DESCRIPTION OF BENCH MARKS

Salyersville, Ky., 1.75 mi W along U.S. Highway 460 and State Highway 7 from the courthouse, midway between two barns on W side of highway and about 0.1 mi each way, across highway from a two story house, 750 ft SW of a cemetery on side hill, 107 ft NW of the NW post at gate to field, 134 ft NE of the center of driveway to house at center of highway, 28 ft SW of centerline of highway, 2 ft below level of highway, in top of concrete post, standard USC&GS tablet stamped "E 91 1935 862.935". Elev. 862.935 ft above mean sea level.

Salyersville, Ky., 1.5 mi W along U.S. Highway 460 and State Highway 7 from the courthouse, on NW corner of SW abutment of bridge on State Highway 30 crossing Licking River, at stream-gaging station, Corps of Engineers, U.S. Army, tablet. Elevation 848.22 ft above mean sea level.

Salyersville, Ky., in the S wall of the bank building, 36 ft W of SE corner of the bank, 3.2 ft above level of sidewalk, set vertically, standard USC&GS tablet stamped "G 91 1935 854.126". Elev. 854.135 ft above mean sea level.

Salyersville, Ky., 0.85 mi SE along State Highway 7 from courthouse at Salyersville, NE and across a hollow from a large cemetery, 28 ft SW of centerline of highway, 128 ft NW of N corner of Hill Top Inn, 82 ft NW of junction of highway and a road NE, 32 ft SE of a telephone pole, 41 ft NW of fence corner, 1 ft NE of fence line, about 1-ft above level of highway and set in top of concrete post standard USC&GS tablet stamped "T 281 1952 902.915". Elev. 902.915 ft above mean sea level.

Salyersville, Ky., 1.1 mi E along U.S. Highway 460 from courthouse in Salyersville, at a side road SE, 21 ft E of center of the side road, 15 ft S of the centerline of the highway in the NE end of the SE headwall of a 3-ft concrete and stone culvert, standard USC&GS tablet stamped "P 293 1952 862.380". Elev. 862.380 ft above mean sea level.

Lakeville, Ky., 2.1 mi S of courthouse in Salyersville, 21 ft E of steps of the Lakeville Grade School, 38 ft S of N water well (there are two wells) a chiseled square on S edge of sidewalk, established by Corps of Engineers, U.S. Army. Elev. 860.02 ft above mean sea level.

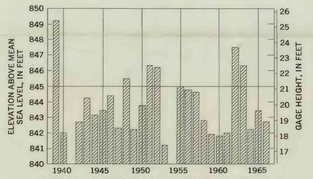


FIGURE 1.—*Annual floods above 840-foot elevation, 1939–66, Licking River near Salyersville (at bridge on Kentucky Highway 30)*

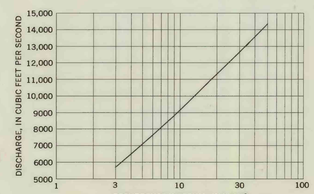


FIGURE 2.—*Frequency of flood discharge on Licking River near Salyersville (at bridge on Kentucky Highway 30)*

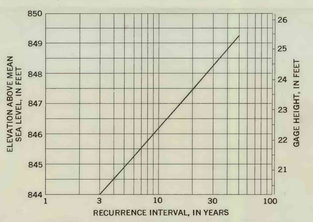


FIGURE 3.—*Frequency of flood stages on Licking River near Salyersville (at bridge on Kentucky Highway 30)*

