DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-321

Base from U. S. Geological Survey
Topographic quadrangle, 1951 with revisions

Geology by J. M. Hoare, 1946–53, assisted by W. L. Coonrad since 1949

EXPLANATION

Qf — Flood plain alluvium
Includes some beach deposits

Qc — Colluvium
Chiefly frost-rived rubble, locally includes stream alluvium, terrace gravels, glacial deposits, and windblown silt

Qd — Glacial drift
Poorly sorted sand, gravel, and boulders; stipple indicates well-defined end and lateral moraines

Qo — Outwash deposits
Poorly to well-sorted silt, sand, gravel, and some boulders in terraces and outwash fan-plains

Recent / Pleistocene — QUATERNARY

QTb — Basalt
Vesicular basalt flows, horizontal

Pliocene or Pleistocene — TERTIARY OR QUATERNARY

TKv — Volcanic rocks
Black, buff, and lavender basalt flows, tuffs and breccia

TKs — Interbedded graywacke, pebble grit, conglomerate, and carbonaceous mudstone

Upper Cretaceous to Upper Tertiary — CRETACEOUS TO TERTIARY

KCgg / KCgu — Gemuk group
Chiefly massive, altered volcanic rocks, massive to thin-bedded siliceous siltstone and chert with lesser amounts of calcareous siltstone, fine-grained graywacke, and limestone, KCgu. Upper part of Gemuk, chiefly fine- and coarse-grained graywacke, siltstone, and conglomerate, locally mapped as KCgg. Graywacke commonly contains coal blebs. Volcanic breccia and agglomerate common in lower part

PALs — Schistose and phyllitic fine-grained rocks
Chiefly calcareous siltstone, limestone, and argillaceous rocks, locally interbedded buff and green schistose tuff and greenstone

PALEOZOIC(?) CARBONIFEROUS TO CRETACEOUS

INTRUSIVE IGNEOUS ROCKS

Tm — Mafic rocks
Chiefly diabase, basalt, and some biotite lamprophyre; forms dikes and sills

Tr — Albite rhyolite
Light-gray or buff, fine-grained and porphyritic; forms dikes and sills and domelike intrusive bodies

Tg — Granitic rocks
Includes pink granite and light- to dark-gray diorite, quartz diorite, and gabbro; forms intrusive stocks

Tu — Ultramafic rocks
Black and greenish black serpentine and serpentinized dunite and peridotite, forms large and small tabular-shaped intrusive bodies

TERTIARY

og — Older granitic rocks
Weakly foliated, light greenish-gray, medium-grained rocks of granitic texture and composition

PRE-TERTIARY

Lithologic symbols
For local differentiation within major map units

Lava flows

Gneissoid greenstone

Conglomerate

Hornfels

Contact
Solid where located by field mapping or where clearly interpretable on aerial photographs; dashed where approximately located by field mapping

Fault
Dashed and dotted where located solely by photointerpretation; dotted where concealed; questioned where inferred

60 — Strike and dip of beds
Probably includes some overturned beds

Strike and dip of beds based on photointerpretation
Probably includes some overturned beds

30 / 29 — Strike and dip of bedding and plunge of drag fold axis

69 — Strike and dip of flow cleavage

Placer mine

76 — Fossil locality
Number refers to list of fossil collections

INTRODUCTION

The geologic map of the Hagemeister Island quadrangle is one of several presenting the results of reconnaissance studies in the Lower Kuskokwim-Bristol Bay Region, southwest Alaska. Field studies, which began in 1946 and ended in 1953, were concerned primarily with bedrock geology. Most of the fieldwork for the geologic map of this quadrangle was done in 1952. Data were obtained on lengthy boat and foot traverses. Areas observed in the field are fairly well indicated by the distribution of strike symbols with numerical dip values. Additional information was obtained from study of aerial photographs and the surficial deposits have been mapped almost entirely by photointerpretation supplemented by numerous field observations.

