SCS ENGINEERS

CCR Surface Impoundment Hydrologic and Hydraulic Capacity Evaluation

Indianapolis Power & Light Company

Petersburg Generating Station

Prepared for:

Indianapolis Power & Light Company

ipl an AES company

Petersburg Station
6925 N. State Road 57
Petersburg, Indiana 47567

Prepared by:

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

October 13, 2016
File No. 25216140

Offices Nationwide
www.scsengineers.com

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1.0 INTRODUCTION

SCS Engineers (SCS) performed hydrologic and hydraulic capacity evaluations of the CCR (coal combustion residuals) surface impoundments at the Indianapolis Power & Light Company (IPL) Petersburg Generating Station (PS) in Petersburg, Indiana. These analyses were performed in accordance with the Federal Register CFR 257.82, "Hydraulic and hydraulic capacity requirements for CCR surface impoundments". **Figure 1** shows the location of the PS. CFR 257.82 is included in **Appendix A**. The layout of the CCR surface impoundments at the PS is shown in **Figure 2**.

The fly ash handling system at the PS has been converted to a dry ash handling system and no fly ash is currently discharged to the CCR surface impoundments.

There are three CCR surface impoundments at PS, Ponds A, A-Discharge, and C. CCR (bottom ash) is sluiced from the PS into Pond A. Pond C is full of CCR up to the bottom of the outlet and will also be closed.

A 15 acre portion of Pond A has been filled and a waste water treatment plant (WWTP) is being constructed in this area. Once complete, the CCR (bottom ash) will be sluiced to the WWTP for treatment. Pond A and A-Discharge will also be closed once the WWTP becomes functional.

2.0 HYDROLOGIC AND HYDRAULIC ANALYSIS

A hydraulic analysis was performed in accordance with the "General Guidelines for New Dams and Improvements to Existing Dams in Indiana", published by the Indiana Department of Natural Resources, Division of Water, January 1, 2001. The hydraulic analysis was performed using HydroCAD storm water modeling software.

According to the General Guidelines, if the time of concentration (Tc) is less than 6 hours, the 6-hour probable maximum precipitation (PMP) should be used to analyze the spillway system. The ponds at the PS are contained within the containment berms, and the Tc for each pond is less than 6 hours. A Type B design storm was used in the HydroCAD model.

The hydraulic analysis evaluates the outlet of the CCR impoundments and ensures that the outlet is capable of safely passing the runoff from the design storm event without embankment overtopping and failing. The design storm event is determined by the hazardous classification of the impoundment.

Pond B is out of service and is not evaluated. Runoff from Pond B drains into Pond A, therefore, Pond B is included in the hydraulic evaluation. Pond B is out of service and is being filled with bottom ash to create a mound at a 5 percent slope. Once filling is complete, Pond B will be permanently closed.

According to IPL personnel, all of the CCR surface impoundments at PS are in the Significant Hazard classification. According to CFR 257.82(3(ii)), for a significant hazard potential CCR surface impoundment, the inflow design flood is the 1,000-year storm event. The National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Frequency Estimate (**Appendix B**), for the Petersburg Indiana area, the 6-hour, 1,000-year storm event is 7.22 inches of precipitation.

Results

The input parameters and output of the HydroCAD model are included in **Appendix C**. The results of the hydraulic analysis are summarized below:

Pond	Berm Elevation	Maximum Water Height	Freeboard (ft)
A-Discharge	440	437.05	2.9
A	440	437.65	2.4
C	455	453.20	1.8

All of the ponds can safely pass the storm event and maintain a minimum of 1.0 foot of freeboard between the water surface and the top of the berm.

3.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

PROFESSIONAL ENGINEER CERTIFICATION

"I, David Hendron, hereby certify that I am a licensed professional engineer in the State of Indiana in accordance with the requirements of Indiana Administrative Code Title 864; and that, to the best of my knowledge, all information contained in this document is correct."

Signature ______________________

Title and PE Number Senior Engineer PE: 10000050

Date 13 October 2016

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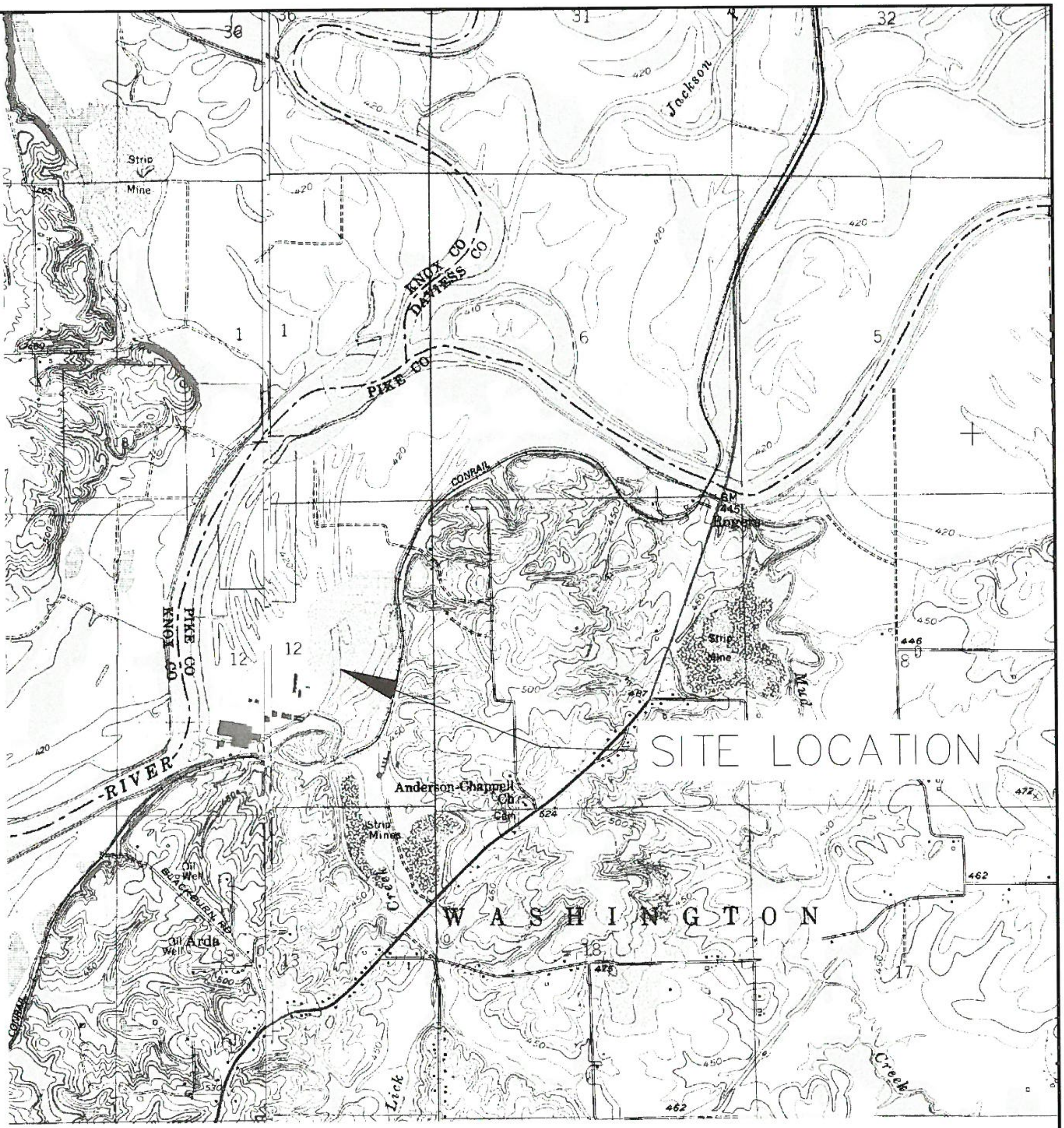
FIGURES



