Virginia Department of Mines Minerals and Energy

GEOLOGIC MAP OF THE PULASKI QUADRANGLE, VIRGINIA

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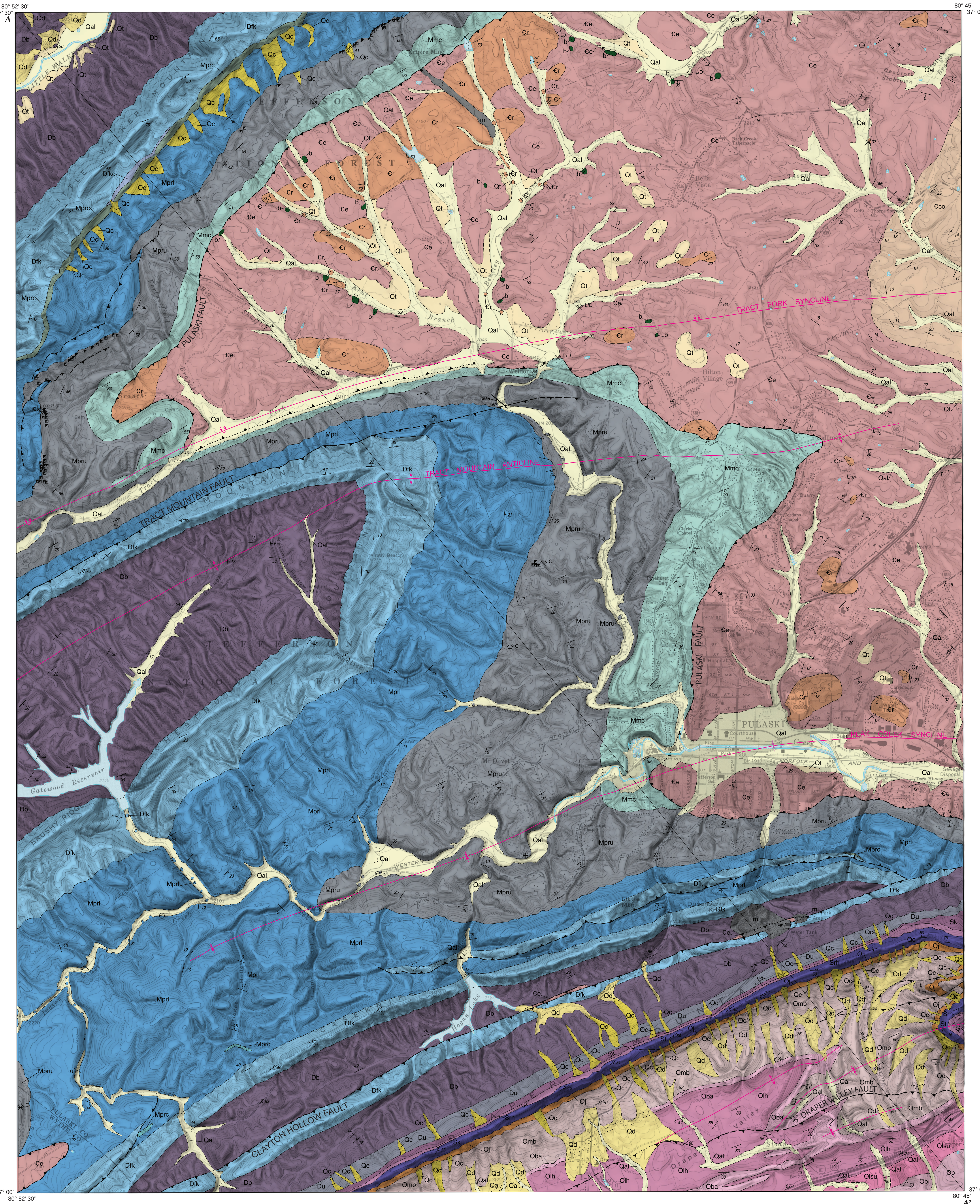
2015

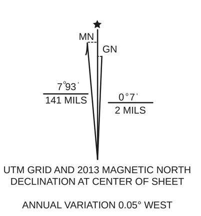


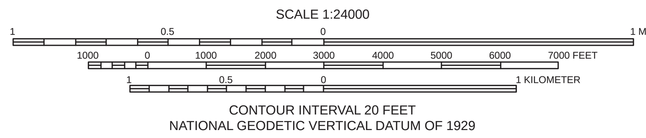
Basemap, modified U.S. Geological Survey DRG 1965, Pulaski Quadrangle, Virginia

