BEDROCK GEOLOGIC MAP OF THE LEMON GAP 7.5-MINUTE QUADRANGLE, NORTH CAROLINA AND TENNESSEE

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF LAND RESOURCES

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NORTH CAROLINA GEOLOGICAL SURVEY
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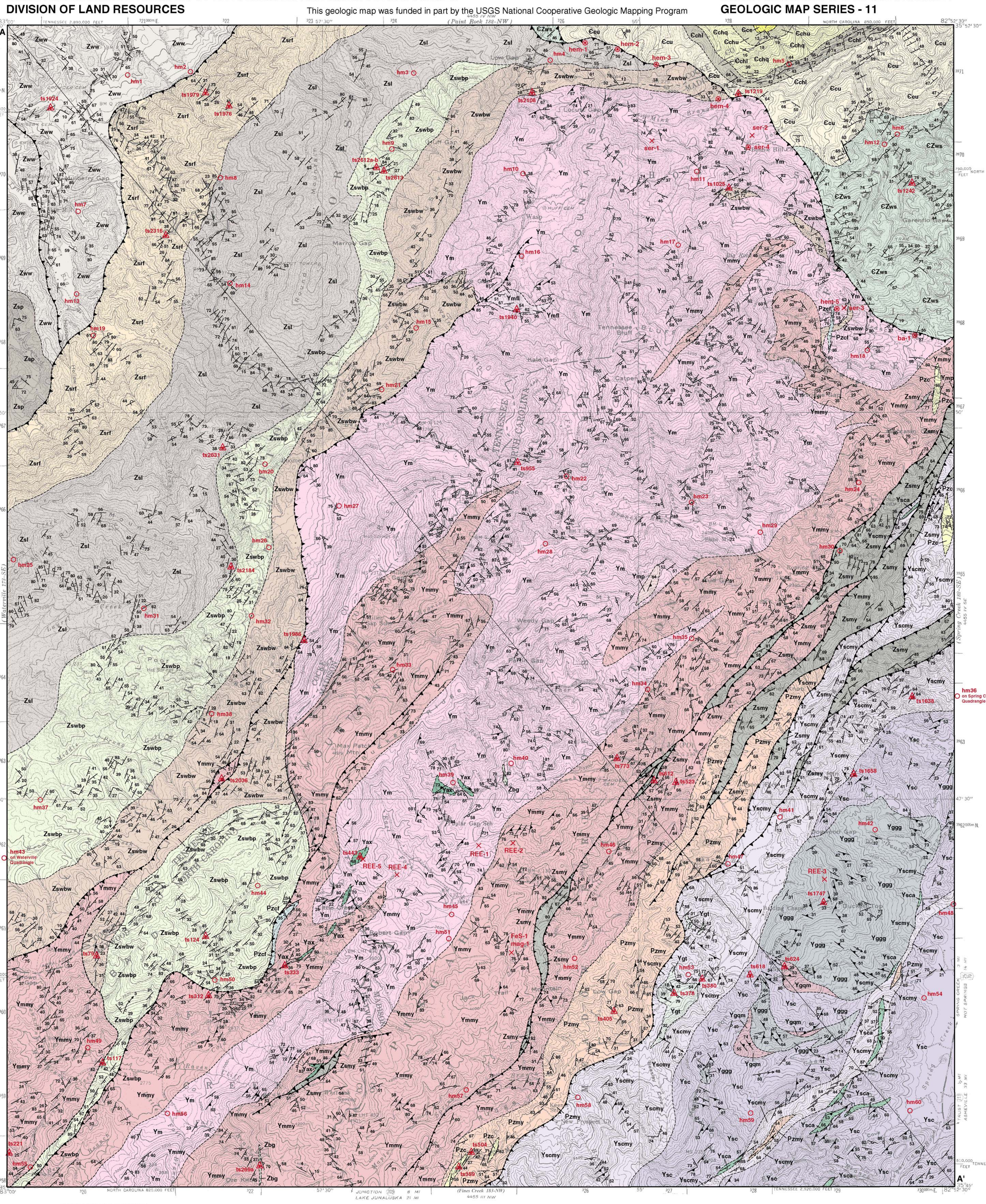

MAP UNITS

CATACLASTIC AND MYLONITIC ROCKS

PALEOZOIC

- **Pzcf** Ferruginous cataclasite
- **Pzc** Cataclasite
- **Pzmy** Sericitic mylonite

METASEDIMENTARY SEQUENCE

CAMBRIAN
CHILHOWEE GROUP

- **Єce** Erwin Formation
- HAMPTON FORMATION
  - **Єchu** upper shale member
  - **Єchq** middle quartzite member
  - **Єchl** lower shale member
- **Єcu** Unicoi Formation

LATE PROTEROZOIC
OCOEE SUPERGROUP
WALDEN CREEK GROUP

- **ЄZws** Sandsuck Formation
- **Zww** Wilhite Formation

SNOWBIRD GROUP

- **Zsp** Pigeon Siltstone
- **Zsrf** Roaring Fork Sandstone
- **Zsl** Longarm Quartzite
- **Zswbp** / **Zswbw** Wading Branch Formation (Zswbp) phyllite (Zswbw) feldspathic metagraywacke
- **Zsmy** Mylonitic Snowbird (undivided)

META-IGNEOUS ROCKS

MIDDLE PROTEROZOIC

- **Zbg** Bakersville Metagabbro
- **Ym** Max Patch Granite
- **Ymp** Max Patch Protomylonitic granite
- **Ymmy** Max Patch Mylonitic granite
- **Ymfl** Max Patch Fine-grained leucocratic granite
- **Yax** Amphibolite Xenoliths
- **Ysc** Spring Creek Granitoid Gneiss
- **Yscmy** Spring Creek Mylonitic Granitoid Gneiss
- **Ysca** Spring Creek Amphibolite
- **Yggg** Garnet-Rich Granulite Gneiss
- **Ygqm** Quartz Monzodioritic Granulite
- **Ygt** Tonalitic Granulite

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STRUCTURAL FEATURES

CONTACTS

Solid line – located in field to within 15 meters; long-dashed – approximately located to within 75 meters; short-dashed – location inferred; querried where uncertain

Thrust fault (teeth on upper plate)

High-angle fault (arrows indicate relative movement)

Unconformable contact (nonconformity or normal fault; exact nature uncertain)

Lithologic contact

STRIKE AND DIP OF PLANAR FEATURES

Observation sites are centered on the strike bar, or at the intersection point of multiple symbols.

25 Bedding	54 Slaty cleavage in metasedimentary rocks
Vertical bedding	61 Mylonitic foliation
76 Overturned bedding (based on primary sedimentary structures)	56 Joint
32 Foliation (most NW trending foliations are thought to be of Grenville Origin)	Vertical joint
Vertical foliation	

BEARING AND PLUNGE OF LINEAR FEATURES

64 Mineral lineation

32 Axis of small fold

MINERAL RESOURCES

● Occurrence

✕ Prospect

COMMODITY LETTER SYMBOLS:

ba	Barite
FeS	Iron sulfides
hem	Hematite
mag	Magnetite
REE	Rare earth elements
ser	Sericite

ser-2: Mineral resource number, referred to in accompanying Mineral Resource Summary. Commodity indicated by letter symbol.

○ **hm34**: Stream sediment heavy mineral and scintillation sample site. Sample numbers correspond to stream sediment heavy mineral analyses listed in table below.

▲ **ts2613**: Thin section and whole rock geochemistry sample site. Sample numbers correspond to whole rock geochemical analyses listed in table below.

DESCRIPTION OF MAP UNITS[1]

CATACLASTIC AND MYLONITIC ROCKS

FERRUGINOUS CATACLASITE (Pzcf) — White, bluish white, to very light gray; brecciated mylonite; fine- to very coarse-grained; inequigranular; angular fragments of quartz and feldspar; mottled throughout with dark gray, brownish black, and very dusky red; granoblastic; cross-cutting; iron oxide bearing veins ranging from several millimeters to several centimeters thick.

