3674

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Department of Commerce and Labor
COAST AND GEODETIC SURVEY

O. H. Tittmann
Superintendent.

State: Alaska

DESCRIPTIVE REPORT.

Hyd. *Sheet No.* 3674

LOCALITY:

S. Knik Arm
Cook Inlet

1914

CHIEF OF PARTY:

R. S. Patton.

11—1646

3674

DEPARTMENT OF COMMERCE

COAST & GEODETIC SURVEY.

O. H. TITTMAN, SUPERINTENDENT.

HYDROGRAPHIC SHEET NO. 3674.

KNIK ARM

COOK INLET, ALASKA.

SCALE: 1-40000.

HYDROGRAPHY by

R. S. PATTON, ASS'T,

A. R. HUNTER, W. O.

Steamer "EXPLORER"

R. S. PATTON, CHIEF OF PARTY.

DESCRIPTIVE REPORT

HYDROGRAPHIC SHEET NO...3674.

SHIP CREEK TO MATANUSKA RIVER,

KNIK ARM, ALASKA.

There is a peculiar interest attaches to Knik Arm just at present, at least to persons whose interests and welfare are contingent on the development of Alaska, because of the probability that the contemplated Government railroad will pass through that region. That this interest has been accentuated and concentrated on this locality is due to the fact that the Alaska Engineering Commission have made their headquarters at ~~Ship Creek~~ Anchorage P.O. and are extending their surveys from that point.

It is scarcely within the province of this report to enter into a detailed discussion of possible routes for this railroad. It does, however, seem to me eminently proper to give to this, as to all branches of governmental or private activity, such consideration as to their relation to this Service as will enable us to keep in advance of any demand for information which may be made upon us. For this reason I feel justified in expressing my own opinion, (an opinion, however, based solely on my own observations and study of conditions), that if a railroad is built, it will follow the south shore of Knik Arm and that Ship Creek will be one of the most important tide water points on the line- certainly for construction and very possibly as a permanent shipping

point as well. As to construction, the reasons for this statement are obvious. It is conceded that for a road in this region the two possible terminals other than Ship Creek itself are Seward and Passage Canal. For purposes of construction Ship Creek possesses decided advantages over either of the others. Passage Canal, in fact, need not be considered at all, since it is cut off from the remainder of the route by high land which must be pierced by a tunnel some miles in length. The advantages of Ship Creek over Seward are,

First:- The former has unlimited space for the storage of supplies and equipment;

Second:- That from there work can be carried in both directions simultaneously; and,

Third:- That it is the nearest available tide water point to the Matanuska coal fields and, obviously, the first work done would be to carry the road through to these fields in order to obtain coal necessary for subsequent work.

As to the suitability of Ship Creek as a permanent shipping point for this coal, conclusions are not so obvious. There is much to be said on both sides of this question. As already stated, Ship Creek has unlimited room for terminal facilities; the haul is about 55 miles less than to Passage Canal and 100 miles less than to Seward. Ship Creek, moreover, possesses the advantage of unlimited anchorage room except in so far as its waters may be obstructed by ice during a portion of the year, whereas the area available for

this purpose both in Resurrection Bay and Passage Canal is extremely limited.

On the other hand, there will undoubtedly be a portion of the year when navigation in upper Cook Inlet will be impeded by ice- (This question of ice will be discussed in detail later in the report)-,and the distance from ports in the United States to Ship Creek is greater than to either Seward or Passage Canal. This latter objection, however, seems to me of slight importance, since, as long as it is assured that the railroad will follow this route, this section will attain to an importance which will compel vessels on regular Southwestern Alaska routes to call there irrespective of whether coal is shipped out or not, while to vessels carrying coal alone the slight extra distance would be of no importance.

In view of these facts, it seems plain to me that if the route finally chosen for the railroad be the one to which the present Commission seem inclined, Cook Inlet during the next few years will be the scene of traffic much more extensive than any other part of Southwestern Alaska, and consequently, that the need for accurate and detailed charts and for extensive aids to navigation will be correspondingly increased.

