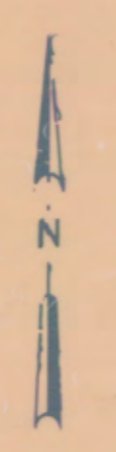
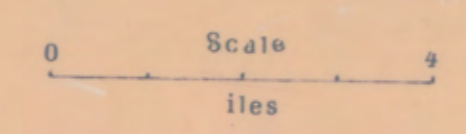


OF NCGS 80-2
GEOLOGIC MAP
 of
REGION K, N.C.

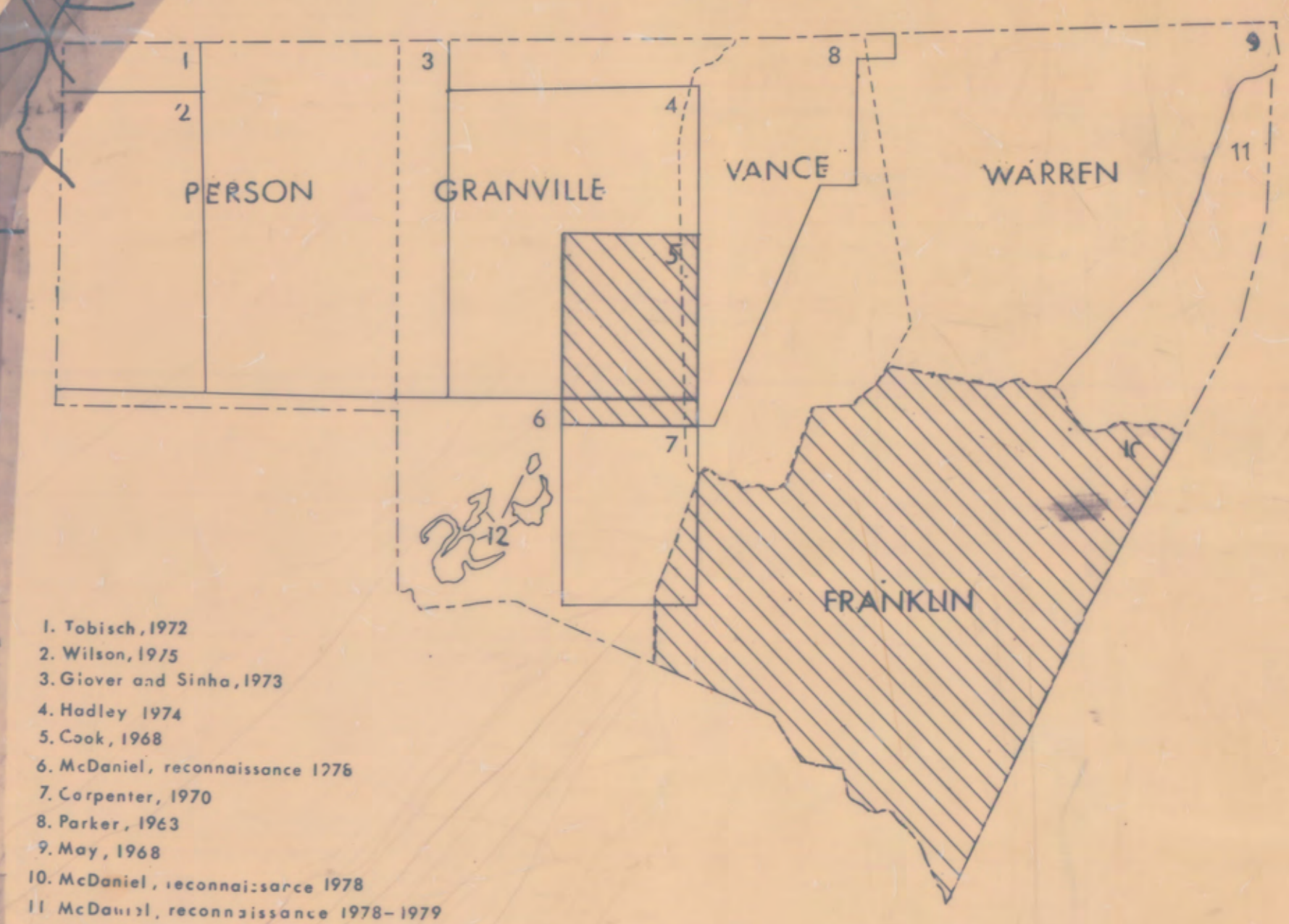
by
 Ronald D. McDaniel
 1980

N.C. Geological Survey
 Open File Map

This report is preliminary and has not been edited or reviewed for conformity with North Carolina Geological Survey standards and nomenclature.



