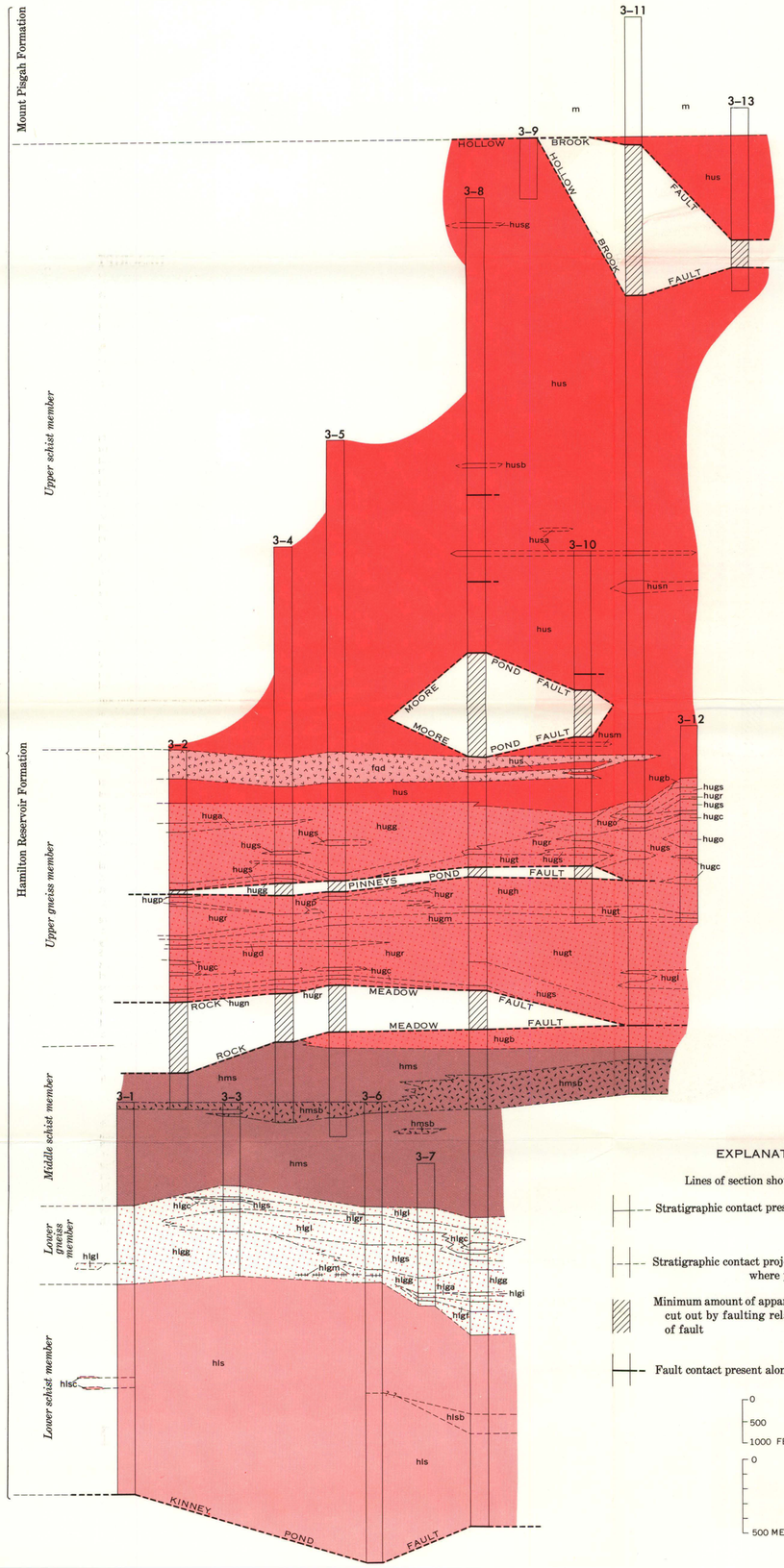
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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 3



Note: Hyphenated mineral names give minerals in decreasing order of general 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 his on the geologic map designates the entire lower schist member of the Hamilton Reservoir Formation whereas units his, hisb, and hisc in the stratigraphic columns of this plate refer to mapped lithologic units in the lower schist member. The columns were constructed from geologic maps of the Westford (Peper and Pease, unpub. data) and Wales (Seiders, unpub. data) quadrangles. Vertical scale: 1 inch is approximately 2,000 feet (610 m)

