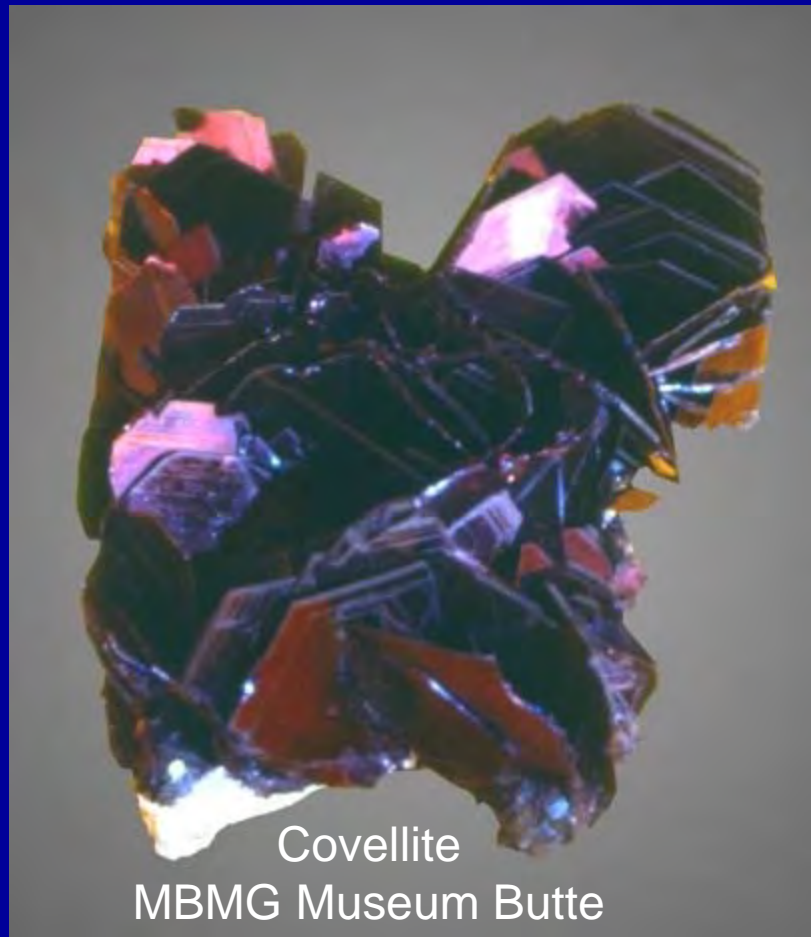


# Mineralogy of Southwest Montana

By Michael J. Gobla

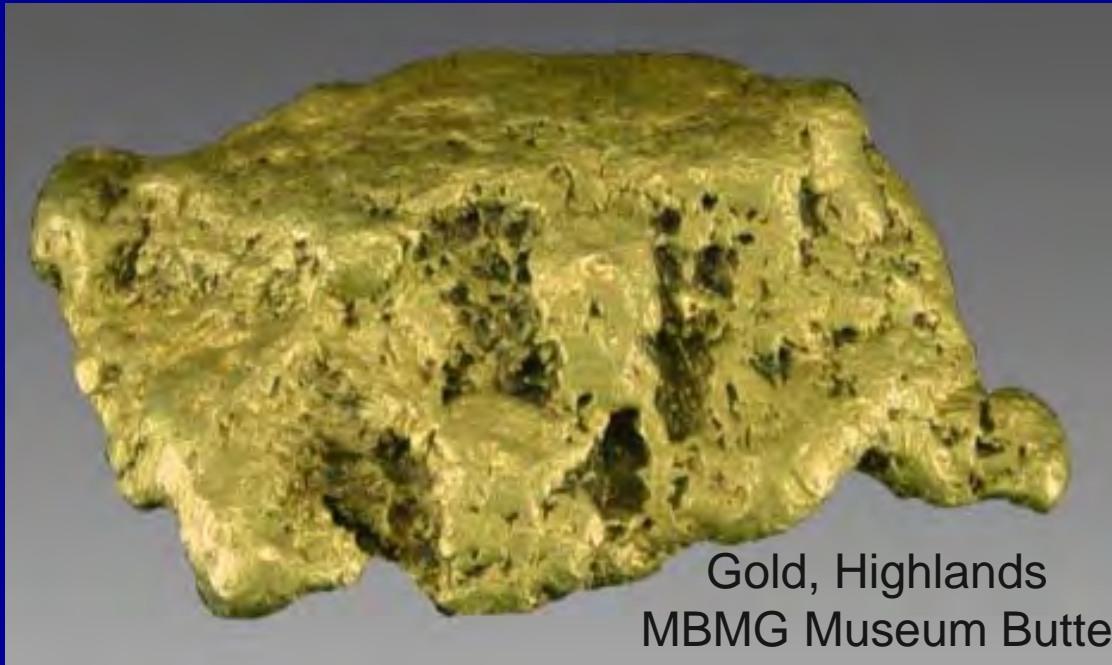


Covellite  
MBMG Museum Butte

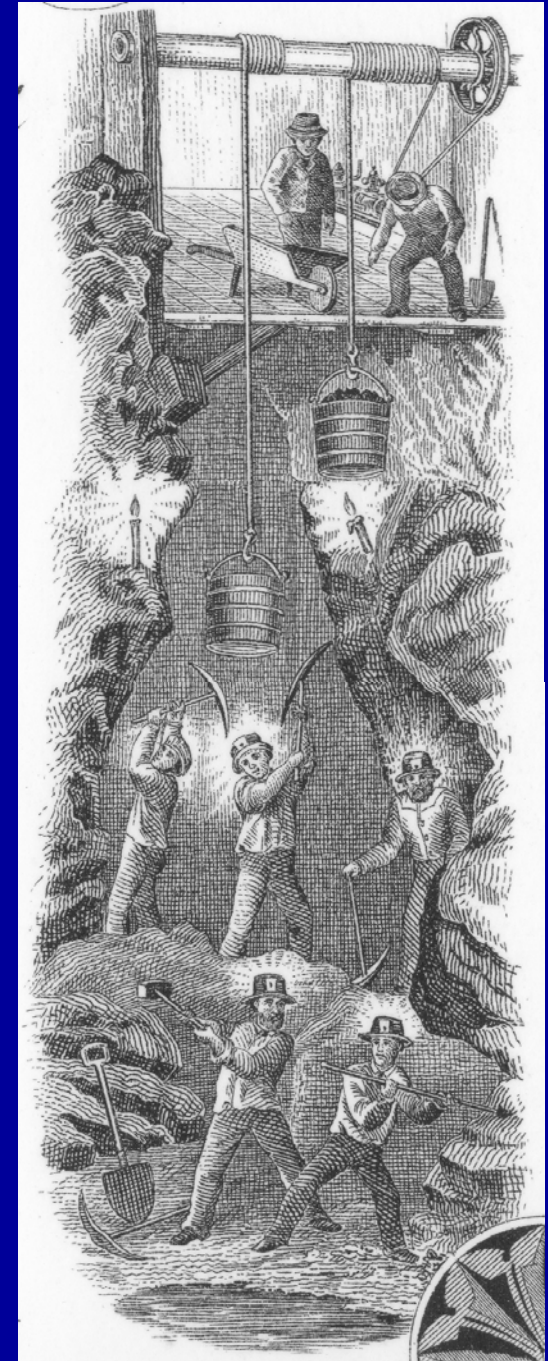


# Presentation Outline

- Montana Geologic Provinces
- World Class Mineral Localities
- Collecting in the Pioneer Mountains



Gold, Highlands  
MBMG Museum Butte



# Gemstones

- Two official State Gemstones
- Montana Agate
- Sapphire



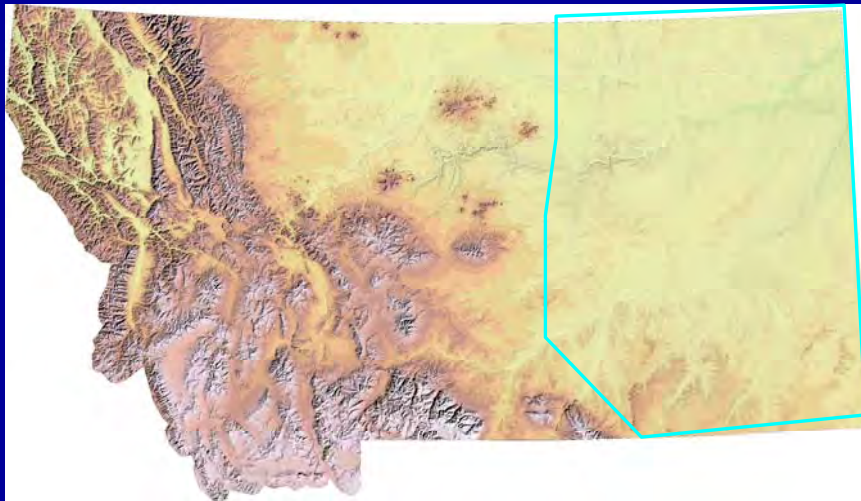
Corundum  
Rock Creek



Montana Agate

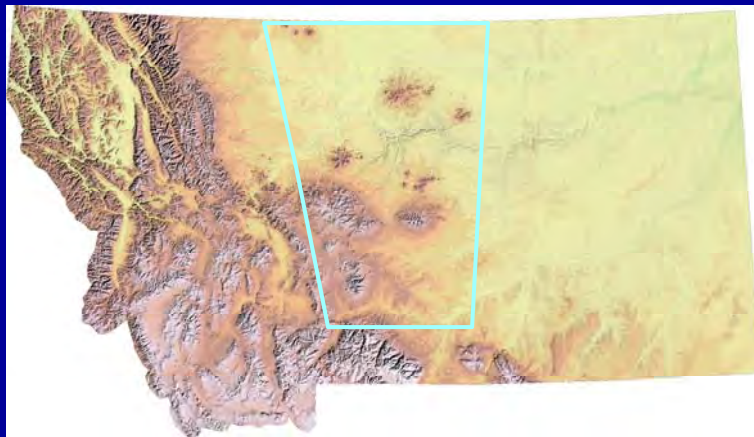
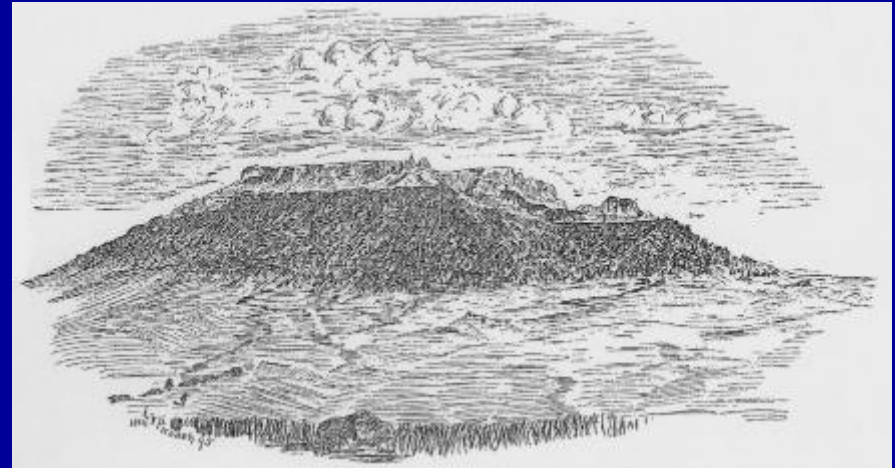
# The Great Plains – Sedimentary Rocks

