MISCELLANEOUS PAPER EL-79-6

MILITARY HYDROLOGY

Report 12

CASE STUDY EVALUATION OF ALTERNATIVE DAM-BREACH FLOOD WAVE MODELS

Volume IV: Laurel Run Case Study

by

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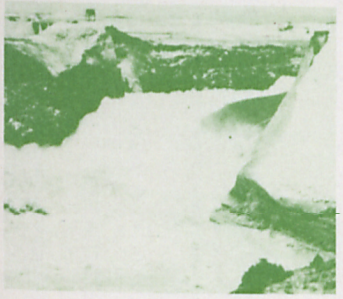
November 1986
Report 12 of a Series

Approved For Public Release; Distribution Unlimited

Prepared for DEPARTMENT OF THE ARMY
US Army Corps of Engineers
Washington, DC 20314-1000

Under DA Project No. 4A762719AT40
Task Area BO, Work Unit 052

US Army Corps of Engineers



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Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Miscellaneous Paper EL-79-6
2. GOVT ACCESSION NO.:
3. RECIPIENT'S CATALOG NUMBER:

4. TITLE *(and Subtitle)*: MILITARY HYDROLOGY; Report 12, CASE STUDY EVALUATION OF ALTERNATIVE DAM-BREACH FLOOD WAVE MODELS; Volume IV: Laurel Run Case Study

5. TYPE OF REPORT & PERIOD COVERED: Report 12 of a series (In 4 volumes)

6. PERFORMING ORG. REPORT NUMBER:

7. AUTHOR(s): Ralph A. Wurbs

8. CONTRACT OR GRANT NUMBER(s):

9. PERFORMING ORGANIZATION NAME AND ADDRESS: US Army Engineer Waterways Experiment Station, Environmental Laboratory, PO Box 631, Vicksburg, Mississippi 39180-0631

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: DA Project No. 4A762719AT40, Task Area BO, Work Unit 052

11. CONTROLLING OFFICE NAME AND ADDRESS: DEPARTMENT OF THE ARMY, US Army Corps of Engineers, Washington, DC 20314-1000

12. REPORT DATE: November 1986

13. NUMBER OF PAGES: 243

14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*:

15. SECURITY CLASS. *(of this report)*: Unclassifed

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

Available from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Dam breach
Dam-break flood forecasting model
Military Hydrology

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report provides a comparative evaluation of several leading state-of-the-art models for dam-breach flood forecasting. Nine alternative models were applied using data sets from four case studies. Results obtained were compared between models and with available measured data. Model accuracy, versatility, and ease-of-use were evaluated, and complexities and weaknesses were identified. The sensitivity of model results to various input data parameters was also investigated. The quantitative results documented by the report provide an

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20. ABSTRACT (Continued).

empirical data base for analyzing the performance of the models under various conditions.

PREFACE

The work reported herein was conducted under Department of the Army Project No. 4A762719AT40, "Mobility and Weapon Effects Technology," Task Area BO, "AirLand Battlefield Environment," Mission Area, "Combat Support," Work Unit 052, "Induced Floods as Linear/Area Obstacles," under the auspices of the Battlefield Terrain Working Group of the AirLand Battlefield Environment Thrust. The study was sponsored by the Office, Chief of Engineers (OCE). Dr. Clemens A. Meyer was the OCE Technical Monitor.

The study was conducted by the US Army Engineer Waterways Experiment Station (WES) under the general supervision of Dr. John Harrison, Chief of the Environmental Laboratory, and Dr. Lewis E. Link, Chief of the Environmental Systems Division, and under the direct supervision of Mr. M. P. Keown, Chief of the Environmental Constraints Group (ECG), and Mr. J. G. Collins, ECG. Mr. M. R. Jourdan, ECG, Principal Investigator, Work Unit 052, provided technical assistance and review. This report was prepared by Dr. Ralph A. Wurbs, who is an Assistant Professor at Texas A&M University working under an Intergovernmental Personnel Act agreement as a Research Engineer, ECG.

COL Allen F. Grum, USA, was the previous Director of WES. COL Dwayne G. Lee, CE, is the present Commander and Director. Dr. Robert W. Whalin is Technical Director.

This report should be cited as follows:

Wurbs, R. A. 1986. "Military Hydrology; Report 12, Case Study Evaluation of Atlernative Dam-Breach Flood Wave Models; Vol IV: Laurel Run Case Study," Miscellaneous Paper EL-79-6, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

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THE LAUREL RUN DAM FAILURE FLOOD

Description of the Flood

The failure of the dam on Laurel Run near Johnstown, Pennsylvania resulted in the sudden release of 450 acre-feet of water into a stream that was already flooding from a severe rainstorm. Laurel Run has a drainage area of 14 square miles above its confluence with the Conemaugh River. The dam was located about 2.5 miles upstream of the confluence. On 19 and 20 July 1977, a severe rainstorm caused heavy flooding in many areas near Johnstown. Flooding in the Laurel Run Valley caused extensive property damage and loss of more than 40 lives. The Laurel Run Dam breached at about 2:35 a.m. on July 20, significantly worsening flood flows.

The 45-foot high earth embankment had a crest elevation of 1,436.5 feet with a spillway crest of 1,430 feet. The water surface is estimated to have reached an elevation of 1,437.2 feet at the time of failure. The reservoir was about 0.4 miles long and generally less than 600 feet wide. The steep walls of the downstream valley confined the flood to a width of less than 500 feet, often less than 200 feet. The channel slope is about 100 feet per mile. Red Run and Wildcat Run tributaries enter Laurel Run 1,100 feet and 9,700 feet below the dam, respectively. Figure 1 is a map of the stream system.

Data Sources

The input data used in the analysis came primarily from a paper by Chen and Armbruster[1] and a report by Land[2]. Construction plans for the embankment and appurtenant outlet structures and a 1:24000 scale U.S.G.S. quadrangle map were also available. Land's study is based largely upon input data developed in conjunction with the study reported by Chen and Armbruster.

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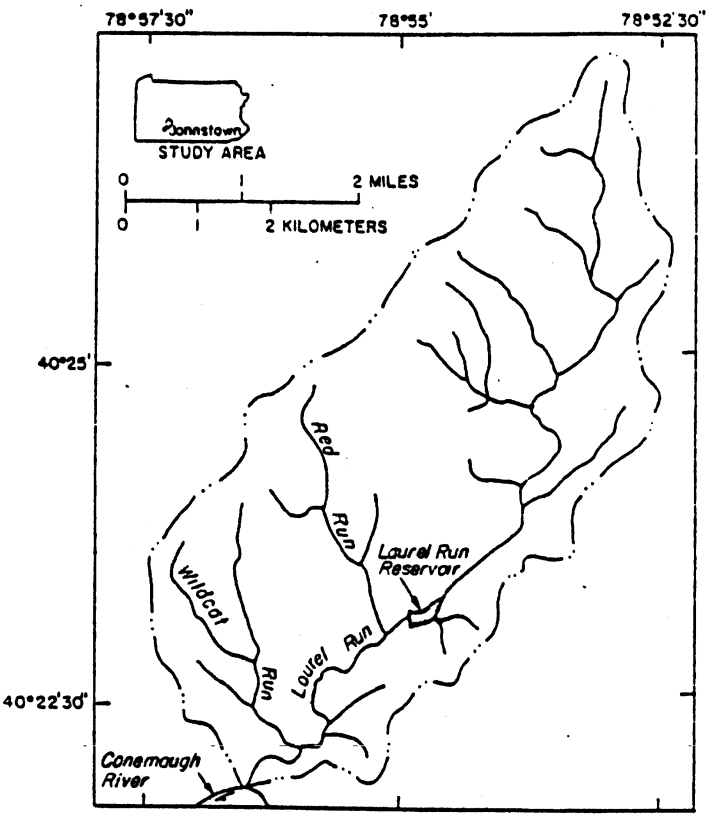
1. Cheng-Lung Chen and Jeffrey T. Armbruster, "Dam-Break Wave Model: Formulation and Verification", ASCE Journal of the Hydraulics Division, Vol. 106, No. HY5, pp. 747-767, May 1980.
2. Larry F. Land, "Evaluation of Selected Dam-Break Flood-Wave Models Using Field Data", U.S. Geological Survey, Water-Resources Investigations 80-44, July 1980.

Figure 1

Map of Laurel Run Drainage Basin



Source: Chen and Armbruster (1980)

Ground coordinates and Manning N values for 18 surveyed cross-sections were used in both studies and are documented by Land. The 18 cross-sections include three in the reservoir, one at the breach opening, and 14 at selected points along the stream channel. The most downstream cross-section is 13,400 feet below the dam. High water marks were identified at the edge of most of the cross-sections surveyed. Cross-section plots and related data are provided herein as Appendix A.

Indirect measurements of peak discharge were made using U.S. Geological Survey procedures at four sites in the Laurel Run basin. The peak discharge at the upstream edge of the reservoir was determined to be 10,500 cfs. A second indirect measurement of 37,000 cfs was made about 1.0 mile downstream from the dam. Peak discharges near the mouths of Red Run and Wildcat Run were estimated to be 4,000 cfs and 2,440 cfs, respectively.

Since gauged streamflow data was not available, Chen and Armbruster developed inflow hydrographs into the reservoir from Laurel Run and into Laurel Run from Red Run and Wildcat Run using the Soil Conservation Service dimensionless hydrograph method and rainfall data. The computed hydrographs were adjusted to conform to the indirect measurements of peak discharge.

The last reservoir water surface elevation reading was made by the dam tender several hours before the rainfall began. Chen and Armbruster routed the simulated inflow hydrograph through the reservoir to estimate the reservoir water surface elevation at the time of failure. Based on eyewitness reports of the flooding downstream and results of the reservoir routing, the time of dam failure was estimated to be about 2.35 a.m. on July 20, 1977. The water surface elevation computed for this time was 1,437.2 feet above mean sea level and outflow was estimated to be 8,900 cfs. The volume of water in the reservoir at the time of failure was estimated to be about 450 acre-feet or about 150% of the capacity at spillway crest elevation.

The breach was approximately triangular in shape and fully penetrated the dam with average side slopes of 2.45:1.00. The breach encompassed ab out one-third of the dam. Apparently no one saw the breach form, but the breach time was probably of the order of a few minutes. Land used a breach time of 15 minutes in his analysis.

OVERVIEW OF ANALYSIS

The Laurel Run dam breach flood wave was analyzed by the present study using the following models: DAMBRK, FLOW SIM 1, FLOW SIM 2, HEC-1, SMPDBK, and HEC Dimensionless Graphs. The results using each model are documented by individual sections of this volume. The final section is a comparison of the results from the six alternative models.

A channel reach extending 13,400 feet below the dam was modeled. Surveyed valley cross-section data taken from Land are presented in Appendix A. The topwidths used in DAMBRK, FLOW SIM 1, and FLOW SIM 2 are also plotted in Appendix A. The estimated dam breach parameters are shown in Appendix A. Computer printouts for a base run of DAMBRK, FLOW SIM 1, FLOW SIM 2, and HEC-1 are included as Appendices B,C,D, and E respectively. These printouts show input data as well as analysis results. Input data and results for SMPDBK and the HEC Dimensionless Graphs are documented in the respective sections covering these models.

A set of input data was developed as a best estimate of actual conditions. The term "base run" is used herein to signify the run made with each alternative model using this initial best estimate data. The term "base run" was adopted to differentiate that run from the numerous other runs made for purposes of sensitivity analysis and otherwise testing various characteristics of the model. The base run for each model is used for comparing the results obtained using the alternative models.

Although it was anticipated that cross-sectional topwidth smoothing would be required to obtain solutions with DAMBRK and FLOW SIM 1 and 2, initial runs were made without smoothing as a test for each of the three models. Computational instabilities prevented the obtaining of solutions. The set of smoothed elevation versus topwidths plotted in Appendix A were used in each of these three dynamic wave models.

Alternative approaches could be taken in regard to when to start the simulation. The base run begins the computations at the time at which the dam breach begins. The starting reservoir water surface elevation is 1437.2 feet above mean sea level. Alternatively, the computations could begin at the beginning of the storm when the reservoir surface was at elevation 1425.0 feet. The model then simulates the several hours of reservoir filling leading to finally reaching the water level causing the

breach. Alternative runs were made with DAMBRK, FLOW SIM 1 and 2, and HEC-1 starting at reservoir water surface elevation 1425.0 feet and the corresponding points on the inflow hydrographs. The results were very close for the two alternative simulation starting times. SMPDBK and HEC Dimensionless Graphs require that the computations begin at the time the breach begins.

The base run uses a reservoir storage versus outflow table provided by Land. Alternative runs were made with DAMBRK, FLOW SIM 1 and 2, and HEC-1 in which spillway characteristics were provided as input data, and the model computed the storage versus outflow relationship. The results obtained using these two approaches were close. The results reported herein are limited essentially to starting the simulation at the time the breach begins and inputing a reservoir storage versus outflow table.

The six alternative models have different approaches for determining the stream stations or locations at which results are printed. The printed results from the different models are difficult to compare directly. Consequently, the results are summarized in the tables presented herein at selected stream stations. Interpolation of model results was often used to obtain values at the desired locations.

FLOW SIM 1 RESULTS

Results from five successful runs of FLOW SIM 1 are presented in Tables 1 through 4 and Figures 2 through 4. Appendix B is a printout of the base run. The base run (labeled run 3 in tables 1-4) includes a breach time of 15 minutes, and the computations begin at the time the breach begins. The cross-section elevation versus topwidths are smoothed and the Manning N values are double the actual estimated values in order to obtain a solution. Runs with breach times of 1 minute, 5 minutes, and 30 minutes and all other input data identical to the base run are also shown (runs 1,2,4).

Run 5 involves starting the simulation several hours before the breach occurs. The starting reservoir water surface elevation is 1425 feet instead of the base run value of 1437.2 feet. In all runs, the breach initiates at a reservoir storage level corresponding to a water surface elevation of 1437.2 feet. Also, in Run 5, the model computes the reservoir storage versus outflow function using input data consisting of a spillway elevation and weir coefficient. In the base run, a reservoir storage versus outflow table is provided as input data.

The remaining run included in the tables and figures is the test data provided by the Southwestern Division (SWD) along with the computer program. The SWD test data includes the same cross-sections but six topwidths per section are used. The other runs use five. The cross-sectional geometry has been smoothed. The smoothing varies somewhat between the SWD test data and the other runs. The Manning N values are significantly higher at most cross-sections than the actual estimated values provided by Land. The N-values range from the actual to double the actual at various cross-sections. The simulation begins with a reservoir water surface elevation of 1425 feet and the storage versus outflow table is provided as input data. The spatial step (500 feet) and time step (5 seconds) are also significantly different from that used in the other runs. Breach parameters are the same.

A solution could not be obtained using the actual estimated N-values provided by Land due to instabilities in the calculations. Modeling of Laurel Run is complicated by a steep channel slope which results in supercritical flow at certain points in the computations. This was considered to be a major reason for the difficulties encountered regarding computational instability. Increasing the N-values forced maintenance of subcritical flow. Various combinations of alternative N values, breach times, spatial steps, and time steps were run in a trial-and-error attempt to obtain a solution as close to the actual conditions as possible. Runs were made in which N-values were increased only at selected cross-sections or more at some cross-sections than others. However, the approach of increasing all N-values by multiplying by the same factor was eventually adopted as being easier and resulting in little additional loss of accuracy. Unsuccessful runs included breach times of 15 and 30 minutes combined with actual N-values and N-values increased by factors of 1.5 and 1.75. The unsuccessful runs usually terminated with messages indicating computational instabilities were encountered.

The base run resulted in a discharge 6.6 percent lower than the measured discharge. The difference between the base run and measured peak water surface elevations are usually within two feet but the computed value is ten feet higher than measured at one location. The computed peak water surface elevation is higher than the measured data along portions of the stream and lower in other reaches.

The base run (run 3) and alternative starting time (run 5) results are almost the same. The maximum discharge for the alternative starting time run are 2 to 3 percent higher than the base run. The maximum water surface elevations are zero to 0.5 feet higher than the base run. The times to maximum elevation are also essentially the same, realizing that the values in the table are referenced to different starting times for the two runs.

Maximum discharges for a breach time of 5 minutes (run 2) are from 4 to 220 percent larger than those for a breach time of 30 minutes (run 4). The corresponding differences in depths between the 5 and 30 minute runs varied from 5 to 39 percent. A 30-minute breach time results in an essentially constant maximum discharge along the entire channel length. A short breach time results in a much higher peak discharge at the dam than at the lower end of the reach.

Table 1
Flow Sim 1 - Laurel Run
Peak Discharges

Distance From Dam (Feet)	Maximum Discharge in cfs					
	SWD Test Data	Run 1 1-Min	Run 2 5-Min	Run 3 Base 15-Min	Run 4 30-Min	Run 5 Alternative 15-Min
0	-	71,200	55,710	36,070	24,970	35,990
400	37,040	67,770	53,630	37,190	26,130	38,500
1000	36,700	59,270	46,160	36,570	25,820	37,680
2000	39,300	55,070	44,460	36,320	25,780	37,370
3000	38,800	44,560	42,880	36,010	25,720	36,990
4000	38,400	41,170	40,850	35,310	25,620	36,230
5000	37,500	38,980	40,700	34,840	25,550	35,780
6000	37,500	39,110	41,070	34,740	25,530	35,690
7000	37,500	39,720	40,760	34,570	25,500	35,520
8000	37,200	35,440	37,290	33,260	25,340	34,280
9000	36,300	32,980	34,490	32,620	25,240	33,720
10,000	36,700	33,010	34,430	33,530	26,540	34,120
11,000	37,200	32,800	34,210	33,460	26,530	34,070
12,000	36,800	32,660	33,910	33,230	26,470	33,820
13,000	35,300	28,160	29,260	30,470	26,030	31,960
13,400	35,100	27,880	28,970	30,200	25,970	31,770

Notes:

1) Runs 1,2,3, and 4 are for breach times of 1 minute, 5 minutes, 15 minutes, and 30 minutes, respectively. All other input data is identical for these three runs.

2) The computations for run 5 begin several hours before the breach. Runs 1,2,3, and 4 start at the time the breach begins.

3) A printout for the base run (Run 3) is provided as Appendix B.

Table 2
Flow Sim 1 - Laurel Run
Peak Water Surface Elevations

Distance From Dam (Feet)	Maximum Water Surface Elevation in Feet						
	Field Data	SWD Test Data	Run 1 1-Min	Run 2 5-Min	Run 3 Base 15-Min	Run 4 30-Min	Run 5 Alternative 15-Min
0	-	-	1406.5	1406.0	1404.4	1402.1	1404.5
400	1398.5	1402.0	1404.3	1404.3	1402.2	1399.2	1402.5
1000	1392.4	1395.9	1401.2	1400.1	1397.9	1394.9	1398.2
2000	1377.1	1379.5	1381.4	1380.3	1379.0	1376.7	1379.2
3000	1361.1	1362.8	1363.2	1363.1	1362.0	1360.2	1362.2
4000	1343.7	1346.3	1347.2	1347.5	1346.2	1343.4	1346.4
5000	1320.8	1324.9	1322.9	1323.6	1322.0	1319.5	1322.2
6000	1298.7	1296.1	1296.2	1296.6	1295.5	1293.9	1295.7
7000	1274.1	1275.1	1275.8	1275.9	1275.2	1273.5	1275.4
8000	1255.7	1260.8	1264.5	1264.9	1264.6	1261.7	1265.0
9000	1241.0	1243.6	1247.1	1247.5	1247.0	1244.9	1247.3
10,000	1220.9	1224.6	1227.2	1227.6	1227.3	1225.2	1227.5
11,000	1200.5	1199.7	1194.4	1199.7	1199.6	1198.2	1199.7
12,000	1180.0	1179.6	1177.8	1178.1	1178.5	1177.2	1178.9
13,000	-	1171.8	1172.0	1172.3	1172.8	1171.3	1173.3
13,400	-	1167.1	1168.1	1168.5	1168.9	1167.4	1169.4

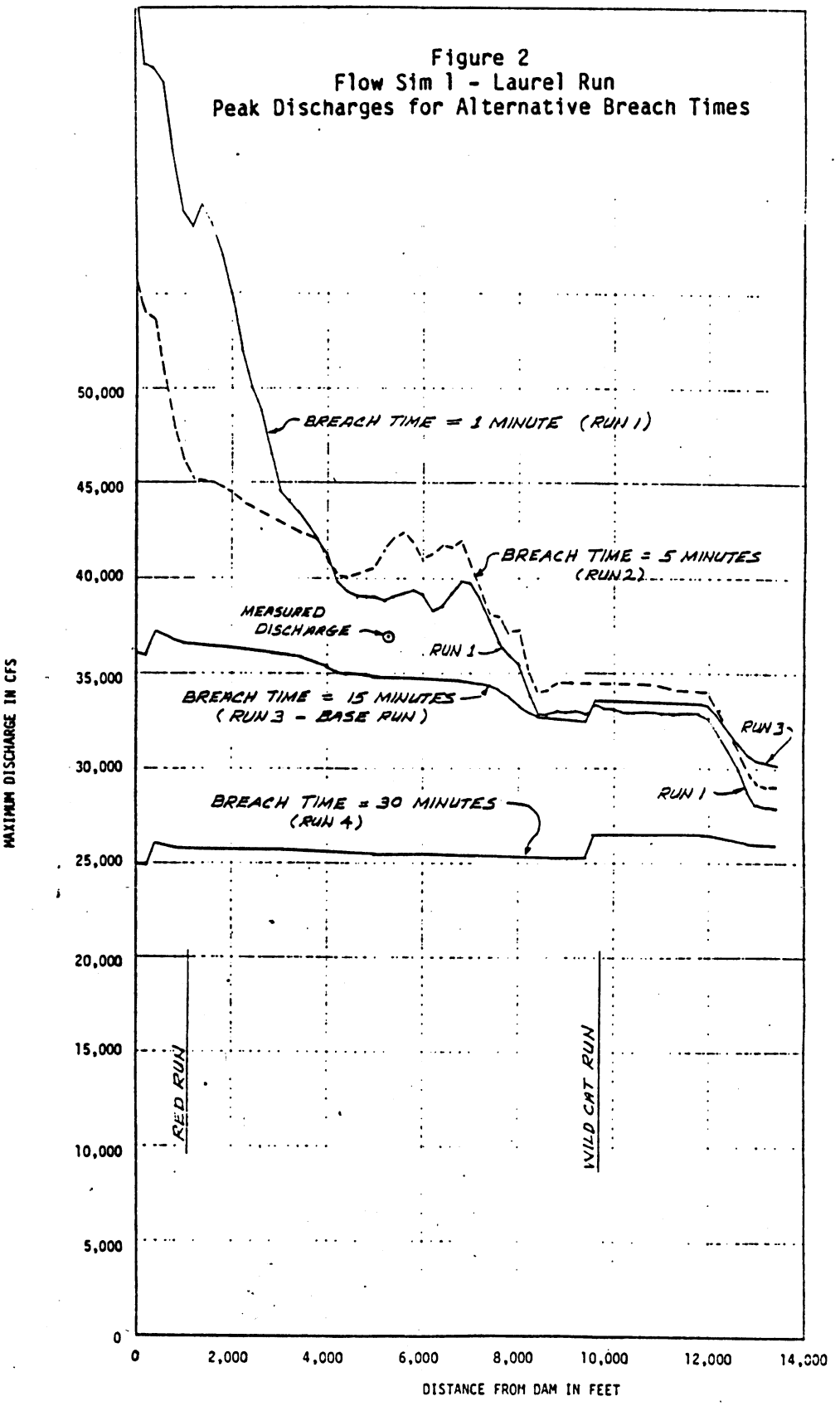
Table 3
Flow Sim 1 - Laurel Run
Maximum Flow Depths

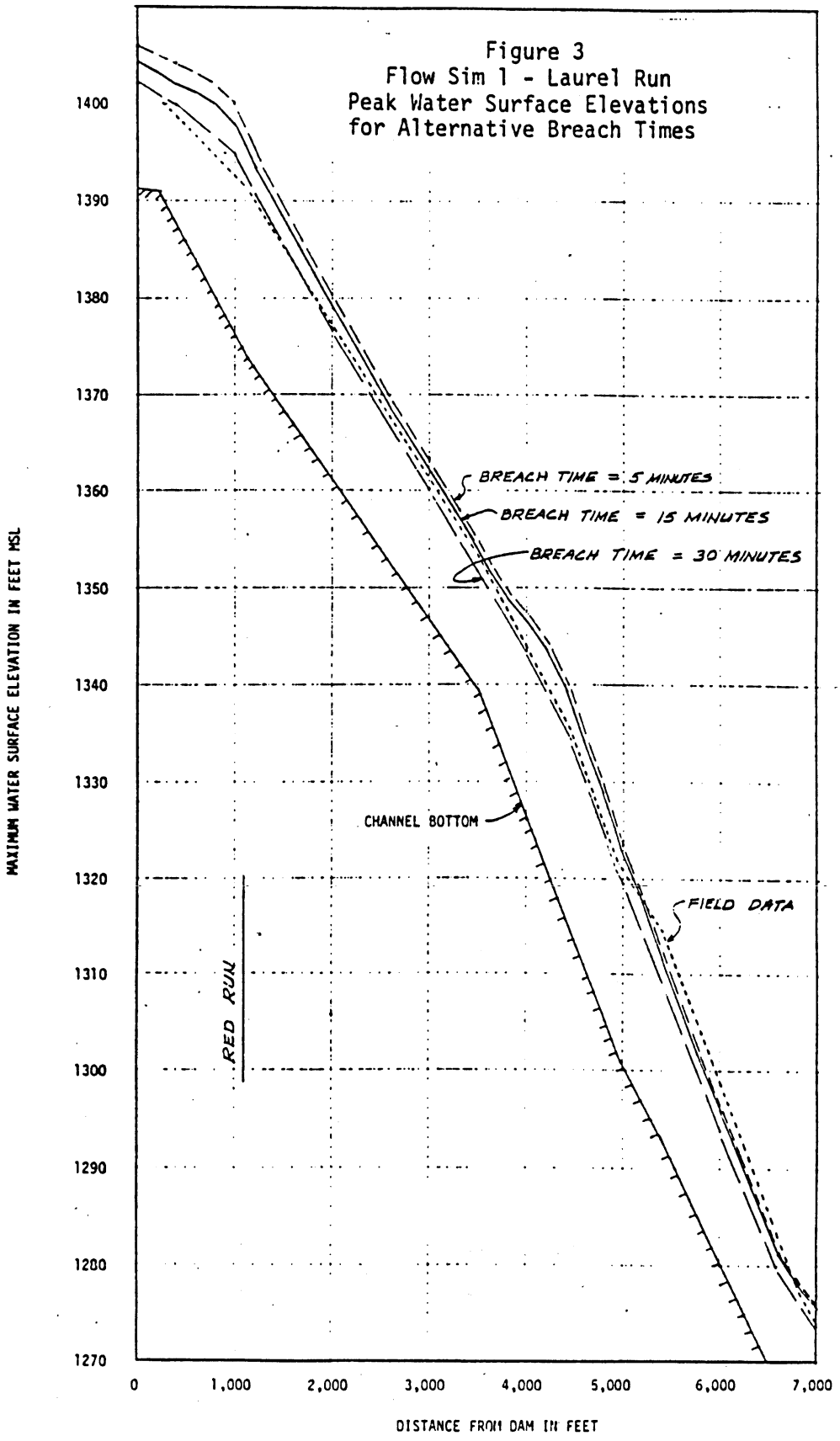
Distance From Dam (Feet)	Maximum Flow Depth in Feet						
	Field Data	SWD Test Data	Run 1 1-Min	Run 2 5-Min	Run 3 Base 15-Min	Run 4 30-Min	Run 5 Alternative 15-Min
0	-	-	14.5	14.0	12.4	10.1	12.5
400	11.0	13.9	16.3	16.4	14.3	11.3	14.6
1000	16.0	19.2	24.8	23.7	21.5	18.5	21.8
2000	16.0	18.2	20.2	19.1	17.7	15.4	17.9
3000	14.5	16.0	16.5	16.3	15.3	13.4	15.4
4000	17.5	19.6	20.6	20.8	19.5	16.8	19.8
5000	20.5	19.6	22.6	23.2	21.6	19.1	21.9
6000	18.5	15.6	15.7	16.1	15.0	13.4	15.2
7000	14.5	14.9	15.6	15.7	15.0	13.3	15.2
8000	15.0	18.4	21.3	21.8	21.4	18.5	21.8
9000	15.5	18.3	21.6	22.0	21.5	19.4	21.8
10,000	14.0	17.0	20.3	20.7	20.4	18.3	20.6
11,000	16.0	14.6	14.3	14.6	14.4	13.0	14.6
12,000	17.0	17.3	14.5	14.8	15.1	13.8	15.6
13,000	-	20.1	20.4	20.7	21.2	19.7	21.7
13,400	-	20.1	21.1	21.5	21.9	20.4	22.4

Table 4
Flow Sim 1 - Laurel Run
Time to Crest Elevation

Distance From Dam (Feet)	Time to Maximum Elevation in Hour					
	SWD Test Data	Run 1 1-Min	Run 2 5-Min	Run 3 Base 15-Min	Run 4 30-Min	Run 5 Alternative 15-Min
0	-	0.10	0.18	0.35	0.50	4.95
400	3.79	0.15	0.21	0.35	0.52	4.95
1000	3.79	0.15	0.21	0.36	0.53	4.96
2000	3.81	0.17	0.23	0.37	0.55	4.97
3000	3.82	0.20	0.25	0.39	0.57	4.99
4000	3.85	0.24	0.28	0.41	0.61	5.02
5000	3.86	0.25	0.30	0.43	0.62	5.03
6000	3.87	0.26	0.31	0.44	0.64	5.04
7000	3.89	0.29	0.33	0.46	0.66	5.06
8000	3.91	0.35	0.39	0.50	0.70	5.10
9000	3.92	0.35	0.39	0.51	0.71	5.11
10,000	3.92	0.37	0.41	0.53	0.73	5.13
11,000	3.95	0.38	0.42	0.54	0.74	5.14
12,000	3.97	0.46	0.50	0.60	0.79	5.19
13,000	3.99	0.48	0.52	0.62	0.81	5.21
13,400	3.99	0.49	0.52	0.62	0.81	5.21

Figure 2
Flow Sim 1 - Laurel Run
Peak Discharges for Alternative Breach Times





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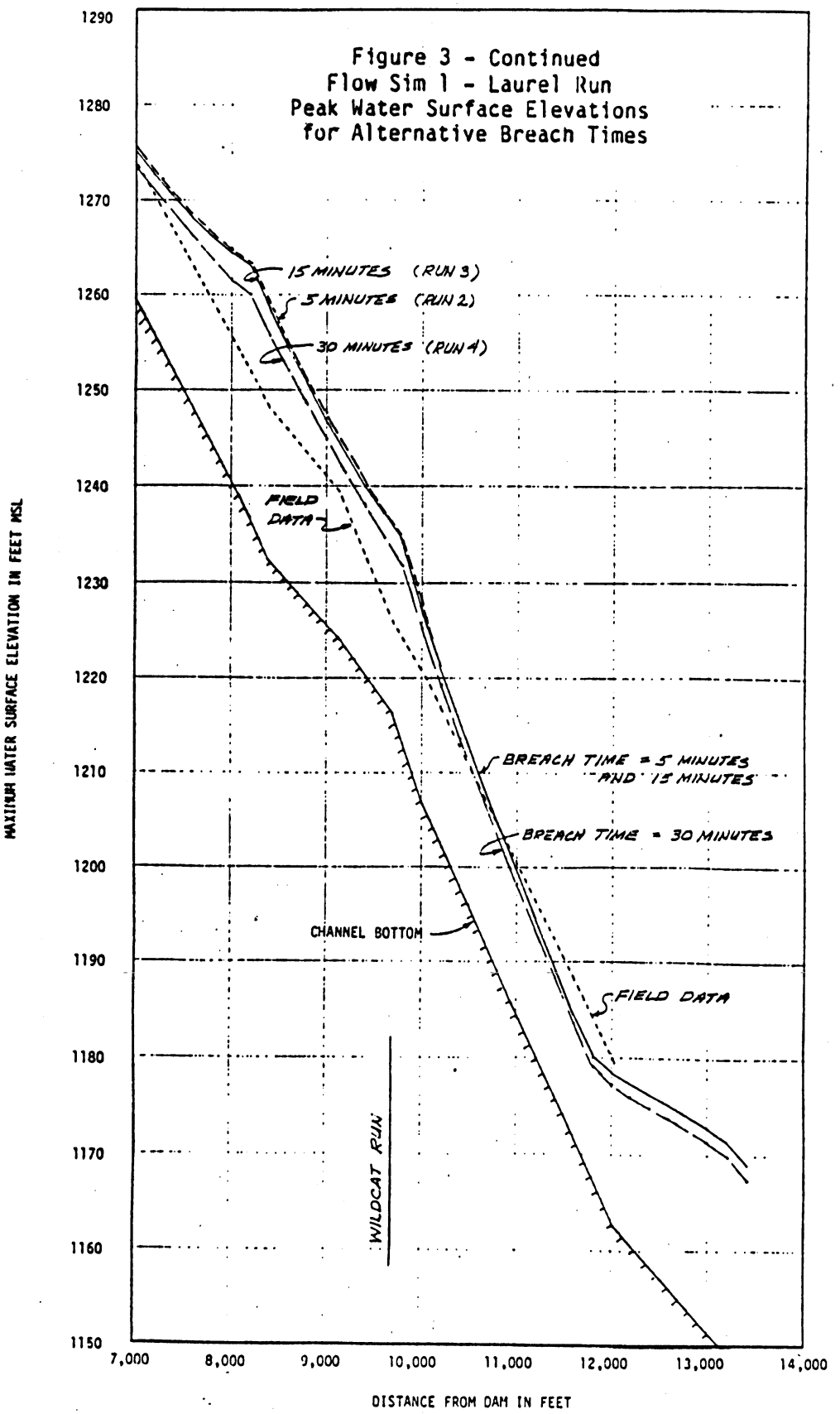


Figure 3 - Continued
Flow Sim 1 - Laurel Run
Peak Water Surface Elevations
for Alternative Breach Times
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
15 MINUTES (RUN 3)
5 MINUTES (RUN 2)
30 MINUTES (RUN 4)
FIELD DATA
BREACH TIME = 5 MINUTES AND 15 MINUTES
BREACH TIME = 30 MINUTES
CHANNEL BOTTOM
FIELD DATA
WILDCAT RUN
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

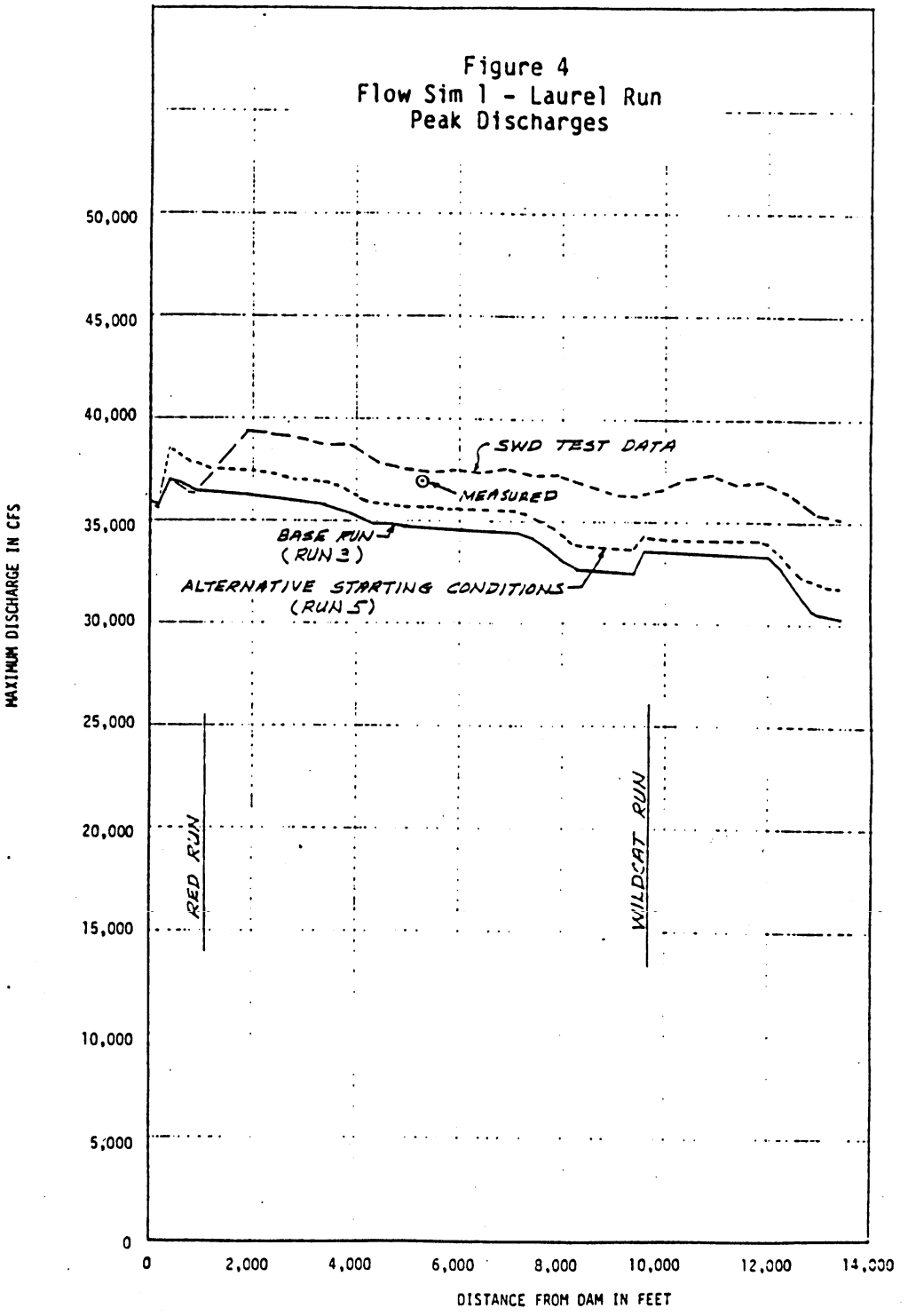


Figure 4
Flow Sim 1 - Laurel Run
Peak Discharges
MAXIMUM DISCHARGE IN CFS
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
SWD TEST DATA
MEASURED
BASE RUN
(RUN 3)
ALTERNATIVE STARTING CONDITIONS
(RUN 5)
RED RUN
WILDCAT RUN
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
DISTANCE FROM DAM IN FEET

FLOW SIM 2 RESULTS

FLOW SIM 2 uses identically the same input data as FLOW SIM 1. A number of the data sets run with FLOW SIM 1 were rerun with FLOW SIM 2. The results of four runs are presented in Tables 5 through 8 and Figures 5 and 6. These runs include the data set for the FLOW SIM 1 base run with doubled N-values and 15-minute breach time, which is labeled run 2, and alternatively a 5-minute breach time, labeled run 4. Runs 1 and 3 have N-values multiplied by factors of 1.5 and 3.0, respectively. Run 1 is designated the FLOW SIM 2 base run since it is the run closest to the base input data while still yielding a solution. Appendix C is a printout of the base run. The remaining run is the test data furnished by SWD along with the program.

The data set for the FLOW SIM 2 base run, with N-values increased by a factor of 1.5, resulted in computational instability when ran by FLOW SIM 1. Other data sets resulting in computational instability do so with both versions of the model. A 5-minute breach time and N-values increased by a factor of 1.5 resulted in instability in FLOW SIM 2 just like in FLOW SIM 1. Results using N-values increased by factors of 1.5, 2.0, and 3.0 are compared in Tables 5 through 8 and Figures 5 and 6. The run with doubled N-values resulted in water surface elevations from 2 to 3 feet higher than the run with N-values increased 1.5 times. The N x 3.0 run has water surface elevations 4 to 6 feet higher than the N x 1.5 run.

Results from successful runs of FLOW SIM 1 and FLOW SIM 2 are almost identical. Peak discharges were found to vary between versions of the model in the range of zero to three percent. Peak water surface elevations were practically always within 0.3 feet and usually within 0.1 feet.

Table 5

Flow Sim 2 - Laurel Run

Peak Discharges

Distance From Dam (Feet)	Maximum Discharge in cfs				
	SWD Test Data	Run 1 15-Min n x 1.5	Run 2 15-Min n x 2.0	Run 3 15-Min n x 3.0	Run 4 5-Min n x 2.0
0	-	33,290	36,070	34,780	55,660
400	37,050	34,690	37,140	35,470	53,330
1,000	36,390	34,140	36,470	34,470	46,080
2,000	39,340	33,920	36,160	33,940	44,380
3,000	39,070	33,710	35,810	33,380	43,370
4,000	38,750	33,340	35,150	32,220	41,090
5,000	37,720	32,930	34,660	31,640	39,940
6,000	37,940	32,810	34,530	31,450	42,670
7,000	37,860	32,680	34,310	31,060	46,050
8,000	37,400	32,110	32,980	28,810	37,860
9,000	36,710	31,630	32,290	27,920	33,730
10,000	37,050	32,530	33,120	28,730	34,050
11,000	37,390	32,460	33,010	28,600	40,770
12,000	37,490	32,330	32,740	28,860	43,120
13,000	35,670	30,570	29,750	24,530	28,480
13,400	35,340	30,290	29,450	24,260	28,010

NOTES:

1) The n-values used in Runs 1,2, and 3 are 1.5, 2.0 and 3.0, respectively, times larger than the estimated actual n-values. All other input data for these three runs are identical. The breach time is 15 minutes.

2) A printout of Run 1 is provided as Appendix D.

Table 6

Flow Sim 2 - Laurel Run

Peak Water Surface Elevations

Distance From Dam (Feet)	Maximum Water Surface Elevation in Feet msl					
	Field Data	SWD Test Data	Run 1 15-Min n x 1.5	Run 2 15-Min n x 2.0	Run 3 15-Min n x 3.0	Run 4 5-Min n x 2.0
0	-		1411.1	1404.4	1407.3	1406.1
400	1398.5	1402.0	1399.3	1402.2	1405.4	1404.4
1,000	1392.4	1395.9	1395.3	1397.9	1401.1	1400.2
2,000	1377.1	1397.5	1376.6	1378.9	1381.6	1380.4
3,000	1361.1	1364.7	1360.0	1362.0	1364.2	1363.1
4,000	1343.7	1346.4	1343.3	1346.1	1349.0	1347.6
5,000	1320.8	1324.9	1319.1	1322.0	1325.0	1323.3
6,000	1298.7	1298.7	1293.7	1295.5	1297.5	1297.8
7,000	1274.1	1276.8	1273.3	1275.2	1277.2	1276.3
8,000	1255.7	1262.7	1261.5	1264.4	1267.1	1264.9
9,000	1241.0	1243.6	1244.4	1246.9	1249.6	1247.3
10,000	1220.9	1224.7	1224.3	1227.2	1230.1	1228.4
11,000	1200.5	1199.8	1197.7	1199.5	1201.3	1201.9
12,000	1180.0	1179.7	1176.3	1178.3	1180.2	1177.9
13,000	-	1176.4	1170.3	1172.5	1174.3	1172.0
13,400	-	1167.2	1166.5	1168.6	1170.4	1168.1

Table 7

Flow Sim 2 - Laurel Run

Maximum Flow Depths

Distance From Dam (Feet)	Maximum Flow Depth in Feet: Field Data	SWD Test Data	Run 1 15-Min n x 1.5	Run 2 15-Min n x 2.0	Run 3 15-Min n x 3.0	Run 4 5-Min n x 2.0
0	-	-	19.1	12.4	15.3	14.1
400	11.0	13.9	11.4	14.3	17.5	16.4
1,000	16.0	20.0	18.9	21.5	24.7	23.8
2,000	16.0	18.2	15.3	17.7	20.3	19.1
3,000	14.5	16.1	13.3	15.2	17.4	16.4
4,000	17.5	19.7	16.7	19.5	22.3	20.9
5,000	20.5	19.7	18.7	21.6	24.7	22.9
6,000	18.5	15.6	13.2	15.0	17.0	17.3
7,000	14.5	15.0	13.1	15.0	17.0	16.1
8,000	15.0	18.6	18.3	21.2	23.9	21.7
9,000	15.5	18.3	18.9	21.4	24.1	21.8
10,000	14.0	17.1	17.4	20.3	23.2	21.4
11,000	16.0	14.7	12.5	14.3	16.2	16.7
12,000	17.0	15.6	12.9	14.9	16.8	14.6
13,000	-	20.2	18.8	20.9	22.8	20.4
13,400	-	20.2	19.5	21.6	23.4	21.1

Table 8

Flow Sim 2 - Laurel Run

Time to Crest Elevation

Distance From Dam (Feet)	Time to Maximum Elevation in Hours				
	SWD Test Data	Run 1 12-Min n x 1.5	Run 2 15-Min n x 2.0	Run 3 15-Min n x 3.0	Run 4 5-Min n x 2.0
0	-	0.35	0.35	0.35	0.19
400	3.79	0.36	0.35	0.36	0.21
1,000	3.80	0.36	0.36	0.36	0.21
2,000	3.81	0.38	0.37	0.38	0.22
3,000	3.82	0.39	0.39	0.40	0.24
4,000	3.85	0.41	0.42	0.44	0.28
5,000	3.86	0.42	0.43	0.46	0.29
6,000	3.87	0.43	0.44	0.48	0.28
7,000	3.89	0.45	0.46	0.51	0.31
8,000	3.91	0.48	0.50	0.57	0.38
9,000	3.92	0.49	0.51	0.58	0.39
10,000	3.93	0.50	0.53	0.60	0.38
11,000	3.94	0.52	0.54	0.62	0.40
12,000	3.97	0.55	0.60	0.72	0.48
13,000	4.00	0.57	0.62	0.75	0.53
13,400	4.00	0.58	0.62	0.75	0.53

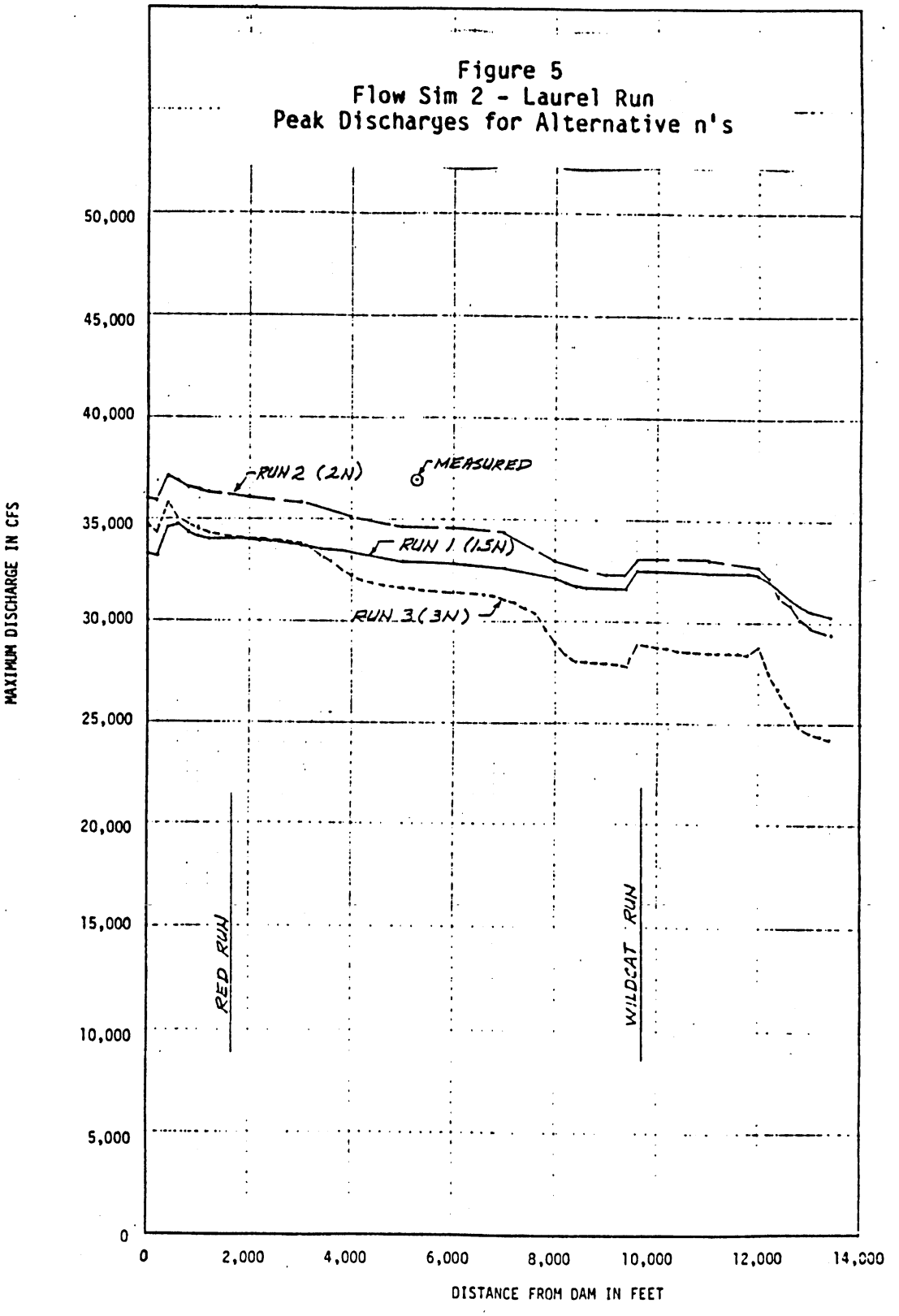


Figure 5
Flow Sim 2 - Laurel Run
Peak Discharges for Alternative n's
MAXIMUM DISCHARGE IN CFS
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
RUN 2 (2N)
MEASURED
RUN 1 (1.5N)
RUN 3 (3N)
RED RUN
WILDCAT RUN
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
DISTANCE FROM DAM IN FEET

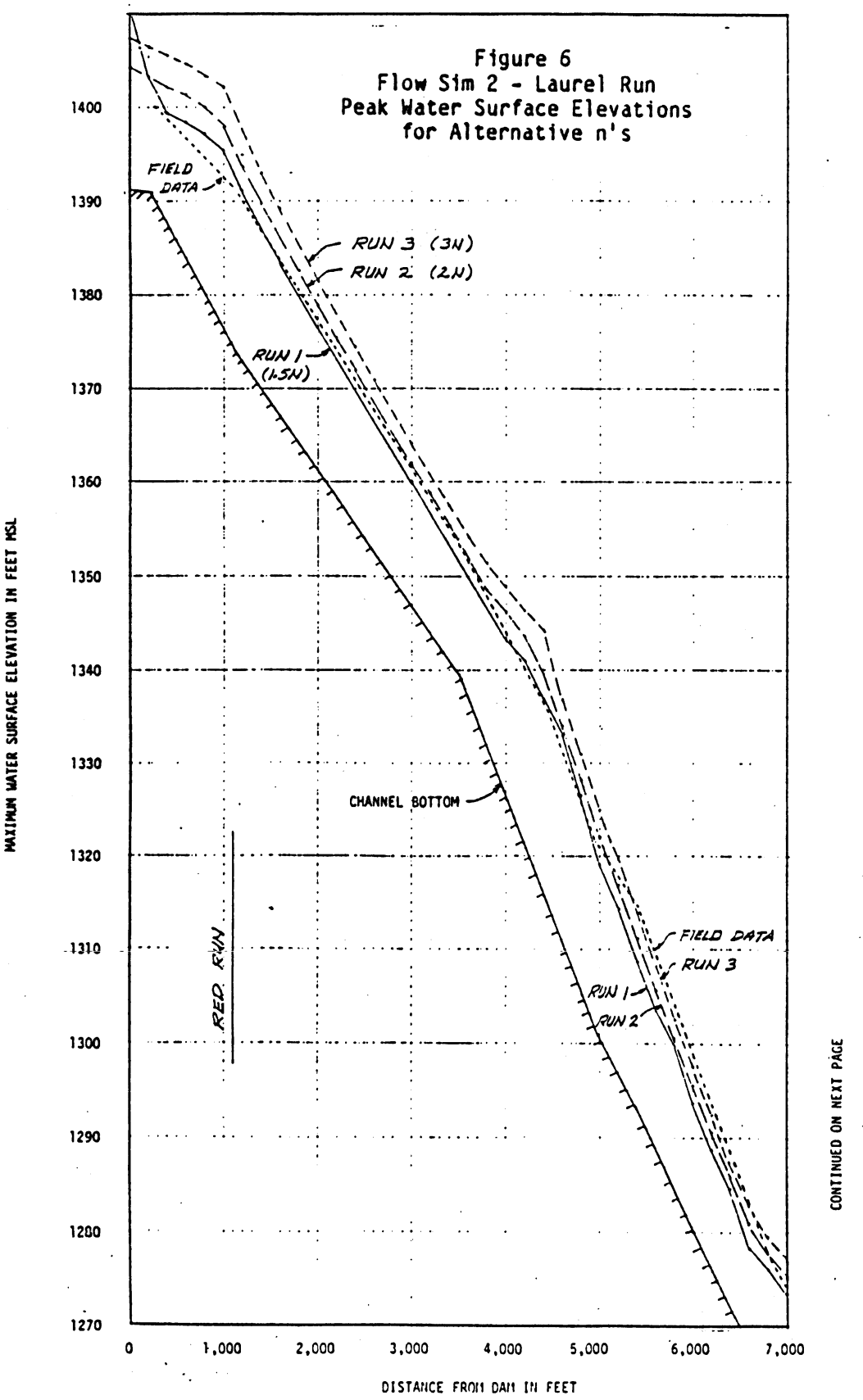


Figure 6
Flow Sim 2 - Laurel Run
Peak Water Surface Elevations
for Alternative n's
FIELD DATA
RUN 3 (3N)
RUN 2 (2N)
RUN 1 (1.5N)
CHANNEL BOTTOM
RED RUN
FIELD DATA
RUN 3
RUN 1
RUN 2
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
1300
1290
1280
1270
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
DISTANCE FROM DAM IN FEET
CONTINUED ON NEXT PAGE

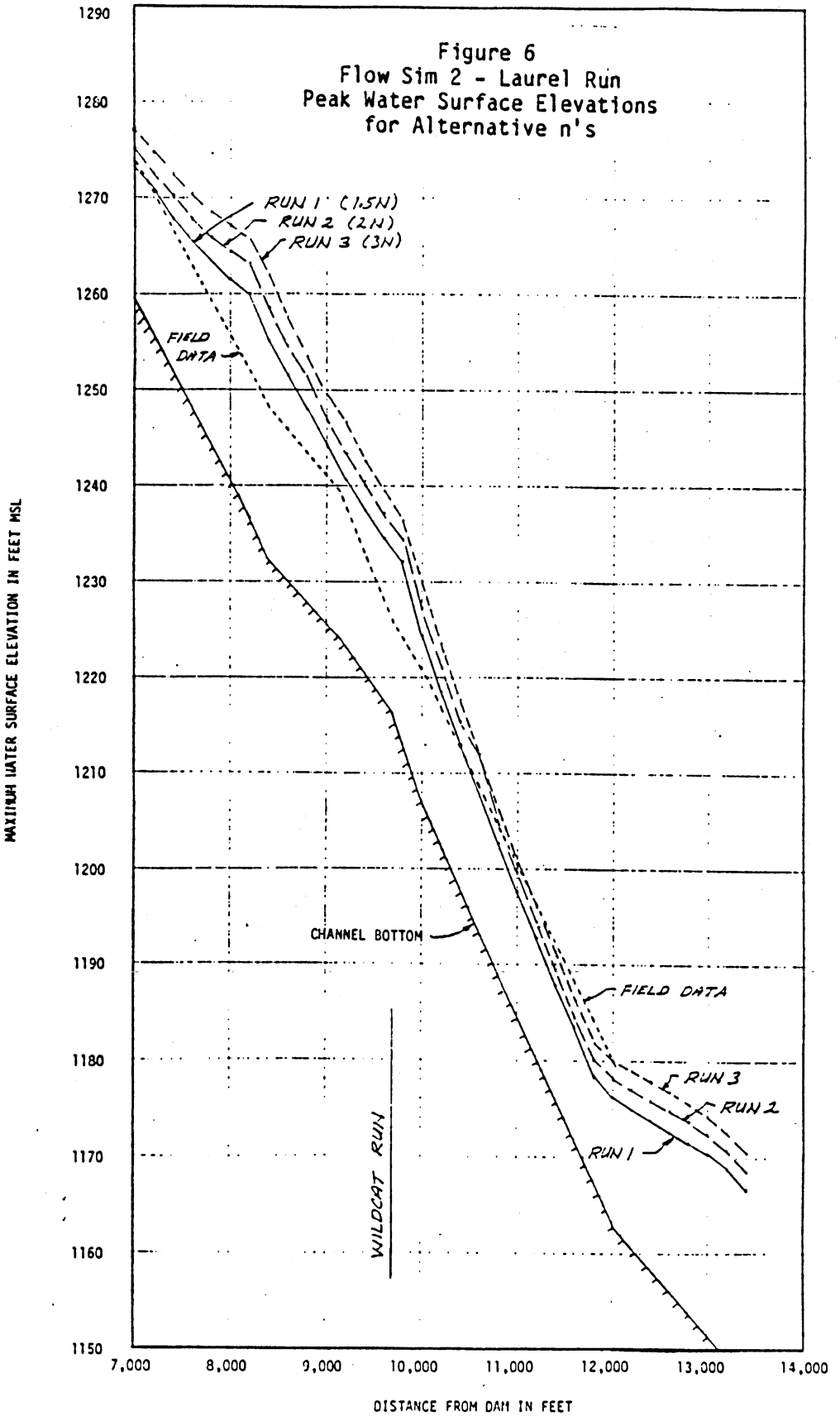


Figure 6
Flow Sim 2 - Laurel Run
Peak Water Surface Elevations
for Alternative n's
RUN 1 (1.5N)
RUN 2 (2N)
RUN 3 (3N)
FIELD DATA
CHANNEL BOTTOM
FIELD DATA
RUN 3
RUN 2
RUN 1
WILDCAT RUN
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

DAMBRK RESULTS

Results for the DAMBRK base run are presented in Table 9 and Figures 7 and 8. A printout of the base run is provided in Appendix D. The DAMBRK and FLOW SIM 1 analyses were conducted simultaneously. Computation instability difficulties similar to those encountered with FLOW SIM 1 and 2 were also encountered with DAMBRK. The originally estimated Manning N values were doubled in order to obtain a solution. Numerous runs were made with various combinations of breach times, N-values, spatial step sizes, convergence criterion, and other input data in order to obtain a solution. Most runs resulted in nonconvergence and no solution. A constant spatial step size (DXM) was finally made as small as possible without exceeding the limit of 200 cross-sections. Supercritical flow was considered to be a primary reason for the nonconvergence difficulties. Consequently, the values of N were increased at selected locations in a trial and error manner without success. Finally all the N-values were increased by multiplying by a constant factor in a trial and error attempt to obtain a solution with the input data as close to actual conditions as possible. The doubled N values force subcritical flow to occur throughout the simulation.

Figures 7 and 8 are plots of maximum discharge and maximum water surface elevation for the base run and alternative runs with breach times of 30 and 60 minutes. Runs with breach times less than 15 minutes resulted in nonconvergence messages and no solution.

Table 9
DAMBRK - Laurel Run
Base Run Results

Distance From Dam (Feet)	Maximum Discharge (cfs)	Maximum Water Surface Elevation (Feet)	Time to Maximum Elevation (hours)
0	41,500	1406.0	0.250
400	40,000	1403.7	0.262
1,000	38,900	1397.9	0.262
2,000	38,300	1378.2	0.275
3,000	37,750	1362.0	0.300
4,000	37,000	1343.9	0.325
5,000	36,600	1320.6	0.337
6,000	36,400	1295.9	0.350
7,000	35,900	1275.6	0.375
8,000	34,300	1261.8	0.412
9,000	33,500	1247.2	0.425
10,000	34,000	1225.1	0.437
11,000	34,000	1198.0	0.450
12,000	33,400	1179.4	0.487
13,000	32,000	1172.3	0.500
13,400	32,100	1167.3	0.500

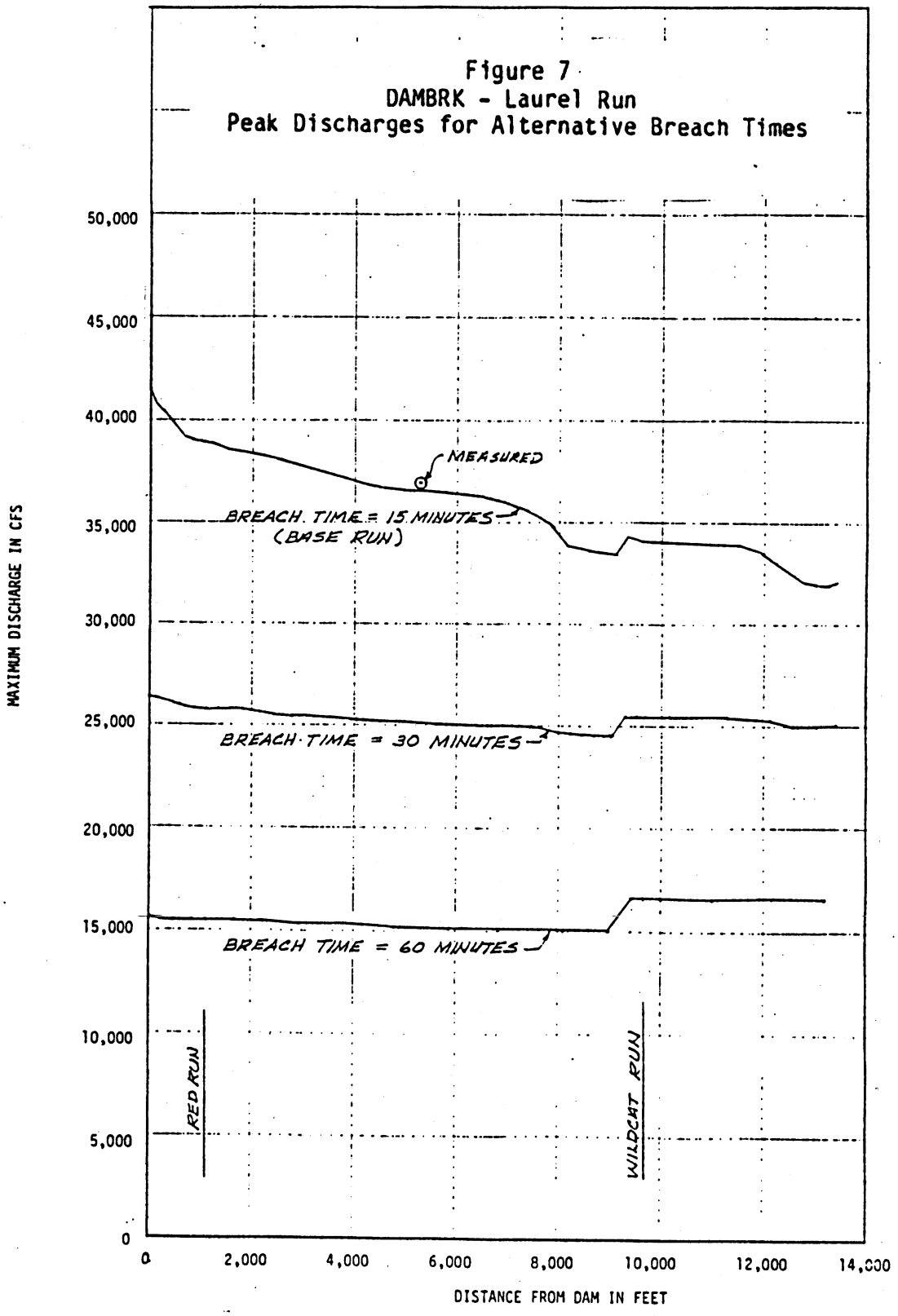
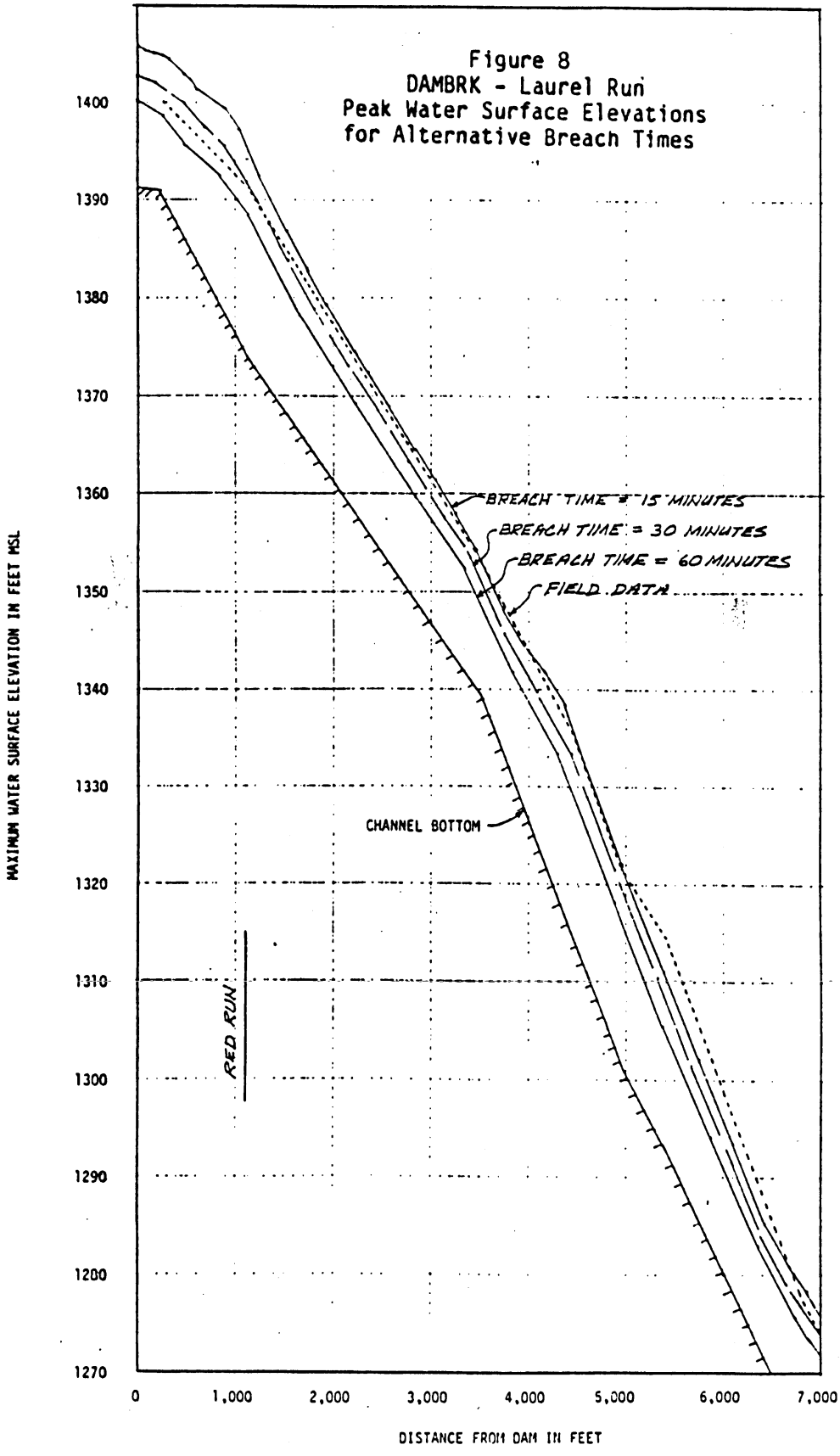


Figure 7
DAMBRK - Laurel Run
Peak Discharges for Alternative Breach Times
MAXIMUM DISCHARGE IN CFS
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
MEASURED
BREACH TIME = 15 MINUTES
(BASE RUN)
BREACH TIME = 30 MINUTES
BREACH TIME = 60 MINUTES
RED RUN
WILDCAT RUN
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
DISTANCE FROM DAM IN FEET



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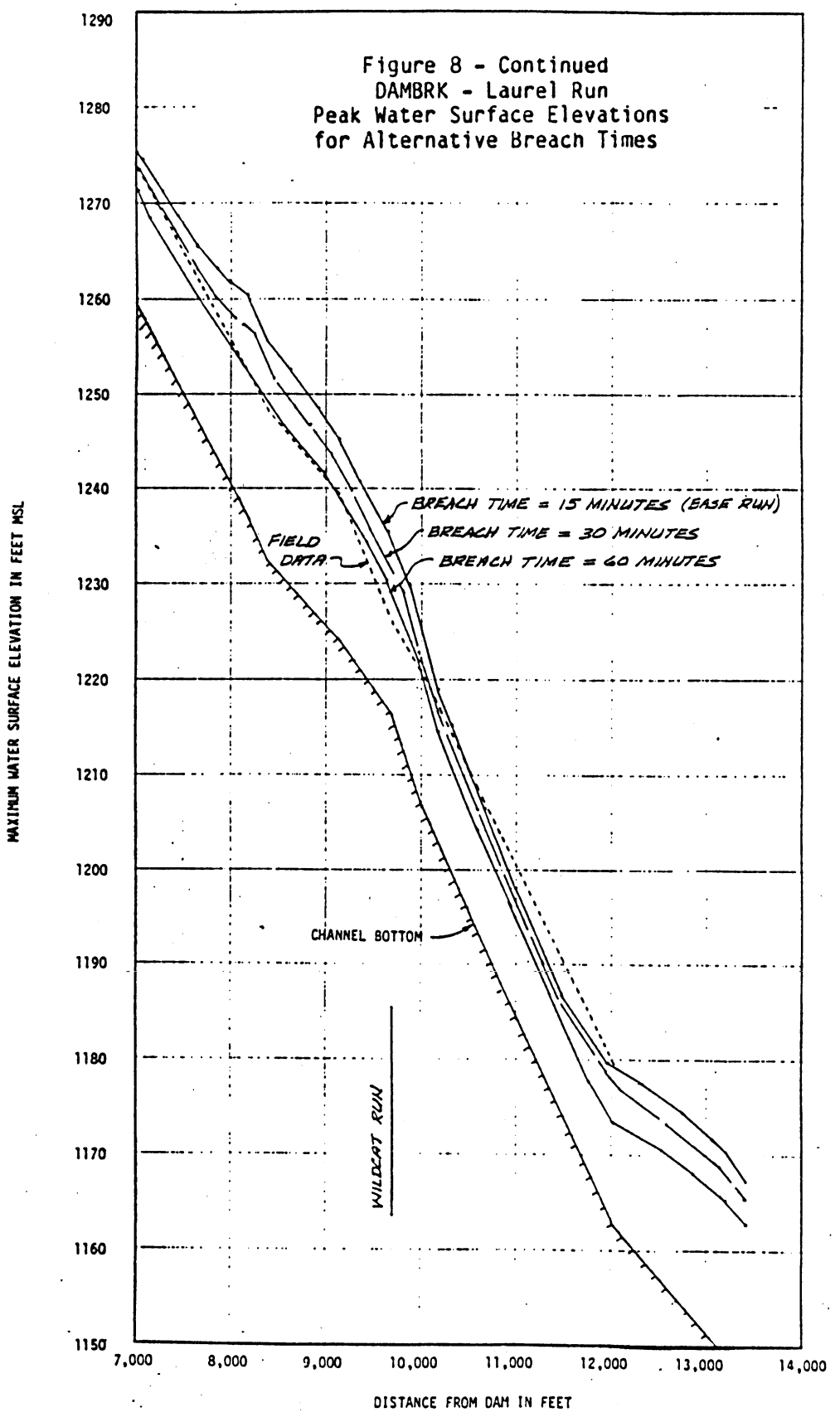


Figure 8 - Continued
DAMBRK - Laurel Run
Peak Water Surface Elevations
for Alternative Breach Times
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
BREACH TIME = 15 MINUTES (BASE RUN)
BREACH TIME = 30 MINUTES
BREACH TIME = 60 MINUTES
FIELD DATA
CHANNEL BOTTOM
WILDCAT RUN
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

HEC-1 RESULTS

The results from four runs of HEC-1 are summarized in Tables 10 through 12 and Figures 9 and 10. A printout of the base run is provided as Appendix E. The base run (labeled Run 1 in the tables and figures) has the number of routing steps (NSTPS) parameter set equal to one (1) for each reach. NSTPS values of 1 are considered appropriate since the channel reaches are relatively short. However, a run with a NSTPS value of 2 for all reaches is presented as Run 2 to demonstrate the sensitivity of model results to this calibration parameter. The base run has a tabulation interval (NMIN) of 1 minute. Run 3 is identical to the base run except NMIN is 4 minutes. The fourth run has a starting water surface elevtion of 1425.0 feet. The breach initiates when the water surface reaches elevation 1437.2 feet. All the other runs start the simulation with the initial water surface elevation at 1437.2 feet. The model also develops the reservoir storage versus outlfow relationship from an inputed spillway elevation and weir coefficient in Run 4. A reservoir storage versus outflow table is provided as input data for the other runs. Run 4 has a NSTPS value of 1 for all reaches and a NMIN of 4.0 minutes.

The modified Puls option was used for channel routing. A cross-section representative of a reach was furnished as input data. Outflow versus storage functions were computed by the model, assuming the representative cross-section is constant through the reach and uniform flow.

The base run is about 2.2 percent above the measured peak discharge. However, the base run peak water surface profile is significantly higher than the measured high water marks. The computed peak flow depths are as much as 2.25 times the field data. The results of all four runs are close. The peak discharges for the alternative runs are all within 12 percent of the base run. The water surface elevations varied by less than 0.5 foot between the four runs. Since the peak water surface profiles are so close, only the base run is plotted in Figure 10.

Table 10
HEC-1 - Laurel run
Peak Discharges

Distance From Dam (Feet)	Maximum Discharge in cfs			
	Run 1 Base	Run 2	Run 3	Run 4
0	42,140	42,140	35,400	35,780
125	42,210	41,300	40,030	35,900
690	40,360	40,540	36,940	36,500
2,325	40,810	41,470	37,800	38,940
3,980	37,930	39,760	34,000	35,890
4,705	37,920	39,750	34,340	36,380
5,185	37,940	39,660	34,820	36,620
6,100	37,500	39,570	35,290	36,890
7,500	36,330	38,690	34,630	35,460
8,300	36,080	38,480	34,370	34,750
8,765	36,030	38,530	34,280	34,410
9,415	36,030	38,440	33,770	34,790
9,850	36,700	39,070	34,160	35,790
11,015	36,590	39,170	34,880	36,160
12,715	35,030	38,170	34,720	34,910
13,400	34,970	38,250	34,740	34,250

NOTES:

1. Run 1 used a NMIN of 1.0 minutes and NSTPS of 1 for all reaches. Run 1 is the HEC-1 base run.

2. Input data for run 2 is identical to run 1 except NSTPS = 2 for all reaches.

3. Input data for run 3 is identical to run 1 except NMIN = 4.0 minutes.

4. Run 4 has a NMIN of 4.0 minutes and NSTPS of 1 for all reaches. The starting reservoir water surface elevation is 1425.0 feet for run 4. The other runs have a starting reservoir water surface elevation of 1437.2 feet.

