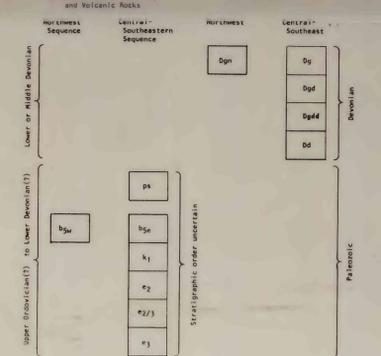


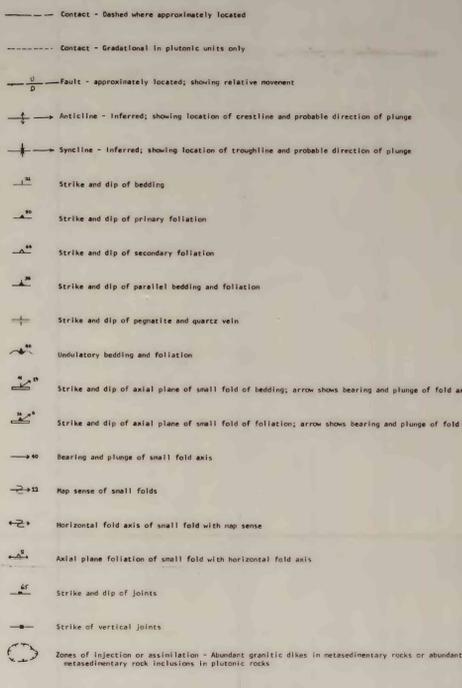


OVER FILE 76-26



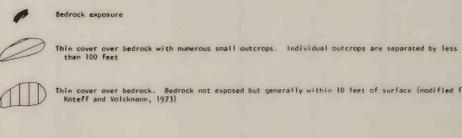
- DESCRIPTION OF UNITS**
- Dgn** GRANITE (Lower Devonian) - Massive to mildly foliated, equigranular leucocratic granite. Muscovite and/or biotite sometimes present, but rare, and present in amounts less than a few percent. Small (1-2 cm) accessory garnets are very common. Rock often contains small metasediment inclusions and pegmatite segregations. Mapped only in areas west of the Beaver Brook Fault. May be equivalent to the granite (Gn) mapped in the eastern part of the quadrangle mapped by Emerson (1917) as Fitchburg Granite.
 - Dg** GRANITE (Lower Devonian) - Massive to mildly foliated leucocratic granite. Dominantly medium- to coarse-grained, locally equigranular or pegmatitic. Muscovite and/or biotite are present in some areas but are never abundant, and generally less than 5 percent in volume. Typically forms small intrusive bodies. May be correlative with the binary granite of Billings (1965).
 - Dgd** BIOTITE GRANODIORITE (Lower Devonian) - Hypidiomorphic granular, medium to coarse-grained leucocratic granodiorite-granite. Biotite usually present in volume up to 10 percent and generally defines a well-developed foliation.
 - Dgd4** BIOTITE AMPHIBOLE GRANODIORITE-BIOTITE (Lower Devonian) - Hypidiomorphic granular, medium to coarse-grained biotite-rich granodiorite-granite. Dark green amphibole is usually present in the more mafic varieties. Amphibole is usually rimmed by biotite. Knots of biotite occur in more leucocratic varieties. Biotite megacrysts and may represent amphibole replaced by biotite. Euhedral (2 mm) sphene is locally abundant as an accessory mineral. Locally the rock may become slightly porphyritic with a few percent of subhedral to euhedral K-spar phenocrysts up to one cm long. Well-developed foliation is characteristic. Foliation trends generally parallel to the regional tectonic grain, but is locally divergent. This unit often contains numerous metasedimentary rock inclusions oriented parallel to the foliation and is locally discordant to the host rock.
 - Dd** AMPHIBOLE BIORITE (Lower Devonian) - A relatively mafic variation of unit Dgd. Chloritized amphibole, which is the dominant mafic mineral, gives the rock a green color. Foliation is very weakly developed if present at all.
 - Ds** MUSCOVITE-QUARTZ SCHIST (Devonian or older) - Rusty weathering silvery muscovite-quartz schist, usually containing abundant quartzite. A very distinctive lithologic unit which is only seen in a small area near the eastern margin of the quadrangle. This unit outcrops poorly and may be interbedded with unit Dg. An outcrop north of the Pepperell quadrangle (on Rt. 130) shows a gradational contact between this unit and rocks of Dg. The thickness of this unit may be greater than 30 m.
 - Dgw** GREEN QUARTZITE AND GRANOFELS (Silurian or Devonian) - Biotite and actinolite-bearing greenish quartzite interbedded with purplish fine-grained biotitic feldspathic metasediments and granofels. Minor thin (0.5 cm) bands of calcillite granofels consisting of coarse-grained plagioclase, quartz, and actinolite facies. This unit apparently correlates with Peck's unit 5 of the Clinton quadrangle and is likely correlative with Emerson's (1917) eastern quartz schist. This unit is similar to rocks of the Barwick Formation in the type section in Maine and New Hampshire. This unit is only mapped west of the Beaver Brook Fault.
