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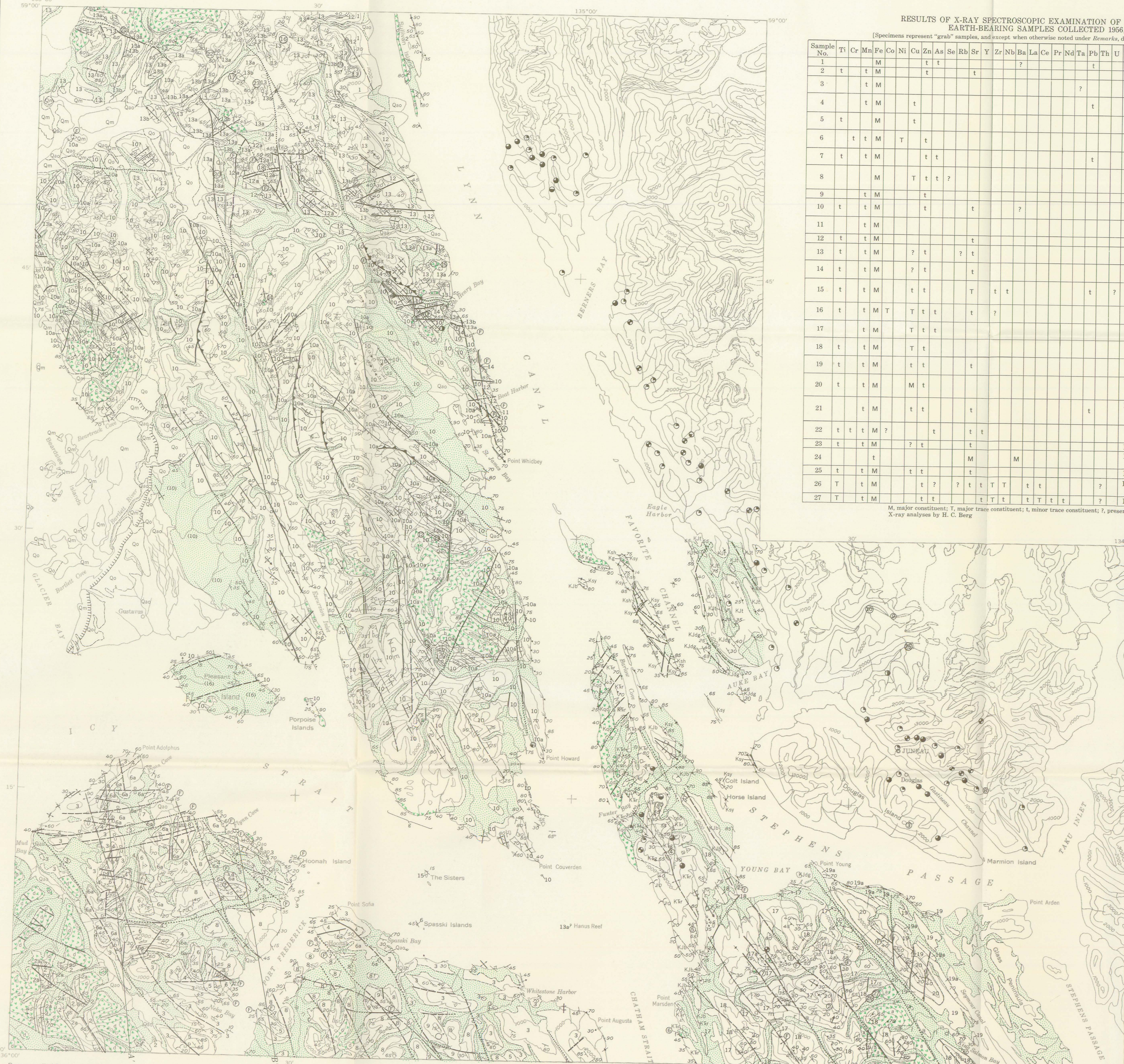


RESULTS OF X-RAY SPECTROSCOPIC EXAMINATION OF SULFIDE AND RARE EARTH-BEARING SAMPLES COLLECTED 1956, 1957, 1958

[Specimens represent "grab" samples, and except when otherwise noted under *Remarks*, data are for unconcentrated material]

