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ANDERSONVILLE QUADRANGLE

GEOLOGY OF THE ANDERSONVILLE QUADRANGLE, VIRGINIA

By John D. Marr, Jr.
1980

UNIT CHARACTERISTICS WITH GEOLOGIC AND ECONOMIC FACTORS AFFECTING LAND MODIFICATION

CENOZOIC — TERTIARY TO QUATERNARY

al — Alluvium: *Floodplain deposits, poorly sorted, subrounded to rounded pebbles and cobbles in a crudely stratified sand and silt matrix: 0-30 feet (0-9 meters) thick.*

Forms well-drained silty to sandy loam containing scattered clay lenses. Lowland subject to periodic flooding that discourages construction, but replenishes soil nutrients. Slopes steepened during construction are subject to sloughing and collapse. Unit well-suited for agriculture and recreational uses. Potential source of sand and gravel.

td — Terrace deposits: *Remnant fluvial deposits, rounded to subrounded cobbles to gravels in a crudely stratified sand, silt and clay matrix with subrounded white quartz cobbles at base; 0-15 feet (0-5 meters) thick.*

Consists of fine sandy loam with clay or gravel subsoil. Rapid percolation of water through gravel layers overlying impermeable clay lenses poses possibility of seepage in deep construction cuts. Gentle topography and loamy soils give unit high potential for agricultural purposes.

MESOZOIC — TRIASSIC

d — Diabase dikes: *Dark-gray to black, fine-to medium-grained diabase with ophitic texture. Weathers to a dark-red, clay-rich saprolite. Spheroidally weathered boulders are common in many places.*

Long narrow zones of dense, poorly-drained soils, that become sticky and highly plastic when wet, overlie the dikes. The contact between these dikes and the surrounding rocks provides a pathway for water seepage. Spheroidally weathered boulders, which are common in the saprolite, require heavy machinery or blasting to remove. The combination of sticky muds and spheroidal boulders narrows the uses of this unit. Some of the wider dikes may have potential as a source of dimension or facing stone.

ORDOVICIAN

Oap, Oaq (K), Oac (K)(S) — Arvonia Formation: **Oap**, *porphyroblastic garnet-mica schist, light-gray to dark-grayish-green, medium-to coarse-grained metasiltstones and metaclaystones; crinkle-folded and well-foliated; occupies folded cores of isoclinal synclines. The intersection of two cleavage surfaces at slight angles to the pervasive foliation produces distinctive crinkle folds. Graphite is disseminated throughout rock.*

Arvonia Formation rocks are confined to cores of synclines. The unit is moderately resistant to erosion and underlies upland areas. The schist weathers to a thin ocherous soil overlying moderately permeable saprolite. Septic tank drainage should be adequate for low-to moderate-density housing. The schist contains sulfides in sufficient quantity to locally affect the potability of groundwater. The schist has a pervasive foliation that can act as a slip-surface which requires deep construction cuts to be buttressed or slopes at such sites to be dug at the angle of pervasive foliation. The soils are generally acid and require lime for agricultural purposes.

Oaq, *quartzite, light-yellowish-gray, medium-grained, banded to cross-bedded micaceous quartzite as much as 75 feet (23 meters) thick occurs above the basal quartz-mica schist. The quartzite weathers to a very pale-orange, sandy, micaceous saprolite.*

Unit weathers to a thin stony to sandy soil overlying solid bedrock that is impermeable, except where it is jointed. Septic tank drainage would be inadequate and the potential for solid or liquid waste disposal is low. Pyrite locally decreases the potability of ground water. Deep construction cuts are moderately stable, but the bedrock requires blasting. These areas are currently being used for woodland, recreation and low-density housing. Kyanite and manufactured sand are produced from the kyanite quartzite at Willis Mountain.

