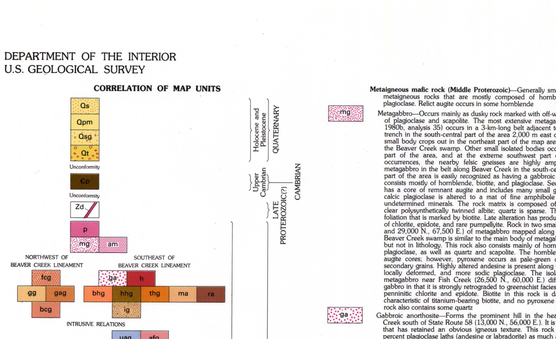
CORRELATION OF MAP UNITS



REGIONAL CORRELATIONS

(See text paragraphs and cross section in front of report for additional information and reference list)

Engel and Engel (1953, p. 1055) proposed a generalized stratigraphic sequence for the northwest Adirondacks. Included in their stratigraphic sequence are units that were not recognized, the stratigraphic top of the sequence was unknown to them. The uppermost units in their sequence were inferred on a structure section from Lake Bonaparte (along between Balmat and Edwards, N. Y. Rocks northwest of the synform were inferred to be younger than those in the synform. Fowler and Carl (1977), on the basis of detailed mapping, proved stratigraphic relations in the region basically essentially on the sequence defined by Engel and Engel. Their subdivisions are: (1) the Balmat-Edwards lowlands including, in ascending order, a basal "lower gneiss" (equivalent locally to granitic gneiss bodies), a "lower marble," an "upper gneiss" (the "major paragneiss" of Engel an Engel, 1953), and an "upper marble" (Balmat-Edwards synform; Brown and Engel, 1956). In 1983, stromatolites showing top direction were identified in the Balmat-Edwards synform (Isachsen and Landing, 1983). They verify that the structure is a synform and thus the upper marble is truly at the top of the stratigraphic sequence in the Grenville lowlands.

Wiener and others (1984), in a stratigraphic synthesis for the Adirondack region, have a significantly different interpretation. They propose the existence of an unconformity above the rocks of the Balmat-Edwards lowlands (their gneiss). They conclude that metasediments overlying the gneiss of the Balmat-Edwards rock (gg) at the base and that the major paragneiss (upper gneiss) of Engel and Engel (1953) lies directly above as seen near Hermiville (20 miles to the southeast of the Beaver Creek area). They propose that this gneiss, northwest of Harrisville, is correlative with the lower gneiss of Fowler and Carl and that the upper marble of the Balmat-Edwards area and the lower marble in the Gouverneur area are correlative. Fowler and Brown (1976) also suggested this, but now do not consider it. They do not have proof of this idea because the upper and lower marbles are distinct and different characteristics and are separated by the major paragneiss. Thus, the stratigraphic interpretation of Wiener and others (1984) is not supported in this study.

Rocks in the Beaver Creek area can be tentatively correlated with the generalized stratigraphic sequence of Engel and Engel (1953) and Fowler and Carl (1977). Only a few of the units of the region are continuous throughout the lowlands, and can thus be used as marker horizons. The best marker unit is the rock in the domical bodies—the lower gneiss. Overlying the lower gneiss is a heterogeneous sequence of rocks that is dominantly carbonate-bearing but that include important gneiss, schist, and quartzite components. In the Beaver Creek area, they include all rock units from the garnet-sillimanite granofels (gsq) upward to the carbonate calc-silicate and quartzite unit (csq); I have correlated these with the "lower marble" unit. The included metasedimentary rocks northwest of the Beaver Creek lineament are the lowermost units in the lower marble.

The nature of the contact between the lower gneiss and the overlying lower marble is open to question. It might be conformable, but because the individual domical bodies of lower gneiss and overlying garnet-sillimanite rock are not in each case in contact with the same stratigraphic zone within the lower marble, I suspect that the contact might be an unconformity or a zone of ductile faulting caused either by thrusting or diapiric piercement of the lower gneiss during metamorphism and deformation.

