Geology Along the Taylor Highway Alaska

GEOLOGICAL SURVEY BULLETIN 1281

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By HELEN L. FOSTER *and* TERRY E. C. KEITH

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A log describing the geology across the Yukon-Tanana Upland, Alaska

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GLOSSARY

Actinolite. A green mineral which commonly occurs in needlelike crystals.

Amygdaloidal. An adjective that describes a volcanic rock in which many small gas cavities have been filled by secondary minerals.

Amygdule. A small gas cavity in a volcanic rock that has been filled with a secondary mineral such as quartz or calcite.

Augen gneiss. In the Fortymile area, a gneiss which has light-gray or pink feldspar crystals that are much larger than the other crystals in the rock. The feldspar crystals are 2 or 3 inches long in some gneisses.

Altiplanation. A process of slow movement, by gravity, of masses of weathered materials (broken up rock and soil) from higher to lower ground, resulting, under certain conditions, in flattened summits and terracelike forms. Common in the Fortymile country above altitudes of 3,500 feet.

Basalt. A hard, dark-colored, fine-grained igneous rock composed primarily of feldspar, pyroxene, and commonly olivine.

Batholith. A very large mass (more than 40 sq miles in area) of granitic rock which has been intruded into the older rocks around it.

Biotite. A common black or dark-green mineral of the mica group. It splits easily into thin sheets.

Breccia and brecciated rock. A rock composed of angular fragments. If the fragments are of volcanic origin, the rock is a volcanic breccia. If the fragments were formed by movement along a fracture, the rock is a fault breccia. Brecciation denotes the breaking of rock into fragments.

Calcite. A common mineral composed of calcium carbonate ($CaCO_3$). It is the principal constituent of limestone. White is the most common color in the Fortymile area.

Cataclastic. A texture in metamorphic rocks that pertains to minerals which have been broken and flattened.

Chert. A very hard fine-grained sedimentary(?) rock composed of silica. It is generally gray, white, pink, red, or black and is commonly banded.

Chevron folds. Very sharp, almost V-shaped folds; usually small.

Creep. The slow and imperceptible movement of finely broken-up rock matter from higher to lower levels.

Conchoidal. The shell-like surface produced by the fracture of a brittle substance.

Conglomerate. A rock composed of sand and gravel that have been cemented together.

Cretaceous. A period in the geologic time scale about 70 to 135 million years ago.

Dike. A long, usually narrow mass of igneous rock which cuts across adjacent rocks.

Diopside. A mineral of the pyroxene group. It is commonly light green.

Dolomite. A calcium magnesium carbonate mineral. Also a rock composed primarily of the mineral dolomite; the rock resembles limestone.

Entrenched meanders. Bends in the winding courses of streams enclosed by steep valley walls. They form when a stream flowing in a meandering course erodes its valley and cuts down but continues to flow in the meandering course.

Epidote. A common bright-green mineral.

Erosion. The wearing away of land and rocks by such agencies as running water, wind, and glaciers.

Erosion surface. A land surface which has been worn away and smoothed by the action of streams, wind, and other land and atmospheric agencies.

Fold. A bend or flexure in the rock layers.

Foliation. A lamination which develops in metamorphic rocks as a result of segregation of different minerals into layers. Rocks tend to break along these laminations.

Fault. A break (fracture) in the earth's crust along which has been displaced rock on one side of the break relative to rock on the other side.

Feldspar. A common rock-forming mineral. It is white, pink, or gray. There are several different kinds.

Felsic rocks. Light-colored rocks commonly high in quartz and light-colored feldspar.

Gabbro. A dark-colored, fairly coarse grained igneous rock composed primarily of feldspar, amphibole, and pyroxene minerals. It may contain olivine as a major constituent.

Gneiss. A coarse-grained metamorphic rock in which the minerals are so arranged as to give a banded appearance to the rock.

Granite. A light-colored fairly coarse grained igneous rock composed primarily of feldspar, quartz, and some dark-colored minerals such as biotite or hornblende.

Granitic rocks. A general term applied to fairly coarse grained igneous rocks. They are generally fairly light colored and have a high silica content.

Granodiorite. A fairly coarse grained igneous rock composed primarily of feldspar, quartz, and dark minerals such as hornblende and (or) biotite. It is one of the commonest rocks of the granite family.

Greenstone. A general and imprecise term applied to altered green rocks which originated from mafic igneous rocks.

Hornblende. A common dark-colored rock-forming mineral of the amphibole mineral group.

Igneous rocks. Rocks which form by the cooling of molten rock material.

Igneous intrusive rocks. Rocks which are fairly coarse grained and are generally considered to have cooled slowly at some depth below the earth's surface.

Igneous extrusive rocks. Rocks which are fairly fine grained and which have cooled rapidly at or near the earth's surface.

Isotopic age. The approximate age of rocks as determined by measuring the rate of radioactive decay of certain minerals.

Joint. A fracture in rock. Joints commonly occur in patterns, cutting the rocks into blocks which may be rectangular, hexagonal, or other shapes. Columnar joints are fractures which break the rocks into columns; they occur commonly in basaltic rocks.

Lamprophyre. Dark-colored rocks that commonly occur in dikes.

Lava. Fluid rock which issues from a volcano fissure in the earth's surface, and the same material when it has solidified by cooling.

Loess. Silt deposited by the wind.

Lineation. Parallel "lines" or ridges in the rock (a metamorphic structure). A definition of the term as used in this road log.

Mafic minerals. Dark-colored minerals high in iron and magnesium.

Mafic rocks. Dark-colored igneous rocks composed largely of iron and magnesian silicate minerals.

Magnetite. A black magnetic iron mineral.

Metamorphic rocks. Igneous and sedimentary rocks which have been changed by heat and pressure.

Mica. A common mineral group in which the crystals split easily into thin, flexible sheets. Biotite (dark-colored) and muscovite (colorless or light-colored) are the commonest members of the group.

Monzonite. A medium- to coarse-grained igneous rock of the granite family. It is composed primarily of two kinds of feldspar, one or more dark minerals such as hornblende or biotite, and a small amount of quartz.

Muskeg. A tussocky bog or marsh generally containing much sphagnum moss.

Olivine. An important rock-forming mineral especially in mafic and ultramafic rocks; it is generally green.

Paleozoic. One of the eras of geologic time (see table 1).

Pegmatite. Very coarse grained, light-colored igneous rock that usually occurs in dikes.

Phenocryst. Large or conspicuous crystals which occur scattered among smaller crystals in an igneous rock.

Pingo. Small hill or mound with a core of ice. When the ice melts, a small water-filled crater usually forms.

Pitchstone. A kind of volcanic glass.

Pleistocene. The earlier of the two epochs which compose the Quaternary Period in the geologic time scale. It is also called the glacial epoch or Ice Age.

Pumice. A lightweight, cellular volcanic rock.

Pumice breccia. A rock composed of fragments of pumice that have been cemented together.

Pyroxene. A mineral group which includes several rock-forming minerals.

Quartz. A common mineral (SiO_2) in many kinds of rocks. Smoky quartz is a gray or brownish-gray variety.

Quartzite. A metamorphic rock consisting largely of quartz. It is usually formed from sandstone.

Recumbent (folds). Folds in which the flanks (and axial plane) are horizontal.

Ripple marks. An undulating surface produced in sand by wind or by water currents or waves. The feature is sometimes preserved when the sediments become hardened into rocks.

Sanidine. A glassy mineral of the feldspar group.

Schist. A metamorphic rock which tends to split easily into thin sheets.

Serpentine. A fairly soft green or greenish-gray mineral. Asbestos is a fibrous variety.

Sill. A sheet of igneous rock which has been intruded between layers of older rock.

Syenite. A fairly coarse grained igneous rock composed principally of feldspar and one or more dark minerals such as hornblende or biotite.

Talc. A light-colored (green to white) soft mineral with a soapy feel.

Terrace (stream). A nearly flat to gently sloping remnant of the former valley floor of a stream. It is at a higher level than the present stream valley.

Tertiary. A period in the geologic time scale (about 12 million to 70 million years ago).

Tuff. A rock formed by the consolidation of volcanic ash and other very small volcanic fragments.

Tuff-breccia. A rock composed of volcanic rock fragments cemented together by smaller materials such as volcanic ash.

Ultramafic rock. A dark-colored rock which contains less than 45 percent silica. The minerals of these rocks are usually partly changed to serpentine.

Unconformable. Layers of rocks overlying other layers at a different angle. A break in time between the deposition of the two sequences of rocks is indicated.

Vesicular. An adjective applied to a rock containing many small cavities.

Vesicle. A small gas cavity in volcanic rock.

Weathering. Processes—such as the chemical action of air, rain-water, and plants and the mechanical action of temperature changes—that cause rocks to break down and crumble.

Welded tuff. A kind of volcanic rock in which pumice and other volcanic fragments have been welded together by heat at the time of original deposition. Some of the heat comes from enveloping hot gases.