Beaause of the unusual importance which, for the above reasons, is attached to this region, a special effort was made to obtain all possible information which could be utilized by this Service. Much of the information obtained applies to Hydrographic Sheet No. 9200a, covering the resurvey from

Ship Creek to Fire Island. It was not, however, included in the report on that sheet, as it seems to apply more particularly to this one, and to give the same information on both reports would be a needless repetition. In considering this report, therefore, the reader should bear in mind its application to the Fire Island sheet.

The report is divided into two general parts:-
First:- General information about the region, such as would be useful in compiling sailing directions, etc., and,
Second:- Information pertaining particularly to the survey itself.

The former is given first, as the information there furnished will throw light on details of the survey which might otherwise be obscured.

GENERAL STATEMENT: Upper Knik Arm is an estuary having, in exaggerated form, the characteristics of such bodies of water. At its head are two rivers of considerable size, the Matanuska and the Knik which, flowing through soft alluvial soil and aided, at least in the case of the Knik, by glacial action, carry down large quantities of silt. To the action of these streams are opposed the forces of a tide of exceptionally great range, a range attaining a maximum of about forty feet and giving rise to currents with a velocity in places close to seven knots.

The result of such an opposition of forces is that Knik Arm, from a point five miles above Ship Creek to the head of the arm, is one vast mud flat, in places bare at all

times, except on one or two of the highest tides of the year; mostly bare at half tide and entirely bare at low water except for local depressions or irregularities in those areas which, on higher stages of the tide, might be called channels.

On the south side of the arm the shore rises in a bluff throughout the entire extent, except in the vicinity of the streams emptying into the arm, which are bordered by marshy areas of small extent. The land is from 50 to 150 feet high, rolling hills extending back to the range of mountains which separates Knik and Turnagain Arms.

On the north side the land is rolling for miles back from the shore, so much so that Mount McKinley, 150 miles away, seems to rise out of a level plain. The upper part of the arm is bordered by an extensive area of marsh.

On both sides the geological formation consists of soft earth or gravel of glacial rather than aqueous origin, if one may judge from the large boulders found imbedded therein. At only one place is there known to be any outcropping of rock immediately adjacent to the shore. This is at Old Knik on the south side of the arm, just below the mouth of the river, where are found two small rocky buttes.

CHANNELS: At the present writing these may be grouped under two heads- the main channel up the arm and the various secondary ones leading from the different streams at the sides. From the clear water above Ship Creek the main channel follows the shore of Goose Bay to the vicinity of △ Crow, then leads diagonally across the arm toward the buttes at Old Knik.

It holds this direction for about seven miles to a point abreast of Fire Creek, where it lies a little over a mile off shore. From this point it parallels the south shore, keeping about one and one half miles off until it reaches the Eklutna River, where it again leads towards the two buttes, passing close to the south shore until just before the buttes are reached. It then leads across the arm to the north shore, passing east of the small marshy island opposite the buttes, and so follows close along the north shore into the river. This is the only channel which can be followed the entire distance through the flats into the river. The sheet will show indications of others, and may not clearly show (the soundings are not yet reduced or plotted as this is being written) that they are merely blind leads, but such is known to be the case, both from our own experience and observations, and from information obtained from others familiar with the locality.

The various secondary channels require but the briefest mention. These are formed by the various streams at the sides, but flatten out and disappear as the strength of the current is dissipated in the open waters of the arm. The channel which follows the south shore is of this character. Good water may be carried as far as the palisades, but this channel ends just above △ Finis 2. The channel to Knik follows the main channel to △ Crow, then leads close along the shore to the town.

In considering this subject, it should be borne clearly

in mind that what are here called channels are such only at or near high water. All navigating must be done on tide, particularly in the upper arm, and the launch which lingers long in that locality after the tide begins to fall, will find itself stranded to wait for the next high water.