Calcite, Barite, Gypsum,  
Montmorillonite, Quartz

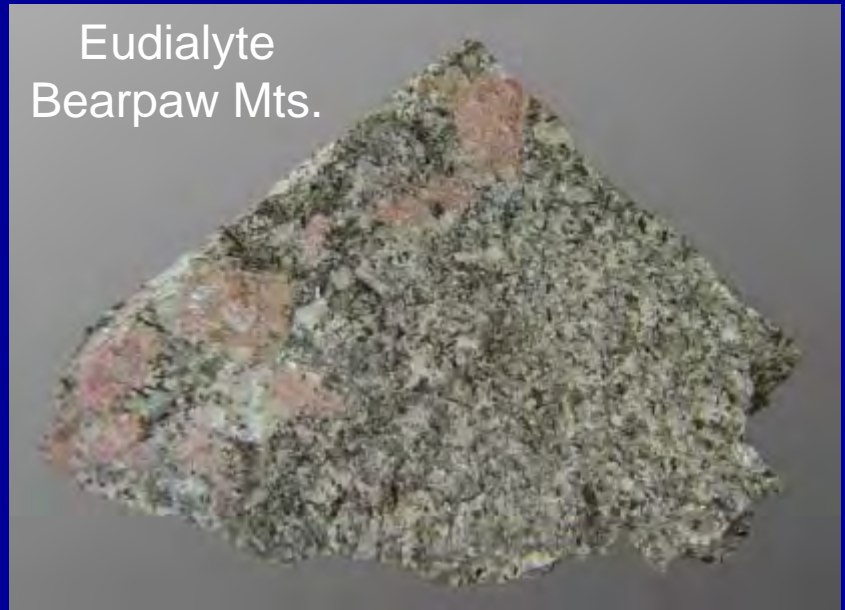


# The Alkalic Province -Sediments Penetrated by Alkaline Intrusive Rocks

- Aegirine, Augite, Biotite, Burbankite, Davanite, Eudialyte, Gold, Hauyne, Barytolamprophyllite, Nepheline, Olivine, Orthoclase, Phologopite, Sanadine, Wadeite



Eudialyte  
Bearpaw Mts.



# The Absorka Province - Precambrian Metamorphics, Intrusive, and Volcanic Rocks

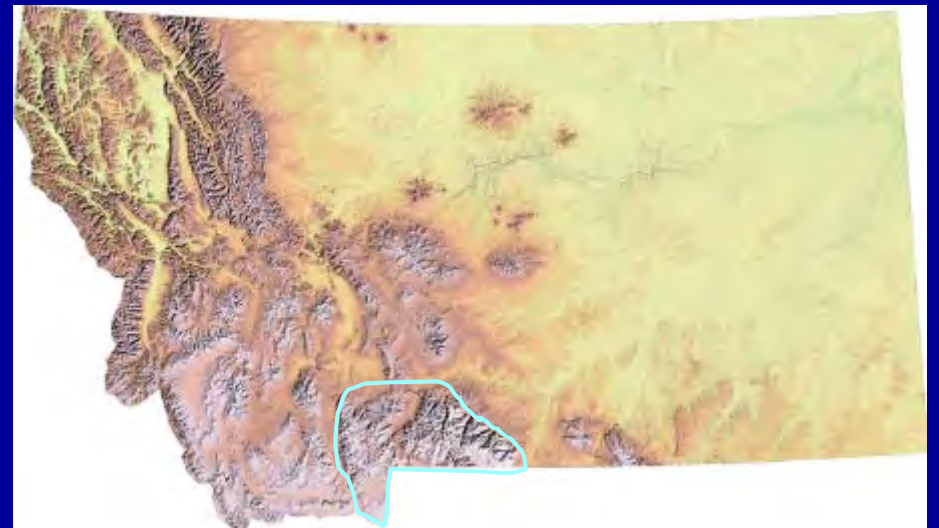
Calcite, Chromite,  
Enstatite, Gold,  
Opal-Hyalite,  
Petrified Wood  
Platinum minerals



Calcite  
Red Cliff  
Gallatin River

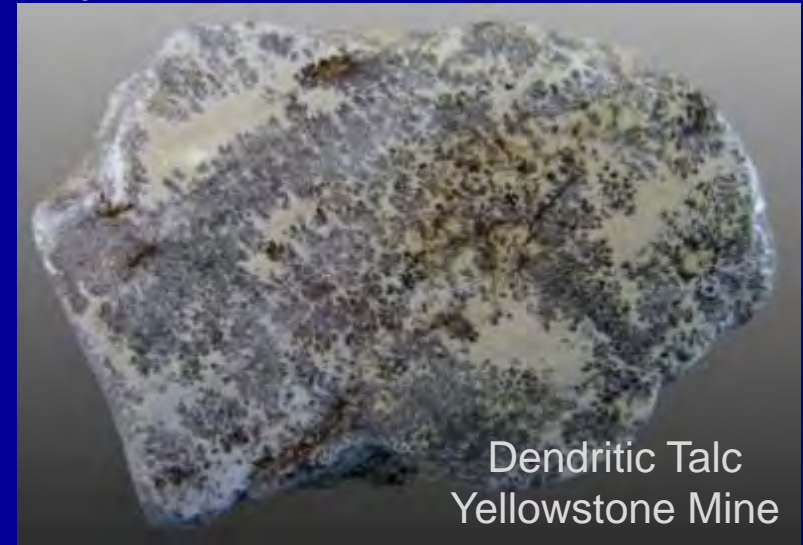


Quartz  
replacing wood



# Wyoming Archean Province - Precambrian Metamorphic and Tertiary Intrusive Rocks

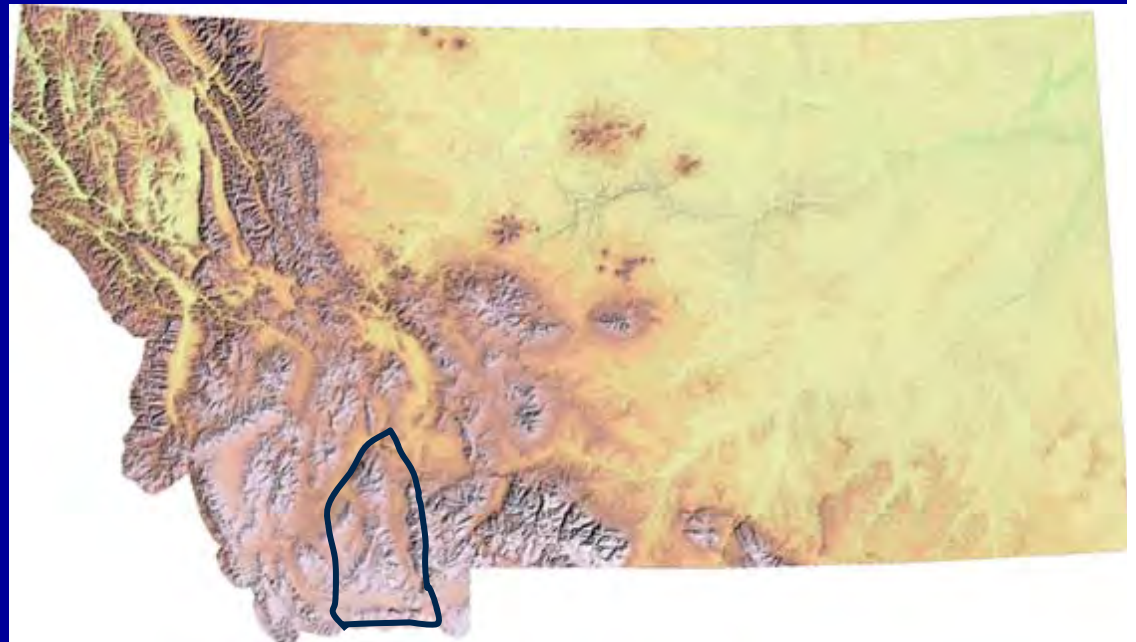
- Metamorphic Rocks – Almandine, Anthophyllite, Corundum, Kyanite, Talc
- Tertiary Intrusives – Gold
- Pegmatites – Biotite, Schorl, Microcline, Muscovite, Rose Quartz



Dendritic Talc  
Yellowstone Mine

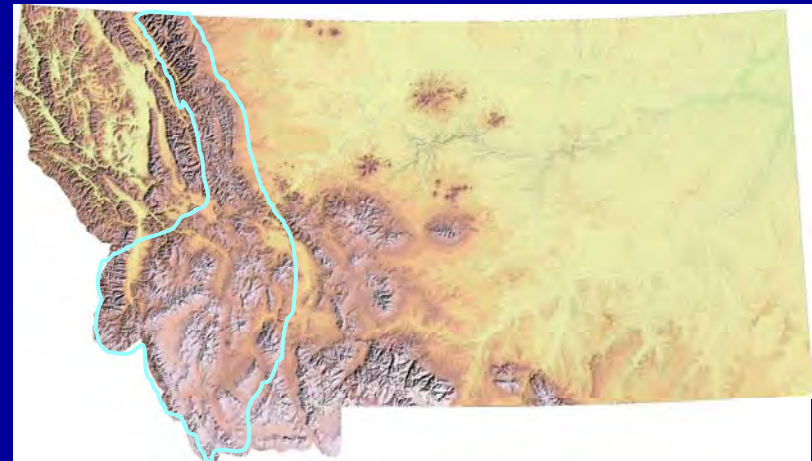


Corundum  
Elk Creek Mine



# The Rocky Mountains – Many Rock Types

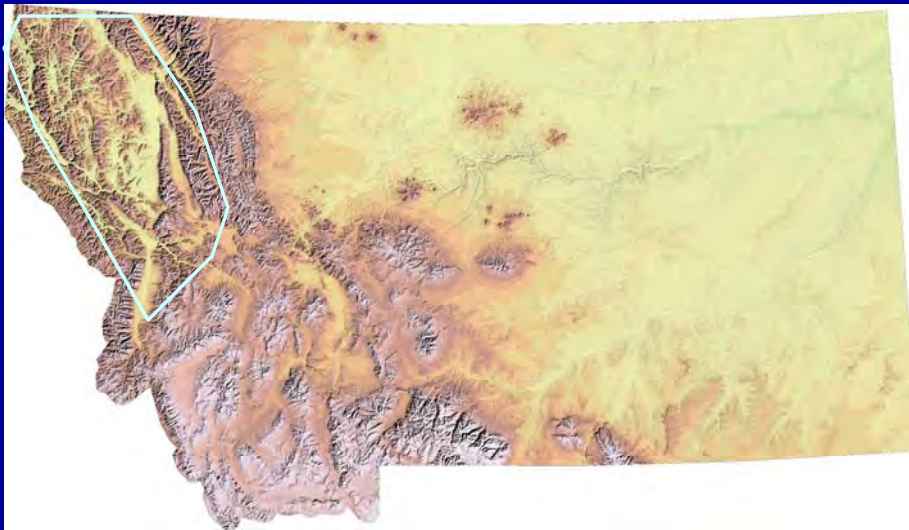
- Pegmatites – Quartz, Schorl, Microcline, Albite, Titanite, Epidote, Allanite
- Skarns – Epidote, Magnetite, Scheelite, Grossular, Spinel
- Tertiary Intrusives – Gold, Silver, Chalcocite, Galena, Hemimorphite, Pyrite, Rhodochrosite, Wulfenite





