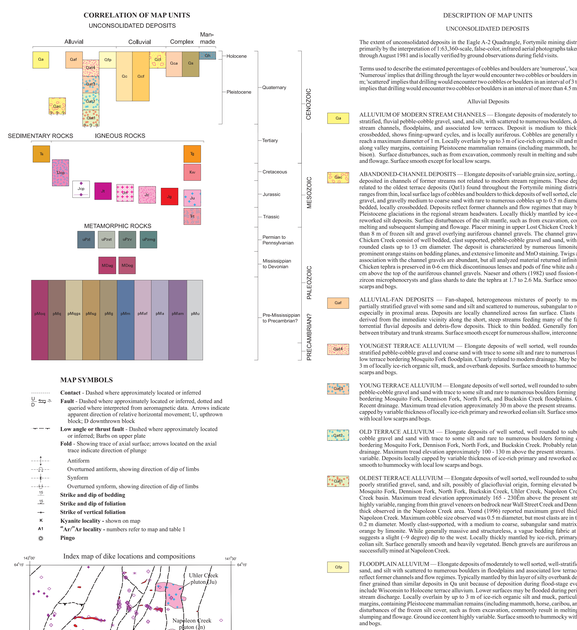
CORRELATION OF MAP UNITS



MAP SYMBOLS

Contact - Dashed where approximately located or inferred

Fault - Dashed where approximately located or inferred, dotted and queried where interpreted from aeromagnetic data. Arrows indicate separate direction of relative horizontal movement; U, upthrown block; D downthrown block

Low angle or thrust fault - Dashed where approximately located or inferred; Barbs on upper plate

Fold - Showing trace of axial surface; arrows located on the axial trace indicate direction of plunge

Antiform

Overturned antiform, showing direction of dip of limbs

Synform

Overturned synform, showing direction of dip of limbs

Strike and dip of bedding

Strike and dip of foliation

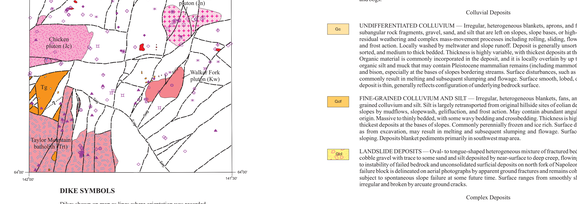
Strike and dip of vertical foliation

K/ar locality - shown on map

$^{40}Ar/^{39}Ar$ locality - numbers refer to map and table 1

Pingo

Index map of dike locations and compositions



DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

The extent of unconsolidated deposits in the Eagle A-2 Quadrangle, Fortymile mining district, was mapped primarily by the interpretation of 1:63,360-scale, false-color, infrared aerial photographs taken from July 1978 through August 1981 and is locally verified by ground observations during field visits.

Terms used to describe the estimated percentages of cobbles and boulders are 'numerous', 'scattered', and 'rare.' Numerous' implies that drilling through the layer would encounter two cobbles or boulders in an interval of 0.6 m, 'scattered' implies that drilling would encounter two cobbles or boulders in an interval of 3 to 4.5 m, and 'rare' implies that drilling would encounter two cobbles or boulders in an interval of more than 4.5 m.

Alluvial Deposits

ALLUVIUM OF MODERN STREAM CHANNELS — Elongate deposits of moderately to well sorted, well stratified, fluvial pebble-cobble gravel and sand, in places with scattered to numerous boulders, deposited in active stream channels, floodplains, and associated low terraces. Deposit is medium to thick bedded, locally crossbedded, shows fining-upward cycles, and is locally auriferous. Cobbles are generally rounded and may reach a maximum diameter of 1 m. Locally overlain by up to 3 m of ice-rich organic silt and muck, particularly along valley margins, containing Pleistocene mammalian remains (including mammoth, horse, caribou, and bison). Surface disturbances, such as from excavation, commonly result in melting and subsequent slumping and flowage. Surface smooth except for local low scarps.

ABANDONED CHANNEL DEPOSITS — Elongate deposits of variable grain size, sorting, and bedding style deposited in channels of former streams not related to modern stream regimens. These deposits are closely related to the oldest terrace deposits (Qat1) found throughout the Fortymile mining district. Corresponding ranges from thin, local surface layer of cobbles and boulders to thick deposits of well sorted, clean pebble-cobble gravel, and gravelly medium to coarse sand with rare to numerous cobbles up to 0.5 m diameter. Thin to thick bedded, locally crossbedded. Deposits reflect former channels and flow regimes that may be related to early Pleistocene glaciations in the regional stream headwaters. Locally thickly mantled by ice-rich, primary and reworked silt deposits. Surface disturbances of the silt mantle, such as from excavation, commonly result in melting and subsequent slumping and flowage. Placer mining in upper Lost Chicken Creek has exposed more than 8 m of frozen silt and gravel overlying auriferous channel gravels. The channel gravels of upper Lost Chicken Creek consist of well bedded, clast supported, pebble-cobble gravel and sand, with rounded to well-rounded clasts up to 13 cm diameter. The deposit is characterized by numerous limonite-filled fractures, prominent orange stains on bedding planes, and extensive limonite and MnO staining. Twigs and large wood is associated with the channel gravels are abundant, but all analyzed material returned infinite dates. The Lost Chicken tephra is preserved in 0-6 cm thick discontinuous lenses and pods of fine white ash approximately 2 cm above the top of the auriferous gravels. Fossils of horses (#1 Xaser and others (1982) and fission-track methods on zircon microphenocrysts and glass shards to date the tephra at 1.7 to 2.6 Ma. Surface smooth with local low scarps and bogs.