The question of the permanence of the present channel is of the greatest importance, and a special effort was made to obtain all possible information on this subject. To Mr. G. M. Palmer, storekeeper and postmaster at Knik, I am indebted for the following information on this subject. Mr. Palmer has been in this region for about thirty years, and during much of that time kept a journal in which he recorded much interesting information regarding meteorological conditions, prevalence of ice, and locality of changes in the channel. Personally, I place particular confidence in the information furnished by Mr. Palmer, since he alone of all the men interviewed, seemed to be unprejudiced in his statements by a wish to make them as favorable as possible, in order to throw no possible impediment in the way of the railroad passing through this region. Mr. Palmer states that these channels are constantly changing and that the changes are of two kinds:

First:- There is a gradual change which is going on all the time- channels deepening in one place and filling in in another or shifting slightly in position, the amount of this change depending upon the amount of rainfall in the basin drained by the various streams emptying into the arm. This

change would be but slight for any one year, but extending o
over a period of years, its effect is to make marked differences in
the channels. At present, he states, the channel leading to
the town of Knik is filling in rapidly.

Second:- The arm is liable to be visited by a flood of
considerable proportions which, in a few hours,
will change its entire configuration. These floods have
their origin in a large lake drained by the Knik river.
It seems that there are two glaciers on the upper reaches
of this river, or possibly that the one large glacier
located about as shown on the chart, has broken in two.
Between these two glaciers lies a lake said to be quite as
large as Knik Arm itself, the lower glacier forming a barrier
which dams up the water. Mr. Palmer states that this lake
was visited by a prospector of his acquaintance who described
it to him, and that the report was confirmed by two other
prospectors who later visited it independently.

About fifteen years ago the waters of this lake burst
through the ice barrier which confined them and flooded the
arm. Previous to that time the channel up the arm had
followed the north shore until up to or a little above the
present town of Knik, then turned towards the center of the
arm, which it followed to the river. The debris carried
down by this flood entirely filled up all channels, so that
the present ones have been cut since that time. The Indians
of this region state that these floods are liable to occur

about every fifteen or twenty years.

As a further indication of the extent to which changes are taking place in this arm, it is interesting to note Mr. Palmer's statement that twenty years ago the present flats on the north side of the arm opposite Fire Island, did not exist, the channel at that time being close along the north shore to the mouth of the Susitna River.

TIDES AND CURRENTS: The predicted maximum range of tide at Ship Creek is about 40', The greatest range actually observed by this Party was 36.0', but these observations were not taken during the period when the highest tide of the year might be expected to occur. A note just received from Mr. Eades states that on August 24th, with calm weather and smooth sea, the high water reached a point 1.886' higher than the highest tide observed by the "EXPLORER". This tide, therefore, would reach 38.0' on the staff. Simultaneous observations showed that the high waters occurred one hour and ten minutes later at Old Knik than at Cairn Point. The difference between Ship Creek and the town of Knik is said to be one hour.

These tides give rise to currents of considerable velocity. Observations taken by the EXPLORER at the anchorage show a maximum of 4-1/2 knots per hour, and since the anchorage chosen for the EXPLORER was always one where there would be the least possible current, it is fair to assume that they attain a velocity at times of at least five knots in the channel. The strongest currents encountered were along the north shore just above Goose Creek, where they

attain an estimated velocity of at least seven knots. It was impracticable to take observations in this vicinity, however. On one occasion the launch attempted to anchor here, but could not hold on against the current. This, although Goose Bay is the head of navigable water in the arm, it is unsafe to attempt to anchor there because of the current and of the limited swinging room. The steamer "General Hubbard" which, a year ago, carried up equipment for the party engaged in carrying from the Matanuska coal fields to tide water the 800 tons of coal intended for test by the Navy, did indeed land her freight at this point, but she was in trouble all the time, frequently compelled to steam full speed ahead to hold her position, and on one high water was forced clear up on the marsh, where the receding tide left her high and dry. She was later floated without damage, but her experience was not such as to induce others to follow her example.