DESCRIPTION OF MAP UNITS

MOUNT PISGAH FORMATION (m on pl. 1)

m — Gray, garnetiferous granular schist and gneiss.—Light to medium gray, thin to very thick layered, fine to very coarse grained; composed of quartz, plagioclase, potassium feldspar, (garnet), biotite, (sillimanite), and (cordierite); graphite sparse and iron sulfide common. Rocks weather gray or grayish orange, less commonly reddish orange (moderately rusty), rarely moderate red and dark yellowish orange (intensely rusty). Sillimanite ranges from sparse or absent in gneiss to abundant in schist. Garnet, rimmed with potassium feldspar, locally absent in schist, commonly as coarse as 0.5–1 inch (1–2 cm) in gneiss

HAMILTON RESERVOIR FORMATION

UPPER SCHIST MEMBER (hus on pl. 1)

hus — Sulfidic graphitic gneiss and schist.—Medium- to coarse-grained quartz-(plagioclase)-(potassium feldspar)-biotite-(garnet)-(sillimanite)-(cordierite)-(sulfide)-(graphite) gneiss and subordinate schist. Sillimanite ranges from sparse to absent in gneiss to abundant in schist. Rocks weather moderate red, reddish brown, and yellowish orange; uncommonly nonsulfidic or sparsely sulfidic, sparsely graphitic. Rock is light to medium gray. Unit includes common but very subordinate light- to dark-gray thin- to medium-layered fine- to medium-grained plagioclase-quartz-(orthopyroxene)-(clinopyroxene)-biotite-(hornblende) gneiss, commonly containing sulfide and graphite

husg — Interlayered mafic and felsic gneiss.—Medium-gray thin- to medium-layered locally schistose fine- to medium-grained plagioclase-orthopyroxene-biotite-hornblende-clinopyroxene gneiss and light-gray thin- to thick-layered medium-grained plagioclase-quartz-biotite-garnet-(potassium feldspar) gneiss. Garnet gneiss is in part sulfidic, rusty weathering, and locally contains sparse sillimanite. Subordinate dark-gray amphibolite

husb — Pyroxene-bearing gneiss.—Medium- light- to dark-gray thin- to medium-layered fine- to medium-grained plagioclase-pyroxene-biotite-(hornblende)-(quartz) gneiss. Commonly contains orthopyroxene, locally contains clinopyroxene and hornblende. Locally biotite-rich and schistose. Commonly sulfidic

husa — Calc-silicate gneiss and amphibolite.—Thin- to medium-layered fine- to medium-grained highly sulfidic calc-silicate gneiss, greenish gray and composed of plagioclase, diopside, (hornblende), (scapolite), (calcite), and (quartz). Locally rich in sphene. Amphibolite is medium dark gray, composed of brown hornblende, plagioclase, and diopside. Both rock types are rust stained. Two stratigraphically equivalent lenses and one higher lens

husn — Mostly gray-weathering quartz-garnet-biotite-sillimanite-plagioclase-potassium feldspar gneiss

husm — Light-gray gneiss.—Plagioclase-quartz-potassium feldspar-biotite-orthopyroxene gneiss and subordinate dark-gray amphibolite

fqd — Foliated quartz diorite (fqd on pl. 1).—Massive and weakly foliated to layered and strongly foliated; medium to coarse grained. In Westford quadrangle, biotite-clinopyroxene quartz diorite; in Wales quadrangle, plagioclase-biotite-quartz-orthopyroxene-(garnet) gneiss. Locally includes minor thinly layered medium- to dark-gray amphibolite and a tongue of sulfidic and graphitic gneiss and schist

