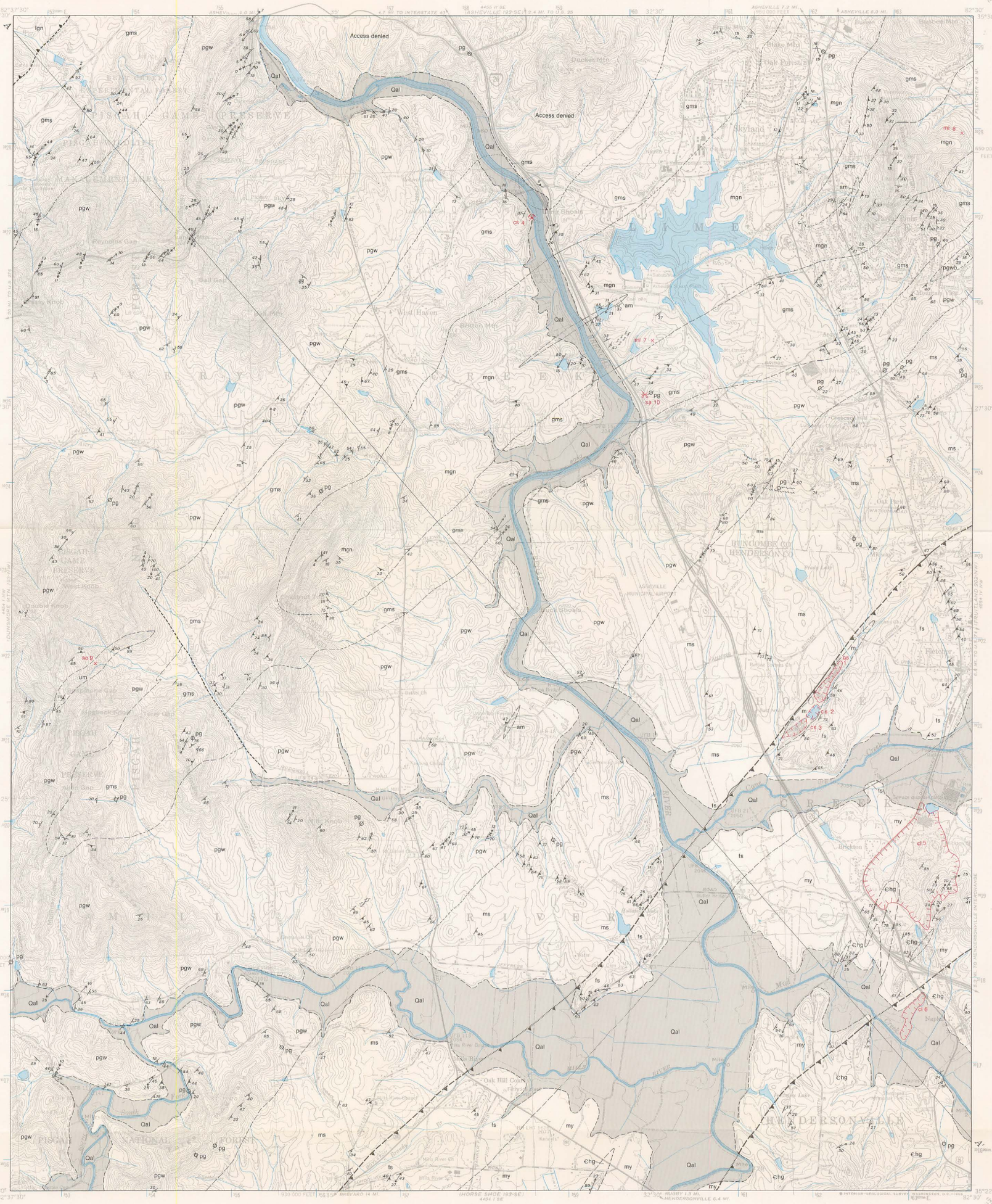
PREPARED IN COOPERATION WITH
UNITED STATES GEOLOGICAL SURVEY

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

GEOLOGIC MAP
SKYLAND QUADRANGLE
NORTH CAROLINA
193-NE



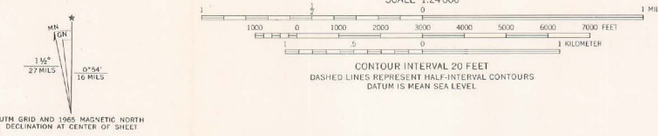
Base from Tennessee Valley Authority and U.S. Geological Survey, 1965