ANCHORAGES: The anchorage universally used is the one off Ship Creek, described in my report covering the re-survey from Ship Creek to Fire Island. The anchorage commonly used by the EXPLORER during the season was about six miles above Ship Creek, in the centre of the deep area which lies about three fourths of a mile north true from △ Genus. This anchorage was used in order to be as close to the work as possible. Otherwise, it is decidedly inferior to the one at Ship Creek and is not recommended for general use.

ICE:

On this subject I found it difficult to obtain what I considered accurate and unprejudiced information. Most of the persons interviewed who had been residents in the vicinity long enough to have any information to offer on the subject, seemed to realize that it would be one of the vital factors in determining the importance of Ship Creek, and were therefore inclined to present the matter in the most favorable light possible. From what I could gather, however, the following is about what might be expected:- Considerable ice may be encountered at any time between the last of December and the last of April, the amount, of course, depending upon the rigor of the winter. This ice forms in the upper arm, is broken up and carried down by the big tides of the month and grounds on the flat along shore, particularly in the basin-like area between Cairn Point and Point Woronzof, where it accumulates. While it may not attain any great thickness, there is certainly enough of it in the strong current to endanger any vessel which encounters it. On the other hand, there will be a considerable portion of each month when the channels are practically clear, these times occurring immediately after the period of highest tides. The situation may be summarized by saying that the vessel which could afford to wait for a few days for a favorable opportunity could probably reach Ship Creek without difficulty, but certainly could not count on remaining there any length of time to discharge and take on cargo, unless a basin were dredged out at Ship Creek to receive her.

I may add that the Alaska Engineering Commission has secured

the services of an experienced man who will be stationed at Ship Creek during the ensuing winter to observe the amount and the behavior of the ice, and so inform them more positively as to its importance.

AIDS TO NAVIGATION: If Knik Arm attains to the importance suggested in this report, it will become imperative to have efficient aids established throughout Cook Inlet. To my mind, these should be-

First:- A light on Anchor Point.

Second:- An efficient light and fog signal on the east foreland.

Third:- A light on Fire Island, established at Race Point rather than on the southwestern end of the island, as formerly.

Fourth:- A channel buoy or range marks to serve as a guide through the shoals off Fire Island. Nothing, I believe, will be required above Ship Creek. There will be but little traffic through the flats to the head of the arm, and for that little local knowledge is necessary in any case.

INDUSTRIES: In this region there is considerable land capable of agricultural development. Already a number of homesteads have been taken up, where agriculture upon a limited scale, (gardening rather than farming), is carried on. Vegetables of various sorts and of excellent quality, can be raised, but the region labors under the obvious disadvantage of having no market for its products. The town of Knik is the metropolis of the region, furnishing supplies for the mines in the

interior, these supplies being carried by launches up the Susitna River to Susitna station, then by trail about seventy miles to the mines. Knik at present, however, is merely a boom town. Most of the people there have been attracted by the prospect of a railroad in the vicinity, and as soon as the location of the road is definitely decided, will undoubtedly move to some point along the line.

WEATHER: During the present summer the weather in Knik Arm was the most delightful I have encountered any where in Alaska. The days were bright and warm with very little rain, and that little more like passing summer showers than the characteristic Alaska drizzle. There was also little or no wind, particularly above Fire Island. On various occasions when it would be blowing a gale out of Turnagain Arm, there would be calm, or only gentle breezes at Ship Creek. This condition is said to prevail during the summer months/ In winter, however, conditions are not so good, heavy winds blow down the arm at times, which winds combined with the strong ebb tide, would undoubtedly render any anchorage far from secure.

