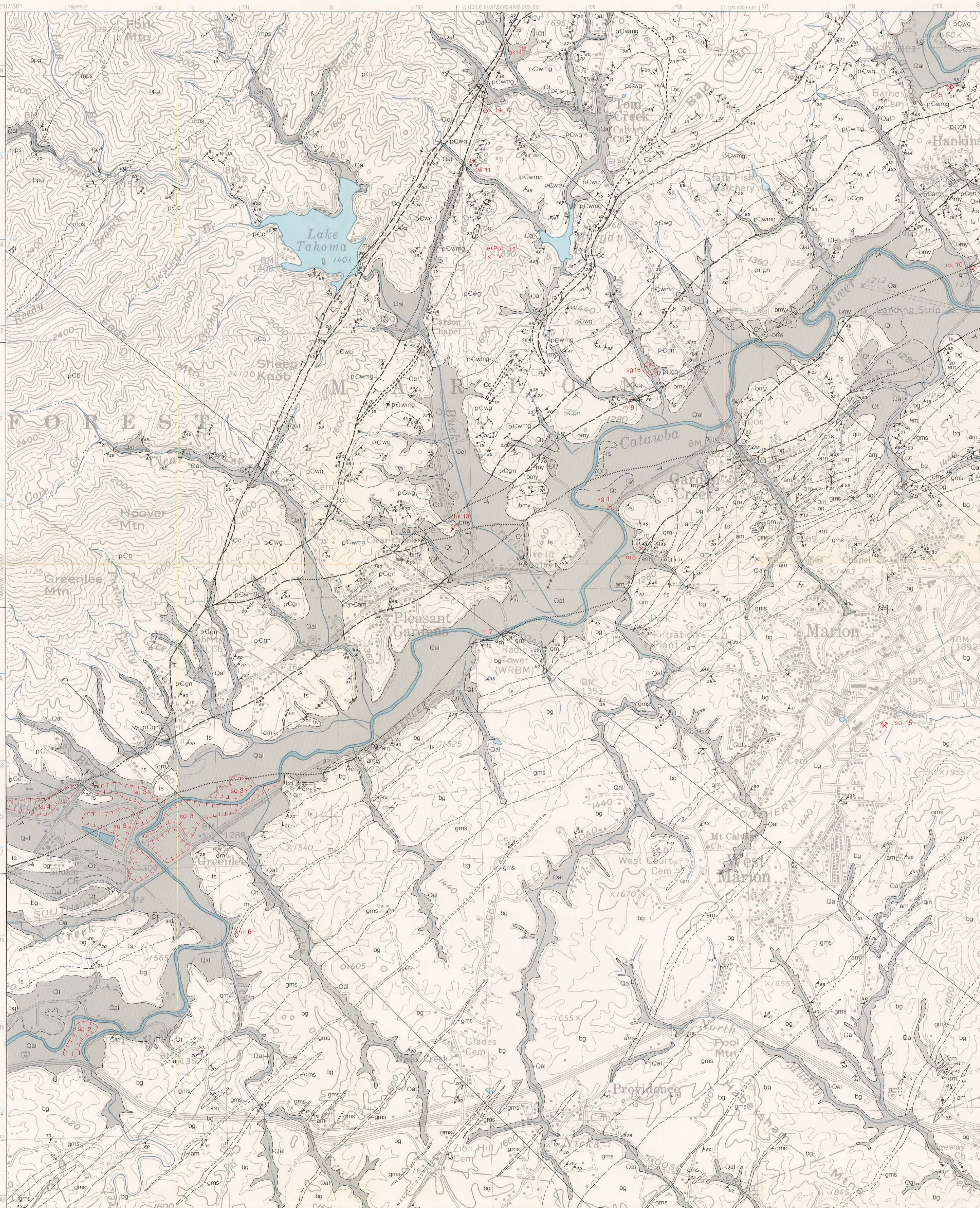
PREPARED IN COOPERATION WITH
UNITED STATES GEOLOGICAL SURVEY

STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
Stephen G. Conrad, State Geologist

