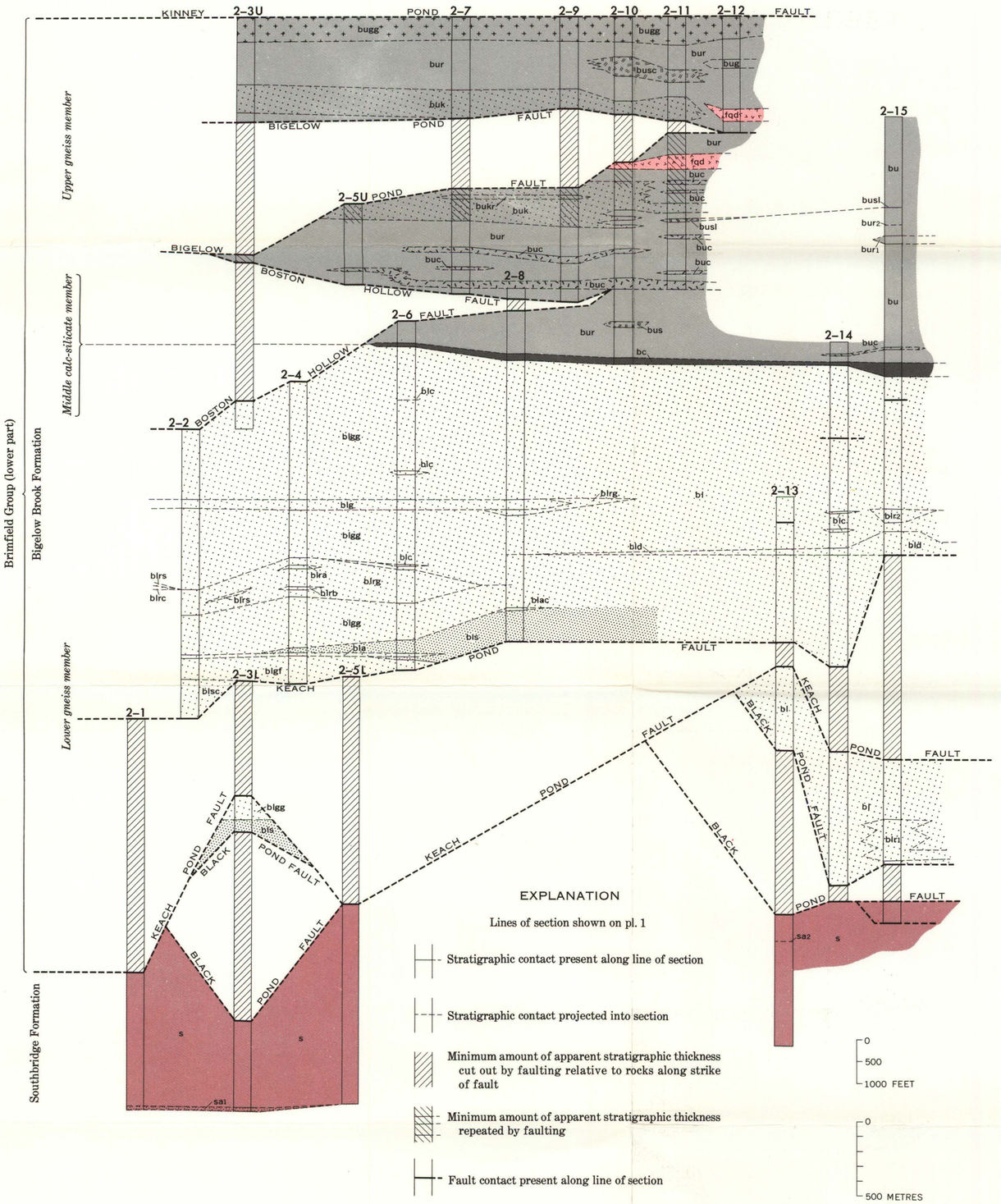
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE STATE OF CONNECTICUT
GEOLOGICAL AND NATURAL HISTORY SURVEY
AND THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

BULLETIN 1389
PLATE 2




# STRATIGRAPHIC COLUMNS OF THE BIGELOW BROOK FORMATION, BRIMFIELD AREA, CONNECTICUT AND MASSACHUSETTS

Note: Hyphenated mineral names give minerals in general order of decreasing abundance. Minerals in parentheses are not present in all samples of the rock type. Letter symbols refer to lithologic units mapped at 1:24,000 scale, and these units may occur at more than one stratigraphic position in the section. For reasons of scale, most mapped lithologic units are not shown on the 1:125,000-scale geologic map (pl. 1), which emphasizes member subdivisions and persistent mapped lithologic units (marker units). Thus unit bl on the geologic map designates the entire lower gneiss member of the Bigelow Brook Formation, whereas blgg, blg, and other units in the stratigraphic columns of this plate refer to mapped lithologic units in the lower gneiss member. Units bu and bl represent undivided upper and lower gneiss members as mapped in the Eastford quadrangle (Pease, 1972). The columns were constructed from geologic maps of the Westford and Eastford quadrangles (Peper and Pease, unpub. data, and Pease, 1972). Vertical scale: 1 inch is approximately 2,000 feet (610 m).

