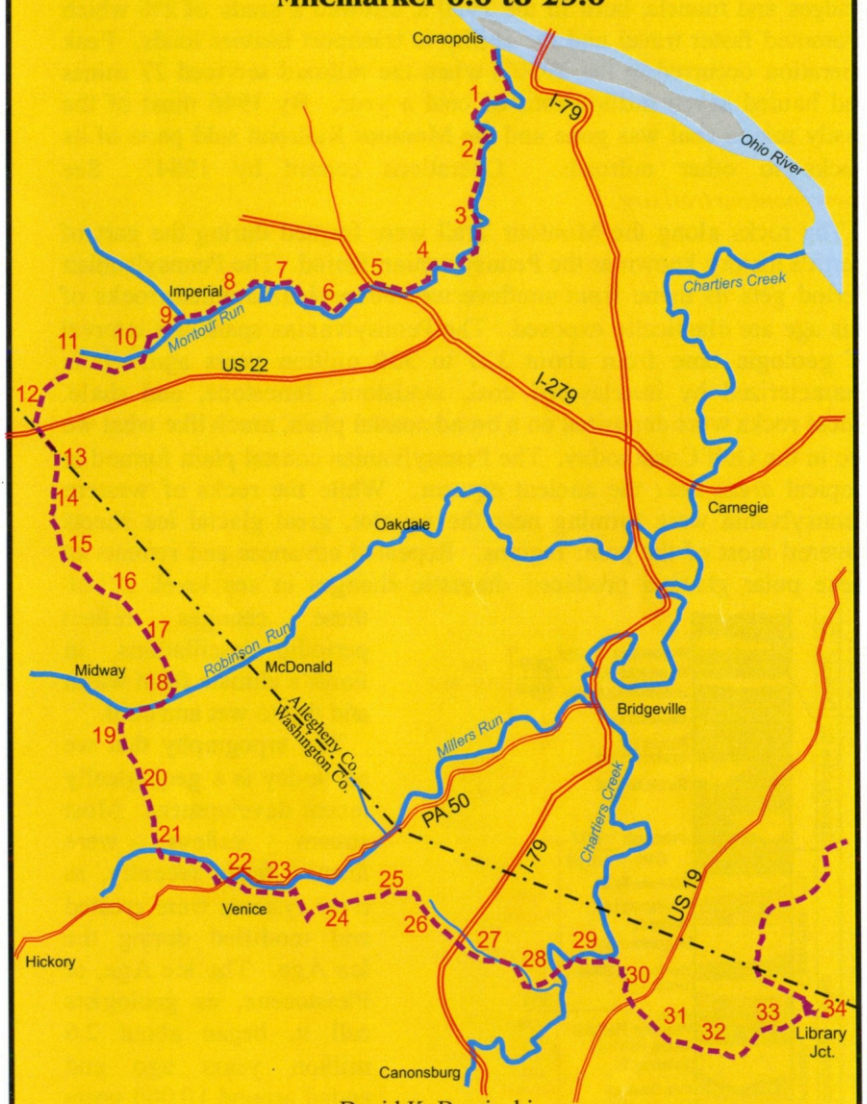
GEOLOGY
OF THE MONTOUR TRAIL

Milemarker 0.0 to 29.0



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Geology Underlies it All

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Introduction

Chartered in 1877, the Montour Railroad was created to collect coal from mines along Montour Run. The initial track ran from Montour Junction, at Coraopolis, to Imperial. By 1912, additional mines were opened to the south and east. In response, the Montour Railroad extended its trackage, reaching West Mifflin in 1917. Upgraded bridges and tunnels, built in the 1920's, allowed a grade of 2% which promoted faster travel and the ability to transport heavier loads. Peak operation occurred in the 1930's when the railroad serviced 27 mines and hauled seven million tons of coal a year. By 1946 most of the easily mined coal was gone and the Montour Railroad sold parts of its tracks to other railroads. Operations ceased by 1984. See *www.montourtrail.org*.

The rocks along the Montour Trail were formed during the part of Earth's history known as the Pennsylvanian Period. The Pennsylvanian Period gets its name from southwestern Pennsylvania where rocks of this age are classically exposed. The Pennsylvanian spans the interval of geologic time from about 320 to 300 million years ago. It is characterized by interlayered coal, sandstone, limestone, and shale. These rocks were deposited on a broad coastal plain, much like what we see in the Gulf Coast today. The Pennsylvanian coastal plain formed in tropical areas near the ancient equator. While the rocks of western Pennsylvania were forming near the equator, great glacial ice sheets covered most of the polar regions. Repeated advances and retreats of these polar glaciers produced dramatic changes in sea level. All of these changes reflect periodic oscillations in Earth's climate from warm and dry to wet and cool.