GEOLOGIC MAP
NE¼ MARION QUADRANGLE
NORTH CAROLINA
GM 210-NE



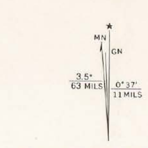
Base from U.S. Geological Survey 1:62,500, 1962

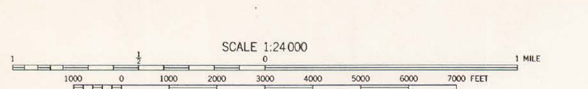
Geologic map cartography and printing by North Carolina Geological Survey, Department of Natural Resources and Community Development

1,000-meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

10,000-foot grid based on North Carolina coordinate system

Field work supported by State of North Carolina





CONTOUR INTERVAL 80 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP LOCATION

Geology mapped in 1962-64

Map preparation and editing by J.F. Conley, L.S. Wiener, C.E. Merschat, and R.J. Floyd

MAP UNITS

QUATERNARY
- Qal — Alluvium

QUATERNARY (AND TERTIARY?)
- Qt — Terrace deposits

LATER PRECAMBRIAN — EARLY PALEOZOIC

BLUE RIDGE
- bpg, q, mps — Paragneiss and paraschist
  - bpg—Biotite paragneiss
  - mps—Muscovite-biotite paraschist
  - q—Quartzite

GRANDFATHER MOUNTAIN WINDOW
- Cc — Chilhowee Group

BREVARD ZONE
- qm — Quartz monzonite
- fs — Schistose mylonite and phyllonite
- bmy — Blastomylonite
- my — Mylonite
- cmy — Calcareous mylonite

INNER PIEDMONT
- qm — Quartz monzonite
- fs — Schistose mylonite and phyllonite
- am, as — Amphibolite; as—Actinolite-chlorite-talc body
- bg — Biotite gneiss
- gms — Garnet-mica schist
- m — Marble

EARLIER PRECAMBRIAN
- pCc, pCcm — Mylonitic quartz-feldspar gneiss; pCcm—Very siliceous dolomitic marble
- pCgq, pCgn, pCam — Layered gneiss; pCam—Amphibolite and hornblende gneiss; pCgq—Mylonitized leucocratic quartz monzonite
- Wilson Creek Gneiss
  - pCwmg — Mica gneiss unit
  - pCwg — Sheared granitic unit
  - pCwq — Quartz monzonite unit

DESCRIPTION OF MAP UNITS[1]

Qal **ALLUVIUM**—Unconsolidated stream deposits, commonly with a lower gravelly portion overlain by an upper sandy to clayey portion. Lower portion of most deposits consists of well-rounded clasts ranging from 1 cm to more than 30 cm in diameter. Quartzose clasts dominate; commonly contains biotite and hornblende-rich gneissic fragments. Upper portion composed of finely laminated, gray-brown, coarse- to fine-grained sand, silt, and clay; commonly contains finely disseminated organic matter. At some places, especially in the larger stream valleys, thin lenses of gray, highly organic clay containing partially carbonized wood fragments are present.

Qt **TERRACE DEPOSITS**—Deposits at lower elevations composed mostly of white quartz gravel overlain by white kaolinitic clay. Deposits at higher elevations composed mostly of rounded, coarse gravel in a matrix of red iron oxides, sand and silt; in many places capped by a lag gravel composed of etched quartz fragments stained reddish brown. Higher terraces are older and may be Tertiary in age.

qm **QUARTZ MONZONITE**—Concordant to slightly discordant bodies of light-colored quartz monzonite, commonly mylonitized. Medium- to coarse-grained and generally equigranular; porphyritic at some places. Composed of quartz, microcline, oligoclase, muscovite, and accessory biotite, epidote, and zircon. Most bodies are from 1½ to 3 m wide and less than 30 m long; a few are more than 100 m wide and 1 km long. Only larger bodies shown on map. Weathers to a kaolinite-quartz saprolite and light-pink sandy soil.

