FRIENDS OF MINERALOGY
Pennsylvania Chapter
NEWSLETTER

VOL. 38 NO. 1 Winter 2010

New Web Page!

Note: FM PA has a new web page

managed by Ron Sloto

http://www.rasloto.com/FM/

thanks Ron!

DUES-DUES-DUES are Do for 2010

Another year has passed and it is time to pay your dues for 2010.

If you have already paid for 2010 please disregard this notice and thank you for your Support.

Seniors age 65 and over 15.00 per year
Regular under age 65 20.00 per year

Your dues support the chapter in many ways: Insurance ($6.00), National dues ($6.00), and Newsletter/Mailings, and other expenses such the Annual Symposium. Dues to the Chapter are not deductible; however, donations are deductible. The PA Chapter is a 501(C) (3) nonprofit organization and donations are gratefully accepted and may be deducted from your federal income tax. Donations of any size help to offset the general operating costs of the Society, helping to keep dues low.

Make your dues Payment out to **Friends of Mineralogy Pa Chapter Inc.**
Send your Dues payment to:

Friends of Mineralogy Pennsylvania Chapter Inc.
P.O. Box 158
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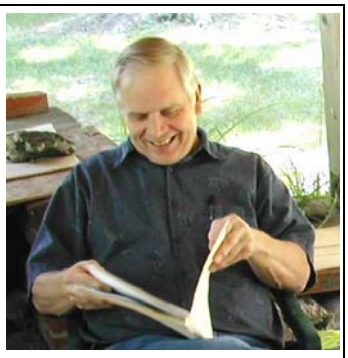
President's Message

Winter 2010



We are already into late January 2010. I hope all had a good Holiday season! The Chapter is planning a Symposium for November 6 and 7. It will be hosted again by Franklin and Marshall College. This year's topic is "Pennsylvania Mineralogy –A Continuation ". We are again, inviting speakers for this event, as I write this newsletter. More details of this year's event will be forthcoming. So - please mark those dates on the calendar, as a "don't miss!"

Field trips are also being planned. If you wish to help out by being a field trip leader, let me know. I am still waiting for several field trip locations to become open to us. The Symposium this past November was the best we've had in years. Attendance was close to 70 (non-members as well as members). Those who attended seemed to enjoy the talks and activities very much. Fred Stohl has been working on putting together a Safety Class. I have included a form for you, to send to him if you would care to spend a day and receive the training. Training would be on the level of "new miner training", as prescribed by MSHA (part 46).

A certificate will be issued to each attendee at the successful completion of the course. Location and date to be announced – all we need for now, is to know if we have enough interest for the group, to go forward in planning the event . See the form on the back of the cover sheet to this newsletter, fill it out and send it to Fred Stohl.

I want to say, "Thanks again", to those who helped with last years' Symposium – despite a few glitches, I thought it went very well. Next year we'll have the refurbished lecture hall for the Symposium. No need to move tables or furniture in the classrooms!

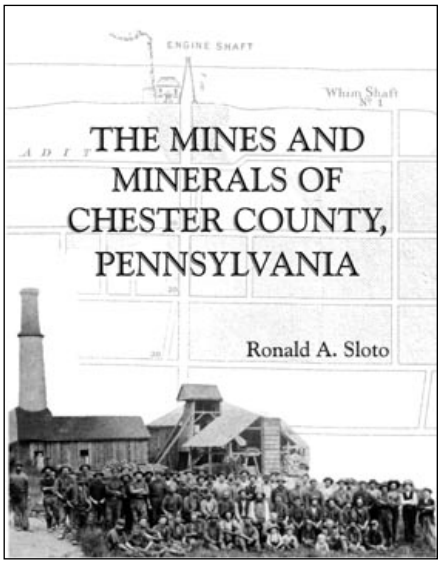
If you have an email address you'd like to share, please send it to me. It saves postage, and you'll get the newsletter in color, plus notice of first trips or other chapter functions, as they come up!!

