U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
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Prepared in cooperation with
THE U.S. DEPARTMENT OF ENERGY AND
THE STATE OF NEW HAMPSHIRE
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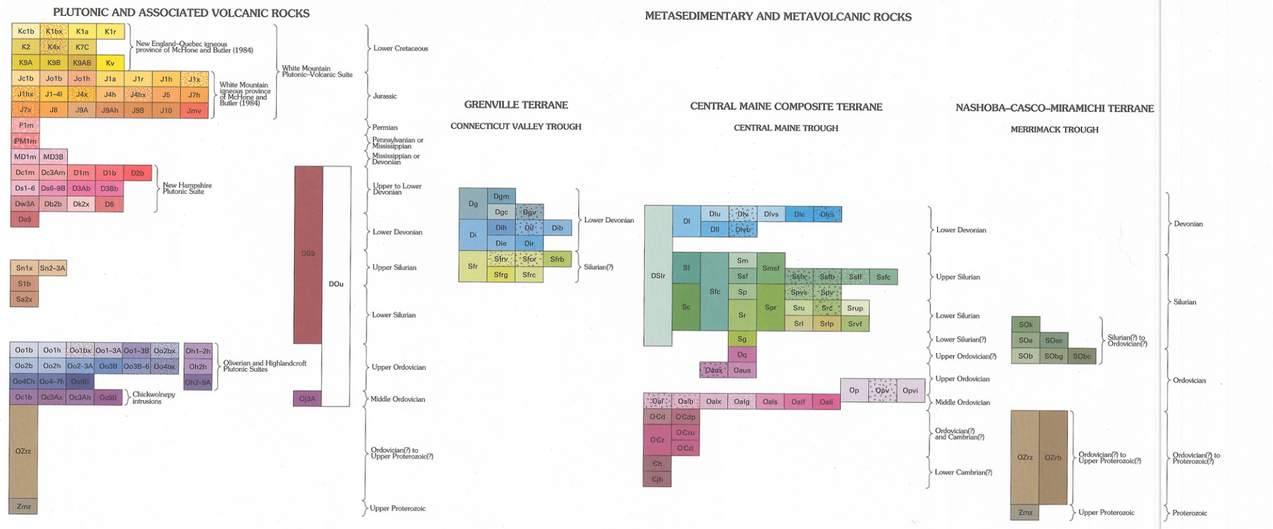
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

PLUTONIC AND ASSOCIATED VOLCANIC ROCKS

[See explanation of map unit symbols in section on "Plutonic Rock Compositions." Note: Because of their relative scarcity and lithologic diversity, volcanic rocks in igneous complexes have not been subdivided on a modified Streckeisen (1973) scheme. The lithologic part of some formal names has been changed in accordance with Streckeisen (1973)]

White Mountain Plutonic-Volcanic Suite (Cretaceous and Jurassic)—Includes Cretaceous alkalic syenite to granitic to gabbroic plutons, minor volcanic rocks, and lamprophyre dikes of the New England-Quebec igneous province of McHone and Butler (1984); also includes Jurassic granite and syenite and less abundant quartz syenite, diorite, gabbro, nepheline syenite, and volcanic rocks of the White Mountain igneous province of McHone and Butler (1984)

- Kc1b — **Mesoperthitic biotite granite (Early Cretaceous)**—Pink Conway-type granite of Kingsley (1931)
- K1bx — **Porphyritic biotite granite**—Pink to gray; hastingsite or riebeckite in some varieties
- K1a — **Rhyolite and fine-grained granite**—Includes some ignimbritic caldera-fill and minor intrusive rocks (part of Ossipee Mountain Complex of Kingsley, 1931); also some aphanitic gray, black, or tan quartz-feldspar porphyry
- K1r — **Medium-grained mesoperthitic granite containing riebeckite and (or) hastingsite**
- K2 — **Biotite-hornblende granodiorite**
- K4x — **Large mesoperthitic phenocrysts in a pink to gray quartz syenite porphyry of "Albany type"**—Alkalic amphibole or fayalite may be present. Part of Ossipee Mountain Complex of Kingsley (1931)
- K7C — **Gray augite-hornblende-biotite monzonite**
- K9A — **Hornblende diorite**—Coarse-grained to porphyritic
- K9B — **Augite-hornblende-biotite gabbro**—Fine- to coarse-grained
- K9AB — **Augite-hornblende diorite and gabbro**—Gray to black, coarse-grained, porphyritic. Found in Mt. Pawtuckaway quadrangle
- Kv — **Basalt**—Black, chiefly massive to porphyritic. Includes minor rhyolitic ignimbrite and andesitic tuff. Part of Ossipee Mountain Complex of Kingsley (1931)
- Jc1b — **Conway Granite (Late? and Middle Jurassic)**—Typically pink, coarse-grained mesoperthitic biotite (amphibole-free) granite; locally fine-grained or porphyritic