MONROE CITY AND SANDY HOOK QUADRANLGE
INDIANA – PIKE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
1980

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QUADRANGLE LOCATION

CLIENT	ipl an AES company — INDIANAPOLIS POWER & LIGHT COMPANY	SITE	PETERSBURG GENERATING STATION 6925 N STATE ROAD 57 PETERSBURG, INDIANA	SITE LOCATION MAP

PROJECT NO.	25216140.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718–6751 PHONE (608) 224–2830	FIGURE
DRAWN:	02/26/08	CHECKED BY:	DH			1
REVISED:	09/28/16	APPROVED BY:				

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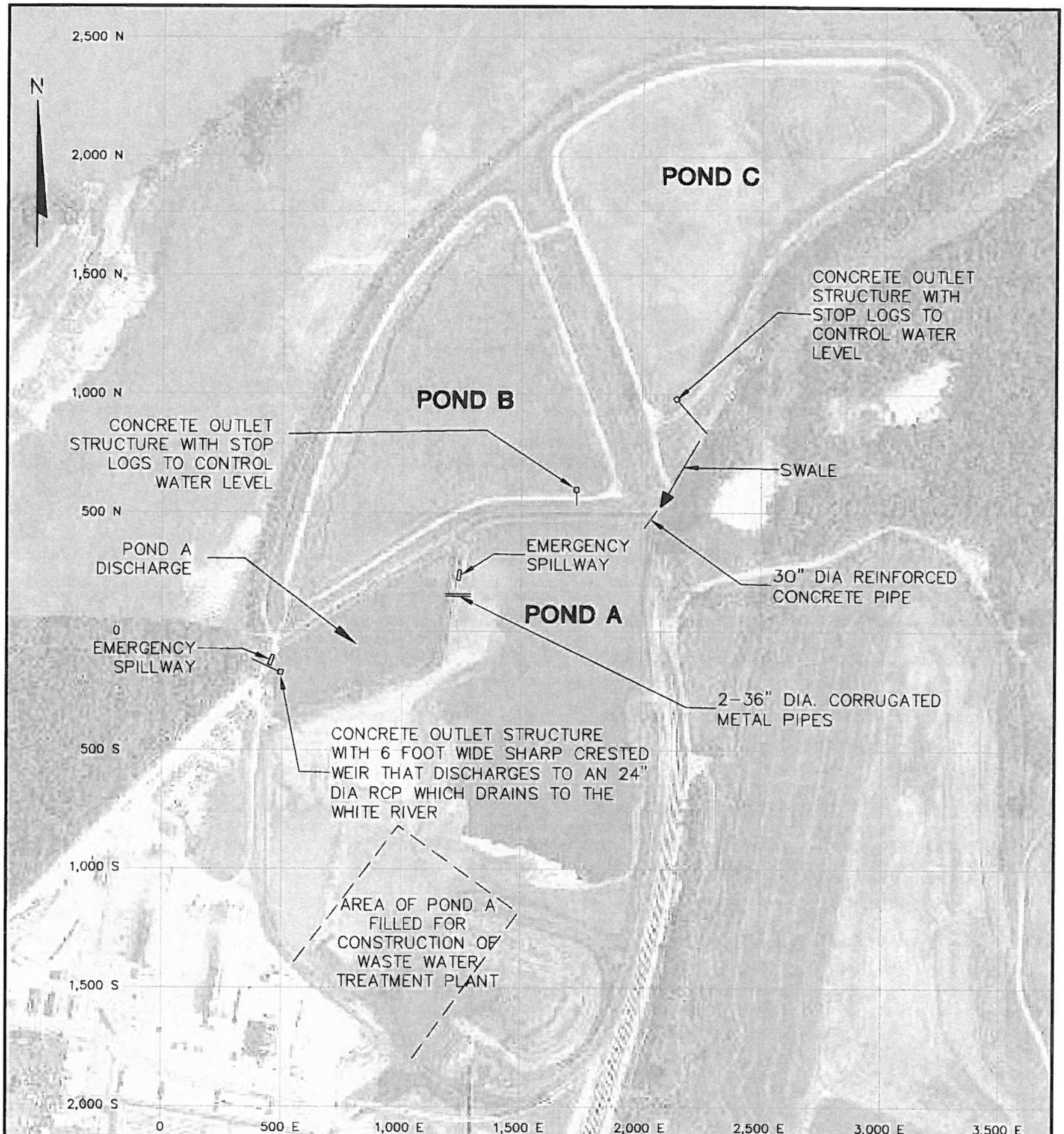

LEGEND

SOIL BORING

PIEZOMETER

600 0 600

SCALE: 1" = 600'

NOTES:

1. NOT FOR CONSTRUCTION OR OTHER SUCH END USES.
2. ON-SITE COORDINATE SYSTEM DEVELOPED FROM IPL DRAWING "PETERSBURG GENERATION PLANT ASH POND: LOCATION OF PIEZOMETERS AND BORINGS" DATED NOV 17, 2011.
3. LOCATION OF OUTLET STRUCTURES IS APPROXIMATE.

CLIENT	ipl an AES company	INDIANAPOLIS POWER & LIGHT COMPANY	SITE	PETERSBURG GENERATING STATION 6925 N STATE ROAD 57 PETERSBURG, INDIANA	CCR SURFACE IMPOUNDMENT HYDRAULIC STRUCTURES LOCATION AND INFORMATION MAP

PROJECT NO.	25216140	DRAWN BY: KG/KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	9/29/16	CHECKED BY:			2
REVISED:		APPROVED BY:			

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APPENDIX A

Federal Register 40 CFR 257.82

follow to periodically assess the effectiveness of the control plan.

(5) The owner or operator of a CCR unit must prepare an initial CCR fugitive dust control plan for the facility no later than October 19, 2015, or by initial receipt of CCR in any CCR unit at the facility if the owner or operator becomes subject to this subpart after October 19, 2015. The owner or operator has completed the initial CCR fugitive dust control plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(1).

(6) *Amendment of the plan.* The owner or operator of a CCR unit subject to the requirements of this section may amend the written CCR fugitive dust control plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(1). The owner or operator must amend the written plan whenever there is a change in conditions that would substantially affect the written plan in effect, such as the construction and operation of a new CCR unit.

(7) The owner or operator must obtain a certification from a qualified professional engineer that the initial CCR fugitive dust control plan, or any subsequent amendment of it, meets the requirements of this section.

(c) *Annual CCR fugitive dust control report.* The owner or operator of a CCR unit must prepare an annual CCR fugitive dust control report that includes a description of the actions taken by the owner or operator to control CCR fugitive dust, a record of all citizen complaints, and a summary of any corrective measures taken. The initial annual report must be completed no later than 14 months after placing the initial CCR fugitive dust control plan in the facility's operating record. The deadline for completing a subsequent report is one year after the date of completing the previous report. For purposes of this paragraph (c), the owner or operator has completed the annual CCR fugitive dust control report when the plan has been placed in the facility's operating record as required by § 257.105(g)(2).

