Potash Sulphur Springs Wilson Springs Vanadium Mines, Garland County, AR
A Collecting Update, Minerals and a Photogallery

By J. Michael Howard, 2017

Since publication of the *Rocks and Minerals* article by Howard and Owens in 1995, little has been written for collectors on the mines and minerals of the PSS vanadium mines and their collecting status. Howard completed his Master's thesis on the PSS intrusive in 1974 and Don Owens was the company mining geologist during most of the active period of mining, which ended in 1991. During this time both Owens and Charles Milton, then of The George Washington University, Washington, D.C., worked on the mineralogy of the orebodies. Several collecting trips were hosted by Owens for the Coon Creek Association during those years, with samples being sent to Milton for identification. Howard, employeed by the State, never lost interest in the minerals of this locality, and made many visits during the active mining period, accompanied by Owens, to collect as mining proceeded in the pits.

The mines are now closed, having having not produced ores since 1991, and reclamation has proceeded to the point that access to the mineralized zones are inaccessible, being either under water or covered with tailings and reclaimed. Ownership of the deposits has changed and the Engineering Company overseeing the reclamation process are reticent to allow non-employees on the site. So for the forseeable future the site is not available to collectors.

Essentially the only source of these minerals to present day collectors are the collections of previous collectors. Don Owens, J. M. Howard and Meredith York had the greatest number of specimens, along with other members of the Coon Creek Association (Henry deLinde, Buford Nichols, and George Megerle to name a few CCA survivors). When Don Owens passed away in 2015, his collection was eventually sold to two mineral dealers. The author was privileged to have an early opportunity in 2016 to purchase PSS micro-specimens from both dealers, James Zigras and Tom Loomis.

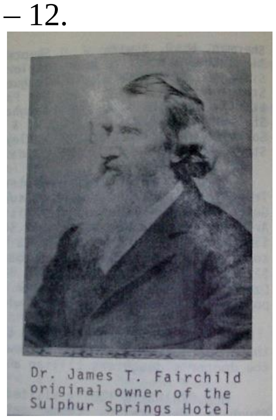
J. M. Howard on left, D. R. Owens on right, AGS Learning Center

With this addition to his collection, the author has now assembled the largest organized number of specimens for the North Wilson, East Wilson, and T-ore body of any living collector. The winter of 2016 was spent examining, labeling and mounting most of the collection. I have been obtaining quality photographic images of the many micromount species, and once this article is publically available the specimens will be for sale, either as an entire collection or as individual specimens. Note that most of the collectible species at PSS were micromineral examples. Miserite and calcite occurred as larger examples, though neither occurred as distinct crystals. Vivianite also was present as larger specimens, mostly thumbnail examples, but one cabinet specimen was recovered by Owens and is now in Howard's collection.

Data on one new mineral has been added to what was given in the R & M article, in particular the identification of Kahazakstanite, identified by Igor Pekov and reported by Howard and Pekov at the 2007 South Central/North Central Joint GSA meeting as a poster. See Kazakhstanite below.

Brief History

Potash Sulphur Springs was the site of a first class resort and 4 story hotel, developed by Dr. James T. Fairchild, who was living on the property as early as 1850. By the early 1920s when Dr. Charles Milton visited the region the hotel was then old and run down. Milton based his field excursions to Magnet Cove, some 4 miles to the east, from there. He stated that he was the only guest in the hotel during his week long visit, and each day would walk to Magnet Cove to visit outcrops and collect samples for later examination (personal comm. with JMH). When the author first visited the springs in the early 1960s, there was no sign of the hotel, but there was a spring house, owned by Mr. C. E. Wilson, whose family had purchased the site from the Fairchild heirs in August 1934. Mr. Wilson was promoting the spring water for its health benefits. It was Mr. Wilson who sold the property to Union Carbide Corporation in the mid-1960s after vanadium was discovered during titanium exploration. For detailed history and interesting commentary the reader need go no further than the following publications: Anonymous, 1894 (reprinted 1994), Ye Hot Springs, Ark. Picture Booke: Woodward & Tiernan Printing Co., St. Louis, MO, 80 p. Reprinted for Hot Springs National Park; Cline, I. E., 1970, Sulphur Springs and Hotel *in* The Record, Yearbook of the Hot Springs-Garland County Historical Society, Issue 11, pp. 1 – 12.



Dr. Fairchild, original owner of the PSS and hotel.

Mr. C. E. Williams, last private owner of the PSS property.
Images from I. E. Cline article, 1970.

