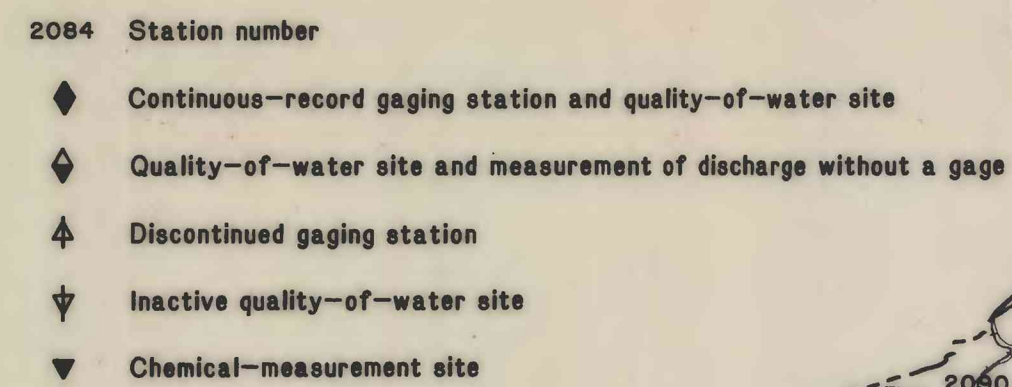


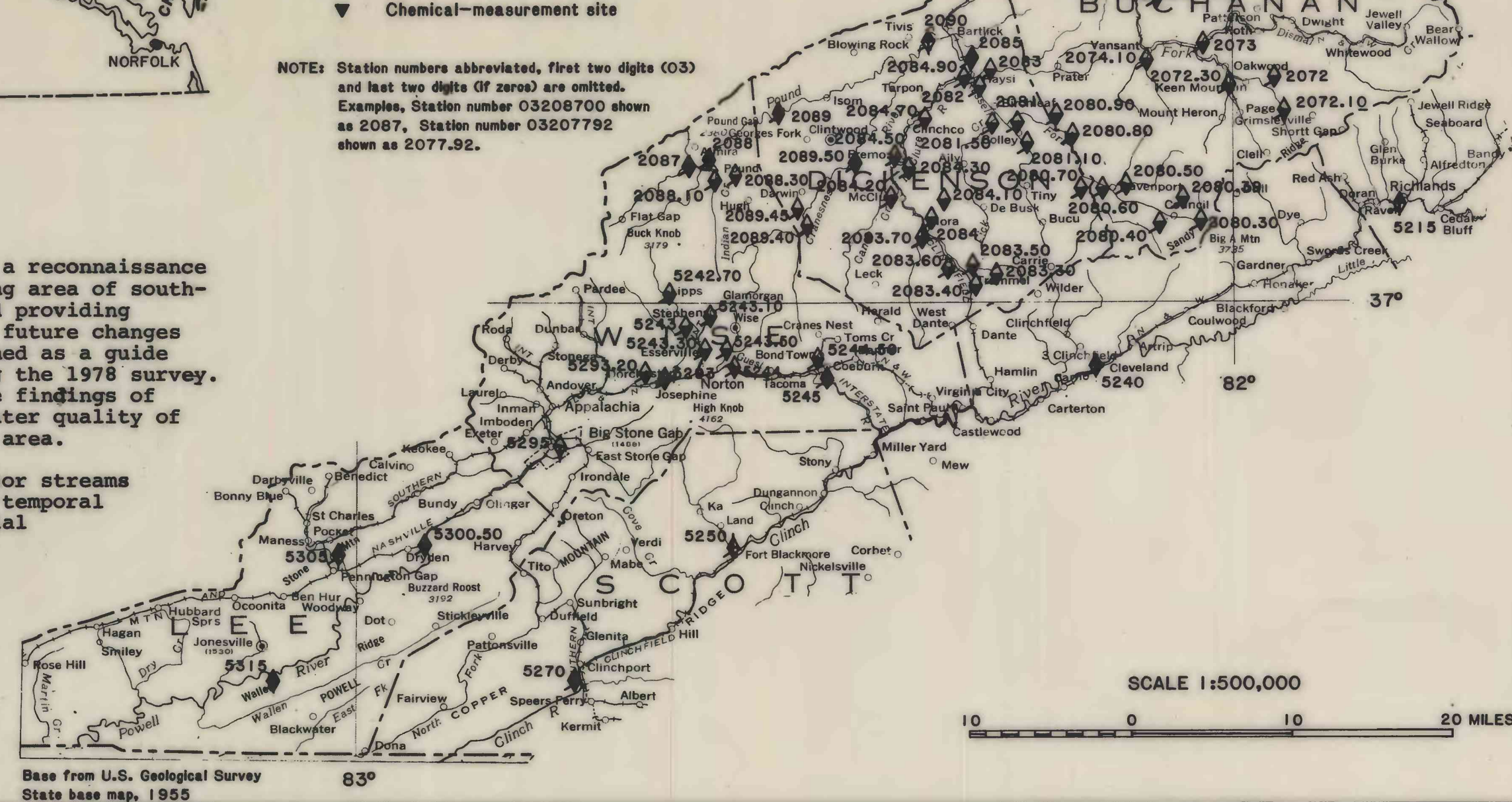
EXPLANATION



NOTE: Station numbers abbreviated, first two digits and last two digits (if zeros) are omitted. Examples, Station number 03208700 shown as 2087, Station number 03207792 shown as 2077.92.

In 1978, a U.S. Geological Survey made a reconnaissance of the surface-water quality in the coal mining area of southwest Virginia. The survey was directed toward providing baseline water-quality data against which any future changes could be compared. Available data were examined as a guide for selection of streams to be sampled during the 1978 survey. The purpose of this report is to summarize the findings of this reconnaissance and to characterize the water quality of streams in the southwest Virginia coal mining area.

Water samples were collected from six major streams at 6-week intervals during 1978 to define the temporal variation in surface-water quality. The spatial variation in water quality was determined by synoptic sampling of 63 stations during the 3-day low-flow period between September 26 and 28, 1978. All water samples were collected by Survey personnel and analyzed by the methods of Brown and others (1970).