Regards,
Arnold Mogal
President,
F.M. PA Chapter

New Book by Ron Sloto

The Mines and Minerals of Chester County, Pennsylvania

This 8-1/2 X 11 book with 512 pages contains information on over 400 mines and mineral localities; extensive bibliography on Chester County mines, minerals, and geology; and topographic maps showing the locations of mines and mineral localities.
$40 ($35 for the book plus $5 shipping) contact
Ron Sloto PO Box 13, St. Peters, PA 19470
Or see http://rasloto.com/book/



57th Annual North Museum Science & Engineering Fair

March 23 - 25, 2010

The 57th North Museum Science and Engineering Fair will be held on the campus of Franklin and Marshall College from March 23- 25 2010. The North Museum is proud to manage this International Science and Engineering Fair affiliate for the young scientists of Lancaster County. Over 360 middle and high school students were in attendance in 2009, representing 22 public and private schools of Lancaster County.

Opportunities to become involved:

The North Museum Science and Engineering Fair welcomes qualified judges. Interested professionals in science fields are encouraged to contact Fair Coordinator Jim Ringlein at jringlein@northmuseum.org.

Organizations and individuals who wish to financially support this showcase of science excellence are encouraged to contact assistant museum director Jamie Alton at jalton@northmuseum.org

Organizations who wish to reward student excellence by offering an auxiliary award are also encouraged to contact Jamie at jalton@northmuseum.org

http://northmuseum.org/ScienceFair/tabid/221/Default.aspx

Friends of Mineralogy Pennsylvania Chapter Directory of Officers

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Society Web page : http://www.rasloto.com/FM/

2010 Shows: www.rockngem.com/showdates.asp

FEBRUARY

13-14--Clifton / North Jersey Gem & Mineral Show, Sponsored by the North Jersey Mineralogical Society NEW LOCATION: Benway School 970 Black Oak Ridge Road, Wayne New Jersey. 10:00 to 5:00. www.nojms.org **(Get $1 off with a flyer that you can download at our FM Pa webpage!)**

20--UPPER MARLBORO, MD: Southern Maryland Rock & Mineral Club; The Show Place Arena, 14900 Pennsylvania Ave.; Sat. 10-4; ages 7 and up $3; contact Michael Patterson, 11000 Thrift Rd., Clinton, MD 20735, (301) 297-4575; e-mail: michael.patterson@pgparks.com; Web site: www.freewebs.com/smrmc/

20-21--ALBANY, NY: James Campbell Memorial Gem, Mineral, and Fossil Show and Sale; NY State Academy of Mineralogy, Capital District Mineral Club; Museum, Empire State Plaza, Madison Ave.; admission $6; Sat. 10-5, Sun. 10-5; contact Michael Hawkins, (518) 486 2011OR mhawkins@mail.nysed.gov

MARCH

6-7--STANTON, DE: Earth Science Gem & Mineral Show and Annual EFMLS Convention; Delaware Min. Soc.; Delaware Technical & Community College, I-95 Exit 4B, Churchmans Rd. (Rte. 58); Sat. 10-6, Sun. 11-5; adults $6; contact Wayne Urion, (302) 998-0686 OR wurion@aol.com; www.delminsociety.net

13--LEVITTOWN, PA: Mineral, Fossil & Micromount Show at Faith Reformed Church, Levittown Parkway and Sexton Lane just south of Mill Creek Road. 10:00 AM to 3:00 PM

26-28--ELKRIDGE, MD - 37th Annual Atlantic Micromounters Conference hosted by the Micromineralogists of the National Capital Area. MHA Conference Center, Elkridge, MD. Registration & Information: Steve Weinberger, <cscrystals2@verizon.net > or 410 833 7927.

20-21--MONTGOMERY, MD: 46th Annual Gem, Mineral, and Fossil Show, Lapidary, and Mineral Society of Montgomery County MD., Inc. Montgomery Co. Fairgrounds Mar.. Patricia Repik-Byrne, Exhibits Chair, Mark Dahlman, Show Chairman http://www.glmsmc.com/show.shtml

27-28--CHAMBERSBURG, PA: 32nd annual show; The Franklin County Rock & Mineral Club; Shalom Christian Academy, 126 Social Island Rd.; Sat. 10-5, Sun. 10-4; adults $4, children under 12 free with adult; contact Mike Mowen, (717) 264-9024; e-mail: mlmo@innernet.net

