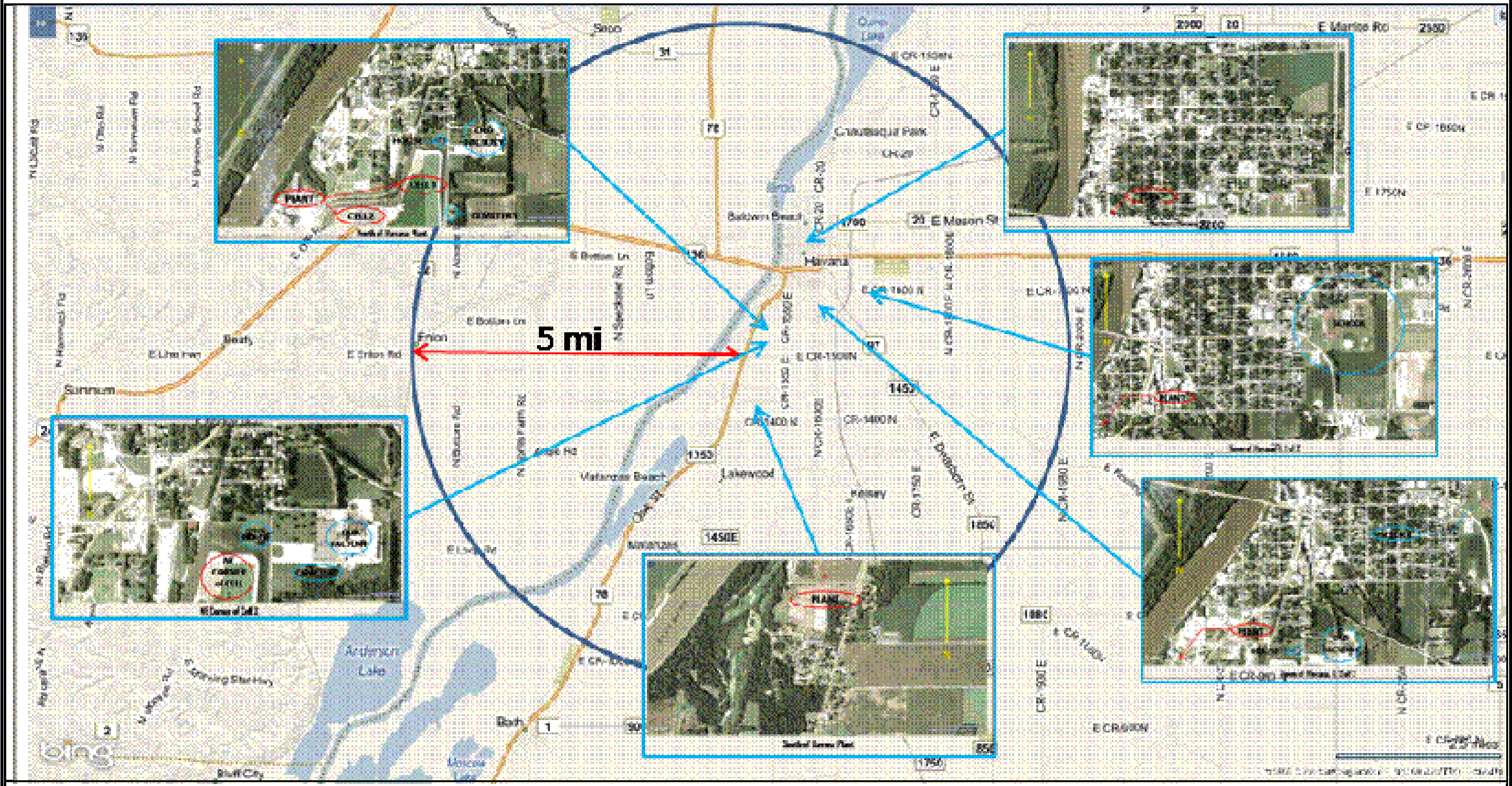
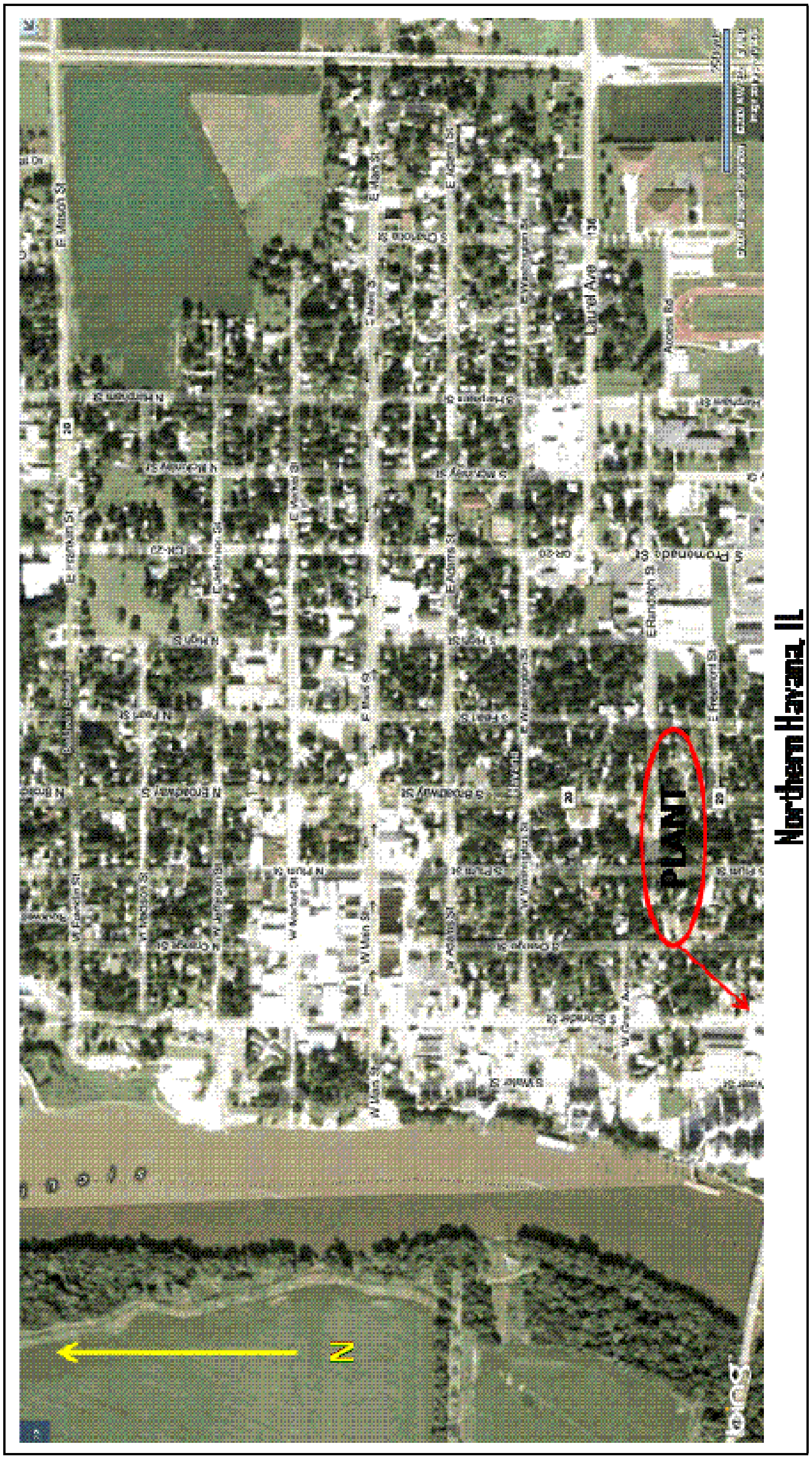
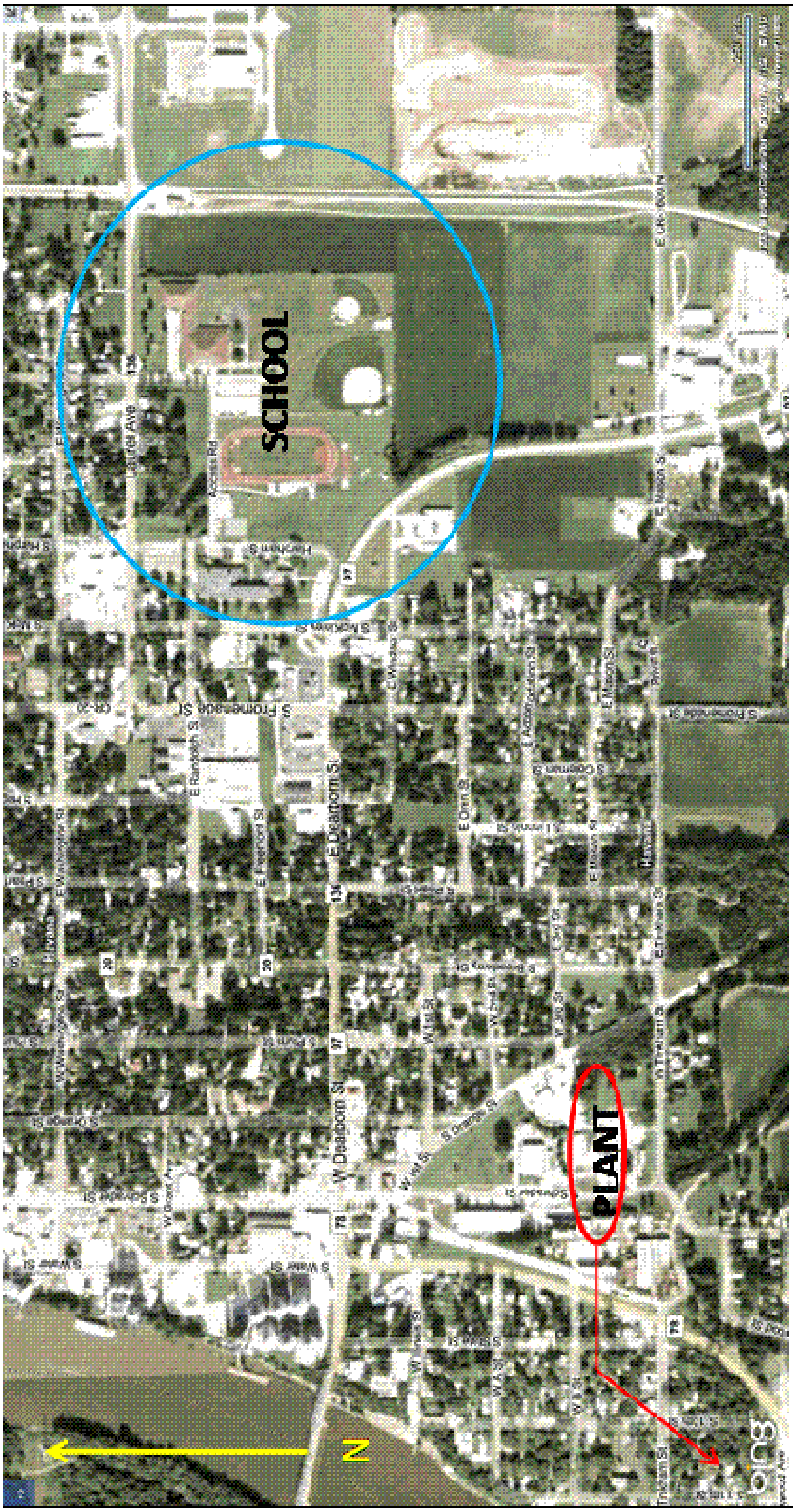
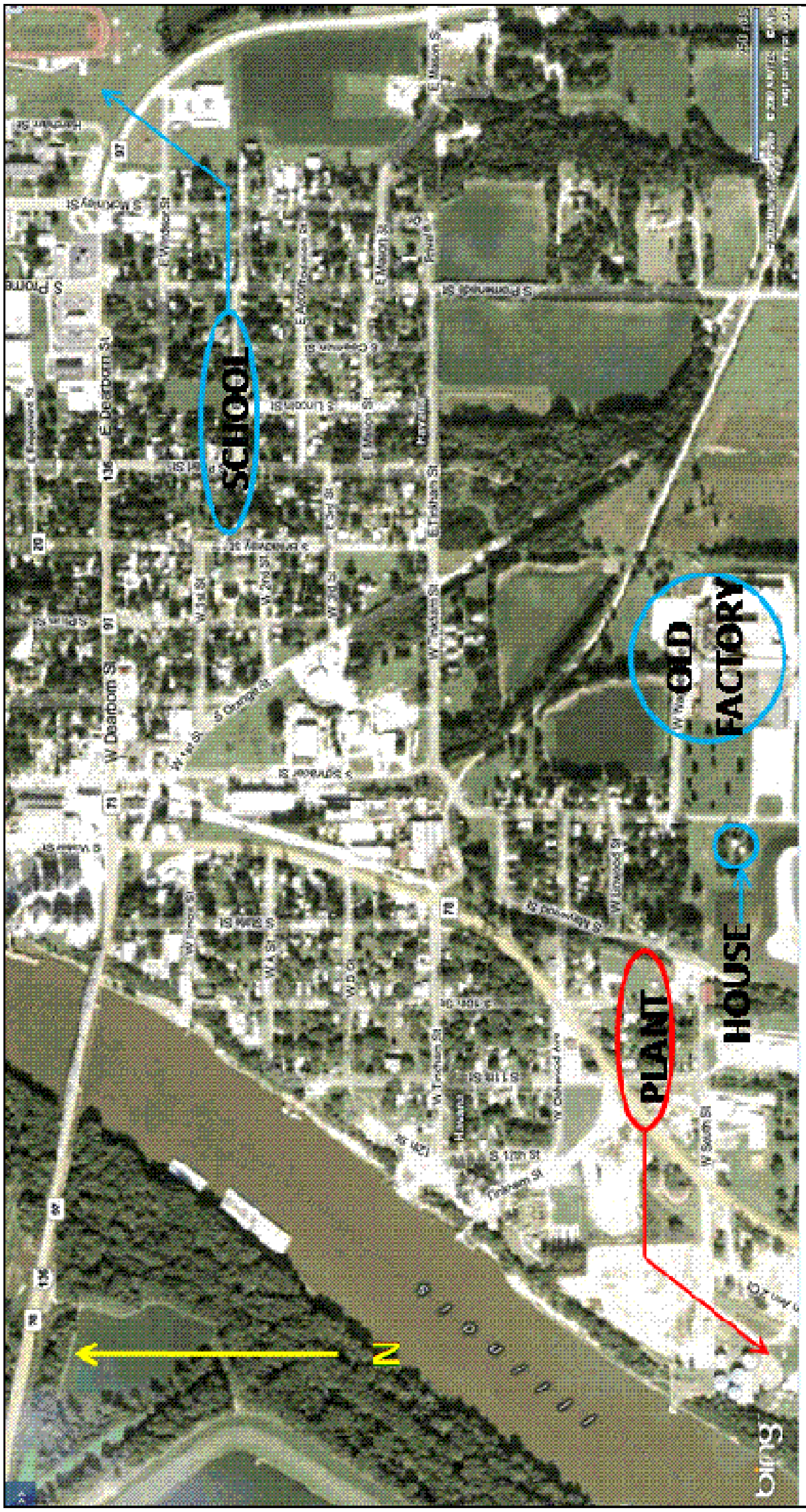


Regional Map Showing the Management Unit(s) in Relationship to Critical Infrastructure
(5 Mile Radius from Havana Site with Photo Locations of Documents 1.2-1.7)

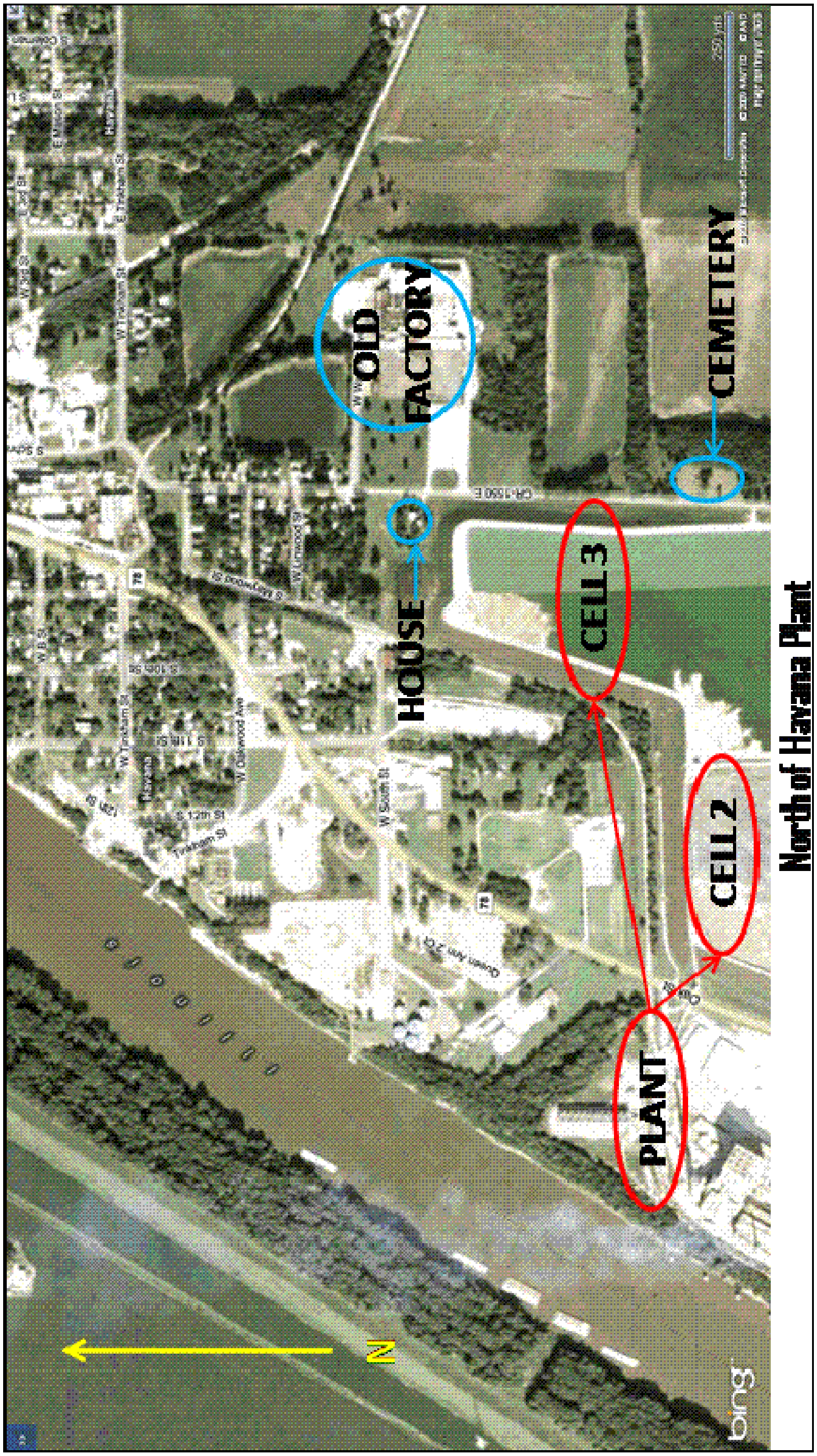

Northern Havana, IL
PLANT
N



Town of Havana, IL 1 of 2

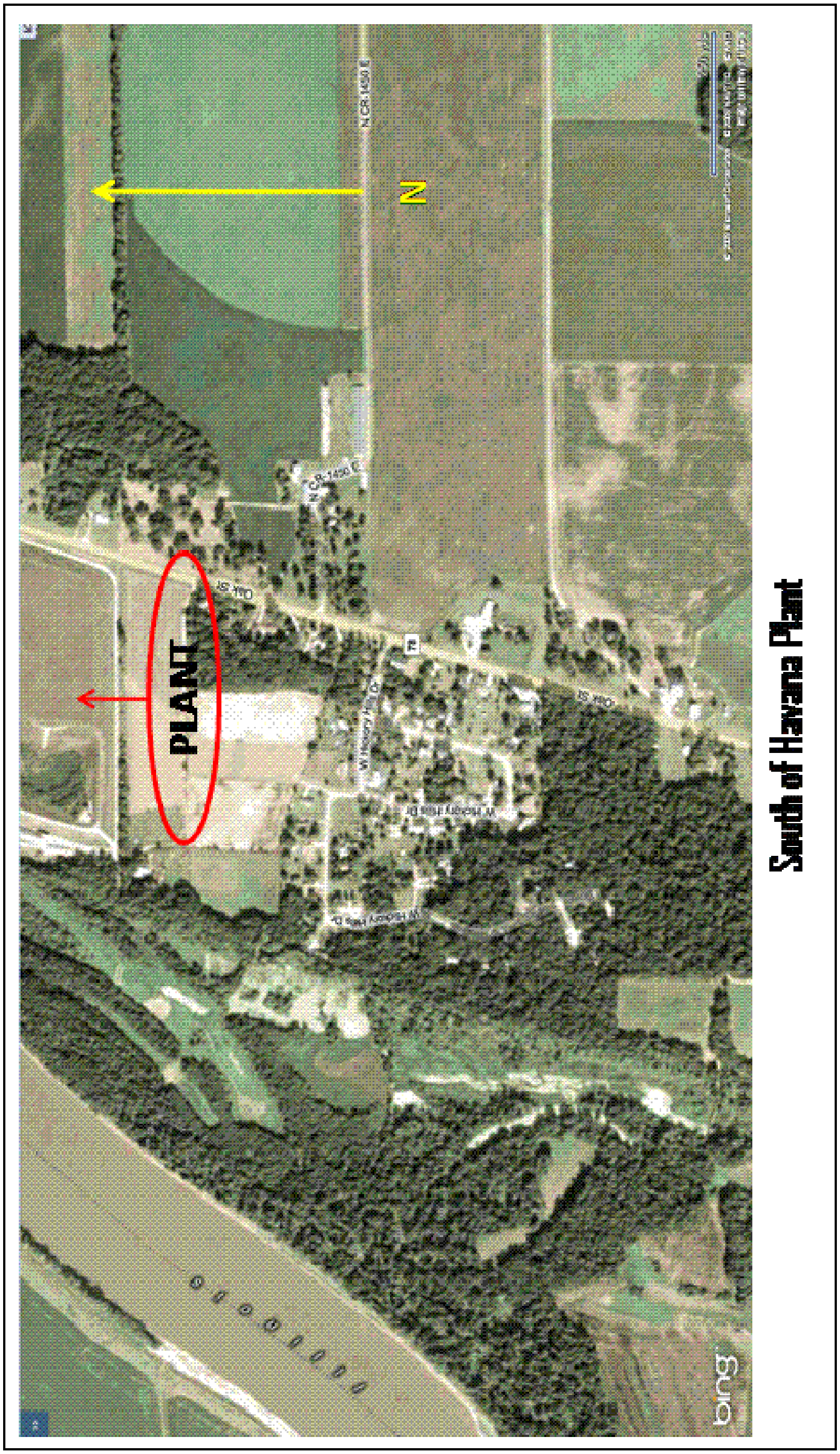


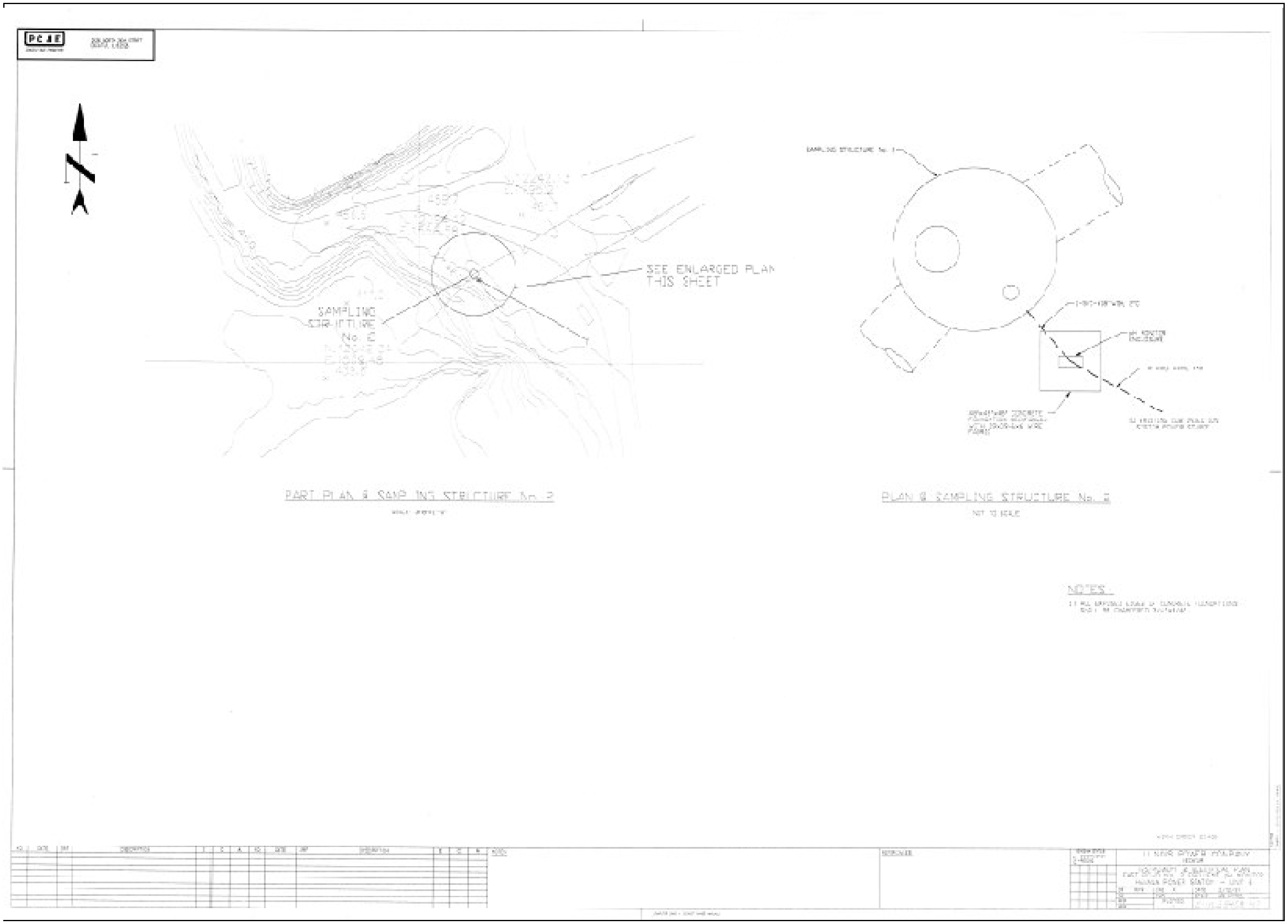
Town of Havana, IL 2 of 2



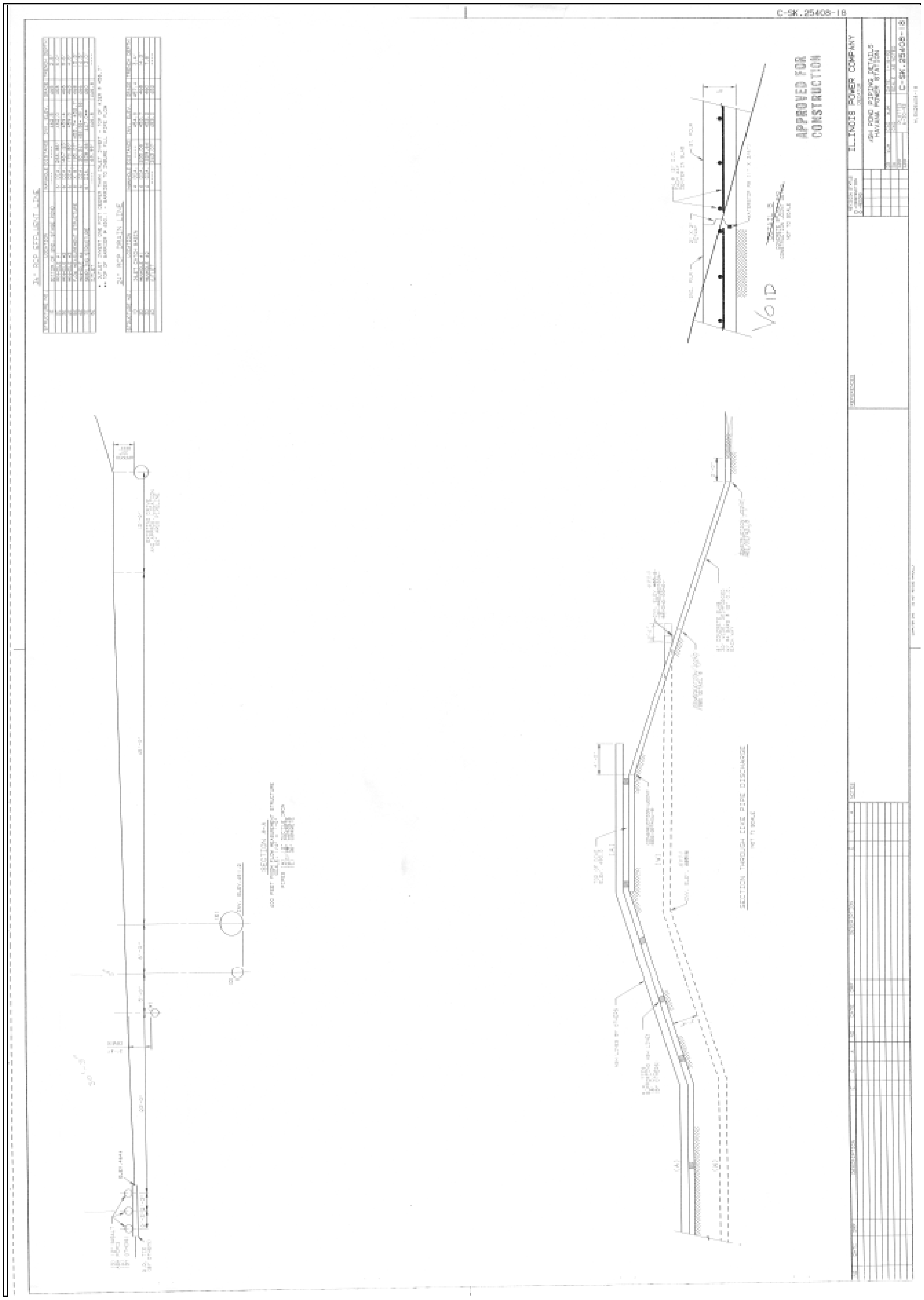
North of Havana Plant

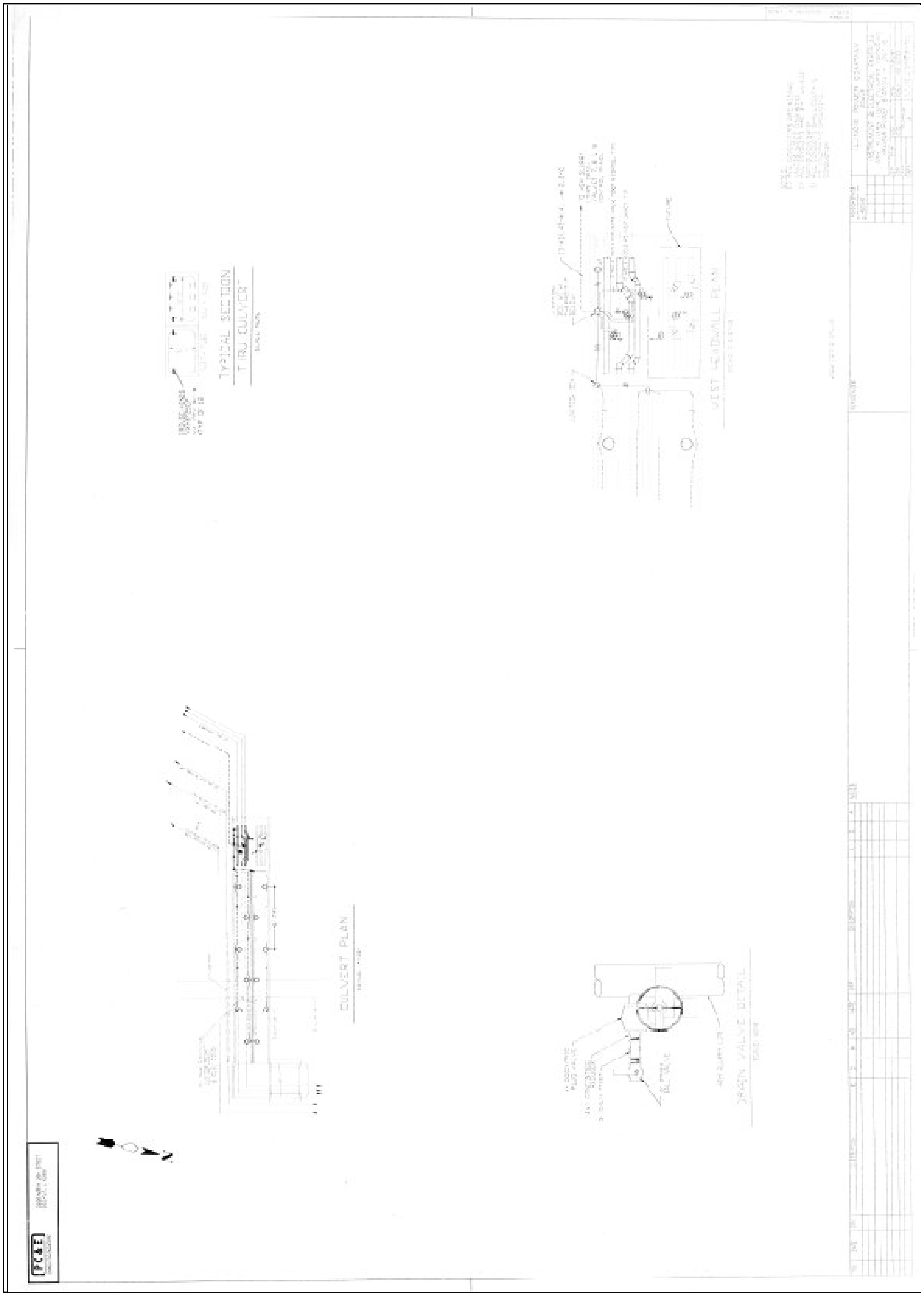
NE Corner of Cell 3

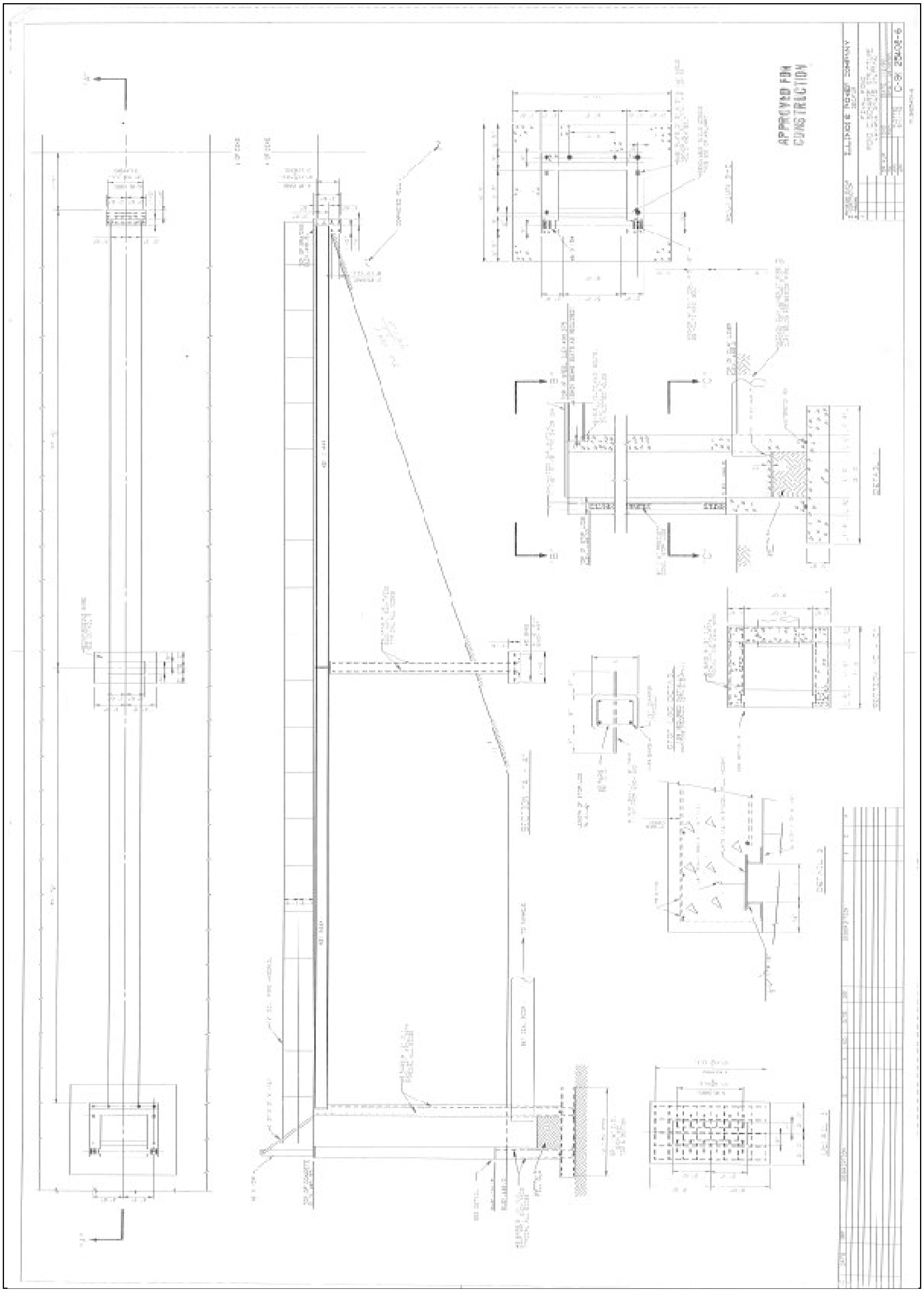

N
PLANT
N CR-1450 E
Oak St
W Hickory Hills Dr
bing
South of Havana Plant


SEE ENLARGED PLAN
THIS SHEET
SAMPLING
STRUCTURE
No. 2
PART PLAN @ SAMPLING STRUCTURE No. 2
PLAN @ SAMPLING STRUCTURE No. 2
NOT TO SCALE
NOTES
HAVANA POWER STATION – UNIT 6

DRAFT


C-SK.25408-18
APPROVED FOR CONSTRUCTION
ILLINOIS POWER COMPANY
ASH POND PIPING DETAILS
HAVANA POWER STATION
C-SK.25408-18
VOID
SECTION THROUGH DIKE PIPE DISCHARGE
NOT TO SCALE


TYPICAL SECTION
THRU CULVERT
WEST HEADWALL PLAN
CULVERT PLAN
DRAIN VALVE DETAIL
PC&E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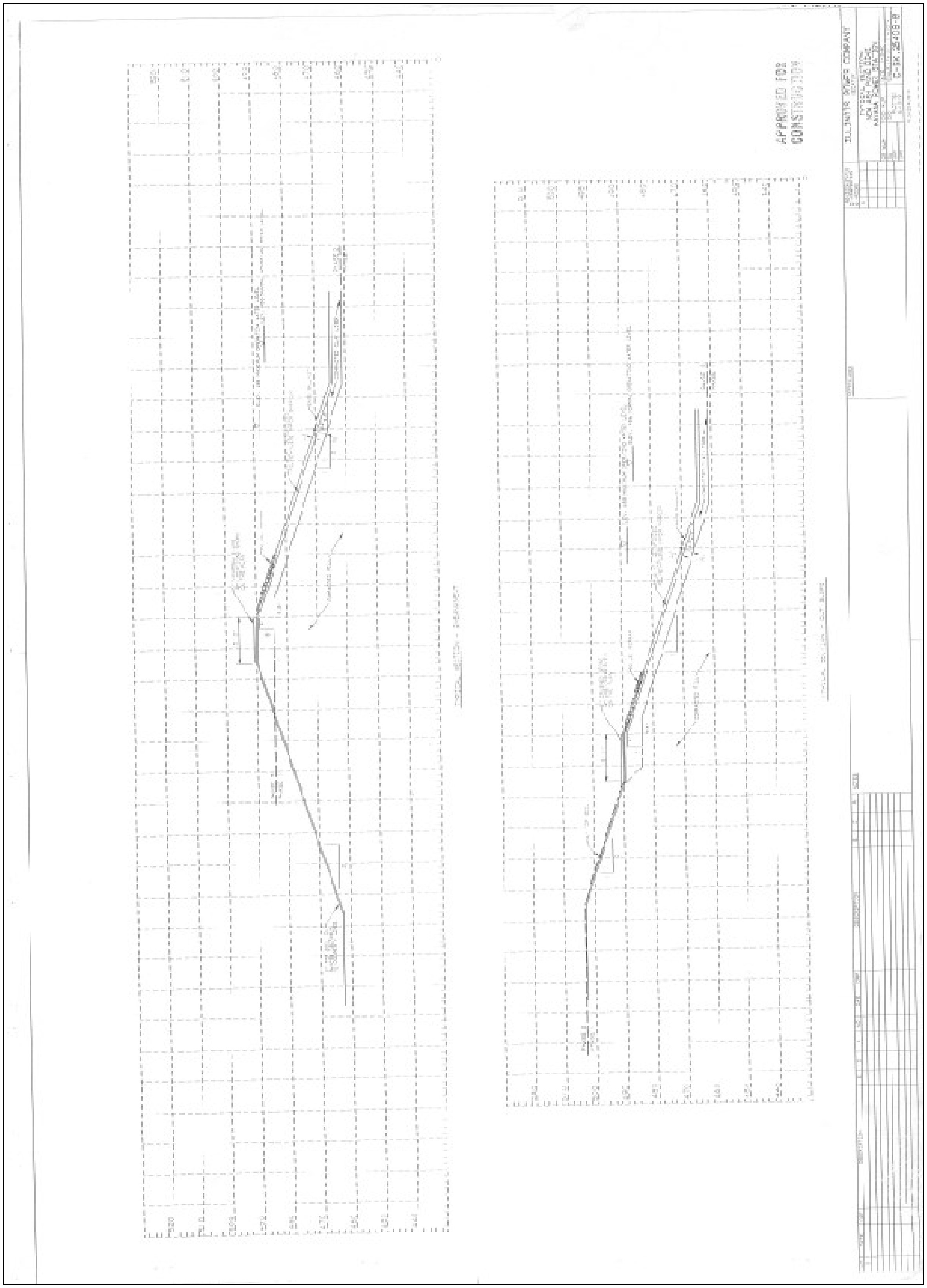
ILLINOIS POWER COMPANY
C-9Y 25408-6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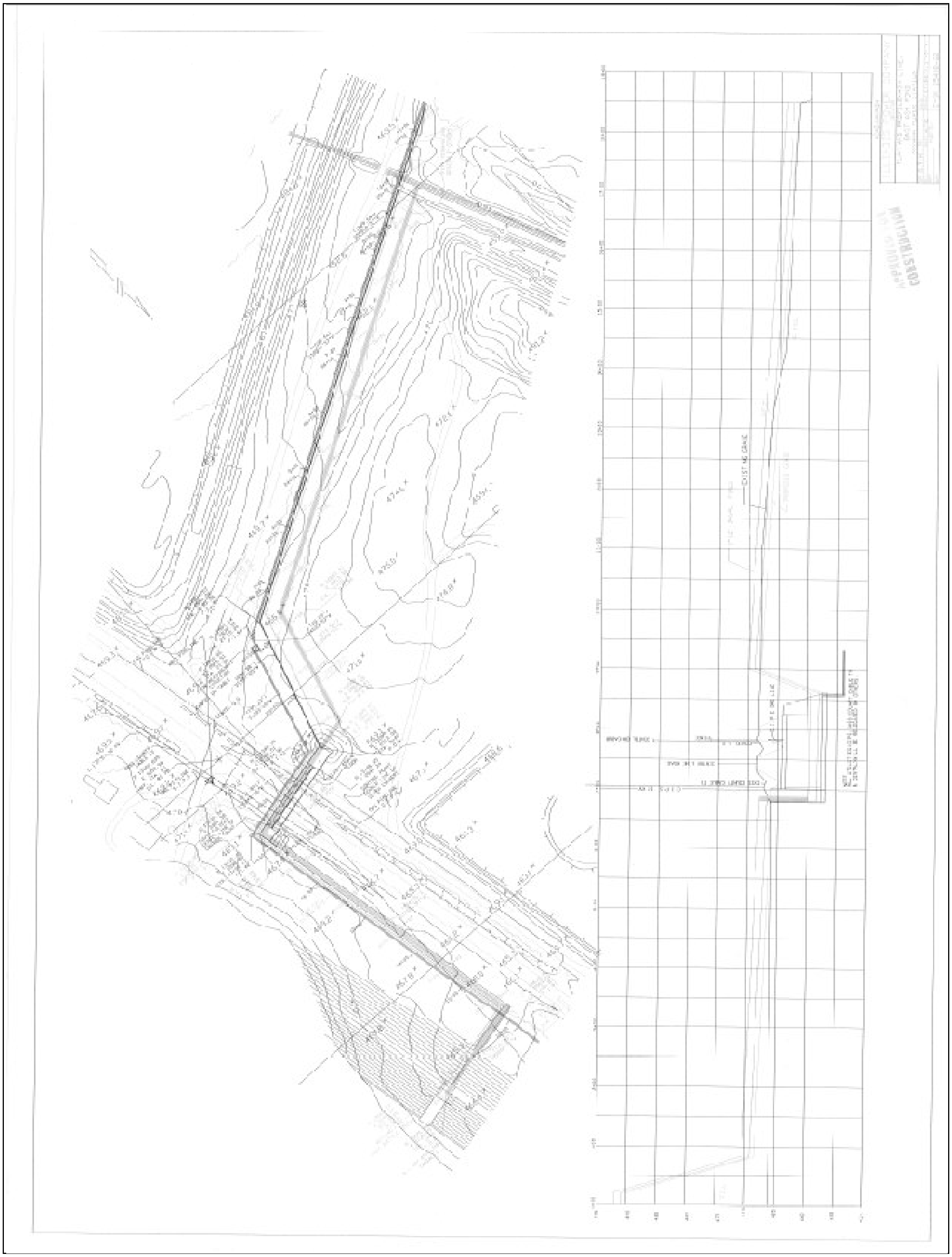
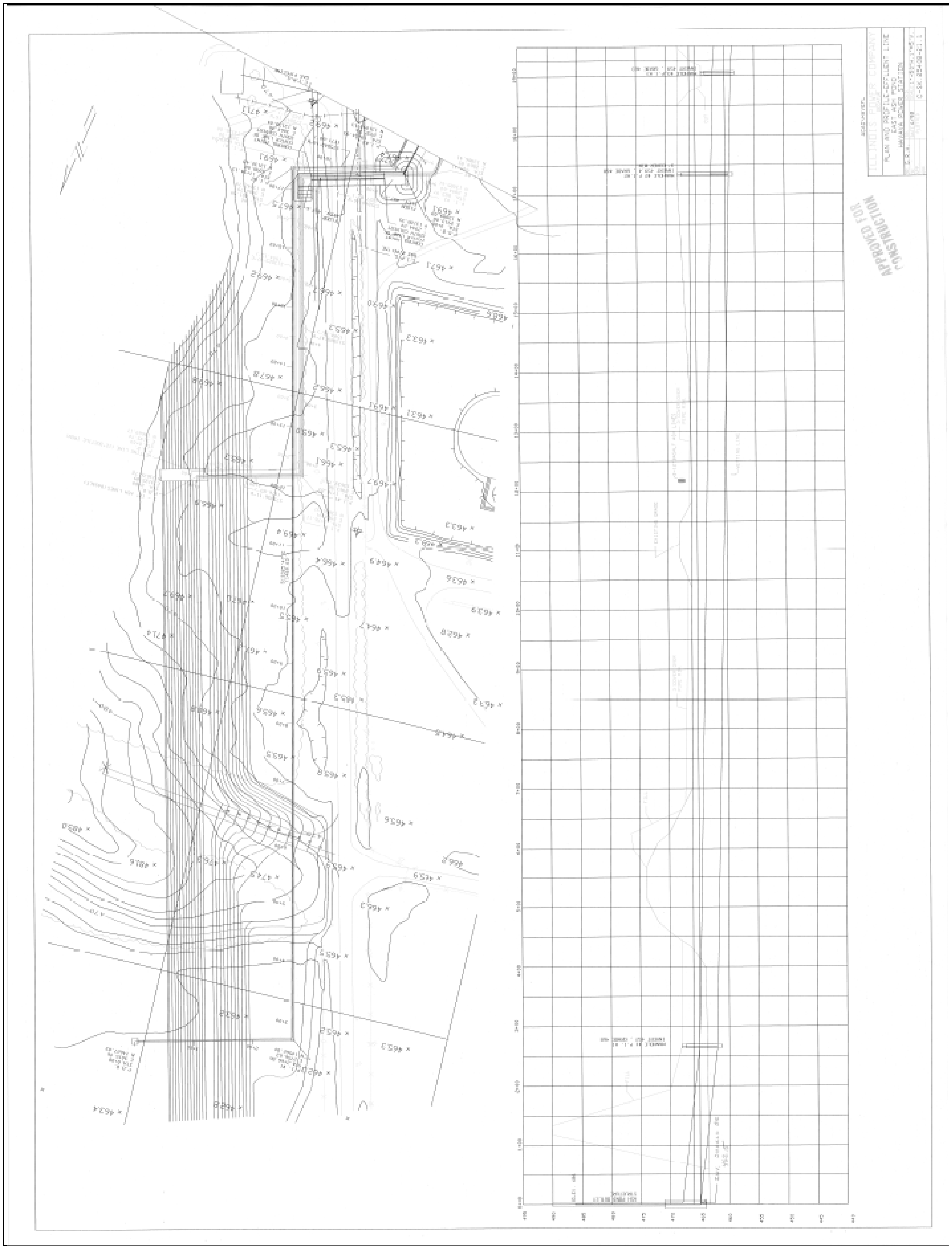
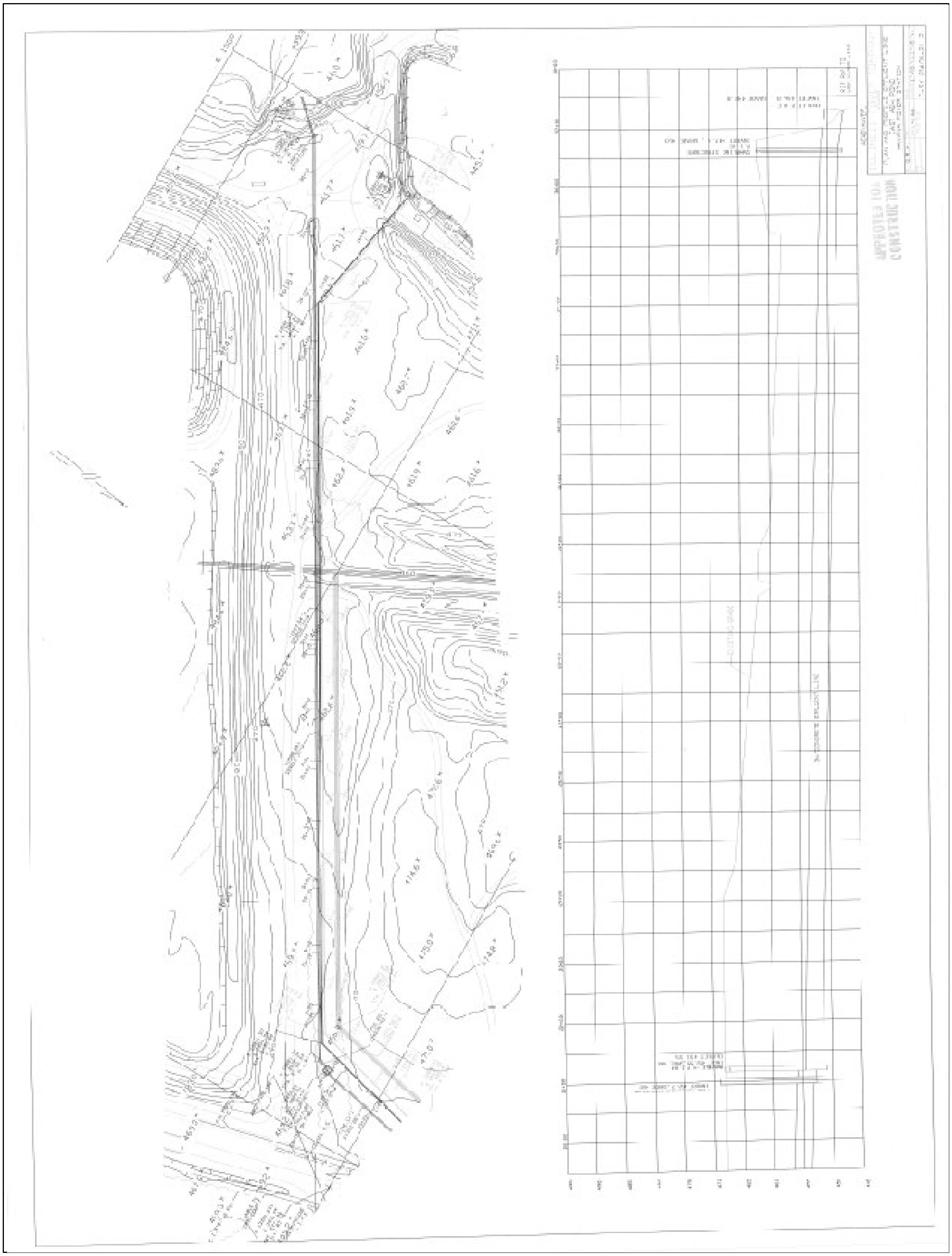
CONSTRUCTION
ILLINOIS POWER COMPANY




ILLINOIS POWER COMPANY
PLAN AND PROFILE-EFFLUENT LINE
EAST ASH POND
HAVANA POWER STATION
C-SK.28408-21.1
APPROVED FOR CONSTRUCTION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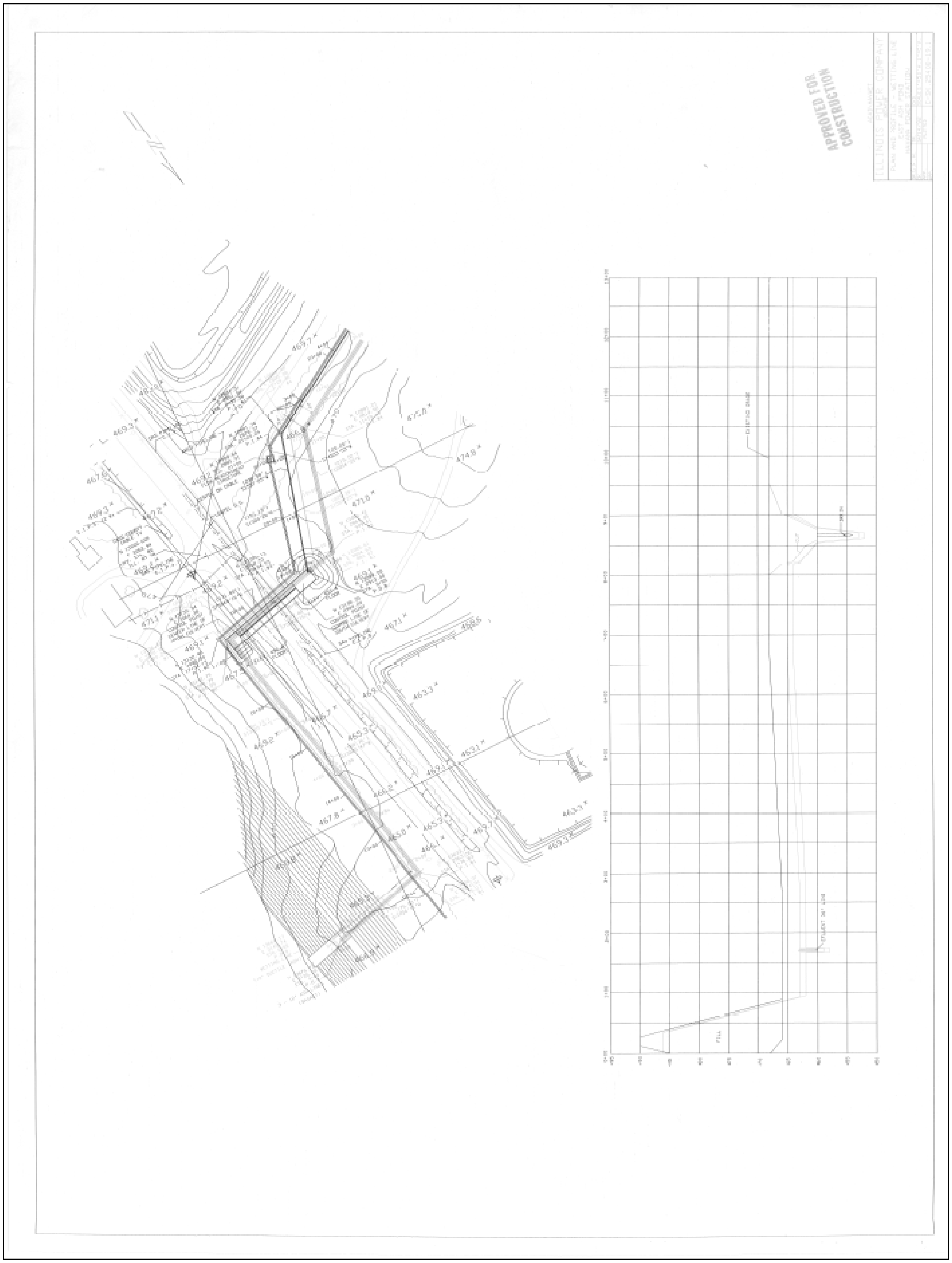
APPROVED FOR CONSTRUCTION
ILLINOIS POWER COMPANY
EXISTING GRADE
FILL
469.7
469.3
471.0
474.8
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463.3
463.1
469.2
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467.9
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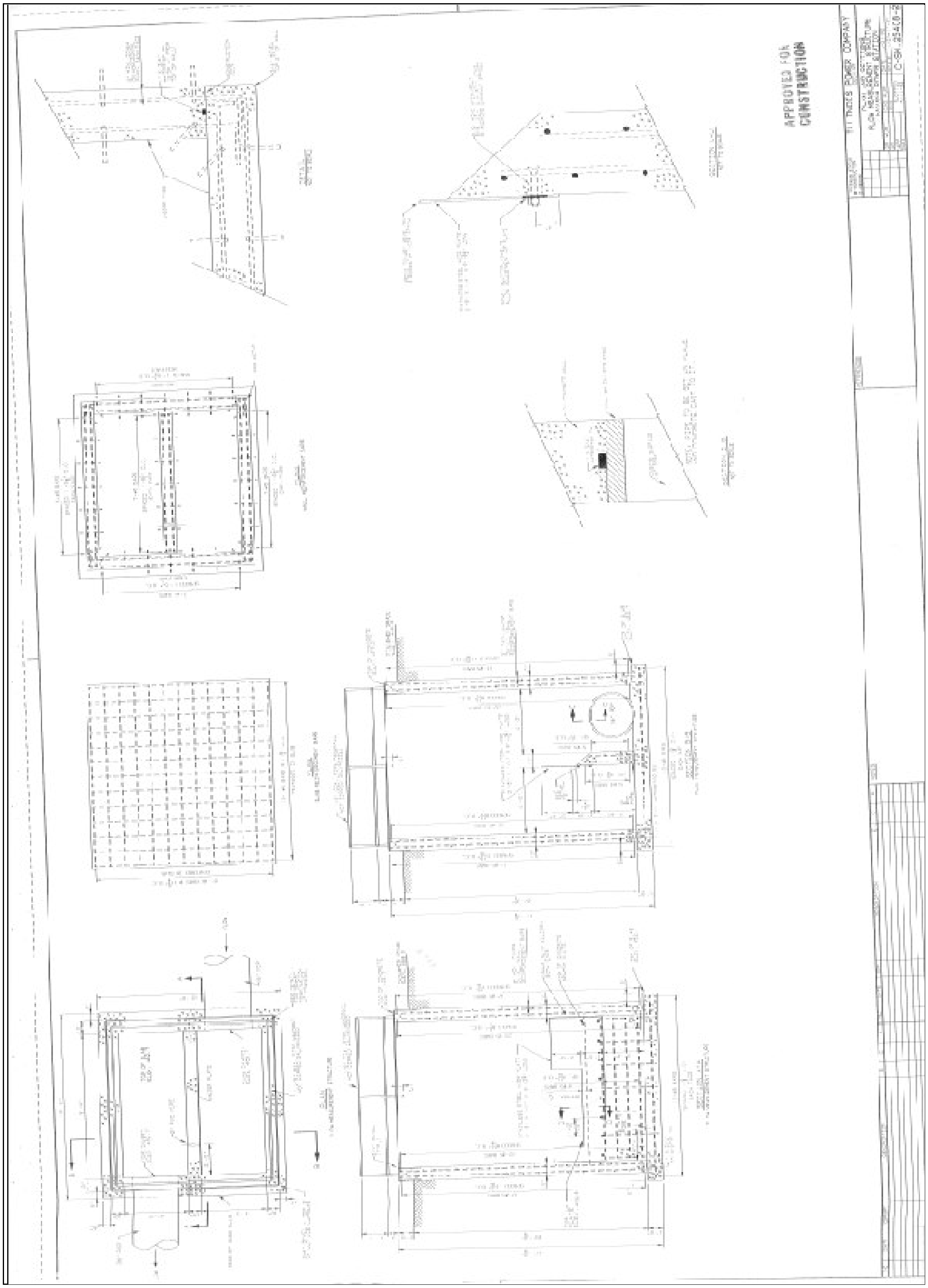
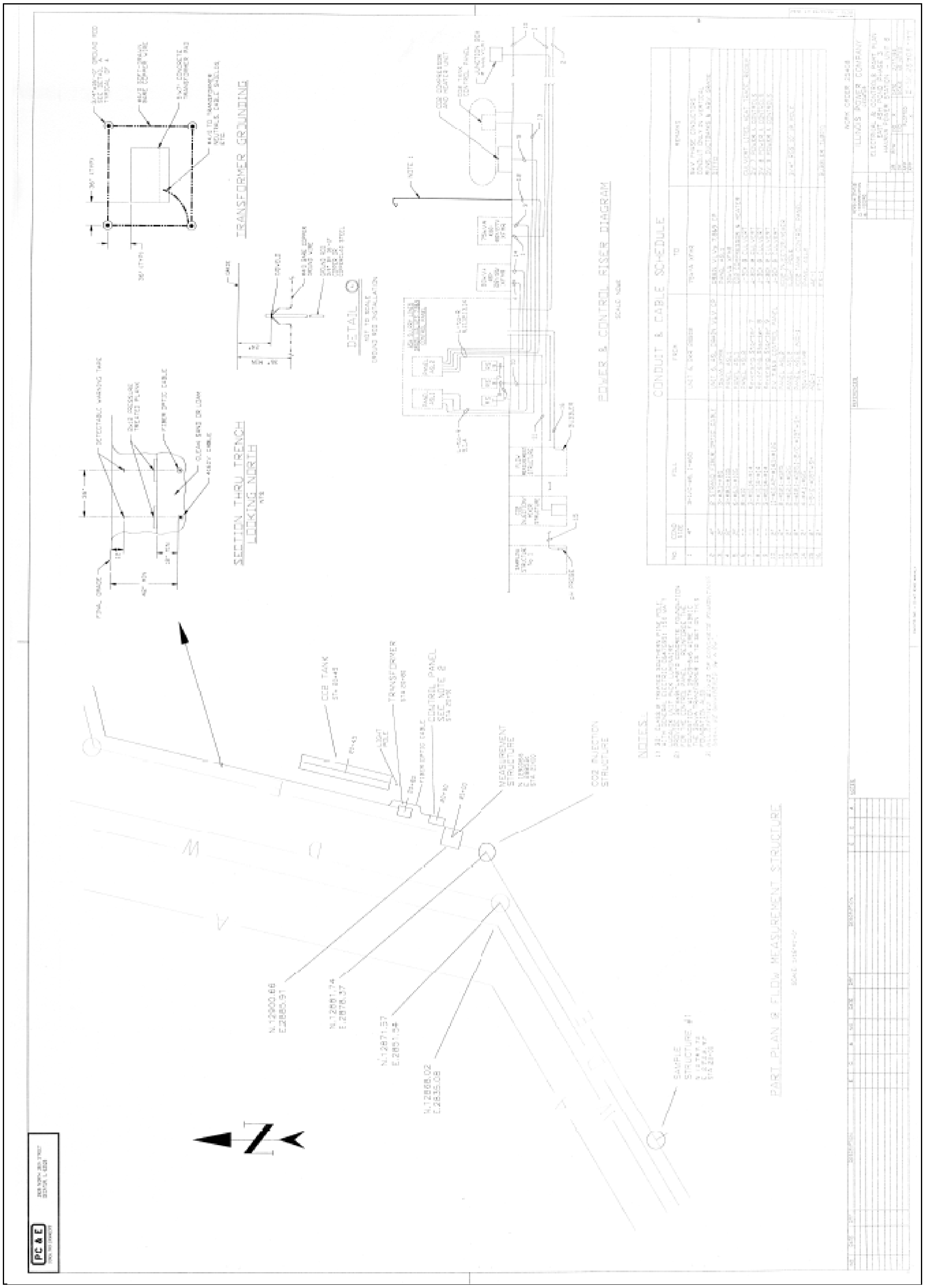
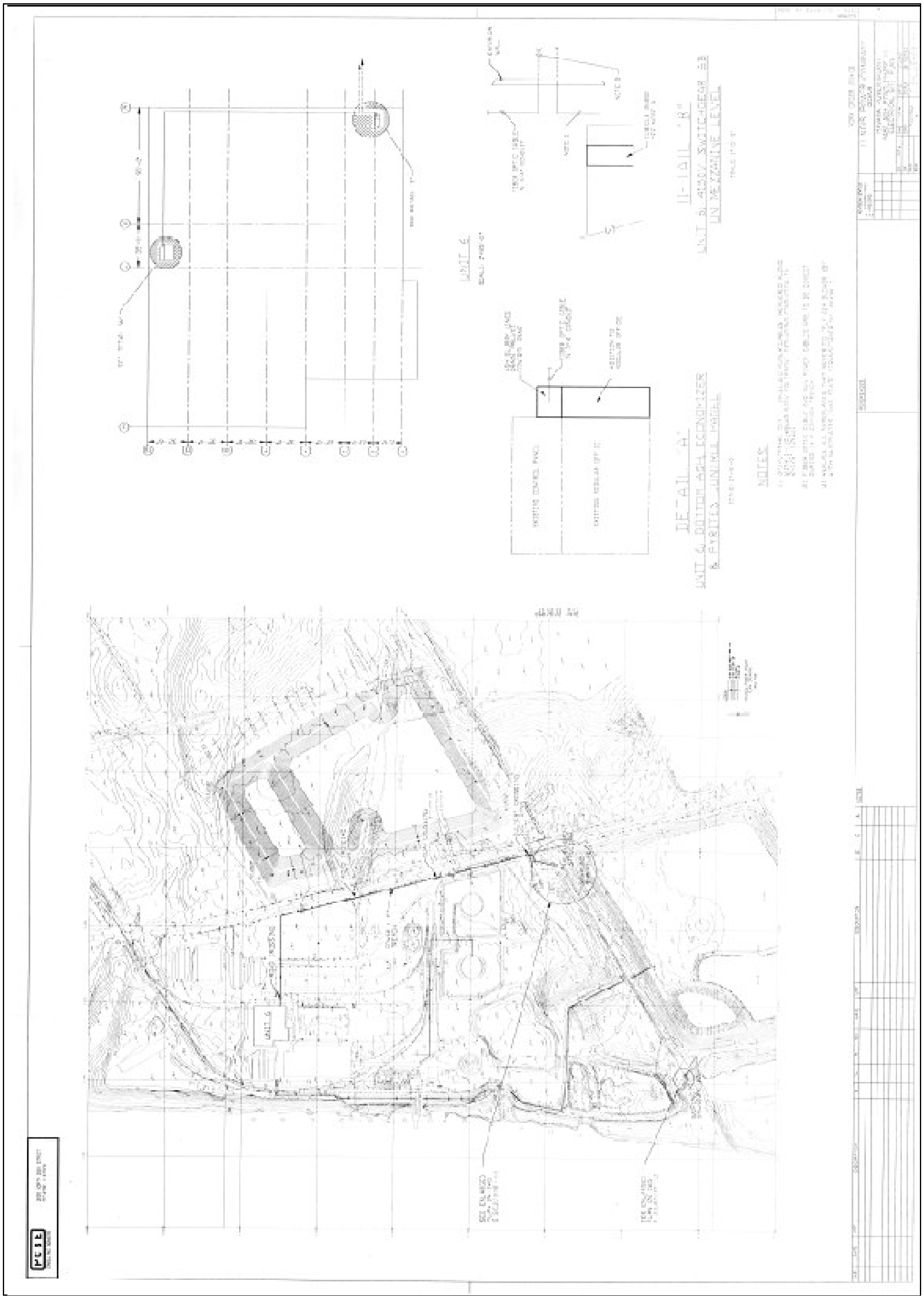
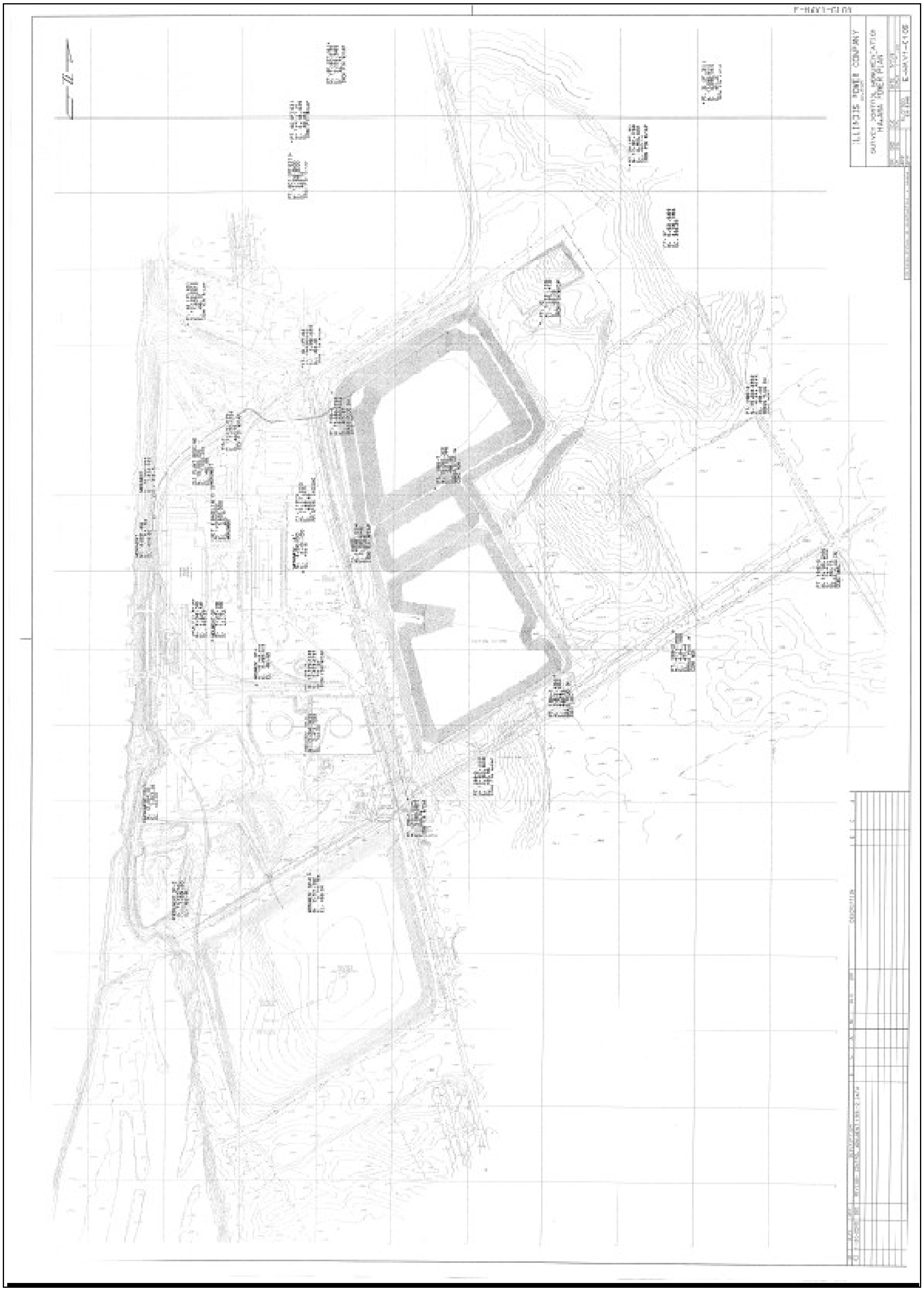
465.3
463.3
469.3
468.9


APPROVED FOR CONSTRUCTION
ILLINOIS POWER COMPANY

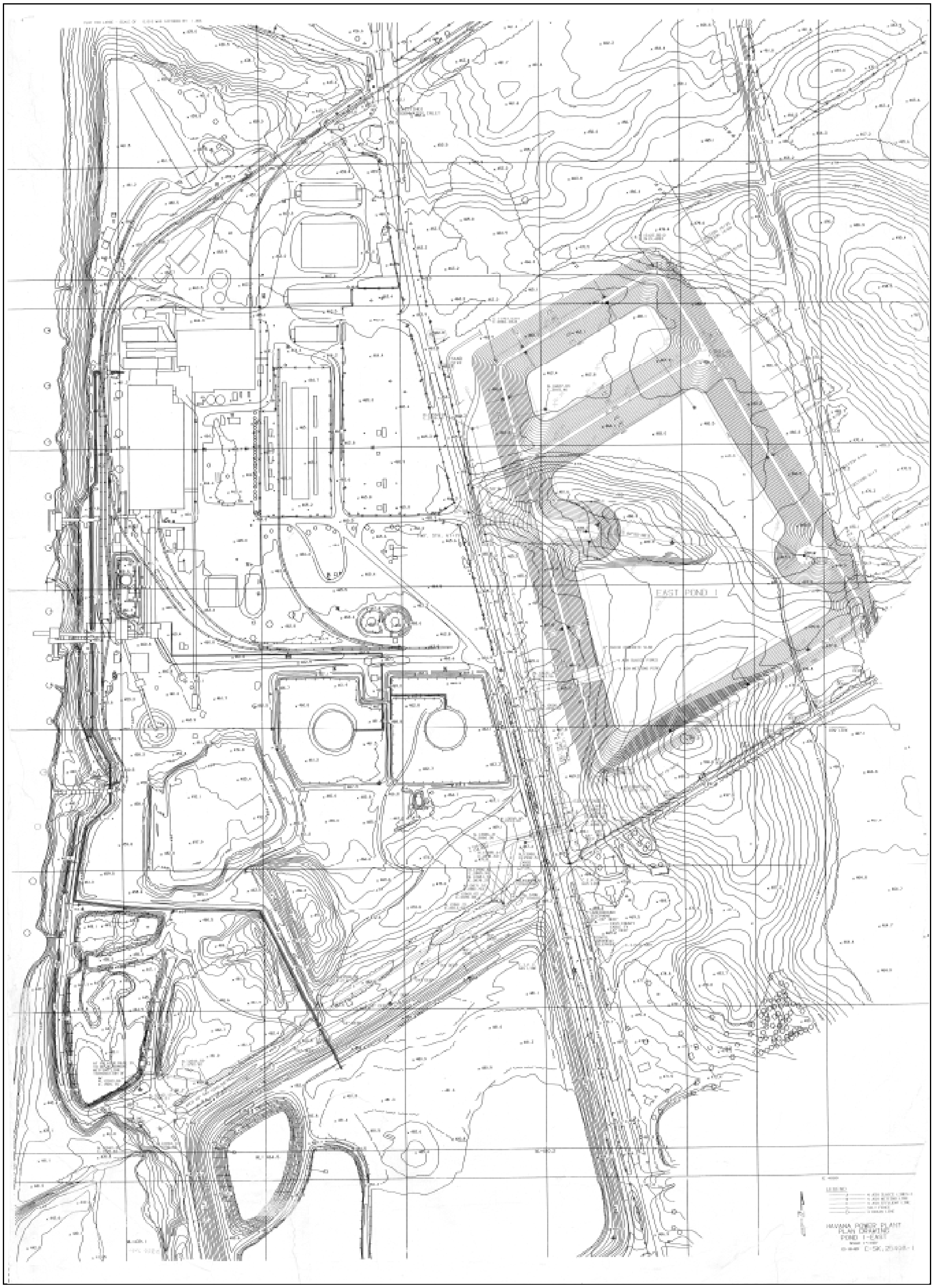

TRANSFORMER GROUNDING
SECTION THRU TRENCH LOOKING NORTH
DETAIL
NOT TO SCALE
GROUND ROD INSTALLATION
POWER & CONTROL RISER DIAGRAM
SCALE NONE
CONDUIT & CABLE SCHEDULE
NOTES:
CO2 TANK
TRANSFORMER
LIGHT POLE
CONTROL PANEL SEE NOTE 2
MEASUREMENT STRUCTURE
CO2 INJECTION STRUCTURE
SAMPLE STRUCTURE #1
N 12900.66
E 2885.91
N 12881.74
E 2878.37
N 12871.57
E 2851.34
N 12868.02
E 2833.08
PART PLAN @ FLOW MEASUREMENT STRUCTURE
FINAL GRADE
FIBER OPTIC CABLE
DETECTABLE WARNING TAPE
N
ILLINOIS POWER COMPANY
WORK ORDER 23408
PC & E


UNIT 6
DETAIL "A"
UNIT 6 BOTTOM ASH ECONOMIZER & PYRITES JUNIOR PANEL
DETAIL "B"
UNIT 6 4160V SWITCHGEAR 6B ON MEZZANINE LEVEL
NOTES
EXISTING CONTROL PANEL
ADDITION TO REGULAR OFFICE
UNIT 6

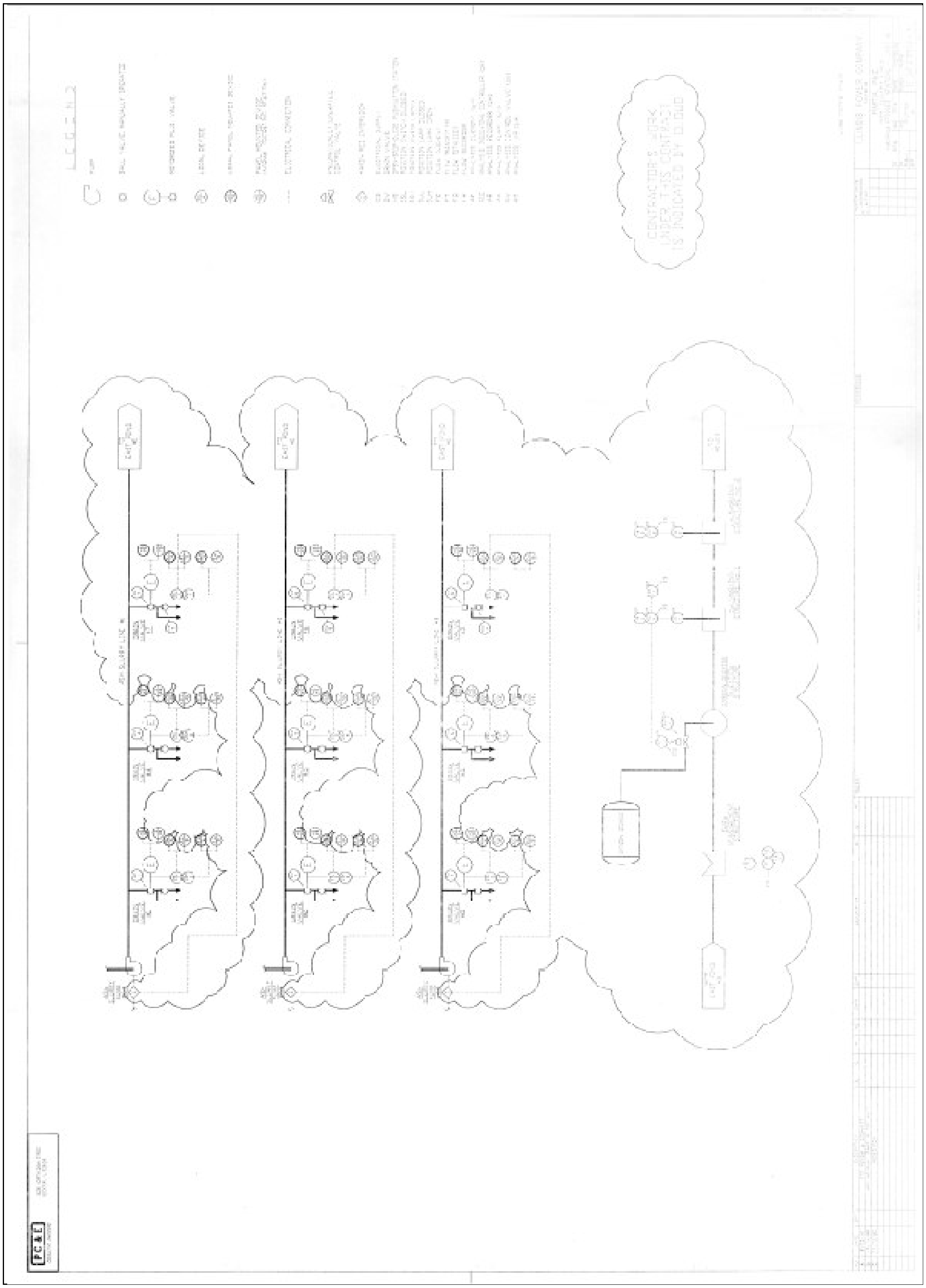
DRAFT


ILLINOIS POWER COMPANY
SURVEY CONTROL MONUMENTATION
HAVANA POWER PLANT

DRAFT



EAST POND 1
LEGEND
HAVANA POWER PLANT
PLAN DRAWING
POND 1-EAST
C-SK.25498-1


LEGEND
CONTRACTOR'S WORK UNDER THIS CONTRACT IS INDICATED BY CLOUD
ILLINOIS POWER COMPANY
PC&E

HAVANA POWER PLANT
HAVANA, ILLINOIS

EAST ASH POND PHASE 3
INSTRUMENT & ELECTRICAL CONSTRUCTION PACKAGE

W.O. 25408

ILLINOIS POWER COMPANY
DECATUR, ILLINOIS

Dynegy Midwest Generation, Inc.

Havana Power Station
Havana, Illinois

East Ash Pond System

IDNR Dam Safety Program

Permit No. DS2002185

Dam ID No. IL50483

Operations
and
Maintenance
Plan

November 2008

Havana Power Station
East Ash Pond System
Class 1 Dam Operations and Maintenance Plan

1.0 General

The following operation and maintenance procedures are provided to maintain the structural integrity of the east ash pond system (cells 1, 2, 3, and the final polishing pond - cell 4). Cells 1 and 2, and the final polishing pond of this system are classified as Small Class 1 dams by the Illinois Department of Natural Resources, Office of Water Resources (IDNR_OWR). Cell 3 is classified as an Intermediate Class 1 dam.

Cells 1, 2, and 3 are the primary ash deposition cells of the system. The fourth cell is the final effluent polishing pond. Cells 1, 2, and 3 are not hydraulically connected.

Water elevations in cell 4 will be slightly lower than in cells 1, 2, or 3. The normal pool elevation of primary cells 1 and 2 of this system is 486 feet above msl. Cell 1 is currently used only for the deposition of bottom ash and there is minimal free standing water in the pond. Cell 2 was taken out of service after cell 3 was constructed and placed into service (2003).

