OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

OPEN-FILE REPORT 98-1

UPDATED: April 25, 2011

DESCRIPTIONS OF GEOLOGIC MAP UNITS

A COMPENDIUM TO ACCOMPANY
DIVISION OF GEOLOGICAL SURVEY
OPEN-FILE BEDROCK GEOLOGY MAPS

by

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The following are generalized stratigraphic descriptions for the geologic units delineated on Ohio Department of Natural Resources, Division of Geological Survey open-file 7.5-minute bedrock-geology maps. Geologic units are listed by system in descending stratigraphic order from youngest to oldest. The order of individual units within each system may not necessarily be in exact stratigraphic order.

The terms *undivided* and *undifferentiated* are used in the following unit descriptions. As applied to these descriptions, **undivided** indicates that formal subdivisions exist, but were not applied at the time the map was compiled, and **undifferentiated** indicates that no subdivisions are known or made at this time.

PERMIAN

Pd: Dunkard Group
- Lithology: shale, siltstone, sandstone, and minor limestone and coal
- Color: shades of gray, green, red, or brown
- Bedding: thin bedded to massive
- Thickness: 500+ feet
- Diagnostic Features: Dominance of shales, siltstone, and sandstone and the presence of nonmarine limestone; rapid horizontal and vertical change in rock type
- **-w-** Washington Coal

PERMIAN AND/OR PENNSYLVANIAN SYSTEM

PIPd: Dunkard Group
- Lithology: sandstone, siltstone, shale, and minor limestone and coal
- Color: shades of brown, gray, red, and green
- Bedding: thin bedded to massive
- Thickness: 600+ feet
- Diagnostic Features: Dominance of sandstone, siltstone, and shale, and the presence of nonmarine limestone; rapid horizontal and vertical change in rock type
- **-hw-** base Hockingport sandstone or top of Waynesburg coal

PENNSYLVANIAN SYSTEM

IPm: Monongahela Group
- Lithology: shale, siltstone, limestone, sandstone, and coal
- Color: shades of gray, green and infrequently red
- Bedding: nonbedded to massive
- Thickness: 350+ feet
- Diagnostic features: laterally extensive nonmarine limestone, economic coal beds
- **-p-** Pittsburgh coal bed

IPc: Conemaugh Group
- Lithology: shale, siltstone, sandstone, mudstone, and lesser amounts of limestone and coal
- Color: shades of gray, green, red, brown, and black
- Bedding: nonbedded to massive
- Thickness: 350 to 490 feet
- Diagnostic features: multicolored mudstones; rare coal beds; thin to thick marine shale and limestone in lower 2/3 of unit; rapid vertical and horizontal changes of rock types

IPcc: *Casselman Formation*: interbedded thick to thin shale and mudstone, and lesser amounts of sandstone beds are abundant and thin coal beds. Dominantly deposited in freshwater environments. Limestone, marine shale, and clay beds are also present. Unit approximately 200 feet in thickness. Base marked by the top of the Ames Limestone.
- **-a-** Ames limestone or equivalent marine strata

IPcg: *Glenshaw Formation*: interbedded thick to thin sandstone, mudstone, and shale beds are abundant and thin coal beds, freshwater and marine limestone, marine shale, and clay beds are also present. Unit approximately 200 feet in thickness. Base marked by the upper surface of the Upper Freeport (no. 7 coal).

IPap: Allegheny and Pottsville Groups undivided
- Lithology: shale, siltstone, sandstone, conglomerate, and subordinate amounts of limestone, clay, flint, and coal
- Color: predominantly shades of gray and black
- Bedding: nonbedded to massive
- Thickness: 450 to 620 feet
- Diagnostic features: economic beds of coal and clay; marine limestone, flint, and shale beds; local development of thick quartzose sandstone and conglomerate in lower ¼ of unit; predominant gray color of unweathered rock; rapid horizontal and vertical changes of rock types
- **no. 5** - coal bed (Lower Kittanning)
- **lm** - Lower Mercer limestone

IPb: *Breathitt Formation*
- **-o-** Obryan Member

MISSISSIPPIAN SYSTEM

Mcw: Coldwater Shale
Lithology: clayey shale with siderite nodules
Color: gray
Bedding: thin bedded
Thickness: 0 to 150+ feet
Diagnostic features: lithology, color, and bedding

