DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-783

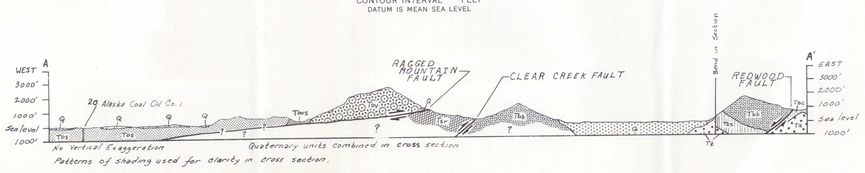
TYSDAL, OTHERS--GEOLOGY,
CORDOVA B-2 AND A-2 QUADS., ALASKA

BASE FROM U.S. GEOLOGICAL SURVEY, 1950

SCALE 1:63 360

1 ½ 0 1 2 3 4 5 MILES
1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL FEET
DATUM IS MEAN SEA LEVEL



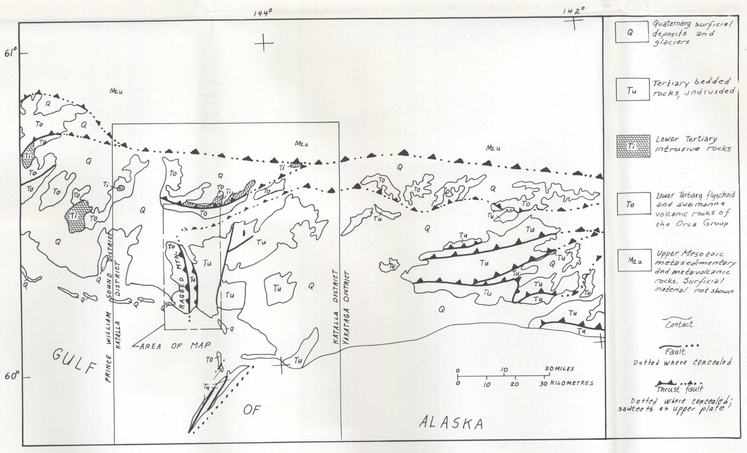


Figure 1.--Index map showing area of map in the Katalla District, Gulf of Alaska Tertiary province, and major faults and rock units (after Plafker, 1967, and unpub. data).

EXPLANATORY NOTE

This map of the Cordova B-2 quadrangle and contiguous onshore parts of the Cordova A-2 quadrangle is one of a series showing the geology of the Gulf of Alaska Tertiary province. The area it covers is located in a structurally complex part of the Katalla district where dominantly east-west oriented Tertiary structures change trend abruptly to become more nearly north-south (fig. 1). Bedrock units, which are dominantly marine sedimentary strata of Paleocene to Miocene age, are exposed in, or are inferred to underlie lowland areas covered by unconsolidated deposits and water. This report represents a compilation of mapping by several workers: the area east of the Ragged Mountain fault and south of the Martin River is from detailed mapping by Miller (1951, 1961, 1976); Kachadoorian (1960) delineated the bulk of the unconsolidated deposits; and Tysdal, Hudson, and Plafker published (1976) a strip map of the Ragged Mountain fault as part of the work resulting from about 18 man-days in the field during 1973 and 1974 in helicopter-supported reconnaissance mapping in Ragged Mountain and detailed mapping along the Ragged Mountain and Martin faults. New geologic units recognized in the area of this mapping are described in the text in greater detail than the other rock units.

BEDDED ROCKS

An aggregate thickness of more than 20,000 feet (6,100 m) of bedded marine sedimentary and volcanic rocks of Paleocene through Miocene age are exposed in the map area. The strata can be divided into two major sequences, juxtaposed by faulting, that exhibit strong contrasts in lithology, degree of metamorphism, and origin. The older sequence, the Orca Group, has been intruded by granitic rocks of known and suspected Eocene age. Small basaltic bodies, Oligocene or younger, have intruded part of the younger sequence, which is composed of the Stillwater, Tokun, Katalla, and Redwood Formations.

Orca Group.--The Orca Group is mapped as three units designated, in ascending order, the volcanic unit, the volcanic and sedimentary unit, and the sedimentary unit.

The volcanic unit, which underlies the rugged terrain of the eastern part of Ragged Mountains, is resistant to erosion. In its northern part, the unit is composed chiefly of very hard and fine-grained, massive apple-green metavolcanic units several tens of feet thick that look like flows in outcrop but in thin section are seen to be aquagene tuff and lesser tuff breccia. The southern part is chiefly aphanitic to porphyritic basalt and interbedded pillow basalt with associated breccia, tuff, chert, and agglomerate.