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REGION K LEGEND

Lithologic descriptions in the legend are based upon descriptions from previous reports and maps and upon field examinations conducted during reconnaissance mapping of previously unmapped areas.

SEDIMENTARY ROCKS

- al Alluvium: Dark-brown, gray to white unconsolidated floodplain deposits of sand, silt, and clay; occasionally contains subrounded to well-rounded pebbles and cobbles.
- cp Upland sediment: Buff to white, unconsolidated, Coastal Plain deposits of clay, sand, and gravel. Found on top of hills in the eastern portion of the area, mostly Franklin County.
- T s Sanford formation: Red, brown, buff, dark gray, maroon to purple irregularly bedded Triassic sandstone, siltstone, mudstone, and shale; buff-colored arkosic sandstone is the predominant rock type; consists chiefly of angular fragments of feldspar and subrounded to angular quartz grains; mica constitutes up to five percent of the rock.
- T sf Sanford formation fanglomerate: Poorly sorted, heterogeneous Triassic conglomerate with angular to subangular igneous and metamorphic rock fragments, boulder, cobbles, and pebbles and a reddish-brown matrix of sand, silt, and clay; little or no bedding present; contains lenses of mudstone and sandstone.

IGNEOUS INTRUSIVE ROCKS

- Kd Cretaceous trachyte dikes; Dark greenish-gray to black, unmetamorphosed, porphyritic quartz trachyte dikes; composed primarily of sanidine, anorthoclase, quartz, and chlorite with minor plagioclase, apatite, clinopyroxene, calcite, pyrite, magnetite, and ilmenite; commonly amygdaloidal: width varies from three to thirty meters: Found in Northwestern Warren County.
- T d Diabase: Dark greenish-gray to black, fine- to medium-grained, massive, unmetamorphosed dikes and sills; composed predominantly of plagioclase, clinopyroxene, and opaque minerals; width of dikes ranges from a few centimeters to 15 meters. Sills are restricted to areas of Triassic sediments. Solid lines

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indicate where located in the field; dashed lines indicate where projected by aeromagnetic data; dots indicate isolated boulders or outcrops.

Pg Pegmatite: White to light gray to buff, coarse- to very coarse-grained dikes composed chiefly of microcline and quartz; contain small amounts of plagioclase, biotite, muscovite, garnet, tourmaline, and beryl. Some pegmatites contain individual feldspar crystals up to 30 centimeters in diameter and muscovite crystals up to 15 centimeters in diameter. Large pegmatites are found in extreme western Franklin, northeastern Franklin, and southeastern Warren counties.

icf Felsic intrusive complex: Light gray to pink, fine- to medium-grained, locally porphyritic, massive to well-foliated, metamorphosed intimate mixture of genetically related felsic intrusive rocks; includes granite, granodiorite, quartz diorite, and quartz monzonite; predominant minerals include quartz, plagioclase, potassium, feldspar, muscovite, and biotite. In some areas complex includes mineralogic gradations within a single body while in other areas it includes separate intrusions; complex in central and western Franklin and Warren counties contains numerous inclusions of mixed gneiss and schist; central Granville County complex contains small bodies of granodiorite and hornblende diorite as well as dikes of metabasalt and hornblende gabbro-diorite. An age date of 575 ± 20 M.Y. has been obtained by Glover and others (1971) for the complex in Person County.

fi Felsic intrusive rocks: Light gray to pink, fine- to coarse-grained, massive to foliated, metamorphosed and unmetamorphosed relatively homogeneous individual bodies of felsic intrusive rocks; includes granite, quartz monzonite, and granodiorite; Predominant minerals include quartz, plagioclase, potassium feldspar, muscovite, and biotite. The Wilton Pluton in southeastern Granville County has a Rb-Sr age date of 285 ± 10 M.Y. (Fullagar and Butler, 1979). The Castalia Pluton in eastern Franklin County yields a similar Rb-Sr age date of 313 ± 13 M.Y. (Fullagar and Butler, 1979).