Geology of the intrusion and the mines

The geology as described by Howard and Owens (1995) has been adequately discussed, and although Owens had planned for years to write up the detailed geology and structure of the various open pit mines, it was never completed. The only data on file presently are detailed preliminary maps by Owens of the East Wilson and North Wilson pits, accomplished during the active years of mining. Copies of these maps are on-file with the Arkansas Geological Survey. Since these pits are now filled with water, no exposures are available for more detailed mapping of these sites. See maps in 1995 article.

In general, the PSS intrusion is a Cretaceous (100 +/- 2 Ma) piercing body of feldspathoidal syenite pierced by multiple mafic intrusive masses at the present level of erosion (date by Zartman and Howard, 1987). The intrusion does not exhibit a ring dike like structure as the better known Magnet Cove complex, due primarily to its much smaller size and different mode of intrusion. The last intrusive mass into this body was a carbonatite, composed primarily of calcite with subordinate amounts of siderite within the massive holocrystalline calcite mass. Within the central portion of the intrusion, drill holes encountered a carbonatite breccia explosive mass. A fenite explosive breccia was exposed in the north wall of the East Wilson pit, seen by the author during his mapping of the body. As with Magnet Cove, the rock was sourced out of the upper mantle and represents a differentiated carbonated basaltic melt.

The orebodies have a complex history, but in general are the result of concentration of vanadium from original pyroxene and biotite within the feldspathoidal host by the process of potassic fenitization. Fenitization also affected the contact rock, particularly when it was the silica-rich Arkansas Novaculite, resulting in a “reverse” skarn process (silica-rich rock invaded by carbonate-rich fluids). The skarn is seen as wollastonite-diopside hedenbergite alteration zones where miserite may be present. Pyroxenites formed by contact metamorphism of the middle division of the Arkansas Novaculite were enriched in vanadium and titanium, and later lateritic weathering during the Paleocene concentrated the vanadium into enriched zones as fingers of oxidation extended downward into the ore zones. This event happened during the same time as the lateritic weathering that formed bauxite from the nepheline syenite in Pulaski and Saline Counties to the northeast of PSS. During mining, the mill feed was set at 1.2 % V_2O_5 for consistency. The ores were blended to achieve this concentration. Zones as high as 8 % V_2O_5 were encountered during mining of the East Wilson pit.

Weathering and lateritic alteration resulted in many of the collectible minerals from the orginal igneous and fenitized host rocks. The mines are the type localities for several minerals, including miserite (1950), straczekite (1984), malhmoodite (1993).

New Species and Data to Report in this article.

The author does not deem it necessary to present the details of every collectible species known from the PSS mines as that information is available in the 1995 R & M article for every mineral except kazakhstanite. Kazakhstanite is described below.

Kazakhstanite was identified as an unknown "bronze type" vanadium mineral informally by Milton and Howard T. Evans, Jr. during the mid-1980s, though little work was done in an attempt to complete it's definition. It was considered in the bokite-corvusite "group". In 2000, Al Fauster identified kazakhstanite from samples provided by J.M. Howard (personal comm., 2000 email) and provided 2 SEM images of the mineral's fibrous habit when associated with fervanite. In 2006 when Igor Pekov, Russian mineralogist, visited the author, he requested and was given several mineral samples to identify. In early 2007, Pekov reported that one of the specimens was kazakhstanite with a feathery texture. From it's physical description, it was apparent that this was the previously examined, but not identified, "bronze" vanadium mineral from PSS. Howard and Pekov presented a poster session at the 2007 South Central / North Central joint GSA Meeting, noting the discovery of this mineral at PSS. This was the 2nd recorded locality for kazakhstanite in North America. One miniature and several thumbnail specimens, as well as many micromount specimens are in Howard's collection. The larger examples tend to be the feathery textured type and the micromineral specimens are typically fibrous and underlay fervanite crystals. The PSS occurrence has not, as of this date, been listed in Mindat.org's dataset.

When the author approached Tom Loomis to purchase some of the Owens' PSS collection, Tom mentioned that he had a really nice sincosite specimen that Don had sent him years ago in trade. I expressed an interest and a price was agreed upon. Then the entire lot of minerals were shipped and payment sent in return. When the sincosite specimen arrived, the quality of the specimen was astounding to the author, having never seen but a few scattered crystals of sincosite perched on corroded quartz. The specimen has 100s of apple green micro sincosite crystals formed in a 1 inch wide curving band across the flat face of a recrystallized piece of Arkansas Novaculite! Sincosite is bright apple green and even as a small hand specimen the example is spectacular for this mineral. Howard decided never to break this piece down, even though it would yield several dozen micromounts. Someone else might wish to attempt that if they owned the specimen, but in the author's opinion that would be a shame!

References

Cline, I. E., 1970, Sulphur Springs Hotel: The Record, Vol. XI, pp. 1-12.

