.83
Volume, in^3	19.1	17.4
Mass, g	471	454
Bulk Density, pcf	94	99
Moisture Content, %	72.0	66.0
Dry Density, pcf	54.4	59.7
Degree of Saturation, %	94.0	99.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 89.98 **Cell Pressure Increment, psi : 5.09** **Increased Cell Pressure,psi : 95.07**

Sample Pressure, psi: 80.02 **Corresponding Sample Pressure, psi: 84.86** **B Coefficient: 0.95**

Sample Pressure Increment, psi: 4.84

FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/11	1	90.0	80.0	12.0	11.8	0.2	69	23.3	8.9E-08	20.5	0.988	8.8E-08
8/11	2	90.0	80.0	12.0	11.8	0.2	68	23.3	9.1E-08	20.5	0.988	8.9E-08
8/11	3	90.0	80.0	12.0	11.8	0.2	68	23.3	9.1E-08	20.5	0.988	8.9E-08
8/11	4	90.0	80.0	12.0	11.8	0.2	70	23.3	8.8E-08	20.5	0.988	8.7E-08

TEST RESULTS: PERMEABILITY AT 20 °C: 8.9 x10^{-8} cm/sec (@ 10 psi effective stress)

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-5
Sample Length (inches):	33.0''
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	1/6
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content .Trimming moisture content =42.9 %
Assumed Specific Gravity:	2.65
Atterbergs:	LL:91 PL: 33 PI: 58

Parameter	Initial	Final
Height, in	3.01	2.99
Diameter, in	2.93	2.88
Area, in^2	6.74	6.51
Volume, in^3	20.3	19.5
Mass, g	563	550
Bulk Density, pcf	105	107
Moisture Content, %	46.1	42.8
Dry Density, pcf	72.2	75.2
Degree of Saturation, %	94.0	95.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 91.95 **Cell Pressure Increment, psi : 5.12** **Increased Cell Pressure,psi : 97.07**

Sample Pressure, psi: 82.02 **Corresponding Sample Pressure, psi: 86.77** **B Coefficient: 0.93**

Sample Pressure Increment, psi: 4.75 **(β value did not increase with increase in pressure. Final degree of saturation > 95 %)**

FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/22	1	92.0	82.0	17.5	17.3	0.2	89	29.0	5.8E-08	20.1	0.998	5.8E-08
8/22	2	92.0	82.0	17.5	17.3	0.2	97	29.0	5.3E-08	20.1	0.998	5.3E-08
8/22	3	92.0	82.0	17.5	17.3	0.2	104	29.0	5.0E-08	20.1	0.998	5.0E-08
8/22	4	92.0	82.0	17.5	17.3	0.2	111	29.0	4.7E-08	20.1	0.998	4.7E-08

TEST RESULTS: PERMEABILITY AT 20 °C: 5.2 x10^{-8} cm/sec (@ 10 psi effective stress)

APS Engineering and Testing

HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIAL USING A FLEXIBLE WALL PERMEAMETER BY ASTM D 5084

Client:	Providence
Project Name:	Fly Ash Pond at Brame Energy Center
Visual Description:	Moist Dark Grayish Brown Clay
Boring No.:	-----
Sample:	FA-6
Sample Length (inches):	32.0'
Sample Type:	Intact
Permeant Fluid:	De-aired Distilled Water
Orientation:	Vertical
Cell:	3
Sample Preparation:	Cut, trimmed and placed into permeameter at as received density and moisture content .Trimming moisture content =36.7 %
Assumed Specific Gravity:	2.65
Atterbergs:	LL:87 PL: 30 PI: 57

Parameter	Initial	Final
Height, in	2.76	2.72
Diameter, in	3.10	2.87
Area, in^2	7.55	6.47
Volume, in^3	20.8	17.6
Mass, g	563	511
Bulk Density, pcf	103	110
Moisture Content, %	52.7	38.7
Dry Density, pcf	67.3	79.6
Degree of Saturation, %	96.0	95.0

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 95.02 **Cell Pressure Increment, psi : 5.01** **Increased Cell Pressure,psi : 100.03**

Sample Pressure, psi: 85.01 **Corresponding Sample Pressure, psi: 89.76** **B Coefficient: 0.95**