Lithologic symbols have been used to indicate known occurrences of distinctive types of rocks which have been identified in the field. These lithic types are more extensive than shown on the map but are shown only where identified in the field.

Previous geologic investigations in the quadrangle were made by J. E. Spurr (1900) who noted the general nature of the rocks on the east coast of Togiak Bay, by G. L. Harrington (1918) who made a few notes on the rocks forming Cape Newenham, and by J. B. Mertie, Jr. (1940) who studied the platinum placer deposits near Red Mountain.

The writers were efficiently assisted in the field by T. A. Konigsmark and Mark Christensen in 1952 and by Brainerd Mears, Jr., and M. E. Kauffman in 1953. Fossil collections were identified by R. W. Imlay, J. B. Reeside, Jr., and Roland W. Brown of the U. S. Geological Survey. Appreciation is expressed to the Goodnews Bay Mining Co. for their assistance, information, and hospitality.

BEDDED ROCKS

Bedded rocks ranging in age from Paleozoic to late Cenozoic crop out in the northern part of the quadrangle. Unconsolidated surficial deposits of Quaternary age and the waters of Kuskokwim and Bristol Bays conceal the bedrock over most of the quadrangle. Bedrock consists primarily of fine- to coarse-grained clastic rocks interbedded with mafic volcanic rocks. They have been grouped in five units: (1) schist and phyllite of Paleozoic(?) age, PALs; (2) the Gemuk group, KCgu, which includes volcanic and sedimentary rocks ranging in age from Carboniferous to Early Cretaceous; (3) moderately deformed sedimentary rocks of Late Cretaceous or early Tertiary age, TKs; (4) a group of volcanic flows, which probably includes rocks of both Cretaceous and Tertiary age, TKv; and (5) undeformed olivine basalt flows of late Pliocene or early Pleistocene age, QTb. Rocks older than the sedimentary rocks of Late Cretaceous or early Tertiary age are highly deformed. They strike generally northeast.

PALEOZOIC(?) SCHIST AND PHYLLITE

Schistose and phyllitic rocks of probable Paleozoic age, PALs, crop out on the west side of Security Cove, on the south side of Cape Newenham south of Security Cove, and on the west side of Cape Pierce. The rocks are chiefly interbedded metasediments that include calcareous siltstone, limestone, and argillaceous rocks. Locally interbedded with the sedimentary rocks are lesser amounts of buff and green calcareous tuff and schistose greenstone. The rocks are intensely deformed; in many places they show well-developed flow cleavage and lineation. On Cape Newenham they strike between west and N. 50° W. and dip consistently north. They appear to be exposed near the axis of a broad northeast-trending structure, as both cleavage and lineation strike consistently northeast on Cape Newenham. On both Cape Pierce and Cape Newenham these highly calcareous, schistose, and phyllitic rocks seem to dip beneath a thick sequence of interbedded volcanic and sedimentary rocks of the Gemuk group. Although no fossils have been found in these rocks and their age is unknown, they are thought to be of middle or early Paleozoic age, as they apparently underlie rocks thought to be of late Paleozoic age.

GEMUK GROUP

Most of the consolidated layered rocks in the Hagemeister quadrangle have been mapped as part of the Gemuk group. As originally defined (Cady and others, 1955, p. 27-34) the Gemuk group in the central Kuskokwim region included rocks of Triassic and Early Cretaceous age and possible equivalents of rocks assigned by Mertie to the Mississippian(?), Permian, and Triassic periods and Early Cretaceous epoch in the adjoining Nushagak district (Mertie, 1938, p. 37-59). In the lower Kuskokwim region rocks of the Gemuk group have yielded sparse fossils ranging in age from Carboniferous to Early Cretaceous. The rocks are complexly folded and faulted. No reliable estimate of their thickness can be made, but it is probably on the order of 15,000 to 25,000 feet.

