H10819

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. B

Registry No. H-10819

LOCALITY

State Alaska

General Locality Cook Inlet

Sublocality Northern Approach to Port Nikiski

1998

CHIEF OF PARTY
Robert Kohut

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DATE DEC 5 2000

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO.

H-10819

HYDROGRAPHIC TITLE SHEET

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

FIELD NO.

B

State: Alaska

General locality: Cook Inlet

Locality: Northern Approach to Port Nikiski

Scale: 1:10,000 Date of survey: June 29 - October 7, 1998

Instructions dated: Novenber 28, 1997 as amended Project No.: OPR-P367-KR

Vessel: Sea Ducer (AK Reg. "AK0691P"

Chief of party: Robert Kohut

Surveyed by: Terra Surveys, LLC

Soundings taken by echo sounder, hand lead, pole: Reson 8101 Multibeam Echo Sounder

Graphic record scaled by: N/A

Graphic record checked by: N/A

Evaluation by: Russ Davies Automated plot by: HP Design Jet 750C+

~~Protracted by~~

Verification by: Russ Davies, Gary Nelson

Soundings in fathoms ~~feet~~ at ~~XXXX~~ MLLW

REMARKS: Contract #: 50-DGNC-8-90021

Contractor: Terra Surveys, LLC

1930 South Whiting Circle

P.O. Box 1549
Palmer, AK 99645

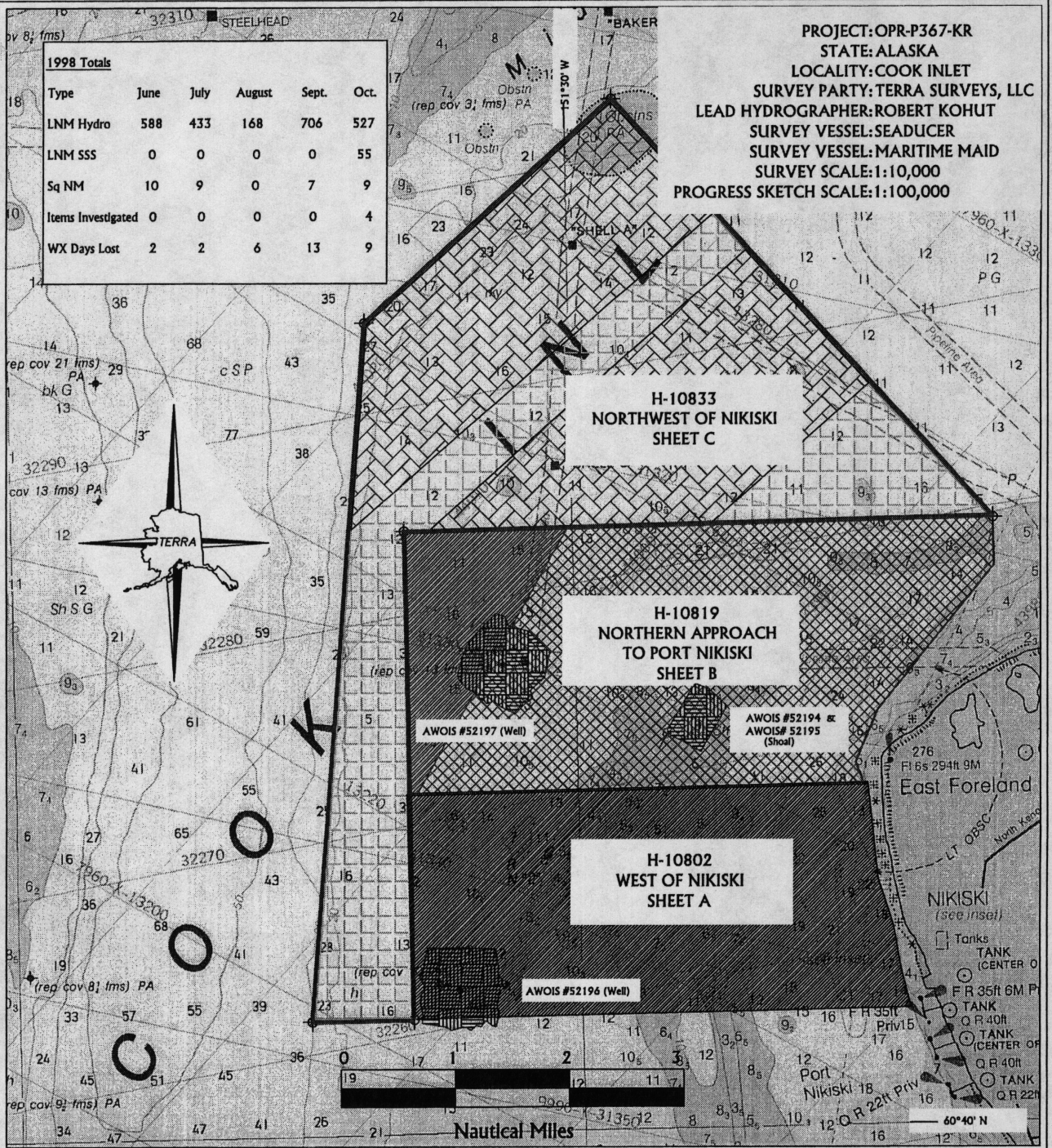
907-745-7215

All times recorded in UTC

AWOIS / SURF 11/29/00

mcR

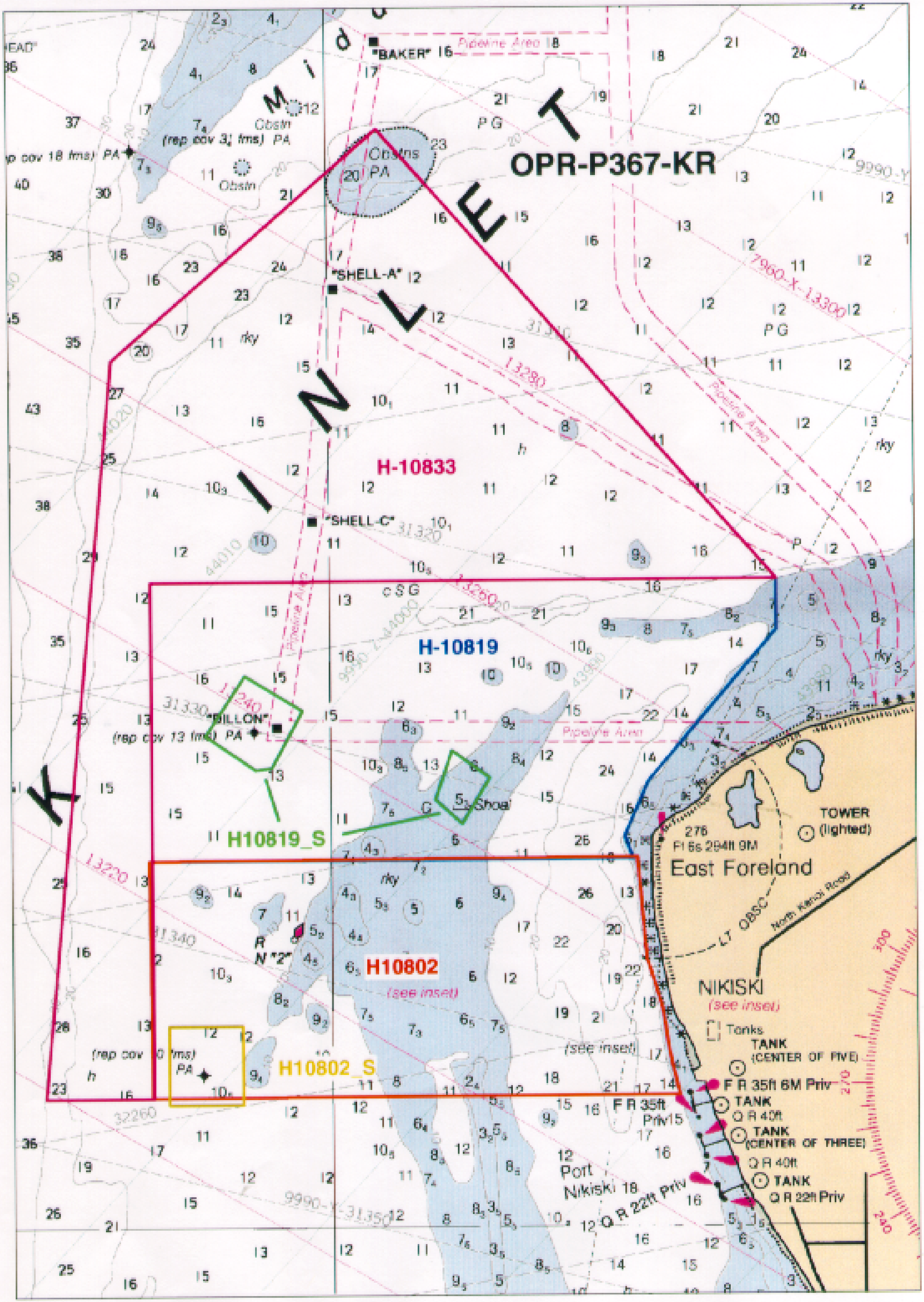
U.S. GOVERNMENT PRINTING OFFICE: 1986 - 652-007/41215



Contract 50-DGNC-8-90021

	WORK ORDER 1				WORK ORDER 2					WORK ORDER 3				WORK ORDER 4
Registry #	H–10802				H–10819					H–10833				AWOIS
Started	06/06/1998				06/29/1998					07/11/1998				10/19/1998
Completed	09/01/1998				10/07/1998					10/11/1998				10/24/1998
Month	June	July	Aug	Sept	June	July	Aug	Sept	Oct	July	Aug	Sept	Oct	Oct
Area		Holidays						Holidays		Reference Surface				
LNM Hydro	491	52	157	8	97	364	0	270	7	17	11	428	520	
LNM SSS														55
Sq NM	8.1	0	0	0	1.7	8.7	0	0	0	0	0	6.7	8.5	0.3
Items Investigated														4
WX Days Lost	2	0	6	0	0	2	0	4	0	0	0	9	5	4

INDEX OF SHEETS



OPR-P367-KR
Mid
K I N L E T
H-10833
H-10819
H10819_S
H10802
(see inset)
H10802_S
"BAKER"
"SHELL-A"
"SHELL-C"
"DILLON"
Pipeline Area
Shoal
East Foreland
TOWER (lighted)
NIKISKI
(see inset)
Tanks
TANK (CENTER OF FIVE)
TANK (CENTER OF THREE)
North Kenai Road
LT OBSC
Port Nikiski

Descriptive Report to Accompany Hydrographic Survey H-10819

Sheet B

Scale 1:10,000

June-October 1998

Terra Surveys, LLC

Chief of Party: Robert Kohut, P.L.S. and Certified Hydrographer

A. PROJECT ✓

This navigable area survey was conducted in accordance with Hydrographic Project Instructions OPR-P367-KR, Northern Approach to Port Nikiski, Cook Inlet, Alaska, dated November 28, 1997, amended January 6, 1998 and April 25, 1998.