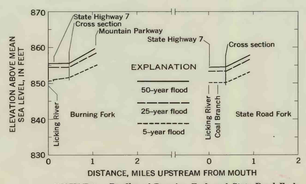


FIGURE 5.—*Profiles of Burning Fork and State Road Fork*

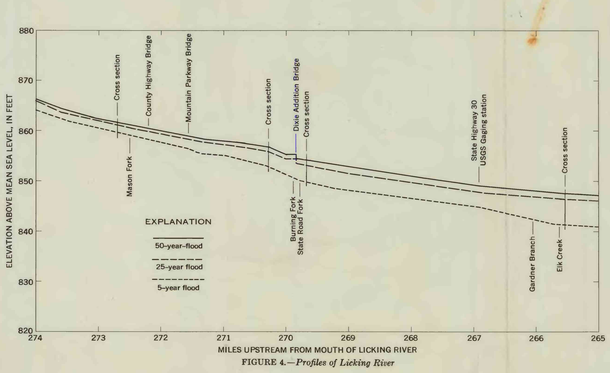
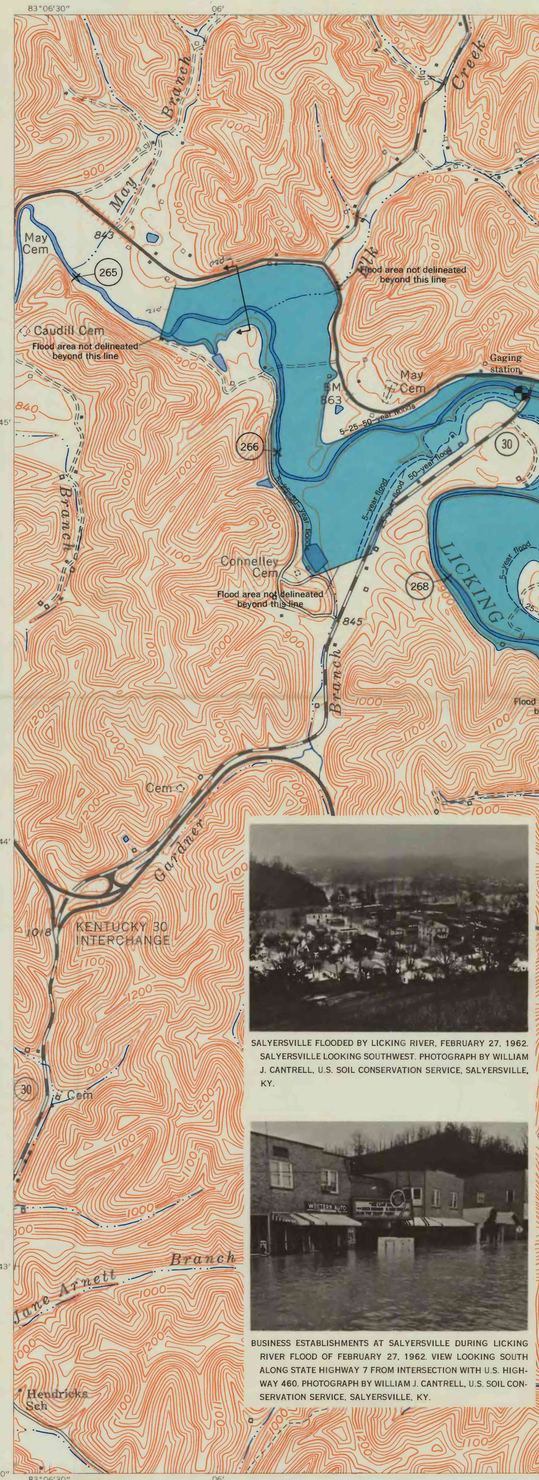


FIGURE 4.—*Profiles of Licking River*



SALYERSVILLE FLOODED BY LICKING RIVER, FEBRUARY 27, 1962. SALYERSVILLE LOOKING SOUTHWEST. PHOTOGRAPH BY WILLIAM J. CANTRELL, U.S. SOIL CONSERVATION SERVICE, SALYERSVILLE, KY.

BUSINESS ESTABLISHMENTS AT SALYERSVILLE DURING LICKING RIVER FLOOD OF FEBRUARY 27, 1962. VIEW LOOKING SOUTH ALONG STATE HIGHWAY 7 FROM INTERSECTION WITH U.S. HIGHWAY 460. PHOTOGRAPH BY WILLIAM J. CANTRELL, U.S. SOIL CONSERVATION SERVICE, SALYERSVILLE, KY.

Base from U.S. Geological Survey Salyersville South and Salyersville North 1:24,000, 1962

SCALE 1:12 000

0 ½ 1 MILE
0 500 1000 2000 3000 4000 FEET
0 .5 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1965

KENTUCKY
QUADRANGLE LOCATION

FLOODS ON LICKING RIVER IN VICINITY OF SALYERSVILLE, KENTUCKY

This report was prepared by the U.S. Geological Survey to further the objectives of the Appalachian Regional Commission. It presents hydrologic data that can be used to evaluate the extent, depth, and frequency of floods that affect the economic development of flood plains of the Licking River and its tributaries in the vicinity of Salyersville, Kentucky. The data provide a technical basis for solving existing flood-plain problems and formulating regulations for land use and development that will reduce future flood damage. The report will be useful for preparing building and zoning regulations, locating waste disposal and water treatment facilities, and developing recreational areas.

The approximate areas that would be inundated by floods with 5-, 25-, and 50-year recurrence intervals on Licking River and its tributaries in the vicinity of Salyersville are shown on the topographic map.