Mx or Mm: Maxville Limestone
Lithology: limestone
Color: gray, weathers light gray to tan
Bedding: massive to nodular
Thickness: 0 to 42 feet where exposed
Diagnostic features: fossiliferous, patchy distribution

Mlc: Logan and Cuyahoga Formations undivided
Logan Formation
Lithology: sandstone, siltstone, and minor shale
Color: brown, weathers light brown to reddish brown
Bedding: thin to thick bedded, planar to lenticular
Thickness: 0 to 400 feet
Diagnostic feature: dominance of sandstone

Cuyahoga Formation
Lithology: shale interbedded with minor sandstone and siltstone grading to massive sandstone (Black Hand Sandstone)
Color: gray to brown, weathers light gray to light brown
Bedding: thin to thick bedded, planar to lenticular
Thickness: 50 to 650 feet
Diagnostic feature: dominance of shale; forms cliffs
NOTE: Thickness of **Mlc** ranges from 250 to 1050 feet.

Mc: Cuyahoga Formation
Lithology: shale and interbedded sandstone and siltstone
Color: gray to brown
Bedding: thin to thick, planar to lenticular
Thickness: 0 to 180 feet where mapped in northern Ohio
Diagnostic feature: dominance of shale

Mu: Mississippian undivided
Maxville Limestone, Logan Formation, Cuyahoga Formation undivided
See **Mx**, **Mm** and **Mlc** for description of units.
Thickness: 0 to 1092 feet
Diagnostic feature: limestone, interbedded shale and sandstone

Ms: Sunbury Shale
Lithology: carbonaceous shale
Color: black to brownish black
Bedding: very thin laminae
Thickness: 30 to 90 feet
Diagnostic features: color, carbonaceous

Mb and Mba: Berea Sandstone
Lithology: sandstone
Color: light greenish gray, weathers to shades of yellow brown
Bedding: thin to thick bedded, planar to lenticular to cross-bedded
Thickness: 15 to 115 feet
Diagnostic feature: very fine-grained

Mbd and Mbe: Bedford Shale
Lithology: shale; siltstone beds in upper 25 feet
Color: gray, green, red, and brown
Bedding: laminated to medium bedded
Thickness: 80 to 155 feet
Diagnostic features: clayey shale, siltstone beds in upper ¼ of unit, siltstone increases in abundance upward

Ms-b or Msbb: Sunbury-Berea-Bedford undivided
Lithology: carbonaceous shale in upper 10–15 feet and silty shale below
Color: dark brown to black in upper part and gray in lower part
Bedding: thinly laminated to thin
Thickness: 0 to 100 feet
Diagnostic features: lithology, color, and bedding
NOTE: Ms-b occurs in the northwestern corner of Ohio.

Mbbd: Berea Sandstone and Bedford Shale undivided
Berea Sandstone
Lithology: sandstone and minor shale
Color: brown, weathers light brown to reddish brown
Bedding: thin to thick, planar to lenticular
Thickness: 5 to 75 feet, locally 100 to 125 feet in Lorain, Cuyahoga, and Medina Counties
Diagnostic feature: dominance of sandstone

Bedford Shale
Lithology: shale and interbedded siltstone and sandstone
Color: gray to brown, locally reddish brown
Bedding: thin to medium, planar to lenticular
Thickness: 80 to 180 feet, locally thin to absent where Berea Sandstone is thick
Diagnostic features: dominance of shale, ripple marks in siltstone beds

DEVONIAN AND/OR MISSISSIPPIAN SYSTEM

DMu: Sunbury Shale, Berea Sandstone, and Bedford Shale undivided
Sunbury Shale
Lithology: carbonaceous shale
Color: black to brown, weathers light brown
Bedding: thin, planar
Thickness: 10 to 50 feet
Diagnostic feature: dominance of carbonaceous shale

Berea Sandstone
Lithology: sandstone and minor shale
Color: brown, weathers light brown to reddish brown
Bedding: thin to thick, planar to lenticular
Thickness: 10 to 50 feet
Diagnostic feature: dominance of sandstone

Bedford Shale
Lithology: shale and interbedded sandstone
Color: gray to brown, weathers light gray to light brown
Bedding: thin to medium, planar to lenticular
Thickness: 80 to 100 feet
Diagnostic feature: dominance of gray shale
NOTE: Thickness of **DMu** ranges from 100 to 200 feet. Unit is mapped in south-central Ohio.