Oac, *quartz-mica schist with layers of micaceous quartzite and quartz-mica conglomerate, light-greenish-gray to light-gray; medium-to coarse-grained, moderately foliated, moderately lineated, locally discontinuous and locally conglomeratic. Conglomeratic basal portion contains elongate, subrounded, light-blue, quartz pebbles in a matrix of muscovite and quartz. The schist weathers to a light-yellowish-gray, sandy, micaceous saprolite. (K), kyanite constitutes as much as 30% of the rock in a few places. Kyanite occurs as massive lenses and stringers segregated from quartz layers; locally contains "jelly bean" gravels. Primary sedimentary structures include: wedge-shaped quartzite layers and quartzite-metapelite couplets; fining-upward sequences; channel fillings and both large-and small-scale cross-beds. (S), sillimanite-bearing zones occur within the conglomerate unit. The sillimanite is dispersed through the rock as fibrous, prismatic crystals.*

Schists are on flanks of linear ridges held up by quartzites. The schists are moderately permeable and septic tank drainage should be adequate for low-to medium-density housing. This unit has a pervasive foliation that provides a potential slip-surface which requires slopes in areas of deep construction to be buttressed or to be cut parallel to the pervasive foliation. Unit produces thin inorganic soils that require fertilization.

PALEOZOIC — CAMBRIAN

p — Pegmatite: *Inequigranular, coarse-grained granitic pegmatites discordantly intruded into the rocks of the Chopawamsic Formation. The pegmatites, which are primarily composed of quartz, potassium feldspar, and muscovite with minor amounts of plagioclase feldspar, are usually associated with tightly folded rocks as ovoid masses; their long dimension corresponds to the regional foliation trend.*

Rock weathers to a very pale-orange to very light-gray saprolite whose surface is strewn with bits of feldspar and mica. The pegmatites are permeable and would provide good septic tank drainage. Fresh construction cuts are moderately stable, but the rock weathers rapidly and is then subject to sloughing. Some of the larger pegmatites have been mined for feldspar and muscovite. The small size of these pegmatites hinders the full exploitation of their resources.

Chopawamsic Formation (Upper Unit: bgn, fv, g, fq, tts, agn; Lower Unit: fq, fv, cs, iv); upper unit: **bgn**, *biotite gneiss, light-gray, medium-to fine-grained, moderately foliated, moderately to well-banded biotite gneiss underlies and forms interlayers with amphibole gneiss. Contacts with amphibole gneiss are gradational over tens of feet and are characterized by an increase in interlayering of the two units. The biotite gneiss ranges from monotonous masses of salt-and-pepper granitic gneiss to a well-segregated, banded biotite-quartz-feldspar gneiss. The biotite gneiss is not resistant to weathering and occupies areas of gentle topography, where it forms thick, light-to pale-brown saprolites.*

Rock is readily weathered and underlies areas of gentle, rolling topography which have deep loamy soils overlying a porous and permeable saprolite. Septic tank drainage should be adequate for moderate-to high-density housing. Some potential exists for solid waste disposal, however, the unit is not suited for liquid waste disposal as contamination of ground-water reservoirs may result from such use. Deep construction cuts are subject to sloughing. Areas denuded of vegetation are subject to extreme erosion.

fv, *felsic volcanic rocks, light-yellowish-gray to white, equigranular rocks of dacitic to rhyodacitic composition. Rocks are interlayered throughout all units within the Chopawamsic Formation. Small phenocrysts of quartz and feldspar are locally common. The felsic volcanic rocks are primarily composed of quartz and feldspar with minor amounts of muscovite.*

Bodies of this rock, which are lenses, have characteristics similar to those of the biotite gneiss.

agn, *amphibole gneiss, greenish-black to black, medium-to coarse-grained, poorly to well-lineated, massive to well-banded amphibole gneiss interlayered with biotite gneiss on all scales from one foot (0.3 m) to hundreds of feet thick. The amphibole gneiss is commonly jointed and contains ptygmatic folds. Medium-grained, light-greenish-gray, quartz-epidote stringers are common and are commonly associated with sulfide mineralization. Amphibole occurs either as tremolite-cummingtonite or as hornblende-cummingtonite.*

Rock is moderately resistant to weathering and forms a rolling topography; weathers to a dark-reddish-orange clayey soil that overlies a sticky, impermeable saprolite. When wet, the soils form a sticky, highly plastic mud. The rock is impermeable, except in the many places where it is abundantly jointed. The joints promote seepage and, therefore, inhibit use of the unit for septic tank drainage and solid and liquid waste disposal. Construction cuts are stable when dry but become unstable when wet. Soils are acid and require lime and fertiliizer.

