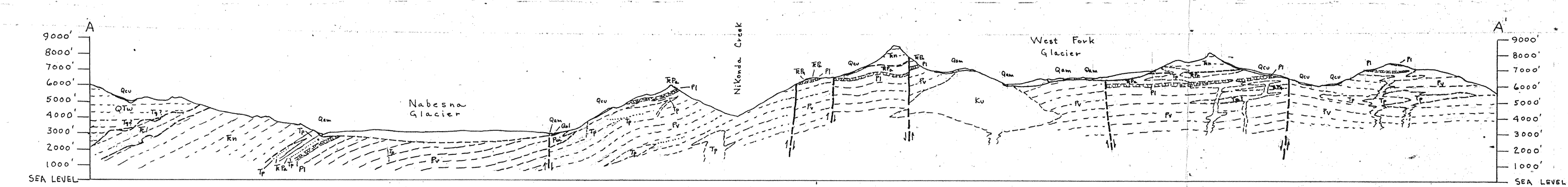
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Geology mapped by D.H. Richter and N.A. Matson, Jr., 1968-1971; M. Hendrick, D. Grybeck and A. Clark, 1968; D.F. Work, 1969 and P.C. Lowe, 1970. Surficial geology chiefly by aerial photo interpretation.

RECONNAISANCE GEOLOGIC MAP OF THE NABESNA A-4 QUADRANGLE

by

D. H. RICHTER



No Vertical Exaggeration

SECTION A - A' NABESNA A-4 QUADRANGLE

U.S. GEOLOGICAL SURVEY OPEN FILE MAP

EXPLANATION

SURFICIAL DEPOSITS

QUATERNARY

Holocene

Qal | Qaf

YOUNGER ALLUVIUM

Qal, alluvium on active flood plains and on lower terraces of major streams. Chiefly gravel and sand.

Qaf, alluvial fans and cones; only larger better-defined cones differentiated from Qcu. Chiefly gravel and sand.

Qrg

ROCK GLACIER DEPOSITS

Includes active and recently active rock glaciers and deposits of formerly active rock glaciers. Chiefly rubble and diamicton

Qcl | Qcu | Qs

COLLUVIAL DEPOSITS

Qcl, landslides, chiefly debris avalanches

Qcu, undifferentiated colluvium on valley walls and hill slopes. Chiefly talus and other slope debris but includes alluvium of numerous minor streams and locally, glacial, rock glacier and mass-wasting deposits. Chiefly rubble, gravel, sand, silt and diamicton; usually poorly sorted.

Qs, solifluction and creep surfaces on high level, low-gradient slopes. Chiefly bedrock rubble but may include older glacial drift deposits

Qao

OLDER ALLUVIUM

Alluvium in higher terraces principally at foot of Nabesna Glacier. Chiefly boulders, gravel and sand. Prominent terraces shown by hachures.

Qam

DRIFT OF THE ALASKAN GLACIATION

Chiefly end and lateral moraines of the younger phase of Alaskan Glaciation left after recession of presently existing glaciers. Locally may overlie glacier ice. Diamicton, rubble and minor gravel

Pleistocene

Qwg | Qwo | Qwm

DRIFT OF WISCONSIN AGE

Qwg, ground moraine, chiefly diamicton; includes local fluvioglacial deposits of gravel and sand and post-glacial pond deposits. Deposits merge with and are covered by Colluvium (Qcu) at higher elevations

Qwo, fluvioglacial Kame(?) deposits in remnant patches along the Nabesna Glacier. Chiefly boulders, gravel and sand, weakly stratified, as much as 300 feet thick.

Qwm, well-defined end moraine in Notch Creek valley. Chiefly diamicton.