ALLUVIAL-FAN DEPOSITS — Fan-shaped, heterogeneous mixtures of poorly to moderately sorted, partially stratified gravel with some sand and silt and scattered to numerous, subangular to rounded boulders, especially in proximal areas. Deposits are locally channelized across fan surface. Clasts generally locally derived from the immediate vicinity along the short, steep streams feeding many of the fans. May include torrential fluvial deposits and debris-flow deposits. Thick to thin bedded. Generally form at intersection between tributary and main valley bottoms. Surface smooth except for numerous shallow, interconnected channels.

YOUNGEST TERRACE ALLUVIUM — Elongate deposits of well sorted, well rounded to subrounded, stratified pebble-cobble gravel and coarse sand with trace to some silt and rare to numerous boulders forming terraces bordering Mosquito Fork floodplain. Clearly related to modern drainage. May be overlain by up to 3 m of locally ice-rich organic silt, muck, and overbank deposits. Surface smooth to hummocky with local low scarps and bogs.

YOUNG TERRACE ALLUVIUM — Elongate deposits of well sorted, well rounded to subrounded, stratified pebble-cobble gravel and sand with trace to some silt and rare to numerous boulders forming elevated benches bordering Mosquito Fork, Dennison Fork, North Fork, Buckskin Creek, Uhler Creek, Napoleon Creek, and Chicken Creek. Typical primary modal mineralogy is 15-20 percent quartz, 35-45 percent plagioclase, 10-15 percent K-feldspar, 10 percent biotite, and lesser amounts of muscovite, epidote, and opaque (carbonaceous) material. Clasts are mostly subangular to subrounded quartz and plutonic K-feldspars are up to 8 mm in length, other major minerals typically are 2-3 mm. Alteration is usually minor, with some chloritization of mafic minerals and sericite dusting of plagioclase. The presence of magmatic epidote (for example, overgrowths on allanite) suggests mesozonal crystallization conditions. Most contacts with country rocks are linear zones lacking outcrops and displaying no obvious horizontal aureole, suggesting post-intrusive faulting. Magnetic susceptibility is generally low (0.1-0.7 x 10^{-3} SI). $^{40}Ar/^{39}Ar$ hornblende plateau age of 188 Ma (sample 9; table 1).

OLD TERRACE ALLUVIUM — Elongate deposits of well sorted, well rounded to subrounded, pebble-cobble gravel and sand with trace to some silt and rare to numerous boulders forming elevated benches bordering Mosquito Fork, Dennison Fork, North Fork, and Buckskin Creek. Probably related to Pleistocene drainage. Maximum tread elevation approximately 100 - 130 m above the present streams. Thickness highly variable. Deposits may contain a variable thickness of ice-rich primary and reworked eolian silt. Surface smooth to hummocky with local low scarps and bogs.

OLDEST TERRACE ALLUVIUM — Elongate deposits of well sorted, well rounded to subangular, generally poorly stratified gravel, sand, and silt, possibly of glacial origin, forming elevated benches bordering Mosquito Fork, Dennison Fork, North Fork, Buckskin Creek, Uhler Creek, Napoleon Creek, and Chicken Creek. Typical primary modal mineralogy is approximately 165 - 230 cm above the present stream. Thickness highly variable, ranging from thin gravel veneers on bedrock near Wolf Street Creek and Dennison Fork to 15 m thick observed in Uhler Creek, and east of the South Fork of the Fortymile River just north of the mouth of Napoleon Creek. One of these dikes from just east of the map area yielded a $^{40}Ar/^{39}Ar$ age of 188 Ma (Layer and others, 2001).

TALUS DEPOSITS — Poorly sorted, angular to subangular, heterogeneous mixtures of fractured bedrock and pebble-cobble gravel with trace to some sand and silt deposited by near-surface to deep creep, flowing, and sliding due to instability of jointed bedrock and unconsolidated surficial deposits. Talus forms by mass wasting. Surface failure block is delineated on aerial photographs by apparent ground fractures and remains coherent, but may be subject to spectacular collapse and flowage at some future time. Surface ranges from smoothly sloping to slightly irregular and broken by arcuate ground cracks.

