DESCRIPTION OF MAPPED UNITS

UNCONSOLIDATED DEPOSITS

and others, 1965, p. 357-361). A few small patches of older (pre-Delta) glacial deposits are

mapped along the lower Tok River, indicating that the most extensive glacial advance in

of the Tanana River, shown by Péwé, Burbank, and Mayo (1967) from air-photo inter-

The Tanana valley is filled with alluvium and some lacustrine deposits to a depth of at

least 128 feet and probably more than 250 feet; eolian deposits occur along its northern

Small areas of residuum from metamorphic rocks occur on remnants of an old warped

erosion surface that extends southeast from Mount Neuberger in the Alaska Range; the

surface is about 5,600 feet in altitude near Mount Neuberger and becomes lower to the

southeast. The residuum is at least 2 feet thick in places but has not been shown on the map.

The age of the surface and residuum is not known but probably pre-dates the oldest glacia-

Alluvium along major streams

margin. Valleys north of the Tanana River contain principally alluvium and colluvium,

pretation, were not identified in the field and thus are not mapped here; however, the possi-

MAP I-593

EXPLANATION

Conglomerate, sandstone, shale, siltstone, tuff, tuffaceous sandstone and shale, lignite, and chert. Folded. Very poorly exposed. In places not distinguishable from tuffaceous Unconsolidated deposits in the Tanacross quadrangle consist of fluvial, colluvial, eolian, diments included in the felsic volcanic rock unit. Locally intruded by volcanic dikes and nd in places overlain by lava flows. Estimated to be at least 200 feet thick in the vicin-Glacial deposits occur only in valleys south of the Tanana River and result from Pleistocene glaciers, most of which originated high in the Alaska Range west and south of the In one locality south of the West Fork the conglomerate unconformably overlies metaquadrangle. In the Tok River drainage systems, well-developed moraines are rare, and morphic rocks of the biotite gneiss and schist unit. This conglomerate is composed primost of the deposits consist of outwash, probably including drainage from the proglacial marily of well-rounded white translucent quartz pebbles, pebbles of gneiss and schist, and lake in the Copper River Basin to the southwest (Péwé and others, 1965, p. 363); the glaa few pebbles of greenish-gray lava in an arkosic, slightly micaceous matrix. Other pebbly ciers were less extensive in this relatively low part of the Alaska Range than in adjacent conglomerates are interbedded with sandstone and shale higher in the section. Pebbles areas to the northwest and southeast. The glacial deposits are assigned principally to either are rock types that are common in the surrounding area. Poorly preserved plant remains the Donnelly Glaciation of Wisconsin age, or the Delta Glaciation of Illinoian age (Péwé

nd impressions common in shales and sandstone. Considered of probable Late Cretaceous age on the basis of a poorly preserved palyomorph flora in rocks exposed along the Taylor Highway about 3 miles south of the West this valley may have reached the vicinity of Tok. Minor glacial deposits of Holocene age Fork Bridge (Foster, 1967, p. B6) and along the Tanana River in the B-5 quadrangle. In the B-5 quadrangle USGS Paleobot. loc. D 3510, Estella Leopold (U.S. Geol. Survey, Jan. 28, 1965) identified two species of Aquilapollenites, Sequoiapollenites, Taxodiaepollenites, and miscellaneous spores. Aquilapollenites and Taxodiaepollenites are also present in the West Fork flora.

Detrital rocks (Kr)

Mentasta Argillite of Richter (1967) (Mza) Argillite and shale with minor sandstone and limestone (occurs only on southwest side of Denali fault). Late Jurassic or Early Cretaceous age.

METAMORPHIC ROCKS

plane schistosity or cleavage. In phyllitic or schistose rocks a strong lineation parallel to the fold axis is formed by very small crenulations in the layering, by mineral orientations,

A third set of folds, characteristically kink folds, deforms the older schistosities and linea-