Sample Pressure Increment, psi: 4.75

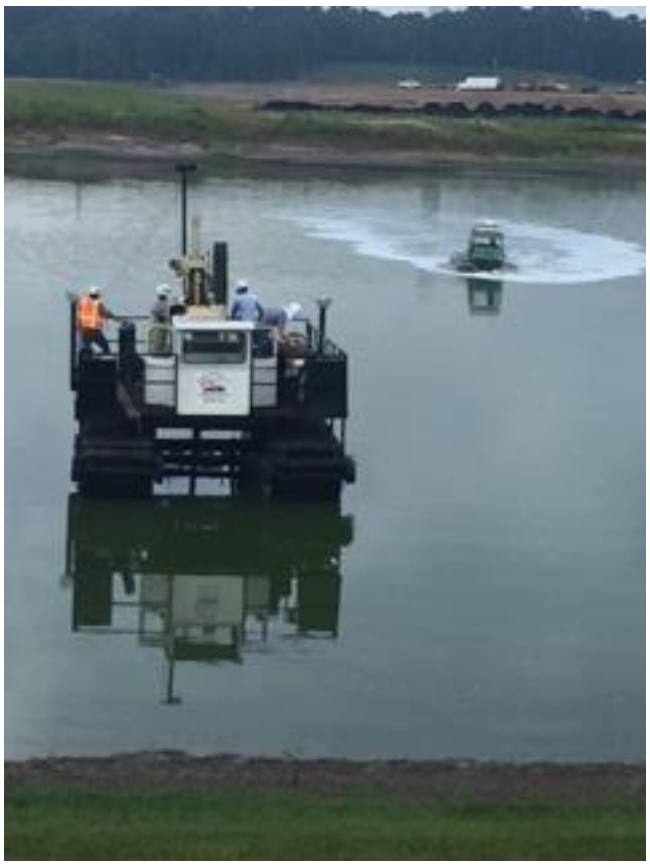
FLOW DATA

Date	Trial	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp., °C	R_t	Permeability K @ 20 °C cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
8/22	1	95.0	85.0	16.0	15.8	0.2	136	29.2	3.8E-08	20.1	0.998	3.8E-08
8/22	2	95.0	85.0	16.0	15.8	0.2	145	29.2	3.6E-08	20.1	0.998	3.6E-08
8/22	3	95.0	85.0	16.0	15.8	0.2	152	29.2	3.4E-08	20.1	0.998	3.4E-08
8/22	4	95.0	85.0	16.0	15.8	0.2	157	29.2	3.3E-08	20.1	0.998	3.3E-08

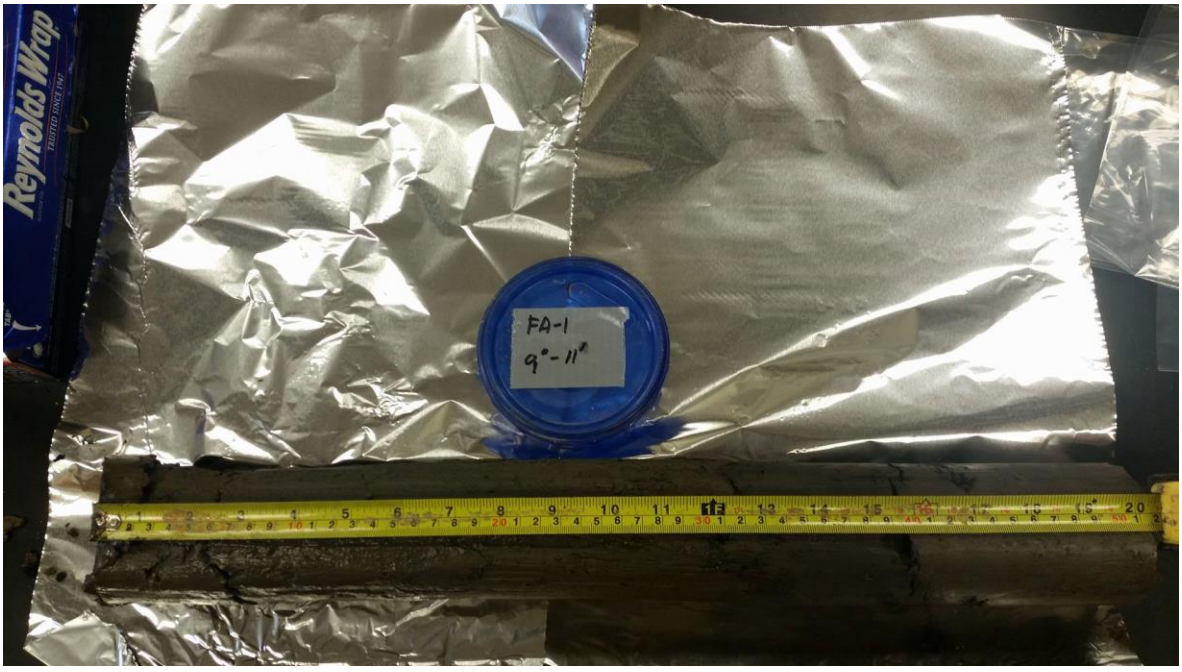
TEST RESULTS: PERMEABILITY AT 20 °C: 3.5 x10^{-8} cm/sec (@ 10 psi effective stress)

