

OCTOBER 2016

CLECO POWER LLC Dolet Hills Power Station



ASH BASIN NO. 1 CCR LINER VERIFICATION

Prepared By:

**Providence Engineering and
Environmental Group LLC**

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Project Number 002-192



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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 Ash Basin No. 1 CCR surface impoundment at the Dolet Hills Power Station near Mansfield, Louisiana meets the liner requirements of the newly promulgated CCR regulations.

A Site Location Map and a Site Plan showing the location of Ash Basin No. 1 within the facility is provided as **Figures 1** and **2**, respectively.

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 unlined 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 ASH BASIN NO. 1 FACTS

Excerpts from the Louisiana Department of Environmental Quality (LDEQ) solid waste permit application (**Attachment 1**) refers to fourteen soil borings, P-22, B-1, B-2, B-43 through B-50, E-6, E-7, and E-8 that were drilled in Ash Basin No. 1. The corresponding boring logs are included in **Attachment 1**, Appendix C-1. Bore holes were plugged by backfilling with cement bentonite grout which has a permeability of 1×10^{-10} cm/sec.

The application states that the entire Ash Basin No. 1 is located over impermeable cohesive soil deposits except a few isolated locations such as at boring locations B-44 and B-50. The log of Boring B-44 shows 2 feet of clay material at the surface and the log of Boring B-50 shows no clay at the surface. Boring B-44 is along the dike alignment. The logs of the nearest borings, E-8 and B-46 indicate a 12 foot thick clay (CL) deposit at the surface. The application states that "therefore, the surface soil condition at Boring B-44 was considered an isolated condition." In addition, it is stated that this area will be covered with cohesive material when the dike is constructed. Boring B-50 is along the dike alignment also. The application states that "even though there is no CL material at the surface in this area, the nearest Boring B-49 indicates 7 feet of CL at the surface. Therefore, the surface soil condition at Boring B-50 is an isolated condition. In addition, this area will be covered with cohesive material when the dike is constructed." Based on the geotechnical borings and the placement of the cohesive/clay soil along the western embankment, a minimum of two feet of clay liner is in-place for Ash Basin No. 1.

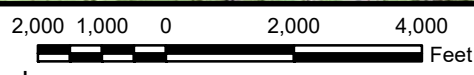
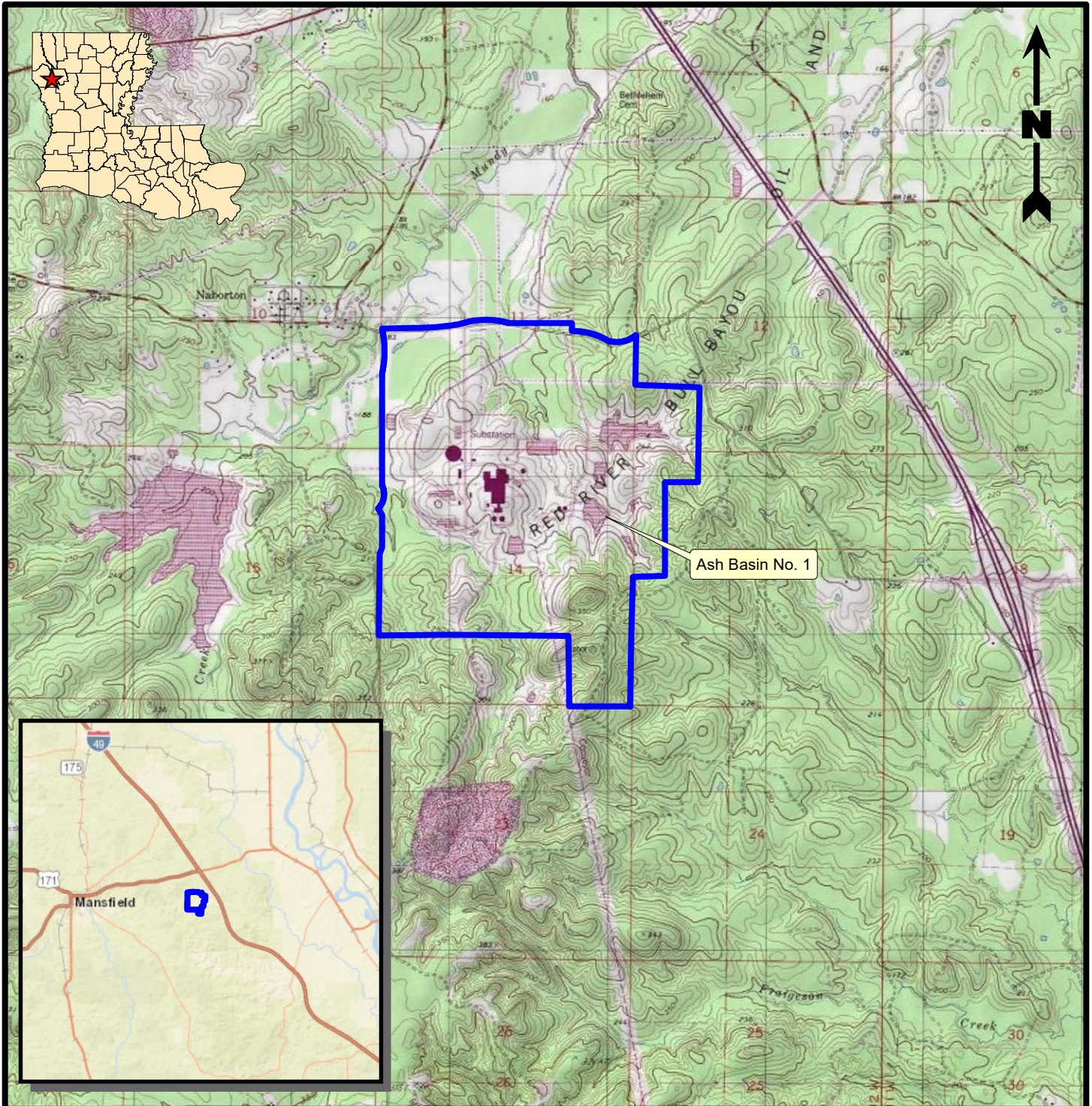
4.0 ASH BASIN NO. 1 LINER PERMEABILITIES

Laboratory permeability tests on ten cohesive soil samples from Ash Basin No. 1 were performed prior to construction. The results are summarized in **Attachment 1**, Appendix C-2. It appears that all of the bottom liner permeability analyses for Ash Basin No. 1 met the regulatory requirements at the time of construction and meet the current bottom liner permeability requirements contained in the CCR rule. The liquid limit and the plasticity indices of in situ cohesive soils in the Ash Basin No. 1 area vary from 29 to 74, and the results are included.