Colluvial Deposits

UNDIFFERENTIATED COLLUVIUM — Irregular, heterogeneous blankets, aprons, and fans of angular to subangular rock fragments, gravel, sand, and silt that are left on slopes, slope bases, or high-level surfaces by residual weathering and complex mass-movement processes including rolling, sliding, flowing, gelification, and frost action. Locally washed by meltwater and slope runoff. Deposit is generally unsorted to very poorly sorted, and moderate to thick bedded. Thickness is highly variable, with thickest deposits at the bases of slopes. Organic material is commonly incorporated in the deposit, and it is locally overlain by up to 3 m of ice-rich organic silt and muck that may contain Pleistocene mammalian remains (including mammoth, horse, caribou, and bison, especially at the bases of slopes bordering streams. Surface disturbances, such as from excavation, commonly result in melting and subsequent slumping and flowage. Surface smooth, lobed, or terraced and, if deposit is thin, generally reflects configuration of underlying bedrock surface.

FINE-GRAINED COLLUVIUM AND SILT — Irregular, heterogeneous blankets, fans, and aprons of fine-grained colluvium and silt. Silt is largely transported from original hillside sites of eolian deposition to lower slopes by mudflows, slopewash, gelification, and frost action. May contain abundant angular clasts of local origin. Moderately to thickly bedded, with some wavy bedding and crossbedding. Thickness is highly variable, with thickest deposits at the bases of slopes. Commonly permanently frozen and ice rich. Surface disturbances, such as from excavation, commonly result in melting and subsequent slumping and flowage. Surface may step to gently sloping. Deposits blanket pediments primarily in southwest map area.

Complex Deposits

SWAMP DEPOSITS — Elongate to blanket deposits of complex(?) bedded peat, organic silt, and organic sand accumulated in surface depressions in local drainages and in former stream channels. Saturated and locally frozen, locally ice rich. Thickness highly variable. Surface smooth, hummocky, or pitted. May have standing water.

COLLUVIAL AND ALLUVIAL VALLEYFILL DEPOSITS — Elongate, aprons- and fan-shaped, heterogeneous mixtures of poorly sorted, angular to subrounded gravel, sand, and silt with scattered to locally numerous boulders and organic material. Deposits occupy valleys and lower slopes downslope from bedrock and colluvial source areas. Deposits are complex, mass-movement processes including rolling, sliding, flowing, gelification, and frost action) and strongly influenced by meltwater and slope runoff. Other important depositional processes may include debris flows, brief, intense (torrential) summer stream flows, and minor snow-avalanching. Commonly forms alternating stratified and unstratified zones and lenses in gullies and steep tributary valleys with intermittent or ephemeral streams. Locally overlain by variable thickness of ice-rich organic silt and muck, especially in areas of little or no slope. Surface disturbances, such as from excavation, commonly result in melting and subsequent slumping and flowage. Surface steep to gently sloping, with local low scarps and shallow channels from ephemeral runoff/streams.

Man-made Deposits

PLACER-MINE TAILINGS AND ARTIFICIAL FILLS — Pebble-cobble gravel with trace to some sand and silt forming bases for roads and airports and piled in active or former gravel pits, open-pit mines, and dredged areas. Well to poorly sorted. Surface smooth to irregular. Extent based primarily on distribution between July 1978 and August 1981 when the aerial photographs were taken.

BEDROCK UNITS

SEDIMENTARY ROCKS

SEDIMENTARY ROCKS (Tertiary) — Poorly- to well-indurated, nonmarine sedimentary rocks of early Tertiary age, as established by plant fossils (Foster, 1976). Typically consists of conglomerate, sandstone, shale, amber-bearing coal, siltstone, and greywacke. Includes local felsic tuff, usually rhyolite composition, with distinctive quartz and sanidine phenocrysts in a light colored, fine-grained matrix or fine-grained, layered ash tuff. Total thickness of unit is in excess of 140 m. Siliceous basal conglomerate with cobbles to 1 m is over 40 m thick in lower Napoleon Creek. Magnetic susceptibility is very low, <0.1 x 10^{-3} SI (Systems International). Petrified wood, with massive black chalcedony containing abundant plant fossils, is locally present in the Chicken area. Silicified and altered regional correlatives of this unit contain epithermal gold prospects, as at Pharmacist Hill, 18 km east of Eagle, Alaska, and Grew Creek, near Ross River, Yukon Territory (Newberry and others, 1998b). Spatial association with placer gold-bearing gravels in the Chicken and Napoleon Creek areas suggests that this unit may be gold-bearing as well. The unit is usually truncated by Tertiary faults; uncomfortable contacts with older units are only rarely observed. The age of this unit may extend into the Cretaceous (based on $^{40}Ar/^{39}Ar$ biotite plateau age of 105.4 Ma and white mica plateau age of 108.8 Ma on tuffaceous? material, east side of Ingle Creek, Eagle A-3 Quadrangle; Layer and others, 2001).

