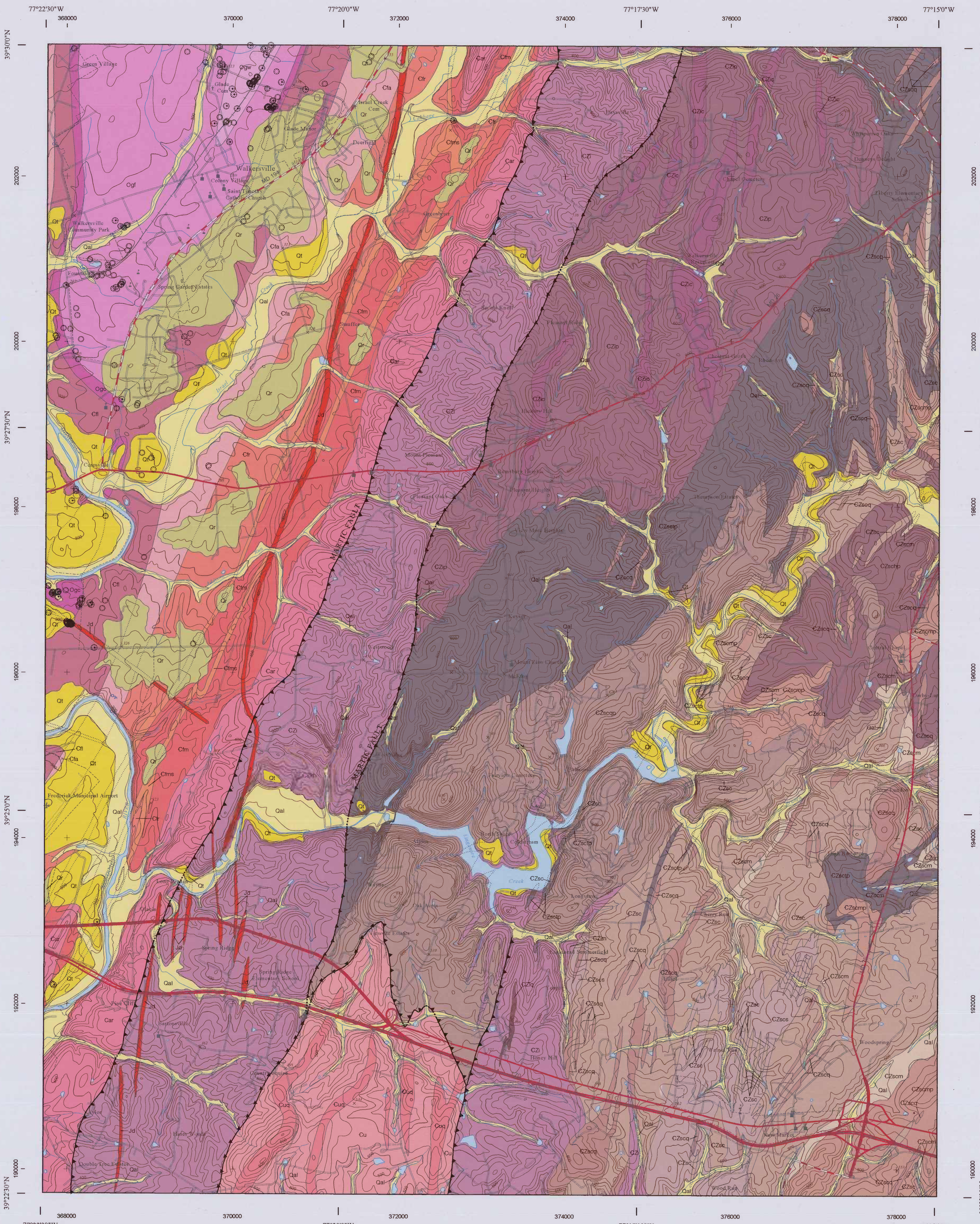


Description of Map Units

Quaternary

Qal — **Alluvium**
Well to poorly sorted stratified mixtures of unconsolidated clay, silt, sand, gravel, and cobbles underlie flood plains of nearly all rivers and tributaries. The channel of the tributary is commonly on bedrock with alluvium exposed along the banks. Thickness of alluvium is highly variable as a function of bedrock, topography, and land-use practices. Thickness estimated at as much as 15 feet (4 to 5 m) along the Monocacy River.