5.0 CONCLUSIONS

Based on the information above, it appears that Cleco intended to have a three-foot compacted clay liner in place for Ash Basin No. 1 that met the regulatory permeability requirements at the time of construction. Geotechnical borings were completed to determine the in situ soil conditions for Ash Basin No. 1. Based on the laboratory data for the in situ soils in the Ash Basin No. 1, a minimum of two feet of clay liner is in-place and laboratory permeability results meet the bottom liner permeability requirements as specified in the 40 CFR 257.71 CCR Rule. **Attachment 2** contains a P.E. Certification that attests to this assessment.

FIGURE 1
SITE LOCATION MAP



Legend

 Facility 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 - Ash Basin No. 1
Mansfield, DeSoto Parish, Louisiana

Cleco Power LLC
Dolet Hills Power Station



PROVIDENCE


Drawn By	LMM	09/13/16
Checked By	LMH	09/13/16
Approved By	CVH	09/13/16

Project Number	002-192	1 Figure
Drawing Number	002-192-A002	

FIGURE 2
SITE MAP

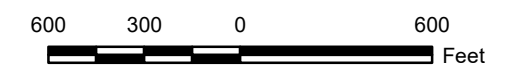


Legend

 Facility Boundary

Reference

Base map comprised of Google Earth aerial imagery from 11/06/12.



Site Map

Liner Verification - Ash Basin No. 1
Mansfield, DeSoto Parish, Louisiana

Cleco Power LLC
Dolet Hills Power Station



Drawn By	LMM	09/13/16
Checked By	LMH	09/13/16
Approved By	CVH	09/13/16
Project Number		2 Figure
002-192		
Drawing Number		
002-192-B003		

ATTACHMENT 1
EXCERPTS FROM BOTTOM ASH POND PERMIT 1994

521.D. FACILITY GEOLOGY

1. INFORMATION REQUIRED FOR TYPE I AND II FACILITIES

1.a. Isometric Profiles and Cross-Sections

The location and a general layout of the Ash Basins and Secondary Pond are shown in Exhibit 2. The subsurface soils in the area of the two Ash Basins and Secondary Pond, which vary in depth between 10' and 45', are underlain by the 800' thick Porters Creek formation clays.

Ash Basin No. 1 - A plan view and cross sections through the dikes of the basins and pond are shown in Exhibits 7 through 13. These exhibits include illustration of soil types and other general features in the area of Ash Basin No. 1.

Ash Basin No. 2 - A plan view and cross-sections through the dike and the basin are shown in Exhibits 7 through 13. These exhibits include illustration of soil types and other general features of Ash Basin No. 2.

Secondary Pond - A plan view and cross sections through the dike and the pond are shown in Exhibits 7 through 13. These exhibits include illustration of soil types and other general features of the Secondary Pond.

1.b. Soil Boring Logs

Ash Basin No. 1 - Fourteen soil borings, P-22, B-1, B-2, B-43 through B-50, E-6, E-7, and E-8, were drilled in the Ash Basin No. 1 area. The locations of these borings are shown in Exhibit 6, and the corresponding boring logs are included in Appendix C-1. Bore holes were plugged by backfilling with cement bentonite grout which has a permeability of 1×10^{-10} cm/sec.

As described subsection 1.a, the entire Ash Basin No. 1 is located over impermeable cohesive soil deposits except at a few isolated locations such as at boring locations B-44 and B-50. The log of Boring B-44 shows only 2' of clay material at the surface and the log of Boring B-50 shows no clay at the surface. Boring B-44 is along the dike alignment (see Exhibits 6 and 10). The logs of the nearest borings, E-8 and B-46, indicate a 12' thick clay (CL) deposit at the surface. Therefore, the surface soil condition at Boring B-44 is an isolated condition. In addition, this area will be covered with cohesive material when the dike is constructed. Boring B-50 is along the dike alignment (see Exhibits 6 and 11). Even though there is no CL material at the surface in this area, the nearest Boring B-49 indicates 7' of CL at the surface. Therefore, the surface soil condition at Boring B-50 is an isolated condition. In

Appendix C.1

Soil Boring Logs

BORING NO. P-22

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWS/C OR SAMPLER (RECOVERY, %)	SOCKET PENETROMETER (spf)		FIELD MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k \times 10^{-7}$ (cm/sec)	FINER THAN # 40 SIEVE (%)	FINER THAN # 200 SIEVE (%)	SYMBOLS	DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)
			q_u	f_s										
0													0	225.41
	ST-1	(100)	1.2 0.9	21.6 104		38	20			73	CL	Medium, Silty CLAY, Some Fine Sand and Iron Ore, Gray and Brown		
	ST-2	(100)	2.0	19.4 109		32	15	0.31 0.18		100		- Grades to Stiff and Orange, Gray and Brown		
5	ST-3	(100)	3.5 0.6	20.1 114		38	16			44	SC	Medium Dense, Clayey Fine SAND, Trace Silt, Trace Iron Ore, Tan and Gray	5	220.41
	ST-4	(50)	4.5	26.7 113		47	24				CL	Hard, Silty CLAY, Trace Iron Ore, Orange and Gray	7.0 8.0	218.41 217.41
10	8-22-25 SS-5	(100)	4.5								CL/ CM	Hard, Silty CLAY, Trace Fine Sand, Orange and Gray (Porters Creek Formation Clays)	10	
												- Grades to Dark Dark Gray		
18	PIT-6	(100)	6.5 5.5	23.2 104		47	23	0.65 0.17		100				15
20	9-24-30 SS-7	(100)	4.5										20	
25	PIT-8	(100)	4.5										25	
30	11-33-41 SS-9	(100)	4.5										30	
38	18-31-50 SS-10	(100)	4.5	24.9 102		31	27						38	
40	20-36-37 SS-11	(100)	4.5										40	
48	29-31-48 SS-12	(100)	4.5										48	
50	34-29-52 SS-13	(100)	6.5	25.8 102									50	215.41