The Gemuk group undifferentiated, KCgu, consists chiefly of massive altered volcanic rocks, massive to thin-bedded siliceous siltstone, and chert. Calcareous siltstone, fine-grained graywacke, and limestone occur in lesser amounts. The volcanic rocks comprise dark green and gray flows, breccias, tuffs, and agglomerates. The flows are fine-grained dark rocks that are rarely porphyritic but are commonly amygdaloidal. Abundant pillow structure indicates that most, or all, of the volcanic rocks are of marine origin. Most of the volcanic rocks are altered to greenstone; locally they are schistose or gneissoid. The undifferentiated rocks of the Gemuk group in the Hagemeister Island quadrangle are probably chiefly of Carboniferous(?), Permian, and Early and Middle Jurassic age. Fossils of Carboniferous(?) and Permian age have been found a few miles north of the quadrangle in sedimentary and volcanic rocks that strike southwest into the quadrangle. Interbedded volcanic and sedimentary rocks on the west side of Hagemeister Island have yielded fossils of Middle and probably Early Jurassic age.

Interbedded coarse- to fine-grained clastic rocks, KCgg, of Early Cretaceous or Late Jurassic age crop out on Hagemeister, Crooked, and Summit Islands and on the east side of Togiak Bay. Thin- to thick-bedded fine- to coarse-grained well-indurated graywacke and conglomerate are characteristic of the unit. The coarse-grained rocks are interbedded with an equal or greater amount of hard, dark-gray siltstone. The base of the unit, which is well exposed in the sea cliffs on the south end of Hagemeister Island consists of several hundred feet of volcanic agglomerate that grades upward into conglomerate. The conglomerate dips steeply east and appears to be overlain by many hundreds of feet of dark, shaly siltstone, which is exposed in low cutbanks along the streams in the middle of Hagemeister Island, and which probably underlies the wide, covered interval east of the conglomerate exposures on the south end of the island. The shaly siltstone seems to be overlain by at least 1,000 feet of very hard, thick-bedded, fine- and coarse-grained graywacke with numerous thin, shaly partings. The graywacke contains scattered blebs of hard coaly material and the shaly partings contain many carbonized-wood fragments. Local inhabitants report that a coal bed several feet thick crops out in the sea cliffs on the south end of Hagemeister Island. The writers did not find the coal and conclude that it has been covered by slumped glacial drift.

The total thickness of the coarse- to fine-grained clastic rocks, KCgg, exposed on Hagemeister Island is at least 5,000 feet. The rocks strike generally northeast and dip steeply southeast. The steep dip of the bedding in some places suggests that the rocks may be isoclinally folded or faulted, but no evidence of overturned bedding or faults was noted. No fossils have been found in these rocks in the Hagemeister Island quadrangle. They are thought to be of Early Cretaceous age (Valanginian) because they are lithologically similar to fossiliferous rocks of that age in the Goodnews quadrangle. However, the possibility that the rocks may be of Late Jurassic age must be considered because they are locally conformable upon rocks of Middle Jurassic age on Hagemeister Island.

LATE CRETACEOUS OR EARLY TERTIARY SEDIMENTARY ROCKS

Sedimentary rocks of early Tertiary or Late Cretaceous age, TKs, consisting of interbedded graywacke, pebble grit, conglomerate, and mudstone crop out in the sea cliffs on the east side of Togiak Bay. Much of the mudstone is carbonaceous, and carbonized plant fragments and thin coal seams are common in the graywacke and grit. In general these rocks are not so well indurated as the rocks of the Gemuk group. They strike N. 60° W. to N. 60° E. and dip 10° to 30° N. The relatively gentle dip of these rocks indicates that they rest with angular unconformity upon highly deformed rocks of the Gemuk group which crop out nearby. It is estimated that between 700 and 800 feet of these gently dipping rocks are exposed in the sea cliffs. However, their true thickness may be either greater or lesser than these figures indicate, as they are broken by numerous small faults and concealed at intervals by glacial drift. Fragmentary plant fossils obtained from these rocks have been tentatively assigned an age of early Tertiary. However, plant fossils obtained from similar rocks about a mile east of the quadrangle are thought to be of probable Cretaceous age. As the fossil evidence is inconclusive, the rocks are mapped as either Late Cretaceous or early Tertiary in age.