CATACLASITE (Pzc) — A unit of breccia and brecciated mylonite. Breccia - very pale orange to grayish pink to dark greenish gray, mottled with pink to moderate reddish orange to moderate red; fine- to coarse-grained, inequigranular to equigranular, granoblastic; massive. Brecciated mylonite - dusky yellow green, mottled with moderate reddish orange and very pale orange; fine- to coarse-grained, inequigranular; angular fragments; consists of 14.0% potassium feldspar, 9.8% plagioclase, and 25.0% quartz, with 39.8% epidote group minerals, 0.4% biotite, 6.8% chlorite, and 4.0% sericite in a very fine-grained matrix.

SERICITIC MYLONITE (Pzmy) — Well developed Neoacadian mylonite characterized by the development of sericite, epidote group minerals, and chlorite, and occurs within linear, northeast striking units. These units enclose blocks of locally unmylonitized to progressively mylonitized rock. Mylonite - medium gray to dark gray; fine- to medium-grained; equigranular to inequigranular; well foliated; lepidoblastic to mylonitic; thin- to medium-layered; consists of 13.6-32.0% quartz, 0-12.0% potassium feldspar, 1.6-32.8% plagioclase, 0.8-2.0% biotite, with accessory zircon and ilmenite and other black opaque minerals. Mylonitic alteration minerals include about 15.0-47.0% sericite and 4.0-38.4% epidote group minerals.

METASEDIMENTARY SEQUENCE

CHILHOWEE GROUP

ERWIN FORMATION[2] (Єce) — Quartzite – white; fine- to medium-grained, locally conglomeratic; thin- to thick-bedded; consists of quartz, sericite, potassium feldspar, plagioclase, and traces of apatite, zircon, epidote group minerals, and sphene. Oriel (1950) reported that some quartzite is ferruginous, which is dusky blue to very dusky purple, the color resulting from finely disseminated hematite in the cementing material, as well as from the decomposition of glauconite. Scolithus are locally present. Interbedded with grayish olive green to dusky green thin-bedded siltstone and shale which are locally stained dark reddish-brown from iron oxides.

HAMPTON FORMATION

UPPER SHALE MEMBER[2] (Єchu) — Alternating greenish black siltstone, silty shale, and sandy shale, interbedded with thin, white to light gray quartzitic layers. Greenish black to medium dark gray sandstone is also present.

MIDDLE QUARTZITE MEMBER[2] (Єchq) — White to yellowish gray to very light gray; medium- to coarse-grained, but locally conglomeratic; thick-bedded, and characteristically graded and cross-bedded; vitreous; feldspathic; sulfidic; rare slaty lithic fragments. Locally interbedded with grayish olive green micaceous silty shale, dark greenish gray sandstone, and medium dark gray quartzite. Scolithus are rare.

LOWER SHALE MEMBER[2] (Єchl) — Silty shales and shaly siltstones – grayish olive green; laminated to thin-bedded, locally rhythmically banded; micaceous. Interbedded with thicker beds of feldspathic sandstone - light gray to very pale orange; fine- to coarse-grained; medium- to very thick-bedded; cross-bedded; feldspathic to arkosic, in places quartzitic; sulfidic.

UNICOI FORMATION (Єcu) — Metagraywacke to feldspathic quartzite – light gray to medium gray; fine- to medium-grained; poorly sorted; bedding ranges from several decimeters to about one meter thick; sulfidic; interlayered with granule metaconglomerate and gray quartzite. Granule metaconglomerate – light gray to pale yellowish brown; coarse-grained to locally very coarse-grained; poorly- to well-sorted; medium- to thick-bedded; graded bedding is common; consists of feldspar and quartz granules in a feldspathic matrix. Gray quartzite – light gray to medium gray; fine- to medium-grained; poorly- to well-sorted; thin- to medium-bedded; grains consist of 66.2% quartz, 13.6% iron sulfides, 1.6% muscovite, 0.2% apatite, and a trace of zircon and tourmaline; matrix minerals consist of 13.6% sericite, 3.4% carbonate, and 1.4% quartz.

WALDEN CREEK GROUP

SANDSUCK FORMATION (ЄZws) — Interbedded sequence of metasiltstone and slate with few metagraywacke beds and lenses. Metasiltstone – grayish olive green to medium gray, weathers light brown to moderate brown; fine-grained; thinly laminated to well-bedded to massive; thickness of bedding ranges from millimeters to about one centimeter. Slate – dusky yellowish brown to brownish black, weathers dark yellowish orange; faint laminae are locally present. Coarser beds and lenses of metagraywacke occur locally.

WILHITE FORMATION (Zww) — Rhythmically banded metasiltstone with local, thin interbeds of slate and metagraywacke. Metasiltstone – olive gray to greenish black; fine- to coarse-grained siltstone; distinctly laminated to well-bedded; thickness of bedding ranges from millimeters to about one centimeter; locally calcareous and sulfidic; consists of 28.6-34.4% sericite, 9.4-25.4% plagioclase, 3.8-22.8% chlorite, 6.4-13.2% quartz, 0-25.8% carbonate, 0.4-3.0% potassium feldspar, 4.0-7.6% biotite, 3.4-6.4% opaques, and trace zircon. Metagraywacke – dark gray; fine- to coarse-grained; thickness of bedding ranges from several decimeters to about one meter; feldspathic.

SNOWBIRD GROUP

PIGEON SILTSTONE (Zsp) — An interbedded sequence of metagraywacke, metasiltstone, and slate. Metagraywacke – medium light gray to medium dark gray; fine- to coarse-grained; poorly sorted; thin- to medium-bedded. Metasiltstone – dark gray to olive black to greenish black; laminated to rhythmically banded. Slate – grayish black to brownish black; laminated; sulfidic.

ROARING FORK SANDSTONE (Zsrf) — A variably interbedded sequence of metasiltstone, metagraywacke to meta-arkose, and slate. Metasiltstone – light bluish gray to dark greenish gray; fine- to coarse-grained; consists of 26.4% potassium feldspar, 23.8% quartz, 20.2% plagioclase, 16% chlorite, 11.8 % sericite, and minor opaques, titanite, and zircon. Metagraywacke – bluish gray to light brownish gray; medium- to coarse-grained; well-sorted; bedding ranges from several decimeters to about one meter thick; locally graded and cross-bedded; consists of 15-56% quartz, 9.4-30.4% potassium feldspar, 10.2-28.8% plagioclase, 0-24% sericite, trace-18.8% chlorite, and minor opaques, carbonate, zircon, and titanite. Slate – grayish brown to grayish black; laminated.

LONGARM QUARTZITE (Zsl) — Dominantly meta-arkose and metasubgraywacke, with sub-ordinate metagraywacke, metasiltstone and slate. Meta-arkose and metasubgraywacke – pinkish gray to grayish pink, mottled with white to very light gray quartz and grayish pink to grayish orange pink feldspar grains; coarse- to very coarse-grained, locally pebbly; thick-bedded; graded and cross-bedded; consists of 39.8-59.0% quartz, 32.6-34.0% potassium feldspar, 7.0-26.0% plagioclase, 1.0-2.2% sericite, 0-2.4% biotite, and traces of zircon, titanite, epidote, and opaque minerals. Interbedded throughout the sequence is dark greenish gray metagraywacke, grayish olive metasiltstone, and grayish black to brownish black slate.

WADING BRANCH PHYLLITE (Zswbp) — Phyllite interbedded and gradational with feldspathic metagraywacke and granule to pebble metaconglomerate. Phyllite – olive gray to dark gray; fine grained; lepidoblastic to mylonitic; laminated to thin bedded; consists of 39.8-78.6% sericite, 17.6-35.8% quartz, 0.2-19.0% plagioclase, 0-2.2% biotite, 2.8-3.8% opaques, and minor epidote, zircon, and spinel. Feldspathic metagraywacke – dark yellowish brown to olive gray; fine- to coarse-grained; angular to subrounded; poorly sorted; locally graded; consists of 35.4% quartz, 18.8% plagioclase, 17.6% potassium feldspar, 12.4% sericite, 11.6% biotite, 2.2% chlorite, 1.6% opaques, 0.2% zircon, and 0.2% titanite. Granule metaconglomerate – medium dark gray to dark gray; coarse-grained; angular to subrounded; poorly sorted, locally graded; consists of 37.8% quartz, 25.6% potassium feldspar, 19.8% sericite, 10.4% plagioclase, 5.2% chlorite, and minor epidote, opaques, and titanite.