End of Boring at 50.0'
Water Level at 20.0' 05-23-80

REVISION	DATE	DESCRIPTION	DOLET HILLS POWER PLANT LOG OF BORING P-22
	PREPARED BY		
0	09-14-84 S N VARADH	ISSUED FOR RECORD	SOUTHWESTERN ELECTRIC POWER COMPANY
			<div style="border: 2px solid black; padding: 5px; display: inline-block;"> SARGENT & LUNDY <small>ENGINEERS</small> </div>
			PROJECT NUMBER: 5803-02

BORING NO. B-1 (PERCOLATION)

SHEET 1 OF 1

DEPTH (ft.)	SAMPLE NUMBER AND TYPE	BLOWS/ft ON SAMPLER (RECOVERY, %)	POCKET PENETROMETER (psi)	% UG TEST (wet)	FIELD MOISTURE CONTENT (%)	SHRINKAGE (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY 1×10^{-7} (cm/sec)	PIERS THAT DO NOT PASS THROUGH #200 SIEVE (%)	PIERS THAT DO NOT PASS THROUGH #100 SIEVE (%)	PROJECT: DOLET HILLS POWER PLANT		
												SYMBOLS	DESCRIPTION	
												CLIENT: SOUTHWESTERN ELECTRIC POWER COMPANY		
												FEATURE: ASB BASIN NO. 1		
												SURFACE ELEVATION: 245.04' TOTAL DEPTH: 23.0'		
												LOCATION: N 497,700 E 1,671,550		
												DEPTH TO GROUNDWATER LEVEL: 15.0' DATE: 10-15-80		
												DRILLED BY: SOUTHWESTERN LABORATORIES		
												LOGGED BY: SOUTHWESTERN LABORATORIES		
												TESTED BY: SOUTHWESTERN LABORATORIES		
0													245.04	
5														
10														
12.5													232.56	
15	SS-1 36-49-49 (100)				21.3									
18	SS-2 30-41-51 (100)													
20														
21	SS-3 23-15-31 (100)													
22	SS-4 28-14-60 (100)				21.1									
23													222.04	
25														
30														
35														
40														
45														
50														

Soil Conditions Between 0.0' and 12.5' Are Similar to Those in Pilot Auger Boring B-1 Drilled for Percolation Tests

SM Very Dense, Silty Fine SA'D, Gray, Tan and Orange

Grades to Light Grav

End of Boring at 23.0'
Water Level at 15.0' on 12-17-80

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	08-14-84 S H WAGNER	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING B-1 (PERCOLATION)**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY
ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-2

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWS/C ON SAMPLER (RECOVERY, %)	S _u POCKET PENETROMETER (psf)	C _u ; UC TEST (pcf)	FIELD MOISTURE CONTENT (%)	DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY k x 10 ⁻⁷ (cm/sec)	FRESH THIN 840 BEVE SIZE (%)	FRESH THIN 200 BEVE SIZE (%)	SYMBOLS	DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)
0												CL	Very Stiff, Silty CLAY, Little Fine Sand, Tan, Orange, Brown And Gray	0	237.05
5														5	
10													- Trace Fine Sand	10	
15														15	
18														18	
20													20.0' Top of Porters Creek Formation Clays	20	217.05
20													CLAY: Hard, Silty CLAY, Trace Fine Sand, Dark Gray	20	216.05
25													End of Boring At 21.0' WATER LEVEL AT 9.0' ON 12-17-80 NO SAMPLING WAS PERFORMED IN THIS BORING. PER DRILLERS DESCRIPTION PORTERS CREEK FORMATION WAS ENCOUNTERED AT 20.0' AND THE OVERLYING SOILS SIMILAR TO ADJACENT BORINGS EXCEPT NO SAND STRATA ENCOUNTERED	25	
30														30	
35														35	
40														40	
45														45	
50														50	

REVISION	DATE	DESCRIPTION
0	08-16-80 S.D. VARADIN	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING B-2**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY
ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-43

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWE/S ON SAMPLER (RECOVERY, %)	S _u POCKET PENETROMETER (LIM) % U.C. TEST (psi)	FIELD MOISTURE CONTENT (%) DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY k x 10 ⁻⁶ (cm/sec)	FINER THAN #40 SIEVE SIZE (%)	FINER THAN #200 SIEVE SIZE (%)	PROJECT: DOLET HILLS POWER PLANT	
										SYMBOLS	DESCRIPTION
0	SS-1 (67)	1-6-8								CL	1.0' Medium Stiff, Fine Sandy SILT, Tan (topsoil)
1	ST-2 (75)	3-5	28.9	49	31	0.08	100	96		CL	2.0' Medium Stiff, Silty CLAY, Some Fine Sand, Red and Gray
5	ST-3 (75)	2-0	29.7	31	13		98	73		SM	6.0' Very Stiff, Silty CLAY, Trace Iron Ore, Orange, Tan and Gray - Grades With Some Fine Sand
7	SS-4 (100)	2-3-3								SM	8.0' Medium Dense, Silty Fine SAND, Trace Iron Ore, Orange and Gray
9	SS-5 (100)	2-2-2								SC	8.0' Loose, Clayey Fine SAND, Trace Iron Ore, Orange and Gray
11										SM	11.0' Very Dense, Silty Fine SAND, Gray
13	SS-6 (100)	13-23-30									17.0' Top of Porters Creek Formation Clava
18										CL/CR	Hard, Silty CLAY, Trace Fine Sand, Dark Gray
20	SS-7 (100)	6-16-20									
22	SS-8 (100)	12-21-34	4.5								
24											
26	PB-9 (100)		4.5								
28	SS-10 (100)	6-27-36	4.5								
30											
32											
34											
36											
38											
40	PB-11 (100)		4.5								
42											
44											
46											
48											
50											