The overlying volcanic and sedimentary unit is characterized by interbedded sandstone typical of the overlying sedimentary unit as well as tuff, tuff breccia, and lesser amounts of basalt of the underlying volcanic unit. Volcaniclastic sandstone and agglomerate are common in this unit. Tuffaceous calcareous sandstone (cross-stripe pattern on the map) that contains shell fragments and microfossils forms part of a mappable sequence near the base of this unit.

The sedimentary unit is a well-bedded flyschoid sequence of tightly cemented sandstone, siltstone, and locally conglomerate and hemipelagic rocks, probably deposited on submarine fans (Winkler, 1976). The chief clastic components are feldspar, quartz, and lesser rock fragments of sedimentary, igneous, and metamorphic origin. Alteration of feldspar ranges from minor to extensive. Prehnite veinlets are present in some samples.

A poorly bedded to massive conglomerate of unknown thickness, considered part of the sedimentary unit (stippled on the map) crops out on the isolated hill west of the Martin River Slough. It consists chiefly of rounded cobbles of felsic tuff 4 to 10 inches (10-25 cm) in diameter with a few cobbles of quartzofeldspathic sandstone. The matrix of the conglomerate is fine- to coarse-grained sandstone consisting of angular grains of feldspar, quartz, and rock fragments of tuff, quartz sandstone, and minor metamorphic rock. At the southern tip of the hill, the conglomerate apparently grades into medium-bedded sandstone and pebbly sandstone with a composition much like that of the conglomerate matrix. Similar sandstone crops out in the Orca Group east of the Martin River Slough.

The Orca Group is intruded by a late early Eocene pluton (potassium-argon age, 52.2 m.y.) north of the Martin fault (Plafker and Lanphere, 1974). Microfossils (D4612, D4613) from the volcanic and sedimentary unit of Ragged Mountain were considered to be of late Eocene age (Miller, 1961). Reexamination of these fossils by J. A. Barron (Table 1) suggests that the siliceoflagellates in this fossil assemblage best correlate with the Naviculopsis constricta Zone, which ranges from late Paleocene to early Eocene (Bukry, in press). Foraminifera collected from the Orca in eastern Prince William Sound about 60 mi (100 km) to the west are suggestive of middle or late Paleocene age (Winkler and Plafer, 1974; Winkler, 1976); megafauna from near Galena Bay in eastern Prince William Sound are most likely of late Paleocene age (Addicott and Plafker, 1971). Therefore the Orca cannot be younger than the late early Eocene granitic rocks that intrude it; its fauna suggests that it is late Paleocene and(or) early Eocene in the map area.

Stillwater Formation.--The Stillwater Formation is strongly deformed, characterized by tight folds and sheared carbonaceous siltstone that has a "coaly" appearance; hence, its estimated thickness of 2,000 feet (610 m) is only approximate. The hard, dense, reddish-brown and pale-green foraminiferal calcareous shaly siltstone was observed in three small outcrop areas along the front of Ragged Mountain: on the west shore of Little Martin Lake (at fossil locality M2602), at the drainage divide east of the easternmost part of the Ragged Mountain fault (at fossil locality M2610), and in the uppermost part of Clear Creek.

The lithology and microfauna of the formation indicate deposition in water of considerable depth, probably outer neritic to upper bathyal. The diversity of planktonic Foraminifera suggests open-sea conditions with surface temperatures relatively warm; some of the benthonic forms suggest deposition in cold bottom water. Most of the forms listed in table 1 indicate an age no younger than the middle Eocene Ulatisian Stage and possibly as old as the early Eocene Penutian Stage (W. W. Rau, written commun., 1975). Rau states that the assemblage (M2610) containing Globorotalia cf. G. aragonensis Nuttall could range into the Bulitian Stage (Paleocene and early Eocene).

The fossil crab Eumorphocorystes naselensis Rathbun was found in float in the upper reaches of Clear Creek (unpub. oil company data, 1938). This fossil is apparently restricted to the middle Oligocene Basin Creek Member of the Katalla Formation (Miller, 1976); its presence in the area mapped as Stillwater Formation may indicate that a thin sliver of the Katalla Formation has been faulted into this strongly deformed and poorly exposed part of the Stillwater.

