Virginia Department of Mines, Minerals and Energy

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Geologic Map of the Dublin Quadrangle
Virginia Division of Geology and Mineral Resources

GEOLOGIC MAP OF THE DUBLIN QUADRANGLE, VIRGINIA

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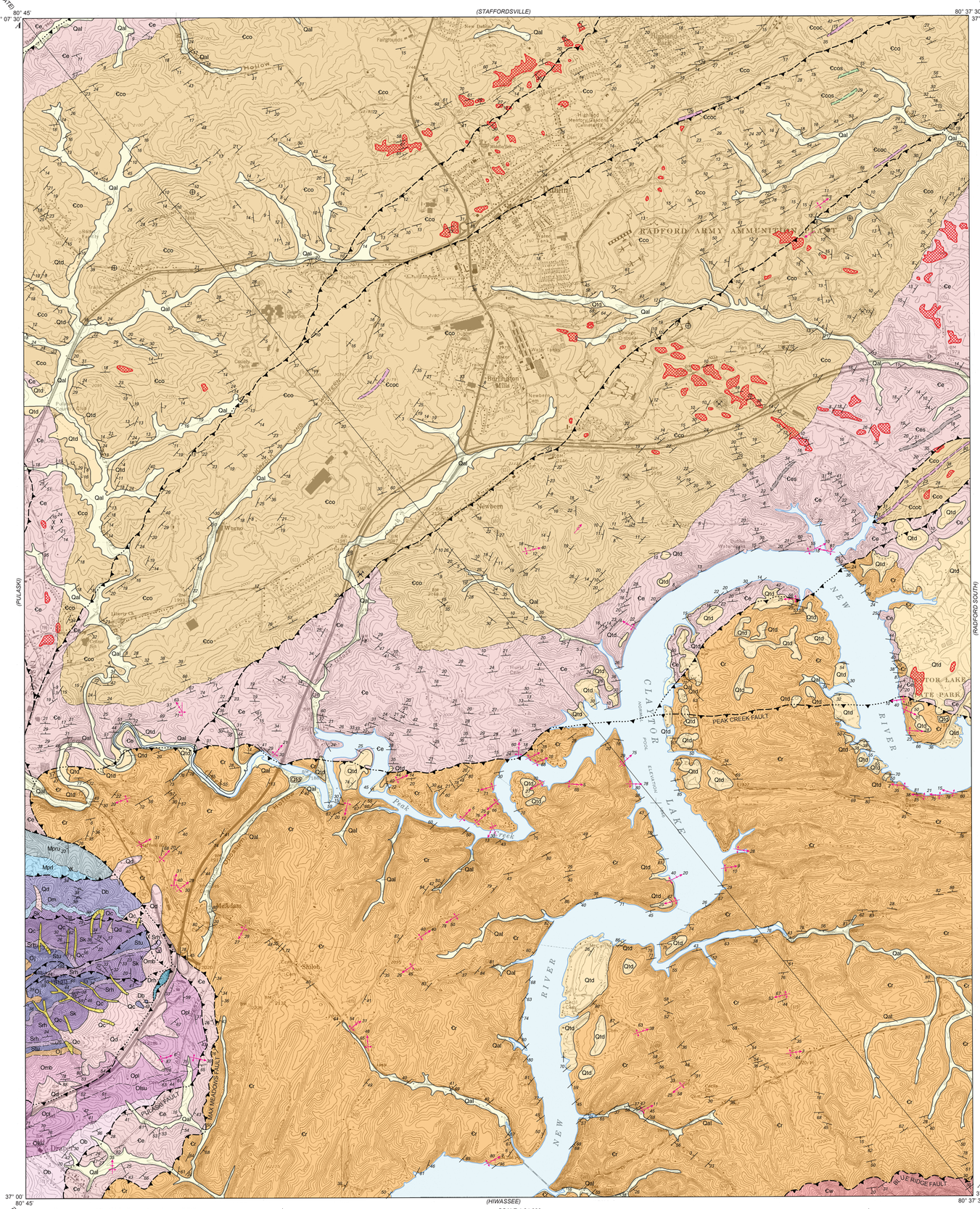
2010