Xenolith. Rock fragments enclosed in bodies of igneous rock but different in composition from the enclosing rock and foreign to it.

GEOLOGY ALONG THE TAYLOR HIGHWAY, ALASKA

By Helen L. Foster and Terry E. C. Keith

ABSTRACT

The Taylor Highway extends 160 miles across the Yukon-Tanana Upland in eastern Alaska from Tetlin Junction on the Alaska Highway to Eagle on the Yukon River. It crosses a varied terrain underlain by a number of types of metamorphic, igneous, and sedimentary rocks; it also passes through the historic gold placer mining areas of the Fortymile country. Numerous well-developed physiographic features include sand dunes, stream terraces, entrenched meanders, and altiplanation surfaces. A road log describes and locates the geologic features along the highway.

INTRODUCTION

The scenic Taylor Highway, completed in 1951, extends 160 miles northward from Tetlin Junction on the Alaska Highway (Mile 1301.8) to the village of Eagle on the Yukon River (fig. 1). A branch of the highway connects with the Canadian highway to Dawson in the Yukon Territory of Canada. From Tetlin Junction the highway passes over low wooded hills and then crosses the divide that separates the drainage of the Tanana River on the south from the drainage of the Fortymile River on the north. The area of the Fortymile River and its major tributaries is commonly known as "the Fortymile" or "the Fortymile country." Topographic maps published by the U.S. Geological Survey are available for the entire area at scales of about 4 miles to the inch (1:250,000) and 1 mile to the inch (1:63,360). The Tanacross quadrangle includes the southern part of the Taylor Highway and the Eagle quadrangle the northern part.

The geology of the Fortymile area was studied and mapped primarily by L. M. Prindle from about 1903 to 1911 (Prindle, 1909), and by J. B. Mertie, Jr., from 1911 to 1931 (Mertie, 1937, p. 6). Their excellent reconnaissance is the basis of our present geologic knowledge of the area. The Taylor Highway is entirely within the physiographic province known as the Yukon-Tanana Upland, a maturely dissected area with relief of approximately 1,500 feet. Twice the highway climbs to over 3,500 feet—once near Mount Fairplay and again to cross American Summit.

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A variety of geologic features can be seen along the Taylor Highway, and many kinds of rocks and minerals can be found in the roadcuts and borrow pits. The rocks include metamorphic, igneous, and sedimentary rocks. Young sediments, not yet consolidated, are also present. The metamorphic rocks are the oldest and the most abundant rocks of the Fortymile country. They are strongly deformed (folded and faulted) because they have been involved in one or more periods of mountain building. The metamorphic rocks have been intruded by magmas, now cooled to crystalline rock masses. Episodes of volcanic activity have produced lavas and tuffs, including welded tuff. Mineralizing solutions, probably associated with some of the later episodes of igneous activity, invaded the metamorphic rocks and deposited gold and other metallic minerals in small amounts in rocks throughout much of the Fortymile country. Later, weathering and erosion concentrated the gold in both ancient and modern stream valleys.

Some of the ancient sediments, which are now conglomerate, sandstone, shale, and tuff, were deposited in small basins on land; and peat, which later became coal, accumulated in swampy areas. In more re-

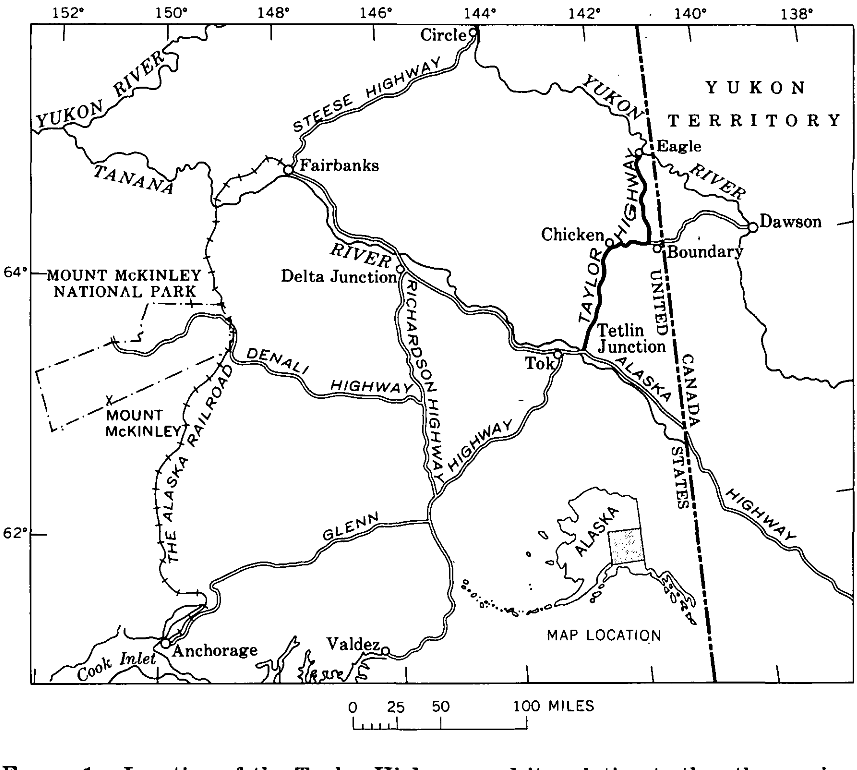

FIGURE 1.—Location of the Taylor Highway and its relation to the other major highways of interior Alaska.

cent geologic time, unconsolidated materials such as sand and silt were deposited by winds sweeping over the bare broad flats of the Tanana Valley. Streams from melting glaciers provided abundant sediment for these deposits. Streams in the northern part of the area laid down thick deposits of sand and gravel in their valleys at this time. Later streams cut through these deposits and partly removed them.

Physiographic features to be seen along the Taylor Highway include erosion surfaces, entrenched meanders, high-level stream terraces, altiplanation surfaces, sand dunes, and pingos. Much of the ground, particularly that covered by muskeg, is perennially frozen below depths of 1–3 feet, and ice lenses and frozen ground can sometimes be seen in fresh-cut stream banks.

Gold was discovered along the Fortymile River in 1896 and shortly thereafter at Chicken, at Jack Wade, at many other places throughout the Fortymile, and along Mission and American Creeks near Eagle. Entry into the Fortymile country was chiefly through Eagle (then called Belle Isle), which was reached by taking a steamer down the Yukon River. Some gold seekers also came overland from Dawson in the Yukon Territory, entering Alaska in the vicinity of Boundary. Trails were quickly worn to the various mining camps, and wagon roads soon followed. By 1907, 9 miles of wagon road, a forerunner of the Taylor Highway, led from Eagle to American Creek. Later this road was extended to Jack Wade. Many other trails, wagon roads, and winter trails for dog sleds were established between mining camps and towns, and later tractors hauled supplies over some of these trails. In the winter the frozen surface of the Fortymile River was used, not without difficulty, as a roadway for transporting freight. With the advent of the airplane, many small landing strips were established and part of the supplies came in by plane. Vestiges of the old roads and trails can be seen in many places along the Taylor Highway. and several abandoned airstrips are recognizable. Most supplies now come over the Taylor Highway by truck.

Along the Taylor Highway, rotting cabins, piles of mine tailings, abandoned gold dredges and sluice boxes, and overgrown ditches that brought water for placer mining are all reminders of the bustling mining days of the late 1800's and early 1900's. Although several placer mines still operate in the Fortymile country, the population is small because there are only a few other ways to make a living, and wintering in the country is rigorous. The Taylor Highway is not kept open in the winter, and only a few people stay the winter in the Fortymile area, mostly in the vicinity of Chicken. Their principal contact with the outside world is an occasional plane landing on the Chicken airfield. When weather permits, mail comes to Chicken about once a month (once a week in the summer).

The Fortymile country still lures prospectors, and each summer a few are at work. Tourists are attracted by the opportunity to explore a fairly remote and scenic part of interior Alaska. Hunters drive the highway searching for moose, bear, and caribou. The highway lies across the path of migrating caribou herds, and generally in the fall hundreds of caribou cross the highway north of Eagle Junction. Geologists and rock hounds are also among those who travel the highway. It is hoped that this bulletin, with its road log and geologic map (pl. 1), may help to make the trip more interesting for those who wish to make the drive.

ACKNOWLEDGMENTS

The local people of the Fortymile area have provided information and given friendly assistance in many ways. William Meldrum, Anne Purdy, Arthur Purdy, Mr. and Mrs. Robert McCombe, and Mr. and Mrs. John Rambaud from the Chicken area; George Robinson of Jack Wade; Mr. and Mrs. Anton Merly and Mr. and Mrs. Barney Hansen of Eagle; Mr. and Mrs. Jack Wilkey of Canyon Creek; and Mr. and Mrs. John Fisher, formerly of Chicken, all deserve special thanks.