fq, *ferruginous quartzites as fine-to medium-grained, dark-reddish-gray, massive to well-banded, persistent to discontinuous lenses occur with the mafic volcanic rocks of the Chopawamsic Formation. Magnetite and specular hematite are interlayered with quartz to produce banding. Ferruginous quartzites in many places are associated with weathered massive sulfide (gossan) zones.* **g**, *gossan zones, dark-brownish wad composed primarily of magnetite and hematite.*

Rocks are resistant to weathering and tend to form short, linear ridges. The unit weathers to shallow, stony soils. Septic tank drainage is poor because the rock is generally impermeable. Construction cuts are generally stable; blasting may be required for deeper cuts. Some potential exists for the mining of massive sulfide ores (gossan) associated with these rocks.

tts, *pale-to dark-greenish-gray, inequigranular talc-tremolite schist as irregular sill-like bodies occur in the amphibole gneiss. The compositions of the schist range from talc-tremolite to actinolite-chlorite. The schists are moderately resistant and, where they are large enough, tend to form small knobs and ridges.*

Rock is in elongate, pod-shaped bodies that weather to a heavy, sticky soil overlying dense, impermeable saprolite that forms a thick, viscous mud when wet. Septic tank drainage is poor and the potential for solid waste disposal is low. Construction cuts in the unit generally require blasting and tend to be unstable. Some potential exists for quarrying dimension stone.

Lower unit: **iv**, *metamorphosed felsic to intermediate volcanics, chiefly andesitic in composition. Fine- to medium-grained, dark-greenish-gray, moderately foliated amphibole gneiss and schist.*

Rock is moderately resistant to weathering and forms a rolling topography. Overlying saprolite is impermeable and forms a sticky, viscous mud when wet. Rock is impervious and not well suited for septic tank drainage or for solid or liquid waste disposal. Soils are slightly acid; high clay content in soil tends to hold fertilizer.

cs, *chlorite schist, thin lenses and interlayers within volcanic rocks of intermediate composition* (**iv**); *consists primarily of chlorite, quartz and albite with accessory epidote.*

These thin, narrow units of rock weather to a thin reddish soil overlying moderately permeable saprolite. Septic tank drainage should be adequate. Rock has a pervasive foliation that may act as a surface of slippage, thus relatively deep, buttressed cuts or cuts at angle of pervasive foliation are required in construction work.

pgr — Plagioclase granite: *White to light-gray, faintly foliated, coarse- to medium-grained granite composed of quartz, plagioclase feldspar, muscovite and minor amounts of microcline.*

Weathers readily to loamy soils and saprolite. Septic tank drainage should be adequate for moderate- to high-density housing. There is some potential for solid waste disposal. Deep construction cuts are subject to slump. Areas denuded of vegetation are subject to extreme erosion.