IGNEOUS ROCKS

MICROGABBRO DIABASE (Tertiary) — Fine- to medium-grained (1–5 mm) tholeiitic microgabbro or diabase. Typical mineralogy is 50–70 percent felted plagioclase laths, 30–50 percent altered clinopyroxene + olivine, 3–5 percent magnetite + ilmenite, and 0–5 percent biotite. Although previously mapped as fine- to coarse-grained basalt (Foster, 1976), the absence of columnar jointing, layering, vesicles, volcanic breccias, or other evidence of extrusive character suggests that this unit is predominantly of shallow (?) intrusive origin or the interior portion of a thick flow. Contacts with adjacent units, where exposed, are high-angle and sheared, suggesting faulted intrusive contacts. $^{40}Ar/^{39}Ar$ biotite plateau age of 57.5 Ma (sample 1; table 1). Probably correlates with Tertiary basalts of similar major- and trace-element compositions (within-plate) throughout Interior Alaska. Early Tertiary resets in Ar spectra for minerals of the Chicken area and some early Tertiary $^{40}Ar/^{39}Ar$ isochrons (Layer and others, 2001) indicate this magmatism may have been extensive in the study area, although widely unaligned mafic dikes (too small to be shown at map scale) are sporadically present elsewhere in the map area and probably represent the same early Tertiary magmatism. Magnetic susceptibility of the unit is moderate to high, usually 1–11 x 10^{-3} SI. Large bodies spatially correspond to aeromagnetic lows, indicating they are reversely magnetized, similar to Tertiary basalt in the Fairbanks area (Roe and Stone, 1993).

WALKER FORK PLUTON (Cretaceous) — Sub-equigranular, medium-grained, hornblende biotite granodiorite and lesser tonalite herein called the Walker Fork pluton. Typical primary modal mineralogy is 25–30 percent quartz, 30–35 percent plagioclase, 10–20 percent poikilitic K-feldspar, 8–15 percent biotite, 0–5 percent hornblende, 1 percent myrmekite, 1 percent opaques, and trace apatite and sphene. Distinguished from nearby Jurassic and Triassic plutons by large, prominent biotite crystals and lack of foliation. Locally cut by aplite and pegmatite dikes and veins containing tourmaline, garnet, and muscovite. Contains numerous, 5–20 percent, mafic enclaves. Mafic enclaves are commonly fine-grained, mostly after plagioclase and mafic minerals. Magnetic susceptibility is high, typically 7–30 x 10^{-3} SI. Pluton is highly fractured near high-angle faults. As demonstrated by presence and absence of hornfels zones, both intrusive and fault contacts with surrounding gneissic rocks are present. This body is not known to contain or be spatially associated with metallic mineralization or placer gold, although it is cut by chalcedonic quartz veins. $^{40}Ar/^{39}Ar$ biotite plateau age of 100 Ma (sample 2; table 1); biotite from nearby gneiss yielded a K-Ar reset age of 99 Ma (Wilson and others, 1985).

CHICKEN PLUTON PORPHYRY (Jurassic to Tertiary?) — One small body of medium- to coarse-grained, pink and gray, K-feldspar porphyritic biotite hornblende granite. Typical modal mineralogy consists of 20–28 percent quartz, 20–30 percent plagioclase, 30–40 percent K-feldspar, 5–15 percent hornblende, 10–20 percent biotite, and ≤ 1 percent opaques. Intrudes the southern margin of the Chicken pluton (Jc). Magnetic susceptibility is 8–9.5 x 10^{-3} SI. Spatially associated with aplite dikes. Southern margin is structurally brecciated adjacent to fault.

BIOTITE CLINOPYROXENITE DIKES (Jurassic) — Fine- to coarse-grained, dark green, generally unfoliated and equigranular (rarely porphyritic) dikes. Typical modal mineralogy consists of 15–90 percent clinopyroxene, 0–50 percent amphibole (secondary?), 0–30 percent plagioclase, 0–7 percent biotite, 0–4 percent quartz, and 3–5 percent opaques. Locally highly altered. Secondary minerals include actinolite, chlorite, talc, carbonate, epidote, clinozoisite, opaques, carbonate, and sericite. Magnetic susceptibilities vary from 0.01–6.7 x 10^{-3} SI to 3.6–5.1 x 10^{-3} SI. Spatially co-extensive with the Napoleon pluton and Jg intrusions in northwestern map area and generally not foliated. Compositionally and texturally similar biotite clinopyroxenite dikes in the northeastern Eagle Quadrangle yield K-Ar ages of 184–185 Ma (Newberry and others, 1998). Such biotite clinopyroxenite bodies are also known to bear platinum group metals (PGM) (Foley and others, 1989) and placers in Napoleon Creek are reported to contain anomalous PGM values (Cathrall and others, 1989). A clinopyroxenite dike inclusion within the Napoleon pluton contains up to 25 ppb platinum and 5 ppb palladium (Werdon and others, 2000).