The normal pool elevation of cell no. 3 is 492 feet above msl. The emergency spillway crest in cell 3 is at approximate elevation 494 feet above msl. This emergency spillway consists of a concrete overflow channel which would discharge to the final effluent polishing pond.

2.0 Operation

2.1 Normal Operation and Surveillance

Ash disposal facility operation will be controlled by limiting discharges from the station to cells 1, 2, or 3 and by varying water surface elevations at the final effluent polishing pond (cell 4) discharge structure.

(a) Ash Pond Monitoring

An Ash Pond Log shall be used to establish and maintain pond history. All inspections and maintenance activities shall be recorded. Responsibility for maintaining this log shall be designated by the Station Manager.

(b) Daily Surveillance

The water surface elevation of each cell of the ash pond system shall be observed and recorded daily in the Ash Pond Log. A staff gauge is installed in each cell of the system and these gauges shall be maintained such that they accurately indicate water level elevations in each cell.

(c) Weekly Surveillance and Inspection

Weekly inspections of the perimeter berms around cells 1, 2, 3, and 4 shall be conducted, looking for seepage and slumping, and unusual seepage at and/or blockage of the outfall structures in each cell. All findings shall be entered into the Ash Pond Log and maintenance activities shall be initiated, if required.

2.2 Emergency Action Plan

During and immediately following unusual storm and flood events, inspection of the cells and their appurtenances shall be carried out and recorded at least once each day.

If the staff gauge in either cell 1 or cell 2 indicates a pool elevation of 487 feet or 492.7 feet in cell 3, inspection of the cells and their appurtenances shall be carried out and recorded at least once every 12 hours.

If the staff gauge in either cell 1 or cell 2 indicates a pool elevation of 488 feet or 494 feet in cell 3, a downstream flood watch will be disseminated and discharges from the station to the ash pond system will be suspended. Inspection of the cells and their appurtenances shall be carried out and recorded at least once every four hours.

When the staff gauge in either cell 1 or cell 2 indicates a pool elevation of 489 feet or 495 feet in cell 3, a flood warning will be disseminated and downstream residents that could experience first floor flooding shall be evacuated. Inspection of the ponds and their appurtenances shall be carried out and recorded at least once every two hours.

When the staff gauge in either cell 1 or cell 2 indicates a pool elevation of 489.25 feet or 495.25 feet in cell 3, all residents within the breach wave area shall be evacuated. Inspection of the ponds and their appurtenances shall be performed and recorded continuously. Residents will not be permitted to return to the breach wave area until the event concludes, the water surface in the cells fall to normal pool levels, and complete inspection of the cells and their appurtenances indicate pond operation to be safe.

Any unusual condition discovered during major storm events or routine inspection which may constitute an emergency shall be communicated as follows:

- Notice of any type of emergency involving the berms or outfall shall be made to the Shift Leader on duty.

- The shift leader on duty shall then notify the Station Manager (A.K. Millis; pager and home tel. nos. 309-297-0105; 309-692-8228; kirk_millis @dynegy.com) or in his absence the Production Manager (B.W. Veech; pager and home telephone nos. 309-303-5678 and 815-664-2608, respectively; e-mail address: byron_veech @dynegy.com). One of these shall then notify the following city, county, state, and federal regulatory authorities:

	Illinois ESDA, 24-hour service	1-800-782-7860
*	IDNR_OWR, Dam Safety Section	217-782-3863
*	IDOT, District 6	217-782-7301
*	Mason County Sheriff	309-543-2231
*	Havana Police Department	309-543-3321
	DMG, Director of Construction	618-206-5801
	DMG, Operations and Environmental Compliance(OEC)	618-206-5934 (office) 618-288-5659 (home) 618-401-5060 (cellular)

2.3 Dewatering

The Station Manager or the Production Manager shall be responsible for determining how repairs shall be accomplished and whether dewatering of the ash pond cells is necessary. Dewatering shall be accomplished by (a) manually removing the concrete stop logs from cell 4 of the ash pond system and (b) pumping of water from cell 1, or cell 2, or cell 3 to cell 4.

If water from cell 1, cell 2, or cell 3 must be rapidly drained to cell 4, the internal berm between cell 1 and cell 4, or between cell 2 and cell 4, or between cell 3 and cell 4 should be breached, but in a controlled manner. Only portions of a berm should be removed to maintain equalized water levels in cell 4. Breaching should be constantly manned and monitored by station personnel until water levels are equalized. Heavy equipment should be kept available so that, if excessive erosion of a berm begins to occur, berm materials can be replaced.

3.0 Maintenance

3.1. Semiannual Inspections

Semiannual inspections shall be conducted during optimal conditions at approximately six-month intervals to determine the general condition of the berms and discharge structure. Degradation of riprap, berm erosion, tree growth, animal burrows, and berm seepage shall be monitored during these inspections.

3.2 Vegetation

Berms shall be maintained to protect the structural integrity of the ash ponds. Damaged and barren areas shall be repaired as soon as appropriate with topsoil, limed, fertilized, and seeded with appropriate vegetation. Refer to Appendix A for a repair design suggestion.

Trees and shrubs observed during semiannual inspections shall be cut and removed from the berms. This shall be done as frequently as is necessary to insure that no tree reaches a size where the root structure would require removal and filling. Woody vegetation, shrubs, and trees shall be removed during the early stages of growth before reaching a 3-inch diameter. Low-growing vegetation that will not interfere with inspections shall be planted and maintained. Grass on the slopes of the berms should not be allowed to grow greater than 12 inches in height.

3.3. Intermediate Standpipe Structures, Final Discharge Structure, and Effluent Piping

Intermediate standpipe structures (which allow water to flow from cell to cell) shall be inspected semiannually for significant corrosion, scaling, etc. Structures significantly corroded shall be promptly repaired or replaced. Substantial deposits of scale shall be removed.

The final discharge structure shall be inspected semiannually for significant corrosion and for spalling and cracking of the concrete beams present in the structure. Any defects discovered shall be promptly repaired.

Effluent piping shall be inspected semiannually for excessive corrosion or scaling. Pipe which is significantly corroded shall be promptly replaced. Substantial scale deposits shall be removed. Effluent piping channels shall be inspected semiannual for seepage (infiltration) and corrosion. Excessive infiltration and corrosion shall be repaired.

Erosion of berms around the discharge structure or intermediate standpipe structures be promptly corrected by revetment with riprap or another erosion control method. Refer to Appendix A for a repair design suggestion.

3.4. Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling with grout.

3.5 Restriction of Unauthorized Vehicles and Personnel

Berm approaches shall be posted with signs and the entire site enclosed by security fencing to prevent unauthorized travel on the roadways and slopes.

3.6. Annual Inspection

An annual inspection shall be made by a licensed Professional Engineer. This inspection shall follow IDNR's "Guidelines and Forms for Inspection of Illinois Dams", and shall be followed by verbal and written reports by the consulting engineer. Based on the findings of the inspection, the Station Manager shall implement corrective action as required to promote dam safety. Procedures and methods for corrective action shall be performed in accordance with the recommendations of the consulting engineer and as outlined above. Copies of the engineer's report along with the corrective action taken shall be reported to the IDNR. An annual statement on forms furnished by the IDNR certifying compliance with the above maintenance plan shall be submitted to the IDNR.

Havana Station IDNR O&M Plan

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 – (217) 782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601 – (312) 814-6026

DOUGLAS P. SCOTT, DIRECTOR

May 22, 2009

Mr. Rick Diericx
Senior Director, Operations Environmental Compliance
Dynegy Midwest Region Operations
604 Pierce Boulevard
O'Fallon, Illinois 62269

Dear Mr. Diericx:

This letter is in response to Dynegy's "2008 Closure Work Plan Annual Report" (Annual Report) and cover letter for the Havana South Ash Pond System, received by the Illinois Environmental Protection Agency (Illinois EPA) on October 6, 2008.

In the cover letter, Dynegy requests that the Illinois EPA give written approval for the discontinuation of all Groundwater monitoring at the South Ash Pond site and provide a declaration of closure. Such action will cause the groundwater management zone (GMZ) established June 1996, in accordance with consent decree 89-CH-5, to expire.

Pursuant to 35 IAC 620.250(c):

> A groundwater management zone expires upon the Agency's receipt of appropriate documentation which confirms the completion of the action taken pursuant to subsection (a) and which confirms the attainment of applicable standards as set forth in Subpart D.

The Annual Report provides data indicating that during the most recent five years of monitoring, four monitoring wells Well 04, Well 15, Well 23 and Well 25 have had boron and/or manganese concentrations higher than the Class I numerical groundwater standard. No other monitoring wells have exceeded the Class I numerical groundwater standards (35 IAC 620.410) during that time period.

Based on the data provided, Well 23 is within the outer most edge (620.240(f)(1)) of the closed impoundment. The applicable groundwater standard is Class IV groundwater. The Class IV groundwater standards are equal to existing concentrations (i.e. constituent concentrations must not increase). The monitoring data provided indicates that both boron and manganese concentrations show a decreasing trend in Well 23. Therefore, Well 23 appears to be in compliance with the applicable standards of 35 IAC 620.

ROCKFORD – 4302 North Main Street, Rockford, IL 61103 – (815) 987-7760 • DES PLAINES – 9511 W. Harrison St., Des Plaines, IL 60016 – (847) 294-4000
ELGIN – 595 South State, Elgin, IL 60123 – (847) 608-3131 • PEORIA – 5415 N. University St., Peoria, IL 61614 – (309) 693-5463
BUREAU OF LAND - PEORIA – 7620 N. University St., Peoria, IL 61614 – (309) 693-5462 • CHAMPAIGN – 2125 South First Street, Champaign, IL 61820 – (217) 278-5800
SPRINGFIELD – 4500 S. Sixth Street Rd., Springfield, IL 62706 – (217) 786-6892 • COLLINSVILLE – 2009 Mall Street, Collinsville, IL 62234 – (618) 346-5120
MARION – 2309 W. Main St., Suite 116, Marion, IL 62959 – (618) 993-7200

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While Well 25 is within 25 feet of the edge of the closed impoundment, available data indicates that the well is screened more than 15 feet below the base of the impoundment, and is therefore monitoring Class I groundwater. Wells 04 and 15 are down gradient and are also monitoring Class I groundwater. During the most recent five years of monitoring all three of these wells have had manganese concentrations higher than the Class I numerical groundwater standard.

Pursuant to 35 IAC 620.410(a)

Inorganic Chemical Constituents
Except due to natural causes or as provided in Section 620.450, concentrations of the following chemical constituents must not be exceeded in Class I groundwater:

Based on a review of the monitoring data provided and the conclusions of the 2002 EPRI report, the concentrations of manganese in these three wells appear to be due to natural aquifer conditions. Under these circumstances, Wells 04, 15 and 25 are in compliance with the applicable standards of 35 IAC 620.450(a)(4)(A), and no reporting pursuant to35 IAC 620.450(a)(5) is required.

Based on the Illinois EPA's review and interpretation of the data submitted by Dynegy, the requirements of 35 IAC 620.250(c) have been satisfied. Therefore, the Havana South Ash Pond GMZ shall expire as of the date of this letter. The Havana South Ash Pond is considered to be closed and no further monitoring or reporting is required pursuant to the GMZ.

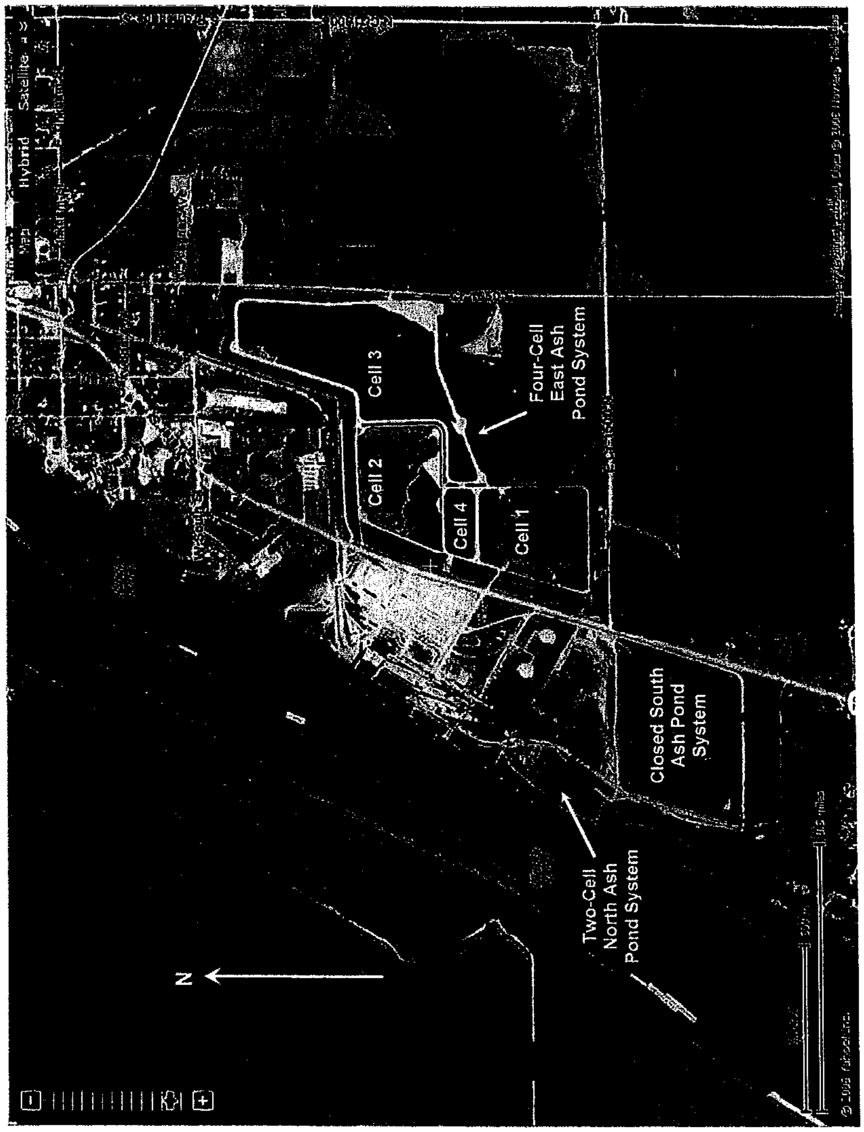
I trust this responds to your needs. If you have further questions or concerns please contact Lynn Dunaway of my staff or me at (217) 785-4787.

Sincerely,

William E. Buscher

William E. Buscher, P.G.
Supervisor, Hydogeology and Compliance Unit
Groundwater Section
Division of Public Water Supplies
Bureau of Water

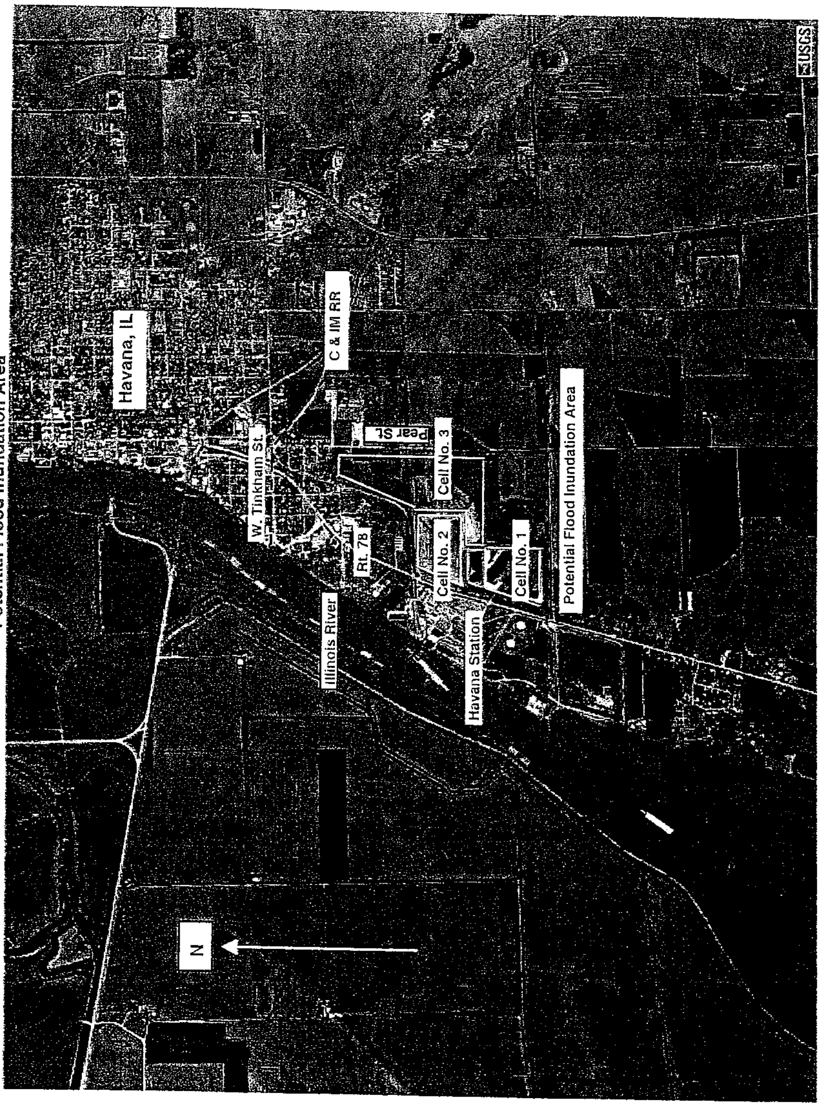
CC: Al Keller, BOW Permits
Connie Tonsor, DLC
Mike Garretson, CAS
Lynn Dunaway
Groundwater File



Havana Station Ash Pond Systems

HA1

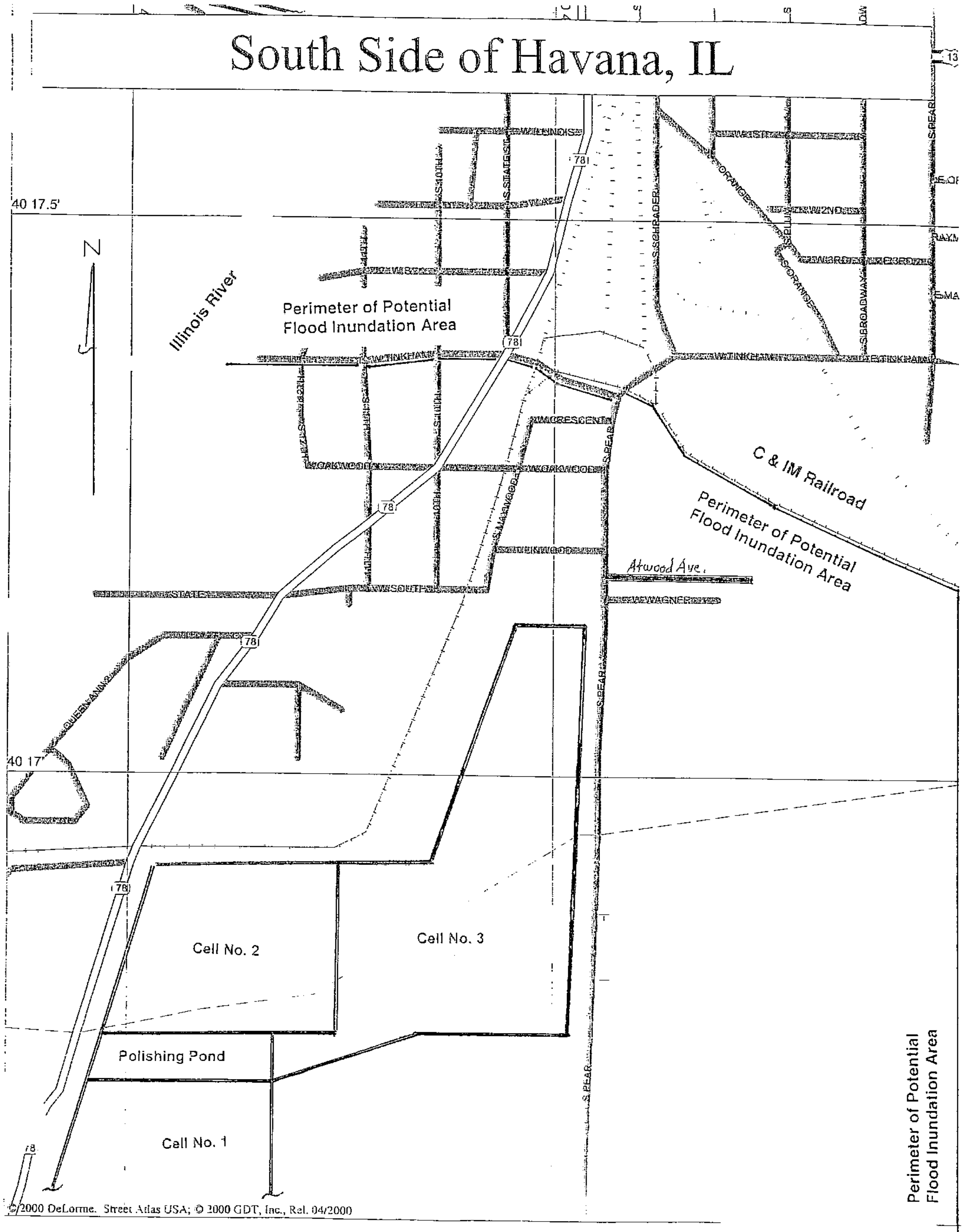
Havana Power Station
Emergency Action Plan for East Ash Pond System
Potential Flood Inundation Area



HA2

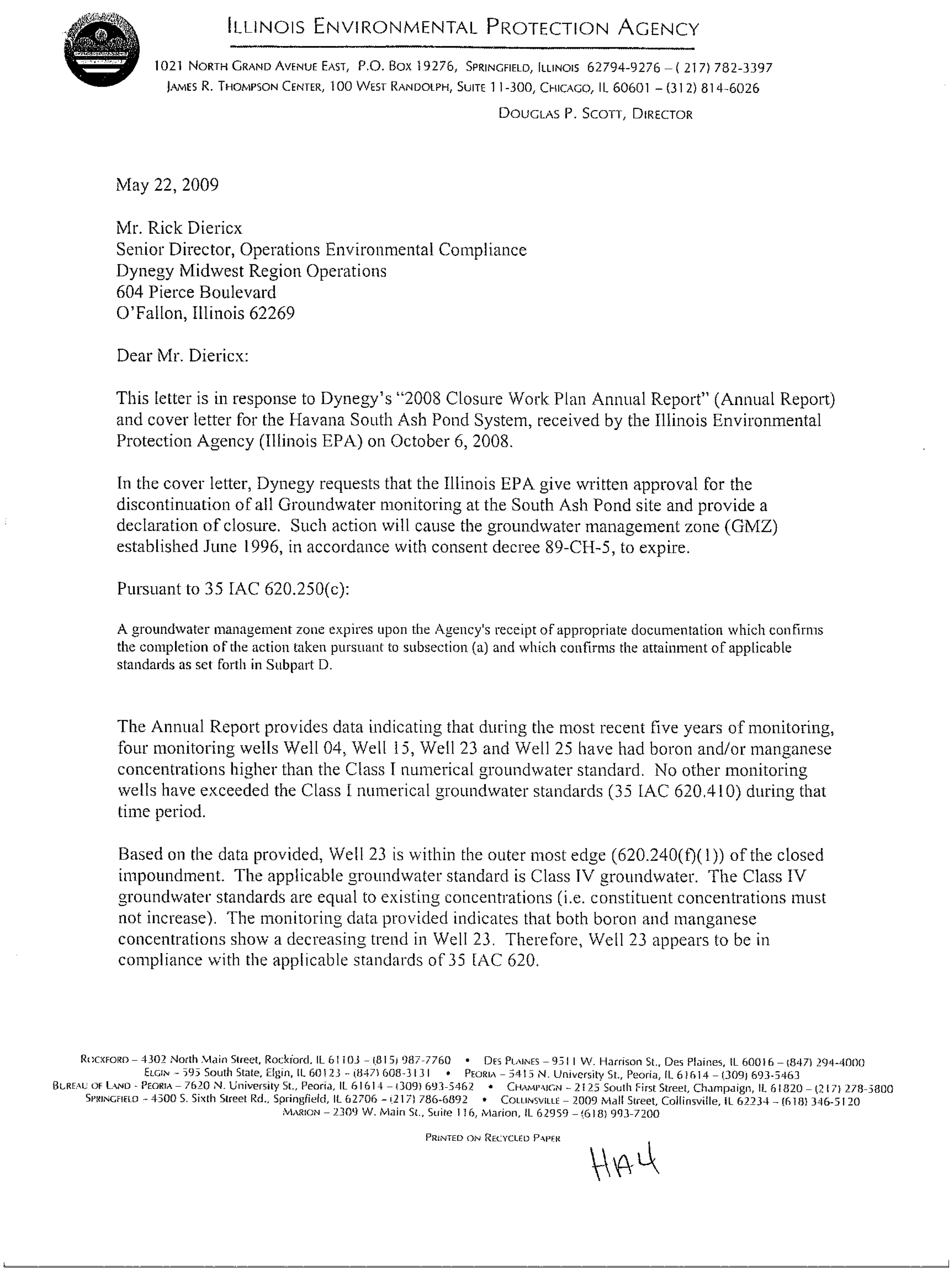
Insert 1-4

DRAFT



HA3

Insert 1-5



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HA4

While Well 25 is within 25 feet of the edge of the closed impoundment, available data indicates that the well is screened more than 15 feet below the base of the impoundment, and is therefore monitoring Class I groundwater. Wells 04 and 15 are down gradient and are also monitoring Class I groundwater. During the most recent five years of monitoring all three of these wells have had manganese concentrations higher than the Class I numerical groundwater standard.

Pursuant to 35 IAC 620.410(a)

Inorganic Chemical Constituents
Except due to natural causes or as provided in Section 620.450, concentrations of the following chemical constituents must not be exceeded in Class I groundwater:

Based on a review of the monitoring data provided and the conclusions of the 2002 EPRI report, the concentrations of manganese in these three wells appear to be due to natural aquifer conditions. Under these circumstances, Wells 04, 15 and 25 are in compliance with the applicable standards of 35 IAC 620.450(a)(4)(A), and no reporting pursuant to35 IAC 620.450(a)(5) is required.

Based on the Illinois EPA's review and interpretation of the data submitted by Dynegy, the requirements of 35 IAC 620.250(c) have been satisfied. Therefore, the Havana South Ash Pond GMZ shall expire as of the date of this letter. The Havana South Ash Pond is considered to be closed and no further monitoring or reporting is required pursuant to the GMZ.

I trust this responds to your needs. If you further questions or concerns please contact Lynn Dunaway of my staff or me at (217) 785-4787.

Sincerely,

William E. Buscher

William E. Buscher, P.G.
Supervisor, Hydogeology and Compliance Unit
Groundwater Section
Division of Public Water Supplies
Bureau of Water

CC: Al Keller, BOW Permits
Connie Tonsor, DLC
Mike Garretson, CAS
Lynn Dunaway
Groundwater File

HA5

D0000392

Design Calculations and Commentary
Submitted for a Dam Safety Construction Permit

Dynegy- Illinois Power
Havana Power Plant
East Ash Pond #3

January 2002

DAVID M. GASKINS
062 - 044275

David M. Gaskins
1/14/02
license expires 11/30/03

HA6

Design Calculations and Commentary Submitted for a Dam Safety Construction Permit

Dynegy- Illinois Power
Havana Power Plant
East Ash Pond #3

January 2002

HA7

Design Calculations and Commentary
Submitted for a Dam Safety Construction Permit

Dynegy- Illinois Power
Havana Power Plant
East Ash Pond #3

Table of Contents

Introduction

Wave Runup / Freeboard

Hydrology and Hydraulics

Effluent Pipe Analysis

Energy Dissipation

De-watering

Seepage

Breach Analysis

Slope Stability Analysis

Soil Reports

Auxiliary Spillway Analysis

Maps

HA8

Introduction to Engineering Calcs. **September 14, 2001**
Havana Power Station **JHK**
East Ash Pond #3B

This manual contains the engineering calculations for the #3B cell of the Havana Power Plant East Ash Pond system. This facility is owned and operated by Illinois Power Company of Decatur, Illinois, a subsidiary of Dynegy, Corp. Its construction will be very similar to the initial ponds of the east ash pond system built in 1992/93 under permit number 20748 and the pond system built in 1998/99 under permit number . The most significant change in construction between the #3B cell and the initial ponds will be the relative size of the new pond, with a storage volume over 2.2 million cubic yards.

The liner for cell #3B will consist of one foot of compacted glacial till clay brought in from off site covered with a 45-mil polypropylene geomembrane. The membrane is essentially impervious to water. The clay layer is to provide additional protection against seepage in the event of pinholes or seaming defects in the membrane. The ponds built in 1992/93 have a three-foot clay liner without a geomembrane.

The maximum toe to crest height for the cell #3B embankment is 34 feet.

Cell #3B will receive no stormwater runoff except for rain that falls directly on the cell or the top of the embankment. All plant waste streams currently going to cell #2 will be redirected to the new cell. These result in a maximum of 11.9-cfs flow into the pond. In an emergency, plant flows can be shut off in a relatively short time.

Outflow from cell #3B will go to the existing polishing pond. From there, the existing outlet works will carry the water to a backwater area of the Illinois River. The only new piping work is the standpipe in cell #3B that directs the outflow to the polishing pond.

The accompanying project plans show the construction details for the new cell. The embankment will be constructed of the on-site soils compacted to no less than 95% of the Standard Proctor density. The clay liner will also be compacted to not less than 95% of Standard Proctor density. A competent inspector, who has experience in this type of work, will observe all construction. The inspector will be hired by the Owner and will be completely independent of the construction contractor. Furthermore, the Illinois Power Engineering Department will closely follow the project from start to finish.

These calculations are intended for submittal to the Illinois Department of Natural Resources, Office of Water Resources for a construction permit. They have been prepared in accordance with the following Office of Water Resources publications:

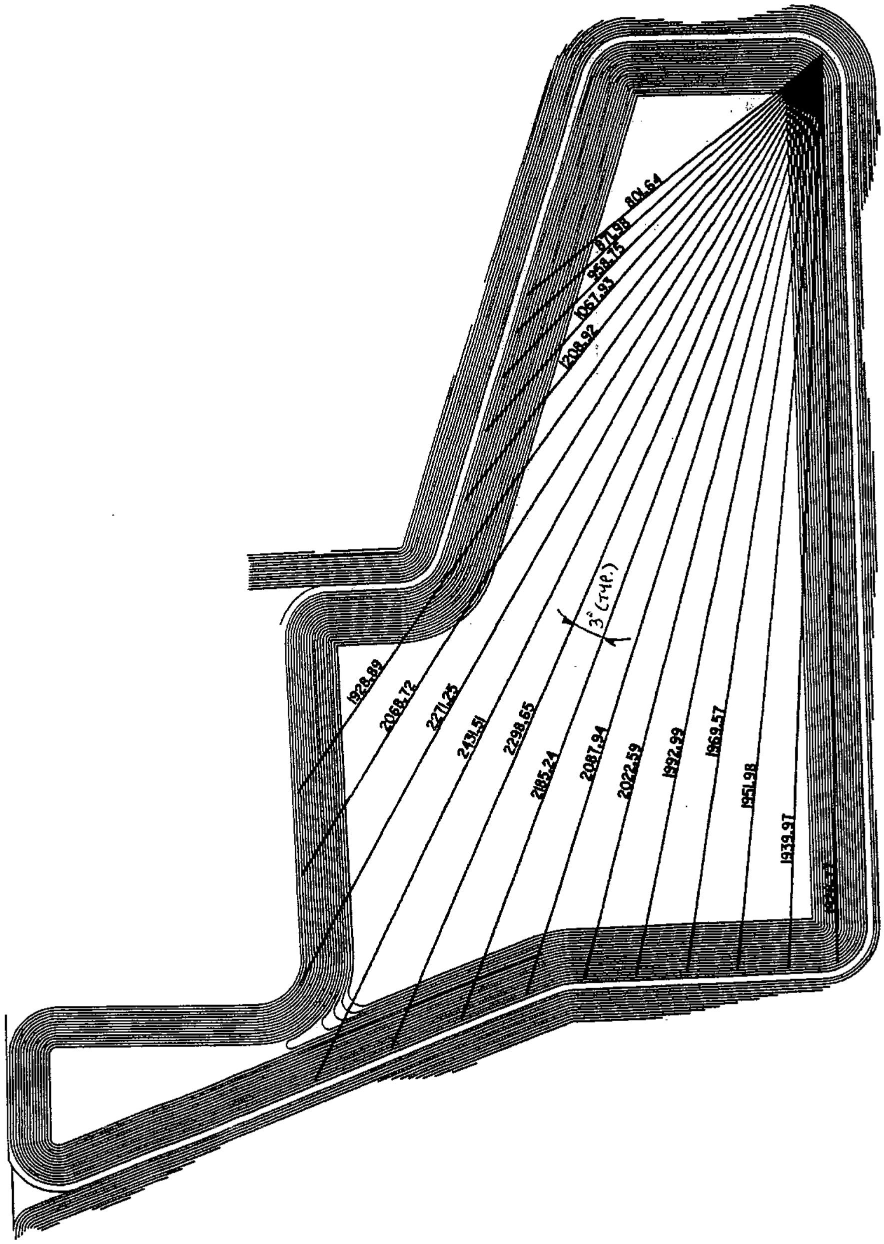
1. **Rules for Construction and Maintenance of Dams**
2. **Procedural Guidelines for Preparation of Technical Data to be Included for Permits for Construction and Maintenance of Dams**

HA9

The table of contents lists the scope of these calculations. They cover hydrology, hydraulics and geotechnical concerns. There are no components of this dam that require structural calculations.

The greatest risk to life and property in the event of a dam breach of the pond system is on State Highway 78 immediately west of cell #2, the power plant adjacent to the highway and the rural township road immediately east of cell #3B and the houses adjacent to the road. The main channel of the Illinois River is approximately ½ mile west of cell #3B. The risk to life and property along the Illinois River caused by a breach of cell #3B is very small.

HA10


801.64
871.98
958.75
1067.93
1208.92
1928.89
2068.72
2271.25
2431.51
2298.65
2185.24
2087.94
2022.59
1992.99
1969.57
1951.98
1939.97
3° (TYP.)

HA 10

Havana East Ash Pond #3B

Fetch Lengths for Wave Runup Analysis

Angle (degrees)	Length (ft.)	Length (mile)	cosine alpha	Length*cos. (mi.)
18	1928.89	0.365	0.951	0.347
15	2068.72	0.392	0.966	0.378
12	2271.25	0.430	0.978	0.421
9	2431.51	0.461	0.988	0.455
6	2298.65	0.435	0.995	0.433
3	2185.24	0.414	0.999	0.413
0	2087.94	0.395	1.000	0.395
3	2022.59	0.383	0.999	0.383
6	1992.99	0.377	0.995	0.375
9	1969.57	0.373	0.988	0.368
12	1951.98	0.370	0.978	0.362
15	1939.97	0.367	0.966	0.355
18	1928.77	0.365	0.951	0.347
	Summations:		12.753	5.034

Feff. = 5.034/12.753 = 0.395 miles

HA 12

Subject: Wave Runup and Freeboard calculation for Pond #3B

I. Purpose:

Calculate the maximum wave runup and freeboard required in Pond #3B of Havana East Ash Pond.

II. Assumptions, inputs and references:

References:

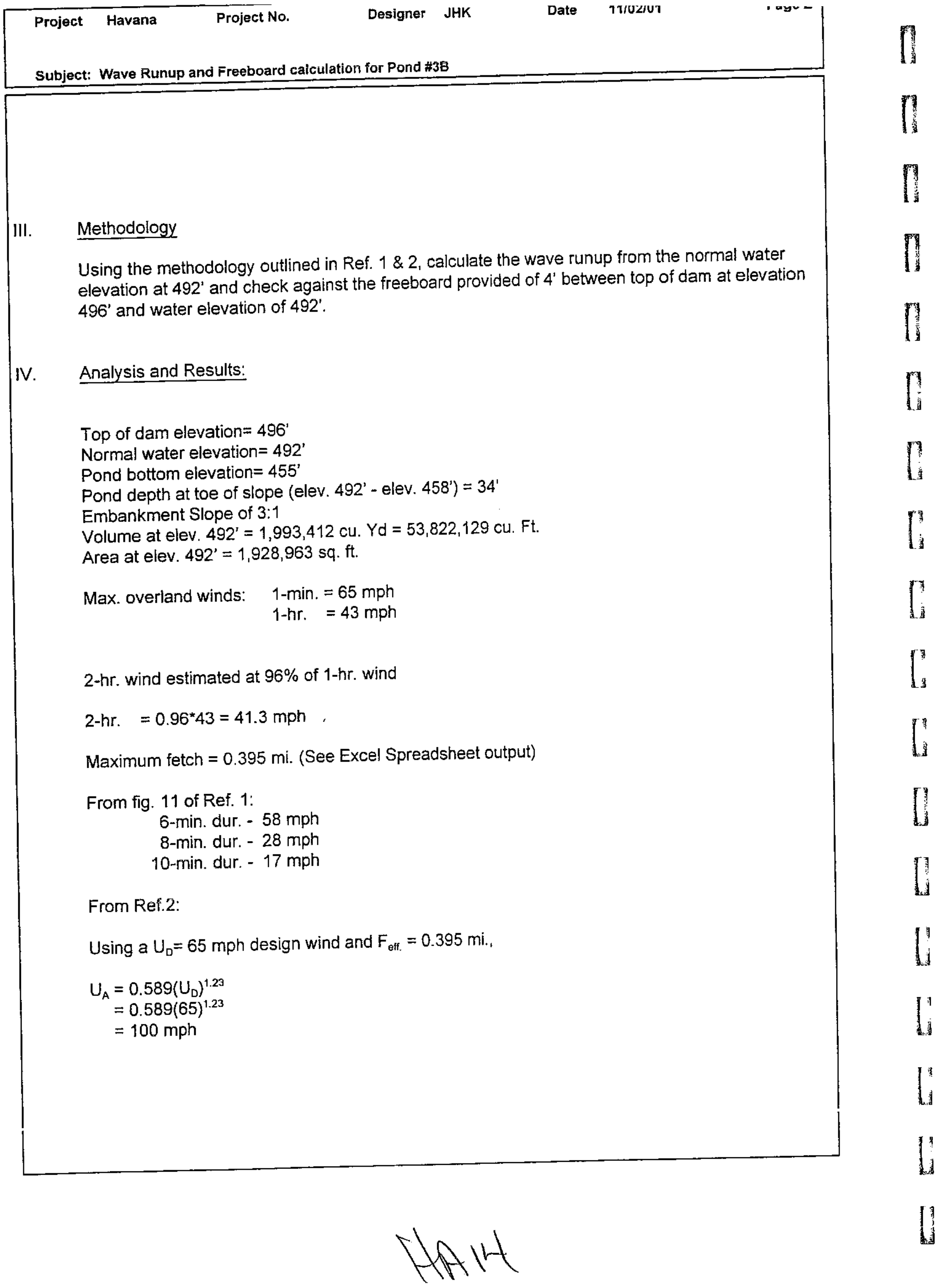
1.) "Wave Runup and Wind Setup on Reservoir Embankments", U.S. Army Corps of Engineers, Office of the Chief of Engineers, ETL 1110-2-221, November 1976.

2.) "Wave Characteristics, Wave Runup and Wind Setup Computational Model" program manual by B.R. Bodine, Corps of Engineers Southwestern Division, January 1986.

3.) Calculations done for Havana East ash pond #2

4.) 100-yr, 24 hr. rainfall from Frequency Distributions of Heavy Rainstorms in Illinois, Illinois State Water Survey, 1989

HA 13



Project Havana **Project No.** **Designer** JHK **Date** 11/02/01

Subject: Wave Runup and Freeboard calculation for Pond #3B

III. Methodology

Using the methodology outlined in Ref. 1 & 2, calculate the wave runup from the normal water elevation at 492' and check against the freeboard provided of 4' between top of dam at elevation 496' and water elevation of 492'.

IV. Analysis and Results:

Top of dam elevation= 496'
Normal water elevation= 492'
Pond bottom elevation= 455'
Pond depth at toe of slope (elev. 492' - elev. 458') = 34'
Embankment Slope of 3:1
Volume at elev. 492' = 1,993,412 cu. Yd = 53,822,129 cu. Ft.
Area at elev. 492' = 1,928,963 sq. ft.

Max. overland winds: 1-min. = 65 mph
1-hr. = 43 mph

2-hr. wind estimated at 96% of 1-hr. wind

2-hr. = 0.96*43 = 41.3 mph

Maximum fetch = 0.395 mi. (See Excel Spreadsheet output)

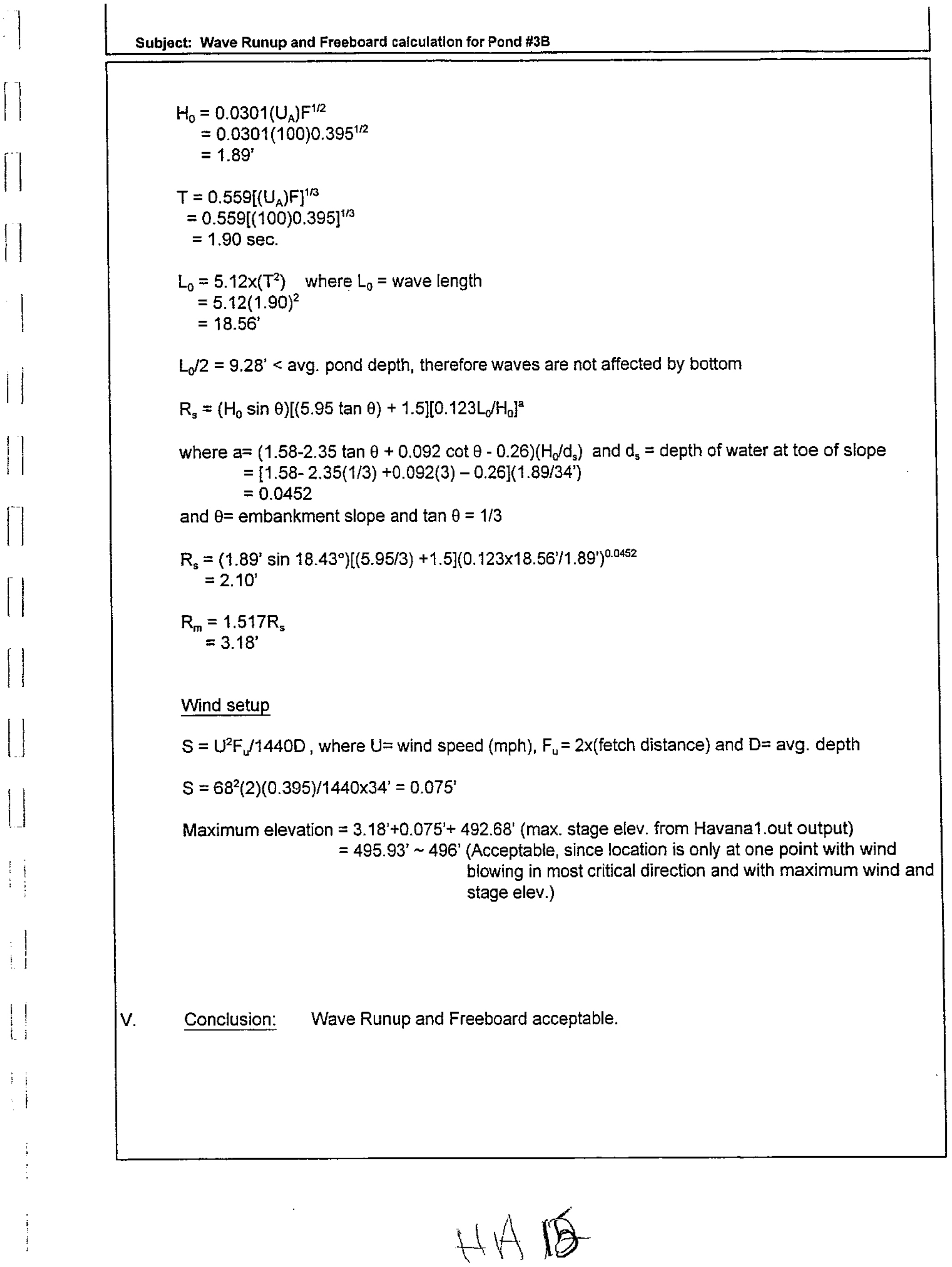
From fig. 11 of Ref. 1:
6-min. dur. - 58 mph
8-min. dur. - 28 mph
10-min. dur. - 17 mph

From Ref.2:

Using a U_D= 65 mph design wind and $F_{eff.}$ = 0.395 mi.,

$U_A = 0.589(U_D)^{1.23}$
$= 0.589(65)^{1.23}$
$= 100$ mph

HA14



Subject: Wave Runup and Freeboard calculation for Pond #3B

$H_0 = 0.0301(U_A)F^{1/2}$
$= 0.0301(100)0.395^{1/2}$
$= 1.89'$

$T = 0.559[(U_A)F]^{1/3}$
$= 0.559[(100)0.395]^{1/3}$
$= 1.90$ sec.

$L_0 = 5.12x(T^2)$ where L_0 = wave length
$= 5.12(1.90)^2$
$= 18.56'$

$L_0/2 = 9.28' <$ avg. pond depth, therefore waves are not affected by bottom

$R_s = (H_0 \sin \theta)[(5.95 \tan \theta) + 1.5][0.123L_0/H_0]^a$

where $a= (1.58\text{-}2.35 \tan \theta + 0.092 \cot \theta - 0.26)(H_0/d_s)$ and d_s = depth of water at toe of slope
$= [1.58\text{-} 2.35(1/3) +0.092(3) - 0.26](1.89/34')$
$= 0.0452$
and θ= embankment slope and $\tan \theta = 1/3$

$R_s = (1.89' \sin 18.43°)[(5.95/3) +1.5](0.123x18.56'/1.89')^{0.0452}$
$= 2.10'$

$R_m = 1.517R_s$
$= 3.18'$

Wind setup

$S = U^2F_u/1440D$, where U= wind speed (mph), F_u = 2x(fetch distance) and D= avg. depth

$S = 68^2(2)(0.395)/1440x34' = 0.075'$

Maximum elevation = 3.18'+0.075'+ 492.68' (max. stage elev. from Havana1.out output)
= 495.93' ~ 496' (Acceptable, since location is only at one point with wind blowing in most critical direction and with maximum wind and stage elev.)

V. Conclusion: Wave Runup and Freeboard acceptable.

HA 15

Hydrologic Analysis/ Spillway Analysis
Havana Power Station
East Ash Pond #3B

November 7, 2001
JHK

The pond system meets the following two design criteria:

1. For the main spillway, a 100-yr., 24-hr. storm plus maximum plant flow must be safely routed through the pond system. This equals a 7-inch rainfall in 24 hours plus a plant flow of 11.9 cfs (7.70 MGD).
2. For the emergency spillway, a storm equal to one-half the PMP storm plus maximum plant flow must be safely routed through the pond system. One half the PMP equals a 16-inch rainfall in 24 hours plus a plant flow of 11.9 cfs (7.70 MGD).

For the pond system, the main spillway and emergency spillway are the same. Standpipes in ponds 1, 2 and 3B, discharge into pond 3. A stoplog structure in pond 3 discharges into an underground 36-inch RCCP that carries the water to the Illinois River. With the exception of the standpipe in the proposed pond 3B, all the outlet structures are existing.

As part of the construction of the new pond, a secondary emergency spillway will be added between ponds 3B and 3. This spillway will be a concrete-lined overflow spillway. It would receive flow only if the 36-inch pipe between ponds 3B and existing pond 3 should become blocked.

From the HEC-1 computer program, the following results were obtained. The HEC-1 runs were run using both the maximum pipe discharge capacity and the pipe discharge capacity based on weir equation. For the ½ PMP storm, the stoplog discharge capacity was based on the weir with end contractions equation. The maximum pond elevations for the 100-yr. storm are below the maximum pond level, as established by wave run-up and setup calculations. It is assumed that wave action will be limited during a ½ PMP storm.

Pond	**½ the PMP storm max. elevation (feet)**	**max. discharge (cfs)**
1	486.92	23
2	486.57	35
3B	493.17	40
3	486.79	93

Pond	**100-yr., 24-hour storm max. elevation (feet)**	**max. discharge (cfs)**
1	486.41	8
2	486.21	19
3B	492.68	18
3	485.63	42

HA 16

References used:

1. **Frequency Distributions of Heavy Rainstorms in Illinois,** Illinois State Water Survey, 1989.
2. **Effects of Basin Rainfall Estimates on Dam Safety Design in Illinois,** Illinois State Water Survey, Surface Water Division, 1981.

HA17

Stage-Storage Relationship- Pond 1 at Havana Power Station

Stage (ft)	Storage (acre-ft)	Water surface area (acres)
486.00	0.00	20.93
486.50	10.53	21.17
487.00	21.17	21.42
487.50	31.94	21.66
488.00	42.84	21.91
488.50	53.85	22.15
489.00	64.98	22.39
489.50	76.24	22.64
490.00	87.62	22.88

Normal pool elevation:	486'
Area at normal elevation:	20.93 acres = 911,818 sq. ft.
Max. pool elevation:	490'
Area at max. elevation:	22.88 acres = 996,705 sq. ft.

Nor

HA 18

6/20/01

Stage-Discharge Relationship- Pond 1 at Havana Power Station

Weir Equation

Q = CLH^1.5
L= PI*D
C= 3.33

Input

D= dia. of standpipe = 30"
H= head increment

Comments	Stage (ft)	Head (ft)	Q (cfs)
elev. of standpipe	486.00	0.00	0.00
	486.50	0.50	9.25
	487.00	1.00	26.15
pipe flow begins	487.50	1.50	48.05
	488.00	2.00	73.97
	488.50	2.50	103.38
	489.00	3.00	135.90
	489.50	3.50	171.25
	490.00	4.00	209.23

Normal pool elevation:	486'
Area at normal elevation:	20.93 acres = 911,818 sq. ft.
Max. pool elevation:	490'
Area at max. elevation:	22.88 acres = 996,705 sq. ft.

Two cases will be considered:

1.) Max. weir flow with head of 0.5(pipe diameter). This is conservative for the evaluation of the pond

2.) Max. pipe flow with 4.0' head of water. This is conservative for pipe evaluation.

HA 19

6/20/01

Stage-Discharge Relationship- Pond 2 at Havana Power Station

Weir Equation

Q = CLH^1.5
L= PI*D
C= 3.33

Input

D= dia. of standpipe = 36"
H= head increment

Comments	Stage (ft)	Head (ft)	Q (cfs)
elev. of standpipe	485.50	0.00	0.00
	486.00	0.50	11.10
	486.50	1.00	31.38
pipe flow begins	487.00	1.50	57.66
	487.50	2.00	88.77
	488.00	2.50	124.06
	488.50	3.00	163.08
	489.00	3.50	205.50
	489.50	4.00	251.08
	490.00	4.50	299.59

Normal pool elevation:	486'
Area at normal elevation:	19.4 acres = 845,135 sq. ft.
Max. pool elevation:	490'
Area at max. elevation:	20.48 acres = 891,891 sq. ft.

Two cases will be considered:

1.) Max. weir flow with head of 0.5(pipe diameter). This is conservative for the evaluation of the pond

2.) Max. pipe flow with 4.5' head of water. This is conservative for pipe evaluation.

HA 80

6/20/01

Stage-Storage Relationship- Pond 2 at Havana Power Station

Stage (ft)	Storage (acre-ft)	Water surface area (acres)
486.00	0.00	19.40
486.50	9.73	19.54
487.00	19.54	19.67
487.50	29.40	19.80
488.00	39.34	19.94
488.50	49.34	20.07
489.00	59.41	20.21
489.50	69.55	20.34
490.00	79.75	20.48

Normal pool elevation:	486'
Area at normal elevation:	19.40 acres = 845,135 sq. ft.
Max. pool elevation:	490'
Area at max. elevation:	20.48 acres = 891,891 sq. ft.

HA21

Stage-Discharge Relationship- Pond 3B at Havana Power Station

Weir Equation

Q = CLH^1.5
L= PI*D
C= 3.33

Input

D= dia. of standpipe = 36"
H= head increment

Comments	Stage (ft)	Head (ft)	Q (cfs)
elev. of standpipe	492.00	0.00	0.00
	492.50	0.50	11.10
	493.00	1.00	31.38
pipe flow begins	493.50	1.50	57.66
	494.00	2.00	88.77
	494.50	2.50	124.06
	495.00	3.00	163.08
	495.50	3.50	205.50
	496.00	4.00	251.08

Normal pool elevation:	492'
Area at normal elevation:	44.28 acres = 1,928,963 sq. ft.
Max. pool elevation:	496'
Area at max. elevation:	46.28 acres = 2,016,020 sq. ft.

Two cases will be considered:

1.) Max. weir flow with head of 0.5(pipe diameter). This is conservative for the evaluation of the pond

2.) Max. pipe flow with 4.5' head of water. This is conservative for pipe evaluation.

H A 20

11/2/01

Stage-Storage Relationship- Pond 3B at Havana Power Station

Stage (ft)	Storage (acre-ft)	Water surface area (acres)
492.00	0.00	44.28
492.50	22.20	44.53
493.00	44.53	44.78
493.50	66.98	45.03
494.00	89.56	45.28
494.50	112.26	45.53
495.00	135.09	45.78
495.50	158.04	46.03
496.00	181.12	46.28

Normal pool elevation:	492'
Area at normal elevation:	44.28 acres = 1,928,963 sq. ft.
Max. pool elevation:	496'
Area at max. elevation:	46.28 acres = 2,016,020 sq. ft.

HA23

Stage-Discharge Relationship- Polishing Pond 3 at Havana

Weir Equation

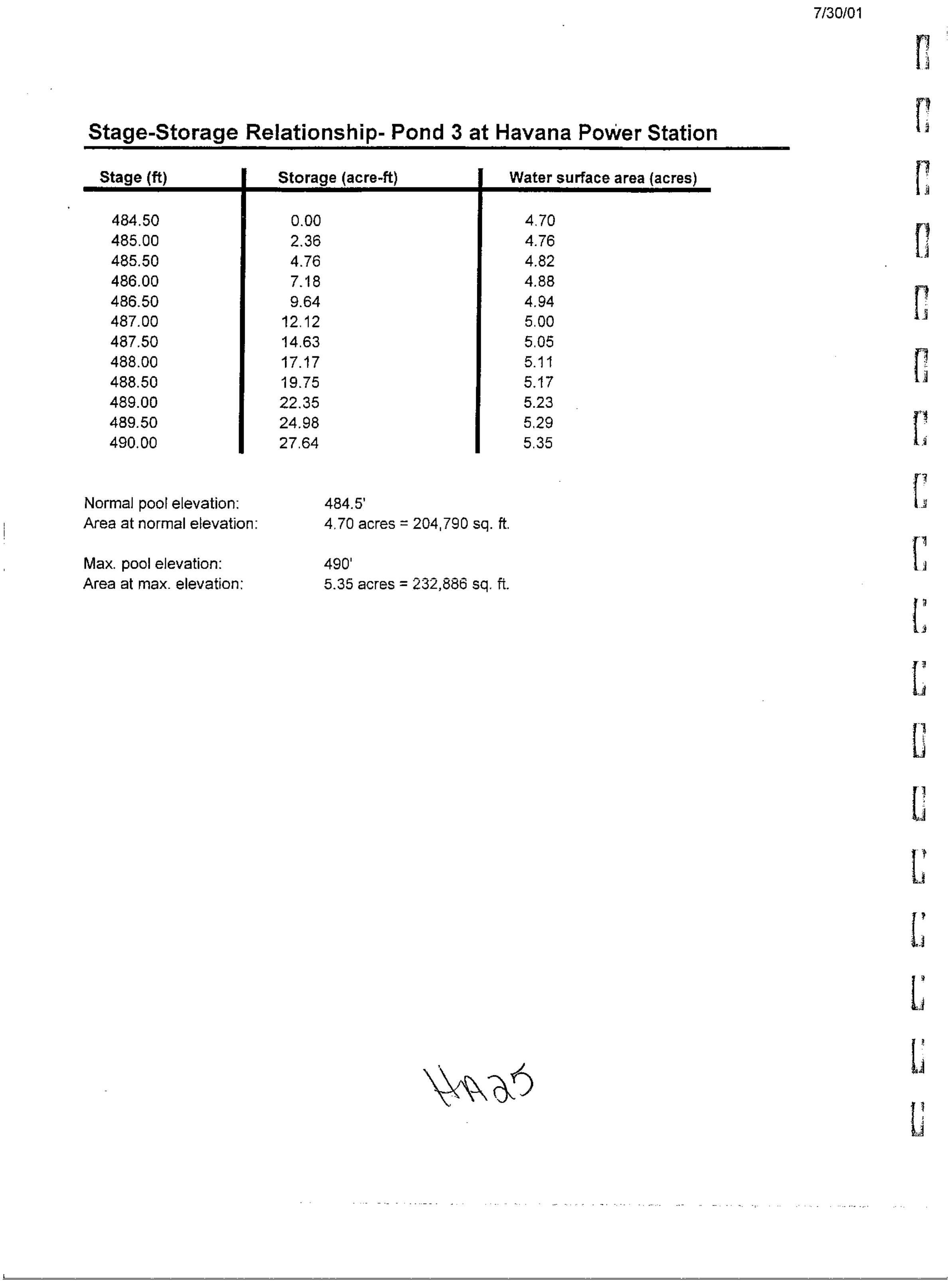
Q = 3.33*L*H^1.5
L= Weir length= 6'

Q1 = 3.33*(L-0.2*H)*H^1.5
Weir length adjusted to account for end contractions

USED ONLY HOR HAVANA5.OUT AND
HAVANA6.OUT RUNS

Elevation (ft)	Head (ft)	Q (cfs)	Q1 (cfs)
484.00	0.00	0.00	0.00
484.50	0.50	7.06	6.95
485.00	1.00	19.98	19.31
485.50	1.50	36.71	34.87
486.00	2.00	56.51	52.74
486.50	2.50	78.98	72.40
487.00	3.00	103.82	93.44
487.50	3.50	130.83	115.56
488.00	4.00	159.84	138.53
488.50	4.50	190.73	162.12
489.00	5.00	223.38	186.15
489.50	5.50	257.71	210.47
490.00	6.00	293.64	234.92

HA 24



7/30/01

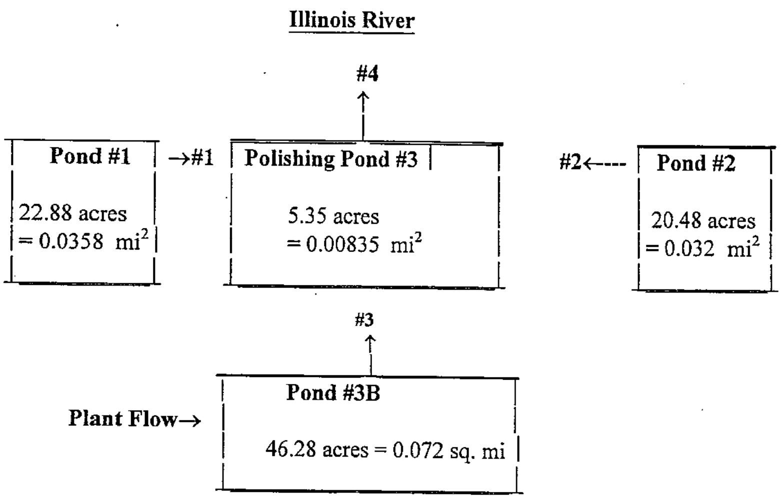
Stage-Storage Relationship- Pond 3 at Havana Power Station

Stage (ft)	Storage (acre-ft)	Water surface area (acres)
484.50	0.00	4.70
485.00	2.36	4.76
485.50	4.76	4.82
486.00	7.18	4.88
486.50	9.64	4.94
487.00	12.12	5.00
487.50	14.63	5.05
488.00	17.17	5.11
488.50	19.75	5.17
489.00	22.35	5.23
489.50	24.98	5.29
490.00	27.64	5.35

Normal pool elevation:	484.5'
Area at normal elevation:	4.70 acres = 204,790 sq. ft.
Max. pool elevation:	490'
Area at max. elevation:	5.35 acres = 232,886 sq. ft.

HA25

Principal Outlet Design



#1- 30"ϕ standpipe discharging into bottom of Polishing Pond

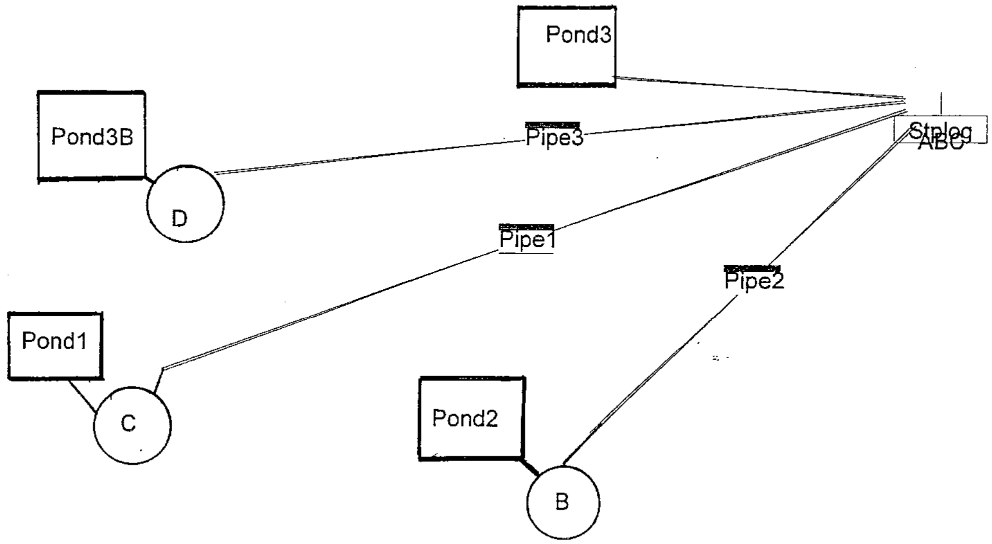
#2- 36"ϕ pipe between Pond #2 and Polishing Pond

#3- 36"ϕ standpipe between Pond #3B and Polishing Pond

#4- 6' wide stop log structure and 36" ϕ RCCP to Illinois River

For 24-hr. events, plant flow = 11.9 cfs (7.70 MGD)

HA28



HA27

H-A28

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                                         havana1.out
1*****************************************                                                    ***************************************
 *                                       *                                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *              MAY    1991              *                                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.0.1E              *                                                    *         609 SECOND STREET           *
 *                                       *                                                    *     DAVIS, CALIFORNIA 95616         *
 * RUN DATE              TIME            *                                                    *         (916) 551-1748              *
 *                                       *                                                    *                                     *
*****************************************                                                     ***************************************


                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X        XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X       XXXXX   X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX


                    THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

                    THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
                    THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
                    NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
                    DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
                    KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                                   HEC-1 INPUT                                                   PAGE  1

                   LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                     1         ID
                     2         ID
                     3         ID
                               *DIAGRAM
                     4         IT      10   1JAN94        0     160
                     5         IO       4

                     6         KK   Pond1
                     7         KO       0       0       0       1      22
                     8         BA  0.0357
                     9         PB       7
                    10         IN       6   1JAN94        0
                               * precip1
                    11         PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
                    12         PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
                    13         PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
                    14         PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
                    15         PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
                    16         PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                Page 1
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7" - 100 YR STORM USING
WEIR DISCHARGE @ PONDS 1, 2 & 3B

```
                                            havana1.out
 17         PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18         PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 19         PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20         PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21         PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22         PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23         PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24         PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25         PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26         PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27         PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28         PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29         PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30         PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31         PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32         PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33         PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34         PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35         PC        1       1       1       1       1
 36         LS        0     100     100
 37         UD     0.15

 38         KK    Pipe1   CNAME       C
 39         KO        0       0       0       0      22
 40         RS        1    ELEV     486       0
            * pond1vol
 41         SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
            * pond1elev
 42         SE      486   486.5     487   487.5     488   488.5     489   489.5     490
            * pond1out
 43         SQ        0     9.2    26.2    26.2    26.2    26.2    26.2    26.2    26.2

                                      HEC-1 INPUT                                         PAGE  2

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 44         KK    Pond2
 45         KO        0       0       0       1      22
 46         BA    0.032
 47         PB        7
 48         IN        6  1JAN94       0
            * precip1
 49         PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50         PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51         PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52         PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53         PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54         PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55         PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56         PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57         PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58         PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59         PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60         PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61         PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62         PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                            Page 2
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HA 29

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                                                  havana1.out
 63          PC      0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64          PC    0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65          PC      0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66          PC    0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67          PC     0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68          PC    0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69          PC     0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70          PC    0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71          PC     0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72          PC    0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73          PC         1       1       1       1       1
 74          LS         0     100     100
 75          UD      0.15

 76          KK     Pipe2   CNAME       B
 77          KO         0       0       0       0      22
 78          RS         1    ELEV     486       0
             * pond2vol
 79          SV         0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
             * pond2out
 80          SQ      11.1    31.4    57.7    57.7    57.7    57.7    57.7    57.7    57.7
             * pond2elev
 81          SE       486   486.5     487   487.5     488   488.5     489   489.5     490

 82          KK    Pond3B New proposed ash pond
 83          KO         0       0       0       1      22
 84          BA     0.072
 85          BF      11.9       0       0
 86          PB         7
 87          IN         6  1JAN94       0
             * precip1
 88          PC         0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89          PC    0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90          PC     0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                         HEC-1 INPUT                                                 PAGE  3

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91          PC    0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92          PC     0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93          PC     0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94          PC      0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95          PC     0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96          PC      0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97          PC     0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98          PC     0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99          PC     0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100          PC     0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101          PC     0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102          PC      0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103          PC    0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104          PC      0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105          PC    0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106          PC     0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107          PC    0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108          PC     0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                                Page 3
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HA30

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                                                  havana1.out
 109            PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 110            PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 111            PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 112            PC       1       1       1       1       1
 113            LS       0     100     100
 114            UD    0.15

 115            KK   Pipe3   CNAME       D
 116            KO       0       0       0       0      22
 117            RS       1    ELEV     486       0
                * pond3Bvol
 118            SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04 181.112
                * pond3Belev
 119            SE     492   492.5     493   493.5     494   494.5     495   495.5     496
                * pond3Bout
 120            SQ       0    11.1   31.38   57.66   57.66   57.66   57.66   57.66   57.66

 121            KK   Pond3
 122            KO       0       0       0       1      22
 123            BA  0.0083
 124            BF       0       0       0
 125            PB       7
 126            IN       6  1JAN94       0
                * precip1
 127            PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 128            PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 129            PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 130            PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 131            PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 132            PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 133            PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 134            PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 135            PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 136            PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 137            PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 138            PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 139            PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                      HEC-1 INPUT                                                  PAGE  4

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 140            PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 141            PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 142            PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 143            PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 144            PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 145            PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 146            PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 147            PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 148            PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 149            PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 150            PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 151            PC       1       1       1       1       1
 152            LS       0     100     100
 153            UD    0.15

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HA31

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                                                        havana1.out
 154          KK     ABC   CNAME  Stplog
 155          KO       0       0       0       0      22
 156          HC       4

 157          KK  Stplog   CNAME     ABC
 158          KO       0       0       0       0      22
 159          RS       1    ELEV     484       0
              * pond3vol
 160          SV       0       0    2.36    4.76    7.18    9.64   12.12   14.63   17.17   19.75
 161          SV   22.35   24.98   27.64
              * pondelv
 162          SE     484   484.5     485   485.5     486   486.5     487   487.5     488   488.5
 163          SE     489   489.5     490
              * pond3out
 164          SQ       0    7.06      20    36.7    56.5      79   103.8   130.8   159.8   190.7
 165          SQ   223.4   257.7   293.6
              * pondelv
 166          SE     484   484.5     485   485.5     486   486.5     487   487.5     488   488.5
 167          SE     489   489.5     490
 168          ZZ
□
                    SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE       (V)  ROUTING          (--->)  DIVERSION OR PUMP FLOW

 NO.        (.)  CONNECTOR        (<---)  RETURN OF DIVERTED OR PUMPED FLOW

   6        Pond1
                V
                V
  38        Pipe1
                .
                .
  44            .           Pond2
                .               V
                .               V
  76            .           Pipe2
                .               .
                .               .
  82            .               .            Pond3B
                .               .                V
                .               .                V
 115            .               .             Pipe3
                .               .                .
                .               .                .
 121            .               .                .            Pond3
                .               .                .                .
                .               .                .                .
 154          ABC.................................................
                V
                V
 157        Stplog

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                 *****************************************
 *                                        *                                 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *                                 *   U.S. ARMY CORPS OF ENGINEERS        *
                                                     Page 5
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H A32

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                                                        havanal.out
 *              MAY   1991                  *                                         *   HYDROLOGIC ENGINEERING CENTER    *
 *           VERSION 4.0.1E                 *                                         *         609 SECOND STREET          *
 *                                          *                                         *      DAVIS, CALIFORNIA 95616       *
 *  RUN DATE                TIME            *                                         *          (916) 551-1748            *
 *                                          *                                         *                                    *
 ********************************************                                         **************************************




   5 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                         NMIN         10  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1JAN94  STARTING DATE
                        ITIME       0000  STARTING TIME
                          NQ,        160  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2JAN94  ENDING DATE
                       NDTIME       0230  ENDING TIME
                        ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL    0.17 HOURS
                        TOTAL TIME BASE   26.50 HOURS

             ENGLISH UNITS
                  DRAINAGE AREA          SQUARE MILES
                  PRECIPITATION DEPTH    INCHES
                  LENGTH, ELEVATION      FEET
                  FLOW                   CUBIC FEET PER SECOND
                  STORAGE VOLUME         ACRE-FEET
                  SURFACE AREA           ACRES
                  TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
   6 KK     *    Pond1   *
            *            *
            **************

   7 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                                                              Page 6
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HA33

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                                                                    havana1.out
                    IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                   ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                   ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                  TIMINT       0.167  TIME INTERVAL IN HOURS


 10 IN          TIME DATA FOR INPUT TIME SERIES
                   JXMIN           6  TIME INTERVAL IN MINUTES
                  JXDATE      1JAN94  STARTING DATE
                  JXTIME           0  STARTING TIME

              SUBBASIN RUNOFF DATA

  8 BA          SUBBASIN CHARACTERISTICS
                   TAREA,         0.04  SUBBASIN AREA

                PRECIPITATION DATA

  9 PB                STORM         7.00  BASIN TOTAL PRECIPITATION

 11 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                    0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00

 36 LS          SCS LOSS RATE
                   STRTL        0.00  INITIAL ABSTRACTION
                  CRVNBR      100.00  CURVE NUMBER
                   RTIMP      100.00  PERCENT IMPERVIOUS AREA

 37 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG        0.15  LAG

                                                   ***

                                            UNIT HYDROGRAPH
                                        7 END-OF-PERIOD ORDINATES
              60.       54.       16.        5.        2.        1.        0.


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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                                                Page 7
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HA 34

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                                                      havanal.out
 38 KK      *              *
            *    Pipe1     *        CNAME      C
            *              *
            **************

 39 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.167  TIME INTERVAL IN HOURS


             HYDROGRAPH ROUTING DATA

 40 RS           STORAGE ROUTING
                       NSTPS           1 NUMBER OF SUBREACHES/                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC      486.00  INITIAL CONDITION
                           X        0.00 WORKING R AND D COEFFICIENT

 41 SV             STORAGE        0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

 42 SE           ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

 43 SQ           DISCHARGE         0.        9.       26.       26.       26.       26.       26.       26.       26.
                                                          ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *              *
 44 KK      *    Pond2     *
            *              *
            **************

 45 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.167  TIME INTERVAL IN HOURS


 48 IN           TIME DATA FOR INPUT TIME SERIES
                       JXMIN           6  TIME INTERVAL IN MINUTES
                      JXDATE      1JAN94  STARTING DATE
                      JXTIME           0  STARTING TIME
                                                       Page 8
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HA35

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                                         havana1.out
                SUBBASIN RUNOFF DATA

      46 BA      SUBBASIN CHARACTERISTICS
                    TAREA,        0.03  SUBBASIN AREA

                 PRECIPITATION DATA

      47 PB         STORM         7.00  BASIN TOTAL PRECIPITATION

      49 PI        INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                    0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00

      74 LS      SCS LOSS RATE
                    STRTL         0.00  INITIAL ABSTRACTION
                   CRVNBR       100.00  CURVE NUMBER
                    RTIMP       100.00  PERCENT IMPERVIOUS AREA

      75 UD      SCS DIMENSIONLESS UNITGRAPH
                    TLAG          0.15  LAG

                                          ***

                                       UNIT HYDROGRAPH
                                    7 END-OF-PERIOD ORDINATES
             54.       49.       15.        5.        1.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
      76 KK *    Pipe2   *       CNAME      B
            *            *
            **************

      77 KO      OUTPUT CONTROL VARIABLES
                    IPRNT            4  PRINT CONTROL
                    IPLOT            0  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                                                        Page 9
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WA 30

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                                                  havana1.out
                   IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                  ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                  ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                 TIMINT       0.167  TIME INTERVAL IN HOURS

          HYDROGRAPH ROUTING DATA

 78 RS      STORAGE ROUTING
                  NSTPS           1 NUMBER OF SUBREACHES/                          ITYP        ELEV  TYPE OF INITIAL CONDITION
                 RSVRIC      486.00  INITIAL CONDITION
                      X        0.00 WORKING R AND D COEFFICIENT

 79 SV          STORAGE        0.0      9.7     19.5     29.4     39.3     49.3     59.4     69.6     79.7

 80 SQ        DISCHARGE        11.      31.      58.      58.      58.      58.      58.      58.      58.

 81 SE        ELEVATION     486.00   486.50   487.00   487.50   488.00   488.50   489.00   489.50   490.00
                                                          ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 82 KK      *   Pond3B   *     New proposed ash pond
            *            *
            **************

 83 KO      OUTPUT CONTROL VARIABLES
                  IPRNT           4  PRINT CONTROL
                  IPLOT           0  PLOT CONTROL
                  QSCAL          0.  HYDROGRAPH PLOT SCALE
                  IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                   IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                  ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                  ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                 TIMINT       0.167  TIME INTERVAL IN HOURS


 87 IN      TIME DATA FOR INPUT TIME SERIES
                  JXMIN           6  TIME INTERVAL IN MINUTES
                 JXDATE      1JAN94  STARTING DATE
                 JXTIME           0  STARTING TIME

          SUBBASIN RUNOFF DATA

 84 BA      SUBBASIN CHARACTERISTICS
                  TAREA,       0.07  SUBBASIN AREA

 85 BF      BASE FLOW CHARACTERISTICS
                  STRTQ       11.90  INITIAL FLOW
                  QRCSN        0.00  BEGIN BASE FLOW RECESSION
                  RTIOR     1.00000  RECESSION CONSTANT
                                                      Page 10
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HA37

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                                                   havana1.out
                   PRECIPITATION DATA

   86 PB               STORM          7.00  BASIN TOTAL PRECIPITATION

   88 PI              INCREMENTAL PRECIPITATION PATTERN
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                         0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                         0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                         0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00

  113 LS              SCS LOSS RATE
                           STRTL          0.00  INITIAL ABSTRACTION
                          CRVNBR        100.00  CURVE NUMBER
                           RTIMP        100.00  PERCENT IMPERVIOUS AREA

  114 UD              SCS DIMENSIONLESS UNITGRAPH
                            TLAG          0.15  LAG

                                                  ***

                                                 UNIT HYDROGRAPH
                                            7 END-OF-PERIOD ORDINATES
                 122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                 **************
                 *            *
  115 KK         *    Pipe3   *         CNAME        D
                 *            *
                 **************

  116 KO              OUTPUT CONTROL VARIABLES
                           IPRNT             4  PRINT CONTROL
                           IPLOT             0  PLOT CONTROL
                           QSCAL            0.  HYDROGRAPH PLOT SCALE
                           IPNCH             0  PUNCH COMPUTED HYDROGRAPH
                            IOUT            22  SAVE HYDROGRAPH ON THIS UNIT
                           ISAV1             1  FIRST ORDINATE PUNCHED OR SAVED
                           ISAV2           160  LAST ORDINATE PUNCHED OR SAVED
                          TIMINT         0.167  TIME INTERVAL IN HOURS
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HA 38

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                                        havana1.out

               HYDROGRAPH ROUTING DATA

 117 RS          STORAGE ROUTING
                       NSTPS          1 NUMBER OF SUBREACHES/                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC     486.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

 118 SV            STORAGE        0.0       22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

 119 SE          ELEVATION     492.00    492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

 120 SQ          DISCHARGE         0.       11.       31.       58.       58.       58.       58.       58.       58.
                                                                  ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 121 KK       *    Pond3   *
              *            *
              **************

 122 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          4   PRINT CONTROL
                       IPLOT          0   PLOT CONTROL
                       QSCAL         0.   HYDROGRAPH PLOT SCALE
                       IPNCH          1   PUNCH COMPUTED HYDROGRAPH
                        IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        160   LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      0.167   TIME INTERVAL IN HOURS


 126 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN          6   TIME INTERVAL IN MINUTES
                      JXDATE    1JAN94   STARTING DATE
                      JXTIME          0   STARTING TIME

               SUBBASIN RUNOFF DATA

 123 BA          SUBBASIN CHARACTERISTICS
                       TAREA,      0.01   SUBBASIN AREA

 124 BF          BASE FLOW CHARACTERISTICS
                       STRTQ       0.00   INITIAL FLOW
                       QRCSN       0.00   BEGIN BASE FLOW RECESSION
                       RTIOR    1.00000   RECESSION CONSTANT

                 PRECIPITATION DATA

 125 PB                STORM       7.00   BASIN TOTAL PRECIPITATION
                                                                   Page 12
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HA39

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                                                                    havanal.out
 127 PI          INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                    0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00

 152 LS          SCS LOSS RATE
                       STRTL         0.00  INITIAL ABSTRACTION
                      CRVNBR       100.00  CURVE NUMBER
                       RTIMP       100.00  PERCENT IMPERVIOUS AREA

 153 UD          SCS DIMENSIONLESS UNITGRAPH
                        TLAG         0.15  LAG

                                                                 ***

                                                              UNIT HYDROGRAPH
                                                            7 END-OF-PERIOD ORDINATES
                      14.        13.         4.         1.         0.         0.         0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                    **************
                    *            *
 154 KK             *     ABC    *        CNAME  Stplog
                    *            *
                    **************

 155 KO          OUTPUT CONTROL VARIABLES
                       IPRNT            4  PRINT CONTROL
                       IPLOT            0  PLOT CONTROL
                       QSCAL           0.  HYDROGRAPH PLOT SCALE
                       IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                        IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        0.167  TIME INTERVAL IN HOURS

 156 HC          HYDROGRAPH COMBINATION
                       ICOMP            4  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***
                                                                Page 13
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DRAFT

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                                        havana1.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
  157 KK   *   Stplog   *      CNAME     ABC
           *            *
           **************

  158 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS

                    HYDROGRAPH ROUTING DATA

  159 RS          STORAGE ROUTING
                        NSTPS          1  NUMBER OF SUBREACHES/                    ITYP        ELEV   TYPE OF INITIAL CONDITION
                       RSVRIC     484.00   INITIAL CONDITION
                            X       0.00  WORKING R AND D COEFFICIENT

  160 SV            STORAGE        0.0        0.0        2.4        4.8        7.2        9.6       12.1       14.6       17.2       19.7
                                  22.4       25.0       27.6

  162 SE          ELEVATION     484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50
                                489.00     489.50     490.00

  164 SQ          DISCHARGE         0.         7.        20.        37.        56.        79.       104.       131.       160.       191.
                                  223.       258.       294.

  166 SE          ELEVATION     484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50
                                489.00     489.50     490.00

                                                         ***

                                     COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

             STORAGE       0.00       0.00       2.36       4.76       7.18       9.64      12.12      14.63      17.17      19.75
             OUTFLOW       0.00       7.06      20.00      36.70      56.50      79.00     103.80     130.80     159.80     190.70
           ELEVATION     484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50

             STORAGE      22.35      24.98      27.64
             OUTFLOW     223.40     257.70     293.60
           ELEVATION     489.00     489.50     490.00

                                                   RUNOFF SUMMARY
                                           FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES
                                                      Page 14
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HA 41

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                                                havanal.out
                                       PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD     BASIN     MAXIMUM     TIME OF
+          OPERATION        STATION    FLOW     PEAK                                           AREA      STAGE     MAX STAGE
                                                           6-HOUR      24-HOUR     72-HOUR

           HYDROGRAPH AT
+                            Pond1      138.    12.00       19.          7.          6.        0.04

           ROUTED TO
+                            Pipe1        8.    13.67        7.          4.          4.        0.04
+                                                                                                       486.41       13.67

           HYDROGRAPH AT
+                            Pond2      124.    12.00       17.          6.          5.        0.03

           ROUTED TO
+                            Pipe2       19.    12.67       15.         12.         12.        0.03
+                                                                                                       486.21       12.67

           HYDROGRAPH AT
+                            Pond3B     291.    12.00       50.         25.         24.        0.07

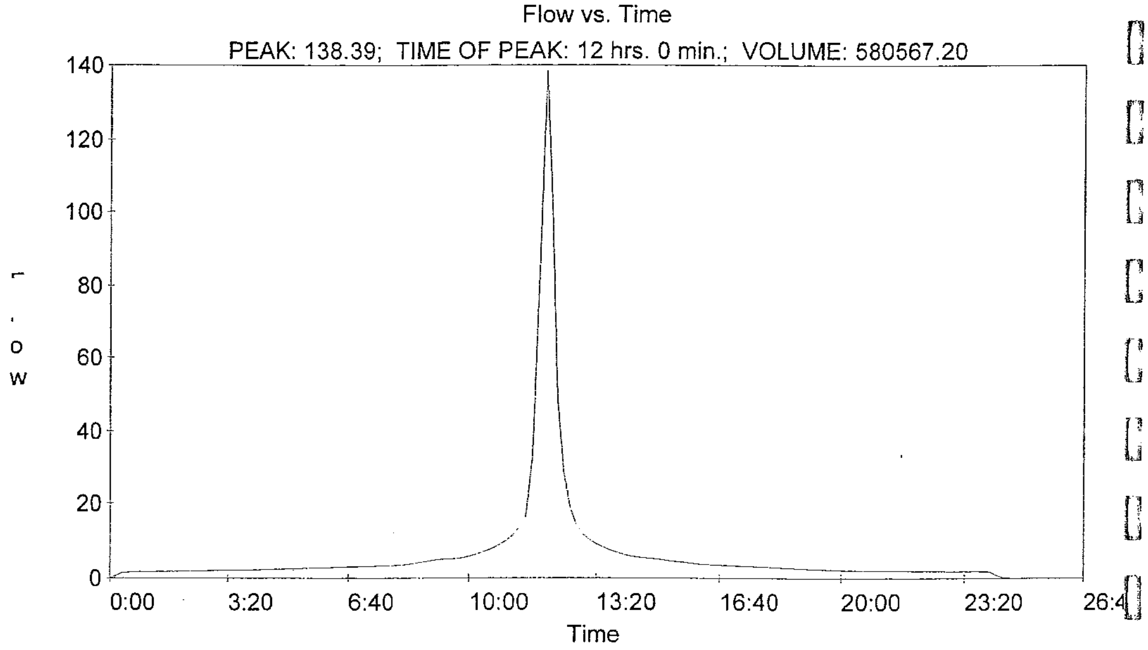
           ROUTED TO
+                            Pipe3       18.    17.50       18.         12.         11.        0.07
+                                                                                                       492.68       17.50

           HYDROGRAPH AT
+                            Pond3       32.    12.00        4.          2.          1.        0.01

           4 COMBINED AT
+                            ABC         62.    12.00       43.         30.         29.        0.15

           ROUTED TO
+                            Stplog      42.    15.17       40.         28.         27.        0.15
+                                                                                                       485.63       15.17

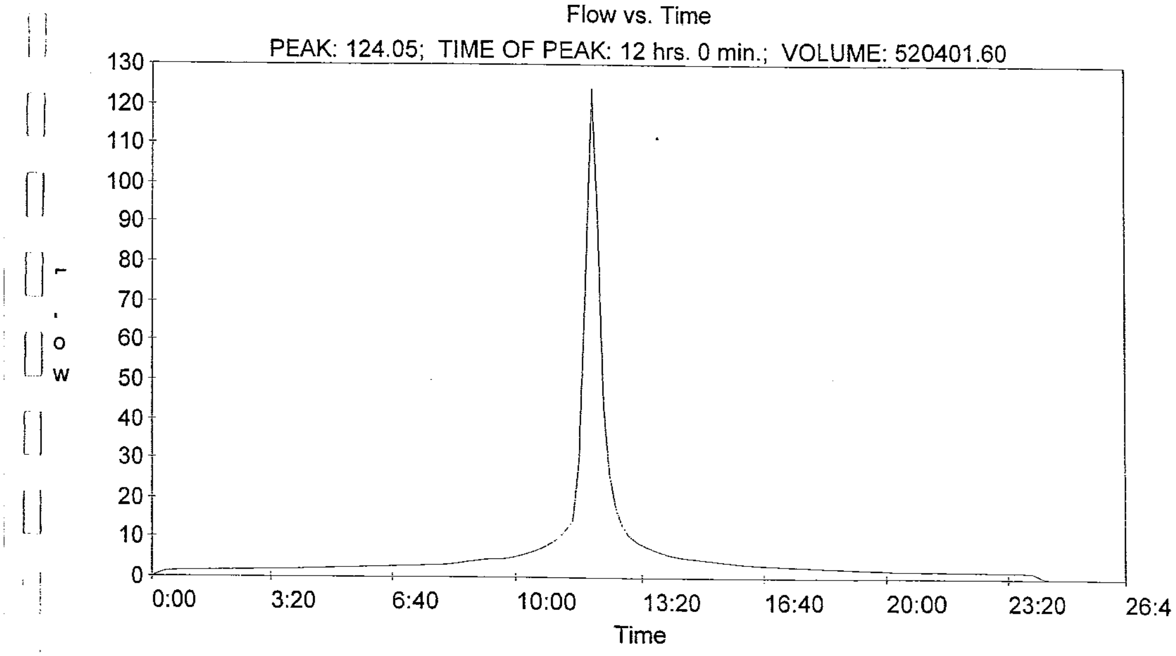

*** NORMAL END OF HEC-1 ***
```



