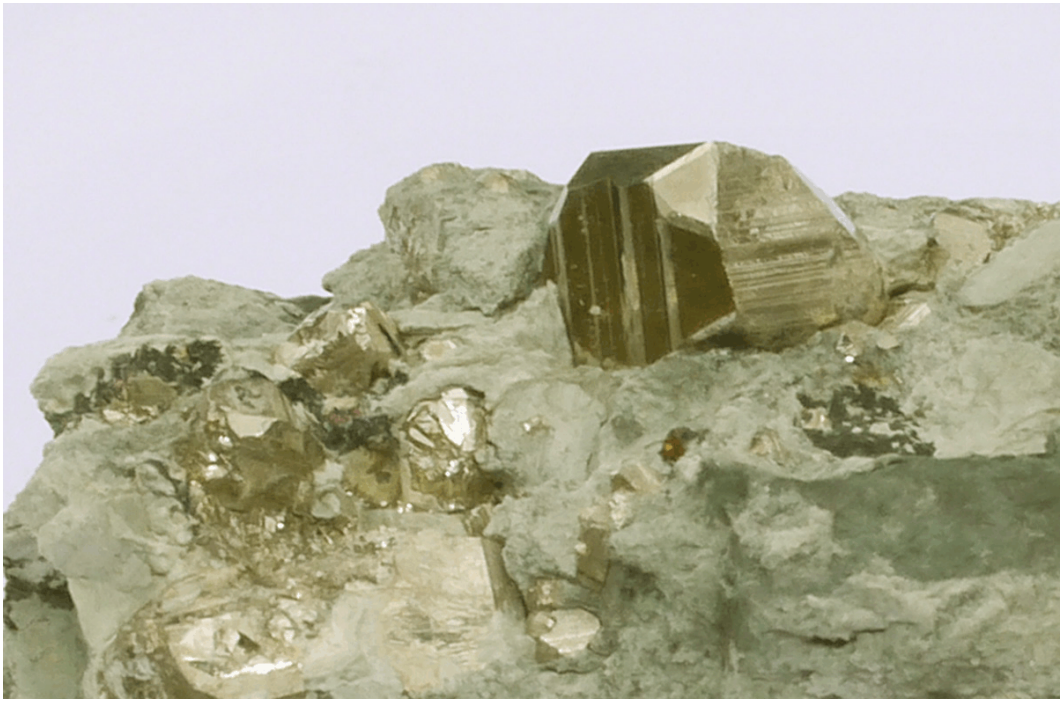
# Friends of Mineralogy
## Pennsylvania Chapter

# Fall Symposium
**November 2 & 3, 2013**

**Presented at**
**Franklin and Marshall College**
**Lancaster, Pennsylvania**



Pyrite, Cornwall Materials Quarry, Lebanon County, Pennsylvania. Large crystal 1 cm. *D. Glick photo*

# Selected Topics on Pennsylvania Mineralogy and Geology

# Friends of Mineralogy

**Dedicated to the advancement of serious interest in minerals and related activities**

We are collectors, professionals, and curators who share a love of mineral specimens and the desire to promote understanding and appreciation of mineralogy.

FM's objectives are to promote, support, protect and expand the collection of mineral specimens and to further the recognition of the scientific, economic and aesthetic value of minerals and collecting mineral specimens.

National FM newsletters, links to other chapters, and much more can be found on their web site: **www.friendsofmineralogy.org**

## Friends of Mineralogy - Pennsylvania Chapter

## provides:

- the benefits of membership in the national organization
- an annual Symposium in November
- field trips
- quarterly illustrated Newsletter
- an extensive WWW site with news, downloadable books, and more

