CPT LOG NO. PB-C-10B

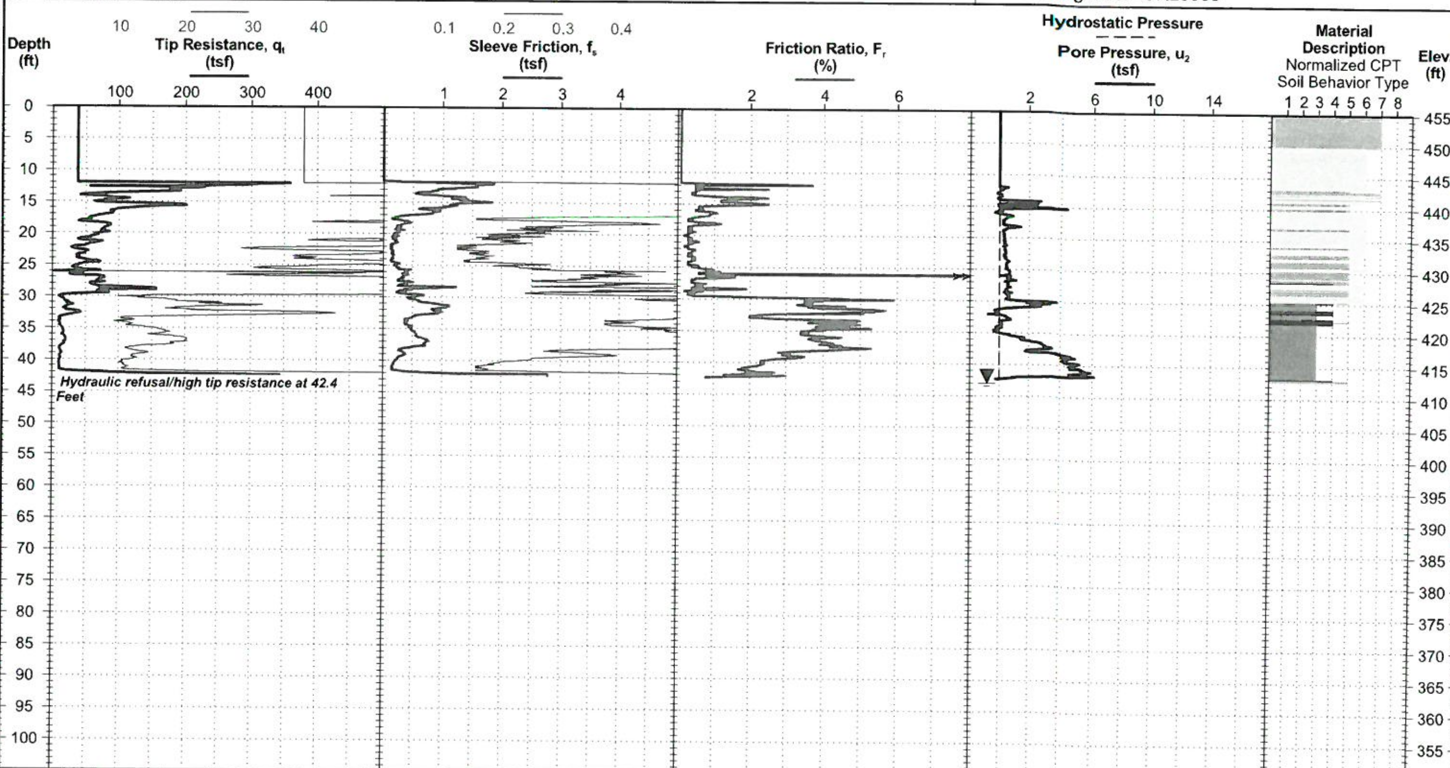
PROJECT: Petersburg Generating Station

CLIENT: Sargent & Lundy

TEST LOCATION: See Exhibit A-2

SITE: 6925 N. State Road 57
Petersburg, Indiana

Surface Elev.: 455.1 ft
Latitude: 38.53911°
Longitude: -87.23903°



Pre-probe through previously tested zone
Hole caved, grout to 13 ft
See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

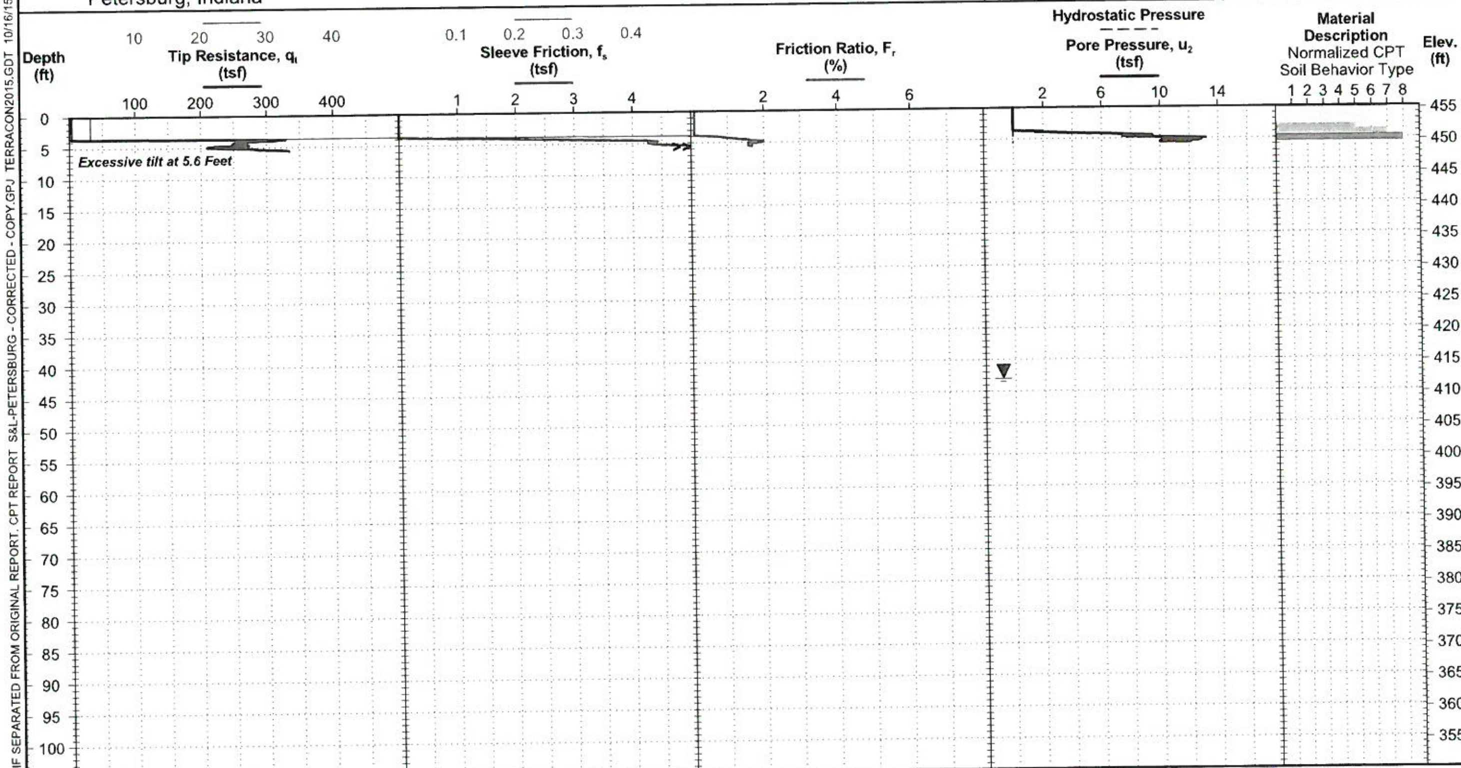
CPT sensor calibration reports available upon request.
Elevation Reference: NAVD88

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION ▼ 43 ft estimated water depth (used in normalizations and correlations; see Appendix C)	Probe no. 4399 with net area ratio of 0.82 U2 pore pressure transducer location Manufactured by Geotech A.B.; calibrated 10/21/2014 Tip and sleeve areas of 10 cm^2 and 150 cm^2 Ring friction reducer with O.D. of 1.875 in	Terracon 611 Lunken Park Drive Cincinnati, Ohio	CPT Started: 8/17/2015 Rig: Geoprobe Project No.: N1155175	CPT Completed: 8/17/2015 Operator: Buchanan/Pattison Exhibit: A-22

CPT LOG NO. PB-C-11

PROJECT: Petersburg Generating Station	**CLIENT:** Sargent & Lundy	**TEST LOCATION:** See Exhibit A-2 Surface Elev.: 455.3 ft Latitude: 38.53728° Longitude: -87.24118°
SITE: 6925 N. State Road 57 Petersburg, Indiana		



Pre-probe below Road Base Material

See Exhibit A-3 for description of field procedures.

See Appendix C for explanation of symbols and abbreviations.

Elevation Reference: NAVD88

CPT sensor calibration reports available upon request.

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION 43 ft estimated water depth (used in normalizations and correlations; see Appendix C)	Probe no. 4399 with net area ratio of 0.82 U2 pore pressure transducer location Manufactured by Geotech A.B.; calibrated 10/21/2014 Tip and sleeve areas of 10 cm^2 and 150 cm^2 Ring friction reducer with O.D. of 1.875 in	Terracon 611 Lunken Park Drive Cincinnati, Ohio	CPT Started: 8/18/2015 Rig: Geoprobe Project No.: N1155175	CPT Completed: 8/18/2015 Operator: Buchanan/Pattison Exhibit: A-23

