LONE MOUNTAIN ROCK SAMPLE FROM BIG SKY SKI RESORT

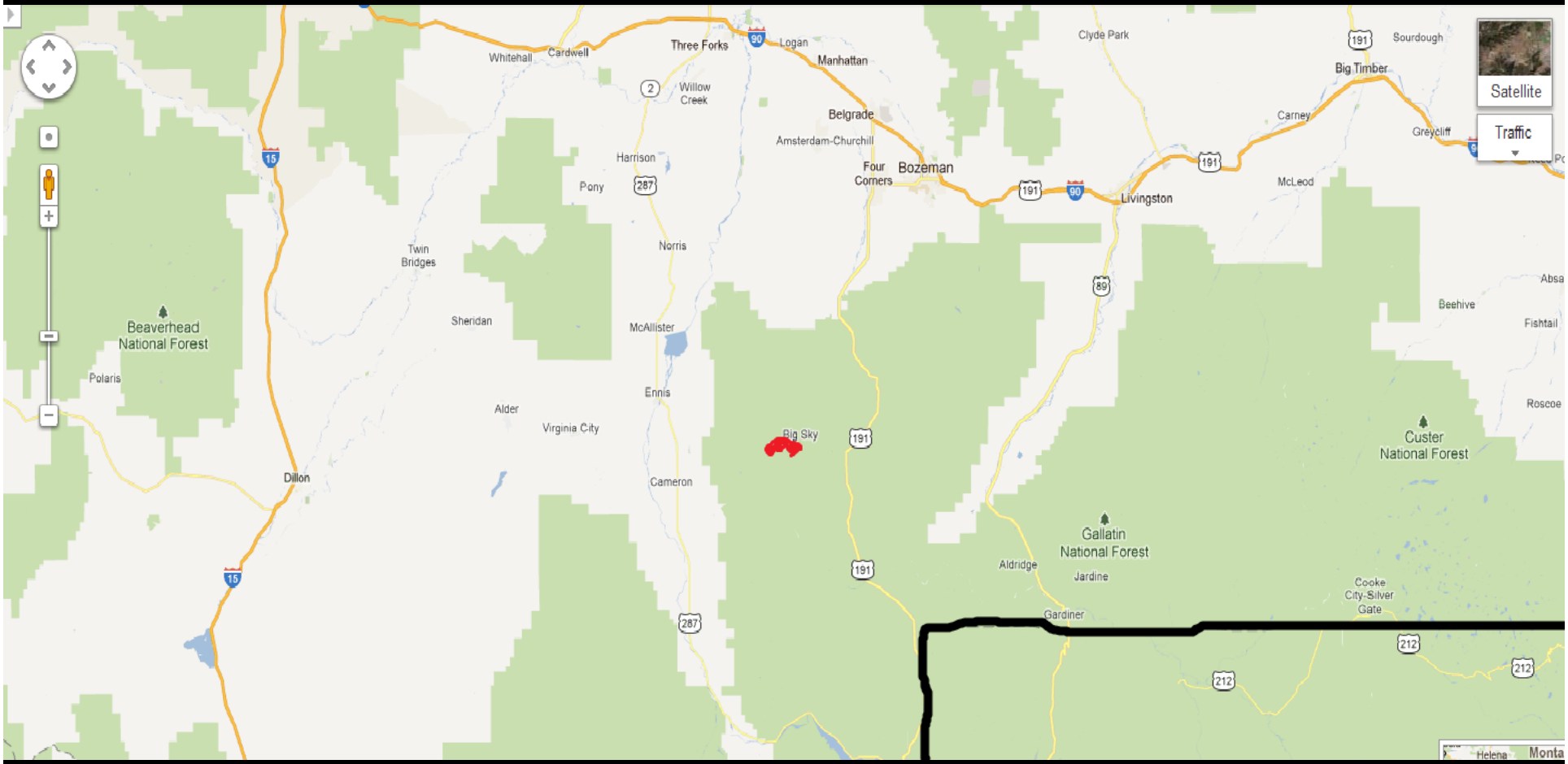
Petrology 422

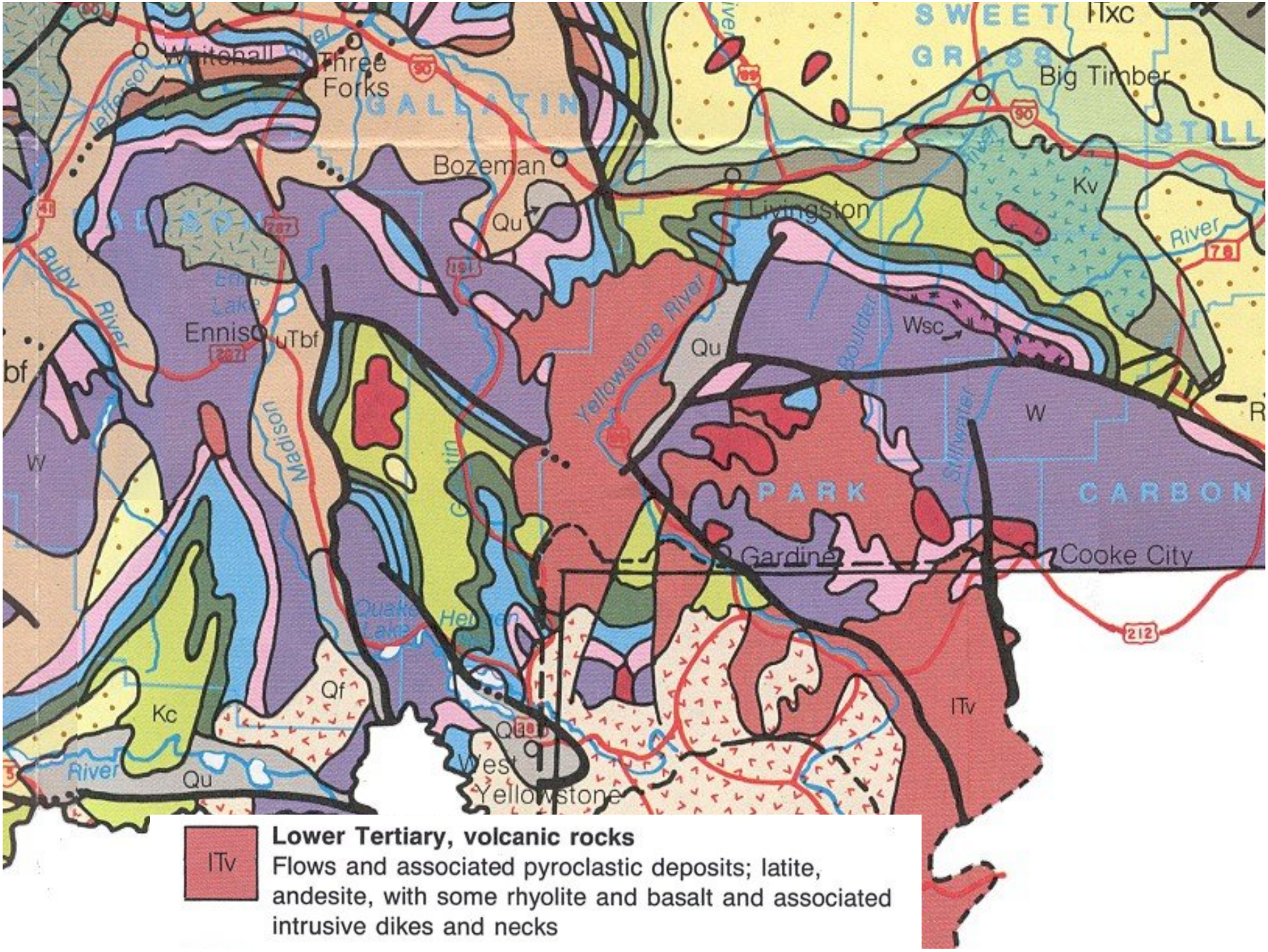
May 3rd, 2012

Outline

- Show location of where the sample was taken
- Show pictures of the sample
- Question I wanted to answer
- Background Information
- XRD data
- XRF data
- Thin section
- Conclusion