 - Dg1** PURPLE, GRAY, AND GREEN QUARTZITE METASANDSTONE, AND GRANOFELS (Silurian or Devonian) - "Basal(?) strata" consist of medium-bedded (5-12 cm) red and green laminated quartzite, sometimes with visible actinolite and/or biotite, gray quartzite, and biotite-rich quartzite, metasediments and siltstone. The basal strata may be correlative with Emerson's (1917) Gadale Quartzite (see below, just a part of the Gadale). A medial "transition zone" consists of medium-bedded (5-10 cm) fine-grained biotite-bearing red and green quartzite and metasediments interbedded with variable amounts of laminated biotite-rich metasediments and biotite granofels with a distinctive salt-and-pepper texture which occurs in laminated medium-bedded layers with even texture and well-developed foliation. This rock may also appear in the other strata of the unit and is characterized by either preserved sedimentary slump features or transposed bedding as indicated by isolated fold noses preserved in other wise uniform layers. The "upper(?) zone" lithology is similar to rocks of the Hebron Formation in Connecticut and southern Massachusetts.
 - Dg2** GRAY QUARTZITE (Silurian or Devonian) - Medium to thick-bedded (5-20 cm) gray, locally red and green quartzite. The quartzite is almost everywhere thinly laminated and interbedded with thin to medium-bedded phyllitic metasilicates and siltstone metasediments (partly volcanic?) which locally may comprise about half of the exposed section. The contact with unit Dg1 is not seen, but it could be gradational. It is arbitrarily drawn where the more interbedded metasilicates and siltstone metasediments (especially with actinolite) of unit Dg1 begin. Contact with unit Dg2 is gradational and is arbitrarily drawn where quartzite comprises at least 50 percent of the section and the interbedded metasilicates is generally more massive bedded than in unit Dg2 and is found in beds 12-22 cm thick. This unit most likely correlates with unit 1 of Peck in the Clinton quadrangle. It could be correlative with the Silvery Formation or perhaps a quartzite-rich facies of the Elliot Formation in the Merrimack Group. The unit also likely correlates with a portion of rocks mapped with Emerson's (1917) Gadale Quartzite.
 - Dg3** GRAY METASILTSTONE (Silurian or Devonian) - Typically thin to medium-bedded (commonly 0.6 cm, but as much as 12 cm) metasilicates and phyllitic metasilicates with minor amounts of interbedded thin-bedded gray quartzite; locally a micaceous very fine-grained metasediment. This unit is characteristically spotted by small ankerite grains which weather to limonite. Phyllite, where present, is often very thinly bedded or occurs as laminae separating metasilicate layers. Layers are very distinct. This unit grades well into unit Dg1 as the metasilicate layers become thicker-bedded (up to 23 cm) and become less micaceous and begin to develop a blocky cleavage. This unit also grades into the phyllite of unit Dg1 as the siltstone layers get thinner-bedded and phyllitic layers become more numerous and thicker. In general, a progression from a more phyllitic thinner-bedded rock to a more massive bedded silty rock is characteristic of this unit in the direction of unit Dg1. This unit is lithologically correlative with Peck's unit 2 of the Clinton quadrangle and the Elliot Formation of the Merrimack Group. It is possibly correlative with rock mapped as part of Emerson's (1917) Gadale Quartzite.

