FOSSIL & HYDRO ENGINEERING

CALCULATION COVER SHEET

| DEPT/SECTION IDENTIFIER | |
|---|---|

| FOR TVA USE ONLY | | |
|---|---|---|
| Each time these calculations are revised, preparers must ensure that the original (R0) RIMS accession number is filled in. | | |
| REV | (for RIM'S use) | RIMS accession number |
| R0 | | |
| R_ | | |
| R_ | | |
| R_ | | |

| NAME OF PLANT/UNIT | KINGSTON FOSSIL | ORGANIZATION P&DE | | |
|---|---|---|---|---|
| CALCULATION TITLE | COAL YARD FLOOD ANALYSIS. | DEPARTMENT CIVIL | | |
| | SIGNATURE REQUIRED | INITIALS ONLY | | |
| REVISION NO. | R0 | R1 | R2 | R3 |
| PREPARED | | | | |
| CHECKED | | | | |
| APPROVED | | | | |
| DATE | 7/6/00 | | | |
| REMARKS/ABSTRACT | | | | |

PARSONS

# Kingston Fossil Plant
# Coal Yard Flood Analysis

June 2000
Revision 0

Parsons Energy & Chemicals Group, Inc.
633 Chestnut Street, Suite 400
Chattanooga, TN 37450

# Kingston Fossil Plant
# Coal Yard Flood Analysis
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# Kingston Fossil Plant
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PARSONS

# ENGINEERING CALCULATIONS
# TITLE AND SUMMARY SHEET

Date 6/29/00

Sheet 1 of 19

Proj. Order No. N/A Calculation No.

Project Title Kingston Fossil Plant, Coal Yard Flood Analysis

Calculation Subject Flood Analysis Date Verified/Checked 7/6/00

STATUS: PRELIMINARY FINAL X SUPERSEDED VOID

**STATEMENT OF PROBLEM**

1) Determine maximum water surface elevation (WSE) for design storm event and ensure that WSE does not exceed 758.0 ft.
2) Evaluate existing basin and yard area to ensure that discharge does not occur during a 100 yr-24 hr storm event.

**SUMMARY OF CONCLUSIONS**

1) The existing basin and yard area are of sufficient volume with addition of emergency spillway to prevent WSE from reaching 758.0 ft. during design storm.
2) Enlargement of existing basin/yard area to approximate size shown in this analysis, in conjunction with construction of an emergency spillway, will prevent discharge during the 100 yr-24 hr storm event.

**Originator's Signature and Date**

7/6/00

**CHECKING METHOD**

1. Review
2. Alternate Calculation

**Checker's Signature and Date**

7/6/00

**Lead Discipline Engineer's Signature and Date**

7/6/00

| Rev. No. | Sheet No. | Description | Reviser's Signature/Date | Checker's Signature/Date | Approved by Signature/Date |
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# COMPUTER CALCULATION SUMMARY SHEET

PO: N/A Job Number: 550134/67100

Computer Code: QTR-55 Version: 5.47

Code Verification Status: Rev. 0, Nov. 1992

Description of Program: Developes runoff hydrographs for small watersheds in accordance with SCS Technical Release No. 55.

Source of Data: See References

Purpose/Description of Calculation: Determine volume of runoff produced by the 10 yr-24 hr and 100 yr-24 hr storm events.

Run Performed By: T. Brown

Date/Time of Run: Various, see computer printouts

Computer Time of Run: N/A

Input Filename: See attached list

Output Filename: See attached list

Files Saved to Disk: Yes

Results: Refer to calculation

Performed By: T. Brown TJB Date: 6/29/00

Checked By: [signature] Date: 7/6/00

Approved By: [signature] Date: 7/6/00

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# COMPUTER CALCULATION SUMMARY SHEET

PO: N/A Job Number: 550134/67100

Computer Code: Pond-2 Version: 5.21

Code Verification Status: Rev. 0, Nov. 1992

Description of Program: Computes solution for routing inflow hydrographs generated by QTR-55 and generates an outflow hydrograph using level-pool routing techniques.

Source of Data: See References

Purpose/Description of Calculation: ~~Route runoff hydrographs produced by the 10 yr-24 hr and~~ 100 yr-24 hr storm events through the basin/yard area.

Run Performed By: T. Brown

Date/Time of Run: Various, see computer printouts

Computer Time of Run: N/A

Input Filename: See attached list

Output Filename: See attached list

Files Saved to Disk: ~~Yes~~

Results: Refer to calculation

Performed By: T. Brown TJB Date: 6/29/00

Checked By: [signature] Date: 7/6/00

Approved By: [signature] Date: 7/6/00

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# COMPUTER CALCULATION SUMMARY SHEET

PO: N/A Job Number: 550134/67100

Computer Code: HEC-HMS Version: 1.1

Code Verification Status: Rev. 0, Dec. 1999

Description of Program: Computer model for simulation of precipitation-runoff processes and reservoir routing.

Source of Data: See References

Purpose/Description of Calculation: Determine volume of runoff produced by the 2-day, 3-day, 5-day, 7-day, and 10-day storm events. Precipitation entered from Kingston rain gage data.

Run Performed By: T. Brown

Date/Time of Run: Various, see computer printouts

Computer Time of Run: N/A

Input Filename: See attached list

Output Filename: See attached list

Files Saved to Disk: Yes

Results: Refer to calculation

Performed By: T. Brown TJB Date: 6/29/00

Checked By: [signature] Date: 7/6/00

Approved By: [signature] Date: 7/6/00

# COMPUTER CALCULATION SUMMARY SHEET

PO: N/A Job Number: 550134/67100

Computer Code: FlowMaster Version: 6.0

Code Verification Status: Rev. 0, Feb. 1997

Description of Program: Computes solutions for uniform flow, open channel hydraulic problems.

Source of Data: See References

Purpose/Description of Calculation: Used to identify flow area and wetted perimeter for channel flow segments of Tc and Tt calculations.

Run Performed By: T. Brown

Date/Time of Run: Various, see computer printouts

Computer Time of Run: N/A

Input Filename: See attached list

Output Filename: See attached list

Files Saved to Disk: Yes

Results: Refer to calculation

Performed By: T. Brown TJB Date: 6/29/00

Checked By: [signature] Date: 7/6/00

Approved By: [signature] Date: 7/6/00

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CALCULATION SHEET

| REV | BY | DATE | CK | DATE | TITLE: KINGSTON FOSSIL PLANT<br>COAL YARD FLOOD ANALYSIS | |
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## Introduction

The Kingston Fossil Plant is completing construction on a new coal handling reclaim facility. This facility includes a coal receiving and storage area, stacking silos, coal feed hopper, and conveyor tunnels. When finished, this facility will improve the coal receiving, storage, and transfer operations.

The existing stormwater system that handles runoff from the new facility consists of a retention basin, dewatering pumps, and a discharge line. Runoff from the coal yard is gravity drained via overland flow and perimeter ditches to the retention basin. As the volume of water in the basin increases, two (2) 1200 gallon-per-minute dewatering pumps transfer this water away from the coal yard to the north via a 10-inch diameter high density polyethylene discharge line. The retention basin has no other means of discharge (i.e., no spillway).

Based on a site visit and review of design drawings for the retention basin, it is obvious that capacity of the existing basin has been greatly reduced due to siltation from erosion and deposition of coal fines. Also, the existing basin has no other means of discharge other than the dewatering pumps. Given the high rainfall intensities for storm events typical of the East Tennessee area, and the relative imperviousness and quick runoff response of the watershed areas, the dewatering pumps, if operated simultaneously, do not have the capacity to keep up with the rate of inflow into the basin. This means that during a storm event, the water surface elevation within the basin will rise and overflow into the adjacent yard area until the storm is essentially over. Under these conditions, the dewatering pumps will only function to "dewater", or remove the water that has collected.

The potential exists for flooding of the new facility during significant rainfall events. The critical elevation of the new inlet grate for the feed coal is at 760.0 ft. Water at or above this elevation will result in flooding of the facility. Flooding will disrupt feed coal for plant operation, and will cause damage to electrical and mechanical equipment.

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## Purpose

The objective of this analysis will be to evaluate the potential for flooding of the new coal feed inlet grate (elevation 760.0 ft.), and to ensure that the basin has adequate capacity to prevent a discharge out of the emergency spillway from the 100 yr-24 hr storm event for the following two scenarios:

1. Existing conditions (retention basin and adjacent yard area at current capacity),
2. Proposed conditions (clean-out/enlarge the existing basin to approximate design volume).

An overflow spillway will be constructed as part of this upgrade project and will be included in the reservoir routing portion of this analysis for both scenarios.

## Assumptions

1. The retention basin is assumed to be at a water surface elevation (WSE) of 748.0 prior to evaluation of storm events under existing conditions, and at a WSE of 745.0 prior to evaluation of storm events under proposed conditions. Further, it is assumed that the dewatering pumps do not start pumping until after the end of the storm event.

2. Reduction of basin storage volume due to accumulation of sediment is not considered.

## Requirements/Limiting Conditions

1. The maximum water surface elevation for any storm event shall not exceed 758.0 ft. (See Ref. 9, Attachment C).

2. The existing basin shall be enlarged to either the original design volume, or a greater volume as required to prevent discharge of the 100 yr-24 hr storm event from the new spillway (See Ref. 9, Attachment C).

3. Areas taken from the drainage map indicate that the total watershed area for sub-basin 1 and sub-basin 2 to be approximately 83 acres in size. The total acreage was increased to 100 acres, with the increase applied as a percentage of the initial size of each sub-basin area (See Ref. 9, Attachment C).

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## Summary of Results

The summary of the calculation results are presented below:

A. Existing conditions:

Peak Water Surface Elevation (any storm) = 756.17 ft
Peak Water Surface Elevation (100yr-24hr storm) = 756.09 ft

(See Attachment A for existing conditions calculations)

B. Proposed conditions:

Peak Water Surface Elevation (any storm) = 756.17 ft
Peak Water Surface Elevation (100yr-24hr storm) = 755.96 ft

(See Attachment B for proposed conditions calculations)

Peak water surface elevation for any storm under both basin conditions is less than 760.0 ft. with the addition of the emergency spillway. Based on this analysis and conditions as identified herein, the new coal hopper inlet should not flood.

The peak water surface elevation for the 100 yr-24 hr storm event under existing basin conditions is 756.09 ft, with a 4.7 cfs discharge out of the emergency spillway. With the basin enlarged to the approximate original design volume, the basin does not discharge, and produces a peak water surface elevation of 755.96 ft.

See summary of results below:

## EXISTING BASIN

| | | Watershed | | Basin | | | |
|---|---|---|---|---|---|---|---|
| Storm Event | Rainfall | SUB-AREA 1 Peak Discharge | SUB-AREA 2 Peak Discharge | Peak Inflow | Peak Outflow | Peak Storage | Peak Water Surface Elevation |
| (frequency-duration) | (inches) | (cfs) | (cfs) | (cfs) | (cfs) | (ac-ft) | (ft) |
| | | | | | | | |
| 10 yr-24 hr | 4.8 | 175.0 | 372.0 | 480.0 | 0.0 | 30.15 | 755.18 |
| 100 yr-24 hr | 6.6 | 259.0 | 548.0 | 707.0 | 4.7 | 43.57 | 756.09 |
| 2-day | 6.98 | 15.0 | 26.9 | 41.9 | 5.8 | 43.90 | 756.11 |
| 3-day | 7.23 | 9.1 | 16.2 | 25.3 | 6.3 | 44.06 | 756.12 |
| 5-day | 7.63 | 9.2 | 16.3 | 25.5 | 6.3 | 44.07 | 756.12 |
| 7-day | 9.13 | 15.0 | 26.9 | 41.9 | 8.9 | 44.85 | 756.17 |
| 10-day | 10.08 | 15.0 | 26.9 | 41.9 | 8.9 | 44.85 | 756.17 |

## PROPOSED BASIN

| | | Watershed | | Basin | | | |
|---|---|---|---|---|---|---|---|
| Storm Event | Rainfall | SUB-AREA 1 Peak Discharge | SUB-AREA 2 Peak Discharge | Peak Inflow | Peak Outflow | Peak Storage | Peak Water Surface Elevation |
| (frequency-duration) | (inches) | (cfs) | (cfs) | (cfs) | (cfs) | (ac-ft) | (ft) |
| | | | | | | | |
| 10 yr-24 hr | 4.8 | 175.0 | 372.0 | 480.0 | 0.0 | 30.15 | 754.96 |
| 100 yr-24 hr | 6.6 | 259.0 | 548.0 | 707.0 | 0.0 | 44.73 | 755.96 |
| 2-day | 6.98 | 15.0 | 26.9 | 41.9 | 4.2 | 46.65 | 756.08 |
| 3-day | 7.23 | 9.1 | 16.2 | 25.3 | 6.0 | 47.22 | 756.12 |
| 5-day | 7.63 | 9.2 | 16.3 | 25.5 | 6.3 | 47.30 | 756.12 |
| 7-day | 9.13 | 15.0 | 26.9 | 41.9 | 8.9 | 48.01 | 756.17 |
| 10-day | 10.08 | 15.0 | 26.9 | 41.9 | 8.9 | 48.09 | 756.17 |

### Conclusions

With the construction of an appropriate emergency spillway at elevation 756.0, the existing basin and adjacent yard area has the storage volume available to prevent the water surface elevation from reaching 758.0 ft. However, the existing basin and yard area does not have the storage volume available to prevent discharge of the 100 yr-24 hr storm event.

If the existing basin is enlarged to the approximate size shown in this analysis in conjunction with construction of an emergency spillway, the storage volume available will be sufficient to prevent discharge from a 100 yr-24 hr storm event.

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As anticipated, there were large differences in peak flows between the hypothetical storm events and the historic storm events. These differences can be explained as follows:

The 10 yr-24 hr, and 100 yr-24 hr storm events are hypothetical storms which use the SCS Type-II rainfall distribution (typical for the Kingston area). The Type II distribution spreads the total storm precipitation amount over a 24-hour period using average rainfall data from across most of the United States. This distribution provides a balanced storm event by centering the largest increment of rainfall around hour-12.

(Reference 10)

| Hour (t) | Incremental Rainfall (in.) | Percent of Total Rainfall |
|---|---|---|
| 11.0 | 0.031 | 23.5% |
| 11.5 | 0.048 | 28.3% |
| 11.75 | 0.074 | 35.7% |
| 12.0 | 0.306 | 66.3% |
| 12.5 | 0.072 | 73.5% |

As illustrated above, through the first 11.75 hours of the storm event, only 35.7% of the total rain have fallen. From hour 11.75 to hour 12.0 (15 minute period), the total amount of rain increases from 35.7% to 66.3%. It is this intense period of rain that produces the large peak flows evidenced from the 10 yr. and 100 yr. runoff hydrographs.

Conversely, the multi-day storm events used in this analysis were taken from rainfall-gage data recorded at the KIF. This data was recorded as total rainfall within 6-hour increments. Since the rainfall gage only records total rainfall within a 6-hour increment, any brief, intense bursts of rainfall were not captured. When this information is entered into the computer model, the model assumes an even distribution across the 6-hour time increment. Ideally, in order to capture rainfall intensities within watersheds of this size (36 ac and 64 ac), a time increment of 5-6 minutes should be used. Given the large time increment of the historic rainfall data, and the duration of the storm events ranging from 2-days to 10-days, significantly lower peak flows would be expected.

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## Methodology

### Design Storm Events

Since it was not obvious from inspection which storm event would produce the largest volume of runoff (i.e, worst case), several different storm events were considered. Two hypothetical storm events, and five (5) historical storm events were used in this analysis. These storm events are given in Table 1:

**Table 1**

| Precipitation Event | Rainfall (in.) | Description |
|---|---|---|
| 10 yr-24 hr | 4.8 | Reference 1 |
| 100 yr-24 hr | 6.6 | Reference 1 |
| 2-Day | 6.98 | Reference 2 |
| 3-Day | 7.23 | Reference 2 |
| 5-Day | 7.63 | Reference 2 |
| 7-Day | 9.13 | Reference 2 |
| 10-Day | 10.08 | Reference 2 |

The historic storm events were taken from rain gage data (station 0712) from the KFP. This data was recorded in 6-hour increments over a 24-hour period dating from October 1986 to April 2000. To determine the worst case precipitation event for the precipitation events listed above, the greatest consecutive-days total rainfall was identified. In all cases the smaller duration storms were nested within the larger duration storms. For example, the largest 2-day storm occurred on Dec 22-23, 1990. The largest 7-day storm occurred on Dec 22-28,1990.

### Drainage Area

The drainage area for this analysis is divided into two major sub-basin areas; sub-basin 1 (SB-1) and sub-basin 2 (SB-2) (See drainage map in Attachment C). SB-1 is located north of the site and is approximately 36 acres in size. This sub-basin is comprised of approximately 83% bare or disturbed soil, with the remaining watershed being either gravel surfacing, pavement, or buildings. Runoff from SB-1 flows in a south and west direction to a conveyance channel, which drains to the retention basin. SB-2 is located south of SB-1 and is approximately 64 acres in size. This sub-basin is comprised of 88% bare soil or stockpiled coal, with the remaining area being gravel surfacing, pavement, buildings, or pond area (existing basin).

**Runoff Hydrographs**

Runoff hydrographs for the 10 yr-24 hr and 100 yr-24 hr storm events were developed using SCS Technical Release No. 55 (TR-55), along with the computer program Quick TR-55 (References 3&4 respectively). Runoff hydrographs for the multi-day duration storm events were developed using the U.S. Army Corps of Engineers HEC-HMS Hydrologic Modeling System (Reference 5).

Variables used in development of the runoff hydrographs by each method are based on methodologies published by the Soil Conservation Service. Variable definitions and reference locations are defined as follows:

**Runoff Curve Number**

A weighted curve number is derived for watershed areas based on the soil type, hydrologic soil group, cover type, and treatment. Due to the industrialization at this site, soil types in the area and the hydrologic soil groupings (HSG) were assumed to be an HSG Type-C soil (sandy clay loam). The cover types and treatment (i.e., bare soil conditions) are based on the conditions observed during the site visit, and known future land uses. Curve numbers are assigned based on the Curve Number Tables 2-2a, 2-2b, and 2-2c (Reference 3). The weighted curve number is derived as follows.

$$CN = \sum (CN_i \times Area_i) / \text{Total Area}$$

Where:

| | |
|---|---|
| CN | = Weighted curve number for drainage subarea, |
| $CN_i$ | = Weighted curve number for drainage subarea (*i*), |
| $Area_i$ | = Area of subarea ($_i$), |
| Total Area | = Total drainage area |

**Time of Concentration**

Time of concentration is comprised of travel times from sheet flow, shallow concentrated flow, and channel flow components. Each component is described as follows:

Sheet Flow (Equation 3-3, Reference 3)

$$T_t = \frac{0.007\ (n \times L)^{0.8}}{(P_2)^{0.5}\ s^{0.4}}$$

where:

$T_t$ = Travel time (hrs)
n = Manning's roughness coefficient. Use following values from Table 3-1, Page 3-3 (Reference 3) for n:

n = 0.011 for bare soil conditions,
n = 0.4 for forested area (wooded, lt)

$P_2$ = 2 yr - 24 hr rainfall (in.). The 2 yr - 24 hr rainfall is used in the SCS equation for sheet flow for any storm frequency. For the Kingston area, use 3.3 inches. (Reference 1)
L = Flow Length (ft)
s = Land slope (ft/ft)

Shallow Concentrated Flow (Page 3-1, Reference 3)

$$T_t = L / 3600 \times V$$

where:

$T_t$ = Travel time (hrs)
L = Flow Length (ft)
3600 is conversion factor from seconds to hours
V = Average velocity (ft/s) taken from Figure 3-1 (Reference 3)

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Channel Flow (Page 3-3, Reference 3)

$$T_t = L / 3600 \times V$$

$T_t$ = Travel time (hrs)
L = Flow Length (ft)
3600 is conversion factor from seconds to hours
V = Average channel velocity (ft/s) taken from equation $V = (1.486r^{2/3}s^{1/2}) / n$ and $r = a / p$
r = Hydraulic radius (ft)
a = Cross sectional area of flow ($ft^2$)
p = Wetted perimeter (ft)
s = Land slope (ft/ft)
n = Manning's roughness coefficient.

**Lag Time**

Lag time is used in the HEC-HMS model in lieu of a time of concentration. Briefly, lag time is defined as the time from the center of mass of excessive rainfall to the peak rate of runoff. For this analysis, an empirical lag time is used as follows:

L = 0.6 Tc (Equation 15-3, Reference 6)

Where Tc = Time of concentration as previously defined.

**Retention Basin**

The existing retention basin is designed to collect and store runoff from the coal yard area. The dewatering pump(s) are then used to remove the collected water and transfer northward out of the coal yard area to the ash pond. This analysis will evaluate the existing basin under current conditions (i.e., sediment not removed), and under proposed conditions where the basin is enlarged to the approximate original basin design volume. Under each scenario, an emergency spillway is assumed with the invert at 756.00 ft. The design storms previously identified will be routed through the retention basin/spillway structure assuming that the basin is empty.

The inflow hydrographs for the respective storm events (as previously described) will be routed through the basin. The Pond-2 computer program (Reference 7) is used to route the inflow hydrographs through the basin for the 10 yr-24 hr, and 100 yr-24 hr storm events, while the HEC-HMS computer program (Reference 5) is used to route the longer duration storm events.

**Basin Volume**

The basin volume assumes that the dewatering pumps have emptied the basin prior to the occurrence of the design storm. (See Elevation-Storage Tables (Table 2 and Table 3 below).

**TABLE 2**
**EXISTING BASIN**

| ELEVATION (FT) | STORAGE VOLUME (ACRE-FEET) | COMMENTS |
|---|---|---|
| 748.0 | 0.00 | BOTTOM OF BASIN |
| 749.0 | 0.26 | |
| 750.0 | 0.67 | |
| 751.0 | 1.50 | |
| 752.0 | 3.38 | |
| 753.0 | 7.23 | |
| 754.0 | 15.03 | |
| 755.0 | 27.44 | |
| 756.0 | 42.14 | SPILLWAY INVERT ELEV. |
| 757.0 | 58.02 | |
| 758.0 | 76.40 | |

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## TABLE 3
## PROPOSED BASIN

| ELEVATION (FT) | STORAGE VOLUME (ACRE-FEET) | COMMENTS |
|---|---|---|
| 745.0 | 0.00 | BOTTOM OF BASIN |
| 746.0 | 0.24 | |
| 747.0 | 0.64 | |
| 748.0 | 1.25 | |
| 749.0 | 2.08 | |
| 750.0 | 3.16 | |
| 751.0 | 4.53 | |
| 752.0 | 6.62 | |
| 753.0 | 10.47 | |
| 754.0 | 18.27 | |
| 755.0 | 30.68 | |
| 756.0 | 45.38 | SPILLWAY INVERT ELEV. |
| 757.0 | 61.26 | |
| 758.0 | 79.64 | |

**Emergency Spillway**

The emergency spillway is designed to discharge when the water surface elevation reaches 756.00 ft. The design assumes a trapezoidal spillway with a 50 ft crest width, and a maximum 4H:1V side slope. Note that flatter side slopes will result in lower flow depths for a given discharge.

To find discharge from a trapezoidal spillway,

1) Find discharge for Case 1, z = 2, n = 0.04, b = 100 ft control channel:
$Q_r = 0.544 g^{(1/2)} H_{ec}^{(3/2)} b_r$ (Reference 8)
where $Q_r$ = discharge in cfs for rectangular channel
$g$ = 32.2 ft/sec2
$H_{ec}$ = Critical specific energy head for control channel section (ft)
$b_r$ = 100 ft.

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Use nomograph (Fig. 5D.1, Reference 8) to find the critical specific energy ($H_{ec}$) as a function of energy head ($H_p$).

2) Adjust $H_{ec}$ for $z = 4$, $n = 0.06$, $b_a = 50$ ft design channel section as follows:

$H_p = H_{ec} + h_f$ where $h_f$ (ft) is the head loss due to friction of the spillway lining. With the above relationship find friction loss associated with each $H_{ec}$ for the control channel section:

$$h_f = H_p - H_{ec}$$

With value of $h_f$ known for the control section for each $H_{ec}$, use correction nomograph (Fig. 5E.1, Reference 8) to determine ratio of friction loss (R) associated with actual channel roughness coefficient used in the design section:

$$h_{f,n} = R\ (h_{f,\ n=0.04})$$

Use relationship $H_p = H_{ec} + h_f$ to find adjusted $H_{ec}$ for each $H_p$ for the design section. .

3) By inspection of Fig. 5E.4 (Reference 8), the ratio for adjusting $h_f$ and $H_{ec}$ for difference in side slopes between the control section ($z = 2$) to the design section ($z = 4$) $\approx 1.0$ for all $H_{ec}$ , $\therefore$ use 1.0.

4) Approximate discharge for trapezoidal channel:

$$Q_a = Q_c\ (1.5b_a + zH_{ec}) / 150 \qquad \text{(Reference 8)}$$

where $Q_a$ = Approximate discharge (cfs) for trapezoidal spillway using actual bottom width ($b_a$).
$Q_c$ = Discharge for control spillway section with 100 ft bottom width and n = 0.04 (cfs).
$b_a$ = Bottom width (ft.).
$z$ = Horizontal component of spillway side slope.
$H_{ec}$ = Adjusted value found in step 2.

See Table 4 for Stage-Discharge relationship of the emergency spillway:

| REV | BY | DATE | CK | DATE | TITLE: KINGSTON FOSSIL PLANT<br>COAL YARD FLOOD ANALYSIS |
|---|---|---|---|---|---|
| 0 | TJB | 6/29/00 | [illegible] | 7/6/00 | |
| | | | | | |
| | | | | | AUTHOR: T. BROWN SHEET 18 OF 19 |

## TABLE 4
## EMERGENCY SPILLWAY STAGE-DISCHARGE

| $H_p$ (ft) | CONTROL SECTION Case 1, b=100 ft, z = 2, L = 50 ft, n = 0.04 | | | DESIGN SECTION Case 1, b = 50 ft, z = 4, L = 50 ft, n = 0.06 | | | |
|---|---|---|---|---|---|---|---|
| | $H_{ec}$ | $h_f$ | $Q_c$ | R | $h_f$ | $H_{ec}$ | $Q_a$ |
| | | | | | | | |
| 0.5 | 0.30 | 0.20 | 50.72 | 1.40 | 0.280 | 0.220 | 25.66 |
| 0.6 | 0.39 | 0.21 | 75.18 | 1.40 | 0.294 | 0.306 | 38.20 |
| 0.7 | 0.46 | 0.24 | 96.31 | 1.41 | 0.338 | 0.362 | 49.08 |
| 0.8 | 0.54 | 0.26 | 122.50 | 1.42 | 0.369 | 0.431 | 62.66 |
| 0.9 | 0.62 | 0.28 | 150.70 | 1.42 | 0.398 | 0.502 | 77.37 |
| 1.0 | 0.71 | 0.29 | 184.68 | 1.43 | 0.415 | 0.585 | 95.22 |
| 1.1 | 0.80 | 0.30 | 220.88 | 1.43 | 0.429 | 0.671 | 114.39 |
| 1.2 | 0.89 | 0.31 | 259.19 | 1.44 | 0.446 | 0.754 | 134.81 |
| 1.3 | 0.99 | 0.31 | 304.07 | 1.45 | 0.450 | 0.850 | 158.93 |
| 1.4 | 1.08 | 0.32 | 346.47 | 1.46 | 0.467 | 0.933 | 181.86 |
| 1.5 | 1.18 | 0.32 | 395.69 | 1.47 | 0.470 | 1.030 | 208.71 |
| | | | | | | | |
| 2.0 | 1.64 | 0.36 | 648.32 | 1.49 | 0.536 | 1.464 | 349.47 |

PARSONS

CALCULATION SHEET

| REV | BY | DATE | CK | DATE | TITLE: KINGSTON FOSSIL PLANT<br>COAL YARD FLOOD ANALYSIS | |
|---|---|---|---|---|---|---|
| 0 | TJB | 6/29/00 | DM | 7/6/00 | | |
| | | | | | | |
| | | | | | AUTHOR: T. BROWN SHEET 19 OF 19 | |

## References


1. U.S. Weather Bureau, *"Rainfall Frequency Atlas of the United States"*, Technical Paper No. 40, 1961.

2. Kingston Fossil Plant, Rainfall Data for Gage 0712, Oct 1986 – April 2000.

3. Soil Conservation Service, *"Urban Hydrology for Small Watersheds"*, June 1986.

4. Haestad Methods, *"Quick TR-55, Urban Hydrology for Small Watersheds"*, vs. 5.46, 1989.

5. United States Army Corps of Engineers, *"HEC-HMS Hydrologic Modeling System"*, Hydrologic Engineering Center, CPD-74, vs. 1.1, March 1999.

6. Soil Conservation Service, *"National Engineering Handbook, Section 4, Hydrology"*, March 1985.

7. Haestad Methods, *"Pond-2", Detention Pond Design & Analysis"*, vs. 5.21, 1989.

8. Haan, C. T., Barfield, B. J., and Hayes, J. C., *"Design Hydrology and Sedimentology for Small Catchments"*, Academic Press, 1994.