CPT LOG NO. PB-C-11B

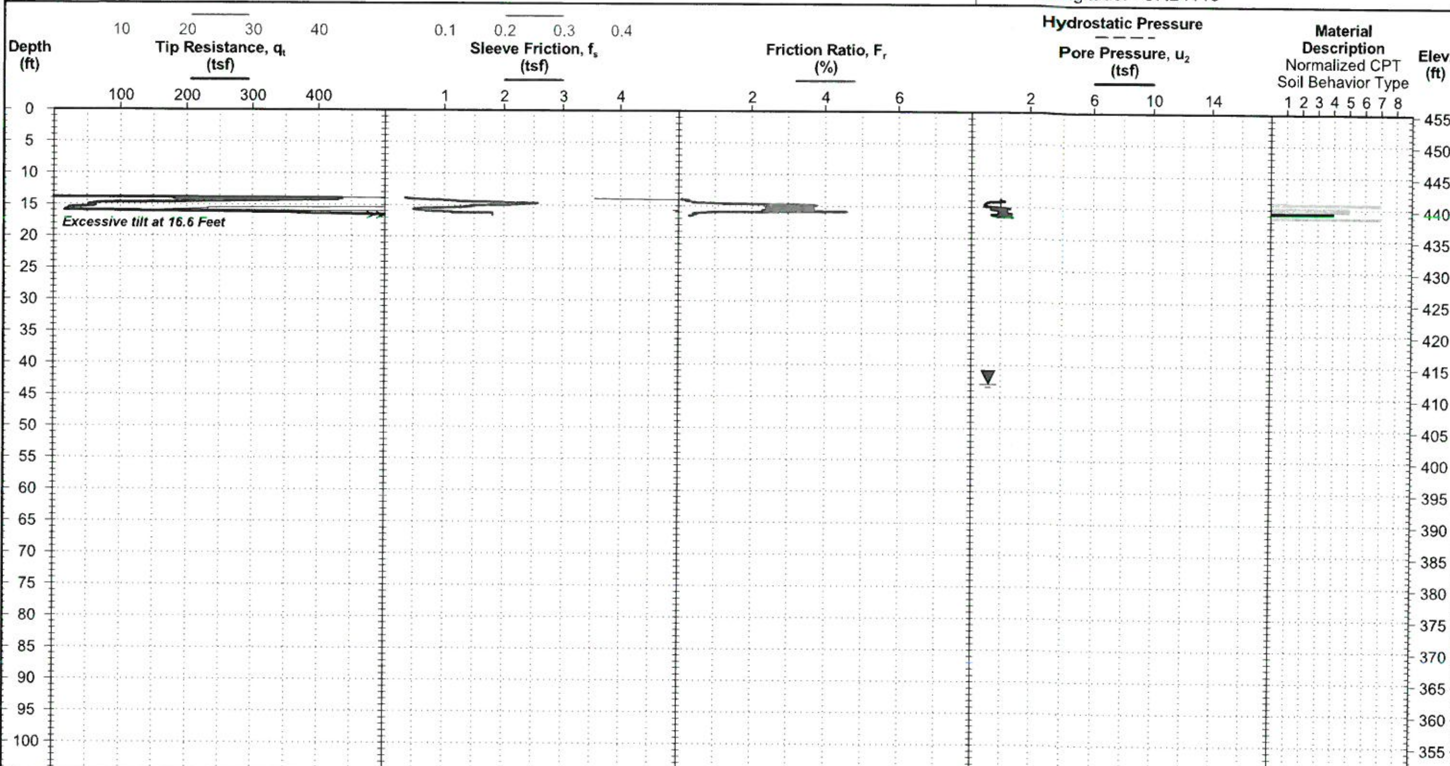
PROJECT: Petersburg Generating Station

CLIENT: Sargent & Lundy

TEST LOCATION: See Exhibit A-2

SITE: 6925 N. State Road 57
Petersburg, Indiana

Surface Elev.: 455.3 ft
Latitude: 38.53728°
Longitude: -87.24118°



Dual tube to 13.5 ft
See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.
Elevation Reference: NAVD88

CPT sensor calibration reports available upon request.

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION
▽ 43 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

Probe no. 4399 with net area ratio of 0.82
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 10/21/2014
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
611 Lunken Park Drive
Cincinnati, Ohio

CPT Started: 8/18/2015	CPT Completed: 8/18/2015
Rig: Geoprobe	Operator: Buchanan/Pattison
Project No.: N1155175	Exhibit: A-24

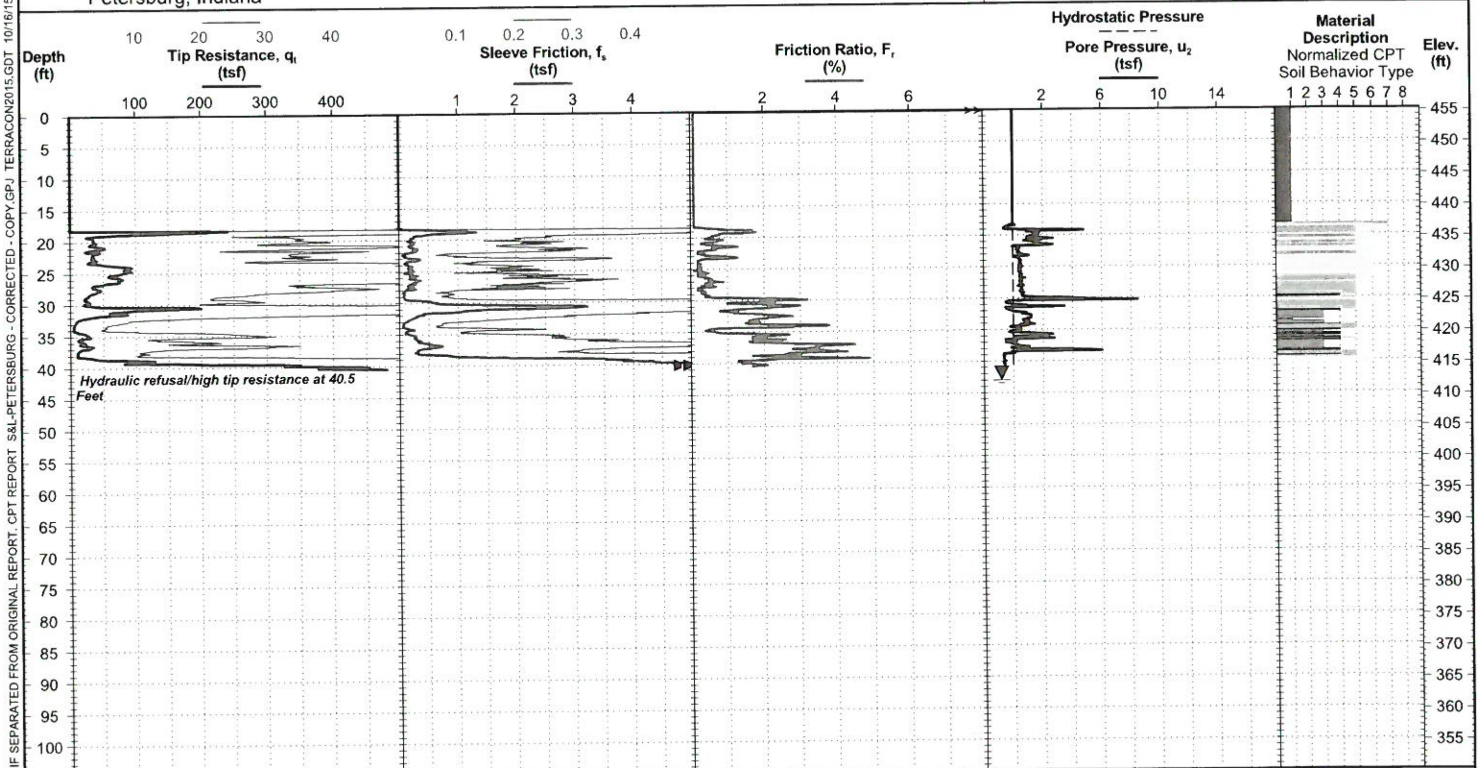
CPT LOG NO. PB-C-11C

PROJECT: Petersburg Generating Station

CLIENT: Sargent & Lundy

SITE: 6925 N. State Road 57
Petersburg, Indiana

TEST LOCATION: See Exhibit A-2
Surface Elev.: 455.3 ft
Latitude: 38.53728°
Longitude: -87.24118°



Dual tube to 18.2 ft
Hole caved, grout to 20 ft
See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.
Elevation Reference: NAVD88

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION ▼ 43 ft estimated water depth (used in normalizations and correlations; see Appendix C)	Probe no. 4399 with net area ratio of 0.82 U2 pore pressure transducer location Manufactured by Geotech A.B.; calibrated 10/21/2014 Tip and sleeve areas of 10 cm^2 and 150 cm^2 Ring friction reducer with O.D. of 1.875 in	Terracon 611 Lunken Park Drive Cincinnati, Ohio	CPT Started: 8/18/2015 Rig: Geoprobe Project No.: N1155175	CPT Completed: 8/18/2015 Operator: Buchanan/Pattison Exhibit: A-25

CPT LOG NO. PB-C-13

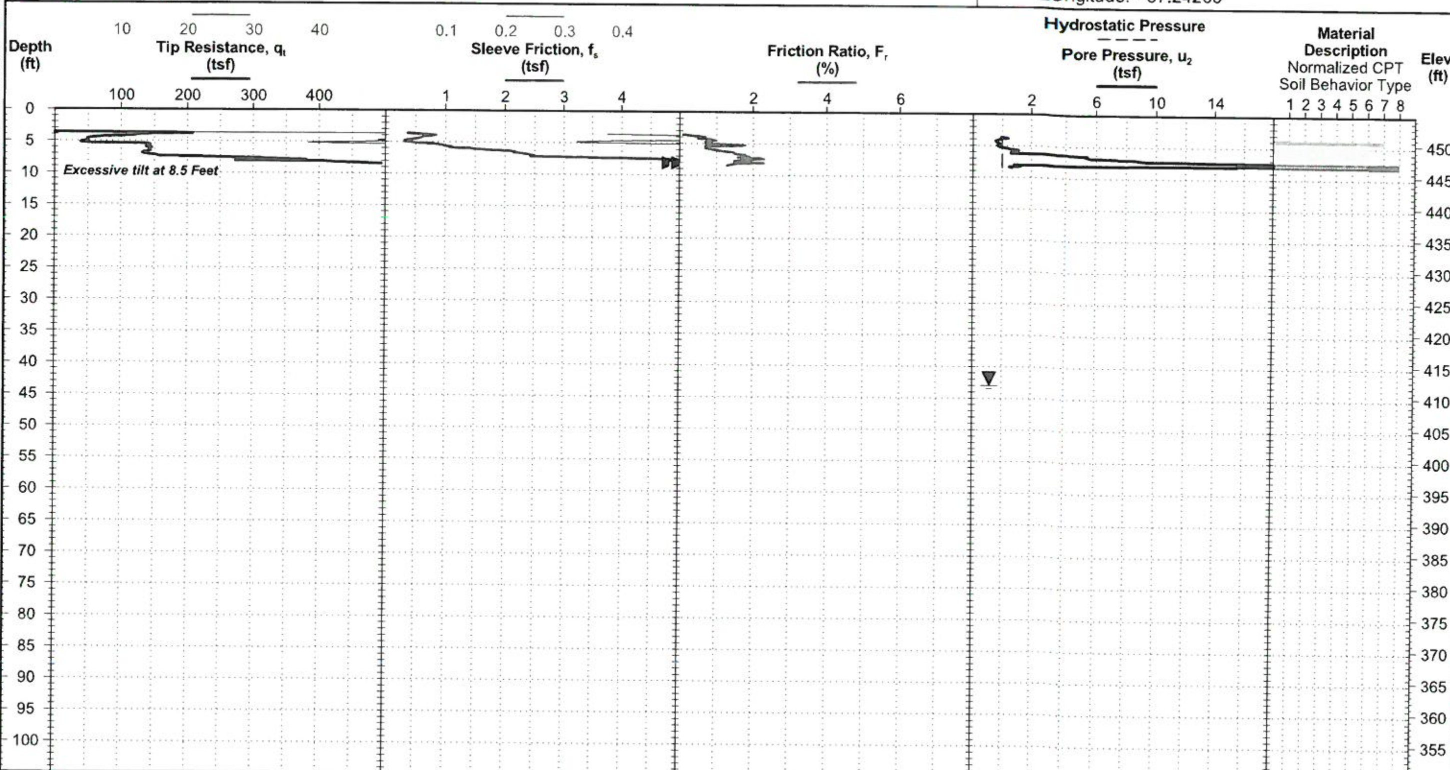
PROJECT: Petersburg Generating Station

CLIENT: Sargent & Lundy

TEST LOCATION: See Exhibit A-2

SITE: 6925 N. State Road 57
Petersburg, Indiana

Surface Elev.: 454.6 ft
Latitude: 38.53644°
Longitude: -87.24265°



Pre-probe below Road Base Material
See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.
Elevation Reference: NAVD88

CPT sensor calibration reports available upon request.

