INFLOW DESIGN FLOOD CONTROL PLAN PERIODIC 5-YEAR REVIEW

30 TAC 352.821 (40 CFR 257.82)

East and West Bottom Ash Pond

Pirkey Power Plant
Hallsville, Texas

October, 2021

Prepared for: Southwest Electric Power Company – Pirkey Power Plant

Hallsville, Texas

Prepared by: American Electric Power Service Corporation

1 Riverside Plaza

Columbus, OH 43215

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY ℠

GERS – 21 – 052

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Inflow Design Flood Control Plan
Periodic 5-year Review
CFR 257.82
Pirkey Power Plant
East and West Bottom Ash Pond

PREPARED BY _Brett A. Dreger_ DATE _10/5/2021_
Brett A. Dreger, P.E.

REVIEWED BY _____ DATE _10-05-2021_
Shahriyar S. Baig, P.E.

APPROVED BY _Gary F. Zych_ DATE _10/6/2021_
Gary F. Zych, P.E.
Manager – AEP Geotechnical Engineering

STATE OF TEXAS
GARY F. ZYCH
127152
LICENSED
PROFESSIONAL ENGINEER
10/6/2021
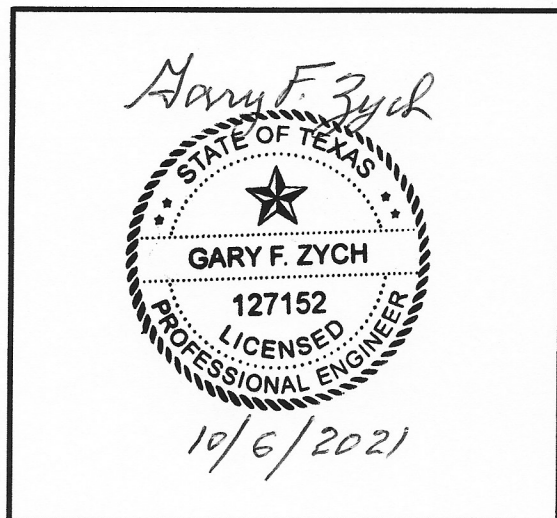
I certify to the best of my knowledge, information, and belief that the information contained in this Inflow Design Flood Control Plan meets the requirements of 40 CFR § 257.82

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Attachment A: Hydrology and Hydraulic Report East and West bottom Ash Ponds

1.0 OBJECTIVE

This report was prepared by AEP- Geotechnical Engineering Services (GES) section to fulfill requirements of 30 TAC 352.821 (40 CFR 257.82) for the hydrologic and hydraulic evaluation of CCR surface impoundments.   This report is a summary of the periodic 5-year review of the initial evaluation.

2.0 DESCRIPTION OF THE CCR UNIT

The Henry W. Pirkey Power Station is located at 2400 FM 3251 and south of Hallsville, Texas.
It is owned and operated by Southwest Electric Power Company (SWEPCO).   The facility operates two surface impoundments for storing CCR materials called the East Bottom Ash Pond (East BAP) and the West Bottom Ash Pond (West BAP).

The East BAP is located directly adjacent to and east of the West BAP.   The East BAP receives sluiced bottom ash and has a surface area of 30.9 acres and a storage capacity of 188 acre-feet.   The pond is almost entirely incised, with a reported maximum embankment height of 4 feet.

The West BAP, which also receives sluiced bottom ash, is located northwest of the main plant buildings and shares its eastern border with the western border of the East BAP.   The West BAP receives sluiced bottom ash and has a surface area of 30 acres and a storage capacity of 188 acre-feet.   The maximum embankment height is 25 feet.   The main upstream embankment slopes are 3 feet horizontal to 1 foot vertical (3:1 H:V); while the main downstream slopes area 2.5:1 H:V.

3.0 INFLOW DESIGN FLOOD 257.82(a)(3)

The facility is classified as a Low Hazard Potential Dam.   This classification has not changed since the initial evaluation.   The Inflow Design Flood is the 100-year storm event which is 10.3 inches during a 24 hour period.

4.0 FLOOD CONTROL PLAN 257.82(c)

The only inflows from the inflow design flood is the direct rainfall within the ponds dikes.   The design to safely pass the inflow design flood without overtopping the crest of the dam is based on the normal pool being at maximum normal operating pool and utilizing the principal spillway and emergency spillway to handle the 100-year design storm without overtopping the crest of the dike.

The analysis in Attachment A includes related excerpts from the 2015 Pirkey H&H Analysis report that provides the description of the spillway system, flood storage capacity, inflow peak discharge and volume, peak discharge from the facility and maximum pool elevation.

There has not been any changes to spillway system, flood storage capacity or rainfall estimates that would change the results presented in Attachment A.

The calculations show that the facility has the capacity to manage the inflow design flood, as well as large flood events.

ATTACHMENT A

Hydrology and Hydraulic Report

East and West Ash Ponds

H.W. Pirkey Power Plant

HYDROLOGY & HYDRAULIC REPORT
EAST & WEST ASH PONDS
H.W. PIRKEY POWER PLANT – HALLSVILLE, TX
December 2015

Prepared for:

Prepared by:

H.W. Pirkey Power Plant
2400 FM 3251
Hallsville, Texas 75650

Akron Consulting, LLC
431 N. Center St.
Longview, Texas 75601
TBPE Firm # 14014

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Introduction

H.W. Pirkey Power Plant which is located in Hallsville, Texas is a subsidiary of American Electric Power. Plant operation requires a series of water impoundments utilized in the process of power generation, including the bottom ash ponds. The purpose of this report is to analyze and document the Hydrologic & Hydraulic characteristics of the East and West Bottom Ash Ponds at Pirkey Power Plant.

Hydrologic Methodology

This section describes the general outline of the hydrologic methodologies used to evaluate the total runoff tributary to the ponds. Specific characteristics of each pond are discussed under individual subheadings later in this report.

The East & West Ash Ponds are total containment ponds. Watershed areas contributing to the flow into these ponds are the ponds and berms/access roads themselves; in other words, these ponds have no additional runoff areas tributary to them. Therefore, a conservative approach is to adopt a curve number 100 and to consider that every inch of rainfall will directly increase the water surface elevation.

According to Natural Resource Conservation Service (formerly SCS) Technical Release 55, the peak flow is calculated using the formula:

$Q = (P-0.2S)^2 / (P+0.8S)$

where,

Q = runoff (inches)

P = rainfall (inches)

S = potential maximum retention after runoff begins (inches) = (1000/curve number) – 10

Applying a curve number of 100 to the formula above will ultimately result in Q = P (because S=0); which implies that the total runoff contributing to the flow in each of the ponds is directly a function of the rainfall event.

Hydraulic Methodology

This section describes the general outline of the hydraulic methodologies used to analyze the storage capacity of the ponds. Specific characteristics of each pond are discussed under individual subheadings later in this report.

The plant's CCR rules require that the ponds be able to accommodate the rainfall volume from a

100 year 24 hour storm without over topping. The normal operating level for each pond is established by other regulations, and it is set to 3 feet below the top of the embankment. Using actual field survey data, an elevation-area-storage table was developed for the ponds and is included in the tables section of this report. Hydraflow Hydrographs was utilized to evaluate storage capacity and the water surface elevations in each pond during the 100 year 24 hour rainfall event. The 25 year 24 hour rainfall event was analyzed as well.

Detailed Hydrologic & Hydraulic characteristics of the ponds are discussed below.

EAST ASH POND:

The East Ash Pond is located to the east of the rail road track and north of the Pirkey Power Plant. This is a coal combustion waste pond used to settle bottom ash that has been sluiced from the plant boiler. Field survey of the embankment around the impoundment indicates that the top of the embankment is at a minimum elevation of 357.0msl, which is consistent with original design drawings. Therefore, based on this top of embankment elevation, the normal operating level was established at 354.0msl. The watershed area contributing to the flow into this pond was estimated to be 29.63 acres.

The storage capacity for each pond was analyzed for a 100-yr, 24-hr rainfall event, which is 10.3 inches. Multiplying the acreage times the inches, the calculated volume of the rainfall event is 1,107,836 cf of water. When this rainfall event was modeled in Hydraflow Hydrographs, it generated a more conservative rainfall volume of 1,142,455 cf.

The storage capacity was also analyzed for a 25-yr, 24-hr rainfall event, which is 8.2 inches. The calculated volume of the rainfall event is 881,967 cf of water. When this rainfall event was modeled in Hydraflow Hydrographs, it generated a more conservative rainfall volume of 909,528 cf.