Table 11
HEC-1 - Laurel Run
Peak Water Surface Elevations

Distance From Dam (Feet)	Maximum Water Elevation in Feet			
	Run 1 Base	Run 2	Run 3	Run 4
0	1437.7	1437.7	1437.7	1437.3
125	1400.8	1400.7	1400.6	1400.2
690	1406.6	1406.6	1405.9	1405.8
2,325	1389.4	1389.6	1388.9	1389.1
3,980	1351.6	1351.8	1351.1	1351.3
4,705	1331.8	1332.1	1331.2	1331.6
5,185	1317.4	1317.7	1316.8	1317.2
6,100	1308.2	1308.5	1307.8	1308.1
7,500	1275.0	1275.3	1274.8	1274.9
8,300	1250.0	1250.4	1249.8	1249.8
8,765	1248.9	1249.5	1248.5	1248.6
9,415	1241.6	1242.2	1241.0	1241.2
9,850	1231.1	1231.5	1230.6	1230.9
11,015	1220.5	1221.0	1220.2	1220.4
12,715	1172.2	1172.6	1172.2	1172.2
13,400	1162.9	1163.5	1162.8	1162.7

Table 12
HEC-1 - Laurel Run
Time to Peak Elevation

Distance From Dam (Feet)	Maximum Water Elevation in Feet			
	Run 1 Base	Run 2	Run 3	Run 4
0	-	-	-	-
125	0.25	0.23	0.20	5.00
690	0.25	0.25	0.27	5.00
2,325	0.27	0.27	0.27	5.00
3,980	0.28	0.30	0.27	5.07
4,705	0.30	0.30	0.33	5.07
5,185	0.30	0.30	0.33	5.07
6,100	0.32	0.32	0.33	5.07
7,500	0.33	0.33	0.33	5.07
8,300	0.33	0.35	0.33	5.07
8,765	0.35	0.35	0.33	5.07
9,415	0.35	0.35	0.33	5.13
9,850	0.35	0.37	0.40	5.13
11,015	0.37	0.37	0.40	5.13
12,715	0.38	0.38	0.40	5.13
13,400	0.40	0.40	0.40	5.13

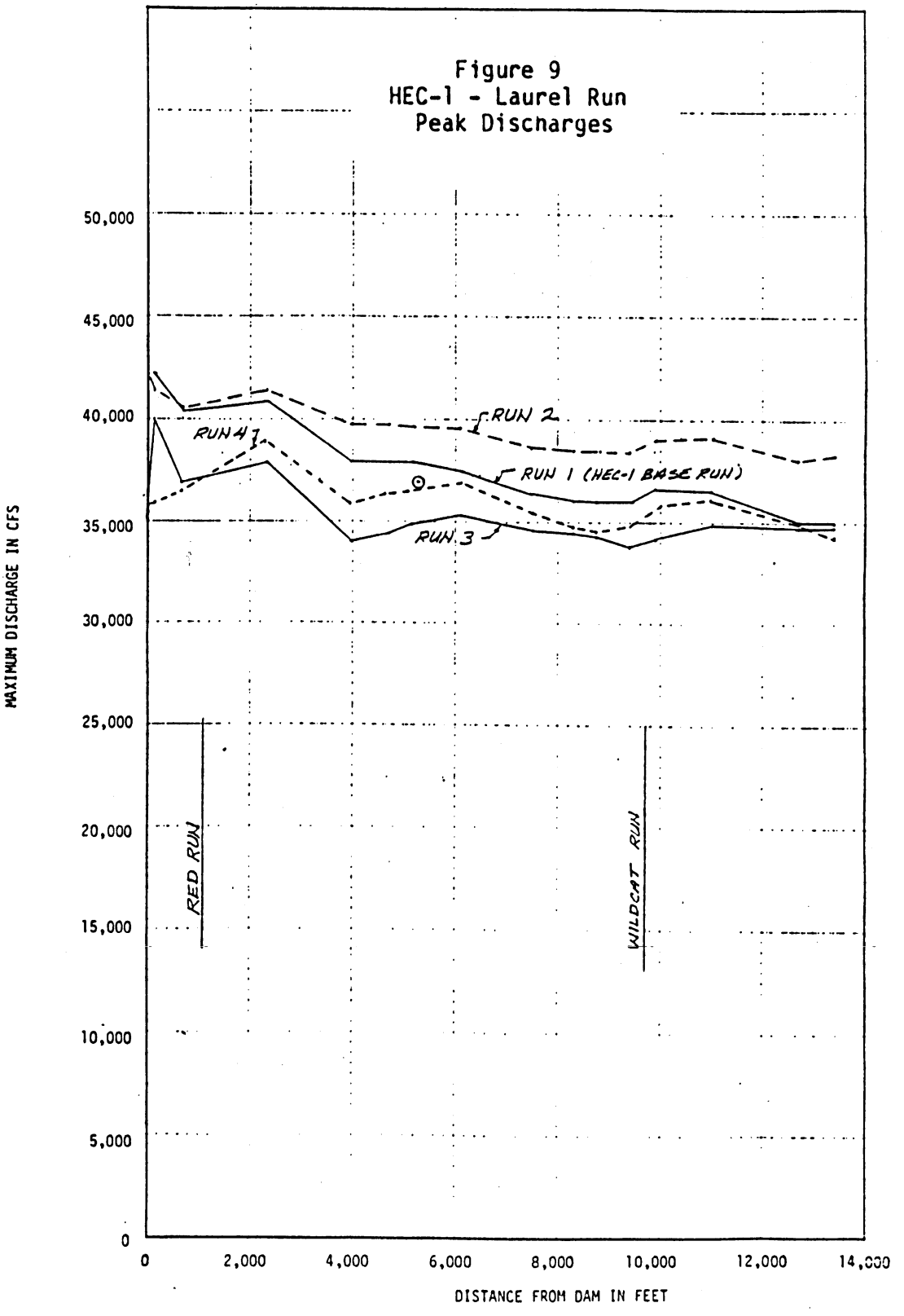


Figure 9
HEC-1 - Laurel Run
Peak Discharges
MAXIMUM DISCHARGE IN CFS
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
RUN 2
RUN 4
RUN 1 (HEC-1 BASE RUN)
RUN 3
RED RUN
WILDCAT RUN
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
DISTANCE FROM DAM IN FEET

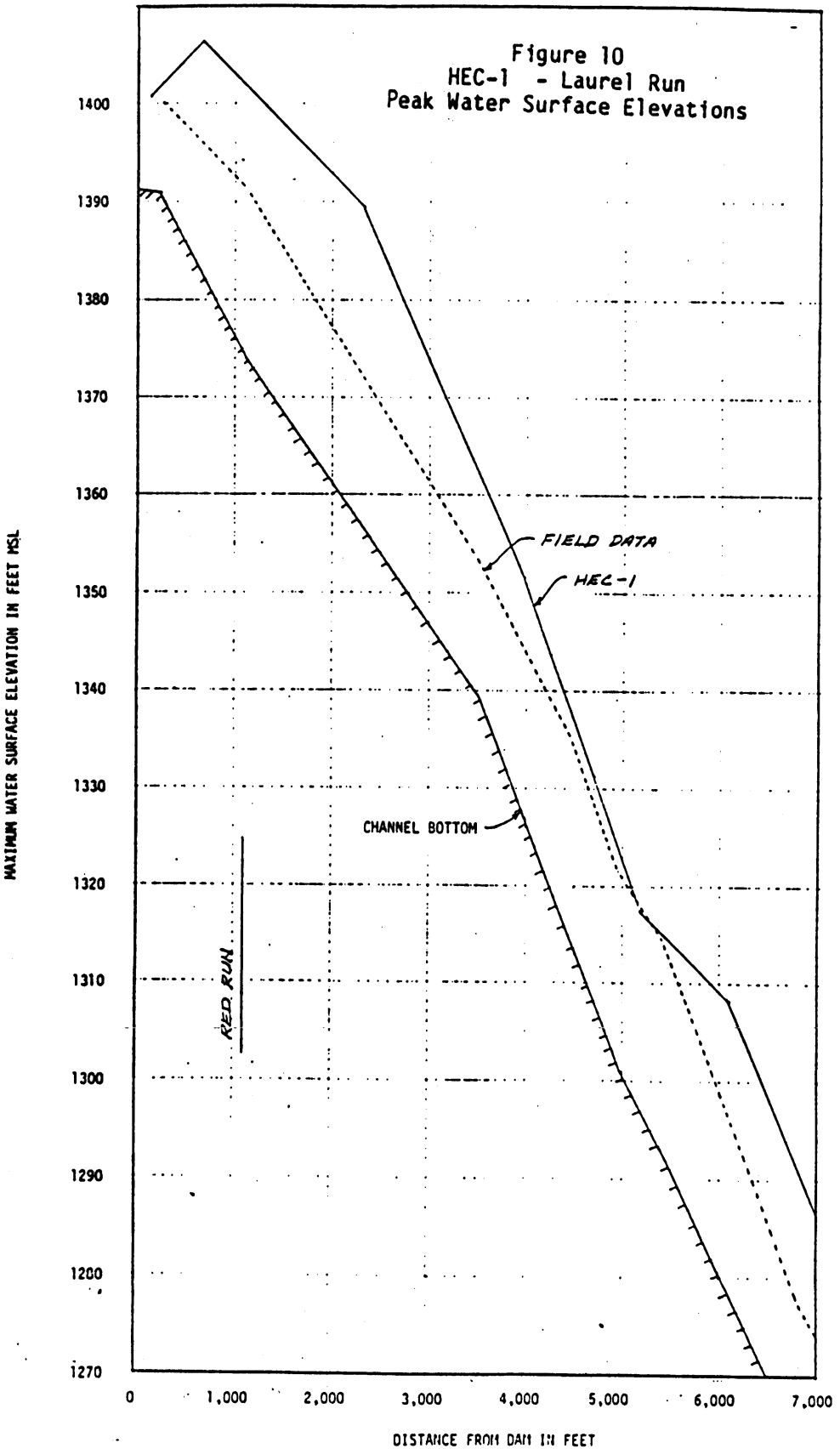


Figure 10
HEC-1 - Laurel Run
Peak Water Surface Elevations
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
1300
1290
1280
1270
FIELD DATA
HEC-1
CHANNEL BOTTOM
RED RUN
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
DISTANCE FROM DAM IN FEET
CONTINUED ON NEXT PAGE

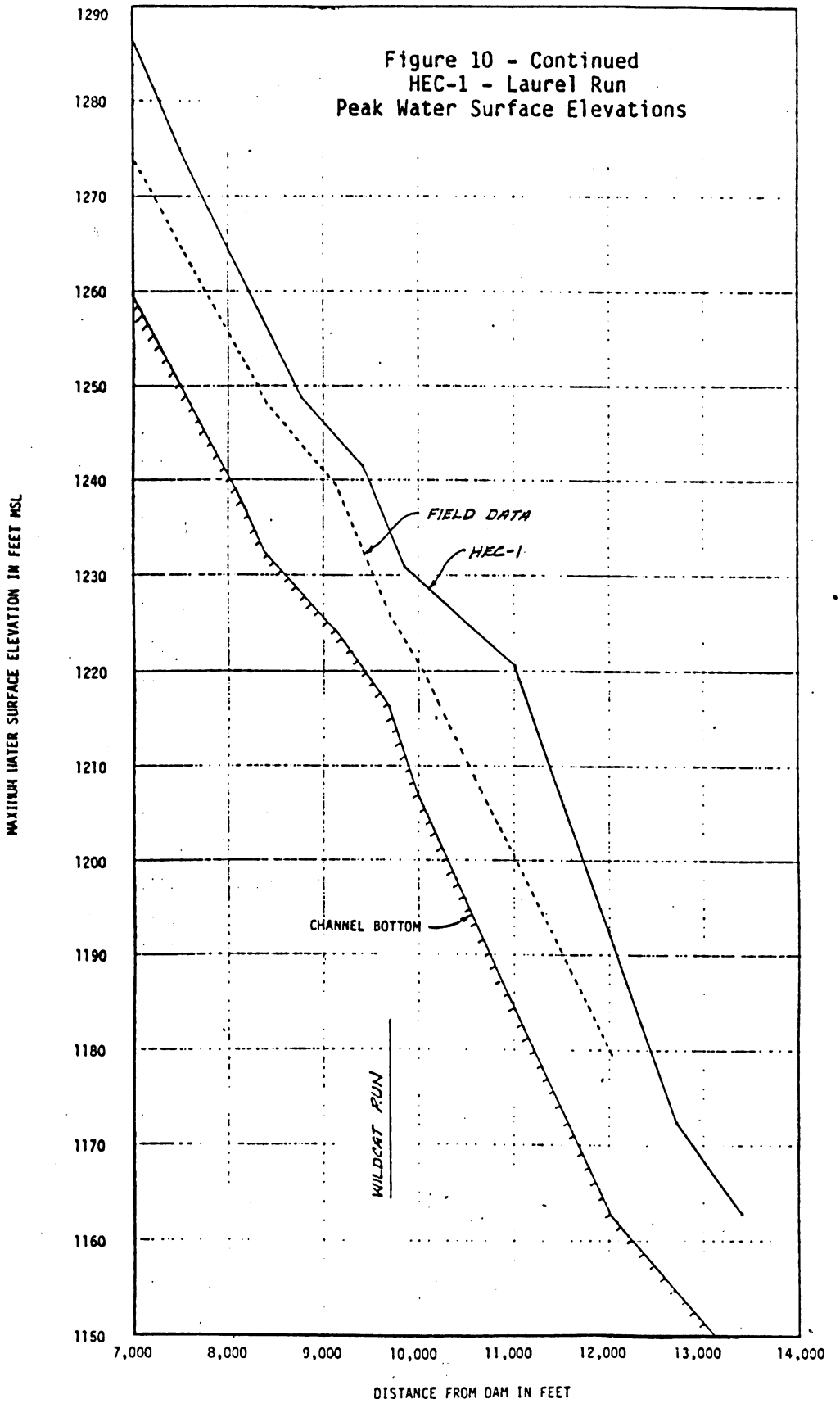


Figure 10 - Continued
HEC-1 - Laurel Run
Peak Water Surface Elevations
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
FIELD DATA
HEC-1
CHANNEL BOTTOM
WILDCAT RUN
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

SMPDBK RESULTS

The results from seven of the runs made with SMPDBK are summarized in Tables 13 through 16 and Figures 12 through 15. A printout of the base run (labeled Run 3) is provided as Figure 11. Runs 1,2,3, and 4 reflect alternative breach times of 1.0 minute, 5.0 minutes, 15.0 minutes, and 30 minutes, respectively, with all other input data held constant. Runs 3,5,6, and 7 have values for the Manning roughness coefficients set equal to 1.0, 0.5, 1.5, and 2.0 times the actual estimated n values, with all other input data held constant.

The base run peak discharge is almost 1.5 times the measured value a mile below the dam. The base run flow depths vary from somewhat below to 1.5 times as high as the measured data. Figures 12 and 14 show the sensitivity of the peak discharges to breach time and Manning n coefficients, respectively. Figures 13 and 15 show the sensitivity of the peak water surface profile to breach time and n coefficients, respectively.

Figure 11

SMPDBK Base Run Printout

PROFILE OF CRESTS AND TIMES FOR
LAUREL RUN DAM
ON LAUREL RUN RIVER

LONG OPTION

DISTANCE (MILES)	PEAK FLOW (CFS)	PEAK DEPTH (FT)	TIME PEAK (HRS)	FLOOD STAGE (FT)	TIME FLOOD (HRS)	TIME FALL BELOW FS (HRS)
0	65327	8.96	.3	15	-999	-999
.21	60790	20.01	.3	15	.1	.2
.84	55404	22.13	.3	15	.1	.3
1.02	53397	15.87	.3	15	.3	.3
1.55	48883	16.96	.4	15	.3	.4
1.73	47610	18.98	.4	15	.2	.4
1.89	46834	18.5	.4	15	.3	.4
2.54	43414	16.54	.4	15	.4	.5

** SUMMARY OF INPUT DATA **

NAME OF DAM		= LAUREL RUN
NAME OF RIVER		= LAUREL RUN
DAM CREST ELEVATION	(FT.MSL)	= 1437.2
BREACH BOTTOM ELEV	(FT. MSL)	= 1392
FINAL BREACH WIDTH	(FT)	= 110.7
VOLUME OF RESERVOIR	(AC-FT)	= 450
SURFACE AREA	(ACRES)	= 35
TIME OF FAILURE	(MIN)	= 15
SPILLWAY/TURBINE FLOW	(CFS)	= 8900

** CROSS SECTION DATA **

X-SEC NO.	MILE NO.	ELEV	TOPWIDTH	MANNING N	VALLEY HT	FS
1	0	1392	0	.03	50.199999815	
		1392.5	150			
		1395.1	315			
		1397	400			
		1405.5	470			

Figure 11 Continued

SMPDBK Base Run Printout

2	.21	1373.9	0	.05	50.199999815
		1374.3	25		
		1374.9	45		
		1382	132.5		
		1390.2	204		
3	.84	1315.1	0	.06	50.199999815
		1317	42.5		
		1325.5	130		
		1331	185		
		1335.8	230		
4	1.02	1293.2	0	.045	50.199999815
		1297.7	100		
		1299.8	147.5		
		1302.1	160		
		1317	230		
5	1.55	1236.4	0	.055	50.199999815
		1241.1	90		
		1242.5	145		
		1247.5	240		
		1252.1	320		
6	1.73	1224	0	.045	50.199999815
		1226.5	55		
		1228.4	100		
		1234.5	140		
		1240.8	180.6		
7	1.89	1206.9	0	.05	50.199999815
		1207.7	41.3		
		1211.4	99		
		1217.8	120		
		1227.8	140		
8	2.54	1147	0	.058	50.199999815
		1148	40		
		1151.4	120		
		1152.5	140		
		1177	575		

Table 13
SMPDBK - Laurel Run
Peak Discharges

Distance From Dam (Feet)	Maximum Discharge in cfs						
	Run 1 1-Min n	Run 2 5-Min n	Run 3 15-Min n	Run 4 30-Min n	Run 5 15-Min 0.5 n	Run 6 15-Min 1.5 n	Run 7 15-Min 2.0-n
0	108,590	92,670	65,330	42,800	65,330	65,330	65,330
1,110	96,870	84,850	60,790	40,540	62,310	59,280	54,860
4,440	85,260	74,370	55,400	38,730	60,020	51,300	47,490
5,390	81,470	71,240	53,400	37,590	58,550	49,290	45,300
8,180	72,920	64,300	48,880	34,960	55,310	44,460	40,410
9,130	70,620	62,390	47,610	34,260	54,390	42,920	39,040
9,980	69,270	61,250	46,830	33,830	53,820	42,240	38,250
13,400	63,260	56,070	43,410	31,600	50,850	38,320	34,460

NOTES:

1. Run 3 is the SMPDBK base run.

2. Runs 1,2, and 3 have breach times of 1 minute, 5 minutes, and 15 minutes, respectively. All other input data is identical.

3. Runs 3,5,6, and 7 have n-values of the actual estimated values, 0.5 times the actual, 1.5 times the actual, and 2.0 times the actual, respectively. All other input data is identical.

Table 14
SMPDBK - Laurel Run
Peak Water Surface Elevations

Distance From Dam (Feet)	Maximum Water Surface Elevation in Feet msl						
	Run 1 1-Min n	Run 2 5-Min n	Run 3 15-Min n	Run 4 30-Min n	Run 5 15-Min 0.5 n	Run 6 15-Min 1.5 n	Run 7 15-Min 2.0 n
0	1403.5	1402.6	1401.0	1399.3	1398.4	1402.9	1404.6
1,110	1398.6	1397.2	1393.9	1390.6	1388.7	1397.7	1400.0
4,440	1341.7	1340.2	1337.2	1334.1	1332.2	1340.5	1342.9
5,390	1312.6	1311.3	1309.1	1306.7	1305.2	1311.7	1313.6
8,180	1256.1	1255.2	1253.4	1251.4	1250.1	1255.5	1257.4
9,130	1246.6	1245.4	1243.0	1240.4	1238.8	1245.7	1247.6
9,980	1229.3	1228.0	1225.4	1222.7	1221.0	1228.4	1230.4
13,400	1166.4	1165.5	1163.5	1161.5	1160.2	1165.7	1167.1

Table 15
SMPDBK - Laurel Run
Peak Flow Depths

Distance From Dam (Feet)	Maximum Depth in Feet						
	Run 1 1-Min n	Run 2 5-Min n	Run 3 15-Min n	Run 4 30-Min n	Run 5 15-Min 0.5 n	Run 6 15-Min 1.5 n	Run 7 15-Min 2.0 n
0	11.5	10.6	9.0	7.3	6.4	10.9	12.6
1,110	24.7	23.3	20.0	16.7	14.8	23.8	26.1
4,440	26.6	25.1	22.1	19.0	17.1	25.4	27.8
5,390	19.4	18.2	15.9	13.5	12.0	18.5	20.4
8,180	19.7	18.8	17.0	15.0	13.7	19.1	21.0
9,130	22.6	21.4	19.0	16.4	14.8	21.7	23.6
9.980	22.4	21.1	18.5	16.0	14.1	21.7	23.5
13,400	19.4	18.5	16.5	14.5	13.2	18.7	20.1

Table 16
SMPDBK - Laurel Run
Time to Peak Elevation

Distance From Dam (Feet)	Maximum Discharge in cfs						
	Run 1 1-Min n	Run 2 5-Min n	Run 3 15-Min n	Run 4 30-Min n	Run 5 15-Min 0.5 n	Run 6 15-Min 1.5 n	Run 7 15-Min 2.0 n
0	0	.1	.3	.5	.3	.3	.3
1,110	0	.1	.3	.5	.3	.3	.3
4,440	.1	.1	.3	.6	.3	.3	.4
5,390	.1	.1	.3	.6	.3	.3	.4
8,180	.1	.2	.4	.6	.3	.4	.4
9,130	.1	.2	.4	.6	.3	.4	.5
9,980	.1	.2	.4	.6	.3	.4	.5
13,400	.2	.3	.4	.7	.4	.5	.6

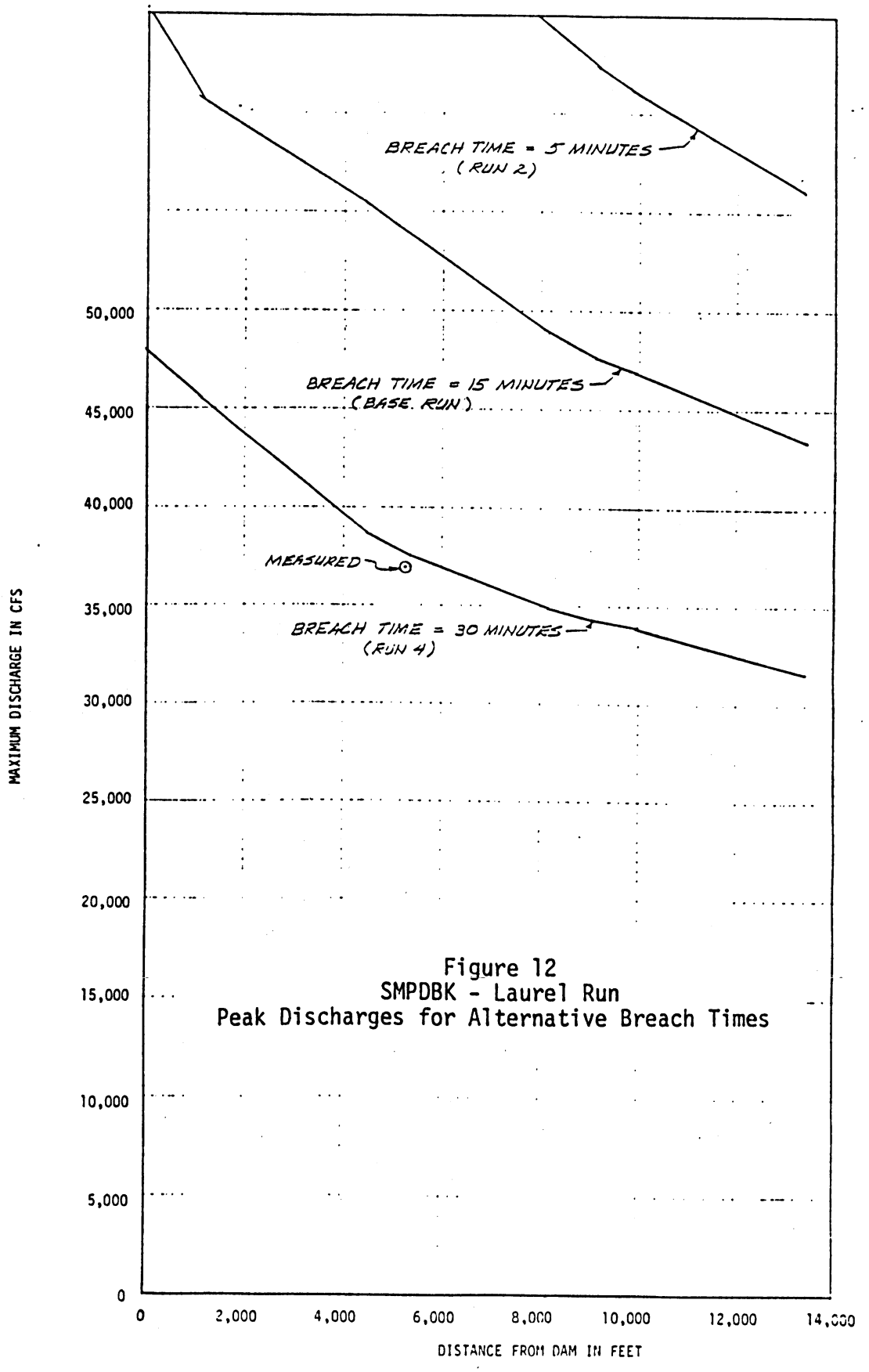


Figure 12
SMPDBK - Laurel Run
Peak Discharges for Alternative Breach Times

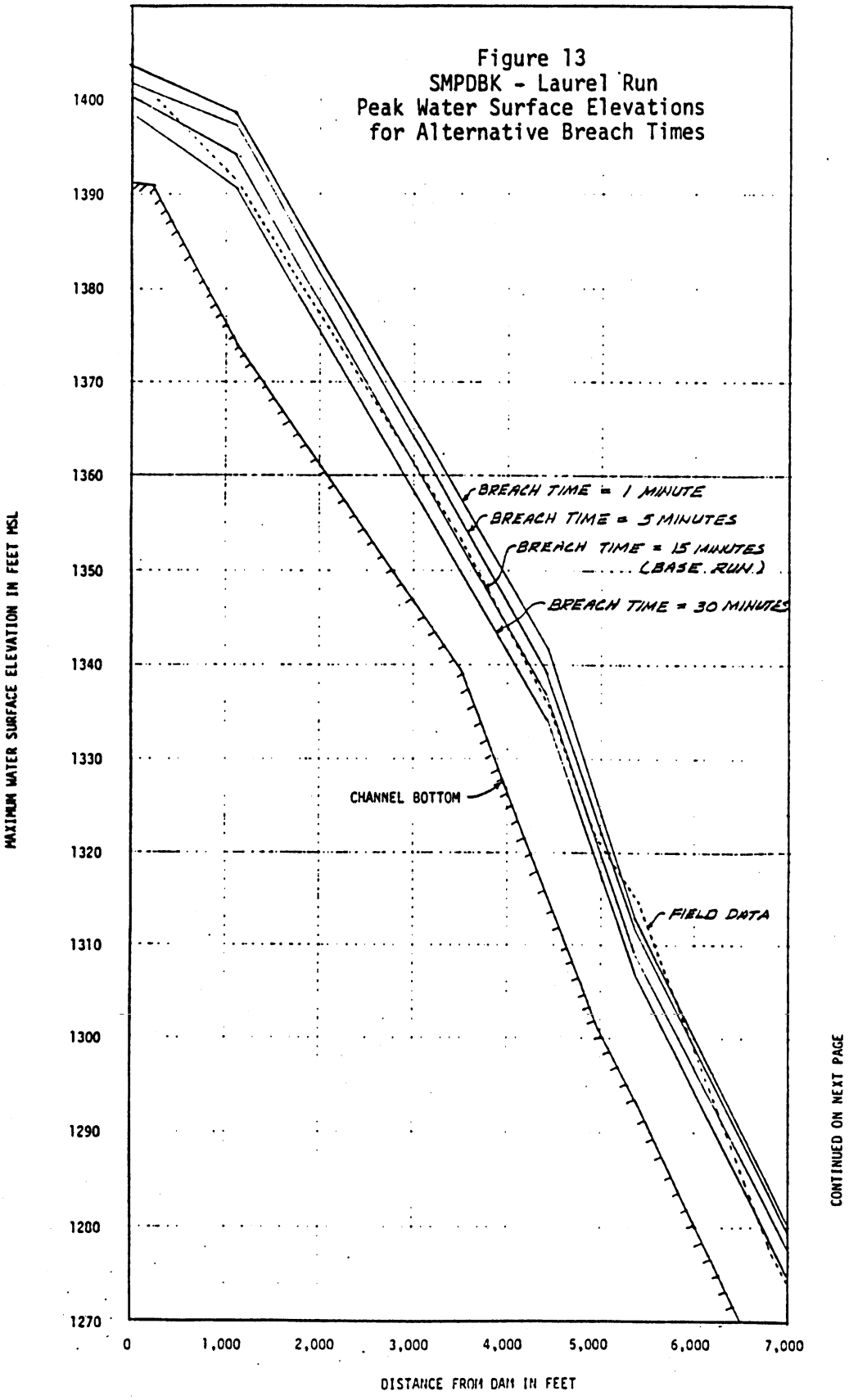


Figure 13
SMPDBK - Laurel Run
Peak Water Surface Elevations
for Alternative Breach Times
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
1300
1290
1200
1270
BREACH TIME = 1 MINUTE
BREACH TIME = 5 MINUTES
BREACH TIME = 15 MINUTES
(BASE RUN.)
BREACH TIME = 30 MINUTES
CHANNEL BOTTOM
FIELD DATA
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
DISTANCE FROM DAM IN FEET
CONTINUED ON NEXT PAGE

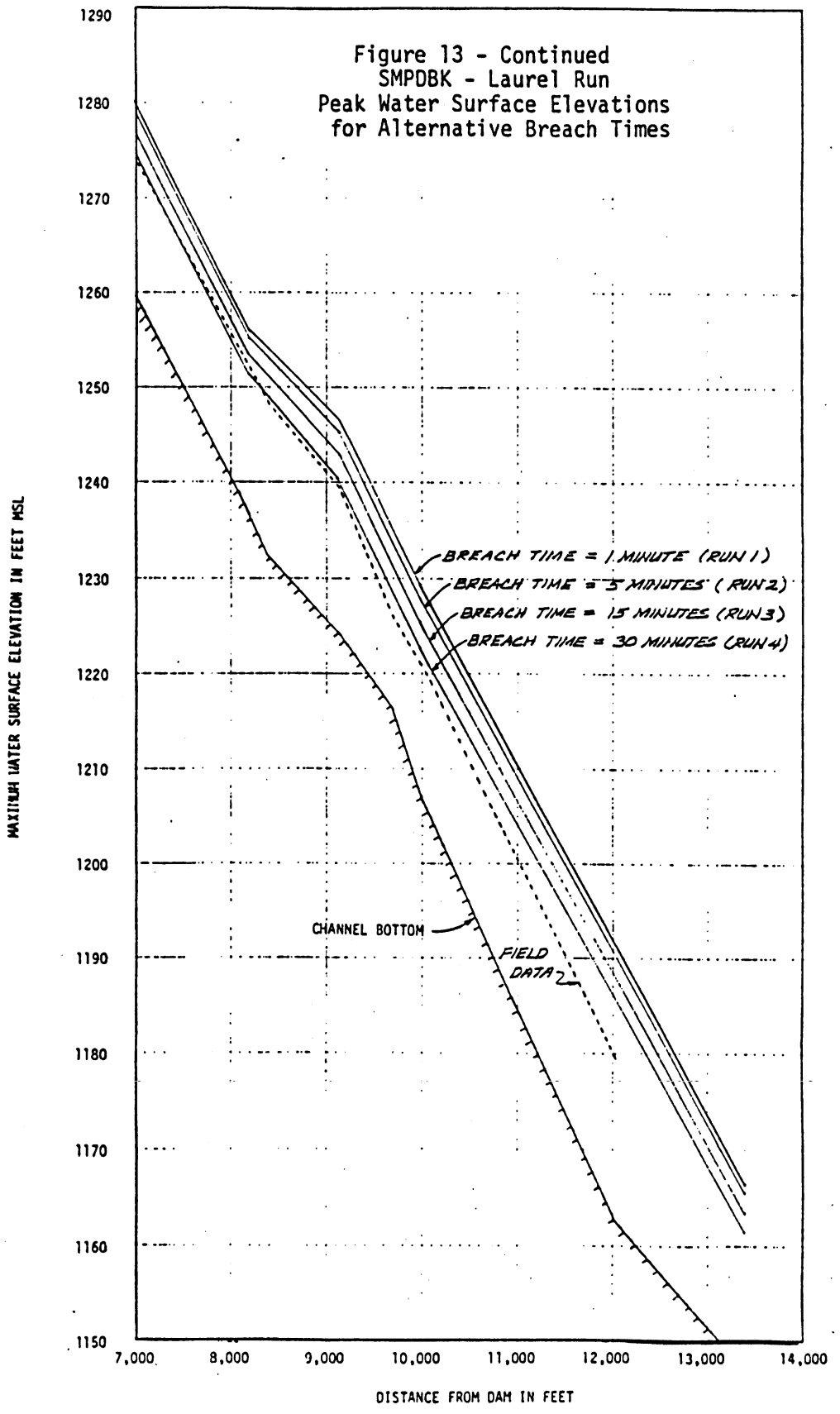


Figure 13 - Continued
SMPDBK - Laurel Run
Peak Water Surface Elevations
for Alternative Breach Times
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
BREACH TIME = 1 MINUTE (RUN 1)
BREACH TIME = 5 MINUTES (RUN 2)
BREACH TIME = 15 MINUTES (RUN 3)
BREACH TIME = 30 MINUTES (RUN 4)
CHANNEL BOTTOM
FIELD DATA 2
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

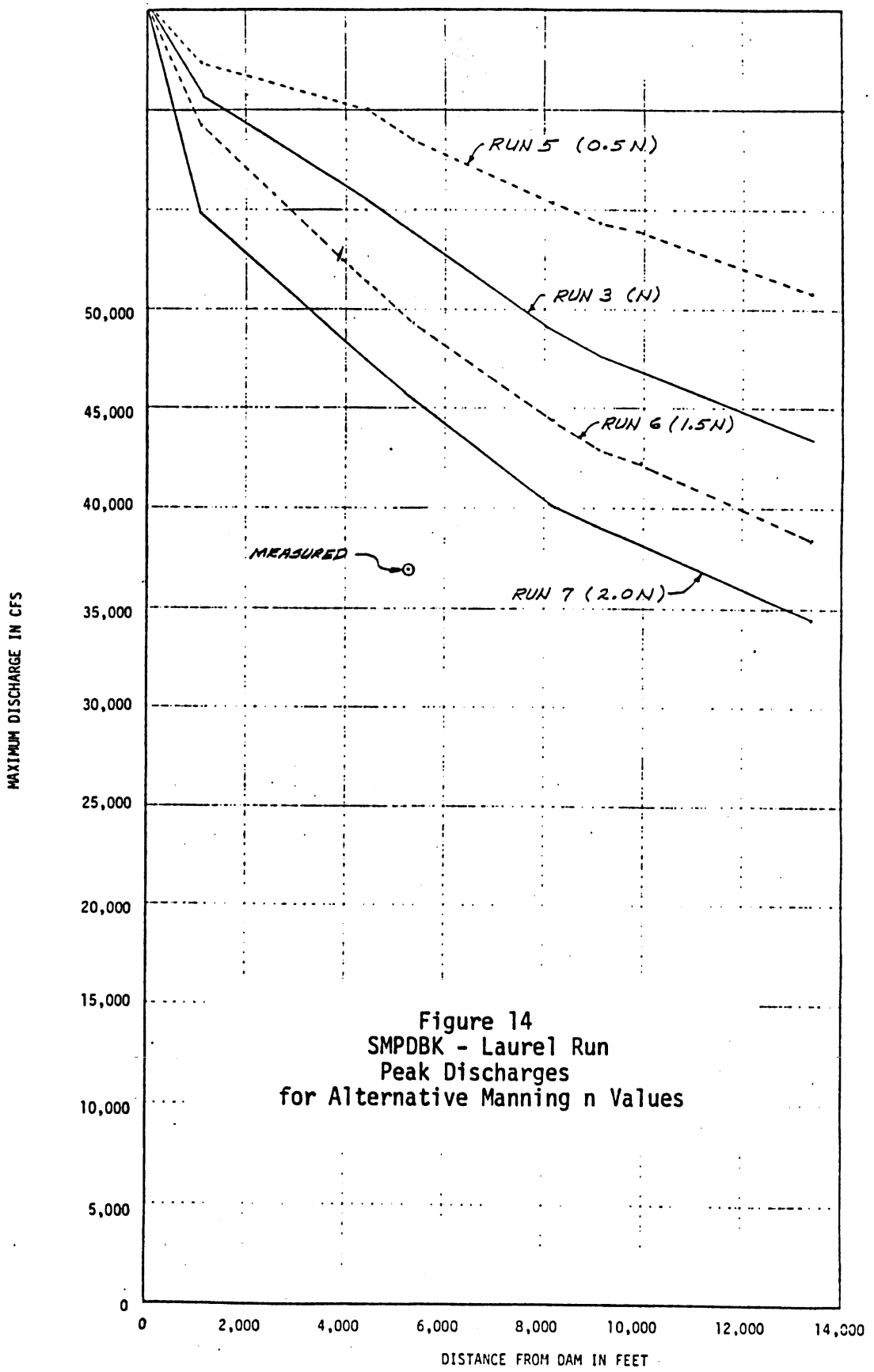


Figure 14
SMPDBK - Laurel Run
Peak Discharges
for Alternative Manning n Values

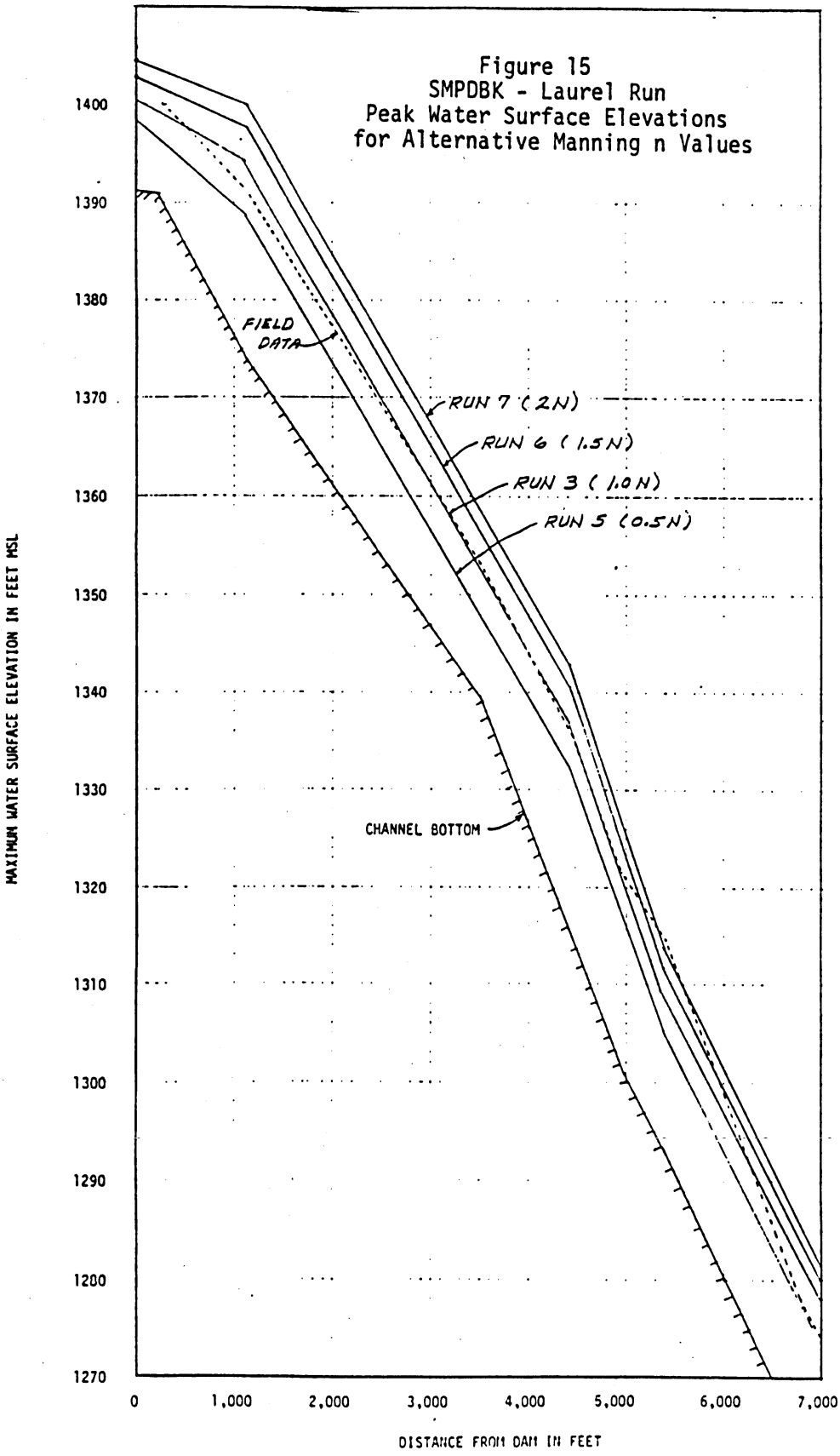


Figure 15
SMPDBK - Laurel Run
Peak Water Surface Elevations
for Alternative Manning n Values
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
1300
1290
1200
1270
FIELD DATA
RUN 7 (2N)
RUN 6 (1.5N)
RUN 3 (1.0N)
RUN 5 (0.5N)
CHANNEL BOTTOM
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
DISTANCE FROM DAM IN FEET
CONTINUED ON NEXT PAGE

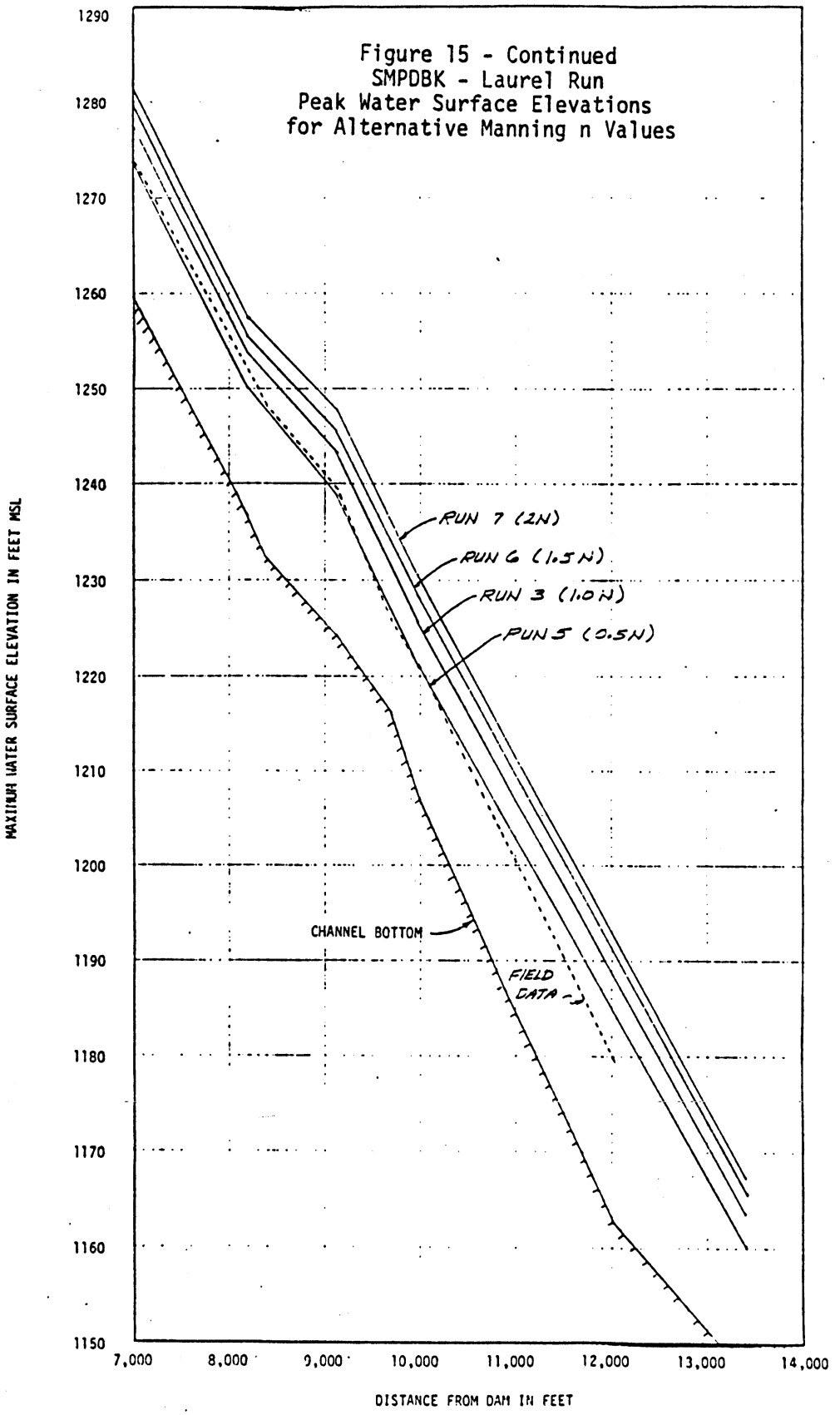


Figure 15 - Continued
SMPDBK - Laurel Run
Peak Water Surface Elevations
for Alternative Manning n Values
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
RUN 7 (2N)
RUN 6 (1.5N)
RUN 3 (1.0N)
RUN 5 (0.5N)
CHANNEL BOTTOM
FIELD DATA
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

HEC DIMENSIONLESS GRAPHS RESULTS

Peak flow depths computed using the HEC Dimensionless Graphs are presented in Table 17. Peak water surface elevations were determined by adding flow depths to the channel bottom elevations and are plotted in Figure 16. The dimensionless graph procedure assumes an instantaneous complete removal of the dam. The following parameters were computed and applied to the graphs:

$C = 21.2$

$M = 0.902$

$F = 0.92$

$L_o = 2{,}511$ feet

TABLE 17
HEC Dimensionless Graphs - Laurel run
Base Run Results

Distance From Dam (feet)	Flow Depth (Feet)	Peak Water Surface Elevation (Feet)	Time to Peak (Hours)
0	25.1	1416.3	0.000
400	23.5	1410.9	0.007
1,000	21.9	1410.9	0.015
2,000	20.6	1381.6	0.031
3,000	19.7	1366.2	0.045
4,000	19.1	1345.2	0.058
5,000	18.3	1318.5	0.073
6,000	17.9	1298.2	0.087
7,000	17.3	1276.9	0.102
8,000	16.8	1257.1	0.118
9,000	16.4	1241.9	0.133
10,000	15.4	1222.2	0.149
11,000	15.7	1200.1	0.165
12,000	15.3	1178.1	0.182
13,000	15.0	1166.4	0.200
13,400	14.8	1161.8	0.205

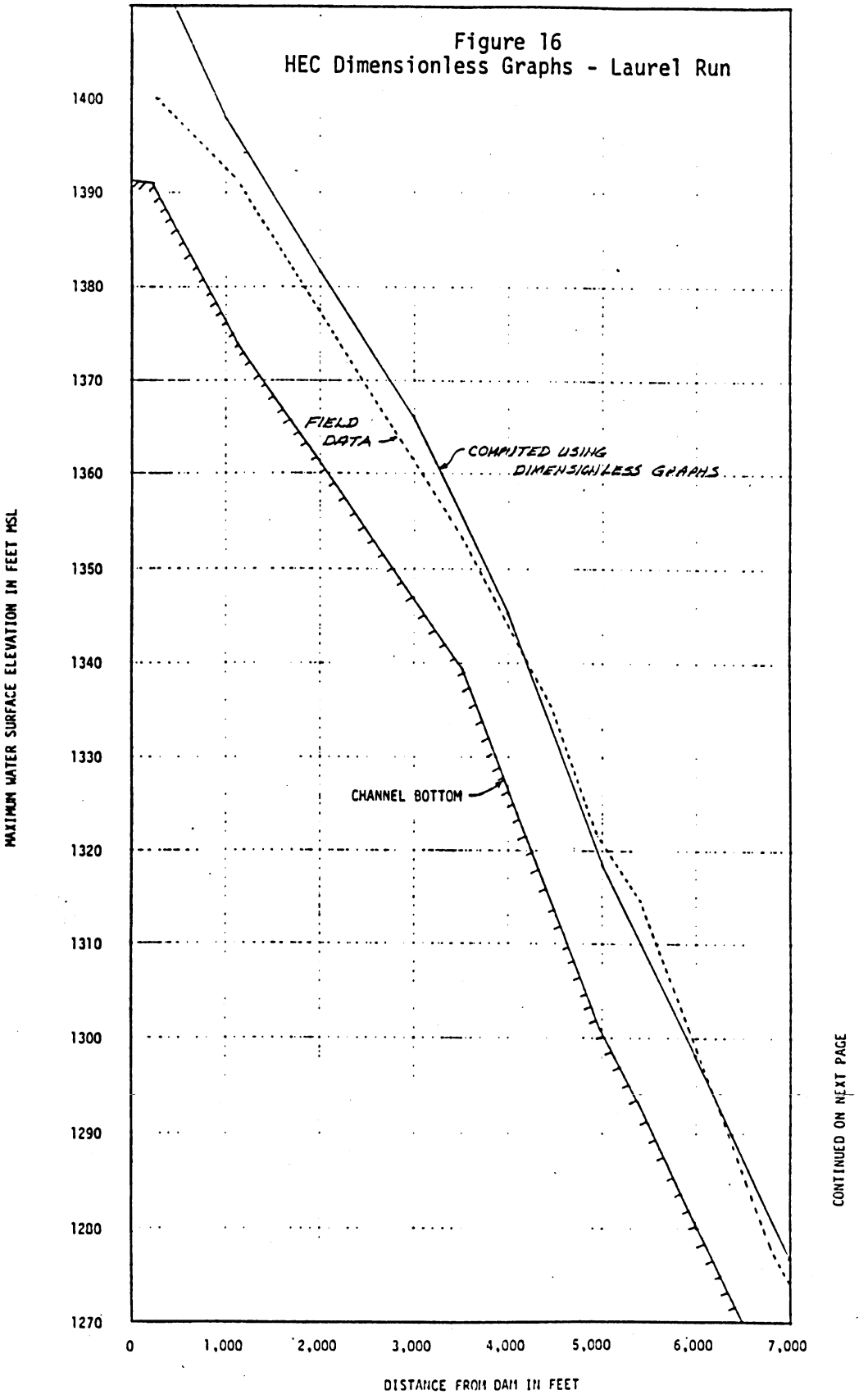


Figure 16
HEC Dimensionless Graphs - Laurel Run
1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
1300
1290
1280
1270
FIELD DATA
COMPUTED USING DIMENSIONLESS GRAPHS
CHANNEL BOTTOM
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
DISTANCE FROM DAM IN FEET
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
CONTINUED ON NEXT PAGE

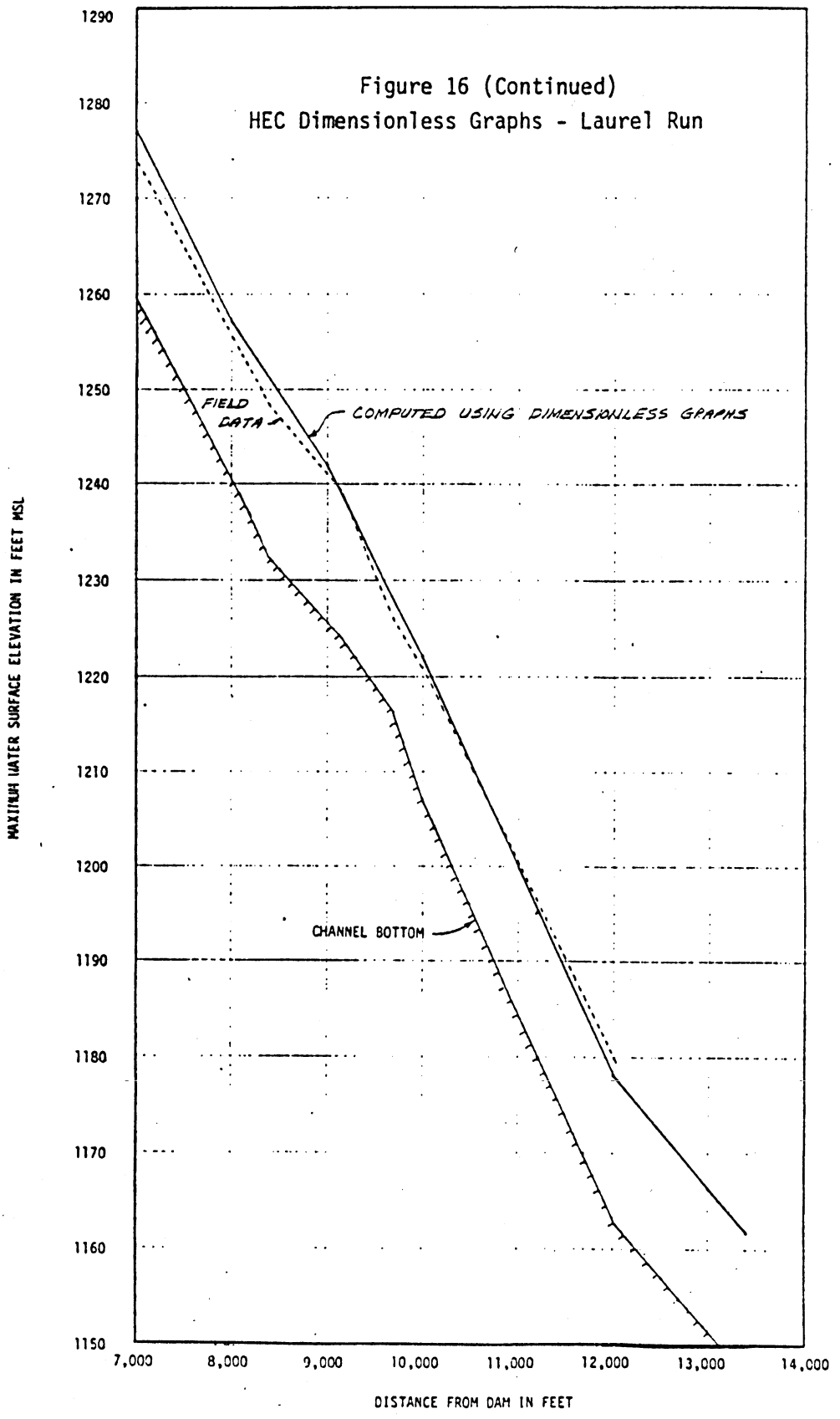


Figure 16 (Continued)
HEC Dimensionless Graphs - Laurel Run
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
FIELD DATA
COMPUTED USING DIMENSIONLESS GRAPHS
CHANNEL BOTTOM
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
DISTANCE FROM DAM IN FEET

The results of modeling the Laurel Run dam breach flood using FLOW SIM 1, FLOW SIM 2, DAMBRK, HEC-1, SMPDBK, and the HEC Dimensionless Graphs are summarized in Tables 18 through 21 and Figures 17 and 18. The results presented in the tables have been interpolated as necessary to have data specified at the same locations for all models in order to facilitate comparison.

Field data available for comparison with model results include a peak discharge measurement of 37,000 cfs about 1.0 mile downstream from the dam and high water marks established at 13 of the surveyed cross-sections. The maximum water surface elevations provided in the field data column of Tables 19 and 20 are interpolations between the field measured high water marks documented by Land.

A "base run" with each model is used in comparing the models. The base run represents an attempt to come as close as possible to incorporating the original best estimate data into the analysis. The best estimate breach characteristics consist of a triangular shaped breach with 2.45 horizontal to 1.00 vertical side slopes and a breach time of 15 minutes. Channel geometry is described by 15 surveyed cross-sections with estimates of Manning n coefficients at each section. Inflow hydrographs are available for inflow into the reservoir and into Laurel Run downstream of the dam from Red Run and Wildcat Run. However, deviations from the best estimate data were required to accommodate each model. These input data manipulations are discussed below.

FLOW SIM 1 and 2, DAMBRK and SMPDBK use topwidth versus elevation data to represent channel geometry. Development of a set of "smoothed" topwidth versus elevation data was required to overcome computational instability difficulties to obtain solutions with the dynamic wave models. The FLOW SIM 1 and 2, DAMBRK, and SMPDBK runs documented herein include the same set of smoothed topwidth versus elevation data. However, SMPDBK used only eight of the 15 cross-sections since the model is limited to a maximum of eight cross-sections. The HEC Dimensionless Graphs use a single cross-section representative of the entire channel. HEC-1 uses a cross-section with eight pairs of vertical and horizontal distance coordinates.

FLOW SIM 1 and 2, DAMBRK, and HEC-1 have essentially the same breach simulation algorithm. SMPDBK can handle only a rectangular breach shape. Consequently, a breach width was used such that the fully developed rectangular breach would have the same cross-ssectional area as the triangular breach used in the other models. The HEC Dimensionless Graphs are based on the assumption of an instantaneous complete removal of the dam.

The FLOW SIM 1 and DAMBRK base runs have Manning n coefficients which are twice as large as the actual estimated values. The high n values were required to prevent supercritical flow and associated computational instability difficulties. The FLOW SIM 2 base run has n coefficients which are 1.5 times the actual estimated values. The HEC-1 and DAMBRK base runs include the actual estimated n values. The HEC Dimensionless Graphs use a single representative n value.

As indicated by Table 18 and Figure 17, the peak discharges computed using FLOW SIM 1 and 2, DAMBRK, and HEC-1 compare favorably. The SMPDBK discharges are much higher than those computed using the other models. The peak discharge one mile below the dam can be expressed as a percentage of the measured discharge as follows: DAMBRK, 99%; HEC-1, 102%; FLOW SIM 1, 94%, FLOW SIM 2, 89%; and SMPDBK, 146%. Discharges are not computed by the HEC Dimensionless Graph procedure.

Peak water surface elevations are compared in Tables 19 and 20 and Figure 18. The water surface profiles computed by the alternative models are fairly close except for the HEC-1 results which are significantly higher than the other models. The absolute values of the deviations between computed and observed water surface elevations at 13 evenly spaced stations are averaged in Table 20. The average deviations are as follows: FLOW SIM 2, 2.5 feet; SMPDBK, 2.6 feet; DAMBRK, 2.9 feet; HEC Dimensionless Graphs, 3.1 feet; FLOW SIM 1, 3.4 feet; and HEC-1, 10.1 feet. The average deviation for the HEC Dimensionless Graphs reduces to 2.4 feet if the first station (400 feet below the dam) is omitted. The average flow depth based on the field data is 15.8 feet. The times at which the peak water surface elevations occurred are shown in Table 21.

The results of FLOW SIM 1, FLOW SIM 2, and DAMBRK compare favorably. The Laurel Run case study provides no indication that one of the three dynamic wave models is more or less accurate than another. The differences between results obtained using FLOW SIM 1 and 2 are due almost entirely to the differences in Manning n coefficients. DAMBRK and FLOW SIM 1 resulted in almost the same peak discharges, and the peak water surface elevations are always within three feet and are within one foot for most of the length of the channel.

HEC-1 peak discharges are comparable to the three dynamic wave models. However, the HEC-1 peak water surface profile is significantly high. The SMPDBK peak discharges are significantly high but the peak water surface profile is comparable to the dynamic wave models. Both SMPDBK and the HEC Dimensionless Graphs yield peak water surface profiles very close to those of the three full dynamic wave models.

TABLE 18
Comparison of Models - Laurel Run
Peak Discharges

Distance From Dam (Feet)	Maximum Discharge in cfs				
	Flow Sim 1	Flow Sim 2	DAMBRK	HEC-1	SMPDBK
0	36,070	33,290	41,500	42,140	65,330
400	37,190	34,690	40,000	41,300	63,700
1,000	36,570	34,140	38,900	40,400	61,300
2,000	36,320	33,920	38,300	40,800	59,250
3,000	36,010	33,710	37,750	39,700	57,800
4,000	35,310	33,340	37,000	37,930	56,200
5,000	34,840	32,930	36,600	37,930	54,400
6,000	34,740	32,810	36,400	37,500	52,700
7,000	34,570	32,680	35,900	36,800	50,900
8,000	33,260	32,110	34,300	36,250	49,200
9,000	32,620	31,630	33,500	36,030	47,800
10,000	33,530	32,530	34,000	36,700	46,800
11,000	33,460	32,460	34,000	39,150	45,800
12,000	33,230	32,330	33,400	35,700	44,800
13,000	30,470	30,570	32,000	35,000	43,800
13,400	30,200	30,290	32,100	34,970	43,410

Table 19
Comparison of Models - Laurel Run
Peak Water Surface Elevations

Distance From Dam (Feet)	Maximum Water Surface Elevation in Feet msl					
	Field Data	Flow Sim 1	Flow Sim 2	DAMBRK	HEC-1	SMPDBK
0	-	1404.4	1411.1	1406.0	-	1401.0
400	1398.5	1402.2	1399.3	1403.7	1403.6	1398.2
1,000	1392.4	1397.9	1395.3	1397.9	1403.1	1394.8
2,000	1377.1	1379.0	1376.6	1378.2	1392.8	1378.5
3,000	1361.1	1362.0	1360.0	1362.0	1373.8	1361.2
4,000	1343.7	1346.2	1343.0	1343.9	1350.8	1344.0
5,000	1320.8	1322.0	1319.1	1320.6	1322.6	1319.8
6,000	1298.7	1295.5	1293.7	1295.9	1309.1	1296.8
7,000	1274.1	1275.2	1273.3	1275.6	1286.7	1277.6
8,000	1255.7	1264.6	1261.5	1261.8	1264.4	1257.0
9,000	1241.0	1247.0	1244.4	1247.2	1246.2	1244.3
10,000	1220.9	1227.3	1224.3	1225.1	1229.6	1224.9
11,000	1200.5	1199.6	1197.7	1198.0	1220.5	1206.6
12,000	1180.0	1178.5	1176.3	1179.4	1192.2	1288.4
13,000	-	1172.8	1170.3	1172.3	1168.3	1170.3
13,400	-	1168.9	1166.5	1167.3	1169.9	1163.5

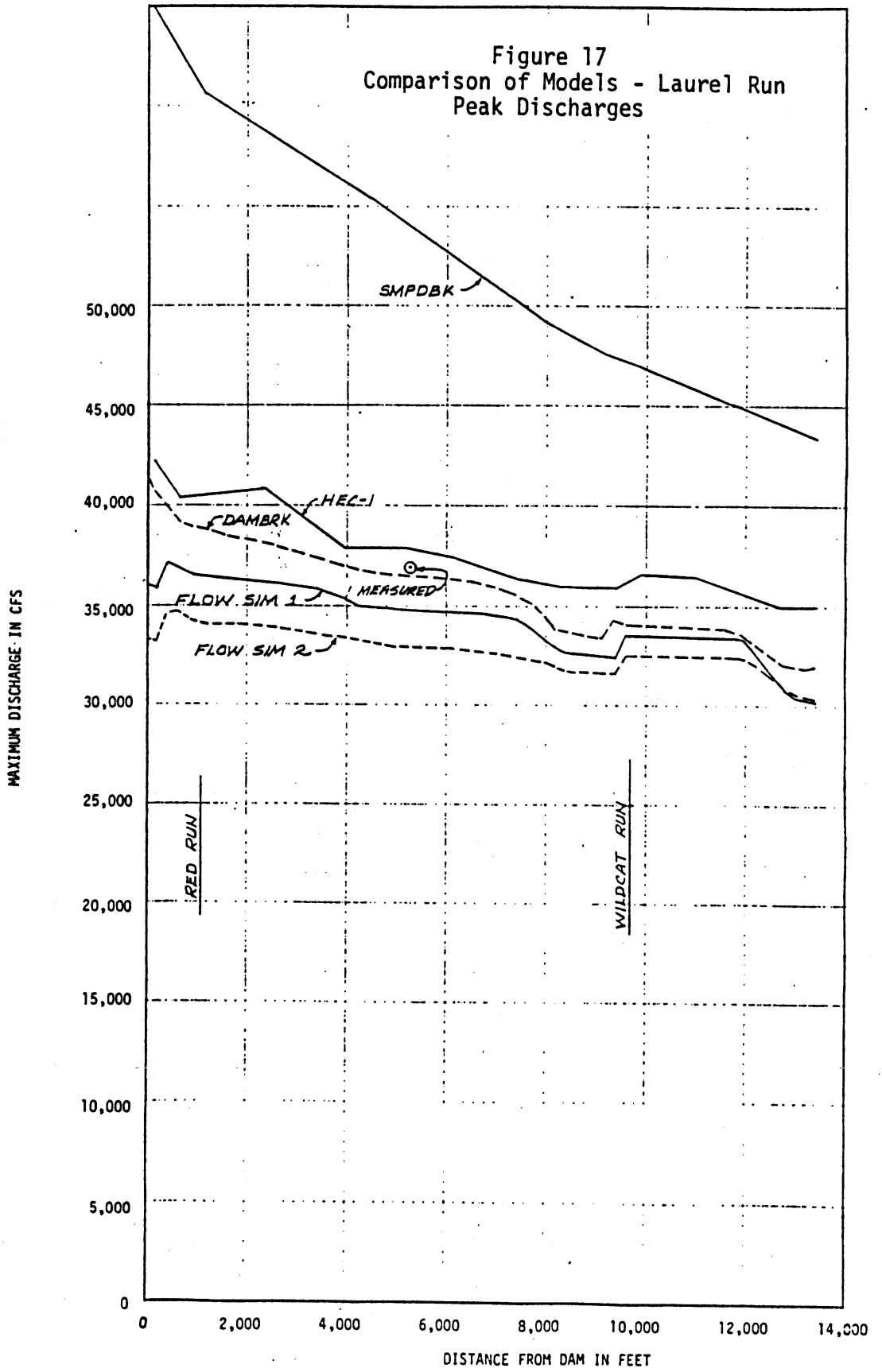
Table 20
Comparison of Models - Laurel Run
Deviations From High Water Marks

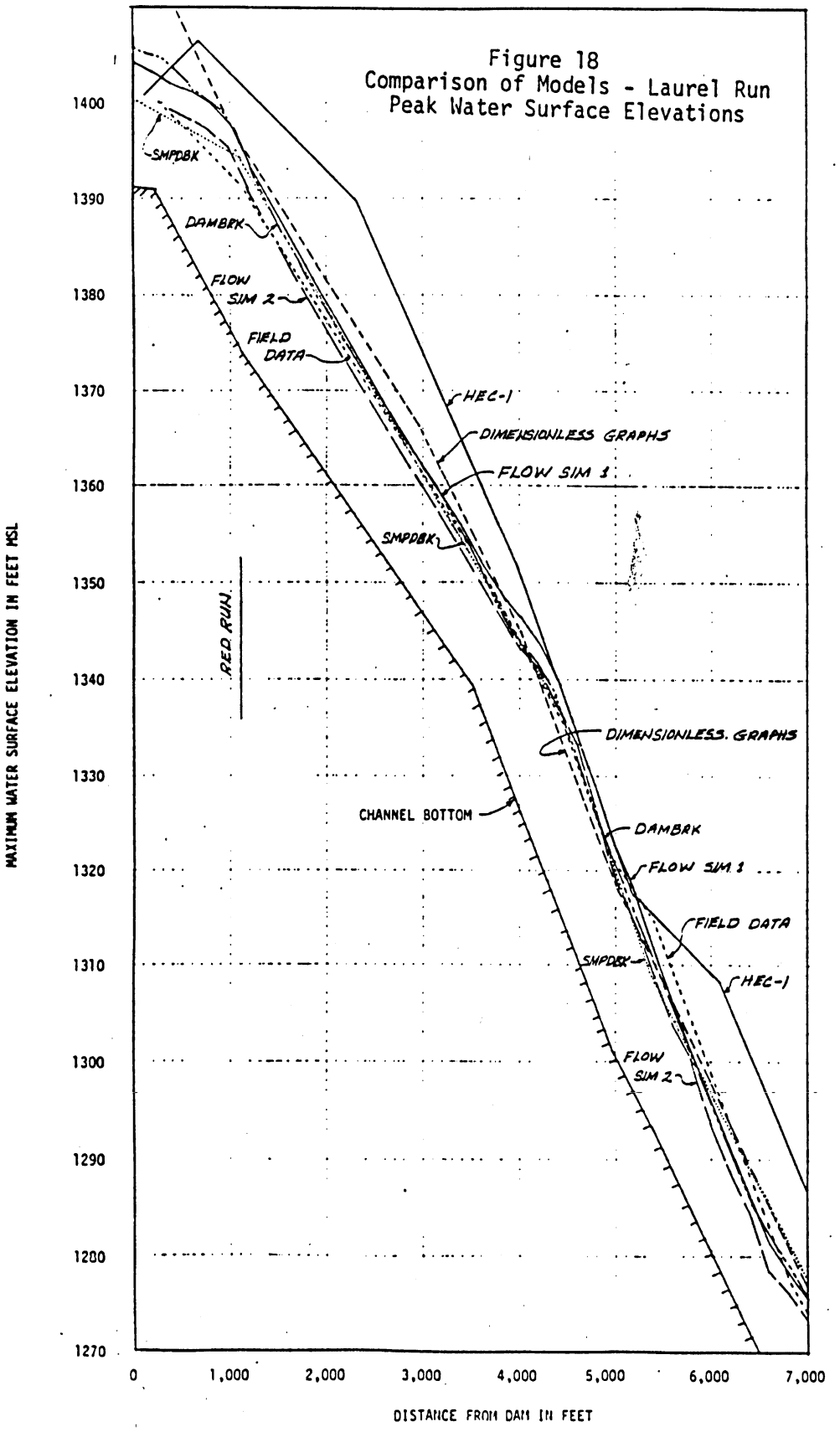
Distance From Dam	Field Data	Flow Depth	Deviations From High Water Mark in Feet					
			Flow Sim 1	Flow Sim 2	DAMBRK	HEC-1	SMPDBK	Graphs
(Feet)	(Feet msl)	(Feet)						
400	1398.5	11.0	3.7	0.8	5.2	5.1	-0.3	12.4
1,000	1392.4	16.0	5.5	2.9	5.5	10.7	2.4	5.6
2,000	1377.1	16.0	1.9	-0.5	1.1	15.7	1.4	4.5
3,000	1361.1	14.5	0.9	-1.1	0.9	12.7	0.1	5.1
4,000	1343.7	17.5	2.5	-0.7	0.2	7.1	0.3	1.5
5,000	1320.8	20.5	1.2	-1.7	-0.2	1.8	-1.0	-2.3
6,000	1298.7	18.5	-3.2	-5.0	-2.8	10.4	-1.9	-0.5
7,000	1274.1	14.5	1.1	-0.8	1.5	12.6	3.5	2.8
8,000	1255.7	15.0	8.9	5.8	6.1	8.7	1.3	1.4
9,000	1241.0	15.5	6.0	3.4	6.2	5.2	3.3	0.9
10,000	1220.9	14.0	6.4	3.4	4.2	8.7	1.3	1.4
11,000	1200.5	16.0	-0.9	-2.8	-2.5	20.0	6.1	-0.4
12,000	1180.0	17.0	-1.5	-3.7	-0.6	12.2	8.4	-1.9
Average		15.8	3.36	2.51	2.85	10.07	2.62	3.12

Table 21
Comparison of Models - Laurel Run
Time to Crest Elevation

Distance From Dam	Time to Maximum Elevation in Hours					
	Flow Sim 1	Flow Sim 2	DAMBRK	HEC-1	SMPDBK	Graphs
(Feet)						
0	0.35	0.35	0.25	0.25	0.3	0.00
400	0.35	0.36	0.26	0.25	0.3	0.01
1,000	0.36	0.36	0.26	0.26	0.3	0.02
2,000	0.37	0.38	0.28	0.27	0.3	0.03
3,000	0.39	0.39	0.30	0.27	0.3	0.04
4,000	0.41	0.41	0.33	0.28	0.3	0.06
5,000	0.43	0.42	0.34	0.30	0.3	0.07
6,000	0.44	0.43	0.35	0.32	0.3	0.09
7,000	0.46	0.45	0.38	0.33	0.4	0.10
8,000	0.50	0.48	0.41	0.33	0.4	0.12
9,000	0.51	0.49	0.43	0.35	0.4	0.13
10,000	0.53	0.50	0.44	0.35	0.4	0.15
11,000	0.54	0.52	0.45	0.37	0.4	0.16
12,000	0.60	0.55	0.49	0.38	0.4	0.18
13,000	0.62	0.57	0.50	0.39	0.4	0.20
13,400	0.62	0.58	0.50	0.40	0.4	0.20

Figure 17
Comparison of Models - Laurel Run
Peak Discharges





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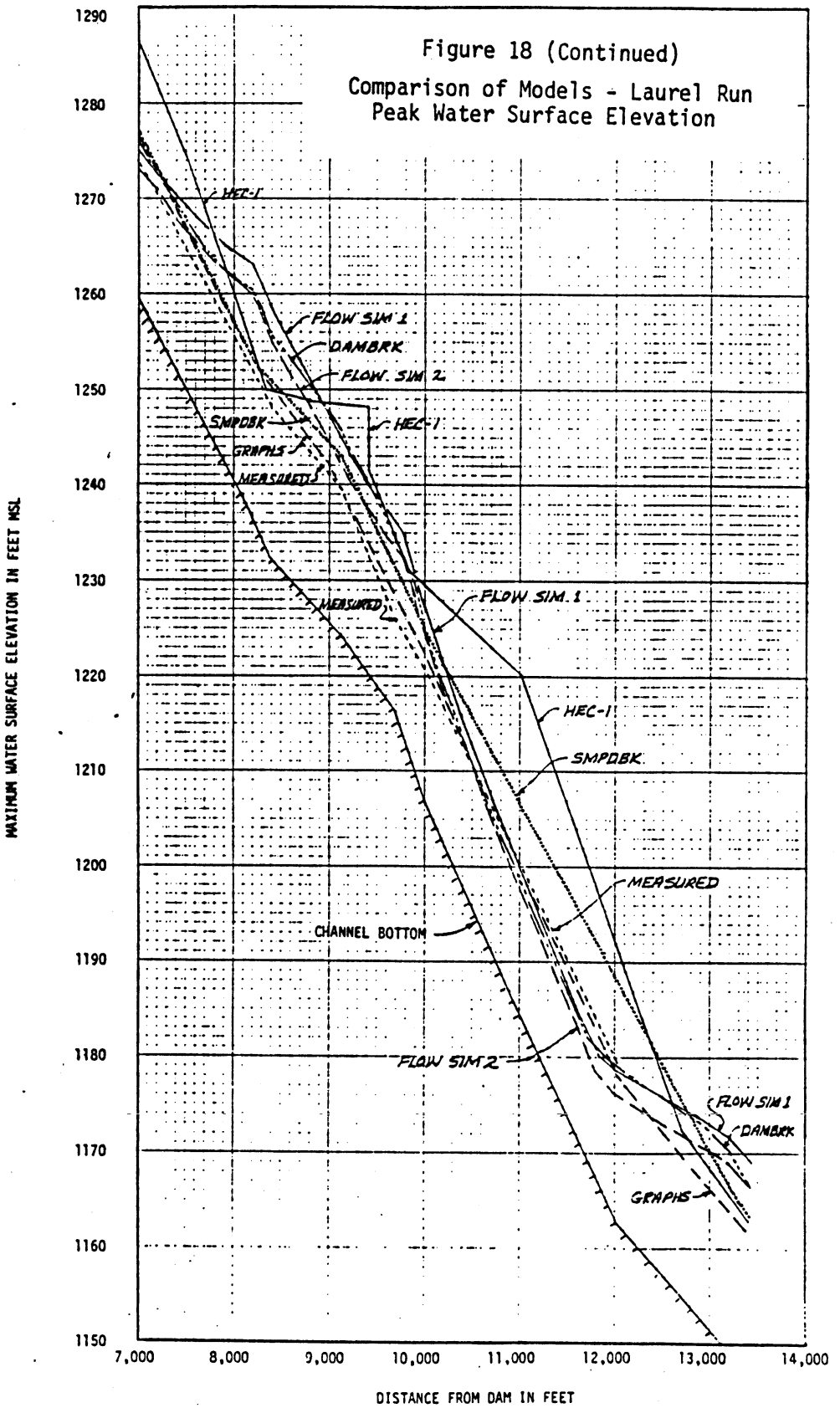


Figure 18 (Continued)
Comparison of Models - Laurel Run
Peak Water Surface Elevation
MAXIMUM WATER SURFACE ELEVATION IN FEET MSL
DISTANCE FROM DAM IN FEET
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
1190
1180
1170
1160
1150
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
HEC-1
FLOW SIM 1
DAMBRK
FLOW SIM 2
SMPDBK
GRAPHS
MEASURED
CHANNEL BOTTOM

APPENDIX A
Cross-Section and Topwidth Plots for the Laurel Run Case Study

Cross-Section and Topwidth Plots

The valley geometry of the 2.54-mile long reach of Laurel Run was modeled using horizontal and vertical coordinate data for 15 cross-sections provided by the report by Land[1]. The cross-sections are plotted herein on pages A-2 through A-16. Topwidth versus elevation data are provided on pages A-17 through A-30. The original topwidths developed from the cross-section data are plotted as solid lines. Smoothing was required to obtain solutions with the dynamic routing models. The smoothed topwidths are indicated by dashed lines.