SEDIMENTARY AND VOLCANIC ROCKS

TERTIARY AND QUATERNARY

QTw / QTwr

WRANGELL LAVA

QTw, chiefly dark brown to dark gray augite-hypersthene and augite-olivine andesite and basaltic andesite flows with interbeds of weakly indurated, layered air fall andesite lapilli tuff. Southwest of Cross Creek Glacier unit includes glassy black dacite flows, gray dacite welded ash flows and gray-green andesite breccias. Well-defined angular unconformity shown by discontinuous dotted line.

QTwr, light tan to light pinkish-gray volcanic lahar and ash flow deposits, probably of rhyolite to dacite in composition, occupying old valleys.

TERTIARY

Tg

GLACIAL DEPOSITS

Chiefly tillite, but includes local occurrences of weakly consolidated boulder and gravel deposits often containing fragments of lignitized wood.

ANGULAR UNCONFORMITY

CRETACEOUS ?

Lower Cretaceous ?

Kbv

BONANZA CREEK VOLCANICS (?)

Dark gray green massive flows and volcanic fragmental rocks exposed along upper Monte Cristo Creek. Rocks are hornfelsed by adjacent plutonic intrusives and locally hydrothermally altered to gypsum, silica rock and sulfides.

CONTACT NOT EXPOSED

TRIASSIC

Upper Triassic

Ꞧl

LIMESTONE

Gray to dark gray massive micritic limestone in poorly-defined beds as much as 20 feet thick; weathers to a conspicuous light gray. Generally recrystallized and commonly brecciated with veins of coarsely crystalline calcite. Near plutonic intrusives magnetite-calc-silicate tactite bodies locally abundant. Non-fossiliferous.

DISCONFORMITY ?

Middle and (or) Upper Triassic

Ꞧn

NIKOLAI GREENSTONE

Dark green, brown, reddish-brown and maroon subaerial amygdaloidal basalt flows separated locally by thin volcaniclastic beds. Base generally marked by discontinuous volcanic conglomerate-breccia containing fragments of basalt and underlying sedimentary rock. Predominantly massive aa flows as much as 50 feet thick. Amygdules filled with quartz, calcite, chlorite, epidote, pumpellyite, zeolite minerals and locally native copper. Near plutonic intrusives thermally metamorphosed to massive fine-grained amphibolite

DISCONFORMITY ?

PERMIAN AND TRIASSIC

Middle Permian and Middle Triassic

ꞦPa

ARGILLITE

Chiefly dark gray argillite with interbedded calcareous siltstone, dark gray to gray-green chert and black carbonaceous and limy shale. Between Nabesna Glacier and Nikonda Creek base of unit is characterized by massive buff silicic tuff as much as 100 feet thick. Upper part of unit is predominantly shale and chert and locally contains abundant <u>Daonella</u>. Dikes, sills and irregular bodies of gabbro (ꞦPg) occur throughout and may constitute more than 50 per cent of the section.

PERMIAN

Lower and (or) Middle Permian

Pl

LIMESTONE

Light gray to gray, thin- and thick-bedded fossiliferous limestone; generally fine grained but commonly recrystallized and base usually marked by coarse-grained clastic limestone containing abundant volcanic detritus. Calc-silicate tactite occurs locally near plutonic intrusive contact. In Cross Creek area, limestone beds are separated and cut by gabbro (ꞦPg) and abundant porphyry intrusions (Tp).

ANGULAR LOCAL UNCONFORMITY ?

Pv / Pvi

VOLCANIC AND VOLCANICLASTIC ROCKS

Pv, interlayered dark green, purplish-gray and gray green massive fragmental volcanic rocks, volcanic flows, lapilli tuffs and fine- to coarse-grained volcaniclastic rocks. Flows generally amygdaloidal, locally exhibiting pillow structure, and mostly of andesitic composition. Volcaniclastic rocks range from mudstone to conglomerate are typically thin bedded and locally graded.

