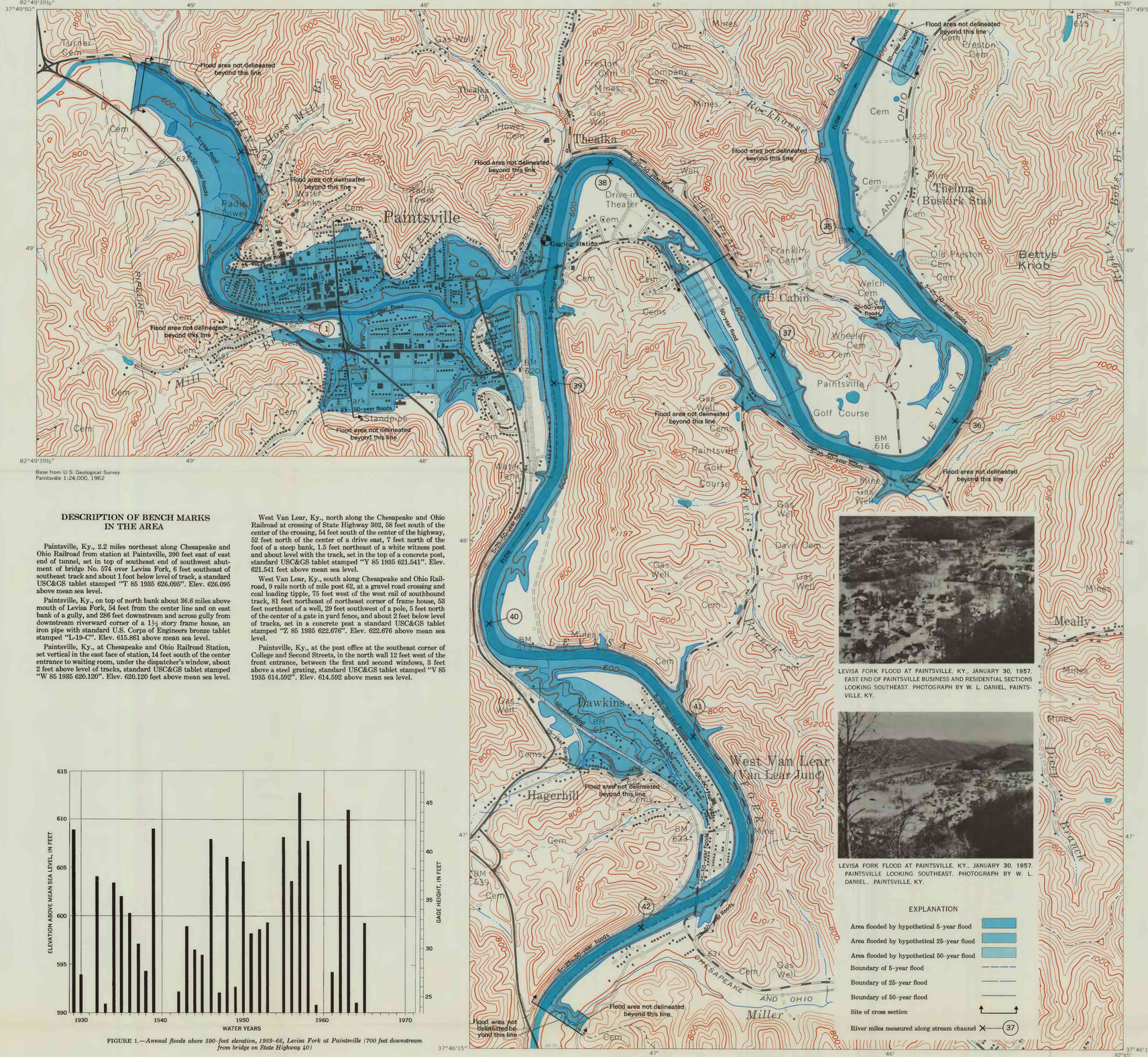
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

HYDROLOGIC INVESTIGATIONS
ATLAS HA-328



Base from U.S. Geological Survey
Paintsville 1:24,000, 1962

DESCRIPTION OF BENCH MARKS IN THE AREA

Paintsville, Ky., 2.2 miles northeast along Chesapeake and Ohio Railroad from station at Paintsville, 390 feet east of east end of tunnel, set in top of southeast end of southwest abutment of bridge No. 574 over Levisa Fork, 6 feet southeast of southeast track and about 1 foot below level of track, a standard USC&GS tablet stamped "T 85 1935 626.095". Elev. 626.095 above mean sea level.

Paintsville, Ky., on top of north bank about 36.6 miles above mouth of Levisa Fork, 54 feet from the center line and on east bank of a gully, and 286 feet downstream and across gully from downstream riverward corner of a 1½ story frame house, an iron pipe with standard U.S. Corps of Engineers bronze tablet stamped "L-19-C". Elev. 615.861 above mean sea level.