Pgr Porphyritic granite: Light-gray, medium- to coarse-grained, porphyritic, well-foliated, unmetamorphosed biotite granite. Primary minerals include potassium feldspar, plagioclase, quartz, biotite, hornblende and minor amounts of muscovite. Potassium feldspar megacrysts, some greater than five centimeters in length, are aligned in a north-south direction parallel to the western contact of the intrusive. Located in

northeastern Warren County. Age is thought to be in the range of 265 - 325 M.Y. (Farrar, 1979).

di Diorite: Medium- to dark-gray, fine- to medium-grained, massive to well-foliated, metamorphosed intrusive rock composed predominantly of sodic plagioclase, hornblende, biotite or pyroxene, \pm minor amounts of quartz and orthoclase. Found mostly in central Granville and western Person counties.

di+gb Mafic intrusive rocks: Dark greenish-gray to black, fine- to coarse-grained, massive to foliated, post- and pre-metamorphic, mafic intrusions of gabbro and gb intimate mixtures of diorite and gabbro; unaltered plutons composed primarily of calcic plagioclase, pyroxene and/or hornblende; quartz, magnetite, and other opaque minerals may be present in small quantities; altered plutons may contain chlorite, tremolite-actinolite, epidote, calcite, and sphene. Pyroxene is commonly replaced by hornblende. Found mostly in Granville and Person counties.

um Ultramafic rocks: Olive-green to dark-green, greenish-gray to black, fine- to coarse-grained, massive to well-foliated, metamorphosed lens-shaped bodies of pyroxenite, serpentinite, and soapstone. Some are individual bodies of these rock types but most are mixed. Pyroxenite is composed primarily of pyroxene and/or amphibole, plagioclase, and opaque minerals. Serpentinite and soapstone contain talc, chlorite, antigorite, actinolite, epidote, magnetite, and occasionally chromite and corundum. Found predominantly in western Person, southeastern Granville, and western Franklin counties.

METASEDIMENTARY AND METAVOLCANIC ROCKS

fv Felsic Volcanic rocks: Buff to red, light- to medium-gray to greenish-gray, fine- to medium-grained, massive to well-foliated, metamorphosed rhyolite flows and felsic tuffs; includes felsic crystal tuffs as well as felsic crystal-lithic tuffs with well-developed foliation. Rhyolite flows are commonly flow banded, porphyritic, and/or spherulitic and lack well-developed foliation. Predominant minerals are feldspar, quartz, sericite, chlorite, and epidote; minor amount of light grayish-green to dark green pyroclastic rocks and flows of intermediate to mafic composition are interlayered with the felsic volcanic rocks.

fv+mv Mixed felsic and mafic volcanic rocks: Intimate mixture of felsic and mafic volcanic rocks. Felsic volcanic rocks are described under the felsic volcanic rock unit.

Mafic volcanic rocks consist of gray, medium greenish-gray, dark green to black, massive to well-foliated, dense, fine-grained, locally porphyritic and/or amygdaloidal, metamorphosed andesitic to mafic tuffs and flows; composed primarily of chlorite, hornblende, actinolite, epidote, plagioclase, calcite, and sphene. Found in northern Granville and western Person counties.

- ve Volcaniclastic-epiclastic rocks: Buff to light greenish-gray, massive to well-foliated, metamorphosed tuffaceous epiclastic rocks and reworked tuffs. Includes phyllitic volcanic sandstone, siltstone, and sericite phyllite, chlorite-sericite phyllite, and minor conglomerate and pyroclastic deposits of felsic to mafic composition. Rock fragments include quartz, feldspar, and volcanic rock types. Fine-grained matrix consists predominantly of sericite and chlorite.
- pag Interbedded metagraywacke, meta-arkose, greenstone, and chlorite-sericite phyllite: Heterogeneous unit of metagraywacke, meta-arkose, chlorite-sericite phyllite, and greenstone. Includes some felsic metavolcanic rocks. Colors vary from light gray to brown and dark green to medium green. Meta-arkose and metagraywacke are well- to poorly-foliated and are composed primarily of feldspar, quartz, muscovite, chlorite, sericite, epidote, and magnetite. Chlorite-sericite phyllite and greenstone are well-foliated and contain chlorite, sericite, epidote, quartz, and magnetite. Found just east of the Triassic basin in southeastern Granville County. Correlates with a similar unit of metavolcanic and metasedimentary rocks mapped by Parker (1979) just east of the Triassic basin in Western Wake County.
- ar Argillite-mudstone: Light- to medium-gray to brown, fine-grained, metamorphosed, interbedded thinly laminated argillite and massive mudstone; bedding plane and slaty cleavage well-developed in the argillite; composed predominantly of quartz, feldspar, sericite, and chlorite; contains local beds of quartzite; occurs in northeastern Franklin and southeastern Warren counties. Western contact with mixed gneiss in gradational.