Mount Osceola Granite (Middle and Early Jurassic)

- Jo1b — Green biotite mesoperthitic granite
- Jo1h — Granite containing hornblende and, locally, hastingsite, ferrohedenbergite, or fayalite
- J1a — **Fine-grained granite**—Commonly contains alkalic amphibole and mesoperthite
- J1r — **Mesoperthitic granite**—Contains riebeckite and (or) hastingsite
- J1h — **Hastingsite granite**—Leucocratic, pink or light-brown, and mesoperthitic
- J1x — **Porphyritic granite**
- J1hx — **Granite porphyry (Early Jurassic)**—Granite containing phenocrysts of smoky quartz and microperthite; alkalic amphibole, hornblende, and hedenbergite or fayalite may be present. "Mount Lafayette" type granite porphyry of Billings (1955)
- J1–4l — **Leucocratic granite to quartz syenite**
- J4x — **Quartz syenite**—Commonly porphyritic and mesoperthitic; contains biotite and, locally, fayalite, hastingsite, hornblende, or ferrohedenbergite
- J4h — **Hornblende or alkalic amphibole quartz syenite**
- J4hx — **Porphyritic hornblende or alkalic amphibole quartz syenite**
- J5 — **Hornblende-biotite quartz monzodiorite**—Composition ranges from quartz monzonite to diorite
- J7h — **Hornblende (or alkalic amphibole) syenite**
- J7x — **Porphyritic syenite**—Hastingsite or hornblende and (or) hedenbergite are present
- J8 — **Augite monzodiorite**
- J9A — **Diorite**—Contains hornblende, biotite, and hedenbergite
- J9Ah — **Porphyritic hornblende diorite**—Found in northwestern New Hampshire
- J9B — **Gabbro**—Has varying amounts of olivine, augite, and hornblende
- J10 — **Nepheline-sodalite-hastingsite syenite**—Found at Red Hill in Mt. Chocorua quadrangle (see index accompanying "Sources of Map Data")
- Jmv — **Moat Volcanics (Middle Jurassic?)**—Bedded and ignimbritic tuffs, flows, and breccias; also porphyritic rhyolite and minor trachyte

Permian intrusive rocks

- P1m — **Gray biotite granite**—Contains minor muscovite. Found in Milford quadrangle

Pennsylvanian or Mississippian intrusive rocks

- IPM1m — **Two-mica granite of the Sebago batholith and Effingham pluton of eastern New Hampshire**

Mississippian or Devonian intrusive rocks

- MD1m — **Two-mica granite**—Found in northern New Hampshire
- MD3B — **Trondhjemite and abundant pegmatite**—Gray and fine-grained; possibly belonging to the Sebago batholith

New Hampshire Plutonic Suite (Late to Early Devonian)—Includes synkinematic and postkinematic granitoids related to the Acadian orogeny. Ages range from 410 to 365 Ma

- Dc1m — **Concord Granite (Late Devonian)**—Gray two-mica granite, locally grading to tonalite
- Dc3Am — **Two-mica tonalite**—Similar to Concord Granite; found in south-central New Hampshire
- D1m — **Two-mica granite of northern and southeastern New Hampshire**—Similar to Concord Granite
- D1b — **Pink equigranular biotite granite (Late Devonian)**—Found in Woodsville and Whitefield quadrangles and in small intrusive units in northern and southeastern New Hampshire
- D2b — **Porphyritic biotite granodiorite**—Found in Mt. Cube quadrangle
- Ds1–6 — **Spaulding Tonalite (Early Devonian) (Spaulding Quartz Diorite of Fowler-Billings, 1949)**—Weakly foliated to nonfoliated, spotted biotite quartz diorite, tonalite, granodiorite, and granite; garnet and muscovite may or may not be present
- Ds6–9B — **Hypersthene-biotite quartz diorite and hornblende or actinolite diorite or gabbro**—Spatially associated with Spaulding Tonalite plutons
- D3Ab — **Biotite tonalite**—Dark-gray; found in southeastern and western New Hampshire
- D3Bb — **Biotite trondhjemite in Rumney quadrangle**
- Dw3A — **Winnipesaukee Tonalite (Early Devonian) (Winnipesaukee Quartz Diorite of Billings, 1955)**—Gray, massive to foliated tonalite and minor quartz diorite, granodiorite, and granite. Probably coeval with Spaulding Tonalite
- Db2b — **Bethlehem Granodiorite (Early Devonian) (Bethlehem Gneiss of Billings, 1955)**—Gray, strongly foliated biotite-muscovite granodiorite and associated tonalite and granite
- Dk2x — **Kinsman Granodiorite (Early Devonian) (Kinsman Quartz Monzonite of Billings, 1955)**—Foliated granite, granodiorite, tonalite, and minor quartz diorite; large megacrysts of potassium feldspar characteristic; garnet locally abundant
- D6 — **Biotite quartz diorite in northeastern New Hampshire**

