SIMULATION OF DYNAMIC FLOODFLOWS AT GAGED STATIONS IN THE SOUTHEASTERN UNITED STATES

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CONVERSION FACTORS

For use of those readers who may prefer to use SI (metric) units rather than inch-pound units, conversion factors for terms used in this report are listed below:

Multiply	By	To obtain
foot (ft)	3.048×10^{-1}	meter (m)
foot (ft)	3.048×10^{2}	millimeter (mm)
foot per second (ft/s)	3.048×10^{-1}	meter per second (m/s)
cubic foot per second (ft^3/s)	2.832×10^{-2}	cubic meter per second (m^3/s)
inch (in.)	2.540×10^{-2}	meter (m)
inch (in.)	2.540×10^{1}	millimeter (mm)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	sqare kilometer (km^2)

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ABSTRACT

Flood discharges at four gaging stations in the Southeastern United States were computed by using a dynamic streamflow model that computes unsteady streamflows at a gaged station using only flood wave velocity and stage, channel, and roughness characteristics at the gage site. River flows at each station were unregulated and relatively large. Daily mean discharges are in excess of 500 cubic feet per second. Stations were selected because of suspected hysteretic stage-discharge relations caused by dynamic flood flows and included Levisa Fork at Prestonsburg and at Paintsville, Kentucky, South Chickamauga Creek near Chickamauga, Tennessee, and Paint Rock River near Woodville, Alabama. All data required by the model were available at the two Levisa Fork and the South Chickamauga Creek stations. Observed effective channel slope and wave velocity were not available at the Paint Rock River station and were estimated. The model was applied to a single flood at the Levisa Fork stations and to two and three floods, respectively, at the South Chickamauga Creek and Paint Rock River stations.

Computed flood discharges at Levisa Fork at Prestonsburg, and at the South Chickamauga Creek and Paint Rock River stations were within 16 percent of measured values. Computed stage-discharge hysteresis was pronounced at each station for each flood investigated. Computed results at Levisa Fork at Paintsville were considered inconclusive because of probable temporary backwater conditions at the station during much of the investigated flood period.

INTRODUCTION

Hydrologists have long recognized the hysteretic nature of stage-discharge relations of certain rivers and streams. The hysteresis "loop" characteristically shows higher discharges for the rising limb of a flood hydrograph than for the recession limb at the same stage. Notable examples of stage-discharge hysteresis are the highly dynamic flows in channel reaches downstream of hydroelectric dams where flows rapidly increase at the onset of power generation and decrease at a relatively slower rate at the end of power generation. Faye and Cherry (1980) investigated the dynamic flow characteristics of the Chattahoochee River in north Georgia and developed a model to compute the hysteretic stage-discharge relation characteristic of dynamic open-channel flow at a single station. These investigations indicated that instantaneous discharge errors in excess of 100 percent and mean daily discharge errors of as much as 20 percent could occur between measured dynamic discharges and dynamic discharges estimated by a

conventional rating curve. Correcting errors of this magnitude is important not only from the standpoint of engineering and planning decisions that are based on discharge quantities, but also from the standpoint of hydrologic analyses of water-quality and sediment-loading investigations.

The model developed by Faye and Cherry (1980) utilizes data generally available at a single gaging station in conjunction with channel slope and wave velocity. The objective of the investigations described in this report is to assess the application of this model to unregulated rivers and streams which demonstrate possible hysteretic stage-discharge relations during floods. Traditional flow-routing analysis of dynamic flow requires, at a minimum, recording gages at two locations and geometry and roughness data pertinent to several intermediate cross sections. The dynamic flow model presented herein uses data collected at a single gaging station to generate hydrographs from which corresponding daily mean and instantaneous flood discharges can be determined. The economic and computational advantages of a single-station model are evident. Note that the designation of "single-station model" as used in this report refers to the relative differences in the quantity of data required to apply the model compared to a traditional flow-routing analysis and does not preclude the use of multiple gaging-station data to compute flow parameters used in the model.

The scope of these investigations included (1) obtaining floodflow data at gaging stations where stage-discharge relations may be significantly hysteretic, (2) applying the dynamic flow model to these data, and (3) evaluating the model's results and corresponding utility and limitations. Dynamic flood discharges were investigated at Levisa Fork at Prestonsburg and at Paintsville, Ky., at South Chickamauga Creek near Chickamauga, Tenn., and at Paint Rock River near Woodville, Ala. The model was applied to a single flood at the Levisa Fork stations and to two and three floods, respectively, at the South Chickamauga Creek and Paint Rock River stations. Data utilized in this study were collected routinely as a part of gaging-station operation or flood-plain information study and not for specific use in a dynamic flow model. Several critical parameters required by the model were not available for each of the flood events studied at the Paint Rock River station and were estimated.

Daily mean flood discharges estimated from rating curves at Levisa Fork at Paintsville, Ky., and at Paint Rock River near Woodville, Ala., are routinely adjusted by using rate of stage change methods. Rated daily mean discharges at these stations reported in this text (Supplementary Data tables 3, 6-8) are unadjusted and are based on the appropriate rating table.

Specific descriptions of stream-channel conditions at individual gage sites were not available for this study. However, descriptions by field personnel and other observers indicate that the channels are deeply incised within alluvium or rock with channel beds generally consisting of a thin veneer of sand, gravel, and cobbles overlying bedrock. Gravel "shoals" may occur sporadically during low flow, particularly at South Chickamauga Creek and Paint Rock River. The tops of channel banks are generally vegetated and are extensively vegetated at many places.

Illustrations used in this report are machine-generated and are designed to facilitate a direct comparison between observed and corresponding computed data at the largest possible scale within a page-size limitation. As such, the vertical and horizontal scales on similar illustrations may differ markedly at individual gage sites according to the magnitudes of the floods investigated.

MODEL DESCRIPTION

Equations

The model developed by Faye and Cherry (1980) is derived from the Saint-Venant one-dimensional, unsteady, open-channel flow equations. These equations, as formulated by Chow (1959, pp. 526-528), are:

$$\frac{\partial y}{\partial x}+\frac{\alpha V}{g}\frac{\partial V}{\partial x}+\frac{1}{g}\frac{\partial V}{\partial t}=S_o-S_f \tag{1}$$

$$D\frac{\partial V}{\partial x}+V\frac{\partial y}{\partial x}+\frac{\partial y}{\partial t}=O \tag{2}$$

in which x = the distance along the channel, in L; y = the water-surface altitude, in L; t = time, in T; g = the acceleration due to gravity in LT^{-2}; V = the mean flow velocity, in LT^{-1}; α = the velocity coefficient; D = the hydraulic depth, in L; S_O = the effective channel slope, in LL^{-1}; and S_f = the friction slope, in LL^{-1}. Equations (1) and (2) are commonly designated the momentum and continuity equations, respectively. These equations were reformulated such that the change in stage with respect to channel length was approximated by a function of wave velocity and the rate of change of stage with time observed at the station of interest. Friction slope was approximated by using Manning's equation (Chow, 1959, p. 99). The ordinary differential equation and its finite-difference approximation as derived by Faye and Cherry (1980), are listed below. Model development is described in detail by Faye and Cherry (1980, pp. 23-26).

$$\left(\frac{g}{V_w}-\frac{\alpha V^2}{V_w D}+\frac{\alpha V}{D}\right)\frac{dy}{dt}-\frac{V^2 n^2 g}{2.22\,R^{4/3}}+gS_o=\frac{dV}{dt} \tag{3}$$

$$\left[\frac{-\alpha(y_{i+1}-y_{i-1})}{2\,V_w D_i}-\frac{n^2 g\,(t_i-t_{i-1})}{2.22\,R_i^{4/3}}\right]V_i^2+\left[\frac{\alpha(y_{i+1}-y_{i-1})}{2\,D_i}-1\right]V_i + (t_i-t_{i-1})gS_o+V_{i-1}+\frac{(y_{i+1}-y_{i-1})g}{2\,V_w}=0. \tag{4}$$

in which n = Manning's roughness coefficient, in $TL^{-1}/3$; V_W = the wave velocity, in LT^{-1}; and i is a time-step index. Other terms are as previously defined. In this study, the velocity coefficient is considered to be unity. L and T, respectively, indicate units of length and time. Note that the form of Manning's equation used in this study restricts the L units to feet.

Assumptions used in developing the model require that (1) the channel cross section is relatively stable, (2) flow is generally within banks and there is no geometric or hydrologic necessity to subdivide the cross section, (3) the channel-top width does not vary greatly along the reach, (4) Manning's equation accounts for energy losses caused by turbulence and other hydraulic factors as well as natural channel roughness, (5) negligible lateral inflow occurs in the vicinity of the gage, and (6) the wave profile remains essentially unchanged as it proceeds downstream.

Supplementary data table 1 (at the end of the report) is a list of the computer code of the dynamic streamflow model. The code is written in enhanced BASIC for the Hewlett-Packard 9845B desktop computer.[1]

Data Collection and Computation

Data applied to the dynamic streamflow model can be characterized as data specific to the gaged site and data representative of channel and hydraulic conditions through a river reach inclusive of the gage location, but extending perhaps several miles upstream and downstream of the gage. Site-specific data required by the model include a complete stage hydrograph of the flood and channel cross-section coordinates. Data relative to the extended river reach include effective channel slope, Manning's "n" as a function of stage at the gage, and flood-wave velocity.

Stage hydrograph: The stage hydrograph pertinent to each flood was obtained from automatic digital or analog recorders located at each gage site. Digital data were collected hourly. All stage records utilized in this study were complete and no interpolation between partial records was required. Time adjustments to the stage data, when necessary, were completed by field personnel or the authors prior to application of the data to the dynamic flow model.

Channel cross section: Channel cross-section coordinates were obtained from soundings noted on discharge measurements collected at or near the gage site. The recorded depths were converted to gage datum by utilizing the time and stage data noted on the discharge measurements in conjunction with automatically recorded stage data. Cross-section profiles relative to measurements ranging from flood stage to low flow were constructed and compared to assess channel stability. This procedure indicated that channel geometry was highly stable at each gage site investigated in this study. The cross-section profile ultimately applied to the dynamic flow model was a composite of several observed profiles at the gage location, but is largely representative of measurements collected during flood stage.

Channel slope: The effective channel slopes at the Levisa Fork and South Chickamauga Creek stations were determined from published "high-water" profiles (Tennessee Valley Authority, 1958, plate 7 and U.S. Army Corps of

1 The use of the brand name in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

Engineers, 1945) which in turn were based on observed peak stages of historical floods at various locations along the respective river channels. Corresponding slope data at the Paint Rock River station were estimated by measuring the "rise and run" of the water surface, as shown on U.S. Geological Survey topographic maps. At each gage site, the determination of effective channel slope necessarily required measurement of the "fall" of the water-surface profile along a reach of the channel extending several miles upstream and downstream of the gage.

Channel roughness: Manning's channel roughness coefficients or "n" values as a function of stage were computed using Manning's equation and discharge measurement notes representative of steady-flow or quasi steady-flow conditions at each gage site. A large number of discharge measurements generally obtained over a period of several years and during different seasons of the year were utilized. Channel roughness as represented by the Manning's equation was computed using the relation:

$$n = \frac{1.49}{V} S_o^{1/2} R^{2/3}, \qquad (5)$$

in which R = the hydraulic radius, in L, and other terms are as previously defined.

Effective channel slope values used to compute Manning's "n" were the same as those applied to the dynamic flow model at each gage location. Mean flow velocities at various gage heights were determined directly from discharge measurement notes and summaries. Corresponding hydraulic radii were computed by applying the mean gage heights listed on the discharge measurement notes to the composite cross section at the gage location and computing corresponding cross-section areas and wetted perimeters. As noted previously, effective channel slopes were computed by using water-surface profiles that extended several miles both upstream and downstream of the gage locations. Natural channel roughness and channel wetted perimeter along corresponding reaches of the channels also affect flow velocity at the individual gage sites, particularly when steady-flow conditions through the extended reach approach uniform open-channel flow. Consequently, the Manning's "n"-stage relations utilized in this study are not considered specific to a gage site, but relative to channel reaches extending several miles both upstream and downstream of the gage locations.

Relations of computed Manning's "n" to stage at the four gage locations described in this report are shown in figures 2, 7, 12, and 20. Points based on observed steady- or near steady-flow conditions are circled on each figure and are considered the best quality data. At several stations, point scatter of the data is excessive (figs. 12 and 20) and the relation of Manning's "n" to stage, as shown, was based on the quality of individual data points as well as hydrologic judgment, particularly the concept that Manning's "n" generally decreases with increasing depth of flow up to bankfull stage (Chow, 1959, p. 104). At Paint Rock River near Woodville, Ala., point scatter was sufficiently excessive such that only a constant Manning's "n" was considered reasonable between gage heights -2.0 and 17.0 (fig. 20). Similarly, where data were largely unavailable such as near the low and high gage-height extremes, Manning's "n" through a small range of stage was considered constant (figs. 2-7 and 12).

The large variations in computed Manning's "n" at a given stage or through a small range in stage can be explained in a variety of ways including (1) the occurrence of a temporary backwater condition at the gage site, (2) inaccurate or nonrepresentative channel slope data, particularly at low flow when downstream control can cause discontinuity of the water-surface profile, (3) seasonal variation in the extent and thickness of bank vegatation, and (4) the deposition of significant quantities of alluvial material to the streambed during floods. Given these factors, the roughness coefficients presented in this report may not compare well to the classical Manning's coefficients published by Chow (1959) and Barnes (1967). Table 1 lists slope and roughness parameters applied to the model at each gage site. Cross-section coordinates, stage record, and other data critical to model evaluations are listed in Supplementary Data tables 2-8 at the end of the report.

Table 1.--Summary of station slope and roughness characteristics

Station	Effective channel slope (ft/ft)	Index stage (ft)	Manning's "n"
Levisa Fork at Prestonsburg, Ky.	0.00027	10	0.028
		50	.078
Levisa Fork at Paintsville, Ky.	.00027	10	.028
		50	.078
South Chickamauga Creek near Chickamauga, Tenn.	.00036	9	.062
		21	.039
Paint Rock River near Woodville, Ala.	.00027	17	.057
		19	.035

Wave velocity: Measurements of flood discharge determine a mean flow velocity at a gage location during a given time period. The mean flow velocity differs from the wave velocity (V_w) used in the model because wave velocity is largely determined by wave celerity; that is the velocity of downstream translation of the wave rather than water particles. Celerity is greater than mean flow velocity at any section of the flood wave.

Analyses of flood wave celerity traditionally have been based on uniformly progressive flow concepts, particularly a form of this flow known as a monoclinal rising wave (Chow, 1959 and Henderson, 1966). Such a wave is characterized by parallel wave fronts at successive positions in the channel and constant downstream velocity of translation of the wave configuration. Based on these characteristics and the assumption of constant wave volume, the downstream velocity of translation of a monoclinal rising wave can be derived as:

$$V_w = \frac{Q_1 - Q_2}{A_1 - A_2}, \tag{6}$$

in which Q and A represent stream discharge and cross-sectional area in L^3T^{-1} and L^2, respectively (Chow, 1959, p. 528-529). The subscripts 1 and 2 indicate, respectively, upstream and downstream location. The maximum wave velocity represented by equation (6) was derived independently by two investigators, Kleitz and Seddon, and is represented for wide channels of generally rectangular cross section by the relation:

$$V_w = \frac{1}{T}\frac{dQ}{dy}, \tag{7}$$

in which Q and y are as previously defined and T is channel top width, in L (Chow, 1959, p. 530).

The use of equation (7) implies that the wave form neither subsides nor disperses during downstream translation and that stream discharge is a unique function of stage; that is mean flow velocity can be completely described by the continuity equation (2). As such, waves described by equation (7) are termed kinematic whereas waves described by the complete Saint-Venant equations (equations (1) and (2)) are termed dynamic. Equations (7) and (5) can be used to determine an approximate ratio between the maximum wave velocity and mean flow velocity in a generally prismatic channel. In wide rectangular channels, this ratio is 1.67 (Chow, 1959, p. 531).

The validity of equation (7) regarding the description of actual flood waves in steep natural channels (effective channel slopes of magnitude 10^{-3} or greater) has been amply demonstrated, most conclusively by Rantz (1961). On the other hand, detailed analyses of flood wave discharges in channels of more moderate slope (10^{-4} or 10^{-5}) by Faye and Cherry (1980) and Fread (1975) indicate that stage-discharge relations relative to unsteady flow can be extremely hysteretic. Thus equation (7) and its corresponding assumptions appear to be violated with regard to flood waves in moderately sloped channels and such waves may be more accurately described by considering the dynamic aspects of unsteady open-channel flow (equations (1) and (2)). This latter approach is the basis of investigations described in this report.

Other determinations of wave velocity can be based on direct observation of wave configurations translated between paired stream gages. Such determinations include the initial occurrence of the flood wave at each station ($dy/dt>0$), the time of translation of the wave peak, and the time of translation of the point of maximum rate of stage change (dy/dt = maximum).

For this study, both computed and observed wave velocities were utilized for model simulations. Velocities computed using equation (7) are termed Kleitz-Seddon values. Velocities computed using the 1.67 ratio of

celerity to mean flow velocity are termed kinematic approximations. Observed and computed velocities at the various gage locations are listed in table 2. The computation of these values is described below.

At the Levisa Fork stations, observed wave velocities were based on paired gage data and included the initial occurrence of the flood wave at the station ($dh/dt>0$) and the translation of the flood-wave peak. Computed velocities included the kinematic approximation (1.67 x mean peak flow velocity) and the Kleitz-Seddon approximation. Translation of the leading edge of the flood hydrograph indicated a wave velocity of 9.14 ft/s. The leading edge of the hydrograph also was considered to be the point of maximum rate of change in stage. Observed flood-wave peak velocity was 2.11 ft/s. The kinematic approximations of wave velocity using measured mean flow velocities near the flood peak were 5.45 ft/s at Prestonsburg and 4.66 ft/s at Paintsville. The corresponding velocities based on the Kleitz-Seddon approximation were 4.6 ft/s and 3.2 ft/s. Flood discharges were computed by the model using wave velocity values ranging from 9.14 to 2.11 ft/s. By a significant degree, the best results at both stations were obtained by utilizing observed peak-wave velocity (2.11 ft/s) and this velocity is the flood-wave velocity referenced in subsequent discussions of flood-discharge simulations at the Levisa Fork stations.

At South Chickamauga Creek near Chickamauga, Tenn., paired gage data were not available for the two flood periods described in this report. However, paired gages were operated on the creek during the period of July 1952 through September 1957. The most downstream gage during that period was located about 600 ft upstream from the gage at which stage records utilized in this study were collected. The authors obtained the analog charts collected at each gage for the coincident period of record (July 1952-September 1957) and computed the peak velocities of 12 flood waves for which the ranges in gage height at the downstream station were similar to those noted during the floods described in this report. Values of observed peak wave velocity ranged from 0.57 to 1.30 ft/s and averaged 0.90 ft/s. Eight of the twelve velocities ranged from 0.82 to 1.0 ft/s. Average velocity of the leading edge of the 12 flood waves was 2.92 ft/s. Wave velocities based on the kinematic approximation also were computed for the two floods investigated at the South Chickamauga Creek station (table 2) and equaled 5.53 and 4.24 ft/s, respectively, relative to the peaks of January 5 and 22, 1982. Corresponding velocities based on the Kleitz-Seddon relation were 3.9 and 2.8 ft/s, respectively (table 2).

Simulations of flood discharges at the South Chickamauga Creek station utilized wave velocities ranging from the kinematic approximation of 5.53 ft/s to the observed average peak wave velocity of 0.90 ft/s. Significantly better results were obtained for both floods by utilizing the observed average peak wave velocity of 0.90 ft/s and subsequent results presented in this text are based on this wave velocity.

No observed wave-velocity data were available at the Paint Rock River station near Woodville, Ala. Estimates of peak wave velocity at this station were based on comparisons of the four pair of observed peak wave velocities and corresponding kinematic wave velocities at the Levisa Fork and

Table 2.--Summary of wave-velocity data

Station	Date	Observed peak wave velocity (ft/s)	Kleitz-Seddon wave velocity (ft/s)	Kinematic wave velocity (ft/s)	Observed wave leading-edge velocity (ft/s)	Ratio of observed peak to kinematic wave velocity (ft/s)
Levisa Fork at Prestonsburg, Ky.	April 2-17, 1977	2.11	4.6	5.45	9.14	0.39
Levisa Fork at Paintsville, Ky.	April 2-17, 1977	2.11	3.2	4.66	9.14	.45
South Chickamauga Creek near Chickamauga, Tenn.	July 1952-September 1957	.90			2.92	
	December 31, 1981-January 8, 1982		3.9	5.53		.16
	January 20-28, 1982		2.8	4.24		.21
Paint Rock River near Woodville, Ala.	March 14-20, 1964			4.76		
	April 9-17, 1969			2.86		
	January 4-11, 1971			2.25		

South Chickamauga Creek stations (table 2). Observed velocities at these stations ranged from about 16 to 45 percent of the kinematic wave velocity approximation and averaged 30 percent. Consequently, peak wave velocity of each flood simulated at the Paint Rock River station was estimated to be 30 percent of the computed kinematic wave velocity. Simulated flood discharges at the Paint Rock station described in this text are based on these estimates.

Although data presented in table 2 indicate that wave velocity probably varies with section stage and discharge, no theoretical or empirical framework has been demonstrated that accurately predicts such variations. Consequently, wave velocities used in this study were applied to the digital model as constant values.

Rating curves and tables and discharge measurements were utilized in this study to check the validity of model-computed discharges and were supplied to the authors by U.S. Geological Survey District offices. As such, these data as well as stage records are presumed to conform to U.S. Geological Survey quality assurance standards. Discharge measurements were generally confined to the flood peak and flood recession. No measurements were available during the early and middle part of the rising limb of the flood hydrograph at any station.

SIMULATIONS

Levisa Fork at Prestonsburg, Kentucky

Data

Levisa Fork at Prestonsburg, Ky., drains an area of 1,701 mi^2 within the eastern Kentucky mountains. Stability of the channel cross section (fig. 1) is excellent. The effective channel slope is 0.00027 ft/ft as estimated from U.S. Army Corps of Engineers' flood water-surface profiles. Manning's "n" values computed from discharge records collected during the period 1972-77 are shown in figure 2. Manning's "n" was considered to vary linearly from 0.028 at a 10-foot gage height to 0.078 at a 50-foot gage height, and was assumed to be constant at these respective values at gage heights above 50 ft and below 10 ft.

The stage hydrograph for the flood of April 2-17, 1977, is shown in figure 3. Tributary reservoir releases account for the second rise beginning on the seventh day. The observed wave velocity from Prestonsburg to the downstream recording gage at Paintsville during this flood was 2.11 ft/s based on translation of the flood wave peak (table 2).

Results

Computed stage-discharge and discharge-time relations based on the application of these data (figs. 1-3) to the dynamic flow model are shown in figures 4 and 5. Model results were excellent. The maximum width of the computed hysteresis loop was 11,500 ft^3/s. Differences between computed and

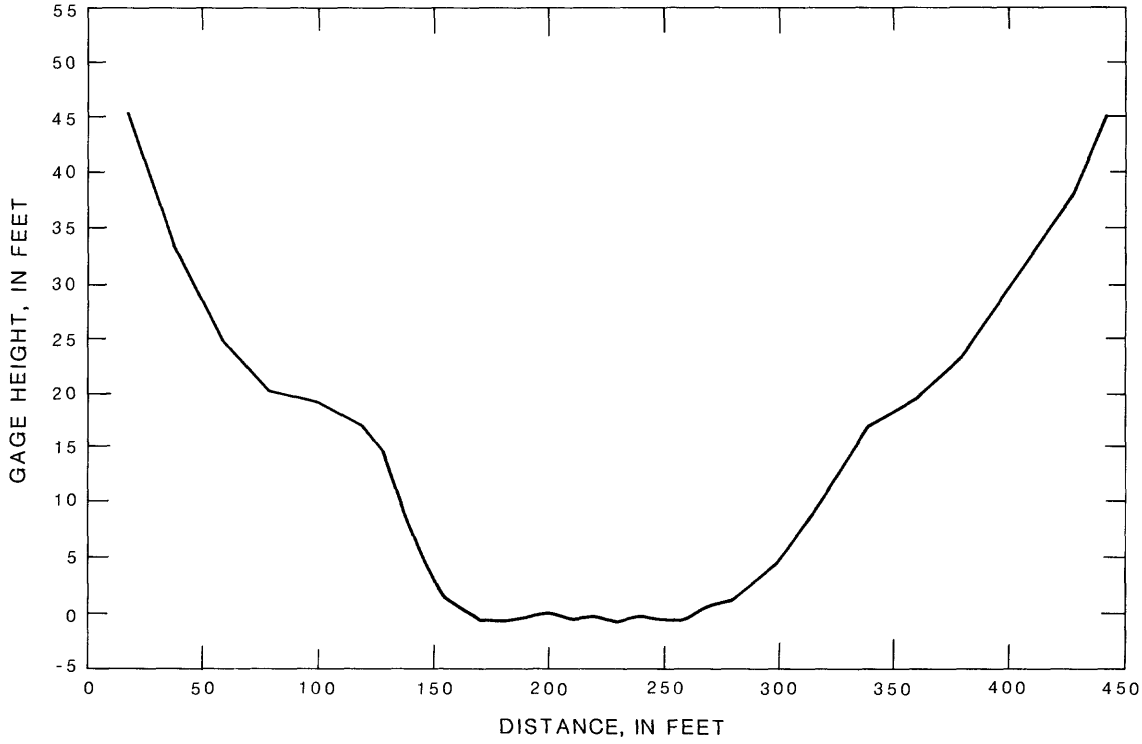

Figure 1.— Channel cross section, Levisa Fork at Prestonsburg, Ky.

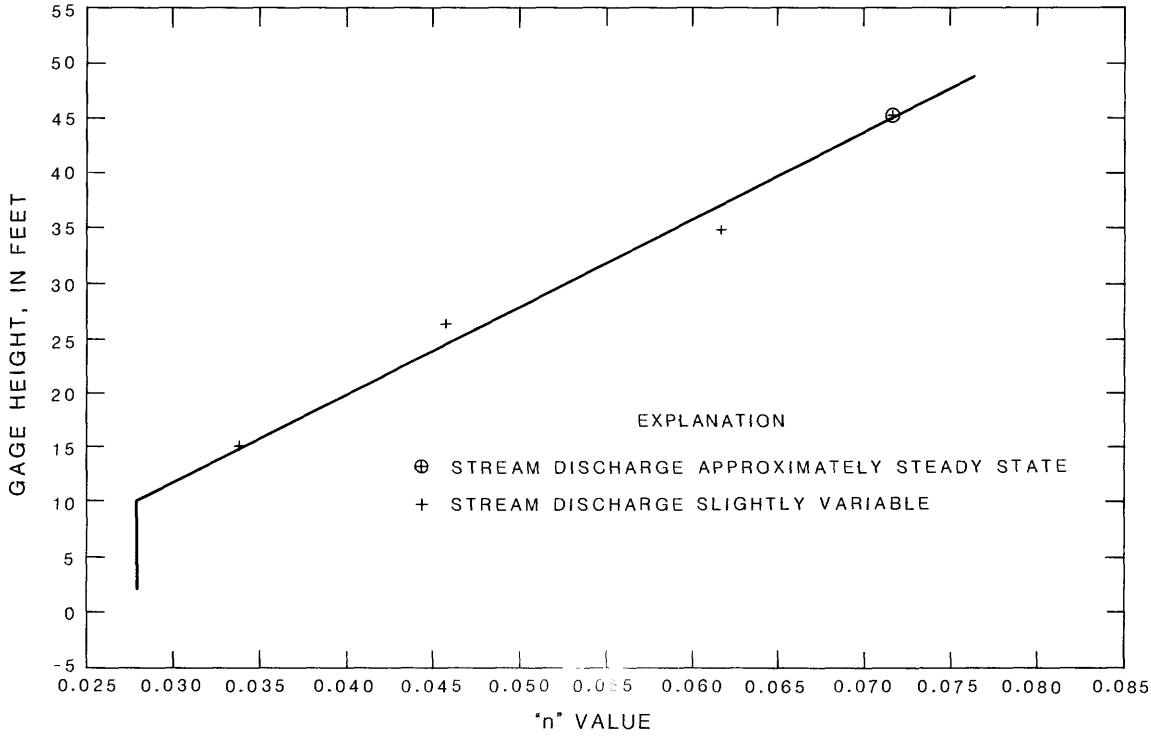

Figure 2.— Relation of Manning's "n" to stage, Levisa Fork at Prestonsburg, Ky.

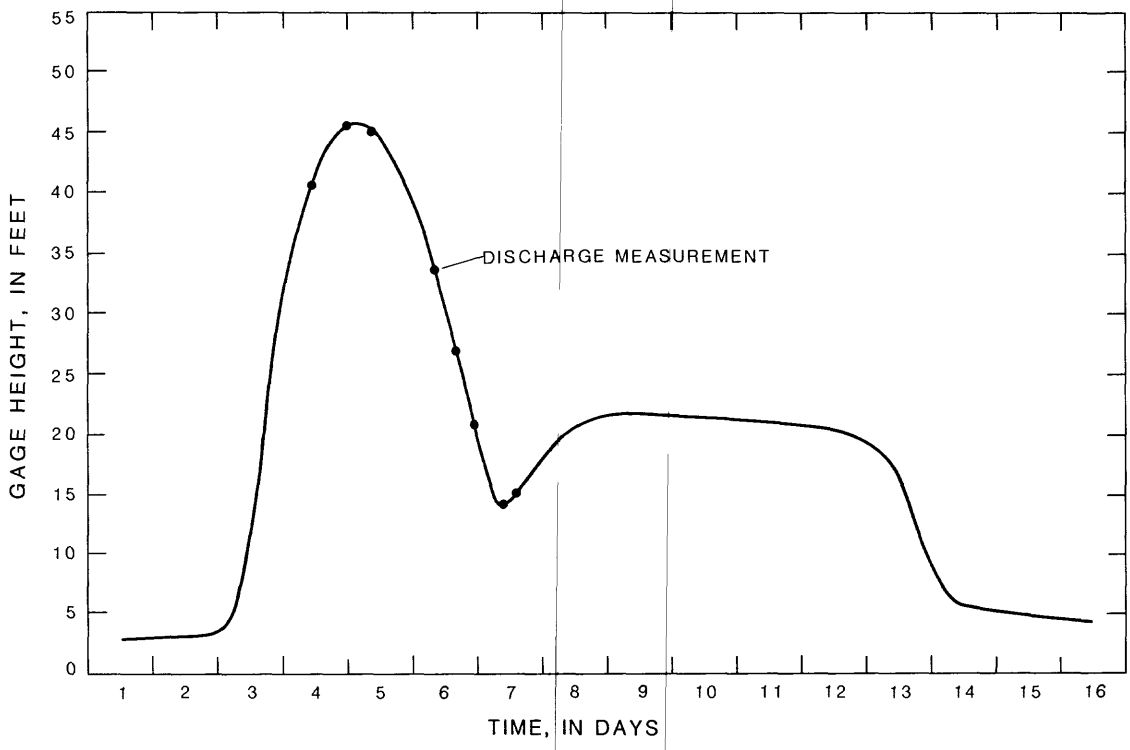

Figure 3.— Stage hydrograph, Levisa Fork at Prestonsburg, Ky., April 2-17, 1977.

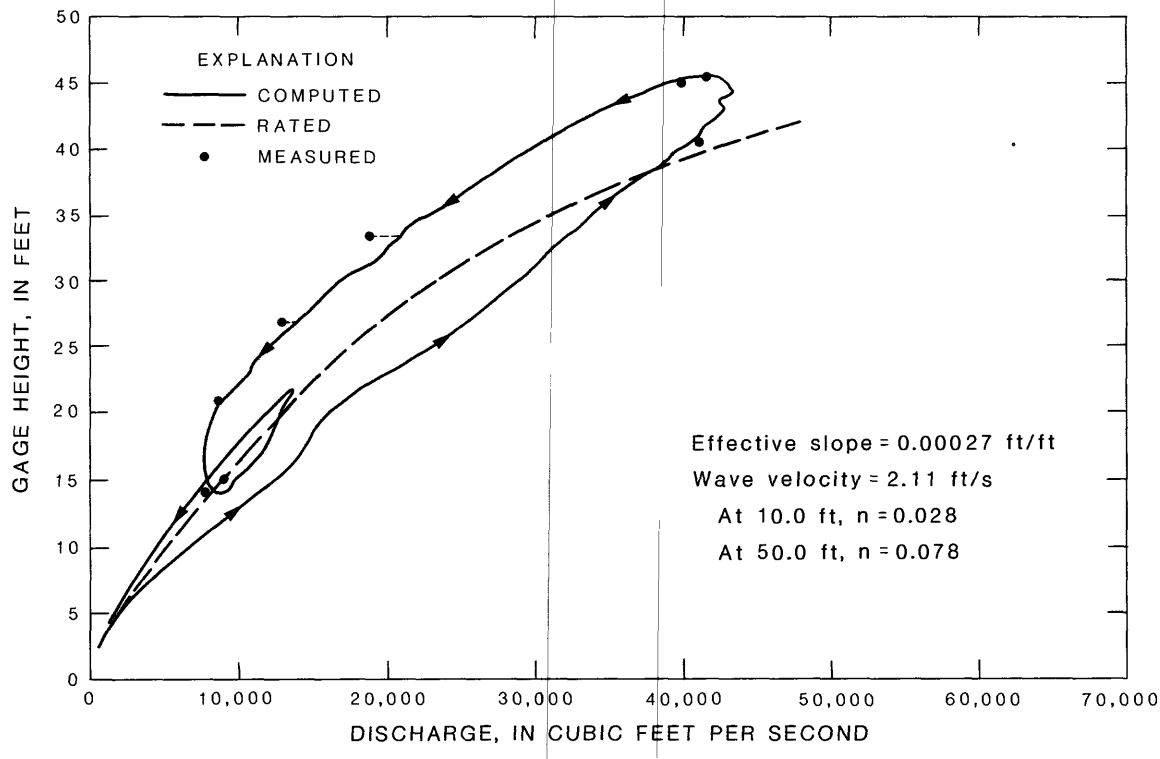

Figure 4.—Hysteretic stage-discharge relation, Levisa Fork at Prestonsburg, Ky., April 2-17, 1977.

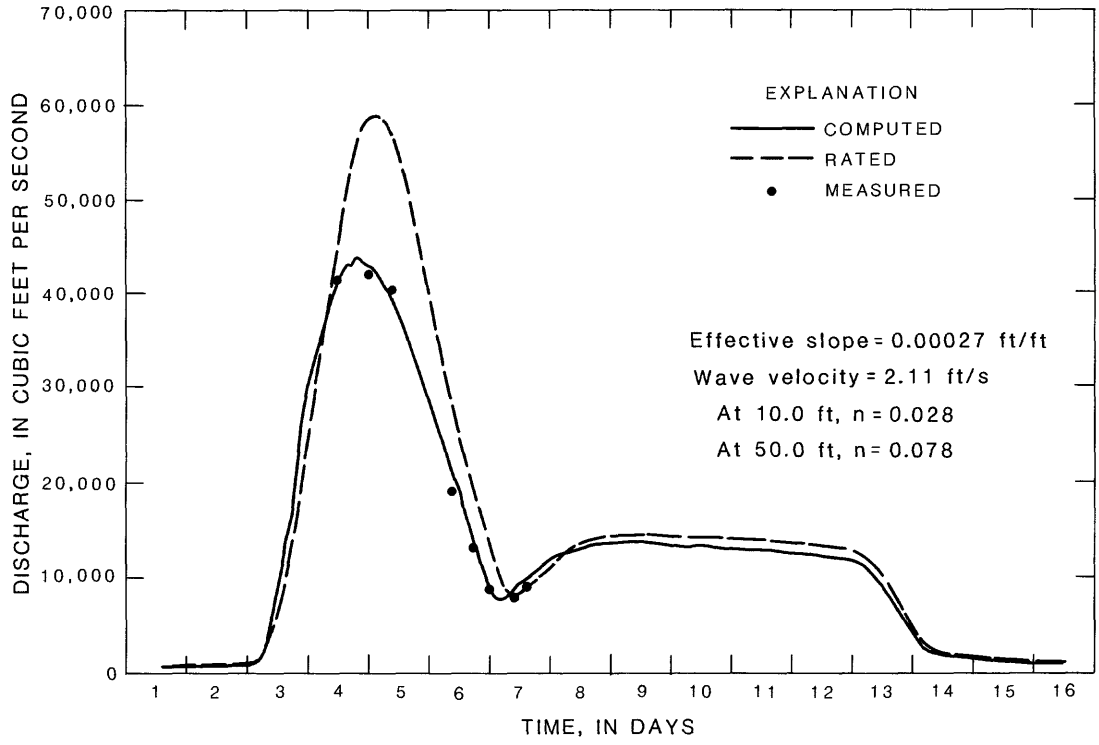

Figure 5.—Computed and rated discharge hydrographs, Levisa Fork at Prestonsburg, Ky., April 2-17, 1977.