ATTACHMENT 5

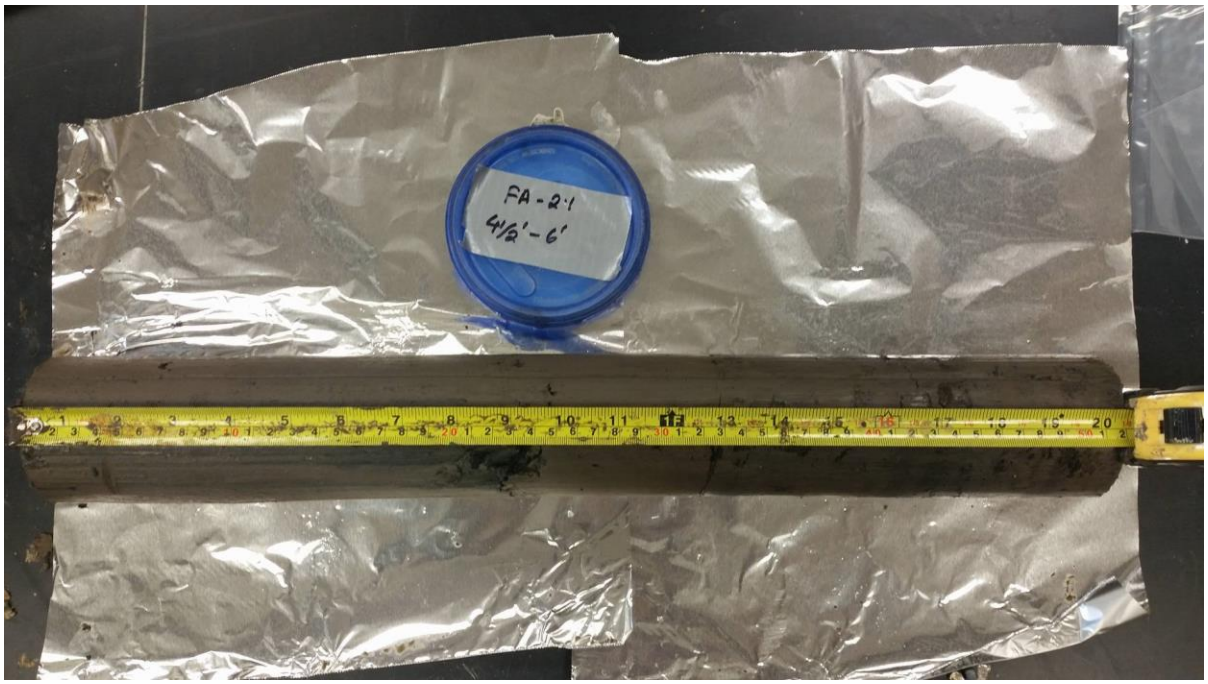
FLY ASH POND BORING PHOTOS



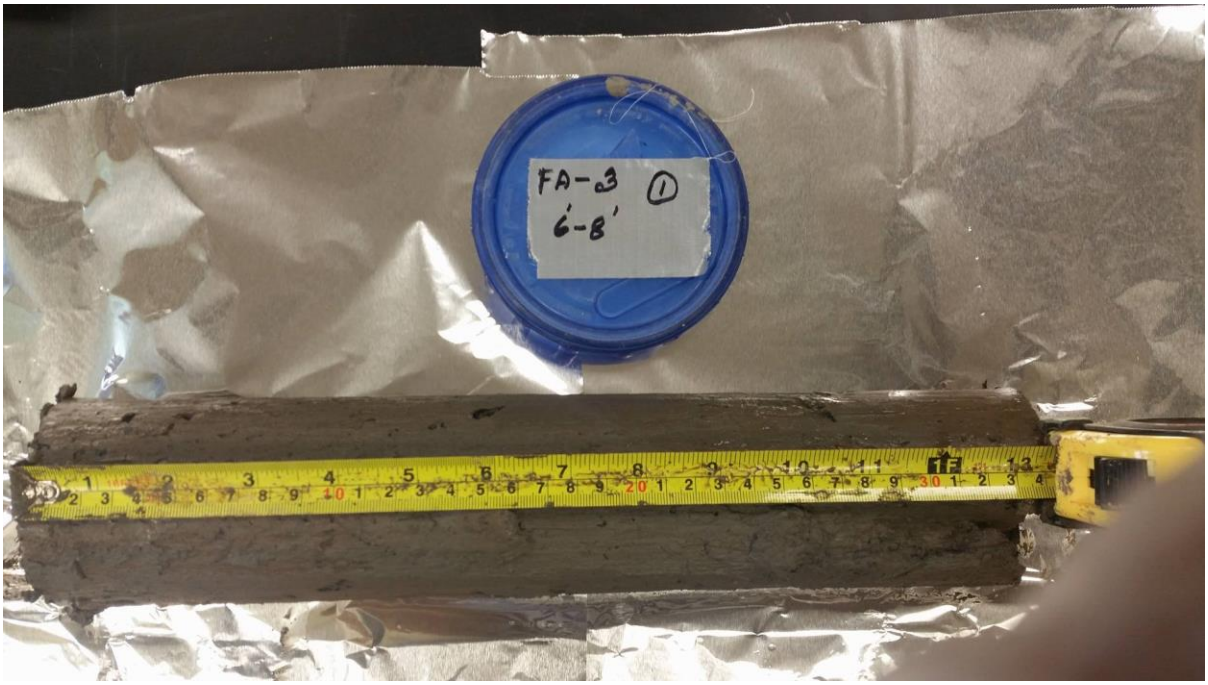
PHOTOGRAPH 1