Devonian intrusive rocks[1]

- De9 — **Exeter Diorite (Early Devonian)**—Includes associated intrusive rocks of southeastern New Hampshire; pyroxene and pyroxene-hornblende diorite and gabbro, along with minor granodiorite and granite

Devonian(?), Silurian(?), and Ordovician(?) intrusive rocks

- DSØ — **Metamorphosed gabbro, diorite, and intrusive basalt dikes**—Chiefly in northern New Hampshire
- DOu — **Serpentinite and soapstone**—Found in central and western New Hampshire as very small bodies

Silurian intrusive rocks[1]

- Sn1x — **Newburyport Complex (Late Silurian)**—Medium-grained porphyritic granite
- Sn2–3A — **Newburyport Complex (early Late Silurian)**—Gray, medium-grained tonalite and granodiorite
- S1b — **Biotite granite stock and dikes (Late to Early Silurian)**—Northernmost New Hampshire
- Sa2x — **Ayer Granodiorite (Early Silurian)**—Gneissic granite to tonalite, locally coarsely porphyritic and muscovitic, southeastern New Hampshire

Oliverian Plutonic Suite[2] **(Late Ordovician)**—Pink, weakly to moderately foliated, locally porphyritic biotite granitoids found in mantled gneiss domes. Mafic varieties contain hornblende. Variably metamorphosed up to amphibolite facies

- Oo1b — **Biotite granite**—Pink, moderately to weakly foliated
- Oo1h — **Hornblende-biotite granite**
- Oo1bx — **Porphyritic (alkalic feldspar) biotite granite**
- Oo1–3A — **Granite, granodiorite, and tonalite**
- Oo1–3B — **Granite, granodiorite, and trondhjemite**
- Oo2bx — **Porphyritic biotite granodiorite in northern Jefferson dome in Milan quadrangle**
- Oo2b — **Biotite granodiorite**
- Oo2h — **Hornblende granodiorite**
- Oo2–3A — **Granodiorite to tonalite**
- Oo3B — **Trondhjemite**—Contains biotite and hornblende
- Oo3B–6 — **Trondhjemite and quartz diorite in northern Jefferson dome in Gorham quadrangle**
- Oo4qx — **Porphyritic biotite quartz syenite in central Jefferson dome in Mt. Washington quadrangle**
- Oo4Ch — **Hornblende quartz monzonite**
- Oo4–7h — **Hornblende-biotite quartz syenite to syenite**
- Oo9B — **Hornblende gabbro**

Highlandcroft Plutonic Suite[2] **(Late Ordovician)**—Pink to green rocks containing epidote, sericite, and chlorite. Found as stocks metamorphosed to greenschist facies and commonly sheared; coeval with Oliverian Plutonic Suite

- Oh1–2h — **Hornblende granite to granodiorite**—Part of Lost Nation pluton of northwestern New Hampshire
- Oh2h — **Hornblende granodiorite of Highlandcroft pluton**—Contains minor tonalite and diorite
- Oh2–9A — **Tonalite, diorite, granodiorite, and granite**—More mafic rocks have hornblende; part of Lost Nation pluton

Rocks of the Chickwolnepy intrusions in northern New Hampshire (Middle Ordovician)

- Oc1b — **Biotite granite**—Contains minor muscovite. Makes up Cambridge Black pluton
- Oc3Ax — **Porphyritic phase of hornblende-biotite tonalite**
- Oc3Ah — **Hornblende-biotite tonalite**
- Oc9B — **Gabbro and diabase**—Foliated to nonfoliated and coarse- to fine-grained; includes mafic dikes tentatively correlated with Chickwolnepy intrusions

Ordovician intrusive rocks

- O3A — **Tonalite (Middle Ordovician)**—Extended from Joslin Turn, Vermont

Ordovician(?) to Late Proterozoic(?) rocks

- OZrz — **Rye Complex**[3] **(Ordovician? to Late Proterozoic?)**—Migmatite consisting of gray, foliated, sheared or mylonitized two-mica granite and pegmatite, as well as minor hornblende-biotite diorite, intruding metapelites and metavolcanic rocks in southeastern New Hampshire

Late Proterozoic rocks

- Zmz — **Massabesic Gneiss Complex**[4] **(Late Proterozoic)**—Migmatite consisting of pink, foliated biotite granite intruding gneissic and granulose metasedimentary and metavolcanic rocks in southeastern New Hampshire