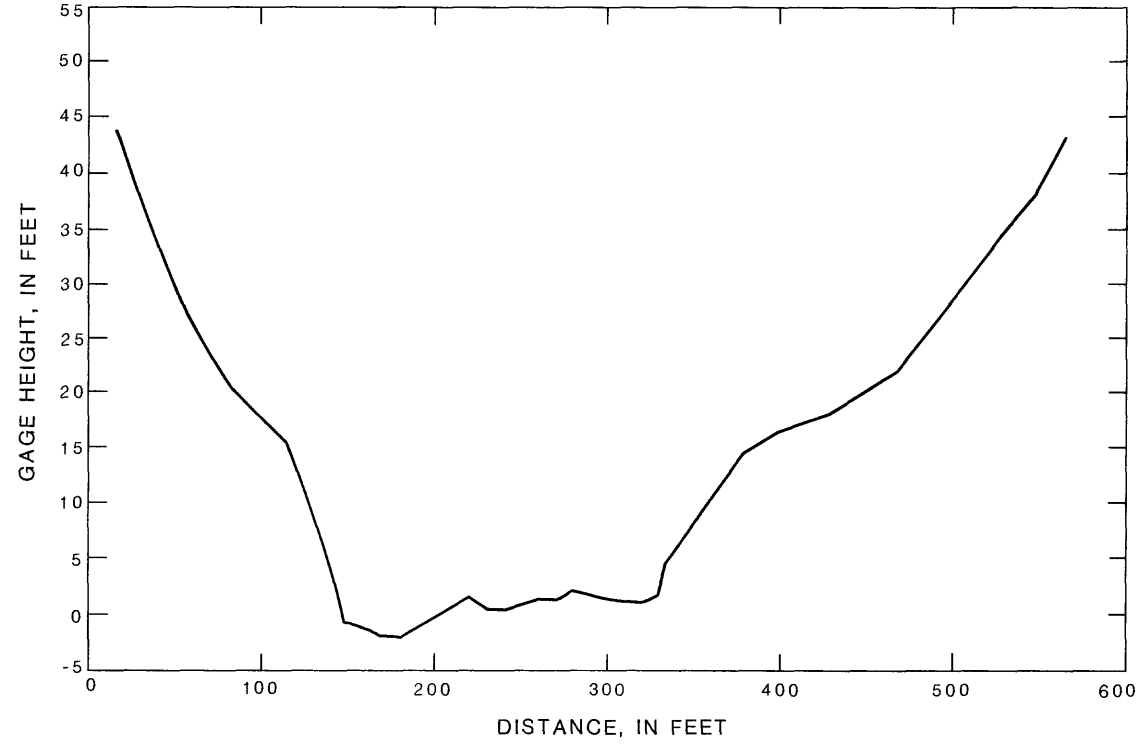

Figure 6.— Channel cross section, Levisa Fork at Paintsville, Ky.

measured discharges ranged from 1.7 to 11.3 percent. Table 3 lists discharges measured during the flood and corresponding computed and rated discharges. Differences between discharges are listed as a percentage of measured discharge. Differences between daily mean discharges computed by the model and those computed from the rating table during the 15-day runoff period were as much as 30 percent, and were greatest between days 3 and 6. Supplementary Data table 2 (at the end of report) lists hourly stage and computed and rated discharges as well as mean daily discharge differences for each day of the flood.

Table 3.--Measured, computed, and rated discharges at Levisa Fork at Prestonsburg, Ky., April 2-17, 1977

[M, measured; C, computed; R, rated]

Date	Time	Gage height (ft)	Measured discharge (ft^3/s) M	Computed[1/] discharge (ft^3/s) C	Absolute error percent C/M	Rated discharge (ft^3/s) R	Absolute error percent R/M
April 5	1300	40.64	41,600	40,900	1.7	43,900	5.5
April 6	0200	45.54	42,100	43,000	2.1	58,600	39.2
April 6	1100	45.10	40,400	39,400	2.4	57,300	41.8
April 7	1000	33.60	19,200	21,300	11.0	28,800	50.0
April 7	1800	26.93	13,200	14,200	7.7	19,800	50.0
April 7	2400	20.93	8,990	9,080	2.1	13,900	54.6
April 8	1000	14.16	7,940	8,840	11.3	8,380	5.5
April 8	1500	15.38	9,100	9,990	9.7	9,210	1.2
Average absolute error:					6.0		31.0

1/ Values of computed discharge rounded. Percent of absolute error based on actual computed values. See Supplementary Data.

Levisa Fork at Paintsville, Kentucky

Data

Levisa Fork at Paintsville, Ky., is located 18.7 river miles downstream from Prestonsburg and drains an area of 2,144 mi^2. Channel geometry (fig. 6) and stability and the relation of Manning's "n" to gage height (fig. 7) are similar to those described at Prestonsburg. Manning's "n" values were computed from discharge records collected during the period 1963-79 and were considered to vary linearly from 0.028 at a 10-foot gage height to 0.078 at a 50-foot gage height. Manning's "n" was considered constant at these respective values at gage heights greater than 50 ft and less than 10 ft.

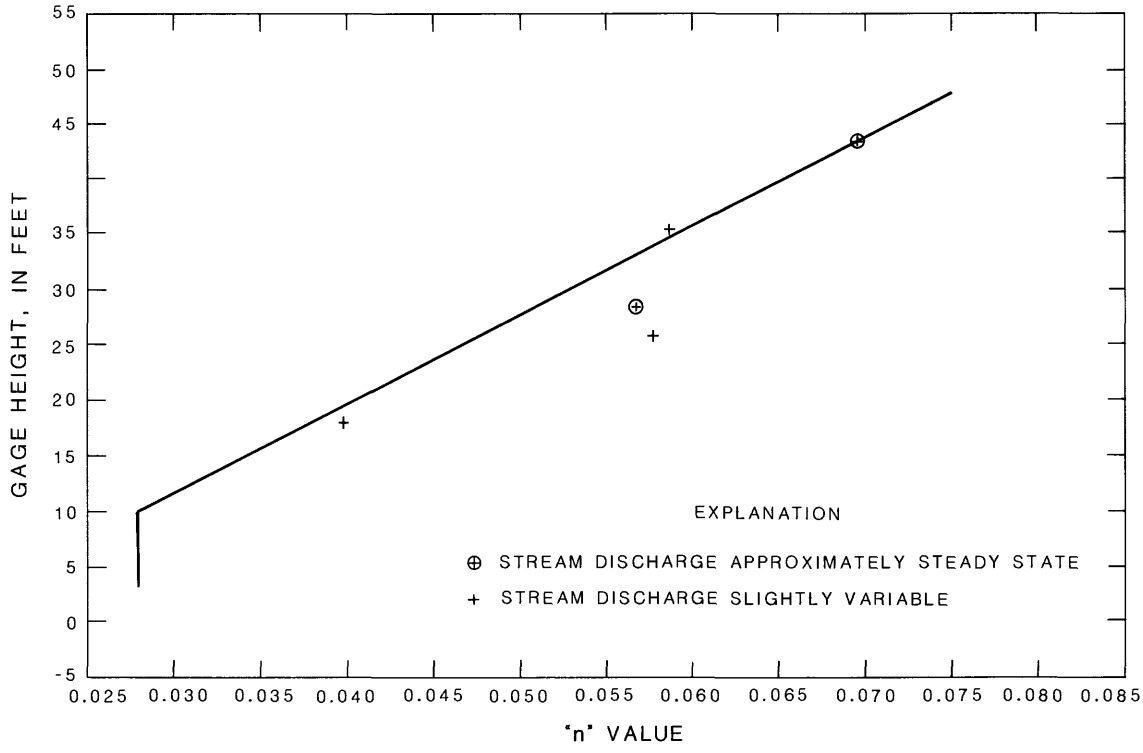

Figure 7.— Relation of Manning's "n" to stage, Levisa Fork at Paintsville, Ky.

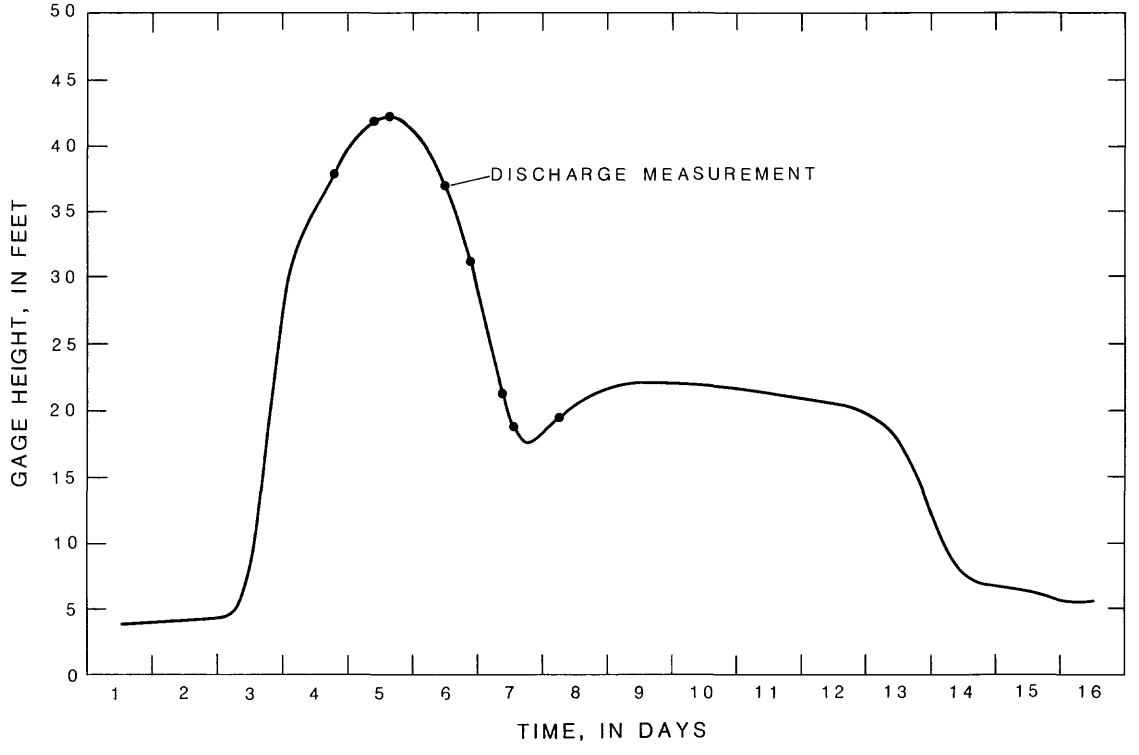

Figure 8.—Stage hydrograph, Levisa Fork at Paintsville, Ky., April 2-17, 1977.

Effective channel slope at this station is 0.00027 ft/ft and was estimated from U.S. Army Corps of Engineers' flood water-surface profiles. The observed peak wave velocity was 2.11 ft/s (table 2).

The stage-hydrograph for the flood of April 2-17, 1977, is shown in figure 8.

Results

Simulated flood discharges at this station were obtained by utilizing wave velocity values ranging from 2.11 to 9.14 ft/s (table 2). All simulations were unsatisfactory; however, model computations at the lower velocity indicated a reasonable loop width and configuration (figs. 9 and 10), but the loop was consistently shifted to the right of the measured discharges. This shift could be the result of temporary backwater conditions at the station during part of the observed flood or an incorrect estimate of channel slope or wave velocity. Given the similarity of Manning's "n" values at both the Prestonsburg and Paintsville stations computed with the same channel slope value and the use of flood-profile maps to determine effective channel slope, a significantly inaccurate effective channel slope would seem unlikely. Similarly, comparison of the stage hydrograph at Prestonsburg (fig. 3) with the corresponding hydrograph at Paintsville (fig. 8) indicates that little attenuation or subsidence of the flood wave occurred between the stations and that rise and recession slopes (dy/dt) were virtually equal over corresponding ranges of gage heights. Thus, the shape of the wave profile remained stable during translation of the wave downstream and peak wave velocity observed between the stations (2.11 ft/s) was probably similar to the actual peak wave velocity at both Prestonsburg and Paintsville.

Consequently, the shift of computed discharges to the right of observed discharges at Paintsville throughout all but the lower part of the flood recession is probably caused by temporary backwater at the gage. The possible occurrence of backwater during the April 2-17, 1977, flood is further suggested by several discharge measurements collected during March 12-14, 1963, near a flood peak of about gage height 43.5 ft. The gage heights and corresponding measured discharges observed during the 1963 flood are listed below (table 4) along with corresponding data from the 1977 flood and are also shown in figure 9. Note that the measurements for both floods span a similar range of gage heights near the flood peak. At gage height 41.82 ft during the flood rise of March 13, 1963, measured discharge equaled 51,000 ft^3/s and the corresponding mean flow velocity was 3.59 ft/s. At gage height 41.85 ft during the flood rise of April 6, 1977, measured discharge was 42,500 ft^3/s and mean flow velocity equaled 2.97 ft/s. Although the 1977 measurement occurred slightly closer to the flood peak than the corresponding 1963 measurement, the disparity between discharges at essentially equal gage heights and cross-sectional areas is highly indicative of backwater conditions during the April 1977 flood.

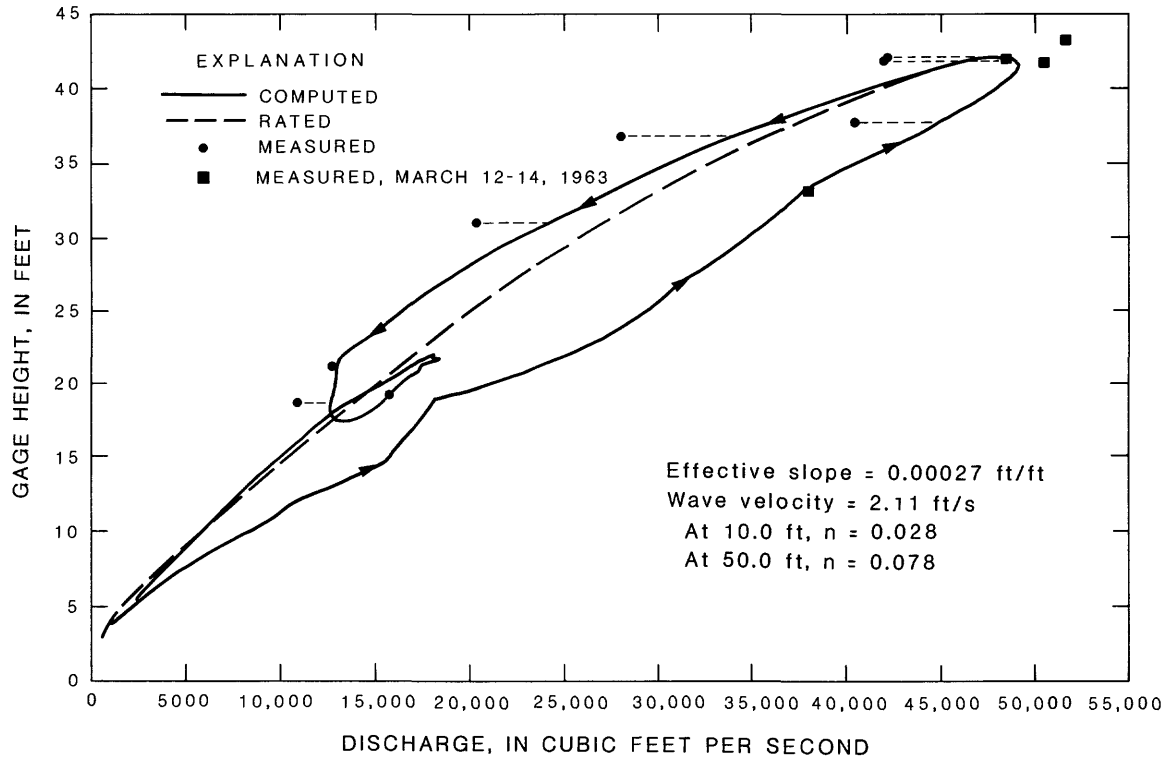

Figure 9.— Hysteretic stage-discharge relation, Levisa Fork at Paintsville, Ky., April 2-17, 1977.

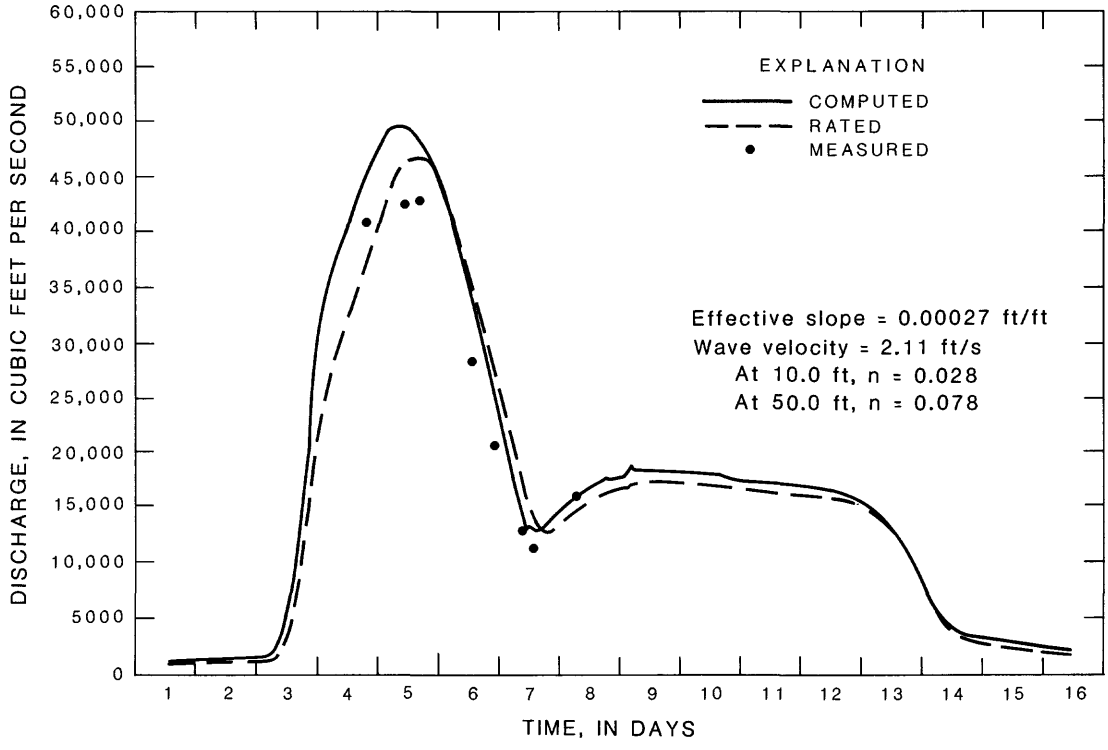

Figure 10.— Computed and rated discharge hydrographs, Levisa Fork at Paintsville, Ky., April 2-17, 1977.

Table 4.--Summary of discharge measurement data collected near the flood peaks of March 12, 1963, andApril 6, 1977, at Levisa Fork at Paintsville, Ky.

Date	Area (ft^2)	Gage height (ft)	Discharge (ft^3/s)	Mean velocity (ft/s)
		1963		
March 12	11,500	33.50	38,400	3.34
March 13	14,200	41.82	51,000	3.59
March 13	15,100	43.50	52,200	3.45
March 14	14,300	42.09	49,000	3.44
		1977		
April 5	12,600	37.83	40,900	3.25
April 6	14,300	41.89	42,500	2.97
April 6	14,800	42.18	42,700	2.89

Although the occurrence of backwater is suggested at this site, its actual cause or causes cannot be determined with certainty. Several possibilities are suggested, however, based on the topography and culture in the general vicinity of the gaging station and include a radical change in channel curvature downstream of the station, debris dams at several bridge structures downstream of the station, discharges from tributaries to Levisa Fork in the vicinity of the station, or a combination of these conditions.

Note that backwater conditions are not fully explained by the equations upon which the model is based. Particularly, changes in friction slope caused by backwater conditions cannot be approximated by Manning's equation. Similarly, changes in stage with distance along the channel cannot be approximated by a function of wave velocity and rate-of-change-of-stage at the gage site. Thus, given the occurrence of backwater, critical assumptions of model development are violated and model computations would be generally unsatisfactory when compared to observed discharges.

Table 5 lists discharges measured during the April 1977 flood and corresponding computed and rated discharges. Differences between discharges are listed as a percentage of measured discharge.

Table 5.--Measured, computed, and rated discharges at Levisa Fork at Paintsville, Ky., April 2-17, 1977

[M, measured; C, computed; R, rated]

Date	Time	Gage height (ft)	Measured discharge (ft^3/s) M	Computed 1/ discharge (ft^3/s) C	Absolute error percent C/M	Rated discharge (ft^3/s) R	Absolute error percent R/M
April 5	2200	37.83	40,900	45,200	10.6	37,700	7.8
April 6	1300	41.89	42,500	49,600	16.6	46,300	8.9
April 6	1900	42.18	42,700	48,700	13.9	46,900	9.8
April 7	1500	36.93	28,500	34,700	21.9	36,100	26.7
April 7	2400	31.07	20,700	24,600	18.8	27,400	32.4
April 8	1100	21.22	12,900	13,100	1.8	16,400	27.1
April 8	1500	18.71	11,100	12,900	16.0	13,900	25.2
April 9	0800	19.41	15,900	16,000	.7	14,600	8.2
Average absolute error:					12.5		18.3

1/ Values of computed discharge rounded. Percent of absolute error based on actual computed values. See Supplementary Data.

Hourly stage and computed and rated discharges are listed in Supplementary Data table 3 (at the end of report). Differences between computed and rated daily mean discharges for each day of the flood also are listed.

South Chickamauga Creek near Chickamauga, Tennessee

Data

South Chickamauga Creek drains an area of 428 mi^2 in the Valley and Ridge province near Chattanooga, Tenn. The channel is generally bedrock and the cross section (fig. 11) is stable. An effective channel slope of 0.00047 ft/ft was obtained from topographic maps. The effective channel slope of 0.00036 ft/ft used in the model was determined from water-surface profiles published in Tennessee Valley Authority (1958). Manning's "n" values (fig. 12) were considered to vary linearly from 0.062 at a gage height of 9 ft to 0.039 at a gage height of 21 ft and were considered to be constant at these respective values at gage heights greater than 21 ft and less than 9 ft. Manning's "n" values were computed from discharge records collected during the period June 1981 to January 1982.

Stage hydrographs for the floods of December 31, 1981 to January 8, 1982, and January 20-28, 1982, are shown in figures 13 and 14, respectively.

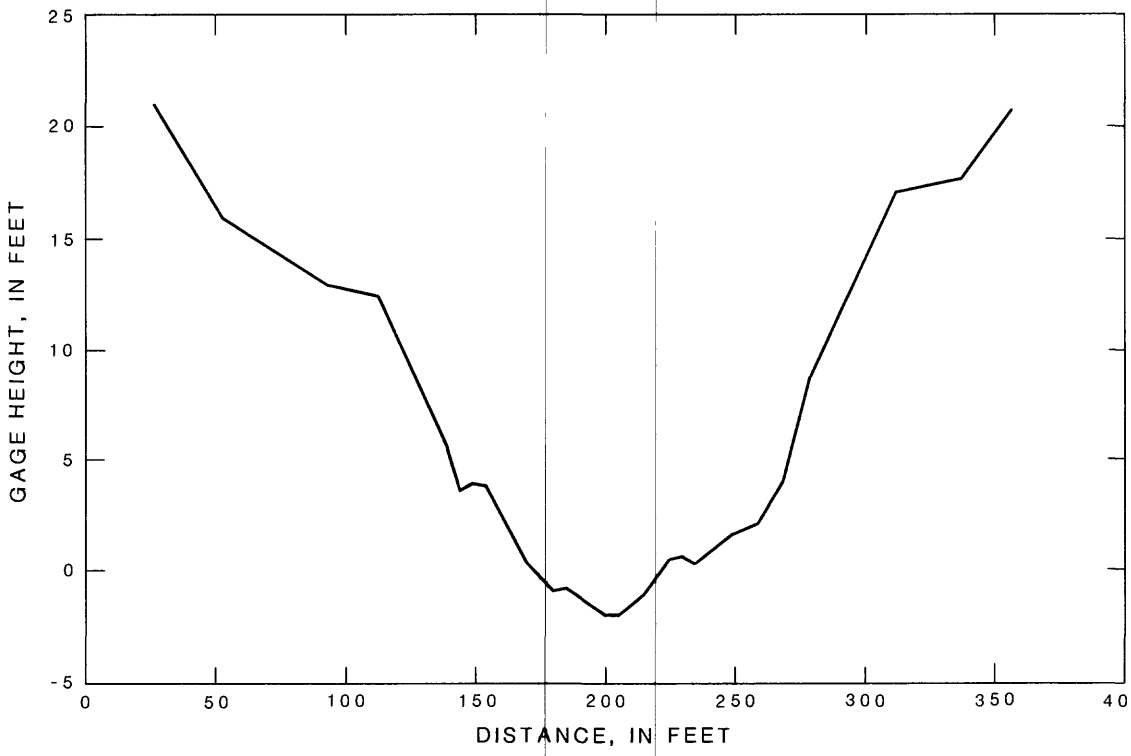

Figure 11.—Channel cross section, South Chickamauga Creek near Chickamauga, Tenn.

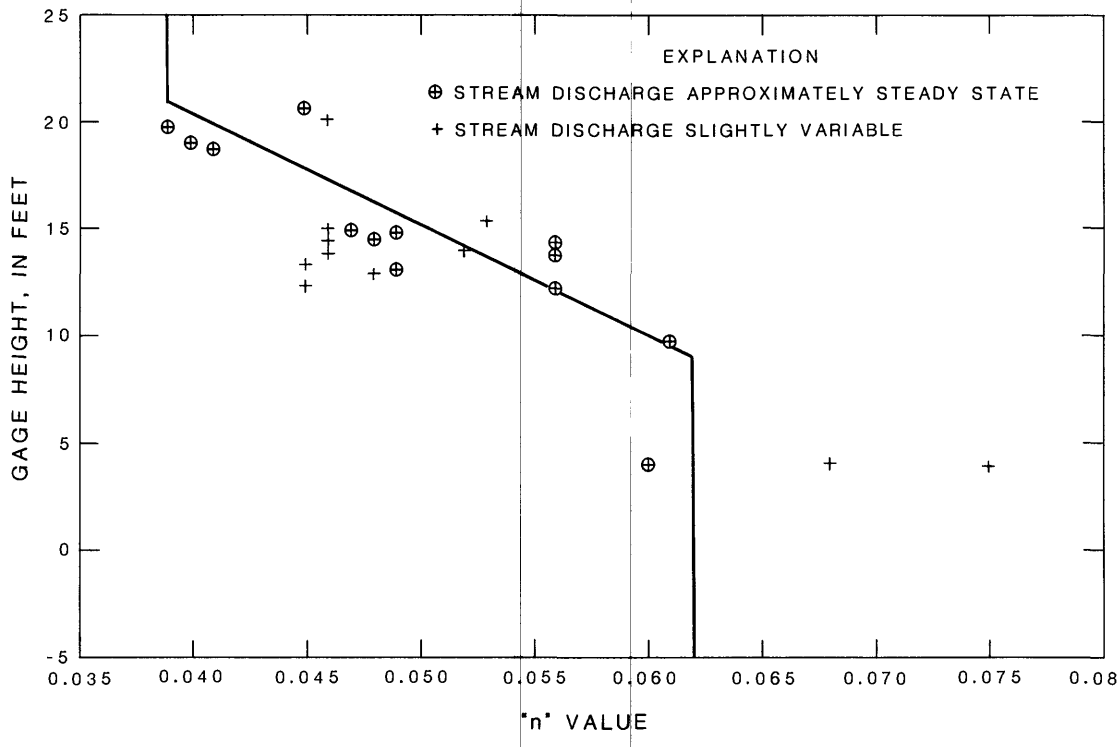

Figure 12.—Relation of Manning's "n" to stage, South Chickamauga Creek near Chickamauga, Tenn.

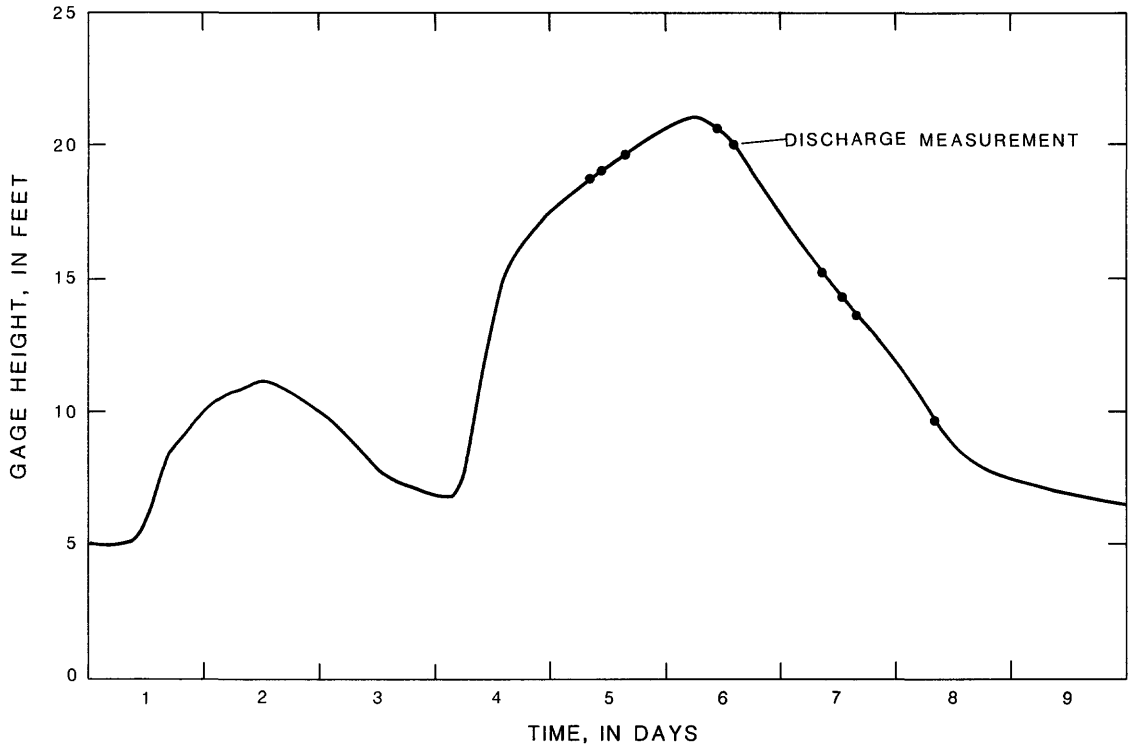

Figure 13.— Stage hydrograph, South Chickamauga Creek near Chickamauga, Tenn., December 31, 1981 - January 8, 1982.

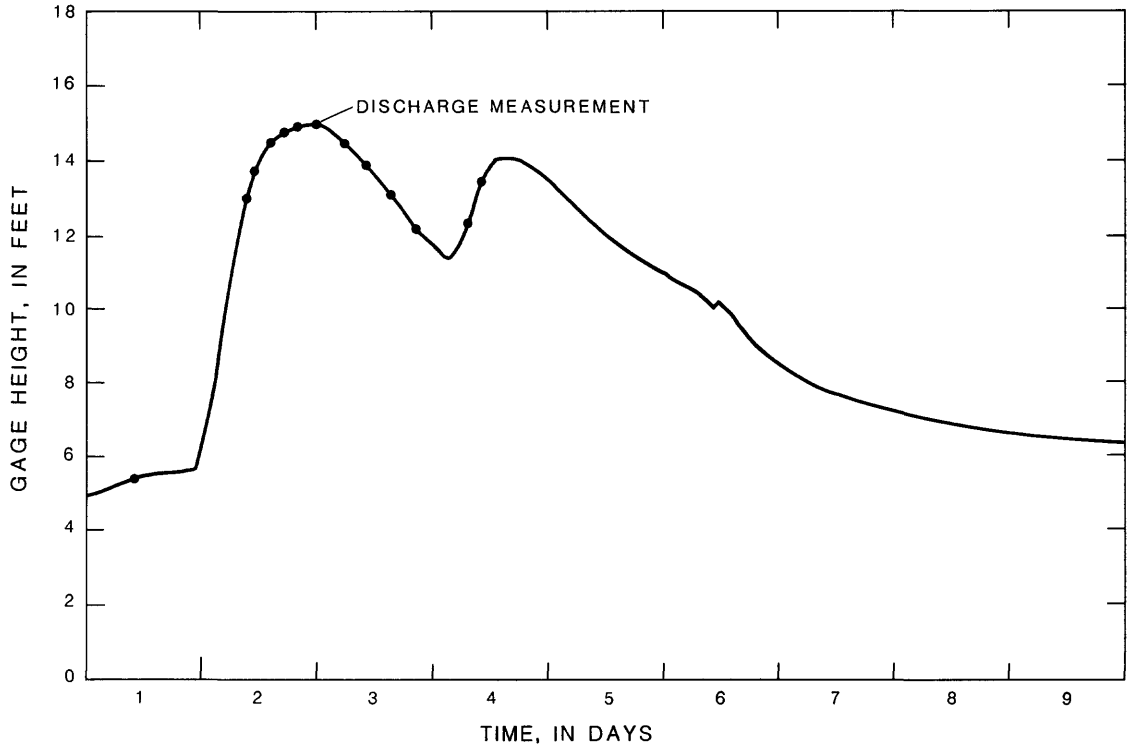

Figure 14.— Stage hydrograph, South Chickamauga Creek near Chickamauga, Tenn., January 20-28, 1982.

Actual flood-wave velocities are unknown but were estimated at 0.90 ft/s based on peak wave velocities of similar floods computed by using paired gage data collected during July 1952 through September 1957 (table 2).

Results

Computed stage-discharge and discharge-time relations based on the application of the channel, roughness, and wave-velocity data described previously are shown in figures 15-18. Model results were excellent. The maximum width of the hysteresis loops for both floods was about 1,900 ft^3/s and 1,200 ft^3/s, respectively. Differences between computed and measured discharges for both floods ranged from 0.5 to 8.7 percent. A steady low-flow measurement obtained prior to the January 20-28 flood was simulated within 24 percent of the measured value. Tables 6 and 7 list discharges measured during the December 31, 1981-January 8, 1982, flood and the January 20-28, 1982, flood and corresponding computed and rated discharges. Differences between discharges are listed as a percentage of measured discharge. Differences between the daily mean discharges computed by the model and those computed from the rating table during the flood of December 31, 1981-January 8, 1982, were as much as 21 percent and were greatest between days 1 and 4. Corresponding differences for the flood of January 20-28, 1982, ranged from less than 1 percent to about 35 percent and were greatest on the first and second days of the flood.

Table 6.--Measured, computed, and rated discharges at South Chickamauga Creek near Chickamauga, Tenn., December 31, 1981-January 8, 1982

[M, measured; C, computed; R, rated]

Date	Time	Gage height (ft)	Measured discharge (ft^3/s) M	Computed[1/] discharge (ft^3/s) C	Absolute error percent C/M	Rated discharge (ft^3/s) R	Absolute error percent R/M
January 4	1000	18.75	10,200	10,900	6.7	9,250	9.3
January 4	1200	19.07	10,800	11,400	5.6	9,730	9.9
January 4	1700	19.72	12,400	12,600	1.9	11,000	11.3
January 5	1300	20.63	12,500	13,100	5.0	12,800	2.4
January 5	1600	20.09	11,200	11,500	2.3	11,700	4.5
January 6	1000	15.28	5,330	5,200	2.5	5,420	1.7
January 6	1400	14.38	4,480	4,450	.6	4,830	7.8
January 6	1700	13.70	4,020	4,040	.5	4,440	10.4
January 7	0900	9.75	2,150	1,970	8.2	2,450	14.0
Average absolute error:					3.7		7.9

1/ Values of computed discharge rounded. Percent of absolute error based on actual computed values. See Supplementary Data.

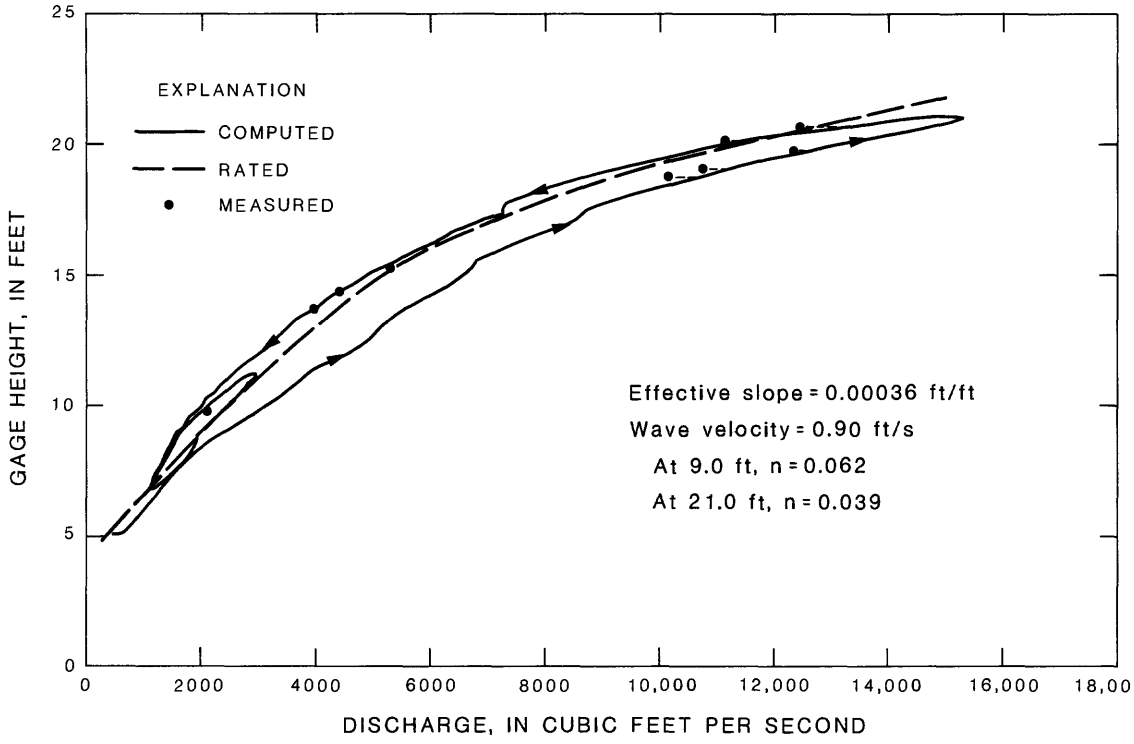

Figure 15.—Hysteretic stage-discharge relation, South Chickamauga Creek near Chickamauga, Tenn., December 31, 1981—January 8, 1982.