SEQUENCE AND AGE OF GEOLOGIC EVENTS

The age of the rocks and time of occurrence of geologic events in the part of the Yukon-Tanana region covered in this report are known only in a general way. Table 1 summarizes these relationships.

TABLE 1.—*Approximate sequence and age of geologic events in the country along the Taylor Highway*

Era	Period	Epoch	Sequence of events
Cenozoic (Present to 70 million years ago)	Quaternary	Holocene	Deposition of gold in stream channels. Deposition of sand dunes and loess; formation of pingos; development of altiplanation surfaces and patterned ground.
		Pleistocene	Downcutting of streams to form canyons and entrenched meanders. Deposition of gold in stream channels. Tilting. Deposition of lake sediments locally. Erosion and formation of broad stream valleys with meandering streams. Deposition of gold in stream valleys.
	Tertiary		Deposition of sediments in local basins. Volcanic activity. Small granitic intrusions. Deposition of sediments in local basins and accumulation of peat. Volcanic activity taking place locally at the same time.

Era	Period	Epoch	Sequence of events
Mesozoic (70 to 225 million years ago)			Deposition of sediments in local basins with contemporaneous volcanic activity in places. Uplift and erosion. Possible time of circulation of mineralizing solutions and deposition of gold and other minerals in the country rock. Intrusion of granitic rocks.
Mesozoic and (or) Paleozoic			Intrusion of ultramafic rocks (ages uncertain).
Paleozoic [1] (225 to 600 million years ago)			Mountain building with deformation and metamorphism of the sedimentary and igneous rocks (one or more periods of mountain building and metamorphism possible). Deposition of sediments and igneous activity.
Paleozoic(?) and(?) Precambrian(?) [1] (225(?) to possibly more than 600 million years ago)			Erosion. Mountain building with deformation and metamorphism of rocks (one or more periods of mountain building and metamorphism possible). Deposition of sediments and volcanic and intrusive activity.

[1] The sequence and number of events in Paleozoic and earlier times is not known, and the sequence given here is only suggestive. It is not known whether the oldest rocks in the area are Precambrian or early Paleozoic in age.

ROAD LOG

Stops of particular interest to amateur mineral and rock collectors are marked with an asterisk. A glossary is included in the preliminary pages of the report to explain briefly for the nongeologist the meaning of many of the geological terms used.

TETLIN JUNCTION TO EAGLE

TANACROSS B-4 QUADRANGLE

Mile [1]

0.0 Tetlin Junction. The Taylor Highway joins the Alaska Highway at mile 1301.8 on the Alaska Highway. Fortymile Roadhouse is on the northwest corner of the junction. Dune sand is seen on both sides of the road, and the Taylor Highway passes through an area of sand dunes for about

[1] The distances given are measured from the mileposts spaced at 1-mile intervals along the highway. A few mileposts may be missing. The locations of the mileposts as they existed along the highway in 1966 are shown on the geologic map (pl. 1).

the first 7 miles. Bedrock of granodiorite is underneath the sand and here and there protrudes through it.

0.3 Road crosses a high-pressure pipeline which brings petroleum products from Haines to Fairbanks for use by the U.S. Army. Note layering in the sand exposed in the cut through the sand dunes.

0.5 To the west is a small rounded hill of gabbro.

1.0 to 2.0 Highway passes through typical sand dune topography. Small ponds occupy many of the depressions between dunes. Asymmetrical ripple marks, formed by wind blowing across the loose sand, may be seen on the faces of many roadcuts. The dune sand is mostly dark gray and is medium grained. It was derived from the vast quantities of loose sediments on flood plains of the Tanana River and other alluvial plains (Tok Fan) at the end of the Pleistocene Epoch and in the early Holocene Epoch. Strong winds removed the finer material from the broad unvegetated plains to the south and east and piled the sand against the low mountains to the northwest. The sand consists of about 2 percent magnetite and 35 percent dark-gray to black fine-grained rock fragments which give it the dark color. About 50 percent of the sand is quartz, feldspar, and small fragments of granitic and metamorphic rocks. Many of the grains are rounded and frosted by wind action.

2.3 Above the sand is about 1 foot of fine-grained wind-deposited sediment (loess). In the higher hills coarse-grained granitic rock is exposed. Most of it is much weathered and very crumbly.

5.8 To the northwest, sand dunes perched on the high valley wall on the north side of Porcupine Creek give the ridgetop a scalloped appearance (fig. 2).

5.9 Layered silt and sandy silt are exposed on both sides of the road (fig. 3). (In places the layered sediments are partly obscured by sand which has slumped over them; a little digging will expose the beds.) These sediments contain tiny white fragile shells of clams and snails—remnants of biotic communities that inhabited ancient lakes during late Pleistocene or early Holocene time.

6.0 Look west for a good view of the sand dunes perched on the north bank of Porcupine Creek.

6.9 Outcrop in borrow pit on west side of road is weathered mica schist, quartz-mica schist, and quartzite—all characteristic of the metamorphic rocks of this vicinity.

FIGURE 2.—Sand dunes along Porcupine Creek. The stabilized dunes are perched on bedrock of the valley wall on the north side of the creek. View north-northwest.

*7.3 Roadcut is in gray coarse-grained granitic rock which intrudes the metamorphic rocks in this area. The granitic rock is weathered and crumbly. The dark-colored minerals are biotite and hornblende. The light-colored minerals are quartz (gray) and feldspar (white). Many well-shaped hexagonal biotite crystals one-fourth inch across can be seen. The long black needlelike crystals are hornblende; note, however, that some of the hornblende crystals are fairly short and stubby. Dark-gray masses of finer grained rock may be xenoliths (inclusions of one type of rock in another). Small veinlets of light-colored granitic material can be seen cutting the main body of rock. Joints (large fractures in the rock) are prominent. They were formed before weathering and are partly obscured by weathering effects.

TANACROSS B-3 QUADRANGLE

8.1 Roadcut is in greenish-gray impure quartzite.

9.0 Light-gray fine-grained silicic rocks intrude the older metamorphic rocks (dark colored here). North along the highway the fine-grained and porphyritic igneous rocks become more abundant.

FIGURE 3.—Lake deposits of layered sand and silt that contain tiny white fossil shells. View east at mile 5.9 near Porcupine Creek.

9. 8 Boulders of dark-greenish-gray rock along the west shoulder of the highway are part of a dike or small igneous body which intrudes the metamorphic rocks.

11. 0 On the east side of the highway are light-cream-colored and pinkish-brown silicic volcanic rocks, both lava and tuff, of probable Tertiary age.

*12. 5 Light-colored cataclastic gneiss is exposed at the base of a borrow pit on the west side of the road. Tertiary volcanic rocks overlie it unconformably. In the pit, reddish-brown, black, and greenish-black semitransparent volcanic glass (pitchstone) can be found. The volcanic glass occurs in broken pieces scattered throughout the lower part of the pit and crops out in the bottom of the pit. Above the volcanic glass, light-gray lava which contains phenocrysts of smoky quartz and feldspar (sanidine) is exposed in the pit walls.

12.7 On clear days, Mount Fairplay is visible to the north.

15.5 Borrow pit on the west side of the road exposes gray fine-grained siliceous tuff that breaks with a conchoidal fracture. Some of the tuff contains poorly preserved plant fragments (mostly impressions of plant stems). This tuff is Late Cretaceous or Tertiary in age.

TANACROSS C-3 QUADRANGLE

18.0 Large boulders of black, medium-grained basalt, probably a dike, are found in the borrow pit on the east side of the road. This is one of the few places in the Tanacross quadrangle where mafic volcanic rocks can be seen along the highway.

21.0 On the west side of the road about 3½ inches of white or very light gray volcanic ash is exposed beneath the sod at the north side of the entrance to a borrow pit. This volcanic ash is believed to be about 1,600 years old (Fernald, 1962, p. B-29). It originated at a volcanic eruption in the Yukon Territory, Canada, and was carried here by the wind. It covers much of the Tanacross and Eagle quadrangles. Many other exposures of this ash can be seen along the highway.

21.3 When traveling north on the highway there is an excellent view of Mount Fairplay (fig. 4).

23.0 Good exposures of pink and tan tuff, tuff-breccia, and pumice and breccia can be seen in the borrow pit on the east side of the road.

23.2 In some rocks the glassy phenocrysts are smoky quartz. There are pieces of pumice in the breccia.

23.8 Boulders of greenish-black mafic igneous rock are found along the east side of the highway. On the west side of the road loose boulders in the bank and gulley are part of a volcanic conglomerate.

25.8 Reddish-gray volcanic tuff is exposed in a small borrow pit on the west side of the road.

27.5 Quartz-mica schist, which has been intruded by material now consolidated to form igneous rocks, crops out along the road.