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION
▽ 43 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

Probe no. 4399 with net area ratio of 0.82
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 10/21/2014
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
611 Lunken Park Drive
Cincinnati, Ohio

CPT Started: 8/13/2015	CPT Completed: 8/13/2015
Rig: Geoprobe	Operator: Pattison
Project No.: N1155175	Exhibit: A-28

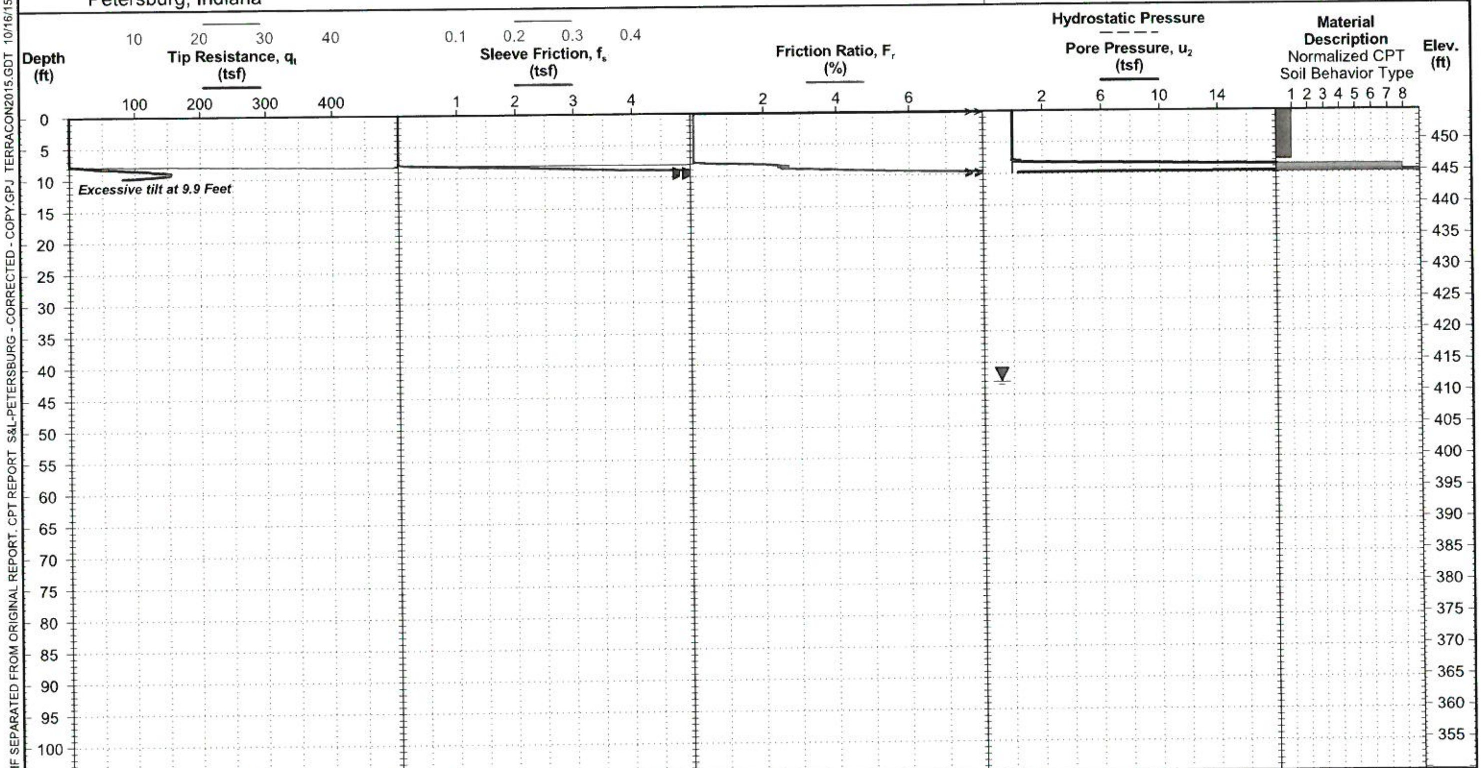
CPT LOG NO. PB-C-13B

PROJECT: Petersburg Generating Station

CLIENT: Sargent & Lundy

SITE: 6925 N. State Road 57
Petersburg, Indiana

TEST LOCATION: See Exhibit A-2
Surface Elev.: 454.6 ft
Latitude: 38.53644°
Longitude: -87.24265°



Dual tube to 7.8 ft

Hole caved, grout to 8 ft

See Exhibit A-3 for description of field procedures.

See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

Elevation Reference: NAVD88

1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

WATER LEVEL OBSERVATION

▽ 43 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

Probe no. 4399 with net area ratio of 0.82
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 10/21/2014
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
611 Lunken Park Drive
Cincinnati, Ohio

CPT Started: 8/18/2015	CPT Completed: 8/18/2015
Rig: Geoprobe	Operator: Pattison
Project No.: N1155175	Exhibit: A-29

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

- Grab Sample
- Shelby Tube
- Standard Penetration Test

WATER LEVEL

- ▽ **Water Initially Encountered**
- ▽ **Water Level After a Specified Period of Time**
- ▼ **Water Level After a Specified Period of Time**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

N	**Standard Penetration Test Resistance (Blows/Ft.)**
(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Ground surface elevations and coordinates of the as-drilled boring/sounding locations were determined using a Leica Viva NetRover survey grade GPS with the following references: WGS84 latitude and longitude with WGS84 ellipsoid height. Based on satellite availability, the horizontal survey data accuracy was reported as ±0.1 foot. The horizontal and vertical references are NAD83 and NAVD88 respectively.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		**CONSISTENCY OF FINE-GRAINED SOILS** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS (ASTM D2488)

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
Few	5 - 10
Little	15 - 25
Some	30 - 45
Mostly	50 - 100

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G,H,I]
			Fines classify as CL or CH	SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]	CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [K,L,M,N]
					Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K,L,M]
			PI plots below "A" line	MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [K,L,M,P]
					Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

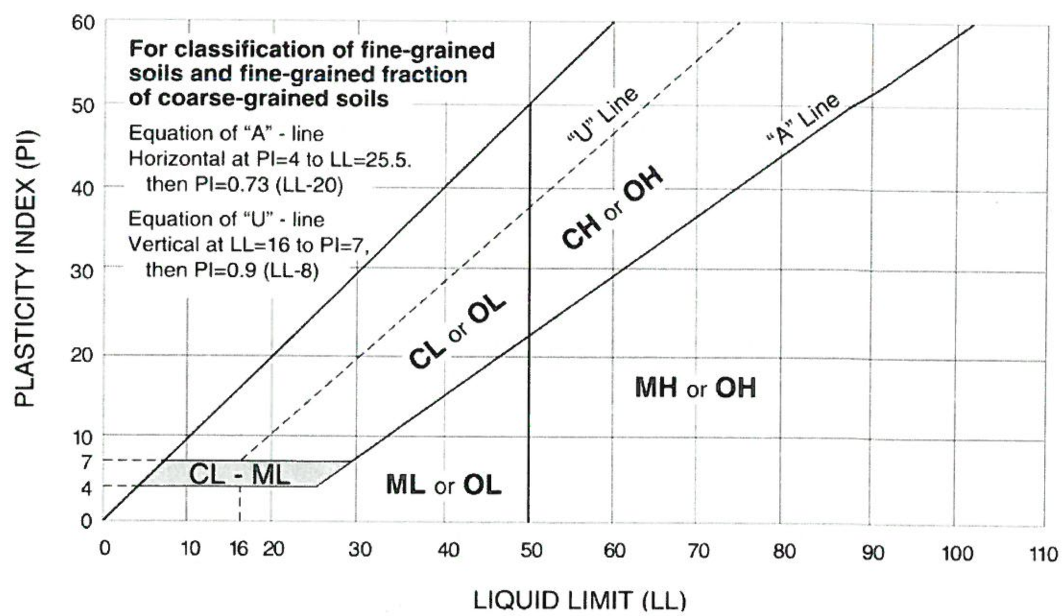
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Geoprobe Systems®
THE WORLD LEADER IN DIRECT PUSH TECHNOLOGY

CERTIFICATE FOR CPT PROBE 4342

PROBE NUMBER	4342 (Terracon)
DATE OF CALIBRATION	June 25, 2015
CALIBRATED BY	Sean Bigler Geoprobe® Systems

POINT RESISTANCE

Sensor Range	100.00 MPa
Scaling Factor	858
Net Area Factor	0.85

LOCAL FRICTION

Sensor Range	1.00 MPa
Scaling Factor	3752
Net Area Factor	0.000

PORE PRESSURE

Sensor Range	2.00 MPa
Scaling Factor	3833

TILT ANGLE

Range	0-40 deg.

CALIBRATION EQUIPMENT

Sensotec® Precision Load Cell Model 73/2537-11-02 — Calibrated June 11, 2009
Serial No. 804409
Calibration at 0.0, 3000, 6000, 9000, 12000, 15000, 18000, 21000, 24000, 27000, 30000, 27000, 24000, 21000, 18000, 15000, 12000, 9000, 6000, 3000, 0.0 lbs

Sensotec® Pressure Transducer Model A-10/6076-08 — Calibrated June 11, 2009
Serial No. 544931
Calibration at 0.0, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 270, 240, 210, 180, 150, 120, 90, 60, 30, 0.0 psi

Documentation of NIST Traceability available upon request.

Cone penetration test probe calibration results are accurate at the time of calibration. Geoprobe® Systems does not guarantee probe accuracy at the time of field testing. ISSMFE international reference test procedure for cone penetration testing recommends probe calibration at least every 3 months.

Geoprobe Systems
THE WORLD LEADER IN DIRECT PUSH TECHNOLOGY

CERTIFICATE FOR CPT PROBE 4399

PROBE NUMBER	4399 (Terracon-OH)
DATE OF CALIBRATION	October 21, 2014
CALIBRATED BY	Troy Schmidt Geoprobe® Systems

POINT RESISTANCE

Sensor Range	100.00 MPa
Scaling Factor	862
Net Area Factor	0.82

LOCAL FRICTION

Sensor Range	1.00 MPa
Scaling Factor	3806
Net Area Factor	0.000

PORE PRESSURE

Sensor Range	2.00 MPa
Scaling Factor	3750

TILT ANGLE

Range	0-40 deg.