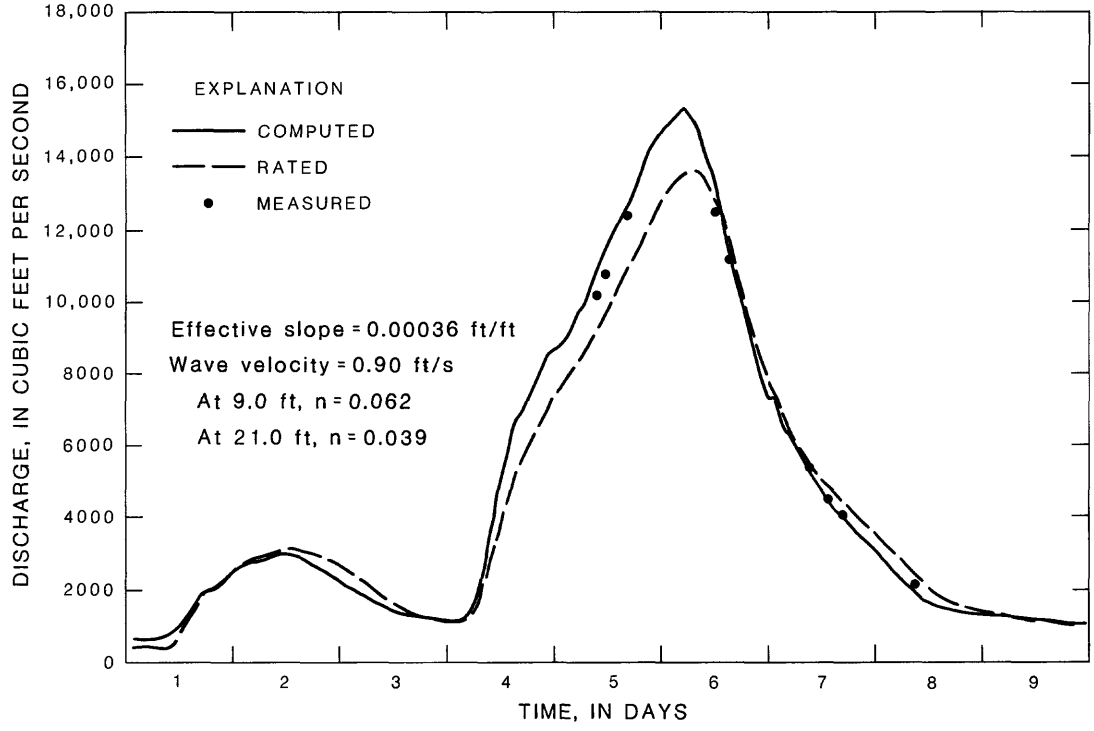

Figure 16.—Computed and rated discharge hydrographs, South Chickamauga Creek near Chickamauga, Tenn., December 31, 1981—January 8, 1982.

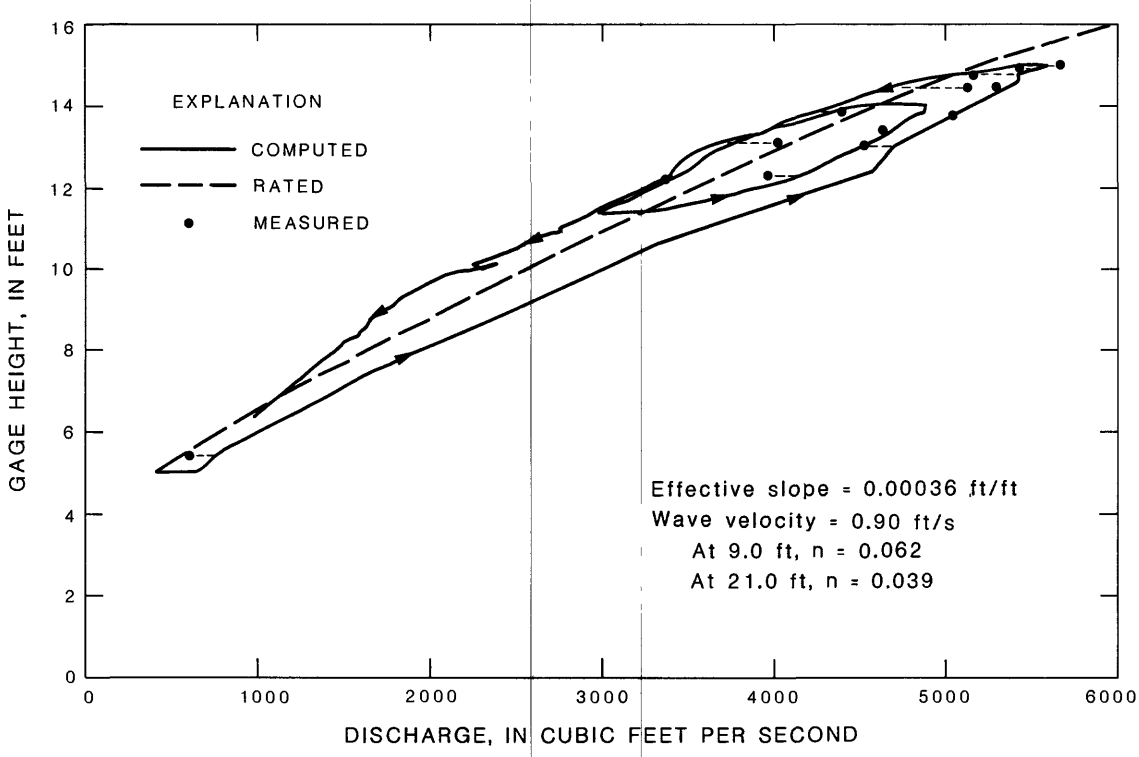

Figure 17.— Hysteretic stage-discharge relation, South Chickamauga Creek near Chickamauga, Tenn., January 20-28, 1982.

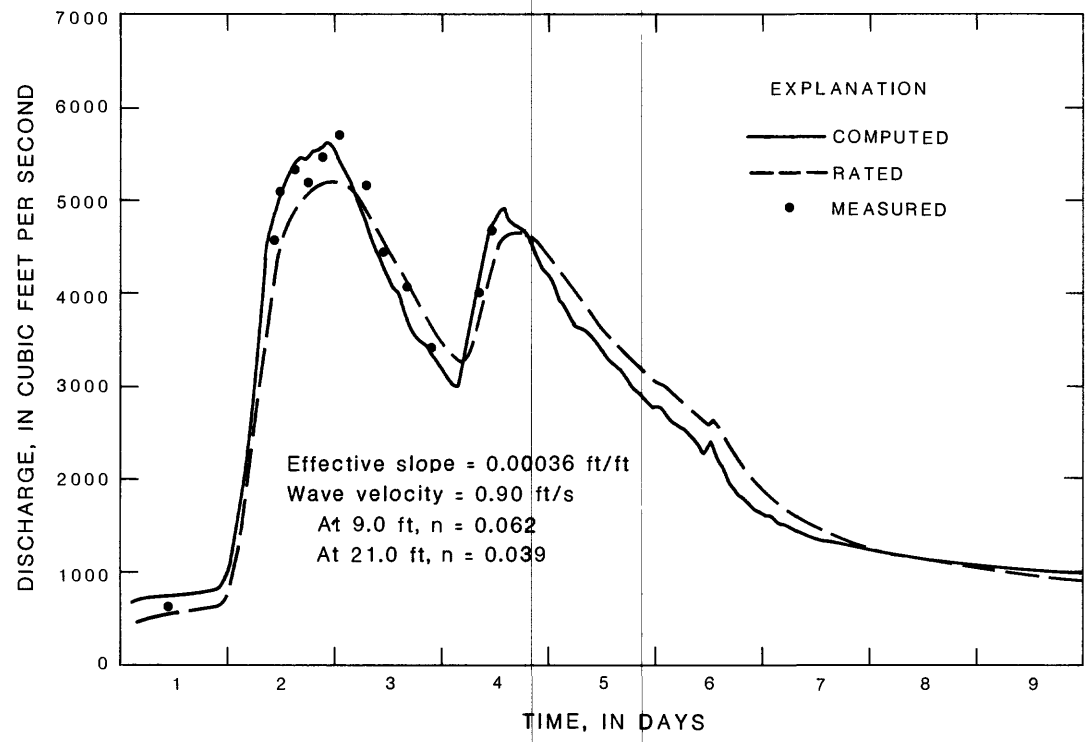

Figure 18.— Computed and rated discharge hydrographs, South Chickamauga Creek near Chickamauga, Tenn., January 20-28, 1982.

Table 7.--Measured, computed, and rated discharges at South Chickamauga Creek near Chickamauga, Tenn., January 20-28, 1982

[M, measured; C, computed; R, rated]

Date	Time	Gage height (ft)	Measured discharge (ft^3/s) M	Computed[1/] discharge (ft^3/s) C	Absolute error percent C/M	Rated discharge (ft^3/s) R	Absolute error percent R/M
January 20	1100	5.41	612	757	23.8	562	8.2
January 21	1100	13.02	4,550	4,720	3.6	4,060	10.8
January 21	1300	13.80	5,060	5,070	.1	4,490	11.3
January 21	1600	14.48	5,320	5,390	1.3	4,890	8.1
January 21	1900	14.77	5,180	5,430	4.7	5,060	2.3
January 21	2200	14.92	5,450	5,550	1.9	5,152	5.5
January 22	0200	14.99	5,690	5,400	5.1	5,190	8.8
January 22	0800	14.47	5,150	4,780	7.3	4,880	5.2
January 22	1200	13.87	4,410	4,270	3.1	4,530	2.7
January 22	1700	13.13	4,050	3,700	8.7	4,120	1.7
January 22	2200	12.21	3,390	3,350	1.2	3,660	8.0
January 23	0900	12.33	3,990	4,190	4.9	3,720	6.8
January 23	1200	13.42	4,660	4,730	1.4	4,280	8.2
Average absolute error:					5.2		6.7

1/ Values of computed discharge rounded. Percent of absolute error based on computed values. See Supplementary Data.

Hourly stage and computed and rated discharges relative to each flood are listed in Supplementary Data tables 4 and 5 (at the end of report). Differences between computed and rated daily mean discharge for each day of the flood also are listed.

Paint Rock River near Woodville, Alabama

Data

Paint Rock River drains an area of 320 mi^2 in the Cumberland Plateau of northeastern Alabama. The channel cross section (fig. 19) is stable. The effective channel slope estimated from U.S. Geological Survey topographic maps is 0.00027 ft/ft. Manning's "n" values (fig. 20) decreased linearly from 0.057 at a gage height of 17 ft to 0.035 at a gage height of 19 ft and were considered to be constant at these respective values for gage heights above 19 ft and below 17 ft. Manning's "n" values were computed from discharge records collected during the period 1962-77.

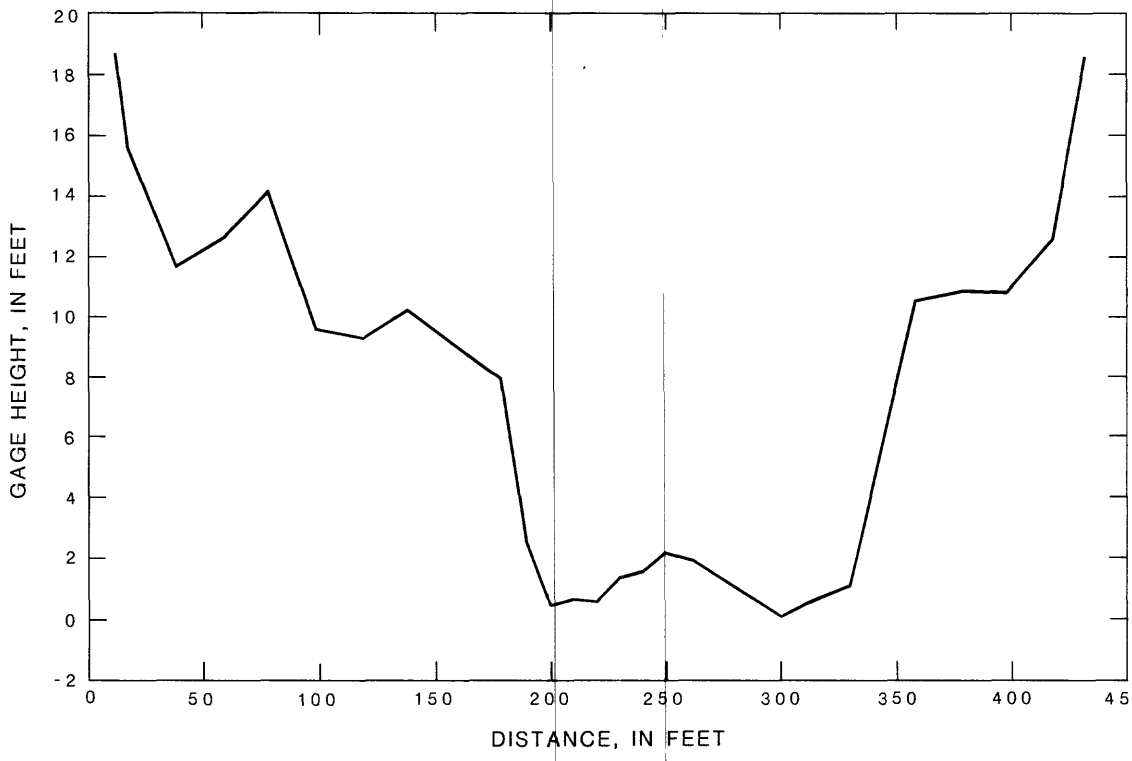

Figure 19.— Channel cross section, Paint Rock River near Woodville, Ala.

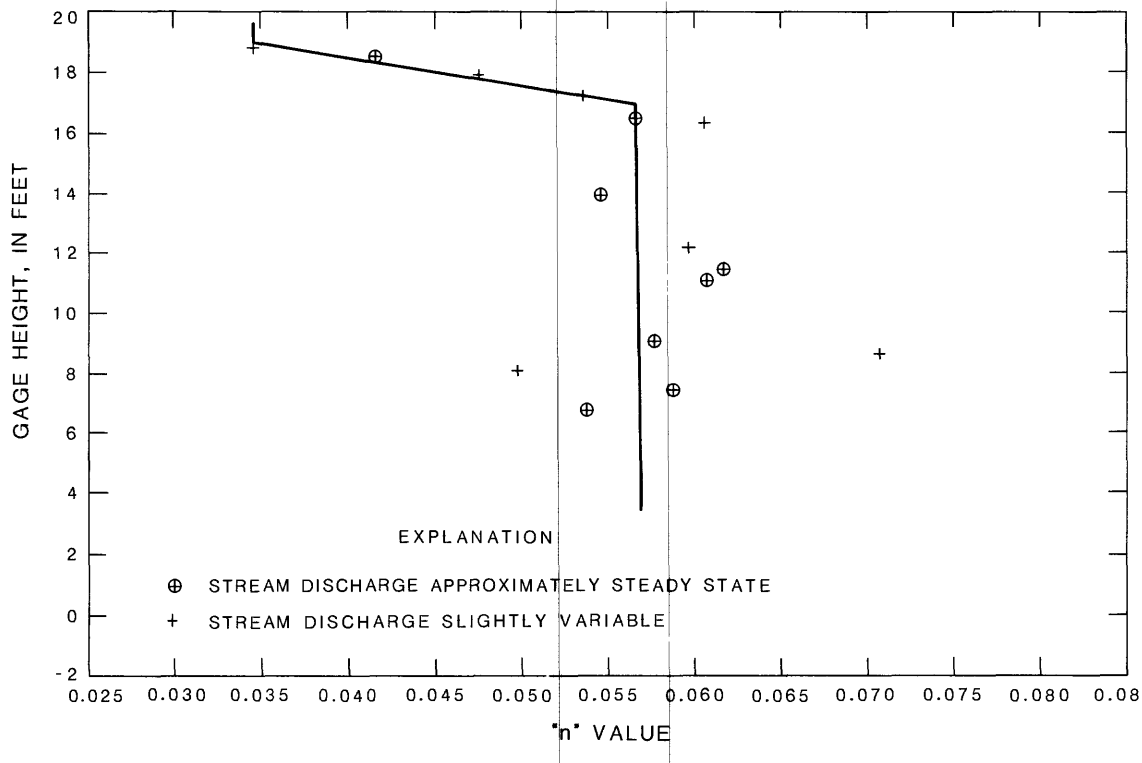

Figure 20.— Relation of Manning's "n" to stage, Paint Rock River near Woodville, Ala.

Stage hydrographs for floods in March 1964, April 1969, and January 1971 are shown in figures 21-23, respectively. Flow was slightly out of banks during the April 1969 and January 1971 floods and was well out of banks during part of the March 1964 flood. Wave velocities estimated by the kinematic approximation based on measured velocities were 4.76, 2.86, and 2.25 ft/s, respectively. Based on comparisons of observed peak wave velocities and the corresponding kinematic approximations at the Levisa Fork and South Chickamauga Creek stations (table 2), the computed kinematic approximations of the peak wave velocities at this station were reduced to 30 percent of their original value for application to the model. Thus, wave velocities utilized in the simulation of dynamic discharge during the floods of March 1964, April 1969, and January 1971 were 1.43, 0.86, and 0.68 ft/s, respectively.

Results

Computed stage-discharge and discharge-time relations based on the application of these data are shown in figures 24-29. Model results were fair to excellent based on corresponding measured discharges. Maximum computed stage-discharge hysteresis pertinent to the flood of March 1964 was about 2,700 ft^3/s. Differences between computed and measured discharges for this flood ranged from about 7 to 16 percent. Differences between the daily mean discharges computed by the model and those computed from the rating table during the 7-day runoff period were as much as 38 percent and were greatest between days 1 and 4. Relative to the flood of April 1969, maximum computed stage-discharge hysteresis was about 1,300 ft^3/s and differences between measured and computed discharges ranged from about 2 to 10 percent. Differences between the daily mean discharges computed by the model and those computed from the rating table during the 9-day runoff period were as much as 45 percent and were greatest between days 2 and 4. Maximum computed stage-discharge hysteresis pertinent to the flood of January 1971 was about 1,600 ft^3/s. Differences between computed and measured discharges for this flood were about 5 percent. Differences between the daily mean discharges computed by the model and those computed from the rating table during the 8-day runoff period were as much as 33 percent and were greatest during days 1 and 2.

Because of the paucity of measured discharge data and the total lack of observed wave-velocity and effective channel-slope data, some degree of uncertainty necessarily remains regarding the accuracy of the model computations at this station. In particular, the lack of discharge data during the flood of March 1964 precludes a thorough analysis of the effects of out-of-bank flows on discharge computations. In addition, the effects of errors of estimates of channel slope and wave velocity on model computations cannot be determined; however, errors relative to wave velocity probably affect the accuracy of computations to a greater degree than similar errors relative to channel slope.

Table 8 lists discharges measured during the three floods and corresponding computed and rated discharges. Differences between discharges are listed as a percentage of measured discharge.

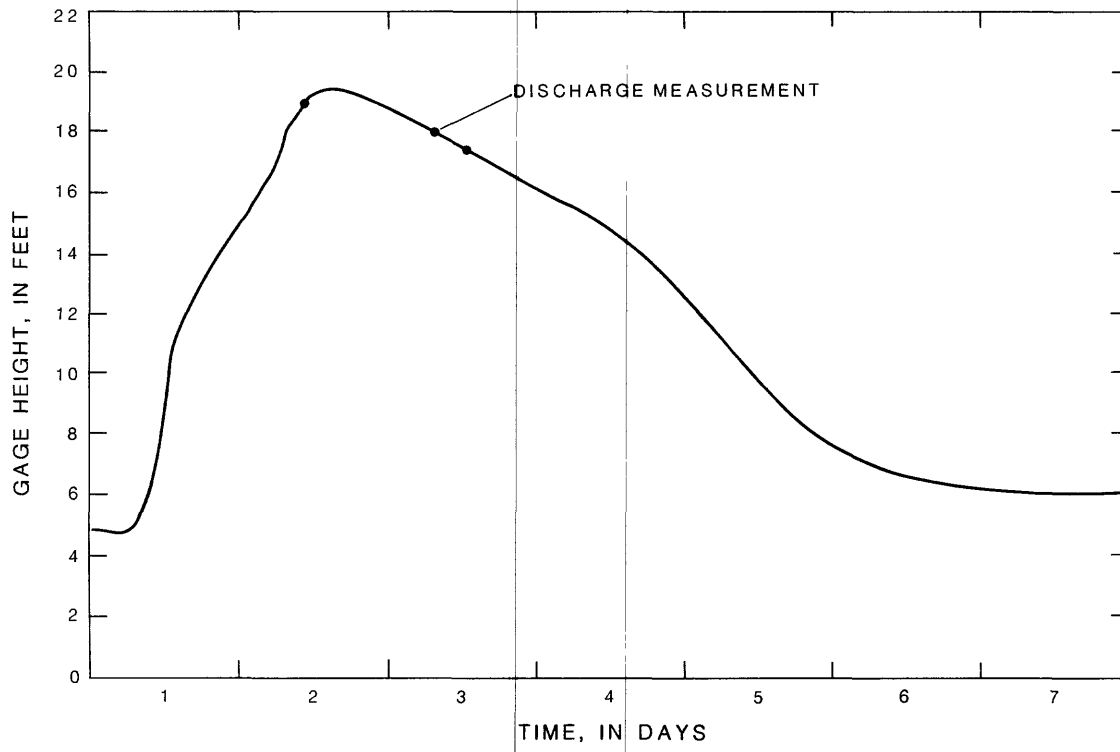

Figure 21.— Stage hydrograph, Paint Rock River near Woodville, Ala., March 14-20, 1964.

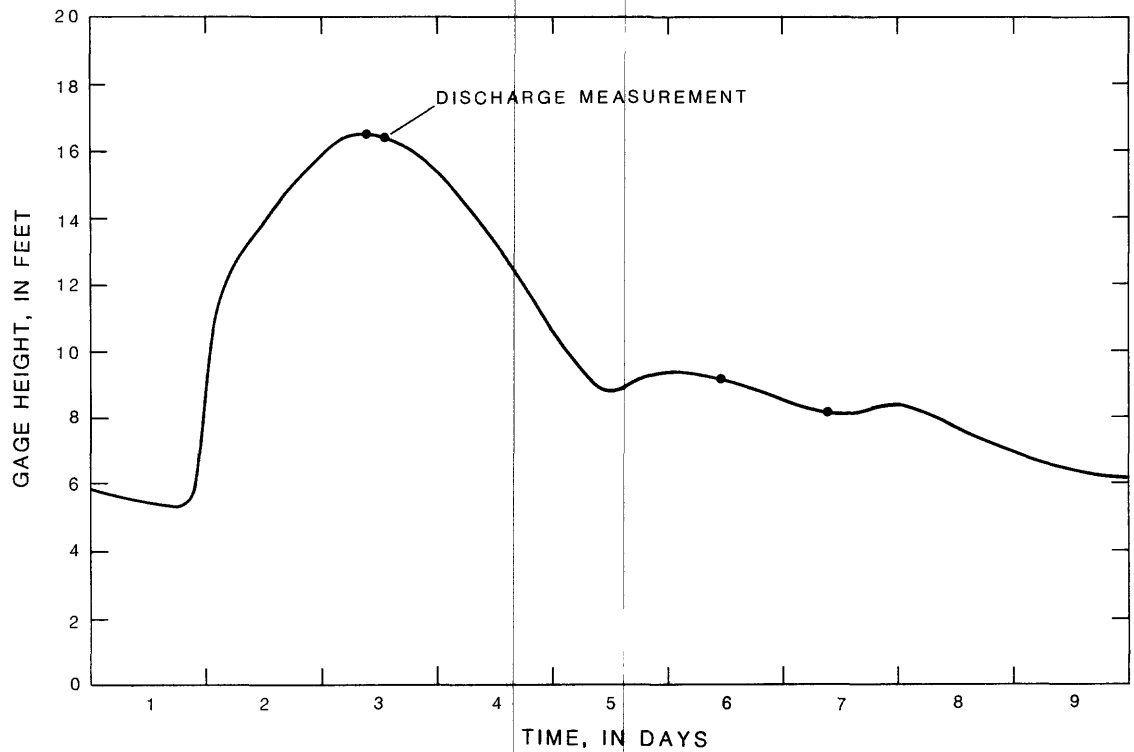

Figure 22.— Stage hydrograph, Paint Rock River near Woodville, Ala., April 9-17, 1969.

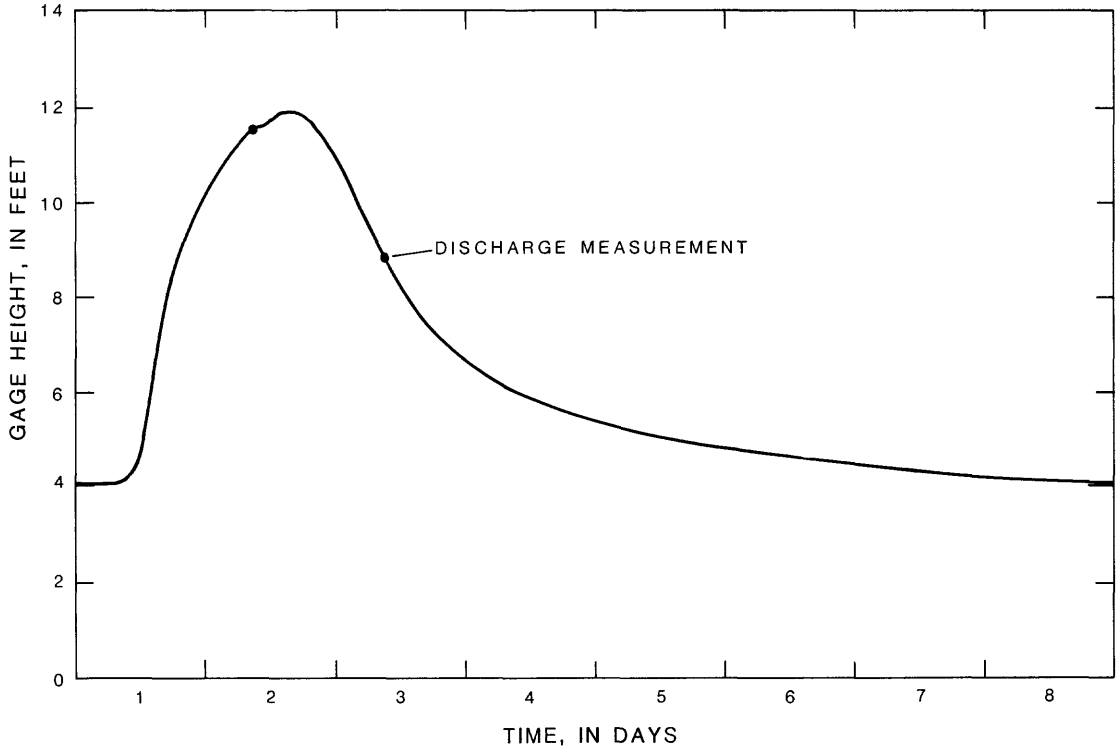

Figure 23.— Stage hydrograph, Paint Rock River near Woodville, Ala., January 4-11, 1971.

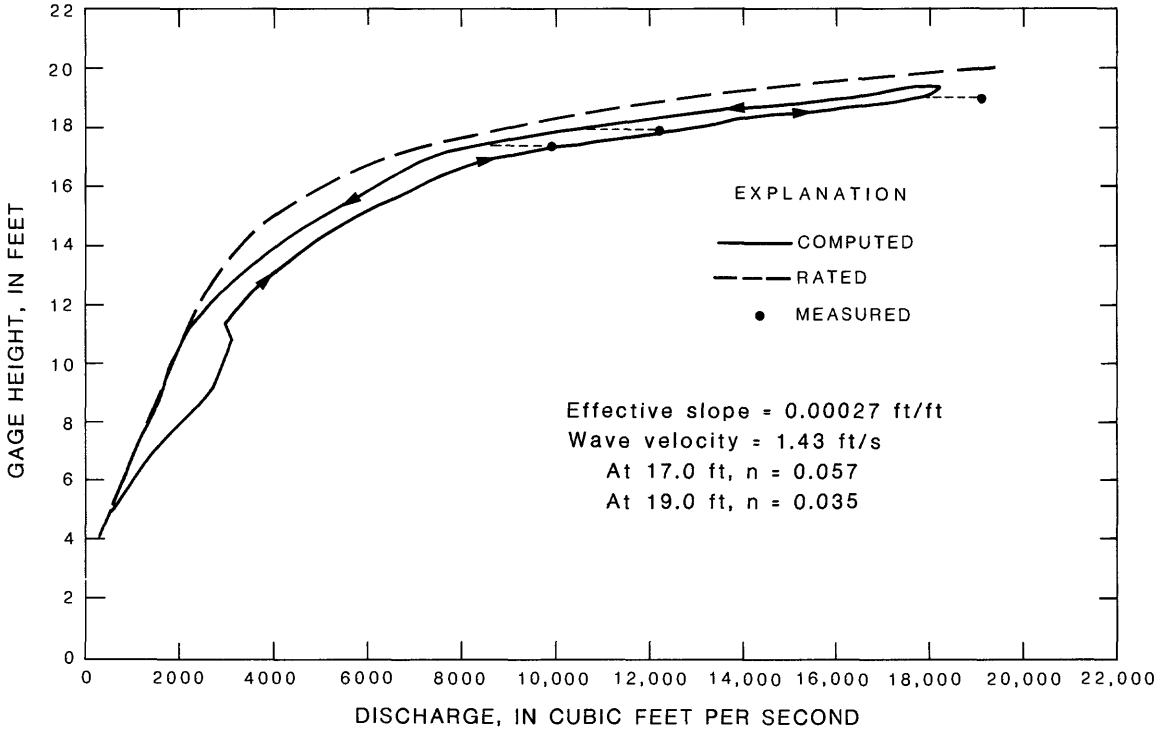

Figure 24.— Hysteretic stage-discharge relation, Paint Rock River near Woodville, Ala., March 14-20, 1964.

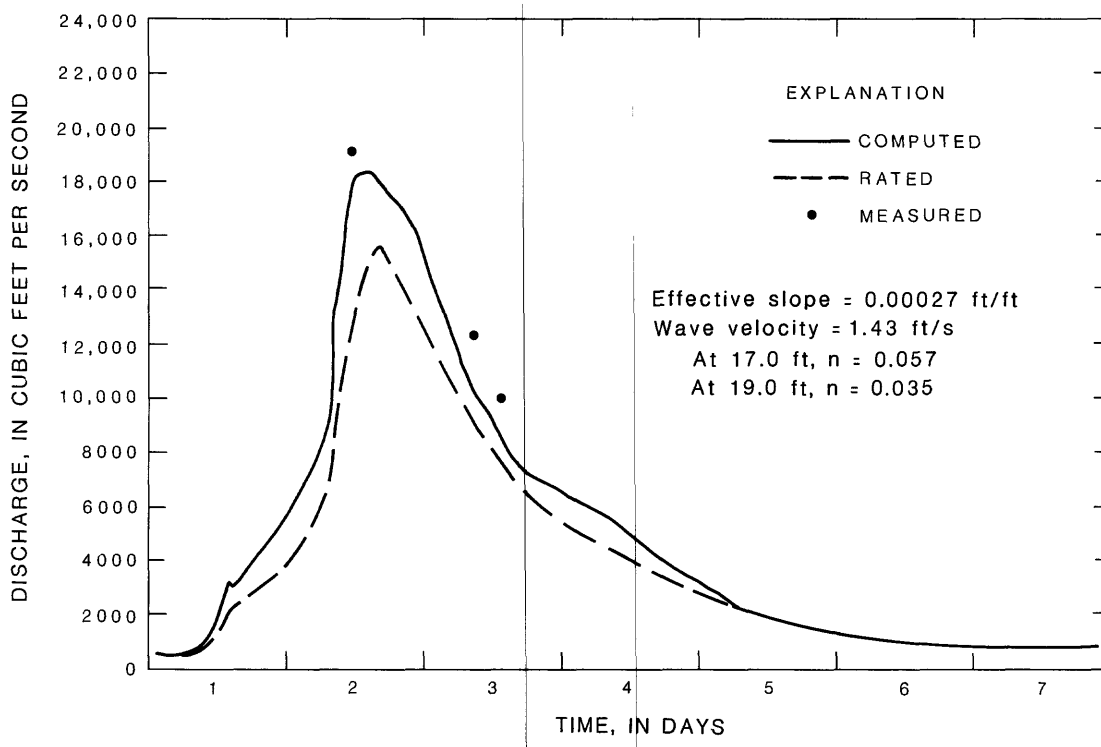

Figure 25.— Computed and rated discharge hydrographs, Paint Rock River near Woodville, Ala., March 14-20, 1964.

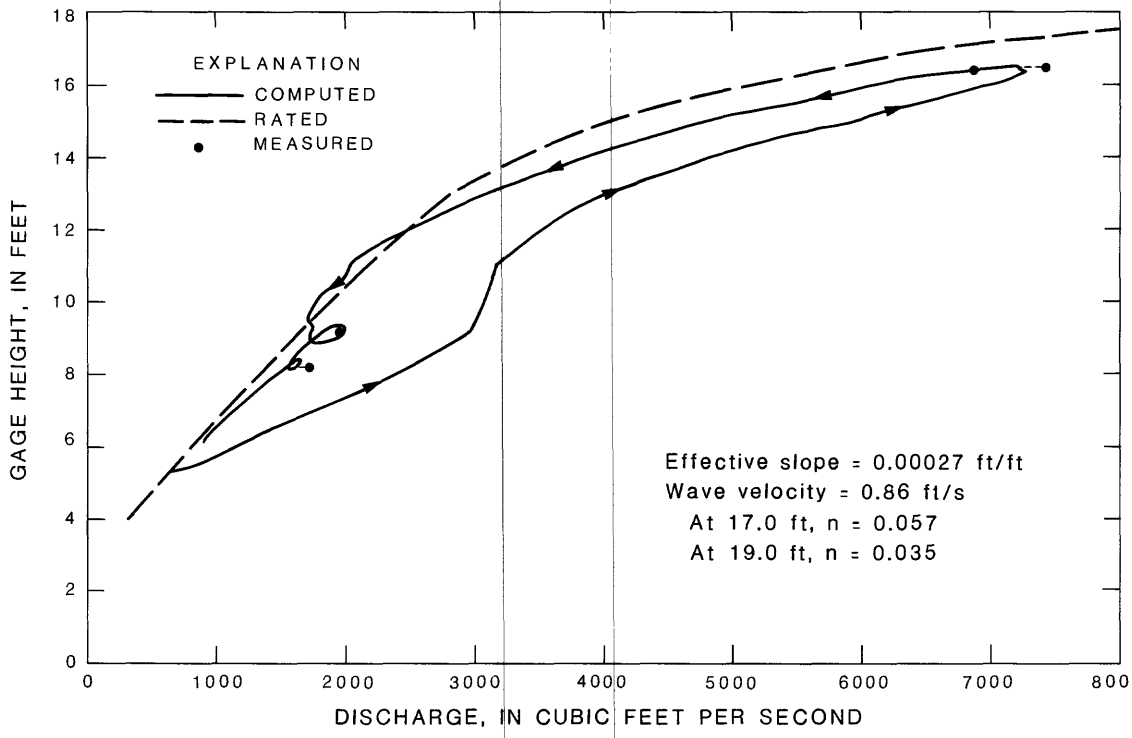

Figure 26.— Hysteretic stage-discharge relation, Paint Rock River near Woodville, Ala., April 9-17, 1969.

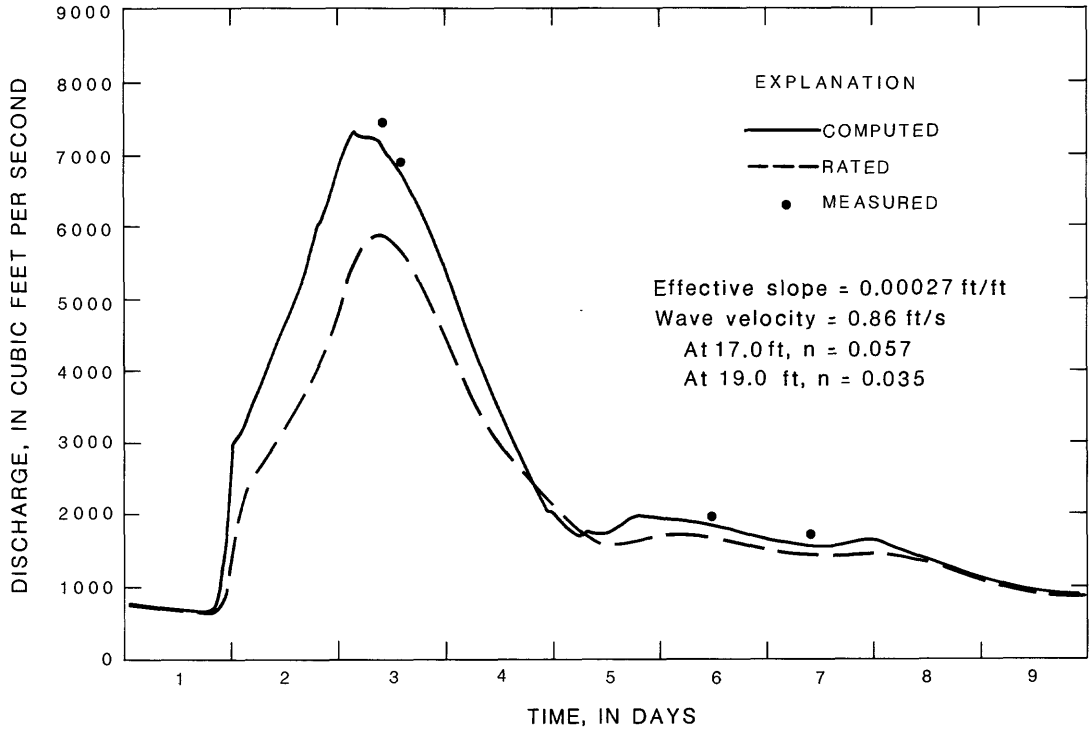

Figure 27.— Computed and rated discharge hydrographs, Paint Rock River near Woodville, Ala., April 9-17, 1969.