WADING BRANCH FELDSPATHIC METAGRAYWACKE (Zswbw) — Feldspathic metagraywacke interbedded with granule conglomerate, phyllite, and a rare basal maroon silty metashale. Feldspathic metagraywacke – Light olive gray, mottled with moderate reddish orange to pinkish gray; medium- to coarse-grained; poorly sorted; angular to subrounded fragments; medium- to thick-bedded, locally graded; consists of 43.6% quartz, 25.2% potassium feldspar, 16.2% plagioclase, 8.6% sericite, 4.8% epidote, 1.0% opaques, and trace amounts of biotite, tourmaline, apatite, and zircon. Maroon silty metashale – grayish red purple; very fine-grained with coarser quartz clasts dispersed throughout; angular to subrounded; poorly sorted; finely laminated; consists of 76.8% sericite, 15.6% quartz, 3.8% opaques, and trace potassium feldspar, epidote, and zircon.

METASEDIMENTARY SEQUENCE (continued)

MYLONITIC SNOWBIRD GROUP, undivided (Zsmy) — Snowbird Group metasediments that have undergone extensive Neoacadian mylonitization. The two typical fault zone rocks of the Mylonitic Snowbird are mylonitic phyllite and mylonitic meta-arkose. Mylonitic phyllite – light olive gray; lepidoblastic; inequigranular; fine-grained; well foliated; consists of 42.8% sericite, 28.8% quartz, 19.2% plagioclase, 5.0% potassium feldspar, 2.4% epidote, 1.2% opaques, and very minor amounts of apatite, zircon, and garnet. Mylonitic meta-arkose – grayish olive green; lepidoblastic to granoblastic; inequigranular; fine-grained; foliated; consists of 40.4% quartz, 24.0% potassium feldspar, 12.6% plagioclase, 12.2% sericite, 5.6% chlorite, 1.0% epidote, 0.8% opaques, and titanite.

META-IGNEOUS ROCKS

BAKERSVILLE METAGABBRO (Zbg) — Typically brownish black to greenish black; sub-ophitic to blastophitic modified to nematoblastic, locally lepidoblastic to mylonitic; medium- to very coarse-grained; slightly foliated to massive; locally altered to amphibolite and biotite-chlorite schist; weathers spheroidally; consists of 32% plagioclase, 23.1% pyroxene, 1.8% opaques, and traces of quartz and apatite; metamorphic and mylonitic alteration minerals include 18.6% chlorite, 13.8% biotite, 8.2% epidote group minerals, and 2.4% sphene. Where porphyritic, the phenocrysts are plagioclase.

MAX PATCH GRANITE (Ym) — (1050 Ma) Exhibits a wide range of compositions from granite to quartz monzodiorite to amphibole-bearing quartz diorite – light gray, variably mottled with pale pink and pale green; coarse-grained; equigranular to slightly megacrystic; granoblastic; weakly foliated to massive; the green coloration of the plagioclase is a result of saussuritization; granite typically consists of potassium feldspar, plagioclase, quartz, biotite, epidote group minerals, sericite, hornblende, and traces of zircon, apatite, carbonate, and opaque minerals; quartz monzodiorite consists of 57.4% plagioclase, 13% quartz, 12% potassium feldspar, 10.6% biotite, 4.2% opaques, 1.8% chlorite, 0.8% apatite, 0.4% carbonate; amphibole-bearing quartz diorite consists of 72.4% plagioclase, 17.4% amphibole, 4.6% biotite, 3.2% chlorite, 1.2% quartz, 0.8% apatite, and 0.4% opaques. Thin zones of mylonitic rock occur throughout, and are characterized by increased sericite, epidote group minerals and chlorite. Amphibolite xenoliths occur at all scales.

MAX PATCH PROTOMYLONITIC GRANITE (Ymp) — Max Patch Granite that has undergone Alleghenian protomylonitization. Medium gray, mottled with pale pink to moderate red and pale green; distinctly megacrystic (potassium feldspar megacrysts); granoblastic to mylonitic; foliated; consists of plagioclase, potassium feldspar, quartz, epidote group minerals, and opaque minerals. Blue quartz grains are common. Sericite content increases with mylonitization.

MAX PATCH MYLONITIC GRANITE (Ymmy) — Max Patch Granite that has undergone Alleghenian mylonitization. Light to medium gray with moderate orange pink megacrysts of potassium feldspar and moderate yellow green epidote alteration of plagioclase; inequigranular; medium- to coarse-grained; weakly foliated to foliated; mylonitic; composition varies from granitic to dominantly granodioritic; consists of 20.4-31.6% quartz, 3.6-3.8% potassium feldspar, 7.4-38.2% plagioclase, 19.2-19.6% biotite, and variable amounts of chlorite, apatite, titanite, carbonate, and opaque minerals. Mylonitic alteration minerals include 16-62% sericite and 14.8-15.2% epidote. This unit also contains blocks of unmylonitized Max Patch granite and mylonitized amphibolite xenoliths.

MAX PATCH FINE-GRAINED LEUCOCRATIC GRANITE (Ymfl) — Light gray to white, mottled with pale pink to moderate red and pale green; fine-grained; massive to foliated; locally mylonitic; consists of plagioclase, potassium feldspar, quartz, epidote group minerals, and opaque minerals.

AMPHIBOLITE XENOLITHS (Yax) — Small lenses and pods that are interpreted to be xenolithic based on: 1) their position within the Max Patch Granite, 2) their non-granitic composition, 3) the presence of a discordant foliation truncated by the granite and 4) amphibolite facies mineral assemblages within the xenoliths that are not found in the surrounding granite. Mottled greenish black and yellowish gray; equigranular; medium-to coarse-grained; nematoblastic to granoblastic, locally mylonitic; foliated (distinct banding is common); consists of 14.8-50.9% amphibole, 42.7-47.7% epidote, 3.6-11.3% titanite, 1.2-3.6% opaques, 0.4-0.8% biotite, 0.2-21.2% quartz, 0.0-0.6% rutile, and 0.0-trace zircon. Original plagioclase component of amphibolite is thoroughly retrograded to epidote.

SPRING CREEK GRANITOID GNEISS (Ysc) — A heterogeneous metamorphosed igneous unit dominated by biotite granitic gneiss interlayered with biotite granodioritic gneiss, biotite quartz dioritic gneiss, amphibolite, biotite gneiss, and biotite schist. Granitoid rock types are light gray, mottled with pinkish gray to pale reddish brown; medium- to coarse-grained; equigranular to inequigranular; granoblastic to lepidoblastic, locally mylonitic; poorly foliated to foliated; massive to medium-layered. Granitoid gneiss consists of 4.0-39.4% quartz, trace-40.5% potassium feldspar, 16.8-43.0% plagioclase, 0.2-35.8% biotite, 1.4-14.8% epidote-group minerals, 0.0-11.0% sericite, 0.0-1.4% chlorite, 0.6-0.8% opaque minerals, 0.0-0.2% apatite, 0.0-0.2% titanite, and trace zircon.

SPRING CREEK MYLONITIC GRANITOID GNEISS (Yscmy) — Spring Creek Granitoid Gneiss that has undergone Alleghenian mylonitization. Light pinkish gray to light brownish gray; inequigranular; granoblastic to lepidoblastic, mylonitic; poorly layered to well layered; consists of 22.2-34.1% plagioclase, 20.2-29.0% quartz, 3.6-42.8% potassium feldspar, 0.4-10.7% epidote-group minerals, trace-21.8% sericite, 1.0-10.4% biotite, 0.4-1.2% sphene, trace-0.6% opaque minerals, and trace chlorite and zircon. Locally interlayered with amphibolite and unmylonitized granitoid gneiss.

SPRING CREEK AMPHIBOLITE (Ysca) — Dark greenish gray to greenish black to brownish black; fine- to coarse-grained; nematoblastic to lepidoblastic; well foliated; thin- to medium-layered; consists primarily of hornblende, plagioclase, epidote-group minerals, and accessory opaque minerals. Where retrogressed, biotite replaces hornblende as the dominant mafic phase. Thin interlayers of biotite-rich gneiss and schist within the Spring Creek most likely represent retrogressive equivalents of amphibolite.

