ALLIANT ENERGY
Wisconsin Power and Light Company
Nelson Dewey Generating Station

CCR SURFACE IMPOUNDMENT

INFLOW DESIGN FLOOD CONTROL PLAN

Report Issued: September 20, 2016
Revision 0

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

EXECUTIVE SUMMARY

This Inflow Flood Control Plan (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 and effective October 19, 2015.

This Report assesses the hydrologic and hydraulic capacity requirements for each CCR unit at Nelson Dewey Generating Station in Cassville, Wisconsin in accordance with §257.82 of the CCR Rule. For purposes of this Report, a CCR unit is defined as any existing CCR surface impoundment. Primarily, the Report documents how the inflow design flood control system has been designed and constructed to meet the CCR Rule section §257.82.

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1 Introduction

The owner or operator of the Coal Combustion Residual (CCR) unit must conduct an initial and periodic inflow design flood control system plan to determine if each CCR unit adequately manages flow into and from each CCR unit during and following the peak discharge of the inflow design flood. The inflow design flood is selected based on the hazard potential classification (§257.73(a)(2)) for each CCR unit.

This Report is prepared in accordance with the requirements of §257.82 of the CCR Rule.

1.1 CCR Rule Applicability

The CCR Rule requires an initial and periodic inflow design flood control system plan certified by a qualified professional engineer (PE) for all existing CCR surface impoundments. This report is the initial inflow design flood control system plan.

1.2 Hydrologic and Hydraulic Capacity Applicability

The Nelson Dewey Generating Station (NED) in Cassville, Wisconsin (Figure 1) has one existing CCR surface impoundment, identified as follows:

- NED Slag Pond

Wisconsin Power and Light Company also has one inactive CCR surface impoundment, the NED WPDES Pond. The NED WPDES Pond will be handled under a separate transmittal in accordance with the CCR Rule, if needed, and is not discussed further herein.

2 FACILITY DESCRIPTION

NED is located north of the Village of Cassville, Wisconsin on the eastern shore of the Mississippi River in Grant County, at 11999 County Highway VV, Cassville, Wisconsin (Figure 1). Located north of the generating plant is Stonefield Village (a state historical landmark) and Nelson Dewey State Park.

NED was a fossil-fueled electric generating station consisting of two steam electric generating units that were retired in December 2015. Sub-bituminous coal was the primary fuel for producing steam. The burning of coal produces a by-product of CCR. The CCR at NED was categorized into two types, slag and fly ash. The fly ash was collected by the electrostatic precipitators and pneumatically conveyed to the on-site fly ash storage silo that is equipped with a baghouse for dust control. The fly ash was then transported off-site for beneficial reuse. The slag was sluiced to a surface impoundment identified as the NED Slag Pond (Figure 2). The NED Slag Pond is located northwest of the generating plant and is presently the only existing CCR surface impoundment at NED.

General Facility Information:

Date of Initial Facility Operations:	1959
WPDES Permit Number:	WI-0002381-07-0
Latitude / Longitude:	42° 43′ 30.792″ N -91° 0′ 40.032″ W
Unit Nameplate Ratings:	Unit 1 (1959): 100 MW
	Unit 2 (1961): 100 MW

2.1 NED Slag Pond

The NED Slag Pond is located northwest of the generating plant and south of the on-site closed ash landfill, Figure 2. The NED Slag Pond receives storm water runoff from part of the on-site closed ash landfill, and the slag handling area. The NED Slag Pond was the primary receiver of process flows from the generating plant prior to December 31, 2015 when the facility's generating units retired. Wastewater was also periodically pumped from the NED WPDES Pond to the NED Slag Pond. Process flows, prior to the facility ceasing operations, included sluiced CCR (slag) from the slag tanks located inside the generating plant, and flows associated with the seal well sump pumps. Flows from the seal well sump pumps included soot blowers, air compressors, boiler blowdown, Unit 1 and Unit 2 floor sumps, oil and hydrogen coolers and demineralization/reverse osmosis multi-media units.

Prior to the facility ceasing operations, the sluiced slag was discharged into the east end of the NED Slag Pond where the majority of CCR was recovered. A dozer was used to push the CCR towards an excavator for dredging. Prior to October 19, 2015, the dredged CCR was stockpiled adjacent to the NED Slag Pond for dewatering. Once dewatered, the CCR was transported off-site for beneficial use. CCR has not been added to any stockpiles outside of the NED Slag Pond on or after October 19, 2015, the effective date of the CCR Rule.

The water used to sluice the CCR from the generating plant to the NED Slag Pond flowed from the east end to the west end of the NED Slag Pond. The southwest corner of the NED Slag Pond consists of the facility's Wisconsin Pollution Discharge Elimination System (WPDES) Outfall 002. The concrete outfall structure includes a rectangular weir restriction that discharges into a 30-inch diameter reinforced concrete pipe (RCP). The water flows through the WPDES Outfall 002, under the embankment on the west side of the NED Slag Pond, and discharges into a riprap lined swale that flows to the southwest into the Mississippi River.

The surface area of the NED Slag Pond is approximately 4.8 acres and has an embankment height of approximately 15 feet from the crest to the toe of the downstream slope. The interior storage depth of the NED Slag Pond is approximately 10 feet. The total volume of impounded CCR and water within the NED Slag Pond is approximately 75,000 cubic yards.

3 HYDROLOGIC AND HYDRAULIC CAPACITY- §257.82(a)

This Report provides hydrologic and hydraulic capacity information for inflow design flood control systems which is intended to:

1. Adequately manage flow into each CCR unit during and following the peak discharge inflow of the specified design flood,
2. Adequately manage flow from each CCR unit during and following the peak discharge inflow of the specified design flood; and,
3. Handle discharge from the CCR unit in accordance with National Pollutant Discharge Elimination System (NPDES) regulations §257.3-3.

3.1 Hazard Classification and Design Storm

The NED Slag Pond is classified as a low hazard potential because a release from the CCR surface impoundment would principally be limited to the facility property with low economic losses and environmental damages.

The design storm for the NED Slag Pond is the 100 year return event SCS Type II 24 hour storm as defined in 40 CFR 257.82 (3) (ii). The total rainfall for the event selected from the National Oceanographic and Atmospheric Administration's probabilistic map for the NED site coordinates is 7.5 inches for the 100 year event, Appendix A.

3.2 Hydrologic and Hydraulic Capacity Methods

The impoundment discharges through a 2 foot wide overflow weir set at elevation 615.3 feet above mean sea level in a concrete wet well in the west corner of the impoundment. The overflowing water discharges through a flush face 30-inch diameter RCP pipe at invert elevation 615.0 feet. The water flows by pipe through the NED Slag Pond embankment and into a swale, which discharges to the Mississippi River. The overflow weir is 2 foot wide and 1.1 foot high and was used to monitor flow from the NED Slag Pond up to a stage of 1.1 foot above the bottom of the weir. During a large rainfall event the flow will exceed the weir capacity and overflow the weir which is installed in the six foot wide wet well, Appendix B. Therefore, the NED Slag Pond outlet is modeled as a combined overflow weir action and entrance controlled pipe culvert outlet, Appendix B.

The 100 year SCS Type II Storm routing was completed using the program Hydraflow by Intelisolve[1]. Hydraflow uses the unit hydrograph method to generate a Type II distributed rainfall for the contributing drainage area of 30 acres, Figure 2. Hydraflow routes the unit hydrograph through the outlet structure of the NED Slag pond storing water within the impoundment in accordance with the input reservoir capacity, Appendix C. The proportion of runoff to rainfall for the drainage is input based on the infiltration characteristics of the area.

3.3 Hydrologic and Hydraulic Capacity Input and Assumptions

This section identifies the input and assumptions for the hydrologic and hydraulic capacity calculations. The input for the 30 acre drainage area, Figure 2, is assigned an average runoff Curve Number (CN) of 83, a slope of 4% and a hydraulic length of 690 feet. The slope and hydraulic length for the closed landfill control the arrival of the peak water from rainfall due to the percentage of acreage from the landfill area.

