DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

EXPLANATION

UNCONSOLIDATED SEDIMENTARY DEPOSITS

The units listed below overlap in age and therefore are not arranged in stratigraphic order

Pleistocene (?) and Recent — QUATERNARY

Qs

Undifferentiated surficial deposits

Mainly glaciofluvial and fluvial gravel, sand, and mud. Includes lagoon and tidal-estuary deposits at present and former shorelines

Qg

Glacial moraine deposits

Undifferentiated deposits of one or more glacial advances; mainly till, but includes lake and glaciofluvial deposits in places. Arrow indicates direction of ice movement as inferred from trend of elongate ridges and trenches

Qsp
Qsf

Marine shoreline deposits

Mainly sand; gravel in places
Qsp, beach and beach-ridge deposits associated with present shoreline
Qsf, beach, beach-ridge and spit deposits associated with former shorelines

Qes

Eolian sand

Deposits with sparse vegetation cover, associated with present shoreline

BEDROCKS

Unconformity

Miocene and Pliocene (?) — TERTIARY

Ty

Yakataga formation

Sandstone and siltstone interbedded with massive conglomeratic sandy mudstone (tillite) in upper part; mainly sandstone and siltstone in lower part; marine

Oligocene and Miocene

Tp

Poul Creek formation

Siltstone with many round to lenticular limestone concretions and sandstone, in part glauconitic; beds of water-laid volcanic breccia and tuff in lower part; marine

Paleocene (?) and Eocene

Tkh

Kulthieth formation

Sandstone, in part arkosic and siltstone; many thin beds of coal; nonmarine and marine. May include basal part of Poul Creek formation locally

Ts

Sedimentary rocks, undifferentiated

Sandstone and siltstone, locally coal-bearing; marine and nonmarine

Unconformity

Upper (?) Cretaceous — CRETACEOUS

Ky

Yakutat group

Graywacke, argillite, and slate; marine

Unconformity ?

MESOZOIC AND OLDER(?)

Mzc

Crystalline complex

Undifferentiated metamorphic and intrusive rocks

Mzv

Volcanic unit

Lava with minor pyroclastic deposits; bedding visible in aerial photographs. Includes small bodies of intrusive igneous rocks

GEOLOGIC SYMBOLS

Contact

Dashed where approximately located; dotted where concealed; queried where inferred

Fault, showing dip

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

Anticline

Syncline

Overturned anticline

Overturned syncline

Folds

Showing trace of axial plane and direction of plunge of axis. Dashed where approximately located

Strike and dip of beds

Strike and dip of beds, up side not known

Strike and dip of overturned beds

Strike of vertical beds (90 is on up side, where known)

Average strike and dominant direction of dip of tightly folded beds

Strike and dip of foliation

Attitude of bedding or foliation

Dashed strike bar indicates attitude estimated from ground or aerial photographs or from distant views

× Oil seep

✳ Gas seep

+C29265
×M854
Fossil locality, showing reference number

California Academy of Sciences locality numbers preceded by "C", University of California locality numbers by "U", all others are Geological Survey locality numbers. Query indicates approximate location. Additional fossil localities in area south of latitude 60°15' and east of longitude 142°30' are shown on U.S. Geological Survey Oil & Gas Inv. Map OM 187

⊙2
Location of well drilled for petroleum
Numbers refer to table 1

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

GLACIERS AND LANDFORMS

Present margin of glacier or ice field

Maximum stand of glaciers during youngest Recent advance; coincides with boundary of Qg deposit in places; dashed where approximately located, queried where inferred. Projections are on side toward ice

Maximum stand of glaciers during older Recent advance; coincides with boundary of Qg deposit in places; dashed where approximately located, queried where inferred. Projections are on side toward ice

Maximum stand of glaciers where definite evidence of only one Recent advance is recognized; coincides with boundary of Qg deposit in places; dashed where approximately located, queried where inferred. Projections are on side toward ice

45

Raised sea cliff. Line is at base of cliff and shows position of former marine shoreline, dashed where approximately located; coincides with boundary of bedrock formation or unconsolidated deposits in places. Figure shows approximate altitude of former marine shoreline

280

Wave-cut bedrock surface overlain by thin or discontinuous unconsolidated deposits. Figure shows approximate altitude

1800

Relatively flat erosion surface on bedrock, overlain by thin or discontinuous unconsolidated deposits; origin uncertain. Figure shows approximate altitude

Landslide

Ridge line

Reef below mean high tide

EXPLANATORY NOTES

This map of the Yakataga district is one of five maps at the same scale, showing the geology of the Gulf of Alaska Tertiary province (see index map). In this province, an arcuate belt more than 300 miles long and 2 to 40 miles wide, sedimentary rocks of Tertiary age are exposed or are inferred to underlie lowland areas covered by Quaternary unconsolidated deposits or ice (Miller, Payne, and Gryc, 1959, p. 37-47). Field studies were carried out in the province intermittently from 1944 to 1960, under the Geological Survey's program of petroleum investigations in southern Alaska.