27.6 In a borrow pit on the east side of the road, faulted cataclastic gneiss is exposed.

29.0 A contact zone between the metamorphic rocks and the igneous intrusive rocks has been crossed. The rubble along the highway is mostly medium-grained, fairly equigranular syenite

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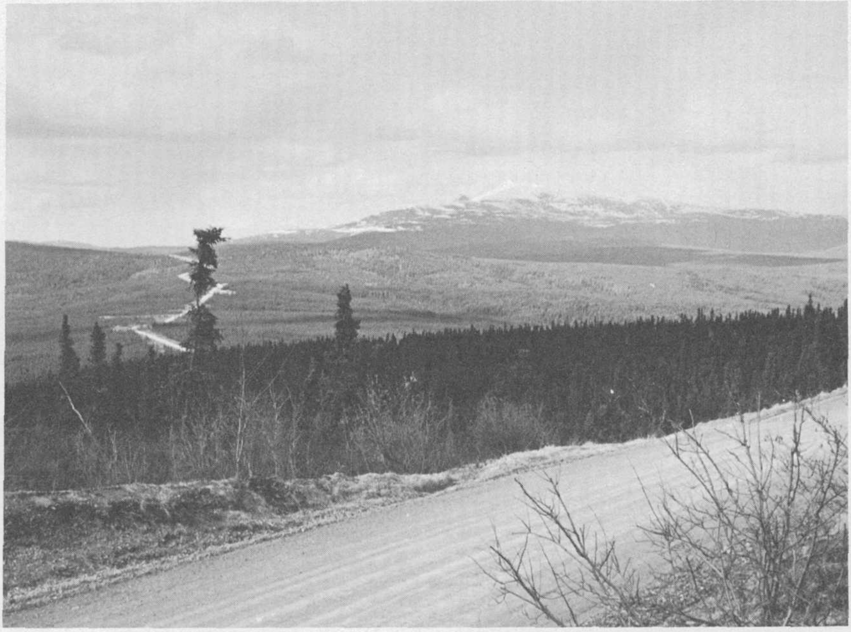

FIGURE 4.—Snow-capped Mount Fairplay rises above the heavily wooded slopes to the south. The Taylor Highway, as it approaches Mount Fairplay from the south, can be seen behind the tall spruce tree. View north-northeast.

from the Mount Fairplay stock (a small igneous intrusive body). However, some porphyritic syenite is also present in the rubble.

29.4 A compound pingo can be seen near the head of the valley to the west. It is composed of a group of irregularly shaped mounds formed as ice lenses grew between layers of frozen silt, bowing up the overlying layers of silt (Foster, 1967, p. 14; Holmes and others, 1968, p. 10). In the distance (if the light is good) other pingos may be seen along the same valley.

31.0 Rubble of medium-grained quartz monzonite may be seen here. This rock contains considerably more quartz than some of the other rock types in the rubble on the slopes of Mount Fairplay.

*33.0 Large dark-gray potassium feldspar phenocrysts can be seen in the porphyritic syenite rubble, and many have weathered out of the rock. Some crystals have a play of bluish color. The slopes above here (to the east) are dominantly syenite rubble, but the jagged peaks on top of Mount Fairplay on the south end are composed of syenite and quartz monzonite. The highest peak on the north end is composed of andesite (fig. 5). A little augen gneiss crops out in the saddle between the andesite and quartz monzonite (see fig. 1). The long slopes that extend to the highway on the north end of Mount Fairplay are dominantly silicic volcanics (Foster, 1967).

33.7 Blocky igneous rock crops out on the east side of the highway. The fresh rock is white or light gray and has quartz phenocrysts.

33.8 A small outcrop of augen gneiss can be seen in contact with igneous rock.

34.3 When the light is good, one or more pingos can be distinguished in the valley to the west.

34.4 To the southwest the Alaska Range with rugged snow-capped peaks can be seen in the distance. Note the contrast of the rugged, glaciated Alaska Range with the gently rounded, flat-topped unglaciated ridges of the Yukon-Tanana Upland in the foreground.

35.0 A sign on the east side of the highway gives some of the history of the area. To the north is a flat-topped ridge surface on bedded Tertiary volcanic tuff; it is probably an old erosion surface (fig. 6). To the east and southeast are the "terraced" slopes of Mount Fairplay. The terraced surfaces are considered to be altiplanation surfaces by some

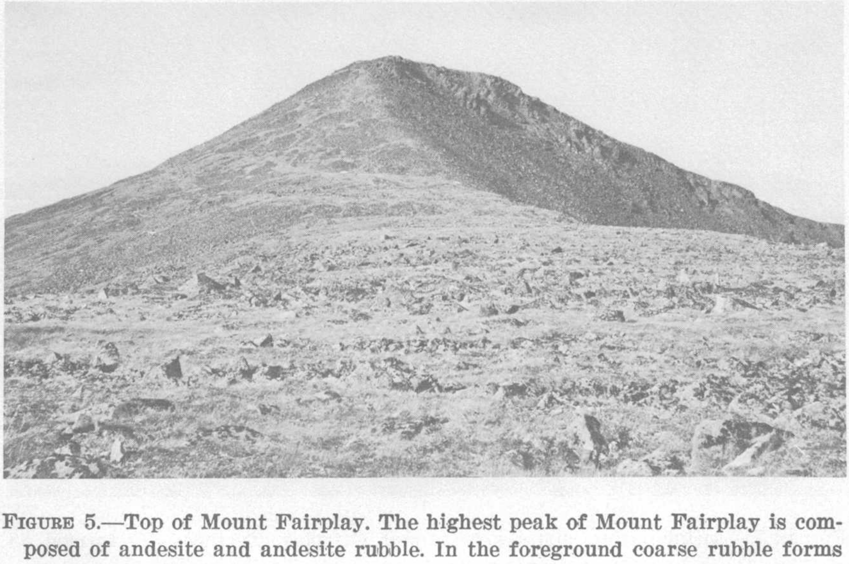

FIGURE 5.—Top of Mount Fairplay. The highest peak of Mount Fairplay is composed of andesite and andesite rubble. In the foreground coarse rubble forms patterned ground. Large boulders in the foreground are about 3 feet in diameter. View north.

geomorphologists (fig. 7). Stone polygons and stripes are visible on some of the surfaces, especially in the fall when contrasting colors in the vegetation make them very conspicuous (fig. 6).

FIGURE 6.—Tuff ridge. The Taylor Highway northwest of Mount Fairplay parallels a flat-topped ridge composed of volcanic tuff. The smooth, flat surface of the ridge may be an erosion surface. The slope of Mount Fairplay in the foreground displays patterned ground. View north-northwest.

FIGURE 7.—Altiplanation surfaces on Mount Fairplay. Terraces are formed on volcanic rocks. View southeast.

35.8 An exposure of white Tertiary tuff may be seen in a roadcut and borrow pit on the west side of the highway.

36.7 White and pinkish-white welded tuff is exposed in the borrow pit on the west side of the highway. Along the highway, both north and south of this exposure, typical felsic lava and tuff may be seen in outcrops and borrow pits. Rounded tan rubble-covered hills to the east of the highway are also composed of felsic volcanic rocks.

TANACROSS D-3 QUADRANGLE

*39.5 Reddish-brown and reddish-gray volcanic tuff, breccia, and pumice breccia crop out here. The rock is much jointed, and the slopes are covered with rubble. A little search in the rubble will yield a rock that has unusual concentric and elliptical rings. Some of the structures remind one of tree rings. The origin of these structures is unknown. They have only been found at this locality along the highway. The rings show nicely in polished specimens.

41.0 The view to the north emphasizes the difference in topography between the metamorphic terrane there and the volcanic terrane just passed. Slopes on the metamorphic rocks are less steep, less dissected, and have a heavier cover of vegetation than slopes on the volcanic hills.

42.0 This milepost marks the southern border of a large area burned by forest fires in the summer of 1966. On the east side of the highway the cuts are in colluvial and alluvial deposits consisting largely of volcanic material.

*43.4 On the scraped hillside on the east side of the road, igneous dikes cut metamorphic rocks (augen gneiss and quartz-mica schist). A little search will produce specimens of augen gneiss (fig. 8), a rock with large (1 inch long) white potassium feldspar crystals. The augen gneiss makes interesting polished specimens.

44.0 Roadcut on the east exposes quartz-mica gneiss and schist of slightly different lithology than the metamorphic rocks at road stops to the south.

46.4 Borrow pit on the east side of the highway is in well-bedded sedimentary rocks of probable Cretaceous age. Plant fragments and stem and leaf impressions are present in some of the sandstone and shale.

*46.8 This exposure of Cretaceous rocks is the best along the highway. Plant fossils can be found here. Also, at the south end of the scraped area, small fragments of red, gray, and banded red and gray chert are scattered about. They polish nicely in a lapidary tumbler.

47.0 The road climbs to the higher terraces of the West Fork. To the north, Taylor Mountain, composed of granodiorite from an igneous intrusion (batholith), dominates the landscape (fig. 9).

