

Northwest
Micro Mineral
Study Group



MICRO PROBE

SPRING, 2004

VOLUME IX, Number 9

SPRING MEETING HILLSBORO, OREGON

Saturday, May 1, 2004

9:30 am to 5:00 pm

Rice NW Museum of Rocks and Minerals
26385 NW Groveland Drive
Hillsboro, Oregon

To reach the Rice Museum, take the Sunset Highway (US 26) west from Portland. Exit at Helvetia Road (exit 61). Jog right 100 feet, then left onto Groveland Drive. The museum is in the trees 1.3 miles to the west.

What a wonderful place to meet. We can enjoy the Museum's displays as well as have our usual program and free table. So bring your microscope and plan to enjoy the day. Bring material for the Museum's give-away rock pile as well as to share with each other.

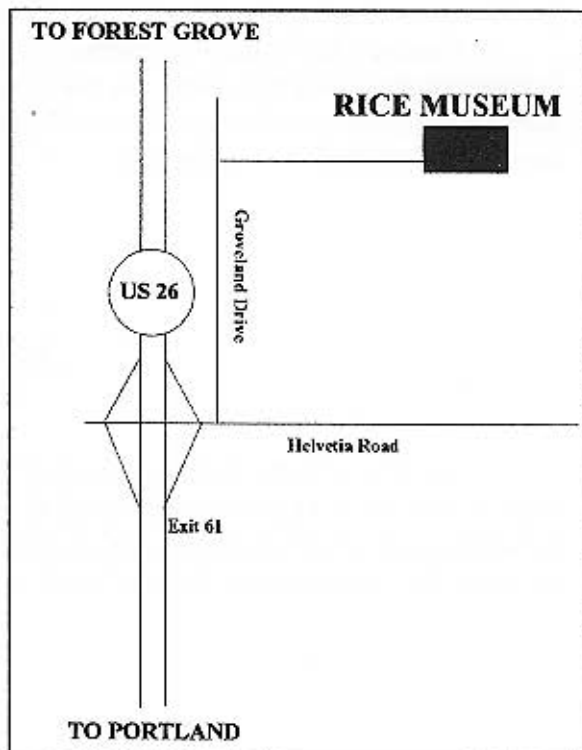
Morning:

11 am We are pleased to have Dr. William Wise with us for the day. He will be talking on "The Minerals of the Silver Coin Mine", an old silver mine near Winnemucca, Nevada with a wide variety of interesting and unusual minerals.

Afternoon:

2 pm Our usual short business meeting and review of the collecting status of locations in the Northwest. We can also see the progress the Rice museum has made in preparing the exhibit room for Northwest minerals.

The kitchen area is available and the club will provide lemonade, coffee, hot water, and the basics for sandwiches. So bring the extras for lunch and we will plan to have a sort of "pot luck" feast at noon. Restaurants are available in the local area. Some of us will get together to eat dinner, so please plan to join us if at all possible.



NWMMSG ON THE WEB

Doug Merson

Since our November meeting I have been working on building a web site for our group. Some progress has been made but my work schedule of seven days a week with some ten hours days has not helped.

The current design has, in addition to a home page, a page on who we are. This will describe the group and provide a history of NWMMSG. A page will be dedicated to our meetings, including the featured speakers and a map to the Rice Museum. Membership detail will be the subject of a page as well as one on the Micro Probe, how to obtain the CD, and a sample of an issue.

I intend to include a photo gallery for a number of Northwest localities and favorite localities members have been to. These galleries will include site photos as well as specimen photos. If any of you have photos you would be willing to have posted please send them to me by e-mail or on CD. The posted size will be 640 x 480 or 800 x 600 with thumbnails on the gallery page. For specimens the size of the featured crystal or the horizontal field of view would be needed unless you have a scale included in the photo.

Another possible area that would need member input would be a section dedicated to field trips. If anyone is interested in writing about their collecting activities, these could be posted.

There will be a links section with sites of interest to collectors. This will be broken down into several topics. Anyone having a favorite site please let me know so that I can include it. Possible topics would be: members home pages, museums, sites with technical data on minerals, professional organizations, and mineral clubs.

Also under development is a discussion page where we and others can discuss any questions we may have.

Once the site is fully developed I will obtain space with a web presence provider for hosting the site. This will allow the use of several e-mail accounts. I will be setting them up for the various officers and editor. This will free your own accounts from group business and the inevitable junk that is ever present.

ARTICLES

Doug Merson

The Micro Probe is always in need of interesting articles. Have you been on a collecting trip? Do you have a technique to share? Found a new locality that you are willing to share? Have information on a technical aspect of mineralogy? Write up an article and send it to Don Howard so it may be included in the Micro Probe.

Another Look At Lemolo Lake,

Donald G. Howard

Last summer's field trip to Lemolo Lake produced a considerable poundage of rock to examine and contemplate. In going through what I brought back, and in conversations with Doug Merson, we have come up with some observations that can be of use to other collectors working at the dam.

Like Summit Rock, the basic rock used to make the dam at Lemolo Lake is a fine-grained gray andesite. Examination under the microscope discloses many tiny phenocrysts of olivine. The material for the dam seems to have been quarried from the south side of the canyon just below the dam, and an extensive barrow pit has been left, with much rock exposed.

Much of the collecting to date has been done on a few boulders left along a short spur road that ends part way down the spillway. Examination of many of those boulders shows that they have a contact side with a soft, brownish, rather porous phase of rock. Since the contact region seems rather abrupt, grading into hard, gray fine-grained material within an inch or so, I would guess that the gray andesite formed over an earlier rock that was scoria-like, with many cavities and not much structural integrity. Though the contact remains clearly visible, very little of the other rock is attached to the boulders.

The gray andesite – the interior of the boulders and most of the rock exposed in the barrow pit – has few cavities, especially ones of any size. The mineralogy in those cavities that are present is quite simple: a glassy lining of tridymite containing scattered light brown blades of enstatite and tiny, thin platelets of black ilmenite. The enstatite has a higher magnesium to iron ratio than does the crystals in the Summit Rock material. The ilmenite is very thin and very tiny. In a few of the pieces collected, there appears to be a few scattered clusters of milky white cristobalite present as well. Other minerals are very scarce indeed.

However, the material near the contact is more interesting. There is a region, generally not more than a centimeter wide, which has numerous small cavities that are lined with a rusty yellow crust that seems to be composed of tiny, flattened, albite-like crystals stained with iron, rusty clay, and small globs of what might be limonite. Upon this base, shiny, metallic-looking clusters of tiny crystals are seen that check out in X-ray fluorescence to be iron oxide – that is, hematite. At high magnification they seem to be small, flattened rhombohedrons. The base material is an aluminum silicate high in calcium and iron, so if it is indeed a feldspar it would probably be anorthite, and the iron would be coming from a surface coating. It could equally well be a calcium iron silicate, with the iron being mainly in the trivalent state. The crystals are too tiny and too tightly fastened to the matrix to easily make a sample suitable for X-ray diffraction.