The diopsidic and hornblendic paragneisses (pda, pba, uag) at the top of the metasedimentary sequence in the Beaver Creek area are possibly equivalent to the "upper gneiss" ("major paragneiss" of Engel and Engel, 1953). If this correlation is correct, then the Beaver Creek area has no stratigraphic counterpart to the upper marble of the Balmat-Edwards syncline. Rocks in the upper marble are distinguished from those of the lower marble in that they are essentially nongraphitic, and rarely contain phlogopite and only a few rusty or pyritic units. Also, tourmaline and scapolite that is common and locally abundant in the rocks of the Beaver Creek area is rare in the upper marble of the Balmat-Edwards syncline.

Most of the granitic rocks of the Beaver Creek area are similar to the Hermon and Antwerp granites of Buddington (1939). Only units ig and bcg are similar in appearance and chemistry to the Hermon gneiss. Some of the others, such as those in the vicinity of Huckleberry Mountain, are more similar to the Antwerp granite.

DESCRIPTION OF MAP UNITS

(Note: Zone 18 Universal Transverse Mercator metric coordinates of key features are in parentheses. All northerly measurements are plus 4,900,000 meters and easterly measurements are plus 400,000 meters.)

Qa **Eolian sand (Holocene and Pleistocene)**—Eolian sand near the Oswegatchie River along Little Bow Road (14,000 N., 60,000 E.) and west of Beaver Creek (19,000 N., 58,600 E.), apparently is winnowed from the alluvium of the nearby valley bottoms. Many areas designated as peat and muck (Qpm) also have deposits of eolian material (loess) on their surfaces but these are not shown on the map. Loess dunes (regularly arranged, low parallel ridges extending from valley sides) are effects of eolian processes. Examples are along Merrill Creek and the South Branch of Beaver Creek (close to 18,000 N., 63,000 E. and 64,000 E.) where parallel, dune-like ridges trend northwest and are apparently aligned with the prevailing wind. Blowouts, now stabilized by vegetation, are also common. These are distinguished from sinkholes in carbonate areas by raised rims. A good example can be found in the meadow 350 m west of Osborn Lake and is visible from Rock Island Road. Many others occur throughout the area, particularly at notches in ridges that acted as minor wind gaps

Qpm **Peat and muck (Holocene and Pleistocene)**—Dusky-brown to black, fibrous peat overlying sticky, gray, lacustrine clay. Fills low areas of the poorly integrated and low-gradient drainage system where it was deposited in post-glacial lakes and swamps. Test probing for peat thickness has been done in this area (Cornelia Cameron, 1968, 1969, unpub. data). Thicknesses of commercial-grade peat determined in the Beaver Creek area are shown by Brown (1983, pl. 1). One hole in a traverse 0.6 km north of Osborne Lake proves a 16.7 m thickness of peat. Below the peat is lacustrine clay of undetermined thickness. Combined auger and core drilling at five sites to determine bedrock lithology beneath Qpm (see geologic map and table 1 in pamphlet) proved that nearly half of the topographic relief on the bedrock surface in this area is filled by Qpm. Hole no. 5 is in a narrow, filled valley, located less than 15 m laterally from outcropping bedrock. At a depth of 22 m, drilling was stopped because large boulders were encountered, but bedrock was not reached, thus indicating a narrow, deep, bedrock gorge

Qsg **Mixed sand and gravel (Pleistocene)**—Small pockets of ice-contact, glacial gravel occur mostly on southeast-facing slopes throughout area: shown only where observed. Presence of a gravel deposit was inferred in cobble-littered areas, and from gravel brought to the surface by burrowing animals

Qt **Glacial till (Pleistocene)**—Occurs in a northeast-southwest-trending hill in the vicinity of the intersection of Rock Island and Mayhew Roads. The hill probably is a drumlin that is along the southwest margin of a drumlin field described by Carl (1978). Soil is bouldery and there are no bedrock outcrops

