861199 Elk

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Report for: D. ARSCOTT,
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Samples: D1a, D1b, D2a, D2b, D3, D4, R7-76L

Summary

The samples are from the Bonanza group, and represent a dacite to rhyodacite volcanic and volcanosedimentary pile with intrusive porphyritic phases.

The rocks are classified as follows:

Sedimentary Rocks		Flow Rocks		Intrusive Rocks	
D1a	dacite to rhyolite	D3	rhyodacite	D1b	dacite
D2a	dacite	D4	rhyodacite	D2a	dacite
D2b	dacite	R7 76L	dacite		
D3	rhyodacite				

As well, samples D2a and D2b, and part of D3 have textures suggesting metamorphic recrystallization.

Numerous types of veins cut the rocks, and alteration patches contain similar mineral assemblages.

1) Assemblages containing K-feldspar

Kf-qz-ep-py	D1a,D3,D4,R7-76L
Kf-qz-pl-py	D1a,D2a
Kf-ep-chl-py	D1b
Kf (vein)	D2a,D3,R7-76L
Kf (repl. of plag)	D1b

2)	Qz-ep-(chl)-(act)	D1a,D2a,D2b,R7-76L
3)	Py-chl	D1b
4)	Prehnite-garnet(?)	D3
5)	Calcite (late)	D2b

Sample D1a Banded Sedimentary Dacite-Rhyolite Tuff

The hand sample is color banded and shows a variety of textures in different layers. Faint load casts in the bottom layers suggest that the tops are in the direction of the red arrow. The variation in K-feldspar composition is well shown on the stained block. The sample is strongly fractured in two main directions with displacement up to 2.5 mm along the fractures.

In thin section the sequence of beds from top to bottom is as follows:

1) Fine grained, finely banded unit, whose banding is shown by mineralogical layering of bands rich in quartz, K-feldspar, and epidote respectively.
2) Fine grained, rich in K-feldspar, some coarse poikilitic to skeletal epidote with interstitial quartz.
3) similar to unit 1.
4) Coarser grained, uniform unit with a few coarser plagioclase grains, low K-feldspar
5) Coarse grained, with plagioclase megacrysts and finer grained elongated plagioclase laths, low K-feldspar.
6) similar to unit 1.
7) similar to unit 2.
8) similar to unit 1.
9) similar to unit 5, with abundant pyrite.
10) similar to unit 1.
11) similar to unit 2.
12) similar to unit 1.
13) similar to unit 2.

Disseminated pyrite occurs throughout the rock, but is most abundant in certain layers; commonly it is rimmed by epidote.

The groundmass of the layers is a mixture of quartz, feldspars, and epidote, with some very fine grained unidentified minerals.

The rock is cut by two major veins. The first consists of quartz along the margins with a core containing K-feldspar, pyrite, epidote, and muscovite. Where the vein cuts a K-feldspar-rich layer, that mineral is concentrated in a thin zone along the margins of the vein.

The second major vein contains quartz, plagioclase, K-feldspar, and abundant pyrite. The layers are offset 2.5 mm along the vein.

Wispy quartz-epidote veinlets cut some layers, but are discontinuous.

Sample D1b Dacite Porphyry

The hand sample is a massive dacite porphyry with abundant pyrite; mafic minerals have been destroyed.

In thin section the rock consists of plagioclase phenocrysts in a matrix of chlorite, quartz, K-feldspar, epidote, and pyrite. Plagioclase phenocrysts (40% of sample) are up to 1.5 mm long, and are prominently zoned towards more sodic rims. They are sub- to euhedral and generally separated from each other by matrix. They are partly replaced, especially in the cores to K-feldspar. Plagioclase also makes up 10-15% of the matrix.

Chlorite (15%) is colorless to light green and forms fine grained radiating aggregates, commonly with intergrown sphene or other Ti-bearing mineral. Pyrite (10%) occurs with chlorite as disseminated

grains, along with lesser epidote and a minor amount of apatite. Very fine to fine grained quartz (5-7%) occurs in the matrix and locally in veins. K-feldspar (7%) occurs with quartz in the matrix. The matrix grain size ranges from 0.002 mm to 0.02 mm.

The rock is cut by two main types of veins:
1) K-feldspar-epidote with minor pyrite and chlorite
2) Pyrite-chlorite-limonite (weathering of pyrite) with minor K-feldspar.

The rock is probably a volcanic dome or very-near-surface dike rock; originally it had a dacitic composition, but K-feldspar alteration has given it a rhyodacite composition.

Sample D2a Metamorphosed Banded Sedimentary Dacite cut by Porphyritic Dacite

The sample can be divided into three main zones for description.

The first occupies about 2/3 of the sample and is the finely banded light green rock. In thin section it is seen to be a metamorphosed rock consisting of epidote-quartz-plagioclase with minor K-feldspar and chlorite; minerals in the proportions 40:30:20:5:5. Banding is shown by preferred orientation of clusters of epidote grains. Quartz generally is coarser grained (0.03 mm) than feldspars (0.005-0.01 mm). The origin of this rock is uncertain, but it may be a metamorphosed sediment as suggested by the sedimentary nature of the second main zone in the sample.