Tokun Formation.--The Tokun Formation is a tightly folded to homoclinal sequence of siltstone and lesser sandstone underlying the intricately dissected terrain in the east-central part of the map. The sandstone is fairly resistant, forming knobs and ridge crests. Throughout the Katalla district, it has yielded a sparse megafauna that is generally suggestive of late Eocene and early Oligocene age (Miller, 1976). The foraminiferal assemblage (M2609) is not well preserved, but the species given in table 1 suggest an Eocene age. The foraminifera Valvulineria tumeyensis Cushman and Simonson, if correctly identified, is indicative of the middle Eocene Narizian Stage.

Katalla Formation.--The Katalla Formation, as stratigraphically restricted by Miller (1976), is a ridge-forming unit comprised of three members that, in aggregate, range from about 4,250 to 5,600 feet (1,311-1,708 m) thick. Where exposed, it is composed of thick units of sandstone, siltstone, and shale. Intermittent submarine volcanic activity during Katalla time is recorded by interbedded flows and pyroclastic debris in neighboring areas to the east and southeast (Plafker, 1974; Miller, 1976) not exposed in the map area. Plafker (1974) has suggested that the glauconite of the formation may be altered volcanic material. Fossils collected from the Katalla Formation in the mapped area are poorly preserved and are nondiagnostic of age. The assemblage given in table 1 suggests an Oligocene age. Its fauna and lithology indicate that it was deposited in sublittoral to bathyal depths in marine waters that ranged from free circulating to basinally restricted.

Redwood Formation.--The Redwood Formation, present only in a small part of the mapped area, is composed of two members, a sandstone member and the overlying Puffy Member, that total about 4,130 feet (1,260 m) thick where measured in the adjoining area east of the mapped outcrops. The sandstone member (about 430 feet (130 m) thick) is chiefly sandstone; siltstone is abundant in the lower part. The thick (about 3,700 feet (1,130 m)) Puffy Member, the upper member, is a resistant ridge-forming unit of sandstone, siltstone, mudstone, and conglomerate that has yielded most of the sparse megafauna of the formation. No fossils were obtained from the Redwood in the mapped area, but a marine fauna from the Redwood Formation to the east has been tentatively correlated with part of the so-called Blakeley Stage (late Oligocene to early Miocene) of the Pacific Northwest (Miller, 1976). The fauna and lithology suggest that deposition took place during the late Oligocene(?) and Miocene in cold marine waters of middle neritic to upper bathyal depths.

INTRUSIVE ROCKS

The locally foliated biotite granodiorite north of the Martin River is part of a large elongate pluton. The pluton, which trends subparallel to the outcrop belt of the Orca Group, was intruded after deformation of the Orca. Within the mapped area, the pluton is juxtaposed against the Orca along a late Tertiary fault; along its northern margin, the pluton has a contact aureole of thermally recrystallized sedimentary rocks cut by dikes extending from the pluton. A potassium-argon age of 52.2 m.y. was obtained on biotite from this pluton (Plafker and Lanphere, 1974).

Small bodies of biotite quartz monzonite are present in siltstone and sandstone of the Orca Group in the northwestern part of Ragged Mountain. The intruded zone consists of an irregular network of foliated medium-grained dikes and sills that range from a few inches to about 5 feet (1.5 m) thick. The zone is surrounded by an associated aureole of thermally recrystallized rocks that covers about 0.5 mi² (1.5 km²). These igneous rocks are considered to be of possible Eocene age because they are generally similar to the early Eocene plutonic rocks intruded into the Orca in the northermost part of the mapped area.

Thin sections of the fine-grained mafic pluglike body intruded into the central area of the Stillwater Formation (sec. 27, T. 18S, R. 5E) indicate that it is an extensively altered plagioclase-rich rock containing biotite, hornblende, lesser clinopyroxene, and accessory apatite. The feldspar is extensively replaced by prehnite and epidote, the mafic minerals by chlorite and sphene. There is only minor contact metamorphism of the country rocks. A basaltic sill only a few feet thick intrudes the Katalla formation in the ridge west of the Katalla River. These igneous rocks must postdate the Oligocene or younger bedded rocks they intrude.

STRUCTURE

The rocks of the mapped area have undergone two major episodes of deformation in early and late Cenozoic time. During the early Cenozoic, the Orca Group was folded, faulted, and metamorphosed to the prehnite-pumpellyite facies. Tectonism was essentially complete by late early Eocene time, when granitic plutons that yield potassium-argon ages of 49.2 to 52.2 m.y. intruded the Orca Group (Plafker, 1974; Plafker and Lanphere, 1974). Rocks younger than the Orca Group have been strongly deformed in the late Cenozoic (since middle Miocene time); deformation continuing to the present is indicated by high seismicity and recent tectonic movements in the region (Plafker, 1969, 1974).