Sample No.	Ti	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Se	Rb	Sr	Y	Zr	Nb	Ba	La	Ce	Pr	Nd	Ta	Pb	Th	U	Remarks
1				M				t	t							?						t			Dark brown cellular "limonite" gossan.
2	t		t	M				t				t													Disseminated pyrite in granulite-gneiss.
3			t	M																	?				Disseminated pyrite in cellular pods associated with feldspar lenses in volcanic rocks.
4			t	M			t															t			Disseminated pyrite chalcopyrite, galena in siderite-cemented quartz breccia.
5	t			M			t																		Pyrite crystals in schist. Pyrite locally contains chalcopyrite.
6		t	t	M		T		t																	Disseminated sulfide and oxide minerals in altered (serpentinized) ultramafic sill.
7	t		t	M				t	t													t			Pyrite in spongy quartz associated with serpentinite.
8				M			T	t	t	?															Pyrite, chalcopyrite, secondary copper minerals in quartz veins in volcanic rocks. Galena noted nearby.
9			t	M				t																	Pyrite in quartz veinlets in migmatite.
10	t		t	M				t				t				?									Sparse pyrite disseminated in iron-stained quartz-mica schist.
11			t	M																					Dark brown iron-stained micaceous material from contact of diorite and limestone.
12	t		t	M								t													Disseminated pyrite in quartz-diorite.
13	t		t	M			?	t			?	t													Pyrite veinlets in limestone and silicified argillite 50 feet ± from granodiorite contact.
14	t		t	M			?	t				t													Pyrite, magnetite(?) in dark brown weathering greenstone granulite.
15	t		t	M			t	t				T		t	t							t		?	Pyrite chalcopyrite, galena, sphalerite(?); ilmenite veinlets in rare earth-bearing quartz-monzonite (uranium prospect).
16	t		t	M	T		T	t	t			t		?											Pyrrhotite, chalcopyrite, pyrite(?) in siliceous greenschist.
17			t	M			T	t	t																Massive pyrite, chalcopyrite boulder in glacial moraine.
18	t		t	M			T	t																	Pyrite, chalcopyrite in cellular siliceous matrix associated with volcanic rocks.
19	t		t	M			t	t				t													Pyrite crystals in quartz veins and pods in phyllite.
20	t		t	M			M	t																	Veinlets of bornite, secondary copper salts, epidote; associated with siliceous volcanic rocks.
21			t	M			t	t				t										t			Pyrite, chalcopyrite(?), secondary copper salts, psilomelane in siliceous gangue; associated with volcanic rocks.
22	t	t	t	M	?				t			t	t												Disseminated pyrite in iron-stained siliceous rocks. Heavy mineral concentrate (bromoform).
23	t		t	M			?	t				t													Iron-stained mafic volcanic rock.
24				t								M				M									Nearly pure barite-celestite cobble found in "float."
25	t		t	M			t	t				t													Iron-stained quartz-mica schist.
26	T		t	M				t	?		?	t	t	T	T		t	t					?		Heavy mineral concentrate (bromoform) of rare earth-bearing pegmatite.
27	T		t	M				t	t				t	T	t		t	T	t	t			?		Do.

M, major constituent; T, major trace constituent; t, minor trace constituent; ?, presence of element is questionable.
X-ray analyses by H. C. Berg

SYMBOLS

Contact
Dotted where concealed

Indefinite contact
Includes gradational contacts, inferred contacts, and indefinite boundaries of surficial deposits

Fault
Dashed where approximately located, dotted where concealed

Fault, showing relative movement
U, upthrown side; D, downthrown side. Saw-teeth on upper plate

Anticline
Showing trace and bearing of axial plane. Dashed where approximately located

Syncline
Showing trace of axial plane. Dashed where approximately located

Overturned anticline
Showing trace of axial plane, direction of dip of limbs, and bearing and plunge of axis

Overturned syncline
Showing trace of axial plane, direction of dip of limbs, and bearing and plunge of axis

Plunge of fold axes

Plunge of minor anticline

Plunge of minor syncline

Strike and dip of beds

Strike and dip of overturned beds

Strike of vertical beds
Where used, position of 90 indicates up side of beds

Strike and dip of beds by distant observation or photointerpretation

Horizontal beds

Generalized strike and dip of crumpled beds

Strike and dip of foliation

Strike of vertical foliation

Fossil locality

Mineral occurrences
Metals may occur singly or in combinations

Gold

Copper

Lead-zinc; locally includes silver

Nickel-cobalt

Uranium-thorium

X-ray spectroscope sample

g
Rocks exposed on beach

Areas without symbols or patterns are unmapped

EXPLANATION

Mapped area of each of units described may contain minor areas of other units too small to represent at scale of map