CALIBRATION EQUIPMENT

Sensotec® Precision Load Cell Model 73/2537-11-02 — Calibrated August 01, 2014
Serial No. 804409
Calibration at 0.0, 3000, 6000, 9000, 12000, 15000, 18000, 21000, 24000, 27000, 30000, 27000, 24000, 21000, 18000, 15000, 12000, 9000, 6000, 3000, 0.0 lbs

Sensotec® Pressure Transducer Model A-10/6076-08 — Calibrated August 01, 2014
Serial No. 544931
Calibration at 0.0, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 270, 240, 210, 180, 150, 120, 90, 60, 30, 0.0 psi

Documentation of NIST Traceability available upon request.

Cone penetration test probe calibration results are accurate at the time of calibration. Geoprobe® Systems does not guarantee probe accuracy at the time of field testing. ISSMFE international reference test procedure for cone penetration testing recommends probe calibration at least every 3 months.

CPT GENERAL NOTES

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
$q_t = q_c + u_2(1 - a)$
Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, u
Pore pressure measured during penetration
u_1 - sensor on the face of the cone
u_2 - sensor on the shoulder (more common)

Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, F_r
The ratio as a percentage of f_s to q_t, accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
$Q_t = (q_t - \sigma_{V0})/\sigma'_{V0}$

Over Consolidation Ratio, OCR
OCR (1) = $0.25(Q_t)^{1.25}$
OCR (2) = $0.33(Q_t)$

Undrained Shear Strength, S_u
$S_u = Q_t \times \sigma'_{V0}/N_{kt}$
N_{kt} is a soil-specific factor (shown on S_u plot)

Sensitivity, S_t
$S_t = (q_t - \sigma_{V0}/N_{kt}) \times (1/f_s)$

Effective Friction Angle, ϕ'
ϕ' (1) = $\tan^{-1}(0.373[\log(q_t/\sigma'_{V0}) + 0.29])$
ϕ' (2) = $17.6 + 11[\log(Q_t)]$

Unit Weight, γ
$\gamma = (0.27[\log(F_r)]+0.36[\log(q_t/atm)]+1.236) \times \gamma_{water}$
σ_{V0} is taken as the incremental sum of the unit weights

Small Strain Shear Modulus, G_0
G_0 (1) = ρV_s^2
G_0 (2) = $0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{V0})$

Soil Behavior Type Index, I_c
$I_c = [(3.47 - \log(Q_t)^2 + (\log(F_r) + 1.22)^2]^{0.5}$

SPT N_{60}
$N_{60} = (q_t/atm) / 10^{(1.1268 - 0.2817Ic)}$

Elastic Modulus, E_s (assumes $q/q_{ultimate}$ ~ 0.3, i.e. FS = 3)
E_s (1) = $2.6\psi G_0$ where $\psi = 0.56 - 0.33\log Q_{t,clean\ sand}$
E_s (2) = G_0
E_s (3) = $0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{V0})$
E_s (4) = $2.5q_t$

Constrained Modulus, M
$M = \alpha_M(q_t - \sigma_{V0})$
For $I_c > 2.2$ (fine-grained soils)
$\alpha_M = Q_t$ with maximum of 14
For $I_c < 2.2$ (coarse-grained soils)
$\alpha_M = 0.0188 \times 10^{(0.55Ic + 1.68)}$

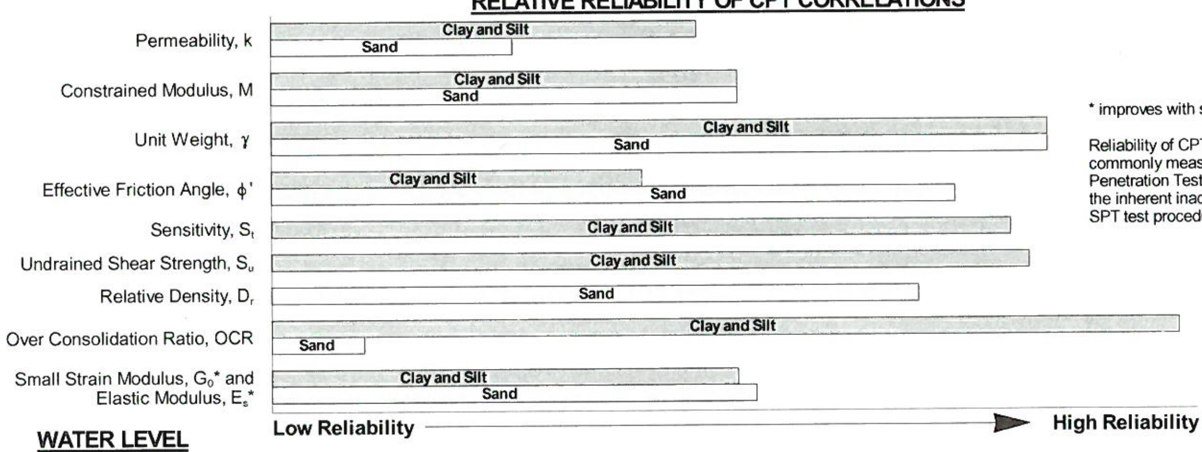
Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04Ic)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37Ic)}$

Relative Density, D_r
$D_r = (Q_t / 350)^{0.5} \times 100$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include q_t, f_s, and u. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. To this end, more than one correlation to a given parameter may be provided. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



* improves with seismic V_s measurements

Reliability of CPT-predicted N_{60} values as commonly measured by the Standard Penetration Test (SPT) is not provided due to the inherent inaccuracy associated with the SPT test procedure.

WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated:"

Measured - Depth to water directly measured in the field

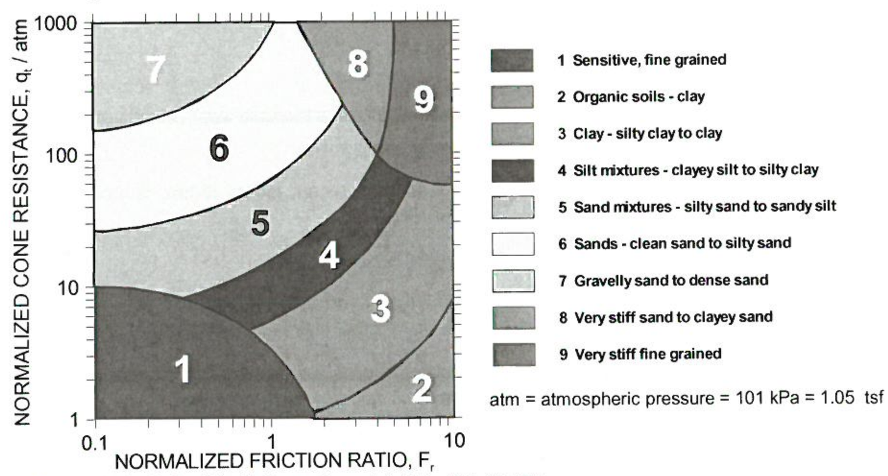
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (u_2). The normalized friction ratio (F_r) is used to classify the soil behavior type.

Typically, silts and clays have high F_r values and generate large excess penetration porewater pressures; sands have lower F_r's and do not generate excess penetration porewater pressures. The adjacent graph (Robertson *et al.*) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



atm = atmospheric pressure = 101 kPa = 1.05 tsf

REFERENCES

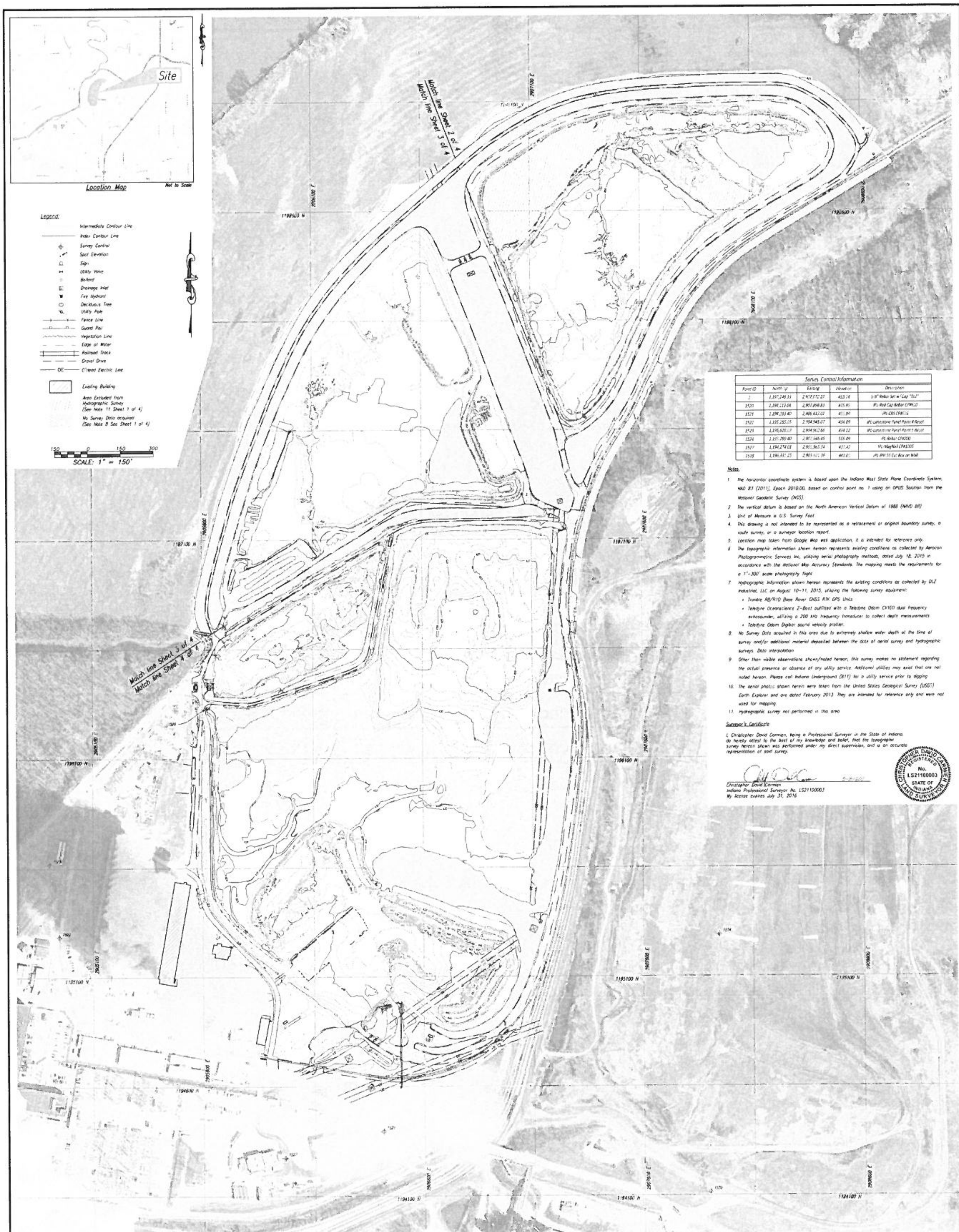
Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institue of Technology, Atlanta, GA.
Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