27-28--PLYMOUTH MEETING, PA: "Philadelphia Mineral Treasures and Fossil Fair"; Philadelhia Min. Soc.; LuLu Temple, 5140 Buttler Pike; Sat. 10-5, Sun. 10-4; adults $5, children $1; contact Duglas Klieger, 26 Cabot Ct., Chesterbrook, PA 19087, (610) 644-2492; dklieger@verizon.net; www.PMS.Moonfruit.com

27-28--SAYRE, PA: 41st annual show; Che-Hanna Rock & Mineral Club; Athens Twp. Volunteer Fire Hall, 211 Herrick Ave.; Sat. 9-5, Sun. 10-5; adults $3, students $1, children under 8 free; contact Bob McGuire, 224 Church St., Lopez, PA 19628, (570) 928-9238; e-mail: uvbob@epix.net

APRIL

17-18--FREEPORT, NY: Show; Freeport Recreation Center; 130 E. Merrick Rd., Meadowbrook Pkwy. to exit M9 west (Merrick Road); Sat. 10-5, Sun. 10-5; adults $5.50, children under 12 free with adult; contact Ralph Gose, P.O. Box 1418, Melville, NY 11747, (631) 271-8411; e-mail: kaleidoscopegemshows@yahoo.com

24-25--FRANKLIN, NJ: 38th annual show and swap; Franklin-Ogdensburg Earth Science Association, New Jersey Earth Science Association, Sterling Hill Mining Museum; Franklin School, 50 Washington Ave.; Sat. 9-5:30, Sun. 9-5; adults $5, children under 14 free; contact Sterling Hill Mining Museum, (973) 209-7212

MAY

1-2--PITTSTON, PA: 7th annual show and sale, "Treasures of the Earth"; Mineralogical Society of Northeastern Pennsylvania; Oblates of St. Joseph, 1880 Hwy. 315; admission $3, children 12 and under and uniformed Scouts free; Sat. 10-5, Sun. 10-4; contact George Walko, (800) 473-3602

5-- MACUNGIE, PA: Spring Mineralfest, Organized by: Pennsylvania Earth Sciences Association 8:30 to 4:00. Macungie Memorial Park Building, Macungie, PA (eight miles southwest of Allentown). See www.mineralfest.com or contact Vince Olsovsky at (610) 439-2337 or mineralfest@verizon.net

The University of Delaware Mineralogical Museum

Visit on 2009 May 16. Reported by Johan Maertens

The University of Delaware Mineralogical Museum was created on the campus of the University of Delaware, at Newark, Delaware. The museum's collection began when Irénée du Pont (1876-1963) donated his fine personal collection in 1965. A significant part of this collection was purchased in 1919 by Mr. du Pont from George Kunz, Vice-President of Tiffany & Co, and had been on display in the Tiffany showroom in New York City.

Then University of Delaware curator Dr. Peter Leavens organized the collection.A grant from the Crystal Trust enabled the University to move the collection in the early 1970s, from the University Morris Library to a new facility in Penny Hall, the Geology Department's building. The holdings have grown in size and in quality over the years through Dr. Leavens with the special support of Mrs. David S. Craven, a niece of Irenée du Pont, David Byers, Frederick Keidel, Alvin Stiles, the Unidel Foundation and other generous donors. The collection's expansion continues, through donors and the exchange of collection holdings for more representative specimens.

For some years the collection went without a curator. The new curator, Dr. Sharon Fitzgerald, a mineralogist and gem expert hired in December 2007, planned and supervised the museum renovation replacing the old gallery in Penny Hall. The university's Mineralogical Museum reopened its doors in May 2009, is free and open to the public.

The gallery is still small and puts about 350 from the 20,000 specimen collection on view. Cases present worldwide minerals, plus special displays on topics including crystal growth and morphology, gem crystals and objects, cave minerals, pseudomorphs and temporary exhibits. In May we wondered at two visiting exhibits, a case with specimens from Michigan's Upper Peninsula copper belt and a case with specimens from longtime donor David Byers featuring a Sweet Home mine specimen called the "Alma Jack" rhodochrosite. The next special exhibit will feature the mineral fluorite. Of course I can barely wait for the calcite special.