9. Miscellaneous e-mail correspondences (See Attachment C).

10. Chow, Maidment, Mays, "Applied Hydrology", McGraw-Hill, Inc., 1988.

# ATTACHMENT A

# EXISTING BASIN CONDITIONS

## ATTACHMENT A-1

## TR-55 – 10 YR-24 HR RUNOFF HYDROGRAPH
## POND-2 – 10 YR-24 HR BASIN ROUTING

CHT A1-1

Quick TR-55 Ver.5.47 S/N:
Executed: 11:30:34 06-13-2000

Kingston Steam Plant
Coal Yard Runoff
Existing~~/Proposed~~ Conditions

RUNOFF CURVE NUMBER DATA

Composite Area: Sub-Area 1

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 4.59 | 89 | |
| Pavement | 1.08 | 98 | |
| Buildings | 0.46 | 98 | |
| Bare Soil Yard Area, 75% Hard | 22.40 | 91 | |
| Bare Soil Area, 25% Dirt | 7.47 | 87 | |
| COMPOSITE AREA ---> | 36.00 | 90.2 | ( 90 ) |

Composite Area: Sub-Area 2

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 3.83 | 89 | |
| Buildings | 1.63 | 98 | |
| Pond Area | 2.40 | 98 | |
| Bare Soil Yard Area, 75% hard | 42.11 | 91 | |
| Bare Soil, 25% dirt | 14.03 | 87 | |
| COMPOSITE AREA ---> | 64.00 | 90.4 | ( 90 ) |

SHT A1-2

Quick TR-55 Ver.5.47  S/N:
Executed: 11:30:34  06-13-2000

Kingston Steam Plant
Coal Yard Runoff
Existing/~~Proposed~~ Conditions

RUNOFF CURVE NUMBER SUMMARY

| Subarea Description | Area (acres) | CN (weighted) |
|---|---|---|
| Sub-Area 1 | 36.00 | 90 |
| Sub-Area 2 | 64.00 | 90 |

SHT A1-3

Quick TR-55 Ver.5.47 S/N:
Executed: 11:30:48 06-13-2000 d:\tva\kingston\calcs\COALYARD.TCT

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Conditions

Tc COMPUTATIONS FOR: Sub-Area 1

SHEET FLOW (Applicable to Tc only)

| | | | | |
|---|---|---|---|---|
| Segment ID | | 1 | | |
| Surface description | | Bare Soil | | |
| Manning's roughness coeff., n | | 0.0110 | | |
| Flow length, L (total < or = 300) | ft | 270.0 | | |
| Two-yr 24-hr rainfall, P2 | in | 3.300 | | |
| Land slope, s | ft/ft | 0.0085 | | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.06 | = | 0.06 |

SHALLOW CONCENTRATED FLOW

| | | | | |
|---|---|---|---|---|
| Segment ID | | 2 | | |
| Surface (paved or unpaved)? | | Unpaved | | |
| Flow length, L | ft | 325.0 | | |
| Watercourse slope, s | ft/ft | 0.0105 | | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 1.6533 | | |
| where: Unpaved Csf = 16.1345 | | | | |
| Paved Csf = 20.3282 | | | | |
| T = L / (3600*V) | hrs | 0.05 | = | 0.05 |

CHANNEL FLOW

| | | | | |
|---|---|---|---|---|
| Segment ID | | 3 | | |
| Cross Sectional Flow Area, a | sq.ft | 14.70 | | |
| Wetted perimeter, Pw | ft | 10.22 | | |
| Hydraulic radius, r = a/Pw | ft | 1.438 | | |
| Channel slope, s | ft/ft | 0.0089 | | |
| Manning's roughness coeff., n | | 0.0300 | | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 5.9704 | | |
| Flow length, L | ft | 655 | | |
| T = L / (3600*V) | hrs | 0.03 | = | 0.03 |

TOTAL TIME (hrs) 0.15

# TC, 1 = Channel Flow, SB-1
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | TC, 1 - Channel Flow, SB-1 |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.008900 | ft/ft |
| Left Side Slope | 3.00 | V : H |
| Right Side Slope | 3.00 | V : H |
| Bottom Width | 4.00 | ft |
| Discharge | 87.50 | cfs |

| Results | | |
|---|---|---|
| Depth | 2.95 | ft |
| Flow Area | 14.7 | ft² |
| Wetted Perimeter | 10.22 | ft |
| Top Width | 5.97 | ft |
| Critical Depth | 2.30 | ft |
| Critical Slope | 0.019527 | ft/ft |
| Velocity | 5.95 | ft/s |
| Velocity Head | 0.55 | ft |
| Specific Energy | 3.50 | ft |
| Froude Number | 0.67 | |
| Flow Type | Subcritical | |

Quick TR-55 Ver.5.47 S/N:
Executed: 11:30:48 06-13-2000 d:\tva\kingston\calcs\COALYARD.TCT

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Conditions

Tc COMPUTATIONS FOR: Sub-Area 2

SHEET FLOW (Applicable to Tc only)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 1 | | 2 | | |
| Surface description | | | Bare Soil | | Bare Soil | | |
| Manning's roughness coeff., n | | | 0.0110 | | 0.0110 | | |
| Flow length, L (total < or = 300) | | ft | 180.0 | | 107.0 | | |
| Two-yr 24-hr rainfall, P2 | | in | 3.300 | | 3.300 | | |
| Land slope, s | | ft/ft | 0.0172 | | 0.0224 | | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | | hrs | 0.03 | + | 0.02 | = | 0.05 |

SHALLOW CONCENTRATED FLOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 3 | | | | |
| Surface (paved or unpaved)? | | | Unpaved | | | | |
| Flow length, L | | ft | 145.0 | | | | |
| Watercourse slope, s | | ft/ft | 0.0179 | | | | |
| $Avg.V = Csf * (s)^{0.5}$ | | ft/s | 2.1586 | | | | |
| where: Unpaved Csf = 16.1345 | | | | | | | |
| Paved Csf = 20.3282 | | | | | | | |
| T = L / (3600*V) | | hrs | 0.02 | | | = | 0.02 |

CHANNEL FLOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 4 | | 5 | | |
| Cross Sectional Flow Area, a | | sq.ft | 30.00 | | 61.70 | | |
| Wetted perimeter, Pw | | ft | 15.03 | | 22.71 | | |
| Hydraulic radius, r = a/Pw | | ft | 1.996 | | 2.717 | | |
| Channel slope, s | | ft/ft | 0.0062 | | 0.0039 | | |
| Manning's roughness coeff., n | | | 0.0300 | | 0.0300 | | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | | ft/s | 6.1997 | | 6.0392 | | |
| Flow length, L | | ft | 644 | | 775 | | |
| T = L / (3600*V) | | hrs | 0.03 | + | 0.04 | = | 0.06 |

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

TOTAL TIME (hrs) 0.14

SHT A1-6

# Tc, 4-Channel Flow, SB-2
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tc, 4 - Channel Flow, SB - 2 |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.006200 | ft/ft |
| Left Side Slope | 3.00 | V : H |
| Right Side Slope | 3.00 | V : H |
| Bottom Width | 4.00 | ft |
| Discharge | 186.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 5.23 | ft |
| Flow Area | 30.0 | ft² |
| Wetted Perimeter | 15.03 | ft |
| Top Width | 7.49 | ft |
| Critical Depth | 3.65 | ft |
| Critical Slope | 0.020266 | ft/ft |
| Velocity | 6.19 | ft/s |
| Velocity Head | 0.60 | ft |
| Specific Energy | 5.83 | ft |
| Froude Number | 0.54 | |
| Flow Type | Subcritical | |

SHT A1-7

# Tc, 5-Channel Flow, SB-2
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tc, 5 - Channel Flow, SB - 2 |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.003900 | ft/ft |
| Left Side Slope | 3.00 | V : H |
| Right Side Slope | 3.00 | V : H |
| Bottom Width | 4.00 | ft |
| Discharge | 372.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 8.87 | ft |
| Flow Area | 61.7 | ft² |
| Wetted Perimeter | 22.71 | ft |
| Top Width | 9.92 | ft |
| Critical Depth | 5.50 | ft |
| Critical Slope | 0.020974 | ft/ft |
| Velocity | 6.03 | ft/s |
| Velocity Head | 0.56 | ft |
| Specific Energy | 9.44 | ft |
| Froude Number | 0.43 | |
| Flow Type | Subcritical | |

ATTACHMENT A1-3

Quick TR-55 Ver.5.47 S/N:
Executed: 11:30:48 06-13-2000 d:\tva\kingston\calcs\COALYARD.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Conditions

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Area 1 | Tc | 0.15 |
| Sub-Area 2 | Tc | 0.14 |

SHTA1-9

Quick TR-55 Ver.5.47  S/N:
Executed: 11:31:00  06-13-2000  d:\tva\kingston\calcs\TTSB-1.TCT

Travel Time SB-1
Coal Yard Drainage

Tt COMPUTATIONS FOR: Sub-Area 1

SHEET FLOW (Applicable to Tc only)

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface description | | | |
| Manning's roughness coeff., n | | 0.0000 | |
| Flow length, L (total < or = 300) | ft | 0.0 | |
| Two-yr 24-hr rainfall, P2 | in | 0.000 | |
| Land slope, s | ft/ft | 0.0000 | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.00 | = 0.00 |

SHALLOW CONCENTRATED FLOW

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface (paved or unpaved)? | | | |
| Flow length, L | ft | 0.0 | |
| Watercourse slope, s | ft/ft | 0.0000 | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 0.0000 | |
| where: Unpaved Csf = 16.1345 | | | |
| Paved Csf = 20.3282 | | | |
| T = L / (3600*V) | hrs | 0.00 | = 0.00 |

CHANNEL FLOW

| | | | |
|---|---|---|---|
| Segment ID | | 1 | |
| Cross Sectional Flow Area, a | sq.ft | 35.00 | |
| Wetted perimeter, Pw | ft | 16.39 | |
| Hydraulic radius, r = a/Pw | ft | 2.135 | |
| Channel slope, s | ft/ft | 0.0037 | |
| Manning's roughness coeff., n | | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 5.0099 | |
| Flow length, L | ft | 1085 | |
| T = L / (3600*V) | hrs | 0.06 | = 0.06 |

TOTAL TIME (hrs) 0.06

Sht A1-10

# Tt, Channel Flow, SB-1
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tt, Channel Flow, SB-1 |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.003700 | ft/ft |
| Left Side Slope | 3.00 | V : H |
| Right Side Slope | 3.00 | V : H |
| Bottom Width | 4.00 | ft |
| Discharge | 175.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 5.88 | ft |
| Flow Area | 35.0 | ft² |
| Wetted Perimeter | 16.39 | ft |
| Top Width | 7.92 | ft |
| Critical Depth | 3.52 | ft |
| Critical Slope | 0.020201 | ft/ft |
| Velocity | 5.00 | ft/s |
| Velocity Head | 0.39 | ft |
| Specific Energy | 6.26 | ft |
| Froude Number | 0.42 | |
| Flow Type | Subcritical | |

SHT A\-11

Quick TR-55 Ver.5.47 S/N:
Executed: 11:31:00 06-13-2000 d:\tva\kingston\calcs\TTSB-1.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Travel Time SB-1
Coal Yard Drainage

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Area 1 | Tt | 0.06 |

S-A1-12

Quick TR-55 Version: 5.47 S/N:



Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used |
|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 36.00 | 90.0 | 0.10 | 0.10 | 4.80 | 3.68 | I.05 .10 |
| Sub-Area 2 | 64.00 | 90.0 | 0.10 | 0.00 | 4.80 | 3.68 | I.05 .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 100.00 acres or 0.1563 sq.mi
Peak discharge = 480 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | * Tt (hr) | Rounded Values Tc (hr) | * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Sub-Area 1 | 0.15 | 0.06 | 0.10 | 0.10 | No | Computed Ia/p < .1 |
| Sub-Area 2 | 0.14 | 0.00 | 0.10 | 0.00 | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Sub-Area 1 | 175 | 12.2 |
| Sub-Area 2 | 372 | 12.1 |
| Composite Watershed | 480 | 12.1 |

SAT A1-14


Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 4 | 6 | 9 | 28 | 55 | 108 | 175 | 145 | 78 |
| Sub-Area 2 | 9 | 13 | 20 | 123 | 238 | 372 | 231 | 80 | 54 |
| Total (cfs) | 13 | 19 | 29 | 151 | 293 | 480 | 406 | 225 | 132 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 46 | 32 | 25 | 20 | 16 | 13 | 12 | 10 | 9 |
| Sub-Area 2 | 45 | 38 | 32 | 28 | 24 | 21 | 19 | 17 | 15 |
| Total (cfs) | 91 | 70 | 57 | 48 | 40 | 34 | 31 | 27 | 24 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 8 | 7 | 7 | 6 | 6 | 5 | 4 | 4 | 4 |
| Sub-Area 2 | 14 | 13 | 12 | 11 | 10 | 8 | 8 | 7 | 7 |
| Total (cfs) | 22 | 20 | 19 | 17 | 16 | 13 | 12 | 11 | 11 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Sub-Area 1 | 4 | 3 | 3 | 2 | 0 |
| Sub-Area 2 | 7 | 6 | 5 | 4 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 11 | 9 | 8 | 6 | 0 |

SHT A1-15

SHT A1-16


Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 11.0 | 13 | 14.8 | 18 |
| 11.1 | 15 | 14.9 | 18 |
| 11.2 | 17 | 15.0 | 17 |
| 11.3 | 19 | 15.1 | 17 |
| 11.4 | 22 | 15.2 | 17 |
| 11.5 | 26 | 15.3 | 16 |
| 11.6 | 29 | 15.4 | 16 |
| 11.7 | 70 | 15.5 | 16 |
| 11.8 | 110 | 15.6 | 15 |
| 11.9 | 151 | 15.7 | 15 |
| 12.0 | 293 | 15.8 | 14 |
| 12.1 | 480 | 15.9 | 14 |
| 12.2 | 406 | 16.0 | 13 |
| 12.3 | 225 | 16.1 | 13 |
| 12.4 | 132 | 16.2 | 13 |
| 12.5 | 91 | 16.3 | 12 |
| 12.6 | 70 | 16.4 | 12 |
| 12.7 | 57 | 16.5 | 12 |
| 12.8 | 48 | 16.6 | 12 |
| 12.9 | 44 | 16.7 | 12 |
| 13.0 | 40 | 16.8 | 11 |
| 13.1 | 37 | 16.9 | 11 |
| 13.2 | 34 | 17.0 | 11 |
| 13.3 | 32 | 17.1 | 11 |
| 13.4 | 31 | 17.2 | 11 |
| 13.5 | 29 | 17.3 | 11 |
| 13.6 | 27 | 17.4 | 11 |
| 13.7 | 26 | 17.5 | 11 |
| 13.8 | 24 | 17.6 | 11 |
| 13.9 | 23 | 17.7 | 11 |
| 14.0 | 22 | 17.8 | 11 |
| 14.1 | 21 | 17.9 | 11 |
| 14.2 | 21 | 18.0 | 11 |
| 14.3 | 20 | 18.1 | 11 |
| 14.4 | 20 | 18.2 | 11 |
| 14.5 | 19 | 18.3 | 10 |

| | | | |
|---|---|---|---|
| 14.6 | 19 | 18.4 | 10 |
| 14.7 | 18 | 18.5 | 10 |

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 18.6 | 10 | 22.4 | 5 |
| 18.7 | 10 | 22.5 | 5 |
| 18.8 | 9 | 22.6 | 5 |
| 18.9 | 9 | 22.7 | 5 |
| 19.0 | 9 | 22.8 | 5 |
| 19.1 | 9 | 22.9 | 5 |
| 19.2 | 9 | 23.0 | 4 |
| 19.3 | 9 | 23.1 | 4 |
| 19.4 | 9 | 23.2 | 4 |
| 19.5 | 8 | 23.3 | 4 |
| 19.6 | 8 | 23.4 | 4 |
| 19.7 | 8 | 23.5 | 4 |
| 19.8 | 8 | 23.6 | 4 |
| 19.9 | 8 | 23.7 | 3 |
| 20.0 | 8 | 23.8 | 3 |
| 20.1 | 8 | 23.9 | 3 |
| 20.2 | 8 | 24.0 | 3 |
| 20.3 | 8 | 24.1 | 3 |
| 20.4 | 8 | 24.2 | 3 |
| 20.5 | 8 | 24.3 | 3 |
| 20.6 | 7 | 24.4 | 2 |
| 20.7 | 7 | 24.5 | 2 |
| 20.8 | 7 | 24.6 | 2 |
| 20.9 | 7 | 24.7 | 2 |
| 21.0 | 7 | 24.8 | 2 |
| 21.1 | 7 | 24.9 | 2 |
| 21.2 | 7 | 25.0 | 2 |
| 21.3 | 7 | 25.1 | 1 |
| 21.4 | 7 | 25.2 | 1 |
| 21.5 | 6 | 25.3 | 1 |
| 21.6 | 6 | 25.4 | 1 |
| 21.7 | 6 | 25.5 | 1 |
| 21.8 | 6 | 25.6 | 1 |
| 21.9 | 6 | 25.7 | 0 |
| 22.0 | 6 | 25.8 | 0 |
| 22.1 | 6 | 25.9 | 0 |
| 22.2 | 6 | | |
| 22.3 | 6 | | |

SHT A1-19

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 10 years

**********
* *
* Kingston Steam Plant *
* Coal Yard Drainage *
* Existing Basin *
* *
* *
**********

Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Rating Table file: d:\tva\kingston\calcs\EXBASIN .PND

----INITIAL CONDITIONS----
Elevation = 748.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

| GIVEN POND DATA | | | INTERMEDIATE ROUTING COMPUTATIONS | |
|---|---|---|---|---|
| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) | 2S/t (cfs) | 2S/t + O (cfs) |
| 748.00 | 0.0 | 0.000 | 0.0 | 0.0 |
| 749.00 | 0.0 | 0.260 | 62.9 | 62.9 |
| 750.00 | 0.0 | 0.670 | 162.1 | 162.1 |
| 751.00 | 0.0 | 1.500 | 363.0 | 363.0 |
| 752.00 | 0.0 | 3.380 | 818.0 | 818.0 |
| 753.00 | 0.0 | 7.230 | 1749.7 | 1749.7 |
| 754.00 | 0.0 | 15.030 | 3637.3 | 3637.3 |
| 755.00 | 0.0 | 27.440 | 6640.5 | 6640.5 |
| 756.00 | 0.0 | 42.140 | 10197.9 | 10197.9 |
| 756.50 | 25.7 | 49.940 | 12085.5 | 12111.1 |
| 756.60 | 38.2 | 51.530 | 12470.3 | 12508.5 |
| 756.70 | 49.1 | 53.140 | 12859.9 | 12909.0 |
| 756.80 | 62.7 | 54.750 | 13249.5 | 13312.2 |
| 756.90 | 77.4 | 56.380 | 13644.0 | 13721.3 |
| 757.00 | 95.2 | 58.020 | 14040.8 | 14136.1 |
| 757.10 | 114.4 | 59.680 | 14442.6 | 14557.0 |
| 757.20 | 134.8 | 61.380 | 14854.0 | 14988.8 |
| 757.30 | 158.9 | 63.120 | 15275.0 | 15434.0 |
| 757.40 | 181.9 | 64.900 | 15705.8 | 15887.7 |
| 757.50 | 208.7 | 66.720 | 16146.2 | 16355.0 |
| 758.00 | 349.5 | 76.400 | 18488.8 | 18838.3 |

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\EXBASIN .POND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 11.000 | 13.00 | ----- | 0.0 | 0.0 | 0.00 | 748.00 |
| 11.100 | 15.00 | 28.0 | 28.0 | 28.0 | 0.00 | 748.45 |
| 11.200 | 17.00 | 32.0 | 60.0 | 60.0 | 0.00 | 748.95 |
| 11.300 | 19.00 | 36.0 | 96.0 | 96.0 | 0.00 | 749.33 |
| 11.400 | 22.00 | 41.0 | 137.0 | 137.0 | 0.00 | 749.75 |
| 11.500 | 26.00 | 48.0 | 185.0 | 185.0 | 0.00 | 750.11 |
| 11.600 | 29.00 | 55.0 | 240.0 | 240.0 | 0.00 | 750.39 |
| 11.700 | 70.00 | 99.0 | 339.0 | 339.0 | 0.00 | 750.88 |
| 11.800 | 110.00 | 180.0 | 519.0 | 519.0 | 0.00 | 751.34 |
| 11.900 | 151.00 | 261.0 | 780.0 | 780.0 | 0.00 | 751.92 |
| 12.000 | 293.00 | 444.0 | 1224.0 | 1224.0 | 0.00 | 752.44 |
| 12.100 | 480.00 | 773.0 | 1997.0 | 1997.0 | 0.00 | 753.13 |
| 12.200 | 406.00 | 886.0 | 2883.0 | 2883.0 | 0.00 | 753.60 |
| 12.300 | 225.00 | 631.0 | 3514.0 | 3514.0 | 0.00 | 753.93 |
| 12.400 | 132.00 | 357.0 | 3871.0 | 3871.0 | 0.00 | 754.08 |
| 12.500 | 91.00 | 223.0 | 4094.0 | 4094.0 | 0.00 | 754.15 |
| 12.600 | 70.00 | 161.0 | 4255.0 | 4255.0 | 0.00 | 754.21 |
| 12.700 | 57.00 | 127.0 | 4382.0 | 4382.0 | 0.00 | 754.25 |
| 12.800 | 48.00 | 105.0 | 4487.0 | 4487.0 | 0.00 | 754.28 |
| 12.900 | 44.00 | 92.0 | 4579.0 | 4579.0 | 0.00 | 754.31 |
| 13.000 | 40.00 | 84.0 | 4663.0 | 4663.0 | 0.00 | 754.34 |
| 13.100 | 37.00 | 77.0 | 4740.0 | 4740.0 | 0.00 | 754.37 |
| 13.200 | 34.00 | 71.0 | 4811.0 | 4811.0 | 0.00 | 754.39 |
| 13.300 | 32.00 | 66.0 | 4877.0 | 4877.0 | 0.00 | 754.41 |
| 13.400 | 31.00 | 63.0 | 4940.0 | 4940.0 | 0.00 | 754.43 |
| 13.500 | 29.00 | 60.0 | 5000.0 | 5000.0 | 0.00 | 754.45 |
| 13.600 | 27.00 | 56.0 | 5056.0 | 5056.0 | 0.00 | 754.47 |
| 13.700 | 26.00 | 53.0 | 5109.0 | 5109.0 | 0.00 | 754.49 |
| 13.800 | 24.00 | 50.0 | 5159.0 | 5159.0 | 0.00 | 754.51 |
| 13.900 | 23.00 | 47.0 | 5206.0 | 5206.0 | 0.00 | 754.52 |
| 14.000 | 22.00 | 45.0 | 5251.0 | 5251.0 | 0.00 | 754.54 |
| 14.100 | 21.00 | 43.0 | 5294.0 | 5294.0 | 0.00 | 754.55 |
| 14.200 | 21.00 | 42.0 | 5336.0 | 5336.0 | 0.00 | 754.57 |
| 14.300 | 20.00 | 41.0 | 5377.0 | 5377.0 | 0.00 | 754.58 |
| 14.400 | 20.00 | 40.0 | 5417.0 | 5417.0 | 0.00 | 754.59 |
| 14.500 | 19.00 | 39.0 | 5456.0 | 5456.0 | 0.00 | 754.61 |
| 14.600 | 19.00 | 38.0 | 5494.0 | 5494.0 | 0.00 | 754.62 |
| 14.700 | 18.00 | 37.0 | 5531.0 | 5531.0 | 0.00 | 754.63 |
| 14.800 | 18.00 | 36.0 | 5567.0 | 5567.0 | 0.00 | 754.64 |
| 14.900 | 18.00 | 36.0 | 5603.0 | 5603.0 | 0.00 | 754.65 |
| 15.000 | 17.00 | 35.0 | 5638.0 | 5638.0 | 0.00 | 754.67 |
| 15.100 | 17.00 | 34.0 | 5672.0 | 5672.0 | 0.00 | 754.68 |
| 15.200 | 17.00 | 34.0 | 5706.0 | 5706.0 | 0.00 | 754.69 |
| 15.300 | 16.00 | 33.0 | 5739.0 | 5739.0 | 0.00 | 754.70 |
| 15.400 | 16.00 | 32.0 | 5771.0 | 5771.0 | 0.00 | 754.71 |

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 15.500 | 16.00 | 32.0 | 5803.0 | 5803.0 | 0.00 | 754.72 |
| 15.600 | 15.00 | 31.0 | 5834.0 | 5834.0 | 0.00 | 754.73 |
| 15.700 | 15.00 | 30.0 | 5864.0 | 5864.0 | 0.00 | 754.74 |
| 15.800 | 14.00 | 29.0 | 5893.0 | 5893.0 | 0.00 | 754.75 |
| 15.900 | 14.00 | 28.0 | 5921.0 | 5921.0 | 0.00 | 754.76 |
| 16.000 | 13.00 | 27.0 | 5948.0 | 5948.0 | 0.00 | 754.77 |
| 16.100 | 13.00 | 26.0 | 5974.0 | 5974.0 | 0.00 | 754.78 |
| 16.200 | 13.00 | 26.0 | 6000.0 | 6000.0 | 0.00 | 754.79 |
| 16.300 | 12.00 | 25.0 | 6025.0 | 6025.0 | 0.00 | 754.80 |
| 16.400 | 12.00 | 24.0 | 6049.0 | 6049.0 | 0.00 | 754.80 |
| 16.500 | 12.00 | 24.0 | 6073.0 | 6073.0 | 0.00 | 754.81 |
| 16.600 | 12.00 | 24.0 | 6097.0 | 6097.0 | 0.00 | 754.82 |
| 16.700 | 12.00 | 24.0 | 6121.0 | 6121.0 | 0.00 | 754.83 |
| 16.800 | 11.00 | 23.0 | 6144.0 | 6144.0 | 0.00 | 754.83 |
| 16.900 | 11.00 | 22.0 | 6166.0 | 6166.0 | 0.00 | 754.84 |
| 17.000 | 11.00 | 22.0 | 6188.0 | 6188.0 | 0.00 | 754.85 |
| 17.100 | 11.00 | 22.0 | 6210.0 | 6210.0 | 0.00 | 754.86 |
| 17.200 | 11.00 | 22.0 | 6232.0 | 6232.0 | 0.00 | 754.86 |
| 17.300 | 11.00 | 22.0 | 6254.0 | 6254.0 | 0.00 | 754.87 |
| 17.400 | 11.00 | 22.0 | 6276.0 | 6276.0 | 0.00 | 754.88 |
| 17.500 | 11.00 | 22.0 | 6298.0 | 6298.0 | 0.00 | 754.89 |
| 17.600 | 11.00 | 22.0 | 6320.0 | 6320.0 | 0.00 | 754.89 |
| 17.700 | 11.00 | 22.0 | 6342.0 | 6342.0 | 0.00 | 754.90 |
| 17.800 | 11.00 | 22.0 | 6364.0 | 6364.0 | 0.00 | 754.91 |
| 17.900 | 11.00 | 22.0 | 6386.0 | 6386.0 | 0.00 | 754.92 |
| 18.000 | 11.00 | 22.0 | 6408.0 | 6408.0 | 0.00 | 754.92 |
| 18.100 | 11.00 | 22.0 | 6430.0 | 6430.0 | 0.00 | 754.93 |
| 18.200 | 11.00 | 22.0 | 6452.0 | 6452.0 | 0.00 | 754.94 |
| 18.300 | 10.00 | 21.0 | 6473.0 | 6473.0 | 0.00 | 754.94 |
| 18.400 | 10.00 | 20.0 | 6493.0 | 6493.0 | 0.00 | 754.95 |
| 18.500 | 10.00 | 20.0 | 6513.0 | 6513.0 | 0.00 | 754.96 |
| 18.600 | 10.00 | 20.0 | 6533.0 | 6533.0 | 0.00 | 754.96 |
| 18.700 | 10.00 | 20.0 | 6553.0 | 6553.0 | 0.00 | 754.97 |
| 18.800 | 9.00 | 19.0 | 6572.0 | 6572.0 | 0.00 | 754.98 |
| 18.900 | 9.00 | 18.0 | 6590.0 | 6590.0 | 0.00 | 754.98 |
| 19.000 | 9.00 | 18.0 | 6608.0 | 6608.0 | 0.00 | 754.99 |
| 19.100 | 9.00 | 18.0 | 6626.0 | 6626.0 | 0.00 | 755.00 |
| 19.200 | 9.00 | 18.0 | 6644.0 | 6644.0 | 0.00 | 755.00 |
| 19.300 | 9.00 | 18.0 | 6662.0 | 6662.0 | 0.00 | 755.01 |
| 19.400 | 9.00 | 18.0 | 6680.0 | 6680.0 | 0.00 | 755.01 |
| 19.500 | 8.00 | 17.0 | 6697.0 | 6697.0 | 0.00 | 755.02 |
| 19.600 | 8.00 | 16.0 | 6713.0 | 6713.0 | 0.00 | 755.02 |
| 19.700 | 8.00 | 16.0 | 6729.0 | 6729.0 | 0.00 | 755.02 |
| 19.800 | 8.00 | 16.0 | 6745.0 | 6745.0 | 0.00 | 755.03 |
| 19.900 | 8.00 | 16.0 | 6761.0 | 6761.0 | 0.00 | 755.03 |
| 20.000 | 8.00 | 16.0 | 6777.0 | 6777.0 | 0.00 | 755.04 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 20.100 | 8.00 | 16.0 | 6793.0 | 6793.0 | 0.00 | 755.04 |
| 20.200 | 8.00 | 16.0 | 6809.0 | 6809.0 | 0.00 | 755.05 |
| 20.300 | 8.00 | 16.0 | 6825.0 | 6825.0 | 0.00 | 755.05 |
| 20.400 | 8.00 | 16.0 | 6841.0 | 6841.0 | 0.00 | 755.06 |
| 20.500 | 8.00 | 16.0 | 6857.0 | 6857.0 | 0.00 | 755.06 |
| 20.600 | 7.00 | 15.0 | 6872.0 | 6872.0 | 0.00 | 755.07 |
| 20.700 | 7.00 | 14.0 | 6886.0 | 6886.0 | 0.00 | 755.07 |
| 20.800 | 7.00 | 14.0 | 6900.0 | 6900.0 | 0.00 | 755.07 |
| 20.900 | 7.00 | 14.0 | 6914.0 | 6914.0 | 0.00 | 755.08 |
| 21.000 | 7.00 | 14.0 | 6928.0 | 6928.0 | 0.00 | 755.08 |
| 21.100 | 7.00 | 14.0 | 6942.0 | 6942.0 | 0.00 | 755.08 |
| 21.200 | 7.00 | 14.0 | 6956.0 | 6956.0 | 0.00 | 755.09 |
| 21.300 | 7.00 | 14.0 | 6970.0 | 6970.0 | 0.00 | 755.09 |
| 21.400 | 7.00 | 14.0 | 6984.0 | 6984.0 | 0.00 | 755.10 |
| 21.500 | 6.00 | 13.0 | 6997.0 | 6997.0 | 0.00 | 755.10 |
| 21.600 | 6.00 | 12.0 | 7009.0 | 7009.0 | 0.00 | 755.10 |
| 21.700 | 6.00 | 12.0 | 7021.0 | 7021.0 | 0.00 | 755.11 |
| 21.800 | 6.00 | 12.0 | 7033.0 | 7033.0 | 0.00 | 755.11 |
| 21.900 | 6.00 | 12.0 | 7045.0 | 7045.0 | 0.00 | 755.11 |
| 22.000 | 6.00 | 12.0 | 7057.0 | 7057.0 | 0.00 | 755.12 |
| 22.100 | 6.00 | 12.0 | 7069.0 | 7069.0 | 0.00 | 755.12 |
| 22.200 | 6.00 | 12.0 | 7081.0 | 7081.0 | 0.00 | 755.12 |
| 22.300 | 6.00 | 12.0 | 7093.0 | 7093.0 | 0.00 | 755.13 |
| 22.400 | 5.00 | 11.0 | 7104.0 | 7104.0 | 0.00 | 755.13 |
| 22.500 | 5.00 | 10.0 | 7114.0 | 7114.0 | 0.00 | 755.13 |
| 22.600 | 5.00 | 10.0 | 7124.0 | 7124.0 | 0.00 | 755.14 |
| 22.700 | 5.00 | 10.0 | 7134.0 | 7134.0 | 0.00 | 755.14 |
| 22.800 | 5.00 | 10.0 | 7144.0 | 7144.0 | 0.00 | 755.14 |
| 22.900 | 5.00 | 10.0 | 7154.0 | 7154.0 | 0.00 | 755.14 |
| 23.000 | 4.00 | 9.0 | 7163.0 | 7163.0 | 0.00 | 755.15 |
| 23.100 | 4.00 | 8.0 | 7171.0 | 7171.0 | 0.00 | 755.15 |
| 23.200 | 4.00 | 8.0 | 7179.0 | 7179.0 | 0.00 | 755.15 |
| 23.300 | 4.00 | 8.0 | 7187.0 | 7187.0 | 0.00 | 755.15 |
| 23.400 | 4.00 | 8.0 | 7195.0 | 7195.0 | 0.00 | 755.16 |
| 23.500 | 4.00 | 8.0 | 7203.0 | 7203.0 | 0.00 | 755.16 |
| 23.600 | 4.00 | 8.0 | 7211.0 | 7211.0 | 0.00 | 755.16 |
| 23.700 | 3.00 | 7.0 | 7218.0 | 7218.0 | 0.00 | 755.16 |
| 23.800 | 3.00 | 6.0 | 7224.0 | 7224.0 | 0.00 | 755.16 |
| 23.900 | 3.00 | 6.0 | 7230.0 | 7230.0 | 0.00 | 755.17 |
| 24.000 | 3.00 | 6.0 | 7236.0 | 7236.0 | 0.00 | 755.17 |
| 24.100 | 3.00 | 6.0 | 7242.0 | 7242.0 | 0.00 | 755.17 |
| 24.200 | 3.00 | 6.0 | 7248.0 | 7248.0 | 0.00 | 755.17 |
| 24.300 | 3.00 | 6.0 | 7254.0 | 7254.0 | 0.00 | 755.17 |
| 24.400 | 2.00 | 5.0 | 7259.0 | 7259.0 | 0.00 | 755.17 |
| 24.500 | 2.00 | 4.0 | 7263.0 | 7263.0 | 0.00 | 755.17 |
| 24.600 | 2.00 | 4.0 | 7267.0 | 7267.0 | 0.00 | 755.18 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 24.700 | 2.00 | 4.0 | 7271.0 | 7271.0 | 0.00 | 755.18 |
| 24.800 | 2.00 | 4.0 | 7275.0 | 7275.0 | 0.00 | 755.18 |
| 24.900 | 2.00 | 4.0 | 7279.0 | 7279.0 | 0.00 | 755.18 |
| 25.000 | 2.00 | 4.0 | 7283.0 | 7283.0 | 0.00 | 755.18 |
| 25.100 | 1.00 | 3.0 | 7286.0 | 7286.0 | 0.00 | 755.18 |
| 25.200 | 1.00 | 2.0 | 7288.0 | 7288.0 | 0.00 | 755.18 |
| 25.300 | 1.00 | 2.0 | 7290.0 | 7290.0 | 0.00 | 755.18 |
| 25.400 | 1.00 | 2.0 | 7292.0 | 7292.0 | 0.00 | 755.18 |
| 25.500 | 1.00 | 2.0 | 7294.0 | 7294.0 | 0.00 | 755.18 |
| 25.600 | 1.00 | 2.0 | 7296.0 | 7296.0 | 0.00 | 755.18 |
| 25.700 | 0.00 | 1.0 | 7297.0 | 7297.0 | 0.00 | 755.18 |
| 25.800 | 0.00 | 0.0 | 7297.0 | 7297.0 | 0.00 | 755.18 |
| 25.900 | 0.00 | 0.0 | 7297.0 | 7297.0 | 0.00 | 755.18 |