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

Polyconic projection: UTM zone 17, NAD 1927

Digital cartography by Amy Gilmer

MN GN
7°51
140 MILS
0°11
3 MILS
2010 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24,000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology mapped from 1980 to 1983

DESCRIPTION OF MAP UNITS

QUATERNARY

Qal — **Alluvium**: Unconsolidated light-gray to light-brown sand, silt, and clay, with channels and lenses of pebbles, cobbles, and boulders of quartzite, sandstone, and chert. Deposits are stratified and often crossbedded and/or graded bedded. Thicknesses from less than 1 to more than 30 feet (0.3 to 9.2 m).

Sinkholes: Areas mapped as sinkhole topography consist of rolling low hills with round to irregularly shaped sinkholes, clusters of sinkholes, and cave openings. These features have formed from solution or collapse of carbonate bedrock. Sinkholes are delineated by closed depression contours on the 1:24,000-scale topographic map. Sinkholes also occur in carbonate rocks of Cambro-Ordovician age throughout the study area. On the Pulaski thrust sheet, sinkholes are more numerous near the New River (Schultz and others, 1991).

Qc — **Colluvium**: Blocky accumulations of erosion-resistant boulders and cobbles of generally angular sandstone and quartzite with minor amounts of siltstone, shale, and chert; includes block streams, block fields, and talus. Deposits range from 0- to 30-feet-thick (0 to 9.2 m) and are derived from nearby strata of Mississippian, Devonian, and Silurian age (Schultz and others, 1991). Generally occurs on the higher elevation slopes below bedrock escarpments and may grade downslope into more matrix-supported debris deposits.

Qd — **Debris deposits**: 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 range from 3 feet (1 m) to greater than 30 feet (10 m) in thickness and include alluvial fans, foot-slope deposits, debris fans, debris flows, and debris avalanches (Schultz and others, 1991). Deposits typically occur in narrow V-shaped valleys along steeper mountain slopes and as broad aprons on the adjacent gentler slopes of the valleys.

Qtd — **Terrace deposits**: Unconsolidated, poorly stratified deposits of medium brown to dark reddish-brown pebbles, sand, silt and clay with minor cobbles. The surface of these deposits has well developed soils that are often modified by sinkholes and stream incision. Clasts within these deposits may exhibit oxidized rinds due to weathering.

MISSISSIPPIAN

Mpru — **Price Formation**: Upper member (Mpru) is gray, quartzose sandstone, mottled maroon and green mudstone, dark-gray siltstone, and black mudstone and/or coal. The coal measures are found near the base of this member except for a local seam at the Bell Hampton Mine, which is at a stratigraphically much higher position. Most seams appear to be laterally discontinuous over distances of a few miles. The quartzose sandstone is typically a medium- to brownish-gray, medium- to coarse-grained, cross-bedded rock containing abundant feldspathic rock fragments and mica. The medium gray siltstones are thinly bedded and are root disrupted below coal seams. The member is generally covered by 1 to 3 feet (0.3 to 0.9 m) of light brown, sandy soil. The unit thins southwestward from about 1500 feet (458 m) to about 1000 feet (305 m).

Mprl — Lower member (Mprl) is interbedded sandstone and siltstone. Siltstone beds increase southwestward along the outcrop belt. Sandstone is fine- to medium-grained. Both sandstone and the siltstone are medium-gray, platy (due to alignment of mica flakes parallel to bedding or cross-bedding), well layered or cross-bedded and contain abundant feldspathic rock fragments and mica. Clay gall conglomerates and medium-gray mudstone beds occur locally. A thin, light brown, sandy soil covers the lower member. The lower member is about 1000 feet (305 m) thick and is stratigraphically underlain by the basal Cloyd Conglomerate Member of the Price Formation. The Cloyd Conglomerate Member consists of 20 to 60 feet (6.1 to 18 m) of massive, very thick bedded, cross-bedded sequences, grading from quartz-cobble conglomerate at the base to quartz-pebble conglomerate to coarse-grained sandy conglomerate at the top. A thin veneer of quartz gravel and sand commonly form a loose soil between the abundant outcrops of this member.