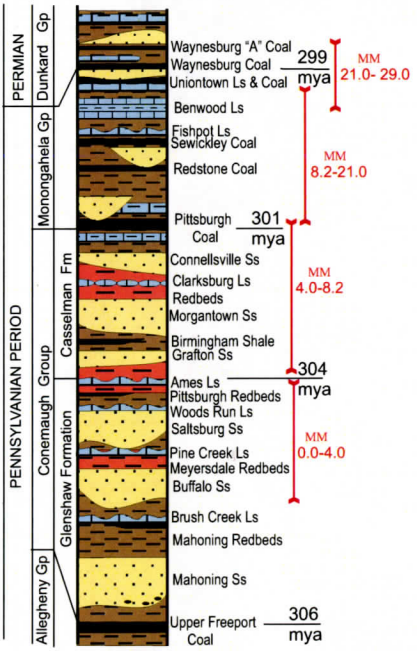


Figure 1. Vertical succession of rock layers exposed along the Montour Trail.

The topography that we see today is a geologically recent development. Most stream valleys were formed fairly recently, as river systems were created and modified during the Ice Age. The Ice Age, or Pleistocene, as geologists call it, began about 2.6 million years ago and ended around 10,000 years ago. Since the end of the Ice Age the topography has been slowly changing as stream erosion and landslides mold the modern landscape.

Geology of the Montour Trail

Rocks exposed along the Montour Trail represent about six million years of Earth's history. Because the strata are flat-lying, the age of the rocks changes with elevation. The oldest rocks are exposed at the trail's lowest point, along the Ohio River. The youngest rocks are exposed at National Tunnel, the highest point on the trail.

MM (Milemarker) 0 to MM 4.0

Rocks occurring along the first three miles of the trail are assignable to the lower part of the Glenshaw Formation of the Conemaugh Group. The most prominent unit is the Buffalo Sandstone Member (Figure 2). This sandstone is the oldest rock unit exposed along the trail and can be seen near the mouth of Montour Run. As the trail grade ascends to the south, you will be passing through rock layers that are progressivelyyounger and younger. These rocks were formed by river systems when western Pennsylvania was a flat coastal plain located near the equator.

Figure 2. A, Ancient river channel deposits of the Buffalo Sandstone, at MM 0.3. B, Closeup of cross-bedded sandstone formed by the ancient river.

MM 4.0, Montour Road, to MM 8.2, Imperial

This part of the Trail passes through rocks of the Casselman Formation of the Conemaugh Group. The base of the Casselman Formation is at the top of the Ames Limestone. This limestone, containing marine fossils, is exposed along Montour Run Road (MM 4.5). The top of the formation is at the base of the Pittsburgh Coal.

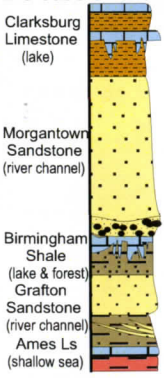


Figure 3. Succession of rocks exposed along FedEx Drive near MM 4.0. Approximately 3 million years of deposition are represented in the units exposed.

An excellent reference section for much of the Casselman Formation is exposed near MM 4.0 on FedEx Drive (Figure 3). This succession of rocks illustrates how depositional environments change through time. From bottom to top the rocks consist of the Grafton Sandstone (ancient river channel), Birmingham Shale (river floodplain and lake), Morgantown Sandstone (river channel), and Clarksburg Shale and Limestone (ancient lake).

As you continue up the trail from FedEx Drive you will resume your trip through rocks of the Casselman Formation. The Morgantown Sandstone is exposed at Cliff Mine Road (MM 6.0) and Enlow Tunnel (MM 7.3) (Figure 3). Enlow Tunnel was constructed in 1924 to straighten the tracks that curve sharply around a meander in Montour Run. Looking across Montour Run to the south from the eastern portal of Enlow Tunnel you should be able to make out a topographically flat area on which a housing development is built. This level area was created during the Ice Age by Lake Monongahela. The gravels on which these houses are built represent beach gravels left behind by this ancient lake. Lake Monongahela was formed about 20,000 years ago when glaciers, in the vicinity of, what is now Ellwood City, dammed the ancient river systems creating a giant lake that submerged much of the valleys of the region.

