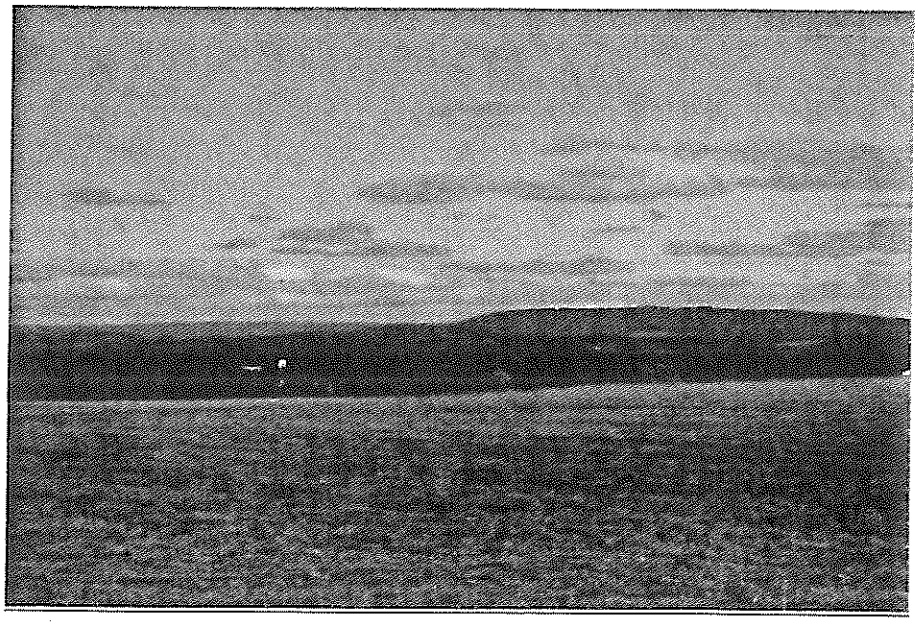
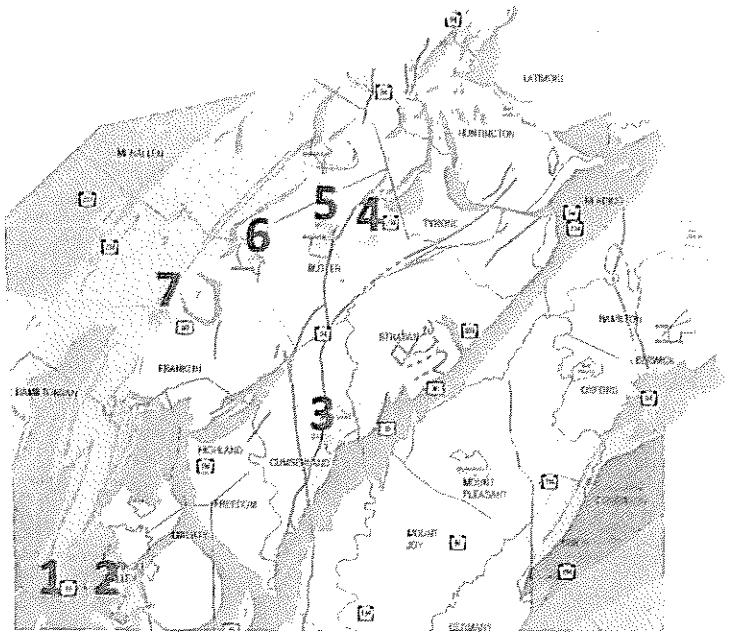
Blasts and Shakes from the Past



A Look at Igneous Rocks and Earthquakes in Adams County, Pennsylvania

Jeri L. Jones, Jones Geological Services
www.jonesgeo.com
jonesgeo@Hughes.net
(717) 225-3744



DCNR

ADAMS
COUNTY

April 2008

N
W
E
S

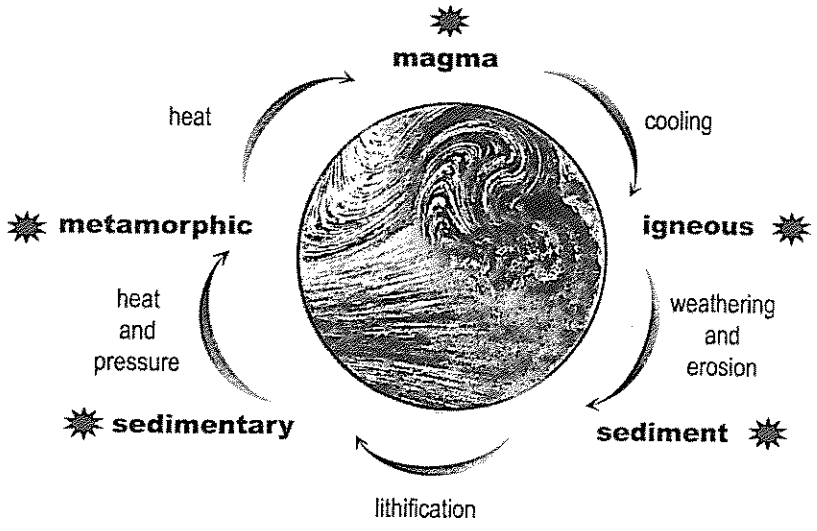
0 1 2 3 4 5 Mi.