DETAILS OF SURVEY:

Instructions for this work were to carry triangulation, topography, and hydrography from the limits of previous work to the head of the arm, the hydrography being such as to define the sloughs in the flats to the mouth of

the Matanuska river and to show the depth which could be carried at high tide over the entire area. The nature of the work called for in this assignment, while not particularly difficult, was tedious, due to the necessity of working entirely on tides and attended by a certain amount of risk because of the strong currents encountered, and of the lack of experience of most of the officers assigned to the party. The ship, when at anchor, required constant watching, as the strain on the cable was at all times severe and sometimes excessive. Twice during the season shackles in the chain spread from the excessive strain, leaving the pin loose and in danger of working out. The personnel of field officers was weak for such work, Mr. Hunter being the only one in the wardroom who had had previous experience in the handling of small boats. It requires skill and good judgement to bring a small boat safely alongside a ship at anchor in a 4-1/2 knot current, and for these two reasons I considered it imperative, particularly during the early part of the work, that either Mr. Hunter or myself should be on board at all times, in order that there might be some one to take prompt and efficient action in case of emergency. I was therefore compelled to trust a considerable portion of the work to officers who had had no previous experience, with the result that the work progressed slowly, and part of it, in the case of the triangulation, had to be gone over a second time. As soon as possible a combined triangulation and topographic

party was put in camp at the head of the arm, as much to minimize the risk of accident as to facilitate the work.

In executing the hydrography it was possible to work only at or near high water. To take the greatest possible advantage of this short working period, the development of the flats was made by lines run normal to the direction of the channel, spaced first 1/4 mile and later 1/2 mile apart. These lines were run at extreme high water in order that they might cover as extensive an area of the flats as possible. A further development of the channel, made necessary by this wide spacing of cross lines, was obtained by carrying a line of soundings each day to and from the work, running up on the last of the flood and returning on the first of the ebb. This method had the further advantage that the channel lines were run at all times in the direction of the current, so that the effect of the latter upon the lead line was minimized.

Tides were observed at Cairn Point, the station of 1910 being reoccupied. A supplemental station was established at Old Knik where observations were taken to determine the difference in time between the two stations. The soundings were then reduced by applying the correction to the observed time at Cairn Point proportionally to the distance from that point, the range, in the absence of information to the contrary, being taken as the same at both stations. This amount of tidal data is perhaps meagre, but there was no place above △ Palisade on the one side, and △ Crow on the other, where

observations could be taken, as the entire area along the shores above these points bares at low water.

Triangulation was carried to two points within sight of the head of the arm, and a base measured above the town of Knik and connected with the triangulation.

A table of statistics of hydrographic work is attached.

Respectfully submitted,

R. S. Patton

CHIEF OF PARTY.

TABLE OF STATISTICS ÷ HYDROGRAPHIC SHEET #.....

Date. 1914.	Letter.	Vol.	Positions.	Soundings.	Miles, Statute.	Vessel.
June 26,	a	1	113	652	27.2	Launch.
June 28,	b	1	101	673	25.0	"
" 29,	c	1	49	371	13.2	"
" 29,	c	2	60	413	17.3	"
" 30	d	2	119	984	35.0	"
July 2,	e	2	65	553	19.2	"
" 2,	e	3	82	657	22.2	"
" 3,	f	3	106	897	30.7	"
" 9,	g	3	49	424	12.7	"
" 9,	g	4	9	74	2.0	"
" 10,	h	4	119	598	21.3	"
" 11,	j	4	57	563	18.0	"
" 13,	k	4	57	602	20.1	"
" 14,	l	5	78	757	28.0	"
" 15,	m	5	79	796	28.0	"
" 24,	s	6	126	748	34.0	"
" 25,	t	6	143	866	42.5	"
" 27,	u	6	20	123	6.8	"
" 27,	u	7	52	324	14.7	"
Aug 14,	a'	8	65	425	14.2	"
July 24,	a"	1	56	576	11.9	Dinghy.
" 25,	b"	1	32	250	7.7	"
	Totals,....		1587	12326	451.7	

Soundings in fathoms: reductions in feet.

Plane of reference, mean lower low water.
" " " reads 3.4' on gauge.
Highest tide observed " 36.1' " "
Lowest " " " 0.1' " "

ADDRESS
U. S. COAST AND GEODETIC SURVEY
WASHINGTON, D. C.