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD

Starting Pond W.S. Elevation = 748.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

| | | |
|---|---|---|
| Peak Inflow | = | 480.00 cfs |
| Peak Outflow | = | 0.00 cfs |
| Peak Elevation | = | 755.18 ft |

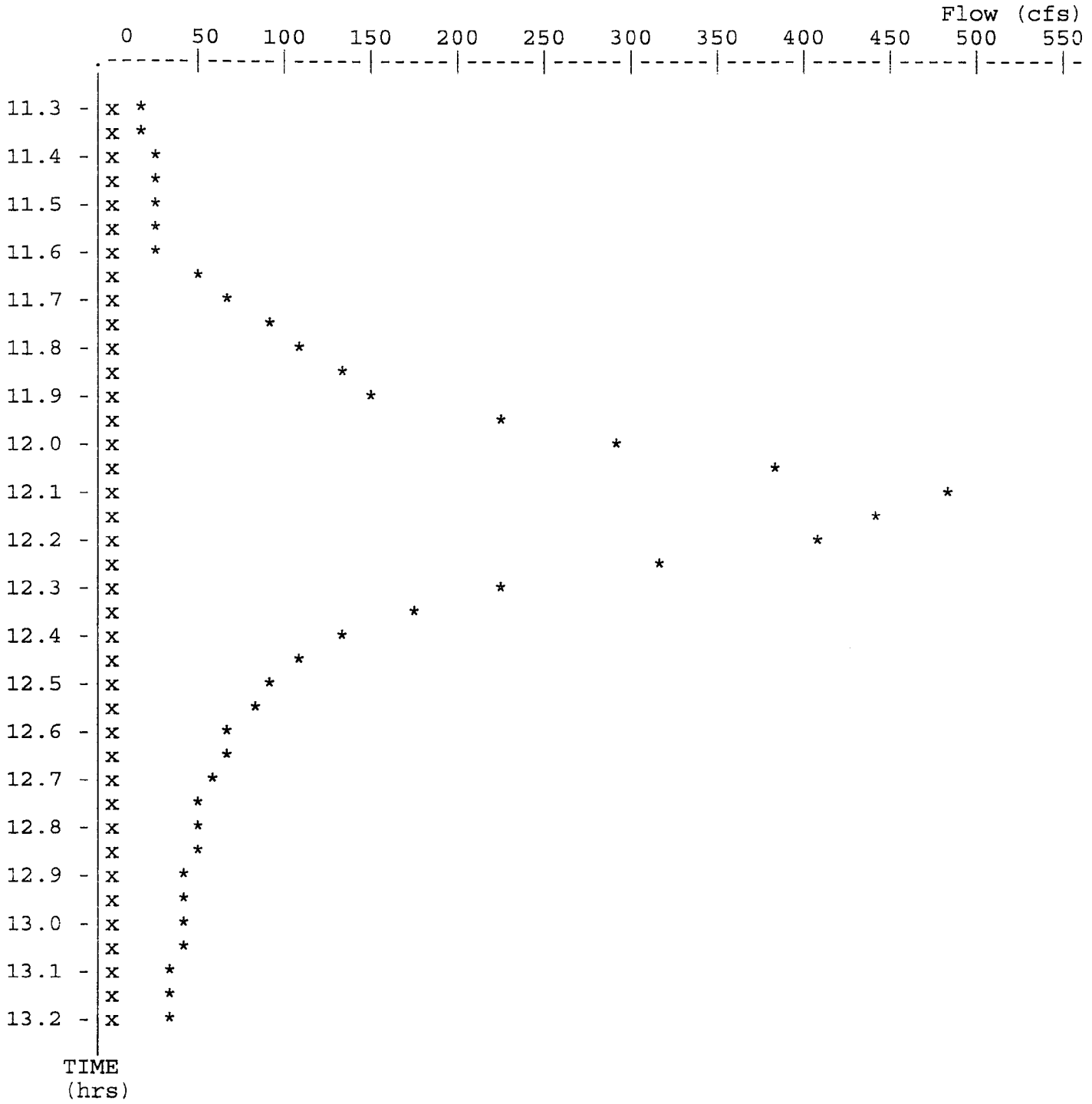
***** Summary of Approximate Peak Storage *****

| | | |
|---|---|---|
| Initial Storage | = | 0.00 ac-ft |
| Peak Storage From Storm | = | 30.15 ac-ft |
| Total Storage in Pond | = | 30.15 ac-ft |

Warning: Inflow hydrograph truncated on left side.