There is no operating water flow from the closed facility into the NED Slag Pond with the exception of a *de minimis* flow of sump water from the basement floor sumps. Normal water elevation in the impoundment is related to the water elevation in the adjacent Mississippi River. The normal pool for the river at Cassville is approximately 603 feet flat pool and the flood stage is 614.5 feet, United States Army Corps of Engineers. At flood stage, the outlet of the NED Slag Pond will not be submerged and the NED Slag Pond water elevation is assumed to be at the bottom of the outlet weir 615.3 feet at the beginning of the storm routing.

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[1] Intelisolve, Pond Routing Software Hydraflow, 2002

4 Inflow Design Flood Control System Plan

The 30 acres of storm water flow into the NED Slag Pond will discharge from the outlet at a maximum flow of 22.2 cubic feet per second during the storm. The NED Slag Pond will store 7.9 acre feet of water during the event and the maximum water elevation will reach 617.1 feet. The minimum crest elevation of the embankment is elevation 620 on the southeast corner with a resultant freeboard of 2.9 feet at the peak of the storm flow.

The results of the storm routing through the NED Slag Pond using Hydraflow are presented in Appendix D.

5 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

To meet the requirements of 40 CFR 257.82(c)(5), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Wisconsin; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.82.

WISCONSIN
MARK W.
LOEROP
E-43783-6
NAPERVILLE
IL
PROFESSIONAL ENGINEER

By:

Name: MARK LOEROP

Date: SEP 20, 2016

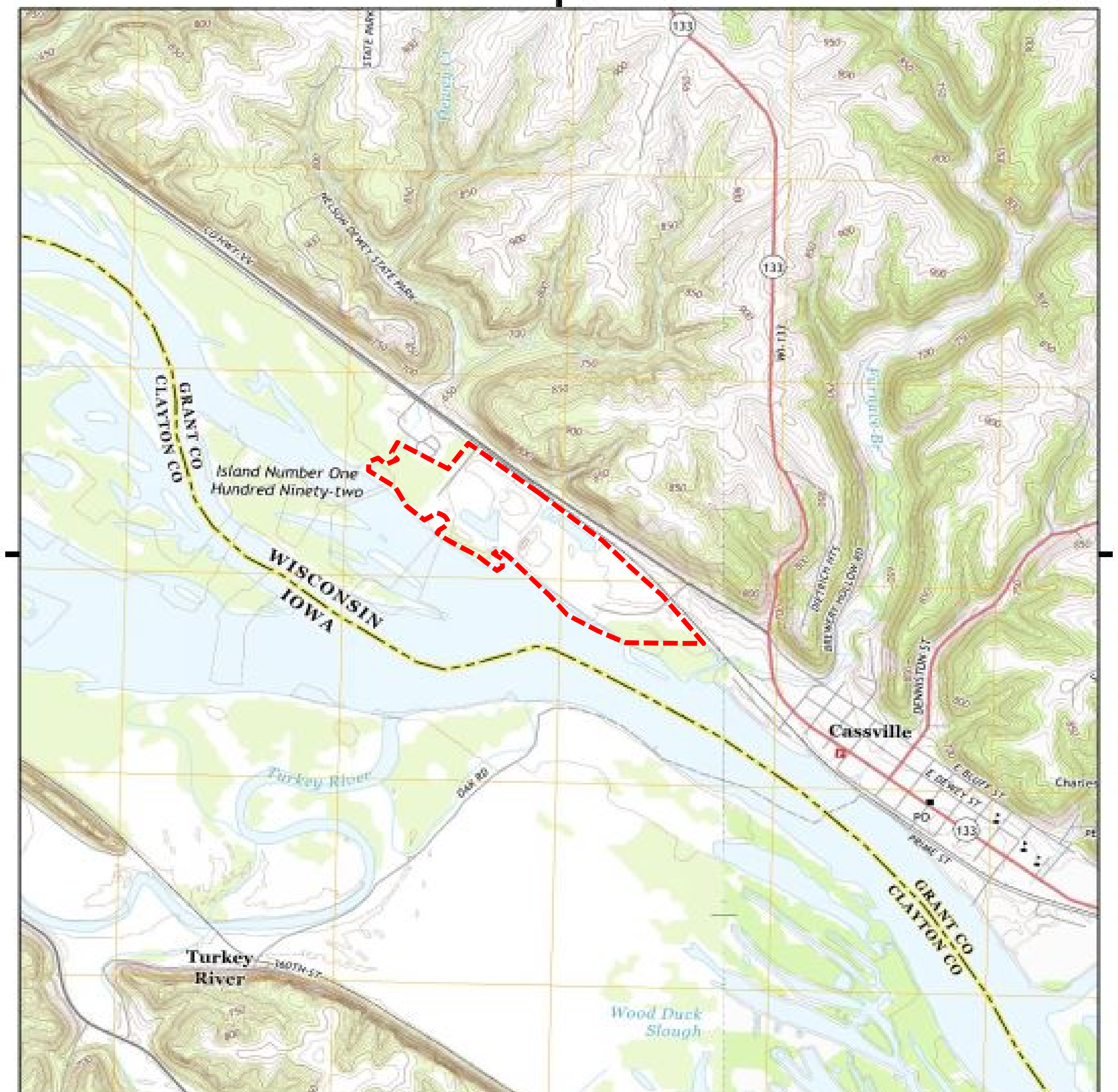
FIGURES

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Inflow Design Flood Control System Plan

Historical Topo Map

2013



This report includes information from the following map sheet(s).

Miles 0.25 0.5 1 1.5

NW N NE W E SW S SE

TP, Turkey River, 2013, 7.5-minute

SE, Cassville, 2013, 7.5-minute

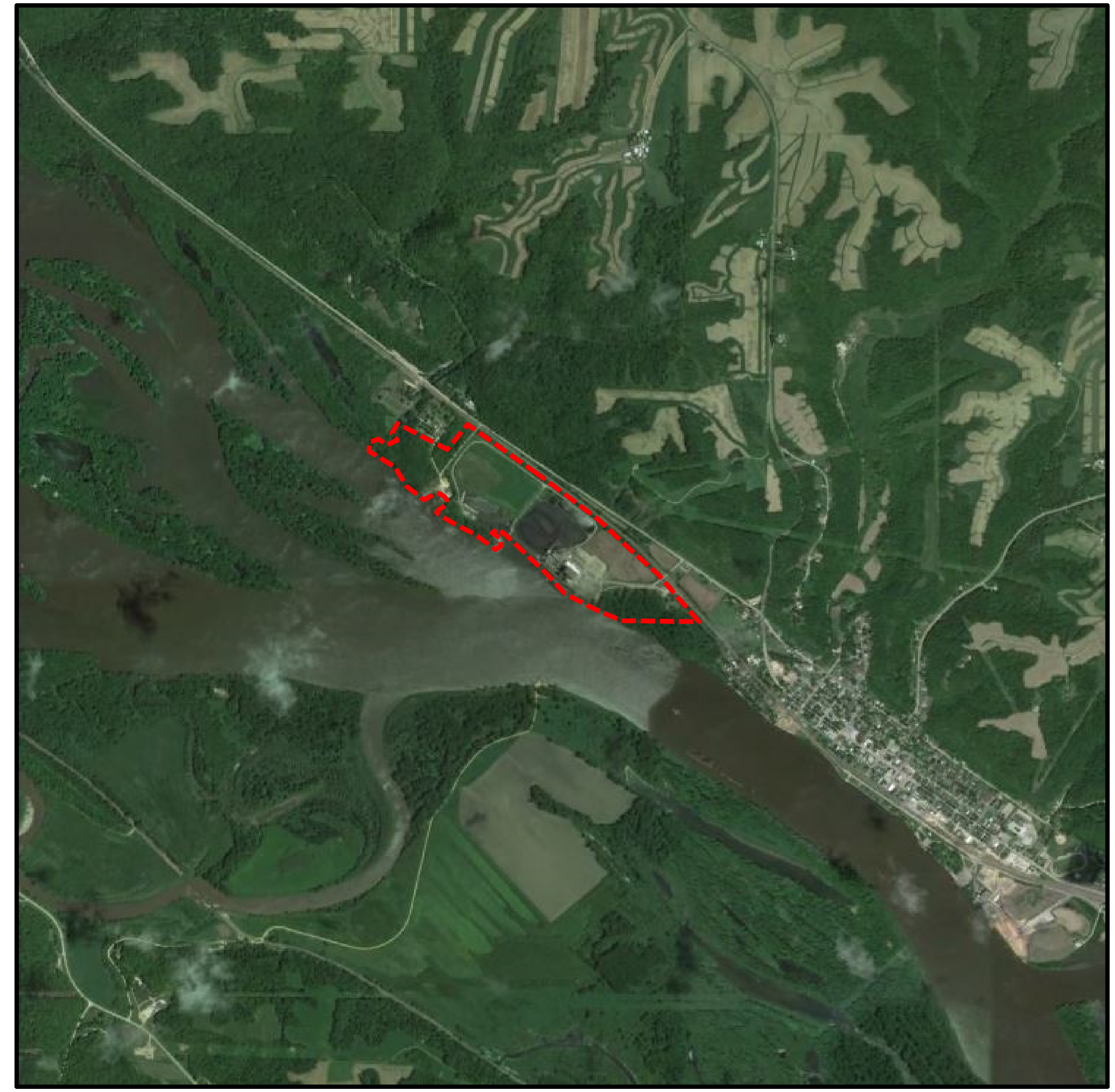
SITE NAME: Nelson Dewey Generating Station