Water surface elevation was then calculated for the 100-yr, 24-hr rainfall event with a normal operating level (354.0msl) as the baseline elevation. Results from Hydraflow Hydrograph indicates that the water surface elevation during the 100-yr, 24-hr rainfall will be 354.99msl which is less than 357.0msl (embankment top). Results from the 25-yr, 24-hr rainfall event indicate the water surface elevation will be 354.79msl which is also less than 357.0msl (embankment top).

WEST ASH POND:

The West Ash Pond is located to the west of the rail road track and adjacent to the east ash pond. This is a coal combustion waste pond used to settle bottom ash that has been sluiced from the plant boiler. Field survey of the embankment around the impoundment indicates that the top of the embankment is at a minimum elevation of 357.0msl, which is consistent with original design drawings. Therefore, based on this top of embankment elevation, the normal operating level was established at 354.0msl. The watershed area contributing to the flow into this pond was estimated to be 33.44 acres.

As mentioned earlier the storage capacity for each pond was analyzed for a 100-yr, 24-hr rainfall event, which is 10.3 inches. Multiplying the acreage times the inches, the calculated volume of the rainfall event is 1,250,228 cf of water. When this rainfall event was modeled in Hydraflow Hydrographs, it generated a more conservative rainfall volume of 1,289,360 cf.

The storage capacity was also analyzed for a 25-yr, 24-hr rainfall event, which is 8.2 inches. The calculated volume of the rainfall event is 995,376 cf of water. When this rainfall event was modeled in Hydraflow Hydrographs, it generated a more conservative rainfall volume of 1,026,480 cf.

Water surface elevation was then calculated for the 100-yr, 24-hr rainfall event with a normal operating level (354.0msl) as the baseline elevation. Results from Hydraflow Hydrograph indicates that the water surface elevation during the 100-yr, 24-hr rainfall will be 355.01msl which is less than 357.0msl (embankment top). Results from the 25-yr, 24-hr rainfall event indicate the water surface elevation will be 354.81msl which is also less than 357.0msl (embankment top).

Summary

Water surface elevations calculated from Hydraflow Hydrographs are tabulated below:

SUMMARY OF POND HYDRAULIC CHARACTERISTICS				
	TOP OF EMBANKMENT	OPERATING LEVEL	100YR-24HR WSEL	25YR-24HR WSEL
EAST ASH POND	357.0	354.0	354.99	354.79
WEST ASH POND	357.0	354.0	355.01	354.81

As evident from the table above, it is the opinion of Akron Consulting that the East & West Ash Ponds will serve to adequately contain the calculated rainfall events.

TABLE 1

Runoff Curve Numbers for Hydrologic Soil-Cover Complexes
(Antecedent Moisture Condition II, and Ia= 0.2 S)
(Adapted from NRCS Technical Release 55)

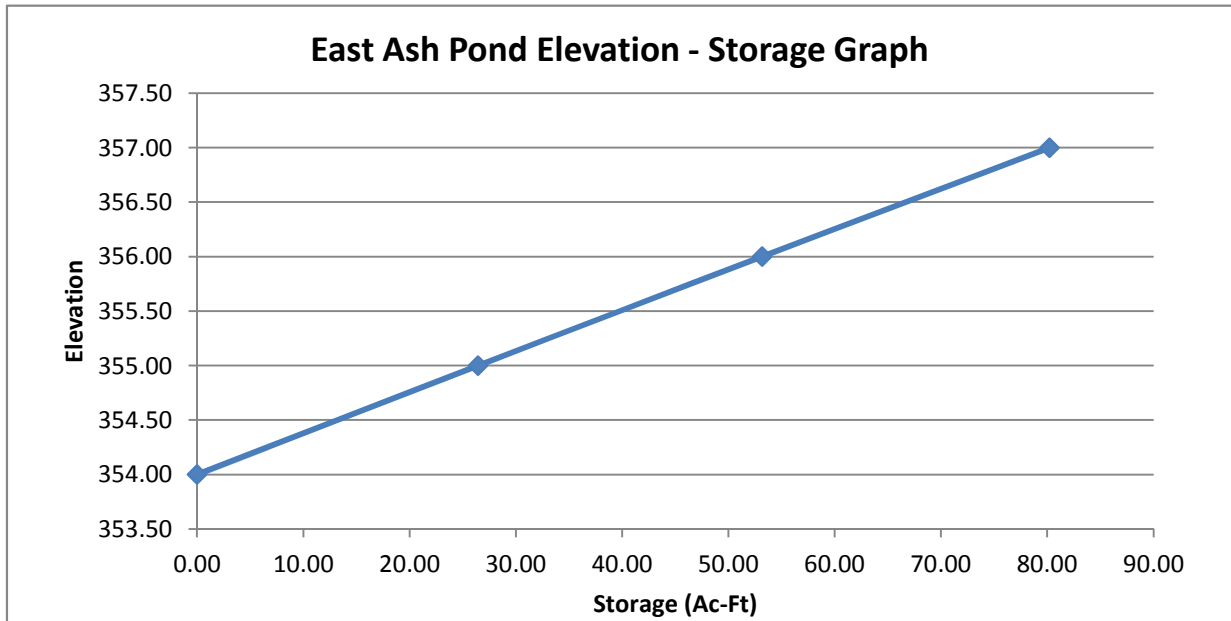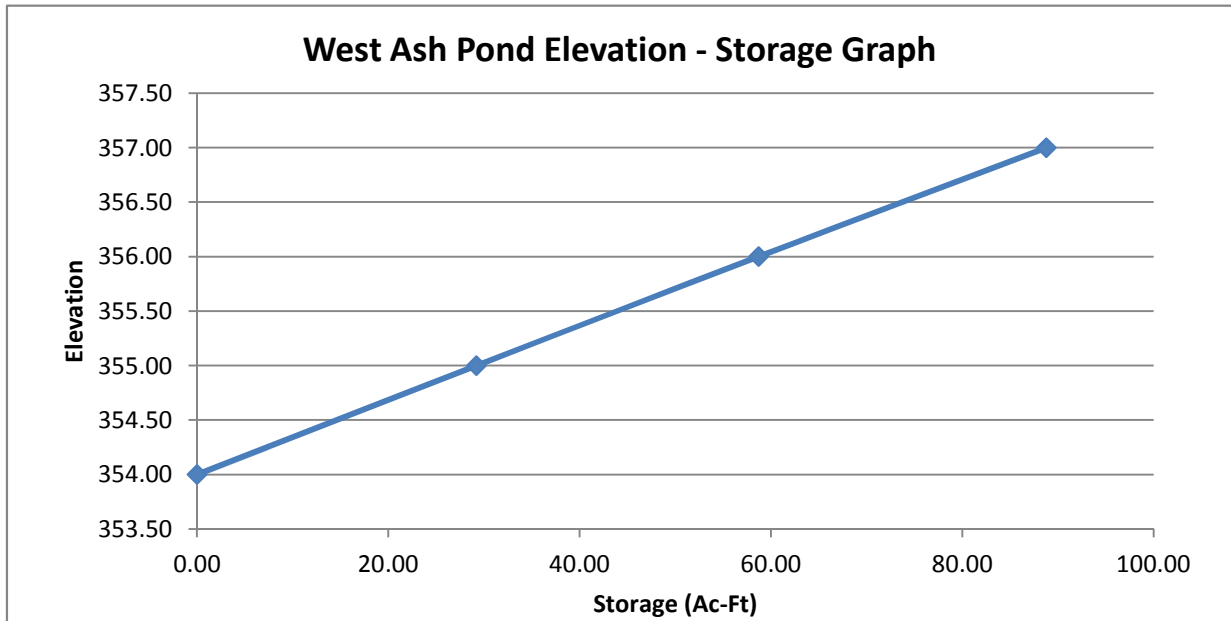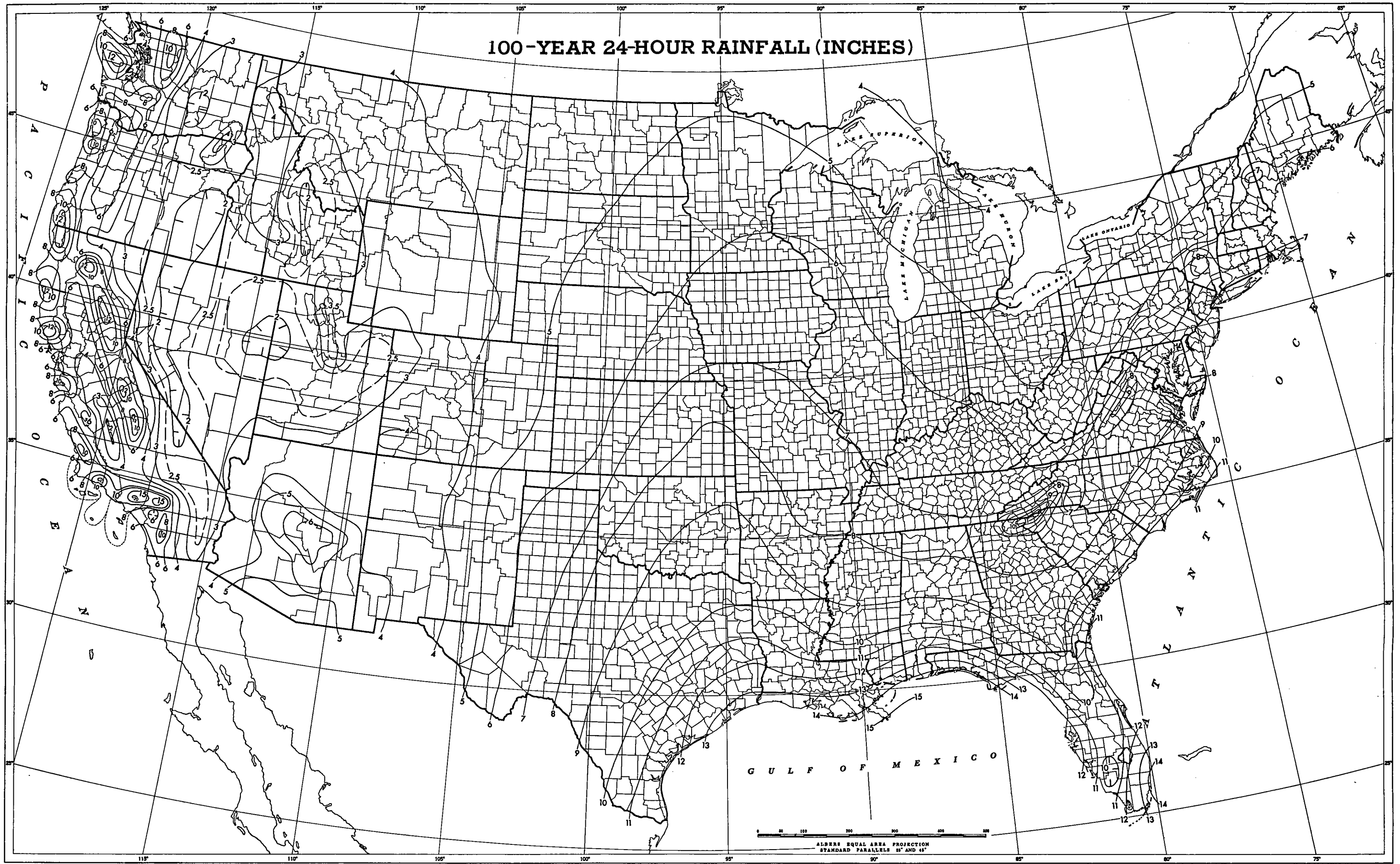| Land Use	Treatment or Practice	Hydrologic Condition	Hydrologic Soil Group A	B	C	D
Fallow	Straight Row	----	77	86	91	94
Row Crops	Straight Row	Poor	72	81	88	91
	Straight Row	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	Contoured	Good	65	75	82	86
	Contoured and Terraced	Poor	66	74	80	82
	Contoured and Terraced	Good	62	71	78	81
Small Grain	Straight Row	Poor	65	76	84	88
	Straight Row	Good	63	75	83	87
	Contoured	Poor	63	74	82	85
	Contoured	Good	61	73	81	84
	Contoured and Terraced	Poor	61	72	79	82
	Contoured and Terraced	Good	59	70	78	81
Close-Seeded, Legumes, Rotation Meadow	Straight Row	Poor	66	77	85	89
	Straight Row	Good	58	72	81	85
	Contoured	Poor	64	75	83	85
	Contoured	Good	55	69	78	83
	Contoured and Terraced	Poor	63	73	80	83
	Contoured and Terraced	Good	51	67	76	80
Pasture Or Range		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow		Good	30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		----	59	74	82	86
Roads/Facilites		----	74	84	90	92