UPPER GNEISS MEMBER (hug on pl. 1)

hugg — Interlayered mafic and felsic gneiss.—Medium-light- to dark-gray thin- to medium-layered fine- to medium-grained quartz-calcic plagioclase-biotite-(orthopyroxene)-(clinopyroxene)-(colorless amphibole)-(garnet) gneiss. Subordinate plagioclase-hornblende-biotite-orthopyroxene-(quartz) gneiss, amphibolite, and thinly layered gray-green calc-silicate-bearing gneiss. Subordinate lenses of rusty-weathering garnet gneiss and sillimanite gneiss and schist

hugr — Rusty-weathering quartz-feldspar gneiss in two major lenses.—Upper lens is gray thin- to thick-layered fine- to coarse-grained quartz-plagioclase-potassium feldspar-biotite-garnet-(cordierite) gneiss. Commonly slightly to strongly rusty weathering, locally nonrusty weathering. Commonly contains sparse sillimanite and is interlayered with minor sillimanite schist and gneiss. Minor grayish-green calc-silicate gneiss. Lower lens is of similar lithology in Westford quadrangle; divisable northward into two lenses (hugs and hugt), in Wales quadrangle

hugb — Quartz-poor gneiss.— Medium-light- to medium-dark-gray thin- to medium-layered locally thick-layered fine- to coarse-grained pyroxene- and hornblende-bearing gneiss. Chiefly plagioclase-(hornblende)-orthopyroxene-biotite-(quartz)-potassium feldspar gneiss; subordinate but abundant plagioclase-(hornblende)-clinopyroxene-(orthopyroxene)-biotite-(quartz)-(potassium feldspar) gneiss. Local dark-gray amphibolite. Light-gray feldspar-quartz-(garnet)-biotite gneiss locally at top of lower unit. Lower lens is chiefly plagioclase-quartz-biotite-(diopside) gneiss in Westford quadrangle and includes subordinate rusty-red-weathering feldspar-quartz-biotite-(sillimanite)-(garnet) gneiss

hugs — Sulfidic sillimanite schist.—Lenses of sulfidic and graphitic sillimanite schist and gneiss and subordinate garnet gneiss like hugt. Lower two lenses grade into and interfinger with hugt in the Wales quadrangle and with hugg in the Westford quadrangle

hugo — Plagioclase-orthopyroxene gneiss.—Medium-gray thin- to medium-layered fine- to medium-grained plagioclase-(quartz)-orthopyroxene-biotite-(garnet) gneiss. Unit includes medium-dark-gray very thickly layered coarse-grained sulfidic and graphitic plagioclase-(quartz)-orthopyroxene-biotite gneiss. Local minor sillimanite schist

hugc — Calc-silicate gneiss.—Lenses of grayish-green to dark-gray thin- to medium-layered fine- to medium-grained plagioclase-diopside-(hornblende)-biotite-(scapolite)-(quartz)-(garnet)-(potassium feldspar)-(calcite)-(sphene) calc-silicate gneiss, in part sulfidic and graphitic

huga — Thinly layered two-amphibole gneiss.—Dark- and medium-gray thinly layered medium-grained quartz-plagioclase-hornblende-biotite gneiss and banded feldspar-quartz gneiss with garnet and pale-brown amphibole; minor amphibolite

hugp — Thickly layered amphibole gneiss.—Thickly layered hornblende-plagioclase amphibolite and banded feldspar-quartz-amphibole-biotite-(garnet) gneiss

hugd — Massive gneiss.—Light- to medium-gray massive to thickly layered strongly to weakly foliated medium-grained plagioclase-hornblende-clinopyroxene-(biotite) gneiss; local patchy alteration to actinolite-plagioclase rocks

hugh — Interlayered mafic and felsic gneiss.—Light- to medium-dark-gray thin to very thickly layered fine- to medium-grained plagioclase-quartz-(hornblende)-biotite-orthopyroxene-(potassium feldspar) gneiss with wide range in abundance of ferromagnesian minerals. Less abundant light-gray chiefly thick-layered medium-grained largely nonsulfidic rarely rusty-weathering plagioclase-quartz-biotite-garnet gneiss. Unit includes dark-gray amphibolite. In Westford quadrangle unit intertongues with hugr

hugt — Thick-layered felsic gneiss.—Light-gray thin- to thick-layered fine- to coarse-grained quartz-(plagioclase)-garnet-biotite-(potassium feldspar)-(cordierite) gneiss and granofels. In part rusty weathering sulfidic, graphitic; locally garnet rich. Commonly contains sparse sillimanite and is interlayered with subordinate sillimanite schist. Local minor grayish-green calc-silicate gneiss