Membership application forms are available on our web site

Please explore the FM-PA web site at
**www.rasloto.com/FM/**

# Selected Topics on
# Pennsylvania Mineralogy and Geology

## Friends of Mineralogy - Pennsylvania Chapter
## Fall Symposium November 2 & 3, 2013

**SCHEDULE of EVENTS**

| **Saturday, November 2: SYMPOSIUM** | | **page** |
|---|---|---|
| 8:30 to 9:00 a.m. | Registration | |
| 9:00 to 9:15 a.m. | Opening Remarks | |
| 9:15 to 10:00 a.m. | **Dr. Stan Mertzman**<br>**Slag, Ceiling Tile, and Industrial Mineralogy** | **5** |
| 10:00 to 10:45 a.m. | BREAK<br>Check out the silent auction and visit the dealers | |
| 10:45 to 11:30 a.m. | **William Kochanov**<br>**A revised interpretation of the Fairfield Quarry debris flow deposits, Adams County, Pennsylvania** | **6** |
| 11:30 a.m. to 1:00 p.m. | LUNCH BREAK - lunch on your own (local map on next page)<br>Silent auction continues until 1:15<br>Room 119 open during Lunch | |
| 1:15 p.m. | Silent Auction ends | |
| 1:30 to 2:10 p.m. | **Robert Beard**<br>**Iron Mines in Pennsylvania, New Jersey, and New York - Geology, History, and Minerals** | **8** |
| 2:10 to 2:50 p.m. | **Ron Sloto**<br>**The Jones Mine, Berks County, Pennsylvania** | **10** |

**Sunday, November 3: FIELD TRIP** - ***See map and directions inside back cover*** **11**

**8:00 a.m. to 12:00 noon - Eastern STANDARD Time - Set clocks back Saturday night**

Meet at Cornwall Materials Quarry on Boyd St. (same as previous trips), southeast of Miners Village, north of US Route 322, Cornwall, Pa. See map.


1 Lisa Bonchek Adams Auditorium in Kaufman Hall
2 Admission, Wohlsen House, *637 College Avenue*
3 Alumni Sports & Fitness Center, *929 Harrisburg Avenue*
4 Appel Infirmary
→ Asian Cultural Center, *see Multicultural Affairs*
5 Arts House, *602 West James Street*
6 Baker Campus, *1300 block of Harrisburg Pike*
7 Ann & Richard Barshinger Center for Musical Arts in Hensel Hal l
8 Ann & Richard Barshinger Life Sciences & Philosophy Building
9 Black Cultural Center, *615 College Avenue*
10 Bonchek College House
→ Bookstore, *see Distler House*
11 Brooks College House
12 Brooks Tennis Center
13 Buchanan House
14 Business Office, *644–646 Race Avenue*
15 Career Services, *619 College Avenue*
16 Centennial Conference Office, *HEDS Consortium, Frederick Street entrance of Lancaster Theological Seminary*
→ College Guest House, *see Huegel Alumni House Annex*
17 College Row
18 College Square
→ Counseling Center, *see Appel Infirmary*
19 Diagnothian Hall
20 Dietz Hall
21 Distler House/Campus Bookstore
22 Facilities Services, *415 Harrisburg Avenue*
23 Faculty, Emeriti Faculty & Foreign Language Tutor Offices, *711 College Avenue*
24 Financial Aid, *617 College Avenue*
25 Franklin-Meyran Hall
26 French House, *548 West James Street*
27 Gerhart House
28 Goethean Hall
29 Green Room Theatre
30 Hackman Physical Sciences Laboratories
31 Patricia E. Harris Center for Business, Government & Public Policy
32 Hartman Green
33 Dr. Leon Herman Arts Center
34 Huegel Alumni House
35 Huegel Alumni House Annex,
→ College Guest House *445 College Avenue*
36 International House, *446–448 West James Street*
37 James Street Apartments, *534 West James Street*
38 Jazzman's Cafe & Bakery
39 Joseph International Center, *701 College Avenue*
→ Kaufman Hall, *see Lisa Bonchek Adams Auditorium in Kaufman Hall*
40 Keiper Liberal Arts
41 Klehr Center for Jewish Life, *645 College Avenue*
42 Kunkel Aquatic Center, *929 Harrisburg Avenue*
43 Marketplace Dining Hall
44 Martin Library of the Sciences
45 Mayser Physical Education Center
→ Meyran Hall, *see Franklin-Meyran Hall*
46 Multicultural Affairs, *625 College Avenue*
47 The President's House, *508 North School Lane*
48 New College House
49 New Street Studio
50 North Museum
51 Office of Student Academic Affairs, *623 College Avenue*
52 Old Main
53 Other Room Theatre
54 Philadelphia Alumni Writers House, *633 College Avenue*
55 Phillips Museum of Art
56 POGIL, *713 College Avenue*
57 Public Safety
58 Roschel Performing Arts Center
59 Schnader Residence Hall
60 Shadek-Fackenthal Library
61 Sponaugle-Williamson Field
62 Stager Hall
63 Stahr Auditorium
64 Steinman College Center
65 Sustainability House, *550–52 West James Street*
66 Thomas Residence Hall
67 Tylus Field: *Ken Gramas Pavilion*
68 Ware College House
→ Warehouse, *see Facilities Services*
69 Weis College House
70 Carolyn W. & Robert S. Wohlsen Center for the Sustainable Environment
→ Writers House, *see Philadelphia Alumni Writers House*