ADDRESS: 11999 County Highway VV
Cassville, WI 53806

CLIENT: Environmental Site Assessors

4555570 - 11 page 4

Historical Aerial Photo 5/30/2015



Approximate Property Boundary

HARD HAT SERVICES ™
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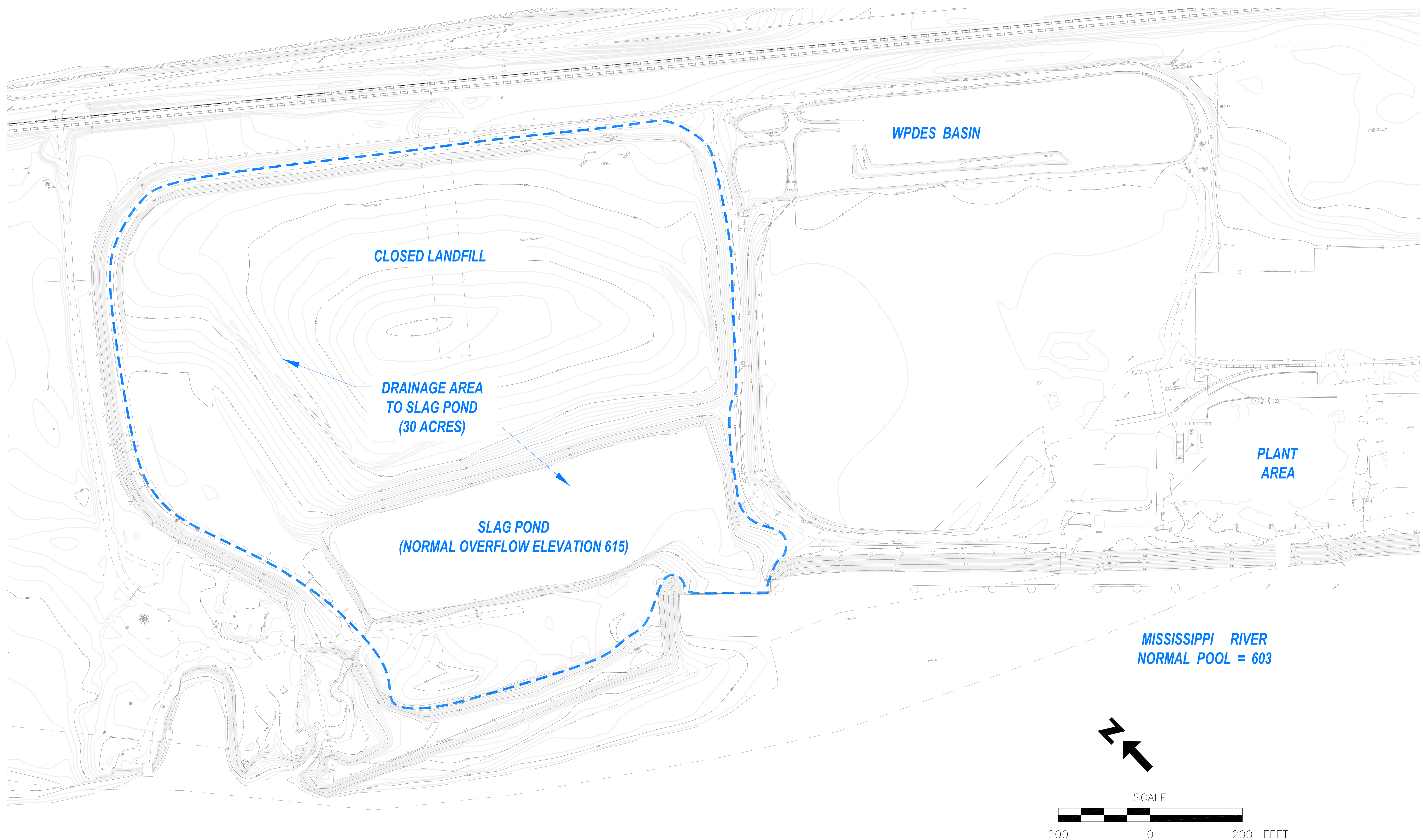
Site Location
Nelson Dewey Generating Station
Wisconsin Power and Light Company

Drawing
Figure 1

Date
7/13/2016



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat™ SERVICES

SCALE:	AS SHOWN
DATE:	8-22-16
DRAWN BY:	JFD
CHKD BY:	TJH
APRVD BY:	MWL

CLIENT / LOCATION
WISCONSIN POWER AND LIGHT
NELSON DEWEY GENERATING STATION
CASSVILLE, WISCONSIN

DRAWING DESCRIPTION
INFLOW DESIGN FLOOD CONTROL PLAN
SITE PLAN

JOB 154.018.012.007
SHT. 2
DWG. 154018012-IFC

APPENDIX A – NOAA Storm Frequency Tabulation

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Inflow Design Flood Control System Plan

NOAA Atlas 14, Volume 8, Version 2
Location name: Cassville, Wisconsin, US*
Latitude: 42.7246°, Longitude: -91.0095°
Elevation: 624 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