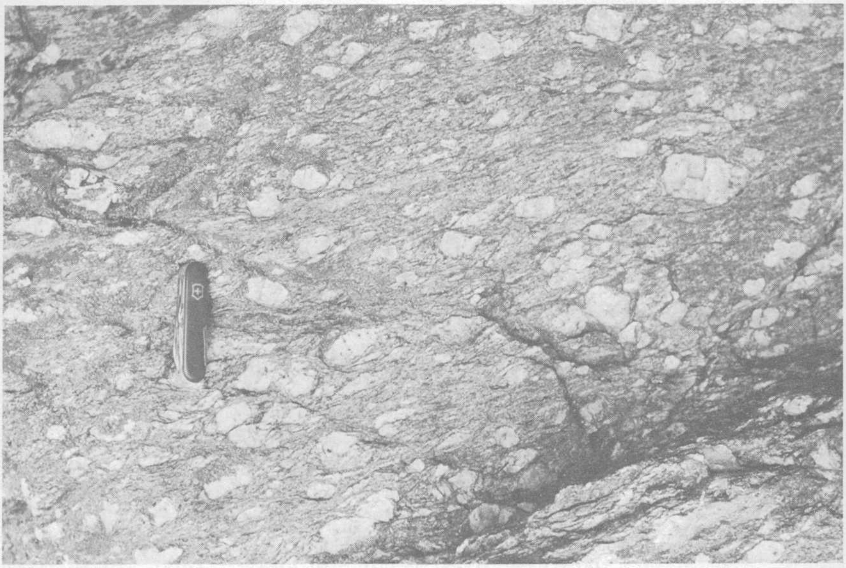

FIGURE 8.—Augen gneiss. The augen (eyes) are large white or light-gray potassium feldspar crystals. Poor exposures of this rock can be seen at several places along the Taylor Highway (mile 33.7, 43.4 and 101.2); the best exposures are on the east side of Mount Fairplay.

FIGURE 9.—View west of Taylor Mountain. The rock is mostly granodiorite.

49.1 The West Fork of the Dennison Fork of the Fortymile River is crossed here. Note the brown color of the water (due to organic acids)—a characteristic of streams draining extensive areas of muskeg. The southern margin of the Taylor Mountain batholith extends along the northwest bank. Here the igneous rock contains large blocks (xenoliths) of metamorphic rock. Gneissic banding is seen locally in the rocks of the Taylor Mountain batholith along this southern margin.

50.3 Highway crosses Taylor Creek.

*57.5 In the borrow pit on the west side of the road fresh specimens of granodiorite of the Taylor Mountain batholith can be obtained. Isotopic determinations on biotite from a similar rock collected about 3 miles north of here gave an age of 190 million years (Wasserburg and others, 1963, p. 258). (See table 1 for geologic time divisions.) West about 200 feet along the dirt road in the pit, a lamprophyre dike is well exposed where the overburden has been scraped off. It is a band of dark-gray rock rich in biotite. Along the margin of the dike, the rock has been brecciated, and secondary calcite has filled in around breccia fragments. Interesting and ornamental specimens of the breccia can be found here that are suitable for cutting and polishing.

EAGLE A-3 QUADRANGLE

58.0 A good view of Mount Fairplay is seen to the south.

60.3 To the west is Taylor Mountain (also at 62.3).

63.6 A view can be had into the valley of Mosquito Fork. Dredge tailings along Chicken Creek, the airfield, and some of the few remaining buildings at Chicken are also visible. Here high-level terrace deposits of Mosquito Fork conceal a contact between granodiorite and Tertiary rocks.

64.0 Greenish-black basalt has invaded white tuffaceous sandstone of Tertiary age.

EAGLE A-2 QUADRANGLE

64.1 The hills to the north on the northwest side of the highway bridge over Mosquito Fork are made up of basalt. To the southeast, high terraces along Mosquito Fork are conspicuous (fig. 10).

64.2 At this point the highway crosses Mosquito Fork. At times the water may appear cloudy because of suspended fine silt caused by placer mining on upstream tributaries.

FIGURE 10.—View south from northwest side of Taylor Highway bridge across Mosquito Fork. The Taylor Highway ascends to a high terrace. Beyond are granitic hills of the Taylor Mountain batholith.

64.4 Outcrops and large weathered boulders of basalt are to be seen on the west side of the road. Some of the basalt is fairly coarse grained, and some is fine grained; some is vesicular and amygdaloidal.

65.4 To the west on a brushy hillside, an old scaffolding marks the site of an abandoned coal mine. The coal is subbituminous and occurs in Tertiary sedimentary rocks.

66.8 A branch road to the north leads to the site of the former town of Chicken, a thriving community in the early 1900's when there was much placer gold mining in this vicinity. In 1898 about 175 people lived near here. By 1925 there were only about 50 residents, and now the permanent year-round population is 1 to 10. The old lodge still stands, and a small post office is maintained (fig. 11). Mail comes in by airplane. The branch road to the south is to the airfield.

The story is told that the name "Chicken" originated at a town meeting in the late 1800's. The miners were discussing a name for the town, and "Ptarmigan" was suggested because there were many of these chickenlike birds in the vicinity. It was agreed that this would be a fine name until someone said, "Good. That's settled, but how do you spell it?" No one knew, so one resident rose to the occasion and said, "Oh well, then let's just call the town 'Chicken'."

*66.9 Here the highway crosses Chicken Creek. Northward up the valley, piles of dredge tailings line the creek, and beyond, the gold dredge can be seen (fig. 12). In the early 1900's many small placer mines lined the creek—one of the richest gold producers in Alaska. Pans of gold ran as high as $2.50, whereas gold in most of the other creeks ran $0.20 to $0.60 a pan. Above the dredge, and on tributaries to Chicken Creek, individual placer mines still operate.

Some of the black rock on top of the dredge tailings is coal; upon exposure to the air it breaks down. The fresh coal contains bits of amber; most pieces of amber are small but some pieces are as much as 1 inch across. When the coal disintegrates, the amber falls out and is lost. At the south end of the tailings, Tertiary plant fossils may be found in ferruginous (reddish-brown) sandstone and limonitic (yellow-brown) nodules. Exposures of the Tertiary sedimentary rocks are rare around Chicken, so the dredge tailings are one of the few places to see them. Pleistocene vertebrate fossils, such as bones of horse, bison, and ele-

FIGURE 11.—Post office at Chicken. This is one of the few buildings which remain from the days when this was a busy mining community.

347-923 O—69——4

phant may also be found among the tailings. They were buried in the unconsolidated deposits which overlie the Tertiary rocks.

Much of the ground around Chicken is frozen and must be thawed before it is mined. Some of the piles of dredge tailings along the highway have been leveled by bulldozers.

*67.2 The black scraped area on the hillside is basalt, some of which is vesicular. Here the basalt appears to cut light-colored Tertiary sedimentary rocks. Mineral collectors may find pieces of clear calcite in the veins and veinlets cutting the basalt.

68.0 The valley of Chicken Creek lies to the north and northwest. The gold dredge can be seen from this point.

68.1 A contact between basalt and diorite is displayed here. View to the south is into the valley of Mosquito Fork and Dennison Fork. View to the west is into the valley of Chicken Creek. Taylor Mountain rises in the distance to the west.

68.3 The Chicken Fire Guard Station usually operates during July and August. Outcrop in the borrow pit on the east

FIGURE 12.—Gold dredge at Chicken. The pipeline in the background brought water from Mosquito Fork for the dredge pond. The pipes on the right side of the picture were used to carry water for thawing the frozen ground.

side of the station is intrusive rock, probably a marginal facies of the Taylor Mountain batholith.

*69.0 Gold was discovered in 1895 at Lost Chicken Creek. The old Lost Chicken Hill placer mine and adjacent ground have been worked intermittently ever since.

Where there has been recent mining frozen black muck overlying old, brown-stained gravels may be seen. The gravels rest on granitic rock. In the lower part of the creek, south of the highway, vertebrate fossils which have washed out of the stream sediments are sometimes found. In the Pleistocene Epoch (Ice Age), large cats, horses, bison, and caribou were among the animals that roamed this area. A lower jaw of *Panthera atrox*, a large Pleistocene cat, was found near the mouth of Lost Chicken Creek (Whitmore and Foster, 1967, p. 247).

69.4 From this point and extending for about 2½ miles eastward along the highway, roadcuts are in the contact zone between greenstone and intrusive rock. Dikes are numerous. Locally, the intrusive rock extends into the greenstone. The intrusive rock is variable in texture and composition and appears to have assimilated some of the greenstone. Epidote is a common green mineral in these rocks.