METAMORPHIC ROCKS

- hg Hornblende gneiss-amphibolite: Dark green to black, fine- to medium-grained, massive amphibolite and well-foliated hornblende gneiss. Contains hornblende, plagioclase, [±] biotite, epidote, actinolite, and quartz. Commonly interlayered with biotite gneiss and schist.

- fg Felsic gneiss: White to light gray, buff to pink, fine- to coarse-grained, foliated, locally lineated, equigranular to porphyroblastic granitic gneiss; predominant minerals are quartz and feldspar with relatively minor amounts of muscovite, biotite, and garnet; contains minor inclusions of biotite and hornblende gneiss and muscovite-biotite schists. Well-developed lineation is present in the fine- to medium-grained felsic gneiss in western Franklin and south-central Vance counties. Rocks in this area are equivalent to the felsic gneiss of Wake County as mapped by Parker (1979).
- ag Augen gneiss: Light gray to pink, medium- to coarse-grained biotite-muscovite granitic gneiss containing microcline augen; commonly interlayered with siltstone and muscovite-biotite schist in eastern Warren County. Also found in central and southeastern Vance County.
- Ms Mica schist: Light-gray to silver-gray to brown, fine- to medium-grained, well- to poorly-foliated, muscovite schist and muscovite-biotite schist; predominant minerals are muscovite, sericite, biotite, and quartz; accessory minerals include biotite, sillimanite, garnet, tourmaline, magnetite, and graphite. Unit contains minor amounts of biotite schist, phyllite, mica gneiss, hornblende gneiss, and feldspathic quartzite; occupies wide zone extending northward from North-central Franklin County to the North Carolina-Virginia State Line; gradual increase in the gneissic component from east to west within the unit.
- Mgs Mixed gneiss and schist: Heterogeneous unit of light- to dark-colored, fine- to coarse-grained, massive to well-foliated and layered gneiss and schist. Includes both biotite- and muscovite-feldspar gneiss, quartzitic gneiss, hornblende gneiss, muscovite and biotite schist, and sericite-chlorite phyllite; calcareous gneiss occurs locally in Northwestern Person County. Biotite- and muscovite-feldspar gneiss are commonly porphyroblastic. Predominant minerals are quartz and feldspar with varying amounts of hornblende, muscovite, sericite, biotite, garnet, and epidote. Pegmatite dikes are present locally. A potassium-argon age determination of 259 ± 10 M.Y. has been obtained for formation of the gneiss near Henderson in Vance County (Kulp and Eckelmann, 1961).
- Msg Mixed schist, siltstone, and gneiss: A heterogeneous unit of well-foliated, interbedded fine- to medium-grained muscovite schist, muscovite-sericite schist, fine grained metasiltstone, and rare augen gneiss and amphibolite; composed predominantly of muscovite, sericite, fine-grained quartz, and feldspar; occurs in

a band extending from northeastern Franklin County northward through eastern Warren County.

- ss Muscovite-garnet-staurolite schist: Silver-gray, well-foliated, very fine-grained muscovite schist and phyllite; contains euhedral megacrysts of garnet, staurolite, and biotite. Kyanite is present locally; well-developed crenulation cleavage overprints the schistosity. Forms a relatively narrow distinctive unit traceable from northeastern Franklin County northward through Warren County to the North Carolina-Virginia State line.

- qt Quartzite: Pale-gray, fine-grained, massive, feldspathic quartzite; consists predominantly of quartz but contains feldspar, muscovite, biotite, sericite, epidote, and magnetite. Fine banding in the rock is produced by graded bedding and compositional differences in adjacent fine beds. Fine secondary quartz pegmatite veins are present along bedding planes. Found in northeastern Warren County.

- sb Siliceous breccia: Buff to pink to white, very fine-grained to aphanitic massive quartz and quartz breccia zones; contains minor muscovite and sericite; comb structure present along fractures which are parallel to strike of the zones; small irregular vugs lined with quartz crystals present locally; angular fragments in the breccia range up to two centimeter; zones vary from a few feet up to 70 meters in width.