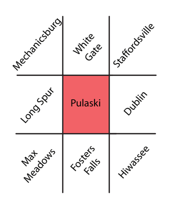
Projection: NAD 1927

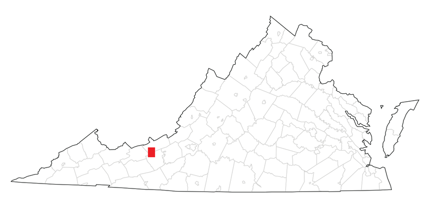
Digital elevation model, derived from 2007 VGIN orthophotography elevation control data

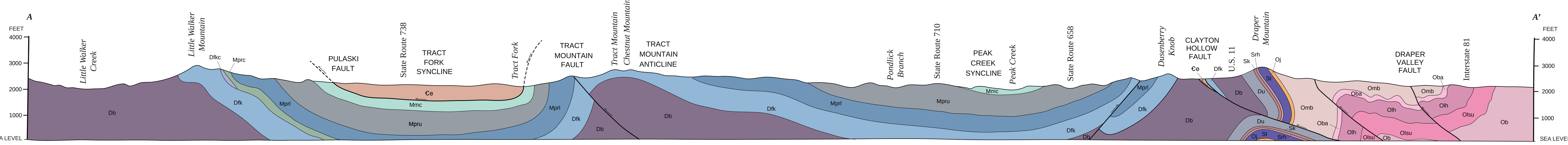
Digital Cartography by Hannah Shepherd, Marques Hatfield, Andrew Biebuyck, and Matthew Heller











Interpretive cross-sections

1. Surficial deposits are not shown.
2. Subsurface structures interpreted from surface measurements

DESCRIPTION OF MAP UNITS

QUATERNARY

ml — **Modified land** – Areas of extensive cut and/or fill related to site development.

Qal — **Alluvium** – Stratified deposits of light-gray to light-brown, unconsolidated sand, silt, and clay that are often cross bedded and graded bedded. Channels and lenses of pebbles, cobbles, and boulders of quartzite, sandstone, and chert are interbedded with the finer material. Several studies of floodplain alluvium along New River suggest that it is Holocene in age (e.g., Bartholomew and Mills, 1991). Thickness ranges from less than one to more than 10 m.

Qt — **Terrace deposits** – Deposits of fine- to coarse-grained, cross-bedded, stratified to massive sand, ranging from about 6 m to more than 60 m above the present flood plains. Finer-grained material has been weathered out of the higher level terraces which consist of relatively thin, 0.3 to 3 m layers of rounded cobbles and boulders of vein quartz, sandstone, and chert. Soils are not developed on these higher level terraces. The surface of lower level terraces consist of well-rounded cobbles and boulders in sandy matrix. Bartholomew and Mills (1991) used the distribution of fluvial terraces in Giles and Montgomery counties, including those mapped in the Radford North quadrangle, to reconstruct late Cenozoic drainage patterns of the New River and some of its tributaries.

Qd — **Debris deposits** – Deposits are clasts of unsorted, angular to rounded boulders, cobbles, and pebbles of sandstone, quartzite, siltstone, shale, chert, and other minor rock types within a matrix of sand, silt, and clay. Deposits include matrix-supported diamictons of mixed alluvium, colluvium, and prehistoric debris flows. Schultz and others (1991) and Mills (2000) provide summaries of nomenclature and genesis of similar deposits in the southern Appalachians. These include alluvial fans, foot-slope deposits, debris fans, debris flows, and debris avalanches. The deposits range from 1 m to greater than 10 m in thickness and occur on the lower elevations of the mountain slopes. These deposits typically occur in narrow V-shaped valleys along steeper mountain slopes and as broad aprons on the adjacent gentler slopes of the valleys. Deposits are generally modified by fluvial processes and have gradational contacts with other types of adjacent unconsolidated deposits. Debris deposits range from at least Pleistocene (Mills, 1988) to Recent (Kochel and Johnson, 1984; Mills and others, 1987).