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.21 S/N:                                    Page 7
                                                  Return Freq:  10 years
Pond File:           d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph:   d:\tva\kingston\calcs\KIF10   .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS10 .HYD
                                                  EXECUTED: 06-29-2000
Peak Inflow     =   480.00 cfs                                 13:01:26
Peak Outflow    =     0.00 cfs
Peak Elevation =   755.18 ft
```




* File: d:\tva\kingston\calcs\KIF10 .HYD Qmax = 480.0 cfs
x File: d:\tva\kingston\calcs\EXBAS10 .HYD Qmax = 0.0 cfs

## ATTACHMENT A-2

## TR-55 – 100 YR-24 HR RUNOFF HYDROGRAPH
## POND-2 – 100 YR-24 HR BASIN ROUTING

Quick TR-55 Ver.5.47  S/N:
Executed: 11:48:18  06-20-2000

Kingston Steam Plant
Coal Yard Runoff
Existing/Proposed Conditions

RUNOFF CURVE NUMBER DATA

Composite Area: Sub-Area 1

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 4.59 | 89 | |
| Pavement | 1.08 | 98 | |
| Buildings | 0.46 | 98 | |
| Bare Soil Yard Area, 75% Hard | 22.40 | 91 | |
| Bare Soil Area, 25% Dirt | 7.47 | 87 | |
| COMPOSITE AREA ---> | 36.00 | 90.2 | ( 90 ) |

Composite Area: Sub-Area 2

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 3.83 | 89 | |
| Buildings | 1.63 | 98 | |
| Pond Area | 2.40 | 98 | |
| Bare Soil Yard Area, 75% hard | 42.11 | 91 | |
| Bare Soil, 25% dirt | 14.03 | 87 | |
| COMPOSITE AREA ---> | 64.00 | 90.4 | ( 90 ) |

Quick TR-55 Ver.5.47  S/N:
Executed: 11:48:18  06-20-2000

Kingston Steam Plant
Coal Yard Runoff
Existing/Proposed Conditions

RUNOFF CURVE NUMBER SUMMARY

| Subarea Description | Area (acres) | CN (weighted) |
|---|---|---|
| Sub-Area 1 | 36.00 | 90 |
| Sub-Area 2 | 64.00 | 90 |

Quick TR-55 Ver.5.47 S/N:
Executed: 11:36:42 06-20-2000 d:\tva\kingston\calcs\100YR.TCT

Kingston Steam Plant
Coal Yard Drainage
Existing/Proposed Conditions

Tc COMPUTATIONS FOR: Sub-Area 1

SHEET FLOW (Applicable to Tc only)

| | | | |
|---|---|---|---|
| Segment ID | | 1 | |
| Surface description | | Bare Soil | |
| Manning's roughness coeff., n | | 0.0110 | |
| Flow length, L (total < or = 300) | ft | 270.0 | |
| Two-yr 24-hr rainfall, P2 | in | 3.300 | |
| Land slope, s | ft/ft | 0.0085 | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.06 | = 0.06 |

SHALLOW CONCENTRATED FLOW

| | | | |
|---|---|---|---|
| Segment ID | | 2 | |
| Surface (paved or unpaved)? | | Unpaved | |
| Flow length, L | ft | 325.0 | |
| Watercourse slope, s | ft/ft | 0.0105 | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 1.6533 | |
| where: Unpaved Csf = 16.1345 | | | |
| Paved Csf = 20.3282 | | | |
| T = L / (3600*V) | hrs | 0.05 | = 0.05 |

CHANNEL FLOW

| | | | |
|---|---|---|---|
| Segment ID | | 3 | |
| Cross Sectional Flow Area, a | sq.ft | 23.20 | |
| Wetted perimeter, Pw | ft | 17.87 | |
| Hydraulic radius, r = a/Pw | ft | 1.298 | |
| Channel slope, s | ft/ft | 0.0089 | |
| Manning's roughness coeff., n | | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 5.5762 | |
| Flow length, L | ft | 655 | |
| T = L / (3600*V) | hrs | 0.03 | = 0.03 |

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TOTAL TIME (hrs) 0.15

SHT AQ-4

# Tc, 1-Channel Flow, SB-1, 100 YR
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tc, 1-Channel Flow, SB-1, 100 YR |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.008900 | ft/ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 3.00 | H : V |
| Bottom Width | 4.00 | ft |
| Discharge | 129.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 2.19 | ft |
| Flow Area | 23.2 | ft² |
| Wetted Perimeter | 17.87 | ft |
| Top Width | 17.16 | ft |
| Critical Depth | 2.02 | ft |
| Critical Slope | 0.012809 | ft/ft |
| Velocity | 5.56 | ft/s |
| Velocity Head | 0.48 | ft |
| Specific Energy | 2.67 | ft |
| Froude Number | 0.84 | |
| Flow Type | Subcritical | |

SHT AQ-5

Quick TR-55 Ver.5.47  S/N:
Executed: 11:36:42  06-20-2000  d:\tva\kingston\calcs\100YR.TCT

Kingston Steam Plant
Coal Yard Drainage
Existing/Proposed Conditions

Tc COMPUTATIONS FOR: Sub-Area 2

SHEET FLOW (Applicable to Tc only)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 1 | | 2 | | |
| Surface description | | | Bare Soil | | Bare Soil | | |
| Manning's roughness coeff., n | | | 0.0110 | | 0.0110 | | |
| Flow length, L (total < or = 300) | | ft | 180.0 | | 107.0 | | |
| Two-yr 24-hr rainfall, P2 | | in | 3.300 | | 3.300 | | |
| Land slope, s | | ft/ft | 0.0172 | | 0.0224 | | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | | hrs | 0.03 | + | 0.02 | = | 0.05 |

SHALLOW CONCENTRATED FLOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 3 | | | | |
| Surface (paved or unpaved)? | | | Unpaved | | | | |
| Flow length, L | | ft | 145.0 | | | | |
| Watercourse slope, s | | ft/ft | 0.0179 | | | | |
| $Avg.V = Csf * (s)^{0.5}$ | | ft/s | 2.1586 | | | | |
| where: Unpaved Csf = 16.1345 | | | | | | | |
| Paved Csf = 20.3282 | | | | | | | |
| T = L / (3600*V) | | hrs | 0.02 | | | = | 0.02 |

CHANNEL FLOW

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment ID | | | 4 | | 5 | | |
| Cross Sectional Flow Area, a | | sq.ft | 46.50 | | 92.80 | | |
| Wetted perimeter, Pw | | ft | 25.04 | | 35.22 | | |
| Hydraulic radius, r = a/Pw | | ft | 1.857 | | 2.635 | | |
| Channel slope, s | | ft/ft | 0.0062 | | 0.0039 | | |
| Manning's roughness coeff., n | | | 0.0300 | | 0.0300 | | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | | ft/s | 5.9084 | | 5.9170 | | |
| Flow length, L | | ft | 644 | | 775 | | |
| T = L / (3600*V) | | hrs | 0.03 | + | 0.04 | = | 0.07 |

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

TOTAL TIME (hrs)  0.14

# Tc, 4-Channel Flow, SB-2, 100 YR
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tc, 4-Channel Flow, Sb-2, 100 YR |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.006200 | ft/ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 3.00 | H : V |
| Bottom Width | 4.00 | ft |
| Discharge | 274.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 3.33 | ft |
| Flow Area | 46.5 | ft² |
| Wetted Perimeter | 25.04 | ft |
| Top Width | 23.96 | ft |
| Critical Depth | 2.90 | ft |
| Critical Slope | 0.011590 | ft/ft |
| Velocity | 5.89 | ft/s |
| Velocity Head | 0.54 | ft |
| Specific Energy | 3.87 | ft |
| Froude Number | 0.75 | |
| Flow Type | Subcritical | |

SHT A2-7

# Tc, 5-Channel Flow, SB-2, 100 YR
# Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tc, 5-Channel Flow, SB-2, 100 yr |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.003900 | ft/ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 3.00 | H : V |
| Bottom Width | 4.00 | ft |
| Discharge | 548.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 4.94 | ft |
| Flow Area | 92.8 | ft² |
| Wetted Perimeter | 35.22 | ft |
| Top Width | 33.62 | ft |
| Critical Depth | 4.00 | ft |
| Critical Slope | 0.010578 | ft/ft |
| Velocity | 5.90 | ft/s |
| Velocity Head | 0.54 | ft |
| Specific Energy | 5.48 | ft |
| Froude Number | 0.63 | |
| Flow Type | Subcritical | |

Quick TR-55 Ver.5.47  S/N:
Executed: 11:36:42  06-20-2000  d:\tva\kingston\calcs\100YR.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Kingston Steam Plant
Coal Yard Drainage
Existing/Proposed Conditions

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Area 1 | Tc | 0.15 |
| Sub-Area 2 | Tc | 0.14 |

Quick TR-55 Ver.5.47  S/N:
Executed: 11:36:56  06-20-2000  d:\tva\kingston\calcs\SB1TT100.TCT

Travel Time
Sub-Basin 1

Tt COMPUTATIONS FOR: Sub-Basin 1

SHEET FLOW (Applicable to Tc only)

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface description | | | |
| Manning's roughness coeff., n | | 0.0000 | |
| Flow length, L (total < or = 300) | ft | 0.0 | |
| Two-yr 24-hr rainfall, P2 | in | 0.000 | |
| Land slope, s | ft/ft | 0.0000 | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.00 | = 0.00 |

SHALLOW CONCENTRATED FLOW

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface (paved or unpaved)? | | | |
| Flow length, L | ft | 0.0 | |
| Watercourse slope, s | ft/ft | 0.0000 | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 0.0000 | |
| where: Unpaved Csf = 16.1345 | | | |
| Paved Csf = 20.3282 | | | |
| T = L / (3600*V) | hrs | 0.00 | = 0.00 |

CHANNEL FLOW

| | | | |
|---|---|---|---|
| Segment ID | | 1 | |
| Cross Sectional Flow Area, a | sq.ft | 54.10 | |
| Wetted perimeter, Pw | ft | 26.96 | |
| Hydraulic radius, r = a/Pw | ft | 2.007 | |
| Channel slope, s | ft/ft | 0.0037 | |
| Manning's roughness coeff., n | | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 4.8064 | |
| Flow length, L | ft | 1085 | |
| T = L / (3600*V) | hrs | 0.06 | = 0.06 |

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

TOTAL TIME (hrs) 0.06

# Tt, Channel Flow, SB-1, 100 YR
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Tt, Channel Flow, SB-1, 100 YR |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Slope | 0.003700 | ft/ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 3.00 | H : V |
| Bottom Width | 4.00 | ft |
| Discharge | 259.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 3.63 | ft |
| Flow Area | 54.1 | ft² |
| Wetted Perimeter | 26.96 | ft |
| Top Width | 25.78 | ft |
| Critical Depth | 2.82 | ft |
| Critical Slope | 0.011677 | ft/ft |
| Velocity | 4.79 | ft/s |
| Velocity Head | 0.36 | ft |
| Specific Energy | 3.99 | ft |
| Froude Number | 0.58 | |
| Flow Type | Subcritical | |

Quick TR-55 Ver.5.47 S/N:
Executed: 11:36:56 06-20-2000 d:\tva\kingston\calcs\SB1TT100.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Travel Time
Sub-Basin 1

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Basin 1 | Tt | 0.06 |

SAT AS-12

Quick TR-55 Version: 5.47 S/N:



Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

NOTE: AREAS, CN's AND Tc SAME AS SHOWN FOR 10 YR-STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used |
|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 36.00 | 90.0 | 0.10 | 0.10 | 6.60 | 5.43 | I.03 .10 |
| Sub-Area 2 | 64.00 | 90.0 | 0.10 | 0.00 | 6.60 | 5.43 | I.03 .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 100.00 acres or 0.1563 sq.mi
Peak discharge = 707 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | * Tt (hr) | Rounded Values Tc (hr) | * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Sub-Area 1 | 0.15 | 0.06 | 0.10 | 0.10 | No | Computed Ia/p < .1 |
| Sub-Area 2 | 0.14 | 0.00 | 0.10 | 0.00 | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Sub-Area 1 | 259 | 12.2 |
| Sub-Area 2 | 548 | 12.1 |
| Composite Watershed | 707 | 12.1 |

SHT A2-14


Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 6 | 9 | 13 | 41 | 82 | 159 | 259 | 214 | 115 |
| Sub-Area 2 | 13 | 18 | 29 | 181 | 351 | 548 | 341 | 118 | 80 |
| Total (cfs) | 19 | 27 | 42 | 222 | 433 | 707 | 600 | 332 | 195 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 68 | 48 | 37 | 30 | 23 | 20 | 17 | 15 | 14 |
| Sub-Area 2 | 67 | 56 | 47 | 41 | 36 | 31 | 28 | 25 | 23 |
| Total (cfs) | 135 | 104 | 84 | 71 | 59 | 51 | 45 | 40 | 37 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 13 | 11 | 10 | 9 | 8 | 7 | 6 | 6 | 6 |
| Sub-Area 2 | 21 | 18 | 17 | 16 | 14 | 12 | 11 | 11 | 10 |
| Total (cfs) | 34 | 29 | 27 | 25 | 22 | 19 | 17 | 17 | 16 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Sub-Area 1 | 5 | 5 | 4 | 4 | 0 |
| Sub-Area 2 | 10 | 8 | 7 | 7 | 0 |

SHT AC-15

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 15 | 13 | 11 | 11 | 0 |

SHT AS-16


Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 11.0 | 19 | 14.8 | 26 |
| 11.1 | 22 | 14.9 | 26 |
| 11.2 | 24 | 15.0 | 25 |
| 11.3 | 27 | 15.1 | 24 |
| 11.4 | 32 | 15.2 | 24 |
| 11.5 | 37 | 15.3 | 23 |
| 11.6 | 42 | 15.4 | 23 |
| 11.7 | 102 | 15.5 | 22 |
| 11.8 | 162 | 15.6 | 21 |
| 11.9 | 222 | 15.7 | 21 |
| 12.0 | 433 | 15.8 | 20 |
| 12.1 | 707 | 15.9 | 20 |
| 12.2 | 600 | 16.0 | 19 |
| 12.3 | 332 | 16.1 | 19 |
| 12.4 | 195 | 16.2 | 18 |
| 12.5 | 135 | 16.3 | 18 |
| 12.6 | 104 | 16.4 | 17 |
| 12.7 | 84 | 16.5 | 17 |
| 12.8 | 71 | 16.6 | 17 |
| 12.9 | 65 | 16.7 | 17 |
| 13.0 | 59 | 16.8 | 17 |
| 13.1 | 55 | 16.9 | 17 |
| 13.2 | 51 | 17.0 | 17 |
| 13.3 | 48 | 17.1 | 17 |
| 13.4 | 45 | 17.2 | 17 |
| 13.5 | 43 | 17.3 | 16 |
| 13.6 | 40 | 17.4 | 16 |
| 13.7 | 38 | 17.5 | 16 |
| 13.8 | 37 | 17.6 | 16 |
| 13.9 | 36 | 17.7 | 16 |
| 14.0 | 34 | 17.8 | 15 |
| 14.1 | 32 | 17.9 | 15 |
| 14.2 | 31 | 18.0 | 15 |
| 14.3 | 29 | 18.1 | 15 |
| 14.4 | 28 | 18.2 | 15 |
| 14.5 | 28 | 18.3 | 14 |

SHT AS-17

| | | | |
|---|---|---|---|
| 14.6 | 27 | 18.4 | 14 |
| 14.7 | 26 | 18.5 | 14 |

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-13-2000 11:31:13
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
Existing/~~Proposed~~ Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 18.6 | 14 | 22.4 | 10 |
| 18.7 | 14 | 22.5 | 10 |
| 18.8 | 13 | 22.6 | 9 |
| 18.9 | 13 | 22.7 | 9 |
| 19.0 | 13 | 22.8 | 9 |
| 19.1 | 13 | 22.9 | 9 |
| 19.2 | 13 | 23.0 | 8 |
| 19.3 | 12 | 23.1 | 8 |
| 19.4 | 12 | 23.2 | 8 |
| 19.5 | 12 | 23.3 | 7 |
| 19.6 | 12 | 23.4 | 7 |
| 19.7 | 12 | 23.5 | 7 |
| 19.8 | 11 | 23.6 | 7 |
| 19.9 | 11 | 23.7 | 6 |
| 20.0 | 11 | 23.8 | 6 |
| 20.1 | 11 | 23.9 | 6 |
| 20.2 | 11 | 24.0 | 6 |
| 20.3 | 11 | 24.1 | 5 |
| 20.4 | 11 | 24.2 | 5 |
| 20.5 | 11 | 24.3 | 5 |
| 20.6 | 11 | 24.4 | 4 |
| 20.7 | 11 | 24.5 | 4 |
| 20.8 | 11 | 24.6 | 4 |
| 20.9 | 11 | 24.7 | 4 |
| 21.0 | 11 | 24.8 | 3 |
| 21.1 | 11 | 24.9 | 3 |
| 21.2 | 11 | 25.0 | 3 |
| 21.3 | 11 | 25.1 | 2 |
| 21.4 | 11 | 25.2 | 2 |
| 21.5 | 11 | 25.3 | 2 |
| 21.6 | 11 | 25.4 | 2 |
| 21.7 | 11 | 25.5 | 1 |
| 21.8 | 11 | 25.6 | 1 |
| 21.9 | 11 | 25.7 | 1 |
| 22.0 | 11 | 25.8 | 1 |
| 22.1 | 11 | 25.9 | 0 |
| 22.2 | 10 | | |
| 22.3 | 10 | | |

SHT A2-19

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 100 years

**********
* *
* Kingston Steam Plant *
* Coal Yard Drainage *
* Existing Basin *
* *
* *
**********

Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Rating Table file: d:\tva\kingston\calcs\EXBASIN .PND

----INITIAL CONDITIONS----
Elevation = 748.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

| GIVEN POND DATA | | | INTERMEDIATE ROUTING COMPUTATIONS | |
|---|---|---|---|---|
| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) | 2S/t (cfs) | 2S/t + O (cfs) |
| 748.00 | 0.0 | 0.000 | 0.0 | 0.0 |
| 749.00 | 0.0 | 0.260 | 62.9 | 62.9 |
| 750.00 | 0.0 | 0.670 | 162.1 | 162.1 |
| 751.00 | 0.0 | 1.500 | 363.0 | 363.0 |
| 752.00 | 0.0 | 3.380 | 818.0 | 818.0 |
| 753.00 | 0.0 | 7.230 | 1749.7 | 1749.7 |
| 754.00 | 0.0 | 15.030 | 3637.3 | 3637.3 |
| 755.00 | 0.0 | 27.440 | 6640.5 | 6640.5 |
| 756.00 | 0.0 | 42.140 | 10197.9 | 10197.9 |
| 756.50 | 25.7 | 49.940 | 12085.5 | 12111.1 |
| 756.60 | 38.2 | 51.530 | 12470.3 | 12508.5 |
| 756.70 | 49.1 | 53.140 | 12859.9 | 12909.0 |
| 756.80 | 62.7 | 54.750 | 13249.5 | 13312.2 |
| 756.90 | 77.4 | 56.380 | 13644.0 | 13721.3 |
| 757.00 | 95.2 | 58.020 | 14040.8 | 14136.1 |
| 757.10 | 114.4 | 59.680 | 14442.6 | 14557.0 |
| 757.20 | 134.8 | 61.380 | 14854.0 | 14988.8 |
| 757.30 | 158.9 | 63.120 | 15275.0 | 15434.0 |
| 757.40 | 181.9 | 64.900 | 15705.8 | 15887.7 |
| 757.50 | 208.7 | 66.720 | 16146.2 | 16355.0 |
| 758.00 | 349.5 | 76.400 | 18488.8 | 18838.3 |

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 11.000 | 19.00 | ----- | 0.0 | 0.0 | 0.00 | 748.00 |
| 11.100 | 22.00 | 41.0 | 41.0 | 41.0 | 0.00 | 748.65 |
| 11.200 | 24.00 | 46.0 | 87.0 | 87.0 | 0.00 | 749.24 |
| 11.300 | 27.00 | 51.0 | 138.0 | 138.0 | 0.00 | 749.76 |
| 11.400 | 32.00 | 59.0 | 197.0 | 197.0 | 0.00 | 750.17 |
| 11.500 | 37.00 | 69.0 | 266.0 | 266.0 | 0.00 | 750.52 |
| 11.600 | 42.00 | 79.0 | 345.0 | 345.0 | 0.00 | 750.91 |
| 11.700 | 102.00 | 144.0 | 489.0 | 489.0 | 0.00 | 751.28 |
| 11.800 | 162.00 | 264.0 | 753.0 | 753.0 | 0.00 | 751.86 |
| 11.900 | 222.00 | 384.0 | 1137.0 | 1137.0 | 0.00 | 752.34 |
| 12.000 | 433.00 | 655.0 | 1792.0 | 1792.0 | 0.00 | 753.02 |
| 12.100 | 707.00 | 1140.0 | 2932.0 | 2932.0 | 0.00 | 753.63 |
| 12.200 | 600.00 | 1307.0 | 4239.0 | 4239.0 | 0.00 | 754.20 |
| 12.300 | 332.00 | 932.0 | 5171.0 | 5171.0 | 0.00 | 754.51 |
| 12.400 | 195.00 | 527.0 | 5698.0 | 5698.0 | 0.00 | 754.69 |
| 12.500 | 135.00 | 330.0 | 6028.0 | 6028.0 | 0.00 | 754.80 |
| 12.600 | 104.00 | 239.0 | 6267.0 | 6267.0 | 0.00 | 754.88 |
| 12.700 | 84.00 | 188.0 | 6455.0 | 6455.0 | 0.00 | 754.94 |
| 12.800 | 71.00 | 155.0 | 6610.0 | 6610.0 | 0.00 | 754.99 |
| 12.900 | 65.00 | 136.0 | 6746.0 | 6746.0 | 0.00 | 755.03 |
| 13.000 | 59.00 | 124.0 | 6870.0 | 6870.0 | 0.00 | 755.06 |
| 13.100 | 55.00 | 114.0 | 6984.0 | 6984.0 | 0.00 | 755.10 |
| 13.200 | 51.00 | 106.0 | 7090.0 | 7090.0 | 0.00 | 755.13 |
| 13.300 | 48.00 | 99.0 | 7189.0 | 7189.0 | 0.00 | 755.15 |
| 13.400 | 45.00 | 93.0 | 7282.0 | 7282.0 | 0.00 | 755.18 |
| 13.500 | 43.00 | 88.0 | 7370.0 | 7370.0 | 0.00 | 755.21 |
| 13.600 | 40.00 | 83.0 | 7453.0 | 7453.0 | 0.00 | 755.23 |
| 13.700 | 38.00 | 78.0 | 7531.0 | 7531.0 | 0.00 | 755.25 |
| 13.800 | 37.00 | 75.0 | 7606.0 | 7606.0 | 0.00 | 755.27 |
| 13.900 | 36.00 | 73.0 | 7679.0 | 7679.0 | 0.00 | 755.29 |
| 14.000 | 34.00 | 70.0 | 7749.0 | 7749.0 | 0.00 | 755.31 |
| 14.100 | 32.00 | 66.0 | 7815.0 | 7815.0 | 0.00 | 755.33 |
| 14.200 | 31.00 | 63.0 | 7878.0 | 7878.0 | 0.00 | 755.35 |
| 14.300 | 29.00 | 60.0 | 7938.0 | 7938.0 | 0.00 | 755.36 |
| 14.400 | 28.00 | 57.0 | 7995.0 | 7995.0 | 0.00 | 755.38 |
| 14.500 | 28.00 | 56.0 | 8051.0 | 8051.0 | 0.00 | 755.40 |
| 14.600 | 27.00 | 55.0 | 8106.0 | 8106.0 | 0.00 | 755.41 |
| 14.700 | 26.00 | 53.0 | 8159.0 | 8159.0 | 0.00 | 755.43 |
| 14.800 | 26.00 | 52.0 | 8211.0 | 8211.0 | 0.00 | 755.44 |
| 14.900 | 26.00 | 52.0 | 8263.0 | 8263.0 | 0.00 | 755.46 |
| 15.000 | 25.00 | 51.0 | 8314.0 | 8314.0 | 0.00 | 755.47 |
| 15.100 | 24.00 | 49.0 | 8363.0 | 8363.0 | 0.00 | 755.48 |
| 15.200 | 24.00 | 48.0 | 8411.0 | 8411.0 | 0.00 | 755.50 |
| 15.300 | 23.00 | 47.0 | 8458.0 | 8458.0 | 0.00 | 755.51 |
| 15.400 | 23.00 | 46.0 | 8504.0 | 8504.0 | 0.00 | 755.52 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 15.500 | 22.00 | 45.0 | 8549.0 | 8549.0 | 0.00 | 755.54 |
| 15.600 | 21.00 | 43.0 | 8592.0 | 8592.0 | 0.00 | 755.55 |
| 15.700 | 21.00 | 42.0 | 8634.0 | 8634.0 | 0.00 | 755.56 |
| 15.800 | 20.00 | 41.0 | 8675.0 | 8675.0 | 0.00 | 755.57 |
| 15.900 | 20.00 | 40.0 | 8715.0 | 8715.0 | 0.00 | 755.58 |
| 16.000 | 19.00 | 39.0 | 8754.0 | 8754.0 | 0.00 | 755.59 |
| 16.100 | 19.00 | 38.0 | 8792.0 | 8792.0 | 0.00 | 755.60 |
| 16.200 | 18.00 | 37.0 | 8829.0 | 8829.0 | 0.00 | 755.62 |
| 16.300 | 18.00 | 36.0 | 8865.0 | 8865.0 | 0.00 | 755.63 |
| 16.400 | 17.00 | 35.0 | 8900.0 | 8900.0 | 0.00 | 755.64 |
| 16.500 | 17.00 | 34.0 | 8934.0 | 8934.0 | 0.00 | 755.64 |
| 16.600 | 17.00 | 34.0 | 8968.0 | 8968.0 | 0.00 | 755.65 |
| 16.700 | 17.00 | 34.0 | 9002.0 | 9002.0 | 0.00 | 755.66 |
| 16.800 | 17.00 | 34.0 | 9036.0 | 9036.0 | 0.00 | 755.67 |
| 16.900 | 17.00 | 34.0 | 9070.0 | 9070.0 | 0.00 | 755.68 |
| 17.000 | 17.00 | 34.0 | 9104.0 | 9104.0 | 0.00 | 755.69 |
| 17.100 | 17.00 | 34.0 | 9138.0 | 9138.0 | 0.00 | 755.70 |
| 17.200 | 17.00 | 34.0 | 9172.0 | 9172.0 | 0.00 | 755.71 |
| 17.300 | 16.00 | 33.0 | 9205.0 | 9205.0 | 0.00 | 755.72 |
| 17.400 | 16.00 | 32.0 | 9237.0 | 9237.0 | 0.00 | 755.73 |
| 17.500 | 16.00 | 32.0 | 9269.0 | 9269.0 | 0.00 | 755.74 |
| 17.600 | 16.00 | 32.0 | 9301.0 | 9301.0 | 0.00 | 755.75 |
| 17.700 | 16.00 | 32.0 | 9333.0 | 9333.0 | 0.00 | 755.76 |
| 17.800 | 15.00 | 31.0 | 9364.0 | 9364.0 | 0.00 | 755.77 |
| 17.900 | 15.00 | 30.0 | 9394.0 | 9394.0 | 0.00 | 755.77 |
| 18.000 | 15.00 | 30.0 | 9424.0 | 9424.0 | 0.00 | 755.78 |
| 18.100 | 15.00 | 30.0 | 9454.0 | 9454.0 | 0.00 | 755.79 |
| 18.200 | 15.00 | 30.0 | 9484.0 | 9484.0 | 0.00 | 755.80 |
| 18.300 | 14.00 | 29.0 | 9513.0 | 9513.0 | 0.00 | 755.81 |
| 18.400 | 14.00 | 28.0 | 9541.0 | 9541.0 | 0.00 | 755.82 |
| 18.500 | 14.00 | 28.0 | 9569.0 | 9569.0 | 0.00 | 755.82 |
| 18.600 | 14.00 | 28.0 | 9597.0 | 9597.0 | 0.00 | 755.83 |
| 18.700 | 14.00 | 28.0 | 9625.0 | 9625.0 | 0.00 | 755.84 |
| 18.800 | 13.00 | 27.0 | 9652.0 | 9652.0 | 0.00 | 755.85 |
| 18.900 | 13.00 | 26.0 | 9678.0 | 9678.0 | 0.00 | 755.85 |
| 19.000 | 13.00 | 26.0 | 9704.0 | 9704.0 | 0.00 | 755.86 |
| 19.100 | 13.00 | 26.0 | 9730.0 | 9730.0 | 0.00 | 755.87 |
| 19.200 | 13.00 | 26.0 | 9756.0 | 9756.0 | 0.00 | 755.88 |
| 19.300 | 12.00 | 25.0 | 9781.0 | 9781.0 | 0.00 | 755.88 |
| 19.400 | 12.00 | 24.0 | 9805.0 | 9805.0 | 0.00 | 755.89 |
| 19.500 | 12.00 | 24.0 | 9829.0 | 9829.0 | 0.00 | 755.90 |
| 19.600 | 12.00 | 24.0 | 9853.0 | 9853.0 | 0.00 | 755.90 |
| 19.700 | 12.00 | 24.0 | 9877.0 | 9877.0 | 0.00 | 755.91 |
| 19.800 | 11.00 | 23.0 | 9900.0 | 9900.0 | 0.00 | 755.92 |
| 19.900 | 11.00 | 22.0 | 9922.0 | 9922.0 | 0.00 | 755.92 |
| 20.000 | 11.00 | 22.0 | 9944.0 | 9944.0 | 0.00 | 755.93 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 13:01:26


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 20.100 | 11.00 | 22.0 | 9966.0 | 9966.0 | 0.00 | 755.93 |
| 20.200 | 11.00 | 22.0 | 9988.0 | 9988.0 | 0.00 | 755.94 |
| 20.300 | 11.00 | 22.0 | 10010.0 | 10010.0 | 0.00 | 755.95 |
| 20.400 | 11.00 | 22.0 | 10032.0 | 10032.0 | 0.00 | 755.95 |
| 20.500 | 11.00 | 22.0 | 10054.0 | 10054.0 | 0.00 | 755.96 |
| 20.600 | 11.00 | 22.0 | 10076.0 | 10076.0 | 0.00 | 755.97 |
| 20.700 | 11.00 | 22.0 | 10098.0 | 10098.0 | 0.00 | 755.97 |
| 20.800 | 11.00 | 22.0 | 10120.0 | 10120.0 | 0.00 | 755.98 |
| 20.900 | 11.00 | 22.0 | 10142.0 | 10142.0 | 0.00 | 755.98 |
| 21.000 | 11.00 | 22.0 | 10164.0 | 10164.0 | 0.00 | 755.99 |
| 21.100 | 11.00 | 22.0 | 10186.0 | 10186.0 | 0.00 | 756.00 |
| 21.200 | 11.00 | 22.0 | 10207.7 | 10208.0 | 0.14 | 756.00 |
| 21.300 | 11.00 | 22.0 | 10228.9 | 10229.7 | 0.43 | 756.01 |
| 21.400 | 11.00 | 22.0 | 10249.5 | 10250.9 | 0.71 | 756.01 |
| 21.500 | 11.00 | 22.0 | 10269.5 | 10271.5 | 0.99 | 756.02 |
| 21.600 | 11.00 | 22.0 | 10289.0 | 10291.5 | 1.26 | 756.02 |
| 21.700 | 11.00 | 22.0 | 10307.9 | 10311.0 | 1.52 | 756.03 |
| 21.800 | 11.00 | 22.0 | 10326.4 | 10329.9 | 1.77 | 756.03 |
| 21.900 | 11.00 | 22.0 | 10344.4 | 10348.4 | 2.02 | 756.04 |
| 22.000 | 11.00 | 22.0 | 10361.8 | 10366.4 | 2.26 | 756.04 |
| 22.100 | 11.00 | 22.0 | 10378.8 | 10383.8 | 2.49 | 756.05 |
| 22.200 | 10.00 | 21.0 | 10394.4 | 10399.8 | 2.71 | 756.05 |
| 22.300 | 10.00 | 20.0 | 10408.6 | 10414.4 | 2.90 | 756.06 |
| 22.400 | 10.00 | 20.0 | 10422.4 | 10428.6 | 3.09 | 756.06 |
| 22.500 | 10.00 | 20.0 | 10435.9 | 10442.4 | 3.28 | 756.06 |
| 22.600 | 9.00 | 19.0 | 10448.0 | 10454.9 | 3.45 | 756.07 |
| 22.700 | 9.00 | 18.0 | 10458.8 | 10466.0 | 3.60 | 756.07 |
| 22.800 | 9.00 | 18.0 | 10469.3 | 10476.8 | 3.74 | 756.07 |
| 22.900 | 9.00 | 18.0 | 10479.5 | 10487.3 | 3.88 | 756.08 |
| 23.000 | 8.00 | 17.0 | 10488.5 | 10496.5 | 4.01 | 756.08 |
| 23.100 | 8.00 | 16.0 | 10496.3 | 10504.5 | 4.11 | 756.08 |
| 23.200 | 8.00 | 16.0 | 10503.9 | 10512.3 | 4.22 | 756.08 |
| 23.300 | 7.00 | 15.0 | 10510.3 | 10518.9 | 4.31 | 756.08 |
| 23.400 | 7.00 | 14.0 | 10515.5 | 10524.3 | 4.38 | 756.09 |
| 23.500 | 7.00 | 14.0 | 10520.6 | 10529.5 | 4.45 | 756.09 |
| 23.600 | 7.00 | 14.0 | 10525.6 | 10534.6 | 4.52 | 756.09 |
| 23.700 | 6.00 | 13.0 | 10529.4 | 10538.6 | 4.57 | 756.09 |
| 23.800 | 6.00 | 12.0 | 10532.2 | 10541.4 | 4.61 | 756.09 |
| 23.900 | 6.00 | 12.0 | 10534.9 | 10544.2 | 4.65 | 756.09 |
| 24.000 | 6.00 | 12.0 | 10537.6 | 10546.9 | 4.68 | 756.09 |
| 24.100 | 5.00 | 11.0 | 10539.2 | 10548.6 | 4.70 | 756.09 |
| 24.200 | 5.00 | 10.0 | 10539.7 | 10549.2 | 4.71 | 756.09 |
| 24.300 | 5.00 | 10.0 | 10540.3 | 10549.7 | 4.72 | 756.09 |
| 24.400 | 4.00 | 9.0 | 10539.9 | 10549.3 | 4.71 | 756.09 |
| 24.500 | 4.00 | 8.0 | 10538.5 | 10547.9 | 4.69 | 756.09 |
| 24.600 | 4.00 | 8.0 | 10537.1 | 10546.5 | 4.68 | 756.09 |

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

INFLOW HYDROGRAPH

| TIME (hrs) | INFLOW (cfs) |
|---|---|
| 24.700 | 4.00 |
| 24.800 | 3.00 |
| 24.900 | 3.00 |
| 25.000 | 3.00 |
| 25.100 | 2.00 |
| 25.200 | 2.00 |
| 25.300 | 2.00 |
| 25.400 | 2.00 |
| 25.500 | 1.00 |
| 25.600 | 1.00 |
| 25.700 | 1.00 |
| 25.800 | 1.00 |
| 25.900 | 0.00 |

ROUTING COMPUTATIONS

| I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
|---|---|---|---|---|
| 8.0 | 10535.8 | 10545.1 | 4.66 | 756.09 |
| 7.0 | 10533.6 | 10542.8 | 4.63 | 756.09 |
| 6.0 | 10530.4 | 10539.6 | 4.58 | 756.09 |
| 6.0 | 10527.3 | 10536.4 | 4.54 | 756.09 |
| 5.0 | 10523.4 | 10532.3 | 4.49 | 756.09 |
| 4.0 | 10518.5 | 10527.4 | 4.42 | 756.09 |
| 4.0 | 10513.8 | 10522.5 | 4.35 | 756.08 |
| 4.0 | 10509.2 | 10517.8 | 4.29 | 756.08 |
| 3.0 | 10503.8 | 10512.2 | 4.22 | 756.08 |
| 2.0 | 10497.5 | 10505.8 | 4.13 | 756.08 |
| 2.0 | 10491.4 | 10499.5 | 4.05 | 756.08 |
| 2.0 | 10485.5 | 10493.4 | 3.96 | 756.08 |
| 1.0 | 10478.8 | 10486.5 | 3.87 | 756.08 |

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

Starting Pond W.S. Elevation = 748.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

| | | |
|---|---|---|
| Peak Inflow | = | 707.00 cfs |
| Peak Outflow | = | 4.72 cfs |
| Peak Elevation | = | 756.09 ft |

***** Summary of Approximate Peak Storage *****

| | | |
|---|---|---|
| Initial Storage | = | 0.00 ac-ft |
| Peak Storage From Storm | = | 43.57 ac-ft |
| Total Storage in Pond | = | 43.57 ac-ft |

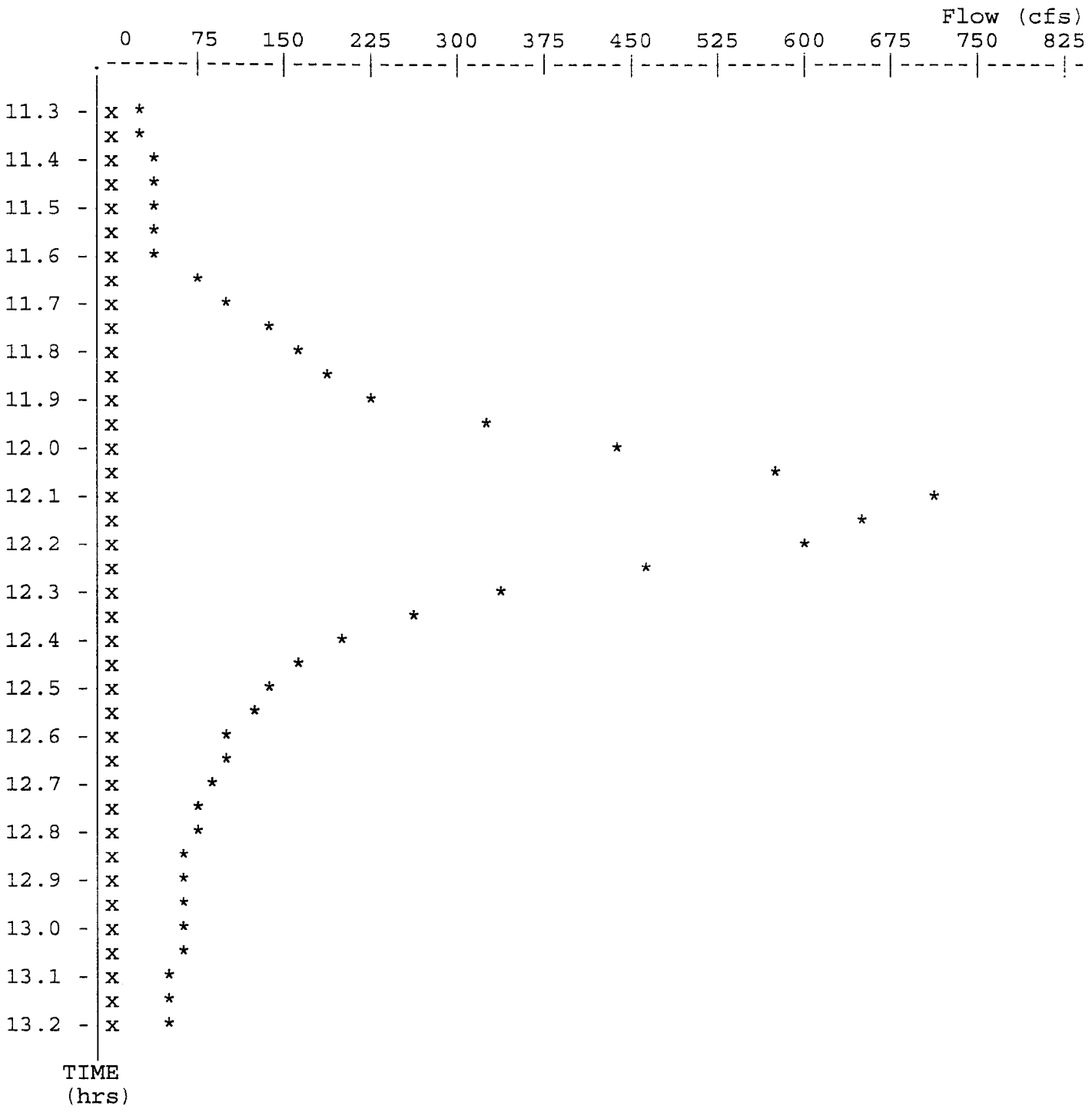
Warning: Inflow hydrograph truncated on left side.

Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\EXBASIN .PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\EXBAS100.HYD

EXECUTED: 06-29-2000 13:01:26

Peak Inflow = 707.00 cfs
Peak Outflow = 4.72 cfs
Peak Elevation = 756.09 ft




* File: d:\tva\kingston\calcs\KIF100 .HYD Qmax = 707.0 cfs
x File: d:\tva\kingston\calcs\EXBAS100.HYD Qmax = 4.7 cfs

## ATTACHMENT A-3

## HEC-HMS – 2-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 2-DAY BASIN ROUTING

SHT A3-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 3

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 15Jun00 1023 | Control Specs | : 2 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 6.98 (in) | Total Direct Runoff | : 5.87 (in) |
| Total Loss | : 1.10 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 5.88 (in) | Total Discharge | : 5.21 (in) |

SAT AB-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 3

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 15Jun00 1023  Control Specs : 2 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |

HMS * Summary of Results for Subbasin-2

EHAB-3

Project : Kingston Steam Plant  Run Name : Run 3

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 15Jun00 1023 | Control Specs | : 2 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 6.98 (in) | Total Direct Runoff | : 5.91 (in) |
| Total Loss | : 1.06 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 5.92 (in) | Total Discharge | : 5.25 (in) |

SHT A3-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 3

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 15Jun00 1023  Control Specs : 2 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |

SAT A3-5

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 3

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 29Jun00 1234 | Control Specs | : 2 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 5.7816 (cfs) | Date/Time of Peak Outflow | : 23 Dec 90 1800 |
| Total Inflow | : 5.24 (in) | Peak Storage | : 43.897(ac-ft) |
| Total Outflow | : 0.70 (in) | Peak Elevation | : 756.11(ft) |

SHT A3-6

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 3

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 29Jun00 1234  Control Specs : 2 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 750.09 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 751.10 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.65 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.85 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.56 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 43.584 | 756.09 | 7.8850 | 4.7505 |
| 23 Dec 90 | 1800 | 43.897 | 756.11 | 3.9113 | 5.7816 |
| 23 Dec 90 | 2400 | 42.986 | 756.05 | 0.9785 | 2.7837 |

## ATTACHMENT A-4

## HEC-HMS – 3-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 3-DAY BASIN ROUTING

SHT A4-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 4

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 15Jun00 1024 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 9.1072 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.23 (in) | Total Direct Runoff | : 6.12 (in) |
| Total Loss | : 1.11 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.12 (in) | Total Discharge | : 5.65 (in) |

SHT A4-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 4

Start of Simulation : 01Dec91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 15Jun00 1024  Control Specs : 3 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | | | | 0.0000 | 0.0000 | 0.0000 |
| 01 Dec 91 | 0600 | 1.95 | 0.85 | 1.10 | 4.9614 | 0.0000 | 4.9614 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.3892 | 0.0000 | 1.3892 |
| 01 Dec 91 | 1800 | 1.90 | 0.16 | 1.74 | 8.0946 | 0.0000 | 8.0946 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 2.2447 | 0.0000 | 2.2447 |
| 02 Dec 91 | 0600 | 2.00 | 0.07 | 1.93 | 9.1072 | 0.0000 | 9.1072 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.5156 | 0.0000 | 2.5156 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 3.1145 | 0.0000 | 3.1145 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.8339 | 0.0000 | 0.8339 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 3.5872 | 0.0000 | 3.5872 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.9928 | 0.0000 | 0.9928 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.1893 | 0.0000 | 0.1893 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0379 | 0.0000 | 0.0379 |

SHAH-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 4

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 15Jun00 1024 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 16.213 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.23 (in) | Total Direct Runoff | : 6.17 (in) |
| Total Loss | : 1.06 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.17 (in) | Total Discharge | : 5.69 (in) |

SHT A4-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 4

Start of Simulation : 01Dec91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 15Jun00 1024  Control Specs : 3 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 01 Dec 91 | 0600 | 1.95 | 0.82 | 1.13 | 9.057 | 0.000 | 9.057 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.536 | 0.000 | 2.536 |
| 01 Dec 91 | 1800 | 1.90 | 0.15 | 1.75 | 14.461 | 0.000 | 14.461 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 4.009 | 0.000 | 4.009 |
| 02 Dec 91 | 0600 | 2.00 | 0.07 | 1.93 | 16.213 | 0.000 | 16.213 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 4.478 | 0.000 | 4.478 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 5.540 | 0.000 | 5.540 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 1.483 | 0.000 | 1.483 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 6.379 | 0.000 | 6.379 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.766 | 0.000 | 1.766 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.337 | 0.000 | 0.337 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.067 | 0.000 | 0.067 |

SHT A4-5

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 4

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 29Jun00 1235 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 25.320 (cfs) | Date/Time of Peak Inflow | : 02 Dec 91 0600 |
| Peak Outflow | : 6.3127 (cfs) | Date/Time of Peak Outflow | : 03 Dec 91 1200 |
| Total Inflow | : 5.68 (in) | Peak Storage | : 44.059(ac-ft) |
| Total Outflow | : 1.01 (in) | Peak Elevation | : 756.12(ft) |

SHT A4-6

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 4

Start of Simulation : 01Dec91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 29Jun00 1235  Control Specs : 3 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 01 Dec 91 | 0600 | 3.476 | 752.02 | 14.0180 | 0.0000 |
| 01 Dec 91 | 1200 | 7.924 | 753.09 | 3.9250 | 0.0000 |
| 01 Dec 91 | 1800 | 14.490 | 753.93 | 22.5558 | 0.0000 |
| 01 Dec 91 | 2400 | 21.633 | 754.53 | 6.2539 | 0.0000 |
| 02 Dec 91 | 0600 | 29.461 | 755.14 | 25.3203 | 0.0000 |
| 02 Dec 91 | 1200 | 37.473 | 755.68 | 6.9938 | 0.0000 |
| 02 Dec 91 | 1800 | 41.353 | 755.95 | 8.6548 | 0.0000 |
| 02 Dec 91 | 2400 | 43.205 | 756.07 | 2.3172 | 3.5021 |
| 03 Dec 91 | 0600 | 43.925 | 756.11 | 9.9663 | 5.8737 |
| 03 Dec 91 | 1200 | 44.059 | 756.12 | 2.7583 | 6.3127 |
| 03 Dec 91 | 1800 | 42.783 | 756.04 | 0.5260 | 2.1164 |
| 03 Dec 91 | 2400 | 42.292 | 756.01 | 0.1052 | 0.4984 |

# ATTACHMENT A-5

## HEC-HMS – 5-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 5-DAY BASIN ROUTING

SHT A5-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 5

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 15Jun00 1042 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 9.1565 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.63 (in) | Total Direct Runoff | : 6.51 (in) |
| Total Loss | : 1.12 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.51 (in) | Total Discharge | : 6.20 (in) |

SHT A5-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 5

Start of Simulation : 29Nov91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 15Jun00 1042  Control Specs : 5 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | | | | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1800 | 0.40 | 0.36 | 0.04 | 0.1903 | 0.0000 | 0.1903 |
| 30 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0533 | 0.0000 | 0.0533 |
| 01 Dec 91 | 0600 | 1.95 | 0.54 | 1.41 | 6.3570 | 0.0000 | 6.3570 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.7791 | 0.0000 | 1.7791 |
| 01 Dec 91 | 1800 | 1.90 | 0.13 | 1.77 | 8.3107 | 0.0000 | 8.3107 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 2.2991 | 0.0000 | 2.2991 |
| 02 Dec 91 | 0600 | 2.00 | 0.06 | 1.94 | 9.1565 | 0.0000 | 9.1565 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.5288 | 0.0000 | 2.5288 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 3.1233 | 0.0000 | 3.1233 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.8362 | 0.0000 | 0.8362 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 3.5940 | 0.0000 | 3.5940 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.9947 | 0.0000 | 0.9947 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.1897 | 0.0000 | 0.1897 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0379 | 0.0000 | 0.0379 |

SHT A5-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 5

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 15Jun00 1042 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 16.296 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.63 (in) | Total Direct Runoff | : 6.56 (in) |
| Total Loss | : 1.07 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.56 (in) | Total Discharge | : 6.25 (in) |

SAT A5-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 5

Start of Simulation : 29Nov91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 15Jun00 1042  Control Specs : 5 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 1800 | 0.40 | 0.35 | 0.05 | 0.412 | 0.000 | 0.412 |
| 30 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.115 | 0.000 | 0.115 |
| 01 Dec 91 | 0600 | 1.95 | 0.52 | 1.43 | 11.486 | 0.000 | 11.486 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 3.214 | 0.000 | 3.214 |
| 01 Dec 91 | 1800 | 1.90 | 0.12 | 1.78 | 14.830 | 0.000 | 14.830 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 4.102 | 0.000 | 4.102 |