## DESCRIPTION OF MAP UNITS

### BIGELOW BROOK FORMATION

UPPER GNEISS MEMBER (bu on pl. 1)

**+bugg+** Interlayered gray sillimanite schist and quartz-plagioclase gneiss.—Medium-gray- to brownish-gray-weathering coarse-grained plagioclase-quartz-potassium feldspar-biotite-garnet-(sillimanite)-(cordierite) schist and gneiss interlayered with appreciable amounts of medium- to fine-grained gray-weathering granular quartz-plagioclase- biotite-(diopside)-(garnet) gneiss that predominates in some areas. Granular gneiss of unit bugg contains plagioclase as calcic as bytownite locally in the Wales quadrangle. Granular gneiss typically well-layered in relict beds 1–3 inches (3–8 cm) thick; locally cross-laminated or graded in Westford quadrangle. Uppermost unit of upper gneiss member extends throughout map area

**bur** Rusty-weathering schist and gneiss.—Rusty red-orange- to brownish-gray-weathering plagioclase-quartz-potassium feldspar-biotite-(garnet)-sillimanite schist and gneiss locally interlayered with subordinate thin layers of grayish-green diopside-bearing calc-silicate gneiss, rusty fissile sulfidic sillimanite schist, and fine-grained dark-gray dense feldspathic biotite- and diopside-bearing quartzite in layers 1–3 inches (3–8 cm) thick

**fqd** Sill of foliated quartz diorite (fqd on pl. 1), not part of Bigelow Brook Formation.—Medium- to dark-gray-weathering strongly to weakly foliated biotite-hornblende diorite and quartz diorite, grading locally into light-gray-weathering biotite quartz monzonite. Margins concordant with foliation of country rock and marked by rare lit-par-lit injection over distances of several feet. Xenoliths of calc-silicate gniess and schlieren of hybridized schist common in marginal zone 20–80 feet wide (6–24 m)

**busc** Rusty sulfidic schist and calc-silicate gneiss.—Thinly parted fissile plagioclase-quartz-potassium feldspar-biotite-(sillimanite)-(garnet) schist interleaved, on a scale of 1–10 inches (3–25 cm), with subordinate but appreciable amounts of thinly layered grayish-green-weathering diopside, scapolite, and garnet-bearing calc-silicate gneiss

**bug** Light-gray-weathering granular gneiss.—Thinly layered quartz-plagioclase-biotite-(diopside)-(garnet) gneiss interleaved with subordinate rusty sulfidic and nonsulfidic gneiss and schist

**buk** Granular gneiss and schist (buk on pl. 1).—Light- to medium-gray-weathering well-layered plagioclase-quartz-biotite-(diopside) gneiss in relict beds 1–3 inches (3–8 cm) thick; locally more abundant medium-gray- to brownish-gray-weathering plagioclase-quartz-potassium feldspar-biotite-(sillimanite)-(garnet) schist and gneiss, and thinly layered greenish-gray- to dark-green-weathering diopside- and hornblende-bearing calc-silicate gneiss

**bukr** Fissile sulfidic schist and rusty-weathering feldspathic schist

**buc** Gray granular calc-silicate-bearing gneiss and schist.—Well-layered medium-grained granular plagioclase-quartz-biotite-(garnet) gneiss with diopside and green hornblende in small amounts. Interleaved and alternating with strongly parted sparsely sillimantic plagioclase-quartz-biotite-(garnet) schist on a scale of 3 inches to 2 feet (8–61 cm). Individual relict beds locally graded. Rare to locally abundant thinly layered dark-greenish-gray-weathering black hornblende- and diopside-bearing calc-silicate gneiss. Lithologic units buc occur in lenses that are several hundred feet (61 m) thick and grade by interbedding over distances of 10–20 feet (3–6 m) into rocks of surrounding units bu and bur

**busl** Sillimanite-megacryst gneiss.—Medium-gray weathering plagioclase-quartz-(potassium feldspar)-sillimanite-garnet-biotite gneiss and schist which contain fibrolitic sillimanite both in the matrix and as inch-sized blue-white prismatic aggregates (pseudomorphic after kyanite). Locally contains garnet-rich biotite-sillimanite schist