SURFICIAL DEPOSITS

Qao
Alluvium and outwash
Stratified sand, gravel, and silt of glacial or recent streams, commonly terraced at several levels. Includes raised marine reworked silt-sand deposits

Qm
Moraine deposits
Unstratified till of ground, terminal, and recessional moraines. Includes locally sandy outwash and buried clay lenses

Covered area
Thin layer of undifferentiated glacial deposits, alluvium, talus, and muskeg. Locally includes raised littoral deposits and glaciomarine terraces. Outcrops common only in stream cuts. Underlying map unit indicated in parentheses where inferred

Qgl
Glacial lake sediments
Silt and blue-gray clay, commonly contains pebbles, few cobbles and varved clay locally

Qo
Outwash
Stratified pebble to cobble gravel, sand, minor amounts of silt and clay; local dunes

BEDDED ROCKS

CHILKAT RANGE AREA

Area exceedingly complex, structure and rock distribution generalized

CENOZOIC — TERTIARY

16
Flows, tuff, and breccia
Medium to light-gray, purple and green andesite, dacite, dacite obsidian, rhyodacite, aegerine-augite soda trachyte, and less abundant dark-gray basalt

15
Basalt
Flows, flow breccia of dark greenish-gray basalt; rocks slightly epidotized. Less than 100 feet exposed

UNCONFORMITY

PALEOZOIC — PERMIAN

14
Limestone
Light to medium brownish-gray, fine to medium crystalline, contains sparse paper-thin reddish-brown separations, fossiliferous, 50(?) feet thick; overlain by limestone, nodular-bedded, light brownish-gray, fine- to medium-grained, interbedded with light greenish-brown chert, which varies along strike from interbedded sequence to apparent limestone-chert conglomerate; in turn overlain by dark-gray slate, interbedded with very fine-grained calcareous graywacke and silty calcareous graywacke. Minimum total thickness 1,000 feet

UNCONFORMITY

MISSISSIPPIAN

DEVONIAN

CHICHAGOF ISLAND

9
Limestone and shale
Limestone, medium brownish and dark-gray, thin- to medium-bedded; contains variable amounts of dark-gray, irregular, nodular, bedded chert. Upper part of limestone generally lighter colored, less cherty, locally gypsiferous, contains corals; lower part darker, more thinly bedded, more cherty, contains abundant brachiopods. Minimum thickness 1,500 feet, top not seen. Limestone underlain by dominantly grayish-black shale, containing variable amounts of dark-gray limestone and dark-gray shaly limestone in lower part. Brachiopods, cephalopods, and gastropods in upper part of shale. Thickness may be 1,500 feet, base not seen

Upper Devonian

8
Andesite and basalt flows, breccia, and tuff
Contains minor intercalated conglomeratic volcanic graywacke, dark-gray limestone, and grayish-black argillite. Volcanic rocks highly variable in composition, color, and thickness. Upper part dominantly andesite, lower part basalt. Chloritization and epidotization widespread, albitization occurs locally. Brachiopod fauna occurs near base. Thickness may exceed 6,000 feet. Queried where identification doubtful

LOCAL UNCONFORMITY

7
Limestone
Dark and light brownish-gray cobbly bedded, bedding thin to medium, contains very minor grayish-black shaly layers. Brachiopods in upper part, corals in middle and basal parts. Maximum thickness approximately 2,500 feet, thinner or absent where eroded prior to deposition of overlying volcanic rocks

Middle(?) Devonian

6 / 6a
Conglomerate, graywacke, siltstone and shale
Conglomerate, 6, dark-gray graywacke, siltstone, and shale, 6a, in highly variable proportions; minor amounts of dark-gray limestone. Rock types interchange within short distances laterally and vertically. Thickens westward; may be as thick as 3,000 feet. Near Pinta Cove distinctive dark-red and greenish-gray sandstone and argillite in upper part contain poorly preserved gastropods. Conglomerate, predominantly cobble- to boulder-size, contains volcanic rock, granite, graywacke, limestone, quartz, chert, and limestone fragments

4
Limestone
Dark brownish-gray, medium- to thick-bedded, unfossiliferous; contains conglomeratic layers in lower part; grades downward into dark-gray, thin-bedded calcareous shale and siltstone. Conglomerate layers contain angular and rounded fragments of chert, graywacke, and limestone. Thickness approximately 800 feet