| 02 Dec 91 | 0600 | 2.00 | 0.06 | 1.94 | 16.296 | 0.000 | 16.296 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 4.500 | 0.000 | 4.500 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 5.555 | 0.000 | 5.555 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 1.487 | 0.000 | 1.487 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 6.391 | 0.000 | 6.391 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.769 | 0.000 | 1.769 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.337 | 0.000 | 0.337 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.067 | 0.000 | 0.067 |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 5

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 29Jun00 1235 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 25.453 (cfs) | Date/Time of Peak Inflow | : 02 Dec 91 0600 |
| Peak Outflow | : 6.3438 (cfs) | Date/Time of Peak Outflow | : 03 Dec 91 1200 |
| Total Inflow | : 6.23 (in) | Peak Storage | : 44.068(ac-ft) |
| Total Outflow | : 1.41 (in) | Peak Elevation | : 756.12(ft) |

Sht A5-6

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 5

Start of Simulation : 29Nov91 0000  Basin Model : Kingston Watershed
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 29Jun00 1235  Control Specs : 5 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 0600 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1200 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1800 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 0600 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1200 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1800 | 0.149 | 748.57 | 0.6025 | 0.0000 |
| 30 Nov 91 | 2400 | 0.341 | 749.20 | 0.1687 | 0.0000 |
| 01 Dec 91 | 0600 | 4.806 | 752.37 | 17.8433 | 0.0000 |
| 01 Dec 91 | 1200 | 10.468 | 753.42 | 4.9935 | 0.0000 |
| 01 Dec 91 | 1800 | 17.444 | 754.19 | 23.1404 | 0.0000 |
| 01 Dec 91 | 2400 | 24.768 | 754.78 | 6.4009 | 0.0000 |
| 02 Dec 91 | 0600 | 32.666 | 755.36 | 25.4525 | 0.0000 |
| 02 Dec 91 | 1200 | 40.719 | 755.90 | 7.0292 | 0.0000 |
| 02 Dec 91 | 1800 | 43.502 | 756.09 | 8.6784 | 4.4814 |
| 02 Dec 91 | 2400 | 43.781 | 756.11 | 2.3233 | 5.3974 |
| 03 Dec 91 | 0600 | 43.987 | 756.12 | 9.9845 | 6.0771 |
| 03 Dec 91 | 1200 | 44.068 | 756.12 | 2.7634 | 6.3438 |
| 03 Dec 91 | 1800 | 42.785 | 756.04 | 0.5269 | 2.1222 |
| 03 Dec 91 | 2400 | 42.292 | 756.01 | 0.1054 | 0.4995 |

## ATTACHMENT A-6

## HEC-HMS – 7-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 7-DAY BASIN ROUTING

SHT A6-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 1

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 15Jun00 1043 | Control Specs | : 7 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 9.13 (in) | Total Direct Runoff | : 7.97 (in) |
| Total Loss | : 1.13 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.00 (in) | Total Discharge | : 7.70 (in) |

SHT A6-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 1

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 15Jun00 1043  Control Specs : 7 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.049 | 0.000 | 0.049 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.010 | 0.000 | 0.010 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 2.432 | 0.000 | 2.432 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.681 | 0.000 | 0.681 |
| 28 Dec 90 | 0600 | 1.12 | 0.02 | 1.10 | 5.101 | 0.000 | 5.101 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 1.418 | 0.000 | 1.418 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 2.407 | 0.000 | 2.407 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.652 | 0.000 | 0.652 |

SHT A6-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 1

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 15Jun00 1043 | Control Specs | : 7 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 9.13 (in) | Total Direct Runoff | : 8.02 (in) |
| Total Loss | : 1.09 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.04 (in) | Total Discharge | : 7.74 (in) |

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 1

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 15Jun00 1043  Control Specs : 7 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.086 | 0.000 | 0.086 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.017 | 0.000 | 0.017 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 4.324 | 0.000 | 4.324 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.211 | 0.000 | 1.211 |
| 28 Dec 90 | 0600 | 1.12 | 0.01 | 1.11 | 9.069 | 0.000 | 9.069 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.520 | 0.000 | 2.520 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 4.279 | 0.000 | 4.279 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.159 | 0.000 | 1.159 |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 1

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 29Jun00 1236 | Control Specs | : 7 Day |

## Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 8.9104 (cfs) | Date/Time of Peak Outflow | : 28 Dec 90 1200 |
| Total Inflow | : 7.73 (in) | Peak Storage | : 44.849(ac-ft) |
| Total Outflow | : 2.76 (in) | Peak Elevation | : 756.17(ft) |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 1

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 29Jun00 1236  Control Specs : 7 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 750.09 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 751.10 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.65 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.85 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.56 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 43.584 | 756.09 | 7.8850 | 4.7505 |
| 23 Dec 90 | 1800 | 43.897 | 756.11 | 3.9113 | 5.7816 |
| 23 Dec 90 | 2400 | 42.986 | 756.05 | 0.9785 | 2.7837 |
| 24 Dec 90 | 0600 | 42.378 | 756.02 | 0.1349 | 0.7828 |
| 24 Dec 90 | 1200 | 42.186 | 756.00 | 0.0270 | 0.1522 |
| 24 Dec 90 | 1800 | 42.148 | 756.00 | 0.0000 | 0.0276 |
| 24 Dec 90 | 2400 | 42.141 | 756.00 | 0.0000 | 0.0028 |
| 25 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0003 |
| 25 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 1800 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 2400 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1800 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 2400 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1800 | 43.063 | 756.06 | 6.7561 | 3.0350 |
| 27 Dec 90 | 2400 | 43.415 | 756.08 | 1.8917 | 4.1930 |
| 28 Dec 90 | 0600 | 44.463 | 756.15 | 14.1699 | 7.6411 |
| 28 Dec 90 | 1200 | 44.849 | 756.17 | 3.9378 | 8.9104 |
| 28 Dec 90 | 1800 | 43.866 | 756.11 | 6.6855 | 5.6771 |
| 28 Dec 90 | 2400 | 43.475 | 756.09 | 1.8112 | 4.3934 |

## ATTACHMENT A-7

## HEC-HMS – 10-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 10-DAY BASIN ROUTING

SHT A7-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 6

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 15Jun00 1044 | Control Specs | : 10 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 10.08 (in) | Total Direct Runoff | : 8.94 (in) |
| Total Loss | : 1.14 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.94 (in) | Total Discharge | : 8.72 (in) |

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 6

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 15Jun00 1044  Control Specs : 10 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.049 | 0.000 | 0.049 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.010 | 0.000 | 0.010 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 2.432 | 0.000 | 2.432 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.681 | 0.000 | 0.681 |
| 28 Dec 90 | 0600 | 1.12 | 0.02 | 1.10 | 5.101 | 0.000 | 5.101 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 1.418 | 0.000 | 1.418 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 2.407 | 0.000 | 2.407 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.652 | 0.000 | 0.652 |
| 29 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.117 | 0.000 | 0.117 |

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.023 | 0.000 | 0.023 |
| 29 Dec 90 | 1800 | 0.18 | 0.00 | 0.18 | 0.801 | 0.000 | 0.801 |
| 29 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.224 | 0.000 | 0.224 |
| 30 Dec 90 | 0600 | 0.02 | 0.00 | 0.02 | 0.133 | 0.000 | 0.133 |
| 30 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.034 | 0.000 | 0.034 |
| 30 Dec 90 | 1800 | 0.58 | 0.01 | 0.57 | 2.587 | 0.000 | 2.587 |
| 30 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.724 | 0.000 | 0.724 |
| 31 Dec 90 | 0600 | 0.17 | 0.00 | 0.17 | 0.900 | 0.000 | 0.900 |
| 31 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.240 | 0.000 | 0.240 |
| 31 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.042 | 0.000 | 0.042 |
| 31 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.008 | 0.000 | 0.008 |

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 6

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 15Jun00 1044 | Control Specs | : 10 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 10.08 (in) | Total Direct Runoff | : 8.98 (in) |
| Total Loss | : 1.10 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.98 (in) | Total Discharge | : 8.76 (in) |

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 6

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 15Jun00 1044  Control Specs : 10 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.086 | 0.000 | 0.086 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.017 | 0.000 | 0.017 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 4.324 | 0.000 | 4.324 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.211 | 0.000 | 1.211 |
| 28 Dec 90 | 0600 | 1.12 | 0.01 | 1.11 | 9.069 | 0.000 | 9.069 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.520 | 0.000 | 2.520 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 4.279 | 0.000 | 4.279 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.159 | 0.000 | 1.159 |
| 29 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.209 | 0.000 | 0.209 |

SHA7-6

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.042 | 0.000 | 0.042 |
| 29 Dec 90 | 1800 | 0.18 | 0.00 | 0.18 | 1.423 | 0.000 | 1.423 |
| 29 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.399 | 0.000 | 0.399 |
| 30 Dec 90 | 0600 | 0.02 | 0.00 | 0.02 | 0.236 | 0.000 | 0.236 |
| 30 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.060 | 0.000 | 0.060 |
| 30 Dec 90 | 1800 | 0.58 | 0.01 | 0.57 | 4.599 | 0.000 | 4.599 |
| 30 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.287 | 0.000 | 1.287 |
| 31 Dec 90 | 0600 | 0.17 | 0.00 | 0.17 | 1.599 | 0.000 | 1.599 |
| 31 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.427 | 0.000 | 0.427 |
| 31 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.074 | 0.000 | 0.074 |
| 31 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.015 | 0.000 | 0.015 |

SAT A7-7

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 6

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : Kingston Watershed |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 29Jun00 1237 | Control Specs | : 10 Day |

## Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 8.9104 (cfs) | Date/Time of Peak Outflow | : 28 Dec 90 1200 |
| Total Inflow | : 8.75 (in) | Peak Storage | : 44.849(ac-ft) |
| Total Outflow | : 3.81 (in) | Peak Elevation | : 756.17(ft) |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 6

Start of Simulation : 22Dec90 0000  Basin Model : Kingston Watershed
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 29Jun00 1237  Control Specs : 10 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 748.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 750.09 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 751.10 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.65 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.85 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.56 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 43.584 | 756.09 | 7.8850 | 4.7505 |
| 23 Dec 90 | 1800 | 43.897 | 756.11 | 3.9113 | 5.7816 |
| 23 Dec 90 | 2400 | 42.986 | 756.05 | 0.9785 | 2.7837 |
| 24 Dec 90 | 0600 | 42.378 | 756.02 | 0.1349 | 0.7828 |
| 24 Dec 90 | 1200 | 42.186 | 756.00 | 0.0270 | 0.1522 |
| 24 Dec 90 | 1800 | 42.148 | 756.00 | 0.0000 | 0.0276 |
| 24 Dec 90 | 2400 | 42.141 | 756.00 | 0.0000 | 0.0028 |
| 25 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0003 |
| 25 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 1800 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 2400 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1800 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 2400 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 0600 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1200 | 42.140 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1800 | 43.063 | 756.06 | 6.7561 | 3.0350 |
| 27 Dec 90 | 2400 | 43.415 | 756.08 | 1.8917 | 4.1930 |
| 28 Dec 90 | 0600 | 44.463 | 756.15 | 14.1699 | 7.6411 |
| 28 Dec 90 | 1200 | 44.849 | 756.17 | 3.9378 | 8.9104 |
| 28 Dec 90 | 1800 | 43.866 | 756.11 | 6.6855 | 5.6771 |
| 28 Dec 90 | 2400 | 43.475 | 756.09 | 1.8112 | 4.3934 |
| 29 Dec 90 | 0600 | 42.567 | 756.03 | 0.3260 | 1.4062 |

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 42.237 | 756.01 | 0.0652 | 0.3185 |
| 29 Dec 90 | 1800 | 42.462 | 756.02 | 2.2241 | 1.0608 |
| 29 Dec 90 | 2400 | 42.561 | 756.03 | 0.6228 | 1.3866 |
| 30 Dec 90 | 0600 | 42.318 | 756.01 | 0.3695 | 0.5866 |
| 30 Dec 90 | 1200 | 42.221 | 756.01 | 0.0937 | 0.2676 |
| 30 Dec 90 | 1800 | 43.142 | 756.06 | 7.1860 | 3.2974 |
| 30 Dec 90 | 2400 | 43.498 | 756.09 | 2.0110 | 4.4664 |
| 31 Dec 90 | 0600 | 42.894 | 756.05 | 2.4982 | 2.4792 |
| 31 Dec 90 | 1200 | 42.649 | 756.03 | 0.6679 | 1.6740 |
| 31 Dec 90 | 1800 | 42.299 | 756.01 | 0.1157 | 0.5220 |
| 31 Dec 90 | 2400 | 42.175 | 756.00 | 0.0231 | 0.1154 |

**ATTACHMENT B**

**PROPOSED BASIN CONDITIONS**

## ATTACHMENT B-1

## TR-55 – 10 YR-24 HR RUNOFF HYDROGRAPH
## POND-2 – 10 YR-24 HR BASIN ROUTING

SHT 81-1

Quick TR-55 Ver.5.47  S/N:
Executed: 10:28:53  06-15-2000

Kingston Steam Plant
Coal Yard Runoff
~~Existing~~/Proposed Conditions

RUNOFF CURVE NUMBER DATA

Composite Area: Sub-Area 1

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 4.59 | 89 | |
| Pavement | 1.08 | 98 | |
| Buildings | 0.46 | 98 | |
| Bare Soil Yard Area, 75% Hard | 22.40 | 91 | |
| Bare Soil Area, 25% Dirt | 7.47 | 87 | |
| COMPOSITE AREA ---> | 36.00 | 90.2 | ( 90 ) |

Composite Area: Sub-Area 2

| SURFACE DESCRIPTION | AREA (acres) | CN | |
|---|---|---|---|
| Gravel Surface | 3.83 | 89 | |
| Buildings | 1.63 | 98 | |
| Pond Area | 2.40 | 98 | |
| Bare Soil Yard Area, 75% hard | 42.11 | 91 | |
| Bare Soil, 25% dirt | 14.03 | 87 | |
| COMPOSITE AREA ---> | 64.00 | 90.4 | ( 90 ) |

SHT B1-2

Quick TR-55 Ver.5.47  S/N:
Executed: 10:28:53  06-15-2000

Kingston Steam Plant
Coal Yard Runoff
~~Existing~~/Proposed Conditions

RUNOFF CURVE NUMBER SUMMARY

| Subarea Description | Area (acres) | CN (weighted) |
|---|---|---|
| Sub-Area 1 | 36.00 | 90 |
| Sub-Area 2 | 64.00 | 90 |

SHT B1-3

Quick TR-55 Ver.5.47 S/N:
Executed: 10:19:47 06-15-2000 d:\tva\kingston\calcs\COALYARD.TCT

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Conditions

Tc COMPUTATIONS FOR: Sub-Area 1

SHEET FLOW (Applicable to Tc only)

| | | | | |
|---|---|---|---|---|
| Segment ID | | | 1 | |
| Surface description | | | Bare Soil | |
| Manning's roughness coeff., n | | | 0.0110 | |
| Flow length, L (total < or = 300) | | ft | 270.0 | |
| Two-yr 24-hr rainfall, P2 | | in | 3.300 | |
| Land slope, s | | ft/ft | 0.0085 | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | | hrs | 0.06 | = 0.06 |

SHALLOW CONCENTRATED FLOW

| | | | | |
|---|---|---|---|---|
| Segment ID | | | 2 | |
| Surface (paved or unpaved)? | | | Unpaved | |
| Flow length, L | | ft | 325.0 | |
| Watercourse slope, s | | ft/ft | 0.0105 | |
| $Avg.V = Csf * (s)^{0.5}$ | | ft/s | 1.6533 | |
| where: | Unpaved Csf = 16.1345 | | | |
| | Paved Csf = 20.3282 | | | |
| T = L / (3600*V) | | hrs | 0.05 | = 0.05 |

CHANNEL FLOW

| | | | | |
|---|---|---|---|---|
| Segment ID | | | 3 | |
| Cross Sectional Flow Area, a | | sq.ft | 14.70 | SAME AS EXISTING SEE ATTACHMENT A |
| Wetted perimeter, Pw | | ft | 10.22 | |
| Hydraulic radius, r = a/Pw | | ft | 1.438 | |
| Channel slope, s | | ft/ft | 0.0089 | |
| Manning's roughness coeff., n | | | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | | ft/s | 5.9704 | |
| Flow length, L | | ft | 655 | |
| T = L / (3600*V) | | hrs | 0.03 | = 0.03 |

TOTAL TIME (hrs) 0.15

Quick TR-55 Ver.5.47 S/N:
Executed: 10:19:47 06-15-2000 d:\tva\kingston\calcs\COALYARD.TCT

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Conditions

Tc COMPUTATIONS FOR: Sub-Area 2

SHEET FLOW (Applicable to Tc only)

| | | 1 | 2 | | |
|---|---|---|---|---|---|
| Segment ID | | | | | |
| Surface description | | Bare Soil | Bare Soil | | |
| Manning's roughness coeff., n | | 0.0110 | 0.0110 | | |
| Flow length, L (total < or = 300) | ft | 180.0 | 107.0 | | |
| Two-yr 24-hr rainfall, P2 | in | 3.300 | 3.300 | | |
| Land slope, s | ft/ft | 0.0172 | 0.0224 | | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.03 | + 0.02 | = | 0.05 |

SHALLOW CONCENTRATED FLOW

| | | 3 | | |
|---|---|---|---|---|
| Segment ID | | | | |
| Surface (paved or unpaved)? | | Unpaved | | |
| Flow length, L | ft | 145.0 | | |
| Watercourse slope, s | ft/ft | 0.0179 | | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 2.1586 | | |
| where: Unpaved Csf = 16.1345 | | | | |
| Paved Csf = 20.3282 | | | | |
| T = L / (3600*V) | hrs | 0.02 | | = 0.02 |

CHANNEL FLOW

| | | 4 | 5 | |
|---|---|---|---|---|
| Segment ID | | | | |
| Cross Sectional Flow Area, a | sq.ft | 30.00 | 61.70 | SAME AS EXISTING. SEE ATTACHMENT A |
| Wetted perimeter, Pw | ft | 15.03 | 22.71 | |
| Hydraulic radius, r = a/Pw | ft | 1.996 | 2.717 | |
| Channel slope, s | ft/ft | 0.0062 | 0.0039 | |
| Manning's roughness coeff., n | | 0.0300 | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 6.1997 | 6.0392 | |
| Flow length, L | ft | 644 | 775 | |
| T = L / (3600*V) | hrs | 0.03 | + 0.04 | = 0.06 |

TOTAL TIME (hrs) 0.14

Quick TR-55 Ver.5.47 S/N:
Executed: 10:19:47 06-15-2000 d:\tva\kingston\calcs\COALYARD.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Conditions

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Area 1 | Tc | 0.15 |
| Sub-Area 2 | Tc | 0.14 |

Quick TR-55 Ver.5.47 S/N:
Executed: 10:20:00 06-15-2000 d:\tva\kingston\calcs\TTSB-1.TCT

Travel Time SB-1
Coal Yard Drainage

Tt COMPUTATIONS FOR: Sub-Area 1

SHEET FLOW (Applicable to Tc only)

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface description | | | |
| Manning's roughness coeff., n | | 0.0000 | |
| Flow length, L (total < or = 300) | ft | 0.0 | |
| Two-yr 24-hr rainfall, P2 | in | 0.000 | |
| Land slope, s | ft/ft | 0.0000 | |
| $T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$ | hrs | 0.00 | = 0.00 |

SHALLOW CONCENTRATED FLOW

| | | | |
|---|---|---|---|
| Segment ID | | | |
| Surface (paved or unpaved)? | | | |
| Flow length, L | ft | 0.0 | |
| Watercourse slope, s | ft/ft | 0.0000 | |
| $Avg.V = Csf * (s)^{0.5}$ | ft/s | 0.0000 | |
| where: Unpaved Csf = 16.1345 | | | |
| Paved Csf = 20.3282 | | | |
| T = L / (3600*V) | hrs | 0.00 | = 0.00 |

CHANNEL FLOW

| | | | |
|---|---|---|---|
| Segment ID | | 1 | |
| Cross Sectional Flow Area, a | sq.ft | 35.00 | SAME AS EXISTING SEE ATTACHMENT A |
| Wetted perimeter, Pw | ft | 16.39 | |
| Hydraulic radius, r = a/Pw | ft | 2.135 | |
| Channel slope, s | ft/ft | 0.0037 | |
| Manning's roughness coeff., n | | 0.0300 | |
| $V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$ | ft/s | 5.0099 | |
| Flow length, L | ft | 1085 | |
| T = L / (3600*V) | hrs | 0.06 | = 0.06 |

TOTAL TIME (hrs) 0.06

Quick TR-55 Ver.5.47 S/N:
Executed: 10:20:00 06-15-2000 d:\tva\kingston\calcs\TTSB-1.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Travel Time SB-1
Coal Yard Drainage

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| Sub-Area 1 | Tt | 0.06 |

SHT 81-3


Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input | Ia/p used |
|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 36.00 | 90.0 | 0.10 | 0.10 | 4.80 | 3.68 | I.05 | .10 |
| Sub-Area 2 | 64.00 | 90.0 | 0.10 | 0.00 | 4.80 | 3.68 | I.05 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 100.00 acres or 0.1563 sq.mi
Peak discharge = 480 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Sub-Area 1 | 0.15 | 0.06 | 0.10 | 0.10 | No | Computed Ia/p < .1 |
| Sub-Area 2 | 0.14 | 0.00 | 0.10 | 0.00 | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Sub-Area 1 | 175 | 12.2 |
| Sub-Area 2 | 372 | 12.1 |
| Composite Watershed | 480 | 12.1 |

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 4 | 6 | 9 | 28 | 55 | 108 | 175 | 145 | 78 |
| Sub-Area 2 | 9 | 13 | 20 | 123 | 238 | 372 | 231 | 80 | 54 |
| Total (cfs) | 13 | 19 | 29 | 151 | 293 | 480 | 406 | 225 | 132 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 46 | 32 | 25 | 20 | 16 | 13 | 12 | 10 | 9 |
| Sub-Area 2 | 45 | 38 | 32 | 28 | 24 | 21 | 19 | 17 | 15 |
| Total (cfs) | 91 | 70 | 57 | 48 | 40 | 34 | 31 | 27 | 24 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 8 | 7 | 7 | 6 | 6 | 5 | 4 | 4 | 4 |
| Sub-Area 2 | 14 | 13 | 12 | 11 | 10 | 8 | 8 | 7 | 7 |
| Total (cfs) | 22 | 20 | 19 | 17 | 16 | 13 | 12 | 11 | 11 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Sub-Area 1 | 4 | 3 | 3 | 2 | 0 |
| Sub-Area 2 | 7 | 6 | 5 | 4 | 0 |

SHT B1-11

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 11 | 9 | 8 | 6 | 0 |

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 11.0 | 13 | 14.8 | 18 |
| 11.1 | 15 | 14.9 | 18 |
| 11.2 | 17 | 15.0 | 17 |
| 11.3 | 19 | 15.1 | 17 |
| 11.4 | 22 | 15.2 | 17 |
| 11.5 | 26 | 15.3 | 16 |
| 11.6 | 29 | 15.4 | 16 |
| 11.7 | 70 | 15.5 | 16 |
| 11.8 | 110 | 15.6 | 15 |
| 11.9 | 151 | 15.7 | 15 |
| 12.0 | 293 | 15.8 | 14 |
| 12.1 | 480 | 15.9 | 14 |
| 12.2 | 406 | 16.0 | 13 |
| 12.3 | 225 | 16.1 | 13 |
| 12.4 | 132 | 16.2 | 13 |
| 12.5 | 91 | 16.3 | 12 |
| 12.6 | 70 | 16.4 | 12 |
| 12.7 | 57 | 16.5 | 12 |
| 12.8 | 48 | 16.6 | 12 |
| 12.9 | 44 | 16.7 | 12 |
| 13.0 | 40 | 16.8 | 11 |
| 13.1 | 37 | 16.9 | 11 |
| 13.2 | 34 | 17.0 | 11 |
| 13.3 | 32 | 17.1 | 11 |
| 13.4 | 31 | 17.2 | 11 |
| 13.5 | 29 | 17.3 | 11 |
| 13.6 | 27 | 17.4 | 11 |
| 13.7 | 26 | 17.5 | 11 |
| 13.8 | 24 | 17.6 | 11 |
| 13.9 | 23 | 17.7 | 11 |
| 14.0 | 22 | 17.8 | 11 |
| 14.1 | 21 | 17.9 | 11 |
| 14.2 | 21 | 18.0 | 11 |
| 14.3 | 20 | 18.1 | 11 |
| 14.4 | 20 | 18.2 | 11 |
| 14.5 | 19 | 18.3 | 10 |

| | | | |
|---|---|---|---|
| 14.6 | 19 | 18.4 | 10 |
| 14.7 | 18 | 18.5 | 10 |

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF10.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 18.6 | 10 | 22.4 | 5 |
| 18.7 | 10 | 22.5 | 5 |
| 18.8 | 9 | 22.6 | 5 |
| 18.9 | 9 | 22.7 | 5 |
| 19.0 | 9 | 22.8 | 5 |
| 19.1 | 9 | 22.9 | 5 |
| 19.2 | 9 | 23.0 | 4 |
| 19.3 | 9 | 23.1 | 4 |
| 19.4 | 9 | 23.2 | 4 |
| 19.5 | 8 | 23.3 | 4 |
| 19.6 | 8 | 23.4 | 4 |
| 19.7 | 8 | 23.5 | 4 |
| 19.8 | 8 | 23.6 | 4 |
| 19.9 | 8 | 23.7 | 3 |
| 20.0 | 8 | 23.8 | 3 |
| 20.1 | 8 | 23.9 | 3 |
| 20.2 | 8 | 24.0 | 3 |
| 20.3 | 8 | 24.1 | 3 |
| 20.4 | 8 | 24.2 | 3 |
| 20.5 | 8 | 24.3 | 3 |
| 20.6 | 7 | 24.4 | 2 |
| 20.7 | 7 | 24.5 | 2 |
| 20.8 | 7 | 24.6 | 2 |
| 20.9 | 7 | 24.7 | 2 |
| 21.0 | 7 | 24.8 | 2 |
| 21.1 | 7 | 24.9 | 2 |
| 21.2 | 7 | 25.0 | 2 |
| 21.3 | 7 | 25.1 | 1 |
| 21.4 | 7 | 25.2 | 1 |
| 21.5 | 6 | 25.3 | 1 |
| 21.6 | 6 | 25.4 | 1 |
| 21.7 | 6 | 25.5 | 1 |
| 21.8 | 6 | 25.6 | 1 |
| 21.9 | 6 | 25.7 | 0 |
| 22.0 | 6 | 25.8 | 0 |
| 22.1 | 6 | 25.9 | 0 |
| 22.2 | 6 | | |
| 22.3 | 6 | | |

SHT B1-15

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 10 years

**********
* *
* Kingston Steam Plant *
* Coal Yard Drainage *
* Proposed Basin *
* *
* *
**********

Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Rating Table file: d:\tva\kingston\calcs\PROPBASN.PND

----INITIAL CONDITIONS----
Elevation = 745.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

| GIVEN POND DATA | | | INTERMEDIATE ROUTING COMPUTATIONS | |
|---|---|---|---|---|
| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) | 2S/t (cfs) | 2S/t + O (cfs) |
| 745.00 | 0.0 | 0.000 | 0.0 | 0.0 |
| 746.00 | 0.0 | 0.240 | 58.1 | 58.1 |
| 747.00 | 0.0 | 0.640 | 154.9 | 154.9 |
| 748.00 | 0.0 | 1.250 | 302.5 | 302.5 |
| 749.00 | 0.0 | 2.080 | 503.4 | 503.4 |
| 750.00 | 0.0 | 3.160 | 764.7 | 764.7 |
| 751.00 | 0.0 | 4.530 | 1096.3 | 1096.3 |
| 752.00 | 0.0 | 6.620 | 1602.0 | 1602.0 |
| 753.00 | 0.0 | 10.470 | 2533.7 | 2533.7 |
| 754.00 | 0.0 | 18.270 | 4421.3 | 4421.3 |
| 755.00 | 0.0 | 30.680 | 7424.6 | 7424.6 |
| 756.00 | 0.0 | 45.380 | 10982.0 | 10982.0 |
| 756.50 | 25.7 | 53.180 | 12869.6 | 12895.2 |
| 756.60 | 38.2 | 54.770 | 13254.3 | 13292.5 |
| 756.70 | 49.1 | 56.380 | 13644.0 | 13693.0 |
| 756.80 | 62.7 | 57.990 | 14033.6 | 14096.2 |
| 756.90 | 77.4 | 59.620 | 14428.0 | 14505.4 |
| 757.00 | 95.2 | 61.260 | 14824.9 | 14920.1 |
| 757.10 | 114.4 | 62.920 | 15226.6 | 15341.0 |
| 757.20 | 134.8 | 64.620 | 15638.0 | 15772.9 |
| 757.30 | 158.9 | 66.360 | 16059.1 | 16218.1 |
| 757.40 | 181.9 | 68.140 | 16489.9 | 16671.7 |
| 757.50 | 208.7 | 69.960 | 16930.3 | 17139.0 |
| 758.00 | 349.5 | 79.640 | 19272.9 | 19622.4 |

Time increment (t) = 0.100 hrs.

SHT B1-16

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 11.000 | 13.00 | ----- | 0.0 | 0.0 | 0.00 | 745.00 |
| 11.100 | 15.00 | 28.0 | 28.0 | 28.0 | 0.00 | 745.48 |
| 11.200 | 17.00 | 32.0 | 60.0 | 60.0 | 0.00 | 746.02 |
| 11.300 | 19.00 | 36.0 | 96.0 | 96.0 | 0.00 | 746.39 |
| 11.400 | 22.00 | 41.0 | 137.0 | 137.0 | 0.00 | 746.82 |
| 11.500 | 26.00 | 48.0 | 185.0 | 185.0 | 0.00 | 747.20 |
| 11.600 | 29.00 | 55.0 | 240.0 | 240.0 | 0.00 | 747.58 |
| 11.700 | 70.00 | 99.0 | 339.0 | 339.0 | 0.00 | 748.18 |
| 11.800 | 110.00 | 180.0 | 519.0 | 519.0 | 0.00 | 749.06 |
| 11.900 | 151.00 | 261.0 | 780.0 | 780.0 | 0.00 | 750.05 |
| 12.000 | 293.00 | 444.0 | 1224.0 | 1224.0 | 0.00 | 751.25 |
| 12.100 | 480.00 | 773.0 | 1997.0 | 1997.0 | 0.00 | 752.42 |
| 12.200 | 406.00 | 886.0 | 2883.0 | 2883.0 | 0.00 | 753.19 |
| 12.300 | 225.00 | 631.0 | 3514.0 | 3514.0 | 0.00 | 753.52 |
| 12.400 | 132.00 | 357.0 | 3871.0 | 3871.0 | 0.00 | 753.71 |
| 12.500 | 91.00 | 223.0 | 4094.0 | 4094.0 | 0.00 | 753.83 |
| 12.600 | 70.00 | 161.0 | 4255.0 | 4255.0 | 0.00 | 753.91 |
| 12.700 | 57.00 | 127.0 | 4382.0 | 4382.0 | 0.00 | 753.98 |
| 12.800 | 48.00 | 105.0 | 4487.0 | 4487.0 | 0.00 | 754.02 |
| 12.900 | 44.00 | 92.0 | 4579.0 | 4579.0 | 0.00 | 754.05 |
| 13.000 | 40.00 | 84.0 | 4663.0 | 4663.0 | 0.00 | 754.08 |
| 13.100 | 37.00 | 77.0 | 4740.0 | 4740.0 | 0.00 | 754.11 |
| 13.200 | 34.00 | 71.0 | 4811.0 | 4811.0 | 0.00 | 754.13 |
| 13.300 | 32.00 | 66.0 | 4877.0 | 4877.0 | 0.00 | 754.15 |
| 13.400 | 31.00 | 63.0 | 4940.0 | 4940.0 | 0.00 | 754.17 |
| 13.500 | 29.00 | 60.0 | 5000.0 | 5000.0 | 0.00 | 754.19 |
| 13.600 | 27.00 | 56.0 | 5056.0 | 5056.0 | 0.00 | 754.21 |
| 13.700 | 26.00 | 53.0 | 5109.0 | 5109.0 | 0.00 | 754.23 |
| 13.800 | 24.00 | 50.0 | 5159.0 | 5159.0 | 0.00 | 754.25 |
| 13.900 | 23.00 | 47.0 | 5206.0 | 5206.0 | 0.00 | 754.26 |
| 14.000 | 22.00 | 45.0 | 5251.0 | 5251.0 | 0.00 | 754.28 |
| 14.100 | 21.00 | 43.0 | 5294.0 | 5294.0 | 0.00 | 754.29 |
| 14.200 | 21.00 | 42.0 | 5336.0 | 5336.0 | 0.00 | 754.30 |
| 14.300 | 20.00 | 41.0 | 5377.0 | 5377.0 | 0.00 | 754.32 |
| 14.400 | 20.00 | 40.0 | 5417.0 | 5417.0 | 0.00 | 754.33 |
| 14.500 | 19.00 | 39.0 | 5456.0 | 5456.0 | 0.00 | 754.34 |
| 14.600 | 19.00 | 38.0 | 5494.0 | 5494.0 | 0.00 | 754.36 |
| 14.700 | 18.00 | 37.0 | 5531.0 | 5531.0 | 0.00 | 754.37 |
| 14.800 | 18.00 | 36.0 | 5567.0 | 5567.0 | 0.00 | 754.38 |
| 14.900 | 18.00 | 36.0 | 5603.0 | 5603.0 | 0.00 | 754.39 |
| 15.000 | 17.00 | 35.0 | 5638.0 | 5638.0 | 0.00 | 754.41 |
| 15.100 | 17.00 | 34.0 | 5672.0 | 5672.0 | 0.00 | 754.42 |
| 15.200 | 17.00 | 34.0 | 5706.0 | 5706.0 | 0.00 | 754.43 |
| 15.300 | 16.00 | 33.0 | 5739.0 | 5739.0 | 0.00 | 754.44 |
| 15.400 | 16.00 | 32.0 | 5771.0 | 5771.0 | 0.00 | 754.45 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 15.500 | 16.00 | 32.0 | 5803.0 | 5803.0 | 0.00 | 754.46 |
| 15.600 | 15.00 | 31.0 | 5834.0 | 5834.0 | 0.00 | 754.47 |
| 15.700 | 15.00 | 30.0 | 5864.0 | 5864.0 | 0.00 | 754.48 |
| 15.800 | 14.00 | 29.0 | 5893.0 | 5893.0 | 0.00 | 754.49 |
| 15.900 | 14.00 | 28.0 | 5921.0 | 5921.0 | 0.00 | 754.50 |
| 16.000 | 13.00 | 27.0 | 5948.0 | 5948.0 | 0.00 | 754.51 |
| 16.100 | 13.00 | 26.0 | 5974.0 | 5974.0 | 0.00 | 754.52 |
| 16.200 | 13.00 | 26.0 | 6000.0 | 6000.0 | 0.00 | 754.53 |
| 16.300 | 12.00 | 25.0 | 6025.0 | 6025.0 | 0.00 | 754.53 |
| 16.400 | 12.00 | 24.0 | 6049.0 | 6049.0 | 0.00 | 754.54 |
| 16.500 | 12.00 | 24.0 | 6073.0 | 6073.0 | 0.00 | 754.55 |
| 16.600 | 12.00 | 24.0 | 6097.0 | 6097.0 | 0.00 | 754.56 |
| 16.700 | 12.00 | 24.0 | 6121.0 | 6121.0 | 0.00 | 754.57 |
| 16.800 | 11.00 | 23.0 | 6144.0 | 6144.0 | 0.00 | 754.57 |
| 16.900 | 11.00 | 22.0 | 6166.0 | 6166.0 | 0.00 | 754.58 |
| 17.000 | 11.00 | 22.0 | 6188.0 | 6188.0 | 0.00 | 754.59 |
| 17.100 | 11.00 | 22.0 | 6210.0 | 6210.0 | 0.00 | 754.60 |
| 17.200 | 11.00 | 22.0 | 6232.0 | 6232.0 | 0.00 | 754.60 |
| 17.300 | 11.00 | 22.0 | 6254.0 | 6254.0 | 0.00 | 754.61 |
| 17.400 | 11.00 | 22.0 | 6276.0 | 6276.0 | 0.00 | 754.62 |
| 17.500 | 11.00 | 22.0 | 6298.0 | 6298.0 | 0.00 | 754.62 |
| 17.600 | 11.00 | 22.0 | 6320.0 | 6320.0 | 0.00 | 754.63 |
| 17.700 | 11.00 | 22.0 | 6342.0 | 6342.0 | 0.00 | 754.64 |
| 17.800 | 11.00 | 22.0 | 6364.0 | 6364.0 | 0.00 | 754.65 |
| 17.900 | 11.00 | 22.0 | 6386.0 | 6386.0 | 0.00 | 754.65 |
| 18.000 | 11.00 | 22.0 | 6408.0 | 6408.0 | 0.00 | 754.66 |
| 18.100 | 11.00 | 22.0 | 6430.0 | 6430.0 | 0.00 | 754.67 |
| 18.200 | 11.00 | 22.0 | 6452.0 | 6452.0 | 0.00 | 754.68 |
| 18.300 | 10.00 | 21.0 | 6473.0 | 6473.0 | 0.00 | 754.68 |
| 18.400 | 10.00 | 20.0 | 6493.0 | 6493.0 | 0.00 | 754.69 |
| 18.500 | 10.00 | 20.0 | 6513.0 | 6513.0 | 0.00 | 754.70 |
| 18.600 | 10.00 | 20.0 | 6533.0 | 6533.0 | 0.00 | 754.70 |
| 18.700 | 10.00 | 20.0 | 6553.0 | 6553.0 | 0.00 | 754.71 |
| 18.800 | 9.00 | 19.0 | 6572.0 | 6572.0 | 0.00 | 754.72 |
| 18.900 | 9.00 | 18.0 | 6590.0 | 6590.0 | 0.00 | 754.72 |
| 19.000 | 9.00 | 18.0 | 6608.0 | 6608.0 | 0.00 | 754.73 |
| 19.100 | 9.00 | 18.0 | 6626.0 | 6626.0 | 0.00 | 754.73 |
| 19.200 | 9.00 | 18.0 | 6644.0 | 6644.0 | 0.00 | 754.74 |
| 19.300 | 9.00 | 18.0 | 6662.0 | 6662.0 | 0.00 | 754.75 |
| 19.400 | 9.00 | 18.0 | 6680.0 | 6680.0 | 0.00 | 754.75 |
| 19.500 | 8.00 | 17.0 | 6697.0 | 6697.0 | 0.00 | 754.76 |
| 19.600 | 8.00 | 16.0 | 6713.0 | 6713.0 | 0.00 | 754.76 |
| 19.700 | 8.00 | 16.0 | 6729.0 | 6729.0 | 0.00 | 754.77 |
| 19.800 | 8.00 | 16.0 | 6745.0 | 6745.0 | 0.00 | 754.77 |
| 19.900 | 8.00 | 16.0 | 6761.0 | 6761.0 | 0.00 | 754.78 |
| 20.000 | 8.00 | 16.0 | 6777.0 | 6777.0 | 0.00 | 754.78 |

SHT 81-18

POND-2 Version: 5.21 S/N: 
EXECUTED: 06-29-2000 12:10:30 Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 20.100 | 8.00 | 16.0 | 6793.0 | 6793.0 | 0.00 | 754.79 |
| 20.200 | 8.00 | 16.0 | 6809.0 | 6809.0 | 0.00 | 754.80 |
| 20.300 | 8.00 | 16.0 | 6825.0 | 6825.0 | 0.00 | 754.80 |
| 20.400 | 8.00 | 16.0 | 6841.0 | 6841.0 | 0.00 | 754.81 |
| 20.500 | 8.00 | 16.0 | 6857.0 | 6857.0 | 0.00 | 754.81 |
| 20.600 | 7.00 | 15.0 | 6872.0 | 6872.0 | 0.00 | 754.82 |
| 20.700 | 7.00 | 14.0 | 6886.0 | 6886.0 | 0.00 | 754.82 |
| 20.800 | 7.00 | 14.0 | 6900.0 | 6900.0 | 0.00 | 754.83 |
| 20.900 | 7.00 | 14.0 | 6914.0 | 6914.0 | 0.00 | 754.83 |
| 21.000 | 7.00 | 14.0 | 6928.0 | 6928.0 | 0.00 | 754.83 |
| 21.100 | 7.00 | 14.0 | 6942.0 | 6942.0 | 0.00 | 754.84 |
| 21.200 | 7.00 | 14.0 | 6956.0 | 6956.0 | 0.00 | 754.84 |
| 21.300 | 7.00 | 14.0 | 6970.0 | 6970.0 | 0.00 | 754.85 |
| 21.400 | 7.00 | 14.0 | 6984.0 | 6984.0 | 0.00 | 754.85 |
| 21.500 | 6.00 | 13.0 | 6997.0 | 6997.0 | 0.00 | 754.86 |
| 21.600 | 6.00 | 12.0 | 7009.0 | 7009.0 | 0.00 | 754.86 |
| 21.700 | 6.00 | 12.0 | 7021.0 | 7021.0 | 0.00 | 754.87 |
| 21.800 | 6.00 | 12.0 | 7033.0 | 7033.0 | 0.00 | 754.87 |
| 21.900 | 6.00 | 12.0 | 7045.0 | 7045.0 | 0.00 | 754.87 |
| 22.000 | 6.00 | 12.0 | 7057.0 | 7057.0 | 0.00 | 754.88 |
| 22.100 | 6.00 | 12.0 | 7069.0 | 7069.0 | 0.00 | 754.88 |
| 22.200 | 6.00 | 12.0 | 7081.0 | 7081.0 | 0.00 | 754.89 |
| 22.300 | 6.00 | 12.0 | 7093.0 | 7093.0 | 0.00 | 754.89 |
| 22.400 | 5.00 | 11.0 | 7104.0 | 7104.0 | 0.00 | 754.89 |
| 22.500 | 5.00 | 10.0 | 7114.0 | 7114.0 | 0.00 | 754.90 |
| 22.600 | 5.00 | 10.0 | 7124.0 | 7124.0 | 0.00 | 754.90 |
| 22.700 | 5.00 | 10.0 | 7134.0 | 7134.0 | 0.00 | 754.90 |
| 22.800 | 5.00 | 10.0 | 7144.0 | 7144.0 | 0.00 | 754.91 |
| 22.900 | 5.00 | 10.0 | 7154.0 | 7154.0 | 0.00 | 754.91 |
| 23.000 | 4.00 | 9.0 | 7163.0 | 7163.0 | 0.00 | 754.91 |
| 23.100 | 4.00 | 8.0 | 7171.0 | 7171.0 | 0.00 | 754.92 |
| 23.200 | 4.00 | 8.0 | 7179.0 | 7179.0 | 0.00 | 754.92 |
| 23.300 | 4.00 | 8.0 | 7187.0 | 7187.0 | 0.00 | 754.92 |
| 23.400 | 4.00 | 8.0 | 7195.0 | 7195.0 | 0.00 | 754.92 |
| 23.500 | 4.00 | 8.0 | 7203.0 | 7203.0 | 0.00 | 754.93 |
| 23.600 | 4.00 | 8.0 | 7211.0 | 7211.0 | 0.00 | 754.93 |
| 23.700 | 3.00 | 7.0 | 7218.0 | 7218.0 | 0.00 | 754.93 |
| 23.800 | 3.00 | 6.0 | 7224.0 | 7224.0 | 0.00 | 754.93 |
| 23.900 | 3.00 | 6.0 | 7230.0 | 7230.0 | 0.00 | 754.94 |
| 24.000 | 3.00 | 6.0 | 7236.0 | 7236.0 | 0.00 | 754.94 |
| 24.100 | 3.00 | 6.0 | 7242.0 | 7242.0 | 0.00 | 754.94 |
| 24.200 | 3.00 | 6.0 | 7248.0 | 7248.0 | 0.00 | 754.94 |
| 24.300 | 3.00 | 6.0 | 7254.0 | 7254.0 | 0.00 | 754.94 |
| 24.400 | 2.00 | 5.0 | 7259.0 | 7259.0 | 0.00 | 754.94 |
| 24.500 | 2.00 | 4.0 | 7263.0 | 7263.0 | 0.00 | 754.95 |
| 24.600 | 2.00 | 4.0 | 7267.0 | 7267.0 | 0.00 | 754.95 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 10 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 24.700 | 2.00 | 4.0 | 7271.0 | 7271.0 | 0.00 | 754.95 |
| 24.800 | 2.00 | 4.0 | 7275.0 | 7275.0 | 0.00 | 754.95 |
| 24.900 | 2.00 | 4.0 | 7279.0 | 7279.0 | 0.00 | 754.95 |
| 25.000 | 2.00 | 4.0 | 7283.0 | 7283.0 | 0.00 | 754.95 |
| 25.100 | 1.00 | 3.0 | 7286.0 | 7286.0 | 0.00 | 754.95 |
| 25.200 | 1.00 | 2.0 | 7288.0 | 7288.0 | 0.00 | 754.95 |
| 25.300 | 1.00 | 2.0 | 7290.0 | 7290.0 | 0.00 | 754.96 |
| 25.400 | 1.00 | 2.0 | 7292.0 | 7292.0 | 0.00 | 754.96 |
| 25.500 | 1.00 | 2.0 | 7294.0 | 7294.0 | 0.00 | 754.96 |
| 25.600 | 1.00 | 2.0 | 7296.0 | 7296.0 | 0.00 | 754.96 |
| 25.700 | 0.00 | 1.0 | 7297.0 | 7297.0 | 0.00 | 754.96 |
| 25.800 | 0.00 | 0.0 | 7297.0 | 7297.0 | 0.00 | 754.96 |
| 25.900 | 0.00 | 0.0 | 7297.0 | 7297.0 | 0.00 | 754.96 |

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF10 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD

Starting Pond W.S. Elevation = 745.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

| | | |
|---|---|---|
| Peak Inflow | = | 480.00 cfs |
| Peak Outflow | = | 0.00 cfs |
| Peak Elevation | = | 754.96 ft |

***** Summary of Approximate Peak Storage *****

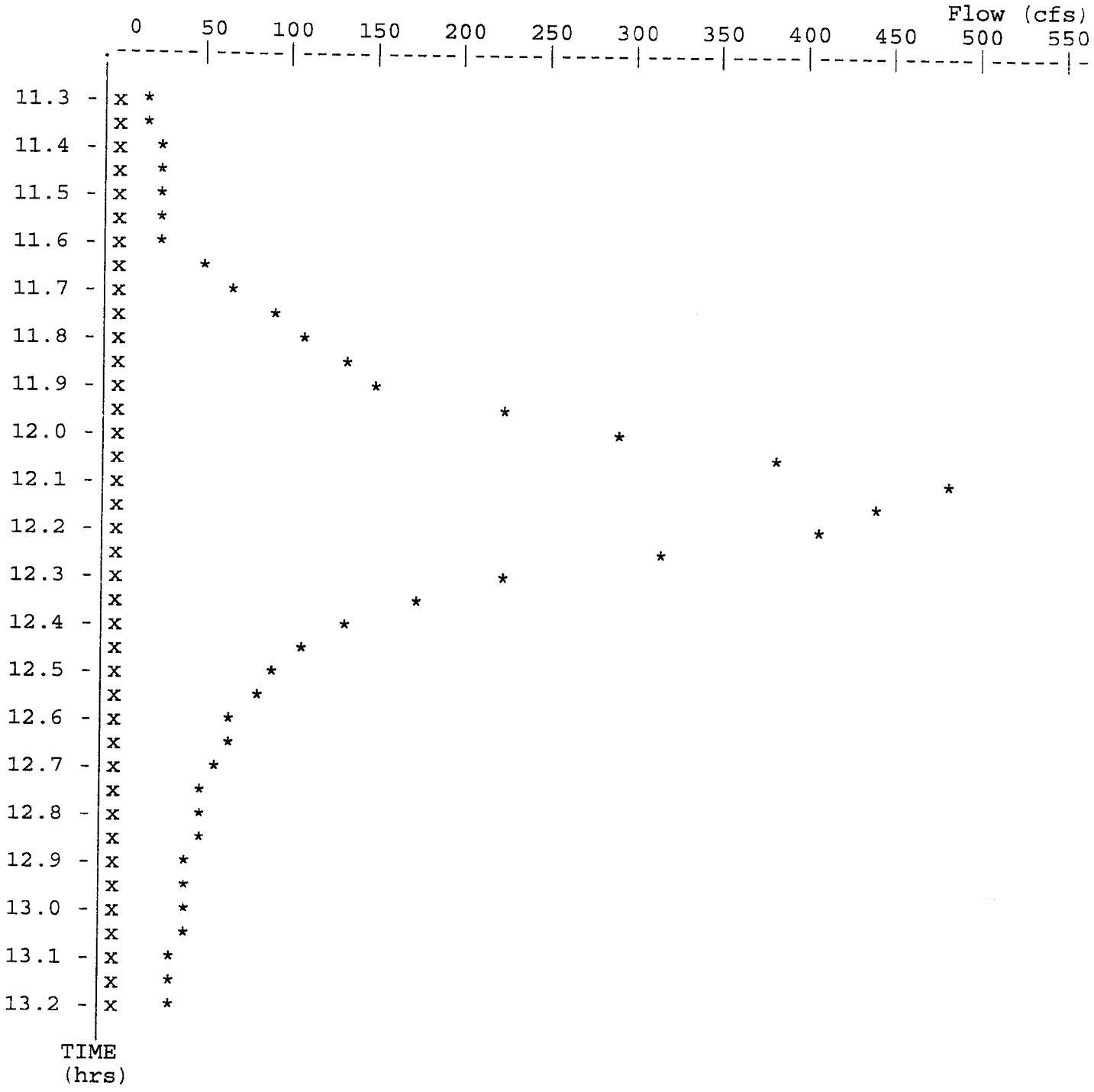
| | | |
|---|---|---|
| Initial Storage | = | 0.00 ac-ft |
| Peak Storage From Storm | = | 30.15 ac-ft |
| Total Storage in Pond | = | 30.15 ac-ft |

Warning: Inflow hydrograph truncated on left side.

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.21 S/N:                                    Page 7
                                                  Return Freq:  10 years
Pond File:           d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph:   d:\tva\kingston\calcs\KIF10    .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS10 .HYD
                                                  EXECUTED: 06-29-2000
Peak Inflow     =    480.00 cfs                                12:10:30
Peak Outflow    =      0.00 cfs
Peak Elevation =    754.96 ft
```