[1]Larry F. Land, "Evaluation of Selected Dam-Break Flood-Wave Models by Using Field Data", U.S. Geological Survey, Water Resources Investigations 80-44, August 1980.

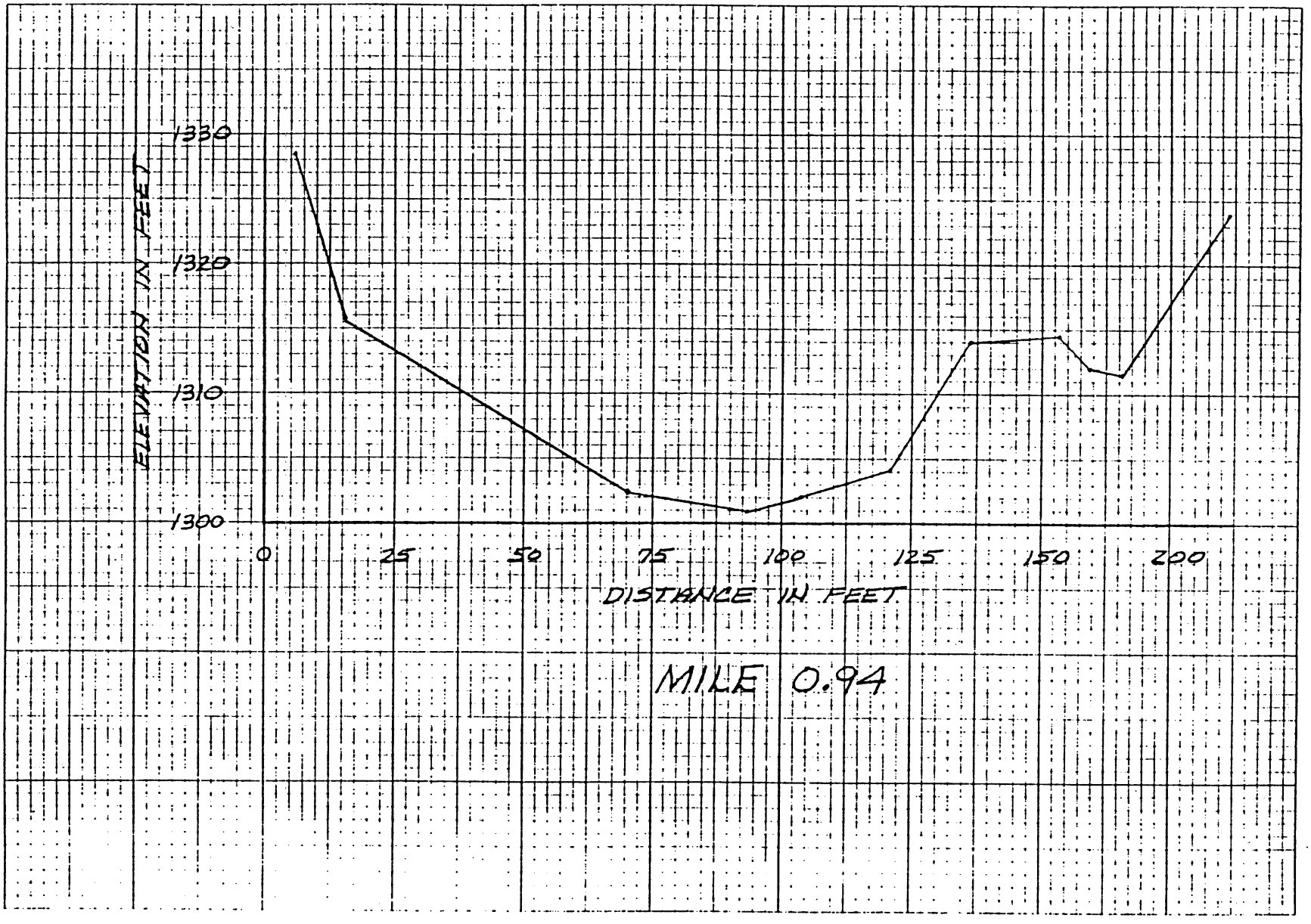

1440
1430
1420
1410
1400
1390
ELEVATION IN FEET
0
100
200
300
400
500
600
700
DISTANCE IN FEET
MILE 0.00

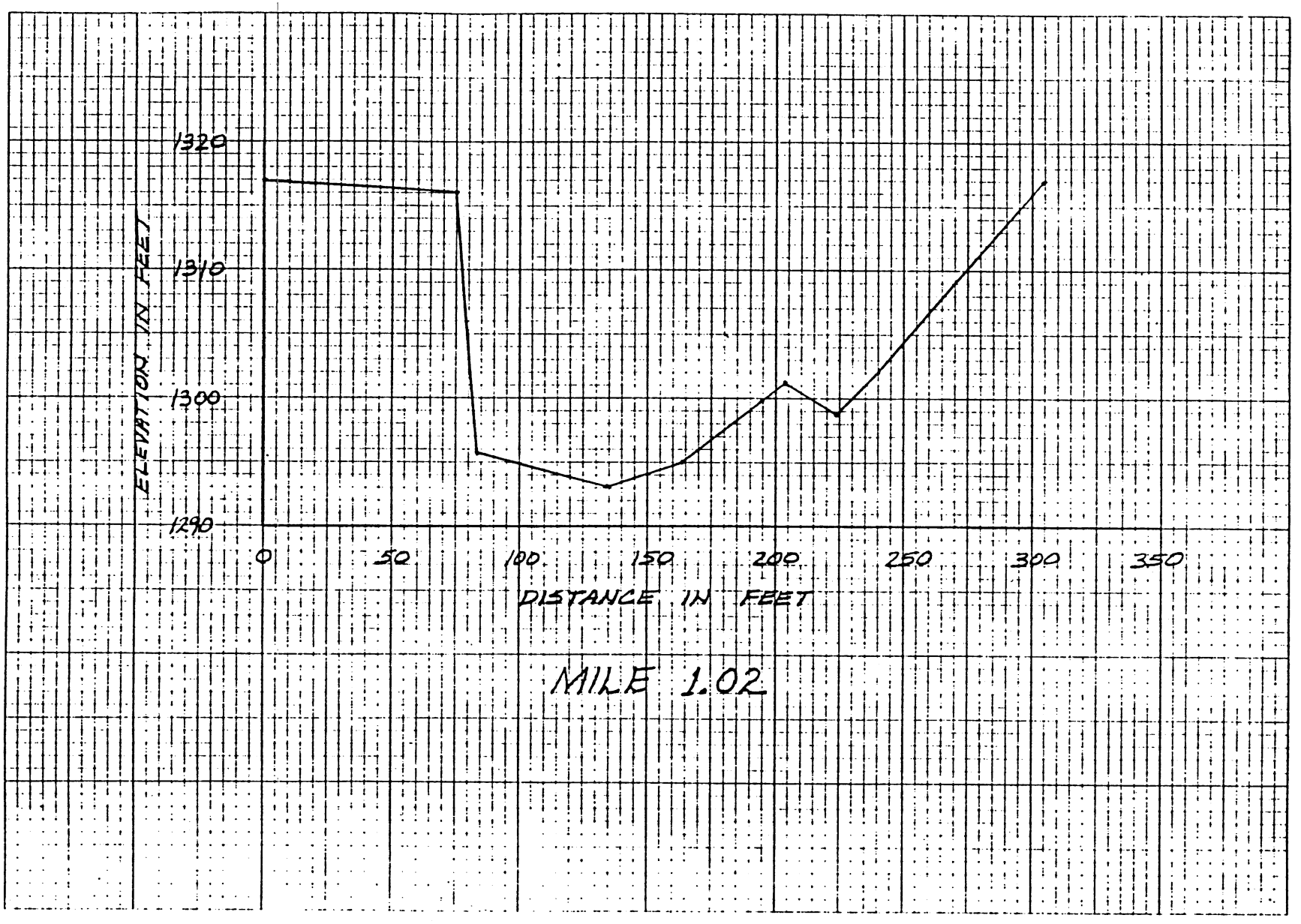
ELEVATION IN FEET
1410
1400
1390
0
100
200
300
400
500
DISTANCE IN FEET
MILE 0.047

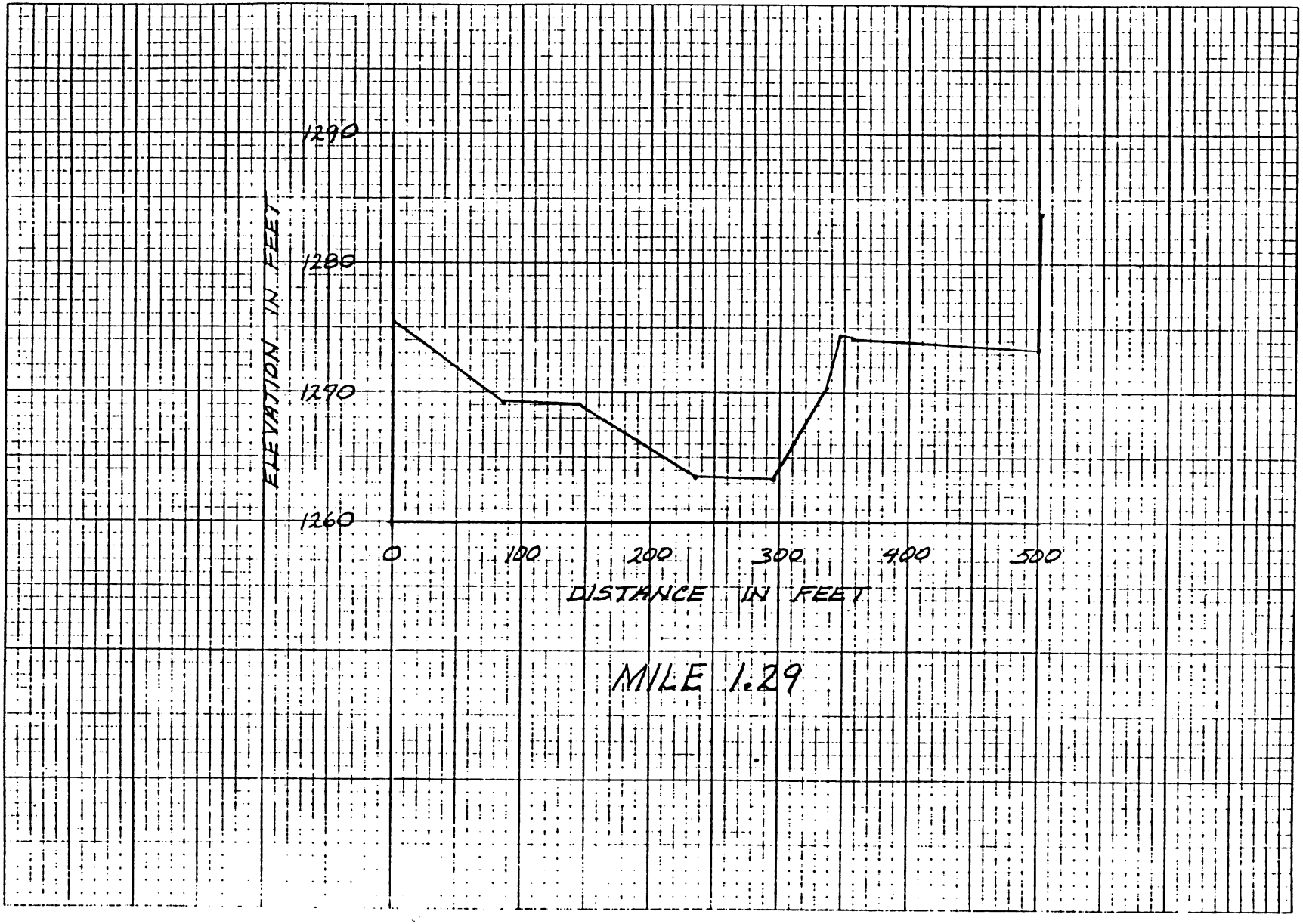
ELEVATION IN FEET
1390
1380
1370
0
50
100
150
200
250
DISTANCE IN FEET
MILE 0.21

1360
1350
1340
1330
ELEVATION IN FEET
0
100
200
300
400
500
DISTANCE IN FEET
MILE 0.67

ELEVATION IN FEET
1340
1330
1320
1310
0
25
50
75
100
125
150
175
200
DISTANCE IN FEET
MILE 0.84


ELEVATION IN FEET
1330
1320
1310
1300
0
25
50
75
100
125
150
200
DISTANCE IN FEET
MILE 0.94


1320
1310
1300
1290
ELEVATION IN FEET
0
50
100
150
200
250
300
350
DISTANCE IN FEET
MILE 1.02

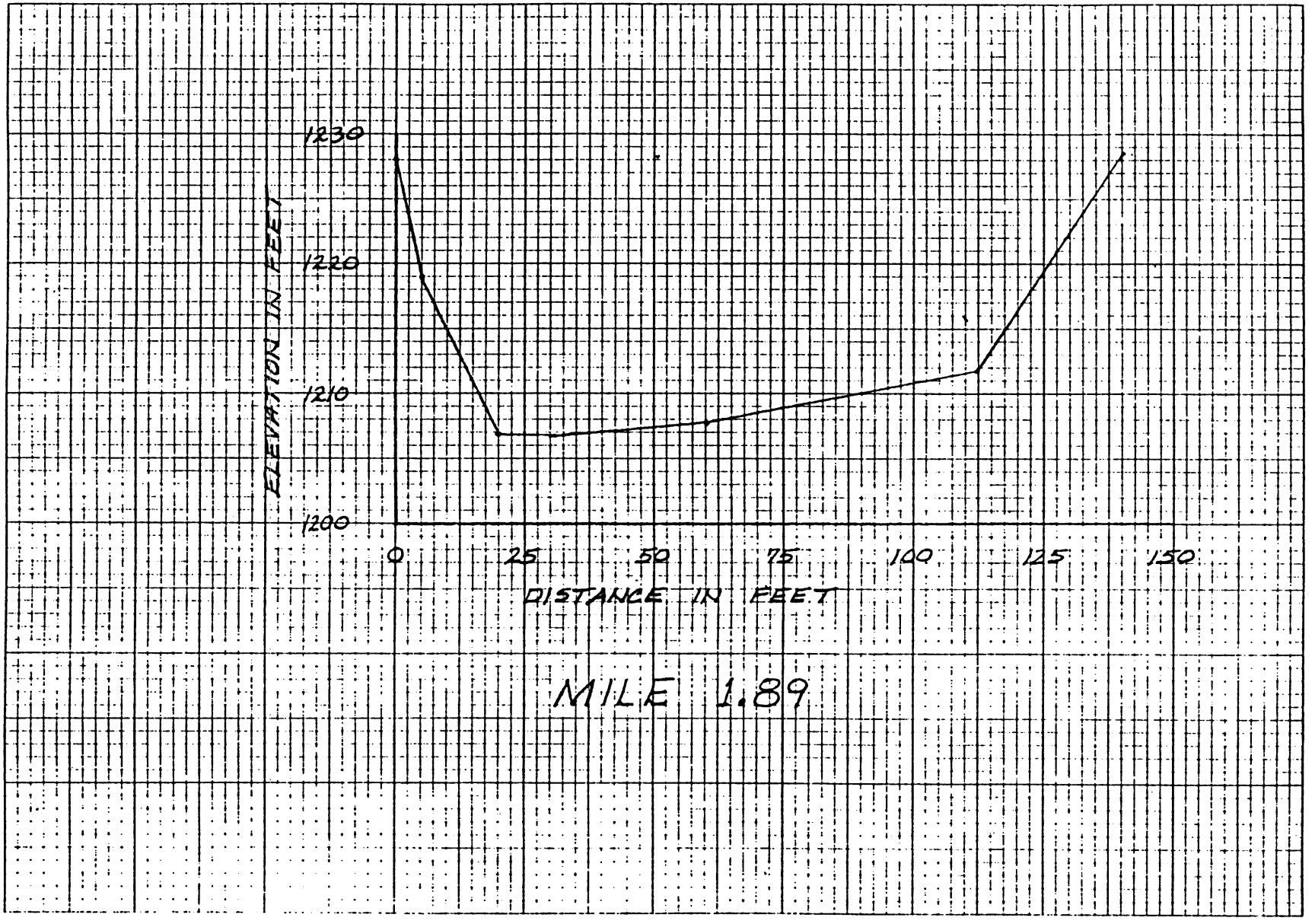

1290
1280
1270
1260
ELEVATION IN FEET
0
100
200
300
400
500
DISTANCE IN FEET
MILE 1.29

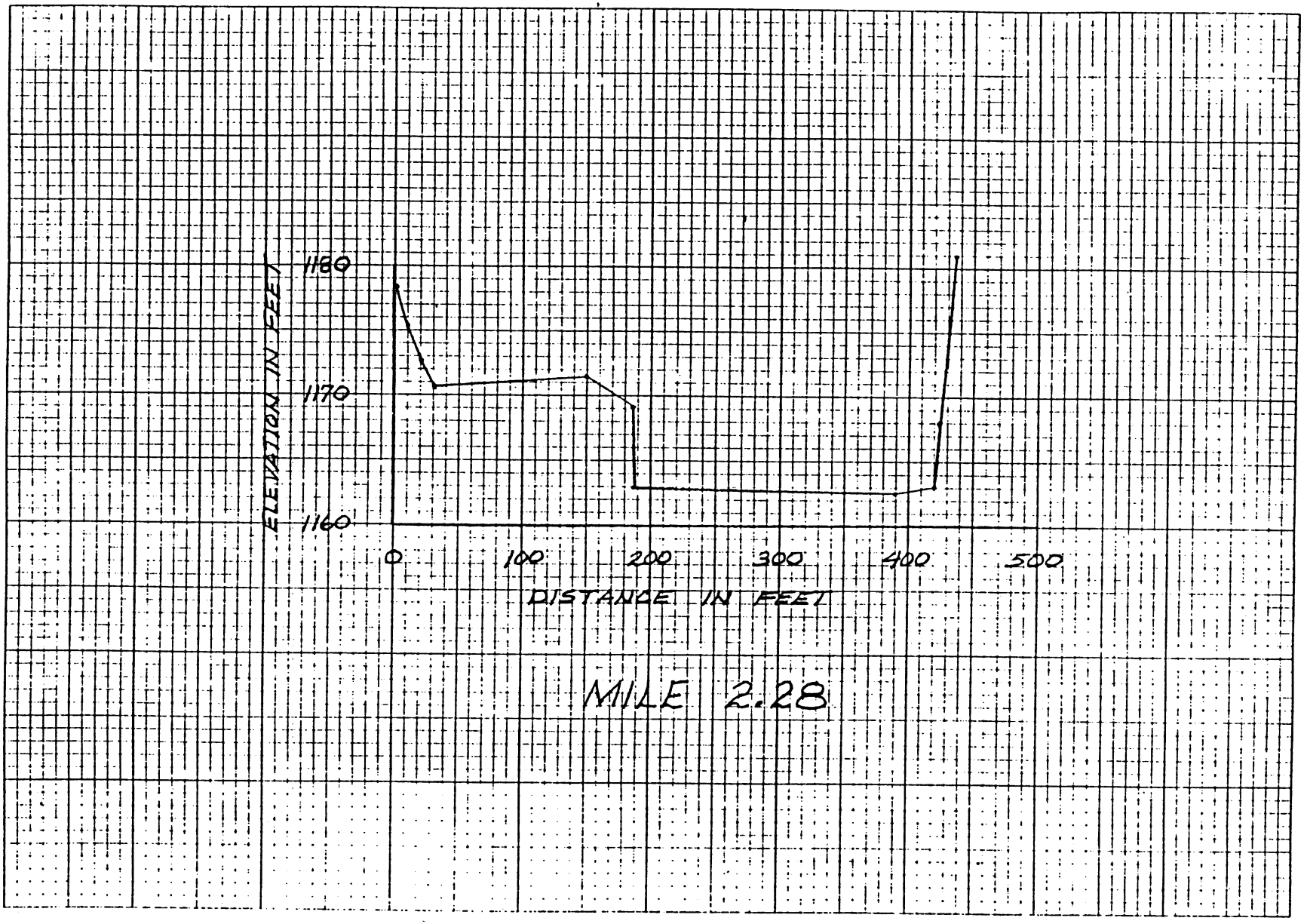
1260
1250
1240
1230
ELEVATION IN FEET
0
50
100
150
200
250
DISTANCE IN FEET
MILE 1.55

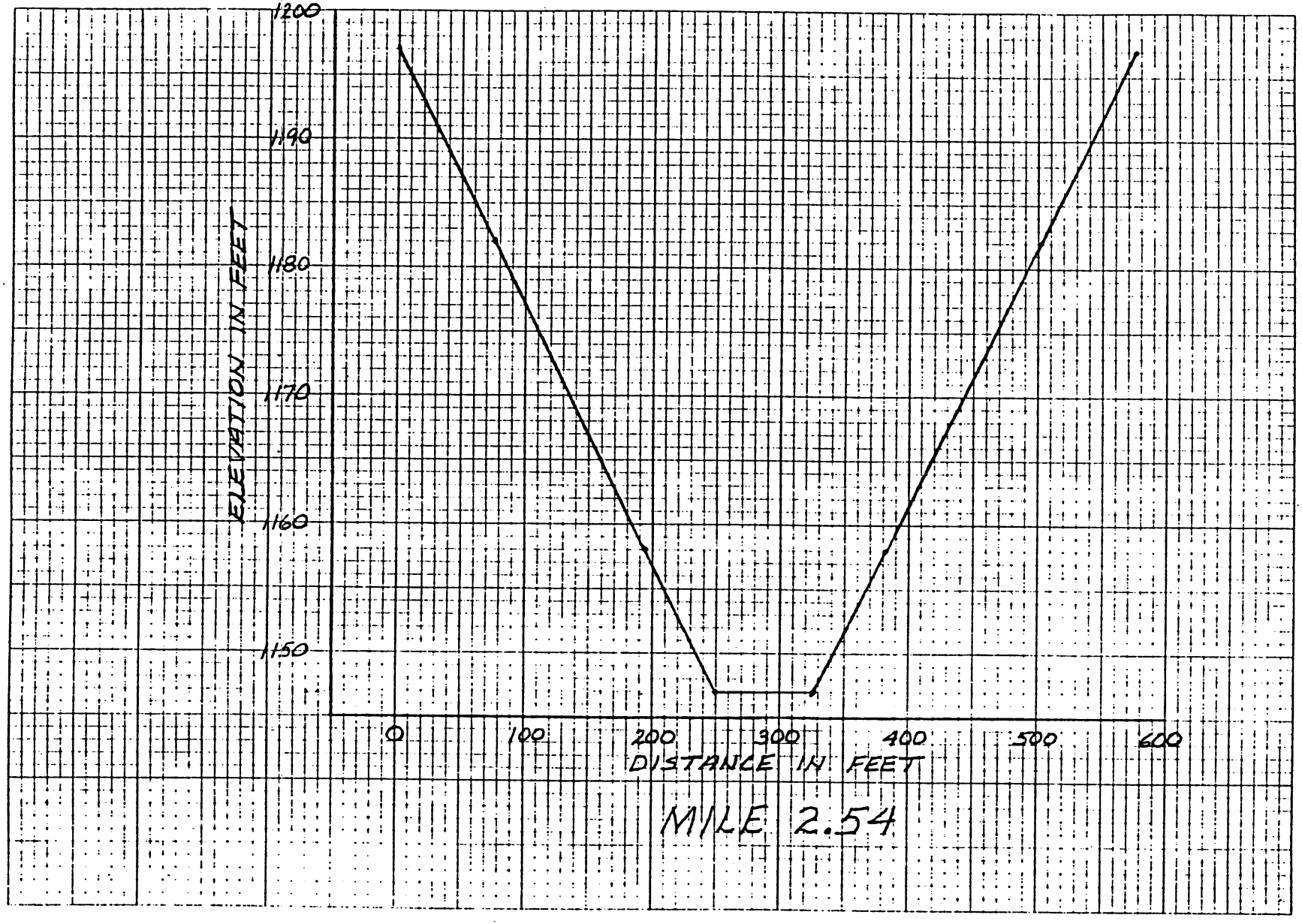
ELEVATION IN FEET
1250
1240
1230
0
25
50
75
100
125
DISTANCE IN FEET
MILE 1.59

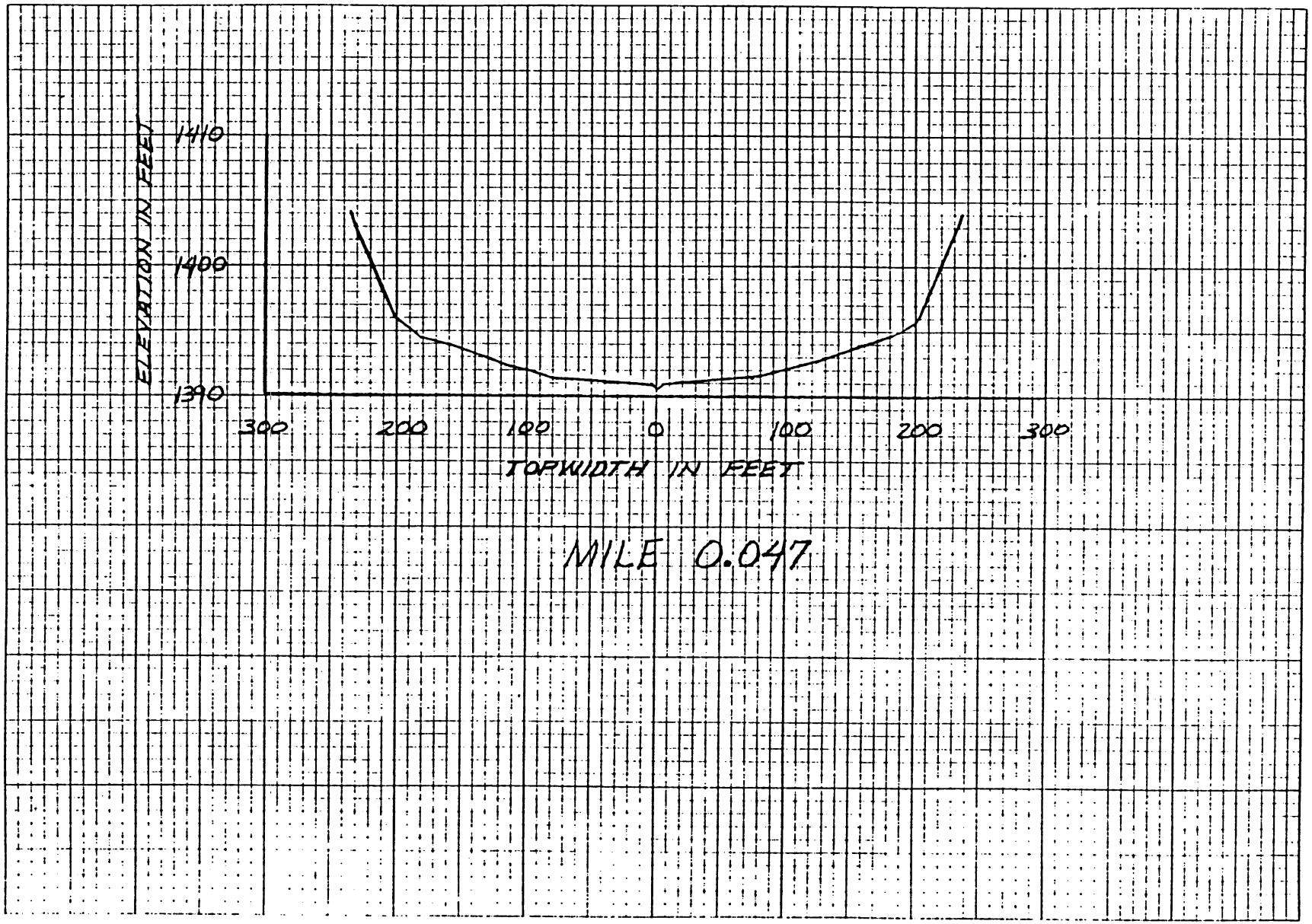
1250
1240
1230
1220
ELEVATION IN FEET
0
25
50
75
100
125
150
DISTANCE IN FEET
MILE 1.73

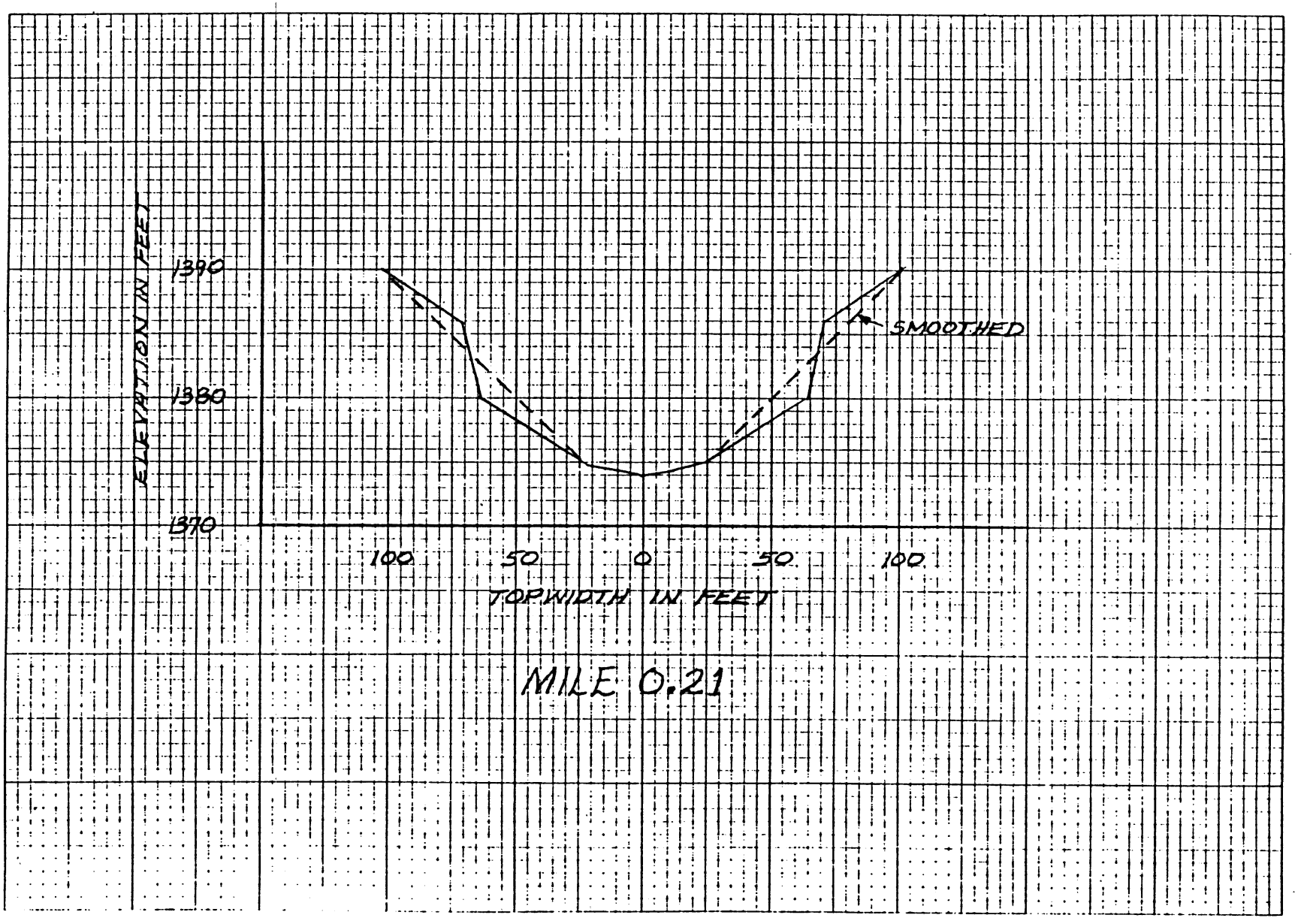
1250
1240
1230
1220
1210
ELEVATION IN FEET
0
50
100
150
200
250
300
DISTANCE IN FEET
MILE 1.84

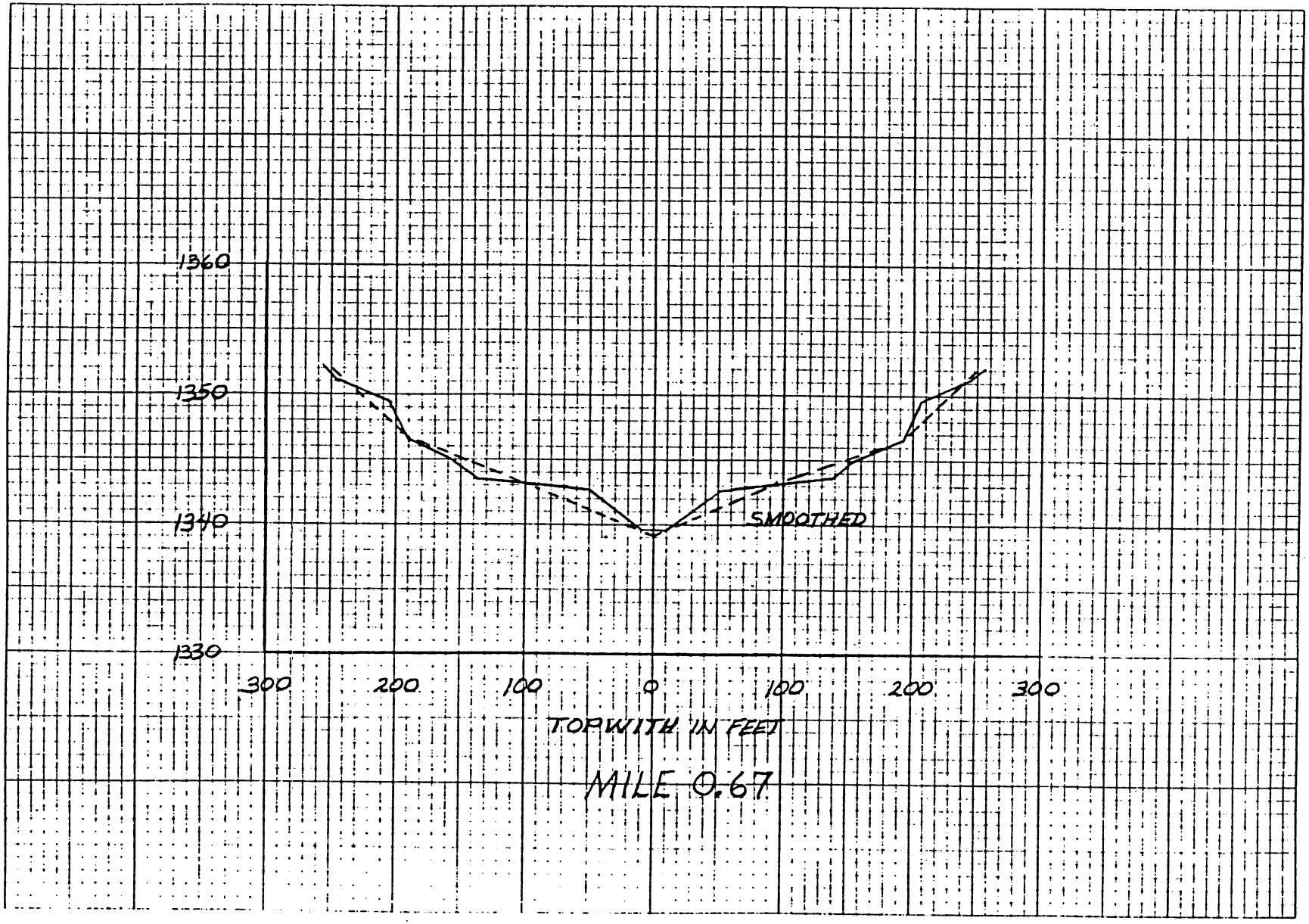

1230
1220
1210
1200
ELEVATION IN FEET
0
25
50
75
100
125
150
DISTANCE IN FEET
MILE 1.89

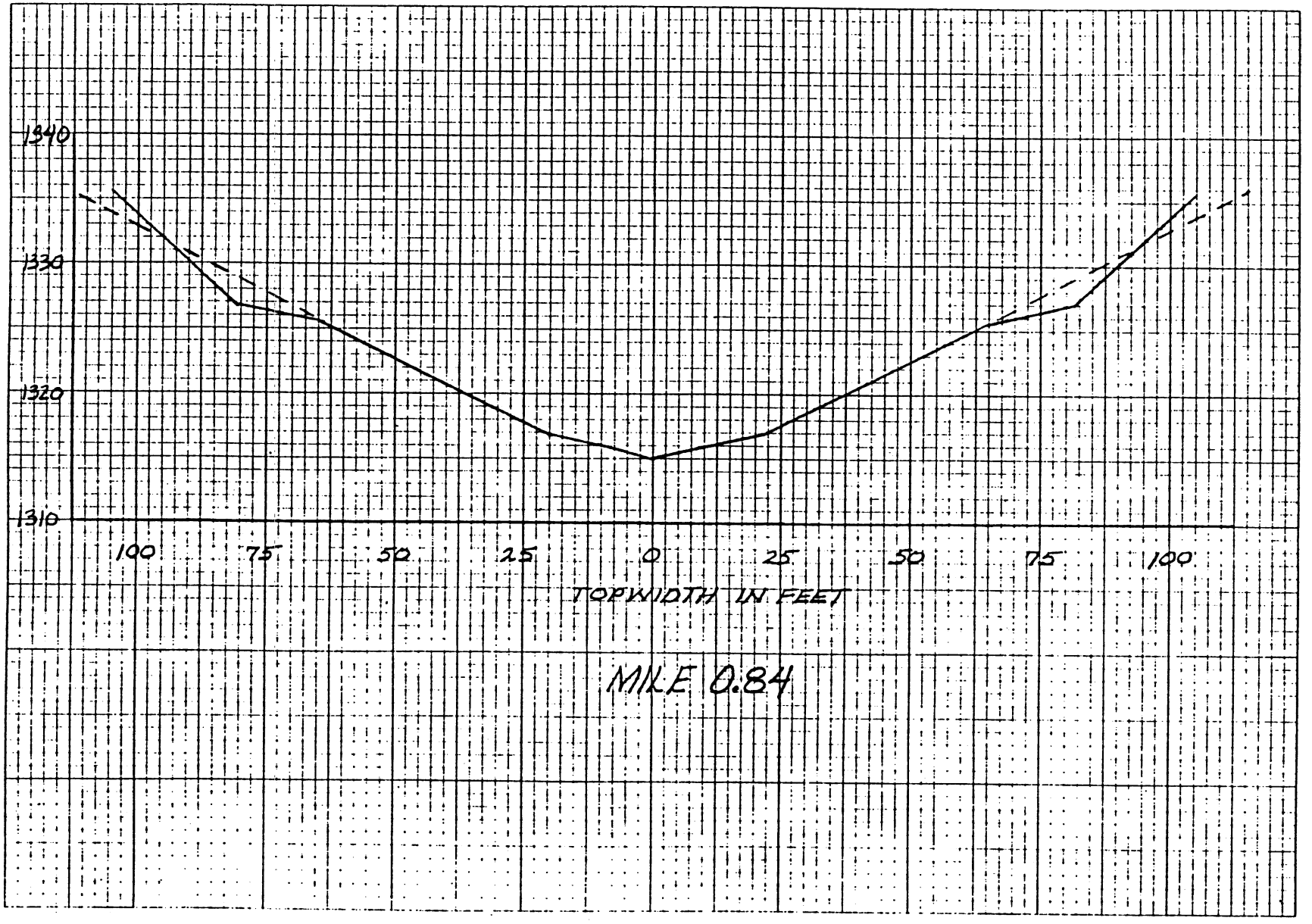

ELEVATION IN FEET
1180
1170
1160
0
100
200
300
400
500
DISTANCE IN FEET
MILE 2.28

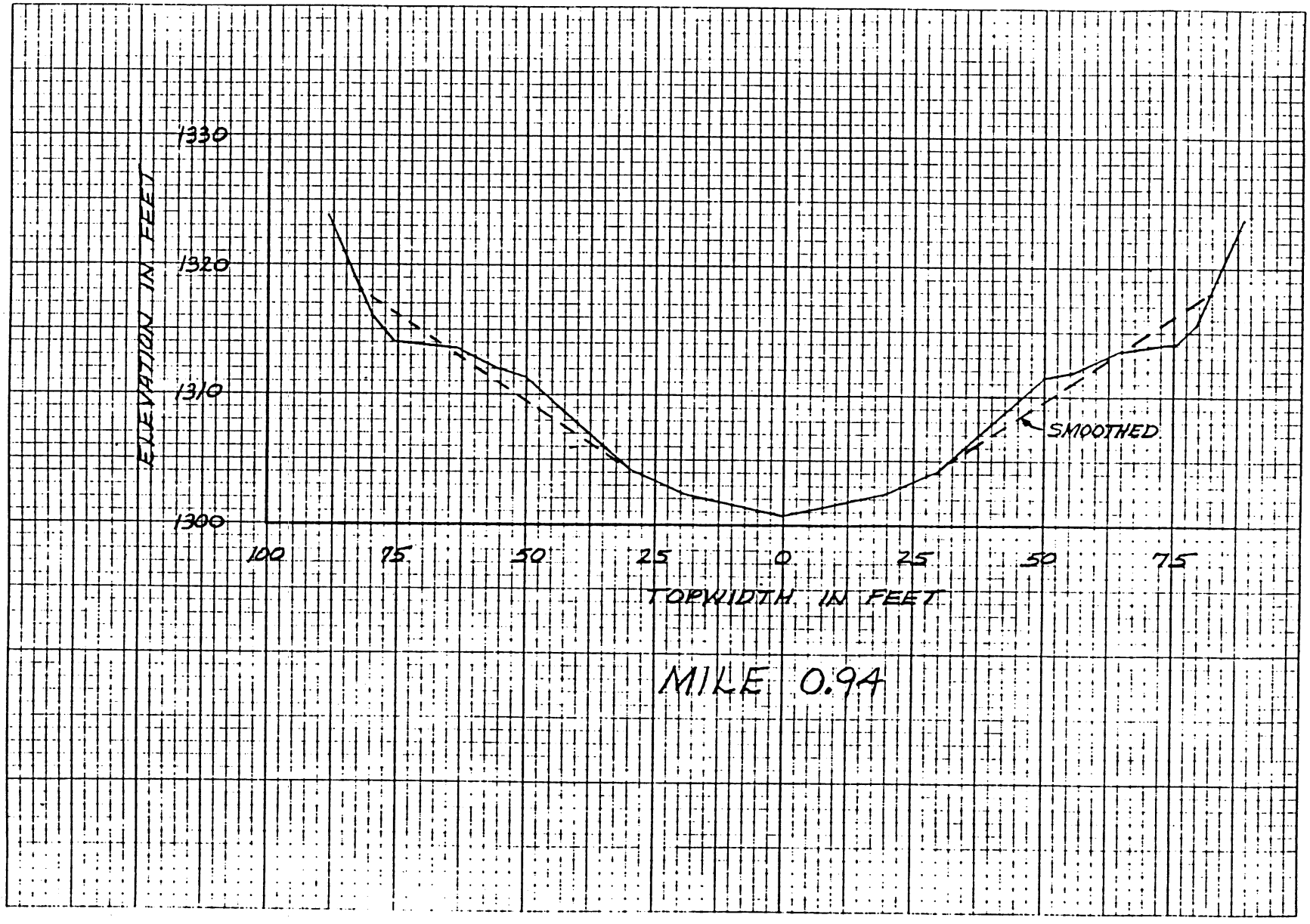

1200
1190
1180
1170
1160
1150
ELEVATION IN FEET
0
100
200
300
400
500
600
DISTANCE IN FEET
MILE 2.54

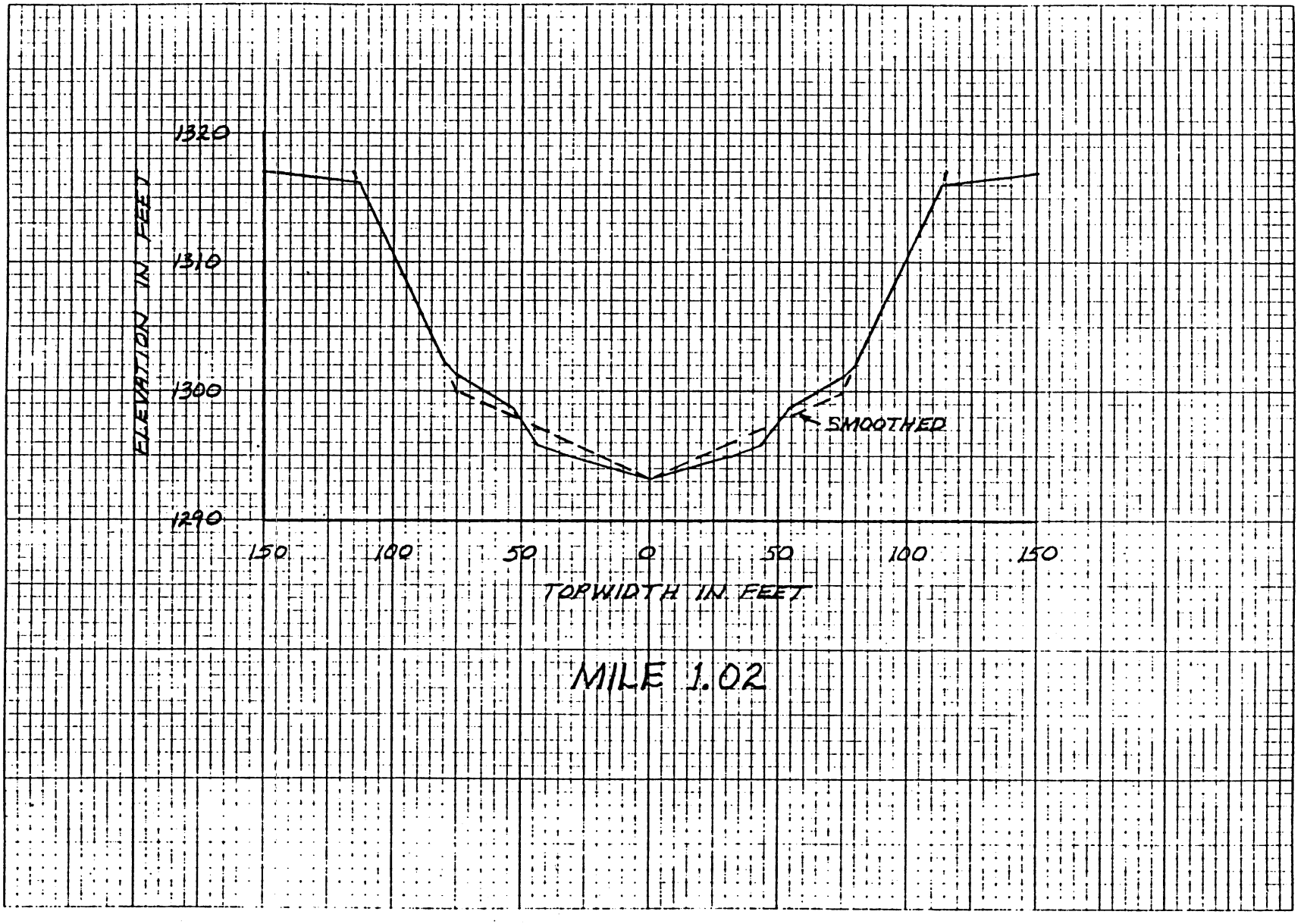

ELEVATION IN FEET
1410
1400
1390
300
200
100
0
100
200
300
TORWIDTH IN FEET
MILE 0.047


ELEVATION IN FEET
1390
1380
1370
SMOOTHED
100
50
0
50
100
TOPWIDTH IN FEET
MILE 0.21

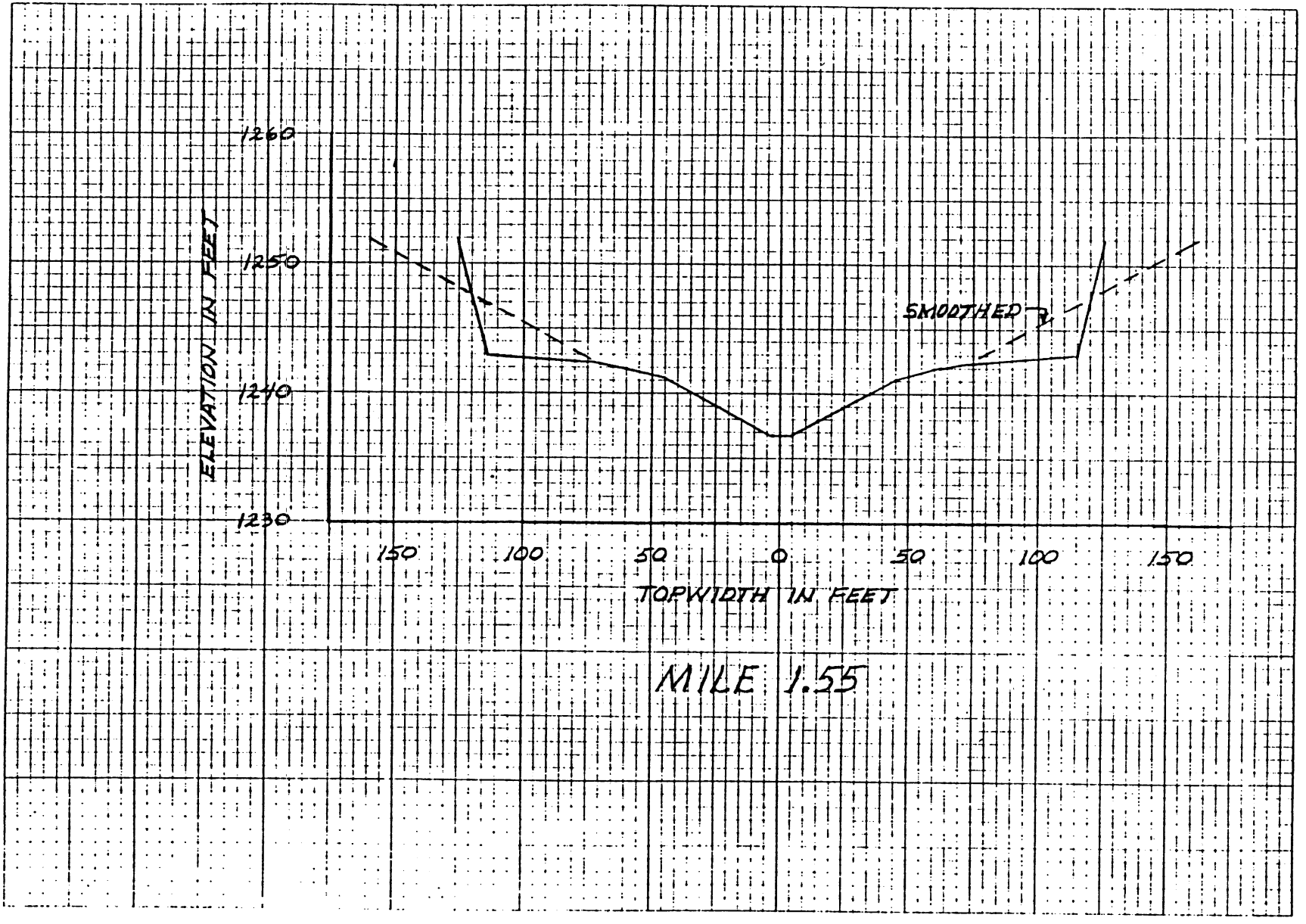

1360
1350
1340
1330
SMOOTHED
300
200
100
0
100
200
300
TOPWIDTH IN FEET
MILE 0.67


1340
1330
1320
1310
100
75
50
25
0
25
50
75
100
TOPWIDTH IN FEET
MILE 0.84


1330
1320
1310
1300
ELEVATION IN FEET
100
75
50
25
0
25
50
75
TOPWIDTH IN FEET
SMOOTHED
MILE 0.94


1320
1310
1300
1290
ELEVATION IN FEET
SMOOTHED
150
100
50
0
50
100
150
TOPWIDTH IN FEET
MILE 1.02

1280
1270
1260
ELEVATION IN FEET
SMOOTHED
300
200
100
0
100
200
300
TOPWIDTH IN FEET
MILE 1.29

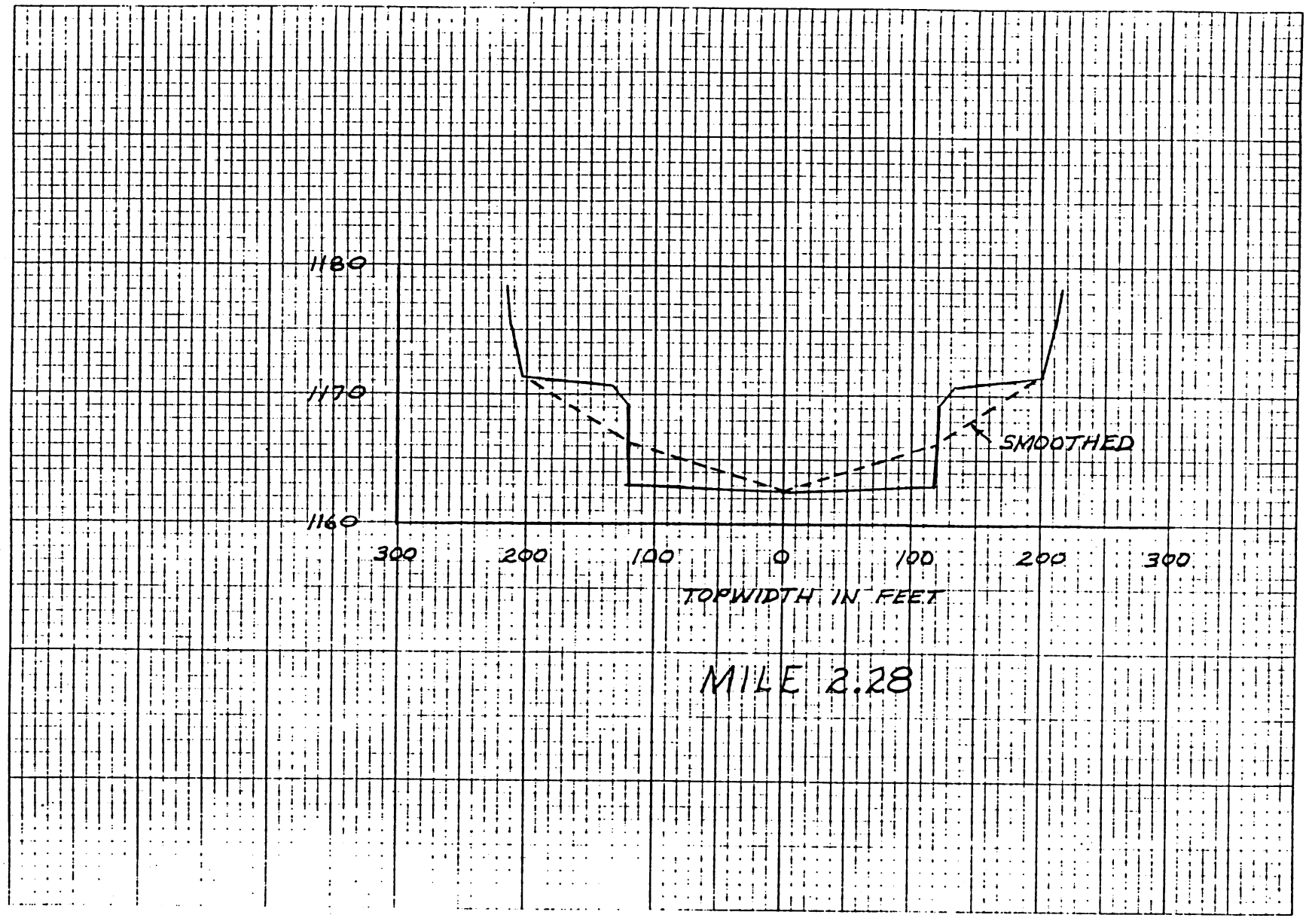

1260
1250
1240
1230
ELEVATION IN FEET
SMOOTHED
150
100
50
0
50
100
150
TOPWIDTH IN FEET
MILE 1.55

1250
1240
1230
ELEVATION IN FEET
SMOOTHED
75
50
25
0
25
50
75
TOPWIDTH IN FEET
MILE 1.59

1240
1230
1220
ELEVATION IN FEET
75
50
25
0
25
50
75
TOPWIDTH IN FEET
SMOOTHED
MILE 1.73

1240
1230
1220
1210
ELEVATION IN FEET
SMOOTHED
150
100
50
0
50
100
150
TOPWIDTH IN FEET
MILE 1.84

1230
1220
1210
1200
ELEVATION IN FEET
75
50
25
0
25
50
75
TOPWIDTH IN FEET
MILE 1.89


1180
1170
1160
SMOOTHED
300
200
100
0
100
200
300
TOPWIDTH IN FEET
MILE 2.28

1190
1180
1170
1160
1150
ELEVATION IN FEET
SMOOTHED
300
200
100
0
100
200
300
TOPWIDTH IN FEET
MILE 2.54

APPENDIX B
Base Run Printout
Dam-Break Flood Forecasting Model (DAMBRK)

PROGRAM DAMBRK---VERSION-A-01/30/82

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH

PRODUCED BY THE DAM BREAK OF

LAUREL RUN RESERVIOR

ON

ANALYSIS BY

RALPH WURBS
WATERWAYS EXPERIMENT STATION JULY 1984

BASED ON PROCEDURE DEVELOPED BY

DANNY L. FREAD, PH.D., RESEARCH HYDROLOGIST
HYDROLOGIC RESEARCH LABORATORY
W23, OFFICE OF HYDROLOGY
NOAA, NATIONAL WEATHER SERVICE
SILVER SPRING, MARYLAND 20910

****
****
*** ***
*** SUMMARY OF INPUT DATA ***
*** ***
****
****

INPUT CONTROL PARAMETERS FOR LAUREL RUN RESERVIOR

PARAMETER	VARIABLE	VALUE
NUMBER OF DYNAMIC ROUTING REACHES	KKN	1
TYPE OF RESERVOIR ROUTING	KUI	0
MULTIPLE DAM INDICATOR	MULDAM	0
PRINTING INSTRUCTIONS FOR INPUT SUMMARY	KDMP	3
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	7
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

LAUREL RUN RESERVIOR RESERVOIR

TABLE OF ELEVATION VS VOLUM E

VOLUME (ACRE-FEET) SA(K)	ELEVATION (FT) HSA(K)
570.0	1440.00
425.0	1435.00
300.0	1430.00
208.0	1425.00
126.0	1420.00
68.0	1415.00
5.0	1405.00
0.0	1392.00

LAUREL RUN RESERVIOR RESERVOIR

TABLE OF ELEVATION VS SURFACE AREA

SURFACE AREA (ACRES) SA(K),	ELEVATION (FT) HSA(K)
22.4	1440.00
35.6	1435.00
14.4	1430.00
22.4	1425.00
10.4	1420.00
12.8	1415.00
-0.2	1405.00
1.0	1392.00

LAUREL RUN RESERVIOR RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
LENGTH OF RESERVOIR	MI	RLM	0.40
ELEVATION OF WATER SURFACE	FT	YO	1437.20
SIDE SLOPE OF BREACH		Z	2.45
ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	1392.00
WIDTH OF BASE OF BREACH	FT	BB	0.0
TIME TO MAXIMUM BREACH SIZE	HR	TFH	0.25
ELEVATION (MSL) OF BOTTOM OF DAM	FT	DATUM	1392.00
VOLUME-SURFACE AREA PARAMETER		VOL	1.00
ELEVATION OF WATER WHEN BREACHED	FT	HF	1437.20
ELEVATION OF TOP OF DAM	FT	HD	1436.50
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	1430.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	0.0
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	0.0
DISCHARGE COEF. FOR GATE FLOW		CG	0.0
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	0.0
DISCHARGE THRU TURBINES	CFS	QT	2000.00

CDO SHOULD NOT BE 0.00 IF OVERTOPPING MAY OCCUR

QSPILL(K,1)	HEAD(K,1)
0.	0.0
3100.	5.0
10000.	10.0
0.	0.0
0.	0.0
0.	0.0
0.	0.0
0.	0.0

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = 0.0 HRS.

TEH(TIME AT WHICH COMPUTATIONS TERMINATE) = 4.0000 HRS.

INFLOW HYDROGRAPH TO LAUREL RUN RESERVIOR

****

10400.00	6800.00	2600.00	1000.00	310.00	100.00	100.00

TIME OF INFLOW HYDROGRAPH ORDINATES

0.0	0.5000	1.5000	2.5000	3.5000	4.5000	10.5000

CROSS-SECTIONAL PARAMETERS FOR
BELOW LAUREL RUN RESERVIOR

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	15
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	0
TYPE OF OUTPUT OTHER THAN HYDROGRAPH PLOTS	JNK	4
CROSS-SECTIONAL SMOOTHING PARAMETER	KSA	0
DOWNSTREAM SUPERCRITICAL OR NOT	KSUPC	0
NO. OF LATERAL INFLOW HYDROGRAPHS	LQ	2
NO. OF POINTS IN GATE CONTROL CURVE	KCG	0

CROSS-SECTIONAL VARIABLES FOR
BELOW LAUREL RUN RESERVIOR

PARAMETER	UNITS	VARIABLE
LOCATION OF CROSS-SECTION	MI	XS(I)
ELEVATION (MSL) OF FLOODING AT CROSS-SECTION	FT	FSTG(I)
ELEV CORRESPONDING TO EACH TOP WIDTH	FT	HS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	FT	BS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	FT	BSS(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	ACRES	DSA(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	ACRES	SSA(K,I)
NUMBER OF CROSS-SECTION		I
NUMBER OF ELEVATION LEVEL		K

CROSS-SECTION NUMBER 1
****

XS(I) = 0.0 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1392.0	1392.5	1395.1	1397.0	1405.5
BS ...	0.0	150.0	315.0	400.0	470.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 2
****

XS(I) = 0.050 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1390.8	1391.3	1393.9	1395.8	1404.3
BS ...	0.0	150.0	315.0	400.0	470.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 3
****

XS(I) = 0.210 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1373.9	1374.3	1374.9	1382.0	1390.2
BS ...	0.0	25.0	45.0	132.5	204.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 4
****

XS(I) = 0.670 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1339.2	1343.2	1346.6	1350.3	1352.4
BS ...	0.0	190.0	380.0	445.0	480.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 5
****

XS(I) = 0.840 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1315.1	1317.0	1325.5	1331.0	1335.8
BS ...	0.0	42.5	130.0	185.0	230.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 6
****

XS(I) = 0.940 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1300.9	1304.1	1313.8	1318.0	1323.9
BS ...	0.0	58.8	128.7	164.5	177.5
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 7
****

XS(I) = 1.020 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1293.2	1297.7	1299.8	1302.1	1317.0
BS ...	0.0	100.0	147.5	160.0	230.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 8
****

XS(I) = 1.290 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1263.6	1267.3	1269.4	1274.0	1275.4
BS ...	0.0	170.0	245.0	390.0	430.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 9
****

XS(I) = 1.550 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1236.4	1241.1	1242.5	1247.5	1252.1
BS ...	0.0	80.0	145.0	240.0	320.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 10
****

XS(I) = 1.590 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1232.3	1232.6	1234.2	1244.5	1250.5
BS ...	0.0	38.8	63.9	108.8	120.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 11
****

XS(I) = 1.730 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1224.0	1226.5	1228.4	1234.5	1240.8
BS ...	0.0	55.0	100.0	140.0	180.6
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 12
****

XS(I) = 1.840 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1216.1	1221.5	1225.2	1228.4	1232.6
BS ...	0.0	140.0	210.0	227.5	245.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 13
****

XS(I) = 1.890 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1206.9	1207.7	1211.4	1217.8	1227.8
BS ...	0.0	41.3	99.0	120.0	140.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 14
****

XS(I) = 2.280 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1162.7	1166.3	1171.6	1175.4	1178.4
BS ...	0.0	242.0	408.0	425.0	435.0
BSS ...	0.0	0.0	0.0	0.0	0.0

CROSS-SECTION NUMBER 15
****

XS(I) = 2.540 FSTG(I) = 0.0 XSL(I) = 0.0 XSR(I) = 0.0

HS ...	1147.0	1148.0	1151.4	1152.5	1197.0
BS ...	0.0	40.0	120.0	140.0	575.0
BSS ...	0.0	0.0	0.0	0.0	0.0

MANNING N ROUGHNESS COEFFICIENTS FOR THE GIVEN REACHES
(CM(K,I),K=1,NCS) WHERE I = REACH NUMBER

REACH	1	0.060	0.060	0.060	0.060	0.060
REACH	2	0.100	0.100	0.100	0.100	0.100
REACH	3	0.100	0.100	0.100	0.100	0.100
REACH	4	0.090	0.090	0.090	0.090	0.090
REACH	5	0.090	0.090	0.090	0.090	0.090
REACH	6	0.090	0.090	0.090	0.090	0.090
REACH	7	0.090	0.090	0.090	0.090	0.090
REACH	8	0.110	0.110	0.110	0.110	0.110
REACH	9	0.110	0.110	0.110	0.110	0.110
REACH	10	0.090	0.090	0.090	0.090	0.090
REACH	11	0.100	0.100	0.100	0.100	0.100
REACH	12	0.100	0.100	0.100	0.100	0.100
REACH	13	0.090	0.090	0.090	0.090	0.090
REACH	14	0.116	0.116	0.116	0.116	0.116

CROSS-SECTIONAL VARIABLES FOR
BELOW LAUREL RUN RESERVIOR

PARAMETER	UNITS	VARIABLE
MINIMUM COMPUTATIONAL DISTANCE USED BETWEEN CROSS-SECTIONS	MI	DXM(I)
CONTRACTION - EXPANSION COEFFICIENTS BETWEEN CROSS-SECTIONS		FKC(I)

REACH NUMBER	DXM(I)	FKC(I)
1	0.013	0.0
2	0.013	0.0
3	0.013	0.0
4	0.013	0.0
5	0.013	0.0
6	0.013	0.0
7	0.013	0.0
8	0.013	0.0
9	0.013	0.0
10	0.013	0.0
11	0.013	0.0
12	0.013	0.0
13	0.013	0.0
14	0.013	0.0

DOWNSTREAM FLOW PARAMETERS FOR
BELOW LAUREL RUN RESERVIOR

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	0.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	0.0
INITIAL SIZE OF TIME STEP	HR	DTHM	0.0
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	0.0
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	98.00
THETA WEIGHTING FACTOR		THETA	0.60
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	0.050
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	0.0

LATERAL INFLOW REACH NUMBER

LQX(I)

3

11

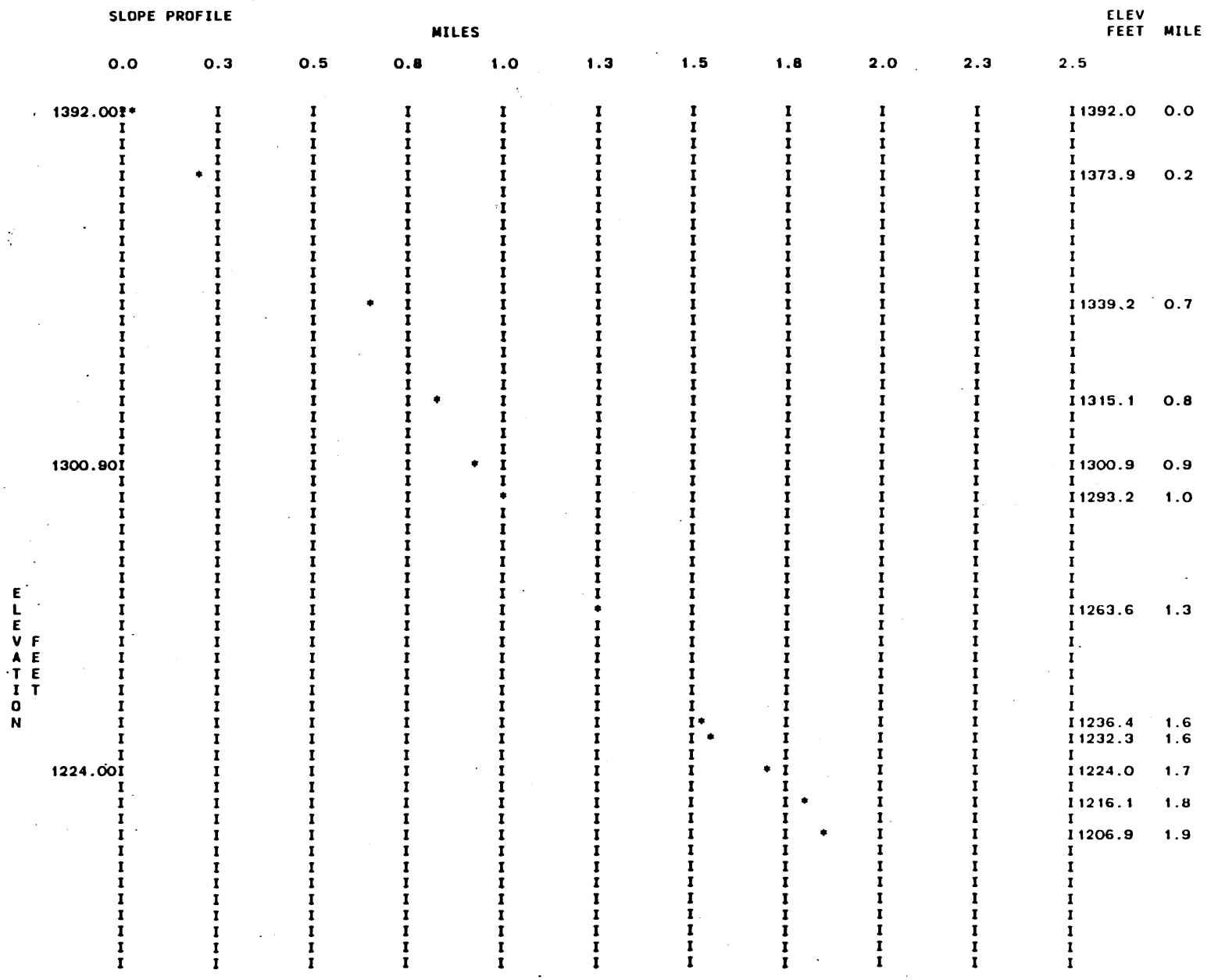
(QL(L, 1),L=1,ITEH)

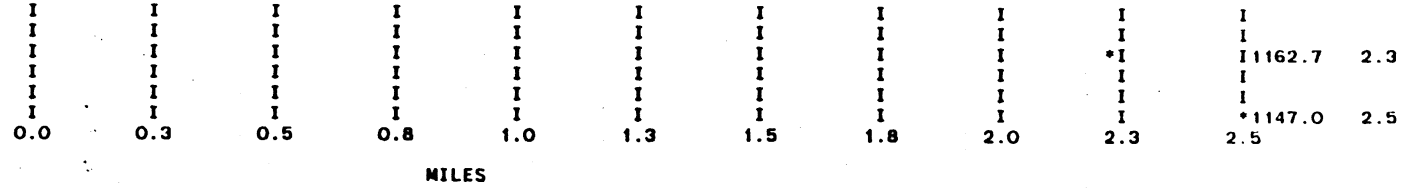
230.	50.	50.	50.	50.	0.	0.

(QL(L, 2),L=1,ITEH)

720.	800.	2400.	700.	160.	28.	28.