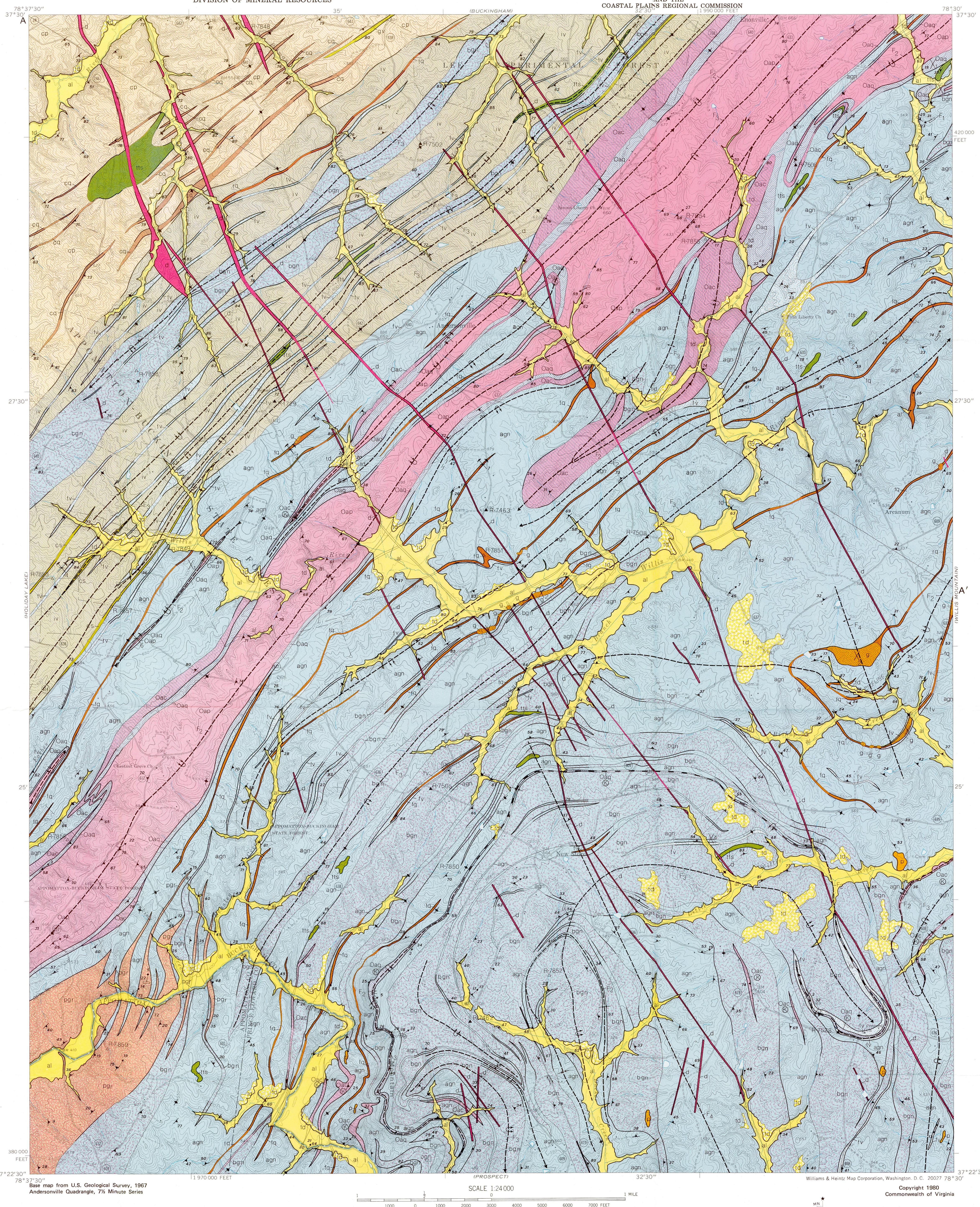
gv — Greenstone volcanic rock: *Dense, dark-green, faintly-foliated, homogenous mafic rock composed primarily of chlorite, actinolite, albite and epidote with accessory amounts of quartz, magnetite and zircon. This unit occurs in the upper part of the Candler phyllite.*

cp, cq — Candler Formation: **cp**, *quartz-mica phyllite and schist, silvery-gray to light-green, fine-grained, highly fissile rock typically containing double cleavage. Bedding is defined by a faint color banding set at a slight angle to incipient foliation. Quartz veins are common and range from thin stringers to lenticular pods. Quartz layers are also common as 1/16-inch-(0.25 cm-) thick bands.*

Rock weathers to a reddish-gray to medium-gray punky saprolite. The rock weathers rapidly and erosion is rapid on areas denuded of foliage. The rock is moderately impermeable and forms a slick viscous mud when wet. Septic tank drainage would be adequate for low-to medium-density housing. High clay content of weathered rock tends to retain fertilizer. Unit well suited for agricultural and timber lands.

cq, *quartzite, thin discontinuous quartzites composed primarily of fine-grained quartz (75%, 0.10 mm) and muscovite (25%, 0.15 mm); imparts a faint foliation to the phyllite.*

Thin, discontinuous lenses and layers of dense, impermeable rock except where abundantly jointed. Septic tank drainage would be inadequate and the potential for solid or liquid waste disposal is low. Deep construction cuts are moderately stable; bedrock may require blasting.