Beyond this centimeter-wide region, the cavities revert to having a lining of tridymite, and within another few centimeters enstatite crystals appear within them and we seem to be back to the bulk material. However, it is in this transition region that other interesting minerals appear. The crystals of ilmenite in this region are larger, much thicker, and much more obviously rhombohedral (more like those from Summit rock in appearance). There are clusters of black crystals in a few cavities that appear to be octahedral, and are therefore probably magnetite. Occasionally a single "large" magnetite crystal can be found. Fine, light brown needles of magnesiohornblende cluster in a few cavities. If fluorapatite occurs, it would be in this region; colorless needles would be hard to distinguish from the magnesiohornblende. Very tiny, very pale pink zircons have been found in cavities of this region. And it is in this region that most of the cavities containing the blood red pseudobrookite crystals are to be found.

The cavities in the bulk andesite have crystals that are rich in magnesium and very rich in silica, and have very little else. Enstatite from this region has a considerably lower iron

concentration than the corresponding mineral at Summit Rock. Clearly the titanium concentration is lower, as evidenced by the tiny size of the ilmenite blades. Only very rarely is a pseudobrookite found, and then it is usually either solitary or one of a very few in the cavity. After looking through a considerable amount of this material, I would have to say that it is booooooring

I would speculate that where the flow came into contact with the pumice-like older rock, more chemicals were introduced *locally* into it. Considerable quantities of iron, already oxidized to the ferric state, became available. Hence the formation of hematite and yellow-brown staining of the cavity linings. Extra titanium together with ferrous iron allowed the ilmenite to grow larger, and together with ferric iron allowed pseudobrookite to form. Pseudobrookite crystals in this region are usually small and thin, and tend to be very numerous in the particular cavities in which they occur. The presence of available calcium, at least in small quantities, allowed the formation of magnesiohornblende. Small amounts of zirconium favored the formation of a few zircons.

The fact that this was an oxidizing environment made for a richer and more varied mix of minerals. Much silica was still present, and at fairly high temperatures, as witnessed by the formation of tridymite, sometimes on top of the magnetite/ilmenite/hematite that lines a cavity. The oxidizing conditions were necessary to be able to form the pseudobrookite, which is a ferric titanate, as opposed to the ferrous titanate ilmenite found throughout the rest of the rock. And all this interesting chemistry in a layer only about an inch thick!

Other minerals are probably present as well, and only await identification. I have a stubby, clear, bright yellow crystal that I suspect may be aegirine, which would have required a local concentration of sodium, an element that seems rather in short supply in this particular andesite. Local amounts of phosphorus could have produced apatite with extra calcium, much as it did at Summit Rock.

So if you elect to spend an afternoon along the spillway at Lake Lemolo, you will have a better idea where to concentrate your activities. There is plenty of rock still there to satisfy a whole host of collectors.

FIGURE CAPTIONS

For electron micrographs, the number is in the lower right corner on the front.

921 Magnesiohornblende

(x120)

Summit Rock, Klamath Co., Oregon

A stubby prismatic crystal. The cross-section is nearly hexagonal; the lower symmetry is disclosed in the asymmetric, blunt termination.

CREDITS:

Micrograph & specimen

Don Howard

Further Update on the Minerals of Summit Rock, Klamath County, Oregon Magnesiohornblende, Phlogopite and Cristobalite

Donald G. Howard

Several articles in recent issues have given descriptions of the Summit Rock minerals. The purpose of this update is to report on findings for two particular boulders from which the author took extensive samples during our field trip last summer. The first regards the associations present with cristobalite, while the second describes the hornblende mineral occurring at Summit Rock. Some notes on inclusions that may be phlogopite are also included.

Cristobalite

A large boulder lying on the west side of the upper quarry area possessed an extensive exposure of cavities containing numerous clusters of cristobalite crystals. The interesting feature of this boulder is that the other minerals present in these cavities represent the minerals described by Dr. William Wise¹ as the enstatite suite rather than the aegirine suite. The base is composed primarily of distinct plagioclase crystals, glassy clear and often rather cavernous. Some areas show exposed octahedral crystals of magnetite with matte black faces and the characteristic reddened color in the surrounding plagioclase. Very thin blades of ilmenite are also present but not abundant; they also have a black matte surface as if they had been lightly coated with a clear drusy of transparent material.

The enstatite in this material is very characteristic. The crystals are very thin, clear brown blades. There is no indication of any alteration to aegirine, even on the surface. The clusters of milky white crystals of cristobalite seem to prefer to grow on the enstatite blades, so they are often nearly completely covered with just edges showing, though some are completely free of cristobalite. Finally, there is a light scattering of very fine white hairlike crystals of fluorapatite.

It seems clear from this material that the cristobalite formed rather late, after at least the original enstatite blades had grown up away from the cavity walls. Since all these blades are thin, one might speculate that thicker, sometimes cavernous, enstatite represents a later generation that added material to the original blades. In this material, the vapors adding to the crystal size were much higher in silica, and cristobalite nucleated and grew instead. This of course had to happen at high temperature, since cristobalite forms only above 1470° C. It is interesting to note that no etching or deterioration of the enstatite occurred during this process, since the crystal surfaces are smooth and the blades are quite transparent.

Phlogopite

Very thin, bright red flakes are occasionally seen as inclusions in clear crystals of enstatite. The suggestion has been made that these may be phlogopite rather than hematite, since there are no other ferric minerals in the enstatite suite. However, phlogopite is a potassium mica, and there is very little potassium as well. Since these are generally inclusions, it is difficult to get a composition, since X-ray fluorescence is a surface effect.

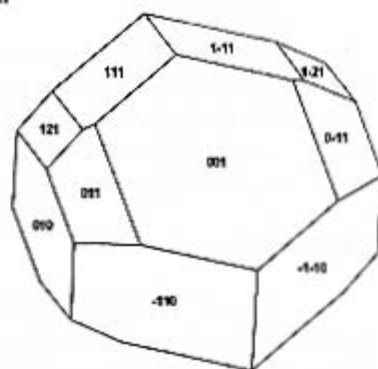
Magnesiohornblende

One of the minerals listed in the original article² on Summit Rock but not included in last month's update¹ was hornblende. This was because Dr. Wise had not observed the mineral himself, and suspected that what had originally been deemed hornblende could have been an acicular form of enstatite. The hornblende, though present in the enstatite suite, is not widely

distributed throughout the cavities representing that suite. And where it does occur, its shade of brown is virtually identical to that of the enstatite crystals.

During last summer's field trip, the author happened on a boulder on the east side at about the level of the doubleback in the road that proved to be thoroughly laced with pink crystals of zircon. This also is a mineral that occurs in the enstatite suite, but is limited to only some of the boulders representing that suite. As it turned out, this particular boulder contained crystals of hornblende as well as those of zircon, often in the same cavities. It has thus been possible to examine the chemistry as well as the form of this mineral.