REFER TO NO. 13

VEC

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON

March 16, 1915.

CHART CONSTRUCTION

Assistant in Charge:

Referring to Hydrographic Sheet 3674, for Knik Arm, Alaska, I submit the following information for the Chief of the Chart Construction Division.

The soundings for this sheet have been reduced to the datum of mean lower low water as determined at Cairn Point, and which was assumed to be the same for the whole of Knik Arm. Allowance was made for the difference in the time of tide in the different parts of the area covered, but the theoretical range was assumed to be the same; that is the height of any high water in any part of the arm was assumed to be the same as the height of the corresponding high water at Cairn Point, although occurring some minutes later.

At Old Knik, near triangulation station "Nitak," near the head of the arm, tides were observed between July 24 and July 31, 1914. At this station the tide near the time of high water appeared to be normal and similar to that at Cairn Point, but when the water at the latter place fell below mean tide level, the water level at Old Knik would remain nearly stationary for 4 or 5 hours until the rising tide in the lower part of the arm again reached approximate mean tide level. Thus it appears that for several hours during the time of low water, the upper part of the arm ceases to be a tidal body and becomes virtually a river with a considerable slope, and the depth of water in this river will probably depend principally upon the volume of water coming down the several tributaries rather than upon any astronomical tidal condition. At high water, the usual tidal conditions will prevail.

The soundings in the vicinity of Old Knik show that the bed of the channel is approximately 10 feet higher than the plane of mean lower low water at Cairn Point. The lowest tide observed at Old Knik was 16 feet above this datum, indicating a depth of approximately 6 feet at that time. The low water fluctuation during the week of observations at this place was 1½ ft., probably due to different stages of the tributary rivers. The actual fluctuation covering longer periods of time would undoubtedly be much greater.

Based upon the information at hand, I make the following recommendations for the datum of the chart for this region;-

1st. That the datum of mean lower low water at Cairn Point be adopted for the lower part of the arm for a distance of 14 miles from

Cairn Point measured northeasterly along the axes of the arm, to a point opposite △ "Lake."

2nd. That from this section to the head of the arm, the datum be assumed to be a sloping plane raising to a height of 15 feet above the Cairn Point datum at Old Knik, making the datum at the latter place 1 foot below the lowest tide observed. This gives a slope of approximately 2 feet to the mile.

If this datum is adopted, the following corrections should be applied to the soundings as indicated on Hydrographic Sheet 3674, the distances being measured from Cairn Point along the axes of the arm, and in accordance with a tracing representing these distances which was recently furnished by the Chart Construction Division and which has been attached to the sheet.

0 to 14 miles	no correction			
miles				foot
14½	increase	soundings	by	1
15	"	"	"	2
15½	"	"	"	3
16	"	"	"	5
16½	"	"	"	6
17	"	"	"	7
17½	"	"	"	8
18	"	"	"	9
18½	"	"	"	10
19	"	"	"	12
19½	"	"	"	13
20	"	"	"	14
20½	"	"	"	15
21	"	"	"	16
21½	"	"	"	17
22	"	"	"	18
22½	"	"	"	20
23	"	"	"	21

L. P. Shidy

Chief of Tidal Division.

VEC
Feb.8,1915
L.O.S.

HYDROGRAPHIC SHEET 3674.