Rock Sample Location

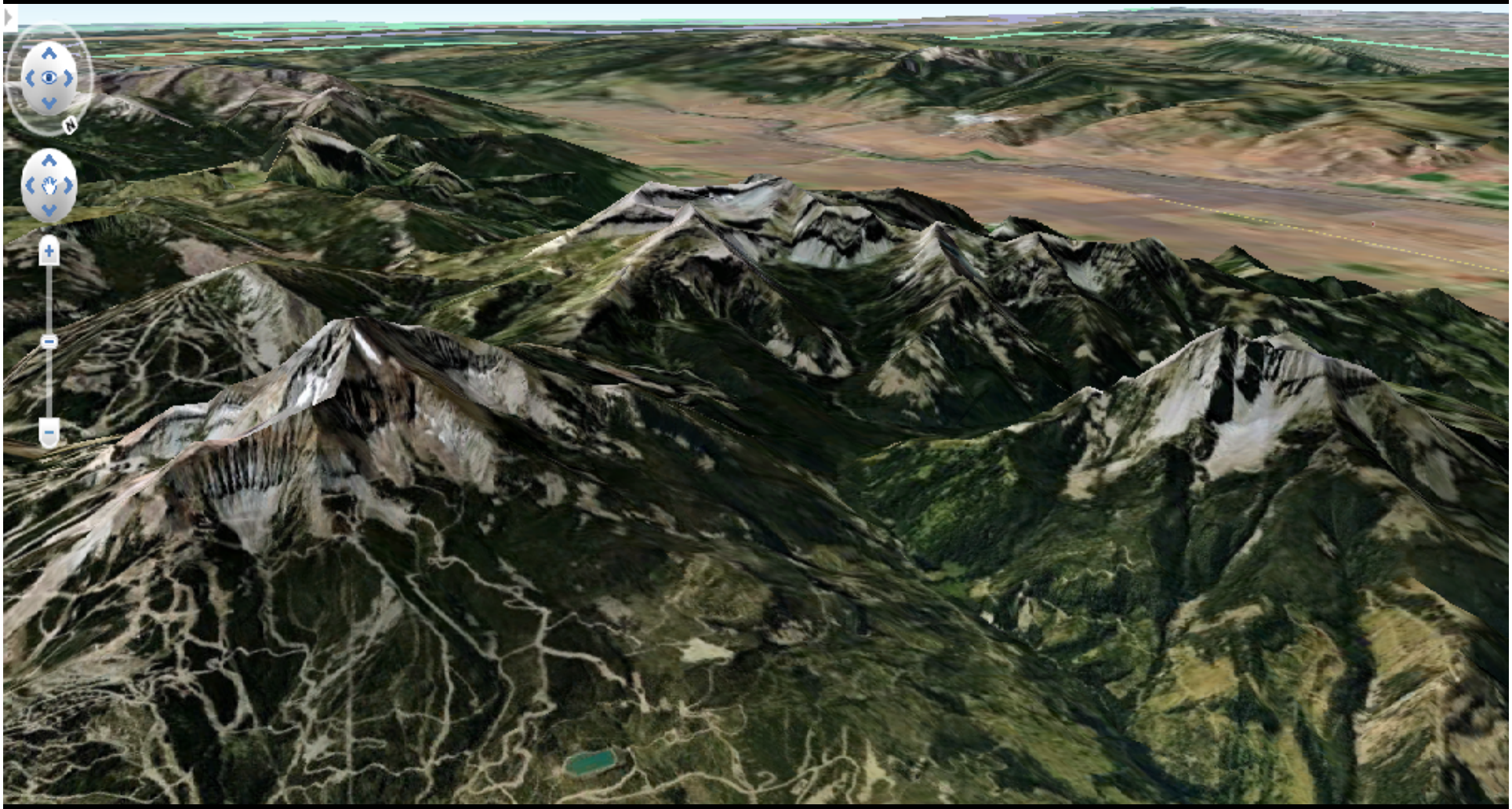


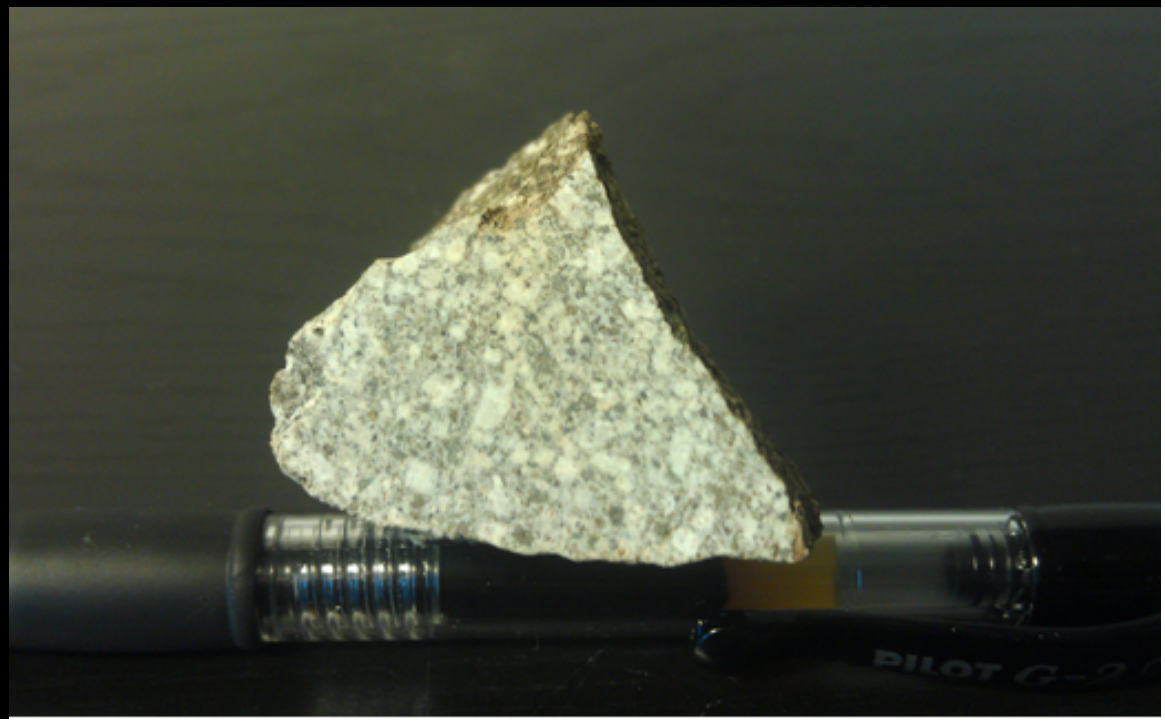


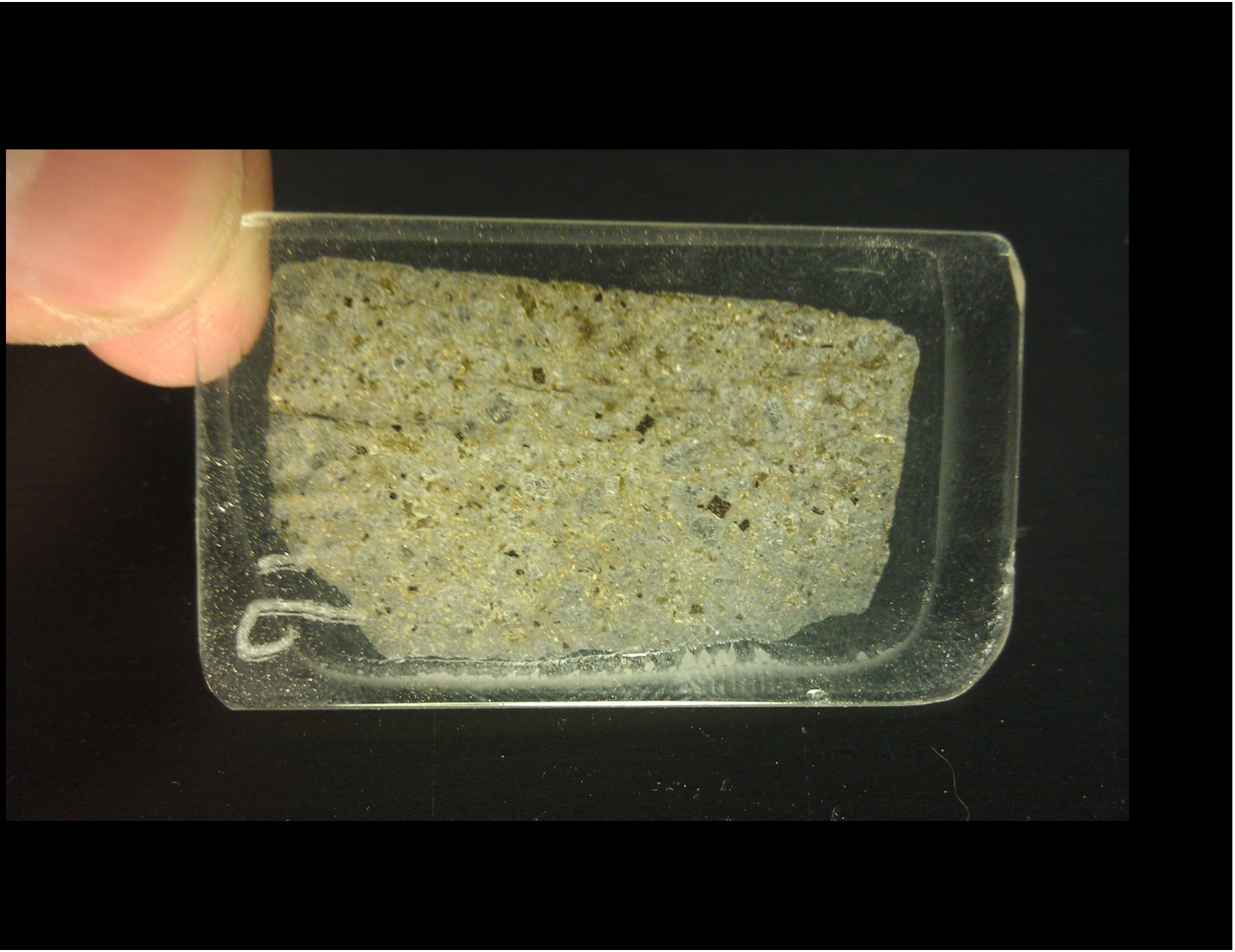
ITv

Lower Tertiary, volcanic rocks