GARNET-RICH GRANULITE GNEISS (Yggg) — Very light gray to light gray to yellowish gray; equigranular to inequigranular; granoblastic, locally mylonitic; weakly foliated to foliated; medium layered to massive; garnet is abundant and characteristic in most folia and is visually estimated to be present in amounts up to 20%; the quartzo-feldspathic component of the rock consists of 48.6% potassium feldspar, 30.6% quartz, 18.6% plagioclase, and 2.2% biotite. Interlayered with biotite granitoid gneiss, orthogranitic gneiss, amphibolite and other granulites.

QUARTZ MONZODIORITIC GRANULITE (Ygqm) — Pale brown to brownish gray with grayish orange pink mottling; equigranular; granoblastic; fine- to coarse-grained; weakly foliated to foliated; medium layered to massive; consists of 59.7% plagioclase, 15.9% potassium feldspar, 12.1% hypersthene, 10.8% quartz, 1.0% biotite, 0.2% apatite, and 0.2% opaques. Interlayered with biotite granitoid gneiss, orthogranitic gneiss, garnet-rich granulite gneiss, and tonalitic granulite.

TONALITIC GRANULITE (Ygt) — Light gray to dark gray to dark greenish gray; equigranular; granoblastic, locally mylonitic; fine- to coarse-grained; weakly foliated to foliated; medium layered to massive; consists of 55.2% plagioclase, 30.1% quartz, 3.2% hypersthene, 2.5% opaques, 0.8% potassium feldspar, 0.7% biotite, 0.1% zircon and alteration minerals (4.0% chlorite, 1.3% epidote, and 0.5% sericite), locally more mafic; weakly retrograded. Interlayered with biotite granitoid gneiss, garnet-rich granulite, and quartz monzodioritic granulite.

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[1] Mineral percentages are based on modal analyses of selected samples. A range of mineral percentages indicates analysis of multiple samples.

[2] Description of map units compiled and modified from:

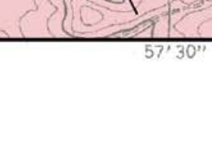
Bearce, D.N., 1966, Geology of the Chilhowee Group and Ocoee Series in the southwestern Bald Mountains, Greene and Cocke counties, Tennessee: Knoxville, University of Tennessee, Ph.D. Dissertation, 147p.
Campbell, M.R., 1897, Description of the Tazewell quadrangle (Virginia - West Virginia): U.S. Geological Survey Atlas, Tazewell folio (no. 44), 6p.
King, P.B., Ferguson, H.W., Craig, L.C., and Rodgers, J., 1944, Geology and manganese deposits of northeastern Tennessee: Tennessee Division of Geology Bulletin 52, 275p.
Oriel, S.S., 1950, Geology and mineral resources of the Hot Springs Window, Madison County, North Carolina: North Carolina Geological Survey Bulletin 60, 70p.
Stose, G.W. and Schrader, F.C., 1923, Manganese deposits of East Tennessee: U.S. Geological Survey Bulletin 737, 154p.