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	**0.373** (0.299-0.470)	**0.439** (0.351-0.554)	**0.551** (0.439-0.695)	**0.647** (0.512-0.819)	**0.784** (0.602-1.02)	**0.893** (0.670-1.18)	**1.01** (0.730-1.35)	**1.12** (0.782-1.54)	**1.29** (0.861-1.80)	**1.41** (0.921-2.00)
10-min	**0.547** (0.437-0.688)	**0.643** (0.514-0.811)	**0.806** (0.642-1.02)	**0.947** (0.750-1.20)	**1.15** (0.882-1.50)	**1.31** (0.981-1.72)	**1.47** (1.07-1.98)	**1.65** (1.15-2.26)	**1.88** (1.26-2.64)	**2.07** (1.35-2.93)
15-min	**0.667** (0.533-0.839)	**0.784** (0.627-0.989)	**0.984** (0.783-1.24)	**1.16** (0.915-1.46)	**1.40** (1.08-1.83)	**1.60** (1.20-2.10)	**1.80** (1.30-2.41)	**2.01** (1.40-2.75)	**2.30** (1.54-3.22)	**2.52** (1.64-3.57)
30-min	**0.917** (0.734-1.16)	**1.09** (0.868-1.37)	**1.37** (1.09-1.73)	**1.61** (1.28-2.04)	**1.96** (1.50-2.56)	**2.24** (1.68-2.94)	**2.52** (1.83-3.38)	**2.82** (1.96-3.86)	**3.22** (2.16-4.51)	**3.54** (2.31-5.01)
60-min	**1.18** (0.947-1.49)	**1.39** (1.11-1.76)	**1.77** (1.41-2.23)	**2.10** (1.66-2.66)	**2.59** (2.00-3.41)	**3.00** (2.26-3.98)	**3.44** (2.50-4.64)	**3.90** (2.73-5.38)	**4.56** (3.06-6.42)	**5.09** (3.32-7.20)
2-hr	**1.45** (1.17-1.81)	**1.70** (1.38-2.12)	**2.16** (1.74-2.70)	**2.58** (2.07-3.24)	**3.23** (2.53-4.22)	**3.77** (2.87-4.97)	**4.36** (3.20-5.85)	**4.99** (3.52-6.85)	**5.90** (4.00-8.26)	**6.64** (4.36-9.34)
3-hr	**1.63** (1.32-2.01)	**1.89** (1.54-2.35)	**2.40** (1.94-2.98)	**2.88** (2.32-3.59)	**3.64** (2.88-4.77)	**4.29** (3.30-5.65)	**5.01** (3.71-6.72)	**5.81** (4.12-7.95)	**6.96** (4.74-9.73)	**7.90** (5.21-11.1)
6-hr	**1.95** (1.61-2.39)	**2.24** (1.84-2.74)	**2.80** (2.29-3.44)	**3.36** (2.73-4.14)	**4.27** (3.43-5.58)	**5.09** (3.96-6.67)	**6.00** (4.50-8.01)	**7.02** (5.04-9.58)	**8.52** (5.87-11.9)	**9.77** (6.50-13.6)
12-hr	**2.30** (1.92-2.79)	**2.59** (2.15-3.15)	**3.19** (2.64-3.87)	**3.79** (3.12-4.63)	**4.80** (3.90-6.22)	**5.70** (4.48-7.42)	**6.72** (5.09-8.92)	**7.88** (5.71-10.7)	**9.59** (6.66-13.3)	**11.0** (7.38-15.2)
24-hr	**2.64** (2.21-3.16)	**2.97** (2.49-3.56)	**3.64** (3.04-4.38)	**4.31** (3.58-5.20)	**5.40** (4.42-6.91)	**6.38** (5.06-8.20)	**7.47** (5.70-9.80)	**8.69** (6.35-11.7)	**10.5** (7.35-14.4)	**12.0** (8.11-16.5)
2-day	**2.96** (2.51-3.50)	**3.37** (2.86-4.00)	**4.16** (3.52-4.95)	**4.93** (4.14-5.88)	**6.14** (5.06-7.73)	**7.19** (5.75-9.12)	**8.35** (6.43-10.8)	**9.64** (7.09-12.8)	**11.5** (8.12-15.7)	**13.1** (8.90-17.8)
3-day	**3.23**	**3.65**	**4.44**	**5.21**	**6.44**	**7.51**	**8.71**	**10.0**	**12.0**	**13.6**

	(2.77-3.81)	(3.11-4.30)	(3.78-5.24)	(4.41-6.18)	(5.34-8.06)	(6.04-9.48)	(6.74-11.2)	(7.43-13.3)	(8.49-16.2)	(9.29-18.5)
4-day	**3.48** (2.99-4.08)	**3.89** (3.34-4.57)	**4.68** (4.01-5.51)	**5.46** (4.64-6.44)	**6.69** (5.57-8.33)	**7.77** (6.27-9.76)	**8.97** (6.97-11.5)	**10.3** (7.65-13.6)	**12.3** (8.71-16.5)	**13.9** (9.52-18.8)
7-day	**4.11** (3.57-4.78)	**4.60** (3.98-5.34)	**5.48** (4.73-6.39)	**6.30** (5.41-7.38)	**7.56** (6.32-9.27)	**8.64** (7.01-10.7)	**9.81** (7.66-12.4)	**11.1** (8.27-14.4)	**12.9** (9.22-17.3)	**14.4** (9.95-19.4)
10-day	**4.69** (4.09-5.41)	**5.25** (4.57-6.06)	**6.23** (5.41-7.21)	**7.10** (6.13-8.27)	**8.41** (7.04-10.2)	**9.49** (7.73-11.6)	**10.6** (8.34-13.4)	**11.9** (8.88-15.3)	**13.6** (9.75-18.1)	**15.0** (10.4-20.1)
20-day	**6.41** (5.66-7.32)	**7.13** (6.29-8.14)	**8.34** (7.33-9.55)	**9.38** (8.18-10.8)	**10.8** (9.14-12.9)	**12.0** (9.86-14.5)	**13.2** (10.4-16.4)	**14.5** (10.9-18.5)	**16.2** (11.7-21.2)	**17.5** (12.2-23.4)
30-day	**7.91** (7.03-8.96)	**8.78** (7.79-9.95)	**10.2** (9.03-11.6)	**11.4** (10.0-13.0)	**13.1** (11.0-15.4)	**14.3** (11.8-17.2)	**15.6** (12.4-19.2)	**17.0** (12.8-21.5)	**18.7** (13.6-24.4)	**20.1** (14.1-26.7)
45-day	**9.85** (8.81-11.1)	**11.0** (9.79-12.3)	**12.7** (11.3-14.4)	**14.2** (12.5-16.1)	**16.1** (13.7-18.8)	**17.6** (14.6-20.8)	**19.0** (15.1-23.2)	**20.4** (15.5-25.7)	**22.2** (16.2-28.8)	**23.6** (16.7-31.2)
60-day	**11.5** (10.4-12.9)	**12.9** (11.6-14.4)	**15.0** (13.4-16.8)	**16.7** (14.8-18.8)	**18.9** (16.1-21.9)	**20.5** (17.0-24.2)	**22.1** (17.6-26.7)	**23.6** (17.9-29.4)	**25.4** (18.5-32.8)	**26.8** (19.0-35.3)

