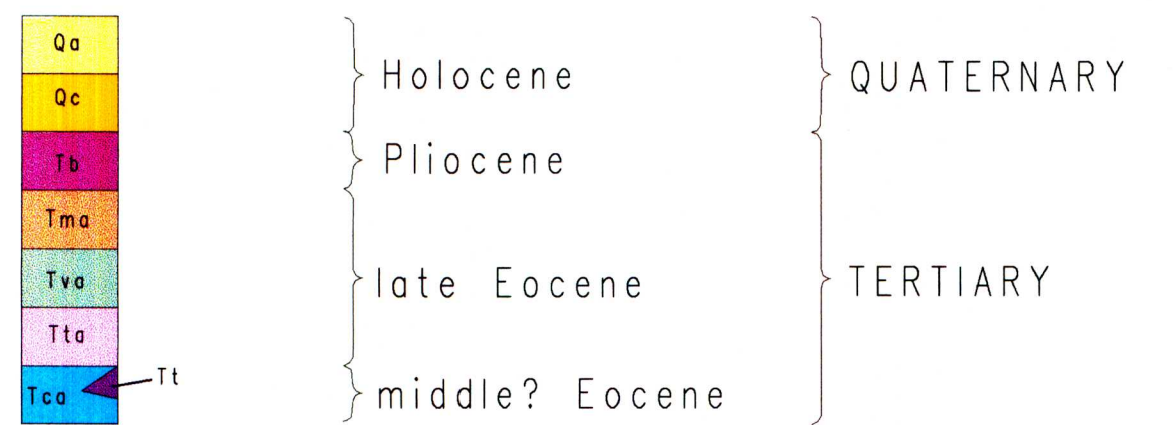






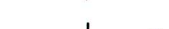









## CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

- |            |  |
|------------|--|
|            | <p><b>Altivium (Holocene)</b>—Fluvial deposits found in the Antatomum Creek (southern part of map area) and Pambok River (southeast map area). Composed of sorted to unsorted silt, sand, gravel, and boulder size clasts</p>  |
| <b>Qc</b>  | <p><b>Colluvium deposits (Holocene)</b>—Composed of unconsolidated sand, pebble, boulders, and blocks in a reddish-orange matrix. Deposits typically found in eroded tops (axis areas) of anticlines, on volcanoclastic rocks (Ive) found between the tuff of Antatomum (Ita) and mafic rocks of Antatomum (Tmo), and below steep slopes below the mafic rocks of Antatomum</p>  |
| <b>Ib</b>  | <p><b>Basaltic lava flows (Pliocene)</b>—Medium dark gray (N4) lava flows, vesiculated to dense; composed of plagioclase phenocrysts in a medium gray to greenish gray matrix. Localities the tuff of Antatomum 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 Pambok (east), Dzaraet (north), and Debed Rivers (northeast). Locally, river channel deposits and lacustrine beds are found interbedded with the lava flows. Estimated exposed thickness 7 m</p>   |
| <b>Tmo</b> | <p><b>Mafic rocks of Antatomum (late Eocene)</b>—Dark gray (N3), brownish-gray (5YR4/1), light-brown-gray (5YR6/1) to grayish-red purple (5P6/4-2) 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. Flow breccias are composed of clasts with vesiculated and siliceous matrix. Lava flows are pillowed commonly where they overlie volcanoclastic rocks. The unit, locally, contains interbedded pale red (5YR6/2) to grayish-red (10YR4/2), medium gray, (N5), and olive-gray (5Y4/1) volcanoclastic rocks as much as 3 m thick. Volcanoclastic rocks are composed of bedded sandstone, siltstone, and conglomerate. Unit usually forms a slope. Estimated thickness 350 m</p>  |
| <b>Tva</b> | <p><b>Volcanoclastic rocks of Antatomum (late Eocene)</b>—Mapped locally, where rocks are well exposed but usually covered by caliche (Qc) areas where the rocks are not well exposed. Interbedded with the tuff of Antatomum. Consists of interbedded thin to thick bedded yellowish-gray (5Y7/2) tuffaceous siltstone and sandstone, very pale-blue (5B8/2) tuffaceous mudstone, and tuffaceous conglomerate. A grayish red (10R4/2) sandstone and siltstone interbed is usually present at the top of the unit. Locally, contains a dark gray (N5) carbonaceous siltstone. Estimated thickness 7 m</p>  |
| <b>Ita</b> | <p><b>Tuff of Antatomum (late Eocene)</b>—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 medium green (5G5/6) color and are as large as 10 cm long. 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. The lower part is light gray (5B7/1) to gray (5B6/1), 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 10 cm long. Pumice have also been altered to medium green 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 comm., 1998). Estimated thickness 125 m</p> |
| <b>Isa</b> | <p><b>Ash-flow tuff (middle? Eocene)</b>—Very-pale orange (10YR7/4), crystal poor, moderately to densely welded, ash-flow tuff. Contains plagioclase, sanidine, and quartz phenocrysts. Pumice are grayish-orange (10YR8/2). The tuff is the eastern part of map area near exploratory drill hole 4a, but pinches out toward drill hole 5a. The tuff overlies the ash-bearing sequence but similar tuffs may be interbedded with the coal-bearing sequence of Antatomum. The tuff appears to have been altered to a lighter color. Estimated exposed thickness 2 m</p>   |
| <b>Tco</b> | <p><b>Coal-bearing sequence of Antatomum (middle? Eocene)</b>—Composed of interbedded grayish-yellow-green (5G7 7/2) tuffaceous sandstone, blackish-red (5R2/2) to very dark red (10R2/2) carbonaceous shale, and locally contains thin coal beds about 10 cm thick. The sequence is about 100 m thick and may have been penetrated by some drill holes (5a) may also be part of this unit. Exposed about 0.5 km northeast of Antatomum. 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 volcanoclastic rocks exposed along between Pambok and Antatomum Creek. See map area (see geologic field guidebook by Maldonado and others, 1993). Estimated thickness 200 m</p>  |

## 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  |
|  | Foliation of ash-flow tuff showing dip   |
|  | Apparent dip of volcanoclastic beds  |
|  | Dip direction of rocks   |
|  | Exploratory drill hole showing hole number   |
|  | Away from viewer, shown only on cross-section  |
|  | Towards viewer, shown only on cross-section  |
|  | Trace of beds, shown only on 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 Vaaghi, north-central Armenia: U.S. Geological Survey Open-file Report 97-721, 10 p.

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