****
****
*** ***
*** SUMMARY OF OUTPUT DATA ***
*** ***
****
****


SLOPE PROFILE
MILES
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
ELEV FEET
MILE
1392.00
1300.90
1224.00
ELEVATION FEET
1392.0 0.0
1373.9 0.2
1339.2 0.7
1315.1 0.8
1300.9 0.9
1293.2 1.0
1263.6 1.3
1236.4 1.6
1232.3 1.6
1224.0 1.7
1216.1 1.8
1206.9 1.9


1162.7
2.3
1147.0
2.5
0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
MILES

CROSS-SECTION NO.	MILE	BOTTOM ELEVATION FEET	REACH NO.	REACH LENGTH MILES	SLOPE FT/MI
1	0.0	1392.00			
2	0.05	1390.80	1	0.05	24.00
3	0.21	1373.90	2	0.16	105.63
4	0.67	1339.20	3	0.46	75.43
5	0.84	1315.10	4	0.17	141.76
6	0.94	1300.90	5	0.10	142.00
7	1.02	1293.20	6	0.08	96.25
8	1.29	1263.60	7	0.27	109.63
9	1.55	1236.40	8	0.26	104.62
10	1.59	1232.30	9	0.04	102.50
11	1.73	1224.00	10	0.14	59.29
12	1.84	1216.10	11	0.11	71.82
13	1.89	1206.90	12	0.05	184.00
14	2.28	1162.70	13	0.39	113.33
15	2.54	1147.00	14	0.26	60.38

MESAGE

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 191 (MAXIMUM ALLOWABLE = 200

SLOPE INFORMATION FOR INPUT REACHES

REACH NO.	WATER ELEVATION FEET	HYDRAULIC DEPTH FEET	BOTTOM SLOPE FT/MI	DYNAMIC SLOPE FT/MI	TOTAL SLOPE FT/MI	CRITICAL SLOPE FT/MI	MANNING&S N
1	1394.77	2.23	24.00	1.69	25.69	212.13	0.060
1	1398.15	4.91	24.00	1.91	25.91	163.12	0.060
1	1401.52	7.87	24.00	2.56	26.56	139.37	0.060
1	1404.90	10.68	24.00	3.30	27.30	125.88	0.060
2	1386.07	2.32	105.63	2.34	107.96	581.39	0.100
2	1389.80	4.93	105.63	2.12	107.75	452.52	0.100
2	1393.52	7.79	105.63	2.43	108.05	388.45	0.100
2	1397.25	10.47	105.63	2.87	108.49	352.01	0.100
3	1360.24	2.01	75.43	4.31	79.75	610.31	0.100
3	1363.92	3.69	75.43	2.65	78.08	498.50	0.100
3	1367.61	6.13	75.43	2.36	77.80	420.75	0.100

3	1371.30	8.60	75.43	2.55	77.99	375.83	0.100
4	1331.39	2.12	141.76	4.22	145.98	485.67	0.090
4	1335.62	3.94	141.76	2.56	144.32	394.99	0.090
4	1339.86	6.49	141.76	2.34	144.10	334.44	0.090
4	1344.10	9.13	141.76	2.63	144.39	298.41	0.090
5	1313.46	3.27	142.00	4.20	146.20	420.06	0.090
5	1318.92	6.44	142.00	3.02	145.02	335.29	0.090
5	1324.39	9.29	142.00	2.82	144.82	296.69	0.090
5	1329.85	12.92	142.00	3.12	145.12	265.82	0.090
6	1302.90	3.15	96.25	3.27	99.52	425.54	0.090
6	1308.75	7.41	96.25	2.62	98.86	319.89	0.090
6	1314.60	11.18	96.25	2.90	99.15	278.91	0.090
6	1320.45	15.64	96.25	3.59	99.84	249.42	0.090
7	1282.85	2.21	109.62	3.55	113.17	478.65	0.090
7	1287.30	5.01	109.62	2.41	112.04	364.55	0.090
7	1291.75	7.55	109.62	2.44	112.07	317.88	0.090
7	1296.20	9.89	109.62	2.74	112.37	290.54	0.090
8	1253.44	1.65	104.62	5.91	110.53	788.65	0.110
8	1256.88	3.36	104.62	3.06	107.68	621.91	0.110
8	1260.31	5.31	104.62	2.45	107.07	534.02	0.110
8	1263.75	7.22	104.62	2.41	107.02	482.16	0.110
9	1238.59	2.79	102.52	4.95	107.47	661.89	0.110
9	1242.83	4.83	102.52	3.37	105.90	551.36	0.110
9	1247.06	7.27	102.52	2.90	105.42	480.91	0.110
9	1251.30	9.75	102.52	2.86	105.38	436.13	0.110
10	1232.52	2.75	59.29	4.45	63.74	445.31	0.090
10	1236.90	6.00	59.29	3.42	62.71	343.20	0.090
10	1241.27	9.03	59.29	3.21	62.49	299.51	0.090
10	1245.65	12.05	59.29	3.24	62.53	272.07	0.090
11	1224.21	2.06	71.82	4.95	76.77	604.92	0.100
11	1228.37	4.75	71.82	3.00	74.82	457.91	0.100
11	1232.54	7.86	71.82	2.76	74.57	387.21	0.100
11	1236.70	10.99	71.82	2.92	74.74	346.37	0.100
12	1216.17	2.73	184.00	3.72	187.72	550.80	0.100

12	1220.85	5.69	184.00	2.76	186.76	431.38	0.100
12	1225.52	9.28	184.00	2.79	186.79	366.46	0.100
12	1230.20	12.97	184.00	3.13	187.13	327.70	0.100
13	1189.38	2.45	113.33	2.55	115.88	462.97	0.090
13	1193.95	5.41	113.33	2.19	115.52	355.31	0.090
13	1198.53	8.94	113.33	2.60	115.93	300.48	0.090
13	1203.10	12.71	113.33	3.27	116.60	267.26	0.090
14	1163.06	4.71	60.39	1.88	62.27	618.02	0.116
14	1171.28	9.59	60.39	3.63	64.02	487.62	0.116
14	1179.49	15.19	60.39	6.79	67.18	418.38	0.116
14	1187.70	21.16	60.39	11.18	71.56	374.58	0.116

TOTAL VOLUME IN RESERVOIR BEHIND
LAUREL RUN RESERVIOR = 497.0 ACRE-FEET

DEFINITION OF VARIABLES IN RESERVOIR DEPLETION TABLE

PARAMETER	UNITS	VARIABLE
TIME STEP FROM START OF ANALYSIS		I
ITERATIONS NECESSARY TO SOLVE FLOW EQUATIONS		K
ELAPSED TIME FROM START OF ANALYSIS	HRS	TTP(I)
TOTAL OUTFLOW FROM DAM	CFS	Q(I)
ELEVATION OF WATER SURFACE AT DAM	FT	H2
ELEVATION OF BOTTOM OF BREACH	FT	YB
EST DEPTH OF FLOW IMMEDIATELY DOWNSTREAM	FT	D
SUBMERGENCE COEFFICIENT		SUB
VELOCITY CORRECTION		VCOR
TOTAL VOLUME DISCHARGED FROM TIME OF BREACH	AC-FT	OUTVOL
BREACH WIDTH	FT	BB

RECTANGULAR BREACH DISCHARGE COEFFICIENT		COFR
INFLOW TO RESERVOIR	CFS	QI(I)
BREACH OUTFLOW	CFS	QBRECH
SPILLWAY OUTFLOW	CFS	QSPIL

RESERVOIR DEPLETION TABLE

I	K	TTP(I)	Q(I)	H2	YB	D	SUB	VCOR	OUTVOL	BB	COFR	QI(I)	QBRECH	QSPIL
1	0	0.0	8135	1437.20	1436.50	1396.57	1.00	1.00	0.0	0.0	3.10	10400.	0.	8136.
2	2	0.005	8198	1437.23	1435.61	1396.58	1.00	1.00	3.4	0.0	3.10	10364.	20.	8178.
3	1	0.010	8280	1437.26	1434.72	1396.60	1.00	1.00	6.8	0.0	3.10	10328.	62.	8219.
4	1	0.015	8390	1437.29	1433.83	1396.63	1.00	1.00	10.2	0.0	3.10	10292.	134.	8257.
5	1	0.020	8532	1437.31	1432.94	1396.66	1.00	1.00	13.7	0.0	3.10	10256.	240.	8292.
6	1	0.025	8708	1437.34	1432.05	1396.71	1.00	1.00	17.3	0.0	3.10	10220.	386.	8323.
7	1	0.030	8923	1437.35	1431.16	1396.76	1.00	1.00	20.9	0.0	3.10	10184.	574.	8350.
8	1	0.035	9178	1437.37	1430.27	1396.82	1.00	1.00	24.7	0.0	3.10	10148.	807.	8372.
9	1	0.040	9475	1437.38	1429.38	1396.90	1.00	1.00	28.5	0.0	3.10	10112.	1088.	8387.
10	1	0.045	9814	1437.39	1428.49	1396.98	1.00	1.00	32.5	0.0	3.10	10076.	1418.	8396.
11	1	0.050	10197	1437.39	1427.60	1397.06	1.00	1.00	36.6	0.0	3.10	10040.	1800.	8397.
12	1	0.055	10624	1437.38	1426.71	1397.15	1.00	1.00	40.9	0.0	3.10	10004.	2235.	8389.
13	1	0.060	11095	1437.37	1425.82	1397.24	1.00	1.00	45.4	0.0	3.10	9968.	2723.	8372.
14	1	0.065	11531	1437.35	1424.93	1397.32	1.00	1.00	50.1	0.0	3.10	9932.	3266.	8266.
15	1	0.070	11934	1437.33	1424.04	1397.40	1.00	1.00	55.0	0.0	3.10	9896.	3864.	8071.
16	1	0.075	12384	1437.29	1423.15	1397.49	1.00	1.00	60.0	0.0	3.10	9860.	4518.	7867.
17	1	0.080	12881	1437.26	1422.26	1397.58	1.00	1.00	65.2	0.0	3.10	9824.	5229.	7653.
18	1	0.085	13424	1437.21	1421.37	1397.68	1.00	1.00	70.6	0.0	3.10	9788.	5996.	7428.
19	1	0.090	14010	1437.15	1420.48	1397.78	1.00	1.00	76.3	0.0	3.10	9752.	6818.	7193.
20	1	0.095	14640	1437.09	1419.59	1397.90	1.00	1.00	82.2	0.0	3.10	9716.	7695.	6946.
21	1	0.100	15311	1437.02	1418.70	1398.01	1.00	1.00	88.4	0.0	3.10	9680.	8626.	6686.
22	1	0.105	16022	1436.94	1417.81	1398.13	1.00	1.00	94.9	0.0	3.10	9644.	9609.	6413.
23	1	0.110	16771	1436.85	1416.92	1398.26	1.00	1.00	101.7	0.0	3.10	9608.	10644.	6127.
24	1	0.115	17556	1436.74	1416.03	1398.39	1.00	1.00	108.8	0.0	3.10	9572.	11729.	5827.
25	2	0.120	18375	1436.63	1415.14	1398.51	1.00	1.00	116.2	0.0	3.10	9536.	12862.	5513.
26	2	0.125	19228	1436.51	1414.25	1398.65	1.00	1.00	123.9	0.0	3.10	9500.	14043.	5185.
27	2	0.130	20268	1436.38	1413.36	1398.81	1.00	1.00	132.1	0.0	3.10	9464.	15268.	5001.
28	2	0.135	21332	1436.23	1412.47	1398.97	1.00	1.00	140.7	0.0	3.10	9428.	16533.	4800.
29	2	0.140	22417	1436.07	1411.58	1399.13	1.00	1.00	149.7	0.0	3.10	9392.	17836.	4581.
30	2	0.145	23523	1435.90	1410.69	1399.29	1.00	1.00	159.2	0.0	3.10	9356.	19177.	4346.
31	2	0.150	24648	1435.72	1409.80	1399.45	1.00	1.00	169.2	0.0	3.10	9320.	20553.	4095.
32	2	0.155	25791	1435.53	1408.91	1399.61	1.00	1.00	179.6	0.0	3.10	9284.	21963.	3828.
33	2	0.160	26951	1435.32	1408.02	1399.77	1.00	1.00	190.5	0.0	3.10	9248.	23406.	3545.
34	2	0.165	28127	1435.11	1407.13	1399.93	1.00	1.00	201.9	0.0	3.10	9212.	24880.	3248.
35	2	0.170	29400	1434.88	1406.24	1400.10	1.00	1.00	213.8	0.0	3.10	9176.	26377.	3024.
36	2	0.175	30747	1434.63	1405.35	1400.27	1.00	1.00	226.2	0.0	3.10	9140.	27878.	2869.
37	2	0.180	32066	1434.35	1404.46	1400.44	1.00	1.00	239.2	0.0	3.10	9104.	29368.	2698.
38	2	0.185	33346	1434.05	1403.57	1400.60	1.00	1.00	252.7	0.0	3.10	9068.	30836.	2511.
39	2	0.190	34571	1433.72	1402.68	1400.75	1.00	1.00	266.7	0.0	3.10	9032.	32267.	2304.
40	2	0.195	35723	1433.35	1401.79	1400.89	1.00	1.00	281.2	0.0	3.10	8996.	33647.	2076.
41	2	0.200	36781	1432.94	1400.90	1401.02	1.00	1.00	296.2	0.0	3.10	8960.	34957.	1824.
42	2	0.205	37715	1432.49	1400.01	1401.13	1.00	1.00	311.6	0.0	3.10	8924.	36171.	1545.
43	2	0.210	38489	1431.99	1399.12	1401.22	1.00	1.00	327.4	0.0	3.10	8888.	37258.	1231.
44	2	0.215	39048	1431.41	1398.23	1401.28	1.00	1.00	343.4	0.0	3.10	8852.	38171.	877.
45	2	0.220	39307	1430.75	1397.34	1401.31	1.00	1.00	359.6	0.0	3.10	8816.	38840.	467.
46	2	0.225	39148	1429.97	1396.45	1401.29	1.00	1.00	375.8	0.0	3.10	8780.	39148.	0.
47	2	0.230	39316	1429.13	1395.56	1401.31	1.00	1.00	392.0	0.0	3.10	8744.	39317.	0.
48	2	0.235	39660	1428.36	1394.67	1401.35	1.00	1.00	408.3	0.0	3.10	8708.	39661.	0.
49	2	0.240	40135	1427.62	1393.78	1401.41	1.00	1.00	424.8	0.0	3.10	8672.	40135.	0.
50	2	0.245	40711	1426.93	1392.89	1401.47	1.00	1.00	441.5	0.0	3.10	8636.	40712.	0.

RESERVOIR DEPLETION TABLE

I	K	TTP(I)	Q(I)	H2	YB	D	SUB	VCOR	OUTVOL	BB	COFR	QI(I)	QBRECH	QSPIL
***	**	******	********	*******	*******	*******	****	****	*********	****	****	*****	******	*****
51	2	0.250	41371	1426.25	1392.00	1401.55	1.00	1.00	458.5	0.0	3.10	8600.	41372.	0.
52	2	0.255	39509	1425.62	1392.00	1401.34	1.00	1.00	475.2	0.0	3.10	8564.	39510.	0.
53	2	0.260	37855	1425.05	1392.00	1401.14	1.00	1.00	491.2	0.0	3.10	8528.	37856.	0.
54	2	0.265	36320	1424.51	1392.00	1400.96	1.00	1.00	506.5	0.0	3.10	8492.	36320.	0.
55	1	0.270	34817	1423.97	1392.00	1400.78	1.00	1.00	521.2	0.0	3.10	8456.	34818.	0.
56	1	0.275	33337	1423.42	1392.00	1400.60	1.00	1.00	535.3	0.0	3.10	8420.	33338.	0.
57	1	0.280	31875	1422.86	1392.00	1400.42	1.00	1.00	548.7	0.0	3.10	8384.	31875.	0.
58	2	0.285	30426	1422.29	1392.00	1400.23	1.00	1.00	561.6	0.0	3.10	8348.	30427.	0.
59	2	0.290	28985	1421.71	1392.00	1400.04	1.00	1.00	573.9	0.0	3.10	8312.	28986.	0.
60	2	0.295	27544	1421.11	1392.00	1399.85	1.00	1.00	585.6	0.0	3.10	8276.	27544.	0.
61	2	0.300	26090	1420.49	1392.00	1399.65	1.00	1.00	596.6	0.0	3.10	8240.	26091.	0.
62	2	0.305	24638	1419.84	1392.00	1399.45	1.00	1.00	607.1	0.0	3.10	8204.	24638.	0.
63	2	0.310	23296	1419.23	1392.00	1399.26	1.00	1.00	617.0	0.0	3.10	8168.	23297.	0.
64	2	0.315	22130	1418.68	1392.00	1399.09	1.00	1.00	626.4	0.0	3.10	8132.	22130.	0.
65	2	0.320	21104	1418.18	1392.00	1398.94	1.00	1.00	635.3	0.0	3.10	8096.	21104.	0.
66	2	0.325	20194	1417.72	1392.00	1398.80	1.00	1.00	643.9	0.0	3.10	8060.	20195.	0.
67	2	0.330	19381	1417.30	1392.00	1398.67	1.00	1.00	652.1	0.0	3.10	8024.	19382.	0.
68	2	0.335	18649	1416.91	1392.00	1398.56	1.00	1.00	659.9	0.0	3.10	7988.	18650.	0.
69	2	0.340	17987	1416.56	1392.00	1398.45	1.00	1.00	667.5	0.0	3.10	7952.	17988.	0.
70	2	0.345	17385	1416.23	1392.00	1398.35	1.00	1.00	674.8	0.0	3.10	7916.	17385.	0.
71	2	0.350	16834	1415.92	1392.00	1398.26	1.00	1.00	681.9	0.0	3.10	7880.	16835.	0.
72	2	0.355	16329	1415.63	1392.00	1398.18	1.00	1.00	688.7	0.0	3.10	7844.	16329.	0.
73	2	0.360	15863	1415.36	1392.00	1398.10	1.00	1.00	695.4	0.0	3.10	7808.	15863.	0.
74	2	0.365	15432	1415.10	1392.00	1398.03	1.00	1.00	701.8	0.0	3.10	7772.	15433.	0.
75	2	0.370	15029	1414.86	1392.00	1397.96	1.00	1.00	708.1	0.0	3.10	7736.	15030.	0.
76	1	0.375	14644	1414.62	1392.00	1397.89	1.00	1.00	714.3	0.0	3.10	7700.	14645.	0.
77	1	0.380	14275	1414.39	1392.00	1397.83	1.00	1.00	720.2	0.0	3.10	7664.	14275.	0.
78	1	0.385	13920	1414.17	1392.00	1397.76	1.00	1.00	726.1	0.0	3.10	7628.	13920.	0.
79	1	0.390	13578	1413.95	1392.00	1397.70	1.00	1.00	731.7	0.0	3.10	7592.	13579.	0.
80	1	0.395	13251	1413.74	1392.00	1397.64	1.00	1.00	737.3	0.0	3.10	7556.	13251.	0.
81	1	0.400	12936	1413.53	1392.00	1397.58	1.00	1.00	742.7	0.0	3.10	7520.	12936.	0.
82	1	0.405	12633	1413.33	1392.00	1397.53	1.00	1.00	748.0	0.0	3.10	7484.	12633.	0.
83	1	0.410	12342	1413.13	1392.00	1397.47	1.00	1.00	753.1	0.0	3.10	7448.	12343.	0.
84	1	0.415	12063	1412.94	1392.00	1397.42	1.00	1.00	758.2	0.0	3.10	7412.	12064.	0.
85	1	0.420	11795	1412.75	1392.00	1397.37	1.00	1.00	763.1	0.0	3.10	7376.	11795.	0.
86	1	0.425	11537	1412.57	1392.00	1397.32	1.00	1.00	767.9	0.0	3.10	7340.	11538.	0.
87	1	0.430	11290	1412.39	1392.00	1397.27	1.00	1.00	772.6	0.0	3.10	7304.	11290.	0.
88	1	0.435	11052	1412.22	1392.00	1397.23	1.00	1.00	777.3	0.0	3.10	7268.	11053.	0.
89	1	0.440	10824	1412.05	1392.00	1397.18	1.00	1.00	781.8	0.0	3.10	7232.	10825.	0.
90	1	0.445	10605	1411.89	1392.00	1397.14	1.00	1.00	786.2	0.0	3.10	7196.	10606.	0.
91	1	0.450	10395	1411.73	1392.00	1397.10	1.00	1.00	790.5	0.0	3.10	7160.	10395.	0.
92	1	0.455	10193	1411.57	1392.00	1397.05	1.00	1.00	794.8	0.0	3.10	7124.	10193.	0.
93	1	0.460	9999	1411.42	1392.00	1397.02	1.00	1.00	799.0	0.0	3.10	7088.	9999.	0.
94	1	0.465	9813	1411.28	1392.00	1396.97	1.00	1.00	803.1	0.0	3.10	7052.	9813.	0.
95	1	0.470	9634	1411.14	1392.00	1396.93	1.00	1.00	807.1	0.0	3.10	7016.	9634.	0.
96	1	0.475	9462	1411.00	1392.00	1396.89	1.00	1.00	811.0	0.0	3.10	6980.	9463.	0.
97	1	0.480	9297	1410.87	1392.00	1396.85	1.00	1.00	814.9	0.0	3.10	6944.	9298.	0.
98	1	0.485	9139	1410.74	1392.00	1396.81	1.00	1.00	818.7	0.0	3.10	6908.	9140.	0.
99	1	0.490	8987	1410.61	1392.00	1396.77	1.00	1.00	822.5	0.0	3.10	6872.	8988.	0.
100	1	0.495	8841	1410.49	1392.00	1396.74	1.00	1.00	826.1	0.0	3.10	6836.	8842.	0.

RESERVOIR DEPLETION TABLE

I	K	TTP(I)	Q(I)	H2	YB	D	SUB	VCOR	OUTVOL	BB	COFR	QI(I)	QBRECH	QSPIL
101	1	0.500	8701	1410.37	1392.00	1396.70	1.00	1.00	829.8	0.0	3.10	6800.	8702.	0.
102	1	0.505	8567	1410.26	1392.00	1396.67	1.00	1.00	833.3	0.0	3.10	6779.	8568.	0.
103	1	0.510	8427	1410.14	1392.00	1396.64	1.00	1.00	837.2	0.0	3.10	6756.	8428.	0.
104	1	0.517	8282	1410.01	1392.00	1396.60	1.00	1.00	841.4	0.0	3.10	6730.	8282.	0.
105	1	0.523	8131	1409.88	1392.00	1396.56	1.00	1.00	845.9	0.0	3.10	6703.	8132.	0.
106	1	0.531	7977	1409.75	1392.00	1396.52	1.00	1.00	850.8	0.0	3.10	6672.	7977.	0.
107	1	0.539	7819	1409.61	1392.00	1396.48	1.00	1.00	856.0	0.0	3.10	6638.	7820.	0.
108	1	0.547	7660	1409.46	1392.00	1396.44	1.00	1.00	861.7	0.0	3.10	6601.	7661.	0.
109	1	0.557	7500	1409.32	1392.00	1396.39	1.00	1.00	867.8	0.0	3.10	6560.	7501.	0.
110	1	0.568	7341	1409.17	1392.00	1396.35	1.00	1.00	874.4	0.0	3.10	6515.	7342.	0.
111	1	0.580	7185	1409.02	1392.00	1396.31	1.00	1.00	881.4	0.0	3.10	6465.	7185.	0.
112	1	0.593	7032	1408.87	1392.00	1396.26	1.00	1.00	889.1	0.0	3.10	6411.	7032.	0.
113	1	0.607	6883	1408.73	1392.00	1396.22	1.00	1.00	897.3	0.0	3.10	6351.	6883.	0.
114	1	0.623	6739	1408.59	1392.00	1396.18	1.00	1.00	906.1	0.0	3.10	6285.	6740.	0.
115	1	0.640	6600	1408.45	1392.00	1396.14	1.00	1.00	915.6	0.0	3.10	6213.	6601.	0.
116	1	0.659	6465	1408.32	1392.00	1396.10	1.00	1.00	925.9	0.0	3.10	6133.	6466.	0.
117	1	0.680	6334	1408.18	1392.00	1396.06	1.00	1.00	936.9	0.0	3.10	6045.	6334.	0.
118	1	0.703	6203	1408.05	1392.00	1396.02	1.00	1.00	948.8	0.0	3.10	5949.	6203.	0.
119	1	0.728	6070	1407.91	1392.00	1395.98	1.00	1.00	961.6	0.0	3.10	5842.	6071.	0.
120	1	0.756	5934	1407.77	1392.00	1395.94	1.00	1.00	975.4	0.0	3.10	5726.	5934.	0.
121	2	0.786	5789	1407.61	1392.00	1395.90	1.00	1.00	990.2	0.0	3.10	5597.	5790.	0.
122	2	0.820	5635	1407.45	1392.00	1395.85	1.00	1.00	1006.1	0.0	3.10	5456.	5635.	0.
123	2	0.857	5466	1407.26	1392.00	1395.80	1.00	1.00	1023.1	0.0	3.10	5301.	5467.	0.
124	2	0.898	5282	1407.05	1392.00	1395.74	1.00	1.00	1041.2	0.0	3.10	5130.	5283.	0.
125	2	0.942	5079	1406.82	1392.00	1395.67	1.00	1.00	1060.3	0.0	3.10	4942.	5079.	0.
126	2	0.992	4854	1406.55	1392.00	1395.60	1.00	1.00	1080.6	0.0	3.10	4735.	4854.	0.
127	2	1.046	4604	1406.25	1392.00	1395.51	1.00	1.00	1101.7	0.0	3.10	4507.	4604.	0.
128	2	1.106	4326	1405.90	1392.00	1395.41	1.00	1.00	1123.7	0.0	3.10	4257.	4326.	0.
129	2	1.171	4014	1405.49	1392.00	1395.30	1.00	1.00	1146.3	0.0	3.10	3982.	4014.	0.
130	2	1.243	3660	1405.00	1392.00	1395.17	1.00	1.00	1169.2	0.0	3.10	3679.	3660.	0.
131	2	1.322	3333	1404.52	1392.00	1395.03	1.00	1.00	1192.1	0.0	3.10	3346.	3334.	0.
132	2	1.410	2965	1403.95	1392.00	1394.87	1.00	1.00	1214.8	0.0	3.10	2979.	2966.	0.
133	2	1.506	2587	1403.32	1392.00	1394.69	1.00	1.00	1236.8	0.0	3.10	2591.	2588.	0.
134	2	1.611	2421	1403.02	1392.00	1394.61	1.00	1.00	1258.7	0.0	3.10	2422.	2421.	0.
135	2	1.727	2235	1402.67	1392.00	1394.51	1.00	1.00	1281.0	0.0	3.10	2236.	2235.	0.
136	2	1.855	2033	1402.28	1392.00	1394.40	1.00	1.00	1303.6	0.0	3.10	2032.	2033.	0.
137	2	1.996	1809	1401.81	1392.00	1394.27	1.00	1.00	1325.9	0.0	3.10	1807.	1809.	0.
138	2	2.150	1565	1401.26	1392.00	1394.12	1.00	1.00	1347.4	0.0	3.10	1560.	1566.	0.
139	0	2.30	1731											
140	0	2.47	1731											
141	0	2.66	1731											
142	0	2.87	1731											
143	0	3.09	1731											
144	0	3.34	1731											
145	0	3.62	1731											
146	0	3.92	1731											
147	0	4.25	1731											

PARAMETER	UNITS	VARIABLE	VALUE
INITIAL FLOW	CFS	Q(1)	8136.
MAX FLOW	CFS	QM	41372.
FINAL FLOW	CFS	Q(NU)	1731.
TIME TO MAX FLOW	HRS	TP	0.25
NUMBER OF TIME STEPS		NNU	147
TOTAL VOLUME DISCHARGED FROM RESERVOIR	AC-FT	DISVOL	1347.
NUMBER OF INTERMEDIATE STATIONS		NN(NS)	191
NUMBER OF TIME STEPS		NNU	147

INITIAL CONDITIONS

I	K	X(I)	YD(I)	QDI(I)	FRD	SOM
191	3	2.540	1159.54	9085.93	0.34	60.389
191	0	2.540	1159.54	9085.93		
190	2	2.527	1160.32	9085.93	0.32	
189	2	2.514	1161.00	9085.93	0.30	
188	3	2.501	1161.61	9085.93	0.29	
187	3	2.488	1162.18	9085.93	0.28	
186	3	2.475	1162.73	9085.93	0.28	
185	3	2.462	1163.26	9085.93	0.28	
184	3	2.449	1163.79	9085.93	0.28	
183	3	2.436	1164.32	9085.93	0.28	
182	3	2.423	1164.85	9085.93	0.28	
181	3	2.410	1165.40	9085.93	0.28	
180	3	2.397	1165.95	9085.93	0.28	
179	3	2.384	1166.52	9085.93	0.29	
178	3	2.371	1167.11	9085.93	0.29	
177	3	2.358	1167.72	9085.93	0.29	
176	3	2.345	1168.35	9085.93	0.30	
175	3	2.332	1168.99	9085.93	0.30	
174	3	2.319	1169.66	9085.93	0.30	
173	3	2.306	1170.35	9085.93	0.30	
172	3	2.293	1171.06	9085.93	0.31	
171	2	2.280	1171.78	9085.93	0.31	
170	4	2.267	1172.22	9085.93	0.41	
169	4	2.254	1173.05	9085.93	0.49	
168	3	2.241	1174.28	9085.93	0.54	
167	3	2.228	1175.73	9085.93	0.55	
166	2	2.215	1177.22	9085.93	0.55	
165	2	2.202	1178.73	9085.93	0.55	
164	2	2.189	1180.24	9085.93	0.55	
163	2	2.176	1181.75	9085.93	0.56	
162	2	2.163	1183.27	9085.93	0.56	
161	2	2.150	1184.79	9085.93	0.56	
160	2	2.137	1186.31	9085.93	0.56	
159	2	2.124	1187.82	9085.93	0.56	
158	2	2.111	1189.33	9085.93	0.56	
157	2	2.098	1190.84	9085.93	0.57	
156	2	2.085	1192.36	9085.93	0.57	
155	2	2.072	1193.89	9085.93	0.57	
154	2	2.059	1195.42	9085.93	0.58	
153	2	2.046	1196.97	9085.93	0.58	
152	3	2.033	1198.52	9085.93	0.59	
151	3	2.020	1200.08	9085.93	0.59	
150	3	2.007	1201.66	9085.93	0.60	
149	3	1.994	1203.25	9085.93	0.60	
148	3	1.981	1204.86	9085.93	0.61	
147	3	1.968	1206.48	9085.93	0.62	
146	3	1.955	1208.12	9085.93	0.63	
145	3	1.942	1209.79	9085.93	0.64	

144	3	1.929	1211.49	9085.93	0.65
143	3	1.916	1213.21	9085.93	0.66
142	3	1.903	1214.98	9085.93	0.67
141	3	1.890	1216.79	9085.93	0.69
140	3	1.873	1220.00	9085.93	0.58
139	3	1.857	1222.53	9085.93	0.62
138	3	1.840	1225.50	9085.93	0.65
137	3	1.826	1227.67	9085.93	0.49
136	3	1.812	1228.98	9085.93	0.46
135	3	1.799	1230.15	9085.93	0.46
134	3	1.785	1231.29	9085.93	0.46
133	3	1.771	1232.42	9085.93	0.47
132	3	1.757	1233.57	9085.93	0.47
131	3	1.744	1234.75	9085.93	0.48
130	3	1.730	1236.15	8365.93	0.44
129	3	1.716	1236.99	8365.93	0.44
128	2	1.702	1237.82	8365.93	0.45
127	2	1.688	1238.66	8365.93	0.45
126	2	1.674	1239.51	8365.93	0.45
125	2	1.660	1240.37	8365.93	0.46
124	2	1.646	1241.23	8365.93	0.46
123	2	1.632	1242.10	8365.93	0.47
122	2	1.618	1242.99	8365.93	0.47
121	2	1.604	1243.89	8365.93	0.47
120	2	1.590	1244.80	8365.93	0.48
119	3	1.577	1246.33	8365.93	0.38
118	3	1.563	1247.34	8365.93	0.37
117	3	1.550	1248.32	8365.93	0.39
116	3	1.537	1249.34	8365.93	0.40
115	3	1.524	1250.44	8365.93	0.41
114	3	1.511	1251.58	8365.93	0.41
113	3	1.498	1252.74	8365.93	0.42
112	3	1.485	1253.93	8365.93	0.42
111	3	1.472	1255.12	8365.93	0.42
110	3	1.459	1256.33	8365.93	0.42
109	3	1.446	1257.54	8365.93	0.42
108	3	1.433	1258.75	8365.93	0.42
107	3	1.420	1259.97	8365.93	0.42
106	3	1.407	1261.20	8365.93	0.42
105	3	1.394	1262.43	8365.93	0.42
104	3	1.381	1263.66	8365.93	0.42
103	3	1.368	1264.89	8365.93	0.42
102	3	1.355	1266.13	8365.93	0.42
101	3	1.342	1267.37	8365.93	0.42
100	3	1.329	1268.62	8365.93	0.42
99	3	1.316	1269.87	8365.93	0.42
98	3	1.303	1271.12	8365.93	0.42
97	3	1.290	1272.37	8365.93	0.42
96	3	1.276	1273.28	8365.93	0.50
95	3	1.263	1274.60	8365.93	0.54
94	2	1.249	1276.12	8365.93	0.55
93	3	1.236	1277.68	8365.93	0.56
92	3	1.222	1279.26	8365.93	0.56
91	3	1.209	1280.83	8365.93	0.56
90	3	1.195	1282.41	8365.93	0.56
89	3	1.182	1283.99	8365.93	0.56
88	3	1.168	1285.57	8365.93	0.56
87	3	1.155	1287.16	8365.93	0.57
86	3	1.141	1288.75	8365.93	0.57
85	3	1.128	1290.33	8365.93	0.57
84	3	1.114	1291.93	8365.93	0.57

83	3	1.101	1293.52	8365.93	0.57
82	3	1.087	1295.11	8365.93	0.58
81	3	1.074	1296.70	8365.93	0.58
80	3	1.060	1298.28	8365.93	0.58
79	3	1.047	1299.87	8365.93	0.59
78	3	1.033	1301.47	8365.93	0.60
77	3	1.020	1303.07	8365.93	0.60
76	3	1.007	1304.70	8365.93	0.60
75	3	0.993	1306.29	8365.93	0.60
74	3	0.980	1307.88	8365.93	0.61
73	3	0.967	1309.48	8365.93	0.62
72	3	0.953	1311.09	8365.93	0.62
71	3	0.940	1312.72	8365.93	0.63
70	2	0.926	1314.59	8365.93	0.65
69	3	0.911	1316.57	8365.93	0.65
68	2	0.897	1318.58	8365.93	0.65
67	2	0.883	1320.58	8365.93	0.65
66	2	0.869	1322.57	8365.93	0.64
65	2	0.854	1324.55	8365.93	0.64
64	2	0.840	1326.51	8365.93	0.64
63	2	0.827	1328.35	8365.93	0.54
62	3	0.814	1329.66	8365.93	0.52
61	3	0.801	1330.89	8365.93	0.52
60	3	0.788	1332.17	8365.93	0.53
59	3	0.775	1333.53	8365.93	0.55
58	3	0.762	1334.98	8365.93	0.56
57	3	0.748	1336.51	8365.93	0.56
56	3	0.735	1338.10	8365.93	0.57
55	3	0.722	1339.75	8365.93	0.57
54	3	0.709	1341.43	8365.93	0.57
53	3	0.696	1343.14	8365.93	0.57
52	3	0.683	1344.88	8365.93	0.57
51	3	0.670	1346.64	8365.93	0.57
50	3	0.657	1348.38	8365.93	0.43
49	3	0.644	1349.51	8365.93	0.41
48	2	0.631	1350.53	8365.93	0.41
47	2	0.617	1351.53	8365.93	0.40
46	2	0.604	1352.52	8365.93	0.40
45	2	0.591	1353.50	8365.93	0.41
44	2	0.578	1354.49	8365.93	0.41
43	2	0.565	1355.47	8365.93	0.41
42	2	0.552	1356.46	8365.93	0.41
41	1	0.539	1357.46	8365.93	0.41
40	2	0.525	1358.45	8365.93	0.41
39	2	0.512	1359.45	8365.93	0.41
38	2	0.499	1360.46	8365.93	0.42
37	2	0.486	1361.47	8365.93	0.42
36	2	0.473	1362.49	8365.93	0.42
35	2	0.460	1363.51	8365.93	0.42
34	2	0.447	1364.54	8365.93	0.43
33	2	0.433	1365.57	8365.93	0.43
32	2	0.420	1366.61	8365.93	0.43
31	2	0.407	1367.66	8365.93	0.43
30	2	0.394	1368.72	8365.93	0.44
29	2	0.381	1369.79	8365.93	0.44
28	3	0.368	1370.87	8365.93	0.44
27	3	0.355	1371.96	8365.93	0.45
26	3	0.341	1373.06	8365.93	0.45
25	3	0.328	1374.17	8365.93	0.45
24	3	0.315	1375.30	8365.93	0.46
23	3	0.302	1376.44	8365.93	0.46

22	3	0.289	1377.59	8365.93	0.47
21	3	0.276	1378.77	8365.93	0.47
20	3	0.263	1379.97	8365.93	0.48
19	3	0.249	1381.19	8365.93	0.49
18	3	0.236	1382.44	8365.93	0.49
17	3	0.223	1383.73	8365.93	0.50
16	3	0.210	1385.10	8135.93	0.49
15	2	0.197	1386.39	8135.93	0.40
14	3	0.183	1387.25	8135.93	0.36
13	3	0.170	1387.98	8135.93	0.35
12	3	0.157	1388.68	8135.93	0.35
11	3	0.143	1389.39	8135.93	0.36
10	3	0.130	1390.17	8135.93	0.38
9	3	0.117	1391.04	8135.93	0.39
8	3	0.103	1392.00	8135.93	0.41
7	3	0.090	1393.05	8135.93	0.42
6	3	0.077	1394.18	8135.93	0.43
5	3	0.063	1395.36	8135.93	0.43
4	3	0.050	1396.58	8135.93	0.44
3	2	0.033	1397.13	8135.93	0.41
2	3	0.017	1397.62	8135.93	0.40
1	3	0.0	1398.08	8135.93	0.39

I	X(I)	YD(I)	YNORM(I)
1	0.0	1398.08	1398.08
2	0.02	1397.62	1397.62
3	0.03	1397.13	1397.13
4	0.05	1396.58	1396.58
5	0.06	1395.36	1395.36
6	0.08	1394.18	1394.18
7	0.09	1393.05	1393.05
8	0.10	1392.00	1392.00
9	0.12	1391.04	1391.04
10	0.13	1390.17	1390.17
11	0.14	1389.39	1389.39
12	0.16	1388.68	1388.68
13	0.17	1387.98	1387.98
14	0.18	1387.25	1387.25
15	0.20	1386.39	1386.39
16	0.21	1385.10	1385.10
17	0.22	1383.73	1383.73
18	0.24	1382.44	1382.44
19	0.25	1381.19	1381.19
20	0.26	1379.97	1379.97
21	0.28	1378.77	1378.77
22	0.29	1377.59	1377.59
23	0.30	1376.44	1376.44
24	0.32	1375.30	1375.30
25	0.33	1374.17	1374.17
26	0.34	1373.06	1373.06
27	0.35	1371.96	1371.96
28	0.37	1370.87	1370.87
29	0.38	1369.79	1369.79
30	0.39	1368.72	1368.72
31	0.41	1367.66	1367.66
32	0.42	1366.61	1366.61
33	0.43	1365.57	1365.57
34	0.45	1364.54	1364.54
35	0.46	1363.51	1363.51
36	0.47	1362.49	1362.49
37	0.49	1361.47	1361.47
38	0.50	1360.46	1360.46

39	0.51	1359.45	1359.45
40	0.53	1358.45	1358.45
41	0.54	1357.46	1357.46
42	0.55	1356.46	1356.46
43	0.56	1355.47	1355.47
44	0.58	1354.49	1354.49
45	0.59	1353.50	1353.50
46	0.60	1352.52	1352.52
47	0.62	1351.53	1351.53
48	0.63	1350.53	1350.53
49	0.64	1349.51	1349.51
50	0.66	1348.38	1348.38
51	0.67	1346.64	1346.64
52	0.68	1344.88	1344.88
53	0.70	1343.14	1343.14
54	0.71	1341.43	1341.43
55	0.72	1339.75	1339.75
56	0.74	1338.10	1338.10
57	0.75	1336.51	1336.51
58	0.76	1334.98	1334.98
59	0.77	1333.53	1333.53
60	0.79	1332.17	1332.17
61	0.80	1330.89	1330.89
62	0.81	1329.66	1329.66
63	0.83	1328.35	1328.35
64	0.84	1326.51	1326.51
65	0.85	1324.55	1324.55
66	0.87	1322.57	1322.57
67	0.88	1320.58	1320.58
68	0.90	1318.58	1318.58
69	0.91	1316.57	1316.57
70	0.93	1314.59	1314.59
71	0.94	1312.72	1312.72
72	0.95	1311.09	1311.09
73	0.97	1309.48	1309.48
74	0.98	1307.88	1307.88
75	0.99	1306.29	1306.29
76	1.01	1304.70	1304.70
77	1.02	1303.07	1303.07
78	1.03	1301.47	1301.47
79	1.05	1299.87	1299.87
80	1.06	1298.28	1298.28
81	1.07	1296.70	1296.70
82	1.09	1295.11	1295.11
83	1.10	1293.52	1293.52
84	1.11	1291.93	1291.93
85	1.13	1290.33	1290.33
86	1.14	1288.75	1288.75
87	1.15	1287.16	1287.16
88	1.17	1285.57	1285.57
89	1.18	1283.99	1283.99
90	1.20	1282.41	1282.41
91	1.21	1280.83	1280.83
92	1.22	1279.26	1279.26
93	1.24	1277.68	1277.68
94	1.25	1276.12	1276.12
95	1.26	1274.60	1274.60
96	1.28	1273.28	1273.28
97	1.29	1272.37	1272.37
98	1.30	1271.12	1271.12
99	1.32	1269.87	1269.87

100	1.33	1268.62	1268.62
101	1.34	1267.37	1267.37
102	1.35	1266.13	1266.13
103	1.37	1264.89	1264.89
104	1.38	1263.66	1263.66
105	1.39	1262.43	1262.43
106	1.41	1261.20	1261.20
107	1.42	1259.97	1259.97
108	1.43	1258.75	1258.75
109	1.45	1257.54	1257.54
110	1.46	1256.33	1256.33
111	1.47	1255.12	1255.12
112	1.48	1253.93	1253.93
113	1.50	1252.74	1252.74
114	1.51	1251.58	1251.58
115	1.52	1250.44	1250.44
116	1.54	1249.34	1249.34
117	1.55	1248.32	1248.32
118	1.56	1247.34	1247.34
119	1.58	1246.33	1246.33
120	1.59	1244.80	1244.80
121	1.60	1243.89	1243.89
122	1.62	1242.99	1242.99
123	1.63	1242.10	1242.10
124	1.65	1241.23	1241.23
125	1.66	1240.37	1240.37
126	1.67	1239.51	1239.51
127	1.69	1238.66	1238.66
128	1.70	1237.82	1237.82
129	1.72	1236.99	1236.99
130	1.73	1236.15	1236.15
131	1.74	1234.75	1234.75
132	1.76	1233.57	1233.57
133	1.77	1232.42	1232.42
134	1.78	1231.29	1231.29
135	1.80	1230.15	1230.15
136	1.81	1228.98	1228.98
137	1.83	1227.67	1227.67
138	1.84	1225.50	1225.50
139	1.86	1222.53	1222.53
140	1.87	1220.00	1220.00
141	1.89	1216.79	1216.79
142	1.90	1214.98	1214.98
143	1.92	1213.21	1213.21
144	1.93	1211.49	1211.49
145	1.94	1209.79	1209.79
146	1.95	1208.12	1208.12
147	1.97	1206.48	1206.48
148	1.98	1204.86	1204.86
149	1.99	1203.25	1203.25
150	2.01	1201.66	1201.66
151	2.02	1200.08	1200.08
152	2.03	1198.52	1198.52
153	2.05	1196.97	1196.97
154	2.06	1195.42	1195.42
155	2.07	1193.89	1193.89
156	2.08	1192.36	1192.36
157	2.10	1190.84	1190.84
158	2.11	1189.33	1189.33
159	2.12	1187.82	1187.82
160	2.14	1186.31	1186.31

161	2.15	1184.79	1184.79
162	2.16	1183.27	1183.27
163	2.18	1181.75	1181.75
164	2.19	1180.24	1180.24
165	2.20	1178.73	1178.73
166	2.21	1177.22	1177.22
167	2.23	1175.73	1175.73
168	2.24	1174.28	1174.28
169	2.25	1173.05	1173.05
170	2.27	1172.22	1172.22
171	2.28	1171.78	1171.78
172	2.29	1171.06	1171.06
173	2.31	1170.35	1170.35
174	2.32	1169.66	1169.66
175	2.33	1168.99	1168.99
176	2.34	1168.35	1168.35
177	2.36	1167.72	1167.72
178	2.37	1167.11	1167.11
179	2.38	1166.52	1166.52
180	2.40	1165.95	1165.95
181	2.41	1165.40	1165.40
182	2.42	1164.85	1164.85
183	2.44	1164.32	1164.32
184	2.45	1163.79	1163.79
185	2.46	1163.26	1163.26
186	2.47	1162.73	1162.73
187	2.49	1162.18	1162.18
188	2.50	1161.61	1161.61
189	2.51	1161.00	1161.00
190	2.53	1160.32	1160.32
191	2.54	1159.54	1159.54

TIME PARAMETERS OF OUTFLOW HYDROGRAPH IMMEDIATELY DOWNSTREAM OF DAM

PARAMETER	UNITS	VARIABLE	VALUE
TIME TO FAILURE	HR	TFH	0.250
TIME TO START OF RISING LIMB OF HYDROGRAPH	HR	TFO	0.0
TIME TO PEAK	HR	TP	0.250
TIME STEP SIZE	HR	DTHI	0.012

TT = 0.0 DTH = 0.0125 ITERR = 0
QU(1) = 8135.93 YU(1) = 1398.08 QU(N) = 9085.93 YU(N) = 1159.54 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0 DTH = 0.0125 ITERR = 0
QU(1) = 8135.93 YU(1) = 1398.08 QU(N) = 9085.93 YU(N) = 1159.54 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0 DTH = 0.0125 ITERR = 0
QU(1) = 8135.93 YU(1) = 1398.08 QU(N) = 9085.93 YU(N) = 1159.55 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0125 DTH = 0.0125 ITERR = 1
QU(1) = 8335.54 YU(1) = 1398.12 QU(N) = 9085.93 YU(N) = 1159.55 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0250 DTH = 0.0125 ITERR = 1
QU(1) = 8708.94 YU(1) = 1398.21 QU(N) = 9085.93 YU(N) = 1159.56 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0375 DTH = 0.0125 ITERR = 1
QU(1) = 9326.77 YU(1) = 1398.37 QU(N) = 9085.93 YU(N) = 1159.56 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0500 DTH = 0.0125 ITERR = 1
QU(1) = 10197.43 YU(1) = 1398.59 QU(N) = 9085.93 YU(N) = 1159.57 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0625 DTH = 0.0125 ITERR = 1

QU(1) = 11313.73 YU(1) = 1398.88 QU(N) = 9085.93 YU(N) = 1159.57 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0750 DTH = 0.0125 ITERR = 1
QU(1) = 12384.98 YU(1) = 1399.17 QU(N) = 9085.93 YU(N) = 1159.57 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.0875 DTH = 0.0125 ITERR = 1
QU(1) = 13717.57 YU(1) = 1399.51 QU(N) = 9085.93 YU(N) = 1159.58 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1000 DTH = 0.0125 ITERR = 1
QU(1) = 15311.54 YU(1) = 1399.89 QU(N) = 9085.93 YU(N) = 1159.58 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1125 DTH = 0.0125 ITERR = 1
QU(1) = 17163.59 YU(1) = 1400.32 QU(N) = 9085.93 YU(N) = 1159.58 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1250 DTH = 0.0125 ITERR = 1
QU(1) = 19228.03 YU(1) = 1400.78 QU(N) = 9085.93 YU(N) = 1159.59 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1375 DTH = 0.0125 ITERR = 1
QU(1) = 21874.93 YU(1) = 1401.34 QU(N) = 9085.93 YU(N) = 1159.59 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1500 DTH = 0.0125 ITERR = 1
QU(1) = 24648.29 YU(1) = 1401.92 QU(N) = 9085.93 YU(N) = 1159.59 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1625 DTH = 0.0125 ITERR = 1
QU(1) = 27539.15 YU(1) = 1402.53 QU(N) = 9085.93 YU(N) = 1159.60 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1750 DTH = 0.0125 ITERR = 1
QU(1) = 30747.12 YU(1) = 1403.17 QU(N) = 9085.93 YU(N) = 1159.60 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.1875 DTH = 0.0125 ITERR = 1
QU(1) = 33958.82 YU(1) = 1403.83 QU(N) = 9085.93 YU(N) = 1159.60 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.2000 DTH = 0.0125 ITERR = 1
QU(1) = 36781.10 YU(1) = 1404.45 QU(N) = 9085.93 YU(N) = 1159.61 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT = 0.2125 DTH = 0.0125 ITERR = 1
QU(1) = 38768.76 YU(1) = 1404.97 QU(N) = 9085.93 YU(N) = 1159.61 FRDM=0.69 IFR=141 FRM=0.28 IFM=184

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TT =   0.2250          DTH =  0.0125          ITERR =   1
QU(1) =   39148.39     YU(1) =    1405.28  QU(N) =    9087.05  YU(N) =    1159.62  FRDM=0.70 IFR= 71 FRM=0.28 IFM=184

TT =   0.2375          DTH =  0.0125          ITERR =   1
QU(1) =   39897.80     YU(1) =    1405.56  QU(N) =    9089.78  YU(N) =    1159.62  FRDM=0.72 IFR= 71 FRM=0.28 IFM=184

TT =   0.2500          DTH =  0.0125          ITERR =   1
QU(1) =   41371.72     YU(1) =    1405.87  QU(N) =    9092.18  YU(N) =    1159.63  FRDM=0.73 IFR= 71 FRM=0.28 IFM=184

TT =   0.2625          DTH =  0.0125          ITERR =   1
QU(1) =   37087.96     YU(1) =    1405.58  QU(N) =    9095.52  YU(N) =    1159.64  FRDM=0.74 IFR= 71 FRM=0.28 IFM=184

TT =   0.2750          DTH =  0.0125          ITERR =   1
QU(1) =   33337.51     YU(1) =    1405.12  QU(N) =    9100.94  YU(N) =    1159.64  FRDM=0.75 IFR= 71 FRM=0.28 IFM=184

TT =   0.2875          DTH =  0.0125          ITERR =   1
QU(1) =   29706.31     YU(1) =    1404.49  QU(N) =    9110.00  YU(N) =    1159.65  FRDM=0.75 IFR= 71 FRM=0.28 IFM=184

TT =   0.3000          DTH =  0.0125          ITERR =   1
QU(1) =   26090.49     YU(1) =    1403.76  QU(N) =    9126.99  YU(N) =    1159.66  FRDM=0.76 IFR= 71 FRM=0.28 IFM=184

TT =   0.3125          DTH =  0.0125          ITERR =   1
QU(1) =   22713.50     YU(1) =    1402.98  QU(N) =    9158.05  YU(N) =    1159.68  FRDM=0.76 IFR= 71 FRM=0.28 IFM=184

TT =   0.3250          DTH =  0.0125          ITERR =   1
QU(1) =   20194.61     YU(1) =    1402.25  QU(N) =    9217.36  YU(N) =    1159.72  FRDM=0.76 IFR= 71 FRM=0.28 IFM=184

TT =   0.3375          DTH =  0.0125          ITERR =   1
QU(1) =   18318.83     YU(1) =    1401.62  QU(N) =    9326.37  YU(N) =    1159.79  FRDM=0.77 IFR=141 FRM=0.28 IFM=184

TT =   0.3500          DTH =  0.0125          ITERR =   1
QU(1) =   16834.69     YU(1) =    1401.09  QU(N) =    9529.55  YU(N) =    1159.91  FRDM=0.79 IFR=141 FRM=0.28 IFM=185

TT =   0.3625          DTH =  0.0125          ITERR =   1
QU(1) =   15648.16     YU(1) =    1400.65  QU(N) =    9904.01  YU(N) =    1160.12  FRDM=0.81 IFR=141 FRM=0.29 IFM=185
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TT =   0.3750          DTH =  0.0125          ITERR =   1
QU(1) =   14644.84     YU(1) =    1400.29  QU(N) =   10586.21  YU(N) =    1160.50  FRDM=0.83 IFR=141 FRM=0.29 IFM=117

TT =   0.3875          DTH =  0.0125          ITERR =   1
QU(1) =   13749.45     YU(1) =    1399.98  QU(N) =   11763.39  YU(N) =    1161.12  FRDM=0.84 IFR=141 FRM=0.29 IFM=117

TT =   0.4000          DTH =  0.0125          ITERR =   1
QU(1) =   12936.03     YU(1) =    1399.71  QU(N) =   13607.02  YU(N) =    1162.02  FRDM=0.85 IFR=141 FRM=0.28 IFM=117

TT =   0.4125          DTH =  0.0125          ITERR =   1
QU(1) =   12203.20     YU(1) =    1399.48  QU(N) =   16133.21  YU(N) =    1163.14  FRDM=0.86 IFR=141 FRM=0.28 IFM=117

TT =   0.4250          DTH =  0.0125          ITERR =   1
QU(1) =   11537.83     YU(1) =    1399.26  QU(N) =   19134.95  YU(N) =    1164.32  FRDM=0.86 IFR=141 FRM=0.28 IFM=117

TT =   0.4375          DTH =  0.0125          ITERR =   1
QU(1) =   10938.77     YU(1) =    1399.07  QU(N) =   22260.17  YU(N) =    1165.40  FRDM=0.86 IFR=141 FRM=0.28 IFM=117

TT =   0.4500          DTH =  0.0125          ITERR =   1
QU(1) =   10395.22     YU(1) =    1398.89  QU(N) =   25182.88  YU(N) =    1166.26  FRDM=0.86 IFR=141 FRM=0.28 IFM=117

TT =   0.4625          DTH =  0.0125          ITERR =   1
QU(1) =    9906.15     YU(1) =    1398.73  QU(N) =   27687.26  YU(N) =    1166.88  FRDM=0.86 IFR=141 FRM=0.28 IFM=117

TT =   0.4750          DTH =  0.0125          ITERR =   1
QU(1) =    9462.64     YU(1) =    1398.59  QU(N) =   29666.13  YU(N) =    1167.24  FRDM=0.85 IFR=141 FRM=0.28 IFM=117

TT =   0.4875          DTH =  0.0125          ITERR =   1
QU(1) =    9063.70     YU(1) =    1398.45  QU(N) =   31088.52  YU(N) =    1167.37  FRDM=0.84 IFR=141 FRM=0.28 IFM=117

TT =   0.5000          DTH =  0.0125          ITERR =   1
QU(1) =    8701.83     YU(1) =    1398.33  QU(N) =   31970.34  YU(N) =    1167.31  FRDM=0.84 IFR=141 FRM=0.28 IFM=117

TT =   0.5125          DTH =  0.0125          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.22  QU(N) =   32359.21  YU(N) =    1167.08  FRDM=0.83 IFR=141 FRM=0.29 IFM=176
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TT =   0.5251          DTH =  0.0126          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   32308.61  YU(N) =    1166.74  FRDM=0.82 IFR=141 FRM=0.28 IFM=176

TT =   0.5379          DTH =  0.0128          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   31885.97  YU(N) =    1166.29  FRDM=0.81 IFR=141 FRM=0.28 IFM=175

TT =   0.5508          DTH =  0.0129          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   31157.21  YU(N) =    1165.79  FRDM=0.80 IFR=141 FRM=0.28 IFM=175

TT =   0.5638          DTH =  0.0130          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   30194.93  YU(N) =    1165.25  FRDM=0.80 IFR=141 FRM=0.28 IFM=175

TT =   0.5769          DTH =  0.0131          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   29064.77  YU(N) =    1164.70  FRDM=0.79 IFR=141 FRM=0.28 IFM=175

TT =   0.5902          DTH =  0.0133          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   27826.03  YU(N) =    1164.15  FRDM=0.78 IFR=141 FRM=0.28 IFM=175

TT =   0.6036          DTH =  0.0134          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   26528.86  YU(N) =    1163.62  FRDM=0.77 IFR=141 FRM=0.28 IFM=175

TT =   0.6171          DTH =  0.0135          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   25213.03  YU(N) =    1163.12  FRDM=0.76 IFR=141 FRM=0.28 IFM=176

TT =   0.6308          DTH =  0.0137          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   23910.20  YU(N) =    1162.66  FRDM=0.76 IFR=141 FRM=0.28 IFM=176

TT =   0.6446          DTH =  0.0138          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   22642.52  YU(N) =    1162.24  FRDM=0.75 IFR=141 FRM=0.28 IFM=176

TT =   0.6585          DTH =  0.0139          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   21426.66  YU(N) =    1161.85  FRDM=0.74 IFR=141 FRM=0.28 IFM=177

TT =   0.6726          DTH =  0.0141          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   20271.96  YU(N) =    1161.51  FRDM=0.74 IFR=141 FRM=0.28 IFM=177
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TT =   0.6868          DTH =  0.0142          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   19185.61  YU(N) =    1161.19  FRDM=0.73 IFR=141 FRM=0.28 IFM=177

TT =   0.7012          DTH =  0.0144          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   18170.07  YU(N) =    1160.91  FRDM=0.73 IFR=141 FRM=0.28 IFM=178

TT =   0.7157          DTH =  0.0145          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   17224.62  YU(N) =    1160.66  FRDM=0.72 IFR=141 FRM=0.28 IFM=178

TT =   0.7304          DTH =  0.0147          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   16348.57  YU(N) =    1160.43  FRDM=0.72 IFR=141 FRM=0.28 IFM=178

TT =   0.7452          DTH =  0.0148          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   15539.48  YU(N) =    1160.22  FRDM=0.71 IFR=141 FRM=0.28 IFM=179

TT =   0.7601          DTH =  0.0150          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   14793.95  YU(N) =    1160.04  FRDM=0.71 IFR=141 FRM=0.28 IFM=179

TT =   0.7752          DTH =  0.0151          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   14110.34  YU(N) =    1159.87  FRDM=0.71 IFR=141 FRM=0.28 IFM=179

TT =   0.7905          DTH =  0.0153          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   13485.79  YU(N) =    1159.72  FRDM=0.70 IFR=141 FRM=0.28 IFM=180

TT =   0.8059          DTH =  0.0154          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   12917.33  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=180

TT =   0.8215          DTH =  0.0156          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   12399.78  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=180

TT =   0.8372          DTH =  0.0157          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   11799.17  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=181

TT =   0.8530          DTH =  0.0159          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   11501.37  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=181

TT =   0.8691          DTH =  0.0160          ITERR =   1
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QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   11012.77  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=181

TT =   0.8853          DTH =  0.0162          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10800.95  YU(N) =    1159.58  FRDM=0.70 IFR=141 FRM=0.28 IFM=182

TT =   0.9016          DTH =  0.0164          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10453.39  YU(N) =    1159.55  FRDM=0.70 IFR=141 FRM=0.28 IFM=182

TT =   0.9181          DTH =  0.0165          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10361.87  YU(N) =    1159.55  FRDM=0.70 IFR=141 FRM=0.28 IFM=182

TT =   0.9348          DTH =  0.0167          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10035.02  YU(N) =    1159.56  FRDM=0.70 IFR=141 FRM=0.28 IFM=182

TT =   0.9517          DTH =  0.0168          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10071.92  YU(N) =    1159.56  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   0.9687          DTH =  0.0170          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9853.25  YU(N) =    1159.57  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   0.9859          DTH =  0.0172          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9910.09  YU(N) =    1159.57  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.0032          DTH =  0.0174          ITERR =   1
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9822.16  YU(N) =    1159.57  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.0208          DTH =  0.0175          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9845.65  YU(N) =    1159.59  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.0385          DTH =  0.0177          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9826.77  YU(N) =    1159.61  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.0563          DTH =  0.0179          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9849.95  YU(N) =    1159.64  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.0744          DTH =  0.0181          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9861.17  YU(N) =    1159.67  FRDM=0.70 IFR=141 FRM=0.28 IFM=183
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TT =   1.0926          DTH =  0.0182          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9888.45  YU(N) =    1159.70  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.1111          DTH =  0.0184          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9911.55  YU(N) =    1159.73  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.1297          DTH =  0.0186          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9941.54  YU(N) =    1159.76  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.1485          DTH =  0.0188          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9970.04  YU(N) =    1159.78  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.1675          DTH =  0.0190          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10001.10  YU(N) =    1159.81  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.1866          DTH =  0.0192          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10032.31  YU(N) =    1159.84  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.2060          DTH =  0.0194          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10063.63  YU(N) =    1159.87  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.2256          DTH =  0.0196          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10096.01  YU(N) =    1159.90  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.2453          DTH =  0.0198          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10128.47  YU(N) =    1159.92  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.2653          DTH =  0.0200          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10161.26  YU(N) =    1159.95  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.2854          DTH =  0.0202          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10194.49  YU(N) =    1159.97  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.3058          DTH =  0.0204          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10227.99  YU(N) =    1160.00  FRDM=0.70 IFR=141 FRM=0.28 IFM=183
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TT =   1.3263        DTH =  0.0206        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10262.38  YU(N) =    1160.02  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.3471        DTH =  0.0208        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10296.09  YU(N) =    1160.04  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.3681        DTH =  0.0210        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10330.58  YU(N) =    1160.06  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.3893        DTH =  0.0212        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10365.43  YU(N) =    1160.09  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.4106        DTH =  0.0214        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10400.09  YU(N) =    1160.11  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.4323        DTH =  0.0216        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10435.61  YU(N) =    1160.13  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.4541        DTH =  0.0218        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10471.44  YU(N) =    1160.15  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.4761        DTH =  0.0220        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10507.21  YU(N) =    1160.17  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.4984        DTH =  0.0223        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10543.27  YU(N) =    1160.19  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.5209        DTH =  0.0225        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10579.98  YU(N) =    1160.21  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.5436        DTH =  0.0227        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10616.75  YU(N) =    1160.23  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.5665        DTH =  0.0229        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10651.39  YU(N) =    1160.24  FRDM=0.71 IFR=141 FRM=0.28 IFM=183
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TT =   1.5897        DTH =  0.0232        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10680.82  YU(N) =    1160.26  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.6131        DTH =  0.0234        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10698.34  YU(N) =    1160.27  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.6367        DTH =  0.0236        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10699.69  YU(N) =    1160.26  FRDM=0.71 IFR=141 FRM=0.28 IFM=183

TT =   1.6606        DTH =  0.0239        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10684.78  YU(N) =    1160.25  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.6847        DTH =  0.0241        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10658.55  YU(N) =    1160.24  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.7090        DTH =  0.0243        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10624.67  YU(N) =    1160.22  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.7336        DTH =  0.0246        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10587.21  YU(N) =    1160.20  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.7584        DTH =  0.0248        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10546.83  YU(N) =    1160.17  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.7835        DTH =  0.0251        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10505.18  YU(N) =    1160.15  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.8089        DTH =  0.0253        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10462.92  YU(N) =    1160.13  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.8344        DTH =  0.0256        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10419.37  YU(N) =    1160.10  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.8603        DTH =  0.0258        ITERR =   2
QU(1) =    8379.67   YU(1) =    1398.12  QU(N) =   10375.86  YU(N) =    1160.08  FRDM=0.70 IFR=141 FRM=0.28 IFM=183
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TT =   1.8864          DTH =  0.0261          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10331.25  YU(N) =    1160.06  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.9128          DTH =  0.0264          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10286.63  YU(N) =    1160.04  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.9394          DTH =  0.0266          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10240.86  YU(N) =    1160.01  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.9663          DTH =  0.0269          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10195.54  YU(N) =    1159.99  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   1.9934          DTH =  0.0272          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10149.34  YU(N) =    1159.97  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.0209          DTH =  0.0274          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10102.35  YU(N) =    1159.95  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.0486          DTH =  0.0277          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10055.40  YU(N) =    1159.93  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.0766          DTH =  0.0280          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =   10008.05  YU(N) =    1159.90  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.1048          DTH =  0.0283          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9959.87  YU(N) =    1159.88  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.1334          DTH =  0.0285          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9911.19  YU(N) =    1159.86  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.1622          DTH =  0.0288          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9862.52  YU(N) =    1159.84  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.1913          DTH =  0.0291          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9813.44  YU(N) =    1159.82  FRDM=0.70 IFR=141 FRM=0.28 IFM=183

TT =   2.2208          DTH =  0.0294          ITERR =   2
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QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9763.75  YU(N) =    1159.79  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.2505          DTH =  0.0297          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9712.89  YU(N) =    1159.77  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.2805          DTH =  0.0300          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9662.43  YU(N) =    1159.75  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.3108          DTH =  0.0303          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9610.84  YU(N) =    1159.73  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.3414          DTH =  0.0306          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9559.47  YU(N) =    1159.71  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.3723          DTH =  0.0309          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9506.89  YU(N) =    1159.68  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.4035          DTH =  0.0312          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9453.67  YU(N) =    1159.66  FRDM=0.69 IFR=141 FRM=0.28 IFM=183

TT =   2.4350          DTH =  0.0315          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9400.92  YU(N) =    1159.64  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.4669          DTH =  0.0319          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9346.71  YU(N) =    1159.61  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.4991          DTH =  0.0322          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9292.78  YU(N) =    1159.59  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.5316          DTH =  0.0325          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9238.09  YU(N) =    1159.57  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.5644          DTH =  0.0328          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9184.91  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.5975          DTH =  0.0331          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9139.34  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184
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TT =   2.6310          DTH =  0.0335          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9113.64  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.6648          DTH =  0.0338          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9103.95  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.6990          DTH =  0.0341          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9101.04  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.7334          DTH =  0.0345          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9098.91  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.7683          DTH =  0.0348          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9098.98  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.8035          DTH =  0.0352          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9098.62  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.8390          DTH =  0.0355          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9098.45  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.8749          DTH =  0.0359          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9098.18  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.9111          DTH =  0.0362          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9097.94  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.9477          DTH =  0.0366          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9097.67  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   2.9847          DTH =  0.0370          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9097.39  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.0221          DTH =  0.0373          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9097.09  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184
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TT =   3.0598          DTH =  0.0377          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9096.79  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.0979          DTH =  0.0381          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9096.46  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.1364          DTH =  0.0385          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9096.12  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.1752          DTH =  0.0389          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9095.76  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.2145          DTH =  0.0393          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9095.38  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.2541          DTH =  0.0396          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9094.98  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.2942          DTH =  0.0400          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9094.56  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.3346          DTH =  0.0404          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9094.12  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.3755          DTH =  0.0408          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9093.66  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.4167          DTH =  0.0413          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9093.16  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.4584          DTH =  0.0417          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9092.66  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.5005          DTH =  0.0421          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9092.11  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184
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TT =   3.5430          DTH =  0.0425          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9091.71  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.5859          DTH =  0.0429          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9091.32  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.6293          DTH =  0.0434          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9090.91  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.6731          DTH =  0.0438          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9090.50  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.7173          DTH =  0.0442          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9090.06  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.7620          DTH =  0.0447          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9089.62  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.8071          DTH =  0.0451          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9089.15  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.8527          DTH =  0.0456          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9088.68  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.8987          DTH =  0.0460          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9088.17  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.9452          DTH =  0.0465          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9087.66  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

TT =   3.9921          DTH =  0.0470          ITERR =   2
QU(1) =    8379.67     YU(1) =    1398.12  QU(N) =    9087.13  YU(N) =    1159.54  FRDM=0.69 IFR=141 FRM=0.28 IFM=184

ROUTING COMPLETED.