PERCENT OF TOTAL MILLIEQUIVALENTS PER LITER

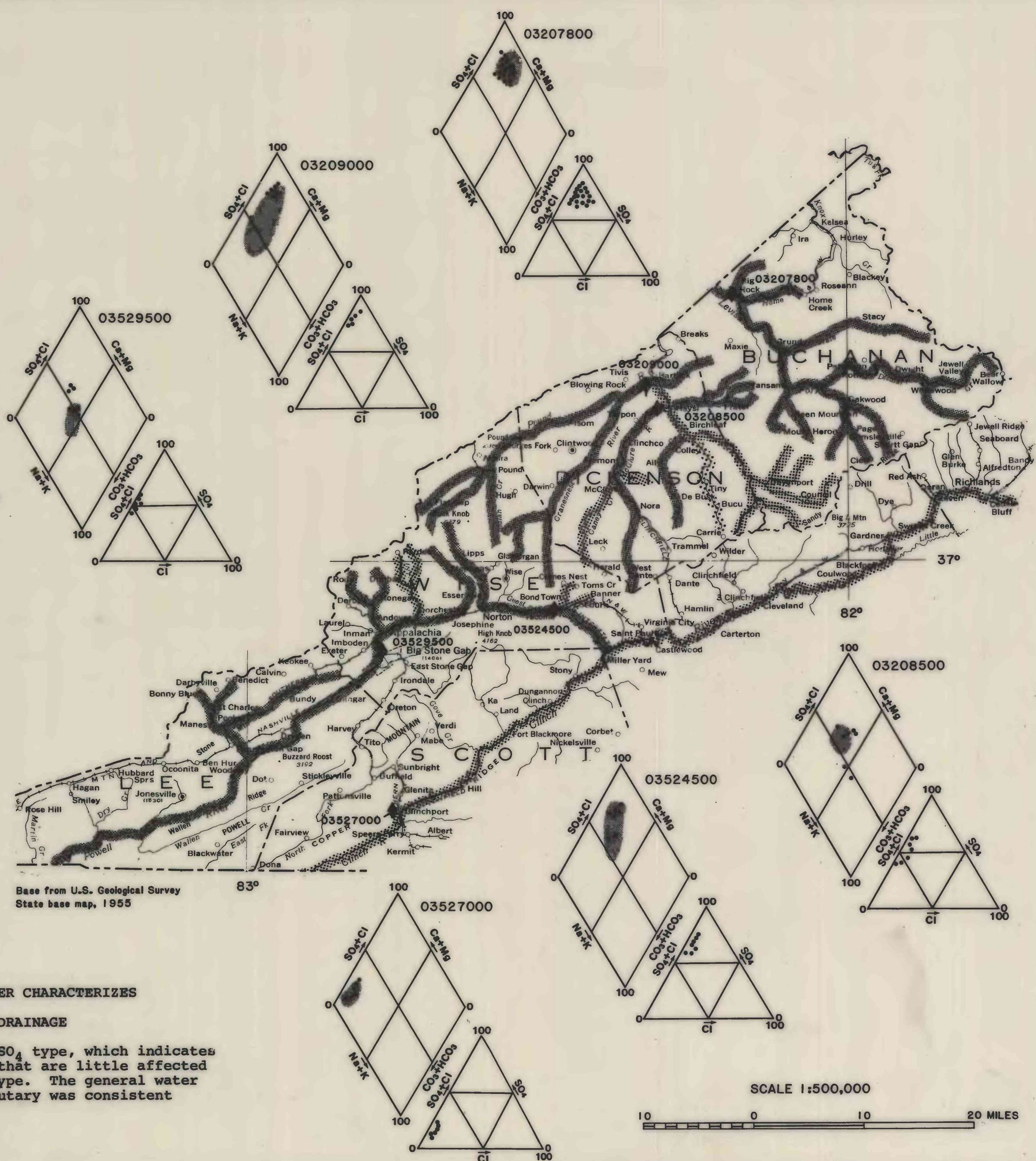
03208500 Station number

- ◆ Continuous-record gaging station and quality-of-water site
- ◆ Quality-of-water site and measurement of discharge without a gage
- Chemical-measurement site
- ⚑ Inactive quality-of-water site
- Stream analysis data point (1978)
- Range of analyses (period of record)

CALCIUM-MAGNESIUM SULFATE TYPE WATER CHARACTERIZES

STREAMS AFFECTED BY MINE DRAINAGE

The water in most streams samples is a CaMgSO_4 type, which indicates that they are affected by coal mining. Streams that are little affected by mine drainage are generally of the CaMgHCO_3 type. The general water type identified in each main stem stream or tributary was consistent throughout the survey.