**bus** Sulfidic schist.—A lens of fissile rusty sulfidic plagioclase-quartz-(potassium feldspar)-sillimanite-biotite-(garnet) schist locally interleaved with rare thin layers of calc-silicate gneiss or dark-gray fine-grained biotite- and diopside-bearing feldspathic quartzite, mapped within rusty-weathering schist and gneiss unit, bur, near base of member

MIDDLE CALC-SILICATE MEMBER (bc on pl. 1)

**bc** Calc-silicate gneiss and biotite schist.—Thinly laminated, locally zoned, olive-gray- to dark-greenish-gray-weathering fine-grained plagioclase-quartz gneiss layers, 2–15 feet (0.6–4.5 m) thick, containing diopside, green hornblende, scapolite, and small amounts of graphite, carbonate, and sphene; interlayered with gray- to light-brown-weathering plagioclase-quartz-biotite-(garnet) schist containing small amounts of actinolite, diopside, or dark-green hornblende, and also interlayered with rarer dark-yellowish-orange-weathering schist containing garnet and sillimanite

LOWER GNEISS MEMBER (bl on pl. 1)

**blgg** Gray garnetiferous schist and calc-silicate gneiss.—Coarse-grained medium-gray-weathering plagioclase-quartz-(potassium feldspar)-biotite-garnet-(sillimanite) schist and gneiss; well foliated and strongly layered, may contain small amounts of hornblende, diopside, or actinolite. Contains sparse thin beds of calc-silicate gneiss and locally abundant lenses of brownish-gray- to yellow-orange-weathering feldspathic schist with potassium feldspar and fibrolitic sillimanite

**blc** Thin lenses in which calc-silicate gneisses are abundant (included in bld on pl. 1).—Mapped at four localities, present but not mapped throughout the member

**blg** Interlayered mafic gneiss and biotite gneiss and schist (blg on pl. 1).—Strongly layered, light- to dark-gray-weathering plagioclase-quartz-biotite gneiss bearing small amounts of black hornblende, clinopyroxene, or pale-brown amphibole; interlayered with locally more abundant garnetiferous gray biotite schist and gneiss. Locally contains banded gneiss in which thin layers of amphibolite alternate with thin layers of leucocratic plagioclase-quartz-biotite gneiss on a scale of 1–2 inches (3–5 cm)

**blrg** Rusty-weathering schist and gneiss.—Moderate-brown-, moderate-yellowish-brown, to brownish-gray-weathering gneiss. Massive to strongly parted layers 3–8 inches (8–20 cm) thick of medium- to coarse-grained feldspathic gneiss alternate with subordinate thinner layers 0.25–2 inches (0.6–5 cm) thick of more schistose medium-grained gneiss richer in fibrolite, biotite, and garnet. Garnets typically weathered and coated with light-brown limonite and hematite. Gneisses typically contain thin concordant feldspar-quartz veins and clots, as well as megacrysts of potassium feldspar and oligoclase. Lenses within the unit include the following:

**blrs** blrs—Red-orange-weathering sulfidic fibrolite schist

**blrc** blrc—Grayish-green diopside- and green hornblende-bearing calc-silicate gneiss

**blra** blra—Dark-gray weakly foliated hornblende-plagioclase-diopside amphibolite

**blrb** blrb—Gray garnetiferous biotite schist

**bld** Diopside-bearing gneiss (bld on pl. 1).—Thinly layered light- to dark-gray-weathering diopside- and green hornblende-bearing gneiss interleaved with locally more abundant brownish-gray-weathering medium- to coarse-grained plagioclase-quartz-biotite-garnet schist

**blac** Interlayered amphibolite and calc-silicate gneiss.—Thinly layered medium-dark-gray-weathering diopside-bearing hornblende-plagioclase amphibolite grading upward by interbedding into thin-layered dark-greenish-gray-weathering plagioclase-quartz-diopside gneiss with minor biotite, green hornblende, and garnet. Interlayered in upper 30 feet (9 m) with thinly parted medium- to light-gray-weathering feldspar-quartz-biotite-sillimanite-garnet schist

**bls** Rusty sulfidic schist.—Variegated, rusty-weathering fissile sulfidic feldspar-quartz-biotite-garnet-(sillimanite) schist interlayered with subordinate rusty feldspathic gneiss of similar mineralogy. This unit not mapped separately in the Eastford quadrangle

**bla** Interlayered hornblende-biotite gneiss and amphibolite.—Medium-grained medium-gray massive to layered plagioclase-hornblende-biotite-(garnet) gneiss locally interlayered with hornblende-plagioclase amphibolite and gray- and rusty-weathering plagioclase-quartz-biotite-garnet schist. Massive gneiss locally contains several inch- to foot-sized (8–30 cm) nodular feldspar-quartz-biotite aggregates, faintly to strongly outlined by wavy parting surfaces. Gneiss also contains rare inch-sized prism-shaped aggregates of light-brownish-gray amphibole pseudomorphic after pyroxene

