



**EXPLANATION**

**CORRELATION OF MAP UNITS**

**QUATERNARY**

**CRETACEOUS TO TERTIARY**

**PALEOZOIC**

**PALEOZOIC ROCKS NORTH OF FAREWELL FAULT**

**PALEOZOIC ROCKS SOUTH OF FAREWELL FAULT**

**DESCRIPTION OF MAP UNITS**

**QUATERNARY DEPOSITS**

**CRETACEOUS TO TERTIARY**

**PALEOZOIC**

**PALEOZOIC ROCKS NORTH OF FAREWELL FAULT**

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**SYMBOLS**

**CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE UNCERTAIN**

**High angle fault, dashed where approximate, queried where uncertain, dotted where covered**

**U = upstream slope**

**D = downstream side**

**Arrows indicate apparent direction of movement**

**Thrust fault, dashed where approximate, queried where uncertain, dotted where covered**

**Anticline, showing trace of crestal plane and direction of plunge**

**Syncline, showing trace of trough plane and direction of plunge**

**Overturned anticline**

**Overturned syncline**

**Strike and dip of beds**

**Inclined**

**Vertical**

**Strike and dip of foliation**

**Inclined**

**Vertical**

**Strike and dip of cleavage**

**Inclined**

**Vertical**

**Strike and dip of joints**

**Inclined**

**Vertical**

**Bearing and plunge of primary subvertical fold axis**

**E** Glacial erratic

**F** Ice marginal meltwater channel

**G** Fossil locality; (see table 1)

**H** Mineral prospect; (see table 2)

**Gossion**

**PALEOZOIC ROCKS NORTH OF FAREWELL FAULT**

**M2P2b** PILLOW BASALT - Dark-green to gray mafic flows locally altered to calcite, epidote, and chlorite. Appears conformably overlies D1m and D1l. Probably equivalent to P2b unit mapped by Gilbert and others (1982).

**M2P2c** CHERT - Dark-gray to black radiolarian(?) chert containing ellipsoidal 4-cm-long concretions of chert and sandstone.

**M2P2g** FLUVIAL(?) CONGLOMERATE - Dark-red-brown, poorly sorted, poorly bedded, volcanic-rich conglomerate composed of subangular to angular clasts of basalt, andesite, chert, and limestone. On Saint Johns Hill, appears to be a debris channel deposit in unit Dm which may represent shallow-marine or deltaic channel.

**Dm1** MASSIVE LIMESTONE - Medium-gray, massive to thick-bedded limestone containing cryptotectal laminations, thin black chert partings, and dolomite nodules, with abundant brachiopod and conifer-like fauna of Frasney (Upper Devonian) age (pl. 1, table 1). Similar to D1 unit south of Farewell fault, but less deformed; probably shallow water to supratidal deposit near shoreline.

**D1l** LAMINATED LIMESTONE - Medium- to dark-gray, thinly laminated limestone containing 2-cm-thick shale and chert partings to coarse-grained lenticular sandstone, interbedded with S4s unit. Sandstone and occasionally carbonaceous limestone beds contain abundant monosterial graptolite fossils that indicate Middle to Late Silurian age (pl. 1, table 1). May (1969) reports poorly preserved Devonian(?) graptolites from upper D1 unit west of Sheep Creek. Interbedded relationship with S4s unit.

**Ds1** SANDSTONE AND SILTSTONE - Brown to terracotta, micaceous, slightly argillitic, thinly laminated medium- to coarse-grained sandstone and siltstone; sand grains dominantly white quartz or light-colored chert or both.

**PALEOZOIC ROCKS SOUTH OF FAREWELL FAULT**

**msc** SANDSTONE, SILTSTONE, SHALE, AND CHERT - Medium-gray, brown-weathered, locally folded, fine- to medium-grained pebble sandstone, siltstone, and shale with laminated, very light gray to brown chert. Hypothetical alteration of cherty horizons and clastic beds near mafic sills (Dg) produces distinctive lenticular serpyllite alteration zones. Sandstone beds exhibit small-scale 3- to 20-cm-thick Bouma B/C/D or B/C/D sequences separated by 20- to 50-m-thick sections of shale. Sandstone may contain more chert than clastic-rich upper part of unit. Sandstone may contain remains of burrowing organisms (shell, tiny sandstone beds from two localities contain coral, bryozoan, and brachiopod fauna of Middle or Late Devonian age (pl. 1, table 1)).

**mdg** MAFIC TO ULTRAMAFIC SILLS, FLOWS, AND DIKES - Dark-green to gray, fine- to coarse-grained, equigranular gabbro to diorite sills, gabbro and basalt dikes, and sheared sill(?) basalts with minor chert confined to and generally parallel to bedding of mdc. Sills locally contain up to 50% magnetite and 25% olivine, and are differentiated with gabbro or ultramafic basal zones grading into dioritic tops; strong permeabilization and local hydrothermal alteration extends to 1000 m from sill-country rock boundaries. Cumulate pyroxene and olivine textures evident in thin section.