VOLCANIC ROCKS

Mafic volcanic rocks, TKv, of probable Tertiary and Cretaceous age crop out on the east side of Hagemeister Island. Most of the rock is black, porphyritic basalt lava, some of which contains olivine. A minor amount of breccia, volcanic agglomerate, and tuff is interbedded with the flows. Locally, porphyritic buff and lavender dacite or andesite flows crop out, but the relationship of these flows to the basalt is uncertain. Some of the basalt flows show little or no alteration, and are similar in appearance and composition to olivine basalt flows of probable Quaternary age that crop out in Togiak Valley in the Goodnews quadrangle a few miles north. The rest of the basalt and all of the dacite or andesite are moderately altered but not to the same degree as the volcanic rocks of Jurassic age, which are part of the Gemuk group, on the west side of Hagemeister Island. The attitude of the volcanic rocks, TKv, seems to be about the same as the underlying sedimentary rocks of the Gemuk group; the strike is between north and N. 43° E. and dip ranges from 20° to 73° E. No fossils have been found in these rocks so that their probable age must be inferred from other criteria. The contrast in the amount of alteration of the rocks suggests that the unit includes volcanic rocks of two different ages. The younger essentially unaltered flows may be correlative with the olivine basalt of late Pliocene or early Pleistocene age that crops out on the east side of Togiak Bay and in Togiak Valley north of the quadrangle. The unaltered basalt on Hagemeister Island and on the mainland has not been mapped as a single unit, because the flows on the mainland are essentially horizontal and those on Hagemeister Island dip steeply east. The altered volcanic rocks that form part of this map unit are probably of Cretaceous age, because they are apparently conformable with underlying sedimentary rocks of probable Cretaceous age, and andesitic volcanic rocks of both Early and Late Cretaceous age have been identified in the Goodnews and Bethel quadrangles farther north.

BASALT

Black and dark-gray olivine basalt flows, QTb, crop out in the sea cliffs on the east side of Togiak Bay and underlie a thin veneer of glacial deposits on the adjoining coastal plain. The rock is fine grained, finely porphyritic, and commonly vesicular and amygdaloidal. Chief rock-forming minerals are small subhedral grains of pyroxene and olivine and small laths of labradorite. The crystalline minerals are embedded in dark-brown isotropic glass. The mineral grains and glassy matrix show little or no secondary alteration and the rocks are fresh looking in hand specimen and thin section. The flows are essentially horizontal. The base of the unit is not exposed but the flows probably overlie fluvial deposits of preglacial age in some places and are elsewhere angularly unconformable upon deformed rocks of early Tertiary or Cretaceous age. Not more than 50 feet of rock is exposed in some of the sea cliffs, but examination of exposures farther north in the Goodnews quadrangle suggests that the average thickness is between 150 and 300 feet. The flows are thought to be of late Pliocene or early Pleistocene age because they show little or no alteration and because they were extruded after Togiak River had cut its wide valley to about its present depth and before the earliest known period of glaciation. They are probably correlative with the basalt flows that crop out along Kwethluk River in the Bethel quadrangle about 100 miles northeast and in the Yukon-Kuskokwim delta region (Harrington, 1918, p. 47-48).