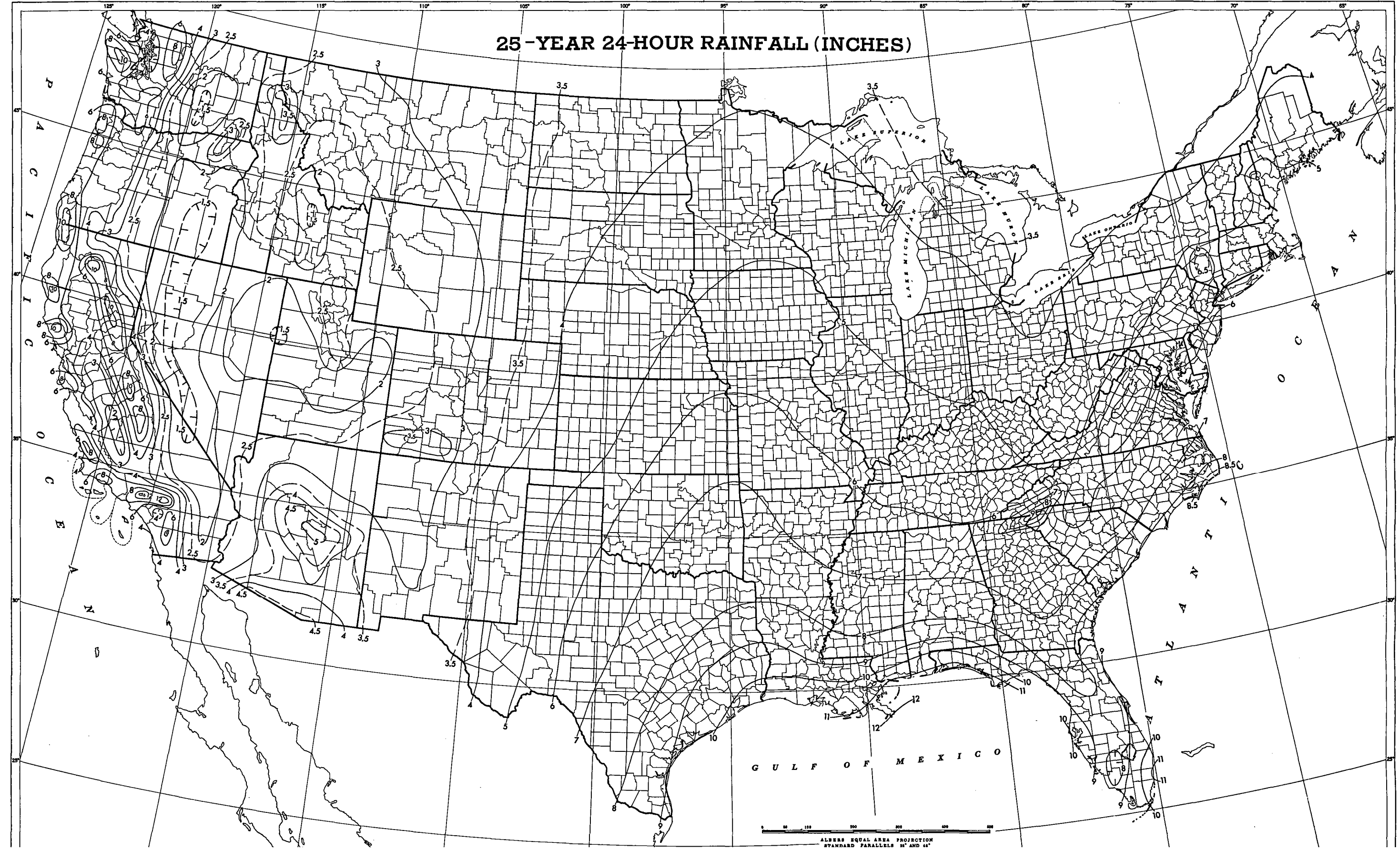| TABLE 2 EAST ASH POND ELEVATION-AREA-STORAGE TABLE H.W. PIRKEY POWER PLANT EXISTING CONDITION NORMAL OPERATING POOL AT 354.0				
ELEVATION (ft)	AREA (Acres)	STORAGE (Ac-Ft)	STORAGE (Cubic Feet)	STORAGE (Million Gallons)
352.00	25.70	na	na	na
353.00	25.99	na	na	na
354.00	26.29	0.00	0	0.00
355.00	26.59	26.44	1,151,730	232.61
356.00	26.88	53.18	2,316,300	467.82
357.00	27.19	80.21	3,493,950	705.67