Fossils have not been found in the metamorphic rocks in the Tanacross quadrangle, and

hese rocks cannot be correlated with well-dated rocks elsewhere. In the northern part of

the Nabesna quadrangle, north of the Denali fault near Mentasta Pass, D. H. Richter (written commun., 1967), found corals in slightly metamorphosed limestone. The corals

indicate a Late Silurian or Early Devonian age for the limestone. The section of rocks

which includes this limestone appears to be continuous with greenschist facies metamor-

phic rocks in the southwestern part of the Tanacross quadrangle. This relationship sug-

gests that at least some of these metamorphic rocks may be early Paleozoic in age. How-

ver, the thickness of the metamorphic rocks is great, and it is possible that several geoogic periods, even as old as Precambrian, are represented. Also, because of the complex

structure of the area, it is possible that some, or even most of the rocks in the Tanacross

Radiometric age dates were obtained on two specimens of the biotite gneiss and schist

nit from localities near the Glenn Highway about 10 miles southwest of Tok. At locality

1) a Sr⁸⁷/Rb⁸⁷ date of 120 million years was obtained on biotite. At locality (2) a K⁴⁰/A

determination on muscovite gave 119 million years and Sr⁸⁷/Rb⁸⁷ gave 524 million years.

whole-rock date (Sr⁸⁷/Rb⁸⁷) gave 1,173 million years (G. D. Eberlein, written commun.,

964). Igneous intrusions are known to occur nearby, and at present these dates cannot be

and others, 1963; G. D. Eberlein, written commun., 1964). However, they are generally

Light-pink, light-green, tan, and gray phyllite, quartz-sericite schist, quartz-sericite-

chlorite schist, quartzite, and marble. In the Alaska Range in the southwestern part of the

quadrangle, the rock is primarily light-pink, light-green, gray, and tan phyllite with some

included greenstone; includes several thin (a few inches to 50 feet) discontinuous marble

beds and quartzite. Northward the rocks become more schistose, and quartz-sericite schist,

Quartz-sericite schist, quartzite, quartz-muscovite schist, actinolite schist, chert and

cally a minor amount of biotite. Poorly exposed in the Yukon-Tanana Upland. Primarily

Dominantly light-greenish-gray quartz-muscovite-chlorite schist, quartz-sericite-chlo-

rite-epidote schist, quartz-actinolite schist, and feldspar-quartz-sericite schist, with minor

dark-green chlorite schist and dark-greenish-black biotite schist. Sulfides locally abun-

this map unit is more or less continuous across the Canadian border with the Klondike

Mostly dark-gray quartz-graphite schist and dark-gray quartzite with some quartz-

ese rocks resemble those in the northern part of the phyllite and schist unit of the Alaska

Range. They extend northward into the Eagle quadrangle. Primarily greenschist facies

of feldspathic gneiss, which may be the Pelly Gneiss, is indicated by symbol in the north-

muscovite schist, quartz-muscovite-chlorite schist, and light-colored quartzite. In places

dant. As a whole, rocks in this unit resemble the Klondike Schist of Cockfield (1921), and

Quartz-graphite schist unit (Pzp€g)

Schist of Cockfield's map. Primarily greenschist facies rocks.

other fine-grained silicic rocks, phyllite, metagraywacke, and schistose greenstones. L

Quartz-mica schist unit (Pzp€k)

types. Rocks of this unit are primarily greenschist facies, lower in metamorphic grade to

quartz-sericite-chlorite schist, quartz-graphite schist, and quartzite are the dominant rock

interpreted in terms of the true age or time of metamorphism of these rocks (Wasserburg

Phyllite and schist unit (Pza)

uadrangle are separated from those in the Nabesna quadrangle by faults.

are common. Kink folds are best developed in phyllitic rocks.

considered Precambrian and (or) Paleozoic in age.

the south and increasing in grade northward.

tions. Small fractures filled with quartz, subparallel to the axial planes of the kink folds,

r by intersecting schistosities. The second set of folds is well developed in most of the

The metamorphic rocks consist of a wide variety of metamorphosed sedimentary and igneous rocks which range in degree of metamorphism from greenschist to amphibolite facies. They are tentatively divided into six map units on the basis of lithology and metamorphic facies, but the contacts between units, the relationships of units, and their validity The higher grade metamorphic rocks in the Alaska Range, the biotite gneiss and schist