Flows and associated pyroclastic deposits; latite, andesite, with some rhyolite and basalt and associated intrusive dikes and necks




PILOT G-2

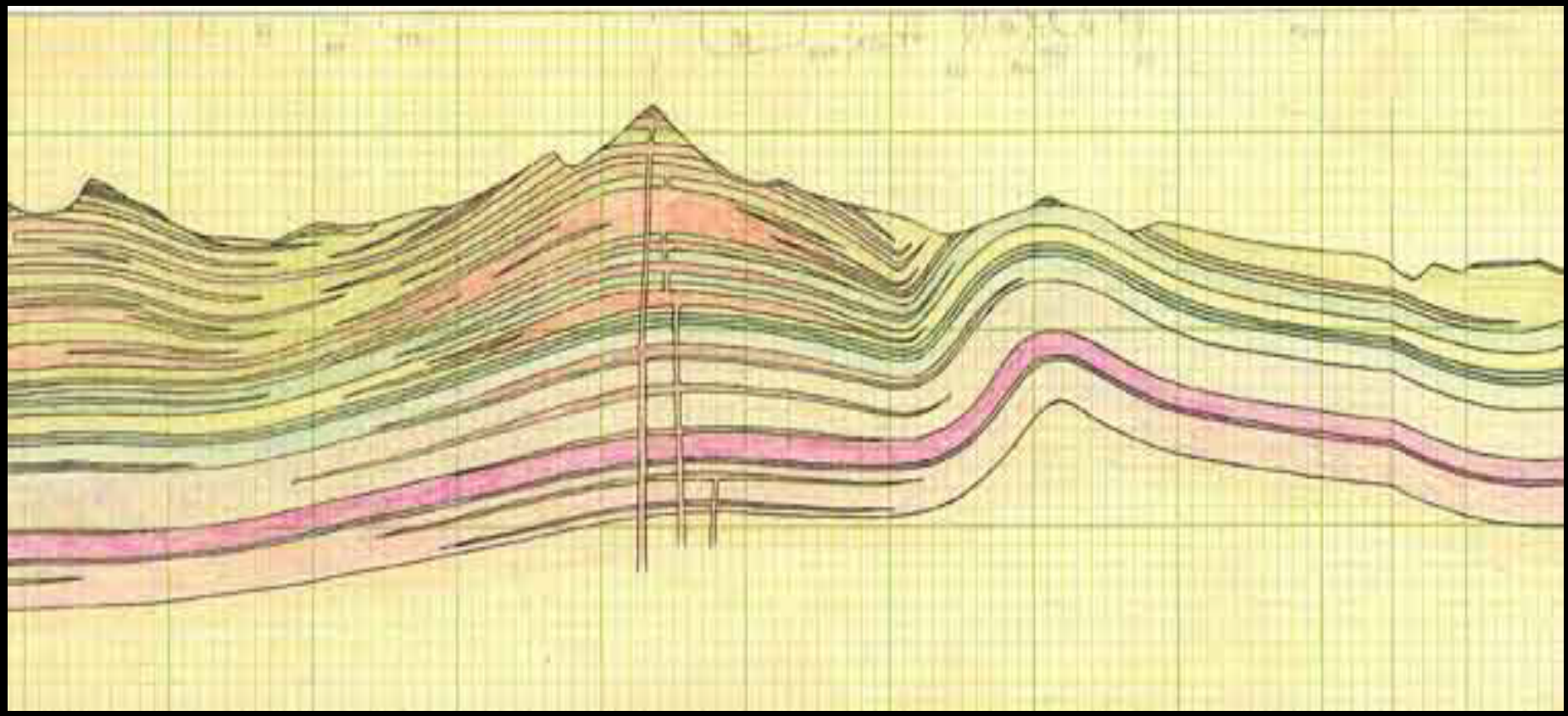


Question

- What type of rock is this sample?