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Howard, J.M. and Owens, D.R., 1995, Minerals of the Wilson Springs Vanadium Mines, Potash Sulphur Springs, Arkansas: Rocks & Minerals, Vol. 70, no. 3, pp. 154-170.

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Smith, A.E., Jr. and Howard, J.M., 2016, Magnet Cove, Hot Spring County, Arkansas: Collector and Professional Observations, Stories, and Photographs of Minerals from this Classic Mineral Collecting Locality. E-publication, rockhoundingAR.com, 149 p.

Zartman, R. E. and Howard, J. M., 1987, Uranium-lead age of large zircon crystals from the Potash Sulfur[sic] Springs igneous complex, Garland County, Arkansas *in* Mantle Metasomatism and Alkaline Magmatism, E. M. Morris and J. D. Pasteris, eds., Geological Society of America Special Paper, 215, p. 235-239.

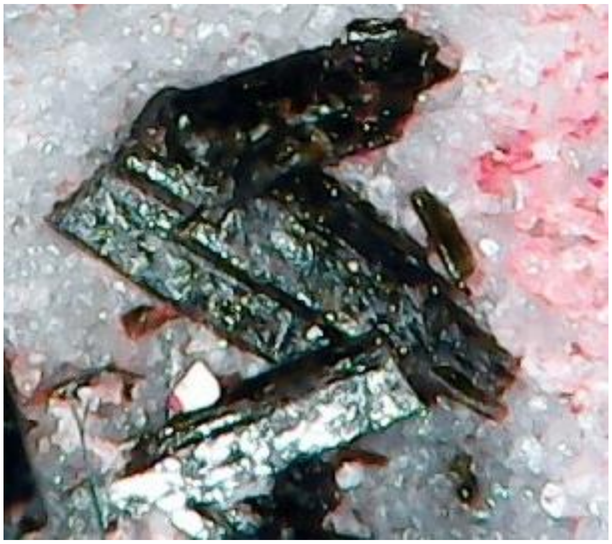
The Photogallery

Since the publication of Smith and Howard's e-book on Magnet Cove in 2016, the author has had a desire to compose a photogallery for the minerals from Potash Sulphur Springs, in the same manner as that of the Magnet Cove publication. This paper's main purpose is to provide additional identification information, photographs of the species, and to bring the locality status information up-to-date. Presently there is no one - to the author's knowledge - doing further work on mineral identification on the minerals of the Arkansas vanadium mines at PSS.

The following abbreviations in the image captions give the finder, owner of imaged specimen, the photographer (in that order), and pit, if restricted in occurrence.

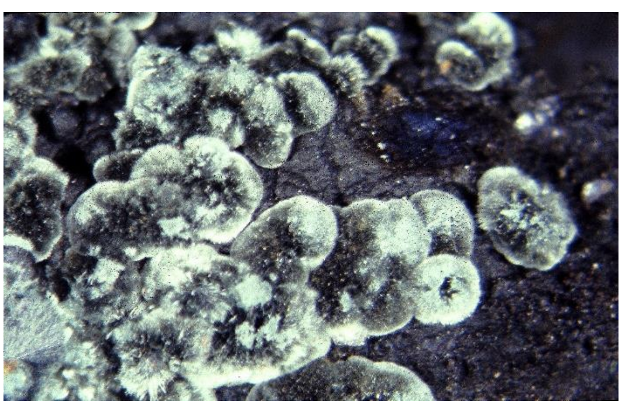
DRO – Don R. Owens	JMH – J. Michael Howard	TB – Tim Barnes
EAO – Ed A. O'Dell	JZ – James Zigras	

EWP – East Wilson pit	NWP – North Wilson pit
T-O – T Orebody	PSS – Potash Sulphur Springs