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

§ 257.81 Run-on and run-off controls for CCR landfills.

(a) The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must design, construct, operate, and maintain:

(1) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and

(2) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(b) Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

(c) *Run-on and run-off control system plan*—(1) *Content of the plan.* The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).

(2) *Amendment of the plan.* The owner or operator may amend the written run-on and run-off control system plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(3). The owner or operator must amend the written run-on and run-off control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(3) *Timeframes for preparing the initial plan*—(i) *Existing CCR landfills.* The owner or operator of the CCR unit must prepare the initial run-on and run-off control system plan no later than October 17, 2016.

(ii) *New CCR landfills and any lateral expansion of a CCR landfill.* The owner or operator must prepare the initial run-on and run-off control system plan no later than the date of initial receipt of CCR in the CCR unit.

(4) *Frequency for revising the plan.* The owner or operator of the CCR unit must prepare periodic run-on and run-off control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).

(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic run-on and run-off control system plans meet the requirements of this section.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

§ 257.82 Hydrologic and hydraulic capacity requirements for CCR surface impoundments.

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(3) The inflow design flood is:

(i) For a high hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the probable maximum flood;

(ii) For a significant hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 1,000-year flood;

(iii) For a low hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 100-year flood; or

(iv) For an incised CCR surface impoundment, the 25-year flood.

(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

(c) *Inflow design flood control system plan*—(1) *Content of the plan.* The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

(2) *Amendment of the plan.* The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(4). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(3) *Timeframes for preparing the initial plan*—(i) *Existing CCR surface impoundments.* The owner or operator of the CCR unit must prepare the initial inflow design flood control system plan no later than October 17, 2016.

(ii) *New CCR surface impoundments and any lateral expansion of a CCR surface impoundment.* The owner or operator must prepare the initial inflow design flood control system plan no later than the date of initial receipt of CCR in the CCR unit.

(4) *Frequency for revising the plan.* The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

§ 257.83 Inspection requirements for CCR surface impoundments.

(a) *Inspections by a qualified person.* (1) All CCR surface impoundments and any lateral expansion of a CCR surface impoundment must be examined by a qualified person as follows:

(i) At intervals not exceeding seven days, inspect for any appearances of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit;

(ii) At intervals not exceeding seven days, inspect the discharge of all outlets of hydraulic structures which pass underneath the base of the surface impoundment or through the dike of the CCR unit for abnormal discoloration, flow or discharge of debris or sediment; and

(iii) At intervals not exceeding 30 days, monitor all CCR unit instrumentation.

(iv) The results of the inspection by a qualified person must be recorded in the facility's operating record as required by § 257.105(g)(5).

(2) *Timeframes for inspections by a qualified person*—(i) *Existing CCR surface impoundments.* The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section no later than October 19, 2015.

(ii) *New CCR surface impoundments and any lateral expansion of a CCR surface impoundment.* The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section upon initial receipt of CCR by the CCR unit.

(b) Annual *inspections by a qualified professional engineer.* (1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under § 257.73(d) or § 257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (*e.g.*, CCR unit design and construction information required by §§ 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under §§ 257.73(d) and 257.74(d), the results of inspections by a qualified person, and results of previous annual inspections);

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures; and

(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.

(2) *Inspection report.* The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Any changes in geometry of the impounding structure since the previous annual inspection;

(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;

(iii) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;

(iv) The storage capacity of the impounding structure at the time of the inspection;

(v) The approximate volume of the impounded water and CCR at the time of the inspection;

(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures; and

(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.

(3) *Timeframes for conducting the initial inspection*—(i) *Existing CCR surface impoundments.* The owner or operator of the CCR unit must complete the initial inspection required by paragraphs (b)(1) and (2) of this section no later than January 18, 2016.

(ii) *New CCR surface impoundments and any lateral expansion of a CCR surface impoundment.* The owner or operator of the CCR unit must complete the initial annual inspection required by paragraphs (b)(1) and (2) of this section is completed no later than 14 months

APPENDIX B

NOAA Atlas 14 Precipitation Frequency Estimate www.nws.noaa.gov

NOAA's National Weather Service
Hydrometeorological Design Studies Center
Precipitation Frequency Data Server (PFDS)

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- Current Projects
- FAQ
- Glossary

Precipitation Frequency (PF)
- PF Data Server
  - PF in GIS Format
  - PF Maps
  - Temporal Distr.
  - Time Series Data
  - PFDS Perform.
- PF Documents

Probable Maximum Precipitation (PMP)
- PMP Documents

Miscellaneous
- Publications
- AEP Storm Analysis
- Record Precipitation

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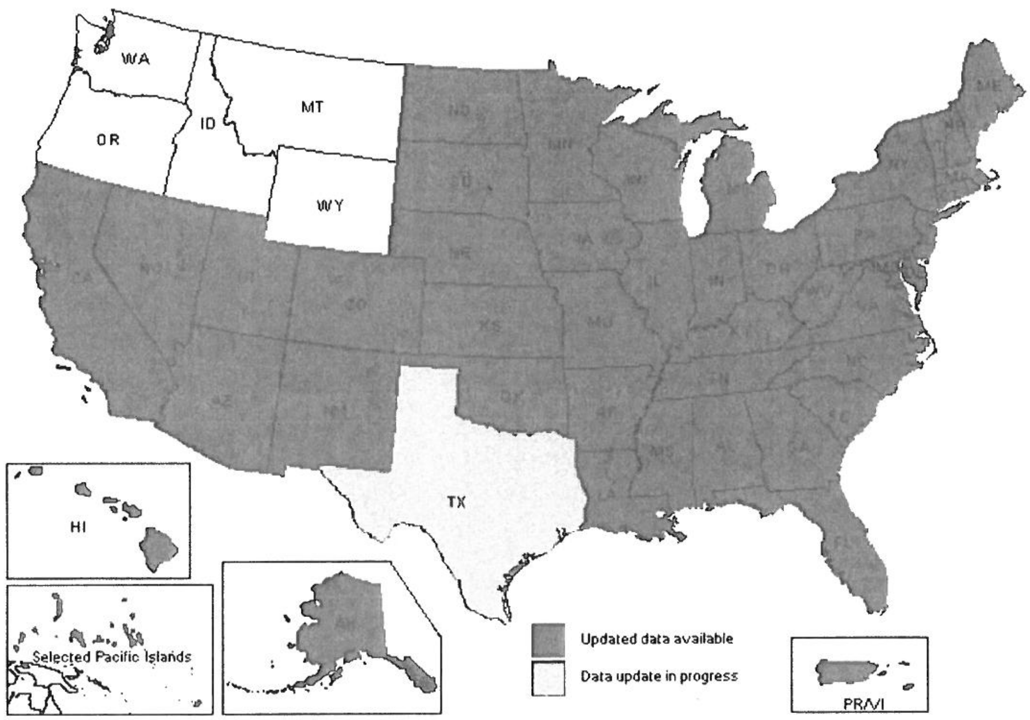
State: Choose a state (or click map) Load



Precipitation Frequency Data Server (PFDS)

The Precipitation Frequency Data Server (PFDS) is a point-and-click interface developed to deliver NOAA Atlas 14 precipitation frequency estimates and associated information. Upon clicking a state on the map above or selecting a state name from the drop-down menu, an interactive map of that state will be displayed. From there, a user can identify a location for which precipitation frequency estimates are needed.