**DC** SHALE AND CHERT - Dark-gray shale and medium- to dark-gray laminated chert overlies algal limestone (D1) in most portions of the map area. About 10 m thick.

**Dsh** SHALE - Sheared organic black shale with silty, platy phyllitic limestone and thin-bedded laminated limestone. Probably at least 300 m thick but highly variable. Dsh occurs between the D1 members in the corner of McGrath B-2 Quadrangle and extends into McGrath B-3 Quadrangle (Gilbert and others, 1982).

**D1** ALGAL LIMESTONE - Massive, thick-bedded, medium-gray limestone about 60 m thick, with 1- to 2-m-thick algal(?) laminations. Microcrystalline corals and Amphipora indicate latest Silurian to MIDDLE Devonian age (pl. 1, table 1).

**P2s1** PHYLITIC CALCARENITE, CALC-SILTSTONE, AND LIMESTONE - Thin- to very thin-bedded, buff to orange-weathering, light- to medium-gray phyllitic calcarenite; thinly laminated to thin-bedded, orange- to brown-weathering, gray to gray-green phyllitic calcarenite, and very thin bedded gray silty limestone. Calcarenite is micaceous, coarse to fine grained, with local cross-bedding and graded bedding; coarse sandstones cataclastically deformed with clasts commonly flattened and stretched. Phyllitic siltstone commonly grades into calc-sandstone or limy siltstone; rarely displays cross-beds and pyrite crystals on partings. Silver-weathering, thinly laminated gray phyllites occur locally as partings and layers up to several meters thick; subparallel and crosscutting quartz and calcite veinlets common. Unit contains from 5 to 355 light-gray, thin-bedded, laminated limestone (pl. 1).

**P2l** LAMINATED TO MASSIVE LIMESTONE - Thin- to very thick bedded, medium- to dark-gray, laminated, locally massive limestone, generally included as part of P2s1 or P2s units, but mapped separately where distinguishable and of appreciable extent; no stratigraphic position implied with respect to P2s1 and P2s. Generally silty with local algal(?) laminations, phyllite and shale partings, and rhomboidal calcite veinlets; varies from 100 to >300 m thick with local folds common. West of Sheep Creek near Windy Fork, unit contains limestone-conglomerate channels 1/2- to 1 m thick and up to 20 m across. 1'C on pl. 1 indicates limestone-conglomerate channel. Structurally overlies Silurian clastic sequence (S4s, S5, S1 units); equivalent to P2l unit of Gilbert and others (1982).

**P2vp** PHYLITIC, VOLCANICLASTIC SANDSTONE, AND CHERT - Thin-bedded, completely folded, mafic phyllite, medium-green volcaniclastic sandstone, and grayish-green chert. Thickness and age unknown. Appears to overlie Silurian clastic units near Sheep Creek and on Tanti Mountain.

**P2cv** LIMESTONE, ARGILLITE, AND CHERT - Light-gray, laminated, rhomboidally veined limestone, medium-gray argillite, and light- to medium-green, wispy contorted exhalative(?) chert horizons 3 to 20 m thick, nonfossiliferous.

**h** ARGILLITE AND PHYLITIC - Medium- to dark-gray, jointed argillite and phyllite often found near areas of major folds or proximal to plutonic rocks; probably thermally and structurally altered Paleozoic clastic rocks. N = horrefies.

**PALEOZOIC ROCKS SOUTH OF FAREWELL FAULT**

**S4s** SANDSTONE, SILTSTONE, SHALE, AND LIMESTONE - Brown to gray, medium- to coarse-grained lenticular limestone, siltstone, and shale, and light- to medium-gray, finely laminated argillite and phyllite. Limestone makes up 5-15% of unit; siltstone and shale locally exhibit phyllitic textures near areas of major folds. Sandstones locally contain 2- to 3-cm-thick Bouma A/B/C sequences, ripple marks, and cross-bedding; structures overlie S4s and S5 units west of Sheep Creek and in the Tanti Mountains. Sandstone and shale units impossible to differentiate from S4s unit but mapped separately because of lack of faunal control; probably middle Silurian unit mapped by Gilbert and others (1982).

**S5** SILTSTONE AND ARGILLITE - Light-gray, brown-weathered siltstone, shale, and other fine-grained lenticular sandstone; sandy fine-grained lenticular sandstone, fluted marls, ripples, and graded bedding, and thin 1/2- to 1-cm-thick B/C/D Bouma sequences are preserved locally. Probably 250-280 m thick; unfossiliferous. We interpret S5 as a silty to silty fan turbidite facies; probably deeper water conditions than S4s units; appears to conformably overlie S4s and S1 units.