# The Belt Basin – Metasediments and Intrusive Rocks

- Bornite, Boulangerite, Chalcopyrite, Galena, Goethite, Gold, Pyrite, Silver, Vermiculite



Pyrite  
Troy Mine



Boulangerite  
Iron Mountain Mine

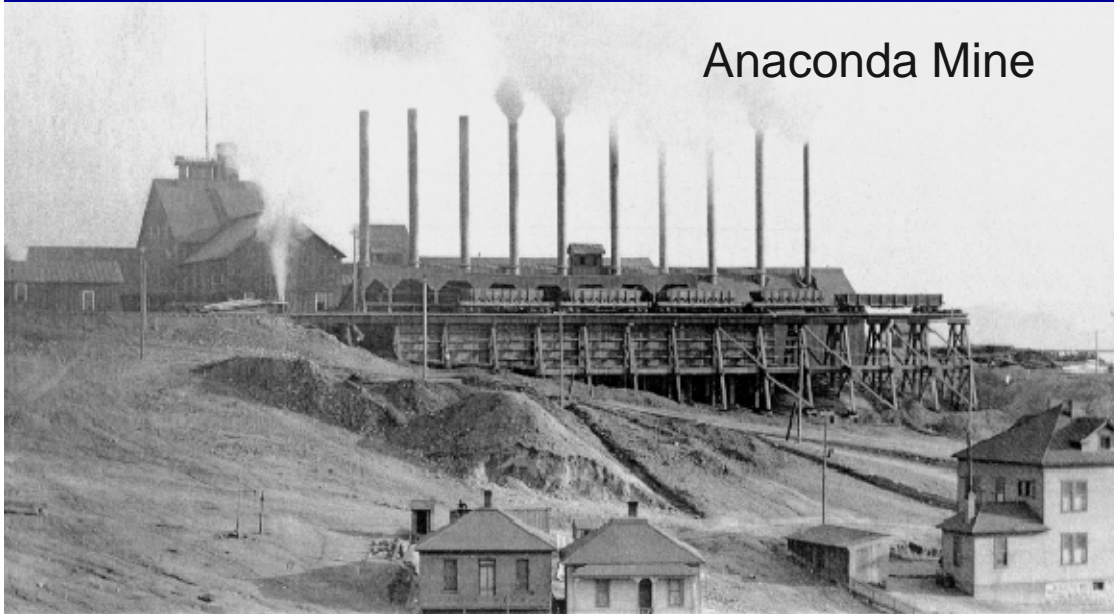


# World Class Localities

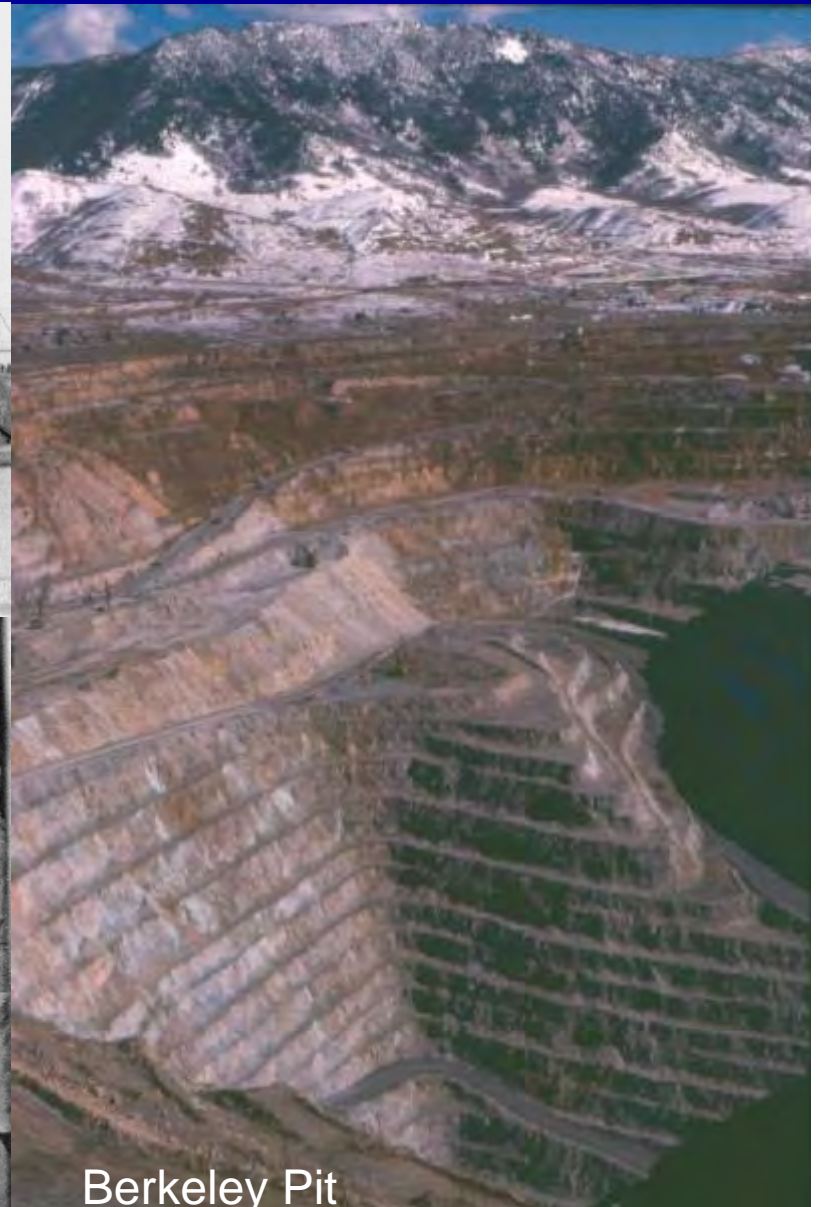
- Butte Ore Deposit - 146 species – 2 new minerals
- Black Pine Mine – 72 species – 3 new minerals
- Stillwater Complex – 68 species – 5 new minerals
- Boulder Batholith Pegmatites – 34 species
- Also Elkhorn Mine, Radersberg District, Philipsburg District