TOURMALINE-MUSCOVITE GRANITE (Jurassic) — Medium-grained, pegmatitic to aplitic granite. Typical primary modal mineralogy is 2 percent tourmaline, 20–25 percent muscovite, 20–25 percent quartz, 25–30 percent K-feldspar, 20–25 percent plagioclase, and trace zircon. Surrounding gneiss contains float of muscovite + tourmaline quartz veins and tourmaline-muscovite granite dikes. Magnetic susceptibility is 0.01–0.02 x 10^{-3} SI. $^{40}Ar/^{39}Ar$ muscovite plateau age of 185.9 Ma (sample 6; table 1). Trace-element data suggests this is a highly fractionated granite with arc-type tectonic affinities.

NAPOLEON CREEK PLUTON (Jurassic) — Sub-equigranular, medium- to coarse-grained, weakly- to non-foliated hornblende quartz monzonite and lesser monzonite and quartz monzodiorite, herein called the Napoleon Creek pluton. Typical primary modal mineralogy is 3–9 percent quartz, 40–50 percent plagioclase, 20–40 percent K-feldspar, 15–20 percent hornblende, 1 percent sphene, 1 percent opaques, 0–1 percent myrmekite, and trace apatite and allanite. Generally characterized by large K-feldspar and obvious hornblende phenocrysts, which define the foliation, if present. Quartz is invariably strained, and crystal margins are commonly granulated. Most contacts with country rocks are linear zones lacking outcrops and displaying no obvious hornfels aureole, suggesting post-intrusive faulting. Magnetic susceptibility is typically high (1–27 x 10^{-3} SI), but the core of the body is significantly less magnetic (0.31–0.61 x 10^{-3} SI). Includes small bodies of biotite clinopyroxenite and coarse-grained hornblende gabbros, which may be inclusions, dikes, and (or) marginal phases. Both the Napoleon Creek plutons and the mafic phases are cut by minor late granite aplite-pegmatite dikes. Extensive, sheared zones of gold-bearing quartz–carbonate–sericite–chlorite–pyrite alteration are present within the pluton, yield an early Cretaceous $^{40}Ar/^{39}Ar$ isochron age (sample 4; table 1), and are under current industry investigation. Plutonic hornblende yielded a $^{40}Ar/^{39}Ar$ plateau age of 186 Ma (sample 7; table 1).

CHICKEN PLUTON (Jurassic) — Medium- to coarse-grained, tan to white, porphyritic to equigranular, weakly- to non-foliated, biotite granite and lesser hornblende biotite granodiorite, herein called the Chicken pluton. Previously mapped as part of the Taylor Mountain batholith (Foster, 1976), but displays significant contrasts in mineralogy, texture, major oxide composition, and age. Typical primary modal mineralogy is 20–25 percent quartz, 30–40 percent plagioclase, 20–30 percent K-feldspar, 0–5 percent hornblende, 5–10 percent biotite, 1–2 percent opaques, <1 percent sphene, magmatic? epidote and opaques, and trace apatite and allanite. K-feldspar megacrysts are common; aplite dikes are locally abundant, especially in upper Snowbouse Creek. Quartz is commonly strained and mortar texture is prevalent. Usually exhibits little alteration, but where alteration is present, it consists mostly of hornblende replaced by epidote + chlorite. Magnetic susceptibility is usually high, typically 4–12 x 10^{-3} SI. Contacts with surrounding rocks are mostly obscure. Lack of obvious hornfels or skarn in surrounding calcareous metamorphic rocks suggests contacts are largely faulted. No significant mineralization is known to occur in this pluton, although quartz-pyrite and K-feldspar–quartz veins occur at the head of Chicken Creek and gold prospects are present near the Chicken pluton at Purdy and Lillwog Creek. Hornblende from the Chicken pluton yields a $^{40}Ar/^{39}Ar$ plateau age of 187.8 Ma (sample 8; table 1), and a $^{40}Ar/^{39}Ar$ isochron age of 54 Ma for the biotite indicates significant heating in early Tertiary time, presumably associated with nearby gabbro. The presence of apparently magmatic-epidote in this pluton suggests it crystallized at elevated pressure, probably >5 kbar.

