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Department of Commerce and Labor
COAST AND GEODETIC SURVEY

O. H. Tittmann.
Superintendent.

State: Alaska.

DESCRIPTIVE REPORT.

Hydrographic Sheet No. "A".

LOCALITY:

Cook Inlet.

(Northern Part)

Original.

1909

CHIEF OF PARTY:

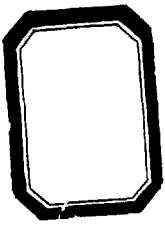
H. W. Rhodes, Assistant.

*Type sheets
3035 to 3043 inc
and type 3044*

*Photograph acc. No.
10502 to 10529 are made
in connection with
this work*

3043, & HYDC 3044.

*See also detailed descriptive reports
with numbers*



3044

Diag. Cht. No. 8502-1

Department of Commerce and Labor
 COAST AND GEODETIC SURVEY

Superintendent.

State: _____

DESCRIPTIVE REPORT.

Sheet No.

LOCALITY:

 190

CHIEF OF PARTY:

Mr. With to par. 3035

3044

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DESCRIPTIVE REPORT

of

COOK INLET, ALASKA.

& HYDC

3044.

U. S. SURVEY,
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MAR 1 4 1910
Acc. No.

GENERAL DESCRIPTION OF THE SHORE LINE OF THE INLET.

The general coast line at the entrance to Cook Inlet is mountainous, with steep slopes rising abruptly from the water to elevations of from 2000 to 3000 feet in the vicinity of Cape Elizabeth, and with higher and rougher peaks on the opposite side in the vicinity of Cape Douglas.

Proceeding up the Inlet on a clear day, the general impression is that of being shut in by high mountains on either side, those on the Kenai Peninsula receding from the shore line to the northward of Kachemak Bay, but increasing in height to a point half way up the ~~up~~ the Peninsula, where many of the peaks are under perpetual snow. In the vicinity of Turnagain Arm, and continuing northerly along the east side of, and to the head of Knik Arm, the mountain range is again lower and more even in appearance, the peaks averaging probably from 2000 to 4000 feet in height. From Anchor Point north, the east shore line is comparatively low, the country for some miles from the shore being a rolling, timbered plateau, with elevations of from 50 to 250 feet at the shore line.

Along the west side of the Inlet from Cape Douglas north to above Chisik Island, the mountains at most points rise abruptly from the water, with Iliamna and Redoubt volcanoes towering well above the surrounding peaks and affording ex-

cellent marks from all parts of the Inlet.

Northwest from Redoubt volcano, the line of the higher snow clad peaks trends away from the shore line, passing through the lofty Mt. Spur and continuing on toward Mt. Foraker and Mt. McKinley, both of which are visible on a clear day from the vicinity of the Forelands northward in the Inlet.

In the northern part of the Inlet, Mt. Susitna is the most conspicuous mark and is an excellent guide on many courses, particularly between "The Forelands" and Tyonek.

OUTLYING DANGERS.

There are no known dangers in the immediate approach to Cook Inlet, unless Dora Rock, near Cape Elizabeth, and ^{Augustine} Sea Otter Rocks, about six miles southeast of Augustine Island may be considered as such. Dora Rock was accurately located in 1907, and Sea Otter Rocks were approximately located from the triangulation of 1908.

PILOTS.

There are no pilots, acting as such, on the Inlet, but a man familiar with the usual courses followed to the head of the Inlet by vessels of moderate draft can generally be secured for such service at Seldovia. The Indians on the Inlet do not act as pilots.

REFUGE.

Port Graham, Seldovia, Coal Bay, Iniskin Bay, Snug Harbor, and Knik Arm are the only harbors in the Inlet, although the East Foreland anchorage is a place of refuge in all but northwesterly winds.

CURRENTS.

The tidal currents have great velocity in the Inlet, and must be taken into account at all times as a factor in economical transportation.

The commercial and fishing steamers always plan their trips to steam with a favorable current, and if obliged to steam against an adverse spring tide, generally anchor and await favoring conditions.

The average velocity of the tidal currents at the entrance to the Inlet is from two to three knots, and in general the velocities increase up the Inlet, with maximum velocities in the vicinity of Point Harriet and The Forelands, and near the entrances to Knik and Turnagain Arms. The maximum current velocity measured by the McARTHUR in 1909 was 5.0 knots, which was obtained at anchorages off West Foreland and near Tyonek and Point Mackenzie as shown on the accompanying tracing of a reconnaissance sheet.

Most of the McARTHUR'S current stations, all of which were at anchorages, were removed from the full strength of the current and there is little doubt that the maximum velocity of the currents at spring tides is as much as eight knots between East and West Forelands, and probably more between Point Harriet and the south end of Kalgin Island.

From Anchor Point north to East and West Forelands, the flood current runs after the time of local high water, the period of such overrun increasing toward The Forelands, where it amounts to as much as two hours at times. North of The Forelands observations show that the currents inshore change nearly

with the times of high and low waters, but the currents in mid stream appear to overrun both high and low waters.

At Nikishka anchorage, just north of East Foreland, the current inshore generally begins to ebb while the mid channel current is still running flood, the difference of time being a half hour or more. At this anchorage, high water occurs about three hours and ten minutes after the time of high water at Kodiak, and low water about three hours and forty minutes after the time of low water at Kodiak.

At Fire Island, high water occurs about four hours and forty minutes after the time of high water at Kodiak, and low water occurs about five hours and twenty minutes after the time of low water at Kodiak.

At Knik Harbor, in the lower part of Knik Arm, high water occurs about five hours and ten minutes after the time of high water at Kodiak, and low water about five hours and forty minutes after the time of low water at Kodiak. Here the tidal currents change practically at the times of high and low waters.

In general, the currents set nearly fair with the channels, the principal exception noted being on the course from East Foreland to Tyonek, where the flood tide sets slightly to the eastward after passing Boulder Point, and very strongly to the eastward after passing the Middle Ground shoal, as will be noted under sailing directions.

WEATHER.

The prevailing winds during the summer are easterly with rain, the gales during that time being from the same direction. In the late summer and early fall, fresh southwesterly breezes

with clear but hazy weather are of frequent occurrence in the lower Inlet, but they seldom blow with much force north of the Forelands. Stiff to fresh northwest breezes, while not frequent, are apt to occur at any time during the early summer; they are generally, though not always, accompanied by rain, and last from one to two days. At such times navigation in the Inlet, except southward with an ebb tide, is very uncomfortable, and even dangerous for small vessels.

Easterly gales become more frequent in the fall, and southeast gales may also be expected in and following September. Snow storms may be expected from the first of October to the end of April.

The upper part of the Inlet is generally closed to navigation by the ice from November until the latter part of April. The ice does not generally interfere with navigation south of Anchor Point, except on the west side of the Inlet, where it is sometimes carried in quantities by wind and tide as far as Mt. Augustine and closing Iliamna Bay for brief periods.

Fogs are not of frequent occurrence but may be expected occasionally during the summer time; their duration without partially clearing, is generally short, although spells of generally foggy weather may last for several days at a time.

LANDMARKS.

While the shore line on both sides of the Inlet can be seen in clear weather, several mountains and headlands are so conspicuous and useful in the navigation of the Inlet, that they deserve especial mention. Mt. Augustine, in the lower Inlet, is a characteristic conical peak rising to an elevation of about 3800 feet

with a flat base. From the southeastward its top has the appearance of a rather symmetrical cone, but from the northeast and north, its top is irregular in outline, the north and west sides of the crater rim having broken down, leaving a sharp circular rim on the southeast face as shown in the accompanying photographs. The upper half of the mountain is obscured in rainy and generally cloudy weather, and frequently during clear weather a cloud cap hangs on its summit,-- soft clouds indicating good weather, and windy weather being frequently foretold by wind caps on the summit. Steam is discharged from the crater much of the time and sometimes forms as a cap on the summit. The peak is useful as a general guide in running courses along the west side of the Inlet to the north of it as far as Snug Harbor. Northward from there it is cut off by high land at Δ Iliamna.

Iliamna volcano, on the west side, is often clear during the summer, and is a conspicuous mark. It has no particular value as a range, but for cross bearings and for use in conjunction with Augustine and Redoubt, it has great value in surveying operations. Steam issues a great part of the time from fissures on its east face just below the summit and from one of the lower peaks on its southeast slope,-- see photograph accompanying this report.

Chisik Island, on the north side of Snug Harbor, has a comparatively smooth surface sloping gradually to the northwest end where it terminates in a high, almost perpendicular cliff which is characteristic and conspicuous. The point of this cliff was located by the 1908 triangulation and is a useful mark and range from the northward where it shows conspicuously

against the snow slopes of Iliamna Mt. (see photograph). The point of Ghisik Island in range with Δ Harriet gives the best course (NxE $1/8$ E Mag.) for proceeding northward from Point Harriet anchorage. (See sailing directions.)

Redoubt Volcano is conspicuous from nearly all parts of the Inlet, is frequently clear in summer, and is a valuable leading and range mark on a number of courses and at several anchorages. It is rather symmetrical, lying with its longer axis north and south, and is easily distinguished from all points east and north by means of a conspicuous notch on its southeast slope just below the summit. (See photograph.)