71.0 To the west the terraced valley of Mosquito Fork can be seen.

72.1 To the east is the valley of South Fork.

72.6 To the southwest, sloping Pleistocene(?) terraces can be seen on the south side of South Fork.

73.0 and 74.0 The roadcuts here are in the Paleozoic(?) greenstone. The fracture surfaces of some of the greenstone are covered in places with a thin white coat of calcium carbonate. At Mile 73 there is a good view into the valley of the South Fork (to the south). The high river terraces are prominent to the southwest along the valley.

74.5 South Fork Lodge.

75.3 The northeast bank of the South Fork of the Fortymile River (fig. 13) is cut in a terrace where exposures show sand and gravel overlying yellowish-tan Paleozoic(?) limestone and dolomite (at high water the bedrock may not be visible). The sand and gravel is overlain by 2 to 4 feet of partly frozen black muck.

76.7 Light- and dark-gray banded marble can be seen at this point. Some is brecciated, and there are small offsets along the fractures. Uphill to the east, tan crumbly brecciated and crushed carbonate rock, partly dolomite with silicified patches, is exposed in the roadcut. This rock is probably of Paleozoic age.

78.5 To the north an entrenched meander of Walker Fork can be seen. The cliff face exposed on the north side of the stream consists of Paleozoic(?) metamorphic rocks. Downstream, the bluff at the west end of the muskeg flat on the north side of the stream is composed of Tertiary conglomerate and breccia. Old trails lead across the muskeg to an abandoned placer mine on the north side of Napoleon Creek. The cut on the high "bench" in the distance is the old mine. On the south side of the road, gray marble and quartzite are exposed. The rocks are cut by a white fine-grained dike and by a medium-grained granitic dike. There are also sills and stringers of granitic rock.

78.6 Faults and folds in quartzitic rocks are evident in the roadcut.

78.7 Here a contact between a granitic intrusion and metamorphic rocks can be seen.

81.0 The granitic boulders in the bank along the south side of the road are representative of the bedrock—a small granitic intrusion crops out along here.

FIGURE 13.—A typical entrenched meander of the South Fork of Fortymile River. Walker Fork is the stream entering on the right (east). The rocks on the north side of Walker Fork are Tertiary conglomerate; those in the steep bank in the background across the South Fork are metamorphic rocks.

81.4 Here there is a covered contact between the granitic intrusive rock and the metamorphic rocks.

81.5 Several kinds of quartz-biotite gneiss and schist are exposed. Two or more small high-angle faults can be seen (if not covered by talus). One fault has several inches of white fault gouge along it. (Best seen in cuts at road level.)

81.9 and 82.0 Across Walker Fork Bridge at Walker Fork campground (east side of the road), a cliff of white quartzite and limy quartzite is exposed on the east side of Wade Creek. Close examination reveals intricate small folds on the face of the cliff. Such complex folding is characteristic of the medium-high-grade metamorphic rocks exposed in this vicinity. In places along Wade Creek the foliation appears to be horizontal, but it probably represents the recumbent limbs of folds.

83.0 Dredge tailings from gold mining activities before World War II line Wade Creek.

84.4 The outcrop on the west side of the road is gray-banded garnetiferous quartz-biotite gneiss. It is a characteristic type of metamorphic rock in this area.

86.0 The abandoned dredge was used in mining gold on Wade Creek until 1940 (fig. 14). The dredge originally burned wood, and 40 men were kept busy cutting wood for fuel. On the west side of the road the iron buckets from the

FIGURE 14.—This abandoned gold dredge on Wade Creek was last used in 1940. A section of metamorphic rocks is exposed behind the dredge.

dredge lie in the grass. Behind the buckets is a low cliff of minutely crinkled quartz-biotite gneiss. An isotopic age determination made on biotite from this rock gave an age of 177–182 million years (G. D. Eberlein, 1964, written commun.). This age probably indicates the time when the rock was heated by the intrusion of the Taylor Mountain batholith and related intrusive rocks rather than the original age of the rock.

86.1 A section of gneiss, schist, and quartzite cut by white granitic dikes is well exposed on the west side of highway. Some of the rocks are garnetiferous.

EAGLE A-1 QUADRANGLE

89.0 Directly below the road at the mile marker, a small plunging anticline in quartzite is exposed in the streambed of Wade Creek (fig. 15). It is indicative of the complex structure of all the metamorphic rocks in the area, but such good outcrops of these structures are few.

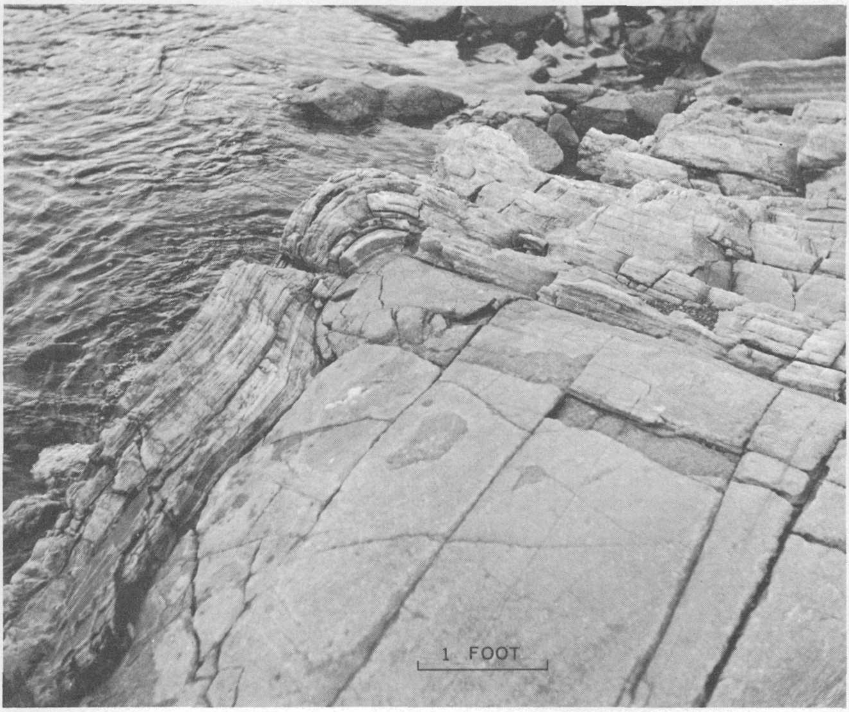

FIGURE 15.—A plunging anticline is exposed in the streambed of Wade Creek. The rock is quartzite.

89.9 Jack Wade is an old mining camp which was in operation from the end of the last century to about 1940. It is private property, and one or more miners live here. Wade Creek is still mined (fig. 16), and in 1963 a 25¼-ounce gold nugget was found.

90.1 Airstrip for Jack Wade can be seen at this point. Before construction of the Taylor Highway, many supplies came to Jack Wade by small airplanes (bush planes).

91.8 to 94.1 The highway climbs out of the valley of Wade Creek to near tree line and high tundra country. Numerous roadcuts show a variety of metamorphic rocks. The lower two-thirds of the roadcuts consists mostly of several varieties of quartz-biotite gneiss. In the upper third, marble (green, pink, and white) and quartzite are poorly exposed. Examples are: Mile 93—gray medium-grained hornblende-biotite-quartz-feldspar gneiss; mile 93.3—dark-gray fine-grained biotite gneiss; mile 94.1—biotite gneiss cut by

FIGURE 16.—Mining on Wade Creek. This miner is separating the gold collected in his large sluice box (the trough in which the man is standing) from the other heavy minerals which accompany the gold; he does this by using the small sluice box.

a pegmatite dike which has pink feldspar and scattered books of biotite 1 inch in diameter.

95.3 To the west one can see the trace of the old wagon road to Jack Wade across the hillside.

95.6 At Eagle (Jack Wade) Junction, one highway goes north to the village of Eagle on the Yukon River, and the other highway goes east to the Canadian border and Dawson in the Yukon Territory.

HIGHWAY NORTH FROM EAGLE (JACK WADE) JUNCTION

95.9 On the east side of the highway, the light-gray rocks which form small rounded hills are white coarsely crystalline marble.

*96.1 To the north-northeast, on a clear day the Ogilvie Mountains on the Arctic Circle in Canada can be seen (the highest mountains in the background). The rolling hills in the foreground are mostly metamorphic rocks similar to those seen along Wade Creek and in the cuts between mileposts 92 and 95.

Tan, gray, and greenish-gray quartzite and quartzitic schist is exposed in the borrow pit on the west side of the road. A search may yield highly polished varicolored slabs and chips of quartzite. The highly polished surfaces are called slickensides and were formed by the grinding motion of the rocks as they slid past each other along a small fault. The fault is exposed in the rear of the pit.

*96.5 In the gully bordering the road on the west side, long (1–3 in.) light-green crystals of diopside can be found. Some crystals are crumbly and much weathered.

97.4 To the east along the ridge that extends perpendicular to the road (about a quarter of a mile east from the road) are prominent pinnaclelike outcrops of firmly cemented quartzite breccia.