INTRUSIVE ROCKS

Intrusive igneous rocks in the Hagemeister Island quadrangle consist of dikes, sills, and a small stock of mafic rocks, Tm; stocks of granitic rocks, Tg; rhyolite dikes, and pluglike intrusive bodies, Tr; intrusive bodies of ultramafic rocks, Tu; and older granitic rocks of pre-Tertiary age, og. The age of most of the intrusive rocks is thought to be Tertiary, because some of them intrude sedimentary rocks of Cretaceous age in this quadrangle and in the Bethel and Russian Mission quadrangles farther north. The granitic rocks, og, on Cape Newenham are thought to be of pre-Tertiary age as they are somewhat gneissoid: granitic rocks of known Tertiary age do not show gneissoid texture. Some of the mafic intrusive rocks, Tm, may be genetically related to granitic rocks of Tertiary age, Tg, as they are closely associated with them and are similar in composition to mafic facies of the granitic rocks. However, in Goodnews and Bethel quadrangles, some of the mafic rocks are intruded by granitic rocks and are therefore older. Contacts between mafic rocks and granitic rocks of Tertiary age were not observed in the Hagemeister Island quadrangle, but some of the diabase sills, Tm, in the sea cliffs on the south end of Hagemeister Island are bordered by thin mylonite zones. The mylonite suggests that the sills were folded with the enclosing sedimentary rocks. As the granitic rocks are thought to be posttectonic, it is probable that at least these folded diabase sills are older than the granitic rocks. Both basalt, Tm, and rhyolite intrusive bodies, Tr, are exposed in the sea cliffs on the east side of Togiak Bay. The basalt intrudes the rhyolite. Probably nearby basalt flows of Late Pliocene or early Pleistocene age, QTb, are the extrusive equivalent of some of these intrusive bodies of basalt. The relative age of rhyolite and granitic rocks was not determined in this quadrangle, as the two rocks were not found in contact with each other. A single contact examined in the Bethel quadrangle indicates that the rhyolite is younger than the granitic rocks of Tertiary age. However, Cady (Cady and others, 1955, p. 71-73) concluded that the rhyolite is older than the granitic rocks in the central Kuskokwim region.

Granitic rocks of probable pre-Tertiary age, og, crop out at two places near Cape Newenham. The rock, which is light gray or light green and poorly foliated, closely resembles some facies of the greenstone which it apparently intrudes. However, the granite is composed of about equal amounts of orthoclase, sodic plagioclase and quartz. Hornblende, which is almost entirely replaced by chlorite, is a minor constituent. Many of the quartz and feldspar crystals are broken and most of the quartz shows strain shadows. These granitic rocks, og, are thought to be older than other stock rocks, Tg, in the quadrangle because they are foliated and contain cataclastic textures indicating that they have been dynamically metamorphosed. The younger granitic rocks, Tg, do not show these metamorphic characteristics. The older granitic rocks, og, may be of Mesozoic age as they appear to intrude sedimentary and volcanic rocks thought to be of late Paleozoic age. The contact between the rocks of granitic composition, og, and the gneissoid greenstone is apparently gradational as it could not be accurately located in the field. Loose fragments of rock composed of large crystals of both diopside and massive grossularite garnet were found at several places west of Security Cove. As these two minerals are commonly formed in contact-metamorphic zones, the granitic intrusive rocks may be more extensive than they are shown on the geologic map.

Granitic rocks of Tertiary age, Tg, form several stocks, which range in size from about a square mile to at least 25 square miles. Some of the stocks are nearly round in plan; others are elongate with their long dimension oriented north or northeast parallel to the regional strike. The fact that contacts of the stocks commonly dip outward indicates that the stocks are more extensive at depth. The southern contact of the stock on Hagemeister Island is exposed in the sea cliff on the west side of the island. The contact dips gently southward so that for several hundred yards along the beach the lower part of the sea cliff is granite and the upper part is massive, baked sedimentary and volcanic rocks. The contacts of the other stocks seem to dip much more steeply than the one described on Hagemeister Island. The stock on Hagemeister Island is pink granite, but the other stocks in the quadrangle are primarily medium- to dark-gray diorite, quartz diorite, and gabbro. Pegmatitic facies of diorite and gabbro, consisting chiefly of large crystals of labradorite and hornblende are common near the borders of the medium-grained stock rocks.