A few of the hornblende crystals are relatively short and stubby, but by far the majority are very thin and acicular, with the length much more than ten times the width. The (110) faces are well developed, which together with an almost equally developed (010) give the crystals a six-sided cross-section that looks very nearly hexagonal. Since they are the same color as the enstatite, the most easily distinguishing feature is the nearly flat termination that results from the very well developed (001) face, as shown at right. Enstatite has a much more pointed termination (see the diagrams in the Microprobe, Vol IX, page 11, #6 and page 13, #8).

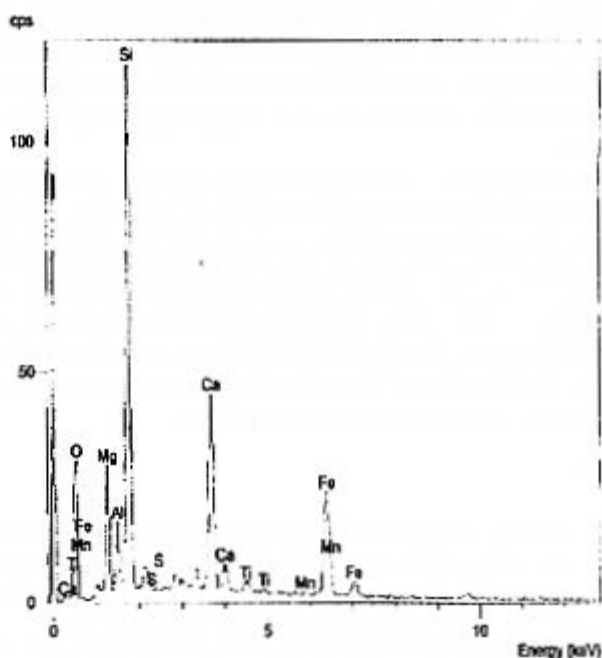


Habit of magnesian hornblende at Summit Rock

Magnesian hornblende is a high calcium, low sodium and aluminum amphibole whose formula is given as:



Magnesian hornblende is actually the magnesium end-member of a series that extends to Ferrohornblende, the iron end-member. Although a complete quantitative analysis has not been carried out, the name Magnesian hornblende was selected from the amphibole group because of the low sodium content and high calcium content, and the fact that magnesium was more abundant than iron, as determined by X-ray fluorescence (see diagram at right). The occurrence is probably sporadic because the high temperature vapors forming the minerals were only occasionally rich enough in calcium to form this mineral. Another sporadically occurring mineral of this suite, zircon, required zirconium in the vapors. Clearly, for the rock from which these specimens were taken, both zirconium and calcium were sufficiently abundant to add these interesting minerals to the mix to be found at Summit Rock.



Energy dispersive X-ray fluorescent spectrum for magnesian hornblende, Summit Rock, Oregon

References:

1. William S. Wise, *Summit Rock Revisited*, Microprobe Vol. IX #8, page 10, (2003).
2. Wallace D. Kieck, *Cavity Minerals of Summit Rock, Oregon*, Am. Min. 55, 1396-1404 (1970).

7

Minerals that Grow on the Specimens in your Collection
An Upgrade on the Minerals from the Kiggins Mine, Clackamas County, Oregon

Donald G. Howard

Most of us are aware that some specimens are difficult to keep in our collections because they tend to break down. Laumontite is practically impossible to prevent from losing water and turning, first to a milky white crystal, and then to a fine white powder. It is not one of my favorites. Native silver specimens tarnish and have a nasty tendency to grow needles of acanthite because of the traces of sulfur in the air.

Some specimens are even worse. Marcasite and some pyrite has a propensity to oxidize to sulfuric acid. Fuzz, often melanterite ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$), will form all over the surface. That can be washed off, but it keeps coming back because of the moisture in the air. Sulfuric acid is very efficient at removing water from the atmosphere. And if the specimen is in a wooden drawer, the sulfuric acid will begin to color and decompose the wood under it.

So last summer I was looking over some of the material I had collected on our field trip to the Kiggins Mine: calcite with a liberal sprinkling of red cinnabar and black regions that we have been calling jordisite. Of course, I knew from XRF data that those regions also contained silica and iron, and probably other things. The calcite veins at the Kiggins Mine were formed by low-temperature groundwaters, and those black regions were originally in the form of gels that later lost water and partially crystallized. The jordisite remained amorphous. I suspect that the iron probably formed very finely divided crystals of marcasite.

To my surprise, blue regions had appeared on some of the specimens, particularly in the blackest regions. Under the microscope, these regions appeared as tiny radial sprays of royal blue needles. This is not something that we have found in the field. But small wonder! The needles are very water soluble, and I have never seen the entrance to the adit where I hammered off those pieces when it wasn't dripping water.

So the blue makes sense: ilsemaninite ($\text{Mo}_3\text{O}_8 \cdot n\text{H}_2\text{O}$). But ilsemaninite is an amorphous mineral. So what was forming the crystals? Once again XRF comes to the rescue: iron, aluminum, and sulfur, with only a little molybdenum. Back from my collecting days in California, I would have recognized the mineral immediately as halotrichite ($\text{FeAl}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O}$). California is dry, and halotrichite often forms needly fuzz on the surface of rocks. White fuzz.

So what I think is happening is this. Jordisite is purported to decompose easily to form ilsemaninite. The iron sulfide (marcasite?) also decomposes. The iron sulfate formed combines with aluminum in the rock to form halotrichite, which the small amount of ilsemaninite colors a rich blue. And where does the aluminum come from? Stilbite has been observed to form in that vein. It is probably in the form of gel or finely divided zeolite, present in the dark patches, that the sulfuric acid can easily break down. Mystery solved.

So do have a look at the pieces you brought back from the Kiggins mine. If the temperature and humidity is just right in your basement (as it seems to be in mine), then you may find the amount of ilsemaninite in your specimens has increased and that you have dainty patches of stained halotrichite growing where no mineral had been before.