fs **SCHISTOSE MYLONITE AND PHYLLONITE**—Grayish-green schistose mylonite and phyllonite. Contains flattened quartz augen (1 to 2 cm long; as much as 6 mm across) in a fine-grained, equigranular, banded matrix. Matrix is composed of quartz, relict microcline, relict plagioclase, sericite (paragonite?), biotite, chlorite altered from biotite, and lesser amounts of garnet, relict hornblende, ilmenite, and calcite; minerals segregated into quartz-rich bands which alternate with mica-rich bands. Bands are contorted and exhibit fluxion textures. At many places coarse mica porphyroblasts ranging from 1 to 2 cm across constitute about 10 percent of the rock and produce a "fish scale" or "button" texture. Weathers to tan-colored chips and finally to brownish-tan soil.

bmy **BLASTOMYLONITE**—Prominent augen of pink feldspar, 1 to 3 cm long and 3 to 15 mm thick, set in a fine-grained mylonitic matrix similar to the schistose mylonite in the unit previously described.

my **MYLONITE**—Massive, gray to black, very fine grained banded mylonite. In places as much as 5 m thick.

cmy **CALCAREOUS MYLONITE**—One layer, 30 cm thick, of calcite-rich mylonite was observed at N.C. coordinates 727,100N., 1,096,250E.

Cc **CHILHOWEE GROUP**—Quartzite, light- to dark-bluish-gray, medium-grained, medium- to thick-bedded, some thinly laminated. Composed of more than 85 percent quartz with minor plagioclase, microcline, muscovite, biotite, garnet, zircon, magnetite, and rutile. Weathers to a distinctive sandy, light-colored soil. Corresponds to upper quartzite unit of Chilhowee Group as mapped by Bryant and Reed (1970).

am (as) **AMPHIBOLITE**—Greenish-gray amphibolite to hornblende gneiss. Occurs as interlayers in other rock units, commonly from 2 to 25 cm thick, and as thicker units as much as 300 m in outcrop width. Composed of hornblende and plagioclase (generally andesine), with accessory quartz, biotite (commonly replaced by chlorite), and sphene; epidote is present as a replacement of feldspar and at many places forms crosscutting veins as much as 2 cm thick; locally garnetiferous. Weathers to a distinctive ocherous saprolite and forms a maroon to dark-brown clayey soil. Only larger bodies mapped.

as—Schistose to massive actinolite-chlorite-talc body (N.C. coordinates 699,800N., 1,107,100E.).

bpg, q, mps **PARAGNEISS AND PARASCHIST**—Biotite paragneiss and muscovite-biotite paraschist dominate; also includes interlayers of quartzite, biotite schist, quartz-biotite schist, and amphibolite to hornblende gneiss. Interlayers of amphibolite to hornblende gneiss, generally associated with biotite paragneiss, range from several centimeters to a meter or more in thickness; composed mainly of hornblende, epidote, and various amounts of plagioclase and biotite.

bpg—Biotite paragneiss, medium- to dark-gray, medium- to fine-grained, with most compositional layers from 15 to 60 cm thick. Composed of equigranular quartz, plagioclase, epidote, biotite, and minor muscovite; and microcline generally present as porphyroblasts.

mps—Muscovite-biotite paraschist, white to silvery-green, well-foliated. Composed mostly of quartz and muscovite with lesser biotite and minor feldspar (commonly altered to mica); contains gray, augen-shaped masses of quartz. Grades into biotite schist, quartz-biotite schist, and quartzite.

q—Quartzite, grayish-white, commonly rodded; sporadically present as interlayers, most between 30 cm and 1 m thick. Composed of quartz (as much as 85 percent), with muscovite and microcline. Only one discrete body, about 1½ m thick, indicated on map (outcrop width exaggerated on map).