Arfvedsonite, EWP, PSS. JMH JMH JMH 20X

Arfvedsonite, EWP, PSS. DRO, JMH, JMH 20X

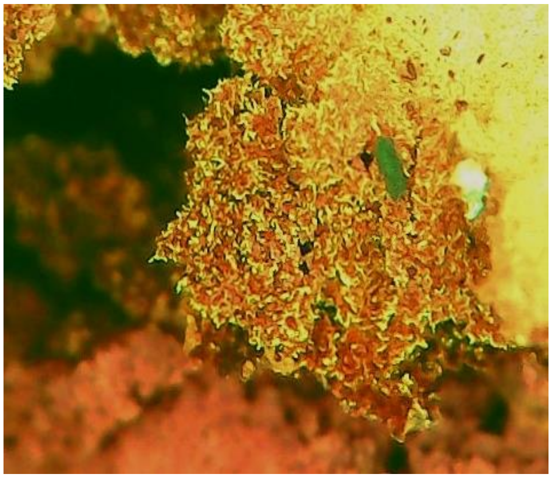


Beraunite, green. NWP, PSS. JMH, JMH, JHM 40X

Beraunite, NWP, PSS. DRO, JMH, JMH. 20X

Beraunite, NWP, PSS. Dro, JMH, JMH 20X

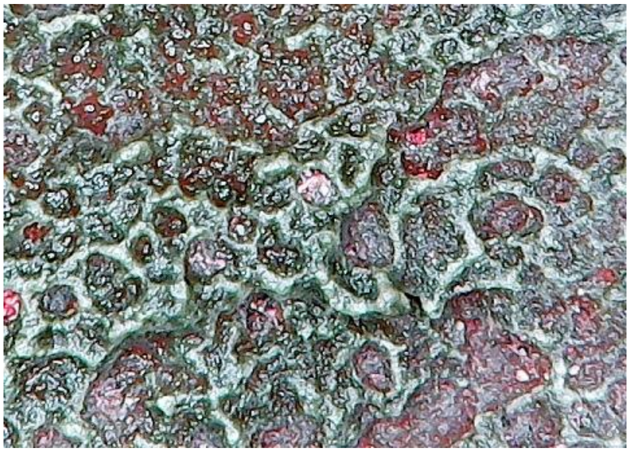
Biotite, rounded crystals, lamprophyre dike, EWP.
JMH, JMH, JMH. 1 to 1.25 inches diameter.



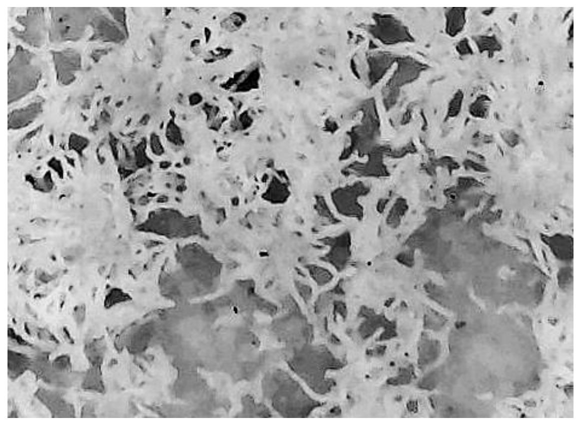
Cacoxenite, NWP, PSS. DRO, JMH JMH 20X

Cacoxenite, NWP, PSS. JMH, JMH, JMH. 30X

Cacoxenite on Straczekite, NWP, PSS. DRO, JMH, JMH. 40X

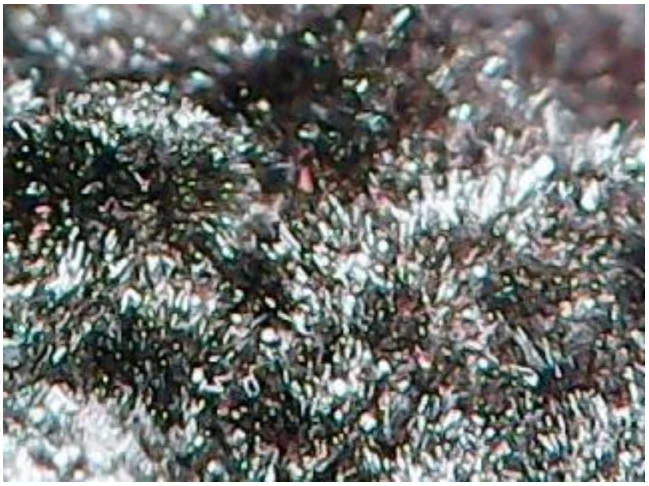


Celadonite (clay) pattern on carnelian, EWP, PSS.
DRO, JMH, JMH. 20X



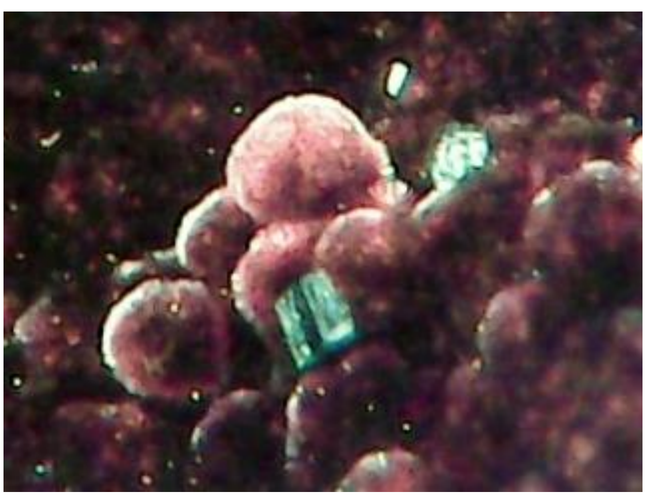
Cristobalite, EWP, PSS. DRO, JMH, JMH
40X