The new gallery is very inviting with its newly installed display cabinets with fiber optic lighting, compared to the previous control room look. The cabinet lighting provides true color balance for specimens from wire silver to delicate elbaite. The light is balanced equally all through the cases at all levels; specimens in the main cases rest on gray Ultrasuede® fabric, drawing attention to the minerals and preventing distracting reflections from the alternative glass shelves in top down lighted displays. The arrangement of the cabinets along the long wall creates a remarkable panoramic exhibit. The renewed museum elevates the mineral display to national reputable mineral exhibitions, with high quality on a small scale.

Our guide Curator Dr. Sharon Fitzgerald entertained questions from the members during our private tour. She answered inquiries on the choice of cabinets and specimens, conservation and specifics about the specimens. "Before the renovation, the museum was set up according to the chemistry of the minerals", Fitzgerald says, "making it relatively inaccessible for people who may not have any knowledge of minerals". "People said the crystals were arranged like a supermarket," she says. The museum contrasts best euhedral crystal samples with growth oddities in an aesthetic display to fascinate and draw the interest of mineral novices and seasoned mineral lovers alike. Dr. Fitzgerald: "The thrill of a collection such as University of Delaware's is to provide the visitor with something that cannot be gotten online or in a textbook."

(continued on next page)

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The University of Delaware Mineralogical Museum by Johan Maertens

Personally, I prefer systematic displays and more minerals from nearby Pennsylvania, Maryland and Delaware. Dr. Fitzgerald is researching and collecting top notch regional specimens to fill a new case. Label information is minimalistic, missing chemistry or crystallographic information. A museum web site link to specific catalog details would be helpful to specialists and learning collectors.

Besides the museum being important to university students, it plays host to thousands of visitors half of whom are children who visit the museum as part of their education. This may spark the interest for the next generation of geologists, mining engineers and collectors. While other natural history museums are closing doors or restricting hours due to the economic situation, this university gallery provides a rare opportunity to showcase and observe premier minerals.

The quantity of superb specimens makes it difficult to pick favorites. The miniatures case is attractive for its diversity. The pseudomorphs display is a subject favorite, closely followed by the wooden crystal models complemented by highly euhedral natural crystals. Among the top large specimens are the largest fine vesuvianite from Canada, a giant franklinite from New Jersey, the best calcite specimen from Delta Carbonate Quarry, York, Pennsylvania and a 614 carat cut kunzite gem along with natural kunzite crystals.

I recommend a visit to this nearby museum; it is well worth the trip. It is a beautiful gallery, rich in many world class specimens. Take about an hour and half for a self guided tour.

Please check the website or call for hours of operation as they change periodically.
http://www.udel.edu/museums
University of Delaware Mineralogical Museum Penny Hall Newark, DE 19716
Tel: (302)-831-8037

Note: Dr. Fitzgerald invites the mineral and geology associations for support with collecting fine local mineral specimens to mount a new museum display. Can help with specimens or references?

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Feature Article:

METAL DEPOSITS IN THE NEWARK BASIN, PENNSYLVANIA

PART 1 (pages 1-4)

By Ronald A. Sloto

Over the next few issues we will present Ron Sloto's recent 8 page article on the

Metal Deposits in the Newark Basin.

METAL DEPOSITS IN THE NEWARK BASIN, PENNSYLVANIA, PART 1

By Ronald A. Sloto

Introduction

Triassic-age sedimentary rocks of the Newark Supergroup and Jurassic-age diabase underlie the Newark Basin (fig. 1), which is approximately 140 mi long and 32 mi wide and is the largest of the 13 major exposed Mesozoic rift basins that stretch from Nova Scotia to South Carolina. Sedimentation in the Newark Basin was the result of infilling of a rift basin formed during the initial stages of continental breakup. The sediment was deposited on folded and deeply eroded rocks of Precambrian and Paleozoic age, which are exposed northwest of the Newark Basin. The fluvial and lacustrine sediments mainly were derived from crystalline rocks southeast and northwest of the basin over a period of 45 million years. Following deposition, the sediments were intruded by diabase, faulted, uplifted, and eroded. The intruding diabase locally metamorphosed the adjacent rocks to a hornfels. Hydrothermal fluids are thought to have migrated through the basin.