5
Limestone and marble
Light grayish-brown and dark-gray, thin-bedded to massive; contains scattered minor, reddish-brown dolomite beds and limestone breccia. Upper part thin bedded; contains greenish-gray siliceous laminae and a few fossils; lower part thick bedded and fossiliferous. Thickness approximately 1,000 feet. May in part represent temporal equivalent of units 4 through 7

3
Graywacke and argillite
Dark-gray graywacke and medium-gray argillite; contains subordinate pebble to cobble conglomerate, light- to medium-gray siltstone, and minor dark-gray limestone. Mostly calcreous, generally finer grined than 6. Conglomerate contains well-rounded to angular fragments of chert, volcanic rock, argillite, and limestone. Unfossiliferous. Thickness approximately 6,000 feet, base not exposed

11
Limestone
Argillaceous thin- to thick-bedded, light- to dark-gray, weathers dark-gray to black. Contains dolomite blebs and stringers near base. Contains brachiopods, ostracods, corals. Minmum thickness 250 feet. Probably equivalent to unit 7

10 / 10a
Graywacke, argillite, and limestone
Undifferentiated rocks, including graywacke, argillite of various types, slate, conglomerate, and some basalt and andesite flows and tuffs. Some graywacke beds highly feldspathic, some highly calcareous. In upper part argillite contains up to 50 percent limestone nodules; two or more marbleized limestone units, 10a. Black slate section in lower part contains graptolites. Thickness probably exceeds 10,000 feet. May be temporal equivalent of units 3 through 6

SILURIAN(?) TO DEVONIAN

13 / 13a / 13b
Siliceous argillite and volcanic rocks
Argillite, 13, dark-gray, siliceous, weathers dark brownish-red, contains large lenses of pebble to cobble conglomerate and layers of gray-green graywacke in lower part. Includes thin-bedded black, gray, and dark-green chert near top. At least 3,000 feet thick. Contains plant fragments. Basalt and andesite flows, agglomerates, and tuff, 13a, increase in abundance upward and laterally and predominate in the north-central Chilkat Range. Includes thin, discontinuous, unfossiliferous limestone units, 13b. Unit is probable temporal equivalent of 10, but may be younger and include rocks equivalent to units 7 and 8

12 / 12a
Limestone and marble
Light- to medium-gray, thick-bedded, contains interbeds of phyllite and lenses and layers of basalt near top. Approximately 3,000 feet thick, thins rapidly northward. Unfossiliferous, except probable equivalent limestone, 12a, contains chain corals, brachiopods, giant cephalopods

1
Schist, phyllite, and slate
Reddish-brown weathering chlorite schist, sericite schist, phyllite, and black slate. Upper 200 to 300 feet medium dark-gray weathering slate and phyllite, thin limestone layers near top. Minimum thickness 2,500 feet. Unfossiliferous

2 / 2a
Metamorphic rocks
Undifferentiated metamorphic rocks of probable Paleozoic age. Mostly amphibolite, quartz-sericite-feldspar schist, quartz-feldspar schist, and marble, 2a; at Sullivan Island predominantly light- to medium-gray slate, sheared graywacke, and phyllite

ADMIRALTY ISLAND

Area exceedingly complex, structure and rock distribution generalized

CRETACEOUS(?)

20
Conglomerate
Massive to very thick-bedded, poorly sorted, pell-mell structure, fragments rounded, polished, predominantly pebble size, some cobble size. Pebbles include dark-gray to grayish-black argillite, banded graywacke, light- to medium-gray limestone, some felsite, quartz, and chert. Fossils rare. Estimated thickness 3,500 feet, top eroded

19 / 19a
Slate, graywacke, and conglomerate
Upper part of unit apparently transitional with overlying 20. Slate, dark gray to grayish-black, some beds calcareous. Graywacke, gray to medium dark gray, fine- to coarse-grained, lithic, commonly calcareous, graded bedding common. Conglomerate, 19a, gray to medium dark gray, calcareous, contains rounded pebbles of slate, basalt, graywacke, limestone, in medium-grained graywacke matrix

PERMIAN(?) TO CRETACEOUS(?)