Pvi, buff to gray green massive rock with conspicuous quartz eyes as much as 1 cm in diameter in a fine-grained dense matrix of quartz, feldspar and white mica. Locally contains irregular patches of siderite, disseminated barite and pyrite and veins of quartz-pyrite-chalcopyrite. May be an altered silicic effusive rock a shallow intrusive

INTRUSIVE ROCKS

Hypabyssal rocks

TERTIARY

Tp / Tp

HORNBLENDE-PLAGIOCLASE PORPHYRY

Includes many different color, textural and phenocrystal varieties apparently ranging in composition from andesite to latite. Colors vary from light gray to dark pinkish-brown and textures from intergranular to trachytic. Larger, irregular bodies generally unaltered; smaller dikes and sills and the complex intrusives of the Cross Creek area generally exhibit varying degrees of deuteric and hydrothermal alteration. Only the larger and more conspicuous intrusives shown. K/Ar dates indicate ages ranging between 17 m.y. (Monte Cristo Creek) and 39 m.y. (Cross Creek) (M.A. Lanphere, writ. comm., 1969, 1971). In the Cross Creek porphyry complex the map unit may include argillite (ꞦPa), gabbro (ꞦPg) and volcanic rock (Pv)

PERMIAN OR TRIASSIC

ꞦPg / ꞦA

GABBRO

Dark brown dikes, sills and irregular bodies of augite gabbro; medium to coarse grained with a subhedral to ophitic texture. Intrudes amygdaloidal basalt (Ꞧn) and older rocks but especially abundant in Permian and Triassic argillite (ꞦPa). Shown only where conspicuous or where it cuts and splits Permian limestone (Pl)

Plutonic rocks

CRETACEOUS

Kp / Kg / Kt

NABESNA BATHOLITH

Kg, chiefly biotite-hornblende granodiorite but includes biotite-hornblende quartz monzonite, biotite quartz diorite and hornblende diorite. Rocks are medium to coarse grained, subhedral granular and non-foliate. Hydrothermal alteration, brecciation and limonite-staining locally pronounced. K/Ar dates from the Nabesna B-4 quadrangle indicate an age of 112-114 m.y. (M.A. Lanphere, writ. comm., 1969)

Kt, medium- to coarse-grained trondhjemite; subhedral granular but locally contains unhedral masses of quartz as much as 2cm in diameter. Biotite largely altered to chlorite.

Kp, light gray to salmon-colored quartz-plagioclase porphyry; contains large quartz eyes and altered plagioclase phenocrysts set in a dense fine-grained matrix of quartz and plagioclase

CRETACEOUS ?

Kgg

GRAPHIC GRANODIORITE

Light gray, medium-grained hornblende granodiorite with graphic intergrowths of quartz and potassium feldspar

Ku

UNDIFFERENTIATED MAFIC INTRUSIVES

Includes small exposures of medium-grained dark hornblende diorite along west side Nabesna Glacier, medium-grained augite-olivine syenodiorite near head of West Fork of Bond Creek and fine- to medium-grained augite-hypersthene norite near head of Middle Fork of Bond Creek. Probably all marginal mafic facies of the Nabesna batholith

ALTERED ROCKS

LIMONITE-STAINING AND HYDROTHERMAL ALTERATION

Stippling with bedrock underprint indicates areas of weak hydrothermal alteration and (or) strong limonite-staining due to oxidation of abundant iron-bearing sulfides. Stippling without bedrock underprint indicates areas of strong hydrothermal alteration in which little or no trace of the original bedrock remains.