EXPLANATION

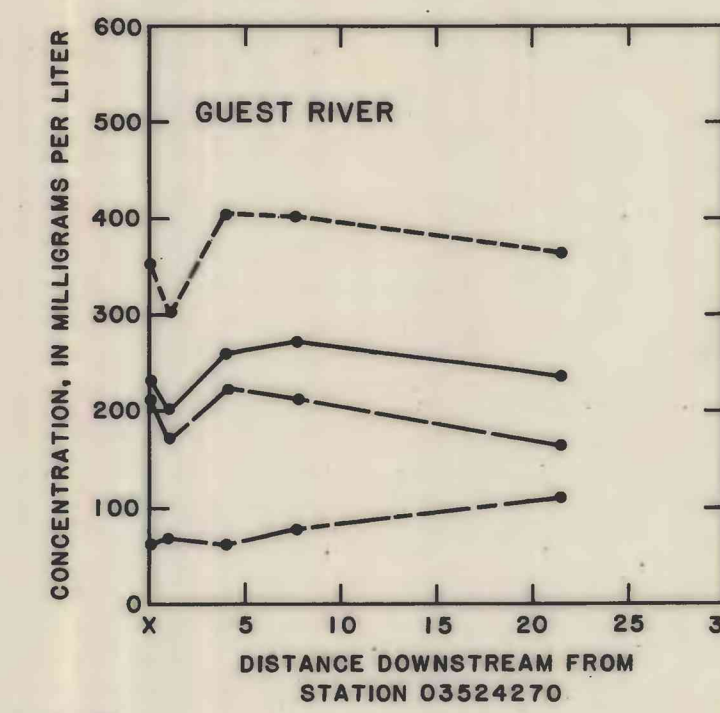
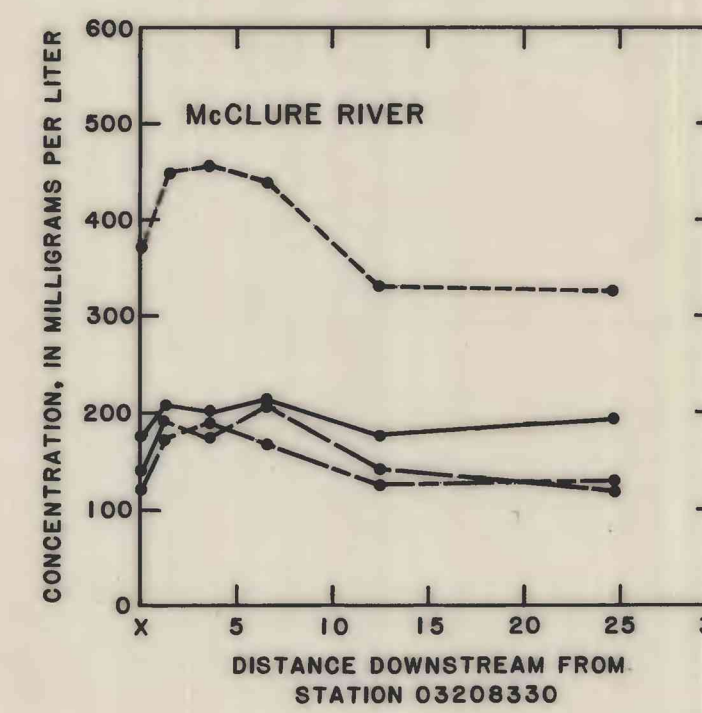