  KTIME=177     ALLOWABLE KTIME= 698          TT=   4.0
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PROFILE OF CRESTS AND TIMES FOR
BELOW LAUREL RUN RESERVIOR

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	MAX VEL (MI/HR)	FLOOD ELEV (FT)	TIME FLOOD ELEV (HR)
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 1							
0.0	1405.87	41371	0.250	7.97	5.43	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 2							
0.017	1405.52	41082	0.250	7.88	5.37	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 3							
0.033	1405.18	40774	0.250	7.77	5.30	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 4							
0.050	1404.86	40454	0.250	7.66	5.22	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 5							
0.063	1404.15	40196	0.250	7.58	5.17	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 6							
0.077	1403.52	39943	0.262	7.52	5.13	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 7							
0.090	1402.94	39698	0.262	7.48	5.10	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 8							
0.103	1402.38	39463	0.262	7.48	5.10	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 9

0.117	1401.82	39238	0.262	7.53	5.13	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 10

0.130	1401.25	39131	0.262	7.56	5.16	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 11

0.143	1400.66	39105	0.262	7.77	5.29	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 12

0.157	1400.02	39064	0.262	8.06	5.50	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 13

0.170	1399.29	39012	0.262	8.50	5.79	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 14

0.183	1398.41	38953	0.262	9.14	6.23	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 15

0.197	1397.23	38891	0.262	10.16	6.93	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 16

0.210	1395.31	38829	0.262	12.17	8.29	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 17

0.223	1393.79	38900	0.262	12.06	8.22	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 18

0.236	1392.34	38828	0.262	11.88	8.10	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 19

0.249	1390.92	38749	0.275	11.70	7.98	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 20

0.263	1389.55	38664	0.275	11.53	7.86	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 21

0.276	1388.21	38572	0.275	11.36	7.75	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 22

0.289	1386.89	38548	0.275	11.15	7.60	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 23

0.302	1385.58	38555	0.275	11.00	7.50	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 24

0.315	1384.30	38549	0.275	10.86	7.40	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 25

0.328	1383.03	38533	0.275	10.72	7.31	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 26

0.341	1381.78	38505	0.275	10.58	7.21	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 27

0.355	1380.54	38467	0.275	10.44	7.12	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 28

0.368	1379.32	38417	0.275	10.31	7.03	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 29

0.381	1378.11	38358	0.275	10.18	6.94	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 30

0.394	1376.91	38289	0.275	10.06	6.86	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 31

0.407	1375.74	38210	0.287	9.93	6.77	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 32

0.420	1374.59	38122	0.287	9.81	6.69	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 33

0.433	1373.44	38052	0.287	9.65	6.58	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 34

0.447	1372.30	38058	0.287	9.55	6.51	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 35

0.460	1371.17	38050	0.287	9.45	6.44	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 36

0.473	1370.04	38031	0.287	9.35	6.37	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 37

0.486	1368.92	37999	0.287	9.25	6.31	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 38

0.499	1367.81	37954	0.287	9.16	6.24	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 39

0.512	1366.70	37897	0.287	9.06	6.18	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 40

0.525	1365.60	37828	0.300	8.97	6.12	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 41

0.539	1364.53	37747	0.300	8.88	6.06	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 42

0.552	1363.45	37655	0.300	8.80	6.00	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 43

0.565	1362.37	37609	0.300	8.68	5.92	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 44

0.578	1361.30	37609	0.300	8.61	5.87	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 45

0.591	1360.21	37597	0.300	8.56	5.83	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 46

0.604	1359.12	37573	0.300	8.52	5.81	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 47

0.617	1358.00	37537	0.300	8.50	5.79	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 48

0.631	1356.84	37489	0.300	8.52	5.81	0.0	0.0

PROFILE OF CRESTS AND TIMES FOR
BELOW LAUREL RUN RESERVIOR

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	MAX VEL (MI/HR)	FLOOD ELEV (FT)	TIME FLOOD ELEV (HR)
**********	*********	**********	********	**********	*********	*********	*********
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 49							
0.644	1355.61	37431	0.300	8.62	5.88	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 50							
0.657	1354.24	37362	0.312	8.88	6.06	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 51							
0.670	1352.44	37278	0.312	9.68	6.60	0.0	0.0
0.683	1350.99	37253	0.312	9.72	6.63	0.0	0.0
0.696	1349.59	37247	0.312	9.78	6.67	0.0	0.0
0.709	1348.26	37221	0.312	9.81	6.69	0.0	0.0
0.722	1347.02	37177	0.312	9.80	6.68	0.0	0.0
0.735	1345.87	37113	0.325	9.77	6.66	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 57							
0.748	1344.81	37034	0.325	9.74	6.64	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 58							
0.762	1343.82	36941	0.325	9.72	6.63	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 59							
0.775	1342.86	36838	0.325	9.76	6.65	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 60							
0.788	1341.91	36771	0.325	9.81	6.69	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 61

0.801	1340.92	36766	0.325	10.07	6.86	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 62

0.814	1339.82	36756	0.325	10.54	7.18	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 63

0.827	1338.47	36740	0.325	11.38	7.76	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 64

0.840	1336.40	36720	0.325	13.23	9.02	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 65

0.854	1334.49	36691	0.325	13.47	9.19	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 66

0.869	1332.56	36656	0.325	13.73	9.36	0.0	0.0
0.883	1330.62	36616	0.325	13.99	9.54	0.0	0.0
0.897	1328.66	36573	0.337	14.27	9.73	0.0	0.0
0.911	1326.66	36526	0.337	14.58	9.94	0.0	0.0
0.926	1324.55	36497	0.337	14.97	10.21	0.0	0.0
0.940	1322.13	36511	0.337	15.75	10.74	0.0	0.0
0.953	1320.29	36519	0.337	15.44	10.53	0.0	0.0
0.967	1318.49	36524	0.337	15.15	10.33	0.0	0.0
0.980	1316.71	36525	0.337	14.90	10.16	0.0	0.0
0.993	1314.94	36523	0.337	14.69	10.01	0.0	0.0
1.007	1313.13	36517	0.337	14.59	9.95	0.0	0.0
1.020	1311.08	36507	0.337	14.81	10.10	0.0	0.0
1.033	1309.24	36494	0.337	14.41	9.83	0.0	0.0
1.047	1307.43	36475	0.337	14.05	9.58	0.0	0.0
1.060	1305.63	36452	0.337	13.71	9.34	0.0	0.0
1.074	1303.86	36423	0.337	13.39	9.13	0.0	0.0
1.087	1302.10	36389	0.337	13.10	8.93	0.0	0.0
1.101	1300.37	36349	0.350	12.82	8.74	0.0	0.0
1.114	1298.66	36320	0.350	12.54	8.55	0.0	0.0
1.128	1296.96	36335	0.350	12.30	8.39	0.0	0.0
1.141	1295.27	36344	0.350	12.08	8.23	0.0	0.0
1.155	1293.59	36347	0.350	11.86	8.09	0.0	0.0
1.168	1291.92	36345	0.350	11.66	7.95	0.0	0.0
1.182	1290.26	36336	0.350	11.46	7.81	0.0	0.0
1.195	1288.62	36319	0.350	11.26	7.68	0.0	0.0
1.209	1286.98	36295	0.350	11.07	7.55	0.0	0.0
1.222	1285.36	36262	0.350	10.86	7.41	0.0	0.0

PROFILE OF CRESTS AND TIMES FOR
BELOW LAUREL RUN RESERVIOR

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	MAX VEL (MI/HR)	FLOOD ELEV (FT)	TIME FLOOD ELEV (HR)
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 97							
1.290	1279.45	36047	0.362	7.57	5.16	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 98							
1.303	1278.23	36000	0.362	7.64	5.21	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 99							
1.316	1277.03	35935	0.375	7.70	5.25	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=100							
1.329	1275.85	35851	0.375	7.76	5.29	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=101							
1.342	1274.66	35750	0.375	7.81	5.32	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=102							
1.355	1273.49	35686	0.375	7.80	5.32	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=103							
1.368	1272.31	35663	0.375	7.84	5.35	0.0	0.0
WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=104							
1.381	1271.15	35621	0.375	7.88	5.37	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 93

1.236	1283.80	36217	0.362	10.61	7.24	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 94

1.249	1282.34	36155	0.362	10.26	6.99	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 95

1.263	1281.08	36095	0.362	9.62	6.56	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.= 96

1.276	1280.11	36079	0.362	8.74	5.96	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=105

1.394	1270.01	35558	0.387	7.91	5.39	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=106

1.407	1268.89	35474	0.387	7.93	5.41	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=107

1.420	1267.80	35366	0.387	7.93	5.41	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=108

1.433	1266.73	35230	0.387	7.92	5.40	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=109

1.446	1265.74	35124	0.400	7.75	5.28	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=110

1.459	1264.82	35024	0.400	7.65	5.22	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=111

1.472	1263.96	34888	0.400	7.50	5.12	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=112

1.485	1263.19	34714	0.412	7.31	4.98	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=113

1.498	1262.52	34502	0.412	7.06	4.81	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=114

1.511	1261.94	34278	0.412	6.62	4.52	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=115

1.524	1261.43	34149	0.412	6.33	4.31	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=116

1.537	1260.99	34005	0.412	6.02	4.10	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=117

1.550	1260.61	33850	0.412	5.70	3.89	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=118

1.563	1259.94	33758	0.412	6.79	4.63	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=119

1.577	1258.80	33748	0.412	8.94	6.09	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=120

1.590	1255.78	33738	0.412	14.52	9.90	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=121

1.604	1254.77	33726	0.412	14.09	9.60	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=122

1.618	1253.74	33710	0.412	13.70	9.34	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=123

1.632	1252.71	33689	0.412	13.35	9.10	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=124

1.646	1251.69	33664	0.425	13.03	8.88	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=125

1.660	1250.66	33635	0.425	12.75	8.69	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=126

1.674	1249.62	33600	0.425	12.50	8.52	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=127

1.688	1248.57	33561	0.425	12.28	8.37	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=128

1.702	1247.51	33538	0.425	12.06	8.22	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=129

1.716	1246.41	33539	0.425	11.93	8.13	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=130

1.730	1245.27	33536	0.425	11.85	8.08	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=131

1.744	1243.60	34317	0.425	12.10	8.25	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=132

1.757	1242.18	34305	0.425	11.89	8.10	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=133

1.771	1240.80	34288	0.425	11.69	7.97	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=134

1.785	1239.43	34265	0.425	11.51	7.85	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=135

1.799	1238.08	34237	0.437	11.36	7.75	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=136

1.812	1236.73	34201	0.437	11.26	7.68	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=137

1.826	1235.33	34157	0.437	11.23	7.66	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=138

1.840	1233.83	34126	0.437	11.29	7.70	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=139

1.857	1232.01	34131	0.437	11.57	7.89	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=140

1.873	1229.90	34133	0.437	12.76	8.70	0.0	0.0
1.890	1224.82	34132	0.437	18.27	12.45	0.0	0.0
1.903	1222.80	34130	0.437	17.51	11.94	0.0	0.0
1.916	1220.84	34126	0.437	16.85	11.49	0.0	0.0
1.929	1218.92	34121	0.437	16.26	11.09	0.0	0.0

WATER SURFACE ELEVATION IS GREATER THAN HIGHEST ELEVATION OF TOP WIDTH FOR CROSS-SECTION NO.=171

2.280	1179.40	33340	0.487	6.23	4.25	0.0	0.0
2.293	1178.89	33200	0.487	6.11	4.17	0.0	0.0
2.306	1178.37	33081	0.500	6.11	4.17	0.0	0.0
2.319	1177.88	32946	0.500	6.12	4.17	0.0	0.0
2.332	1177.39	32795	0.500	6.12	4.18	0.0	0.0
2.345	1176.90	32631	0.500	6.14	4.18	0.0	0.0
2.358	1176.42	32528	0.500	6.07	4.14	0.0	0.0
2.371	1175.93	32433	0.500	6.10	4.16	0.0	0.0
2.384	1175.45	32329	0.500	6.13	4.18	0.0	0.0
2.397	1174.96	32219	0.500	6.17	4.21	0.0	0.0
2.410	1174.46	32151	0.500	6.19	4.22	0.0	0.0
2.423	1173.95	32118	0.500	6.27	4.27	0.0	0.0
2.436	1173.43	32082	0.500	6.36	4.34	0.0	0.0
2.449	1172.88	32045	0.500	6.48	4.42	0.0	0.0
2.462	1172.31	32010	0.500	6.62	4.52	0.0	0.0
2.475	1171.70	32038	0.500	6.82	4.65	0.0	0.0
2.488	1171.05	32079	0.500	7.07	4.82	0.0	0.0
2.501	1170.33	32126	0.500	7.37	5.03	0.0	0.0

PROFILE OF CRESTS AND TIMES FOR
BELOW LAUREL RUN RESERVIOR

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	MAX VEL (MI/HR)	FLOOD ELEV (FT)	TIME FLOOD ELEV (HR)
1.942	1217.04	34113	0.437	15.73	10.73	0.0	0.0
1.955	1215.19	34104	0.437	15.26	10.40	0.0	0.0
1.968	1213.38	34092	0.437	14.83	10.11	0.0	0.0
1.981	1211.60	34077	0.437	14.43	9.84	0.0	0.0
1.994	1209.84	34059	0.437	14.07	9.60	0.0	0.0
2.007	1208.10	34039	0.450	13.74	9.37	0.0	0.0
2.020	1206.39	34020	0.450	13.42	9.15	0.0	0.0
2.033	1204.70	34029	0.450	13.14	8.96	0.0	0.0
2.046	1203.03	34036	0.450	12.88	8.78	0.0	0.0
2.059	1201.37	34041	0.450	12.63	8.61	0.0	0.0
2.072	1199.72	34042	0.450	12.40	8.46	0.0	0.0
2.085	1198.08	34041	0.450	12.19	8.31	0.0	0.0
2.098	1196.46	34037	0.450	11.99	8.17	0.0	0.0
2.111	1194.85	34030	0.450	11.79	8.04	0.0	0.0
2.124	1193.25	34019	0.450	11.61	7.92	0.0	0.0
2.137	1191.65	34004	0.450	11.44	7.80	0.0	0.0
2.150	1190.06	33986	0.450	11.27	7.68	0.0	0.0
2.163	1188.49	33963	0.450	11.11	7.58	0.0	0.0
2.176	1186.93	33935	0.462	10.96	7.47	0.0	0.0
2.189	1185.38	33919	0.462	10.78	7.35	0.0	0.0
2.202	1183.88	33919	0.462	10.59	7.22	0.0	0.0
2.215	1182.47	33904	0.475	10.29	7.02	0.0	0.0
2.228	1181.32	33859	0.475	9.77	6.66	0.0	0.0
2.241	1180.48	33776	0.487	8.99	6.13	0.0	0.0
2.254	1179.95	33656	0.487	8.04	5.48	0.0	0.0
2.267	1179.61	33508	0.487	7.09	4.83	0.0	0.0
2.514	1169.50	32183	0.500	7.78	5.30	0.0	0.0
2.527	1168.53	32256	0.500	8.34	5.69	0.0	0.0
2.540	1167.37	32359	0.487	9.20	6.27	0.0	0.0

APPENDIX C
Base Run Printout
Flow Simulation Model (Flow Sim 1)

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*** PROGRAM FLOW SIM 1     ***
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ANALYSIS FOR

LAUREL RUN DAM BREACH SIMULATION

ANALYSIS PERFORMED BY

RALPH WURBS
WATERWAYS EXPERIMENT STATION
JULY 1984

PROCEDURES AND PROGRAM DEVELOPED BY

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DECEMBER 1983 EDITION

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***  SUMMARY OF INPUT DATA  ***
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PARAMETER AND CONTROL CONSTANTS

PARAMETERS/CONSTANTS	UNITS	NOTATION	VALUE
SPATIAL STEP	FT	DELX	200.00
MAXIMUM HYDRAULIC DEPTH	FT	HMAX	-4.00
MANNINGS N-VALUE (CONSTANT)		CCON	0.000
SPATIAL DIMENSIONS		DIMEN	1.00
SIMULATION TIME	HRS	TTIME	10.00
PRINT TIME INTERVAL	HRS	PTIME	0.15
TIME INTERVAL FOR BOUNDARY VALUES	HRS	RTIME	1.00
DOWNSTREAM BOUNDARY CONTROL COEFFICIENT		CBOUND	0.00
RUN TIME CONTROL	HRS	TSUP	0.00
FACTOR FOR GROUND WATER FLOW		QFACT	0.000
NUMBER OF STREAMS		NJ	1
NUMBER OF BARRIERS OR DAMS		KB	1
NUMBER OF EXPANSIONS		KE	0
NUMBER OF CONSTRICTIONS		KC	0
NUMBER OF LATERAL OUTFLOW LOCATIONS		LOM	0
OPTION FOR PRINTING CHANNEL DATA		IABC	0
PRINTOUT CONTROL		ISUP	0
LATERAL INFLOW INPUT OPTION		ITAPE	0
TAILWATER OPTION		ISUB	1
NUMBER OF LATERAL INFLOW LOCATIONS		LIM	2
TOTAL NUMBER OF Z OR Q NODES		MM	69
NUMBER OF RAW DATA STATIONS		ISTAM	16

CONTROL FOR DOWNSTREAM WATER LEVEL	ITT	0
OVERBANK STORAGE CONTROL	ISTOR	0
NUMBER OF RAW DATA IN VERTICAL FOR X-SEC	KDATA	5
CONTROL FOR RESERVOIR REGULATION	NREG	0
NUMBER OF RESERVOIR ELEVATIONS	KRES	3
NUMBER OF RESERVOIR STORAGE VALUES	IDATA	10
HYDROGRAPH PRINTING OPTION	IHYD	0
FLOODED OR DRY BED INDICATOR	IDRY	0
NUMBER OF PLOTTING LOCATIONS	IPLOT	0
NUMBER OF DIVIDED FLOW CHANNELS	MCON	0
OPTION FOR PRINTING LAST Z AND Q VALUES	LAST	0
RATIO OPTION FOR UPSTREAM INFLOW VALUES	INFAC	0

TIME STEP (DELT) = 4.00 SEC

MAXIMUM I VALUE FOR EACH STREAM

69

TYPE OF BREACH OPTION

0

RESERVOIR, DAM AND BREACH PARAMETERS

SPILLWAY PARAMETERS - DAM NUMBER 1

SPILLWAY CREST ELEVATION *****	1430.00 FEET
DISCHARGE COEFFICIENT ********	0.00
SPILLWAY CREST WIDTH *********	0.00 FEET

RESERVOIR INITIAL CONDITIONS - DAM NUMBER 1

RESERVOIR STORAGE **********	0.450 (K AC-FT)
RESERVOIR INFLOW **********	0.00 CFS
RESERVOIR OUTFLOW **********	0.00 CFS

ELEVATION VS. STORAGE - DAM NO. 1

RES. EL. (FEET)	STORAGE (K AC-FT)
1392.0	0.000
1400.0	0.001
1405.0	0.005
1410.0	0.029
1415.0	0.068
1420.0	0.126
1425.0	0.208
1430.0	0.300
1435.0	0.425
1440.0	0.570

OUTLET WORKS ELEVATION VS DISCHARGE - DAM NO. 1

RES. EL. (FEET)	DISCHARGE (CFS)
1430.0	0.0
1435.0	3100.0
1440.0	10000.0

DAM AND BREACH PARAMETERS - DAM NO. 1

DAM OR BARRIER LOCATION ****	68 (M-VALUE)
DAM OR BARRIER ELEVATION ***	1437. FEET
CRITICAL BREACH ELEVATION **	1437. FEET
TOTAL BREACH TIME **********	900. SEC
BREACH SECTION SLOPE *******	2.4500
WIDTH OF BOTTOM BREACH *****	0.0 FEET
WIDTH OF DAM ***************	0. FEET
MINIMUM BREACH ELEVATION ***	1392. FEET

LATERAL INFLOW LOCATIONS

21 67

LATERAL INFLOW

720.00	1600.00	1550.00	430.00	94.00	28.00	28.00	28.00	28.00	28.00
28.00									
2140.00	600.00	140.00	50.00	50.00	50.00	50.00	50.00	50.00	0.00
0.00									

DATA STATION LOCATIONS IN MILES

0.0000	0.2595	0.6439	0.7008	0.8087	0.9470	0.9848	1.2500	1.5152	1.5966
1.6970	1.8712	2.3239	2.4905	2.5379	2.5760				

DATA STATION NUMBER 1 STATION MILE = 0.0000

HS	1147.0	1148.0	1151.4	1152.5	1197.0
BS	0.0	40.0	120.0	140.0	575.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1160	0.1160	0.1160	0.1160	0.1160

DATA STATION NUMBER 2 STATION MILE = 0.2595

HS	1162.7	1166.3	1171.6	1175.4	1178.4
BS	0.0	242.0	408.0	425.0	435.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0900	0.0900	0.0900	0.0900	0.0900

DATA STATION NUMBER 3 STATION MILE = 0.6439

HS	1206.9	1207.7	1211.4	1217.8	1227.8
BS	0.0	41.3	99.0	120.0	140.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1000	0.1000	0.1000	0.1000	0.1000

DATA STATION NUMBER 4 STATION MILE = 0.7008

HS	1216.1	1221.5	1225.2	1228.4	1232.6
BS	0.0	140.0	210.0	227.5	245.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1000	0.1000	0.1000	0.1000	0.1000

DATA STATION NUMBER 5 STATION MILE = 0.8087

HS	1224.0	1226.5	1228.4	1234.5	1240.8
BS	0.0	55.0	100.0	140.0	180.6
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0900	0.0900	0.0900	0.0900	0.0900

DATA STATION NUMBER 6 STATION MILE = 0.9470

HS	1232.3	1232.6	1234.2	1244.5	1250.5
BS	0.0	38.8	63.9	108.8	120.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1100	0.1100	0.1100	0.1100	0.1100

DATA STATION NUMBER 7 STATION MILE = 0.9848

HS	1236.4	1241.1	1242.5	1247.5	1252.1
BS	0.0	90.0	145.0	240.0	320.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1100	0.1100	0.1100	0.1100	0.1100

DATA STATION NUMBER 8 STATION MILE = 1.2500

HS	1263.6	1267.3	1269.4	1274.0	1275.4
BS	0.0	170.0	245.0	390.0	430.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0800	0.0800	0.0800	0.0800	0.0800

DATA STATION NUMBER 9 STATION MILE = 1.5152

HS	1293.2	1297.7	1299.8	1302.1	1317.0
BS	0.0	100.0	147.5	160.0	230.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0900	0.0900	0.0900	0.0900	0.0900

DATA STATION NUMBER 10 STATION MILE = 1.5966

HS	1300.9	1304.1	1313.8	1318.0	1323.9
BS	0.0	58.8	128.7	164.5	177.5
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0900	0.0900	0.0900	0.0900	0.0900

DATA STATION NUMBER 11 STATION MILE = 1.6970

HS	1315.1	1317.0	1325.5	1331.0	1335.8
BS	0.0	42.5	130.0	185.0	230.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1200	0.1200	0.1200	0.1200	0.1200

DATA STATION NUMBER 12 STATION MILE = 1.8712

HS	1339.2	1343.2	1346.6	1350.3	1352.4
BS	0.0	190.0	380.0	445.0	480.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1000	0.1000	0.1000	0.1000	0.1000

DATA STATION NUMBER 13 STATION MILE = 2.3239

HS	1373.9	1374.3	1374.9	1382.0	1390.2
BS	0.0	25.0	45.0	132.5	204.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.1000	0.1000	0.1000	0.1000	0.1000

DATA STATION NUMBER 14 STATION MILE = 2.4905

HS	1390.8	1391.3	1393.9	1395.8	1404.3
BS	0.0	150.0	315.0	400.0	470.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0600	0.0600	0.0600	0.0600	0.0600

DATA STATION NUMBER 15 STATION MILE = 2.5379

HS	1392.0	1392.5	1395.1	1397.0	1405.5
BS	0.0	150.0	315.0	400.0	470.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0600	0.0600	0.0600	0.0600	0.0600

DATA STATION NUMBER 16 STATION MILE = 2.5760

HS	1397.2	1403.2	1410.0	1425.9	1437.4
BS	0.0	335.0	478.0	585.0	650.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0600	0.0600	0.0600	0.0600	0.0600

BED ELEVATIONS

1147.00	1149.29	1151.58	1153.87	1156.17	1158.46	1160.75	1163.35	1167.71	1172.06
1176.42	1180.77	1185.13	1189.48	1193.84	1198.19	1202.55	1206.91	1213.03	1217.48
1220.26	1223.03	1225.48	1227.75	1230.02	1232.30	1239.80	1243.20	1246.60	1250.00
1253.40	1256.80	1260.20	1263.60	1267.83	1272.06	1276.28	1280.51	1284.74	1288.97
1293.19	1296.78	1300.36	1305.45	1310.81	1316.14	1321.38	1326.62	1331.86	1337.11
1340.94	1343.85	1346.75	1349.65	1352.56	1355.46	1358.36	1361.27	1364.17	1367.07
1369.98	1372.88	1376.39	1380.24	1384.08	1387.92	1391.04	1392.00	1397.20	

INITIAL WATER LEVELS

1147.00	1149.29	1151.58	1153.87	1156.17	1158.46	1160.75	1163.35	1167.71	1172.06
1176.42	1180.77	1185.13	1189.48	1193.84	1198.19	1202.55	1206.91	1213.03	1217.48
1220.26	1223.03	1225.48	1227.75	1230.02	1232.30	1239.80	1243.20	1246.60	1250.00
1253.40	1256.80	1260.20	1263.60	1267.83	1272.06	1276.28	1280.51	1284.74	1288.97
1293.19	1296.78	1300.36	1305.45	1310.81	1316.14	1321.38	1326.62	1331.86	1337.11
1340.94	1343.85	1346.75	1349.65	1352.56	1355.46	1358.36	1361.27	1364.17	1367.07
1369.98	1372.88	1376.39	1380.24	1384.08	1387.92	1391.04	1392.00	1397.20	

UPSTREAM BOUNDARY DISCHARGE IN CFS

10400.00	4700.00	1800.00	655.00	205.00	100.00	100.00	100.00	100.00	100.00
100.00									

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*** ***
*** SUMMARY OF OUTPUT DATA ***
*** ***
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RESERVOIR DEPLETION DATA FOR DAM NUMBER 1

DAM LOCATED AT NODE = 68 BEGAN TO BREACH AT NTIME= 88 OR HOUR = 0.098
BREACH WIDTH = 0.00 FEET

DAM BREACHED BY UNIFORM TIME INCREMENT METHOD

NOTE *** DURING THE TIME OF DAM HEIGHT REDUCTION IN BREACH SECTION, RESERVOIR DEPLETION VALUES ARE PRINTED FOR EVERY TIME STEP

TIME (HRS)	RES.ELEV. (FEET)	STORAGE (1000 AC-FT)	RES. INFLOW (CFS)	RES.OUTFLOW (CFS)	BREACH EL. (FEET)	EL.BELOW DAM (FEET)	OUTLET WKS.FLOW (CFS)	DAM OVERFLOW (CFS)
0.10	1437.21	0.489	9846.	6139.	1436.30	1397.47	6139.	0.
0.10	1437.23	0.490	9839.	6155.	1436.10	1397.47	6155.	0.
0.10	1437.24	0.490	9833.	6172.	1435.91	1397.48	6171.	0.
0.10	1437.25	0.490	9827.	6190.	1435.71	1397.49	6187.	0.
0.10	1437.26	0.491	9820.	6208.	1435.51	1397.49	6203.	0.
0.10	1437.27	0.491	9814.	6227.	1435.31	1397.50	6218.	0.
0.10	1437.28	0.491	9808.	6248.	1435.12	1397.50	6234.	0.
0.11	1437.29	0.492	9801.	6268.	1434.92	1397.51	6250.	0.
0.11	1437.30	0.492	9795.	6290.	1434.72	1397.52	6265.	0.
0.11	1437.32	0.492	9789.	6313.	1434.52	1397.52	6281.	0.
0.11	1437.33	0.492	9782.	6337.	1434.32	1397.53	6296.	0.
0.11	1437.34	0.493	9776.	6362.	1434.13	1397.54	6311.	0.
0.11	1437.35	0.493	9770.	6388.	1433.93	1397.54	6326.	0.
0.11	1437.36	0.493	9763.	6416.	1433.73	1397.55	6341.	0.
0.11	1437.37	0.494	9757.	6444.	1433.53	1397.56	6355.	0.
0.11	1437.38	0.494	9751.	6475.	1433.34	1397.57	6370.	0.
0.12	1437.39	0.494	9744.	6506.	1433.14	1397.58	6384.	0.
0.12	1437.40	0.495	9738.	6539.	1432.94	1397.58	6398.	0.
0.12	1437.41	0.495	9732.	6573.	1432.74	1397.59	6413.	0.
0.12	1437.42	0.495	9725.	6609.	1432.54	1397.60	6426.	0.
0.12	1437.43	0.495	9719.	6647.	1432.35	1397.61	6440.	0.
0.12	1437.44	0.496	9713.	6686.	1432.15	1397.62	6454.	0.
0.12	1437.45	0.496	9706.	6726.	1431.95	1397.63	6467.	0.

0.12	1437.46	0.496	9700.	6769.	1431.75	1397.64	6480.	0.
0.12	1437.47	0.497	9694.	6812.	1431.56	1397.65	6493.	0.
0.13	1437.48	0.497	9687.	6858.	1431.36	1397.67	6506.	0.
0.13	1437.49	0.497	9681.	6905.	1431.16	1397.68	6518.	0.
0.13	1437.49	0.497	9675.	6954.	1430.96	1397.69	6530.	0.
0.13	1437.50	0.498	9668.	7006.	1430.76	1397.70	6542.	0.
0.13	1437.51	0.498	9662.	7058.	1430.57	1397.72	6554.	0.
0.13	1437.52	0.498	9656.	7113.	1430.37	1397.73	6565.	0.
0.13	1437.53	0.498	9649.	7169.	1430.17	1397.75	6577.	0.
0.13	1437.53	0.499	9643.	7227.	1429.97	1397.76	6587.	0.
0.13	1437.54	0.499	9637.	7288.	1429.78	1397.78	6598.	0.
0.14	1437.55	0.499	9630.	7350.	1429.58	1397.79	6609.	0.
0.14	1437.56	0.499	9624.	7414.	1429.38	1397.81	6619.	0.
0.14	1437.56	0.499	9618.	7480.	1429.18	1397.83	6629.	0.
0.14	1437.57	0.500	9611.	7548.	1428.98	1397.84	6638.	0.
0.14	1437.58	0.500	9605.	7619.	1428.79	1397.86	6647.	0.
0.14	1437.58	0.500	9599.	7691.	1428.59	1397.88	6656.	0.
0.14	1437.59	0.500	9592.	7766.	1428.39	1397.90	6665.	0.
0.14	1437.59	0.500	9586.	7842.	1428.19	1397.92	6673.	0.
0.14	1437.60	0.500	9580.	7921.	1428.00	1397.94	6680.	0.
0.15	1437.60	0.501	9573.	8001.	1427.80	1397.96	6688.	0.
0.15	1437.61	0.501	9567.	8084.	1427.60	1397.98	6695.	0.
0.15	1437.61	0.501	9561.	8169.	1427.40	1398.01	6701.	0.
0.15	1437.62	0.501	9554.	8257.	1427.20	1398.03	6708.	0.
0.15	1437.62	0.501	9548.	8346.	1427.01	1398.05	6713.	0.
0.15	1437.63	0.501	9542.	8438.	1426.81	1398.08	6719.	0.
0.15	1437.63	0.501	9535.	8532.	1426.61	1398.10	6724.	0.
0.15	1437.63	0.501	9529.	8629.	1426.41	1398.13	6729.	0.
0.15	1437.64	0.501	9523.	8727.	1426.22	1398.15	6733.	0.
0.16	1437.64	0.501	9516.	8828.	1426.02	1398.18	6736.	0.
0.16	1437.64	0.502	9510.	8931.	1425.82	1398.20	6739.	0.
0.16	1437.64	0.502	9504.	9037.	1425.62	1398.23	6742.	0.
0.16	1437.64	0.502	9497.	9145.	1425.42	1398.26	6744.	0.
0.16	1437.64	0.502	9491.	9256.	1425.23	1398.29	6746.	0.
0.16	1437.64	0.502	9485.	9368.	1425.03	1398.32	6747.	0.
0.16	1437.64	0.502	9478.	9483.	1424.83	1398.35	6748.	0.
0.16	1437.64	0.502	9472.	9601.	1424.63	1398.38	6748.	0.
0.16	1437.64	0.502	9466.	9721.	1424.44	1398.41	6748.	0.
0.17	1437.64	0.502	9459.	9843.	1424.24	1398.44	6747.	0.
0.17	1437.64	0.502	9453.	9968.	1424.04	1398.47	6746.	0.
0.17	1437.64	0.502	9447.	10096.	1423.84	1398.50	6744.	0.
0.17	1437.64	0.501	9440.	10226.	1423.64	1398.53	6741.	0.
0.17	1437.63	0.501	9434.	10358.	1423.45	1398.57	6738.	0.
0.17	1437.63	0.501	9428.	10493.	1423.25	1398.60	6734.	0.
0.17	1437.63	0.501	9421.	10630.	1423.05	1398.64	6730.	0.
0.17	1437.62	0.501	9415.	10770.	1422.85	1398.67	6725.	0.
0.17	1437.62	0.501	9409.	10913.	1422.66	1398.71	6719.	0.
0.18	1437.61	0.501	9402.	11058.	1422.46	1398.74	6713.	0.
0.18	1437.61	0.501	9396.	11205.	1422.26	1398.78	6706.	0.
0.18	1437.60	0.500	9390.	11356.	1422.06	1398.81	6699.	0.
0.18	1437.60	0.500	9383.	11509.	1421.86	1398.85	6690.	0.
0.18	1437.59	0.500	9377.	11664.	1421.67	1398.89	6681.	0.
0.18	1437.58	0.500	9371.	11822.	1421.47	1398.93	6672.	0.
0.18	1437.57	0.500	9364.	11983.	1421.27	1398.97	6661.	0.
0.18	1437.56	0.499	9358.	12146.	1421.07	1399.00	6650.	0.
0.18	1437.55	0.499	9352.	12312.	1420.88	1399.04	6638.	0.
0.19	1437.55	0.499	9345.	12481.	1420.68	1399.08	6626.	0.
0.19	1437.53	0.499	9339.	12652.	1420.48	1399.13	6612.	0.
0.19	1437.52	0.498	9333.	12826.	1420.28	1399.17	6598.	0.
0.19	1437.51	0.498	9326.	13003.	1420.08	1399.21	6583.	0.
0.19	1437.50	0.498	9320.	13183.	1419.89	1399.25	6568.	0.

0.19	1437.49	0.497	9314.	13365.	1419.69	1399.29	6551.	0.
0.19	1437.48	0.497	9307.	13550.	1419.49	1399.34	6534.	0.
0.19	1437.46	0.496	9301.	13737.	1419.29	1399.38	6516.	0.
0.19	1437.45	0.496	9295.	13928.	1419.10	1399.42	6497.	0.
0.20	1437.43	0.496	9288.	14121.	1418.90	1399.47	6477.	0.
0.20	1437.42	0.495	9282.	14316.	1418.70	1399.51	6456.	0.
0.20	1437.40	0.495	9276.	14515.	1418.50	1399.55	6434.	0.
0.20	1437.38	0.494	9269.	14716.	1418.30	1399.60	6412.	0.
0.20	1437.37	0.494	9263.	14920.	1418.11	1399.64	6389.	0.
0.20	1437.35	0.493	9257.	15127.	1417.91	1399.69	6364.	0.
0.20	1437.33	0.493	9250.	15337.	1417.71	1399.73	6339.	0.
0.20	1437.31	0.492	9244.	15550.	1417.51	1399.78	6313.	0.
0.20	1437.29	0.491	9238.	15765.	1417.32	1399.83	6286.	0.
0.21	1437.27	0.491	9231.	15983.	1417.12	1399.87	6258.	0.
0.21	1437.25	0.490	9225.	16204.	1416.92	1399.92	6229.	0.
0.21	1437.22	0.489	9219.	16428.	1416.72	1399.97	6199.	0.
0.21	1437.20	0.489	9212.	16654.	1416.52	1400.01	6168.	0.
0.21	1437.18	0.488	9206.	16883.	1416.33	1400.06	6136.	0.
0.21	1437.15	0.487	9200.	17116.	1416.13	1400.11	6103.	0.
0.21	1437.13	0.487	9193.	17351.	1415.93	1400.16	6069.	0.
0.21	1437.10	0.486	9187.	17589.	1415.73	1400.21	6034.	0.
0.21	1437.07	0.485	9181.	17830.	1415.54	1400.26	5997.	0.
0.22	1437.04	0.484	9174.	18074.	1415.34	1400.31	5960.	0.
0.22	1437.02	0.483	9168.	18321.	1415.14	1400.36	5922.	0.
0.22	1436.99	0.483	9162.	18570.	1414.94	1400.41	5882.	0.
0.22	1436.96	0.482	9155.	18822.	1414.74	1400.46	5841.	0.
0.22	1436.93	0.481	9149.	19078.	1414.55	1400.51	5800.	0.
0.22	1436.89	0.480	9143.	19336.	1414.35	1400.56	5757.	0.
0.22	1436.86	0.479	9136.	19597.	1414.15	1400.61	5713.	0.
0.22	1436.83	0.478	9130.	19861.	1413.95	1400.67	5668.	0.
0.22	1436.79	0.477	9124.	20128.	1413.76	1400.72	5621.	0.
0.23	1436.76	0.476	9117.	20398.	1413.56	1400.77	5574.	0.
0.23	1436.72	0.475	9111.	20671.	1413.36	1400.82	5525.	0.
0.23	1436.68	0.474	9105.	20947.	1413.16	1400.87	5475.	0.
0.23	1436.65	0.473	9098.	21225.	1412.96	1400.92	5424.	0.
0.23	1436.61	0.472	9092.	21507.	1412.77	1400.98	5372.	0.
0.23	1436.57	0.470	9086.	21791.	1412.57	1401.03	5318.	0.
0.23	1436.53	0.469	9079.	22079.	1412.37	1401.09	5263.	0.
0.23	1436.49	0.468	9073.	22370.	1412.17	1401.14	5207.	0.
0.23	1436.44	0.467	9067.	22637.	1411.98	1401.20	5149.	0.
0.24	1436.40	0.466	9060.	22856.	1411.78	1401.25	5091.	0.
0.24	1436.36	0.464	9054.	23076.	1411.58	1401.30	5031.	0.
0.24	1436.31	0.463	9048.	23296.	1411.38	1401.35	4970.	0.
0.24	1436.26	0.462	9041.	23516.	1411.18	1401.40	4908.	0.
0.24	1436.22	0.460	9035.	23736.	1410.99	1401.44	4846.	0.
0.24	1436.17	0.459	9029.	23957.	1410.79	1401.49	4782.	0.
0.24	1436.12	0.458	9022.	24177.	1410.59	1401.54	4717.	0.
0.24	1436.08	0.456	9016.	24398.	1410.39	1401.58	4651.	0.
0.24	1436.03	0.455	9010.	24620.	1410.20	1401.63	4584.	0.
0.25	1435.98	0.453	9003.	24841.	1410.00	1401.67	4517.	0.
0.25	1435.93	0.452	8997.	25063.	1409.80	1401.72	4448.	0.
0.25	1435.87	0.450	8991.	25284.	1409.60	1401.76	4378.	0.
0.25	1435.82	0.449	8984.	25505.	1409.40	1401.80	4307.	0.
0.25	1435.77	0.447	8978.	25727.	1409.21	1401.85	4236.	0.
0.25	1435.72	0.446	8972.	25948.	1409.01	1401.89	4163.	0.
0.25	1435.66	0.444	8965.	26170.	1408.81	1401.94	4090.	0.
0.25	1435.61	0.443	8959.	26390.	1408.61	1401.98	4015.	0.
0.25	1435.55	0.441	8953.	26611.	1408.42	1402.02	3939.	0.
0.26	1435.50	0.439	8946.	26833.	1408.22	1402.06	3862.	0.
0.26	1435.44	0.438	8940.	27053.	1408.02	1402.11	3785.	0.
0.26	1435.38	0.436	8934.	27273.	1407.82	1402.15	3706.	0.

0.26	1435.32	0.434	8927.	27494.	1407.62	1402.19	3626.	0.
0.26	1435.26	0.433	8921.	27714.	1407.43	1402.23	3546.	0.
0.26	1435.20	0.431	8915.	27933.	1407.23	1402.28	3464.	0.
0.26	1435.14	0.429	8908.	28153.	1407.03	1402.32	3381.	0.
0.26	1435.08	0.427	8902.	28372.	1406.83	1402.36	3298.	0.
0.26	1435.02	0.426	8896.	28591.	1406.64	1402.40	3213.	0.
0.27	1434.95	0.424	8889.	28808.	1406.44	1402.44	3127.	0.
0.27	1434.88	0.422	8883.	29040.	1406.24	1402.48	3069.	0.
0.27	1434.80	0.420	8877.	29275.	1406.04	1402.53	3024.	0.
0.27	1434.73	0.418	8870.	29511.	1405.84	1402.57	2977.	0.
0.27	1434.65	0.416	8864.	29745.	1405.65	1402.61	2931.	0.
0.27	1434.57	0.414	8858.	29979.	1405.45	1402.65	2883.	0.
0.27	1434.50	0.412	8851.	30211.	1405.25	1402.70	2835.	0.
0.27	1434.42	0.410	8845.	30444.	1405.05	1402.74	2787.	0.
0.27	1434.34	0.408	8839.	30675.	1404.86	1402.78	2738.	0.
0.28	1434.26	0.406	8832.	30905.	1404.66	1402.83	2689.	0.
0.28	1434.17	0.404	8826.	31134.	1404.46	1402.87	2639.	0.
0.28	1434.09	0.402	8820.	31362.	1404.26	1402.91	2588.	0.
0.28	1434.01	0.400	8813.	31589.	1404.06	1402.95	2537.	0.
0.28	1433.92	0.398	8807.	31816.	1403.87	1403.00	2485.	0.
0.28	1433.84	0.396	8801.	32041.	1403.67	1403.04	2433.	0.
0.28	1433.75	0.394	8794.	32265.	1403.47	1403.08	2381.	0.
0.28	1433.67	0.392	8788.	32488.	1403.27	1403.13	2327.	0.
0.28	1433.58	0.389	8782.	32663.	1403.08	1403.17	2274.	0.
0.29	1433.49	0.387	8775.	32765.	1402.88	1403.21	2219.	0.
0.29	1433.40	0.385	8769.	32867.	1402.68	1403.24	2165.	0.
0.29	1433.31	0.383	8763.	32968.	1402.48	1403.28	2110.	0.
0.29	1433.23	0.381	8756.	33070.	1402.28	1403.31	2055.	0.
0.29	1433.14	0.378	8750.	33170.	1402.09	1403.34	2000.	0.
0.29	1433.05	0.376	8744.	33271.	1401.89	1403.36	1944.	0.
0.29	1432.96	0.374	8737.	33368.	1401.69	1403.39	1889.	0.
0.29	1432.87	0.372	8731.	33465.	1401.49	1403.42	1833.	0.
0.29	1432.77	0.369	8725.	33559.	1401.30	1403.45	1776.	0.
0.30	1432.68	0.367	8718.	33653.	1401.10	1403.48	1720.	0.
0.30	1432.59	0.365	8712.	33746.	1400.90	1403.51	1663.	0.
0.30	1432.50	0.362	8706.	33837.	1400.70	1403.54	1606.	0.
0.30	1432.41	0.360	8699.	33927.	1400.50	1403.56	1549.	0.
0.30	1432.31	0.358	8693.	34017.	1400.31	1403.59	1492.	0.
0.30	1432.22	0.356	8687.	34104.	1400.11	1403.61	1434.	0.
0.30	1432.13	0.353	8680.	34192.	1399.91	1403.64	1377.	0.
0.30	1432.03	0.351	8674.	34277.	1399.71	1403.67	1319.	0.
0.30	1431.94	0.348	8668.	34361.	1399.52	1403.69	1260.	0.
0.31	1431.84	0.346	8661.	34443.	1399.32	1403.72	1202.	0.
0.31	1431.75	0.344	8655.	34525.	1399.12	1403.74	1143.	0.
0.31	1431.65	0.341	8649.	34604.	1398.92	1403.76	1085.	0.
0.31	1431.56	0.339	8642.	34683.	1398.72	1403.79	1026.	0.
0.31	1431.46	0.337	8636.	34761.	1398.53	1403.81	966.	0.
0.31	1431.37	0.334	8630.	34837.	1398.33	1403.83	907.	0.
0.31	1431.27	0.332	8623.	34913.	1398.13	1403.86	847.	0.
0.31	1431.17	0.329	8617.	34988.	1397.93	1403.88	788.	0.
0.31	1431.08	0.327	8611.	35061.	1397.74	1403.90	728.	0.
0.32	1430.98	0.324	8604.	35132.	1397.54	1403.92	667.	0.
0.32	1430.88	0.322	8598.	35203.	1397.34	1403.95	607.	0.
0.32	1430.78	0.320	8592.	35272.	1397.14	1403.97	547.	0.
0.32	1430.69	0.317	8585.	35339.	1396.94	1403.99	486.	0.
0.32	1430.59	0.315	8579.	35406.	1396.75	1404.01	425.	0.
0.32	1430.49	0.312	8573.	35471.	1396.55	1404.03	364.	0.
0.32	1430.39	0.310	8566.	35535.	1396.35	1404.05	303.	0.
0.32	1430.29	0.307	8560.	35597.	1396.15	1404.07	241.	0.
0.32	1430.19	0.305	8554.	35659.	1395.96	1404.09	180.	0.
0.33	1430.09	0.302	8547.	35721.	1395.76	1404.11	118.	0.

0.33	1429.99	0.300	8541.	35779.	1395.56	1404.13	56.	0.
0.33	1429.85	0.297	8535.	35835.	1395.36	1404.15	0.	0.
0.33	1429.72	0.295	8528.	35855.	1395.16	1404.17	0.	0.
0.33	1429.58	0.292	8522.	35874.	1394.97	1404.19	0.	0.
0.33	1429.44	0.290	8516.	35893.	1394.77	1404.20	0.	0.
0.33	1429.31	0.287	8509.	35913.	1394.57	1404.22	0.	0.
0.33	1429.17	0.285	8503.	35931.	1394.37	1404.23	0.	0.
0.33	1429.03	0.282	8497.	35948.	1394.18	1404.24	0.	0.
0.34	1428.90	0.280	8490.	35964.	1393.98	1404.26	0.	0.
0.34	1428.76	0.277	8484.	35979.	1393.78	1404.27	0.	0.
0.34	1428.62	0.275	8478.	35993.	1393.58	1404.28	0.	0.
0.34	1428.48	0.272	8471.	36007.	1393.38	1404.30	0.	0.
0.34	1428.35	0.270	8465.	36019.	1393.19	1404.31	0.	0.
0.34	1428.21	0.267	8459.	36030.	1392.99	1404.32	0.	0.
0.34	1428.07	0.264	8452.	36041.	1392.79	1404.33	0.	0.
0.34	1427.93	0.262	8446.	36051.	1392.59	1404.34	0.	0.
0.34	1427.79	0.259	8440.	36060.	1392.40	1404.35	0.	0.
0.35	1427.66	0.257	8433.	36067.	1392.20	1404.36	0.	0.
0.45	1418.59	0.110	7838.	17578.	1392.00	1400.98	0.	0.
0.60	1412.35	0.047	6983.	9086.	1392.00	1398.50	0.	0.
0.75	1410.30	0.031	6128.	6971.	1392.00	1397.81	0.	0.
0.90	1408.91	0.024	5273.	5715.	1392.00	1397.37	0.	0.
1.05	1407.86	0.019	4557.	4875.	1392.00	1397.02	0.	0.
1.20	1407.17	0.015	4122.	4362.	1392.00	1396.80	0.	0.
1.35	1406.55	0.012	3687.	3918.	1392.00	1396.59	0.	0.
1.50	1406.00	0.010	3252.	3456.	1392.00	1396.36	0.	0.
1.65	1405.46	0.007	2817.	3033.	1392.00	1396.14	0.	0.
1.80	1404.62	0.005	2382.	2443.	1392.00	1395.83	0.	0.
1.95	1403.86	0.004	1947.	1995.	1392.00	1395.53	0.	0.
2.10	1403.31	0.004	1686.	1708.	1392.00	1395.30	0.	0.
2.25	1402.96	0.003	1514.	1538.	1392.00	1395.16	0.	0.
2.40	1402.57	0.003	1343.	1368.	1392.00	1395.00	0.	0.
2.55	1402.15	0.003	1171.	1199.	1392.00	1394.83	0.	0.
2.70	1401.68	0.002	999.	1030.	1392.00	1394.65	0.	0.
2.85	1401.18	0.002	827.	861.	1392.00	1394.47	0.	0.
3.00	1400.60	0.001	656.	694.	1392.00	1394.27	0.	0.
3.15	1400.25	0.001	588.	605.	1392.00	1394.14	0.	0.
3.30	1399.91	0.001	520.	524.	1392.00	1394.04	0.	0.
3.45	1399.59	0.001	453.	456.	1392.00	1393.94	0.	0.
3.60	1399.24	0.001	385.	389.	1392.00	1393.84	0.	0.
3.75	1398.86	0.001	318.	322.	1392.00	1393.73	0.	0.
3.90	1398.41	0.001	250.	255.	1392.00	1393.61	0.	0.
4.05	1397.94	0.001	200.	202.	1392.00	1393.37	0.	0.
4.20	1397.73	0.001	184.	186.	1392.00	1393.21	0.	0.
4.35	1397.56	0.001	168.	170.	1392.00	1393.11	0.	0.
4.50	1397.37	0.001	153.	154.	1392.00	1393.01	0.	0.
4.65	1397.16	0.001	137.	139.	1392.00	1392.87	0.	0.
4.80	1396.94	0.001	121.	123.	1392.00	1392.76	0.	0.
4.95	1396.72	0.001	105.	108.	1392.00	1392.65	0.	0.
5.10	1396.60	0.001	100.	99.	1392.00	1392.62	0.	0.
5.25	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
5.40	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
5.55	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
5.70	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
5.85	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.00	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.15	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.30	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.45	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.60	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
6.75	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.

6.90	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.05	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.20	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.35	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.50	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.65	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.80	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
7.95	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.10	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.25	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.40	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.55	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.70	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
8.85	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.00	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.15	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.30	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.45	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.60	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.75	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
9.90	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.
10.00	1396.63	0.001	100.	100.	1392.00	1392.65	0.	0.

MAXIMUM COMPUTED WATER SURFACE ELEVATIONS AND FLOWS

STREAM NUMBER 1

NODE	STATION (FT)	BED ELEV (FT)	MAX W.S. ELEV(FT)	STAGE (FT)	TIME-MAX ELEV(HRS)	MAX FLOW (CFS)	MAX VEL. (FT/SEC)	feet below dam
69	13600.0	1397.20	1437.64	40.44	0.16	10394.	0.00	-200
68	13400.0	1392.00	1404.38	12.38	0.35	36074.	0.00	0
67	13200.0	1391.04	1403.23	12.19	0.35	35861.	8.53	200
66	13000.0	1387.92	1402.21	14.29	0.35	37188.	8.76	400
65	12800.0	1384.08	1401.25	17.18	0.36	36924.	7.98	600
64	12600.0	1380.24	1400.07	19.83	0.36	36712.	7.69	800
63	12400.0	1376.39	1397.93	21.53	0.36	36567.	8.51	1000
62	12200.0	1372.88	1393.82	20.94	0.36	36486.	10.40	1200
61	12000.0	1369.98	1389.92	19.95	0.36	36451.	11.48	1400
60	11800.0	1367.07	1386.17	19.10	0.37	36411.	10.97	1600
59	11600.0	1364.17	1382.52	18.35	0.37	36370.	10.53	1800
58	11400.0	1361.27	1378.96	17.69	0.37	36323.	10.14	2000
57	11200.0	1358.36	1375.46	17.10	0.37	36266.	9.80	2200
56	11000.0	1355.46	1372.03	16.57	0.38	36208.	9.50	2400
55	10800.0	1352.56	1368.65	16.09	0.38	36144.	9.22	2600
54	10600.0	1349.65	1365.31	15.66	0.38	36074.	8.97	2800
53	10400.0	1346.75	1362.01	15.26	0.39	36005.	8.75	3000
52	10200.0	1343.85	1358.72	14.87	0.39	35932.	8.55	3200
51	10000.0	1340.94	1355.25	14.31	0.39	35846.	8.47	3400
50	9800.0	1337.11	1351.70	14.59	0.40	35752.	8.49	3600
49	9600.0	1331.86	1348.66	16.79	0.41	35561.	8.31	3800
48	9400.0	1326.62	1346.17	19.54	0.41	35312.	7.98	4000

47	9200.0	1321.38	1343.65	22.26	0.42	35089.	7.96	4200
46	9000.0	1316.14	1339.47	23.33	0.42	34971.	8.97	4400
45	8800.0	1310.81	1334.00	23.19	0.42	34916.	10.74	4600
44	8600.0	1305.45	1328.27	22.82	0.42	34876.	12.04	4800
43	8400.0	1300.36	1321.99	21.63	0.43	34844.	13.38	5000
42	8200.0	1296.78	1316.96	20.18	0.43	34825.	13.90	5200
41	8000.0	1293.19	1311.20	18.00	0.43	34795.	13.77	5400
40	7800.0	1288.97	1305.74	16.77	0.43	34780.	13.61	5600
39	7600.0	1284.74	1300.53	15.79	0.44	34761.	12.95	5800
38	7400.0	1280.51	1295.52	15.01	0.44	34744.	12.38	6000
37	7200.0	1276.28	1290.63	14.34	0.44	34729.	11.91	6200
36	7000.0	1272.06	1285.89	13.84	0.45	34722.	11.47	6400
35	6800.0	1267.83	1280.98	13.15	0.45	34707.	11.23	6600
34	6600.0	1263.60	1277.85	14.25	0.46	34670.	10.05	6800
33	6400.0	1260.20	1275.23	15.03	0.46	34569.	8.99	7000
32	6200.0	1256.80	1272.67	15.87	0.47	34463.	8.78	7200
31	6000.0	1253.40	1270.22	16.82	0.48	34326.	8.60	7400
30	5800.0	1250.00	1268.01	18.01	0.49	34109.	8.43	7600
29	5600.0	1246.60	1266.12	19.53	0.49	33742.	8.21	7800
28	5400.0	1243.20	1264.56	21.36	0.50	33258.	7.94	8000
27	5200.0	1239.80	1263.26	23.46	0.50	32887.	7.57	8200
26	5000.0	1232.30	1258.64	26.34	0.50	32706.	8.92	8400
25	4800.0	1230.02	1254.63	24.61	0.50	32683.	12.38	8600
24	4600.0	1227.75	1250.83	23.08	0.51	32653.	12.19	8800
23	4400.0	1225.48	1247.01	21.53	0.51	32621.	12.18	9000
22	4200.0	1223.03	1243.31	20.28	0.51	32590.	12.15	9200
21	4000.0	1220.26	1240.16	19.90	0.52	32546.	11.46	9400
20	3800.0	1217.48	1237.25	19.76	0.52	33639.	10.75	9600
19	3600.0	1213.03	1234.53	21.50	0.52	33569.	10.11	9800
18	3400.0	1206.91	1227.34	20.43	0.53	33531.	11.98	10000

17	3200.0	1202.55	1221.14	18.59	0.53	33517.	14.68	10200
16	3000.0	1198.19	1215.39	17.20	0.53	33502.	13.68	10400
15	2800.0	1193.84	1209.93	16.10	0.54	33487.	12.89	10600
14	2600.0	1189.48	1204.67	15.19	0.54	33472.	12.26	10800
13	2400.0	1185.13	1199.56	14.43	0.54	33460.	11.74	11000
12	2200.0	1180.77	1194.55	13.78	0.54	33447.	11.30	11200
11	2000.0	1176.42	1189.64	13.23	0.55	33432.	10.93	11400
10	1800.0	1172.06	1184.76	12.70	0.55	33417.	10.62	11600
9	1600.0	1167.71	1180.24	12.53	0.57	33425.	10.33	11800
8	1400.0	1163.35	1178.47	15.12	0.60	33226.	9.67	12000
7	1200.0	1160.75	1177.29	16.54	0.60	32766.	8.41	12200
6	1000.0	1158.46	1176.22	17.76	0.61	32096.	8.05	12400
5	800.0	1156.17	1175.16	18.99	0.61	31244.	7.96	12600
4	600.0	1153.87	1174.03	20.16	0.62	30732.	7.92	12800
3	400.0	1151.58	1172.76	21.18	0.62	30473.	7.89	13000
2	200.0	1149.29	1171.19	21.90	0.62	30305.	7.89	13200
1	0.0	1147.00	1168.90	21.90	0.62	30244.	7.03	13400

APPENDIX D
Base Run Printout
Flow Simulation Model (Flow Sim 2)

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*** PROGRAM FLOW SIM 2     ***
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ANALYSIS FOR

LAUREL RUN DAM BREACH SIMULATION

ANALYSIS PERFORMED BY

RALPH WURBS
WATERWAYS EXPERIMENT STATION
JULY 1984

PROCEDURES AND PROGRAM DEVELOPED BY

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DECEMBER 1983 EDITION

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*** SUMMARY OF INPUT DATA ***
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PARAMETER AND CONTROL CONSTANTS

PARAMETERS/CONSTANTS	UNITS	NOTATION	VALUE
SPATIAL STEP	FT	DELX	200.00
MAXIMUM HYDRAULIC DEPTH	FT	HMAX	-4.00
MANNINGS N-VALUE (CONSTANT)		CCON	0.000
SPATIAL DIMENSIONS		DIMEN	1.00
SIMULATION TIME	HRS	TTIME	4.00
PRINT TIME INTERVAL	HRS	PTIME	0.15
TIME INTERVAL FOR BOUNDARY VALUES	HRS	RTIME	1.00
DOWNSTREAM BOUNDARY CONTROL COEFFICIENT		CBOUND	0.00
RUN TIME CONTROL	HRS	TSUP	0.00
NUMBER OF STREAMS		NJ	1
NUMBER OF BARRIERS OR DAMS		KB	1
NUMBER OF EXPANSIONS		KE	0
NUMBER OF CONSTRICTIONS		KC	0
NUMBER OF LATERAL OUTFLOW LOCATIONS		LOM	0
OPTION FOR PRINTING CHANNEL DATA		IABC	0
PRINTOUT CONTROL		ISUP	0
LATERAL INFLOW INPUT OPTION		ITAPE	0
TAILWATER OPTION		ISUB	1
TIME FOR INCREASING TIME STEP		TCH	0.00
NUMBER OF LATERAL INFLOW LOCATIONS		LIM	2
TOTAL NUMBER OF Z OR Q NODES		MM	69
NUMBER OF RAW DATA STATIONS		ISTAM	16

CONTROL FOR DOWNSTREAM WATER LEVEL	ITT	0
OVERBANK STORAGE CONTROL	ISTOR	0
NUMBER OF RAW DATA IN VERTICAL FOR X-SEC	KDATA	5
CONTROL FOR RESERVOIR REGULATION	NREG	0
NUMBER OF RESERVOIR ELEVATIONS	KRES	3
NUMBER OF RESERVOIR STORAGE VALUES	IDATA	10
HYDROGRAPH PRINTING OPTION	IHYD	0
FLOODED OR DRY BED INDICATOR	IDRY	0
NUMBER OF PLOTTING LOCATIONS	IPLOT	0
NUMBER OF DIVIDED FLOW CHANNELS	MCON	0
OPTION FOR PRINTING LAST Z AND Q VALUES	LAST	0
RATIO OPTION FOR UPSTREAM INFLOW VALUES	INFAC	0

TIME STEP (DELT) = 4.00 SEC

MAXIMUM I VALUE FOR EACH STREAM

69

TYPE OF BREACH OPTION

0

RESERVOIR, DAM AND BREACH PARAMETERS

SPILLWAY PARAMETERS - DAM NUMBER 1

SPILLWAY CREST ELEVATION *****	1430.00 FEET
DISCHARGE COEFFICIENT ********	0.00
SPILLWAY CREST WIDTH *********	0.00 FEET

RESERVOIR INITIAL CONDITIONS - DAM NUMBER 1

RESERVOIR STORAGE **********	0.450 (K AC-FT)
RESERVOIR INFLOW **********	0.00 CFS
RESERVOIR OUTFLOW **********	0.00 CFS

ELEVATION VS STORAGE - DAM NO. 1

RES. EL. (FEET)	STORAGE (k AC-FT)
1392.0	0.000
1400.0	0.001
1405.0	0.005
1410.0	0.029
1415.0	0.068
1420.0	0.126
1425.0	0.208
1430.0	0.300
1435.0	0.425
1440.0	0.570

OUTLET WORKS ELEVATION VS DISCHARGE - DAM NO. 1

RES. EL. (FEET)	DISCHARGE (CFS)
1430.0	0.0
1435.0	3100.0
1440.0	10000.0

DAM AND BREACH PARAMETERS - DAM NO. 1

DAM OR BARRIER LOCATION ****	68	(M-VALUE)
DAM OR BARRIER ELEVATION ***	1437.	FEET
CRITICAL BREACH ELEVATION **	1437.	FEET
TOTAL BREACH TIME **********	900.	SEC
BREACH SECTION SLOPE *******	2.4500	
WIDTH OF BOTTOM BREACH *****	0.0	FEET
WIDTH OF DAM ***************	0.	FEET
MINIMUM BREACH ELEVATION ***	1392.	FEET

LATERAL INFLOW LOCATIONS

21 67

LATERAL INFLOW

720.00	1600.00	1550.00	430.00	94.00
2140.00	600.00	140.00	50.00	50.00

DATA STATION LOCATIONS IN MILES

0.0000	0.2595	0.6439	0.7008	0.8087	0.9470	0.9848	1.2500	1.5152	1.5966
1.6970	1.8712	2.3239	2.4905	2.5379	2.5760				

DATA STATION NUMBER 1 STATION MILE = 0.0000

HS	1147.0	1148.0	1151.4	1152.5	1197.0
BS	0.0	40.0	120.0	140.0	575.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0876	0.0876	0.0876	0.0876	0.0876

DATA STATION NUMBER 2 STATION MILE = 0.2595

HS	1162.7	1166.3	1171.6	1175.4	1178.4
BS	0.0	242.0	408.0	425.0	435.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0675	0.0675	0.0675	0.0675	0.0675

DATA STATION NUMBER 3 STATION MILE = 0.6439

HS	1206.9	1207.7	1211.4	1217.8	1227.8
BS	0.0	41.3	99.0	120.0	140.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0750	0.0750	0.0750	0.0750	0.0750

DATA STATION NUMBER 4 STATION MILE = 0.7008

HS	1216.1	1221.5	1225.2	1228.4	1232.6
BS	0.0	140.0	210.0	227.5	245.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0750	0.0750	0.0750	0.0750	0.0750

DATA STATION NUMBER 5 STATION MILE = 0.8087

HS	1224.0	1226.5	1228.4	1234.5	1240.8
BS	0.0	55.0	100.0	140.0	180.6
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0675	0.0675	0.0675	0.0675	0.0675

DATA STATION NUMBER 6 STATION MILE = 0.9470

HS	1232.3	1232.6	1234.2	1244.5	1250.5
BS	0.0	38.8	63.9	108.8	120.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0825	0.0825	0.0825	0.0825	0.0825

DATA STATION NUMBER 7 STATION MILE = 0.9848

HS	1236.4	1241.1	1242.5	1247.5	1252.1
BS	0.0	90.0	145.0	240.0	320.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0825	0.0825	0.0825	0.0825	0.0825

DATA STATION NUMBER 8 STATION MILE = 1.2500

HS	1263.6	1267.3	1269.4	1274.0	1275.4
BS	0.0	170.0	245.0	390.0	430.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0600	0.0600	0.0600	0.0600	0.0600

DATA STATION NUMBER 9 STATION MILE = 1.5152

HS	1293.2	1297.7	1299.8	1302.1	1317.0
BS	0.0	100.0	147.5	160.0	230.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0675	0.0675	0.0675	0.0675	0.0675

DATA STATION NUMBER 10 STATION MILE = 1.5966

HS	1300.9	1304.1	1313.8	1318.0	1323.9
BS	0.0	58.8	128.7	164.5	177.5
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0675	0.0675	0.0675	0.0675	0.0675

DATA STATION NUMBER 11 STATION MILE = 1.6970

HS	1315.1	1317.0	1325.5	1331.0	1335.8
BS	0.0	42.5	130.0	185.0	230.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0900	0.0900	0.0900	0.0900	0.0900

DATA STATION NUMBER 12 STATION MILE = 1.8712

HS	1339.2	1343.2	1346.6	1350.3	1352.4
BS	0.0	190.0	380.0	445.0	480.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0750	0.0750	0.0750	0.0750	0.0750

DATA STATION NUMBER 13 STATION MILE = 2.3239

HS	1373.9	1374.3	1374.9	1382.0	1390.2
BS	0.0	25.0	45.0	132.5	204.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0750	0.0750	0.0750	0.0750	0.0750

DATA STATION NUMBER 14 STATION MILE = 2.4905

HS	1390.8	1391.3	1393.9	1395.8	1404.3
BS	0.0	150.0	315.0	400.0	470.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0450	0.0450	0.0450	0.0450	0.0450

DATA STATION NUMBER 15 STATION MILE = 2.5379

HS	1392.0	1392.5	1395.1	1397.0	1405.5
BS	0.0	150.0	315.0	400.0	470.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.4500	0.4500	0.4500	0.4500	0.4500

DATA STATION NUMBER 16 STATION MILE = 2.5760

HS	1397.2	1403.2	1410.0	1425.9	1437.4
BS	0.0	335.0	478.0	585.0	650.0
BSS	0.0	0.0	0.0	0.0	0.0
CMANN	0.0450	0.0450	0.0450	0.0450	0.0450

BED ELEVATIONS

1147.00	1149.29	1151.58	1153.87	1156.17	1158.46	1160.75	1163.35	1167.71	1172.06
1176.42	1180.77	1185.13	1189.48	1193.84	1198.19	1202.55	1206.91	1213.03	1217.48
1220.26	1223.03	1225.48	1227.75	1230.02	1232.30	1239.80	1243.20	1246.60	1250.00
1253.40	1256.80	1260.20	1263.60	1267.83	1272.06	1276.28	1280.51	1284.74	1288.97
1293.19	1296.78	1300.36	1305.45	1310.81	1316.14	1321.38	1326.62	1331.86	1337.11
1340.94	1343.85	1346.75	1349.65	1352.56	1355.46	1358.36	1361.27	1364.17	1367.07
1369.98	1372.88	1376.39	1380.24	1384.08	1387.92	1391.04	1392.00	1397.20	

INITIAL WATER LEVELS

1147.00	1149.29	1151.58	1153.87	1156.17	1158.46	1160.75	1163.35	1167.71	1172.06
1176.42	1180.77	1185.13	1189.48	1193.84	1198.19	1202.55	1206.91	1213.03	1217.48
1220.26	1223.03	1225.48	1227.75	1230.02	1232.30	1239.80	1243.20	1246.60	1250.00
1253.40	1256.80	1260.20	1263.60	1267.83	1272.06	1276.28	1280.51	1284.74	1288.97
1293.19	1296.78	1300.36	1305.45	1310.81	1316.14	1321.38	1326.62	1331.86	1337.11
1340.94	1343.85	1346.75	1349.65	1352.56	1355.46	1358.36	1361.27	1364.17	1367.07
1369.98	1372.88	1376.39	1380.24	1384.08	1387.92	1391.04	1392.00	1397.20	

UPSTREAM BOUNDARY DISCHARGE IN CFS

10400.00	4700.00	1800.00	655.00	205.00

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*** ***
*** SUMMARY OF OUTPUT DATA ***
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RESERVOIR DEPLETION DATA FOR DAM NUMBER 1

DAM LOCATED AT NODE = 68 BEGAN TO BREACH AT NTIME= 90 OR HOUR = 0.100
BREACH WIDTH = 0.00 FEET

DAM BREACHED BY UNIFORM TIME INCREMENT METHOD

NOTE *** DURING THE TIME OF DAM HEIGHT REDUCTION IN BREACH SECTION, RESERVOIR DEPLETION VALUES ARE PRINTED FOR EVERY TIME STEP

TIME (HRS)	RES.ELEV. (FEET)	STORAGE (1000 AC-FT)	RES. INFLOW (CFS)	RES.OUTFLOW (CFS)	BREACH EL. (FEET)	EL.BELOW DAM (FEET)	OUTLET WKS.FLOW (CFS)	DAM OVERFLOW (CFS)
0.10	1437.22	0.489	9839.	6142.	1436.30	1401.40	6142.	0.
0.10	1437.23	0.490	9833.	6159.	1436.10	1401.41	6158.	0.
0.10	1437.24	0.490	9827.	6176.	1435.91	1401.42	6174.	0.
0.10	1437.25	0.490	9820.	6193.	1435.71	1401.44	6190.	0.
0.10	1437.26	0.491	9814.	6212.	1435.51	1401.45	6206.	0.
0.11	1437.27	0.491	9808.	6231.	1435.31	1401.46	6222.	0.
0.11	1437.28	0.491	9801.	6251.	1435.12	1401.47	6237.	0.
0.11	1437.30	0.492	9795.	6271.	1434.92	1401.48	6253.	0.
0.11	1437.31	0.492	9789.	6293.	1434.72	1401.50	6268.	0.
0.11	1437.32	0.492	9782.	6316.	1434.52	1401.51	6284.	0.
0.11	1437.33	0.493	9776.	6340.	1434.32	1401.52	6299.	0.
0.11	1437.34	0.493	9770.	6365.	1434.13	1401.53	6314.	0.
0.11	1437.35	0.493	9763.	6391.	1433.93	1401.54	6329.	0.
0.11	1437.36	0.493	9757.	6418.	1433.73	1401.56	6343.	0.
0.12	1437.37	0.494	9751.	6447.	1433.53	1401.57	6358.	0.
0.12	1437.38	0.494	9744.	6478.	1433.34	1401.58	6373.	0.
0.12	1437.39	0.494	9738.	6509.	1433.14	1401.60	6387.	0.
0.12	1437.40	0.495	9732.	6542.	1432.94	1401.61	6401.	0.
0.12	1437.41	0.495	9725.	6576.	1432.74	1401.63	6415.	0.
0.12	1437.42	0.495	9719.	6612.	1432.54	1401.64	6429.	0.
0.12	1437.43	0.496	9713.	6649.	1432.35	1401.66	6443.	0.
0.12	1437.44	0.496	9706.	6688.	1432.15	1401.67	6456.	0.
0.12	1437.45	0.496	9700.	6729.	1431.95	1401.69	6469.	0.

0.13	1437.46	0.496	9694.	6771.	1431.75	1401.71	6482.	0.
0.13	1437.47	0.497	9687.	6815.	1431.56	1401.73	6495.	0.
0.13	1437.48	0.497	9681.	6860.	1431.36	1401.75	6508.	0.
0.13	1437.49	0.497	9675.	6908.	1431.16	1401.77	6520.	0.
0.13	1437.50	0.497	9668.	6957.	1430.96	1401.79	6532.	0.
0.13	1437.50	0.498	9662.	7008.	1430.76	1401.81	6544.	0.
0.13	1437.51	0.498	9656.	7060.	1430.57	1401.83	6556.	0.
0.13	1437.52	0.498	9649.	7115.	1430.37	1401.85	6568.	0.
0.13	1437.53	0.498	9643.	7171.	1430.17	1401.87	6579.	0.
0.14	1437.54	0.499	9637.	7229.	1429.97	1401.90	6589.	0.
0.14	1437.54	0.499	9630.	7290.	1429.78	1401.92	6600.	0.
0.14	1437.55	0.499	9624.	7352.	1429.58	1401.95	6611.	0.
0.14	1437.56	0.499	9618.	7416.	1429.38	1401.97	6620.	0.
0.14	1437.56	0.499	9611.	7482.	1429.18	1402.00	6630.	0.
0.14	1437.57	0.500	9605.	7550.	1428.98	1402.03	6640.	0.
0.14	1437.58	0.500	9599.	7620.	1428.79	1402.06	6649.	0.
0.14	1437.58	0.500	9592.	7693.	1428.59	1402.09	6657.	0.
0.14	1437.59	0.500	9586.	7767.	1428.39	1402.12	6666.	0.
0.15	1437.60	0.500	9580.	7844.	1428.19	1402.15	6674.	0.
0.15	1437.60	0.500	9573.	7922.	1428.00	1402.18	6682.	0.
0.15	1437.61	0.501	9567.	8003.	1427.80	1402.22	6689.	0.
0.15	1437.61	0.501	9561.	8086.	1427.60	1402.25	6696.	0.
0.15	1437.62	0.501	9554.	8171.	1427.40	1402.29	6703.	0.
0.15	1437.62	0.501	9548.	8258.	1427.20	1402.33	6709.	0.
0.15	1437.62	0.501	9542.	8348.	1427.01	1402.36	6715.	0.
0.15	1437.63	0.501	9535.	8439.	1426.81	1402.40	6720.	0.
0.15	1437.63	0.501	9529.	8533.	1426.61	1402.44	6725.	0.
0.16	1437.63	0.501	9523.	8630.	1426.41	1402.48	6730.	0.
0.16	1437.64	0.501	9516.	8729.	1426.22	1402.52	6734.	0.
0.16	1437.64	0.502	9510.	8830.	1426.02	1402.57	6738.	0.
0.16	1437.64	0.502	9504.	8933.	1425.82	1402.61	6741.	0.
0.16	1437.64	0.502	9497.	9038.	1425.62	1402.66	6743.	0.
0.16	1437.64	0.502	9491.	9146.	1425.42	1402.70	6746.	0.
0.16	1437.64	0.502	9485.	9257.	1425.23	1402.75	6747.	0.
0.16	1437.64	0.502	9478.	9369.	1425.03	1402.80	6748.	0.
0.16	1437.64	0.502	9472.	9484.	1424.83	1402.84	6749.	0.
0.17	1437.64	0.502	9466.	9602.	1424.63	1402.89	6749.	0.
0.17	1437.64	0.502	9459.	9722.	1424.44	1402.94	6749.	0.
0.17	1437.64	0.502	9453.	9844.	1424.24	1403.00	6748.	0.
0.17	1437.64	0.502	9447.	9969.	1424.04	1403.05	6747.	0.
0.17	1437.64	0.502	9440.	10097.	1423.84	1403.10	6745.	0.
0.17	1437.64	0.501	9434.	10226.	1423.64	1403.16	6742.	0.
0.17	1437.63	0.501	9428.	10359.	1423.45	1403.21	6739.	0.
0.17	1437.63	0.501	9421.	10494.	1423.25	1403.27	6735.	0.
0.17	1437.63	0.501	9415.	10631.	1423.05	1403.33	6731.	0.
0.18	1437.62	0.501	9409.	10771.	1422.85	1403.38	6726.	0.
0.18	1437.62	0.501	9402.	10914.	1422.66	1403.44	6720.	0.
0.18	1437.61	0.501	9396.	11059.	1422.46	1403.50	6714.	0.
0.18	1437.61	0.501	9390.	11206.	1422.26	1403.56	6707.	0.
0.18	1437.60	0.500	9383.	11357.	1422.06	1403.63	6699.	0.
0.18	1437.60	0.500	9377.	11509.	1421.86	1403.69	6691.	0.
0.18	1437.59	0.500	9371.	11665.	1421.67	1403.75	6682.	0.
0.18	1437.58	0.500	9364.	11823.	1421.47	1403.82	6672.	0.
0.18	1437.57	0.500	9358.	11984.	1421.27	1403.88	6662.	0.
0.19	1437.56	0.499	9352.	12147.	1421.07	1403.95	6651.	0.
0.19	1437.56	0.499	9345.	12313.	1420.88	1404.01	6639.	0.
0.19	1437.55	0.499	9339.	12481.	1420.68	1404.08	6626.	0.
0.19	1437.54	0.499	9333.	12653.	1420.48	1404.15	6613.	0.
0.19	1437.52	0.498	9326.	12827.	1420.28	1404.22	6599.	0.
0.19	1437.51	0.498	9320.	13004.	1420.08	1404.29	6584.	0.
0.19	1437.50	0.498	9314.	13183.	1419.89	1404.36	6568.	0.

0.19	1437.49	0.497	9307.	13365.	1419.69	1404.43	6551.	0.
0.19	1437.48	0.497	9301.	13550.	1419.49	1404.50	6534.	0.
0.20	1437.46	0.496	9295.	13737.	1419.29	1404.57	6516.	0.
0.20	1437.45	0.496	9288.	13928.	1419.10	1404.65	6497.	0.
0.20	1437.43	0.496	9282.	14121.	1418.90	1404.72	6477.	0.
0.20	1437.42	0.495	9276.	14316.	1418.70	1404.80	6456.	0.
0.20	1437.40	0.495	9269.	14515.	1418.50	1404.87	6434.	0.
0.20	1437.38	0.494	9263.	14716.	1418.30	1404.95	6412.	0.
0.20	1437.37	0.494	9257.	14920.	1418.11	1405.02	6389.	0.
0.20	1437.35	0.493	9250.	15127.	1417.91	1405.10	6364.	0.
0.20	1437.33	0.493	9244.	15337.	1417.71	1405.18	6339.	0.
0.21	1437.31	0.492	9238.	15549.	1417.51	1405.26	6313.	0.
0.21	1437.29	0.491	9231.	15765.	1417.32	1405.34	6286.	0.
0.21	1437.27	0.491	9225.	15983.	1417.12	1405.42	6258.	0.
0.21	1437.25	0.490	9219.	16204.	1416.92	1405.50	6229.	0.
0.21	1437.22	0.489	9212.	16427.	1416.72	1405.58	6199.	0.
0.21	1437.20	0.489	9206.	16654.	1416.52	1405.66	6168.	0.
0.21	1437.18	0.488	9200.	16883.	1416.33	1405.74	6136.	0.
0.21	1437.15	0.487	9193.	17116.	1416.13	1405.82	6102.	0.
0.21	1437.13	0.487	9187.	17351.	1415.93	1405.90	6068.	0.
0.22	1437.10	0.486	9181.	17589.	1415.73	1405.98	6033.	0.
0.22	1437.07	0.485	9174.	17830.	1415.54	1406.07	5997.	0.
0.22	1437.04	0.484	9168.	18073.	1415.34	1406.15	5959.	0.
0.22	1437.02	0.483	9162.	18320.	1415.14	1406.23	5921.	0.
0.22	1436.99	0.483	9155.	18569.	1414.94	1406.32	5882.	0.
0.22	1436.96	0.482	9149.	18822.	1414.74	1406.40	5841.	0.
0.22	1436.93	0.481	9143.	19077.	1414.55	1406.49	5799.	0.
0.22	1436.89	0.480	9136.	19336.	1414.35	1406.58	5757.	0.
0.22	1436.86	0.479	9130.	19596.	1414.15	1406.66	5712.	0.
0.23	1436.83	0.478	9124.	19861.	1413.95	1406.75	5667.	0.
0.23	1436.79	0.477	9117.	20128.	1413.76	1406.84	5621.	0.
0.23	1436.76	0.476	9111.	20398.	1413.56	1406.92	5573.	0.
0.23	1436.72	0.475	9105.	20670.	1413.36	1407.01	5524.	0.
0.23	1436.68	0.474	9098.	20946.	1413.16	1407.10	5475.	0.
0.23	1436.65	0.473	9092.	21225.	1412.96	1407.19	5423.	0.
0.23	1436.61	0.472	9086.	21506.	1412.77	1407.28	5371.	0.
0.23	1436.57	0.470	9079.	21791.	1412.57	1407.36	5317.	0.
0.23	1436.53	0.469	9073.	22078.	1412.37	1407.45	5262.	0.
0.24	1436.48	0.468	9067.	22369.	1412.17	1407.54	5206.	0.
0.24	1436.44	0.467	9060.	22635.	1411.98	1407.63	5149.	0.
0.24	1436.40	0.466	9054.	22854.	1411.78	1407.72	5090.	0.
0.24	1436.35	0.464	9048.	23074.	1411.58	1407.81	5030.	0.
0.24	1436.31	0.463	9041.	23294.	1411.38	1407.90	4969.	0.
0.24	1436.26	0.462	9035.	23514.	1411.18	1407.98	4908.	0.
0.24	1436.22	0.460	9029.	23734.	1410.99	1408.06	4845.	0.
0.24	1436.17	0.459	9022.	23955.	1410.79	1408.14	4781.	0.
0.24	1436.12	0.458	9016.	24176.	1410.59	1408.21	4716.	0.
0.25	1436.07	0.456	9010.	24396.	1410.39	1408.29	4650.	0.
0.25	1436.03	0.455	9003.	24617.	1410.20	1408.36	4583.	0.
0.25	1435.98	0.453	8997.	24839.	1410.00	1408.43	4516.	0.
0.25	1435.93	0.452	8991.	25060.	1409.80	1408.50	4447.	0.
0.25	1435.87	0.450	8984.	25282.	1409.60	1408.57	4377.	0.
0.25	1435.82	0.449	8978.	25503.	1409.40	1408.64	4306.	0.
0.25	1435.77	0.447	8972.	25724.	1409.21	1408.70	4235.	0.
0.25	1435.72	0.446	8965.	25945.	1409.01	1408.77	4162.	0.
0.25	1435.66	0.444	8959.	26156.	1408.81	1408.84	4088.	0.
0.26	1435.61	0.443	8953.	26268.	1408.61	1408.90	4014.	0.
0.26	1435.55	0.441	8946.	26379.	1408.42	1408.96	3938.	0.
0.26	1435.50	0.439	8940.	26491.	1408.22	1409.02	3862.	0.
0.26	1435.44	0.438	8934.	26605.	1408.02	1409.08	3786.	0.
0.26	1435.39	0.436	8927.	26718.	1407.82	1409.13	3709.	0.

0.26	1435.33	0.435	8921.	26832.	1407.62	1409.17	3631.	0.
0.26	1435.27	0.433	8915.	26946.	1407.43	1409.21	3553.	0.
0.26	1435.21	0.431	8908.	27060.	1407.23	1409.26	3475.	0.
0.26	1435.16	0.430	8902.	27173.	1407.03	1409.29	3395.	0.
0.27	1435.10	0.428	8896.	27286.	1406.83	1409.33	3316.	0.
0.27	1435.04	0.426	8889.	27399.	1406.64	1409.37	3236.	0.
0.27	1434.98	0.424	8883.	27511.	1406.44	14Q9.40	3155.	0.
0.27	1434.91	0.423	8877.	27629.	1406.24	1409.44	3087.	0.
0.27	1434.84	0.421	8870.	27757.	1406.04	1409.47	3044.	0.
0.27	1434.77	0.419	8864.	27885.	1405.84	1409.51	3001.	0.
0.27	1434.70	0.418	8858.	28011.	1405.65	1409.54	2958.	0.
0.27	1434.63	0.416	8851.	28136.	1405.45	1409.57	2914.	0.
0.27	1434.56	0.414	8845.	28258.	1405.25	1409.61	2871.	0.
0.28	1434.49	0.412	8839.	28380.	1405.05	1409.64	2826.	0.
0.28	1434.42	0.410	8832.	28500.	1404.86	1409.67	2782.	0.
0.28	1434.34	0.409	8826.	28618.	1404.66	1409.71	2737.	0.
0.28	1434.27	0.407	8820.	28735.	1404.46	1409.74	2693.	0.
0.28	1434.20	0.405	8813.	28852.	1404.26	1409.78	2647.	0.
0.28	1434.12	0.403	8807.	28967.	1404.06	1409.81	2602.	0.
0.28	1434.05	0.401	8801.	29080.	1403.87	1409.84	2556.	0.
0.28	1433.97	0.399	8794.	29193.	1403.67	1409.87	2510.	0.
0.28	1433.90	0.397	8788.	29304.	1403.47	1409.90	2464.	0.
0.29	1433.82	0.396	8782.	29413.	1403.27	1409.94	2417.	0.
0.29	1433.75	0.394	8775.	29521.	1403.08	1409.97	2370.	0.
0.29	1433.67	0.392	8769.	29629.	1402.88	1410.00	2323.	0.
0.29	1433.59	0.390	8763.	29735.	1402.68	1410.03	2276.	0.
0.29	1433.52	0.388	8756.	29839.	1402.48	1410.06	2228.	0.
0.29	1433.44	0.386	8750.	29943.	1402.28	1410.09	2180.	0.
0.29	1433.36	0.384	8744.	30045.	1402.09	1410.11	2132.	0.
0.29	1433.28	0.382	8737.	30146.	1401.89	1410.14	2084.	0.
0.29	1433.20	0.380	8731.	30245.	1401.69	1410.17	2035.	0.
0.30	1433.12	0.378	8725.	30344.	1401.49	1410.20	1986.	0.
0.30	1433.04	0.376	8718.	30441.	1401.30	1410.23	1937.	0.
0.30	1432.96	0.374	8712.	30537.	1401.10	1410.25	1888.	0.
0.30	1432.88	0.372	8706.	30632.	1400.90	1410.28	1838.	0.
0.30	1432.80	0.370	8699.	30725.	1400.70	1410.31	1788.	0.
0.30	1432.72	0.368	8693.	30817.	1400.50	1410.33	1738.	0.
0.30	1432.64	0.366	8687.	30908.	1400.31	1410.36	1688.	0.
0.30	1432.56	0.364	8680.	30996.	1400.11	1410.38	1637.	0.
0.30	1432.48	0.362	8674.	31085.	1399.91	1410.41	1586.	0.
0.31	1432.39	0.360	8668.	31173.	1399.71	1410.43	1536.	0.
0.31	1432.31	0.358	8661.	31258.	1399.52	1410.45	1484.	0.
0.31	1432.23	0.356	8655.	31343.	1399.32	1410.48	1433.	0.
0.31	1432.14	0.354	8649.	31425.	1399.12	1410.50	1382.	0.
0.31	1432.06	0.352	8642.	31507.	1398.92	1410.52	1330.	0.
0.31	1431.98	0.349	8636.	31587.	1398.72	1410.55	1278.	0.
0.31	1431.89	0.347	8630.	31667.	1398.53	1410.57	1226.	0.
0.31	1431.81	0.345	8623.	31745.	1398.33	1410.59	1173.	0.
0.31	1431.72	0.343	8617.	31822.	1398.13	1410.61	1121.	0.
0.32	1431.64	0.341	8611.	31897.	1397.93	1410.63	1068.	0.
0.32	1431.55	0.339	8604.	31971.	1397.74	1410.65	1015.	0.
0.32	1431.47	0.337	8598.	32044.	1397.54	1410.67	962.	0.
0.32	1431.38	0.334	8592.	32116.	1397.34	1410.69	909.	0.
0.32	1431.29	0.332	8585.	32187.	1397.14	1410.71	855.	0.
0.32	1431.21	0.330	8579.	32256.	1396.94	1410.73	801.	0.
0.32	1431.12	0.328	8573.	32324.	1396.75	1410.75	747.	0.
0.32	1431.03	0.326	8566.	32391.	1396.55	1410.77	694.	0.
0.32	1430.94	0.324	8560.	32456.	1396.35	1410.79	639.	0.
0.33	1430.86	0.321	8554.	32520.	1396.15	1410.81	585.	0.
0.33	1430.77	0.319	8547.	32583.	1395.96	1410.83	530.	0.
0.33	1430.68	0.317	8541.	32645.	1395.76	1410.84	476.	0.