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

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

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

Field work jointly supported by Tennessee Valley Authority and State of North Carolina



UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF-INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

MAP LOCATION

Geology mapped in 1970-71. Assistance of D. E. Dunn gratefully acknowledged

Map compilation and editing by R. J. Floyd, L. S. Wiener, and C. E. Merschat

MAP UNITS

SURFICIAL DEPOSITS

QUATERNARY
- Qal — Alluvium, Colluvium

NORTHWEST OF BREVARD ZONE

MIDDLE PALEOZOIC
- pg — Pegmatite, Trondhjemite

LATER PRECAMBRIAN — EARLY PALEOZOIC
- um — Altered ultramafic rock
- am — Amphibolite
- ms — Mica schist
- pgw / pgwb — Paragneiss and metagraywacke; pgwb—Biotite metasandstone
- mgn — Mica gneiss
- gms — Garnet-mica schist

EARLIER PRECAMBRIAN
- lgn — Layered biotite gneiss

BREVARD ZONE AND SOUTHEAST OF BREVARD ZONE

AGE UNCERTAIN
- m — Marble
- fs — Porphyroclastic phyllonite and phyllonitic schist
- my — Porphyroclastic mylonite and ultramylonite

CAMBRIAN
- €hg — Henderson Gneiss

DESCRIPTION OF MAP UNITS[1]

Qal **ALLUVIUM**—Unconsolidated stream deposits composed of poorly to well-sorted gravel, sand, silt, and clay. Only major deposits mapped.

COLLUVIUM—Unconsolidated, poorly sorted, bouldery to fine-grained debris of local origin. Present as hillside block fields, which commonly merge with valley fill in many stream courses, and as talus or fan deposits at the base of steep slopes. Not mapped.

pg **PEGMATITE**—Very coarse to coarse grained. Composed of quartz, plagioclase, microcline, and muscovite; with minor biotite, garnet, and tourmaline. Occurs as generally concordant, tabular or podlike bodies, which range from less than 30 cm to more than 10 m in thickness. Too small to show accurately at map scale; mapped bodies indicated by individual symbols.

TRONDHJEMITE—Light- to medium-gray, porphyritic. Matrix is very fine grained and is composed of plagioclase (48 percent), quartz (35 percent), biotite (7 percent), sericite (4 percent), potassic feldspar (2 percent; probably of secondary origin), and traces of carbonate, epidote, garnet, apatite, sphene, and opaque minerals. White to light-gray oligoclase phenocrysts, 0.5 to 3 mm across, twinned, commonly zoned and poikilitic, comprise about 6 percent of the rock. Occurs as thin dikes and sills, massive to very weakly foliated, and commonly contains well-foliated xenoliths derived from surrounding rocks. Intrudes map units northwest of the Brevard zone. Not mapped.

um **ALTERED ULTRAMAFIC ROCK**—Lustrous greenish-gray, fine- to medium-grained, moderately foliated. Composed of talc, chlorite, amphibole, minor serpentine (?), and opaque minerals.

am **AMPHIBOLITE**—Medium-gray to greenish-black. Composed mainly of hornblende (60 to 90 percent) and plagioclase (1 to 30 percent) with lesser quartz (1 to 18 percent), biotite (0 to 10 percent), and epidote (0 to 4 percent). Chlorite, sphene, garnet, apatite, calcite, and opaque minerals may also be present. Includes coarse-grained, nonlayered rock masses with poorly developed foliation; fine-grained schistose rock; and fine- to medium-grained hornblende gneiss consisting of alternating dark-colored, hornblende-rich layers and light-colored plagioclase-rich layers. Amphibolite occurs as discontinuous, generally concordant bodies several centimeters to as much as 1,500 meters in length, which are interlayered with other units throughout the map area. Weathers to a distinctive yellowish-brown to dark-reddish-brown clayey saprolite. Only larger bodies mapped.