The purpose of this contract is to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of this area. Numerous obstructions and shoaling have been reported in this area. The area is adjacent to four docks including one commercial multipurpose dock used primarily in oilfield support, a petroleum dock, a liquid natural gas (LNG) dock and a loading dock for a fertilizer manufacturing plant. The area is transited by oil tankers, liquid natural gas tankers, oilfield support vessels, commercial fishing boats, commercial fishing tenders, tug and barge contractors and oil spill response vessels.

The project area is approximately 10.4 square nautical miles and extends two and a third nautical miles north and four nautical miles west of East Foreland in upper Cook Inlet. The survey extends from near shore across a deep area, over a shoal and into the deeps.

A shallow water multibeam sonar system was used to locate and determine the least depth over the obstructions and shoals as well as to determine the least depths over the entire project area. Every effort has been made to provide complete traceability of this survey product and is reconstructible from the raw data.

B. AREA SURVEYED

The area surveyed (Sheet B) for H-10819 covers approximately 10.4 square nautical miles northwest of Nikiski, Alaska. The following NAD 83 latitudes and longitudes are the hydrographic survey limits:

Degrees Latitude (N)	Degrees Longitude (W)
60.754102	151.550159
60.754102	151.375058
60.747165	151.375131
60.726446	151.411119
60.718988	151.417930
60.715900	151.415600
60.715900	151.550187

The Index of Sheets shows the area surveyed for H-10819.

C. SURVEY VESSELS

The ***Sea Ducer***, a 31-foot Uscola Offshore Pilot with aluminum hull, was used for all data acquisition.

The Sea Ducer 1997 Uscola Offshore Pilot	AK ID # 0691 Hull ID # UCN0317M997
Manufacturer	Uscola Boat Works Palmer , AK
L.O.A.	31 ft.
Beam	10 ft.
Draft	1.5-2.0 ft.
Power Plant	Twin 188hp AD41/DP Volvo-Penta turbo diesels with stern drives.
Data collection power source	24vdc, 12vdc from mains 110vac from 2.4 kW Trace Inverter 110vac from 5kw Northern Lights Genset
Cruise Speed	35 knots
Fuel Cap	204 gallons
Fuel consumption	13 gal/hr @ cruise
Gross tonnage	5 short tons displacement

D. Automated Data Acquisition and Processing

Data Collection

Multibeam data collection was performed on a 333 MHz Pentium II PC running Reson's 6042 Multibeam Data Collection software under Windows 95. The data collection PC received Reson 8101 bathymetry via a serial interface and Reson 8101 sonar imagery via an Ethernet interface. It received motion and position information (heave, pitch, roll, heading, latitude and longitude) via serial interface from the Seatex Seapath 200 system. The Seapath 200 received differential correctors from an Ag120 GPS receiver tuned to the U.S. Coast Guard Beacon Kenai.

The Reson 8101 received motion information from the Seapath 200 to aid in filtering. The motion information allowed the Reson to apply filters based on minimum and maximum depths while the vessel was experiencing roll.

Coastal Oceanographics' Hypack software was utilized for navigation and line tracking as well as for the collection of quality control statistics. The Hypack software ran on a 200mhz Pentium computer. It received motion and position data (heave, pitch, roll, heading, latitude and longitude) from the Seapath 200. It also received a check position from a second Ag120 GPS receiver receiving differential correctors from the U.S. Coast Guard Beacons Kodiak or Cape Hinchinbrook.

Processing Overview

The Reson 6042 software collects multibeam data in its native format, a binary file with a 'SVY' extension. The first step in processing the data was to convert the 'SVY' file to a 'XTF', Extended Triton Format, for compatibility with CARIS HIPS. This was done using the Reson 6042 software while offline. The data was then transferred in Hypack raw navigation data files off the vessel via 2.6-gigabyte Magneto-Optical (MO) disks.

The MOs were transferred daily from the vessel to the project office for processing. The data was copied to the server for storage and archived on 4mm DAT tapes. The XTF files were converted to HIPS files using HIPS' refoXTF program.

Once converted, the lines were reviewed in HIPS 'Line' mode for defects in positioning, motion sensor data or sounding data. The positioning data was examined for jumps in position and if necessary data was rejected without interpolation. The various sensors, including azimuth, heave, pitch, roll and tide, were also checked. If necessary data was rejected without interpolation or in the case of small isolated spikes, rejected with interpolation. Typically no rejection was required for either the positioning or for the various sensors. The soundings were then reviewed in the Hydrographic Data Cleaning System (HDCS) editor where the user could filter or manually reject outliers. Filters used were beam quality, beam number and (when implemented by Universal) a roll value or angle from nadir filters. Beams of only the highest quality were accepted. If a question arose about a possible bottom feature then beams of lesser quality were reviewed. Initially, beam filters were overused resulting in some data after editing

yielding only 61 beams per profile. This practice was quickly discarded and only the beam filtering necessary to speed processing was performed, typically 5 to 15 outer beams on each side. The implementation of an angle filter by Universal was used when available and soundings outside a 100 degree sector about nadir were rejected by filter after that. Line spacing was adjusted with water depth in the field to ensure three-beam overlap on adjacent lines with a 90° swath. This underestimation of swath width ensured sufficient overlap. When reviewing the soundings, the sidescan imagery obtained from the Reson 8101 was viewed in a window on the edit screen. This allowed the hydrographer to make decisions about the veracity of questionable features with the sidescan imagery to aid them.

Following adjustment for the sound velocity profile measured in the field, the data was beam edited in **HIPS** 'Line' mode. Preliminary tides for the National Ocean Service (NOS) gage at Nikiski (945-5760) were applied without zoning. The next step in HIPS was to 'merge' the data. In the merge step the various sensors for motion and position of the vessel were used to compute the final position and depth of the sounding.

Following merging, the data was reviewed in the HIPS 'Subset' editor for outliers. Soundings for a geographic area from multiple lines can be viewed from several directions and flagged as 'Rejected' if deemed an outlier or as 'Outstanding' if it is a feature the user desires to track. The soundings 'Rejected' in subset mode were typically single outliers. Soundings marked as 'Outstanding' are features which rose ten percent of the water depth. In the absence of sidescan information or reports of obstructions, these features are assumed to be rocks. The status of the 'Outstanding' flag is accessible from this point to the final drawing.

Following the 'Subset' editor, the data was exported to the Caris Editor, a Geographic Information System (GIS) and inspected for coverage. In the Caris Editor, the soundings were displayed and the operator zoomed and panned along each line to check for sufficient overlap between adjacent lines and gaps within the line. Areas requiring additional coverage were outlined and fill in lines were chosen, data collected and edited as described.

Once coverage was complete for the project, the data was exported from the Caris HIPS files to a database. During the export, the tide zone for each profile was determined, the angle from nadir that the sounding was taken at was determined and the athwartships footprint size was calculated. This information with all the flags from Caris HIPS are maintained in the database. After transfer to the database the soundings were tide adjusted using the zoning scheme provided and the Final Verified tides from the NOS gage at Nikiski (945-5760). These tides were down loaded from the NOS internet site. The tide was applied equally to all soundings within each profile. Following the tide adjustment, soundings were flagged as rejected if the footprint was deemed to large for the required shoal detection or the angle at which the sounding was taken was outside of the acceptable swath. The athwartships footprint was maintained at 2 meters or less down to 30 meters (MLLW) and at 10% of water depth or less (tide reduced) below 30 meters. The angle from nadir was maintained at less than 50° for most of this survey. Crossline statistics indicated that the allowable angle could be raised to 58° in water

depths less than 30 meters (MLLW) and to 55° in water depths greater than 30 meters (MLLW). These wider nadir angles were used to reaccept a limited number of soundings in a small area devoid of soundings. The accepted soundings were within expected accuracy standards and footprint size.

An average of the acceptable soundings within each square meter was then exported to the Caris Editor as a tide adjusted final data set. The cleaned cross lines were exported to the Caris Editor in their entirety. The combined data was used for cross line analysis, tide zone analysis and coverage plots.

All accepted soundings were checked for overplot removal. Deeper soundings that would overplot the shoalest soundings were then suppressed. The unsuppressed soundings were then exported to AutoCAD. The unsuppressed soundings, which had been flagged by the operators as 'Outstanding', were placed on a separate layer in AutoCAD for identification on the drawing as rocks. All of the plotted soundings in AutoCAD contain an identification number, which allows tracing the sounding back to the database and thus back through all steps to collection. A histogram of unsuppressed soundings was generated from the database. The data was also exported to AutoCAD for trackline plots which depict the track of the sonar head.

Quality Control

The raw navigation files from Hypack were used for quality assurance. The files were processed using HPTools to summarize the start and end times of lines, distance traveled, average vessel speed, minimum number of satellites and maximum HDOP encountered. There were some incidences when the Hypack log was inadvertently turned off during the running of a line. In these instances, the lineal nautical mileage and speed were computed from the XTF files. The lines were then checked for the several conditions that could cause disqualification. Disqualification could be due to going to fast for the range scale used causing insufficient sounding density or inadequate GPS caused by less than 4 satellites or when the Horizontal Dilution of Precision (HDOP) was greater than 2.5.