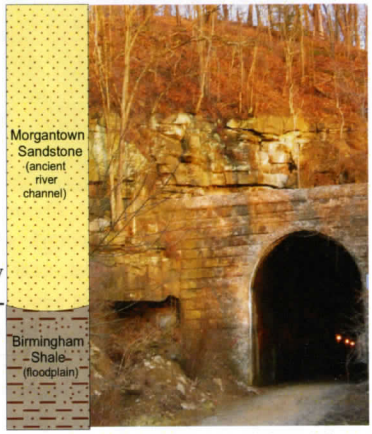


Figure 3. The western portal of Enlow Tunnel (MM 7.3) displays the contact at the base of the Morgantown Sandstone with the underlying Birmingham Shale.

At Imperial (MM 8.0), the Montour trail reaches the stratigraphic level of the Pittsburgh Coal. Over the next few miles the Montour Trail passes old surface mines that have been reclaimed to their original contour (Figure 4). At least one of these mines was used as a sanitary landfill.

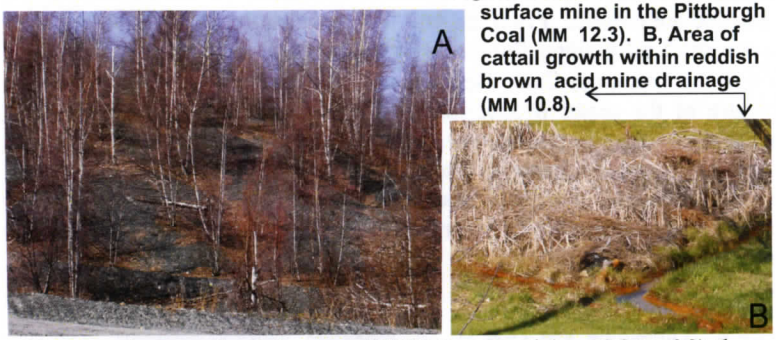
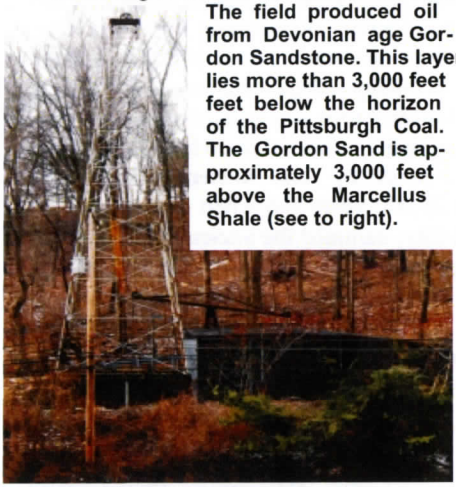
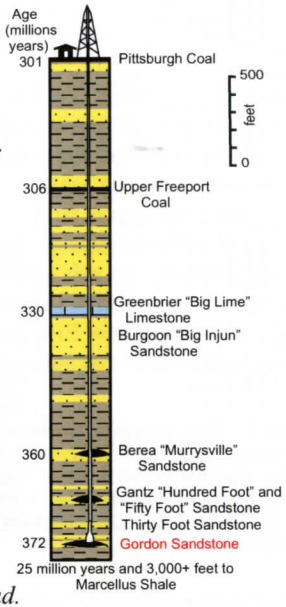


Figure 4. A, Area reclaimed from surface mine in the Pittburgh Coal (MM 12.3). B, Area of cattail growth within reddish brown acid mine drainage (MM 10.8).

You may have noticed that near Cliff Mine Road (MM 5.0 to 6.0) there are remnants of old oil field derricks and storage tanks (Figure 5). Most of these structures are remains of the oil boom of the late 1800's. This oil field is known as the McDonald Field. Actually, the McDonald Field is a group of separated fields. Some of the more prominent fields are the Moon Run, Crafton, McCurdy, and Hopper. Oil was first discovered in this area between 1888 and 1896. It was produced from a Devonian sandstone known as the Gordon Sand (Figure 5). This sandstone was formed along an ancient shoreline more than 370 million years ago.

Figure 5. McDonald Oil Field. Oil derrick (below) at Cliff Mine Road Marriott Inn. This is one of hundreds of structures remaining from the McDonald Oil Field. The field produced oil from Devonian age Gordon Sandstone. This layer lies more than 3,000 feet feet below the horizon of the Pittsburgh Coal. The Gordon Sand is approximately 3,000 feet above the Marcellus Shale (see to right).





MM 8.2, Imperial, to MM 20.0, Primose Road.