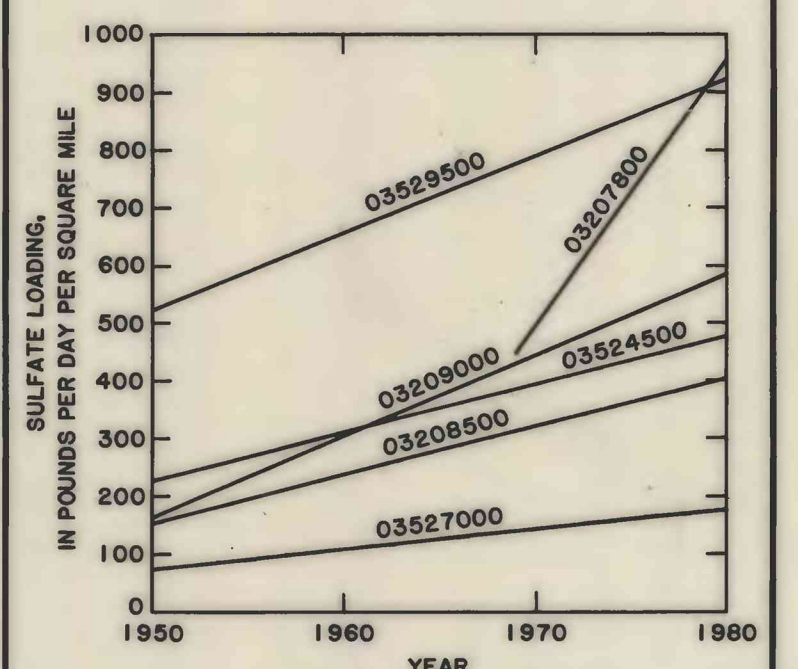
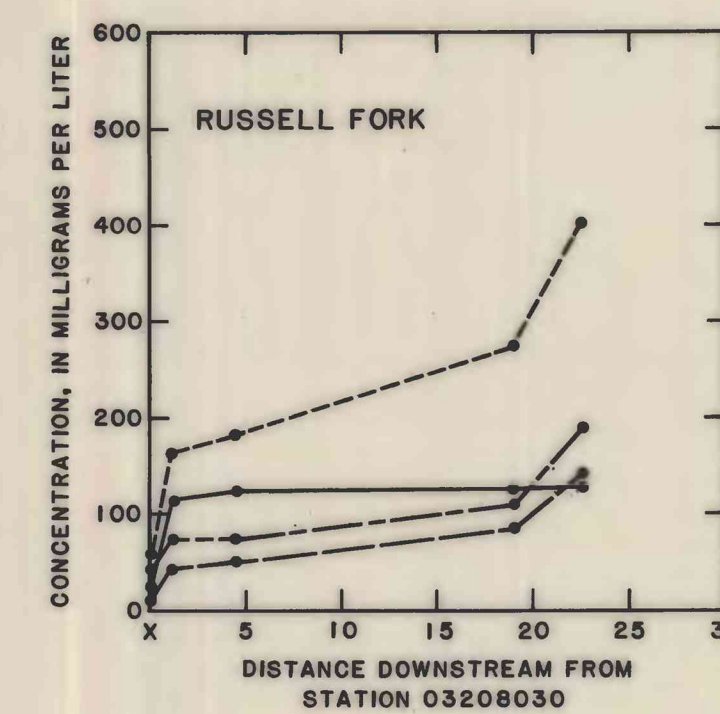
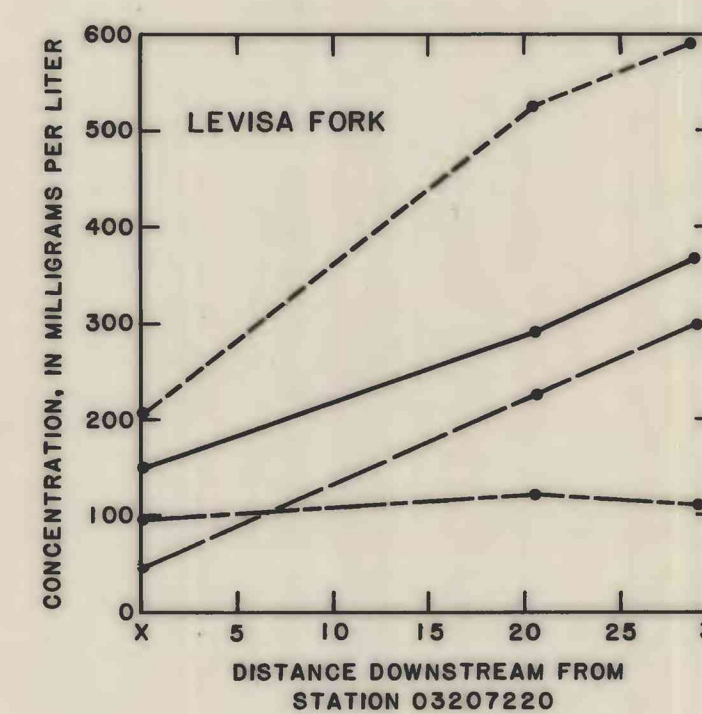