Mt. Susitna, at the head of the Inlet, is a conspicuous mountain with a ridge of high ground extending off from it in a westerly direction. From the south it appears rather symmetrical with moderate slopes, but from the eastward it has the appearance of a long high ridge with its summit to the left of the center. It is a leading and range mark useful for the navigation of that part of the Inlet lying to the northward of East and West Forelands as far as North Foreland.

Anchor Point, Kalgin Island, East Foreland, West Foreland, North Foreland, Point Possession and Fire Island, while comparatively low, are all prominent in their respective localities, and useful marks both in navigation and in surveying operations.

INSHORE DANGERS.

The shores of the Inlet northward from Kachemak Bay on the east, and Iliamna Bay on the west, are fringed with dangers almost continuously. Boulder patches, reefs, mud banks, and shoals are so numerous and extensive that their descriptions

along surveyed portions will be given in connection with the detailed description of the shore line.

CHANNELS.

The Inlet, from its entrance up to The Forelands, may be considered as divided into two channels by Kalgin Island and the shoals off either end of it. The eastern or main channel is practically the only one used, and on mid channel courses, so far as known, a depth of at least ten fathoms may be carried nearly to the Forelands.

The channel west of Kalgin Island is again divided into two by a shoal middle ground, baring two or three feet at the lower tides, and lying abreast the center of the island and about two and one half miles off its west shore line. Good water can be carried through each of the channels, but the one to the westward of the shoal is the wider and the easier to follow.

From The Forelands northward again to North Foreland there are two channels separated by a long middle ground shoal which bares two or three feet at the lower tides; either of these channels may be followed to the North Foreland and from there on to the entrances to Turnagain and Knik Arms. the channel is practically in mid stream.

ANCHORAGES.

From Δ Anchor Point northward as far as Δ Ninilchik, temporary anchorage may be had practically anywhere at distances of a third to a half mile off shore, in depths of from four to six fathoms; bottom apparently hard sand, but fair holding ground:-- sand shoals, partly bare at low water extend about three quar-

ters of a mile off shore westward from Anchor Point River Valley.

At Cape Starichkof a high gravel and sand bank lies between the foot of the bluff and high water mark, and at its northern end curves rather sharply inshore, thus affording some shelter from the south. The cannery tenders use this anchorage and report good shelter in southerly weather. Anchor about 250 yards off shore abreast the fishermen's house in three and one half fathoms at low water, with Anchor Point shore line showing just inside the outer line of the spit.

At Ninilchik fish house (about a half mile north of Δ Ninilchik) anchor one third of a mile off shore in four fathoms and abreast or a little south of the house. Do not anchor northward of this point, as a rock one mile off shore and a little north of the house bares at lower tides and the shore line generally is foul.

Kasilof Anchorage.

Temporary anchorage can be had in four fathoms, hard bottom, about five eighths of a mile off shore and a little south of Δ Kasilof. This is an exposed anchorage except in northeasterly weather. The cannery ship of the Alaska Packers' cannery at Kasilof anchors for the summer with a heavy anchor at a point about two miles southwesterly from this position in nine fathoms, mud bottom!

Salamato Anchorage.

Anchorage may be had one third of a mile off shore in the flat bight of the shore line about six miles southeast of East

Foreland in five fathoms, sand bottom. This anchorage is exposed to all but northeasterly winds. The Steamer McARTHUR attempted to use it during the season of 1909 for shelter from a nothwest wind, but it was found that the wind drew around East Foreland and a heavy sea made into the anchorage.

EAST FORELAND.

This is the best anchorage in the Inlet outside of the land-locked harbors, and has good protection from all but northwesterly winds. Winds from that quarter send in a rather heavy sea which, in connection with the tidal currents, makes it a very uncomfortable berth; southwesterly winds draw up the Inlet and do not blow home nor send in much sea.

The usual and best anchorage is in six fathoms, abreast or a little below the fish house, and about 800 meters off shore. The bottom is hard, probably sand over hard mud, but good holding ground. The fish house bears SE x E magnetic from the anchorage. Southward from this point the water deepens rapidly close inshore, and a mile north of East Foreland there are depths of twelve fathoms close in to the beach. An anchorage more than a quarter of a mile to the southward of the fish house is not desirable as the holding ground is not as good and the ebb tide runs much stronger on approaching East Foreland. Good fresh water may be had in small quantities from a seepage through the bluff just north of the fish house, but it can only be boated off at high water. Water in much larger quantities may be had from a small stream three quarters of a mile further north, but the flow does not usually last through the summer.

GRAY CLIFF.

Abreast Δ Gray Cliff, on the east shore, there is a break in the extensive offlying boulder fields and through it the shore may be approached to within three quarters of a mile, where a good anchorage in four fathoms, mud bottom, can be had with good shelter from easterly and southeasterly weather. To approach this anchorage, steer E x S magnetic, heading for a low rocky point of the shore which lies 800 meters south of "Gray Cliff Boulder" (a most conspicuous whitewashed gray granite boulder, ^{exposed} 15 feet at high water ~~mark~~, and lying just outside of high water mark and 450 meters south of Δ Gray Cliff) and anchor when three quarters of a mile off shore. From this anchorage Jumbo Rock (ten feet above high water ~~mark~~ and bearing NE x N magnetic, two and three quarters miles from Boulder Point and seven eighths of a mile off shore) is just open of Boulder Point, and Gray Cliff Boulder is in range with a conspicuous V shaped notch in the top of the bluff line.

Point Possession.

Temporary anchorage may be had three quarters of a mile off shore at a point two miles south of Point Possession in four fathoms, sand bottom. This anchorage is protected from easterly and southeasterly weather, but considerable sea makes around Point Possession at times from the violent northeasterly winds which blow at intervals out of Turnagain Arm.

On the north side of Point Possession, anchorage may be had in four fathoms, hard bottom, 400 meters off shore and abreast a conspicuous gulch at the west end of a high bluff one mile west

of Δ Grand View, with shelter from southerly and southwesterly winds which are occasionally felt in this vicinity. The anchorage is inside of the strong tidal currents which set in and out of Turnagain Arm. Water can be secured ^{by boats} at high tide from the gulch mentioned but in the late summer the flow is small and the water considerably discolored by flowing over the clay bluff.

There is an extensive reef off the west side of Point Possession extending from a point one half mile north of Δ Possession southward for a distance of one and a half miles and for a distance of one and one eighth miles off shore at its furthest projecting point. There are depths of three fathoms on the western edge of the reef where the depths increase suddenly to ten and twelve fathoms. The east shore line of Fire Island in line with Point Woronzoff gives a range which just clears the reef and care should be used in rounding the point at low water not to open this range until well clear of the reef. A current line generally indicates the edge of the reef when the tidal current is strong in either direction.

Fire Island.

There is a good anchorage on the west side of Fire Island in four fathoms, hard bottom, about one third of a mile off shore, on line between Race Point and the point of the spit at the southwestern end of the island, and about one mile from Race Point.

The current runs strong here throughout the flood, but the ebb current is weak and after the first two hours of ebb tide it is nearly slack. Occasionally some swell is had from the south-

west, but it does not affect the anchorage seriously. With a fresh northwesterly or northerly breeze the anchorage is untenable as a very rough sea and tide rips prevail, especially during flood tide. This anchorage is generally used by small craft bound up Turnagain Arm either when wind bound or when waiting for a favorable tide.

Turnagain Arm is noted for the violent winds which blow out of it at intervals whenever the wind is easterly,-- with gentle to moderate easterly breezes in other parts of the Inlet, the wind will frequently blow out of the Arm with a force of 6 to 8, and a very heavy sea and tide rips are to be found on a line from its mouth across to "Ladd's" on the west shore. Vessels anchored at the latter place in calm weather are sometimes forced to seek shelter from the heavy breaking seas.

Turnagain Arm is referred to by members of the local shipping fraternity as "The Cannon" which well expresses their opinions of it.

Point Mackenzie.

Anchorage one half mile southwest (magnetic) of Point Mackenzie and three eighths of a mile off shore may be had in four fathoms, hard bottom. The flood current is very strong here, five knots at times, but the ebb is much weaker. Holding ground is good.

Knik Harbor.

The shallow bight of the east shore line of Knik Arm, three miles NE 1/2 E (magnetic) from Point Mackenzie, is known locally as Knik Harbor and affords good shelter from all but northerly winds. Reports state that northerly winds are never severe

during the season when the Arm is open, and such evidence is corroborated by the McARTHUR'S observations in 1909. Anchor about 500 meters off the beach in six or seven fathoms at low water, with the two houses on the beach bearing ENE (magnetic) Bottom hard mud, and good holding ground. The bottom falls off rapidly here to twelve or fifteen fathoms. In order to have swinging room ^{inshore} at low water do not anchor where there will be less than six or seven fathoms at low water. Neither the flood nor the ebb currents have much velocity here, but in mid channel they are very strong. A vessel mills around a great deal at times at this anchorage, due to changeable eddies, and precautions should be taken against the result of a foul anchor.