bg **BIOTITE GNEISS**—Light- to medium-gray, generally medium-grained, foliated, commonly porphyroblastic. Composed mostly of equigranular quartz, plagioclase (oligoclase-andesine), microcline, biotite, and subsidiary muscovite; small quantities of hornblende locally present in matrix. Porphyroblasts are mostly microcline; some are plagioclase. Parallel to subparallel, well-developed abundant mica flakes form schistose layers most commonly from 2 to 8 cm thick, which alternate with gneissic layers 20 to 40 cm thick. Many exposures have a migmatitic aspect due to the presence of irregular lenses, clots, and streamerlike injections of granitic pegmatite and quartz-plagioclase-microcline-biotite masses. Small, generally concordant, cataclastically deformed and rodded quartz veins are present throughout. Map unit includes minor interlayers of garnet-mica schist and amphibolite to hornblende gneiss. Unit weathers to brown or grayish-brown saprolite.

gms **GARNET-MICA SCHIST**—Light- to dark-silvery-gray, inequigranular to porphyroblastic schist; ranges from interlayers within the biotite gneiss unit (bg) to units which are as much as 800 m in outcrop width. Composed of muscovite (30 to 45 percent), quartz (20 to 30 percent), biotite (10 to 15 percent), and garnet (8 to 10 percent ; as 2 to 4 mm porphyroblasts, poikiloblastic, euhedral to subhedral; some exhibit chloritic alteration.) Various amounts of kyanite, oligoclase, ilmenite, chlorite, and pyrrhotite are present; may also contain perthitic microcline and plagioclase, partially to almost completely altered to mica. Weathers to brown saprolite and produces red micaceous clay soil to silty clay soil. Only larger bodies mapped.

m **MARBLE**—Fine- to medium-grained, light- to medium-gray, dolomitic in part. Contains disseminated grains of muscovite, quartz, and feldspar.

pCc, pCcm **MYLONITIC QUARTZ-FELDSPAR GNEISS**—Light- to medium-gray, medium- to coarse-grained, inequigranular flaser and mortar gneiss. Light-colored layers rich in quartz and feldspar alternate with dark-gray biotite-rich layers. Composed of microcline (1 to 6 mm), oligoclase, and quartz in a matrix of quartz, muscovite, plagioclase, biotite (some replaced by chlorite), and epidote with minor amounts of garnet, sericite, opaque minerals, and calcite. Muscovite, and less commonly biotite, is present as 2 to 6 mm porphyroblasts in foliation planes. Map unit corresponds in part to Cranberry Gneiss of Bryant and Reed (1970).

pCcm—One exposure of very siliceous dolomitic marble (N.C. coordinates 733,950N., 1,082,750E.).

pCgq, pCgn, pCam **LAYERED GNEISS**—Biotite gneiss, ranges to biotite schist; compositionally layered, medium- to dark-gray, fine- to medium-grained, equigranular. Composed of quartz, plagioclase, biotite, and minor muscovite; locally garnetiferous. Includes some layers and masses of granitic mortar and flaser gneiss which contain pink microcline porphyroblasts.

pCam—Amphibolite and hornblende gneiss, black to greenish-black, medium-grained, equigranular, layered and foliated. Composed of hornblende, epidote, plagioclase, biotite, and locally garnet. Present as thin lenses and interlayers (most are too small and discontinuous to show on map).

pCgq—Mylonitized leucocratic quartz monzonite. White to light-gray, mylonitized, equigranular to porphyritic quartz monzonitic rock. Composed of microcline, quartz, oligoclase, muscovite, and minor biotite.

WILSON CREEK GNEISS

pCwmg Mica Gneiss Unit—Mica gneiss to augen gneiss, light-gray, poorly foliated, medium- to fine-grained, well-rodded and lineated, inequigranular. Composed of quartz (40 to 55 percent), plagioclase (20 to 30 percent), muscovite (15 to 20 percent), microcline (5 to 10 percent), opaque minerals (3 percent), various amounts of sericite altered from muscovite and feldspar, and chlorite altered from biotite. Weathers to light-tan saprolite and pinkish silty clay soil.