The rocks of the area have been strongly folded and faulted along north-south and east-west structural trends since after middle Miocene time. The deformation is greater and more complex in the southern part of the area (Miller, 1951). The post-Orca rocks of the Katalla district show a pattern of north-trending folds superimposed on a general east-west fold trend. The east-west folds are characterized by a broad anticlinorium (see map of Miller, 1961) that, east of the Clear Creek fault, is reflected by a large area of Tokun Formation which is overlain by generally north-dipping younger strata to the north and south-dipping younger strata to the south. In areas adjacent to major faults that cut these post-Orca rocks, north- to northeastward-trending folds appear to be superimposed on the east-west anticlinal trend.

The amount of displacement along the major faults in the area can be determined only approximately. Minimum eastward displacement on the Ragged Mountain fault, a major structural boundary along which highly contrasting rock sequences are juxtaposed, is at least 4 mi (6.4 km) (see cross section), probably considerably greater. Tysdal, Hudson, and Plafker (1976) speculate that during Holocene time the Ragged Mountain fault may have undergone gravity-driven displacement of at least 600 feet (180 m) westward, a direction of reversed movement. The Chugach-St. Elias fault beneath the Martin River flood plain is believed to be part of this same structural boundary and has had large north side up relative displacement (Miller, 1951; Plafker, 1967, 1974). The amount of displacement on the Martin fault north of the Chugach-St. Elias fault is unknown, as the rocks along it are locally strongly deformed within a zone more than 300 feet (91 m) wide. Displacement on the Clear Creek fault, parallel to the Ragged Mountain fault on the east, is at least 1 mi (1.6 km), probably more. The Redwood fault, a throughgoing structure near Redwood Creek, reverses its sense of displacement within the mapped area and does not display a large offset.

PETROLEUM EXPLORATION AND PRODUCTION

Oil and gas seeps were discovered in the Katalla district about 1896; active exploration began shortly thereafter (Martin, 1921). The history of subsequent hydrocarbon exploration and production, and potential for finding oil in the Katalla district, have been summarized in other works (Miller, 1951, 1976) and need not be repeated here. The locations of known oil and gas seeps and well sites within the mapped part of the district are shown on table 2, except for the 26 closely spaced wells drilled within the Katalla oilfield area (outlined on map) which are plotted on a large-scale map in Miller (1976).

REFERENCES

Addicott, W. O., and Plafker, George, 1971, Paleocene mollusks from the Gulf of Alaska Tertiary Province; a significant new occurrence on the north Pacific rims: U.S. Geol. Survey Prof. Paper 750-B, p. 48-52.

Bukry, David, 197_, Cenozoic silicoflagellate and coccolith stratigraphy, South Atlantic Ocean, Deep Sea Drilling Project Leg 36: Deep Sea Drilling Project Initial Reports, v. 36 [in press].

Kachadoorian, Reuben, 1960, Engineering geology of the Katalla area, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-308.

Martin, G. C., 1921, Preliminary report on the petroleum in Alaska: U.S. Geol. Survey Bull. 719, p. 11-34.

Miller, D. J., 1951, Preliminary report on the geology and oil possibilities of the Katalla district, Alaska: U.S. Geol. Survey open-file report, 66 p.

_____1961, Geology of the Katalla district, Gulf of Alaska Tertiary province, Alaska: U.S. Geol. Survey open-file report.

_____1976, Geologic map and sections of the south-central part of the Katalla district, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-722.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province: U.S. Geol. Survey Misc. Geol. Inv. Map I-484.

_____1969, Tectonics of the March 27, 1964, Alaska earthquake: U.S. Geol. Survey Prof. Paper 543-I, 74 p.

_____1974, Preliminary geologic map of Kayak and Wingham Islands, Alaska: U.S. Geol. Survey open-file map 74-82.

Plafker, George, and Lanphere, M. A., 1974, Radiometrically dated plutons cutting the Orca Group, in Carter, Claire, ed., U.S. Geological Survey Alaskan Program, 1974: U.S. Geol. Survey Circ. 700, p. 53.

Tysdal, R. G., Hudson, Travis, and Plafker, George, 1976, Surface features and recent movement along the Ragged Mountain fault, south-central Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-782.

Winkler, G. W., 1976, Deep-sea deposition of the lower Tertiary Orca Group, eastern Prince William Sound, Alaska: U.S. Geol. Survey open-file report 76-83.