METASEDIMENTARY AND METAVOLCANIC ROCKS OF THE CONNECTICUT VALLEY TROUGH

- Dg — **Gile Mountain Formation, undivided (Lower Devonian)**—Gray to tan metawacke and schist or phyllite; gradational into the Meetinghouse Slate Member but is much more thickly bedded and less pelitic than the member. Includes minor metavolcanic lentils
- Dgm — Meetinghouse Slate Member—Gray to black phyllite and silty metasandstone turbidite
- Dgc — Interbedded gray slate or phyllite and brown-weathering calcite-ankerite metasiltstone—Contains minor marble and quartzite. Resembles Waits River Formation in Vermont
- Dqv — Mafic metavolcanic member—Possibly equivalent to Putney Volcanics of southeastern Vermont
- Dl — **Ironbound Mountain Formation**[5]**, undivided (Lower Devonian)**—Interbedded gray phyllite, in places containing feldspathic clasts, and feldspathic metasandstone, variably graded
- Dih — Grits at Halls Stream in northern New Hampshire—Thickly bedded feldspathic volcaniclastic grit and interbedded gray slate. Equivalent to Grenier Ponds Member of the Ironbound Mountain Formation in western Maine
- Div — Felsic volcanic member
- Dib — Basaltic to andesitic member
- Die — Euxinic metashale member
- Dir — Metarhyolite and microgranite intrusions
- Sfr — **Frontenac Formation**[6]**, undivided (Silurian?)**—Interbedded thick feldspathic wackes, tan and green slates, and minor calcareous lenses
- Sfrv — Mixed volcanic and sedimentary facies
- Sfrb — Proximal bimodal volcanic facies
- Sfrb — Metabasalt interbeds
- Sfrg — Graded-bedded metagraywacke and subordinate gray phyllite
- Sfrc — Massive tan- or brown-weathering calcite-ankerite-muscovite granofels and interbedded gray metapelite—Probably partly a facies equivalent to the Waits River Formation in Vermont

METASEDIMENTARY AND METAVOLCANIC ROCKS OF THE CENTRAL MAINE TROUGH

[Variably metamorphosed sedimentary and volcanic rocks of greenschist to granulite facies, locally migmatized. Area includes structural belts between the Monroe fault on the west and the Campbell Hill fault on the east; that is, the Bronson Hill anticlinorium, Piermont allochthon, Kearsarge-central Maine synclinorium, central New Hampshire anticlinorium, and Rochester-Lebanon (Maine) antiformal synclinorium]

- Dl — **Littleton Formation, undivided (Lower Devonian; Siegenian)**—Gray metapelite and metawacke and subordinate metavolcanic rocks; generally, but not everywhere, conformable with the underlying Fitch or Madrid Formations. Fossiliferous in western New Hampshire
- Dlu — Upper unnamed member—Light-gray metaturbidite, lithologically identical to, and probably correlative with, the Seboomook Formation of Maine. Coticule layers common
- Dlv — Volcanic lentils—Both mafic and felsic
- Dlvs — Epiclastic metavolcanic sediments
- Dlc — Calc-silicate rock—Possibly equivalent in part to Hildreths Formation of Maine but not restricted to one horizon. Locally fossiliferous, as in Moosilauke quadrangle
- Dlcs — Metaconglomerate and quartzite—Locally fossiliferous in Whitefield quadrangle
- Dll — Lower unnamed member—Thinly or poorly bedded aluminous lower part, somewhat rusty. Rare quartzite lentils. Carrabassett Formation in northwestern Maine is probably correlative
- Dlvs — Metabasaltic greenstone or amphibolite
- DSlr — **Migmatitic rocks (Devonian and Silurian)**—Formations unidentifiable owing to obliteration of original sedimentary or volcanic characteristics by anatexis or by numerous intrusions
- Sf — **Fitch Formation (Upper Silurian; Pridolian and Ludlovian)**—Metamorphosed limestone, calcareous sandstone, siltstone, and dark pelitic schist; lower contact is disconformable on the Clough Quartzite. Fossiliferous
- Sfc — **Fitch and Clough Formations, undivided (Silurian)**
- Sm — **Madrid Formation (Upper Silurian?)**—Massive to weakly foliated, purple biotite-feldspar granofels, layered calc-silicate, and dark pelitic-sulfidic schist containing calc-silicate pods in upper member; an eastern facies equivalent to the upper part of the Fitch Formation. Locally mapped as the Warner Formation of Nielson (1981) in southern New Hampshire
- Smsf — **Madrid and Smalls Falls Formations, undivided (Silurian)**
- Ssf — **Smalls Falls Formation, undivided (Upper to Middle Silurian; Ludlovian and Wenlockian)**—Very rusty weathering, thinly bedded sulfidic-graphitic schist and pyrrhotitic calc-silicate granofels. Eastern facies equivalent to lower part of the Fitch Formation. Locally mapped as Francestown Formation of Nielson (1981) in southern New Hampshire
- Sslv — Mixed metavolcanic rocks and metavolcanic sediments
- Ssfb — Metabasalt member
- Ssfl — Felsic metavolcanic member
- Ssfc — Metaconglomerate member—Found in Errol quadrangle in northern New Hampshire
- Sp — **Perry Mountain Formation, undivided (Middle? to Lower? Silurian)**—Sharply interbedded quartzites, light-gray nongraphitic metapelite, and "fast-graded" metaturbidites. Coticule layers common
- Spvs — Sedimentary and subordinate distal felsic and mafic volcanic facies in Piermont allochthon
- Spv — Volcanic facies in Piermont allochthon
- Spr — **Perry Mountain and Rangeley Formations, undivided (Silurian)**
- Sc — **Clough Quartzite (Lower Silurian; upper Llandoverian)**—Orthoquartzite, quartz metaconglomerate, muscovite schist, and minor polymictic metaconglomerate. Disconformable below the Fitch Formation and unconformable on Ordovician formations. Equivalent, in part, to member C of Rangeley Formation of Maine. Fossiliferous
- Sr — **Rangeley Formation, undivided (Lower Silurian; Llandoverian)**
- Sru — Upper part of Rangeley Formation—Rusty-weathering, pelitic schist, metasandstone, and local coarse-grained metasandstone lentils; calc-silicate pods common; minor coticule. Probably equivalent to member C of Rangeley Formation of Maine
- Src — Member C (uppermost) of the Rangeley Formation in Maine and northeastern and southwestern New Hampshire—Quartz-pebble conglomerate overlain by rusty metapelite and feldspathic quartzite
- Srup — Pink to green calc-silicate and purple biotite granofels—Thinly bedded. Close to transition from lower to upper parts of the Rangeley Formation. Probably equivalent to part of Paxton Formation of Zen and others (1983) in Massachusetts[7]
- Srl — Lower part of Rangeley Formation—Gray, thinly laminated (5-25 mm) metapelite containing local lentils of turbidites and thin quartz conglomerates in western New Hampshire. Sparse calc-silicate pods and coticule. Probably equivalent to member B of Rangeley Formation of Maine
- Srlp — Ribbon-banded calc-silicate of eastern New Hampshire—Probably equivalent to Patch Mountain Member of the Sangerville Formation (Llandoverian and Wenlockian) of central Maine
- Srvf — Felsic metavolcanic rocks—Found in south-central New Hampshire
- Sg — **Greenvale Cove Formation (Lower Silurian?)**—Grayish-violet interlaminated metashale, feldspathic metasandstone, and calc-silicate rock of the Piermont allochthon in western New Hampshire
- Oq — **Quimby Formation (Upper Ordovician?)**—Black graphitic-sulfidic rusty-weathering schist and thickly bedded metagraywacke