Qc — **Colluvium** – Deposits are blocky accumulations of erosion-resistant sandstone and quartzite with minor amounts of siltstone, shale, and chert. Colluvial deposits include talus, boulder streams, boulder fields and minor amounts of alluvium (Schultz and others, 1991). Colluvial deposits are usually clast-supported diamictons, but may include minor amounts of sand and silt matrix between clasts. Generally, colluvium occurs on the higher elevation slopes below bedrock escarpments and may grade downslope into more matrix-supported debris-type deposits. The deposits form and move by a variety of processes (Mills, 1988) including rock fall, creep, gelifluction, and tree throw. A periglacial origin for some of these deposits has been suggested (Mills, 1988); however, on steeper slopes below bedrock escarpments the deposits are most likely Holocene to Recent in age and may be presently active (Hupp, 1983). The deposits are derived from nearby strata of Mississippian, Devonian, Silurian, and Ordovician-age and range up to 10 m in thickness.

MISSISSIPPIAN

Mmc — **Maccrady Formation** – Only the lower marine member is exposed in the study area and consists of cyclic deposits of sandstone overlain by mottled grayish-red and grayish-green mudstone. The mottled mudstone is in units that are commonly 8–15 m thick and are interbedded with 15–100 cm thick beds of medium-gray, thin-bedded, fine- to medium-grained sandstone and cross-bedded, medium- to coarse-grained sandstone. The sandstone typically consists of 6–10 m of thick bedded (30–120 cm), dark grayish-red, crossbedded or medium-gray, medium- to coarse-grained, feldspathic and/or micaceous, quartzose sandstone. The base of the Maccrady is placed at the base of the lowest thick bed of dark grayish-red sandstone. The top of the Maccrady is truncated by the Pulaski Fault. Total thickness is about 300 m.

Mpru — **Price Formation, upper member** – A coal-bearing dark-gray to black mudstone forms the basal 20–40 m of the upper member. The basal mudstone unit is overlain by a nonmarine cyclic clastic sequences of sandstone, siltstone, and mudstone. Scour channels are common and coarse-grained, lithic arenites form the basal part of each sequence and fine upward into dark-gray laminated siltstone (Brown,1983). The arenites are medium-gray, thick-bedded (30–120 cm), cross-bedded, uncommonly rippled, coarse- to fine-grained arenite with lithic clasts of mudstone common near the base of coarser beds. Mottled grayish-red and green mudstone locally caps sequences. The thickness and amount of mottled mudstone increases upward so that the uppermost 30–50 m of this member is predominantly mottled mudstone with minor fine-grained sandstone interbeds. Brown (1983) provides plant lists for a measured section in Bartholomew and Brown (1992). Locally, upright tree stumps of *Lepidodendropis* are present along Tract Fork south of Weldon and *Rhodea endlicher* is present south of Pulaski. Two coal beds present in the upper member have been mined (Bartholomew and Brown, 1992). Rank of coal ranges from semi-anthracite to low-volatile bituminous (Lewis and Hower, 1990; Campbell and others, 1925). The coal occurs in 0.5–6 m thick beds and is black with dark-gray to black thinly laminated, commonly rooted mudstone (Brown, 1983) and plant fragments are common. The total thickness of the upper member is about 350 m.

Mprl — **Price Formation, lower member** – The lower member of the Price Formation is a dominantly marine sequence of interbedded sandstone, siltstone, and mudstone with 3–15 m thick beds of quartz-pebble conglomerate and othoquartzite locally. The sublitharenites are medium-gray, fine- to medium-grained, platy, well laminated or cross-bedded with lithic fragments of quartz, feldspar, and mica (Brown, 1983). The siltstones are medium-gray, platy, well laminated and are sometimes associated with clayball conglomerates. Thin (10–20 cm) sandy quartz-pebble conglomerates occur locally near the base and are typically massive-bedded with 0.5–1 cm, well rounded, well sorted milky-quartz-pebbles, gray chert pebbles and other rock fragments in a siliceous cement. Cooper (1961) reported *Muensteroceras* along U.S. Highway 11 on Draper Mountain. Total thickness is about 200 m.

Mprc — **Price Formation, basal Cloyd Conglomerate member** – In places, the lower member of the Price Formation is underlain by the Cloyd Conglomerate member, which consists of up to 20 m of white to light-gray, massive to cross-bedded (on a scale of several meters), graded bedded, 3–6 m thick sequences of quartz-cobble, quartz-pebble and sandy quartz-pebble conglomerate. Milky quartz clasts with 2–10 cm long axes are dominant, with minor chert clasts typically present. Siliceous cement is predominant, although Kreisa and Bambach (1973) noted minor hematite cement locally. In western Pulaski County, the Cloyd thins rapidly and is only locally present on Tract and Draper mountains. At these localities, it is predominantly a light-gray, medium-grained quartz arenite with a few thin (10–100 cm) lenses or beds of quartz-pebble conglomerate (Bartholomew and Brown, 1992). Total thickness ranges from 0–20 m.