# Butte – The Richest Hill on Earth



Anaconda Mine



Parrot Mine

Berkeley Pit

# Butte - Alice Mine

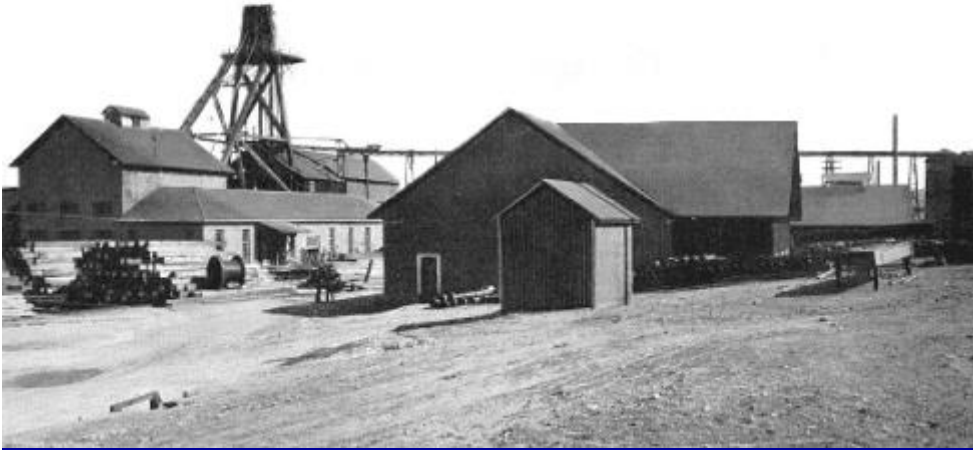


Gold MBMR Museum Butte



Silver

# Leonard Mine - Butte



Covellite



Chalcocite



Enargite

# Boston and Montana Company

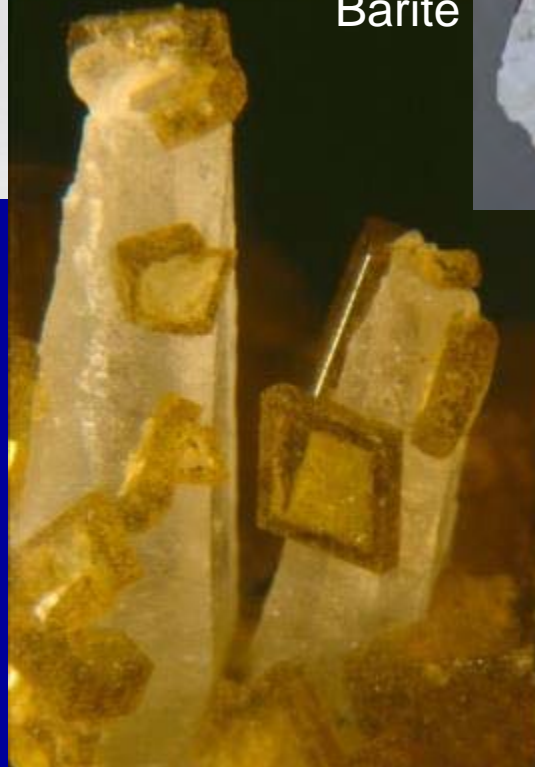


Leonard Lewishon

Digenite



Barite



Bornite after Digenite

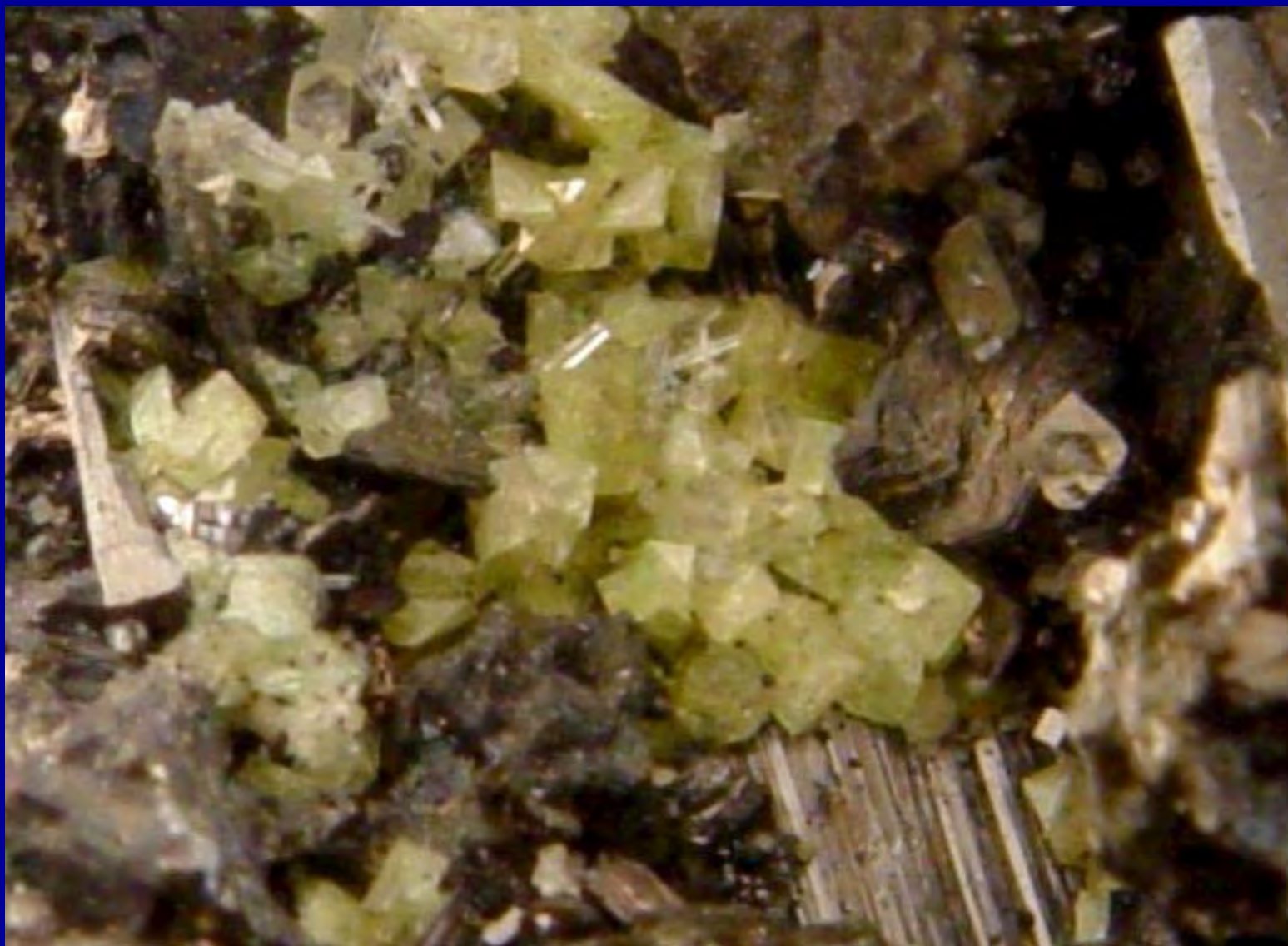


Luzonite on Covellite  
Leonard Mine, Butte



Hinsdalite on Enargite

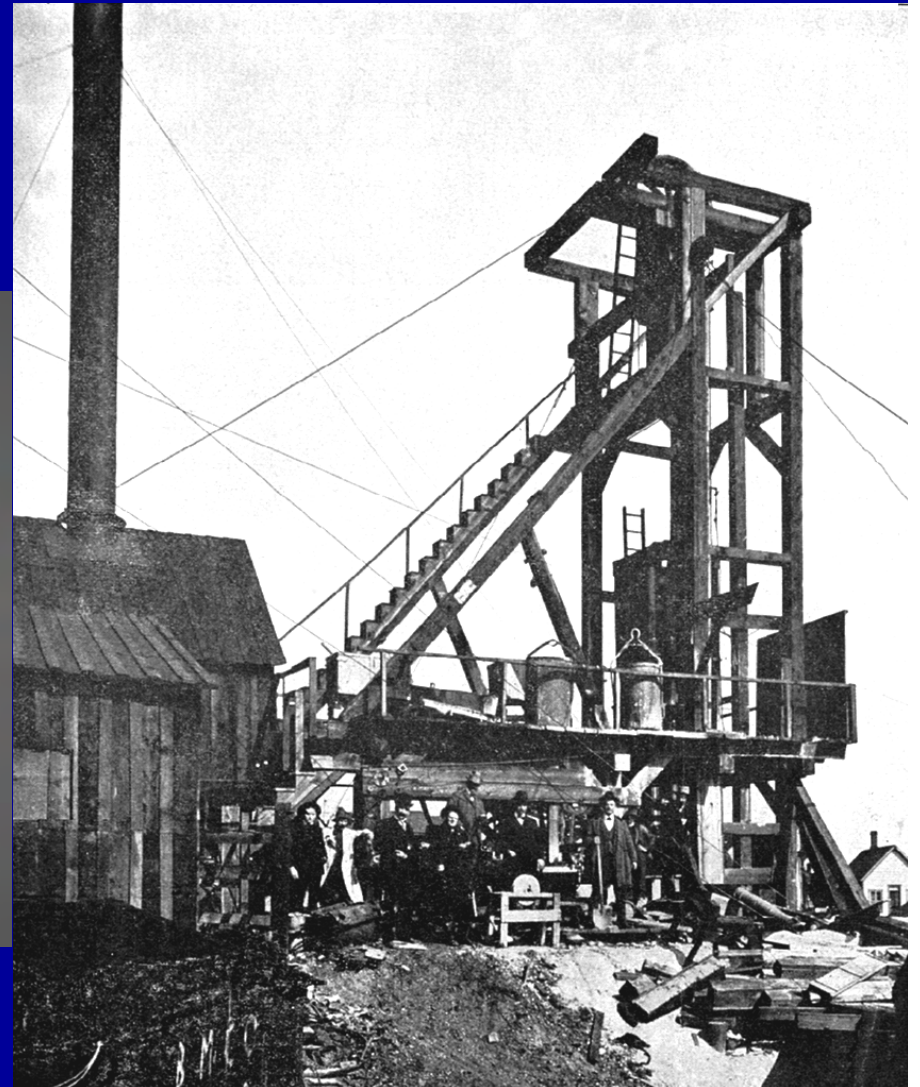
Leonard Mine, Butte

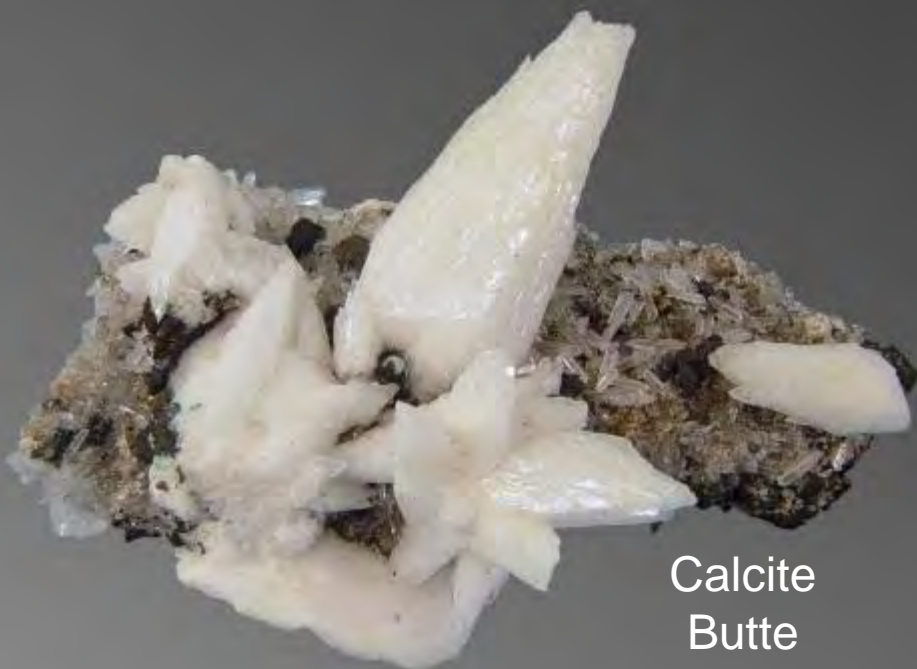