UHLER CREEK PLUTON (Jurassic) — Sub-equigranular, medium-grained, modestly- to non-foliated biotite–hornblende granodiorite and minor quartz monzodiorite, herein called the Uhler Creek pluton. Typical modal mineralogy is 15–20 percent quartz, 35–45 percent plagioclase, 10–15 percent K-feldspar, 10 percent biotite, 5–10 percent hornblende, 1–2 percent opaques, and trace apatite and allanite. Mafic minerals are up to 8 mm in length, other major minerals typically are 2–3 mm. Alteration is usually minor, with some chloritization of mafic minerals and sericite dusting of plagioclase. The presence of magmatic epidote (for example, overgrowths on allanite) suggests mesozonal crystallization conditions. Most contacts with country rocks are linear zones lacking outcrops and displaying no obvious hornfels aureole, suggesting post-intrusive faulting. Magnetic susceptibility is generally low (0.1–0.7 x 10^{-3} SI). $^{40}Ar/^{39}Ar$ hornblende plateau age of 188 Ma (sample 9; table 1).

FELSIC-COMPOSITION PHANERITIC DIKE-LIKE BODIES (Jurassic?) — Numerous small and elongate Jurassic (?) plutons scattered throughout the northern half of the map area compositionally and texturally resemble the Chicken and Uhler plutons. May or may not be foliated, commonly porphyritic, medium-grained, tend to be elongated in east–west direction parallel to field axial traces in surrounding metamorphic rocks, and mostly range between granite and quartz monzodiorite in composition. Typically contain 15–30 percent quartz, 15–35 percent K-feldspar, 35–45 percent plagioclase, 0–25 percent hornblende, 2–10 percent biotite, and minor sphene, opaques, and magmatic? epidote as overgrowths on trace allanite. Magnetic susceptibilities vary greatly, from 0.1–0.3 to 1.–2.5 x 10^{-3} SI. Presence of magmatic epidote indicates the bodies were emplaced at mesozonal depths. Locally spatially associated with small base-metal skarns (Werdon and others, 2000) south of Buckskin Creek, and east of the South Fork of the Fortymile River just north of the mouth of Napoleon Creek. One of these dikes from just east of the map area yielded a $^{40}Ar/^{39}Ar$ age of 188 Ma (Layer and others, 2001).

TAYLOR MOUNTAIN BATHOLITH (Triassic) — Slightly foliated (interior) to strongly foliated (margins), medium- to coarse-grained, sub-equigranular, biotite–hornblende quartz monzodiorite, tonalite, granodiorite, and quartz diorite of the Taylor Mountain Batholith. Typical primary modal mineralogy is 15–25 percent quartz, 40–70 percent plagioclase, 5–20 percent K-feldspar, 5–10 percent hornblende, 5–8 percent biotite, 1 percent opaques, and trace apatite and zircon. Contains numerous, 5–20 percent, mafic enclaves. Foliation is due to partial alteration of biotite and hornblende to chlorite + epidote + carbonate. Magnetic susceptibility of most samples is high (2–10 x 10^{-3} SI), but marginal facies and sheared samples are typically lower. Contacts with surrounding rocks are complex, zones of intensely foliated granite dioritic dikes and sills are locally present in units uPzst, uPzv, and uPzmg near the batholith, but the sheared contacts apparently predominate. Most likely the Taylor Mountain batholith intruded units uPzst, uPzv, and uPzmg, but subsequent Jurassic deformation, and later high-angle faulting, has disrupted most of the original contacts. The batholith is not in direct contact with amphibolite-facies gneissic rocks within the map area and the relationship between these two units is not known.

The majority of the Taylor Mountain batholith is devoid of known metallic mineralization; however, small copper–bismuth–gold-bearing veins are present in and near the far northern edge of the batholith at Lillwog Creek and the Highway Copper prospect. $^{40}Ar/^{39}Ar$ dating of these prospects (Newberry and others, 1998); sample 10; table 1) yields mineralization ages of ~183–194 Ma, that is, ~20–30 Ma younger than the batholith. Rocks of the Taylor Mountain batholith have yielded a U–Pb (upturn) age of 214 Ma (Aleinikoff and others, 1981); K-Ar ages of 177–183 Ma (Wilson and others, 1985); and $^{40}Ar/^{39}Ar$ plateau ages of 209 Ma (Newberry, 2004 Ma (Dusel-Bacon, 1984), and 210–211 Ma (Dusel-Bacon and Cooper, 1999) and (or) biotite (Cushing, 1984). Most likely the magmatic age is ~214 Ma with younger apparent ages caused by an early Jurassic heating and deformation event. Coarse, porphyritic hornblende quartz diorite dikes with $^{40}Ar/^{39}Ar$ hornblende plateau age of 197.5 Ma (sample 11; table 1).