Background Information

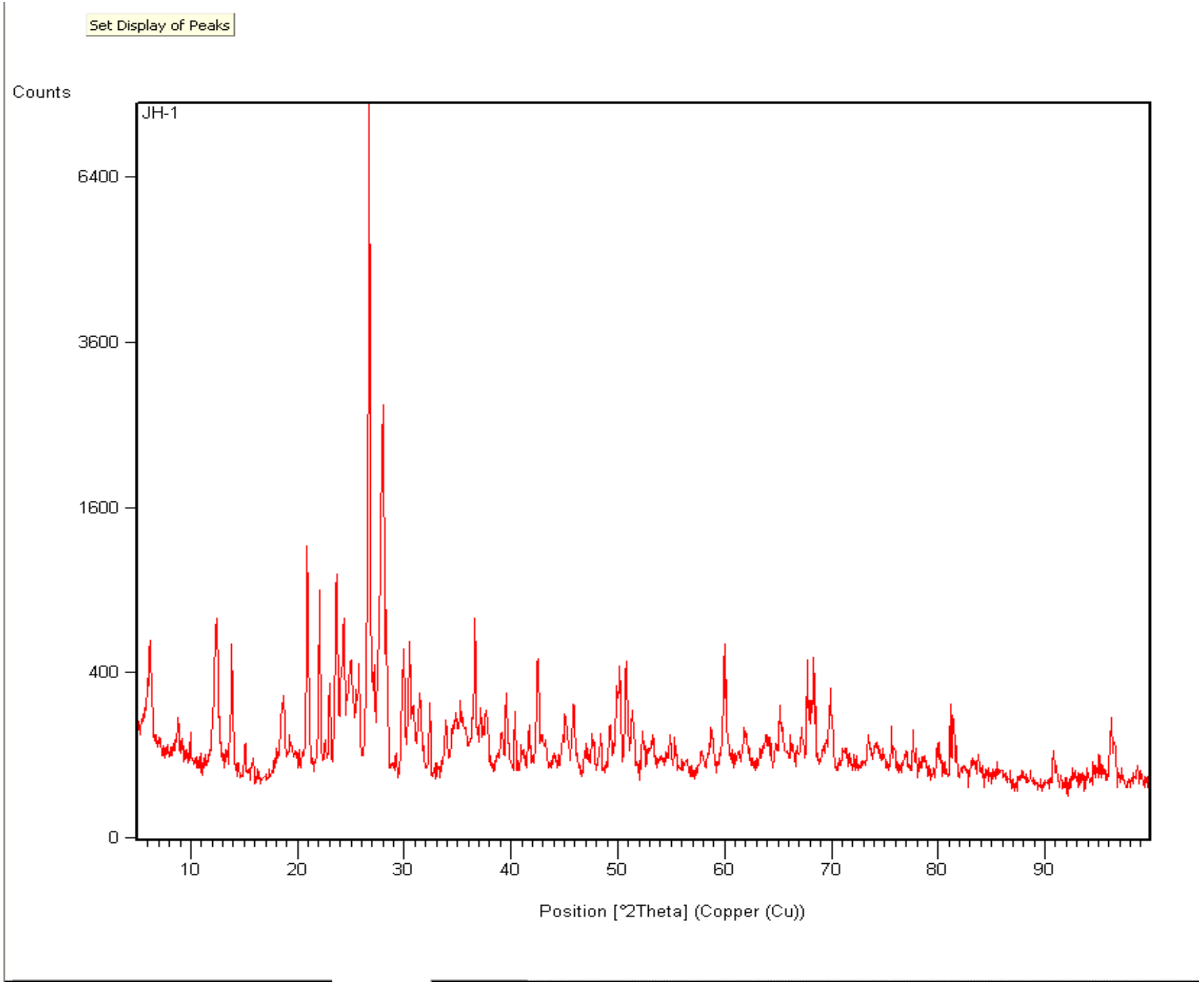
- Lone Mountain is apart of the Madison Range
- The Madison range consists couple different types of mountains
- It contains dormant volcanoes and small batholiths
- Lone Mountain is a “dead” volcano
- If cut vertically in half, it would look like a christmas tree
- This is due to the lava flowing out of a vertical crack and flowing outwards like a shield volcano