18
Greenschist and amphibolite
Includes calc-silicate granulite, quartzo-feldspathic schist, marble, and phyllite. Greenschist contains chlorite, epidote, sericite, actinolite, variable amounts quartz, albite, rarely potash feldspar. Amphibolite contains hornblende, epidote, oligoclase, variable amounts quartz, potash feldspar, commonly quartzo-feldspathic. Calc-silicate granulite contains diopside, calcite, quartz, andesine, potash feldspar, locally garnet. Quartzo-feldspathic schist contains quartz, oligoclase-andesine, potash feldspar, biotite, hornblende, and hypersthene; grades into granulite of similar composition. Minor silvery-gray phyllite, lenticular marble beds occur near base in zone transitional with underlying 17. In general metamorphic grade increases toward quartz monzonite bodies. In Eagle Peak area rocks are less metamorphosed. Dominantly andesite flows, tuff, breccia; greenish-gray to dark greenish-gray and minor purple; hornblende and augite phenocrysts common, plagioclase phenocrysts rare. At places intercalated thin grayish-black slate and dark gray limestone. Fossils collected from rocks cropping out at Young Bay indicate a possible Late Triassic age (J. T. Dutro, Jr., written communication, 1958) for the lower part of this unit

17 / 17a
Graywacke semischist, slate, and phyllite
Includes marble and greenschist. Graywacke semischist, medium to light-gray, medium-grained, somewhat calcareous. Slate, dark-gray to grayish-black, some beds calcareous. Phyllite, medium to dark, silvery-gray, siliceous, commonly finely crenulated. Marble, grayish-brown, massive, lenticular. Greenschist contains chlorite, epidote, sericite, and albite. Marble and greenschist near top of zone transitional with 18 overlying. 17a is body of probable serpentinized dolomite at least 200 feet thick. Graywacke beds near middle of unit contain brachiopods and pelecypods, including Muirwoodia *(identified by G. A. Cooper, 1957), that indicate a probable Permian age for a part of unit*

MANSFIELD PENINSULA, ISLANDS IN FAVORITE CHANNEL AND AUKE BAY–EAGLE HARBOR AREA

Largely after Barker, Fred, 1957, Geology of the Juneau B-3 quadrangle, Alaska: U. S. Geol. Survey Geol. Quad. Map GQ-100

CRETACEOUS(?)

Ksh
Shelter formation
Black slate and greenstone; conglomerate with pebbles of slate, chert, felsite, and graywacke, in graywacke matrix

Ksy
Symonds formation
Dark-gray to black carbonaceous plagioclase-quartz, sericite-chlorite graywacke, slate, and conglomerate; augite-bearing volcanic flow breccia

PERMIAN(?) TO CRETACEOUS(?)

SOUTHWEST LIMB OF SHELTER SYNCLINE

TRIASSIC(?) TO CRETACEOUS(?)

KJb
Barlow Cove formation
Chlorite-epidote-albite schist, with minor augite-bearing flows; greenschist, graywacke, slate, and conglomerate. Considered to be Jurassic(?) to Early Cretaceous(?) in age (Barker, 1957)

KTr / KTrg
Retreat group
Sericite schist, greenschist, slate, and graywacke; some gray marble. South of Funter Bay contains zone predominantly greenschist, KTrg. Considered Late Triassic(?) to Early Cretaceous(?) in age (Barker, 1957)

NORTHEAST LIMB OF SHELTER SYNCLINE

JURASSIC(?) TO CRETACEOUS(?)

KJdg
Douglas Island volcanic group
Augite-bearing volcanic flow breccia with minor tuff; dark-gray to black plagioclase-quartz graywacke

KJt
Treadwell formation
Slate, augite-bearing volcanic flow breccia, graywacke, tuff, and sericite schist

INTRUSIVE ROCKS

Rocks are grouped according to lithology, may represent more than one episode of intrusion, and no age relationship is implied by position in column

CRETACEOUS

Kg
Gabbro
Sericitized hornblende-uralite gabbro; sericitized uralite gabbro on Shelter Island. Considered to be Cretaceous(?) in age (Barker, 1957)

Kqd
Quartz diorite
Lineated, foliated, sheared albite-oligoclase-quartz-biotite quartz diorite. Considered to be Cretaceous(?) in age (Barker, 1957)

a
Granite and quartz monzonite
Biotite-allanite granite, biotite-quartz monzonite, quartz-albite-microcline pegmatite. Northern of two plutons four miles east of Adams Inlet locally contains hornblende porphyry

b
Diorite and quartz diorite
Hornblende diorite, hornblende quartz diorite; locally at Excursion Inlet contains diabase, pigeonite-hornblende andesite dikes and sills