DEVONIAN SYSTEM

Da: Antrim Shale
Lithology: carbonaceous shale
Color: dark brown to black
Bedding: thinly laminated
Thickness: 0 to 230 feet
Diagnostic features: lithology, color, and bedding

Doh: Ohio Shale
Lithology: carbonaceous shale with carbonate/siderite concretions
Color: brownish black to greenish gray, weathers brown
Bedding: laminated to thin bedded, fissile parting
Thickness: 250 to 500+ feet
Diagnostic features: color, petroliferous odor, carbonate/siderite concretions in lowermost 50 feet

Dol: Olentangy Shale
Lithology: clayey shale with limestone nodules
Color: greenish gray to medium gray
Bedding: laminated to thin
Thickness: 20 to 55 feet
Diagnostic features: limestone nodules in lower 1/3, thin beds of brownish-gray shale in upper 2/3, clay content

Dolp: Olentangy Shale - Prout Limestone Member
Lithology: limestone, dolomitic in part
Color: olive gray
Bedding: irregular
Thickness: 0 to 9 feet
Diagnostic features: hard, siliceous; pyrite, glauconite and phosphatic bone fragments at upper contact; unit present in northern Ohio

Dolpb: Olentangy Shale, Plumbrook Shale Member
Lithology: shale and argillaceous limestone
Color: gray
Bedding: thin
Thickness: 20 to 40 feet on outcrop; 60 feet in subsurface
Diagnostic features: dominance of fossiliferous shale; unit present in northern Ohio

Do: Ohio-Olentangy Shale undivided
See **Doh** and **Dol** for unit descriptions.
NOTE: Thickness of **Do** is 250+ feet.

Dt: Traverse Group undivided
Lithology: upper part cherty dolomite, lower part fossiliferous shale interbedded with limestone
Color: gray to light brown in upper part, olive gray in lower part
Bedding: thin to medium
Thickness: 0 to 170 feet
Diagnostic features: upper portion contains abundant chert, lower portion very fossiliferous

Ddd: Dundee Limestone
Lithology: fossiliferous limestone in upper part to cherty dolomite in lower part
Color: olive gray to brown
Bedding: upper part thin bedded, lower part medium to thick bedded
Thickness: 0 to 105 feet
Diagnostic features: fossiliferous in upper portion, chert in lower portion

Dd: Delaware Limestone
Lithology: argillaceous, cherty, carbonaceous limestone
Color: gray to brown
Bedding: thin to massive
Thickness: 0 to 45 feet
Diagnostic features: argillaceous partings; chert nodules and layers; petroliferous odor

Dc: Columbus Limestone
Lithology: fossiliferous limestone and dolomite
Color: gray to brown, weathers brown
Bedding: massive
Thickness: 0 to 105 feet
Diagnostic features: upper 2/3 fossiliferous, gray limestone; lower 1/3 brown dolomite

Dcl: Columbus-Lucas undifferentiated
Lithology: dolomite, quartz grains locally in lower portion
Color: gray to brown, weathers brown
Bedding: massive to thin
Thickness: 85 to 100 feet
Diagnostic feature: lithology

Ddr: Detroit River Group undivided
Lithology: dolomite
Color: brown to gray
Bedding: medium to thick
Thickness: 0 to 170 feet
Diagnostic features: laminations; nodules or interbeds of anhydrite and gypsum; basal part becomes sandy dolomite or fine-grained sandstone

Dh: Holland Quarry Shale
Lithology: sandy, fossiliferous shale
Color: dark gray to black
Bedding: poorly bedded
Thickness: 0 to 20 feet
Diagnostic features: sandiness; fossil fish and eurypterids
NOTE: See Carman (1960) and Kjellesvig-Waering (1961) for additional details on the Holland Quarry Shale.

SILURIAN SYSTEM

Sbi: Bass Islands Group undivided
Lithology: dolomite
Color: yellow gray to olive gray
Bedding: laminated to thick
Thickness: 0 to 110 feet
Diagnostic features: laminations; brecciated or rubbly appearance

Ssg: Salina Group
Lithology: dolomite
Color: gray and brown
Bedding: thin to medium and laminae
Thickness: 275 to 555
Diagnostic features: argillaceous partings; algal laminations; angular breccia or clasts, particularly in upper one-sixth of unit (northern Ohio); anhydrite/gypsum in subsurface

Ssu or Sus: Salina undifferentiated/undifferentiated Salina dolomite
Lithology: dolomite
Color: gray and brown
Bedding: thin
Thickness: 235 to 335 feet
Diagnostic features: argillaceous partings; brecciated intervals; anhydrite/gypsum zones; algal lamination

NOTE: Both **Ssu** and **Sus** appear on bedrock-geology maps because there was a change in philosophy of unit terminology used between different mapping phases, not because of any change in the characteristics of the rock unit.