Mont Saint-Hilaire Confirmed Species, September 9, 2003

This list was edited by Malcolm Back, Bob Gault and Bob Rank

(Reprinted from the International Micromounter's Journal)

(* denotes TYPE locality)

Abenakiite-(Ce)* (UK85)	Carltonite* (UK15)	Gaidonnayite* (UK23)
Acanthite	Catapleiite	Galena
Actinolite	Celestine	Ganophyllite
Adamsite-(Y)* (UK96 & 106)	Cerite-(Ce)	Garronite
Aegirine	Cerussite	Gaultite* (UK84)
Alabandite	Chabazite-Ca	Genthelvit
Albite	Chabazite-Na	Gersdorffite
(Albite+Parisite=UK26)	(Chabazite+?=UK35)	Gibbsite
Allanite-(Ce)	(Chabazite+Natroilite+UK47)	Gismondine
Almandine	Chalconatrolite	Gmelinite-Na
Analcime	Chalcopyrite	Gobbsinite
Anatase	Chamosite	Goethite
Ancylite-(Ce) (UK3 & 10)	Charmarite* (2H&3T) (UK58 group)	Gonnardite (<i>name used in place of tetranatrolite.</i>)
Andesine	Chkalovite	Gotzenite
Andradite	Chlormagaluminate	(Gotzenite+?=UK24)
Anglesite	Clinocllore	Graphite
Ankerite	Clinoptilolite-K	Griegite
Annite	Cordierite	Griceite* (UK54)
Anorthoclase	Cordylite-(Ce) (UK12)	Grossularite
Antimony	Corundum	Gypsum
Aragoniyr	Cryolite	Halite
Arfvedsonite	Daqingshanite-(Ce) (UK44)	Halotrichite
Arsenopyrite	Datolite	Harmotome
Ashcroftine-(Y)	Dawsonite	Hedenbergite
Astrophyllite	Digenite	Helvite
(Astrophyllite+Natroilite=UK71)	Diopside	Hematite
Augite	Djurleite	Hemimorphite
Barite	Dolomite	Hercynite
Baryllite	Donnayite-(Y)* (UK33)	Hessite
Barytolamprophyllite	Dorfmanite	Hibschite
Bastnasite-(Ce)	Doyleite* (UK45)	Hilairite* (UK20)
Bavenite	Dravite	Hjortdahlite
Baileychlore	Edenite	Hisingerite
Behoite	Edingtonite	Hochelagaite* (UK50)
Berthierine	Ekanite	Horvathite-(Y)* (UK104)
Beryl	Elpidite	Hydrocerussite
Beryllonite	Enstatite	Hydroxyapophyllite (UK11 group)
Boudantite	Epididymite (UK14)	Hydrozincite
Biotite series	Epidote	Ilmenite
Bimessite	Epistolite (UK46, previously listed as Murmanite)	Ilmenorutile
Bismuth	Erdite	Jarosite Joaquinite-(Ce)
Bonshtedtite	Erythrite	Kaersutite
Bradleyite	Eudialyte	Kainosite-(Y)
Birholite-(Ce) (UK22)	Eudidymite	Kaolinite
Brochantite	Ewaldite (UK37)	Kellyite
Brookite	Faujasite-Na	Kentbrooksite
Brookite	Ferroceldadonite	Khomyskovite*
Burbankite	Ferrocolumbite	Kogarkoite
Calcio-ancylite-(Ce)	Ferrokentbrooksite	Korobitsynite
Calcio-burbankite* (UK100a)	Fluorapatite	Kukharenskoite-(Ce)* (UK65)
Calciohilairite	Fluorapophyllite (UK11 group)	Kupletskite
Calcite	Fluorbritholite-(Ce)	Kulnohorite
Canerinite	Fluorite	Labuntsovite (UK5)
Carbocernaite (UK40)	Franconite (UK43)	Lamprophyllite
Carbonate-fluorapatite		
Caresite-3T* (UK58 group)		

Langite	Nordstrandite	Shigaite (UK76)
Lanthanite-(Ce)	Normandite* (UK59)	Shoniokite-(Y)
Lavanite	" <i>Oligoclase</i> " (not a species)	Shortite
Lead	Oneillite*	Siderite
Leifite	Opal	Siderophyllite
Lemoyneite* (UK13)	Orthoclase	Sidorenkite
Lepidocrocite	Orthojoaquinite-(Ce)	Silinaite* (UK81)
Leucophanite	Parakeldyshite	Sodalite
Leucosphenite (UK8)	<i>Paranatrolite</i> (dubious status)	Sperminite
Lintisite (UK74)	Paraumbite	Spessartite
Lizardite	Parisite-(Ce) (18T & 72T)	Sphalerite
Lollingite	(Parisite+albite+UK26)	Stacyite* (UK4)
Loparite-(Ce)	Pectolite	Steenstrupine-(Ccc)
Lorenzenite (UK1, 7, & 16)	Penkvilkiite (UK41)	Stillwellite-(Ce)
<i>Lovozerite group</i>	Perraultite* (UK17)	Strontianite
Lucshite	Petarasite* (UK42)	Struvitesugilite
Lukechangite-(Ce)* (UK103)	Petersenite-(Ce)* (UK100)	Sulfur
Magadiite	Phillipsite-K	Synchysite-(Ce) (12T & 24T)
Magnesian-arfvedsonite	Phillipsite-Na	Szomolnokite
Magnesian-hornblende	Phlogopite	Tadzhikite-(Ce) (UK39) (<i>only Tadzhikite-(Y) has so far been approved. There is a nomenclature problem in this mineral.</i>)
Magnesite	Phosinaite-(Ce) (UK64)	Tainiolite
Magnetite	Pirssonite	Tennantite
Makaitite (UK66)	Polythionite	Terskite
Manganokhomyakovite	Posnjakite	(Terskite+Zakharovite=UK49)
Mangan-neptunite	Poudretteite*	Tetrahedrite
Manganocolumbite	Prehnite	Thalcosite
Manganokukisvumite* (UK112)	Pyrite	Thaumasite
Manganotychite	Pyrochlore	Thenardite
Marcasite	Pyrophanite	Thermonatrite
Mekelveyite-(Y) (UK30)	(Pyrophanite+rutile=UK9)	Thomasclarkite-(Y) (UK93)
Meionite	Pyrrhotite	Thonsonite
Melanterite	Quartz	Thorbastnasite
Michoelsenite* (UK32)	Quintinite-3T* (UK58 group)	Thorite
Microcline	Raite	Thomsonite* (UK27)
Milarite	Rasvumite	Thorogummite
Millerite	Reederite-(Y) (UK102)	Titanite
Mimetite	Remondite-(Ce)	Tremolite
Miserite (UK36)	Revdite	Trona
Molybdenite (2H & 3R)	Rhabdophane-(Ce) (UK34)	Tsepinitite-Na
Monazite-(Ce)	Rhabdophane-(La)	Tugtupite
Monteregianite-(Y)* (UK6)	Rhodochrosite	Tumchaite (UK110)
Montmorillonite	Richterite	Tundrite-(Ce) (UK18)
Mosandrite (Rinkite)?	Riebeckite	Tuperssuatsiaite
Muscovite	Rinkite (Mosandrite)?	Ussingite
Nahpoite	Rontgenite-(Ce)	Vaterite
Nalipoite* (UK63)	Rosenbuschite	Vermiculite
Narsarsukite (UK2)	Rouvilleite* (UK62)	Vesuvianite (UK21)
Natrium	Rozenite	Villiaumite
Natrolemoyneite*	Rutile	Vinogradovite (UK28)
Natrolite	Sabinaite	Vitusite-(Ce)
Natron	Sanidine	Vuonnemite
Natrophosphate	Saponite	Vuoriyarvite-K
Natrosilite	Sazhinite-(Ce)	Wadeite
Neighborite	Sazykinaite-(Y) (UK88)	Wagnerite
Nenadkevichite	Schairerite	Weloganite
Neotocite	Schorl	Willemite
Nepheline	Scheelite	Wohlerite
Neptunite	Searlesite	Wollastonite
Nickeline	Senaite	Wulfenite
Niobokupletskite*	Sepiolite	
Nontronite (UK29)	Serandite	
Nordite-(Ce)	Sheldrickite* (UK90)	