SELECTED REFERENCES

- Allen, E.P., and Wilson, W.F., 1968, Geology and mineral resources of Orange County, North Carolina: North Carolina Division of Mineral Resources Bulletin 81, 58 p.
- Anderson, G.D. and Fullagar, P.D., 1977, Geochronology of the Boy Scout-Jones molybdenum prospect, southwestern Halifax County, North Carolina (abs.): Geological Society of America Abstracts with Programs, v. 9, p. 114.
- Allen, E.P., Clays and shales of the North Carolina Piedmont: North Carolina Geological Survey Section Information Circular 25 [unpublished].
- Bain, G.L., and Thomas, J.D., 1966, Geology and ground water in the Durham area, North Carolina: Department of Water Resources, Division of Ground Water Bulletin 7, 147 p.
- Bain, G.L., and Harvey, B.W., 1977, Field guide to the geology of the Durham Triassic basin: Carolina Geological Society Field Trip Guidebook, 83 p.
- Briggs, D.F., Gilbert, M.C., Glover, L. III, 1978, Petrology and regional significance of the Roxboro Metagranite, North Carolina: Geological Society of America Bulletin, v. 89, p. 511-521.
- Broadhurst, S.D., 1950, A general survey of some high-silica materials in North Carolina: Division of Mineral Resources Information Circular 7.
- Broadhurst, S.D., and Councill, R.J., 1953, High-Alumina minerals in the Volcanic-slate belt series of North Carolina: North Carolina Division of Mineral Resources Information Circular 10, 22 p.
- Broadhurst, S.D., 1956, Lithium resources of North Carolina: North Carolina Division of Mineral Resources Information Circular 15, 37 p.
- Broadhurst, S.D., and Parker, J.M., III, 1959, Guidebook for Piedmont field trip, featuring metamorphic facies in the Raleigh area, North Carolina: Southeastern Section of the Geological Society of America Guidebook, 24 p.
- Butler, J.R., and Ragland, P.C., 1969, A petrochemical survey of plutonic intrusions in the Piedmont, southeastern Appalachians, U.S.A.: Contributions to Mineralogy and Petrology, v. 24, p. 164-190.
- Campbell, M.R., and Kimball, K.W., 1923, The Deep River coal field of North Carolina: North Carolina Geological and Economic Survey Bulletin 33, 95 p.
- Burt, E.R., 1977, Alphabetical listing of theses and dissertations of North Carolina geology: North Carolina Geology and Mineral Resources Section Open File Report 77-1, 19 p.

- Carpenter, P.A., III, 1970, Geology of the Wilton area, Granville County, North Carolina [Masters]: North Carolina State University, Raleigh, North Carolina, 105 p.
- Carpenter, P.A., III, 1972, Gold resources of North Carolina: North Carolina Division of Mineral Resources Information Circular 21, 55 p.
- Carpenter, P.A., III, 1976, Metallic mineral deposits of the Carolina slate belt, North Carolina: North Carolina Mineral Resources Section Bulletin 84, 166 p.
- Casadevall, Tom, 1977, The Nutbush Creek dislocation, Vance County, North Carolina, and Mecklenburg County, Virginia - a probable fault of regional significance (abs.): Geological Society of America Abstracts with Programs, v. 9, no. 2, p. 127-128.
- Casadevall, Tom, and Rye, R.O., 1980, The Tungsten Queen deposit, Hamme district, Vance County, North Carolina: A stable isotope study of a metamorphosed quartz-huebnerite vein: Economic Geology, v. 75, p. 523-537.
- Charles, W.C., 1960, The east border of the Durham Triassic basin of North Carolina [Masters]: University of North Carolina, Chapel Hill, North Carolina, 47 p.
- Conley, J.F., 1978, Geology of the Piedmont of Virginia-interpretations and problems, in Contributions to Virginia Geology III: Virginia Division of Mineral Resources Publication 7, p. 115-149.
- Cook, J.T., 1968, Geology of the Oxford area, Granville County, North Carolina: [Masters]: North Carolina State University, Raleigh, North Carolina, 117 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1976, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5103-2, 170 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1977, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5103-3, 143 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1977, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5103-4.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1977, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5103-5, 96 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1978, Evaluation and

- targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5648-1, 173 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1978, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU 5648-4, 156 p.
- Costain, J.K., Glover, Lynn, III, and Sinha, A.K., 1979, Evaluation and targeting of geothermal energy resources in the Southeastern United States: Virginia Polytechnic Institute and State University Progress Report VPI & SU-78ET-27001-7, 146 p.
- Councill, R.J., 1954, The Commercial granites of North Carolina: North Carolina Division of Mineral Resources Bulletin 67, 56 p.
- Espenshade, G.H., 1947, Tungsten deposits of Vance County, North Carolina, and Mecklenberg County, Virginia: U.S. Geological Survey Bulletin 948A, 17 p.
- Espenshade, G.H., and Potter, D.B., 1960, Kyanite, sillimanite and andalusite deposits, southeastern United States: U.S. Geological Survey Professional Paper 336, 121 p.
- Foose, M.P., and Slack, J.F., 1978, Premetamorphic hydrothermal origin of the Tungsten Queen vein, Hamme district, North Carolina as indicated by mineral textures and minor structures: U.S. Geological Survey Open-File Report OF-78-427, 34 p.
- Foose, M.P., Slack, J.F., and Casadevall, Tom, 1980, Textural and structural evidence for a predeformation hydrothermal origin of the Tungsten Queen deposit, Hamme district, North Carolina: Economic Geology, vol. 75, p. 515-522.
- Fullager, P.D., 1971, Age and origin of plutonic intrusions in the Piedmont of the southeastern Appalachians: Geological Society of America Bulletin, v. 82, p. 2845-2862.
- Fullager, P.D., and Butler, J.R., 1979, 325 to 265 M.Y. - Old Granitic plutons in the Piedmont of the Southeastern Appalachians: American Journal of Science, v. 279, p. 161-185.
- Gair, J.E., 1977, Maps and diagrams showing structural control of the Hamme tungsten deposit, Vance County, North Carolina: U.S. Geological Survey Map I-1009.
- Glover, Lynn, III, Sinha, A.K., Higgins, M.W., and Kirk, W.S., 1971, U-Pb dating of Carolina slate belt and Charlotte belt rocks, Virgilina district, Virginia and North Carolina (abs.): Geological Society of America Abstracts with Programs, v. 3, no. 5, p. 313.
- Glover, Lynn, III, and Sinha, A.K., 1973, The Virgilina deformation, a late Precambrian to Early Cambrian (?) orogenic event in the central

- Piedmont of Virginia and North Carolina: American Journal of Science, v. 273A, Cooper Volume, p. 234-251.
- Griffitts, W.R., and Olson, J.C., 1953, Mica deposits of the southeastern Piedmont, Part 6, outlying deposits in North Carolina: U.S. Geological Survey Professional Paper 248-D. p. 283-293.
- Hadley, J.B., 1973, Igneous rocks of the Oxford area, Granville County, North Carolina: American Journal of Science v. 273-A, Cooper Volume, P. 217-233.
- Hadley, J.B., 1974, Geologic Map of the Oxford quadrangle, Granville and Vance counties, North Carolina: U.S. Geological Survey Miscellaneous Field Studies Map MF-608.
- Hatcher, R.D., Jr., Howell, D.E., and Talwani, P., 1977, Eastern Piedmont fault system; Speculations on its extent: Geology, v. 5, p. 636-640.
- Hatcher, R.D., Jr., Howell, D.E., and Talwani, P., and Zietz, I., fault system - Some speculations on its extent: Geological Society of American Abstracts with Programs, v. 9, p. 145-146.
- Julian, E.L., 1972, Aplite-pegmatite-granite relations in the Castalia quarry, Franklin County, North Carolina, and petrology of the surrounding granite [Masters]: North Carolina State University, Raleigh, North Carolina, 61 p.
- Koch, N.F., 1967, The diabase of the Butner - Creedmoor area, Granville County, North Carolina: Southeastern Geology, v. 8, n. 2, p. 73-79.
- Kreisa, R.D., 1980, Geology of the Omega, South Boston, Cluster Springs, and Virgilina quadrangles: Virginia Division of Mineral Resources Publications 5, 22 p.
- Kulp, J. Lawrence, and Eckelmann, 1961, Potassium-argon isotopic ages on micas from the Southern Appalachians: New York Academy of Science Annal., v. 91, p. 408-419.
- Laney, F.B., 1917, The geology and ore deposits of the Virgilina district of Virginia and North Carolina: Virginia Geological Survey Bulletin 14, 175 p.
- LeGrand, H.E., 1960, Geology and groundwater resources of Pittsylvania and Halifax counties, Virginia: Virginia Division of Mineral Resources Bulletin 75, 87 p.
- May, J.V., and Thomas, J.D., 1968, Geology and groundwater resources in the Raleigh area: Department of Water Resources, Division of Ground Water Bulletin 15, 135 p.
- McConnell, K.I., 1974, Geology of the Late Precambrian Flat River complex and associated volcanic rocks near Durham, North Carolina [Masters]: Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 65 p.