Lines were also disqualified by the Caris HIPS operators if they were excessively noisy or had missing data due to improper filtering in the collection process.

Software Summary

SeaBat 6042 Software produced by Reson was used for all multibeam data acquisition. Caris Hips, a processing program developed by Universal System Ltd., was used for all multibeam post processing and quality assurance.

E. SONAR EQUIPMENT (Towed sidescan) ✓

The Specifications of the Side scan sonar used during the AWOIS item investigation survey, (refer to Item Investigation Report in section N: COMPARISON WITH THE CHART), are as follows:

S.E.A. Transceiver, Model ST350, S/N 9701 100/500 kHz System

The Primary Fish used was a Klein 100 kHz, the Secondary fish was a Klein 500 kHz. Both were operated with a 1.5 degree beam width and 20 degree depression angle.

The sonar system was interfaced with Terra Surveys Triton Elics "ISIS" Processing system, for data storage, enhancement, and display. An EPC 1086 graphic recorder was used to display sonar images real time during the survey. The sonar images were displayed real time on the EPC using uncorrected for slant range and speed. The data displayed on the Triton "ISIS" system was viewed with corrections for slant range and speed, to provide a more realistic view of the collected data.

The sonar fish was towed from the stern of the vessel using approximately 600 feet of Klein 8 conductor tow cable interfaced with a slip ring and deck cable.

F. SOUNDING EQUIPMENT

The survey vessel, *Sea Ducer* was equipped with a Reson SeaBat 8101 multibeam echo sounder system (serial # 85100120). The system's two main components consist of a surface processor (serial # 13983) and transducer head (serial # 049710).

Soundings were recorded in meters and corrected for the speed of sound through water from multiple daily measurements of the water column profile (see Section G). Depths encountered in the survey range from 9.05 meters/4.9 fathoms (Latitude 60.750084° N, Longitude 151.3784° W), to 55.31 meters /30.2 fathoms (Latitude 60.725475° N, Longitude 151.4282° W), at MLLW based on verified tide data from the Nikiski Gage (945-5760).

Metric leadlines were used for depth comparison with the depth sounder. Leadlines were constructed from metric fiberglass survey tapes with 24 or 36 ounce lead balls attached such that the bottom of the ball was at the zero mark. Leadline comparisons were conducted a minimum of once weekly by simultaneously reading the draft marks on the sonar head pole, the leadline depth (typically 3-6 meters) and the depth from the 8101. The comparison was made with the formula:

Error = Leadline Depth – Draft – 8101 Depth

The multibeam did experience a fault during the survey. While checking raw data from the unit ("snapshots"), Reson engineers discovered a bad former on the starboard side. The unit was shipped to Reson in California on August 19, 1998, and was back in service on August 25, 1998. Reson's engineers found a broken trace on a circuit board controlling the beam forming for the four outermost beams on the starboard side. Those beams are not included in the smooth sheet.

Data analysis has revealed a slight frown shaped swath in the 8101. This feature first became apparent in reference surface analysis and sub-set editing in *CARIS* HDCS. The general trend is a raised surface in the middle of the swath. Part of this feature is a nipple effect (raised ridge) generated around nadir by several beams. The nipple effect was minimized in the field by lowering the sounder gain to its lowest level without losing data, but could not be eliminated. Terra Surveys, LLC and Reson have explored possible causes for these effects throughout the project by analyzing raw data directly from the 8101 sonar head ("snapshots"). The cause of the problem was not resolved at the time of this report, but Reson does not feel the sounder is out of specifications and the problem will not cause the accuracy of the data to be out of specifications.

G. Corrections to Soundings

The following methods were used to determine, evaluate and apply corrections to soundings.

Speed of sound through water

The velocity of sound through water was determined by a minimum of two casts per day with the following two instruments.

Velocimeter (sound velocity, temperature and depth profiler)	*SVPlus* (standard instrument with 50 dBar pressure sensor and 350 ms temperature sensor)
Manufacturer	Applied Microsystems Ltd. Sydney, British Columbia, Canada
Serial number	**3201**
Pressure Calibration	4/30/98 by Applied Microsystems Ltd.
Temperature Calibration	4/29/98 by Applied Microsystems Ltd.
Distilled Water Sound Calibration	4/20/98 by Applied Microsystems Ltd.
Voltage Calibration	5/27/98 by Applied Microsystems Ltd.

Velocimeter (sound velocity, temperature and depth profiler)	*SVPlus* (standard instrument with 50 dBar pressure sensor and 350 ms temperature sensor)
Manufacturer	Applied Microsystems Ltd. Sydney, British Columbia, Canada
Serial number	**3259**
Pressure Calibration	4/30/98 by Applied Microsystems Ltd.
Temperature Calibration	4/29/98 by Applied Microsystems Ltd.
Distilled Water Sound Calibration	4/21/98 by Applied Microsystems Ltd.
Battery Calibration	4/30/98 by Applied Microsystems Ltd.

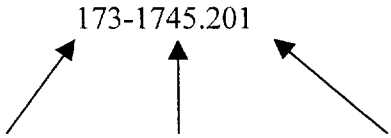
The following instrument was operated at the surface.

Velocimeter (sound velocity, temperature and depth profiler)	*Smart SV&P* (standard instrument with 50 dBar pressure sensor)
Manufacturer	Applied Microsystems Ltd. Sydney, British Columbia, Canada
Serial number	**4177**
Pressure Calibration Distilled Water Sound Calibration	6/10/98 by Applied Microsystems Ltd. 4/20/98 by Applied Microsystems Ltd.

Copies of the manufacturer's calibration reports are included in Appendix G.

The velocimeters were set at a sample rate of 15 samples per second during casts, and 1 sample per minute for the continuous monitoring of the work area. A daily log was kept to note any variance between the two velocimeters. Dual casts were done a minimum of once a day for comparison between velocimeters. During survey operations, either one of the *SVPlus* velocimeters or the *Smart SV&P* logged the sound velocity once per minute. The casts were taken as deep as possible and geographically distributed to satisfy the 95% anticipated water depth and represent local and diurnal variability. The velocimeters were manually initialized and downloaded using PROCOMM terminal software.

The sound velocity data file name convention follows:



Julian Day Time of deployment Velocimeter serial number

The naming convention incorporated the Julian day and time as well as the serial number of the sensor. On days 157 and 158 the field crew used Julian day and Universal Coordinated Time (UTC). On days 159 through 179 the field crew used Alaska Daylight Savings Time. The office reductions then verified and reflected the true Julian day and UTC derived directly from the raw data header. From day 179 to the end of the project the field crew reverted back to using true Julian day and UTC.

Example Raw Data header:

du 173-1745.201
SVPlus S/N 3201
New cast started on **06-23-98 at 01:50:52**
Sample rate is 1 second
Depth increment 0.50
Sound velocity increment 0.00

Julian Date and Time

Julian Day and UTC file names will reflect an 8-hour difference or be the same depending on which naming convention was used. Regardless of the naming convention used, the correct Julian day was derived directly from the raw data, and applied to the soundings in CARIS from a continuous SVP file of all the casts.

Sound Velocity Data after conversion:

File Name: C201__173-1745

Section 1998-**174**	**1:50:52**
26.7	1477.21
26.1	1477.22
25.5	1477.2
24.6	1477.18
24.0	1477.17
23.2	1477.16
22.6	1477.16

The converted file names start with C (converted) and the serial number:
C201__173-1745.

Processing Procedures

The velocimeter raw pressure data was converted to depths in meters in a spreadsheet using Foronoff and Saunder's formula as provided by Applied Microsytems Ltd. The formula is as follows:

P=pressure in decibars

x=sin(latitude/57.29578)

X=x^2

Gr=9.780318*(1+(0.0052788+0.0000236*X)*X+0.000001029*X

D=(((-0.00000000000000182*P+0.0000000002279)*P+9.72659)*P

Depth=D/Gr

The formula was checked with latitudes for the north and south extent of the survey and the resulting depths varied by millimeters so an average was used. This method was also tested against the results of Applied Microsystems Ltd. *Total System Software* and found to be identical.

The data was then converted to a CARIS format where the profile corrections were applied to the soundings. CARIS applies the most recent velocity cast in the file so the newest correctors were always being used. The following Sound Velocity Profile Summary shows the casts, their positions and the maximum depths of each cast. See Appendix I for listings of each cast.

Filed with the hydrographic data.

Instrument Corrections

No special instrument corrections were made.

Corrections determined from bar checks and vertical casts.

Metric lead lines were used for depth comparison with the depth sounder. Lead lines were constructed from metric fiberglass survey tapes with 24 or 36-ounce lead balls attached such that the bottom of the ball was at the zero mark. Lead line comparisons were conducted a minimum of once weekly by simultaneously reading the draft marks on the sonar head pole, the lead line depth (typically 3-6 meters) and the depth from the 8101. The comparison was made with the formula:

Error = Lead line Depth – Draft – 8101 Depth

The lead lines are summarized below:

Date	Draft (m)	8101 Depth (m)	Lead Line (m)	Error (m)
25 June 1998	1.04	2.83	3.88	+0.01
JD 176	1.05	2.86	3.90	-0.01
2 July 1998	1.06	3.11	4.20	+0.03
JD 183	1.06	2.91	3.95	-0.01
15 August 1998	1.09	3.56	4.63	-0.02
JD 227	1.09	3.52	4.65	-0.04
14 Sept 1998	1.09	1.00	2.03	+0.06
JD 257				
21 Sept 1998	1.10	6.47	7.53	+0.04
JD 264				
11 October 1998	1.05	5.83	6.92	+0.04
JD 284				

Subject: H10819 Cook Inlet
Date: Fri, 17 Nov 2000 07:19:52 -0500
From: "George.Myers" <George.Myers@noaa.gov>
To: Dennis Hill <Dennis.Hill@noaa.gov>

Don Haines discussed your suggestion with me and he agrees with your analysis. So, I guess as you said the item will be shown on the h-dwg without a PA. Don says he wants it shown on the survey also. The DR will need to be revised. This is AWOIS 52197 and is a submerged wellhead.
Also, in reviewing the sheet I noted that a "6" at lat. 60 degrees, 43 minutes, 29 seconds; Long. 151 degrees, 27 minutes, 51 seconds needs an appended "RK" label so that it agrees with the h-dwg and DR It looks to me that this is AWOIS 52194.
You might as well send everything to me when you are done with the revisions because the "job" missed the OPS people (Maurice or Mike) to do the AWOIS check -- I will send it over to them when the new revised data arrives.
Considering the smooth sheet and the positional data not conforming to accuracy standards - you may need to show it as a "PA", a no-no, but how else?
--
George Myers
(301)713-2709 (123)
1315 East West Highway
Silver Spring, Maryland 20910

History: Submerged wellhead as to show on smooth sheet and H. Drawing.