Fresh water may be had at high water from two small streams between the houses and Cairn Point, but the flow is small and the water discolored by the soil. About 200 meters below the houses a considerable stream discharges out of the grassy flat and at high water a boat can be taken close to a two foot fall. This flat is no doubt covered at the higher tides, but the McARTHUR watered there several times in 1909 and always found the water sweet

On June 10th, 1909, the McARTHUR anchored in five fathoms hard bottom ^{a little west of mid-channel in Knik Arm} at a point four miles above Cairn Point, but the shoaling water indicated an end to the channel navigable at low water.

Iniskin Bay.

The eastern shore and the upper half of this bay are shoal and bare at low water, but the lower central and western parts afford a sheltered anchorage in from four to five fathoms. The

McARTHUR used this anchorage twice in 1908 in stormy weather with winds of force from 5 to 7 blowing from north through east around to southeast and found it sheltered from all heavy outside swell, and nothing worse than a sea made within the two or three mile sweep of the harbor itself to contend with. The detached islands with their connecting reefs which make off southwesterly from the mainland at the east point of the entrance, extend far enough off to give shelter from a southeasterly sea.

The following directions are from courses passed over six times by the McARTHUR in 1908 with continuous soundings which gave from nine to fourteen fathoms in the entrance between the surveyed ground of the Iliamna Bay chart, and the anchorage in Iniskin Bay. At the anchorage, the bottom shoals gradually toward the north and east.

From a point about two miles easterly (magnetic) from North Head, at the entrance to Iliamna Bay, steer N $1/4$ E (magnetic) to pass about one quarter of a mile off the land at the west point of the entrance to the bay. Continue this course about two miles beyond the most prominent point of the west shore and anchor in four or five fathoms, sticky bottom. East point of entrance (an island) bears SE $1/2$ S (magnetic), west point bears S x W $1/2$ W (magnetic). ^{House on East shore bears E.N.E. mag.} This will give a position well over in the west side of the bay. The entering course passes about one and a half miles west of Loaf Island (the east point of the entrance). It is probable that a course ^{passing} nearer in mid channel could be used, but nothing is known of the depths there. A reef extending southwesterly from Loaf Island breaks three quarters of a mile off in heavy weather. On this N $1/4$ E entering course

Black Reef will be left about seven eighths of a mile, and the shoal northeast of it, about five eighths of a mile, on the port hand.

Chinitna Bay.

This is a shoal bay, the lower part exposed to all easterly weather, and with no shelter, unless it may be for small craft near the head of the bay.

At 7:25 P. M. on May 27th, 1908, the Steamer McARTHUR anchored in the middle of the bay, about three quarters of a mile above the island in its entrance, in four fathoms, sticky bottom; which depth would probably reduce to three fathoms two feet at mean low water. Water shoaled gradually from the entrance.

Snug Harbor.

The anchorage is abreast or a little below the house near the northwest end of Chisik Island. Anchor about one third of a mile off shore in eighteen to nineteen fathoms, sticky bottom. No sea makes in, but strong willa waws fall off the high ground of Chisik Island. The mid channel entrance is clear and deep.

Point Harriet.

There is a good anchorage in all moderate weather, on the north side of Point Harriet, and so far as known, it is a safe anchorage during the summer except for southerly and southeasterly gales. On the night of September 2nd, 1908, the Steamer McARTHUR was obliged to anchor here in a southerly gale, and although a heavy sea made in, it was possible to maintain the anchorage throughout the night. Northwesterly breezes blow off the land a few miles away and do not send in much sea. Nothing

is known of the anchorage in northeasterly gales. Anchor in four and a half or five fathoms, mud about one half mile off shore with the high water mark at Point Harriet bearing SSE $1/2$ E (magnetic) distant five eighths of a mile. The ebb current has a velocity of from two to three knots; the flood current is weak and of short duration.

North Kalgin Anchorage.

Stand in for the center of the bight at the northwest point of Kalgin Island on an east (magnetic) course, and anchor in four fathoms, hard bottom, about on the line of the two points of the bight, and just before the range of the south point in line with the southwesterly point of Kalgin Island is closed.

West Foreland.

Anchorage in from four to eight fathoms, rocky bottom, can be had about one and a half miles SW x S (magnetic) from the point of West Foreland, with shelter from northwesterly winds. The bottom is very uneven and, in the absence of a survey, the anchorage is not to be recommended, except in cases of necessity. The flood current has a velocity of five knots, and the ebb somewhat less.

Tyonek.

Anchor about 250 meters off shore abreast the east end of the village, with the Greek Church bearing about NNW (magnetic). Depth, between four and five fathoms with mud and gravel bottom. Flood current from four to five knots; ebb, two to three knots. Be careful of a shoal, bare 100 meters off shore at low water, at a point 200 meters west of the anchorage. Good in moderate

weather from any quarter, or in fresh northwesterly winds.

RIVERS.

Kasilof and Kenai Rivers are navigable at high water for short distances inside their entrances by small steamers, but their entrances are very shoal at low water.

Susitna River is navigable for stern wheel steamers with a draft of from two to three feet, as far as the Talkeetna River, a distance of about sixty miles. Under favorable conditions of high water, the steamer "Alice", operated by the Alaska Commercial Company, has been as far as Indian Creek, about one hundred miles from the mouth.

The "Alice" is reported to have been up the Yentna for a distance of twenty miles from its junction with the Susitna, but this report of the distance has not been verified. The tide does not affect the depths for more than seven miles above the river's mouth. Above the influence of the tide, the current of the river is very swift.

The channels across the flats carry about two feet at low water. They change during the winter and the spring under the influence of the ice and the freshets, and the channels in and above the entrance are said to change frequently in the spring and early summer. Later in the season they are more permanent.

Beluga River carries as much as 18 feet at high water as far as the Alaska Commercial Company's station, about two miles above its entrance, but the deepest water at the station is not more than 8 feet at low water. Navigation at present is limited to steamers and schooners of about ten feet draft, which are expected to settle somewhat in the soft mud at low water. The

tide affects the river for a distance of six or eight miles above its mouth. Small boat navigation is said to extend to Beluga Lake, about twenty miles inland.

The channel, ^{across the flats} to the mouth of the river has least depths of two and three feet at low water. It is fairly permanent during the summer, but is said to shift during the winter and ~~the~~ spring under the influence of the ice.

WATERING PLACES.

Fresh water is piped to the wharves at Port Graham and at Seldovia, but up the Inlet it is very difficult to obtain, and is nowhere accessible except at high water. The streams at East Foreland, at the north side of Point Possession, and in Knik Arm are the only ones known where a vessel can approach the shore closely enough to permit boating water in any quantities.

LIGHTS, BUOYS, Etc.

A white stake light is maintained on the northwest point of Entrance Island, Port Graham, by the Alaska Commercial Company, and a black can buoy in six fathoms marks the south end of the reef inside the harbor.

At Seldovia, the black spar buoy formerly marking the rock in the entrance was not in place during the season of 1909.

At Kasilof River, the cannery boats maintain a number of spar or barrel buoys marking the channel across the flats and into the mouth of the river

During the summer, the cannery boats generally maintain a buoy to mark the position of Salmo Rock, off the entrance to Kenai River.

During the summer of 1909, the Alaska Commercial Company had a red barrel buoy and a red spar buoy marking the channel across the flats to the Beluga River, and also two tripod range beacons at the northerly point of the entrance ^{for} leading through *a lighted beacon, just inshore from those above mentioned, and* the same channel. During the latter part of the season, a light in the window of the Alaska Commercial Company's store, gave a range for crossing the flats.

Near the mouth of the Susitna River, there are a number of beacons maintained and shifted during the season by the crew of the steamer "Alice". During the latter part of the season of 1909, a light was maintained at the mouth of the river, but its exact location was not ascertained.

SAILING DIRECTIONS.

(All courses and bearings are magnetic).

If bound up the Inlet from the southeast, when two miles west of Flat Island make good a N xW 1/2 W course for forty-five and a half miles, which will lead to a position six and a half miles off shore with Ninilchik Church or village bearing east. From here make good a N 5/8 W course for forty miles to a point seven eighths of a mile west of East Foreland.

The first course made good will lead two miles off Anchor Point. The flood tide will generally set fair with this course except near Anchor Point, where a slight westerly set is sometimes felt.

The wooded hill on the south end of Kalgin Island will be raised when about twenty-three miles distant, or when on line between the high ground at Δ Ninilchik and Iliamna Mt.

On the N $5/8$ W course, the northeast point of Kalgin Island will be passed at a distance of 6 $1/2$ miles. Abreast and to the north of Kalgin Island, a slight easterly set will be experienced with a flood tide, but on approaching East Foreland, a westerly set prevails and it is quite strong at times when abreast the point.

An eight knot vessel picking up a spring flood current a little north of Anchor Point will be able to carry it to Fire Island.

East Foreland to Tyonek.

With East Foreland bearing N.N.E. $7/8$ of a mile distant, make good a North course for about 15 miles to a point with Tyonek village bearing N.x W $1/2$ W, 6 miles distant, and then make good a course to the anchorage abreast the village.

On the first course, with a flood tide it will be necessary to allow from $1/4$ to $3/4$ of a point for easterly set; and on the last course, from one to 2 $1/2$ points, depending on the stage of the flood current. Considerably less allowance will be required for the westerly set of the ebb current.

At the beginning of the North course, Mt. Susitna should be slightly on the port bow, and the North Foreland bluff about $3/8$ of a point on the same bow.