unit, are approximately separated on the map from the lower grade phyllite and schist unit Primarily gravel and sand.—Locally includes silt, organic silt, and peat. Occurs as flood plains and adjacent low terraces. Peat and organic silt commonly fill or partly fill old oxby a dashed line. Rocks transitional in mineralogy and lithology between the two groups occur on both sides of the line for distances of a few feet to a few thousand feet. The line bows and other depressions on flood plains. In places flood-plain deposits incised by dry pears to be the approximate biotite isograd, and garnet first appears a few feet to a few On the Robertson River and some parts of the Tanana River, alluvium occurs as islands nousand feet north of the line. Gneissic rocks including augen gneiss crop out only north surrounded by braided channels which shift laterally. The flood plain of the Robertson The metamorphic rocks, with the possible exception of some rocks in the phyllite and River and parts of the Tanana River are covered by overflow ice in winter. schist unit and the metadiorite, are polymetamorphic. They are complexly folded, and (Qas) nbs of large-amplitude (several thousand feet) folds are visible in places in the Alaska Range. The foliation in the Alaska Range most commonly strikes northwest, more or less

for more detailed mapping are uncertain.

Primarily silt and sand.—Contains admixtures of organic material; locally includes gravel. Occurs as flood plains and adjacent low terfaces; may include pond deposits. In places arallel to the trend of the range, and dip is generally southwest. In most places in the Alasa Range and in the Yukon-Tanana Upland, the large folds are not readily apparent, but In summer dry expanses of the flood plain are sources of windblown silt, which is deposeveral sets of small folds (amplitude of an inch to several feet) are evident. ited on other parts of the flood plain, bordering terraces, and nearby hills. The earliest set of small folds are tight isoclinal folds which have well-developed axial Silt and peat deposits (Qs) plane schistosity and which fold compositional layering. Preservation of these folds is Alluvial, eolian, and lacustrine silt mixed with peat and finely divided organic material; occurs throughout the quadrangle in large and small depressions (only the larger areas A second set of folds deforms the schistosity and has a moderately well developed axial-

Surface of deposits generally hummocky; silt commonly perennially frozen below depths of 1 or 2 feet. Landslide deposits (QI)

colluvial aprons, and talus cones; locally mixed with glacial deposits. Also in narrow valley

bottoms as flood plains and low terraces. Includes broad alluvial fans mixed with some

Coarse, angular, rubble from active and inactive rock glaciers. Locally mixed with till.

colluvial material on east slopes of Mount Fairplay. Locally includes residual material on

Silt generally tan to dark brown or light gray to dark gray; mostly well stratified and

Mixed coarse and fine unconsolidated debris deposited by the larger landslides, earthflows, and avalarches. Small areas of such deposits not mapped. Alluvium and colluvium in small stream valleys Primarily gravel, sand, and rubble.—Occurs on steep valley walls as alluvial fans, alluvial-

bottoms as flood plains and low terraces. Includes alluvial fans bordering the Tanana River valley on the north flank of the Alaska Range. Primarily silt and sand.—Also includes gravel, rubble, organic silt, and peat. Occurs on slopes of valley sides as alluvial fans and mixed colluvial and alluvial deposits; generally poorly stratified and poorly sorted; coarser grained higher on the slopes and finer grained toward valley bottom. Also occurs in better stratified and sorted deposits in narrow valley

gentle slopes and low ridges. Beach deposits of Tetlin Lake (Qb) Fine-grained sand and silt, generally well sorted; locally includes some organic material. Rock glacier deposits (Qr)

Many rock glacier deposits too small to show on map. Eolian deposits on active flood plains (Qe) Sand and minor silt with some admixture of organic material; commonly mixed with fluvial and lacustrine deposits.

Fluvial and lacustrine deposits (Qfl) Sand, silt, and admixtures of organic material. Occurs in areas marginal to low terraces of the Tanana River valley. Gravel present at depths of as little as 10 feet along the Tetlin River and probably elsewhere within the unit. Deposits commonly perennially frozen be-

Lake deposits (Qls) Fine sand and silt, well-bedded. Contains tiny shells of mollusks. Exposures partly

covered and mixed with colluvial and eolian deposits. Probably of late Pleistocene age or early Holocene age. Primarily gravel and sand; locally includes silt, and commonly overlain by a few inches

to a few feet of loess. Material generally well stratified and fairly well sorted. In the Tok River valley of both Donnelly and Delta age; in the northern part of area probably of late Pleistocene age. (Only larger and higher terraces along main streams shown.) Outwash aprons and alluvial fan

deposits of the Donnelly Glaciation (Qoa) Primarily well-rounded gravel with some sand and minor silt beds: includes dark-colored volcanic rocks from outside the mapped area. May include some Holocene alluvium. Generally well stratified; fairly well sorted. Moraines of the Donnelly Glaciation (Qm)

Alluvial fan deposits of the Delta Glaciation (Qof)

Moraines of the Delta Glaciation (Qdm)

is continuous with more extensive deposits in adjacent quadrangles.

ameter. Source of black chert unknown.