pCwg Sheared Granitic Unit—White to light-pink, medium- to coarse-grained, equigranular to porphyritic, poorly foliated. Composed of microcline (30 percent), quartz (25 percent), plagioclase (25 percent), and lesser amounts of muscovite, biotite, epidote, and opaque minerals. Fluxion textures predominate. Weathers to whitish-tan saprolite and pinkish-gray to light-tan soil.

pCwq Quartz Monzonite Unit—Medium- to dark-green, medium- to coarse-grained, inequigranular to porphyritic. Composed of muscovite (20 to 35 percent), plagioclase (20 to 30 percent), quartz (20 to 25 percent), microcline (10 to 15 percent), chlorite (5 percent), and minor epidote, calcite, biotite, ilmenite, and leucoxene. Cataclasitc textures, ranging from mortar gneiss to mylonite, are present throughout.

[1] Detailed manuscript of the map area is on open file with the North Carolina Geological Survey, Department of Natural Resources and Community Development, Raleigh, North Carolina 27611.

REFERENCE CITED

Bryant, Bruce, and Reed, J. C., Jr., 1970, Geology of the Grandfather Mountain window and vicinity, North Carolina and Tennessee: U.S. Geological Survey Professional Paper 615, 190 p.

STRUCTURAL SYMBOLS

CONTACTS AND FAULTS

Contact, dashed where approximately located, short-dashed where inferred. Contacts not projected through Quaternary units

Thrust fault, dashed where approximately located, short-dashed where inferred, dotted where concealed; ⊣ on upper plate

FOLDS

15 Minor antiform, showing bearing and plunge of fold axis

45 Minor synform, showing bearing and plunge of fold axis

Horizontal minor asymmetrical fold, showing fold pattern

15 Plunging minor asymmetrical fold, showing fold pattern

PLANAR FEATURES

(Where planar features are combined with lineations, their intersection marks the point of observation)

17 Strike and dip of inclined beds

22 Strike and dip of inclined foliation

Strike of vertical foliation

Horizontal foliation

LINEATIONS

25 Bearing and plunge of lineation

Horizontal lineation

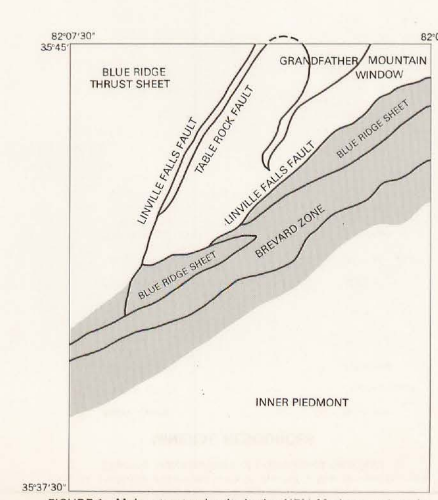


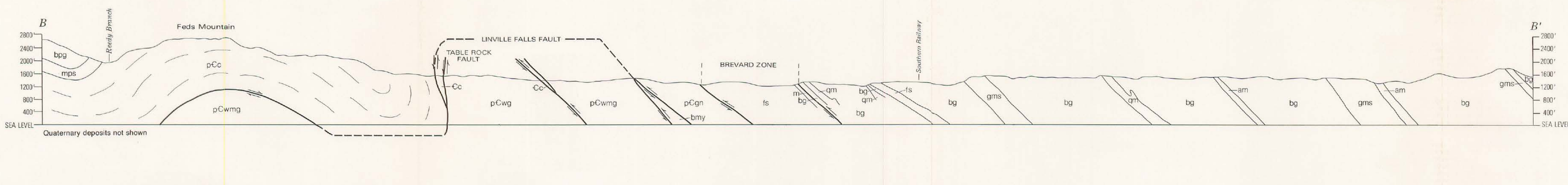
FIGURE 1—Major structural units in the NE¼ Marion quadrangle. Shading indicates zone of pronounced cataclasis