0.33	1430.59	0.315	8535.	32706.	1395.56	1410.86	421.	0.
0.33	1430.50	0.313	8528.	32766.	1395.36	1410.88	366.	0.
0.33	1430.41	0.310	8522.	32824.	1395.16	1410.89	311.	0.
0.33	1430.32	0.308	8516.	32881.	1394.97	1410.91	256.	0.
0.33	1430.23	0.306	8509.	32936.	1394.77	1410.93	200.	0.
0.33	1430.14	0.304	8503.	32991.	1394.57	1410.94	145.	0.
0.34	1430.05	0.301	8497.	33044.	1394.37	1410.96	89.	0.
0.34	1429.95	0.299	8490.	33096.	1394.18	1410.97	33.	0.
0.34	1429.83	0.297	8484.	33134.	1393.98	1410.99	0.	0.
0.34	1429.70	0.295	8478.	33153.	1393.78	1411.00	0.	0.
0.34	1429.58	0.292	8471.	33170.	1393.58	1411.01	0.	0.
0.34	1429.46	0.290	8465.	33187.	1393.38	1411.02	0.	0.
0.34	1429.33	0.288	8459.	33204.	1393.19	1411.03	0.	0.
0.34	1429.21	0.285	8452.	33220.	1392.99	1411.04	0.	0.
0.34	1429.09	0.283	8446.	33236.	1392.79	1411.05	0.	0.
0.35	1428.96	0.281	8440.	33251.	1392.59	1411.06	0.	0.
0.35	1428.84	0.279	8433.	33265.	1392.40	1411.06	0.	0.
0.35	1428.71	0.276	8427.	33279.	1392.20	1411.07	0.	0.
0.45	1420.78	0.139	7844.	18184.	1392.00	1407.01	0.	0.
0.60	1414.71	0.066	6989.	10071.	1392.00	1403.79	0.	0.
0.75	1411.92	0.044	6135.	7099.	1392.00	1402.19	0.	0.
0.90	1410.75	0.035	5280.	5889.	1392.00	1401.44	0.	0.
1.05	1409.77	0.028	4560.	4963.	1392.00	1400.84	0.	0.
1.20	1409.03	0.024	4125.	4350.	1392.00	1400.38	0.	0.
1.35	1408.47	0.022	3690.	3906.	1392.00	1400.04	0.	0.
1.50	1407.89	0.019	3255.	3483.	1392.00	1399.71	0.	0.
1.65	1407.27	0.016	2820.	3070.	1392.00	1399.34	0.	0.
1.80	1406.59	0.013	2385.	2657.	1392.00	1398.94	0.	0.
1.95	1405.86	0.009	1950.	2246.	1392.00	1398.52	0.	0.
2.10	1405.16	0.006	1687.	1903.	1392.00	1398.12	0.	0.
2.25	1404.34	0.004	1516.	1546.	1392.00	1397.66	0.	0.
2.40	1403.89	0.004	1344.	1372.	1392.00	1397.42	0.	0.
2.55	1403.43	0.004	1172.	1203.	1392.00	1397.18	0.	0.
2.70	1402.92	0.003	1000.	1035.	1392.00	1396.91	0.	0.
2.85	1402.34	0.003	829.	868.	1392.00	1396.60	0.	0.
3.00	1401.68	0.002	657.	702.	1392.00	1396.24	0.	0.
3.15	1401.25	0.002	588.	610.	1392.00	1395.97	0.	0.
3.30	1400.91	0.002	521.	542.	1392.00	1395.79	0.	0.
3.45	1400.57	0.001	453.	476.	1392.00	1395.62	0.	0.
3.60	1400.20	0.001	386.	411.	1392.00	1395.44	0.	0.
3.75	1399.64	0.001	318.	323.	1392.00	1395.20	0.	0.
3.90	1399.12	0.001	251.	256.	1392.00	1394.92	0.	0.
4.00	1398.72	0.001	206.	212.	1392.00	1394.73	0.	0.

MAXIMUM COMPUTED WATER SURFACE ELEVATIONS AND FLOWS

STREAM NUMBER 1

NODE	STATION (FT)	BED ELEV (FT)	MAX W.S. ELEV(FT)	STAGE (FT)	TIME-MAX ELEV(HRS)	MAX FLOW (CFS)	MAX VEL. (FT/SEC)
69	13600.0	1397.20	1437.64	40.44	0.16	10394.	0.00
68	13400.0	1392.00	1411.08	19.08	0.35	33291.	5.57
67	13200.0	1391.04	1403.23	12.19	0.35	33177.	5.57
66	13000.0	1387.92	1399.32	11.40	0.36	34684.	8.87
65	12800.0	1384.08	1398.33	14.25	0.36	34472.	9.77
64	12600.0	1380.24	1397.26	17.02	0.36	34273.	8.96
63	12400.0	1376.39	1395.25	18.85	0.36	34144.	9.63
62	12200.0	1372.88	1391.01	18.13	0.36	34072.	11.80
61	12000.0	1369.98	1387.26	17.29	0.37	34038.	13.27
60	11800.0	1367.07	1383.63	16.55	0.37	34005.	12.69
59	11600.0	1364.17	1380.07	15.90	0.37	33956.	12.20
58	11400.0	1361.27	1376.59	15.32	0.38	33920.	11.77
57	11200.0	1358.36	1373.19	14.83	0.38	33882.	11.39
56	11000.0	1355.46	1369.84	14.38	0.38	33845.	11.04
55	10800.0	1352.56	1366.54	13.99	0.38	33794.	10.72
54	10600.0	1349.65	1363.29	13.63	0.39	33754.	10.42
53	10400.0	1346.75	1360.07	13.32	0.39	33709.	10.15
52	10200.0	1343.85	1356.87	13.02	0.39	33660.	9.91
51	10000.0	1340.94	1353.48	12.54	0.40	33601.	9.81
50	9800.0	1337.11	1349.52	12.42	0.40	33540.	10.06
49	9600.0	1331.86	1346.01	14.14	0.41	33461.	10.10
48	9400.0	1326.62	1343.33	16.70	0.41	33338.	9.63

47	9200.0	1321.38	1341.01	19.62	0.41	33186.	9.33
46	9000.0	1316.14	1336.85	20.71	0.42	33081.	10.33
45	8800.0	1310.81	1331.10	20.29	0.42	33021.	12.55
44	8600.0	1305.45	1325.75	20.29	0.42	32971.	14.03
43	8400.0	1300.36	1319.09	18.73	0.42	32931.	15.61
42	8200.0	1296.78	1314.35	17.57	0.43	32913.	16.41
41	8000.0	1293.19	1308.65	15.46	0.43	32868.	16.19
40	7800.0	1288.97	1303.47	14.50	0.43	32855.	16.04
39	7600.0	1284.74	1298.46	13.72	0.43	32834.	15.18
38	7400.0	1280.51	1293.69	13.18	0.43	32813.	14.42
37	7200.0	1276.28	1288.75	12.47	0.44	32798.	13.95
36	7000.0	1272.06	1284.55	12.49	0.44	32775.	13.19
35	6800.0	1267.83	1279.21	11.38	0.44	32750.	13.06
34	6600.0	1263.60	1276.04	12.44	0.45	32728.	12.00
33	6400.0	1260.20	1273.28	13.08	0.45	32680.	10.77
32	6200.0	1256.80	1270.59	13.79	0.45	32630.	10.39
31	6000.0	1253.40	1268.00	14.60	0.46	32562.	10.15
30	5800.0	1250.00	1265.54	15.54	0.47	32469.	9.88
29	5600.0	1246.60	1263.33	16.73	0.47	32339.	9.56
28	5400.0	1243.20	1261.53	18.33	0.48	32111.	9.16
27	5200.0	1239.80	1260.14	20.34	0.48	31848.	8.72
26	5000.0	1232.30	1255.06	22.77	0.48	31710.	10.09
25	4800.0	1230.02	1251.45	21.42	0.48	31696.	14.35
24	4600.0	1227.75	1248.01	20.26	0.49	31665.	14.08
23	4400.0	1225.48	1244.38	18.90	0.49	31634.	14.10
22	4200.0	1223.03	1240.64	17.61	0.49	31605.	14.27
21	4000.0	1220.26	1237.48	17.23	0.50	31571.	13.61
20	3800.0	1217.48	1234.53	17.04	0.50	32668.	12.79
19	3600.0	1213.03	1232.10	19.07	0.50	32584.	11.70
18	3400.0	1206.91	1224.33	17.43	0.50	32526	13.89

17	3200.0	1202.55	1218.48	15.94	0.50	32523.	17.45
16	3000.0	1198.19	1212.99	14.80	0.51	32505.	16.21
15	2800.0	1193.84	1207.73	13.90	0.51	32486.	15.25
14	2600.0	1189.48	1202.64	13.16	0.51	32467.	14.48
13	2400.0	1185.13	1197.65	12.53	0.52	32456.	13.86
12	2200.0	1180.77	1192.80	12.03	0.52	32437.	13.32
11	2000.0	1176.42	1187.89	11.47	0.52	32422.	12.94
10	1800.0	1172.06	1183.42	11.36	0.52	32383.	12.38
9	1600.0	1167.71	1178.22	10.51	0.53	32417.	12.27
8	1400.0	1163.35	1176.26	12.91	0.55	32326.	10.40
7	1200.0	1160.75	1174.96	14.21	0.56	32052.	8.89
6	1000.0	1158.46	1173.80	15.34	0.56	31611.	8.63
5	800.0	1156.17	1172.69	16.52	0.57	31172.	8.59
4	600.0	1153.87	1171.58	17.70	0.57	30818.	8.59
3	400.0	1151.58	1170.34	18.76	0.57	30569.	8.63
2	200.0	1149.29	1168.83	19.54	0.57	30399.	8.74
1	0.0	1147.00	1166.54	19.54	0.58	30292.	8.43

APPENDIX E
Base Run Printout
HEC-1 Flood Hydrograph Package

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         FEBRUARY 1981                 *
*         REVISED 30 OCT 81             *
*                                       *
*  RUN DATE  08/18/84    TIME  14: 0    *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. SEE SEPTEMBER 1981 INPUT DESCRIPTION FOR NEW DEFINITIONS.

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

    1     ID        LAUREL RUN
    2     ID        WATERWAYS EXPERIMENT STATION
    3     ID        RALPH WURBS      MAY 84
    4     IT       1 20JUL77     0230      150
    5     IO       0         0

    6     KK       01 LAUREL RUN DAM INFLOW HYDROGRAPH
    7     BA     10.0
    8     IN       30 20JUL77     0230
    9     QI   10400.  6800.0   4700.   2600.   1800.   1000.    655.    310.    205.   100.0
   10     QI     100.0

   11     KK          BREACH SIMULATION DATA
   12     RS         1    ELEV  1437.2       0
   13     SV        0.      1.      5.     29.     68.    126.    208.    300.    425.   570.
   14     SQ        0.      0.      0.      0.      0.      0.      0.      0.   3100.  10000.
   15     SE     1392.   1400.   1405.   1410.   1415.   1420.   1425.   1430.   1435.  1440.
   16     ST   1436.5      0.      0.      0.
   17     SB     1392.      0.    2.45     .25  1437.2

   18     KK     RCH1
   19     RS         1    FLOW      0.       0
   20     RC       .03     .03     .03    125. .033333
   21     RX        0.     35.     65.    125.    170.    200.    335.    620.
   22     RY    1404.7  1399.2  1396.4  1391.2  1391.4  1396.4  1403.3  1408.3

   23     KK     RCH2
   24     RS         1    FLOW      0.       0
   25     RC       .05     .05     .05    565. 0.0016
   26     RX        0.     20.     35.    164.    300.    435.    461.    477.
   27     RY    1404.3  1398.8  1396.   1391.   1390.8  1396.  1402.9  1407.9

   28     KK         RED RUN INFLOW HYDROGRAPH
   29     BA     10.0
   30     QI    2140.    970.    600.    230.    140.     50.     50.     50.     50.    50.
   31     QI     50.

   32     KK          COMBINATION OF RED RUN WITH MAIN FLOW
   33     HC

   34     KK     RCH3
   35     RS         1    FLOW      0.       0
   36     RC       .05     .05     .05   1635. .019314
   37     RX        0.     7.5     16.     22.5   132.5    138.    146.    210.
   38     RY    1390.2  1385.0  1380.0  1375.5  1375.5  1380.0  1386.0  1390.6

   39     KK     RCH4
   40     RS         1    FLOW     0.0       0
   41     RC       .06     .06     .06   1655. .014458
   42     RX        0.      5.     10.     28.     38.   145.0   250.0   518.0
   43     RY    1354.0  1349.5  1343.8  1339.5  1339.2  1343.7  1342.8  1352.4
```

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

  44      KK    RCH5
  45      RS       1    FLOW     0.0       0
  46      RC    .045    .045    .045   725.0 .026196
  47      RX      0.      41.     83.     157.     179.     195.   202.5   210.0
  48      RY  1335.8  1325.3  1327.0  1316.1  1316.1  1328.0  1332.0  1336.8

  49      KK    RCH6
  50      RS       1    FLOW     0.0       0
  51      RC    .045    .045    .045    480. .027048
  52      RX      6.      15.    42.5      69.     121.   136.0   166.0   186.0
  53      RY  1328.5  1315.9  1309.0  1302.4  1304.1  1313.8  1311.6  1323.9

  54      KK    RCH7
  55      RS       1    FLOW     0.0       0
  56      RC    .045    .045    .045   915.0 .017907
  57      RX      0.      71.     82.      83.     134.   202.0   240.0   302.0
  58      RY  1317.0  1316.1  1299.6  1295.8  1293.2  1301.4  1302.1  1316.7

  59      KK    RCH8
  60      RS       1    FLOW     0.0       0
  61      RC    .055    .055    .055   1400. .021143
  62      RX      0.      85.    145.     235.     295.   355.0   499.0   500.0
  63      RY  1275.4  1269.4  1269.1  1263.8  1263.6  1274.4  1273.6  1283.9

  64      KK    RCH9
  65      RS       1    FLOW     0.0       0
  66      RC    .055    .055    .055    800. .019429
  67      RX      0.      20.     61.     116.     126.   183.0   241.0   250.0
  68      RY  1252.1  1241.1  1242.6  1236.4  1236.6  1242.5  1242.1  1257.4

  69      KK    RCH10
  70      RS       1    FLOW     0.0       0
  71      RC    .045    .045    .045    465. .020500
  72      RX      0.      10.     20.      30.      67.    83.    107.    120.
  73      RY  1250.5  1234.2  1234.2  1232.3  1232.6  1239.2  1242.2  1250.5

  74      KK    RCH11
  75      RS       1    FLOW     0.0       0
  76      RC     .05     .05     .05    650. .011448
  77      RX      0.       3.     31.      43.      55.    133.   142.5    148.
  78      RY  1240.8  1228.0  1228.7  1224.0  1224.0  1229.8  1236.0  1240.8

  79      KK          WILDCAT RUN INFLOW HYDROGRAPH
  80      BA    10.0
  81      QI     720.     800.    1600.    2400.    1550.    700.    430.    160.     94.     28.
  82      QI     28.

  83      KK          COMBINATION OF WILD CAT RUN WITH MAIN FLOW
  84      HC
```

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

  85      KK   RCH12
  86      RS       1    FLOW     0.0       0
  87      RC     .05     .05     .05    435. .013739
  88      RX      0.      5.     49.     63.    100.   150.0   220.0   234.0
  89      RY  1232.4  1228.4  1216.1  1216.1  1220.5  1221.6  1222.0  1232.6

  90      KK   RCH13
  91      RS       1    FLOW     0.0       0
  92      RC    .045    .045    .045   1165. .030667
  93      RX      0.      5.    12.5     20.    31.0    68.0   112.0   140.0
  94      RY  1227.8  1217.8  1213.0  1206.9  1206.9  1207.7  1211.4  1228.7

  95      KK   RCH14
  96      RS       1    FLOW     0.0       0
  97      RC    .058    .058    .058   1700. .021773
  98      RX      0.     30.    148.    185.    186.   420.0   425.0   435.0
  99      RY  1178.4  1170.8  1171.6  1169.2  1163.0  1163.0  1168.0  1181.9

 100      KK   RCH15
 101      RS       1    FLOW     0.0       0
 102      RC    .058    .058    .058    685. .011460
 103      RX      0.     75.    195.    250.    325.   380.0   500.0   575.0
 104      RY  1197.0  1182.0  1158.0  1147.0  1147.0  1158.0  1182.0  1197.0
 105      ZZ
```

```
*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*           FEBRUARY 1981               *
*         REVISED 30 OCT 81             *
*                                       *
* RUN DATE  08/18/84     TIME   14: 0   *
*                                       *
*****************************************

*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************


                              LAUREL RUN
                              WATERWAYS EXPERIMENT STATION
                              RALPH WURBS      MAY 84

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

    IT         HYDROGRAPH TIME DATA
                      NMIN            1  MINUTES IN COMPUTATION INTERVAL
                     IDATE      20JUL77  STARTING DATE
                     ITIME         0230  STARTING TIME
                        NQ          150  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      20JUL77  ENDING DATE
                    NDTIME         0459  ENDING TIME

                COMPUTATION INTERVAL     0.02 HOURS
                     TOTAL TIME BASE     2.48 HOURS

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


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

           **************
           *            *
  6 KK     *        01  *       LAUREL RUN DAM INFLOW HYDROGRAPH
           *            *
           **************

  8 IN         TIME DATA FOR INPUT TIME SERIES
                    JXMIN           30  TIME INTERVAL IN MINUTES
                   JXDATE      20JUL77  STARTING DATE
                   JXTIME          230  STARTING TIME

               SUBBASIN RUNOFF DATA
```

7 BA SUBBASIN CHARACTERISTICS

TAREA 10.00 SUBBASIN AREA

***

HYDROGRAPH AT STATION 01

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
20	JUL	0230	1	10400.	20	JUL	0308	39	6240.	20	JUL	0346	77	3580.	20	JUL	0424	115	1960.
20	JUL	0231	2	10280.	20	JUL	0309	40	6170.	20	JUL	0347	78	3510.	20	JUL	0425	116	1933.
20	JUL	0232	3	10160.	20	JUL	0310	41	6100.	20	JUL	0348	79	3440.	20	JUL	0426	117	1907.
20	JUL	0233	4	10040.	20	JUL	0311	42	6030.	20	JUL	0349	80	3370.	20	JUL	0427	118	1880.
20	JUL	0234	5	9920.	20	JUL	0312	43	5960.	20	JUL	0350	81	3300.	20	JUL	0428	119	1853.
20	JUL	0235	6	9800.	20	JUL	0313	44	5890.	20	JUL	0351	82	3230.	20	JUL	0429	120	1827.
20	JUL	0236	7	9680.	20	JUL	0314	45	5820.	20	JUL	0352	83	3160.	20	JUL	0430	121	1800.
20	JUL	0237	8	9560.	20	JUL	0315	46	5750.	20	JUL	0353	84	3090.	20	JUL	0431	122	1773.
20	JUL	0238	9	9440.	20	JUL	0316	47	5680.	20	JUL	0354	85	3020.	20	JUL	0432	123	1747.
20	JUL	0239	10	9320.	20	JUL	0317	48	5610.	20	JUL	0355	86	2950.	20	JUL	0433	124	1720.
20	JUL	0240	11	9200.	20	JUL	0318	49	5540.	20	JUL	0356	87	2880.	20	JUL	0434	125	1693.
20	JUL	0241	12	9080.	20	JUL	0319	50	5470.	20	JUL	0357	88	2810.	20	JUL	0435	126	1667.
20	JUL	0242	13	8960.	20	JUL	0320	51	5400.	20	JUL	0358	89	2740.	20	JUL	0436	127	1640.
20	JUL	0243	14	8840.	20	JUL	0321	52	5330.	20	JUL	0359	90	2670.	20	JUL	0437	128	1613.
20	JUL	0244	15	8720.	20	JUL	0322	53	5260.	20	JUL	0400	91	2600.	20	JUL	0438	129	1587.
20	JUL	0245	16	8600.	20	JUL	0323	54	5190.	20	JUL	0401	92	2573.	20	JUL	0439	130	1560.
20	JUL	0246	17	8480.	20	JUL	0324	55	5120.	20	JUL	0402	93	2547.	20	JUL	0440	131	1533.
20	JUL	0247	18	8360.	20	JUL	0325	56	5050.	20	JUL	0403	94	2520.	20	JUL	0441	132	1507.
20	JUL	0248	19	8240.	20	JUL	0326	57	4980.	20	JUL	0404	95	2493.	20	JUL	0442	133	1480.
20	JUL	0249	20	8120.	20	JUL	0327	58	4910.	20	JUL	0405	96	2467.	20	JUL	0443	134	1453.
20	JUL	0250	21	8000.	20	JUL	0328	59	4840.	20	JUL	0406	97	2440.	20	JUL	0444	135	1427.
20	JUL	0251	22	7880.	20	JUL	0329	60	4770.	20	JUL	0407	98	2413.	20	JUL	0445	136	1400.
20	JUL	0252	23	7760.	20	JUL	0330	61	4700.	20	JUL	0408	99	2387.	20	JUL	0446	137	1373.
20	JUL	0253	24	7640.	20	JUL	0331	62	4630.	20	JUL	0409	100	2360.	20	JUL	0447	138	1347.
20	JUL	0254	25	7520.	20	JUL	0332	63	4560.	20	JUL	0410	101	2333.	20	JUL	0448	139	1320.
20	JUL	0255	26	7400.	20	JUL	0333	64	4490.	20	JUL	0411	102	2307.	20	JUL	0449	140	1293.
20	JUL	0256	27	7280.	20	JUL	0334	65	4420.	20	JUL	0412	103	2280.	20	JUL	0450	141	1267.
20	JUL	0257	28	7160.	20	JUL	0335	66	4350.	20	JUL	0413	104	2253.	20	JUL	0451	142	1240.
20	JUL	0258	29	7040.	20	JUL	0336	67	4280.	20	JUL	0414	105	2227.	20	JUL	0452	143	1213.
20	JUL	0259	30	6920.	20	JUL	0337	68	4210.	20	JUL	0415	106	2200.	20	JUL	0453	144	1187.
20	JUL	0300	31	6800.	20	JUL	0338	69	4140.	20	JUL	0416	107	2173.	20	JUL	0454	145	1160.
20	JUL	0301	32	6730.	20	JUL	0339	70	4070.	20	JUL	0417	108	2147.	20	JUL	0455	146	1133.
20	JUL	0302	33	6660.	20	JUL	0340	71	4000.	20	JUL	0418	109	2120.	20	JUL	0456	147	1107.
20	JUL	0303	34	6590.	20	JUL	0341	72	3930.	20	JUL	0419	110	2093.	20	JUL	0457	148	1080.
20	JUL	0304	35	6520.	20	JUL	0342	73	3860.	20	JUL	0420	111	2067.	20	JUL	0458	149	1053.
20	JUL	0305	36	6450.	20	JUL	0343	74	3790.	20	JUL	0421	112	2040.	20	JUL	0459	150	1027.
20	JUL	0306	37	6380.	20	JUL	0344	75	3720.	20	JUL	0422	113	2013.					
20	JUL	0307	38	6310.	20	JUL	0345	76	3650.	20	JUL	0423	114	1987.					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
10400.	0.02	(CFS)	4342.	4342.	4342.	4342.
		(INCHES)	1.671	1.671	1.671	1.671
		(AC-FT)	891.	891.	891.	891.

CUMULATIVE AREA = 10.00 SQ MI

*** ***

```
              **************
              *            *
11 KK         *            *      BREACH SIMULATION DATA
              *            *
              **************

                HYDROGRAPH ROUTING DATA

12 RS             STORAGE ROUTING
                        NSTPS            1  NUMBER OF SUBREACHES
                         ITYP        ELEV.  TYPE OF INITIAL CONDITION
                       RSVRIC      1437.20  INITIAL CONDITION
                            X          0.0  WORKING R AND D COEFFICIENT

13 SV               STORAGE        0.0       1.0       5.0      29.0      68.0     126.0     208.0     300.0     425.0     570.0

14 SQ             DISCHARGE         0.        0.        0.        0.        0.        0.        0.        0.     3100.    10000.

15 SE             ELEVATION    1392.00   1400.00   1405.00   1410.00   1415.00   1420.00   1425.00   1430.00   1435.00   1440.00

16 ST             TOP OF DAM
                        TOPEL      1436.50  ELEVATION AT TOP OF DAM
                       DAMWID          0.0  DAM WIDTH
                         COQD          0.0  WEIR COEFFICIENT
                         EXPD          0.0  EXPONENT OF HEAD

17 SB             BREACH DATA
                         ELBM      1392.00  ELEVATION AT BOTTOM OF BREACH
                        BRWID          0.0  WIDTH OF BREACH BOTTOM
                            Z         2.45  BREACH SIDE SLOPE
                        TFAIL         0.25  TIME FOR BREACH TO DEVELOP
                       FAILEL      1437.20  W.S. ELEVATION TO TRIGGER FAILURE
                                                        ***
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BEGIN DAM FAILURE AT 0.0 HOURS

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HYDROGRAPH AT STATION

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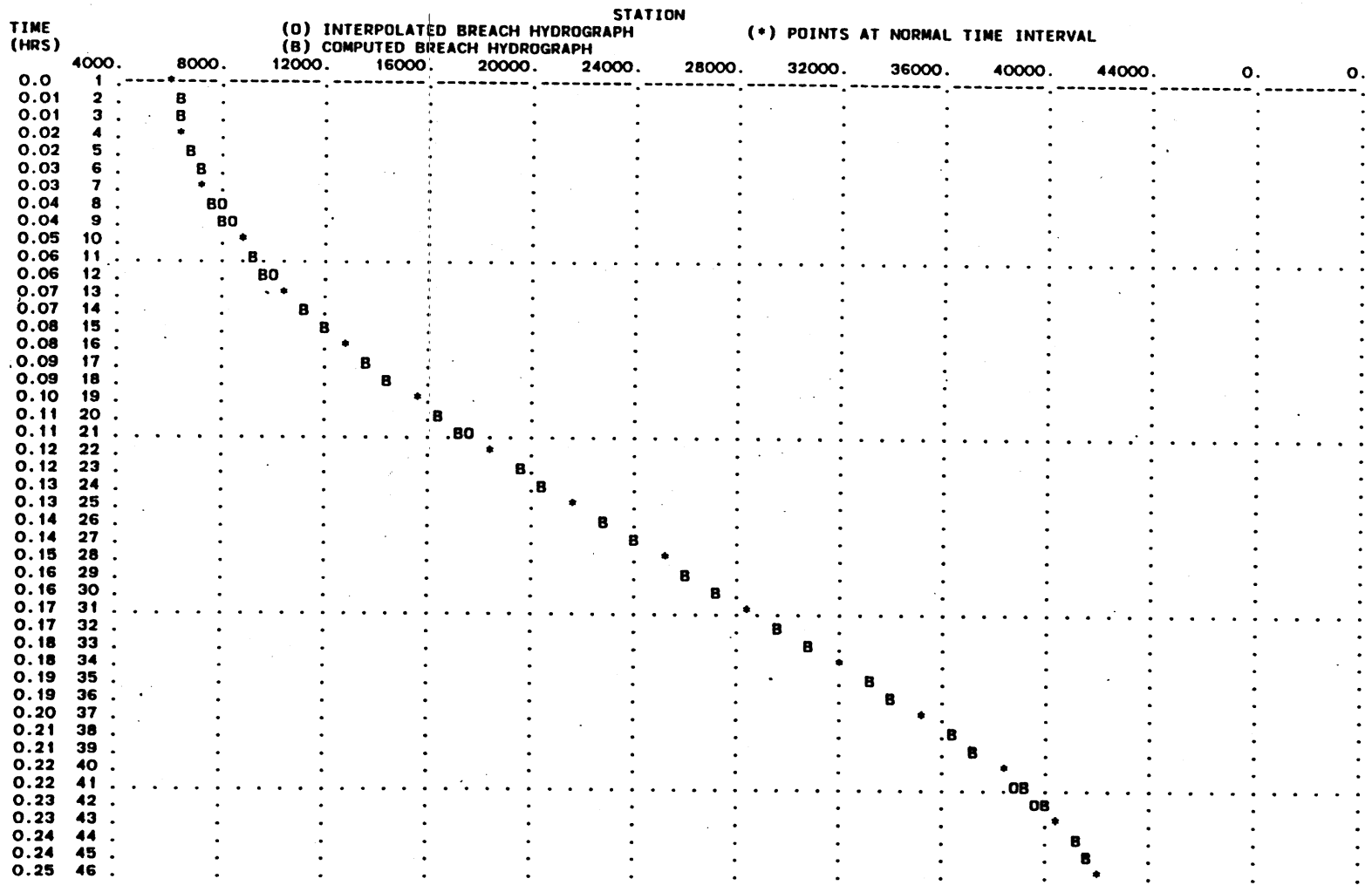
DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	6136.	488.8	1437.2	*	20	JUL	0320	51	5664.	17.0	1407.5	*	20	JUL	0410	101	2362.	3.3	1402.9
20	JUL	0231	2	6573.	494.3	1437.4	*	20	JUL	0321	52	5594.	16.7	1407.4	*	20	JUL	0411	102	2335.	3.3	1402.9
20	JUL	0232	3	7381.	498.8	1437.5	*	20	JUL	0322	53	5526.	16.3	1407.4	*	20	JUL	0412	103	2309.	3.3	1402.8
20	JUL	0233	4	8662.	501.7	1437.6	*	20	JUL	0323	54	5457.	15.9	1407.3	*	20	JUL	0413	104	2282.	3.2	1402.8
20	JUL	0234	5	10446.	502.3	1437.7	*	20	JUL	0324	55	5388.	15.6	1407.2	*	20	JUL	0414	105	2256.	3.2	1402.7
20	JUL	0235	6	12714.	500.0	1437.6	*	20	JUL	0325	56	5320.	15.2	1407.1	*	20	JUL	0415	106	2229.	3.1	1402.7

20 JUL 0236	7	15406.	494.1	1437.4	*	20 JUL 0326	57	5252.	14.8	1407.0	*	20 JUL 0416	107	2203.	3.1	1402.6
20 JUL 0237	8	18430.	484.0	1437.0	*	20 JUL 0327	58	5184.	14.5	1407.0	*	20 JUL 0417	108	2176.	3.1	1402.6
20 JUL 0238	9	21683.	469.5	1436.5	*	20 JUL 0328	59	5115.	14.1	1406.9	*	20 JUL 0418	109	2150.	3.0	1402.5
20 JUL 0239	10	25047.	450.2	1435.9	*	20 JUL 0329	60	5047.	13.7	1406.8	*	20 JUL 0419	110	2123.	3.0	1402.5
20 JUL 0240	11	28417.	426.2	1435.0	*	20 JUL 0330	61	4979.	13.3	1406.7	*	20 JUL 0420	111	2097.	2.9	1402.4
20 JUL 0241	12	31932.	397.2	1433.9	*	20 JUL 0331	62	4912.	12.9	1406.7	*	20 JUL 0421	112	2071.	2.9	1402.4
20 JUL 0242	13	35219.	363.4	1432.5	*	20 JUL 0332	63	4844.	12.5	1406.6	*	20 JUL 0422	113	2044.	2.9	1402.3
20 JUL 0243	14	38212.	325.0	1431.0	*	20 JUL 0333	64	4776.	12.1	1406.5	*	20 JUL 0423	114	2018.	2.8	1402.3
20 JUL 0244	15	40575.	282.7	1429.1	*	20 JUL 0334	65	4708.	11.7	1406.4	*	20 JUL 0424	115	1991.	2.8	1402.2
20 JUL 0245	16	42138.	237.7	1426.6	*	20 JUL 0335	66	4640.	11.3	1406.3	*	20 JUL 0425	116	1965.	2.7	1402.2
20 JUL 0246	17	35393.	196.2	1424.3	*	20 JUL 0336	67	4573.	10.9	1406.2	*	20 JUL 0426	117	1939.	2.7	1402.1
20 JUL 0247	18	30088.	162.9	1422.3	*	20 JUL 0337	68	4505.	10.5	1406.2	*	20 JUL 0427	118	1912.	2.6	1402.0
20 JUL 0248	19	26138.	135.8	1420.6	*	20 JUL 0338	69	4438.	10.1	1406.1	*	20 JUL 0428	119	1886.	2.6	1402.0
20 JUL 0249	20	22476.	113.5	1418.9	*	20 JUL 0339	70	4370.	9.7	1406.0	*	20 JUL 0429	120	1859.	2.5	1401.9
20 JUL 0250	21	19434.	95.8	1417.4	*	20 JUL 0340	71	4303.	9.3	1405.9	*	20 JUL 0430	121	1833.	2.5	1401.9
20 JUL 0251	22	17176.	81.6	1416.2	*	20 JUL 0341	72	4235.	8.9	1405.8	*	20 JUL 0431	122	1807.	2.5	1401.8
20 JUL 0252	23	15448.	70.0	1415.2	*	20 JUL 0342	73	4168.	8.5	1405.7	*	20 JUL 0432	123	1780.	2.4	1401.8
20 JUL 0253	24	13640.	60.5	1414.0	*	20 JUL 0343	74	4101.	8.0	1405.6	*	20 JUL 0433	124	1754.	2.4	1401.7
20 JUL 0254	25	12233.	53.2	1413.1	*	20 JUL 0344	75	4034.	7.6	1405.5	*	20 JUL 0434	125	1728.	2.3	1401.6
20 JUL 0255	26	11181.	47.4	1412.4	*	20 JUL 0345	76	3966.	7.2	1405.5	*	20 JUL 0435	126	1701.	2.3	1401.6
20 JUL 0256	27	10370.	42.7	1411.8	*	20 JUL 0346	77	3899.	6.7	1405.4	*	20 JUL 0436	127	1675.	2.2	1401.5
20 JUL 0257	28	9729.	38.8	1411.3	*	20 JUL 0347	78	3832.	6.3	1405.3	*	20 JUL 0437	128	1648.	2.2	1401.5
20 JUL 0258	29	9211.	35.6	1410.8	*	20 JUL 0348	79	3765.	5.8	1405.2	*	20 JUL 0438	129	1622.	2.1	1401.4
20 JUL 0259	30	8783.	32.8	1410.5	*	20 JUL 0349	80	3699.	5.4	1405.1	*	20 JUL 0439	130	1596.	2.1	1401.3
20 JUL 0300	31	8423.	30.4	1410.2	*	20 JUL 0350	81	3587.	4.9	1404.9	*	20 JUL 0440	131	1569.	2.0	1401.3
20 JUL 0301	32	8062.	28.3	1409.9	*	20 JUL 0351	82	3359.	4.7	1404.6	*	20 JUL 0441	132	1543.	2.0	1401.2
20 JUL 0302	33	7688.	26.7	1409.5	*	20 JUL 0352	83	3247.	4.5	1404.4	*	20 JUL 0442	133	1517.	1.9	1401.2
20 JUL 0303	34	7406.	25.5	1409.3	*	20 JUL 0353	84	3161.	4.4	1404.3	*	20 JUL 0443	134	1491.	1.9	1401.1
20 JUL 0304	35	7182.	24.5	1409.1	*	20 JUL 0354	85	3086.	4.3	1404.2	*	20 JUL 0444	135	1464.	1.8	1401.0
20 JUL 0305	36	7001.	23.6	1408.9	*	20 JUL 0355	86	3015.	4.2	1404.1	*	20 JUL 0445	136	1438.	1.8	1401.0
20 JUL 0306	37	6850.	22.9	1408.7	*	20 JUL 0356	87	2946.	4.2	1403.9	*	20 JUL 0446	137	1412.	1.7	1400.9
20 JUL 0307	38	6722.	22.3	1408.6	*	20 JUL 0357	88	2876.	4.1	1403.8	*	20 JUL 0447	138	1386.	1.7	1400.8
20 JUL 0308	39	6609.	21.8	1408.5	*	20 JUL 0358	89	2807.	4.0	1403.7	*	20 JUL 0448	139	1359.	1.6	1400.8
20 JUL 0309	40	6508.	21.3	1408.4	*	20 JUL 0359	90	2738.	3.9	1403.6	*	20 JUL 0449	140	1333.	1.6	1400.7
20 JUL 0310	41	6415.	20.9	1408.3	*	20 JUL 0400	91	2669.	3.8	1403.5	*	20 JUL 0450	141	1307.	1.5	1400.6
20 JUL 0311	42	6329.	20.4	1408.2	*	20 JUL 0401	92	2616.	3.7	1403.4	*	20 JUL 0451	142	1281.	1.4	1400.6
20 JUL 0312	43	6247.	20.0	1408.1	*	20 JUL 0402	93	2579.	3.7	1403.3	*	20 JUL 0452	143	1254.	1.4	1400.5
20 JUL 0313	44	6169.	19.6	1408.0	*	20 JUL 0403	94	2549.	3.6	1403.3	*	20 JUL 0453	144	1228.	1.3	1400.4
20 JUL 0314	45	6093.	19.3	1408.0	*	20 JUL 0404	95	2521.	3.6	1403.2	*	20 JUL 0454	145	1202.	1.3	1400.3
20 JUL 0315	46	6019.	18.9	1407.9	*	20 JUL 0405	96	2494.	3.5	1403.2	*	20 JUL 0455	146	1176.	1.2	1400.3
20 JUL 0316	47	5946.	18.5	1407.8	*	20 JUL 0406	97	2468.	3.5	1403.1	*	20 JUL 0456	147	1150.	1.2	1400.2
20 JUL 0317	48	5875.	18.1	1407.7	*	20 JUL 0407	98	2441.	3.5	1403.1	*	20 JUL 0457	148	1124.	1.1	1400.1
20 JUL 0318	49	5804.	17.8	1407.7	*	20 JUL 0408	99	2415.	3.4	1403.0	*	20 JUL 0458	149	1098.	1.0	1400.0
20 JUL 0319	50	5734.	17.4	1407.6	*	20 JUL 0409	100	2388.	3.4	1403.0	*	20 JUL 0459	150	1041.	1.0	1399.9

'EAK OUTFLOW IS 42138. AT TIME 0.25 HOURS

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF 0.006 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF 0.017 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
0.0	0.0	6136.		6136.		0.	0.	0.
0.006	0.006	6282.		6252.		30.	30.	0.
0.011	0.011	6427.		6394.		33.	63.	0.
0.017	0.017	6573.		6573.		0.	63.	0.
0.022	0.022	6842.		6794.		48.	111.	0.
0.028	0.028	7112.		7062.		49.	161.	0.
0.033	0.033	7381.		7381.		0.	161.	0.
0.039	0.039	7808.		7753.		55.	216.	0.
0.044	0.044	8235.		8179.		56.	272.	0.
0.050	0.050	8662.		8662.		0.	272.	0.
0.056	0.056	9257.		9201.		56.	328.	0.
0.061	0.061	9851.		9796.		56.	383.	0.
0.067	0.067	10446.		10446.		0.	383.	0.
0.072	0.072	11202.		11151.		51.	435.	0.
0.078	0.078	11958.		11907.		51.	486.	0.
0.083	0.083	12714.		12714.		0.	486.	0.
0.089	0.089	13611.		13568.		43.	529.	0.
0.094	0.094	14508.		14466.		42.	571.	0.
0.100	0.100	15406.		15406.		0.	571.	0.
0.106	0.106	16414.		16382.		32.	602.	0.
0.111	0.111	17422.		17391.		31.	633.	0.
0.117	0.117	18430.		18430.		0.	633.	0.
0.122	0.122	19514.		19495.		19.	652.	0.
0.128	0.128	20599.		20580.		18.	671.	0.
0.133	0.133	21683.		21683.		0.	671.	0.
0.139	0.139	22804.		22797.		7.	678.	0.
0.144	0.144	23926.		23920.		6.	684.	0.
0.150	0.150	25047.		25047.		0.	684.	0.
0.156	0.156	26171.		26175.		-5.	679.	0.
0.161	0.161	27294.		27300.		-6.	673.	0.
0.167	0.167	28417.		28417.		0.	673.	0.
0.172	0.172	29589.		29604.		-15.	658.	0.
0.178	0.178	30760.		30779.		-19.	639.	0.
0.183	0.183	31932.		31932.		0.	639.	0.
0.189	0.189	33028.		33058.		-30.	610.	0.
0.194	0.194	34124.		34154.		-31.	579.	0.
0.200	0.200	35219.		35219.		0.	579.	0.
0.206	0.206	36217.		36252.		-35.	544.	0.
0.211	0.211	37214.		37249.		-35.	509.	0.
0.217	0.217	38212.		38212.		0.	509.	0.
0.222	0.222	38999.		39137.		-137.	371.	0.
0.228	0.228	39787.		39977.		-190.	181.	0.
0.233	0.233	40575.		40575.		0.	181.	0.
0.239	0.239	41096.		41135.		-39.	142.	0.
0.244	0.244	41617.		41655.		-38.	105.	0.
0.250	0.250	42138.		42138.		0.	105.	0.


STATION
TIME (HRS)
(O) INTERPOLATED BREACH HYDROGRAPH
(B) COMPUTED BREACH HYDROGRAPH
(*) POINTS AT NORMAL TIME INTERVAL
4000. 8000. 12000. 16000. 20000. 24000. 28000. 32000. 36000. 40000. 44000. 0. 0.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
42138.	0.25	(CFS)	6723.	6723.	6723.	6723.
		(INCHES)	2.587	2.587	2.587	2.587
		(AC-FT)	1380.	1380.	1380.	1380.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
502.	0.06	59.	59.	59.	59.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1437.67	0.06	1408.52	1408.52	1408.52	1408.52

COMULATIVE AREA = 10.00 SQ MI

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              *            *
18 KK         *      RCH1  *
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HYDROGRAPH ROUTING DATA

19 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

20 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.030	LEFT OVERBANK N-VALUE
ANCH	0.030	MAIN CHANNEL N-VALUE
ANR	0.030	RIGHT OVERBANK N-VALUE
RLNTH	125.	REACH LENGTH
SEL	0.0333	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
22 RY	ELEVATION	1404.70	1399.20	1396.40	1391.20	1391.40	1396.40	1403.30	1408.30
21 RX	DISTANCE	0.0	35.00	65.00	125.00	170.00	200.00	335.00	620.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.12	0.30	0.51	0.77	1.06	1.40	1.80	2.27	2.81
OUTFLOW	0.0	302.98	1145.46	2510.67	4441.43	6988.95	10370.68	15136.87	20895.22	27775.39
ELEVATION	1391.20	1392.10	1393.00	1393.90	1394.80	1395.70	1396.60	1397.50	1398.40	1399.30
STORAGE	3.41	4.08	4.80	5.59	6.45	7.44	8.58	9.85	11.25	12.79
OUTFLOW	35901.39	45304.79	56055.40	68222.31	81129.00	95606.12	112897.81	132657.37	155022.75	180146.94

ELEVATION 1400.20 1401.10 1402.00 1402.90 1403.80 1404.70 1405.60 1406.50 1407.40 1408.30

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 180147.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH1

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DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
20 JUL 0230	1	0.	0.0	1391.2	20 JUL 0320	51	5670.	0.9	1395.2	20 JUL 0410	101	2365.	0.5	1393.8
20 JUL 0231	2	10642.	1.4	1396.7	20 JUL 0321	52	5600.	0.9	1395.2	20 JUL 0411	102	2338.	0.5	1393.8
20 JUL 0232	3	4294.	0.7	1394.7	20 JUL 0322	53	5531.	0.9	1395.2	20 JUL 0412	103	2312.	0.5	1393.8
20 JUL 0233	4	10753.	1.4	1396.7	20 JUL 0323	54	5463.	0.9	1395.2	20 JUL 0413	104	2285.	0.5	1393.8
20 JUL 0234	5	8651.	1.2	1396.1	20 JUL 0324	55	5394.	0.9	1395.1	20 JUL 0414	105	2259.	0.5	1393.7
20 JUL 0235	6	13837.	1.7	1397.3	20 JUL 0325	56	5326.	0.9	1395.1	20 JUL 0415	106	2232.	0.5	1393.7
20 JUL 0236	7	14234.	1.7	1397.3	20 JUL 0326	57	5257.	0.9	1395.1	20 JUL 0416	107	2206.	0.5	1393.7
20 JUL 0237	8	19031.	2.1	1398.1	20 JUL 0327	58	5189.	0.9	1395.1	20 JUL 0417	108	2179.	0.5	1393.7
20 JUL 0238	9	20865.	2.3	1398.4	20 JUL 0328	59	5121.	0.8	1395.0	20 JUL 0418	109	2153.	0.5	1393.7
20 JUL 0239	10	25353.	2.6	1399.0	20 JUL 0329	60	5053.	0.8	1395.0	20 JUL 0419	110	2127.	0.4	1393.6
20 JUL 0240	11	27829.	2.8	1399.3	20 JUL 0330	61	4985.	0.8	1395.0	20 JUL 0420	111	2100.	0.4	1393.6
20 JUL 0241	12	32063.	3.1	1399.8	20 JUL 0331	62	4917.	0.8	1395.0	20 JUL 0421	112	2074.	0.4	1393.6
20 JUL 0242	13	34794.	3.3	1400.1	20 JUL 0332	63	4849.	0.8	1394.9	20 JUL 0422	113	2047.	0.4	1393.6
20 JUL 0243	14	38274.	3.6	1400.4	20 JUL 0333	64	4782.	0.8	1394.9	20 JUL 0423	114	2021.	0.4	1393.6
20 JUL 0244	15	40304.	3.7	1400.6	20 JUL 0334	65	4714.	0.8	1394.9	20 JUL 0424	115	1994.	0.4	1393.6
20 JUL 0245	16	42213.	3.9	1400.8	20 JUL 0335	66	4646.	0.8	1394.9	20 JUL 0425	116	1968.	0.4	1393.5
20 JUL 0246	17	35960.	3.4	1400.2	20 JUL 0336	67	4578.	0.8	1394.8	20 JUL 0426	117	1942.	0.4	1393.5
20 JUL 0247	18	30148.	3.0	1399.6	20 JUL 0337	68	4511.	0.8	1394.8	20 JUL 0427	118	1915.	0.4	1393.5
20 JUL 0248	19	26481.	2.7	1399.1	20 JUL 0338	69	4443.	0.8	1394.8	20 JUL 0428	119	1889.	0.4	1393.5
20 JUL 0249	20	22578.	2.4	1398.6	20 JUL 0339	70	4377.	0.8	1394.8	20 JUL 0429	120	1862.	0.4	1393.5
20 JUL 0250	21	19669.	2.2	1398.2	20 JUL 0340	71	4309.	0.7	1394.7	20 JUL 0430	121	1836.	0.4	1393.5
20 JUL 0251	22	17230.	2.0	1397.8	20 JUL 0341	72	4242.	0.7	1394.7	20 JUL 0431	122	1810.	0.4	1393.4
20 JUL 0252	23	15588.	1.8	1397.6	20 JUL 0342	73	4174.	0.7	1394.7	20 JUL 0432	123	1783.	0.4	1393.4
20 JUL 0253	24	13725.	1.7	1397.2	20 JUL 0343	74	4107.	0.7	1394.6	20 JUL 0433	124	1757.	0.4	1393.4
20 JUL 0254	25	12319.	1.6	1397.0	20 JUL 0344	75	4040.	0.7	1394.6	20 JUL 0434	125	1731.	0.4	1393.4
20 JUL 0255	26	11227.	1.5	1396.8	20 JUL 0345	76	3973.	0.7	1394.6	20 JUL 0435	126	1704.	0.4	1393.4
20 JUL 0256	27	10422.	1.4	1396.6	20 JUL 0346	77	3906.	0.7	1394.5	20 JUL 0436	127	1678.	0.4	1393.4
20 JUL 0257	28	9771.	1.3	1396.4	20 JUL 0347	78	3839.	0.7	1394.5	20 JUL 0437	128	1651.	0.4	1393.3
20 JUL 0258	29	9246.	1.3	1396.3	20 JUL 0348	79	3772.	0.7	1394.5	20 JUL 0438	129	1625.	0.4	1393.3
20 JUL 0259	30	8811.	1.2	1396.2	20 JUL 0349	80	3705.	0.7	1394.5	20 JUL 0439	130	1599.	0.4	1393.3
20 JUL 0300	31	8447.	1.2	1396.1	20 JUL 0350	81	3601.	0.7	1394.4	20 JUL 0440	131	1572.	0.4	1393.3
20 JUL 0301	32	8090.	1.2	1396.0	20 JUL 0351	82	3387.	0.6	1394.3	20 JUL 0441	132	1546.	0.4	1393.3
20 JUL 0302	33	7715.	1.1	1395.9	20 JUL 0352	83	3246.	0.6	1394.2	20 JUL 0442	133	1520.	0.4	1393.2
20 JUL 0303	34	7421.	1.1	1395.8	20 JUL 0353	84	3175.	0.6	1394.2	20 JUL 0443	134	1494.	0.3	1393.2
20 JUL 0304	35	7198.	1.1	1395.8	20 JUL 0354	85	3088.	0.6	1394.2	20 JUL 0444	135	1467.	0.3	1393.2
20 JUL 0305	36	7011.	1.1	1395.7	20 JUL 0355	86	3025.	0.6	1394.1	20 JUL 0445	136	1441.	0.3	1393.2
20 JUL 0306	37	6864.	1.0	1395.7	20 JUL 0356	87	2950.	0.6	1394.1	20 JUL 0446	137	1415.	0.3	1393.2
20 JUL 0307	38	6731.	1.0	1395.6	20 JUL 0357	88	2884.	0.6	1394.1	20 JUL 0447	138	1389.	0.3	1393.2
20 JUL 0308	39	6619.	1.0	1395.6	20 JUL 0358	89	2813.	0.6	1394.0	20 JUL 0448	139	1362.	0.3	1393.1
20 JUL 0309	40	6515.	1.0	1395.5	20 JUL 0359	90	2745.	0.5	1394.0	20 JUL 0449	140	1336.	0.3	1393.1
20 JUL 0310	41	6423.	1.0	1395.5	20 JUL 0400	91	2675.	0.5	1394.0	20 JUL 0450	141	1310.	0.3	1393.1
20 JUL 0311	42	6336.	1.0	1395.5	20 JUL 0401	92	2620.	0.5	1394.0	20 JUL 0451	142	1284.	0.3	1393.1
20 JUL 0312	43	6254.	1.0	1395.4	20 JUL 0402	93	2582.	0.5	1393.9	20 JUL 0452	143	1257.	0.3	1393.1
20 JUL 0313	44	6175.	1.0	1395.4	20 JUL 0403	94	2552.	0.5	1393.9	20 JUL 0453	144	1231.	0.3	1393.1
20 JUL 0314	45	6099.	1.0	1395.4	20 JUL 0404	95	2524.	0.5	1393.9	20 JUL 0454	145	1205.	0.3	1393.0
20 JUL 0315	46	6025.	1.0	1395.4	20 JUL 0405	96	2497.	0.5	1393.9	20 JUL 0455	146	1179.	0.3	1393.0

20	JUL	0316	47	5952.	0.9	1395.3	* 20	JUL	0406	97	2471.	0.5	1393.9	* 20	JUL	0456	147	1153.	0.3	1393.0
20	JUL	0317	48	5881.	0.9	1395.3	* 20	JUL	0407	98	2444.	0.5	1393.9	* 20	JUL	0457	148	1128.	0.3	1393.0
20	JUL	0318	49	5810.	0.9	1395.3	* 20	JUL	0408	99	2418.	0.5	1393.8	* 20	JUL	0458	149	1102.	0.3	1393.0
20	JUL	0319	50	5739.	0.9	1395.3	* 20	JUL	0409	100	2391.	0.5	1393.8	* 20	JUL	0459	150	1052.	0.3	1392.9

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
42213.	0.25	(CFS)	6722.	6722.	6722.	6722.
		(INCHES)	2.587	2.587	2.587	2.587
		(AC-FT)	1380.	1380.	1380.	1380.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
4.	0.25	1.	1.	1.	1.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1400.80	0.25	1394.94	1394.94	1394.94	1394.94

CUMULATIVE AREA = 10.00 SQ MI

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              *            *
23 KK         *    RCH2    *
              *            *
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HYDROGRAPH ROUTING DATA

24 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

25 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.050	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	565.	REACH LENGTH
SEL	0.0016	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL	-------	+ ---	RIGHT OVERBANK ---		
27 RY	ELEVATION	1404.30	1398.80	1396.00	1391.00	1390.80	1396.00	1402.90	1407.90
26 RX	DISTANCE	0.0	20.00	35.00	164.00	300.00	435.00	461.00	477.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	1.63	3.97	6.86	10.29	14.26	18.77	23.51	28.34	33.27

OUTFLOW	0.0	118.94	449.57	984.99	1741.69	2739.54	4062.72	5887.70	7985.26	10346.68
ELEVATION	1390.80	1391.70	1392.60	1393.50	1394.40	1395.30	1396.20	1397.10	1398.00	1398.90
STORAGE	38.29	43.38	48.55	53.80	59.12	64.52	69.97	75.45	80.97	86.52
OUTFLOW	12965.80	15833.91	18945.77	22297.15	25886.12	29709.00	33793.31	38103.22	42634.40	47383.40
ELEVATION	1399.80	1400.70	1401.60	1402.50	1403.40	1404.30	1405.20	1406.10	1407.00	1407.90

HYDROGRAPH AT STATION RCH2

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1390.8	20	JUL	0320	51	5796.	23.3	1397.1	20	JUL	0410	101	2446.	13.1	1395.0
20	JUL	0231	2	951.	6.7	1393.4	20	JUL	0321	52	5728.	23.1	1397.0	20	JUL	0411	102	2418.	13.0	1395.0
20	JUL	0232	3	2778.	14.4	1395.3	20	JUL	0322	53	5660.	22.9	1397.0	20	JUL	0412	103	2391.	12.9	1395.0
20	JUL	0233	4	4451.	19.8	1396.4	20	JUL	0323	54	5592.	22.7	1397.0	20	JUL	0413	104	2363.	12.8	1395.0
20	JUL	0234	5	6727.	25.4	1397.5	20	JUL	0324	55	5523.	22.6	1396.9	20	JUL	0414	105	2337.	12.7	1394.9
20	JUL	0235	6	8870.	30.2	1398.3	20	JUL	0325	56	5455.	22.4	1396.9	20	JUL	0415	106	2310.	12.6	1394.9
20	JUL	0236	7	11505.	35.5	1399.3	20	JUL	0326	57	5386.	22.2	1396.9	20	JUL	0416	107	2283.	12.4	1394.9
20	JUL	0237	8	14289.	40.6	1400.2	20	JUL	0327	58	5318.	22.0	1396.8	20	JUL	0417	108	2256.	12.3	1394.9
20	JUL	0238	9	17530.	46.2	1401.2	20	JUL	0328	59	5250.	21.9	1396.8	20	JUL	0418	109	2230.	12.2	1394.8
20	JUL	0239	10	20879.	51.6	1402.1	20	JUL	0329	60	5182.	21.7	1396.8	20	JUL	0419	110	2203.	12.1	1394.8
20	JUL	0240	11	24447.	57.0	1403.0	20	JUL	0330	61	5113.	21.5	1396.7	20	JUL	0420	111	2177.	12.0	1394.8
20	JUL	0241	12	28004.	62.1	1403.9	20	JUL	0331	62	5045.	21.3	1396.7	20	JUL	0421	112	2150.	11.9	1394.8
20	JUL	0242	13	31632.	67.1	1404.7	20	JUL	0332	63	4977.	21.1	1396.7	20	JUL	0422	113	2124.	11.8	1394.7
20	JUL	0243	14	35007.	71.5	1405.5	20	JUL	0333	64	4909.	21.0	1396.6	20	JUL	0423	114	2097.	11.7	1394.7
20	JUL	0244	15	38015.	75.3	1406.1	20	JUL	0334	65	4842.	20.8	1396.6	20	JUL	0424	115	2071.	11.6	1394.7
20	JUL	0245	16	40356.	78.2	1406.5	20	JUL	0335	66	4774.	20.6	1396.6	20	JUL	0425	116	2044.	11.5	1394.7
20	JUL	0246	17	39439.	77.1	1406.4	20	JUL	0336	67	4706.	20.4	1396.5	20	JUL	0426	117	2018.	11.4	1394.6
20	JUL	0247	18	34917.	71.4	1405.4	20	JUL	0337	68	4638.	20.3	1396.5	20	JUL	0427	118	1992.	11.3	1394.6
20	JUL	0248	19	30387.	65.4	1404.4	20	JUL	0338	69	4571.	20.1	1396.4	20	JUL	0428	119	1965.	11.2	1394.6
20	JUL	0249	20	26521.	60.0	1403.5	20	JUL	0339	70	4503.	19.9	1396.4	20	JUL	0429	120	1939.	11.1	1394.6
20	JUL	0250	21	23078.	55.0	1402.7	20	JUL	0340	71	4436.	19.7	1396.4	20	JUL	0430	121	1912.	11.0	1394.6
20	JUL	0251	22	20222.	50.5	1401.9	20	JUL	0341	72	4369.	19.6	1396.4	20	JUL	0431	122	1886.	10.9	1394.5
20	JUL	0252	23	17935.	46.9	1401.3	20	JUL	0342	73	4301.	19.4	1396.3	20	JUL	0432	123	1860.	10.8	1394.5
20	JUL	0253	24	16014.	43.7	1400.8	20	JUL	0343	74	4234.	19.2	1396.3	20	JUL	0433	124	1833.	10.7	1394.5
20	JUL	0254	25	14333.	40.7	1400.2	20	JUL	0344	75	4167.	19.0	1396.3	20	JUL	0434	125	1807.	10.5	1394.5
20	JUL	0255	26	12906.	38.2	1399.8	20	JUL	0345	76	4100.	18.9	1396.2	20	JUL	0435	126	1780.	10.4	1394.4
20	JUL	0256	27	11804.	36.1	1399.4	20	JUL	0346	77	4038.	18.7	1396.2	20	JUL	0436	127	1754.	10.3	1394.4
20	JUL	0257	28	10901.	34.3	1399.1	20	JUL	0347	78	3983.	18.5	1396.1	20	JUL	0437	128	1729.	10.2	1394.4
20	JUL	0258	29	10175.	32.9	1398.8	20	JUL	0348	79	3923.	18.3	1396.1	20	JUL	0438	129	1705.	10.1	1394.4
20	JUL	0259	30	9606.	31.7	1398.6	20	JUL	0349	80	3861.	18.1	1396.1	20	JUL	0439	130	1681.	10.0	1394.3
20	JUL	0300	31	9122.	30.7	1398.4	20	JUL	0350	81	3791.	17.8	1396.0	20	JUL	0440	131	1656.	9.9	1394.3
20	JUL	0301	32	8698.	29.8	1398.3	20	JUL	0351	82	3691.	17.5	1395.9	20	JUL	0441	132	1630.	9.8	1394.3
20	JUL	0302	33	8303.	29.0	1398.1	20	JUL	0352	83	3565.	17.1	1395.9	20	JUL	0442	133	1605.	9.7	1394.2
20	JUL	0303	34	7942.	28.2	1398.0	20	JUL	0353	84	3446.	16.7	1395.8	20	JUL	0443	134	1579.	9.5	1394.2
20	JUL	0304	35	7651.	27.6	1397.9	20	JUL	0354	85	3340.	16.3	1395.7	20	JUL	0444	135	1553.	9.4	1394.2
20	JUL	0305	36	7400.	27.0	1397.7	20	JUL	0355	86	3245.	16.0	1395.6	20	JUL	0445	136	1527.	9.3	1394.1
20	JUL	0306	37	7187.	26.5	1397.7	20	JUL	0356	87	3158.	15.7	1395.6	20	JUL	0446	137	1501.	9.2	1394.1
20	JUL	0307	38	7008.	26.1	1397.6	20	JUL	0357	88	3077.	15.4	1395.5	20	JUL	0447	138	1475.	9.1	1394.1
20	JUL	0308	39	6855.	25.7	1397.5	20	JUL	0358	89	3000.	15.2	1395.5	20	JUL	0448	139	1448.	9.0	1394.1
20	JUL	0309	40	6723.	25.4	1397.5	20	JUL	0359	90	2926.	14.9	1395.4	20	JUL	0449	140	1422.	8.8	1394.0
20	JUL	0310	41	6606.	25.2	1397.4	20	JUL	0400	91	2853.	14.7	1395.4	20	JUL	0450	141	1396.	8.7	1394.0
20	JUL	0311	42	6502.	24.9	1397.4	20	JUL	0401	92	2784.	14.4	1395.3	20	JUL	0451	142	1370.	8.6	1394.0
20	JUL	0312	43	6407.	24.7	1397.3	20	JUL	0402	93	2725.	14.2	1395.3	20	JUL	0452	143	1344.	8.5	1393.9
20	JUL	0313	44	6318.	24.5	1397.3	20	JUL	0403	94	2678.	14.0	1395.2	20	JUL	0453	144	1317.	8.4	1393.9
20	JUL	0314	45	6235.	24.3	1397.2	20	JUL	0404	95	2637.	13.9	1395.2	20	JUL	0454	145	1291.	8.2	1393.9

20 JUL 0315	46	6155.	24.1	1397.2	*	20 JUL 0405	96	2600.	13.7	1395.2	*	20 JUL 0455	146	1265.	8.1	1393.8
20 JUL 0316	47	6079.	23.9	1397.2	*	20 JUL 0406	97	2566.	13.6	1395.1	*	20 JUL 0456	147	1239.	8.0	1393.8
20 JUL 0317	48	6004.	23.8	1397.1	*	20 JUL 0407	98	2534.	13.4	1395.1	*	20 JUL 0457	148	1213.	7.9	1393.8
20 JUL 0318	49	5931.	23.6	1397.1	*	20 JUL 0408	99	2503.	13.3	1395.1	*	20 JUL 0458	149	1187.	7.8	1393.7
20 JUL 0319	50	5862.	23.4	1397.1	*	20 JUL 0409	100	2474.	13.2	1395.1	*	20 JUL 0459	150	1158.	7.6	1393.7
					*						*					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
40356.	0.25	(CFS)	6684.	6684.	6684.	6684.
		(INCHES)	2.572	2.572	2.572	2.572
		(AC-FT)	1372.	1372.	1372.	1372.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
78.	0.25	22.	22.	22.	22.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1406.55	0.25	1396.70	1396.70	1396.70	1396.70

CUMULATIVE AREA = 10.00 SQ MI

28 KK — RED RUN INFLOW HYDROGRAPH

8 IN — TIME DATA FOR INPUT TIME SERIES

JXMIN	30	TIME INTERVAL IN MINUTES
JXDATE	20JUL77	STARTING DATE
JXTIME	230	STARTING TIME

SUBBASIN RUNOFF DATA

29 BA — SUBBASIN CHARACTERISTICS

TAREA	10.00	SUBBASIN AREA

HYDROGRAPH AT STATION

DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW
20 JUL 0230	1	2140.	*	20 JUL 0308	39	871.	*	20 JUL 0346	77	403.	*	20 JUL 0424	115	158.
20 JUL 0231	2	2101.	*	20 JUL 0309	40	859.	*	20 JUL 0347	78	390.	*	20 JUL 0425	116	155.
20 JUL 0232	3	2062.	*	20 JUL 0310	41	847.	*	20 JUL 0348	79	378.	*	20 JUL 0426	117	152.
20 JUL 0233	4	2023.	*	20 JUL 0311	42	834.	*	20 JUL 0349	80	366.	*	20 JUL 0427	118	149.
20 JUL 0234	5	1984.	*	20 JUL 0312	43	822.	*	20 JUL 0350	81	353.	*	20 JUL 0428	119	146.

20 JUL 0235	6	1945.	*	20 JUL 0313	44	810.	*	20 JUL 0351	82	341.	*	20 JUL 0429	120	143.									
20 JUL 0236	7	1906.	*	20 JUL 0314	45	797.	*	20 JUL 0352	83	329.	*	20 JUL 0430	121	140.									
20 JUL 0237	8	1867.	*	20 JUL 0315	46	785.	*	20 JUL 0353	84	316.	*	20 JUL 0431	122	137.									
20 JUL 0238	9	1828.	*	20 JUL 0316	47	773.	*	20 JUL 0354	85	304.	*	20 JUL 0432	123	134.									
20 JUL 0239	10	1789.	*	20 JUL 0317	48	760.	*	20 JUL 0355	86	292.	*	20 JUL 0433	124	131.									
20 JUL 0240	11	1750.	*	20 JUL 0318	49	748.	*	20 JUL 0356	87	279.	*	20 JUL 0434	125	128.									
20 JUL 0241	12	1711.	*	20 JUL 0319	50	736.	*	20 JUL 0357	88	267.	*	20 JUL 0435	126	125.									
20 JUL 0242	13	1672.	*	20 JUL 0320	51	723.	*	20 JUL 0358	89	255.	*	20 JUL 0436	127	122.									
20 JUL 0243	14	1633.	*	20 JUL 0321	52	711.	*	20 JUL 0359	90	242.	*	20 JUL 0437	128	119.									
20 JUL 0244	15	1594.	*	20 JUL 0322	53	699.	*	20 JUL 0400	91	230.	*	20 JUL 0438	129	116.									
20 JUL 0245	16	1555.	*	20 JUL 0323	54	686.	*	20 JUL 0401	92	227.	*	20 JUL 0439	130	113.									
20 JUL 0246	17	1516.	*	20 JUL 0324	55	674.	*	20 JUL 0402	93	224.	*	20 JUL 0440	131	110.									
20 JUL 0247	18	1477.	*	20 JUL 0325	56	662.	*	20 JUL 0403	94	221.	*	20 JUL 0441	132	107.									
20 JUL 0248	19	1438.	*	20 JUL 0326	57	649.	*	20 JUL 0404	95	218.	*	20 JUL 0442	133	104.									
20 JUL 0249	20	1399.	*	20 JUL 0327	58	637.	*	20 JUL 0405	96	215.	*	20 JUL 0443	134	101.									
20 JUL 0250	21	1360.	*	20 JUL 0328	59	625.	*	20 JUL 0406	97	212.	*	20 JUL 0444	135	98.									
20 JUL 0251	22	1321.	*	20 JUL 0329	60	612.	*	20 JUL 0407	98	209.	*	20 JUL 0445	136	95.									
20 JUL 0252	23	1282.	*	20 JUL 0330	61	600.	*	20 JUL 0408	99	206.	*	20 JUL 0446	137	92.									
20 JUL 0253	24	1243.	*	20 JUL 0331	62	588.	*	20 JUL 0409	100	203.	*	20 JUL 0447	138	89.									
20 JUL 0254	25	1204.	*	20 JUL 0332	63	575.	*	20 JUL 0410	101	200.	*	20 JUL 0448	139	86.									
20 JUL 0255	26	1165.	*	20 JUL 0333	64	563.	*	20 JUL 0411	102	197.	*	20 JUL 0449	140	83.									
20 JUL 0256	27	1126.	*	20 JUL 0334	65	551.	*	20 JUL 0412	103	194.	*	20 JUL 0450	141	80.									
20 JUL 0257	28	1087.	*	20 JUL 0335	66	538.	*	20 JUL 0413	104	191.	*	20 JUL 0451	142	77.									
20 JUL 0258	29	1048.	*	20 JUL 0336	67	526.	*	20 JUL 0414	105	188.	*	20 JUL 0452	143	74.									
20 JUL 0259	30	1009.	*	20 JUL 0337	68	514.	*	20 JUL 0415	106	185.	*	20 JUL 0453	144	71.									
20 JUL 0300	31	970.	*	20 JUL 0338	69	501.	*	20 JUL 0416	107	182.	*	20 JUL 0454	145	68.									
20 JUL 0301	32	958.	*	20 JUL 0339	70	489.	*	20 JUL 0417	108	179.	*	20 JUL 0455	146	65.									
20 JUL 0302	33	945.	*	20 JUL 0340	71	477.	*	20 JUL 0418	109	176.	*	20 JUL 0456	147	62.									
20 JUL 0303	34	933.	*	20 JUL 0341	72	464.	*	20 JUL 0419	110	173.	*	20 JUL 0457	148	59.									
20 JUL 0304	35	921.	*	20 JUL 0342	73	452.	*	20 JUL 0420	111	170.	*	20 JUL 0458	149	56.									
20 JUL 0305	36	908.	*	20 JUL 0343	74	440.	*	20 JUL 0421	112	167.	*	20 JUL 0459	150	53.									
20 JUL 0306	37	896.	*	20 JUL 0344	75	427.	*	20 JUL 0422	113	164.	*												
20 JUL 0307	38	884.	*	20 JUL 0345	76	415.	*	20 JUL 0423	114	161.	*												
			*				*				*												

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
2140.	0.02	(CFS)	611.	611.	611.	611.
		(INCHES)	0.235	0.235	0.235	0.235
		(AC-FT)	125.	125.	125.	125.

CUMULATIVE AREA = 10.00 SQ MI

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32 KK — COMBINATION OF RED RUN WITH MAIN FLOW

33 HC — HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION
SUM OF 2 HYDROGRAPHS

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
20 JUL 0230	1	2140.	20 JUL 0308	39	7726.	20 JUL 0346	77	4441.	20 JUL 0424	115	2229.
20 JUL 0231	2	3052.	20 JUL 0309	40	7582.	20 JUL 0347	78	4373.	20 JUL 0425	116	2199.
20 JUL 0232	3	4840.	20 JUL 0310	41	7453.	20 JUL 0348	79	4301.	20 JUL 0426	117	2170.
20 JUL 0233	4	6474.	20 JUL 0311	42	7336.	20 JUL 0349	80	4227.	20 JUL 0427	118	2141.
20 JUL 0234	5	8711.	20 JUL 0312	43	7229.	20 JUL 0350	81	4144.	20 JUL 0428	119	2111.
20 JUL 0235	6	10815.	20 JUL 0313	44	7128.	20 JUL 0351	82	4032.	20 JUL 0429	120	2082.
20 JUL 0236	7	13411.	20 JUL 0314	45	7032.	20 JUL 0352	83	3894.	20 JUL 0430	121	2052.
20 JUL 0237	8	16156.	20 JUL 0315	46	6940.	20 JUL 0353	84	3762.	20 JUL 0431	122	2023.
20 JUL 0238	9	19358.	20 JUL 0316	47	6851.	20 JUL 0354	85	3644.	20 JUL 0432	123	1994.
20 JUL 0239	10	22668.	20 JUL 0317	48	6764.	20 JUL 0355	86	3536.	20 JUL 0433	124	1964.
20 JUL 0240	11	26197.	20 JUL 0318	49	6679.	20 JUL 0356	87	3438.	20 JUL 0434	125	1935.
20 JUL 0241	12	29715.	20 JUL 0319	50	6597.	20 JUL 0357	88	3344.	20 JUL 0435	126	1905.
20 JUL 0242	13	33304.	20 JUL 0320	51	6519.	20 JUL 0358	89	3255.	20 JUL 0436	127	1876.
20 JUL 0243	14	36640.	20 JUL 0321	52	6439.	20 JUL 0359	90	3168.	20 JUL 0437	128	1848.
20 JUL 0244	15	39609.	20 JUL 0322	53	6359.	20 JUL 0400	91	3083.	20 JUL 0438	129	1821.
20 JUL 0245	16	41911.	20 JUL 0323	54	6278.	20 JUL 0401	92	3011.	20 JUL 0439	130	1794.
20 JUL 0246	17	40955.	20 JUL 0324	55	6197.	20 JUL 0402	93	2949.	20 JUL 0440	131	1766.
20 JUL 0247	18	36394.	20 JUL 0325	56	6116.	20 JUL 0403	94	2899.	20 JUL 0441	132	1737.
20 JUL 0248	19	31825.	20 JUL 0326	57	6036.	20 JUL 0404	95	2855.	20 JUL 0442	133	1709.
20 JUL 0249	20	27920.	20 JUL 0327	58	5955.	20 JUL 0405	96	2815.	20 JUL 0443	134	1680.
20 JUL 0250	21	24438.	20 JUL 0328	59	5874.	20 JUL 0406	97	2778.	20 JUL 0444	135	1651.
20 JUL 0251	22	21543.	20 JUL 0329	60	5794.	20 JUL 0407	98	2743.	20 JUL 0445	136	1622.
20 JUL 0252	23	19217.	20 JUL 0330	61	5713.	20 JUL 0408	99	2709.	20 JUL 0446	137	1593.
20 JUL 0253	24	17257.	20 JUL 0331	62	5633.	20 JUL 0409	100	2677.	20 JUL 0447	138	1564.
20 JUL 0254	25	15537.	20 JUL 0332	63	5553.	20 JUL 0410	101	2646.	20 JUL 0448	139	1534.
20 JUL 0255	26	14071.	20 JUL 0333	64	5472.	20 JUL 0411	102	2615.	20 JUL 0449	140	1505.
20 JUL 0256	27	12930.	20 JUL 0334	65	5392.	20 JUL 0412	103	2585.	20 JUL 0450	141	1476.
20 JUL 0257	28	11988.	20 JUL 0335	66	5312.	20 JUL 0413	104	2554.	20 JUL 0451	142	1447.
20 JUL 0258	29	11223.	20 JUL 0336	67	5232.	20 JUL 0414	105	2525.	20 JUL 0452	143	1418.
20 JUL 0259	30	10615.	20 JUL 0337	68	5152.	20 JUL 0415	106	2495.	20 JUL 0453	144	1388.
20 JUL 0300	31	10092.	20 JUL 0338	69	5072.	20 JUL 0416	107	2465.	20 JUL 0454	145	1359.
20 JUL 0301	32	9656.	20 JUL 0339	70	4992.	20 JUL 0417	108	2435.	20 JUL 0455	146	1330.
20 JUL 0302	33	9249.	20 JUL 0340	71	4913.	20 JUL 0418	109	2406.	20 JUL 0456	147	1301.
20 JUL 0303	34	8875.	20 JUL 0341	72	4833.	20 JUL 0419	110	2376.	20 JUL 0457	148	1272.
20 JUL 0304	35	8572.	20 JUL 0342	73	4753.	20 JUL 0420	111	2347.	20 JUL 0458	149	1243.
20 JUL 0305	36	8308.	20 JUL 0343	74	4674.	20 JUL 0421	112	2317.	20 JUL 0459	150	1211.
20 JUL 0306	37	8083.	20 JUL 0344	75	4594.	20 JUL 0422	113	2288.			
20 JUL 0307	38	7892.	20 JUL 0345	76	4515.	20 JUL 0423	114	2258.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
41911.	0.25	(CFS)	7295.	7295.	7295.	7295.
		(INCHES)	1.404	1.404	1.404	1.404
		(AC-FT)	1497.	1497.	1497.	1497.

