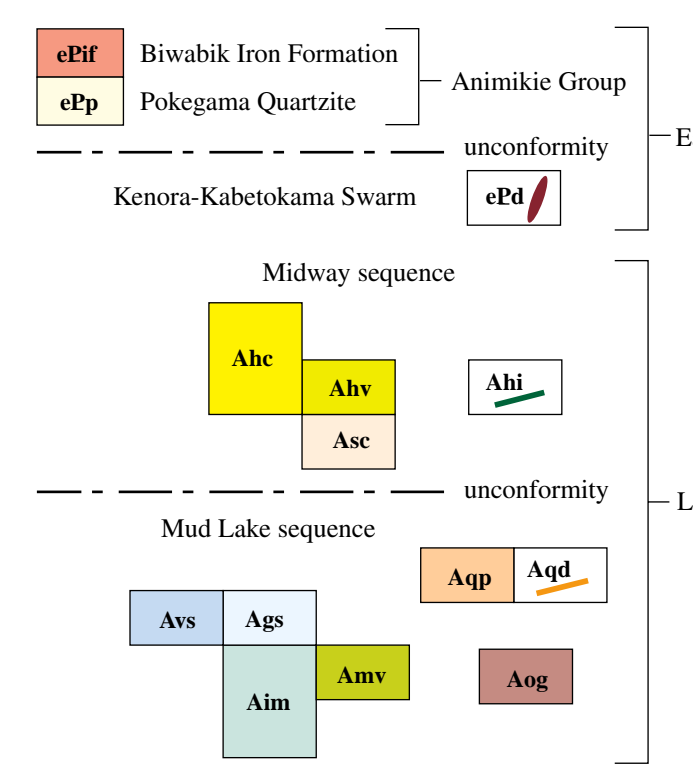


**CORRELATION OF MAP UNITS**

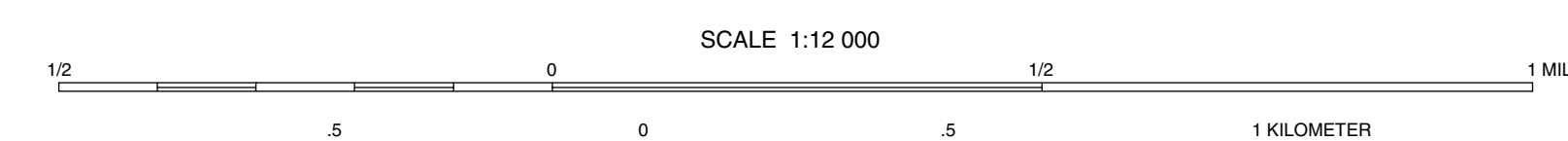


**DESCRIPTION OF MAP UNITS**

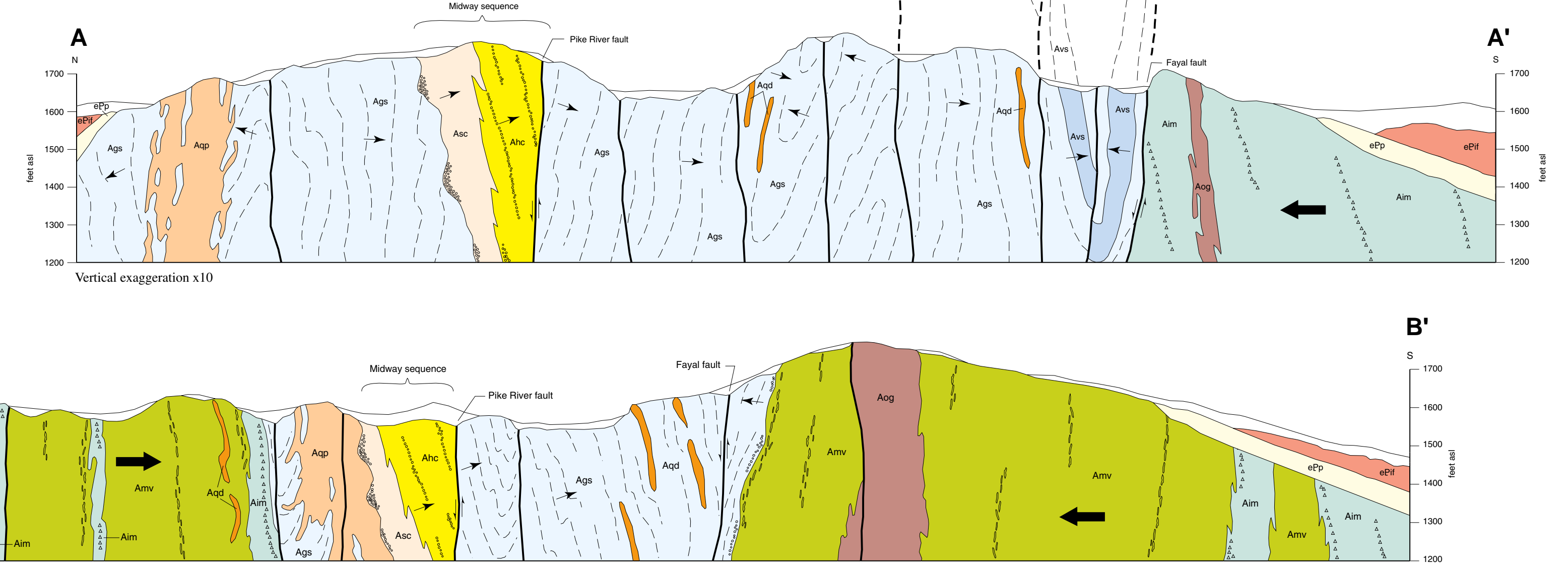
- ANIMIKIE GROUP**
- ePif** Bivabik Iron Formation undivided—contains thick-bedded granular chert, iron silicates, magnetite, and hematite, interbedded with thin-bedded iron silicates, carbonates, magnetite, and hematite.
  - ePp** Pokegama Quartzite—includes quartzite, quartz-rich siltstone, and shale.
- Kenora-Kabetokama Swarm**
- eKs** Diabasic to gabbroic dikes.
- LATE ARCHEAN**
- Midway sequence—low greenschist grade metamorphism**
- The Midway volcanic and clastic sequence is named for outcrops in the hamlet of Midway, which lies between Eveleth and Virginia. Where a complete section of the Midway sequence occurs, units Asc, Ahv, and Ahc lie in stratigraphic succession; however, individual units are laterally discontinuous and interdigitate. These units form a homoclinal south-facing sequence that occupies a steep half-graben structure bounded on the southeast by the Pike River fault. The sequence rests unconformably on, and contains fragments of most units of the Mud Lake sequence. Deposition of the Midway sequence post-dates folding that occurred during D<sub>1</sub> deformation, but pre-dates the development of metamorphic minerals and fabric associated with D<sub>2</sub> deformation. This relative temporal setting and the association of unique hornblende-phyric volcanic strata are characteristic of pull-apart basin deposits like those comprising "Timiskaming-type" sequences exposed in the Kirkland Lake and Thunder Bay areas of Ontario.
- Ahc** Conglomerate and lithic sandstone—maroon-red to deep green, derived largely from hornblende- and plagioclase-bearing trachyandesite porphyry of unit Ahv. Some clasts of plagioclase porphyry are so coarse grained as to imply derivation from exhumed hypabyssal intrusions (unit Ahl). Additional clast types represent the full range of older rocks, including graywacke and slate (unit Ags), calc-alkalic and tholeiitic volcanic rocks (units Aim and Amv, respectively), and quartz-feldspar porphyry intrusions (units Aqv and Aqd).

**MAP SYMBOLS**

- GEOLOGIC CONTACTS**
- Approximately located; inferred from geophysical data and topographic lineaments away from outcrops and drill holes.