97.8 To the north, Steele Creek Dome, composed mostly of metamorphic rocks, is a prominent landmark.

98.1 From here for about 0.2 mile on the east side of the road, the banks are dark colored because rocks composed primarily of hornblende and biotite have disintegrated.

*101.2 Quartz-biotite gneiss with pink and white potassium feldspar augen occurs as rubble in the banks on the southwest side of the road.

105.2 The road begins to descend to the valley of the Fortymile River.

105.6 On the east side of the road the light-colored boulders are rubble from a small granitic intrusion. The rock is dominantly quartz and feldspar with a little biotite.

EAGLE B–1 QUADRANGLE

108.9 In the roadcut on the east, recumbent folds can be seen. The rocks are gray and greenish-gray quartzite layers with interbedded tan carbonate layers.

109.9 Eastward from the road turnout is an excellent view of high terraces of the Fortymile River (fig. 17). Here the stream is entrenched to depths of more than 600 feet. Most of the rock exposed is gray quartz-biotite gneiss. Good rock exposures are numerous as the road descends toward the Fortymile River.

110.9 Dark-gray to black fine-grained garnetiferous biotite-hornblende gneiss is exposed here. To the north, white cliffs composed of marble are visible along the Fortymile River.

111.3 Actinolite-talc schist is exposed along a fault.

111.5 The Fortymile River and highway bridge come into view here. Prominent nearly vertical beds of white marble can be seen on the northeast side the of stream (fig. 18).

FIGURE 17.—A large meander of the Fortymile River. View northeast from mile 109.9. A broad, nearly flat high-level terrace borders the north side of the river. The river has cut down through metamorphic rocks.

112.4 Here again, the prominent beds in the steep bank on the north side of the Fortymile River are white marble. They are interbedded with hornblende schist and gneiss.

112.6 The highway crosses the Fortymile River at this point (fig. 19). Placer gold has been mined from gravel bars in the stream for over 80 years. The Fortymile River joins the Yukon River at the abandoned town of Fortymile in Canada.

114.3 Folded marble is exposed in the roadcut. Marble can also be seen high in the cliffs to the east bordering O'Brien Creek.

115.0 White marble is exposed in the roadcut and crops out in the cliffs on the east side of O'Brien Creek. Talus and rubble from the marble cliffs form the slope which extends to the stream.

116.5 Intricate folds in quartzite and marble are exposed on the west side of the road (fig. 20); the cliff on the east side of O'Brien Creek is composed of hornblende gneiss.

117.1 Cross Alder Creek.

FIGURE 18.—Vertical marble beds on the northeast side of the Fortymile River. Isoclinally folded metamorphic rocks are well exposed along the bank. View north from south side of stream.

*118.0 In the borrow pit on the west side of the road pieces of schist may contain green fibrous actinolite needles that are as much as 3 inches long. Talc-garnet schist is also present, and garnets 1 inch in diameter may be collected; however, they are not suitable for jewelry.

119.3 Faulted, folded, and shattered metamorphic rocks are exposed on the west side of the highway.

119.8 Cross King Creek.

121.2 Road crosses a high terrace of O'Brien Creek. Meanders of O'Brien Creek are incised more than 300 feet here; white marble overlying gneiss and schist is exposed in cliffs on the east side of the creek.

*122.0 In the borrow pit on the west side of the road, rock specimens containing long dark-green hornblende needles can be found.

123.0 A fault zone (about 0.3 mile wide) crosses the highway. It separates the section of medium-grade metamorphic rocks consisting of quartz-biotite gneiss, marble, and quartzite to the south from low-grade metamorphic rocks consisting of dark-gray quartzite and quartzitic schist, graphitic schist, and greenstone to the north.

FIGURE 19.—Taylor Highway bridge across Fortymile River. View east (downstream) of Fortymile River at very low water. The steep valley walls of an entrenched meander are visible beyond the bridge.

123.5 On the east side of O'Brien Creek, massive marble (of the Birch Creek Schist) crops out. The fault seen at mile 123.0 follows the valley north of the marble outcrops.

123.8 Dark-gray graphite schist with fine lineation crops out on the west side of the highway.

124.2 Landslide topography on dark-gray quartzitic schist can be seen to the east.

FIGURE 20.—The intricately folded marble and quartzite of the gneiss and schist unit are well exposed in roadcuts along the west side of O'Brien Creek north of the Fortymile River.

124.5 Cross Columbia Creek.

125.0 Landslide topography, which is also common in the dark-gray quartz-graphite schist, is seen again, particularly on the west side of the road. There is a distinct change in topography after crossing the fault at mile 123. North of the fault there are few cliffs and many old landslides.

126.5 An exposure of green schist on the west side of the road has chevron-type folding.

127.8 An outcrop of massive greenstone on the west side of the road appears to grade upward into folded green schist. The effect may be due to hill creep.

128.0 A knob of slightly schistose greenstone can be seen on the west side of the highway.

128.4 Cliffs of greenstone are exposed along the east side of O'Brien Creek.

129.6 Fine-grained greenstone with amygdules is exposed in the roadcut on the west side of the highway.

129.7 Cross Dime Creek.

130.5 Black siltstone, shale, and limestone crop out on the west side of the road. These rocks are less metamorphosed than the dark-gray quartz-graphite schist.

130.8 Serpentine, some fibrous, and actinolite can be found on the west side of the road.

131.6 Cross King Solomon Creek.

132.0 In the borrow pit on the east side of the highway, tan, gray, green, and pink siltstone is exposed.

EAGLE C-1 QUADRANGLE

133.5 Terrace gravel is exposed in the borrow pit on east side of road.

134.6 A good view of Wolf Mountain, composed of massive greenstone, can be had to the west. Altiplanation terraces are evident, especially on the north side (fig. 21).

135.1 Unmetamorphosed basalt with nearly horizontal columnar jointing (probably a dike) crops out in the cliffs on the east side of the road (fig. 22). The joints were formed by contraction as the lava cooled.

135.4 The exposure on the east side of the highway shows folded and faulted black schist and greenstone with orange-colored altered zones.

135.8 Cross North Fork. Light-green and yellow-green schist and phyllite and white quartz-feldspar rock are exposed.

136.8 Terrace gravel is exposed in the borrow pit.

FIGURE 21.—Wolf Mountain is composed of massive greenstone. Altiplanation surfaces have formed on top giving the flat, terraced appearance.

141.6 This place on the highway is called American (Eagle) Summit. The view west is of typical rolling tundra just above tree line. Glacier Mountain is the distant high peak to the northwest. To the west-southwest are stepped surfaces which have been termed altiplanation terraces. The highest nearly concordant levels may be an erosional surface. Stone stripes and polygons can be seen on many of the tundra surfaces. This is a famous place for hunting caribou in the fall.

143.3 The outcrops here are greenish-gray greenstone.

143.9 Marble and quartzite are exposed in the borrow pit and roadcut. Folds, a small fault, and upturned beds can be seen in the roadcut.

145.0 The outcrop on the west side of the road is fairly massive greenschist.

145.9 Small blue quartz "eyes" can be found in the schist in the borrow pit on the west side of the highway.

148.3 White and gray banded marble can be seen here. North from here to Teddys Fork, greenschist is interbedded with dark-gray quartz-graphite schist.

148.6 Gravel Gulch was the site of placer gold mining in the early 1900's.

148.9 Massive dark-colored greenstone is exposed here.

FIGURE 22.—Steep cliffs of columnar basalt crop out along the highway at mile 135.1. The nearly horizontal attitude of many of the joints suggests that the basalt was intruded as a dike.

149.1 Cross Discovery Fork.

149.5 A small body of ultramafic rock is exposed on the west side of Discovery Fork.

150.6 Crinkling, infolding, and interbedding of green and black schist is seen here.

150.9 Placer gold has been mined along much of Teddys Fork.

151.8 Cross American Creek.

152.2 On the east side of the road is the site of the Berglund cabin. Evelyn Berglund Shore, author of "Born on Snowshoes," was born here.

Also on the east side of road is the approximate contact between an ultramafic body and black quartzitic schist. To the north the highway goes through a canyon whose walls are composed of serpentinized ultramafic rock.

*152.5 Cross American Creek. Asbestos (fibrous serpentine) can be found in the roadcut on the northeast side of the bridge.

152.8 to 153.3 The massive serpentinized ultramafic body is well exposed on the east side of the road.

154.0 On the southeast side of the road, there is coarse talus from the massive ultramafic rock.

154.2 On the west side, high on the cliffs, boulder streams of ultramafic rocks can be seen. In this part of the canyon are some spectacular views of these multicolored steep ultramafic rock cliffs (fig. 23).