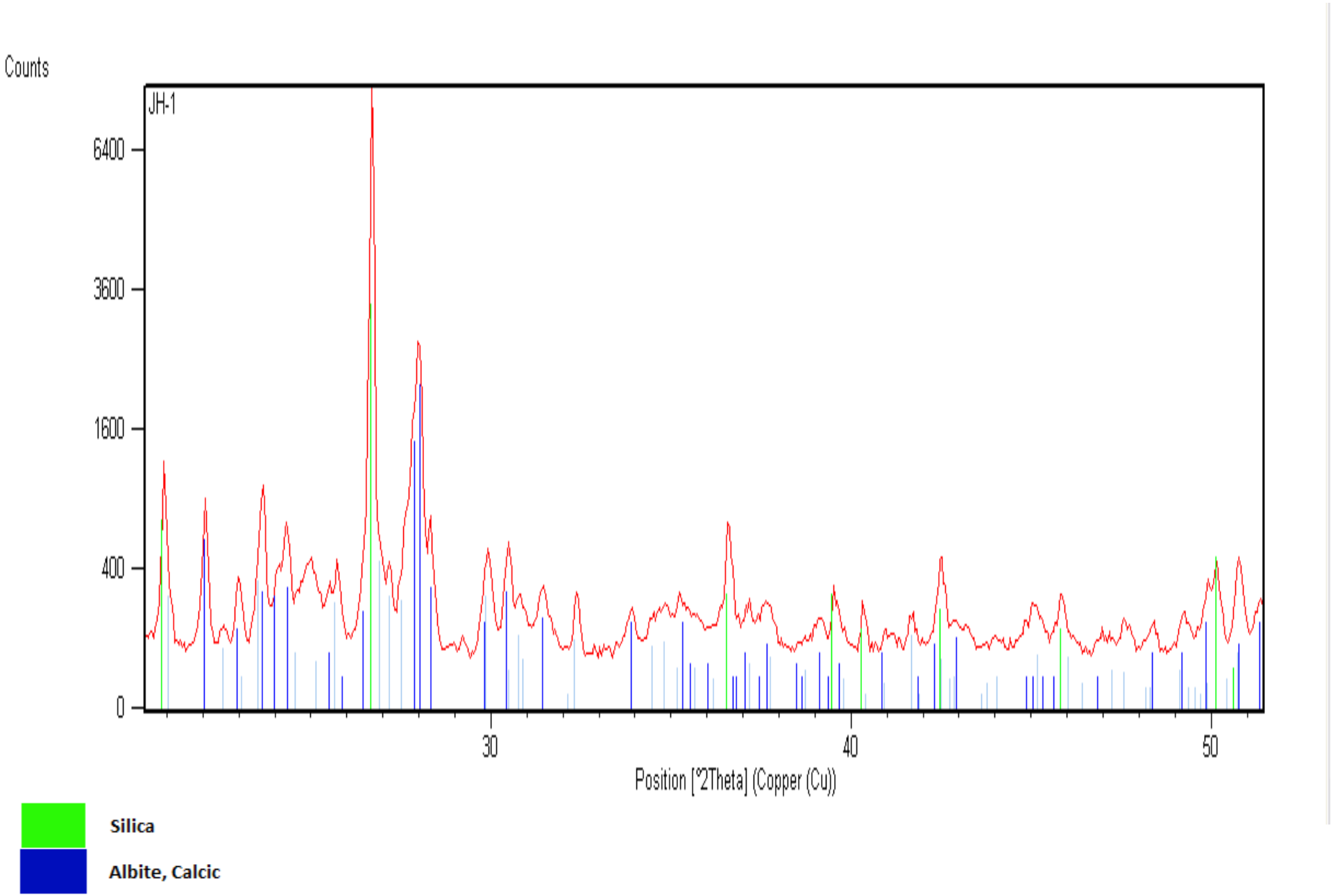


Drawing by Rodger Swanson of the USGS

Background continued

- Andesite peaks or batholiths
- Magma surged through a fault, forming a long narrow batholiths also called a stock
- This area is believed to a part of the Absaroka super group volcanoes in Yellowstone national park


Set Display of Peaks
Counts
JH-1
6400
3600
1600
400
0
10
20
30
40
50
60
70
80
90
Position [°2Theta] (Copper (Cu))


Counts
JH-1
6400
3600
1600
400
0
30
40
50
Position [°2Theta] (Copper (Cu))
Silica
Albite, Calcic