Gravel and conglomerate (Tc)

of the biotite gneiss and schist unit. Three separate occurrences known:

Glacial deposits of pre-Delta age (Qom)

SEDIMENTARY ROCKS

They were subaerially deposited and probably have been extensively eroded as only small

Thin patch of gravel and conglomerate about 40 acres in area in the northeastern part

of the Tanacross quadrangle at an altitude of about 3,800 feet. Mostly yellowish-white

quartz pebbles and black, well-rounded, polished chert pebbles 1/4 inch to 5 inches in di-

feet in the Alaska Range about 9 miles southwest of Tok. Mostly white quartz pebbles

2 inch to 5 inches in diameter; includes a few light-gray quartzite and gneiss pebbles;

about 15 miles southwest of Tok; fragments of quartz and schist; mostly rounded, but some

angular. Deposits of this unit all of probable Tertiary age but most likely deposited sepa-

2. Gravel, covering an area of about 1/4 square mile at an altitude a little over 3,000

3. Gravel, covering an area of about 40 acres at an altitude of a little over 3,900 feet

by calcium carbonate.

fluvial deposits.

Primarily till, gravelly and sandy, locally bouldery; includes patches of gravel and sand. Biotite gneiss and schist unit (Pzp€b) Chiefly terminal moraine, but minor lateral and ground moraine. Includes some colluvial Primarily quartz-biotite gneiss and schist, quartz-hornblende gneiss, quartz-feldsparmaterial. In a few cirques in Alaska Range may include moraines of Holocene age. Hillocks biotite gneiss, augen gneiss, quartz-muscovite-garnet gneiss, and quartzite. Many rocks and ridges of moraines are steep sided; large, closely spaced, slightly weathered boulders highly garnetiferous. Map unit essentially corresponds to Mertie's "Birch Creek Schis cover the surface; ponds common. Upper 1-1.5 feet of till weathered. Till locally mantled nd associated igneous rocks." Granitic gneisses of the Pelly Gneiss type (Mertie, 1937, by loess or alluvial silt. p. 202) are abundant. In most of the area, rocks of the Pelly Gneiss type are so intermixed Eolian deposits primarily in dunes (Qd) nd apparently interlayered with other rock types that it was not practical to map them Sand, medium- to fine-grained, tan to dark-gray, crossbedded, well-sorted; mostly in staseparately. However, occurrences of augen gneiss, which is a characteristic rock type of bilized dunes; in places some silt or sand overlain by loess. Where sand is gray, dark color the Pelly Gneiss, are indicated on the map by symbol. Also, a large, fairly consistent area is due primarily to dark-colored rock fragments.

Where this unit reaches the Canadian border in the eastern part of the quadrangle the Primarily gravel, well-rounded; includes dark-colored volcanic rocks from outside the rock is mostly of the Pelly Gneiss type and was mapped in Canada as the Pelly Gneiss by mapped area; also includes sand and very minor silt; generally well stratified; fairly well Cockfield (1921). These rocks are mostly amphibolite facies. sorted; overlain by a few inches to several feet of silt and fine sand, locally in the form of ice-wedge casts; stained by iron to a depth of at least 6 feet; numerous stones coated in part IGNEOUS ROCKS

The igneous rocks of the Tanacross quadrangle range in composition from silicic to nafic and ultramafic and from fine grained to coarsely porphyritic. Some rocks have inter-Primarily till, gravelly and sandy; locally includes gravel and sand. Includes material mediate textures suggesting that they are from shallow intrusions. Also there is considerble gradation from coarse to fine textures and also gradation from porphyritic to equirainal topography more subdued and material more deeply oxidized than in moraines of the Donnelly Glaciation. Surface boulders are widely scattered and deeply weathered. The largest areas of igneous intrusion are granodiorites of Mesozoic age. The bound-