KEY

CONTACTS
- Exposed or approximate
- Covered or inferred

FOLDS
- Anticline: trace of fold and direction of plunge
- Syncline: trace of fold and direction of plunge
- Overturned anticline: trace of fold and direction of plunge
- Overturned syncline: trace of fold and direction of plunge
- Minor fold: strike and dip of axial plane; plunge of axis
- F_1 — Tight intrafolial isoclines (observed in outcrop)
- F_2 — Tight refolded isocline
- F_3 — Open, upright or overturned fold
- F_4 — Open, northwest-trending fold

FAULTS
- Black line where exposed or approximate; gray line where covered or inferred; arrows indicate direction of relative movement
- Shear zone

FOLIATION
- Strike and dip of foliation
- Strike of vertical foliation
- Horizontal foliation

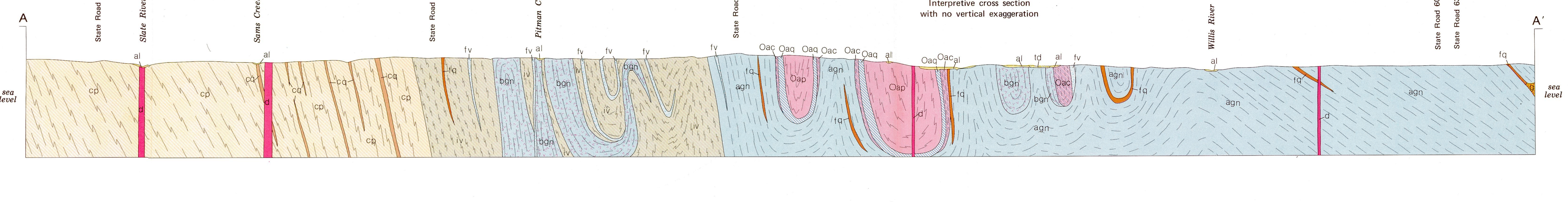
LINEATION
- Direction and angle of plunge of mineral lineation

MINES AND PROSPECTS

Abandoned gold mine
1. Anderson mine No. 1
2. Anderson mine No. 2
3. Bondurant mine
4. Willis Creek mine
5. Flood mine
6. Gilliam mine
7. Copal mine

Prospect
1. Area of numerous prospects (gold)
2. Area of numerous prospects (iron)
3. Area of numerous prospects (kyanite)
4. Prospect (amethyst)

SAMPLE LOCATIONS
- R-7173 — R, repository number of rock sample on file at the Virginia Division of Mineral Resources
- R-7174 — Sample of raw material having potential commercial use, R, repository number of sample on file at Virginia Division of Mineral Resources.



STRATIGRAPHY

The Andersonville quadrangle encompasses an area of approximately 56 square miles (145 square km) in southern Buckingham, eastern Appomattox and northwestern Prince Edward counties in central Virginia within the Piedmont physiographic province. The area has been of interest to base-metal mining groups in recent years. Several abandoned gold mines and significant reserves of kyanite are located within the area.

PRECAMBRIAN OR LOWER PALEOZOIC ROCKS

Candler Formation

The oldest rocks within the Andersonville quadrangle are a sequence of schists and phyllites with interlayered micaceous quartzites that belong to the Candler Formation. Brown (1951) originally named this unit the Candler phyllite and schist and later changed the name to the Candler Formation (Brown, 1953). In the northwestern part of the Andersonville quadrangle, the Candler Formation grades into the overlying Chopawamsic Formation. Conley and Johnson (1975) noted this conformable relationship on strike to the northeast in the Columbia 15-minute quadrangle. The change from Candler phyllites to Chopawamsic metavolcanic rocks is gradational, and the contact between them is drawn where metavolcanic rocks become predominate over phyllite.

Greenstone Volcanic Rock

The upper part of the Candler contains greenstones (metamorphosed mafic volcanic rock). Ern (1968) noted these rocks in the Buckingham 15-minute quadrangle, the area immediately north of the Andersonville quadrangle, and Smith, Milici and Greenberg (1964) mapped the rock as metabasalt. This greenstone is lithically distinct from the volcanic rocks within the Chopawamsic Formation, and the exact relationship of this greenstone to rocks surrounding it is uncertain.