Ammonoosuc Volcanics (Upper and Middle Ordovician)

Upper part of Ammonoosuc Volcanics (Upper Ordovician)—Probably equivalent to Partridge Formation in Massachusetts

- Oaus — Bimodal volcanic rocks
- Oaus — Metasedimentary rocks—Contain mafic metavolcanic lenses
- Oal — Metavolcanic and metasedimentary rocks of the lower part of Ammonoosuc Volcanics, undivided (Middle Ordovician)
- Oalb — Metabasalt
- Oalx — Bimodal volcanic rocks—Locally includes unmapped **Oals**
- Oalg — Volcaniclastic metagraywackes
- Oals — Metasedimentary rocks
- Oalf — Felsic metavolcanic rocks
- Oali — White quartz-kyanite rock and silicate iron-formation
- Op — **Partridge Formation, undivided (Upper to Middle Ordovician)**—Black, rusty-weathering sulfidic-graphitic slate or schist and sparse to abundant metagraywacke. Lies stratigraphically between upper and lower parts of the Ammonoosuc Volcanics
- Opv — Interstratified metavolcanic rocks—Chiefly amphibolites, found in southwestern New Hampshire
- Opvi — White quartz-kyanite rock
- OCd — **Dead River Formation, undivided (Lower Ordovician? and Upper Cambrian?)**—Thinly laminated, "pin-striped" gray, green, or tan metapelite and quartzite
- OCdp — Graded-bedded metapelite—Found in Percy quadrangle of northern New Hampshire
- OCz — **Azizcohos Formation, undivided (Lower Ordovician? and Upper Cambrian?)**—Probably a lower pelitic facies of the Dead River Formation (shown in section only)
- OCzu — Upper unnamed member—Gray metapelite containing sparse siltstone laminations and abundant lenses of vein quartz
- OCzl — Lower unnamed member—Rusty, dark metapelite containing thin coticule laminations, feldspathic metatuff, and vein quartz lenses
- Ch — **Hurricane Mountain Formation (Upper Cambrian?)**—Rusty-weathered, dark siliceous scaly slate or schist having flaser structure and polymictic fragments ranging in size from a few millimeters up to (in Maine) several hundred meters. A mélange consisting of metasedimentary, felsic and mafic metavolcanic, and ultramafic rocks
- Cjp — **Jim Pond Formation (Upper Cambrian)**—Pillow metabasalt member. Lenses within the Hurricane Mountain Formation of northern New Hampshire interpreted as tectonic rafts of Jim Pond Formation