The stocks of probable Tertiary age are surrounded by metamorphic aureoles of hornfels formed by the recrystallization of sedimentary and volcanic rocks. The large, isolated mountain west of the mouth of Matogak River is probably underlain by a small granitic stock that is not exposed at the present level of erosion because the mountain consists of hornfels. Fragments of granitic rock form part of the frost rubble on the south side of the mountain. The gneissoid texture of some of the greenstone east of Aeoleus Mountain and on Cape Newenham is probably, in part, the result of contact metamorphism and, in part, due to local variation in the composition of the greenstone, because in most places greenstone is merely altered to hornfels near the stocks.

Albite rhyolite, Tr, crops out at several places in the sea cliffs east of Togiak Bay and apparently forms several small dome-shaped intrusive bodies a short distance back from the coast. The rhyolite exposed in the sea cliffs forms dikes and sills 5 to 20 feet thick. The rock is light gray or buff, fine grained and porphyritic. It consists of euhedral phenocrysts of orthoclase and large, rounded grains of quartz in a fine-grained matrix of orthoclase, sodic plagioclase and quartz. Dark minerals are altered to shreds of brown and green chlorite. Garnet and tiranite are accessory minerals.

Mafic rocks, Tm, are chiefly diabase but include some biotite lamprophyre. The rocks form hypabyssal dikes and sills most of which are less than 50 feet thick. Some of the diabase sills on the south end of Hagemeister Island have mylonite borders, which indicate that the sills were folded at the same time as the enclosing sedimentary rocks in early Tertiary time. The fresh appearance and vesicular borders on some of the mafic sills east of Togiak Bay indicate that these sills are the intrusive equivalent of the olivine basalt flows of late Pliocene or early Pleistocene age.

Ultramafic rocks, Tu, form several small, apparently tabular intrusive bodies on Cape Newenham and one or more large intrusive bodies that are probably sill-like north of Chagvan Bay. The rocks are black or greenish black on fresh surfaces and yellowish brown on weathered surfaces. The primary rock-forming minerals are chiefly olivine, pyroxene, and amphibole. Calcic plagioclase forms a minor part of the rock. Serpentine has replaced part or all of the olivine and pyroxene in most of the rocks. The small bodies on Cape Newenham consist of massive black and fibrous green serpentine and magnetite formed by the complete alteration of dunite or peridotite. The ultramafic rocks north of Chagvan Bay are described in detail in a report on the platinum placer deposits on Salmon River (Mertie, 1940, p. 45-54).

UNCONSOLIDATED QUATERNARY DEPOSITS

Glacial drift, Qd, comprising various types of ice-contact and glaciofluvial deposits, is widespread in the quadrangle. The deposits consist chiefly of unsorted and poorly sorted sand, gravel, and boulders. Clay-boulder till, such as is exposed in the sea cliffs on the south end of Hagemeister Island, apparently forms a minor part of the unit. Small areas of glacial outwash, alluvium, and colluvium are included with the unit. The thickness of the deposits ranges from a thin veneer to at least 100 feet. The unit is mapped chiefly from aerial photographs on the basis of topographic expression. Areas of well-defined swell and swale topography, which are indicated by a stippled pattern on the geologic map, are probably end or recessional moraines. The distribution and curvature of the moraines indicate that most of Togiak Bay, Hagemeister Island, and Hagemeister Strait were covered by ice that moved down Togiak Valley. None of the glacial deposits have been dated but they are thought to be of early Wisconsin age.

Outwash deposits, Qo, consisting of poorly to well-sorted sand and gravel with some silt and boulders, form terraces and outwash fan-plains. The deposits are recognized on aerial photographs by their relationship to end and recessional moraines and by their well-drained surface scarred by numerous abandoned stream channels. The broad outwash plain north of Slug Mountain in the west-central part of the quadrangle is characterized by many underfit streams, which join to form the headwaters of Slug River. The thickness of the outwash deposits ranges from a thin veneer to more than 150 feet. They are thought to be of early Wisconsin age.

Colluvium, Qc, consists chiefly of frost-rived rubble but locally includes small amounts of bog deposits, flood-plain alluvium, terrace deposits, glacial gravels, and windblown silt. The deposits are best developed on the rounded slopes of unglaciated mountains in the western part of the quadrangle where they merge and interfinger with other kinds of unconsolidated deposits near the base of the slopes. The unit is mapped mostly by photogeologic methods.