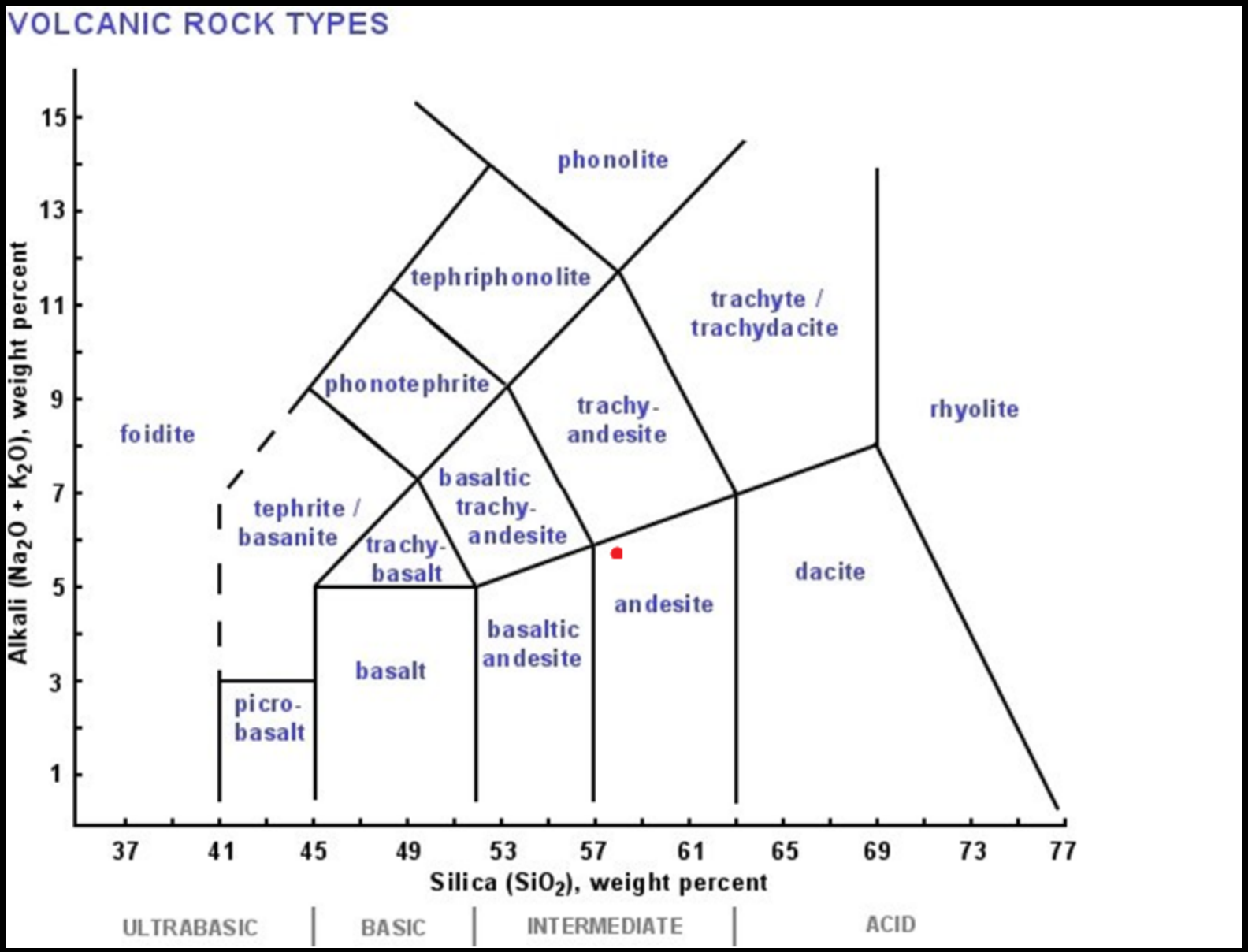
XRF data

SiO2 (%)	58.096
Al2O3 (%)	13.389
Fe2O3 (%)	4.899
CaO (%)	2.626
MgO (%)	4.876
MnO (%)	0.07
Na2O (%)	3.125
K2O (%)	2.33
P2O5 (%)	0.147
TiO2 (%)	0.606

Ba (PPM)	359
Nd (PPM)	38
Ni (PPM)	82
Rb (PPM)	56
S (PPM)	56
Sc (PPM)	12
Sb (PPM)	7.5
Sr (PPM)	832
Th (PPM)	6.6
Y (PPM)	16
V (PPM)	117
Zn (PPM)	68
Zr (PPM)	277

Nb (PPM)	10.6
Sn (PPM)	6.3
Dy (PPM)	2.8
Eu (PPM)	0.7
Hf (PPM)	3.3
Sm (PPM)	2.7
Er (PPM)	2.3
Ho (PPM)	0.8
Ta (PPM)	0.8
Tb (PPM)	0.6
U (PPM)	3.7
Ag (PPM)	0.1
Ge (PPM)	136.5
Yb (PPM)	2.3
Ga (PPM)	20
Cl (PPM)	147