Qr — **Weathering residuum**
Mixture of moderate reddish brown soil and pebbles, cobbles, and blocks of light gray to white, angular, locally, euhedral quartz. Thickness ranges from a thin veneer to 10 feet (3.0 m).

Qt — **Terrace deposits**
Reddish-brown to brown, sandy and clayey mixture of rounded pebbles to cobbles of sandstone, vein quartz and quartzite. Present along elevated low relief areas above the Monocacy River. Several separate levels of terrace deposits can be observed, but are not separately mapped here. Thickness ranges from a thin veneer to more than 10 feet (3 m).

Jurassic

Jd — **Diabase dike(s)**
Medium to dark gray, medium crystalline and equigranular, massive diabase, with characteristic orange-brown weathered surface. Dikes vary from a wedge-edge to more than 150 feet (46 m) wide. While displayed as a solid unit on the map, the area mapped as diabase dike(s) actually represents an interfingering with the surrounding bedrock unit(s).

Ordovician

Grove Formation
Thick-bedded to massive, medium to light gray limestone with interbedded, tan to medium gray dolomite. Three members are recognized and mapped in the Frederick Valley as outlined by Brezinski (2004).

Ogw — **Woodsboro Member**
Thinly bedded, dark gray, bioturbated, lime mudstone, and interbedded medium-bedded, dark gray, fine-grained lime mudstone with thin wavy-bedded, with tan, dolomitic partings. Top of this member not exposed in map area, but unit becomes thickly interbedded toward the top with medium dark gray, fine-grained lime mudstone with wavy beds. Thickness is 500 feet (152 m).

Ogf — **Fountain Rock Member**
Very thickly bedded, medium light gray, locally sandy, thrombolitic and stromatolitic algal, lime mudstone and medium gray, tan weathering, laminated, dolomitic limestone and olive gray dolomite. Thickness is probably no greater than 1000 feet (305 m) along the eastern flank, but may be as much as 4,500 feet (1,372 m) along the western limb of the Frederick Valley Synclinorium.

Ogc — **Ceresville Member**
Medium light gray to medium gray, thick-bedded and cross-bedded, arenaceous limestone and sandy, dolomitic limestone with thin interbeds (1 ft or 0.3 m) of medium light gray, sandy, thrombolitic dolomite. Thickness is approximately 150 to 200 feet (46 to 61 m).

Cambrian

Frederick Formation
Thick-bedded to massive, medium to light gray limestone with interbedded, tan to medium gray dolomite. Three members are recognized and mapped in the Frederick Valley as outlined by Brezinski (2004).

Cfl — **Lime Kiln Member**
Interbedded, thinly laminated to thinly bedded, dark gray, fine-grained limestone, calcareous shale, and medium bedded, fine-grained limestone near the base, becoming more thickly interbedded toward the top with medium dark gray, fine-grained limestone and wavy bedding and stromatolitic algal beds. Near the top, the member becomes interbedded with cross-bedded, sandy, medium light gray limestone. Thickness is 700 feet (213m).

Cfa — **Adamstown Member**
Thinly interbedded, medium dark gray to dark gray, argillaceous, fine-grained limestone and dusky yellow to medium dark gray, silty dolomite. Limestone beds range from 0.1 to 2.0 inches (0.3 to 5.1 cm) in thickness. Several thin (6.0 to 30 feet or 1.8 to 9.1 m), dark greenish gray to greenish black, light olive brown weathering, silty, calcareous shale intervals are present throughout the member. The top of the member is mapped at the base of the lowest medium to thick bed of sandy or algal limestone. Thickness is approximated at 1,000 feet (305 m).