DEVONIAN

Dfk, Dfkc — **Foreknobs Formation** – Predominantly cyclic clastic sequences of medium-gray, medium-grained, massive bedded, locally slightly calcareous, sandstone fining upward to medium-gray siltstone, locally capped by black mudstone with sharp contacts. Scour channels and fossil debris mark the base of each sequence. The base of the formation is at the base of the lowermost thick beds of sandstone containing abundant fossil debris. In places, the upper 5–15 m of the formation contains abundant, 0.5–2 m thick beds and lenses of conglomeratic sandstone (Dfkc). Cooper (1961) reported *Cyrtospirifer disjunctus* and *Orthothetes chemungensis* along with crinoids, ophiuroids, and other fossils along U.S. Highway 11 on Draper Mountain. Total thickness 150–300 m.

Db — **Brallier Formation** – Cyclic sequences of medium-gray, fine-grained, 5 to 15 cm thick beds of well-laminated, commonly cross-bedded sandstone and siltstone overlain by dark-gray to black mudstone. The thickness and percentage of the sandstone and siltstone beds decrease downward so that mudstone predominates over the coarser clastics near the base. The base of the formation is placed at the lowest occurrence of prominent siltstone and/or sandstone beds. Thickness is difficult to determine due to folding and faulting.

Du — **Rocky Gap Sandstone, Huntersville Chert, and Millboro Shale** – The Rocky Gap is a medium-gray, medium- to coarse-grained, commonly iron-oxide-cemented quartz sandstone. The Huntersville Chert is massive bedded white chert that usually occurs as weathered cobbles and coarse pebbles in a narrow swale between the sandstone of the underlying Rocky Gap and overlying Millboro Shale. The Millboro is dark-gray to black, thinly bedded and fissile mudstone. The Millboro is sparsely fossiliferous, containing a limited variety of poorly preserved fossils including brachiopods, cephalopods, clams, snails, crinoids, and worm burrows (Cooper, 1961). The Millboro contains concretions and disseminated sulfides as well as a few thin beds of carbonate. Millboro outcrops are commonly concealed beneath colluvium derived from adjacent Silurian strata. In the Pulaski quadrangle Cooper (1939a) reported a thickness of 10 m for the Rocky Gap, 20 m (65 feet) for the Huntersville Chert, and 100 m for the Millboro along U.S. Highway Rt. 11 where it crosses Draper Mountain.

SILURIAN

Sk — **Keefer Sandstone** – The Keefer consists of light- to dark-gray, fine- to medium-grained sandstone and quartzite, cross-bedded and cross-laminated, rippled, mudcracked, and burrowed. Includes minor very light-gray, grayish-red, and medium-red siltstone and shale. Thickness is about 70 m.

Srh — **Rose Hill Formation** – Dark-reddish-gray, hematite cemented, burrowed, fine- to medium-grained sandstone irregularly interbedded with lesser amounts of dark-reddish-gray to grayish-green shale. Sandstone has prominent low-angle cross-bedding and lamination. Clay balls and lenses of quartz-pebble, lithic-fragment and fossil-hash conglomerate occur within the sandstone. The thickness is approximately 20 m.

St — **Tuscarora Formation** – The upper part consists of medium-light-to dark-gray, fine- to medium-grained sandstone with medium-gray quartzite. The middle consists of very light gray, erosion resistant, ledge-forming, exceptionally well-sorted and well-indurated, thick-bedded, fine- to coarse-grained orthoquartzite. The lower part consists of greenish-gray to medium light gray, medium- to coarse-grained sandstone with interbedded medium light gray orthoquartzite. Cross-bedding and cross-laminations are common and quartz pebble conglomerates are locally present. Fossils are limited to uncommon worm burrows. The contacts both above and below are placed at the first appearance of red beds. The thickness is about 35 m.