Terracon

ATTACHMENT D

TOPOGRAPHIC & BATHYMETRIC SURVEYS OF ASH POND SYSTEM

Item	Drawing Number	Title
1	8113PETE SHT 1	Petersburg Generating Station, Overall Ash Pond Survey
2	8113PETE SHT 2	Petersburg Generating Station, Overall Ash Pond Survey [of Pond C]
3	8113PETE SHT 4	Petersburg Generating Station, Overall Ash Pond Survey [of Ponds A & A']



Survey Control Information				
Point ID	Northing	Easting	Elevation	Description
2	1,197,249.33	2,907,072.27	453.14	5/8" Rebar Set w/Cap "DLZ"
1520	1,198,212.04	2,907,898.83	475.95	IPL Red Cap Rebar CP#520
1521	1,194,293.40	2,906,412.02	[illegible]	IPL-CRS CP#[illegible]
1522	1,195,265.05	2,904,945.07	434.09	IPL Limestone Panel Point 4 Reset
1523	1,195,628.02	2,904,912.66	434.12	IPL Limestone Panel Point 5 Reset
1524	1,197,289.40	2,907,546.45	555.09	IPL Rebar CP#200
1527	1,194,274.03	2,901,965.34	437.42	IPL-MagNail CP#1005
1528	1,196,331.25	2,903,[illegible].36	441.07	IPL BM 55 Cut Box on Wall

Notes:

1. The horizontal coordinate system is based upon the Indiana West State Plane Coordinate System, NAD 83 (2011), Epoch 2010.00, based on control point no. 1 using an OPUS Solution from the National Geodetic Survey (NGS).
2. The vertical datum is based on the North American Vertical Datum of 1988 (NAVD 88).
3. Unit of Measure is U.S. Survey Foot.
4. This drawing is not intended to be represented as a retracement or original boundary survey, a route survey, or a surveyor location report.
5. Location map taken from Google Map web application, it is intended for reference only.
6. The topographic information shown hereon represents existing conditions as collected by Aerocon Photogrammetric Services Inc, utilizing aerial photography methods, dated July 18, 2015 in accordance with the National Map Accuracy Standards. The mapping meets the requirements for a 1"-300' scale photography flight.
7. Hydrographic Information shown hereon represents the existing conditions as collected by DLZ Industrial, LLC on August 10-11, 2015, utilizing the following survey equipment:
   - Trimble R8/R10 Base Rover GNSS RTK GPS Units
   - Teledyne Oceanscience Z-Boat outfitted with a Teledyne Odom CV100 dual frequency echosounder, utilizing a 200 kHz frequency transducer to collect depth measurements
   - Teledyne Odom Digibar sound velocity profiler.
8. No Survey Data acquired in this area due to extremely shallow water depth at the time of survey and/or additional material deposited between the date of aerial survey and hydrographic surveys. Data interpolation.
9. Other than visible observations shown/noted hereon, this survey makes no statement regarding the actual presence or absence of any utility service. Additional utilities may exist that are not noted hereon. Please call Indiana Underground (811) for a utility service prior to digging.
10. The aerial photos shown herein were taken from the United States Geological Survey (USGS) Earth Explorer and are dated February 2013. They are intended for reference only and were not used for mapping.
11. Hydrographic survey not performed in this area.

Surveyor's Certificate

I, Christopher David Carmien, being a Professional Surveyor in the State of Indiana, do hereby attest to the best of my knowledge and belief, that the topographic survey hereon shown was performed under my direct supervision, and is an accurate representation of said survey.

Christopher David Carmien
Indiana Professional Surveyor No. LS21100003
My license expires July 31, 2016

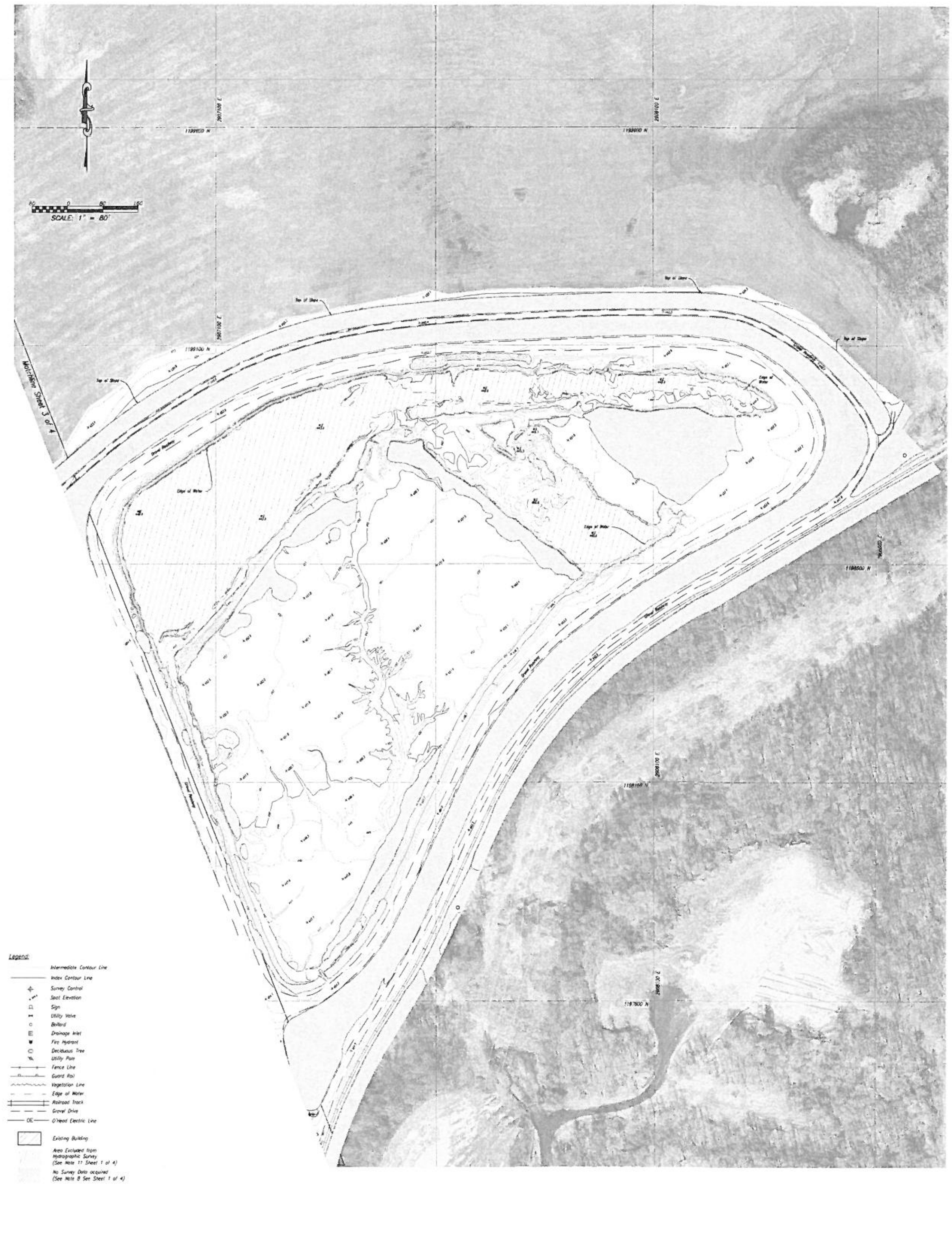
CHRISTOPHER DAVID CARMIEN REGISTERED No. LS21100003 STATE OF INDIANA LAND SURVEYOR

SHEET 1 OF 4	Petersburg — Sargent & Lundy, LLC Indianapolis Power & Light (IPL) — Indiana	DRAWN: KJM; CHK'D: CDC; DESIGNED: -; APPRV'D: DRW; DATE: September 15, 2015; 1" = 150'	NO. 1	REVISION: Added Grid Lines, Toe of Slope and Notes	BY: KJM	DATE: 10.05.15
DRAWING NUMBER 8113PETE	Petersburg Generating Station Overall Ash Pond Survey	PROJECT NUMBER 1550-8113-90				

S&L Project No. : 1057084

DLZ
DLZ INDUSTRIAL, LLC
316 TECH DRIVE, BURNS HARBOR, INDIANA 46304
TELEPHONE (219) 764-4700 FAX (219) 764-4156

M:\PROJ\1550\8113\TOPOGRAPHIC\8113TO-PETERSBURG-COMBINE.DWG



SHEET 2 OF 4	Petersburg — Sargent & Lundy, LLC — Indianapolis Power & Light (IPL) — Indiana	DRAWN: KJM	CHK'D: CDC	
DRAWING NUMBER 8113PETE	Petersburg Generating Station Overall Ash Pond Survey	DESIGNED: –	APPR'D: DRM	
		DATE: September 15, 2015		
		1" = 150'		
		PROJECT NUMBER 1550-8113-90		

NO.	REVISION	BY	DATE
1	Added Grid Lines, Toe of Slope and Notes	KJM	10.05.15

S&L Project No. : 1057084

CHRISTOPHER DAVID CARMIEN — REGISTERED No. LS21100003 — STATE OF INDIANA — LAND SURVEYOR

DLZ INDUSTRIAL, LLC
316 TECH DRIVE, BURNS HARBOR, INDIANA 46304
TELEPHONE (219) 764-4700 FAX (219) 764-4156

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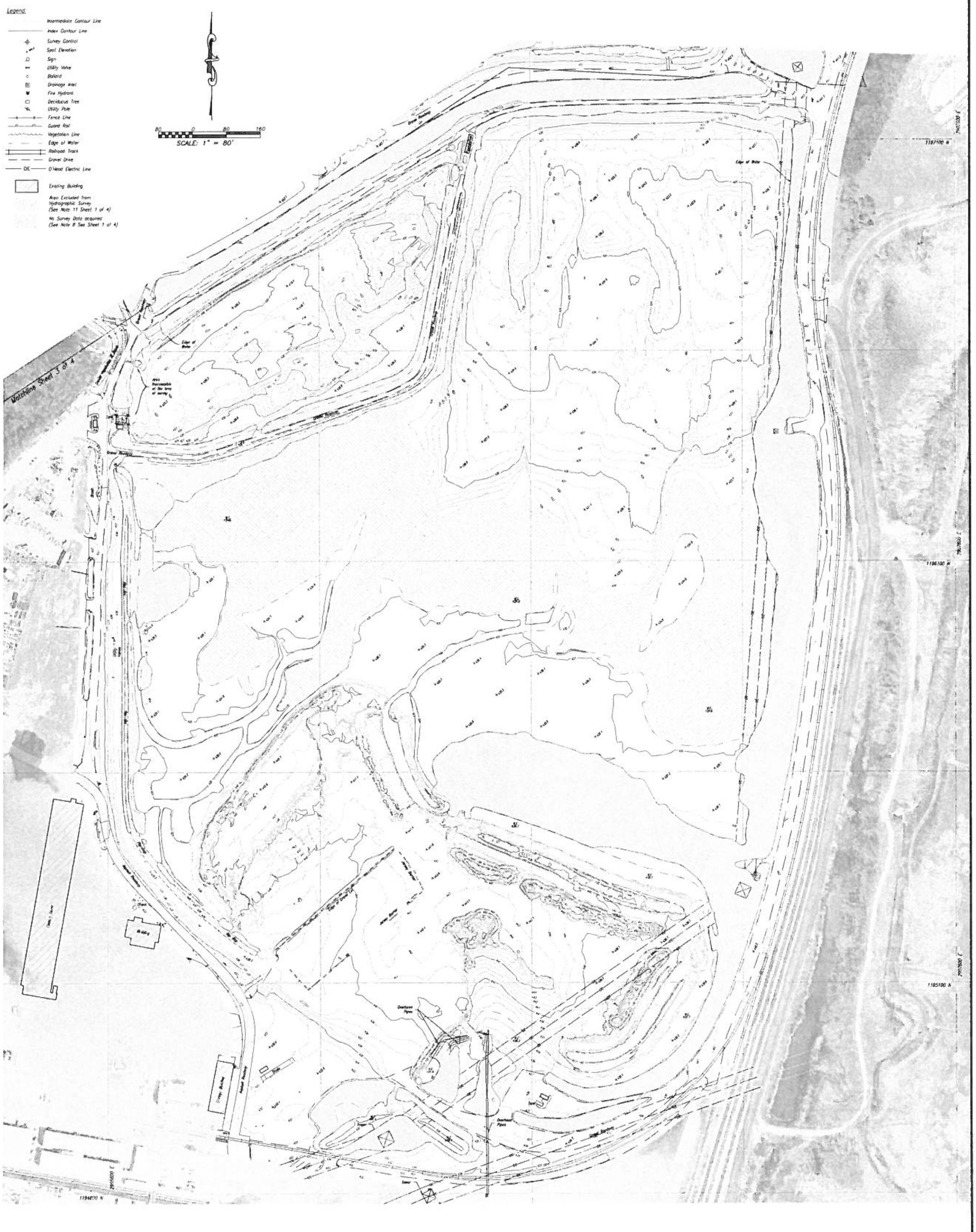