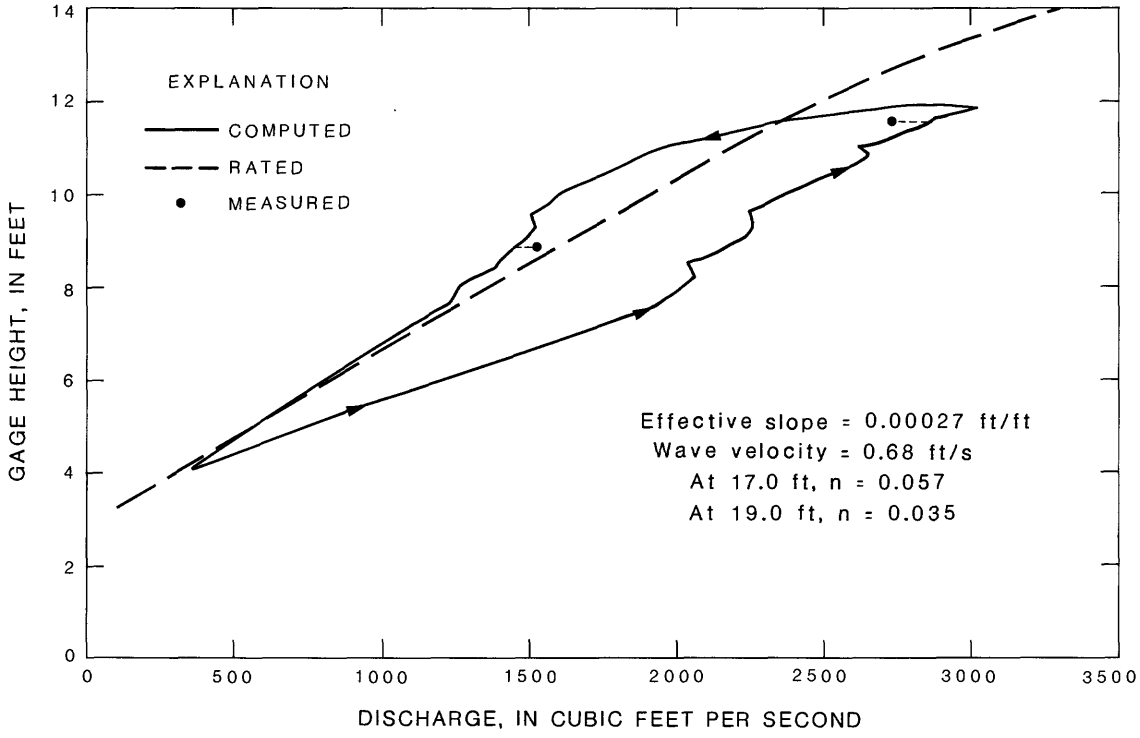

Figure 28.— Hysteretic stage-discharge relation, Paint Rock River near Woodville, Ala., January 4-11, 1971.

Table 8.--Measured, computed, and rated discharges at Paint Rock River near Woodville, Ala., March 14-20, 1964, April 9-17, 1969, and January 4-11, 1971

[M, measured; C, computed; R, rated]

Date	Time	Gage height (ft)	Measured discharge (ft^3/s) M	Computed [1/] discharge (ft^3/s) C	Absolute error percent C/M	Rated discharge (ft^3/s) R	Absolute error percent R/M
March 15, 1964	1200	18.95	19,200	17,900	6.7	13,000	32.3
March 16, 1964	0900	17.91	12,300	10,400	15.7	9,000	26.8
March 16, 1964	1400	17.35	10,000	8,440	15.6	7,470	25.3
April 11, 1969	1100	16.35	7,460	7,090	4.9	5,860	21.4
April 11, 1969	1500	16.39	6,900	6,750	2.2	5,670	17.8
April 14, 1969	1200	9.18	1,960	1,860	5.2	1,680	14.3
April 15, 1969	1000	8.19	1,720	1,560	9.5	1,410	18.0
January 5, 1971	1000	11.53	2,740	2,860	4.5	2,350	14.2
January 6, 1971	1000	8.84	1,530	1,460	4.9	1,590	3.9
Average absolute error:					7.7		19.3

1/ Values of computed discharge rounded. Percent of absolute error based on actual computed values. See Supplementary Data.

Supplementary Data tables 6-8 (at the end of report) list hourly stage and computed and rated discharges relative to each flood as well as differences between computed and rated daily mean discharge for each flood day.

CONCLUSIONS

The dynamic streamflow model satisfactorily computed flood discharges at Levisa Fork at Prestonsburg, Ky., at South Chickamauga Creek near Chickamauga, Tenn., and, given some degree of uncertainty, at Paint Rock River near Woodville, Ala. Parameters utilized by the model at the Levisa Fork and South Chickamauga Creek stations exactly equaled or were entirely based on observed data. At the Paint Rock River station, wave velocity and effective channel slope were estimated.

Model computations at Levisa Fork at Paintsville, Ky., were unsatisfactory. Several explanations for the poor model results at this station include:

1. The effective channel slope used in the model and to compute Manning's "n" may have been significantly inaccurate.

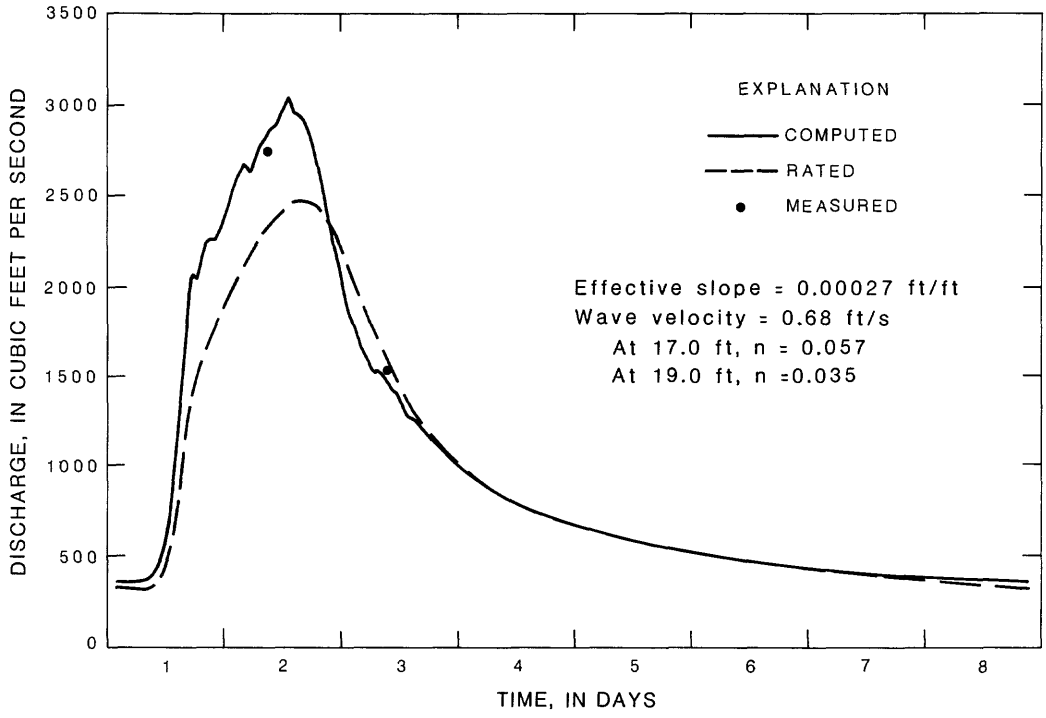

Figure 29.— Computed and rated discharge hydrographs, Paint Rock River near Woodville, Ala., January 4-11, 1971.

2. A temporary backwater condition may have occurred during the peak and the near peak part of the flood, or
3. Wave attenuation and subsidence may have caused significant changes in wave velocity during translation between Prestonsburg and Paintsville.

Of these explanations, temporary backwater seems more reasonable in light of the use of flood-profile maps to determine effective channel slope, the lack of significant observed wave attenuation or subsidence between Prestonsburg and Paintsville, and the previous occurrence of significantly higher observed discharges at flood stages and flow conditions similar to those investigated in this study. Additional comprehensive flood data are needed to ultimately resolve the question of backwater at this station.

In addition, the accuracy of model computations regarding the rising part of the flood discharge hydrograph cannot be evaluated at any station because of a general lack of observed discharge data.

Of the parameters utilized by the model, wave velocity seems to be the most difficult to estimate and also is particularly critical to the quality of model computations. Thus, until satisfactory methods of estimating wave velocity from commonly observed flow parameters are available, future evaluation of the model should be based on observed peak wave velocities between paired gages. Of the commonly used methods of estimating wave velocity utilized in this study, including the Kleitz-Seddon and kinematic wave approsimations, neither provided satisfactory model results nor compared favorably with observed wave-velocity data.

Estimates of effective channel slope based on topographic maps can also be significantly in error. Prior to obtaining the Tennessee Valley Authority flood-plain study of South Chickamauga Creek (Tennessee Valley Authority, 1958), model computations utilized an effective channel slope at this station of 0.00047 ft/ft. The slope was an estimate based on topographic maps. Use of the observed effective channel slope of 0.00036 ft/ft and corresponding values of Manning's "n" with all other model parameters held the same did not significantly change model results from those obtained with a slope of 0.00047 ft/ft.

Model results described previously were sufficiently promising to warrant further study and evaluation. Relatively long-term (2-3 years) studies at several selected gaging stations are suggested. The studies should address the following points:

1. The effect of Manning's "n" variability, particularly seasonal variability, on the accuracy of model computations--
   Unpredictable variations in "n" values could increase the difficulty of maintaining and verifying model calibration. Manning's "n" variability also can be tested by utilizing "n" values based on rated stage-discharge relations and values based on visual examination of channel characteristics similar to methodologies developed for slope-area analyses.
2. The effects of wave velocity variability on the accuracy of model computations--
   Data from paired gages may indicate useful relations between wave velocity and common flow parameters, such as peak stage or peak discharge. The development of such relations may preclude the future necessity of utilizing the model in conjunction with paired gage data.
3. The effects of channel slope variability on the accuracy of model computations--
   The sensitivity and accuracy of model results should be tested using observed channel slopes and corresponding slopes computed from topographic maps or other sources.
4. The difficulty of obtaining comprehensive sets of discharge measurements necessary for model calibration and verification--
   Calibration of the model at stations that peak quickly or that are far away from a field office may prove difficult and restrict the application of the model. Particular difficulty should be anticipated regarding the measurement of discharge during rising flood stages.
5. The integration of dynamic flow model data requirements and discharge computations into routine district surface-water data collection, analysis, and reporting--
   The ulitmate goal of this effort is the substitution of computed model discharges into the daily discharge record when flow conditions at the gage are sufficiently dynamic.
6. The utility of recent studies which classify and mathematically describe shallow-water waves, particularly studies by Ponce and Simons (1977), Ponce and others (1979), and Menendez and Norscini (1982) should be thoroughly investigated--
   Results of these studies may indicate various conceptual improvements to the dynamic flow model that could be tested during future studies.

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SUPPLEMENTARY DATA

Tables 1-8

Table 1.--Digital program list

Pages 37-48

```
1000  REM     PROGRAM 'DYNAM'              DECEMBER 1981              MERRITT E. BLALOCK
1050  REM
1100  REM     PROGRAM TO PERFORM DYNAMIC STREAMFLOW COMPUTATIONS AND PROVIDE
1150  REM     PRINTOUT AND PLOTS OF THE RESULTING DATA.  THE INPUT DATA FILE
1200  REM     FOR THIS PROGRAM CAN BE PREPARED USING PROGRAM 'INPUT'.
1250  REM
1300  REM     REF:  FAYE, R.E. AND CHERRY, R.N., 1980, CHANNEL AND DYNAMIC
1350  REM           FLOW CHARACTERISTICS OF THE CHATTAHOOCHEE RIVER, BUFORD
1400  REM           DAM TO GEORGIA HIGHWAY 141,
1450  REM           GEOLOGICAL SURVEY WATER SUPPLY PAPER 2063, 66 P.
1500  REM
1550  REM
1600  REM     SIMPLE VARIABLES
1650  REM
1700  REM       A                                  ! AREA (SQ FT)
1750  REM       Ai, Bi, Ci                         ! TERMS IN EQUATION (P. 24)
1800  REM       D                                  ! HYDRAULIC DEPTH (FT)
1850  REM       Dt                                 ! TIME INCREMENT (SEC)
1900  REM       Dy                                 ! DEPTH INCREMENT (FT)
1950  REM       N                                  ! N VALUE
2000  REM       Peak_line                          ! LINE NUMBER OF PEAK STAGE
2050  REM       Plotter                            ! SELECTS THERMAL OR 9872A
2100  REM       Qc                                 ! COMPUTED DISCHARGE (CFS)
2150  REM       Qr                                 ! RATED DISCHARGE (CFS)
2200  REM       Qm                                 ! MEASURED DISCHARGE
2250  REM       R                                  ! HYDRAULIC RADIUS (FT)
2300  REM       So                                 ! EFFECTIVE SLOPE (FT/FT)
2350  REM       V                                  ! COMPUTED VELOCITY (FPS)
2400  REM       Vprev                              ! PREVIOUS VELOCITY (FPS)
2450  REM       Vw                                 ! WAVE VELOCITY (FPS)
2500  REM
2550  REM
2600  REM     INDEX VARIABLES
2650  REM
2700  REM       N5                                 ! N VALUES
2750  REM       N20                                ! MEASURED DISCHARGES
2800  REM       N25                                ! STAGE-N VALUE POINTS
2850  REM       N35                                ! CROSS SECTION POINTS
2900  REM       N50                                ! RATING TABLE POINTS
2950  REM       N500                               ! STAGE-HYDROGRAPH POINTS
3000  REM
3050  REM
3100  REM     DIMENSIONED VARIABLES
3150  REM                                          ! TITLE
3200  REM       Station_name$[48]                  !   STATION NAME
3250  REM       Station_number$[10]                !   STATION NUMBER
3300  REM       Date$[40]                          !   DATE OF STORM
3350  REM                                          ! N VALUES
3400  REM       Gh_n(5)                            !   GAGE HEIGHT (FT)
3450  REM       N(5)                               !   N VALUE
3500  REM                                          ! MEASURED DISCHARGES
3550  REM       Hyd_line(20)                       !   HYDROGRAPH LINE
3600  REM       Qm(20)                             !   DISCHARGE (CFS)
3650  REM                                          ! CROSS SECTION
3700  REM       X(35)                              !   X COORDINATE (FT)
3750  REM       Y(35)                              !   Y COORDINATE (FT)
3800  REM                                          ! RATING TABLE
```

```
3850  REM       Gh_r(50)                                !   GAGE HEIGHT (FT)
3900  REM       Qr(50)                                  !   DISCHARGE (CFS)
3950  REM       Q_r(500)                                !   INTERPOLATED RATING (CFS)
4000  REM                                               ! STAGE-HYDROGRAPH
4050  REM       Time(500)                               !   TIME (HHMM)
4100  REM       Stage(500)                              !   GAGE HEIGHT (FT)
4150  REM       Q_c(500)                                !   COMPUTED DISCHARGE (CFS)
4200  REM                                               ! STAGE - N VALUE DATA
4250  REM       Gh_nvalue(25)                           !   GAGE HEIGHT (FT)
4300  REM       Nvalue(25)                              !   N VALUE
4350  REM
4400  REM
4450  REM     COMMON BLOCK DATA
4500  REM
4550        OPTION BASE 1
4600          COM Station_name$[48],Station_number$[10],Date$[40]
4650          COM So,Vw,N5,Gh_n(5),N(5)
4700          COM N20,SHORT Hyd_line(20),Qm(20)
4750          COM N35,SHORT X(35),Y(35)
4800          COM N50,SHORT Gh_r(50),Qr(50)
4850          COM N500,SHORT Time(500),Stage(500)
4900          COM Q_c(500),Q_r(500)
4950          COM Gh_max,Gh_min,Qmax,Day,Plotter
5000          COM N25,SHORT Gh_nvalue(25),Nvalue(25)
5050  REM
5100  REM
5150  REM     INITIALIZATION OF CONSTANTS
5200  REM
5250            LET G=32.2                              ! GRAVITY (FT/SEC/SEC)
5300  REM
5350  REM
5400  REM     INITIALIZATION OF SELECTED VARIABLES
5450  REM
5500            LET Line_count=0                        ! LINE COUNTER FOR PRINTOUT
5550            LET Day=1                               ! DAYS OF STORM DURATION
5600            LET H=1                                 ! INDEX OF MEASURED DISCHARGES
5650            LET Qmax=0                              ! MAXIMUM DISCHARGE
5700            LET Gh_max=0                            ! MAXIMUM STAGE
5750            LET Gh_min=0                            ! MINIMUM STAGE (IF < 0)
5800  REM                                               ! MEAN DAILY VALUES
5850            LET Seconds=0                           !   TIME (SEC)
5900            LET Volume_c=0                          !   COMPUTED VOLUME (CU FT)
5950            LET Volume_r=0                          !   RATED VOLUME (CU FT)
6000  REM                                               ! HYDROGRAPH VOLUMES
6050            LET Total_volume_c=0                    !   COMPUTED VOLUME (CU FT)
6100            LET Total_volume_r=0                    !   RATED VOLUME (CU FT)
6150  REM
6200  REM
6250  REM ** MAIN PROGRAM **
6300  REM
6350  REM
6400  REM     OBTAIN DATA AND PRINT TITLE PAGE
6450  REM
6500        GOSUB 9600                                  ! DATA FILE ACCESS
6550        GOSUB 10850                                 ! SUBSIDIARY DATA INPUT
6600        GOSUB 12750                                 ! PRINT TITLE PAGE
6650  REM
```

```
6700  REM    FIRST TIME STEP
6750  REM
6800       LET I=1                                  ! HYDROGRAPH INDEX
6850         GOSUB 17450                            ! N VALUE: N
6900         GOSUB 18400                            ! AREA: A,D,R
6950         GOSUB 22600                            ! RATING TABLE: Qr
7000           Q_c(I)=Qc=Qr                         !   INITIAL DISCHARGE
7050           V=Vprev=Qc/A                         !   INITIAL VELOCITY
7100           Per_cent_diff_1=0                    !   INITIAL % DIFFERENCE
7150         GOSUB 23450                            ! MEASURED DISCHARGE: Qm
7200         GOSUB 24300                            ! MAXIMUM-MINIMUM
7250       GOSUB 26650                              ! PRINT PAGE HEADING
7300       GOSUB 25550                              ! PRINT TIME STEP
7350  REM
7400  REM    DYNAMIC STREAMFLOW COMPUTATIONS
7450  REM
7500       FOR I=2 TO N500-1
7550         GOSUB 16200                            ! TIME INCREMENT: Dt
7600         GOSUB 17000                            ! DEPTH INCREMENT: Dy
7650         GOSUB 17450                            ! N VALUE: N
7700         GOSUB 18400                            ! AREA: A,D,R
7750         GOSUB 20650                            ! EQUATION: Ai,Bi,Ci
7800         GOSUB 21450                            ! NEWTON'S METHOD: V,Qc
7850         GOSUB 22600                            ! RATING TABLE: Qr
7900         GOSUB 23450                            ! MEASURED DISCHARGE: Qm
7950         GOSUB 24300                            ! MAXIMUM-MINIMUM
8000         GOSUB 24850                            ! CUMULATIVE VOLUMES
8050         GOSUB 25550                            ! PRINT TIME STEP
8100         IF Peak_line=I THEN GOSUB 29950        ! TOTAL VOLUME OF WATER
8150         IF Time(I)<>2400 THEN 8300
8200           GOSUB 28050                          ! MEAN DAILY VALUES
8250           GOSUB 29100                          ! DAY NUMBER
8300       NEXT I
8350  REM
8400  REM    FINAL TIME STEP
8450  REM
8500       PRINT USING 8550;I,Time(I),Stage(I)      ! PRINT TIME STEP
8550         IMAGE 3D,3X,4Z,3DZ.DD
8600       IF Time(I-1)<>2400 THEN GOSUB 28050      ! MEAN DAILY VALUES
8650       GOSUB 29950                              ! TOTAL VOLUME OF WATER
8700       PRINT PAGE
8750  REM
8800       PRINTER IS 16                            ! CRT
8850       PRINT PAGE
8900  REM
8950  REM    LOAD PLOTTING PROGRAM
9000  REM
9050       INPUT " TO PLOT DATA, PRESS <CONT>, OTHERWISE PRESS <STOP> ",Answer
9100       DISP " LOADING GRAPHICS PROGRAM "
9150       LOAD "GRAPH1"
9200  REM
9250       END
9300  REM
9350  REM
9400  REM
9450  REM ** SUBROUTINES **
9500  REM
9550  REM
9600  REM    SUBROUTINE `DATA FILE ACCESS'
```

```
9650  REM
9700  REM     DATA FILE CAN BE PREPARED USING PROGRAM 'INPUT'.
9750  REM     TAPE CASSETTE MUST BE IN DRIVE T15.
9800  REM
9850        PRINTER IS 16
9900        PRINT PAGE
9950  REM
10000       INPUT " ENTER NAME OF DATA FILE ",File_name$
10050       ASSIGN #1 TO File_name$,File_flag
10100         IF File_flag=0 THEN 10300
10150           BEEP
10200           DISP " FILE NOT FOUND,";
10250           GOTO 10000
10300 REM
10350       READ #1;Station_name$,Station_number$,Date$
10400       READ #1;N35,X(*),Y(*)
10450       READ #1;N500,Time(*),Stage(*)
10500       READ #1;N50,Gh_r(*),Qr(*)
10550       READ #1;N20,Hyd_line(*),Qm(*)
10600       READ #1;N25,Gh_nvalue(*),Nvalue(*)
10650       ASSIGN #1 TO *
10700       RETURN
10750 REM
10800 REM
10850 REM     SUBROUTINE 'SUBSIDIARY DATA INPUT'
10900 REM
10950 REM        IN:
11000 REM       OUT: So,Vw,N5,N(),Gh_n()
11050 REM
11100       PRINTER IS 16
11150       PRINT PAGE
11200 REM
11250       INPUT " EFFECTIVE SLOPE, FEET PER FOOT",So
11300       PRINT " EFFECTIVE SLOPE IS";So;"FT/FT"
11350 REM
11400       INPUT " WAVE VELOCITY, FEET PER SECOND",Vw
11450       PRINT " WAVE VELOCITY IS";Vw;"FPS"
11500 REM
11550       PRINT
11600       PRINT
11650       PRINT "N VALUE TABLE (BEGIN WITH LOWEST GAGE HEIGHT)"
11700       PRINT
11750       PRINT "       GAGE           "
11800       PRINT "LINE  HEIGHT  N VALUE"
11850       INPUT " NUMBER OF POINTS IN N VALUE TABLE, 2 MINIMUM, 5 MAXIMUM",N5
11900       FOR I=1 TO N5
11950         PRINT USING "#,3D";I
12000           INPUT " GAGE HEIGHT ",Gh_n(I)
12050         PRINT USING "#,4DZ.DD";Gh_n(I)
12100           INPUT " N VALUE ",N(I)
12150         PRINT USING "4DZ.3D";N(I)
12200       NEXT I
12250       PRINT
12300       PRINT
```

```
12350 REM
12400       PRINT " TO PRINT OUT VOLUME OF HYDROGRAPH AT THE PEAK, "
12450       PRINT " ENTER THE LINE NUMBER WHERE THE PEAK OCCURS     "
12500       INPUT Peak_line
12550       PRINT PAGE
12600       RETURN
12650 REM
12700 REM
12750 REM     SUBROUTINE `PRINT TITLE PAGE'
12800 REM
12850       DEF FNTab(A$)=40-LEN(A$) DIV 2          ! TO CENTER PRINTOUT
12900       PRINTER IS 8,1,WIDTH(80)
12950 REM
13000       PRINT
13050       PRINT
13100       PRINT TAB(25),"DYNAMIC STREAMFLOW COMPUTATIONS"
13150       PRINT
13200       PRINT TAB(29),"Water Supply Paper 2063"
13250       PRINT
13300       PRINT
13350         Tab=FNTab(Station_name$)
13400       PRINT TAB(Tab),Station_name$
13450       PRINT TAB(28),"Station number: ";Station_number$
13500         Tab=FNTab(Date$)
13550       PRINT TAB(Tab),Date$
13600       PRINT
13650 REM
13700       PRINT TAB(31),"Tape file is: ";File_name$
13750       PRINT
13800       PRINT
13850       PRINT TAB(16),"The per cent difference computations compare the"
13900       PRINT TAB(16),"computed value with the rated or measured value."
13950       PRINT
14000       PRINT TAB(16),"      (% diff=(computed-rated)/rated * 100)      "
14050       PRINT
14100       PRINT
14150       IF Peak_line<=0 THEN 14350
14200         PRINT TAB(28),"Peak occurs at line";Peak_line
14250         PRINT
14300         PRINT
14350 REM
14400       PRINT
14450       PRINT TAB(28),"CROSS SECTION COORDINATES"
14500       PRINT
14550       PRINT USING 14650
14600       PRINT USING 14700
14650         IMAGE 4("LINE    X       Y      ")
14700         IMAGE 4("=====================")
14750       K=N35 DIV 4                             ! NO. OF LINES
14800         IF N35 MOD 4>0 THEN K=K+1             ! NO. OF LINES
14850       FOR I=1 TO K
14900         FOR J=I TO N35 STEP K                 ! FOUR SETS OF COLUMNS
14950           PRINT USING 15000;J,X(J),Y(J)
15000             IMAGE #,3D,6D,4DZ.D,4X
15050         NEXT J
```

```
15100         PRINT
15150       NEXT I
15200       PRINT
15250       PRINT
15300 REM
15350       PRINT USING "25X,K,DZ.5D,K";"Effective Slope=",So," ft/ft"
15400       PRINT
15450       PRINT USING "27X,K,DZ.DD,K";"Wave Velocity=",Vw," ft/sec"
15500       PRINT
15550       PRINT
15600 REM
15650       PRINT TAB(37),"n VALUES"
15700       PRINT
15750       FOR I=1 TO N5
15800         PRINT USING 15850;"At ",Gh_n(I)," ft, n= ",N(I)
15850           IMAGE 30X,K,DZ.D,K,Z.3D
15900       NEXT I
15950       PRINT
16000 REM
16050       RETURN
16100 REM
16150 REM
16200 REM     SUBROUTINE `TIME INCREMENT': Dt
16250 REM
16300 REM     CONVERTS (HHMM) TO SECONDS AND
16350 REM     OBTAINS DIFFERENCE IN TIMES
16400 REM
16450 REM        IN: Time(I-1),Time(I)
16500 REM       OUT: Dt
16550 REM     LOCAL: Time1,Time2 (SEC)
16600 REM
16650       Time1=3600*(Time(I-1) DIV 100)+60*(Time(I-1) MOD 100)
16700       Time2=3600*(Time(I) DIV 100)+60*(Time(I) MOD 100)
16750       IF Time1=24*3600 THEN Time1=0
16800       Dt=Time2-Time1
16850       RETURN
16900 REM
16950 REM
17000 REM     SUBROUTINE `DEPTH INCREMENT': Dy
17050 REM
17100 REM        IN: Stage(I-1),Stage(I+1)
17150 REM       OUT: Dy
17200 REM
17250       Dy=(Stage(I+1)-Stage(I-1))/2
17300       RETURN
17350 REM
17400 REM
17450 REM     SUBROUTINE `N VALUE': N
17500 REM
17550 REM     INTERPOLATES FOR APPROPRIATE N VALUE BASED ON STAGE.
17600 REM     INTERPOLATION IS LINEAR.  N VALUE IS HELD CONSTANT
17650 REM     WITH STAGE BEYOND THE RANGE OF DATA.
17700 REM
17750 REM        IN: Stage(I),N5,Gh_n(),N()
17800 REM       OUT: N
17850 REM
```

```
17900       IF (Stage(I)<=Gh_n(1)) OR (Stage(I)>=Gh_n(N5)) THEN 18150
17950         FOR J=2 TO N5
18000           IF Stage(I)<=Gh_n(J) THEN 18100
18050         NEXT J
18100         N=N(J-1)+(N(J)-N(J-1))*(Stage(I)-Gh_n(J-1))/(Gh_n(J)-Gh_n(J-1))
18150       IF Stage(I)<=Gh_n(1) THEN N=N(1)          ! LOWERMOST N VALUE
18200       IF Stage(I)>=Gh_n(N5) THEN N=N(N5)        ! UPPERMOST N VALUE
18250       RETURN
18300 REM
18350 REM
18400 REM     SUBROUTINE `AREA': A,D,R
18450 REM
18500 REM     COMPUTES AREA, HYDRAULIC DEPTH, AND
18550 REM     HYDRAULIC RADIUS OF CROSS SECTION
18600 REM
18650 REM        IN: STAGE(I),N35,X(),Y()
18700 REM       OUT: A,D,R
18750 REM     LOCAL: B                                  ! TOP WIDTH
18800 REM            D1,D2                              ! DEPTH AT (J-1),(J)
18850 REM            Dpos                               ! POSITIVE DEPTH
18900 REM            P                                  ! WETTED PERIMETER
18950 REM            X                                  ! HORIZONTAL DISTANCE
19000 REM            Y                                  ! VERTICAL DISTANCE
19050 REM
19100       A=P=B=0
19150       FOR J=2 TO N35
19200         D1=Stage(I)-Y(J-1)
19250         D2=Stage(I)-Y(J)
19300         Y=ABS(Y(J)-Y(J-1))
19350         X=ABS(X(J)-X(J-1))
19400         IF (Stage(I)>Y(J)) AND (Stage(I)>Y(J-1)) THEN GOSUB 19750
19450         IF (Stage(I)>Y(J)) EXOR (Stage(I)>Y(J-1)) THEN GOSUB 20100
19500       NEXT J
19550       D=A/B
19600       R=A/P
19650       RETURN
19700 REM
19750 REM     SUBROUTINE `Both Points Submerged': A,P,B
19800 REM
19850       A=A+X*(D1+D2)/2                           ! AREA OF TRAPEZOID
19900       P=P+SQR(X^2+Y^2)
19950       B=B+X
20000       RETURN
20050 REM
20100 REM     SUBROUTINE `One Point Submerged': A,P,B
20150 REM
20200       IF D1>0 THEN Dpos=D1                      ! POSITIVE DEPTH
20250       IF D2>0 THEN Dpos=D2                      ! POSITIVE DEPTH
20300       X=X*Dpos/Y                                ! SIMILAR TRIANGLES
20350       A=A+X*Dpos/2                              ! AREA OF TRIANGLE
20400       P=P+SQR(X^2+Dpos^2)
20450       B=B+X
20500       RETURN
20550 REM
20600 REM
20650 REM     SUBROUTINE `EQUATION': Ai,Bi,Ci
20700 REM
20750 REM     COMPUTES COEFFICIENTS OF DYNAMIC
20800 REM     STREAMFLOW EQUATION, P.24.
20850 REM
```

```
20900 REM        IN: D,Dy,Dt,G,N,R,So,Vprev,Vw
20950 REM       OUT: Ai,Bi,Ci
21000 REM
21050      IF Vw=0 THEN Vwave=1.67*Vprev
21100      IF Vw>0 THEN Vwave=Vw
21150      Ai=-Dy/(Vwave*D)-N^2*G*Dt/(2.22*R^(4/3))
21200      Bi=Dy/D-1
21250      Ci=Dt*G*So+Vprev+Dy*G/Vwave
21300      RETURN
21350 REM
21400 REM
21450 REM     SUBROUTINE 'NEWTON'S METHOD': V,Qc
21500 REM
21550 REM     FIND ROOTS OF EQUATION (P.24)
21600 REM
21650 REM        IN: A,Ai,Bi,Ci,Vprev
21700 REM       OUT: Qc,Q_c(I),V,Vprev
21750 REM     LOCAL: F                              ! EQUATION (P. 24)
21800 REM            Fprime                         ! FIRST DERIVATIVE
21850 REM
21900      FOR J=1 TO 20
21950        F=Ai*Vprev^2+Bi*Vprev+Ci
22000        Fprime=2*Ai*Vprev+Bi
22050        V=Vprev-F/Fprime
22100          IF ABS(V-Vprev)<.001 THEN 22300
22150        Vprev=V
22200      NEXT J
22250        PRINT "ITERATION FAILURE IN LINE";I
22300      Vprev=V
22350      Qc=V*A
22400      Q_c(I)=Qc
22450      RETURN
22500 REM
22550 REM
22600 REM     SUBROUTINE 'RATING TABLE': Qr
22650 REM
22700 REM     FINDS RATED DISCHARGE FOR GIVEN STAGE.
22750 REM     USES LINEAR INTERPOLATION.
22800 REM
22850 REM        IN: Stage(I),NSO,Gh_r(),Qr()
22900 REM       OUT: Qr,Q_r(),Per_cent_diff_1
22950 REM
23000      FOR J=2 TO NSO-1
23050        IF Stage(I)<=Gh_r(J) THEN 23150
23100      NEXT J
23150      Qr=Qr(J-1)+(Qr(J)-Qr(J-1))*(Stage(I)-Gh_r(J-1))/(Gh_r(J)-Gh_r(J-1))
23200      Q_r(I)=Qr
23250      Per_cent_diff_1=(Qc-Qr)/Qr*100
23300      RETURN
23350 REM
23400 REM
23450 REM     SUBROUTINE 'MEASURED DISCHARGE': Qm
23500 REM
23550 REM     OUTPUTS MEASURED DISCHARGE AT APPROPRIATE
23600 REM     HYDROGRAPH LINE NUMBER FOR PRINTING.
23650 REM
23700 REM        IN: I,H,Hyd_line(H),Qm(H),Qc
23750 REM       OUT: Qm,Per_cent_diff_2,Rms_error,H
23800 REM
23850 REM
```

```
23900       Qm=0
23950       IF I<>Hyd_line(H) THEN 24150
24000         Qm=Qm(H)
24050         Per_cent_diff_2=(Qc-Qm)/Qm*100
24100         IF H<N20 THEN H=H+1
24150       RETURN
24200 REM
24250 REM
24300 REM     SUBROUTINE MAXIMUM-MINIMUM
24350 REM
24400 REM     DETERMINES MAXIMUM GAGE HEIGHT AND DISCHARGE.
24450 REM     DETERMINES MINIMUM GAGE HEIGHT IF LESS THAN ZERO.
24500 REM
24550       Qmax=MAX(Qc,Qr,Qm,Qmax)
24600       Gh_max=MAX(Stage(I),Gh_max)
24650       Gh_min=MIN(Stage(I),Gh_min)
24700       RETURN
24750 REM
24800 REM
24850 REM     SUBROUTINE 'CUMULATIVE VOLUME'
24900 REM
24950 REM     COMPUTES CUMULATIVE VOLUMES AND
25000 REM     TIME FOR MEAN DAILY VALUES.
25050 REM
25100 REM        IN: Dt,Qc,Qr
25150 REM       OUT: Seconds,Volume_c,Volume_r
25200 REM
25250       Seconds=Seconds+Dt
25300       Volume_c=Volume_c+Dt*(Q_c(I)+Q_c(I-1))/2
25350       Volume_r=Volume_r+Dt*(Q_r(I)+Q_r(I-1))/2
25400       RETURN
25450 REM
25500 REM
25550 REM     SUBROUTINE 'PRINT TIME STEP'
25600 REM
25650 REM        IN: Page
25700 REM       OUT: Page
25750 REM
25800       IF Line_count>=64 THEN GOSUB 26650          ! PRINT PAGE HEADING
25850 REM
25900       PRINT USING 25950;I,Time(I),Stage(I),V,Qc,Qr,Per_cent_diff_1
25950         IMAGE #,3D,3X,4Z,3DZ.DD,5DZ.DD,2(6DC3D.DD),3DZ.D
26000 REM
26050       IF Qm=0 THEN 26250
26100         PRINT USING 26150;Qm,Per_cent_diff_2
26150           IMAGE 6DC3D.DD,3DZ.D
26200         GOTO 26400
26250 REM
26300         PRINT USING 26350
26350           IMAGE 6X,"------",5X,"--"
26400 REM
26450       Line_count=Line_count+1
26500       RETURN
26550 REM
26600 REM
26650 REM     SUBROUTINE 'PRINT PAGE HEADING'
26700 REM
26750 REM        IN:
26800 REM       OUT: Page
26850 REM
26900       PRINT PAGE
26950 REM
```

```
27000      PRINT USING 27450
27050      PRINT USING 27650
27100 REM
27150      PRINT USING 27500
27200      PRINT USING 27700
27250 REM
27300      PRINT USING 27550
27350      PRINT USING 27750
27400 REM
27450      IMAGE #,"              GAGE    COMPUTED  COMPUTED  "
27500      IMAGE #,"LINE  TIME  HEIGHT  VELOCITY  DISCHARGE "
27550      IMAGE #,"========================================="
27600 REM
27650      IMAGE "     RATED     %       MEASURED    %      "
27700      IMAGE "   DISCHARGE  DIFF     DISCHARGE  DIFF    "
27750      IMAGE "========================================="
27800 REM
27850      Line_count=3
27900      RETURN
27950 REM
28000 REM
28050 REM     SUBROUTINE `MEAN DAILY VALUES'
28100 REM
28150 REM        IN: Page,Seconds,Volume_c,Volume_r
28200 REM       OUT: Page,Final_volume_c,Final_volume_r
28250 REM
28300      IF Line_count>59 THEN GOSUB 26650          ! PRINT PAGE HEADING
28350      Per_cent_diff=(Volume_c-Volume_r)/Volume_r*100
28400      FIXED 2
28450        PRINT
28500        PRINT "MEAN DAILY DISCHARGE:"
28550        PRINT "  COMPUTED DATA:";Volume_c/Seconds;"CFS"
28600        PRINT "   RATING TABLE:";Volume_r/Seconds;"CFS"
28650      FIXED 1
28700        PRINT "      DIFFERENCE:";Per_cent_diff;"%"
28750      STANDARD
28800      Line_count=Line_count+5
28850        Total_volume_c=Total_volume_c+Volume_c
28900        Total_volume_r=Total_volume_r+Volume_r
28950        Seconds=Volume_c=Volume_r=0
29000      RETURN
29050 REM
29100 REM     SUBROUTINE `DAY NUMBER'
29150 REM
29200 REM     INCREMENTS Day AFTER EACH TWENTY-FOUR HOUR PERIOD
29250 REM
29300 REM        IN: Day,Page
29350 REM       OUT: Day,Page
29400 REM
29450      IF Line_count>58 THEN GOSUB 26650          ! PRINT PAGE HEADING
29500      Day=Day+1
29550        PRINT
29600        PRINT
29650        PRINT "DAY NUMBER";Day
29700        PRINT
29750      Line_count=Line_count+4
29800      RETURN
29850 REM
29900 REM
29950 REM     SUBROUTINE `TOTAL VOLUME OF WATER'
30000 REM
```

```
30050 REM     COMPUTES AND PRINTS TOTAL VOLUME OF WATER UNDER
30100 REM     HYDROGRAPH FOR BOTH COMPUTED AND RATED DISCHARGES.
30150 REM
30200       IF Line_count>58 THEN GOSUB 26650          ! PRINT PAGE HEADING
30250       Per_cent_diff=(Total_volume_c-Total_volume_r)/Total_volume_r*100
30300       FIXED 0
30350         PRINT
30400         PRINT
30450         PRINT "TOTAL VOLUME OF WATER AT THIS POINT:"
30500         PRINT "  COMPUTED DATA:";Total_volume_c;"CUBIC FEET"
30550         PRINT "   RATING TABLE:";Total_volume_r;"CUBIC FEET"
30600       FIXED 1
30650         PRINT "     DIFFERENCE:";Per_cent_diff;"%"
30700         PRINT
30750         PRINT
30800       STANDARD
30850       Line_count=Line_count+8
30900       RETURN
30950 REM
31000       END
```