CUMULATIVE AREA = 20.00 SQ MI

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             *            *
 34 KK       *    RCH3    *
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HYDROGRAPH ROUTING DATA

35 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

36 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.050	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	1635.	REACH LENGTH
SEL	0.0193	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL		------- +	--- RIGHT OVERBANK ---		
38 RY	ELEVATION	1390.20	1385.00	1380.00	1375.50	1375.50	1380.00	1386.00	1390.60
37 RX	DISTANCE	0.0	7.50	16.00	22.50	132.50	138.00	146.00	210.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	3.31	6.69	10.13	13.63	17.20	20.82	24.52	28.29	32.14
OUTFLOW	0.0	310.63	986.50	1940.02	3135.79	4552.52	6203.36	8117.72	10241.91	12571.58
ELEVATION	1375.50	1376.29	1377.09	1377.88	1378.68	1379.47	1380.27	1381.06	1381.86	1382.65
STORAGE	36.05	40.04	44.10	48.23	52.51	57.15	62.16	67.53	73.27	79.36
OUTFLOW	15103.15	17833.62	20760.85	23883.82	27153.25	30676.16	34460.06	38516.11	42859.11	47527.39
ELEVATION	1383.45	1384.24	1385.04	1385.83	1386.63	1387.42	1388.21	1389.01	1389.80	1390.60

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HYDROGRAPH AT STATION RCH3

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1375.5	*	20	JUL	0320	51	6633.	21.7	1380.4	*	20	JUL	0410	101	2718.	12.4	1378.4
20	JUL	0231	2	319.	3.4	1376.3	*	20	JUL	0321	52	6552.	21.5	1380.4	*	20	JUL	0411	102	2685.	12.3	1378.4
20	JUL	0232	3	1267.	7.7	1377.3	*	20	JUL	0322	53	6472.	21.3	1380.4	*	20	JUL	0412	103	2652.	12.2	1378.4
20	JUL	0233	4	2812.	12.7	1378.5	*	20	JUL	0323	54	6391.	21.2	1380.3	*	20	JUL	0413	104	2621.	12.1	1378.3
20	JUL	0234	5	4855.	17.9	1379.6	*	20	JUL	0324	55	6311.	21.0	1380.3	*	20	JUL	0414	105	2590.	12.0	1378.3
20	JUL	0235	6	7297.	22.9	1380.7	*	20	JUL	0325	56	6230.	20.9	1380.3	*	20	JUL	0415	106	2559.	11.9	1378.3
20	JUL	0236	7	9937.	27.8	1381.7	*	20	JUL	0326	57	6154.	20.7	1380.2	*	20	JUL	0416	107	2529.	11.9	1378.3
20	JUL	0237	8	12785.	32.5	1382.7	*	20	JUL	0327	58	6078.	20.5	1380.2	*	20	JUL	0417	108	2499.	11.8	1378.3
20	JUL	0238	9	15879.	37.2	1383.7	*	20	JUL	0328	59	6000.	20.4	1380.2	*	20	JUL	0418	109	2469.	11.7	1378.2
20	JUL	0239	10	19217.	42.0	1384.6	*	20	JUL	0329	60	5921.	20.2	1380.1	*	20	JUL	0419	110	2439.	11.6	1378.2

20 JUL 0240	11	22741.	46.7	1385.5	*	20 JUL 0330	61	5841.	20.0	1380.1	*	20 JUL 0420	111	2410.	11.5	1378.2
20 JUL 0241	12	26327.	51.4	1386.4	*	20 JUL 0331	62	5761.	19.9	1380.1	*	20 JUL 0421	112	2380.	11.4	1378.2
20 JUL 0242	13	29887.	56.1	1387.2	*	20 JUL 0332	63	5681.	19.7	1380.0	*	20 JUL 0422	113	2351.	11.3	1378.2
20 JUL 0243	14	33370.	60.7	1388.0	*	20 JUL 0333	64	5601.	19.5	1380.0	*	20 JUL 0423	114	2321.	11.2	1378.1
20 JUL 0244	15	36624.	65.0	1388.6	*	20 JUL 0334	65	5520.	19.3	1379.9	*	20 JUL 0424	115	2292.	11.2	1378.1
20 JUL 0245	16	39456.	68.8	1389.2	*	20 JUL 0335	66	5440.	19.1	1379.9	*	20 JUL 0425	116	2262.	11.1	1378.1
20 JUL 0246	17	40811.	70.6	1389.4	*	20 JUL 0336	67	5360.	19.0	1379.9	*	20 JUL 0426	117	2233.	11.0	1378.1
20 JUL 0247	18	39346.	68.6	1389.2	*	20 JUL 0337	68	5280.	18.8	1379.8	*	20 JUL 0427	118	2203.	10.9	1378.1
20 JUL 0248	19	35761.	63.9	1388.5	*	20 JUL 0338	69	5200.	18.6	1379.8	*	20 JUL 0428	119	2174.	10.8	1378.0
20 JUL 0249	20	31730.	58.5	1387.6	*	20 JUL 0339	70	5120.	18.4	1379.7	*	20 JUL 0429	120	2144.	10.7	1378.0
20 JUL 0250	21	27922.	53.5	1386.8	*	20 JUL 0340	71	5040.	18.3	1379.7	*	20 JUL 0430	121	2115.	10.6	1378.0
20 JUL 0251	22	24527.	49.1	1386.0	*	20 JUL 0341	72	4960.	18.1	1379.7	*	20 JUL 0431	122	2085.	10.6	1378.0
20 JUL 0252	23	21682.	45.3	1385.3	*	20 JUL 0342	73	4881.	17.9	1379.6	*	20 JUL 0432	123	2056.	10.5	1378.0
20 JUL 0253	24	19367.	42.2	1384.7	*	20 JUL 0343	74	4801.	17.7	1379.6	*	20 JUL 0433	124	2027.	10.4	1377.9
20 JUL 0254	25	17410.	39.4	1384.1	*	20 JUL 0344	75	4721.	17.6	1379.6	*	20 JUL 0434	125	1997.	10.3	1377.9
20 JUL 0255	26	15740.	37.0	1383.6	*	20 JUL 0345	76	4642.	17.4	1379.5	*	20 JUL 0435	126	1968.	10.2	1377.9
20 JUL 0256	27	14335.	34.9	1383.2	*	20 JUL 0346	77	4563.	17.2	1379.5	*	20 JUL 0436	127	1939.	10.1	1377.9
20 JUL 0257	28	13179.	33.1	1382.8	*	20 JUL 0347	78	4495.	17.1	1379.4	*	20 JUL 0437	128	1914.	10.0	1377.9
20 JUL 0258	29	12225.	31.6	1382.5	*	20 JUL 0348	79	4427.	16.9	1379.4	*	20 JUL 0438	129	1889.	9.9	1377.8
20 JUL 0259	30	11456.	30.3	1382.3	*	20 JUL 0349	80	4357.	16.7	1379.4	*	20 JUL 0439	130	1863.	9.8	1377.8
20 JUL 0300	31	10807.	29.2	1382.0	*	20 JUL 0350	81	4283.	16.5	1379.3	*	20 JUL 0440	131	1836.	9.8	1377.8
20 JUL 0301	32	10257.	28.3	1381.9	*	20 JUL 0351	82	4199.	16.3	1379.3	*	20 JUL 0441	132	1809.	9.7	1377.8
20 JUL 0302	33	9806.	27.5	1381.7	*	20 JUL 0352	83	4098.	16.1	1379.2	*	20 JUL 0442	133	1781.	9.6	1377.8
20 JUL 0303	34	9390.	26.8	1381.5	*	20 JUL 0353	84	3982.	15.8	1379.2	*	20 JUL 0443	134	1753.	9.5	1377.7
20 JUL 0304	35	9017.	26.1	1381.4	*	20 JUL 0354	85	3862.	15.5	1379.1	*	20 JUL 0444	135	1725.	9.4	1377.7
20 JUL 0305	36	8695.	25.5	1381.3	*	20 JUL 0355	86	3745.	15.2	1379.0	*	20 JUL 0445	136	1697.	9.2	1377.7
20 JUL 0306	37	8416.	25.1	1381.2	*	20 JUL 0356	87	3634.	14.9	1379.0	*	20 JUL 0446	137	1668.	9.1	1377.7
20 JUL 0307	38	8176.	24.6	1381.1	*	20 JUL 0357	88	3530.	14.6	1378.9	*	20 JUL 0447	138	1639.	9.0	1377.6
20 JUL 0308	39	7980.	24.3	1381.0	*	20 JUL 0358	89	3431.	14.4	1378.8	*	20 JUL 0448	139	1610.	8.9	1377.6
20 JUL 0309	40	7808.	23.9	1380.9	*	20 JUL 0359	90	3337.	14.1	1378.8	*	20 JUL 0449	140	1581.	8.8	1377.6
20 JUL 0310	41	7655.	23.6	1380.9	*	20 JUL 0400	91	3246.	13.9	1378.7	*	20 JUL 0450	141	1552.	8.7	1377.6
20 JUL 0311	42	7518.	23.4	1380.8	*	20 JUL 0401	92	3161.	13.7	1378.7	*	20 JUL 0451	142	1523.	8.6	1377.5
20 JUL 0312	43	7394.	23.1	1380.8	*	20 JUL 0402	93	3089.	13.5	1378.6	*	20 JUL 0452	143	1494.	8.5	1377.5
20 JUL 0313	44	7281.	22.9	1380.7	*	20 JUL 0403	94	3026.	13.3	1378.6	*	20 JUL 0453	144	1465.	8.4	1377.5
20 JUL 0314	45	7175.	22.7	1380.7	*	20 JUL 0404	95	2969.	13.1	1378.6	*	20 JUL 0454	145	1436.	8.3	1377.5
20 JUL 0315	46	7076.	22.5	1380.6	*	20 JUL 0405	96	2918.	13.0	1378.5	*	20 JUL 0455	146	1406.	8.2	1377.4
20 JUL 0316	47	6981.	22.3	1380.6	*	20 JUL 0406	97	2872.	12.9	1378.5	*	20 JUL 0456	147	1377.	8.1	1377.4
20 JUL 0317	48	6890.	22.2	1380.6	*	20 JUL 0407	98	2829.	12.7	1378.5	*	20 JUL 0457	148	1348.	8.0	1377.4
20 JUL 0318	49	6802.	22.0	1380.5	*	20 JUL 0408	99	2790.	12.6	1378.4	*	20 JUL 0458	149	1319.	7.9	1377.4
20 JUL 0319	50	6716.	21.8	1380.5	*	20 JUL 0409	100	2753.	12.5	1378.4	*	20 JUL 0459	150	1290.	7.8	1377.3

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
40811.	0.27	(CFS)	7257.	7257.	7257.	7257.
		(INCHES)	1.396	1.396	1.396	1.396
		(AC-FT)	1489.	1489.	1489.	1489.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
71.	0.27	21.	21.	21.	21.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1389.43	0.27	1380.07	1380.07	1380.07	1380.07

CUMULATIVE AREA = 20.00 SQ MI

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39 KK          RCH4
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HYDROGRAPH ROUTING DATA

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40 RS     STORAGE ROUTING
               NSTPS          1  NUMBER OF SUBREACHES
                ITYP       FLOW  TYPE OF INITIAL CONDITION
              RSVRIC        0.0  INITIAL CONDITION
                   X        0.0  WORKING R AND D COEFFICIENT

41 RC     NORMAL DEPTH CHANNEL ROUTING
                 ANL      0.060  LEFT OVERBANK N-VALUE
                ANCH      0.060  MAIN CHANNEL N-VALUE
                 ANR      0.060  RIGHT OVERBANK N-VALUE
               RLNTH       1655.  REACH LENGTH
                 SEL     0.0145  ENERGY SLOPE
               ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
43 RY	ELEVATION	1354.00	1349.50	1343.80	1339.50	1339.20	1343.70	1342.80	1352.40
42 RX	DISTANCE	0.0	5.00	10.00	28.00	38.00	145.00	250.00	518.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.53	1.76	3.63	6.14	9.54	16.18	24.50	33.49	43.14
OUTFLOW	0.0	24.76	126.84	336.55	681.72	1192.85	2088.78	3659.38	5690.48	8169.69
ELEVATION	1339.20	1339.98	1340.76	1341.54	1342.32	1343.09	1343.87	1344.65	1345.43	1346.21
STORAGE	53.45	64.43	76.06	88.37	101.34	114.97	129.28	144.25	159.54	174.85
OUTFLOW	11097.30	14479.02	18323.38	22640.55	27441.33	32738.44	38544.38	44915.82	52639.15	60885.86
ELEVATION	1346.99	1347.77	1348.55	1349.32	1350.10	1350.88	1351.66	1352.44	1353.22	1354.00

HYDROGRAPH AT STATION RCH4

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1339.2	20	JUL	0320	51	6895.	38.2	1345.8	20	JUL	0410	101	2897.	20.5	1344.3
20	JUL	0231	2	10.	0.2	1339.5	20	JUL	0321	52	6804.	37.8	1345.8	20	JUL	0411	102	2852.	20.2	1344.3
20	JUL	0232	3	84.	1.2	1340.4	20	JUL	0322	53	6716.	37.5	1345.8	20	JUL	0412	103	2810.	20.0	1344.2
20	JUL	0233	4	353.	3.7	1341.6	20	JUL	0323	54	6631.	37.1	1345.7	20	JUL	0413	104	2770.	19.8	1344.2
20	JUL	0234	5	978.	8.1	1342.8	20	JUL	0324	55	6547.	36.8	1345.7	20	JUL	0414	105	2732.	19.6	1344.2
20	JUL	0235	6	1865.	14.5	1343.7	20	JUL	0325	56	6463.	36.5	1345.7	20	JUL	0415	106	2696.	19.4	1344.2
20	JUL	0236	7	3339.	22.8	1344.5	20	JUL	0326	57	6382.	36.2	1345.6	20	JUL	0416	107	2661.	19.2	1344.2
20	JUL	0237	8	5446.	32.4	1345.3	20	JUL	0327	58	6302.	35.9	1345.6	20	JUL	0417	108	2627.	19.0	1344.1
20	JUL	0238	9	8089.	42.8	1346.2	20	JUL	0328	59	6223.	35.6	1345.6	20	JUL	0418	109	2594.	18.9	1344.1

20 JUL 0239	10	11182.	53.7	1347.0	*	20 JUL 0329	60	6144.	35.3	1345.6	*	20 JUL 0419	110	2562.	18.7	1344.1
20 JUL 0240	11	14620.	64.9	1347.8	*	20 JUL 0330	61	6065.	34.9	1345.5	*	20 JUL 0420	111	2530.	18.5	1344.1
20 JUL 0241	12	18294.	76.0	1348.5	*	20 JUL 0331	62	5986.	34.6	1345.5	*	20 JUL 0421	112	2499.	18.4	1344.1
20 JUL 0242	13	22113.	86.9	1349.2	*	20 JUL 0332	63	5906.	34.3	1345.5	*	20 JUL 0422	113	2468.	18.2	1344.1
20 JUL 0243	14	25956.	97.3	1349.9	*	20 JUL 0333	64	5826.	34.0	1345.5	*	20 JUL 0423	114	2438.	18.0	1344.0
20 JUL 0244	15	29715.	107.2	1350.4	*	20 JUL 0334	65	5746.	33.7	1345.4	*	20 JUL 0424	115	2408.	17.9	1344.0
20 JUL 0245	16	33246.	116.2	1351.0	*	20 JUL 0335	66	5669.	33.4	1345.4	*	20 JUL 0425	116	2378.	17.7	1344.0
20 JUL 0246	17	36255.	123.6	1351.4	*	20 JUL 0336	67	5596.	33.1	1345.4	*	20 JUL 0426	117	2348.	17.6	1344.0
20 JUL 0247	18	37926.	127.8	1351.6	*	20 JUL 0337	68	5522.	32.7	1345.4	*	20 JUL 0427	118	2318.	17.4	1344.0
20 JUL 0248	19	37763.	127.4	1351.6	*	20 JUL 0338	69	5446.	32.4	1345.3	*	20 JUL 0428	119	2288.	17.2	1344.0
20 JUL 0249	20	36008.	123.0	1351.3	*	20 JUL 0339	70	5369.	32.1	1345.3	*	20 JUL 0429	120	2258.	17.1	1344.0
20 JUL 0250	21	33307.	116.4	1351.0	*	20 JUL 0340	71	5291.	31.7	1345.3	*	20 JUL 0430	121	2229.	16.9	1343.9
20 JUL 0251	22	30298.	108.7	1350.5	*	20 JUL 0341	72	5213.	31.4	1345.2	*	20 JUL 0431	122	2199.	16.8	1343.9
20 JUL 0252	23	27268.	100.9	1350.1	*	20 JUL 0342	73	5134.	31.0	1345.2	*	20 JUL 0432	123	2170.	16.6	1343.9
20 JUL 0253	24	24528.	93.5	1349.6	*	20 JUL 0343	74	5055.	30.7	1345.2	*	20 JUL 0433	124	2140.	16.5	1343.9
20 JUL 0254	25	22059.	86.7	1349.2	*	20 JUL 0344	75	4976.	30.3	1345.2	*	20 JUL 0434	125	2111.	16.3	1343.9
20 JUL 0255	26	19924.	80.6	1348.8	*	20 JUL 0345	76	4896.	30.0	1345.1	*	20 JUL 0435	126	2083.	16.1	1343.9
20 JUL 0256	27	18036.	75.2	1348.5	*	20 JUL 0346	77	4817.	29.6	1345.1	*	20 JUL 0436	127	2061.	16.0	1343.8
20 JUL 0257	28	16450.	70.4	1348.2	*	20 JUL 0347	78	4740.	29.3	1345.1	*	20 JUL 0437	128	2038.	15.8	1343.8
20 JUL 0258	29	15061.	66.2	1347.9	*	20 JUL 0348	79	4665.	29.0	1345.0	*	20 JUL 0438	129	2015.	15.6	1343.8
20 JUL 0259	30	13901.	62.6	1347.6	*	20 JUL 0349	80	4591.	28.6	1345.0	*	20 JUL 0439	130	1991.	15.5	1343.8
20 JUL 0300	31	12932.	59.4	1347.4	*	20 JUL 0350	81	4518.	28.3	1345.0	*	20 JUL 0440	131	1967.	15.3	1343.8
20 JUL 0301	32	12091.	56.7	1347.2	*	20 JUL 0351	82	4444.	28.0	1345.0	*	20 JUL 0441	132	1943.	15.1	1343.7
20 JUL 0302	33	11370.	54.3	1347.1	*	20 JUL 0352	83	4364.	27.6	1344.9	*	20 JUL 0442	133	1918.	14.9	1343.7
20 JUL 0303	34	10773.	52.3	1346.9	*	20 JUL 0353	84	4277.	27.2	1344.9	*	20 JUL 0443	134	1892.	14.7	1343.7
20 JUL 0304	35	10260.	50.5	1346.8	*	20 JUL 0354	85	4181.	26.8	1344.9	*	20 JUL 0444	135	1866.	14.5	1343.7
20 JUL 0305	36	9800.	48.9	1346.6	*	20 JUL 0355	86	4079.	26.4	1344.8	*	20 JUL 0445	136	1840.	14.3	1343.7
20 JUL 0306	37	9393.	47.4	1346.5	*	20 JUL 0356	87	3974.	25.9	1344.8	*	20 JUL 0446	137	1813.	14.1	1343.6
20 JUL 0307	38	9034.	46.2	1346.4	*	20 JUL 0357	88	3869.	25.4	1344.7	*	20 JUL 0447	138	1786.	13.9	1343.6
20 JUL 0308	39	8721.	45.1	1346.4	*	20 JUL 0358	89	3764.	25.0	1344.7	*	20 JUL 0448	139	1758.	13.7	1343.6
20 JUL 0309	40	8451.	44.1	1346.3	*	20 JUL 0359	90	3662.	24.5	1344.7	*	20 JUL 0449	140	1731.	13.5	1343.6
20 JUL 0310	41	8216.	43.3	1346.2	*	20 JUL 0400	91	3576.	24.1	1344.6	*	20 JUL 0450	141	1703.	13.3	1343.5
20 JUL 0311	42	8023.	42.6	1346.2	*	20 JUL 0401	92	3490.	23.6	1344.6	*	20 JUL 0451	142	1675.	13.1	1343.5
20 JUL 0312	43	7852.	41.9	1346.1	*	20 JUL 0402	93	3406.	23.2	1344.5	*	20 JUL 0452	143	1647.	12.9	1343.5
20 JUL 0313	44	7698.	41.3	1346.1	*	20 JUL 0403	94	3326.	22.7	1344.5	*	20 JUL 0453	144	1618.	12.7	1343.5
20 JUL 0314	45	7556.	40.8	1346.0	*	20 JUL 0404	95	3250.	22.3	1344.4	*	20 JUL 0454	145	1590.	12.5	1343.4
20 JUL 0315	46	7427.	40.2	1346.0	*	20 JUL 0405	96	3180.	22.0	1344.4	*	20 JUL 0455	146	1561.	12.3	1343.4
20 JUL 0316	47	7307.	39.8	1345.9	*	20 JUL 0406	97	3114.	21.6	1344.4	*	20 JUL 0456	147	1532.	12.1	1343.4
20 JUL 0317	48	7195.	39.3	1345.9	*	20 JUL 0407	98	3054.	21.3	1344.4	*	20 JUL 0457	148	1503.	11.8	1343.4
20 JUL 0318	49	7090.	38.9	1345.9	*	20 JUL 0408	99	2997.	21.0	1344.3	*	20 JUL 0458	149	1475.	11.6	1343.3
20 JUL 0319	50	6991.	38.5	1345.8	*	20 JUL 0409	100	2946.	20.7	1344.3	*	20 JUL 0459	150	1446.	11.4	1343.3

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
37926.	0.28	(CFS)	7202.	7202.	7202.	7202.
		(INCHES)	1.386	1.386	1.386	1.386
		(AC-FT)	1478.	1478.	1478.	1478.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
128.	0.28	36.	36.	36.	36.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1351.58	0.28	1345.33	1345.33	1345.33	1345.33

CUMULATIVE AREA = 20.00 SQ MI

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          *            *
 44 KK    *     RCH5   *
          *            *
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     HYDROGRAPH ROUTING DATA

 45 RS       STORAGE ROUTING
                  NSTPS          1  NUMBER OF SUBREACHES
                   ITYP       FLOW  TYPE OF INITIAL CONDITION
                 RSVRIC        0.0  INITIAL CONDITION
                      X        0.0  WORKING R AND D COEFFICIENT

 46 RC       NORMAL DEPTH CHANNEL ROUTING
                    ANL      0.045  LEFT OVERBANK N-VALUE
                   ANCH      0.045  MAIN CHANNEL N-VALUE
                    ANR      0.045  RIGHT OVERBANK N-VALUE
                  RLNTH        725.  REACH LENGTH
                    SEL     0.0262  ENERGY SLOPE
                  ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                              --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 48 RY       ELEVATION    1335.80   1325.30   1327.00   1316.10   1316.10   1328.00   1332.00   1336.80
 47 RX       DISTANCE         0.0       41.00     83.00    157.00    179.00    195.00    202.50    210.00

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                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        0.0       0.48      1.12      1.92      2.88      4.00      5.28      6.73      8.33     10.18
          OUTFLOW        0.0     145.94    504.35   1080.42   1896.43   2976.77   4345.76   6027.24   8044.41  10432.37
        ELEVATION    1316.10   1317.19   1318.28   1319.37   1320.46   1321.55   1322.64   1323.73   1324.81   1325.90

          STORAGE       12.70     15.64     18.69     21.86     25.13     28.52     32.02     35.63     39.35     43.14
          OUTFLOW    13371.52  17664.06  22796.24  28589.99  35033.07  42120.74  49849.44  58216.25  67222.44  77275.25
        ELEVATION    1326.99   1328.08   1329.17   1330.26   1331.35   1332.44   1333.53   1334.62   1335.71   1336.80

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     13372. TO     77275.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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                                        HYDROGRAPH AT STATION      RCH5

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 DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
 20 JUL 0230   1       0.      0.0  1316.1 * 20 JUL 0320  51    6951.      7.5  1324.2 * 20 JUL 0410 101    2933.      4.0  1321.5
 20 JUL 0231   2       2.      0.0  1316.1 * 20 JUL 0321  52    6857.      7.4  1324.2 * 20 JUL 0411 102    2887.      3.9  1321.5
 20 JUL 0232   3      17.      0.1  1316.2 * 20 JUL 0322  53    6767.      7.3  1324.1 * 20 JUL 0412 103    2842.      3.9  1321.4
 20 JUL 0233   4      87.      0.3  1316.6 * 20 JUL 0323  54    6680.      7.2  1324.1 * 20 JUL 0413 104    2801.      3.8  1321.4
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20 JUL 0234	5	374.	0.9	1317.9	*	20 JUL 0324	55	6595.	7.2	1324.0	*	20 JUL 0414	105	2761.	3.8	1321.3
20 JUL 0235	6	1043.	1.9	1319.3	*	20 JUL 0325	56	6511.	7.1	1324.0	*	20 JUL 0415	106	2724.	3.7	1321.3
20 JUL 0236	7	2213.	3.2	1320.8	*	20 JUL 0326	57	6429.	7.0	1323.9	*	20 JUL 0416	107	2688.	3.7	1321.3
20 JUL 0237	8	4012.	5.0	1322.4	*	20 JUL 0327	58	6348.	7.0	1323.9	*	20 JUL 0417	108	2653.	3.7	1321.2
20 JUL 0238	9	6467.	7.1	1324.0	*	20 JUL 0328	59	6269.	6.9	1323.9	*	20 JUL 0418	109	2619.	3.6	1321.2
20 JUL 0239	10	9427.	9.4	1325.4	*	20 JUL 0329	60	6190.	6.9	1323.8	*	20 JUL 0419	110	2587.	3.6	1321.2
20 JUL 0240	11	12575.	12.0	1326.7	*	20 JUL 0330	61	6111.	6.8	1323.8	*	20 JUL 0420	111	2554.	3.6	1321.1
20 JUL 0241	12	16368.	14.8	1327.8	*	20 JUL 0331	62	6031.	6.7	1323.7	*	20 JUL 0421	112	2523.	3.5	1321.1
20 JUL 0242	13	20395.	17.3	1328.7	*	20 JUL 0332	63	5955.	6.7	1323.7	*	20 JUL 0422	113	2492.	3.5	1321.1
20 JUL 0243	14	24362.	19.5	1329.5	*	20 JUL 0333	64	5876.	6.6	1323.6	*	20 JUL 0423	114	2461.	3.5	1321.0
20 JUL 0244	15	28237.	21.7	1330.2	*	20 JUL 0334	65	5796.	6.5	1323.6	*	20 JUL 0424	115	2431.	3.4	1321.0
20 JUL 0245	16	31957.	23.6	1330.8	*	20 JUL 0335	66	5717.	6.5	1323.5	*	20 JUL 0425	116	2400.	3.4	1321.0
20 JUL 0246	17	35174.	25.2	1331.4	*	20 JUL 0336	67	5642.	6.4	1323.5	*	20 JUL 0426	117	2370.	3.4	1320.9
20 JUL 0247	18	37436.	26.3	1331.7	*	20 JUL 0337	68	5568.	6.3	1323.4	*	20 JUL 0427	118	2340.	3.3	1320.9
20 JUL 0248	19	37918.	26.5	1331.8	*	20 JUL 0338	69	5493.	6.3	1323.4	*	20 JUL 0428	119	2310.	3.3	1320.9
20 JUL 0249	20	36700.	25.9	1331.6	*	20 JUL 0339	70	5417.	6.2	1323.3	*	20 JUL 0429	120	2281.	3.3	1320.8
20 JUL 0250	21	34308.	24.8	1331.2	*	20 JUL 0340	71	5339.	6.1	1323.3	*	20 JUL 0430	121	2251.	3.2	1320.8
20 JUL 0251	22	31426.	23.3	1330.7	*	20 JUL 0341	72	5261.	6.1	1323.2	*	20 JUL 0431	122	2221.	3.2	1320.8
20 JUL 0252	23	28392.	21.7	1330.2	*	20 JUL 0342	73	5183.	6.0	1323.2	*	20 JUL 0432	123	2192.	3.2	1320.8
20 JUL 0253	24	25610.	20.2	1329.7	*	20 JUL 0343	74	5104.	5.9	1323.1	*	20 JUL 0433	124	2162.	3.2	1320.7
20 JUL 0254	25	23026.	18.8	1329.2	*	20 JUL 0344	75	5025.	5.9	1323.1	*	20 JUL 0434	125	2133.	3.1	1320.7
20 JUL 0255	26	20833.	17.5	1328.8	*	20 JUL 0345	76	4946.	5.8	1323.0	*	20 JUL 0435	126	2104.	3.1	1320.7
20 JUL 0256	27	18844.	16.3	1328.3	*	20 JUL 0346	77	4867.	5.7	1323.0	*	20 JUL 0436	127	2079.	3.1	1320.6
20 JUL 0257	28	17161.	15.3	1328.0	*	20 JUL 0347	78	4788.	5.7	1322.9	*	20 JUL 0437	128	2056.	3.0	1320.6
20 JUL 0258	29	15752.	14.3	1327.6	*	20 JUL 0348	79	4712.	5.6	1322.9	*	20 JUL 0438	129	2032.	3.0	1320.6
20 JUL 0259	30	14478.	13.5	1327.3	*	20 JUL 0349	80	4637.	5.5	1322.8	*	20 JUL 0439	130	2009.	3.0	1320.6
20 JUL 0300	31	13413.	12.7	1327.0	*	20 JUL 0350	81	4564.	5.5	1322.8	*	20 JUL 0440	131	1985.	3.0	1320.5
20 JUL 0301	32	12605.	12.0	1326.7	*	20 JUL 0351	82	4490.	5.4	1322.7	*	20 JUL 0441	132	1961.	2.9	1320.5
20 JUL 0302	33	11826.	11.4	1326.4	*	20 JUL 0352	83	4413.	5.3	1322.7	*	20 JUL 0442	133	1936.	2.9	1320.5
20 JUL 0303	34	11154.	10.8	1326.2	*	20 JUL 0353	84	4331.	5.3	1322.6	*	20 JUL 0443	134	1911.	2.9	1320.5
20 JUL 0304	35	10586.	10.3	1326.0	*	20 JUL 0354	85	4245.	5.2	1322.6	*	20 JUL 0444	135	1886.	2.9	1320.4
20 JUL 0305	36	10071.	9.9	1325.7	*	20 JUL 0355	86	4148.	5.1	1322.5	*	20 JUL 0445	136	1862.	2.8	1320.4
20 JUL 0306	37	9625.	9.6	1325.5	*	20 JUL 0356	87	4045.	5.0	1322.4	*	20 JUL 0446	137	1836.	2.8	1320.4
20 JUL 0307	38	9238.	9.3	1325.4	*	20 JUL 0357	88	3940.	4.9	1322.3	*	20 JUL 0447	138	1809.	2.8	1320.3
20 JUL 0308	39	8899.	9.0	1325.2	*	20 JUL 0358	89	3835.	4.8	1322.2	*	20 JUL 0448	139	1782.	2.7	1320.3
20 JUL 0309	40	8605.	8.8	1325.1	*	20 JUL 0359	90	3732.	4.7	1322.1	*	20 JUL 0449	140	1754.	2.7	1320.3
20 JUL 0310	41	8349.	8.6	1325.0	*	20 JUL 0400	91	3636.	4.6	1322.1	*	20 JUL 0450	141	1727.	2.7	1320.2
20 JUL 0311	42	8133.	8.4	1324.9	*	20 JUL 0401	92	3549.	4.5	1322.0	*	20 JUL 0451	142	1699.	2.6	1320.2
20 JUL 0312	43	7950.	8.3	1324.8	*	20 JUL 0402	93	3464.	4.5	1321.9	*	20 JUL 0452	143	1671.	2.6	1320.2
20 JUL 0313	44	7788.	8.1	1324.7	*	20 JUL 0403	94	3381.	4.4	1321.9	*	20 JUL 0453	144	1642.	2.6	1320.1
20 JUL 0314	45	7639.	8.0	1324.6	*	20 JUL 0404	95	3302.	4.3	1321.8	*	20 JUL 0454	145	1614.	2.5	1320.1
20 JUL 0315	46	7502.	7.9	1324.5	*	20 JUL 0405	96	3228.	4.2	1321.7	*	20 JUL 0455	146	1585.	2.5	1320.0
20 JUL 0316	47	7377.	7.8	1324.5	*	20 JUL 0406	97	3160.	4.2	1321.7	*	20 JUL 0456	147	1557.	2.5	1320.0
20 JUL 0317	48	7260.	7.7	1324.4	*	20 JUL 0407	98	3096.	4.1	1321.6	*	20 JUL 0457	148	1528.	2.4	1320.0
20 JUL 0318	49	7151.	7.6	1324.3	*	20 JUL 0408	99	3036.	4.1	1321.6	*	20 JUL 0458	149	1499.	2.4	1319.9
20 JUL 0319	50	7048.	7.5	1324.3	*	20 JUL 0409	100	2981.	4.0	1321.6	*	20 JUL 0459	150	1470.	2.4	1319.9
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
37918.	0.30	(CFS)	7190.	7190.	7190.	7190.
		(INCHES)	1.383	1.383	1.383	1.383
		(AC-FT)	1476.	1476.	1476.	1476.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
27.	0.30	7.	7.	7.	7.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR

1331.79	0.30	1323.18	1323.18	1323.18	1323.18

CUMULATIVE AREA = 20.00 SQ MI

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              *            *
49 KK         *    RCH6    *
              *            *
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HYDROGRAPH ROUTING DATA

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50 RS          STORAGE ROUTING
                   NSTPS            1  NUMBER OF SUBREACHES
                    ITYP         FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC          0.0  INITIAL CONDITION
                       X          0.0  WORKING R AND D COEFFICIENT

51 RC          NORMAL DEPTH CHANNEL ROUTING
                     ANL        0.045  LEFT OVERBANK N-VALUE
                    ANCH        0.045  MAIN CHANNEL N-VALUE
                     ANR        0.045  RIGHT OVERBANK N-VALUE
                   RLNTH         480.  REACH LENGTH
                     SEL       0.0270  ENERGY SLOPE
                   ELMAX          0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL		------- +	--- RIGHT OVERBANK ---		
53 RY	ELEVATION	1328.50	1315.90	1309.00	1302.40	1304.10	1313.80	1311.60	1323.90
52 RX	DISTANCE	6.00	15.00	42.50	69.00	121.00	136.00	166.00	186.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.36	1.26	2.30	3.45	4.72	6.10	7.61	9.48	11.70
OUTFLOW	0.0	137.98	908.29	2277.84	4176.40	6650.43	9885.77	13702.39	18230.86	23964.74
ELEVATION	1302.40	1303.77	1305.15	1306.52	1307.89	1309.27	1310.64	1312.01	1313.39	1314.76
STORAGE	14.05	16.48	18.95	21.47	24.04	26.66	29.33	32.01	34.72	37.43
OUTFLOW	30800.42	38626.52	47297.32	56778.54	67046.06	78082.25	89993.81	102888.62	116528.37	130894.62
ELEVATION	1316.14	1317.51	1318.88	1320.26	1321.63	1323.00	1324.38	1325.75	1327.12	1328.50

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 2278. TO 130895.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH6

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                                                      *                                                       *
DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
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20 JUL 0230	1	0.	0.0	1302.4	20 JUL 0320	51	6981.	4.9	1309.4	20 JUL 0410	101	2954.	2.7	1307.0
20 JUL 0231	2	0.	0.0	1302.4	20 JUL 0321	52	6886.	4.8	1309.4	20 JUL 0411	102	2907.	2.7	1307.0
20 JUL 0232	3	4.	0.0	1302.4	20 JUL 0322	53	6795.	4.8	1309.3	20 JUL 0412	103	2862.	2.7	1306.9
20 JUL 0233	4	24.	0.1	1302.6	20 JUL 0323	54	6707.	4.7	1309.3	20 JUL 0413	104	2819.	2.6	1306.9
20 JUL 0234	5	110.	0.3	1303.5	20 JUL 0324	55	6624.	4.7	1309.3	20 JUL 0414	105	2778.	2.6	1306.9
20 JUL 0235	6	532.	0.8	1304.5	20 JUL 0325	56	6543.	4.7	1309.2	20 JUL 0415	106	2740.	2.6	1306.9
20 JUL 0236	7	1468.	1.7	1305.7	20 JUL 0326	57	6460.	4.6	1309.2	20 JUL 0416	107	2703.	2.6	1306.8
20 JUL 0237	8	3123.	2.8	1307.1	20 JUL 0327	58	6378.	4.6	1309.1	20 JUL 0417	108	2668.	2.5	1306.8
20 JUL 0238	9	5467.	4.1	1308.6	20 JUL 0328	59	6298.	4.5	1309.1	20 JUL 0418	109	2634.	2.5	1306.8
20 JUL 0239	10	8437.	5.5	1310.0	20 JUL 0329	60	6219.	4.5	1309.0	20 JUL 0419	110	2601.	2.5	1306.8
20 JUL 0240	11	11650.	6.8	1311.3	20 JUL 0330	61	6140.	4.5	1309.0	20 JUL 0420	111	2569.	2.5	1306.7
20 JUL 0241	12	15209.	8.2	1312.5	20 JUL 0331	62	6061.	4.4	1308.9	20 JUL 0421	112	2537.	2.5	1306.7
20 JUL 0242	13	19199.	9.9	1313.6	20 JUL 0332	63	5983.	4.4	1308.9	20 JUL 0422	113	2505.	2.4	1306.7
20 JUL 0243	14	23268.	11.4	1314.6	20 JUL 0333	64	5905.	4.3	1308.9	20 JUL 0423	114	2475.	2.4	1306.7
20 JUL 0244	15	27282.	12.8	1315.4	20 JUL 0334	65	5826.	4.3	1308.8	20 JUL 0424	115	2444.	2.4	1306.6
20 JUL 0245	16	31045.	14.1	1316.2	20 JUL 0335	66	5747.	4.3	1308.8	20 JUL 0425	116	2414.	2.4	1306.6
20 JUL 0246	17	34523.	15.2	1316.8	20 JUL 0336	67	5670.	4.2	1308.7	20 JUL 0426	117	2383.	2.4	1306.6
20 JUL 0247	18	36982.	16.0	1317.2	20 JUL 0337	68	5596.	4.2	1308.7	20 JUL 0427	118	2353.	2.3	1306.6
20 JUL 0248	19	37941.	16.3	1317.4	20 JUL 0338	69	5521.	4.1	1308.6	20 JUL 0428	119	2324.	2.3	1306.6
20 JUL 0249	20	37069.	16.0	1317.2	20 JUL 0339	70	5445.	4.1	1308.6	20 JUL 0429	120	2294.	2.3	1306.5
20 JUL 0250	21	34910.	15.3	1316.9	20 JUL 0340	71	5368.	4.1	1308.6	20 JUL 0430	121	2266.	2.3	1306.5
20 JUL 0251	22	32092.	14.5	1316.4	20 JUL 0341	72	5290.	4.0	1308.5	20 JUL 0431	122	2238.	2.3	1306.5
20 JUL 0252	23	29138.	13.5	1315.8	20 JUL 0342	73	5212.	4.0	1308.5	20 JUL 0432	123	2208.	2.2	1306.5
20 JUL 0253	24	26288.	12.5	1315.2	20 JUL 0343	74	5133.	3.9	1308.4	20 JUL 0433	124	2179.	2.2	1306.4
20 JUL 0254	25	23673.	11.6	1314.7	20 JUL 0344	75	5054.	3.9	1308.4	20 JUL 0434	125	2149.	2.2	1306.4
20 JUL 0255	26	21441.	10.7	1314.2	20 JUL 0345	76	4975.	3.9	1308.3	20 JUL 0435	126	2120.	2.2	1306.4
20 JUL 0256	27	19390.	9.9	1313.7	20 JUL 0346	77	4896.	3.8	1308.3	20 JUL 0436	127	2093.	2.2	1306.3
20 JUL 0257	28	17628.	9.2	1313.2	20 JUL 0347	78	4817.	3.8	1308.2	20 JUL 0437	128	2068.	2.1	1306.3
20 JUL 0258	29	16162.	8.6	1312.8	20 JUL 0348	79	4740.	3.7	1308.2	20 JUL 0438	129	2045.	2.1	1306.3
20 JUL 0259	30	14852.	8.1	1312.4	20 JUL 0349	80	4665.	3.7	1308.2	20 JUL 0439	130	2022.	2.1	1306.3
20 JUL 0300	31	13718.	7.6	1312.0	20 JUL 0350	81	4591.	3.7	1308.1	20 JUL 0440	131	1998.	2.1	1306.2
20 JUL 0301	32	12819.	7.3	1311.7	20 JUL 0351	82	4517.	3.6	1308.1	20 JUL 0441	132	1974.	2.1	1306.2
20 JUL 0302	33	12053.	7.0	1311.4	20 JUL 0352	83	4442.	3.6	1308.0	20 JUL 0442	133	1950.	2.1	1306.2
20 JUL 0303	34	11338.	6.7	1311.2	20 JUL 0353	84	4362.	3.5	1308.0	20 JUL 0443	134	1925.	2.0	1306.2
20 JUL 0304	35	10744.	6.4	1310.9	20 JUL 0354	85	4277.	3.5	1307.9	20 JUL 0444	135	1900.	2.0	1306.1
20 JUL 0305	36	10217.	6.2	1310.8	20 JUL 0355	86	4184.	3.5	1307.9	20 JUL 0445	136	1875.	2.0	1306.1
20 JUL 0306	37	9753.	6.0	1310.6	20 JUL 0356	87	4090.	3.4	1307.8	20 JUL 0446	137	1850.	2.0	1306.1
20 JUL 0307	38	9356.	5.9	1310.4	20 JUL 0357	88	3987.	3.3	1307.8	20 JUL 0447	138	1823.	2.0	1306.1
20 JUL 0308	39	9001.	5.7	1310.3	20 JUL 0358	89	3882.	3.3	1307.7	20 JUL 0448	139	1797.	1.9	1306.0
20 JUL 0309	40	8693.	5.6	1310.1	20 JUL 0359	90	3777.	3.2	1307.6	20 JUL 0449	140	1769.	1.9	1306.0
20 JUL 0310	41	8426.	5.5	1310.0	20 JUL 0400	91	3678.	3.1	1307.5	20 JUL 0450	141	1742.	1.9	1306.0
20 JUL 0311	42	8198.	5.4	1309.9	20 JUL 0401	92	3587.	3.1	1307.5	20 JUL 0451	142	1714.	1.9	1306.0
20 JUL 0312	43	8005.	5.3	1309.8	20 JUL 0402	93	3501.	3.0	1307.4	20 JUL 0452	143	1686.	1.9	1305.9
20 JUL 0313	44	7837.	5.2	1309.8	20 JUL 0403	94	3417.	3.0	1307.3	20 JUL 0453	144	1658.	1.8	1305.9
20 JUL 0314	45	7684.	5.2	1309.7	20 JUL 0404	95	3337.	2.9	1307.3	20 JUL 0454	145	1630.	1.8	1305.9
20 JUL 0315	46	7544.	5.1	1309.6	20 JUL 0405	96	3261.	2.9	1307.2	20 JUL 0455	146	1601.	1.8	1305.8
20 JUL 0316	47	7415.	5.0	1309.6	20 JUL 0406	97	3190.	2.9	1307.2	20 JUL 0456	147	1573.	1.8	1305.8
20 JUL 0317	48	7296.	5.0	1309.5	20 JUL 0407	98	3124.	2.8	1307.1	20 JUL 0457	148	1544.	1.7	1305.8
20 JUL 0318	49	7185.	4.9	1309.5	20 JUL 0408	99	3062.	2.8	1307.1	20 JUL 0458	149	1515.	1.7	1305.8
20 JUL 0319	50	7080.	4.9	1309.4	20 JUL 0409	100	3005.	2.7	1307.0	20 JUL 0459	150	1486.	1.7	1305.7

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	2.48-HR
37941.	0.30	(CFS)	7182.	7182.	7182.	7182.
		(INCHES)	1.382	1.382	1.382	1.382
		(AC-FT)	1474.	1474.	1474.	1474.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE

(AC-FT)	(HR)	6-HR	24-HR	72-HR	2.48-HR
16.	0.30	5.	5.	5.	5.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1317.39	0.30	1308.59	1308.59	1308.59	1308.59

CUMULATIVE AREA = 20.00 SQ MI

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              *            *
54 KK         *    RCH7    *
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HYDROGRAPH ROUTING DATA

55 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

56 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.045	LEFT OVERBANK N-VALUE
ANCH	0.045	MAIN CHANNEL N-VALUE
ANR	0.045	RIGHT OVERBANK N-VALUE
RLNTH	915.	REACH LENGTH
SEL	0.0179	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

--- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---

58 RY	ELEVATION	1317.00	1316.10	1299.60	1295.80	1293.20	1301.40	1302.10	1316.70
57 RX	DISTANCE	0.0	71.00	82.00	83.00	134.00	202.00	240.00	302.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.46	1.84	3.87	6.18	8.77	11.65	14.98	19.23	23.66
OUTFLOW	0.0	70.84	449.82	1379.36	2758.97	4579.08	6894.68	9940.98	14039.56	18913.84
ELEVATION	1293.20	1294.45	1295.70	1296.96	1298.21	1299.46	1300.71	1301.97	1303.22	1304.47
STORAGE	28.25	33.00	37.91	42.98	48.22	53.62	59.18	64.90	70.78	77.48
OUTFLOW	24507.95	30800.15	37779.56	45441.17	53783.36	62806.88	72514.00	82908.25	93994.12	105433.81
ELEVATION	1305.72	1306.98	1308.23	1309.48	1310.73	1311.99	1313.24	1314.49	1315.74	1317.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 37780. TO 105434.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH7

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1293.2	20	JUL	0320	51	7061.	11.8	1300.8	20	JUL	0410	101	3010.	6.5	1298.4
20	JUL	0231	2	0.	0.0	1293.2	20	JUL	0321	52	6962.	11.7	1300.7	20	JUL	0411	102	2958.	6.5	1298.3
20	JUL	0232	3	0.	0.0	1293.2	20	JUL	0322	53	6870.	11.6	1300.7	20	JUL	0412	103	2910.	6.4	1298.3
20	JUL	0233	4	3.	0.0	1293.3	20	JUL	0323	54	6785.	11.5	1300.7	20	JUL	0413	104	2865.	6.3	1298.3
20	JUL	0234	5	15.	0.1	1293.5	20	JUL	0324	55	6700.	11.4	1300.6	20	JUL	0414	105	2822.	6.3	1298.3
20	JUL	0235	6	76.	0.5	1294.5	20	JUL	0325	56	6617.	11.3	1300.6	20	JUL	0415	106	2781.	6.2	1298.2
20	JUL	0236	7	370.	1.5	1295.4	20	JUL	0326	57	6534.	11.2	1300.5	20	JUL	0416	107	2744.	6.2	1298.2
20	JUL	0237	8	1254.	3.6	1296.8	20	JUL	0327	58	6452.	11.1	1300.5	20	JUL	0417	108	2710.	6.1	1298.2
20	JUL	0238	9	3028.	6.6	1298.4	20	JUL	0328	59	6371.	11.0	1300.4	20	JUL	0418	109	2676.	6.0	1298.1
20	JUL	0239	10	5680.	10.1	1300.1	20	JUL	0329	60	6291.	10.9	1300.4	20	JUL	0419	110	2642.	6.0	1298.1
20	JUL	0240	11	8951.	13.9	1301.6	20	JUL	0330	61	6211.	10.8	1300.3	20	JUL	0420	111	2609.	5.9	1298.1
20	JUL	0241	12	12492.	17.6	1302.7	20	JUL	0331	62	6132.	10.7	1300.3	20	JUL	0421	112	2576.	5.9	1298.0
20	JUL	0242	13	16431.	21.4	1303.8	20	JUL	0332	63	6054.	10.6	1300.3	20	JUL	0422	113	2544.	5.8	1298.0
20	JUL	0243	14	20671.	25.1	1304.9	20	JUL	0333	64	5976.	10.5	1300.2	20	JUL	0423	114	2513.	5.8	1298.0
20	JUL	0244	15	24890.	28.5	1305.8	20	JUL	0334	65	5897.	10.4	1300.2	20	JUL	0424	115	2481.	5.7	1298.0
20	JUL	0245	16	28967.	31.6	1306.6	20	JUL	0335	66	5818.	10.3	1300.1	20	JUL	0425	116	2451.	5.7	1297.9
20	JUL	0246	17	32675.	34.3	1307.3	20	JUL	0336	67	5740.	10.2	1300.1	20	JUL	0426	117	2420.	5.6	1297.9
20	JUL	0247	18	35719.	36.5	1307.9	20	JUL	0337	68	5663.	10.1	1300.0	20	JUL	0427	118	2390.	5.6	1297.9
20	JUL	0248	19	37442.	37.7	1308.2	20	JUL	0338	69	5588.	10.0	1300.0	20	JUL	0428	119	2360.	5.5	1297.8
20	JUL	0249	20	37504.	37.7	1308.2	20	JUL	0339	70	5513.	9.9	1300.0	20	JUL	0429	120	2330.	5.5	1297.8
20	JUL	0250	21	36006.	36.7	1307.9	20	JUL	0340	71	5437.	9.8	1299.9	20	JUL	0430	121	2301.	5.4	1297.8
20	JUL	0251	22	33528.	34.9	1307.5	20	JUL	0341	72	5360.	9.7	1299.9	20	JUL	0431	122	2272.	5.4	1297.8
20	JUL	0252	23	30652.	32.9	1306.9	20	JUL	0342	73	5283.	9.6	1299.8	20	JUL	0432	123	2243.	5.3	1297.7
20	JUL	0253	24	27848.	30.8	1306.4	20	JUL	0343	74	5204.	9.5	1299.8	20	JUL	0433	124	2214.	5.3	1297.7
20	JUL	0254	25	25112.	28.7	1305.8	20	JUL	0344	75	5126.	9.4	1299.8	20	JUL	0434	125	2185.	5.2	1297.7
20	JUL	0255	26	22754.	26.8	1305.3	20	JUL	0345	76	5047.	9.3	1299.7	20	JUL	0435	126	2155.	5.2	1297.7
20	JUL	0256	27	20619.	25.1	1304.9	20	JUL	0346	77	4968.	9.3	1299.7	20	JUL	0436	127	2127.	5.1	1297.6
20	JUL	0257	28	18705.	23.5	1304.4	20	JUL	0347	78	4889.	9.2	1299.6	20	JUL	0437	128	2100.	5.1	1297.6
20	JUL	0258	29	17144.	22.1	1304.0	20	JUL	0348	79	4810.	9.1	1299.6	20	JUL	0438	129	2075.	5.0	1297.6
20	JUL	0259	30	15732.	20.8	1303.7	20	JUL	0349	80	4733.	9.0	1299.5	20	JUL	0439	130	2051.	5.0	1297.6
20	JUL	0300	31	14484.	19.6	1303.3	20	JUL	0350	81	4658.	8.9	1299.5	20	JUL	0440	131	2027.	5.0	1297.5
20	JUL	0301	32	13481.	18.7	1303.0	20	JUL	0351	82	4584.	8.8	1299.5	20	JUL	0441	132	2003.	4.9	1297.5
20	JUL	0302	33	12647.	17.8	1302.8	20	JUL	0352	83	4516.	8.7	1299.4	20	JUL	0442	133	1979.	4.9	1297.5
20	JUL	0303	34	11888.	17.0	1302.6	20	JUL	0353	84	4442.	8.6	1299.4	20	JUL	0443	134	1955.	4.8	1297.5
20	JUL	0304	35	11212.	16.3	1302.4	20	JUL	0354	85	4362.	8.5	1299.3	20	JUL	0444	135	1930.	4.8	1297.5
20	JUL	0305	36	10628.	15.7	1302.2	20	JUL	0355	86	4276.	8.3	1299.3	20	JUL	0445	136	1905.	4.7	1297.4
20	JUL	0306	37	10115.	15.2	1302.0	20	JUL	0356	87	4186.	8.2	1299.2	20	JUL	0446	137	1880.	4.7	1297.4
20	JUL	0307	38	9676.	14.7	1301.9	20	JUL	0357	88	4090.	8.1	1299.1	20	JUL	0447	138	1855.	4.7	1297.4
20	JUL	0308	39	9292.	14.3	1301.7	20	JUL	0358	89	3988.	7.9	1299.1	20	JUL	0448	139	1829.	4.6	1297.4
20	JUL	0309	40	8948.	13.9	1301.6	20	JUL	0359	90	3885.	7.8	1299.0	20	JUL	0449	140	1802.	4.6	1297.3
20	JUL	0310	41	8648.	13.6	1301.4	20	JUL	0400	91	3782.	7.6	1298.9	20	JUL	0450	141	1775.	4.5	1297.3
20	JUL	0311	42	8388.	13.3	1301.3	20	JUL	0401	92	3685.	7.5	1298.8	20	JUL	0451	142	1748.	4.5	1297.3
20	JUL	0312	43	8166.	13.0	1301.2	20	JUL	0402	93	3593.	7.4	1298.8	20	JUL	0452	143	1720.	4.4	1297.3
20	JUL	0313	44	7977.	12.8	1301.2	20	JUL	0403	94	3506.	7.2	1298.7	20	JUL	0453	144	1692.	4.4	1297.2
20	JUL	0314	45	7810.	12.6	1301.1	20	JUL	0404	95	3422.	7.1	1298.7	20	JUL	0454	145	1664.	4.3	1297.2
20	JUL	0315	46	7658.	12.5	1301.0	20	JUL	0405	96	3342.	7.0	1298.6	20	JUL	0455	146	1636.	4.3	1297.2
20	JUL	0316	47	7520.	12.3	1301.0	20	JUL	0406	97	3266.	6.9	1298.6	20	JUL	0456	147	1607.	4.2	1297.2
20	JUL	0317	48	7393.	12.2	1300.9	20	JUL	0407	98	3195.	6.8	1298.5	20	JUL	0457	148	1579.	4.2	1297.1
20	JUL	0318	49	7275.	12.1	1300.9	20	JUL	0408	99	3128.	6.7	1298.5	20	JUL	0458	149	1550.	4.2	1297.1
20	JUL	0319	50	7165.	11.9	1300.8	20	JUL	0409	100	3067.	6.6	1298.4	20	JUL	0459	150	1521.	4.1	1297.1

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR

37504.	0.32	(CFS)	7162.	7162.	7162.	7162.
		(INCHES)	1.378	1.378	1.378	1.378
		(AC-FT)	1470.	1470.	1470.	1470.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
38.	0.32	11.	11.	11.	11.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1308.18	0.32	1299.80	1299.80	1299.80	1299.80

CUMULATIVE AREA = 20.00 SQ MI

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59 KK **RCH8**

HYDROGRAPH ROUTING DATA

60 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

61 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.055	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	1400.	REACH LENGTH
SEL	0.0211	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL	-------	+	--- RIGHT OVERBANK ---		
63 RY	ELEVATION	1275.40	1269.40	1269.10	1263.80	1263.60	1274.40	1273.60	1283.90
62 RX	DISTANCE	0.0	85.00	145.00	235.00	295.00	355.00	499.00	500.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	2.18	5.36	9.37	14.21	19.87	27.69	36.78	46.59	57.13
OUTFLOW	0.0	236.87	893.94	1975.36	3525.61	5593.54	8704.22	12793.77	17742.14	23548.02
ELEVATION	1263.60	1264.67	1265.74	1266.81	1267.87	1268.94	1270.01	1271.08	1272.15	1273.22
STORAGE	69.75	86.56	103.70	120.85	138.00	155.15	172.31	189.46	206.63	223.79
OUTFLOW	30306.05	39184.89	50146.41	62546.93	76256.31	91194.87	107299.87	124519.75	142810.56	162134.12
ELEVATION	1274.28	1275.35	1276.42	1277.49	1278.56	1279.63	1280.69	1281.76	1282.83	1283.90

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HYDROGRAPH AT STATION RCH8

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1263.6	20	JUL	0320	51	7271.	24.1	1269.5	20	JUL	0410	101	3155.	13.0	1267.6
20	JUL	0231	2	0.	0.0	1263.6	20	JUL	0321	52	7159.	23.8	1269.5	20	JUL	0411	102	3093.	12.9	1267.6
20	JUL	0232	3	0.	0.0	1263.6	20	JUL	0322	53	7055.	23.5	1269.4	20	JUL	0412	103	3036.	12.7	1267.5
20	JUL	0233	4	0.	0.0	1263.6	20	JUL	0323	54	6957.	23.3	1269.4	20	JUL	0413	104	2982.	12.5	1267.5
20	JUL	0234	5	2.	0.0	1263.6	20	JUL	0324	55	6865.	23.1	1269.4	20	JUL	0414	105	2932.	12.4	1267.5
20	JUL	0235	6	8.	0.1	1263.6	20	JUL	0325	56	6776.	22.8	1269.3	20	JUL	0415	106	2885.	12.2	1267.4
20	JUL	0236	7	38.	0.3	1263.8	20	JUL	0326	57	6690.	22.6	1269.3	20	JUL	0416	107	2840.	12.1	1267.4
20	JUL	0237	8	146.	1.3	1264.3	20	JUL	0327	58	6605.	22.4	1269.3	20	JUL	0417	108	2799.	11.9	1267.4
20	JUL	0238	9	571.	3.8	1265.2	20	JUL	0328	59	6522.	22.2	1269.3	20	JUL	0418	109	2761.	11.8	1267.3
20	JUL	0239	10	1673.	8.2	1266.5	20	JUL	0329	60	6440.	22.0	1269.2	20	JUL	0419	110	2724.	11.7	1267.3
20	JUL	0240	11	3682.	14.6	1268.0	20	JUL	0330	61	6358.	21.8	1269.2	20	JUL	0420	111	2688.	11.6	1267.3
20	JUL	0241	12	6576.	22.3	1269.3	20	JUL	0331	62	6278.	21.6	1269.2	20	JUL	0421	112	2654.	11.5	1267.3
20	JUL	0242	13	10095.	30.8	1270.4	20	JUL	0332	63	6198.	21.4	1269.1	20	JUL	0422	113	2620.	11.4	1267.2
20	JUL	0243	14	14211.	39.6	1271.4	20	JUL	0333	64	6119.	21.2	1269.1	20	JUL	0423	114	2587.	11.3	1267.2
20	JUL	0244	15	18688.	48.3	1272.3	20	JUL	0334	65	6041.	21.0	1269.1	20	JUL	0424	115	2554.	11.2	1267.2
20	JUL	0245	16	23221.	56.5	1273.2	20	JUL	0335	66	5962.	20.8	1269.1	20	JUL	0425	116	2522.	11.1	1267.2
20	JUL	0246	17	27324.	64.2	1273.8	20	JUL	0336	67	5883.	20.6	1269.0	20	JUL	0426	117	2491.	11.0	1267.2
20	JUL	0247	18	31021.	71.1	1274.4	20	JUL	0337	68	5805.	20.4	1269.0	20	JUL	0427	118	2460.	10.9	1267.1
20	JUL	0248	19	33986.	76.7	1274.7	20	JUL	0338	69	5728.	20.2	1269.0	20	JUL	0428	119	2429.	10.8	1267.1
20	JUL	0249	20	35846.	80.2	1275.0	20	JUL	0339	70	5652.	20.0	1269.0	20	JUL	0429	120	2399.	10.7	1267.1
20	JUL	0250	21	36331.	81.2	1275.0	20	JUL	0340	71	5577.	19.8	1268.9	20	JUL	0430	121	2369.	10.6	1267.1
20	JUL	0251	22	35497.	79.6	1274.9	20	JUL	0341	72	5505.	19.6	1268.9	20	JUL	0431	122	2339.	10.5	1267.1
20	JUL	0252	23	33679.	76.1	1274.7	20	JUL	0342	73	5432.	19.4	1268.9	20	JUL	0432	123	2310.	10.4	1267.0
20	JUL	0253	24	31317.	71.7	1274.4	20	JUL	0343	74	5356.	19.2	1268.8	20	JUL	0433	124	2280.	10.3	1267.0
20	JUL	0254	25	28720.	66.8	1274.0	20	JUL	0344	75	5279.	19.0	1268.8	20	JUL	0434	125	2251.	10.2	1267.0
20	JUL	0255	26	26140.	62.0	1273.6	20	JUL	0345	76	5202.	18.8	1268.7	20	JUL	0435	126	2222.	10.1	1267.0
20	JUL	0256	27	23739.	57.5	1273.2	20	JUL	0346	77	5123.	18.6	1268.7	20	JUL	0436	127	2193.	10.0	1267.0
20	JUL	0257	28	21500.	53.4	1272.8	20	JUL	0347	78	5045.	18.4	1268.7	20	JUL	0437	128	2164.	10.0	1266.9
20	JUL	0258	29	19533.	49.8	1272.5	20	JUL	0348	79	4966.	18.2	1268.6	20	JUL	0438	129	2136.	9.9	1266.9
20	JUL	0259	30	17830.	46.8	1272.2	20	JUL	0349	80	4888.	17.9	1268.6	20	JUL	0439	130	2110.	9.8	1266.9
20	JUL	0300	31	16421.	44.0	1271.9	20	JUL	0350	81	4811.	17.7	1268.5	20	JUL	0440	131	2084.	9.7	1266.9
20	JUL	0301	32	15164.	41.5	1271.6	20	JUL	0351	82	4735.	17.5	1268.5	20	JUL	0441	132	2059.	9.6	1266.9
20	JUL	0302	33	14082.	39.3	1271.4	20	JUL	0352	83	4660.	17.3	1268.5	20	JUL	0442	133	2035.	9.6	1266.8
20	JUL	0303	34	13147.	37.5	1271.2	20	JUL	0353	84	4587.	17.1	1268.4	20	JUL	0443	134	2010.	9.5	1266.8
20	JUL	0304	35	12363.	35.8	1271.0	20	JUL	0354	85	4513.	16.9	1268.4	20	JUL	0444	135	1986.	9.4	1266.8
20	JUL	0305	36	11680.	34.3	1270.8	20	JUL	0355	86	4435.	16.7	1268.3	20	JUL	0445	136	1963.	9.3	1266.8
20	JUL	0306	37	11061.	32.9	1270.6	20	JUL	0356	87	4353.	16.5	1268.3	20	JUL	0446	137	1941.	9.2	1266.8
20	JUL	0307	38	10510.	31.7	1270.5	20	JUL	0357	88	4267.	16.2	1268.3	20	JUL	0447	138	1918.	9.2	1266.7
20	JUL	0308	39	10025.	30.6	1270.4	20	JUL	0358	89	4175.	16.0	1268.2	20	JUL	0448	139	1894.	9.1	1266.7
20	JUL	0309	40	9597.	29.7	1270.2	20	JUL	0359	90	4079.	15.7	1268.2	20	JUL	0449	140	1870.	9.0	1266.7
20	JUL	0310	41	9219.	28.8	1270.1	20	JUL	0400	91	3980.	15.5	1268.1	20	JUL	0450	141	1844.	8.9	1266.7
20	JUL	0311	42	8887.	28.1	1270.1	20	JUL	0401	92	3881.	15.2	1268.1	20	JUL	0451	142	1818.	8.8	1266.6
20	JUL	0312	43	8608.	27.4	1270.0	20	JUL	0402	93	3784.	14.9	1268.0	20	JUL	0452	143	1792.	8.7	1266.6
20	JUL	0313	44	8377.	26.9	1269.9	20	JUL	0403	94	3690.	14.7	1268.0	20	JUL	0453	144	1765.	8.6	1266.6
20	JUL	0314	45	8169.	26.3	1269.8	20	JUL	0404	95	3599.	14.4	1267.9	20	JUL	0454	145	1738.	8.5	1266.6
20	JUL	0315	46	7982.	25.9	1269.8	20	JUL	0405	96	3513.	14.2	1267.9	20	JUL	0455	146	1710.	8.4	1266.5
20	JUL	0316	47	7813.	25.4	1269.7	20	JUL	0406	97	3437.	13.9	1267.8	20	JUL	0456	147	1682.	8.3	1266.5
20	JUL	0317	48	7659.	25.1	1269.7	20	JUL	0407	98	3362.	13.7	1267.8	20	JUL	0457	148	1654.	8.2	1266.5
20	JUL	0318	49	7519.	24.7	1269.6	20	JUL	0408	99	3290.	13.5	1267.7	20	JUL	0458	149	1626.	8.1	1266.5
20	JUL	0319	50	7390.	24.4	1269.6	20	JUL	0409	100	3220.	13.3	1267.7	20	JUL	0459	150	1598.	8.0	1266.4

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

(CFS)	(HR)		6-HR	24-HR	72-HR	2.48-HR
36331.	0.33	(CFS)	7123.	7123.	7123.	7123.
		(INCHES)	1.371	1.371	1.371	1.371
		(AC-FT)	1462.	1462.	1462.	1462.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)	6-HR	24-HR	72-HR	2.48-HR
81.	0.33	22.	22.	22.	22.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
(FEET)	(HR)	6-HR	24-HR	72-HR	2.48-HR
1275.01	0.33	1268.62	1268.62	1268.62	1268.62

CUMULATIVE AREA = 20.00 SQ MI

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             *            *
64 KK        *    RCH9    *
             *            *
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HYDROGRAPH ROUTING DATA

65 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

66 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.055	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	800.	REACH LENGTH
SEL	0.0194	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK --- +		------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---			
68 RY	ELEVATION	1252.10	1241.10	1242.60	1236.40	1236.60	1242.50	1242.10	1257.40
67 RX	DISTANCE	0.0	20.00	61.00	116.00	126.00	183.00	241.00	250.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.36	1.14	2.35	3.97	6.18	10.15	14.74	19.39	24.09
OUTFLOW	0.0	56.60	275.10	721.88	1456.53	2553.77	4506.55	7641.34	11556.46	16169.79
ELEVATION	1236.40	1237.51	1238.61	1239.72	1240.82	1241.93	1243.03	1244.14	1245.24	1246.35
STORAGE	28.85	33.66	38.53	43.45	48.42	53.43	58.46	63.50	68.56	73.63
OUTFLOW	21429.55	27298.74	33749.16	40758.48	48308.69	56544.97	65344.14	74649.94	84447.87	94725.31
ELEVATION	1247.45	1248.56	1249.66	1250.77	1251.87	1252.98	1254.08	1255.19	1256.29	1257.40

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 40758. TO 94725.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH9

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1236.4	20	JUL	0320	51	7400.	14.4	1244.1	20	JUL	0410	101	3256.	7.6	1242.3
20	JUL	0231	2	0.	0.0	1236.4	20	JUL	0321	52	7282.	14.2	1244.0	20	JUL	0411	102	3189.	7.5	1242.3
20	JUL	0232	3	0.	0.0	1236.4	20	JUL	0322	53	7170.	14.1	1244.0	20	JUL	0412	103	3126.	7.3	1242.2
20	JUL	0233	4	0.	0.0	1236.4	20	JUL	0323	54	7065.	13.9	1243.9	20	JUL	0413	104	3066.	7.2	1242.2
20	JUL	0234	5	0.	0.0	1236.4	20	JUL	0324	55	6967.	13.8	1243.9	20	JUL	0414	105	3011.	7.1	1242.2
20	JUL	0235	6	1.	0.0	1236.4	20	JUL	0325	56	6873.	13.6	1243.9	20	JUL	0415	106	2959.	7.0	1242.2
20	JUL	0236	7	5.	0.0	1236.5	20	JUL	0326	57	6783.	13.5	1243.8	20	JUL	0416	107	2910.	6.9	1242.1
20	JUL	0237	8	22.	0.1	1236.8	20	JUL	0327	58	6696.	13.4	1243.8	20	JUL	0417	108	2864.	6.8	1242.1
20	JUL	0238	9	109.	0.5	1237.8	20	JUL	0328	59	6611.	13.2	1243.8	20	JUL	0418	109	2822.	6.7	1242.1
20	JUL	0239	10	477.	1.7	1239.1	20	JUL	0329	60	6528.	13.1	1243.7	20	JUL	0419	110	2782.	6.6	1242.1
20	JUL	0240	11	1485.	4.0	1240.8	20	JUL	0330	61	6445.	13.0	1243.7	20	JUL	0420	111	2743.	6.6	1242.0
20	JUL	0241	12	3335.	7.8	1242.4	20	JUL	0331	62	6364.	12.9	1243.7	20	JUL	0421	112	2707.	6.5	1242.0
20	JUL	0242	13	6225.	12.7	1243.6	20	JUL	0332	63	6284.	12.8	1243.7	20	JUL	0422	113	2671.	6.4	1242.0
20	JUL	0243	14	10367.	18.0	1244.9	20	JUL	0333	64	6204.	12.6	1243.6	20	JUL	0423	114	2637.	6.4	1242.0
20	JUL	0244	15	15155.	23.1	1246.1	20	JUL	0334	65	6125.	12.5	1243.6	20	JUL	0424	115	2603.	6.3	1242.0
20	JUL	0245	16	20096.	27.6	1247.2	20	JUL	0335	66	6046.	12.4	1243.6	20	JUL	0425	116	2570.	6.2	1241.9
20	JUL	0246	17	24748.	31.6	1248.1	20	JUL	0336	67	5967.	12.3	1243.5	20	JUL	0426	117	2538.	6.2	1241.9
20	JUL	0247	18	28856.	34.8	1248.8	20	JUL	0337	68	5888.	12.2	1243.5	20	JUL	0427	118	2506.	6.1	1241.9
20	JUL	0248	19	32338.	37.5	1249.4	20	JUL	0338	69	5810.	12.1	1243.5	20	JUL	0428	119	2475.	6.0	1241.8
20	JUL	0249	20	34839.	39.3	1249.8	20	JUL	0339	70	5733.	11.9	1243.5	20	JUL	0429	120	2444.	6.0	1241.8
20	JUL	0250	21	36077.	40.2	1250.0	20	JUL	0340	71	5657.	11.8	1243.4	20	JUL	0430	121	2413.	5.9	1241.8
20	JUL	0251	22	35915.	40.0	1250.0	20	JUL	0341	72	5583.	11.7	1243.4	20	JUL	0431	122	2383.	5.8	1241.8
20	JUL	0252	23	34601.	39.1	1249.8	20	JUL	0342	73	5510.	11.6	1243.4	20	JUL	0432	123	2353.	5.8	1241.7
20	JUL	0253	24	32563.	37.6	1249.5	20	JUL	0343	74	5436.	11.5	1243.4	20	JUL	0433	124	2324.	5.7	1241.7
20	JUL	0254	25	30134.	35.8	1249.0	20	JUL	0344	75	5360.	11.4	1243.3	20	JUL	0434	125	2294.	5.7	1241.7
20	JUL	0255	26	27553.	33.9	1248.6	20	JUL	0345	76	5284.	11.3	1243.3	20	JUL	0435	126	2265.	5.6	1241.6
20	JUL	0256	27	25155.	31.9	1248.2	20	JUL	0346	77	5206.	11.2	1243.3	20	JUL	0436	127	2236.	5.5	1241.6
20	JUL	0257	28	22840.	30.0	1247.7	20	JUL	0347	78	5128.	11.1	1243.3	20	JUL	0437	128	2206.	5.5	1241.6
20	JUL	0258	29	20756.	28.2	1247.3	20	JUL	0348	79	5050.	10.9	1243.2	20	JUL	0438	129	2178.	5.4	1241.5
20	JUL	0259	30	18963.	26.6	1246.9	20	JUL	0349	80	4971.	10.8	1243.2	20	JUL	0439	130	2150.	5.4	1241.5
20	JUL	0300	31	17375.	25.2	1246.6	20	JUL	0350	81	4893.	10.7	1243.2	20	JUL	0440	131	2123.	5.3	1241.5
20	JUL	0301	32	16018.	23.9	1246.3	20	JUL	0351	82	4816.	10.6	1243.1	20	JUL	0441	132	2097.	5.3	1241.5
20	JUL	0302	33	14893.	22.8	1246.0	20	JUL	0352	83	4740.	10.5	1243.1	20	JUL	0442	133	2071.	5.2	1241.4
20	JUL	0303	34	13862.	21.7	1245.8	20	JUL	0353	84	4666.	10.4	1243.1	20	JUL	0443	134	2047.	5.2	1241.4
20	JUL	0304	35	12969.	20.8	1245.6	20	JUL	0354	85	4592.	10.3	1243.1	20	JUL	0444	135	2022.	5.1	1241.4
20	JUL	0305	36	12205.	20.1	1245.4	20	JUL	0355	86	4516.	10.2	1243.0	20	JUL	0445	136	1998.	5.1	1241.4
20	JUL	0306	37	11535.	19.4	1245.2	20	JUL	0356	87	4452.	10.0	1243.0	20	JUL	0446	137	1974.	5.0	1241.3
20	JUL	0307	38	10985.	18.7	1245.1	20	JUL	0357	88	4380.	9.9	1243.0	20	JUL	0447	138	1952.	5.0	1241.3
20	JUL	0308	39	10458.	18.1	1244.9	20	JUL	0358	89	4299.	9.7	1242.9	20	JUL	0448	139	1928.	4.9	1241.3
20	JUL	0309	40	9983.	17.5	1244.8	20	JUL	0359	90	4212.	9.5	1242.9	20	JUL	0449	140	1905.	4.9	1241.3
20	JUL	0310	41	9561.	17.0	1244.7	20	JUL	0400	91	4120.	9.4	1242.8	20	JUL	0450	141	1880.	4.8	1241.2
20	JUL	0311	42	9188.	16.6	1244.6	20	JUL	0401	92	4024.	9.2	1242.8	20	JUL	0451	142	1855.	4.8	1241.2
20	JUL	0312	43	8865.	16.2	1244.5	20	JUL	0402	93	3927.	9.0	1242.7	20	JUL	0452	143	1830.	4.7	1241.2
20	JUL	0313	44	8592.	15.9	1244.4	20	JUL	0403	94	3831.	8.8	1242.6	20	JUL	0453	144	1804.	4.7	1241.2
20	JUL	0314	45	8358.	15.6	1244.3	20	JUL	0404	95	3736.	8.6	1242.6	20	JUL	0454	145	1777.	4.6	1241.1
20	JUL	0315	46	8151.	15.3	1244.3	20	JUL	0405	96	3645.	8.4	1242.5	20	JUL	0455	146	1750.	4.6	1241.1
20	JUL	0316	47	7965.	15.1	1244.2	20	JUL	0406	97	3559.	8.2	1242.5	20	JUL	0456	147	1723.	4.5	1241.1
20	JUL	0317	48	7797.	14.9	1244.2	20	JUL	0407	98	3478.	8.1	1242.4	20	JUL	0457	148	1695.	4.4	1241.1
20	JUL	0318	49	7645.	14.7	1244.1	20	JUL	0408	99	3401.	7.9	1242.4	20	JUL	0458	149	1667.	4.4	1241.0

20 JUL 0319 50 7523. 14.6 1244.1 * 20 JUL 0409 100 3327. 7.8 1242.4 * 20 JUL 0459 150 1639. 4.3 1241.0

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
36077.	0.33	(CFS)	7102.	7102.	7102.	7102.
		(INCHES)	1.366	1.366	1.366	1.366
		(AC-FT)	1458.	1458.	1458.	1458.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
40.	0.33	12.	12.	12.	12.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1250.03	0.33	1243.09	1243.09	1243.09	1243.09

CUMULATIVE AREA = 20.00 SQ MI

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69 KK

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HYDROGRAPH ROUTING DATA

70 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

71 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.045	LEFT OVERBANK N-VALUE
ANCH	0.045	MAIN CHANNEL N-VALUE
ANR	0.045	RIGHT OVERBANK N-VALUE
RLNTH	465.	REACH LENGTH
SEL	0.0205	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

--- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---

73 RY	ELEVATION	1250.50	1234.20	1234.20	1232.30	1232.60	1239.20	1242.20	1250.50
72 RX	DISTANCE	0.0	10.00	20.00	30.00	67.00	83.00	107.00	120.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.35	0.84	1.47	2.14	2.84	3.57	4.32	5.13	6.01
OUTFLOW	0.0	128.28	489.75	1124.33	1987.37	3053.40	4310.35	5751.48	7494.35	9490.55
ELEVATION	1232.30	1233.26	1234.22	1235.17	1236.13	1237.09	1238.05	1239.00	1239.96	1240.92

STORAGE	6.98	8.03	9.09	10.18	11.29	12.42	13.57	14.75	15.94	17.16
OUTFLOW	11734.20	14264.03	17059.57	20097.44	23370.61	26874.26	30604.92	34560.13	38738.08	43137.37
ELEVATION	1241.88	1242.84	1243.79	1244.75	1245.71	1246.67	1247.62	1248.58	1249.54	1250.50

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1987. TO 43137.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH10