St: Tymochtee Dolomite
Lithology: dolomite with brownish-black to gray shale laminae
Color: olive gray to yellowish brown
Bedding: thin to massive
Thickness: 0 to 140 feet
Diagnostic feature: carbonaceous shale partings

Sg: Greenfield Dolomite
Lithology: argillaceous dolomite
Color: olive gray to yellow brown
Bedding: thin to massive
Thickness: 0 to 80 feet
Diagnostic features: absence of shale laminae when compared to overlying unit; sedimentary breccia zones

Sgt: Greenfield Dolomite and Tymochtee Dolomite undivided
Peebles 7.5-minute Quadrangle – Adams County, Ohio (Swinford, 1985)
See **St** and **Sg** for unit descriptions.

St-b: Tymochtee Dolomite, Greenfield Dolomite*, and Peebles Dolomite*, Lilley Formation*, and Bisher Formation* undivided
Tymochtee Dolomite
Lithology: argillaceous dolomite and minor shale
Color: bluish gray, weathers gray
Bedding: planar to lenticular, thin to medium
Thickness: 0 to 50 feet
Diagnostic features: increase in argillaceous dolomite and shale; shale laminae
*See **Sg-b** for descriptions of other units.
NOTE: Thickness of **St-b** ranges from 220 to 260 feet.

Sg-b: Greenfield Dolomite, Peebles Dolomite*, Lilley Formation*, and Bisher Formations* undivided
Greenfield Dolomite
Lithology: dolomite
Color: bluish gray, weathers yellowish to light gray
Bedding: planar, thin to medium
Thickness: 0 to 100 feet
Diagnostic feature: planar, thin- to medium-bedded dolomite beds lacking argillaceous material
*See **Splb** for descriptions of other units.
NOTE: Thickness of **Sg-b** ranges from 80 to 160 feet.

Sl: Lockport Dolomite
Lithology: dolomite
Color: shades of white to medium gray
Bedding: medium to massive
Thickness: 30 to 300 feet
Diagnostic features: fossiliferous; vuggy porosity; finely to coarsely crystalline nature

Sp: Peebles Dolomite
Sl: Lilley Formation
Sb: Bisher Formation
Units appear only on the Peebles, Ohio 7.5-minute quadrangle in Adams County, Ohio. Appears on Winchester quadrangle as **Sbi**.
See **Splb** for unit descriptions.

Splb: Peebles Dolomite, Lilley Formation, Bisher Formation undivided
Peebles Dolomite
Lithology: dolomite
Color: bluish gray, weathers light gray
Bedding: planar to irregular, thick to massive
Thickness: 0 to 120 feet
Diagnostic features: thick to massive bedding; vuggy to cavernous porosity; forms cliffs

Lilley Formation
Lithology: dolomite with minor limestone, chert, and shale
Color: bluish gray to gray, weathers reddish gray to gray
Bedding: planar to irregular, thin to thick
Thickness: 20 to 80 feet
Diagnostic features: presence of fossiliferous dolomite and distinct planar to irregular bedding

Bisher Formation
Lithology: argillaceous dolomite with minor shale
Color: bluish gray to gray, weathers yellowish orange
Bedding: planar to lenticular, thin to thick
Thickness: 20 to 90 feet
Diagnostic feature: dominance of argillaceous dolomite
NOTE: Thickness of **Splb** ranges from 80 to 160 feet.

Seb: Estill Shale and Bisher Formation undivided
See **Se, Splb, Sg-b,** or **St-b** for unit descriptions.

Sc-l or Scseml: Cedarville Dolomite*, Springfield Dolomite*, Euphemia Dolomite*, Massie Shale*, Laurel Dolomite* undivided
*See **Scse** and **Sm-b** for unit descriptions.
NOTE: Thickness of **Scseml** ranges from 115 to 150 feet.
Thickness of **Sc-l** ranges from 115 to 140 feet.