Subject: **Re: H10819: AWOIS Item 52197 Followup #2**
Date: Mon, 13 Nov 2000 15:10:34 -0500
From: "Don Haines" <Don.Haines@noaa.gov>
Organization: NOS/OCS/HSD
To: Dennis Hill <Dennis.Hill@noaa.gov>
CC: Nelson Gary <Gary.Nelson@noaa.gov>, Davies Russ <Russ.Davies@noaa.gov>, Greenawalt <Brian.Greenawalt@noaa.gov>, Myers <George.Myers@noaa.gov>

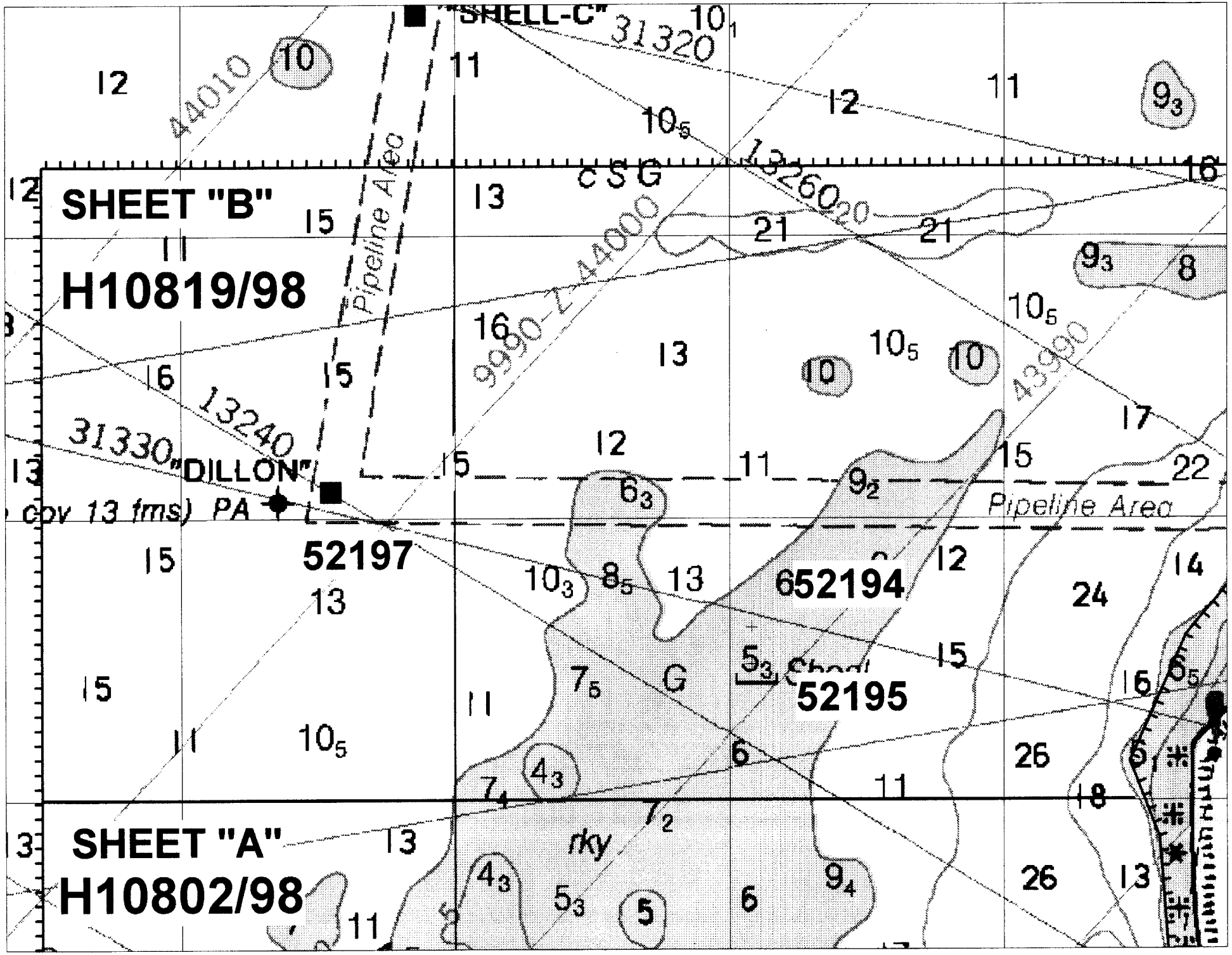
Dennis:
I agree with your analysis below. Please work with George to get the info in the ER and to the final plots/h-dwgs for Sam's signature. Thanks for the follow-up.

Thanks,
Don

Dennis Hill wrote:

> *Don:*
> *We finally got a response from Terra Surveys regarding this item. They have reviewed their side scan records and determined that the contact was observed on one pass only. The quality of the positioning determined from this single contact is not great. The sea conditions involved a significant cross-track current which probably moved the fish from where it would predictably fly. Also, they were unable to improve the quality of the fish position since it lacked an onboard compass. I think that what we have is as good as it's going to get.*
>
> *I however, feel that we should consider recommending removal of the PA from the chart, not based on high quality survey positioning but rather on cartographic reality. As I indicated in my original message (see below) the difference in positions between the charted (or originally reported) position and this survey position is approximately 36.9 meters. At the scale of the chart this difference is insignificant since both locations plot within the size of the well head symbology. Therefore, for raster charting the location is fine. However, for ENC charting we would have a problem, but since no ENC's exist in this area that's a mute point.*
>
> *If we decide to recommend removal of the charted "PA" note I think we should explain in the eval report that this is based on a cartographic decision, not based on high quality survey data.*
>
> *-dh*
> *======Original Message==========*
> *AWOIS Item 52197 INVESTIGATION*
> *FOLLOWUP DISCUSSION*
>
> *AWOIS item 52197, a submerged wellhead, charted at lat.60/44/03.97 (60.73443611), long. 151/31/17.08 (151.52141111) was investigated during survey H10819. The hydrographer utilized both multibeam and side scan sonar technology. The wellhead was discovered with side scan sonar at lat. 60/44/02.89 (60.73413611), long. 151/31/18.12 (151.521700). The quality of this position is considered to be approximate since it originates from an interpreted side scan sonar*

> record. The wellhead was not observed with multibeam sonar. The cause
> is unknown but suspected to be related to the relatively small size of
> the obstruction, potentially less than the 2-meter orthogonal criteria
> for detection by
> presently utilized sonars.
>
> The inherent error in the side scan sonar position is unknown but
> estimated to be in excess of the horizontal position accuracy stipulated
> in the Specifications and Deliverables, " The NOS specification for
> hydrographic positioning is that the total error in position of
> soundings, dangers and all other significant features, at the 95
> percent confidence level, will not exceed 5 meters + 5 percent of the
> depth." (Section 3.1). The total allowable positioning error in 13
> fathoms of water is therefore approximately 6.2 meters.
>
> The inverse distance between the charted, or originally reported
> position of the obstruction, and the survey observation is 36.9
> meters. Assuming the original position was accurate to within 10
> meters the present survey location can be adjusted accordingly then
> evaluated. The resulting inverse between the adjusted position and the
> survey position is reduced to 26.9 meters, still in excess of the NOS
> positioning specification. Assuming the original position was
> accurate to within 20 meters the resulting inverse of 16.9 meters is
> still in excess of specifications.
>
> Further investigation of the side scan record will be conducted with the
> cooperation of Terra Surveys to determine if a refinement of the survey
> position is possible. I doubt this will result in any significant
> improvement. I feel that we have encountered a situation in which the
> multibeam technology has failed to provide data of sufficient quality
> to resolve a very specific type of item investigation. Perhaps a
> refinement of required procedures may prevent a recurrence in the
> future. It is suggested that specifications be developed which would
> require hydrographers to utilize a narrow set of inner beams when
> attempting to locate small obstructions.
>
> Pending a final review of the side scan records I recommend the charted
> obstruction remain as charted.
>
> Click here to view a chart graphic showing the general vicinity of the
> obstruction.
>
> Click here to view chart graphic depicting the location of the
> obstruction and the location of the side scan sonar contact.
>
> -dh
>
> ---
> Name: dennis.hill.vcf
> dennis.hill.vcf Type: VCard (text/x-vcard)
> Encoding: 7bit
> Description: Card for dennis hill


"SHELL-C"
SHEET "B"
H10819/98
Pipeline Area
CSG
"DILLON"
52197
52194
52195
Pipeline Area
SHEET "A"
H10802/98
rky