DEVONIAN

Db — **Brallier Formation**: Cyclic sequences of 2- to 6-inch-thick (5.1 to 15.2 cm) beds of medium-gray, well-laminated, commonly crossbedded, fine-grained sandstone and siltstone overlain by dark-gray to black mudstone. The thickness and percentage of the sandstone/siltstone beds both decrease downward constituting a coarsening upwards sequence. Thickness ranges from about 2000 to 3500 feet (610 to 1068 m).

Dm — **Millboro Shale**: Dark gray to black, thinly bedded, sparsely fossiliferous, fissile mudstone and black shale. Contains abundant concretions and disseminated sulfides as well as a few thin beds of carbonate. Thickness ranges from about 1000 to 1300 feet (305 to 397 m).

Drh — **Rocky Gap Sandstone and Hunterville Chert**: Rocky Gap Sandstone is a buff to brown, medium- to thick-bedded, coarse-grained calcareous cemented sandstone. Very friable in places from solution of carbonate cement. Local quartz pebble conglomerate. Iron and manganese streaks and stains are common. The Hunterville Chert consists of light to dark gray fine-grained chert and dark gray to black mudstone. Thickness ranges from 50 to 100 feet (15 to 30 m).

SILURIAN

Sk — **Keefer Sandstone**: Predominantly thick-bedded, light gray to white, massive, cross-bedded, rippled, medium- to coarse-grained quartzose sandstone and fine- to medium-grained orthoquartzite. Burrowed beds and minor reddish-brown sandstone also occur with interbedded minor quartz-pebble conglomerate and greenish-gray siltstone and mudstone lenses. The thickness is approximately 200 feet (61 m).

Srh — **Rose Hill Formation**: Interbedded, hematite-cemented, dark brownish-red, fine- to medium-grained, ferruginous sandstone and dark reddish-gray, mottled mudstone and siltstone. Lesser amounts of interbedded, fossiliferous, burrowed red siltstone and mottled greenish-gray shale. Thickness is approximately 140 feet (43 m).

Stu — **Tuscarora Formation**: Interbedded, massive, fine-grained, light gray to white orthoquartzite and massive and cross-bedded, medium- to coarse-grained, light gray to white quartzose sandstone with lenses of quartz-pebble conglomerate and greenish-gray siltstone and mudstone. Both trough and planar cross bedding occur throughout the section. Thickness is approximately 100 feet (30 m).

ORDOVICIAN

Oj — **Juniata Formation**: Predominantly interbedded maroon to dark reddish-brown, mottled siltstone and mudstone with thin beds of fine-grained reddish-brown sandstone. Fossil *Lingula* fragments and reduction spots are locally common. The thickness is about 150 feet (46 m).

Omb — **Martinsburg Formation**: Upper portion consists of interbedded 0.5- to 1.0-foot-thick (15 to 30.5 cm) beds of massive, fine-grained, medium gray sandstone with fossil debris and medium gray well-laminated calcareous mudstone. This grades down section into dominantly medium to dark gray, coarse-grained, bioclastic limestone interbedded with medium gray, well laminated calcareous mudstone. The thickness is estimated to be about 1100 feet (336 m). The use of Martinsburg Formation in this area follows past usage by Butts (1933, 1940) and Cooper (1961).

Opl — **Liberty Hall Formation**: Consists of wavy bedded, medium to dark gray, fine-grained limestone interbedded with dark gray to black, calcareous, fissile mudstone. Total thickness from 900 to 1800 feet (274 to 549 m).

Ols — **Middle Ordovician limestone undivided**: Lower part of section consists of medium to light gray, dolomitic limestone overlain by medium to light gray, massive, calcareous dolomite with numerous fenestrae and scattered medium gray chert. The middle part of this unit consists of light gray to dark gray limestone with abundant dark gray and black nodular and bedded chert. The upper part of this section is medium to dark gray, irregular to planar-bedded, argillaceous limestone with interlaminated and interbedded, thin, olive-gray, fissile mudstone with abundant fossil fragments. Total thickness is about 600 feet (183 m).