East Ash Pond Elevation - Storage Graph

TABLE 3
WEST ASH POND ELEVATION-AREA-STORAGE TABLE
H.W. PIRKEY POWER PLANT
EXISTING CONDITION
NORMAL OPERATING POOL AT 354.0

ELEVATION (ft)	AREA (Acres)	STORAGE (Ac-Ft)	STORAGE (Cubic Feet)	STORAGE (Million Gallons)
352.00	28.43	na	na	na
353.00	28.74	na	na	na
354.00	29.05	0.00	0	0.00
355.00	29.36	29.21	1,272,170	256.94
356.00	29.67	58.72	2,557,840	516.61
357.00	30.47	88.79	3,867,690	781.16

West Ash Pond Elevation - Storage Graph

100-YEAR 24-HOUR RAINFALL (INCHES)

PACIFIC OCEAN

ATLANTIC OCEAN

GULF OF MEXICO

LAKE SUPERIOR

LAKE MICHIGAN

LAKE HURON

LAKE ONTARIO

LAKE ERIE

ALBERS EQUAL AREA PROJECTION
STANDARD PARALLELS 29° AND 45°

25-YEAR 24-HOUR RAINFALL (INCHES)

ALBERS EQUAL AREA PROJECTION
STANDARD PARALLELS 29° AND 45°

Hydrograph Report

Tuesday, 00 3, 2015

Hyd. No. 1

East Ash Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 310.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,142,455 cuft
Drainage area	= 29.630 ac	Curve number	= 100
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 10.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

East Ash Pond

Hyd. No. 1 -- 100 Year
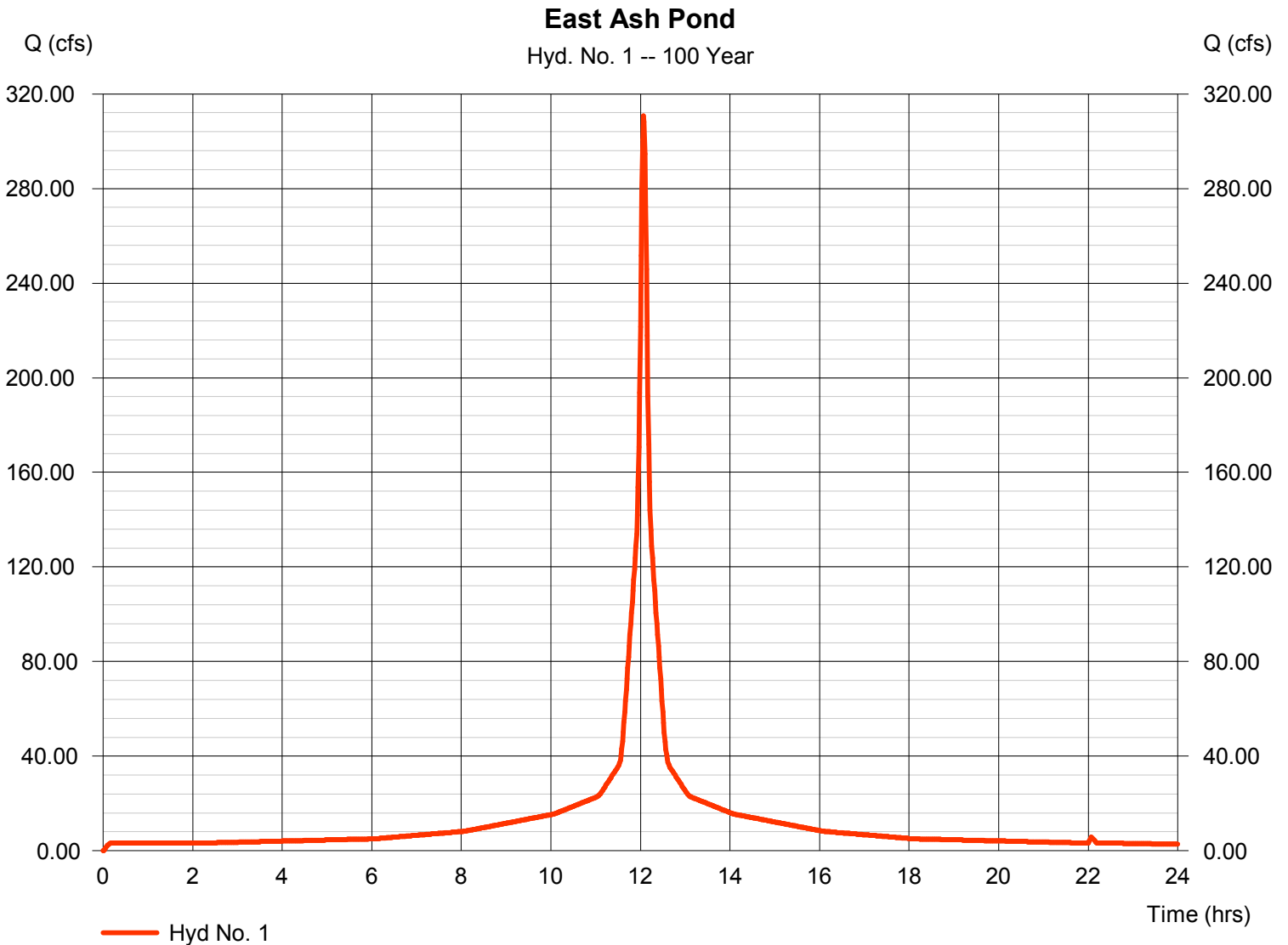
Hyd No. 1

Hydrograph Report

Tuesday, 00 3, 2015

Hyd. No. 2

East Ash Pond

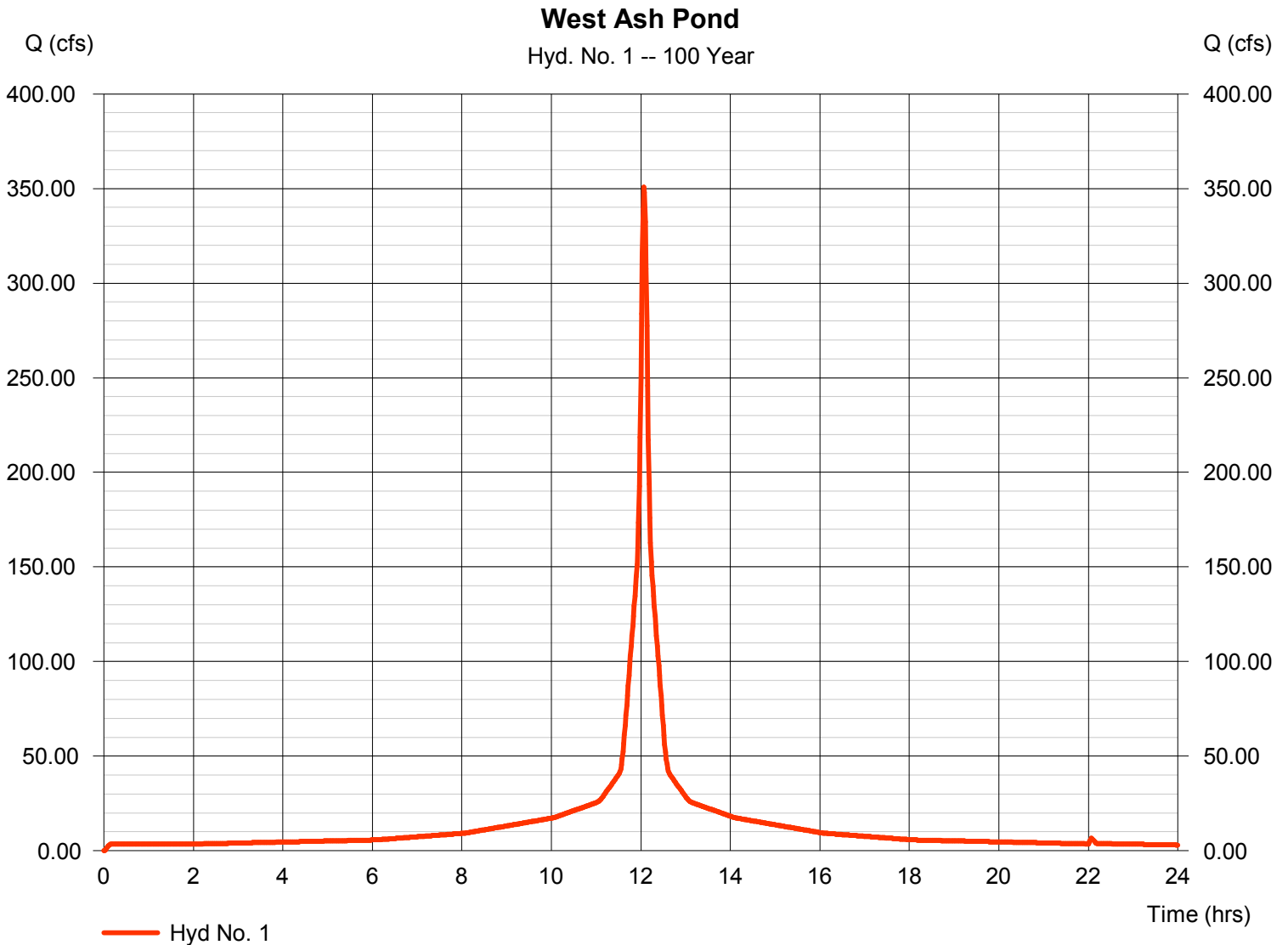|				
Hydrograph type	= Reservoir		Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs		Time to peak	= n/a
Time interval	= 1 min		Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - East Ash Pond		Max. Elevation	= 354.99 ft
Reservoir name	= East Ash Pond			

Storage Indication method used. Wet pond routing start elevation = 354.00 ft.