POND 1 PEAK FLOW

7" - 100 YR STORM

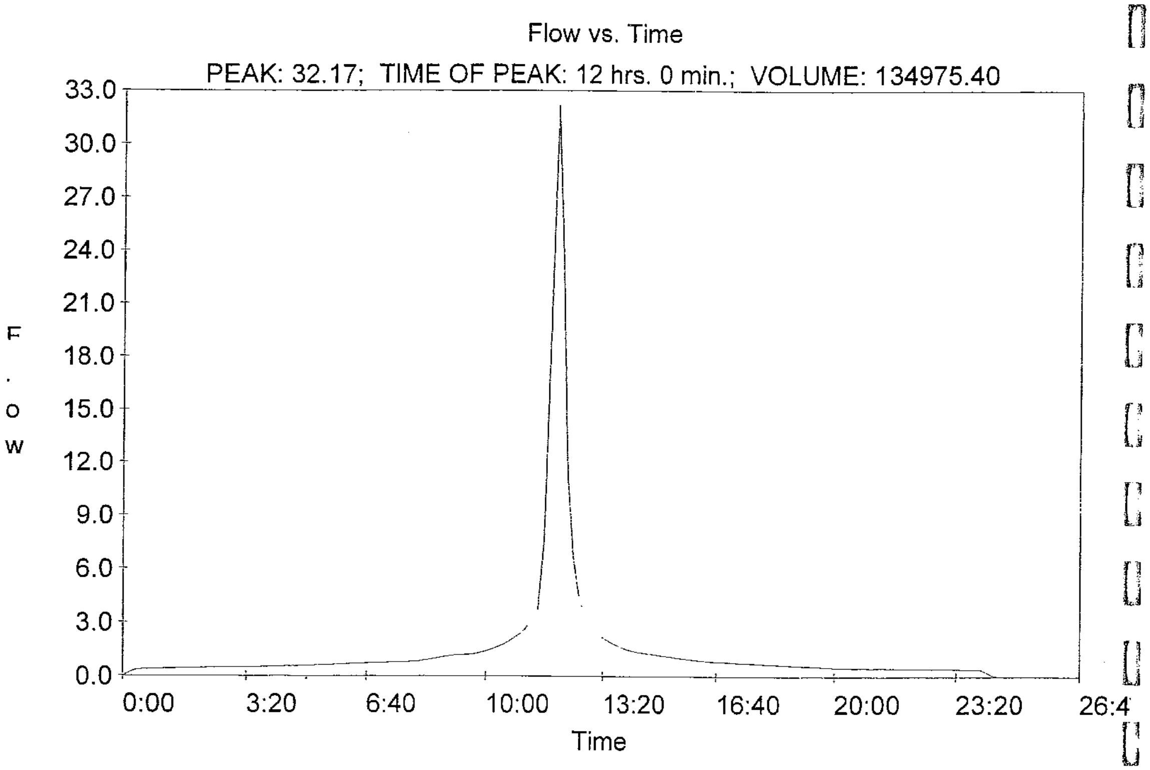
HA 43



Pond 2 PEAK FLOW

7" - 100 YR STORM

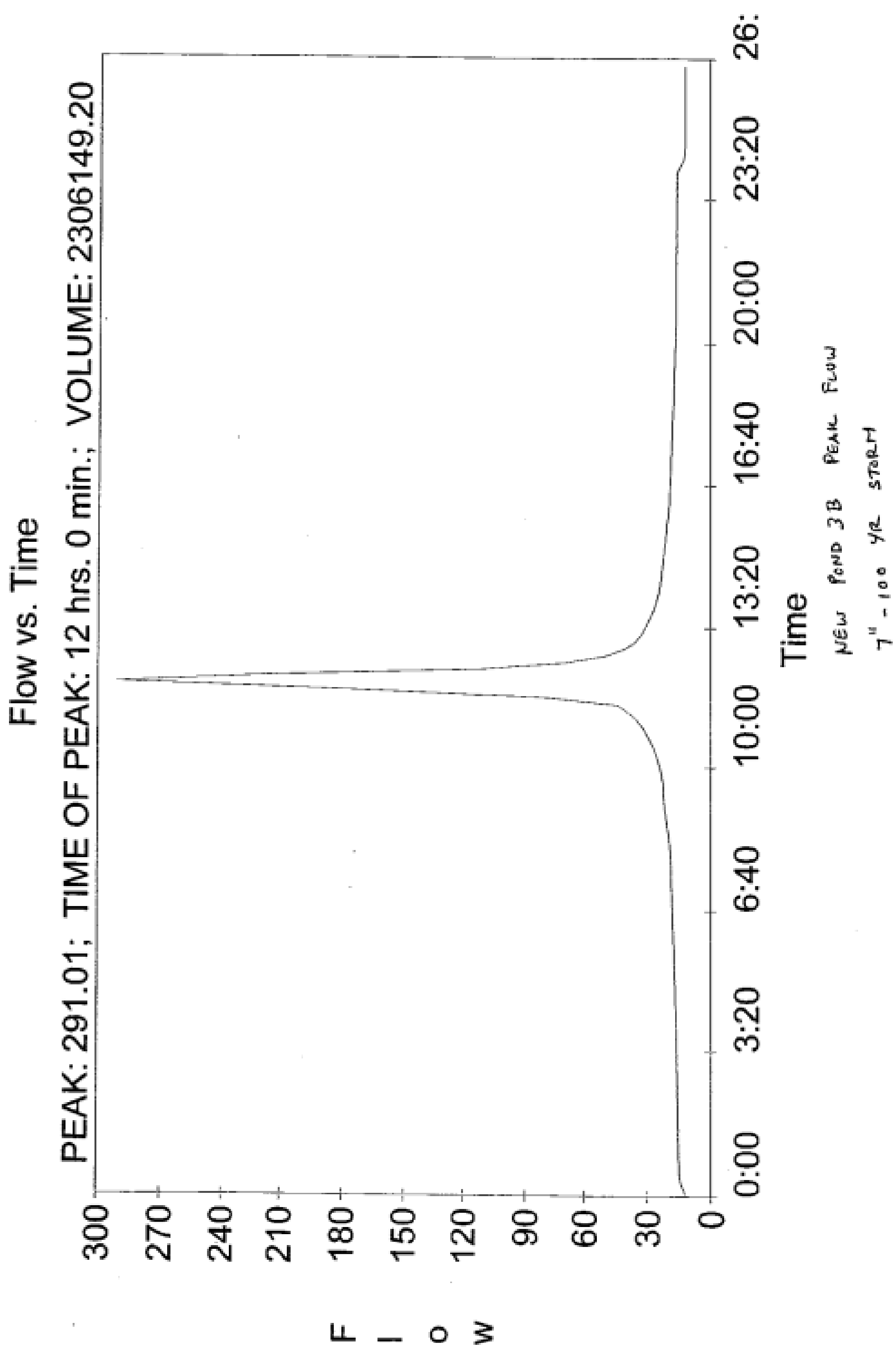
HA#4



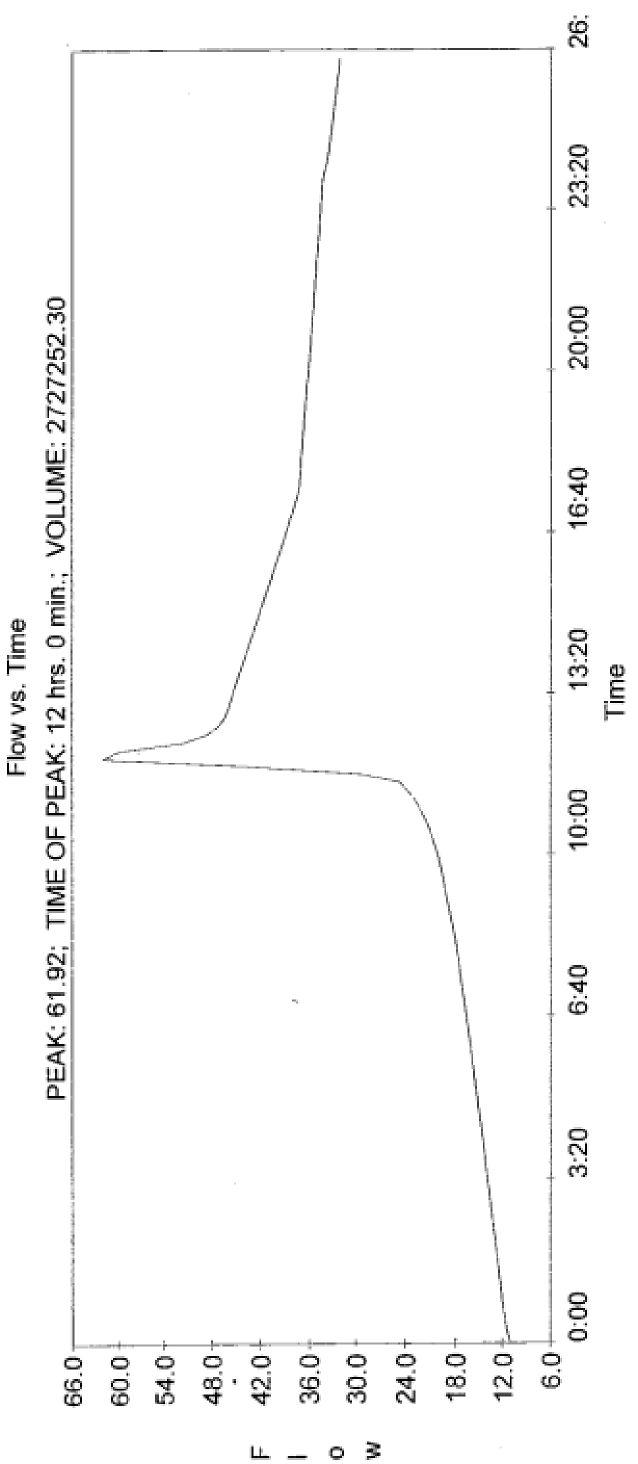
Pond 3 Peak Flow

7" - 100 YR STORM

HA45



NEW POND 3B PEAK FLOW
7" - 100 YR STORM

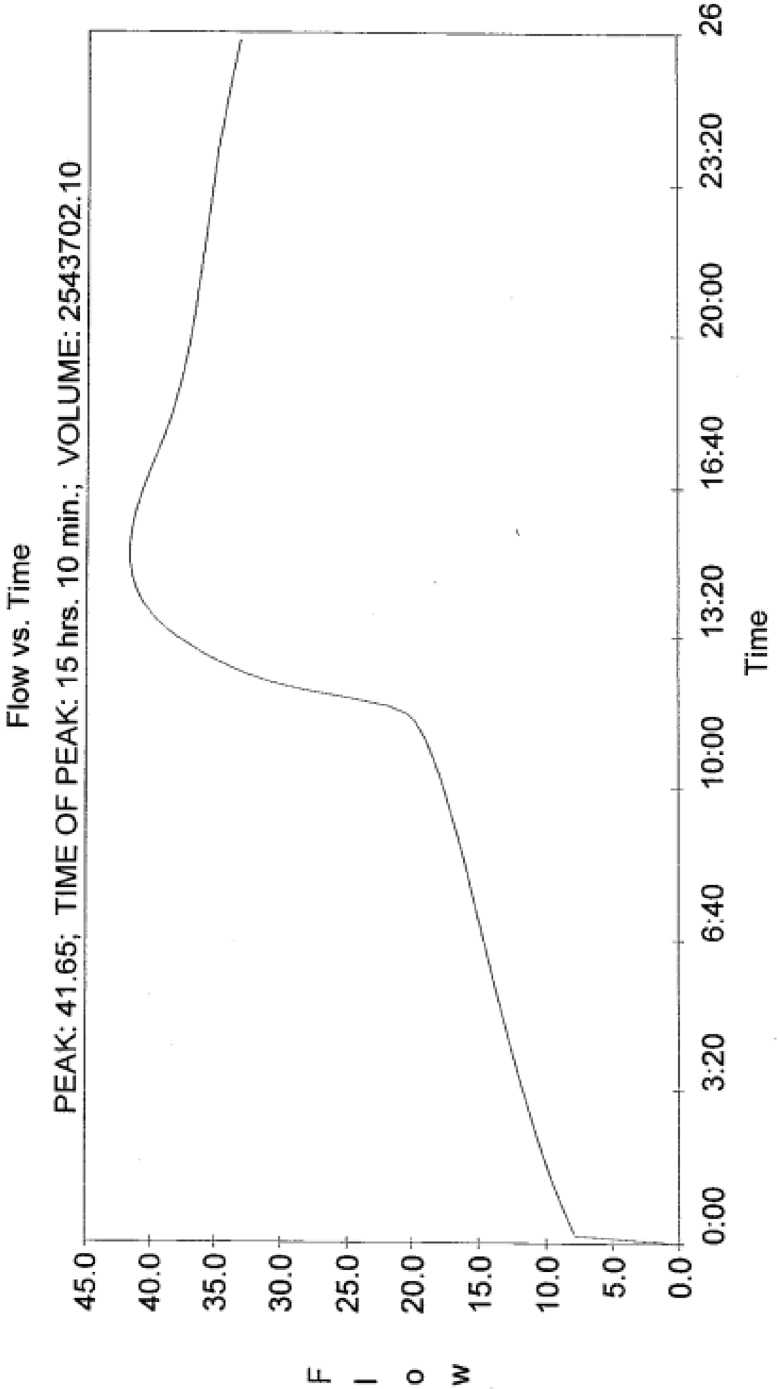


CBC PEAK FLOW

7" - 100 YR STORM

HA47

DRAFT



STOP LOG PEAK FLOW - 7" (100 YR s

HA #8

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                                         havana2.out
1*****************************************                          ****************************************
 *                                        *                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY    1991               *                          *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.0.1E              *                          *          609 SECOND STREET           *
 *                                        *                          *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE              TIME            *                          *          (916) 551-1748              *
 *                                        *                          *                                      *
 ******************************************                          ****************************************



                          X     X  XXXXXXX   XXXXX          X
                          X     X  X        X     X        XX
                          X     X  X        X               X
                          XXXXXXX  XXXX     X       XXXXX   X
                          X     X  X        X               X
                          X     X  X        X     X         X
                          X     X  XXXXXXX   XXXXX         XXX


 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                        HEC-1 INPUT                                              PAGE  1

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1           ID
   2           ID
   3           ID
               *DIAGRAM
   4           IT      10  1JAN94       0     160
   5           IO       4

   6           KK    Pond1
   7           KO       0       0       0       1      22
   8           BA  0.0358
   9           PB       7
  10           IN       6  1JAN94       0
               * precipl
  11           PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
  12           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
  13           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
  14           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
  15           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
  16           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                      Page 1
```

7' - 100 YR STORM USING MAX.
DISCHARGE @ PONDS 1,2 & 3B

HA 49

DRAFT

```
                                                  havana2.out
17            PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
18            PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
19            PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
20            PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
21            PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
22            PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
23            PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
24            PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
25            PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
26            PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
27            PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
28            PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
29            PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
30            PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
31            PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
32            PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
33            PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
34            PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
35            PC        1       1       1       1       1
36            LS        0     100     100
37            UD     0.15

38            KK    Pipe1   CNAME       C
39            KO        0       0       0       0      22
40            RS        1    ELEV     486       0
              * pond1vol
41            SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
              * pond1elev
42            SE      486   486.5     487   487.5     488   488.5     489   489.5     490
              * pond1out
43            SQ        0    9.25   26.15   48.05   73.97  103.38   135.9  171.25  209.23

                                      HEC-1 INPUT                                              PAGE  2

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


44            KK    Pond2
45            KO        0       0       0       1      22
46            BA    0.032
47            PB        7
48            IN        6  1JAN94       0
              * precip1
49            PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
50            PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
51            PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
52            PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
53            PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
54            PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
55            PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
56            PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
57            PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
58            PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
59            PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
60            PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
61            PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
62            PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                                 Page 2
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HA 50

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                                        havana2.out
 63        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73        PC       1       1       1       1       1
 74        LS       0     100     100
 75        UD    0.15

 76        KK   Pipe2   CNAME       B
 77        KO       0       0       0       0      22
 78        RS       1    ELEV     486       0
           * pond2vol
 79        SV       0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
           * pond2out
 80        SQ    11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08  299.59
           * pond2elev
 81        SE     486   486.5     487   487.5     488   488.5     489   489.5     490

 82        KK  Pond3B New proposed ash pond
 83        KO       0       0       0       1      22
 84        BA   0.072
 85        BF    11.9       0       0
 86        PB       7
 87        IN       6  1JAN94       0
           * precip1
 88        PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89        PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90        PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                   HEC-1 INPUT                                         PAGE  3

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91        PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92        PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93        PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95        PC   0.099   0.101   0.103  0.1051  0.1072  8.1093  0.1114  0.1135  0.1156  0.1178
 96        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                        Page 3
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HA 51

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                                               havana2.out
109        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
110        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
111        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
112        PC       1       1       1       1       1
113        LS       0     100     100
114        UD    0.15

115        KK   Pipe3   CNAME       D
116        KO       0       0       0       0      22
117        RS       1    ELEV     492       0
           * pond3Bvol
118        SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04 181.121
           * pond3Belev
119        SE     492   492.5     493   493.5     494   494.5     495   495.5     496
           * pond3Bout
120        SQ       0    11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08

121        KK   Pond3
122        KO       0       0       0       1      22
123        BA  0.0083
124        BF       0       0       0
125        PB       7
126        IN       6  1JAN94       0
           * precip1
127        PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
128        PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
129        PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
130        PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
131        PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
132        PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
133        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
134        PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
135        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
136        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
137        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
138        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
139        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                      HEC-1 INPUT                                         PAGE  4

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

140        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
141        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
142        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
143        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
144        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
145        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
146        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
147        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
148        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
149        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
150        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
151        PC       1       1       1       1       1
152        LS       0     100     100
153        UD    0.15

                                           Page 4
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HA 52

```
                                                                      havana2.out          *
   154           KK      ABC    CNAME  Stplog
   155           KO        0        0       0       0       22
   156           HC        4

   157           KK   Stplog    CNAME     ABC
   158           KO        0        0       0       0       22
   159           RS        1     ELEV     484       0
                 * pond3vol
   160           SV        0        0    2.36    4.76     7.18     9.64    12.12    14.63    17.17    19.75
   161           SV    22.35    24.98   27.64
                 * pondelv
   162           SE      484    484.5     485   485.5      486    486.5      487    487.5      488    488.5
   163           SE      489    489.5     490
                 * pond3out
   164           SQ        0     7.06      20    36.7     56.5       79    103.8    130.8    159.8    190.7
   165           SQ    223.4    257.7   293.6
                 * pondelv
   166           SE      484    484.5     485   485.5      486    486.5      487    487.5      488    488.5
   167           SE      489    489.5     490
   168           ZZ

            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.    (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     6     Pond1
               V
               V
    38     Pipe1
               .
               .
    44         .        Pond2
               .            V
               .            V
    76         .        Pipe2
               .            .
               .            .
    82         .            .        Pond3B
               .            .             V
               .            .             V
   115         .            .         Pipe3
               .            .             .
               .            .             .
   121         .            .             .        Pond3
               .            .             .            .
               .            .             .            .
   154       ABC.......................................
               V
               V
   157    Stplog

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                          ***************************************
 *                                        *                          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                          *   U.S. ARMY CORPS OF ENGINEERS      *
                                                     Page 5
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HA53

```
*                                         *                      havana2.out              *  HYDROLOGIC ENGINEERING CENTER  *
*            MAY    1991                  *                                               *      609 SECOND STREET          *
*        VERSION 4.0.1E                   *                                               *   DAVIS, CALIFORNIA 95616       *
*                                         *                                               *       (916) 551-1748            *
*  RUN DATE              TIME             *                                               *                                 *
*******************************************                                               ***********************************




  5 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT           HYDROGRAPH TIME DATA
                       NMIN          10  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1JAN94  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         160  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2JAN94  ENDING DATE
                     NDTIME        0230  ENDING TIME
                      ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL    0.17 HOURS
                     TOTAL TIME BASE   26.50 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
  6 KK        *    Pond1   *
              *            *
              **************

  7 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                                                      Page 6
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HA 54

```
                                                                          havana2.out
                       IOUT            22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1             1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2           160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         0.167  TIME INTERVAL IN HOURS


    10 IN           TIME DATA FOR INPUT TIME SERIES
                      JXMIN             6  TIME INTERVAL IN MINUTES
                     JXDATE       1JAN94  STARTING DATE
                     JXTIME             0  STARTING TIME

                 SUBBASIN RUNOFF DATA

     8 BA           SUBBASIN CHARACTERISTICS
                      TAREA,         0.04  SUBBASIN AREA

                    PRECIPITATION DATA

     9 PB                STORM        7.00  BASIN TOTAL PRECIPITATION

    11 PI             INCREMENTAL PRECIPITATION PATTERN
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                         0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                         0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                         0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                         0.00      0.00      0.00      0.00

    36 LS           SCS LOSS RATE
                      STRTL          0.00  INITIAL ABSTRACTION
                     CRVNBR        100.00  CURVE NUMBER
                      RTIMP        100.00  PERCENT IMPERVIOUS AREA

    37 UD           SCS DIMENSIONLESS UNITGRAPH
                       TLAG          0.15  LAG

                                                     ***

                                               UNIT HYDROGRAPH
                                            7 END-OF-PERIOD ORDINATES
                 60.       54.       16.        5.        2.        1.        0.


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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Page 7

H55

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                                                              havana2.out
                 *            *
   38 KK         *    Pipe1   *      CNAME       C
                 *            *
                 **************

   39 KO             OUTPUT CONTROL VARIABLES
                           IPRNT            4  PRINT CONTROL
                           IPLOT            0  PLOT CONTROL
                           QSCAL           0.  HYDROGRAPH PLOT SCALE
                           IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                            IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                           ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                           ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                          TIMINT        0.167  TIME INTERVAL IN HOURS


                   HYDROGRAPH ROUTING DATA

   40 RS             STORAGE ROUTING
                           NSTPS            1  NUMBER OF SUBREACHES/                          ITYP        ELEV  TYPE OF INITIAL CONDITION
                          RSVRIC       486.00  INITIAL CONDITION
                               X         0.00  WORKING R AND D COEFFICIENT

   41 SV              STORAGE        0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

   42 SE            ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

   43 SQ            DISCHARGE         0.        9.       26.       48.       74.      103.      136.      171.      209.
                                                             ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
   44 KK         *    Pond2   *
                 *            *
                 **************

   45 KO             OUTPUT CONTROL VARIABLES
                           IPRNT            4  PRINT CONTROL
                           IPLOT            0  PLOT CONTROL
                           QSCAL           0.  HYDROGRAPH PLOT SCALE
                           IPNCH            1  PUNCH COMPUTED HYDROGRAPH
                            IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                           ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                           ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                          TIMINT        0.167  TIME INTERVAL IN HOURS


   48 IN             TIME DATA FOR INPUT TIME SERIES
                           JXMIN            6  TIME INTERVAL IN MINUTES
                          JXDATE      1JAN94  STARTING DATE
                          JXTIME            0  STARTING TIME
                                                              Page 8
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HA 36

DRAFT

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                                                      havana2.out
                          SUBBASIN RUNOFF DATA

           46 BA           SUBBASIN CHARACTERISTICS
                                 TAREA,       0.03  SUBBASIN AREA

                           PRECIPITATION DATA

           47 PB                 STORM        7.00  BASIN TOTAL PRECIPITATION

           49 PI             INCREMENTAL PRECIPITATION PATTERN
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                                0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00

           74 LS           SCS LOSS RATE
                                STRTL         0.00  INITIAL ABSTRACTION
                               CRVNBR       100.00  CURVE NUMBER
                                RTIMP       100.00  PERCENT IMPERVIOUS AREA

           75 UD           SCS DIMENSIONLESS UNITGRAPH
                                 TLAG         0.15  LAG

                                                          ***

                                                       UNIT HYDROGRAPH
                                                    7 END-OF-PERIOD ORDINATES
                        54.       49.       15.        5.        1.        0.        0.

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                    **************
                    *            *
           76 KK    *    Pipe2   *       CNAME      B
                    *            *
                    **************

           77 KO           OUTPUT CONTROL VARIABLES
                                IPRNT           4  PRINT CONTROL
                                IPLOT           0  PLOT CONTROL
                                QSCAL          0.  HYDROGRAPH PLOT SCALE
                                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                                                              Page 9
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HA 57

HA 58

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                                                                     havana2.out
                          IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                        TIMINT       0.167  TIME INTERVAL IN HOURS


                  HYDROGRAPH ROUTING DATA

  78 RS             STORAGE ROUTING
                         NSTPS           1 NUMBER OF SUBREACHES/                          ITYP        ELEV   TYPE OF INITIAL CONDITION
                        RSVRIC      486.00  INITIAL CONDITION
                             X        0.00 WORKING R AND D COEFFICIENT

  79 SV                STORAGE         0.0       9.7      19.5      29.4      39.3      49.3      59.4      69.6      79.7

  80 SQ              DISCHARGE         11.       31.       58.       89.      124.      163.      205.      251.      300.

  81 SE              ELEVATION      486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                                 ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  82 KK    *    Pond3B  *      New proposed ash pond
           *            *
           **************

  83 KO             OUTPUT CONTROL VARIABLES
                         IPRNT           4  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE
                         IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                          IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                        TIMINT       0.167  TIME INTERVAL IN HOURS


  87 IN             TIME DATA FOR INPUT TIME SERIES
                         JXMIN           6  TIME INTERVAL IN MINUTES
                        JXDATE      1JAN94  STARTING DATE
                        JXTIME           0  STARTING TIME

                  SUBBASIN RUNOFF DATA

  84 BA             SUBBASIN CHARACTERISTICS
                         TAREA,       0.07  SUBBASIN AREA

  85 BF             BASE FLOW CHARACTERISTICS
                         STRTQ       11.90  INITIAL FLOW
                        QRCSN         0.00  BEGIN BASE FLOW RECESSION
                         RTIOR     1.00000  RECESSION CONSTANT
                                                               Page 10
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                                             havana2.out
                   PRECIPITATION DATA

  86 PB                  STORM        7.00  BASIN TOTAL PRECIPITATION

  88 PI              INCREMENTAL PRECIPITATION PATTERN
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                       0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00

 113 LS             SCS LOSS RATE
                          STRTL         0.00  INITIAL ABSTRACTION
                         CRVNBR       100.00  CURVE NUMBER
                          RTIMP       100.00  PERCENT IMPERVIOUS AREA

 114 UD             SCS DIMENSIONLESS UNITGRAPH
                           TLAG         0.15  LAG

                                                            ***

                                                         UNIT HYDROGRAPH
                                                     7 END-OF-PERIOD ORDINATES
                 122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
 115 KK          *   Pipe3    *        CNAME       D
                 *            *
                 **************

 116 KO             OUTPUT CONTROL VARIABLES
                          IPRNT          4  PRINT CONTROL
                          IPLOT          0  PLOT CONTROL
                          QSCAL         0.  HYDROGRAPH PLOT SCALE
                          IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                           IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                         TIMINT      0.167  TIME INTERVAL IN HOURS

                                                   Page 11
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HA 59

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                                                  havana2.out
                  HYDROGRAPH ROUTING DATA

 117 RS           STORAGE ROUTING
                        NSTPS          1 NUMBER OF SUBREACHES/                        ITYP        ELEV   TYPE OF INITIAL CONDITION
                        RSVRIC    492.00  INITIAL CONDITION
                             X      0.00 WORKING R AND D COEFFICIENT

 118 SV             STORAGE         0.0       22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

 119 SE           ELEVATION      492.00     492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

 120 SQ           DISCHARGE          0.        11.       31.       58.       89.      124.      163.      205.      251.
                                                               ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
 121 KK          *    Pond3   *
                 *            *
                 **************

 122 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS

 126 IN          TIME DATA FOR INPUT TIME SERIES
                        JXMIN          6  TIME INTERVAL IN MINUTES
                       JXDATE     1JAN94  STARTING DATE
                       JXTIME          0  STARTING TIME

                SUBBASIN RUNOFF DATA

 123 BA          SUBBASIN CHARACTERISTICS
                        TAREA,      0.01  SUBBASIN AREA

 124 BF          BASE FLOW CHARACTERISTICS
                        STRTQ       0.00  INITIAL FLOW
                        QRCSN       0.00  BEGIN BASE FLOW RECESSION
                        RTIOR    1.00000  RECESSION CONSTANT

                 PRECIPITATION DATA

 125 PB                 STORM       7.00  BASIN TOTAL PRECIPITATION
                                                              Page 12
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HA 60

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                                                                      havana2.out
 127 PI           INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                     0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00

 152 LS           SCS LOSS RATE
                       STRTL         0.00  INITIAL ABSTRACTION
                      CRVNBR       100.00  CURVE NUMBER
                       RTIMP       100.00  PERCENT IMPERVIOUS AREA

 153 UD           SCS DIMENSIONLESS UNITGRAPH
                        TLAG         0.15  LAG

                                                            ***

                                                          UNIT HYDROGRAPH
                                                   7 END-OF-PERIOD ORDINATES
                   14.        13.        4.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                  **************
                  *            *
 154 KK           *    ABC     *        CNAME   Stplog
                  *            *
                  **************

 155 KO           OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      0.167  TIME INTERVAL IN HOURS

 156 HC           HYDROGRAPH COMBINATION
                       ICOMP          4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                            ***
                                                          Page 13
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HA 61

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                                         havana2.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
157 KK        *   Stplog   *        CNAME     ABC
              *            *
              **************

158 KO           OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

159 RS           STORAGE ROUTING
                      NSTPS           1 NUMBER OF SUBREACHES/                      ITYP         ELEV   TYPE OF INITIAL CONDITION
                     RSVRIC      484.00  INITIAL CONDITION
                          X        0.00 WORKING R AND D COEFFICIENT

160 SV             STORAGE        0.0       0.0       2.4       4.8       7.2       9.6      12.1      14.6      17.2      19.7
                                 22.4      25.0      27.6

162 SE             ELEVATION   484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                               489.00    489.50    490.00

164 SQ             DISCHARGE       0.        7.       20.       37.       56.       79.      104.      131.      160.      191.
                                 223.      258.      294.

166 SE             ELEVATION   484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                               489.00    489.50    490.00

                                                         ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

               STORAGE       0.00      0.00      2.36      4.76      7.18      9.64     12.12     14.63     17.17     19.75
               OUTFLOW       0.00      7.06     20.00     36.70     56.50     79.00    103.80    130.80    159.80    190.70
             ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

               STORAGE      22.35     24.98     27.64
               OUTFLOW     223.40    257.70    293.60
             ELEVATION     489.00    489.50    490.00

                                                RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES
                                                    Page 14
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HA

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                                                                   havana2.out
                                             PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
+            OPERATION         STATION       FLOW      PEAK                                          AREA      STAGE    MAX STAGE
                                                                  6-HOUR      24-HOUR     72-HOUR

             HYDROGRAPH AT
+                               Pond1         139.     12.00         19.          7.          6.      0.04

             ROUTED TO
+                               Pipe1           8.     13.67          7.          4.          4.      0.04
+                                                                                                              486.42      13.67

             HYDROGRAPH AT
+                               Pond2         124.     12.00         17.          6.          5.      0.03

             ROUTED TO
+                               Pipe2          19.     12.67         15.         12.         12.      0.03
+                                                                                                              486.21      12.67

             HYDROGRAPH AT
+                              Pond3B         291.     12.00         50.         25.         24.      0.07

             ROUTED TO
+                               Pipe3          18.     17.50         18.         12.         11.      0.07
+                                                                                                              492.68      17.50

             HYDROGRAPH AT
+                               Pond3          32.     12.00          4.          2.          1.      0.01

             4 COMBINED AT
+                                 ABC          62.     12.00         43.         30.         29.      0.15

             ROUTED TO
+                              Stplog          42.     15.17         40.         29.         27.      0.15
+                                                                                                              485.63      15.17


 *** NORMAL END OF HEC-1 ***
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HA63

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                                                  Havana3.out
1*****************************************                                    ***************************************
 *                                       *                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *              MAY   1991               *                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.0.1E               *                                    *         609 SECOND STREET           *
 *                                       *                                    *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE              TIME           *                                    *          (916) 551-1748             *
 *                                       *                                    *                                     *
 *****************************************                                    ***************************************



                              X       X  XXXXXXX   XXXXX          X
                              X       X  X        X     X        XX
                              X       X  X        X               X
                              XXXXXXX    XXXX     X       XXXXX   X
                              X       X  X        X               X
                              X       X  X        X     X         X
                              X       X  XXXXXXX   XXXXX         XXX
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0.5 PMP Using Q @ Polishing Pon[d]
& Weir Discharge @ Ponds 1,2 & 3

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 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL    LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                              HEC-1 INPUT                                          PAGE  1

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    1          ID
    2          ID
    3          ID
               *DIAGRAM
    4          IT      10   1JAN94       0     160
    5          IO       4

    6          KK   Pond1
    7          KO       0        0       0       1      22
    8          BA  0.0358
    9          PB      16
   10          IN       6   1JAN94       0
               * precip1
   11          PC       0    0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
   12          PC  0.0105   0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
   13          PC   0.022   0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
   14          PC  0.0345   0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
   15          PC   0.048   0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
   16          PC   0.063   0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                    Page 1
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                                                    Havana3.out
  17            PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
  18            PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
  19            PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
  20            PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
  21            PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
  22            PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
  23            PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
  24            PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
  25            PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
  26            PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
  27            PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
  28            PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
  29            PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
  30            PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
  31            PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
  32            PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
  33            PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
  34            PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
  35            PC        1       1       1       1       1
  36            LS        0     100     100
  37            UD     0.15

  38            KK    Pipe1   CNAME       C
  39            KO        0       0       0       0      22
  40            RS        1    ELEV     486       0
                * pond1vol
  41            SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
                * pond1elev
  42            SE      486   486.5     487   487.5     488   488.5     489   489.5     490
                * pond1out
  43            SQ        0     9.2    26.2    26.2    26.2    26.2    26.2    26.2    26.2

                                        HEC-1 INPUT                                           PAGE  2

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  44            KK    Pond2
  45            KO        0       0       0       1      22
  46            BA    0.032
  47            PB       16
  48            IN        6  1JAN94       0
                * precip1
  49            PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
  50            PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
  51            PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
  52            PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
  53            PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
  54            PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
  55            PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
  56            PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
  57            PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
  58            PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
  59            PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
  60            PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
  61            PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
  62            PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                                       Page 2
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HA 65

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                                                  Havana3.out
 63        PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64        PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65        PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66        PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67        PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68        PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69        PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70        PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71        PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72        PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73        PC        1       1       1       1       1
 74        LS        0     100     100
 75        UD     0.15

 76        KK    Pipe2   CNAME       B
 77        KO        0       0       0       0      22
 78        RS        1    ELEV     486       0
           * pond2vol
 79        SV        0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
           * pond2out
 80        SQ     11.1    31.4    57.7    57.7    57.7    57.7    57.7    57.7    57.7
           * pond2elev
 81        SE      486   486.5     487   487.5     488   488.5     489   489.5     490

 82        KK   Pond3B New proposed ash pond
 83        KO        0       0       0       1      22
 84        BA    0.072
 85        BF     11.9       0       0
 86        PB       16
 87        IN        6  1JAN94       0
           * precip1
 88        PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89        PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90        PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                   HEC-1 INPUT                                          PAGE  3

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91        PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92        PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93        PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94        PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95        PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96        PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97        PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98        PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99        PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100        PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101        PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102        PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103        PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104        PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105        PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106        PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107        PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108        PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                                  Page 3
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HA 88

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 109          PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 110          PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 111          PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 112          PC       1       1       1       1       1
 113          LS       0     100     100
 114          UD    0.15

 115          KK   Pipe3   CNAME       D
 116          KO       0       0       0       0      22
 117          RS       1    ELEV     492       0
              * pond3Bvol
 118          SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
              * pond3Belev
 119          SE     492   492.5     493   493.5     494   494.5     495   495.5     496
              * pond3Bout
 120          SQ       0    11.1   31.38   57.66   57.66   57.66   57.66   57.66   57.66

 121          KK   Pond3
 122          KO       0       0       0       1      22
 123          BA  0.0083
 124          BF       0       0       0
 125          PB      16
 126          IN       6  1JAN94       0
              * precip1
 127          PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 128          PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 129          PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 130          PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 131          PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 132          PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 133          PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 134          PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 135          PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 136          PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 137          PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 138          PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 139          PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                          HEC-1 INPUT                                                  PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 140          PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 141          PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 142          PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 143          PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 144          PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 145          PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 146          PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 147          PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 148          PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 149          PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 150          PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 151          PC       1       1       1       1       1
 152          LS       0     100     100
 153          UD    0.15
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HA 67

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154          KK      ABC    CNAME   Stplog
155          KO        0        0        0       0       22
156          HC        4

157          KK   Stplog    CNAME      ABC
158          KO        0        0        0       0       22
159          RS        1     ELEV      484       0
             * pond3vol
160          SV        0        0     2.36    4.76     7.18     9.48    12.12    14.63    17.17    19.75
161          SV    22.35    24.98    27.64
             * pondelv
162          SE      484    484.5      485   485.5      486    486.5      487    487.5      488    488.5
163          SE      489    489.5      490
             * pond3out
164          SQ        0     7.06       20    36.7     56.5       79    103.8    130.8    159.8    190.7
165          SQ    223.4    257.7    293.6
             * pondelv
166          SE      484    484.5      485   485.5      486    486.5      487    487.5      488    488.5
167          SE      489    489.5      490
168          ZZ
```

HA 68

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☐
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING            (--->) DIVERSION OR PUMP FLOW

  NO.       (.) CONNECTOR          (<---) RETURN OF DIVERTED OR PUMPED FLOW

   6        Pond1
               V
               V
  38        Pipe1
               .
               .
  44           .          Pond2
               .             V
               .             V
  76           .          Pipe2
               .             .
               .             .
  82           .             .           Pond3B
               .             .              V
               .             .              V
 115           .             .           Pipe3
               .             .              .
               .             .              .
 121           .             .              .           Pond3
               .             .              .              .
               .             .              .              .
 154          ABC.............................................
               V
               V
 157        Stplog

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                          ***************************************
 *                                        *                          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE    (HEC-1)  *                          *     U.S. ARMY CORPS OF ENGINEERS    *
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                                                      Havana3.out
*            MAY   1991               *                                      *   HYDROLOGIC ENGINEERING CENTER    *
*         VERSION 4.0.1E              *                                      *        609 SECOND STREET           *
*                                     *                                      *     DAVIS, CALIFORNIA 95616        *
* RUN DATE            TIME            *                                      *          (916) 551-1748            *
*                                     *                                      *                                    *
***************************************                                      **************************************




  5 IO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           10  MINUTES IN COMPUTATION INTERVAL
                      IDATE       1JAN94  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ,         160  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE       2JAN94  ENDING DATE
                     NDTIME         0230  ENDING TIME
                      ICENT           19  CENTURY MARK

                COMPUTATION INTERVAL    0.17 HOURS
                     TOTAL TIME BASE   26.50 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  6 KK        *    Pond1   *
              *            *
              **************

  7 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            1  PUNCH COMPUTED HYDROGRAPH
                                                           Page 6
```

HA 69

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                                                 Havana3.out
                      IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        0.167  TIME INTERVAL IN HOURS


  10 IN             TIME DATA FOR INPUT TIME SERIES
                     JXMIN            6  TIME INTERVAL IN MINUTES
                    JXDATE       1JAN94  STARTING DATE
                    JXTIME            0  STARTING TIME

                  SUBBASIN RUNOFF DATA

   8 BA             SUBBASIN CHARACTERISTICS
                      TAREA,          0.04  SUBBASIN AREA

                    PRECIPITATION DATA

   9 PB                STORM         16.00  BASIN TOTAL PRECIPITATION

  11 PI               INCREMENTAL PRECIPITATION PATTERN
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                        0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.02     0.06
                        0.14     0.19     0.03     0.02     0.02     0.01     0.01     0.01     0.01     0.01
                        0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                        0.00     0.00     0.00     0.00

  36 LS             SCS LOSS RATE
                     STRTL          0.00  INITIAL ABSTRACTION
                    CRVNBR        100.00  CURVE NUMBER
                     RTIMP        100.00  PERCENT IMPERVIOUS AREA

  37 UD             SCS DIMENSIONLESS UNITGRAPH
                      TLAG          0.15  LAG

                                                 ***

                                             UNIT HYDROGRAPH
                                           7 END-OF-PERIOD ORDINATES
                 60.      54.      16.       5.       2.       1.       0.


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


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HA90

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                                                        Havana3.out
   38 KK    *          *
            *   Pipe1  *       CNAME       C
            *          *
            **************

   39 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      0.167  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

   40 RS         STORAGE ROUTING
                       NSTPS          1 NUMBER OF SUBREACHES/                               ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC     486.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

   41 SV           STORAGE         0.0       10.5       21.2       31.9       42.8       53.8       65.0       76.2       87.6

   42 SE         ELEVATION      486.00     486.50     487.00     487.50     488.00     488.50     489.00     489.50     490.00

   43 SQ         DISCHARGE          0.         9.        26.        26.        26.        26.        26.        26.        26.
                                                                  ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *          *
   44 KK    *   Pond2  *
            *          *
            **************

   45 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      0.167  TIME INTERVAL IN HOURS

   48 IN         TIME DATA FOR INPUT TIME SERIES
                       JXMIN          6  TIME INTERVAL IN MINUTES
                      JXDATE      1JAN94  STARTING DATE
                      JXTIME          0  STARTING TIME
                                                          Page 8
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HA 71

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                                               Havana3.out
                     SUBBASIN RUNOFF DATA

         46 BA         SUBBASIN CHARACTERISTICS
                          TAREA,         0.03   SUBBASIN AREA

                       PRECIPITATION DATA

         47 PB                STORM        16.00  BASIN TOTAL PRECIPITATION

         49 PI           INCREMENTAL PRECIPITATION PATTERN
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                            0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                            0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                            0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                            0.00      0.00      0.00      0.00

         74 LS         SCS LOSS RATE
                          STRTL          0.00   INITIAL ABSTRACTION
                         CRVNBR        100.00   CURVE NUMBER
                          RTIMP        100.00   PERCENT IMPERVIOUS AREA

         75 UD         SCS DIMENSIONLESS UNITGRAPH
                          TLAG           0.15   LAG

                                                 ***

                                          UNIT HYDROGRAPH
                                      7 END-OF-PERIOD ORDINATES
                     54.       49.       15.        5.        1.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                     **************
                     *            *
         76 KK       *   Pipe2    *        CNAME        B
                     *            *
                     **************

         77 KO         OUTPUT CONTROL VARIABLES
                          IPRNT          4   PRINT CONTROL
                          IPLOT          0   PLOT CONTROL
                          QSCAL         0.   HYDROGRAPH PLOT SCALE
                          IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                                                     Page 9
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HA92

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                                                        Havana3.out
                    IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                   ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                   ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                  TIMINT       0.167  TIME INTERVAL IN HOURS

            HYDROGRAPH ROUTING DATA

 78 RS        STORAGE ROUTING
                   NSTPS           1  NUMBER OF SUBREACHES/                          ITYP        ELEV  TYPE OF INITIAL CONDITION
                  RSVRIC      486.00  INITIAL CONDITION
                       X        0.00  WORKING R AND D COEFFICIENT

 79 SV            STORAGE        0.0       9.7      19.5      29.4      39.3      49.3      59.4      69.6      79.7

 80 SQ          DISCHARGE        11.       31.       58.       58.       58.       58.       58.       58.       58.

 81 SE          ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                                  ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 82 KK     *   Pond3B   *     New proposed ash pond
           *            *
           **************

 83 KO        OUTPUT CONTROL VARIABLES
                   IPRNT           4  PRINT CONTROL
                   IPLOT           0  PLOT CONTROL
                   QSCAL          0.  HYDROGRAPH PLOT SCALE
                   IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                    IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                   ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                   ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                  TIMINT       0.167  TIME INTERVAL IN HOURS

 87 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN           6  TIME INTERVAL IN MINUTES
                  JXDATE      1JAN94  STARTING DATE
                  JXTIME           0  STARTING TIME

            SUBBASIN RUNOFF DATA

 84 BA        SUBBASIN CHARACTERISTICS
                   TAREA,       0.07  SUBBASIN AREA

 85 BF        BASE FLOW CHARACTERISTICS
                   STRTQ       11.90  INITIAL FLOW
                   QRCSN        0.00  BEGIN BASE FLOW RECESSION
                   RTIOR     1.00000  RECESSION CONSTANT
                                                          Page 10
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HA73

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                                                            Havana3.out
                       PRECIPITATION DATA

   86 PB                  STORM        16.00  BASIN TOTAL PRECIPITATION

   88 PI                INCREMENTAL PRECIPITATION PATTERN
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                          0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00

  113 LS               SCS LOSS RATE
                          STRTL          0.00  INITIAL ABSTRACTION
                          CRVNBR       100.00  CURVE NUMBER
                          RTIMP        100.00  PERCENT IMPERVIOUS AREA

  114 UD               SCS DIMENSIONLESS UNITGRAPH
                          TLAG           0.15  LAG

                                                         ***

                                                    UNIT HYDROGRAPH
                                                 7 END-OF-PERIOD ORDINATES
                 122.       109.        33.        10.         3.         1.         0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  115 KK      *     Pipe3  *      CNAME       D
              *            *
              **************

  116 KO               OUTPUT CONTROL VARIABLES
                          IPRNT           4  PRINT CONTROL
                          IPLOT           0  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE
                          IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                           IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                         TIMINT       0.167  TIME INTERVAL IN HOURS
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HA98

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                                                   Havana3.out

                HYDROGRAPH ROUTING DATA

 117 RS           STORAGE ROUTING
                        NSTPS          1 NUMBER OF SUBREACHES/                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC     492.00  INITIAL CONDITION
                            X       0.00 WORKING R AND D COEFFICIENT

 118 SV             STORAGE        0.0      22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

 119 SE           ELEVATION     492.00    492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

 120 SQ           DISCHARGE         0.       11.       31.       58.       58.       58.       58.       58.       58.
                                                            ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
 121 KK      *    Pond3   *
             *            *
             **************

 122 KO           OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS


 126 IN           TIME DATA FOR INPUT TIME SERIES
                        JXMIN          6  TIME INTERVAL IN MINUTES
                       JXDATE     1JAN94  STARTING DATE
                       JXTIME          0  STARTING TIME

                SUBBASIN RUNOFF DATA

 123 BA           SUBBASIN CHARACTERISTICS
                        TAREA,      0.01  SUBBASIN AREA

 124 BF           BASE FLOW CHARACTERISTICS
                        STRTQ       0.00  INITIAL FLOW
                        QRCSN       0.00  BEGIN BASE FLOW RECESSION
                        RTIOR    1.00000  RECESSION CONSTANT

                  PRECIPITATION DATA

 125 PB                 STORM      16.00  BASIN TOTAL PRECIPITATION

                                                     Page 12
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HA 75

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                                                    Havana3.out
 127 PI          INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                    0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00

 152 LS         SCS LOSS RATE
                      STRTL         0.00  INITIAL ABSTRACTION
                     CRVNBR       100.00  CURVE NUMBER
                      RTIMP       100.00  PERCENT IMPERVIOUS AREA

 153 UD         SCS DIMENSIONLESS UNITGRAPH
                       TLAG         0.15  LAG

                                                    ***

                                                 UNIT HYDROGRAPH
                                           7 END-OF-PERIOD ORDINATES
                    14.       13.        4.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 154 KK       *     ABC    *        CNAME  Stplog
              *            *
              **************

 155 KO         OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS

 156 HC         HYDROGRAPH COMBINATION
                      ICOMP           4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                   ***
                                                 Page 13
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HA 98

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                                        Havana3.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 157 KK        *   Stplog   *        CNAME     ABC
               *            *
               **************

 158 KO            OUTPUT CONTROL VARIABLES
                         IPRNT          4  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE
                         IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                          IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                        TIMINT      0.167  TIME INTERVAL IN HOURS


                 HYDROGRAPH ROUTING DATA

 159 RS            STORAGE ROUTING
                         NSTPS          1 NUMBER OF SUBREACHES/                       ITYP       ELEV  TYPE OF INITIAL CONDITION
                        RSVRIC     484.00  INITIAL CONDITION
                             X       0.00 WORKING R AND D COEFFICIENT

 160 SV              STORAGE        0.0       0.0       2.4       4.8       7.2       9.5      12.1      14.6      17.2      19.7
                                   22.4      25.0      27.6

 162 SE            ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                 489.00    489.50    490.00

 164 SQ            DISCHARGE        0.        7.       20.       37.       56.       79.      104.      131.      160.      191.
                                   223.      258.      294.

 166 SE            ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                 489.00    489.50    490.00

                                                       ***

                                           COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                 STORAGE        0.00      0.00      2.36      4.76      7.18      9.48     12.12     14.63     17.17     19.75
                 OUTFLOW        0.00      7.06     20.00     36.70     56.50     79.00    103.80    130.80    159.80    190.70
               ELEVATION      484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

                 STORAGE       22.35     24.98     27.64
                 OUTFLOW      223.40    257.70    293.60
               ELEVATION      489.00    489.50    490.00

                                                        RUNOFF SUMMARY
                                                 FLOW IN CUBIC FEET PER SECOND
                                               TIME IN HOURS,  AREA IN SQUARE MILES
                                                           Page 14
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HA77

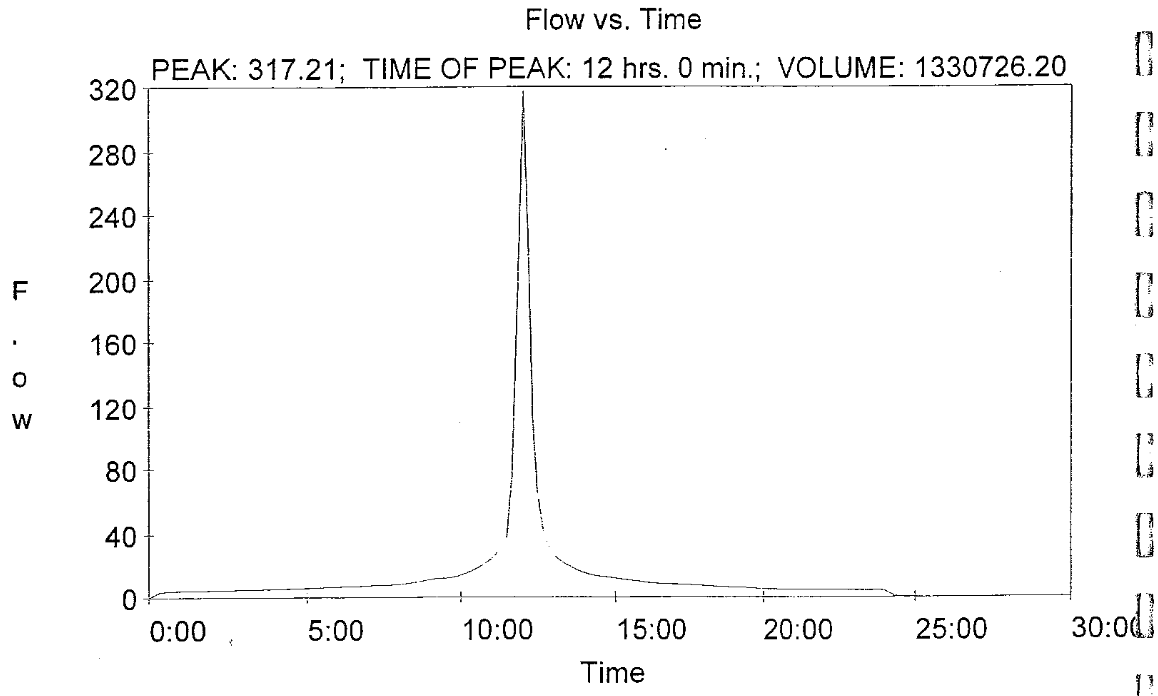
```
                                          Havana3.out

+       OPERATION        STATION     PEAK    TIME OF   AVERAGE FLOW FOR MAXIMUM PERIOD    BASIN   MAXIMUM   TIME OF
                                     FLOW     PEAK                                         AREA    STAGE   MAX STAGE
                                                        6-HOUR     24-HOUR    72-HOUR

        HYDROGRAPH AT
+                         Pond1      317.     12.00       44.        15.        14.        0.04
        ROUTED TO
+                         Pipe1       23.     13.17       21.        11.        10.        0.04
+                                                                                                  486.92     13.17
        HYDROGRAPH AT
+                         Pond2      284.     12.00       39.        14.        12.        0.03
        ROUTED TO
+                         Pipe2       35.     12.67       28.        16.        16.        0.03
+                                                                                                  486.57     12.67
        HYDROGRAPH AT
+                        Pond3B      650.     12.00       99.        43.        40.        0.07
        ROUTED TO
+                         Pipe3       40.     14.17       39.        24.        22.        0.07
+                                                                                                  493.17     14.17
        HYDROGRAPH AT
+                         Pond3       74.     12.00       10.         4.         3.        0.01
        4 COMBINED AT
+                           ABC      131.     12.00       95.        54.        50.        0.15
        ROUTED TO
+                        Stplog       93.     15.00       87.        51.        47.        0.15
+                                                                                                  486.78     15.00

*** NORMAL END OF HEC-1 ***
```

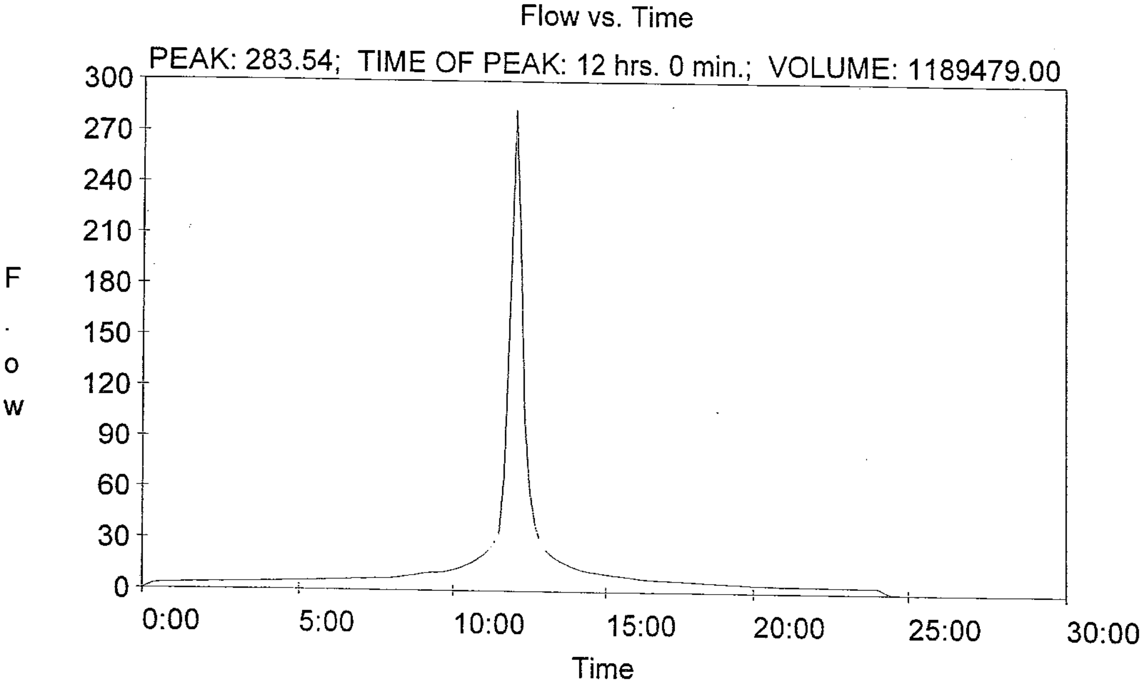
HA78



Pond 1 Peak Flow

16" - ½ PMP Storm

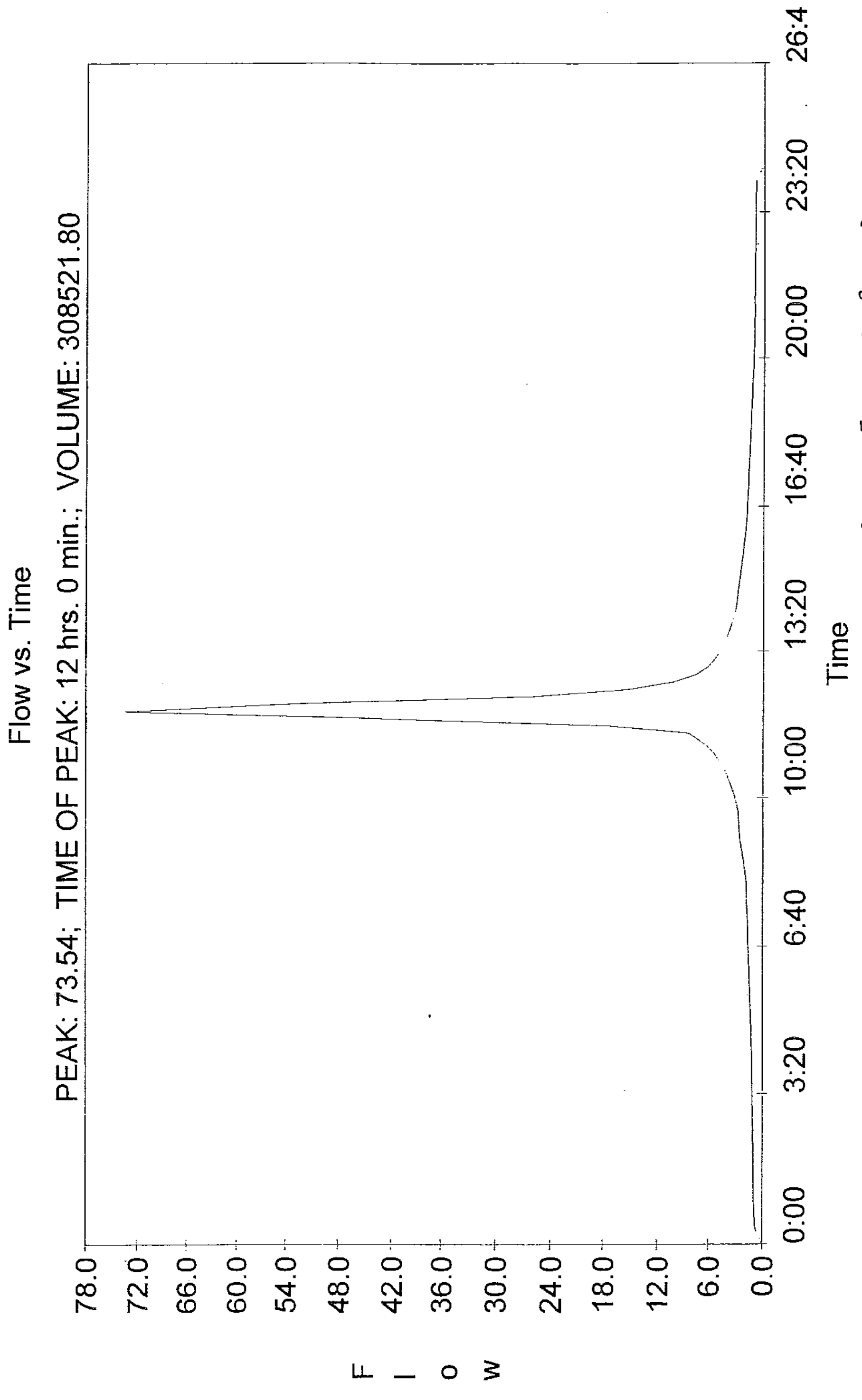
HA 79



Pond 2 PEAK FLOW
16" - ½ PMP Storm

HA 80

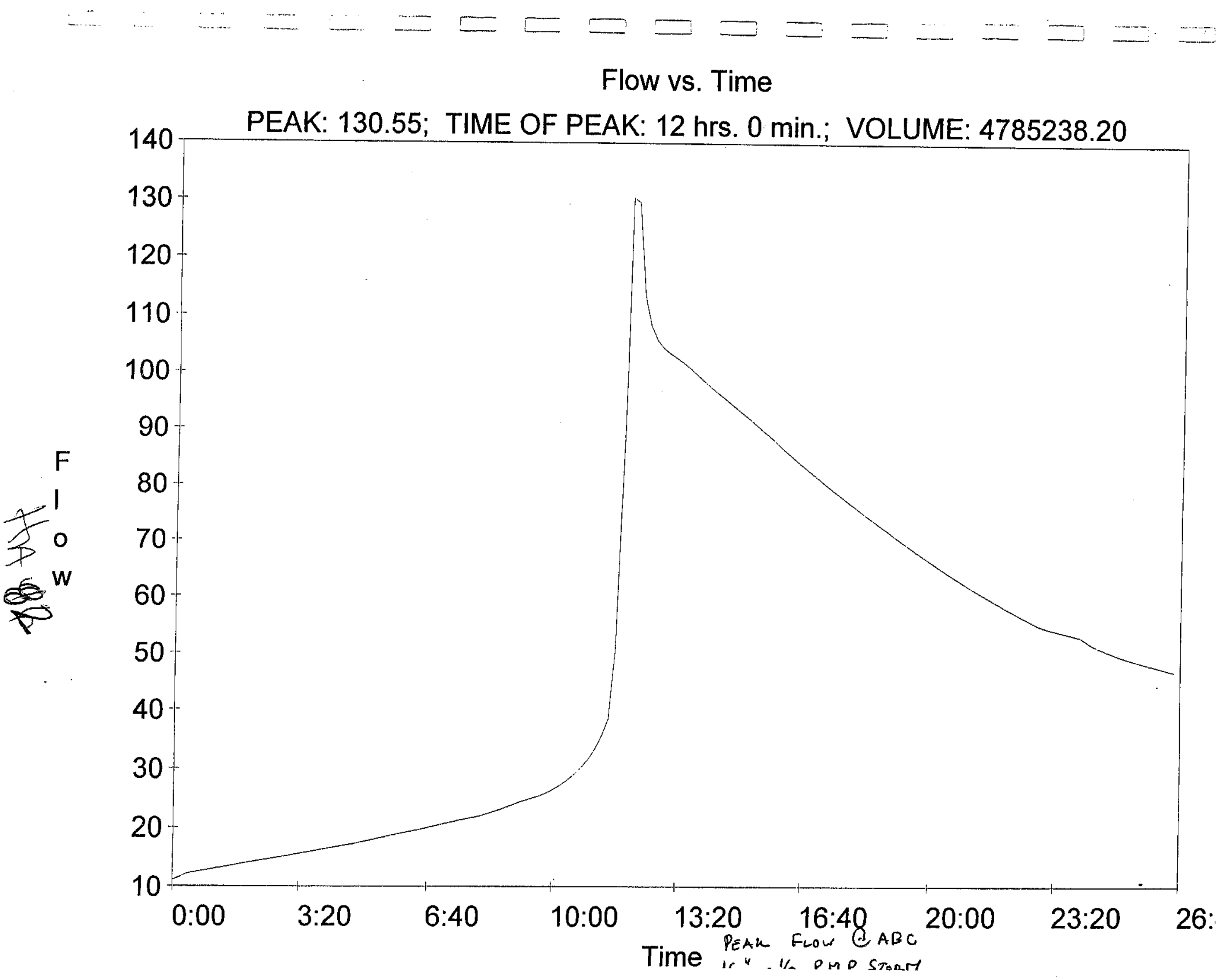
DRAFT

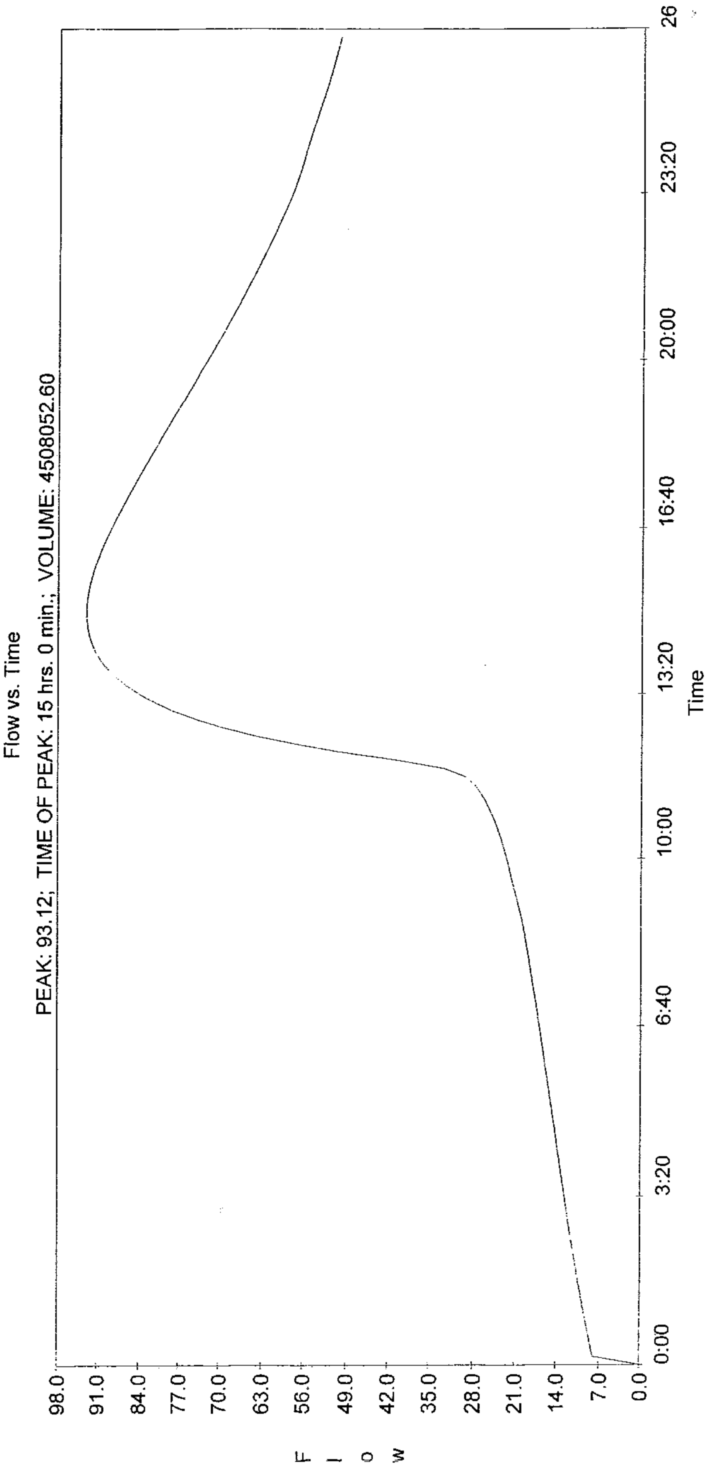


Peak Flow @ Pond 3
16" - 1/2 PMP Storm

HA 81

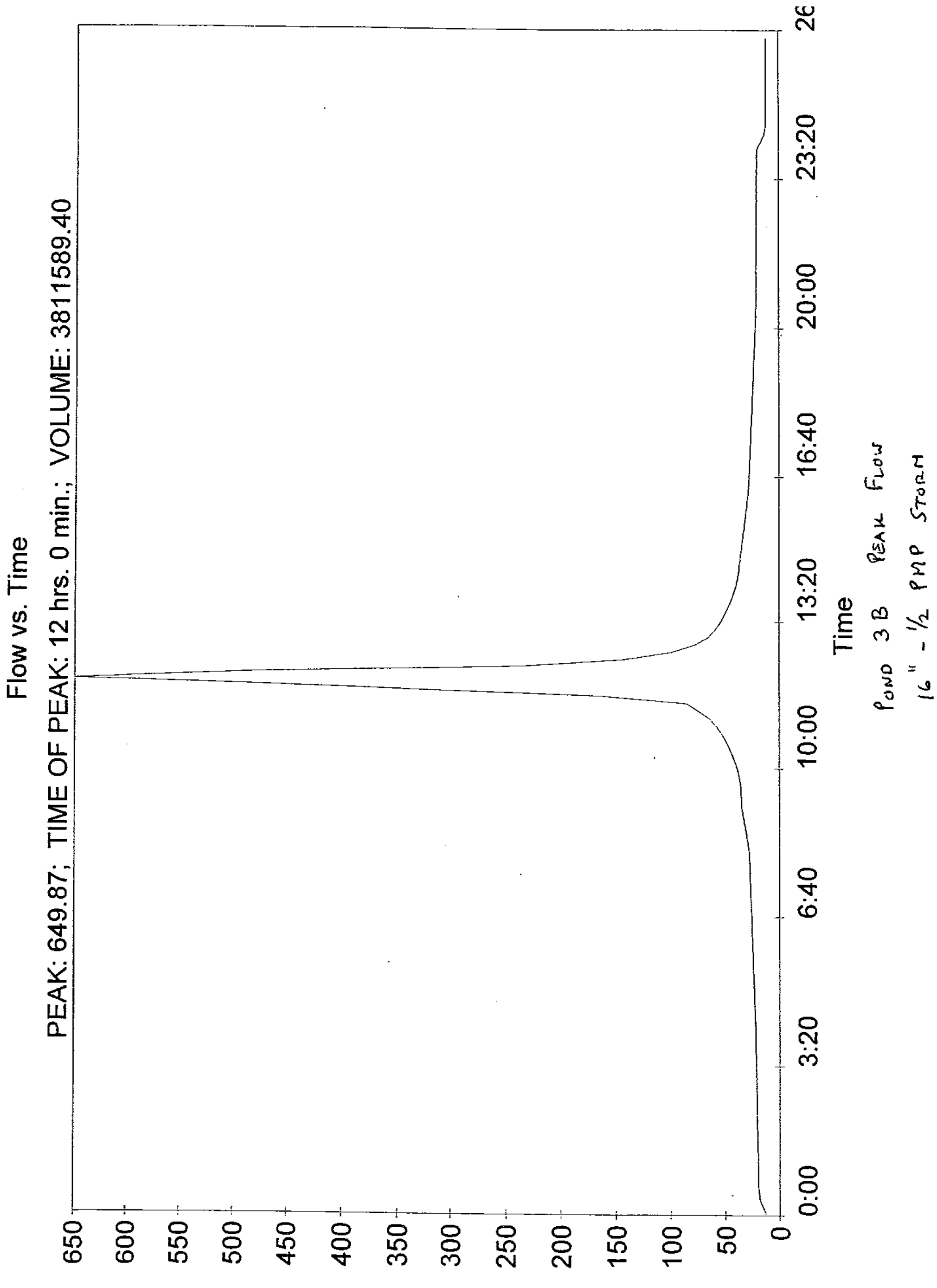
DRAFT


Flow vs. Time
PEAK: 130.55; TIME OF PEAK: 12 hrs. 0 min.; VOLUME: 4785238.20
Flow
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0:00
3:20
6:40
10:00
13:20
16:40
20:00
23:20
26:
Time
PEAK FLOW @ ABC
PMP STORM
HA 82



Stop Log Peak Flow
16" - 1/2 PMP Storm

HA 83



Pond 3B Peak Flow
16" - 1/2 PMP Storm

HA84

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                                          Havana4.out
1*****************************************                                   ****************************************
 *                                       *                                   *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                   *   U.S. ARMY CORPS OF ENGINEERS       *
 *             MAY    1991               *                                   *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E              *                                   *          609 SECOND STREET           *
 *                                       *                                   *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE             TIME            *                                   *          (916) 551-1748              *
 *                                       *                                   *                                      *
 *****************************************                                   ****************************************


                            X     X  XXXXXXX   XXXXX         X
                            X     X  X        X     X       XX
                            X     X  X        X              X
                            XXXXXXX  XXXX     X       XXXXX  X
                            X     X  X        X              X
                            X     X  X        X     X        X
                            X     X  XXXXXXX   XXXXX        XXX


  THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

  THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
  THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
  NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
  DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
  KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                           HEC-1 INPUT                                            PAGE  1

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1           ID
   2           ID
   3           ID
               *DIAGRAM
   4           IT     10   1JAN94       0     160
   5           IO      4

   6           KK    Pond1
   7           KO      0        0       0       1      22
   8           BA  0.0358
   9           PB      16
  10           IN      6   1JAN94       0
               * precipl
  11           PC      0    0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
  12           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
  13           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
  14           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
  15           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
  16           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                              Page 1
```

0.5 PMP (16" STORM) USING Q @
Polishing POND @ MAX DISCHARGE
@ Ponds 1,2 & 3B

HA-85

```
                                                    Havana4.out
 17             PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18             PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 19             PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20             PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21             PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22             PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23             PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24             PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25             PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26             PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27             PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28             PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29             PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30             PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31             PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32             PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33             PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34             PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35             PC        1       1       1       1       1
 36             LS        0     100     100
 37             UD     0.15

 38             KK    Pipe1   CNAME       C
 39             KO        0       0       0       0      22
 40             RS        1    ELEV     486       0
                * pond1vol
 41             SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
                * pond1elev
 42             SE      486   486.5     487   487.5     488   488.5     489   489.5     490
                * pond1out
 43             SQ        0    9.25   26.15   48.05   73.97  103.38   135.9  171.25  209.23

                                         HEC-1 INPUT                                          PAGE  2

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44             KK    Pond2
 45             KO        0       0       0       1      22
 46             BA    0.032
 47             PB       16
 48             IN        6  1JAN94       0
                * precip1
 49             PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50             PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51             PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52             PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53             PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54             PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55             PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56             PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57             PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58             PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59             PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60             PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61             PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62             PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                                 Page 2
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HA 88

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                                                Havana4.out
 63          PC      0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64          PC    0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728. 0.8753  0.8777
 65          PC      0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66          PC    0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67          PC     0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68          PC    0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69          PC     0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70          PC    0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71          PC     0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72          PC    0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73          PC         1       1       1       1       1
 74          LS         0     100     100
 75          UD      0.15

 76          KK     Pipe2   CNAME       B
 77          KO         0       0       0       0      22
 78          RS         1    ELEV     486       0
             * pond2vol
 79          SV         0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
             * pond2out
 80          SQ      11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08  299.59
             * pond2elev
 81          SE       486   486.5     487   487.5     488   488.5     489   489.5     490

 82          KK    Pond3B New proposed ash pond
 83          KO         0       0       0       1      22
 84          BA     0.072
 85          BF      11.9       0       0
 86          PB        16
 87          IN         6  1JAN94       0
             * precipl
 88          PC         0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89          PC    0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90          PC     0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                       HEC-1 INPUT                                              PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91          PC    0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92          PC     0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93          PC     0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94          PC      0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95          PC     0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96          PC      0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97          PC     0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98          PC     0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99          PC     0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100          PC     0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101          PC     0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102.         PC      0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103          PC    0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104          PC      0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105          PC    0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106          PC     0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107          PC    0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108          PC     0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                                 Page 3
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HA 87

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                                                Havana4.out
 109          PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 110          PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 111          PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 112          PC       1       1       1       1       1
 113          LS       0     100     100
 114          UD    0.15

 115          KK   Pipe3   CNAME       D
 116          KO       0       0       0       0      22
 117          RS       1    ELEV     492       0
              * pond3Bvol
 118          SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
              * pond3Belev
 119          SE     492   492.5     493   493.5     494   494.5     495   495.5     496
              * pond3Bout
 120          SQ       0    11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08

 121          KK   Pond3
 122          KO       0       0       0       1      22
 123          BA  0.0083
 124          BF       0       0       0
 125          PB      16
 126          IN       6  1JAN94       0
              * precipl
 127          PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 128          PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 129          PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 130          PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 131          PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 132          PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 133          PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 134          PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 135          PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 136          PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 137          PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 138          PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 139          PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                           HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 140          PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 141          PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 142          PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 143          PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 144          PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 145          PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 146          PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 147          PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 148          PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 149          PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 150          PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 151          PC       1       1       1       1       1
 152          LS       0     100     100
 153          UD    0.15
```

HA 88

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                                                                    Havana4.out
     154          KK     ABC    CNAME   Stplog
     155          KO       0        0        0        0        22
     156          HC       4

     157          KK  Stplog    CNAME      ABC
     158          KO       0        0        0        0        22
     159          RS       1     ELEV      484        0
                  * pond3vol
     160          SV       0        0     2.36     4.76      7.18     9.64    12.12    14.63    17.17    19.75
     161          SV   22.35    24.98    27.64
                  * pondelv
     162          SE     484    484.5      485    485.5       486    486.5      487    487.5      488    488.5
     163          SE     489    489.5      490
                  * pond3out
     164          SQ       0     7.06       20     36.7      56.5       79    103.8    130.8    159.8    190.7
     165          SQ   223.4    257.7    293.6
                  * pondelv
     166          SE     484    484.5      485    485.5       486    486.5      487    487.5      488    488.5
     167          SE     489    489.5      490
     168          ZZ
☐
              SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V)  ROUTING          (--->)  DIVERSION OR PUMP FLOW

   NO.      (.)  CONNECTOR        (<---)  RETURN OF DIVERTED OR PUMPED FLOW

    6        Pond1
                 V
                 V
   38        Pipe1
                 .
                 .
   44            .           Pond2
                 .               V
                 .               V
   76            .           Pipe2
                 .               .
                 .               .
   82            .               .           Pond3B
                 .               .               V
                 .               .               V
  115            .               .            Pipe3
                 .               .               .
                 .               .               .
  121            .               .               .           Pond3
                 .               .               .               .
                 .               .               .               .
  154          ABC...............................................
                 V
                 V
  157       Stplog

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                                *****************************************
 *                                       *                                                *                                       *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                                *   U.S. ARMY CORPS OF ENGINEERS        *
                                                                  Page 5
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HA 89

```
*              MAY   1991               *               *  HYDROLOGIC ENGINEERING CENTER    *
*           VERSION 4.0.1E              *               *         609 SECOND STREET         *
*                                       *               *      DAVIS, CALIFORNIA 95616      *
*  RUN DATE                 TIME        *               *          (916) 551-1748           *
*                                       *               *                                   *
*****************************************               *************************************



 5 IO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                       NMIN           10  MINUTES IN COMPUTATION INTERVAL
                      IDATE       1JAN94  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ,         160  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE       2JAN94  ENDING DATE
                     NDTIME         0230  ENDING TIME
                      ICENT           19  CENTURY MARK

                COMPUTATION INTERVAL    0.17 HOURS
                     TOTAL TIME BASE   26.50 HOURS

         ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 6 KK          *    Pond1   *
               *            *
               **************

 7 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            1  PUNCH COMPUTED HYDROGRAPH
```