Wurtzite (2H, 4H & 8H)
Xenotime-(Y)

Yofortierite* (UK 25 & 31)
Zakharovite (UK38)

Zeophyllite
Zircon

Listed by unknown number

UK1 Lorentzenite
UK2 Narsarsukite
UK3 Ancyilite-(Ce)
UK4 Steacyite*
UK5 Labuntsovite
UK6 Montegregianite-(Y)*
UK7 Lorentzenite
UK8 Leucosphenite
UK9 Pyrophanite+rutile
UK10 Ancyilite-(Ce)
UK11 Apophyllite group
UK12 Cordylite-(Ce)
UK13 Lemoyneite*
UK14 Epididymite
UK15 Carletonite*
UK16 Lorenzenite
UK17 Pernaultite*
UK18 Tundrite-(Ce)
UK19 Nenadkevichite
UK20 Hilairite*
UK21 Vesuvianite
UK22 Britholite-(Ce)
UK23 Gaidonnayite*
UK24 Gotzenite+?
UK25 Yofortierite*
UK26 Albite+parisite
UK27 Thomasite*
UK28 Vinogradovite
UK29 Nontronite
UK30 McKelveyite-(Y)
UK31 Yofortierite*
UK32 Micheelsenite*
UK33 Donnallite-(Y)*
UK33A
UK34 Rhabdophane-(Ce)
UK35 Chabazite+?
UK36 Miserite
UK37 Ewaldite
UK37A
UK38 Zakharovite
UK39 Tadzhikite-(Ce)
UK40 Carbocearnite
UK41 Penkvilksite
UK42 Petarsite*

UK43 Franconite
UK44 Daqingshanite-(Ce)
UK45 Doyleite*
UK46 Epistollite
UK47 Chabazite+natrolite
UK48 & UK48A
UK49 Terskite+Zakharovite
UK50 Hochelagaite*
UK51
UK52
UK52, UK53A & UK53B
UK54 Griceite*
UK55 group
UK56
UK57 IMA accepted; not yet published.
UK58 group: Caresite-3T
Charmarite (2H&3T)*
Quintinite-3T*
UK59 Normandite*
UK60 & UK60A
UK61 IMA accepted. Hainaultite
In press.
UK61A
UK62 Rouvilleite*
UK63 Nalipoite*
UK64 Phosinaite
UK65 Kukharenkoite-(Ce)*
UK66 Makatite
UK67
UK68
UK69 IMA approved; not yet published. A. McDonald.
UK70
UK71 Astrophyllite+natrolite
UK72
UK73 group
UK74 Lintisite
UK75 On hold. A. McDonald.
UK76 Shignite
UK77 group
UK78
UK79
UK80

UK81 Silinaite*
UK82 & UK82A
UK83
UK84 Gaultite*
UK85 Abenakiite-(Ce)*
UK86
UK87
UK88 Sazykinaite-(Y)
UK89
UK90 Sheldrickite*
UK91
UK92 IMA accepted Martinite.
Not yet published.
A. McDonald.
UK93 Thonascarkite-(Y)
UK94
UK95
UK96 Adamsite-(Y)*
UK97
UK98
UK99 IMA accepted. Not yet published. A. McDonald.
UK100 Petersenite (Ce)*
UK100A Calcioburbankite*
UK101
UK102 Reederite-(Y)
UK103 Lukechangite-(Ce)*
UK104 Horvathite-(Y)*
UK105 yttrium phosphate.
M. Back, R. Ramik,
A. McDonald, R. Gault.
UK106 Adamsite-(Y)
UK107 On hold. A. McDonald.
& M. Back
UK108 On hold. A. McDonald.
& M. Back
UK109
UK110 Tumchaite
UK111 Ca,Na,Mn,Ba phosphate
A. McDonald & R. Gault
UK112 Manganokukisvunite
IMA approved. Submitted.
UK113 Na,Ca carbonate
R. Gault

NOTES: This list was compiled from various sources including the following, whom we gratefully acknowledge:

Mineralogical Record, Vol. 21, #4, 1990

Rocks & Minerals, Vol 70, #2, 1995 *Mont Saint-Hilaire Revisited*, part 2.

Mr. Laszlo Horvath

Mr. Tony Steede

Please forward any additions, deletions, or corrections to the editors of the list.

Detailed status of New Species Pending Publication
Malcolm Back

UK57 (name pending) $(\text{Na,Ca})_6(\text{Ca,Na})_3\text{Si}_{16}\text{O}_{38}(\text{F,OH})_2 \cdot 3\text{H}_2\text{O}$

Researcher: A. McDonald, who supplied the data

Status: IMA accepted. Publication and the name pending.

Triclinic: $P\bar{1}$; a 9.613(2) Å, b 12.115(2) Å, c 9.589(2) Å; $a:b:c$ 0.7935:1:0.7915
 α 92.95(2)°, β 119.81(2)°, γ 96.62(2)°
 V 954.8(1) Å³, $Z=1$

Associated minerals: microcline, clinoamphibole, narsarsukite

Mineral origin: Late-stage phase, possibly arising from the interaction of late-stage fluids with marble xenoliths.

As subhedral, rounded plates, measuring $<0.5 \mu\text{m}$ in thickness and up to 3 mm across. Platy habit, with a {010} pinacoid. Transparent and colorless with a white streak, and a pearly luster. No fluorescence observed in long-wave or short-wave UV radiation. Moh's hardness 3, brittle with perfect {010} cleavage, and a splintery fracture. Measured density of 2.50(1) g/cm³ and calculated 2.51(1) g/cm³. No effervescence in 1:1 HCl.

Biaxial negative: α 1.522(1), β 1.528(1), γ 1.529(1); 2V (measured) 48(1)°, (calculated) 44(1)°. No dispersion noted. Orientation: $X=b$; pleochroism: none observed.

UK69 (name pending) $\text{Na}_{15}\text{Sr}_{12}\text{Zr}_{14}\text{Si}_{42}\text{O}_{138}(\text{OH})_6 \cdot 12\text{H}_2\text{O}$

Researcher: A. McDonald, who supplied the data

Status: IMA accepted. Publication and the name pending.

Hexagonal: $P6_3\text{cm}$; a 19.720(1) Å, c 9.9788(5) Å; $c:a$ 0.5060
 V 3360.7(1) Å³, $Z=1$

Associated minerals: albite, aegirine, alkali amphibole, analcime, annite, burbankite group, calcite, donnayite-(Y), microcline, pyrite, pyrrhotite, titanite

Mineral origin: Late-stage hydrothermal product in igneous breccias and silicate cavities in nepheline syenite.