Diopside-hedenbergite, NWP, PSS. JMH, JMH, JMH. 20X

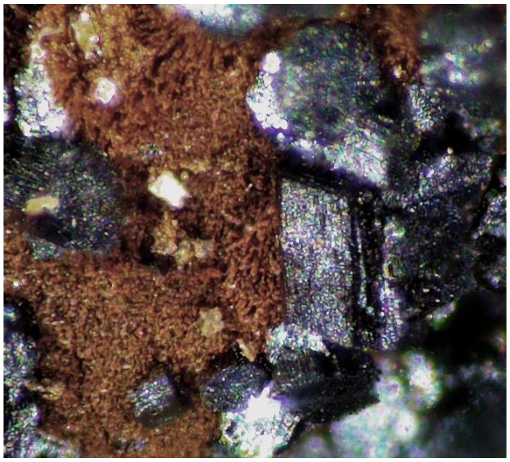


Duttonite on Straczekite, NWP, PSS. JMH, JMH, JMH. 20X

Fervanite, NWP, PSS, DRO DRO SEM 300X



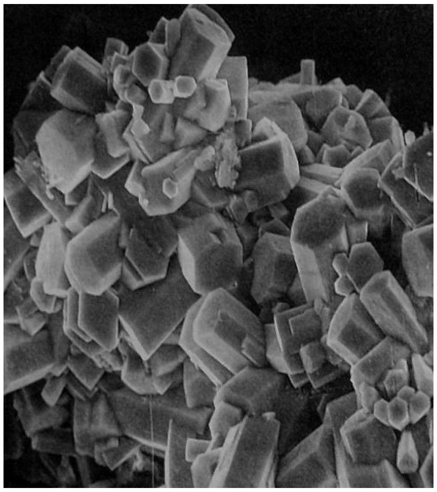
Fervanite on Kazakhstanite, NWP, PSS. DRO, JMH, JMH 20X



Fervanite on altered Kazakhstanite, T-Orebody,
PSS. DRO, JMH, EAO. 30X

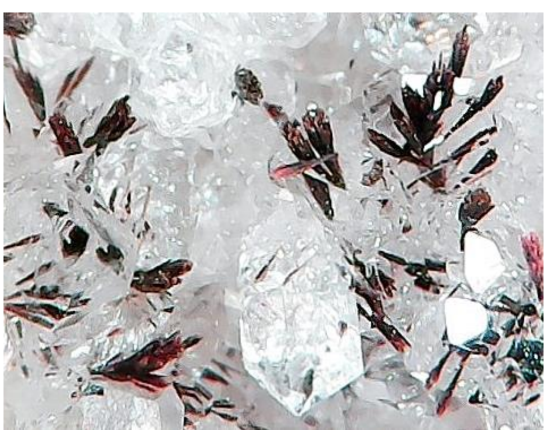
Fervanite on Kazakhstanite, NWP, PSS.
DRO, JMH, JMH. 20X

Fluorapatite, NWP, PSS. DRO, JMH, JMH. 30X

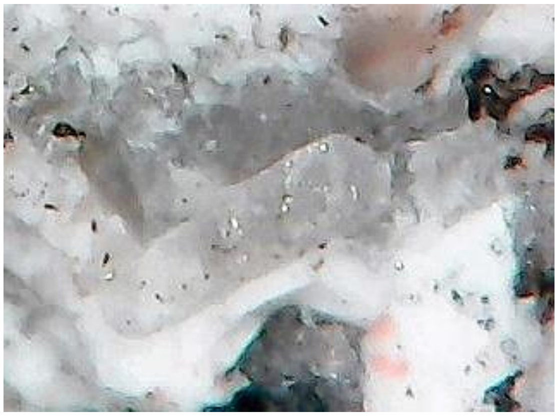


Fluorapatite, NWP, PSS. USGS
SEM 300X

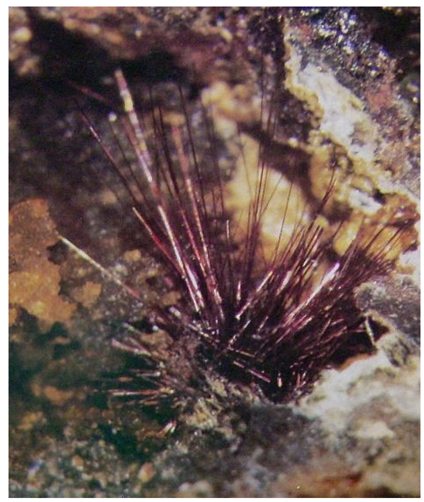
Fluorapophyllite, pinkish crystalline mass on Wollastonite skarn, NWP, PSS. JMH, JMH, JMH. Image is 25% reduction.