# Slag, Ceiling Tile, and Industrial Mineralogy

## Dr. Stan Mertzman

### Abstract

A large Lancaster-based company makes ceiling tile the world-over. The prime ingredient that is used in the formulation of ceiling tile is a substance known as mineral wool. Slag, a waste product from steelmaking facilities, is the starting raw material from which mineral wool is made. The mineralogy and chemistry of slag is an important factor governing the physical properties of mineral wool. In this talk we'll tour a new state-of-the-art industrial facility in West Virginia that makes nearly 100,000 tons of mineral wool per year and use it as a backdrop for examining the wide-ranging mineralogy and chemistry of slag.

### Biography

Ph.D. earned from Case Western Reserve University located in Cleveland, Ohio in 1971

Post-doctoral fellowship for one year in the Division of Mineral Sciences at the Smithsonian Institution in Washington DC, 1971-1972

Hired as an Assistant Professor of Geology at Franklin and Marshall College beginning in July 1972

Presently the Earl D. Stage and Mary E. Stage Professor of Geosciences at Franklin and Marshall College

Teaching responsibilities include introductory physical geology, mineralogy, petrology, and geochemistry

Research interests includes calibration of the "chem-min" analytical instruments currently operating on the Mars rovers, volcanism in the Cascade Mountains of the Pacific Northwest, XRD mineral analysis and XRF rock analysis for companies and individual researchers scattered around the world

# A revised interpretation of the Fairfield Quarry debris flow deposits, Adams County, Pennsylvania

## William Kochanov

**Abstract**

Triassic-age limestone fanglomerates are common to the Mesozoic Basin of south-central Pennsylvania. The alluvial-derived clasts within the fanglomerates range in size from pebble to boulder and are set within a characteristic, finer-grained, reddish-brown mud to silt-size matrix.

A limestone conglomerate in the Fairfield area of Pennsylvania lacks the defining reddish-brown matrix posing the question of whether or not the rocks are of Triassic age. Initial field examination of the lithologic and bedding characteristics of the conglomerate provided an interpretation that the exposure was a series of Ordovician-age, sub-aqueous debris flow deposits (Kochanov, 2008).

At least four major cycles are visible along the quarry highwall; each cycle base is defined by wedges of massive, light- to medium-gray limestone conglomerate draped by carbonate muds and siltstones before grading upward into a greenish-gray laminite sequence. The variety of rounded to sub-angular limestone, marble, dolostone and chert clasts, occurring within the conglomerate implies a mixed provenance. Similarities of the clasts to Lower to Middle Ordovician carbonate bedrock mapped in the Fairfield and Frederick, Maryland areas establishes a pedigree for the source rock (Bassler, 1919; Kochanov, 2008).

However, dinosaur footprints were recently discovered within the laminite sequence in the upper quarry which counters the interpretation of the exposures being of Ordovician age. In light of this discovery, the question of the “whitening” of the reddish-brown matrix, characteristic of Triassic fanglomerates, needs to be addressed.

The green coloration of the laminite is thought to be derived from a reduction of ferric iron to ferrous iron. Pyrite is a very common accessory mineral in both the limestone conglomerate and the laminite as individual, cubic microcrystals and small granular masses. Other sources of iron would be from the clay minerals. Zones of small, subhedral, grossular-andradite garnets have also been observed within the laminite. The garnets are typically less than 1 mm in diameter and occur singly as a honey brown to a dark brown to black color (Kochanov, 2008).Though far less common, vesuvianite (SEM/EDS verification by R. C. Smith, II and J. H. Barnes of a specimen from Joe Dague) is also present in the host calcite. An SEM scan of the greenish laminite showed the minerals to be primarily albite and diopside (John Barnes, pers. comm., 2008).