As stubby, euhedral crystals, averaging $<0.5 \text{ mm}$ long to a maximum of 1.5 mm. Occurs both as single crystals and as rosettes (rosettes typically $<0.1 \text{ mm}$). Fibrous to acicular to prismatic habit, with pinacoids {0001} and prism {1010}. Transparent and gray, pale green, or brown with a white streak, and a vitreous luster. No fluorescence observed in long-wave or short-wave UV radiation. Moh's hardness $5 \frac{1}{2}$, brittle with an uneven to conchoidal fracture. No effervescence in 1:1 HCl. Density was not measured and the calculated density using cell dimensions derived from crystal structure analysis and empirical formula is 3.16(1) g/cm³.

Uniaxial negative: ω 1.627(1), ϵ 1.645(1); pleochroism not observed.

UK92 Martinite $(\text{Na},\text{Ca})_{11}\text{Ca}_4(\text{Si,S,B})_{14}\text{B}_2\text{O}_{40}\text{F}_2 \cdot 4\text{H}_2\text{O}$

Researcher: A. McDonald, who supplied the data and gave permission to release the name.

Named for Dr. Robert Francois "Bob" Martin, Professor of Mineralogy, McGill University, Montreal, Quebec and long-time editor of the Canadian Mineralogist, in recognition of his work on the mineralogy of feldspars and the petrology of alkaline intrusions.

Status: IMA accepted. Publication pending.

Triclinic: $P\bar{1}$; a 9.5437(7) Å, b 14.0268(10) Å, c 9.5349(6) Å; $a:b:c$ 0.6804:1:0.6798
 α 71.057(1)°, β 119.788(1)°, γ 105.846(1)°
 V 1038.01(1) Å³, $Z=1$

Associated minerals: albite, aegirine, microcline, villiaumite, cudialyte group, loverzerite group, terskite, erdite.

Mineral origin: Late-stage phase, possibly arising from a metasomatic event associated with emplacement of sodalite syenite xenoliths.

As sub- to euhedral plates, measuring $<10 \mu\text{m}$ in thickness and up to 50 μm across. Occurs both as single crystals and as rosettes. Platy habit, with a {010} pinacoid. Transparent, purple, lilac or colorless with a white streak, and a vitreous luster. No fluorescence observed in long-wave or short-wave UV radiation. Moh's hardness 4, brittle with perfect {010} cleavage, and an uneven fracture. No effervescence in 1:1 HCl. Density was not measured and the calculated density using cell dimensions derived from crystal structure analysis and empirical formula is 2.52(1) g/cm³.

Biaxial negative: α 1.529(1), β 1.549(1), γ 1.551(1); 2V (measured) 38(1)°, (calculated) 35(1)°. No dispersion noted. Orientation: $X=b$; pleochroism: none observed.

UK111

A. McDonald

Mineral occurs as a gun-metal gray, foliated grouping, about 0.5 mm in diameter, in association with aegirine, catapleiite, calcite, siderite, annite, etc. It forms in the interstices between aegirine and catapleiite. Chemically, it appears to be a Na Ba phosphate hydrate with Ca and Mn. The sample was collected in October, 1999, from the so-called "Poudrette pegmatite". According to Andy, as far as he knows there is only the one specimen that he collected, but the mineral could easily be overlooked on samples collected from the pegmatite. Let us know if you find any more of this material.

UK112 Manganokukisvumite $\text{Na}_6\text{MnTi}_4\text{Si}_8\text{O}_{28} \cdot 4\text{H}_2\text{O}$

R. Gault

STATUS: IMA accepted, and the paper has been submitted for publication.

Orthorhombic *Pccn* a 29.05, b 8.612, c 5.220, V 1305.9 Å³, $Z=2$.

Manganokukisvumite is the manganese analogue of kukisvumite. First discovered in 1987 by Jerry Van Velthuisen. It occurs in small cavities in an albite-rich syenite breccia associated with aegirine, microcline, albite, annite, pyrite, chalcopyrite, pyrrhotite, natrolite, labuntsovite, titanite, calcite, a chlorite-group mineral, magnetite, fluorapatite, elpidite, and sodalite.

Manganokukisvumite crystals are colorless and transparent with a vitreous luster and a white streak. The crystals are extremely thin, flattened and sword-shaped to 0.5 mm in length, frequently forming rosette-like radiating groups.

Moh's Hardness 5.5-6. Brittle with no apparent cleavage but with a splintery fracture. Measured density 2.86 g/cm³. Biaxial negative. n_x 1.657, n_y 1.744, n_z 1.792; $2V(\text{calc}) = 70^\circ$. There is no dispersion and no pleochroism.

UK113

R. Gault

This is an unknown carbonate of Na and Ca. It is possibly hydrous. It is white, acicular to fibrous. It was found by Laszlo and Elsa Horvath in 1997 in a vein off of the "Poudrette pegmatite" associated with remondite, eudidymite, siderite, rutile and calcite. Electron microprobe, X-ray powder diffraction and X-ray photoelectron spectroscopy analyses have been performed on the material. The strongest lines in the XRPD pattern are: 13.00(10), 9.21(8), 4.37(4), 3.60(4), 3.27(10), 2.61(5).

Baileychlore

R. Gault

Baileychlore, the Zn member of the chlorite group, was identified on a specimen collected by Laszlo and Elsa Horvath in the 1970's. It occurs as aggregates of tan colored, very thin flakes forming spherical rosettes to 0.5 mm across. It is found in small cavities in microcline, the only associated species on the specimen. Its provenance is uncertain, but it likely formed in pegmatite.

Specimen with unusual korobitsynite and nenadkevichite

M. Weber

Marcelle Weber e-mailed me on June 2, 2003 to report the following information on an old specimen. "You might be interested in a recent ID by Bob Gault. On May 29, 1971 we collected specimens which included UK6 (monteregianite), UK29 (nenadkevichite), UK32 (micheelsenite), UK33 (donnayite-(Y)), fluorite, rhodochrosite, and albite. The monteregianite ranged from very good to badly altered; the micheelsenite is fibrous with a very few fine needles; and the nenadkevichite looked like 'nails', some with caps on both ends of the prism. Bob has just advised me that the prisms are korobitsynite and the caps are nenadkevichite."

Ferrokentbrooksie

Identified by R. Gault by microprobe as part of a study of the cudialyte group of minerals. Cannot be identified from other members of the group by visual identification.

NOTE: A French mineral collector, Paul Poulain, would like very much to exchange some minerals of France for U.S. minerals. If interested, contact:

<POULAIN.Paul@wanadoo.fr>

This might be a great chance to get some very colorful and unusual minerals.