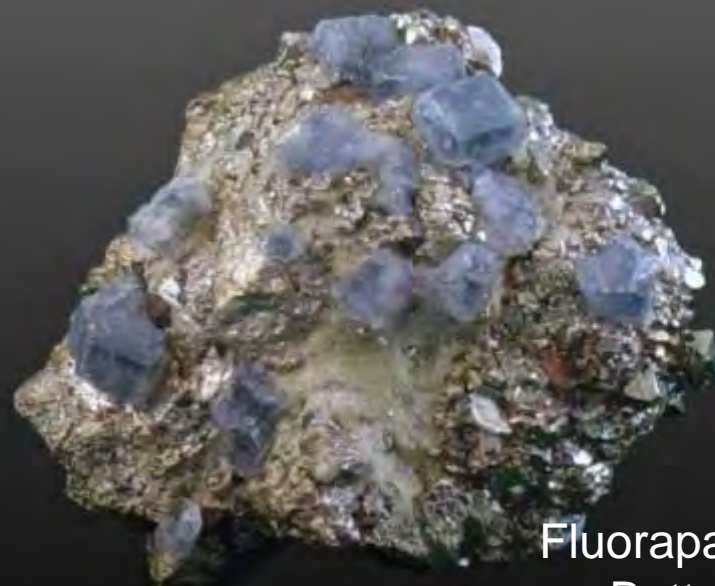
# Emma Mine - Butte

Rhodochrosite





Calcite  
Butte



Fluorapatite  
Butte



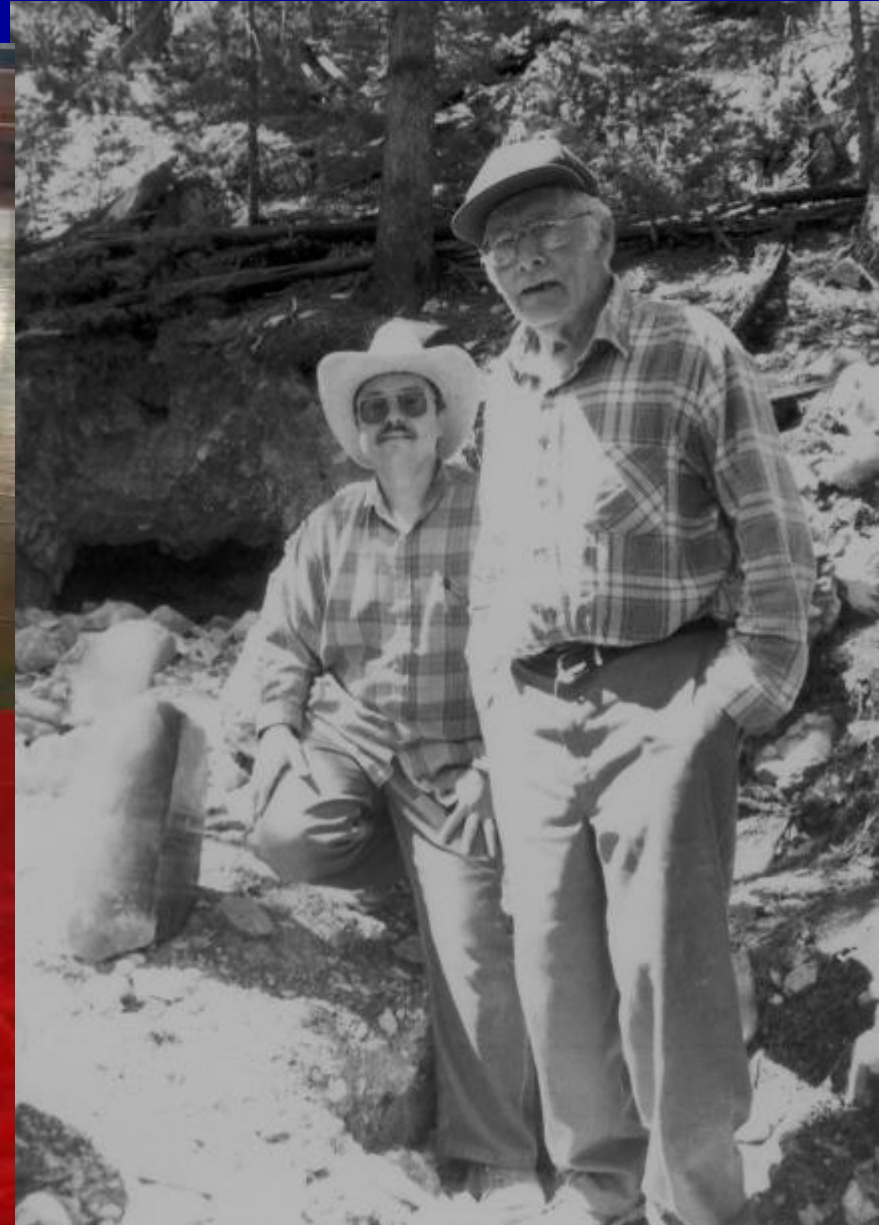
Bornite  
Steward Mine



Barite  
Butte

# Boulder Batholith Pegmatites

Smoky Quartz  
Rheanna Star  
MBMG Museum Butte





### Cristaux de quartz fumé

Prélevés en août 1985 d'une cavité de la partie ouest du Dentschhorn (alt. 3'000 m) au pied du glacier de Tignes, situés au Val d'Sirenon, UI.

Les 53 grands cristaux cristallins ont une masse totale de 101 kg.



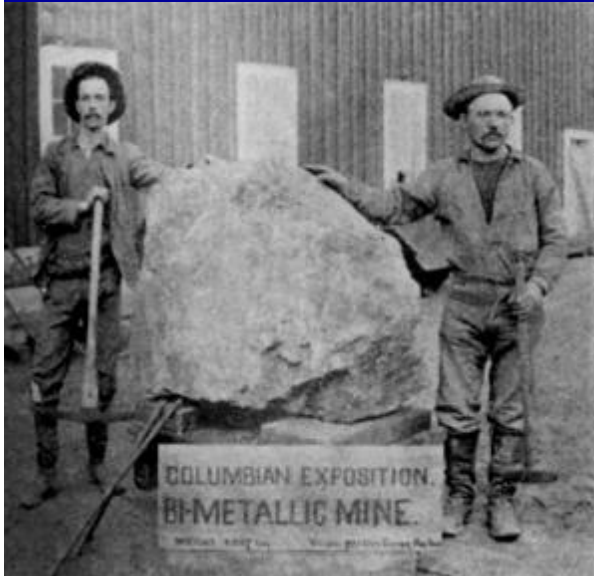
NE PAS TOUCHER S.V.P.