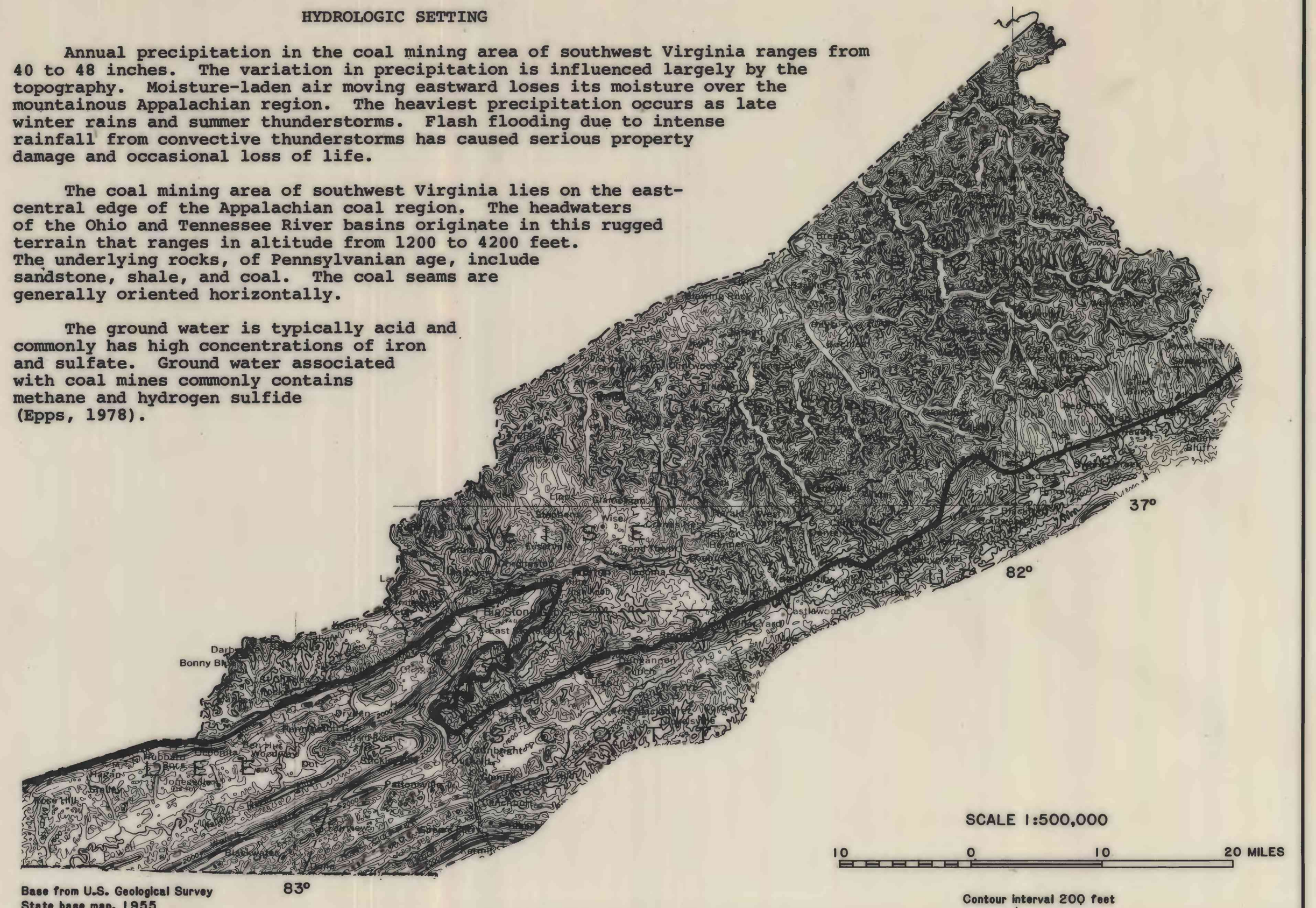
Southern boundary of coal bearing rocks in Virginia