Pegmatites of the Black Hills – The Keystone area

Robert J. Smith

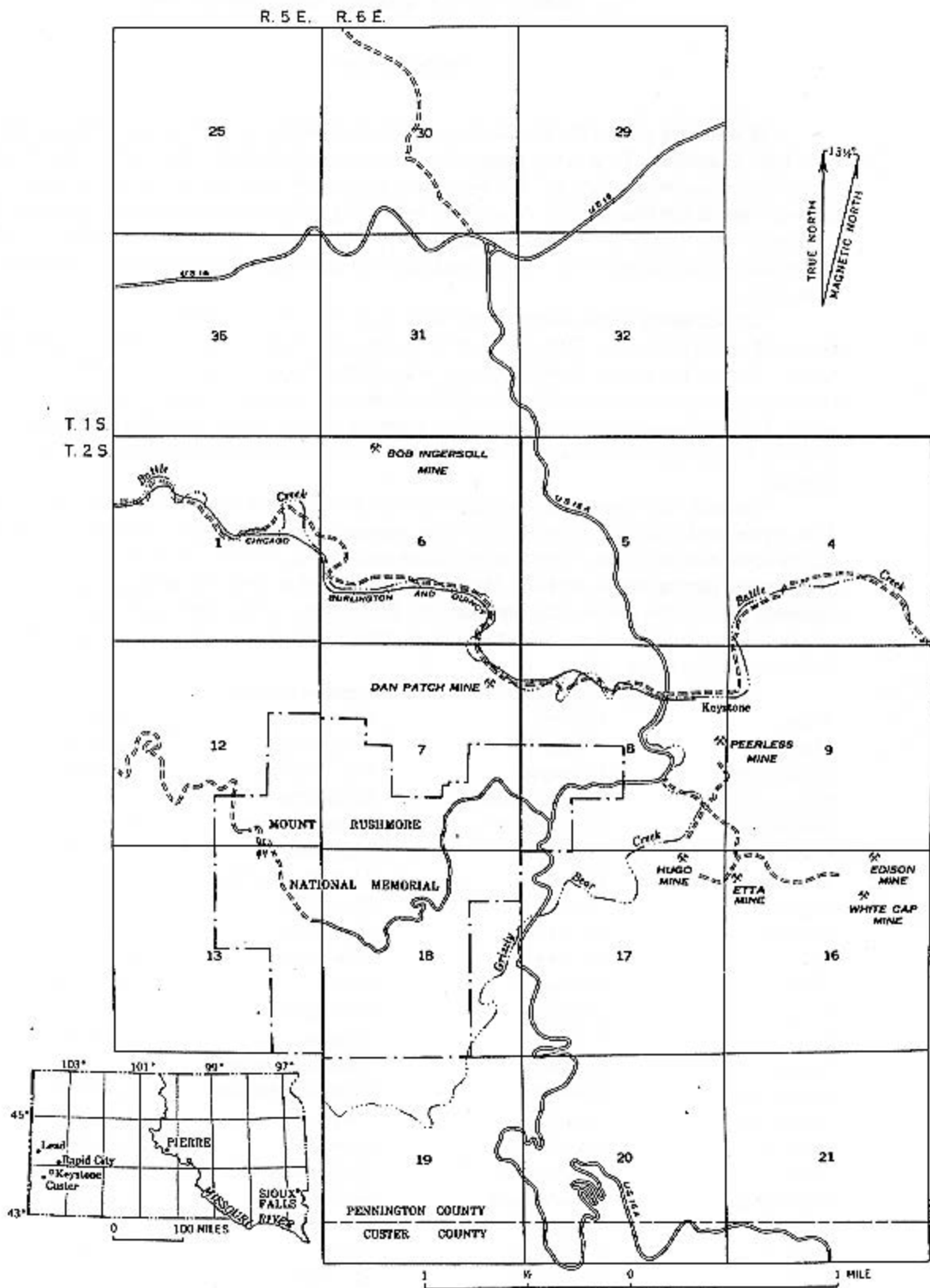
If you have visited the Mt. Rushmore National Memorial in the Central Black Hills you have been in another of the major pegmatite areas of the Black Hills. This is the area around Keystone in Pennington County. Mt. Rushmore is a granite crag that is part of the Harney Granite Core of the Black Hills. Associated with this granite core are a number of pegmatites of a series of sizes from a few inches to many acres. Some of these pegmatites are the sites of some of the major mines in the Hills. And mineralogically they are some of the most interesting areas in the region.

Like so many of the mines in the Black Hills, the ones around Keystone were originally examined as tin prospects. This is true even though very little tin was ever recovered from these mines. Most of the money from tin mining was removed from the investors, not the pegmatites. However, a good deal of valuable material has been mined from the Keystone mines over the years. This included a number of important minerals such as spodumene, beryl, feldspars of different kinds, and other strategic materials such as cerium, tantalum, niobium, and even a little uranium.

Probably the most noted and storied of the mines in this area is the famous Etta Mine. This pegmatite is a steeply plunging pipe that originally formed a distinct knob that has been mined down to a major pit. This is an excellent example of a zoned pegmatite, and like so many of the zoned pegmatites in the Hills, the Etta has produced an amazing series of interesting minerals. One of the species that has made the Etta famous is the large (and I do mean large) spodumene crystals found in and near the core. These include crystals up to forty feet in length and many tons in mass.

The following is a partial list of minerals found at the mine:

Albite	Epidote	Microcline	Sicklerite
Allauadite	Elbaite	Mitradatite	Siderite
Almandine	Eucryptite	Molybdenite	Sphalerite
Andalusite	Ferrisicklerite	Molybdite	Sphene
Arrojadite	Fluorapatite	Montgomeryite	Spodumene
Arsenolite	Frondelite	Monazite	Stannite
Arsenopyrite	Galena	Montmorillonite	Stewartite
Augelite	Goethite	Muscovite	Strengite
Autunite	Graphite	Oglioclase	Strunzite
Azurite	Heterosite	Olivenite	Struverite
Barite	Hureaulite	Opal	Tantalite
Beryl	Ilmenite	Orthoclase	Tapiolite
Biotite	Johnsite	Petalite	Tavorite
Bismuth	Kaolinite	Phosphosiderite	Todorokite
Caoxenite	Kesterite	Psuedomalachite	Torbernite
Cassiterite	Laueite	Purpurite	Triphylite
Cerussite	Lepidolite	Quartz	Triplite
Chalcocite	Libethenite	Rockbridgeite	Uraninite
Chalcopyrite	Lithiophilite	Rutile	Varlamoffite
Columbite	Lollingite	Scheelite	Vivianite
Corundum	Ludlamite	Schorl	Wolframite
Diadochite	Malachite	Scorodite	Xanthoxenite
Dufrenite			Zircon



Index map showing location of the Hugo pegmatite, Keystone, S. Dak.