ORDOVICIAN

Oj — **Juniata Formation** – Maroon to dark reddish brown, mottled siltstone and mudstone interbedded with thin beds of reddish-brown, fine-grained sandstone. Fragments of *Lingula* and reduction spots are locally common. The Juniata Formation is exposed on steep outcrop slopes; however, colluvium from the overlying and topographically higher Silurian-age sandstone and quartzite usually mantles these slopes. Cobbles of resistant sandstone of the Juniata Formation are found on steep outcrop slopes below the covered Juniata. The thickness is about 45 m.

Omb — **Martinsburg Formation** – Upper portion is dominantly interbedded dark-gray to black mudstone and medium-gray, massive-bedded to well laminated, fine-grained sandstone. The lower portion is composed of interbedded medium- to dark-gray, coarse-grained, 2–15 cm-thick beds of limestone with abundant bioclastic debris, and light- to medium-gray calcareous mudstone (Kreisa, 1980). Cooper (1939a; 1961) reported *Orthorynchula stevensoni* and *Byssonychia radiata* along U.S. Highway 11 on Draper Mountain. The thickness is estimated to be about 400 m.

Oba — **Bays Formation** – Interbedded light-gray, fine-grained quartzite and light-gray or reddish gray quartz sandstone and greenish-gray or reddish gray siltstone and mudstone and dark yellowish green, waxy, translucent bentonite. Total thickness is about 30 m.

Olh — **Liberty Hall Formation** – The upper part of the Libery Hall consists of dark-gray to black mudstone with abundant, 2–15 cm-thick, interbeds of dark-gray, coarse-grained, nonfossilferous limestone. In the lower 100 m, mudstone occurs as 0.5–1 cm-thick lenses between 5–15 cm-thick beds of finely laminated limestone. The lower contact with the underlying middle Ordovician limestone is gradational. At Draper, Cooper (1961) reported *Dionide holdeni* and *nymphoidea* from the lower part of the formation. Total thickness is about 300-600 m.

Olsu — **Middle Ordovician limestone, undivided** – Upper part consists of medium- to dark-gray, irregularly to planar-bedded, argillaceous limestone interbedded with thin, olive-gray, fissile mudstone with abundant fossil fragments. The middle part of the unit consists of medium light gray to medium dark gray limestone interbedded with coarse-grained calcarenite. Dark gray and black nodular and bedded chert are abundant. The lower dolomitic limestone consists of medium-to-light gray dolomitic limestone overlain by beds of medium light gray, massive bedded, calcareous dolomite with numerous fenestrae and scattered medium gray chert. At Draper, Cooper (1961) reported *Trinodus elspethi* from the uppermost (Fetzer) limestone; *Billingsari* and *Maculurites opercula* from the underlying (Giesler) limestone; and *Rostricellula pristina* from the underlying basal conglomeratic limestone. Total thickness is approximately 200 m.

Ob — **Beekmantown Group** – Predominantly light- to medium-gray, massive, thick-bedded, fine- to medium-grained dolomite with 0.3–2.0 m thick interbeds of medium to light-gray, massive-bedded to layered chert. Abundant chert fragments form a resistant residuum above this unit. The basal part of the group is interbedded medium-gray dolomite and light- to medium-gray massive bedded, lime mudstone with dolomite seams. About 150 m above the base is about 30 m of light- to medium-gray, massive lime mudstone with dolomite seams and interbedded massive dolomite. This limestone contains the lower Ordovician *Lecanospira* at Draper (Cooper, 1961) Total thickness of about 200 m.

CAMBRIAN

Єco — **Conococheague Formation** – The upper third of the formation consists of bluish-gray, irregularly bedded, crinkly laminated limestone and dolomite with minor sandstone lenses. The lower two-thirds of the formation consists of interbedded dark-bluish-gray ribbon limestone and dolomite with argillaceous partings. This lithology is interbedded with discontinuous 0.3–6.0 m thick beds of calcareous quartz sandstone, lenses of oolite and flat pebble carbonate clast conglomerates, and light gray to white chert. Cooper (1939a) reported *Crytozoon speciosa* near the town of Draper, in the southeast corner of the quadrangle. Thickness is about 500 m (Cooper, 1939a).