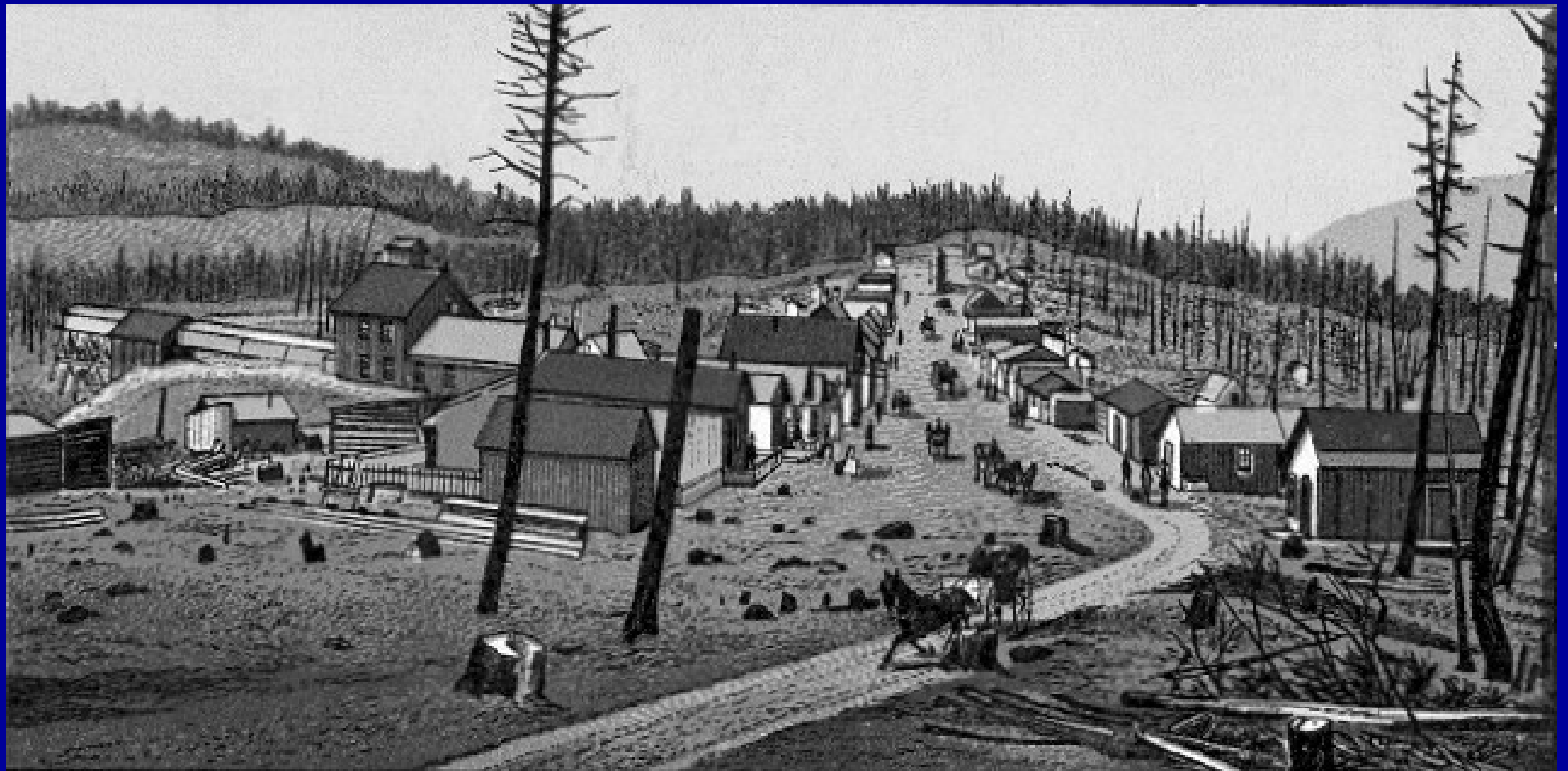




# Philipsburg District

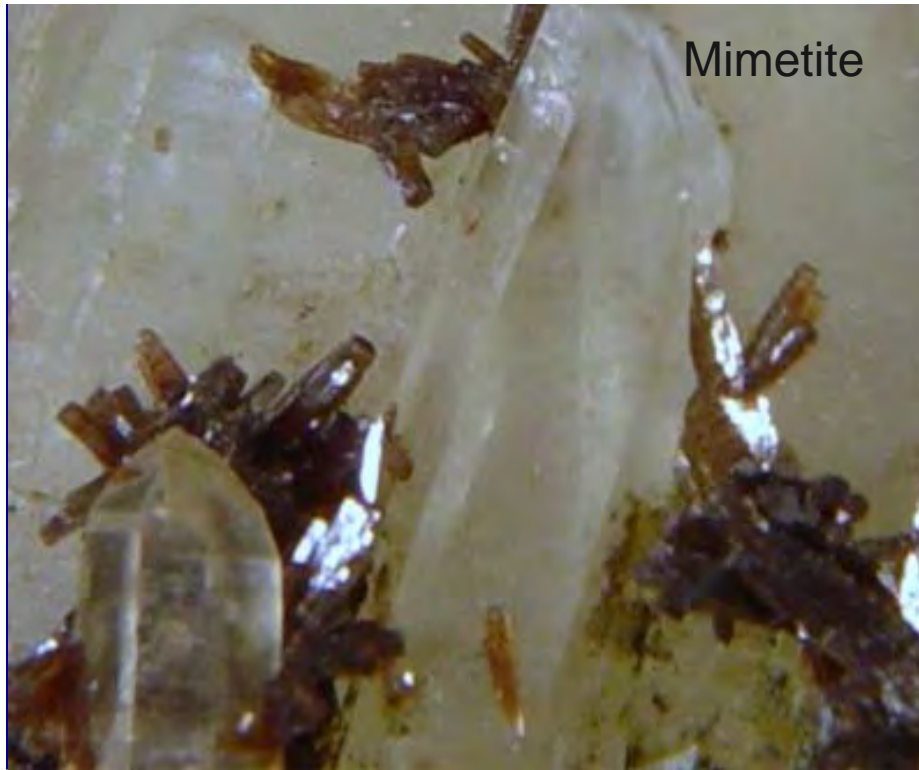


# Black Pine Mine – Granite County









Mimetite



Kipushite



Vesleyite



Tetrahedrite

**Japan-law twin Quartz  
Black Pine Mine**



# Olivenite – Black Pine Mine



Rhodochrosite on Quartz  
Black Pine Mine



Hubnerite and Rhodochrosite on Quartz  
Black Pine Mine



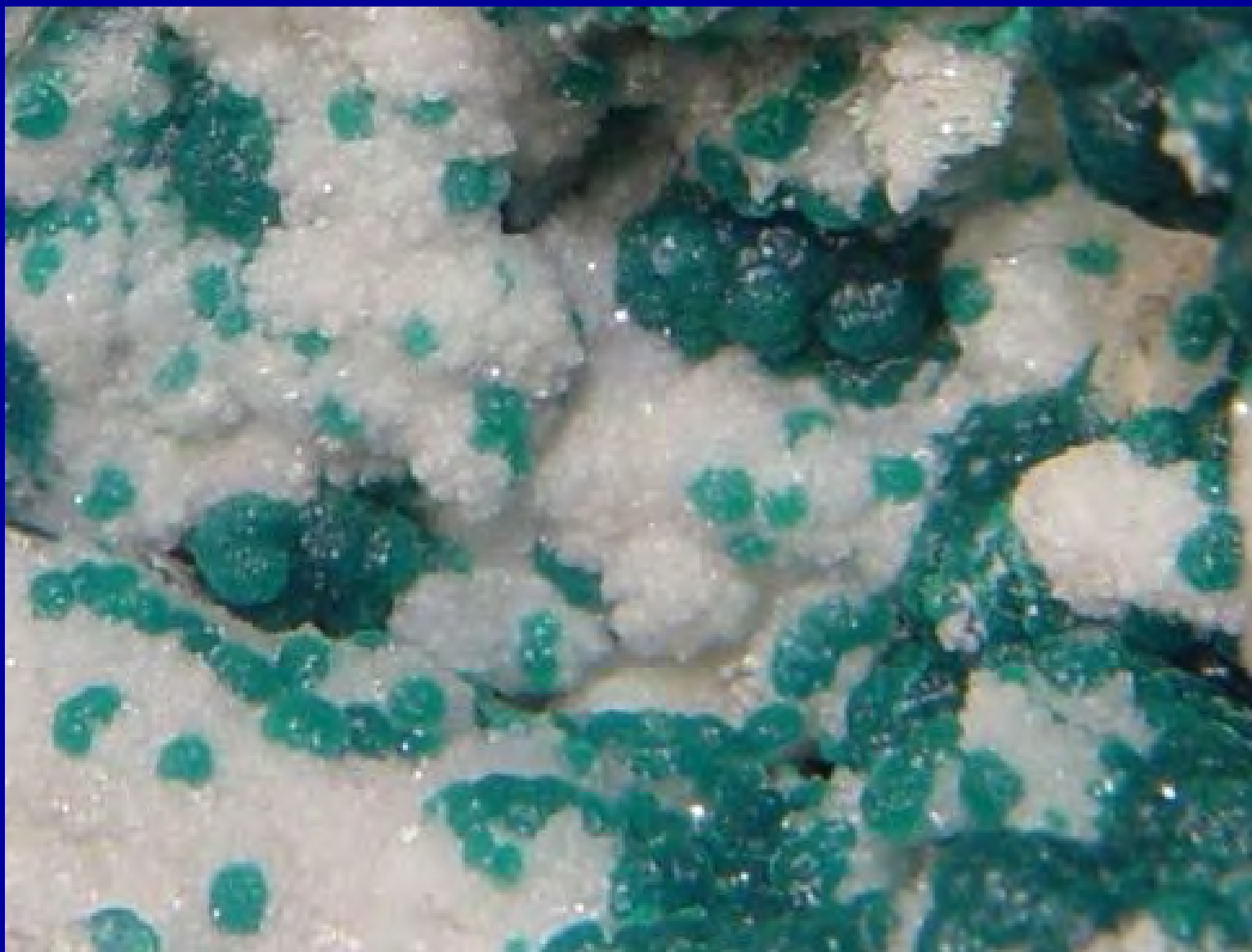
# Radersburg District



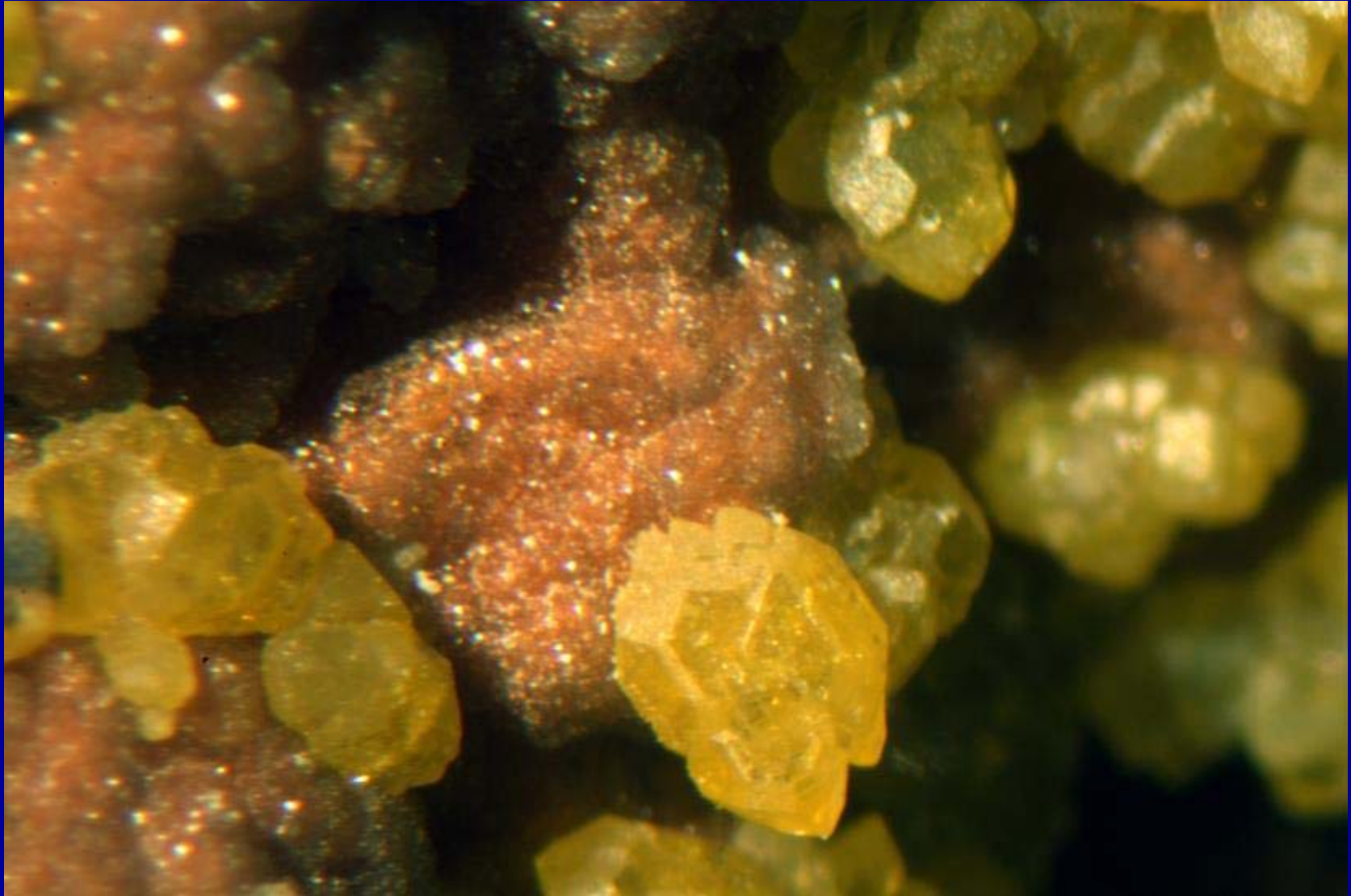




# Rosasite, Summit Mine



# Mimetite, Summit Mine



# Descloizite, Summit Mine



# Vanadinite, Jo Jo Mine



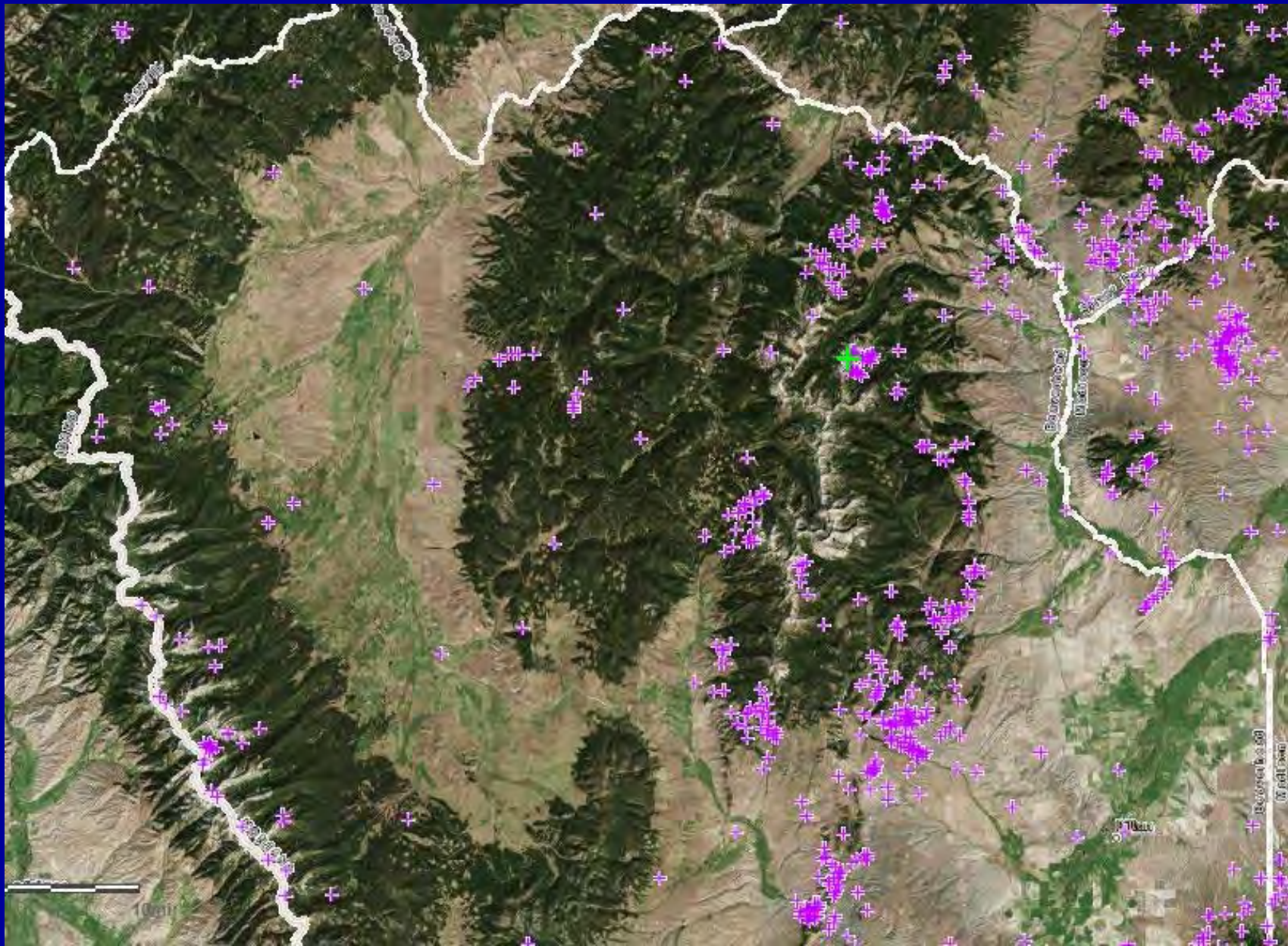