Estimates and their confidence intervals can be displayed directly as tables or graphs via separate tabs. Links to supplementary information (such as ASCII grids of estimates, associated temporal distributions of heavy rainfall, time series data at observation sites, cartographic maps, etc.) can also be found.

NOAA Atlas 14 documents provide additional information on the underlying data and functioning of the PFDS.

PFDS is compatible with all modern web browsers. However, some browsers offer a smoother experience than others. We recommend Chrome, Firefox, Internet Explorer 10+, and Safari.

Main Link Categories:
Home | OWP(OHD)

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Office of Water Prediction (OWP)
1325 East West Highway
Silver Spring, MD 20910
Page Author: HDSC webmaster

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Credits
Glossary

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About Us
Career Opportunities

NOAA Atlas 14, Volume 2, Version 3
Location name: Petersburg, Indiana, USA*
Latitude: 38.5363°, Longitude: -87.2418°
Elevation: 449.34 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.394 (0.362-0.431)	0.467 (0.429-0.511)	0.554 (0.509-0.606)	0.624 (0.571-0.681)	0.713 (0.649-0.777)	0.783 (0.710-0.852)	0.851 (0.768-0.926)	0.923 (0.828-1.00)	1.02 (0.906-1.11)	1.09 (0.964-1.19)
10-min	0.613 (0.563-0.669)	0.729 (0.670-0.798)	0.861 (0.791-0.941)	0.963 (0.881-1.05)	1.09 (0.993-1.19)	1.19 (1.08-1.29)	1.28 (1.16-1.39)	1.38 (1.24-1.50)	1.50 (1.33-1.63)	1.59 (1.40-1.73)
15-min	0.751 (0.690-0.820)	0.892 (0.819-0.976)	1.06 (0.971-1.16)	1.19 (1.08-1.29)	1.35 (1.23-1.47)	1.47 (1.33-1.60)	1.59 (1.44-1.73)	1.71 (1.54-1.86)	1.87 (1.66-2.03)	1.98 (1.75-2.16)
30-min	0.993 (0.913-1.09)	1.19 (1.10-1.31)	1.45 (1.33-1.58)	1.65 (1.51-1.80)	1.90 (1.73-2.07)	2.10 (1.90-2.29)	2.30 (2.07-2.50)	2.50 (2.24-2.72)	2.77 (2.46-3.01)	2.97 (2.63-3.24)
60-min	1.21 (1.12-1.33)	1.46 (1.35-1.60)	1.82 (1.67-1.99)	2.09 (1.92-2.28)	2.47 (2.25-2.69)	2.77 (2.51-3.01)	3.07 (2.77-3.34)	3.39 (3.04-3.69)	3.83 (3.41-4.17)	4.18 (3.69-4.55)
2-hr	1.45 (1.32-1.58)	1.75 (1.60-1.92)	2.20 (2.01-2.40)	2.55 (2.33-2.78)	3.04 (2.76-3.31)	3.44 (3.11-3.74)	3.85 (3.47-4.19)	4.29 (3.84-4.67)	4.90 (4.35-5.32)	5.38 (4.75-5.86)
3-hr	1.54 (1.42-1.68)	1.86 (1.71-2.04)	2.34 (2.14-2.55)	2.73 (2.49-2.97)	3.27 (2.97-3.56)	3.72 (3.36-4.04)	4.19 (3.77-4.55)	4.69 (4.19-5.09)	5.40 (4.78-5.85)	5.98 (5.25-6.48)
6-hr	1.87 (1.72-2.05)	2.26 (2.07-2.47)	2.82 (2.58-3.09)	3.28 (3.00-3.59)	3.94 (3.57-4.30)	4.48 (4.05-4.88)	5.05 (4.54-5.49)	5.66 (5.05-6.15)	6.52 (5.76-7.08)	7.22 (6.32-7.85)
12-hr	2.21 (2.04-2.42)	2.67 (2.45-2.92)	3.31 (3.04-3.62)	3.84 (3.51-4.18)	4.58 (4.17-4.98)	5.18 (4.71-5.63)	5.81 (5.25-6.31)	6.48 (5.83-7.03)	7.41 (6.61-8.05)	8.17 (7.23-8.87)
24-hr	2.64 (2.46-2.83)	3.17 (2.96-3.40)	3.95 (3.68-4.23)	4.58 (4.26-4.92)	5.48 (5.05-5.92)	6.23 (5.68-6.78)	7.03 (6.31-7.72)	7.88 (6.97-8.76)	9.09 (7.85-10.3)	10.1 (8.53-11.6)
2-day	3.14 (2.93-3.37)	3.77 (3.51-4.05)	4.66 (4.33-5.01)	5.39 (4.99-5.81)	6.42 (5.88-6.98)	7.28 (6.59-7.98)	8.19 (7.31-9.10)	9.15 (8.03-10.3)	10.5 (9.00-12.3)	11.7 (9.75-13.9)
3-day	3.36 (3.13-3.61)	4.03 (3.76-4.33)	4.97 (4.63-5.35)	5.75 (5.32-6.20)	6.84 (6.27-7.44)	7.75 (7.03-8.49)	8.71 (7.79-9.67)	9.73 (8.55-11.0)	11.2 (9.58-12.9)	12.4 (10.4-14.6)
4-day	3.58 (3.34-3.84)	4.29 (4.00-4.61)	5.29 (4.92-5.69)	6.11 (5.66-6.59)	7.27 (6.66-7.90)	8.22 (7.46-9.01)	9.23 (8.26-10.2)	10.3 (9.08-11.6)	11.8 (10.2-13.6)	13.1 (11.0-15.4)
7-day	4.18 (3.90-4.48)	5.00 (4.67-5.37)	6.14 (5.70-6.61)	7.06 (6.53-7.63)	8.37 (7.65-9.12)	9.43 (8.53-10.4)	10.6 (9.43-11.8)	11.7 (10.3-13.3)	13.4 (11.5-15.7)	14.8 (12.4-17.7)
10-day	4.74 (4.43-5.07)	5.67 (5.30-6.07)	6.94 (6.46-7.45)	7.96 (7.38-8.58)	9.39 (8.62-10.2)	10.6 (9.58-11.6)	11.8 (10.5-13.1)	13.0 (11.5-14.7)	14.8 (12.8-17.2)	16.3 (13.7-19.3)
20-day	6.51 (6.13-6.92)	7.74 (7.29-8.24)	9.28 (8.70-9.89)	10.5 (9.80-11.2)	12.1 (11.2-13.1)	13.4 (12.3-14.6)	14.7 (13.4-16.2)	16.1 (14.4-17.9)	17.9 (15.8-20.3)	19.3 (16.7-22.3)
30-day	8.02 (7.58-8.50)	9.48 (8.95-10.0)	11.2 (10.5-11.9)	12.5 (11.7-13.3)	14.3 (13.3-15.3)	15.6 (14.5-16.9)	17.0 (15.6-18.5)	18.4 (16.6-20.3)	20.2 (18.0-22.7)	21.6 (19.0-24.7)
45-day	10.1 (9.54-10.7)	11.9 (11.2-12.6)	13.9 (13.1-14.7)	15.5 (14.5-16.4)	17.5 (16.4-18.7)	19.1 (17.7-20.5)	20.6 (19.0-22.3)	22.1 (20.2-24.3)	24.1 (21.7-26.9)	25.6 (22.8-28.9)
60-day	12.0 (11.4-12.7)	14.2 (13.4-14.9)	16.5 (15.6-17.4)	18.2 (17.2-19.3)	20.5 (19.2-21.8)	22.3 (20.7-23.8)	23.9 (22.1-25.8)	25.5 (23.4-27.8)	27.6 (25.0-30.5)	29.2 (26.1-32.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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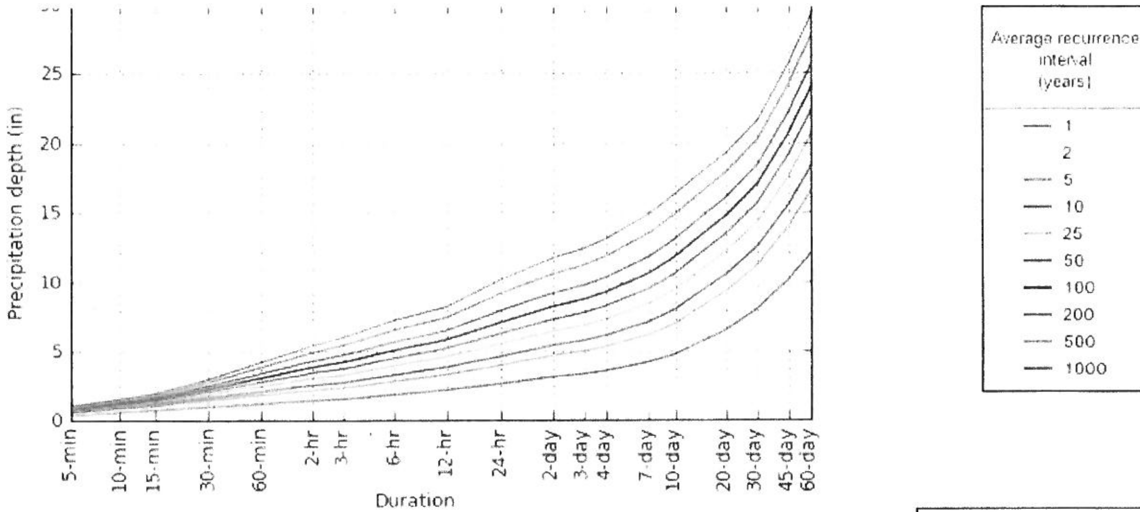
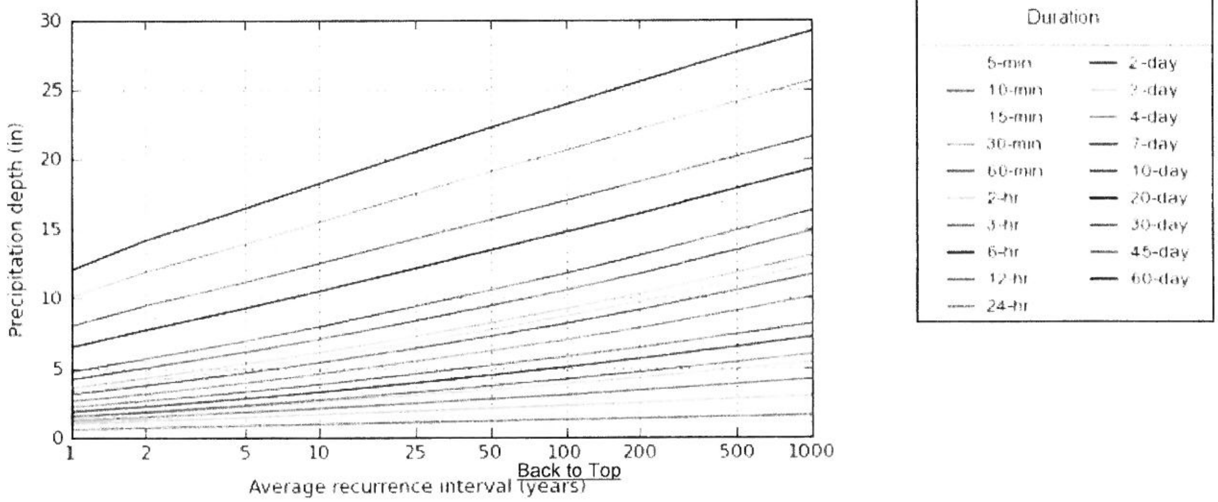
PF graphical