METASEDIMENTARY AND METAVOLCANIC ROCKS OF THE MERRIMACK TROUGH

Merrimack Group[8] **(Silurian? to Ordovician?)**—Includes Berwick, Eliot and Kittery Formations. See also footnote 1

- SOk — **Kittery Formation**—Tan, graded-bedded, calcareous metasandstone and purple and green phyllite. Grades into the Eliot Formation but facing direction is uncertain
- SOe — **Eliot Formation**—Gray to green phyllite, calcareous quartzite, quartz-mica schist, and well-bedded calc-silicate
- SOec — Calef Member—Black phyllite at western contact of the Eliot Formation
- SOb — **Berwick Formation**—Purple biotite-quartz-feldspar granofels or schist and interbeds of calc-silicate granofels and minor metapelites. Stratigraphic sequence with respect to Eliot Formation uncertain
- SObg — Gove Member—White muscovite schist. Equivalent to the Gonic Formation of Hussey (1962)
- SObc — Unnamed member—Contains more calc-silicate (15 percent) than does the remainder of the formation (5 percent)
- OZrz — **Rye Complex**[3] **(Ordovician? to Late Proterozoic?)**—Light-colored to gray schists and gneisses, quartzites, and amphibolites. Variably migmatized and mylonitized. Contact with Kittery Formation on west is the Portsmouth fault
- OZrb — Breakfast Hill Granite of Novotny (1964)[9]—Blastomylonitic quartz-feldspar granitic gneiss and pegmatite intruded the Rye Complex and formed a migmatite
- Zmz — **Massabesic Gneiss Complex**[4] **(Late Proterozoic)**—Quartzose-feldspathic gneiss and biotite schists (locally rusty), granofels, and calc-silicate rocks closely intruded by, and grading into, a pink gneissic granite (623 Ma) that produced a migmatite

EXPLANATION OF MAP SYMBOLS

Contact—Dashed where location is inferred (shown in section only); dotted across large lakes

FAULTS

Normal fault—Ticks on downthrown side. Dotted across large lakes. **Abbreviations:** AF, Ammonoosuc; GF, Grantham; NF, Newbury; MBF, Mesozoic border fault; HHG, Hyland Hill graben; MLG Mine Ledge graben; WHG, West Hill graben

High-angle or strike-slip fault—U on upthrown block and D on downthrown block or arrows where relative direction of movement is known. Commonly silicified or expressed as a topographic lineament. Abbreviations: DRF, Dead Water Ridge; DiPF, Diamond Pond; DPF, Deer Pond; TPF, Thrasher Peaks; BLF, Bill Little; NHF, Northey Hill; PPF, Pine Peak; RRF, Roxbury Road; PF, Pinnacle; SF, Spofford; CHF, Campbell Hill; SLF, Silver Lake; FHF, Flint Hill; MHF, Misery Hill

High-angle thrust fault or shear zone—Filled sawteeth on upper plate. Dashed where location is inferred. Characterized by strong ductile fabric. Abbreviations: PTF, Portsmouth; TBF, Tunnel Brook

Low-angle thrust fault or normal slide—Open sawteeth on upper plate. Dashed where location is inferred. Generally folded. Abbreviations: MF, Mahoosuc; PMF, Plumbago Mountain; TF, Thornton; FHF, Foster Hill; MNF, Monroe; CF, Canterbury; CPF, Chesham Pond; BHF, Brennan Hill

Undifferentiated fault—Dashed where location is inferred (shown in section only)

OTHER FEATURES

Premetamorphic breccia—Angular clasts of varying sedimentary protolith scattered through a matrix of sulfidic black phyllite

Dikes

PLUTONIC ROCK COMPOSITIONS

[Modified from Streckeisen (1973) and Osberg and others (1985)]

From left to right, plutonic labels give the age, formation name (if applicable), composition in a modified Streckeisen system (two or more numbers for a compositional range), characteristic mineralogy, and textures or special features. Volcanic rocks (v) are not classified similarly.

Composition

1 Granite (either alkali- or two-feldspar granite)
2 Granodiorite
3A Tonalite
3B Trondhjemite
4 Quartz syenite (4A and 4B)
4C Quartz monzonite
5 Quartz monzodiorite
6 Quartz diorite
7 Syenite (7A and 7B)
7C Monzonite
8 Monzodiorite
9A Diorite
9B Gabbro
10 Foid-bearing syenite
11 Foid-bearing monzodiorite
12 Foid-bearing gabbro-diorite

Other rocks

u Ultramafic rocks

Characteristic mineralogy

b Biotite (may have minor muscovite)
m Muscovite or muscovite and biotite
h Hornblende or hastingsite (plus biotite)
r Riebeckite (plus hastingsite)

Texture or structure

x Porphyritic or megacrystic
z Migmatized
a Aphanitic or fine-grained
l Leucocratic

Examples

Dc1m Devonian Concord two-mica granite
J9B Jurassic gabbro
Dk2x Devonian Kinsman megacrystic granodiorite

FOOTNOTES

[1]The Early Devonian and Late Silurian age assignments for the Exeter and Newburyport plutons of southeastern New Hampshire are based on work by Bothner and others (1993), which supersedes several previously reported isotopic ages.