According to reports of local residents, some of whom remembered as far back as 60 years, the February 1939 flood was the highest they had observed on Licking River and its tributaries. This flood at the gaging station, Licking River near Salyersville (1.2 miles west of Salyersville) has a recurrence interval of 50 years. The flood of February 1962 at the gaging station was 1.7 feet lower than that of February 1939.

The procedure used to define flood boundaries was to construct flood profiles from elevations of floodmarks identified in the field and from existing data. Elevations of the 5-, 25-, and 50-year floods were derived from the flood profiles by interpolating between floods of known recurrence intervals. The extent of flooding by these three floods delineated on the topographic map was determined by interpolation between contours (lines of equal ground elevations). Overflow boundaries were identified during field investigations and surveys. The portrayal of flood boundaries is consistent with the scale of the map (1 inch = 1,000 feet; contour interval 20 feet).

Greater floods than the 50-year flood whose boundaries are shown on the map are possible. The flood boundaries reflect channel conditions existing prior to 1967. Subsequent changes in channel conditions, highways and bridges, urban development, and other cultural changes may affect the inundation pattern of future floods. Planned protective works may reduce the extent and frequency of flooding but may not eliminate all future flooding.

Flood height.—The height of a flood at a stream-gaging station is usually stated in terms of gage height or stage which is the elevation of the water surface above a selected datum plane. Elevations shown on the map are in feet above mean sea level, datum of 1929. Gage heights at the gage on Licking River near Salyersville can be converted to elevations above mean sea level by adding 823.80 feet.

Elevation and year of occurrence of each annual flood (highest peak in each water year) above 840-foot elevation at the gaging station during the period 1939–66 are shown in figure 1. The graph illustrates the irregular occurrence of floods on Licking River and typifies the probable magnitude of floods in the Salyersville area.

Flood discharge.—The rate of discharge of a stream is the volume of flow that passes a particular site in a given period of time. Discharge rates usually are expressed in units of cubic feet per second (cfs). The maximum or peak discharge attained by a flood generally occurs at the time of the maximum height (stage) of the flood, but if the stream is affected by variable backwater, the maximum discharge may not occur at the same time as the maximum stage. For example, backwater from an ice or debris jam may cause a high stage during a period of relatively low discharge.

Flood frequency.—Frequency of floods at the gaging station on Licking River near Salyersville is based on the partial-duration series for this report. The partial-duration series is computed on the basis of all momentary peak discharges above a selected base discharge. The general relation between frequency and discharge is shown in figure 2, and the general relation between frequency and stage is shown in figure 3. The frequency curves shown are based on channel conditions existing in 1966. Future changes in channel conditions would likely change the frequency relations. The relation between frequency and stage is dependent on the relation of stage to discharge. Any changes in the stage-discharge relation, caused by channel filling or dredging, straightening stream channel, and building of floodwalls in the immediate vicinity of the gage could alter stage-discharge relations and hence frequency-stage relations. Changes upstream such as construction of reservoirs or floodwalls and filling or dredging the stream channel will alter the frequency-discharge relations. Extrapolation of the curves beyond the limits shown is not recommended because of the possible large errors.

Recurrence intervals.—As applied to flood events, recurrence interval is the average number of years within which a given flood will be equaled or exceeded once. It is emphasized that recurrence intervals are average figures. The fact that a 10-year flood has occurred does not preclude the occurrence of a flood equal to or greater than the 10-year flood occurring next week or next year. Another way of comparing frequency of floods is in terms of their probabilities of occurrence (virtually the reciprocal of their recurrence intervals for floods greater than the 10-year flood). For example, a flood with a 25-year recurrence interval would have a 4-percent chance of being equaled or exceeded in any given year.

The general relation between recurrence interval and flood height at the gaging station on Licking River near Salyersville (fig. 3) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	849.2
25	847.9
10	846.2
5	844.9

Flood profiles.—Profiles of the water surface for the 5-, 25-, and 50-year floods, based on profiles of the floods of February 1939, February 1962, and March 1967, are shown in figures 4 and 5. Where floodmarks could not be obtained for the two highest floods, the profiles were constructed on the basis of flood crests determined from photographs, reports of local residents, and elevations of streambeds and lower flood stages. River miles used for the profiles correspond to those marked along the streams on the topographic map.

The abrupt changes in the profiles, shown at some road crossings, indicate the difference in water surface elevations at the upstream and downstream sides of bridges that produce channel contractions. The drop in water surface through bridge openings during future floods may be different from that shown on the profiles. An increase in channel capacity through a bridge opening would reduce the flood height on the upstream side. An ice or debris jam in the channel or at a bridge would tend to increase the upstream flood height. Channel changes may also change the overflow pattern of future floods.