Locally the till has been modified by mass movement, eolian deposition, and fluvial action aries of these intrusions are very irregular, and many large xenoliths and roof pendants are included. In most places these granitic rocks could not be differentiated on aerial hotographs from metamorphic rocks nor was it possible to field check all ridges. Thus their boundaries are not known in detail. Also, the number of distinct times of Mesozoic Small remnants of weathered till and gravel of lateral and ground moraine and glaciointrusive activity is not known. It is possible that most of the Mesozoic granitic rocks are parts of only one or two large plutons. Basalt of Prindle Volcano (Qp) Vesicular alkali-olivine basalt, containing abundant peridotite and granulite inclusions. Sedimentary rocks of Late Cretaceous(?) and Tertiary age occur in small patches in sev-

eral widely separated localities in both the Yukon-Tanana Upland and the Alaska Range. Basalt composes a small cone and lava flow of presumed Holocene age. Basalt consists of linopyroxene, olivine, opaque minerals, and a fine-grained to microcrystalline groundremnants, particularly of the Tertiary deposits, remain. A small patch of Late Jurassic or mass believed to contain occult nepheline and potassium feldspar. The ultramafic inclusions consist of several different assemblages of olivine, orthopyroxene, clinopyroxene. Early Cretaceous sedimentary rocks occurs on the southwest side of the Denali fault and and spinel. Mineral assemblages of granulite inclusions consist of plagioclase, clinopyroxene, hypersthene, quartz, and carbonate with apatite, zircon, magnetite, and rutile as accessory minerals (Foster and others, 1966). Well-rounded gravel and weakly cemented conglomerate; rests unconformably on rocks

> Dark-gray and dark-greenish-gray basalt, including olivine basalt, of flows, dikes, and small volcanoes. Also includes basaltic ejecta and basaltic volcanic breccia. Age not definitely known but believed to be Tertiary or Quaternary. Some of the volcanoes still appear to retain some of the original forms of their cones. Gabbro (Tgb)

Dark-gray or greenish-black coarse-grained hornblende gabbro. In places appears to rade into basalt. Intrudes metamorphic rocks. Its close spatial relationship to basalt of nall volcanoes suggests a possible Tertiary age. Mafic volcanic rocks (Tm)

Dark-gray, dark-greenish-gray, and dark-maroon lava, breccia, and tuff, mostly of andesitic composition. Uniformly fine-grained to coarsely porphyritic. Some vesicular and

amygdaloidal lava. Phenocrysts are plagioclase, biotite, amphibole, and pyroxene. Iron oxides and sulfides abundant. Locally much altered. Breccias include fragments of schist and, in at least two places, granitic rocks. Local small areas of felsic rocks included. Of

cia, pumice breccia, volcanic conglomerate, and tuffaceous sediments. Includes lava of aphanitic to porphyritic texture; tuff is very fine to coarse grained and includes lapilli tul with concretionary lapilli. Breccia includes some fragments of gneiss, schist, quartzite, and rarely granitic rocks. Welded tuff common, especially in the Sixtymile Butte area. Quartz phenocrysts are commonly well-terminated crystals of smoky quartz. Iron sulfides locally very abundant occurring as small crystals or oxidized to form brown limonitic specks in the rocks. Most of these rocks are considerably altered. Of probable Tertiary

Granite porphyry (Tp) Pink or light gray. Well-terminated quartz phenocrysts commonly one-eighth to threequarters of an inch long. Groundmass composed primarily of quartz, potassium feldspar, and plagioclase and ranges from fine to coarse grained. Locally, rocks of porphyritic texture grade into fine- to coarse-grained equigranular rocks of similar composition. Found hroughout quadrangle as small intrusive bodies, dikes, and sills; intrudes metamorphic and other granitic rocks. Of probable Tertiary age.

rocks of McArthur Creek area (Mzmu) Coarse- to fine-grained rocks of silicic to mafic composition. Mostly much altered and weathered. Outcrops rare. Probably mostly of Mesozoic age, but could include some

rocks of Ketchumstuk Mountain (Mzgb) Coarse-grained hornblende gabbro. Locally occurs with dark-gray basalt and basaltic