[2]For age constraints on Oliverian and Highlandcroft Plutonic Suites, please see list of isotopic ages accompanying the "Plutonic Map Showing Isotopic Age and Fossil Control."

[3]The name Rye Formation is here revised as Rye Complex because the unit consists of granite intruding gneissic and granulose metasedimentary and metavolcanic rock. The Breakfast Hill Granite of Novotny (1964), or the granite at Breakfast Hill (Novotny, 1969), has been included in what had been the "upper metavolcanic member" of the Rye Formation of Novotny (1969). Hussey (1980) first recognized that the "metavolcanic member" was composed of strongly deformed granitic intrusions.

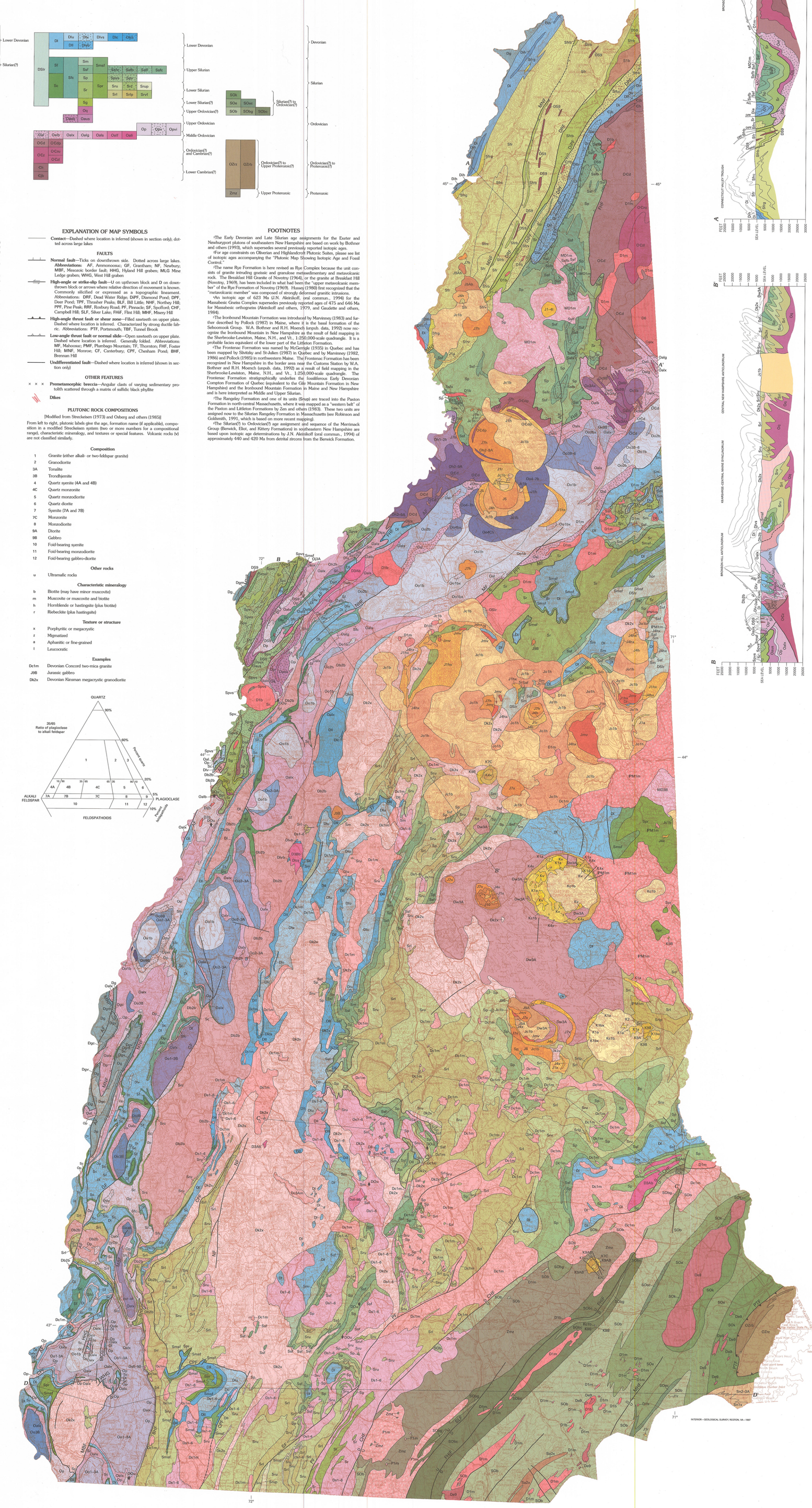
[4]An isotopic age of 623 Ma (J.N. Aleinikoff, oral commun., 1994) for the Massabesic Gneiss Complex supersedes previously reported ages of 475 and 646 Ma for Massabesic orthogneiss (Aleinikoff and others, 1979, and Gaudette and others, 1984).