Chopawamsic Formation

Conformably overlying and interlayered with Candler phyllite is the Chopawamsic Formation, which is named for exposures along Chopawamsic Creek in northern Virginia by Southwick, Reed and Mixon (1971). It has been traced into north-central Virginia by Higgins and others (1973), Pavlides and others (1974), and Conley and Johnson (1975). The Chopawamsic was extended into central Virginia by Conley (1978) and Conley and Marr (1979). In the Andersonville quadrangle the Chopawamsic Formation consists of two units. The lower unit is a sequence of metavolcanic rocks of felsic to intermediate compositions. Three rock types are grouped into predominantly felsic and mafic rocks. In several traverses made across the contact between the upper and lower units there is a difference in calcium content in plagioclase feldspars. Feldspars from the lower unit have anorthite contents of 0 to 15 percent and those from the upper unit, 25 to 30 percent. Determinations were made by X-ray diffraction. This contact between the upper and lower units, which does not exactly parallel the one between the Chopawamsic and Arvonia formations, appears to represent a change in degree of metamorphism. The upper part of the Chopawamsic Formation, which is at a higher metamorphic grade, may represent beds folded over the lower part of the Chopawamsic in this area. Both the upper and lower units contain ferruginous quartzites which are unique to the Chopawamsic Formation. These ferruginous quartzites are intimately associated with gossans (iron-bearing zones) which consist predominantly of weathered pyrite and chalcopyrite with minor amounts of galena and sphalerite. In many places the ferruginous quartzites provide "pathways" to the gossans where garnets increase in size and become more manganese rich. One of the larger gossan zones in this area was described by Riesmeyer (1969).

The age of the Chopawamsic Formation is considered to be Early Cambrian based on discordant radiometric zircon ages obtained from felsic rocks (Higgins and others, 1971). Glover, (1974) reported an age of 530 to 570 million years for the Chopawamsic.

Pegmatites

Numerous granitic pegmatites intrude the volcanic rocks of the Chopawamsic Formation. These pegmatites increase in number as the intensity of deformation of the Chopawamsic increases. Because the pegmatites intrude the Chopawamsic rocks, their maximum age is Early Cambrian; because they do not intrude the Arvonia Formation, their minimum age is Middle to Late Ordovician.

Arvonia Formation

The Arvonia Formation overlies the Chopawamsic Formation with angular unconformity (Taber, 1913). The basal unit of the Arvonia Formation is a locally discontinuous quartz-mica schist which contains layers of micaceous quartzite and quartz-mica conglomerate. Some of the conglomeratic clasts are composed of bluish quartz pebbles. These pebbles have come from sources other than Chopawamsic or Candler rocks, which do not contain "blue" quartz within the area studied. Placer gold, probably derived from sulfides within the Chopawamsic rocks, is disseminated in the basal clastic rocks of the Arvonia Formation. The micaceous schist grades upward into a persistent, banded quartzite unit. Both the basal micaceous schist and the banded quartzite contain disseminated graphite and pyrite. Higher in the sequence, the Arvonia consists primarily of light- to dark-gray porphyroblastic muscovite-biotite schist with garnet as porphyroblasts. This schist consists of thin, interbedded metasiltstones and metaclaystones; pyrite is a common accessory mineral.

The rocks of the Arvonia Formation are probably Middle to Late Ordovician in age. No fossils were found within the study area; they were probably destroyed during metamorphism of Arvonia rocks. Metamorphic grade in Arvonia rocks increases toward the south, where characteristic minerals are fibrous sillimanite and kyanite. At the type locality, Arvonia, which is along strike to the northeast, fossil forms identified include: brachiopods, bryozoans, crinoids, pelecypods and trilobites of Middle or Late Ordovician age (Darton, 1892; Dale, 1906; Watson and Powell, 1911; Smith, Milici and Greenberg, 1964; Brown, 1969; and Tillman, 1970). Harper and others (1973) dated the slates of the Arvonia Formation at 300 m.y. using the whole rock K-Ar method. This date does not correspond to any known orogenic event affecting rocks of the Virginia Piedmont and it probably represents a time of cooling when the rocks formed a closed K-Ar system following a metamorphic event (Hadley, 1964).

Included in the Arvonia Formation are the kyanite schist and quartzite at Woods Mountain. Within the schist and quartzite units are wedge-shaped sequences in each of which a basal "jelly bean" gravel grades upward into fine quartzite which in turn grades upward into a nearly pure kyanite. The kyanite quartzite on the eastern flank of Woods Mountain contains large and small-scale relict cross-beds and channel fill structures (Conley and Marr, 1980).