Flood depths.—Depth of flooding at any point can be estimated for the three hypothetical floods (5-, 25-, and 50-year floods) by substracting the ground elevation from the water-surface elevation at that point as indicated by the profiles in figures 4 and 5. The approximate ground elevation can be determined by interpolating between contours on the map; more accurate elevations can be obtained by leveling from nearby bench marks.

Cross sections in figures 6 and 7 illustrate the depth of flooding at these sites for the hypothetical floods.

Acknowledgments.—The selection of the site for this project was made in collaboration with the Appalachian Regional Commission and the Division of Water, Kentucky Department of Natural Resources. Coordination of planning with the district office of the Corps of Engineers was accomplished through the office of Appalachian Studies, Corps of Engineers. Additional flood data were obtained from residents in the area and from field investigations.

Additional data.—Other information pertaining to floods in Magoffin County, Kentucky, can be obtained at the office of the U.S. Geological Survey, Louisville, Kentucky, and from the following published reports:

Hannum, C. H., 1968, Floods on Licking River in vicinity of Salyersville, Kentucky, U.S. Geol. Survey open-file report, 17 p.

McCabe, J. A., 1962, Floods in Kentucky, magnitude and frequency: Kentucky Geol. Survey, Inf. Circ. 9, ser. 10, 196 p.

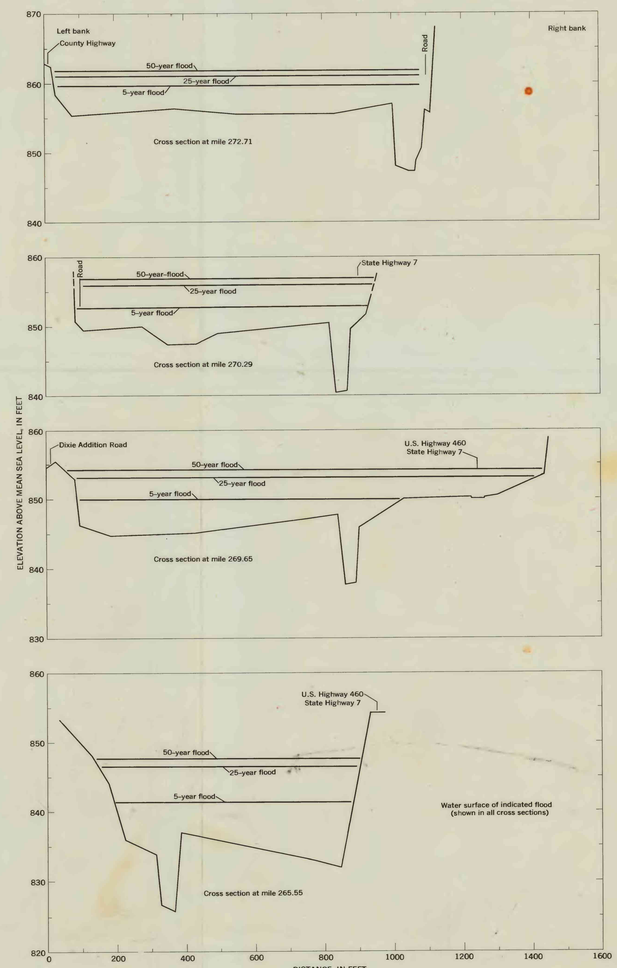


FIGURE 6.—*Cross sections of Licking River*

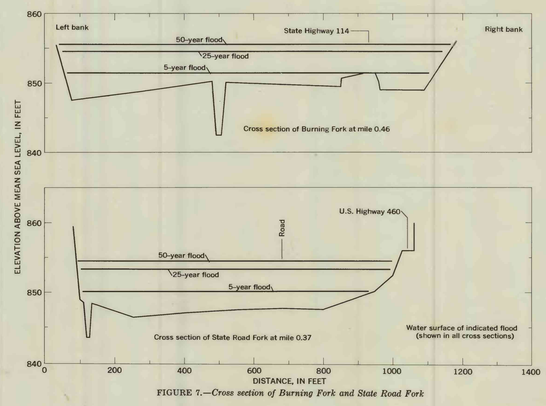


FIGURE 7.—*Cross section of Burning Fork and State Road Fork*

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FLOODS ON LICKING RIVER IN VICINITY OF SALYERSVILLE, KENTUCKY

By
Curtis H. Hannum

1969

For sale by U. S. Geological Survey, price 75 cents