End of Boring at 40.5'
Water Level at 8.0' on 12-17-80

REVISION	DATE	DESCRIPTION	DOLET HILLS POWER PLANT LOG OF BORING B-43
	PREPARED BY		
0	08-16-84	ISSUED FOR RECORD	SOUTHWESTERN ELECTRIC POWER COMPANY SARGENT & LUNDY PROJECT NUMBER: 5803-02
	S N WEAVER		

BORING NO. B-44

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLAND/ft ON SAMPLER (RECOVERY, %)	SOCKET PENETROMETER (100% U.S. TEST (100))	FIELD MOISTURE CONTENT (%) DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k \times 10^{-7}$ (cm/sec)	FINER THAN #40 SIEVE (%)	FINER THAN #200 SIEVE (%)	SYMBOLS	DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)
0	SS-1	4-6-8 (67)		16.0	45	25				CL	Stiff, Silty CLAY, Little Fine Sand, Trace Iron Ore, Red and Tan	0	244.97
	ST-2	(67)		25.4				96	34	SC	2.0' Dense, Clayey Fine SAND, Trace Organics, Reddish Tan	2.0	242.97
8	SS-3	10-13-14 (100)								SP	4.0' Medium Dense Silty Fine SAND to Fine Fine SAND, Trace Silt, Trace Organics, Tan and Orange	5	240.97
	SS-4	9-16-17 (100)											
	SS-5	12-22-28 (100)											
10													
	SS-6	16-24-42 (100)											
18													
	SS-7	14-22-39 (100)		24.8				100	3				
20													
	SS-8	14-20-23 (100)		4.5						CL/CH	22.0' Top of Foxiers Creek Formation Clays Hard, Silty CLAY, Dark Gray	22.0	222.97
28													
	PB-9	(100)		4.5									
30													
	SS-10	17-27-31 (100)		4.5									
38													
	SS-11	21-31-30 (100)		4.5									
40													
	PB-12	(92)		4.5									
48													
50													

End of Boring at 46.0'
Water Level at 16.0' on 12-17-80

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	08-14-84 S H WARREN	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING B-44**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY

ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-45

SHEET 1 OF 1

DEPTH (ft.)	SAMPLE NUMBER AND TYPE	BLOWS/ft ON SAMPLER (RECOVERY, %)	POCKET PENETROMETER (psi)		FIELD MOISTURE CONTENT (%)	SOIL DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k = 10^{-7}$ (cm/sec)	FINER THAN #40 SIEVE (%)	FINER THAN #100 SIEVE (%)	SYMBOLS	DESCRIPTION	DEPTH (ft.)	ELEVATION (ft., MSL)
			q_0 , U.C. TEST (psi)	q_1 , U.C. TEST (psi)											
0	SS-1 (100)											ML	Stiff, Fine Sandy SILT, Trace Iron Ore, Red and Tan	0	229.74
	SS-2 (100)	6-6-8			19.0		29			97	75	CL	Stiff, Silty CLAY, Some Fine Sand, Orange and Gray Mottled		227.74
	ST-3 (25)				20.0			0.20							
	SS-4 (100)														
	ST-5 (50)														
10															
	SS-6 (100)											CL/CH	Hard, Silty CLAY, Dark Gray		217.74
15															
	SS-7 (100)														
20															
	PS-8 (100)				4.5										
25															
	SS-9 (100)				4.5										
30															
	PS-10 (83)				4.5										
35															
40															
45															
50															

PROJECT: DOLET HILLS POWER PLANT
 CLIENT: SOUTHWESTERN ELECTRIC POWER COMPANY
 FEATURE: ASH BASIN NO. 1
 SURFACE ELEVATION: 229.74' TOTAL DEPTH: 36.0'
 LOCATION: N 497,700 ; E 1,671,090
 DEPTH TO GROUND WATER LEVEL 12.0' (DATE: 09-08-80)
 DRILLED BY: SOUTHWESTERN LABORATORIES
 LOGGED BY: SOUTHWESTERN LABORATORIES
 TESTED BY: SOUTHWESTERN LABORATORIES

12.0' Top of Porters Creek Formation Clays
 End of Boring at 36.0'
 Water Level at 12.0' on 12-17-80

REVISION	DATE	DESCRIPTION
0	09-14-84	ISSUED FOR RECORD
	S. N. VARADAN	

DOLET HILLS POWER PLANT
LOG OF BORING B-45

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY
 ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-46

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOW/8" OR SAMPLER (RECOVERY, %)	POCKET PENETROMETER (107) % U.C. TEST (147)	FIELD MOISTURE CONTENT (%) DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY 1/10 ⁷ (cm/sec)	PIER THRU # 40 BEVE SIZE (%)	PIER THRU # 200 BEVE SIZE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)
										CL	CH			
0	SS-1	5-5-5 (78)	4.7		29	10				CL		Stiff, Fine Sandy SILT, Tan, Trace Organics	0	226.36
	ST-2	(88)								CL		1.0' Stiff, Silty CLAY, and Fine Sand, Grav		225.36
	SS-3	5-10-14 (100)										2.0' and red		224.36
	SS-4	16-11-21 (100)										Very Stiff, Silty CLAY, Little Fine Sand, Orange, Tan and Mottled		
	SS-5	16-13-20 (100)										- Grades to Hard		
12.0'												12.0' Top of Fortera Creek Formation Clays		214.36
	SS-6	14-17-24 (100)								CH		Hard, Silty CLAY, dark Gray		
	SS-7	16-22-29 (100)												
	PB-8	(100)	4.5 5.9	22.0 100	59	40								
	SS-9	(100)	4.5											
	PB-1C	(93)	4.5											
35.0'												End of Boring at 35.0'		191.36
												Water level at 8.0' on 12-17-80		