TABLE 1.--*Selected Tertiary megafauna, microfauna, and microflora from Katalla district**

Katalla Formation, Burls Creek Shale and Basin Creek Members	
Gastropods: (identifications by F. S. MacNeil)	
Epitonium aff. E. condoni Dall	M4325
Exilia lincolnensis Weaver	CAS15355, CAS15382
Turritella aff. T. lompocensis Arnold	CAS15356
Pelecypods: (identifications by F. S. MacNeil)	
Crenella cf. C. porterensis Weaver	CAS15356
Hyalopecten (Delectopecten)	CAS15381
Lima cf. L. twinensis Durham	CAS15391
Pitar sp. aff. P. dalli (Weaver)	CAS15354, CAS15361
Solena cf. S. eugenensis (Clark)	CAS15354
Thracia cf. T. trapezoides Conrad	M4326
Katalla Formation, Split Creek Sandstone Member	
Echinoid: (identifications by W. O. Addicott and J. W. Durham)	
Brissaster maximus H. L. Clark(?)	M5940
Spatangoid - fragment similar to specimens in M5940	M5939
Gastropods: (identifications by W. O. Addicott)	
Cassidid - fragment	M5939
Turritella n. sp.? aff. T. berriani brevitabulata (Merriam and Turner)	M5939
Pelecypods: (identifications by W. O. Addicott)	
Nuculana sp. A - internal mold	M5939
N. sp. B - internal mold	M5939
Pitar sp. aff. P. dalli (Weaver)	CAS 15340
Tellina sp. - deformed specimens	M5939
Tokun Formation	
Crustaceans: (identifications by L. G. Hertlein)	
Branchioplax washingtoniana Rathbun	D240(T)
Foraminifera: (identifications by W. W. Rau)	
?Eggerella elongata Blaisdell	M2609
?E. subconica Parr	M2609
?Spiroplectammina eocenica (Cushman and Barksdale)	M2609
?Valvulineria tumeyensis Cushman and Simonson	M2609
Pelecypods: (identifications by L. G. Hertlein)	
Pecten (Delectopecten) sp. (imperfect)	D241(T)
?Scaphander sp. (imperfect, cast)	D241(T)
Stillwater Formation	
Foraminifera: (identifications by W. W. Rau)	
Amphimorphina cf. A. californica Cushman and McMasters	M2602
?Bolivinopsis sp.	M2602
Bulimina corrugata Cushman and Siegfus	M2611
Globigerina cf. G. decepta Martin	M2605, M2607
?G. decepta Martin	M2610
Globigerina spp.	M2605, M2607
Globorotalia cf. G. aragonensis Nuttall	M2610
?G. aragonensis Nuttall	M2599
G. cf. G. californica Smith	M2610
G. cf. G. crassata aequa Cushman and Renz	M2599
G. cf. G. membranacea (Ehrenberg)	M2602, M2605, M2607
G. spp.	M2607
Glomospira charoides (Jones and Parker)	M2599
Guttulina spp.	M2599
Karreriella sp.	M2599
?Valvulineria sp	M2605
Orca Group, volcanic and sandstone unit	
Diatoms: (identifications by J. A. Barron)	
Arachnodiscus cf. A. ehrenbergii Bailey	D4612
Trinacria cf. T. pileclus (Ehrenberg) Granow	D4612
Echinoids: (identifications by W. O. Addicott)	
Eucidaris spp. - spines	M5938
Pelecypod: (identifications by W. O. Addicott)	
Ostrea sp.	
Silicoflagellates: (identifications by J. A. Barron)	
Corbisema apiculata (Lemmerman) Hanna	M4612
C. geometrica? Hanna (broken)	M4612
C. hastata (Lemmerman) Frenguelli	M4612
C. triacantha (Ehrenberg) Hanna s.l.	M4612
Dictyocha aspera (Lemmerman) Frenguelli s.l.	M4612
Naviculopsis constricta (Schulz) Frenguelli	M4612
N. foliacea Deflandre	M4612

*No fossils are listed for localities of California Academy of Sciences (CAS). Some Geological Survey localities shown on map do not appear in table because identifiable fossils were not found.