SHT B1-22




* File: d:\tva\kingston\calcs\KIF10 .HYD Qmax = 480.0 cfs
x File: d:\tva\kingston\calcs\PRBAS10 .HYD Qmax = 0.0 cfs

## ATTACHMENT B-2

## TR-55 – 100 YR-24 HR RUNOFF HYDROGRAPH
## POND-2 – 100 YR-24 HR BASIN ROUTING

SHT SS-1

Quick TR-55 Version: 5.47 S/N:


Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

NOTE: AREAS, CN's, AND Tc SAME AS GIVEN FOR 100YR STORM, EXISTING CONDITIONS

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input | Ia/p used |
|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 36.00 | 90.0 | 0.10 | 0.10 | 6.60 | 5.43 | I.03 | .10 |
| Sub-Area 2 | 64.00 | 90.0 | 0.10 | 0.00 | 6.60 | 5.43 | I.03 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 100.00 acres or 0.1563 sq.mi
Peak discharge = 707 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Sub-Area 1 | 0.15 | 0.06 | 0.10 | 0.10 | No | Computed Ia/p < .1 |
| Sub-Area 2 | 0.14 | 0.00 | 0.10 | 0.00 | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.

SK 82-2


Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Sub-Area 1 | 259 | 12.2 |
| Sub-Area 2 | 548 | 12.1 |
| Composite Watershed | 707 | 12.1 |

SHT 82-3



TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 6 | 9 | 13 | 41 | 82 | 159 | 259 | 214 | 115 |
| Sub-Area 2 | 13 | 18 | 29 | 181 | 351 | 548 | 341 | 118 | 80 |
| Total (cfs) | 19 | 27 | 42 | 222 | 433 | 707 | 600 | 332 | 195 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 68 | 48 | 37 | 30 | 23 | 20 | 17 | 15 | 14 |
| Sub-Area 2 | 67 | 56 | 47 | 41 | 36 | 31 | 28 | 25 | 23 |
| Total (cfs) | 135 | 104 | 84 | 71 | 59 | 51 | 45 | 40 | 37 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Sub-Area 1 | 13 | 11 | 10 | 9 | 8 | 7 | 6 | 6 | 6 |
| Sub-Area 2 | 21 | 18 | 17 | 16 | 14 | 12 | 11 | 11 | 10 |
| Total (cfs) | 34 | 29 | 27 | 25 | 22 | 19 | 17 | 17 | 16 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Sub-Area 1 | 5 | 5 | 4 | 4 | 0 |
| Sub-Area 2 | 10 | 8 | 7 | 7 | 0 |

SNT 39-4

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 15 | 13 | 11 | 11 | 0 |

Quick TR-55 Version: 5.47 S/N:


Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 11.0 | 19 | 14.8 | 26 |
| 11.1 | 22 | 14.9 | 26 |
| 11.2 | 24 | 15.0 | 25 |
| 11.3 | 27 | 15.1 | 24 |
| 11.4 | 32 | 15.2 | 24 |
| 11.5 | 37 | 15.3 | 23 |
| 11.6 | 42 | 15.4 | 23 |
| 11.7 | 102 | 15.5 | 22 |
| 11.8 | 162 | 15.6 | 21 |
| 11.9 | 222 | 15.7 | 21 |
| 12.0 | 433 | 15.8 | 20 |
| 12.1 | 707 | 15.9 | 20 |
| 12.2 | 600 | 16.0 | 19 |
| 12.3 | 332 | 16.1 | 19 |
| 12.4 | 195 | 16.2 | 18 |
| 12.5 | 135 | 16.3 | 18 |
| 12.6 | 104 | 16.4 | 17 |
| 12.7 | 84 | 16.5 | 17 |
| 12.8 | 71 | 16.6 | 17 |
| 12.9 | 65 | 16.7 | 17 |
| 13.0 | 59 | 16.8 | 17 |
| 13.1 | 55 | 16.9 | 17 |
| 13.2 | 51 | 17.0 | 17 |
| 13.3 | 48 | 17.1 | 17 |
| 13.4 | 45 | 17.2 | 17 |
| 13.5 | 43 | 17.3 | 16 |
| 13.6 | 40 | 17.4 | 16 |
| 13.7 | 38 | 17.5 | 16 |
| 13.8 | 37 | 17.6 | 16 |
| 13.9 | 36 | 17.7 | 16 |
| 14.0 | 34 | 17.8 | 15 |
| 14.1 | 32 | 17.9 | 15 |
| 14.2 | 31 | 18.0 | 15 |
| 14.3 | 29 | 18.1 | 15 |
| 14.4 | 28 | 18.2 | 15 |
| 14.5 | 28 | 18.3 | 14 |

SM 82-6

| | | | |
|---|---|---|---|
| 14.6 | 27 | 18.4 | 14 |
| 14.7 | 26 | 18.5 | 14 |

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 06-15-2000 10:20:17
Watershed file: --> D:\TVA\KINGSTON\CALCS\COALYARD.MOP
Hydrograph file: --> D:\TVA\KINGSTON\CALCS\KIF100.HYD

Kingston Steam Plant
Coal Yard Drainage
~~Existing~~/Proposed Condtions

| Time (hrs) | Flow (cfs) | Time (hrs) | Flow (cfs) |
|---|---|---|---|
| 18.6 | 14 | 22.4 | 10 |
| 18.7 | 14 | 22.5 | 10 |
| 18.8 | 13 | 22.6 | 9 |
| 18.9 | 13 | 22.7 | 9 |
| 19.0 | 13 | 22.8 | 9 |
| 19.1 | 13 | 22.9 | 9 |
| 19.2 | 13 | 23.0 | 8 |
| 19.3 | 12 | 23.1 | 8 |
| 19.4 | 12 | 23.2 | 8 |
| 19.5 | 12 | 23.3 | 7 |
| 19.6 | 12 | 23.4 | 7 |
| 19.7 | 12 | 23.5 | 7 |
| 19.8 | 11 | 23.6 | 7 |
| 19.9 | 11 | 23.7 | 6 |
| 20.0 | 11 | 23.8 | 6 |
| 20.1 | 11 | 23.9 | 6 |
| 20.2 | 11 | 24.0 | 6 |
| 20.3 | 11 | 24.1 | 5 |
| 20.4 | 11 | 24.2 | 5 |
| 20.5 | 11 | 24.3 | 5 |
| 20.6 | 11 | 24.4 | 4 |
| 20.7 | 11 | 24.5 | 4 |
| 20.8 | 11 | 24.6 | 4 |
| 20.9 | 11 | 24.7 | 4 |
| 21.0 | 11 | 24.8 | 3 |
| 21.1 | 11 | 24.9 | 3 |
| 21.2 | 11 | 25.0 | 3 |
| 21.3 | 11 | 25.1 | 2 |
| 21.4 | 11 | 25.2 | 2 |
| 21.5 | 11 | 25.3 | 2 |
| 21.6 | 11 | 25.4 | 2 |
| 21.7 | 11 | 25.5 | 1 |
| 21.8 | 11 | 25.6 | 1 |
| 21.9 | 11 | 25.7 | 1 |
| 22.0 | 11 | 25.8 | 1 |
| 22.1 | 11 | 25.9 | 0 |
| 22.2 | 10 | | |
| 22.3 | 10 | | |

SHT B2-8

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 100 years

```
**************************
*                        *
*  Kingston Steam Plant  *
*   Coal Yard Drainage   *
*     Proposed Basin     *
*                        *
*                        *
**************************
```

Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Rating Table file: d:\tva\kingston\calcs\PROPBASN.PND

----INITIAL CONDITIONS----
Elevation = 745.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) |
|---|---|---|
| 745.00 | 0.0 | 0.000 |
| 746.00 | 0.0 | 0.240 |
| 747.00 | 0.0 | 0.640 |
| 748.00 | 0.0 | 1.250 |
| 749.00 | 0.0 | 2.080 |
| 750.00 | 0.0 | 3.160 |
| 751.00 | 0.0 | 4.530 |
| 752.00 | 0.0 | 6.620 |
| 753.00 | 0.0 | 10.470 |
| 754.00 | 0.0 | 18.270 |
| 755.00 | 0.0 | 30.680 |
| 756.00 | 0.0 | 45.380 |
| 756.50 | 25.7 | 53.180 |
| 756.60 | 38.2 | 54.770 |
| 756.70 | 49.1 | 56.380 |
| 756.80 | 62.7 | 57.990 |
| 756.90 | 77.4 | 59.620 |
| 757.00 | 95.2 | 61.260 |
| 757.10 | 114.4 | 62.920 |
| 757.20 | 134.8 | 64.620 |
| 757.30 | 158.9 | 66.360 |
| 757.40 | 181.9 | 68.140 |
| 757.50 | 208.7 | 69.960 |
| 758.00 | 349.5 | 79.640 |

INTERMEDIATE ROUTING COMPUTATIONS

| 2S/t (cfs) | 2S/t + O (cfs) |
|---|---|
| 0.0 | 0.0 |
| 58.1 | 58.1 |
| 154.9 | 154.9 |
| 302.5 | 302.5 |
| 503.4 | 503.4 |
| 764.7 | 764.7 |
| 1096.3 | 1096.3 |
| 1602.0 | 1602.0 |
| 2533.7 | 2533.7 |
| 4421.3 | 4421.3 |
| 7424.6 | 7424.6 |
| 10982.0 | 10982.0 |
| 12869.6 | 12895.2 |
| 13254.3 | 13292.5 |
| 13644.0 | 13693.0 |
| 14033.6 | 14096.2 |
| 14428.0 | 14505.4 |
| 14824.9 | 14920.1 |
| 15226.6 | 15341.0 |
| 15638.0 | 15772.9 |
| 16059.1 | 16218.1 |
| 16489.9 | 16671.7 |
| 16930.3 | 17139.0 |
| 19272.9 | 19622.4 |

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 11.000 | 19.00 | ----- | 0.0 | 0.0 | 0.00 | 745.00 |
| 11.100 | 22.00 | 41.0 | 41.0 | 41.0 | 0.00 | 745.71 |
| 11.200 | 24.00 | 46.0 | 87.0 | 87.0 | 0.00 | 746.30 |
| 11.300 | 27.00 | 51.0 | 138.0 | 138.0 | 0.00 | 746.83 |
| 11.400 | 32.00 | 59.0 | 197.0 | 197.0 | 0.00 | 747.29 |
| 11.500 | 37.00 | 69.0 | 266.0 | 266.0 | 0.00 | 747.75 |
| 11.600 | 42.00 | 79.0 | 345.0 | 345.0 | 0.00 | 748.21 |
| 11.700 | 102.00 | 144.0 | 489.0 | 489.0 | 0.00 | 748.93 |
| 11.800 | 162.00 | 264.0 | 753.0 | 753.0 | 0.00 | 749.96 |
| 11.900 | 222.00 | 384.0 | 1137.0 | 1137.0 | 0.00 | 751.08 |
| 12.000 | 433.00 | 655.0 | 1792.0 | 1792.0 | 0.00 | 752.20 |
| 12.100 | 707.00 | 1140.0 | 2932.0 | 2932.0 | 0.00 | 753.21 |
| 12.200 | 600.00 | 1307.0 | 4239.0 | 4239.0 | 0.00 | 753.90 |
| 12.300 | 332.00 | 932.0 | 5171.0 | 5171.0 | 0.00 | 754.25 |
| 12.400 | 195.00 | 527.0 | 5698.0 | 5698.0 | 0.00 | 754.43 |
| 12.500 | 135.00 | 330.0 | 6028.0 | 6028.0 | 0.00 | 754.53 |
| 12.600 | 104.00 | 239.0 | 6267.0 | 6267.0 | 0.00 | 754.61 |
| 12.700 | 84.00 | 188.0 | 6455.0 | 6455.0 | 0.00 | 754.68 |
| 12.800 | 71.00 | 155.0 | 6610.0 | 6610.0 | 0.00 | 754.73 |
| 12.900 | 65.00 | 136.0 | 6746.0 | 6746.0 | 0.00 | 754.77 |
| 13.000 | 59.00 | 124.0 | 6870.0 | 6870.0 | 0.00 | 754.82 |
| 13.100 | 55.00 | 114.0 | 6984.0 | 6984.0 | 0.00 | 754.85 |
| 13.200 | 51.00 | 106.0 | 7090.0 | 7090.0 | 0.00 | 754.89 |
| 13.300 | 48.00 | 99.0 | 7189.0 | 7189.0 | 0.00 | 754.92 |
| 13.400 | 45.00 | 93.0 | 7282.0 | 7282.0 | 0.00 | 754.95 |
| 13.500 | 43.00 | 88.0 | 7370.0 | 7370.0 | 0.00 | 754.98 |
| 13.600 | 40.00 | 83.0 | 7453.0 | 7453.0 | 0.00 | 755.01 |
| 13.700 | 38.00 | 78.0 | 7531.0 | 7531.0 | 0.00 | 755.03 |
| 13.800 | 37.00 | 75.0 | 7606.0 | 7606.0 | 0.00 | 755.05 |
| 13.900 | 36.00 | 73.0 | 7679.0 | 7679.0 | 0.00 | 755.07 |
| 14.000 | 34.00 | 70.0 | 7749.0 | 7749.0 | 0.00 | 755.09 |
| 14.100 | 32.00 | 66.0 | 7815.0 | 7815.0 | 0.00 | 755.11 |
| 14.200 | 31.00 | 63.0 | 7878.0 | 7878.0 | 0.00 | 755.13 |
| 14.300 | 29.00 | 60.0 | 7938.0 | 7938.0 | 0.00 | 755.14 |
| 14.400 | 28.00 | 57.0 | 7995.0 | 7995.0 | 0.00 | 755.16 |
| 14.500 | 28.00 | 56.0 | 8051.0 | 8051.0 | 0.00 | 755.18 |
| 14.600 | 27.00 | 55.0 | 8106.0 | 8106.0 | 0.00 | 755.19 |
| 14.700 | 26.00 | 53.0 | 8159.0 | 8159.0 | 0.00 | 755.21 |
| 14.800 | 26.00 | 52.0 | 8211.0 | 8211.0 | 0.00 | 755.22 |
| 14.900 | 26.00 | 52.0 | 8263.0 | 8263.0 | 0.00 | 755.24 |
| 15.000 | 25.00 | 51.0 | 8314.0 | 8314.0 | 0.00 | 755.25 |
| 15.100 | 24.00 | 49.0 | 8363.0 | 8363.0 | 0.00 | 755.26 |
| 15.200 | 24.00 | 48.0 | 8411.0 | 8411.0 | 0.00 | 755.28 |
| 15.300 | 23.00 | 47.0 | 8458.0 | 8458.0 | 0.00 | 755.29 |
| 15.400 | 23.00 | 46.0 | 8504.0 | 8504.0 | 0.00 | 755.30 |

SHB2-10

POND-2 Version: 5.21 S/N: 
EXECUTED: 06-29-2000 12:10:30 Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 15.500 | 22.00 | 45.0 | 8549.0 | 8549.0 | 0.00 | 755.32 |
| 15.600 | 21.00 | 43.0 | 8592.0 | 8592.0 | 0.00 | 755.33 |
| 15.700 | 21.00 | 42.0 | 8634.0 | 8634.0 | 0.00 | 755.34 |
| 15.800 | 20.00 | 41.0 | 8675.0 | 8675.0 | 0.00 | 755.35 |
| 15.900 | 20.00 | 40.0 | 8715.0 | 8715.0 | 0.00 | 755.36 |
| 16.000 | 19.00 | 39.0 | 8754.0 | 8754.0 | 0.00 | 755.37 |
| 16.100 | 19.00 | 38.0 | 8792.0 | 8792.0 | 0.00 | 755.38 |
| 16.200 | 18.00 | 37.0 | 8829.0 | 8829.0 | 0.00 | 755.39 |
| 16.300 | 18.00 | 36.0 | 8865.0 | 8865.0 | 0.00 | 755.40 |
| 16.400 | 17.00 | 35.0 | 8900.0 | 8900.0 | 0.00 | 755.41 |
| 16.500 | 17.00 | 34.0 | 8934.0 | 8934.0 | 0.00 | 755.42 |
| 16.600 | 17.00 | 34.0 | 8968.0 | 8968.0 | 0.00 | 755.43 |
| 16.700 | 17.00 | 34.0 | 9002.0 | 9002.0 | 0.00 | 755.44 |
| 16.800 | 17.00 | 34.0 | 9036.0 | 9036.0 | 0.00 | 755.45 |
| 16.900 | 17.00 | 34.0 | 9070.0 | 9070.0 | 0.00 | 755.46 |
| 17.000 | 17.00 | 34.0 | 9104.0 | 9104.0 | 0.00 | 755.47 |
| 17.100 | 17.00 | 34.0 | 9138.0 | 9138.0 | 0.00 | 755.48 |
| 17.200 | 17.00 | 34.0 | 9172.0 | 9172.0 | 0.00 | 755.49 |
| 17.300 | 16.00 | 33.0 | 9205.0 | 9205.0 | 0.00 | 755.50 |
| 17.400 | 16.00 | 32.0 | 9237.0 | 9237.0 | 0.00 | 755.51 |
| 17.500 | 16.00 | 32.0 | 9269.0 | 9269.0 | 0.00 | 755.52 |
| 17.600 | 16.00 | 32.0 | 9301.0 | 9301.0 | 0.00 | 755.53 |
| 17.700 | 16.00 | 32.0 | 9333.0 | 9333.0 | 0.00 | 755.54 |
| 17.800 | 15.00 | 31.0 | 9364.0 | 9364.0 | 0.00 | 755.55 |
| 17.900 | 15.00 | 30.0 | 9394.0 | 9394.0 | 0.00 | 755.55 |
| 18.000 | 15.00 | 30.0 | 9424.0 | 9424.0 | 0.00 | 755.56 |
| 18.100 | 15.00 | 30.0 | 9454.0 | 9454.0 | 0.00 | 755.57 |
| 18.200 | 15.00 | 30.0 | 9484.0 | 9484.0 | 0.00 | 755.58 |
| 18.300 | 14.00 | 29.0 | 9513.0 | 9513.0 | 0.00 | 755.59 |
| 18.400 | 14.00 | 28.0 | 9541.0 | 9541.0 | 0.00 | 755.59 |
| 18.500 | 14.00 | 28.0 | 9569.0 | 9569.0 | 0.00 | 755.60 |
| 18.600 | 14.00 | 28.0 | 9597.0 | 9597.0 | 0.00 | 755.61 |
| 18.700 | 14.00 | 28.0 | 9625.0 | 9625.0 | 0.00 | 755.62 |
| 18.800 | 13.00 | 27.0 | 9652.0 | 9652.0 | 0.00 | 755.63 |
| 18.900 | 13.00 | 26.0 | 9678.0 | 9678.0 | 0.00 | 755.63 |
| 19.000 | 13.00 | 26.0 | 9704.0 | 9704.0 | 0.00 | 755.64 |
| 19.100 | 13.00 | 26.0 | 9730.0 | 9730.0 | 0.00 | 755.65 |
| 19.200 | 13.00 | 26.0 | 9756.0 | 9756.0 | 0.00 | 755.66 |
| 19.300 | 12.00 | 25.0 | 9781.0 | 9781.0 | 0.00 | 755.66 |
| 19.400 | 12.00 | 24.0 | 9805.0 | 9805.0 | 0.00 | 755.67 |
| 19.500 | 12.00 | 24.0 | 9829.0 | 9829.0 | 0.00 | 755.68 |
| 19.600 | 12.00 | 24.0 | 9853.0 | 9853.0 | 0.00 | 755.68 |
| 19.700 | 12.00 | 24.0 | 9877.0 | 9877.0 | 0.00 | 755.69 |
| 19.800 | 11.00 | 23.0 | 9900.0 | 9900.0 | 0.00 | 755.70 |
| 19.900 | 11.00 | 22.0 | 9922.0 | 9922.0 | 0.00 | 755.70 |
| 20.000 | 11.00 | 22.0 | 9944.0 | 9944.0 | 0.00 | 755.71 |