Goethite in and on Quartz, EWP, PSS. DRO, JMH, JMH. 20X



Gypsum, var. selenite, NWP, PSS. JMH, JMH, JMH 20X



Hewettite, T-O, PSS. DRO, JZ, JMH.
7 mm fibers

Kazakhstanite, miniature, NWP, PSS. JMH, JMH, JMH.

Kazakhstanite, NWP, PSS. JMH, JMH, JMH, 20X

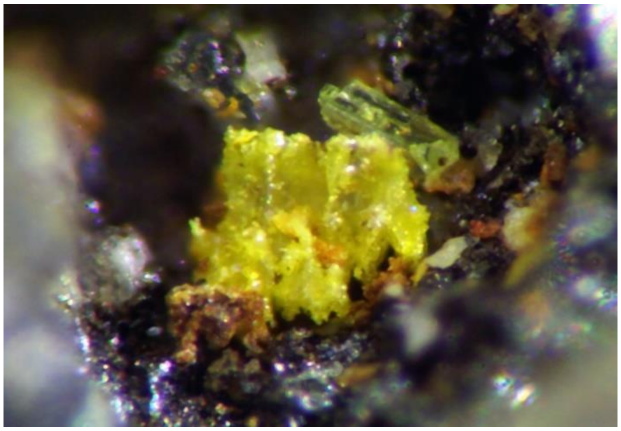
Kingite coated by opal, NWP, PSS. DRO JMH JMH, 20X

Magnetite, residual. PSS JMH, JMH, JMH 0.75 inch

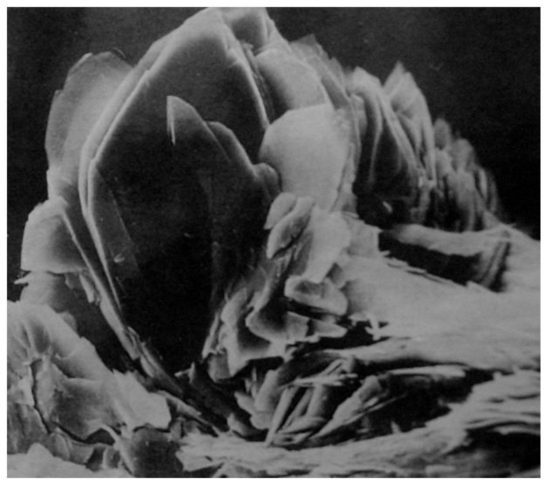
Malhmoodite on Kolbeckite, NWP, PSS. CM 500X

Malhmoodite on Diopside-Hedenbergite, NWP, PSS. JMH, JMH, JMH. 20

Metaschoderite, NWP, PSS. DRO, JMH, EAO. 0.8 mm.



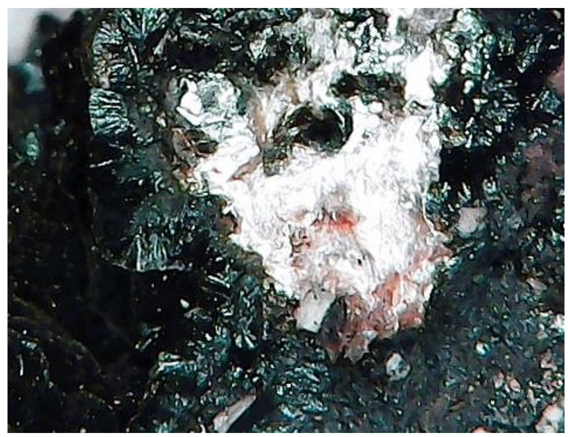
Metatyuyamunite with Kolbeckite, NWP, PSS.
DRO, JMH, EAO. 0.2 mm across.



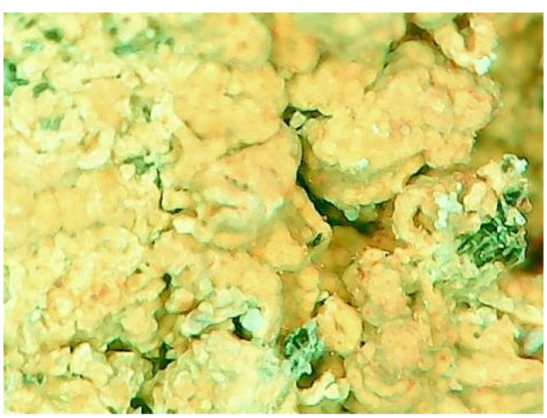
Metatyuyamunite, NWP, PSS. DRO DRO
USGS SEM 600X