RECRD 52194 VESSLTERMS OBSTRUCTION CHART 16662 AREA P

CARTOCODE 0067 SNDINGCODE DEPTH 0

NATIVLAT 60/43/31.20 NATIVLON 151/27/42.00 convert NATIVDATUM 6

LAT83 60/43/29.17 LONG83 151/27/50.07 Update GP GPQUALITY High

60 43 29.17 151 27 50.07 GPSOURCE Direct

LATDEC 60.72476944444 LONDEC 151.4639083333

PROJECT OPR-P367 ITEMSTATUS Assigned SEARCHTYPE Full

RADIUS 200 INIT RWD ASSIGNED 2/23/1995

TECNIQ ES,S2,DI

Techniqnote

History

HISTORY
H8617WD/61-- CLEARED 33 FT; HUNG 37 FT; SOUNDED 41 FT; (CHARTED ì AS SHOAL CLEARED 5 FM 3 FT). POSITION GIVEN IN LAT 60-43-31.2N, LONG ì 151-27-42W(NAD27).
H9621/76-- 6.2 FM DEPTH CARRIED FORWARD IN DEPTHS OF 7.4 FMS. (1964 ì EARTHQUAKE SUBSIDENCE OF .2 FM APPLIED). (ENTERED 2/95 RWD)

Fieldnote

Proprietar

YEARSUNK NIMANUM SYSTEMNUM 10313 Print Record

RECRD 52195 VESSLTERMS OBSTRUCTION CHART 16662 AREA P

CARTOCODE 0067 SNDINGCODE DEPTH 0

NATIVLAT 60/43/39.00 NATIVLON 151/27/42.00 convert NATIVDATUM 6

LAT83 60/43/36.98 LONG83 151/27/50.07 Update GP GPQUALITY High

60 43 36.98 151 27 50.07 GPSOURCE Direct

LATDEC 60.72693888889 LONDEC 151.4639083333

PROJECT OPR-P367 ITEMSTATUS Assigned SEARCHTYPE Full

RADIUS 200 INIT RWD ASSIGNED 2/23/1995

TECNIQ ES,S2,DI

Techniqnote

History

HISTORY
H8617WD/61-- CLEARED 33 FT; HUNG 36 FT; SOUNDED 37 FT; (CHARTED I AS SHOAL CLEARED 5 FM 3 FT). POSITION GIVEN IN LAT 60-43-39N, I LONG 151-27-42W(NAD27).
H9621/76-- 6.1 FM DEPTH CARRIED FORWARD IN DEPTHS OF 6.3 FMS. (1964 I EARTHQUAKE SUBSIDENCE OF .2 FM APPLIED). (ENTERED 2/95 RWD)

Fieldnote

Proprietar

YEARSUNK NIMANUM SYSTEMNUM 10314 Print Record

RECRD 52197 VESSLTERMS OBSTRUCTION CHART 16662 AREA P

CARTOCODE 0067 SNDINGCODE DEPTH 0

NATIVLAT 60/44/06.00 NATIVLON 151/31/09.00 convert NATIVDATUM 6

LAT83 60/44/03.97 LONG83 151/31/17.08 Update GP GPQUALITY Med

60 44 3.97 151 31 17.08 GPSOURCE Direct

LATDEC 60.73443611111 LONDEC 151.5214111111

PROJECT OPR-P367 ITEMSTATUS Assigned SEARCHTYPE Full

RADIUS 500 INIT RWD ASSIGNED 2/23/1995

TECNIQ ES,S4,DI

Techniqnote

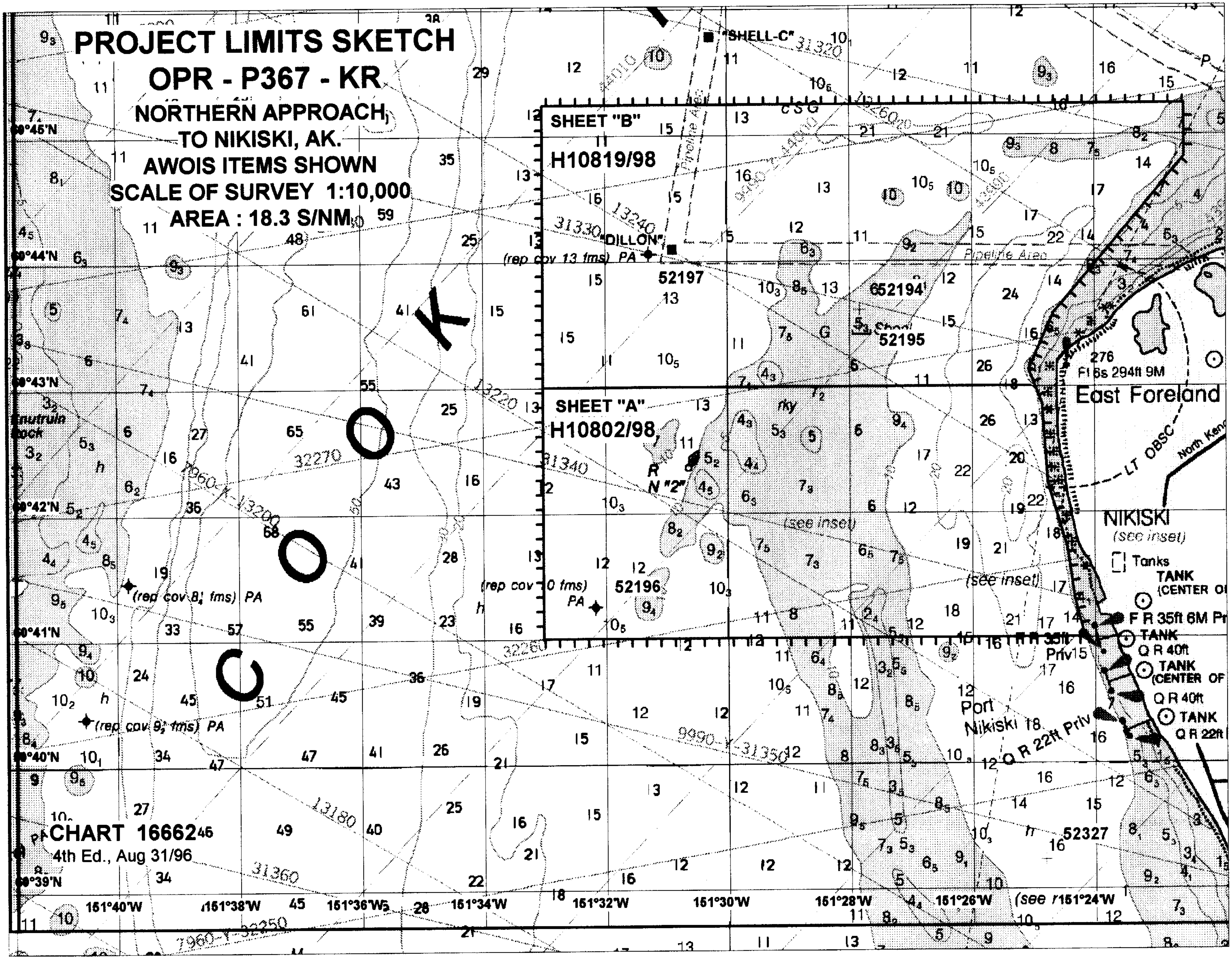
History

HISTORY
CL1179/67-- 17TH CGD SPEC. NOTICE TO MARINERS-8/24/67; WELL I (COVERED 85 FT AT MLLW), ...IT SHOULD HAVE BEEN CHARTED AS 14 I FMS, NOT 13 FMS....., RISES 6 FT OFF THE BOTTOM. POSITION GIVEN I IN LAT 60-44-06N, LONG 151-31-09W (NAD27). NAMED- PAN AMERICAN I MIDDLE GROUND SHOAL 18746 NO.1.
H9621/76-- 15 FM DEPTHS EXIST IN VICINITY. (ENTERED 2/95 RWD)

Fieldnote

Proprietar

YEARSUNK NIMANUM SYSTEMNUM 10316 Print Record


PROJECT LIMITS SKETCH
OPR - P367 - KR
NORTHERN APPROACH,
TO NIKISKI, AK.
AWOIS ITEMS SHOWN
SCALE OF SURVEY 1:10,000
AREA : 18.3 S/NM
SHEET "B"
H10819/98
SHEET "A"
H10802/98
COOK
"SHELL-C"
"DILLON"
Pipeline Area
52197
52194
52195
52196
52327
(rep cov 13 fms) PA
(rep cov 10 fms) PA
(rep cov 8 fms) PA
(rep cov 9 fms) PA
Enutruia Rock
East Foreland
Fl 6s 294ft 9M
LT OBSC
NIKISKI
(see inset)
Tanks
TANK (CENTER OF
F R 35ft 6M Pr
Q R 40ft
Q R 22ft
Port Nikiski
Q R 22ft Priv
F R 35ft Priv
CHART 16662
4th Ed., Aug 31/96
60°45'N
60°44'N
60°43'N
60°42'N
60°41'N
60°40'N
60°39'N
151°40'W
151°38'W
151°36'W
151°34'W
151°32'W
151°30'W
151°28'W
151°26'W
151°24'W

An alternate method of checking was used on the 29th of August. The reduced nadir beam depth was compared to a reduced single beam echosounder. The data was corrected for offsets in both the horizontal and vertical planes. Sound velocity, heave, pitch, and roll corrections were also applied.

Date	8101 Depth (m)	ODOM Depth (m)	Vertical Offset (m)	Error (m)
29 August 1998 JD 241	27.89	28.45	0.53	0.03
5 Sept 1998 JD 249	26.96	27.42	.53	.06
12 Sept 1998 JD 255	21.74	22.24	.53	.03

Static Draft

A metric adhesive rod face was adhered to the sides of the hull and the multibeam pole for daily readings of the vessel draft. The tapes were calibrated to read the depth of the sonar head. The draft was recorded a minimum of once daily and usually twice. The draft readings were incorporated in a spreadsheet, which included the date and time, line name, engine rpm and draft. From the spreadsheet data and the measured offsets for the boat, the distance from the boat's reference point to the water line was computed for every line and utilized in the HIPS Vessel Configuration File (see following discussion of settlement for more detail).

Settlement

Measurements for the Squat and Settlement were conducted near East Forelands in the work area, using **O**n **T**he **F**ly **R**eal **T**ime **K**inematic (OTF-RTK) GPS survey procedures. The measurements were conducted with two Trimble 7400MSi's on the *Sea Ducer* and a Trimble 4000SSi as a base station. Pacific Crest Radio modems were used to transmit the correctors to the vessel.