SHT B2-11

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD

| INFLOW HYDROGRAPH | | ROUTING COMPUTATIONS | | | | |
|---|---|---|---|---|---|---|
| TIME (hrs) | INFLOW (cfs) | I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
| 20.100 | 11.00 | 22.0 | 9966.0 | 9966.0 | 0.00 | 755.71 |
| 20.200 | 11.00 | 22.0 | 9988.0 | 9988.0 | 0.00 | 755.72 |
| 20.300 | 11.00 | 22.0 | 10010.0 | 10010.0 | 0.00 | 755.73 |
| 20.400 | 11.00 | 22.0 | 10032.0 | 10032.0 | 0.00 | 755.73 |
| 20.500 | 11.00 | 22.0 | 10054.0 | 10054.0 | 0.00 | 755.74 |
| 20.600 | 11.00 | 22.0 | 10076.0 | 10076.0 | 0.00 | 755.75 |
| 20.700 | 11.00 | 22.0 | 10098.0 | 10098.0 | 0.00 | 755.75 |
| 20.800 | 11.00 | 22.0 | 10120.0 | 10120.0 | 0.00 | 755.76 |
| 20.900 | 11.00 | 22.0 | 10142.0 | 10142.0 | 0.00 | 755.76 |
| 21.000 | 11.00 | 22.0 | 10164.0 | 10164.0 | 0.00 | 755.77 |
| 21.100 | 11.00 | 22.0 | 10186.0 | 10186.0 | 0.00 | 755.78 |
| 21.200 | 11.00 | 22.0 | 10208.0 | 10208.0 | 0.00 | 755.78 |
| 21.300 | 11.00 | 22.0 | 10230.0 | 10230.0 | 0.00 | 755.79 |
| 21.400 | 11.00 | 22.0 | 10252.0 | 10252.0 | 0.00 | 755.79 |
| 21.500 | 11.00 | 22.0 | 10274.0 | 10274.0 | 0.00 | 755.80 |
| 21.600 | 11.00 | 22.0 | 10296.0 | 10296.0 | 0.00 | 755.81 |
| 21.700 | 11.00 | 22.0 | 10318.0 | 10318.0 | 0.00 | 755.81 |
| 21.800 | 11.00 | 22.0 | 10340.0 | 10340.0 | 0.00 | 755.82 |
| 21.900 | 11.00 | 22.0 | 10362.0 | 10362.0 | 0.00 | 755.83 |
| 22.000 | 11.00 | 22.0 | 10384.0 | 10384.0 | 0.00 | 755.83 |
| 22.100 | 11.00 | 22.0 | 10406.0 | 10406.0 | 0.00 | 755.84 |
| 22.200 | 10.00 | 21.0 | 10427.0 | 10427.0 | 0.00 | 755.84 |
| 22.300 | 10.00 | 20.0 | 10447.0 | 10447.0 | 0.00 | 755.85 |
| 22.400 | 10.00 | 20.0 | 10467.0 | 10467.0 | 0.00 | 755.86 |
| 22.500 | 10.00 | 20.0 | 10487.0 | 10487.0 | 0.00 | 755.86 |
| 22.600 | 9.00 | 19.0 | 10506.0 | 10506.0 | 0.00 | 755.87 |
| 22.700 | 9.00 | 18.0 | 10524.0 | 10524.0 | 0.00 | 755.87 |
| 22.800 | 9.00 | 18.0 | 10542.0 | 10542.0 | 0.00 | 755.88 |
| 22.900 | 9.00 | 18.0 | 10560.0 | 10560.0 | 0.00 | 755.88 |
| 23.000 | 8.00 | 17.0 | 10577.0 | 10577.0 | 0.00 | 755.89 |
| 23.100 | 8.00 | 16.0 | 10593.0 | 10593.0 | 0.00 | 755.89 |
| 23.200 | 8.00 | 16.0 | 10609.0 | 10609.0 | 0.00 | 755.90 |
| 23.300 | 7.00 | 15.0 | 10624.0 | 10624.0 | 0.00 | 755.90 |
| 23.400 | 7.00 | 14.0 | 10638.0 | 10638.0 | 0.00 | 755.90 |
| 23.500 | 7.00 | 14.0 | 10652.0 | 10652.0 | 0.00 | 755.91 |
| 23.600 | 7.00 | 14.0 | 10666.0 | 10666.0 | 0.00 | 755.91 |
| 23.700 | 6.00 | 13.0 | 10679.0 | 10679.0 | 0.00 | 755.91 |
| 23.800 | 6.00 | 12.0 | 10691.0 | 10691.0 | 0.00 | 755.92 |
| 23.900 | 6.00 | 12.0 | 10703.0 | 10703.0 | 0.00 | 755.92 |
| 24.000 | 6.00 | 12.0 | 10715.0 | 10715.0 | 0.00 | 755.92 |
| 24.100 | 5.00 | 11.0 | 10726.0 | 10726.0 | 0.00 | 755.93 |
| 24.200 | 5.00 | 10.0 | 10736.0 | 10736.0 | 0.00 | 755.93 |
| 24.300 | 5.00 | 10.0 | 10746.0 | 10746.0 | 0.00 | 755.93 |
| 24.400 | 4.00 | 9.0 | 10755.0 | 10755.0 | 0.00 | 755.94 |
| 24.500 | 4.00 | 8.0 | 10763.0 | 10763.0 | 0.00 | 755.94 |
| 24.600 | 4.00 | 8.0 | 10771.0 | 10771.0 | 0.00 | 755.94 |

POND-2 Version: 5.21 S/N:
EXECUTED: 06-29-2000 12:10:30


Return Freq: 100 years

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD

INFLOW HYDROGRAPH

| TIME (hrs) | INFLOW (cfs) |
|---|---|
| 24.700 | 4.00 |
| 24.800 | 3.00 |
| 24.900 | 3.00 |
| 25.000 | 3.00 |
| 25.100 | 2.00 |
| 25.200 | 2.00 |
| 25.300 | 2.00 |
| 25.400 | 2.00 |
| 25.500 | 1.00 |
| 25.600 | 1.00 |
| 25.700 | 1.00 |
| 25.800 | 1.00 |
| 25.900 | 0.00 |

ROUTING COMPUTATIONS

| I1+I2 (cfs) | 2S/t - O (cfs) | 2S/t + O (cfs) | OUTFLOW (cfs) | ELEVATION (ft) |
|---|---|---|---|---|
| 8.0 | 10779.0 | 10779.0 | 0.00 | 755.94 |
| 7.0 | 10786.0 | 10786.0 | 0.00 | 755.94 |
| 6.0 | 10792.0 | 10792.0 | 0.00 | 755.95 |
| 6.0 | 10798.0 | 10798.0 | 0.00 | 755.95 |
| 5.0 | 10803.0 | 10803.0 | 0.00 | 755.95 |
| 4.0 | 10807.0 | 10807.0 | 0.00 | 755.95 |
| 4.0 | 10811.0 | 10811.0 | 0.00 | 755.95 |
| 4.0 | 10815.0 | 10815.0 | 0.00 | 755.95 |
| 3.0 | 10818.0 | 10818.0 | 0.00 | 755.95 |
| 2.0 | 10820.0 | 10820.0 | 0.00 | 755.95 |
| 2.0 | 10822.0 | 10822.0 | 0.00 | 755.96 |
| 2.0 | 10824.0 | 10824.0 | 0.00 | 755.96 |
| 1.0 | 10825.0 | 10825.0 | 0.00 | 755.96 |

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph: d:\tva\kingston\calcs\KIF100 .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD

Starting Pond W.S. Elevation = 745.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

| | | |
|---|---|---|
| Peak Inflow | = | 707.00 cfs |
| Peak Outflow | = | 0.00 cfs |
| Peak Elevation | = | 755.96 ft |

***** Summary of Approximate Peak Storage *****

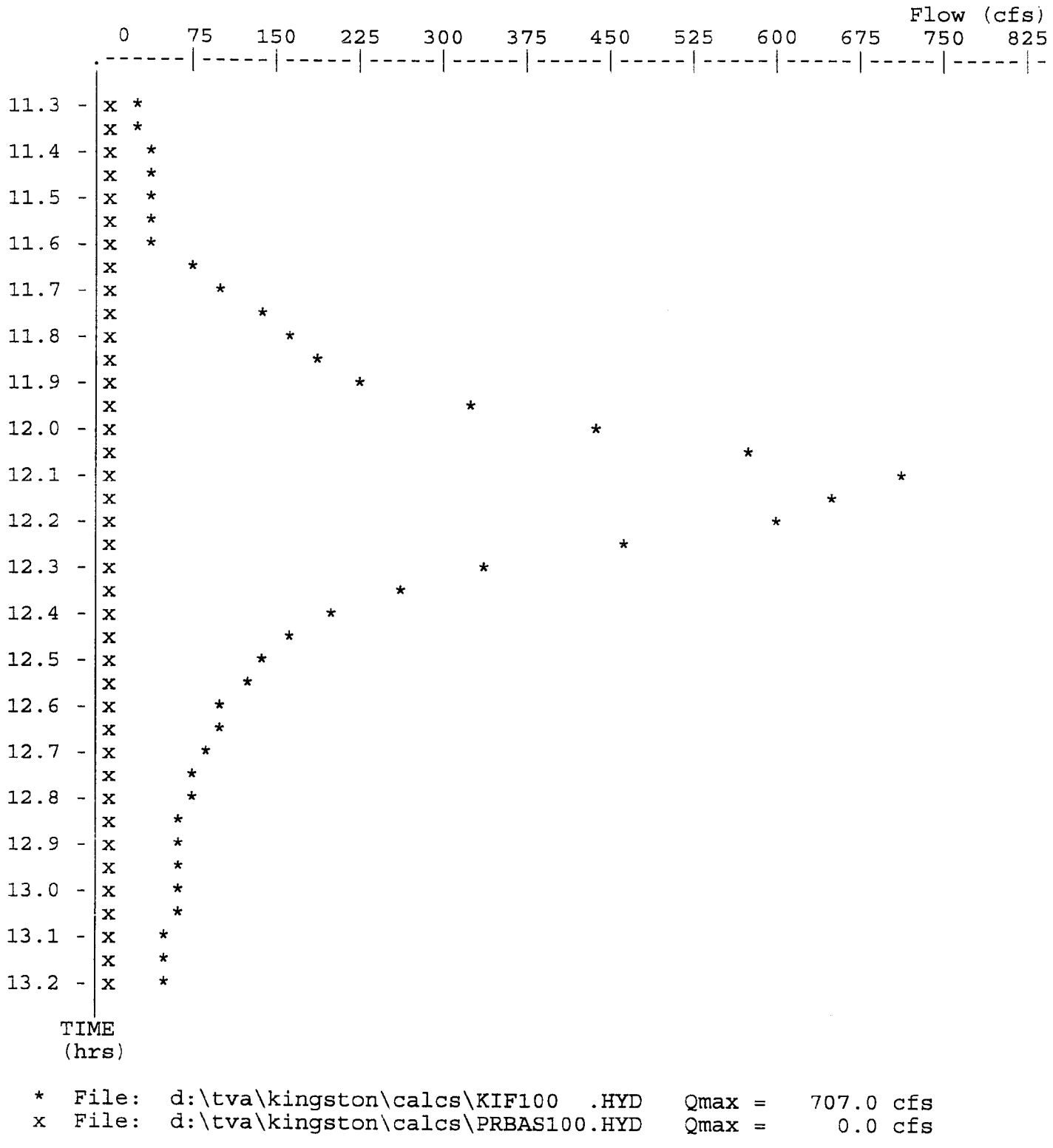
| | | |
|---|---|---|
| Initial Storage | = | 0.00 ac-ft |
| Peak Storage From Storm | = | 44.73 ac-ft |
| Total Storage in Pond | = | 44.73 ac-ft |

Warning: Inflow hydrograph truncated on left side.