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DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
20 JUL 0230	1	0.	0.0	1232.3	20 JUL 0320	51	7441.	5.1	1239.9	20 JUL 0410	101	3286.	3.0	1237.3
20 JUL 0231	2	0.	0.0	1232.3	20 JUL 0321	52	7321.	5.0	1239.9	20 JUL 0411	102	3217.	2.9	1237.2
20 JUL 0232	3	0.	0.0	1232.3	20 JUL 0322	53	7207.	5.0	1239.8	20 JUL 0412	103	3152.	2.9	1237.2
20 JUL 0233	4	0.	0.0	1232.3	20 JUL 0323	54	7100.	4.9	1239.7	20 JUL 0413	104	3091.	2.9	1237.1
20 JUL 0234	5	0.	0.0	1232.3	20 JUL 0324	55	6999.	4.9	1239.7	20 JUL 0414	105	3035.	2.8	1237.1
20 JUL 0235	6	0.	0.0	1232.3	20 JUL 0325	56	6904.	4.9	1239.6	20 JUL 0415	106	2984.	2.8	1237.0
20 JUL 0236	7	1.	0.0	1232.3	20 JUL 0326	57	6813.	4.8	1239.6	20 JUL 0416	107	2933.	2.8	1237.0
20 JUL 0237	8	6.	0.0	1232.3	20 JUL 0327	58	6725.	4.8	1239.5	20 JUL 0417	108	2886.	2.7	1236.9
20 JUL 0238	9	30.	0.1	1232.5	20 JUL 0328	59	6640.	4.7	1239.5	20 JUL 0418	109	2842.	2.7	1236.9
20 JUL 0239	10	141.	0.4	1233.3	20 JUL 0329	60	6556.	4.7	1239.4	20 JUL 0419	110	2801.	2.7	1236.9
20 JUL 0240	11	755.	1.1	1234.6	20 JUL 0330	61	6473.	4.7	1239.4	20 JUL 0420	111	2761.	2.6	1236.8
20 JUL 0241	12	2279.	2.3	1236.4	20 JUL 0331	62	6391.	4.6	1239.4	20 JUL 0421	112	2724.	2.6	1236.8
20 JUL 0242	13	4980.	3.9	1238.5	20 JUL 0332	63	6311.	4.6	1239.3	20 JUL 0422	113	2688.	2.6	1236.8
20 JUL 0243	14	8930.	5.8	1240.7	20 JUL 0333	64	6231.	4.5	1239.3	20 JUL 0423	114	2653.	2.6	1236.7
20 JUL 0244	15	13665.	7.8	1242.6	20 JUL 0334	65	6151.	4.5	1239.2	20 JUL 0424	115	2619.	2.6	1236.7
20 JUL 0245	16	18782.	9.7	1244.3	20 JUL 0335	66	6072.	4.5	1239.2	20 JUL 0425	116	2586.	2.5	1236.7
20 JUL 0246	17	23640.	11.4	1245.8	20 JUL 0336	67	5993.	4.4	1239.1	20 JUL 0426	117	2553.	2.5	1236.6
20 JUL 0247	18	27961.	12.8	1246.9	20 JUL 0337	68	5915.	4.4	1239.1	20 JUL 0427	118	2521.	2.5	1236.6
20 JUL 0248	19	31613.	13.9	1247.9	20 JUL 0338	69	5837.	4.4	1239.1	20 JUL 0428	119	2490.	2.5	1236.6
20 JUL 0249	20	34374.	14.7	1248.5	20 JUL 0339	70	5759.	4.3	1239.0	20 JUL 0429	120	2459.	2.4	1236.6
20 JUL 0250	21	35903.	15.1	1248.9	20 JUL 0340	71	5686.	4.3	1239.0	20 JUL 0430	121	2428.	2.4	1236.5
20 JUL 0251	22	36034.	15.2	1248.9	20 JUL 0341	72	5611.	4.2	1238.9	20 JUL 0431	122	2397.	2.4	1236.5
20 JUL 0252	23	34937.	14.9	1248.7	20 JUL 0342	73	5538.	4.2	1238.9	20 JUL 0432	123	2367.	2.4	1236.5
20 JUL 0253	24	33038.	14.3	1248.2	20 JUL 0343	74	5464.	4.2	1238.8	20 JUL 0433	124	2338.	2.4	1236.4
20 JUL 0254	25	30676.	13.6	1247.6	20 JUL 0344	75	5389.	4.1	1238.8	20 JUL 0434	125	2308.	2.4	1236.4
20 JUL 0255	26	28145.	12.8	1247.0	20 JUL 0345	76	5313.	4.1	1238.7	20 JUL 0435	126	2279.	2.3	1236.4
20 JUL 0256	27	25689.	12.0	1246.3	20 JUL 0346	77	5236.	4.1	1238.7	20 JUL 0436	127	2249.	2.3	1236.4
20 JUL 0257	28	23386.	11.3	1245.7	20 JUL 0347	78	5158.	4.0	1238.6	20 JUL 0437	128	2220.	2.3	1236.3
20 JUL 0258	29	21258.	10.6	1245.1	20 JUL 0348	79	5080.	4.0	1238.6	20 JUL 0438	129	2191.	2.3	1236.3
20 JUL 0259	30	19397.	9.9	1244.5	20 JUL 0349	80	5001.	3.9	1238.5	20 JUL 0439	130	2163.	2.3	1236.3
20 JUL 0300	31	17781.	9.4	1244.0	20 JUL 0350	81	4923.	3.9	1238.5	20 JUL 0440	131	2136.	2.2	1236.3
20 JUL 0301	32	16369.	8.8	1243.6	20 JUL 0351	82	4846.	3.8	1238.4	20 JUL 0441	132	2109.	2.2	1236.2
20 JUL 0302	33	15193.	8.4	1243.2	20 JUL 0352	83	4769.	3.8	1238.4	20 JUL 0442	133	2083.	2.2	1236.2
20 JUL 0303	34	14147.	8.0	1242.8	20 JUL 0353	84	4694.	3.8	1238.3	20 JUL 0443	134	2058.	2.2	1236.2
20 JUL 0304	35	13232.	7.6	1242.4	20 JUL 0354	85	4620.	3.7	1238.3	20 JUL 0444	135	2034.	2.2	1236.2
20 JUL 0305	36	12425.	7.3	1242.1	20 JUL 0355	86	4545.	3.7	1238.2	20 JUL 0445	136	2009.	2.2	1236.2
20 JUL 0306	37	11730.	7.0	1241.9	20 JUL 0356	87	4476.	3.7	1238.2	20 JUL 0446	137	1986.	2.1	1236.1
20 JUL 0307	38	11152.	6.7	1241.6	20 JUL 0357	88	4408.	3.6	1238.1	20 JUL 0447	138	1964.	2.1	1236.1
20 JUL 0308	39	10623.	6.5	1241.4	20 JUL 0358	89	4330.	3.6	1238.1	20 JUL 0448	139	1941.	2.1	1236.1
20 JUL 0309	40	10129.	6.3	1241.2	20 JUL 0359	90	4248.	3.5	1238.0	20 JUL 0449	140	1918.	2.1	1236.1
20 JUL 0310	41	9690.	6.1	1241.0	20 JUL 0400	91	4159.	3.5	1237.9	20 JUL 0450	141	1894.	2.1	1236.0
20 JUL 0311	42	9304.	5.9	1240.8	20 JUL 0401	92	4064.	3.4	1237.9	20 JUL 0451	142	1869.	2.0	1236.0
20 JUL 0312	43	8967.	5.8	1240.7	20 JUL 0402	93	3968.	3.4	1237.8	20 JUL 0452	143	1844.	2.0	1236.0
20 JUL 0313	44	8677.	5.7	1240.5	20 JUL 0403	94	3871.	3.3	1237.7	20 JUL 0453	144	1818.	2.0	1235.9

20 JUL 0314	45	8431.	5.5	1240.4	*	20 JUL 0404	95	3776.	3.3	1237.6	*	20 JUL 0454	145	1792.	2.0	1235.9
20 JUL 0315	46	8216.	5.4	1240.3	*	20 JUL 0405	96	3683.	3.2	1237.6	*	20 JUL 0455	146	1765.	2.0	1235.9
20 JUL 0316	47	8023.	5.4	1240.2	*	20 JUL 0406	97	3595.	3.2	1237.5	*	20 JUL 0456	147	1738.	1.9	1235.9
20 JUL 0317	48	7850.	5.3	1240.1	*	20 JUL 0407	98	3512.	3.1	1237.4	*	20 JUL 0457	148	1711.	1.9	1235.8
20 JUL 0318	49	7693.	5.2	1240.1	*	20 JUL 0408	99	3433.	3.1	1237.4	*	20 JUL 0458	149	1683.	1.9	1235.8
20 JUL 0319	50	7560.	5.2	1240.0	*	20 JUL 0409	100	3358.	3.0	1237.3	*	20 JUL 0459	150	1655.	1.9	1235.8
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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
36034.	0.35	(CFS)	7093.	7093.	7093.	7093.
		(INCHES)	1.365	1.365	1.365	1.365
		(AC-FT)	1456.	1456.	1456.	1456.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
15.	0.35	4.	4.	4.	4.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1248.92	0.35	1238.72	1238.72	1238.72	1238.72

CUMULATIVE AREA = 20.00 SQ MI

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74 KK     *    RCH11   *
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HYDROGRAPH ROUTING DATA

75 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

76 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.050	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	650.	REACH LENGTH
SEL	0.0114	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
78 RY	ELEVATION	1240.80	1228.00	1228.70	1224.00	1224.00	1229.80	1236.00	1240.80
77 RX	DISTANCE	0.0	3.00	31.00	43.00	85.00	133.00	142.50	148.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.25	0.69	1.31	2.13	3.18	4.70	6.40	8.14	9.90
OUTFLOW	0.0	39.93	160.48	384.38	733.93	1233.71	1988.69	3088.70	4530.32	6193.55
ELEVATION	1224.00	1224.88	1225.77	1226.65	1227.54	1228.42	1229.30	1230.19	1231.07	1231.96
STORAGE	11.68	13.48	15.31	17.15	19.01	20.89	22.79	24.70	26.63	28.57
OUTFLOW	8064.77	10133.70	12392.23	14833.80	17454.11	20247.52	23207.68	26330.71	29613.25	33052.34
ELEVATION	1232.84	1233.72	1234.61	1235.49	1236.38	1237.26	1238.14	1239.03	1239.91	1240.80

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 17454. TO 33052.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH11

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1224.0	20	JUL	0320	51	7525.	11.2	1232.6	20	JUL	0410	101	3350.	6.7	1230.3
20	JUL	0231	2	0.	0.0	1224.0	20	JUL	0321	52	7404.	11.1	1232.5	20	JUL	0411	102	3279.	6.6	1230.3
20	JUL	0232	3	0.	0.0	1224.0	20	JUL	0322	53	7287.	10.9	1232.5	20	JUL	0412	103	3210.	6.5	1230.3
20	JUL	0233	4	0.	0.0	1224.0	20	JUL	0323	54	7175.	10.8	1232.4	20	JUL	0413	104	3146.	6.5	1230.2
20	JUL	0234	5	0.	0.0	1224.0	20	JUL	0324	55	7070.	10.7	1232.4	20	JUL	0414	105	3086.	6.4	1230.2
20	JUL	0235	6	0.	0.0	1224.0	20	JUL	0325	56	6971.	10.6	1232.3	20	JUL	0415	106	3039.	6.3	1230.1
20	JUL	0236	7	0.	0.0	1224.0	20	JUL	0326	57	6877.	10.6	1232.3	20	JUL	0416	107	2989.	6.2	1230.1
20	JUL	0237	8	1.	0.0	1224.0	20	JUL	0327	58	6787.	10.5	1232.2	20	JUL	0417	108	2940.	6.2	1230.1
20	JUL	0238	9	4.	0.0	1224.1	20	JUL	0328	59	6699.	10.4	1232.2	20	JUL	0418	109	2893.	6.1	1230.0
20	JUL	0239	10	20.	0.1	1224.5	20	JUL	0329	60	6614.	10.3	1232.2	20	JUL	0419	110	2849.	6.0	1230.0
20	JUL	0240	11	145.	0.6	1225.7	20	JUL	0330	61	6530.	10.2	1232.1	20	JUL	0420	111	2807.	6.0	1230.0
20	JUL	0241	12	731.	2.1	1227.5	20	JUL	0331	62	6448.	10.1	1232.1	20	JUL	0421	112	2767.	5.9	1229.9
20	JUL	0242	13	2232.	5.1	1229.5	20	JUL	0332	63	6367.	10.1	1232.0	20	JUL	0422	113	2729.	5.8	1229.9
20	JUL	0243	14	5595.	9.3	1231.6	20	JUL	0333	64	6286.	10.0	1232.0	20	JUL	0423	114	2693.	5.8	1229.9
20	JUL	0244	15	10477.	13.8	1233.9	20	JUL	0334	65	6206.	9.9	1232.0	20	JUL	0424	115	2658.	5.7	1229.8
20	JUL	0245	16	15925.	17.9	1235.9	20	JUL	0335	66	6131.	9.8	1231.9	20	JUL	0425	116	2624.	5.7	1229.8
20	JUL	0246	17	21254.	21.5	1237.6	20	JUL	0336	67	6054.	9.8	1231.9	20	JUL	0426	117	2590.	5.6	1229.8
20	JUL	0247	18	26025.	24.5	1238.9	20	JUL	0337	68	5975.	9.7	1231.8	20	JUL	0427	118	2558.	5.6	1229.8
20	JUL	0248	19	30088.	26.9	1240.0	20	JUL	0338	69	5897.	9.6	1231.8	20	JUL	0428	119	2525.	5.5	1229.7
20	JUL	0249	20	33280.	28.7	1240.9	20	JUL	0339	70	5819.	9.5	1231.8	20	JUL	0429	120	2494.	5.5	1229.7
20	JUL	0250	21	35322.	29.9	1241.4	20	JUL	0340	71	5743.	9.4	1231.7	20	JUL	0430	121	2463.	5.4	1229.7
20	JUL	0251	22	36032.	30.3	1241.6	20	JUL	0341	72	5669.	9.3	1231.7	20	JUL	0431	122	2432.	5.4	1229.7
20	JUL	0252	23	35432.	29.9	1241.4	20	JUL	0342	73	5594.	9.3	1231.6	20	JUL	0432	123	2401.	5.3	1229.6
20	JUL	0253	24	33846.	29.0	1241.0	20	JUL	0343	74	5521.	9.2	1231.6	20	JUL	0433	124	2371.	5.3	1229.6
20	JUL	0254	25	31662.	27.8	1240.4	20	JUL	0344	75	5446.	9.1	1231.6	20	JUL	0434	125	2341.	5.2	1229.6
20	JUL	0255	26	29196.	26.4	1239.8	20	JUL	0345	76	5371.	9.0	1231.5	20	JUL	0435	126	2312.	5.2	1229.6
20	JUL	0256	27	26736.	24.9	1239.1	20	JUL	0346	77	5295.	8.9	1231.5	20	JUL	0436	127	2282.	5.2	1229.5
20	JUL	0257	28	24400.	23.5	1238.5	20	JUL	0347	78	5218.	8.9	1231.4	20	JUL	0437	128	2253.	5.1	1229.5
20	JUL	0258	29	22221.	22.2	1237.8	20	JUL	0348	79	5140.	8.8	1231.4	20	JUL	0438	129	2224.	5.1	1229.5
20	JUL	0259	30	20258.	20.9	1237.3	20	JUL	0349	80	5062.	8.7	1231.4	20	JUL	0439	130	2195.	5.0	1229.5
20	JUL	0300	31	18569.	19.8	1236.7	20	JUL	0350	81	4983.	8.6	1231.3	20	JUL	0440	131	2167.	5.0	1229.4
20	JUL	0301	32	17069.	18.7	1236.2	20	JUL	0351	82	4905.	8.5	1231.3	20	JUL	0441	132	2139.	4.9	1229.4
20	JUL	0302	33	15802.	17.8	1235.8	20	JUL	0352	83	4828.	8.5	1231.2	20	JUL	0442	133	2113.	4.9	1229.4
20	JUL	0303	34	14692.	17.0	1235.4	20	JUL	0353	84	4752.	8.4	1231.2	20	JUL	0443	134	2087.	4.9	1229.4
20	JUL	0304	35	13735.	16.3	1235.1	20	JUL	0354	85	4677.	8.3	1231.2	20	JUL	0444	135	2062.	4.8	1229.4
20	JUL	0305	36	12870.	15.7	1234.8	20	JUL	0355	86	4603.	8.2	1231.1	20	JUL	0445	136	2037.	4.8	1229.3
20	JUL	0306	37	12124.	15.1	1234.5	20	JUL	0356	87	4530.	8.1	1231.1	20	JUL	0446	137	2012.	4.7	1229.3
20	JUL	0307	38	11495.	14.6	1234.3	20	JUL	0357	88	4466.	8.1	1231.0	20	JUL	0447	138	1989.	4.7	1229.3
20	JUL	0308	39	10936.	14.1	1234.0	20	JUL	0358	89	4396.	8.0	1231.0	20	JUL	0448	139	1971.	4.7	1229.3

DA	MON	HRMN	ORD	FLOW			*	DA	MON	HRMN	ORD	FLOW			*	DA	MON	HRMN	ORD	FLOW		
20	JUL	0309	40	10420.	13.7	1233.8	*	20	JUL	0359	90	4319.	7.9	1230.9	*	20	JUL	0449	140	1950.	4.6	1229.3
20	JUL	0310	41	9957.	13.3	1233.6	*	20	JUL	0400	91	4235.	7.8	1230.9	*	20	JUL	0450	141	1928.	4.6	1229.2
20	JUL	0311	42	9551.	13.0	1233.5	*	20	JUL	0401	92	4145.	7.7	1230.8	*	20	JUL	0451	142	1904.	4.5	1229.2
20	JUL	0312	43	9184.	12.7	1233.3	*	20	JUL	0402	93	4051.	7.6	1230.8	*	20	JUL	0452	143	1880.	4.5	1229.2
20	JUL	0313	44	8864.	12.4	1233.2	*	20	JUL	0403	94	3955.	7.4	1230.7	*	20	JUL	0453	144	1855.	4.4	1229.1
20	JUL	0314	45	8590.	12.1	1233.1	*	20	JUL	0404	95	3859.	7.3	1230.7	*	20	JUL	0454	145	1830.	4.4	1229.1
20	JUL	0315	46	8355.	11.9	1233.0	*	20	JUL	0405	96	3765.	7.2	1230.6	*	20	JUL	0455	146	1804.	4.3	1229.1
20	JUL	0316	47	8147.	11.8	1232.9	*	20	JUL	0406	97	3673.	7.1	1230.5	*	20	JUL	0456	147	1777.	4.3	1229.1
20	JUL	0317	48	7966.	11.6	1232.8	*	20	JUL	0407	98	3586.	7.0	1230.5	*	20	JUL	0457	148	1750.	4.2	1229.0
20	JUL	0318	49	7803.	11.4	1232.7	*	20	JUL	0408	99	3504.	6.9	1230.4	*	20	JUL	0458	149	1723.	4.2	1229.0
20	JUL	0319	50	7655.	11.3	1232.6	*	20	JUL	0409	100	3425.	6.8	1230.4	*	20	JUL	0459	150	1695.	4.1	1229.0

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
36032.	0.35	(CFS)	7073.	7073.	7073.	7073.
		(INCHES)	1.361	1.361	1.361	1.361
		(AC-FT)	1452.	1452.	1452.	1452.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
30.	0.35	9.	9.	9.	9.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1241.56	0.35	1231.47	1231.47	1231.47	1231.47

CUMULATIVE AREA = 20.00 SQ MI

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              *            *
  79 KK       *            *      WILDCAT RUN INFLOW HYDROGRAPH
              *            *
              **************

   8 IN             TIME DATA FOR INPUT TIME SERIES
                          JXMIN          30  TIME INTERVAL IN MINUTES
                          JXDATE    20JUL77  STARTING DATE
                          JXTIME        230  STARTING TIME

                  SUBBASIN RUNOFF DATA

  80 BA             SUBBASIN CHARACTERISTICS
                          TAREA       10.00  SUBBASIN AREA
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HYDROGRAPH AT STATION

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DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW	*	DA MON HRMN	ORD	FLOW

20 JUL 0230	1	720.	20 JUL 0308	39	1013.	20 JUL 0346	77	2027.	20 JUL 0424	115	1720.
20 JUL 0231	2	723.	20 JUL 0309	40	1040.	20 JUL 0347	78	2053.	20 JUL 0425	116	1692.
20 JUL 0232	3	725.	20 JUL 0310	41	1067.	20 JUL 0348	79	2080.	20 JUL 0426	117	1663.
20 JUL 0233	4	728.	20 JUL 0311	42	1093.	20 JUL 0349	80	2107.	20 JUL 0427	118	1635.
20 JUL 0234	5	731.	20 JUL 0312	43	1120.	20 JUL 0350	81	2133.	20 JUL 0428	119	1607.
20 JUL 0235	6	733.	20 JUL 0313	44	1147.	20 JUL 0351	82	2160.	20 JUL 0429	120	1578.
20 JUL 0236	7	736.	20 JUL 0314	45	1173.	20 JUL 0352	83	2187.	20 JUL 0430	121	1550.
20 JUL 0237	8	739.	20 JUL 0315	46	1200.	20 JUL 0353	84	2213.	20 JUL 0431	122	1522.
20 JUL 0238	9	741.	20 JUL 0316	47	1227.	20 JUL 0354	85	2240.	20 JUL 0432	123	1493.
20 JUL 0239	10	744.	20 JUL 0317	48	1253.	20 JUL 0355	86	2267.	20 JUL 0433	124	1465.
20 JUL 0240	11	747.	20 JUL 0318	49	1280.	20 JUL 0356	87	2293.	20 JUL 0434	125	1437.
20 JUL 0241	12	749.	20 JUL 0319	50	1307.	20 JUL 0357	88	2320.	20 JUL 0435	126	1408.
20 JUL 0242	13	752.	20 JUL 0320	51	1333.	20 JUL 0358	89	2347.	20 JUL 0436	127	1380.
20 JUL 0243	14	755.	20 JUL 0321	52	1360.	20 JUL 0359	90	2373.	20 JUL 0437	128	1352.
20 JUL 0244	15	757.	20 JUL 0322	53	1387.	20 JUL 0400	91	2400.	20 JUL 0438	129	1323.
20 JUL 0245	16	760.	20 JUL 0323	54	1413.	20 JUL 0401	92	2372.	20 JUL 0439	130	1295.
20 JUL 0246	17	763.	20 JUL 0324	55	1440.	20 JUL 0402	93	2343.	20 JUL 0440	131	1267.
20 JUL 0247	18	765.	20 JUL 0325	56	1467.	20 JUL 0403	94	2315.	20 JUL 0441	132	1238.
20 JUL 0248	19	768.	20 JUL 0326	57	1493.	20 JUL 0404	95	2287.	20 JUL 0442	133	1210.
20 JUL 0249	20	771.	20 JUL 0327	58	1520.	20 JUL 0405	96	2258.	20 JUL 0443	134	1182.
20 JUL 0250	21	773.	20 JUL 0328	59	1547.	20 JUL 0406	97	2230.	20 JUL 0444	135	1153.
20 JUL 0251	22	776.	20 JUL 0329	60	1573.	20 JUL 0407	98	2202.	20 JUL 0445	136	1125.
20 JUL 0252	23	779.	20 JUL 0330	61	1600.	20 JUL 0408	99	2173.	20 JUL 0446	137	1097.
20 JUL 0253	24	781.	20 JUL 0331	62	1627.	20 JUL 0409	100	2145.	20 JUL 0447	138	1068.
20 JUL 0254	25	784.	20 JUL 0332	63	1653.	20 JUL 0410	101	2117.	20 JUL 0448	139	1040.
20 JUL 0255	26	787.	20 JUL 0333	64	1680.	20 JUL 0411	102	2088.	20 JUL 0449	140	1012.
20 JUL 0256	27	789.	20 JUL 0334	65	1707.	20 JUL 0412	103	2060.	20 JUL 0450	141	983.
20 JUL 0257	28	792.	20 JUL 0335	66	1733.	20 JUL 0413	104	2032.	20 JUL 0451	142	955.
20 JUL 0258	29	795.	20 JUL 0336	67	1760.	20 JUL 0414	105	2003.	20 JUL 0452	143	927.
20 JUL 0259	30	797.	20 JUL 0337	68	1787.	20 JUL 0415	106	1975.	20 JUL 0453	144	898.
20 JUL 0300	31	800.	20 JUL 0338	69	1813.	20 JUL 0416	107	1947.	20 JUL 0454	145	870.
20 JUL 0301	32	827.	20 JUL 0339	70	1840.	20 JUL 0417	108	1918.	20 JUL 0455	146	842.
20 JUL 0302	33	853.	20 JUL 0340	71	1867.	20 JUL 0418	109	1890.	20 JUL 0456	147	813.
20 JUL 0303	34	880.	20 JUL 0341	72	1893.	20 JUL 0419	110	1862.	20 JUL 0457	148	785.
20 JUL 0304	35	907.	20 JUL 0342	73	1920.	20 JUL 0420	111	1833.	20 JUL 0458	149	757.
20 JUL 0305	36	933.	20 JUL 0343	74	1947.	20 JUL 0421	112	1805.	20 JUL 0459	150	728.
20 JUL 0306	37	960.	20 JUL 0344	75	1973.	20 JUL 0422	113	1777.			
20 JUL 0307	38	987.	20 JUL 0345	76	2000.	20 JUL 0423	114	1748.			

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
2400.	1.50	(CFS)	1417.	1417.	1417.	1417.
		(INCHES)	0.545	0.545	0.545	0.545
		(AC-FT)	291.	291.	291.	291.

CUMULATIVE AREA = 10.00 SQ MI

83 KK — COMBINATION OF WILD CAT RUN WITH MAIN FLOW

84 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION
SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
20	JUL	0230	1	720.	20	JUL	0308	39	11949.	20	JUL	0346	77	7321.	20	JUL	0424	115	4378.
20	JUL	0231	2	723.	20	JUL	0309	40	11460.	20	JUL	0347	78	7271.	20	JUL	0425	116	4315.
20	JUL	0232	3	725.	20	JUL	0310	41	11024.	20	JUL	0348	79	7220.	20	JUL	0426	117	4254.
20	JUL	0233	4	728.	20	JUL	0311	42	10644.	20	JUL	0349	80	7168.	20	JUL	0427	118	4193.
20	JUL	0234	5	731.	20	JUL	0312	43	10304.	20	JUL	0350	81	7117.	20	JUL	0428	119	4132.
20	JUL	0235	6	733.	20	JUL	0313	44	10011.	20	JUL	0351	82	7065.	20	JUL	0429	120	4072.
20	JUL	0236	7	736.	20	JUL	0314	45	9764.	20	JUL	0352	83	7015.	20	JUL	0430	121	4013.
20	JUL	0237	8	740.	20	JUL	0315	46	9555.	20	JUL	0353	84	6965.	20	JUL	0431	122	3953.
20	JUL	0238	9	746.	20	JUL	0316	47	9374.	20	JUL	0354	85	6917.	20	JUL	0432	123	3895.
20	JUL	0239	10	764.	20	JUL	0317	48	9220.	20	JUL	0355	86	6869.	20	JUL	0433	124	3836.
20	JUL	0240	11	891.	20	JUL	0318	49	9083.	20	JUL	0356	87	6823.	20	JUL	0434	125	3778.
20	JUL	0241	12	1480.	20	JUL	0319	50	8961.	20	JUL	0357	88	6786.	20	JUL	0435	126	3720.
20	JUL	0242	13	2984.	20	JUL	0320	51	8859.	20	JUL	0358	89	6742.	20	JUL	0436	127	3662.
20	JUL	0243	14	6350.	20	JUL	0321	52	8764.	20	JUL	0359	90	6692.	20	JUL	0437	128	3605.
20	JUL	0244	15	11234.	20	JUL	0322	53	8673.	20	JUL	0400	91	6635.	20	JUL	0438	129	3547.
20	JUL	0245	16	16685.	20	JUL	0323	54	8588.	20	JUL	0401	92	6517.	20	JUL	0439	130	3490.
20	JUL	0246	17	22016.	20	JUL	0324	55	8510.	20	JUL	0402	93	6395.	20	JUL	0440	131	3434.
20	JUL	0247	18	26791.	20	JUL	0325	56	8437.	20	JUL	0403	94	6270.	20	JUL	0441	132	3378.
20	JUL	0248	19	30856.	20	JUL	0326	57	8370.	20	JUL	0404	95	6146.	20	JUL	0442	133	3323.
20	JUL	0249	20	34050.	20	JUL	0327	58	8306.	20	JUL	0405	96	6023.	20	JUL	0443	134	3269.
20	JUL	0250	21	36095.	20	JUL	0328	59	8246.	20	JUL	0406	97	5903.	20	JUL	0444	135	3215.
20	JUL	0251	22	36808.	20	JUL	0329	60	8187.	20	JUL	0407	98	5788.	20	JUL	0445	136	3162.
20	JUL	0252	23	36211.	20	JUL	0330	61	8130.	20	JUL	0408	99	5677.	20	JUL	0446	137	3109.
20	JUL	0253	24	34627.	20	JUL	0331	62	8075.	20	JUL	0409	100	5570.	20	JUL	0447	138	3058.
20	JUL	0254	25	32446.	20	JUL	0332	63	8020.	20	JUL	0410	101	5467.	20	JUL	0448	139	3011.
20	JUL	0255	26	29983.	20	JUL	0333	64	7966.	20	JUL	0411	102	5367.	20	JUL	0449	140	2962.
20	JUL	0256	27	27525.	20	JUL	0334	65	7913.	20	JUL	0412	103	5270.	20	JUL	0450	141	2911.
20	JUL	0257	28	25192.	20	JUL	0335	66	7864.	20	JUL	0413	104	5178.	20	JUL	0451	142	2859.
20	JUL	0258	29	23016.	20	JUL	0336	67	7814.	20	JUL	0414	105	5090.	20	JUL	0452	143	2807.
20	JUL	0259	30	21056.	20	JUL	0337	68	7762.	20	JUL	0415	106	5014.	20	JUL	0453	144	2754.
20	JUL	0300	31	19369.	20	JUL	0338	69	7710.	20	JUL	0416	107	4936.	20	JUL	0454	145	2700.
20	JUL	0301	32	17895.	20	JUL	0339	70	7659.	20	JUL	0417	108	4858.	20	JUL	0455	146	2645.
20	JUL	0302	33	16655.	20	JUL	0340	71	7610.	20	JUL	0418	109	4783.	20	JUL	0456	147	2591.
20	JUL	0303	34	15572.	20	JUL	0341	72	7562.	20	JUL	0419	110	4710.	20	JUL	0457	148	2535.
20	JUL	0304	35	14642.	20	JUL	0342	73	7514.	20	JUL	0420	111	4640.	20	JUL	0458	149	2480.
20	JUL	0305	36	13803.	20	JUL	0343	74	7467.	20	JUL	0421	112	4572.	20	JUL	0459	150	2424.
20	JUL	0306	37	13084.	20	JUL	0344	75	7420.	20	JUL	0422	113	4506.					
20	JUL	0307	38	12482.	20	JUL	0345	76	7371.	20	JUL	0423	114	4441.					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
36808.	0.35	(CFS)	8489.	8489.	8489.	8489.
		(INCHES)	1.089	1.089	1.089	1.089
		(AC-FT)	1742.	1742.	1742.	1742.

CUMULATIVE AREA = 30.00 SQ MI

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85 KK RCH12

HYDROGRAPH ROUTING DATA

86 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

87 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.050	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	435.	REACH LENGTH
SEL	0.0137	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---			
89 RY	ELEVATION	1232.40	1228.40	1216.10	1216.10	1220.50	1221.60	1222.00	1232.60
88 RX	DISTANCE	0.0	5.00	49.00	63.00	100.00	150.00	220.00	234.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	0.17	0.42	0.77	1.21	1.74	2.47	3.77	5.46	7.19
OUTFLOW	0.0	45.56	169.78	385.68	708.98	1154.89	1512.40	2505.96	4131.16	6188.43
ELEVATION	1216.10	1216.97	1217.84	1218.71	1219.57	1220.44	1221.31	1222.18	1223.05	1223.92
STORAGE	8.96	10.76	12.60	14.48	16.39	18.33	20.30	22.28	24.28	26.31
OUTFLOW	8635.22	11447.76	14610.20	18111.17	21942.24	26162.88	30703.76	35543.23	40674.54	46119.91
ELEVATION	1224.78	1225.65	1226.52	1227.39	1228.26	1229.13	1229.99	1230.86	1231.73	1232.60

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 8635. TO 46120.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH12

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DA MON HRMN ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN ORD	OUTFLOW	STORAGE	STAGE

20 JUL 0230	1	0.	0.0	1216.1	*	20 JUL 0320	51	8906.	9.1	1224.9	*	20 JUL 0410	101	5530.	6.6	1223.6
20 JUL 0231	2	367.	0.7	1218.6	*	20 JUL 0321	52	8808.	9.1	1224.8	*	20 JUL 0411	102	5428.	6.6	1223.6
20 JUL 0232	3	606.	1.1	1219.3	*	20 JUL 0322	53	8716.	9.0	1224.8	*	20 JUL 0412	103	5329.	6.5	1223.6
20 JUL 0233	4	687.	1.2	1219.5	*	20 JUL 0323	54	8628.	9.0	1224.8	*	20 JUL 0413	104	5234.	6.4	1223.5
20 JUL 0234	5	716.	1.2	1219.6	*	20 JUL 0324	55	8551.	8.9	1224.8	*	20 JUL 0414	105	5144.	6.3	1223.5
20 JUL 0235	6	728.	1.2	1219.6	*	20 JUL 0325	56	8475.	8.8	1224.7	*	20 JUL 0415	106	5061.	6.2	1223.4
20 JUL 0236	7	733.	1.2	1219.6	*	20 JUL 0326	57	8405.	8.8	1224.7	*	20 JUL 0416	107	4983.	6.2	1223.4
20 JUL 0237	8	737.	1.2	1219.6	*	20 JUL 0327	58	8340.	8.7	1224.7	*	20 JUL 0417	108	4906.	6.1	1223.4
20 JUL 0238	9	741.	1.2	1219.6	*	20 JUL 0328	59	8278.	8.7	1224.7	*	20 JUL 0418	109	4829.	6.1	1223.3
20 JUL 0239	10	751.	1.3	1219.7	*	20 JUL 0329	60	8218.	8.7	1224.6	*	20 JUL 0419	110	4755.	6.0	1223.3
20 JUL 0240	11	808.	1.3	1219.8	*	20 JUL 0330	61	8160.	8.6	1224.6	*	20 JUL 0420	111	4683.	5.9	1223.3
20 JUL 0241	12	1086.	1.7	1220.3	*	20 JUL 0331	62	8104.	8.6	1224.6	*	20 JUL 0421	112	4614.	5.9	1223.3
20 JUL 0242	13	1745.	2.8	1221.5	*	20 JUL 0332	63	8049.	8.5	1224.6	*	20 JUL 0422	113	4547.	5.8	1223.2
20 JUL 0243	14	3955.	5.3	1223.0	*	20 JUL 0333	64	7994.	8.5	1224.6	*	20 JUL 0423	114	4481.	5.8	1223.2
20 JUL 0244	15	8466.	8.8	1224.7	*	20 JUL 0334	65	7941.	8.5	1224.5	*	20 JUL 0424	115	4417.	5.7	1223.2
20 JUL 0245	16	14272.	12.4	1226.4	*	20 JUL 0335	66	7890.	8.4	1224.5	*	20 JUL 0425	116	4354.	5.7	1223.1
20 JUL 0246	17	20028.	15.4	1227.8	*	20 JUL 0336	67	7840.	8.4	1224.5	*	20 JUL 0426	117	4291.	5.6	1223.1
20 JUL 0247	18	25207.	17.9	1228.9	*	20 JUL 0337	68	7789.	8.3	1224.5	*	20 JUL 0427	118	4230.	5.5	1223.1
20 JUL 0248	19	29626.	19.8	1229.8	*	20 JUL 0338	69	7737.	8.3	1224.5	*	20 JUL 0428	119	4169.	5.5	1223.1
20 JUL 0249	20	33149.	21.3	1230.4	*	20 JUL 0339	70	7686.	8.3	1224.4	*	20 JUL 0429	120	4111.	5.4	1223.0
20 JUL 0250	21	35561.	22.3	1230.9	*	20 JUL 0340	71	7635.	8.2	1224.4	*	20 JUL 0430	121	4056.	5.4	1223.0
20 JUL 0251	22	36698.	22.7	1231.1	*	20 JUL 0341	72	7587.	8.2	1224.4	*	20 JUL 0431	122	3998.	5.3	1223.0
20 JUL 0252	23	36457.	22.6	1231.0	*	20 JUL 0342	73	7539.	8.2	1224.4	*	20 JUL 0432	123	3939.	5.3	1222.9
20 JUL 0253	24	35139.	22.1	1230.8	*	20 JUL 0343	74	7492.	8.1	1224.4	*	20 JUL 0433	124	3880.	5.2	1222.9
20 JUL 0254	25	33129.	21.3	1230.4	*	20 JUL 0344	75	7445.	8.1	1224.4	*	20 JUL 0434	125	3822.	5.1	1222.9
20 JUL 0255	26	30728.	20.3	1230.0	*	20 JUL 0345	76	7397.	8.1	1224.3	*	20 JUL 0435	126	3764.	5.1	1222.9
20 JUL 0256	27	28302.	19.3	1229.5	*	20 JUL 0346	77	7347.	8.0	1224.3	*	20 JUL 0436	127	3706.	5.0	1222.8
20 JUL 0257	28	25921.	18.2	1229.1	*	20 JUL 0347	78	7297.	8.0	1224.3	*	20 JUL 0437	128	3648.	5.0	1222.8
20 JUL 0258	29	23743.	17.2	1228.6	*	20 JUL 0348	79	7247.	8.0	1224.3	*	20 JUL 0438	129	3591.	4.9	1222.8
20 JUL 0259	30	21705.	16.3	1228.2	*	20 JUL 0349	80	7195.	7.9	1224.3	*	20 JUL 0439	130	3533.	4.8	1222.7
20 JUL 0300	31	19975.	15.4	1227.8	*	20 JUL 0350	81	7144.	7.9	1224.3	*	20 JUL 0440	131	3476.	4.8	1222.7
20 JUL 0301	32	18418.	14.6	1227.5	*	20 JUL 0351	82	7092.	7.8	1224.2	*	20 JUL 0441	132	3420.	4.7	1222.7
20 JUL 0302	33	17123.	13.9	1227.1	*	20 JUL 0352	83	7041.	7.8	1224.2	*	20 JUL 0442	133	3365.	4.7	1222.6
20 JUL 0303	34	15988.	13.3	1226.9	*	20 JUL 0353	84	6991.	7.8	1224.2	*	20 JUL 0443	134	3310.	4.6	1222.6
20 JUL 0304	35	14997.	12.8	1226.6	*	20 JUL 0354	85	6942.	7.7	1224.2	*	20 JUL 0444	135	3256.	4.6	1222.6
20 JUL 0305	36	14143.	12.3	1226.4	*	20 JUL 0355	86	6894.	7.7	1224.2	*	20 JUL 0445	136	3202.	4.5	1222.6
20 JUL 0306	37	13384.	11.9	1226.2	*	20 JUL 0356	87	6847.	7.7	1224.1	*	20 JUL 0446	137	3149.	4.4	1222.5
20 JUL 0307	38	12732.	11.5	1226.0	*	20 JUL 0357	88	6806.	7.6	1224.1	*	20 JUL 0447	138	3097.	4.4	1222.5
20 JUL 0308	39	12172.	11.2	1225.9	*	20 JUL 0358	89	6765.	7.6	1224.1	*	20 JUL 0448	139	3047.	4.3	1222.5
20 JUL 0309	40	11665.	10.9	1225.7	*	20 JUL 0359	90	6718.	7.6	1224.1	*	20 JUL 0449	140	2999.	4.3	1222.4
20 JUL 0310	41	11217.	10.6	1225.6	*	20 JUL 0400	91	6665.	7.5	1224.1	*	20 JUL 0450	141	2949.	4.2	1222.4
20 JUL 0311	42	10820.	10.4	1225.5	*	20 JUL 0401	92	6578.	7.5	1224.1	*	20 JUL 0451	142	2898.	4.2	1222.4
20 JUL 0312	43	10462.	10.1	1225.3	*	20 JUL 0402	93	6459.	7.4	1224.0	*	20 JUL 0452	143	2846.	4.1	1222.4
20 JUL 0313	44	10146.	9.9	1225.3	*	20 JUL 0403	94	6336.	7.3	1224.0	*	20 JUL 0453	144	2794.	4.1	1222.3
20 JUL 0314	45	9878.	9.8	1225.2	*	20 JUL 0404	95	6211.	7.2	1223.9	*	20 JUL 0454	145	2740.	4.0	1222.3
20 JUL 0315	46	9651.	9.6	1225.1	*	20 JUL 0405	96	6095.	7.1	1223.9	*	20 JUL 0455	146	2686.	4.0	1222.3
20 JUL 0316	47	9458.	9.5	1225.0	*	20 JUL 0406	97	5976.	7.0	1223.8	*	20 JUL 0456	147	2632.	3.9	1222.2
20 JUL 0317	48	9291.	9.4	1225.0	*	20 JUL 0407	98	5859.	6.9	1223.8	*	20 JUL 0457	148	2577.	3.8	1222.2
20 JUL 0318	49	9146.	9.3	1224.9	*	20 JUL 0408	99	5745.	6.8	1223.7	*	20 JUL 0458	149	2522.	3.8	1222.2
20 JUL 0319	50	9018.	9.2	1224.9	*	20 JUL 0409	100	5636.	6.7	1223.7	*	20 JUL 0459	150	2471.	3.7	1222.1

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	2.48-HR
36698.	0.35	(CFS)	8471.	8471.	8471.	8471.
		(INCHES)	1.087	1.087	1.087	1.087
		(AC-FT)	1739.	1739.	1739.	1739.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)	6-HR	24-HR	72-HR	2.48-HR

23.	0.35		8.	8.	8.	8.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1231.06	0.35	1224.16	1224.16	1224.16	1224.16

CUMULATIVE AREA = 30.00 SQ MI

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90 KK

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* *
* RCH13 *
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HYDROGRAPH ROUTING DATA

91 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

92 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.045	LEFT OVERBANK N-VALUE
ANCH	0.045	MAIN CHANNEL N-VALUE
ANR	0.045	RIGHT OVERBANK N-VALUE
RLNTH	1165.	REACH LENGTH
SEL	0.0307	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
94 RY	ELEVATION	1227.80	1217.80	1213.00	1206.90	1206.90	1207.70	1211.40	1228.70
93 RX	DISTANCE	0.0	5.00	12.50	20.00	31.00	68.00	112.00	140.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	1.12	2.99	5.33	8.12	11.17	14.33	17.59	20.97	24.46
OUTFLOW	0.0	210.68	942.65	2169.27	3930.50	6340.21	9323.79	12835.07	16826.09	21287.05
ELEVATION	1206.90	1208.05	1209.19	1210.34	1211.49	1212.64	1213.78	1214.93	1216.08	1217.22
STORAGE	28.05	31.73	35.48	39.30	43.20	47.17	51.22	55.35	59.54	63.81
OUTFLOW	26215.20	31593.24	37404.36	43641.24	50298.46	57372.16	64859.27	72757.87	81066.50	89860.44
ELEVATION	1218.37	1219.52	1220.67	1221.81	1222.96	1224.11	1225.26	1226.40	1227.55	1228.70

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 26215. TO 89860.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RCH13

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1206.9	20	JUL	0320	51	8995.	14.0	1213.7	20	JUL	0410	101	5629.	10.3	1212.3
20	JUL	0231	2	42.	0.2	1207.1	20	JUL	0321	52	8886.	13.9	1213.6	20	JUL	0411	102	5523.	10.1	1212.2
20	JUL	0232	3	144.	0.8	1207.7	20	JUL	0322	53	8788.	13.8	1213.6	20	JUL	0412	103	5421.	10.0	1212.2
20	JUL	0233	4	301.	1.3	1208.2	20	JUL	0323	54	8696.	13.7	1213.5	20	JUL	0413	104	5323.	9.9	1212.2
20	JUL	0234	5	471.	1.8	1208.5	20	JUL	0324	55	8612.	13.6	1213.5	20	JUL	0414	105	5229.	9.8	1212.1
20	JUL	0235	6	577.	2.1	1208.6	20	JUL	0325	56	8534.	13.5	1213.5	20	JUL	0415	106	5140.	9.7	1212.1
20	JUL	0236	7	642.	2.2	1208.7	20	JUL	0326	57	8460.	13.4	1213.5	20	JUL	0416	107	5057.	9.5	1212.0
20	JUL	0237	8	682.	2.3	1208.8	20	JUL	0327	58	8391.	13.3	1213.4	20	JUL	0417	108	4978.	9.4	1212.0
20	JUL	0238	9	706.	2.4	1208.8	20	JUL	0328	59	8326.	13.3	1213.4	20	JUL	0418	109	4900.	9.4	1212.0
20	JUL	0239	10	723.	2.4	1208.8	20	JUL	0329	60	8264.	13.2	1213.4	20	JUL	0419	110	4824.	9.3	1211.9
20	JUL	0240	11	747.	2.5	1208.9	20	JUL	0330	61	8205.	13.1	1213.4	20	JUL	0420	111	4750.	9.2	1211.9
20	JUL	0241	12	832.	2.7	1209.0	20	JUL	0331	62	8147.	13.1	1213.3	20	JUL	0421	112	4679.	9.1	1211.8
20	JUL	0242	13	1114.	3.3	1209.4	20	JUL	0332	63	8091.	13.0	1213.3	20	JUL	0422	113	4609.	9.0	1211.8
20	JUL	0243	14	2036.	5.1	1210.2	20	JUL	0333	64	8036.	13.0	1213.3	20	JUL	0423	114	4542.	8.9	1211.8
20	JUL	0244	15	4644.	9.0	1211.8	20	JUL	0334	65	7982.	12.9	1213.3	20	JUL	0424	115	4476.	8.8	1211.7
20	JUL	0245	16	9781.	14.8	1213.9	20	JUL	0335	66	7929.	12.9	1213.2	20	JUL	0425	116	4412.	8.7	1211.7
20	JUL	0246	17	16228.	20.5	1215.9	20	JUL	0336	67	7879.	12.8	1213.2	20	JUL	0426	117	4349.	8.7	1211.7
20	JUL	0247	18	22219.	25.1	1217.4	20	JUL	0337	68	7828.	12.7	1213.2	20	JUL	0427	118	4287.	8.6	1211.7
20	JUL	0248	19	27302.	28.8	1218.6	20	JUL	0338	69	7777.	12.7	1213.2	20	JUL	0428	119	4225.	8.5	1211.6
20	JUL	0249	20	31403.	31.6	1219.5	20	JUL	0339	70	7725.	12.6	1213.2	20	JUL	0429	120	4165.	8.4	1211.6
20	JUL	0250	21	34446.	33.6	1220.1	20	JUL	0340	71	7674.	12.6	1213.1	20	JUL	0430	121	4108.	8.3	1211.6
20	JUL	0251	22	36185.	34.7	1220.4	20	JUL	0341	72	7625.	12.5	1213.1	20	JUL	0431	122	4051.	8.3	1211.5
20	JUL	0252	23	36590.	35.0	1220.5	20	JUL	0342	73	7576.	12.5	1213.1	20	JUL	0432	123	3993.	8.2	1211.5
20	JUL	0253	24	35772.	34.4	1220.3	20	JUL	0343	74	7528.	12.4	1213.1	20	JUL	0433	124	3934.	8.1	1211.5
20	JUL	0254	25	34081.	33.3	1220.0	20	JUL	0344	75	7481.	12.4	1213.1	20	JUL	0434	125	3883.	8.0	1211.5
20	JUL	0255	26	31859.	31.9	1219.6	20	JUL	0345	76	7433.	12.3	1213.1	20	JUL	0435	126	3829.	8.0	1211.4
20	JUL	0256	27	29499.	30.3	1219.1	20	JUL	0346	77	7385.	12.3	1213.0	20	JUL	0436	127	3772.	7.9	1211.4
20	JUL	0257	28	27102.	28.7	1218.6	20	JUL	0347	78	7336.	12.2	1213.0	20	JUL	0437	128	3715.	7.8	1211.3
20	JUL	0258	29	24869.	27.1	1218.1	20	JUL	0348	79	7285.	12.2	1213.0	20	JUL	0438	129	3657.	7.7	1211.3
20	JUL	0259	30	22786.	25.6	1217.6	20	JUL	0349	80	7234.	12.1	1213.0	20	JUL	0439	130	3600.	7.6	1211.3
20	JUL	0300	31	20910.	24.2	1217.1	20	JUL	0350	81	7183.	12.1	1213.0	20	JUL	0440	131	3542.	7.5	1211.2
20	JUL	0301	32	19305.	22.9	1216.7	20	JUL	0351	82	7132.	12.0	1212.9	20	JUL	0441	132	3485.	7.4	1211.2
20	JUL	0302	33	17868.	21.8	1216.3	20	JUL	0352	83	7080.	12.0	1212.9	20	JUL	0442	133	3429.	7.3	1211.2
20	JUL	0303	34	16647.	20.8	1216.0	20	JUL	0353	84	7030.	11.9	1212.9	20	JUL	0443	134	3373.	7.2	1211.1
20	JUL	0304	35	15611.	19.9	1215.7	20	JUL	0354	85	6980.	11.8	1212.9	20	JUL	0444	135	3319.	7.2	1211.1
20	JUL	0305	36	14677.	19.1	1215.5	20	JUL	0355	86	6931.	11.8	1212.9	20	JUL	0445	136	3264.	7.1	1211.1
20	JUL	0306	37	13857.	18.5	1215.2	20	JUL	0356	87	6884.	11.7	1212.8	20	JUL	0446	137	3211.	7.0	1211.0
20	JUL	0307	38	13140.	17.8	1215.0	20	JUL	0357	88	6839.	11.7	1212.8	20	JUL	0447	138	3158.	6.9	1211.0
20	JUL	0308	39	12539.	17.3	1214.8	20	JUL	0358	89	6797.	11.7	1212.8	20	JUL	0448	139	3106.	6.8	1211.0
20	JUL	0309	40	12011.	16.8	1214.7	20	JUL	0359	90	6753.	11.6	1212.8	20	JUL	0449	140	3055.	6.7	1210.9
20	JUL	0310	41	11526.	16.4	1214.5	20	JUL	0400	91	6705.	11.6	1212.8	20	JUL	0450	141	3006.	6.7	1210.9
20	JUL	0311	42	11094.	16.0	1214.4	20	JUL	0401	92	6639.	11.5	1212.8	20	JUL	0451	142	2956.	6.6	1210.9
20	JUL	0312	43	10709.	15.6	1214.2	20	JUL	0402	93	6544.	11.4	1212.7	20	JUL	0452	143	2905.	6.5	1210.8
20	JUL	0313	44	10364.	15.3	1214.1	20	JUL	0403	94	6428.	11.3	1212.7	20	JUL	0453	144	2854.	6.4	1210.8
20	JUL	0314	45	10065.	15.0	1214.0	20	JUL	0404	95	6310.	11.1	1212.6	20	JUL	0454	145	2801.	6.3	1210.8
20	JUL	0315	46	9809.	14.8	1213.9	20	JUL	0405	96	6200.	11.0	1212.6	20	JUL	0455	146	2748.	6.2	1210.7
20	JUL	0316	47	9592.	14.6	1213.9	20	JUL	0406	97	6084.	10.8	1212.5	20	JUL	0456	147	2694.	6.2	1210.7
20	JUL	0317	48	9407.	14.4	1213.8	20	JUL	0407	98	5967.	10.7	1212.5	20	JUL	0457	148	2640.	6.1	1210.6
20	JUL	0318	49	9252.	14.3	1213.8	20	JUL	0408	99	5850.	10.6	1212.4	20	JUL	0458	149	2585.	6.0	1210.6
20	JUL	0319	50	9118.	14.1	1213.7	20	JUL	0409	100	5738.	10.4	1212.3	20	JUL	0459	150	2531.	5.9	1210.6

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
36590.	0.37	(CFS)	8442.	8442.	8442.	8442.

(INCHES)	1.083	1.083	1.083	1.083
(AC-FT)	1733.	1733.	1733.	1733.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
35.	0.37	12.	12.	12.	12.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1220.51	0.37	1212.89	1212.89	1212.89	1212.89

CUMULATIVE AREA = 30.00 SQ MI

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95 KK RCH14

HYDROGRAPH ROUTING DATA

96 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

97 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.058	LEFT OVERBANK N-VALUE
ANCH	0.058	MAIN CHANNEL N-VALUE
ANR	0.058	RIGHT OVERBANK N-VALUE
RLNTH	1700.	REACH LENGTH
SEL	0.0218	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK --- +		------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---	
99 RY ELEVATION	1178.40	1170.80	1171.60	1169.20	1163.00	1163.00	1168.00	1181.90
98 RX DISTANCE	0.0	30.00	148.00	185.00	186.00	420.00	425.00	435.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	9.11	18.26	27.45	36.69	45.98	55.30	64.83	75.04	89.26
OUTFLOW	0.0	878.01	2784.14	5465.84	8818.10	12775.69	17292.54	21777.84	26631.35	32713.00
ELEVATION	1163.00	1163.99	1164.99	1165.98	1166.98	1167.97	1168.97	1169.96	1170.96	1171.95
STORAGE	104.97	120.86	136.93	153.18	169.61	186.22	202.99	219.81	236.65	253.52
OUTFLOW	40669.18	49613.43	59473.11	70203.31	81771.75	94153.94	107451.62	121651.69	136622.44	152344.25
ELEVATION	1172.95	1173.94	1174.94	1175.93	1176.92	1177.92	1178.91	1179.91	1180.90	1181.90

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HYDROGRAPH AT STATION RCH14

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1163.0	20	JUL	0320	51	9246.	37.7	1167.1	20	JUL	0410	101	5852.	28.5	1166.1
20	JUL	0231	2	3.	0.0	1163.0	20	JUL	0321	52	9107.	37.4	1167.1	20	JUL	0411	102	5742.	28.2	1166.1
20	JUL	0232	3	14.	0.1	1163.0	20	JUL	0322	53	8985.	37.1	1167.0	20	JUL	0412	103	5634.	27.9	1166.0
20	JUL	0233	4	40.	0.4	1163.0	20	JUL	0323	54	8875.	36.8	1167.0	20	JUL	0413	104	5529.	27.6	1166.0
20	JUL	0234	5	83.	0.9	1163.1	20	JUL	0324	55	8780.	36.6	1167.0	20	JUL	0414	105	5434.	27.3	1166.0
20	JUL	0235	6	138.	1.4	1163.2	20	JUL	0325	56	8697.	36.4	1166.9	20	JUL	0415	106	5351.	27.1	1165.9
20	JUL	0236	7	197.	2.0	1163.2	20	JUL	0326	57	8617.	36.1	1166.9	20	JUL	0416	107	5266.	26.8	1165.9
20	JUL	0237	8	255.	2.6	1163.3	20	JUL	0327	58	8540.	35.9	1166.9	20	JUL	0417	108	5183.	26.5	1165.9
20	JUL	0238	9	309.	3.2	1163.4	20	JUL	0328	59	8468.	35.7	1166.9	20	JUL	0418	109	5101.	26.2	1165.8
20	JUL	0239	10	360.	3.7	1163.4	20	JUL	0329	60	8399.	35.5	1166.9	20	JUL	0419	110	5021.	25.9	1165.8
20	JUL	0240	11	407.	4.2	1163.5	20	JUL	0330	61	8333.	35.4	1166.8	20	JUL	0420	111	4943.	25.7	1165.8
20	JUL	0241	12	454.	4.7	1163.5	20	JUL	0331	62	8270.	35.2	1166.8	20	JUL	0421	112	4866.	25.4	1165.8
20	JUL	0242	13	519.	5.4	1163.6	20	JUL	0332	63	8210.	35.0	1166.8	20	JUL	0422	113	4792.	25.1	1165.7
20	JUL	0243	14	650.	6.7	1163.7	20	JUL	0333	64	8151.	34.9	1166.8	20	JUL	0423	114	4720.	24.9	1165.7
20	JUL	0244	15	1094.	10.1	1164.1	20	JUL	0334	65	8095.	34.7	1166.8	20	JUL	0424	115	4649.	24.7	1165.7
20	JUL	0245	16	2630.	17.5	1164.9	20	JUL	0335	66	8039.	34.5	1166.7	20	JUL	0425	116	4581.	24.4	1165.7
20	JUL	0246	17	6162.	29.4	1166.2	20	JUL	0336	67	7985.	34.4	1166.7	20	JUL	0426	117	4514.	24.2	1165.6
20	JUL	0247	18	11732.	43.5	1167.7	20	JUL	0337	68	7932.	34.2	1166.7	20	JUL	0427	118	4448.	24.0	1165.6
20	JUL	0248	19	18125.	57.1	1169.2	20	JUL	0338	69	7880.	34.1	1166.7	20	JUL	0428	119	4384.	23.7	1165.6
20	JUL	0249	20	23635.	68.7	1170.3	20	JUL	0339	70	7829.	34.0	1166.7	20	JUL	0429	120	4321.	23.5	1165.6
20	JUL	0250	21	28095.	78.5	1171.2	20	JUL	0340	71	7777.	33.8	1166.7	20	JUL	0430	121	4259.	23.3	1165.5
20	JUL	0251	22	31381.	86.1	1171.7	20	JUL	0341	72	7726.	33.7	1166.7	20	JUL	0431	122	4199.	23.1	1165.5
20	JUL	0252	23	33789.	91.4	1172.1	20	JUL	0342	73	7676.	33.5	1166.6	20	JUL	0432	123	4140.	22.9	1165.5
20	JUL	0253	24	35026.	93.8	1172.2	20	JUL	0343	74	7626.	33.4	1166.6	20	JUL	0433	124	4081.	22.7	1165.5
20	JUL	0254	25	34975.	93.7	1172.2	20	JUL	0344	75	7578.	33.3	1166.6	20	JUL	0434	125	4023.	22.5	1165.4
20	JUL	0255	26	33938.	91.7	1172.1	20	JUL	0345	76	7530.	33.1	1166.6	20	JUL	0435	126	3967.	22.3	1165.4
20	JUL	0256	27	32307.	88.3	1171.9	20	JUL	0346	77	7481.	33.0	1166.6	20	JUL	0436	127	3912.	22.1	1165.4
20	JUL	0257	28	30483.	84.0	1171.6	20	JUL	0347	78	7433.	32.9	1166.6	20	JUL	0437	128	3855.	21.9	1165.4
20	JUL	0258	29	28436.	79.3	1171.3	20	JUL	0348	79	7384.	32.7	1166.6	20	JUL	0438	129	3799.	21.7	1165.4
20	JUL	0259	30	26314.	74.4	1170.9	20	JUL	0349	80	7334.	32.6	1166.5	20	JUL	0439	130	3742.	21.5	1165.3
20	JUL	0300	31	24111.	69.7	1170.4	20	JUL	0350	81	7284.	32.5	1166.5	20	JUL	0440	131	3685.	21.3	1165.3
20	JUL	0301	32	22136.	65.6	1170.0	20	JUL	0351	82	7233.	32.3	1166.5	20	JUL	0441	132	3627.	21.1	1165.3
20	JUL	0302	33	20396.	61.9	1169.7	20	JUL	0352	83	7183.	32.2	1166.5	20	JUL	0442	133	3570.	21.0	1165.3
20	JUL	0303	34	18860.	58.6	1169.3	20	JUL	0353	84	7132.	32.0	1166.5	20	JUL	0443	134	3514.	20.8	1165.3
20	JUL	0304	35	17523.	55.8	1169.0	20	JUL	0354	85	7081.	31.9	1166.5	20	JUL	0444	135	3458.	20.6	1165.2
20	JUL	0305	36	16338.	53.3	1168.8	20	JUL	0355	86	7031.	31.8	1166.4	20	JUL	0445	136	3402.	20.4	1165.2
20	JUL	0306	37	15302.	51.2	1168.5	20	JUL	0356	87	6982.	31.6	1166.4	20	JUL	0446	137	3347.	20.2	1165.2
20	JUL	0307	38	14400.	49.3	1168.3	20	JUL	0357	88	6933.	31.5	1166.4	20	JUL	0447	138	3292.	20.0	1165.2
20	JUL	0308	39	13619.	47.7	1168.2	20	JUL	0358	89	6887.	31.4	1166.4	20	JUL	0448	139	3239.	19.8	1165.2
20	JUL	0309	40	12947.	46.3	1168.0	20	JUL	0359	90	6842.	31.2	1166.4	20	JUL	0449	140	3186.	19.6	1165.1
20	JUL	0310	41	12396.	45.1	1167.9	20	JUL	0400	91	6797.	31.1	1166.4	20	JUL	0450	141	3134.	19.5	1165.1
20	JUL	0311	42	11903.	43.9	1167.8	20	JUL	0401	92	6747.	31.0	1166.4	20	JUL	0451	142	3083.	19.3	1165.1
20	JUL	0312	43	11449.	42.9	1167.6	20	JUL	0402	93	6685.	30.8	1166.3	20	JUL	0452	143	3032.	19.1	1165.1
20	JUL	0313	44	11035.	41.9	1167.5	20	JUL	0403	94	6605.	30.6	1166.3	20	JUL	0453	144	2981.	18.9	1165.1
20	JUL	0314	45	10662.	41.0	1167.4	20	JUL	0404	95	6511.	30.3	1166.3	20	JUL	0454	145	2930.	18.8	1165.0
20	JUL	0315	46	10333.	40.2	1167.4	20	JUL	0405	96	6408.	30.0	1166.3	20	JUL	0455	146	2878.	18.6	1165.0
20	JUL	0316	47	10046.	39.6	1167.3	20	JUL	0406	97	6302.	29.8	1166.2	20	JUL	0456	147	2825.	18.4	1165.0
20	JUL	0317	48	9798.	39.0	1167.2	20	JUL	0407	98	6191.	29.5	1166.2	20	JUL	0457	148	2775.	18.2	1165.0
20	JUL	0318	49	9585.	38.5	1167.2	20	JUL	0408	99	6078.	29.1	1166.2	20	JUL	0458	149	2734.	18.0	1165.0
20	JUL	0319	50	9404.	38.1	1167.1	20	JUL	0409	100	5965.	28.8	1166.1	20	JUL	0459	150	2690.	17.8	1164.9

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR

35026.	0.38	(CFS)	8356.	8356.	8356.	8356.
		(INCHES)	1.072	1.072	1.072	1.072
		(AC-FT)	1715.	1715.	1715.	1715.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
94.	0.38	33.	33.	33.	33.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1172.24	0.38	1166.49	1166.49	1166.49	1166.49

CUMULATIVE AREA = 30.00 SQ MI

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          *            *
100 KK    *     RCH15  *
          *            *
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HYDROGRAPH ROUTING DATA

101 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.0	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

102 RC NORMAL DEPTH CHANNEL ROUTING

ANL	0.058	LEFT OVERBANK N-VALUE
ANCH	0.058	MAIN CHANNEL N-VALUE
ANR	0.058	RIGHT OVERBANK N-VALUE
RLNTH	685.	REACH LENGTH
SEL	0.0115	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
104 RY	ELEVATION	1197.00	1182.00	1158.00	1147.00	1147.00	1158.00	1182.00	1197.00
103 RX	DISTANCE	0.0	75.00	195.00	250.00	325.00	380.00	500.00	575.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.0	3.65	8.38	14.21	21.12	29.13	38.22	48.40	59.67	72.03
OUTFLOW	0.0	1104.44	3782.91	8032.34	13987.24	23056.13	34624.81	48611.98	65169.04	84439.06
ELEVATION	1147.00	1149.63	1152.26	1154.89	1157.53	1160.16	1162.79	1165.42	1168.05	1170.68
STORAGE	85.48	100.01	115.64	132.35	150.15	169.04	189.02	210.09	232.25	255.50
OUTFLOW	106560.75	131669.19	159897.56	191375.62	226231.50	264590.50	306576.87	352311.81	401915.25	455506.00
ELEVATION	1173.31	1175.94	1178.58	1181.21	1183.84	1186.47	1189.10	1191.73	1194.36	1197.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 48612. TO 455506.

THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

HYDROGRAPH AT STATION RCH15

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
20	JUL	0230	1	0.	0.0	1147.0	20	JUL	0320	51	9387.	15.8	1155.5	20	JUL	0410	101	5964.	11.4	1153.6
20	JUL	0231	2	0.	0.0	1147.0	20	JUL	0321	52	9230.	15.6	1155.4	20	JUL	0411	102	5852.	11.2	1153.5
20	JUL	0232	3	3.	0.0	1147.0	20	JUL	0322	53	9093.	15.4	1155.4	20	JUL	0412	103	5742.	11.1	1153.5
20	JUL	0233	4	11.	0.0	1147.0	20	JUL	0323	54	8971.	15.3	1155.3	20	JUL	0413	104	5635.	10.9	1153.4
20	JUL	0234	5	29.	0.1	1147.1	20	JUL	0324	55	8864.	15.2	1155.3	20	JUL	0414	105	5533.	10.8	1153.3
20	JUL	0235	6	57.	0.2	1147.1	20	JUL	0325	56	8770.	15.1	1155.2	20	JUL	0415	106	5439.	10.7	1153.3
20	JUL	0236	7	95.	0.3	1147.2	20	JUL	0326	57	8686.	15.0	1155.2	20	JUL	0416	107	5352.	10.5	1153.2
20	JUL	0237	8	140.	0.5	1147.3	20	JUL	0327	58	8606.	14.9	1155.1	20	JUL	0417	108	5267.	10.4	1153.2
20	JUL	0238	9	189.	0.6	1147.5	20	JUL	0328	59	8530.	14.8	1155.1	20	JUL	0418	109	5183.	10.3	1153.1
20	JUL	0239	10	239.	0.8	1147.6	20	JUL	0329	60	8458.	14.7	1155.1	20	JUL	0419	110	5102.	10.2	1153.1
20	JUL	0240	11	289.	1.0	1147.7	20	JUL	0330	61	8389.	14.6	1155.1	20	JUL	0420	111	5022.	10.1	1153.0
20	JUL	0241	12	338.	1.1	1147.8	20	JUL	0331	62	8324.	14.5	1155.0	20	JUL	0421	112	4943.	10.0	1153.0
20	JUL	0242	13	389.	1.3	1147.9	20	JUL	0332	63	8262.	14.5	1155.0	20	JUL	0422	113	4867.	9.9	1152.9
20	JUL	0243	14	457.	1.5	1148.1	20	JUL	0333	64	8201.	14.4	1155.0	20	JUL	0423	114	4793.	9.8	1152.9
20	JUL	0244	15	600.	2.0	1148.4	20	JUL	0334	65	8143.	14.3	1154.9	20	JUL	0424	115	4720.	9.7	1152.8
20	JUL	0245	16	1035.	3.4	1149.5	20	JUL	0335	66	8086.	14.3	1154.9	20	JUL	0425	116	4650.	9.6	1152.8
20	JUL	0246	17	2876.	6.8	1151.4	20	JUL	0336	67	8031.	14.2	1154.9	20	JUL	0426	117	4581.	9.5	1152.8
20	JUL	0247	18	6761.	12.5	1154.1	20	JUL	0337	68	7983.	14.1	1154.9	20	JUL	0427	118	4514.	9.4	1152.7
20	JUL	0248	19	12698.	19.6	1157.0	20	JUL	0338	69	7932.	14.1	1154.8	20	JUL	0428	119	4449.	9.3	1152.7
20	JUL	0249	20	19642.	26.1	1159.2	20	JUL	0339	70	7880.	14.0	1154.8	20	JUL	0429	120	4384.	9.2	1152.6
20	JUL	0250	21	25231.	30.8	1160.7	20	JUL	0340	71	7828.	13.9	1154.8	20	JUL	0430	121	4321.	9.1	1152.6
20	JUL	0251	22	29441.	34.1	1161.6	20	JUL	0341	72	7777.	13.9	1154.7	20	JUL	0431	122	4260.	9.0	1152.6
20	JUL	0252	23	32378.	36.5	1162.3	20	JUL	0342	73	7726.	13.8	1154.7	20	JUL	0432	123	4199.	9.0	1152.5
20	JUL	0253	24	34274.	37.9	1162.7	20	JUL	0343	74	7676.	13.7	1154.7	20	JUL	0433	124	4140.	8.9	1152.5
20	JUL	0254	25	34966.	38.5	1162.9	20	JUL	0344	75	7627.	13.7	1154.6	20	JUL	0434	125	4081.	8.8	1152.4
20	JUL	0255	26	34476.	38.1	1162.8	20	JUL	0345	76	7578.	13.6	1154.6	20	JUL	0435	126	4024.	8.7	1152.4
20	JUL	0256	27	33212.	37.1	1162.5	20	JUL	0346	77	7529.	13.5	1154.6	20	JUL	0436	127	3967.	8.6	1152.4
20	JUL	0257	28	31515.	35.8	1162.1	20	JUL	0347	78	7481.	13.5	1154.6	20	JUL	0437	128	3911.	8.6	1152.3
20	JUL	0258	29	29595.	34.3	1161.6	20	JUL	0348	79	7433.	13.4	1154.5	20	JUL	0438	129	3855.	8.5	1152.3
20	JUL	0259	30	27521.	32.6	1161.2	20	JUL	0349	80	7383.	13.3	1154.5	20	JUL	0439	130	3798.	8.4	1152.3
20	JUL	0300	31	25365.	30.9	1160.7	20	JUL	0350	81	7334.	13.3	1154.5	20	JUL	0440	131	3748.	8.3	1152.2
20	JUL	0301	32	23271.	29.3	1160.2	20	JUL	0351	82	7284.	13.2	1154.4	20	JUL	0441	132	3696.	8.2	1152.2
20	JUL	0302	33	21500.	27.8	1159.7	20	JUL	0352	83	7233.	13.1	1154.4	20	JUL	0442	133	3642.	8.1	1152.1
20	JUL	0303	34	19859.	26.3	1159.2	20	JUL	0353	84	7182.	13.0	1154.4	20	JUL	0443	134	3586.	8.0	1152.1
20	JUL	0304	35	18397.	25.0	1158.8	20	JUL	0354	85	7131.	13.0	1154.3	20	JUL	0444	135	3530.	7.9	1152.0
20	JUL	0305	36	17111.	23.9	1158.4	20	JUL	0355	86	7081.	12.9	1154.3	20	JUL	0445	136	3474.	7.8	1152.0
20	JUL	0306	37	15979.	22.9	1158.1	20	JUL	0356	87	7031.	12.8	1154.3	20	JUL	0446	137	3418.	7.7	1151.9
20	JUL	0307	38	14990.	22.0	1157.8	20	JUL	0357	88	6982.	12.8	1154.2	20	JUL	0447	138	3363.	7.6	1151.9
20	JUL	0308	39	14130.	21.3	1157.6	20	JUL	0358	89	6934.	12.7	1154.2	20	JUL	0448	139	3308.	7.5	1151.8
20	JUL	0309	40	13478.	20.5	1157.3	20	JUL	0359	90	6888.	12.6	1154.2	20	JUL	0449	140	3254.	7.5	1151.7
20	JUL	0310	41	12877.	19.8	1157.0	20	JUL	0400	91	6842.	12.6	1154.2	20	JUL	0450	141	3201.	7.4	1151.7
20	JUL	0311	42	12335.	19.2	1156.8	20	JUL	0401	92	6795.	12.5	1154.1	20	JUL	0451	142	3149.	7.3	1151.6
20	JUL	0312	43	11844.	18.6	1156.6	20	JUL	0402	93	6742.	12.4	1154.1	20	JUL	0452	143	3098.	7.2	1151.6
20	JUL	0313	44	11395.	18.1	1156.4	20	JUL	0403	94	6677.	12.4	1154.1	20	JUL	0453	144	3047.	7.1	1151.5
20	JUL	0314	45	10988.	17.6	1156.2	20	JUL	0404	95	6597.	12.2	1154.0	20	JUL	0454	145	2995.	7.0	1151.5
20	JUL	0315	46	10623.	17.2	1156.0	20	JUL	0405	96	6505.	12.1	1153.9	20	JUL	0455	146	2944.	6.9	1151.4
20	JUL	0316	47	10300.	16.8	1155.9	20	JUL	0406	97	6405.	12.0	1153.9	20	JUL	0456	147	2892.	6.8	1151.4
20	JUL	0317	48	10019.	16.5	1155.8	20	JUL	0407	98	6299.	11.8	1153.8	20	JUL	0457	148	2841.	6.7	1151.3
20	JUL	0318	49	9775.	16.2	1155.7	20	JUL	0408	99	6189.	11.7	1153.8	20	JUL	0458	149	2793.	6.6	1151.3
20	JUL	0319	50	9566.	16.0	1155.6	20	JUL	0409	100	6077.	11.5	1153.7	20	JUL	0459	150	2748.	6.6	1151.2

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	2.48-HR
34966.	0.40	(CFS)	8324.	8324.	8324.	8324.
		(INCHES)	1.068	1.068	1.068	1.068
		(AC-FT)	1708.	1708.	1708.	1708.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	2.48-HR
38.	0.40	13.	13.	13.	13.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	2.48-HR
1162.85	0.40	1154.04	1154.04	1154.04	1154.04

CUMULATIVE AREA = 30.00 SQ MI

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	01	10400.	0.02	4342.	4342.	4342.	10.00		
ROUTED TO		42138.	0.25	6723.	6723.	6723.	10.00	1437.67	0.06
ROUTED TO	RCH1	42213.	0.25	6722.	6722.	6722.	10.00	1400.80	0.25
ROUTED TO	RCH2	40356.	0.25	6684.	6684.	6684.	10.00	1406.55	0.25
HYDROGRAPH AT		2140.	0.02	611.	611.	611.	10.00		
2 COMBINED AT		41911.	0.25	7295.	7295.	7295.	20.00		
ROUTED TO	RCH3	40811.	0.27	7257.	7257.	7257.	20.00	1389.43	0.27
ROUTED TO	RCH4	37926.	0.28	7202.	7202.	7202.	20.00	1351.58	0.28
ROUTED TO	RCH5	37918.	0.30	7190.	7190.	7190.	20.00	1331.79	0.30
ROUTED TO	RCH6	37941.	0.30	7182.	7182.	7182.	20.00	1317.39	0.30
ROUTED TO	RCH7	37504.	0.32	7162.	7162.	7162.	20.00	1308.18	0.32
ROUTED TO	RCH8	36331.	0.33	7123.	7123.	7123.	20.00	1275.01	0.33
ROUTED TO	RCH9	36077.	0.33	7102.	7102.	7102.	20.00	1250.03	0.33
ROUTED TO	RCH10	36034.	0.35	7093.	7093.	7093.	20.00	1248.92	0.35
ROUTED TO	RCH11	36032.	0.35	7073.	7073.	7073.	20.00	1241.56	0.35
HYDROGRAPH AT		2400.	1.50	1417.	1417.	1417.	10.00		
2 COMBINED AT		36808.	0.35	8489.	8489.	8489.	30.00		
ROUTED TO	RCH12	36698.	0.35	8471.	8471.	8471.	30.00	1231.06	0.35
ROUTED TO	RCH13	36590.	0.37	8442.	8442.	8442.	30.00	1220.51	0.37
ROUTED TO	RCH14	35026.	0.38	8356.	8356.	8356.	30.00	1172.24	0.38
ROUTED TO	RCH15	34966.	0.40	8324.	8324.	8324.	30.00	1162.85	0.40

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1437.20	1436.50	1436.50
STORAGE	489.	468.	468.
OUTFLOW	6136.	5170.	5170.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1437.67	1.17	502.	42138.	0.13	0.25	0.0

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