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	09-16-84 S B VARADAN	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING B-46**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY

ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-47

SHEET 1 OF 2

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWB/S ON SAMPLER (RECOVERY, %)	% POCKET PENETROMETER (ppt)	q _p , S.C. TEST (tsf)	FIELD MOISTURE CONTENT (%)	SPT BLOWB (ppt)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k = 10^{-7}$ (cm/sec)	FINER THAN # 40 SIEVE (%)	FINER THAN # 200 SIEVE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft)	ELEVATION (ft., MSL)
												CL	SH			
0	SS-1	6-7 (67)											CH	1.0'	260.32	
	ST-2	(100)		25.8	71	31				99	95				259.32	
5	SS-3	6-9 (100)													5	
	ST-4	(67)		28.3	54	33	0.37			100	99					
10	SS-5	7-10-13 (100)													10	
	ST-6	(58)														
17.0'													CL	17.0'	243.32	
20	SS-7	5-7-12 (100)											CL	21.0'	239.32	
28	SS-8	14-20-28 (100)											ML	27.0'	233.32	
36	SS-10	16-26-28 (100)		33.0						96	65				36	
40	SS-11	23-33-33 (67)											SH	37.0'	223.32	
48	SS-12	21-30-39 (71)													48	
50	SS-13	18-27-48 (100)											CL/CH	47.0'	213.32	

REVISION	DATE	DESCRIPTION	DOLET HILLS POWER PLANT LOG OF BORING B-47
	PREPARED BY		
0	08-10-84 S B WARDEN	ISSUED FOR RECORD	SOUTHWESTERN ELECTRIC POWER COMPANY
			<div style="border: 2px solid black; padding: 5px; display: inline-block;"> SARGENT & LUNDY </div>
			PROJECT NUMBER: 5803-02

BORING NO. B-48

SHEET 1 OF 2

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWB/C ON SAMPLER (RECOVERY, %)	POCKET PENETROMETER (psi)	% U.C. TEST (wet)	FIELD MOISTURE CONTENT (%)	DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k = 10^{-7}$ (cm/sec)	FINER THAN #20 SIEVE (%)	FINER THAN #100 SIEVE (%)	FINER THAN #200 SIEVE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft)	ELEVATION (ft., MSL)
													CL	SM			
0	SS-1	0-6-6 (56)											CL	1.0'	Stiff, Silty Fine SAND, Tan, Trace ORGANICS (topsoil)	0	248.27
	SS-2	(50)											CL	6.0'	Stiff, Silty CLAY, Trace Fine Sand, Orange, Gray and Red Mottled	6	247.27
	SS-3	5-11-17 (100)											CL	6.0'	- Grades to Vary Stiff	12	242.27
	SS-4	(58)											CL	8.0'	Very Stiff, Silty CLAY, Gray	18	240.27
	SS-5	4-5-10 (100)											CL	12.0'	Stiff, Silty CLAY, Trace Lignite, Dark Brown	24	236.27
	SS-6	10-14-21 (100)											SM	27.0'	Hard, Fine Sandy SILT, With Clayey Silt, Orange, Gray and Tan	30	221.27
	SS-7	2-17-22 (100)											SM	37.0'	Very Dense, Silty Fine SAND, Gray	36	211.27
	SS-8	14-19-24 (100)											SM		- Grades with Dark Gray Clayey Silt	42	
	SS-9	16-23-32 (22)											SM			48	
	SS-10	9-22-29 (56)											SM			54	
	SS-11	18-25-31 (25)											CL		37.0' Top of Porters Creek Formation Clays	60	
	SS-12	21-27-36 (100)											CL		Hard, Silty CLAY, Trace Fine Sand, Dark Gray	66	
	PB-1	(100)														72	

REVISION	DATE	DESCRIPTION
0	09-16-84	ISSUED FOR RECORD
	S H VARADAN	

**DOLET HILLS POWER PLANT
LOG OF BORING B-48**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY
ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. B-49

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWB/S' ON SAMPLER (RECOVERY, %)	C _u POCKET PENETROMETER (psi)	q _u , U.C. TEST (psi)	FIELD MOISTURE CONTENT (%)	SPT DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COMPONENT OF PERMEABILITY IN 10 ⁻⁶ (cm/sec)	FINER THAN #40 SIEVE (%)	FINER THAN #200 SIEVE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)	
												CL	OL				
0	SS-1 (67)				7.6		30	11					OL	Stiff, Silty CLAY, Little Fine Sand, Trace 1.0' Organics, Orange and Tan (Topsoil)	0	232.00	
	ST-2 (58)				19.0		66	46					CR	Hard, Silty CLAY, Trace Fine Sand, Orange, Gray and Red Mottled	1	231.00	
5	SS-3 6-4-16 (100)				5.8								CL	4.0' Very Stiff, Silty CLAY, Trace Fine Sand, Trace Iron Ore, Tan, Orange and Gray Mottled	5	228.00	
	ST-4 (100)																
10	SS-5 12-26-30 (100)												SM	8.0' Very Dense, Silty Fine SAND, Trace Clay, Orange, Gray and Tan	10	224.00	
15	SS-6 15-27-35 (100)				22.8					99	17						
20	SS-7 13-25-29 (100)																
22.0'	Top of Porters Creek Formation Clays															22.0'	210.00
25	SS-8 11-15-20 (100)												CL	Hard, Silty CLAY, Dark Gray	25		
30	PB-9 (100)				6.0	21.0	49	29			100						
35	SS-10 6-23-24 (100)																
40	SS-11 18-21-40 (100)																
45	PB-12 (93)																
45	End of Boring at 45.0'															45	187.00
	Water Level at 19.0' on 12-17-80																