HA90

```
                                                    Havana4.out
              IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
            TIMINT       0.167  TIME INTERVAL IN HOURS


10 IN         TIME DATA FOR INPUT TIME SERIES
              JXMIN              6  TIME INTERVAL IN MINUTES
            JXDATE          1JAN94  STARTING DATE
            JXTIME               0  STARTING TIME

          SUBBASIN RUNOFF DATA

 8 BA         SUBBASIN CHARACTERISTICS
                 TAREA,       0.04  SUBBASIN AREA

              PRECIPITATION DATA

 9 PB            STORM       16.00  BASIN TOTAL PRECIPITATION

11 PI           INCREMENTAL PRECIPITATION PATTERN
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.01       0.01       0.01       0.01       0.01       0.01       0.01
                   0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.02       0.02       0.06
                   0.14       0.19       0.03       0.02       0.02       0.01       0.01       0.01       0.01       0.01
                   0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                   0.00       0.00       0.00       0.00

36 LS         SCS LOSS RATE
                 STRTL        0.00  INITIAL ABSTRACTION
                CRVNBR      100.00  CURVE NUMBER
                 RTIMP      100.00  PERCENT IMPERVIOUS AREA

37 UD         SCS DIMENSIONLESS UNITGRAPH
                  TLAG        0.15  LAG

                                                 ***

                                          UNIT HYDROGRAPH
                                       7 END-OF-PERIOD ORDINATES
             60.       54.       16.        5.        2.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
                                              Page 7
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HA 91

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                                                            Havana4.out
                  *              *
 38 KK            *     Pipel    *        CNAME       C
                  *              *
                  ****************

 39 KO                OUTPUT CONTROL VARIABLES
                            IPRNT          4  PRINT CONTROL
                            IPLOT          0  PLOT CONTROL
                            QSCAL         0.  HYDROGRAPH PLOT SCALE
                            IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                             IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT      0.167  TIME INTERVAL IN HOURS


                    HYDROGRAPH ROUTING DATA

 40 RS                STORAGE ROUTING
                            NSTPS          1 NUMBER OF SUBREACHES/                           ITYP         ELEV  TYPE OF INITIAL CONDITION
                           RSVRIC     486.00  INITIAL CONDITION
                                X       0.00 WORKING R AND D COEFFICIENT

 41 SV               STORAGE        0.0       10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

 42 SE             ELEVATION     486.00     486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

 43 SQ             DISCHARGE         0.         9.       26.       48.       74.      103.      136.      171.      209.
                                                                ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                 ***************
                 *             *
 44 KK           *    Pond2    *
                 *             *
                 ***************

 45 KO                OUTPUT CONTROL VARIABLES
                            IPRNT          4  PRINT CONTROL
                            IPLOT          0  PLOT CONTROL
                            QSCAL         0.  HYDROGRAPH PLOT SCALE
                            IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                             IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT      0.167  TIME INTERVAL IN HOURS


 48 IN                TIME DATA FOR INPUT TIME SERIES
                           JXMIN           6  TIME INTERVAL IN MINUTES
                          JXDATE      1JAN94  STARTING DATE
                          JXTIME           0  STARTING TIME
                                                            Page 8
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HAQ2

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                                                  Havana4.out
                    SUBBASIN RUNOFF DATA

 46 BA                SUBBASIN CHARACTERISTICS
                           TAREA,         0.03   SUBBASIN AREA

                      PRECIPITATION DATA

 47 PB                     STORM        16.00   BASIN TOTAL PRECIPITATION

 49 PI                  INCREMENTAL PRECIPITATION PATTERN
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                           0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.02     0.06
                           0.14     0.19     0.03     0.02     0.02     0.01     0.01     0.01     0.01     0.01
                           0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                           0.00     0.00     0.00     0.00

 74 LS                SCS LOSS RATE
                           STRTL          0.00   INITIAL ABSTRACTION
                          CRVNBR        100.00   CURVE NUMBER
                           RTIMP        100.00   PERCENT IMPERVIOUS AREA

 75 UD                SCS DIMENSIONLESS UNITGRAPH
                            TLAG          0.15   LAG

                                                   ***

                                                UNIT HYDROGRAPH
                                             7 END-OF-PERIOD ORDINATES
                       54.       49.       15.        5.        1.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                **************
                *            *
 76 KK          *    Pipe2   *         CNAME        B
                *            *
                **************

 77 KO               OUTPUT CONTROL VARIABLES
                          IPRNT          4   PRINT CONTROL
                          IPLOT          0   PLOT CONTROL
                          QSCAL         0.   HYDROGRAPH PLOT SCALE
                          IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                                                        Page 9
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HA 93

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                                                   Havana4.out
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       0.167  TIME INTERVAL IN HOURS

               HYDROGRAPH ROUTING DATA

 78 RS            STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES/                          ITYP        ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC      486.00  INITIAL CONDITION
                         X        0.00  WORKING R AND D COEFFICIENT

 79 SV              STORAGE        0.0       9.7      19.5      29.4      39.3      49.3      59.4      69.6      79.7

 80 SQ            DISCHARGE        11.       31.       58.       89.      124.      163.      205.      251.      300.

 81 SE            ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                                ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** 

              **************
              *            *
 82 KK        *   Pond3B   *        New proposed ash pond
              *            *
              **************

 83 KO            OUTPUT CONTROL VARIABLES
                     IPRNT           4  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       0.167  TIME INTERVAL IN HOURS

 87 IN            TIME DATA FOR INPUT TIME SERIES
                     JXMIN           6  TIME INTERVAL IN MINUTES
                    JXDATE      1JAN94  STARTING DATE
                    JXTIME           0  STARTING TIME

               SUBBASIN RUNOFF DATA

 84 BA            SUBBASIN CHARACTERISTICS
                    TAREA,        0.07  SUBBASIN AREA

 85 BF            BASE FLOW CHARACTERISTICS
                     STRTQ       11.90  INITIAL FLOW
                     QRCSN        0.00  BEGIN BASE FLOW RECESSION
                     RTIOR     1.00000  RECESSION CONSTANT
                                                    Page 10
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                                                          Havana4.out
                    PRECIPITATION DATA

 86 PB                 STORM       16.00  BASIN TOTAL PRECIPITATION

 88 PI               INCREMENTAL PRECIPITATION PATTERN
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                        0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                        0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                        0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00

113 LS              SCS LOSS RATE
                       STRTL        0.00  INITIAL ABSTRACTION
                      CRVNBR      100.00  CURVE NUMBER
                       RTIMP      100.00  PERCENT IMPERVIOUS AREA

114 UD              SCS DIMENSIONLESS UNITGRAPH
                        TLAG        0.15  LAG

                                                         ***

                                                   UNIT HYDROGRAPH
                                                 7 END-OF-PERIOD ORDINATES
                  122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
115 KK         *    Pipe3   *       CNAME       D
               *            *
               **************

116 KO              OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.167  TIME INTERVAL IN HOURS
                                                          Page 11
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HA95

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              HYDROGRAPH ROUTING DATA

 117 RS         STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES/                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC     492.00   INITIAL CONDITION
                         X       0.00  WORKING R AND D COEFFICIENT

 118 SV           STORAGE         0.0      22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

 119 SE          ELEVATION     492.00    492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

 120 SQ          DISCHARGE         0.       11.       31.       58.       89.      124.      163.      205.      251.
                                                                   ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 121 KK       *    Pond3   *
              *            *
              **************

 122 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      0.167  TIME INTERVAL IN HOURS


 126 IN         TIME DATA FOR INPUT TIME SERIES
                     JXMIN          6  TIME INTERVAL IN MINUTES
                    JXDATE    1JAN94  STARTING DATE
                    JXTIME          0  STARTING TIME

              SUBBASIN RUNOFF DATA

 123 BA         SUBBASIN CHARACTERISTICS
                     TAREA,      0.01  SUBBASIN AREA

 124 BF         BASE FLOW CHARACTERISTICS
                     STRTQ       0.00  INITIAL FLOW
                     QRCSN       0.00  BEGIN BASE FLOW RECESSION
                     RTIOR    1.00000  RECESSION CONSTANT

              PRECIPITATION DATA

 125 PB               STORM     16.00  BASIN TOTAL PRECIPITATION
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HA 98

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                                                                  Havana4.out
127 PI          INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                     0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00

152 LS          SCS LOSS RATE
                      STRTL         0.00  INITIAL ABSTRACTION
                     CRVNBR       100.00  CURVE NUMBER
                      RTIMP       100.00  PERCENT IMPERVIOUS AREA

153 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG          0.15  LAG

                                                             ***

                                                      UNIT HYDROGRAPH
                                                  7 END-OF-PERIOD ORDINATES
                    14.       13.        4.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
154 KK       *     ABC    *       CNAME   Stplog
             *            *
             **************

155 KO          OUTPUT CONTROL VARIABLES
                     IPRNT             4  PRINT CONTROL
                     IPLOT             0  PLOT CONTROL
                     QSCAL            0.  HYDROGRAPH PLOT SCALE
                     IPNCH             0  PUNCH COMPUTED HYDROGRAPH
                      IOUT            22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1             1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2           160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT         0.167  TIME INTERVAL IN HOURS

156 HC          HYDROGRAPH COMBINATION
                     ICOMP             4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                            ***
                                                          Page 13
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HA 97

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                                   Havana4.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  157 KK      *   Stplog   *         CNAME     ABC
              *            *
              **************

  158 KO           OUTPUT CONTROL VARIABLES
                         IPRNT          4  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE
                         IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                          IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                        TIMINT      0.167  TIME INTERVAL IN HOURS

                 HYDROGRAPH ROUTING DATA

  159 RS           STORAGE ROUTING
                         NSTPS          1  NUMBER OF SUBREACHES/                        ITYP         ELEV  TYPE OF INITIAL CONDITION
                        RSVRIC     484.00  INITIAL CONDITION
                             X       0.00  WORKING R AND D COEFFICIENT

  160 SV             STORAGE         0.0       0.0       2.4       4.8       7.2       9.6      12.1      14.6      17.2      19.7
                                    22.4      25.0      27.6

  162 SE           ELEVATION      484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                  489.00    489.50    490.00

  164 SQ           DISCHARGE          0.        7.       20.       37.       56.       79.      104.      131.      160.      191.
                                    223.      258.      294.

  166 SE           ELEVATION      484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                  489.00    489.50    490.00

                                                                   ***

                                            COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

             STORAGE       0.00      0.00      2.36      4.76      7.18      9.64     12.12     14.63     17.17     19.75
             OUTFLOW       0.00      7.06     20.00     36.70     56.50     79.00    103.80    130.80    159.80    190.70
           ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

             STORAGE      22.35     24.98     27.64
             OUTFLOW     223.40    257.70    293.60
           ELEVATION     489.00    489.50    490.00
 □
                                                       RUNOFF SUMMARY
                                                FLOW IN CUBIC FEET PER SECOND
                                             TIME IN HOURS,  AREA IN SQUARE MILES
                                                          Page 14
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HA 98

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                                             Havana4.out
                                                  
                                PEAK    TIME OF   AVERAGE FLOW FOR MAXIMUM PERIOD    BASIN    MAXIMUM    TIME OF
      OPERATION       STATION   FLOW     PEAK                                         AREA     STAGE     MAX STAGE
                                                  6-HOUR      24-HOUR     72-HOUR
 +
      HYDROGRAPH AT
 +                     Pond1     317.    12.00       44.         15.         14.      0.04
      ROUTED TO
 +                     Pipe1      23.    13.17       21.         11.         10.      0.04     486.92      13.17
 +
      HYDROGRAPH AT
 +                     Pond2     284.    12.00       39.         14.         12.      0.03
      ROUTED TO
 +                     Pipe2      35.    12.67       28.         16.         16.      0.03     486.57      12.67
 +
      HYDROGRAPH AT
 +                     Pond3B    650.    12.00       99.         43.         40.      0.07
      ROUTED TO
 +                     Pipe3      40.    14.17       39.         24.         22.      0.07     493.17      14.17
 +
      HYDROGRAPH AT
 +                     Pond3      74.    12.00       10.          4.          3.      0.01
    4 COMBINED AT
 +                     ABC       131.    12.00       95.         54.         50.      0.15
      ROUTED TO
 +                     Stplog     93.    15.00       87.         51.         47.      0.15     486.79      15.00
 +


 *** NORMAL END OF HEC-1 ***
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HA 99

Page 15

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                                             Havana5.out

1*****************************************                                     ****************************************
 *                                        *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY   1991                *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E               *                                    *          609 SECOND STREET           *
 *                                        *                                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE              TIME            *                                    *          (916) 551-1748              *
 *                                        *                                    *                                      *
 *****************************************                                     ****************************************


                          X     X  XXXXXXX   XXXXX          X
                          X     X  X        X     X        XX
                          X     X  X        X               X
                          XXXXXXX  XXXX     X       XXXXX   X
                          X     X  X        X               X
                          X     X  X        X     X         X
                          X     X  XXXXXXX   XXXXX         XXX


 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL    LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                         HEC-1 INPUT                                              PAGE  1

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID
  2           ID
  3           ID
              *DIAGRAM
  4           IT      10  1JAN94       0     160
  5           IO       4

  6           KK    Pond1
  7           KO       0       0       0       1      22
  8           BA  0.0358
  9           PB      16
 10           IN       6  1JAN94       0
              * precip1
 11           PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 12           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 13           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 14           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 15           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 16           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                 Page 1
```

0.5 PMP Using Q1 @ Polishing Pond
& Weir Discharge @ Ponds 1, 2 & 3B

HA100

```
                                          Havana5.out
 17       PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18       PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 19       PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20       PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21       PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22       PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23       PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24       PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25       PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26       PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27       PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28       PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29       PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30       PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31       PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32       PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33       PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34       PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35       PC        1       1       1       1       1
 36       LS        0     100     100
 37       UD     0.15

 38       KK    Pipe1   CNAME       C
 39       KO        0       0       0       0      22
 40       RS        1    ELEV     486       0
          * pond1vol
 41       SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
          * pond1elev
 42       SE      486   486.5     487   487.5     488   488.5     489   489.5     490
          * pond1out
 43       SQ        0     9.2    26.2    26.2    26.2    26.2    26.2    26.2    26.2

                                     HEC-1 INPUT                                          PAGE  2

LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44       KK    Pond2
 45       KO        0       0       0       1      22
 46       BA    0.032
 47       PB       16
 48       IN        6  1JAN94       0
          * precip1
 49       PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50       PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51       PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52       PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53       PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54       PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55       PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56       PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57       PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58       PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59       PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60       PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61       PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62       PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                          Page 2
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HA101

```
 63          PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64          PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65          PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66          PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67          PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68          PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69          PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70          PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71          PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72          PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73          PC       1       1       1       1       1
 74          LS       0     100     100
 75          UD    0.15

 76          KK   Pipe2   CNAME       B
 77          KO       0       0       0       0      22
 78          RS       1    ELEV     486       0
             * pond1vol
 79          SV       0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
             * pond2out
 80          SQ    11.1    31.4    57.7    57.7    57.7    57.7    57.7    57.7    57.7
             * pond2elev
 81          SE     486   486.5     487   487.5     488   488.5     489   489.5     490

 82          KK  Pond3B New proposed ash pond
 83          KO       0       0       0       1      22
 84          BA   0.072
 85          BF    11.9       0       0
 86          PB      16
 87          IN       6  1JAN94       0
             * precipl
 88          PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89          PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90          PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                   HEC-1 INPUT                                           PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91          PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92          PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93          PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94          PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95          PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96          PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97          PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98          PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99          PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100          PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101          PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102          PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103          PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104          PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105          PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106          PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107          PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108          PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
```

HA
102

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                                                 Havana5.out
109        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
110        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
111        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
112        PC       1       1       1       1       1
113        LS       0     100     100
114        UD    0.15

115        KK   Pipe3   CNAME       D
116        KO       0       0       0       0      22
117        RS       1    ELEV     492       0
           * pond3Bvol
118        SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
           * pond3Belev
119        SE     492   492.5     493   493.5     494   494.5     495   495.5     496
           * pond3Bout
120        SQ       0    11.1   31.38   57.66   57.66   57.66   57.66   57.66   57.66

121        KK   Pond3
122        KO       0       0       0       1      22
123        BA  0.0083
124        BF       0       0       0
125        PB      16
126        IN       6  1JAN94       0
           * precip1
127        PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
128        PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
129        PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
130        PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
131        PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
132        PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
133        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
134        PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
135        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
136        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
137        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
138        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
139        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                       HEC-1 INPUT                                    PAGE  4

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

140        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
141        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
142        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
143        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
144        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
145        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
146        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
147        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
148        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
149        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
150        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
151        PC       1       1       1       1       1
152        LS       0     100     100
153        UD    0.15

                                           Page 4
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HA 103

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 154           KK       ABC     CNAME   Stplog
 155           KO         0         0        0        0       22
 156           HC         4

 157           KK   Stplog    CNAME       ABC
 158           KO         0         0         0       0       22
 159           RS         1      ELEV       484       0
               * pond3vol
 160           SV         0         0      2.36    4.76     7.18     9.64    12.12    14.63    17.17    19.75
 161           SV     22.35     24.98     27.64
               * pondelv
 162           SE       484     484.5       485   485.5      486    486.5      487    487.5      488    488.5
 163           SE       489     489.5       490
               * pond3out
 164           SQ         0      6.95     19.31   34.87    52.74     72.4    93.44   115.56   138.53   162.12
 165           SQ    186.15    210.47    234.92
               * pondelv
 166           SE       484     484.5       485   485.5      486    486.5      487    487.5      488    488.5
 167           SE       489     489.5       490
 168           ZZ
□
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE         (V)  ROUTING          (--->)  DIVERSION OR PUMP FLOW

  NO.         (.)  CONNECTOR        (<---)  RETURN OF DIVERTED OR PUMPED FLOW

    6          Pond1
                   V
                   V
   38          Pipe1
                   .
                   .
   44              .           Pond2
                   .               V
                   .               V
   76              .           Pipe2
                   .               .
                   .               .
   82              .               .           Pond3B
                   .               .               V
                   .               .               V
  115              .               .            Pipe3
                   .               .               .
                   .               .               .
  121              .               .               .            Pond3
                   .               .               .                .
                   .               .               .                .
  154            ABC.................................................
                   V
                   V
  157         Stplog

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                              *****************************************
 *                                         *                              *                                       *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)    *                              *   U.S. ARMY CORPS OF ENGINEERS        *
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HA-
104

```
                                               Havana5.out
*              MAY   1991               *                                          *    HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.0.1E              *                                          *          609 SECOND STREET           *
*                                       *                                          *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE              TIME           *                                          *            (916) 551-1748            *
*                                       *                                          *                                      *
*****************************************                                          ****************************************




   5 IO         OUTPUT CONTROL VARIABLES
                       IPRNT            4   PRINT CONTROL
                       IPLOT            0   PLOT CONTROL
                       QSCAL           0.   HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                        NMIN           10   MINUTES IN COMPUTATION INTERVAL
                       IDATE       1JAN94   STARTING DATE
                       ITIME         0000   STARTING TIME
                          NQ,         160   NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE       2JAN94   ENDING DATE
                      NDTIME         0230   ENDING TIME
                       ICENT           19   CENTURY MARK

                  COMPUTATION INTERVAL     0.17 HOURS
                       TOTAL TIME BASE    26.50 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
   6 KK        *    Pond1   *
               *            *
               **************

   7 KO         OUTPUT CONTROL VARIABLES
                       IPRNT            4   PRINT CONTROL
                       IPLOT            0   PLOT CONTROL
                       QSCAL           0.   HYDROGRAPH PLOT SCALE
                       IPNCH            1   PUNCH COMPUTED HYDROGRAPH
                                                  Page 6
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HA 105

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                                                            Havana5.out
                  IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                  ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                  ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                 TIMINT      0.167  TIME INTERVAL IN HOURS


     10 IN        TIME DATA FOR INPUT TIME SERIES
                  JXMIN          6  TIME INTERVAL IN MINUTES
                 JXDATE     1JAN94  STARTING DATE
                 JXTIME          0  STARTING TIME

                SUBBASIN RUNOFF DATA

      8 BA        SUBBASIN CHARACTERISTICS
                  TAREA,      0.04  SUBBASIN AREA

                  PRECIPITATION DATA

      9 PB            STORM      16.00  BASIN TOTAL PRECIPITATION

     11 PI          INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                     0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00

     36 LS        SCS LOSS RATE
                  STRTL       0.00  INITIAL ABSTRACTION
                 CRVNBR     100.00  CURVE NUMBER
                  RTIMP     100.00  PERCENT IMPERVIOUS AREA

     37 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG       0.15  LAG

                                                ***

                                          UNIT HYDROGRAPH
                                       7 END-OF-PERIOD ORDINATES
             60.       54.       16.        5.        2.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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                                               Page 7
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HA [illegible]
106

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                                                                            Havana5.out
                       *              *
   38 KK               *     Pipe1    *        CNAME       C
                       *              *
                       ****************

   39 KO            OUTPUT CONTROL VARIABLES
                          IPRNT           4  PRINT CONTROL
                          IPLOT           0  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE
                          IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                           IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                         TIMINT       0.167  TIME INTERVAL IN HOURS


                  HYDROGRAPH ROUTING DATA

   40 RS            STORAGE ROUTING
                          NSTPS           1 NUMBER OF SUBREACHES/                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                         RSVRIC      486.00  INITIAL CONDITION
                              X        0.00 WORKING R AND D COEFFICIENT

   41 SV              STORAGE        0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

   42 SE            ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

   43 SQ            DISCHARGE         0.        9.       26.       26.       26.       26.       26.       26.       26.
                                                                      ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                       ****************
                       *              *
   44 KK               *     Pond2    *
                       *              *
                       ****************

   45 KO            OUTPUT CONTROL VARIABLES
                          IPRNT           4  PRINT CONTROL
                          IPLOT           0  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE
                          IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                           IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                         TIMINT       0.167  TIME INTERVAL IN HOURS

   48 IN            TIME DATA FOR INPUT TIME SERIES
                         JXMIN            6  TIME INTERVAL IN MINUTES
                         JXDATE     1JAN94  STARTING DATE
                         JXTIME           0  STARTING TIME
                                                                         Page 8
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HA 107

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                                                 Havana5.out

                         SUBBASIN RUNOFF DATA

    46 BA                  SUBBASIN CHARACTERISTICS
                              TAREA,         0.03  SUBBASIN AREA

                           PRECIPITATION DATA

    47 PB                     STORM        16.00  BASIN TOTAL PRECIPITATION

    49 PI                    INCREMENTAL PRECIPITATION PATTERN
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                                0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                                0.00      0.00      0.00      0.00

    74 LS                  SCS LOSS RATE
                              STRTL          0.00  INITIAL ABSTRACTION
                             CRVNBR        100.00  CURVE NUMBER
                              RTIMP        100.00  PERCENT IMPERVIOUS AREA

    75 UD                  SCS DIMENSIONLESS UNITGRAPH
                               TLAG          0.15  LAG

                                                         ***

                                                      UNIT HYDROGRAPH
                                                7 END-OF-PERIOD ORDINATES
                         54.       49.       15.        5.        1.        0.        0.


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                      **************
                      *            *
    76 KK             *    Pipe2   *        CNAME       B
                      *            *
                      **************

    77 KO                  OUTPUT CONTROL VARIABLES
                              IPRNT          4  PRINT CONTROL
                              IPLOT          0  PLOT CONTROL
                              QSCAL         0.  HYDROGRAPH PLOT SCALE
                              IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                                                             Page 9
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HA 108

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                                                            Havana5.out
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       0.167  TIME INTERVAL IN HOURS

             HYDROGRAPH ROUTING DATA

 78 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES/                         ITYP        ELEV   TYPE OF INITIAL CONDITION
                    RSVRIC     486.00  INITIAL CONDITION
                         X       0.00  WORKING R AND D COEFFICIENT

 79 SV            STORAGE        0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

 80 SQ          DISCHARGE        11.       31.       58.       58.       58.       58.       58.       58.       58.

 81 SE          ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                            ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 82 KK        *   Pond3B   *     New proposed ash pond
              *            *
              **************

 83 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      0.167  TIME INTERVAL IN HOURS

 87 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN          6  TIME INTERVAL IN MINUTES
                    JXDATE    1JAN94  STARTING DATE
                    JXTIME          0  STARTING TIME

             SUBBASIN RUNOFF DATA

 84 BA          SUBBASIN CHARACTERISTICS
                     TAREA,       0.07  SUBBASIN AREA

 85 BF          BASE FLOW CHARACTERISTICS
                     STRTQ      11.90  INITIAL FLOW
                     QRCSN       0.00  BEGIN BASE FLOW RECESSION
                     RTIOR    1.00000  RECESSION CONSTANT
                                                     Page 10
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HA 109

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                                                    Havana5.out
                 PRECIPITATION DATA

 86 PB                STORM       16.00  BASIN TOTAL PRECIPITATION

 88 PI             INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                      0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00

113 LS             SCS LOSS RATE
                       STRTL        0.00  INITIAL ABSTRACTION
                      CRVNBR      100.00  CURVE NUMBER
                       RTIMP      100.00  PERCENT IMPERVIOUS AREA

114 UD             SCS DIMENSIONLESS UNITGRAPH
                        TLAG        0.15  LAG

                                                  ***

                                                 UNIT HYDROGRAPH
                                               7 END-OF-PERIOD ORDINATES
                122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
115 KK           *   Pipe3    *        CNAME      D
                 *            *
                 **************

116 KO             OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS

                                                 Page 11
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HA 110

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                                                    Havana5.out

               HYDROGRAPH ROUTING DATA

117 RS            STORAGE ROUTING
                       NSTPS             1 NUMBER OF SUBREACHES/                         ITYP         ELEV   TYPE OF INITIAL CONDITION
                      RSVRIC        492.00  INITIAL CONDITION
                           X          0.00 WORKING R AND D COEFFICIENT

118 SV              STORAGE         0.0       22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

119 SE            ELEVATION      492.00    492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

120 SQ            DISCHARGE          0.       11.       31.       58.       58.       58.       58.       58.       58.
                                                              ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
121 KK        *    Pond3   *
              *            *
              **************

122 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           4   PRINT CONTROL
                        IPLOT           0   PLOT CONTROL
                        QSCAL          0.   HYDROGRAPH PLOT SCALE
                        IPNCH           1   PUNCH COMPUTED HYDROGRAPH
                         IOUT          22   SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1   FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         160   LAST ORDINATE PUNCHED OR SAVED
                       TIMINT       0.167   TIME INTERVAL IN HOURS

126 IN            TIME DATA FOR INPUT TIME SERIES
                        JXMIN           6   TIME INTERVAL IN MINUTES
                       JXDATE      1JAN94   STARTING DATE
                       JXTIME           0   STARTING TIME

               SUBBASIN RUNOFF DATA

123 BA            SUBBASIN CHARACTERISTICS
                       TAREA,        0.01   SUBBASIN AREA

124 BF            BASE FLOW CHARACTERISTICS
                       STRTQ         0.00   INITIAL FLOW
                       QRCSN         0.00   BEGIN BASE FLOW RECESSION
                       RTIOR      1.00000   RECESSION CONSTANT

                  PRECIPITATION DATA

125 PB                 STORM        16.00   BASIN TOTAL PRECIPITATION
                                                          Page 12
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HA 111

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                                                        Havana5.out
127 PI          INCREMENTAL PRECIPITATION PATTERN
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                   0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.02     0.06
                   0.14     0.19     0.03     0.02     0.02     0.01     0.01     0.01     0.01     0.01
                   0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00

152 LS          SCS LOSS RATE
                      STRTL        0.00  INITIAL ABSTRACTION
                     CRVNBR      100.00  CURVE NUMBER
                      RTIMP      100.00  PERCENT IMPERVIOUS AREA

153 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG         0.15  LAG

                                                     ***

                                                   UNIT HYDROGRAPH
                                                7 END-OF-PERIOD ORDINATES
                  14.       13.       4.       1.       0.       0.       0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                   **************
                   *            *
154 KK             *     ABC    *       CNAME   Stplog
                   *            *
                   **************

155 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS

156 HC          HYDROGRAPH COMBINATION
                      ICOMP           4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                     ***
                                                   Page 13
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HA 12

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                                              Havana5.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 157 KK    *   Stplog   *      CNAME     ABC
           *            *
           **************

 158 KO         OUTPUT CONTROL VARIABLES
                      IPRNT          4  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT      0.167  TIME INTERVAL IN HOURS

              HYDROGRAPH ROUTING DATA

 159 RS         STORAGE ROUTING
                      NSTPS          1 NUMBER OF SUBREACHES/                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC     484.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

 160 SV          STORAGE       0.0       0.0       2.4       4.8       7.2       9.6      12.1      14.6      17.2      19.7
                              22.4      25.0      27.6

 162 SE         ELEVATION    484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                             489.00    489.50    490.00

 164 SQ         DISCHARGE        0.        7.       19.       35.       53.       72.       93.      116.      139.      162.
                               186.      210.      235.

 166 SE         ELEVATION    484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                             489.00    489.50    490.00

                                                   ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

              STORAGE      0.00      0.00      2.36      4.76      7.18      9.64     12.12     14.63     17.17     19.75
              OUTFLOW      0.00      6.95     19.31     34.87     52.74     72.40     93.44    115.56    138.53    162.12
            ELEVATION    484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

              STORAGE     22.35     24.98     27.64
              OUTFLOW    186.15    210.47    234.92
            ELEVATION    489.00    489.50    490.00

                                               RUNOFF SUMMARY
                                          FLOW IN CUBIC FEET PER SECOND
                                       TIME IN HOURS,  AREA IN SQUARE MILES
                                                  Page 14
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HA 113

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                                                       Havana5.out
                                         PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
+             OPERATION       STATION    FLOW     PEAK                                           AREA      STAGE    MAX STAGE
                                                            6-HOUR      24-HOUR     72-HOUR

              HYDROGRAPH AT
+                              Pond1     317.     12.00      44.         15.         14.         0.04

              ROUTED TO
+                              Pipe1      23.     13.17      21.         11.         10.         0.04
+                                                                                                        486.92      13.17

              HYDROGRAPH AT
+                              Pond2     284.     12.00      39.         14.         12.         0.03

              ROUTED TO
+                              Pipe2      33.     12.83      27.         16.         16.         0.03
+                                                                                                        486.54      12.83

              HYDROGRAPH AT
+                              Pond3B    650.     12.00      99.         43.         40.         0.07

              ROUTED TO
+                              Pipe3      40.     14.17      39.         24.         22.         0.07
+                                                                                                        493.17      14.17

              HYDROGRAPH AT
+                              Pond3      74.     12.00      10.          4.          3.         0.01

              4 COMBINED AT
+                              ABC       130.     12.00      94.         54.         50.         0.15

              ROUTED TO
+                              Stplog     91.     15.33      86.         51.         47.         0.15
+                                                                                                        486.93      15.33

*** NORMAL END OF HEC-1 ***
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HA 114

Havana6.out

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1***************************************                                          ****************************************
 *                                      *                                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1) *                                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY    1991             *                                          *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E             *                                          *         609 SECOND STREET            *
 *                                      *                                          *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE            TIME            *                                          *          (916) 551-1748              *
 *                                      *                                          *                                      *
 ***************************************                                          ****************************************



                    X      X  XXXXXXX   XXXXX          X
                    X      X  X        X     X        XX
                    X      X  X        X               X
                    XXXXXXX  XXXX      X       XXXXX   X
                    X      X  X        X               X
                    X      X  X        X     X         X
                    X      X  XXXXXXX   XXXXX         XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                        HEC-1 INPUT                                            PAGE  1

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID
  2           ID
  3           ID
              *DIAGRAM
  4           IT      10  1JAN94       0     160
  5           IO       4

  6           KK   Pond1
  7           KO       0       0       0       1      22
  8           BA  0.0358
  9           PB      16
 10           IN       6  1JAN94       0
              * precip1
 11           PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 12           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 13           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 14           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 15           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 16           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                   Page 1
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0.5 PMP Using Q1 @ Polishing Pond

& Max Discharge @ Ponds 1, 2 & 3B

HA 115

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                                      Havana6.out
 17          PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18          PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156 ·0.1178
 19          PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20          PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21          PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22          PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23          PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24          PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25          PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26          PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27          PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28          PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29          PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30          PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31          PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32          PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33          PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34          PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35          PC        1       1       1       1       1
 36          LS        0     100     100
 37          UD     0.15

 38          KK    Pipel   CNAME       C
 39          KO        0       0       0       0      22
 40          RS        1    ELEV     486       0
             * pondlvol -
 41          SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
             * pondlelev
 42          SE      486   486.5     487   487.5     488   488.5     489   489.5     490
             * pondlout
 43          SQ        0    9.25   26.15   48.05   73.97  103.38   135.9  171.25  209.23

                                    HEC-1 INPUT                                          PAGE  2

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44          KK    Pond2
 45          KO        0       0       0       1      22
 46          BA    0.032
 47          PB       16
 48          IN        6  1JAN94       0
             * precipl
 49          PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50          PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51          PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52          PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53          PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54          PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55          PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56          PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57          PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58          PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59          PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60          PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61          PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62          PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                         Page 2
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14A 88
116

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                                        Havana6.out
   63        PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
   64        PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
   65        PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
   66        PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
   67        PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
   68        PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
   69        PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
   70        PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
   71        PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
   72        PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
   73        PC        1       1       1       1       1
   74        LS        0     100     100
   75        UD     0.15

   76        KK    Pipe2   CNAME       B
   77        KO        0       0       0       0      22
   78        RS        1    ELEV     486       0
             * pond2vol
   79        SV        0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
             * pond2out
   80        SQ     11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08  299.59
             * pond2elev
   81        SE      486   486.5     487   487.5     488   488.5     489   489.5     490

   82        KK   Pond3B New proposed ash pond
   83        KO        0       0       0       1      22
   84        BA    0.072
   85        BF     11.9       0       0
   86        PB       16
   87        IN        6  1JAN94       0
             * precipl
   88        PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
   89        PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
   90        PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                   HEC-1 INPUT                                                  PAGE  3

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   91        PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
   92        PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
   93        PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
   94        PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
   95        PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
   96        PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
   97        PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
   98        PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
   99        PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
  100        PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
  101        PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
  102        PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
  103        PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
  104        PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
  105        PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
  106        PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
  107        PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
  108        PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
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HA 117

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 109           PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 110           PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 111           PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 112           PC       1       1       1       1       1
 113           LS       0     100     100
 114           UD    0.15

 115           KK   Pipe3   CNAME       D
 116           KO       0       0       0       0      22
 117           RS       1    ELEV     492       0
               * pond3Bvol
 118           SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
               * pond3Belev
 119           SE     492   492.5     493   493.5     494   494.5     495   495.5     496
               * pond3Bout
 120           SQ       0    11.1   31.38   57.66   88.77  124.06  163.08   205.5  251.08

 121           KK   Pond3
 122           KO       0       0       0       1      22
 123           BA  0.0083
 124           BF       0       0       0
 125           PB      16
 126           IN       6  1JAN94       0
               * precip1
 127           PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 128           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 129           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 130           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 131           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 132           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 133           PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 134           PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 135           PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 136           PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 137           PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 138           PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 139           PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                         HEC-1 INPUT                                          PAGE  4

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 140           PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 141           PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 142           PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 143           PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 144           PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 145           PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 146           PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 147           PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 148           PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 149           PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 150           PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 151           PC       1       1       1       1       1
 152           LS       0     100     100
 153           UD    0.15
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                                                  Havana6.out
 154         KK      ABC    CNAME  Stplog
 155         KO        0        0       0       0       22
 156         HC        4

 157         KK   Stplog    CNAME     ABC
 158         KO        0        0       0       0       22
 159         RS        1     ELEV     484       0
             * pond3vol
 160         SV        0        0    2.36    4.76     7.18     9.64    12.12    14.63    17.17    19.75
 161         SV    22.35    24.98   27.64
             * pondelv
 162         SE      484    484.5     485   485.5      486    486.5      487    487.5      488    488.5
 163         SE      489    489.5     490
             * pond3out
 164         SQ        0     6.95   19.31   34.87    52.74     72.4    93.44   115.56   138.53   162.12
 165         SQ   186.15   210.47  234.92
             * pondelv
 166         SE      484    484.5     485   485.5      486    486.5      487    487.5      488    488.5
 167         SE      489    489.5     490
 168         ZZ
□
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V)  ROUTING          (--->)  DIVERSION OR PUMP FLOW

  NO.       (.)  CONNECTOR        (<---)  RETURN OF DIVERTED OR PUMPED FLOW

   6         Pond1
                 V
                 V
  38         Pipe1
                 .
                 .
  44             .         Pond2
                 .             V
                 .             V
  76             .         Pipe2
                 .             .
                 .             .
  82             .             .         Pond3B
                 .             .              V
                 .             .              V
 115             .             .          Pipe3
                 .             .              .
                 .             .              .
 121             .             .              .          Pond3
                 .             .              .              .
                 .             .              .              .
 154           ABC.........................................
                 V
                 V
 157        Stplog

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1**************************************                                  ****************************************
 *                                     *                                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
                                                  Page 5
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HA 119

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                                              Havana6.out
*            MAY   1991             *                                   *   HYDROLOGIC ENGINEERING CENTER    *
*          VERSION 4.0.1E           *                                   *         609 SECOND STREET          *
*                                   *                                   *      DAVIS, CALIFORNIA 95616       *
*   RUN DATE             TIME       *                                   *          (916) 551-1748            *
*                                   *                                   *                                    *
*************************************                                   **************************************



   5 IO         OUTPUT CONTROL VARIABLES
                      IPRNT           4   PRINT CONTROL
                      IPLOT           0   PLOT CONTROL
                      QSCAL          0.   HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          10   MINUTES IN COMPUTATION INTERVAL
                      IDATE      1JAN94   STARTING DATE
                      ITIME        0000   STARTING TIME
                         NQ,        160   NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2JAN94   ENDING DATE
                     NDTIME        0230   ENDING TIME
                      ICENT          19   CENTURY MARK

                  COMPUTATION INTERVAL     0.17 HOURS
                       TOTAL TIME BASE    26.50 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   6 KK       *    Pond1   *
              *            *
              **************

   7 KO         OUTPUT CONTROL VARIABLES
                      IPRNT           4   PRINT CONTROL
                      IPLOT           0   PLOT CONTROL
                      QSCAL          0.   HYDROGRAPH PLOT SCALE
                      IPNCH           1   PUNCH COMPUTED HYDROGRAPH
                                                      Page 6
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HA08
120

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                                                                   Havana6.out
                        IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        0.167  TIME INTERVAL IN HOURS

  10 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN            6  TIME INTERVAL IN MINUTES
                      JXDATE       1JAN94  STARTING DATE
                      JXTIME            0  STARTING TIME

               SUBBASIN RUNOFF DATA

   8 BA          SUBBASIN CHARACTERISTICS
                      TAREA,         0.04  SUBBASIN AREA

                 PRECIPITATION DATA

   9 PB                STORM        16.00  BASIN TOTAL PRECIPITATION

  11 PI            INCREMENTAL PRECIPITATION PATTERN
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                      0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.02     0.06
                      0.14     0.19     0.03     0.02     0.02     0.01     0.01     0.01     0.01     0.01
                      0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00

  36 LS          SCS LOSS RATE
                       STRTL         0.00  INITIAL ABSTRACTION
                      CRVNBR       100.00  CURVE NUMBER
                       RTIMP       100.00  PERCENT IMPERVIOUS AREA

  37 UD          SCS DIMENSIONLESS UNITGRAPH
                        TLAG         0.15  LAG

                                                                 ***

                                                           UNIT HYDROGRAPH
                                                      7 END-OF-PERIOD ORDINATES
              60.      54.      16.       5.       2.       1.       0.


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
                                                             Page 7
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HA 121

```
                                              Havana6.out
38 KK      *           *
           *   Pipel   *      CNAME     C
           *           *
           *************

39 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      0.167  TIME INTERVAL IN HOURS


             HYDROGRAPH ROUTING DATA

40 RS          STORAGE ROUTING
                     NSTPS          1 NUMBER OF SUBREACHES/                          ITYP        ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC     486.00  INITIAL CONDITION
                         X       0.00 WORKING R AND D COEFFICIENT

41 SV            STORAGE        0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

42 SE          ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

43 SQ          DISCHARGE         0.        9.       26.       48.       74.      103.      136.      171.      209.
                                                           ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          *************
          *           *
44 KK     *   Pond2   *
          *           *
          *************

45 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT      0.167  TIME INTERVAL IN HOURS


48 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN          6  TIME INTERVAL IN MINUTES
                    JXDATE     1JAN94  STARTING DATE
                    JXTIME          0  STARTING TIME
                                                     Page 8
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HA [illegible]
122

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                                                        Havana6.out
                   SUBBASIN RUNOFF DATA

   46 BA             SUBBASIN CHARACTERISTICS
                        TAREA,          0.03   SUBBASIN AREA

                       PRECIPITATION DATA

   47 PB                  STORM        16.00   BASIN TOTAL PRECIPITATION

   49 PI              INCREMENTAL PRECIPITATION PATTERN
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                        0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                        0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                        0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                        0.00      0.00      0.00      0.00

   74 LS              SCS LOSS RATE
                          STRTL         0.00   INITIAL ABSTRACTION
                         CRVNBR       100.00   CURVE NUMBER
                          RTIMP       100.00   PERCENT IMPERVIOUS AREA

   75 UD              SCS DIMENSIONLESS UNITGRAPH
                           TLAG         0.15   LAG

                                                        ***

                                                      UNIT HYDROGRAPH
                                                  7 END-OF-PERIOD ORDINATES
                  54.       49.       15.        5.        1.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   76 KK      *   Pipe2    *      CNAME        B
              *            *
              **************

   77 KO               OUTPUT CONTROL VARIABLES
                          IPRNT            4   PRINT CONTROL
                          IPLOT            0   PLOT CONTROL
                          QSCAL           0.   HYDROGRAPH PLOT SCALE
                          IPNCH            0   PUNCH COMPUTED HYDROGRAPH
                                                        Page 9
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HA 123

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                                                         Havana6.out
                   IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                  ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                  ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                 TIMINT       0.167  TIME INTERVAL IN HOURS

            HYDROGRAPH ROUTING DATA

 78 RS          STORAGE ROUTING
                  NSTPS           1 NUMBER OF SUBREACHES/                     ITYP       ELEV  TYPE OF INITIAL CONDITION
                 RSVRIC      486.00  INITIAL CONDITION
                      X        0.00 WORKING R AND D COEFFICIENT

 79 SV            STORAGE       0.0       9.7      19.5      29.4      39.3      49.3      59.4      69.6      79.7

 80 SQ          DISCHARGE       11.       31.       58.       89.      124.      163.      205.      251.      300.

 81 SE          ELEVATION    486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                            ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 82 KK         *    Pond3B  *       New proposed ash pond
               *            *
               **************

 83 KO          OUTPUT CONTROL VARIABLES
                  IPRNT           4  PRINT CONTROL
                  IPLOT           0  PLOT CONTROL
                  QSCAL          0.  HYDROGRAPH PLOT SCALE
                  IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                   IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                  ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                  ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                 TIMINT       0.167  TIME INTERVAL IN HOURS

 87 IN          TIME DATA FOR INPUT TIME SERIES
                  JXMIN           6  TIME INTERVAL IN MINUTES
                 JXDATE      1JAN94  STARTING DATE
                 JXTIME           0  STARTING TIME

            SUBBASIN RUNOFF DATA

 84 BA          SUBBASIN CHARACTERISTICS
                  TAREA,       0.07  SUBBASIN AREA

 85 BF          BASE FLOW CHARACTERISTICS
                  STRTQ       11.90  INITIAL FLOW
                 QRCSN         0.00  BEGIN BASE FLOW RECESSION
                  RTIOR     1.00000  RECESSION CONSTANT
                                                        Page 10
```

HA 600
124

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                                                       Havana6.out
                 PRECIPITATION DATA

  86 PB              STORM        16.00  BASIN TOTAL PRECIPITATION

  88 PI           INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                     0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00

 113 LS          SCS LOSS RATE
                     STRTL         0.00  INITIAL ABSTRACTION
                    CRVNBR       100.00  CURVE NUMBER
                     RTIMP       100.00  PERCENT IMPERVIOUS AREA

 114 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG         0.15  LAG

                                                    ***

                                                  UNIT HYDROGRAPH
                                              7 END-OF-PERIOD ORDINATES
              122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                  **************
                  *            *
 115 KK           *    Pipe3   *        CNAME       D
                  *            *
                  **************

 116 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            4  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE
                     IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                      IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        0.167  TIME INTERVAL IN HOURS
                                                        Page 11
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HA 125

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                                              Havana6.out
                    HYDROGRAPH ROUTING DATA

 117 RS              STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES/                           ITYP         ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC     492.00   INITIAL CONDITION
                           X        0.00  WORKING R AND D COEFFICIENT

 118 SV                STORAGE       0.0      22.2      44.5      67.0      89.6     112.3     135.1     158.0     181.1

 119 SE              ELEVATION    492.00    492.50    493.00    493.50    494.00    494.50    495.00    495.50    496.00

 120 SQ              DISCHARGE        0.       11.       31.       58.       89.      124.      163.      205.      251.
                                                                  ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                   **************
                   *            *
 121 KK            *    Pond3   *
                   *            *
                   **************

 122 KO             OUTPUT CONTROL VARIABLES
                          IPRNT          4   PRINT CONTROL
                          IPLOT          0   PLOT CONTROL
                          QSCAL         0.   HYDROGRAPH PLOT SCALE
                          IPNCH          1   PUNCH COMPUTED HYDROGRAPH
                           IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                          ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                          ISAV2        160   LAST ORDINATE PUNCHED OR SAVED
                         TIMINT      0.167   TIME INTERVAL IN HOURS


 126 IN             TIME DATA FOR INPUT TIME SERIES
                          JXMIN          6   TIME INTERVAL IN MINUTES
                         JXDATE     1JAN94   STARTING DATE
                         JXTIME          0   STARTING TIME

                  SUBBASIN RUNOFF DATA

 123 BA             SUBBASIN CHARACTERISTICS
                          TAREA,       0.01   SUBBASIN AREA

 124 BF             BASE FLOW CHARACTERISTICS
                          STRTQ        0.00   INITIAL FLOW
                          QRCSN        0.00   BEGIN BASE FLOW RECESSION
                          RTIOR     1.00000   RECESSION CONSTANT

                    PRECIPITATION DATA

 125 PB                   STORM       16.00   BASIN TOTAL PRECIPITATION
                                                       Page 12
```

HA08
126

```
                                                    Havana6.out
127 PI          INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                   0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00

152 LS          SCS LOSS RATE
                      STRTL          0.00  INITIAL ABSTRACTION
                     CRVNBR        100.00  CURVE NUMBER
                      RTIMP        100.00  PERCENT IMPERVIOUS AREA

153 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG          0.15  LAG

                                                        ***

                                                    UNIT HYDROGRAPH
                                                7 END-OF-PERIOD ORDINATES
                 14.        13.         4.         1.         0.         0.         0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
154 KK       *    ABC     *       CNAME   Stplog
             *            *
             **************

155 KO          OUTPUT CONTROL VARIABLES
                      IPRNT             4  PRINT CONTROL
                      IPLOT             0  PLOT CONTROL
                      QSCAL            0.  HYDROGRAPH PLOT SCALE
                      IPNCH             0  PUNCH COMPUTED HYDROGRAPH
                       IOUT            22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1             1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2           160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         0.167  TIME INTERVAL IN HOURS

156 HC          HYDROGRAPH COMBINATION
                      ICOMP             4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                        ***
                                                      Page 13
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HA 127

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                                        Havana6.out

   *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
 157 KK          *   Stplog   *       CNAME     ABC
                 *            *
                 **************

 158 KO           OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

 159 RS           STORAGE ROUTING
                        NSTPS          1 NUMBER OF SUBREACHES/                         ITYP         ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC     484.00  INITIAL CONDITION
                            X       0.00 WORKING R AND D COEFFICIENT

 160 SV             STORAGE       0.0        0.0        2.4        4.8        7.2        9.6       12.1       14.6       17.2       19.7
                                 22.4       25.0       27.6

 162 SE           ELEVATION    484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50
                               489.00     489.50     490.00

 164 SQ           DISCHARGE        0.         7.        19.        35.        53.        72.        93.       116.       139.       162.
                                 186.       210.       235.

 166 SE           ELEVATION    484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50
                               489.00     489.50     490.00

                                                            ***

                                             COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                    STORAGE      0.00       0.00       2.36       4.76       7.18       9.64      12.12      14.63      17.17      19.75
                    OUTFLOW      0.00       6.95      19.31      34.87      52.74      72.40      93.44     115.56     138.53     162.12
                  ELEVATION    484.00     484.50     485.00     485.50     486.00     486.50     487.00     487.50     488.00     488.50

                    STORAGE     22.35      24.98      27.64
                    OUTFLOW    186.15     210.47     234.92
                  ELEVATION    489.00     489.50     490.00
 □
                                                         RUNOFF SUMMARY
                                                    FLOW IN CUBIC FEET PER SECOND
                                                 TIME IN HOURS,   AREA IN SQUARE MILES
                                                             Page 14
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HA 128

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                                                Havana6.out

                                           PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD       BASIN     MAXIMUM      TIME OF
             OPERATION          STATION    FLOW     PEAK                                             AREA      STAGE      MAX STAGE
   +                                                             6-HOUR      24-HOUR      72-HOUR

             HYDROGRAPH AT
   +                             Pond1     317.    12.00          44.          15.          14.        0.04

             ROUTED TO
   +                             Pipe1      23.    13.17          21.          11.          10.        0.04
   +                                                                                                             486.92        13.17

             HYDROGRAPH AT
   +                             Pond2     284.    12.00          39.          14.          12.        0.03

             ROUTED TO
   +                             Pipe2      35.    12.67          28.          16.          16.        0.03
   +                                                                                                             486.57        12.67

             HYDROGRAPH AT
   +                            Pond3B     650.    12.00          99.          43.          40.        0.07

             ROUTED TO
   +                             Pipe3      40.    14.17          39.          24.          22.        0.07
   +                                                                                                             493.17        14.17

             HYDROGRAPH AT
   +                             Pond3      74.    12.00          10.           4.           3.        0.01

             4 COMBINED AT
   +                               ABC     131.    12.00          95.          54.          50.        0.15

             ROUTED TO
   +                            Stplog      92.    15.33          86.          51.          47.        0.15
   +                                                                                                             486.96        15.33


 *** NORMAL END OF HEC-1 ***
```

HA 129

Effluent Pipe Analysis
Havana Power Station
East Ash Pond #3B

January 2, 2002
JHK

The discharge from pond #3 is carried to the Illinois River by a 36-inch round reinforced concrete pipe. The pipe is fitted with Anderson Seals – a three-part rubber joint seal that allows the pipe to operate under pressure without leakage at the joints. Under normal conditions, the pipe does not flow full. At high flow conditions, water will back up in the stop log structure, pressurizing the effluent pipe.

The following conditions were analyzed using the FlowMaster program from Haestad.

1. 100-year, 24-hour storm, will all ponds discharging through the effluent pipe.
2. The ½-PMP storm, with all ponds discharging through the effluent pipe.

The results of the pressure pipe analysis for each of the two conditions is summarized below:

Condition	Required Flow (cfs)	Pressure at Pipe Inlet
1	42	neg. head- pipe not full
2	93	9.99 psi (~23' head)

Condition 2 would cause some water to overflow from the manholes located along the length of the 36" effluent pipe, due to the high pressure. This is acceptable because of the small likelihood of the ½-PMP storm and general flooding in the area from sources other than the pond.

However, as an additional precaution, the standpipe in pond 2 will be modified to restrict water flow into pond 3 once pond 3B is put into service. Pipe diameter will be reduced from 3' ϕ to 1.5' ϕ. Two additional HEC-1 runs were made to investigate effects on possible pressure and flow through first manhole:

1. Discharge from pond 2 reduced to reflect restricted flow. The HEC-1 analysis showed that flow at the outlet structure was reduced to 82 cfs, which translates into approximately a 13' head at the 1st manhole.

2. Same as above plus plant flow of 11.9 cfs stopped. This condition may require change in plant operating procedures if water is seen discharging through manhole. The HEC-1 analysis showed that flow at the outlet structure was reduced to 72 cfs, which translates into approximately a 6.9' head at the 1st manhole and 5.5' head at the 2nd manhole. The existing 1st manhole configuration shows that it is capable of containing up to 10.5' of head, which is greater than the 6.9' head calculated and 6.8' head at the 2nd manhole which is greater than the 5.5' calculated, therefore no overflow occurs once plant flow is stopped.

HA [illegible]

HA 130

DRAFT

Eff. press.@93 cfs (0.5 PMP-16" storm)
Worksheet for Pressure Pipe

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Pressure at 92 cfs effluent flow 93
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pressure at 1

Input Data		
Pressure at 2	0.00 psi	
Elevation at 1	464.00 ft	
Elevation at 2	448.30 ft	
Length	3,684.00 ft	
C Coefficient	140.0	
Diameter	36.00 in	
Discharge	41,742.0 gal/min	= 93 cfs

Results			
Pressure at 1	9.99	psi	~ 23.1' head
Headloss	38.75	ft	
Energy Grade at 1	489.74	ft	
Energy Grade at 2	450.99	ft	
Hydraulic Grade at 1	487.05	ft	
Hydraulic Grade at 2	448.30	ft	
Flow Area	7.07	ft²	
Wetted Perimeter	9.42	ft	
Velocity	13.16	ft/s	
Velocity Head	2.69	ft	
Friction Slope	0.010517	ft/ft	

HA 131

Eff. pipe press. @42cfs(100 yr storm 7")
Worksheet for Pressure Pipe

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Pressure at 42 cfs effluent flow
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pressure at 1

Input Data	
Pressure at 2	0.00 psi
Elevation at 1	464.00 ft
Elevation at 2	448.30 ft
Length	3,684.00 ft
C Coefficient	140.0
Diameter	36.00 in
Discharge	18,850.0 gal/min = 42cfs

Results		
Pressure at 1	-2.95	psi
Headloss	8.89	ft
Energy Grade at 1	457.74	ft
Energy Grade at 2	448.85	ft
Hydraulic Grade at 1	457.19	ft
Hydraulic Grade at 2	448.30	ft
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Friction Slope	0.002413	ft/ft

PIPE DOES NOT FLOW FULL

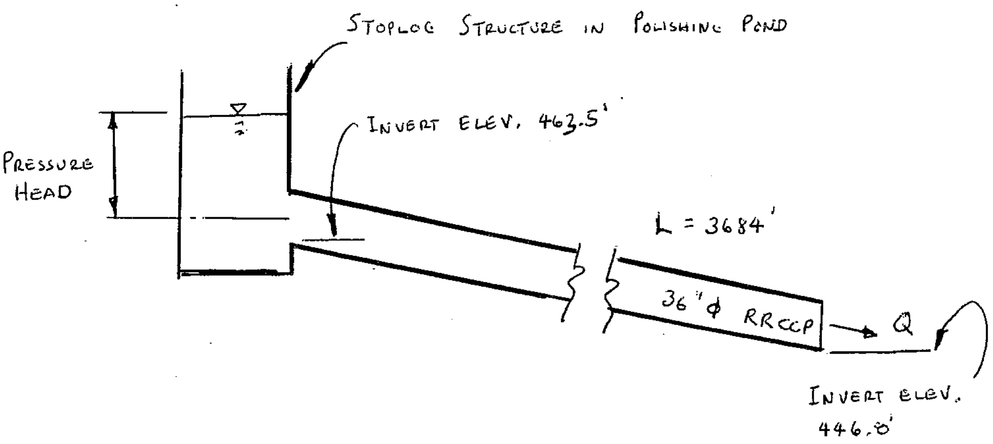
11/07/01
03:24:48 PM

Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 (203) 755-1666

FlowMaster v5.15
Page 1 of 1

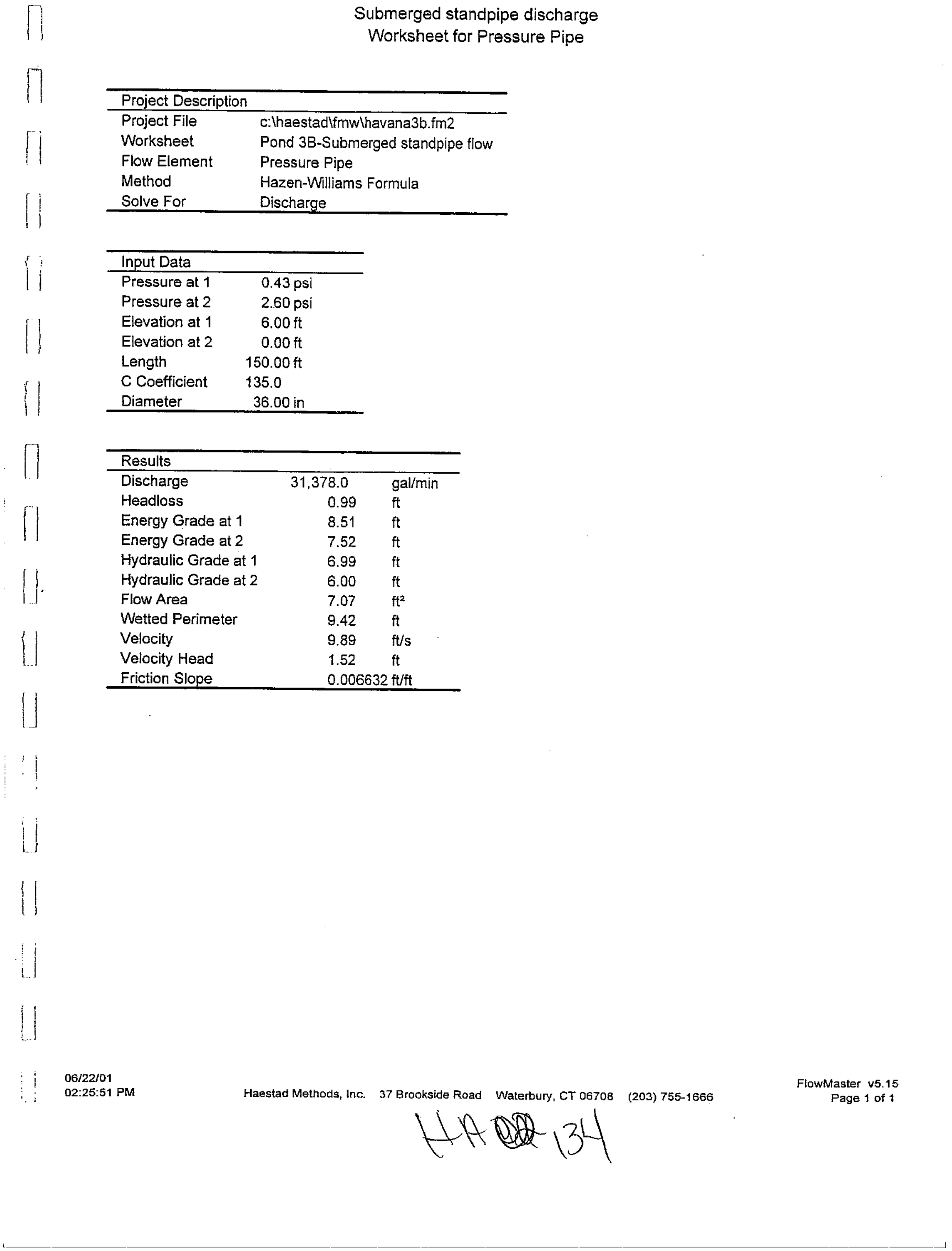
HA 132

PROJECT: Havana East Ash Pond 3B
PROJECT NO.
SUBJECT: Effluent Pipe Analysis
DESIGNER: JHK
PAGE:
DATE:



Schematic of Effluent Pipe

HA 133



Submerged standpipe discharge
Worksheet for Pressure Pipe

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Pond 3B-Submerged standpipe flow
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Discharge

Input Data	
Pressure at 1	0.43 psi
Pressure at 2	2.60 psi
Elevation at 1	6.00 ft
Elevation at 2	0.00 ft
Length	150.00 ft
C Coefficient	135.0
Diameter	36.00 in

Results		
Discharge	31,378.0	gal/min
Headloss	0.99	ft
Energy Grade at 1	8.51	ft
Energy Grade at 2	7.52	ft
Hydraulic Grade at 1	6.99	ft
Hydraulic Grade at 2	6.00	ft
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Velocity	9.89	ft/s
Velocity Head	1.52	ft
Friction Slope	0.006632	ft/ft

06/22/01
02:25:51 PM

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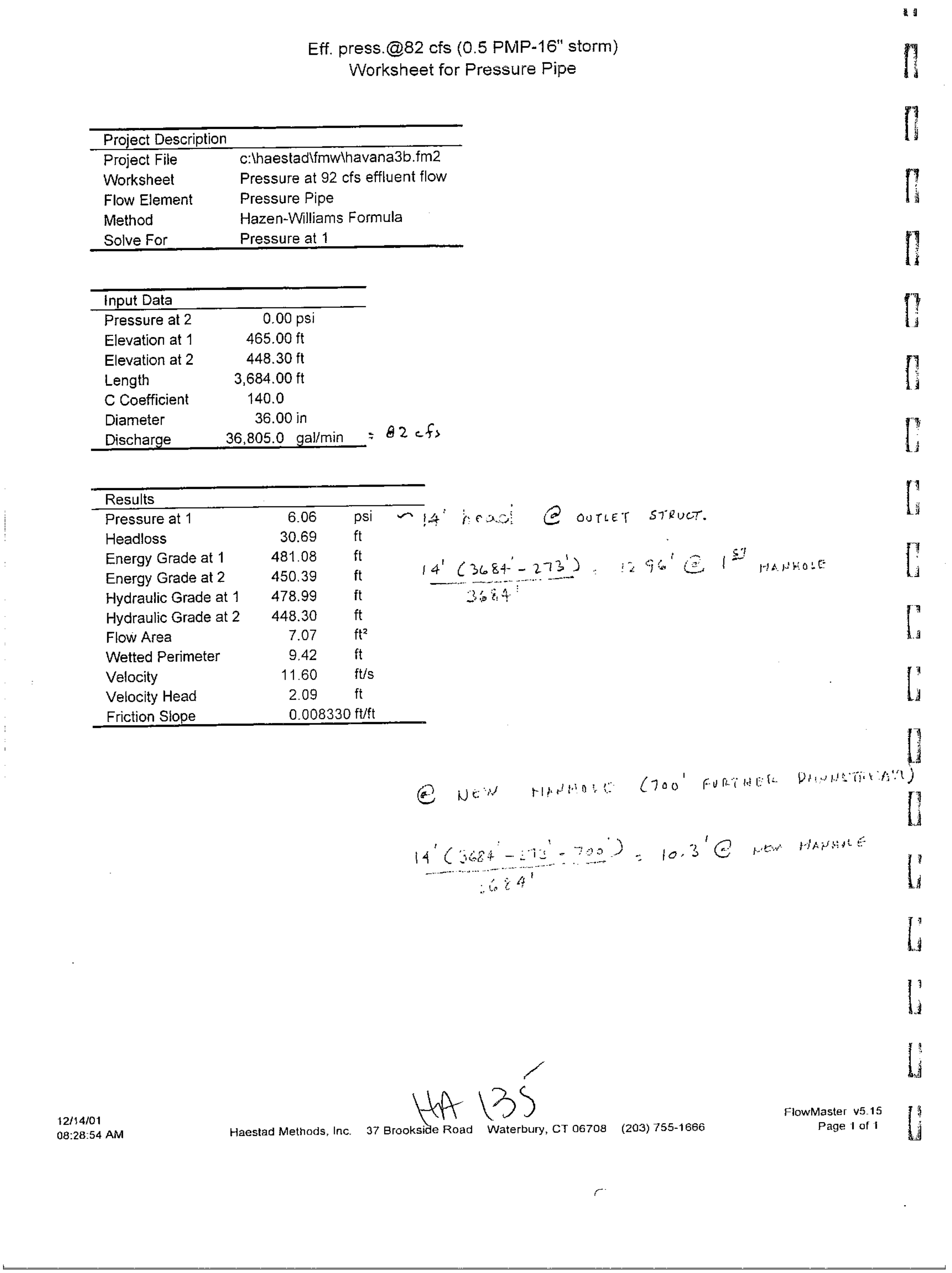
FlowMaster v5.15
Page 1 of 1

HA 134



Eff. press.@82 cfs (0.5 PMP-16" storm)
Worksheet for Pressure Pipe

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Pressure at 92 cfs effluent flow
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pressure at 1

Input Data	
Pressure at 2	0.00 psi
Elevation at 1	465.00 ft
Elevation at 2	448.30 ft
Length	3,684.00 ft
C Coefficient	140.0
Diameter	36.00 in
Discharge	36,805.0 gal/min = 82 cfs

Results		
Pressure at 1	6.06	psi ~ 14' head @ OUTLET STRUCT.
Headloss	30.69	ft
Energy Grade at 1	481.08	ft
Energy Grade at 2	450.39	ft
Hydraulic Grade at 1	478.99	ft
Hydraulic Grade at 2	448.30	ft
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Velocity	11.60	ft/s
Velocity Head	2.09	ft
Friction Slope	0.008330 ft/ft	

$\frac{14'(3684'-273')}{3684'} = 12.96'$ @ 1ST MANHOLE

@ NEW MANHOLE (700' FURTHER DOWNSTREAM)

$\frac{14'(3684'-273'-700')}{3684'} = 10.3'$ @ NEW MANHOLE

HA 135

12/14/01
08:28:54 AM

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FlowMaster v5.15
Page 1 of 1

Eff. press.@72 cfs (0.5 PMP-16" storm)
Worksheet for Pressure Pipe

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Pressure at 92 cfs effluent flow
Flow Element	Pressure Pipe
Method	Hazen-Williams Formula
Solve For	Pressure at 1

Input Data	
Pressure at 2	0.00 psi
Elevation at 1	465.00 ft
Elevation at 2	448.30 ft
Length	3,684.00 ft
C Coefficient	140.0
Diameter	36.00 in
Discharge	32,316.0 gal/min = 72 cfs

Results		
Pressure at 1	3.22	psi
Headloss	24.12	ft
Energy Grade at 1	474.03	ft
Energy Grade at 2	449.91	ft
Hydraulic Grade at 1	472.42	ft
Hydraulic Grade at 2	448.30	ft
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Velocity	10.19	ft/s
Velocity Head	1.61	ft
Friction Slope	0.006547	ft/ft

≈ 7.43' head @ OUTLET STRUCT.

$$\frac{7.43'(3684'-272')}{3684'} = 6.88' \text{ @ } 1^{\underline{ST}} \text{ MANHOLE}$$

℄ OF 3' PIPE = 463.5'

GRADE ELEV. 468'

$$\begin{array}{rl} 468' & \\ -\ 463.5 & \\ \hline 4.5' & \\ 3.0' & \text{STICK-UP ABOVE GRADE} \\ 3.0' & \text{EXTENSION PIECE} \\ \hline 10.5' & \text{ABOVE ℄ OF PIPE} > 7.43' \end{array}$$

@ NEW MANHOLE (700' FURTHER DOWNSTREAM)

$$\frac{7.43'(3684'-273'-700')}{3684'} = 5.47' \text{ @ NEW MANHOLE}$$

GRADE ELEV. 466'

$$\begin{array}{rl} 466' & \\ -\ 463.2' & \text{℄ OF PIPE} \\ +\ 3.0' & \text{STICK-UP} \\ \hline 6.8' & > 5.47' \text{ OK} \end{array}$$

12/14/01
08:29:31 AM

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FlowMaster v5.15
Page 1 of 1

HA-08
136

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                                                        Havana.out
1***************************************                                                    ***************************************
 *                                     *                                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *                                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *             MAY   1991              *                                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *         VERSION 4.0.1E              *                                                    *         609 SECOND STREET           *
 *                                     *                                                    *     DAVIS, CALIFORNIA 95616         *
 * RUN DATE            TIME            *                                                    *         (916) 551-1748              *
 *                                     *                                                    *                                     *
***************************************                                                    ***************************************


                                    X     X  XXXXXXX   XXXXX           X
                                    X     X  X        X     X         XX
                                    X     X  X        X                X
                                    XXXXXXX -XXXX     X        XXXXX   X
                                    X     X  X        X                X
                                    X     X  X        X     X          X
                                    X     X  XXXXXXX   XXXXX          XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                         HEC-1 INPUT                                                  PAGE  1

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID
  2           ID
  3           ID
              *DIAGRAM
  4           IT      10  1JAN94       0     160
  5           IO       4

  6           KK   Pond1
  7           KO       0       0       0       1      22
  8           BA  0.0358
  9           PB      16
 10           IN       6  1JAN94       0
              * precip1
 11           PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 12           PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 13           PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 14           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 15           PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 16           PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                    Page 1
```

Run #1

HA 131

```
                                              Havana.out
 17        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18        PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 19        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34        PC  0.9887 "0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35        PC       1       1       1       1       1
 36        LS       0     100     100
 37        UD    0.15

 38        KK   Pipe1   CNAME       C
 39        KO      0'       0       0       0      22
 40        RS       1    ELEV     486       0
           * pond1vol
 41        SV       0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
           * pond1elev
 42        SE     486   486.5     487   487.5     488   488.5     489   489.5     490
           * pond1out
 43        SQ       0     9.2    26.2    26.2    26.2    26.2    26.2    26.2    26.2

                                        HEC-1 INPUT                                        PAGE  2

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44        KK   Pond2
 45        KO       0       0       0       1      22
 46        BA   0.032
 47        PB      16
 48        IN       6  1JAN94       0
           * precip1
 49        PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50        PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51        PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52        PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53        PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54        PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56        PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                              Page 2
```

HA
138

```
                                                   Havana.out
 63            PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64            PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65            PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66            PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67            PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68            PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69            PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70            PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71            PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72            PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73            PC       1       1       1       1       1
 74            LS       0     100     100
 75            UD    0.15

 76            KK   Pipe2   CNAME       B
 77            KO       0       0       0       0      22
 78            RS       1    ELEV     486       0
               * pond2vol
 79            SV       0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
               * pond2out
 80            SQ    5.55   15.69    28.9    28.9    28.9    28.9    28.9    28.9    28.9
               * pond2elev
 81            SE     486   486.5     487   487.5     488   488.5     489   489.5     490

 82            KK  Pond3B New proposed ash pond
 83            KO       0       0       0       1      22
 84            BA   0.072
 85            BF    11.9       0       0
 86            PB      16
 87            IN       6  1JAN94       0
               * precipl
 88            PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89            PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90            PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                       HEC-1 INPUT                                              PAGE  3

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91            PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92            PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93            PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94            PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95            PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96            PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97            PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98            PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99            PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100            PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101            PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102            PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103            PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104            PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105            PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106            PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107            PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108            PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                                   Page 3
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HA 139

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                                            Havana.out
 109        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 110        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 111        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 112        PC       1       1       1       1       1
 113        LS       0     100     100
 114        UD    0.15

 115        KK   Pipe3   CNAME       D
 116        KO       0       0       0       0      22
 117        RS       1    ELEV     492       0
            * pond3Bvol
 118        SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
            * pond3Belev
 119        SE     492   492.5     493   493.5     494   494.5     495   495.5     496
            * pond3Bout
 120        SQ       0    11.1   31.38   57.66   57.66   57.66   57.66   57.66   57.66

 121        KK   Pond3
 122        KO       0       0       0       1      22
 123        BA  0.0083
 124        BF       0       0       0
 125        PB      16
 126        IN       6  1JAN94       0
            * precip1
 127        PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 128        PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 129        PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 130        PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 131        PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 132        PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 133        PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 134        PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 135        PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 136        PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 137        PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 138        PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 139        PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                      HEC-1 INPUT                                       PAGE  4

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 140        PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 141        PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 142        PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 143        PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 144        PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 145        PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 146        PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 147        PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 148        PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 149        PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 150        PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 151        PC       1       1       1       1       1
 152        LS       0     100     100
 153        UD    0.15

                                            Page 4
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HA
140

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                                                              Havana.out
 154          KK      ABC   CNAME  Stplog
 155          KO        0       0       0       0      22
 156          HC        4

 157          KK  Stplog    CNAME     ABC
 158          KO        0       0       0       0      22
 159          RS        1    ELEV     484       0
              * pond3vol
 160          SV        0       0    2.36    4.76    7.18    9.48   12.12   14.63   17.17   19.75
 161          SV    22.35   24.98   27.64
              * pondelv
 162          SE      484   484.5     485   485.5     486   486.5     487   487.5     488   488.5
 163          SE      489   489.5     490
              * pond3out
 164          SQ        0    6.95   19.31   34.87   52.74    72.4   93.44  115.56  138.53  162.12
 165          SQ   210.47  234.92   293.6
              * pondelv
 166          SE      484   484.5     485   485.5     486   486.5     487   487.5     488   488.5
 167          SE      489   489.5     490
 168          ZZ

                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   6        Pond1
                V
                V
  38        Pipe1
                .
                .
  44            .        Pond2
                .            V
                .            V
  76            .        Pipe2
                .            .
                .            .
  82            .            .         Pond3B
                .            .             V
                .            .             V
 115            .            .          Pipe3
                .            .             .
                .            .             .
 121            .            .             .           Pond3
                .            .             .               .
                .            .             .               .
 154          ABC.................................
                V
                V
 157       Stplog

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                              ****************************************
 *                                        *                              *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *                              *    U.S. ARMY CORPS OF ENGINEERS      *
                                                      Page 5
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HA 141

```
                                                    Havana.out
 *            MAY    1991                  *                                      *   HYDROLOGIC ENGINEERING CENTER    *
 *          VERSION 4.0.1E                 *                                      *         609 SECOND STREET          *
 *                                         *                                      *     DAVIS, CALIFORNIA 95616       *
 *  RUN DATE              TIME             *                                      *          (916) 551-1748            *
 *                                         *                                      *                                    *
 *******************************************                                      ***************************************



   5 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN         10  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1JAN94  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ,       160  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     2JAN94  ENDING DATE
                      NDTIME       0230  ENDING TIME
                       ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     0.17 HOURS
                       TOTAL TIME BASE    26.50 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                *************
                *           *
   6 KK         *   Pond1   *
                *           *
                *************

   7 KO         OUTPUT CONTROL VARIABLES
                      IPRNT          4  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                                                     Page 6
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HA006
142

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                                                             Havana.out
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.167  TIME INTERVAL IN HOURS

  10 IN           TIME DATA FOR INPUT TIME SERIES
                       JXMIN           6  TIME INTERVAL IN MINUTES
                      JXDATE     1JAN94   STARTING DATE
                      JXTIME           0  STARTING TIME

                SUBBASIN RUNOFF DATA

   8 BA           SUBBASIN CHARACTERISTICS
                       TAREA,       0.04  SUBBASIN AREA

                  PRECIPITATION DATA

   9 PB                STORM       16.00  BASIN TOTAL PRECIPITATION

  11 PI             INCREMENTAL PRECIPITATION PATTERN
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                       0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00

  36 LS           SCS LOSS RATE
                       STRTL        0.00  INITIAL ABSTRACTION
                      CRVNBR      100.00  CURVE NUMBER
                       RTIMP      100.00  PERCENT IMPERVIOUS AREA

  37 UD           SCS DIMENSIONLESS UNITGRAPH
                        TLAG        0.15  LAG

                                                         ***

                                                   UNIT HYDROGRAPH
                                                 7 END-OF-PERIOD ORDINATES
                  60.       54.       16.        5.        2.        1.        0.

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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                                                        Page 7
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HA 143

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                                                        Havana.out
 38 KK          *              *
                *     Pipe1    *        CNAME       C
                *              *
                ****************

 39 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS

              HYDROGRAPH ROUTING DATA

 40 RS          STORAGE ROUTING
                      NSTPS           1 NUMBER OF SUBREACHES/                    ITYP          ELEV   TYPE OF INITIAL CONDITION
                     RSVRIC      486.00  INITIAL CONDITION
                          X        0.00 WORKING R AND D COEFFICIENT

 41 SV             STORAGE       0.0      10.5      21.2      31.9      42.8      53.8      65.0      76.2      87.6

 42 SE           ELEVATION    486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00

 43 SQ           DISCHARGE        0.        9.       26.       26.       26.       26.       26.       26.       26.
                                                                 ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                ****************
                *              *
 44 KK          *     Pond2    *
                *              *
                ****************

 45 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           4  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.167  TIME INTERVAL IN HOURS


 48 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           6  TIME INTERVAL IN MINUTES
                     JXDATE     1JAN94  STARTING DATE
                     JXTIME           0  STARTING TIME
                                                        Page 8
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HA-~~009~~
144

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                                                          Havana.out
                    SUBBASIN RUNOFF DATA

 46 BA                SUBBASIN CHARACTERISTICS
                          TAREA,         0.03  SUBBASIN AREA

                      PRECIPITATION DATA

 47 PB                    STORM        16.00  BASIN TOTAL PRECIPITATION

 49 PI                 INCREMENTAL PRECIPITATION PATTERN
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                          0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00

 74 LS                SCS LOSS RATE
                          STRTL         0.00  INITIAL ABSTRACTION
                         CRVNBR       100.00  CURVE NUMBER
                          RTIMP       100.00  PERCENT IMPERVIOUS AREA

 75 UD                SCS DIMENSIONLESS UNITGRAPH
                           TLAG         0.15  LAG

                                                         ***

                                                      UNIT HYDROGRAPH
                                                    7 END-OF-PERIOD ORDINATES
                 54.        49.        15.         5.         1.         0.         0.