- FAULTS**
- Inferred, offset sense imprecisely known, located in part by geophysical data and lineaments.
  - Approximately located strike-slip fault, relative offset as shown; right-lateral, left-lateral.
  - Approximately located dip-slip fault, relative offset as shown; upthrown; U; downthrown; D.
- AXIAL SURFACE TRACES OF FOLDS**
- First generation (F<sub>1</sub>) fold: anticline, syncline.
  - Inferred axial trace of the principal F<sub>1</sub> fold, the Mud Lake syncline (MLS).
  - Second generation (F<sub>2</sub>) fold: upright anticline, syncline; inverted or inclined axial trace of anticline, syncline.
- STRIKE AND DIP OF BEDDING AND CLEAVAGE**
- Inclined, vertical; stratigraphic top direction not determined.
  - Inclined, vertical; top direction indicated by ball.
  - Overturned; in this example, stratigraphic younging is south, dip is north.
  - Cleavage and schistosity of metamorphic origin associated with D<sub>2</sub> deformation; inclined, vertical (Note that cleavage is nearly everywhere steeper than and left of bedding).
- OUTCROP OR GROUP OF CLOSELY SPACED, SMALL OUTCROPS**
- DRILL HOLES**
- Exploration drill hole—azimuth and length of penetration approximate (data on file with the Minnesota Department of Natural Resources, Minerals Division, Hibbing, Minnesota).



On the geologic cross-sections A-A' and B-B':  
Small arrows indicate direction of stratigraphic younging; large arrows denote stratigraphic younging direction in volcanic packages.  
Dashed lines and other symbols within map units depict generalized trend of bedding based on surface exposures and rarely on drill core. Triangles indicate volcanic breccia; lenses are volcanic flow unit contacts; circles represent conglomerate. Locations are approximate.



Digital base modified from U.S.G.S. 1996 Digital Raster Graphic of the Virginia, McKinley, Eveleth and Gilbert 1:24 000 Quadrangles (1962; photorevised 1984).  
Universal Transverse Mercator Projection, grid zone 15  
1987 North American Datum  
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Digital cartography by Joyce Meints and T.E. Wahl.  
Graphic design by R.S. Lively  
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Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.

**BEDROCK GEOLOGIC MAP OF THE MIDWAY AREA, ST. LOUIS COUNTY, MINNESOTA**