Flood-plain alluvium, Qf, (locally includes some beach deposits) consists of mud, silt, sand, gravel, and boulders forming the flood plains of present day streams. The deposits are incised a few feet to a few tens of feet below the surface of older unconsolidated deposits and bedrock benches.

STRUCTURE

The rocks of the Hagemeister quadrangle strike generally northeastward parallel to the regional trend of the rocks in this part of Alaska. The regional dip is probably southeast as the rocks are generally younger from west to east. Strata of Early Cretaceous age and older are tightly compressed into many folds of various sizes. The homoclinal dip of these rocks in many areas is thought to indicate that they are *isoclinally folded* and overturned. Small drag folds and cleavage are common in these rocks.

Small faults showing a few feet of displacement are common in many of the exposures of bedrock in the near-vertical sea cliffs. Most of the faults observed are high-angle faults that strike about parallel to the bedding. They probably have little structural or stratigraphic significance. Most of the faults that have been mapped in the quadrangle have been recognized on the basis of topographic expression.

The angular shape and remarkably straight sides of Hagemeister Island strongly suggest that it is bounded by faults on the west, east, and north sides. The northeasterly trend of the north side of the island probably reflects the southwestern extension of the Togiak-Tikchik fault, which extends northeastward across the Goodnews quadrangle and into the central Kuskokwim region where it is called the Holitna fault (Cady and others, 1955, p. 92, pl. 2). In the Hagemeister Island quadrangle this great fault, or fault zone, trends about N. 55° E. approximately parallel to the trend of the Aleutian Islands and Aleutian trench to the south. Relative movement on the faults is unknown, but it is probable that Hagemeister Island is an uplifted fault block.

MINERAL RESOURCES AND OCCURRENCES

PLATINUM

Placer platinum and a minor amount of gold are being mined (1958) on Salmon River, which flows into Kuskokwim Bay between Red Mountain and Chagvan Bay. The mine on Salmon River, which is operated by the Goodnews Bay Mining Co., is the only producer of the platinum group metals in Alaska and is the only mine in the United States and territories whose chief product is platinum. It is reported to have produced about 34,000 ounces in 1938 (Mertie, 1940, p. 59). The current production is probably on the same order of magnitude. The placer deposits, mining activity, and geology in the vicinity of Salmon River are described in detail by Mertie (1940, p. 15-90) who points out the close association of ultramafic rocks and the occurrence of platinum.

GOLD

A small amount of gold is recovered with the platinum on Salmon River. Placer gold is also reported (Smith, 1937, p. 63) on Slug River and in the beach sands on the northwest side of Hagemeister Strait. The exact location of these occurrences is not known to the writers, but it is probable that the gold was reconcentrated from glacial gravels, which are widespread in that part of the quadrangle.

COAL

Coal is reported by Harrington (Brooks and others, 1919, p. 228) and by the local inhabitants on Hagemeister Island, in the sea cliffs on the east side of Togiak Bay, and on the Ungalikthluk River. The coal on Hagemeister Island is reported to form a bed several feet thick in the upper part of the Gemuk group which is exposed in the sea cliffs on the south end of the island. The senior author failed to find the coal bed in the course of his brief examination of the rocks and concluded that it was concealed by unconsolidated material that had slumped down from the top of the sea cliffs. Small blebs of coal and coal seams less than an inch thick are closely associated with black carbonaceous shale in the rocks of Late Cretaceous or early Tertiary age east of Togiak Bay, but no coal beds of possible economic interest were found. No search was made for the coal, which is said to crop out on the Ungalikthluk River and the exact location of the outcrop is unknown to the writers.