The second occupies one corner of the sample, and appears bleached in hand sample. The zone appear similar to some of the fine sedimentary layers in Sample D1a. Epidote is much less abundant than in the first zone, occurring in scattered small patches. In some layers are a few coarse plagioclase grains, and in others is abundant very fine grained, disseminated pyrite.

The third occupies another corner of the sample and is a porphyritic dacite with scattered plagioclase phenocrysts in an irregular matrix of quartz, plagioclase, epidote, and actinolite. Actinolite and epidote form fine to coarse patches, and probably are alteration minerals. Pyrite is eommon in the dacite. This rock is intrusive into the banded sediments, whose layers are truncated at the contact.

Alteration consists of coarse patches of epidote-quartz-chlorite in the sediments near the contact with the dacite, and several types of veins and veinlets. The latter include quartz veinlets, K-feldspar veinlets, and large veins consisting of moderately to strongly altered plagioclase with a few coarse patches of pyrite-epidote-K-feldspar-quartz.

Sample D2b Banded Metamorphosed Dacitic Sediment

In hand sample the rock is seen to consist of alternating pink and light green bands. The pink bands are not continuous, and appear to be an alteration of the light green rock; this is further supported by erosscutting veinlets of the same pink material. Later fractures have offset the bands in the order of a few millimeters.

In thin section the light green bands consist of medium grained (0.02-0.05 mm) quartz (70%), epidote (10%),and plagioclase (20%), with minor calcite ss patchy skeletal grains. Quartz shows an excellent mosaic texture typical of metamorphic recrystallization.

The pink bands and veins contain abundant very fine grained garnet, with quartz, epidote (especially along the borders), K-feldspar, and chlorite.

The rock probably is a metamorphosed sedimentary rock whioh consisted of alternating quartz-rich and feldspar-rich layers. Plagioclase would have been altered to epidote and garnet during metamorphism.

Three types of veins or veinlets cut the rock.

1) Coarse grained epidote-quartz which crosscuts the main banding in the rock; epidote is more abundant where the vein cuts garnet-epidote-rich bands, and quartz is more abundant where the vein cuts quartz-rich bands.
2) irregular veinlets containing abundant garnet crosscut banding at about 45 degrees. Garnet may in part have formed during post-metamorphism metasomatism, possibly related to intrusion of the dacite porphyry seen in other samples.
3) late calcite veinlets crosscut epidote-quartz veins.

Sample D3 Banded Rhyodacite Sedimentary Rock; Rhyodacite Flow

The hand sample consists of two main rock types, a banded rhyodacitic sedimentary rock and a massive rhyodacite flow or intrusive rock of similar composition. Only the sedimentary rock occurs in the thin section. Near the contact the sedimentary rock is brecciated and cut by a vein of what appears to be quartz.

In thin section, the texture of the well banded part of the sample is similar to that of sedimentary unit 1 in sample D1a. The rock contains quartz, epidote, feldspars, and pyrite; the grain size is 0.002 mm to 0.010 mm. Compositional banding is present, with one layer richer in quartz and pyrite, and a few containing more abundant plagioclase fragments, but the latter are not as prominent ae those in unit 5 of sample D1a.

On the other side of the vein, the rock generally is coarser grained (0.004 to 0.015 mm) and contains more quartz. The texture is a mosaic typical of metamorphic recrystallization.

Several types of veins and veinlets cut the rock.

1) The main white vein consists of medium to coarse grained prehnite with patches of a fine grained, high relief mineral, which appears to be isotropic, and probably is garnet. The garnet is abundant along the borders of the vein.
2) Quartz veinlets with pyrite and K-feldspar; the band rich in quartz and pyrite might be an early vein.
3) K-feldspar veinlets

Sample D4 Siliceous Rhyodacite Flow

The hand sample is a massive to slightly banded rhyodacite cut by several veinlets and leached at ene end.

In thin section the rock consists of scattered plagioclase phenocrysts (up to 0.3 mm) (5% of the rock) in a matrix rich in quartz. The matrix grain size is 0.015-0.025 mm. Mineral abundances

are quartz 65%, plagioclase 10%, K-feldspar 10%, epidote 10%, and chlorite 5%. Epidote generally forms fine disseminated grains, but locally occurs in coarser patches.

Veinlets contain epidote, K-feldspar, quartz and pyrite. Secondary biotite and muscovite occur near the veinlets and probably are related in origin to them. Limonite is abundant in the leached zone as an alteration product of pyrite.

Sample # R7-76L Dacite Flow

In hand sample the rock is uniform and slightly banded, with the bands defined mainly by distribution of pyrite and alteration veinlets. The pyrite content varies from band to band in the rock.

In thin section the rock is a fine grained (0.002-0.015 mm) intergrowth of quartz and plagioclase, with slightly coarser patches of fine grained epidote aggregates. The rock contains a few coarser plagioclase grains and the matrix commonly contains elongate laths of plagioclase intimately intergrown with quartz, suggesting that it crystallized from a melt, and that the rock has an igneous rather than sedimentary origin.

Pyrite occurs in coarser grained patches surrounded by epidote and/or actinolite, with quartz and K-feldspar.

Veins are of several types:

1) Irregular contorted epidote-chlorite veinlets parallel to banding.
2) Wispy quartz-epidote veinlets parallel to late epidote-chlorite vein.
3) K-feldspar veinlets
4) Late epidote-chlorite-actinolite veins croscutting banding and early epidote-chlorite veins.

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