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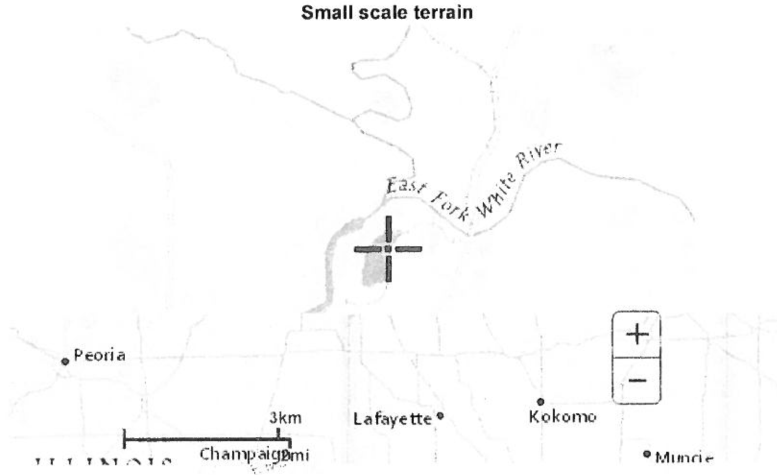
NOAA Atlas 14, Volume 2, Version 3 Created (GMT): Wed Sep 28 14:37 01 2016

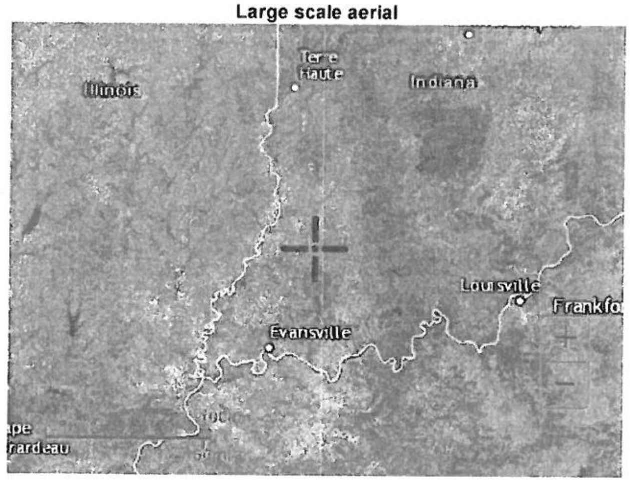
Maps & aerials

Small scale terrain



Large scale terrain

Large scale aerial



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Disclaimer

APPENDIX C

HydroCAD Model Analysis

Purpose

Determine if the CCR ponds at IP&L Petersburg Generating Station can adequately manage flow into and out of the ponds during the design storm event, specified by 40 CFR 257.82.

Approach

Determine the storage capacity of each basin. Use HydroCAD to generate the runoff hydrograph, route the hydrograph through the ponds and outlet structures and determine the maximum water elevation and outflow from each pond. HydroCAD uses the TR-20 methodologies to generate the hydrograph. The ponds are shown on Figure 2.