SHEET 4 OF 4	Petersburg	Sargent & Lundy, LLC Indianapolis Power & Light (IPL)	Indiana	DRAWN: KJM CHK'D: CDC DESIGNED: – APPRV'D: DRW DATE: September 15, 2015 1" = 150'	NO. 1	REVISION: Added Grid Lines, Toe of Slope and Notes	BY KJM DATE 10.05.15
DRAWING NUMBER 8113PETE		Petersburg Generating Station Overall Ash Pond Survey		PROJECT NUMBER 1550-8113-90			

S&L Project No. : 1057084

CHRISTOPHER DAVID CARMIEN REGISTERED No. LS21100003 STATE OF INDIANA LAND SURVEYOR

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316 TECH DRIVE, BURNS HARBOR, INDIANA 46304
TELEPHONE (219) 764-4700 FAX (219) 764-4156

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ATTACHMENT E

OPERATIONS & MAINTENANCE PLAN

SCS BT SQUARED

Ash Pond Operations and Maintenance Plan

Indianapolis Power & Light Company
Petersburg Generating Station
Petersburg, Indiana

Prepared for:

Indianapolis Power & Light Company

6925 N. State Road 57
Petersburg, Indiana 47567

Prepared by:

SCS BT SQUARED
2830 Dairy Drive
Madison, Wisconsin 53718-6751
(608) 224-2830

April 2012
File No. 25211429.53

Ash Pond Operations and Maintenance Plan
Petersburg Generating Station
Petersburg, Indiana

Prepared for:

Indianapolis Power & Light Company
6925 N. State Road 57
Petersburg, Indiana 47567

Prepared by:

SCS BT SQUARED
2830 Dairy Drive
Madison, Wisconsin 53718-6751
(608) 224-2830

April 2012
File No. 25211429.53

Table of Contents

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1.0 INTRODUCTION

The ash ponds are owned and operated by Indianapolis Power and Light Company (IP&L). This Operations and Maintenance Plan (O&M) Plan was prepared to fulfill Tasks 3a and 3b of the Action Plan prepared in response to the U.S. Environmental Protection Agency report prepared by CDM following their inspection of ash ponds at the Petersburg (PS) Station in May 2010.

This O&M Plan was prepared using the Indiana Dam Safety Inspection Manual, Part 1 - Overview of Dams and Ownership in Indiana, and Part 2 - Dam Management and Maintenance by the Indiana Department of Natural Resources, Division of Water dated August 28, 2007, for general guidance.

This O&M Plan is for the four ash ponds (Ponds A, B, C, and A-Discharge) located northwest of the generating station. Ash generated by burning coal at the generating station is mixed with water and pumped to Pond A where initial sedimentation occurs. The supernatant fluid from Pond A then flows to Pond A-Discharge for final sedimentation. After sedimentation in Pond A-Discharge is complete, the fluid is discharged from Pond A-Discharge to the National Pollutant Discharge Elimination System permitted outfall to the discharge channel (Lick Creek) that flows to the White River. The ash/water slurry from the Station can also be pumped (dredged) to Ponds B or C for storage purposes until excavated for beneficial reuse projects or mine placement. Water from Pond B flows to Pond C and then to Pond A. Water from Pond C can flow to Pond B or Pond A. The ponds were created by berms constructed of native site soils including clay and sand and ash. There is an access road on the top of each berm, and the outside of each berm is vegetated. The layout of the ponds is shown on **Figure 1**.

This O&M Plan has been prepared to assist IP&L in assuring the safety of the ash ponds and berms and allow continuous operation of the ponds, minimize the need for costly repairs, and extend the useful life of each pond.

2.0 OPERATIONS

There are four ash ponds at the PS Station. The layout of the ponds is shown on **Figure 1**. The approximate area of each of the ponds is as follows:

Pond A	65 acres	Initial Sedimentation
Pond B	24 acres	Secondary Sedimentation
Pond C	28 acres	Secondary Sedimentation
Pond A-Discharge	6 acres	Secondary sedimentation

2.1 NORMAL OPERATION

Figure 1 shows the flow of ash slurry through the present (March 2012) normal operation of the ash ponds at the PS Station. The ash ponds at Petersburg receive slurry of ash and water from the Station. There is a 35 acre area around the Station where storm water is collected and pumped to the ash ponds with the ash slurry. Pond A normally receives the water from the Station and acts as the primary ash settling pond. Water from Pond A is discharged through two 36-inch-diameter pipes to Pond A-Discharge. The outlet of Pond A-Discharge is a concrete outlet structure. Water entering this outlet structure flows to the discharge channel (Lick Creek) and to the White River.

The dredging of Pond A typically begins when Pond A fills with ash and the ash from Pond A is dredged and pumped to Pond B or C or the ash is excavated and sent off site for beneficial reuse or mine placement. This creates additional airspace in Pond A for continued use for initial sedimentation of ash for Station use.

During normal operation, the fluid level in Pond A, Pond B, Pond C, and Pond A-Discharge is approximately the same elevation as the invert elevation of the discharge structure. Water is allowed to discharge freely from each pond and water is not backed up in the ponds. The level of fluid in Pond B and Pond C can be controlled by the addition of stop logs in the discharge structure located in each pond.

3.0 INSTRUMENTATION AND MONITORING

3.1 PIEZOMETER MONITORING

There are ten piezometers (PZ-1 through PZ-10) located around the ash ponds at Petersburg Station. The location of the piezometers is shown on **Figure 2**. The piezometers are used to monitor the elevation of the water inside the berm of the ash ponds. The water level in the piezometers shall be measured on a monthly basis. Water levels shall be recorded on the example monitoring form included in **Appendix A.**

Liquid levels measured in the piezometers can be compared to the following liquid levels.

Pond	Piezometers	Water Level
A	PZ5	435.3
A-Discharge	PZ6	431.0
B	PZ2 (upper lift) PZ7 (lower lift)	448.0 434.0
C	PZ3 and PZ4 (upper lift) PZ9 and PZ10 (lower lift)	448.0 434.0

If the level in any piezometer exceeds the elevation listed above, a Station supervisor must be notified.

3.2 POND WATER LEVEL MONITORING

There are four staff gauges installed in the ash ponds at PS Station. Each ash pond has a staff gauge located at the outlet structure of the pond. The staff gauges are used to monitor the level of the water in each pond. The water level in each ash pond will be recorded weekly. There is an example monitoring form included in **Appendix A**.

The water level in the ash ponds can be compared to the following table:

Pond	Water Elevation
A	438.3
A-Discharge	437.1
B	453.1
C	453.1

If the water level in any of the ponds is above the above water elevations, a Station supervisor must be notified.

3.3 RECORD KEEPING

Completed monitoring forms shall be kept in **Appendix D** of this O&M Plan or at an alternative location determined by the facility. Where necessary, these forms will direct users to additional records prepared in response to all actions discussed and taken in response to measurements in either the piezometers or staff gages that exceeded recommended values.

4.0 INSPECTIONS

The ash pond inspection program includes two types of inspections:

- Maintenance inspections
- Informal inspections

Maintenance inspections shall be performed as a preventative measure to identify problems and develop solutions to prevent further degradation. Maintenance inspections shall be a complete inspection of all of the ash ponds and berms.

Informal inspections may be performed on only a portion of the ash pond berm where a problem is known to exist or provide an update on site conditions

4.1 INSPECTION PERSONNEL

Maintenance inspection shall be performed by personnel familiar with dam design and construction, the causes of dam failures, and the visual signs which identify problems or potential concerns, preferably a qualified external professional.

Informal inspections may be performed by IP&L personnel familiar with the ash ponds and berms who possess sufficient knowledge to make an accurate assessment of the ponds and berms conditions.

4.2 INSPECTION FREQUENCY

Maintenance inspections shall be performed on a semi-annual basin in the spring and fall of every year.

Informal inspections shall be performed on a bi-weekly basis or after a significant rain event/weather condition.

4.3 INSPECTION FORMS

Example inspection forms for the inspections are included in **Attachment B**. These forms are to be completed for every inspection.

4.4 RECORD KEEPING

Completed inspection forms shall be kept in **Appendix D** of this O&M Plan or at an alternative location as determined by the facility.

5.0 MAINTENANCE

5.1 VEGETATION

A good, thick grass cover at an appropriate height is an important part of berm maintenance. A healthy stand of grass can serve the following purposes:

1. Protect the surface from extreme runoff events
2. Minimize animal penetrations
3. Minimize growth of woody vegetation
4. Allow for visual monitoring of the berm surface

A good grass cover requires mowing twice per year, if acceptable safety conditions exist to keep the grass at a reasonable height and discourage the establishment of woody vegetation. Any bare or thin spots should be reseeded as needed.

Any trees or brush should be cut flush with the ground. If necessary, the stump should be removed and the excavation filled with compacted structural fill.

5.2 EROSION

Erosion is a natural process and its continuous forces will eventually wear down almost any surface or structure. Erosion is a particularly important consideration for the ash pond dikes at the PS Station because the dikes are constructed of ash. Ash is a relatively easily erodible material, subject to damage in the event of improper drainage, settlement, vehicle traffic, inadequate vegetation, animal burrows, or other factors. Periodic and timely maintenance is essential in preventing continuous deterioration and possible failure.