Fly Ash Pond - Typical Geotechnical Drilling Rig Setup.



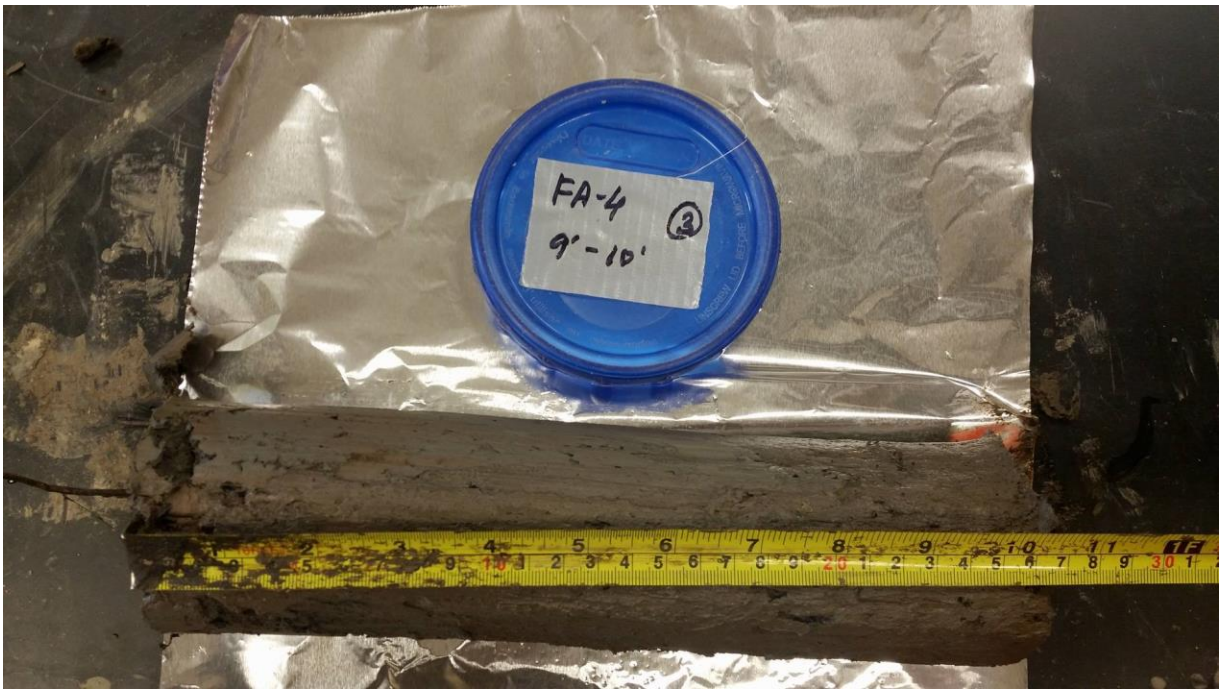
PHOTOGRAPH 2
Fly Ash Pond Undisturbed Soil Sample FA-1.