Єe, b — **Elbrook Formation** – The uppermost part of the formation is characterized by interbedded sandy, commonly cross-bedded, fine-grained dolomite containing thin (1–10 cm) lenses of fine- to medium-grained sandstone and 30–120 cm thick ribbon-banded limestone and dolomite. The amount of quartz sand decreases and the percentage of limestone increases downsection. Below the upper part, the Elbrook consists of cyclic sequences of medium-gray, thinly laminated, fine-grained dolomite with cross-bedding, scour channels, and edge-wise dolomite conglomerates; bioturbated, fine-grained dolomite with burrowed zones filled with slightly coarser-grained dolomite; and ribbon-banded, slightly burrowed, fine to very fine grained dolomite and/or limestone micrite. Limestone units are up to 15 m thick. The percentage of limestone decreases downsection and dolomite overlies the basal 7–15 m of light greenish gray, thinly laminated, fine-grained, dolomite mudstone and interbedded dolomite. The Elbrook Formation on the Pulaski thrust sheet is complexly folded and faulted. Often brecciation and faulting is so intense near the base of the formation that it obscures the stratigraphic contact with the underlying Rome Formation. Carbonate tectonic breccia (b) occurs in the lower part of the Elbrook. Total thickness is 500 m.

Єr — **Rome Formation** – Interbedded, mottled maroon, green, and yellow, laminated, phyllitic mudstone, red, 3–8 m thick siltstone, light-gray to pinkish-gray to red, fine-grained, well-sorted, hematite-cemented sandstone and light- to medium-gray, laminated, fine-grained, silty dolomite in beds up to 2 m thick. Micaceous minerals impart a poor to well-developed parting parallel to bedding which is commonly cut by a younger, poor- to well-developed cleavage. Rocks of the Rome are extensively fractured and slickensided surfaces are commonly calcite coated. Soils developed on the Rome consist of phyllite fragments in a clayey light brown matrix. The total thickness of the Rome in the Pulaski quadrangle cannot be determined with certainty because neither the top nor the base are exposed and complex folding and faulting have tectonically thickened the sequence. Cooper (1939a) estimated a thickness of the Rome within this area to be approximately 2000 feet (600 m).

MAP SYMBOLS

For all contact and fault symbols: lines are solid where the location is exact, long-dashed where the location is approximate; short-dashed where the location is inferred; dotted where the location is concealed. For geologic observation symbols, observation sites are centered on the strike bar or at the intersection point of multiple symbols.

Contacts

Fault contacts

Thrust - sawteeth on upthrown block

Folds - showing direction of plunge where appropriate

Anticline

Syncline

Overturned syncline

Geologic observations

8 — Strike and dip of inclined beds

80 — Strike and dip of overturned beds

Strike of vertical beds

Horizontal beds

80 — Strike and dip of inclined cleavage

Mineral Resources

C — Abandoned coal mine

L/D — Abandoned limestone/dolomite quarry

Abandoned coal mine shaft

INTRODUCTION

The Pulaski 7.5-minute quadrangle is located in Pulaski and Wythe counties in southwestern Virginia. The quadrangle is within the Valley and Ridge physiographic province. Elevation ranges from a low of about 1900 feet (580 meters) along the eastern edge of the quadrangle in the Peak Creek drainage, to 3000 feet (915 meters) along the crest of Little Walker Mountain in the northwest corner of the quadrangle. Peak Creek is the major drainage within the southern part of the study area and it drains southeast into the New River in the adjacent Dublin quadrangle. In the western part of the quadrangle are typical southern Appalachian northeast-trending ridges composed of sandstone and quartzite. Adjacent valleys are underlain by less resistant shale or carbonate rocks. The eastern part of the quadrangle is the western edge of a very broad, planer, lowland, underlain with dolomite and limestone. The geomorphology in this broad lowland valley is more typical of the Shenandoah Valley to the northeast.

STRATIGRAPHY

The stratigraphy in this part of the Valley and Ridge has been studied extensively for many years. Early work included Campbell and others (1925), Butts (1933, 1940), and Cooper (1939a). Subsequent work by Cooper (1961, 1964) and later work by students and faculty from Virginia Tech (Kreisa, 1980; Kreisa and Bambach, 1973; Brown, 1983; Randall, 1984; Read, 1980, 1989a, 1989b) continued to refine the descriptions for the rocks in this area. Further studies by Bartholomew and Brown (1992) and Rossbach and Dennison (1994) added further details to the stratigraphy of this area. Rocks of the Pulaski Thrust Sheet are predominantly dolomite and limestone of Cambrian age and form a composite thickness of approximately 4500 feet (1300 m) (Schultz, 1983, 1986). Rocks of the Saltville Thrust Sheet in the study area consist of carbonate and siliciclastic rocks ranging from Middle Cambrian to Lower Mississippian in age and are approximately 10,000 feet thick (3000 m). McDowell and Schultz (1990) provide a summary of stratigraphy of Saltville sheet rocks in adjacent Giles County. The composite stratigraphic section records a transition from the Appalachian passive margin sequence (Read, 1989b) through the last stages of clastic sedimentation in response to Alleghanian mountain building.