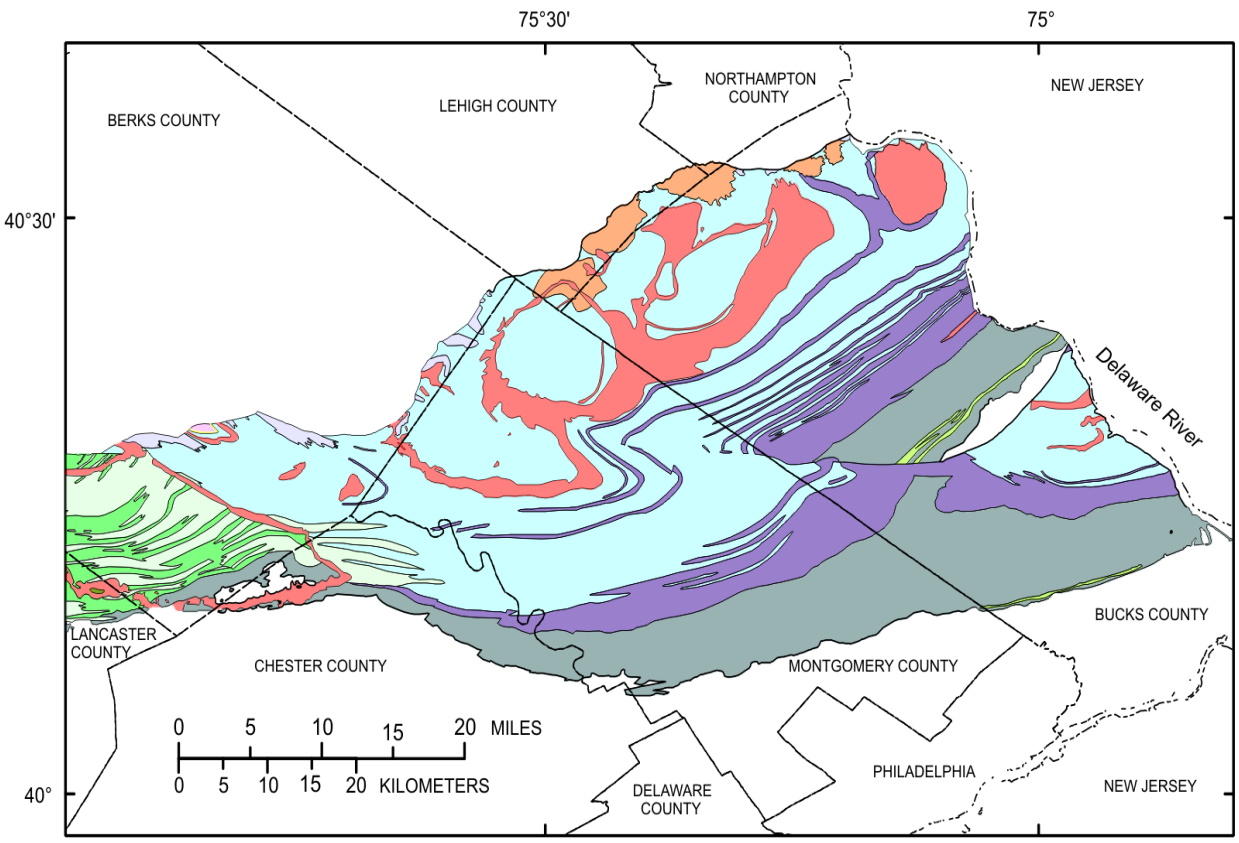
Several types of metal deposits in the Newark Basin are described here. A mine is a locality that has a written or recorded history of actual or attempted commercial development and ore production. A prospect is a locality where some excavation or mineral exploration activity has occurred. An occurrence is a locality where anomalously high metal concentrations or interesting or unusual metal-bearing minerals occur, but no mining or prospecting for metals has taken place (Robinson and Sears, 1988, p. 266).

Types of Mineral Deposits in the Newark Basin

Four types of mineral deposits are defined for Mesozoic basins in the eastern United States. They follow the modes of ore occurrence described by Wherry (1908a, p. 731); however, there is overlap in these categories. The first three deposit types discussed are associated with igneous activity and show many similar features of geology and mineralization. They are of hydrothermal origin, and all are associated with hydrothermal alteration zones bordering intrusions of diabase and its differentiates. Robinson (1988, p. 303) and Robinson and Sears (1988, p. 265) divide the deposits into (1) magnetite skarn and skarn/replacement deposits, (2) hornfels copper deposits, (3) diabase hosted vein and late-stage igneous segregation deposits, and (4) sediment hosted and stratabound replacement deposits.