Bound south from Tyonek anchorage with an ebb current, a S.S.E. course has been found to make good to the East Foreland anchorage, but this will not hold good at different stages of the tide.

If bound to Fire Island, the usual course, and one known to have no depths of less than six fathoms at low water, is to

make good a North course from the position off East Foreland for 23 miles to a position 1 1/2 miles off shore above North Foreland with Ladd's warehouse bearing S.W.x W, then make good a N.E. 1/2 E. course for 25 miles to a position 3/4 of a mile off Race Point, and follow the west shore of Fire Island to the anchorage. With a flood tide steer N.E.x E. to make the last course good.

There is shoal water between Fire Island and the entrance to Knik Arm, and it is probable that the best depths are to be found close along the edge of the mud bank at the north side of the channel. So far as known, about four fathoms can be carried across at low water, but until the hydrography is complete, vessels of more than fifteen feet draft should wait for half flood tide before crossing.

From a position 1 1/2 miles W.N.W. from Race Point, steer N.E., heading a little north of the center of the entrance between Point Mackenzie and Point Woronzof, and when up to the entrance, proceed in mid channel as may be desired. The tidal currents set fair with the course.

So far as known, a mid channel course up the Inlet is safe after passing the shoal lying N.N.W. of East Foreland. About twelve fathoms of water can be carried by Point Possession, ^{and} into Turnagain Arm on a course passing 1 1/2 miles off Point Possession.

From Snug Harbor North. -- West side of Kalgin Island.

From a position one mile east of the southeast point of Chisik Island, steer N.5/8 E., heading a little west of the

center of the passage between the south end of Kalgin Island and Point Harriet. When three miles below Point Harriet, haul a little to the eastward so as to pass nearly in mid channel between Point Harriet and Kalgin Island. With Point Harriet bearing W.x S., distant about 2 1/4 miles, steer N.W.x N. for about 3 1/2 miles until Point Harriet is in range with the high shore line just south of Smug Harbor, and bearing S. 1/4 W. From this position, steer N.x E. 1/8 E. for eight miles, heading midway between the north point of Kalgin Island and the low point of the opposite shore, and with the high point of Chisik Island dead astern and showing over the land 5/8 of a mile inside Point Harriet. When the north end of Kalgin Island is open and its northeast point bears E.x S., steer N. 1/2 E. for 6 1/4 miles until Butte Hill, a conspicuous, dark, wooded butte, bears W.x S. and then steer N.E. heading 1 1/2 miles outside of West Foreland and with Redoubt Mt. bearing dead astern. Hold this course for about nine miles until well clear of West Foreland, and then proceed as may be desired.

The course from Smug Harbor toward Point Harriet gives a safe clearance of the shoal which bares at low water between six and seven miles south of Kalgin Island. A reef bares for three quarters of a mile east of Point Harriet and the point should not be approached closer than 1 1/2 miles in the line of the reef. The flood current sets fair with all the courses except abreast the upper end of Chisik Island where there is some westerly set, ^{with flood,} and on the N.W.x N. course passing Point Harriet, where it sets more to the north.

The middle ground west of Kalgin Island has shoal depths for about two miles both north and south of its uncovered ends, but its sides appear to be much bolder.

A shoal which bares for three miles in a northeast and southwest direction lies with its center five miles south of West Foreland.

There is a deep channel along the west side of Kalgin Island between it and the shoal, but its use should not be attempted without local knowledge. There is an extensive mud bank off the bight of the shore line west of West Foreland, and care should be had not to approach the shore closer than three miles in the center of the bight.

The courses given above have been run a number of times by the McARTHUR, carrying a marine sentry kite at various depths, and it is believed that nowhere is there a less depth than ten fathoms except on the northeast course by West Foreland, where depths of seven or eight fathoms may be found.

West Foreland to Tyonek

With the high water mark at West Foreland bearing South, distant three miles, steer North, heading just clear of the west end of a gray bluff line on the shore ahead, and keeping on line between it and West Foreland. When within three or four miles of the shore line, haul gradually to the eastward giving Tower Point a berth of two miles, from which position a straight course may be laid for the Tyonek anchorage or to pass North Foreland at a distance of half a mile. The tidal

currents set fair with this course except at the ends, where they are more nearly parallel to the adjacent shore line. This course is for a flood tide. Bound down with the ebb, a south course has been found to hold good.

PORTS.

Port Graham is the transfer point for practically all freight going into the Cook Inlet country. The Alaska Commercial Company has a substantial wharf about two hundred feet long, with fresh water piped on it, and with about eighteen feet at low water along its face. All regular steamers of the Alaska Steamship Company which operate in Southwestern Alaska, go through to Port Graham, as well as the "Portland" and the "Bertha" of the Alaska Pacific Steamship Company. Mining machinery and provisions for the Susitna River country comprise the bulk of the freight, and it was transported in 1909 to the Beluga River Station by the Steamer "Tyonic" and power schooner "Hunter", and from there up the Susitna River by the river steamer "Alice". There is a small general merchandise store at Port Graham and a limited amount of supplies can be had. There was no hotel in 1909 and passengers going in by this route had poor accommodations. A large number of passengers to and from the Susitna River and Knik Arm country went by the Alaska ^{Central} ~~Northern~~ Railway and pack train from Seward to Turnagain Arm, and thence by launches to Beluga, or direct to the head of navigation.

The Alaska Commercial Company furnished coal to order at Port Graham in 1909, but have announced their intention of maintaining a coal supply there the coming season (1910).

There is no Post Office at Port Graham, but application has been made for one, and it will probably be established the coming season. Mail is sent and received by practically all steamers touching here.

Seldovia, the nearest Post Office, has one regular mail a month from Seattle, and the mail steamer "Dora", making a round trip each month, stops each way both there and at Port Graham.

The port of Seldovia has been fully described in previous reports.

Homer, a practically deserted coal mining village in Kachemak Bay, is visited once a month by the "Dora".

At Beluga, two miles up the river of the same name, the Alaska Commercial Company has a fairly complete general merchandise store, and there is a small hotel or boarding house operated during the summer for passengers passing through. The steamer "Alice" makes frequent trips from here to various points up the Susitna River, chiefly to "Susitna Station" of the Alaska Commercial Company, twenty miles up the river, where a large and complete stock of provisions and general merchandise is maintained.

Trading stations at Hope, Sunrise and Knik furnish supplies for their respective localities.

The store at Tyonek formerly maintained by the Alaska Commercial Company was removed to Beluga in 1909, and no supplies are now to be had at the former place.

REPORTED DANGERS.

The five fathom bank shown on chart 8502 as extending about seven miles off shore between Chinitna Bay and Snug Harbor does not exist as a continuous bank, but there are reefs at least six miles off shore in that locality.

On May 30th, 1908, at 9:00 P M. when six miles off shore by reckoning (good bearings not obtainable), the McARTHUR'S kite tripped at 10 fathoms and the hand lead gave six fathoms four feet (about six fathoms reduced) and then twelve fathoms in a few casts. The ship was north bound and a conspicuous wooded canon, leading up toward Mt. Iliamna and lying a little north of Δ Bear Flat, bore west. It seems probable that there is a submerged moraine of an old glacier here and the area should be approached with care.

The detached shoal shown off Point Harriet is a reef connected with the land as already described.

The shoal west of Kalgin Island lies closer to the island than shown. The part that bares is hard sand, and no rocks show on it; shoal soundings off its south end are on rocky bottom.

It is probable that there are navigable channels between the ends of Kalgin Island and the shoals which bare at low water off each end. These shoals lie in line with the general trend of the island. Soundings of ten feet, sand, were obtained from a whaleboat about three quarters of a mile off the north center of the island. No rocks show at extreme low water over a large area between the ends of the island and the shoals, and this would insure a depth of at least four fathoms at high

water. Rocks show for a considerable distance off the north-east corner of the island (see 1908 report) and there are dangerous boulders lying in depths of from four to five fathoms in the same direction and even more to the eastward.

The shoal shown above The Forelands bares as a long ridge of hard sand lying in the direction of the channel. It bares for a length of three and a half miles, and its greatest height above low water is variously estimated to be from two to five feet.

There is no evidence of the existence of the shoal shown as lying between North Foreland and Fire Island. The McARTHUR ran two lines over the supposed position of the shoal and crossed the same ground several times in thick weather towing a kite at ten fathoms and found no indication of a shoal. The Indians and the oldest white inhabitants have no knowledge of a shoal in that locality. It is possible that this position was meant to cover the Moose Point Shoal, which is three and a quarter miles long and a little more than two miles off shore, and nearly abreast the position indicated on Chart 8502. There is an extensive rocky shoal off the south end of Fire Island as shown on the chart, with depths of from three to four fathoms, but its western and southern limits have not been defined.

There is a rock, awash at low water, three and a half miles off the east shore opposite North Foreland, as shown on the accompanying reconnaissance sheet, and owing to the size of the boulders found along that shore, it is not advisable to skirt it in less than seven fathoms.

The waters of the Inlet are much discolored by glacial silt. At low water the discoloration may extend to the mouth of the Inlet, and at high tide the water may be comparatively clear to the Forelands or even above them. Frequently with either a flood or an ebb current the water above the Forelands appears as a liquid mud.