hugm — Mafic gneiss.—Medium- to dark-gray thick to very thick layered locally thin- to medium-layered medium- to coarse-grained granular plagioclase-clinopyroxene-biotite-(quartz) gneiss. Clinopyroxene commonly overgrown or replaced by green, brown, and colorless amphibole. Locally biotite rich, well foliated. At East Brimfield unit contains orthopyroxene and hornblende instead of clinopyroxene. Granular gneisses intertongued locally with schists and rusty gneisses

hugl — Layered biotite gneiss.—Very light to medium-light-gray thin- to very thick layered medium- to coarse-grained quartz-plagioclase-potassium feldspar-biotite-(orthopyroxene)-(garnet) granitic gneiss. Unit has gradational contacts with subordinate interlayered quartz-feldspar pegmatite and medium-grained medium-gray feldspar-orthopyroxene-biotite-(quartz)-(hornblende) gneiss. Gneiss has local cross-cutting contacts with interlayered dark-gray amphibolite

hugn — Gray sillimanite-garnet schist.—Discontinuous lens of medium-gray plagioclase-quartz-potassium feldspar-biotite-sillimanite-garnet schist, typically with fresh pink garnets. Interfingers with overlying unit hugr

MIDDLE SCHIST MEMBER (hms on pl. 1)

hms — Sulfidic and graphitic schist.—Moderate-red- and yellowish-orange-weathering thinly layered (quartz)-biotite-(sillimanite)-(garnet)-(plagioclase)-(potassium feldspar)-(cordierite)-pyrite-graphite schist and gneiss having a wide range in mineral abundances. Chiefly quartz-biotite-sillimanite-garnet-feldspar schist and gneiss in Wales quadrangle. Chiefly quartz-feldspar-biotite-sillimanite-garnet gneiss in Westford quadrangle. Local thin-layered grayish-green calc-silicate gneiss and thin-layered dark-gray feldspathic quartzite

hmsb — Felsic biotite gneiss.—Medium-light- to medium-dark-gray thin- to medium-layered fine- to medium-grained quartz-plagioclase-clinopyroxene-biotite gneiss, commonly sulfidic and graphitic, rarely garnetiferous; very thickly layered medium- to coarse-grained light- to medium-gray plagioclase-quartz-potassium feldspar-biotite-orthopyroxene-(garnet) gneiss. Subordinate grayish-green calc-silicate gneiss, hornblende-bearing gneiss, and amphibolite. Unit locally intertongues with schist and gneiss of overlying unit hms. Includes calc-silicate gneiss in Westford quadrangle

LOWER GNEISS MEMBER (hig on pl. 1)

higl — Layered gneiss.—Medium-light- to medium-dark-gray thin- to thick-layered feldspar-pyroxene-quartz-(biotite)-(garnet) gneiss and subordinate but abundant gray-green calc-silicate gneiss and amphibolite. Rare coarse-grained orthopyroxene-hornblende-biotite-plagioclase gneiss, dark-gray quartzite, and sillimanite schist. Graphite was mined from veins in a plagioclase-potassium feldspar-biotite-quartz pegmatite within the unit

higr — Rusty gneiss and schist.—Rusty-weathering feldspar-quartz-biotite-garnet-(sillimanite) gneiss and locally abundant sulfidic and graphitic sillimanite schist.

higc — Calc-silicate gneiss.—Two lenses of grayish-green thin- to thick-layered fine- to medium-grained plagioclase-diopside-sphene-(hornblende)-(scapolite)-(quartz)-(calcite) calc-silicate gneiss

higs — Sulfidic and graphitic schist and gneiss.—Fissile sulfidic and graphitic sillimanite schist and thin- to thick-layered feldspar-quartz-garnet-biotite gneiss commonly with thin layers of calc-silicate gneiss

higg — Granular gneiss.—Thick lens in south which fingers northward into two lower lenses. Lens in south is medium-grained weakly to strongly layered plagioclase-(quartz)-biotite gneiss interlayered with subordinate feldspar-quartz gneisses with garnet, hornblende, pale-brown amphibole, or diopside. Lenses in north contain subordinate calc-silicate gneiss

higi — Thick-layered ferruginous gneiss.—Distinctive unit characterized by very thickly layered medium- to coarse-grained granular sulfidic garnet-quartz-apatite-biotite-graphite gneiss, in part especially rich in garnet and apatite. Contains appreciable sillimanite schist and gneiss in northern part