Hornblende syenite porphyry (Mzs) Primarily hornblende syenite porphyry, but some other granitic rocks occur within the mapped unit. Locally very coarse grained with hornblende phenocrysts over 2 inches long. Grades to medium-grained and almost equigranular syenite. Contacts with other

Granodiorite of Taylor Mountain batholith (Jkg) Medium- to coarse-grained equigranular granodiorite; locally adamellite, quartz diorite, undant and well exposed along the north side of the West Fork 0.3 mile west of the Taylor Highway bridge. Cut by dikes of pegmatite, aplite, diorite, and lamprophyre. anodicrite from this pluton collected along the Taylor Highway about 3 miles north of the northern boundary of the Tanacross quadrangle gave an age of 190 million years by Sr⁸⁷/Rb³⁷ determinations on biotite (Wasserburg and others, 1963, p. 258). Considered Late Triassic or Early Jurassic in age.

from diorite to granite but dominantly biotite and biotite-hornblende granodiorite. Gran-River. Minor associated pegmatite and graphic granite. Some areas of fairly uniform granitic rock types occur, but areas of mixed granitic rubble common. Granitic rocks have been intruded as dikes, sills, and plutons. Roof pendants and xenoliths of metamorphic rocks abundant. Contact relationships generally obscure, but contact metamorphism

Ultramafic rocks (MzPzu) Peridotites, mostly serpentinized, occurring as dikes and small masses. Some slightly foliated. Appear to be intrusive into the metamorphic rocks. Age considered late Paleo-

Metadiorite (Pzd) Gray altered and metamorphosed rocks of probable dioritic composition; intruded into the metamorphic rocks of the phyllite and schist unit primarily as sills, dikes, and small masses. Age considered Paleozoic(?). FAULTING AND STRUCTURAL TRENDS

Topographic features such as straight parallel ridges and stream valleys suggest a north-

east-striking structural control in the Tanacross quadrangle. A second, possibly younger, trend at right angles results in a roughly rectangular topographic map pattern. These trends, particularly the northeasterly trend, are somewhat obscured in the areas of extensive Cenozoic rocks, probably because the pattern originated, at least in part, in pre-Tertiary time. Several east-northeast-striking faults are mapped, and many others are suspected. Many small faults are known which show no apparent relationship to these trends. The large Denali fault, a part of a major fracture zone that cuts the Alaska Range, trends northwest and crosses only the southwest corner of the quadrangle. There is evidence along a few miles to the southeast in the Nabesna D-5 quadrangle (H. R. Schmoll, written commun., 1967). Landslides, which may also be indicative of recent movement, occur along the fault in the Tanacross quadrangle. The Denali fault marks the southern limit of the The straight courses of the Tok River and Clearwater Creek suggest faults, but major

but might be related to small local faults. ECONOMIC GEOLOGY

mony in the form of the sulfide, stibnite, occurs in a vein on Stibnite Creek but has not been economic to mine (Moffit, 1954, p. 207-208). Traces of gold are found in some streams, particularly in the Alaska Range, but none have been rich enough for placer mining. Small concentrations of copper chromium, and nickel minerals have also been reported. Values that may be slightly anomalous were obtained for copper, lead, molybdenum, gold, and silver in the vicinity of Burnt Lake from stream-sediment and bedrock sampling. laminae, lenses, and veins of magnesite, dolomite, and quartz in a multicolor of various the Alaska Highway and Glenn Highway. It has been used extensively in building and

REFERENCES CITED Cockfield, W. E., 1921, Sixtymile and Ladue Rivers area, Yukon: Canada Geol. Survey Mem. 123, no. 105, geol. ser., 60 p. Foster, H. L., 1967, Geology of the Mount Fairplay area, Alaska: U.S. Geol. Survey Bull. Foster, H. L., Forbes, R. B., and Ragan, D. M., 1966, Granulite and peridotite inclusions

maintaining these roads and an abundant supply remains for such future use. Most of the

gravel has been used locally.