Stream or river
1, Dikes (if present)
Municipal boundary

web site www.dcnr.state.pa.us/topogeo/groundwater/rocktypes.aspx

ROCK TYPES *See complete description. Not all rock types in the legend may be present on the map.

1, Dark crystalline rocks
2, Light crystalline rocks
3, Schist*
5, Quartzite
7, Red sedimentary rocks*
8, Limestone
9, Dolomite
10, Limestone and dolomite
11, Limestone or dolomite*
15, Shale or siltstone*



ABOUT YOUR HOST

Jeri Jones holds a degree in Geoarchaeology from Catawba College in Salisbury, N.C. He returned back home to York, PA after graduation and became employed by the York County Parks where he is currently the Program Coordinator. Within the Parks, he does educational geological and archaeological programs for all ages.

Jeri has been studying the area's geology for 30 years. In 1998, he formed Jones Geological Services where he provides educational programs and field trips for colleges, civic organizations, scout groups and secondary schools. He also teaches Continuing Education courses for Harrisburg Area Community College. Although he loves to study the geologic history, mining history and dinosaurs fossils of the region, he loves to pass his knowledge on to others. Everyone one of us is affected by geology, either by the location of our homes, our water supply or all of the products we use in everyday life. Jeri has authored or co-authored four books, numerous articles and hosted a 3-part video series known as TimeWalk. He received the Digman Award in Geology by the National Association of Geoscience Teachers, Eastern Chapter in 2006. He has found a way to combine one of its favorite hobbies with his profession as he analyses and recommends clay to be used on area dirt tracks. He and his wife, Lou Ann reside in the Spring Grove, York County area.

INTRODUCTION

Welcome to this specially-designed field trip for Renfrew Institute! Today's trip will take you back into time and see some of the major characteristic rocks in the area. We will let you identify some rocks and minerals and talk about the geologic history of the area.

This cross-sectional tour that you will experience today will visit three distinct geologic areas: the Great Valley (GV), South Mountain (SM) and the Gettysburg-Newark Section (GN). The first two areas belong to the Ridge and Valley physiographic province which also includes the famous Appalachian Mountains. Until 1998, South Mountain was a classified with the Blue Ridge province. Today, the Pennsylvania Geologic Survey considers South Mountain a section of the Ridge and Valley since these two areas were formed during the same geologic processes especially during the Paleozoic Era.

The Gettysburg-Newark Section of the Piedmont contains the youngest rocks on our field trip. These rocks were laid down during the Mesozoic Era, the time of the early dinosaurs and a rather exciting time in southeastern Pennsylvania.

All three sections that we visit today represent not only show characteristic examples of rocks but different stages of how our landscape evolved. Following is a summary of rocks types and ages with each section:

GV	Limestone, dolomite, shale, sandstone (Middle Cambrian)
SM	Metabasalt, metarhyolite, quartzite, phyllite, volcanic slate (Proterozoic – Lower Cambrian)
GN	Sandstone, shale, conglomerate, fanglomerate (Triassic-Jurassic)

Formation Names and Thickness Encountered On This Trip

Waynesboro Formation	Limestone/sandy dolomite	±1,000 feet
Antietam Formation	Sandstone/phyllite	500-900 feet
Harpers Formation	Phyllite	300-1,000 feet
Weverton Formation	Quartzite	500-1,400 feet
Catoctin Formation	Metarhyolite/metabasalt/schist	3,000-3,200 feet
Gettysburg Formation	Sandstone/shale/conglomerate/ Fanglomerate	15,500 feet
Diabase	Diabase	10-1,500 feet

Schedule:

9:15 – 9:15	Travel
9:20 – 10:35	STOP 1 – Jack's Mountain Tunnel
10:35 – 10:45	Travel
10:45 – 11:05	STOP 2 – Pa. Rte. 16 Metarhyolite
11:05 – 11:30	Travel
11:30 – 12:00	Lunch at Gettysburg Park
12:00 – 12:10	Travel
12:10 – 12:45	STOP 3 – Gettysburg CSX Railroad Cut
12:45 – 1:05	Travel
1:05 – 1:30	STOP 4 – Chestnut Hill Road Earthquake
1:30 – 1:40	Travel
1:40 – 2:05	STOP 5 – Aspers Basalt
2:05 – 2:15	Travel
2:15 – 2:35	STOP 6 – Border Fault(?)
2:35 – 2:50	Travel
2:50 – 3:20	STOP 7 – Buchanon Valley Fire Company metarhyolite

An itinerary and location map is included here. To assure that we arrive back to Refrew on time, we hope to stay on the schedule. Feel free to collect rock samples at the stops.