Table 2.--Station characteristics and summary of hourly stage and computed and rated discharges at Levisa Fork at Prestonsburg, Ky., April 2-17, 1977

Pages 49-61

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

Levisa Fork at Prestonsburg, Ky.
Station number: 03-209800
April 2-17, 1977

Tape file is: FILE 2

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 89

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	20	45.4	8	140	7.5	15	230	-.7	22	320	10.2
2	40	33.4	9	155	1.2	16	240	-.2	23	340	17.1
3	60	24.9	10	170	-.6	17	250	-.6	24	360	19.6
4	80	20.2	11	180	-.6	18	260	-.5	25	380	23.4
5	100	19.3	12	200	0.1	19	270	0.7	26	400	29.6
6	120	16.9	13	210	-.5	20	280	1.2	27	430	38.1
7	130	14.2	14	220	-.2	21	300	4.6	28	445	45.6

Effective Slope= 0.00027 ft/ft

Wave Velocity= 2.11 ft/sec

n VALUES

At 10.0 ft, n= 0.028
At 50.0 ft, n= 0.078

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	1300	2.88	1.96	767.20	767.20	0.0	-----	--
2	1400	2.87	1.74	678.95	762.80	-11.0	-----	--
3	1500	2.87	1.73	676.65	762.80	-11.3	-----	--
4	1600	2.86	1.73	672.89	758.40	-11.3	-----	--
5	1700	2.86	1.73	672.85	758.40	-11.3	-----	--
6	1800	2.85	1.73	669.17	754.00	-11.3	-----	--
7	1900	2.85	1.73	669.13	754.00	-11.3	-----	--
8	2000	2.84	1.74	671.01	749.60	-10.5	-----	--
9	2100	2.91	1.77	699.72	780.40	-10.3	-----	--
10	2200	2.93	1.76	701.80	789.20	-11.1	-----	--
11	2300	2.93	1.76	700.06	789.20	-11.3	-----	--
12	2400	2.93	1.76	701.68	789.20	-11.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 686.06 CFS
RATING TABLE: 767.00 CFS
DIFFERENCE: -10.6 %

DAY NUMBER 2

13	0100	2.95	1.78	712.63	798.00	-10.7	-----	--
14	0200	2.99	1.78	726.35	815.60	-10.9	-----	--
15	0300	2.99	1.78	724.74	815.60	-11.1	-----	--
16	0400	3.01	1.79	732.34	825.00	-11.2	-----	--
17	0500	3.01	1.78	730.67	825.00	-11.4	-----	--
18	0600	3.01	1.79	733.24	825.00	-11.1	-----	--
19	0700	3.04	1.80	744.86	840.00	-11.3	-----	--
20	0800	3.04	1.80	744.10	840.00	-11.4	-----	--
21	0900	3.06	1.80	751.81	850.00	-11.6	-----	--
22	1000	3.06	1.80	751.89	850.00	-11.5	-----	--
23	1100	3.08	1.81	761.46	860.00	-11.5	-----	--
24	1200	3.10	1.82	768.51	870.00	-11.7	-----	--
25	1300	3.11	1.82	772.48	875.00	-11.7	-----	--
26	1400	3.13	1.83	779.47	885.00	-11.9	-----	--
27	1500	3.13	1.82	778.60	885.00	-12.0	-----	--
28	1600	3.14	1.83	783.44	890.00	-12.0	-----	--
29	1700	3.15	1.83	786.52	895.00	-12.1	-----	--
30	1800	3.15	1.83	787.47	895.00	-12.0	-----	--
31	1900	3.17	1.84	796.37	905.00	-12.0	-----	--
32	2000	3.18	1.85	801.40	910.00	-11.9	-----	--
33	2100	3.21	1.86	813.49	925.00	-12.1	-----	--
34	2200	3.22	1.88	824.34	930.00	-11.4	-----	--
35	2300	3.32	1.93	873.59	980.00	-10.9	-----	--
36	2400	3.41	1.96	913.30	1,025.00	-10.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 770.30 CFS
RATING TABLE: 870.68 CFS
DIFFERENCE: -11.5 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 3								
37	0100	3.52	2.01	969.89	1,080.00	-10.2	------	--
38	0200	3.69	2.09	1,060.64	1,165.00	-9.0	------	--
39	0300	3.92	2.20	1,186.65	1,280.00	-7.3	------	--
40	0400	4.22	2.35	1,374.80	1,443.20	-4.7	------	--
41	0500	4.71	2.59	1,706.98	1,717.60	-.6	------	--
42	0600	5.37	2.86	2,182.74	2,109.40	3.5	------	--
43	0700	6.11	3.14	2,767.63	2,571.50	7.6	------	--
44	0800	6.96	3.46	3,531.05	3,124.00	13.0	------	--
45	0900	7.94	3.79	4,496.32	3,808.00	18.1	------	--
46	1000	8.95	4.08	5,562.71	4,420.00	25.9	------	--
47	1100	9.96	4.37	6,750.70	5,218.00	29.4	------	--
48	1200	11.04	4.53	7,903.07	6,056.00	30.5	------	--
49	1300	12.28	4.71	9,339.23	7,003.00	33.4	------	--
50	1400	13.74	4.88	11,072.98	8,061.50	37.4	------	--
51	1500	15.35	4.93	12,800.18	9,363.75	36.7	------	--
52	1600	16.96	4.87	14,330.01	10,668.00	34.3	------	--
53	1700	18.48	4.62	15,221.42	11,908.00	27.8	------	--
54	1800	19.91	4.38	16,030.99	13,123.50	22.2	------	--
55	1900	21.40	4.36	17,821.68	14,320.00	24.5	------	--
56	2000	23.03	4.43	20,300.75	15,830.00	28.2	------	--
57	2100	24.86	4.47	23,077.85	17,660.00	30.7	------	--
58	2200	26.64	4.42	25,417.67	19,504.00	30.3	------	--
59	2300	28.22	4.32	27,147.37	21,275.00	27.6	------	--
60	2400	29.62	4.23	28,640.15	23,025.00	24.4	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 10284.58 CFS
RATING TABLE: 8113.94 CFS
DIFFERENCE: 26.8 %

DAY NUMBER 4								
61	0100	30.90	4.15	30,008.42	24,850.00	20.8	------	--
62	0200	32.07	4.05	30,976.90	26,601.50	16.4	------	--
63	0300	33.04	3.98	31,892.69	28,008.00	13.9	------	--
64	0400	34.03	3.95	33,065.67	29,454.00	12.3	------	--
65	0500	34.91	3.88	33,809.24	31,038.00	8.9	------	--
66	0600	35.71	3.83	34,529.17	32,478.00	6.3	------	--
67	0700	36.45	3.80	35,381.27	33,900.00	4.4	------	--
68	0800	37.19	3.79	36,389.37	35,380.00	2.9	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
69	0900	37.92	3.78	37,327.39	36,840.00	1.3	------	--
70	1000	38.63	3.77	38,373.90	38,575.00	-.5	------	--
71	1100	39.36	3.77	39,404.22	40,400.00	-2.5	------	--
72	1200	40.05	3.72	39,948.80	42,150.00	-5.2	------	--
73	1300	40.64	3.73	40,910.78	43,920.00	-6.9	41,600.00	-1.7
74	1400	41.36	3.70	41,727.64	46,080.00	-9.4	------	--
75	1500	41.88	3.65	41,915.15	47,640.00	-12.0	------	--
76	1600	42.45	3.64	42,642.55	49,350.00	-13.6	------	--
77	1700	42.95	3.62	43,125.96	50,850.00	-15.2	------	--
78	1800	43.46	3.57	43,320.43	52,380.00	-17.3	------	--
79	1900	43.83	3.49	42,938.55	53,490.00	-19.7	------	--
80	2000	44.13	3.49	43,402.18	54,390.00	-20.2	------	--
81	2100	44.52	3.49	43,950.78	55,560.00	-20.9	------	--
82	2200	44.82	3.44	43,751.37	56,460.00	-22.5	------	--
83	2300	45.07	3.41	43,661.33	57,210.00	-23.7	------	--
84	2400	45.28	3.36	43,422.63	57,840.00	-24.9	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 38686.88 CFS
RATING TABLE: 41976.54 CFS
DIFFERENCE: -7.8 %

DAY NUMBER 5

85	0100	45.42	3.33	43,169.19	58,260.00	-25.9	------	--
86	0200	45.54	3.30	42,992.01	58,620.00	-26.7	42,100.00	2.1
87	0300	45.61	3.28	42,839.62	58,830.00	-27.2	------	--
88	0400	45.68	3.27	42,745.62	59,040.00	-27.6	------	--
89	0500	45.71	3.24	42,346.98	59,130.00	-28.4	------	--

TOTAL VOLUME OF WATER AT THIS POINT:
COMPUTED DATA: 4324856711 CUBIC FEET
RATING TABLE: 4433417100 CUBIC FEET
DIFFERENCE: -2.4 %

90	0600	45.69	3.21	42,050.02	59,070.00	-28.8	------	--
91	0700	45.67	3.18	41,513.21	59,010.00	-29.7	------	--
92	0800	45.55	3.14	40,864.82	58,650.00	-30.3	------	--
93	0900	45.44	3.12	40,539.45	58,320.00	-30.5	------	--
94	1000	45.29	3.09	39,937.75	57,870.00	-31.0	------	--
95	1100	45.10	3.07	39,430.39	57,300.00	-31.2	40,400.00	-2.4
96	1200	44.90	3.07	39,069.88	56,700.00	-31.1	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
97	1300	44.69	3.03	38,355.86	56,070.00	-31.6	-----	--
98	1400	44.40	3.01	37,779.75	55,200.00	-31.6	-----	--
99	1500	44.15	3.00	37,266.88	54,450.00	-31.6	-----	--
100	1600	43.82	2.95	36,261.13	53,460.00	-32.2	-----	--
101	1700	43.45	2.92	35,392.09	52,350.00	-32.4	-----	--
102	1800	43.04	2.90	34,691.59	51,120.00	-32.1	-----	--
103	1900	42.63	2.88	34,007.03	49,890.00	-31.8	-----	--
104	2000	42.18	2.85	33,134.44	48,540.00	-31.7	-----	--
105	2100	41.70	2.84	32,422.30	47,100.00	-31.2	-----	--
106	2200	41.22	2.82	31,677.06	45,660.00	-30.6	-----	--
107	2300	40.70	2.80	30,842.98	44,100.00	-30.1	-----	--
108	2400	40.17	2.79	30,143.28	42,510.00	-29.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 38171.37 CFS
RATING TABLE: 54538.13 CFS
DIFFERENCE: -30.0 %

DAY NUMBER 6

109	0100	39.63	2.76	29,213.02	41,075.00	-28.9	-----	--
110	0200	39.03	2.75	28,397.43	39,575.00	-28.2	-----	--
111	0300	38.46	2.74	27,719.96	38,150.00	-27.3	-----	--
112	0400	37.85	2.72	26,802.74	36,700.00	-27.0	-----	--
113	0500	37.22	2.70	25,929.89	35,440.00	-26.8	-----	--
114	0600	36.56	2.68	25,083.57	34,120.00	-26.5	-----	--
115	0700	35.89	2.67	24,281.67	32,802.00	-26.0	-----	--
116	0800	35.20	2.64	23,308.01	31,560.00	-26.1	-----	--
117	0900	34.46	2.56	21,887.05	30,228.00	-27.6	-----	--
118	1000	33.60	2.59	21,311.40	28,820.00	-26.1	19,200.00	11.0
119	1100	32.93	2.58	20,550.39	27,848.50	-26.2	-----	--
120	1200	32.03	2.61	19,937.86	26,543.50	-24.9	-----	--
121	1300	31.42	2.61	19,391.13	25,630.00	-24.3	-----	--
122	1400	30.52	2.49	17,638.75	24,280.00	-27.4	-----	--
123	1500	29.64	2.49	16,888.55	23,050.00	-26.7	-----	--
124	1600	28.76	2.47	15,964.11	21,950.00	-27.3	-----	--
125	1700	27.83	2.45	15,097.19	20,813.00	-27.5	-----	--
126	1800	26.93	2.43	14,213.03	19,823.00	-28.3	13,200.00	7.7
127	1900	25.96	2.40	13,284.41	18,760.00	-29.2	-----	--
128	2000	25.02	2.33	12,181.64	17,820.00	-31.6	-----	--
129	2100	23.93	2.31	11,261.66	16,730.00	-32.7	-----	--
130	2200	22.96	2.38	10,851.78	15,760.00	-31.1	-----	--
131	2300	21.99	2.34	9,998.58	14,792.00	-32.4	-----	--
132	2400	20.93	2.29	9,073.05	13,944.00	-34.9	8,890.00	2.1

MEAN DAILY DISCHARGE:
COMPUTED DATA: 19616.75 CFS
RATING TABLE: 27104.04 CFS
DIFFERENCE: -27.6 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 7								
133	0100	19.86	2.32	8,460.00	13,081.00	-35.3	-----	--
134	0200	18.78	2.43	8,189.79	12,163.00	-32.7	-----	--
135	0300	17.74	2.56	7,995.91	11,292.00	-29.2	-----	--
136	0400	16.76	2.72	7,898.30	10,508.00	-24.8	-----	--
137	0500	15.88	2.90	7,860.54	9,801.00	-19.8	-----	--
138	0600	15.18	3.10	7,952.99	9,223.50	-13.8	-----	--
139	0700	14.65	3.31	8,129.60	8,786.25	-7.5	-----	--
140	0800	14.34	3.50	8,368.69	8,530.50	-1.9	-----	--
141	0900	14.18	3.64	8,586.46	8,398.50	2.2	-----	--
142	1000	14.16	3.76	8,840.76	8,382.00	5.5	7,940.00	11.3
143	1100	14.25	3.85	9,120.45	8,456.25	7.9	-----	--
144	1200	14.43	3.94	9,491.08	8,604.75	10.3	-----	--
145	1300	14.75	3.95	9,781.26	8,868.75	10.3	-----	--
146	1400	14.96	3.90	9,826.98	9,042.00	8.7	-----	--
147	1500	15.16	3.90	9,985.63	9,207.00	8.5	9,100.00	9.7
148	1600	15.38	3.92	10,219.29	9,388.50	8.8	-----	--
149	1700	15.64	3.94	10,469.18	9,603.00	9.0	-----	--
150	1800	15.90	3.93	10,666.92	9,817.50	8.7	-----	--
151	1900	16.15	3.93	10,876.19	10,020.00	8.5	-----	--
152	2000	16.42	3.95	11,148.30	10,236.00	8.9	-----	--
153	2100	16.72	3.95	11,427.55	10,476.00	9.1	-----	--
154	2200	17.02	3.96	11,702.21	10,716.00	9.2	-----	--
155	2300	17.36	3.93	11,905.69	10,988.00	8.4	-----	--
156	2400	17.67	3.89	12,058.33	11,236.00	7.3	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 9561.23 CFS
RATING TABLE: 9924.15 CFS
DIFFERENCE: -3.7 %

DAY NUMBER 8								
157	0100	18.00	3.84	12,215.23	11,500.00	6.2	-----	--
158	0200	18.29	3.80	12,353.79	11,746.50	5.2	-----	--
159	0300	18.60	3.77	12,522.58	12,010.00	4.3	-----	--
160	0400	18.88	3.72	12,627.79	12,248.00	3.1	-----	--
161	0500	19.14	3.68	12,746.79	12,469.00	2.2	-----	--
162	0600	19.39	3.64	12,812.85	12,681.50	1.0	-----	--
163	0700	19.61	3.58	12,836.34	12,868.50	-.2	-----	--
164	0800	19.84	3.54	12,913.97	13,064.00	-1.1	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
165	0900	20.06	3.49	12,943.24	13,248.00	-2.3	-----	--
166	1000	20.25	3.46	13,001.47	13,400.00	-3.0	-----	--
167	1100	20.44	3.45	13,148.08	13,552.00	-3.0	-----	--
168	1200	20.61	3.43	13,251.70	13,688.00	-3.2	-----	--
169	1300	20.76	3.43	13,377.02	13,808.00	-3.1	-----	--
170	1400	20.92	3.41	13,470.64	13,936.00	-3.3	-----	--
171	1500	21.03	3.39	13,513.67	14,024.00	-3.6	-----	--
172	1600	21.15	3.38	13,594.87	14,120.00	-3.7	-----	--
173	1700	21.24	3.37	13,633.71	14,192.00	-3.9	-----	--
174	1800	21.33	3.36	13,671.36	14,264.00	-4.2	-----	--
175	1900	21.39	3.34	13,664.75	14,312.00	-4.5	-----	--
176	2000	21.44	3.34	13,693.38	14,352.00	-4.6	-----	--
177	2100	21.49	3.34	13,739.58	14,392.00	-4.5	-----	--
178	2200	21.54	3.34	13,786.69	14,432.00	-4.5	-----	--
179	2300	21.59	3.34	13,833.91	14,472.00	-4.4	-----	--
180	2400	21.64	3.33	13,865.61	14,512.00	-4.5	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 13179.81 CFS
RATING TABLE: 13402.23 CFS
DIFFERENCE: -1.7 %

DAY NUMBER 9

181	0100	21.68	3.32	13,855.69	14,544.00	-4.7	-----	--
182	0200	21.70	3.31	13,856.42	14,560.00	-4.8	-----	--
183	0300	21.73	3.31	13,868.04	14,584.00	-4.9	-----	--
184	0400	21.74	3.31	13,860.79	14,592.00	-5.0	-----	--
185	0500	21.76	3.31	13,878.79	14,608.00	-5.0	-----	--
186	0600	21.77	3.31	13,888.14	14,616.00	-5.0	-----	--
187	0700	21.79	3.31	13,922.81	14,632.00	-4.8	-----	--
188	0800	21.81	3.31	13,942.45	14,648.00	-4.8	-----	--
189	0900	21.83	3.31	13,945.47	14,664.00	-4.9	-----	--
190	1000	21.84	3.31	13,985.85	14,672.00	-4.7	-----	--
191	1100	21.88	3.31	14,009.33	14,704.00	-4.7	-----	--
192	1200	21.88	3.29	13,944.67	14,704.00	-5.2	-----	--
193	1300	21.88	3.30	13,957.43	14,704.00	-5.1	-----	--
194	1400	21.89	3.30	13,967.50	14,712.00	-5.1	-----	--
195	1500	21.89	3.29	13,919.43	14,712.00	-5.4	-----	--
196	1600	21.87	3.28	13,866.13	14,696.00	-5.6	-----	--
197	1700	21.85	3.27	13,813.56	14,680.00	-5.9	-----	--
198	1800	21.81	3.27	13,758.48	14,648.00	-6.1	-----	--
199	1900	21.78	3.27	13,729.71	14,624.00	-6.1	-----	--
200	2000	21.74	3.26	13,676.48	14,592.00	-6.3	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
201	2100	21.70	3.26	13,638.59	14,560.00	-6.3	-----	--
202	2200	21.66	3.27	13,617.41	14,528.00	-6.3	-----	--
203	2300	21.63	3.28	13,622.14	14,504.00	-6.1	-----	--
204	2400	21.61	3.26	13,557.71	14,488.00	-6.4	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 13843.21 CFS
RATING TABLE: 14624.50 CFS
DIFFERENCE:-5.3 %

DAY NUMBER 10

205	0100	21.55	3.27	13,515.65	14,440.00	-6.4	-----	--
206	0200	21.54	3.28	13,570.14	14,432.00	-6.0	-----	--
207	0300	21.52	3.27	13,507.64	14,416.00	-6.3	-----	--
208	0400	21.48	3.27	13,468.39	14,384.00	-6.4	-----	--
209	0500	21.46	3.28	13,481.13	14,368.00	-6.2	-----	--
210	0600	21.44	3.29	13,479.78	14,352.00	-6.1	-----	--
211	0700	21.43	3.29	13,502.51	14,344.00	-5.9	-----	--
212	0800	21.43	3.30	13,535.17	14,344.00	-5.6	-----	--
213	0900	21.44	3.31	13,561.64	14,352.00	-5.5	-----	--
214	1000	21.45	3.31	13,587.32	14,360.00	-5.4	-----	--
215	1100	21.47	3.31	13,606.84	14,376.00	-5.4	-----	--
216	1200	21.48	3.30	13,569.58	14,384.00	-5.7	-----	--
217	1300	21.47	3.29	13,526.73	14,376.00	-5.9	-----	--
218	1400	21.46	3.30	13,546.91	14,368.00	-5.7	-----	--
219	1500	21.47	3.30	13,588.82	14,376.00	-5.5	-----	--
220	1600	21.48	3.30	13,568.68	14,384.00	-5.7	-----	--
221	1700	21.47	3.28	13,495.45	14,376.00	-6.1	-----	--
222	1800	21.44	3.27	13,417.51	14,352.00	-6.5	-----	--
223	1900	21.40	3.27	13,378.08	14,320.00	-6.6	-----	--
224	2000	21.37	3.27	13,365.91	14,296.00	-6.5	-----	--
225	2100	21.34	3.27	13,323.49	14,272.00	-6.6	-----	--
226	2200	21.30	3.27	13,301.43	14,240.00	-6.6	-----	--
227	2300	21.28	3.28	13,283.81	14,224.00	-6.6	-----	--
228	2400	21.24	3.28	13,247.01	14,192.00	-6.7	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 13482.71 CFS
RATING TABLE: 14353.17 CFS
DIFFERENCE:-6.1 %

DAY NUMBER 11

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
229	0100	21.22	3.28	13,259.45	14,176.00	-6.5	-----	--
230	0200	21.20	3.28	13,227.22	14,160.00	-6.6	-----	--
231	0300	21.17	3.28	13,198.92	14,136.00	-6.6	-----	--
232	0400	21.15	3.29	13,211.12	14,120.00	-6.4	-----	--
233	0500	21.14	3.29	13,218.72	14,112.00	-6.3	-----	--
234	0600	21.13	3.28	13,179.85	14,104.00	-6.6	-----	--
235	0700	21.10	3.29	13,181.19	14,080.00	-6.4	-----	--
236	0800	21.11	3.30	13,222.32	14,088.00	-6.1	-----	--
237	0900	21.10	3.29	13,184.28	14,080.00	-6.4	-----	--
238	1000	21.09	3.30	13,219.12	14,072.00	-6.1	-----	--
239	1100	21.11	3.31	13,255.02	14,088.00	-5.9	-----	--
240	1200	21.11	3.30	13,210.35	14,088.00	-6.2	-----	--
241	1300	21.10	3.29	13,183.68	14,080.00	-6.4	-----	--
242	1400	21.09	3.28	13,112.68	14,072.00	-6.8	-----	--
243	1500	21.04	3.28	13,063.70	14,032.00	-6.9	-----	--
244	1600	21.03	3.29	13,099.99	14,024.00	-6.6	-----	--
245	1700	21.01	3.29	13,068.76	14,008.00	-6.7	-----	--
246	1800	20.99	3.28	13,019.50	13,992.00	-7.0	-----	--
247	1900	20.95	3.27	12,951.08	13,960.00	-7.2	-----	--
248	2000	20.91	3.26	12,882.78	13,928.00	-7.5	-----	--
249	2100	20.85	3.27	12,856.82	13,880.00	-7.4	-----	--
250	2200	20.83	3.28	12,870.18	13,864.00	-7.2	-----	--
251	2300	20.79	3.27	12,805.39	13,832.00	-7.4	-----	--
252	2400	20.75	3.27	12,767.66	13,800.00	-7.5	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 13103.73 CFS
RATING TABLE: 14040.50 CFS
DIFFERENCE: -6.7 %

DAY NUMBER 12

253	0100	20.71	3.28	12,746.22	13,768.00	-7.4	-----	--
254	0200	20.68	3.28	12,749.44	13,744.00	-7.2	-----	--
255	0300	20.66	3.27	12,688.38	13,728.00	-7.6	-----	--
256	0400	20.60	3.27	12,631.87	13,680.00	-7.7	-----	--
257	0500	20.58	3.29	12,657.95	13,664.00	-7.4	-----	--
258	0600	20.55	3.28	12,618.29	13,640.00	-7.5	-----	--
259	0700	20.52	3.29	12,619.81	13,616.00	-7.3	-----	--
260	0800	20.51	3.30	12,641.41	13,608.00	-7.1	-----	--
261	0900	20.50	3.29	12,619.30	13,600.00	-7.2	-----	--
262	1000	20.48	3.29	12,600.48	13,584.00	-7.2	-----	--
263	1100	20.47	3.29	12,591.40	13,576.00	-7.3	-----	--
264	1200	20.45	3.29	12,544.16	13,560.00	-7.5	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
265	1300	20.42	3.28	12,501.02	13,536.00	-7.6	-----	--
266	1400	20.39	3.28	12,458.63	13,512.00	-7.8	-----	--
267	1500	20.35	3.28	12,421.83	13,480.00	-7.8	-----	--
268	1600	20.32	3.28	12,409.29	13,456.00	-7.8	-----	--
269	1700	20.29	3.28	12,354.16	13,432.00	-8.0	-----	--
270	1800	20.24	3.26	12,250.14	13,392.00	-8.5	-----	--
271	1900	20.17	3.26	12,170.21	13,336.00	-8.7	-----	--
272	2000	20.10	3.29	12,212.84	13,280.00	-8.0	-----	--
273	2100	20.08	3.29	12,195.90	13,264.00	-8.1	-----	--
274	2200	20.00	3.27	12,078.19	13,200.00	-8.5	-----	--
275	2300	19.92	3.28	12,030.88	13,132.00	-8.4	-----	--
276	2400	19.83	3.29	11,998.74	13,055.50	-8.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 12465.62 CFS
RATING TABLE: 13508.99 CFS
DIFFERENCE:-7.7 %

DAY NUMBER 13

277	0100	19.75	3.30	11,958.13	12,987.50	-7.9	-----	--
278	0200	19.65	3.30	11,853.33	12,902.50	-8.1	-----	--
279	0300	19.52	3.31	11,786.87	12,792.00	-7.9	-----	--
280	0400	19.40	3.31	11,674.94	12,690.00	-8.0	-----	--
281	0500	19.21	3.30	11,484.63	12,528.50	-8.3	-----	--
282	0600	19.01	3.29	11,281.50	12,358.50	-8.7	-----	--
283	0700	18.76	3.27	11,010.48	12,146.00	-9.3	-----	--
284	0800	18.47	3.27	10,765.08	11,899.50	-9.5	-----	--
285	0900	18.16	3.26	10,490.41	11,636.00	-9.8	-----	--
286	1000	17.79	3.26	10,193.52	11,332.00	-10.0	-----	--
287	1100	17.40	3.25	9,870.80	11,020.00	-10.4	-----	--
288	1200	16.93	3.23	9,488.50	10,644.00	-10.9	-----	--
289	1300	16.43	3.20	9,047.33	10,244.00	-11.7	-----	--
290	1400	15.88	3.17	8,590.52	9,801.00	-12.4	-----	--
291	1500	15.31	3.15	8,144.92	9,330.75	-12.7	-----	--
292	1600	14.70	3.13	7,697.98	8,827.50	-12.8	-----	--
293	1700	14.08	3.11	7,262.31	8,316.00	-12.7	-----	--
294	1800	13.43	3.10	6,849.23	7,836.75	-12.6	-----	--
295	1900	12.82	3.09	6,454.68	7,394.50	-12.7	-----	--
296	2000	12.17	3.04	5,956.72	6,923.25	-14.0	-----	--
297	2100	11.48	3.02	5,525.43	6,397.00	-13.6	-----	--
298	2200	10.84	3.04	5,192.31	5,901.00	-12.0	-----	--
299	2300	10.23	3.05	4,866.21	5,428.25	-10.4	-----	--
300	2400	9.66	2.99	4,463.86	4,978.00	-10.3	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 8986.55 CFS
RATING TABLE: 10014.72 CFS
DIFFERENCE:-10.3 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 14								
301	0100	9.07	2.91	4,029.55	4,506.00	-10.6	-----	--
302	0200	8.55	2.84	3,677.39	4,180.00	-12.0	-----	--
303	0300	8.04	2.77	3,332.47	3,874.00	-14.0	-----	--
304	0400	7.58	2.71	3,054.77	3,556.00	-14.1	-----	--
305	0500	7.18	2.67	2,825.94	3,276.00	-13.7	-----	--
306	0600	6.83	2.63	2,629.96	3,039.50	-13.5	-----	--
307	0700	6.53	2.61	2,478.15	2,844.50	-12.9	-----	--
308	0800	6.31	2.60	2,371.15	2,701.50	-12.2	-----	--
309	0900	6.12	2.57	2,268.25	2,578.00	-12.0	-----	--
310	1000	5.96	2.55	2,181.57	2,475.20	-11.9	-----	--
311	1100	5.82	2.53	2,107.88	2,388 40	-11.7	-----	--
312	1200	5.71	2.52	2,055.43	2,320.20	-11.4	-----	--
313	1300	5.63	2.51	2,018.91	2,270.60	-11.1	-----	--
314	1400	5.57	2.51	1,994.44	2,233.40	-10.7	-----	--
315	1500	5.54	2.51	1,978.67	2,214.80	-10.7	-----	--
316	1600	5.49	2.49	1,943.84	2,183.80	-11.0	-----	--
317	1700	5.44	2.47	1,911.20	2,152.80	-11.2	-----	--
318	1800	5.38	2.45	1,873.03	2,115.60	-11.5	-----	--
319	1900	5.32	2.44	1,839.58	2,078.40	-11.5	-----	--
320	2000	5.27	2.43	1,812.30	2,047.40	-11.5	-----	--
321	2100	5.22	2.42	1,785.24	2,016.40	-11.5	-----	--
322	2200	5.18	2.40	1,759.85	1,991.60	-11.6	-----	--
323	2300	5.12	2.39	1,727.33	1,954.40	-11.6	-----	--
324	2400	5.09	2.39	1,716.06	1,935.80	-11.4	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2364.45 CFS
RATING TABLE: 2685.64 CFS
DIFFERENCE: -12.0 %

DAY NUMBER 15								
325	0100	5.06	2.38	1,699.06	1,917.20	-11.4	-----	--
326	0200	5.03	2.37	1,681.92	1,898.60	-11.4	-----	--
327	0300	5.00	2.37	1,666.82	1,880.00	-11.3	-----	--
328	0400	4.98	2.36	1,657.42	1,868.80	-11.3	-----	--
329	0500	4.96	2.36	1,646.16	1,857.60	-11.4	-----	--
330	0600	4.94	2.35	1,634.86	1,846.40	-11.5	-----	--
331	0700	4.92	2.35	1,623.59	1,835.20	-11.5	-----	--
332	0800	4.90	2.34	1,610.45	1,824.00	-11.7	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
333	0900	4.87	2.32	1,589.90	1,807.20	-12.0	-----	--
334	1000	4.83	2.31	1,565.78	1,784.80	-12.3	-----	--
335	1100	4.79	2.29	1,541.84	1,762.40	-12.5	-----	--
336	1200	4.74	2.27	1,510.90	1,734.40	-12.9	-----	--
337	1300	4.68	2.25	1,476.64	1,700.80	-13.2	-----	--
338	1400	4.62	2.24	1,444.51	1,667.20	-13.4	-----	--
339	1500	4.56	2.22	1,413.28	1,633.60	-13.5	-----	--
340	1600	4.50	2.21	1,384.31	1,600.00	-13.5	-----	--
341	1700	4.45	2.20	1,362.27	1,572.00	-13.3	-----	--
342	1800	4.41	2.19	1,345.39	1,549.60	-13.2	-----	--
343	1900	4.38	2.18	1,327.20	1,532.80	-13.4	-----	--
344	2000	4.32	2.16	1,299.00	1,499.20	-13.4	-----	--
345	2100	4.30	2.17	1,295.11	1,488.00	-13.0	-----	--
346	2200	4.28	2.17	1,286.94	1,476.80	-12.9	-----	--
347	2300	4.27	2.17	1,283.52	1,471.20	-12.8	-----	--
348	2400	4.26	2.17	1,280.14	1,465.60	-12.7	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1493.54 CFS
RATING TABLE: 1704.52 CFS
DIFFERENCE: -12.4 %

DAY NUMBER 16

349	0100	4.26	2.17	1,284.66	1,465.60	-12.3	-----	--
350	0200	4.28	2.18	1,294.63	1,476.80	-12.3	-----	--
351	0300	4.28	2.18	1,296.26	1,476.80	-12.2	-----	--
352	0400	4.31	2.20	1,315.72	1,493.60	-11.9	-----	--
353	0500	4.34	2.20	1,326.35	1,510.40	-12.2	-----	--
354	0600	4.34	2.20	1,324.82	1,510.40	-12.3	-----	--
355	0700	4.36	2.20	1,334.73	1,521.60	-12.3	-----	--
356	0800	4.36	2.20	1,331.71	1,521.60	-12.5	-----	--
357	0900	4.36	2.19	1,330.04	1,521.60	-12.6	-----	--
358	1000	4.35	2.19	1,325.02	1,516.00	-12.6	-----	--
359	1100	4.35	2.19	1,323.40	1,516.00	-12.7	-----	--
360	1200	4.33						

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1315.06 CFS
RATING TABLE: 1500.47 CFS
DIFFERENCE: -12.4 %

TOTAL VOLUME OF WATER AT THIS POINT:
COMPUTED DATA: 17014571664 CUBIC FEET
RATING TABLE: 19690645860 CUBIC FEET
DIFFERENCE: -13.6 %

Table 3.--Station characteristics and summary of hourly stage and computed and rated discharges at Levisa Fork at Paintsville, Ky., April 2-17, 1977

Pages 62-74

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

Levisa Fork at Paintsville, Ky.
Station number: 03-212500
April 2-17, 1977

Tape file is: FILE 1

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 102

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	20	43.7	9	170	-2.0	17	300	1.3	25	470	22.1
2	40	34.9	10	180	-2.1	18	320	1.0	26	490	25.7
3	60	27.1	11	220	1.5	19	330	1.7	27	530	34.3
4	85	20.3	12	230	0.4	20	334	4.4	28	550	37.8
5	115	15.5	13	240	0.3	21	360	10.2	29	570	43.3
6	137	5.7	14	260	1.3	22	380	14.4			
7	148	-.8	15	270	1.3	23	400	16.4			
8	160	-1.3	16	280	2.1	24	430	18.0			

Effective Slope= 0.00027 ft/ft

Wave Velocity= 2.11 ft/sec

n VALUES

At 10.0 ft, n= 0.028
At 50.0 ft, n= 0.078

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	1300	3.88	1.48	980.00	980.00	0.0	-----	--
2	1400	3.87	1.95	1,281.00	975.00	31.4	-----	--
3	1500	3.86	1.96	1,285.77	970.00	32.6	-----	--
4	1600	3.86	1.96	1,287.56	970.00	32.7	-----	--
5	1700	3.86	1.96	1,286.09	970.00	32.6	-----	--
6	1800	3.85	1.95	1,278.46	965.00	32.5	-----	--
7	1900	3.84	1.96	1,276.84	960.00	33.0	-----	--
8	2000	3.86	1.98	1,296.64	970.00	33.7	-----	--
9	2100	3.90	1.99	1,320.04	990.00	33.3	-----	--
10	2200	3.91	1.98	1,321.78	995.00	32.8	-----	--
11	2300	3.92	1.99	1,327.87	1,000.00	32.8	-----	--
12	2400	3.93	1.99	1,334.11	1,005.00	32.7	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1283.56 CFS
RATING TABLE: 977.95 CFS
DIFFERENCE: 31.2 %