SUGGESTIONS FOR PROSPECTING

Systematic search for placer platinum and gold should be guided by the fact that the gold deposits are associated with granitic and rhyolitic intrusive bodies, and the platinum is associated with ultramafic intrusive rocks such as form Red Mountain. However, the occurrence of the intrusive rocks does not necessarily imply that the precious metals are sure or even likely to be present, because experience has shown that appreciable quantities of the precious metals are in relatively few of such intrusive rocks. Nevertheless, such intrusive masses are certainly the best sites for prospecting. Another geologic factor of especial importance in the Hagemeister Island quadrangle is glaciation. Most of the placer gold and platinum in Alaska, whether in preglacial or postglacial gravels, were probably derived from their bedrock sources in preglacial time. Most of the Hagemeister Island quadrangle has been glaciated or has received a large amount of glacial outwash from nearby glaciers. Hence, placer deposits which may have formed in preglacial time were either destroyed by glacial ice or buried by glacial gravels. The southern end of the platinum pay streak on Salmon River is buried by 60 to 100 feet of glacial outwash most of which was probably deposited by glacial streams flowing westward from the large glacier that pushed southwest in Hagemeister Strait. The search for additional placer deposits over most of the quadrangle should be chiefly a search for preglacial stream channels in the vicinity of intrusive granitic or ultramafic rocks.

An area of possible interest is the low plain north of Red Mountain, which may have been incised by northward-flowing streams in preglacial time. Placer deposits that may have formed in these preglacial channels may not have been destroyed because the channels would be transverse to the movement of the ice, which was southwest past the north end of Red Mountain. An area of possible interest to the gold prospector is the large mountain on the north side of Hagemeister Strait about 3 miles west of the mouth of Matogak River. Most of the mountain consists of volcanic and sedimentary rocks that have been altered to hornfels. Fragments of granite were found on the south side of the mountain, and it is probable that the mountain is underlain by a body of intrusive granite. Although the granitic rocks themselves are not exposed to any appreciable extent, they may have been the source of gold-bearing veins in the rocks which have been eroded from the sides of the mountain. If there are gold-bearing veins associated with the granitic rocks, it is logical to assume that placer gold deposits were laid down by the streams that drained the mountain in preglacial time. Placer deposits that may have been laid down on the south and east sides of the mountain may have been destroyed by the ice that moved through Hagemeister Strait unless they were incised in bedrock channels. Placer deposits which may have formed on the west and north sides of the mountain should still be there.

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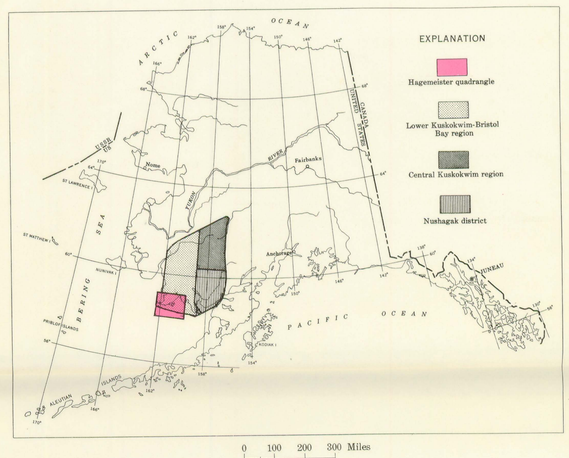

INDEX MAP OF ALASKA

FOSSIL COLLECTIONS

Locality number	Collection number	Field number	Age
26	.....	52AHr115	Middle Jurassic (Bajocian or Bathonian)
	.....		
27	24357	52AHr135	Probably Early Jurassic
28	.....	52AHr3023	Probably early Tertiary (Plant fossils)
	.....		

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—MR-3350

GEOLOGIC MAP OF THE HAGEMEISTER ISLAND QUADRANGLE, ALASKA

By
J. M. Hoare and W. L. Coonrad

Scale 1:250 000

5 0 5 10 15 20 25 Miles

Shoreline shown represents the approximate line of mean high water
1951 magnetic declination at south edge of sheet varies from 18° to 19° east

1961

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-321

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