Two Trimble 7400MSi antennas were installed on the Sea Ducer. One antenna was installed near the bow and one on the aft swim deck, both on the centerline of the vessel. The relationship of these antennas to the vessel baseline was surveyed and recorded.

Three files were collected during each test; one ASCII file was recorded for each of the two Kinematic GPS Receivers. These files contained the National Marine Electronics Association (NMEA) "GGA" string, a GPS output string which contains the time, position, ellipsoid height, HDOP and mode. The third file was collected using Triton ISIS which logged the attitude information from the Seapath 200. The *Sea Ducer's* attitude and elevations were recorded at rest and at various RPM settings to determine vessel dynamics. The static data for the vessel at rest was observed as a baseline and used to correct for tide changes with a starting and ending tide. The results of the measurements were compiled in a spreadsheet. A graph depicting vessel settlement and speed at various RPM settings is shown on the following page. The vessel dynamics appear to react, as any small launch would be expected. At low RPMs (speed), the aft lowers, the bow rises, and the vessel settles into the water. As the RPM is increased the settlement increases to a point where the hull begins to plane. At the upper end of the useable survey speeds (RPM 2800 – 3000) the vessels reference point is actually 3-9 cm above its elevation at rest.

The daily draft readings, RPM values, and the reference point to water line distance for each line were recorded on the written line notes. A macro converted this information to a text file for insertion into the HIPS Vessel Configuration file.

Vessel Configuration File (VCF)

An example of the Reference Point to Water Line entry in the VCF is as follows:

```
# +-------------------------------------------+
# |                                           |
# | RP Definition                             |
# |                                           |
# +-------------------------------------------+
RPDfn
        {
        1998-157-17:10
                {
                Waterline       0.41                    # in meters
                Apply           "YES"                   # in merge
                Comment         "File=157-0000/RPM=1200/Settlement=-0.026/8101 Draft=1.040"
                Authorization " "
                }
```

The entry above is for a day when the draft (of the sonar head) was 1.04 meters and the settlement is –0.026 for an engine RPM of 1200. The resulting waterline measurement is 0.41 meters. The equation used for computation of RP definition is:

RP Definition (Waterline) = SeaBat Elevation Offset - Draft + Settlement

Heave, Roll and Pitch

The Seatex Seapath 200 sensor system was used to determine heave, roll and pitch as well as azimuth and position.

Manufacturer :	Seatex
Model :	Seapath 200 m320-00
Seapath Serial number:	0361
Motion Reference Unit:	MRU-5
MRU Serial number:	299cus
Manufacturers stated accuracy:	
Heading:	0.05° 1σ (4 meter baseline)
Roll and Pitch:	0.05° 1σ
Heave:	0.05 meters 1σ
Position Accuracy:	2 meters 2σ

Tide Correctors

In accordance with section 6.1 of the statement of work, the NOS tide station at Nikiski, Alaska (945-5760) was used as the source for the MLLW datum for this project. No supplemental gauges were installed. The unverified (preliminary) 6-minute data was downloaded from NOS database via the Internet and applied during the CARIS post processing routine. A height corrector of -6.067 meters was applied to the preliminary data to reference tides to MLLW (per contractor's note at web site http://www.opsd.nos.noaa.gov/aknote.html). No zoning was applied to the preliminary data.

Verified 6-minute tides were acquired from NOS after the survey was completed. The verified tide data was downloaded from the Ocean Products and Services Division (OPSD) World Wide Web site (http://www.opsd.nos.noaa.gov). The time and height tidal zoning correctors listed in Appendix E* were applied during transfer of the soundings from CARIS to the SQL Server Database. After determining the tidal zone for each profile, the associated soundings were adjusted for the final tide.

* Filed with the hydrographic data.

H. Control Stations ✓

The horizontal control datum for this project is North American Datum of 1983 (NAD 83). All software, comparisons of junctions and prior surveys referenced NAD 83.

All data provided in NAD 27 was translated to NAD 83. The National Ocean Service Automated Wreck and Obstruction Information System (AWOIS) data was converted from NAD 27 to NAD 83 with Blue Marble's Geographic Calculator.

The U.S. Coast Guard Differential Navigation Beacons at Kenai, Kodiak and Cape Hinchinbrook were used during hydrographic survey operations for horizontal positions and confidence checks. The NGS second order control station, NIK, was used as a DGPS performance check site. NAD 83 Geographic Coordinates for these horizontal control stations are found in Appendix C. *

No control was set during this survey.

* Filed with the hydrographic data.

I. Hydrographic Position Control ✓

Position Accuracy

Differential Global Positioning System (DGPS) provided the basis of hydrographic positions throughout the survey. The total horizontal positional error falls within 10 meters at the 95% confidence level for all features in this project. A fixed-point DGPS Performance Check was performed to confirm this accuracy standard and a graphical analysis of the check is included in Appendix H.*

In addition to the accuracy of the DGPS system, the accuracy of the sounding position depends on the following:

Characteristics of the multibeam system
Depth of water
Accuracy of heave, pitch, roll, and heading measurements
Accuracy that latencies are accounted for and applied
Accuracy and reliability of the of Sound Velocity Profile (SVP)

Position Control

Differential GPS (DGPS) provided hydrographic position control throughout this survey. The following stations were used for project control:

U.S Coast Guard DGPS Beacon	USCG DGPS Beacon Frequency
Kenai, Alaska	310 kHz
Kodiak, Alaska	313 KHz
Cape Hinchinbrook, Alaska	292 KHz

outside survey area

Control Station	NGS PID	Horizontal Order
NIK	TT0543	SECOND

The United States Coast Guard (USCG) Differential Global Positioning System (DGPS) Beacons at Kenai, Kodiak and Cape Hinchinbrook Light were used during hydrographic

* Filed with the hydrographic data.

operations for horizontal positions and confidence checks. Control station "NIK" was used as a DGPS performance check site.

DGPS Performance Check

The National Geodetic Service (NGS) station "NIK" was used as a fixed-point DGPS performance check site during a 24 hour observation period. The USCG Kenai DGPS beacon was checked against the fixed position of "NIK". A Trimble Ag120 DGPS receiver, capable of receiving beacon correctors in the Radio Technical Commission Marine (RTCM) format was placed on control station "NIK". It computed a differentially corrected position at a rate of one per second and output a National Marine Electronics Association (NMEA 0183) "GGA" message once per second to a logging computer. The computed position was compared to the control point's published position. A graphical analysis of this data is found in Appendix H. *

The Kenai, Kodiak and Cape Hinchinbrook USCG differential navigation beacons were used for horizontal survey positions and confidence checks during hydrographic operations. A confidence check was performed by simultaneously receiving positions on the vessel from two different beacons. When Kenai correctors were used for primary positioning, Kodiak was used as a confidence check. When Kenai was down for maintenance, Kodiak correctors were used for primary positioning and Cape Hinchinbrook was used as a confidence check. The Kenai CORS site had a scheduled outage on Julian days 159 through 165. There were 7 days throughout the survey when a confidence check was not possible due to lack of available correctors from a secondary beacon. The data from these days was accepted based on the fact that the primary beacons had proven reliable and exhibited no questionable behavior on the days without independent verification. The high bulkhead walls at *Sea Ducer's* Arness Dock berth precluded setting a fixed point for confidence checks because the satellites were blocked. A fixed confidence checkpoint was established at the Kenai River launch ramp for later work orders. Data supporting the confidence checks and the positioning criteria can be found in Appendix H. *

Positioning Equipment

The following GPS equipment was used:

Equipment Location	Type of Receiver/Antenna	Receiver serial No.	Compact Dom Antenna serial No.
Primary	Ag120/Trimble	0220061863	0220661841
Aft	SEATEX/Trimble	Seapath-2497011	0220110175
Backup	Ag120/Trimble	0220061678	0220061769
Forward	SEATEX/Trimble	Seapath-2497011	0220109126

* Filed with the hydrographic data.

Refer to diagrams included in Section C* (Vessels) for the instrument locations on the *Sea Ducer*.

Difficulties that degraded the expected position accuracy included insufficient satellite coverage near oilrigs and multipath on very calm waters. Tracklines around oilrigs were run at an angle to the main scheme tracklines in order to insure sufficient satellite visibility and good geometry. A choke ring collar was mounted on the receiver's antenna to reduce multipath from flat, calm water. HDOP spikes due to atmospheric conditions or satellite constellation configurations were rare. Spikes that did occur were caught either in the field and no further data was collected or by the quality control procedures in the office using the recorded data. There were no unusual atmospheric conditions that affected data quality. The only malfunctions involving positioning equipment were the result of power outages. Surveying would continue when power was restored.

Systematic errors were resolved during pre-survey testing with configuration modifications to the AgGPS120, Reson, and Seatex Seapath 200 systems until results proved reasonable. Detailed configuration settings are listed in Appendix G.*

Prior to field season, all sensor locations were established and a precise conventional survey of the vessel was performed utilizing a Theodolite / EDM and steel chain. From this, sensor offsets, stationing and elevations were determined and applied to the appropriate sensor or processing stage. The origin point (RP) of the vessel was called CL3 and the position of the multibeam sonar transducer was called Seabat 8101.

* Filed with the hydrographic data.

J. SHORELINE ✓

Not applicable

CHARTED shoreline from chart 16662 5th Ed., July 5, 1997 was drawn on the smooth sheet for orientation purposes only.

K. Crosslines

Following reduction of the sounding data a DTM was created in the Caris Editor. First the soundings within the database that had not been rejected either in editing or in the database due to footprint size, angle or beam number were gridded on a 1-meter interval. Gridding involved extracting and averaging soundings within each 1-meter by 1 meter area. A record was then output with the average depth and the coordinates for the center of the cell. This set of records comprised approximately 37 million points and was imported to the Caris Editor. A regular DTM was created using a 5-meter cell size and a radius of 5 meters. Each cell within the regular DTM was a weighted average of the soundings within a 5-meter radius of the cell center. Weighting within the radius was based on the distance from the center of the cell with closer soundings given higher weights. After a DTM was made each crossline was compared to the DTM four ways. The acceptable soundings (not rejected) were compared by beam number and by angle. Then the soundings not rejected in HDCS but unusable due to having a footprint too large or excessive launch angles were compared to the DTM using both launch angle and beam number.