# Wulfenite, James R. Lee Mine



# Wulfenite on Vanadinite, Blackhawk Mine



# Pioneer Mountains



# Crystal Park





# Crystal Park Amethyst



# Quartz Crystals - Crystal Park



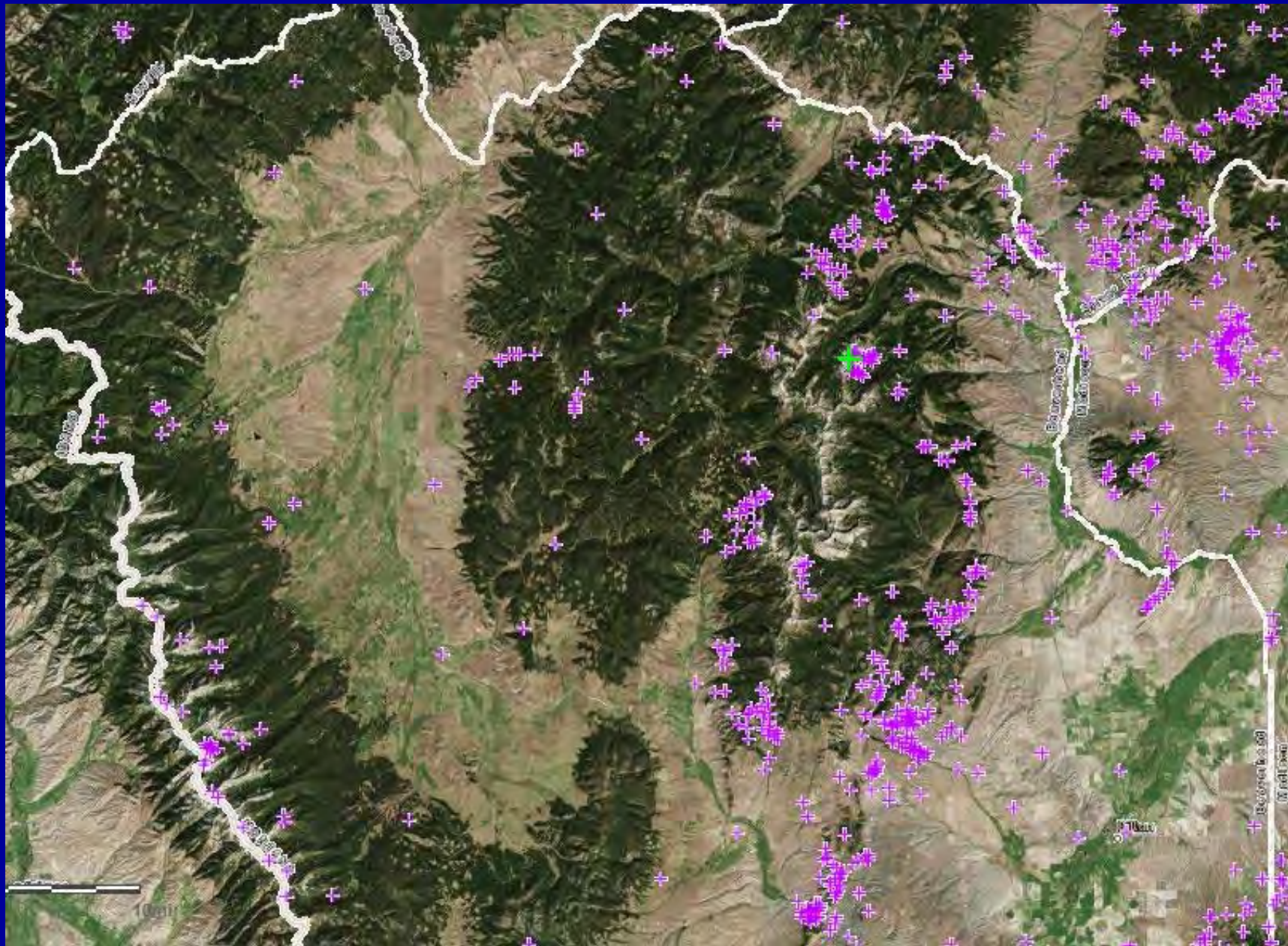
# Gar Mine – Comet Mountain



# Wulfenite, Gar Mine



# Pioneer Mountains



# Calvert Mine – Epidote



# Calvert Mine



Grossular



Epidote  
MBMG Museum Butte

# Ivenhoe Mine – Browns Lake





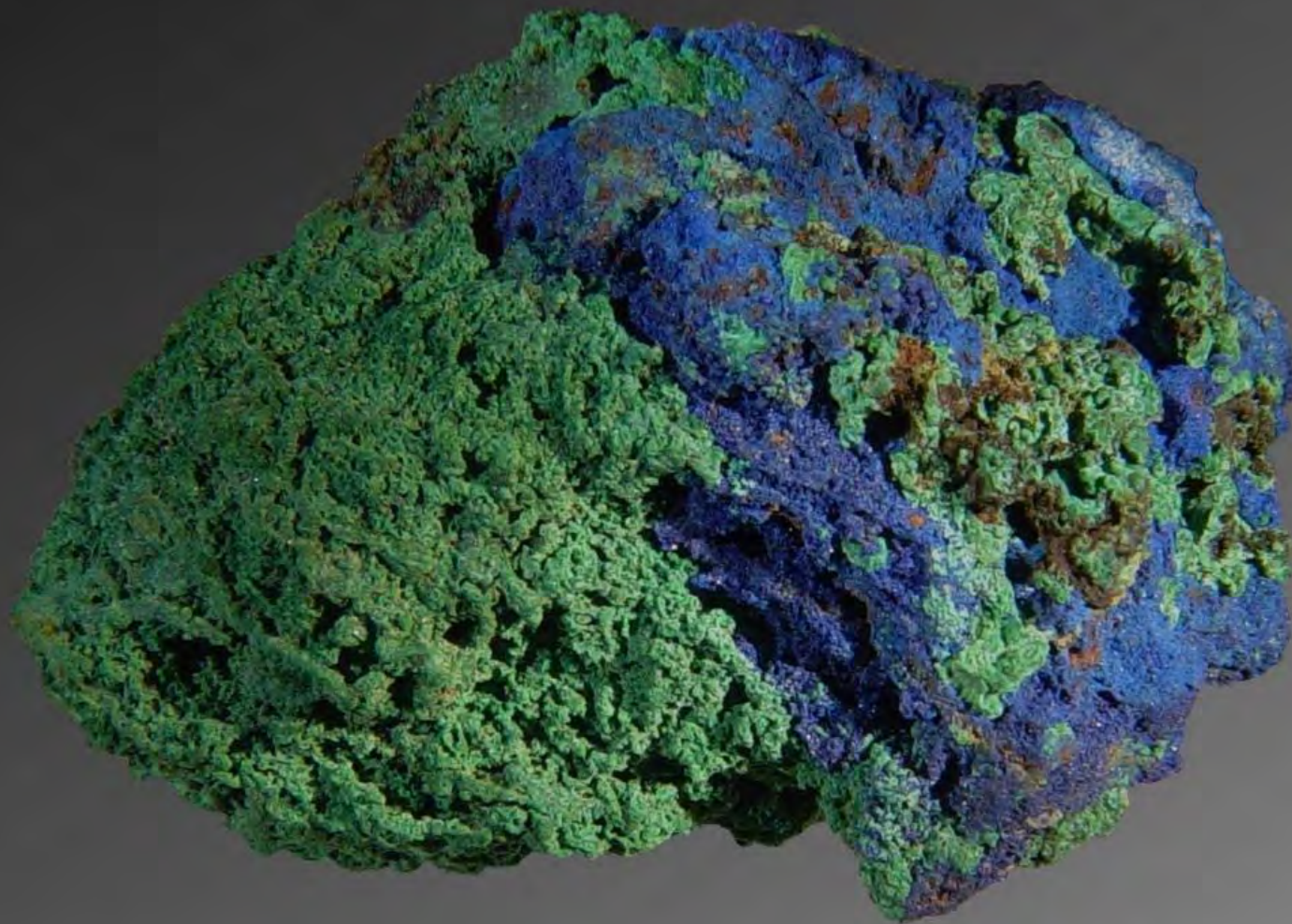
# Hecla Mine – Lion Mountain



# Hecla Mine – Lion Mountain



# Azurite Malachite – Lion