East Ash Pond

Hyd. No. 2 -- 100 Year

Hydrograph Report

Tuesday, 00 3, 2015
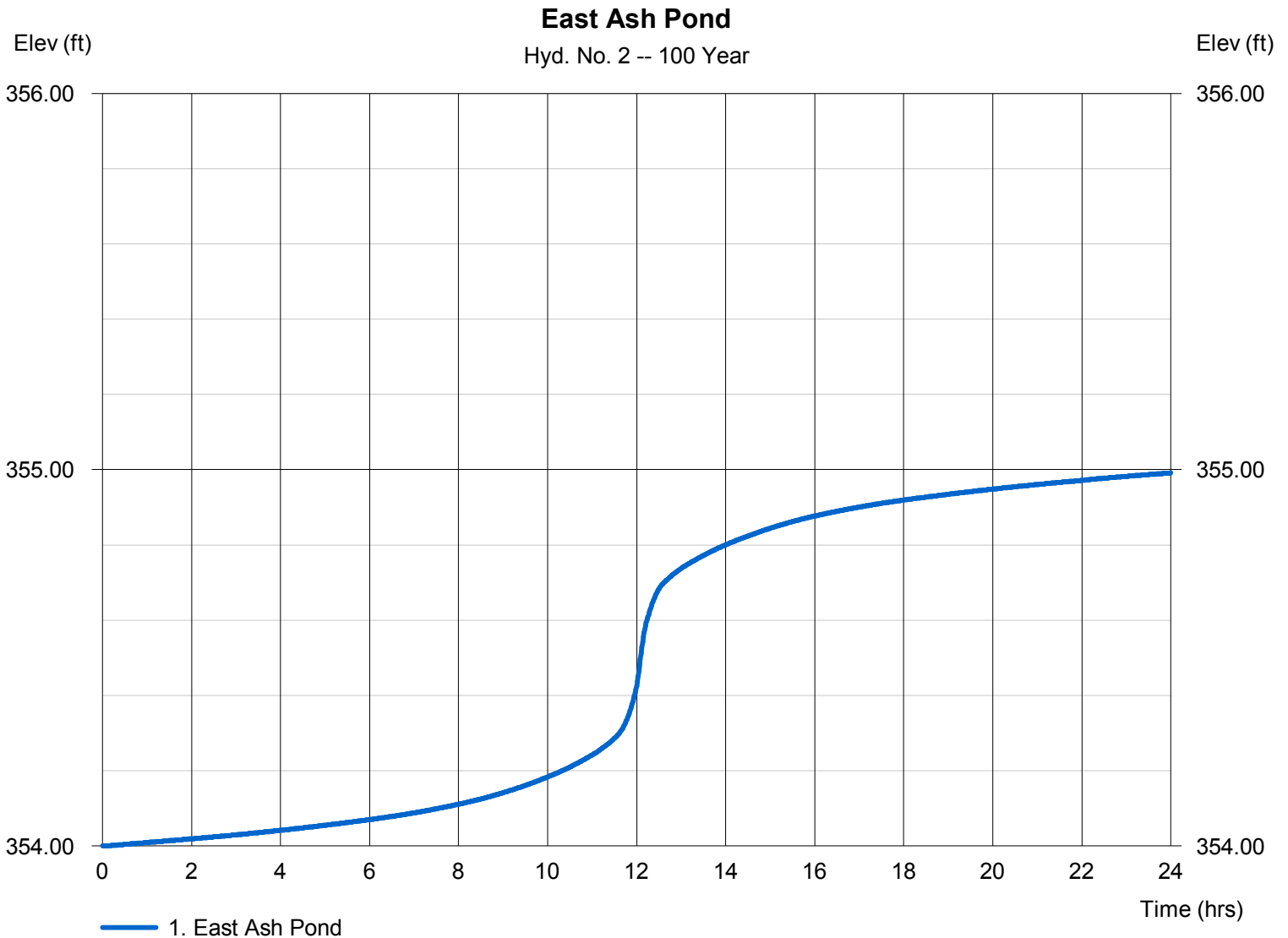
Hyd. No. 1

West Ash Pond

Hydrograph type	= SCS Runoff		Peak discharge	= 350.69 cfs
Storm frequency	= 100 yrs		Time to peak	= 12.07 hrs
Time interval	= 1 min		Hyd. volume	= 1,289,360 cuft
Drainage area	= 33.440 ac		Curve number	= 100
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= User		Time of conc. (Tc)	= 5.00 min
Total precip.	= 10.30 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

West Ash Pond

Hyd. No. 1 -- 100 Year

Hydrograph Report

Tuesday, 00 3, 2015

Hyd. No. 2

West Ash Pond

Hydrograph type	= Reservoir		Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs		Time to peak	= n/a
Time interval	= 1 min		Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - West Ash Pond		Max. Elevation	= 355.01 ft
Reservoir name	= West Ash Pond			

Storage Indication method used. Wet pond routing start elevation = 354.00 ft.
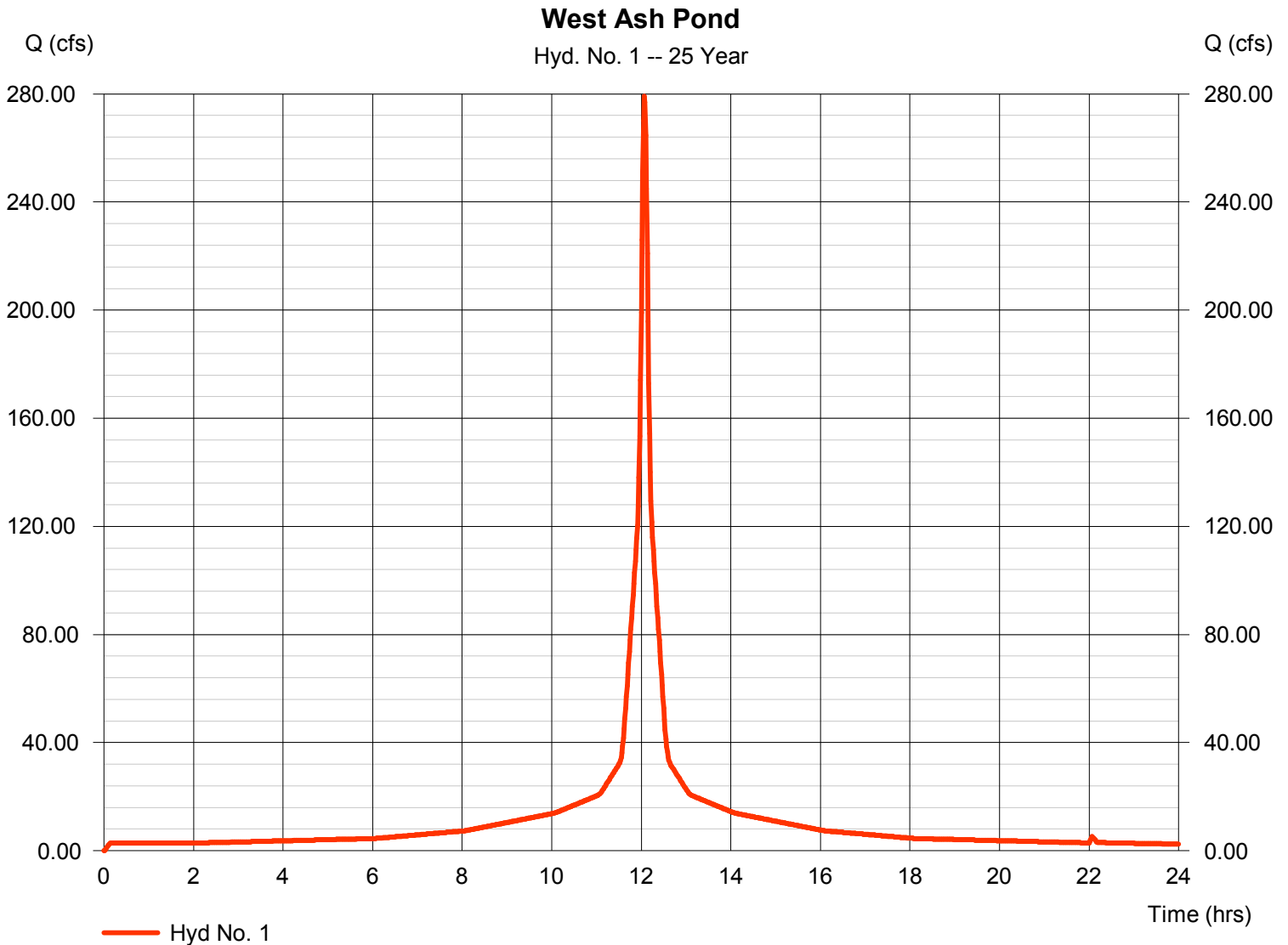
West Ash Pond