155.2 Cross Marion Creek.

155.3 Features characteristic of the margin of the ultramafic mass, including folding, schistose appearance, and dark and light banding, are evident. The greenish-gray color seen on the

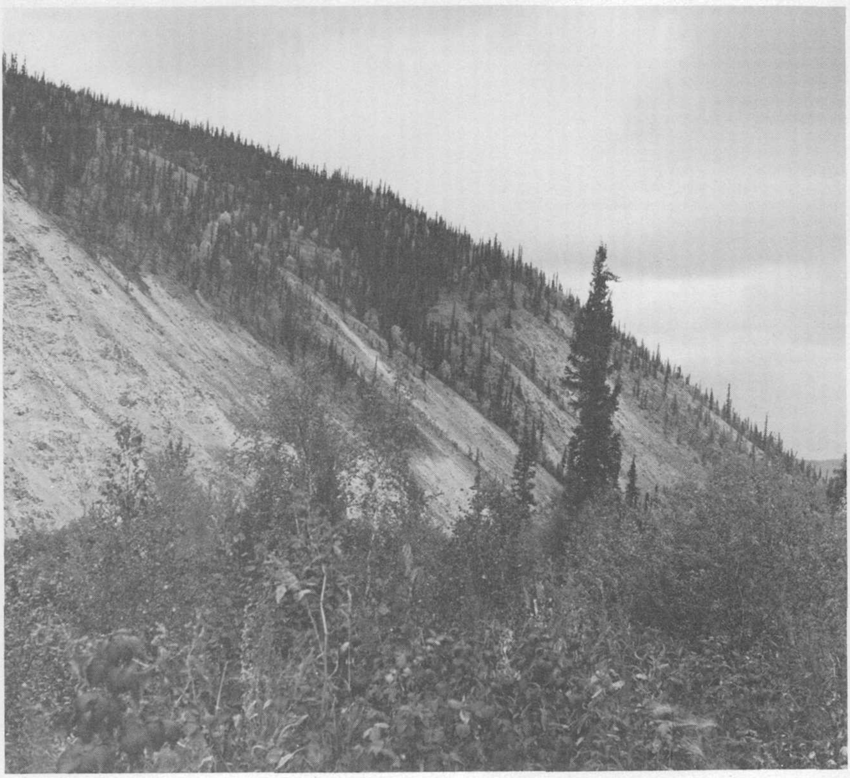

FIGURE 23.—Ultramafic rock along the canyon of American Creek. View northwest of multicolored weathered cliffs.

rocky cliff to the west is typical of the ultramafic rock. Vegetation is absent or sparse on these rocks.

155.5 Contact between quartzite and the ultramafic body can be seen here.

156.1 The gully is eroded on the contact between quartzite and Tertiary conglomerate. The conglomerate is coarse at the contact.

156.7 To the west, the steep front and sharp change in slope between the ultramafic body and the Tertiary rocks is apparent. The rolling, heavily wooded area of the Tertiary sedimentary rocks contrasts with the sparsely vegetated area of the ultramafic body.

EAGLE D-1 QUADRANGLE

157.2 Tertiary conglomerate, sandstone, and siltstone are exposed in the borrow pit. To the south distinct ridges and valleys in the ultramafic rocks are prominent.

157.4 The quarry on the northeast side of Bluff Creek is the best place along the road to see Tertiary conglomerate.

*157.6 The old borrow pit on the east side of road is in Tertiary conglomerate, sandstone, and limy siltstone. The siltstone contains fossil leaves.

159.0 The most northerly outcrop of Tertiary sandstone and conglomerate is found along the road near this milepost.

159.3 Here the road comes onto a high terrace of the Yukon River. Gravel is present in the cut on the northwest side of the road.

159.9 The gravel pit on the northwest side of the road is in a high terrace of the Yukon River. The gravel is covered by as much as 2 feet of windblown silt (loess).

The composition of this gravel is different from that of the underlying Tertiary conglomerate. The terrace gravel has a great variety of locally derived rocks including granitic rocks, conglomerate, schist, and ultramafic rocks. The Tertiary conglomerate has many black well-rounded chert pebbles.

160.1 Crossbedding of a silty sand terrace can be seen in the roadcut. The sand is overlain by 1 foot of loess. The view northeast is of the valley of the Yukon River. Eagle Bluff is to the north. The valley here occupies the Tintina Trench, a large fault valley which extends southeast into Canada.

The road now descends to the historic village of Eagle on the banks of the Yukon River (fig. 24). The name "Yukon" apparently comes from "Yu-kon-ah," the term that Indians around Nulato applied to the river; it means "the great water." In the past, steamers plied the river bringing supplies for the hundreds of placer gold miners who were working within a radius of 100 miles or so. Fort Egbert, where one or two companies of infantrymen were stationed, was located here, and the old army mule barn still stands. The Army Signal Corps operated a telegraph line from Eagle to Valdez until 1933.

In 1898 Eagle had a population of 800, in addition to the 800 or 900 infantrymen at Fort Egbert. There were 580 cabins in the town and 140 placer mines on American Creek.

Roald Amundson, the famous Norwegian explorer and discoverer of the South Pole, trekked overland to Eagle in February 1906, and telegraphed word to the outside world that he had sailed through the Northwest Passage and had located the north magnetic pole. The cabin where he stayed for a few days still stands.

Numerous buildings and landmarks of historic interest can be seen at Eagle, including the old courthouse where Judge Wickersham once presided, the customs house, the military cemetery, and parts of a water-supply system for Fort Egbert.

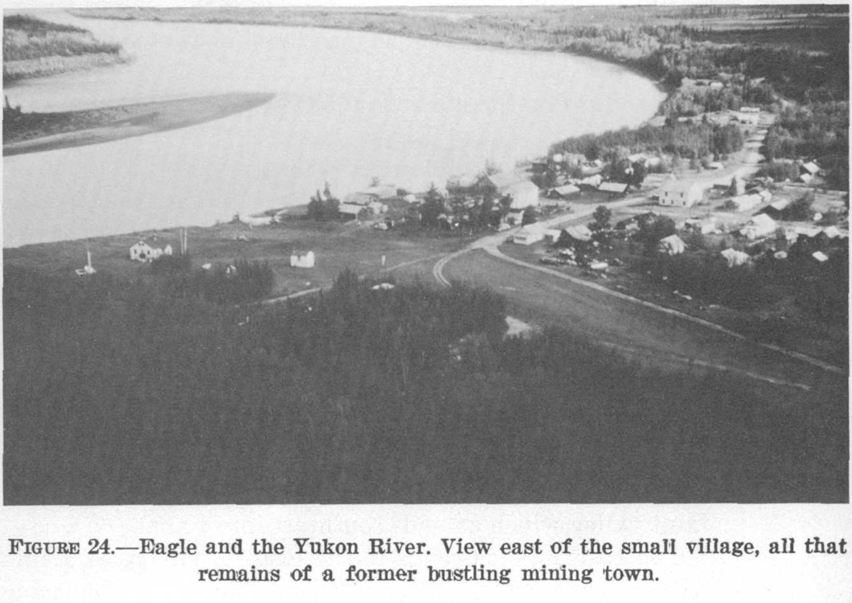

FIGURE 24.—Eagle and the Yukon River. View east of the small village, all that remains of a former bustling mining town.

CANADIAN BORDER TO EAGLE JUNCTION

0.0 United States–Canadian border. On the north side of the road the rubble is dark-gray quartzite. In places the rock grades to gray quartzitic schist. To the south are flat terraced tundra surfaces underlain primarily by gray quartzite and quartzitic schist.

0.8 Gray quartzitic rock is exposed in the cut in the rubble on the north side of the road. It is strongly crinkled. To the east a sharp hill of gray quartzite is seen. To the west is Davis Dome.

1.0 Outcrops and rubble of light-gray (weathers tan) quartz-muscovite gneiss occur about 200 feet below the south side of the road. In places the gneiss contains scattered blue-gray "eyes" of glassy quartz about one-eighth inch across.

2.1 The valley of Walker Fork lies to the south. Younger Creek is the tributary entering from the south. Tailings from placer gold mining border the creeks. The high terraced tundra hills are largely underlain by gray quartzite and gray quartzitic schist. Rock of the same type is exposed in the roadcut on the north.

2.5 To the southwest are gold-dredge tailings in the valley of Walker Fork. The old dredge still lies in the valley, partly hidden in the brush.

4.0 Boundary Lodge is at this milepost.

7.75 A few hundred feet north of the road, a section of gray quartz-biotite gneiss can be seen. Many layers are highly garnetiferous, particularly those near the base of the exposure. Some of the upper layers contain coarse biotite flakes one-half inch across. One part has garnets one-half inch across. Small dikes and sills of light-colored granitic rock cut the gneiss.

*9.75 Gray quartz-biotitic gneiss crops out on both sides of the road. Parts of the gneiss are highly garnetiferous, and large garnets are well exposed on the south side of the road. Some hornblende gneiss is interbedded with the biotite gneiss. There is a good exposure of hornblende gneiss at mile 10.6.

*11.3 A small outcrop of coarse hornblende gneiss containing long (more than 1 inch) hornblende crystals occurs on the north side of the road.

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