Paintsville, Ky., at Chesapeake and Ohio Railroad Station, set vertical in the east face of station, 14 feet south of the center entrance to waiting room, under the dispatcher's window, about 2 feet above level of tracks, standard USC&GS tablet stamped "W 85 1935 620.120". Elev. 620.120 feet above mean sea level.

West Van Lear, Ky., north along the Chesapeake and Ohio Railroad at crossing of State Highway 302, 58 feet south of the center of the crossing, 54 feet south of the center of the highway, 52 feet north of the center of a drive east, 7 feet north of the foot of a steep bank, 1.5 feet northeast of a white witness post and about level with the track, set in the top of a concrete post, standard USC&GS tablet stamped "Y 85 1935 621.541". Elev. 621.541 feet above mean sea level.

West Van Lear, Ky., south along Chesapeake and Ohio Railroad, 9 rails north of mile post 62, at a gravel road crossing and coal loading tipple, 75 feet west of the west rail of southbound track, 81 feet northeast of northeast corner of frame house, 53 feet northeast of a well, 29 feet southwest of a pole, 5 feet north of the center of a gate in yard fence, and about 2 feet below level of tracks, set in a concrete post a standard USC&GS tablet stamped "Z 85 1935 622.676". Elev. 622.676 above mean sea level.

Paintsville, Ky., at the post office at the southeast corner of College and Second Streets, in the north wall 12 feet west of the front entrance, between the first and second windows, 3 feet above a steel grating, standard USC&GS tablet stamped "V 85 1935 614.592". Elev. 614.592 above mean sea level.

FLOODS ON LEVISA FORK IN VICINITY OF PAINTSVILLE, 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 Levisa Fork and its tributaries in a selected area at Paintsville, 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 Levisa Fork and its tributaries in the vicinity of Paintsville are shown on the topographic map.

According to reports of local residents, some of whom remembered as far back as 60 years, the January 1957 flood was the highest they had observed on Levisa Fork and its tributaries. This flood at the gaging station, Levisa Fork at Paintsville, has a recurrence interval of 24 years. The historical flood of February 1862 at the gaging station was 0.7 foot higher than that of January 1957.

The procedure used to define flood boundaries was to construct flood profiles from elevation 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 40 feet).

Greater floods than the 50-year flood whose boundaries are shown on the map are possible. The flood boundaries shown 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 area 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 the 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 Levisa Fork at Paintsville can be converted to elevations above mean sea level by adding 566.84 feet.

Elevation and year of occurrence of each annual flood (highest peak in each water year) above 590.0 foot elevation at the gaging station during the period 1929–66 are shown in figure 1. The graph illustrates the irregular occurrence of floods on Levisa Fork and typifies the probable relative magnitude of floods in the Paintsville 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 Levisa Fork at Paintsville 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 building 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 Levisa Fork at Paintsville (fig. 3) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	616.5
25	615.0
10	611.9
5	609.0

Flood profiles.—Profiles of the water surface for the 5-, 25-, and 50-year floods on Levisa Fork, based on profiles of the floods of January 1957, March 1963, and March 1967, are shown in figure 4. Where floodmarks could not be obtained for the two higher 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.

No profiles are shown for floods on Paint Creek. Major flooding on Paint Creek in the area of this report is caused by backwater from Levisa Fork.

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 profile in figure 4. Flood depth along Paint Creek may be determined by subtracting ground elevations from the water-surface elevation at Paint Creek on the profile of figure 4. The approximate ground elevation can be determined by interpolating between contours on the map; more accurate elevations can be obtained by leveling from nearby benchmarks.

Six cross sections in figures 5 and 6 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. Flood elevations for past floods at Paintsville, Ky., were obtained from Paintsville and Johnson County Civil Defense, and Paintsville Gas, Water and Sewer System. Additional flood data were obtained from local residents in the area and from field investigations.

Additional data.—Other information pertaining to floods in Johnson 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., 1963, Floods of July 29 and 30, 1961 in eastern Kentucky: U.S. Geol. Survey open-file report, 7 p.

———1967, Floods on Levisa Fork in vicinity of Paintsville 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.

U.S. Geological Survey, 1957, Floods of January-February 1957 in southeastern Kentucky and adjacent areas: U.S. Geol. Survey Water-Supply Paper 1652-A, 195 p.