Hyd. No. 2 -- 100 Year
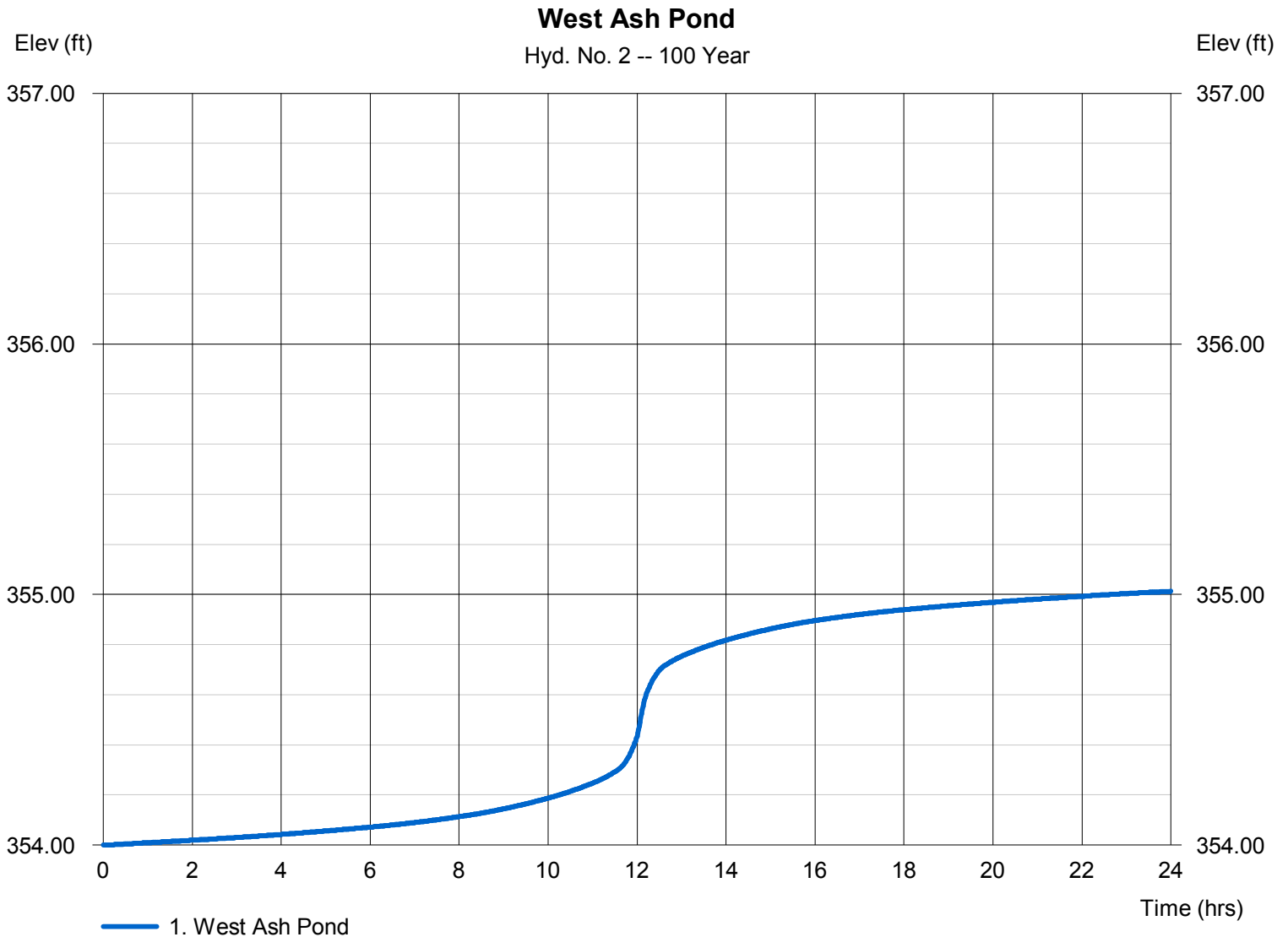
— 1. West Ash Pond

Hydrograph Report

Hyd. No. 1

East Ash Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 247.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 909,528 cuft
Drainage area	= 29.630 ac	Curve number	= 100
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

East Ash Pond

Hyd. No. 1 -- 25 Year
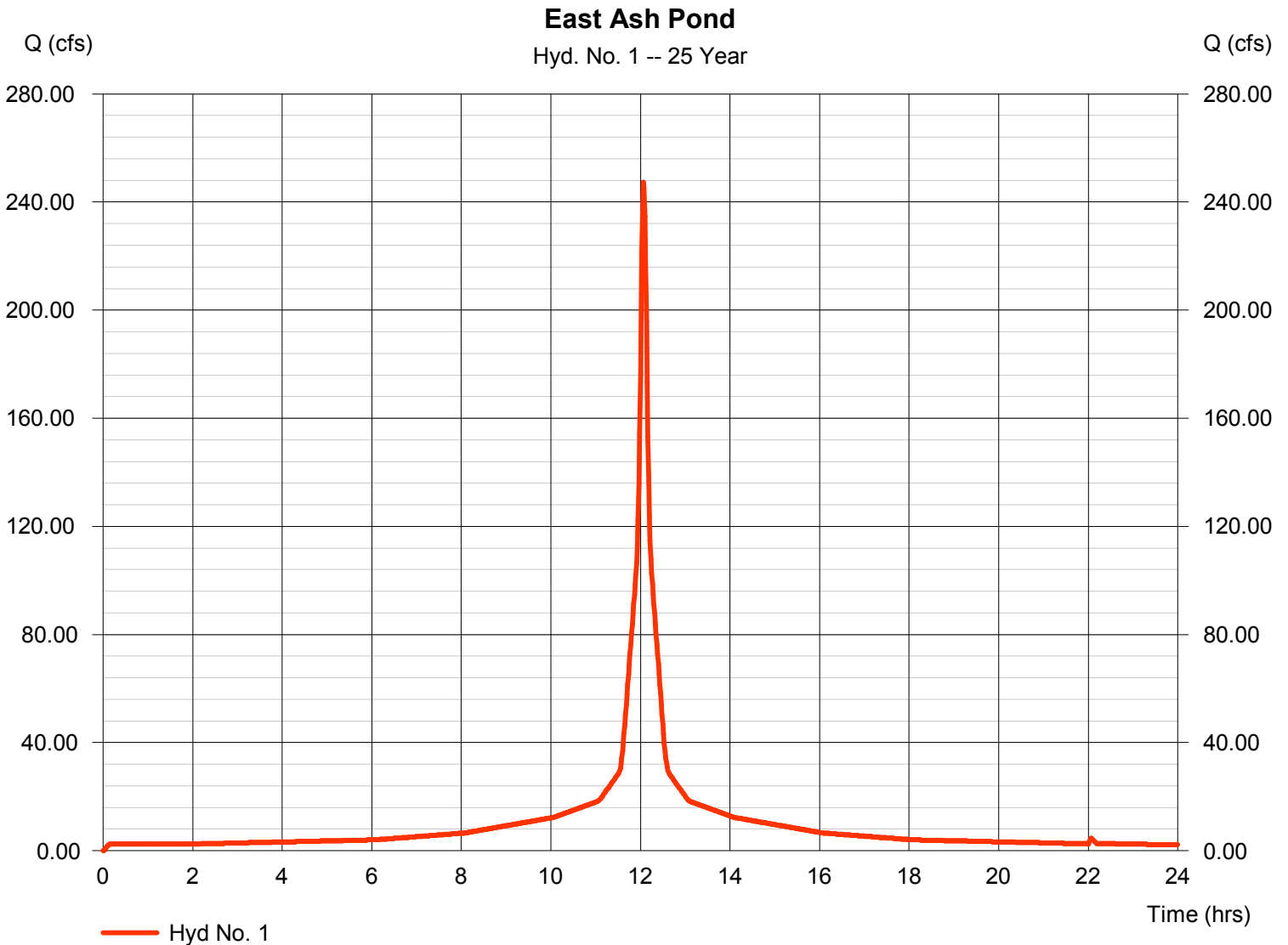
Hydrograph Report

Hyd. No. 2

East Ash Pond

Hydrograph type	= Reservoir		Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs		Time to peak	= n/a
Time interval	= 1 min		Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - East Ash Pond		Max. Elevatioo	= 354.79 ft
Reservoir name	= East Ash Pond			