The accuracy required for this survey was that 90% of the soundings used have an error of 0.3 meters or 1% of water depth whichever is greater. An equivalent error budget is allowed for water level corrections for a total error budget of 0.6 meters or 2%, whichever is greater. The table below summarizes the crossline statistics. The columns labeled 90% are either the largest angle or outboard beam numbers that had 90% or greater compliance with the required accuracy.

The statistics are summarized below:

					0 - 30 Meters			> 30 Meters		
Line Name	Number of Soundings	Min Depth	Max Depth	Std Dev Center	90% Angle	90% Beam Port	90% Beam Stbd	90% Angle	90% Beam Port	90% Beam Stbd
1800064	938,119	11.28	48.03	0.18	63°	11	98	56°	17	92
1800065	853,155	10.76	52.82	0.18	58°	16	94	59°	15	89
1800066	955,746	10.52	54.24	0.25	45°	22	99	53°	18	84
1800067	1,104,318	13.24	48.93	0.36	58°	12	90	65°	11	93
1800068	985,180	16.16	41.50	0.23	58°	11	91	54°	19	91
1800069	1,301,617	12.63	34.45	0.20	63°	12	92	62°	12	92
1800070	872,751	11.28	37.04	0.25	65°	9	96	58°	14	92
1800071	1251709	11.28	35.37	0.15	64°	11	98	66°	13	94

The following pages list the statistics found in this process. The file naming indicates the line name, whether the data was accepted or rejected and whether organized by angle or beam number. An example is:

1580002_a_b

1580002 would be the line name.
The first character indicates whether the soundings are **A**ccepted or **R**ejected.
The second character indicates whether the data is grouped by **B**eam number or **A**ngle.

For data organized by angle, user number 1 contains soundings with an angle between 0° and 1°, user number 2 has soundings with an angle between 1° and 2° and so on.

For data organized by beam, the user number equals the Reson 8101 beam number.

L. Junctions ✓ See Section L of Evac Report.

Survey H-10819 was compared with survey H-10802, a 1:10,000 scale survey covering the area immediately to the south of H-10819 and overlapping with the southern portion of H-10819. Agreement between the surveys was very good with the majority of the soundings agreeing within 0.1 fathom. No adjustment or reconciliation is necessary.

M. Comparison with Prior Surveys

See Section M of Eval Report.

Not applicable.

N. Comparison with the Chart See Section N and O of the Event Report.

This survey was compared in Autocad Map to the following charts:

Chart	Scale	Edition	Date
16662	1:100,000	4th	August 31, 1996
16662 Inset	1:50,000	4th	August 31, 1996

General agreement between the chart and inset on the chart and this survey was good although changes in the edges of the shoal were detected. This survey also found a number of rocks not noted on the chart. This is probably the result of the high sounding density of this survey. As a result the soundings found tended to both match the chart and contain higher and lower values within the same area of the chart.

The shoal which is present in the southern center of the sheet appears to have a deeper area in the center of it's northern extent which has shown significant shoaling. The string of shallower depths on the chart in the northeastern part of this sheet have been determined to be a string of sand waves which showed significant movement during the survey.

Though no sidescan was collected over the area we are able to detect the location of the pipelines which connect to the Dillon oil platform since they are visible as linear anomalies in the DTM. We checked the location of the pipelines against the corridor shown on the chart and found the pipe to be on the extreme west edge of the corridor which heads north from Dillon to Shell-C. The platform is depicted on the chart in the correct location. The pipelines heading to shore (east) from Dillon appear to run outside the charted corridor. They follow an alignment that differs from the chart in direction. At the end near the shore the pipeline enters some large sand waves and it cannot be detected any further. Where it enters the sand waves it is 375 meters north of the charted corridor. It almost appears as if when plotting the corridor an angle point to the north was omitted. The pipeline was found with Multibeam data and shows up as a 'linear anomaly'. We know there are pipes there and have confirmed with John Epps of Besse, Epps & Potts, a surveyor who checks on the pipelines regularly with sidescan that there are two parallel pipes heading east as we detected.

The following page lists the significant charted soundings around which shoaler (or deeper) soundings were found. Following the list are three Investigation reports for three item investigations conducted within the area encompassed by this survey.

H-10819 Depth Fathoms	Latitude	Longitude	Comment on agreement with Chart
✓ 4.9	60° 45' 0.301 " N	151° 22' 42.143 " W	Between 7 fathom and 8 fathom 2 foot soundings
✓ 6.2	60° 43' 29.062 " N	151° 27' 51.601 " W	Near 5 fathom 3 foot wiredraged shoal
✓ 6.3	60° 42' 57.481 " N	151° 28' 30.836 " W	Near 7 fathom 2 foot sounding
✓ 8.7	60° 44' 16.174 " N	151° 27' 52.330 " W	Near 11 fathom sounding
✓ 8.9	60° 44' 23.633 " N	151° 25' 59.963 " W	Outside 10 fathom curve between 10 and 15 fathom soundings
✓ 9.0	60° 44' 29.786 " N	151° 27' 11.415 " W	Near 10 fathom sounding
✓ 9.6	60° 43' 24.304 " N	151° 31' 2.706 " W	Between 10 fathom 5 foot and 13 fathom soundings
✓ 9.6	60° 43' 50.128 " N	151° 28' 21.925 " W	Near 13 fathom sounding
✓ 9.8	60° 44' 45.994 " N	151° 25' 50.332 " W	Near 10 fathom 5 foot sounding
✓ 10.6	60° 44' 46.946 " N	151° 32' 13.153 " W	Between 11 fathom and 16 fathom soundings
✓ 10.9	60° 43' 20.111 " N	151° 26' 37.737 " W	Between 11 fathom and 15 fathom soundings
✓ 10.9	60° 44' 16.654 " N	151° 28' 54.985 " W	Near 12 fathom sounding

Attachment #12

Item Investigation Report

Item Description (as charted): AWOIS #52194 ✓

Source: Unknown, Approx. 1987

Charted Position: Latitude 60-43-29.17 N Longitude 151-27-50.07 W NAD 83

Charts Affected: 16660
16662 w/ Inset
16663

Investigation

Dates(s)/Day Number(s):	Survey Vessel Name: M/V Maritime Maid
Position Numbers/Time:	Rock Outcrop - Line 292-2219 45 meters to starboard. Numerous boulders 70-90 meters to starboard. Multibeam at this location shows depth of 11.42 meters / 6.2 fathoms for a sounding which is listed as a rock– shoalest sounding in search area is 6.0 fathoms but is near outer edge of search area.
Investigation Method:	Sidescan Sonar (200%) / Multibeam 100%
Surveyed Position (NAD83):	Latitude 60°43'29.062" N Longitude 151°27'51.601" W
Position Determined By:	DGPS/USCG Beacon at Kenai (310Khz)

Investigation Summary:

A side scan sonar survey was performed on this reported shoal location encompassing a 200-meter search radius. Vessel track lines were on an 80-meter grid to achieve 200% coverage. The tow point was located at the vessel stern on centerline. The system was operated at a 100-meter range scale with tow fish altitudes adjusted to 8-20% of the range scale. Survey speeds were maintained below 5 knots. Average depths in survey area are 10-13 meters. Confidence checks were performed daily using features found in and near the area including sand waves, pipelines, oil platforms and pipelines.

The data quality was reasonable considering the marginal weather and high currents in the work area, but some problems were encountered with very high stress on the tow cable and sonar fish. A failure occurred in the tow cable at the fish end, due to a open conductor in the starboard channel. This intermittent open conductor caused the data quality to suffer at times until the problem was identified and fixed. In addition, an intermittent problem was encountered due to the bulkhead connector on the 100 kHz sonar fish as a carbon trace between the 750-volt trigger line and seawater. This problem was very intermittent and was made worse by the high towing speeds encountered during the survey at the survey site. The strumming of the tow cable would effect the mechanical connection of the tow cable and the sonar fish causing a slight electrical path for a high voltage leak. Thus not allowing the transmit capacitor in the towed fish to fully charge for consistent ping rates.

Isolated rocks and outcrops were visible in the sidescan records. It is believed the multibeam soundings collected should show the least depths over the area.

Charting Recommendation

AWOIS Items 52194 and 52195 were surveyed simultaneously and the nature of the obstruction is more of a general feature rather than two distinct features. The resulting least depth is the shoalest near the center of the area determined with shallow water multibeam bathymetry. The shoalest sounding near the reported location of AWOIS #52194 is a rock which is 11.42 meters / 6.2 fathoms. This depth is shown on the smooth sheet and is listed as a rock.

Recommended Least Depth: Use complete multibeam coverage for least depth of 6.2^{0} fathoms at Latitude 60°43'29.062" N and Longitude 151°27'51.601" W as shown on smooth sheet and remove wiredrag symbol.

Concur.
Chart as "6 Rk"

==========

Office Use:

Attachment #12

Item Investigation Report

Item Description (as charted): AWOIS #52195 ✓

Source: Unknown, Approx. 1987

Charted Position: Latitude 60-43-36.98 N Longitude 151-27-50.07 W NAD 83

Charts Affected: 16660
16662 w/ Inset
16663

Investigation

Dates(s)/Day Number(s):

Survey Vessel Name: M/V Maritime Maid

Position Numbers/Time:

Rock Outcrop – Line 292-2136, 60 meters to port. . Multibeam at this location shows depth of 10.09 meters / 5.5 fathoms for a sounding which is listed as a rock– this is the shoalest sounding in the search area.