[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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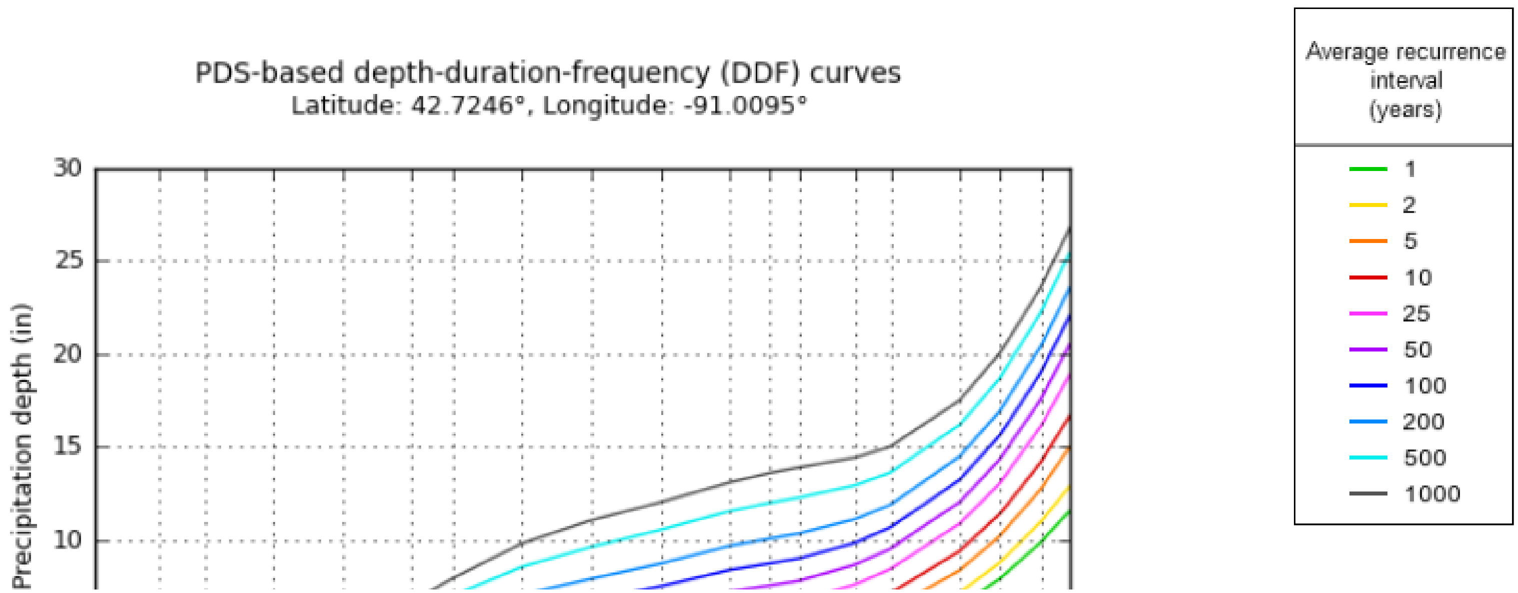
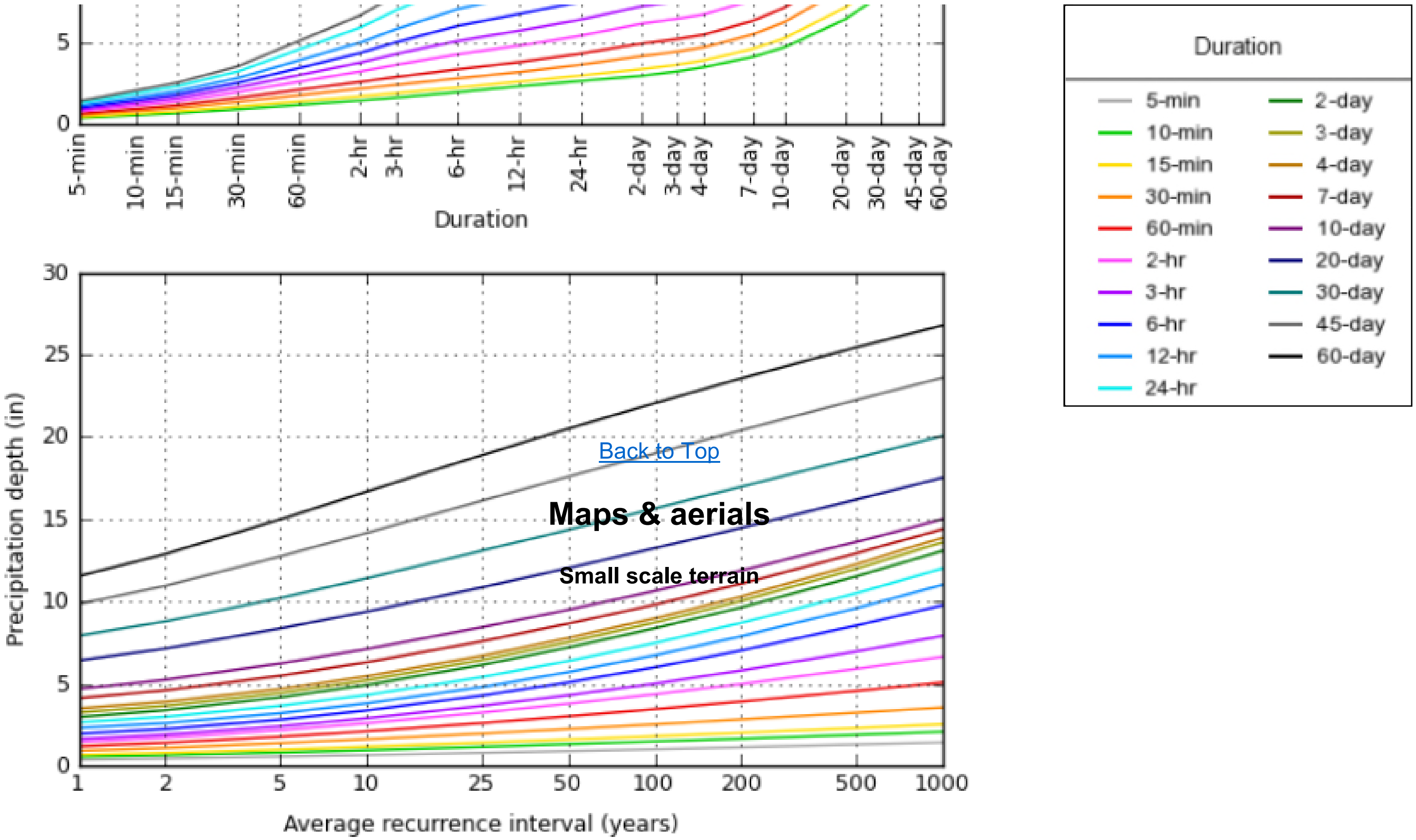
PF graphical





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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 8, Version 2 Created (GMT): Fri Aug 5 21:02:55 2016

Large scale map

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

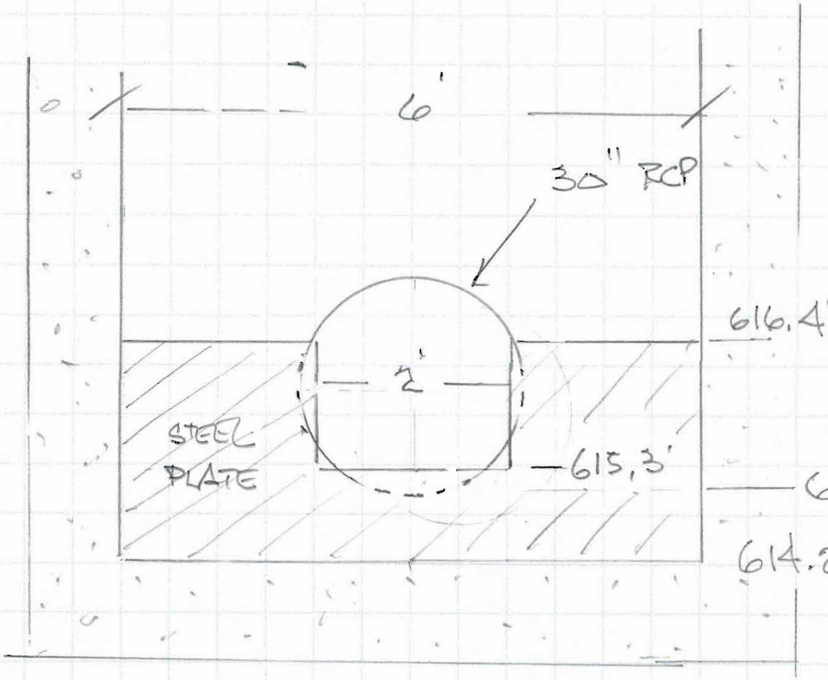
APPENDIX B – Wet Well and Overflow Weir Information and Picture

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Inflow Design Flood Control System Plan