STRUCTURE

Early mapping by Campbell and others (1925) and Butts (1933) identified many of the large-scale folds and faults in the Pulaski quadrangle and surrounding area. Cooper (1939a) provides an excellent map and description of rocks in the Pulaski-Draper Mountain area. Deformation ranges from grain-scale cataclasis to regional-scale folding and faulting during the Alleghanian orogeny. More recent research has focused on the details of deformation associated with faulting. References to this work are included in the discussion below.

PULASKI THRUST SHEET

The Pulaski Fault is one of the most extensive southeast-dipping Alleghanian-age thrusts in the southern and central Appalachians (Bartholomew, 1987). The Pulaski thrust was named and described by Campbell and others (1925) for exposures near Pulaski, Virginia. Butts (1933) mapped the Pulaski Fault and extended it into the central Appalachians. Cooper (1939a; 1939b; 1961) and Cooper and Haff (1940) described in detail the Pulaski Fault in the New River Valley and named and described the Max Meadow tectonic breccia associated with the Pulaski Fault. Cooper (1961, 1970) and Rodgers (1970) extended the fault approximately 300 miles (500 km) from near Staunton, Virginia, southward into Tennessee where it is overridden by rocks of the Blue Ridge thrust. Bartholomew (1987) summarized previous studies on the Pulaski Thrust Sheet in the greater Roanoke, Virginia area, estimated minimum displacement on the order of 100 km, and placed the Pulaski and related structures within a regional tectonic framework. Near the present study area, Schultz (1983, 1986) documented many of the structural and stratigraphic details associated with the Pulaski Thrust Sheet. In the greater New River valley area, the maximum thickness of the Pulaski Thrust Sheet is approximately 4800 feet (1500 m) (Schultz, 1983, 1986). Cooper (1939a), Stanley and Schultz (1983) and Schultz (1983, 1986) described the nature of the fault surface in this area of the Pulaski thrust sheet. Cooper (1939a) described secondary mineralization of iron and manganese oxides in the Draper Mountain area and reported prospect pits where these minerals have been concentrated along the Pulaski Fault. Elsewhere, the fault surface includes: (1) highly deformed Cambrian-age Elbrook dolomite and/or locally Cambrian-age Rome mudstone overlying macerated, fractured and cleaved Mississippian-age rocks; (2) highly fractured Cambrian-age Elbrook dolomite above a thin, approximately 20 cm-thick, black, clay rich, foliated gouge overlying highly fractured Mississippian-age rocks; and (3) Max Meadows tectonic breccia overlying macerated and brecciated Mississippian-age rocks.

Campbell and others (1925), Butts (1933), and Cooper (1939a, 1939b) recognized the folded nature of the Pulaski Fault. Campbell and others (1925) and Cooper (1939a, 1939b) recognized that Cambrian-age limestone and dolomite, Campbell's Shenendoah Limestone, and Cooper's Elbrook Dolomite, occurring along the Clayton Hollow Fault on the northwest side of Draper Mountain was an important indicator of complex overthrust tectonics.