Magnetite Skarn and Skarn/Replacement Deposits

Magnetite skarn and skarn/replacement deposits are the most common, largest, and most economically significant of the deposits. They are referred to as Cornwall-type ore bodies (Spencer, 1908) after the large ore body mined at Cornwall, Pa. Some notable examples of Cornwall-type ore bodies include the Cornwall, Grace, French Creek, Jones, and Boyertown mines. These deposits generally are found in carbonate rocks bordering diabase sheets. Skarns are formed by replacement of carbonate-bearing rocks during contact metamorphism and metasomatism. Such deposits contain abundant magnetite and accessory sulfide minerals enriched in Cu, Co, Au, and Ag.



Geology from Miles and Whitfield (2001)

EXPLANATION

- Diabase
- Sedimentary strata at Jacksonwald and Aspers
- Jacksonwald Basalt
- Brunswick Group
- Limestone fanglomerate
- Quartz fanglomerate
- Hammer Creek Formation sandstone
- Hammer Creek Formation conglomerate
- Lockatong Formation
- Stockton Formation
- Stockton conglomerate
- Pre-Mesozoic rocks

Figure 1. Bedrock geology of the Newark Basin in southeastern Pennsylvania.

Spencer (1908, p. 13) first recognized the method of deposition of Cornwall-type ore bodies. He stated that the ores were "*formed by more or less metasomatic replacement of sedimentary rocks by iron minerals precipitated from heated solutions set into circulation by the invading diabase*." The model for ore deposition was developed by Eugster and Chou (1979).

During the early Jurassic, diabase intruded the Paleozoic and Triassic rocks. Convective hydrothermal cells driven by temperature gradients were established by the intruding diabase. Fluids, consisting mostly of groundwater, but including some connate brine and late-stage diabase differentiates, were set into motion. The circulating fluid coupled three spatially separated reactions: (1) formation of HCl by conversion of muscovite, quartz, and KCl to K-feldspar in the hottest, deepest part of the cell; (2) dissolution of Fe-bearing minerals; and (3) precipitation by neutralization of magnetite, pyrite, and chalcopyrite in the host rock.

Hornfels Copper Deposits

Hornfels copper deposits commonly are associated with diabase sheets but are insignificant in terms of historical metal production; most are only mineralogical curiosities. These occurrences are characteristically enriched in precious and other rare metals, which make them interesting from a geochemical perspective. The deposits appear to be metasomatic replacements of original calcareous siltstones and shales thermally metamorphosed to hornfels near diabase intrusive bodies. Copper is the principal metal at most of the deposits, and small amounts of Au and Ag are present in a few areas. This deposit type differs from the other deposit types by being enriched in Bi, Mo, and sometimes Sn. Chalcopyrite and bornite with, at some places, magnetite, hematite, and chalcocite, are typically found as veins and replacements in dark-gray, fine-grained hornfels. Chrysocolla and malachite, formed by supergene alteration of the copper minerals, commonly occurs on fracture and weathered-rock surfaces in most deposits.

The hornfels copper deposits either underlie or overlie the diabase sheets. Those with polymetallic metallization (Cu, Au, Ag, Mo, Bi, Sn) appear to be associated with late-stage diabase differentiates (ferrogabbro and granophyre) enriched in volatiles and Cu. These late-stage differentiates may have released a chlorine-rich fluid from the magma enriched in Cu, Fe, Au, and other trace metals. Groundwater hydrothermal cells set up by cooling diabase also may have provided additional Cu and other metals. Fracturing of the host rock promoted and focused fluid flow. The copper minerals generally occur in the lower temperature facies of contact metamorphism, often just within the recognizable hornfels. Copper mineralization of this type associated with large diabase sheets may be separated from diabase by tens to hundreds of feet of unmineralized hornfels. The mineralized zones may be fractured, vuggy, or faulted. The hornfels copper deposits appear to differ from the magnetite skarn deposits in being formed from solutions of lower oxygen fugacity and temperature than those from which the magnetite skarns formed (Robinson, 1988, p. 315).