Cfr — **Rocky Springs Station Member**
Interbedded, dark gray, thinly bedded, lime mudstone and black, dolomitic shale, massive, medium gray, polymictic breccias, medium gray, sandy limestone, and dark gray, flaggy lime mudstone. Breccia beds are thick (>30 feet or 9 m), massive and relatively continuous along strike on the western flank of the synclinorium. On the eastern flank of the synclinorium only thin (<3.0 feet or 0.9 m) breccias are present. Top of the member is mapped at the top of the stratigraphically highest polymictic breccia or sandstone interval. Thickness is approximated at 1,200 feet (366 m) on the eastern flank, but is likely many times thicker on the western flank.

Cfm, Cfms — **Monocacy Member**
Thickly interbedded, black, platy shale and rubbly, dolomitic breccias, laminated lime mudstone, and black shale. The top of the member is marked by a laterally continuous black shale (Cfms) that is more than 50 feet (15 m) thick. Thickness of this member is approximately 200 feet (61 m).

Car — **Araby Formation**
Thickly bedded, greenish black to grayish black, very fine grained to fine-grained, burrow-mottled, silty sandstone, interbedded with medium gray to grayish black, phyllitic shales 3.0 to 10 feet (0.9 to 3.0 m) thick. Top of the formation consists of grayish black phyllitic shale 45 to 60 feet (14 to 18 m) thick. The Araby Formation is present on the eastern side of the Frederick Valley Synclinorium. Thickness of the Araby Formation is estimated at 600 feet (183 m).

Late Proterozoic? - Cambrian?

Cu, Cuq — **Urbana Formation**
Moderate olive-brown to light olive-gray, calcareous metasandstone, metagraywacke, quartzite, and meta-siltstone that are poorly sorted, graded-beds, cross-beds, and sparse ripple marks. Individually mapped quartzite intervals (Cuq) are light olive-gray and light brownish gray, coarse-grained, thin- to medium-bedded, cross-bedded, pitted, vuggy, friable, lensoidal, and discontinuous.

CZsc — **Sams Creek Formation**
Dark greenish gray to medium bluish gray, aphanitic to porphyritic, massive to schistose metabasalt composed of chlorite, epidote, quartz, altered plagioclase, actinolite, hornblende, and albite; igneous texture is locally preserved and pods of epidosite are common; includes some metaconglomerate composed of greenstone pebbles and cobbles, and local pillow structures and hyaloclastite.

CZscm — **Marble**
Interbedded, light olive-gray to olive-gray, medium- to coarse-grained, medium-bedded, locally ferruginous, micaceous, silty sandstone and very fine grained, silty sandstone to sandy siltstone. Thickness is estimated at 300 feet (100 m).

CZsctp — **Tuffaceous phyllite**
Grayish red purple and bluish gray, variegated, vesicular phyllite with light gray streaks and blebs of tuffaceous phyllite.

CZscmp — **Muscovite phyllite**
Light bluish gray, dusky yellow, and moderate orange-pink, muscovite-chlorite phyllite containing albite porphyroblasts, quartz, and hematite dust. Contains minor metasiltstone. Lithologically distinct from rocks of the Ijamsville Phyllite and Marburg Formation.

CZschp — **Hematite phyllite**
Bluish purple, hematite-rich phyllite. Resembles Ijamsville Phyllite.

CZscqp — **Quartzite interbedded with phyllite**
Light gray quartzite interbedded with purple phyllite and slate, variegated, conglomeratic phyllite, and bluish gray, tuffaceous phyllite.

CZscq — **Quartzite**
Light gray to grayish green, medium-grained, thin-bedded to massive quartzite and minor calcareous sandstone. Contains detrital plagioclase, orthoclase, and polymictic quartz. Bedding is defined by concentrations of heavy minerals. Interbedded with phyllite, greenstone (CZsc), and metasiltstone and metagraywacke (CZsc), that are light gray, medium- and coarse-grained quartzite, locally calcareous and cross-bedded.