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                *************
                *           *
 76 KK          *   Pipe2   *        CNAME        B
                *           *
                *************

 77 KO                OUTPUT CONTROL VARIABLES
                          IPRNT            4  PRINT CONTROL
                          IPLOT            0  PLOT CONTROL
                          QSCAL           0.  HYDROGRAPH PLOT SCALE
                          IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                                                        Page 9
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HA 145

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                                                    Havana.out
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
               TIMINT      0.167  TIME INTERVAL IN HOURS


           HYDROGRAPH ROUTING DATA

 78 RS          STORAGE ROUTING
                NSTPS          1 NUMBER OF SUBREACHES/                          ITYP         ELEV   TYPE OF INITIAL CONDITION
               RSVRIC     486.00  INITIAL CONDITION
                    X       0.00 WORKING R AND D COEFFICIENT

 79 SV            STORAGE        0.0       9.7      19.5      29.4      39.3      49.3      59.4      69.6      79.7

 80 SQ          DISCHARGE         6.        16.       29.       29.       29.       29.       29.       29.       29.

 81 SE          ELEVATION     486.00    486.50    487.00    487.50    488.00    488.50    489.00    489.50    490.00
                                                             ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 82 KK      *   Pond3B   *     New proposed ash pond
            *            *
            **************

 83 KO          OUTPUT CONTROL VARIABLES
                IPRNT          4  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
               TIMINT      0.167  TIME INTERVAL IN HOURS


 87 IN          TIME DATA FOR INPUT TIME SERIES
                JXMIN          6  TIME INTERVAL IN MINUTES
               JXDATE      1JAN94  STARTING DATE
               JXTIME          0  STARTING TIME

           SUBBASIN RUNOFF DATA

 84 BA          SUBBASIN CHARACTERISTICS
                TAREA,       0.07  SUBBASIN AREA

 85 BF          BASE FLOW CHARACTERISTICS
                STRTQ       11.90  INITIAL FLOW
                QRCSN        0.00  BEGIN BASE FLOW RECESSION
                RTIOR     1.00000  RECESSION CONSTANT
                                                       Page 10
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HA-008
146

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                                              Havana.out

                       PRECIPITATION DATA

 86 PB                     STORM        16.00  BASIN TOTAL PRECIPITATION

 88 PI                  INCREMENTAL PRECIPITATION PATTERN
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                          0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                          0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                          0.00      0.00      0.00      0.00

113 LS                 SCS LOSS RATE
                             STRTL         0.00  INITIAL ABSTRACTION
                            CRVNBR       100.00  CURVE NUMBER
                             RTIMP       100.00  PERCENT IMPERVIOUS AREA

114 UD                 SCS DIMENSIONLESS UNITGRAPH
                              TLAG         0.15  LAG

                                                ***

                                                UNIT HYDROGRAPH
                                             7 END-OF-PERIOD ORDINATES
                     122.      109.       33.       10.        3.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                  ***************
                  *             *
115 KK            *   Pipe3     *      CNAME        D
                  *             *
                  ***************

116 KO                  OUTPUT CONTROL VARIABLES
                            IPRNT           4  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE
                            IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                             IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                            ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                            ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                           TIMINT       0.167  TIME INTERVAL IN HOURS
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HA 147

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                                                    Havana.out

                 HYDROGRAPH ROUTING DATA

 117 RS            STORAGE ROUTING
                     NSTPS           1 NUMBER OF SUBREACHES/                         ITYP         ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC     492.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

 118 SV               STORAGE       0.0       22.2       44.5       67.0       89.6      112.3      135.1      158.0      181.1

 119 SE             ELEVATION    492.00     492.50     493.00     493.50     494.00     494.50     495.00     495.50     496.00

 120 SQ             DISCHARGE        0.        11.        31.        58.        58.        58.        58.        58.        58.
                                                                 ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 121 KK        *    Pond3   *
               *            *
               **************

 122 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           1  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       0.167  TIME INTERVAL IN HOURS


 126 IN           TIME DATA FOR INPUT TIME SERIES
                       JXMIN           6  TIME INTERVAL IN MINUTES
                      JXDATE     1JAN94   STARTING DATE
                      JXTIME           0  STARTING TIME

                SUBBASIN RUNOFF DATA

 123 BA           SUBBASIN CHARACTERISTICS
                       TAREA,       0.01  SUBBASIN AREA

 124 BF           BASE FLOW CHARACTERISTICS
                       STRTQ        0.00  INITIAL FLOW
                       QRCSN        0.00  BEGIN BASE FLOW RECESSION
                       RTIOR     1.00000  RECESSION CONSTANT

                  PRECIPITATION DATA

 125 PB                STORM       16.00  BASIN TOTAL PRECIPITATION
```

HA
148

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                                                                  Havana.out
127 PI          INCREMENTAL PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                  0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00

152 LS          SCS LOSS RATE
                     STRTL         0.00  INITIAL ABSTRACTION
                    CRVNBR       100.00  CURVE NUMBER
                     RTIMP       100.00  PERCENT IMPERVIOUS AREA

153 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG         0.15  LAG

                                                                  ***

                                                         UNIT HYDROGRAPH
                                                      7 END-OF-PERIOD ORDINATES
                 14.        13.        4.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
154 KK     *    ABC     *        CNAME  Stplog
           *            *
           **************

155 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            4  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE
                     IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                      IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        0.167  TIME INTERVAL IN HOURS

156 HC          HYDROGRAPH COMBINATION
                     ICOMP            4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***
                                                                Page 13
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HA 149

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                                              Havana.out

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                  **************
                  *            *
 157 KK           *   Stplog   *      CNAME    ABC
                  *            *
                  **************

 158 KO              OUTPUT CONTROL VARIABLES
                           IPRNT          4  PRINT CONTROL
                           IPLOT          0  PLOT CONTROL
                           QSCAL         0.  HYDROGRAPH PLOT SCALE
                           IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                            IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                           ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                           ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                          TIMINT      0.167  TIME INTERVAL IN HOURS


                    HYDROGRAPH ROUTING DATA

 159 RS              STORAGE ROUTING
                          NSTPS          1  NUMBER OF SUBREACHES/                         ITYP         ELEV   TYPE OF INITIAL CONDITION
                         RSVRIC     484.00  INITIAL CONDITION
                              X       0.00 WORKING R AND D COEFFICIENT

 160 SV                STORAGE        0.0       0.0       2.4       4.8       7.2       9.5      12.1      14.6      17.2      19.7
                                     22.4      25.0      27.6

 162 SE              ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                   489.00    489.50    490.00

 164 SQ              DISCHARGE         0.        7.       19.       35.       53.       72.       93.      116.      139.      162.
                                     210.      235.      294.

 166 SE              ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                   489.00    489.50    490.00

                                                                ***

                                              COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                STORAGE      0.00      0.00      2.36      4.76      7.18      9.48     12.12     14.63     17.17     19.75
                OUTFLOW      0.00      6.95     19.31     34.87     52.74     72.40     93.44    115.56    138.53    162.12
              ELEVATION    484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

                STORAGE     22.35     24.98     27.64
                OUTFLOW    210.47    234.92    293.60
              ELEVATION    489.00    489.50    490.00
 ▢
                                                         RUNOFF SUMMARY
                                                   FLOW IN CUBIC FEET PER SECOND
                                                 TIME IN HOURS,  AREA IN SQUARE MILES
                                                            Page 14
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144

150

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                                              Havana.out

                                       PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM      TIME OF
             OPERATION       STATION   FLOW     PEAK                                            AREA       STAGE     MAX STAGE
 +                                                          6-HOUR      24-HOUR     72-HOUR

             HYDROGRAPH AT
 +                            Pond1     317.    12.00         44.         15.         14.       0.04

             ROUTED TO
 +                            Pipe1      23.    13.17         21.         11.         10.       0.04
 +                                                                                                        486.92       13.17

             HYDROGRAPH AT
 +                            Pond2     284.    12.00         39.         14.         12.       0.03

             ROUTED TO
 +                            Pipe2      21.    13.17         19.         12.         11.       0.03
 +                                                                                                        486.71       13.17

             HYDROGRAPH AT
 +                           Pond3B     650.    12.00         99.         43.         40.       0.07

             ROUTED TO
 +                            Pipe3      40.    14.17         39.         24.         22.       0.07
 +                                                                                                        493.17       14.17

             HYDROGRAPH AT
 +                            Pond3      74.    12.00         10.          4.          3.       0.01

             4 COMBINED AT
 +                              ABC     121.    12.00         86.         49.         45.       0.15

             ROUTED TO
 +                           Stplog      82.    15.67         78.         46.         42.       0.15
 +                                                                                                        486.72       15.67


 *** NORMAL END OF HEC-1 ***
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HA 151

Run #2

MA
152

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                                              Havana.out
1*****************************************                                  ****************************************
 *                                        *                                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
 *              MAY    1991               *                                  *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.0.1E               *                                  *        609 SECOND STREET             *
 *                                        *                                  *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE             TIME             *                                  *         (916) 551-1748               *
 *                                        *                                  *                                      *
 *****************************************                                  ****************************************




                                              X     X  XXXXXXX   XXXXX          X
                                              X     X  X        X     X        XX
                                              X     X  X        X               X
                                              XXXXXXX  XXXX     X       XXXXX   X
                                              X     X  X        X               X
                                              X     X  X        X     X         X
                                              X     X  XXXXXXX   XXXXX         XXX




 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                          HEC-1 INPUT                                            PAGE  1

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1            ID
   2            ID
   3            ID
                *DIAGRAM
   4            IT      10  1JAN94       0     160
   5            IO       4

   6            KK   Pond1
   7            KO       0       0       0       1      22
   8            BA  0.0358
   9            PB      16
  10            IN       6  1JAN94       0
                * precip1
  11            PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
  12            PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
  13            PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
  14            PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
  15            PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
  16            PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
                                                   Page 1
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                                                         Havana.out
 17           PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 18           PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 19           PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 20           PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 21           PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 22           PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 23           PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 24           PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
 25           PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 26           PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 27           PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 28           PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 29           PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 30           PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 31           PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 32           PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 33           PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 34           PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 35           PC        1       1       1       1       1
 36           LS        0     100     100
 37           UD     0.15

 38           KK    Pipe1   CNAME       C
 39           KO        0       0       0       0      22
 40           RS        1    ELEV     486       0
              * pond1vol
 41           SV        0   10.53   21.17   31.94   42.84   53.85   64.98   76.24   87.62
              * pond1elev
 42           SE      486   486.5     487   487.5     488   488.5     489   489.5     490
              * pond1out
 43           SQ        0     9.2    26.2    26.2    26.2    26.2    26.2    26.2    26.2

                                           HEC-1 INPUT                                    PAGE  2

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 44           KK    Pond2
 45           KO        0       0       0       1      22
 46           BA    0.032
 47           PB       16
 48           IN        6  1JAN94       0
              * precip1
 49           PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 50           PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 51           PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
 52           PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 53           PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 54           PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 55           PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 56           PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 57           PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 58           PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 59           PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 60           PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
 61           PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
 62           PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
                                                     Page 2
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HA 153

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                                              Havana.out
 63          PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
 64          PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
 65          PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
 66          PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
 67          PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
 68          PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
 69          PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
 70          PC   0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
 71          PC    0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
 72          PC   0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
 73          PC        1       1       1       1       1
 74          LS        0     100     100
 75          UD     0.15

 76          KK    Pipe2   CNAME       B
 77          KO        0       0       0       0      22
 78          RS        1    ELEV     486       0
             * pond2vol
 79          SV        0    9.73   19.54    29.4   39.34   49.34   59.41   69.55   79.75
             * pond2out
 80          SQ     5.55   15.69    28.9    28.9    28.9    28.9    28.9    28.9    28.9
             * pond2elev
 81          SE      486   486.5     487   487.5     488   488.5     489   489.5     490

 82          KK   Pond3B New proposed ash pond
 83          KO        0       0       0       1      22
 84          BA    0.072
 85          BF        0       0       0
 86          PB       16
 87          IN        6  1JAN94       0
             * precip1
 88          PC        0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
 89          PC   0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
 90          PC    0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332

                                          HEC-1 INPUT                                          PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 91          PC   0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
 92          PC    0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
 93          PC    0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
 94          PC     0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
 95          PC    0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
 96          PC     0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
 97          PC    0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
 98          PC    0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
 99          PC    0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
100          PC    0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656
101          PC    0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
102          PC     0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
103          PC   0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
104          PC     0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
105          PC   0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
106          PC    0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
107          PC   0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
108          PC    0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
                                            Page 3
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154

HA 155

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                                                       Havana.out
109            PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
110            PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
111            PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
112            PC       1       1       1       1       1
113            LS       0     100     100
114            UD    0.15

115            KK   Pipe3   CNAME       D
116            KO       0       0       0       0      22
117            RS       1    ELEV     492       0
               * pond3Bvol
118            SV       0    22.2   44.53   66.98   89.56  112.26  135.09  158.04  181.12
               * pond3Belev
119            SE     492   492.5     493   493.5     494   494.5     495   495.5     496
               * pond3Bout
120            SQ       0    11.1   31.38   57.66   57.66   57.66   57.66   57.66   57.66

121            KK   Pond3
122            KO       0       0       0       1      22
123            BA  0.0083
124            BF       0       0       0
125            PB      16
126            IN       6  1JAN94       0
               * precip1
127            PC       0   0.001   0.002  0.0031  0.0041  0.0051  0.0062  0.0073  0.0083  0.0094
128            PC  0.0105  0.0116  0.0127  0.0138   0.015  0.0161  0.0173  0.0185  0.0196  0.0208
129            PC   0.022  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0307  0.0319  0.0332
130            PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0438  0.0452  0.0466
131            PC   0.048  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
132            PC   0.063  0.0646  0.0662  0.0679  0.0696  0.0712   0.073  0.0747  0.0764  0.0782
133            PC    0.08  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931   0.095   0.097
134            PC   0.099   0.101   0.103  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
135            PC    0.12  0.1223  0.1246  0.1271  0.1296  0.1323   0.135  0.1379  0.1408  0.1439
136            PC   0.147  0.1502  0.1534  0.1566  0.1598   0.163  0.1663  0.1697  0.1733  0.1771
137            PC   0.181  0.1851  0.1895  0.1941  0.1989   0.204  0.2094  0.2152  0.2214   0.228
138            PC   0.235  0.2427  0.2513  0.2609  0.2715   0.283  0.3068  0.3544  0.4308  0.5679
139            PC   0.663   0.682  0.6986   0.713  0.7252   0.735  0.7434  0.7514  0.7588  0.7656

                                        HEC-1 INPUT                                            PAGE  4

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

140            PC   0.772   0.778  0.7836   0.789  0.7942   0.799  0.8036   0.808  0.8122  0.8162
141            PC    0.82  0.8237  0.8273  0.8308  0.8342  0.8376  0.8409  0.8442  0.8474  0.8505
142            PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
143            PC    0.88  0.8823  0.8846  0.8868   0.889  0.8912  0.8934  0.8955  0.8976  0.8997
144            PC  0.9018  0.9038  0.9058  0.9078  0.9098  0.9117  0.9136  0.9155  0.9174  0.9192
145            PC   0.921  0.9228  0.9246  0.9263   0.928  0.9297  0.9314   0.933  0.9346  0.9362
146            PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466   0.948  0.9494  0.9507
147            PC   0.952  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597   0.961  0.9622  0.9635
148            PC  0.9647   0.966  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
149            PC   0.977  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
150            PC  0.9887  0.9899   0.991  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
151            PC       1       1       1       1       1
152            LS       0     100     100
153            UD    0.15

                                               Page 4
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                                                    Havana.out
  154          KK      ABC   CNAME   Stplog
  155          KO        0       0        0       0      22
  156          HC        4

  157          KK   Stplog   CNAME      ABC
  158          KO        0       0        0       0      22
  159          RS        1    ELEV      484       0
               * pond3vol
  160          SV        0       0     2.36    4.76    7.18    9.48   12.12  '14.63   17.17   19.75
  161          SV    22.35   24.98    27.64
               * pondelv
  162          SE      484   484.5      485   485.5     486   486.5     487   487.5     488   488.5
  163          SE      489   489.5      490
               * pond3out
  164          SQ        0    6.95    19.31   34.87   52.74    72.4   93.44  115.56  138.53  162.12
  165          SQ   210.47  234.92    293.6
               * pondelv
  166          SE      484   484.5      485   485.5     486   486.5     487   487.5     488   488.5
  167          SE      489   489.5      490
  168          ZZ
□
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE       (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

  NO.        (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6        Pond1
                 V
                 V
   38        Pipe1
                 .
                 .
   44            .          Pond2
                 .              V
                 .              V
   76            .          Pipe2
                 .              .
                 .              .
   82            .              .           Pond3B
                 .              .               V
                 .              .               V
  115            .              .           Pipe3
                 .              .               .
                 .              .               .
  121            .              .               .            Pond3
                 .              .               .                .
                 .              .               .                .
  154           ABC.............................................
                 V
                 V
  157         Stplog

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                    *****************************************
 *                                        *                                    *                                       *
 *    FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS        *
                                                             Page 5
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HA000156

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                                                            Havana.out
 *              MAY   1991                   *                                                        *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.0.1E                 *                                                        *         609 SECOND STREET            *
 *                                           *                                                        *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE              TIME               *                                                        *           (916) 551-1748             *
 *                                           *                                                        *                                      *
 *********************************************                                                        ****************************************



   5 IO           OUTPUT CONTROL VARIABLES
                        IPRNT           4   PRINT CONTROL
                        IPLOT           0   PLOT CONTROL
                        QSCAL          0.   HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                         NMIN          10   MINUTES IN COMPUTATION INTERVAL
                        IDATE       1JAN94   STARTING DATE
                        ITIME        0000   STARTING TIME
                           NQ,        160   NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE       2JAN94   ENDING DATE
                       NDTIME        0230   ENDING TIME
                        ICENT          19   CENTURY MARK

                  COMPUTATION INTERVAL     0.17 HOURS
                       TOTAL TIME BASE    26.50 HOURS

          ENGLISH UNITS
               DRAINAGE AREA           SQUARE MILES
               PRECIPITATION DEPTH     INCHES
               LENGTH, ELEVATION       FEET
               FLOW                    CUBIC FEET PER SECOND
               STORAGE VOLUME          ACRE-FEET
               SURFACE AREA            ACRES
               TEMPERATURE             DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                **************
                *            *
   6 KK         *    Pond1   *
                *            *
                **************

   7 KO           OUTPUT CONTROL VARIABLES
                        IPRNT           4   PRINT CONTROL
                        IPLOT           0   PLOT CONTROL
                        QSCAL          0.   HYDROGRAPH PLOT SCALE
                        IPNCH           1   PUNCH COMPUTED HYDROGRAPH
                                                                 Page 6
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HA157

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                                                    Havana.out
                    IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                   ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                   ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                  TIMINT       0.167  TIME INTERVAL IN HOURS


   10 IN          TIME DATA FOR INPUT TIME SERIES
                    JXMIN          6  TIME INTERVAL IN MINUTES
                   JXDATE     1JAN94  STARTING DATE
                   JXTIME          0  STARTING TIME

                SUBBASIN RUNOFF DATA

    8 BA          SUBBASIN CHARACTERISTICS
                    TAREA,        0.04  SUBBASIN AREA

                  PRECIPITATION DATA

    9 PB              STORM       16.00  BASIN TOTAL PRECIPITATION

   11 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                     0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00

   36 LS          SCS LOSS RATE
                    STRTL         0.00  INITIAL ABSTRACTION
                   CRVNBR       100.00  CURVE NUMBER
                    RTIMP       100.00  PERCENT IMPERVIOUS AREA

   37 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG         0.15  LAG

                                                  ***

                                               UNIT HYDROGRAPH
                                           7 END-OF-PERIOD ORDINATES
                 60.       54.       16.        5.        2.        1.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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                                            Page 7
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HA 158

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                                                                    Havana.out
              *              *
  38 KK       *    Pipel     *         CNAME      C
              *              *
              ****************

  39 KO            OUTPUT CONTROL VARIABLES
                         IPRNT          4   PRINT CONTROL
                         IPLOT          0   PLOT CONTROL
                         QSCAL         0.   HYDROGRAPH PLOT SCALE
                         IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                          IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2        160   LAST ORDINATE PUNCHED OR SAVED
                        TIMINT      0.167   TIME INTERVAL IN HOURS


                   HYDROGRAPH ROUTING DATA

  40 RS             STORAGE ROUTING
                         NSTPS          1  NUMBER OF SUBREACHES/                          ITYP         ELEV   TYPE OF INITIAL CONDITION
                        RSVRIC     486.00   INITIAL CONDITION
                             X       0.00  WORKING R AND D COEFFICIENT

  41 SV             STORAGE         0.0       10.5       21.2       31.9       42.8       53.8       65.0       76.2       87.6

  42 SE           ELEVATION      486.00     486.50     487.00     487.50     488.00     488.50     489.00     489.50     490.00

  43 SQ           DISCHARGE          0.         9.        26.        26.        26.        26.        26.        26.        26.
                                                                   ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               ****************
               *              *
  44 KK        *    Pond2     *
               *              *
               ****************

  45 KO             OUTPUT CONTROL VARIABLES
                         IPRNT          4   PRINT CONTROL
                         IPLOT          0   PLOT CONTROL
                         QSCAL         0.   HYDROGRAPH PLOT SCALE
                         IPNCH          1   PUNCH COMPUTED HYDROGRAPH
                          IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                         ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                         ISAV2        160   LAST ORDINATE PUNCHED OR SAVED
                        TIMINT      0.167   TIME INTERVAL IN HOURS


  48 IN             TIME DATA FOR INPUT TIME SERIES
                         JXMIN          6   TIME INTERVAL IN MINUTES
                        JXDATE     1JAN94   STARTING DATE
                        JXTIME          0   STARTING TIME
                                                                    Page 8
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HA 159

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                                                      Havana.out
              SUBBASIN RUNOFF DATA

 46 BA          SUBBASIN CHARACTERISTICS
                      TAREA,        0.03  SUBBASIN AREA

                PRECIPITATION DATA

 47 PB                STORM        16.00  BASIN TOTAL PRECIPITATION

 49 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                    0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00

 74 LS          SCS LOSS RATE
                     STRTL         0.00  INITIAL ABSTRACTION
                    CRVNBR       100.00  CURVE NUMBER
                     RTIMP       100.00  PERCENT IMPERVIOUS AREA

 75 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG         0.15  LAG

                                                     ***

                                                 UNIT HYDROGRAPH
                                               7 END-OF-PERIOD ORDINATES
              54.        49.        15.        5.        1.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
 76 KK       *    Pipe2   *        CNAME        B
             *            *
             **************

 77 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            4  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE
                     IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                                                     Page 9
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HA
160

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                                                        Havana.out
              IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
             ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
             ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
            TIMINT       0.167  TIME INTERVAL IN HOURS


         HYDROGRAPH ROUTING DATA

 78 RS        STORAGE ROUTING
                 NSTPS         1  NUMBER OF SUBREACHES/                              ITYP          ELEV  TYPE OF INITIAL CONDITION
                RSVRIC    486.00  INITIAL CONDITION
                     X      0.00  WORKING R AND D COEFFICIENT

 79 SV           STORAGE        0.0        9.7       19.5       29.4       39.3       49.3       59.4       69.6       79.7

 80 SQ         DISCHARGE         6.        16.        29.        29.        29.        29.        29.        29.        29.

 81 SE         ELEVATION     486.00     486.50     487.00     487.50     488.00     488.50     489.00     489.50     490.00
                                                              ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 82 KK         *   Pond3B   *      New proposed ash pond
               *            *
               **************

 83 KO         OUTPUT CONTROL VARIABLES
                    IPRNT          4  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
                    IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                     IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT      0.167  TIME INTERVAL IN HOURS


 87 IN         TIME DATA FOR INPUT TIME SERIES
                    JXMIN          6  TIME INTERVAL IN MINUTES
                   JXDATE     1JAN94  STARTING DATE
                   JXTIME          0  STARTING TIME

             SUBBASIN RUNOFF DATA

 84 BA         SUBBASIN CHARACTERISTICS
                    TAREA,        0.07   SUBBASIN AREA

 85 BF         BASE FLOW CHARACTERISTICS
                    STRTQ         0.00   INITIAL FLOW
                   QRCSN          0.00   BEGIN BASE FLOW RECESSION
                   RTIOR       1.00000   RECESSION CONSTANT
                                                          Page 10
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HA 161

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                                         Havana.out

                  PRECIPITATION DATA

   86 PB              STORM        16.00  BASIN TOTAL PRECIPITATION

   88 PI            INCREMENTAL PRECIPITATION PATTERN
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.01       0.01       0.01       0.01       0.01       0.01       0.01
                        0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.02       0.02       0.06
                        0.14       0.19       0.03       0.02       0.02       0.01       0.01       0.01       0.01       0.01
                        0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01       0.01
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00

  113 LS          SCS LOSS RATE
                      STRTL         0.00  INITIAL ABSTRACTION
                     CRVNBR       100.00  CURVE NUMBER
                      RTIMP       100.00  PERCENT IMPERVIOUS AREA

  114 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         0.15  LAG

                                                           ***

                                                      UNIT HYDROGRAPH
                                                 7 END-OF-PERIOD ORDINATES
                     122.       109.        33.        10.         3.         1.         0.

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                ***************
                *             *
  115 KK        *    Pipe3    *         CNAME        D
                *             *
                ***************

  116 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          160  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        0.167  TIME INTERVAL IN HOURS

                                          Page 11
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HA ~~86~~
162

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                                                    Havana.out

                 HYDROGRAPH ROUTING DATA

117 RS            STORAGE ROUTING
                        NSTPS          1 NUMBER OF SUBREACHES/                        ITYP          ELEV   TYPE OF INITIAL CONDITION
                       RSVRIC     492.00  INITIAL CONDITION
                            X       0.00 WORKING R AND D COEFFICIENT

118 SV              STORAGE        0.0       22.2       44.5       67.0       89.6      112.3      135.1      158.0      181.1

119 SE            ELEVATION     492.00     492.50     493.00     493.50     494.00     494.50     495.00     495.50     496.00

120 SQ            DISCHARGE         0.        11.        31.        58.        58.        58.        58.        58.        58.
                                                          ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
121 KK        *    Pond3   *
              *            *
              **************

122 KO            OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          1  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS

126 IN            TIME DATA FOR INPUT TIME SERIES
                        JXMIN          6  TIME INTERVAL IN MINUTES
                       JXDATE      1JAN94  STARTING DATE
                       JXTIME          0  STARTING TIME

                 SUBBASIN RUNOFF DATA

123 BA            SUBBASIN CHARACTERISTICS
                        TAREA,        0.01  SUBBASIN AREA

124 BF            BASE FLOW CHARACTERISTICS
                        STRTQ        0.00  INITIAL FLOW
                        QRCSN        0.00  BEGIN BASE FLOW RECESSION
                        RTIOR     1.00000  RECESSION CONSTANT

                  PRECIPITATION DATA

125 PB                  STORM       16.00  BASIN TOTAL PRECIPITATION
                                                     Page 12
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Ha 163

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                                                                 Havana.out
127 PI           INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.06
                   0.14      0.19      0.03      0.02      0.02      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00

152 LS          SCS LOSS RATE
                      STRTL         0.00  INITIAL ABSTRACTION
                     CRVNBR       100.00  CURVE NUMBER
                      RTIMP       100.00  PERCENT IMPERVIOUS AREA

153 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         0.15  LAG

                                                                ***

                                                            UNIT HYDROGRAPH
                                                          7 END-OF-PERIOD ORDINATES
               14.       13.        4.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                 **************
                 *            *
154 KK           *    ABC     *     CNAME   Stplog
                 *            *
                 **************

155 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          4  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         160  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       0.167  TIME INTERVAL IN HOURS


156 HC          HYDROGRAPH COMBINATION
                      ICOMP          4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                               ***
                                                             Page 13
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HA ~~77~~ 164

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                                        Havana.out

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
157 KK        *   Stplog   *      CNAME      ABC
              *            *
              **************

158 KO           OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        160  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.167  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

159 RS           STORAGE ROUTING
                        NSTPS          1  NUMBER OF SUBREACHES/                    ITYP         ELEV   TYPE OF INITIAL CONDITION
                       RSVRIC     484.00   INITIAL CONDITION
                            X       0.00  WORKING R AND D COEFFICIENT

160 SV              STORAGE        0.0       0.0       2.4       4.8       7.2       9.5      12.1      14.6      17.2      19.7
                                  22.4      25.0      27.6

162 SE            ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                489.00    489.50    490.00

164 SQ            DISCHARGE         0.        7.       19.       35.       53.       72.       93.      116.      139.      162.
                                  210.      235.      294.

166 SE            ELEVATION     484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50
                                489.00    489.50    490.00

                                                ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE      0.00      0.00      2.36      4.76      7.18      9.48     12.12     14.63     17.17     19.75
            OUTFLOW      0.00      6.95     19.31     34.87     52.74     72.40     93.44    115.56    138.53    162.12
          ELEVATION    484.00    484.50    485.00    485.50    486.00    486.50    487.00    487.50    488.00    488.50

            STORAGE     22.35     24.98     27.64
            OUTFLOW    210.47    234.92    293.60
          ELEVATION    489.00    489.50    490.00
0
                                            RUNOFF SUMMARY
                                      FLOW IN CUBIC FEET PER SECOND
                                  TIME IN HOURS,  AREA IN SQUARE MILES
                                                Page 14
```

HA 165

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                                                Havana.out

                                    PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD    BASIN   MAXIMUM   TIME OF
              OPERATION    STATION  FLOW     PEAK                                          AREA     STAGE   MAX STAGE
+                                                     6-HOUR     24-HOUR     72-HOUR

              HYDROGRAPH AT
+                           Pond1    317.    12.00       44.        15.         14.        0.04

              ROUTED TO
+                           Pipe1     23.    13.17       21.        11.         10.        0.04
+                                                                                                  486.92    13.17

              HYDROGRAPH AT
+                           Pond2    284.    12.00       39.        14.         12.        0.03

              ROUTED TO
+                           Pipe2     21.    13.17       19.        12.         11.        0.03
+                                                                                                  486.71    13.17

              HYDROGRAPH AT
+                          Pond3B    638.    12.00       88.        31.         28.        0.07

              ROUTED TO
+                           Pipe3     30.    14.00       29.        16.         15.        0.07
+                                                                                                  492.96    14.17

              HYDROGRAPH AT
+                           Pond3     74.    12.00       10.         4.          3.        0.01

              4 COMBINED AT
+                             ABC    112.    12.00       76.        42.         39.        0.15

              ROUTED TO
+                          Stplog     72.    15.50       68.        39.         36.        0.15
+                                                                                                  486.48    15.50

*** NORMAL END OF HEC-1 ***
```

HA
164

Energy Dissipation
Havana Power Station
East Ash Pond #3B

July 24, 2001
JHK

Energy dissipation of the pond outflow is provided by large riprap at the downstream end of the existing effluent pipe. Since its installation, this riprap has provided good slope protection at the pipe discharge. During a period of lowering the pond by pulling stoplogs, the effluent pipe carried much higher flows than normal, and during this time the riprap held up and provided slope protection.

Based on this historical information, it is a reasonable assumption that the riprap will continue to hold up and provide good energy dissipation and slope protection. No changes are proposed as part of construction of pond #3B.

HA ~~89~~
167

De-watering Method and Calculations
Havana Power Station
East Ash Pond #3B

November 5, 2001
JHK

In the event that the pond system would need to be de-watered, the stoplog structure in the polishing pond (pond #3) will be used. It will be possible to de-water half of the total reservoir in seven days using the stoplog outlet structure as outlined below.

The partition between pond 3B and pond 3 will be breached with Illinois Power earthmoving equipment stationed at the plant or by a contractor's equipment. This will equalize the level in these ponds at a level close to elevation 492.0 feet, since the elevation of pond 3B is at 492' and of pond 3 at elevation 486' with the bulk of the volume coming from pond 3B. The total volume of water will be 1321.1 acre-feet at the start of de-watering. To reduce the volume to 660 acre-feet, the water level will need to be reduced to elevation 476.75 feet. To lower the pond 15.25 feet, 23 of the eight-inch tall stoplogs will be to be removed. Over a seven-day period, this works out to removing one stoplog approximately every 7 hours. The breach between ponds 3 and 3B will be deepened as necessary while de-watering these ponds.

The average flow during de-watering will be 47.5 cfs. The effluent pipe would not flow full at this rate. The flow measurement device downstream of the stoplog structure will be monitored during de-watering to ensure stoplogs are being removed at a sufficient rate to de-water half the pond volume in 7 days.

Pond 1 and 2 will be full of ash by the time pond 3B is finished. Therefore, ponds 1 and 2 are not considered in the de-watering plan.

The following pages contain the calculations for the de-watering plan.

HA [illegible]
168

De-watering Method and Calculations
Havana Power Station
East Ash Pond #3B

November 5, 2001
JHK

Pond 3- Pool volume at elev. 486.0' = 138,000 cu. Yd.
= 85.54 acre-ft.

Area at elev. 486' = 4.89 acres

Area at elev. 462' = 94,471 sq. ft
= 2.17 acres

Δ = (4.89 – 2.17)/(486'-462') = 0.113 acres/ft.

V_y = 85.54 acre-ft -½(4.89x2 - 0.113[486-y])(486-y)

Pond 3B- Pool volume at elev. 492.0' = 1,993,412 cu. Yd.
= 1235.6 acre-ft.

Area at elev. 492' = 1,928,962.6 sq. ft. = 44.28 acres

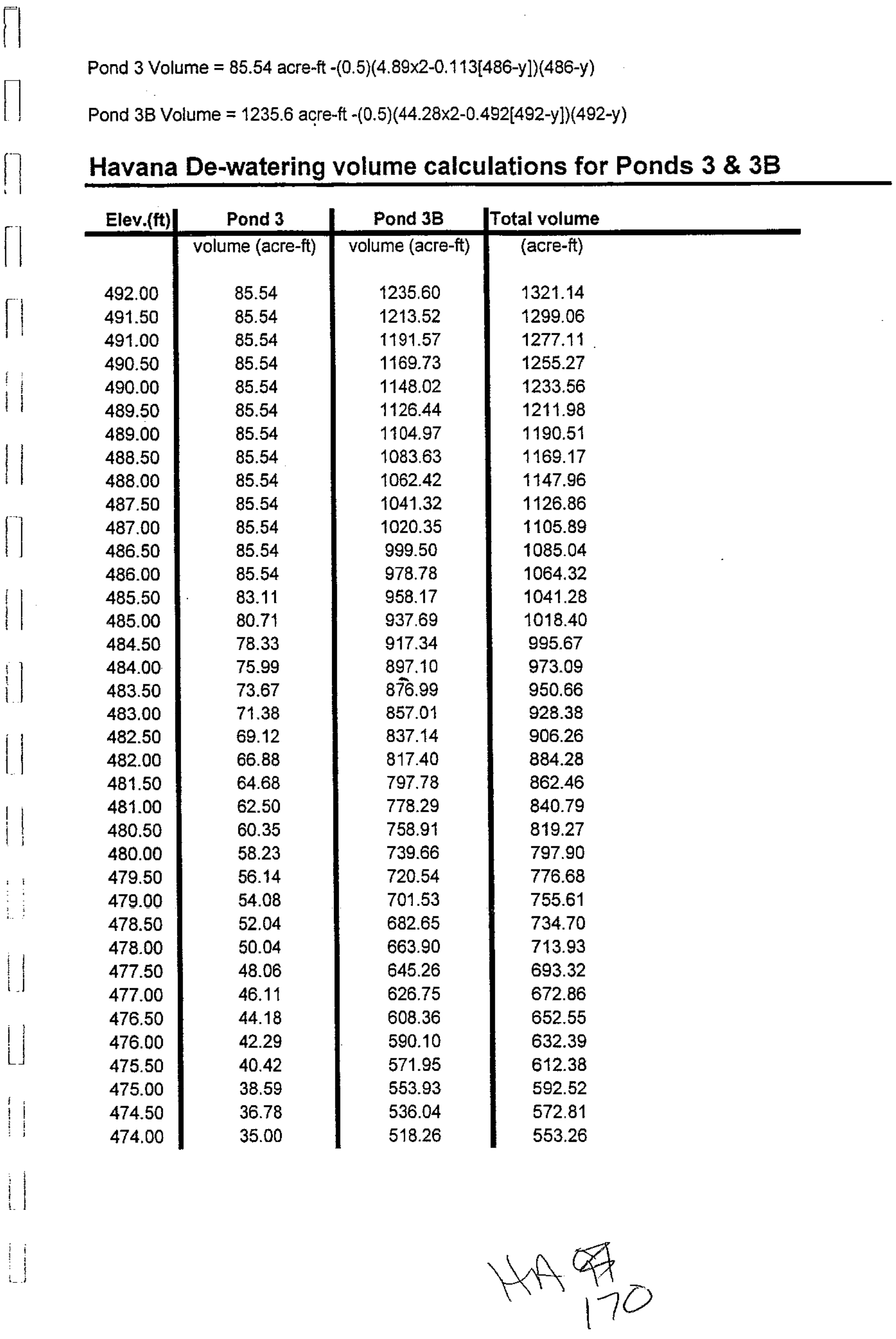
Area at elev. 460' = 1,243,043 sq. ft. = 28.536 acres

Δ = (44.28 – 28.536)/(492'-460') = 0.492 acres/ft.

V_y = 1235.6 acre-ft -½(44.28x2 - 0.492[492-y])(492-y)

Total volume of pond system at elev. 486' = 1235.6 + 85.54
= 1321.1 acre-ft.

HA 169



Pond 3 Volume = 85.54 acre-ft -(0.5)(4.89x2-0.113[486-y])(486-y)

Pond 3B Volume = 1235.6 acre-ft -(0.5)(44.28x2-0.492[492-y])(492-y)

Havana De-watering volume calculations for Ponds 3 & 3B

Elev.(ft)	Pond 3 volume (acre-ft)	Pond 3B volume (acre-ft)	Total volume (acre-ft)
492.00	85.54	1235.60	1321.14
491.50	85.54	1213.52	1299.06
491.00	85.54	1191.57	1277.11
490.50	85.54	1169.73	1255.27
490.00	85.54	1148.02	1233.56
489.50	85.54	1126.44	1211.98
489.00	85.54	1104.97	1190.51
488.50	85.54	1083.63	1169.17
488.00	85.54	1062.42	1147.96
487.50	85.54	1041.32	1126.86
487.00	85.54	1020.35	1105.89
486.50	85.54	999.50	1085.04
486.00	85.54	978.78	1064.32
485.50	83.11	958.17	1041.28
485.00	80.71	937.69	1018.40
484.50	78.33	917.34	995.67
484.00	75.99	897.10	973.09
483.50	73.67	876.99	950.66
483.00	71.38	857.01	928.38
482.50	69.12	837.14	906.26
482.00	66.88	817.40	884.28
481.50	64.68	797.78	862.46
481.00	62.50	778.29	840.79
480.50	60.35	758.91	819.27
480.00	58.23	739.66	797.90
479.50	56.14	720.54	776.68
479.00	54.08	701.53	755.61
478.50	52.04	682.65	734.70
478.00	50.04	663.90	713.93
477.50	48.06	645.26	693.32
477.00	46.11	626.75	672.86
476.50	44.18	608.36	652.55
476.00	42.29	590.10	632.39
475.50	40.42	571.95	612.38
475.00	38.59	553.93	592.52
474.50	36.78	536.04	572.81
474.00	35.00	518.26	553.26

HA ~~97~~
170

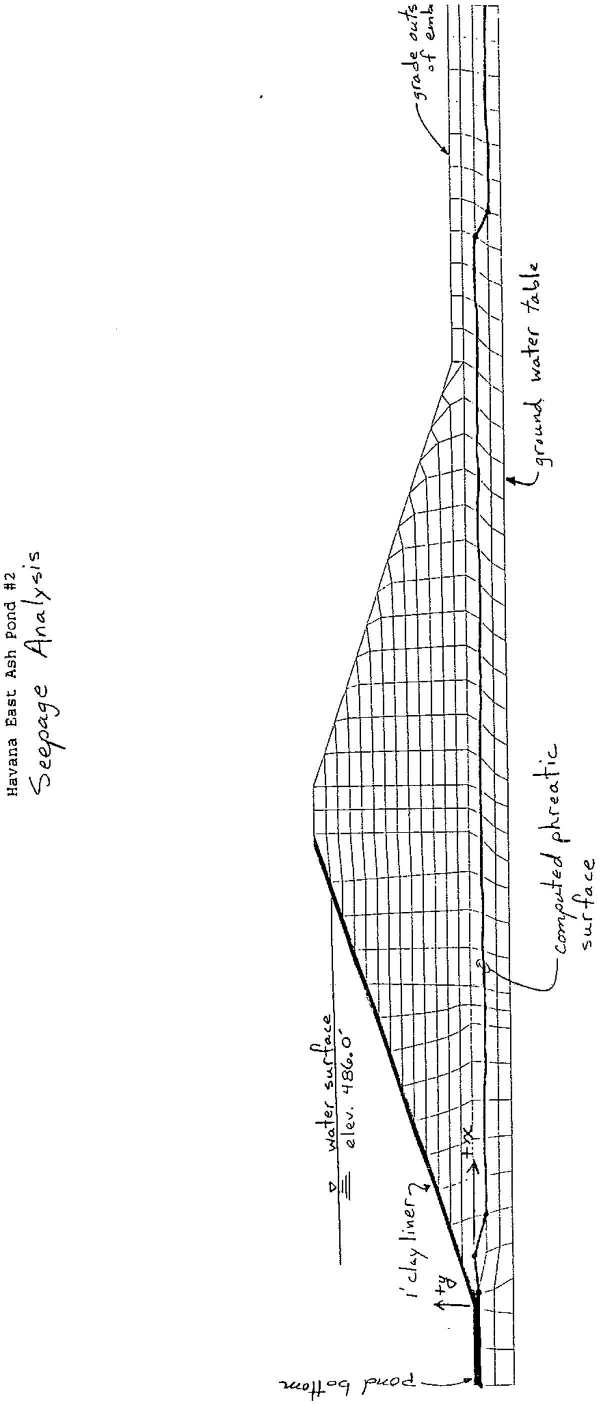
Seepage Analysis
Havana Power Station
East Ash Pond #3B

July 23, 2001
JHK

The new pond will have a polypropylene liner that is impermeable for practical purposes. Since there is no seepage under normal conditions, an "adverse" condition was analyzed to determine what would happen should the liner be damaged. The following calculations are for the full head of the pond being applied directly to the one-foot clay layer under the synthetic liner. This condition could occur if the liner were to have a significant tear or puncture.

The computer program Boss Seep2D was used to analyze the embankment of pond 2 for seepage. Pond 3B is adjacent to pond 2 and has similar properties to pond 2 with a smaller head, therefore Boss Seep2D was not run for pond 3B on the basis of comparison. The clay layer has a very low permeability compared to the sandy soils which form the embankment, and seepage through the clay flows nearly straight down to a phreatic surface elevation below the toe of the embankment. Therefore, seepage on the downstream face of the embankment should not occur, and a toe drain system is not needed. The Seep2D analysis for pond 2 is attached for reference.

HA
171


Havana East Ash Pond #2
Seepage Analysis
grade outs of emb
ground water table
computed phreatic surface
water surface elev. 486.0'
1' clay liner
+x
+y
pond bottom

HA 172

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                         PLANE FLOW PROBLEM




      Havana East Ash Pond #2


      NUMBER OF NODAL POINTS------393
      NUMBER OF ELEMENTS----------359
      NUMBER OF DIFF. MATERIALS--- 12
      ELEVATION OF DATUM----------        .000




                              MATERIAL PROPERTIES

      MAT       K1          K2          ANGLE       USPAR1      USPAR2

       1    .1035E+01   .1035E+01   .0000E+00   .1000E-02   .0000E+00
       2    .2628E+05   .2628E+05   .0000E+00   .1000E-02   .0000E+00
       3    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
       4    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
       5    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
       6    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
       7    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
       8    .0000E+00   .0000E+00   .0000E+00   .1000E-02   .0000E+00
```

AA 173

K_1 & K_2 in ft/yr. in above table

Mat. #1 is clay @ $1.0 * 10^{-6}$ cm/sec permeability.

Mat. #2 is sand @ $2.54 * 10^{-2}$ cm/sec permeability.

```
   9    .0000E+00    .0000E+00    .0000E+00    .1000E-02    .0000E+00
  10    .0000E+00    .0000E+00    .0000E+00    .1000E-02    .0000E+00
  11    .0000E+00    .0000E+00    .0000E+00    .1000E-02    .0000E+00
  12    .0000E+00    .0000E+00    .0000E+00    .1000E-02    .0000E+00


                      NODE POINT INFORMATION

         NODE   BC         X            Y        FLOW-HEAD

           1     1      -20.00          .00        35.00
           2     0      -20.00        -5.00          .00
           3     0      -20.00       -10.00          .00
           4     1      -10.00          .00        35.00
           5     0      -10.26        -1.00          .00
           6     0      -20.00        -1.00          .00
           7     0      -10.74        -5.00          .00
           8     0      -11.00       -10.00          .00
           9     1         .00          .00        35.00
          10     0        -.52        -1.00          .00
          11     0       -1.48        -5.00          .00
          12     0       -2.00       -10.00          .00
          13     1        8.75         2.92        35.00
          14     0       11.95         2.92          .00
          15     0        3.20          .00          .00
          16     0        3.00        -1.00          .00
          17     0        4.18        -5.00          .00
          18     0        7.00       -10.00          .00
          19     1       17.50         5.83        35.00
          20     0       20.70         5.83          .00
          21     0       21.63         2.92          .00
          22     0       22.70          .00          .00
          23     0       12.95          .00          .00
          24     0       13.74        -3.33          .00
          25     0       15.21        -6.67          .00
```

HA 174

26	0	16.00	-10.00	.00
27	1	26.25	8.75	35.00
28	0	29.45	8.75	.00
29	0	30.32	5.83	.00
30	0	31.30	2.92	.00
31	0	32.45	.00	.00
32	0	32.85	-3.33	.00
33	0	23.30	-3.33	.00
34	0	24.40	-6.67	.00
35	0	25.00	-10.00	.00
36	1	35.00	11.67	35.00
37	0	38.20	11.67	.00
38	0	39.00	8.75	.00
39	0	39.89	5.83	.00
40	0	40.93	2.92	.00
41	0	42.20	.00	.00
42	0	42.41	-3.33	.00
43	0	42.79	-6.67	.00
44	0	33.60	-6.67	.00
45	0	34.00	-10.00	.00
46	1	43.75	14.58	35.00
47	0	46.95	14.58	.00
48	0	47.68	11.67	.00
49	0	48.49	8.75	.00
50	0	49.41	5.83	.00
51	0	50.52	2.92	.00
52	0	51.95	.00	.00
53	0	51.96	-3.33	.00
54	0	51.99	-6.67	.00
55	0	52.00	-10.00	.00
56	0	43.00	-10.00	.00
57	1	52.50	17.50	35.00
58	0	55.70	17.50	.00
59	0	56.36	14.58	.00
60	0	57.08	11.67	.00
61	0	57.89	8.75	.00
62	0	58.83	5.83	.00
63	0	60.02	2:92	.00
64	0	61.70	.00	.00
65	0	61.52	-3.33	.00

HA ~~98~~
175

DRAFT

```
  66    0     61.18     -6.67       .00
  67    0     61.00    -10.00       .00
  68    1     61.25     20.42     35.00
  69    0     64.45     20.42       .00
  70    0     65.04     17.50       .00
  71    0     65.68     14.58       .00
  72    0     66.37     11.67       .00
  73    0     67.15      8.75       .00
  74    0     68.10      5.83       .00
  75    0     69.37      2.92       .00
  76    0     71.45       .00       .00
  77    0     71.07     -3.33       .00
  78    0     70.38     -6.67       .00
  79    0     70.00    -10.00       .00
  80    1     70.00     23.33     35.00
  81    0     73.20     23.33       .00
  82    0     73.42     20.42       .00
  83    0     73.66     17.50       .00
  84    0     73.93     14.58       .00
  85    0     74.25     11.67       .00
  86    0     74.64      8.75       .00
  87    0     75.21      5.83       .00
  88    0     76.17      2.92       .00
  89    0     76.32       .00       .00
  90    0     75.85     -3.33       .00
  91    0     74.97     -6.67       .00
  92    0     74.50    -10.00       .00
  93    1     78.75     26.25     35.00
  94    0     81.95     26.25       .00
  95    0     81.87     23.33       .00
  96    0     81.78     20.42       .00
  97    0     81.70     17.50       .00
  98    0     81.62     14.58       .00
  99    0     81.53     11.67       .00
 100    0     81.45      8.75       .00
 101    0     81.37      5.83       .00
 102    0     81.28      2.92       .00
 103    0     81.20       .00       .00
 104    0     80.63     -3.33       .00
 105    0     79.57     -6.67       .00
```

HA 176

```
106    0      79.00    -10:00      .00
107    1      87.50     29.17    35.00
108    0      90.70     29.17      .00
109    0      90.72     26.25      .00
110    0      90.75     23.33      .00
111    0      90.78     20.42      .00
112    0      90.80     17.50      .00
113    0      90.82     14.58      .00
114    0      90.85     11.67      .00
115    0      90.88      8.75      .00
116    0      90.90      5.83      .00
117    0      90.93      2.92      .00
118    0      90.95       .00      .00
119    0      90.18     -3.33      .00
120    0      88.76     -6.67      .00
121    0      88.00    -10.00      .00
122    1      96.25     32.08    35.00
123    0      99.45     32.08      .00
124    0      99.56     29.17      .00
125    0      99.68     26.25      .00
126    0      99.79     23.33      .00
127    0      99.90     20.42      .00
128    0     100.02     17.50      .00
129    0     100.13     14.58      .00
130    0     100.25     11.67      .00
131    0     100.36      8.75      .00
132    0     100.47      5.83      .00
133    0     100.59      2.92      .00
134    0     100.70       .00      .00
135    0      99.74     -3.33      .00
136    0      97.96     -6.67      .00
137    0      97.00    -10.00      .00
138    1     105.00     35.00    35.00
139    0     108.20     35.00      .00
140    0     108.39     32.08      .00
141    0     108.57     29.17      .00
142    0     108.76     26.25      .00
143    0     108.95     23.33      .00
144    0     109.14     20.42      .00
145    0     109.32     17.50      .00
```

HA 85
177

```
146     0     109.51     14.58      .00
147     0     109.70     11.67      .00
148     0     109.89      8.75      .00
149     0     110.07      5.83      .00
150     0     110.26      2.92      .00
151     0     110.45       .00      .00
152     0     109.30     -3.33      .00
153     0     107.15     -6.67      .00
154     0     106.00    -10.00      .00
155     1     117.00     39.00    35.00
156     0     120.20     39.00      .00
157     0     120.20     36.00      .00
158     0     120.20     33.00      .00
159     0     120.20     30.00      .00
160     0     120.20     27.00      .00
161     0     120.20     24.00      .00
162     0     120.20     21.00      .00
163     0     120.20     18.00      .00
164     0     120.20     15.00      .00
165     0     120.20     12.00      .00
166     0     120.20      9.00      .00
167     0     120.20      6.00      .00
168     0     120.20      3.00      .00
169     0     120.20       .00      .00
170     0     118.27     -3.33      .00
171     0     114.68     -6.67      .00
172     0     112.75    -10.00      .00
173     0     126.10     39.00      .00
174     0     126.10     36.00      .00
175     0     126.10     33.00      .00
176     0     126.10     30.00      .00
177     0     126.10     27.00      .00
178     0     126.10     24.00      .00
179     0     126.10     21.00      .00
180     0     126.10     18.00      .00
181     0     126.10     15.00      .00
182     0     126.10     12.00      .00
183     0     126.10      9.00      .00
184     0     126.10      6.00      .00
185     0     126.10      3.00      .00
```

HA 178

```
 186    0      126.10        .00         .00
 187    0      124.39      -3.33         .00
 188    0      121.21      -6.67         .00
 189    0      119.50     -10.00         .00
 190    2      132.00      39.00         .00
 191    0      132.00      36.00         .00
 192    0      132.00      33.00         .00
 193    0      132.00      30.00         .00
 194    0      132.00      27.00         .00
 195    0      132.00      24.00         .00
 196    0      132.00      21.00         .00
 197    0      132.00      18.00         .00
 198    0      132.00      15.00         .00
 199    0      132.00      12.00         .00
 200    0      132.00       9.00         .00
 201    0      132.00       6.00         .00
 202    0      132.00       3.00         .00
 203    0      132.00        .00         .00
 204    0      130.51      -3.33         .00
 205    0      127.74      -6.67         .00
 206    0      126.25     -10.00         .00
 207    2      140.31      36.23         .00
 208    0      140.68      33.11         .00
 209    0      140.71      30.10         .00
 210    0      140.74      27.09         .00
 211    0      140.77      24.08         .00
 212    0      140.80      21.07         .00
 213    0      140.83      18.06         .00
 214    0      140.86      15.05         .00
 215    0      140.88      12.04         .00
 216    0      140.91       9.03         .00
 217    0      140.94       6.02         .00
 218    0      140.97       3.01         .00
 219    0      141.00        .00         .00
 220    0      138.93      -3.33         .00
 221    0      135.07      -6.67         .00
 222    0      133.00     -10.00         .00
 223    2      148.62      33.46         .00
 224    0      149.37      30.21         .00
 225    0      149.43      27.19         .00
```

HA

179

```
226   0   149.50    24.17    .00
227   0   149.56    21.15    .00
228   0   149.62    18.13    .00
229   0   149.68    15.10    .00
230   0   149.75    12.08    .00
231   0   149.81     9.06    .00
232   0   149.87     6.04    .00
233   0   149.94     3.02    .00
234   0   150.00      .00    .00
235   0   147.93    -3.33    .00
236   0   144.07    -6.67    .00
237   0   142.00   -10.00    .00
238   2   156.92    30.69    .00
239   0   158.07    27.31    .00
240   0   158.17    24.28    .00
241   0   158.27    21.24    .00
242   0   158.38    18.21    .00
243   0   158.48    15.17    .00
244   0   158.59    12.14    .00
245   0   158.69     9.10    .00
246   0   158.79     6.07    .00
247   0   158.90     3.04    .00
248   0   159.00      .00    .00
249   0   156.93    -3.33    .00
250   0   153.07    -6.67    .00
251   0   151.00   -10.00    .00
252   2   165.23    27.92    .00
253   0   166.77    24.41    .00
254   0   166.92    21.36    .00
255   0   167.08    18.31    .00
256   0   167.23    15.26    .00
257   0   167.38    12.20    .00
258   0   167.54     9.15    .00
259   0   167.69     6.10    .00
260   0   167.85     3.05    .00
261   0   168.00      .00    .00
262   0   165.93    -3.33    .00
263   0   162.07    -6.67    .00
264   0   160.00   -10.00    .00
265   2   173.54    25.15    .00
```

HA 180

```
266     0     175.49     21.50      .00
267     0     175.70     18.43      .00
268     0     175.92     15.36      .00
269     0     176.13     12.29      .00
270     0     176.35      9.22      .00
271     0     176.57      6.14      .00
272     0     176.78      3.07      .00
273     0     177.00       .00      .00
274     0     174.93     -3.33      .00
275     0     171.07     -6.67      .00
276     0     169.00    -10.00      .00
277     2     181.85     22.39      .00
278     0     184.22     18.59      .00
279     0     184.52     15.49      .00
280     0     184.81     12.40      .00
281     0     185.11      9.30      .00
282     0     185.41      6.20      .00
283     0     185.70      3.10      .00
284     0     186.00       .00      .00
285     0     183.93     -3.33      .00
286     0     180.07     -6.67      .00
287     0     178.00    -10.00      .00
288     2     190.15     19.61      .00
289     0     192.98     15.67      .00
290     0     193.38     12.54      .00
291     0     193.79      9.40      .00
292     0     194.19      6.27      .00
293     0     194.60      3.13      .00
294     0     195.00       .00      .00
295     0     192.93     -3.33      .00
296     0     189.07     -6.67      .00
297     0     187.00    -10.00      .00
298     2     198.46     16.85      .00
299     0     201.79     12.74      .00
300     0     202.34      9.55      .00
301     0     202.89      6.37      .00
302     0     203.45      3.18      .00
303     0     204.00       .00      .00
304     0     201.93     -3.33      .00
305     0     198.07     -6.67      .00
```

HA [illegible]
181

```
306     0     196.00    -10.00      .00
307     2     206.77     14.08      .00
308     0     210.66      9.78      .00
309     0     211.44      6.52      .00
310     0     212.22      3.26      .00
311     0     213.00       .00      .00
312     0     210.93     -3.33      .00
313     0     207.07     -6.67      .00
314     0     205.00    -10.00      .00
315     2     215.08     11.31      .00
316     0     219.69      6.77      .00
317     0     220.85      3.38      .00
318     0     222.00       .00      .00
319     0     219.93     -3.33      .00
320     0     216.07     -6.67      .00
321     0     214.00    -10.00      .00
322     2     223.38      8.54      .00
323     0     229.10      3.63      .00
324     0     231.00       .00      .00
325     0     228.93     -3.33      .00
326     0     225.07     -6.67      .00
327     0     223.00    -10.00      .00
328     2     231.69      5.77      .00
329     0     240.00       .00      .00
330     0     237.93     -3.33      .00
331     0     234.07     -6.67      .00
332     0     232.00    -10.00      .00
333     2     240.00      3.00      .00
334     2     248.33      3.00      .00
335     0     248.33       .00      .00
336     0     246.43     -3.33      .00
337     0     242.90     -6.67      .00
338     0     241.00    -10.00      .00
339     2     256.67      3.00      .00
340     0     256.67       .00      .00
341     0     254.94     -3.33      .00
342     0     251.73     -6.67      .00
343     0     250.00    -10.00      .00
344     2     265.00      3.00      .00
345     0     265.00       .00      .00
```

HA 182

```
346    0     263.44     -3.33       .00
347    0     260.56     -6.67       .00
348    0     259.00    -10.00       .00
349    2     273.33      3.00       .00
350    0     273.33       .00       .00
351    0     271.95     -3.33       .00
352    0     269.38     -6.67       .00
353    0     268.00    -10.00       .00
354    2     281.67      3.00       .00
355    0     281.67       .00       .00
356    0     280.46     -3.33       .00
357    0     278.21     -6.67       .00
358    0     277.00    -10.00       .00
359    2     290.00      3.00       .00
360    0     290.00       .00       .00
361    0     288.96     -3.33       .00
362    0     287.04     -6.67       .00
363    0     286.00    -10.00       .00
364    2     298.33      3.00       .00
365    0     298.33       .00       .00
366    0     297.47     -3.33       .00
367    0     295.86     -6.67       .00
368    0     295.00    -10.00       .00
369    2     306.67      3.00       .00
370    0     306.67       .00       .00
371    0     305.98     -3.33       .00
372    0     304.69     -6.67       .00
373    0     304.00    -10.00       .00
374    2     315.00      3.00       .00
375    0     315.00       .00       .00
376    0     314.48     -3.33       .00
377    0     313.52     -6.67       .00
378    0     313.00    -10.00       .00
379    2     323.33      3.00       .00
380    0     323.33       .00       .00
381    0     322.99     -3.33       .00
382    0     322.35     -6.67       .00
383    0     322.00    -10.00       .00
384    2     331.67      3.00       .00
385    0     331.67       .00       .00
```

HA 98
HA 183

```
       386     0       331.49       -3.33          .00
       387     0       331.17       -6.67          .00
       388     0       331.00      -10.00          .00
       389     2       340.00        3.00          .00
       390     2       340.00         .00          .00
       391     2       340.00       -3.33          .00
       392     2       340.00       -6.67          .00
       393     2       340.00      -10.00          .00


                          ELEMENT  INFORMATION

           ELMT        #1      #2      #3      #4        MAT       ANGLE

             1          1       6       5       4          1          .0
             2          6       2       7       5          2          .0
             3          2       3       8       7          2          .0
             4          4       5      10       9          1          .0
             5          5       7      11      10          2          .0
             6          7       8      12      11          2          .0
             7          9      15      14      13          1          .0
             8          9      10      16      15          1          .0
             9         10      11      17      16          2          .0
            10         11      12      18      17          2          .0
            11         13      14      20      19          1          .0
            12         21      20      14      14          2          .0
            13         22      21      14      23          2          .0
            14         23      14      15      15          2          .0
            15         15      16      24      23          2          .0
            16         16      17      25      24          2          .0
            17         17      18      26      25          2          .0
            18         19      20      28      27          1          .0
            19         29      28      20      20          2          .0
            20         30      29      20      21          2          .0
            21         31      30      21      22          2          .0
```

HA 184

22	22	33	32	31	2	.0
23	23	24	33	22	2	.0
24	24	25	34	33	2	.0
25	25	26	35	34	2	.0
26	27	28	37	36	1	.0
27	38	37	28	28	2	.0
28	39	38	28	29	2	.0
29	40	39	29	30	2	.0
30	41	40	30	31	2	.0
31	31	32	42	41	2	.0
32	32	44	43	42	2	.0
33	33	34	44	32	2	.0
34	34	35	45	44	2	.0
35	36	37	47	46	1	.0
36	48	47	37	37	2	.0
37	49	48	37	38	2	.0
38	50	49	38	39	2	.0
39	51	50	39	40	2	.0
40	52	51	40	41	2	.0
41	41	42	53	52	2	.0
42	42	43	54	53	2	.0
43	43	56	55	54	2	.0
44	44	45	56	43	2	.0
45	46	47	58	57	1	.0
46	59	58	47	47	2	.0
47	60	59	47	48	2	.0
48	61	60	48	49	2	.0
49	62	61	49	50	2	.0
50	63	62	50	51	2	.0
51	64	63	51	52	2	.0
52	52	53	65	64	2	.0
53	53	54	66	65	2	.0
54	54	55	67	66	2	.0
55	57	58	69	68	1	.0
56	70	69	58	58	2	.0
57	71	70	58	59	2	.0
58	72	71	59	60	2	.0
59	73	72	60	61	2	.0
60	74	73	61	62	2	.0
61	75	74	62	63	2	.0

HA 185

```
 62      76     75     63     64       2       .0
 63      64     65     77     76       2       .0
 64      65     66     78     77       2       .0
 65      66     67     79     78       2       .0
 66      68     69     81     80       1       .0
 67      82     81     69     69       2       .0
 68      83     82     69     70       2       .0
 69      84     83     70     71       2       .0
 70      85     84     71     72       2       .0
 71      86     85     72     73       2       .0
 72      87     86     73     74       2       .0
 73      88     87     74     75       2       .0
 74      89     88     75     76       2       .0
 75      76     77     90     89       2       .0
 76      77     78     91     90       2       .0
 77      78     79     92     91       2       .0
 78      80     81     94     93       1       .0
 79      95     94     81     81       2       .0
 80      96     95     81     82       2       .0
 81      97     96     82     83       2       .0
 82      98     97     83     84       2       .0
 83      99     98     84     85       2       .0
 84     100     99     85     86       2       .0
 85     101    100     86     87       2       .0
 86     102    101     87     88       2       .0
 87     103    102     88     89       2       .0
 88      89     90    104    103       2       .0
 89      90     91    105    104       2       .0
 90      91     92    106    105       2       .0
 91      93     94    108    107       1       .0
 92     109    108     94     94       2       .0
 93     109     94     95    110       2       .0
 94     110     95     96    111       2       .0
 95     111     96     97    112       2       .0
 96     112     97     98    113       2       .0
 97     113     98     99    114       2       .0
 98     114     99    100    115       2       .0
 99     115    100    101    116       2       .0
100     116    101    102    117       2       .0
101     117    102    103    118       2       .0
```

HA 186

```
 102       103    104    119    118       2       .0
 103       104    105    120    119       2       .0
 104       105    106    121    120       2       .0
 105       107    108    123    122       1       .0
 106       124    123    108    108       2       .0
 107       124    108    109    125       2       .0
 108       125    109    110    126       2       .0
 109       126    110    111    127       2       .0
 110       127    111    112    128       2       .0
 111       128    112    113    129       2       .0
 112       129    113    114    130       2       .0
 113       130    114    115    131       2       .0
 114       131    115    116    132       2       .0
 115       132    116    117    133       2       .0
 116       133    117    118    134       2       .0
 117       118    119    135    134       2       .0
 118       119    120    136    135       2       .0
 119       120    121    137    136       2       .0
 120       122    123    139    138       1       .0
 121       140    139    123    123       2       .0
 122       140    123    124    141       2       .0
 123       141    124    125    142       2       .0
 124       142    125    126    143       2       .0
 125       143    126    127    144       2       .0
 126       144    127    128    145       2       .0
 127       145    128    129    146       2       .0
 128       146    129    130    147       2       .0
 129       147    130    131    148       2       .0
 130       148    131    132    149       2       .0
 131       149    132    133    150       2       .0
 132       150    133    134    151       2       .0
 133       134    135    152    151       2       .0
 134       135    136    153    152       2       .0
 135       136    137    154    153       2       .0
 136       138    139    156    155       1       .0
 137       157    156    139    139       2       .0
 138       157    139    140    158       2       .0
 139       158    140    141    159       2       .0
 140       159    141    142    160       2       .0
 141       160    142    143    161       2       .0
```

HA ~~188~~
187

```
  142    161   143   144   162      2      .0
  143    162   144   145   163      2      .0
  144    163   145   146   164      2      .0
  145    164   146   147   165      2      .0
  146    165   147   148   166      2      .0
  147    166   148   149   167      2      .0
  148    167   149   150   168      2      .0
  149    168   150   151   169      2      .0
  150    151   152   170   169      2      .0
  151    152   153   171   170      2      .0
  152    153   154   172   171      2      .0
  153    173   156   157   174      2      .0
  154    174   157   158   175      2      .0
  155    175   158   159   176      2      .0
  156    176   159   160   177      2      .0
  157    177   160   161   178      2      .0
  158    178   161   162   179      2      .0
  159    179   162   163   180      2      .0
  160    180   163   164   181      2      .0
  161    181   164   165   182      2      .0
  162    182   165   166   183      2      .0
  163    183   166   167   184      2      .0
  164    184   167   168   185      2      .0
  165    185   168   169   186      2      .0
  166    169   170   187   186      2      .0
  167    170   171   188   187      2      .0
  168    171   172   189   188      2      .0
  169    190   173   174   191      2      .0
  170    191   174   175   192      2      .0
  171    192   175   176   193      2      .0
  172    193   176   177   194      2      .0
  173    194   177   178   195      2      .0
  174    195   178   179   196      2      .0
  175    196   179   180   197      2      .0
  176    197   180   181   198      2      .0
  177    198   181   182   199      2      .0
  178    199   182   183   200      2      .0
  179    200   183   184   201      2      .0
  180    201   184   185   202      2      .0
  181    202   185   186   203      2      .0
```

HA 188

```
182     186   187   204   203      2      .0
183     187   188   205   204      2      .0
184     188   189   206   205      2      .0
185     191   207   190   190      2      .0
186     192   208   207   191      2      .0
187     193   209   208   192      2      .0
188     194   210   209   193      2      .0
189     195   211   210   194      2      .0
190     196   212   211   195      2      .0
191     197   213   212   196      2      .0
192     198   214   213   197      2      .0
193     199   215   214   198      2      .0
194     200   216   215   199      2      .0
195     201   217   216   200      2      .0
196     202   218   217   201      2      .0
197     203   219   218   202      2      .0
198     203   204   220   219      2      .0
199     204   205   221   220      2      .0
200     205   206   222   221      2      .0
201     208   223   207   207      2      .0
202     209   224   223   208      2      .0
203     210   225   224   209      2      .0
204     211   226   225   210      2      .0
205     212   227   226   211      2      .0
206     213   228   227   212      2      .0
207     214   229   228   213      2      .0
208     215   230   229   214      2      .0
209     216   231   230   215      2      .0
210     217   232   231   216      2      .0
211     218   233   232   217      2      .0
212     219   234   233   218      2      .0
213     219   220   235   234      2      .0
214     220   221   236   235      2      .0
215     221   222   237   236      2      .0
216     224   238   223   223      2      .0
217     225   239   238   224      2      .0
218     226   240   239   225      2      .0
219     227   241   240   226      2      .0
220     228   242   241   227      2      .0
221     229   243   242   228      2      .0
```

HA 189

```
 222      230  244  243  229      2      .0
 223      231  245  244  230      2      .0
 224      232  246  245  231      2      .0
 225      233  247  246  232      2      .0
 226      234  248  247  233      2      .0
 227      234  235  249  248      2      .0
 228      235  236  250  249      2      .0
 229      236  237  251  250      2      .0
 230      239  252  238  238      2      .0
 231      240  253  252  239      2      .0
 232      241  254  253  240      2      .0
 233      242  255  254  241      2      .0
 234      243  256  255  242      2      .0
 235      244  257  256  243      2      .0
 236      245  258  257  244      2      .0
 237      246  259  258  245      2      .0
 238      247  260  259  246      2      .0
 239      248  261  260  247      2      .0
 240      248  249  262  261      2      .0
 241      249  250  263  262      2      .0
 242      250  251  264  263      2      .0
 243      253  265  252  252      2      .0
 244      254  266  265  253      2      .0
 245      255  267  266  254      2      .0
 246      256  268  267  255      2      .0
 247      257  269  268  256      2      .0
 248      258  270  269  257      2      .0
 249      259  271  270  258      2      .0
 250      260  272  271  259      2      .0
 251      261  273  272  260      2      .0
 252      261  262  274  273      2      .0
 253      262  263  275  274      2      .0
 254      263  264  276  275      2      .0
 255      266  277  265  265      2      .0
 256      267  278  277  266      2      .0
 257      268  279  278  267      2      .0
 258      269  280  279  268      2      .0
 259      270  281  280  269      2      .0
 260      271  282  281  270      2      .0
 261      272  283  282  271      2      .0
```

HA 190

```
262       273   284   283   272      2        .0
263       273   274   285   284      2        .0
264       274   275   286   285      2        .0
265       275   276   287   286      2        .0
266       278   288   277   277      2        .0
267       279   289   288   278      2        .0
268       280   290   289   279      2        .0
269       281   291   290   280      2        .0
270       282   292   291   281      2        .0
271       283   293   292   282      2        .0
272       284   294   293   283      2        .0
273       284   285   295   294      2        .0
274       285   286   296   295      2        .0
275       286   287   297   296      2        .0
276       289   298   288   288      2        .0
277       290   299   298   289      2        .0
278       291   300   299   290      2        .0
279       292   301   300   291      2        .0
280       293   302   301   292      2        .0
281       294   303   302   293      2        .0
282       294   295   304   303      2        .0
283       295   296   305   304      2        .0
284       296   297   306   305      2        .0
285       299   307   298   298      2        .0
286       300   308   307   299      2        .0
287       301   309   308   300      2        .0
288       302   310   309   301      2        .0
289       303   311   310   302      2        .0
290       303   304   312   311      2        .0
291       304   305   313   312      2        .0
292       305   306   314   313      2        .0
293       308   315   307   307      2        .0
294       309   316   315   308      2        .0
295       310   317   316   309      2        .0
296       311   318   317   310      2        .0
297       311   312   319   318      2        .0
298       312   313   320   319      2        .0
299       313   314   321   320      2        .0
300       316   322   315   315      2        .0
301       317   323   322   316      2        .0
```

HA

191

```
302      318   324   323   317      2        .0
303      318   319   325   324      2        .0
304      319   320   326   325      2        .0
305      320   321   327   326      2        .0
306      323   328   322   322      2        .0
307      324   329   328   323      2        .0
308      324   325   330   329      2        .0
309      325   326   331   330      2        .0
310      326   327   332   331      2        .0
311      329   333   328   328      2        .0
312      333   329   335   334      2        .0
313      329   330   336   335      2        .0
314      330   331   337   336      2        .0
315      331   332   338   337      2        .0
316      334   335   340   339      2        .0
317      335   336   341   340      2        .0
318      336   337   342   341      2        .0
319      337   338   343   342      2        .0
320      339   340   345   344      2        .0
321      340   341   346   345      2        .0
322      341   342   347   346      2        .0
323      342   343   348   347      2        .0
324      344   345   350   349      2        .0
325      345   346   351   350      2        .0
326      346   347   352   351      2        .0
327      347   348   353   352      2        .0
328      349   350   355   354      2        .0
329      350   351   356   355      2        .0
330      351   352   357   356      2        .0
331      352   353   358   357      2        .0
332      354   355   360   359      2        .0
333      355   356   361   360      2        .0
334      356   357   362   361      2        .0
335      357   358   363   362      2        .0
336      359   360   365   364      2        .0
337      360   361   366   365      2        .0
338      361   362   367   366      2        .0
339      362   363   368   367      2        .0
340      364   365   370   369      2        .0
341      365   366   371   370      2        .0
```

HA 192

```
           342        366    367    372    371          2          .0
           343        367    368    373    372          2          .0
           344        369    370    375    374          2          .0
           345        370    371    376    375          2          .0
           346        371.   372    377    376          2          .0
           347        372    373    378    377          2          .0
           348        374    375    380    379          2          .0
           349        375    376    381    380          2          .0
           350        376    377    382    381          2          .0
           351        377    378    383    382          2          .0
           352        379    380    385    384          2          .0
           353        380    381    386    385          2          .0
           354        381    382    387    386          2          .0
           355        382    383    388    387          2          .0
           356        384    385    390    389          2          .0
           357        385    386    391    390          2          .0
           358        386    387    392    391          2          .0
           359        387    388    393    392          2          .0


                     NODAL FLOWS AND HEADS               POSITION OF PHREATIC SURFACE

                                 PERCENTAGE OF
      NODE        HEAD          AVAILABLE HEAD       FLOW        ABOVE   ON   BELOW      X          Y

        1       .3500E+02          91.8 %          .1970E+03                    *
        2      -.3062E+01          14.2 %                                       *
```

193

```
             3      -.3065E+01          14.2 %                                        *
             4       .3500E+02          91.8 %          .3942E+03                     *
             5      -.9447E+00          18.5 %                                   *              -10.24      -
 .94
             6      -.9450E+00          18.5 %                                   *              -20.00      -
 .95
             7      -.3071E+01          14.1 %                                        *
             8      -.3073E+01          14.1 %                                        *
             9       .3500E+02          91.8 %          .3292E+03                     *
            10      -.9438E+00          18.5 %                                   *                -.49      -
 .94
            11      -.3099E+01          14.1 %                                        *
            12      -.3099E+01          14.1 %                                        *
            13       .3500E+02          91.8 %          .2697E+03                     *
            14       .2917E+01          26.4 %                                   *               11.44
 2.92
            15       .0000E+00          20.4 %                                   *                2.94
 .00
            16      -.3113E+01          14.1 %                                   *                3.63      -
 3.11
            17      -.3123E+01          14.0 %                                        *
            18      -.3142E+01          14.0 %                                        *
            19       .3500E+02          91.8 %          .2699E+03                     *
            20       .5833E+01          32.3 %                                   *               19.95
 5.83
            21                                                              *
            22      -.3251E+01          13.8 %                                   *               23.28      -
 3.25
            23      -.3178E+01          13.9 %                                   *               13.70      -
 3.18
            24      -.3180E+01          13.9 %                                        *
            25      -.3192E+01          13.9 %                                        *
            26      -.3199E+01          13.9 %                                        *
            27       .3500E+02          91.8 %          .2316E+03                     *
            28       .8750E+01          38.3 %                                   *               28.45
 8.75
            29                                                              *
            30                                                              *
            31                                                              *
            32      -.3337E+01          13.6 %                                   *               32.85      -
```

HA 194

```
 3.34
          33     -.3251E+01     13.8 %                           *           23.28    -
 3.25
          34     -.3264E+01     13.7 %                               *
          35     -.3269E+01     13.7 %                               *
          36      .3500E+02     91.8 %       .9328E+02               *
          37      .1167E+02     44.2 %                           *           36.95
11.67
          38                                                  *
          39                                                  *
          40                                                  *
          41                                                  *
          42     -.3430E+01     13.4 %                           *           42.42    -
 3.43
          43     -.3435E+01     13.4 %                               *
          44     -.3346E+01     13.6 %                               *
          45     -.3350E+01     13.6 %                               *
          46      .3500E+02     91.8 %       .7192E+02               *
          47      .1458E+02     50.2 %                           *           45.45
14.58
          48                                                  *
          49                                                  *
          50                                                  *
          51                                                  *
          52                                                  *
          53     -.3528E+01     13.2 %                           *           51.96    -
 3.53
          54     -.3530E+01     13.2 %                               *
          55     -.3531E+01     13.2 %                               *
          56     -.3437E+01     13.4 %                               *
          57      .3500E+02     91.8 %       .7210E+02               *
          58      .1750E+02     56.1 %                           *           53.95
17.50
          59                                                  *
          60                                                  *
          61                                                  *
          62                                                  *
          63                                                  *
          64                                                  *
          65     -.3638E+01     13.0 %                           *           61.49    -
```

HA 195

```
3.64
          66        -.3634E+01          13.0 %                                       *
          67        -.3632E+01          13.0 %                                       *
          68         .3500E+02          91.8 %          .7388E+02                    *
          69         .2042E+02          62.1 %                                  *             62.46
20.42
          70                                                               *
          71                                                               *
          72                                                               *
          73                                                               *
          74                                                               *
          75                                                               *
          76                                                               *
          77        -.3747E+01          12.8 %                                  *             70.99       -
3.75
          78        -.3740E+01          12.8 %                                       *
          79        -.3736E+01          12.8 %                                       *
          80         .3500E+02          91.8 %          .3299E+02                    *
          81         .2333E+02          68.0 %                                  *             70.96
23.33
          82                                                               *
          83                                                               *
          84                                                               *
          85                                                               *
          86                                                               *
          87                                                               *
          88                                                               *
          89                                                               *
          90        -.3802E+01          12.6 %                                  *             75.73       -
3.80
          91        -.3793E+01          12.7 %                                       *
          92        -.3788E+01          12.7 %                                       *
          93         .3500E+02          91.8 %          .1150E+02                    *
          94         .2625E+02          74.0 %                                  *             79.47
26.25
          95                                                               *
          96                                                               *
          97                                                               *
          98                                                               *
          99                                                               *
```

HA 196

```
         100                                                               *
         101                                                               *
         102                                                               *
         103                                                               *
         104        -.3857E+01          12.5 %                                  *             80.46       -
3.86
         105        -.3846E+01          12.6 %                                       *
         106        -.3840E+01          12.6 %                                       *
         107         .3500E+02          91.8 %          .1153E+02                    *
         108         .2917E+02          79.9 %                                  *             87.98
29.17
         109                                                               *
         110                                                               *
         111                                                               *
         112                                                               *
         113                                                               *
         114                                                               *
         115                                                               *
         116                                                               *
         117                                                               *
         118                                                               *
         119        -.3966E+01          12.3 %                                  *             89.92       -
3.97
         120        -.3952E+01          12.3 %                                       *
         121        -.3943E+01          12.4 %                                       *
         122         .3208E+02          85.9 %                                  *      -      96.49
32.08
         123         .3208E+02          85.9 %                                  *             96.49
32.08
         124                                                               *
         125                                                               *
         126                                                               *
         127                                                               *
         128                                                               *
         129                                                               *
         130                                                               *
         131                                                               *
         132                                                               *
         133                                                               *
         134                                                               *
```

HA 197

```
          135    -.4074E+01     12.1 %                                *        99.34    -
  4.07
          136    -.4058E+01     12.1 %                                   *
          137    -.4047E+01     12.1 %                                   *
          138     .3500E+02     91.8 %         .4386E+00              *       105.00
 35.00
          139                                                      *
          140                                                      *
          141                                                      *
          142                                                      *
          143                                                      *
          144                                                      *
          145                                                      *
          146                                                      *
          147                                                      *
          148                                                      *
          149                                                      *
          150                                                      *
          151                                                      *
          152    -.4182E+01     11.9 %                                *       108.75    -
  4.18
          153    -.4163E+01     11.9 %                                   *
          154    -.4150E+01     11.9 %                                   *
          155                                                      *
          156                                                      *
          157                                                      *
          158                                                      *
          159                                                      *
          160                                                      *
          161                                                      *
          162                                                      *
          163                                                      *
          164                                                      *
          165                                                      *
          166                                                      *
          167                                                      *
          168                                                      *
          169                                                      *
          170    -.4278E+01     11.7 %                                *       117.25    -
  4.28
```

HA 198

```
         171        -.4249E+01          11.7 %                                      *
         172        -.4227E+01          11.8 %                                      *
         173                                                              *
         174                                                              *
         175                                                              *
         176                                                              *
         177                                                              *
         178                                                              *
         179                                                              *
         180                                                              *
         181                                                              *
         182                                                              *
         183                                                              *
         184                                                              *
         185                                                              *
         186                                                              *
         187        -.4347E+01          11.5 %                                 *             123.42      -
4.35
         188        -.4323E+01          11.6 %                                      *
         189        -.4304E+01          11.6 %                                      *
         190                                                              *
         191                                                              *
         192                                                              *
         193                                                              *
         194                                                              *
         195                                                              *
         196                                                              *
         197                                                              *
         198                                                              *
         199                                                              *
         200                                                              *
         201                                                              *
         202                                                              *
         203                                                              *
         204        -.4419E+01          11.4 %                                 *             129.61      -
4.42
         205        -.4398E+01          11.4 %                                      *
         206        -.4381E+01          11.5 %                                      *
         207                                                              *
         208                                                              *
```

HP
199

```
        209                                                                *
        210                                                                *
        211                                                                *
        212                                                                *
        213                                                                *
        214                                                                *
        215                                                                *
        216                                                                *
        217                                                                *
        218                                                                *
        219                                                                *
        220         -.4526E+01           11.2 %                                 *             137.55       -
4.53
        221         -.4493E+01           11.2 %                                      *
        222         -.4466E+01           11.3 %                                      *
        223                                                                *
        224                                                                *
        225                                                                *
        226                                                                *                               -
        227                                                                *
        228                                                                *
        229                                                                *
        230                                                                *
        231                                                                *
        232                                                                *
        233                                                                *
        234                                                                *
        235         -.4644E+01           10.9 %                                 *             146.41       -
4.64
        236         -.4613E+01           11.0 %                                      *
        237         -.4585E+01           11.1 %                                      *
        238                                                                *
        239                                                                *
        240                                                                *
        241                                                                *
        242                                                                *
        243                                                                *
        244                                                                *
        245                                                                *
        246                                                                *
```

HA 200

```
          247                                                               *
          248                                                               *
          249        -.4763E+01          10.7 %                                 *              155.27      -
4.76
          250        -.4734E+01          10.7 %                                       *
          251        -.4706E+01          10.8 %                                       *
          252                                                               *
          253                                                               *
          254                                                               *
          255                                                               *
          256                                                               *
          257                                                               *
          258                                                               *
          259                                                               *
          260                                                               *
          261                                                               *
          262        -.4884E+01          10.4 %                                 *              164.13      -
4.88
          263        -.4856E+01          10.5 %                                       *
          264        -.4828E+01          10.6 %                                       *
          265                                                               *
          266                                                               *
          267                                                               *
          268                                                               *
          269                                                               *
          270                                                               *
          271                                                               *
          272                                                               *
          273                                                               *
          274        -.5006E+01          10.2 %                                 *              172.99      -
5.01
          275        -.4980E+01          10.2 %                                       *
          276        -.4952E+01          10.3 %                                       *
          277                                                               *
          278                                                               *
          279                                                               *
          280                                                               *
          281                                                               *
          282                                                               *
          283                                                               *
```

201

```
         284                                                               *
         285        -.5131E+01            9.9 %                                 *             181.85       -
5.13
         286        -.5107E+01           10.0 %                                      *
         287        -.5078E+01           10.0 %                                      *
         288                                                               *
         289                                                               *
         290                                                               *
         291                                                               *
         292                                                               *
         293                                                               *
         294                                                               *
         295        -.5258E+01            9.7 %                                 *             190.70       -
5.26
         296        -.5235E+01            9.7 %                                      *
         297        -.5206E+01            9.8 %                                      *
         298                                                               *
         299                                                               *
         300                                                               *
         301                                                               *
         302                                                               *
         303                                                               *
         304        -.5387E+01            9.4 %                                 *             199.55       -
5.39
         305        -.5366E+01            9.5 %                                      *
         306        -.5336E+01            9.5 %                                      *
         307                                                               *
         308                                                               *
         309                                                               *
         310                                                               *
         311                                                               *
         312        -.5519E+01            9.1 %                                 *             208.40       -
5.52
         313        -.5498E+01            9.2 %                                      *
         314        -.5468E+01            9.2 %                                      *
         315                                                               *
         316                                                               *
         317                                                               *
         318                                                               *
         319        -.5661E+01            8.9 %                                 *             217.24       -
```

HA 202

```
5.66
         320        -.5641E+01          8.9 %                                      *
         321        -.5608E+01          9.0 %                                      *
         322                                                             *
         323                                                             *
         324                                                             *
         325        -.5825E+01          8.5 %                                 *              226.05      -
5.83
         326        -.5808E+01          8.6 %                                      *
         327        -.5769E+01          8.6 %                                      *
         328                                                             *
         329                                                             *
         330        -.5993E+01          8.2 %                                 *              234.85      -
5.99
         331        -.5979E+01          8.2 %                                      *
         332        -.5940E+01          8.3 %                                      *
         333                                                             *
         334                                                             *
         335                                                             *
         336        -.6159E+01          7.8 %                                 *              243.44      -
6.16
         337        -.6150E+01          7.9 %                                      *
         338        -.6113E+01          7.9 %                                      *
         339                                                             *
         340                                                             *
         341        -.6328E+01          7.5 %                                 *              252.05      -
6.33
         342        -.6323E+01          7.5 %                                      *
         343        -.6289E+01          7.6 %                                      *
         344                                                             *
         345                                                             *
         346        -.6502E+01          7.1 %                                 *              260.70      -
6.50
         347        -.6502E+01          7.1 %                                 *              260.70      -
6.50
         348        -.6469E+01          7.2 %                                      *
         349                                                             *
         350                                                             *
         351                                                             *
         352        -.6698E+01          6.7 %                                 *              269.37      -
```

HA
203

```
6.70
         353        -.6666E+01            6.8 %                                      *
         354                                                               *
         355                                                               *
         356                                                               *
         357        -.6897E+01            6.3 %                                 *             278.13      -
6.90
         358        -.6872E+01            6.4 %                                      *
         359                                                               *
         360                                                               *
         361                                                               *
         362        -.7124E+01            5.9 %                                 *             286.89      -
7.12
         363        -.7101E+01            5.9 %                                      *
         364                                                               *
         365                                                               *
         366                                                               *
         367        -.7369E+01            5.4 %                                 *             295.68      -
7.37
         368        -.7351E+01            5.4 %                                      *
         369                                                               *
         370                                                               *
         371                                                               *
         372        -.7625E+01            4.8 %                                 *             304.49      -
7.63
         373        -.7608E+01            4.9 %                                      *
         374                                                               *
         375                                                               *
         376                                                               *
         377        -.7914E+01            4.3 %                                 *             313.32      -
7.91
         378        -.7908E+01            4.3 %                                      *
         379                                                               *
         380                                                               *
         381                                                               *
         382        -.8336E+01            3.4 %                                 *             322.17      -
8.34
         383        -.8336E+01            3.4 %                                      *
         384                                                               *
         385                                                               *
```

HA 204

```
               386                                                                   *
               387     -.8829E+01     2.4 %                                              *          331.06    -
     8.83
               388     -.8820E+01     2.4 %                                                  *
               389                                                                   *
               390                                                                   *
               391                                                                   *
               392     -.9394E+01     1.2 %                                              *
     9.39                                                                                           340.00    -
               393     -.1000E+02      .0 %        -.2478E+04                                *


               FLOW(-) =    4.7972E+03            FLOW(+) =    4.7964E+03
                         FLOW(AVE) =    4.7968E+03




                                   ELEMENT FLOWRATES

       ELMT      V1          V2        P-AXIS ANG      RES V        DIR OF V


         1     .491E-03    -.394E+02    .000E+00     .394E+02     -.900E+02
         2     .125E+02    -.138E+05    .000E+00     .138E+05     -.899E+02
         3     .258E+02    -.142E+02    .000E+00     .295E+02     -.289E+02
         4     .183E-02    -.394E+02    .000E+00     .394E+02     -.900E+02
         5     .378E+02    -.139E+05    .000E+00     .139E+05     -.898E+02
         6     .760E+02    -.114E+02    .000E+00     .769E+02     -.850E+01
         7     .123E+02    -.370E+02    .000E+00     .390E+02     -.716E+02
         8     .242E+01    -.985E+01    .000E+00     .101E+02     -.762E+02
         9     .371E+04    -.984E+04    .000E+00     .105E+05     -.693E+02
        10     .121E+03    -.193E+02    .000E+00     .123E+03     -.902E+01
        11     .123E+02    -.370E+02    .000E+00     .390E+02     -.716E+02
```

205

```
  15     .791E+01   -.250E+05    .000E+00    .250E+05    -.900E+02
  16     .164E+03   -.477E+02    .000E+00    .171E+03    -.162E+02
  17     .164E+03   -.747E+01    .000E+00    .165E+03    -.260E+01
  18     .123E+02   -.370E+02    .000E+00    .390E+02    -.716E+02
  23     .000E+00    .000E+00    .000E+00    .000E+00     .000E+00
  24     .200E+03   -.191E+02    .000E+00    .201E+03    -.546E+01
  25     .205E+03   -.612E+01    .000E+00    .205E+03    -.171E+01
  26     .124E+02   -.371E+02    .000E+00    .391E+02    -.716E+02
  32     .256E+03   -.902E+01    .000E+00    .256E+03    -.202E+01
  33     .235E+03   -.167E+02    .000E+00    .236E+03    -.407E+01
  34     .235E+03   -.436E+01    .000E+00    .235E+03    -.106E+01
  35     .124E+02   -.373E+02    .000E+00    .393E+02    -.716E+02
  42     .271E+03   -.120E+02    .000E+00    .271E+03    -.252E+01
  43     .274E+03   -.395E+01    .000E+00    .274E+03    -.826E+00
  44     .256E+03   -.319E+01    .000E+00    .256E+03    -.715E+00
  45     .125E+02   -.373E+02    .000E+00    .394E+02    -.716E+02
  53     .300E+03   -.887E+01    .000E+00    .300E+03    -.169E+01
  54     .296E+03   -.277E+01    .000E+00    .296E+03    -.535E+00
  55     .125E+02   -.374E+02    .000E+00    .395E+02    -.716E+02
  64     .302E+03   -.794E+00    .000E+00    .302E+03    -.151E+00
  65     .302E+03   -.298E+00    .000E+00    .302E+03    -.565E-01
  66     .125E+02   -.376E+02    .000E+00    .396E+02    -.716E+02
  76     .303E+03   -.105E+01    .000E+00    .303E+03    -.197E+00
  77     .303E+03   -.244E+00    .000E+00    .303E+03    -.462E-01
  78     .126E+02   -.377E+02    .000E+00    .397E+02    -.716E+02
  89     .304E+03   -.637E-01    .000E+00    .304E+03    -.120E-01
  90     .304E+03   -.117E+00    .000E+00    .304E+03    -.220E-01
  91     .126E+02   -.378E+02    .000E+00    .398E+02    -.716E+02
 103     .304E+03    .544E+00    .000E+00    .304E+03     .103E+00
 104     .303E+03    .841E-01    .000E+00    .303E+03     .159E-01
 105     .126E+02   -.379E+02    .000E+00    .399E+02    -.716E+02
 118     .302E+03    .113E+01    .000E+00    .302E+03     .215E+00
 119     .302E+03    .230E+00    .000E+00    .302E+03     .435E-01
 134     .301E+03    .133E+01    .000E+00    .301E+03     .253E+00
 135     .301E+03    .335E+00    .000E+00    .301E+03     .638E-01
 151     .299E+03    .144E+01    .000E+00    .299E+03     .277E+00
 152     .299E+03    .238E+00    .000E+00    .299E+03     .456E-01
 167     .297E+03   -.216E+01    .000E+00    .297E+03    -.418E+00
 168     .299E+03    .339E+00    .000E+00    .299E+03     .651E-01
 183     .301E+03   -.721E+01    .000E+00    .301E+03    -.137E+01
```