A healthy and sturdy Station growth on all sloped surfaces is one of the most effective means of erosion protection. Prompt repair of vegetated areas that develop erosion is required to prevent more serious damage to the berm. Rills and gullies should be filled with suitable soil (the upper 4 inches should be topsoil), lightly compacted, and seeded.

Erosion on the top of the berm on the access road should be addressed. Of particular importance is the provision of a "hardened" gravel surface roadway on top of all ash pond dikes at the PS Station. Vehicle traffic can result in tire ruts, which can be areas where water collects and erosion occurs. The access road should be maintained using road gravel or bottom ash and compacted to allow vehicle access in all weather conditions. Additionally, an erosion resistant surface should be provided and maintained between the road surface and the vegetative cover or the rip rap surface provided on the upstream (inside) and downstream (outside) slopes of all of the ash pond dikes.

Erosion on the inside of the berm can be caused by wave action within the pond. Rock riprap may be required on the interior slope of the berm to prevent erosion.

Any erosion issues shall be documented in the inspection sheet. Records of all repair / maintenance activities should be documented and either located in **Appendix D** or an alternative location.

5.3 SEEPAGE

Seepage may be through the foundation of the berm, through the embankment or along the foundation / embankment interface. Seepage can emerge anywhere on the downstream face of the berm, beyond the toe, or on the downstream abutments. Seepage may vary from a "soft" wet area to a flowing channel of water. It may show up first as an area where vegetation is lush and dark green. Cattails, reeds, moss, and other marsh vegetation often become established in a seepage area.

Seepage poses the highest risk to failure of ash pond dikes like those at PS Station, and any suspicion of the occurrence of seepage must be noted and identified to the EAC and EAE immediately. Specifically, any time that seepage is suspected to be occurring, these areas should be noted on the inspection forms with the exact location of the seepage and the approximate dimensions. The information must be communicated with the EAC and EAE immediately. As necessary, the On-Call Engineer should be consulted if any actual seepage is observed to be occurring.

5.4 OUTLETS

The outlet of each ash pond should be inspected during the semi-annual RPI inspections. Several of the outlets are corrugated metal pipes, which can corrode and breakdown over time. The outlets should not be blocked with debris or ash and water should be able to freely enter and exit the outlets. Any debris blocking the flow into the pipe should be removed.

If the outlet has a mechanical gate structure, decisions should be made whether to attempt to open and close the gate. If the gate has not been operated for a long period of time, opening the gate may result in damage that requires substantial repair cost and can actually result in risk to the dike structure. In the event that IP&L decides that it is too risky to attempt to operate a mechanical gate, it will be assumed that this gate does not exist for operation and any EAP provisions that rely on operation of this gate will be reviewed and modified as necessary.

Any issues associated with the ash pond outlets shall be documented in the inspection sheet. Records of all repair / maintenance activities should be documented and either located in **Appendix D** or an alternative location.

5.5 RIPRAP

The riprap on the interior slope of the ash ponds should be inspected during the RPI and IMI inspections. Any areas of eroded or missing riprap should be noted and repaired.

Records of all repair / maintenance activities should be documented and either located in **Appendix D** or an alternative location.

5.6 ACCESS ROADS

There are gravel access roads along the top of the ash pond berms. The access roads should be maintained to allow safe passage of vehicles. The road surface must be maintained to allow access to the ash ponds and berms. Any areas of erosion or degraded areas should be immediately repaired.

Records of all repair / maintenance activities should be documented and either located in **Appendix D** or an alternative location.

5.7 RODENT CONTROL

Rodents such as groundhogs, muskrats, and beaver can make burrows in the ash pond berms and compromise the structural integrity of the berms by the creation of holes in the dike by burrowing. The burrows can collapse thus weakening the structure, and can serve as an unobstructed pathway for seepage into the core area of the dike.

In the event burrows are observed, these should be filled immediately using methods that restore structural integrity to the dike and restore a completely obstructed flow path to water.

Additionally, IMI inspections should be increased to locate any new burrows and to identify what animals are active. Removal of the animals should be an immediate priority.

Any issues associated with rodents shall be documented in the inspection sheet. Records of all repair / maintenance activities should be documented and either located in **Appendix D** or an alternative location.

5.8 RECORD KEEPING

An example maintenance form is included in **Appendix C.** Completed forms of any maintenance activities performed should be kept in **Appendix D** of this O&M Plan or an alternative location as determined by the facility for a minimum of three years.

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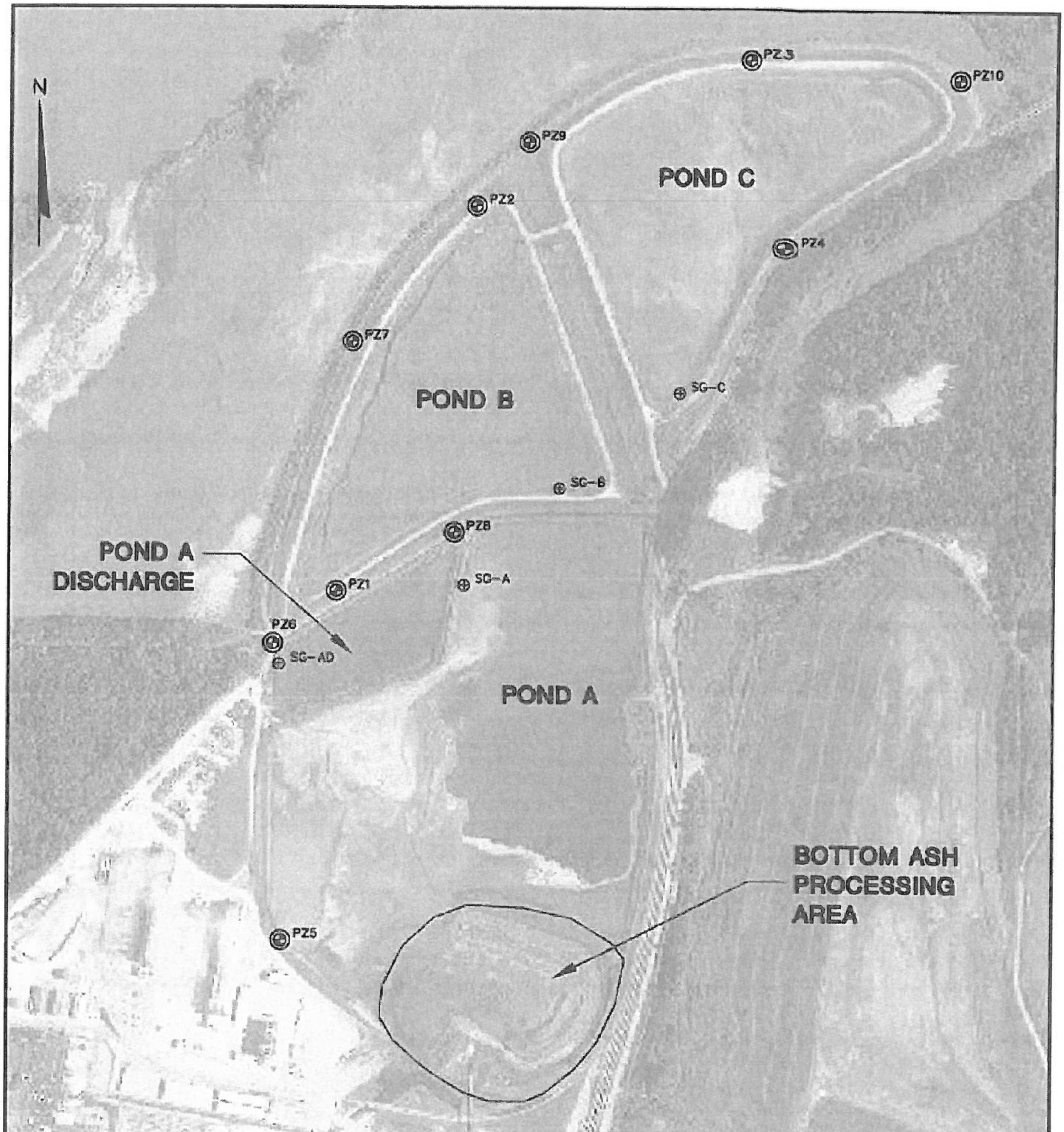
FIGURES



600 0 600

SCALE: 1" = 600'

NOTES:
1. NOT FOR CONSTRUCTION OR OTHER SUCH END USES.

CLIENT: INDIANAPOLIS POWER & LIGHT COMPANY	SITE: PETERSBURG GENERATING STATION 6925 N STATE ROAD 57 PETERSBURG, INDIANA		ASH POND LAYOUT PLAN
PROJECT NO. 25211429.53	DRAWN BY: KRG	ENGINEER: SCS BT SQUARED 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN: 02/02/12	CHECKED BY: DH		1
REVISED:	APPROVED BY: DH 04/06/12		

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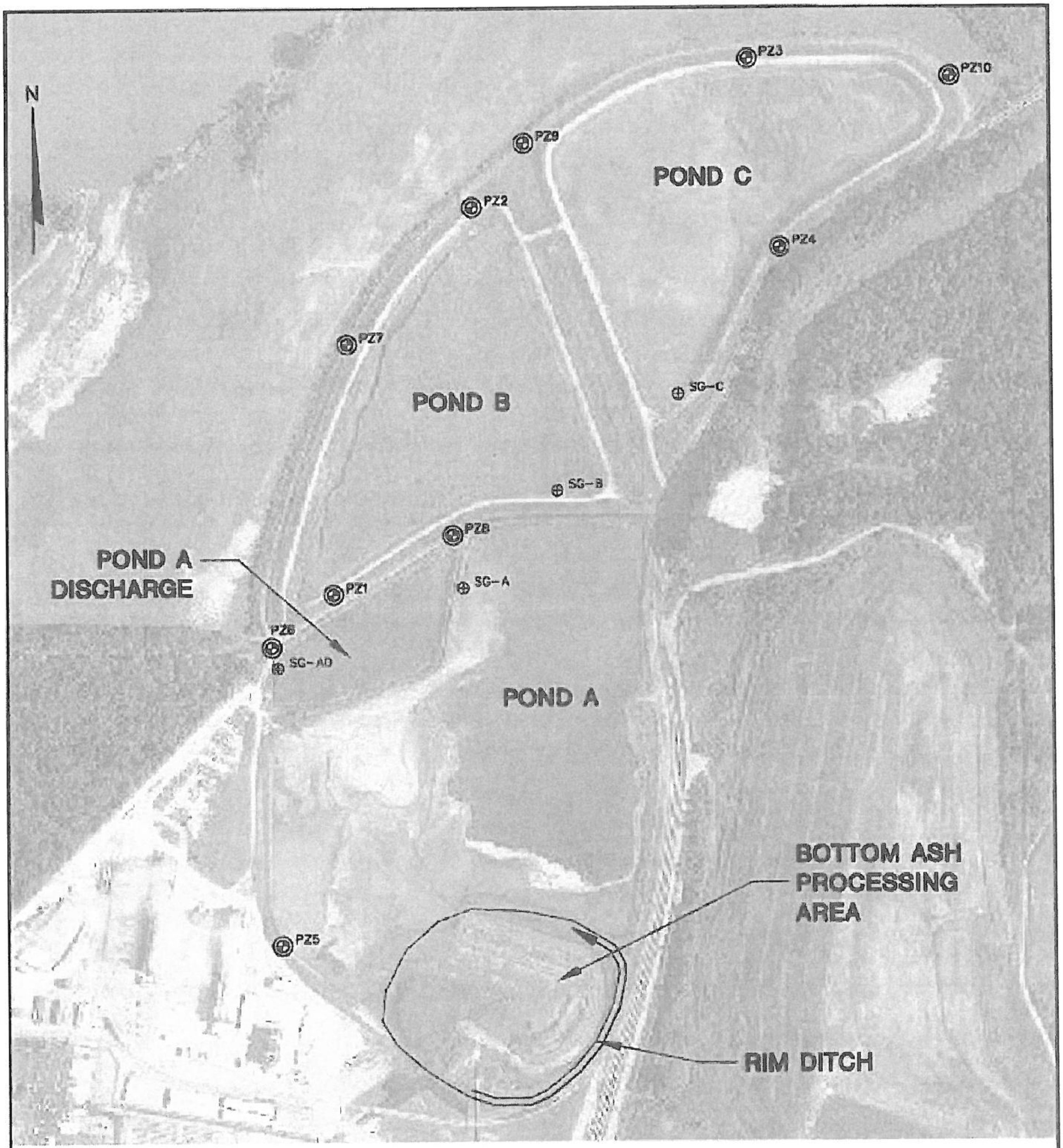