Winter, chapter 2.4



Thin Section Microscopy

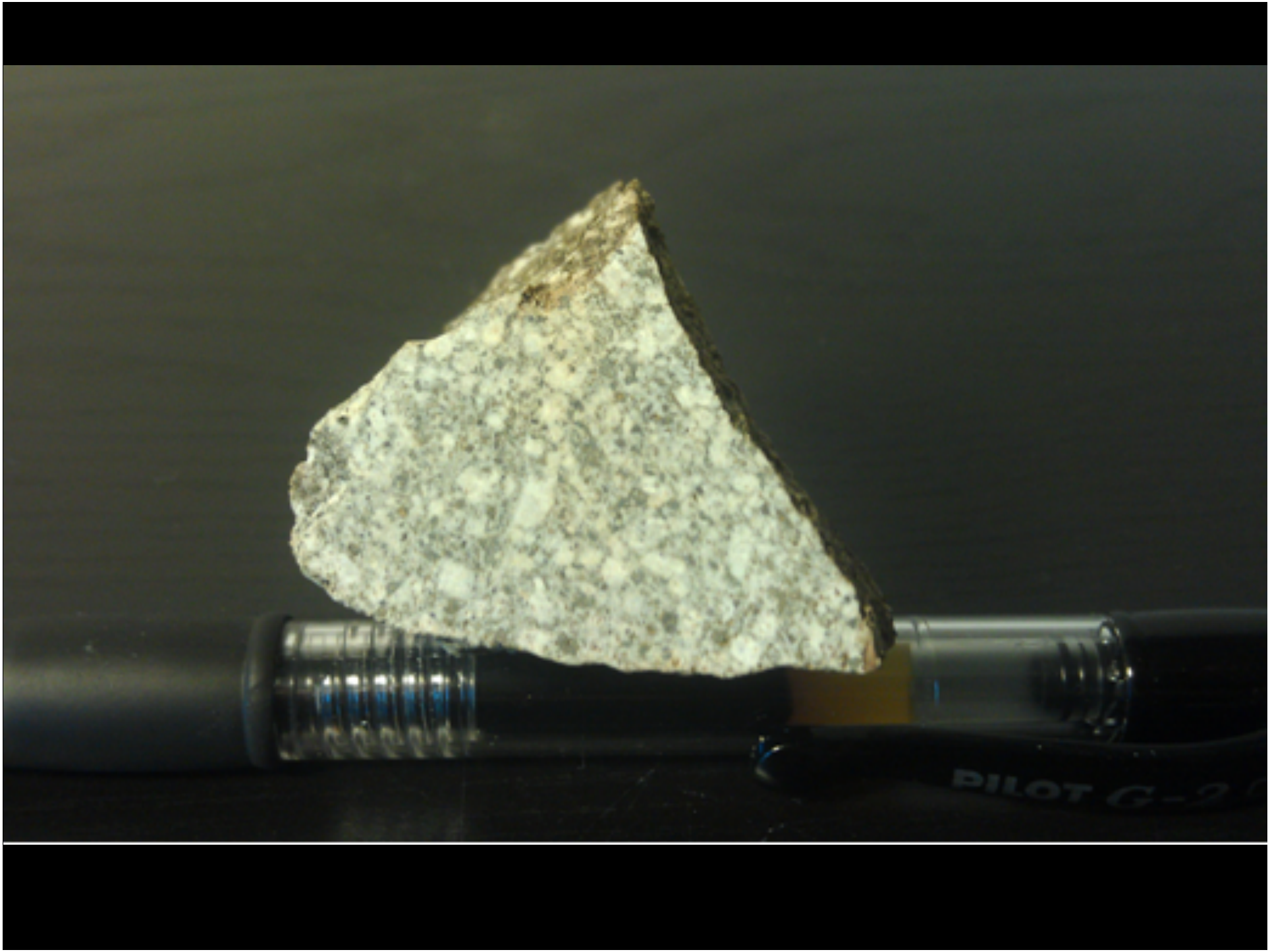
What is supposed to be in Andesite

- Minerals
  - Hornblende
  - Biotite
  - Plagioclase
  - Quartz
  - pyroxenes

What I noticed in my thin section

- Minerals
  - Plagioclase
  - Quartz
  - Hornblende
  - Biotite
  - Muscovite
- But everything was extensively weathered

Encyclopedia Britannica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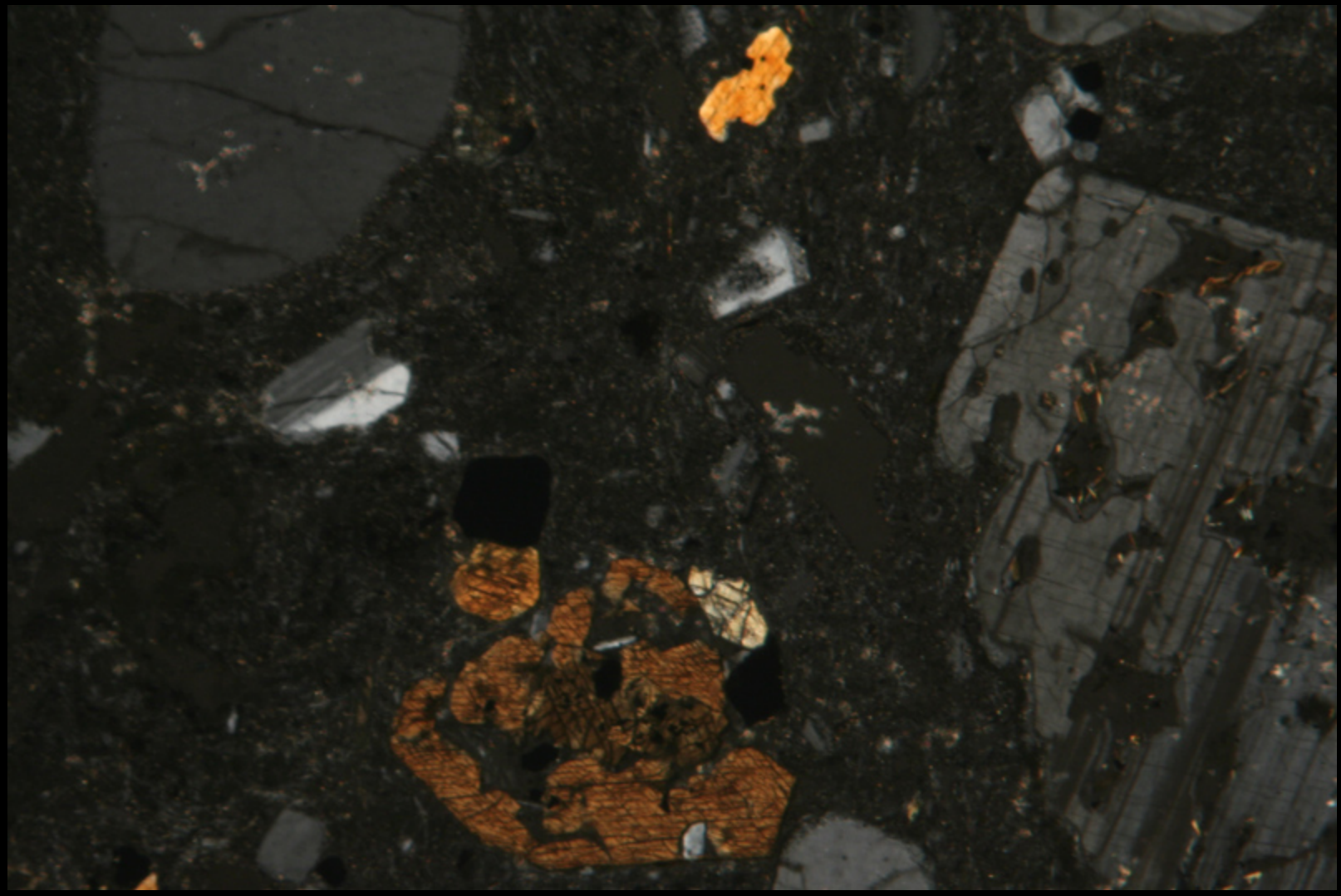

Conclusion

- The Lone Mountain is a “dead” volcano
- It has layers of sedimentary and igneous rocks
- My sample was taken from a layer of igneous rock
- Looking at what the thin section contained and the amounts of SiO_2 versus $Na_2O + K_2O$, provide evidence that my sample is an andesite rock

References

- John J. Thomas, Bowen Reaction Series, accessed 5/1/2012, http://www.skidmore.edu/~jthomas/fairlysimpleexercises/pdf/brs.pdf
- Montana Department of Transportation, Lone Mountain, accessed on 5/2/2012, http://mathscience.mt.gov/files/RoadSignPDF/LoneMountain.pdf
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- Winter, chapter 2, figure 2.4