Ed **Potsdam Sandstone (Late Cambrian)**—Well-bedded, buff to brown sandstone streaked with brown and red iron-oxide stains, locally crossbedded and ripplemarked. Many small sandstone bodies in marble outcrop areas are remnants of sinkhole and open-joint fillings in the underlying marble. Sandstone overlying marble commonly has circular areas where bedding is broken and slumped into funnel shapes up to 35 m across. These were caused by flowage of liable and poorly cemented sand into cavities in the underlying marble shortly after deposition. Cylindrical sand tubes that are the filled vertical channels are concentrically layered because of laminar flow. Many examples of tubes and funnels can be seen along Cream of the Valley Road near 17,600 N., 61,600 E. Similar features near Redwood, N.Y., were described by Dietrich (1953). At many places, the surface of the Proterozoic rocks and a zone extending several meters below the unconformity is heavily oxidized and has local deposits of hematite and limonite. These have been prospected and mined for iron (Brown, 1983, locs. 35, 36, 90). Iron-oxide deposits generally occur where the underlying rocks are pyritic. Marble in the zone was dolomitized and silicified during this mineralization (Brown, 1983). Both Potsdam 1 (subaerially deposited) and Potsdam II (shallow-marine transgressive) types of sandstone as described by Selleck (1975), occur in the area. Type I is massive and Type II is well-bedded. The beds are less than a meter thick and show both current and wave ripples as well as low-angle crossbeds. Regional relief of the Potsdam-Proterozoic contact is considerable and is probably a result of a combination of initial topographic relief, subsequent solution of marble, and vertical offset along faults. Small patches of Potsdam Sandstone occur in the bottom of the valley that forms the Beaver Creek lineament, but no Potsdam caps the nearby hills that are as much as 60 m higher. Therefore, the Beaver Creek trench must have existed on the pre-Upper Cambrian surface, and surrounding hilltops have been lowered by erosion enough to strip away all remnants of Potsdam Sandstone

IGNEOUS AND METAIGNEOUS ROCKS

Zd **Diabase dikes (Late Proterozoic?)**—Northeast-trending, steeply dipping, dark, alkalic, olivine diabase dikes, weathered to a distinctive reddish brown because of altered olivine. The dike protecting through Pierces Corner is as much as 20 m thick. A parallel dike southwest of Hickory Lake locally is more than 10 m thick. Rock is phanaritic, has intersertal to ophitic texture (Brown, 1980b, analyses 2, 6, 7, 9) and chilled amygdaloidal margins less than a meter thick. Dikes form low, rounded outcrops that are inconspicuous and barely protrude through the soil. At many places, the dikes have been selectively plucked by glaciers, leaving a small topographic notch. Both large dikes are alkalic, subsilicic, and contain more than 15 percent magnetite and/or1 titanomagnetite. The Pierces Corner dike contains abundant olivine, analcite, and pinkish-brown pyroxene (titanaugite). Similar but generally much thinner dikes are aphanitic, dark gray to black, amygdaloidal, and resemble the chilled margins of the wider dikes. Dike rocks, although undeformed, have been hydrothermally altered to chlorite and zeolites; olivine is partly altered to serpentine. Two additional dikes, located about 1.2 km north of the outlet of Hickory Lake, one along Fish Creek and the other 305 m to the east of the first, resemble the other dikes in occurrence, but differ in composition. These dikes are silicic diabase and are not alkalic (Brown, 1980b, analyses 1 and 8). All dikes are part of a northeast-trending swarm that is widespread in the Thousand Island area and to the west in Ontario (Brown, 1975). They are deeply weathered where close to the base of the Potsdam Sandstone, are apparently truncated by that unit, and thus are assumed to be Late Proterozoic or Early Cambrian in age. D. F. Hewitt and R. Greggs (written commun., 1973) report the same geologic relationship in nearby Ontario. A paleomagnetic study by Brookes (1983) correlated paleogeographic pole positions in these rocks with pole positions through time. Unfortunately, the results are erratic and inconclusive