Mountain



# Smithsonite – Hecla Mine



# Hemimorphite – Hecla Mine

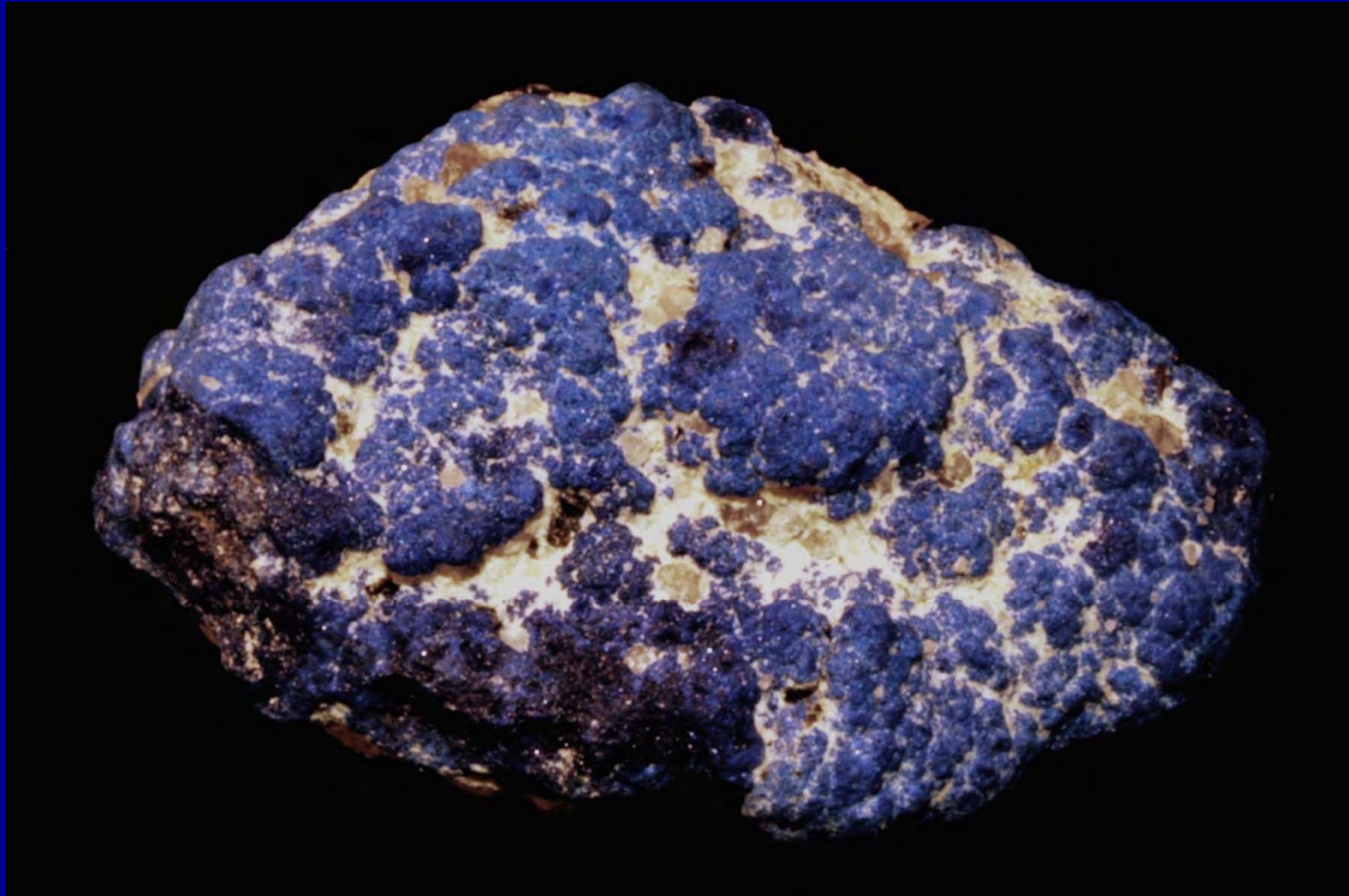


# Indian Queen Mine – Farlin

Farlin Mining Camp, Mt. Torry District



# Azurite – Indian Queen Mine

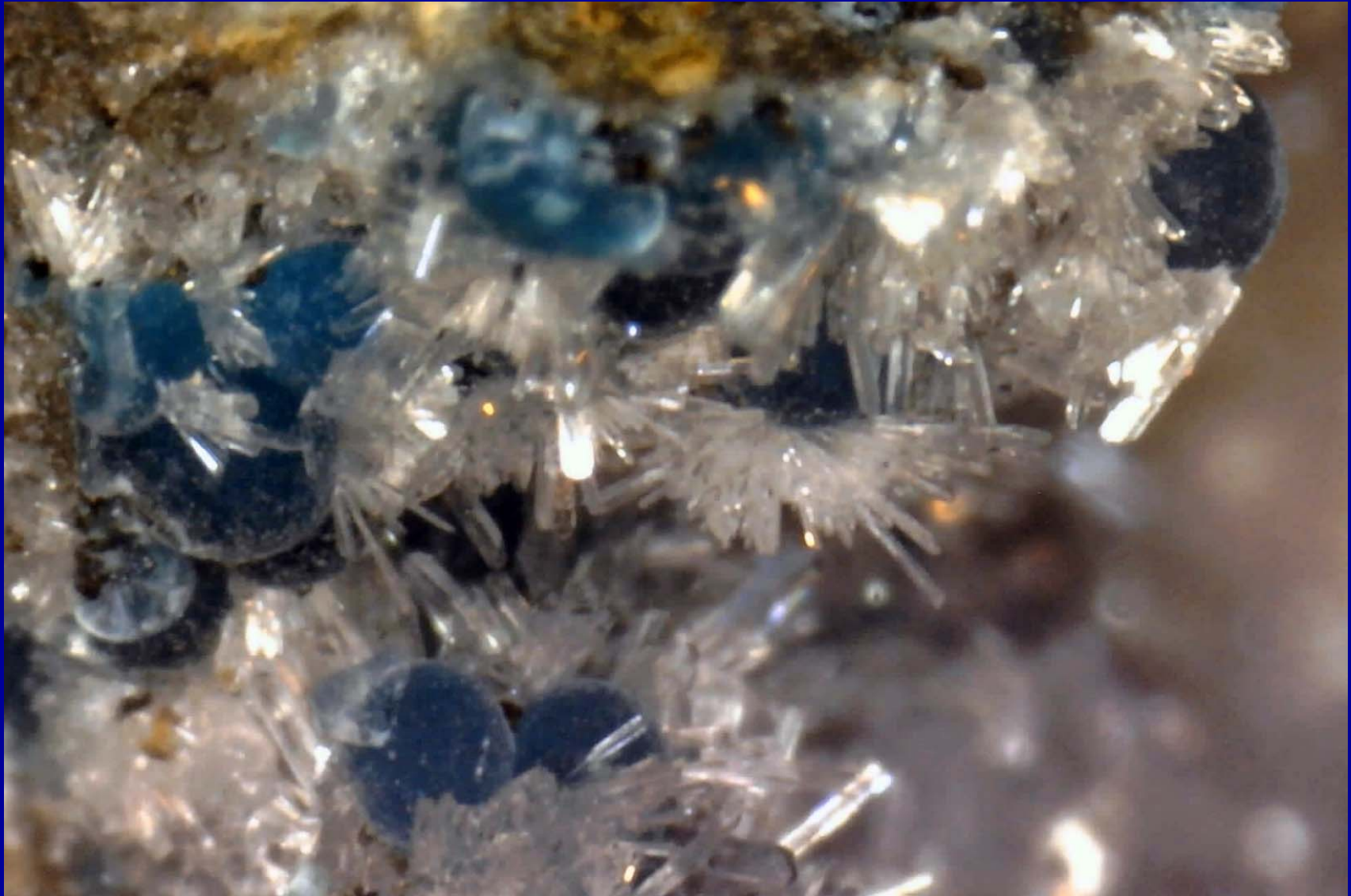


# Iron Mountain Mine, Argentina





# Hemimorphite Rosasite, Argentina

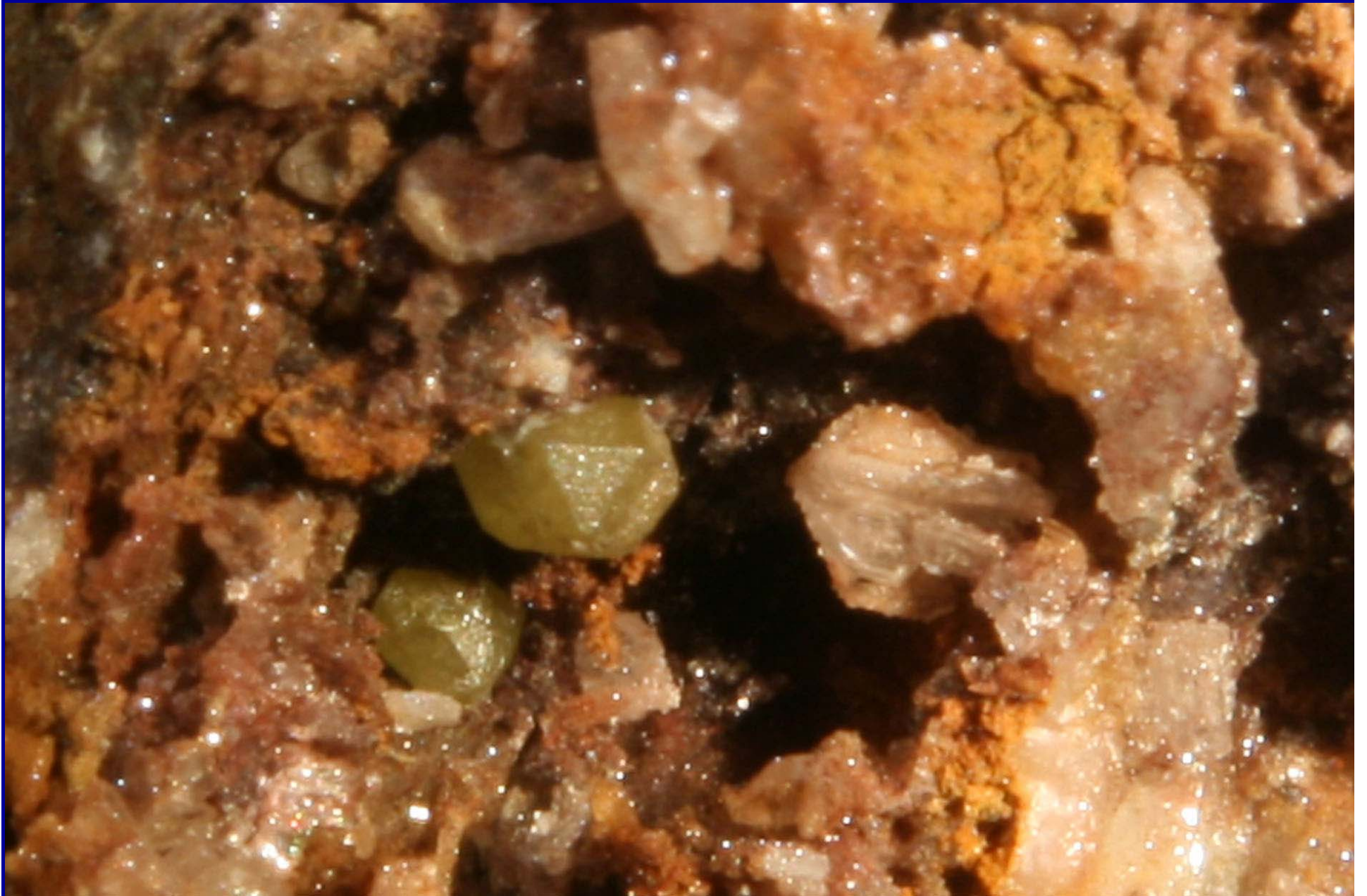


# Ingersoll Mine



# Ingersoll Mine - Chlorargyrite





# Ingersoll Mine



# GPS



# Stacking Technology



**Arthurite**

**Copper Stope, Majuba Hill Mine**

**Pershing County, Nevada**

# Fluorite – Warm Springs Mine





# Montana!