With an average tidal current, there are boils and swirls throughout the Inlet, but they do not necessarily indicate dangerously shoal water, as they show in depths of fifteen fathoms if the bottom is uneven. Unusually heavy swirls with slight overfalls should be avoided, and any disturbance which has a recognized "wake" in the water should be considered as indicating a dangerous rock or shoal.

Sharply demarked tide lines with considerable disturbance will be found in mid channel west of Anchor Point, and frequently, near the end of flood or ebb, about three miles east of West Foreland.

Respectfully submitted,

H. W. Rhodes.

Assistant, Coast & Geodetic Survey.

Commanding U. S. S. "McArthur".

Typ. No. 3044

C. & G. SURVEY,
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ALASKA

Statistics of Hydrography, 1909

3044

COOK INLET

1909 Letter	Number of				Vessel
	Vol.	Angles	Soundings	Miles	
May 21 A	1	27	50	8.5	M ^c Arthur
July 1 B	1	3	0		"
July 10 C	1	3	1	1.0	"
July 29 D	1	50	72	28.0	"
Aug 23 E	1	42	43	34.0	"
Sept 7 F	1	17	33	8.75	"
" 15 G	1	41	69	32.3	"
" 21 H	1	65	390	34.0	"
" 23 I	1	61	236	30.2	"
		309	894	176.75	"

Soundings plotted by H. L. Simmons

Hyd. Sheet No. 3044.

Mar. 29, 1910.

The records of this sheet are clear and well kept.

H. L. Simons

TOP C

3035 to 3043



C. &
RAB AND
MAR 1 4 1910
Ass. No.

Department of Commerce and Labor
COAST AND GEODETIC SURVEY

O. H. Tittmann.
Superintendent.

State: Alaska.

DESCRIPTIVE REPORT.

Topographic Sheet No. A to I

LOCALITY:

Cook Inlet.

(Northern Part)

(Original)

1909

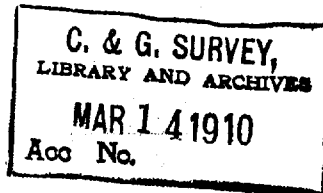
CHIEF OF PARTY:

H. W. Rhodes, Assistant.

Top 3035 to
3043 incl.

See also general descript. report of
Cook Inlet

3041



Cook Inlet

Alaska

Topography of West shore line

from

Nikolai River to Round Point

scale 1:20,000

Surveyed during season 1909 by
party on board Steamer "M.C. Arthur."

H.W. Rhodes, Asst. Commanding

TOP 3035 TO 3035

DESCRIPTIVE REPORT

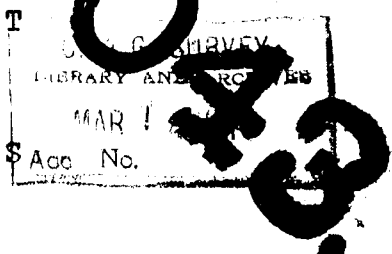
TO ACCOMPANY

TOPOGRAPHIC SHEETS

A - B - C - D - E - F - G - H - & I

OF

COOK INLET, ALASKA. *scales 1:20 000*



NOTE: This report has to do chiefly with a detailed description of the shore line shown on the accompanying sheets. Other information will be found in a general descriptive report of the Inlet which is forwarded herewith.

Survey Methods.

The topography was carried on at the same time as the triangulation, and generally preceded the computations. Whenever possible, the distance between adjacent stations on the same sheet was platted before the shore line was run in. In general, the distances and azimuths were found to check up well between triangulation stations, and such discrepancies as were found, were distributed proportionally between the points of control.

At nearly all points, the nature of the shore line made it impossible to get ^{elevations for} in shore contours, and in place of them, notes descriptive of the general character of the country have been written on the sheets.

SHEET A. (Δ Salamato to one mile south of Swanson's Creek, 21.7 miles)

3035

The shore line from Δ Salamato towards East Foreland appears as a regular, nearly level bluff from fifty to one hundred and fifty feet high, heavily wooded inshore, and with a steep grayish face, except in a few places where some vegetation grows on its face. There is a small creek in a conspicuous gulch about 700 meters north of Δ Salamato.

From East Foreland, the bluff slopes gradually from a height of about ²⁰⁰ 22 feet to a low grassy area, about two miles eastward. The bluff rises again to the eastward to an elevation of 140 feet, and continues on a fairly regular slope to Δ Salamato.

East Foreland is a conspicuous rounding bluff with a nearly perpendicular face of a yellowish-gray clay and sand, with gravel interspersed. The ground slopes inshore for some distance from the edge of the bluff, thus giving it a characteristic appearance when seen clear of the adjoining shore line. The top is covered with heavy alders and patches of cottonwood, with some spruce. The general appearance of this stretch of shore line when approaching from the southward, is that of a low, nearly level, wooded plateau.

From East Foreland to Nikishka the bluff is moderately high and steep. Nikishka is the name given to a fishermen's house two and one half miles above East Foreland, belonging to the Alaska Packers' Cannery at Kasilof. This is the native name of the site of the fish trap. There are no natives here and no buildings except the one house which is occupied from the latter part of May until September by men tending the fish trap.

From the fish house northerly nearly to Boulder Point there is shoal ground for three quarters of a mile off shore, with two shoals which bare at low water. At Boulder Point the ground is rough and irregular, and rises slightly inshore. Four miles northeasterly from Boulder Point there is a prominent bluff with a steep yellowish face and heavily wooded top..

From this point the bluff line slopes gradually to the north-eastward.

A large and conspicuous boulder field begins at Boulder Point and extends along shore almost continuously to Moose Point, a distance of about twenty-one miles. For a large part of the distance these granite boulders show as much as two miles off shore at low water, with occasional ones which show above high water; many of them are of great size, several being at least forty feet in diameter. Jumbo Rock and the large one, one mile outside of it are located by triangulation cuts, and will prove useful points in the hydrography.

Five and three quarters miles northeasterly from Boulder Point there is a creek which drains a considerable area of low country, but it is not navigable.

3036 SHEET B. (Below Swanson's Creek to Δ Birch Hill, 14.1 miles)

Swanson's Creek, about two miles south of Δ Gray Cliff, is navigable at low water by row boats and at high water by sloops or launches. The volume of water in this creek and the low country back of it give indications that it may be navigable for several miles. Reconnaissance was made on foot for a mile inshore.

The bluff line rises at Δ Gray Cliff to a height of 150 feet, the greatest elevation shown on this sheet. Its height and its distinguishing light gray color make it a good mark from the Inlet.

About five hundred meters below Δ Gray Cliff is a conspicuous boulder of granite, about forty feet in diameter and lying about forty meters ^{outside} ~~below~~ the high water mark; its top and

westerly face were white-washed in 1909. It is known in the triangulation records as White.

About twelve hundred meters below Δ Gray Cliff is another conspicuous boulder, and abreast it and about three quarters of a mile off shore, is an anchorage elsewhere described, the limits of the boulders being much closer in shore at this point.

From Δ Gray Cliff northward the bluff line is rather regular in appearance and heavily wooded. At Δ Birch Hill, the bluff again rises to an elevation of 140 feet, and then slopes downward gradually toward Moose Point.

3037 SHEET C. (Δ Birch Hill to three miles inside Turnagain Arm, 18.6 miles)

Moose Point is low and wooded, with a grassy flat on its southwesterly point. It is a conspicuous point from the northward when seen clear of the land south of it. The country back of it is low for about one mile inshore, and then rises again. This point marks the northerly limit of the extensive boulder fields, the shore to the northward as far as Point Possession being comparatively free from boulders showing above low water. Two miles off shore and a little north of Moose Point, there is a long shoal of hard sand, bare from two to three feet at low water. About four miles northeast of Moose Point there is a small spruce tree on a low grassy point which was accurately located by the plane table.

From Δ Moose Point north as far as Point Possession village, the bluff line is practically continuous, with elevations increasing gradually to 140 feet at a point about two miles south of Point Possession. The bluff at the village is low

(about twenty feet) there being a low valley leading inshore from this point. About six miles above Moose Point there is a prominent and conspicuous reddish bluff ninety feet high, and immediately ^{North} ~~west~~ of it is a deep cañon cutting through the bluff and carrying a small stream. This cañon is conspicuous only from the southwestward. From the Point Possession Indian village the bluff rises gradually around the Point and into Turnagain Arm, where it reaches its maximum elevation of 277 feet at Δ Grand View.

As seen from the southwest, Point Possession is a low, heavily wooded headland with a steep bluff line the face of which is partly overgrown with bushes. There are some rocks on the beach as well as some awash immediately outside of Δ Point Possession. About one mile around the point from the station there is a conspicuous high gulch in the bluff line. Fresh water can be obtained here, and there is a good temporary anchorage about four hundred meters off shore. From this point eastward along the shore there are a number of rocks awash at low water, and one large one which bares at half tide lies about one mile off shore in a northeasterly direction from Δ Grand View. Its position was not determined.