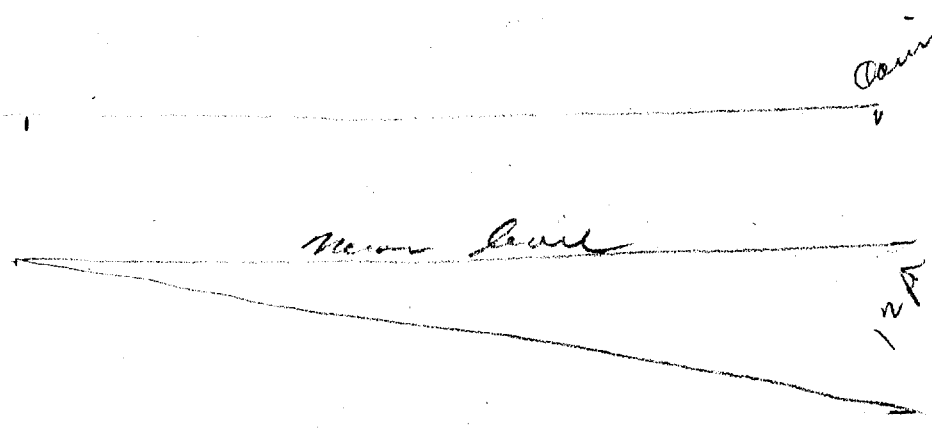
Knik Arm, Alaska, by Assistant R.S.

Patton in 1914.

TIDES.

	Cairn Point ft.
Mean lower low water, or plane of reference on staff	3.4
Lowest tide observed " "	0.1
Highest " " " "	35.7
Mean range of tide	27.2
Mean Tide Level	15.3

Allowance was made for difference in tide at the gage and at the point of sounding.



27.2
3.4
123.8

11.9
3.4
15.3

3674

EXAMINATION OF HYDROGRAPHIC SHEETS
by the
DIVISIONS OF FIELD WORK AND FIELD RECORDS.

Sheet No. 3674

1. + Are numbers of hydrographic sheets adjoining limits of work shown? ...No.....

2. Are transferred soundings of adjacent hydrographic sheets made to show that ground has been covered? ...No.....

3. + Is sheet of proper size? .....

4. + Is sheet well laid out, no additions required? .....

5. Are limits of hydrography regular? .....

6. + Are positions of signals accentuated by light dot of black ink to assist plotting? ...No.....

7. + Are tidal stations plotted on sheet? ....No.....

8. Is area of work completely covered? .....

.....

9. Are critical soundings and dangers shown distinctly? .....

.....

10. + Is the control good? Not sufficient intermediate signals generally except by plantable or sext.

11. + Are positions of signals clearly shown? .....

12. Are soundings well distributed? ..No...on account of difficulty in running systematic lines of sounding in strong current

13. Are shoals carefully and sufficiently developed? .....

.....

.....

14. Do soundings cross satisfactorily? .....

.....

15. Is existence or non-existence of a reported shoal determined?
.....

16. Is least sounding over bar probably determined by check soundings or diagonal sounding lines crossing same? .....
.....
.....

17.+ Are projection and plotting checked? .....

18. Is the scale of this sheet sufficient to show the necessary details in the navigable channels? No
.....

19. +Is the shoreline shown? No.....

20.+ Is there an accompanying list of plane table or sextant positions of signals? No.....

21. Has sufficient attention been given to the development of channel? No - not in upper part of Kuk Arm at high water.....

22. Are sufficient bottom characteristics shown? .....
.....

23. Are sounding lines normal to coast? .....
.....

24. Have suspicious soundings been investigated? .....
.....

25. Are ranges or bearings given for important shoals? .....
.....

26.. Are sailing directions given? .....

27. Is the general hydrography in the entire area properly developed? .....

28. Are shallow channels for motor boats sounded? .....

.....

29. Is there a note as to coloration of water in or near mouths of rivers and bays? No.....

30. Is there any information given as to obtaining fresh water? ..

.....

31. Are there proper intervals between soundings? .....

.....

32. Are projecting points of land and reefs determined by sufficient lines with soundings at close intervals run at right angle to direction of points? .....

.....

33. Is there sufficient data to draw depth curves? .....

.....

34. Are shoal areas remote from shore properly developed by independent system of buoy signals placed in the vicinity of shoal?

.....

35. Are soundings obtained at docks in harbor? .....

.....

36. Is there a full list of data effecting sheet given? No.....

.....

37. Are description of hydrographic signals and marking of same recorded? .....No.....

38. Is there a list of land marks given? ..No.....

39.+ Does descriptive report give date of instructions? ..... No .....