This grossular-diopside-calcite-vesuvianite assemblage seems to fit with low pressure hornblende hornfels facies contact metamorphism (Van Houten, 1970; Smith, 2002). Van Houten (1969) reported that this mineral assemblage occurs within the calcareous Lockatong of western New Jersey and is restricted to a zone within 50 meters of a diabase sheet. At the Fairfield Valley Quarry, it seems most reasonable to presume that such a sheet was the York Haven Diabase and that it was once located within a comparable distance overhead, but is now eroded (Smith, 2002). This is supported, in part, by the presence, at times, of zeolites in the Fairfield Quarry, the residual grossular nodules scattered over many fields in the flats near Fairfield (Stose and Bascom, 1929) and the absence of a distinctive aeromagnetic pattern.

The "bleaching" of the reddish-brown matrix would require a mechanism to allow a thorough "washing" of the finer-grained sediment. Porosity within the conglomeratic matrix could be enhanced by the alteration of feldspar to clays and/or through diagenetic changes of the limestone. Fracturing of the country rock through cooling of the diabase sheet and earlier tectonic imprinting would have also contributed to establishing pathways for these fluids. Once the pathways were established, fluids heated from the intrusion of the nearby diabase sheet, could have converted the ferric iron to the more soluble ferrous iron and in essence, removing the reddish-brown coloration.

**References**

Bassler, R.S. 1919, The Cambrian and Ordovician Deposits of Maryland, Maryland Geological Survey, John Hopkins Press, 424 p.

Kochanov, W.E., 2008, Fairfield inlier, Ordovician Beekmantown? carbonates: 73rd Field Conference of Pennsylvania Geologists, Stop 6, p. 96-106

Moulton, G. F., 1926, Some Features of Redbed Bleaching: AAPG Bulletin, v. 10, p. 304-311.

Smith, R.C., II, 2002, Field Notes of 7/24/02 to Fairfield Quarry, Adams County.
Stose, G.W. and Bascom, F., 1929, Fairfield – Gettysburg Folio: U.S. Geological Survey.

VanHouten (1969), Hornfels facies, Late Triassic Newark Group, New Jersey [abs.]: Geological Society of America Abstracts with Programs 1969, pt. 7, p. 299-230.

**Biography**

William (Bill) Kochanov (pronounced KO-**CHAN**'-OFF) is a geologist with the Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, Geologic Mapping Division. Throughout his tenure at the Survey, he has been involved with bedrock mapping projects covering areas within the northern anthracite coal field, the northern tier Endless Mountains region, and in the Chester Valley of southeastern Pennsylvania. He has also authored 14 county reports specific to subsidence features within the karst regions of Pennsylvania as well as numerous articles pertaining to the general geology of Pennsylvania.

# Iron Mines in Pennsylvania, New Jersey, and New York- Geology, History, and Minerals

## Robert Beard, P.G., Harrisburg, Pennsylvania

**Abstract**

Throughout history, iron formed the industrial foundation of advanced civilizations. Gold and silver provided money and financing, but armies, industry, and society as we know them today would not exist without iron and steel. Early mining entrepreneurs quickly recognized the need for iron, and many of the first mines in the northeastern United States were iron mines.

Iron is relatively common and found in a wide variety of rocks throughout the northeastern United States. These include recently formed bog irons, early Paleozoic sedimentary irons, and Precambrian through Jurassic deposits of magnetite and associated iron minerals. Many of these deposits are complex and have impurities that include phosphorous and sulfur, and other metals such as zinc, titanium, and manganese sometimes act as contaminants and make processing iron ores difficult. This posed major challenges for early metallurgists and many deposits could not be exploited until they were better understood.

Some of the first iron mines in the region exploited bog iron ores in southern New Jersey, which were mainly oxidized iron deposits of limonite and goethite. These were roasted and reduced to metallic iron. Steel was very expensive to produce, and most iron production in the 1600s and 1700s was limited to cast and wrought iron. After the development of the vast iron ore deposits in the Lake Superior region in the late 19th Century, virtually all the deposits of limonite and hematite in the northeastern United States were no longer economic. Many of the smaller mines that exploited magnetite were also closed.