TABLE 2.--*Wells drilled for petroleum in map area through 1969, exclusive of those in Katalla Oil Field area which are tabulated in Miller, 1976.*

(Data from Miller, 1976)

Location No.	Company and well name or number	Location	Year	Total depth Feet	Total depth (Meters)	Formation penetrated	Results and remarks
4[1]	Alaska Petroleum & Coal Co. 1 (110)	Near head of Katalla Slough--	1903	1,710	(521.6)	Katalla Formation----------	Abandoned at limit of drilling equipment. Small shows of oil reported.
5	Alaska Petroleum & Coal Co. 2 (111)	Katalla River-----	1903	280	(85.4)	Quaternary unconsolidated deposits	Abandoned.
13	ASC&PS (108)	Mitcher Creek ----	1904	1,000±	(305±)	----------do----------	Show of oil; not tested for production.
14	Alaska Petroleum & Coal Co. 3 (112)	Near Katalla -----	1904	1,500±	(457.5±)	----------do----------	Abandoned.
16	Clarence Cunninghan 2 (107)	--------do---------	1904	--	--	Tokun Formation----------	Abandoned at depth of several hundred feet.
17	Alaska Petroleum & Coal Co. 4 (113)	Near Katalla -----	1905-6	--	--	Katalla Formation---------	Abandoned at depth probably greater than 1,500 ft (457.5 m).
19	Alaska Petroleum & Coal Co. 5 (114)	Near Katalla Slough ---------	1907	1,600	(488)	----------do----------	Abandoned.
20	Alaska Coal Oil Co. 1 (115) ---	Mirror Slough ----	1911-17	1,040	(317.2)	Orca(?) Group----------	Abandoned. Shows of oil and gas at 710 ft (216.6 m).
21	Alaska Coal Oil Co. 2 (116) ---	--------do---------	--	272	(83)	----------do----------	Abandoned.
22	Alaska Coal Oil Co. 3 (117) ---	--------do---------	--	250±	(76.2)	----------do----------	

[1] Not located on map

CORRELATION OF MAP UNITS

Qsp, Qsf, Qs, Qt, Qas, Qag, Qls, Qo, Qm	Holocene	QUATERNARY
Trp, Trs	Miocene and Oligocene(?)	TERTIARY
	Oligocene(?)	
Tl	Oligocene or younger	
Tbb, Tss	Oligocene	
Tt	Oligocene and Eocene	
Tsr	Eocene	
Tg	Eocene and Eocene(?)	
Tos, Tovs, Tov	Lower Eocene and(or) Paleocene	

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsp — BEACH DEPOSITS (Holocene: post-1964) - Mainly sand with minor gravel of present beaches, beach ridges, spits, and tidal flats

Qsf — OLDER BEACH DEPOSITS (Holocene: pre-1964) - Mainly sand and gravel of former beaches, beach ridges, spits, and tidal flats

Qs — UNDIVIDED SURFICIAL DEPOSITS (Holocene) - Mainly fluvial, glaciofluvial, lacustrine, swamp, lagoon, and muskeg deposits consisting of gravel, sand, silt, mud, and peat. Some areas poorly drained or saturated with water throughout the year

Qt — TALUS DEPOSITS (Holocene) - Angular boulders, cobbles, and pebbles along eastern flank of Ragged Mountain

Qas — ALLUVIAL SAND DEPOSITS (Holocene) - Sand with locally interbedded gravel underlying flood plain of Martin River

Qag — ALLUVIAL GRAVEL DEPOSITS (Holocene) - Deposits of alluvial fans and flood plains of major streams. Chiefly gravel, sand, and silt; includes abundant cobbles where alluvial fans grade into talus deposits

Qls — LANDSLIDE DEPOSITS (Holocene) - Angular boulders, cobbles, and pebbles in larger landslides, chiefly along eastern flank of Ragged Mountain

Qo — OUTWASH DEPOSITS (Holocene) - Mainly well-sorted stratified sand and gravel derived from glacial deposits. Gradational with alluvial sand deposits in many places. Outwash deposits characterized by nearly flat surfaces with local relief as much as 15 ft (4.5 m)

Qm — MORAINAL DEPOSITS (Holocene) - Chiefly end and lateral moraine complexes consisting of subangular to angular cobbles and boulders and till of gravel, sand, and minor silt. Morainal complexes form uneven terrain consisting of ridges 20 to 100 ft (6-30 m) high separated by swales and undrained depressions

CONSOLIDATED ROCKS

REDWOOD FORMATION (Miocene and upper Oligocene?)