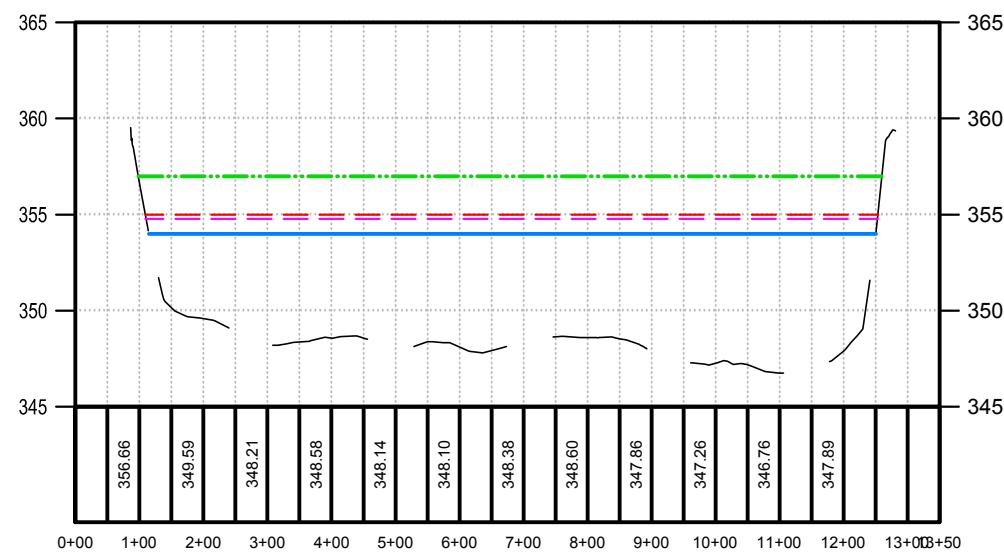Storage Indication method used. Wet pond routing start elevation = 354.00 ft.

East Ash Pond

Hyd. No. 2 -- 25 Year
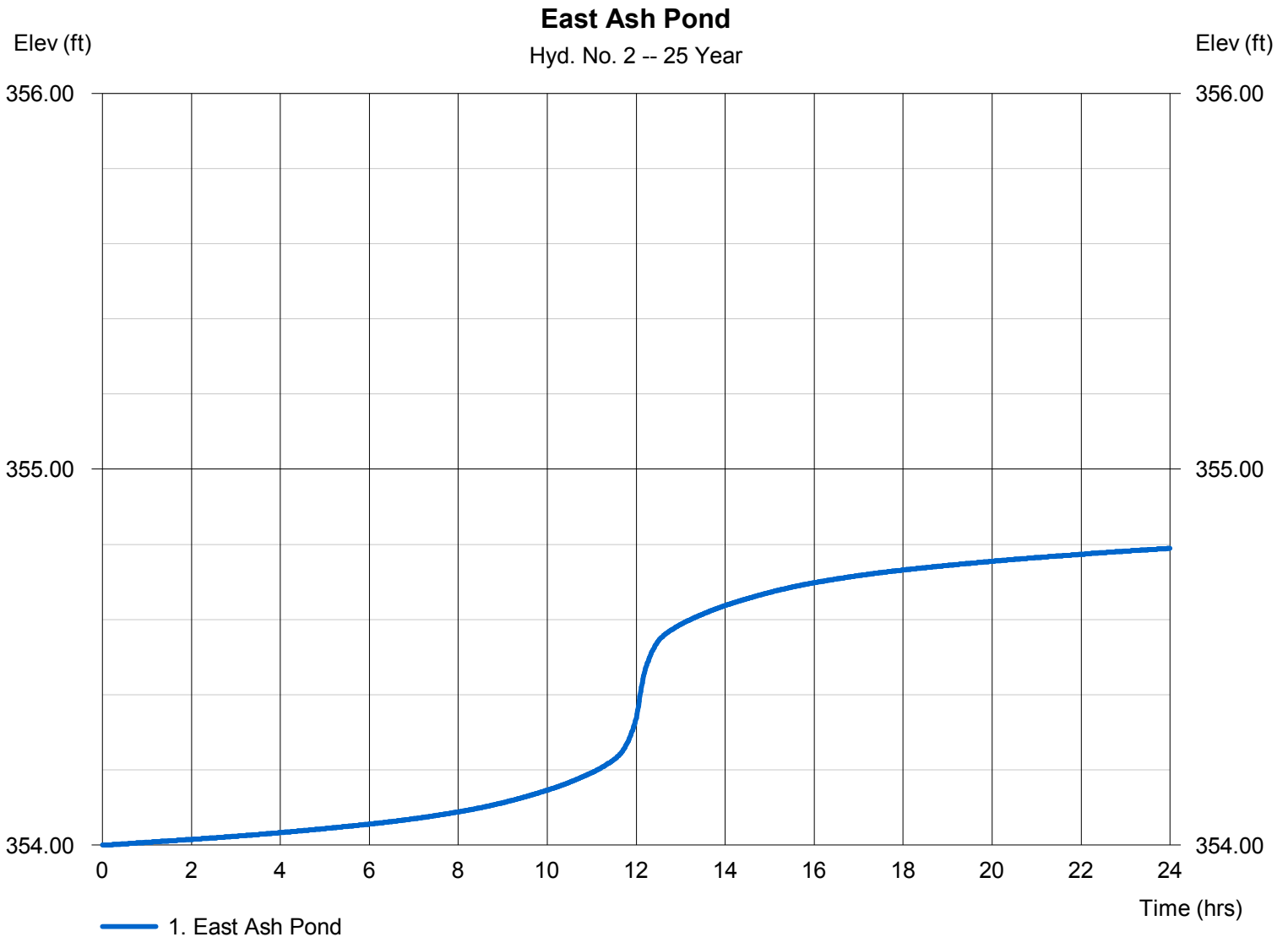
Hydrograph Report

Tuesday, 00 15, 2015

Hyd. No. 1

West Ash Pond

Hydrograph type	= SCS Runoff		Peak discharge	= 279.19 cfs
Storm frequency	= 25 yrs		Time to peak	= 12.07 hrs
Time interval	= 1 min		Hyd. volume	= 1,026,480 cuft
Drainage area	= 33.440 ac		Curve number	= 100
Basin Slope	= 0.0 %		Hydraulic length	= 0 ft
Tc method	= User		Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.20 in		Distribution	= Type III
Storm duration	= 24 hrs		Shape factor	= 484

West Ash Pond
Hyd. No. 1 -- 25 Year

Q (cfs) ... Time (hrs)

— Hyd No. 1

Hydrograph Report

Tuesday, 00 15, 2015

Hyd. No. 2

West Ash Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - West Ash Pond	Max. Elevation	= 354.81 ft
Reservoir name	= West Ash Pond		

Storage Indication method used. Wet pond routing start elevation = 354.00 ft.