The bluff from the gulch above mentioned to a point about one half mile east of Δ Grand View, is nearly perpendicular, from 150 to 250 feet in height, and inaccessible. In the vicinity of Δ Grand View, and for some distance eastward, the bluff is merely a thin high ridge, being not more than two hundred meters wide and pitching off rather sharply inshore. There is a lake about one mile straight inshore from Δ Grand View,

the elevation of the ground at that point being estimated to be fifty feet.

3038 SHEET D. (Fire Island to Point Mackenzie, 24.4 miles)

Fire Island is rather heavily wooded with spruce, birch, alder, and cottonwood. Its northern half presents a rather regular outline, but its southern end is rough and broken, there being some high sand hills with irregularly wooded slopes and some bare summits. A lake surrounded by high hills on three sides is a peculiar topographic feature of its south end. The sand drifts under the influence of easterly winds, and the sand hills are encroaching on the spit at the southwestern point of the island. There are no streams on the island, and after the snow water is gone, the island is dry except for the water in the lake. Some fresh water may be had at a depth of a few feet at the foot of the low bluff in the bight of the shore line northwesterly from the lake, but in the late summer it has been found to be much discolored and not perfectly sweet.

The southwestern point of the island is a low spit about ten feet high partially covered by spruce. The east shore line of the island is a steep bluff, highest at the south end and sloping gradually to the north. The west shore line has a very high steep bluff abreast the center of the island, decreasing in elevation toward the north end, where the ground is low and flat, and subject to overflow by storm floods.

There is an extensive mud flat in the bight at the southwestern end of the island, baring about a half mile off shore at the lower waters, and there is shoal water in a line from

from the anchorage (one half mile off shore, and one mile above Race Point) to Spit Point. The limits of the shoal bare at low water and connecting Fire Island and Point Campbell are only approximate on the Turnagain Arm side, and it probably extends much further south and east in that vicinity.

The hills at Point Campbell, which is just beyond the limit of the topography shown on the sheet, appear to be sand hills similar to those on the south end of Fire Island, and from two to three hundred feet high. Toward Point Woronzof the bluff is lower, being probably sixty feet at half the distance to Point Woronzof, and then gradually rising to that Point. Midway between these points there is an extensive marsh, and at its ^{north} west end, a fishing village used in the summer time by natives from the upper end of Knik Arm. Abreast this marsh and about a half mile off shore is a shoal which bares one eighth by one mile in a north and south direction at low water. Point Woronzof is a rounding headland 155 feet high with steep bare faces, and heavily wooded with cottonwood and birch. Inshore from the signal the ground rises slightly and then falls away again into a somewhat lower and heavily wooded plateau.

Eastward from Δ Woronzof into Knik Arm, the bluff line decreases gradually in elevation at the shore line, being about thirty feet high in the vicinity of Δ Delta, and rising inshore in a southeasterly direction until merged into a plateau about 125 feet high. The creek shown near the end of the sheet has steep mud banks at low water, and can be entered for half a mile or more at high water by small boats and launches; it apparently drains a considerable area through the low valley di-

rectly inshore.

At Point Mackenzie the bluff is fairly regular, heavily wooded, about sixty feet in height, and for a distance of one and one-half miles westward is at the high water line; from that point it trends rather sharply inshore, and forms the north boundary of a swamp which is from two to three miles wide from this point westward as far as the Little Susitna River. The Susitna Mud Flat has its eastern beginning about one mile westerly from Point Mackenzie and trends rapidly off shore to the westward.

3039

SHEET E. (Lower part of Knik Arm, 16.2 miles)

From one mile south of Δ Gnat up to that signal there is a low wooded bluff about thirty feet high. Three-eighths of a mile above Δ Gnat is the entrance to Ship Creek, a good sized stream extending inshore for some miles. The tide affects this stream for a distance of nearly half a mile, or to the limit of the flat ground. Above that point the creek bed rises through a number of rapids to the higher ground. A large log house, partly obscured by trees, stands on the north bank of the creek a quarter of a mile from the outer shore. There is a good trail cleared and blazed, on the north bank of Ship Creek, which was followed by a reconnaissance party for a distance of about two and a half miles inshore without finding its terminus. The name "Ship Creek" was obtained from mining location notices along the banks.

From Ship Creek northward to \odot Gable there is a rather extensive grassy flat in front of the bluff line. This flat covers at extreme tides but water found in small streams on it is

sweet. At its northern end, where the bluff comes down close to high water, there are two log houses said to have been built some years ago for a station for the Alaska Commercial Company, when they landed freight for the Arm directly from the S. S. "Bertha" at this point.

From Ship Creek the bluff rises gradually from a low plateau about fifteen feet high to Cairn Point, where it has an elevation of 112 feet and from which point it rises gradually inshore. From Cairn Point a shoal which bares at low water extends about one mile in a northwesterly direction. Northward from Cairn Point to the limits of the sheet, the bluff line is somewhat lower, and is cut at intervals of about a mile by small canons carrying fresh water. The second creek above Cairn Point has a good flow of water, but the "McArthur" could not approach it closer than three quarters of a mile on account of shoal water and very rocky bottom. Some boulders are found at the foot of the bluff northward from Cairn Point.

From Point Mackenzie northward, the west shore line increases gradually in height for a distance of about three miles where it reaches a maximum elevation and then descends in an irregular manner to the north limits of the sheet, where it has an elevation of about forty feet.

Just inside of Point Mackenzie is an extensive shoal of mud, sand and boulders, which bares for three quarters of a mile off shore at the lower tides. Northward of this the low water mark is not more than four hundred meters off shore, until near the bight in the shore line, where it again extends about three quarters of a mile off shore. A few boulders are found between high

and low water marks throughout this stretch. From the arm. the country presents a heavily wooded appearance, the trees being birch, spruce, alder, and cottonwood.

3040 SHEET F. (Kustatan River to McArthur River, 20 miles).

From a distance, West Foreland shows as a moderately high, flat topped, timbered headland. The southeasterly part is the highest, having an elevation of about 175 feet. From there northward to Δ Hay, the ground is somewhat lower and shows as wooded hills, gulches, and ridges. The bluff along the shore is rather regular with an average elevation of 110 feet.

Kustatan Village, one mile west of the point of the Foreland, consists of five or six houses built on top of the bluff, which is here about 150 feet high, open and grass covered. There are about thirty natives belonging to the village.

The shore line at West Foreland is fringed with boulders, many of them being ten feet or more in diameter; they show all the way from high water mark to low water mark, with a number awash still further out, and soundings for a mile or more off shore to the southward of the point, indicate that they extend that far. About one mile west of the point, the mud flats begin, and these extend off the low shore line to the westward for a distance of several miles.

The Kustatan River makes in to the northwestward from the south side of the Foreland and connects inshore with the McArthur River; the natives frequently go to Tyonek in bidarkas by this route when the weather is bad outside. No local name could be found for McArthur River, which apparently has not

been charted before. The natives sometimes call it "Beluga", but that name is now fixed locally as the name of the river north of North Foreland.

There is an extensive area of low ground on the north bank of the Kustatan River for some distance in shore, but its limits could not be determined. From a distance it resembles a tundra.

From West Foreland northward nearly to Δ Hay there are numerous boulders along the beach, but from there on, there are only occasional ones. At Δ Hay, there is the beginning of an extensive mud flat which trends off shore to the northward, reaching a maximum distance of two and one eighth miles from the high water line at a point abreast the McArthur River.

On the north bank of a small stream a quarter of a mile north of Δ Hay is a deserted village of the Kustatan Indians.

Two miles north of Δ Hay the bluff line recedes from the high water line and trends in to the base of a conspicuous wooded ridge, five miles long and three hundred feet high, which is two and one half miles back from high water mark at its northern end.

A portion of the south bank of the McArthur River is shown at the extreme end of this sheet. At high tide the mouth of this river is over one mile wide, but at low tide it shows much bare ground, and it is uncertain how much water, if any, can be carried in at that time. There are no rocks or boulders visible off the mouth of this river at extreme low water.

From McArthur River to the beginning of SHEET G, near Δ Goose Flat, a distance of about eight miles, the shore line swings on an easy line to connect. The country is low, flat,

and grassed, with clumps of spruce tree about one and one half miles inshore along the south half of the distance, and further inshore along the north half. There appear to be several tidal sloughs making in through the high water line.

3041 SHEET G. (Nikolai River to Δ Round Point, 16 miles).

The high water line in the vicinity of Δ Goose Flat is somewhat indefinite; the ground is a hard mud flat, sparsely grassed and partially covered by old drift logs for a distance of a mile or more inshore; it is evidently all covered at storm floods. Nikolai River has about fifteen feet of water at high tide nearly as far up as Δ Goose Flat; its channel across the mud flats has from one to two feet at low tide. The water is fresh as far down as the station, except for a short time at high water. The mud flats bare for upward of two miles off shore at this point. From the Nikolai River eastward, the high water line becomes more sharply defined, and the flat ground back of it is higher as the bluff line is approached, and one mile east of the river, gravel is found at the high water mark.

One and one eighth miles west of Δ Tower is a conspicuous gulch with a small stream of fresh water and a good camp site, the only one in this vicinity. There is an anchorage about three quarters of a mile off shore at this place, in from four to five fathoms of water, hard bottom, with the village of Tyonek open about one hundred meters on Tower Point.