Bedrock geology

The rocks mapped as the crystalline complex (Mzc) in the northeastern part of the Yakataga district were not seen on the ground but, from aerial reconnaissance and study of aerial photographs, are correlated with and appear to be continuous along strike with the metamorphic rocks and associated intrusive igneous rocks in the vicinity of Mount St. Elias in the adjoining Malaspina district (Plafker and Miller, 1957). The crystalline complex is inferred to be either overlain unconformably by, or in fault contact with, younger rocks of the Yakutat group near the east end of Barkley Ridge.

The volcanic unit (Mzv) comprises lava flows and flow breccias of dusky purple and grayish-green amygdaloidal basalt or andesite, and possibly some tuffaceous rocks, where traversed at the end of a spur extending west from Barkley Ridge (Brabb and Miller, 1960, p. 10-11). Massive volcanic rocks, cut by small masses of gabbro and probably more felsic plutonic rocks, form most of the spur that projects northeastward into the Bagley Ice Field about 2 miles from the east end of Waxell Ridge. At the head of this spur the north-dipping volcanic rocks grade southward into well-bedded green and greenish-gray tuffaceous sandstone and argillite, which is in fault contact with sedimentary rocks of Tertiary age. The volcanic unit appears to be in depositional and structurally conformable contact with the Yakutat group on the west flank of Mount Miller, but at other localities southeast of Mount Miller and southwest of Mount Steller aerial photographs show discordant bedding trends suggestive of either an angular unconformity or faulting at this contact. Where examined in the vicinity of the Bering Glacier, the volcanic unit is more highly altered than the Yakutat group. From this evidence, and the relationships observed between probably equivalent volcanic rocks and the Yakutat group in the Malaspina district and Yakutat Bay region, the volcanic unit is considered to be older than the Yakutat group and probably of early or middle Mesozoic age.

EXPLANATORY NOTES (CONTINUED)

The rocks assigned to the Yakutat group at the west end of Barkley Ridge are argillite and poorly sorted fine-grained sandstone and siltstone of graywacke type (Brabb and Miller, 1960, p. 11-13). The argillite is medium dark gray to black, commonly has a well-developed fracture cleavage. At some localities it contains lenticular calcareous concretions. Most of the sandstone and siltstone is medium gray, and weathers pale reddish brown or light brown. Interbedded argillite and sandstone similar in lithology was seen at two other localities examined on the ground; on a nunatak southeast of Mount Miller, and near the end of a spur extending south from Mount Steller. A depositional contact between the Yakutat group and overlying sedimentary rocks of Tertiary age is tentatively mapped, from aerial photographs, at one locality near the east end of Waxell Ridge. A foraminifer found in argillite of the Yakutat group at locality 59AMr453, near the west end of Barkley Ridge, was identified by Ruth Todd of the U.S. Geological Survey as Nodosaria affinis Reuss and is regarded by her as indicating a Late Cretaceous or Paleocene age. The Late (?) Cretaceous age previously assigned to the Yakutat group by Plafker and Miller (1957) is tentatively accepted for this area.

The Kulthieth, Poul Creek, and Yakataga formations, as exposed in their type localities in the Robinson Mountains, constitute an apparently conformable sequence of sedimentary rocks exceeding 25,000 feet in thickness and ranging in age from Paleocene (?) to Pliocene (?). A previously published description of these formations (Miller, 1957) applies to this map.

The similarity in appearance of the basal, more sandy part of the Poul Creek formation and upper part of the Kulthieth formation makes it difficult to identify and trace the contact between these formations in areas of complex structure, either in reconnaissance field mapping or on aerial photographs. For this reason it is likely that the basal part of the Poul Creek is present locally in areas mapped as the Kulthieth formation between the northeast part of the Bering Glacier and the Kosakuts fault, west of long 142°37', and between the Kosakuts and Hope Creek faults, east of this longitude. The presence of the Poul Creek in a narrow belt south of the Hope Creek fault, between the Kulthieth and Duktoth Rivers, is indicated by both lithologic and paleontologic evidence, but the structural interpretation of this occurrence as a fault sliver is highly conjectural.

The undifferentiated sedimentary rocks of Tertiary age (Ts) mapped in several areas in the northern part of the Yakataga district are believed to consist mainly of a predominantly marine sequence that includes the equivalent of the siltstone sequence in the Malaspina district (Plafker and Miller, 1957), and that is in part equivalent to and in part older than the lower part of the Kulthieth formation as exposed in the Robinson Mountains. Predominantly nonmarine, coal-bearing beds similar to those in the Kulthieth formation are present locally in these undifferentiated rocks, as tongues in the upper part of the marine sequence and partly lying above the marine sequence. Where examined on the ground at the west end of Barkley Ridge (Brabb and Miller, 1960, p. 13-14), at the east end of Waxell Ridge, and on a nunatak in the Guyot Glacier, the characteristic rock types in the predominantly marine sequence are dark gray to black argillite or siltstone, and lighter gray, dense, fine-grained sandstone that weathers pink to dusky red. According to F.S. MacNeil of the U.S. Geological Survey, the fossil marine mollusks collected at these localities (M855, M856, M854, D252(T)) are too poorly preserved for certain identification, but the fauna as a whole suggests a middle Eocene age.