ms **MICA SCHIST**—Lustrous, yellowish-gray to dark-gray, medium-grained. Composed of muscovite, biotite, plagioclase, and quartz; minor garnet and epidote; and traces of zircon, sphene, and opaque minerals. Schist is well foliated; locally gneissic. At some places interlayered with micaceous feldspathic metasandstone, which ranges from a few centimeters to more than a meter in thickness. Probably derived from argillaceous sediments with minor sandy layers. Thin, conformable granitic or quartz-rich pegmatitic layers present throughout unit.

pgw / pgwb **PARAGNEISS AND METAGRAYWACKE**—Dominated by laterally and vertically intergraded paragneiss and feldspathic biotite metagraywacke. Paragneiss is more abundant to the northwest where the metamorphic grade is higher, and metagraywacke is more abundant to the southeast where the metamorphic grade is lower. Paragneiss and metagraywacke are likely derived from argillaceous and feldspathic sandstone and graywacke, in part calcareous, with minor interbeds of mudstone, siltstone, and rare conglomerate.

Paragneiss is medium to bluish gray and medium grained. Composed of quartz (44 percent), plagioclase (21 percent), muscovite (15 percent), biotite (14 percent); minor chlorite and garnet; and traces of epidote, zircon, calcite, and opaque minerals. Interlayers more commonly associated with paragneiss include biotite schist (1 to 10 cm thick) and medium- to coarse-grained feldspathic metasandstone (as much as 60 cm thick). Garnetiferous mica schist and phyllite are also present locally. Feldspathic biotite metagraywacke is massive, yellowish gray to dark gray, and fine to medium grained. Composed of quartz (44 percent), plagioclase (17 percent), biotite (16 percent), muscovite (7 percent), clinozoisite-epidote (3 percent; epidote commonly has allanite cores); and traces of apatite, sphene, zircon, and opaque minerals. Minor interlayers, generally from a few centimeters to a few meters thick, associated mostly with the metagraywacke, include biotite metasandstone, biotite-muscovite schist, metasiltstone, and rare metaconglomerate.

Throughout the paragneiss and metagraywacke unit are amphibolite pods and layers which are identical to the amphibolite unit *(am)* previously described, as well as pods and lenses of garnetiferous calc-silicate granofels. Calc-silicate granofels is medium grained and is composed of quartz (40 percent), plagioclase (19 percent), epidote-clinozoisite (12 percent), biotite (8 percent), and garnet (6 percent); minor carbonate, muscovite, and sphene; and traces of hornblende, rutile, zircon, and opaque minerals.

pgwb—Biotite metasandstone, bluish-gray to yellowish-gray, medium- to fine-grained, thick- to thin-layered. Composed principally of quartz, feldspar, biotite, muscovite, and locally garnet.

mgn **MICA GNEISS**—Gray to dark-gray, fine- to medium-grained, moderately foliated; locally an augen gneiss. Composed of quartz (40 percent), plagioclase (26 percent), biotite (15 percent), muscovite (8 percent), garnet (0 to 9 percent); minor carbonate, epidote, sphene, and opaque minerals; and traces of apatite and zircon. Interlayers include biotite schist, feldspathic metasandstone, and garnetiferous mica schist; pods and thin layers of calc-silicate granofels are locally present. Stratigraphically equivalent to paragneiss and metagraywacke unit *(pgw)*.

gms **GARNET-MICA SCHIST**—Lustrous, dark-reddish-brown, fine- to medium-grained schist. Composed of muscovite-sericite (33 percent), biotite (10 percent), chlorite (9 percent), garnet (1-20 percent; as large as 1 cm across), plagioclase (17 percent), quartz (14 percent); minor epidote, graphite, pyrrhotite, and other opaque minerals; and traces of sphene, apatite, and zircon. Locally contains sillimanite, kyanite, or staurolite. Includes interlayers of mica gneiss and feldspathic metasandstone. Garnet-mica schist unit was probably derived from argillaceous, sulfidic sediments which contained minor feldspathic, sandy interbeds. Weathers to orange-brown to dark-brown, micaceous saprolite, which commonly contains conspicuous garnet grains. Stratigraphic equivalence of noncontiguous outcrop bands of garnet-mica schist is presumed but not established.