CZscs — **Metasiltstone**
Metasiltstone, phyllite, quartzite, and metagraywacke, undifferentiated. Light brown metasiltstone interbedded with quartzite and calcareous metasandstone. Bedding can be recognized except where transposed in shear zones adjacent to faults. Muscovite phyllite containing albite porphyroblasts and elongate blebs of chlorite is interpreted to be a metatuff.

CZi — **Ijamsville Phyllite**
Dusky blue, grayish blue, very dusky red-purple, greenish gray to pale olive phyllite. Phyllonite contains abundant pods and folded stringers of white vein quartz, and minor slate. Intensely folded and sheared with finely laminated beds seen only in slate. Phyllite consists mostly of muscovite and chlorite, but also contains paragonite and chloritoid. Has a lustrous sheen because of paragonite (determined by x-ray diffraction) and dark color because of abundant hematite dust.

CZiq — **Quartzite**
Yellowish gray, fine- to medium-grained, sericitic quartzite locally intervenes between phyllite and metabasalt.

CZim — **Marble**
Light olive-gray, sandy limestone and dusky red, calcareous quartzite occurs within phyllite locally.

CZic — **Conglomeratic metagraywacke**
Light gray and green, medium- to coarse-grained metagraywacke with white quartz pebbles, variegated phyllite, and green chloritic matrix.

CZip — **Chlorite phyllite**
Light olive-gray and greenish gray, chlorite phyllite and metasiltstone.

Base layers derived from U.S. Geological Survey (USGS)
7.5-minute Series (Topographic)
Walkersville Quadrangle 1953 (Revised 1993)
Digital line graphs for hydrography, topography, transportation and boundaries (1:24,000)
(Topographic quadrangle was mapped by Corps of Engineers, U.S. Army; revised by USGS. Topography by photogrammetric methods from aerial photographs taken 1943. Culture revised by USGS 1953. Map edited in 1993 by USGS based on aerial photographs taken 1988 and other sources; this information not field checked and may not meet USGS content standards.)

Point cultural features shown are from USGS Geographic Names Information System database
1993 magnetic north declination (center of quadrangle): 10 degrees west
(To determine current magnetic declination see: http://www.ngdc.noaa.gov/cgi-bin/seg/gmag/fldsnth1.pl)

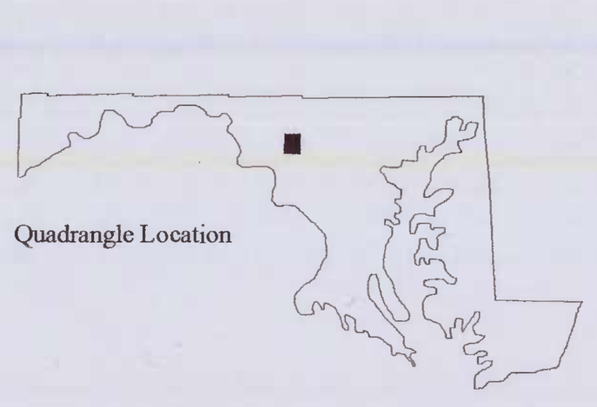
Current map projection:
Maryland State Plane Coordinate System 1987
(Projection: Lambert Conformal Conic, 1980 geodetic reference system)
(Horizontal Datum: North American Datum 1983)

MD State Plane 2000-meter grid tics and coordinates shown in black
Geographic coordinates (latitude-longitude) shown near corners and 2.5' intervals (in black)

GN
(State Plane Grid North)

Karst Features Map of the Walkersville Quadrangle, Frederick County, Maryland

By
David K. Brezinski
2004


Quadrangle Location

Scale 1:24,000

1 0.5 0 1 Miles
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0.5 0 1 Kilometers

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929
(To convert elevations to the North American Vertical Datum of 1988, subtract 1 foot)
(To convert from feet to meters, multiply by 0.3048)

Adjoining 7.5' Quadrangle Names
Walkersville Quadrangle, shaded

1	2	3	1. Catoctin Furnace 2. Woodsboro 3. Union Bridge
4	(shaded)	5	4. Frederick 5. Libertytown
6	7	8	6. Buckeystown 7. Urbana 8. Damascus