LEGEND

PZ1 PIEZOMETER

SG-A STAFF GAUGE

600 0 600

SCALE: 1" = 600'

NOTES:
1. NOT FOR CONSTRUCTION OR OTHER SUCH END USES.

CLIENT	ipl an AES company — INDIANAPOLIS POWER & LIGHT COMPANY	SITE	PETERSBURG GENERATING STATION 6925 N STATE ROAD 57 PETERSBURG, INDIANA	PIEZOMETER AND STAFF GAUGE LAYOUT PLAN

				ENGINEER		
PROJECT NO.	25211429.53	DRAWN BY:	KRG		SCS BT SQUARED	FIGURE
DRAWN:	02/02/12	CHECKED BY:	DH		2830 DAIRY DRIVE MADISON, WI 53718-6751	2
REVISED:		APPROVED BY:	DH 04/06/12		PHONE: (608) 224-2830	

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APPENDIX A

Example Monitoring Forms

Ash Pond Monitoring Form
Petersburg Generating Station
Indianapolis Power & Light Company
Petersburg, Indiana

Date: ______________________

Personnel: ______________________

Piezometer Reading

Piezometer	Coordinates		Top of Casing El.	Depth to Water from Top of Casing	Water Elevation
	N	E			
PZ1	166.50	722.89	454.69		
PZ2	1,792.66	1,309.62	454.91		
PZ3	2,414.89	2,469.10	456.11		
PZ4	1,620.70	2,601.93	456.84		
PZ5	-1,303.68	498.75	440.46		
PZ6	-54.91	461.42	439.11		
PZ7	1,218.32	784.93	440.10		
PZ8	414.76	1,220.41	440.67		
PZ9	2,062.09	1,526.96	439.31		
PZ10	2,338.91	3,317.43	440.32		

Staff Gauge Reading

Pond A	
Pond A-Discharge	
Pond B	
Pond C	

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APPENDIX B

Example Inspection Forms

PETERSBURG STATION
BI-WEEKLY ASH POND(S) INSPECTION RECORD

This record is completed on a bi-weekly basis after inspection is completed. DATE:____________________

										Initials	
Ash Pond Description (Name/ID)	Date	Erosion Along Crest or Embankment Slopes (Y/N)	Appearance of Sinkholes or Seepage (Y/N)*	Tension Cracks Along Crest or Slope Faces (Y/N)	Presence of Vegetation Cover Along the Embankment Slopes (Y/N)	Changes in Dike Alignment (Y/N)	Appearance of Erosion/Deterioration Around Outlet Structures (Y/N)	Sloughing or Bulging On Slopes?	Description of Current Operational Conditions (Normal/ Abnormal)	Authorized Supervisor	Personnel

*Seepage:
1. Location Description:____
2. Active Flow? (Y/N)
3. Color of Active Flow:____

Inspection Issue	Work Order #	Responsible Person	Corrective Action Taken	Date Issue Resolved

Rev. 6-18-10

IPL Dike Field Review Checklist

1) Complete all Portions of this Section (Pre-review)
Date of Review:____________________
Name of Dike:____________________ Project Number ____________

2) Review Inventory – Highlight missing information (Pre-review)
Owner(s) Name(s): **Indianapolis Power & Light Company**____________
Address: **4050 Blue Bluff Road**____________
City: **Martinsville**__________State **Indiana**____Zip (+4)__________
Telephone (Home):__________Telephone (Work): __________
Contact Person:____________________
Designed By:____________________
Constructed By:____________________
Year Completed:__________Plans Available (Yes, No) (Location):__________
Purpose of Dike:____________________
Age of Dike:____________________

3) General Information
Mowing (times per year):____________________
Prior problems (wet areas, erosion, slides):____________________
____
____
Repair or modification (what & when):____________________
____
____
Failure/Incident/Breach (max. pool):____________________
____
____
Downstream hazard status (recent changes):____________________
____
____
Dike Embankment Material:____________________
____
____
Slope Erosion Control:____________________
____
____

4) Field Information (while at site)
Pool Elevation (during review):____________________Time:(a.m. p.m.)
Site Conditions (temp., weather, ground moisture):____________________
____
Review Party:____________________

Required Action

None | Monitor | Maintenance | Engineer

5) INSIDE SLOPE   Gradient: Horizontal: Vertical: (est. meas.)

☐ **VEGETATION** [no problem]

☐ Trees: Quantity: (<5, sparse, dense)________ ☐ ☐ ☐ ☐
Diameter: (<6", 6-12", >12")________
Location:________
Notes:________
____

☐ Brush: Quantity: (spare, dense)________ ☐ ☐ ☐ ☐
Location: ________
Notes:________
____

☐ Ground Cover: Type: (grass, crown vetch) Other:________ ☐ ☐ ☐ ☐
Quantity: (bare, sparse, adequate, dense) ________
Appearance: (too tall, too short, good) ________
Notes:________
____

☐ **SLOPE PROTECTION** [no problem, could not inspect thoroughly]

☐ None
☐ Riprap: Average Diameter:________ ☐ ☐ ☐ ☐
(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted–yes, no)
Notes:________
____

☐ Wave Berm:________ ☐ ☐ ☐ ☐
Vegetation: (adequate, bare, sparse, improper vegetation)________
Notes:________
____

☐ Other:________ ☐ ☐ ☐ ☐
Notes:________
____

☐ **EROSION** [no problem, could not inspect thoroughly]

☐ Wave Erosion (beaching): Scarp: Length: ________ Height:________ ☐ ☐ ☐ ☐
Location:________
Notes:________
____

☐ Runoff Erosion (Gullies): Quantity:________ ☐ ☐ ☐ ☐
Depth:________ Width: ________ Length:________
Location:________
Notes/Causes:________
____

☐ **INSTABILITIES** [no problem, could not inspect thoroughly]

☐ Slides: Transverse Length: ________ Longitudinal Length:________ ☐ ☐ ☐ ☐
Scarp: Width:________ Length:________
Location: ________
Crack: Width:________ Depth:________
Notes/Causes________

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity:______ Length:______ Width:________ Depth:________
Location:________
Notes/Causes:________
____

None | Monitor | Maintenance | Engineer

Required Action

□ Cracks: □ Transverse □ Longitudinal □ Other
Quantity:_______ Length:_________ Width:_________ Depth:_________
Location: ____________________
Notes/Causes:____________________
____________________ □ □ □ □

□ Bulges □ Depressions □ Hummocky
Size:_____ Height:_______ Depth:_________
Location: ____________________
Notes/Causes:____________________
____________________ □ □ □ □

□ Bulges □ Depressions □ Hummocky
Size:_____ Height:_______ Depth:_________
Location: ____________________
Notes/Causes:____________________
____________________ □ □ □ □

□ **OTHER** [no problem, could not inspect thoroughly]
□ Rodent Burrows: (few, numerous)____________________ □ □ □ □
Location: ____________________
Notes/Causes:____________________
____

□ Other:____________________ □ □ □ □
Notes:____________________
____

6) CREST Length:________ Width:_________ (est. meas.)

□ **VEGETATION** [no problem]
□ Trees: Quantity: (<5, sparse, dense)____________________ □ □ □ □
Diameter: (<6", 6-12", >12")____________________
Location: ____________________
Notes:____________________
____

□ Brush: Quantity: (spare, dense)____________________ □ □ □ □
Location: ____________________
Notes:____________________
____

□ Ground Cover: Type: (grass, crown vetch) Other:____________________ □ □ □ □
Quantity: (bare, sparse, adequate, dense)____________________
Appearance: (too tall, too short, good)____________________
Notes:____________________
____

□ **EROSION** [no problem, could not inspect thoroughly]
□ Runoff Erosion (Gullies): Quantity: _____ Depth:_____ Width:_____ Length:_____ □ □ □ □
Location: ____________________
Notes:____________________

Required Action

None | Monitor | Maintenance | Engineer

☐ **WIDTH** [no problem]
☐ Too Narrow ☐ ☐ ☐ ☐
Location: ______
Notes/Causes: ______

☐ **INSTABILITIES** [no problem, could not inspect thoroughly]
☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity: ______ Length: ______ Width: ______ Depth: ______
Location: ______
Notes/Causes: ______

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity: ______ Length: ______ Width: ______ Depth: ______
Location: ______
Notes/Causes: ______

☐ Bulges: ☐ Depressions ☐ Hummocky ☐ ☐ ☐ ☐
Size: ______ Height: ______ Depth: ______
Location: ______
Notes/Causes: ______

☐ **OTHER** [no problem, could not inspect thoroughly]
☐ Rodent Burrows: (few, numerous) ______ ☐ ☐ ☐ ☐
Location: ______
Notes: ______

☐ Other: ______ ☐ ☐ ☐ ☐
Notes: ______

7) OUTSIDE SLOPE Gradient: Horizontal: Vertical: (est. meas.)

☐ **VEGETATION** [no problem] ☐ ☐ ☐ ☐
☐ Trees: Quantity: (<5, sparse, dense) ______
Diameter: (<6", 6-12", >12") ______
Location: ______
Notes: ______

☐ Brush: Quantity: (spare, dense) ______ ☐ ☐ ☐ ☐
Location: ______
Notes: ______

☐ Ground Cover: Type: (grass, crown vetch) Other: ______ ☐ ☐ ☐ ☐
Quantity: (bare, sparse, adequate, dense) ______
Appearance: (too tall, too short, good) ______
Notes: ______

None | Monitor | Maintenance | Engineer

Required Action