lgn **LAYERED BIOTITE GNEISS**—Map unit includes layered biotite-plagioclase-quartz gneiss, biotite-muscovite gneiss, calc-silicate granofels pods and lenses, and migmatite. The dominant biotite-plagioclase-quartz gneiss is composed of quartz (37 percent), plagioclase (31 percent), biotite (21 percent), potassic feldspar (0 to 17 percent), muscovite (3 percent); minor chlorite, hornblende, garnet, and epidote; and traces of calcite, sillimanite, apatite, zircon, magnetite, and other opaque minerals. Granitic veins, which are common throughout, are leucocratic mixtures of quartz, plagioclase, potassic feldspar, and muscovite.

m **MARBLE**—White and light-gray, fine- to medium-grained, thick-bedded marble; in part dolomitic. Composed mostly of calcite, with minor amounts of quartz, pyrite, and magnetite. Marble encloses a few discontinuous layers of sericitic phyllite as much as 10 cm thick.

fs **PORPHYROCLASTIC PHYLLONITE AND PHYLLONITIC SCHIST**—Lustrous gray and greenish-gray, fine- to medium-grained groundmass that commonly contains porphyroclasts of silvery muscovite or muscovite-sericite. Groundmass exhibits well-developed fluxion structure and is composed mostly of quartz, muscovite-sericite, and biotite-chlorite; locally contains graphite and garnet. The mica-aggregate porphyroclasts comprise from 30 to 60 percent of the rock and occur as ovoid masses as much as 2.5 cm long and 1 cm thick. They are flattened in the foliation planes and give rise to a distinctive "fish-scale" appearance. Lenses of fine-grained, bluish-gray mylonite and highly graphitic phyllonite present locally.

my **PORPHYROCLASTIC MYLONITE AND ULTRAMYLONITE**—Interlayered cataclastic rocks with less than 35 percent phyllosilicate minerals.

Porphyroclastic mylonite is light gray, greenish gray, and medium to dark gray. Porphyroclasts are mostly microcline, rounded to lenticular, 1 to 8 mm across. The thinly laminated, fine-grained groundmass constitutes more than 80 percent of the rock; composed of quartz, plagioclase, microcline, muscovite-sericite, biotite-chlorite, and minor amounts of opaque minerals.

Ultramylonite is gray to greenish gray, very fine grained to aphanitic; feldspar porphyroclasts are less than 0.2 mm in size. Composition of ultramylonite is very similar to porphyroclastic mylonite.

Interlayers of porphyroclastic phyllonite and phyllonitic schist, and dark-colored mylonite are present at some places.

€hg **HENDERSON GNEISS**—Cataclastic augen gneiss, light- to dark-gray, medium-grained, moderately foliated, with conspicuous pink feldspar augen. Locally includes layers of medium-grained, bluish-gray mylonite as much as 60 cm thick. Augen 0.2 to 2 cm across, commonly composed of microcline, constitute about one-fourth of the rock and are enclosed in a matrix of potassic feldspar, biotite-chlorite, plagioclase (albite-oligoclase), quartz, muscovite-sericite, and epidote; with minor zircon, sphene, apatite, and opaque minerals.

[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.

Mineral percentage values are averaged from thin-section examinations: trondhjemite - 5 sections; amphibolite - 12; paragneiss and metagraywacke unit, paragneiss - 5; feldspathic biotite metagraywacke - 11; calc-silicate granofels - 6; mica gneiss - 6; garnet-mica schist - 12; layered biotite gneiss - 7.