Explanation of Map Symbols

Geologic Symbols

Contacts
Geologic contact; approximately located dotted where concealed

Karst Features
Active Sinkhole
Depression
Spring

Faults
Thrust fault sawteeth on upthrown block
Overturned Thrust Fault base of sawteeth on upper plate; sawteeth in direction of dip
Fault; concealed

Base Map Symbols

Transportation
Primary route, class 1 (divided, lanes separated)
Primary route, class 1 (undivided)
Secondary route, class 2 (undivided)
Light duty road or street, class 3
Unimproved road or street, class 4
Railroad, railroad siding or spur

Topography
Topographic index contour (100-ft interval)
Topographic intermediate contour (20-ft interval)

Hydrography
Stream
Water body (eg. lakes, ponds, rivers)

Culture
Incorporated city, village, town or borough
Small park boundary
Landing Strip, Airport, or Perimeter of Airport
Cemetery
Church
Airport
School

References

Brezinski, D.K., 2004, Stratigraphy of Frederick Valley and its relationship to karst development. Maryland Geological Survey Report of Investigations 75, 101 p.

Brezinski, D.K., Southworth, S., and Edwards J.Jr., 2004, Geologic Map of the Walkersville Quadrangle, Frederick County, Maryland: Maryland Geological Survey, Quadrangle Geologic Map. scale 1:24000 (WALKEGEO2004.1).

Reinhardt, J., 1974, Stratigraphy, Sedimentology and Cambro-Ordovician Paleogeography of the Frederick Valley, Maryland: Maryland Geological Survey, Report of Investigations 23, 73 p.

Southworth, S., Brezinski, D.K., Drake, A.A., Jr., Orndorff, R.C., Froelich, A.J., Reddy, J., and Daniels, D., 2003, Digital Geologic Map of the Frederick 30 by 60 Minute Quadrangle, Maryland, Virginia, and West Virginia. U.S. Geological Survey Open File Report 02-437, 1:100,000 -scale, (http://pubs.usgs.gov/of/2002/of02-437/).

Supplemental Information

Use Constraints: These data represent the results of data collection/processing for a specific Department of Natural Resources, Maryland Geological Survey activity and indicate general existing conditions. As such, they are only valid for the intended use, content, time, and accuracy specifications. The user is responsible for the results of any application of the data for other than their intended purpose. The Maryland Geological Survey makes no warranty, expressed or implied, as to the use or appropriateness of the licensed data, and there are no warranties of merchantability or fitness for a particular purpose of use. The Maryland Geological Survey makes no representation to the accuracy or completeness of the data and may not be held liable for human error or defect. Data are only valid at 1:24,000 scale. Data should not be used at a scale greater than that.

Acknowledgements: This map was funded in part by the Maryland State Highway Administration.

Field mapping of karst features was conducted by David Brezinski in 2002-2004. Field mapping of the geology was completed in 2003 and was conducted in conjunction with the United States Geological Survey (USGS). This karst map was compiled in digital form by Heather Quinn of the Maryland Geological Survey and Brent Anderson and Catherine Luckhardt of Towson University, Center for Geographic Information Sciences.

The facilities and services of the Maryland Department of Natural Resources are available to all without regard to race, color, religion, sex, sexual orientation, age, national origin or physical or mental disability.

Version: WALKEKST2004.1
Released June 2004

STATE OF MARYLAND
Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lieutenant Governor

MARYLAND DEPARTMENT OF NATURAL RESOURCES

DEPARTMENT OF NATURAL RESOURCES
C. Ronald Franks
Secretary

W. P. Jensen
Deputy Secretary

MARYLAND GEOLOGICAL SURVEY
Emery T. Cleaves
Director

Copies of this map are available
in hard copy (paper) and digital form from:
MARYLAND GEOLOGICAL SURVEY
2300 Saint Paul Street
Baltimore, MD 21218
Ph: 410-554-5500
Fax: 410-554-5502
http://www.mgs.md.gov/