Scse: Cedarville Dolomite, Springfield Dolomite, Euphemia Dolomite undivided

Cedarville Dolomite
- Lithology: dolomite
- Color: white to gray to blue gray, weathers gray
- Bedding: massive
- Thickness: 0 to 100 feet
- Diagnostic features: abundant intercrystalline (sucrosic), moldic, and vuggy porosity; pentamerid brachiopod fossil zone near contact with Springfield Dolomite; forms cliffs

Springfield Dolomite
- Lithology: dolomite
- Color: gray to tan, mottled with brownish gray
- Bedding: massive where unweathered, layered bricklike where weathered
- Thickness: 5 to 10 feet
- Diagnostic feature: bricklike bedding

Euphemia Dolomite
- Lithology: dolomite to dolomitic limestone
- Color: gray to bluish gray
- Bedding: massive
- Thickness: 5 to 15 feet
- Diagnostic features: large, blocky bedding where weathered; forms cliffs

NOTE: Thickness of **Scse** ranges from 10 to 125 feet.

Sm-b: Massie Shale, Laurel Dolomite, Osgood Shale, Dayton Limestone, Brassfield Limestone undivided

Massie Shale
- Lithology: shale with minor limestone and dolomite
- Color: gray to bluish gray
- Bedding: planar to irregular, thin to thick
- Thickness: 0 to 10 feet
- Diagnostic features: calcareous shale with limestone and dolomite; slakes easily

Laurel Dolomite
- Lithology: argillaceous to nonargillaceous dolomite
- Color: gray to tan, weathers brown
- Bedding: wavy, thin to medium
- Thickness: 5 to 10 feet
- Diagnostic feature: lithology

Osgood Shale
- Lithology: shale calcareous with minor limestone and dolomite
- Color: blue gray to gray, weathers brown
- Bedding: thin to massive
- Thickness: 3 to 25 feet
- Diagnostic features: lithology; slakes and slumps readily in outcrop

Dayton Formation/Limestone
- Lithology: dolomitic limestone
- Color: gray to bluish gray, weathers grayish white
- Bedding: medium to thick
- Thickness: 5 to 15 feet
- Diagnostic features: medium-to thick-bedded dolomitic limestone; dominantly fine-grained texture

Brassfield Formation/Limestone
- Lithology: limestone with grayish-green, argillaceous to glauconitic partings
- Color: white to pink, locally gray, brown, or red
- Bedding: irregular, thin to medium
- Thickness: 20 to 50 feet
- Diagnostic features: coarsely crystalline limestone; abundant fossil crinoidal material; forms cliffs

NOTE: Brassfield Limestone locally mapped as **Sb.** Thickness of **Sm-b** ranges from 32 to 100 feet.

Se: Estill Shale
- Lithology: shale and minor dolomite interbedded
- Color: reddish to greenish gray, weathers light gray
- Bedding: planar to irregular, thin to thick
- Thickness: 30 to 180 feet
- Diagnostic features: dominance of shale; landslides common in areas where unit is exposed

Sdnb: Dayton Limestone, Noland Formation, and Brassfield Formation undivided

Dayton Limestone
- Lithology: limestone
- Color: gray, weathers light gray
- Bedding: planar, medium to thick
- Thickness: 2 to 12 feet
- Diagnostic feature: planar bedding

Noland Formation
- Lithology: shale, minor interbedded limestone and dolomite
- Color: gray to bluish gray, weathers light gray
- Bedding: planar to irregular, thin to thick bedded
- Thickness: 0 to 25 feet
- Diagnostic feature: dominance of shale

Brassfield Formation
- Lithology: limestone, minor interbedded dolomite, chert, and shale
- Color: blue, green, to pinkish gray, weathers reddish to light gray
- Bedding: planar, irregular, and nodular, thin to thick
- Thickness: 20 to 60 feet
- Diagnostic feature: dominance of limestone

NOTE: Locally mapped as **Sdb** and **Sbn.** Thickness of **Sdnb** ranges from 22 to 97 feet.

Sdb: Dayton Limestone and Brassfield Formation undivided

See **Sdnb** or **Sm-b** for unit descriptions.