MINERAL RESOURCES

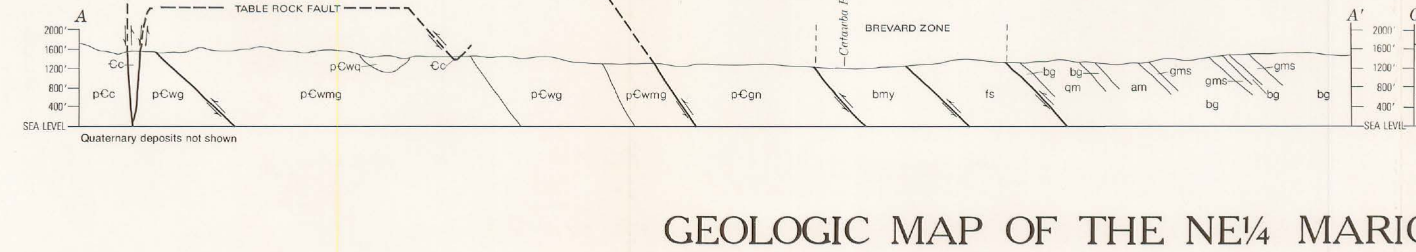
Symbol		Abbreviation	
	Active quarry	bk	Brick clay
	Inactive quarry	cs	Crushed stone
	Active pit	fs	Flagstone
	Active pit	Fe	Iron
	Inactive pit	Pb	Lead
×	Occurrence or prospect	m	Marble
⊙	Sample locality	sg	Sand and gravel
3	Map numbers refer to descriptions in Mineral Resources Summary	so	Soapstone

TABLE 1—Mineral resources activities in the NE¼ Marion quadrangle

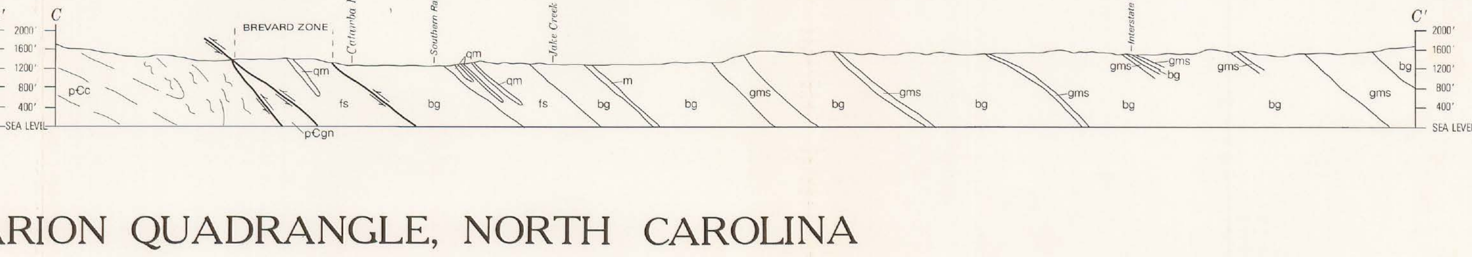
Locality number	Commodity and activity	Status	Operator
1	Sand and gravel pit	Active	E.P. Boyd and Sons
2	Sand and gravel pit	Inactive	B.V. Hedrick Company
3	Sand and gravel pit	Inactive	Becker County Sand and Gravel Company
4	Sand and gravel pit	Inactive	Becker County Sand and Gravel Company
5	Flagstone quarry	Active	Unknown
6	Marble occurrence	————	—————
7	Marble occurrence	————	—————
8	Marble occurrence	————	—————
9	Marble occurrence	————	—————
10	Crushed stone quarry	Inactive	Unknown
11	Brick clay sample locality	————	—————
12	Brick clay sample locality	————	—————
13	Brick clay sample locality	————	—————
14	Brick clay sample locality	————	—————
15	Soapstone quarry	Inactive	Unknown
16	Sand and gravel pit	Active	R.L. Johnson (Marion pit)
17	Iron (and lead?) prospect	————	Unknown



Quaternary deposits not shown



Quaternary deposits not shown



GEOLOGIC MAP OF THE NE¼ MARION QUADRANGLE, NORTH CAROLINA

By
James F. Conley and Kenneth M. Drummond

1981