**S1** LIMESTONE AND INTERBEDDED SANDSTONE - Medium- to dark-gray, recrystallized limestone beds from 5 to 60 m thick with 1- to 3-m-thick beds of medium- to coarse-grained siltstone and shale, and graded bedding; siltstone, interbedded with S4s unit. Sandstone and occasionally carbonaceous limestone beds contain abundant monosterial graptolite fossils that indicate Middle to Late Silurian age (pl. 1, table 1). May (1969) reports poorly preserved Devonian(?) graptolites from upper S1 unit west of Sheep Creek. Interbedded relationship with S4s unit.

**S4s** SANDSTONE, SILTSTONE, AND SHALE - Medium- to dark-gray, medium- to coarse-grained lenticular sandstone with oscillation ripple marks, flute casts, and graded bedding; siltstone, and shale. Sandstone contains clasts of black chert, quartz, and basalt. Some S4s units, ABC, ABCD, and B/C/D Bouma sequences present in lower part of section; cross-bedding well defined in Bouma C interval. Fines upward with siltstone and shale increasing from 25% at base to 50% near top; apparent thickness ranges from 300 m near Tanti Mountain to 200 m on Sheep Creek. We interpret S4s unit as a proximal or midfan clastic turbidite facies. Stratigraphically overlies Scl unit.

**Scl** LIMESTONE, CHERT, AND SILTSTONE - Light- to medium-gray, finely laminated, recrystallized limestone containing 5-cm-thick brown carbonaceous-siltstone partings and dark-gray, cracked, radiolarian chert. According to May (1969), Scl unit is 16 m thick west of Sheep Creek; thickness could not be determined by the authors in other areas. Faunal collections on Sheep Creek and near southern map boundary contain monosterial graptolites of Early(?) Silurian age (pl. 1, table 1). Stratigraphically overlies D4s unit.

**D4s** SHALE, SILTSTONE, AND CHERT - Dominantly medium- to dark-gray, fissile, locally folded shale with minor dark-brown siltstone interbeds; banded, medium- to dark-gray chert, and minor tuffaceous(?) sandstone comprise upper 30 m of section; structurally deformed, estimated 500 m thick on Sheep Creek. Sulfur-antimony plumes on joint surfaces and bedding planes distinguish D4s from similar Paleozoic strata of younger age (see text for localities with biserial graptolites). Indicated late-early to late Indevonian age (pl. 1, table 1).

**TERTIARY IGNEOUS ROCKS**

**Tvs** VOLCANICLASTIC SANDSTONE AND LACUSTRINE SILT - Brown to gray, medium- to fine-grained lenticular sandstone, siltstone, and siltstone; a 15-m-thick section contains flora-rich silt and silty sand of possible lacustrine origin. Thin coal partings 10 cm to over 1 m thick locally present (coal Btu analyses listed in table 4).

**Tvat** ANDESITIC AIR-FALL TUFF - Medium-green to gray very coarse to medium-grained 150- to 180-m-thick air-fall tuff on S10 Mountain; includes at least four 15- to 25-m-thick air-fall beds. Each bed consists of 3-m-thick basal layer of angular boulder- to cobble-sized debris to fine-sand-sized tuff. Probably proximal to a volcanic center. Each air-fall sequence covers paleozoic rock in petrified wood, dicotyledon leaves, and metapsaonia of Paleocene to Eocene age (table 1).

**Tva** ANDESITIC FLOWS AND LAPILLI TUFF - Medium-gray to green-gray andesitic flows, commonly porphyritic, with aphanitic groundmass consisting of andesite, clinopyroxene, and opaque. Porphyritization of mafic mineralogy common.

**Tvb** BASALT AND BASALTIC ANDESITE - Dark-gray-green to maroon, locally porphyritic olivine-augite basalt or basaltic andesite flows; groundmass often altered to chlorite, epidote, and secondary opaque minerals. Columnar jointing in fresh outcrop. Occurs as interlayer in felsic volcanic flows near S10 Mountain and at mountain front; hence, no stratigraphic position within tertiary volcanic section implied. Mafic and intermediate constituents similar to Paleocene Tantalus Formation in Denali National Park (Gilbert and others, 1976).

**Tvd** DACITE FLOWS AND DIKES - Light- to medium-gray-green, aphanitic to porphyro-aphanitic chloritized dacite flows; flow banding uncommon. West of Velksa Lake, intruded by numerous hornblende granitoid dikes of similar appearance.

**Tvt** AIR-FALL TUFF OF INTERMEDIATE TO FELSIC COMPOSITION - Light- to medium-green-gray, well-laminated crystal tuff consisting of 1- to 3-m-thick graded bed sequences containing pebble-sized angular clasts (at base) that grade into fine silt-sized clasts; probably indicates distal air-fall deposit. In upper Tanti Creek, contains 10-cm-thick paleozoic rich in undated plant fossils (table 1). Includes well-sorted(?) tuffs 6 km south of Saint Johns Hill.

**Tav** AGGLOMERATE - Medium-green-gray, poorly sorted, 45-m-thick volcanic agglomerate of pebbles to boulder-sized clasts of basalt and andesite.

PRELIMINARY GEOLOGIC MAP OF MCGRATH B-2 QUADRANGLE, ALASKA

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