Ssl: sub-Lockport undifferentiated
- Lithology: dolomite, limestone, and shale
- Color: shades of gray to olive green, yellow, and reddish gray
- Bedding: laminated to thick
- Thickness: 15 to 175 feet
- Diagnostic features: argillaceous, glauconitic, pyritic, ferruginous and/or phosphatic; locally fossiliferous

ORDOVICIAN SYSTEM

Ou: Ordovician undivided/Ordovician undifferentiated
Lithology: shale with interbedded dolomite and limestone
Color: various shades of gray
Bedding: thin to medium
Thickness: 145+ feet
Diagnostic feature: lithology

Odwl, Olwd, or Odwhl: Drakes Formation, Whitewater Formation, and Liberty Formation undivided

Drakes Formation
Lithology: shale and limestone/dolomite interbedded; averages 90% shale and 10% limestone/dolomite
Color: gray and maroon, weathers yellowish gray
Bedding: planar to irregular, thin to thick
Thickness: 20 to 30 feet
Diagnostic features: ratio of shale to limestone/dolomite
NOTE: Locally mapped as **Od** or **Odp**: **Preachersville Member of the Drakes Formation**

Whitewater Formation
Lithology: limestone and shale interbedded; averages 60% limestone and 40% shale
Color: gray, weathers yellowish gray
Bedding: irregular to wavy, thin to medium
Thickness: 20 to 80 feet
Diagnostic features: ratio of limestone to shale and dominance of wavy to irregular bedding

Liberty Formation
Lithology: limestone and shale interbedded; averages 50% limestone and 50% shale
Color: gray, weathers yellowish gray
Bedding: planar to irregular, thin to medium
Thickness: 20 to 40 feet
Diagnostic feature: ratio of shale to limestone
NOTE: Thickness of **Odwl** ranges from 60 to 150 feet.

Os: Saluda Formation
Lithology: micritic limestone and shale interbedded; averages 55% limestone and 45% shale
Color: gray, weathers yellowish gray
Bedding: irregular, nodular, and wavy, thin to thick
Thickness: 0 to 11 feet
Diagnostic feature: micritic limestone

Odw: Drakes Formation and Waynesville Formation undivided
Drakes Formation – See **Odwl** for description.
Waynesville Formation – See **Ow** description.
NOTE: Thickness of **Odw** ranges from 110 to 150 feet.

Ob: Bull Fork Formation
Lithology: shale and limestone interbedded; averages 40–60% shale and 40–60% limestone
Color: gray, weathers light gray
Bedding: planar to irregular, thin to thick
Thickness: estimated 200 feet
Diagnostic features: ratio of shale to limestone; dominance of medium- to thick-bedded shales
NOTE: Mapped only in Peebles, Ohio 7.5-minute quadrangle in Adams County (Swinford, 1985).

Ow: Waynesville Formation
Lithology: shale and limestone interbedded; averages 70% shale and 30% limestone
Color: gray to bluish gray, weathers light gray
Bedding: planar to irregular, thin to thick
Thickness: 90 to 120 feet
Diagnostic features: ratio of shale to limestone; dominance of medium- to thick-bedded shales

Oa: Arnheim formation (informal unit)
Lithology: shale and limestone interbedded; averages 60% shale and 40% limestone
Color: gray to bluish gray, weathers light gray
Bedding: planar, wavy, irregular, and nodular, thin to thick
Thickness: 50 to 100 feet
Diagnostic features: ratio of shale to limestone; nodular bedding in upper portion; presence of multiple sedimentary cycles consisting of the alternation of shale and limestone displaying planar to irregular bedding with limestone and shale exhibiting wavy to nodular bedding

Owa or Oa-w: Waynesville Formation and-Arnheim formations undivided
See **Ow** and **Oa** for description.
NOTE: Thickness of **Owa** ranges from 140 to 220 feet.

Ogl or Oglu: Grant Lake Limestone
Lithology: limestone and shale interbedded; averages 80% limestone and 20% shale
Color: gray to bluish gray, weathers light gray to yellowish gray
Bedding: wavy, irregular, and rare planar, thin to thick
Thickness: 80 to 120 feet
Diagnostic features: ratio of limestone to shale; dominance of wavy and irregular bedding
NOTE: See Schumacher and others (1991) for additional details on the Grant Lake Limestone.

Ogl: Grant Lake Formation
Lithology: limestone and shale interbedded; averages 50% limestone and 50% shale
Color: gray to bluish gray, weathers light gray to yellowish gray
Bedding: planar, wavy, irregular, and nodular, thin to thick
Thickness: 60 to 130 feet
Diagnostic features: ratio of limestone and shale; dominance of wavy bedding in the lower part and nodular bedding in the upper part
NOTE: See Schumacher and others (1991) for additional details on the Grant Lake Formation.