WHOLE ROCK ICP ANALYSIS[1] OF SELECTED SAMPLES

SAMPLE[2]	COORDINATES (State Plane, NAD 27, in feet)	ROCK TYPE	MAP UNIT	OXIDES IN PERCENT											ELEMENTS IN PPM[3]													
				SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Cr_2O_3	Ba	Cu	Zn	Ni	Co	Sr	Zr	Ce	Y	Nb	Sc	Ta	LOI[4]	SUM[5]
ts359	751,859N; 831,117E (NC)	brecciated granitic mylonite	Pzc	67.55	14.57	4.49	1.51	2.77	3.73	2.70	0.68	<0.01	0.08	<0.001	1028	23	59	<20	<20	412	209	80	15	<10	7	<20	1.8	100.10
ts405	757,699N; 837,433E (NC)	mylonitic granodioritic gneiss	Pzmy	62.34	19.30	4.08	0.75	1.12	6.82	3.19	0.43	0.10	0.09	<0.001	1120	32	63	<20	<20	260	686	294	106	<10	14	<20	1.4	99.94
ts504	752,456N; 831,620E (NC)	mylonite	Pzmy	72.82	12.31	3.42	0.87	3.83	0.40	3.67	0.58	0.11	0.05	<0.001	1616	<20	81	<20	<20	619	478	40	19	<10	8	<20	2.0	100.40
ts1219	793,409N; 843,737E (NC)	quartzite	Єcu	83.60	5.45	4.76	0.62	0.87	0.12	1.44	0.11	0.04	0.02	<0.001	120	<20	37	<20	<20	26	87	<20	<10	<10	1	29	3.4	100.47
ts1242	789,646N; 850,405E (NC)	laminated metasiltstone	ЄZws	55.26	19.79	9.45	2.84	0.49	1.58	4.59	1.29	0.34	0.12	0.016	1096	<20	128	33	32	60	312	103	47	<10	20	<20	4.0	99.99
ts1924	550,254N; 2,890,459E (TN)	calcareous metasiltstone	Zww	58.35	14.78	7.04	3.24	2.79	2.19	4.56	1.02	0.22	0.07	0.006	685	22	103	34	<20	125	461	120	55	17	14	<20	5.5	99.97
ts1976	550,545N; 2,897,451E (TN)	feldspathic quartzite	Zsrf	77.60	9.77	1.65	0.31	0.50	1.95	5.49	1.12	0.07	0.05	0.004	1128	67	458	82	<20	67	821	111	42	21	9	<20	1.1	99.96
ts1979	551,008N; 2,896,524E (TN)	laminated metasiltstone	Zsrf	60.88	16.09	7.38	2.25	0.60	3.82	4.68	0.96	0.32	0.10	0.008	1032	29	125	<20	<20	105	635	154	52	23	17	<20	2.6	99.95
ts2316	545,471N; 2,895,192E (TN)	metasiltstone	Zsrf	62.42	14.34	5.40	1.53	3.58	4.29	2.97	0.93	0.33	0.15	0.003	568	<20	92	22	<20	200	593	181	66	18	15	<20	3.8	99.96
ts2184	532,478N; 2,898,088E (TN)	meta-arkose	Zsl	79.74	7.85	2.84	0.20	0.04	1.10	4.50	1.71	0.04	0.02	0.004	859	<20	<20	<20	<20	65	1152	86	20	32	12	<20	1.6	99.92
ts2631	537,191N; 2,897,628E (TN)	feldspathic quartzite	Zsl	83.63	7.49	1.78	0.09	0.03	0.55	4.69	0.65	0.02	0.01?	0.003	753	<20	<20	<20	<20	44	332	42	15	<10	5	<20	0.9	99.99
ts612	766,564N; 839,474E (NC)	mylonite	Zsmy	70.14	14.69	3.31	0.85	1.06	1.88	4.52	0.66	0.26	0.03	<0.001	2041	22	78	<20	<20	293	381	78	39	<10	12	<20	2.1	99.84
ts117	756,488N; 817,374E (NC)	mylonitic phyllite	Zswbp	73.76	12.42	3.42	1.07	0.41	0.08	5.10	0.80	0.25	0.06	?0.001	715	<20	48	<20	<20	24	659	82	30	17	12	<20	2.4	99.98
ts124	761,290N; 821,615E (NC)	mylonitic phyllite	Zswbp	49.39	24.62	12.12	2.23	0.23	0.42	4.12	0.92	0.22	0.14	0.011	713	20	187	54	36	91	185	59	112	31	19	<20	5.3	99.90
ts2612a	548,306N; 2,903,304E (TN)	metagraywacke	Zswbp	73.40	11.41	5.02	0.83	0.06	0.75	4.12	0.84	0.14	0.06	0.009	1053	<20	90	26	<20	87	534	95	74	12	11	<20	3.1	99.98
ts2612b	548,306N; 2,903,304E (TN)	very fine-grained metasiltstone	Zswbp	50.02	24.04	7.88	1.90	0.02	0.06	9.53	1.09	0.11	0.04	0.008	2373	<20	64	21	<20	34	185	145	95	19	22	<20	4.9	99.94
ts2613	548,183N; 2,903,617E (TN)	metagraywacke	Zswbp	66.78	14.64	4.45	1.00	0.84	0.90	7.88	1.01	0.15	0.06	0.006	1429	<20	38	45	<20	122	645	182	37	26	13	<20	1.9	99.92
ts79	760,677N; 817,289E (NC)	meta-arkose	Zswbw	80.31	9.95	1.51	0.20	0.90	1.42	4.16	0.42	0.08	0.03	0.001	1206	36	31	<20	<20	399	146	144	28	16	2	30	0.8	100.02
ts1025	789,756N; 843,224E (NC)	mylonitic metagraywacke	Zswbw	72.82	10.65	5.19	0.55	0.77	1.96	4.92	1.17	0.11	0.07	<0.001	1229	<20	52	<20	<20	165	252	111	20	23	5	<20	1.5	99.93
ts2108	551,435N; 2,909,286E (TN)	silty metashale	Zswbw	56.74	20.36	7.34	1.42	0.05	0.07	7.75	1.12	0.23	0.04	0.006	1067	<20	36	46	<20	89	585	290	536	21	19	<20	4.5	99.95
ts269a	752,309N; 823,451E (NC)	metagabbro	Zbg	46.38	15.21	14.22	6.33	8.99	2.40	0.75	2.51	0.31	0.18	0.004	267	<20	141	58	78	392	127	<20	26	33	22	32	2.8	100.23
ts1986	529,704N; 2,901,023E (TN)	quartz diorite	Ym	48.41	16.61	11.70	3.71	8.69	2.81	1.69	3.20	0.44	0.17	0.009	536	23	108	25	32	430	185	94	36	19	21	<20	2.2	99.83
ts955	779,328N; 834,539E (NC)	biotite quartz monzodioritic gneiss	Ym	63.79	14.86	6.50	1.36	2.59	3.12	3.97	1.24	0.60	0.15	0.003	1793	<20	262	<20	21	398	632	257	71	11	18	<20	1.1	99.69
ts312	758,948N; 821,595E (NC)	mylonitic biotite gneiss	Ymmy	63.11	14.71	7.07	1.50	3.49	2.91	3.05	1.46	0.63	0.11	<0.001	1579	<20	182	<20	28	598	601	237	64	29	16	22	1.7	100.14
ts523	766,557N; 840,214E (NC)	mylonitic tonalitic gneiss	Ymmy	63.52	14.18	6.32	0.91	4.22	3.70	3.09	1.51	0.78	0.11	<0.001	1196	26	174	<20	27	585	618	54	58	13	16	23	1.4	100.08
ts773	767,588N; 837,920E (NC)	biotite granodioritic gneiss	Ymmy	62.82	14.86	6.73	1.38	4.52	2.88	3.38	1.37	0.71	0.13	<0.001	1801	36	149	<20	25	650	578	170	65	<10	18	<20	1.0	100.20
ts333	760,032N; 824,660E (NC)	epidotized amphibolite	Yax	49.00	12.71	12.70	2.08	15.66	0.45	0.16	3.97	0.75	0.12	<0.001	66	<20	105	<20	59	1791	197	<20	38	38	23	48	2.2	100.09
ts443	764,136N; 827,753E (NC)	amphibolite	Yax	42.57	14.78	15.69	4.13	16.94	0.82	0.33	2.26	0.27	0.41	0.034	74	<20	234	94	67	356	122	<20	27	25	32	<20	1.8	100.17
ts618	758,892N; 842,785E (NC)	biotite granitic gneiss	Ysc	71.66	14.05	2.51	0.33	0.67	0.87	4.92	0.28	0.26	0.02	<0.001	1724	<20	44	<20	<20	270	241	142	10	<10	6	<20	4.5	100.35
ts1658	766,582N; 847,171E (NC)	biotite quartz dioritic gneiss	Ysc	51.68	17.97	9.07	4.26	6.61	2.80	3.66	1.61	0.32	0.16	0.008	1023	<20	107	33	21	527	295	197	148	37	50	<20	1.5	99.93
ts1940	542,913N; 2,908,937E (TN)	granitic gneiss	Ysc	69.73	14.50	2.67	0.64	0.93	3.22	5.84	0.49	0.11	0.05	0.003	1320	<20	49	<20	<20	312	159	103	11	10	4	<20	1.6	100.01
ts221	753,144N; 813,576E (NC)	biotite granodioritic gneiss	Yscmy	71.52	13.39	4.03	0.94	0.84	3.42	4.01	0.57	0.16	0.06	0.004	435	<20	44	<20	<20	154	247	139	27	16	6	<20	0.9	99.98
ts380	758,788N; 840,926E (NC)	biotite granodioritic gneiss	Yscmy	72.83	13.76	2.17	0.38	1.37	2.85	4.73	0.30	0.07	0.02	<0.001	1058	<20	41	<20	<20	396	122	65	<10	<10	1	<20	1.0	99.68
ts1638	769,535N; 849,597E (NC)	mylonitic biotite granitic gneiss	Yscmy	72.28	13.81	2.01	0.34	1.32	2.79	5.63	0.28	0.08	0.02	<0.001	770	<20	<20	<20	<20	185	206	114	17	<10	3	<20	1.3	100.02
ts2036	524,188N; 2,897,970E (TN)	mylonitic granitic gneiss	Yscmy	73.38	13.42	1.72	0.45	0.62	3.31	5.59	0.21	0.02	0.05	<0.001	746	<20	25	<20	<20	186	80	74	11	<10	2	<20	1.1	100.00
ts1747	761,653N; 845,823E (NC)	garnet-biotite granitic gneiss	Yggg	70.11	14.92	3.24	0.72	2.55	2.20	4.78	0.27	0.05	0.06	<0.001	1755	<20	<20	79	<20	434	179	120	31	<10	7	<20	0.8	100.00
ts624	759,140N; 844,157E (NC)	quartz monzodioritic granulite	Ygqm	59.91	17.31	8.03	2.54	4.79	3.93	2.13	1.18	0.41	0.09	<0.001	1152	<20	139	<20	26	655	224	<20	18	<10	14	24	0.1	100.69
ts378	758,318N; 839,815E (NC)	hypersthene tonalitic granulite	Ygt	57.91	16.93	7.82	2.74	6.16	4.03	1.91	1.04	0.75	0.10	0.002	621	36	109	21	24	589	380	70	100	<10	25	40	0.6	100.24

[1] Whole Rock Inductively Coupled Plasma - Atomic Emission Spectrometer (ICP) analysis conducted by Acme Analytical Laboratories, LTD., 852 E. Hastings St., Vancouver, BC
[2] Sample numbers correspond to thin section and whole rock sample localities shown on geologic map
[3] PPM = parts per million
[4] LOI = loss on ignition in percent
[5] SUM = Sum total in percent

QUADRANGLE LOCATION



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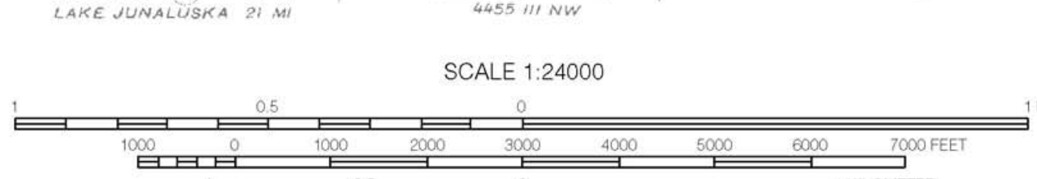

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

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MAP SHOWING IGNEOUS AND METAMORPHIC CONDITIONS

Metamorphic and primary igneous mafic minerals observed in stream sediment heavy mineral samples and thin sections. Sample site localities also shown on geologic map.