p **Pegmatites (Middle Proterozoic)**—Irregularly shaped pegmatite bodies composed mostly of quartz and perthite intrude metasedimentary rocks and gneiss generally in elongate masses parallel to layering; some, however, are crosscutting. Most pegmatites are only a few hundred meters long and a few meters thick. The largest bodies occur in the zone between Beaver Creek and the Pleasant Lake-Hickory-Mud Lakes fault system. One pegmatite nearly 1.5 km in length and at places only 30 m wide crops out just southeast of the Hickory-Mud Lakes fault at Hickory Lake (24,000 N., 60,000 E.). Belts of pegmatites in this position relative to both the Hickory-Mud Lakes and Pleasant Lake faults have been intruded along a zone that was a precursor to these faults during an early stage of tectonism. At places, the pegmatites appear to grade into lenses of white quartzite (bsq). Another belt of pegmatite masses occurs 0.5 km northwest of and parallel to Beaver Creek in a zone east of Pierces Corner. Most of the larger pegmatite bodies are in the magnesian marble (mm) or in nearby carbonate gneiss (rsm) units, although all of the units of Proterozoic age locally contain small pegmatite bodies. Pegmatite that intrudes marble commonly contains white to cream perthite or sodic plagioclase. Plagioclase in some pegmatites within quartz-rich rocks (csq) and nearby carbonate gneiss (rsm) is albite and microcline (schiller) colors (Brown, 1983, locations 20, 25, and 55) and is probably pertitic. Pegmatite in marble also commonly includes megascopic phlogopite, diopside, and, in their contact zones, tremolite, clinopyroxene, apatite, and graphite. Pegmatite that intrudes biotitic, feldspathic, or amphibolitic gneisses usually has pink feldspar and includes crystals of biotite and schorl. These are essentially perthite-microcline-quartz pegmatites. Locally, plagioclase is purplish gray, lavender, or very pale green. These pegmatites are probably anatectic products from the enclosing gneisses. Small pegmatites were mapped in the Hyde School and Hickory Lake quadrangles in the western part of the map area. Many other pegmatite bodies are too small to be shown because of their small size. Most are mainly quartz and orthoclase with rare mica and black tourmaline. Some pegmatites in the Hickory Lake antiform contain coarse-grained magnetite

pda Diopside pegmatites—Well-layered, granoblastic and characterized by an abundance of diopside. Accessory sphene is ubiquitous and green hornblende occurs commonly. Occurrence of a variety of interlayered mineral assemblages including quartz-diopside-oligoclase, diopside-scapolite-quartz; green hornblende-diopside-oligoclase; microcline; green hornblende and quartz-oligoclase-biotite. Accessory minerals are sphene, apatite, tourmaline, and magnetite or ilmenite. Sphene is abundant and may make up as much as 2 percent in some layers. Unit occurs mainly in two areas. Most of it is in the belt of rocks between Beaver Creek (Brown, 1980b, analysis 23), is similarly pink in color and finely granulated in texture, and is in the same structural position as the narrow lens of the jacksite synform along the east bank of Beaver Creek. The paragneiss layers here consist mostly of pale-green diopside, quartz, and oligoclase (Brown, 1980b, analysis 40); but other rock types also are present. A medium-grained, strongly foliated and well-layered variety of diopside-quartz-oligoclase-microcline gneiss is the most prominent outcrop ridges on either limb of the synform and helps to outline the structure (cross section B-B'). The other two areas are in the vicinity of Tremblay Flats (Brown, 1983, locs. 1 and 2). Some layers are rich in granoblastic tourmaline (Brown and Ayuso, 1985) and biotite. The other main kind of diopside-rock occurs as layers along Maple Ridge Road in the northeastern part of the area from near Gore Road northeast to the western edge of map area. The rocks here may be distinguished from that on the western zone along Beaver Creek by the following characteristics: 1) there are neither quartzite zones nor hornblende-rich rocks here; 2) granoblastic scapolite (mizzonite) is very common in many layers instead of plagioclase, although in the western belt, scapolite occurs only in small amounts; 3) there are no layers of hornblende replacing diopside and plagioclase; 4) microcline occurs in the eastern belt in quartz-microcline-diopside granofels (gdq) interlayered with similar rock containing oligoclase instead of microcline. Microcline is common here but not in the western belt. Sphene is abundant and grains are commonly retrograde metamorphism. In the western zone, the patchy areas of scapolite and green hornblende in layers of diopside are probably due to epidote and biotite alteration, however, some form oxide augen. Strained quartz constitutes 30–35 percent of the rock, diopside, or microcline, 25–40 percent, plagioclase, 20–25 percent; and slightly chlorinated biotite, about 8 percent. Accessory minerals are sphene, apatite, and ilmenite. Folded scapolite-diopside layers are common. The plunge of their minor fold axes is consistent with the west to northwest lineation in the vicinity of this granite mass. Both specific gravity and magnetic susceptibility measurements (pdm) along its southeast border, but is distinctly crossbedded elsewhere