HYDROLOGIC SETTING

Annual precipitation in the coal mining area of southwest Virginia ranges from 40 to 48 inches. The variation in precipitation is influenced largely by the topography. Moisture-laden air moving eastward loses its moisture over the mountainous Appalachian region. The heaviest precipitation occurs as late winter rains and summer thunderstorms. Flash flooding due to intense rainfall from convective thunderstorms has caused serious property damage and occasional loss of life.

The coal mining area of southwest Virginia lies on the east-central edge of the Appalachian coal region. The headwaters of the Ohio and Tennessee River basins originate in this rugged terrain that ranges in altitude from 1200 to 4200 feet. The underlying rocks, of Pennsylvanian age, include sandstone, shale, and coal. The coal seams are generally oriented horizontally.

The ground water is typically acid and commonly has high concentrations of iron and sulfate. Ground water associated with coal mines commonly contains methane and hydrogen sulfide (Epps, 1978).



EXPLANATION

- Data point
- | | | | |
|-------|------------------|-------|------------------------------------|
| ----- | Dissolved solids | ----- | Dissolved SO ₄ |
| ===== | Hardness, total | ----- | Alkalinity (as CaCO ₃) |

DOWNSTREAM WATER QUALITY TRENDS

Main stem water quality changes reflect inflow of water from tributary streams. Concentrations of constituents generally increase downstream in the Russell Fork and the Levisa Fork. The McClure River shows the effect of the downstream dilution of its heavily mined headwaters. The Guest River shows the effect of a dilute inflow near its point of origin. All rivers have high dissolved-solids concentrations and moderately hard to hard waters.

EXPLANATION

03529500 Downstream station number

SULFATE LOADS HAVE
INCREASED OVER TIME

The sulfate loads in all streams have increased since 1950. Time-trend regression analysis was computed using sulfate concentration data from six streams. The greatest increase in sulfate loadings was in the heavily mined Levisa Fork (03207800) basin. The Clinch River (03527000) basin, only partly affected by mining, showed the smallest increase in sulfate loading.