Metamorphic Zones
(from thin section and stream sediment heavy mineral data)

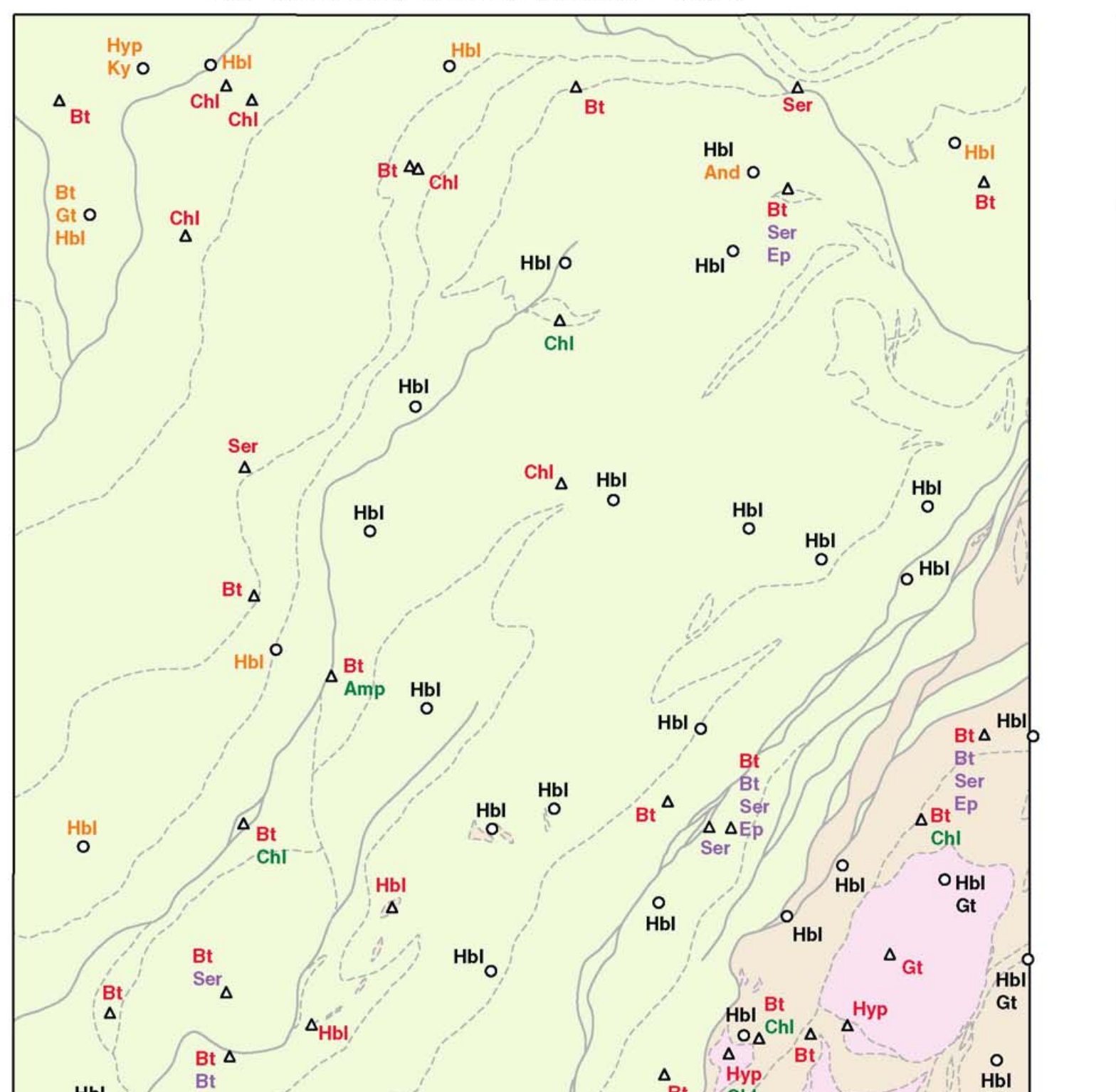
- 🟩 Areas of Paleozoic greenschist facies metamorphism
- 🟫 Areas of Paleozoic amphibolite facies metamorphism
- 🟪 Areas of relict Grenville granulite facies metamorphism

Red - Prograde metamorphic minerals observed in thin sections
Green - Retrograde metamorphic minerals observed in thin sections
Purple - Mylonitic alteration minerals observed in thin sections
Blue - Primary igneous mafic mineral observed in thin section
Orange - Aberrant prograde metamorphic minerals observed in stream sediment heavy mineral samples (detrital grains or contamination?)
Black - Prograde metamorphic minerals observed in stream sediment heavy mineral samples (igneous or metamorphic origin of hornblende undetermined)

○ Stream sediment heavy mineral sample site

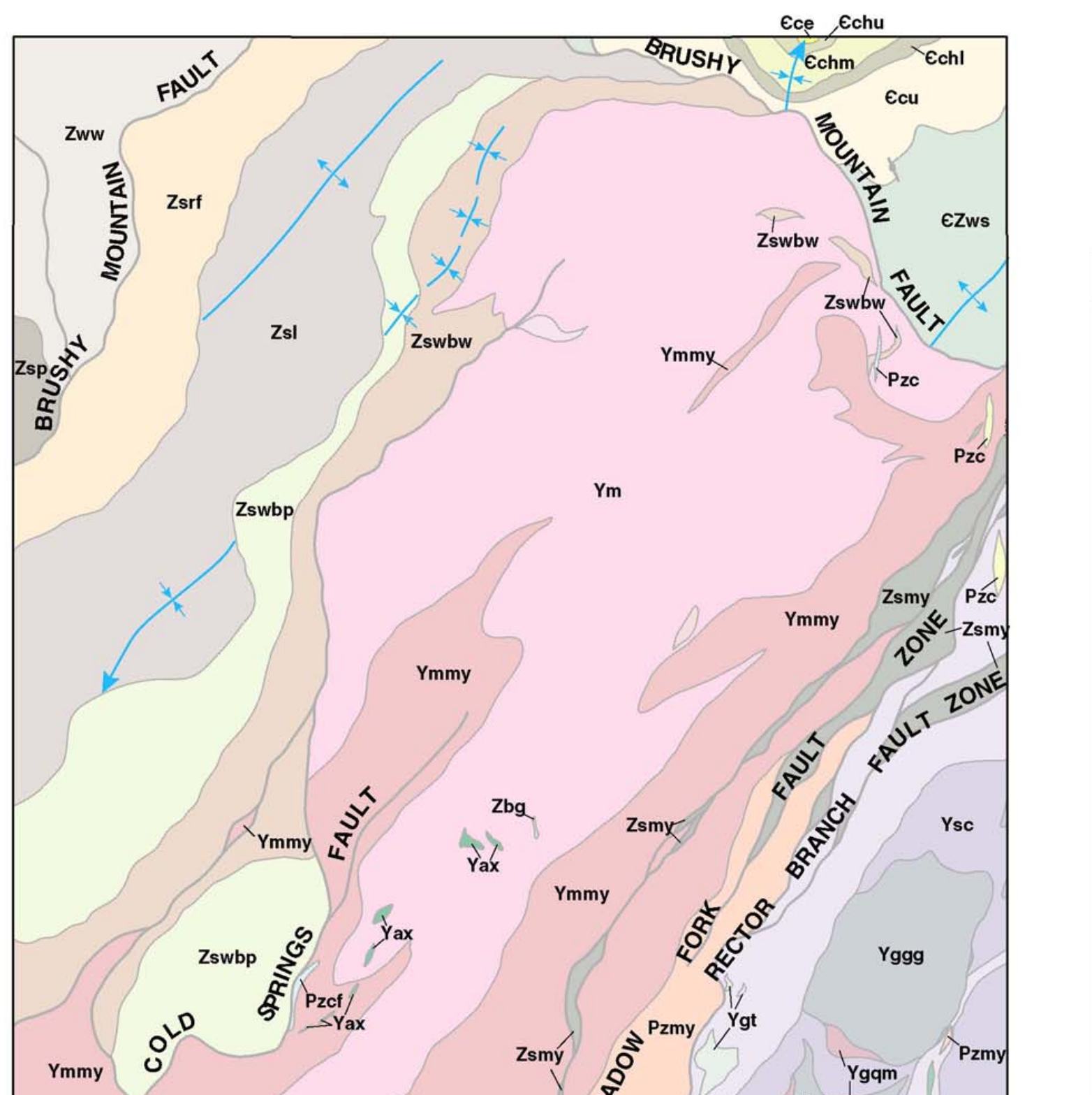
△ Thin section sample site

Mineral Abbreviations: Amp - Amphibole; And - Andalusite; Bt - biotite; Chl - chlorite; Gt - garnet; Hbl - hornblende; Hyp - Hypersthene; Ky - kyanite; Pyx - pyroxene; Ser - sericite.