HA 206

```
 184   .301E+03   -.340E+01   .000E+00   .301E+03   -.648E+00
 199   .348E+03   -.187E+02   .000E+00   .348E+03   -.307E+01
 200   .335E+03   -.801E+01   .000E+00   .335E+03   -.137E+01
 214   .350E+03   -.396E+01   .000E+00   .350E+03   -.647E+00
 215   .351E+03   -.140E+01   .000E+00   .351E+03   -.229E+00
 228   .353E+03   -.105E+02   .000E+00   .353E+03   -.171E+01
 229   .353E+03   -.688E-01   .000E+00   .353E+03   -.112E-01
 241   .357E+03   -.110E+02   .000E+00   .358E+03   -.177E+01
 242   .356E+03   -.923E+00   .000E+00   .356E+03   -.148E+00
 253   .363E+03   -.142E+02   .000E+00   .363E+03   -.224E+01
 254   .362E+03   -.102E+01   .000E+00   .362E+03   -.161E+00
 264   .370E+03   -.165E+02   .000E+00   .370E+03   -.256E+01
 265   .368E+03   -.126E+01   .000E+00   .368E+03   -.196E+00
 274   .376E+03   -.151E+02   .000E+00   .377E+03   -.230E+01
 275   .375E+03   -.123E+01   .000E+00   .375E+03   -.189E+00
 283   .382E+03   -.131E+02   .000E+00   .382E+03   -.196E+01
 284   .381E+03   -.934E+00   .000E+00   .381E+03   -.141E+00
 291   .387E+03    .498E+01   .000E+00   .387E+03    .736E+00
 292   .384E+03   -.952E+00   .000E+00   .384E+03   -.142E+00
 298   .422E+03    .146E+02   .000E+00   .422E+03    .198E+01
 299   .414E+03   -.790E+01   .000E+00   .414E+03   -.109E+01
 304   .488E+03   -.328E+02   .000E+00   .489E+03   -.384E+01
 305   .479E+03   -.127E+02   .000E+00   .479E+03   -.152E+01
 309   .499E+03   -.472E+02   .000E+00   .501E+03   -.541E+01
 310   .499E+03   -.238E+00   .000E+00   .499E+03   -.274E-01
 314   .509E+03   -.635E+02   .000E+00   .513E+03   -.712E+01
 315   .508E+03   -.220E+01   .000E+00   .508E+03   -.249E+00
 318   .515E+03   -.777E+02   .000E+00   .521E+03   -.858E+01
 319   .514E+03   -.631E+00   .000E+00   .514E+03   -.703E-01
 322   .525E+03   -.901E+02   .000E+00   .532E+03   -.975E+01
 323   .524E+03   -.544E+01   .000E+00   .524E+03   -.595E+00
 327   .585E+03   -.146E+02   .000E+00   .586E+03   -.145E+01
 331   .600E+03   -.151E+01   .000E+00   .600E+03   -.144E+00
 335   .673E+03   -.169E+02   .000E+00   .673E+03   -.144E+01
 339   .733E+03   -.135E+02   .000E+00   .734E+03   -.105E+01
 343   .758E+03    .681E+01   .000E+00   .758E+03    .515E+00
 347   .866E+03   -.201E+02   .000E+00   .867E+03   -.133E+01
 351   .125E+04   -.117E+03   .000E+00   .126E+04   -.535E+01
 355   .143E+04   -.296E+02   .000E+00   .143E+04   -.118E+01
 359   .228E+04   -.890E+04   .000E+00   .919E+04   -.757E+02
```

HA 207

```
                    NODAL FLOWS AND HEADS

                                  PERCENTAGE OF
  NODE          HEAD             AVAILABLE HEAD         FLOW

    1         .1390E+03              3.0 %           -.1000E+03
    2         .1390E+03              3.0 %           -.2063E-01
    3         .1390E+03              3.0 %           -.1693E-01
    4         .2430E+04             50.7 %
    5         .2372E+04             49.4 %
    6         .1390E+03              3.0 %           -.1088E+03
    7         .1301E+04             27.2 %
    8         .1390E+03              3.0 %           -.7839E-01
    9         .4693E+04             97.7 %
   10         .4593E+04             95.6 %
   11         .2539E+04             52.9 %
   12         .1390E+03              3.0 %           -.1601E+00
   13         .4792E+04             99.7 %
   14         .4774E+04             99.4 %           -.5302E+02
   15         .4774E+04             99.4 %            .2516E+03
   16         .4804E+04            100.0 %
   17         .3409E+04             71.0 %
   18         .1390E+03              3.0 %           -.2178E+00
   19         .4769E+04             99.3 %
   20         .4774E+04             99.4 %            .1336E+02
```

HA 208

```
 21      .2917E+01       .2 %        .0000E+00
 22     -.3251E+01       .1 %        .0000E+00
 23      .4774E+04     99.4 %        .2520E+00
 24      .4594E+04     95.6 %
 25      .2400E+04     50.0 %
 26      .1390E+03      3.0 %       -.2317E+00
 27      .4775E+04     99.4 %
 28      .4774E+04     99.4 %       -.3379E+01
 29      .5833E+01       .3 %        .0000E+00
 30      .2917E+01       .2 %        .0000E+00
 31      .0000E+00       .1 %        .0000E+00
 32      .4774E+04     99.4 %        .2534E+00
 33      .4774E+04     99.4 %        .2501E+00
 34      .2426E+04     50.6 %
 35      .1390E+03      3.0 %       -.2354E+00
 36      .4773E+04     99.4 %
 37      .4774E+04     99.4 %        .8755E+00
 38      .8750E+01       .3 %        .0000E+00
 39      .5833E+01       .3 %        .0000E+00
 40      .2917E+01       .2 %        .0000E+00
 41      .0000E+00       .1 %        .0000E+00
 42      .4774E+04     99.4 %        .2565E+00
 43      .2491E+04     51.9 %
 44      .2461E+04     51.3 %
 45      .1390E+03      3.0 %       -.2386E+00
 46      .4774E+04     99.4 %
 47      .4774E+04     99.4 %       -.2448E+00
 48      .1167E+02       .4 %        .0000E+00
 49      .8750E+01       .3 %        .0000E+00
 50      .5833E+01       .3 %        .0000E+00
 51      .2917E+01       .2 %        .0000E+00
 52      .0000E+00       .1 %        .0000E+00
 53      .4774E+04     99.4 %        .2598E+00
 54      .2526E+04     52.6 %
 55      .1390E+03      3.0 %       -.2454E+00
 56      .1390E+03      3.0 %       -.2419E+00
 57      .4774E+04     99.4 %
 58      .4774E+04     99.4 %        .4805E-01
 59      .1458E+02       .4 %        .0000E+00
 60      .1167E+02       .4 %        .0000E+00
```

209

```
 61         .8750E+01         .3 %        .0000E+00
 62         .5833E+01         .3 %        .0000E+00
 63         .2917E+01         .2 %        .0000E+00
 64         .0000E+00         .1 %        .0000E+00
 65         .4774E+04       99.4 %        .2637E+00
 66         .2566E+04       53.5 %
 67         .1390E+03        3.0 %      -.2493E+00
 68         .4774E+04       99.4 %
 69         .4774E+04       99.4 %      -.1682E-01
 70         .1750E+02         .5 %        .0000E+00
 71         .1458E+02         .4 %        .0000E+00
 72         .1167E+02         .4 %        .0000E+00
 73         .8750E+01         .3 %        .0000E+00
 74         .5833E+01         .3 %        .0000E+00
 75         .2917E+01         .2 %        .0000E+00
 76         .0000E+00         .1 %        .0000E+00
 77         .4774E+04       99.4 %        .2002E+00
 78         .2607E+04       54.3 %
 79         .1390E+03        3.0 %      -.1895E+00
 80         .4774E+04       99.4 %
 81         .4774E+04       99.4 %        .1036E-01
 82         .2042E+02         .6 %        .0000E+00
 83         .1750E+02         .5 %        .0000E+00
 84         .1458E+02         .4 %        .0000E+00
 85         .1167E+02         .4 %        .0000E+00
 86         .8750E+01         .3 %        .0000E+00
 87         .5833E+01         .3 %        .0000E+00
 88         .2917E+01         .2 %        .0000E+00
 89         .0000E+00         .1 %        .0000E+00
 90         .4774E+04       99.4 %        .1348E+00
 91         .2628E+04       54.8 %
 92         .1390E+03        3.0 %      -.1277E+00
 93         .4774E+04       99.4 %
 94         .4774E+04       99.4 %      -.2369E-01
 95         .2333E+02         .6 %        .0000E+00
 96         .2042E+02         .6 %        .0000E+00
 97         .1750E+02         .5 %        .0000E+00
 98         .1458E+02         .4 %        .0000E+00
 99         .1167E+02         .4 %        .0000E+00
100         .8750E+01         .3 %        .0000E+00
```

HA 210

```
 101        .5833E+01      .3 %       .0000E+00
 102        .2917E+01      .2 %       .0000E+00
 103        .0000E+00      .1 %       .0000E+00
 104        .4774E+04    99.4 %       .2042E+00
 105        .2649E+04    55.2 %
 106        .1390E+03     3.0 %      -.1939E+00
 107        .4774E+04    99.4 %
 108        .4774E+04    99.4 %       .3903E-01
 109        .2625E+02      .7 %       .0000E+00
 110        .2333E+02      .6 %       .0000E+00
 111        .2042E+02      .6 %       .0000E+00
 112        .1750E+02      .5 %       .0000E+00
 113        .1458E+02      .4 %       .0000E+00
 114        .1167E+02      .4 %       .0000E+00
 115        .8750E+01      .3 %       .0000E+00
 116        .5833E+01      .3 %       .0000E+00
 117        .2917E+01      .2 %       .0000E+00
 118        .0000E+00      .1 %       .0000E+00
 119        .4774E+04    99.4 %       .2759E+00
 120        .2693E+04    56.1 %
 121        .1390E+03     3.0 %      -.2621E+00
 122        .4774E+04    99.4 %      -.7353E-01
 123        .3208E+02      .8 %       .0000E+00
 124        .2917E+02      .7 %       .0000E+00
 125        .2625E+02      .7 %       .0000E+00
 126        .2333E+02      .6 %       .0000E+00
 127        .2042E+02      .6 %       .0000E+00
 128        .1750E+02      .5 %       .0000E+00
 129        .1458E+02      .4 %       .0000E+00
 130        .1167E+02      .4 %       .0000E+00
 131        .8750E+01      .3 %       .0000E+00
 132        .5833E+01      .3 %       .0000E+00
 133        .2917E+01      .2 %       .0000E+00
 134        .0000E+00      .1 %       .0000E+00
 135        .4774E+04    99.4 %       .2803E+00
 136        .2739E+04    57.1 %
 137        .1390E+03     3.0 %      -.2666E+00
 138        .3500E+02      .9 %       .0000E+00
 139        .3500E+02      .9 %       .0000E+00
 140        .3208E+02      .8 %       .0000E+00
```

HAB
211

```
141        .2917E+02        .7 %       .0000E+00
142        .2625E+02        .7 %       .0000E+00
143        .2333E+02        .6 %       .0000E+00
144        .2042E+02        .6 %       .0000E+00
145        .1750E+02        .5 %       .0000E+00
146        .1458E+02        .4 %       .0000E+00
147        .1167E+02        .4 %       .0000E+00
148        .8750E+01        .3 %       .0000E+00
149        .5833E+01        .3 %       .0000E+00
150        .2917E+01        .2 %       .0000E+00
151        .0000E+00        .1 %       .0000E+00
152        .4774E+04      99.4 %       .2712E+00
153        .2786E+04      58.0 %
154        .1390E+03       3.0 %      -.2371E+00
155        .3900E+02        .9 %       .0000E+00
156        .3900E+02        .9 %       .0000E+00
157        .3600E+02        .9 %       .0000E+00
158        .3300E+02        .8 %       .0000E+00
159        .3000E+02        .8 %       .0000E+00
160        .2700E+02        .7 %       .0000E+00
161        .2400E+02        .6 %       .0000E+00
162        .2100E+02        .6 %       .0000E+00
163        .1800E+02        .5 %       .0000E+00
164        .1500E+02        .4 %       .0000E+00
165        .1200E+02        .4 %       .0000E+00
166        .9000E+01        .3 %       .0000E+00
167        .6000E+01        .3 %       .0000E+00
168        .3000E+01        .2 %       .0000E+00
169        .0000E+00        .1 %       .0000E+00
170        .4774E+04      99.4 %       .2258E+00
171        .2825E+04      58.9 %
172        .1390E+03       3.0 %      -.2062E+00
173        .3900E+02        .9 %       .0000E+00
174        .3600E+02        .9 %       .0000E+00
175        .3300E+02        .8 %       .0000E+00
176        .3000E+02        .8 %       .0000E+00
177        .2700E+02        .7 %       .0000E+00
178        .2400E+02        .6 %       .0000E+00
179        .2100E+02        .6 %       .0000E+00
180        .1800E+02        .5 %       .0000E+00
```

HA 212

```
181     .1500E+02      .4 %     .0000E+00
182     .1200E+02      .4 %     .0000E+00
183     .9000E+01      .3 %     .0000E+00
184     .6000E+01      .3 %     .0000E+00
185     .3000E+01      .2 %     .0000E+00
186     .0000E+00      .1 %     .0000E+00
187     .4774E+04    99.4 %     .1928E+00
188     .2860E+04    59.6 %
189     .1390E+03     3.0 %    -.2090E+00
190     .3900E+02      .9 %     .0000E+00
191     .3600E+02      .9 %     .0000E+00
192     .3300E+02      .8 %     .0000E+00
193     .3000E+02      .8 %     .0000E+00
194     .2700E+02      .7 %     .0000E+00
195     .2400E+02      .6 %     .0000E+00
196     .2100E+02      .6 %     .0000E+00
197     .1800E+02      .5 %     .0000E+00
198     .1500E+02      .4 %     .0000E+00
199     .1200E+02      .4 %     .0000E+00
200     .9000E+01      .3 %     .0000E+00
201     .6000E+01      .3 %     .0000E+00
202     .3000E+01      .2 %     .0000E+00
203     .0000E+00      .1 %     .0000E+00
204     .4774E+04    99.4 %     .2234E+00
205     .2896E+04    60.3 %
206     .1390E+03     3.0 %    -.2119E+00
207     .3623E+02      .9 %     .0000E+00
208     .3311E+02      .8 %     .0000E+00
209     .3010E+02      .8 %     .0000E+00
210     .2709E+02      .7 %     .0000E+00
211     .2408E+02      .6 %     .0000E+00
212     .2107E+02      .6 %     .0000E+00
213     .1806E+02      .5 %     .0000E+00
214     .1505E+02      .4 %     .0000E+00
215     .1204E+02      .4 %     .0000E+00
216     .9029E+01      .3 %     .0000E+00
217     .6019E+01      .3 %     .0000E+00
218     .3010E+01      .2 %     .0000E+00
219     .0000E+00      .1 %     .0000E+00
220     .4774E+04    99.4 %     .2709E+00
```

HA
213

```
221      .2943E+04    61.3 %
222      .1390E+03     3.0 %     -.2514E+00
223      .3346E+02      .8 %      .0000E+00
224      .3021E+02      .8 %      .0000E+00
225      .2719E+02      .7 %      .0000E+00
226      .2417E+02      .6 %      .0000E+00
227      .2115E+02      .6 %      .0000E+00
228      .1813E+02      .5 %      .0000E+00
229      .1510E+02      .4 %      .0000E+00
230      .1208E+02      .4 %      .0000E+00
231      .9063E+01      .3 %      .0000E+00
232      .6042E+01      .3 %      .0000E+00
233      .3021E+01      .2 %      .0000E+00
234      .0000E+00      .1 %      .0000E+00
235      .4774E+04    99.4 %      .2919E+00
236      .3006E+04    62.6 %
237      .1390E+03     3.0 %     -.2931E+00
238      .3069E+02      .8 %      .0000E+00
239      .2731E+02      .7 %      .0000E+00
240      .2428E+02      .6 %      .0000E+00
241      .2124E+02      .6 %      .0000E+00
242      .1821E+02      .5 %      .0000E+00
243      .1517E+02      .5 %      .0000E+00
244      .1214E+02      .4 %      .0000E+00
245      .9104E+01      .3 %      .0000E+00
246      .6069E+01      .3 %      .0000E+00
247      .3035E+01      .2 %      .0000E+00
248      .0000E+00      .1 %      .0000E+00
249      .4774E+04    99.4 %      .2985E+00
250      .3072E+04    64.0 %
251      .1390E+03     3.0 %     -.2998E+00
252      .2792E+02      .7 %      .0000E+00
253      .2441E+02      .6 %      .0000E+00
254      .2136E+02      .6 %      .0000E+00
255      .1831E+02      .5 %      .0000E+00
256      .1526E+02      .5 %      .0000E+00
257      .1220E+02      .4 %      .0000E+00
258      .9154E+01      .3 %      .0000E+00
259      .6103E+01      .3 %      .0000E+00
260      .3051E+01      .2 %      .0000E+00
```

HA 214

```
261        .0000E+00        .1 %      .0000E+00
262        .4774E+04      99.4 %      .3054E+00
263        .3142E+04      65.4 %
264        .1390E+03       3.0 %    -.3069E+00
265        .2515E+02        .7 %      .0000E+00
266        .2150E+02        .6 %      .0000E+00
267        .1843E+02        .5 %      .0000E+00
268        .1536E+02        .5 %      .0000E+00
269        .1229E+02        .4 %      .0000E+00
270        .9216E+01        .3 %      .0000E+00
271        .6144E+01        .3 %      .0000E+00
272        .3072E+01        .2 %      .0000E+00
273        .0000E+00        .1 %      .0000E+00
274        .4774E+04      99.4 %      .3128E+00
275        .3216E+04      67.0 %
276        .1390E+03       3.0 %    -.3144E+00
277        .2239E+02        .6 %      .0000E+00
278        .1859E+02        .5 %      .0000E+00
279        .1549E+02        .5 %      .0000E+00
280        .1240E+02        .4 %      .0000E+00
281        .9297E+01        .3 %      .0000E+00
282        .6198E+01        .3 %      .0000E+00
283        .3099E+01        .2 %      .0000E+00
284        .0000E+00        .1 %      .0000E+00
285        .4774E+04      99.4 %      .3208E+00
286        .3295E+04      68.6 %
287        .1390E+03       3.0 %    -.3225E+00
288        .1961E+02        .5 %      .0000E+00
289        .1567E+02        .5 %      .0000E+00
290        .1254E+02        .4 %      .0000E+00
291        .9404E+01        .3 %      .0000E+00
292        .6269E+01        .3 %      .0000E+00
293        .3135E+01        .2 %      .0000E+00
294        .0000E+00        .1 %      .0000E+00
295        .4774E+04      99.4 %      .3293E+00
296        .3380E+04      70.4 %
297        .1390E+03       3.0 %    -.3311E+00
298        .1685E+02        .5 %      .0000E+00
299        .1274E+02        .4 %      .0000E+00
300        .9554E+01        .3 %      .0000E+00
```

HA 215

```
301       .6369E+01       .3 %        .0000E+00
302       .3185E+01       .2 %        .0000E+00
303       .0000E+00       .1 %        .0000E+00
304       .4774E+04     99.4 %        .3384E+00
305       .3472E+04     72.3 %
306       .1390E+03      3.0 %      -.3403E+00
307       .1408E+02       .4 %        .0000E+00
308       .9779E+01       .3 %        .0000E+00
309       .6519E+01       .3 %        .0000E+00
310       .3260E+01       .2 %        .0000E+00
311       .0000E+00       .1 %        .0000E+00
312       .4774E+04     99.4 %        .3481E+00
313       .3570E+04     74.3 %
314       .1390E+03      3.0 %      -.3504E+00
315       .1131E+02       .4 %        .0000E+00
316       .6769E+01       .3 %        .0000E+00
317       .3385E+01       .2 %        .0000E+00
318       .0000E+00       .1 %        .0000E+00
319       .4774E+04     99.4 %        .3588E+00
320       .3683E+04     76.7 %
321       .1390E+03      3.0 %      -.3617E+00
322       .8538E+01       .3 %        .0000E+00
323       .3635E+01       .2 %        .0000E+00
324       .0000E+00       .1 %        .0000E+00
325       .4774E+04     99.4 %        .3723E+00
326       .3822E+04     79.6 %
327       .1390E+03      3.0 %      -.3753E+00
328       .5769E+01       .3 %        .0000E+00
329       .0000E+00       .1 %        .0000E+00
330       .4774E+04     99.4 %        .3827E+00
331       .3978E+04     82.8 %
332       .1390E+03      3.0 %      -.3910E+00
333       .3000E+01       .2 %        .0000E+00
334       .3000E+01       .2 %        .0000E+00
335       .0000E+00       .1 %        .0000E+00
336       .4774E+04     99.4 %        .3952E+00
337       .4150E+04     86.4 %
338       .1390E+03      3.0 %      -.4084E+00
339       .3000E+01       .2 %        .0000E+00
340       .0000E+00       .1 %        .0000E+00
```

HA 216

```
 341        .4774E+04      99.4 %       .4145E+00
 342        .4334E+04      90.2 %
 343        .1390E+03       3.0 %      -.4278E+00
 344        .3000E+01        .2 %       .0000E+00
 345        .0000E+00        .1 %       .0000E+00
 346       -.6502E+01        .0 %       .0000E+00
 347        .4774E+04      99.4 %       .4372E+00
 348        .1390E+03       3.0 %      -.4500E+00
 349        .3000E+01        .2 %       .0000E+00
 350        .0000E+00        .1 %       .0000E+00
 351       -.3333E+01        .1 %       .0000E+00
 352        .4774E+04      99.4 %       .4658E+00
 353        .1390E+03       3.0 %      -.4766E+00
 354        .3000E+01        .2 %       .0000E+00
 355        .0000E+00        .1 %       .0000E+00
 356       -.3333E+01        .1 %       .0000E+00
 357        .4774E+04      99.4 %       .4991E+00
 358        .1390E+03       3.0 %      -.5084E+00
 359        .3000E+01        .2 %       .0000E+00
 360        .0000E+00        .1 %       .0000E+00
 361       -.3333E+01        .1 %       .0000E+00
 362        .4774E+04      99.4 %       .5394E+00
 363        .1390E+03       3.0 %      -.5487E+00
 364        .3000E+01        .2 %       .0000E+00
 365        .0000E+00        .1 %       .0000E+00
 366       -.3333E+01        .1 %       .0000E+00
 367        .4774E+04      99.4 %       .5913E+00
 368        .1390E+03       3.0 %      -.6004E+00
 369        .3000E+01        .2 %       .0000E+00
 370        .0000E+00        .1 %       .0000E+00
 371       -.3333E+01        .1 %       .0000E+00
 372        .4774E+04      99.4 %       .6582E+00
 373        .1390E+03       3.0 %      -.6675E+00
 374        .3000E+01        .2 %       .0000E+00
 375        .0000E+00        .1 %       .0000E+00
 376       -.3333E+01        .1 %       .0000E+00
 377        .4774E+04      99.4 %       .7590E+00
 378        .1390E+03       3.0 %      -.7693E+00
 379        .3000E+01        .2 %       .0000E+00
 380        .0000E+00        .1 %       .0000E+00
```

217

```
   381          -.3333E+01          .1 %          .0000E+00
   382           .4774E+04        99.4 %          .9602E+00
   383           .1390E+03         3.0 %        -.9698E+00
   384           .3000E+01          .2 %          .0000E+00
   385           .0000E+00          .1 %          .0000E+00
   386          -.3333E+01          .1 %          .0000E+00
   387           .4774E+04        99.4 %          .1115E+01
   388           .1390E+03         3.0 %        -.1115E+01
   389           .3000E+01          .2 %          .0000E+00
   390           .0000E+00          .1 %          .0000E+00
   391          -.3333E+01          .1 %          .0000E+00
   392           .1390E+03         3.0 %          .2966E+00
   393           .1390E+03         3.0 %        -.3061E+00


    FLOW(-) =    2.8063E+02             FLOW(+) =    2.8059E+02
                      FLOW(AVE) =    2.8061E+02



                        ELEMENT FLOWRATES

 ELMT       V1          V2       P-AXIS ANG     RES V       DIR OF V

   1    -.221E+03   -.135E+01    .000E+00    .221E+03    -.180E+03
   2    -.679E-02   -.461E-02    .000E+00    .821E-02    -.146E+03
   3    -.242E-02   -.436E-02    .000E+00    .499E-02    -.119E+03
   4    -.219E+03    .429E+01    .000E+00    .219E+03     .179E+03
   5    -.692E-02   -.134E-01    .000E+00    .151E-01    -.117E+03
   6    -.258E-02   -.134E-01    .000E+00    .136E-01    -.101E+03
   7    -.107E+02    .150E+02    .000E+00    .184E+02     .125E+03
   8    -.458E+02   -.186E+02    .000E+00    .494E+02    -.158E+03
```

HA 218

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  9   -.896E-02   -.214E-01    .000E+00    .232E-01    -.113E+03
 10   -.226E-02   -.221E-01    .000E+00    .222E-01    -.958E+02
 11    .270E+01   -.414E+01    .000E+00    .494E+01    -.569E+02
 12    .105E-03   -.171E-02    .000E+00    .171E-02    -.865E+02
 13   -.144E-03   -.262E-01    .000E+00    .262E-01    -.903E+02
 14   -.191E-03   -.253E-01    .000E+00    .253E-01    -.904E+02
 15   -.700E+00    .117E+01    .000E+00    .136E+01     .121E+03
 16    .000E+00    .000E+00    .000E+00    .000E+00     .000E+00
 17   -.306E-03   -.257E-01    .000E+00    .257E-01    -.907E+02
 18   -.553E-04   -.260E-01    .000E+00    .260E-01    -.901E+02
 19    .186E+00   -.334E+00    .000E+00    .382E+00    -.609E+02
 20   -.195E-03   -.267E-01    .000E+00    .267E-01    -.904E+02
 21   -.191E-03   -.263E-01    .000E+00    .263E-01    -.904E+02
 22   -.726E-04   -.263E-01    .000E+00    .263E-01    -.902E+02
 23   -.503E-01    .969E-01    .000E+00    .109E+00     .117E+03
 24   -.212E-03   -.270E-01    .000E+00    .270E-01    -.904E+02
 25   -.727E-04   -.271E-01    .000E+00    .271E-01    -.902E+02
 26   -.641E-04   -.267E-01    .000E+00    .267E-01    -.901E+02
 27    .144E-01   -.296E-01    .000E+00    .329E-01    -.641E+02
 28   -.241E-03   -.275E-01    .000E+00    .275E-01    -.905E+02
 29   -.821E-04   -.275E-01    .000E+00    .275E-01    -.902E+02
 30   -.408E-02    .883E-02    .000E+00    .973E-02     .115E+03
 31   -.246E-03   -.279E-01    .000E+00    .279E-01    -.905E+02
 32   -.859E-04   -.279E-01    .000E+00    .279E-01    -.902E+02
 33    .870E-03   -.160E-02    .000E+00    .182E-02    -.615E+02
 34   -.252E-03   -.283E-01    .000E+00    .283E-01    -.905E+02
 35   -.884E-04   -.283E-01    .000E+00    .283E-01    -.902E+02
 36   -.561E-03    .117E-02    .000E+00    .130E-02     .116E+03
 37   -.255E-03   -.286E-01    .000E+00    .286E-01    -.905E+02
 38   -.897E-04   -.285E-01    .000E+00    .285E-01    -.902E+02
 39    .394E-03   -.922E-03    .000E+00    .100E-02    -.669E+02
 40   -.259E-03   -.289E-01    .000E+00    .289E-01    -.905E+02
 41   -.921E-04   -.289E-01    .000E+00    .289E-01    -.902E+02
 42   -.986E-03    .296E-02    .000E+00    .312E-02     .108E+03
 43   -.264E-03   -.295E-01    .000E+00    .295E-01    -.905E+02
 44   -.951E-04   -.294E-01    .000E+00    .294E-01    -.902E+02
 45   -.270E-03   -.300E-01    .000E+00    .300E-01    -.905E+02
 46   -.983E-04   -.299E-01    .000E+00    .299E-01    -.902E+02
 47   -.277E-03   -.305E-01    .000E+00    .305E-01    -.905E+02
 48   -.104E-03   -.304E-01    .000E+00    .304E-01    -.902E+02
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219

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 49   -.274E-03   -.309E-01   .000E+00   .309E-01   -.905E+02
 50   -.101E-03   -.308E-01   .000E+00   .308E-01   -.902E+02
 51   -.284E-03   -.313E-01   .000E+00   .313E-01   -.905E+02
 52   -.104E-03   -.312E-01   .000E+00   .312E-01   -.902E+02
 53   -.340E-03   -.318E-01   .000E+00   .318E-01   -.906E+02
 54   -.127E-03   -.317E-01   .000E+00   .317E-01   -.902E+02
 55   -.348E-03   -.325E-01   .000E+00   .325E-01   -.906E+02
 56   -.133E-03   -.323E-01   .000E+00   .323E-01   -.902E+02
 57   -.362E-03   -.332E-01   .000E+00   .332E-01   -.906E+02
 58   -.139E-03   -.330E-01   .000E+00   .330E-01   -.902E+02
 59   -.378E-03   -.340E-01   .000E+00   .340E-01   -.906E+02
 60   -.147E-03   -.338E-01   .000E+00   .338E-01   -.902E+02
 61   -.396E-03   -.348E-01   .000E+00   .348E-01   -.907E+02
 62   -.157E-03   -.346E-01   .000E+00   .346E-01   -.903E+02
 63   -.419E-03   -.357E-01   .000E+00   .357E-01   -.907E+02
 64   -.168E-03   -.355E-01   .000E+00   .355E-01   -.903E+02
 65   -.442E-03   -.366E-01   .000E+00   .366E-01   -.907E+02
 66   -.180E-03   -.364E-01   .000E+00   .364E-01   -.903E+02
 67   -.467E-03   -.376E-01   .000E+00   .376E-01   -.907E+02
 68   -.193E-03   -.374E-01   .000E+00   .374E-01   -.903E+02
 69   -.495E-03   -.387E-01   .000E+00   .387E-01   -.907E+02
 70   -.208E-03   -.385E-01   .000E+00   .385E-01   -.903E+02
 71   -.560E-03   -.399E-01   .000E+00   .399E-01   -.908E+02
 72   -.238E-03   -.397E-01   .000E+00   .397E-01   -.903E+02
 73   -.677E-03   -.413E-01   .000E+00   .413E-01   -.909E+02
 74   -.294E-03   -.411E-01   .000E+00   .411E-01   -.904E+02
 75   -.738E-03   -.430E-01   .000E+00   .430E-01   -.910E+02
 76   -.330E-03   -.427E-01   .000E+00   .427E-01   -.904E+02
 77   -.803E-03   -.448E-01   .000E+00   .448E-01   -.910E+02
 78   -.366E-03   -.446E-01   .000E+00   .446E-01   -.905E+02
 79   -.857E-03   -.469E-01   .000E+00   .470E-01   -.910E+02
 80   -.393E-03   -.466E-01   .000E+00   .466E-01   -.905E+02
 81   -.971E-03   -.485E-01   .000E+00   .485E-01   -.911E+02
 82   -.481E-03   -.489E-01   .000E+00   .489E-01   -.906E+02
 83   -.573E-03   -.516E-01   .000E+00   .516E-01   -.906E+02
 84   -.615E-03   -.548E-01   .000E+00   .548E-01   -.906E+02
 85   -.749E-03   -.587E-01   .000E+00   .587E-01   -.907E+02
 86   -.882E-03   -.638E-01   .000E+00   .638E-01   -.908E+02
 87   -.101E-02   -.702E-01   .000E+00   .702E-01   -.908E+02
 88   -.128E-02   -.788E-01   .000E+00   .789E-01   -.909E+02
```

HA 220

```
 89   -.222E-02    -.938E-01    .000E+00    .938E-01    -.914E+02
 90   -.342E-02    -.124E+00    .000E+00    .124E+00    -.916E+02
 91    .670E-02    -.995E-01    .000E+00    .997E-01    -.861E+02
```

221

Dam Breach Analysis
Havana Power Station
East Ash Pond #3B

December 14, 2001
JHK

The dam breach analysis was done with the use of two computer programs by Boss Corporation. The first was BREACH and the second was DAMBRK. The critical section for the dam breach analysis was taken as the northeast side of pond 3B. This portion of the dam is adjacent to a rural road with houses nearby and a manufacturing facility across the road. This section of the dam is not the highest portion, but it does represent the greatest risk of safety to life and property. The facility/houses would have a combined occupancy of 10 to 15 during a rainstorm event.

Using the BOSS BREACH computer program, possible failure of the dam via overtopping will be modeled. The polypropylene liner and one-foot clay layer are ignored in the modeling due to limitations in the program and their relative small effects during a dam failure. BREACH modeled the erosion of the dam due to a ½-PMP (i.e.; a 16" rain in 24 hours) rainstorm washing out the top of the dam, overtopping occurring and then erosion of a section of the dam. The HEC-1 analysis results giving the maximum stage elevation of approximately 494' during the ½-PMP rainstorm were used as a top of the dam input to the BREACH and DAMBRK models. The topographic plans showing that the area near the northeast corner of the dam had a minimum elevation of 467', therefore this elevation was used as the input to the BREACH and DAMBRK models for the bottom of the dam. Pond water below this elevation is ignored when computing reservoir volumes. For flows into the pond during the failure, it was assumed that overtopping would begin at hour 4 of a ½-PMP storm event. The distribution of this storm is shown on the following pages. In addition to this, a plant flow of 11.9 cfs is added.

From the soil reports, the average D_{50} value for embankment materials is 0.346 mm. The density for 95% of standard Proctor is 105.6 pcf. The ϕ angle is 30.4°, and the soil has negligible cohesion (C= 10 psf is used as a non-zero value).

The BREACH model indicated that the dam would be protected by the vegetation for a period of time, but that failure of the dam would occur after the vegetation had eroded away. BREACH indicated a peak outflow of 14,693 cfs during the dam failure with a final breach bottom width of 9.5 feet. The side slopes of the breach were approximately 1:1.

DAMBRK was run to analyze the flood crest from the dam to the manufacturing facility and nearby houses. No analysis was done downstream of the manufacturing facility and houses since modeling the flow around the structures with DAMBRK would be very difficult, and give somewhat questionable results. Furthermore, the risk to life safety is greatest at these structures.

The closest house is approximately 200' from the top of the dam and the INTERMET-Havana Foundry manufacturing facility is approximately 650 feet from the top of the dam.

HA 028
222

Dam Breach Analysis
Havana Power Station
East Ash Pond #3B

December 14, 2001
JHK

To run DAMBRK, several criteria had to be selected and assumptions made in order for the program to run. These are listed below:

1. A Manning's coefficient value of 0.04 for the entire downstream channel.
2. The maximum top width of the downstream channel of 200 feet.
3. A constant turbine outflow of 100 cfs was used in order to avoid computational problems with the program.
4. A constant inflow of 165 cfs into the pond. This is the sum of the maximum value of the inflow hydrograph used in BREACH plus the 100 cfs assumed for turbine flow.
5. The grade is approximately at elevation 467 along the entire channel. A fictitious channel of 10-foot width and a constant slope of 15 feet per mile was added to avoid computational problems in the program.

The key results of the DAMBRK run are summarized below:

1. Maximum outflow of 16,295 cfs. This was considered close enough to the 14,693 cfs value (~10%) calculated by BREACH to be acceptable.
2. The maximum stage of the breach wave is about 10 feet with a velocity of 9.3 ft/sec., at a distance of about 500 feet (.075 miles) from the dam.

HA 223

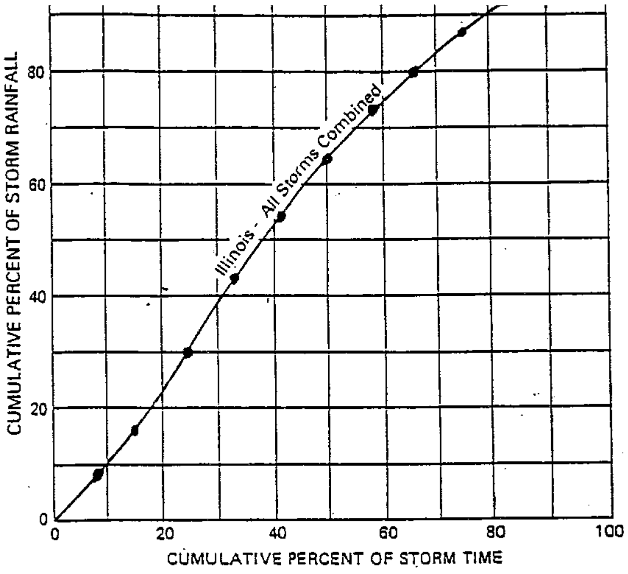


Figure 4. Median time distribution derived from combining all 261 storms from the central Illinois network

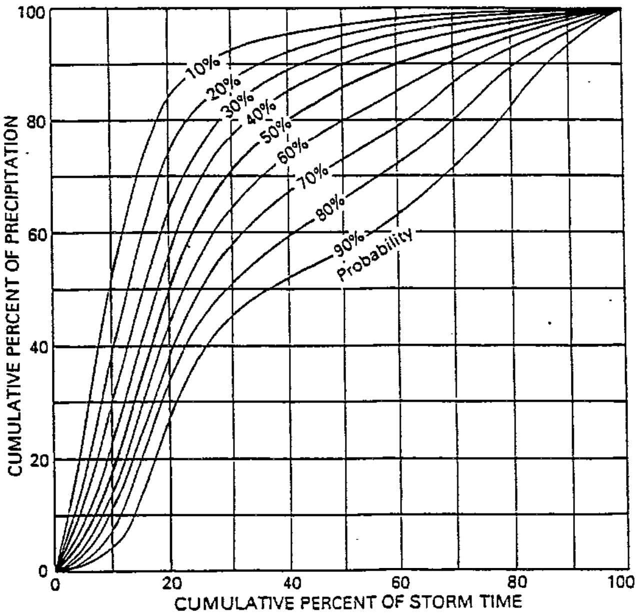


Figure 5. Time distribution of areal mean rainfall in first-quartile storms

From: Time Distributions of Heavy Rainstorms in Illinois by Floyd Huff, Illinois State Water Survey, 1990

HA 119
224

Flow into pond 3B from the 1/2-PMP storm by 2-hr. intervals

hour	% storm	% precipitation	delta % precip.	inches rain	avg. cfs	avg.+plant inflow
2	8.33	8	8	1.28	30.35	42.25
4	16.66	16	8	1.28	30.35	42.25
6	25.00	30	14	2.24	53.12	65.02
8	33.33	42	12	1.92	45.53	57.43
10	41.66	53	11	1.76	41.73	53.63
12	50.00	66	13	2.08	49.32	61.22
14	58.33	74	8	1.28	30.35	42.25
16	66.66	80	6	0.96	22.76	34.66
18	75.00	87	7	1.12	26.56	38.46
20	83.33	92	5	0.8	18.97	30.87
22	91.66	96	4	0.64	15.18	27.08
24	100.00	100	4	0.64	15.18	27.08

Total rainfall = 16.00

Avg. cfs = (in. rain)*2,048,802 sq. ft./[(12"/ft)(2 hrs *60 min/hr*60 sec/min)]

Plant inflow = 11.9 cfs

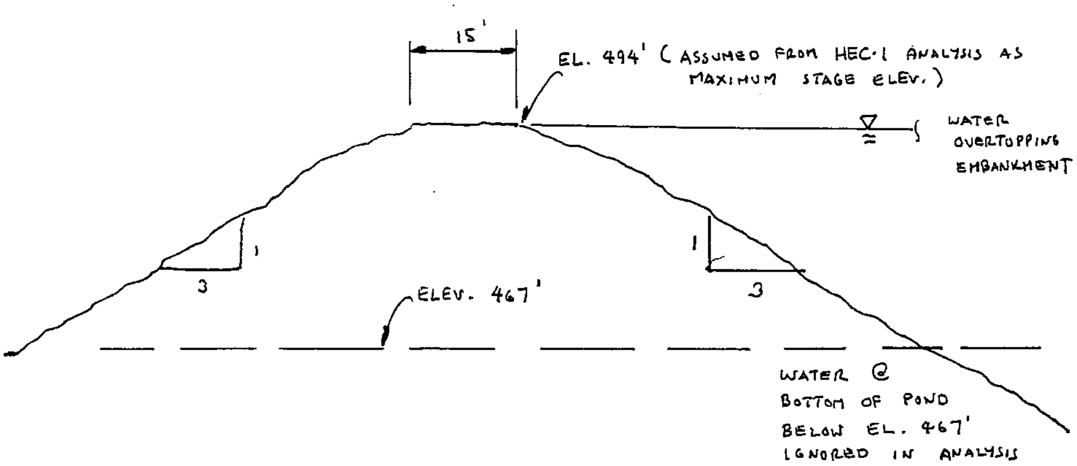
HA 225

SUBJECT:

DESIGNER:

PAGE:

DATE:



POND AREA @ EL. 467' = 1,360,766 ft^2

= 31.2 acres

HA0000
226

```
BOSS BREACH  version 1.10                                        PAGE   1
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                              11/09/2001
________________________________________________________________________________


                          ============================
                           B O S S    B R E A C H (tm)
                          ============================

                         Copyright (C) 1988 Boss Corporation
                         All Rights Reserved

                         Version        : 1.10
                         Serial Number  : 22205


PROGRAM ORIGIN :
----------------

   Boss Breach (tm) is an enhanced version of Professor D. L. Fread's
   July 1988 NWS BREACH program.


DISCLAIMER :
------------

   Boss Breach (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Breach error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.


PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE   : Havana East Ash Pond #3B
   PROJECT NUMBER  :
   DESCRIPTION     : Calculate peak outflow during dam failu
   ENGINEER        : JHK
   DATE OF RUN     : 11/09/2001
   TIME OF RUN     :  2:51 pm
```

HA 227

```
BOSS BREACH  version 1.10                                          PAGE    2
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                                11/09/2001
-------------------------------------------------------------------------------

INPUT DATA :
------------

   INFLOW HYDROGRAPH DESCRIPTION :
   -------------------------------

      Time      Upstream
      Elapsed   Inflow
      TIN(I)    QIN(I)
      (hr)      (cfs)
      --------- ---------
            .00      42.3
           2.00      42.3
           4.00      65.0
           6.00      57.4
           8.00      53.6
          10.00      61.2
          12.00      42.3
          14.00      34.7


   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation Surface
                Area
      HSA(I)    RSA(I)
      (ft MSL)  (acres)
      --------- ---------
         494.00      45.3
         467.00      31.2
            .00        .0
            .00        .0
            .00        .0
            .00        .0
            .00        .0
            .00        .0


   TAILWATER CROSS-SECTION DESCRIPTION :
   -------------------------------------

      Elevation Tailwater Tailwater
                Top       Manning
                Width     n
      HSTW(I)   BSTW(I)   CMTW(I)
      (ft MSL)  (ft)
      --------- --------- ---------
         466.90        .0     .0340
         467.00     100.0     .0350
         470.00    4000.0     .0350
            .00        .0     .0000
            .00        .0     .0000
            .00        .0     .0000
            .00        .0     .0000
            .00        .0     .0000
```

HA 228

```
BOSS BREACH  version 1.10                                          PAGE   3
  PROJECT TITLE   : Havana East Ash Pond #3B
  PROJECT NUMBER :                                               11/09/2001
-----------------------------------------------------------------------------

   RESERVOIR AND OVERTOPPING BREACH DESCRIPTION :
   ----------------------------------------------

      Initial Reservoir Water Surface Elevation (ft MSL, HI)          494.00

      Dam Bottom Elevation (ft MSL, HL)                               467.00

      Dam Top Elevation (ft MSL, HU)                                  494.00

      Spillway Crest Elevation (ft MSL, HSP)                             .00

      Dam Crest Length (ft, CRL)                                      550.00

      Dam Crest Width (ft, WC)                                         15.00

      Ratio of Breach Width to Flow Depth (BR)                         2.000

      Initial Breach Depth on Downstream Face (ft, H)                  .1000
```

HA 229

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BOSS BREACH  version 1.10                                         PAGE   4
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                              11/09/2001
--------------------------------------------------------------------------

   DAM INNER CORE DESCRIPTION :
   ----------------------------

      D50 Grain Size (mm, D50C)                                       .000

      Ratio of D90 to D30 Grain Sizes (UNFCC)                         .000

      Porosity Ratio (PORC)                                           .000

      Unit Weight (lb/cu ft, UWC)                                      .00

      Manning n of Core Material (CNC)                               .0000

      Internal Friction Angle (degrees, AFRC)                          .00

      Cohesive Strength (lb/sq ft, COHC)                               .00

      Average Upstream & Downstream Inner Core Slope (ZC)      1 :     .00

   DAM OUTER CORE DESCRIPTION :
   ----------------------------

      D50 Grain Size (mm, D50S)                                       .346

      Ratio of D90 to D30 Grain Sizes (UNFCS)                        2.500

      Porosity Ratio (PORS)                                           .360

      Unit Weight (lb/cu ft, UWS)                                   105.00

      Manning n of Core Material (CNS)                               .0000

      Internal Friction Angle (degrees, AFRS)                        30.40

      Cohesive Strength (lb/sq ft, COHS)                             10.00

      Average Clay Plasticity Index (PI)                               .00

      CA Clay Critical Shear Stress Coefficient (CA)                  .020

      CB Clay Critical Shear Stress Coefficient (CB)                  .600
```

HA 1[illegible]
230

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BOSS BREACH  version 1.10                                          PAGE    5
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                                11/09/2001
_____________________________________________________________________________

   DAM FACE DESCRIPTION :
   ----------------------

      Upstream Face Slope (ZU)                      1 (vertical) :      3.00

      Downstream Face Slope (ZD)                    1 (vertical) :      3.00

      Downstream Face D50 Grain Size (mm, D50DF)                        .000

      Downstream Face D90 to D30 Grain Size Ratio (UNFCDF)              .000

      Average Grass Length (inches, GL)                                 3.00

      Grass Condition Factor (1=good, 0=none, GS)                        .80

      Maximum Grass-Lined Channel Velocity (ft/sec, VMP)                1.50

   BOUNDARY CONDITIONS :
   ---------------------

      Simulation Duration (hr, TEH)                                    12.00

      Basic Time-Step Size (hr, DTH)                                    .005

      Iteration Error Tolerance (%, ERR)                                 .01

      Downstream River Bottom Slope (ft/mi, SM)                        5.000

      Maximum Allowable Breach Bottom Width (ft, BMX)                   .000

      Discharge Plot Time-Step Interval (FPT)                          10.00

      Time-step at which Plotting Starts (TPR)                           .00
```

#A 231

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BOSS BREACH  version 1.10                                                PAGE   6
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                                     11/09/2001
-----------------------------------------------------------------------------------

INTERNAL COMPUTATION CHECKS :
-----------------------------

     Avg. inner & outer matl. internal friction angle (rad, AFRA)        30.40

     Equation 21 Theta1' (radians, TH1)                                  60.20

     Equation 13 Critical Depth H1' (ft, H1)                               .67

     Equation 21 Theta2' (radians, TH2)                                  45.30

     Equation 13 Critical Depth H2' (ft, H2)                              2.16

     Equation 21 Theta3' (radians, TH3)                                  37.85

     Equation 13 Critical Depth H3' (ft, H3)                              6.95
```

HA [illegible]
232

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BOSS BREACH  version 1.10                                          PAGE   7
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                               11/09/2001
_____________________________________________________________________________

   FAILURE CODES (KG) :
   --------------------

      0 = No erosion of grassed face
      1 = Erosion of dam downstream face
      2 = Erosion of dam upstream face
      3 = Draining of reservoir with breach size continuing to increase
      4 = Piping mode
      5 = Collapse mode

   PPP DESCRIPTION BASED ON ABOVE FAILURE CODES (KG) :
   ---------------------------------------------------

      1 = Depth of erosion perpendicular to downstream face
      2 = Length of breach along downstream face
      3 = Increase in breach width
      4 = Elevation of top of piping breach

   HP DESCRIPTION BASED ON ABOVE FAILURE CODES (KG) :
   --------------------------------------------------

      1 = Erosion width across top of dam
      2 = Erosion depth at upstream face
      3 = Breach flow depth
      4 = Piping head
```

```
BOSS BREACH  version 1.10                                          PAGE  60
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                               11/09/2001
_____________________________________________________________________________

SUMMARY OF OUTPUT RESULTS :
---------------------------

   GENERAL RESULTS :
   -----------------

      Total Number of Iterations                                          0

      Time of Breach Failure (hr, TFHI)                                 .01

      Total Time-Steps Used (I)                                        2290

      Total Elapsed Time (hr, T)                                      7.708

      Outflow Hydrograph Rising Limb Duration (hr, TRS)                .029

      Time at which Significant Rise in Outflow Begins (hr, TB)       5.711

      Dam Top Elevation (ft MSL, HU)                                 494.00

      Outflow at Time Zero (cfs, QO)                                     .0

      Simplified Time of Breach Failure (hr, TFH)                      .452

      TFH  - Time of failure (hr) which is a linear equivalent of
             the outflow hydrograph rising limb duration (TRS) obtained
             by using the simplified dam-break discharge equation.

      TFHI - Time of failure (hr) which is a linear equivalent of
```

HA 233

the outflow hydrograph rising limb duration (TRS) obtained by integrating breach outflow (QB) versus time from T=0 to T=Peak Outflow (TP).

HA [illegible]
234

```
                                                              PAGE  61
BOSS BREACH  version 1.10
  PROJECT TITLE  : Havana East Ash Pond #3B                 11/09/2001
  PROJECT NUMBER :
-----------------------------------------------------------------------

   OUTPUT RESULTS AT TIME OF PEAK OUTFLOW :
   ----------------------------------------
                                                                 5.791
      Elapsed Time (hr, TP)
                                                                    0.
      Spillway Outflow (cfs)
                                                                14693.
      Breach Outflow (cfs, QBP)
                                                                14693.
      Total Outflow (cfs, QP)
                                                                  79.0
      Breach Top Width (ft, BRW)
                                                                   9.5
      Breach Bottom Width (ft, BO)
                                                                 52.15
      Breach Side Slope Relative to Vertical (degrees, Z)

   OUTPUT RESULTS AT END OF BREACH ANALYSIS :
   ------------------------------------------
                                                                  27.0
      Breach Depth (ft, BRD)
                                                                 467.0
      Breach Bottom Elevation (ft MSL, HC)
                                                                 52.15
      Breach Side Slope Relative to Vertical (degrees, AGL)
                                                                 475.9
      Reservoir Water Surface Elevation (ft MSL, HY)
```

HA 235

```
BOSS BREACH  version 1.10                                          PAGE  62
  PROJECT TITLE  : Havana East Ash Pond #3B
  PROJECT NUMBER :                                               11/09/2001
-----------------------------------------------------------------------------

OUTPUT HYDROGRAPH PLOT :
------------------------

   TIME
DISCHARGE
    (hr)
(cfs)
 ------
---------
      60.     2060.     4060.     6060.     8060.    10060.    12060.    14060.    16060.    18060.
20060.

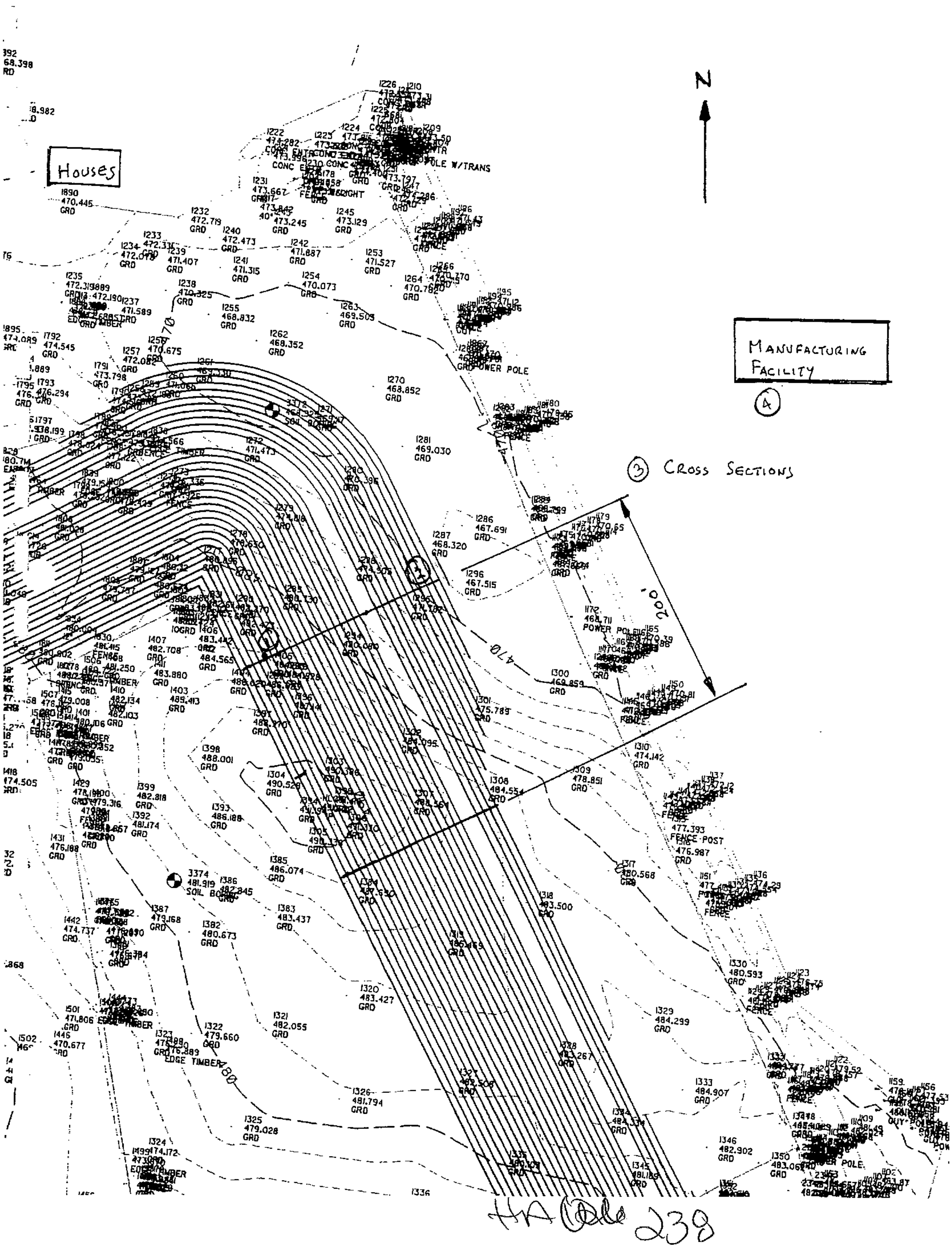
  5.701 *         .         .         .         .         .         .         .         .         .
.         60.
  5.751 *         .         .         .         .         .         .         .         .         .
.         76.
  5.801 .         .         .         .         .         .         .         . *       .         .
.      14445.
  5.851 .         .         .         .         .         .         .  *      .         .         .
.      12982.
  5.901 .         .         .         .         .         .      *  .         .         .         .
.      11726.
  5.951 .         .         .         .         .         . *       .         .         .         .
.      10640.
  6.001 .         .         .         .         .      *  .         .         .         .         .
.       9696.
  6.051 .         .         .         .         .  *      .         .         .         .         .
.       8869.
  6.101 .         .         .         .         *         .         .         .         .         .
.       8143.
  6.151 .         .         .         .     *   .         .         .         .         .         .
.       7500.
  6.201 .         .         .         .  *      .         .         .         .         .         .
.       6930.
  6.251 .         .         .         . *       .         .         .         .         .         .
.       6422.
  6.301 .         .         .         *         .         .         .         .         .         .
.       5967.
  6.351 .         .         .     *   .         .         .         .         .         .         .
.       5559.
  6.401 .         .         .    *    .         .         .         .         .         .         .
.       5190.
  6.451 .         .         .  *      .         .         .         .         .         .         .
.       4857.
  6.501 .         .         . *       .         .         .         .         .         .         .
.       4555.
  6.551 .         .         .*        .         .         .         .         .         .         .
.       4280.
  6.601 .         .         *         .         .         .         .         .         .         .
.       4029.
  6.651 .         .        *.         .         .         .         .         .         .         .
.       3799.
  6.701 .         .       * .         .         .         .         .         .         .         .
.       3588.
  6.751 .         .     *   .         .         .         .         .         .         .         .
.       3395.
  6.801 .         .    *    .         .         .         .         .         .         .         .
.       3217.
  6.851 .         .   *     .         .         .         .         .         .         .         .
.       3052.
  6.901 .         .  *      .         .         .         .         .         .         .         .
.       2900.
  6.951 .         . *       .         .         .         .         .         .         .         .
.       2759.
```

HA 0025
236

```
  7.001 .         .  *      .         .         .         .         .         .         .
.       2628.
  7.051 .         . *       .         .         .         .         .         .         .
.       2506.
  7.101 .         . *       .         .         .         .         .         .         .
.       2392.
  7.151 .         .*        .         .         .         .         .         .         .
.       2286.
  7.201 .         .*        .         .         .         .         .         .         .
.       2187.
  7.251 .         *         .         .         .         .         .         .         .
.       2094.
  7.301 .         *         .         .         .         .         .         .         .
.       2008.
  7.351 .        *.         .         .         .         .         .         .         .
.       1926.
  7.401 .        *.         .         .         .         .         .         .         .
.       1849.
  7.451 .        *.         .         .         .         .         .         .         .
.       1777.
  7.501 .       * .         .         .         .         .         .         .         .
.       1710.
  7.551 .       * .         .         .         .         .         .         .         .
.       1645.
  7.601 .       * .         .         .         .         .         .         .         .
.       1585.
  7.651 .      *  .         .         .         .         .         .         .         .
.       1528.
  7.701 .      *  .         .         .         .         .         .         .         .
.       1474.

END OF OUTPUT
```

HA 237


N
Houses
Manufacturing Facility
④
③ Cross Sections
200'
①
②
470
480
3372
SOIL BORING
3374
SOIL BORING
POWER POLE
FENCE POST
POLE W/TRANS

```
BOSS DAMBRK  version 3.00                                    PAGE    1
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                   11/09/2001
---------------------------------------------------------------------------


                         ============================
                          B O S S    D A M B R K (tm)
                         ============================

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                    Version       : 3.00
                    Serial Number : 23619

       Illinois Power Co.


PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.


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------------

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PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE   : Havana East Ash Pond
   PROJECT NUMBER  : Pond 3B
   DESCRIPTION     : South East side dam break analysis
   ENGINEER        : John Kao
   DATE OF RUN     : 11/09/2001
   TIME OF RUN     :  4:04 pm
```

HA 239

```
BOSS DAMBRK  version 3.00                                             PAGE   2
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                          11/09/2001
______________________________________________________________________________

INPUT DATA SUMMARY :
--------------------

   INPUT CONTROL PARAMETERS :
   --------------------------

      Problem Specification Option                       13

      Number of Dynamic Routing Reaches (KKN)             1

      Type of Reservoir Routing (KUI)                     1  (dynamic routing)

      Number of multiple dams/bridges (MULDAM)            1

      No. of Reservoir Inflow Hydrograph Points (ITEH)    2

      No. of Informational Cross-Sections (NPRT)          3

      Flood-Plain Routing (KFLP)                          0  (no)

   SEQUENTIAL CROSS-SECTION NUMBERS (NPT) :
   ----------------------------------------

          2    3    4
```

HA 0027
248

```
BOSS DAMBRK  version 3.00                                   PAGE    3
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                11/09/2001
-----------------------------------------------------------------------

   CROSS-SECTION NUMBERS COINCIDENT
   WITH UPSTREAM DAM FACE (IDAM)      :
   ----------------------------------

               1

   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation vs. Surface Area Table

      Elevation Surface
                Area
      HSA(K)    SA(K)
      (ft MSL)  (acres)
      --------- ---------------
         494.00           45.300
         492.00           44.280
         467.00           31.240
         466.90            0.000
           0.00            0.000
           0.00            0.000
           0.00            0.000
           0.00            0.000
```

```
BOSS DAMBRK  version 3.00                                        PAGE    4
  PROJECT TITLE   : Havana East Ash Pond
  PROJECT NUMBER  : Pond 3B                                     11/09/2001
-----------------------------------------------------------------------------

   DAM NUMBER :   1
   ---------------

   RESERVOIR AND BREACH PARAMETERS :
   ---------------------------------

      Initial Elevation of Water Surface (YO, ft MSL)                  494.00

      Breach Side Slope (Z)                                    1:        1.00

      Breach Bottom Elevation (YBMIN, ft MSL)                          467.00

      Breach Base Width (BB, ft)                                         9.50

      Time of Breach Formation (TFH, hr)                                 0.05


   RESERVOIR DESCRIPTION :
   -----------------------

      Water Surface Elevation at Time of Breach (HF, ft MSL)           494.00

      Top of Dam Crest Elevation (HD, ft MSL)                          494.00

      Uncontrolled Spillway Crest Elevation (HSP, ft MSL)                0.00

      Spillway Gate Center Elevation (HGT, ft MSL)                       0.00

      Uncontrolled Spillway Discharge Coefficient (CS)                   0.00

      Spillway Gate Discharge Coefficient (CG)                           0.00

      Dam Overtopping Discharge Coefficient (CDO)                     1320.00

      Turbine Discharge (QT, cfs)                                      100.00
```

HA 1028
242

```
BOSS DAMBRK  version 3.00                                          PAGE    5
  PROJECT TITLE   : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                        11/09/2001
______________________________________________________________________________

   BOUNDARY CONDITIONS :
   ---------------------

      Hydrograph Time Intervals (DHF, hr)                               0.00

      Routing Period (TEH, hr)                                          2.00

      Breach Development Exponent (BREX)                                0.00

      Mud/Debris Flow Parameter (MUD)                                      0

      Dry Bed Routing Parameter (IWF)                                      0

      Hydraulic Radius Computation Parameter (KPRES)               0 (R=A/B)

      Landslide Simulation (KSL)                                    0 (none)

      Critical Flow Froude Number (DFR)                                0.950

   INFLOW HYDROGRAPH DESCRIPTION :
   ------------------------------

      Time      Upstream
      Elapsed   Inflow
      TI(K)     QI(K)
      (hr)      (cfs)
      --------- --------------
           0.00          165.0
           2.00          165.0
```

HA 243

```
BOSS DAMBRK  version 3.00                                        PAGE    6
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                      11/09/2001
______________________________________________________________________________

    SUMMARY OF PROGRAM CONTROL PARAMETERS :
    ---------------------------------------

       Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

       Number of Cross-Sections Entered (NS)                     4

       Number of Top Widths Entered (NCS)                        8

       Number of Cross-Sectional Hydrographs to Plot (NTT)       0

       Flow Type Parameter (KSUPC)                               3  (mixed flow)

       Number of Lateral Inflow Hydrographs (LQ)                 0

       Number of Points in Gate Control Curve (KCG)              0


    CHANNEL-VALLEY BOUNDARY CONDITIONS :
    ------------------------------------

       Max Discharge at Downstream End (QMAXD, cfs)                      0.0

       Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)            0.0000

       Initial Time-Step Size (DTHM, hr)                             -1.0000

       Time at which Dam Starts to Fail (TFI, hr)                     0.0000

       Theta Weighting Factor (F1I)                                    0.000

       Stage Convergence Criterion (EPSY, ft)                          0.050

       Downstream Boundary Type Paramter (YDN)                          0.00

       Slope of Channel Downstream of Dam (SOM, ft/mi)                0.0000
```

HA [illegible]
244

```
BOSS DAMBRK  version 3.00                                      PAGE   7
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                   11/09/2001
------------------------------------------------------------------------

   CROSS-SECTION NUMBER :    1
   --------------------------

      Cross-Section Location (XS(I), mi)                          1.000

      Flooding Elevation (FSTG(I), ft MSL)                        0.000

   DOWNSTREAM REACH NUMBER :    1
   -----------------------------

      Reach Contraction-Expansion Coefficient (FKC)               0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)   0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
         467.00      10.0    0.0400       0.0
         472.00      20.0    0.0400       0.0
         477.00      30.0    0.0400       0.0
         482.00      40.0    0.0400       0.0
         487.00      50.0    0.0400       0.0
         488.00      52.0    0.0400       0.0
         490.00      52.0    0.0400       0.0
         495.00      52.0    0.0400       0.0
```

HA 245

```
BOSS DAMBRK  version 3.00                                          PAGE   8
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                        11/09/2001
_____________________________________________________________________________

  CROSS-SECTION NUMBER :   2
  --------------------------

    Cross-Section Location (XS(I), mi)                                1.038

    Flooding Elevation (FSTG(I), ft MSL)                              0.000

  DOWNSTREAM REACH NUMBER :   2
  -----------------------------

    Reach Contraction-Expansion Coefficient (FKC)                     0.000

    Minimum Distance Between Interpolated Cross-Sections (DXM, mi)    0.001

  CROSS-SECTION and REACH DESCRIPTION :
  -------------------------------------

    Elevation Channel   Channel   Storage
              Top       Manning   Top
              Width     n         Width
    HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
    (ft MSL)  (ft)                (ft)
    --------- --------- --------- ---------
       466.43      10.0    0.0400       0.0
       466.99      10.0    0.0400       0.0
       467.00     200.0    0.0400       0.0
       482.00     200.0    0.0400       0.0
       487.00     200.0    0.0400       0.0
       492.00     200.0    0.0400       0.0
       496.00     200.0    0.0400       0.0
       498.00     200.0    0.0400       0.0
```

HA1389
246

```
                                                                  PAGE    9
BOSS DAMBRK  version 3.00
  PROJECT TITLE  : Havana East Ash Pond                          11/09/2001
  PROJECT NUMBER : Pond 3B
_____________________________________________________________________________

   CROSS-SECTION NUMBER :    3
   --------------------------

      Cross-Section Location (XS(I), mi)                                 1.070

      Flooding Elevation (FSTG(I), ft MSL)                               0.000

   DOWNSTREAM REACH NUMBER :    3
   -----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                      0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)     0.001

   CROSS-SECTION and REACH DESCRIPTION :
   ------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
         465.95      10.0    0.0400       0.0
         466.99      10.0    0.0400       0.0
         467.00     140.0    0.0400       0.0
         472.00     200.0    0.0400       0.0
         487.00     200.0    0.0400       0.0
         492.00     200.0    0.0400       0.0
         496.00     200.0    0.0400       0.0
         498.00     200.0    0.0400       0.0
```

HA 247

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                       11/09/2001
_____________________________________________________________________________

   CROSS-SECTION NUMBER :    4
   --------------------------

      Cross-Section Location (XS(I), mi)                               1.099

      Flooding Elevation (FSTG(I), ft MSL)                             0.000

   CROSS-SECTION DESCRIPTION :
   ---------------------------

      Elevation Channel   Storage
                Top       Top
                Width     Width
      HS(K,I)   BS(K,I)   BSS(K,I)
      (ft MSL)  (ft)      (ft)
      --------- --------- ---------
         465.52      10.0       0.0
         466.99      10.0       0.0
         467.00      90.0       0.0
         472.00     200.0       0.0
         477.00     200.0       0.0
         487.00     200.0       0.0
         492.00     200.0       0.0
         498.00     200.0       0.0
```

HA PB4
248

HA 249

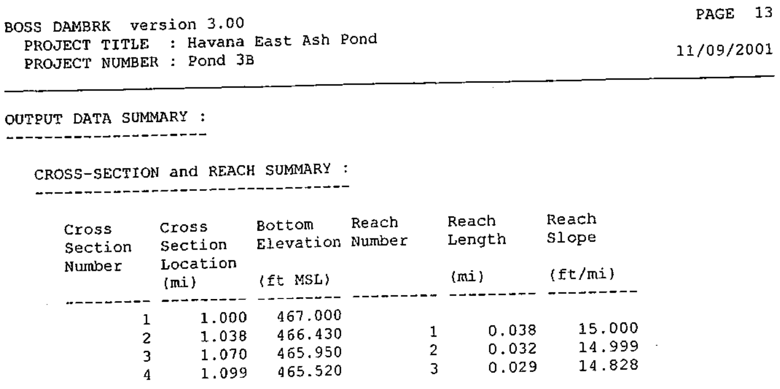
```
BOSS DAMBRK  version 3.00                                            PAGE  12
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                         11/09/2001
-----------------------------------------------------------------------------

   DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
   (DXM) THAT WILL BE USED IN COMPUTATIONS      :
   ---------------------------------------------

      Down      Interp.
      Stream    Cross
      Reach     Section
      Number    Distance
      I=1,NS1   DXM(I)
                (mi)
      --------- ---------
              1  101.0000
              2    0.0010
              3    0.0010


      Total number of cross-sections (original+interpolated)              63

      Maximum number of cross-sections allowed                           300
```



```
BOSS DAMBRK  version 3.00                                    PAGE  13
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                 11/09/2001
-----------------------------------------------------------------------

OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross     Cross     Bottom    Reach     Reach     Reach
      Section   Section   Elevation Number    Length    Slope
      Number    Location
                (mi)      (ft MSL)            (mi)      (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     1.000   467.000
              2     1.038   466.430         1     0.038    15.000
              3     1.070   465.950         2     0.032    14.999
              4     1.099   465.520         3     0.029    14.828
```

HA 251

```
BOSS DAMBRK  version 3.00                                          PAGE  14
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                       11/09/2001
-------------------------------------------------------------------------------

   RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :
   ---------------------------------------


      Dam/      Revised
      Bridge    Cross
                Section
                Number
      --------- ---------
              1         1


      Number of Intermediate Cross-Sections (NN(NS))                      63

      Number of Time Steps (NNU)                                           2
```

HA B3
252

```
BOSS DAMBRK  version 3.00                                          PAGE  15
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                       11/09/2001
---------------------------------------------------------------------------

   INITIAL CONDITIONS TABLE :
   --------------------------

Cross     Cross     Normal    Normal    Critical  Critical  Froude    Iteration Iteration
Section   Section   Flow      Flow      Flow      Flow      Indicator Count for Count for
Number    Location  Water     Depth     Water     Depth     (0 = sub) Computing Computing
                    Elevation           Elevation           (1 = sup) Nrml Dpth Crtl Dpth
I         XI        YN        DEPN      YC        DEPC      IFR       ITN       ITC
          (mi)      (ft MSL)  (ft)      (ft MSL)  (ft)
--------- --------- --------- --------- --------- --------- --------- --------- ---------
        1     1.000    469.29      2.29    468.39      1.39         0        12        12
        2     1.038    467.41      0.98    467.17      0.74         0        12        12
        3     1.039    467.41      0.99    467.17      0.75         0        12        12
        4     1.040    467.41      1.01    467.17      0.77         0        12        12
        5     1.041    467.41      1.02    467.17      0.78         0        12        12
        6     1.042    467.41      1.04    467.17      0.80         0        12        12
        7     1.043    467.41      1.05    467.16      0.81         0        12        12
        8     1.044    467.41      1.07    467.16      0.82         0        12        12
        9     1.045    467.41      1.09    467.16      0.84         0        12        12
       10     1.046    467.41      1.10    467.16      0.85         0        12        12
       11     1.047    467.42      1.13    467.17      0.87         0        12        12
       12     1.048    467.42      1.14    467.17      0.89         0        12        12
       13     1.049    467.42      1.16    467.17      0.90         0        12        12
       14     1.050    467.42      1.17    467.17      0.92         0        12        12
       15     1.051    467.43      1.19    467.17      0.93         0        12        12
       16     1.052    467.43      1.21    467.17      0.95         0        12        12
       17     1.053    467.43      1.22    467.17      0.97         0        12        12
       18     1.054    467.43      1.24    467.16      0.97         0        12        12
       19     1.055    467.43      1.25    467.17      0.99         0        12        12
       20     1.056    467.43      1.27    467.17      1.01         0        12        12
       21     1.057    467.43      1.29    467.17      1.02         0        12        12
       22     1.058    467.43      1.30    467.17      1.04         0        12        12
       23     1.059    467.44      1.33    467.17      1.05         0        12        12
       24     1.060    467.44      1.34    467.17      1.07         0        12        12
       25     1.061    467.44      1.36    467.17      1.09         0        12        12
       26     1.062    467.45      1.38    467.17      1.10         0        12        12
       27     1.063    467.45      1.39    467.17      1.11         0        12        12
       28     1.064    467.45      1.41    467.17      1.13         0        12        12
       29     1.065    467.45      1.42    467.17      1.14         0        12        12
       30     1.066    467.45      1.44    467.17      1.16         0        12        12
       31     1.067    467.45      1.46    467.17      1.18         0        12        12
       32     1.068    467.45      1.47    467.17      1.19         0        12        12
       33     1.069    467.46      1.50    467.17      1.21         0        12        12
       34     1.070    467.46      1.51    467.17      1.22         0        12        12
       35     1.071    467.47      1.53    467.17      1.23         0        12        12
       36     1.072    467.47      1.55    467.17      1.25         0        12        12
       37     1.073    467.47      1.56    467.17      1.27         0        12        12
       38     1.074    467.47      1.58    467.17      1.28         0        12        12
       39     1.075    467.47      1.60    467.17      1.30         0        12        12
       40     1.076    467.47      1.61    467.18      1.31         0        12        12
       41     1.077    467.48      1.63    467.17      1.32         0        12        12
       42     1.078    467.48      1.65    467.17      1.34         0        12        12
       43     1.079    467.49      1.67    467.17      1.36         0        12        12
       44     1.080    467.49      1.69    467.17      1.37         0        12        12
       45     1.081    467.49      1.70    467.18      1.39         0        12        12
       46     1.082    467.49      1.72    467.17      1.40         0        12        12
       47     1.083    467.49      1.74    467.17      1.41         0        12        12
       48     1.084    467.49      1.75    467.17      1.43         0        12        12
       49     1.085    467.50      1.77    467.17      1.45         0        12        12
```

HA 253

```
BOSS DAMBRK  version 3.00                                      PAGE  16
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                   11/09/2001
---------------------------------------------------------------------------

Cross     Cross     Normal    Normal    Critical  Critical  Froude    Iteration Iteration
Section   Section   Flow      Flow      Flow      Flow      Indicator Count for Count for
Number    Location  Water     Depth     Water     Depth     (0 = sub) Computing Computing
                    Elevation           Elevation           (1 = sup) Nrml Dpth Crtl Dpth
I         XI        YN        DEPN      YC        DEPC      IFR       ITN       ITC
          (mi)      (ft MSL)  (ft)      (ft MSL)  (ft)
--------- --------- --------- --------- --------- --------- --------- --------- ---------
       50     1.086    467.50      1.79    467.17      1.46         0        12        12
       51     1.087    467.50      1.80    467.17      1.47         0        12        12
       52     1.088    467.51      1.83    467.17      1.49         0        12        12
       53     1.089    467.51      1.84    467.17      1.50         0        12        12
       54     1.090    467.51      1.86    467.17      1.52         0        12        12
       55     1.091    467.52      1.88    467.18      1.54         0        12        12
       56     1.092    467.52      1.89    467.17      1.55         0        12        12
       57     1.093    467.52      1.91    467.17      1.56         0        12        12
       58     1.094    467.52      1.93    467.17      1.58         0        12        12
       59     1.095    467.52      1.94    467.17      1.59         0        12        12
       60     1.096    467.53      1.97    467.17      1.60         0        12        12
       61     1.097    467.53      1.98    467.17      1.62         0        12        12
       62     1.098    467.54      2.00    467.17      1.64         0        12        12
       63     1.099    467.54      2.02    467.17      1.65         0        12        12
```

HA MBAY
254

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BOSS DAMBRK  version 3.00                                               PAGE  17
  PROJECT TITLE   : Havana East Ash Pond
  PROJECT NUMBER  : Pond 3B                                           11/09/2001
________________________________________________________________________________

   SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :
   ---------------------------------------------------

      Cross-section Number at Downstream End of Model (IN)                    63
      Initial Water Surface Elev. at Downstream End (YNN, ft MSL)        467.538
      Initial Flow Depth at Downstream End (DEP, ft)                       2.018

   COMPUTED STEP BACKWATER TABLE :
   -------------------------------

      Cross     Cross     Flow           Backwater Backwater Iteration
      Section   Section                  Water     Water     Count for
      Number    Location                 Surface   Depth     Computing
                                         Elevation           Backwater
      I         X         QIL            YIL       DEP       ITB
                (mi)      (cfs)          (ft MSL)  (ft)
      --------- --------- -------------- --------- --------- ---------
             62     1.098          100.0   467.555     2.020         5
             61     1.097          100.0   467.570     2.021         5
             60     1.096          100.0   467.584     2.020         5
             59     1.095          100.0   467.597     2.018         5
             58     1.094          100.0   467.609     2.015         5
             57     1.093          100.0   467.620     2.011         5
             56     1.092          100.0   467.630     2.006         5
             55     1.091          100.0   467.640     2.001         5
             54     1.090          100.0   467.649     1.995         5
             53     1.089          100.0   467.657     1.989         5
             52     1.088          100.0   467.665     1.982         5
             51     1.087          100.0   467.673     1.975         5
```

HA-255

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BOSS DAMBRK  version 3.00                                          PAGE  18
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                       11/09/2001
___________________________________________________________________________

     Cross     Cross     Flow           Backwater Backwater Iteration
     Section   Section                  Water     Water     Count for
     Number    Location                 Surface   Depth     Computing
                                        Elevation           Backwater
     I         X         QIL            YIL       DEP       ITB
               (mi)      (cfs)          (ft MSL)  (ft)
     --------- --------- -------------- --------- --------- ---------
            50     1.086          100.0   467.680     1.967         5
            49     1.085          100.0   467.687     1.959         5
            48     1.084          100.0   467.693     1.951         5
            47     1.083          100.0   467.700     1.942         5
            46     1.082          100.0   467.706     1.934         5
            45     1.081          100.0   467.711     1.924         5
            44     1.080          100.0   467.717     1.915         5
            43     1.079          100.0   467.722     1.906         5
            42     1.078          100.0   467.727     1.896         5
            41     1.077          100.0   467.732     1.886         5
            40     1.076          100.0   467.737     1.876         5
            39     1.075          100.0   467.741     1.865         5
            38     1.074          100.0   467.746     1.855         5
            37     1.073          100.0   467.750     1.844         5
            36     1.072          100.0   467.754     1.833         5
            35     1.071          100.0   467.758     1.823         5
            34     1.070          100.0   467.762     1.811         5
            33     1.069          100.0   467.765     1.800         5
            32     1.068          100.0   467.769     1.789         5
            31     1.067          100.0   467.772     1.777         5
            30     1.066          100.0   467.775     1.766         5
            29     1.065          100.0   467.779     1.754         5
            28     1.064          100.0   467.782     1.742         5
            27     1.063          100.0   467.785     1.730         5
            26     1.062          100.0   467.788     1.718         5
            25     1.061          100.0   467.791     1.706         5
            24     1.060          100.0   467.794     1.694         5
            23     1.059          100.0   467.796     1.681         5
            22     1.058          100.0   467.799     1.669         5
            21     1.057          100.0   467.801     1.656         5
            20     1.056          100.0   467.804     1.644         5
            19     1.055          100.0   467.806     1.631         5
            18     1.054          100.0   467.809     1.619         5
            17     1.053          100.0   467.811     1.606         5
            16     1.052          100.0   467.813     1.593         5
            15     1.051          100.0   467.816     1.581         5
            14     1.050          100.0   467.818     1.568         5
            13     1.049          100.0   467.820     1.555         5
            12     1.048          100.0   467.822     1.542         5
            11     1.047          100.0   467.824     1.529         5
            10     1.046          100.0   467.826     1.516         5
             9     1.045          100.0   467.828     1.503         5
             8     1.044          100.0   467.830     1.490         5
             7     1.043          100.0   467.831     1.476         5
             6     1.042          100.0   467.833     1.463         5
             5     1.041          100.0   467.835     1.450         5
             4     1.040          100.0   467.837     1.437         5
             3     1.039          100.0   467.838     1.423         5
             2     1.038          100.0   467.840     1.410         5
             1     1.000          100.0   494.000    27.000         0
```

HAV3B
256

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BOSS DAMBRK  version 3.00                                        PAGE  19
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                     11/09/2001
-------------------------------------------------------------------------

   INITIAL CONDITIONS :
   --------------------

      Interp.   Initial   Initial
      Cross-    Water     Flow
      Section   Elevation
      I         YI(I)     QDI(I)
                (ft MSL)  (cfs)
      --------- --------- ---------------
              1    494.00            100.0
              2    467.84            100.0
              3    467.84            100.0
              4    467.84            100.0
              5    467.83            100.0
              6    467.83            100.0
              7    467.83            100.0
              8    467.83            100.0
              9    467.83            100.0
             10    467.83            100.0
             11    467.82            100.0
             12    467.82            100.0
             13    467.82            100.0
             14    467.82            100.0
             15    467.82            100.0
             16    467.81            100.0
             17    467.81            100.0
             18    467.81            100.0
             19    467.81            100.0
             20    467.80            100.0
             21    467.80            100.0
             22    467.80            100.0
             23    467.80            100.0
             24    467.79            100.0
             25    467.79            100.0
             26    467.79            100.0
             27    467.78            100.0
             28    467.78            100.0
             29    467.78            100.0
             30    467.78            100.0
             31    467.77            100.0
             32    467.77            100.0
             33    467.77            100.0
             34    467.76            100.0
             35    467.76            100.0
             36    467.75            100.0
             37    467.75            100.0
             38    467.75            100.0
             39    467.74            100.0
             40    467.74            100.0
             41    467.73            100.0
             42    467.73            100.0
             43    467.72            100.0
             44    467.72            100.0
             45    467.71            100.0
             46    467.71            100.0
```

HA 257

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BOSS DAMBRK  version 3.00                                          PAGE  20
  PROJECT TITLE  : Havana East Ash Pond
  PROJECT NUMBER : Pond 3B                                        11/09/2001
________________________________________________________________________________

   INITIAL CONDITIONS :
   --------------------

      Interp.   Initial   Initial
      Cross-    Water     Flow
      Section   Elevation
      I         YI(I)     QDI(I)
                (ft MSL)  (cfs)
      --------- --------- ---------------
             47    467.70           100.0
             48    467.69           100.0
             49    467.69           100.0
             50    467.68           100.0
             51    467.67           100.0
             52    467.67           100.0
             53    467.66           100.0
             54    467.65           100.0
             55    467.64           100.0
             56    467.63           100.0
             57    467.62           100.0
             58    467.61           100.0
             59    467.60           100.0
             60    467.58           100.0
             61    467.57           100.0
             62    467.55           100.0
             63    467.54           100.0

ROUTING COMPLETED :
-------------------

      Number of Time Steps Used (KTIME)                                    177

      Maximum Number of Time Steps Allowed                                1199

      Total Time of Flood Routing (TT, hr)                                 2.0

      Flood Wave Arrival Time based upon a WSEL Increase of (ft)          1.00

   CONSERVATION OF MASS RESULTS :
   ------------------------------

      Should be close to 0.00%, a negative value denotes flow volume was lost
      during the routing, a positive value denotes flow volume was gained
      during the routing. Normalized as a percent of inflow volume, maximum
      change in conservation of mass during routing was       0.00
```

HA V36
258

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                                                              PAGE  21
BOSS DAMBRK  version 3.00
  PROJECT TITLE  : Havana East Ash Pond                       11/09/2001
  PROJECT NUMBER : Pond 3B
------------------------------------------------------------------------

    FLOOD CREST SUMMARY :
    ---------------------

Cross     Maximum   Maximum   Time To   Maximum   Flood     Time To   Flood Wave
Section   Stage     Flow      Maximum   Flow      Elevation Flood     Arrival
Location  Elevation           Stage     Velocity            Elevation Time
(mi)      (ft MSL)  (cfs)     (hr)      (ft/sec)  (ft MSL)  (hr)      (hr)
--------- --------- --------- --------- --------- --------- --------- ---------
    1.000    494.00     16295     0.005     17.30      0.00      0.00      0.00
    1.038    477.62     16295     0.080      8.90      0.00      0.00      0.02
    1.039    477.60     16206     0.080      8.94      0.00      0.00      0.02
    1.040    477.58     16216     0.080      8.97      0.00      0.00      0.02
    1.041    477.56     16224     0.080      9.01      0.00      0.00      0.02
    1.042    477.54     16230     0.080      9.04      0.00      0.00      0.02
    1.043    477.52     16234     0.080      9.08      0.00      0.00      0.02
    1.044    477.50     16235     0.080      9.11      0.00      0.00      0.02
    1.045    477.47     16234     0.080      9.15      0.00      0.00      0.03
    1.046    477.45     16231     0.080      9.18      0.00      0.00      0.03
    1.047    477.43     16226     0.080      9.21      0.00      0.00      0.03
    1.048    477.41     16218     0.080      9.25      0.00      0.00      0.03
    1.049    477.39     16209     0.080      9.28      0.00      0.00      0.03
    1.050    477.37     16198     0.080      9.31      0.00      0.00      0.03
    1.051    477.35     16184     0.080      9.34      0.00      0.00      0.03
    1.052    477.32     16169     0.080      9.36      0.00      0.00      0.03
    1.053    477.30     16151     0.080      9.39      0.00      0.00      0.03
    1.054    477.28     16131     0.080      9.40      0.00      0.00      0.03
    1.055    477.26     16109     0.080      9.42      0.00      0.00      0.03
    1.056    477.24     16086     0.080      9.43      0.00      0.00      0.03
    1.057    477.22     16060     0.080      9.43      0.00      0.00      0.03
    1.058    477.21     16032     0.080      9.43      0.00      0.00      0.03
    1.059    477.19     16003     0.080      9.41      0.00      0.00      0.03
    1.060    477.17     15973     0.080      9.41      0.00      0.00      0.03
    1.061    477.15     15942     0.080      9.41      0.00      0.00      0.03
    1.062    477.13     15910     0.080      9.40      0.00      0.00      0.03
    1.063    477.11     15878     0.080      9.39      0.00      0.00      0.03
    1.064    477.10     15845     0.080      9.38      0.00      0.00      0.03
    1.065    477.08     15811     0.080      9.36      0.00      0.00      0.03
    1.066    477.07     15776     0.080      9.33      0.00      0.00      0.03
    1.067    477.05     15740     0.080      9.30      0.00      0.00      0.03
    1.068    477.04     15703     0.080      9.27      0.00      0.00      0.03
    1.069    477.02     15664     0.080      9.23      0.00      0.00      0.03
    1.070    477.01     15625     0.075      9.18      0.00      0.00      0.03
    1.071    476.99     15586     0.075      9.21      0.00      0.00      0.03
    1.072    476.97     15546     0.075      9.24      0.00      0.00      0.03
    1.073    476.95     15505     0.075      9.26      0.00      0.00      0.03
    1.074    476.93     15463     0.075      9.29      0.00      0.00      0.03
    1.075    476.90     15420     0.075      9.32      0.00      0.00      0.03
    1.076    476.88     15377     0.075      9.35      0.00      0.00      0.03
    1.077    476.85     15368     0.075      9.38      0.00      0.00      0.03
    1.078    476.83     15368     0.075      9.42      0.00      0.00      0.03
    1.079    476.80     15368     0.075      9.45      0.00      0.00      0.03
    1.080    476.77     15368     0.075      9.49      0.00      0.00      0.03
    1.081    476.74     15369     0.075      9.53      0.00      0.00      0.03
    1.082    476.71     15369     0.075      9.57      0.00      0.00      0.03
    1.083    476.68     15369     0.075      9.61      0.00      0.00      0.03
    1.084    476.65     15369     0.090      9.65      0.00      0.00      0.03
```

HA 259

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BOSS DAMBRK  version 3.00                                           PAGE  22
   PROJECT TITLE  : Havana East Ash Pond
   PROJECT NUMBER : Pond 3B                                       11/09/2001
-----------------------------------------------------------------------------

    FLOOD CREST SUMMARY :
    ---------------------

Cross     Maximum   Maximum   Time To   Maximum   Flood     Time To   Flood Wave
Section   Stage     Flow      Maximum   Flow      Elevation Flood     Arrival
Location  Elevation           Stage     Velocity            Elevation Time
(mi)      (ft MSL)  (cfs)     (hr)      (ft/sec)  (ft MSL)  (hr)      (hr)
--------- --------- --------- --------- --------- --------- --------- ---------
    1.085    476.61     15369     0.090      9.70      0.00      0.00      0.03
    1.086    476.59     15369     0.085      9.75      0.00      0.00      0.03
    1.087    476.56     15369     0.085      9.81      0.00      0.00      0.03
    1.088    476.53     15368     0.085      9.87      0.00      0.00      0.03
    1.089    476.50     15366     0.085      9.93      0.00      0.00      0.03
    1.090    476.47     15365     0.085     10.00      0.00      0.00      0.03
    1.091    476.44     15362     0.085     10.07      0.00      0.00      0.03
    1.092    476.41     15358     0.085     10.16      0.00      0.00      0.03
    1.093    476.37     15354     0.085     10.25      0.00      0.00      0.03
    1.094    476.34     15348     0.085     10.36      0.00      0.00      0.03
    1.095    476.30     15340     0.085     10.47      0.00      0.00      0.03
    1.096    476.25     15330     0.085     10.60      0.00      0.00      0.03
    1.097    476.20     15340     0.085     10.75      0.00      0.00      0.03
    1.098    476.15     15353     0.085     10.93      0.00      0.00      0.03
    1.099    476.09     15363     0.085     11.16      0.00      0.00      0.03

END OF OUTPUT
```

Slope Stability Analysis
Havana Power Station
East Ash Pond #3B

September 10, 2001
JHK

Slope stability calculations were done with the computer Slope/W produced by Geo-Slope International. The Spencer method of analysis was used.