The bluff for about a mile on either side of Δ Tower is very steep, its face bare of vegetation, and of a conspicuous light gray color. There are a number of conspicuous red bluffs in the bight of the shore line below Old Tyonek, and a number

of isolated deposits of iron ore in the same vicinity. There are also several veins of coal (lignite) varying from a few inches to two or three feet in thickness.

The village of old Tyonek, consisting of about a dozen native houses, was formerly located three quarters of a mile westward at the mouth of a creek, but owing to an extremely high tide about eight years ago which inundated the village, they were obliged to move to higher ground.

There are rocks awash at low water about three quarters of a mile off Tower Point and slightly to the westward of the signal, and the depths for some distance off shore are uneven and with rocky bottom. There are several large boulders about three quarters of a mile off shore abreast the bight of the shore line east of Tower Point. From here toward Tyonek village, the shore is bolder and can be approached to within one third of a mile.

From Old Tyonek eastward for one and one half miles, the bluff increases in height to 180 feet, and is rough and broken. From here to Δ Tyonek it is very even, with a flat top 150 feet high.

Tyonek village, built on a grassy spit about three feet above high water, has about seventy-five native and two or three white inhabitants.

North Foreland is an undulating hilly ridge, covered with spruce and heavy cottonwoods, and has an elevation of about 150 feet. Northwest from it the ground is rough and broken with deep gulches and lakes, and wooded hills with elevations to 300 feet or more. From North Foreland northward, the bluff is lower and more regular in appearance, with a conspicuous valley and a

few Indian houses at Shorty's Creek, one and a half miles north. From the bluff above Δ Goose Flat to the limits of this sheet, there is a gravel beach at high water mark.

SHEET H (Δ Round Point to Theodore River, 15 miles)

3042 From Δ Round Point to the Chuit River valley, the bluff is regular, flat on top, and about seventy feet high. The Chuit River enters the Inlet through a conspicuous low break in the bluff line. About eight feet can be carried into the mouth of the river at high tide. The tide affects the river for a distance of about one mile inshore. There is a small Indian village known as "Ladd's" and a conspicuous ^{old} warehouse at the mouth.

From Chuit River to Three Mile Creek, the bluff appears fairly regular from off shore, with a promontory about 150 feet high on the south side of Three Mile Creek. North from Three Mile Creek for a distance of about two and one half miles, the bluff is flat and regular, with a steep bare face, and about seventy feet high. From that point northward it is inside the Beluga River Flat, and has the appearance of a low, heavily wooded ridge.

Mud flats begin in the vicinity of Three Mile Creek and extend northward at an increasing distance off shore, baring about one and one half miles outside the high water mark at the Beluga River. In the vicinity of the Beluga River, the tree line is about two miles inside of the ordinary high water mark, and the country inshore is low and heavily wooded. At extreme high waters (storm floods) the Beluga Flats cover back to the tree line. The commercial features of this river are elsewhere

described.

There are placer locations about eight miles up the Beluga River, which are said to carry fair values. Near its head waters are lignite deposits of considerable extent, said to be of high quality and with veins up to fourteen feet in thickness.

The Theodore River, three and one half miles above the Beluga, is similar to the Nikolai River, which has already been described; about four or five miles from high water it reaches a point within three quarters of a mile of the Beluga River, and there is an easy portage between the two.

The Lewis River, about three miles beyond the Theodore River, is said to be only a tidal slough draining the marshes.

3043 SHEET I. (Susitna River to Little Susitna River, 16 miles.)

The shore line shown on this sheet is fronted throughout its length by an extensive mud flat extending at low water from three to five miles off shore. In most places the high water line is indefinite, and east of the Susitna River, it is about two and one half miles outside of the tree line. The country inshore is low, flat, and apparently heavily wooded. There are some birch and alder, but spruce predominate.

Susitna River has two channels, known as the East and the West, which unite about fifteen miles inshore; about six miles inshore they are connected by a slough, carrying five to six feet at times of high water, and used at such times by small boats. The commercial features of the Susitna River are elsewhere described.

Small boats can enter the Little Susitna River at low water

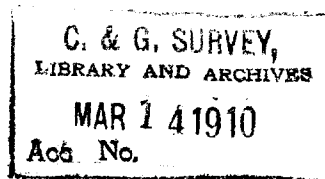
if able to follow the channel across the mud flats. At high water, twelve ^{feet} can be carried into the entrance, and it is reported to be navigable for launches with favorable tides for a distance of eight miles.

East of the Little Susitna River, the tree line sweeps inshore somewhat, and then out again to cross a creek one mile east of the Little Susitna River, at a distance of two and a half miles inshore from high water mark. From this point eastward, the tree line follows a bluff about sixty feet high which extends eastward continuously to Point Mackenzie.

Respectfully submitted,
H. W. Rhodes.
asst. C. G. S.

2ip = 3035
To accompany sheet A.

Department of Commerce and Labor



COOK INLET,

ALASKA.

PLANE TABLE POSITIONS.

OBJECT	LATITUDE	D.M.	LONGITUDE	D.P.	REMARKS.
* Salamata	$\Delta 60^{\circ} 36' 36.62''$	1133.43	151 20 52.41	797.2	
E. Foreland	$\Delta 60 43 01.80$	55.7	151 24 47.59	721.7	209 Feet
Boulder	$\Delta 60 46 07.50$	232.1	151.15 52.11	789.0	
Fish Ho.	Midway between Boulder and E. Foreland slightly above H.W. line. Designated on charts as Nikishka.				
Village	Consists of a shack and a few sheds. Is on the Wly. bank of a creek about 2 miles N. Ely along shore from Boulder. Called by some natives Nikishka #3.				

Positions were all determined by plane table prior to triangulation. Topography carried on without a projection. Geographical Positions of triangulation stations as given here are from the triangulation computations.

3036

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Cook Inlet

Alaska

Topography of East shore line

from

Swanson's Creek to Birch Hill

Scale 1: 20,000

Surveyed during season of 1909. By
party on board Steamer "McArthur."

H.W. Rhodes, Asst. Comdg.

Top = 3036

TO ACCOMPANY SHEET R.
Department of Commerce and Labor

C. & G. SURVEY,
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COOK INLET,

ALASKA.

PLANE TABLE POSITIONS.

OBJECT	LATITUDE	D.M.	LONGITUDE	D.P.	REMARKS.
Gray Cliff Δ	60 49 34.45	1066.3	150 57 58.53	884.6	150 Feet.
Birch Hill Δ	60 54 45.46	1407.1	150 45 54.65	823.7	112 "

The topography preceded the triangulation.

The geographical positions are from the triangulation computations.

4037
 TO ACCOMPANY SHEET C.
 Department of Commerce and Labor

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COOK INLET,

ALASKA.

PLANE TABLE POSITIONS.

OBJECT	LATITUDE	D.M.	LONGITUDE	D.M.	REMARKS
△ Birch Hill	60 54 45.46	1407.1	150 45 54.65	823.7	
△ MOOSE Pt.	60 57 19.12	591.8	150 41 03.07	46.2	10' approx.
△ Possession	61 02 05.56	172.1	150 24 09.74	146.2	100'
△ Grand View	61 01 13.07	404.6	150 20 52.58	789.9	277'

- Shed House on bluff, 43' high, on North side of creek midway between Moose Pt. and Birch Hill. Numerous large boulders on shore on South side of creek.
- Lone Tree Small spruce on point about 4 miles N.E. from Moose Pt. in centre of large grassy patch. Not distinguishable from off shore but may be readily recognized from the beach.
- Spruce Spruce tree, with upper branches chopped off, on bluff 75' high. Triangles blazed on two trees distant not more than 10 meters. This bluff is about 5 miles S.W. from Pt. Possession. At its base is a shack with a cedar bark roof giving it a reddish appearance. On the south side of a creek flowing past the foot of this bluff is another prominent, steep bluff 90' high. The shack is as well located as this tree.
- Village All the houses were rodded in. One of them was used as a hydrographic signal being designated as, "Hut". Village is about 600 meters S.W. from Point Possession.

As the topography preceded the triangulation, without a projection, D.M'S & D.P'S. of objects other than triangulation stations are not given. (Positions of triangulation stations from computation)

2038
 TO ACCOMPANY SHEET D.
 Department of Commerce and Labor

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FIRE I. & KNIK ARM,

ALASKA.

PLANE TABLE POSITIONS.

OBJECT.	LATITUDE	D.M.	LONGITUDE	D.P.	REMARKS.
SPIT					5 Feet.
Fire △	61 07 29.32	907.6	150 14 09.2	137.7	307 "
Race △	61 09 54.38	1683.3	150 13 48.68	727.9	
Delta △	61 11 55.97	1732.5	149 57 37.07	553.7	28 "
Wright △	61 10 14.69	454.7	150 09 56.12	839.1	8 "

All stations given hereon, were located by plane table, without a projection, preceding the triangulation. Positions are from later computations.

20p = 3034

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TO ACCOMPANY SHEET E.
Department of Commerce and Labor

KNIK ARM,

ALASKA.

PLANE TABLE POSITIONS.