FIGURE 1.—*Annual floods above 590-foot elevation, 1929–66, Levisa Fork at Paintsville (700 feet downstream from bridge on State Highway 40)*

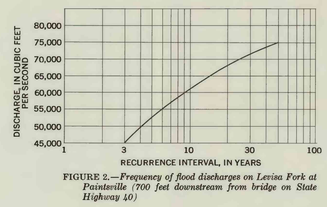


FIGURE 2.—*Frequency of flood discharges on Levisa Fork at Paintsville (700 feet downstream from bridge on State Highway 40)*

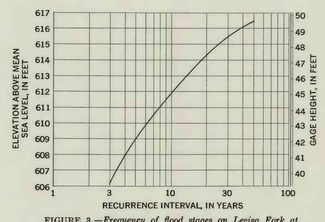


FIGURE 3.—*Frequency of flood stages on Levisa Fork at Paintsville (700 feet downstream from bridge on State Highway 40)*

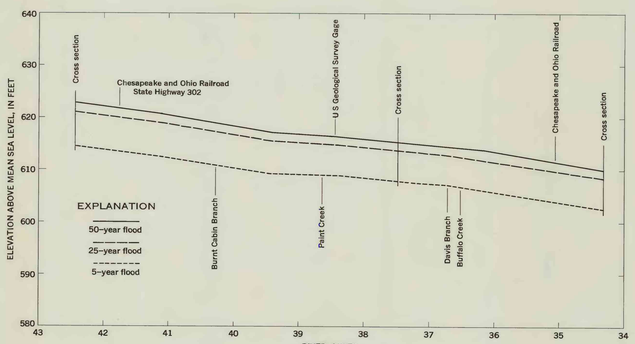


FIGURE 4.—*Flood profiles of Levisa Fork*

LEVISA FORK FLOOD AT PAINTSVILLE, KY., JANUARY 30, 1957. EAST END OF PAINTSVILLE BUSINESS AND RESIDENTIAL SECTIONS LOOKING SOUTHEAST. PHOTOGRAPH BY W. L. DANIEL, PAINTSVILLE, KY.

LEVISA FORK FLOOD AT PAINTSVILLE, KY., JANUARY 30, 1957. PAINTSVILLE LOOKING SOUTHEAST. PHOTOGRAPH BY W. L. DANIEL, PAINTSVILLE, KY.

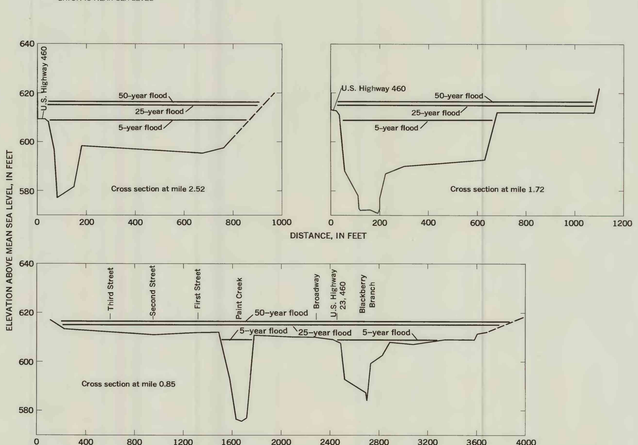


FIGURE 6.—*Cross sections of Paint Creek*

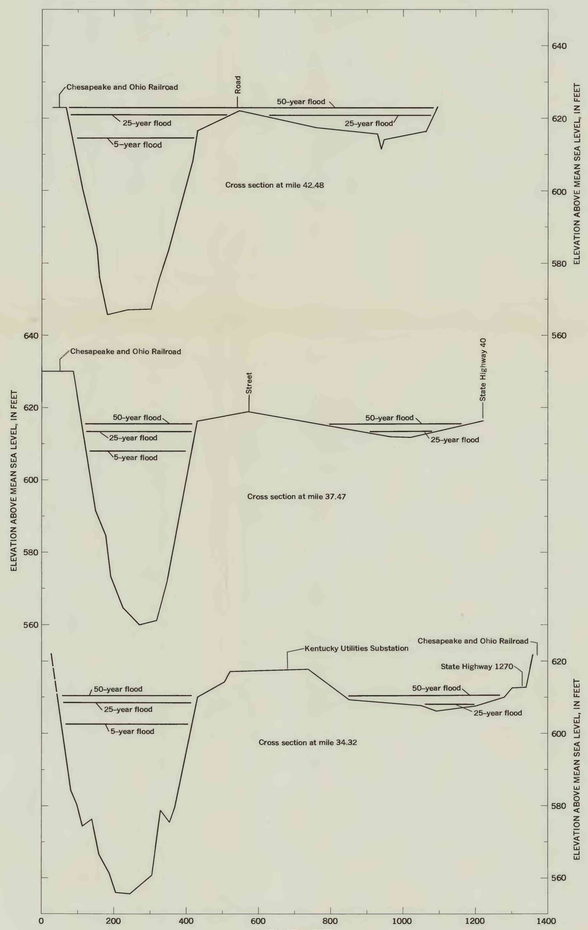


FIGURE 5.—*Cross sections of Levisa Fork*

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By
Curtis H. Hannum

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