STRUCTURAL SYMBOLS

(Where structural symbols are combined, their intersection marks the point of observation)

CONTACTS AND FAULTS
- Contact, dashed where approximately located, short-dashed where indefinite or inferred, dotted where concealed
- Thrust fault, dashed where approximately located, dotted where concealed, sawteeth on upper plate
- Inferred fault
- Shear zone, showing dip

FOLDS
- Bearing and plunge of axis of small antiform
- Bearing and plunge of axis of small synform
- Bearing of horizontal axis of small fold

PLANAR FEATURES
- Strike and dip of schistosity; inclined, vertical
- Strike and dip of foliation in nonschistose rocks

LINEAR FEATURES
- Attitude of mineral elongation or streaking; plunging, horizontal
- Attitude of lineation resulting from intersection of earlier foliation; plunging, horizontal

PEGMATITE BODIES
- Strike and dip of bounding contacts
- Trend of body
- Location, orientation not determined

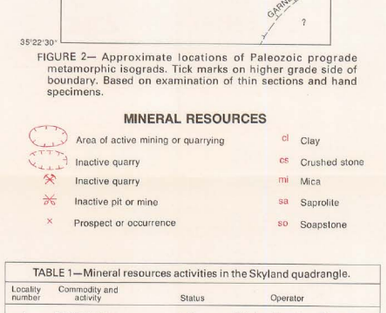


FIGURE 1—Index map showing location of Brevard zone and inferred major structural features in the Skyland quadrangle and the immediately adjacent area to the northeast. Garnet-mica schist unit indicated by shading. Zone of pronounced cataclasis shown in red.

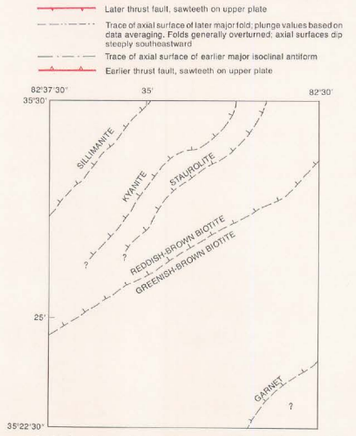


FIGURE 2— Approximate locations of Paleozoic prograde metamorphic isograds. Tick marks on higher grade side of boundary. Based on examination of thin sections and hand specimens.

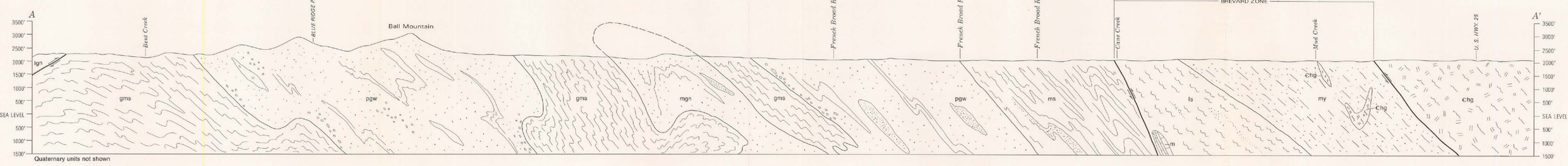
MINERAL RESOURCES

- Area of active mining or quarrying
- Inactive quarry
- Inactive quarry
- Inactive pit or mine
- Prospect or occurrence

cl Clay
cs Crushed stone
mi Mica
sa Saprolite
so Soapstone

TABLE 1—Mineral resources activities in the Skyland quadrangle.

Locality number	Commodity and activity	Status	Operator
1	Crushed stone (marble) quarry	Active	Fletcher Limestone Company (Fletcher quarry)
2	Crushed stone (marble) quarry	Inactive	B & C Lime and Stone Company
3	Crushed stone (marble) quarry	Inactive	B & C Lime and Stone Company (Cogdill quarry)
4	Crushed stone (schist) quarry	Inactive	Unknown
5	Brick clay pit	Active	Moland-Drysdale Brick Corporation (Fletcher North-South mine)
6	Brick clay pit	Active	Moland-Drysdale Brick Corporation (Greer mine)
	Mica prospect (Hattie Bell Underwood)	———	———
8	Mica prospect (Shortz)	———	———
9	Soapstone occurrence	———	———
10	Saprolite pit	Inactive	Unknown



Quaternary units not shown

GEOLOGIC MAP OF THE SKYLAND QUADRANGLE, NORTH CAROLINA

By
Abdallah E. Dabbagh

1981