CHICKEN METAMORPHIC COMPLEX

The greenschist facies uPzmg, uPzv, uPzl, and uPzst units have been variously grouped and correlated. Foster (1969) mapped these units together as 'metamorphic rocks of the Chicken area' and distinguished them from greenschist facies graphitic quartzite present 20 km north and 25 km east of the map area. Foster (1976) grouped all the greenschist facies units in the map area as a single unit. Cushing (1984) identified the metagabbro–metadiorite (uPzmg) as 'amphibolite' and correlated it with the locally amphibolite-bearing rocks of the amphibolite-facies gneiss and schist units. Foster and others (1994) correlated the greenschist facies units originally identified as 'metamorphic rocks of the Chicken area' with mafic–ultramafic rocks of the Seventeenthe Terrane (ophiolite). However, the absence of ultramafic rocks in the Chicken area and the presence of intermediate- and felsic-composition metamorphic rocks is atypical of Seventeenthe Terrane.

METASEDIMENTARY AND METAFUTFACEOUS ROCKS (upper Paleozoic) — Greenschist facies metasedimentary and lesser metavolcanic rocks. Metasedimentary rocks of this unit are fine- to medium-grained marble, slate, quartz mica schist, and quartzite. Protolithic age assignment based on reported crinoid columns in marble near Napoleon Creek (Pinsdle, 1909). Metavolcanic rocks are mostly andesitic to basaltic metatuffs and metatuffaceous sediments. Metatuffs are characterized by abundant, 1–5 percent, greenstone interbeds included in this unit. Unit thickness is unknown, but most likely in excess of 200 m. Magnetic susceptibility of this unit varies tremendously: greenstone is typically 0.5–5 x 10^{-3} SI, intermediate to felsic composition metavolcanic rocks are 0.5–0.1 x 10^{-3} SI, and metasedimentary rocks are <0.1 x 10^{-3} SI. This unit contains gold–calcite veins at the Purdy mine, but no evidence for base-metal syngenetic mineralization. Abundance of hornfels in this unit or adjacent to Jurassic intrusive bodying portions near or adjacent to contacts with Jurassic and Triassic plutons suggest that these contacts are faults.

LIMESTONE (upper Paleozoic) — Limestone, subunit of uPzst. White, gray, and yellowish-brown colored, fine- to medium-grained limestone. Limescone varies from fine-bedded units interbedded with phyllite to massive beds up to 46 m thick. Commonly forms cliffs where exposed. Limestone varies from fairly pure calcium carbonate to impure varieties with quartz, muscovite, epidote, and opaque (carbonaceous) material. Fragments of crinoid stems present in limestone cropping out on the South Fork of the Fortymile River just below the mouth of Napoleon Creek (Pinsdle, 1909). Unit is dolomitized and/or brecciated near high-angle faults.

METAVOLCANIC AND LESSER METASEDIMENTARY ROCKS (upper Paleozoic) — Greenschist facies metavolcanic and lesser metasedimentary rocks. Metavolcanic rocks are mostly fine-grained, chlorite–albite–quartz–carbonate phyllite of basaltic major- and trace-element composition. May include minor phyllitic rocks of andesitic to rhyolitic composition with mm-scale mineral and color banding suggesting a tuffaceous origin. Sills or dikes 1–2 m thick of metagabbro and metadiorite are common within 0.5 km of the contact with the metagabbro unit (uPzmg). Metasedimentary rocks of this unit are fine- to medium-grained marble, slate, quartz mica phyllite, and minor quartzite. Paleozoic age assignment based on spatial association with uPzst and uPzl units. Unit thickness is unknown, but most likely in excess of 200 m. Magnetic susceptibility of this unit varies tremendously: greenstone is typically 0.5–5 x 10^{-3} SI, intermediate to felsic composition metavolcanic rocks are 0.5–0.1 x 10^{-3} SI, and metasedimentary rocks are <0.1 x 10^{-3} SI. This unit contains epithermal-style veining at the Wall Street mine, but no evidence for base-metal syngenetic mineralization. Absence of either hornfels in this unit or skarn in carbonate-bearing portions near or adjacent to contacts with Jurassic and Triassic plutons suggests that these contacts are faults. Cut by metadiorite dike with $^{40}Ar/^{39}Ar$ hornblende plateau ages ranging from 287.7 Ma to 304.6 Ma (sample 13; table 1; Layer and others, 2001).