Miserite with wollastonite, NWP, PSS. JMH, JMH, JMH 3 in. across

Miserite wollastonite skarn, NWP, PSS.
JMH, JMH, JMH. 3 in. across slab



Muscovite on fibrous Straczekite, NWP,
PSS. JMH, JMH, JMH. 20X



Nontronite, PSS. DRO, JMH, JMH. 20X

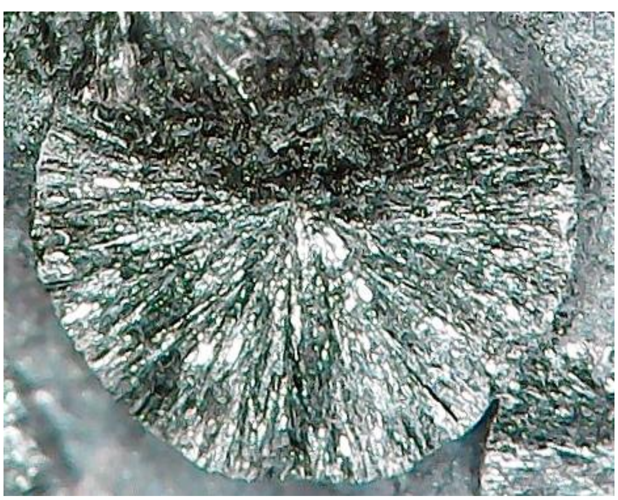
Opal, common, EWP, PSS. JMH, JMH, JMH. 4 in. across.

Orthoclase with pyrite, EWP, PSS. JMH, JMH, JMH. ~10X

Orthoclase, EWP, PSS. JMH, JMH, JMH. ~10X

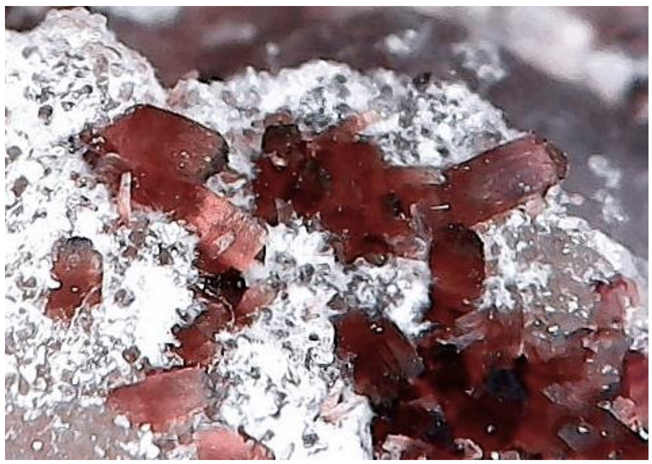
Pyrite, spherical, T-O, PSS. DRO, JMH,
JMH. ~10X

Agate, EWP, PSS. DRO, DRO, JMH. 0.75 in wide



Rockbridgeite, EWP, DRO, JMH, JMH. 2 mm dia.

Siderite, NWP, PSS. JMH. JMH. JMH. 20X

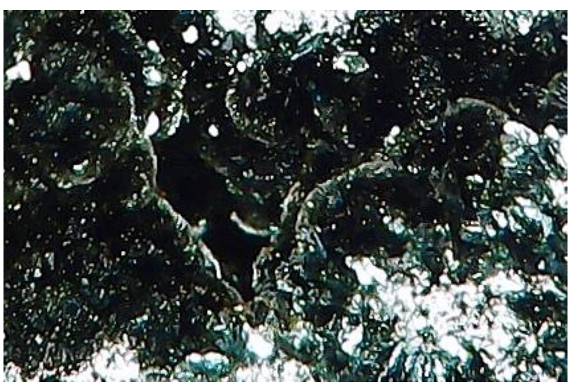


Siderite, EWP, PSS. DRO, JMH, JMH. 20X

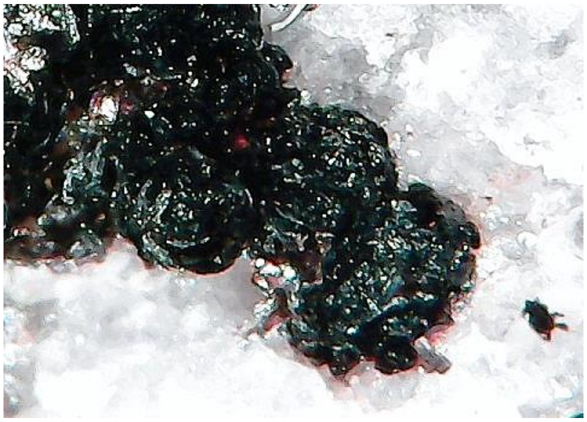
Sincosite on quartz, T-O, PSS. DRO, JMH, JMH. 30X