Of course, cameras and hammers are welcomed at all of the stops for you to collect both your memories and specimens to take home. Thank you for attending this special tour and hope you enjoy the adventure!

STOP 1

What:	Jack's Mountain CSX Railroad Tunnel
Location:	0.5 mile east of Iron Springs Road along the CSX Railroad
Rock Type(s):	Catoctin metabasalt and Weverton quartzite

STOP 3.

What:	Diabase intrusion into sedimentary rocks of the Gettysburg formation
Location:	Along CSX Railroad behind Lee;s Headquarters north of U.S. Rte. 30.
Rock Types:	Shale, sandstone, diabase, hornfels
What To See Here:	As we walk east on the railroad tracks, we encounter a large outcrop of Gettysburg formation shale and sandstone. It is easy to distinguish between the shale and sandstone. Notice the reddish color. This is characteristic of the Triassic rocks in this area. Check out the direction of tilt of the sedimentary rocks. Continue to the railroad switch. Notice the larger blocks of a dense rock. This is diabase, an intrusive igneous rock that cooled from magma at least 1 mile beneath the surface. Look at the crystal size of this rock and compare it to the crystal size of the basalt or rhyolite we saw earlier. What is the difference? The black rock found between the diabase and sedimentary rock is known as a hornfels. A hornfels is a rock that has been baked (thermal metamorphism). Often with larger diabase intrusions, mineral deposits are formed within the hornfels, but not here. Copper and iron have been mined in Pennsylvania for this same geologic setting.
Geologic History:	These rocks reflect the breakup of Pangaea roughly 200 million years ago. The sedimentary rocks tell us on a rift valley where Africa and North America were trying to pull apart. Think today about the Red Sea, which is a modern-day rift valley. Southeastern Pennsylvania was located close to the latitude of Miami, Florida during the Triassic Period (200 mya). The reddish color of these rocks is a result of the sediment exposed to the atmosphere at times, allowing the iron in the rock to oxidize. Occasional streams, oxbow lakes and ponds were found in this area. Think of the Everglades today – reflecting the same environment as we see here.

The diabase is younger in age (175-160 mya) during the Jurassic Period. This is the last period of the breakup of Pangaea, As the crust pulled apart, magma came up through cracks to heal the Earth. The heat of the magma spilled out into the sedimentary rocks, baking them. These site was the best example showing the diabase-hornfels-sedimentary rocks relationship before Gettysburg College place the gabion baskets over the diabase.

NOTES

- This exposure shows you just how difficult it is sometimes for a geologist to interpret the geology. This rock is concealed and only can be found when you dig into the hillside or walk into the orchard.
- Look for a light-brownish rock that is potted with cavities. These cavities were like "gas pockets."

NOTES

STOP 6.

3. Quaker Valley - The Border Fault
   - This valley represents the border between rocks of South Mountain (about 600 mya) to those of the Piedmont Gettysburg-Newark Section containing rocks about 200-170 mya. We are standing on the younger side.
   - This fault was active in at lease the Mesozoic Era as Pangaea was rifting apart.
   - This is the western side of what is called the Gettysburg Basin, a downwarped piece of crust that had much erosion of sediment in and the intrusion of magma up through the rifting crust.
   - Quaker Valley is a valley because rocks in a fault area have been previously fractured and crushed, allowing quicker weathering and erosion to take place.

NOTES

Low, D.J., and Conger, R.W., 2002. Ground-water availability in part of the Borough of Carroll Valley and the establishment of a drought-monitoring well. U. S. Geol. Survey Water. Res. Rept.02-4273.

MacLachan, David B., 1993. Jacks Mountain Tunnel in South Mountain and the Triassic in Adams County, Guidebook for the 12th annual Field Trip of the Harrisburg Area Geological Society. Harrisburg, PA.