c
Granodiorite and quartz monzonite
Hornblende granodiorite, biotite quartz monzonite. Pluton north of Beartrack Cove mostly hornblende granodiorite, contains biotite-hornblende diorite, hornblende-hypersthene quartz diorite variants. Larger pluton north of Adams Inlet hornblende granodiorite; variants include hornblende-biotite quartz diorite, hornblende-hypersthene quartz diorite, biotite-hornblende diorite, diorite prophyry. At uranium prospect near William Henry Bay, biotite quartz monzonite, fine-grained diorite, and andesite(?) dikes

d
Diorite and quartz diorite
Hornblende-biotite diorite, hornblende-biotite quartz diorite, lesser amounts quartz monzonite, quartz monzonite gneiss, granodiorite, and hornblendite. Plutons west of William Henry Bay mostly sheared augite-biotite diorite, augite diorite. Small pluton Central Chilkat Mountains augite diorite cut by diabase or andesite dikes. At Sullivan Island biotite quartz diorite gneiss, granodiorite gneiss, biotite diorite

e
Syenodiorite
Hornblende syenodiorite, locally propylite or altered hornblende andesite

f
Ultramafic rocks
Serpentinite body near Point Marsden, containing antigorite, carbonate, and talc; probably a sill at least 500 feet thick. Bodies on Admiralty Island serpentinized periodotite or pyroxenite, probably more than 200 feet thick, appear layered

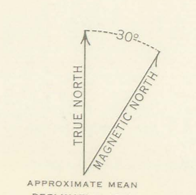
g
Andesite dikes and sills
Altered hornblende basaltic andesite, hornblende-pigeonite andesite, and hornblende andesite

h
Granodiorite
Hornblende granodiorite, biotite-hornblende granodiorite; local variants include hornblende diorite, diorite porphyry, hornblende syenodiorite, hornblende-garnet syenodiorite, hornblende quartz diorite, biotite-hornblende quartz diorite containing abundant fine-grained hornblende diorite inclusions

i
Diabase and basalt
Intrusions northwest of William Henry Bay are diabase, locally may contain fine-grained diorite. Plug on Pleasant Island is augite basalt

j
Gabbro
Uralite-biotite-hypersthene gabbro, locally altered hornblende andesite

X–c
Small bodies of intrusive rock.
Composition indicated



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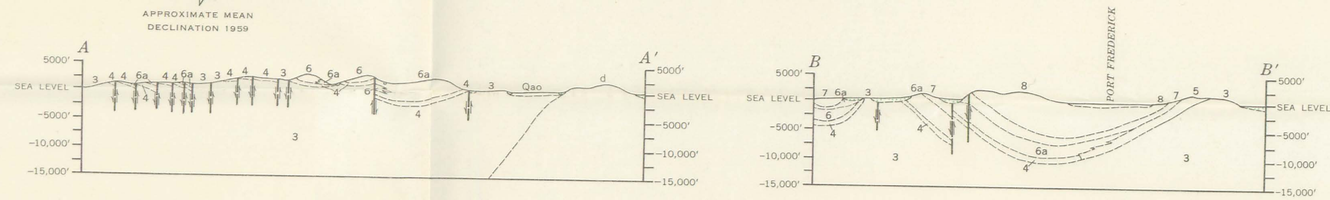
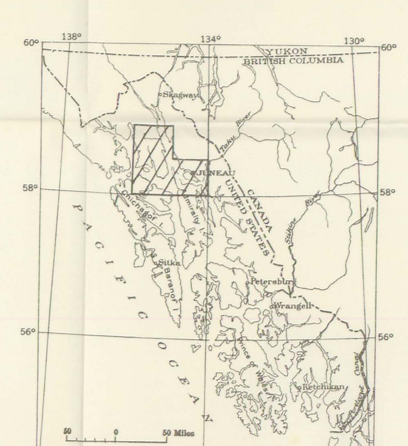
2 0 2 4 6 8 10 MILES
CONTOUR INTERVAL 1000 FEET
DATUM IS MEAN SEA LEVEL

Geology by Ernest H. Lathram, Robert A. Loney, William H. Condon, Henry C. Berg, Don J. Miller, John S. Pomeroy, Maurice Grolier, J. Thomas Dutro, Jr., 1956–58

Quaternary geology largely from interpretation of aerial photographs by William H. Condon, 1957–58





INDEX MAP SHOWING LOCATION OF MAP AREA

PROGRESS MAP OF THE GEOLOGY OF THE JUNEAU QUADRANGLE, ALASKA

By
Ernest H. Lathram, Robert A. Loney, William H. Condon
and Henry C. Berg
1959

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