PLAN VIEW-OUTFALL STRUCTURE
SCALE: 1/2" = 1'-0"
NOTE: SLAB REINFORCING SHOWN IS IN ADDITION TO THAT INDICATED ON SECTION 2/9
R-1650 NEENAH TYPE "C" LID
NEENAH R-1650 TYPE "C" LID
NEENAH R1981-W STEPS @ 16" o/c
FINISHED GRADE
4"x6" RECESS TO RECEIVE STOP LOGS
6" CONCRETE SLAB W/ 6x6-6/6 WWF
COMPACTED GRANULAR FILL
30" RCP
PRESS WEDGE II GASKET
1/9 SECTION SCALE 1/6"=1'-0"
2/9 SECTION SCALE 1/2"=1'-0"
3/9 SECTION SCALE 1/2"=1'-0"
4/9 SECTION SCALE 1"=1'-0"
TIMBER STOP LOG
5/9 SECTION SCALE 1/2"=1'-0"
6/9 SECTION SCALE 1"=1'-0"
7/9 SECTION SCALE: NONE
NOTE: REINFORCING SHOWN IS IN ADDITION TO THAT INDICATED ON SECTION 4
SEE SECTION 3/9 FOR WALL REINFORCING TYP.
3'-0"x3'-0" CORNER BARS TO MATCH WALL HOR. REINF.
WALL HOR. REINF.
NOTE: VERT. REINF. NOT SHOWN. PROVIDE SUFFICIENT VERTICAL SUPPORT BARS TO HOLD HOR. REINF. IN PROPER ALIGNMENT.
TYPICAL CORNER REINFORCING DETAIL CONCRETE WALLS
NOTES
1) MINIMUM CONCRETE COMPRESSIVE STRENGTH @ 2
2) REINFORCING BARS: ASTM A-615 GRADE 60
3) WELDED STEEL WIRE FABRIC: ASTM A-185 60,000 psi
4) FILL MATERIAL SHALL BE FREE DRAINING (LESS PASSING #200 SIEVE) GRANULAR MATERIAL
5) UNDER SLAB FILL SHALL BE COMPACTED TO 95 MAXIMUM DRY DENSITY, ASTM D1557
6) N.T.S. WHERE SHOWN INDICATES DRAWING NOT
NO. BY DATE REVISION
OUTFALL STRUCTURAL PLAN & DE
ASH DISPOSAL FACILIT
WISCONSIN POWER AND LIGHT CO
NELSON DEWEY GENERATING S
CASSVILLE, WISCONSIN
WARZYN
DRAWN GBH
CHECKED RAJ
APPROVED RWT
SCALE AS SHOWN
DATE 3-27-78

NELSON DEWEY OUTLET STRUCTURE



FROM WARZYN 2 OF 22 3-21-78

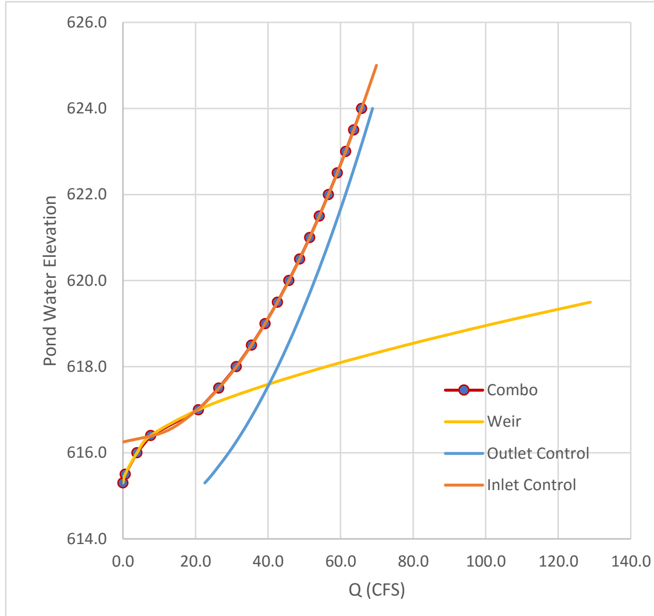
&

PICTURE OF WET WELL


2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
2.0
9
8
7
6
5
4
3
2
1

CASSville - Slag Pond Outlet Discharge Curve

2.5	FT = Pipe Diameter Steel
0.625	FT = Hydraulic Radius
3.1933	k in Q outlet control equation
615	FT = Pipe Inlet Invert Elevation
50	FT = Length
0.025	= n for RCP
0.6	= Co for Inlet Control
614.25	FT = Tail Water Elevation
2	FT = Weir Width (to 616.4')
3.3	= Weir Coefficient



OUTLET CONTROL / BARROW CONTROL

Q CFS	Elevation	Head Ft
22.579	615.3	1.0
24.636	615.5	1.3
29.15	616.0	1.8
33.053	616.5	2.3
36.541	617.0	2.8
39.725	617.5	3.3
42.671	618.0	3.8
45.427	618.5	4.3
48.025	619.0	4.8
50.489	619.5	5.3
52.839	620.0	5.8
55.088	620.5	6.3
57.249	621.0	6.8
59.332	621.5	7.3
61.344	622.0	7.8
63.292	622.5	8.3
65.181	623.0	8.8
67.018	623.5	9.3
68.805	624.0	9.8

Weir Equation

Q = Cw * L * H^1.5

H Ft	Q CFS	2 foot widt	+ 4' Width
615.3	0.0	0.0	
615.5	0.6	0.6	
616.0	3.9	3.9	
616.4	7.6	7.6	0
617.0	20.8	14.6	6.1
617.5	36.8	21.5	15.2
618.0	56.0	29.3	26.7
618.5	78.0	37.8	40.2
619.0	102.3	47.0	55.3
619.5	128.9	56.8	72.0

INLET CONTROL

Q CFS	Elevation	Head (to pipe middle) Ft
0	616.3	0
11.813	616.5	0.25
20.461	617.0	0.75
26.415	617.5	1.25
31.254	618.0	1.75
35.439	618.5	2.25
39.179	619.0	2.75
42.592	619.5	3.25
45.751	620.0	3.75
48.706	620.5	4.25
51.491	621.0	4.75
54.134	621.5	5.25
56.653	622.0	5.75
59.065	622.5	6.25
61.382	623.0	6.75
63.615	623.5	7.25
65.772	624.0	7.75
67.86	624.5	8.25
69.886	625.0	8.75