bsq Augened granite—The seven porphyroblastic gneissoid granite bodies along the west side of Beaver Creek are lithologically similar. The rock contains 35 percent quartz, 30 percent microcline (including perthite), 30 percent oligoclase (An_{20}-An_{25}), 30 percent strained quartz, and 5 to 15 percent slightly chlorinated, dark biotite. Accessory minerals are sphene, apatite, magnetite, and possible allanite. A distinct garnet-bearing, felsic zone surrounds the two larger masses and also the two northernmost, smaller bodies. The rock has a sugary textured and very fine grained. It is composed of quartz, oligoclase, and microcline and lack the porphyroblasts of the rest of the granite. The distinctive, brown, euhedral to subhedral garnets that constitute about 1 percent of the rock. Microprobe analyses of these garnets show these to be almandine with varying proportions of the pyrolites, than the diopside paragenesis probably was a dolomitic shale and the biotite-bearing diopside-scapolite-quartz rocks were derived from the impure carbonate rocks. Schist contains some pyrite and most places has a rusty or sooty appearance due to weathering of pyrite. It contains garnet and sillimanite in the sole or outcrops in the low area adjacent and west of the Hyde School antiform. Garnet-sillimanite is the principal dark mineral. Ratio of sodium to potassium feldspar varies, and although potassium feldspar usually is dominant, some rocks have more sodic than potassic feldspar. Many specimens show a weak mortar texture and have small grains of undetermined albite, microcline, and quartz in mortar and quartz and potassium feldspar in porphyroblasts. Plagioclase shows fine, blocky exsolution or replacement by potassium feldspar aligned with twinning. Microcline and potassium feldspar are perthitic. Accessory minerals (other than magnetite) are apatite, sphene, and zircon. Two conformable lithologic phases of alkali-feldspar granite are recognized in the Hyde School antiform and one occurs in the Hickory Lake body. The phase common to both antiforms (lab) contains numerous flakes of biotite aligned in lineations that range from 1 cm to a meter in thickness and are distributed throughout the rock. The other phase is known only in the Hyde School antiform. Its compositional range (all) is massive and is characterized by a scarcity of amphibole layers. At most places, these two phases can be easily distinguished in the field. But at some places, particularly where the layering digs gently, the distinction is less definite. Rock is coarse-grained, pink to red, and has a distinctive granitic texture. It is broken and jagged on the outcrop as rows of large disconnected and rotated rectangular blocks. Joints are widely spaced and commonly are healed by pink pegmatite. Where the rock is cut by a locally-developed pegmatite, it may have many commonly outline lobes, and not restricted to the aaalatic rock, and have the same mode of occurrence and shapes in the antiform. Because of high color contrast, the layers are most easily noticed in the alaskitic rocks