- McDaniel, R.D., and McKenzie, B.J., 1976, A directory of North Carolina mineral producers: North Carolina Mineral Resources Section Special Publication, 64 p.
- McIntosh, F.K., 1948, Investigation of the Hamme tungsten district, Vance County, North Carolina, and Mecklenburg, County, Virginia: U.S. Bureau of Mines Report of Investigations 4380, 6 p.
- Mundorff, M.J., 1946, Ground Water in the Halifax area, North Carolina: North Carolina Department of Conservation and Development Bulletin 51, 76 p.
- Mundorff, J.J., 1948, Geology and ground water in the Greensboro area, North Carolina: North Carolina Division of Mineral Resources, Bulletin 55, 108 p.
- Newberry, A.W., Roos, A., Robertson, A.F., Dahners, L.A., and Cohen, C.J., 1948, Investigation of the Virgilina copper district, Virginia and North Carolina: U.S. Bureau of Mines Report of Investigations 4384, 14 p.
- Nitze, H.B.C., and Hanna, G.B., 1896, Gold deposits of North Carolina: North Carolina Geological Survey Bulletin 3, 198 p.
- Nitze, H.B.C., and Wilkins, H.A.J., 1897, Gold mining in North Carolina and adjacent south Appalachian regions: North Carolina Geological Survey Bulletin 10, 164 p.
- North Carolina Department of Conservation and Development, Division of Mineral Resources, 1958, Geologic Map of North Carolina, scale 1:500,000.
- Pardee, J.T., and Park, C.F., Jr., 1948, Gold deposits of the southern Piedmont: U.S. Geological Survey Professional Paper 213, 156 p.
- Parker, J.M., III, 1963, Geologic setting of the Hamme tungsten district, North Carolina and Virginia: U.S. Geological Survey Bulletin 1122-G, G1-G69.
- Parker, J.M., III, 1968, Structure of easternmost North Carolina Piedmont: Southeastern Geology, v.9, no. 3, p. 117-131.
- Parker, J.M., III, 1977, Structure of the Raleigh belt of eastern Piedmont in Wake County, North Carolina (abs.): Geological Society of America Abstracts with Programs, v. 9, no. 2, p. 173.
- Parker, J.M., III, 1978, Structure of west flank of the Raleigh belt, North Carolina: in Snoke, A.W., ed., Geological investigations of the eastern Piedmont, Southern Appalachians, Carolina Geological Society Field Trip Guidebook 1978, p. 17.
- Parker, J.M., III, 1979, Geology and Mineral Resources of Wake County, North Carolina: North Carolina Geological Survey Section Bulletin 86, 122 p.

- Prouty, W.F., 1931, Triassic deposits of the Durham basin and their relation to other Triassic areas of the eastern United States: American Journal of Science, v. 21, no. 126, p. 473-490.
- Prouty, W.F., 1928, Triassic deposits of the Durham basin: Geological Society of America Bulletin, v. 39, p. 210-211.
- Reinemund, J.A., 1955, Geology of the Deep River coal field, North Carolina: U.S. Geological Survey Professional Paper 246, 159 p.
- Sinha, A.K., 1976, Timing of metamorphic and igneous events in the central Piedmont and Blue Ridge (abs.): Geological Society of America Abstracts with Programs, v. 8, p. 267.
- Slack, J.F., Foose, M.P., and Casadevall, T., 1978, Huebnerite textures and related fold structures and their bearing on ore genesis at the Hamme (Tungsten Queen) mine North Carolina (abs.): Geological Society of America Abstracts with Programs, v. 10, no 4, p. 198.
- Spence, W.H., and McDaniel, R.D., 1979, Upper Cretaceous trachytes of the northeastern North Carolina Piedmont: Geological Society of America Abstracts with Programs, v. 11, p.
- Steel, W.G., 1952, The eastern Piedmont pegmatite district of North Carolina: Division of Mineral Resources Information Circular 9, 26 p.
- Stoddard, E.F., Cavaroc, V.V., McDaniel, R.D., 1978, Status of geologic research in the Raleigh belt and adjacent areas, eastern Piedmont of North Carolina: in Snoke, A.W., ed., Geological investigations of the eastern Piedmont, Southern Appalachians, Carolina Geological Society Field Trip Guidebook, p. 812.
- Stoddard, E.F., and McDaniel, R.D., 1979, Geology of the Raleigh belt in eastern Franklin and Warren counties, North Carolina: Geological Society of America Abstracts with Programs, v. 11, p. 214.
- Stuckey, J.L., and Conrad, S.G., 1958, Explanatory text for geologic map of North Carolina: North Carolina Division of Mineral Resources Bulletin 71, 51 p.
- Stuckey, J.L., 1965, North Carolina: its geology and mineral resources: North Carolina Department of Conservation and Development Special Publication, 550 p.
- Stucky, J.L., 1967, Pyrophyllite deposits in North Carolina: North Carolina Division of Mineral Resources Bulletin 80, 38 p.
- Tobish, O.T., and Glover, Lynn, III, 1969, Metamorphic changes across part of the Carolina slate belt - Charlotte belt boundary, North Carolina and Virginia: U.S. Geological Survey Professional Paper 650-C, p. C1-C7.
- Tobish, O.T., and Glover, L., III, 1971, Nappe formation in part of the southern Appalachian Piedmont: Geological Society of America

Bulletin, v. 82, no. 8, p. 2209-2229.