Assumptions

Pond	Crest Elevation	
A - Discharge	440	
A	440	Crest Elevations from survey information provided in
B	455	IPL Drawing "Petersburg Generating Station CCR Pond: Location
C	455	of Piezometers and Soil Borings" dated Nov. 17, 2011.

* According to IP&L personnel, the ponds at the Petersburg Station are classified as Significant Hazard. Ponds classified as Significant Hazards must be able to contain and pass the 1,000 year storm event.

* Pond B is out of service. Runoff from Pond B drains to Pond A, therefore Pond B is included in the hydraulic analysis.

* According to NOAA Atlas 14, the 1,000 year storm event for Petersburg, Indiana = 7.22 inches of precipitation for the 6-hr storm.

* According to the General Guidelines for New Dams and Improvements to Existing Dams in Indiana 2001, Section 4.2.3 for a Tc less than 6 hours, a 6-hour storm event is used. All of the CCR ponds at Petersburg have a Tc of less than 6 hours.

* The model was setup using a Type B storm event in accordance with the General Guidelines for New Dams and Improvements to Existing Dams in Indiana, Section 4.2.3.

* Storm water that falls near the generating station is collected and pumped to Pond A. It is assumed that this flow is 2,000 gpm (4.5 cfs), based on information from IP&L personnel.

* The fly ash at the generating station is handled by a dry ash handling system and is not discharged to the ash ponds. Bottom ash is sluiced to Pond A via a pipe that discharges at a rate of approximately 450 gpm (1 cfs), based on information provided by IP&L personnel.

* Ponds B and C are out of service, i.e., no CCR is sluiced to these ponds. Pond C is full of CCR to approximately elevation 454 on the northeast side. The CCR slopes to the outlet at a slope of approximately 0.5%. Pond B is full of CCR and is being filled with more CCR to create a mound with a 5% slope for the final grades for closure. A portion of Pond B is currently being used as a equipment storage area for construction at the site.

* A portion of Pond A (15 acres) has been filled in and a waste water treatment plant is being constructed in this location. Once the waste water treatment plant is complete, bottom ash will be sluiced to the WWTP for treatment and all of the CCR ponds will be taken out of service. Storm water runoff from the WWTP drains to Pond A.

* Outlets — Outlet Information is from IPL survey information and 8/22/16 SCS Engineers site visit.

  Pond C - Pond C has a concrete outlet structure with stop logs to control the water level. This structure This outlet structure drains via a 24" culvert to a swale located southeast of Pond C which drains to Pond A through a 30" diameter reinforced concrete pipe. The elevation of the stop logs is 3 ft below the elevation of the crest of the berm for Pond C.

  Pond B - Pond B has a concrete outlet structure similar to the one in Pond C. This outlet structure drains to Pond A. The elevation of the stop logs is 4 ft below the crest of the berm for Pond B.

Pond A - Pond A flows to Pond A-Discharge via 2 - 36" diameter reinforced concrete pipes. The invert elevation of the pipes is 3.5 ft below the crest of the berm for Pond A.
There is an emergency spillway on the berm between Pond A and Pond A-Discharge. The spillway is 45 ft wide at an elevation of 437.5 and side slopes of 10:1.

Pond A-Discharge has a concrete outlet structure with a 6-ft wide sharp edge weir.
This outlet structure drains to a 24" diameter reinforced concrete pipe (RCP) that drains to the White River.
Based on measurments made during a August 2016 site visit, the elevation of the weir is 4 feet below the crest of the berm for Pond A-Discharge.
There is an emergency spillway on the berm between Pond A-Discharge and the White River. The spillway is 45 ft wide at an elevation of 437.0 and side slopes of 10:1.

Storage of each pond is calculated using AutoCAD to trace the outline of the pond on a drawing and calculating the area of the pond and interior contours assuming 3H:1V interior side slopes. It is assumed that the storage volume above the invert of the outlet of Pond A and A-Discharge is available for water storage.

Pond A-Discharge	Elevation	Area (ac)
	440	6.3
	438	6.0
	436	5.7

Pond A	Elevation	Area (ac)
	440	52.2
	438	51.1
	436	50.0

Pond B	Elevation	Area (ac)
	455	24.2
	454	1.7
	453	1.1
	452	0.7
	451	0.3

Pond C	Elevation	Area (ac)
	455	28.2
	453	13.5
	451	2.0

* To model precipitation falling directly into Ponds A and A-Discharge, a Tc of 0 was used.

* Assume the water level at the start of the storm event is level with the outlet of the pond.

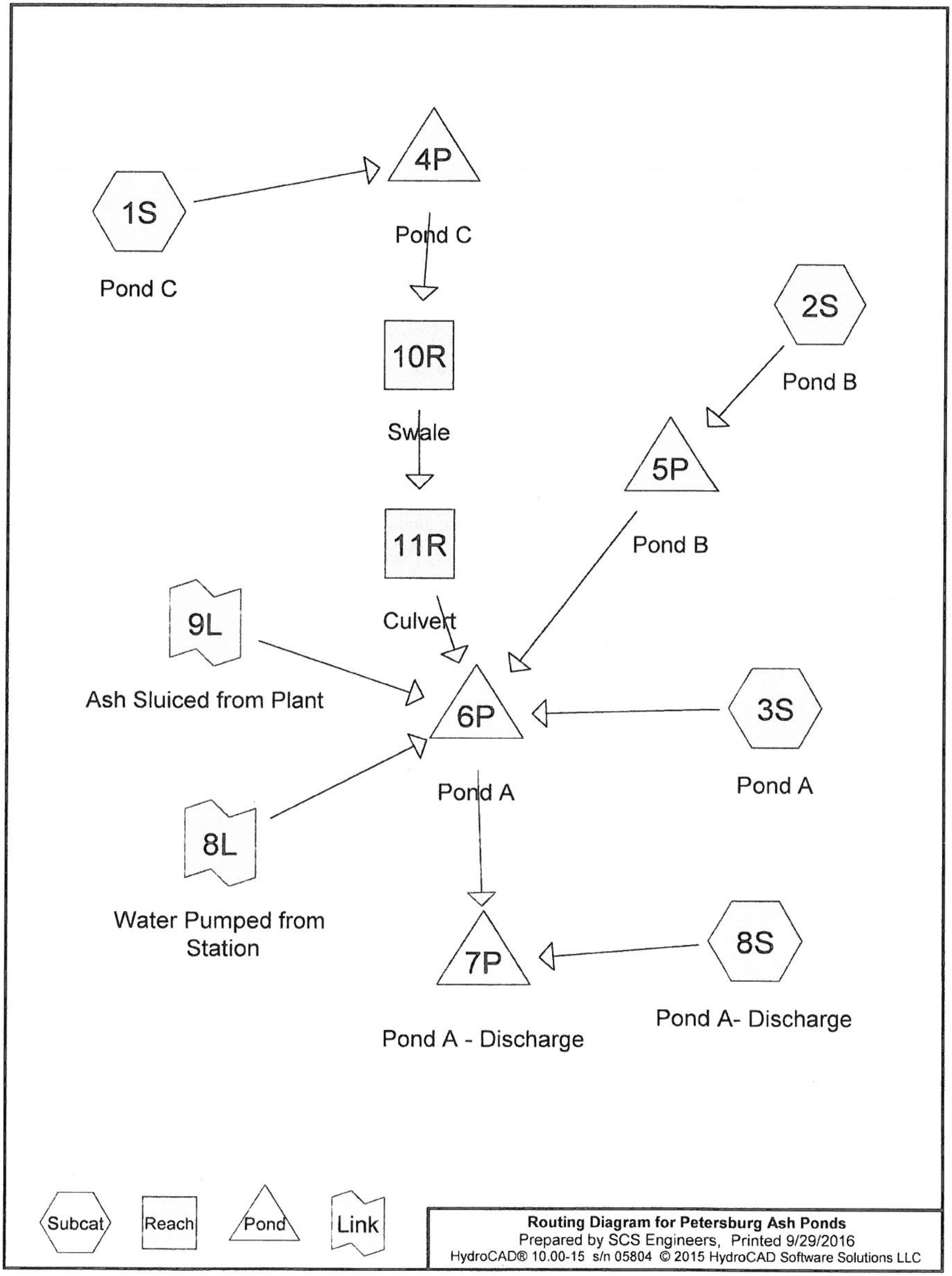
Results

For Significant Hazard Ponds (1,000-yr storm)