Because the embankment will be made of highly permeable, sandy soil, and the pond will have an impermeable liner, there will not be any cases where the undrained strength of the sand will control. For all significant load conditions, the embankment will be in the consolidated-drained condition. As shown in other portions of these calculations, any seepage that would get through the liner system would migrate nearly straight down through the embankment until reaching the water table.

Based on these characteristics of the embankment, no rapid drawdown or partial pool analysis was done. The embankment was analyzed for water to the normal operating elevation of 492 feet and ash fill to 492 feet. For each of these, both seismic and non-seismic conditions were analyzed for both low and high water table. This resulted in eight separate cases being analyzed. These are summarized in the table below along with the minimum factor of safety for each case as computed by Slope/W.

Because the clay liner will be only one-foot thick, it was ignored during slope stability calculations. Its primary purpose is seepage control, not strength. For water-filled pond conditions, the clay liner was given no strength. For the ash-filled pond conditions, the clay was given the same strength properties as the ash to simplify data input. Both of these assumptions are on the conservative side. The actual weight of the clay was used on all cases.

The properties for deposited fly ash are typical values for this type of material. The properties for all other soils are from soil tests performed specifically for this project. See the Soil Reports section of these calculations for further information.

The embankment will be made of the on-site sandy soil compacted to 95% of standard Proctor density. The top ten feet of existing material is somewhat loose with a density of a little less than 95% standard Proctor density. During construction, it is likely that this material will consolidate some, but this was ignored when estimating soil properties for the upper foundation layer. The same soil properties were used for the embankment as the upper foundation layer, which is conservative. Compaction to 95% standard Proctor density will actually give slightly better strength. The deeper foundation soils are somewhat denser than 95% standard Proctor density. The properties used for the deeper foundation soils are shown on the lab reports.

The project is in earthquake zone 1. A seismic factor of 0.025 was applied to determine earthquake forces.

HA 008
261

In all cases without earthquake forces, the factor of safety was greater than 1.5. In all cases with earthquake forces, the factor of safety was greater than 1.0. Therefore, it was concluded that the embankment has adequate strength. It should also be noted, that in all the cases the minimum factor of safety was associated with slips on the downstream face of the embankment that did not penetrate to the upstream face. The graphical output shows the slip surface associated with the minimum factor of safety.

The full printout for a Slope/W run is quite large. To avoid printing a lot needless pages in this report, only sample pages are included. Full program output can be provided if needed. The following sheets contain summary information for the slope stability analysis. The content of these pages is as follows:

1. Table of analyzed conditions and corresponding factor of safety.
2. Summary of soil properties
3. Summary of ground water elevations.
4. Sketch of embankment geometry
5. Graphical computer summary of each load case.
6. First and last page from a typical analysis printout.

HA 262

Slope Stability Analysis
Havana Power Station
East Ash Pond #3B

September 10, 2001
JHK

Summary of Analysis Conditions

Analysis Case

	1A	1B	2A	2B	3A	3B	4A	4B
Factor of Safety	1.56	1.57	1.62	1.50	1.61	1.52	1.61	1.48
Water-filled pond	X	X	X	X				
Ash-filled pond					X	X	X	X
No seismic factor	X		X		X		X	
Seismic factor applied		X		X		X		X
High ground water elevation	X	X			X	X		
Low ground water elevation			X	X			X	X

Soil Properties;

Deep Foundation Soils	Density	118.7 pcf
	Phi Angle	34 degrees
	Cohesion	0.0
Shallow Foundation Soils And Embankment	Density	103.7 pcf
	Phi Angle	26 degrees
	Cohesion	0.0
Clay Liner	Density	118.7 pcf
	Phi Angle	N/A
	Cohesion	N/A
Ash	Density	90 pcf (saturated weight)
	Phi Angle	20 degrees
	Cohesion	0.0

HA0319
263

PROJECT:

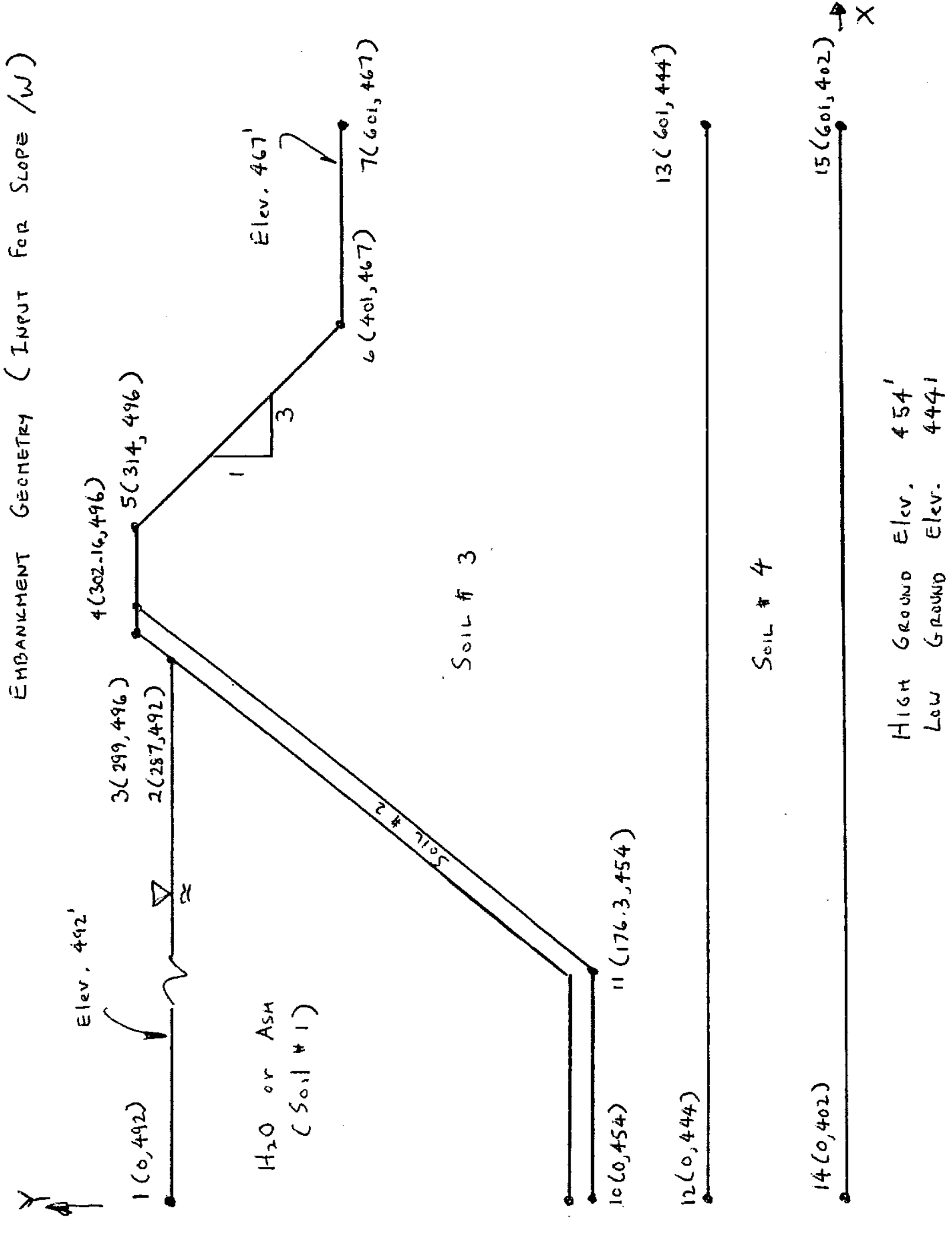
PROJECT NO.:

SUBJECT:

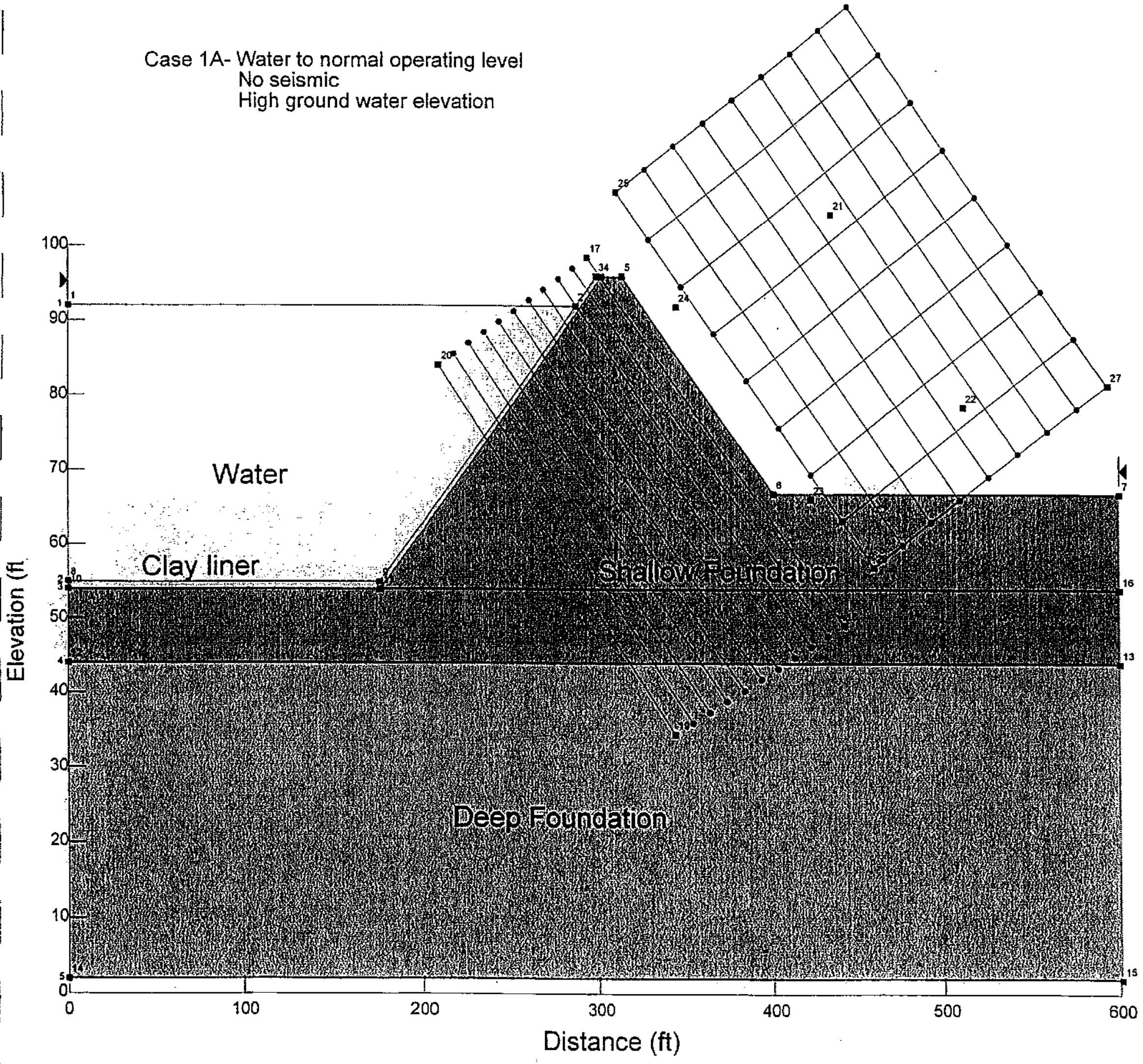
DESIGNER:

PAGE:

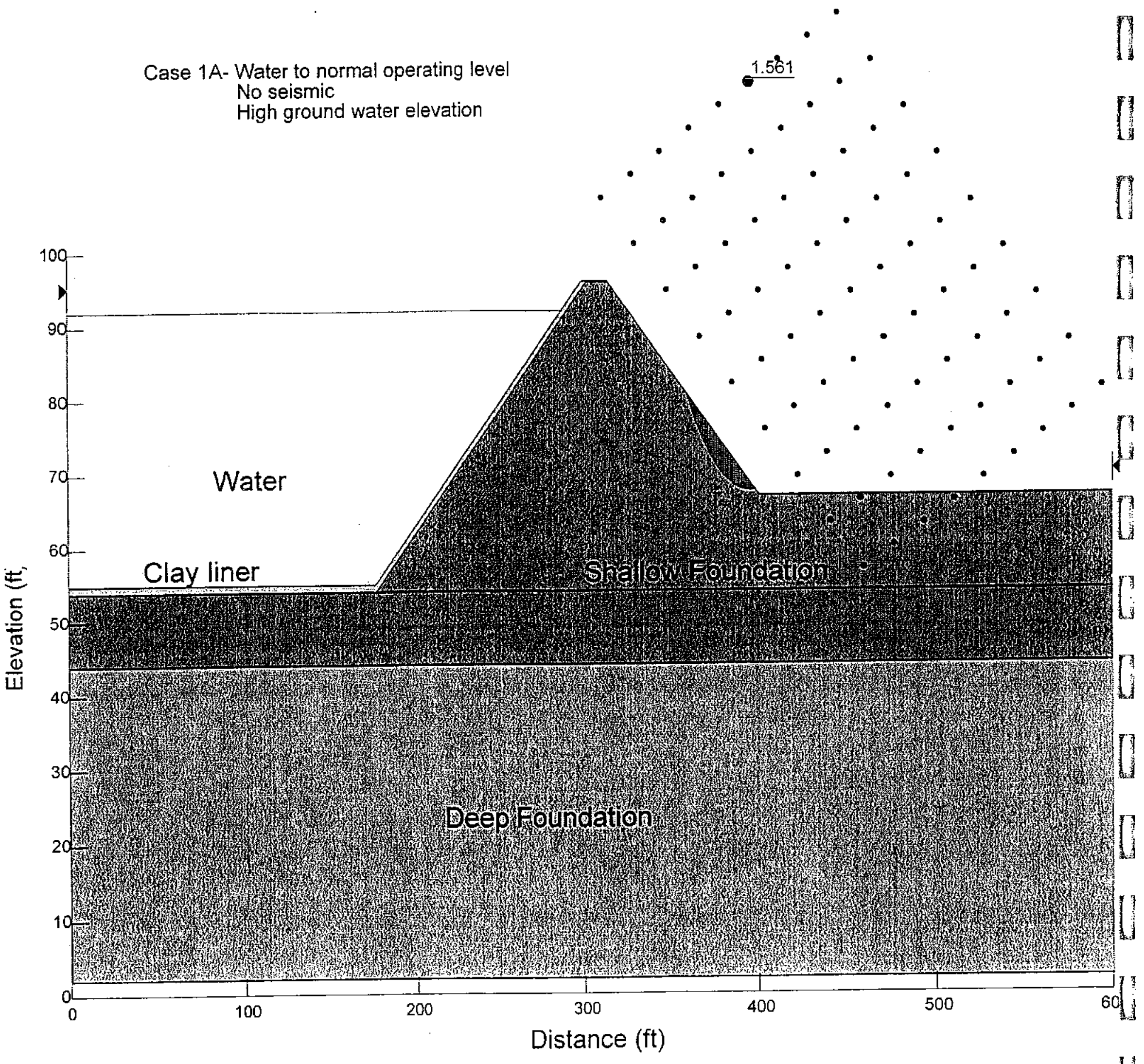
DATE:



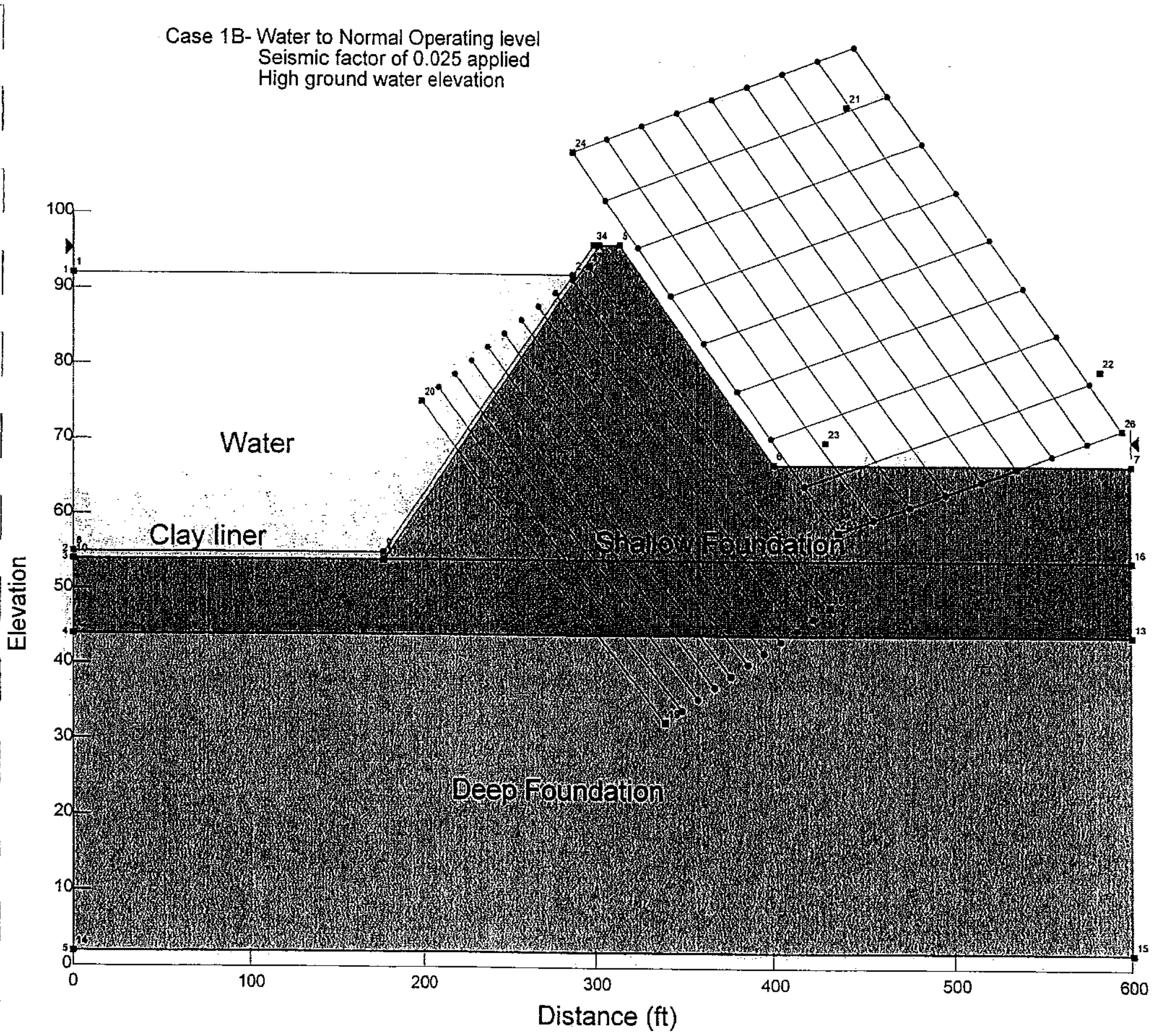
HA 264


Case 1A- Water to normal operating level
No seismic
High ground water elevation
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevation (ft)
Distance (ft)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
17
34
5
25
21
24
20
27
22
6
23
7
16
13
15
1
2
3
4
8
9
10
14

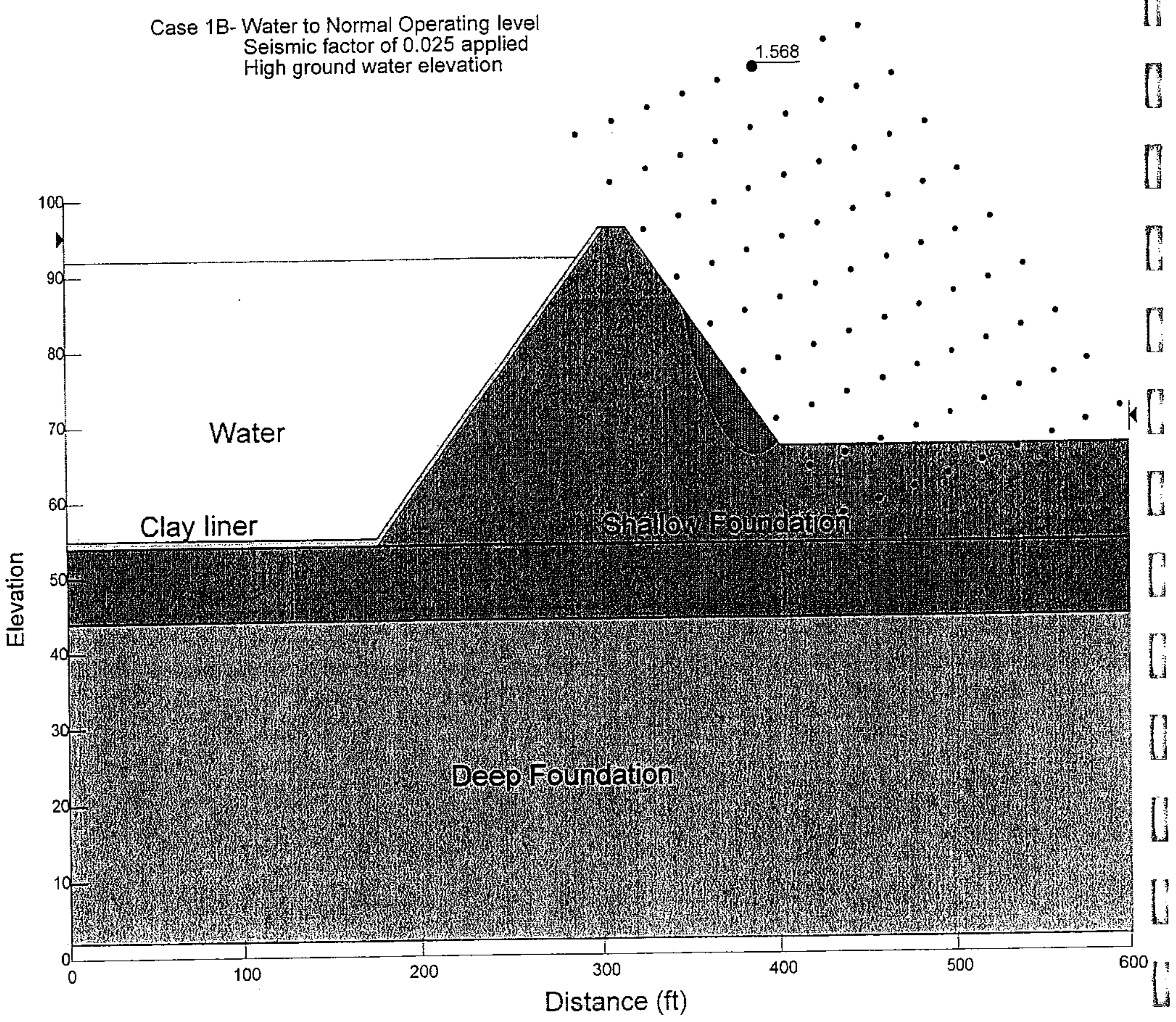
HAWQ
265


Case 1A- Water to normal operating level
No seismic
High ground water elevation
1.561
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevation (ft)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 266

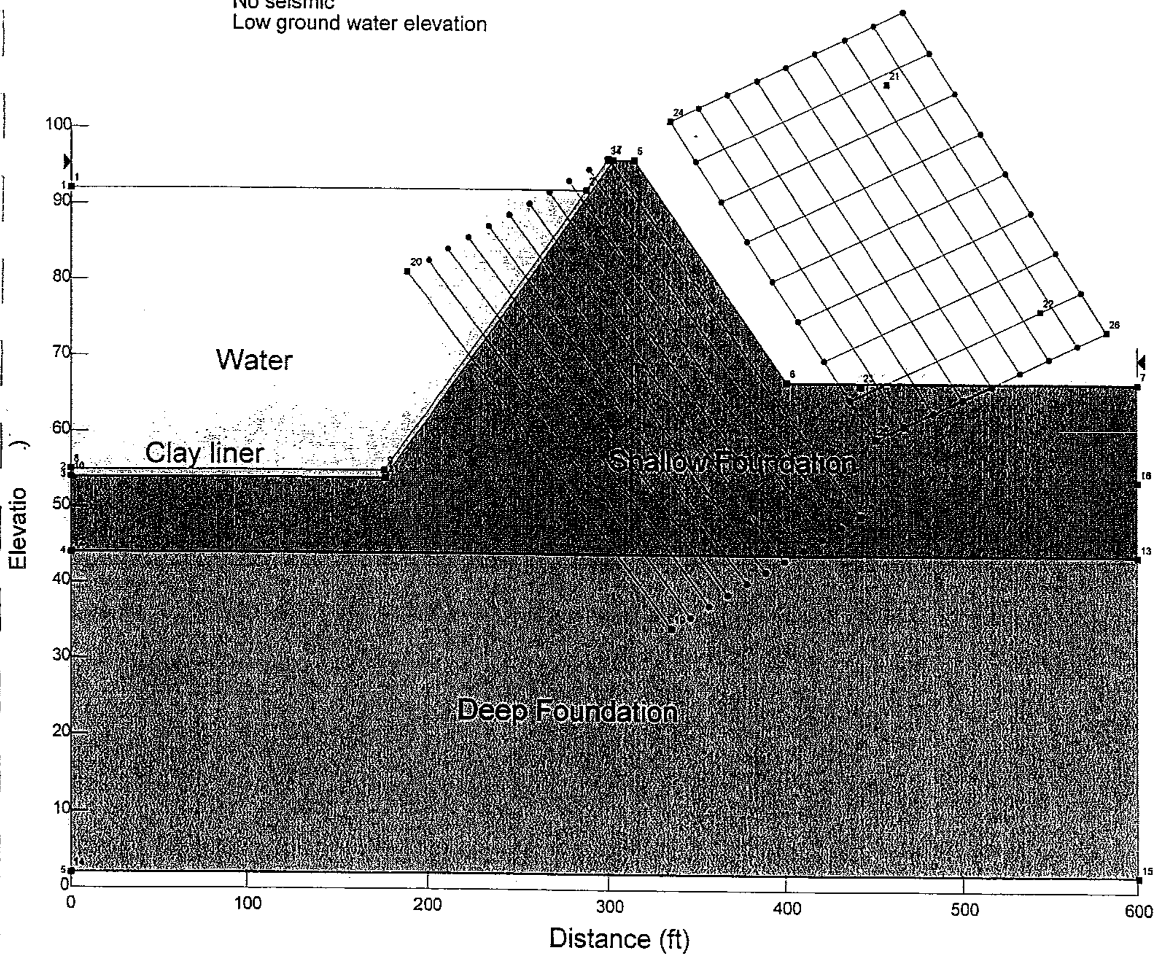

Case 1B- Water to Normal Operating level
Seismic factor of 0.025 applied
High ground water elevation
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevation
Distance (ft)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
1
2
3
4
5
6
7
13
15
16
20
21
22
23
24
26
34

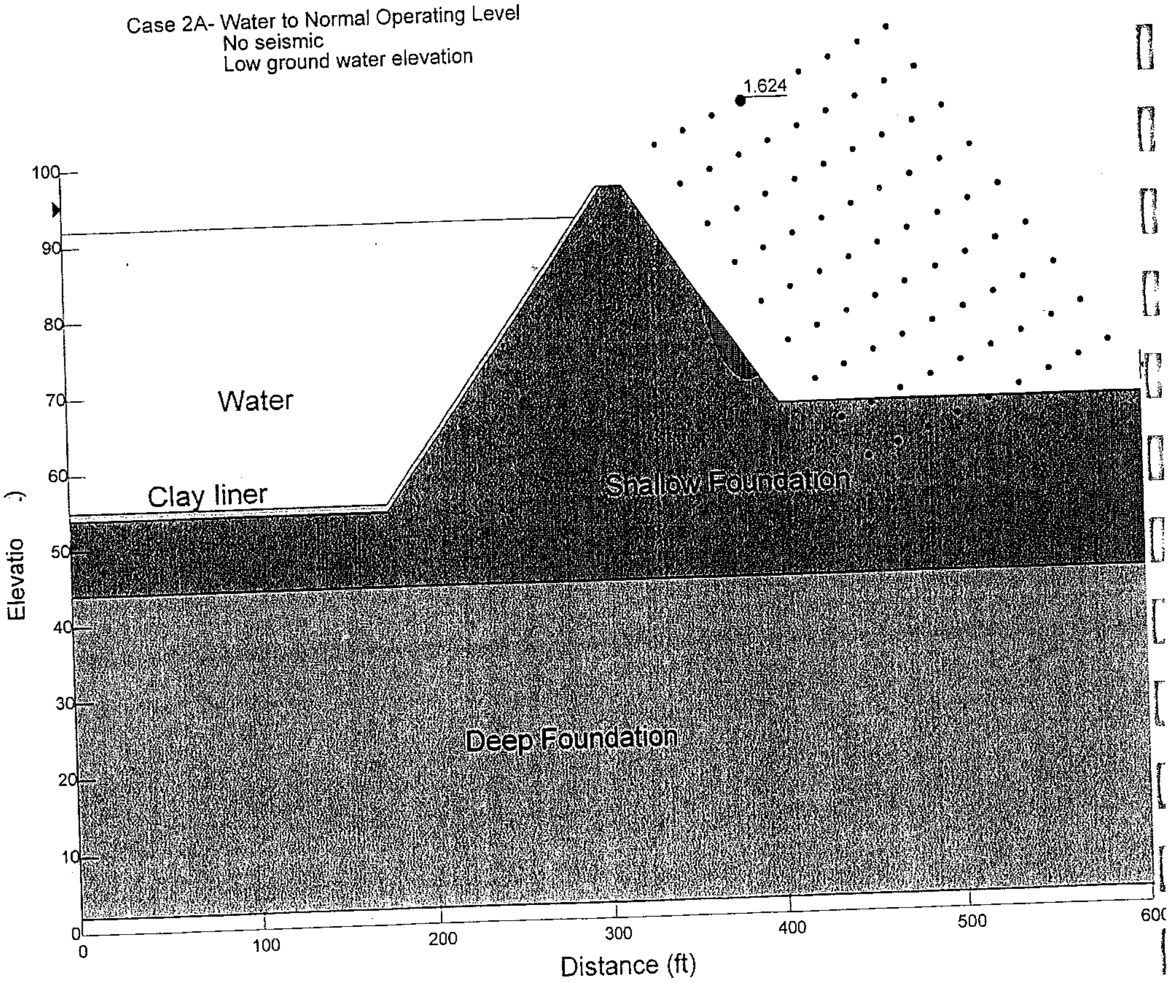
HA Mtg
267


Case 1B- Water to Normal Operating level
Seismic factor of 0.025 applied
High ground water elevation
1.568
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevation
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 268

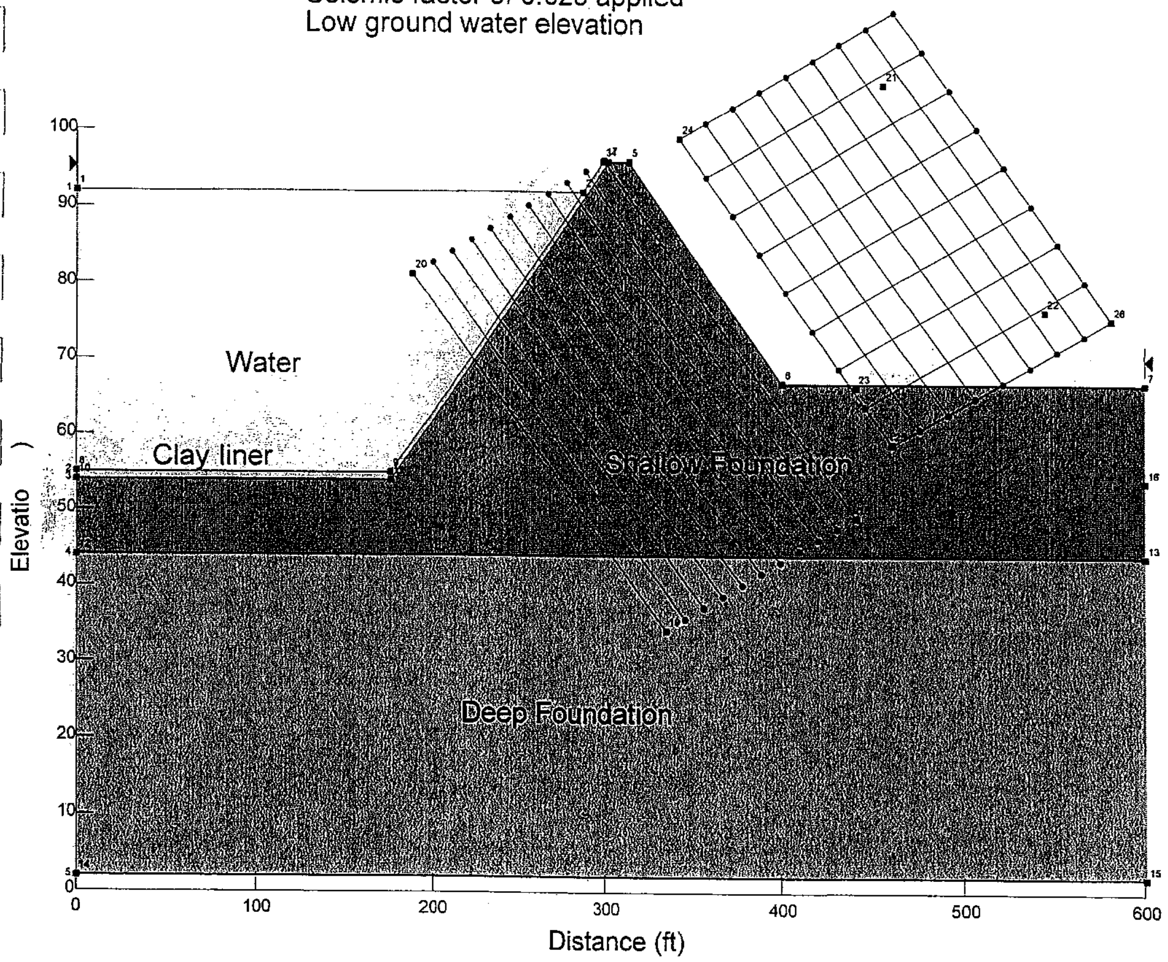
Case 2A- Water to Normal Operating Level
No seismic
Low ground water elevation



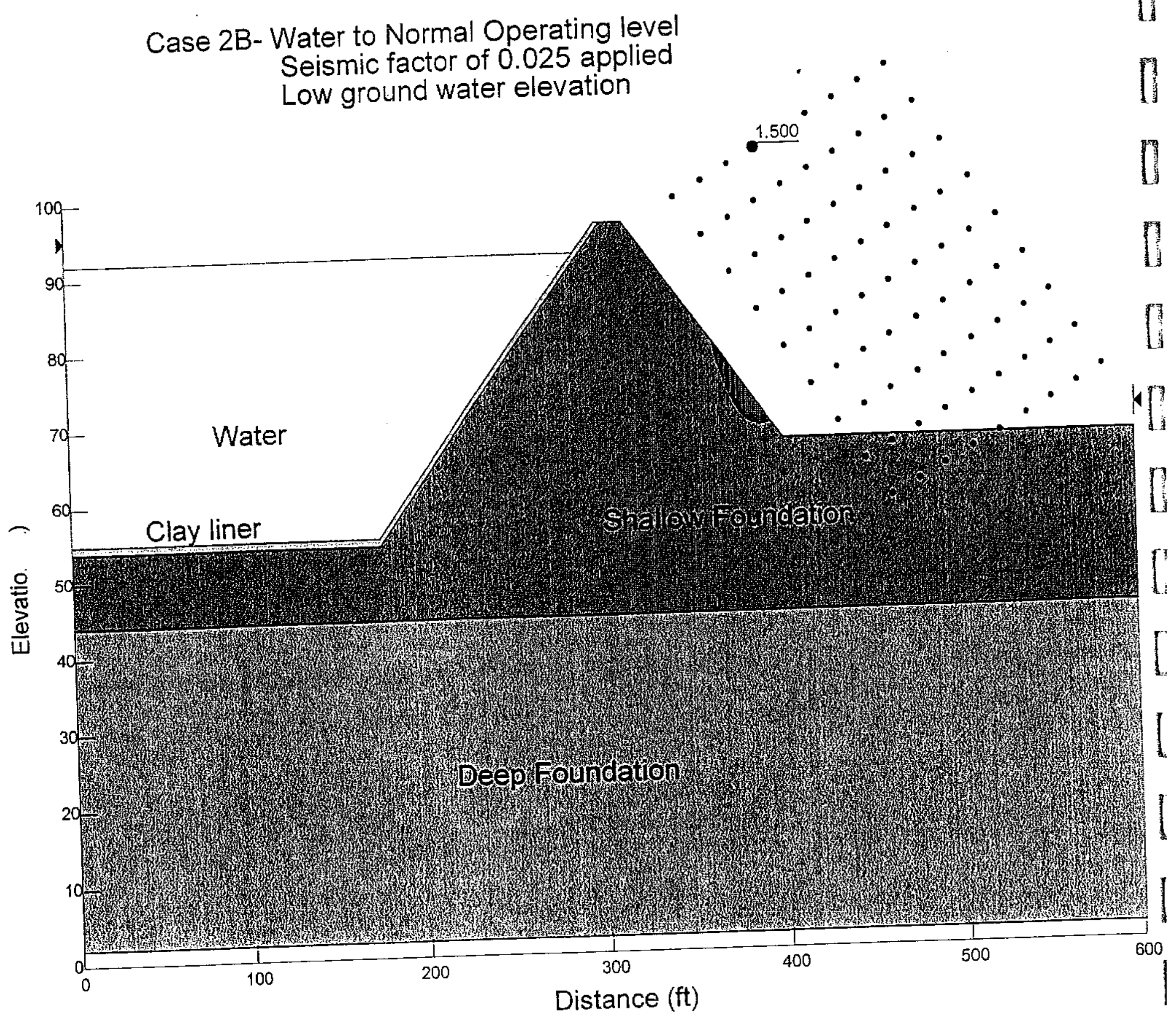

Case 2A- Water to Normal Operating Level
No seismic
Low ground water elevation
1.624
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevatio)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 270

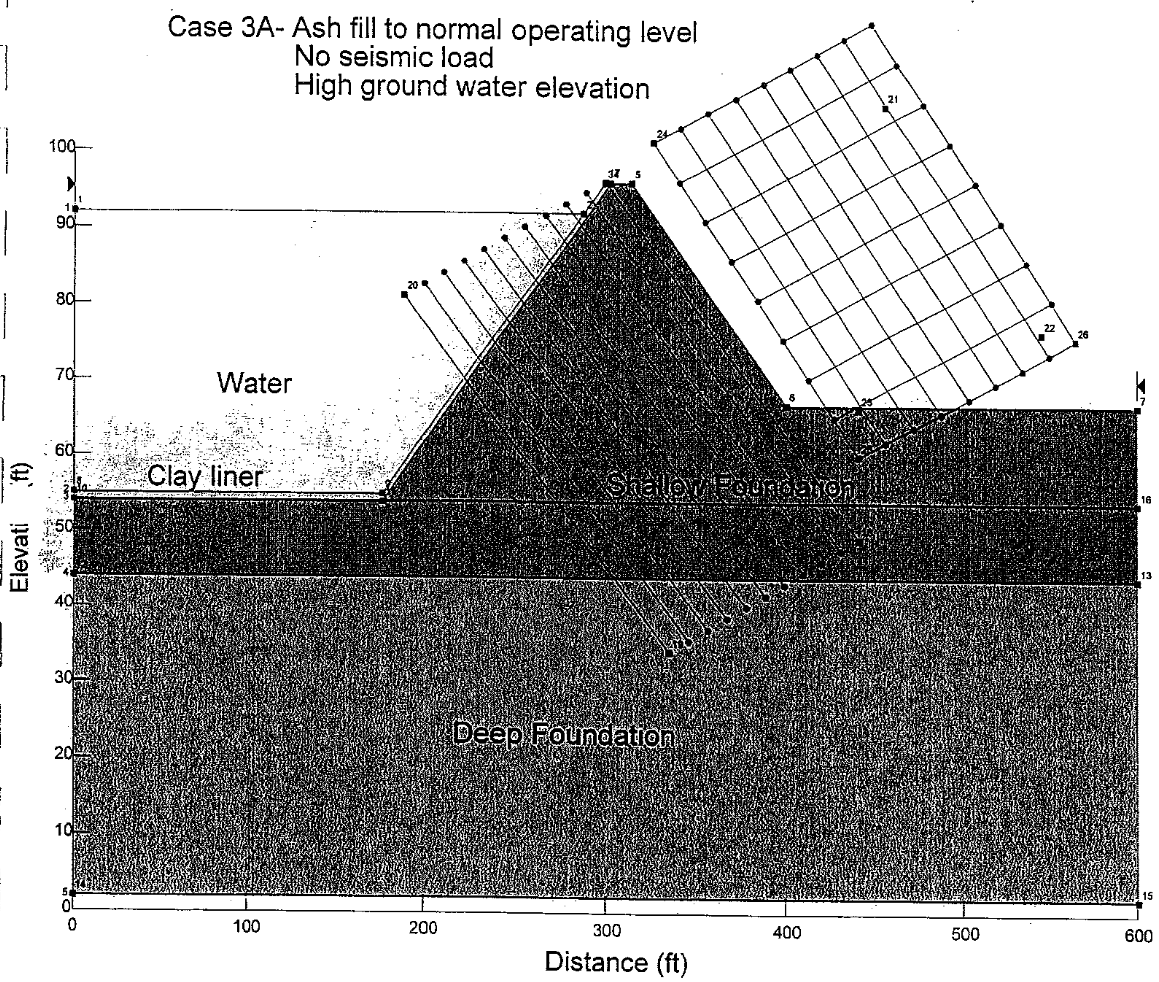
Case 2B- Water to Normal Operating level
Seismic factor of 0.025 applied
Low ground water elevation



HA 1/13
271

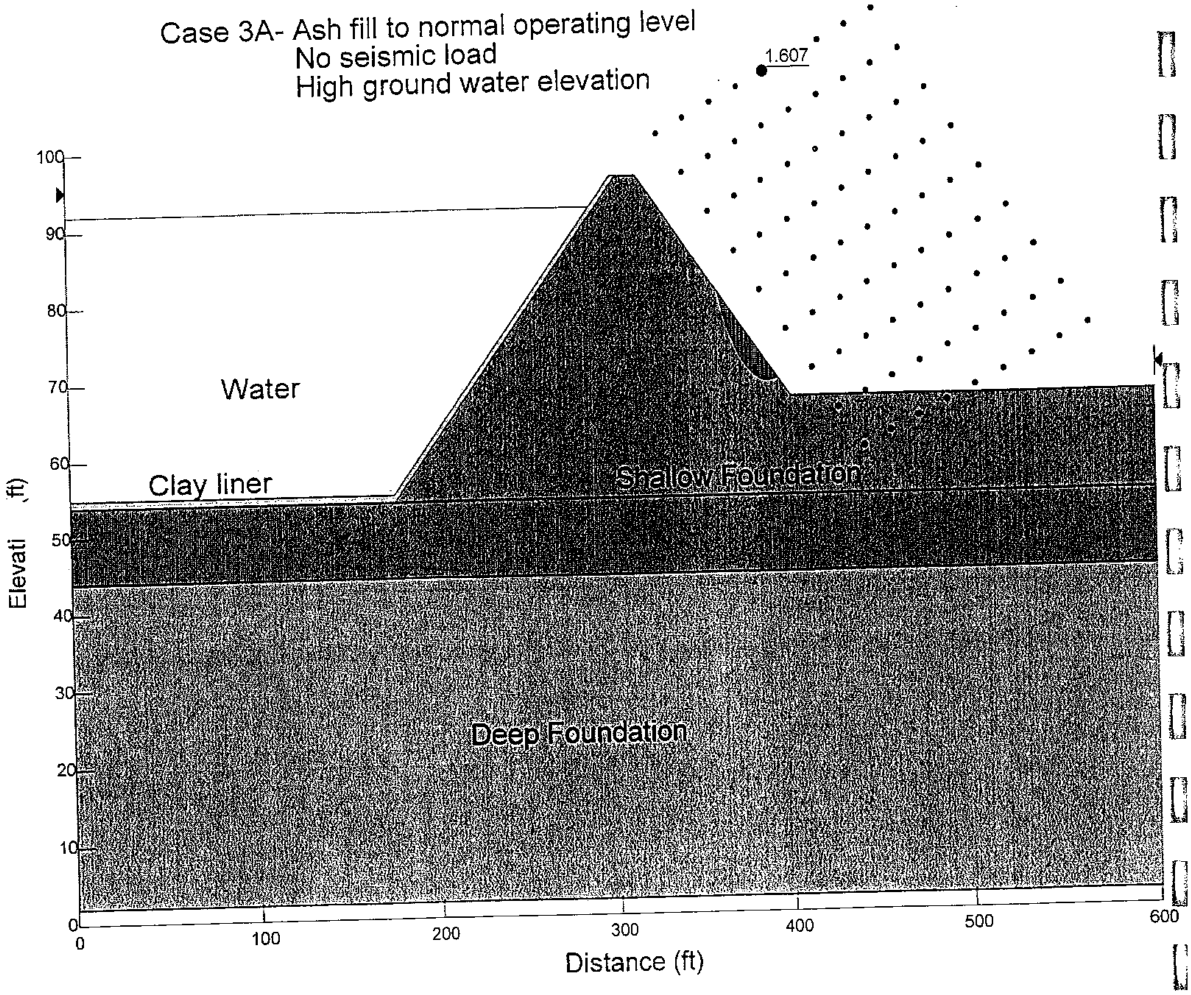

Case 2B- Water to Normal Operating level
Seismic factor of 0.025 applied
Low ground water elevation
1.500
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevatio.)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 272

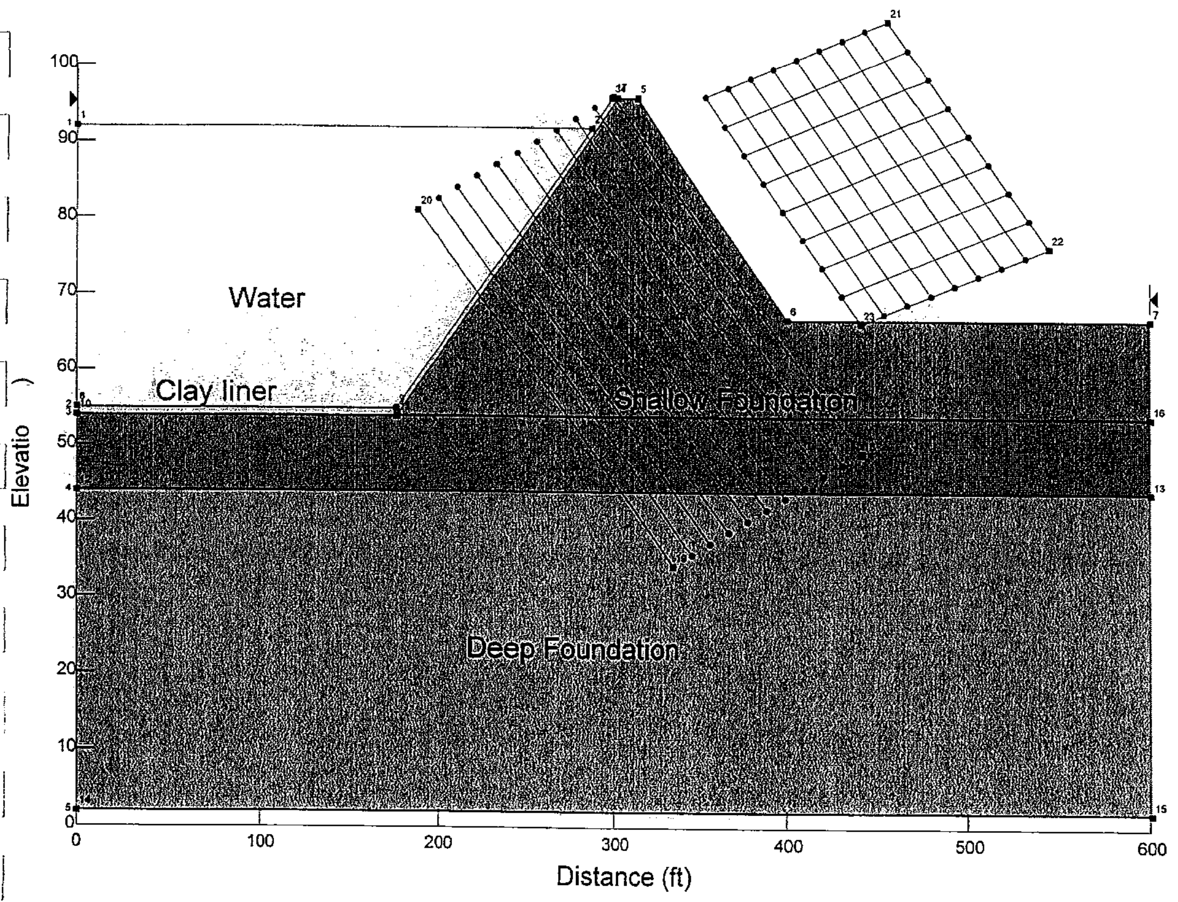


Case 3A- Ash fill to normal operating level
No seismic load
High ground water elevation

7-4A [illegible]
213

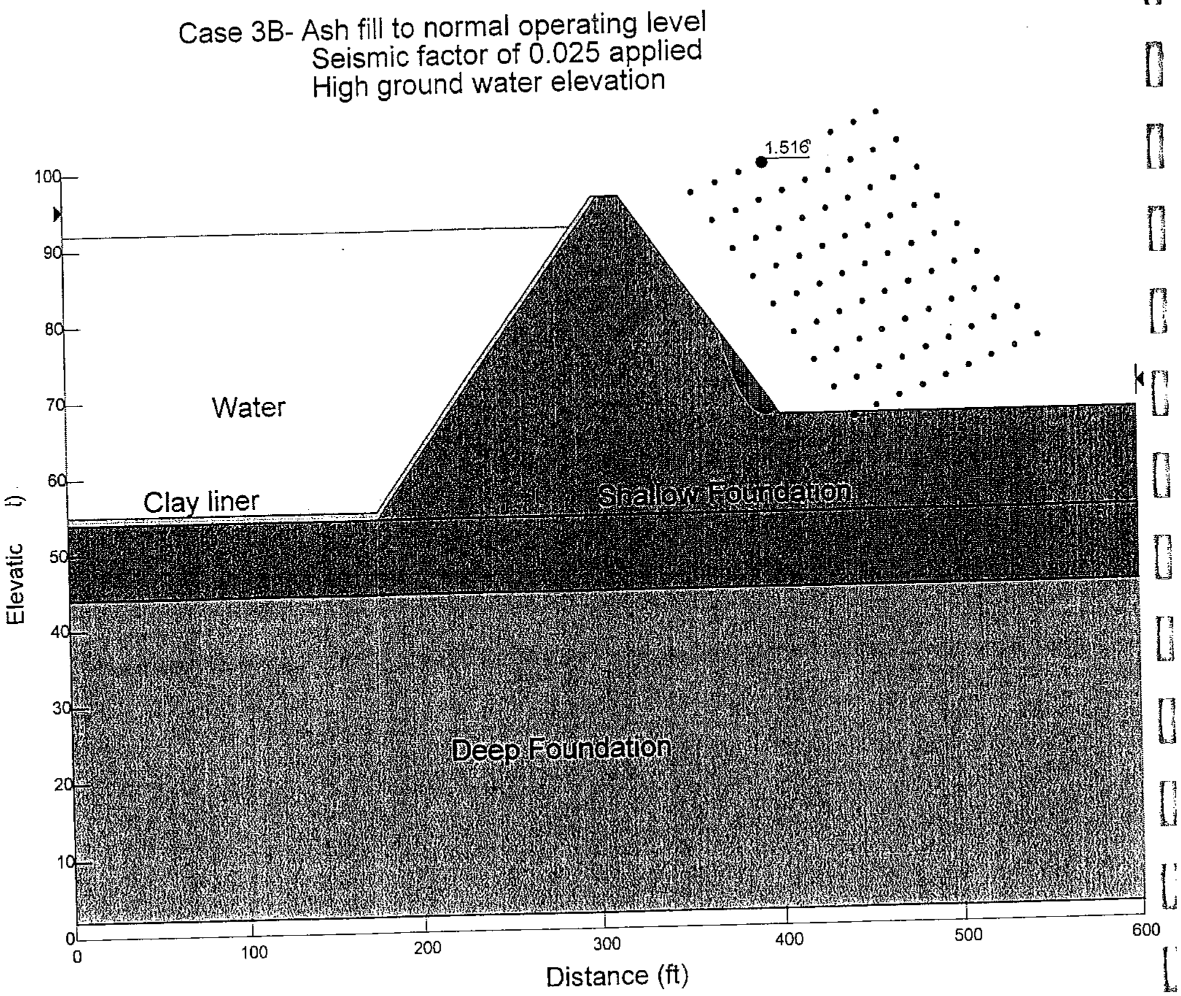

Case 3A- Ash fill to normal operating level
No seismic load
High ground water elevation
1.607
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevati ,ft)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 274

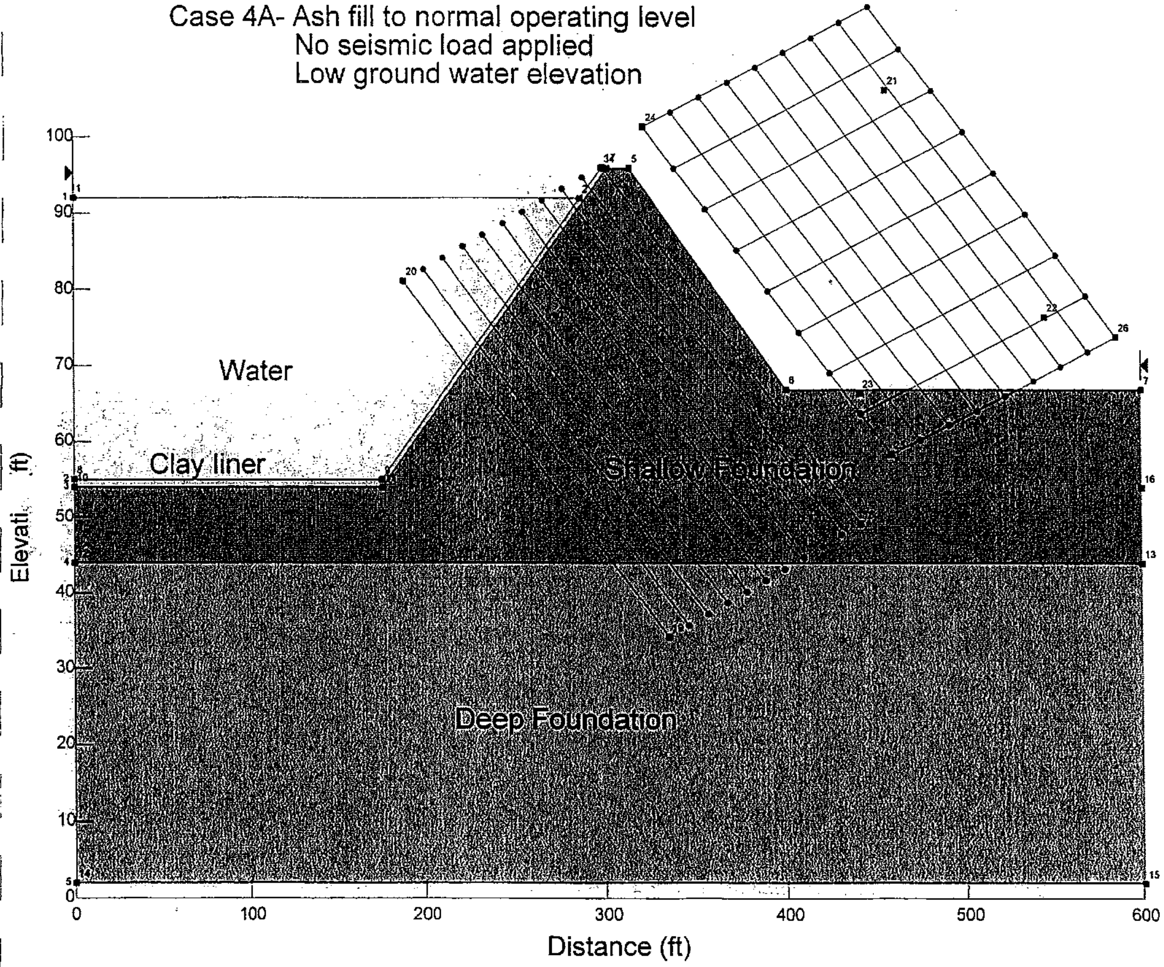


Case 3B- Ash fill to normal operating level
Seismic factor of 0.025 applied
High ground water elevation

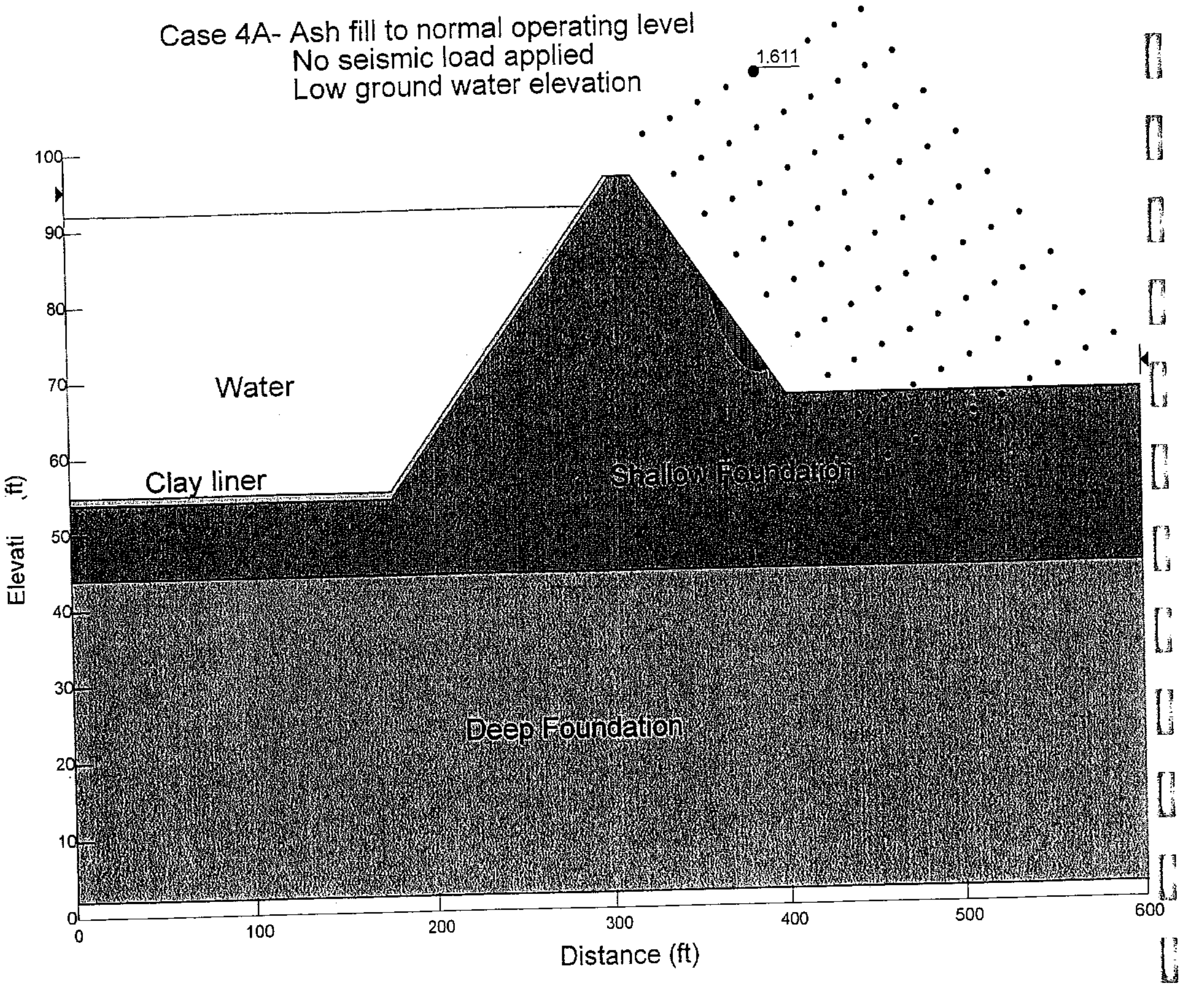
HA
275


Case 3B- Ash fill to normal operating level
Seismic factor of 0.025 applied
High ground water elevation
1.516
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevatic
t)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

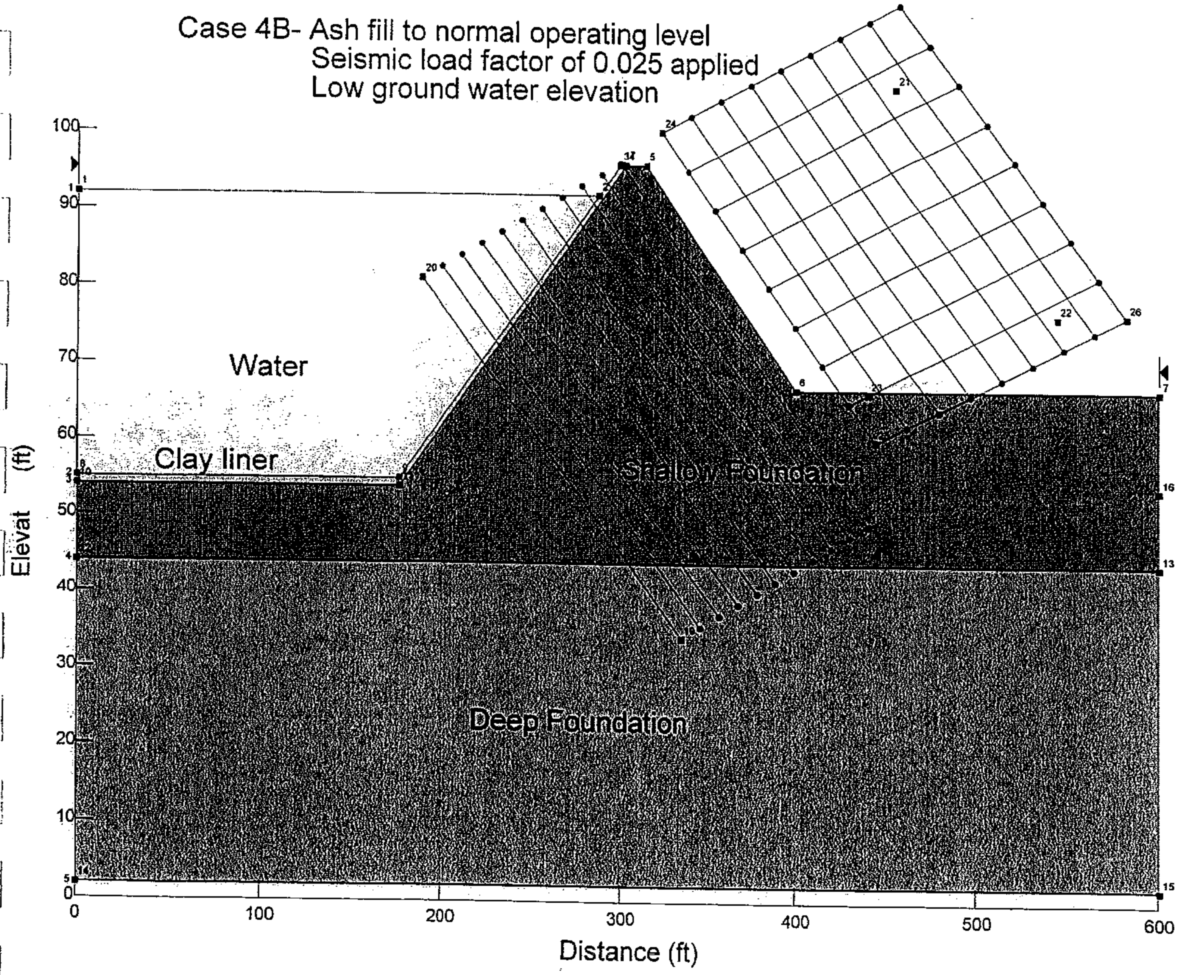
HA 276


Case 4A- Ash fill to normal operating level
No seismic load applied
Low ground water elevation

277

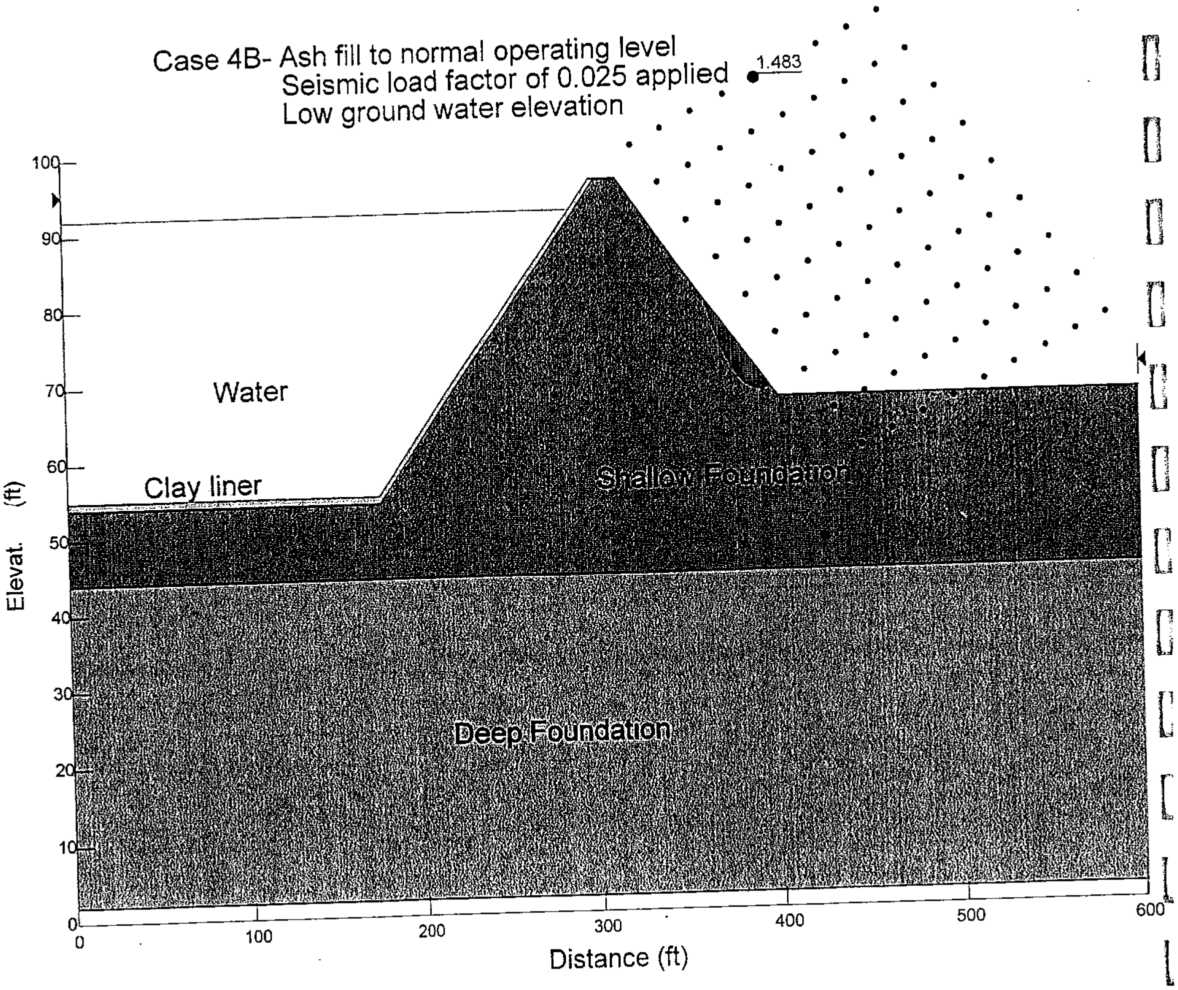

Case 4A- Ash fill to normal operating level
No seismic load applied
Low ground water elevation
1.611
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevati ,ft)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Distance (ft)

HA 278



Case 4B- Ash fill to normal operating level
Seismic load factor of 0.025 applied
Low ground water elevation

279


Case 4B- Ash fill to normal operating level
Seismic load factor of 0.025 applied
Low ground water elevation
1.483
Water
Clay liner
Shallow Foundation
Deep Foundation
Elevat. (ft)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
Distance (ft)

HA 280

WHITNEY & ASSOCIATES
INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-01
DATE 6-27-01
W. & A. FILE NO. 1656
SHEET 1 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 450.3
GROUND SURFACE ELEVATION 467.8
GROUND WATER ELEVATION AT 24+ HRS. 452.6 CAVE
BORING DISCONTINUED AT ELEVATION 406.8
GROUND WATER ELEVATION AT COMPLETION 449.9 IN

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	6"						
Loose, Brown, Fine-Grained SAND With Considerable Silty Clay							
		SS	9	-	-	-	14
	4						
		SS	10	-	-	-	13
Medium-Density, Light Brown, Fine-Grained SAND							
	8	SS	15	-	-	-	3
		SS	14	-	-	-	3
	12						
		SS	13	-	-	-	4
	16	SS	12	-	-	-	4
Loose, Light Brown, Fine-Grained SAND							
	20						
		SS	5	-	-	-	17
	24	SS	8	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 148
281

BORING LOG
(CONTINUATION)

BORING NO. B-01

DATE 6-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 2 OF ~~1656~~ 34

W. & A. FILE NO.

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 1 of 34							
	30	SS	10	-	-	-	-
	34						
Medium-Density, Light Brown, Fine-To Coarse-Grained SAND And Fine-Grained GRAVEL		SS	19	-	-	-	-
	38						
		SS	25	-	-	-	-
	42						
		SS	25	-	-	-	-
	46						
	50	SS	26	-	-	-	-
	54						
		SS	28	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 282

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BORING LOG
(CONTINUATION)

BORING NO. B-01

DATE 6-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 3 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 2 of 34							
Medium-Density, Light Brown, Fine-To Coarse-Grained SAND	60	SS	29	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 00449
283

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INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-02
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 4 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 448.5
GROUND SURFACE ELEVATION 466.7
GROUND WATER ELEVATION AT 24+(P) HRS. 451.2
BORING DISCONTINUED AT ELEVATION 435.7
GROUND WATER ELEVATION AT COMPLETION 450.5

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	3"						
Medium, Dark Brown SANDY CLAY		SS	19	1.1	0.8	112	9
Medium-Density, Brown, Fine-Grained SAND With Considerable Silty Clay	5	SS	19	-	-	-	11
Medium-Density, Light Brown, Fine-Grained SAND		SS	18	-	-	-	4
	10	SS	20	-	-	-	4
Loose, Light Brown, Fine-Grained SAND		SS	9	-	-	-	4
	15	SS	10	-	-	-	6
	20	SS	10	-	-	-	17
Medium-Density, Light Brown, Fine- To Medium-Grained SAND	25	SS	13	-	-	-	-
Medium-Density, Light Brown, Fine- To Medium-Grained SAND And Fine-Grained GRAVEL	30	SS	16	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 284

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INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-03
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 5 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 451.8
GROUND SURFACE ELEVATION 466.9
GROUND WATER ELEVATION AT 24+(P) HRS. 455.7 CAVE
BORING DISCONTINUED AT ELEVATION 435.9
GROUND WATER ELEVATION AT COMPLETION 454.1 IN

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown, Fine-Grained SAND With Some Organic Vegetation	5"						
Medium-Density, Light Brown, Fine-Grained SAND		SS	18	-	-	-	5
	5	SS	17	-	-	-	3
		SS	12	-	-	-	3
	10	SS	13	-	-	-	4
Loose, Light Brown, Fine-Grained SAND		SS	10	-	-	-	7
	15	SS	8	-	-	-	16
Loose, Orange-Brown, Fine- To Medium-Grained SAND	20	SS	7	-	-	-	-
Medium-Density, Orange-Brown, Fine- To Medium-Grained SAND	25	SS	20	-	-	-	-
Medium-Density, Gray-Brown, Fine- To Coarse-Grained SAND	30	SS	28	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA
285

BORING NO. B-04
DATE 6-25-01
W. & A. FILE NO. 1656
SHEET 6 OF 34

WHITNEY & ASSOCIATES
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2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 449.5
GROUND SURFACE ELEVATION 466.0
GROUND WATER ELEVATION AT 24+ HRS. -
BORING DISCONTINUED AT ELEVATION 405.0
GROUND WATER ELEVATION AT COMPLETION 451.9 CAVE-I

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM Organic Topsoil	8"						
Soft, Brown And Dark Brown SANDY LOAM							
		SS	5	0.5	0.4	110	11
	4						
Medium, Brown SANDY CLAY LOAM							
		SS	15	1.2	0.9	114	13
Loose, Brown, Fine- To Medium-Grained SAND	8	SS	7	-	-	-	5
Loose, Light Brown, Fine- To Medium-Grained SAND		SS	6	-	-	-	12
	12						
		SS	5	-	-	-	19
	16	SS	5	-	-	-	18
Very Loose, Brown, Fine- To Medium-Grained SAND With Some Silty Clay							
	20	SS	3	-	-	-	22
Very Loose, Light Brown, Fine- To Medium-Grained SAND							
	24	SS	2	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 286

BORING NO. B-04

BORING LOG
(CONTINUATION)

DATE 6-25-01

PROJECT Illinois Power Ash Pond Extension

SHEET 7 OF ~~1656~~ 34

LOCATION Havana, Illinois

W. & A. FILE NO.

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 6 of 34							
	30	SS	4	-	-	-	-
	34	SS	3	-	-	-	-
Medium-Density, Light Brown, Medium- To Coarse-Grained SAND And Fine-Grained GRAVEL	38	SS	26	-	-	-	-
	42						
Medium-Density, Light Brown And Gray-Brown, Fine- To Coarse-Grained SAND And Fine- To Medium-Grained GRAVEL		SS	23	-	-	-	-
	46						
	50	SS	25	-	-	-	-
	54	SS	20	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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PEORIA, ILLINOIS

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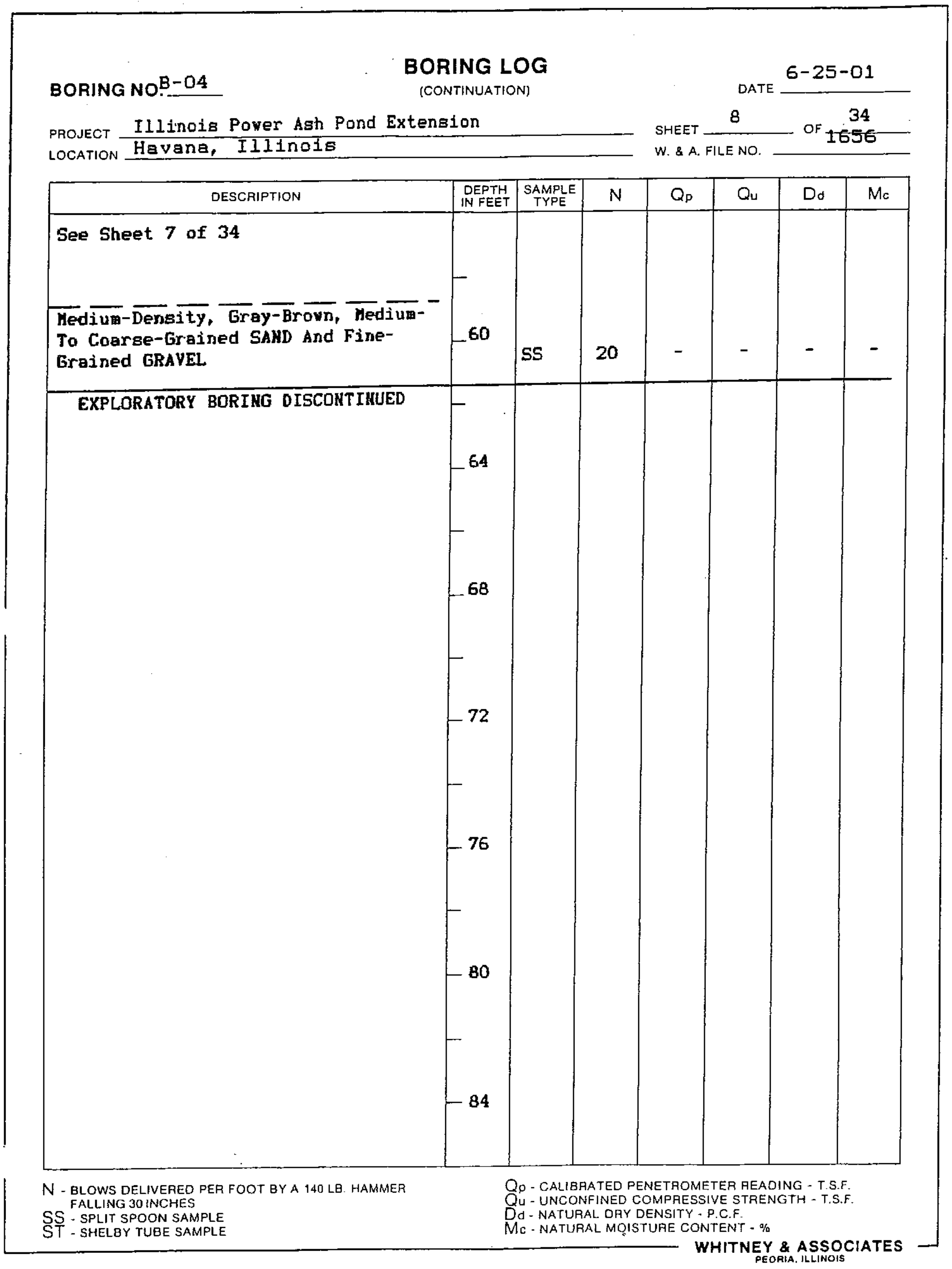
287



BORING NO. B-04

BORING LOG
(CONTINUATION)

DATE 6-25-01

PROJECT Illinois Power Ash Pond Extension

SHEET 8 OF 34

LOCATION Havana, Illinois

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 7 of 34							
Medium-Density, Gray-Brown, Medium-To Coarse-Grained SAND And Fine-Grained GRAVEL	60	SS	20	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 288

DRAFT

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INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO B-05
DATE 6-27-01
W. & A. FILE NO. 1656
SHEET 9 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U.S.B.S.C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 452.1
GROUND SURFACE ELEVATION 466.9
GROUND WATER ELEVATION AT 24+ HRS. 456.2 CAVE IN
BORING DISCONTINUED AT ELEVATION 405.9
GROUND WATER ELEVATION AT COMPLETION 451.1