The Montour Trail passes through several former coal mining towns (Boggs, Champion, Quicksilver, and Primrose) as it continues to climb in grade. The rocks along this section of the trail are assigned to the lower Monongahela Group. The area near the trail have been extensively surface mined for the Pittsburgh Coal. Between MM 12.0 and MM 13.0 the trail leaves Allegheny County and enters Washington County. Exposures along this part of the trail are limited. Upon reaching Quicksilver (MM 15.0) abundant exposures of the Benwood Limestone are present. From the 967-foot long McDonald Trestle you can see spoil piles along Robinson Run that are remains of the Shaw Mine in the Pittsburgh Coal. Between MM 19.0 and 20.0 is an excellent exposure of the upper Monongahela Group's Uniontown Limestone (Figure 6). This limestone unit, just like the underlying Benwood Limestone, represents an ancient lake deposit. These lakes covered the region near the end of the Pennsylvanian Period. Near the top of the exposure is the thin Uniontown Coal and Sandstone.

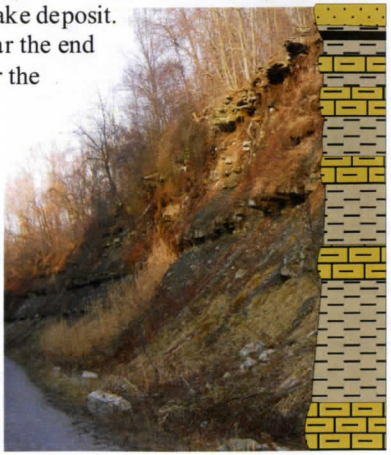


Figure 6. Limestone and coal at MM 19.1-19.5. The change from limestone to shale reflects rapid changes in the ancient climate. When the climate was wet, shales formed, but when the climate grew dry, limestones were deposited. The thin Uniontown Coal, near the top of the cut, sits below the Uniontown Sandstone.

MM 20.0, Primrose Road, to MM 24.0, Bishop

From MM 22 to MM 23 the Benwood Limestone of the Monongahela Group is exposed. The Benwood Limestone represents the deposits of a lake, similar to, but older than the Uniontown Limestone discussed above. This limestone is well exposed along Interstate 79 at the Carnegie Exit. The many oil derricks and storage tanks present along the section from Galati Road to Bishop are once again the remnants of the McDonald Oil Field.

MM 24.0, Bishop to MM 29.0, Linewood Road

The National Tunnel (MM 25) represents the highest elevation on the Montour grade at 1,136 feet above sea level. The 623-foot long tunnel is cut through the lower part of the Permian Dunkard Group. Deposited about 299 million years ago, these rocks are the youngest exposed along the trail (Figure 7). The Waynesburg "A" Coal is exposed in the cliff above the western portal. As the trail descends eastward from National Tunnel towards Chartiers Creek, it cuts through younger rocks. The trail parallels McPherson Creek and passes the Henderson coal mine which was opened in 1914 in the Pittsburgh Coal. The Pittsburgh Coal is at a depth of 240 feet in this area. Rocks exposed along this part of the trail are assigned to the Monongahela Group.

Figure 7. Rocks exposed at National Tunnel (MM 25) formed during the Permian Period about 299 million years ago. Exposed are ancient lake (limestone and shale), swamp (coal), and river channel (sandstone). The Permian Waynesburg "A" Coal is exposed near the top of the cut.

At Greer Tunnel (MM 28.5) the Uniontown Limestone is once again exposed below the trail grade, and along the adjacent Chartiers Creek. In the cliff above the western portal of the tunnel is the Waynesburg Coal.

From Greer Tunnel to Linewood Road (MM 29) the trail again begins to ascend topographically. It also climbs through progressively younger strata of the Monongahela Group. At MM 29 the Waynesburg Coal is exposed along the trail.

The Montour Trail continues on to MM 46 at Clairton, where it ends.

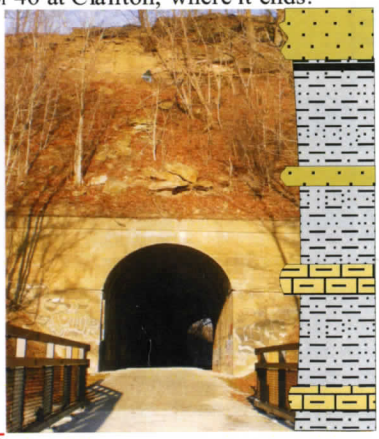


Figure 8. Greer Tunnel (MM 29) cuts through rocks that mark the change from the Pennsylvanian to Permian Periods. The Uniontown Limestone is exposed at grade, but the Permian Waynesburg Coal is present near the top of the cut.