mm **Graphitic, phlogopitic marble (Middle Proterozoic)**—White to light-gray, medium-grained marble, 0.5 mm, massive marble of uniform composition. Marble is calcitic to slightly magnesian (see Brown, 1978, analyses 13 and 14). Graphite occurs as disseminated flakes or in zones of very fine grains that produce blue-gray, centimeter-thick layers. Clear, pale, brownish grains of phlogopite occur throughout. A distinguishing characteristic of this unit is the scattered prismatic megacrysts of white tremolite as much as 3 cm long. These weather in relief on outcrop surfaces and locally are also aligned particularly near fold axes. Brown crystals of tourmaline (dravite or uvite) as much as 4 cm across are disseminated in the marble or included in fist-sized or larger pegmatitic clots. Crystals were noted at 14,000 to 14,700 N., 58,000 E. and at 21,800 N., 61,000 E. (Brown, 1983, locations 94 and 62). Clear, yellowish-orange grains of chondrodite locally occur in streaky, granular layers and isolated clots in the marble. Rock is commonly folded (Brown, 1983, locs. 51 and 74). An extensive zone of white, translucent, nongraphitic marble containing scattered phlogopite and tremolite occurs at the base of the section. Biotite defines a rough augen structure around garnets. The garnets in these outcrops are anhedral and all have a distinct, clear overgrowth around their cores, that, in most cases, contains fine grains of included quartz, biotite, magnetite, and lepidocrocite. Lepidocrocite is abundant in some rolling of the garnets during deformation. The matrix of the rock shows a rough mortar texture of large micropercthite grains and deformed quartz leaves set in a mortar of granular quartz, oligoclase, and some biotite. Magnetite is a common accessory. Garnet-rich rock in the outcrop at the western tip of the southern dome of the Hyde School antiform differs from that at the outcrops to the southeast in that the garnets are euhedral and constitute 25–40 percent of the rock. This variety is coarse-grained (0.5 to 1.5 cm across) and is composed of garnet, quartz, and perthite, with a small amount of fine-grained recrystallized quartz and plagioclase. Red garnets are overgrown and mineral inclusions in the core show rotation. The garnet-rich rock at the outcrop (20,150 N., 53,150 E.) north of the southwest tip of the south dome that is surrounded by peat and muck (Qpm), also differs slightly from the rock in the other areas. Here, garnets are large, rounded nodules (1 to 3 cm across) that have finely laminated cores. The laminae are outlined by clouds of submicroscopic inclusions. The garnets have 2-mm-thick, lighter-red rinds. Garnets form rounded augen in a host rock of locally microfolded microperthite, quartz, and reddish-brown biotite. Quartz is strung out in granulated leaves, and sillimanite is sparse, occurring mainly as scarce needles in other mineral phases. Magnetite is a common accessory