DAY NUMBER 2

13	0100	3.94	1.99	1,340.36	1,010.00	32.7	-----	--
14	0200	3.95	2.00	1,348.21	1,015.00	32.8	-----	--
15	0300	3.97	2.01	1,360.76	1,025.00	32.8	-----	--
16	0400	3.98	2.01	1,367.14	1,030.00	32.7	-----	--
17	0500	4.00	2.02	1,379.71	1,040.00	32.7	-----	--
18	0600	4.01	2.02	1,386.12	1,046.20	32.5	-----	--
19	0700	4.03	2.03	1,400.41	1,058.60	32.3	-----	--
20	0800	4.05	2.04	1,413.23	1,071.00	32.0	-----	--
21	0900	4.07	2.05	1,426.06	1,083.40	31.6	-----	--
22	1000	4.09	2.05	1,437.25	1,095.80	31.2	-----	--
23	1100	4.10	2.05	1,442.02	1,102.00	30.9	-----	--
24	1200	4.11	2.06	1,450.12	1,108.20	30.9	-----	--
25	1300	4.13	2.07	1,464.76	1,120.60	30.7	-----	--
26	1400	4.15	2.07	1,476.09	1,133.00	30.3	-----	--
27	1500	4.16	2.07	1,480.90	1,139.20	30.0	-----	--
28	1600	4.17	2.08	1,487.36	1,145.40	29.9	-----	--
29	1700	4.18	2.08	1,492.14	1,151.60	29.6	-----	--
30	1800	4.18	2.07	1,490.40	1,151.60	29.4	-----	--
31	1900	4.18	2.08	1,492.10	1,151.60	29.6	-----	--
32	2000	4.19	2.08	1,498.61	1,157.80	29.4	-----	--
33	2100	4.19	2.08	1,496.93	1,157.80	29.3	-----	--
34	2200	4.19	2.08	1,500.40	1,157.80	29.6	-----	--
35	2300	4.21	2.09	1,517.02	1,170.20	29.6	-----	--
36	2400	4.23	2.11	1,533.90	1,182.60	29.7	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1440.92 CFS
RATING TABLE: 1100.65 CFS
DIFFERENCE: 30.9 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 3								
37	0100	4.27	2.13	1,565.89	1,207.40	29.7	-----	--
38	0200	4.32	2.15	1,601.44	1,238.40	29.3	-----	--
39	0300	4.37	2.17	1,641.08	1,269.40	29.3	-----	--
40	0400	4.45	2.21	1,704.99	1,319.00	29.3	-----	--
41	0500	4.55	2.26	1,789.77	1,381.00	29.6	-----	--
42	0600	4.71	2.35	1,934.34	1,480.20	30.7	-----	--
43	0700	4.96	2.47	2,156.23	1,635.20	31.9	-----	--
44	0800	5.28	2.63	2,458.15	1,858.80	32.2	-----	--
45	0900	5.73	2.84	2,909.53	2,178.30	33.6	-----	--
46	1000	6.30	3.07	3,511.06	2,619.00	34.1	-----	--
47	1100	6.98	3.35	4,297.60	3,183.40	35.0	-----	--
48	1200	7.80	3.64	5,322.79	3,920.00	35.8	-----	--
49	1300	8.70	3.94	6,528.35	4,730.00	38.0	-----	--
50	1400	9.66	4.24	7,961.59	5,594.00	42.3	-----	--
51	1500	10.73	4.47	9,488.38	6,557.00	44.7	-----	--
52	1600	11.95	4.39	10,621.47	7,655.00	38.8	-----	--
53	1700	12.62	4.73	12,220.12	8,258.00	48.0	-----	--
54	1800	14.83	5.00	15,777.94	10,247.00	54.0	-----	--
55	1900	16.31	4.69	16,728.37	11,594.50	44.3	-----	--
56	2000	17.78	4.42	17,743.74	12,991.00	36.6	-----	--
57	2100	19.07	4.14	18,421.31	14,270.00	29.1	-----	--
58	2200	19.89	4.37	20,747.98	15,090.00	37.5	-----	--
59	2300	22.12	4.66	26,005.49	17,320.00	50.1	-----	--
60	2400	24.13	4.51	28,790.39	19,336.50	48.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 8679.16 CFS
RATING TABLE: 6160.67 CFS
DIFFERENCE: 40.9 %

DAY NUMBER 4								
61	0100	25.71	4.28	30,153.88	20,995.50	43.6	-----	--
62	0200	26.93	4.13	31,270.54	22,276.50	40.4	-----	--
63	0300	28.03	4.06	32,712.49	23,439.00	39.6	-----	--
64	0400	29.03	3.99	33,913.82	24,739.00	37.1	-----	--
65	0500	29.90	3.91	34,755.50	25,870.00	34.3	-----	--
66	0600	30.65	3.84	35,460.48	26,845.00	32.1	-----	--
67	0700	31.32	3.79	36,169.88	27,716.00	30.5	-----	--
68	0800	31.93	3.74	36,850.93	28,509.00	29.3	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
69	0900	32.49	3.69	37,325.29	29,286.00	27.5	-----	--
70	1000	32.96	3.67	37,861.13	29,944.00	26.4	-----	--
71	1100	33.45	3.63	38,321.40	30,630.00	25.1	-----	--
72	1200	33.82	3.60	38,669.48	31,148.00	24.1	-----	--
73	1300	34.24	3.61	39,478.18	31,772.00	24.3	-----	--
74	1400	34.64	3.58	39,871.18	32,392.00	23.1	-----	--
75	1500	34.99	3.57	40,430.97	32,934.50	22.8	-----	--
76	1600	35.39	3.59	41,370.09	33,554.50	23.3	-----	--
77	1700	35.81	3.59	42,082.89	34,205.50	23.0	-----	--
78	1800	36.21	3.58	42,669.53	34,867.50	22.4	-----	--
79	1900	36.61	3.57	43,292.88	35,567.50	21.7	-----	--
80	2000	37.00	3.57	44,029.07	36,250.00	21.5	-----	--
81	2100	37.42	3.57	44,826.20	36,985.00	21.2	-----	--
82	2200	37.83	3.55	45,219.81	37,702.50	19.9	40,900.00	10.6
83	2300	38.18	3.54	45,743.72	38,360.00	19.2	-----	--
84	2400	38.57	3.55	46,575.55	39,140.00	19.0	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 38756.76 CFS
RATING TABLE: 30634.47 CFS
DIFFERENCE: 26.5 %

DAY NUMBER 5

85	0100	38.95	3.52	46,990.06	39,900.00	17.8	-----	--
86	0200	39.28	3.51	47,428.76	40,560.00	16.9	-----	--
87	0300	39.63	3.50	47,857.31	41,260.00	16.0	-----	--
88	0400	39.92	3.48	48,171.54	41,840.00	15.1	-----	--
89	0500	40.23	3.47	48,664.09	42,517.50	14.5	-----	--
90	0600	40.51	3.45	48,859.93	43,147.50	13.2	-----	--
91	0700	40.76	3.44	49,186.48	43,710.00	12.5	-----	--
92	0800	41.02	3.43	49,486.47	44,295.00	11.7	-----	--
93	0900	41.24	3.41	49,555.48	44,790.00	10.6	-----	--
94	1000	41.44	3.39	49,680.56	45,240.00	9.8	-----	--
95	1100	41.62	3.37	49,718.41	45,645.00	8.9	-----	--
96	1200	41.77	3.35	49,643.53	45,982.50	8.0	-----	--
97	1300	41.89	3.33	49,563.22	46,252.50	7.2	42,500.00	16.6
98	1400	41.99	3.31	49,556.78	46,477.50	6.6	-----	--
99	1500	42.08	3.29	49,426.70	46,680.00	5.9	-----	--
100	1600	42.13	3.27	49,220.52	46,792.50	5.2	-----	--
101	1700	42.17	3.26	49,106.49	46,882.50	4.7	-----	--
102	1800	42.19	3.24	48,850.86	46,927.50	4.1	-----	--

TOTAL VOLUME OF WATER AT THIS POINT:
COMPUTED DATA: 4273787822 CUBIC FEET
RATING TABLE: 3312923400 CUBIC FEET
DIFFERENCE: 29.0 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
103	1900	42.18	3.23	48,650.88	46,905.00	3.7	42,700.00	13.9
104	2000	42.17	3.21	48,285.66	46,882.50	3.0	-----	--
105	2100	42.10	3.18	47,811.25	46,725.00	2.3	-----	--
106	2200	42.03	3.16	47,392.97	46,567.50	1.8	-----	--
107	2300	41.91	3.14	46,780.93	46,297.50	1.0	-----	--
108	2400	41.77	3.13	46,361.64	45,982.50	0.8	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 48598.23 CFS
RATING TABLE: 44784.95 CFS
DIFFERENCE: 8.5 %

DAY NUMBER 6

109	0100	41.62	3.11	45,938.82	45,645.00	0.6	-----	--
110	0200	41.45	3.09	45,371.19	45,262.50	0.2	-----	--
111	0300	41.25	3.07	44,637.07	44,812.50	-.4	-----	--
112	0400	41.01	3.05	43,951.51	44,272.50	-.7	-----	--
113	0500	40.76	3.03	43,316.73	43,710.00	-.9	-----	--
114	0600	40.48	3.02	42,699.05	43,080.00	-.9	-----	--
115	0700	40.20	3.00	42,031.21	42,450.00	-1.0	-----	--
116	0800	39.88	2.97	41,077.47	41,760.00	-1.6	-----	--
117	0900	39.52	2.95	40,283.08	41,040.00	-1.8	-----	--
118	1000	39.16	2.93	39,449.91	40,320.00	-2.2	-----	--
119	1100	38.75	2.92	38,657.02	39,500.00	-2.1	-----	--
120	1200	38.36	2.90	37,740.94	38,720.00	-2.5	-----	--
121	1300	37.89	2.86	36,598.70	37,807.50	-3.2	-----	--
122	1400	37.42	2.86	35,819.37	36,985.00	-3.2	-----	--
123	1500	36.93	2.83	34,727.77	36,127.50	-3.9	28,500.00	21.9
124	1600	36.38	2.80	33,607.16	35,165.00	-4.4	-----	--
125	1700	35.82	2.79	32,699.19	34,221.00	-4.4	-----	--
126	1800	35.24	2.77	31,633.75	33,322.00	-5.1	-----	--
127	1900	34.62	2.73	30,375.69	32,361.00	-6.1	-----	--
128	2000	33.95	2.71	29,306.93	31,330.00	-6.5	-----	--
129	2100	33.29	2.70	28,363.05	30,406.00	-6.7	-----	--
130	2200	32.60	2.66	27,017.28	29,440.00	-8.2	-----	--
131	2300	31.84	2.62	25,683.55	28,392.00	-9.5	-----	--
132	2400	31.07	2.61	24,596.32	27,391.00	-10.2	20,700.00	18.8

MEAN DAILY DISCHARGE:
COMPUTED DATA: 36936.06 CFS
RATING TABLE: 38034.01 CFS
DIFFERENCE: -2.9 %

DAY NUMBER 7

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
133	0100	30.28	2.58	23,426.48	26,364.00	-11.1	------	--
134	0200	29.46	2.53	22,023.72	25,298.00	-12.9	------	--
135	0300	28.57	2.50	20,729.62	24,141.00	-14.1	------	--
136	0400	27.69	2.47	19,564.59	23,074.50	-15.2	------	--
137	0500	26.76	2.45	18,343.64	22,098.00	-17.0	------	--
138	0600	25.83	2.44	17,347.18	21,121.50	-17.9	------	--
139	0700	24.90	2.45	16,425.51	20,145.00	-18.5	------	--
140	0800	23.98	2.46	15,559.54	19,180.00	-18.9	------	--
141	0900	23.07	2.48	14,768.42	18,270.00	-19.2	------	--
142	1000	22.19	2.45	13,723.68	17,390.00	-21.1	------	--
143	1100	21.22	2.51	13,136.57	16,420.00	-20.0	12,900.00	1.8
144	1200	20.45	2.67	13,222.71	15,650.00	-15.5	------	--
145	1300	19.79	2.78	13,089.05	14,990.00	-12.7	------	--
146	1400	19.20	2.88	12,953.37	14,400.00	-10.0	------	--
147	1500	18.71	2.98	12,876.77	13,910.00	-7.4	11,100.00	16.0
148	1600	18.29	3.05	12,784.25	13,490.00	-5.2	------	--
149	1700	17.94	3.14	12,783.24	13,143.00	-2.7	------	--
150	1800	17.68	3.25	12,962.71	12,896.00	0.5	------	--
151	1900	17.53	3.38	13,288.66	12,753.50	4.2	------	--
152	2000	17.52	3.46	13,604.61	12,744.00	6.8	------	--
153	2100	17.56	3.50	13,819.01	12,782.00	8.1	------	--
154	2200	17.66	3.52	14,022.19	12,877.00	8.9	------	--
155	2300	17.78	3.54	14,222.22	12,991.00	9.5	------	--
156	2400	17.95	3.55	14,461.28	13,152.50	10.0	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 15591.94 CFS
RATING TABLE: 17350.01 CFS
DIFFERENCE: -10.1 %

DAY NUMBER 8

157	0100	18.14	3.54	14,661.14	13,340.00	9.9	------	--
158	0200	18.32	3.53	14,830.54	13,520.00	9.7	------	--
159	0300	18.50	3.53	15,047.30	13,700.00	9.8	------	--
160	0400	18.70	3.53	15,257.78	13,900.00	9.8	------	--
161	0500	18.88	3.51	15,398.57	14,080.00	9.4	------	--
162	0600	19.05	3.50	15,559.34	14,250.00	9.2	------	--
163	0700	19.22	3.50	15,772.40	14,420.00	9.4	------	--
164	0800	19.41	3.50	16,011.72	14,610.00	9.6	15,900.00	0.7
165	0900	19.60	3.48	16,151.34	14,800.00	9.1	------	--
166	1000	19.75	3.47	16,276.29	14,950.00	8.9	------	--
167	1100	19.92	3.46	16,442.65	15,120.00	8.7	------	--
168	1200	20.06	3.45	16,559.67	15,260.00	8.5	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
169	1300	20.21	3.44	16,723.09	15,410.00	8.5	------	--
170	1400	20.35	3.43	16,845.31	15,550.00	8.3	------	--
171	1500	20.48	3.42	16,978.85	15,680.00	8.3	------	--
172	1600	20.61	3.42	17,113.73	15,810.00	8.2	------	--
173	1700	20.73	3.41	17,218.21	15,930.00	8.1	------	--
174	1800	20.84	3.42	17,422.50	16,040.00	8.6	------	--
175	1900	21.00	3.41	17,580.46	16,200.00	8.5	------	--
176	2000	21.09	3.37	17,494.38	16,290.00	7.4	------	--
177	2100	21.15	3.36	17,517.20	16,350.00	7.1	------	--
178	2200	21.22	3.36	17,598.14	16,420.00	7.2	------	--
179	2300	21.28	3.35	17,610.44	16,480.00	6.9	------	--
180	2400	21.32	3.34	17,615.40	16,520.00	6.6	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 16421.23 CFS
RATING TABLE: 15122.76 CFS
DIFFERENCE: 8.6 %

DAY NUMBER 9

181	0100	21.36	3.34	17,660.79	16,560.00	6.6	------	--
182	0200	21.40	3.34	17,708.25	16,600.00	6.7	------	--
183	0300	21.44	3.33	17,735.85	16,640.00	6.6	------	--
184	0400	21.47	3.42	18,245.28	16,670.00	9.4	------	--
185	0500	21.75	3.44	18,692.61	16,950.00	10.3	------	--
186	0600	21.82	3.35	18,300.32	17,020.00	7.5	------	--
187	0700	21.86	3.34	18,283.81	17,060.00	7.2	------	--
188	0800	21.91	3.33	18,320.34	17,110.00	7.1	------	--
189	0900	21.94	3.32	18,293.14	17,140.00	6.7	------	--
190	1000	21.96	3.31	18,293.21	17,160.00	6.6	------	--
191	1100	21.98	3.31	18,316.05	17,180.00	6.6	------	--
192	1200	22.00	3.31	18,319.17	17,200.00	6.5	------	--
193	1300	22.01	3.31	18,350.98	17,210.00	6.6	------	--
194	1400	22.04	3.30	18,325.32	17,240.00	6.3	------	--
195	1500	22.02	3.30	18,277.06	17,220.00	6.1	------	--
196	1600	22.04	3.31	18,362.90	17,240.00	6.5	------	--
197	1700	22.05	3.30	18,357.01	17,250.00	6.4	------	--
198	1800	22.06	3.30	18,347.13	17,260.00	6.3	------	--
199	1900	22.06	3.29	18,303.92	17,260.00	6.0	------	--
200	2000	22.05	3.29	18,268.67	17,250.00	5.9	------	--
201	2100	22.04	3.30	18,297.63	17,240.00	6.1	------	--
202	2200	22.05	3.30	18,311.75	17,250.00	6.2	------	--
203	2300	22.04	3.28	18,236.64	17,240.00	5.8	------	--
204	2400	22.02	3.28	18,188.49	17,220.00	5.6	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 18229.57 CFS
RATING TABLE: 17075.83 CFS
DIFFERENCE: 6.8 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 10								
205	0100	22.00	3.29	18,205.51	17,200.00	5.8	-----	--
206	0200	22.00	3.29	18,207.65	17,200.00	5.9	-----	--
207	0300	21.98	3.28	18,141.79	17,180.00	5.6	-----	--
208	0400	21.96	3.28	18,115.88	17,160.00	5.6	-----	--
209	0500	21.94	3.28	18,091.98	17,140.00	5.6	-----	--
210	0600	21.92	3.28	18,047.24	17,120.00	5.4	-----	--
211	0700	21.89	3.28	18,031.46	17,090.00	5.5	-----	--
212	0800	21.88	3.29	18,041.55	17,080.00	5.6	-----	--
213	0900	21.86	3.29	18,018.84	17,060.00	5.6	-----	--
214	1000	21.85	3.28	17,986.22	17,050.00	5.5	-----	--
215	1100	21.82	3.28	17,928.69	17,020.00	5.3	-----	--
216	1200	21.80	3.29	17,945.52	17,000.00	5.6	-----	--
217	1300	21.79	3.29	17,935.74	16,990.00	5.6	-----	--
218	1400	21.77	3.29	17,932.78	16,970.00	5.7	-----	--
219	1500	21.77	3.29	17,913.22	16,970.00	5.6	-----	--
220	1600	21.74	3.29	17,855.87	16,940.00	5.4	-----	--
221	1700	21.73	3.29	17,843.03	16,930.00	5.4	-----	--
222	1800	21.70	3.26	17,683.14	16,900.00	4.6	-----	--
223	1900	21.63	3.25	17,553.18	16,830.00	4.3	-----	--
224	2000	21.58	3.27	17,575.00	16,780.00	4.7	-----	--
225	2100	21.55	3.27	17,543.99	16,750.00	4.7	-----	--
226	2200	21.50	3.27	17,444.60	16,700.00	4.5	-----	--
227	2300	21.45	3.27	17,425.07	16,650.00	4.7	-----	--
228	2400	21.42	3.28	17,412.43	16,620.00	4.8	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 17886.18 CFS
RATING TABLE: 16984.58 CFS
DIFFERENCE: 5.3 %

DAY NUMBER 11								
229	0100	21.38	3.28	17,366.80	16,580.00	4.7	-----	--
230	0200	21.35	3.28	17,331.88	16,550.00	4.7	-----	--
231	0300	21.31	3.28	17,265.01	16,510.00	4.6	-----	--
232	0400	21.27	3.28	17,237.59	16,470.00	4.7	-----	--
233	0500	21.24	3.28	17,223.76	16,440.00	4.8	-----	--
234	0600	21.21	3.29	17,189.90	16,410.00	4.8	-----	--
235	0700	21.18	3.29	17,194.96	16,380.00	5.0	-----	--
236	0800	21.17	3.29	17,185.40	16,370.00	5.0	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
237	0900	21.14	3.30	17,170.34	16,340.00	5.1	------	--
238	1000	21.14	3.30	17,171.47	16,340.00	5.1	------	--
239	1100	21.11	3.30	17,116.62	16,310.00	4.9	------	--
240	1200	21.10	3.30	17,143.65	16,300.00	5.2	------	--
241	1300	21.09	3.30	17,114.17	16,290.00	5.1	------	--
242	1400	21.07	3.30	17,089.95	16,270.00	5.0	------	--
243	1500	21.06	3.30	17,058.56	16,260.00	4.9	------	--
244	1600	21.03	3.30	17,022.64	16,230.00	4.9	------	--
245	1700	21.02	3.30	17,050.43	16,220.00	5.1	------	--
246	1800	21.01	3.30	17,001.44	16,210.00	4.9	------	--
247	1900	20.98	3.29	16,945.01	16,180.00	4.7	------	--
248	2000	20.96	3.30	16,940.44	16,160.00	4.8	------	--
249	2100	20.94	3.30	16,918.21	16,140.00	4.8	------	--
250	2200	20.92	3.30	16,895.10	16,120.00	4.8	------	--
251	2300	20.90	3.30	16,871.95	16,100.00	4.8	------	--
252	2400	20.88	3.30	16,848.82	16,080.00	4.8	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 17109.83 CFS
RATING TABLE: 16313.75 CFS
DIFFERENCE: 4.9 %

DAY NUMBER 12

253	0100	20.86	3.29	16,786.67	16,060.00	4.5	------	--
254	0200	20.82	3.29	16,738.52	16,020.00	4.5	------	--
255	0300	20.80	3.29	16,715.47	16,000.00	4.5	------	--
256	0400	20.76	3.29	16,669.37	15,960.00	4.4	------	--
257	0500	20.74	3.30	16,685.17	15,940.00	4.7	------	--
258	0600	20.72	3.29	16,625.45	15,920.00	4.4	------	--
259	0700	20.68	3.29	16,558.28	15,880.00	4.3	------	--
260	0800	20.65	3.30	16,561.39	15,850.00	4.5	------	--
261	0900	20.63	3.29	16,521.17	15,830.00	4.4	------	--
262	1000	20.59	3.30	16,474.41	15,790.00	4.3	------	--
263	1100	20.57	3.30	16,470.69	15,770.00	4.4	------	--
264	1200	20.54	3.30	16,418.18	15,740.00	4.3	------	--
265	1300	20.51	3.29	16,363.91	15,710.00	4.2	------	--
266	1400	20.47	3.29	16,317.26	15,670.00	4.1	------	--
267	1500	20.44	3.29	16,283.08	15,640.00	4.1	------	--
268	1600	20.40	3.29	16,218.57	15,600.00	4.0	------	--
269	1700	20.36	3.29	16,191.10	15,560.00	4.1	------	--
270	1800	20.33	3.30	16,157.99	15,530.00	4.0	------	--
271	1900	20.29	3.29	16,094.51	15,490.00	3.9	------	--
272	2000	20.25	3.28	15,994.66	15,450.00	3.5	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
273	2100	20.18	3.27	15,861.44	15,380.00	3.1	------	--
274	2200	20.11	3.26	15,728.85	15,310.00	2.7	------	--
275	2300	20.01	3.25	15,546.80	15,210.00	2.2	------	--
276	2400	19.90	3.24	15,392.16	15,100.00	1.9	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 16337.64 CFS
RATING TABLE: 15704.17 CFS
DIFFERENCE: 4.0 %

DAY NUMBER 13

277	0100	19.78	3.24	15,248.78	14,980.00	1.8	------	--
278	0200	19.66	3.25	15,144.24	14,860.00	1.9	------	--
279	0300	19.55	3.25	15,033.89	14,750.00	1.9	------	--
280	0400	19.43	3.26	14,912.99	14,630.00	1.9	------	--
281	0500	19.32	3.26	14,820.73	14,520.00	2.1	------	--
282	0600	19.21	3.26	14,658.23	14,410.00	1.7	------	--
283	0700	19.07	3.25	14,463.38	14,270.00	1.4	------	--
284	0800	18.93	3.25	14,305.51	14,130.00	1.2	------	--
285	0900	18.78	3.24	14,088.39	13,980.00	0.8	------	--
286	1000	18.60	3.22	13,824.45	13,800.00	0.2	------	--
287	1100	18.40	3.21	13,543.73	13,600.00	-.4	------	--
288	1200	18.17	3.18	13,204.42	13,370.00	-1.2	------	--
289	1300	17.90	3.17	12,854.05	13,105.00	-1.9	------	--
290	1400	17.60	3.16	12,513.69	12,820.00	-2.4	------	--
291	1500	17.25	3.16	12,171.85	12,487.50	-2.5	------	--
292	1600	16.88	3.17	11,851.40	12,136.00	-2.3	------	--
293	1700	16.47	3.18	11,493.60	11,746.50	-2.2	------	--
294	1800	16.02	3.18	11,084.60	11,319.00	-2.1	------	--
295	1900	15.55	3.19	10,675.32	10,895.00	-2.0	------	--
296	2000	15.05	3.18	10,233.58	10,445.00	-2.0	------	--
297	2100	14.54	3.18	9,790.01	9,986.00	-2.0	------	--
298	2200	14.00	3.17	9,302.52	9,500.00	-2.1	------	--
299	2300	13.46	3.16	8,845.40	9,014.00	-1.9	------	--
300	2400	12.92	3.14	8,341.44	8,528.00	-2.2	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 12747.15 CFS
RATING TABLE: 12773.67 CFS
DIFFERENCE: -.2 %

DAY NUMBER 14

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
301	0100	12.34	3.11	7,822.81	8,006.00	-2.3	------	--
302	0200	11.77	3.11	7,390.97	7,493.00	-1.4	------	--
303	0300	11.22	3.13	7,011.78	6,998.00	0.2	------	--
304	0400	10.71	3.14	6,652.29	6,539.00	1.7	------	--
305	0500	10.21	3.14	6,297.15	6,089.00	3.4	------	--
306	0600	9.75	3.13	5,932.00	5,675.00	4.5	------	--
307	0700	9.33	3.08	5,547.61	5,297.00	4.7	------	--
308	0800	8.94	3.04	5,196.59	4,946.00	5.1	------	--
309	0900	8.59	3.01	4,917.33	4,631.00	6.2	------	--
310	1000	8.31	2.98	4,689.81	4,379.00	7.1	------	--
311	1100	8.04	2.94	4,449.59	4,136.00	7.6	------	--
312	1200	7.80	2.92	4,262.34	3,920.00	8.7	------	--
313	1300	7.61	2.91	4,128.94	3,749.00	10.1	------	--
314	1400	7.46	2.89	4,008.01	3,614.00	10.9	------	--
315	1500	7.31	2.86	3,877.53	3,479.00	11.5	------	--
316	1600	7.18	2.85	3,784.69	3,362.00	12.6	------	--
317	1700	7.09	2.84	3,715.64	3,281.00	13.2	------	--
318	1800	6.99	2.83	3,637.66	3,191.70	14.0	------	--
319	1900	6.93	2.83	3,600.02	3,141.90	14.6	------	--
320	2000	6.87	2.81	3,541.83	3,092.10	14.5	------	--
321	2100	6.80	2.79	3,482.63	3,034.00	14.8	------	--
322	2200	6.75	2.79	3,449.80	2,992.50	15.3	------	--
323	2300	6.71	2.78	3,418.29	2,959.30	15.5	------	--
324	2400	6.67	2.76	3,370.70	2,926.10	15.2	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 4861.31 CFS
RATING TABLE: 4572.19 CFS
DIFFERENCE: 6.3 %

DAY NUMBER 15

325	0100	6.60	2.75	3,308.54	2,868.00	15.4	------	--
326	0200	6.56	2.75	3,284.55	2,834.80	15.9	------	--
327	0300	6.52	2.74	3,253.68	2,801.60	16.1	------	--
328	0400	6.49	2.73	3,231.21	2,776.70	16.4	------	--
329	0500	6.46	2.73	3,205.12	2,751.80	16.5	------	--
330	0600	6.43	2.72	3,178.97	2,726.90	16.6	------	--
331	0700	6.40	2.71	3,152.91	2,702.00	16.7	------	--
332	0800	6.37	2.71	3,130.61	2,677.10	16.9	------	--
333	0900	6.35	2.70	3,117.00	2,660.50	17.2	------	--
334	1000	6.33	2.70	3,096.26	2,643.90	17.1	------	--
335	1100	6.30	2.68	3,066.86	2,619.00	17.1	------	--
336	1200	6.27	2.67	3,037.47	2,594.10	17.1	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
337	1300	6.23	2.66	2,996.32	2,560.90	17.0	-----	--
338	1400	6.18	2.64	2,953.95	2,519.40	17.2	-----	--
339	1500	6.14	2.64	2,927.17	2,486.20	17.7	-----	--
340	1600	6.11	2.63	2,898.78	2,461.30	17.8	-----	--
341	1700	6.06	2.60	2,843.71	2,419.80	17.5	-----	--
342	1800	5.99	2.58	2,779.17	2,362.90	17.6	-----	--
343	1900	5.92	2.56	2,721.98	2,313.20	17.7	-----	--
344	2000	5.85	2.54	2,665.58	2,263.50	17.8	-----	--
345	2100	5.78	2.53	2,615.98	2,213.80	18.2	-----	--
346	2200	5.73	2.52	2,582.48	2,178.30	18.6	-----	--
347	2300	5.68	2.51	2,546.15	2,142.80	18.8	-----	--
348	2400	5.64	2.49	2,508.54	2,114.40	18.6	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2980.59 CFS
RATING TABLE: 2545.78 CFS
DIFFERENCE: 17.1 %

DAY NUMBER 16

349	0100	5.57	2.48	2,459.68	2,064.70	19.1	-----	--
350	0200	5.55	2.48	2,455.38	2,050.50	19.7	-----	--
351	0300	5.52	2.48	2,435.35	2,029.20	20.0	-----	--
352	0400	5.51	2.48	2,433.17	2,022.10	20.3	-----	--
353	0500	5.50	2.48	2,428.42	2,015.00	20.5	-----	--
354	0600	5.50	2.48	2,431.26	2,015.00	20.7	-----	--
355	0700	5.50	2.49	2,434.20	2,015.00	20.8	-----	--
356	0800	5.51	2.49	2,442.04	2,022.10	20.8	-----	--
357	0900	5.51	2.49	2,442.15	2,022.10	20.8	-----	--
358	1000	5.52	2.49	2,452.74	2,029.20	20.9	-----	--
359	1100	5.53	2.49	2,457.86	2,036.30	20.7	-----	--
360	1200	5.53						

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2445.24 CFS
RATING TABLE: 2032.75 CFS
DIFFERENCE: 20.3 %

TOTAL VOLUME OF WATER AT THIS POINT:
COMPUTED DATA: 22315875020 CUBIC FEET
RATING TABLE: 20782431180 CUBIC FEET
DIFFERENCE: 7.4 %

Table 4.--Station characteristics and summary of hourly stage and computed and rated discharges at South Chickamauga Creek near Chickamauga, Tenn., December 31, 1981-January 8, 1982.

Pages 75-83

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

South Chickamauga Creek near Chickamauga, Tenn.
Station number: 03-567500
December 31,1981 - January 8,1982

Tape file is: FILE 6

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 216

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	30	21.0	7	150	3.9	13	205	-2.0	19	260	2.1
2	55	16.0	8	155	3.8	14	215	-1.1	20	270	4.0
3	95	12.9	9	170	0.4	15	225	0.5	21	280	8.6
4	115	12.4	10	180	-.9	16	230	0.6	22	315	17.1
5	140	5.7	11	185	-.8	17	235	0.3	23	340	17.7
6	145	3.6	12	200	-2.0	18	250	1.6	24	360	20.8

Effective Slope= 0.00036 ft/ft

Wave Velocity= 0.90 ft/sec

n VALUES

At 9.0 ft, n= 0.062
At 21.0 ft, n= 0.039

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	0100	5.06	0.78	432.20	432.20	0.0	-----	--
2	0200	5.05	1.17	646.77	428.50	50.9	-----	--
3	0300	5.02	1.17	642.69	417.40	54.0	-----	--
4	0400	5.01	1.18	644.43	413.70	55.8	-----	--
5	0500	5.01	1.18	645.84	413.70	56.1	-----	--
6	0600	5.01	1.18	645.86	413.70	56.1	-----	--
7	0700	5.01	1.18	647.22	413.70	56.4	-----	--
8	0800	5.02	1.20	657.77	417.40	57.6	-----	--
9	0900	5.08	1.22	680.74	439.60	54.9	-----	--
10	1000	5.15	1.29	729.74	465.50	56.8	-----	--
11	1100	5.44	1.39	841.16	572.80	46.9	-----	--
12	1200	5.74	1.47	944.61	683.80	38.1	-----	--
13	1300	6.13	1.59	1,109.68	834.60	33.0	-----	--
14	1400	6.70	1.69	1,313.49	1,074.00	22.3	-----	--
15	1500	7.14	1.76	1,478.59	1,260.20	17.3	-----	--
16	1600	7.73	1.87	1,727.07	1,513.90	14.1	-----	--
17	1700	8.25	1.88	1,877.07	1,747.50	7.4	-----	--
18	1800	8.60	1.82	1,919.38	1,912.00	0.4	-----	--
19	1900	8.79	1.79	1,934.66	2,001.30	-3.3	-----	--
20	2000	8.97	1.81	2,011.10	2,085.90	-3.6	-----	--
21	2100	9.18	1.87	2,129.08	2,184.60	-2.5	-----	--
22	2200	9.42	1.93	2,269.26	2,297.40	-1.2	-----	--
23	2300	9.69	1.97	2,411.17	2,424.30	-.5	-----	--
24	2400	9.94	1.97	2,486.80	2,541.80	-2.2	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1276.82 CFS
RATING TABLE: 1126.20 CFS
DIFFERENCE: 13.4 %

DAY NUMBER 2

25	0100	10.08	1.97	2,533.17	2,608.40	-2.9	-----	--
26	0200	10.27	2.00	2,634.90	2,699.60	-2.4	-----	--
27	0300	10.41	2.01	2,682.63	2,766.80	-3.0	-----	--
28	0400	10.54	2.02	2,744.17	2,829.20	-3.0	-----	--
29	0500	10.66	2.02	2,790.56	2,886.80	-3.3	-----	--
30	0600	10.75	2.01	2,803.26	2,930.00	-4.3	-----	--
31	0700	10.80	2.01	2,819.83	2,954.00	-4.5	-----	--
32	0800	10.87	2.01	2,847.99	2,987.60	-4.7	-----	--
33	0900	10.90	2.04	2,893.46	3,002.00	-3.6	-----	--
34	1000	11.02	2.08	2,992.33	3,060.00	-2.2	-----	--
35	1100	11.10	2.07	3,005.84	3,100.00	-3.0	-----	--
36	1200	11.16	2.05	3,004.97	3,130.00	-4.0	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
37	1300	11.18	2.02	2,961.20	3,140.00	-5.7	-----	--
38	1400	11.15	2.00	2,918.10	3,125.00	-6.6	-----	--
39	1500	11.13	1.99	2,905.96	3,115.00	-6.7	-----	--
40	1600	11.10	1.96	2,851.84	3,100.00	-8.0	-----	--
41	1700	11.02	1.92	2,769.50	3,060.00	-9.5	-----	--
42	1800	10.93	1.89	2,688.88	3,016.40	-10.9	-----	--
43	1900	10.80	1.86	2,607.20	2,954.00	-11.7	-----	--
44	2000	10.69	1.85	2,567.25	2,901.20	-11.5	-----	--
45	2100	10.59	1.83	2,498.72	2,853.20	-12.4	-----	--
46	2200	10.45	1.80	2,416.72	2,786.00	-13.3	-----	--
47	2300	10.33	1.77	2,346.24	2,728.40	-14.0	-----	--
48	2400	10.17	1.74	2,253.19	2,651.60	-15.0	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2735.61 CFS
RATING TABLE: 2930.43 CFS
DIFFERENCE:-6.6 %