Trp — PUFFY MEMBER (Miocene and upper Oligocene?) - About 3,700 ft (1,130 m) of massive siltstone, mudstone, and claystone, hard and resistant to erosion (50 percent of member); conglomeratic mudstone and conglomerate containing rounded to well-rounded cobbles and pebbles (30 percent of member); and light-gray to light-brown, fine- to medium-grained feldspathic sandstone (20 percent of member). Sparse marine fauna is suggestive of middle neritic to upper bathyal water depths. Top is not exposed. Apparently gradational with underlying strata.

Trs — SANDSTONE MEMBER (upper Oligocene?) - About 430 ft (130 m) thick; consists of siltstone and subordinate sandstone in the lower third of the member and dark-gray, thick-bedded, fine- to medium-grained sandstone and minor siltstone in the upper part. Marine megafauna uncommon and nondiagnostic. In gradational contact with the underlying Katalla Formation; strata of this formation may locally be included in the sandstone member

Tl — MAFIC INTRUSIVE ROCKS (Oligocene or younger) - Altered black to greenish-black clinopyroxene-bearing rocks of basaltic composition; in isolated outcrops

KATALLA FORMATION (Oligocene)

Tbb — BURLS CREEK SHALE MEMBER (upper? Oligocene) AND BASIN CREEK MEMBER (middle Oligocene), UNDIVIDED - The Burls Creek Shale and Basin Creek Members form tan- to rusty-weathering bold ridges, slightly dissected by many small streams

The Burls Creek Shale Member is composed of three units. The upper unit, about 2,000 ft (610 m) thick in area of Katalla oilfield, consists of dark-gray, massive to platy siltstone and sandy siltstone with interlayered thin-bedded fine-grained sandstone. Light-gray, thin- and medium-bedded to lenticular fine-grained limestone present in some places. Contact with the underlying unit gradational. The middle unit, 50 to 200 ft (15 to 61 m) thick in the Katalla area, consists of slope-forming black fetid siltstone and organic shale containing dark-gray calcareous concretions to 2 ft (60 cm) in diameter. Commonly sheared into slickensided rock chips. Unit was deposited in restricted environment, probably at bathyal depths. Unit present at one or more horizons; conformably overlies underlying unit. The lower unit, about 1,000 ft (305 m) thick in ridge west of Redwood Creek, consists of light- to medium-gray massive siltstone containing a few medium-gray hard calcareous concretions that range from 2 to 10 ft (0.6 to 3 m) in greatest diameter. Reddish-brown-weathering resistant beds of pyritic glauconitic sandstone to 40 ft (12 m) thick present in lower unit. Contact with underlying strata conformable.

The Basin Creek Member is composed of 550 to 1,000 ft (168 and 305 m) of resistant, ridge-forming gray thick bedded very fine grained quartzofeldspathic sandstone, locally glauconitic, and interlayered dark-gray thick-bedded siltstone and sandy siltstone. Hard, round calcareous concretions 1 to 6 in (2.5 to 15 cm) in diameter, called "cannonballs", are common in the siltstone and locally contain fossil crabs. The member is marine, middle sublittoral to upper(?) bathyal. Contact with the underlying strata gradational

Tss — SPLIT CREEK SANDSTONE MEMBER (middle Oligocene) - Approximately 700 to 1,400 ft (213 to 427 m) of ridge-forming brownish-gray thick-bedded medium- to coarse-grained sandstone and thin-bedded to finely laminated, fine- to medium-grained sandstone. Finely laminated siltstone interbeds in some areas. Cross-bedding present locally. Thick-bedded sandstone commonly mottled due to presence of light-gray zeolites. The Split Creek is an inner to middle sublittoral deposit. Basal contact sharp but conformable

Tt — TOKUN FORMATION (early Oligocene and late Eocene) - As much as 3,500 ft (1,067 m) thick. The upper part consists of gray massive siltstone and interlayered light-gray, thin-bedded to lenticular calcareous siltstone and silty limestone; hard calcareous concretions, 1 in to 3 ft (2.5 to 90 cm) in largest dimension; interbeds of light-gray finely laminated thin- to medium-bedded micaceous very fine grained sandstone common in the siltstone. Crossbedding present locally. Fossil crabs common; mollusks preserved locally in this marine, inner to outer sublittoral deposit. Inferred lower part of the Tokun exposed only southeast of the Katalla oilfield area; mainly gray fine- to medium-grained micaceous feldspathic sandstone with numerous interbeds of siltstone and thin-bedded sandstone