Oglm: Grant Lake Formation, Mount Auburn Member
Lithology: shale and limestone interbedded; averages 50% shale and 50% limestone
Color: gray, weathers yellowish gray
Bedding: nodular, wavy to irregular, thin to medium
Thickness: 20 to 30 feet
Diagnostic features: bedding, lithology

Ogls: Grant Lake Limestone, Straight Creek Member
- Lithology: limestone and shale interbedded; averages 75% limestone and 25% shale
- Color: gray to bluish gray, weathers light gray to yellowish gray
- Bedding: wavy, irregular, and minor nodular, thin to thick
- Thickness: 20 to 30 feet
- Diagnostic features: ratio of limestone to shale; bedding

Oglc: Grant Lake Formation/Limestone, Corryville Member
- Lithology: shale and limestone interbedded; averages 65% shale and 35% limestone
- Color: gray, weathers yellowish gray
- Bedding: planar to lenticular
- Thickness: 15 to 75 feet
- Diagnostic features: ratio of shale to limestone; dominance of planar bedding

Oglb: Grant Lake Formation/Limestone, Bellevue Member
- Lithology: limestone and shale interbedded; averages 65% limestone and 35% shale
- Color: gray, weathers yellowish gray
- Bedding: irregular to wavy
- Thickness: 10 to 70 feet
- Diagnostic feature: dominance of wavy to irregular limestone

Om: Miamitown Shale
- Lithology: shale and limestone interbedded; averages 90% shale and 10% limestone
- Color: gray to bluish gray, weathers light gray to yellowish gray
- Bedding: planar to nodular, thin to thick
- Thickness: 0 to 35 feet
- Diagnostic features: ratio of shale to limestone; thick-bedded shales; nodular bedding of limestones

Of: Fairview Formation
- Lithology: limestone and shale interbedded; averages 50% limestone and 50% shale
- Color: gray to bluish gray, weathers light gray to yellowish gray
- Bedding: planar to lenticular, thin to medium
- Thickness: 50 to 120 feet
- Diagnostic features: ratio of limestone to shale; bedding

Omf and Ofm: Miamitown Shale-Fairview Formation undivided/Fairview Formation-Miamitown Shale undivided

See descriptions of **Of** and **Om** for the characteristics of these units.

NOTE: Thickness of **Omf** and **Ofm** ranges from 50 to 150 feet.

Ok: Kope Formation
- Lithology: shale and limestone interbedded; averages 75% shale and 25% limestone
- Color: gray to bluish gray, weathers light gray to yellowish gray
- Bedding: planar, thin to thick
- Thickness: 200 to 260 feet
- Diagnostic feature: amount of shale

Op: Point Pleasant Formation
- Lithology: limestone and shale interbedded; averages 60% limestone and 40% shale
- Color: gray to bluish gray, weathers light gray
- Bedding: planar to lenticular, thin to medium
- Thickness: 0 to 80 feet; entire unit not exposed
- Diagnostic feature: ratio of limestone to shale

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STRATIGRAPHIC CORRELATION CHART

Larsen, G.L., 1998, Generalized correlation chart of bedrock units in Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Open-File Report 98-2, chart.

This plot-on-demand chart shows the regional correlation and relationships of most surface-rock units identified on the 7.5-minute-scale reconnaissance bedrock-geology maps on open file at the ODNR Division of Geological Survey. Generally accepted subsurface terminology also is shown. The lithostratigraphic correlations are based on a geologic-time framework consisting of both North American and global subdivisions. The chart is divided into 14 columns representing 14 different geologic regions of the state. An extensive list of references is included.

ADDITIONAL STRATIGRAPHIC REFERENCES

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Ford, J.P., 1967, Cincinnatian geology in southwestern Hamilton County, Ohio: American Association of Petroleum Geologists Bulletin, v. 51, no. 6, p. 918–936, 14 fig.

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Larsen, G.L., 1994, Regional bedrock geology of the Ohio portion of the Lima, Ohio-Indiana, 30 x 60 minute quadrangle: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Map 7, scale 1″ = about 1½ miles.

Larsen, G.L., 1998, Generalized correlation chart of bedrock units in Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Open-File Report 98-2, chart.

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Pashin, J.C. and Ettensohn, F.R., 1995, Reevaluation of the Bedford-Berea sequence in Ohio and adjacent states—Forced regression in a foreland basin: Geological Society of America Special Paper 298, 68 p.

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