DAY NUMBER 3

49	0100	10.02	1.71	2,172.35	2,579.60	-15.8	-----	--
50	0200	9.84	1.68	2,095.78	2,494.80	-16.0	-----	--
51	0300	9.70	1.68	2,048.34	2,429.00	-15.7	-----	--
52	0400	9.55	1.63	1,954.57	2,358.50	-17.1	-----	--
53	0500	9.35	1.59	1,851.68	2,264.50	-18.2	-----	--
54	0600	9.16	1.56	1,770.02	2,175.20	-18.6	-----	--
55	0700	8.95	1.52	1,677.59	2,076.50	-19.2	-----	--
56	0800	8.73	1.51	1,613.44	1,973.10	-18.2	-----	--
57	0900	8.54	1.50	1,563.47	1,883.80	-17.0	-----	--
58	1000	8.35	1.48	1,500.99	1,794.50	-16.4	-----	--
59	1100	8.16	1.46	1,435.84	1,705.20	-15.8	-----	--
60	1200	7.96	1.45	1,382.75	1,612.80	-14.3	-----	--
61	1300	7.80	1.45	1,355.68	1,544.00	-12.2	-----	--
62	1400	7.67	1.44	1,315.30	1,488.10	-11.6	-----	--
63	1500	7.51	1.43	1,278.03	1,419.30	-10.0	-----	--
64	1600	7.42	1.44	1,267.96	1,380.60	-8.2	-----	--
65	1700	7.32	1.44	1,240.28	1,337.60	-7.3	-----	--
66	1800	7.24	1.42	1,213.06	1,303.20	-6.9	-----	--
67	1900	7.13	1.41	1,179.85	1,255.90	-6.1	-----	--
68	2000	7.05	1.42	1,169.03	1,221.50	-4.3	-----	--
69	2100	6.99	1.41	1,153.82	1,195.80	-3.5	-----	--
70	2200	6.92	1.41	1,138.05	1,166.40	-2.4	-----	--
71	2300	6.88	1.41	1,131.14	1,149.60	-1.6	-----	--
72	2400	6.83	1.41	1,118.82	1,128.60	-.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1508.13 CFS
RATING TABLE: 1737.48 CFS
DIFFERENCE:-13.2 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 4								
73	0100	6.80	1.42	1,119.55	1,116.00	0.3	-----	--
74	0200	6.79	1.42	1,121.46	1,111.80	0.9	-----	--
75	0300	6.78	1.43	1,125.63	1,107.60	1.6	-----	--
76	0400	6.80	1.51	1,193.84	1,116.00	7.0	-----	--
77	0500	7.06	1.67	1,377.50	1,225.80	12.4	-----	--
78	0600	7.51	1.78	1,588.42	1,419.30	11.9	-----	--
79	0700	7.96	1.91	1,823.85	1,612.80	13.1	-----	--
80	0800	8.63	2.10	2,217.19	1,926.10	15.1	-----	--
81	0900	9.44	2.40	2,840.65	2,306.80	23.1	-----	--
82	1000	10.75	2.62	3,653.10	2,930.00	24.7	-----	--
83	1100	11.35	2.65	3,967.29	3,225.00	23.0	-----	--
84	1200	12.35	2.95	4,931.10	3,725.00	32.4	-----	--
85	1300	13.20	2.87	5,283.61	4,160.00	27.0	-----	--
86	1400	13.97	2.92	5,862.22	4,583.50	27.9	-----	--
87	1500	14.62	2.97	6,394.54	4,972.00	28.6	-----	--
88	1600	15.22	2.95	6,759.56	5,376.00	25.7	-----	--
89	1700	15.55	2.88	6,849.63	5,640.00	21.4	-----	--
90	1800	15.88	2.92	7,171.12	5,904.00	21.5	-----	--
91	1900	16.16	2.94	7,435.98	6,160.00	20.7	-----	--
92	2000	16.41	2.98	7,717.84	6,410.00	20.4	-----	--
93	2100	16.64	3.01	7,991.25	6,640.00	20.4	-----	--
94	2200	16.85	3.06	8,283.79	6,850.00	20.9	-----	--
95	2300	17.07	3.10	8,570.28	7,084.00	21.0	-----	--
96	2400	17.25	3.08	8,657.09	7,300.00	18.6	-----	--
MEAN DAILY DISCHARGE:								
COMPUTED DATA: 4590.31 CFS								
RATING TABLE: 3784.00 CFS								
DIFFERENCE: 21.3 %								
DAY NUMBER 5								
97	0100	17.42	3.05	8,715.06	7,504.00	16.1	-----	--
98	0200	17.55	3.04	8,807.72	7,660.00	15.0	-----	--
99	0300	17.71	3.06	9,006.97	7,852.00	14.7	-----	--
100	0400	17.87	3.09	9,237.52	8,044.00	14.8	-----	--
101	0500	18.01	3.13	9,490.52	8,214.00	15.5	-----	--
102	0600	18.18	3.16	9,749.36	8,452.00	15.3	-----	--
103	0700	18.30	3.17	9,888.61	8,620.00	14.7	-----	--
104	0800	18.43	3.22	10,172.60	8,802.00	15.6	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
105	0900	18.58	3.28	10,522.67	9,012.00	16.8	-----	--
106	1000	18.75	3.34	10,882.63	9,250.00	17.7	10,200.00	6.7
107	1100	18.92	3.38	11,172.83	9,488.00	17.8	-----	--
108	1200	19.07	3.40	11,406.32	9,733.00	17.2	10,800.00	5.6
109	1300	19.21	3.43	11,663.44	9,999.00	16.6	-----	--
110	1400	19.35	3.47	11,926.13	10,265.00	16.2	-----	--
111	1500	19.48	3.49	12,150.84	10,512.00	15.6	-----	--
112	1600	19.60	3.52	12,379.11	10,740.00	15.3	-----	--
113	1700	19.72	3.55	12,634.17	10,968.00	15.2	12,400.00	1.9
114	1800	19.84	3.58	12,870.94	11,196.00	15.0	-----	--
115	1900	19.95	3.60	13,064.54	11,405.00	14.6	-----	--
116	2000	20.05	3.65	13,383.11	11,600.00	15.4	-----	--
117	2100	20.20	3.71	13,776.60	11,900.00	15.8	-----	--
118	2200	20.32	3.74	14,009.45	12,140.00	15.4	-----	--
119	2300	20.45	3.77	14,315.05	12,400.00	15.4	-----	--
120	2400	20.57	3.80	14,551.86	12,640.00	15.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 11367.94 CFS
RATING TABLE: 9821.92 CFS
DIFFERENCE: 15.7 %

DAY NUMBER 6

121	0100	20.68	3.81	14,737.78	12,860.00	14.6	-----	--
122	0200	20.77	3.82	14,874.38	13,040.00	14.1	-----	--
123	0300	20.85	3.84	15,051.04	13,200.00	14.0	-----	--
124	0400	20.93	3.84	15,150.98	13,360.00	13.4	-----	--
125	0500	20.97	3.84	15,227.63	13,440.00	13.3	-----	--
126	0600	21.04	3.85	15,362.28	13,580.00	13.1	-----	--
127	0700	21.07	3.80	15,189.03	13,640.00	11.4	-----	--
128	0800	21.06	3.76	15,008.81	13,620.00	10.2	-----	--
129	0900	21.04	3.72	14,809.01	13,580.00	9.1	-----	--
130	1000	20.98	3.61	14,332.75	13,460.00	6.5	-----	--
131	1100	20.85	3.54	13,903.01	13,200.00	5.3	-----	--
132	1200	20.76	3.51	13,680.77	13,020.00	5.1	-----	--
133	1300	20.63	3.41	13,120.27	12,760.00	2.8	12,500.00	5.0
134	1400	20.45	3.32	12,574.27	12,400.00	1.4	-----	--
135	1500	20.27	3.27	12,193.00	12,040.00	1.3	-----	--
136	1600	20.09	3.12	11,457.02	11,680.00	-1.9	11,200.00	2.3
137	1700	19.78	2.97	10,635.11	11,082.00	-4.0	-----	--
138	1800	19.52	2.95	10,320.84	10,588.00	-2.5	-----	--
139	1900	19.27	2.87	9,814.29	10,113.00	-3.0	-----	--
140	2000	18.98	2.79	9,280.74	9,572.00	-3.0	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
141	2100	18.71	2.71	8,801.25	9,194.00	-4.3	-----	--
142	2200	18.40	2.62	8,262.18	8,760.00	-5.7	-----	--
143	2300	18.10	2.57	7,869.70	8,340.00	-5.6	-----	--
144	2400	17.81	2.48	7,386.50	7,972.00	-7.3	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 12609.39 CFS
RATING TABLE: 11951.46 CFS
DIFFERENCE: 5.5 %

DAY NUMBER 7

145	0100	17.47	2.54	7,299.35	7,564.00	-3.5	-----	--
146	0200	17.30	2.60	7,355.31	7,360.00	-.1	-----	--
147	0300	17.05	2.48	6,840.25	7,060.00	-3.1	-----	--
148	0400	16.70	2.40	6,418.12	6,700.00	-4.2	-----	--
149	0500	16.45	2.42	6,296.66	6,450.00	-2.4	-----	--
150	0600	16.20	2.38	6,050.40	6,200.00	-2.4	-----	--
151	0700	15.97	2.34	5,801.16	5,976.00	-2.9	-----	--
152	0800	15.72	2.31	5,592.09	5,776.00	-3.2	-----	--
153	0900	15.51	2.30	5,426.94	5,608.00	-3.2	-----	--
154	1000	15.28	2.25	5,196.21	5,424.00	-4.2	5,330.00	-2.5
155	1100	15.05	2.20	4,959.87	5,240.00	-5.3	-----	--
156	1200	14.79	2.19	4,795.57	5,074.00	-5.5	-----	--
157	1300	14.60	2.19	4,692.28	4,960.00	-5.4	-----	--
158	1400	14.38	2.13	4,454.48	4,828.00	-7.7	4,480.00	-.6
159	1500	14.13	2.09	4,257.18	4,678.00	-9.0	-----	--
160	1600	13.90	2.09	4,146.71	4,545.00	-8.8	-----	--
161	1700	13.70	2.08	4,040.03	4,435.00	-8.9	4,020.00	0.5
162	1800	13.50	2.04	3,886.58	4,325.00	-10.1	-----	--
163	1900	13.28	2.00	3,705.73	4,204.00	-11.9	-----	--
164	2000	13.04	1.96	3,547.53	4,072.00	-12.9	-----	--
165	2100	12.81	1.95	3,429.23	3,955.00	-13.3	-----	--
166	2200	12.56	1.95	3,341.02	3,830.00	-12.8	-----	--
167	2300	12.30	1.95	3,240.75	3,700.00	-12.4	-----	--
168	2400	12.04	1.93	3,121.61	3,570.00	-12.6	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 5001.15 CFS
RATING TABLE: 5322.29 CFS
DIFFERENCE: -6.0 %

DAY NUMBER 8

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
169	0100	11.82	1.90	2,995.26	3,460.00	-13.4	-----	--
170	0200	11.56	1.83	2,805.29	3,330.00	-15.8	-----	--
171	0300	11.28	1.79	2,662.98	3,190.00	-16.5	-----	--
172	0400	11.03	1.75	2,521.37	3,065.00	-17.7	-----	--
173	0500	10.73	1.70	2,361.39	2,920.40	-19.1	-----	--
174	0600	10.46	1.68	2,265.09	2,790.80	-18.8	-----	--
175	0700	10.21	1.62	2,116.69	2,670.80	-20.7	-----	--
176	0800	9.88	1.63	2,038.42	2,513.60	-18.9	-----	--
177	0900	9.75	1.60	1,972.85	2,452.50	-19.6	2,150.00	-8.2
178	1000	9.40	1.52	1,784.95	2,288.00	-22.0	-----	--
179	1100	9.18	1.52	1,735.40	2,184.60	-20.6	-----	--
180	1200	8.91	1.47	1,616.09	2,057.70	-21.5	-----	--
181	1300	8.64	1.48	1,563.23	1,930.80	-19.0	-----	--
182	1400	8.45	1.51	1,552.23	1,841.50	-15.7	-----	--
183	1500	8.31	1.52	1,528.53	1,775.70	-13.9	-----	--
184	1600	8.18	1.51	1,489.24	1,714.60	-13.1	-----	--
185	1700	8.05	1.50	1,453.36	1,653.50	-12.1	-----	--
186	1800	7.94	1.49	1,424.15	1,604.20	-11.2	-----	--
187	1900	7.83	1.49	1,395.04	1,556.90	-10.4	-----	--
188	2000	7.74	1.49	1,381.69	1,518.20	-9.0	-----	--
189	2100	7.68	1.49	1,362.53	1,492.40	-8.7	-----	--
190	2200	7.59	1.47	1,330.76	1,453.70	-8.5	-----	--
191	2300	7.52	1.48	1,317.27	1,423.60	-7.5	-----	--
192	2400	7.46	1.47	1,301.28	1,397.80	-6.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1870.22 CFS
RATING TABLE: 2223.85 CFS
DIFFERENCE: -15.9 %

DAY NUMBER 9

193	0100	7.40	1.47	1,282.40	1,372.00	-6.5	-----	--
194	0200	7.34	1.46	1,269.17	1,346.20	-5.7	-----	--
195	0300	7.30	1.46	1,259.47	1,329.00	-5.2	-----	--
196	0400	7.25	1.45	1,241.22	1,307.50	-5.1	-----	--
197	0500	7.20	1.44	1,223.00	1,286.00	-4.9	-----	--
198	0600	7.14	1.44	1,207.20	1,260.20	-4.2	-----	--
199	0700	7.10	1.44	1,200.20	1,243.00	-3.4	-----	--
200	0800	7.06	1.43	1,185.48	1,225.80	-3.3	-----	--
201	0900	7.01	1.43	1,170.28	1,204.30	-2.8	-----	--
202	1000	6.97	1.43	1,160.71	1,187.40	-2.2	-----	--
203	1100	6.93	1.42	1,148.71	1,170.60	-1.9	-----	--
204	1200	6.89	1.42	1,136.72	1,153.80	-1.5	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
205	1300	6.85	1.41	1,124.79	1,137.00	-1.1	------	--
206	1400	6.81	1.41	1,115.34	1,120.20	-.4	------	--
207	1500	6.78	1.41	1,108.86	1,107.60	0.1	------	--
208	1600	6.75	1.40	1,095.28	1,095.00	0.0	------	--
209	1700	6.70	1.39	1,080.58	1,074.00	0.6	------	--
210	1800	6.67	1.39	1,076.45	1,061.40	1.4	------	--
211	1900	6.64	1.39	1,067.77	1,048.80	1.8	------	--
212	2000	6.61	1.39	1,059.05	1,036.20	2.2	------	--
213	2100	6.58	1.38	1,050.36	1,023.60	2.6	------	--
214	2200	6.55	1.38	1,041.70	1,011.00	3.0	------	--
215	2300	6.52	1.38	1,033.08	998.40	3.5	------	--
216	2400	6.49						

MEAN DAILY DISCHARGE:
  COMPUTED DATA: 1150.95 CFS
  RATING TABLE: 1173.86 CFS
  DIFFERENCE: -2.0 %

TOTAL VOLUME OF WATER AT THIS POINT:
  COMPUTED DATA: 3629608800 CUBIC FEET
  RATING TABLE: 3453895800 CUBIC FEET
  DIFFERENCE: 5.1 %

Table 5.--Station characteristics and summary of hourly stage and computed and rate discharges at South Chickamauga Creek near Chickamauga, Tenn., January 20-28, 1982

Pages 84-92

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

South Chickamauga Creek near Chickamauga, Tenn.
Station number: 03-567500
January 20 - 28, 1982

Tape file is: FILE 7

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 216

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	30	21.0	7	150	3.9	13	205	-2.0	19	260	2.1
2	55	16.0	8	155	3.8	14	215	-1.1	20	270	4.0
3	95	12.9	9	170	0.4	15	225	0.5	21	280	8.6
4	115	12.4	10	180	-.9	16	230	0.6	22	315	17.1
5	140	5.7	11	185	-.8	17	235	0.3	23	340	17.7
6	145	3.6	12	200	-2.0	18	250	1.6	24	360	20.8

Effective Slope= 0.00036 ft/ft

Wave Velocity= 0.90 ft/sec

n VALUES

At 9.0 ft, n= 0.062
At 21.0 ft, n= 0.039

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	0100	5.00	0.75	410.00	410.00	0.0	------	--
2	0200	5.03	1.19	655.56	421.10	55.7	------	--
3	0300	5.06	1.20	664.84	432.20	53.8	------	--
4	0400	5.08	1.20	669.78	439.60	52.4	------	--
5	0500	5.11	1.21	681.32	450.70	51.2	------	--
6	0600	5.16	1.23	696.62	469.20	48.5	------	--
7	0700	5.21	1.24	712.12	487.70	46.0	------	--
8	0800	5.28	1.25	730.00	513.60	42.1	------	--
9	0900	5.33	1.25	736.92	532.10	38.5	------	--
10	1000	5.36	1.25	744.57	543.20	37.1	------	--
11	1100	5.41	1.26	757.47	561.70	34.9	612.00	23.8
12	1200	5.44	1.26	760.60	572.80	32.8	------	--
13	1300	5.46	1.26	762.57	580.20	31.4	------	--
14	1400	5.47	1.26	765.13	583.90	31.0	------	--
15	1500	5.49	1.26	770.30	591.30	30.3	------	--
16	1600	5.50	1.26	772.91	595.00	29.9	------	--
17	1700	5.52	1.26	778.11	602.40	29.2	------	--
18	1800	5.53	1.27	782.35	606.10	29.1	------	--
19	1900	5.56	1.27	790.22	617.20	28.0	------	--
20	2000	5.57	1.27	789.59	620.90	27.2	------	--
21	2100	5.58	1.28	795.46	624.60	27.4	------	--
22	2200	5.61	1.29	806.72	635.70	26.9	------	--
23	2300	5.64	1.35	850.74	646.80	31.5	------	--
24	2400	5.89	1.46	969.67	739.30	31.2	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 746.25 CFS
RATING TABLE: 552.29 CFS
DIFFERENCE: 35.1 %

DAY NUMBER 2

25	0100	6.21	1.59	1,123.93	868.20	29.5	------	--
26	0200	6.78	1.74	1,370.99	1,107.60	23.8	------	--
27	0300	7.37	1.84	1,606.64	1,359.10	18.2	------	--
28	0400	7.99	2.02	1,938.12	1,625.70	19.2	------	--
29	0500	8.89	2.22	2,430.66	2,048.30	18.7	------	--
30	0600	9.79	2.35	2,907.22	2,471.30	17.6	------	--
31	0700	10.55	2.41	3,284.27	2,834.00	15.9	------	--
32	0800	11.16	2.50	3,655.04	3,130.00	16.8	------	--
33	0900	11.81	2.64	4,158.44	3,455.00	20.4	------	--
34	1000	12.45	2.72	4,606.46	3,775.00	22.0	------	--
35	1100	13.02	2.62	4,715.38	4,061.00	16.1	4,550.00	3.6
36	1200	13.45	2.59	4,901.09	4,297.50	14.0	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
37	1300	13.80	2.58	5,066.66	4,490.00	12.8	5,060.00	0.1
38	1400	14.07	2.56	5,196.10	4,642.00	11.9	-----	--
39	1500	14.30	2.56	5,316.49	4,780.00	11.2	-----	--
40	1600	14.48	2.54	5,391.61	4,888.00	10.3	5,320.00	1.3
41	1700	14.62	2.53	5,448.01	4,972.00	9.6	-----	--
42	1800	14.73	2.50	5,444.14	5,038.00	8.1	-----	--
43	1900	14.77	2.48	5,425.47	5,062.00	7.2	5,180.00	4.7
44	2000	14.83	2.50	5,500.38	5,098.00	7.9	-----	--
45	2100	14.89	2.49	5,524.04	5,134.00	7.6	-----	--
46	2200	14.92	2.50	5,551.37	5,152.00	7.8	5,450.00	1.9
47	2300	14.98	2.51	5,607.34	5,188.00	8.1	-----	--
48	2400	15.01	2.50	5,602.41	5,208.00	7.6	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 4143.99 CFS
RATING TABLE: 3685.43 CFS
DIFFERENCE: 12.4 %

DAY NUMBER 3

49	0100	15.04	2.46	5,538.78	5,232.00	5.9	-----	--
50	0200	14.99	2.41	5,398.74	5,194.00	3.9	5,690.00	-5.1
51	0300	14.94	2.40	5,339.29	5,164.00	3.4	-----	--
52	0400	14.88	2.38	5,262.48	5,128.00	2.6	-----	--
53	0500	14.81	2.35	5,166.15	5,086.00	1.6	-----	--
54	0600	14.72	2.30	5,008.28	5,032.00	-.5	-----	--
55	0700	14.58	2.27	4,867.14	4,948.00	-1.6	-----	--
56	0800	14.47	2.26	4,776.62	4,882.00	-2.2	5,150.00	-7.3
57	0900	14.33	2.21	4,611.04	4,798.00	-3.9	-----	--
58	1000	14.17	2.18	4,475.90	4,702.00	-4.8	-----	--
59	1100	14.02	2.17	4,373.59	4,612.00	-5.2	-----	--
60	1200	13.87	2.16	4,274.19	4,528.50	-5.6	4,410.00	-3.1
61	1300	13.73	2.12	4,144.54	4,451.50	-6.9	-----	--
62	1400	13.55	2.11	4,028.92	4,352.50	-7.4	-----	--
63	1500	13.42	2.12	4,006.07	4,281.00	-6.4	-----	--
64	1600	13.31	2.09	3,888.04	4,220.50	-7.9	-----	--
65	1700	13.13	2.03	3,698.34	4,121.50	-10.3	4,050.00	-8.7
66	1800	12.94	2.00	3,578.93	4,020.00	-11.0	-----	--
67	1900	12.76	2.00	3,505.76	3,930.00	-10.8	-----	--
68	2000	12.56	2.02	3,448.13	3,830.00	-10.0	-----	--
69	2100	12.37	2.05	3,430.69	3,735.00	-8.1	-----	--
70	2200	12.21	2.03	3,349.19	3,655.00	-8.4	3,390.00	-1.2
71	2300	12.04	2.03	3,276.14	3,570.00	-8.2	-----	--
72	2400	11.92	2.03	3,233.59	3,510.00	-7.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 4327.71 CFS
RATING TABLE: 4493.02 CFS
DIFFERENCE: -3.7 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 4								
73	0100	11.79	2.00	3,141.10	3,445.00	-8.8	------	--
74	0200	11.65	1.98	3,065.14	3,375.00	-9.2	------	--
75	0300	11.53	1.97	3,002.29	3,315.00	-9.4	------	--
76	0400	11.40	1.98	2,981.84	3,250.00	-8.3	------	--
77	0500	11.36	2.08	3,114.35	3,230.00	-3.6	------	--
78	0600	11.47	2.21	3,359.01	3,285.00	2.3	------	--
79	0700	11.71	2.33	3,633.12	3,405.00	6.7	------	--
80	0800	12.00	2.42	3,898.27	3,550.00	9.8	------	--
81	0900	12.33	2.51	4,186.91	3,715.00	12.7	3,990.00	4.9
82	1000	12.68	2.52	4,361.18	3,890.00	12.1	------	--
83	1100	13.07	2.52	4,564.98	4,088.50	11.7	------	--
84	1200	13.42	2.51	4,726.82	4,281.00	10.4	4,660.00	1.4
85	1300	13.66	2.47	4,789.45	4,413.00	8.5	------	--
86	1400	13.85	2.48	4,899.84	4,517.50	8.5	------	--
87	1500	14.04	2.43	4,913.10	4,624.00	6.3	------	--
88	1600	14.07	2.35	4,765.18	4,642.00	2.7	------	--
89	1700	14.08	2.33	4,729.93	4,648.00	1.8	------	--
90	1800	14.07	2.32	4,701.41	4,642.00	1.3	------	--
91	1900	14.06	2.32	4,692.90	4,636.00	1.2	------	--
92	2000	14.05	2.29	4,626.12	4,630.00	-.1	------	--
93	2100	13.98	2.23	4,481.75	4,589.00	-2.3	------	--
94	2200	13.88	2.20	4,374.71	4,534.00	-3.5	------	--
95	2300	13.78	2.19	4,300.30	4,479.00	-4.0	------	--
96	2400	13.68	2.18	4,227.97	4,424.00	-4.4	------	--
MEAN DAILY DISCHARGE: COMPUTED DATA: 4126.69 CFS RATING TABLE: 4047.96 CFS DIFFERENCE: 1.9 %								
DAY NUMBER 5								
97	0100	13.58	2.18	4,175.59	4,369.00	-4.4	------	--
98	0200	13.50	2.13	4,054.61	4,325.00	-6.3	------	--
99	0300	13.33	2.09	3,901.48	4,231.50	-7.8	------	--
100	0400	13.21	2.10	3,866.25	4,165.50	-7.2	------	--
101	0500	13.09	2.07	3,763.14	4,099.50	-8.2	------	--
102	0600	12.94	2.05	3,667.97	4,020.00	-8.8	------	--
103	0700	12.82	2.06	3,635.83	3,960.00	-8.2	------	--
104	0800	12.69	2.07	3,600.72	3,895.00	-7.6	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
105	0900	12.57	2.09	3,579.88	3,835.00	-6.7	------	--
106	1000	12.45	2.10	3,545.97	3,775.00	-6.1	------	--
107	1100	12.32	2.09	3,485.01	3,710.00	-6.1	------	--
108	1200	12.20	2.07	3,408.78	3,650.00	-6.6	------	--
109	1300	12.07	2.05	3,327.08	3,585.00	-7.2	------	--
110	1400	11.95	2.05	3,275.34	3,525.00	-7.1	------	--
111	1500	11.85	2.03	3,221.80	3,475.00	-7.3	------	--
112	1600	11.74	2.04	3,183.99	3,420.00	-6.9	------	--
113	1700	11.68	2.03	3,155.18	3,390.00	-6.9	------	--
114	1800	11.58	1.99	3,054.08	3,340.00	-8.6	------	--
115	1900	11.46	1.96	2,976.44	3,280.00	-9.3	------	--
116	2000	11.35	1.96	2,933.33	3,225.00	-9.0	------	--
117	2100	11.26	1.96	2,902.18	3,180.00	-8.7	------	--
118	2200	11.18	1.95	2,857.43	3,140.00	-9.0	------	--
119	2300	11.09	1.93	2,800.96	3,095.00	-9.5	------	--
120	2400	11.00	1.92	2,763.67	3,050.00	-9.4	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 3411.20 CFS
RATING TABLE: 3684.48 CFS
DIFFERENCE:-7.4 %

DAY NUMBER 6

121	0100	10.93	1.95	2,779.76	3,016.40	-7.8	------	--
122	0200	10.93	1.94	2,762.76	3,016.40	-8.4	------	--
123	0300	10.83	1.89	2,660.73	2,968.40	-10.4	------	--
124	0400	10.75	1.89	2,628.79	2,930.00	-10.3	------	--
125	0500	10.67	1.87	2,581.10	2,891.60	-10.7	------	--
126	0600	10.58	1.86	2,539.94	2,848.40	-10.8	------	--
127	0700	10.51	1.87	2,526.20	2,814.80	-10.3	------	--
128	0800	10.46	1.84	2,478.83	2,790.80	-11.2	------	--
129	0900	10.35	1.81	2,401.35	2,738.00	-12.3	------	--
130	1000	10.26	1.79	2,351.01	2,694.80	-12.8	------	--
131	1100	10.14	1.74	2,255.85	2,637.20	-14.5	------	--
132	1200	9.98	1.83	2,320.33	2,560.60	-9.4	------	--
133	1300	10.14	1.86	2,406.57	2,637.20	-8.7	------	--
134	1400	9.99	1.75	2,219.14	2,565.30	-13.5	------	--
135	1500	9.92	1.72	2,163.39	2,532.40	-14.6	------	--
136	1600	9.73	1.65	2,022.89	2,443.10	-17.2	------	--
137	1700	9.55	1.63	1,949.04	2,358.50	-17.4	------	--
138	1800	9.37	1.60	1,868.98	2,273.90	-17.8	------	--
139	1900	9.18	1.59	1,813.63	2,184.60	-17.0	------	--
140	2000	9.05	1.60	1,791.17	2,123.50	-15.7	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
141	2100	8.93	1.57	1,734.95	2,067.10	-16.1	-----	--
142	2200	8.77	1.55	1,672.38	1,991.90	-16.0	-----	--
143	2300	8.63	1.56	1,652.63	1,926.10	-14.2	-----	--
144	2400	8.54	1.57	1,637.20	1,883.80	-13.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2240.91 CFS
RATING TABLE: 2561.58 CFS
DIFFERENCE:-12.5 %

DAY NUMBER 7

145	0100	8.44	1.56	1,599.14	1,836.80	-12.9	-----	--
146	0200	8.34	1.57	1,593.13	1,789.80	-11.0	-----	--
147	0300	8.32	1.55	1,568.97	1,780.40	-11.9	-----	--
148	0400	8.17	1.52	1,504.08	1,709.90	-12.0	-----	--
149	0500	8.11	1.54	1,503.92	1,681.70	-10.6	-----	--
150	0600	8.02	1.53	1,474.16	1,639.40	-10.1	-----	--
151	0700	7.96	1.53	1,463.84	1,612.80	-9.2	-----	--
152	0800	7.90	1.52	1,440.85	1,587.00	-9.2	-----	--
153	0900	7.83	1.51	1,417.70	1,556.90	-8.9	-----	--
154	1000	7.77	1.51	1,404.19	1,531.10	-8.3	-----	--
155	1100	7.72	1.51	1,390.97	1,509.60	-7.9	-----	--
156	1200	7.67	1.51	1,377.71	1,488.10	-7.4	-----	--
157	1300	7.63	1.50	1,361.76	1,470.90	-7.4	-----	--
158	1400	7.57	1.50	1,345.30	1,445.10	-6.9	-----	--
159	1500	7.54	1.49	1,338.54	1,432.20	-6.5	-----	--
160	1600	7.49	1.48	1,316.82	1,410.70	-6.7	-----	--
161	1700	7.44	1.48	1,303.65	1,389.20	-6.2	-----	--
162	1800	7.40	1.48	1,290.99	1,372.00	-5.9	-----	--
163	1900	7.35	1.47	1,275.23	1,350.50	-5.6	-----	--
164	2000	7.31	1.47	1,268.14	1,333.30	-4.9	-----	--
165	2100	7.28	1.47	1,258.80	1,320.40	-4.7	-----	--
166	2200	7.24	1.46	1,243.61	1,303.20	-4.6	-----	--
167	2300	7.20	1.46	1,233.80	1,286.00	-4.1	-----	--
168	2400	7.17	1.46	1,227.16	1,273.10	-3.6	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1391.98 CFS
RATING TABLE: 1517.31 CFS
DIFFERENCE:-8.3 %

DAY NUMBER 8

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
169	0100	7.14	1.45	1,217.92	1,260.20	-3.4	-----	--
170	0200	7.11	1.45	1,206.05	1,247.30	-3.3	-----	--
171	0300	7.07	1.44	1,196.33	1,230.10	-2.7	-----	--
172	0400	7.05	1.45	1,192.77	1,221.50	-2.4	-----	--
173	0500	7.02	1.45	1,191.23	1,208.60	-1.4	-----	--
174	0600	7.03	1.45	1,189.31	1,212.90	-1.9	-----	--
175	0700	6.98	1.43	1,163.97	1,191.60	-2.3	-----	--
176	0800	6.95	1.43	1,157.22	1,179.00	-1.8	-----	--
177	0900	6.91	1.42	1,145.23	1,162.20	-1.5	-----	--
178	1000	6.88	1.42	1,138.68	1,149.60	-1.0	-----	--
179	1100	6.85	1.42	1,132.17	1,137.00	-.4	-----	--
180	1200	6.83	1.41	1,121.37	1,128.60	-.6	-----	--
181	1300	6.78	1.41	1,106.51	1,107.60	-.1	-----	--
182	1400	6.76	1.41	1,107.67	1,099.20	0.8	-----	--
183	1500	6.74	1.41	1,101.86	1,090.80	1.0	-----	--
184	1600	6.72	1.40	1,093.60	1,082.40	1.0	-----	--
185	1700	6.69	1.40	1,084.75	1,069.80	1.4	-----	--
186	1800	6.67	1.40	1,081.18	1,061.40	1.9	-----	--
187	1900	6.65	1.40	1,077.65	1,053.00	2.3	-----	--
188	2000	6.64	1.40	1,074.74	1,048.80	2.5	-----	--
189	2100	6.62	1.39	1,066.62	1,040.40	2.5	-----	--
190	2200	6.60	1.39	1,060.75	1,032.00	2.8	-----	--
191	2300	6.58	1.39	1,054.94	1,023.60	3.1	-----	--
192	2400	6.56	1.39	1,051.37	1,015.20	3.6	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1129.24 CFS
RATING TABLE: 1132.57 CFS
DIFFERENCE: -.3 %

DAY NUMBER 9

193	0100	6.55	1.39	1,050.72	1,011.00	3.9	-----	--
194	0200	6.54	1.39	1,045.63	1,006.80	3.9	-----	--
195	0300	6.52	1.38	1,039.83	998.40	4.1	-----	--
196	0400	6.51	1.39	1,039.13	994.20	4.5	-----	--
197	0500	6.50	1.38	1,036.28	990.00	4.7	-----	--
198	0600	6.49	1.38	1,033.39	985.80	4.8	-----	--
199	0700	6.48	1.38	1,030.51	981.60	5.0	-----	--
200	0800	6.47	1.38	1,027.63	977.40	5.1	-----	--
201	0900	6.46	1.38	1,024.76	973.20	5.3	-----	--
202	1000	6.45	1.38	1,019.72	969.00	5.2	-----	--
203	1100	6.43	1.37	1,011.82	960.60	5.3	-----	--
204	1200	6.41	1.37	1,008.24	952.20	5.9	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
205	1300	6.40	1.37	1,007.55	948.00	6.3	-----	--
206	1400	6.39	1.37	1,004.74	943.80	6.5	-----	--
207	1500	6.38	1.37	1,001.89	939.60	6.6	-----	--
208	1600	6.37	1.37	999.05	935.40	6.8	-----	--
209	1700	6.36	1.37	996.21	931.20	7.0	-----	--
210	1800	6.35	1.37	993.38	927.00	7.2	-----	--
211	1900	6.34	1.36	990.55	922.80	7.3	-----	--
212	2000	6.33	1.36	987.72	918.60	7.5	-----	--
213	2100	6.32	1.36	984.89	914.40	7.7	-----	--
214	2200	6.31	1.36	979.99	910.20	7.7	-----	--
215	2300	6.29	1.35	972.28	901.80	7.8	-----	--
216	2400	6.27						

MEAN DAILY DISCHARGE:
  COMPUTED DATA: 1014.15 CFS
   RATING TABLE: 958.68 CFS
     DIFFERENCE: 5.8 %

TOTAL VOLUME OF WATER AT THIS POINT:
  COMPUTED DATA: 1940437713 CUBIC FEET
   RATING TABLE: 1950079680 CUBIC FEET
     DIFFERENCE: -.5 %

Table 6.--Station characteristics and summary of hourly stage and computed rated discharges at Paint Rock River near Woodville, Ala., March 14-20, 1964

Pages 93-99

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

Paint Rock River near Woodville, Ala.
Station number: 03-574500
March 14-20, 1964

Tape file is: FILE 3

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 144

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	15	18.6	8	140	10.3	15	240	1.6	22	330	1.1
2	20	15.6	9	180	7.9	16	250	2.2	23	340	4.3
3	40	11.7	10	190	2.6	17	260	2.0	24	360	10.6
4	60	12.6	11	200	0.5	18	270	1.6	25	380	10.9
5	80	14.2	12	210	0.7	19	300	0.1	26	400	10.9
6	100	9.6	13	220	0.6	20	310	0.5	27	420	12.6
7	120	9.3	14	230	1.4	21	320	0.8	28	435	18.6

Effective Slope= 0.00027 ft/ft

Wave Velocity= 1.43 ft/sec

n VALUES

At 17.0 ft, n= 0.057
At 19.0 ft, n= 0.035

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	0100	4.83	0.95	519.20	519.20	0.0	-----	--
2	0200	4.81	0.98	531.35	514.40	3.3	-----	--
3	0300	4.80	0.98	530.14	512.00	3.5	-----	--
4	0400	4.79	0.98	527.75	509.60	3.6	-----	--
5	0500	4.78	0.98	526.28	507.20	3.8	-----	--
6	0600	4.78	0.99	535.59	507.20	5.6	-----	--
7	0700	4.87	1.06	584.15	528.80	10.5	-----	--
8	0800	5.15	1.15	685.63	597.50	14.7	-----	--
9	0900	5.50	1.28	835.48	685.00	22.0	-----	--
10	1000	6.20	1.46	1,119.85	865.00	29.5	-----	--
11	1100	6.90	1.62	1,426.25	1,057.50	34.9	-----	--
12	1200	7.80	1.90	1,961.00	1,305.00	50.3	-----	--
13	1300	9.20	2.14	2,753.75	1,684.00	63.5	-----	--
14	1400	10.80	1.88	3,161.12	2,124.00	48.8	-----	--
15	1500	11.35	1.64	3,026.61	2,292.00	32.1	-----	--
16	1600	11.85	1.66	3,322.20	2,452.00	35.5	-----	--
17	1700	12.28	1.65	3,554.77	2,598.00	36.8	-----	--
18	1800	12.70	1.67	3,829.40	2,745.00	39.5	-----	--
19	1900	13.09	1.67	4,083.49	2,895.00	41.1	-----	--
20	2000	13.38	1.68	4,289.93	3,040.00	41.1	-----	--
21	2100	13.70	1.72	4,605.10	3,200.00	43.9	-----	--
22	2200	14.04	1.74	4,878.59	3,376.00	44.5	-----	--
23	2300	14.30	1.76	5,116.53	3,545.00	44.3	-----	--
24	2400	14.61	1.82	5,508.07	3,746.50	47.0	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2386.90 CFS
RATING TABLE: 1724.92 CFS
DIFFERENCE: 38.4 %

DAY NUMBER 2

25	0100	14.93	1.85	5,845.40	3,954.50	47.8	-----	--
26	0200	15.20	1.89	6,172.36	4,228.00	46.0	-----	--
27	0300	15.53	1.96	6,665.13	4,604.20	44.8	-----	--
28	0400	15.90	2.00	7,114.64	5,026.00	41.6	-----	--
29	0500	16.20	2.02	7,438.35	5,412.00	37.4	-----	--
30	0600	16.50	2.08	7,895.12	5,820.00	35.7	-----	--
31	0700	16.85	2.16	8,520.84	6,296.00	35.3	-----	--
32	0800	17.27	2.47	10,164.59	7,250.60	40.2	-----	--
33	0900	18.05	3.00	13,296.09	9,476.00	40.3	-----	--
34	1000	18.30	3.07	13,952.54	10,456.00	33.4	-----	--
35	1100	18.67	3.46	16,270.62	11,906.40	36.7	-----	--
36	1200	18.95	3.72	17,911.25	13,004.00	37.7	19,200.00	-6 7

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
37	1300	19.12	3.73	18,219.49	13,956.00	30.5	------	--
38	1400	19.23	3.70	18,277.94	14,649.00	24.8	------	--
39	1500	19.32	3.69	18,356.50	15,216.00	20.6	------	--
40	1600	19.38	3.64	18,210.26	15,594.00	16.8	------	--
41	1700	19.37	3.58	17,872.51	15,531.00	15.1	------	--
42	1800	19.33	3.54	17,605.70	15,279.00	15.2	------	--
43	1900	19.27	3.51	17,388.83	14,901.00	16.7	------	--
44	2000	19.21	3.49	17,177.61	14,523.00	18.3	------	--
45	2100	19.13	3.46	16,920.56	14,019.00	20.7	------	--
46	2200	19.05	3.44	16,723.85	13,515.00	23.7	------	--
47	2300	18.97	3.37	16,268.63	13,082.40	24.4	------	--
48	2400	18.85	3.23	15,400.27	12,612.00	22.1	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 13530.12 CFS
RATING TABLE: 10661.60 CFS
DIFFERENCE: 26.9 %