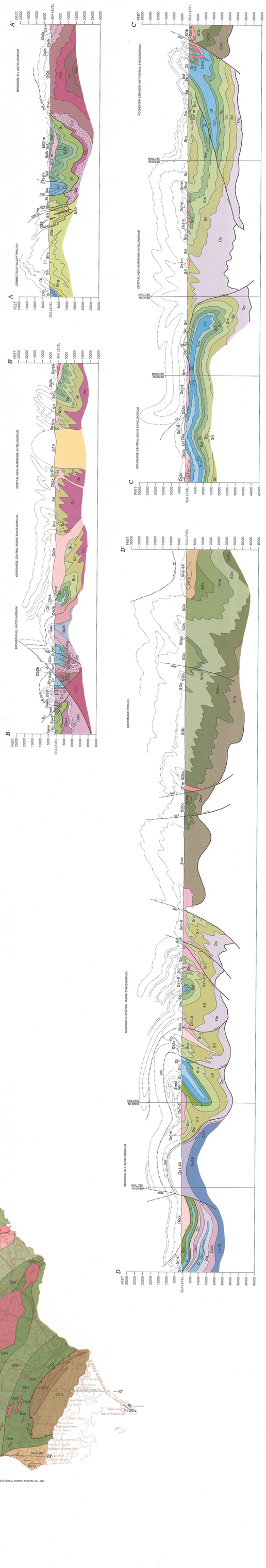
[5]The Ironbound Mountain Formation was introduced by Marvinney (1983) and further described by Pollock (1987) in Maine, where it is the basal formation of the Seboomook Group. W.A. Bothner and R.H. Moench (unpub. data, 1992) now recognize the Ironbound Mountain in New Hampshire as the result of field mapping in the Sherbrooke-Lewiston, Maine, N.H., and Vt., 1:250,000-scale quadrangle. It is a probable facies equivalent of the lower part of the Littleton Formation.

[6]The Frontenac Formation was named by McGerrigle (1935) in Quebec and has been mapped by Slivitzky and St-Julien (1987) in Quebec and by Marvinney (1982, 1986) and Pollock (1985) in northwestern Maine. The Frontenac Formation has been recognized in New Hampshire in the border area near the Customs Station by W.A. Bothner and R.H. Moench (unpub. data, 1992) as a result of field mapping in the Sherbrooke-Lewiston, Maine, N.H., and Vt., 1:250,000-scale quadrangle. The Frontenac Formation stratigraphically underlies the fossiliferous Early Devonian Compton Formation of Quebec (equivalent to the Gile Mountain Formation in New Hampshire) and the Ironbound Mountain Formation in Maine and New Hampshire and is here interpreted as Middle and Upper Silurian.

[7]The Rangeley Formation and one of its units (Srup) are traced into the Paxton Formation in north-central Massachusetts, where it was mapped as a "western belt" of the Paxton and Littleton Formations by Zen and others (1983). These two units are assigned now to the Silurian Rangeley Formation in Massachusetts (see Robinson and Goldsmith, 1991, which is based on more recent mapping).

[8]The Silurian(?) to Ordovician(?) age assignment and sequence of the Merrimack Group (Berwick, Eliot, and Kittery Formations) in southeastern New Hampshire are based upon isotopic age determinations by J.N. Aleinikoff (oral commun., 1994) of approximately 440 and 420 Ma from detrital zircons from the Berwick Formation.





Base from U.S. Geological Survey
Albany, 1956, revised 1974; Boston, 1958, revised 1970; Glens Falls, 1956, revised 1972; Lake Champlain, 1962, revised (United States only) 1972; Lewiston, 1956, revised 1972; Portland, 1956, revised 1972; and Sherbrooke, 1961
Transverse Mercator Projection

SCALE 1:250 000

CONTOUR INTERVALS 50 AND 100 FEET

Geology compiled in 1984-94 from sources shown accompanying the index
Edited by Susan Tufts-Moore and Elizabeth D. Koozmin
Digital cartography by Thomas Falk (Complex Systems Research Center, University of New Hampshire, Durham, N. H.) and D. Paul Mathieux

BEDROCK GEOLOGIC MAP OF NEW HAMPSHIRE

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1997

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