Sincosite on Straczekite, T-O, PSS.
DRO, JMH, TB 0.5 mm

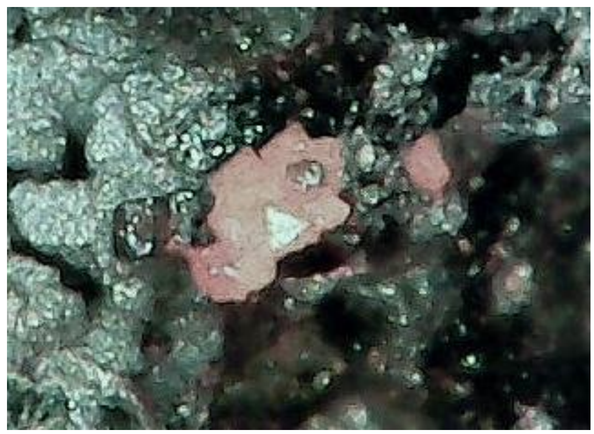
Sincosite, T-O, PSS. DRO, JMH, JMH. 20X



Straczekite, spherical fibrous habit, NWP, PSS. DRO, JMH, JMH. 20X



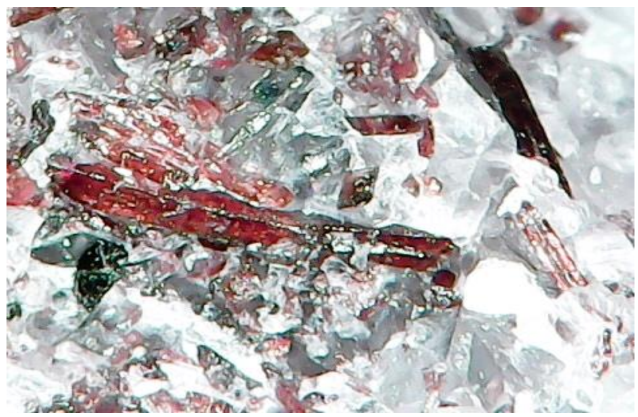
Straczekite, spherical masses of plates, NWP, PSS. DRO, JMH, JMH. 20X

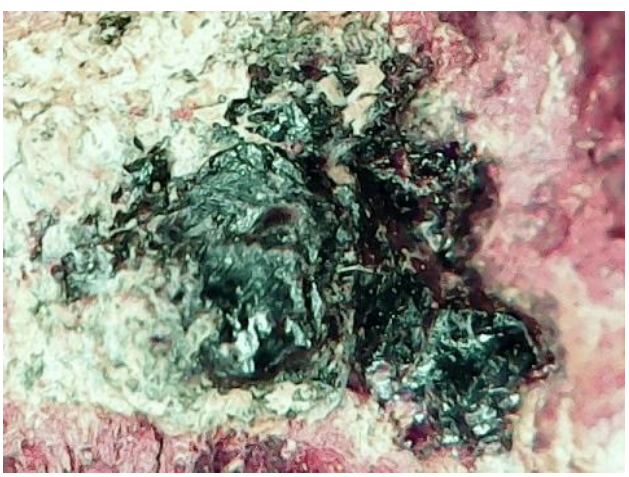


Strontiopyrochlore, NWP, PSS. JMH, JMH, JMH. 30X

Titanite, NWP, PSS. DRO, JMH, JMH. 20X


Titanite, NWP, PSS. DRO, JMH, JMH. 20X

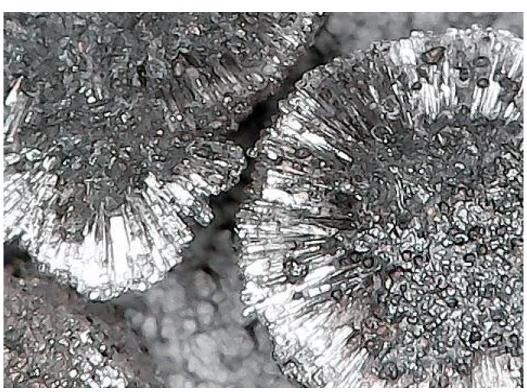

Titanite, NWP, PSS. JMH, JMH, JMH. 20X



Vanadian andradite, anhedral, NWP, PSS. JMH, JMH, JMH. 20X

Vivianite, NWP, PSS. DRO, JMH, JMH.
Stellate group is 3 in. across.

Wavellite on MnOx, NWP, PSS.
DRO, JMH, JMH. 20X



Wavellite on MnOx, NWP, PSS. DRO, JMH, JMH. 20X