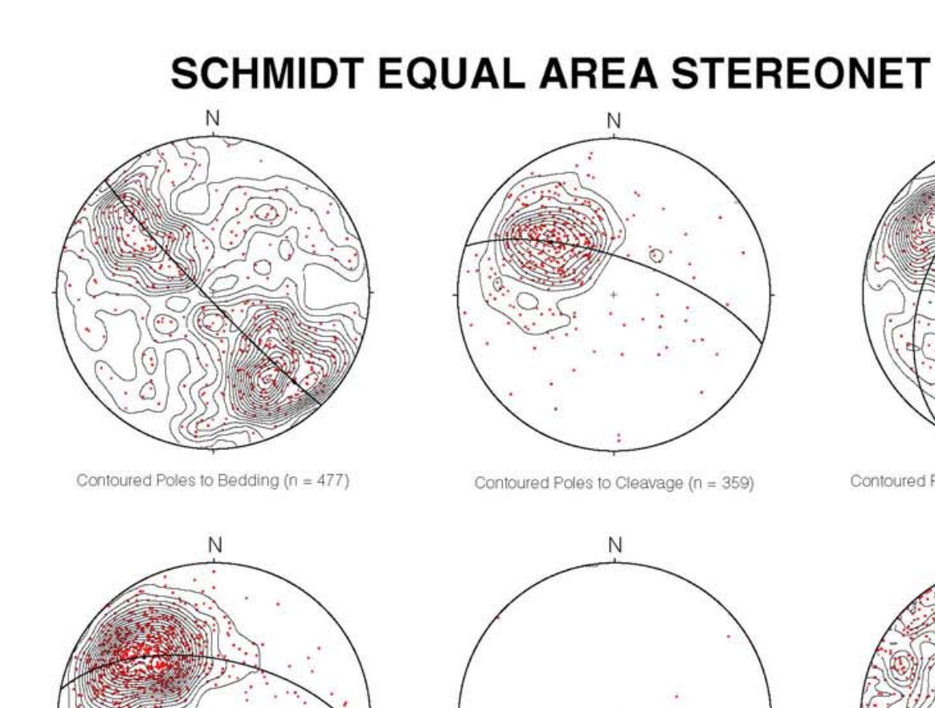


MAP SHOWING MAJOR STRUCTURAL FEATURES

- Anticline
- Syncline
- Plunging anticline
- Plunging syncline
- Fault contact
- Lithologic contact



SCHMIDT EQUAL AREA STEREONET DATA



Contoured Poles to Bedding (n = 477)

Contoured Poles to Cleavage (n = 369)

Contoured Poles to Gneissic Foliation (n = 211)

Contoured Poles to Mylonitic Foliation (n = 876)

Lineation Orientations (n = 16)

▲ Mean Vector

Contoured Poles to Joints (n = 801)
Unidirectional Rose Diagram Inset
(right-hand rule applied)

STREAM SEDIMENT HEAVY MINERAL ANALYSIS

Stream sediment heavy mineral analysis was conducted from October 2001 – September 2002 to aid geologic mapping, better define conditions of metamorphism, and inventory minerals of potential economic significance. Procedure: In the field, approximately 13 kg of stream sediment material is panned to approximately 300 g of heavy mineral concentrate at each sample locality (scintillation data are also collected at the sample site). In the laboratory, concentrate is washed and passed through heavy liquid separation using tetrabromoethane, and scanned with short- and long-wave ultraviolet illumination using an Ultra-violet Products Inc. Model UVGL-48 Mineralight Lamp. Magnetite is removed with an alnico hand magnet. A sample split is grain mounted on a standard 27x46 mm glass slide and approximately 200 grains are identified and counted with the aid of a petrographic microscope and 1.67 index of refraction oil. Results of stream sediment heavy mineral analysis are tabulated below.

Mineral abbreviations used in table: Mag-magnetite; Gt-garnet; Ep-epidote group minerals; Hbl-hornblende; Zr-zircon; Ttn-titanite; Rt-rutile; Lcx-leucoxene; Hem-hematite and other red opaque minerals; Ilm-ilmenite and other black opaque minerals; Tm-tourmaline; En-enstatite; Ap-apatite; Ath-anthophyllite; Tlc-talc; Hy-hypersthene; And-andalusite; Bt-biotite; Ky-kyanite.