- Tobish, O.T., 1972, Geologic map of the Milton quadrangle, Virginia-North Carolina, and adjacent areas of Virginia: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-683, 1 sheet, scale 1:62,500.
- U.S. Geological Survey, 1971, Aeromagnetic map of the Milton quadrangle, Halifax and Pittsylvania counties, Virginia and Caswell and Person counties, North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-746.
- U.S. Geological Survey, 1971, Aeromagnetic map of the South Boston quadrangle, Halifax County, Virginia, and Person and Granville counties, North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-747.
- U.S. Geological Survey, 1971, Aeromagnetic map of the Winstead quadrangle, Person and Caswell counties, North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-748.
- U.S. Geological Survey, 1971, Aeromagnetic map of the Roxboro quadrangle, Person and Granville counties, North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-749.
- U.S. Geological Survey, 1973, Aeromagnetic map of the Oxford quadrangle and part of the Clarksville quadrangle, north-central North Carolina: U.S. Geological Survey Geophysical Investigations GP-882.
- U.S. Geological Survey, 1973, Aeromagnetic map of the north parts of the Durham North and Creedmoor quadrangles, north-central North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-883.
- U.S. Geological Survey, 1973, Aeromagnetic map of the Henderson quadrangle and parts of the Louisburg and Boydton quadrangles, north-central North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-884.
- U.S. Geological Survey, 1973, Aeromagnetic map of the Norlina quadrangle and parts of the Castalia and South Hill quadrangles, north-central North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-885.
- U.S. Geological Survey, 1973, Aeromagnetic map of the Essex-Roanoke Rapids area, northeastern North Carolina: U.S. Geological Survey Geophysical Investigations Map GP-886.
- U.S. Geological Survey, 1974, Aeromagnetic map of south half of the Creedmoor quadrangle, North Carolina: Preliminary map on open-file, scale 1:62,500, Open-File Report no. 74-29.
- U.S. Geological Survey, 1974, Aeromagnetic map of south half of Durham North quadrangle, North Carolina: Preliminary map on open-file, scale 1:62,500, Open-File Report no. 74-29.

- U.S. Geological Survey, 1974, Aeromagnetic map of parts of the Greensboro and Raleigh 1 x 2 quadrangles North Carolina: U.S. Geological Survey Open-File Report 74-29.
- U.S. Geological Survey, 1977, Aeromagnetic map of the north-central North Carolina: U.S. Geological Survey Open-File Report 77-192.
- U.S. Geological Survey, 1977, Aeroradioactivity map of north-central North Carolina: U.S. Geological Survey Open-File Report 77-193.
- Virginia Division of Mineral Resources, 1963, Geologic map of Virginia, scale 1:500,000.
- Vliek, P.J., Robinson, E.S., Glover, Lynn, III, 1978, Effects of regional metamorphism and structure on magnetic anomalies over the Carolina slate belt near Roxboro, North Carolina: Geological Society of America Abstracts with Programs, v. 10.
- White, W.A., 1943, Tungsten deposit near Townsville: North Carolina Division of Mineral Resources, Mineral Investigations 1, 9 p.
- White, W.A., 1945, Tungsten deposit near Townsville, North Carolina: American Mineralogist, v. 30, p. 97-110.
- Wilson, W.F., 1975, Bibliography of North Carolina geology, 1901-1960: North Carolina Division of Mineral Resources Bulletin 82, 87 p.
- Wilson, W.F., 1975, Geology of the Winstead quadrangle, North Carolina: North Carolina Mineral Resources Section Geological Map 2, 1 sheet, scale 1:62,500.
- Wilson, W.F., and Carpenter, P.A., III, 1975, Region J geology: a guide for North Carolina mineral resource development and land use planning: North Carolina Mineral Resources Section Regional Geology Series 1, 76 p.
- Wilson, W.F., Carpenter, P.A., III, Burt, E.R., McDaniel, R.D., Coffey, J.C., and McKenzie, B.J., 1978, Geology of the Raleigh 1 x 2 quadrangle, North Carolina: E.I. Du Pont De Nemours and Company Report DP-1490.