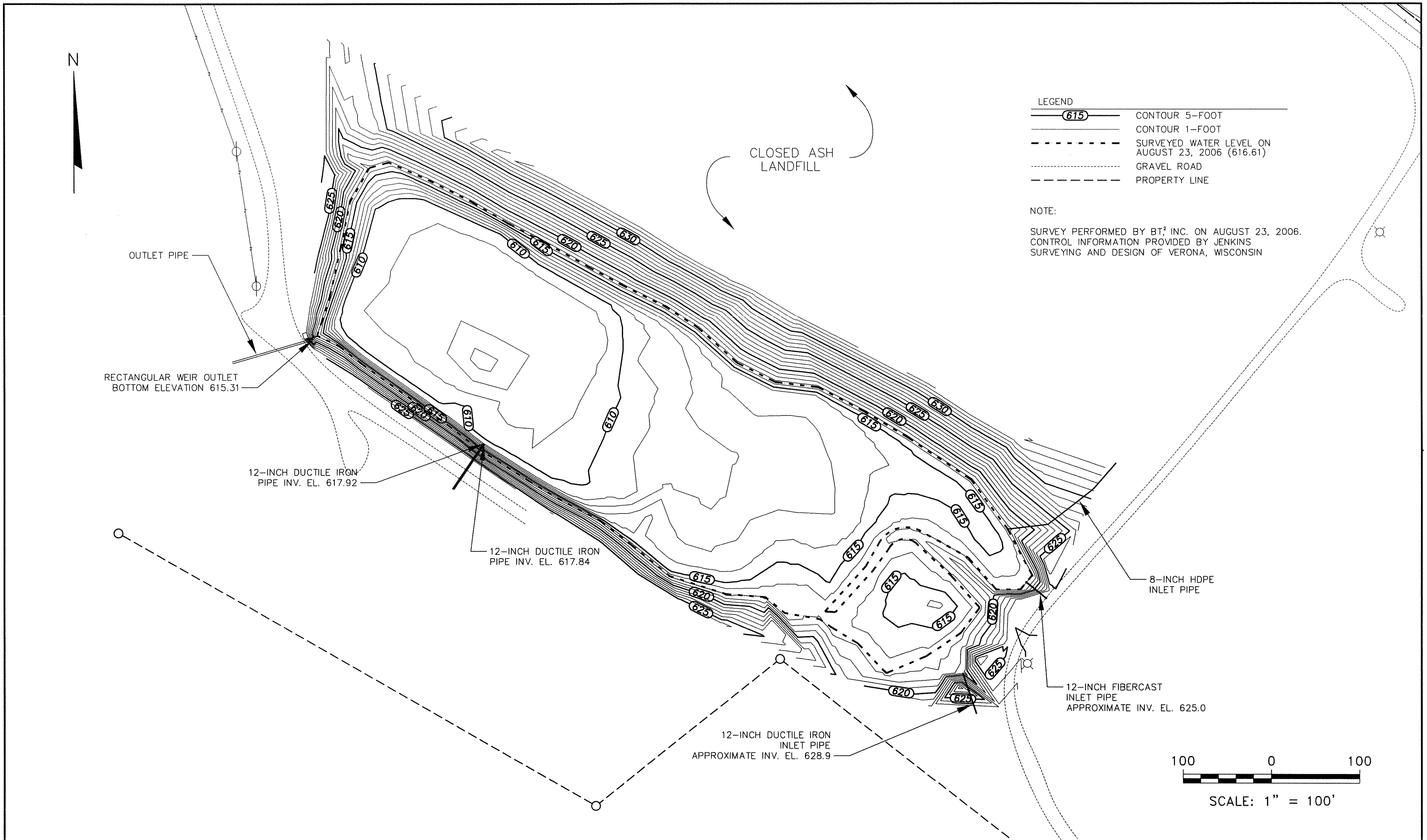
Combo Discharge Curve

615.3	0.0	Weir Control
615.5	0.6	
616.0	3.9	
616.4	7.6	
617.0	20.8	Inlet Control
617.5	26.4	
618.0	31.3	
618.5	35.4	
619.0	39.2	
619.5	42.6	
620.0	45.8	
620.5	48.7	
621.0	51.5	
621.5	54.1	
622.0	56.7	
622.5	59.1	
623.0	61.4	
623.5	63.6	
624.0	65.8	

APPENDIX C – NED Slag Pond Topography and

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Inflow Design Flood Control System Plan



PROJECT NO.	3197	DRAWN BY:	TR	ENGINEER: BT² inc. 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830 FAX: (608) 224-2839	CLIENT: ALLIANT ENERGY — ALLIANT ENERGY NELSON DEWEY ENERGY CENTER 11999 CTH VV CASSVILLE, WISCONSIN	SITE: ALLIANT NELSON DEWEY 11999 CTH VV CASSVILLE, WISCONSIN	SLAG POND TOPOGRAPHIC SURVEY
DRAWN:	08/29/06	CHECKED BY:	SC				SHEET
REVISED:	09/05/06	APPROVED BY:					2 OF 22

APPENDIX D – Inflow Flood Control Analysis

Alliant Energy
Wisconsin Power and Light Company
Nelson Dewey Generating Station
Cassville, Wisconsin

Inflow Design Flood Control System Plan

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

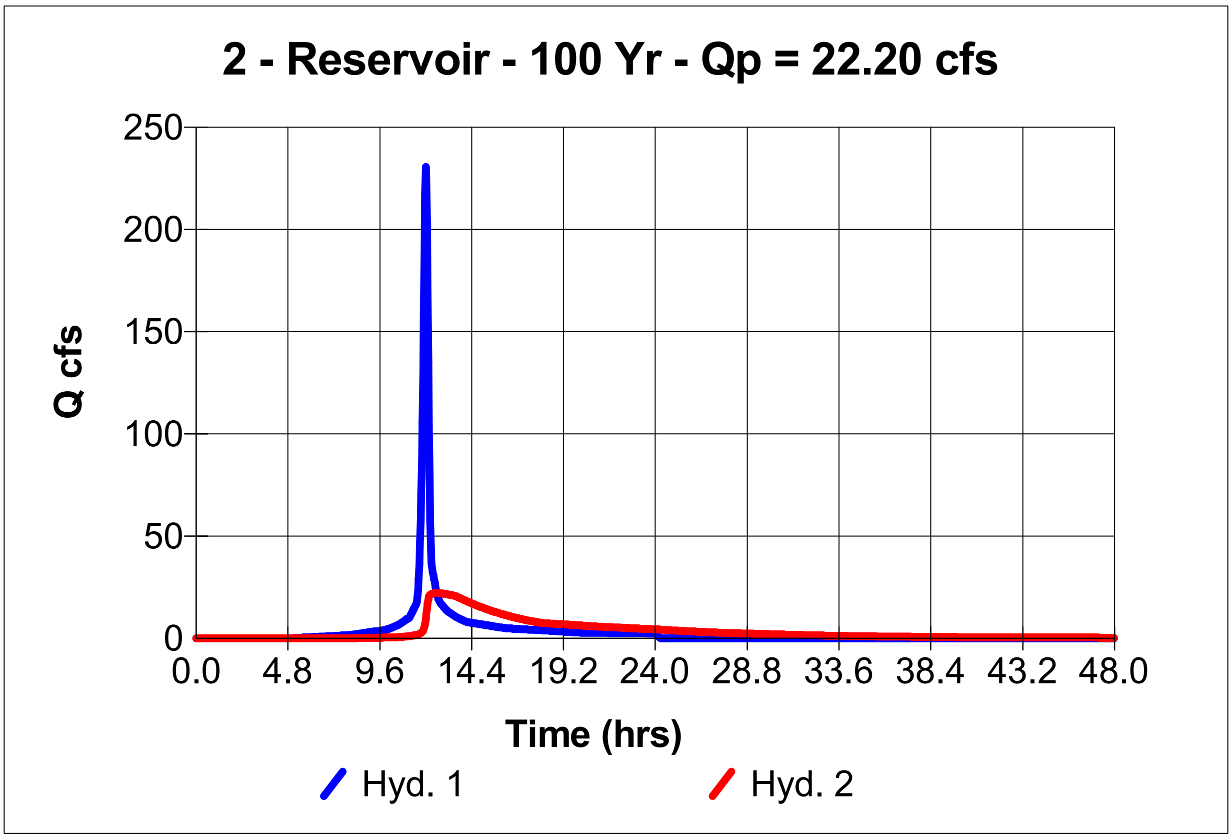
Hyd. No. 2

Slag Pond Outlflow

Hydrograph type	= Reservoir	Peak discharge	= 22.20 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 1	Reservoir name	= Slag Pond
Max. Elevation	= 617.13 ft	Max. Storage	= 7.940 acft

Storage Indication method used.