Pond	Maximum Water Elevation	Minimum Freeboard (ft)	Maximum Outflow (cfs)
A-Discharge	437.05	2.9	15.7
A	437.65	2.4	19.0
C	453.20	1.8	11.1

A freeboard amount of 1.0 foot or greater is considered adequate to prevent overtopping of the pond.
From Part 650 Engineering Field Handbook by USDA Natural Resources Conservation Service (NRCS), Chapter 11 - Ponds and Reservoirs.

Therefore, all of the ponds at Petersburg Station have adequate freeboard for the design storm event.


1S
Pond C
4P
Pond C
10R
Swale
11R
Culvert
2S
Pond B
5P
Pond B
9L
Ash Sluiced from Plant
6P
Pond A
3S
Pond A
8L
Water Pumped from Station
7P
Pond A - Discharge
8S
Pond A- Discharge
Subcat
Reach
Pond
Link
Routing Diagram for Petersburg Ash Ponds
Prepared by SCS Engineers, Printed 9/29/2016
HydroCAD® 10.00-15 s/n 05804 © 2015 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Pond C

Runoff = 153.56 cfs @ 2.52 hrs, Volume= 16.967 af, Depth= 7.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type B 6-hr 1,000-yr Rainfall=7.22"

	Area (ac)	CN	Description
*	28.200	100	Ash
	28.200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	100	0.0050	0.79		**Sheet Flow, Ash surface** Smooth surfaces n= 0.011 P2= 3.17"
3.5	300	0.0050	1.44		**Shallow Concentrated Flow, Ash** Paved Kv= 20.3 fps
7.8	1,000	0.0050	2.14	10.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.035 Earth, dense weeds
13.4	1,400	Total			

Summary for Subcatchment 2S: Pond B

Runoff = 136.11 cfs @ 2.45 hrs, Volume= 14.560 af, Depth= 7.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type B 6-hr 1,000-yr Rainfall=7.22"

	Area (ac)	CN	Description
*	19.000	100	Ash
*	5.200	100	Equipment Storage Area
	24.200	100	Weighted Average
	24.200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	1.98		**Sheet Flow, Ash** Smooth surfaces n= 0.011 P2= 3.17"
1.7	450	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.0	1,300	0.0050	5.40	107.95	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.022 Earth, clean & straight
6.5	1,850	Total			

Summary for Subcatchment 3S: Pond A

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 380.42 cfs @ 2.39 hrs, Volume= 40.432 af, Depth= 7.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type B 6-hr 1,000-yr Rainfall=7.22"

	Area (ac)	CN	Description
*	52.200	100	Ash Pond
*	15.000	98	WWTP / Asphalt
	67.200	100	Weighted Average
	67.200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, Pond A**

Summary for Pond 4P: Pond C

Inflow Area = 28.200 ac,100.00% Impervious, Inflow Depth = 7.22" for 1,000-yr event
Inflow = 153.56 cfs @ 2.52 hrs, Volume= 16.967 af
Outflow = 11.07 cfs @ 6.13 hrs, Volume= 12.317 af, Atten= 93%, Lag= 216.9 min
Primary = 11.07 cfs @ 6.13 hrs, Volume= 12.317 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 452.00' Surf.Area= 8.150 ac Storage= 5.475 af
Peak Elev= 453.20' @ 6.13 hrs Surf.Area= 15.006 ac Storage= 19.220 af (13.745 af above start)

Plug-Flow detention time= 795.3 min calculated for 6.842 af (40% of inflow)
Center-of-Mass det. time= 480.1 min (655.3 - 175.2)

Volume	Invert	Avail.Storage	Storage Description
#1	451.00'	58.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
451.00	2.800	0.000	0.000
453.00	13.500	16.300	16.300
455.00	28.200	41.700	58.000

Device	Routing	Invert	Outlet Devices
#1	Device 2	452.00'	**2.8' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	451.00'	**24.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 451.00' / 449.00' S= 0.0400 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=11.07 cfs @ 6.13 hrs HW=453.20' TW=449.54' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 11.07 cfs of 16.60 cfs potential flow)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 11.07 cfs @ 3.59 fps)

Summary for Pond 5P: Pond B

Inflow Area = 24.200 ac,100.00% Impervious, Inflow Depth = 7.22" for 1,000-yr event
Inflow = 136.11 cfs @ 2.45 hrs, Volume= 14.560 af
Outflow = 31.93 cfs @ 3.08 hrs, Volume= 14.560 af, Atten= 77%, Lag= 37.9 min
Primary = 31.93 cfs @ 3.08 hrs, Volume= 14.560 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 454.46' @ 3.08 hrs Surf.Area= 11.961 ac Storage= 5.874 af

Plug-Flow detention time= 86.8 min calculated for 14.554 af (100% of inflow)
Center-of-Mass det. time= 87.0 min (255.8 - 168.8)

Volume	Invert	Avail.Storage	Storage Description
#1	451.00'	15.705 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
451.00	0.290	0.000	0.000
452.00	0.660	0.475	0.475
453.00	1.110	0.885	1.360
454.00	1.690	1.400	2.760
455.00	24.200	12.945	15.705

Device	Routing	Invert	Outlet Devices
#1	Device 2	451.00'	**2.8' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	449.00'	**24.0" Round Culvert** L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 449.00' / 444.00' S= 0.0500 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=31.93 cfs @ 3.08 hrs HW=454.46' TW=437.19' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 31.93 cfs @ 10.16 fps)
  └─**1=Sharp-Crested Rectangular Weir** (Passes 31.93 cfs of 44.31 cfs potential flow)