Not far from the Etta Mine is the White Cap Mine. This pegmatite has been mined for feldspar and mica as well as some spodumene and amblygonite. Very similar mineralization to the Etta is found at this locale. Good samples of columbite, tantalite, and fluorapatite have been recovered from this mine. One find that I made at the White Cap was some excellent microcrystals of lazulite in quartz. Lazulite is not uncommon in Black Hills mines, but it is seldom found in good crystals.

There are many other well-known mines in the Keystone area. These include the King Lithia pegmatite that has produced some of the finest fluorapatite specimens uncovered. There is also the Big Chief Mine that is the type locale for a number of new phosphate minerals. These include perloffite and olmstedite among others.

One of my favorite locales in the area is the Hugo Mine. The Hugo is a large pegmatite body that has been one of the best feldspar producers in the area. Like so many of the mines in the Hills, the Hugo started as a tin prospect, and like so many other 'tin mines', it produced very little tin ore. However, it did produce large amounts of feldspar that made a pretty good profit for a while. Some very large masses of fluorapatite and spodumene have also been mined. The pegmatite is very complex, with many zones and many replacement bodies.

Some of the best specimens that I have recovered at the Hugo are some excellent composite crystals of cassiterite that can be up to three inches on an edge. Also good fluorapatite and spodumene can be found, along with a number of members of the feldspar group. Phosphates also can be collected, but not in the numbers found in many of the Custer area pegmatites. I have also found some good columbite-tantalite specimens in this mine and in a number of the pegmatites in the Keystone area.

With this little article is a map of the general area of the Keystone pegmatites and the Mt. Rushmore zone. This is a great place to visit for a number of reasons, not the least of which is the Rushmore carvings themselves.

Probably the most impressive mineralogical factor in the Keystone pegmatites is the presence of a number of very large crystal forms in many of the mines. Just think about the giant spodumene crystals in the Etta and other mines of the area. There are also very large groups of apatites and feldspars, as well as giant sheets of the micas, including muscovite and biotite as well as some good sized masses of lepidolite. These alone are worth a visit to the Keystone Swarm.

THE MICROPROBE

Published twice a year by the
NORTHWEST MICROMINERAL STUDY GROUP

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DUES: \$15 per year per mailing address, payable for each calendar year
at the Spring meeting or by mail to the Secretary-Treasurer:

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Crystal images from the Tacoma Smelter Slag, Tacoma, Washington

Saul Krotki

"Preliminary Study of Minerals in Tacoma Smelter Slags" by Raymond Lasmanis, David Norman, and Bart Cannon, appeared in *Washington Geology*, vol. 25, no. 3, September 1997. The analyses matched many known species, but in numerous cases only elements were listed while species identification remained uncertain. I recently collaborated with Bart Cannon to continue the investigation. Spectra and SEM/BSE images were derived for many minute but distinctive crystal forms. In most cases far too little material was available for definitive x-ray diffraction identification. Here is an opportunity to enjoy a work in progress. While the minerals remain unidentified, the variety of habits they present are a delight to contemplate!



Fig 1. Blue-green bow tie shaped cluster. Probably the copper sulfate hydroxide, brochantite. The field of view in this SEM/BSE image is approximately 300 microns wide. These clusters reach up to 800 microns (0.8 mm).

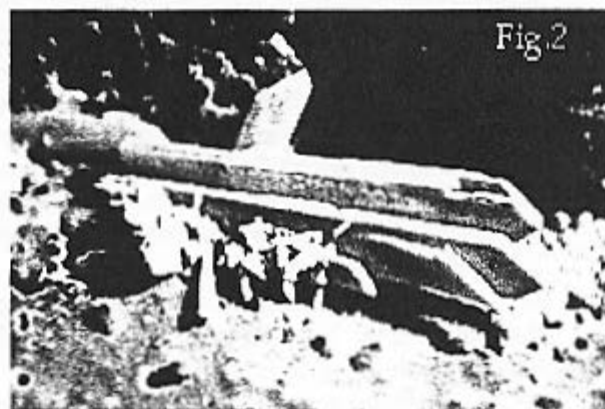


Fig 2. Photomicrograph of pale turquoise blue crystal cluster 1.0 mm in length. Unknown copper sulfate. Very scarce.



Fig 3. SEM/BSE image of pale ocher yellow hexagonal plates. Field of view 300 microns wide. EDS spectra indicates iron only. Possibly goethite, after ferrihydrite

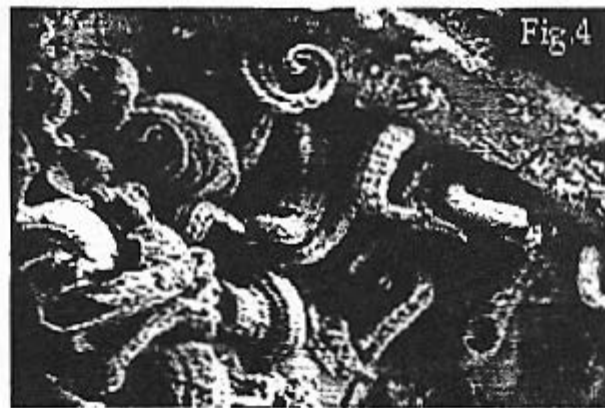
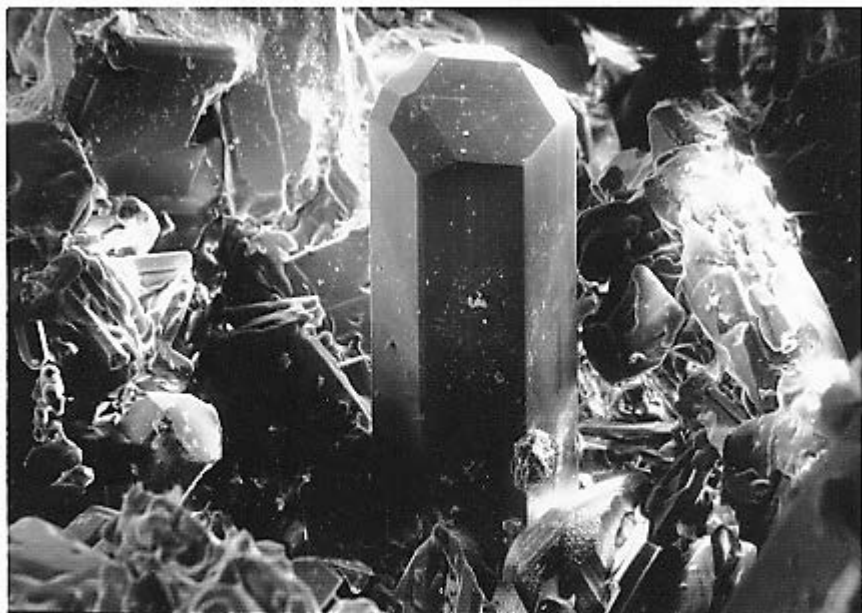


Fig 4. Exotic ram's horn forms with complex chemistry. EDS spectrum indicates lead, iron, copper, arsenic, and chlorine. Any guesses?



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