Péwé, T. L., Hopkins, D. M., and Giddings, J. L., 1965, The Quaternary geology and archaeology of Alaska, in Wright, H. E., Jr., and Frey, D. G., editors, The Quaternary of the United States—a review volume for the VII Congress of the International Association for Quaternary Research: Princeton, Princeton Univ. Press, p. 355-374. Richter, D. H., 1967, Geology of the Upper Slana-Mentasta Pass area, south-central Alas-St. Amand, Pierre, 1957, Geological and geophysical synthesis of the tectonics of portions of British Columbia, the Yukon Territory, and Alaska: Geol. Soc. America Bull., v. 68,

Schist and some batholithic intrusions in Alaska [abs.]: Geol. Soc. America Spec.

probable Tertiary age. Felsic volcanic rocks (Tf)

White, light-gray, light-green, light-pink, brown, and cream-colored lava, tuff, tuff brec-

Syenite of Mount Fairplay (Ts) Dominantly syenite but includes some monzonite and adamellite. Syenite equigranular to coarsely porphyritic. Porphyritic phase has gray potassium feldspar with crystals as much as 2 inches long. Discordantly intrudes biotite gneiss and schist unit including augen gneiss. A mean lead-alpha age of 103 million years was obtained on zircon from the syenite (Matzko and others, 1958, p. 531) and an isotopic age of 69 million years was obtained on biotite by the Sr⁸⁷/Rb⁸⁷ method (Wasserburg and others, 1963). Age is considered Ter-

breccia. Most of rock much altered. Age unknown, but possibly Mesozoic.

granitic rocks covered. Of probable Mesozoic age.

Granitic rocks (Mzg)

te and granodiorite porphyry common, especially along the north side of the Tanana Probably mostly of Mesozoic age and about the same age as the granodiorite of Taylor Mountain batholith; but includes rocks intruded at several different times.

Fairly fine grained, equigranular to coarsely porphyritic rocks ranging in composition

faults were not recognized in the field. In the southwestern part of the quadrangle, displacements of marble beds and of metadiorite intrusions indicate movement along small eastnortheast-trending strike-slip faults, primarily with left-lateral offsets. Only a few small thrust faults were verified in the field, but thrusting is probably more widespread and signif-The Tanana River valley may have a structural origin (St. Amand, 1957, p. 1368), but

definite evidence of faulting, other than physiographic, has not been found in the Tanacross quadrangle. No significant difference between the rocks of the Yukon-Tanana Upland on the north side of the river and the Alaska Range to the south is recognized. Local brecciation of the granitic rocks along the north side of the river has been noted in places

Significant mineral deposits have not been discovered in the Tanacross quadrangle. Anti-A body of magnesite marble in the southwestern part of the quadrangle north of Lost Creek has been quarried to a limited extent for ornamental stone (Richter, 1967, p. 19). he marble occurs in a band 10-30 feet thick and about a mile long. It "consists of thin Gravel from glacio-fluvial and alluvial fan deposits is fairly abundant along much of

from Prindle Volcano, Yukon-Tanana Upland, Alaska, in Geological Survey research, 1966: U.S. Geol. Survey Prof. Paper 550-B, p. B115-B119. Holmes, G. W., 1965, Geologic reconnaissance along the Alaska Highway Delta River to Matzko, J. J., Jaffe, H. W., and Waring, C. L., 1958, Lead-alpha age determinations of anitic rocks from Alaska: Am. Jour. Sci., v. 256, no. 8, p. 529-539. Mertie, J. B., Jr., 1937, The Yukon-Tanana region, Alaska: U.S. Geol. Survey Bull. 872, Moffit, F. H., 1938, Geology of the Salana-Tok district, Alaska: U.S. Geol. Survey Bull. ___1954, Geology of the eastern part of the Alaska Range and adjacent area: U.S. Geol, Survey Bull, 989-D, p. 63-218. Péwé, T. L., Burbank, Lawrence, and Mayo, L. R., 1967, Multiple glaciation of the Yukon-Tanana Upland, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-507, scale

ka: Alaska Div. of Mines and Minerals Geol. Rept. 30, 25 p. Wasserburg, G. J., Eberlein, G. D., and Lanphere, M. A., 1963, Age of the Birch Creek

Qa Qas Qa, primarily gravel Qas, primarily silt and sand Alluvium and colluvium in small stream valleys Qcg, primarily gravel, sand, and rubble Qc, primarily silt and sand R. ZUE!