The kyanite schist and kyanite quartzite units at Woods Mountain are mapped with the Arvonia Formation because the stratigraphic sequences and lithologies of the units at Woods Mountain are similar to those of the Arvonia Formation (Conley and Marr, 1980) and because the basal Arvonia Formation contains kyanite and sillimanite at several locations in the Andersonville quadrangle.

TRIASSIC SYSTEM

Diabase Dikes

Several diabase dikes ranging in width from a few feet to about 220 feet (67 m) cut through the metamorphic and sedimentary rocks of the area. Some of these dikes were traced for several miles. They characteristically weather to a red sticky and clayey soil marked by rounded exfoliated boulders. These dikes clearly postdate all known tectonic events and are considered to be Triassic or slightly younger in age.

QUATERNARY SYSTEM

Terrace deposits of unconsolidated gravels and cobbles in a sand, silt and clay matrix are along most of the drainage systems; these deposits are generally less than 10 feet (3 m) thick. The few such deposits in upland areas may represent an older drainage system. Alluvial deposits blanket floodplains of major stream drainages. The alluvium is composed of unconsolidated sand and silt with subrounded to rounded cobbles and pebbles. These deposits reach thicknesses of 30 feet (9 m).

STRUCTURE

The rocks of the area have a complex deformational history. There is evidence that the oldest rocks have undergone four periods of folding. F_1 folds which occur as tight isoclinal, intrafolial folds on the flanks of the larger F_2 folds, were observed within the rocks of the Candler and Chopawamsic formations and not in the rocks of the overlying Arvonia Formation. Pavlides (1973) described a similar relationship between the Chopawamsic Formation and the Quantico Slate, which is a younger formation, in northern Virginia.

F_2 folds occur as tight, isoclinal, refolded synclines and broader, more open anticlines. The tight synclinal folds contain pelitic schists and quartzites of the Arvonia Formation in their cores; intervening anticlines are cored by rocks of the Chopawamsic Formation. The F_2 fold event imposed a pervasive foliation on the rocks. This foliation is disrupted where it is bent by F_3 folding. The F_2 folds generally trend northeast-southwest and are overturned to the northwest.

F_3 folds, which are more open and upright than the F_2 folds, can only be recognized where F_2 folds are bent around the noses of F_3 folds. F_3 folds are the largest scale folds in the area.

Two F_4 folds, open, gentle folds trending northwesterly, are in the quadrangle. F_4 folds are recognizable at the map scale where F_2 and F_3 folds are bent around F_4 axes. F_4 folding did not impose a foliation on the rocks of the area.

ARVONIA SYNCLINORIUM

The Arvonia synclinorium, which is defined at the surface by the limits of the Arvonia Formation, trends north-northeast across the central Virginia Piedmont. It extends from near Carysbrook, Virginia (Smith, Milici and Greenberg, 1964) through the Dillwyn 15-minute quadrangle (Brown, 1969) and the Buckingham 15-minute quadrangle (Ern, 1968) to near Flood, Virginia in the Pamplin 15-minute quadrangle, a distance of approximately forty-one miles (66 km). The Arvonia Formation crosses the Andersonville quadrangle diagonally from the northeast to southwest. Along strike to the northeast, the Arvonia Formation was described by Watson and Powell (1911) as being in, "Closely compressed folds, probably of the isoclinal type." Taber (1913) referred to the slate at Carysbrook, Virginia as lying at the bottom of a synclinal fold. Jonas (1932) considered the structure to represent several closely folded synclines and Stose (1948) considered it to be a double syncline. Brown (1969) thought it to be a single syncline overturned to the northwest. Mapping in the Andersonville quadrangle shows the Arvonia Formation to be contained in a zone of several tight isoclinal synclines. One of these synclines corresponds to the southeastern limb of the larger syncline described by Brown (1969); the other synclines correspond to the northwestern part of this fold. Infolds of Arvonia Formation rock to the northwest of these folds may correspond to the Long Island syncline of Smith, Milici and Greenberg (1964) and of Ern (1968).

Small shear zones occur locally along the southeastern side of the Arvonia synclinorium. These shear zones probably formed in response to the tight folding of the Arvonia Formation and do not, therefore, represent a pervasive shear zone.