**blgf** Feldspathic gray biotite schist.—Medium-light-gray- to olive-gray-weathering, medium- to coarse-grained quartz-plagioclase-biotite-garnet schist interleaved with subordinate medium- to coarse-grained schist and gneiss with as much as 10 percent fibrolitic sillimanite and 5–20 percent limpid pink garnet. Most schist contains inch-sized (2.5 cm) irregular veins and patches of feldspar-quartz aggregate, also megacrysts of oligoclase and microcline-microperthite. Outcrops typically contain a few thin layers of hornblende- and diopside-bearing calc-silicate gneiss

**blsc** Interlayered sulfidic sillimanite gneiss and calc-silicate gneiss.—Dark- to moderate-reddish-brown- and pale-greenish-yellow-weathering sulfidic and graphitic plagioclase-quartz-potassium feldspar-biotite-sillimanite-(garnet) schist interlayered with rare to abundant thin layers of dusky-green calc-silicate gneiss with greenish-black hornblende, diopside, and biotite

**bu / bl** Undifferentiated rocks of upper and lower gneiss members, respectively (bu and bl on pl. 1)

**bur1 / bur2 / blr1 / blr2** Show position of rusty-weathering schists and gneisses mapped in the Eastford quadrangle (Pease, 1972)

### SOUTHBRIDGE FORMATION OF M. H. PEASE, JR. (1972) (s on pl. 1)

**s** Interlayered quartz-plagioclase-biotite gneiss and subordinate feldspathic schist.—Light- to medium-gray-weathering granular quartz-plagioclase-biotite gneiss (Color Index 10–30), interlayered with rare light- to medium-gray-weathering feldspathic biotite-muscovite-(sillimanite) schist, light olive-gray calc-silicate gneiss, and plagioclase-hornblende-quartz-biotite gneiss. The granular gneiss may contain small amounts of diopside, hornblende, actinolite, muscovite, and potassium feldspar. Small pink garnets are present in amounts as large as 3 percent in granular gneiss in the upper 1,200 feet (370 m) of the unit, but are absent in the lower part. Feldspathic schists form rare thin layers in the lower one-third of the unit; these schists increase irregularly in thickness, abundance, grain size, and garnet content upwards in the unit, reaching thicknesses of 4 feet (1.2 m) and making up 20 percent of many individual exposures near the top of the interval

**sa2 / sa1** Interlayered feldspar-quartz-biotite gneiss and amphibolite.—Dark-gray fine- to medium-grained strongly foliated hornblende-plagioclase amphibolite interleaved with more abundant medium-gray fine-grained feldspar-quartz-biotite gneiss and feldspathic biotite-muscovite-(sillimanite) schist

## LOCATION OF END POINTS OF SECTION LINES FOR STRATIGRAPHIC COLUMNS

Connecticut grid system: XN, thousands of feet north; XE, thousands of feet east

| Column | Section line | Bearing | | |
|---|---|---|---|---|
| 2-1 | 377.35N, 761.30E | N52°W | to | 379.85N, 758.45E |
| 2 | 380.93N, 758.14E | N55°W | to | 386.58N, 748.75E |
| 3 U | 390.75N, 752.70E | N58°W | to | 390.20N, 748.75E |
| 3 L | 382.46N, 766.85E | N49°W | to | 386.18N, 762.04E |
| 4 | 386.04N, 761.92E | N47°W | to | 393.70N, 754.18E |
| 5 U | 398.03N, 757.63E | N39°W | to | 399.61N, 756.27E |
| 5 L | 387.68N, 773.85E | N47°W | to | 388.04N, 368.19E |
| 6 | 391.10N, 766.10E | N48°W | to | 398.50N, 758.05E |
| 7 | 401.56N, 760.21E | N57°W | to | 405.05N, 755.85E |
| 8 | 397.31N, 770.09E | N58°W | to | 403.06N, 761.34E |
| 9 | 405.42N, 762.90E | N51°W | to | 409.26N, 758.20E |
| 10 | 408.56N, 767.85E | N55°W | to | 413.80N, 761.05E |
| 11 | 419.64N, 769.50E | N56°W | to | 420.10N, 763.83E |
| 12 | 424.25N, 768.83E | N62°W | to | 425.58N, 766.19E |
| 13 | 400.25N, 780.65E | N59°W | to | 405.69N, 770.10E |
| 14 | 408.53N, 780.93E | N65°W | to | 412.90N, 770.03E |
| 15 | 418.60N, 786.21E | N67°W | to | 424.69N, 770.00E |

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1975