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM Organic Topsoil	4"						
Loose, Brown, Fine-Grained SAND With Considerable Silty Clay							
		SS	10	-	-	107	13
	4						
Medium, Brown SANDY CLAY LOAM		SS	12	0.7	0.5	100	20
Loose, Light Brown, Fine-Grained SAND							
	8	SS	8	-	-	-	8
		SS	5	-	-	-	14
	12						
		SS	8	-	-	-	16
Loose, Light Brown, Fine- To Medium-Grained SAND	16	SS	10	-	-	-	19
Loose, Brown, Fine-Grained SAND With Some Silt	20	SS	9	-	-	-	-
	24						
Loose Brown, Fine- To Medium-Grained SAND With Some Coarse-Grained Sand		SS	8	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 1052
289

BORING LOG
(CONTINUATION)

BORING NO. B-05

DATE 6-27-01

PROJECT Illinois Power Ash Pond Extension

SHEET 10 OF 34 ~~1656~~

LOCATION Havana, Illinois

W. & A. FILE NO.

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 9 of 34							
Medium-Density, Light Brown And Brown, Fine-Grained SAND	30	SS	15	-	-	-	-
	34	SS	20	-	-	-	-
	38	SS	21	-	-	-	-
	42						
Medium-Density, Brown, Medium- To Coarse-Grained SAND	46	SS	16	-	-	-	-
Medium-Density, Brown, Medium- To Coarse-Grained SAND With Some Fine-Grained Gravel	50	SS	18	-	-	-	-
Medium-Density, Brown, Medium- To Coarse-Grained SAND	54	SS	21	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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BORING NO. B-05

BORING LOG

(CONTINUATION)

DATE 06-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 11 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 10 of 34							
	60	SS	23	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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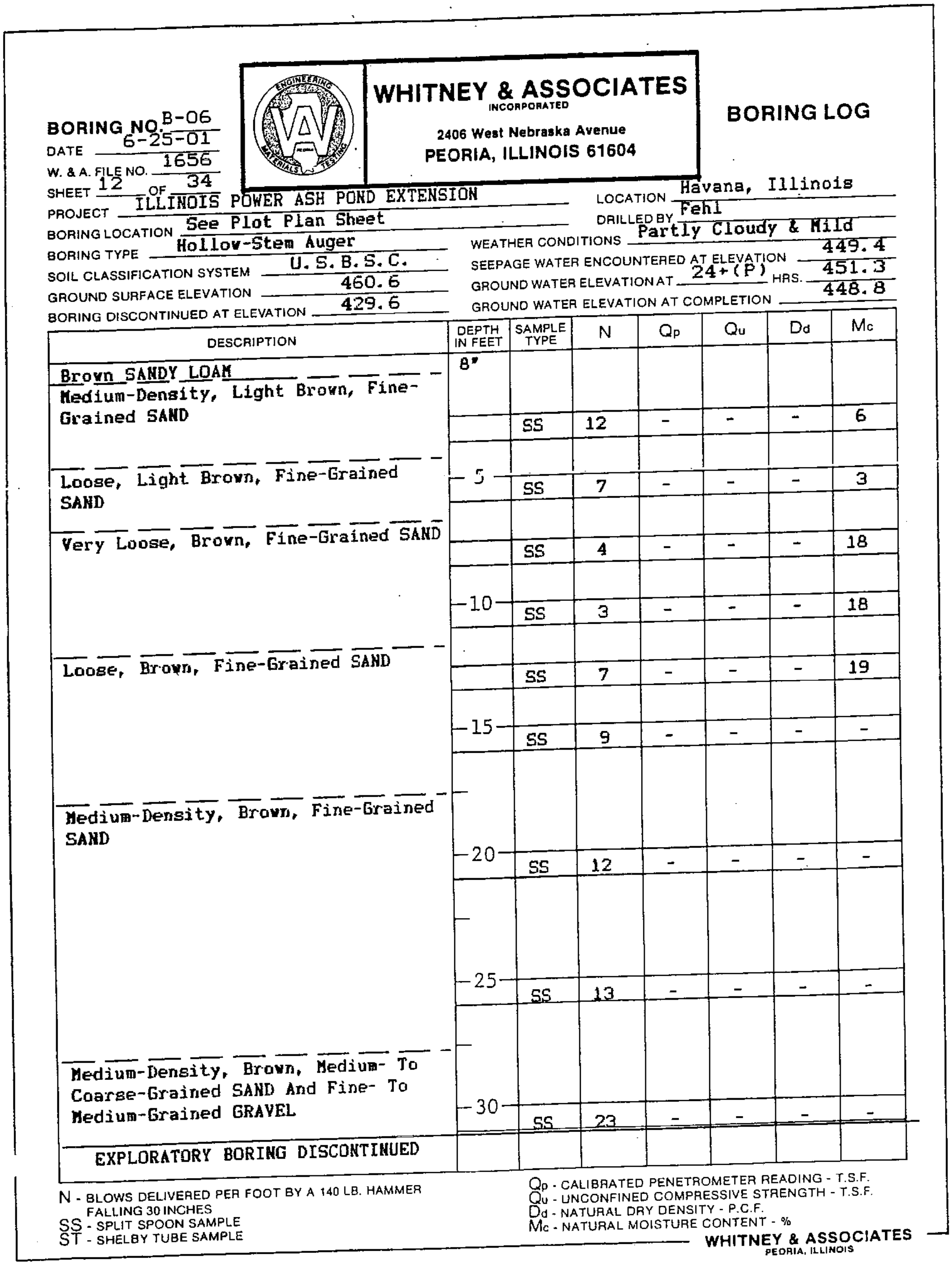

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BORING LOG

BORING NO. B-06
DATE 6-25-01
W. & A. FILE NO. 1656
SHEET 12 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
BORING LOCATION See Plot Plan Sheet
BORING TYPE Hollow-Stem Auger
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
GROUND SURFACE ELEVATION 460.6
BORING DISCONTINUED AT ELEVATION 429.6

LOCATION Havana, Illinois
DRILLED BY Fehl
WEATHER CONDITIONS Partly Cloudy & Mild
SEEPAGE WATER ENCOUNTERED AT ELEVATION 449.4
GROUND WATER ELEVATION AT 24+(P) HRS. 451.3
GROUND WATER ELEVATION AT COMPLETION 448.8

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	8"						
Medium-Density, Light Brown, Fine-Grained SAND		SS	12	-	-	-	6
Loose, Light Brown, Fine-Grained SAND	5	SS	7	-	-	-	3
Very Loose, Brown, Fine-Grained SAND		SS	4	-	-	-	18
	10	SS	3	-	-	-	18
Loose, Brown, Fine-Grained SAND		SS	7	-	-	-	19
	15	SS	9	-	-	-	-
Medium-Density, Brown, Fine-Grained SAND	20	SS	12	-	-	-	-
	25	SS	13	-	-	-	-
Medium-Density, Brown, Medium- To Coarse-Grained SAND And Fine- To Medium-Grained GRAVEL	30	SS	23	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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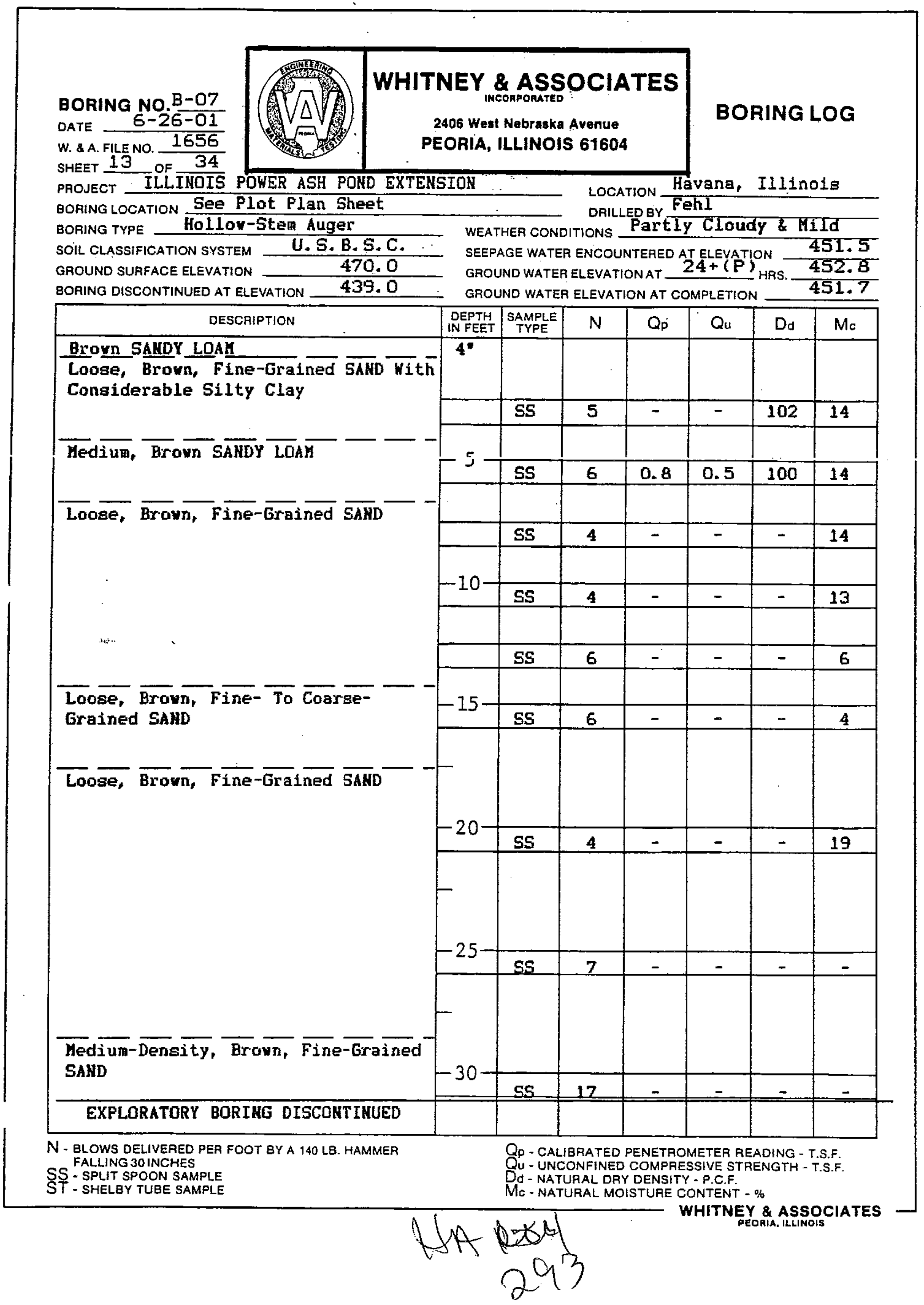

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PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-07
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 13 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 451.5
GROUND SURFACE ELEVATION 470.0
GROUND WATER ELEVATION AT 24+(P) HRS. 452.8
BORING DISCONTINUED AT ELEVATION 439.0
GROUND WATER ELEVATION AT COMPLETION 451.7

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	4"						
Loose, Brown, Fine-Grained SAND With Considerable Silty Clay		SS	5	-	-	102	14
Medium, Brown SANDY LOAM	5	SS	6	0.8	0.5	100	14
Loose, Brown, Fine-Grained SAND		SS	4	-	-	-	14
	10	SS	4	-	-	-	13
		SS	6	-	-	-	6
Loose, Brown, Fine- To Coarse-Grained SAND	15	SS	6	-	-	-	4
Loose, Brown, Fine-Grained SAND	20	SS	4	-	-	-	19
	25	SS	7	-	-	-	-
Medium-Density, Brown, Fine-Grained SAND	30	SS	17	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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BORING LOG

BORING NO. B-08
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 14 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
BORING LOCATION See Plot Plan Sheet
BORING TYPE Hollow-Stem Auger
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
GROUND SURFACE ELEVATION 474.6
BORING DISCONTINUED AT ELEVATION 443.6
LOCATION Havana, Illinois
DRILLED BY Fehl
WEATHER CONDITIONS Partly Cloudy & Mild
SEEPAGE WATER ENCOUNTERED AT ELEVATION 451.4
GROUND WATER ELEVATION AT 24+(P) HRS. 465.1 CAVE IN
GROUND WATER ELEVATION AT COMPLETION 453.8

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Q_p	Q_u	D_d	M_c
Brown SANDY LOAM	3"						
Loose, Light Brown, Fine-Grained SAND With Some Silty Clay		SS	6	-	-	-	8
	5	SS	6	-	-	-	6
		SS	5	-	-	-	8
	10	SS	6	-	-	-	9
Loose, Light Brown, Fine- To Medium-Grained SAND		SS	9	-	-	-	4
Medium-Density, Light Brown, Fine-Grained SAND	15	SS	16	-	-	-	5
	20	SS	16	-	-	-	18
Loose, Light Brown, Fine-Grained SAND	25	SS	8	-	-	-	-
	30	SS	10	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Q_p - CALIBRATED PENETROMETER READING - T.S.F.
Q_u - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
D_d - NATURAL DRY DENSITY - P.C.F.
M_c - NATURAL MOISTURE CONTENT - %

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BORING LOG

BORING NO. B-09
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 15 OF 34

PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 454.3
GROUND SURFACE ELEVATION 488.7
GROUND WATER ELEVATION AT 24+ HRS. 477.2 CAVE
BORING DISCONTINUED AT ELEVATION 427.7
GROUND WATER ELEVATION AT COMPLETION 468.9 IN

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	4"						
Loose, Brown, Fine-Grained SAND With Some Silty Clay							
		SS	6	-	-	-	6
	4						
		SS	7	-	-	-	5
Loose, Brown, Fine-Grained SAND	8	SS	6	-	-	-	6
		SS	6	-	-	-	5
	12						
		SS	8	-	-	-	6
	16	SS	10	-	-	-	7
Medium-Density, Light Brown, Fine-Grained SAND	20	SS	15	-	-	-	4
	24						
		SS	18	-	-	-	2

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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HA ~~1350~~ 295

BORING LOG
(CONTINUATION)

BORING NO. B-09

DATE 6-26-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 16 OF 34 ~~1656~~

W. & A. FILE NO.

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 15 of 34							
	30	SS	25	-	-	-	-
	34						
Medium-Density, Light Brown, Fine- To Medium-Grained SAND		SS	16	-	-	-	-
	38						
		SS	26	-	-	-	-
	42						
Medium-Density, Light Brown, Fine-Grained SAND		SS	24	-	-	-	-
	46						
Medium-Density, Light Brown, Fine-Grained SAND With Fine-Grained <u>Gravel</u>	50						
Medium-Density, Light Brown, Medium- To Coarse-Grained SAND		SS	26	-	-	-	-
	54						
		SS	28	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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PEORIA, ILLINOIS

HA 296

BORING NO. B-09

BORING LOG
(CONTINUATION)

DATE 06-26-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 17 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 16 of 34							
Dense, Light Brown, Medium- To Coarse-Grained SAND With Fine-Grained Gravel	60	SS	31	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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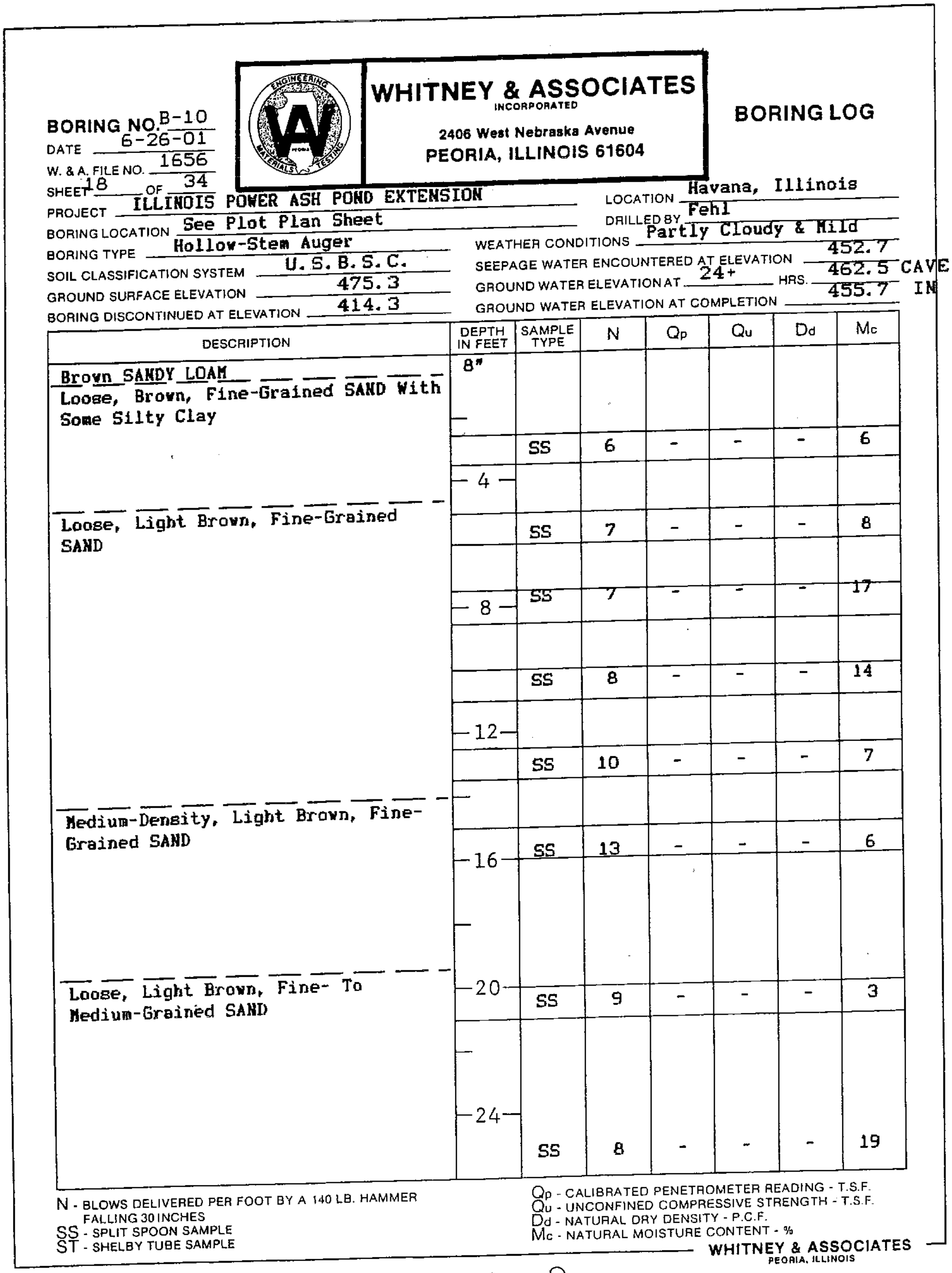
297



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BORING LOG

BORING NO. B-10
DATE 6-26-01
W. & A. FILE NO. 1656
SHEET 18 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
BORING LOCATION See Plot Plan Sheet
BORING TYPE Hollow-Stem Auger
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
GROUND SURFACE ELEVATION 475.3
BORING DISCONTINUED AT ELEVATION 414.3

LOCATION Havana, Illinois
DRILLED BY Fehl
WEATHER CONDITIONS Partly Cloudy & Mild
SEEPAGE WATER ENCOUNTERED AT ELEVATION 452.7
GROUND WATER ELEVATION AT 24+ HRS. 462.5 CAVE
GROUND WATER ELEVATION AT COMPLETION 455.7 IN

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	8"						
Loose, Brown, Fine-Grained SAND With Some Silty Clay		SS	6	-	-	-	6
	4						
Loose, Light Brown, Fine-Grained SAND		SS	7	-	-	-	8
	8	SS	7	-	-	-	17
		SS	8	-	-	-	14
	12						
		SS	10	-	-	-	7
Medium-Density, Light Brown, Fine-Grained SAND	16	SS	13	-	-	-	6
Loose, Light Brown, Fine- To Medium-Grained SAND	20	SS	9	-	-	-	3
	24						
		SS	8	-	-	-	19

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 298

BORING LOG
(CONTINUATION)

BORING NO. B-10
DATE 6-26-01
PROJECT Illinois Power Ash Pond Extension
LOCATION Havana, Illinois
SHEET 19 OF 34
W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 18 of 34							
Medium-Density, Light Brown, Fine- To Medium-Grained SAND	30	SS	13	-	-	-	-
	34	SS	16	-	-	-	-
Medium-Density, Light Brown, Fine- To Coarse-Grained SAND And Fine-Grained GRAVEL	38	SS	25	-	-	-	-
Medium-Density, Light Brown, Medium- To Coarse-Grained SAND And Fine- To Medium-Grained GRAVEL	42	SS	25	-	-	-	-
	46						
Medium-Density, Dark Brown, Fine- To Coarse-Grained SAND	50	SS	26	-	-	-	-
Dense, Dark Brown, Fine- To Coarse-Grained SAND	54	SS	36	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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PEORIA, ILLINOIS

299

BORING LOG

(CONTINUATION)

BORING NO. B-10

DATE 06-26-01

PROJECT Illinois Power Ash Pond Extension

SHEET 20 OF 34 ~~1656~~

LOCATION Havana, Illinois

W. & A. FILE NO.

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 19 of 34							
Dense, Dark Brown, Medium- To Coarse-Grained SND And Fine- To Medium-Grained GRAVEL	60	SS	35	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES

SS - SPLIT SPOON SAMPLE

ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.

Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.

Dd - NATURAL DRY DENSITY - P.C.F.

Mc - NATURAL MOISTURE CONTENT - %

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BORING NO. B-11
DATE 6-28-01
W. & A. FILE NO. 1656
SHEET 21 OF 34

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PEORIA, ILLINOIS 61604

BORING LOG

PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 452.7
GROUND SURFACE ELEVATION 467.6
GROUND WATER ELEVATION AT 24+(P) HRS. 453.1
BORING DISCONTINUED AT ELEVATION 436.6
GROUND WATER ELEVATION AT COMPLETION 452.4

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	7"						
Loose, Light Brown, Fine-Grained SAND With Some Silty Clay		SS	8	-	-	-	9
Loose, Brown, Fine-Grained SAND With Considerable Silty Clay	5	SS	9	-	-	-	11
Loose, Brown, Fine-Grained SAND		SS	6	-	-	-	10
Loose, Brown, Fine-Grained SAND With Considerable Silty Clay	10	SS	5	-	-	-	16
Loose, Brown, Fine-Grained SAND		SS	5	-	-	-	19
	15	SS	4	-	-	-	-
	20	SS	8	-	-	-	-
Medium-Density, Light Brown, Fine- To Coarse-Grained SAND	25	SS	12	-	-	-	-
Medium-Density, Light Brown, Fine-Grained SAND	30	SS	16	-	-	-	-
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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301

BORING LOG
(CONTINUATION)

BORING NO. B-12
DATE 06-25-01
PROJECT Illinois Power Ash Pond Extension
SHEET 24 OF 34
LOCATION Havana, Illinois
W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 23 of 34							
Dense, Gray-Brown, Fine- To Medium-Grained SAND And Fine-Grained GRAVEL	60	SS	35	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

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HA 302

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BORING LOG

BORING NO. B-13
DATE 6-25-01
W. & A. FILE NO. 1656
SHEET 25 OF 34

PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 449.0
GROUND SURFACE ELEVATION 466.5
GROUND WATER ELEVATION AT 24+ HRS. 455.9
BORING DISCONTINUED AT ELEVATION 405.5
GROUND WATER ELEVATION AT COMPLETION 448.6

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	7"						
Loose, Light Brown And Brown, Fine-Grained SAND With Some Silty Clay		SS	7	-	-	-	11
	4						
		SS	9	-	-	-	10
Very Loose, Light Brown, Fine-Grained SAND	8	SS	4	-	-	-	6
		SS	3	-	-	-	4
	12						
Loose, Light Brown, Fine-Grained SAND		SS	6	-	-	-	6
	16	SS	8	-	-	-	10
Loose, Light Brown, Fine- To Medium-Grained SAND	20						
		SS	8	-	-	-	18
	24						
		SS	10	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

303

BORING LOG

(CONTINUATION)

BORING NO. B-13

DATE 6-25-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 26 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 25 of 34							
Medium-Density, Gray-Brown, Medium- To Coarse-Grained SAND And Fine-Grained GRAVEL	30	SS	12	-	-	-	-
	34	SS	13	-	-	-	-
	38						
		SS	16	-	-	-	-
	42						
Medium-Density, Brown, Fine- To Medium-Grained SAND		SS	20	-	-	-	-
	46						
Medium-Density, Brown, Medium- To Coarse-Grained SAND							
	50	SS	23	-	-	-	-
	54	SS	18	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 304

BORING LOG
(CONTINUATION)

BORING NO. B-13

DATE 06-25-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 27 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 26 of 34							
Medium-Density, Brown, Fine- To Medium-Grained SAND	60	SS	17	-	-	-	-
EXPLORATORY BORING DISCONTINUED	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA [illegible] 305

WHITNEY & ASSOCIATES
INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-14
DATE 6-28-01
W. & A. FILE NO. 1656
SHEET 28 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
BORING LOCATION See Plot Plan Sheet
BORING TYPE Hollow-Stem Auger
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
GROUND SURFACE ELEVATION 481.9
BORING DISCONTINUED AT ELEVATION 450.9

LOCATION Havana, Illinois
DRILLED BY Fehl
WEATHER CONDITIONS Partly Cloudy & Mild
SEEPAGE WATER ENCOUNTERED AT ELEVATION 466.8
GROUND WATER ELEVATION AT 24+(P) HRS. 454.4
GROUND WATER ELEVATION AT COMPLETION 453.8

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	6"						
Loose, Gray Brown, Fine-Grained SAND With Some Silty Clay		SS	8	-	-	-	9
Loose, Light Brown, Fine-Grained SAND	5	SS	7	-	-	-	8
Medium-Density, Dark Brown, Fine-Grained SAND With Considerable Silty Clay		SS	10	-	-	-	9
	10	SS	11	-	-	-	15
Medium-Density, Brown, Fine-Grained SAND With Some Silty Clay		SS	12	-	-	-	14
	15	SS	15	-	-	-	20
Medium-Density, Light Brown, Fine-Grained SAND	20	SS	13	-	-	-	5
Medium-Density, Light Brown, Fine- To Medium-Grained SAND	25	SS	15	-	-	-	5
	30	SS	13	-	-	-	15
EXPLORATORY BORING DISCONTINUED							

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

KH 366

BORING NO. B-15
DATE 6-27-01
W. & A. FILE NO. 1656
SHEET 29 OF 34

WHITNEY & ASSOCIATES
INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

PROJECT ILLINOIS POWER ASH POND EXTENSION
LOCATION Havana, Illinois
BORING LOCATION See Plot Plan Sheet
DRILLED BY Fehl
BORING TYPE Hollow-Stem Auger
WEATHER CONDITIONS Partly Cloudy & Mild
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
SEEPAGE WATER ENCOUNTERED AT ELEVATION 450.8
GROUND SURFACE ELEVATION 473.2
GROUND WATER ELEVATION AT 24+ HRS. 451.4
BORING DISCONTINUED AT ELEVATION 412.2
GROUND WATER ELEVATION AT COMPLETION 449.6

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM	5"						
Loose, Brown, Fine-Grained SAND With Some Silty Clay							
		SS	5	-	-	-	10
	4						
		SS	6	-	-	-	11
Loose, Brown, Fine-Grained SAND With Trace Of Silty Clay	8	SS	8	-	-	-	9
Loose, Light Brown, Fine-Grained SAND		SS	9	-	-	-	8
Medium-Density, Light Brown, Fine-Grained SAND	12						
		SS	13	-	-	-	8
	16	SS	17	-	-	-	3
Loose, Light Brown, Fine-Grained SAND							
	20	SS	8	-	-	-	4
Loose, Light Brown, Fine- To Medium-Grained SAND	24						
		SS	8	-	-	-	16

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA Add 307

BORING LOG

(CONTINUATION)

BORING NO. B-15

DATE 6-27-01

SHEET 30 OF 34

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Q_p	Q_u	D_d	M_c
See Sheet 29 of 34							
Medium-Density, Light Brown, Fine- To Medium-Grained SAND	30	SS	15	-	-	-	-
Medium-Density, Light Brown, Fine- To Coarse-Grained SAND And Fine-Grained GRAVEL	34	SS	18	-	-	-	-
	38						
		SS	23	-	-	-	-
	42						
Medium-Density, Light Brown, Medium- To Coarse-Grained SAND And Fine-Grained GRAVEL		SS	24	-	-	-	-
	46						
	50	SS	23	-	-	-	-
	54						
		SS	24	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Q_p - CALIBRATED PENETROMETER READING - T.S.F.
Q_u - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
D_d - NATURAL DRY DENSITY - P.C.F.
M_c - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA308

BORING LOG

(CONTINUATION)

BORING NO. B-15

DATE 06-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 31 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 30 of 34							
Medium-Density, Light Brown, Fine-To Medium-Grained SAND	60	SS	26	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HAVANA
309

WHITNEY & ASSOCIATES
INCORPORATED
2406 West Nebraska Avenue
PEORIA, ILLINOIS 61604

BORING LOG

BORING NO. B-16
DATE 6-27-01
W. & A. FILE NO. 1656
SHEET 32 OF 34
PROJECT ILLINOIS POWER ASH POND EXTENSION
BORING LOCATION See Plot Plan Sheet
BORING TYPE Hollow-Stem Auger
SOIL CLASSIFICATION SYSTEM U. S. B. S. C.
GROUND SURFACE ELEVATION 468.9
BORING DISCONTINUED AT ELEVATION 407.9

LOCATION Havana, Illinois
DRILLED BY Fehl
WEATHER CONDITIONS Partly Cloudy & Mild
SEEPAGE WATER ENCOUNTERED AT ELEVATION 450.1
GROUND WATER ELEVATION AT 24+ HRS. 451.4
GROUND WATER ELEVATION AT COMPLETION 449.7

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
Brown SANDY LOAM Loose, Brown And Light Brown, Fine-Grained SAND With Some Silty Clay	8"						
		SS	8	-	-	-	9
	4						
		SS	9	-	-	-	11
Medium-Density, Brown And Light Brown, Fine-Grained SAND	8	SS	15	-	-	-	3
		SS	19	-	-	-	4
Medium-Density, Light Brown, Fine- To Medium-Grained SAND	12						
		SS	16	-	-	-	7
Medium-Density, Light Brown, Fine-Grained SAND	16	SS	14	-	-	-	4
Loose, Light Brown, Fine- To Medium-Grained SAND	20	SS	8	-	-	-	17
	24						
		SS	5	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 310

BORING NO. B-16

BORING LOG

(CONTINUATION)

DATE 6-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 33 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Q_p	Q_u	D_d	M_c
See Sheet 32 of 34							
Medium-Density, Light Brown And Gray-Brown, Fine- To Medium-Grained SAND	30						
		SS	15	-	-	-	-
	34						
		SS	15	-	-	-	-
Medium-Density, Gray-Brown And Light Brown, Fine- To Coarse-Grained SAND	38						
		SS	17	-	-	-	-
	42						
		SS	19	-	-	-	-
	46						
	50						
		SS	26	-	-	-	-
	54						
		SS	24	-	-	-	-

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES

SS - SPLIT SPOON SAMPLE

ST - SHELBY TUBE SAMPLE

Q_p - CALIBRATED PENETROMETER READING - T.S.F.

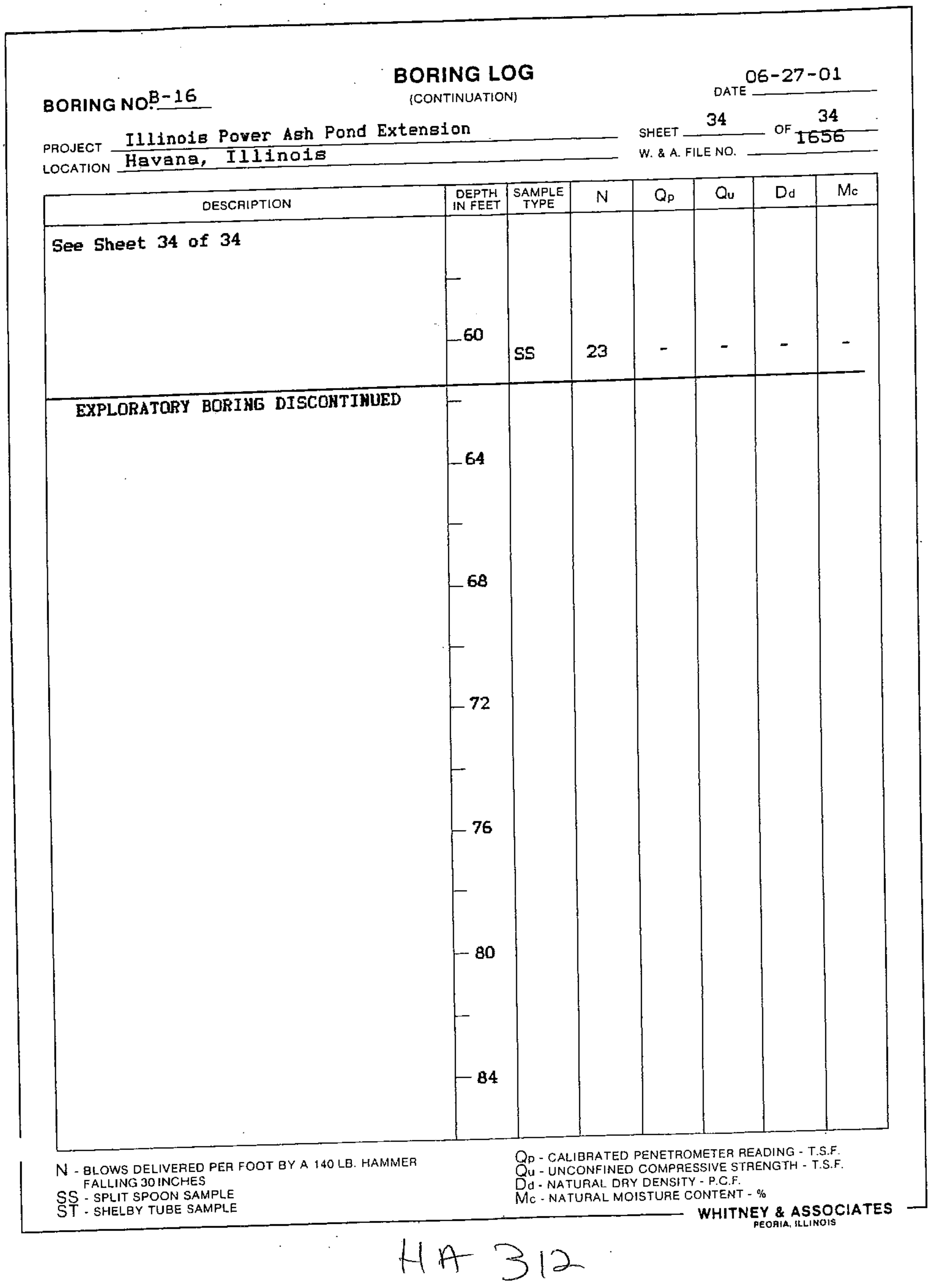
Q_u - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.

D_d - NATURAL DRY DENSITY - P.C.F.

M_c - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

311



BORING LOG
(CONTINUATION)

BORING NO. B-16

DATE 06-27-01

PROJECT Illinois Power Ash Pond Extension

LOCATION Havana, Illinois

SHEET 34 OF 34

W. & A. FILE NO. 1656

DESCRIPTION	DEPTH IN FEET	SAMPLE TYPE	N	Qp	Qu	Dd	Mc
See Sheet 34 of 34							
	60	SS	23	-	-	-	-
EXPLORATORY BORING DISCONTINUED							
	64						
	68						
	72						
	76						
	80						
	84						

N - BLOWS DELIVERED PER FOOT BY A 140 LB. HAMMER FALLING 30 INCHES
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE

Qp - CALIBRATED PENETROMETER READING - T.S.F.
Qu - UNCONFINED COMPRESSIVE STRENGTH - T.S.F.
Dd - NATURAL DRY DENSITY - P.C.F.
Mc - NATURAL MOISTURE CONTENT - %

WHITNEY & ASSOCIATES
PEORIA, ILLINOIS

HA 312

2x2 box culvert under highway 78
Worksheet for Rectangular Channel

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	2x2 Box Culvert
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data			
Mannings Coefficient	0.013		
Channel Slope	0.037000 ft/ft		
Depth	2.00	ft	} FULL FLOW
Bottom Width	2.00	ft	

Results		
Discharge	67.11	cfs
Flow Area	4.00	ft²
Wetted Perimeter	6.00	ft
Top Width	2.00	ft
Critical Depth	3.27	ft
Critical Slope	0.011496 ft/ft	
Velocity	16.78	ft/s
Velocity Head	4.38	ft
Specific Energy	6.38	ft
Froude Number	2.09	
Flow is supercritical.		

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Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 (203) 755-1666

FlowMaster v5.15
Page 1 of 1

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313

Check ditch for 1/2 PMP
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\fmw\havana3b.fm2
Worksheet	Auxiliary Spillway for Havana Polishing
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.031	
Channel Slope	0.009600	ft/ft
Left Side Slope	5.000000	H : V
Right Side Slope	5.000000	H : V
Bottom Width	10.00	ft
Discharge	100.00	cfs

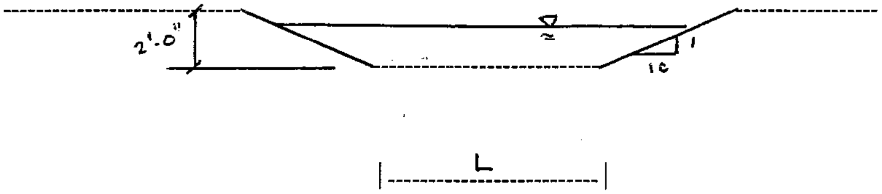
Results		
Depth	1.33	ft
Flow Area	22.18	ft²
Wetted Perimeter	23.58	ft
Top Width	23.31	ft
Critical Depth	1.19	ft
Critical Slope	0.014904	ft/ft
Velocity	4.51	ft/s
Velocity Head	0.32	ft
Specific Energy	1.65	ft
Froude Number	0.81	
Flow is subcritical.		

HA-314

Auxiliary Spillway Analysis
Havana Power Station
East Ash Pond #3B

October 8, 2001
JHK

Check auxiliary spillway at the polishing pond for the following new flows of ½-PMP storm of 100 cfs and 100-year, 24-hr. storm of 44 cfs. Spillway will act as a weir. Ignore sloping sides when determining capacity of weir.



For the 100 cfs flow, allow H to be up to 1.5'
For the 44 cfs flow, allow H to be up to 1.0'

$Q = CLH^{1.5}$ $C = 2.70$

Calculate required width of spillway, L:

For Q= 100 cfs $L = 100/[(2.7)(1.5)^{1.5}] = 20.2'$

For Q= 44 cfs $L = 44/[(2.7)(1.0)^{1.5}] = 16.3'$

Existing spillway is 20'. Note: spillway L does not take into consideration sloping portion of spillway, which would increase the flow going through spillway. Also, these flows assume that effluent pipe is completely blocked, which is unlikely. The auxiliary spillway is not needed to meet the state dam safety criteria.

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315

Auxiliary Spillway Analysis **October 8, 2001**
Havana Power Station **JHK**
East Ash Pond #3B

The stoplog structure in the polishing pond is both the primary and emergency spillway for the pond system. Calculations elsewhere in this document show that it has sufficient capacity for the maximum design storm.

The auxiliary spillway from the polishing pond is an existing one. As part of this new pond 3B, an additional spillway, connecting pond 3B to the polishing pond, will be added. The critical flow, since both the existing spillway and the new spillway are the same size and dimensions, will come from the existing spillway in the polishing pond where the flow is greater. This calculation checks the existing spillway for the higher discharge resulting from adding a new pond to the system.

The stoplog structure discharges into a 36-inch round reinforced concrete pipe that routes the water to the Illinois River. Should a blockage ever occur in the 36-inch pipe, performance of the stoplog structure would be reduced. To provide for a controlled discharge in the event of a blockage of the 36-inch pipe, an auxiliary spillway was installed in pond #3 as part of the previous pond addition work. There will also be an auxiliary spillway installed between new pond #3B and polishing pond #3, to provide a path for the water should the outlet for pond #3B become blocked.

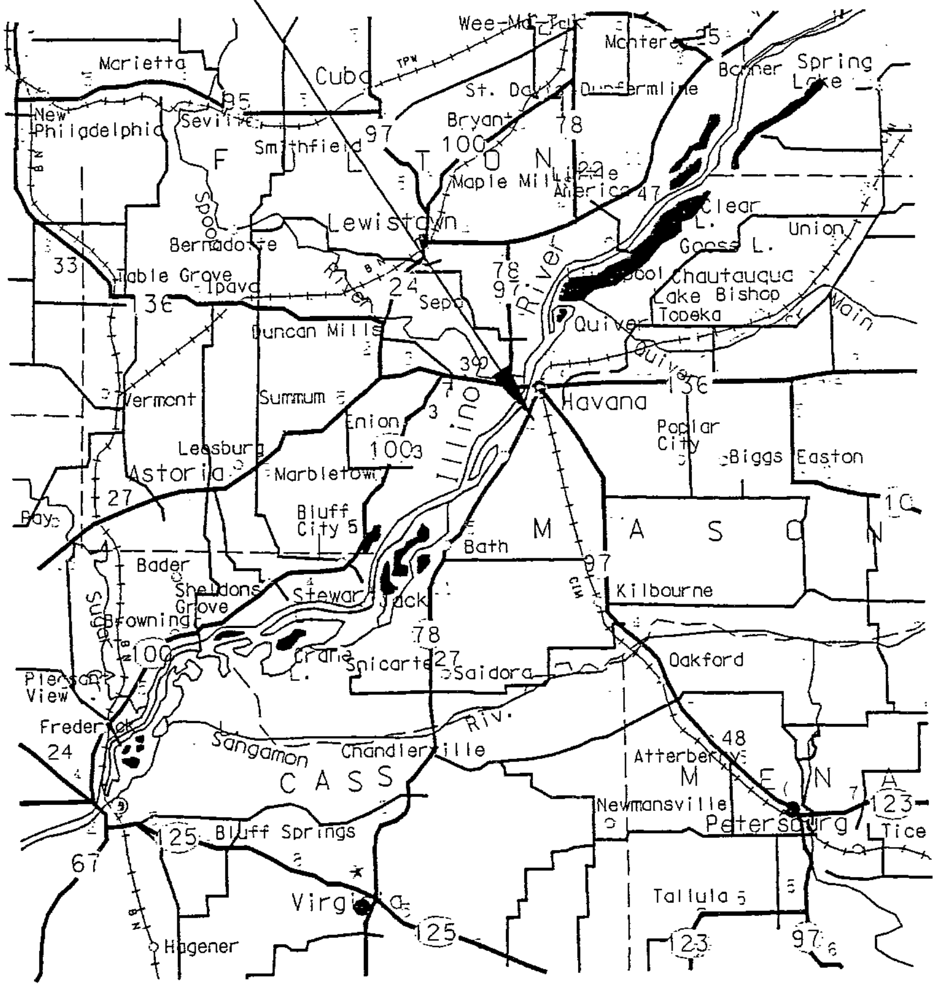
Since the auxiliary spillway is not the emergency spillway, but is in addition to it, there is no specified design flow. However, since its purpose is to back up the emergency spillway, it is appropriate to use the same design flows for each. As stated above, the existing spillway for polishing pond #3 has the critical water flow. The design flow for the 100-year, 24-hour storm is 44 cfs, and the design flow for the ½-PMP storm is 100 cfs. The auxiliary spillway was analyzed as a broad crested weir. It has a maximum head of 2-feet. The width is sufficient to carry 44 cfs with a 1-ft head and 100 cfs with a 1.5-ft head.

Any water that discharges over the auxiliary spillway from the polishing pond #3 will flow north parallel to Highway 78 to a 2-ft square box culvert located south of the railroad tracks on the north edge of the pond system. The culvert flows westward under the highway, eventually discharging into a large swale draining into the Illinois River. The box culvert will control the maximum flow into the river. It has a full flow capacity of 67 cfs. Flow in excess of this, would cause minor flooding of the highway.

It would be very unlikely that the auxiliary spillway would ever see a discharge. Regular pond observation by the plant would detect high pond levels and corrective action would be taken. Plant flows can be shut down in a short time if critical pond levels are reached.

DRAFT

PROJECT LOCATION



LOCATION MAP

SCALE: 1"=1 MILE

HA

317

Response to Request No. 3:

The East Ash Pond System is designed to permanently contain materials in categories (1) fly ash, (2) bottom ash, (3) boiler slag, and (5) other. The category (5) other materials consist discharges to the East Ash Pond System of the following materials as identified in the Havana Power Station's National Pollutant Discharge Elimination System (NDPES) permit:

Unit 6 bottom ash sluice water
Unit 6 dry fly ash handling area drainage
Dredged material
Units 1-6 demineralizer regenerant wastes
Unit 6 condensate polisher wastes

The North Ash Pond System is intended to permanently contain materials in categories (1) fly ash, (2) bottom ash, (3) boiler slag, and (5) other. The category (5) other materials consist of discharges to the North Ash Pond System of the following materials as identified in the Havana Power Station's NPDES permit:

Units 1-6 ash hopper overflow
Units 1-6 boiler blowdown
Units 1-6 demineralizer regenerant wastes
Units 6 condensate polisher wastes
Units 1-6 floor and sump drainage
Units 1-5 miscellaneous heat exchangers
Units 1-5 ash handling equipment drainage
Unit 6 coal pile runoff
Unit 6 transformer drains
Unit 6 roof drainage
Yard area runoff
Water softener backwash
Service water strainer backwash
Units 1-6 nonchemical metal cleaning waste
Unit 6 cooling tower blowdown
Winter low point drain line
Accumulated coal barge stormwater
Reverse osmosis unit concentrate
Reverse osmosis unit maintenance waste
Activated carbon treatment system effluent
Groundwater remediation project discharge
Units 1-6 water sampling system drains

4. Was the management unit(s) designed by a Professional Engineer? Is or was the construction of the waste management units(s) under the supervision of a Professional Engineer? Is inspection and monitoring of the safety of the waste management unit(s) under the supervision of a Professional Engineer?

Response to Request No. 4:

The cells of the East Ash Pond System were designed by and constructed under the supervision of a registered Professional Engineer employed by DMG or the previous owner/operator of Havana Power Station, Illinois Power Company. In 2008 and 2009, a Professional Engineer employed by URS Corporation inspected and assessed the safety of the East Ash Pond System. Prior to that, beginning in approximately 1990 and through 2007, the safety of East Ash Pond System was inspected annually by a registered Professional Engineer employed by DMG or Illinois Power Company.

DMG was unable to locate any records to determine whether the North Ash Pond System was or was not designed by a Professional Engineer. DMG was also unable to locate any records to determine whether the North Ash Pond System was or was not constructed under the supervision of a Professional Engineer. In 2009, a Professional Engineer employed by URS Corporation inspected and assessed the safety of the North Ash Pond System.

5. When did the company last assess or evaluate the safety (i.e., structural integrity) of the management unit(s)? Briefly describe the credentials of those conducting the structural integrity assessments/evaluations. Identify actions taken or planned by facility personnel as a result of these assessments or evaluations. If corrective actions were taken, briefly describe the credentials of those performing the corrective actions, whether they were company employees or contractors. If the company plans an assessment or evaluation in the future, when is it expected to occur?

Response to Request No. 5:

DMG last assessed and evaluated the safety (*i.e.,* structural integrity) of both the North Ash Pond System and the East Ash Pond System in March 2009. The East Ash Pond System was also assessed and evaluated for safety in 2008. Those assessments/evaluations were conducted by Ken Berry, a registered Professional Engineer employed by URS Corporation. Mr. Berry, a Senior Project Manager in the Geotechnical Engineering Group of URS Corporation, is a geotechnical engineer with experience in landslides, levees, foundations, geotechnical instrumentation, and general construction. His recent experience includes a design project for the New Orleans levees, a load test on an I-wall and levee in New Orleans, and investigations for 30 miles of levee analyses in the counties east of St. Louis, Missouri. Mr. Berry received his BSCE from North Carolina State University in 1989 and his MSCE (geotechnical) from Virginia Polytechnic Institute and State University in 1990. He is registered as a Professional Engineer in Missouri and Illinois and has been employed by URS Corporation since 1991. Prior to 2008 (i.e., beginning in approximately 1990 and through 2007), a registered Professional Engineer employed by DMG or Illinois Power Company (the previous owner/operator of Havana Power Station) with experience in dam safety annually inspected the safety of the cells of the East Ash Pond System.

DMG has not yet received URS' report of the March 2009 dam inspections at Havana Power Station. After receipt of URS' report, DMG will assign a Professional Engineer to ensure that all required corrective actions are implemented. At that time, DMG will determine whether company employees or contractors will be used to perform any identified corrective actions. DMG has not yet had the opportunity to develop or implement any corrective actions.

DMG plans to have a qualified Professional Engineer perform safety (i.e. structural integrity) inspections of both the East Ash Pond System and North Ash Pond System in 2010.

6. When did a State or a Federal regulatory official last inspect or evaluate the safety (structural integrity) of the management unit(s)? If you are aware of a planned state or federal inspection or evaluation in the future, when is it expected to occur? Please identify the Federal or State regulatory agency or department which conducted or is planning the inspection or evaluation. Please provide a copy of the most recent official inspection report or evaluation.

Response to Request No. 6:

The IDNR OWR last inspected the safety (structural integrity) of the East Ash Pond System prior to the filling each cell with water. Specifically, IDNR OWR last inspected Cell 1 in 1990; Cells 2 and 4 in 1997, and Cell 3 in 2003. IDNR did not provide and DMG does not have copies of those IDNR inspection reports. DMG is not aware of a planned state or federal inspection or evaluation of the East Ash Pond System in the future.

To the best of DMG's knowledge, no federal or state agency regulatory official has inspected or evaluated the safety (structural integrity) of the North Ash Pond System. DMG is not aware of a planned state or federal inspection or evaluation of the North Ash Pond System in the future.

7. Have assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year uncovered a safety issue(s) with the management unit(s), and, if so, describe the actions that have been or are being taken to deal with the issue or issues. Please provide any documentation that you have for these actions.

Response to Request No. 7:

No federal or state regulatory officials have conducted any assessment, evaluation or inspection of the North Ash Pond System or the East Ash Pond System at Havana Power Station within the past year.

8. What is the surface area (acres) and total storage capacity of each of the management units? What is the volume of material currently stored in each of the management unit(s). Please provide the date that the volume measurement was taken. Please provide the maximum height of the management units(s). The basis for determining maximum height is explained later in this Enclosure.

Response to Request No. 8:

The East Ash Pond System has a total surface area of 90 acres. The estimated design storage volume of each cell in the East Ash Pond System at normal pool elevation is as follows: Cell 1 - 520 acre-feet (ac-ft); Cell 2 - 620 ac-ft; Cell 3 - 1,410 ac-ft; and Cell 4 - 75 ac-ft. The total estimated design volume of the East Ash Pond System is 2,625 ac-ft. The estimated volume of materials currently stored in each cell is as follows: Cell 1- 506 ac-ft; Cell 2 - 565 ac-ft; Cell 3 - 310 ac-ft; and Cell 4 - 7 ac-ft. Because no recent volume measurements have been taken for any of the cells in the East Ash Pond System, on or about March 18, 2009, a DMG-employed Professional Engineer estimated the material volumes in order to respond to this question.

The maximum height of each cell in the East Ash Pond System is approximately as follows: Cell 1 - 25 feet; Cell 2 - 40 feet; Cell 3 - 38 feet; and Cell 4 - 40 feet.

The North Ash Pond System has a surface area of approximately 6 acres. The estimated design storage volume of the North Ash Pond System is 25 ac-ft. The estimated volume of materials currently stored is 5 ac-ft. Because no volume measurements have been taken for the single cell of the North Ash Pond, on or about March 18, 2009, a DMG-employed Professional Engineer estimated the material volumes in order to respond to this question.

The maximum height of the North Ash Pond System is approximately 22 feet.

9. Please provide a brief history of known spills or unpermitted releases from the unit within the last ten years, whether or not these were reported to State or federal regulatory agencies. For purposes of this question, please include only releases to surface water or to the land (do not include releases to groundwater).

Response to Request No. 9:

To the best of DMG's knowledge, there have been no spills or unpermitted releases of coal combustion residues or byproducts to surface water or to the land from either the East Ash Pond System or North Ash Pond System at Havana Power Station in the last ten years.

All discharges from the East Ash Pond System and North Ash Pond System in the last ten years in excess of Havana Power Station's NPDES permit limitations have been reported to the Illinois Environmental Protection Agency, in accordance with NPDES permit reporting requirements. For purposes of responding to this request, DMG did not consider infrequent exceedances of NPDES permit pollutant discharge limits (e.g. TSS) to be "unpermitted releases" within the scope of the EPA's request and, thus, they are not identified in this response. To the extent EPA interprets this request differently, DMG objects to the request because it is vague, overly broad, and too indefinite for reasonable interpretation.

10. Please identify all current legal owner(s) and operator(s) at the facility.

Response to Request No. 10:

Dynegy Midwest Generation, Inc. is the current legal owner and operator of Havana Power Station.

******

In accordance with and for purposes of the following certification, all portions of this response are hereby identified as information for which the certifying authorized representative cannot personally verify their accuracy.

I certify that the information contained in this response to EPA's request for information and the accompanying documents is true, accurate, and complete. As to the identified portions of this response for which I cannot personally verify their accuracy, I certify under penalty of law that this response and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature: A. Kirk Millis

Name: A. Kirk Millis

Title: Plant Manager

cc: Rich Eimer, Executive Vice President, Generation Operations
Keith McFarland, Vice President, Midwest Fleet Operations
James Ingram, Vice President & Group General Counsel, Environmental

Photo 1: (EAPS) Cell 1 Along S Toward Plant, Havana Power Plant, Havana, IL, 05.27.09

Photo 2: (EAPS) Cell 1 Looking Toward N of Cell 1 (downstream side), Havana Power Plant, Havana, IL, 05.27.09

Photo 3: (EAPS) Cell 1, Lower Edge of SW Corner, Havana Power Plant, Havana, IL, 05.27.09

Photo 4: (EAPS) Cell 1 SE Corner, Havana Power Plant, Havana, IL, 05.27.09

Photo 5: (EAPS) Cell 1, SE Toward Plant, Havana Power Plant, Havana, IL, 05.27.09

Photo 6: (EAPS) Cell 1, SW Corner, Havana Power Plant, Havana, IL, 05.27.09

Photo 7: (EAPS) Cell 2, Coal Pile Runoff (mostly storm water), Havana Power Plant, Havana, IL, 05.27.09

Photo 8: (EAPS) Cell 2, NW Corner, Havana Power Plant, Havana, IL, 05.27.09

Photo 9: (EAPS) Cell 2, NW Corner Looking at Plant, Havana Power Plant, Havana, IL, 05.27.09

Photo 10: (EAPS) Cell 2, NW Corner Looking E, Havana Power Plant, Havana, IL, 05.27.09

Photo 11: (EAPS) Cell 2, NW Corner Looking N, Havana Power Plant, Havana, IL, 05.27.09

Photo 12: (EAPS) Cell 2 NW Corner Looking S, Havana Power Plant, Havana, IL, 05.27.09

Photo 13: (Cell 2) NW Corner Looking S, Havana Power Plant, Havana, IL, 05.27.09

Photo 14: (EAPS) Cell 2, NW Corner Looking W, Havana Power Plant, Havana, IL, 05.27.09

Photo 15: (EAPS) Cell 4, Emergency Spillway (along W edge into roadway; towards plant), Havana Power Plant, Havana, IL, 05.27.09

Photo 16: (EAPS) Cell 4, W Edge (energy dissipater of emergency spillway), Havana Power Plant, Havana, IL, 05.27.09

Photo 17: (EAPS) Cell 2, Staff Gage, Havana Power Plant, Havana, IL, 05.27.09

Photo 18: (EAPS) Cell 2, N Edge (looking E toward Cell 3 wetting structure), Havana Power Plant, Havana, IL, 05.27.09

Photo 19: (EAPS) Between Cell 3 and Cell 2 (looking S), Havana Power Plant, Havana, IL, 05.27.09

Photo 20: (EAPS) Cell 3 Extra Fly Ash Basin in SE Corner, Havana Power Plant, Havana, IL, 05.27.09

Photo 21: (EAPS) Cell 3, Fly Ash Outfall Structure, Havana Power Plant, Havana, IL, 05.27.09

Photo 22: (EAPS) Cell 3, Looking N From S Edge, Havana Power Plant, Havana, IL, 05.27.09

Photo 23: (EAPS) Cell 3, NW Corner (bottom ash outfall area) 1 of 2, Havana Power Plant, Havana, IL, 05.27.09

Photo 24: (EAPS) Cell 3, NW Corner (bottom ash outfall area) 2 of 2, Havana Power Plant, Havana, IL, 05.27.09

Photo 25: (EAPS) Cell 3, NE Corner Looking N, Havana Power Plant, Havana, IL, 05.27.09

Photo 26: (EAPS) Cell 3, NE Corner Looking S, Havana Power Plant, Havana, IL, 05.27.09

Photo 27: (EAPS) Cell 3, NE Corner Looking W (abandoned factory), Havana Power Plant, Havana, IL, 05.27.09

Photo 28: (EAPS) Cell 3, NE Corner Looking W Toward Bottom Ash Discharge Structure, Havana Power Plant, Havana, IL, 05.27.09

Photo 29: (EAPS) Cell 3, NE Corner Looking NW Toward Barn-Structure (1 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 30: (EAPS) Cell 3, NE Corner Looking NW Toward Barn-Structure (2 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 31: (EAPS) Cell 3, NW Corner Looking N Toward Barn Structure, Havana Power Plant, Havana, IL, 05.27.09

Photo 32: (EAPS) Cell 3, NNW Corner (polypropylene liner), Havana Power Plant, Havana, IL, 05.27.09

Photo 33: (EAPS) Cell 3, NNW Corner Looking E, Havana Power Plant, Havana, IL, 05.27.09

Photo 34: (EAPS) Cell 3, NNW Corner Looking W, Havana Power Plant, Havana, IL, 05.27.09

Photo 35: (EAPS) Cell 3, NW Corner Looking W, Havana Power Plant, Havana, IL, 05.27.09

Photo 36: (EAPS) Cell 3, NW Corner Looking N, Havana Power Plant, Havana, IL, 05.27.09

Photo 37: (EAPS) Cell 3, Open Trough Fly Ash Discharge, Havana Power Plant, Havana, IL, 05.27.09

Photo 38: (EAPS) Cell 3, NW Corner Looking SE, Havana Power Plant, Havana, IL, 05.27.09

Photo 39: (EAPS) Cell 4, Primary Spillway from Cell 4 to River, Havana Power Plant, Havana, IL, 05.27.09

Photo 40: (EAPS) Cell 3, Pipe at SE of Cell 3 (fabrication over synthetic liner), Havana Power Plant, Havana, IL, 05.27.09

Photo 41: (EAPS) Cell 3, Ponding S of Cell 3 at Toe of Embankment (no flow), Havana Power Plant, Havana, IL, 05.27.09

Photo 42: (EAPS) Cell 3, S Edge Embankment (1 of 3), Havana Power Plant, Havana, IL, 05.27.09

Photo 43: (EAPS) Cell 3, S Edge Embankment (2 of 3), Havana Power Plant, Havana, IL, 05.27.09

Photo 44: (EAPS) Cell 3, S Edge Embankment (3 of 3), Havana Power Plant, Havana, IL, 05.27.09

Photo 45: (EAPS) Cell 3, S Edge Looking E (1 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 46: (EAPS) Cell 3, S Edge Looking E (2 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 47: (EAPS) Cell 3, E Edge Looking S, Havana Power Plant, Havana, IL, 05.27.09

Photo 48: (EAPS) Cell 3, S of Cell 3 Area Leading to Ponding, Havana Power Plant, Havana, IL, 05.27.09

Photo 49: (EAPS) Cell 3, S of Extra Fly Ash Basin, Havana Power Plant, Havana, IL, 05.27.09

Photo 50: (EAPS) Cell 3, SE Corner Looking N (1 of 2), Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 51: (EAPS) Cell 3, SE Corner Looking N (2 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 52: (EAPS) Cell 3, SE Corner Looking W, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 53: (EAPS) Cell 3, Staff Gage and Primary Spillway, Havana Power Plant, Havana, IL, 05.27.09

Photo 54: (Cell 3) SW Edge Corner (cell 4 to the East/right), Havana Power Plant, Havana, IL, 05.27.09

Photo 55: (EAPS) From Toe of Cell 3 (NE corner) Looking Toward Adjacent House, Havana Power Plant, Havana, IL, 05.27.09

Photo 56: (EAPS) From Toe of Cell 3 (NE corner) Looking W, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 57: (EAPS) Between Cell 3 and Cell 4 Overflow Spillway, Havana Power Plant, Havana, IL, 05.27.09

Photo 58: (EAPS) Cell 3, Vegetation Along S Edge, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 59: (EAPS) Cell 3, W Edge, Havana Power Plant, Havana, IL, 05.27.09

Photo 60: (EAPS) Cell 4, Intersection of Cell 1 and Cell 4 (NE of Cell 1) Mainly Storm Water, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 61: (EAPS) Cell 4, Looking SE at Cell 1, Havana Power Plant, Havana, IL, 05.27.09

Photo 62: (EAPS) Embankment between Cells 3 and 4 Havana Power Plant, Havana, IL, 05.27.09

Photo 63: (NAPS) Culverts from Coal Pile to NAPS (upstream side), Havana Power Plant, Havana, IL, 05.27.09

Photo 64: (NAPS) Coal Pile Runoff Coming into NAPS, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 65: (NAPS) Coal Runoff (culverts connecting two NAPS cells), Havana Power Plant, Havana, IL, 05.27.09

Photo 66: (NAPS) Coal Runoff (culvert connecting two NAPS cells), Havana Power Plant, Havana, IL, 05.27.09

Photo 67: (NAPS) Into Downstream Pond, Havana Power Plant, Havana, IL, 05.27.09

Photo 68: (NAPS) Wall of Incision, Havana Power Plant, Havana, IL, 05.27.09

Photo 69: (NAPS) Upstream (plant behind), Havana Power Plant, Havana, IL, 05.27.09

Photo 70: (NAPS) West of NAPS Looking at IL River, Havana Power Plant, Havana, IL, 05.27.09

Photo 71: (NAPS) Looking S at Incision Wall, Havana Power Plant, Havana, IL, 05.27.09

Photo 72: (NAPS) Culvert Connecting Two Cells, Havana Power Plant, Havana, IL, 05.27.09

Photo 73: (SAPS) Southernmost Embankment Looking East, Havana Power Plant, Havana, IL, 05.27.09

Photo 74: (SAPS) Looking East Over Capped Cell, Havana Power Plant, Havana, IL, 05.27.09

DRAFT

Photo 75: (SAPS) Overlooking Closed Pond (1 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 76: (SAPS) Overlooking Closed Pond (2 of 2), Havana Power Plant, Havana, IL, 05.27.09

Photo 77: (SAPS) Stop Log Structure (similar design to EAPS), Havana Power Plant, Havana, IL, 05.27.09

Photo 78: (SAPS) Westernmost Embankment Looking S, Havana Power Plant, Havana, IL, 05.27.09

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: Havana Power Plant
Date: 5/27/09
Unit Name: East Ash Pond System (4 cell)
Operator's Name: Dynegy
Unit I.D.:
Hazard Potential Classification [✓ High] Significant Low
Inspector's Name: Cleighton Smith/Lauren Ohotzke

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	varies		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	varies		20. Decant Pipes:	■	■
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	Being provided		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):	■	■
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?	N/A	
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?	N/A	
11. Is there significant settlement along the crest?		X	Over widespread areas?	N/A	
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?	N/A	
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?	N/A	
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?	N/A	
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	X	see note #1
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
#1	Standing water in areas of toe, but was deemed to be from recent rain.

EPA FORM -XXXX

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # ____________ INSPECTOR Cleighton Smith/ Lauren Ohotzke

Date ____________

Impoundment Name Havana - East Ash Pond System

Impoundment Company Dynegy

EPA Region V

State Agency (Field Office) Addresss Illinois EPA
1021 North Grand Avenue East
PO Box 19276, Springfield, IL 62794-9276

Name of Impoundment East Ash Pond System

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ________ Update ________

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?	X	

IMPOUNDMENT FUNCTION: storage of ccw

Nearest Downstream Town : Name Havana

Distance from the impoundment less than 1.0 miles

Impoundment Location:	Longitude	-90	Degrees 04	Minutes	44.59	Seconds
	Latitude	40	Degrees 16	Minutes	36.35	Seconds
	State	IL	County	MASON		

Does a state agency regulate this impoundment? YES X NO ______

If So Which State Agency? Illinois Dept of Natural Resources Office of Dam Safety

EPA Form XXXX-XXX, Jan 09

1

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

______ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

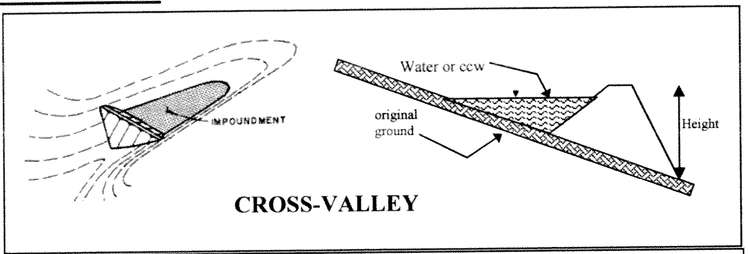
______ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

__X__ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

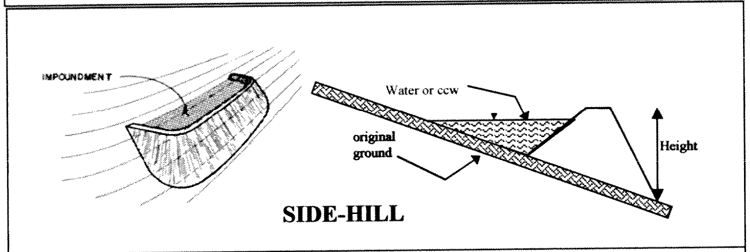
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Homes are located immediately downstream of cell #3. Also IL DNR - Dam Safety has classified this system as high hazard.

CONFIGURATION:

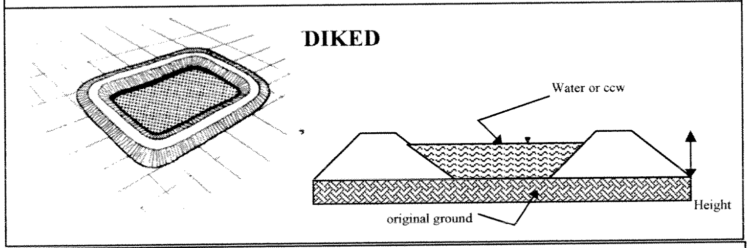


CROSS-VALLEY

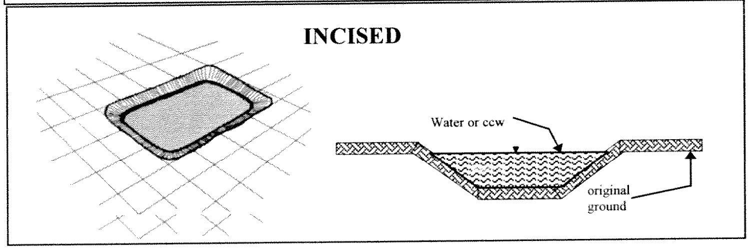


SIDE-HILL

DIKED



INCISED



_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height max ~ 40 feet
Pool Area 90 acres
Current Freeboard being provided feet

Embankment Material Sand/ash, clay
Liner clay, geo-membrane
Liner Permeability being provided

EPA Form XXXX-XXX, Jan 09

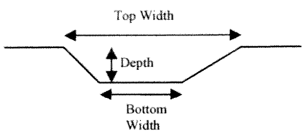
3

TYPE OF OUTLET (Mark all that apply)

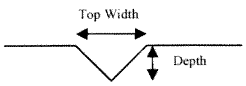
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width

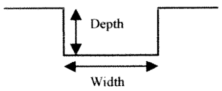
TRAPEZOIDAL



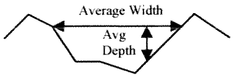
TRIANGULAR



RECTANGULAR

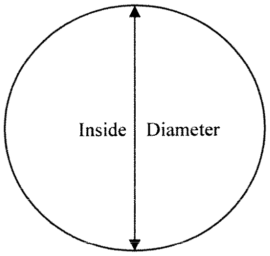


IRREGULAR



_____ **Outlet**

_____ inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) ______________________

Is water flowing through the outlet? YES _______ NO _______

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) DROP STRUCTURE W/ STOP LOGS - DRAINS TO CULVERT WHICH DRAINS TO ILLINOIS RIVER - DETAILS BEING PROVIDED

The Impoundment was Designed By DAVID GASKINS, PE

Has there ever been a failure at this site? YES ________ NO __X__

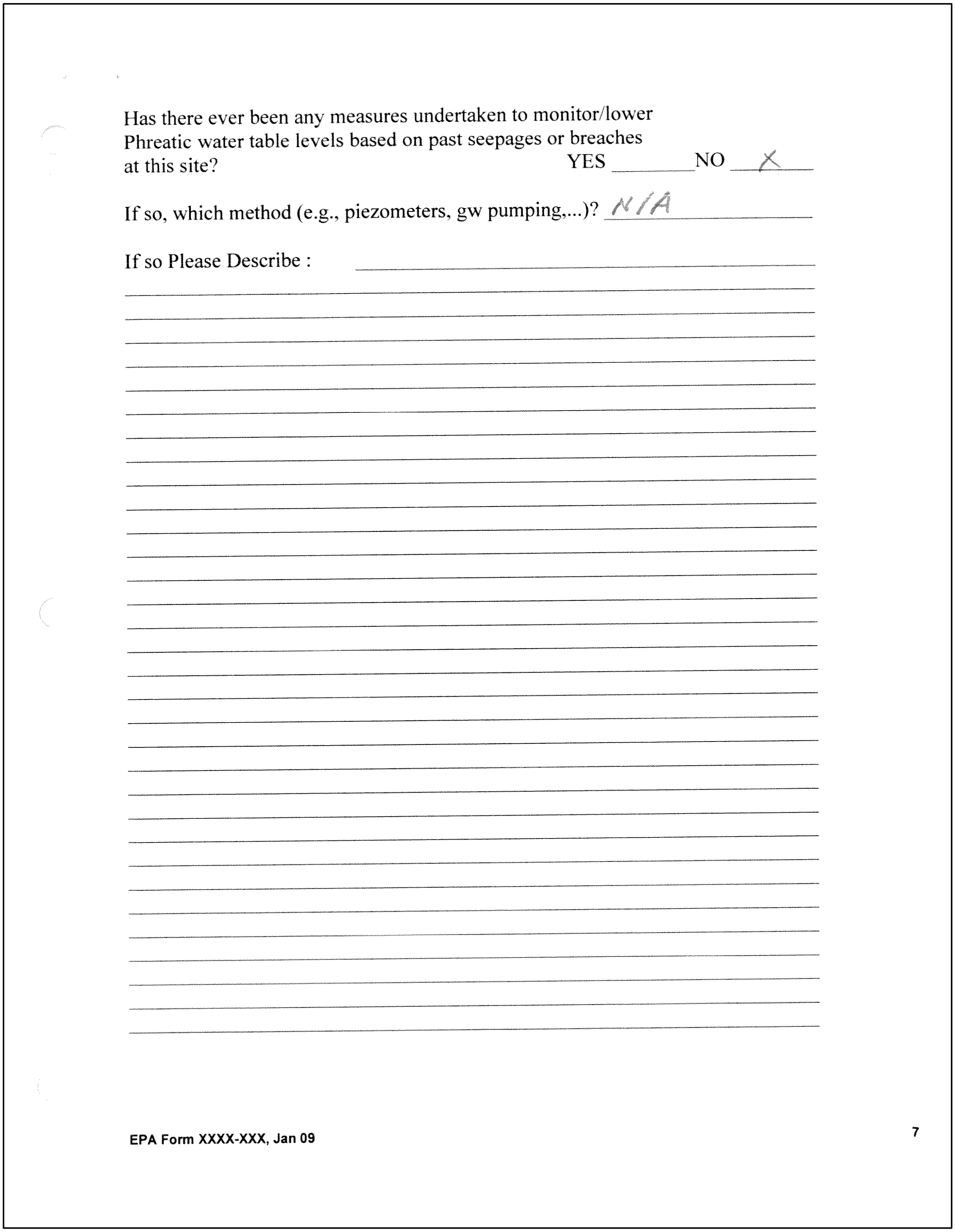
If So When? N/A

If So Please Describe : ____________________

Has there ever been significant seepages at this site? YES _______ NO X

If So When? N/A

IF So Please Describe:



Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ________ NO X

If so, which method (e.g., piezometers, gw pumping,...)? N/A

If so Please Describe :

EPA Form XXXX-XXX, Jan 09

7

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: Havana Power plant Date: 5/27/09

Unit Name: North Ash Pond System (2 cell) Operator's Name: Dynegy

Unit I.D.: Hazard Potential Classification: High Significant Low N/A

Inspector's Name: Cleighton Smith / Lauren Ohotzke

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

SEE NOTE BELOW

	Yes	No
1. Frequency of Company's Dam Inspections?	N/A	
2. Pool elevation (operator records)?	N/A	
3. Decant inlet elevation (operator records)?	N/A	
4. Open channel spillway elevation (operator records)?	N/A	
5. Lowest dam crest elevation (operator records)?	N/A	
6. If instrumentation is present, are readings recorded (operator records)?	N/A	
7. Is the embankment currently under construction?	N/A	
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below)	N/A	
10. Cracks or scarps on crest?	N/A	
11. Is there significant settlement along the crest?	N/A	
12. Are decant trashracks clear and in place?	N/A	
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?	N/A	
14. Clogged spillways, groin or diversion ditches?	N/A	
15. Are spillway or ditch linings deteriorated?	N/A	
16. Are outlets of decant or underdrains blocked?	N/A	
17. Cracks or scarps on slopes?	N/A	

	Yes	No
18. Sloughing or bulging on slopes?	N/A	
19. Major erosion or slope deterioration?	N/A	
20. Decant Pipes:	■	■
Is water entering inlet, but not exiting outlet?	N/A	
Is water exiting outlet, but not entering inlet?	N/A	
Is water exiting outlet flowing clear?	N/A	
21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):	■	■
From underdrain?	N/A	
At isolated points on embankment slopes?	N/A	
At natural hillside in the embankment area?	N/A	
Over widespread areas?	N/A	
From downstream foundation area?	N/A	
"Boils" beneath stream or ponded water?	N/A	
Around the outside of the decant pipe?	N/A	
22. Surface movements in valley bottom or on hillside?	N/A	
23. Water against downstream toe?	N/A	
24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
# 1	THE NORTH ASH POND SYSTEM IS NOT AN IMPOUNDMENT, BUT AN INCISION. ALSO, IT RECEIVES COAL PILE RUNOFF, NOT CCW. ∴ MOST OF CHECKLIST IS NOT APPLICABLE

EPA FORM -XXXX

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW) N/A
Impoundment Inspection

Impoundment NPDES Permit # __________ INSPECTOR cleighton Smith / Lauren Oholtzke

Date __________

Impoundment Name __________

Impoundment Company __________

EPA Region __________

State Agency (Field Office) Addresss __________

____

Name of Impoundment __________

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ______ Update ______

	Yes	No
Is impoundment currently under construction?		
Is water or ccw currently being pumped into the impoundment?		

IMPOUNDMENT FUNCTION: __________

Nearest Downstream Town : Name Havana

Distance from the impoundment less than 1.0 miles

Impoundment Location:

Longitude	-90	Degrees	04	Minutes	44.59 Seconds
Latitude	40	Degrees	16	Minutes	36.35 Seconds
State	IL	County	Mason		

Does a state agency regulate this impoundment? YES ______ NO X

If So Which State Agency? __________

EPA Form XXXX-XXX, Jan 09

N/A

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

______ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

______ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

______ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

____

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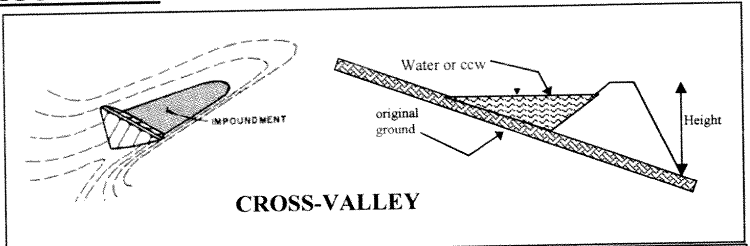
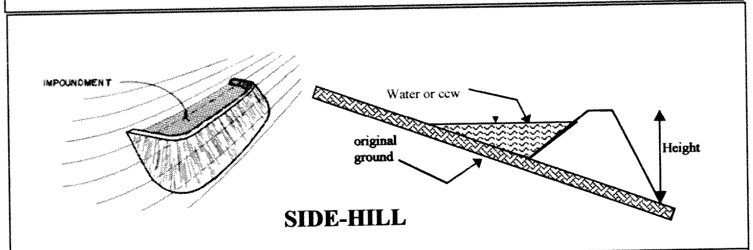
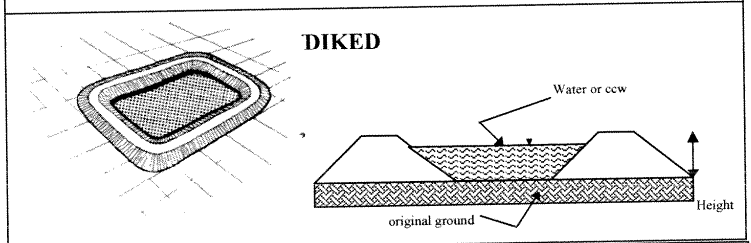
CONFIGURATION:



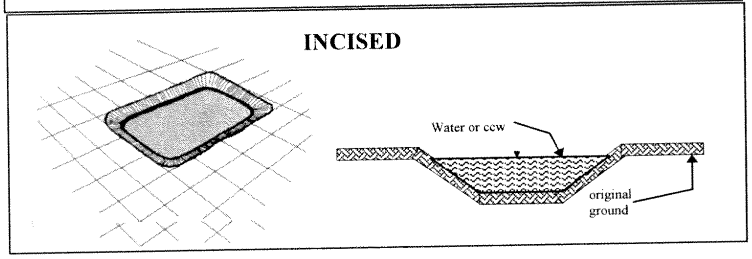
CROSS-VALLEY



SIDE-HILL



DIKED



INCISED

_____ Cross-Valley
_____ Side-Hill
_____ Diked
__X__ Incised (form completion optional)
_____ Combination Incised/Diked

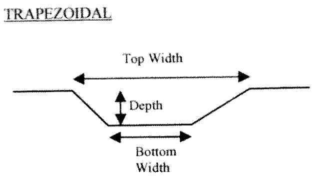
Embankment Height __________ feet
Pool Area __________ acres
Current Freeboard __________ feet

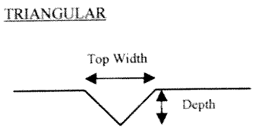
Embankment Material __________
Liner __________
Liner Permeability __________

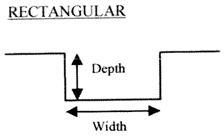
TYPE OF OUTLET (Mark all that apply)   N/A

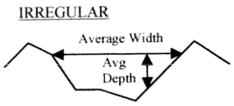
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width



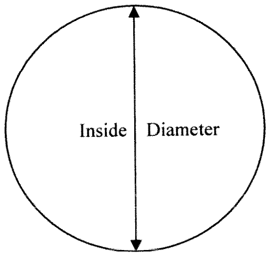






_____ **Outlet**

_____ inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _______________________

Is water flowing through the outlet?   YES _______   NO _______

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) _________________________________

The Impoundment was Designed By ____________________________________
____

N/A

Has there ever been a failure at this site? YES ___________ NO ____________

If So When? ______________________________

If So Please Describe : ____

EPA Form XXXX-XXX, Jan 09

N/A

Has there ever been significant seepages at this site? YES _______ NO _______

If So When? ___________________________

IF So Please Describe: ___________________________

N/A

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ________NO ________

If so, which method (e.g., piezometers, gw pumping,...)? ______________________

If so Please Describe : ______________________

DRAFT

Havana Power Plant Site Visit Attendance Sheet

May 27, 2009

Name	Company	Phone	E-mail
Rick Diericx	Dynegy	618-206-5912	Rick_Diericx@Dynegy.com
David Gaskins	Engineering Design Services	217-692-2685	david@eds7.com
Jim Watson	Dynegy-HA	309-543-8777	jim.watson@dynegy.com
Phil Morris	Dynegy	618-206-5934	phil.morris@dynegy.com
Joe Kimlinger	Dynegy	618-410-6534	joe.kimlinger@dynegy.com
Chris Lieberman	IEPA/BOL/Permits	217-524-3294	chris.lieberman@illinois.gov
Ted Dragovich	IEPA	217-524-3306	ted.dragovich@illinois.gov
Doug Van Nattan	IEPA/BOL/Permits	217-524-7505	doug.vannattan@illinois.gov
Ken Berry	URS	314-429-0100	kenneth_berry@URScorp.com
Cleighton Smith	Dewberry	856-802-0843	cleighton.smith@dewberry.com
Lauren Ohotzke	Dewberry	856-802-0843	lohotzke@dewberry.com

Havana Power Plant Meeting Notes May 27, 2009

- Dam Safety Assessment
    - Records, Design Drawings, Calculations, etc.
    - Visual Observation

- Ken (URS) did previous inspection in November

- Almost all drawings of cells done by Dynegy
    - Cleighton reviewed all drawings, placing post-its on those he wanted electronic copies of (Dynegy would be providing those docs)

- Testing done to reach ground water was performed to see if ash is leaking into wells, etc.

- Cells 1, 2, 3, 4 (polishing pond)

- Calculations reviewed
    - Copy of entire calc documents (all done by Dynegy) will be send via PDF to Cleighton

- Breach mapping done to determine speed which would flow out
    - No banks to contain downstream flow so it is difficult to model because the flow could go "anywhere" and "everywhere"

- Height of embankment (max. height) needed for cells in question
    - Reference contour for elevations and slope determination of cell walls (will also be available in calculations)

- Any breach would go right into the Illinois River

- No major housing settlements near "closed" western cell (all along the Illinois River)

- Contact Phil for URS stuff (not Ken, directly)

- ~50% ash sold

Havana Power Plant Site Walk Notes May 27, 09

- Overall High Hazard
- Plant not operating during our visit due to shut down for construction
- Cells 1, 2, 3, 4 are lined (have an impervious layer)
- Cells on river side are note lined (do not have an impervious layer)
- Culverts are checked daily to insure clear/not clogged
- N. Ash Pond System (NAPS) communicates from 1 side of "road" to the other
- Downstream of (NAPS) looks more like an incision than an impoundment
- No combustion waste maintained (no DNR permits)
- Tertiary cell of NAPS (inactive)
    - All cleaned out
        - No longer takes CCW
        - Only water other than rain water from the dredging of river spoils
- Ash lines running under roadway to cells 1 through 4
    - Lined/covered in a fabric with solid concrete/mortar/grout (no aggregate) pumped into it

- Cell 1 (scalping pond)
    - Mostly closed (over half)
    - Not accepting any new ash
    - Physically, the piping is not hooked up
    - Typically mow top of embankment until where slope makes unsafe for mowers
    - Trees along just beyond tow of embankment
    - SE corner= no trees, just grass
    - NE mainly storm water

- Cell 3
    - Some ponding along S edge
    - Extra fly ash basin in SE corner