West Ash Pond

Hyd. No. 2 -- 25 Year

1. West Ash Pond
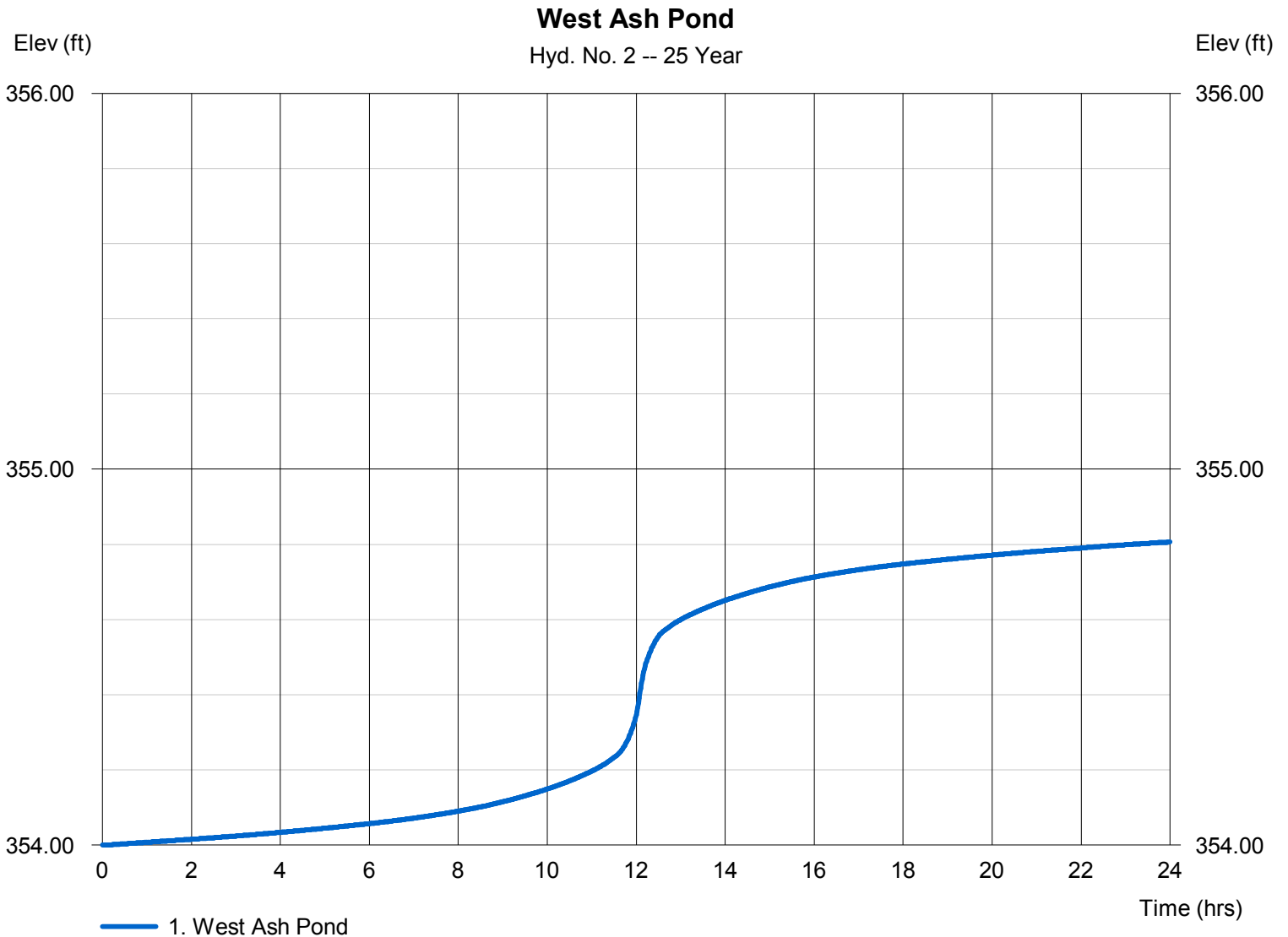
PLAN VIEW
SCALE: 1"=200'

Scale bar: 0 — 300' — 600' 1"=300'

N
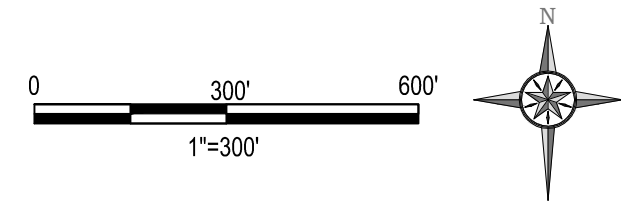
LEGEND

— — — WATERSHED BOUNDARY

SECTION A-A
HORIZ. SCALE: 1"=300'
VERT. SCALE: 1"=30'

Station values: 356.66, 349.59, 348.21, 348.58, 348.14, 348.10, 348.38, 348.60, 348.86, 347.26, 346.76, 347.89

Stations: 0+00, 1+00, 2+00, 3+00, 4+00, 5+00, 6+00, 7+00, 8+00, 9+00, 10+00, 11+00, 12+00, 13+00, 13+50

LEGEND

— · — TOP OF EMBANKMENT ELEV.= 357.00
— — — 100 YEAR 24 HOUR WSEL ELEV.= 354.99
— — — 25 YEAR 24 HOUR WSEL ELEV.= 354.79
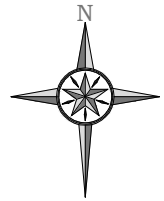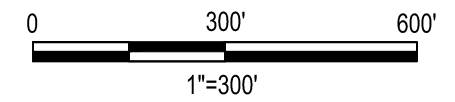———— NORMAL OPERATING LEVEL= 354.00
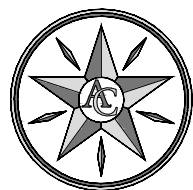
AKRON CONSULTING, LLC.
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TBPE Firm Reg. # 14014
(O) 903-236-9744
(F) 903-236-9745
www.akron-consulting.com

EAST ASH POND WATER
SURFACE EXHIBIT

PLAN VIEW
SCALE: 1"=300'

WEST ASH POND

B

0+00 2+00 4+00 6+00 8+00 10+00 12+00 14+00 16+00

B

LEGEND

▬ ▬ ▬ WATERSHED BOUNDARY

0   300'   600'

1"=300'

N

SECTION B-B
HORIZ. SCALE: 1"=300'
VERT. SCALE: 1"=30'

| 356.71 | 347.25 | 347.16 | 347.25 | 346.99 | 346.95 | 346.96 | 347.16 | 347.05 | 347.09 | 347.37 | 347.07 | 347.26 | 348.58 | 356.81 |

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00

LEGEND

▬ ▬ ▬ TOP OF EMBANKMENT ELEV.= 357.00

▬ ▬ ▬ 100 YEAR 24 HOUR WSEL ELEV.= 355.01

▬ ▬ ▬ 25 YEAR 24 HOUR WSEL ELEV.= 354.81

▬▬▬ NORMAL OPERATING LEVEL= 354.00

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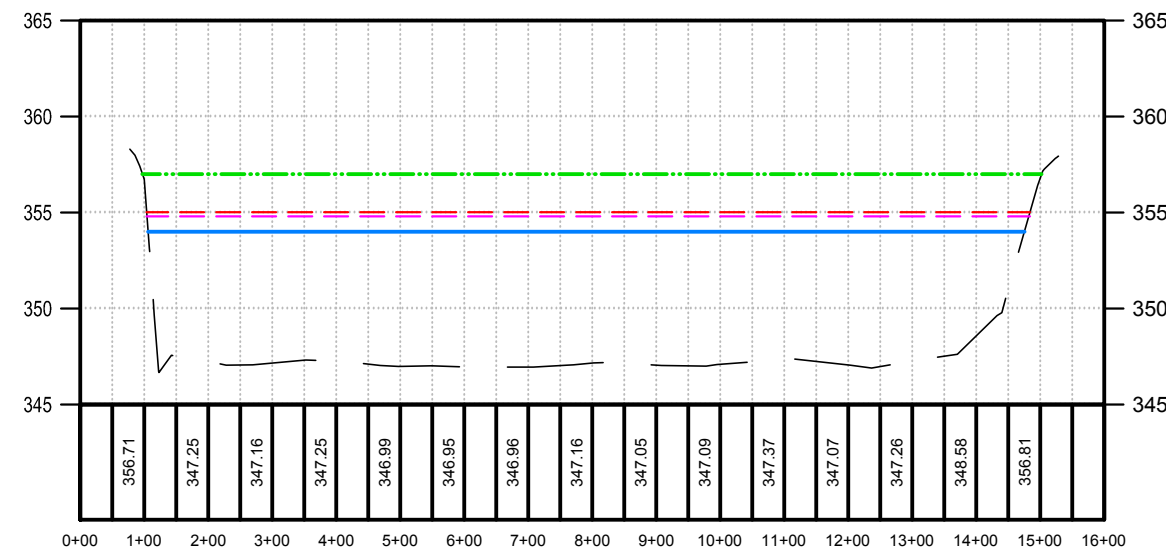www.akron-consulting.com

WEST ASH POND WATER SURFACE EXHIBIT