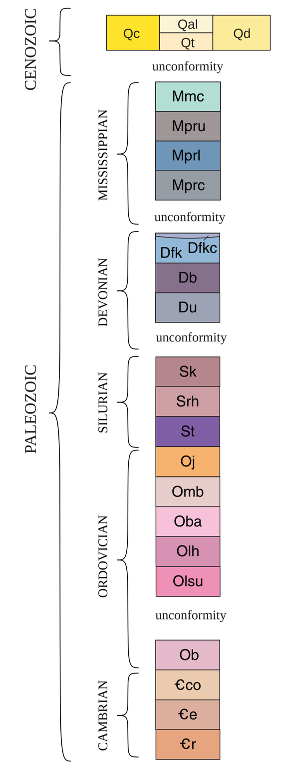
SALTVILLE THRUST SHEET

Rocks within the western part of the Pulaski quadrangle are part of the Saltville Thrust Sheet. These rocks were overridden by the Pulaski Thrust Sheet in the eastern part of the study area and are exposed at the surface in a series of folds along the western and northwestern margin of the Pulaski sheet. Although not exposed on this quadrangle, the Saltville thrust is a major southeast dipping fault that has been traced for approximately 500 km along strike into Alabama (Rodgers, 1970). In the study area, rocks of the Saltville sheet are folded and faulted and range in age from the Mississippian Maccrady Formation to the Ordovician Beekmantown Group. From east to west, the large-scale folds of the Saltville sheet in the Pulaski quadrangle include the Draper Mountain anticline, Peak Creek Syncline, Tract Mountain Anticline and the Tract Fork Syncline. These structures affect the map pattern of the overlying Pulaski Thrust Sheet as noted above. Cooper (1939a) mapped the Draper Mountain Anticline in detail, describing the asymmetric nature of the fold and its faulted northwest limb. Additionally, deformation of rocks of the Saltville sheet is commonly extensive in the mudstones of the Mississippian Maccrady and Price formations near the Pulaski Fault (Schultz, 1983; 1986) and intense locally within some of the coal beds just to the north of the leading edge of the Pulaski Fault (Bartholomew and Brown, 1992). In the southeast corner of the quadrangle, localized small-scale folding, faulting and cleavage development in the Saltville sheet is generally confined to the limestone and calcareous shale of the Ordovician age Martinsburg and Liberty Hall formations.

The Clayton Hollow Fault has been recognized for many years (Campbell, 1894; Cooper, 1939a), but its exact nature is still not fully described. Part of the controversy is related to slivers of Elbrook dolomite (Campbell, 1894; Butts, 1933; Cooper, 1939a, 1939b) that have been mapped along the fault. They have been interpreted as fragments of the Pulaski Thrust Sheet trapped along a southeast-dipping high angle fault that cuts through the footwall and Saltville block rocks, into the overlying Pulaski Thrust Sheet. The Clayton Hollow Fault is a low-angle, southeast-dipping thrust fault which floors the allochthonous rocks of the Draper Mountain window. Rocks of the overriding Pulaski thrust fault are folded about the window rocks and the slivers of Elbrook are below the hanging wall of the Clayton Hollow Fault on the overturned northwest limb of the Draper Mountain Anticline.

The Tract Mountain Fault (Cove Fault of Campbell, 1894) is a thrust fault on the north side of the Tract Mountain Anticline. In the Pulaski quadrangle, it places Devonian age rocks on Mississippian age rocks, and older Mississippian age rocks on younger Mississippian rocks. In general, the fault places deformed, steep to southeast-dipping overturned beds against northwest -dipping rocks on the northwest limb of the Tract Mountain Anticline. Campbell and others (1925) first called attention to this fault and named it the Walker Fault (Campbell, 1894) or Cove Fault (Campbell and others, 1925). Campbell and others (1925) documented fault truncation of the Price coal seams by the Cove Fault near the northeast end of the steeply dipping northwest limb of the Tract Mountain Anticline. On this geologic map (Campbell and others, 1925, Plate 13) the Cove Fault (Tract Mountain Fault) loses displacement near the northeast- plunging nose of the Tract Mountain Anticline and does not offset the nearby trace of the Pulaski Fault. Additionally, their cross-sections (Campbell and others, 1925, Plate 13, Section G-G') document a deformation history that involves emplacement of the Pulaski Thrust Sheet followed by large-scale folding. The Tract Mountain Anticline is coincident with fold tightening and subsequent faulting along the Cove (Tract Mountain) Fault. Butts (1933) documents a southeast-dipping high-angle reverse fault, throwing Devonian-age Chemung over Mississippian-age Price, agreeing with Campbell and others (1925) earlier interpretation. Also, the fault is shown to lose displacement near the very end of the plunging Tract Mountain Anticline. Butts (1933) recognized, but did not name this structure. Cooper (1961) renamed the Cove Fault the Tract Mountain Fault. The map trace of the fault is coincident with previous maps except that Cooper (1961, Plates 21 and 33) extends the fault northeastward to where it is overlain by rocks of the Pulaski thrust sheet. The implication of this is that emplacement of the Pulaski Fault post-dates movement of the Tract Mountain Fault.

CORRELATION OF MAP UNITS



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