SAMPLE[1]	COORDINATES (State Plane, NAD 27, feet)	MAP UNITS DRAINED[2]	%HM IN SAMPLE[3]	PERCENT HEAVY MINERALS IN SAMPLE[4]																		
				Mag	Gt	Ep	Hbl	Zr	Ttn	Rt	Lcx	Hem	Ilm	Tm	En	Ap	Ath	Tlc	Hy	And	Bt	Ky
hm1	551,625N; 2,893,406E(TN)	Zww, Zsrf	0.03	6.7	0.0	3.3	0.0	25.7	1.4	0.5	21.0	22.4	17.7	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5
hm2	551,853N; 2,895,877E(TN)	Zsrf, Zsl, Zww	0.05	4.4	0.0	0.0	1.0	23.0	0.5	0.0	15.3	5.3	49.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
hm3	552,047N; 2,904,626E(TN)	Zswbp, Zswbw, Zsl	0.02	3.1	0.0	2.4	0.5	44.1	2.4	0.0	6.8	0.5	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm4	552,690N; 2,909,996E(TN)	Zswbw, Ym, Zsl	N/A	Scintillation sample site only																		
hm5	794,491N; 845,754E(NC)	Єchq, Єchu, Єchl	0.02	12.2	0.0	3.1	0.0	7.9	1.3	1.8	19.8	47.4	6.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm6	791,599N; 849,864E(NC)	ЄZws, Єcu	0.09	20.8	0.0	2.7	0.0	7.4	0.0	0.4	9.4	55.7	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm7	546,223N; 2,891,660E(TN)	Zww	0.02	12.2	0.4	3.1	0.4	20.6	0.9	0.0	10.5	40.0	10.1	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.3	0.0
hm8	547,757N; 2,897,216E(TN)	Zsl	0.20	5.3	0.0	0.0	0.0	8.5	0.5	0.0	14.2	1.9	69.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm9	549,040N; 2,903,798E(TN)	Zswbp, Zswbw	0.03	16.7	0.0	1.6	0.0	30.4	2.5	0.8	10.3	5.3	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm10	548,277N; 2,908,947E(TN)	Zswbw, Ym	0.14	13.5	0.0	0.9	0.0	0.4	0.0	0.4	7.3	1.7	75.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm11	790,426N; 841,967E(NC)	Ym	2.15	24.8	0.0	5.9	0.4	4.0	0.7	0.0	11.4	7.7	44.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
hm12	791,267N; 849,386E(NC)	Ym, ЄZws, Zswbw	0.38	21.4	0.0	2.8	0.4	7.9	0.8	0.0	8.6	11.0	47.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm13	542,993N; 2,891,681E(NC)	Zww, Zsrf	0.01	4.5	0.0	4.8	0.0	41.1	3.8	0.0	16.7	3.3	24.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm14	543,666N; 2,897,773E(TN)	Zsl	0.08	9.9	0.0	1.4	0.0	6.8	0.9	0.5	10.8	1.8	68.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm15	542,073N; 2,904,977E(TN)	Zswbw, Ym	1.02	1.7	0.0	2.0	0.0	3.9	0.5	0.0	3.4	0.5	87.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm16	545,046N; 2,909,048E(TN)	Ym, Ymfl	2.57	15.2	0.8	3.4	0.4	4.2	0.8	0.0	2.5	0.0	72.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
hm17	787,594N; 841,124E(NC)	Ym, Ymmy	2.89	15.9	0.0	4.6	0.8	1.7	0.4	0.0	7.6	3.8	65.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm18	783,206N; 848,542E(NC)	Ym, Ymmy, Pzcf	0.56	11.8	0.0	5.3	0.0	5.7	0.9	0.0	19.0	12.4	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm19[5]	541,455N; 2,892,435E(TN)	Zsrf, Zsl	0.01	23.8	0.0	0.0	0.0	16.3	0.4	0.8	10.6	15.2	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm20	536,567N; 2,899,288E(TN)	Zswbp, Zsl	0.07	16.8	0.0	0.8	0.0	25.4	0.8	0.0	7.5	8.3	40.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm21	539,671N; 2,903,873E(TN)	Zswbw, Ym	0.37	10.2	0.0	6.7	0.4	5.4	1.3	0.0	6.3	4.0	65.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm22	778,672N; 836,413E(NC)	Ym	1.46	11.8	0.0	3.5	2.6	5.3	0.9	0.0	14.1	4.0	57.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm23	777,412N; 841,281E(NC)	Ym, Ymmy	2.19	27.8	0.0	5.4	1.4	4.7	0.7	0.0	8.7	9.0	41.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm24	778,003N; 847,778E(NC)	Ymmy, Ym	3.33	24.8	0.0	2.3	1.1	2.6	0.4	0.0	19.2	5.6	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm25	532,510N; 2,889,522E(TN)	Zsl	0.04	20.7	0.0	3.1	0.0	39.3	0.8	0.4	4.7	6.2	24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm26	533,303N; 2,899,524E(TN)	Zswbp, Zsl	0.17	4.2	0.0	2.9	0.0	16.8	1.0	0.0	15.8	1.4	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm27	535,070N; 2,902,158E(TN)	Ym	1.35	32.9	0.0	3.4	0.3	3.4	1.3	0.0	4.0	0.0	54.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm28	776,106N; 835,489E(NC	Ym	3.10	12.3	0.0	3.5	0.0	6.1	0.4	0.0	25.9	2.6	49.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm29	776,282N; 843,852E(NC)	Ym	3.47	20.1	0.0	0.4	0.8	2.0	0.0	0.0	19.2	8.4	49.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm30	775,363N; 846,986E(NC)	Ymmy, Zsmy	1.60	27.5	0.0	1.8	1.1	3.3	0.0	0.0	25.7	10.9	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm31[5]	530,760N; 2,894,681E(TN)	Zsl	0.03	13.6	0.0	2.2	0.0	42.3	3.9	1.3	4.3	6.9	25.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm32	530,565N; 2,898,911E(TN)	Zswbp, Zsl, Zswbw	0.04	1.5	0.0	2.5	0.5	26.1	1.0	1.5	11.8	0.5	54.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm33	771,470N; 829,314E(NC)	Ymmy, Ym	6.14	6.0	0.0	0.0	0.9	3.8	2.8	0.0	20.2	2.3	63.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm34	770,249N; 839,238E(NC)	Ym, Ymmy	2.97	18.3	0.0	4.5	1.6	4.1	2.0	0.0	14.3	4.9	49.8	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
hm35	772,095N; 840,992E(NC)	Ymmy, Ym, Ymp	2.67	15.9	0.0	7.2	0.0	3.8	0.4	0.0	28.2	5.0	37.9	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0
hm36	769,486N; 851,168E(NC)	Ysc, Yscmy, Zsmy	1.10	12.1	0.0	16.6	8.3	6.6	3.1	0.0	10.1	22.3	19.7	0.0	0.0	0.0	0.4	0.0	0.9	0.0	0.0	0.0
hm37	523,175N; 2,890,903E(TN)	Zswbp	0.05	1.4	0.0	3.4	0.0	24.1	4.4	0.0	16.3	0.0	50.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm38	526,708N; 2,897,413E(TN)	Zswbw, Zswbp	0.03	6.9	0.0	2.3	0.0	10.7	0.5	0.0	22.8	9.3	47.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm39	766,952N; 831,534E(NC)	Ym, Ymmy	3.41	37.2	0.0	2.4	1.8	2.1	1.2	0.0	11.0	2.1	42.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm40	767,628N; 833,801E(NC)	Ym	2.11	31.0	0.0	2.1	5.9	3.5	1.0	0.0	18.6	3.8	31.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm41	764,993N; 844,165E(NC)	Yscmy, Zsmy	0.58	11.1	0.0	8.0	2.2	8.4	5.7	0.0	21.2	18.6	24.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm42	764,388N; 847,920E(NC)	Yggg, Yscmy, Ysc	0.49	18.1	2.0	8.7	6.8	7.9	4.4	0.0	11.9	9.1	29.4	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0
hm43	520,834N; 2,889,697E(TN)	Zswbp, Zswbw	0.03	2.0	0.0	4.9	0.0	8.8	1.0	1.0	22.6	2.0	57.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm44	763,159N; 823,698E(NC)	Zswbp, Ymmy	0.17	3.3	0.0	0.0	0.0	8.6	0.0	0.0	11.0	14.8	46.4	0.0	0.0	0.0	5.7	10.0	0.0	0.0	0.0	0.0
hm45	761,743N; 831,244E(NC)	Ymmy, Ym	0.67	6.6	0.0	4.2	0.5	6.1	1.9	0.0	31.8	1.4	47.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm46	763,976N; 837,471E(NC)	Ymmy	0.89	29.1	0.0	3.9	1.1	1.4	1.4	0.0	29.1	8.8	25.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm47	763,302N; 842,140E(NC)	Pzmy, Yscmy	1.22	9.2	0.0	2.7	6.4	2.3	0.9	0.0	42.7	11.8	24.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm48	761,338N; 850,823E(NC)	Yggg, Ysc, Yscmy	2.48	29.7	4.2	1.1	4.9	2.1	0.0	0.0	0.0	3.9	53.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm49	757,197N; 816,747E(NC)	Ymmy, Zswbp	0.14	3.3	0.0	10.6	0.5	8.2	3.9	0.0	32.9	7.7	32.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm50	759,546N; 821,888E(NC)	Zswbp, Ymmy	0.57	32.5	0.0	23.6	0.0	10.5	7.4	0.0	14.9	6.8	4.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
hm51	760,800N; 831,068E(NC)	Ymmy, Ym	0.65	48.5	0.0	1.5	0.0	1.3	1.3	0.0	21.6	1.5	24.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm52	759,826N; 835,969E(NC)	Ymmy, Zsmy	1.77	12.1	0.0	2.6	0.0	0.4	3.5	0.0	35.6	8.8	36.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm53	758,991N; 840,367E(NC)	Pzmy, Yscmy, Ygt	3.44	63.3	0.0	4.5	5.0	1.4	1.8	0.0	6.1	1.6	16.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm54	757,732N; 849,539E(NC)	Ysc, Yscmy, Ysca	7.79	4.5	1.0	1.9	15.3	0.5	1.4	0.0	4.8	1.0	69.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm55	752,588N; 814,381E(NC)	Ymmy, Ym, Zswbp	0.38	5.7	0.0	5.2	0.9	6.6	2.4	0.9	33.5	6.1	38.2	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
hm56	754,414N; 819,832E(NC)	Ym, Ymmy	0.86	11.1	0.4	4.0	3.6	1.3	3.1	0.0	24.0	8.4	43.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
hm57	754,870N; 931,496E(NC)	Ymmy	0.37	4.3	0.0	7.2	0.5	7.7	3.8	0.0	33.0	2.9	40.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm58[5]	754,381N; 835,900E(NC)	Yscmy	0.78	2.8	0.0	40.8	8.3	3.4	10.7	0.0	11.7	4.4	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm59	753,487N; 842,620E(NC)	Ysc, Yscmy, Ysca	3.46	5.7	0.9	11.3	8.0	2.8	3.8	0.0	6.6	4.2	56.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
hm60	753,336N; 848,818E(NC)	Ysc, Ysca	1.95	27.6	0.0	34.0	1.1	10.5	8.0	0.0	6.2	3.3	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1] Sample numbers correspond to stream sediment heavy mineral sample localities shown on geologic map
[2] Up to three most dominant map units contributing to the drainage basin, listed in decending order of map area
[3] Percentage of heavy minerals in 13.6 kg stream sediment sample
[4] Point count percentages of heavy minerals from processed samples
[5] Sample in which scheelite was observed with short-wave ultraviolet illumination

CROSS SECTION A-A'

Unit contacts
Fault contacts
Foliation
Bedding