higa — Amphibolite gneiss.—In southern part, thin- to thick-layered plagioclase-hornblende-(clinopyroxene)-biotite amphibolite. Changes northward into a lower gneiss, which is generally dark gray and rich in biotite and orthopyroxene, and an upper gneiss, which is richer in orthopyroxene. Amphibolite present in both rock types but more abundant in lower gneiss

higm — Hypersthene-megacryst gneiss.—Lenses, 10–20 feet (3–6 m) thick, of medium-gray medium- to coarse-grained weakly foliated plagioclase-biotite-quartz-clinopyroxene gneiss. Gneiss contains rare 0.5 inch (1 cm) stubby megacrysts of hypersthene, partly altered to pale-brown amphibole

higf — Fissile graphite-rich schist.—Distinctive units of fissile medium-grained sulfide- and graphite-rich quartz-potassium feldspar-plagioclase-sillimanite-cordierite-graphite-biotite-(garnet) schist. Weathered rock is quite friable, very light gray with yellow- and brown-rust stains. In most exposures sparse biotite and garnet are destroyed by weathering

LOWER SCHIST MEMBER (his on pl. 1)

his — Sillimanitic, graphitic, and sulfidic schist and gneiss.—Coarse-grained yellowish-orange-weathering quartz-plagioclase-potassium feldspar-biotite-garnet-(sillimanite)-(graphite) gneiss interlayered with fissile sulfidic schist of the same mineralogy but richer in sillimanite and graphite. Gneiss more abundant below general stratigraphic horizon of hisb; schist more abundant above hisb. Minor thin to thick layers of dark-gray fine- to medium-grained in part quartz-rich quartz-feldspar-biotite-(clinopyroxene)-(garnet) gneiss. Sparse thin layers of medium-light-gray granular gneiss like that in the Bigelow Brook Formation east of the Kinney Pond fault

hisb — Granular gneiss and amphibolite.—Generally dark-colored granular gneiss and amphibolite interlayered in thick beds with subordinate sillimanite schist and gneiss. Granular gneiss is thin- to thick-layered medium- to dark-gray fine- to medium-grained commonly sulfidic plagioclase-hornblende-clinopyroxene-biotite-(orthopyroxene)-(quartz)-(garnet) gneiss. Local thick-layered medium-dark-gray plagioclase-orthopyroxene-quartz-biotite-pyrite gneiss contains myrmekite and shows intensive replacement of orthopyroxene by colorless amphibole

hisc — Calc-silicate gneiss.—Light- to medium-gray and grayish-green thinly layered plagioclase-quartz-biotite-(diopside) gneiss

EXPLANATION

Lines of section shown on pl. 1

Stratigraphic contact present along line of section

Stratigraphic contact projected into section; querried where probable

Minimum amount of apparent stratigraphic thickness cut out by faulting relative to rocks along strike of fault

Fault contact present along line of section

LOCATION OF END POINTS AND BEND POINTS OF SECTION LINES FOR STRATIGRAPHIC COLUMNS

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

Column	Section line	Bearing		
3–1	386.45N, 745.31E	N60°W	to	393.10N, 736.05E
2	406.45N, 744.15E	N65°W	to	410.25N, 736.00E
3	410.55N, 751.12E	N73°W	to	412.30N, 746.93E
4	413.25N, 748.07E	N65°W	to	419.04N, 735.95E
5	418.64N, 751.05E	N65°W	to	425.45N, 735.91E
6	415.05N, 761.50E	N61°W	to	420.61N, 751.02E
7	420.75N, 757.04E	N52°W	to	422.90N, 754.15E
8	427.15N, 766.70E	N67°W	to	434.95N, 749.23E
	N76°W to	437.30N, 736.46E		
9	440.80N, 737.20E	N71°W	to	441.43N, 735.77E
10	438.26N, 755.16E	N57°W	to	441.21N, 746.66E
11	449.44N, 764.20E	N70°W	to	452.90N, 752.85E
	N85°W to	454.30N, 737.45E		
12	464.28N, 763.00E	N85°W	to	465.03N, 757.75E
13	470.55N, 746.25E	N84°W	to	471.05N, 741.53E

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1975

STRATIGRAPHIC COLUMNS OF THE MOUNT PISGAH AND HAMILTON RESERVOIR FORMATIONS, BRIMFIELD AREA, CONNECTICUT AND MASSACHUSETTS