HORNBLENDE METAGABBRO AND METADIABASE (upper Paleozoic) — Moderately- to non-foliated, fine- to medium-grained, hornblende metagabbro and metadiabase. The bulk of this unit is interpreted to represent a volcanic arc open which more extensive volcanics-dominated (uPzv) and sediment-dominated (uPzst, uPzl) units were deposited. Possibly a sill- or dike-swarm, as suggested by fine-grained intra-unit contacts and common occurrence of this unit as dike or sill in other units. These rocks are nearly indistinguishable in major- and trace-element composition from the metabasalt of unit uPzst. In this section, these rocks display a variably strong greenschist facies overprint, with primary igneous (?) hornblende and clinopyroxene replaced by fine-grained actinolite + chlorite + calcite and plagioclase replaced by albite + carbonate + sericite. Magnetic susceptibility is usually high, 5–20 x 10^{-3} SI, but considerably lower where sheared. Abundant dikes of Taylor Mountain batholith-type quartz diorite are locally present in this unit on both sides of the South Fork of the Fortymile River east of Chicken; however, abrupt, sheared contacts suggest that original intrusive contacts have been displaced by high-angle faults. Similarly, although dikes and sills of metagabbro/metadiabase are present in unit uPzst, the contact between uPzmg and uPzst is mostly faulted. Amphibole from uPzmg and from a dike of this unit in greenstone yielded disturbed $^{40}Ar/^{39}Ar$ spectra, with highest-temperature fraction ages of 227 and 225 Ma and pseudo-plateau ages of 213 and 201 Ma (Cushing, 1984). The spectra indicate a pre-trial Triassic magmatic age with a thermal reset caused by intrusion of the Taylor Mountain Batholith and younger plutons.

FORTYMILE RIVER ASSEMBLAGE

Foster (1969) grouped all the amphibolite-facies rocks in the map area as a single gneiss and schist unit. Although individual lithologic unit boundaries were not delineated, marble-rich, garnet-rich, and quartzite-rich areas and augen gneiss were commonly observed on ridgetop traverses and are indicated by various symbols on her map. Foster (1976) grouped all the amphibolite-facies rocks in the map area as a single biotite gneiss and amphibolite unit, with marble-rich areas indicated by a carbonate pattern on the map. Based on mineral assemblages in mafic rocks and mineral assemblages and compositions in pelitic rocks, rocks of the Eagle A-2 Quadrangle have experienced epidote–amphibolite facies metamorphism (Dusel-Bacon and others, 1995). Local presence of staurolite and kyanite in gneiss and schist is apparently related to local aluminum-rich protoliths and not to significant variations in metamorphic conditions. Pre-, syn-, and post-tectonic mineral fabrics are observed in the rocks, indicating a complex thermal and structural history, probably involving multiple deformational episodes. Hornblendes from these amphibolite-facies metamorphic rocks have yielded highest-temperature $^{40}Ar/^{39}Ar$ fraction ages of 180–214 Ma and stepped pseudo-plateau, plateau, and saddle ages of 148–204 Ma (Cushing, 1984; Hansen and others, 1991). Biotites far from known Jurassic or younger plutons have yielded $^{40}Ar/^{39}Ar$ plateau ages of 187 Ma (Cushing, 1984) and 182 Ma (Layer and others, 2001) and isochron ages of 187–189 Ma (Layer and others, 2001). The majority of the rocks in the Eagle A-2 Quadrangle are texturally and compositionally indistinguishable from metamorphic rocks of the Eagle A-3 Quadrangle that have Mississippian U–Pb (magmatic) ages (Cynthia Dusel-Bacon, written commun., 2001) indicating the amphibolite-facies metamorphic rocks are as a whole of Mississippian or older age. Similarities in protolith age, major- and trace-element composition, and metamorphic facies to metamorphic rocks of the Tanacross Quadrangle (Dusel-Bacon and Cooper, 1999) and to the Fairbanks area (Newberry and others, 1996) suggest that this unit is widespread in eastern Interior Alaska. We infer that this unit was structurally juxtaposed with the lower-grade Pennsylvanian metamorphic rocks by early Jurassic time, as both are intruded by early Jurassic plutons, but all contacts between this unit and pre-Jurassic rocks are obscured by the extensive high-angle faulting and generally poor exposures characteristic of the region. Although these amphibolite-facies rocks were previously referred to as the Taylor Mountain Assemblage (Hansen and Dusel-Bacon, 1998), our mapping shows these units are not in contact with the Taylor Mountain Batholith. The amphibolite-facies units are currently referred to as the Fortymile River Assemblage (Cynthia Dusel-Bacon, written commun., 2000).

AUGEN GNEISS (Mississippian to Devonian) — Medium- to coarse-grained, biotite–quartz–feldspar gneiss with relict igneous K-feldspar megacrysts that now form porphyroclasts (augen) to 3.5 cm in a matrix of quartz, feldspar, biotite (commonly chloritized), and lesser white mica. Generally has a granodioritic to granitic bulk composition. Present as ellipsoidal bodies generally <2 km² in surface area generally displaying sheared contacts with surrounding amphibolite-facies metamorphic rocks. Magnetic susceptibility variable, but commonly 1–10 x 10^{-3} SI. There are no published dates for this unit in the Eagle Quadrangle, but similar appearing bodies elsewhere in the Yukon-Tanana region yield Mississippian (Aleinikoff and others, 1986; Newberry and others, 1998a) and uppermost Devonian (Mortensen, 1986) U–Pb ages.

ORTHOGNEISS (Mississippian to Devonian) — Medium- to coarse-grained, variably foliated, biotite–quartz–feldspar gneiss.