The only iron mines in the PA-NJ-NY region that stayed open were the larger mines in which the main iron ore was magnetite, and production at many of these mines surged during World War II and the Korean War. In Pennsylvania, these mines included the Cornwall and Grace Mines in southeastern Pennsylvania. In New Jersey, iron production was primarily at the large iron mines in the zinc districts near Franklin and Sterling Hill. In New York, the major iron mines included Star Lake, Tahawus, and Lyon Mountain. Unfortunately, many of the richest zones were soon mined out and production at virtually all the northeastern iron mines was doomed by economics. Post-war iron requirements were greatly reduced, and competition from foreign and other domestic iron mines made all the northeastern iron mines uneconomic. Most of these mines closed during the mid 20th Century, with the Star Lake Mine in New York and the Grace Mine in Pennsylvania being amongst the last to close in the late 1970s.

Today, many of these former iron mines are being reevaluated for construction aggregates, water supplies, and redevelopment as industrial, commercial, and residential properties. Iron mines are among the largest mines, and generally have extensive mine dumps and tailing piles that offer some interesting collecting and viewing opportunities. Limited access is generally available at many former iron mines in PA-NJ-NY through unposted ground adjacent to the mines and dumps, and many mines are within state forests and local parks. Many of these mines left some significant environmental legacies, and the extensive slag dumps left at the mills and furnaces offer some interesting collecting opportunities. Magnetite, garnet, pyrite, and many other minerals are still abundant at many of these former mines and are generally easy to find in both outcrops and tailings.

**Biography**

Robert Beard, P.G., is a geologist and has collected rocks for over 30 years. In his early days of rock collecting, his colleagues said that he would get over the excitement of finding an interesting rock, but that never happened. He received his B.A. in geology, with a minor in mathematics, from California State University, Chico in 1983, and his M.S. degree in geology from the University of New Mexico in 1987. He is a licensed Professional Geologist in Pennsylvania and works in the environmental consulting industry. He is a Contributing Editor to *Rock & Gem* magazine, and has written for *Rock & Gem* since 1993. His most recent book is *Rockhounding Pennsylvania and New Jersey*, published by Globe Pequot Press, and he is in the process of finishing a new book, *Rockhounding New York*, which will also be published by Globe Pequot. He currently lives in Harrisburg, Pennsylvania with his wife Rosalina, son Daniel, and daughter Roberta.