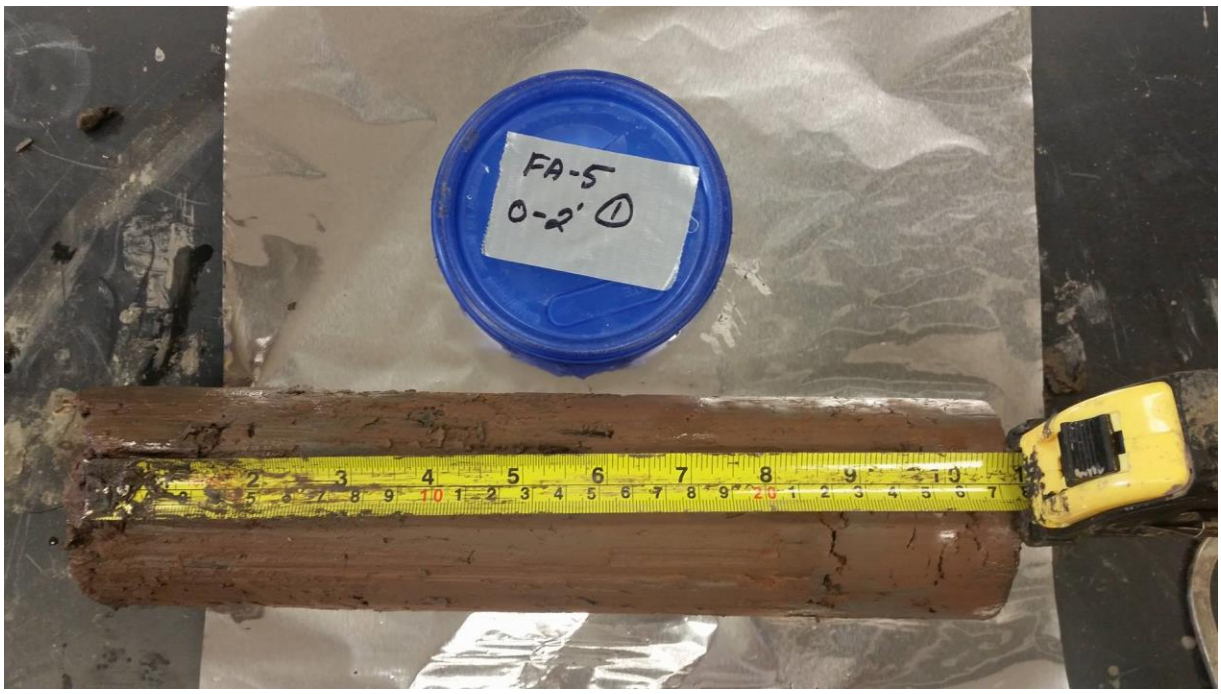
PHOTOGRAPH 3
Fly Ash Pond Undisturbed Soil Sample FA-2.