Summary for Pond 6P: Pond A

```
Inflow Area =    119.600 ac,100.00% Impervious,  Inflow Depth >  7.85"   for  1,000-yr event
Inflow      =    420.25 cfs @   2.39 hrs,  Volume=       78.213 af
Outflow     =     18.98 cfs @   7.89 hrs,  Volume=       23.631 af,  Atten= 95%,  Lag= 329.8 min
Primary     =      9.86 cfs @   7.89 hrs,  Volume=       14.106 af
Secondary   =      9.11 cfs @   7.89 hrs,  Volume=        9.525 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 436.50' Surf.Area= 50.275 ac Storage= 25.069 af
Peak Elev= 437.65' @ 7.89 hrs Surf.Area= 50.909 ac Storage= 83.432 af (58.363 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 471.4 min (806.9 - 335.5)

Volume	Invert	Avail.Storage	Storage Description
#1	436.00'	204.400 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
436.00	50.000	0.000	0.000
438.00	51.100	101.100	101.100
440.00	52.200	103.300	204.400

Device	Routing	Invert	Outlet Devices
#1	Primary	436.50'	**36.0" Round Culvert X 2.00** L= 100.0' Ke= 0.300 Inlet / Outlet Invert= 436.50' / 436.00' S= 0.0050 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	437.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.50 Width (feet) 45.00 95.00

Primary OutFlow Max=9.86 cfs @ 7.89 hrs HW=437.65' TW=436.84' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 9.86 cfs @ 2.92 fps)

Secondary OutFlow Max=9.11 cfs @ 7.89 hrs HW=437.65' TW=436.84' (Dynamic Tailwater)
└─**2=Custom Weir/Orifice** (Weir Controls 9.11 cfs @ 1.28 fps)

Summary for Pond 7P: Pond A - Discharge

Inflow Area = 125.900 ac,100.00% Impervious, Inflow Depth > 2.61" for 1,000-yr event
Inflow = 37.09 cfs @ 2.39 hrs, Volume= 27.421 af
Outflow = 15.71 cfs @ 12.17 hrs, Volume= 21.997 af, Atten= 58%, Lag= 586.4 min
Primary = 13.89 cfs @ 12.17 hrs, Volume= 21.190 af
Secondary = 1.83 cfs @ 12.17 hrs, Volume= 0.808 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 437.05' @ 12.17 hrs Surf.Area= 5.858 ac Storage= 6.087 af

Plug-Flow detention time= 266.5 min calculated for 21.988 af (80% of inflow)
Center-of-Mass det. time= 129.9 min (847.8 - 717.9)

Volume	Invert	Avail.Storage	Storage Description
#1	436.00'	24.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
436.00	5.700	0.000	0.000
438.00	6.000	11.700	11.700
440.00	6.300	12.300	24.000

Device	Routing	Invert	Outlet Devices
#1	Device 2	436.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	435.50'	**24.0" Round Culvert** L= 200.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 435.50' / 432.00' S= 0.0175 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Secondary	437.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 3.00 Width (feet) 45.00 105.00

Primary OutFlow Max=13.89 cfs @ 12.17 hrs HW=437.05' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 13.89 cfs @ 5.30 fps)
↑—**1=Sharp-Crested Rectangular Weir** (Passes 13.89 cfs of 20.46 cfs potential flow)

Secondary OutFlow Max=1.83 cfs @ 12.17 hrs HW=437.05' (Free Discharge)
↑—**3=Custom Weir/Orifice** (Weir Controls 1.83 cfs @ 0.75 fps)

Summary for Link 8L: Water Pumped from Station

Inflow	=	4.50 cfs @	0.00 hrs,	Volume=	8.929 af
Primary	=	4.50 cfs @	0.00 hrs,	Volume=	8.929 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Constant Inflow= 4.50 cfs

Summary for Subcatchment 8S: Pond A- Discharge

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 35.66 cfs @ 2.39 hrs, Volume= 3.791 af, Depth= 7.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type B 6-hr 1,000-yr Rainfall=7.22"

	Area (ac)	CN	Description
*	6.300	100	Ash Pond
	6.300		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, Pond A-Discharge**

Summary for Link 9L: Ash Sluiced from Plant

Inflow	=	1.00 cfs @	0.00 hrs, Volume=	1.984 af	
Primary	=	1.00 cfs @	0.00 hrs, Volume=	1.984 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Constant Inflow= 1.00 cfs

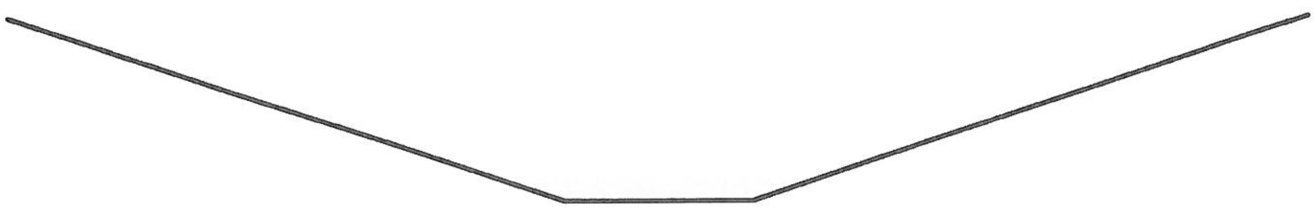
Summary for Reach 10R: Swale

Inflow Area = 28.200 ac,100.00% Impervious, Inflow Depth > 5.24" for 1,000-yr event
Inflow = 11.07 cfs @ 6.13 hrs, Volume= 12.317 af
Outflow = 11.07 cfs @ 6.15 hrs, Volume= 12.311 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.96 fps, Avg. Travel Time= 1.1 min

Peak Storage= 601 cf @ 6.15 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 4.00' Flow Area= 64.0 sf, Capacity= 723.31 cfs

4.00' x 4.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 28.00'
Length= 200.0' Slope= 0.0250 '/'
Inlet Invert= 449.00', Outlet Invert= 444.00'



Summary for Reach 11R: Culvert

[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 10R OUTLET depth by 0.18' @ 6.18 hrs

Inflow Area = 28.200 ac,100.00% Impervious, Inflow Depth > 5.24" for 1,000-yr event
Inflow = 11.07 cfs @ 6.15 hrs, Volume= 12.311 af
Outflow = 11.07 cfs @ 6.15 hrs, Volume= 12.308 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.61 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 7.82 fps, Avg. Travel Time= 0.6 min

Peak Storage= 345 cf @ 6.15 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 62.58 cfs

30.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 300.0' Slope= 0.0167 '/'
Inlet Invert= 444.00', Outlet Invert= 439.00'

an AES company

Indianapolis Power & Light Company
Petersburg Generating Station

Liner Documentation for Existing CCR Surface Impoundments

Prepared by

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S&L Project No. 10572-085

Rev. 0
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Issue Purpose: Use

1 LINER DOCUMENTATION

Federal CCR Rule Reference: 40 CFR 257.71(a)(1)

Indianapolis Power & Light Company (IPL) operates the Petersburg Generating Station (PS). The site's existing coal combustion residual (CCR) surface impoundments – Pond A, Pond A', and Pond C – presently accept CCR and are planned to be closed in the future. This document addresses the liner design to satisfy 40 CFR 257.71(a)(1):

> "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:
>
> (i) 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;
>
> (ii) A composite liner that meets the requirements of § 257.70(b); or
>
> (iii) An alternative composite liner that meets the requirements of § 257.70(c)."

While the PS existing CCR surface impoundments were constructed with compacted soil, ash, and/or clay, they do not meet the requirements above. Therefore, for the purposes of 40 CFR 257.71(a)(1), Ponds A, A', and C are considered to be existing unlined CCR surface impoundments and are subject to 40 CFR 257.101(a).

2 CERTIFICATION

<u>Federal CCR Rule Reference: 40 CFR 257.71(b)</u>

The documentation presented herein to meet the requirements of 40 CFR 257.71(a) is accurate.

I certify that this document was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Indiana.

Certified By: ______________________ Date: 10-14-2016

Seal:

DAVID E. NIELSON
REGISTERED
No. PE10300076
STATE OF
INDIANA
PROFESSIONAL ENGINEER

10-14-2016

EXP- 7-31-2018