REVISION	DATE	DESCRIPTION	DOLET HILLS POWER PLANT LOG OF BORING B-49
	PREPARED BY		
0	09-14-80 S B YORADIN	ISSUED FOR RECORD	SOUTHWESTERN ELECTRIC POWER COMPANY SARGENT & LUNDY PROJECT NUMBER: 5803-02

BORING NO. B-50

SHEET 1 OF 2

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWS/ft ON SAMPLER (RECOVERY, %)	S _u POCKET PENETROMETER (lbf/in ²)	q _p , UC TEST (lbf/in ²)	FIELD MOISTURE CONTENT (%) DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY 1 x 10 ⁻⁷ (cm/sec)	FINER THAN #40 SIEVE SIZE (%)	FINER THAN #200 SIEVE SIZE (%)	PROJECT: DOLET HILLS POWER PLANT	
											SYMBOLS	DESCRIPTION
0	SS-1	3-7-11 (96)									SC	Stiff, Fine Sandy <u>SILT</u> , Trace Organics
	SS-2	3-21-24 (89)		9.6				100	25		SC	Hard, Clayey Fine <u>SAND</u> , Red, Tan and Gray Mottled
5	SS-3	20-29-27 (100)									SH	4.0' Very Dense, Silty Fine <u>SAND</u> , Orange, Tan and Gray Mottled
	SS-4	20-28-23 (89)										- Trace Silty Clay
10	SS-5	8-12-17 (100)									CL	8.0' Very Stiff, Silty <u>CLAY</u> , Trace Fine Sand, Dark Gray
												12.0' Top of Porters Creek Formation Clays
15	SS-6	13-22-43 (100)									CL/CH	Hard, Silty <u>CLAY</u> , Trace Fine Sand, Dark Gray
20	SS-7	25-21-39 (100)		30.3	43	23						
25	SS-8	19-33-37 (100)										
30	SS-9	21-33-36 (100)										
35	SS-10	20-2--31 (100)										
40	SS-11	19-26-33 (100)										
45	SS-12	21-31-35 (100)										
50	PS-13	(92)	3.6	13.0	107	61	39	0.20				

REVISION	DATE	DESCRIPTION
0	09-16-84 S H VARADH	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING B-50**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY

ENGINEERS

PROJECT NUMBER: 5803-02

BORING NO. E-6

SHEET 1 OF 1

DEPTH (ft.)	SAMPLE NUMBER AND TYPE	BLOWS/ft ON SAMPLER (RECOVERY, %)	POCKET PENETROMETER (100) (RECOVERY, %)	FIELD MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k \times 10^{-7}$ (cm/sec)	FINER THAN #40 SIEVE (%)	FINER THAN #200 SIEVE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft.)	ELEVATION (ft., MSL)
										CL	SN			
0	ST-1									CL		Stiff, Silty CLAY, and Fine Sand, Brown and Gray	0	248.4
	ST-2			17.0 106	45	25	0.26	99	54			- Grades to Very Stiff, Tan and Gray		
8	ST-3			14.1 103				99	32	SN		4.0' Very Dense, Silty Fine SAND, Trace Clay, Tan	8	246.4
	SS-4	17-33/4"										- Grades Without Trace Clay		
	SS-5	20-30/4"												
18	SS-6	2C 30/5"											18	233.4
												End of Boring at 15.0' No Water Encountered		

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	08-14-84 D R WARDEN	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING E-6**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY

PROJECT NUMBER: 5803-02

BORING NO. E-7

SHEET 1 OF 1

DEPTH (ft)	SAMPLE NUMBER AND TYPE	BLOWER/ST OR SAMPLER (RECOVERY, %)	WATER CONTENT (%)	FIELD MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY $k \times 10^{-4}$ (cm/sec)	FINER THAN # 40 SIEVE (%)	FINER THAN # 200 SIEVE (%)	SYMBOLS		DESCRIPTION	DEPTH (ft)	ELEVATION (ft, MSL)
										CL	CR			
0	ST-1									CL		Hard, Silty CLAY, Little Fine Sand, Red and Gray	0	252.01
	ST-2									CR	2.0'	Hard, Silty CLAY, Trace Fine Sand, Brown and Gray	2	250.01
5	ST-3		24.0	102	74	51	0.03	100	93			- Grades to Tan	5	
	ST-4											- Grades to Tan and Gray		
	ST-5													
10														
15	SS-5	23-27								SM	2.0'	Very Dense, Silty Fine SAND, Tan	15	240.01
18												End of Boring at 15.0' No Water Encountered	18	237.01
20														
25														
30														
35														
40														
45														
50														

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	00-10-84 S. B. VIGOR	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING E-7**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY

PROJECT NUMBER: 5803-02

BORING NO. E-8

SHEET 1 OF 1

DEPTH (ft.)	SAMPLE NUMBER AND TYPE	BLOWB/S ON SAMPLER (RECOVERY, %)	S _u POCKET PENETROMETER (tsf)	S _u U.C. TEST (tsf)	FIELD MOISTURE CONTENT (%) DRY DENSITY (pcf)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	COEFFICIENT OF PERMEABILITY k x 10 ⁷ (cm/sec)	FINER THAN #40 SIEVE (%)	FINER THAN #200 SIEVE (%)	SYMBOLS DESCRIPTION	
											CL	DESCRIPTION
0	ST-1										CL	Hard, Silty CLAY, Little Fine Sand, Tan
	ST-2											- Grades To Tan And Brown
5	ST-3				17.0 106	37	17	0.38	79			- Grades With Some Fine Sand
	ST-4											- Grades To Tan And Gray
10	ST-5											
12.0	SS-6	30-20/C									SM	2.0' Very Dense, Silty Fine SAND, Tan
15.0												End of Boring at 15.0' No Water Encountered