R. ZUE!

R. ZUE!

S. HINGTION 79 MI. 1 (2) INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1970—G69109 Compilation by Helen L. Foster, 1968 Base by U.S. Geological Survey, 1964 Geologic mapping 1961-1967 by: Helen L. Foster, 1961-1964 and 1967, BIG DELTA EAGLE assisted by Mona G. Carpenter, 1961-1962, and Beverly Marsters, 1963; Henry R. Schmoll, 1960-1963, assisted by Richard CONTOUR INTERVAL 200 FEET H. Bennett, 1960-1962, with John Trach, DOTTED LINES REPRESENT 100-FOOT CONTOURS 1963; Terry C. Keith, 1964 and 1967; Arthur T. Fernald, 1960; J. M. Hoare, W. H. GULKANA NABESNA 1969 MAGNETIC DECLINATION AT SOUTH EDGE OF Condon, and Sandra Clark, 1967 Patterned area, primarily quartz-feldspar-SHEET VARIES FROM 27° TO 29° EAST Also geology adapted from published maps by: biotite gneiss. Triangles indicate area in Helen L. Foster (1967), G. William Holmes truded by many fine-grained felsic and

UNCONSOLIDATED DEPOSITS Alluvium along major Silt and peat deposits Landslide deposit IGNEOUS ROCKS Beach deposits of Rock-glacier deposits Eolian deposits on Basalt of Prindle Volcano Tetlin Lake Primarily rubble active floodplains Sand and silt Sand and minor silt Fluvial and lacustrine Lake deposits Fine sand and silt Sand, silt, and admixtures of organic material Outwash aprons and allu- Moraines of the Donnelly Eolian deposits, primarily Primarily gravel and sand vial fan deposits of the Glaciation Donnelly Glaciation Primarily till Primarily gravel Alluvial-fan deposits Moraines of the of the Delta Glaciation Delta Glaciation Primarily till Primarily gravel Glacial deposits of pre-Delta age Weathered till and gravel SEDIMENTARY ROCKS Gravel and conglomerate Mafic volcanic rocks Felsic volcanic rocks Granite porphyry Syenite of Mount Fairplay Undifferentiated igneous rocks Gabbro and basaltic rocks of McArthur Creek area of Ketchumstuk Mountain Detrital rocks Mentasta Argillite of Richter (1967) Granitic rocks Each triangle indicates approximate Diagonal dashed lines, area of mostly horn locality where porphyritic syenite blende-biotite granodiorite; horizonta dashed lines, area of mostly hornblend granodiorite; vertical dashed lines, area rubble was found mostly biotite-hornblende granodiorit dotted, areas of diorite or quartz diori Ultramafic rocks METAMORPHIC ROCKS Phyllite and schist unit Schist and quartzite unit Quartz-mica schist unit Quartz-graphite schist unit

Biotite gneiss and schist unit

granite porphyry dikes

(1965), and D. H. Richter (1967)

Approximate biotite isograd Separates greenschist facies rocks from amphibolite facies rocks Dashed where approximately located; queried where doubtful; dotted where conceale Arrows indicate apparent direction of o set. U, upthrown side; D, downthrown side

Contact, approximately located

____ Thrust fault _____ Fault or lineament from areal photographs

Not checked on ground

+ +

Strike and dip of foliation

Inclined Vertical Horizontal Strike and dip of beds 20 + Inclined Vertical Horizontal

Inclined Horizontal Bearing and plunge of axis of minor fold or mineral lineation

Quarry in magnesite marble

Pingo or pingos

Stibnite prospect

Augen gneiss Augen are potassium feldspar

Abundant sulphides Mostly fine grains widely disseminate

Conglomerate occurrence

Tectonic breccia

Country rock cut by one or more dikes, sills,

or other small igneous masses, commonly indicated only by a mixture of rock types in rubble. Letter indicates composition p, pegmatite g, granite R, rhyolite; definite quartz phenocrysts v, rhyolite or dacite d, diorite or quartz diorite

m, mafic; mostly andesite u, ultramafic n and in, greenstone dikes and small masses of greenstone ++++, marble layers A, granite porphyry (well-terminated quar phenocrysts; rock similar to Tp but pri-

marily in dikes)

Area not visited Type of rock not definitely known

Localities where rocks have been dated by isotopic methods

RECONNAISSANCE GEOLOGIC MAP OF THE TANACROSS QUADRANGLE, ALASKA Helen L. Foster

For sale by U.S. Geological Survey, price \$1.00