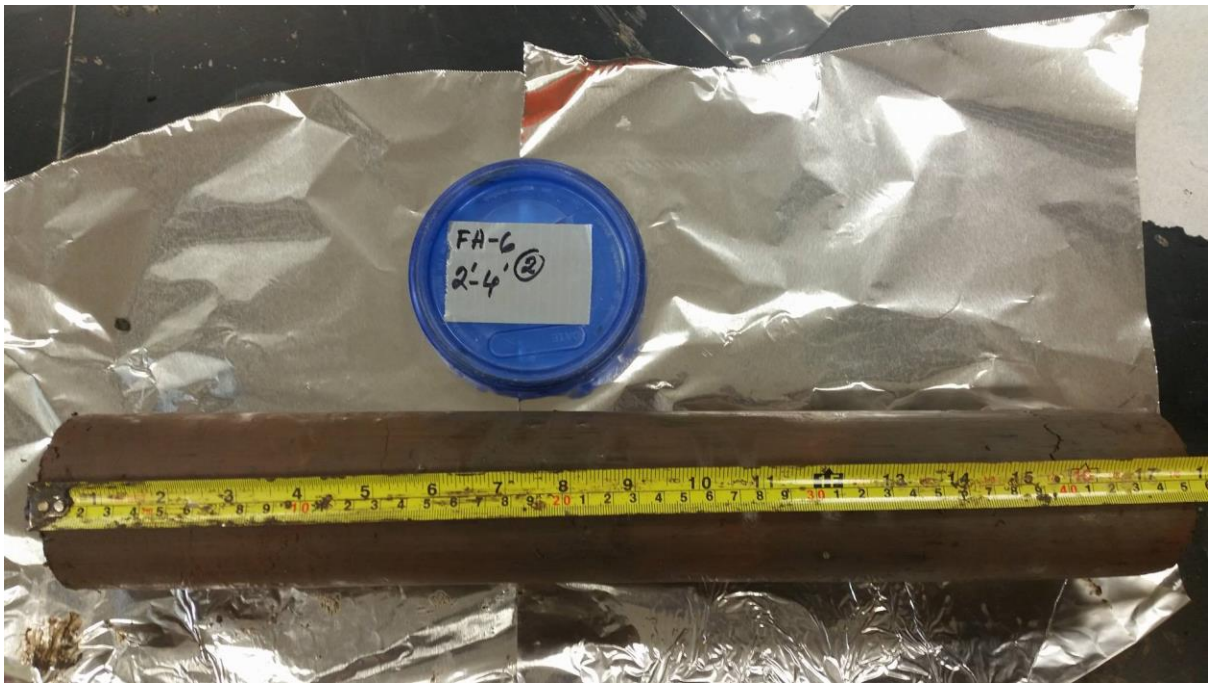
PHOTOGRAPH 4
Fly Ash Pond Undisturbed Soil Sample FA-3.



PHOTOGRAPH 5
Fly Ash Pond Undisturbed Soil Sample FA-4.



PHOTOGRAPH 6
Fly Ash Pond Undisturbed Soil Sample FA-5.



PHOTOGRAPH 7
Fly Ash Pond Undisturbed Soil Sample FA-6.

ATTACHMENT 6

FLY ASH POND P.E. CERTIFICATION

CLECO BRAME ENERGY CENTER
FLY ASH POND
CCR LINER VERIFICATION ASSESSMENT

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I have performed a liner verification assessment for Cleco's Brame Energy Center Fly Ash Pond in accordance with the 40 CFR 257.71 CCR requirements. This liner verification assessment has determined that the Fly Ash Pond has met the following requirement:

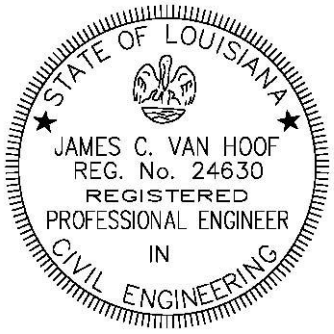
- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1 x 10^{-7} cm/sec

James C. Van Hoof
Name

24630 **LA**
Registration No. State

James C. Van Hoof, P.E.
Signature

10/12/2016
Date



(Seal)