ECONOMIC GEOLOGY

By Palmer C. Sweet

MASSIVE SULFIDES

Sulfide deposits (zinc, copper, gold and lead mineralization) occur in the metavolcanic rock of the Chopawamsic Formation southeast of Andersonville (Gair, 1978, p. 53-55). In recent years there has been intensive drilling and other exploration work for massive sulfides by mining companies.

GOLD

Gold is associated with the massive sulfides in the quadrangle (Sweet, 1980). Most of the pits and trenches of six old mines and prospects are on linear ridges of micaceous quartzite and fine-grained, quartz-mica schist of the Arvonia Formation. The gold probably represents placer deposits formed on the eroded surface of rocks of the Chopawamsic Formation. A list of the old mines and prospects with years of activity follows:

Anderson (1 and 2)	placer mining in 1830's; shafts sunk by 1865
Bondurant	placer mining in 1836; shafts sunk in 1865, 1875 and 1901
Copal (Kopall) prospect	prospect in 1880's (?)
Flood (James Anderson's)	placer mining in 1830's; shaft sunk by 1865
Gilliam	shaft sunk in 1865
Willis Creek	placer mining in 1800's

CLAY MATERIALS

Clay-material resources in this area include transported clays and also residual clays, which are on many types of rocks, including quartz-mica schists, amphibolites, and hornblende schists and gneisses. A plastic, dark-red residual clay on the hill near the east side of State Road 638 just south of the intersection of the road and Brickyard Branch may have been a past source of clay material or a past site of a brick plant.

Six samples of clay materials selected from several rock units were tested and evaluated at the Tuscaloosa Metallurgy Research Laboratory under a cooperative program between the Virginia Division of Mineral Resources and the U. S. Bureau of Mines. The test results received are preliminary. Three of the residual clay samples (R-7502, R-7505, and R-7506) were collected in the central to northeastern portion of the quadrangle from the lower part of the Chopawamsic Formation and from the Arvonia Formation. The samples have acceptable test hardness and shrinkage and the material has potential use in structural clay products.

Three residual clay samples from the central to southern part of the quadrangle (R-7462, R-7463, and R-7508) were taken from the upper part of the Chopawamsic Formation; the rock types below the clays are amphibole gneiss and biotite gneiss. Testing of these materials indicates insufficient hardness for structural clay products. These materials may be suitable for other uses, such as fill material. Testing of a sample of residual clay (R-1729) collected about 1.3 miles (2 km) southwest of Andersonville likewise indicated no potential commercial use, but the clay may be suitable for various uses locally. The floodplain of the Appomattox River was explored for clay materials, but no good exposures of clay were found.

KYANITE

Woods Mountain is largely composed of kyanite-bearing quartzite. Kyanite makes up 7.8 to 26.1 weight percent of the rock (Espenshade and Potter, 1960, p. 49). There are low ledges of kyanite-bearing quartzite on the Carwile property about 3 miles (4.8 km) east of Woods Mountain.

CONSTRUCTION MATERIALS

There are no active rock quarries in the area; nor are there sand and gravel operations. A sample (approximately 100 pounds) of weathered amphibole gneiss (R-7528) from a 15-foot-high (5 m) exposure off the north side of State Road 636 about 0.2 mile (0.3 km) by road west of the intersection with State Road 608 was tested by the Virginia Department of Highways and Transportation; results follow:

Sample	Specific Gravity	Los Angeles Grading	Los Angeles Abrasion Loss	% Absorption	% Soundness Loss
R-7528	2.97	A	81.9	1.3	65.3

Physical test data for rock material from additional sites in Buckingham County are in "Physical Test Results of the Virginia Highway Statewide Aggregate Survey" (Virginia Department of Highways and Transportation, 1954). A mica schist (?) prospect near Arcanum tested for grade A material had an abrasion loss of 61.9 percent; this material is not suitable for grade A stone (Virginia Department of Highways and Transportation, 1954). An abandoned quarry in granite gneiss located about 2.5 miles (4 km) south of the Andersonville quadrangle was formerly operated for roadstone.

Triassic age diabase, a tough, greenish-black rock, occurs in thin, elongate dikes that are probably too narrow to quarry.

Sand for ice-control on roadways was produced south of Andersonville, probably from the floodplain of the Willis River, by the Virginia Department of Highways and Transportation in the 1950's.

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