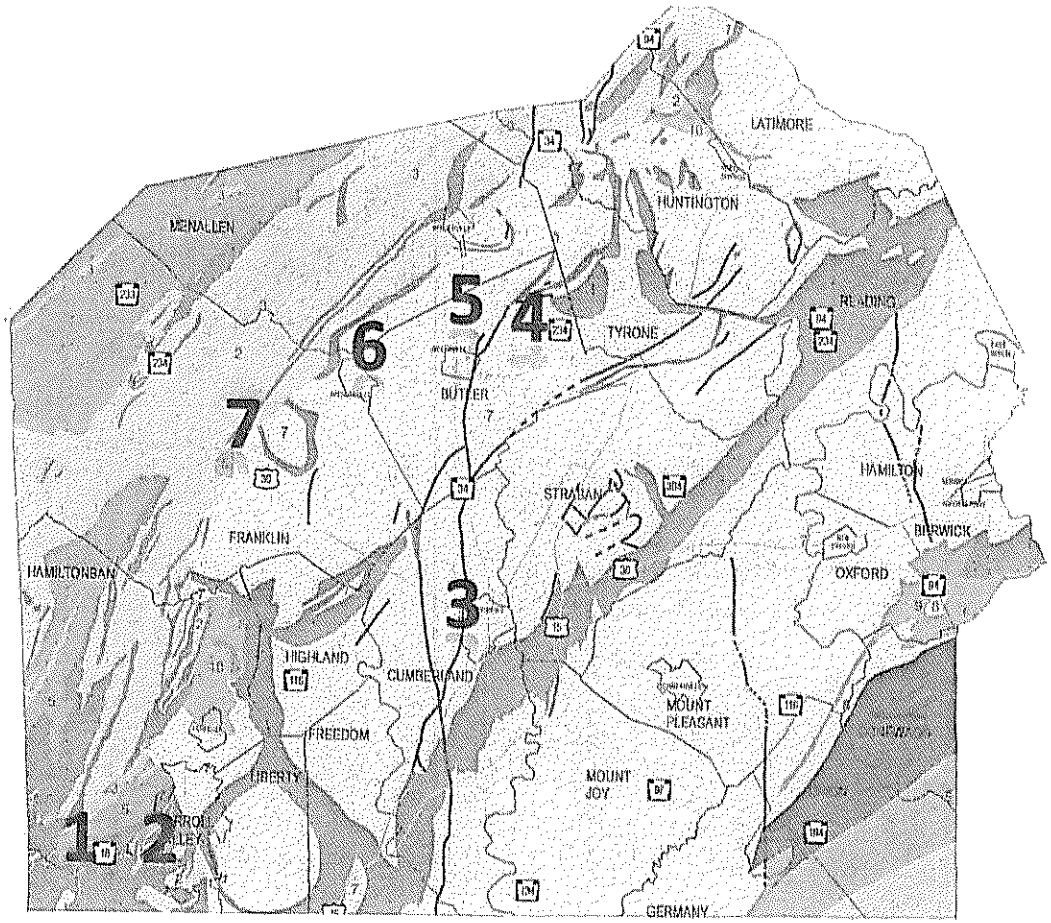
Nelson, A., 1968. GAF Corporation Quarries, Charmian, Pennsylvania *in* Guidebook for the 33rd annual Field Conference of Pennsylvania Geologists, The geology of mineral deposits in south-central Pennsylvania. Harrisburg, PA.

Scharnberger, C.K., 1989. Earthquake Hazard in Pennsylvania. Pa. Geol. Survey, 4th ser., Educational Series 10.

Smith, R.C., II,, Berkeiser, Jr., S.W., and Barnes, J.H., 1991. Pennsylvania's Version of he Catoctin Metabasalt Story in 56th Annual Field Conference of Pennsylvania Geologists Guidebook - Geology in the South Mountain Area, Pennsylvania, William Sevon and Noel Potter, Jr., editors.

Stose, G. W., 1910. Copper deposits of South Mountain in southern Pennsylvania. U. S. Geol. Survey Bull. 430, pp. 122-131.

Stose, G.W., 1932. Geology and mineral resources of Adams County, Pennsylvania. Pa. Geol. Survey, 4th ser., County Report 1.



DCNR

ADAMS COUNTY

April 2008

N
W E
S

0 1 2 3 4 5 Mi

Stream or river

1, Dikes (if present)

Municipal boundary

web site: www.dcnr.state.pa.us/topogeo/groundwater/rocktypes.aspx

ROCK TYPES *See complete description. Not all rock types in the legend may be present on the map.

- 1, Dark crystalline rocks
- 2, Light crystalline rocks
- 3, Schist*
- 5, Quartzite
- 7, Red sedimentary rocks*
- 8, Limestone
- 9, Dolomite
- 10, Limestone and dolomite
- 11, Limestone or dolomite*
- 15, Shale or siltstone*