DAY NUMBER 3

49	0100	18.76	3.13	14,813.12	12,259.20	20.8	------	--
50	0200	18.65	3.01	14,097.24	11,828.00	19.2	------	--
51	0300	18.55	2.91	13,504.41	11,436.00	18.1	------	--
52	0400	18.44	2.80	12,901.29	11,004.80	17.2	------	--
53	0500	18.34	2.71	12,380.97	10,612.80	16.7	------	--
54	0600	18.23	2.62	11,844.05	10,181.60	16.3	------	--
55	0700	18.13	2.54	11,379.50	9,789.60	16.2	------	--
56	0800	18.02	2.46	10,878.42	9,358.40	16.2	------	--
57	0900	17.91	2.37	10,363.98	9,029.80	14.8	12,300.00	-15.7
58	1000	17.77	2.28	9,860.15	8,640.60	14.1	------	--
59	1100	17.68	2.24	9,596.67	8,390.40	14.4	------	--
60	1200	17.58	2.17	9,194.92	8,112.40	13.3	------	--
61	1300	17.46	2.09	8,777.05	7,778.80	12.8	------	--
62	1400	17.35	2.04	8,442.83	7,473.00	13.0	10,000.00	-15.6
63	1500	17.24	1.97	8,095.46	7,167.20	13.0	------	--
64	1600	17.12	1.91	7,751.14	6,833.60	13.4	------	--
65	1700	17.01	1.86	7,463.92	6,527.80	14.3	------	--
66	1800	16.90	1.84	7,297.18	6,364.00	14.7	------	--
67	1900	16.78	1.83	7,151.26	6,200.80	15.3	------	--
68	2000	16.67	1.82	7,032.49	6,051.20	16.2	------	--
69	2100	16.56	1.80	6,888.70	5,901.60	16.7	------	--
70	2200	16.44	1.79	6,746.81	5,738.40	17.6	------	--
71	2300	16.33	1.78	6,630.45	5,588.80	18.6	------	--
72	2400	16.22	1.76	6,478.19	5,439.20	19.1	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 9751.30 CFS
RATING TABLE: 8387.27 CFS
DIFFERENCE: 16.3 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 4								
73	0100	16.09	1.74	6,328.36	5,262.40	20.3	-----	--
74	0200	15.98	1.74	6,238.22	5,117.20	21.9	-----	--
75	0300	15.88	1.73	6,137.04	5,003.20	22.7	-----	--
76	0400	15.78	1.72	6,035.71	4,889.20	23.4	-----	--
77	0500	15.69	1.71	5,934.77	4,786.60	24.0	-----	--
78	0600	15.59	1.70	5,812.72	4,672.60	24.4	-----	--
79	0700	15.49	1.68	5,694.19	4,558.60	24.9	-----	--
80	0800	15.38	1.67	5,566.52	4,433.20	25.6	-----	--
81	0900	15.27	1.65	5,450.56	4,307.80	26.5	-----	--
82	1000	15.16	1.64	5,325.81	4,182.40	27.3	-----	--
83	1100	15.04	1.62	5,192.11	4,045.60	28.3	-----	--
84	1200	14.92	1.60	5,050.28	3,948.00	27.9	-----	--
85	1300	14.78	1.58	4,890.60	3,857.00	26.8	-----	--
86	1400	14.64	1.55	4,724.16	3,766.00	25.4	-----	--
87	1500	14.47	1.52	4,514.12	3,655.50	23.5	-----	--
88	1600	14.28	1.50	4,351.40	3,532.00	23.2	-----	--
89	1700	14.13	1.49	4,220.01	3,434.50	22.9	-----	--
90	1800	13.94	1.46	4,036.21	3,320.00	21.6	-----	--
91	1900	13.75	1.45	3,896.44	3,225.00	20.8	-----	--
92	2000	13.57	1.43	3,744.88	3,135.00	19.5	-----	--
93	2100	13.36	1.41	3,574.93	3,030.00	18.0	-----	--
94	2200	13.16	1.39	3,430.92	2,930.00	17.1	-----	--
95	2300	12.95	1.37	3,270.26	2,832.50	15.5	-----	--
96	2400	12.73	1.35	3,120.37	2,755.50	13.2	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 4925.81 CFS
RATING TABLE: 4000.90 CFS
DIFFERENCE: 23.1 %

DAY NUMBER 5								
97	0100	12.52	1.34	2,989.52	2,682.00	11.5	-----	--
98	0200	12.30	1.33	2,877.32	2,605.00	10.5	-----	--
99	0300	12.10	1.33	2,768.54	2,535.00	9.2	-----	--
100	0400	11.87	1.31	2,638.38	2,458.40	7.3	-----	--
101	0500	11.64	1.30	2,521.82	2,384.80	5.7	-----	--
102	0600	11.41	1.27	2,375.35	2,311.20	2.8	-----	--
103	0700	11.16	1.24	2,216.91	2,231.20	-.6	-----	--
104	0800	10.90	1.27	2,164.74	2,152.00	0.6	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
105	0900	10.65	1.29	2,112.83	2,082.00	1.5	-----	--
106	1000	10.40	1.27	1,995.27	2,012.00	-.8	-----	--
107	1100	10.14	1.25	1,883.46	1,939.20	-2.9	-----	--
108	1200	9.87	1.26	1,808.79	1,864.90	-3.0	-----	--
109	1300	9.63	1.27	1,752.79	1,800.10	-2.6	-----	--
110	1400	9.39	1.33	1,768.32	1,735.30	1.9	-----	--
111	1500	9.17	1.36	1,747.63	1,675.90	4.3	-----	--
112	1600	8.95	1.36	1,684.60	1,616.50	4.2	-----	--
113	1700	8.75	1.35	1,628.47	1,562.50	4.2	-----	--
114	1800	8.55	1.35	1,570.57	1,508.50	4.1	-----	--
115	1900	8.36	1.35	1,526.44	1,457.20	4.8	-----	--
116	2000	8.20	1.35	1,486.02	1,414.00	5.1	-----	--
117	2100	8.03	1.34	1,437.81	1,368.10	5.1	-----	--
118	2200	7.87	1.34	1,399.56	1,324.25	5.7	-----	--
119	2300	7.73	1.33	1,356.16	1,285.75	5.5	-----	--
120	2400	7.59	1.29	1,281.93	1,247.25	2.8	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1996.35 CFS
RATING TABLE: 1916.97 CFS
DIFFERENCE: 4.1 %

DAY NUMBER 6

121	0200	7.35	1.30	1,239.32	1,181.25	4.9	-----	--
122	0400	7.14	1.27	1,172.97	1,123.50	4.4	-----	--
123	0600	6.93	1.25	1,110.81	1,065.75	4.2	-----	--
124	0800	6.78	1.24	1,070.72	1,024.50	4.5	-----	--
125	1000	6.65	1.23	1,032.36	988.75	4.4	-----	--
126	1200	6.53	1.22	997.53	955.75	4.4	-----	--
127	1400	6.43	1.21	969.24	928.25	4.4	-----	--
128	1600	6.34	1.20	944.25	903.50	4.5	-----	--
129	1800	6.27	1.19	926.35	884.25	4.8	-----	--
130	2000	6.22	1.19	912.88	870.50	4.9	-----	--
131	2200	6.17	1.18	897.83	856.75	4.8	-----	--
132	2400	6.12	1.17	883.68	843.00	4.8	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1029.75 CFS
RATING TABLE: 985.66 CFS
DIFFERENCE: 4.5 %

DAY NUMBER 7

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
133	0200	6.08	1.17	871.77	832.00	4.8	------	--
134	0400	6.03	1.16	856.23	818.25	4.6	------	--
135	0600	5.98	1.16	843.09	805.00	4.7	------	--
136	0800	5.95	1.15	836.59	797.50	4.9	------	--
137	1000	5.93	1.15	832.27	792.50	5.0	------	--
138	1200	5.92	1.15	830.84	790.00	5.2	------	--
139	1400	5.92	1.15	831.59	790.00	5.3	------	--
140	1600	5.92	1.16	832.34	790.00	5.4	------	--
141	1800	5.93	1.16	836.75	792.50	5.6	------	--
142	2000	5.95	1.16	843.38	797.50	5.8	------	--
143	2200	5.97	1.17	848.53	802.50	5.7	------	--
144	2400	5.98						

MEAN DAILY DISCHARGE:
  COMPUTED DATA: 843.72 CFS
  RATING TABLE: 802.55 CFS
  DIFFERENCE: 5.1 %

TOTAL VOLUME OF WATER AT THIS POINT:
  COMPUTED DATA: 2963018923 CUBIC FEET
  RATING TABLE: 2448670950 CUBIC FEET
  DIFFERENCE: 21.0 %

Table 7.--Station characteristics and summary of hourly stage and computed and rated discharges at Paint Rock River near Woodville, Ala., April 9-17, 1969

Pages 100-107

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

Paint Rock River near Woodville, Ala.
Station number: 03-574500
April 9-17, 1969

Tape file is: FILE 4

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 168

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	15	18.6	8	140	10.3	15	240	1.6	22	330	1.1
2	20	15.6	9	180	7.9	16	250	2.2	23	340	4.3
3	40	11.7	10	190	2.6	17	260	2.0	24	360	10.6
4	60	12.6	11	200	0.5	18	270	1.6	25	380	10.9
5	80	14.2	12	210	0.7	19	300	0.1	26	400	10.9
6	100	9.6	13	220	0.6	20	310	0.5	27	420	12.6
7	120	9.3	14	230	1.4	21	320	0.8	28	435	18.6

Effective Slope= 0.00027 ft/ft

Wave Velocity= 0.86 ft/sec

n VALUES

At 17.0 ft, n= 0.057
At 19.0 ft, n= 0.035

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	0100	5.81	1.09	762.50	762.50	0.0	------	--
2	0200	5.77	1.10	768.96	752.50	2.2	------	--
3	0300	5.73	1.10	755.83	742.50	1.8	------	--
4	0400	5.68	1.09	744.35	730.00	2.0	------	--
5	0500	5.65	1.09	740.65	722.50	2.5	------	--
6	0600	5.62	1.09	732.49	715.00	2.4	------	--
7	0700	5.59	1.08	722.08	707.50	2.1	------	--
8	0800	5.55	1.08	711.22	697.50	2.0	------	--
9	0900	5.52	1.08	705.26	690.00	2.2	------	--
10	1000	5.49	1.07	695.10	682.50	1.8	------	--
11	1100	5.45	1.06	686.51	672.50	2.1	------	--
12	1200	5.43	1.06	683.26	667.50	2.4	------	--
13	1300	5.40	1.06	673.28	660.00	2.0	------	--
14	1400	5.37	1.05	665.33	652.50	2.0	------	--
15	1500	5.34	1.05	659.46	645.00	2.2	------	--
16	1600	5.32	1.05	656.21	640.00	2.5	------	--
17	1700	5.30	1.05	654.90	635.00	3.1	------	--
18	1800	5.30	1.06	658.82	635.00	3.8	------	--
19	1900	5.30	1.07	662.74	635.00	4.4	------	--
20	2000	5.32	1.11	692.85	640.00	8.3	------	--
21	2100	5.45	1.26	809.57	672.50	20.4	------	--
22	2200	5.90	1.50	1,078.24	785.00	37.4	------	--
23	2300	6.65	1.82	1,525.17	988.75	54.3	------	--
24	2400	7.75	2.20	2,254.32	1,291.25	74.6	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 790.90 CFS
RATING TABLE: 712.85 CFS
DIFFERENCE: 10.9 %

DAY NUMBER 2

25	0100	9.15	2.33	2,982.34	1,670.50	78.5	------	--
26	0200	10.25	2.03	3,113.41	1,970.00	58.0	------	--
27	0300	11.05	1.82	3,188.53	2,196.00	45.2	------	--
28	0400	11.57	1.77	3,382.84	2,362.40	43.2	------	--
29	0500	11.98	1.72	3,528.57	2,493.60	41.5	------	--
30	0600	12.30	1.69	3,654.01	2,605.00	40.3	------	--
31	0700	12.60	1.67	3,783.75	2,710.00	39.6	------	--
32	0800	12.83	1.67	3,911.71	2,790.50	40.2	------	--
33	0900	13.06	1.68	4,085.85	2,880.00	41.9	------	--
34	1000	13.27	1.69	4,227.24	2,985.00	41.6	------	--
35	1100	13.46	1.69	4,361.72	3,080.00	41.6	------	--
36	1200	13.64	1.72	4,552.96	3,170.00	43.6	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
37	1300	13.86	1.74	4,765.71	3,280.00	45.3	-----	--
38	1400	14.05	1.74	4,886.32	3,382.50	44.5	-----	--
39	1500	14.22	1.75	5,036.55	3,493.00	44.2	-----	--
40	1600	14.40	1.77	5,208.89	3,610.00	44.3	-----	--
41	1700	14.55	1.78	5,336.35	3,707.50	43.9	-----	--
42	1800	14.70	1.80	5,503.41	3,805.00	44.6	-----	--
43	1900	14.85	1.85	5,770.35	3,902.50	47.9	-----	--
44	2000	15.07	1.88	6,029.88	4,079.80	47.8	-----	--
45	2100	15.22	1.86	6,090.36	4,250.80	43.3	-----	--
46	2200	15.36	1.89	6,283.82	4,410.40	42.5	-----	--
47	2300	15.53	1.91	6,504.50	4,604.20	41.3	-----	--
48	2400	15.68	1.92	6,658.49	4,775.20	39.4	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 4610.23 CFS
RATING TABLE: 3186.33 CFS
DIFFERENCE: 44.7 %

DAY NUMBER 3

49	0100	15.83	1.94	6,847.34	4,946.20	38.4	-----	--
50	0200	15.98	1.96	7,039.21	5,117.20	37.6	-----	--
51	0300	16.13	1.96	7,144.09	5,316.80	34.4	-----	--
52	0400	16.23	1.96	7,216.30	5,452.80	32.3	-----	--
53	0500	16.35	1.96	7,312.65	5,616.00	30.2	-----	--
54	0600	16.42	1.93	7,266.33	5,711.20	27.2	-----	--
55	0700	16.47	1.91	7,246.93	5,779.20	25.4	-----	--
56	0800	16.50	1.91	7,242.41	5,820.00	24.4	-----	--
57	0900	16.53	1.90	7,238.18	5,860.80	23.5	-----	--
58	1000	16.54	1.88	7,167.56	5,874.40	22.0	-----	--
59	1100	16.53	1.86	7,090.88	5,860.80	21.0	7,460.00	-4.9
60	1200	16.51	1.85	7,023.04	5,833.60	20.4	-----	--
61	1300	16.48	1.83	6,943.83	5,792.80	19.9	-----	--
62	1400	16.44	1.82	6,852.95	5,738.40	19.4	-----	--
63	1500	16.39	1.80	6,750.69	5,670.40	19.1	6,900.00	-2.2
64	1600	16.33	1.79	6,658.13	5,588.80	19.1	-----	--
65	1700	16.27	1.76	6,504.84	5,507.20	18.1	-----	--
66	1800	16.17	1.73	6,326.54	5,371.20	17.8	-----	--
67	1900	16.08	1.72	6,222.84	5,248.80	18.6	-----	--
68	2000	15.98	1.70	6,090.84	5,117.20	19.0	-----	--
69	2100	15.88	1.68	5,959.67	5,003.20	19.1	-----	--
70	2200	15.77	1.66	5,799.84	4,877.80	18.9	-----	--
71	2300	15.65	1.64	5,650.20	4,741.00	19.2	-----	--
72	2400	15.53	1.62	5,523.69	4,604.20	20.0	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 6736.93 CFS
RATING TABLE: 5438.98 CFS
DIFFERENCE: 23.9 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 4								
73	0100	15.41	1.60	5,363.89	4,467.40	20.1	------	--
74	0200	15.27	1.59	5,221.81	4,307.80	21.2	------	--
75	0300	15.15	1.55	5,031.47	4,171.00	20.6	------	--
76	0400	14.97	1.50	4,751.35	3,980.50	19.4	------	--
77	0500	14.79	1.49	4,613.39	3,863.50	19.4	------	--
78	0600	14.63	1.47	4,465.44	3,759.50	18.8	------	--
79	0700	14.45	1.45	4,285.24	3,642.50	17.6	------	--
80	0800	14.28	1.42	4,101.71	3,532.00	16.1	------	--
81	0900	14.08	1.39	3,909.79	3,402.00	14.9	------	--
82	1000	13.89	1.37	3,753.76	3,295.00	13.9	------	--
83	1100	13.68	1.36	3,615.79	3,190.00	13.3	------	--
84	1200	13.50	1.35	3,501.79	3,100.00	13.0	------	--
85	1300	13.30	1.33	3,337.89	3,000.00	11.3	------	--
86	1400	13.10	1.31	3,202.46	2,900.00	10.4	------	--
87	1500	12.90	1.29	3,047.32	2,815.00	8.3	------	--
88	1600	12.68	1.28	2,929.23	2,738.00	7.0	------	--
89	1700	12.50	1.28	2,848.33	2,675.00	6.5	------	--
90	1800	12.30	1.25	2,694.28	2,605.00	3.4	------	--
91	1900	12.07	1.22	2,541.52	2,524.50	0.7	------	--
92	2000	11.83	1.21	2,412.18	2,445.60	-1.4	------	--
93	2100	11.58	1.19	2,289.23	2,365.60	-3.2	------	--
94	2200	11.34	1.17	2,159.00	2,288.80	-5.7	------	--
95	2300	11.09	1.16	2,043.58	2,208.80	-7.5	------	--
96	2400	10.87	1.20	2,041.18	2,143.60	-4.8	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 3579.29 CFS
RATING TABLE: 3193.81 CFS
DIFFERENCE: 12.1 %

DAY NUMBER 5								
97	0100	10.64	1.22	1,993.65	2,079.20	-4.1	------	--
98	0200	10.42	1.20	1,898.30	2,017.60	-5.9	------	--
99	0300	10.19	1.19	1,812.90	1,953.20	-7.2	------	--
100	0400	9.98	1.21	1,770.96	1,894.60	-6.5	------	--
101	0500	9.78	1.23	1,741.39	1,840.60	-5.4	------	--
102	0600	9.61	1.24	1,708.92	1,794.70	-4.8	------	--
103	0700	9.43	1.29	1,724.07	1,746.10	-1.3	------	--
104	0800	9.27	1.35	1,757.96	1,702.90	3.2	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
105	0900	9.13	1.36	1,732.46	1,665.10	4.0	-----	--
106	1000	9.00	1.38	1,719.92	1,630.00	5.5	-----	--
107	1100	8.91	1.40	1,730.63	1,605.70	7.8	-----	--
108	1200	8.85	1.43	1,744.39	1,589.50	9.7	-----	--
109	1300	8.82	1.46	1,772.14	1,581.40	12.1	-----	--
110	1400	8.83	1.49	1,817.70	1,584.10	14.7	-----	--
111	1500	8.88	1.52	1,861.60	1,597.60	16.5	-----	--
112	1600	8.94	1.54	1,909.08	1,613.80	18.3	-----	--
113	1700	9.04	1.56	1,961.59	1,640.80	19.6	-----	--
114	1800	9.13	1.56	1,985.16	1,665.10	19.2	-----	--
115	1900	9.21	1.55	1,999.08	1,686.70	18.5	-----	--
116	2000	9.27	1.53	1,999.61	1,702.90	17.4	-----	--
117	2100	9.31	1.52	1,992.00	1,713.70	16.2	-----	--
118	2200	9.34	1.50	1,975.32	1,721.80	14.7	-----	--
119	2300	9.36	1.48	1,960.44	1,727.20	13.5	-----	--
120	2400	9.37	1.48	1,958.50	1,729.90	13.2	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1857.05 CFS
RATING TABLE: 1737.13 CFS
DIFFERENCE: 6.9 %

DAY NUMBER 6

121	0200	9.39	1.46	1,941.31	1,735.30	11.9	-----	--
122	0400	9.38	1.46	1,931.01	1,732.60	11.5	-----	--
123	0600	9.36	1.46	1,925.24	1,727.20	11.5	-----	--
124	0800	9.32	1.46	1,920.14	1,716.40	11.9	-----	--
125	1000	9.26	1.46	1,897.79	1,700.20	11.6	-----	--
126	1200	9.18	1.45	1,857.93	1,678.60	10.7	1,960.00	-5.2
127	1400	9.08	1.44	1,817.39	1,651.60	10.0	-----	--
128	1600	8.98	1.43	1,780.43	1,624.60	9.6	-----	--
129	1800	8.87	1.42	1,743.56	1,594.90	9.3	-----	--
130	2000	8.77	1.42	1,713.30	1,567.90	9.3	-----	--
131	2200	8.67	1.42	1,683.49	1,540.90	9.3	-----	--
132	2400	8.58	1.41	1,654.69	1,516.60	9.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1834.85 CFS
RATING TABLE: 1657.79 CFS
DIFFERENCE: 10.7 %

DAY NUMBER 7

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
133	0200	8.48	1.41	1,620.62	1,489.60	8.8	------	--
134	0400	8.38	1.41	1,599.54	1,462.60	9.4	------	--
135	0600	8.32	1.41	1,586.05	1,446.40	9.7	------	--
136	0800	8.24	1.41	1,564.12	1,424.80	9.8	------	--
137	1000	8.19	1.41	1,556.12	1,411.30	10.3	1,720.00	-9.5
138	1200	8.14	1.42	1,550.48	1,397.80	10.9	------	--
139	1400	8.13	1.44	1,568.30	1,395.10	12.4	------	--
140	1600	8.17	1.46	1,601.37	1,405.90	13.9	------	--
141	1800	8.25	1.47	1,638.16	1,427.50	14.8	------	--
142	2000	8.34	1.48	1,662.42	1,451.80	14.5	------	--
143	2200	8.40	1.46	1,662.72	1,468.00	13.3	------	--
144	2400	8.41	1.44	1,639.11	1,470.70	11.5	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1604.73 CFS
RATING TABLE: 1439.54 CFS
DIFFERENCE: 11.5 %

DAY NUMBER 8

145	0200	8.36	1.42	1,601.17	1,457.20	9.9	------	--
146	0400	8.28	1.40	1,559.33	1,435.60	8.6	------	--
147	0600	8.16	1.38	1,511.28	1,403.20	7.7	------	--
148	0800	8.03	1.37	1,466.32	1,368.10	7.2	------	--
149	1000	7.88	1.36	1,417.75	1,327.00	6.8	------	--
150	1200	7.73	1.34	1,369.06	1,285.75	6.5	------	--
151	1400	7.60	1.33	1,327.83	1,250.00	6.2	------	--
152	1600	7.47	1.31	1,282.89	1,214.25	5.7	------	--
153	1800	7.34	1.30	1,238.57	1,178.50	5.1	------	--
154	2000	7.21	1.29	1,198.74	1,142.75	4.9	------	--
155	2200	7.10	1.27	1,164.08	1,112.50	4.6	------	--
156	2400	6.98	1.26	1,126.54	1,079.50	4.4	------	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1376.65 CFS
RATING TABLE: 1287.50 CFS
DIFFERENCE: 6.9 %

DAY NUMBER 9

157	0200	6.88	1.25	1,099.31	1,052.00	4.5	------	--
158	0400	6.79	1.24	1,072.08	1,027.25	4.4	------	--
159	0600	6.70	1.23	1,045.06	1,002.50	4.2	------	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
160	0800	6.62	1.22	1,019.83	980.50	4.0	-----	--
161	1000	6.53	1.21	990.21	955.75	3.6	-----	--
162	1200	6.44	1.20	965.50	931.00	3.7	-----	--
163	1400	6.37	1.19	947.05	911.75	3.9	-----	--
164	1600	6.30	1.18	925.84	892.50	3.7	-----	--
165	1800	6.23	1.18	907.58	873.25	3.9	-----	--
166	2000	6.18	1.18	898.10	859.50	4.5	-----	--
167	2200	6.15	1.19	902.51	851.25	6.0	-----	--
168	2400	6.20						

MEAN DAILY DISCHARGE:
  COMPUTED DATA: 989.55 CFS
  RATING TABLE: 950.13 CFS
  DIFFERENCE: 4.1 %

TOTAL VOLUME OF WATER AT THIS POINT:
  COMPUTED DATA: 2010075496 CUBIC FEET
  RATING TABLE: 1684382220 CUBIC FEET
  DIFFERENCE: 19.3 %

Table 7.--Station characteristics and summary of hourly stage and computed and rated discharges at Paint Rock River near Woodville, Ala., January 4-11, 1971

Pages 108-114

DYNAMIC STREAMFLOW COMPUTATIONS

Water Supply Paper 2063

Paint Rock River near Woodville,Ala.
Station number: 03-574500
January 4-11, 1971

Tape file is: FILE 5

The per cent difference computations compare the computed value with the rated or measured value.

(% diff=(computed-rated)/rated * 100)

Peak occurs at line 156

CROSS SECTION COORDINATES

LINE	X	Y	LINE	X	Y	LINE	X	Y	LINE	X	Y
1	15	18.6	8	140	10.3	15	240	1.6	22	330	1.1
2	20	15.6	9	180	7.9	16	250	2.2	23	340	4.3
3	40	11.7	10	190	2.6	17	260	2.0	24	360	10.6
4	60	12.6	11	200	0.5	18	270	1.6	25	380	10.9
5	80	14.2	12	210	0.7	19	300	0.1	26	400	10.9
6	100	9.6	13	220	0.6	20	310	0.5	27	420	12.6
7	120	9.3	14	230	1.4	21	320	0.8	28	435	18.6

Effective Slope= 0.00027 ft/ft

Wave Velocity= 0.68 ft/sec

n VALUES

At 17.0 ft, n= 0.057
At 19.0 ft, n= 0.035

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
1	0100	4.05	0.78	332.00	332.00	0.0	-----	--
2	0200	4.04	0.84	358.31	329.60	8.7	-----	--
3	0300	4.03	0.84	356.64	327.20	9.0	-----	--
4	0400	4.02	0.84	354.60	324.80	9.2	-----	--
5	0500	4.01	0.84	353.90	322.40	9.8	-----	--
6	0600	4.01	0.84	355.23	322.40	10.2	-----	--
7	0700	4.01	0.85	356.57	322.40	10.6	-----	--
8	0800	4.02	0.86	363.91	324.80	12.0	-----	--
9	0900	4.06	0.88	378.98	334.40	13.3	-----	--
10	1000	4.12	0.93	406.70	348.80	16.6	-----	--
11	1100	4.27	1.02	470.14	384.80	22.2	-----	--
12	1200	4.54	1.14	570.72	449.60	26.9	-----	--
13	1300	4.90	1.31	728.95	536.00	36.0	-----	--
14	1400	5.50	1.50	980.64	685.00	43.2	-----	--
15	1500	6.10	1.67	1,252.79	837.50	49.6	-----	--
16	1600	6.85	1.85	1,616.72	1,043.75	54.9	-----	--
17	1700	7.55	1.95	1,931.57	1,236.25	56.2	-----	--
18	1800	8.20	1.88	2,071.69	1,414.00	46.5	-----	--
19	1900	8.50	1.77	2,048.02	1,495.00	37.0	-----	--
20	2000	8.85	1.79	2,187.03	1,589.50	37.6	-----	--
21	2100	9.15	1.76	2,257.25	1,670.50	35.1	-----	--
22	2200	9.40	1.71	2,272.47	1,738.00	30.8	-----	--
23	2300	9.65	1.63	2,257.27	1,805.50	25.0	-----	--
24	2400	9.88	1.62	2,332.72	1,867.60	24.9	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1098.37 CFS
RATING TABLE: 823.57 CFS
DIFFERENCE: 33.4 %

DAY NUMBER 2

25	0100	10.12	1.61	2,419.79	1,933.60	25.1	-----	--
26	0200	10.34	1.60	2,485.79	1,995.20	24.6	-----	--
27	0300	10.53	1.61	2,579.64	2,048.40	25.9	-----	--
28	0400	10.71	1.59	2,639.22	2,098.80	25.7	-----	--
29	0500	10.88	1.57	2,664.68	2,146.40	24.1	-----	--
30	0600	11.03	1.50	2,627.56	2,189.60	20.0	-----	--
31	0700	11.18	1.52	2,727.62	2,237.60	21.9	-----	--
32	0800	11.33	1.52	2,789.43	2,285.60	22.0	-----	--
33	0900	11.43	1.50	2,813.98	2,317.60	21.4	-----	--
34	1000	11.53	1.50	2,864.07	2,349.60	21.9	2,740.00	4.5
35	1100	11.61	1.49	2,881.51	2,375.20	21.3	-----	--
36	1200	11.67	1.49	2,893.14	2,394.40	20.8	-----	--

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
37	1300	11.72	1.52	2,982.86	2,410.40	23.7	-----	--
38	1400	11.84	1.52	3,039.71	2,448.80	24.1	-----	--
39	1500	11.88	1.47	2,959.58	2,461.60	20.2	-----	--
40	1600	11.90	1.46	2,947.17	2,468.00	19.4	-----	--
41	1700	11.92	1.44	2,914.85	2,474.40	17.8	-----	--
42	1800	11.90	1.40	2,838.58	2,468.00	15.0	-----	--
43	1900	11.86	1.38	2,772.83	2,455.20	12.9	-----	--
44	2000	11.80	1.33	2,653.12	2,436.00	8.9	-----	--
45	2100	11.68	1.30	2,535.47	2,397.60	5.8	-----	--
46	2200	11.57	1.24	2,378.89	2,362.40	0.7	-----	--
47	2300	11.37	1.20	2,219.69	2,298.40	-3.4	-----	--
48	2400	11.22	1.18	2,136.68	2,250.40	-5.1	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 2702.66 CFS
RATING TABLE: 2296.33 CFS
DIFFERENCE: 17.7 %

DAY NUMBER 3

49	0100	11.02	1.12	1,957.97	2,186.40	-10.4	-----	--
50	0200	10.80	1.12	1,882.10	2,124.00	-11.4	-----	--
51	0300	10.53	1.13	1,811.63	2,048.40	-11.6	-----	--
52	0400	10.31	1.11	1,712.73	1,986.80	-13.8	-----	--
53	0500	10.04	1.09	1,615.13	1,911.20	-15.5	-----	--
54	0600	9.80	1.11	1,580.35	1,846.00	-14.4	-----	--
55	0700	9.56	1.11	1,515.87	1,781.20	-14.9	-----	--
56	0800	9.30	1.17	1,529.74	1,711.00	-10.6	-----	--
57	0900	9.05	1.19	1,504.81	1,643.50	-8.4	-----	--
58	1000	8.84	1.19	1,455.27	1,586.80	-8.3	1,530.00	-4.9
59	1100	8.60	1.20	1,413.23	1,522.00	-7.1	-----	--
60	1200	8.42	1.23	1,401.87	1,473.40	-4.9	-----	--
61	1300	8.23	1.20	1,331.35	1,422.10	-6.4	-----	--
62	1400	8.02	1.19	1,270.80	1,365.40	-6.9	-----	--
63	1500	7.82	1.21	1,254.70	1,310.50	-4.3	-----	--
64	1600	7.67	1.23	1,243.98	1,269.25	-2.0	-----	--
65	1700	7.53	1.22	1,199.93	1,230.75	-2.5	-----	--
66	1800	7.38	1.20	1,158.05	1,189.50	-2.6	-----	--
67	1900	7.25	1.21	1,133.11	1,153.75	-1.8	-----	--
68	2000	7.13	1.20	1,105.95	1,120.75	-1.3	-----	--
69	2100	7.02	1.19	1,072.03	1,090.50	-1.7	-----	--
70	2200	6.90	1.18	1,039.95	1,057.50	-1.7	-----	--
71	2300	6.80	1.18	1,018.59	1,030.00	-1.1	-----	--
72	2400	6.70	1.18	997.14	1,002.50	-.5	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 1407.34 CFS
RATING TABLE: 1528.63 CFS
DIFFERENCE: -7.9 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
DAY NUMBER 4								
73	0100	6.62	1.17	977.35	980.50	-.3	-----	--
74	0200	6.53	1.16	950.55	955.75	-.5	-----	--
75	0300	6.45	1.15	930.79	933.75	-.3	-----	--
76	0400	6.37	1.15	911.17	911.75	-.1	-----	--
77	0500	6.30	1.14	894.50	892.50	0.2	-----	--
78	0600	6.23	1.13	874.24	873.25	0.1	-----	--
79	0700	6.16	1.13	857.64	854.00	0.4	-----	--
80	0800	6.10	1.13	847.38	837.50	1.2	-----	--
81	0900	6.05	1.12	829.82	823.75	0.7	-----	--
82	1000	5.98	1.11	810.01	805.00	0.6	-----	--
83	1100	5.93	1.11	802.42	792.50	1.3	-----	--
84	1200	5.88	1.10	788.52	780.00	1.1	-----	--
85	1300	5.83	1.10	774.61	767.50	0.9	-----	--
86	1400	5.78	1.09	760.81	755.00	0.8	-----	--
87	1500	5.73	1.08	747.10	742.50	0.6	-----	--
88	1600	5.68	1.08	736.44	730.00	0.9	-----	--
89	1700	5.64	1.08	728.50	720.00	1.2	-----	--
90	1800	5.60	1.07	717.73	710.00	1.1	-----	--
91	1900	5.56	1.07	709.76	700.00	1.4	-----	--
92	2000	5.53	1.06	698.99	692.50	0.9	-----	--
93	2100	5.48	1.06	685.70	680.00	0.8	-----	--
94	2200	5.45	1.06	680.41	672.50	1.2	-----	--
95	2300	5.41	1.05	667.31	662.50	0.7	-----	--
96	2400	5.37	1.04	659.43	652.50	1.1	-----	--
97	0100	5.34	1.05	656.73	645.00	1.8	-----	--
98	0200	5.32	1.04	649.06	640.00	1.4	-----	--
99	0300	5.28	1.03	636.21	630.00	1.0	-----	--
100	0400	5.25	1.03	630.92	622.50	1.4	-----	--
101	0500	5.22	1.02	623.28	615.00	1.3	-----	--
102	0600	5.19	1.02	618.03	607.50	1.7	-----	--
103	0700	5.17	1.02	612.96	602.50	1.7	-----	--
104	0800	5.14	1.02	605.37	595.00	1.7	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 800.42 CFS
RATING TABLE: 795.84 CFS
DIFFERENCE: .6 %

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
105	0900	5.12	1.02	602.62	590.00	2.1	-----	--
106	1000	5.10	1.01	595.32	585.00	1.8	-----	--
107	1100	5.07	1.00	585.51	577.50	1.4	-----	--
108	1200	5.04	1.00	580.27	570.00	1.8	-----	--
109	1300	5.02	1.00	577.55	565.00	2.2	-----	--
110	1400	5.00	1.00	572.62	560.00	2.3	-----	--
111	1500	4.98	0.99	567.68	555.20	2.2	-----	--
112	1600	4.96	0.99	562.76	550.40	2.2	-----	--
113	1700	4.94	0.99	557.85	545.60	2.2	-----	--
114	1800	4.92	0.99	552.96	540.80	2.2	-----	--
115	1900	4.90	0.98	548.09	536.00	2.3	-----	--
116	2000	4.88	0.98	543.24	531.20	2.3	-----	--
117	2100	4.86	0.98	538.40	526.40	2.3	-----	--
118	2200	4.84	0.98	535.62	521.60	2.7	-----	--
119	2300	4.83	0.98	535.25	519.20	3.1	-----	--
120	2400	4.82	0.96	524.77	516.80	1.5	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 586.68 CFS
RATING TABLE: 575.67 CFS
DIFFERENCE: 1.9 %

DAY NUMBER 6

121	0200	4.77	0.96	516.84	504.80	2.4	-----	--
122	0400	4.74	0.96	511.73	497.60	2.8	-----	--
123	0600	4.71	0.95	504.66	490.40	2.9	-----	--
124	0800	4.68	0.95	497.62	483.20	3.0	-----	--
125	1000	4.65	0.95	491.56	476.00	3.3	-----	--
126	1200	4.63	0.94	486.90	471.20	3.3	-----	--
127	1400	4.60	0.94	479.05	464.00	3.2	-----	--
128	1600	4.57	0.93	472.15	456.80	3.4	-----	--
129	1800	4.54	0.93	465.30	449.60	3.5	-----	--
130	2000	4.51	0.92	458.49	442.40	3.6	-----	--
131	2200	4.48	0.92	451.73	435.20	3.8	-----	--
132	2400	4.45	0.91	445.00	428.00	4.0	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 485.08 CFS
RATING TABLE: 470.30 CFS
DIFFERENCE: 3.1 %

DAY NUMBER 7

LINE	TIME	GAGE HEIGHT	COMPUTED VELOCITY	COMPUTED DISCHARGE	RATED DISCHARGE	% DIFF	MEASURED DISCHARGE	% DIFF
133	0200	4.42	0.91	439.16	420.80	4.4	-----	--
134	0400	4.40	0.90	434.72	416.00	4.5	-----	--
135	0600	4.37	0.90	427.28	408.80	4.5	-----	--
136	0800	4.34	0.89	420.71	401.60	4.8	-----	--
137	1000	4.31	0.89	414.18	394.40	5.0	-----	--
138	1200	4.28	0.88	408.47	387.20	5.5	-----	--
139	1400	4.26	0.88	404.93	382.40	5.9	-----	--
140	1600	4.24	0.88	400.64	377.60	6.1	-----	--
141	1800	4.22	0.87	396.36	372.80	6.3	-----	--
142	2000	4.20	0.87	392.10	368.00	6.5	-----	--
143	2200	4.18	0.87	388.59	363.20	7.0	-----	--
144	2400	4.17	0.87	387.21	360.80	7.3	-----	--

MEAN DAILY DISCHARGE:
COMPUTED DATA: 411.94 CFS
RATING TABLE: 390.60 CFS
DIFFERENCE: 5.5 %

DAY NUMBER 8

145	0200	4.16	0.87	385.09	358.40	7.4	-----	--
146	0400	4.15	0.87	382.98	356.00	7.6	-----	--
147	0600	4.14	0.86	380.87	353.60	7.7	-----	--
148	0800	4.13	0.86	378.77	351.20	7.9	-----	--
149	1000	4.12	0.86	376.67	348.80	8.0	-----	--
150	1200	4.11	0.86	373.87	346.40	7.9	-----	--
151	1400	4.09	0.85	369.01	341.60	8.0	-----	--
152	1600	4.07	0.85	364.86	336.80	8.3	-----	--
153	1800	4.05	0.84	360.75	332.00	8.7	-----	--
154	2000	4.03	0.84	357.33	327.20	9.2	-----	--
155	2200	4.02	0.84	355.95	324.80	9.6	-----	--
156	2400	4.01						

MEAN DAILY DISCHARGE:
COMPUTED DATA: 372.89 CFS
RATING TABLE: 344.98 CFS
DIFFERENCE: 8.1 %

TOTAL VOLUME OF WATER AT THIS POINT:
COMPUTED DATA: 672929233 CUBIC FEET
RATING TABLE: 618870420 CUBIC FEET
DIFFERENCE: 8.7 %

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