Diabase Hosted Vein and Late Stage Igneous Segregation Deposits

Diabase hosted vein and late stage igneous segregation deposits generally are found within or bordering diabase sheets. The segregations and veins formed by combined magmatic and postmagmatic processes resulted in disseminated replacements of host rock by metallic minerals and epigenetic mineral fillings of tabular or sheet-like fractures in the host rock. The segregations and veins are enriched in Cu and locally in precious and other trace metals (minor Co and As and trace Ag, Au, and Pd). The few diabase hosted vein deposits are largely mineralogical curiosities as the amount of mineralized rock is small and not of economic importance. Vein occurrences are near diabase pegmatite or segregation veins commonly found in the upper part of diabase sheets (Robinson, 1988, p. 315-316). Most veins occur in diabase and may be either parallel or crosscut igneous layering (Shannon, 1926); some veins are in shear zones or rock adjacent to diabase. The veins appear to have been formed by hydro-

thermal fluids derived from late stage differentiates. Chalcopyrite and pyrite typically are the most abundant sulfide minerals, but trace amounts of bornite, galena, native silver, arsenopyrite, and sphalerite have been reported.

The vein deposits appear to be associated with pegmatitic phases of diabase that grade into ferrogabbro or granophyre. They commonly are near the periphery of the upper part of diabase sheets but may occur in shear zones or fracture zones anywhere in the sheet. Mineralization also may be associated with miariolitic cavities developed from fluids evolved from the enclosing ferrogabbro or granophyre. Diabase near the veins is bleached and shows alteration of hypersthene to chlorite and intermediate plagioclase to pink orthoclase. Common vein minerals, such as chlorite, epidote, datolite, prehnite, calcite, and zeolite minerals, are characteristic of low temperature hydrothermal alteration of diabase.

The diabase hosted vein deposits are associated with segregations of late stage diabase differentiates enriched in incompatible elements. The vein mineralization apparently is related to the evolution of hydrothermal fluids from these late stage differentiates near their solidus temperature as evidenced by mineralization both in miariolitic cavities and crosscutting veins. The deposition of sulfides probably is related to cooling of the hydrothermal fluid. The source of the metals and sulfur presumably is the residual diabase differentiates. Fracturing of the host rock promoted and focused fluid flow (Robinson, 1988, p. 316).

Sediment Hosted and Stratabound Replacement Deposits

Sediment hosted and stratabound replacement deposits of Cu and Zn are found in fluvial sandstones and lacustrine mudstones. Mineral deposition appears to be associated with depositional conditions that favor preservation of organic material within permeable strata. Precipitation of Cu as a sulfide is caused by the metal-rich fluid encountering a reducing environment; the Cu-sulfides are precipitated as sulfate is reduced or by replacement of pyrite (Rose, 1976). The origin of mineralizing fluids and the timing of their introduction is unknown. Sandstone deposits are Cu rich and typically also are enriched in Ag and, in places, U; they are associated with areas rich in organic debris contained in the rocks. Black mudstone hosted deposits are Cu and/or Zn rich and occur, in general, as stratabound disseminations or stratabound discordant veinlets and replacements (Smoot and Robinson, 1988, p. 356-357).

The Cu rich zones are stratabound but lenticular and may cut across sedimentary layering. The mineralized zones are characteristically associated with redox interfaces in the sedimentary sections, with typical reductants being plant fossil debris and sometimes pyrite or thermally metamorphosed rocks. The primary sulfide minerals are chalocite and pyrite. In some places bornite, chalcopyrite, native copper, or covellite may be primary or secondary minerals. Native silver, galena, sphalerite, and various arsenic, cobalt, nickel, and molybdenum minerals also may occur in small amounts. Secondary supergene minerals malachite, azurite, and chrysocolla are common and sometimes coat weathered surfaces or impregnate fractures with conspicuous color. Base-metal minerals in the fluvial sandstones from surface outcrops consist mainly of malachite and chrysocolla filling intergranular spaces or coating carbonized wood. These minerals are interpreted as weathering products of copper sulfides that replaced woody debris and partially filled intergranular spaces. The ores have extreme Cu enrichment and also are enriched in Ag and Ba and slightly enriched in Sr but not enriched in Zn and Pb relative to the representative unmineralized sandstones (Smoot and Robinson, 1988, p. 357-358).