Ob — **Beekmantown Group**: Consists predominantly of light to medium gray, massive and thick-bedded, fine- to medium-grained dolomite. The dolomite has interbeds of up to 1-foot-thick of medium to light gray, massive chert. In the basal part of the section the dolomite is interbedded with a light to medium gray, massive limestone with dolomite seams. Total thickness is about 500 feet (152 m).

CAMBRIAN

Ꞓcos / Ꞓco / Ꞓcoc — **Conococheague Formation**: Cyclic 3- to 4.5-foot-thick (0.9 to 1.4 m) packages of basal intraformational limestone and dolomite clasts, conglomeratic limestone overlain by millimeter to centimeter laminated blue-gray limestone. This part of the cycle is overlain by bluish-gray "ribbon" limestone. Tops of the cycles are capped by blocky, light gray dolomite. In places, the upper part of the cycles may consist of light pink dolomitic mudstone. These cycles are interbedded with chert-bearing stromatolitic dark gray limestone forming lags on the surface of linear strike ridges (Ꞓcoc), light pink limestone and dolomite, rippled and mud-cracked light gray limestone and dolomite, and distinctively white-weathered, highly fractured, blocky dolomite and oolitic chert. Discontinuous, medium- to fine-grained, light gray, 1- to 8-inch-thick (2.5 to 20.3 cm) carbonate cemented quartz sandstones are present near the base of the unit and throughout the section but exposures are relatively rare (Ꞓcos). Total thickness is between 1800 and 2000 feet (549 and 610 m).

Ꞓe — **Elbrook Formation**: Upper part consists of 3- to 20-foot-thick (0.9 to 6.1 m), tan and gray, irregularly banded, partially dolomitized limestone interbedded with 1- to 3-foot-thick (0.3 to 0.9 m) stylolitic, dark gray, fine-grained dolomitic limestone and massive, 3- to 6-foot-thick (0.9 to 1.8 m), thrombolitic dolomite. Occasional 5- to 10-foot-thick (1.5 to 3.1 m) cyclic packages of 1.5- to 2.5-inch-thick (4 to 6 cm) intraformational dolomite clasts, limestone conglomerate are overlain by 1- to 3-foot-thick (0.3 to 0.9 m) ribbon-banded, partially dolomitized limestone overlain by 3-foot-thick (1 m) massive dolomite. Middle part consists of cyclic sequences 3- to 20-foot-thick (0.9 to 6.1 m) , partially dolomitized, wavy laminated limestone with 1- to 10-foot-thick (0.3 to 3.1 m), centimeter-laminated, light gray, argillaceous dolomite and 1- to 15-foot-thick (0.3 to 4.6 m) cherty dolomite with thin, evaporite-disrupted laminations. The lower part of the middle section consists of cyclic interbedded sequences of 3- to 20-foot-thick (0.9 to 6.1 m), flat and stromatalitic algal laminates and 1- to 10-foot-thick (0.3 to 3.1 m) centimeter-laminated argillaceous dolomite. The lower Elbrook is dominantly 15- to 30-foot-thick (4.6 to 9.2 m) centimeter-laminated, argillaceous dolomite, 3- to 10-foot-thick (0.9 to 3.1 m), massive bedded, light gray dolomite and 3- to 20-foot-thick (0.9 to 6.1 m) algal laminated dark gray dolomite and dolomitic limestone. Near the base of the formation, light olive-green and pale-pink argillaceous dolomite occurs. Near Radford, an undeformed section of the lowermost Elbrook consists of two 1-foot-thick (0.3 m), maroon phyllitic mudstones interbedded with 3- to 6-foot-thick (0.9 to 1.8 m) olive-gray, massive dolomite and 1- to 6-foot-thick (0.3 to 1.8 m) centimeter-laminated dolomite. A fine to medium-grained sandstone (s) also occurs in 1- to 10-cm-thick lenses within sandy, cross-bedded fine grained dolomite. In the map area, the lower most Elbrook has been described as a broken formation (Schultz, 1986, Bartholomew, 1987). The total thickness of the Elbrook Formaiton ranges from 1800 to 2000 feet (549 to 610 m).

