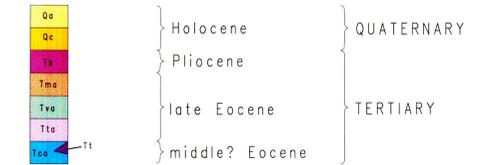


RECONNAISSANCE SURFICIAL AND BEDROCK MAP OF THE
ANTARAMUT-DZORAGYUKH AREA, NORTH-CENTRAL ARMENIA

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CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

- Qa** Alluvium (Holocene)—Fluvial deposits found in the Antaramut Creek (southern part of map area) and Pambak River (southeast map area). Composed of sorted to unsorted silt, sand, gravel, and boulder size clasts.
- Qc** Colluvium deposits (Holocene)—Composed of unconsolidated sand, pebble, boulders, and blocks in a reddish-clay matrix. Deposits typically found in eroded tops (axis areas) of anticlines, on volcaniclastic rocks (Tva) found between the tuff of Antaramut (Tta) and mafic rocks of Antaramut (Tma), and below steep slopes below the mafic rocks of Antaramut.
- Tb** Basaltic lava flows (Pliocene)—Medium dark gray (N4) lava flows, vesiculated to dense; composed of plagioclase phenocrysts in a medium grained groundmass. Locally overlies the tuff of Antaramut in the eastern part of map area. The unit is composed of very thick lava flows (some pillowed) and lava flow breccias east and north of map area. The flows fill a paleosol that is now occupied by the present Pambak (east), Dzoraget (north), and Debed Rivers (northeast). Locally, river channel deposits and lacustrine beds are found interbedded with the lava flows. Estimated exposed thickness 7 m.
- Tma** Mafic rocks of Antaramut (late Eocene)—Dark gray (N3), brownish-gray (5YR4/1), light-brownish gray (5YR6/1) to grayish-red purple (5RP4/2) basaltic, basaltic-andesitic, and andesitic lava flows and lava-flow breccias. Flows are typically porphyritic and contain clinopyroxene, clinopyroxene and plagioclase, and clinopyroxene, plagioclase, and olivine(?) phenocrysts in a fine to medium-grained groundmass. Flows are dense to vesiculated with vesicles filled with silica. Locally, the lava flows are pillowed commonly where they overlie volcaniclastic rocks. The unit, locally, contains interbedded pairs red (5YR6/2) to grayish-red (10YR4/2), medium gray, (N3), and olive-gray (5Y4/1) volcaniclastic rocks as much as 3 m thick. Volcaniclastic rocks are composed of bedded sandstone, siltstone, and conglomerate. Unit usually forms a slope. Estimated thickness 350 m.
- Tva** Volcaniclastic rocks of Antaramut (late Eocene)—Mapped locally, where rocks are well exposed but usually covered by colluvium (Qc). In areas where the rocks are not well exposed, mapped with the tuff of Antaramut. Consists of interbedded thin to thick bedded yellowish-gray (5Y7/2) tuffaceous siltstone and sandstone, very pale-blue (5BB/2) tuffaceous mudstone, and tuffaceous conglomerate. A grayish red (10R4/2) sandstone and siltstone interval is usually present at the top of the unit. Locally, contains a dark gray (N3) carbonaceous siltstone. Estimated thickness 7 m.
- Tta** Tuff of Antaramut (late Eocene)—Ash-flow tuff (ignimbrite) composed of three parts: an upper, middle, and lower part. The upper part is pale-green (10G6/2), light-bluish gray (5B7/1) to greenish-gray (5G6/1), partially to moderately welded tuff, and contains plagioclase, hornblende, and biotite phenocrysts. The upper part is lithic rich, composed mostly of intermediate volcanic lithic fragments. Pumice have been altered to moderate green (5G5/6) color and are as large as 10 cm long. Forms a slope. The middle part is pale-red (10R6/2) to pale-yellowish brown (10YR6/2), moderately to densely welded, crystal rich tuff, composed mostly of plagioclase, hornblende, biotite, and pyroxene(?) phenocrysts. Commonly contains intermediate volcanic lithic fragments but less than the upper and lower parts. Pumice are as large as 10 cm long. Forms a cliff. The lower part is light bluish-gray (5B7/1), partially to moderately welded tuff and contains plagioclase, hornblende, and biotite phenocrysts. Lower part resembles the upper part and is also rich in lithic fragments composed mostly of intermediate volcanic fragments as large as 5 cm long. Pumice have also been altered to a greenish color. Commonly forms a slope. Hornblende from the middle part has been dated at 40.45±0.38 Ma using the 40Ar/39Ar method (Lisa Peters, New Mexico Bureau of Mines and Mineral Resources, written commun., 1998). Estimated thickness 125 m.
- Tt** Ash-flow tuff (middle? Eocene)—Very-pale orange (10YR7/4), crystal poor, moderately to densely welded, ash-flow tuff. Contains plagioclase, sanidine, and quartz phenocryst. Pumice are grayish-orange (10YR8/2). The tuff is located in the western part of map area near exploratory drill hole 4a, but pinches out toward drill hole 5a. The tuff overlies the coal-bearing sequence but similar tuffs may be interbedded with the coal-bearing sequence of Antaramut. The tuff appears to have been altered to a lighter color. Estimated exposed thickness 2 m.
- Ttc** Coal-bearing sequence of Antaramut (middle? Eocene)—Composed of interbedded grayish-yellow-green (5GY 7/2) tuffaceous sandstone, blackish-red (5R2/2) to very dark red (10R2/2) carbonaceous shale, and locally contains thin coal beds about one meter thick. Interbedded andesitic lava flows that have been penetrated by some drill holes (5a) may also be part of this unit. Exposed about 0.5 km northeast of Antaramut. The unit is exposed in a shear zone and has been extremely altered and oxidized. The unit is not well exposed in the map area but may be equivalent to volcaniclastic rocks exposed along the highway between Pambak and Vaogni southeast of map area (see geologic field guidebook by Maldonado and others, 1999). Estimated thickness 200 m.

MAP SYMBOLS

- ?— Contact, approximately located, queried where uncertain
- ||— Strike-slip fault; arrows indicate relative movement; dotted where concealed; T towards, A away
- - - Fault; dotted where concealed, queried where uncertain
- ⊕ Queried gravity-slide block
- - - Axis of anticline, dashed where approximately located, dotted where concealed, queried where uncertain
- - - Axis of syncline, dashed where approximately located, dotted where concealed, queried where uncertain
- ↘/↙ Faciation of ash-flow tuff showing dip
- ↘ Apparent dip of volcaniclastic beds
- ↘ Dip direction of rocks
- 4a Exploratory drill hole showing hole number
- A Away from viewer, shown only on a cross-section
- T Towards viewer, shown only on a cross-section
- Trace of beds, shown only on a cross-section B-B'
- Roads

REFERENCES CITED

Maldonado Florian, Martirosian Arthur, Harutunian Samvel, Malkhasian Gourgen, and B.S. Pierce, 1999, Geologic road log from Vanadzor to the coal deposits of Antaramut, Antaramut, to Dzoragyukh, and Dzoragyukh to Vaogni, north-central Armenia: U.S. Geological Survey Open-File Report 97-721, 10 p.

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