Hydrograph Volume = 13.564 acft



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	230.63	2	720	14.109	----	------	------	Capped Ash Landfill
2	Reservoir	22.20	2	754	13.564	1	617.13	7.940	Slag Pond Outlflow

Proj. file: Cassville Slag.gpw	Return Period: 100 yr	Run date: 08-11-2016

Hydrograph Report

Hyd. No. 1

Capped Ash Landfill

Hydrograph type	= SCS Runoff	Peak discharge	= 230.63 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 30.00 ac	Curve number	= 83
Basin Slope	= 4.0 %	Hydraulic length	= 690 ft
Tc method	= LAG	Time of conc. (Tc)	= 10.7 min
Total precip.	= 7.47 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 14.109 acft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)	Time -- (hrs	Outflow cfs)
8.57	2.34	15.37	6.21	22.17	2.65
8.77	2.65	15.57	5.91	22.37	2.63
8.97	2.97	15.77	5.61	22.57	2.60
9.17	3.27	15.97	5.30	22.77	2.58
9.37	3.43	16.17	5.04	22.97	2.56
9.57	3.57	16.37	4.91	23.17	2.54
9.77	3.92	16.57	4.80	23.37	2.52
9.97	4.44	16.77	4.70	23.57	2.50
10.17	5.04	16.97	4.59	23.77	2.48
10.37	5.82	17.17	4.48	23.97	2.45
10.57	6.68	17.37	4.37		
10.77	7.84	17.57	4.27		
10.97	9.27	17.77	4.16	*...End*	
11.17	10.44	17.97	4.05		
11.37	14.32	18.17	3.94		
11.57	19.88	18.37	3.83		
11.77	70.66	18.57	3.73		
11.97	217.64	18.77	3.62		
12.17	104.10	18.97	3.51		
12.37	32.18	19.17	3.40		
12.57	22.76	19.37	3.29		
12.77	17.41	19.57	3.18		
12.97	15.15	19.77	3.07		
13.17	13.15	19.97	2.96		
13.37	11.85	20.17	2.87		
13.57	10.66	20.37	2.84		
13.77	9.67	20.57	2.82		
13.97	8.81	20.77	2.80		
14.17	8.06	20.97	2.78		
14.37	7.70	21.17	2.75		
14.57	7.41	21.37	2.73		
14.77	7.11	21.57	2.71		
14.97	6.81	21.77	2.69		
15.17	6.51	21.97	2.67		

Hydrograph Report

Hyd. No. 2

Slag Pond Outlflow

Hydrograph type	= Reservoir	Peak discharge	= 22.20 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 1	Reservoir name	= Slag Pond
Max. Elevation	= 617.13 ft	Max. Storage	= 7.940 acft

Storage Indication method used.

Outflow hydrograph volume = 13.564 acft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.80	86.40	615.88	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.09
12.00	230.63 <<	616.47	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.08
12.20	77.70	617.03	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.14
12.40	30.60	617.11	-----	-----	-----	-----	-----	-----	-----	-----	-----	22.04
12.60	21.41	617.13	-----	-----	-----	-----	-----	-----	-----	-----	-----	22.20
12.80	16.99	617.11	-----	-----	-----	-----	-----	-----	-----	-----	-----	22.06
13.00	14.78	617.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.80
13.20	12.90	617.06	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.47
13.40	11.65	617.03	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.08
13.60	10.48	616.99	-----	-----	-----	-----	-----	-----	-----	-----	-----	20.53
13.80	9.52	616.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	19.69
14.00	8.66	616.91	-----	-----	-----	-----	-----	-----	-----	-----	-----	18.84
14.20	7.98	616.87	-----	-----	-----	-----	-----	-----	-----	-----	-----	17.99
14.40	7.65	616.84	-----	-----	-----	-----	-----	-----	-----	-----	-----	17.17
14.60	7.36	616.80	-----	-----	-----	-----	-----	-----	-----	-----	-----	16.40
14.80	7.06	616.77	-----	-----	-----	-----	-----	-----	-----	-----	-----	15.66
15.00	6.76	616.73	-----	-----	-----	-----	-----	-----	-----	-----	-----	14.96
15.20	6.46	616.70	-----	-----	-----	-----	-----	-----	-----	-----	-----	14.29
15.40	6.16	616.68	-----	-----	-----	-----	-----	-----	-----	-----	-----	13.65
15.60	5.86	616.65	-----	-----	-----	-----	-----	-----	-----	-----	-----	13.04
15.80	5.56	616.62	-----	-----	-----	-----	-----	-----	-----	-----	-----	12.45
16.00	5.25	616.59	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.88
16.20	5.01	616.57	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.34
16.40	4.89	616.55	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.83
16.60	4.79	616.52	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.35
16.80	4.68	616.50	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.90
17.00	4.57	616.49	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.47
17.20	4.46	616.47	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.08
17.40	4.36	616.45	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.70
17.60	4.25	616.43	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.35
17.80	4.14	616.42	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.02
18.00	4.03	616.40	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.70
18.20	3.92	616.39	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.52
18.40	3.82	616.38	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.39
18.60	3.71	616.36	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.26
18.80	3.60	616.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.14
19.00	3.49	616.34	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.02
19.20	3.38	616.32	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.89

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
19.40	3.27	616.31	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.77
19.60	3.16	616.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.65
19.80	3.05	616.28	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.52
20.00	2.95	616.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.40
20.20	2.86	616.26	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.28
20.40	2.84	616.24	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.16
20.60	2.82	616.23	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.05
20.80	2.79	616.22	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.94
21.00	2.77	616.21	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.83
21.20	2.75	616.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.72
21.40	2.73	616.19	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.62
21.60	2.71	616.17	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.52
21.80	2.69	616.16	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.42
22.00	2.67	616.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.33
22.20	2.64	616.14	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.23
22.40	2.62	616.13	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.14
22.60	2.60	616.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.06
22.80	2.58	616.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.97
23.00	2.56	616.11	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.89
23.20	2.54	616.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.81
23.40	2.51	616.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.73
23.60	2.49	616.08	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.65
23.80	2.47	616.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.58
24.00	2.45	616.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.50
24.20	0.63	616.05	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.41
24.40	0.00	616.04	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.26
24.60	0.00	616.02	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.11
24.80	0.00	616.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.97
25.00	0.00	615.99	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.85
25.20	0.00	615.98	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.76
25.40	0.00	615.96	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.66
25.60	0.00	615.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.57
25.80	0.00	615.94	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.48
26.00	0.00	615.92	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.40
26.20	0.00	615.91	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.31
26.40	0.00	615.90	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.23
26.60	0.00	615.89	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.15
26.80	0.00	615.87	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.07
27.00	0.00	615.86	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.00
27.20	0.00	615.85	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.92
27.40	0.00	615.84	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.85
27.60	0.00	615.83	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.78
27.80	0.00	615.82	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.71
28.00	0.00	615.81	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.64
28.20	0.00	615.80	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.58
28.40	0.00	615.79	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.51
28.60	0.00	615.78	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.45
28.80	0.00	615.77	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.39
29.00	0.00	615.76	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.33
29.20	0.00	615.75	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.27

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - Slag Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	615.30	189,486	0.000	0.000
0.20	615.50	189,486	0.870	0.870
0.70	616.00	189,486	2.175	3.045
1.10	616.40	189,486	1.740	4.785
1.70	617.00	189,486	2.610	7.395
2.20	617.50	189,486	2.175	9.570
2.70	618.00	189,486	2.175	11.745
3.20	618.50	189,486	2.175	13.920
3.70	619.00	189,486	2.175	16.095
4.20	619.50	189,486	2.175	18.270
4.70	620.00	189,486	2.175	20.445
5.20	620.50	189,486	2.175	22.620
5.70	621.00	189,486	2.175	24.795

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	615.30	---	---	---	---	---	---	---	---	---	0.00
0.20	0.870	615.50	---	---	---	---	---	---	---	---	---	0.60
0.70	3.045	616.00	---	---	---	---	---	---	---	---	---	3.90
1.10	4.785	616.40	---	---	---	---	---	---	---	---	---	7.60
1.70	7.395	617.00	---	---	---	---	---	---	---	---	---	20.80
2.20	9.570	617.50	---	---	---	---	---	---	---	---	---	26.40
2.70	11.745	618.00	---	---	---	---	---	---	---	---	---	31.30
3.20	13.920	618.50	---	---	---	---	---	---	---	---	---	35.40
3.70	16.095	619.00	---	---	---	---	---	---	---	---	---	39.20
4.20	18.270	619.50	---	---	---	---	---	---	---	---	---	42.60
4.70	20.445	620.00	---	---	---	---	---	---	---	---	---	45.80
5.20	22.620	620.50	---	---	---	---	---	---	---	---	---	48.70
5.70	24.795	621.00	---	---	---	---	---	---	---	---	---	51.50