METAVOLCANIC(?) ROCKS

Foliated granofels and gneiss ranging in composition from biotite granite to diorite (Middle Proterozoic)—These rocks are widely distributed and have compositions that include granite, trondhjemite, granodiorite and quartz diorite. Most varieties have another feldspar that are dispersed and the fractures are filled with pegmatite of similar composition to the host granitoid. Rocks of granitic, trondhjemitic and quartz diorite compositions are pale pink to light gray, fine to medium grained, and have conspicuous, evenly distributed biotite and (or) hornblende that in most rocks make the foliation or layering. These rocks form prominent outcrop ridges. Some outcrops show pink and gray color layering because of the variation of feldspar types. Biotite-hornblende-oligoclase to albitic plagioclase ranges from about 21 to about 1:3 and quartz content varies from 10 percent to as much as 35 percent. Potassium feldspar is perthitic, untwinned orthoclase and (or) microcline. Albitic plagioclase commonly is antiperthitic or occurs in hallowed, clear, untwinned, small grains. Quartz occurs in deformed, xenoblastic grains and also as numerous tiny, rounded, clear grains included in other mineral phases. Biotite or hornblende constitutes as much as 10 percent of the rock and in most specimens is altered to chlorite, magnetite, and (or) hematite. Epidote, sphene, apatite, and zircon are accessory phases. Rocks of granodiorite, quartz diorite, and diorite compositions are mainly medium to dark gray. Fresh surfaces of some granodioritic rocks are beige to light-yellowish-brown due to the color of the plagioclase. Dark minerals are conspicuous in all rock types. Biotite is most common, but hornblende is also abundant in the more mafic rocks. Oligoclase and albite (antiperthite) are the dominant feldspars (greater than 40 percent) in most rocks. Orthoclase occurs mainly in rectangular patches along twinning planes in antiperthite and constitutes less than 20 percent of the rock. Quartz is volumetrically equal to or greater than potassium feldspar. Pyroxene, mostly hypersthene, occurs in some rocks, called charnockite, in trace amounts and is common in the southwestern quarter of the Hickory Lake body

ala **Alaskite granitoids (Middle Proterozoic)**—Fine-grained, moderate-pink, xenoblastic rock, composed of quartz, orthoclase, and albite, and at least 2 percent of the principal dark mineral. Ratio of sodium to potassium feldspar varies, and although potassium feldspar usually is dominant, some rocks have more sodic than potassium feldspar. Many specimens show a weak mortar texture and have small grains of undetermined albite, microcline, and quartz in mortar and potassium feldspar and quartz. Plagioclase shows fine, blocky exsolution or replacement by potassium feldspar aligned with twinning. Microcline and potassium feldspar are perthitic. Accessory minerals (other than magnetite) are apatite, sphene, and zircon. Two conformable lithologic phases of alkali-feldspar granite are recognized in the Hyde School antiform and one occurs in the Hickory Lake body. The phase common to both antiforms (lab) contains numerous flakes of biotite aligned in lineations that range from 1 cm to a meter in thickness and are distributed throughout the rock. The other phase is known only in the Hyde School antiform. Its compositional range (all) is massive and is characterized by a scarcity of amphibole layers. At most places, these two phases can be easily distinguished in the field. But at some places, particularly where the layering digs gently, the distinction is less definite. Rock is coarse-grained, pink to red, and has a distinctive granitic texture. It is broken and jagged on the outcrop as rows of large disconnected and rotated rectangular blocks. Joints are widely spaced and commonly are healed by pink pegmatite. Where the rock is cut by a locally-developed pegmatite, it may have many commonly outline lobes, and not restricted to the aaalatic rock, and have the same mode of occurrence and shapes in the antiform. Because of high color contrast, the layers are most easily noticed in the alaskitic rocks

bsq **Biotite-quartz-oligoclase and granofels and vitreous feldspathic quartzites (Middle Proterozoic)**—Biotite-feldspar-quartz-rich rocks and associated vitreous feldspathic quartzites. Rocks are mainly fine grained and well layered, but is not subdivided here because of the smaller rsq scale. Microcline and oligoclase occur in the dominant feldspars (greater than 40 percent) in most rocks. Orthoclase occurs mainly in rectangular patches along twinning planes in antiperthite and constitutes less than 20 percent of the rock. Quartz is volumetrically equal to or greater than potassium feldspar. Pyroxene, mostly hypersthene, occurs in some rocks, called charnockite, in trace amounts and is common in the southwestern quarter of the Hickory Lake body

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gsm **Scapolite-quartz-graphite marble (Middle Proterozoic)**—Medium- to coarse-grained, graphitic marble that occurs along northwest-trending belt. Composed of quartz calcite, and scapolite. Rock contains dark-gray, coarse, granular grus. Possibly correlative with part of the quartz-bearing marble (unit csq) in the Beaver Creek area. Rock contains dark-gray, granular aggregates of scapolite 5 cm across