Object	Lat.	D.M.	Long.	D.P.	Remarks.
Delta \triangle	61 II	55.97	1732.5	149 57 371	553.7 28 feet
Gnat \triangle	61 I3	05.15	159.4	149 54 335	499.7 5 feet.
Cairn \triangle	station. Position determined by plane table, but will be more accurately located upon resumption of triangulation				
Shack	On west side of Knik Arm, on top of bluff 90' high. About 2000 meters north of Mackenzie. S.E. edge of shack used.				
Tree	Large tree on highest part of prominent bluff on West side of Knik Arm, bearing N.N.W. from Cairn. It is approximately 140 meters from the edge of the bluff, which is 154 feet high. It may be readily recognized from any point on the South side of the Inlet.				
Gable	Out shore gable of the more southerly of two fish houses approximately 1250 meters from Cairn.				
Rock	Prominent white boulder on the West side of the Inlet making at Cairn an angle with Mackenzie of approximately 82 15. Is a short distance above H.W. line.				
Stone	White boulder, near H.W. line on E. side of the Inlet, about 396 meters from the mouth of the second large creek North of Cairn, and about 1362 meters from shack				
H	four miles North of Cairn.				
House.	S.W. corner of larger shack on E. side of Inlet; about 4 miles North of Cairn.				
Stub	Rod reading from last set up. Marked by a stub driven in base of bluff a little above H.W. line. It is on the West side of the Inlet about 469 meters from the mouth of creek about one mile North from aforementioned prominent bluff.				
Spruce	One of two scraggy spruce trees near the edge of the bluff, approximately, 86 meters beyond Stub. Sufficiently mutilated to be readily recognized.				

The Topography was carried on without a projection, preceding the triangulation. Positions of triangulation stations are from later computation,

Ed. 9-26-08-200,000

DEPARTMENT OF COMMERCE
U.S. COAST AND GEODETIC SURVEY

REG. NO. 393#
3039 a

TOPOGRAPHIC TITLE SHEET

The Topographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 1

REGISTER NO. 3039a

State Alaska

General locality Knik Arm

Locality Anchorage and Vicinity

Scale 1 : 10000 Date of survey May and July, 1918.

Vessel

Chief of party E.R.Hand

Surveyed by E.R.Hand And W.D.Patterson

Inked by

Heights in feet above to ground to tops of trees

Contour, Approximate contour, Form line interval feet

Instructions dated, 19

Remarks: Revision survey of Anchorage and vicinity

Extract From Descriptive Report of H-4035 (1918)

3. The Signals were determined directly on this smooth sheet,
by plane tables methods, from the plotted triangulation stations.
I also did some revision work on this sheet around Anchorage,
determining points by which the blue prints of town and new
wharf may be utilized.

E.R. Hand

REVIEW OF TOPOGRAPHIC SURVEY No. 3039 a

Title (Par. 56) Anchorage + vicinity, Knik Arm, Alaska.

Chief of Party E.R. Hand Surveyed by E.R. Hand + Inked by —
W.D. Patterson

Ship — Instructions dated — Surveyed in May-June 1918

1. ✓ The survey and preparation for it conform to the requirements of the Topographic Manual. (Par. 7, 8, 9, 13, 16.)
2. ✓ The character and scope of the survey satisfy the instructions.
3. ~~The control and closures of traverses were adequate. (Par. 12, 29.)~~
4. The amount of vertical control that the Manual specifies for -contours-formlines- was accomplished. (Par. 18, 19, 20, 21, 22, 23.)
no vertical control was accomplished.
5. ~~The delineation of contours-formlines is satisfactory. (Par. 49, 50.)~~
6. ✓ There is sufficient control on maps from other sources that were transmitted by the field party to enable their application to the charts. (Par. 28.) *(See page 1 of Descriptive report of H-4035)*
7. High water line on ~~marshy and mangrove coast~~ is clear and adequate for chart compilation. (Par. 16a, 43, 44.)
8. ✓ The representation of low water lines, ~~reefs~~, ~~coral reefs~~ and rocks, and legends pertaining to them is satisfactory. (Par. 36, 37, 38, 39, 40, 41.)
9. ✓ Rocks and other important details shown on previous surveys and on the chart were verified. (Par. 25, 26, 27.)
10. ~~The span, draw and clearances of bridges are shown. (Par. 16c.)~~
11. ~~Locations and elevations of summits are given. (Par. 19, 51.)~~
12. ~~The tree line was shown on mountains. (Par. 16g.)~~

NOTE: Strike out paragraphs, words or phrases not applicable and modify those requiring it. Paragraph numbers refer to those in the Topographic Manual. Use reverse side for extending remarks.

13. ~~The descriptive report covers all details listed in the Manual, in so far as they apply to this survey. (Par. 64, 65, 66, 67.)~~
No descriptive report was submitted by the field party. see review of H-4035 re - origin of this sheet as a topo!
14. ~~The descriptive report also contains additional information required in aero-topography relative to type of photographs, method of compilation and type of ground control.~~
15. ~~The descriptions of recoverable stations and references to shore line were accomplished on Form 524. (Par. 29, 30, 57, 67 except scaling of DMs and DPs, 68.)~~
16. ~~A list of landmarks for charts was furnished on Form 567 and plotting checked. (Par. 16d, e, 60.)~~
17. ~~The magnetic meridian was shown and declination was checked. (Par. 47, 52.)~~
- ✓ 18. The geographic datum of the sheet is *Valdey Datum* and the reference station is correctly noted. (Par. 34.)
- ✓ 19. Junctions with contemporary surveys are adequate. ~~There are contemporary top. surveys.~~
- ✓ 20. Geographic names are shown on the sheet and are covered by the Descriptive report. (Par. 64, 66k.)
- ✓ 21. The quality of the drafting is good. (Par. 31, 32, 33, 35, 36, 37, 38, 39, 40, 41, 42, 45, 46, 47, 48, 49, 50.)
- ✓ 22. No additional surveying is recommended.

23. ~~The Chief of Party inspected and approved the sheet and the descriptive report after review by~~

24. Remarks: *This sheet consists of a revision survey only. see remarks regard same in Descriptive Report for H-4035(1918) and Review of same.*

Reviewed in office by *John B. Raddy - Oct. 6, 1936*

Examined and approved:

Chief, Section of Field Records

Chief, Section of Field Work

Chief, Division of Charts

Chief, Division of Hyd. and Top.

21p = 3040

G. & G. SURVEY,
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PLANE TABLE POSITIONS.

Cook Inlet, Alaska, 1909 Str. McARTHUR.

	Lat.	D.M.	Long.	D.P.
△ Kustatan,	60 43 03.68	113.9	151 45 33.79	512.4
△ Hay	60 47 48.92	1514.1	151 46 23.32	352.7

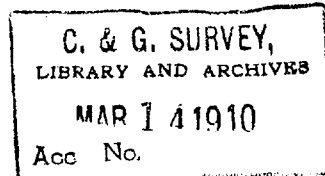
Village. A deserted Indian village of partly tumbled-down shacks about one-fourth of a mile northerly from △ Hay.

The topography was executed coincident with the triangulation observations and before a projection was made. The positions, aside from the triangulation stations, are only plane table locations.

To accompany Sheet "F"

app.

207 = 3041



PLANE TABLE POSITIONS.

Cook Inlet, Alaska, 1909 Str. McARTHUR.

	Lat.	D.M.	Long.	D.P.
△ Goose Flat,	61 00 26.63	824.3	151 30 29.28	440.0
△ Tower,	61 00 28.23	873.8	151 21 31.58	474.5
△ Tyonek,	61 02 33.06	1023.3	151 11 20.22	303.5
△ Round Point,	61 04 31.15	964.2	151 07 55.22	828.1

Shorty's, 61 03 45.4 1405. 151 08 38.5 578.

Approximate position.

A log house, occupied by "Shorty" McConahay, about two miles northeasterly along the beach from △ Tyonek.

Old Tyonek, An Indian village three and one-half miles southwesterly along the beach from △ Tyonek.

The topography was executed coincident with the triangulation observations and before a projection was made. The positions, aside from the triangulation stations, are only plane table locations.

To accompany Sheet "G".

a.j.c.

Top = 3042

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PLANE TABLE POSITIONS.

Cook Inlet, Alaska, 1909. Str. McARTHUR.

	Lat.	D.M.	Long.	D.P.
△ Round Point,	61 04 31.15	964.2	151 07 55.22	828.1
△ Terrace,	61 09 20.99	649.7	151 03 23.44	350.6
△ Beluga,	61 12 32.53	1006.9	150 53 55.32	826.0

Ladd's A long warehouse on the bank of the Chuit River.

Beluga. The store building of the Alaska Commercial Company on the Beluga River.

The topography was executed coincident with the triangulation observations and before a projection was made. The positions, aside from the triangulation stations, are only plane table locations.

To accompany Sheet "H".

att.

Top = 3043

C. & G. SURVEY,
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MAR 1 4 1910
Acc No.

PLANE TABLE POSITIONS.

Cook Inlet, Alaska, 1909 Str. McARTHUR.

	Lat.	D.M.	Long.	D.P.
Δ Susitna,	61 15 19.90	616.0	150 31 06.50	96.9
Δ Little,	61 15 53.48	1655.5	150 17 58.84	877.0

The topography was executed coincident with the triangulation observations and before a projection was made.

To accompany Sheet "I".

alt.