Tsr — STILLWATER FORMATION (Eocene) - Probably more than 2,000 ft (610 m) thick; consists mainly of black thin- to medium-bedded carbonaceous micaceous siltstone, finely laminated micaceous siltstone and calcareous sandstone. Thick-bedded fine- to medium-grained sandstone present locally; reddish-brown to pale-green finely laminated calcareous Foraminifera-bearing shaly siltstone occurs locally. Medium-gray dense calcareous concretions to 3 ft (90 cm) across and black round calcareous concretions to 2 in (5 cm) common. Deposited in outer littoral to bathyal environment. Contacts not exposed

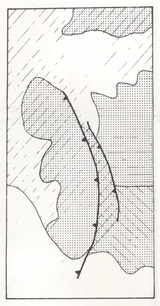
Tg — GRANITIC ROCKS (Eocene and Eocene?) - Pluton north of Martin River is light-gray medium- to coarse-grained hypidiomorphic biotite granodiorite. Small plutons intruding Ragged Mountain are chiefly light-gray medium-grained hypidiomorphic, moderately foliated biotite quartz monzonite; adjacent sedimentary rocks thermally recrystallized. Querried where doubtful.

ORCA GROUP (lower Eocene and(or) Paleocene) - Includes:

Tos — Sedimentary unit; as much as 5,000 ft (1,525 m) of dark-gray, thin-, medium-, and thick-bedded, fine-grained, tightly cemented sandstone beds grading upward into siltstone and locally calcareous siltstone; pebbly sandstone present in basal part of some beds; ripple marks, load casts, and crossbeds occur locally. Thick sequences of dark-gray siltstone interbedded with the sandstone. Conglomerate with cobbles composed of tuff (stippled), on isolated hill west of Martin River slough, are assigned to this unit. Unit chiefly a flyschoid sequence of rhythmically layered beds deposited at bathyal depths. Contact with underlying strata probably unconformable

Tovs — Volcanic and sedimentary unit; approximately 1,000 ft (305 m) to more than 5,000 ft (1,525 m) of interbedded light- to dark-gray, thin- to thick-bedded fine- to medium-grained sandstone and arkosic sandstone and interbedded finely laminated siltstone. Volcaniclastic sandstone, rubbly weathering agglomerate, and thin-bedded tuff interlayered in this sequence. In lower part of unit, these strata are interlayered with abundant aquagene tuff and tuff breccia. A tuffaceous calcareous sandstone containing shell fragments noted locally near the base of the unit (cross-stripe pattern). Contact with underlying unit probably conformable

Tov — Volcanic unit; about 2,000 ft (762 m) of light- to dark-green cliff-forming massive metavolcanic rocks composed of thin- to thick-bedded aquagene tuff and tuff breccia, agglomeratic tuff, basalt, and pillow basalt; reddish to gray-green thin-bedded banded siliceous shale, porcellanite, and chert present locally. Rocks are metamorphosed to prehnite-pumpellyite facies; basalt is extensively epidotized



Surficial geology mainly after Kachadoorian (1960) with modifications along Ragged Mountain fault by Tysdal, Hudson, and Plafker, 1973-74.

Geologic Data Sources

Miller (1976)

Miller (1961)

Geologic reconnaissance by Tysdal, Hudson, and Plafker, 1973-74; Miller (1961)

Stippled pattern indicates mountainous areas

o-22 — Exploration well drilled for petroleum. Well number is from table in Miller (1976), listing all wells in Katalla district

* Gas seep

× Oil seep

+ 5990 — Fossil locality

Showing reference number. California Academy of Sciences localities are preceded by CAS: all others are U.S. Geological Survey localities

● 52.2 — Potassium-argon age, in million years

Contact, approximately located

Dotted where concealed or inferred

Fault, dashed where approximately located; dotted where concealed; queried where inferred. U, upthrown side, D, downthrown side

Thrust fault, approximately located. Dotted where concealed. Sawteeth on upper plate

Anticline 20 — Syncline 15

Minor anticline 25 — Minor syncline 20 — Closely spaced minor folds 20

Folds

Showing direction of dip of limbs, trace of axial surface, and plunge of axis

Inclined 65 — Vertical — Overturned 60

Strike and dip of beds

Ball indicates top of beds known from sedimentary structures

Strike and dip of beds

Tops unknown

GEOLOGIC MAP OF THE CORDOVA B-2 QUADRANGLE AND NORTHERN PART OF THE CORDOVA A-2 QUADRANGLE, SOUTH-CENTRAL ALASKA

BY

RUSSELL G. TYSDAL, TRAVIS HUDSON, AND GEORGE PLAFKER

1976

☆Interior--Geological Survey, Menlo Park, California--1976

For sale by U. S. Geological Survey