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.21 S/N:                                        Page 7
                                                    Return Freq: 100 years
Pond File:           d:\tva\kingston\calcs\PROPBASN.PND
Inflow Hydrograph:   d:\tva\kingston\calcs\KIF100  .HYD
Outflow Hydrograph: d:\tva\kingston\calcs\PRBAS100.HYD
                                                    EXECUTED: 06-29-2000
Peak Inflow     =    707.00 cfs                                  12:10:30
Peak Outflow    =      0.00 cfs
Peak Elevation =    755.96 ft
```

SHT 82-15




* File: d:\tva\kingston\calcs\KIF100 .HYD Qmax = 707.0 cfs
x File: d:\tva\kingston\calcs\PRBAS100.HYD Qmax = 0.0 cfs

## ATTACHMENT B-3

## HEC-HMS – 2-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 2-DAY BASIN ROUTING

SHT 83-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 7

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 15Jun00 1118 | Control Specs | : 2 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 6.98 (in) | Total Direct Runoff | : 5.87 (in) |
| Total Loss | : 1.10 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 5.88 (in) | Total Discharge | : 5.21 (in) |

SHT B3-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 7

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 15Jun00 1118  Control Specs : 2 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |

SHT B3-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 7

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 15Jun00 1118 | Control Specs | : 2 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 6.98 (in) | Total Direct Runoff | : 5.91 (in) |
| Total Loss | : 1.06 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 5.92 (in) | Total Discharge | : 5.25 (in) |

SHT 33-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 7

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 15Jun00 1118  Control Specs : 2 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |

SHT B3-5

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 7

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 23Dec90 2400 | Precip Model | : 2 Day |
| Execution Time | : 29Jun00 1245 | Control Specs | : 2 Day |

## Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 4.1792 (cfs) | Date/Time of Peak Outflow | : 23 Dec 90 1800 |
| Total Inflow | : 5.24 (in) | Peak Storage | : 46.650(ac-ft) |
| Total Outflow | : 0.36 (in) | Peak Elevation | : 756.08(ft) |

SHT 23-5

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 7

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 23Dec90 2400  Precip Model : 2 Day
Execution Time : 29Jun00 1245  Control Specs : 2 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 747.17 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 748.54 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.23 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.59 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.34 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 44.762 | 755.96 | 7.8850 | 0.0000 |
| 23 Dec 90 | 1800 | 46.650 | 756.08 | 3.9113 | 4.1792 |
| 23 Dec 90 | 2400 | 46.177 | 756.05 | 0.9785 | 2.6210 |

## ATTACHMENT B-4

## HEC-HMS – 3-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 3-DAY BASIN ROUTING

SHT B4-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 8

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 15Jun00 1120 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 9.1072 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.23 (in) | Total Direct Runoff | : 6.12 (in) |
| Total Loss | : 1.11 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.12 (in) | Total Discharge | : 5.65 (in) |

SHT B4-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 8

Start of Simulation : 01Dec91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 15Jun00 1120  Control Specs : 3 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | | | | 0.0000 | 0.0000 | 0.0000 |
| 01 Dec 91 | 0600 | 1.95 | 0.85 | 1.10 | 4.9614 | 0.0000 | 4.9614 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.3892 | 0.0000 | 1.3892 |
| 01 Dec 91 | 1800 | 1.90 | 0.16 | 1.74 | 8.0946 | 0.0000 | 8.0946 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 2.2447 | 0.0000 | 2.2447 |
| 02 Dec 91 | 0600 | 2.00 | 0.07 | 1.93 | 9.1072 | 0.0000 | 9.1072 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.5156 | 0.0000 | 2.5156 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 3.1145 | 0.0000 | 3.1145 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.8339 | 0.0000 | 0.8339 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 3.5872 | 0.0000 | 3.5872 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.9928 | 0.0000 | 0.9928 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.1893 | 0.0000 | 0.1893 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0379 | 0.0000 | 0.0379 |

SAT 84-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 8

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 15Jun00 1120 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 16.213 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.23 (in) | Total Direct Runoff | : 6.17 (in) |
| Total Loss | : 1.06 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.17 (in) | Total Discharge | : 5.69 (in) |

SHTB4-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 8

Start of Simulation : 01Dec91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 15Jun00 1120  Control Specs : 3 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 01 Dec 91 | 0600 | 1.95 | 0.82 | 1.13 | 9.057 | 0.000 | 9.057 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.536 | 0.000 | 2.536 |
| 01 Dec 91 | 1800 | 1.90 | 0.15 | 1.75 | 14.461 | 0.000 | 14.461 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 4.009 | 0.000 | 4.009 |
| 02 Dec 91 | 0600 | 2.00 | 0.07 | 1.93 | 16.213 | 0.000 | 16.213 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 4.478 | 0.000 | 4.478 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 5.540 | 0.000 | 5.540 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 1.483 | 0.000 | 1.483 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 6.379 | 0.000 | 6.379 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.766 | 0.000 | 1.766 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.337 | 0.000 | 0.337 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.067 | 0.000 | 0.067 |

SHT 24-5

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 8

| | | | |
|---|---|---|---|
| Start of Simulation | : 01Dec91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 3 Day |
| Execution Time | : 29Jun00 1246 | Control Specs | : 3 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 25.320 (cfs) | Date/Time of Peak Inflow | : 02 Dec 91 0600 |
| Peak Outflow | : 6.0361 (cfs) | Date/Time of Peak Outflow | : 03 Dec 91 1200 |
| Total Inflow | : 5.68 (in) | Peak Storage | : 47.215(ac-ft) |
| Total Outflow | : 0.65 (in) | Peak Elevation | : 756.12(ft) |

S-T 84-6

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 8

Start of Simulation : 01Dec91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 3 Day
Execution Time : 29Jun00 1246  Control Specs : 3 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 30 Nov 91 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 01 Dec 91 | 0600 | 3.476 | 750.23 | 14.0180 | 0.0000 |
| 01 Dec 91 | 1200 | 7.924 | 752.34 | 3.9250 | 0.0000 |
| 01 Dec 91 | 1800 | 14.490 | 753.52 | 22.5558 | 0.0000 |
| 01 Dec 91 | 2400 | 21.633 | 754.27 | 6.2539 | 0.0000 |
| 02 Dec 91 | 0600 | 29.461 | 754.90 | 25.3203 | 0.0000 |
| 02 Dec 91 | 1200 | 37.473 | 755.46 | 6.9938 | 0.0000 |
| 02 Dec 91 | 1800 | 41.353 | 755.73 | 8.6548 | 0.0000 |
| 02 Dec 91 | 2400 | 44.073 | 755.91 | 2.3172 | 0.0000 |
| 03 Dec 91 | 0600 | 46.337 | 756.06 | 9.9663 | 3.1497 |
| 03 Dec 91 | 1200 | 47.215 | 756.12 | 2.7583 | 6.0361 |
| 03 Dec 91 | 1800 | 46.015 | 756.04 | 0.5260 | 2.0883 |
| 03 Dec 91 | 2400 | 45.531 | 756.01 | 0.1052 | 0.4956 |

## ATTACHMENT B-5

## HEC-HMS – 5-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 5-DAY BASIN ROUTING

SHT 35-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 9

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 15Jun00 1120 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 9.1565 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.63 (in) | Total Direct Runoff | : 6.51 (in) |
| Total Loss | : 1.12 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.51 (in) | Total Discharge | : 6.20 (in) |

SHT B5-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 9

Start of Simulation : 29Nov91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 15Jun00 1120  Control Specs : 5 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | | | | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 29 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1800 | 0.40 | 0.36 | 0.04 | 0.1903 | 0.0000 | 0.1903 |
| 30 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0533 | 0.0000 | 0.0533 |
| 01 Dec 91 | 0600 | 1.95 | 0.54 | 1.41 | 6.3570 | 0.0000 | 6.3570 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.7791 | 0.0000 | 1.7791 |
| 01 Dec 91 | 1800 | 1.90 | 0.13 | 1.77 | 8.3107 | 0.0000 | 8.3107 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 2.2991 | 0.0000 | 2.2991 |
| 02 Dec 91 | 0600 | 2.00 | 0.06 | 1.94 | 9.1565 | 0.0000 | 9.1565 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 2.5288 | 0.0000 | 2.5288 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 3.1233 | 0.0000 | 3.1233 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.8362 | 0.0000 | 0.8362 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 3.5940 | 0.0000 | 3.5940 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.9947 | 0.0000 | 0.9947 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.1897 | 0.0000 | 0.1897 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.0379 | 0.0000 | 0.0379 |

SAT 85-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 9

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 15Jun00 1120 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 16.296 (cfs) | Date/Time of Peak Discharge | : 02 Dec 91 0600 |
| Total Precipitation | : 7.63 (in) | Total Direct Runoff | : 6.56 (in) |
| Total Loss | : 1.07 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 6.56 (in) | Total Discharge | : 6.25 (in) |

SHT 85-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 9

Start of Simulation : 29Nov91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 15Jun00 1120  Control Specs : 5 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 30 Nov 91 | 1800 | 0.40 | 0.35 | 0.05 | 0.412 | 0.000 | 0.412 |
| 30 Nov 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.115 | 0.000 | 0.115 |
| 01 Dec 91 | 0600 | 1.95 | 0.52 | 1.43 | 11.486 | 0.000 | 11.486 |
| 01 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 3.214 | 0.000 | 3.214 |
| 01 Dec 91 | 1800 | 1.90 | 0.12 | 1.78 | 14.830 | 0.000 | 14.830 |
| 01 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 4.102 | 0.000 | 4.102 |
| 02 Dec 91 | 0600 | 2.00 | 0.06 | 1.94 | 16.296 | 0.000 | 16.296 |
| 02 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 4.500 | 0.000 | 4.500 |
| 02 Dec 91 | 1800 | 0.60 | 0.01 | 0.59 | 5.555 | 0.000 | 5.555 |
| 02 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 1.487 | 0.000 | 1.487 |
| 03 Dec 91 | 0600 | 0.78 | 0.01 | 0.77 | 6.391 | 0.000 | 6.391 |
| 03 Dec 91 | 1200 | 0.00 | 0.00 | 0.00 | 1.769 | 0.000 | 1.769 |
| 03 Dec 91 | 1800 | 0.00 | 0.00 | 0.00 | 0.337 | 0.000 | 0.337 |
| 03 Dec 91 | 2400 | 0.00 | 0.00 | 0.00 | 0.067 | 0.000 | 0.067 |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 9

| | | | |
|---|---|---|---|
| Start of Simulation | : 29Nov91 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 03Dec91 2400 | Precip Model | : 5 Day |
| Execution Time | : 29Jun00 1246 | Control Specs | : 5 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 25.453 (cfs) | Date/Time of Peak Inflow | : 02 Dec 91 0600 |
| Peak Outflow | : 6.3248 (cfs) | Date/Time of Peak Outflow | : 03 Dec 91 1200 |
| Total Inflow | : 6.23 (in) | Peak Storage | : 47.303(ac-ft) |
| Total Outflow | : 1.04 (in) | Peak Elevation | : 756.12(ft) |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 9

Start of Simulation : 29Nov91 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 03Dec91 2400  Precip Model : 5 Day
Execution Time : 29Jun00 1246  Control Specs : 5 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 28 Nov 91 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 0600 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1200 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 1800 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 29 Nov 91 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 0600 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1200 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 30 Nov 91 | 1800 | 0.149 | 745.62 | 0.6025 | 0.0000 |
| 30 Nov 91 | 2400 | 0.341 | 746.25 | 0.1687 | 0.0000 |
| 01 Dec 91 | 0600 | 4.806 | 751.13 | 17.8433 | 0.0000 |
| 01 Dec 91 | 1200 | 10.468 | 753.00 | 4.9935 | 0.0000 |
| 01 Dec 91 | 1800 | 17.444 | 753.89 | 23.1404 | 0.0000 |
| 01 Dec 91 | 2400 | 24.768 | 754.52 | 6.4009 | 0.0000 |
| 02 Dec 91 | 0600 | 32.666 | 755.14 | 25.4525 | 0.0000 |
| 02 Dec 91 | 1200 | 40.719 | 755.68 | 7.0292 | 0.0000 |
| 02 Dec 91 | 1800 | 44.613 | 755.95 | 8.6784 | 0.0000 |
| 02 Dec 91 | 2400 | 46.460 | 756.07 | 2.3233 | 3.5532 |
| 03 Dec 91 | 0600 | 47.170 | 756.11 | 9.9845 | 5.8899 |
| 03 Dec 91 | 1200 | 47.303 | 756.12 | 2.7634 | 6.3248 |
| 03 Dec 91 | 1800 | 46.025 | 756.04 | 0.5269 | 2.1203 |
| 03 Dec 91 | 2400 | 45.532 | 756.01 | 0.1054 | 0.4994 |

# ATTACHMENT B-6

## HEC-HMS – 7-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 7-DAY BASIN ROUTING

SHT 36-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 10

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 15Jun00 1121 | Control Specs | : 7 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 9.13 (in) | Total Direct Runoff | : 7.97 (in) |
| Total Loss | : 1.13 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.00 (in) | Total Discharge | : 7.70 (in) |

ATTB6-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 10

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 15Jun00 1121  Control Specs : 7 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.049 | 0.000 | 0.049 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.010 | 0.000 | 0.010 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 2.432 | 0.000 | 2.432 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.681 | 0.000 | 0.681 |
| 28 Dec 90 | 0600 | 1.12 | 0.02 | 1.10 | 5.101 | 0.000 | 5.101 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 1.418 | 0.000 | 1.418 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 2.407 | 0.000 | 2.407 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.652 | 0.000 | 0.652 |

EXT 86-3

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 10

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 15Jun00 1121 | Control Specs | : 7 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 9.13 (in) | Total Direct Runoff | : 8.02 (in) |
| Total Loss | : 1.09 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.04 (in) | Total Discharge | : 7.74 (in) |

SAT 86-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 10

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 15Jun00 1121  Control Specs : 7 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.086 | 0.000 | 0.086 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.017 | 0.000 | 0.017 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 4.324 | 0.000 | 4.324 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.211 | 0.000 | 1.211 |
| 28 Dec 90 | 0600 | 1.12 | 0.01 | 1.11 | 9.069 | 0.000 | 9.069 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.520 | 0.000 | 2.520 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 4.279 | 0.000 | 4.279 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.159 | 0.000 | 1.159 |

SHT B6-5

HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 10

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 28Dec90 2400 | Precip Model | : 7 Day |
| Execution Time | : 29Jun00 1246 | Control Specs | : 7 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 8.9104 (cfs) | Date/Time of Peak Outflow | : 28 Dec 90 1200 |
| Total Inflow | : 7.73 (in) | Peak Storage | : 48.089(ac-ft) |
| Total Outflow | : 2.39 (in) | Peak Elevation | : 756.17(ft) |

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 10

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 28Dec90 2400  Precip Model : 7 Day
Execution Time : 29Jun00 1246  Control Specs : 7 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 747.17 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 748.54 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.23 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.59 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.34 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 44.762 | 755.96 | 7.8850 | 0.0000 |
| 23 Dec 90 | 1800 | 46.650 | 756.08 | 3.9113 | 4.1792 |
| 23 Dec 90 | 2400 | 46.177 | 756.05 | 0.9785 | 2.6210 |
| 24 Dec 90 | 0600 | 45.613 | 756.01 | 0.1349 | 0.7663 |
| 24 Dec 90 | 1200 | 45.426 | 756.00 | 0.0270 | 0.1505 |
| 24 Dec 90 | 1800 | 45.388 | 756.00 | 0.0000 | 0.0274 |
| 24 Dec 90 | 2400 | 45.381 | 756.00 | 0.0000 | 0.0028 |
| 25 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0003 |
| 25 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 1800 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 2400 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1800 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 2400 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1800 | 46.303 | 756.06 | 6.7561 | 3.0350 |
| 27 Dec 90 | 2400 | 46.655 | 756.08 | 1.8917 | 4.1930 |
| 28 Dec 90 | 0600 | 47.703 | 756.15 | 14.1699 | 7.6411 |
| 28 Dec 90 | 1200 | 48.089 | 756.17 | 3.9378 | 8.9104 |
| 28 Dec 90 | 1800 | 47.106 | 756.11 | 6.6855 | 5.6771 |
| 28 Dec 90 | 2400 | 46.715 | 756.09 | 1.8112 | 4.3934 |

## ATTACHMENT B-7

## HEC-HMS – 10-DAY RUNOFF HYDROGRAPH
## HEC-HMS – 10-DAY BASIN ROUTING

SHT B7-1

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 11

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 15Jun00 1122 | Control Specs | : 10 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 15.036 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 10.08 (in) | Total Direct Runoff | : 8.94 (in) |
| Total Loss | : 1.14 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.94 (in) | Total Discharge | : 8.72 (in) |

SHT 87-2

# HMS * Summary of Results for Subbasin-1

Project : Kingston Steam Plant  Run Name : Run 11

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 15Jun00 1122  Control Specs : 10 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.57 | 0.23 | 1.030 | 0.000 | 1.030 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.288 | 0.000 | 0.288 |
| 22 Dec 90 | 1800 | 3.80 | 0.47 | 3.33 | 15.036 | 0.000 | 15.036 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 4.206 | 0.000 | 4.206 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 10.366 | 0.000 | 10.366 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.837 | 0.000 | 2.837 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 1.408 | 0.000 | 1.408 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.352 | 0.000 | 0.352 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.049 | 0.000 | 0.049 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.010 | 0.000 | 0.010 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 2.432 | 0.000 | 2.432 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.681 | 0.000 | 0.681 |
| 28 Dec 90 | 0600 | 1.12 | 0.02 | 1.10 | 5.101 | 0.000 | 5.101 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 1.418 | 0.000 | 1.418 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 2.407 | 0.000 | 2.407 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.652 | 0.000 | 0.652 |
| 29 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.117 | 0.000 | 0.117 |

SHT 37-3

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.023 | 0.000 | 0.023 |
| 29 Dec 90 | 1800 | 0.18 | 0.00 | 0.18 | 0.801 | 0.000 | 0.801 |
| 29 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.224 | 0.000 | 0.224 |
| 30 Dec 90 | 0600 | 0.02 | 0.00 | 0.02 | 0.133 | 0.000 | 0.133 |
| 30 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.034 | 0.000 | 0.034 |
| 30 Dec 90 | 1800 | 0.58 | 0.01 | 0.57 | 2.587 | 0.000 | 2.587 |
| 30 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.724 | 0.000 | 0.724 |
| 31 Dec 90 | 0600 | 0.17 | 0.00 | 0.17 | 0.900 | 0.000 | 0.900 |
| 31 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.240 | 0.000 | 0.240 |
| 31 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.042 | 0.000 | 0.042 |
| 31 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.008 | 0.000 | 0.008 |

SHT 87-4

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 11

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 15Jun00 1122 | Control Specs | : 10 Day |

Computed Results

| | | | |
|---|---|---|---|
| Peak Discharge | : 26.904 (cfs) | Date/Time of Peak Discharge | : 22 Dec 90 1800 |
| Total Precipitation | : 10.08 (in) | Total Direct Runoff | : 8.98 (in) |
| Total Loss | : 1.10 (in) | Total Baseflow | : 0.00 (in) |
| Total Excess | : 8.98 (in) | Total Discharge | : 8.76 (in) |

SHT 87-5

# HMS * Summary of Results for Subbasin-2

Project : Kingston Steam Plant  Run Name : Run 11

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 15Jun00 1122  Control Specs : 10 Day

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | | | | 0.000 | 0.000 | 0.000 |
| 22 Dec 90 | 0600 | 0.80 | 0.55 | 0.25 | 1.970 | 0.000 | 1.970 |
| 22 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.552 | 0.000 | 0.552 |
| 22 Dec 90 | 1800 | 3.80 | 0.45 | 3.35 | 26.904 | 0.000 | 26.904 |
| 22 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 7.524 | 0.000 | 7.524 |
| 23 Dec 90 | 0600 | 2.18 | 0.06 | 2.12 | 18.451 | 0.000 | 18.451 |
| 23 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 5.048 | 0.000 | 5.048 |
| 23 Dec 90 | 1800 | 0.20 | 0.00 | 0.20 | 2.504 | 0.000 | 2.504 |
| 23 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.626 | 0.000 | 0.626 |
| 24 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.086 | 0.000 | 0.086 |
| 24 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.017 | 0.000 | 0.017 |
| 24 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Dec 90 | 1800 | 0.55 | 0.01 | 0.54 | 4.324 | 0.000 | 4.324 |
| 27 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.211 | 0.000 | 1.211 |
| 28 Dec 90 | 0600 | 1.12 | 0.01 | 1.11 | 9.069 | 0.000 | 9.069 |
| 28 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 2.520 | 0.000 | 2.520 |
| 28 Dec 90 | 1800 | 0.48 | 0.01 | 0.47 | 4.279 | 0.000 | 4.279 |
| 28 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.159 | 0.000 | 1.159 |
| 29 Dec 90 | 0600 | 0.00 | 0.00 | 0.00 | 0.209 | 0.000 | 0.209 |

SHT 87-6

| Date | Time | Precip. (in) | Loss (in) | Excess (in) | Direct Q (cfs) | Base-flow (cfs) | Total Q (cfs) |
|---|---|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.042 | 0.000 | 0.042 |
| 29 Dec 90 | 1800 | 0.18 | 0.00 | 0.18 | 1.423 | 0.000 | 1.423 |
| 29 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.399 | 0.000 | 0.399 |
| 30 Dec 90 | 0600 | 0.02 | 0.00 | 0.02 | 0.236 | 0.000 | 0.236 |
| 30 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.060 | 0.000 | 0.060 |
| 30 Dec 90 | 1800 | 0.58 | 0.01 | 0.57 | 4.599 | 0.000 | 4.599 |
| 30 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 1.287 | 0.000 | 1.287 |
| 31 Dec 90 | 0600 | 0.17 | 0.00 | 0.17 | 1.599 | 0.000 | 1.599 |
| 31 Dec 90 | 1200 | 0.00 | 0.00 | 0.00 | 0.427 | 0.000 | 0.427 |
| 31 Dec 90 | 1800 | 0.00 | 0.00 | 0.00 | 0.074 | 0.000 | 0.074 |
| 31 Dec 90 | 2400 | 0.00 | 0.00 | 0.00 | 0.015 | 0.000 | 0.015 |

SHT B7-7

# HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 11

| | | | |
|---|---|---|---|
| Start of Simulation | : 22Dec90 0000 | Basin Model | : KIF, Proposed Basin |
| End of Simulation | : 31Dec90 2400 | Precip Model | : 10 Day Storm |
| Execution Time | : 29Jun00 1247 | Control Specs | : 10 Day |

## Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow | : 41.940 (cfs) | Date/Time of Peak Inflow | : 22 Dec 90 1800 |
| Peak Outflow | : 8.9104 (cfs) | Date/Time of Peak Outflow | : 28 Dec 90 1200 |
| Total Inflow | : 8.75 (in) | Peak Storage | : 48.089(ac-ft) |
| Total Outflow | : 3.43 (in) | Peak Elevation | : 756.17(ft) |

SHT 37-8

HMS * Summary of Results for Reservoir-1

Project : Kingston Steam Plant  Run Name : Run 11

Start of Simulation : 22Dec90 0000  Basin Model : KIF, Proposed Basin
End of Simulation : 31Dec90 2400  Precip Model : 10 Day Storm
Execution Time : 29Jun00 1247  Control Specs : 10 Day

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 21 Dec 90 | 2400 | 0.000 | 745.00 | 0.0000 | 0.0000 |
| 22 Dec 90 | 0600 | 0.744 | 747.17 | 2.9999 | 0.0000 |
| 22 Dec 90 | 1200 | 1.696 | 748.54 | 0.8400 | 0.0000 |
| 22 Dec 90 | 1800 | 12.302 | 753.23 | 41.9400 | 0.0000 |
| 22 Dec 90 | 2400 | 25.609 | 754.59 | 11.7300 | 0.0000 |
| 23 Dec 90 | 0600 | 35.662 | 755.34 | 28.8172 | 0.0000 |
| 23 Dec 90 | 1200 | 44.762 | 755.96 | 7.8850 | 0.0000 |
| 23 Dec 90 | 1800 | 46.650 | 756.08 | 3.9113 | 4.1792 |
| 23 Dec 90 | 2400 | 46.177 | 756.05 | 0.9785 | 2.6210 |
| 24 Dec 90 | 0600 | 45.613 | 756.01 | 0.1349 | 0.7663 |
| 24 Dec 90 | 1200 | 45.426 | 756.00 | 0.0270 | 0.1505 |
| 24 Dec 90 | 1800 | 45.388 | 756.00 | 0.0000 | 0.0274 |
| 24 Dec 90 | 2400 | 45.381 | 756.00 | 0.0000 | 0.0028 |
| 25 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0003 |
| 25 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 1800 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 25 Dec 90 | 2400 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 1800 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 26 Dec 90 | 2400 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 0600 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1200 | 45.380 | 756.00 | 0.0000 | 0.0000 |
| 27 Dec 90 | 1800 | 46.303 | 756.06 | 6.7561 | 3.0350 |
| 27 Dec 90 | 2400 | 46.655 | 756.08 | 1.8917 | 4.1930 |
| 28 Dec 90 | 0600 | 47.703 | 756.15 | 14.1699 | 7.6411 |
| 28 Dec 90 | 1200 | 48.089 | 756.17 | 3.9378 | 8.9104 |
| 28 Dec 90 | 1800 | 47.106 | 756.11 | 6.6855 | 5.6771 |
| 28 Dec 90 | 2400 | 46.715 | 756.09 | 1.8112 | 4.3934 |
| 29 Dec 90 | 0600 | 45.807 | 756.03 | 0.3260 | 1.4062 |

| Date | Time | Reservoir Storage (ac-ft) | Reservoir Elevation (ft) | Inflow (cfs) | Outflow (cfs) |
|---|---|---|---|---|---|
| 29 Dec 90 | 1200 | 45.477 | 756.01 | 0.0652 | 0.3185 |
| 29 Dec 90 | 1800 | 45.702 | 756.02 | 2.2241 | 1.0608 |
| 29 Dec 90 | 2400 | 45.801 | 756.03 | 0.6228 | 1.3866 |
| 30 Dec 90 | 0600 | 45.558 | 756.01 | 0.3695 | 0.5866 |
| 30 Dec 90 | 1200 | 45.461 | 756.01 | 0.0937 | 0.2676 |
| 30 Dec 90 | 1800 | 46.382 | 756.06 | 7.1860 | 3.2974 |
| 30 Dec 90 | 2400 | 46.738 | 756.09 | 2.0110 | 4.4664 |
| 31 Dec 90 | 0600 | 46.134 | 756.05 | 2.4982 | 2.4792 |
| 31 Dec 90 | 1200 | 45.889 | 756.03 | 0.6679 | 1.6740 |
| 31 Dec 90 | 1800 | 45.539 | 756.01 | 0.1157 | 0.5220 |
| 31 Dec 90 | 2400 | 45.415 | 756.00 | 0.0231 | 0.1154 |

## ATTACHMENT C

## MISCELLANEOUS ATTACHMENTS

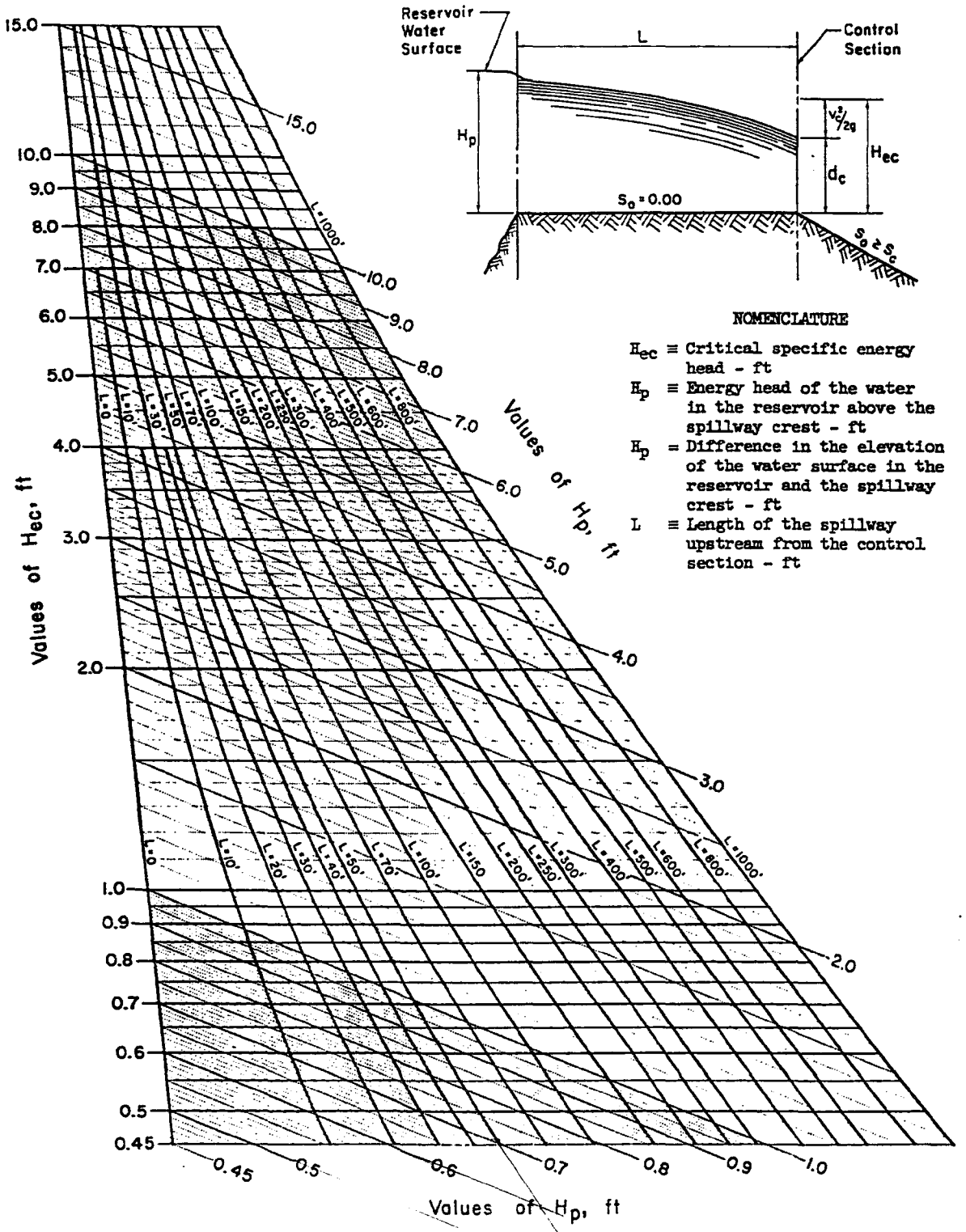



**Figure 5D.1** $H_{ec}$ versus $H_p$ for emergency spillways of various lengths $L$. Case 1, $b$ = 100 ft, $z$ = 2, $n$ = 0.04. (Soil Conservation Service, 1968).

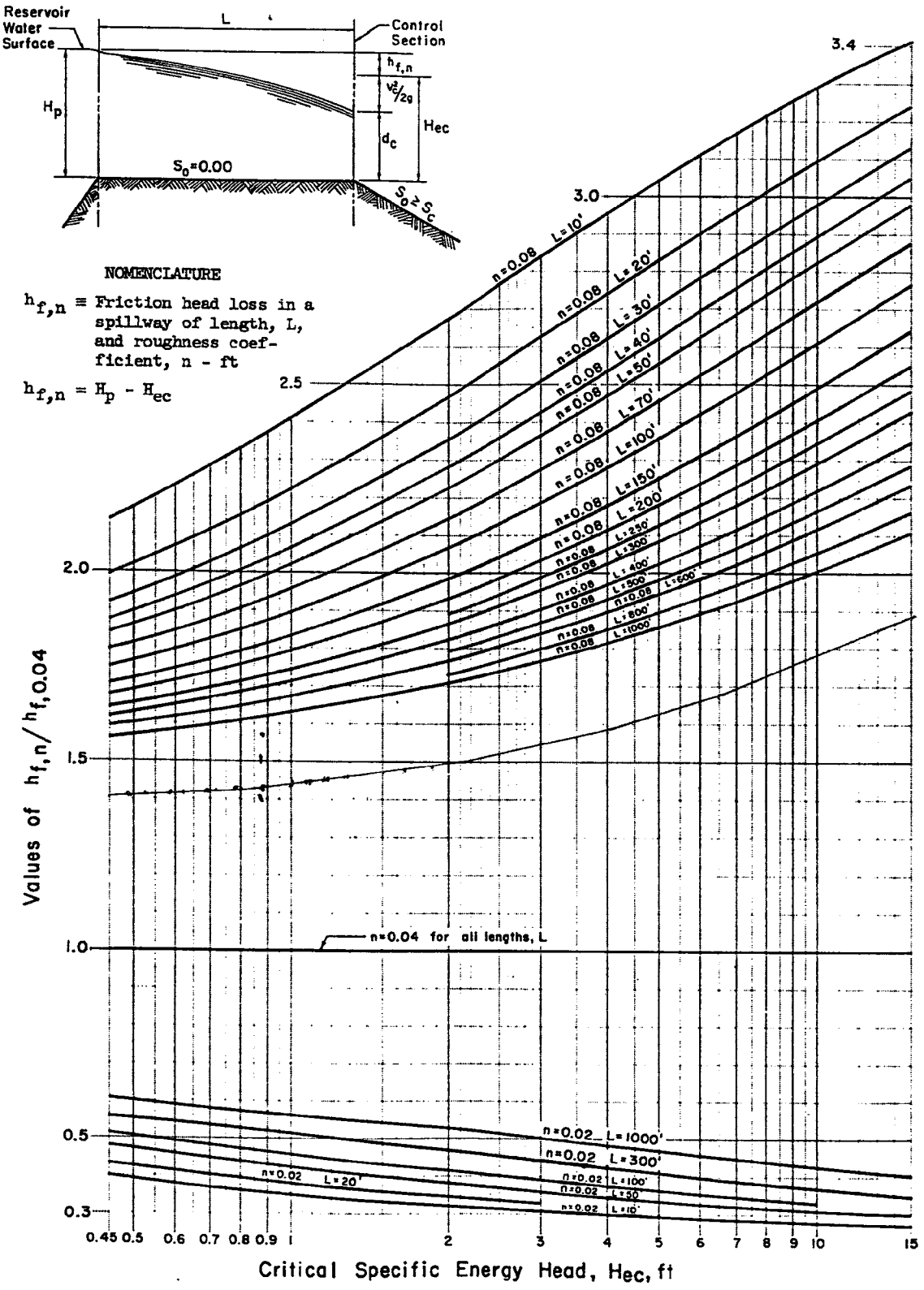



**Figure 5E.1** Effect of $n$ on friction head loss. Case 1, $b$ = 100 ft, $z$ = 2 (Soil Conservation Service, 1968).

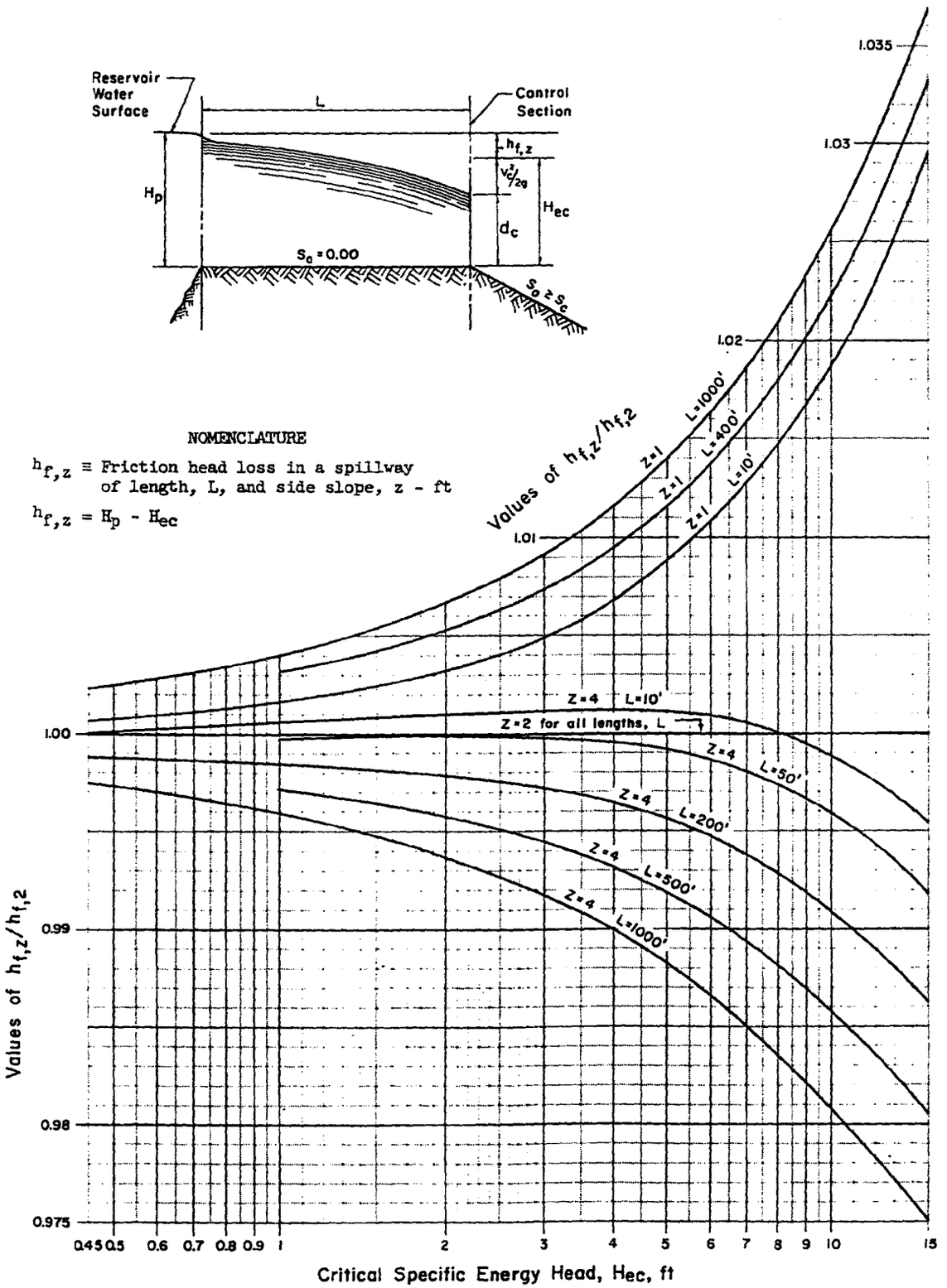



**Figure 5E.4** Effect of $z$ on friction head loss. Case 1, $b$ = 100 ft, $n$ = 0.04 (Soil Conservation, 1968).

SHT C4
REF - 9

## Brown, Timothy J

**From:** Smith, Daniel R
**Sent:** Wednesday, May 17, 2000 5:50 PM
**To:** 'cmminghini@tva.gov'
**Cc:** Brown, Timothy J; 'jhcatlet@tva.gov'; 'hlpetty@tva.gov'
**Subject:** KIF meeting notes

A summary of items from our meetings yesterday (in Chattanooga) and at the site today. If either of you have any questions, comments, or clarifications, please respond.

Dan

Meeting in Chattanooga (Tuesday May 16), Cheri Minghini (TVA) and Dan Smith (Parsons)

1. Cheri provided rainfall data (electronic format) for station 0712. A hard copy summary of data from station 10250 was also provided (listing max rainfall from 1994). Parsons would like data from both stations if available.

2. Discussed preliminary pond size (based on 6.6 inch storm event [100 yr storm for KIF]) with Cheri (based on watershed size and runoff coefficients TVA had used earlier). A pond for this event would be quite large (> 50 ac-ft). This may exceed safe dam act thresholds.

3. The maximum elevation for the water in the pond should not exceed el. 758.

4. Discussed potential pipe routing, and planned to meet at KIF Wednesday at 10 am. TVA is going to buy new 10 HDPE pipe (DR 17). Costs per ft (delivered, but not installed) were $6.78/ft and $7.11/ft. This means that the existing Flygt electric pumps will be used.

5. Confirmed deliverable dates: May 31 for sketches showing pipe routing, and June 15 for drawing depicting the excavation contours for the pond (along with a calculation).

Wednesday, Meeting at KIF (Cheri Minghini and Harold Catlett - TVA), and (Tim Brown and Dan Smith - Parsons).

1. Harold conducted at site tour. Potential routes for the HDPE pipe were looked at.

2. The existing pumps (Flygt C-3201 w/ 462 impeller) will be placed on the existing barge. A 6 in dia stainless steel pipe attached each pump will wye into a single 6 in dia ss line with check valve. A flexible hose will connect to the ss line and to the new HDPE line. It is desirable to bypass existing piping contained inside a building, and attach to the new HDPE line. TVA wants to know if the existing SS pipe configuration can continue to be used, or if the pipe sizes need to be enlarged to allow optimal operation of the system. Parsons will look into this, as it may affect cost if larger pipe (and check valve) were needed.

Parsons will need to know the bottom depth of the pond when dredged, and the minimum depth of water needed to operate the pumps (Harold will provide).

3. There are 3 existing survey monuments in the coal yard, where excavation is likely to achieve greater pond volume. Cheri will discuss with surveyors regarding the impact of elimination/relocation of these monuments.

4. If the max elevation (not to be exceeded) is 758, the Kelsh topo shows spot elevations of 757.2 (LP elevation) where the contractor access road is located (southern perimeter of the coal yard). Therefore, the maximum elevation (by default) may the the elevation of the road. In the past (before construction of the new coal handling facility), the water elevation in the coal yard has exceeded the elevation of the road.

Parsons presented an idea regarding pond function. The road could be depressed along a portion of its length to form a spillway in the event some storm event (greater than the design storm event) were to cause water to rise higher than anticipated. This would allow an additional margin of safety regarding storage, but would allow water from the coal yard to bypass the NPDES permitted outfall. Parsons needs direction from TVA on whether this would be a desirable approach. If this approach is deemed viable, Parsons may need to confirm elevations in the area where a spillway would be placed.

5. In all likelihood, the size of the pond would exceed safe dam act limitations, based on a quick review of the regulations by Parsons. Parsons does not expect that embankments will be needed to impound water, rather excavation will increase the storage volume for the existing area within the coal yard. The issue of whether the safe dam act would apply needs to be investigated, and Parsons recommends that TVA Environmental Affairs look into this issue and provide direction to Parsons as needed.

6. Harold said that a new electrical line will cross the coal yard to the electrical equipment to be activitated for supplying power to the pumps. Parsons will need to coordinate with the TVA electrical engineer in Chattanooga for

SHTCS

specifics of the route and burial depth, when looking at excvation within the coal yard.

7. The preferred route for the HDPE pipe would be outside the coal yard fence until it would pass beneath a new rail siding through an existing sleeve (the sleeve used by the existing 14 in HDPE pipe). From there it would pass beneath existing (and a new) rail line through a new sleeve to be jacked beneath these rail lines. From there it would undergo a change in direction (long radius) and pass beneath the plant road and existing rail line (new sleeve). From there it would follow the alignment of the existing above-ground fiberglass line parallel with ash sluce lines to the fly ash discharge pond. The existing fiberglass line will be replaced by new 10 in dia HDPE line.

8. Harold provided drawing numbers 106W201, 203, 204, and 205 for the new rail siding located within the existing rail siding.

9. Harold said that TVA would like to have cleanouts installed along the pipeline. Dan said that the cleanouts can be provided by the pipe supplier, and wyes fabricated on pipe spools are available. There may be some additional welding of butt joints, but the cost increase should be minimal. Dan though that cleanouts should be provided at changes of direction, and about an 800 ft maximum spacing.

10. Crossings beneath the rail lines should follow NS requirements. Lynn Petty has these. Harold thought that the casing pipe should be at least 40 inches beneath the top of rail.

11. Parsons had looked at the pump and length of pipe. A quick (approximate) calculation for a 10 inch pipe revealed that one pump would operate at 1200 gpm. At that rate, and the large size of the pond (potentially larger than 50 ac-ft), up to 10 days may be needed to dewater the pond (if filled to the maximum volume). Parsons will start the drainage calculations and first determine the watershed size and runoff characteristics and forward to TVA for review, prior to performing calculations. Parsons will review the data supplied by TVA and look at probable storm events (either single events or a series of smaller events over a longer period - possibly up to 10 days) for TVA to review also prior to completion of detailed calculations.

12. Parsons will start constuction of the pipe routing map next week, and will incorporate the field run topo as it becomes available (expected early next week).

SHT C6

REF - 9

## Brown, Timothy J

**From:** Smith, Daniel R
**Sent:** Thursday, May 25, 2000 4:19 PM
**To:** Minghini, Cherie M.
**Cc:** Petty, Harold L.; Brown, Timothy J
**Subject:** RE: KIF Coal Yard Drainage Pond

Please review the info below and feel free to comment or revise, if it is not accurate.

Today we discussed the discrepancies in the drainage area. The email below (both areas total approximately 140 ac) describes the basis for your previous calc. Based on your review of the topo used to determine the drainage area described below, you think now that the watershed would be smaller by approximately 40 ac, or 100 ac total. This revised estimate is based on rerouting of drainages since the topo used for your previous calculation was made. Based on our review of the kelsh topo, we have determined a drainage area of about 83 ac. We will review our topo further against some plant yard drainage drawings and try to ensure that our estimate is as accurate as can be. You also indicated in our conversation that some of your estimated area may have been from the quad map, which may not be as accurate as the 1992 kelsh topo esimated using a cad program. This may explain some of the discrepancy between 83 ac and 100 ac.

Last week we discussed whether the safe dam act provisions would apply to water impounded in the coal yard. You explained that because dikes aren't being built up, and TVA has historically not needed dam permits for coal yard and ash disposal facility impoundment, that any provisions listed in the safe dam act would be exempted for this project.

Based on our visit to the site Wednesday May 17, we discussed construction of a spillway at the south end of the coal yard. The intent of this spillway would be to direct water (in excess of a 10 yr 24 hr storm event) from the coal yard to an existing drainage way located on the north side of the asphalt road leading from the scales.

Now that we're getting close to defining the drainage area, and considering the progress we've made on the base map, we will take a look at the 10 yr 24 hr storm event and look at whether water will exceed the low point elevation obtained by Joel Paris.

If you have any comments or corrections, please reply by email (or phone call) to me or Tim Brown. Tim's number in Oak Ridge is (865) 220-4548.

Dan

-----Original Message-----
From: Minghini, Cherie M. [mailto:cmminghini@tva.gov]
Sent: Friday, May 05, 2000 4:00 PM
To: Smith, Daniel R
Cc: Petty, Harold L.
Subject: KIF Coal Yard Drainage Pond

I pulled our drainage calculations from the previous Coal Yard Runoff Pond project. It appears that there is approximately 5,795,280 sf of drainage area (we used a runoff coefficient of .7 for this area) and an additional drainage area of 293,250 sf in the railroad track area (we used a runoff coefficient of .5 for this area) which all drains to the pond. I am not sure how this has changed since 1994 (obviously the addition of the blender/unloader). These drainage areas were calculated based on Kelsh topo sheets:

461K530 M-8
M-7
M-6
L-7
L-8

and the Harriman Quad Map.

Hopefully this will help give you an idea of what we are looking at, but you will probably want to relook at this. Call me if you have any questions at 751-6375.

Thanks,

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SHT C7

Cherie M. Minghini, P.E.
Tennessee Valley Authority
Project & Discipline Engineering
(423) 751-6375

SHT C8
REF - 9

## Brown, Timothy J

**From:** Smith, Daniel R
**Sent:** Thursday, June 08, 2000 2:34 PM
**To:** 'cmminghini@tva.gov'
**Cc:** Brown, Timothy J
**Subject:** FW: KIF Coal Yard Runoff - updated info and questions

Based on our discussion this afternoon, Parsons will proceed with the following:

1. We will assume a riprap spillway unless you direct otherwise.
2. In order to avoid having to do any regrading in the vicinity of the paved road/gravel road intersection (just west of the scales), we may set the spillway elevation at 756. This would provide at least a one-foot spillway depth, which would provide more capacity than a one-half foot spillway depth. We will review the coal yard excavation limits previously determined using a drawing you will provide. We will show excavation contours per the drawing, or excavation to impound the 100 year storm event, which ever is greater.

Dan

-----Original Message-----
**From:** Smith, Daniel R
**Sent:** Thursday, June 08, 2000 1:18 PM
**To:** 'cmminghini@tva.gov'
**Cc:** Brown, Timothy J
**Subject:** KIF Coal Yard Runoff - updated info and questions

I understand you will be out of the office until Friday. I will call you Monday to discuss some of the questions I have below.

We are continuing to work on the stormwater runoff portion of this project, and have some preliminary (unchecked) calculation results to share with you. Based on review of the recent field-run topo for the coal yard area (only), we've estimated approximately 58.2 ac-ft of storage available based on the existing contours. These results are preliminary and are subject to some modifications. We've looked at 3 storm events:

1) a 10 yr-24 hour storm. This requires 30.2 ac-ft of storage.
2) a 100 yr-24 hour storm. This requires 44.7 ac-ft of storage.
3) a 10 day storm event (not continuous); 10.08 inches of rainfall - requires 63.2 ac-ft of storage (el 757 assumed as the spillway elevation).

Because we've decided to go with a spillway, we may not need to excavate as much soil as previously thought. I set the elevation of the temporary spillway at 756.5, but depending on the required discharge from the spillway (to be determined), it may have to be slightly deeper. Since we've got all the topo tied in now, there may be other options to consider, than the drawing I gave you last week with the spillway cut at 756.5.

Some items/questions to consider in light of the 6/16 deadline for completion of Phase 1:

Last week you had requested a manhour estimate for us to complete phase 2. I haven't been able to provide you an answer yet, because the scope may still be evolving. I'll elaborate below.

1. We should be able to get the phase 1 Sketch (SK-01) to you by next Friday, complete with notes and excavation contours for the coal yard elevation, provided we agree on a spillway elevation.

2. The volume of excavation will obviously depend on where we set the spillway elevation. I would like to discuss some ideas on Monday regarding potential options and the impact on excavation volumes.

2. Spillway design. How much detail should we go into for the phase 1 submittal by this Friday? My understanding is that TVA wanted a sketch that could be constructed from. We were thinking in terms of a riprap spillway, but I spoke to Harold Catlett the other day, and he said he would perfer a concrete spillway. I consider the design of a permanent spillway beyond the scope of the original task, as discussed with you and Lynn Petty on May 15. Also, I didn't include quantities for a spillway (concrete or otherwise) in the cost estimate. Setting a spillway elevation and completing the calcs can be done by the end of next week, but detailing a concrete spillway (that would also have to consider traffic loads) by 6/16 won't be possible.

I'll call you on Monday.

Dan

SHTC9
REF-9

## Brown, Timothy J

**From:** Minghini, Cherie M. [cmminghini@tva.gov]
**Sent:** Thursday, June 08, 2000 1:32 PM
**To:** Brown, Timothy J; Smith, Daniel R
**Subject:** RE: KIF Coal Yard

I think you have already talked to Lynn about this, but he says that the drainage was rerouted at the time the old ash pond was retired which was several years before this rainstorm occurred. We should be safe in assumed the 100 acre drainage area.

> ———
> From: Daniel R Smith[SMTP:Daniel.R.Smith@parsons.com]
> Sent: Tuesday, June 06, 2000 4:15 PM
> To: Timothy J Brown
> Cc: Minghini, Cheri
> Subject: KIF Coal Yard
>
> Will have topo ready first thing in the morning for your use. You can
> pull down Sk-01 from the global server. Had a little trouble with the 757
> contour interval, but what I have now should make sense. Everything
> should be tied in (elevations 750 - 760), although the 760 contour
> interval (and 759) are guessed at from the coal facility design drawing.
> These are indicated by dashed lines. From 758 on down everything should
> be ok.
>
> I think I'll work in Oak Ridge Thursday, so that we can go over the
> hydrology calcs and pump calcs. I should be able to look at your calcs
> later tonight or tomorrow.
>
> Did talk to Harold Catlett. He's looking for our info. He thought that
> the coal yard flooded in December 1990 (or 91). Isn't that the period you
> were looking at for the 10 yr storm? He also said that they've had a lot
> of rain, and the yard
>
> I also asked Harold another question, which may be very important in
> trying to reconcile flood/storm events. I told him that Cheri had
> originally looked at a drainage area of 140 (approx) acres, which was
> subsequently reduced to about 100 ac. Harold seemed to know about that
> modification, and was going to try to find out when that modification was
> made. If it was made after the event which flooded the coal yard, then it
> will be hard to replicate that event with the model.
>
> I am working on the pump calcs, and should have something by Thursday.
>
> Dan
>

**ATTACHMENT D**

**DRAINAGE MAP**