Ꞓr — **Rome Formation**: Mottled maroon, green and yellow, phyllitic, finely laminated mudstone interbedded with red siltstone, light gray to pinkish-gray to red, fine-grained well sorted, sandstone and quartzite, dark gray massive dolomite, and medium gray, thinly laminated, fine-grained silty dolomite. This unit is extensively folded, cleaved, and fractured and neither the top nor base is exposed. Thickness probably exceeds 900 feet (274 m).

Ꞓw — **Weverton Formation**: The lower part of the Weverton consists of finely laminated, 75- to 90-feet-thick beds of medium to dark gray phyllitic metamudstone and metasiltstone overlain by 90 to 120 feet thick beds of medium gray, well bedded, medium- to coarse-grained conglomeratic metagraywacke. The upper part of the section consists of light greenish-gray to white, poorly to moderately well bedded, medium- to coarse-grained metagraywacke and massive quartzite, including coarse quartz-pebble and lithic metaconglomerate. Thickness ranges from 1800 to 2400 feet (589 to 732 m).

REFERENCES

Bartholomew, M.J., 1987, Evolution of the Pulaski thrust system, southwestern Virginia: Geological Society of America Bulletin, v. 99, no. 10, 491-510.

Bartholomew, M. J., and Lowry, W. D., 1979, Geology of the Blacksburg quadrangle, Virginia: Division of Mineral Resources Publication 14, 1:24,000-scale, single sheet.

Butts, Charles, 1933, Geologic map of the Appalachian Valley of Virginia with explanatory text: Virginia Geological Survey Bulletin 42, 56 p.

Butts, Charles, 1940, Geology of the Appalachian Valley in Virginia: Virginia Geological Survey Bulletin 52, Pt. I, 568 p.

Cooper, B. N., 1961, Grand Appalachian Excursion: Geologic Guidebook #1, Engineering Extension Service, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 187 p.

Schultz, A.P, 1986, Broken formations of the Pulaski thrust sheet near Pulaski, Virginia, *in*, McDowell, R.C. and Glover, Lynn, III, eds., Studies in Appalachian Geology: Virginia Polytechnic Institute and State University, Department of Geological Science Memoir 3, p. 13-26.

Schultz, A.P., Bartholomew, M.J., and Lewis, S.E., 1991, Map showing surficial and generalized bedrock geology and accompanying side-looking airborne radar image of the Radford 30X60 degree quadrangle, Virginia and West Virginia: U.S. Geological Survey Miscellaneous Investigations, Map I-2170-A, 1:100,000 scale, 2 sheets.

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SUGGESTED REFERENCE

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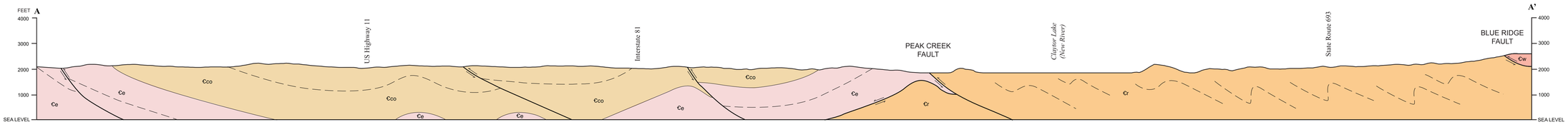
MAP SYMBOLS

- Contact, approximate
- Contact, covered
- Contact, surficial deposit
- Thrust fault, approximate, teeth on upthrown block
- Thrust fault, covered, teeth on upthrown block
- Strike and dip of inclined beds
- Strike of vertical beds
- Strike and dip of overturned beds
- Horizontal beds
- Strike and dip of axial surface and trend and plunge of mesoscopic anticlinal fold axis
- Inclined fold hinge of small, minor synform
- Inclined fold hinge of small, minor antiform
- Prospect
- Abandoned mine or quarry



Interpretive cross-section:
1) No vertical exaggeration
2) Subsurface structures interpreted from surface measurements.