- Dg2/3** SILVERY GRAY PHYLITE (Silurian or Devonian) - Silvery-gray sericitic-rich phyllite and silty phyllite, uniformly thin-bedded (0.5 m). Characteristically spotted by small ankerite grains which weather to limonite. Some uppermost ankerite layers are present. The unit is almost everywhere deformed by chevron folds and is contorted. The unit is apparently correlative with a portion of Peck's unit 2 or 3 and may be lithologically similar to parts of the Elliot Formation of the Merrimack Group. This unit was apparently included in the Worcester Phyllite by Emerson (1917).
- Dg3** DARK GRAY PHYLITE (Silurian or Devonian) - Dark gray phyllite and silty phyllite; ankerite is rare to absent. The unit appears to be slightly carbonaceous. This unit is almost everywhere strongly deformed by chevron folds and is contorted; found only adjacent to the Beaver Brook Fault. The unit may be correlative with part of Peck's unit 3 and was included in the Worcester Phyllite by Emerson (1917).



- Geological Symbols**
- Contact - Dashed where approximately located
 - Contact - Gradational in plutonic units only
 - - - - - Fault - approximately located; showing relative movement
 - ~ Anticline - Inferred; showing location of crestline and probable direction of plunge
 - ~ Syncline - Inferred; showing location of troughline and probable direction of plunge
 - Strike and dip of bedding
 - Strike and dip of primary foliation
 - Strike and dip of secondary foliation
 - Strike and dip of parallel bedding and foliation
 - Strike and dip of pegmatite and quartz vein
 - Undulatory bedding and foliation
 - Strike and dip of axial plane of small fold of bedding; arrow shows bearing and plunge of fold axis
 - Strike and dip of axial plane of small fold of foliation; arrow shows bearing and plunge of fold axis
 - Bearing and plunge of small fold axis
 - Map sense of small folds
 - Horizontal fold axis of small fold with map sense
 - Axial plane foliation of small fold with horizontal fold axis
 - Strike and dip of joints
 - Strike of vertical joints
 - Zones of injection or assimilation - Abundant granitic dikes in metasedimentary rocks or abundant metasedimentary rock inclusions in plutonic rocks

Note: A large silicified breccia zone is also found on the west side of Heald Pond in the Townsend quad range along the southern extension of the Beaver Brook Fault.

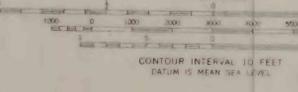


- Selected References**
- Emerson, B. K., 1917, Geology of Massachusetts and Rhode Island: U. S. Geol. Survey Bull. 597, 289 p.
 - Hussey, A. M., II, 1968, Stratigraphy and structure of southwestern Maine, in: Zim, Isaac, White, V. S., Malver, D. B., and Thompson, J. B., Jr., (eds.), Studies of Appalachian geology, northern and maritime: New York, Interscience Publishers, p. 291-301.
 - Peck, J. M., 1975, Preliminary bedrock geology of the Clinton quadrangle, Worcester County, Massachusetts: U. S. Geol. Survey Open File Map no. 75-656, 1 map, cross-sections (3 sheets) scale 1:24,000, text, 30 p. (In press), Silurian and Devonian stratigraphy in the Clinton quadrangle, central Massachusetts, (p. Page, L. R. (ed.), Stratigraphy of New England: Geol. Soc. Amer. Mem. 142.

EXPLANATION FOR INTERIM GEOLOGIC MAP
OF THE PEPPERELL QUADRANGLE,
MASSACHUSETTS - NEW HAMPSHIRE
by
G. R. Robinson, Jr.
1975

sheet 3 of 3

Base map by U.S. Geological Survey, 1965.
15,000-foot grid based on Massachusetts coordinate system, modified zone, and New Hampshire coordinate system.
9000 meter Universal Transverse Mercator grid ties, zone 19.



Geology mapped in 1975 by G. R. Robinson, Jr., A. J. Barrett, S. L. Russell, and P. Wergel, under the direction of E. L. Bourdette

INTERIM GEOLOGIC MAP OF THE PEPPERELL QUADRANGLE, MASSACHUSETTS - NEW HAMPSHIRE

Outcrop Distribution
by
G. R. Robinson, Jr.
1975

Massachusetts (Pepperell quad), sheet 1:24,000 1976.
sheet 2
Cop. 1