REVISION	DATE	DESCRIPTION
	PREPARED BY	
0	02-16-84 S H VERRAH	ISSUED FOR RECORD

**DOLET HILLS POWER PLANT
LOG OF BORING E-8**

SOUTHWESTERN ELECTRIC POWER COMPANY

SARGENT & LUNDY
ENGINEERS

PROJECT NUMBER: 5803-02

Appendix C.2

Soil Test Results

Table C-1 (Page 2 of 2)
 SUMMARY OF LABORATORY TEST RESULTS OF
 SOIL BORING SAMPLES RELATED TO ASH BASIN - 1

Boring Number	Sample Number	Sample Depth (ft)	Particle Size Analysis (% Passing)				Atterberg Limits			Unified Soil Classification System	Water Content (%)	Dry Unit Weight (pcf)	Laboratory Permeability (ft/cm/sec)	Unconfined Compressive Strength q_u (ksf)
			No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)					
B-15	SB-2	2.5-4.0		100	97	75	49	20	29	CL	19.0	89	2.0×10^{-8}	
	ST-3	4.0-6.0							19	CL	32.0			
B-16	SB-1	0-1.5					29	19	10	CL	14.7	100		11.9
	SB-8	2.0-25.5				59	19	40	CH	22.0				
B-17	ST-2	2.0-4.0			99	95	71	20	51	CH	23.8	97	3.7×10^{-8}	
	ST-4	6.0-8.0			100	99	54	20	33	CH	28.3	95		
B-19	SB-10	33.5-35.0			95	65				ML	33.0			
	SB-1	0-1.5				30	19	11	CL	7.6	105			11.7
B-20	SB-2	2.0-4.0				66	20	46	CH	19.0				
	SB-6	13.5-15.0			99	17			ML	22.8				
B-30	SB-9	28.0-30.0				100	80	20	CL	21.0	97			12.1
	SB-2	2.5-4.0			100	25	49	20	SC	9.4				
B-4	SB-7	18.5-20.0					43	20	23	CL	30.3	107	2.0×10^{-8}	11.2
	SB-13	48.0-50.0					61	22	39	CH	15.0			
B-6	ST-2	2.0-4.0	100		99	54	45	20	21	CL	17.0	104	2.6×10^{-8}	
	ST-3	4.0-6.0			99	12	61	22	39	CH	14.1	103		
B-7	ST-3	4.0-6.0			100	91	74	23	51	CH	24.0	102	0.3×10^{-8}	
	ST-3	4.0-6.0			100	79	17	17	17	CL	17.0	106	1.8×10^{-8}	

Appendix C-2
Soil Test Results

Table C-1 (Page 1 of 2)
SUMMARY OF LABORATORY TEST RESULTS OF
SOIL BORING SAMPLES RELATED TO ASH BASIN - 1

Boring Number	Sample Number	Sample Depth (ft)	Particle Size Analysis (% Passing)				Atterberg Limits			Unified Soil Classification System	Water Content (%)	Dry Unit Weight (pcf)	Laboratory Permeability (k, cm/sec)	Unconfined Compressive Strength (ksf)
			No. 4 Sieve	No. 10 Sieve	No. 40 Sieve	No. 200 Sieve	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)					
P-22	BT-1	1.0-3.0				13	38	18	20	CL	21.6	104		1.9
	BT-2	3.0-5.0			100	61	32	17	15	CL	19.4	109	3.1x10 ⁻⁸ 1.8x10 ⁻⁸	
	BT-3	5.0-7.0	100		14	31	18	22	16	GC	20.1	114		1.3
	BT-4	7.0-9.0					47	23	24	CL	26.7	113		
	PTT-6	13.0-15.0				100	47	24	23	CL	23.2	104	6.5x10 ⁻⁸ 1.7x10 ⁻⁸	11.0
	BT-10	33.5-35.0								CH	24.9	102		
	BT-12	48.5-50.0								CH	25.8	101		
	BT-2	14.5-16.0				25				GM	21.3			
	BT-4	21.5-23.0				19				SM	21.1			
	BT-2	2.0-4.0			100	96	49	18	31	CL	18.9	108	0.8x10 ⁻⁸	
	BT-3	4.0-6.0			98	71	31	18	13	CL	19.7			
	D-44	BT-1	0-1.5					45	20	25	CL	16.6		
BT-2		2.0-4.0		98	96	44				GC	25.4	105		
BT-7		18.5-20.0			100	3				SP	24.8			

Appendix D

Construction Verification Program

**APPENDIX D
CONSTRUCTION VERIFICATION PROGRAM**

I. Introduction

Southwestern Electric Power Company (SWEPCO) is committed to providing verification that the in situ clays, acceptable nonsynthetic liners and compacted cohesive soils used to construct the wastewater pond facilities will provide a barrier equivalent to three feet of natural clay having a coefficient of permeability no greater than 1×10^{-7} cm/sec. The six disposal facilities requiring verification are:

- Bottom Ash Disposal - consisting of two Ash Basins and one Secondary Pond.
- Surge and Auxiliary Surge (for Temporary Storage of Flue Gas Desulfurization (FGD)) Slurry - consisting of one Surge Pond and one Auxiliary Surge Pond.
- Metal Cleaning Waste Collection - consisting of one Metal Cleaning Waste Pond.
- Plant Discharge Collection - consisting of one Plant Discharge Collection Pond.
- Runoff Collection for Lignite Pile - consisting of one Lignite Pile Runoff Basin.
- Runoff Collection for Limestone Pile - consisting of one Limestone Pile Runoff Basin.