CONTACT
Dashed where approximate or inferred

U / D
FAULT
Dashed where approximate or inferred; dotted where concealed. U, upthrown side, D, downthrown side

TERRACE SCARP
Hachures point downslope

ANGULAR UNCONFORMITY
Shown only in Wrangell Lava

ANTICLINE
Showing approximate trace of axial plane

SYNCLINE
Showing approximate trace of axial plane

55
Inclined

Vertical

STRIKE AND DIP OF BEDS AND FLOWS

⊕
HORIZONTAL BEDS OR FLOWS

85
STRIKE AND DIP OF MAJOR JOINTS

19
STRIKE AND DIP OF MINERAL BANDING

• 3
FOSSIL LOCALITY
Numbers refer to collections described in accompanying table

X 5
PROSPECT OR MINERAL OCCURRENCE
Numbers refer to deposits described in accompanying table

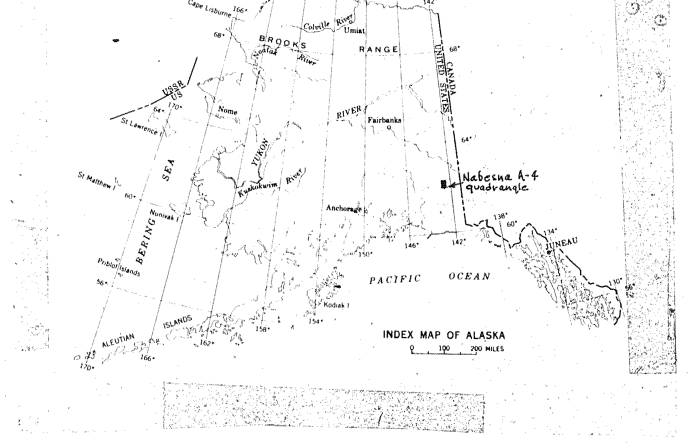
FOSSIL COLLECTIONS

Map No.	U.S.G.S. No.	Identification	Studied by
Middle Triassic			
1	M 5809	<u>Daonella frami</u> Kittl	N.J. Silberling
		<u>Daonella degeeri</u> Boehm	
2	M 5810	<u>Daonella frami</u> Kittl	N.J. Silberling
		<u>Daonella degeeri</u> Boehm	
3	M 5811	<u>Daonella degeeri</u> Boehm	N.J. Silberling
4	69-AMn-124	halobiid pelecypods	N.J. Silberling
Lower and (or) Middle Permian			
5	23878-PC	<u>Clisiophyllum</u> sp.	C.L. Rowett
		Antiquatonia ? arctica (Whitfield)	R.E. Grant
		<u>Kochiproductus</u> sp.	
		<u>Liosotella</u> cf. <u>L. delicatula</u> Dunbar	
		<u>Liosotella</u> cf. <u>L. grandicosta</u> Dunbar	
		<u>Orthotichia</u> sp.	
		<u>Rhynchopora</u> sp.	
		<u>Spiriferella</u> sp.	
6	23879-PC	<u>Clisiophyllum</u> sp.	C.L. Rowett
7	23432-PC	polycoelid coral, possibly <u>Sochkineophyllum</u> Grabau	C.L. Rowett

PROSPECTS AND MINERAL OCCURRENCES

Map No	Principal commodity (Name of deposit)	Type of mineralization
1	Mo (Monte Cristo Creek)	Disseminated, Vein
2	Cu, Mo (Orange Hill)	Disseminated, tactite
3	Cu, Mo (Bond Creek)	Disseminated, vein, tactite
4	Pb	Oxidized zone
5	Au, Pb, Zn	Vein, tactite
6	Cu	Disseminated, vein
7	Cu	Disseminated, vein
8	Cu	Disseminated, vein
9	Cu	Tactite
10	Au, Co	Vein
11	Cu	Tactite
12	Cu, Zn (Nabesna Glacier)	Disseminated, vein
13	Cu, Zn	Vein
14	Cu, Pb, Zn	Vein
15	Cu	Disseminated
16	Ag, Pb, Zn (Cross Creek)	Vein
17	Cu, Pb, Zn	Vein
18	Cu	Disseminated

Analytical data on samples from these prospects and mineral occurrences and from other localities are given by Richter, D.H. and Matson, Jr., N.A, in U.S. Geol. Survey Open-file Report: Geochemical data from the Nabesna A-4 quadrangle, Alaska, 1970



This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey standards and nomenclature.

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