Mineral resources

Many oil seeps and some gas seeps have been found in the Yakataga district. Most of the seeps occur on outcrops of the Poul Creek formation and lower part of the Yakataga formation in a narrow belt along the coast between Cape Yakataga and Johnston Creek (Miller, 1951, p. 41-44; 1957). Oil claims were located on the coastal belt of seeps as early as 1897 (Maddren, 1914, p. 146-147), but exploration by drilling did not start until nearly 30 years later. By the end of 1960 four test wells had been drilled and abandoned in the coastal area between Johnston Creek and Big River; drilling was suspended on one well on the coastal lowland near the eastern margin of the Bering Glacier and was still in progress on another well nearby (table 1). Federal oil and gas leases in effect at the end of 1960 covered nearly all of the Yakataga district south of the Bering Glacier and the Guyot Glacier.

Coal occurs in the Kulthieth formation and in some outcrop areas of the undifferentiated lower Tertiary rocks (Ts) in the Yakataga district. Based on partial analyses of several samples from widely distributed localities, the coal ranges in rank from high-volatile bituminous to anthracite; the maximum observed thickness of a single bed is 6 feet. None of the known outcrops of coal is easily accessible. Mining has not been attempted, so far as is known.

Placer mining for gold in the Quaternary deposits of the Yakataga district has been carried on sporadically since gold was discovered in the beach sands at Umbrella Reef about 1897 (Maddren, 1914, p. 133-143). Most of the gold production has come from localized natural concentrations of heavy minerals below high-tide line along the beach between Poul Creek and the mouth of the south channel of the Yakataga River--in recent years mainly from the beach just west of Cape Yakataga. Attempts have been made to mine gold in the stream deposits along the White River, and the raised beach deposits east of Cape Yakataga also have been prospected by drilling. Radioactive minerals have been identified in small concentration in the beach deposits (Moxham, 1952).

References cited

Brabb, E.E., and Miller, D.J., 1960, Reconnaissance traverse across the eastern Chugach Mountains, Alaska: U.S. Geol. Survey open-file report.

Maddren, A.G., 1914, Mineral resources of the Yakataga district, Alaska: U.S. Geol. Survey Bull. 592-E, p. 119-153.

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

_____, 1957, Geology of the southeastern part of the Robinson Mountains, Yakataga district, Alaska: U.S. Geol. Survey Oil and Gas Inv. Map OM-187.

Miller, D.J., Payne, T.G., and Gryc, George, 1959, Geology of possible petroleum provinces in Alaska: U.S. Geol. Survey Bull. 1094, 131 p.

Moxham, R.M., 1952, Radioactive minerals in the Yakataga beach placers, in Moxham, R.M., and Nelson, A.E., Reconnaissance for radioactive deposits in south-central Alaska, 1947-49: U.S. Geol. Survey Circ. 184, pt. 3, p. 11-14.

Plafker, George, and Miller, D.J., 1957, Reconnaissance geology of the Malaspina district, Alaska: U.S. Geol. Survey Oil and Gas Inv. Map OM-189.

Table 1.--Wells drilled for petroleum in the Yakataga district, Alaska, through year 1960

Location No. on map	Company and name of well	Location	Year	Total depth (feet)	Formation penetrated	Results
1	General Petroleum Corp. Sullivan 1	Johnston Creek	1926-27	2,005	Poul Creek formation	Abandoned. Shows of oil and gas.
2	Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc. Sullivan Strat. 1	Big River	1954	4,837	Poul Creek formation	Abandoned. Strong flow of slightly saline water.
3	Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc. Sullivan Unit 1	Little River	1954-55	10,013	Poul Creek and Kulthieth(?) formations	Abandoned. Shows of oil and gas.
4	Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc. Sullivan Unit 2	Little River	1956-57	12,052	Poul Creek and Kulthieth(?) formations	Abandoned. Shows of oil and gas.
5	Richfield Oil Corp. Kaliakh River Unit 1	Near Tsivat River	1959-60	----------	Information not released	Drilling suspended May 1960 at 14,699 feet
6	Richfield Oil Corp. Kaliakh River Unit 2	----do----	1960	----------	-----do--------	Drilling below 10,000 feet at end of 1960

GEOLOGY OF THE YAKATAGA DISTRICT, GULF OF ALASKA TERTIARY PROVINCE, ALASKA

By

Don J. Miller