40. Are small islets and rocks distinctly shown? .....

41. Is information relative to anchorage given? ..... Yes .....

42.+ Are survey methods explained sufficiently? .....

43. Are geographical names given on sheet? .....

44. Are coast pilot notes given? .....

45. Is the unit of soundings given in title? .....

46. Are sufficient depth curves shown? .....

47. Are aids to navigation shown? .....

48. Are grass or kelp indications shown? .....

49. Are sailing courses shown on sheet? .....

50. Is descriptive note given as to visibility of shoals? .. No. .....

51. Are dangers fully described in descriptive report? .....

52. Is the character of reefs described on sheet? .....

53. Are beaches indicated where vessels in distress could be safely beached? .....

54. Are standard symbols used in drafting? .....

55. Is information relative to currents given? .....

56. Is there a statement as to certainty or probability of least depth over dangers given? .....

57. Is the existence of certain shoals doubtful? .....

58. Is a general description of coast given? .....

59. Is information relative to commercial importance given? No.

60. Does the descriptive report cover one or a moderate number of sheets?

61. Are descriptions of headlands given?

62. Is the nature of shoals whether coral rock or sand shown on sheet?

63.+ Is the position of the tide gauge well selected? Is the tidal data sufficient for the reduction of soundings over the area of the sheet?

64.+ Have projection lines been numbered around all the edges?

65.+ Has the geographic position of one of the triangulation points on the sheet been inked near the bottom edge of the sheet?

66. Was the speed of the sounding boat such as to allow vertical readings of the leadline?

67. Were lines of soundings run along the axis of narrow channels?
No - upper part of Knik Arm at HW.

68. Have rocks or shoals seen from the sounding boat in passing been definitely located?

69. Have charted shoals reefs, or rocks been investigated?

70.+ Have sounding records been kept in approved form?

71. Are Wire drag surveys required? .....

72. Is the area between the soundings taken and the shore indicated or described as being covered by reefs, etc. as the case may be?

.....

Other Remarks .....

.....

.....

The forgoing points marked by a cross (+) and the following additional points are to be considered for wire drag hydrographic sheets.

73. What additional areas, if any, in the locality covered by the sheet should be dragged? .....

.....

74. Number of small areas inside limits of work missed by drag (few, moderate number, numerous) .....

75. Are shoals discovered with drag clearly shown? .....

76. Were shoals later covered by drag set at suitable depth? .....

.....

77. Are all areas missed by drag clearly shown? .....

78. Are overlaps ample? .....

79. Do effective depths conform to instructions under which the work was done? .....

80. If work was done before present practice as regards effective depths was adopted, should the area be re-dragged to conform to the present practice? .....

.....

.....

81. Are all shoals discovered shown on current issue of chart? ....

.....

Hydrographic Sheet 3674

The hydrography throughout this sheet is reduced to the plane of m.l.l.w. at Cairn Pt. This has resulted in misrepresentation of the upper part of Knik Arm. See the letter of March 16, 1915 from the Tidal Div. in this connection.

As recommended in this letter the soundings, northward of a point 14 miles above Cairn Pt., should be corrected in accordance with a table contained in the letter. This can be done as a sub-sketch on the sheet.

The names of the principal geographic features should be given.

E. P. Ellis
1-5-16

The letter of March 16, 1915 is attached to the descriptive report.

Hyd. Sheet. No. 3674

The adverse natural conditions in this place, make an accurate survey very difficult.

The positions were very badly confused in the protracting. In many cases, when a position was missed, the error would be carried through the entire line. More than half of the positions on the smooth sheet, had different position numbers on the boat sheet. Also many positions were incorrectly protracted.

Along the south shore there are indications of a secondary channel. Although quite deep for short stretches, these are blind leads and can not be followed through.

The main channel is well developed, but there are a great many poor crossings.

Constant changes due to strong currents and glacial floods are occuring in this area. On this account, no attempt was made to join this sheet with the one adjoining it. (Hyd. 3200)

R. L. Johnston