II. Implementation

To meet this commitment, SWEPCO has or will take the following actions:

A. Securing a Contractor to Construct the Ponds

Specification H-5333 titled "Earthwork" and the design drawings listed therein were prepared by Sargent & Lundy (consultants to SWEPCO). These documents completely describe the work that is required to construct an acceptable waste disposal facility that will be in complete accordance with the Solid Waste Rules and Regulations of the Louisiana Department of Environmental Quality (LDEQ) at the Dolet Hills Power

Plant site. The specification covers stripping of topsoil and unsuitable material, excavation, preparation of subgrades, fill placement, dike construction, slope protection, nonsynthetic liners, compaction of cohesive soils, and drainage work. Copies of the logs of all the soil borings have been included for reference. The design drawings indicate the extent of the work by providing dimensioned plan views and cross sectional elevations of the waste disposal facilities. The cross sectional elevations indicate the in situ clays and the placement of acceptable nonsynthetic liners where required.

These documents were issued for bids on June 15, 1984. SWEPCO selected the Machen Construction Company from Little Rock, Arkansas to perform this work. Machen has acknowledged that all work will be done in strict accordance with the technical requirements of Specification H-5333 and the design drawings listed therein.

B. Secure Services of an Independent Testing Laboratory to Assure Quality of the Work Performed

As indicated in Project Specification H-5333, the services of an independent testing laboratory will be provided by SWEPCO. This testing service will perform the quality tests specified in Project Specification H-5333 to determine suitability of the material used and will perform field inspections, visual observations for changes in soil composition and tests to ascertain the contractors conformance of the work to the technical requirements of Specification H-5333.

For this work SWEPCO has retained the services of Mr. Gordon M. Naquin, a registered professional engineer specializing in geotechnical engineering, who is associated with Southwestern Laboratories in Shreveport, Louisiana. Mr. Naquin has experience in the inspection of dike and dam construction within the States of Louisiana, Arkansas and Texas. Mr. Naquin will be providing full time onsite management and inspection for SWEPCO for this work.

C. Development of a Verification Program

Sargent & Lundy has been charged with the task of developing a verification program. For each of the six disposal facilities, the program requirements will be as follows:

1. Compile a list of all the field density tests

performed on cohesive lining material and the dike fill placed during construction. This includes a statistical summary of the field dry density, field water content and percent compaction data.

2. Compile the results of any laboratory testing performed on samples representing the cohesive material used as lining and dike fill material.
3. Compile results of specified laboratory testing on undisturbed samples obtained from the in-place (compacted or in situ) cohesive lining after construction at specific locations identified by the consulting engineers. The laboratory testing will consist of soil classification per the Unified Soil Classification System, grain size analysis, Atterberg limits, and permeability tests.
4. The results of the laboratory testing and field density test summary will be compared to technical requirements given in Specification H-5333 and to the permeability requirements given in the LDEQ Solid Waste Rules and Regulations to document compliance.
5. Any material which does not meet the minimum requirements of Specification H-5333 or the permeability requirements listed in the LDEQ Solid Waste Rules and Regulations will be brought to SWEPCO's attention so that corrective action can be taken to replace the unsuitable material with an acceptable nonsynthetic lining material.

A written summary of the verification program results will be prepared for issuance as a separate document.

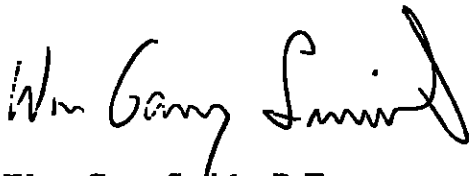
Appendix E

Certification

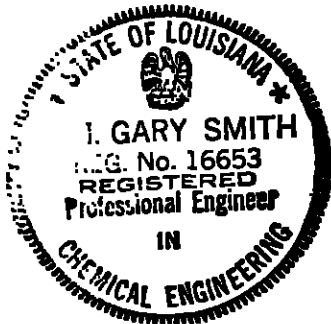
**APPENDIX E
CERTIFICATION**

On behalf of M.S. Environmental Consultants, I, Wm. Gary Smith, P.E., make this certification as a registered Professional Engineer, Licensed in Louisiana. This certification is for an amended application to the Louisiana Department of Environmental Quality for a Solid Waste Disposal Permit. This application is for surface impoundments at Dolet Hills Power Plant and is submitted by Central Louisiana Electric Company, Inc.

I certify under penalty of law that I have personally examined and I am familiar with the information submitted in this amended permit application. In accordance with the original certification, the facility as described in this amended permit application meets the requirements of the Solid Waste Rules and Regulations. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.



Wm. Gary Smith, P.E.
Louisiana Registration No. 16653



ATTACHMENT 2
ASH BASIN No. 1 P.E. CERTIFICATION

**CLECO DOLET HILLS POWER STATION
ASH BASIN NO. 1
CCR LINER VERIFICATION ASSESSMENT**

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I have performed a liner verification assessment for Cleco's Dolet Hills Power Station Ash Basin No. 1 in accordance with the 40 CFR 257.71 CCR requirements. This liner verification assessment has determined that the Ash Basin No. 1 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 1×10^{-7} cm/sec

James C. Van Hoof

Name

24630

Registration No.

LA

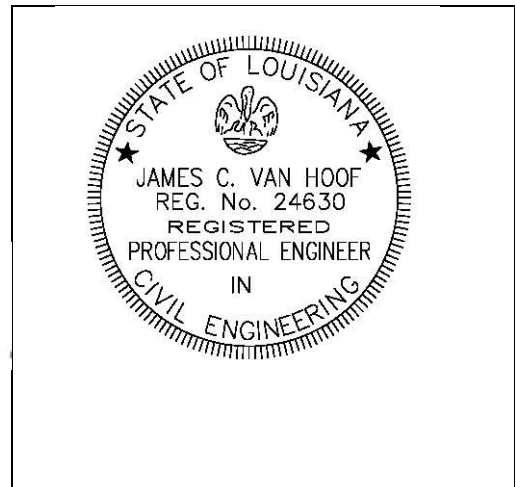
State

James C. Van Hoof, P.E.

Signature

10/12/2016

Date



(Seal)