# The Jones Mine, Berks County, Pennsylvania

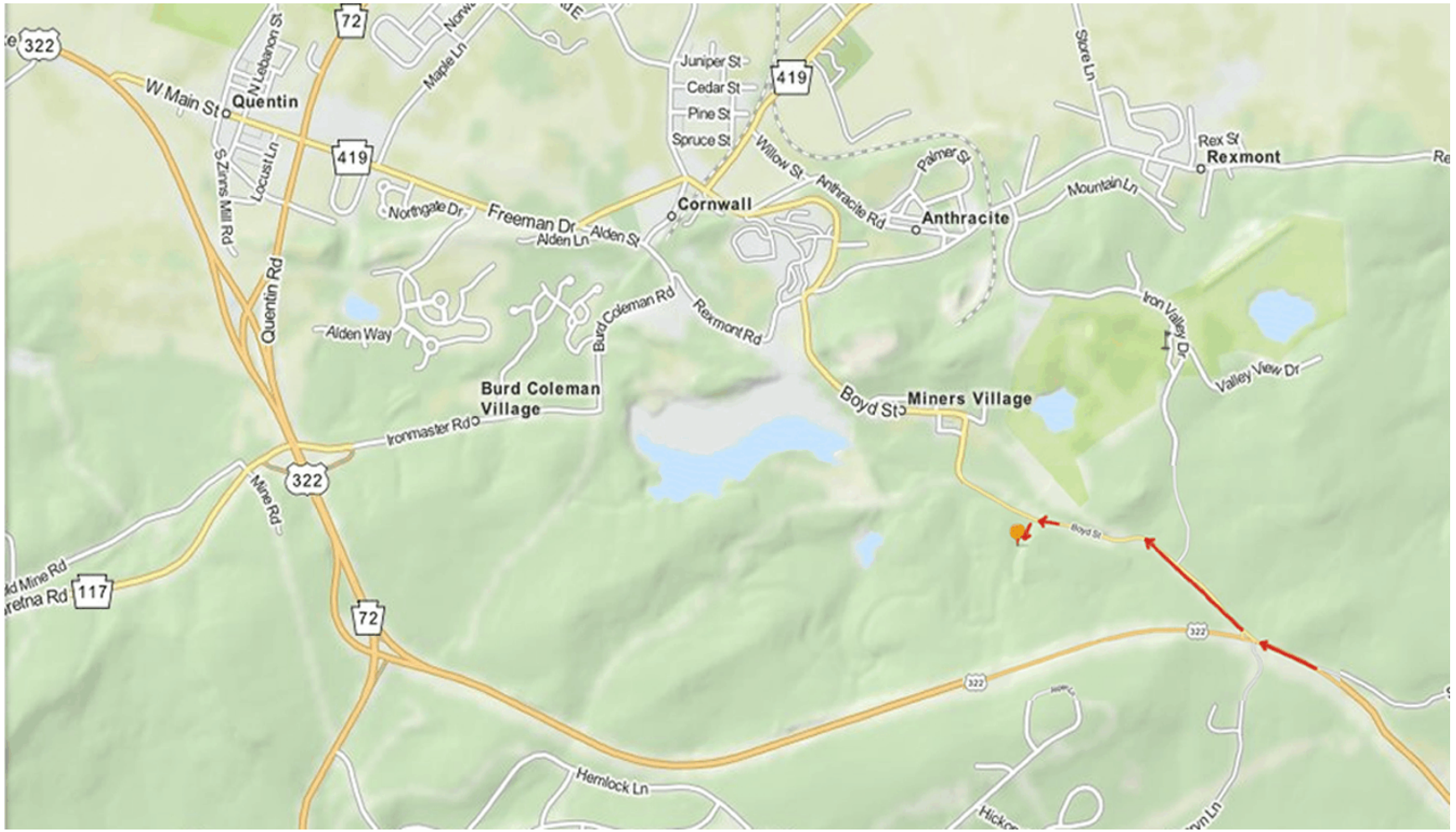
## Ron Sloto

### Abstract

The Jones mine is located in Caernarvon Township, Berks County. The Jones mine is a Cornwall-type magnetite skarn deposit, but it is unusual because the ore typically contained more than 1 percent copper. The host rock of the Jones mine was the Cambrian Vintage Formation dolomite. The mine produced an estimated 500,000 tons of ore during its lifetime. The iron ore deposit was discovered by David Jones (1709-1782) sometime in the mid 1700s. In 1774, the mine was acquired by the owners of Hopewell Furnace. In the 1800s, the mine was operated for both iron and copper. A consortium of furnace owners jointly operated the Jones mine as a source of iron ore for local iron furnaces. Charles Wheatley mined copper ore from the Jones mine in the 1870s. The mine was closed and flooded by 1892. The Jones mine is noted for its mineral specimens, particularly for very fine examples of aragonite and malachite.

### Biography

Ron Sloto is a hydrogeologist with the U.S. Geological Survey in the Exton, Pennsylvania, project office. He has worked on a wide variety of hydrogeological and water-resource issues in Pennsylvania and the surrounding states. His recent experience includes pre-gas drilling baseline water-quality studies in areas of Pennsylvania underlain by the Marcellus Shale. He is the author of the book “Mines and Minerals of Chester County, Pennsylvania” and is currently working on a similar book for Berks County.




**CORNWALL, PENNSYLVANIA, AREA** Mapquest Map Builder Beta and Mapquest.com

## DIRECTIONS TO CORNWALL MATERIALS QUARRY, CORNWALL, PA

From the Lancaster area, go north on PA 501 (Lititz Pike, straight through Lititz, PA) approximately 12 miles.

At traffic light in Brickerville, turn left on US 322 West and go 5.0 miles.

In the middle of the woods in a valley, bear right onto Boyd Street and go 0.9 miles to driveway for Cornwall Materials on the left.

Drive up the driveway and meet the group by 8:00 a.m. EST.