Investigation Method:

Sidescan Sonar (200%) / Multibeam 100%

Surveyed Position (NAD83):

Latitude 60°43'37.357" N
Longitude 151°27'52.797"W

Position Determined By:

DGPS/USCG Beacon at Kenai (310Khz)

Investigation Summary:

A side scan sonar survey was performed on this reported shoal location encompassing a 200-meter search radius. Vessel track lines were on an 80-meter grid to achieve 200% coverage. The tow point was located at the vessel stern on centerline. The system was operated at a 100-meter range scale with tow fish altitudes adjusted to 8-20% of the range scale. Survey speeds were maintained below 5 knots. Average depths in survey area are 10-13 meters. Confidence checks were performed daily using features found in and near the area including sand waves, pipelines, oil platforms and pipelines.

The data quality was reasonable considering the marginal weather and high currents in the work area, but some problems were encountered with very high stress on the tow cable and sonar fish. A failure occurred in the tow cable at the fish end, due to a open conductor in the starboard channel. This intermittent open conductor caused the data quality to suffer at times until the problem was identified and fixed. In addition, an intermittent problem was encountered due to the bulkhead connector on the 100 kHz sonar fish as a carbon trace between the 750-volt trigger line and seawater. This problem was very intermittent and was made worse by the high towing speeds encountered during the survey at the survey site. The strumming of the tow cable would effect the mechanical connection of the tow cable and the sonar fish causing a slight electrical path for a high voltage leak. Thus not allowing the transmit capacitor in the towed fish to fully charge for consistent ping rates.

Isolated rocks and outcrops were visible in the sidescan records. It is believed the multibeam soundings collected should show the least depths over the area.

Charting Recommendation

AWOIS Items 52194 and 52195 were surveyed simultaneously and the nature of the obstruction is more of a general feature rather than two distinct features. The resulting least depth is the shoalest near the center of the area determined with shallow water multibeam bathymetry. The shoalest sounding near the reported location of AWOIS #52195 is a rock which is 10.09 meters / 5.5 fathoms. This depth is shown on the smooth sheet and is listed as a rock.

Recommended Least Depth: Use complete multibeam coverage for least depth of 5.3 fathoms at Latitude 60°43'37.357" N and Longitude 151°27'52.797"W as shown on smooth sheet and remove wiredrag symbol. Concur.

Chart as "5$_2$ Rk"

Office Use:

Attachment #12

Item Investigation Report

Item Description (as charted): AWOIS #52197 ✓

Well named Pan American Middle Ground Shoal 18746 No. 1

Source: Unknown, Approx. 1987

Charted Position: Latitude 60-~~41~~-~~15.96~~ 44-04 N Longitude 151-~~32-10.07~~ 31-17.1 W NAD 83 mcr 11/29/00

Charts Affected: 16660
16662 w/ Inset
16663

Investigation

Dates(s)/Day Number(s):	Survey Vessel Name: M/V Maritime Maid
Position Numbers/Time:	Pipe – Line 297-1101 on starboard
Investigation Method:	Sidescan Sonar (400% coverage)
Surveyed Position (NAD83):	60°44'02.89"N / 151°31'18.12"W
Position Determined By:	DGPS/USCG Beacon at Kenai (310 Khz)

Investigation Summary:

A side scan sonar survey was performed on this reported well location encompassing a 500 meter search radius. Vessel track lines were run at 80 meter line spacing to achieve 200% coverage with an additional lines at 80 meter line spacing run at 90° to the first set for 400% total coverage. The tow point was located at the vessels stern on centerline. The system was operated at a 100 meter range scale with tow fish altitudes adjusted to 8-8-20% of the range scale. Tow speeds were kept to less than 5 knots over the ground.

Average depths in survey area are 14 fathoms. Confidence checks were found during the course of the survey and included sand waves, pipelines and the legs of an oil platform.

The data quality was reasonable considering the marginal weather and high currents in the work area, but some problems were encountered with very high stress on the tow cable and sonar fish. A failure occurred in the tow cable at the fish end, due to a open conductor in the starboard channel. This intermittent open conductor caused the data quality to suffer at times until the problem was identified and fixed. In addition, an intermittent problem was encountered due to the bulk head connector on the 100 kHz sonar fish as a carbon trace between the 750 volt trigger line and sea water. This problem was very intermittent and was made worse by the high towing speeds encountered during the survey at the survey site. The strumming of the tow cable would effect the mechanical connection of the tow cable and the sonar fish causing a slight electrical path for a high voltage leak. Thus not allowing the transmit capacitor in the towed fish to fully charge for consistent ping rates.

The pipe was seen best on line 297-1101. It determined using shadow height to be approximately 2.25 meters high and 0.6 meters in diameter. The dimensions were difficult to determine due to the proximity of the pipe to the track line.

Charting Recommendation

Soundings in the vicinity of the pipe indicate the depth to be 14.4 fathoms or 26.33 meters. Subtracting 2.25 meters for the height of the pipe above the seafloor makes the depth 24.08 meters or 13.1 fathoms rounded. The charted depth is shown as 13 fathoms.

Recommended Least Depth: No change recommended (13 fathoms) Retain as charted. Expunge "PA"

==========

Office Use:

O. Not Used by Contractor ✓

P. Aids to Navigation ✓

There were no Aids to Navigation found in this survey. Two pipeline corridors are charted within the bounds of this survey. The pipelines were visible in the multibeam data and the location of pipelines was determined. The pipeline heading from the Dillon platform to the north lies along the west side of the charted corridor. The pipeline heading east from the Dillon platform lies outside the charted corridor. A chartlet showing the corridors is included in ~~Appendix A.~~ this report.

Q. Statistics ✓

The following list of statistics applies to surveying performed from the *Sea Ducer*, the only vessel used on this survey.

Lineal Nautical Miles of Sounding Lines (Shallow Water Multibeam)	736.25
Square Nautical Miles (100% Shallow Water Multibeam Coverage)	10.4
Number of Velocity Casts	100
Number of Supplemental tide stations installed	0
Number of Horizontal Control Stations Occupied / Established	1
Number of Items Investigated	3

R. Miscellaneous ✓

This survey found the general location and depths over the shoal to be very similar to the chart. Sand waves were found in several areas and when lines were run at later dates to cover holidays the locations of the wave crests had changed indicating movement. This movement was not unexpected in an area with peak currents in excess of 6 knots.

The smooth sheet soundings were analyzed for the number of soundings representing each beam on the Reson 8101 and are included below.

S. Recommendations

We are unaware of any planned activities involving construction or dredging within or adjacent to this area.

T. Referral to Reports ✓

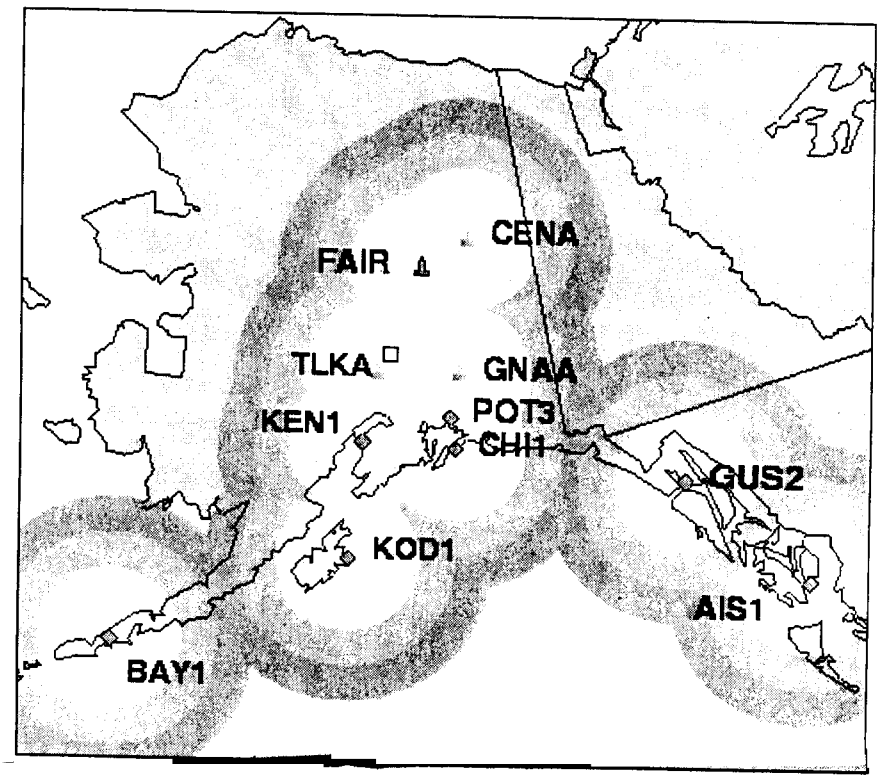
NOAA PROJECT OPR-P367-KR

H-10819

Terra Surveys, LLC

- **LINE STATISTICS, 1998**
- **QUALITY CONTROL REPORTS, 1998**
- **CALIBRATION, 1998**
- **LINE LOGS, JD 176-189, 1998**
- **LINE LOGS, JD 225-247, 1998**
- **LINE LOGS, JD 248-280, 1998**

CORS COVERAGE – ALASKA
(100, 200, 300, and 400 km ranges)



Blue = Active site with 30 second sampling rate

Gray = Future site

ORIGINAL PAGE IS
NOT IN COLOR

DGPS BROADCAST SITE STATUS & OPERATING SPECIFICATIONS
STATUS AS OF 3/18/99

USERS SHOULD NOTIFY THE NIS WATCHSTANDER AT (703)313-5900 OF ANY OBSERVED OUTAGES, PROBLEMS, OR REQUESTS. ALL CURRENT OUTAGE INFORMATION WILL BE LISTED FOLLOWING EACH SITE.

THE COAST GUARD DGPS SERVICE IS AVAILABLE FOR POSITIONING AND NAVIGATION. USERS MAY EXPERIENCE SERVICE INTERRUPTIONS WITHOUT ADVANCE NOTICE. COAST GUARD DGPS BROADCASTS SHOULD NOT BE USED UNDER ANY CIRCUMSTANCES WHERE A SUDDEN SYSTEM FAILURE OR INACCURACY COULD CONSTITUTE A SAFETY HAZARD.

NOTE: Differential corrections are based on the NAD 83 position of the reference station (REFSTA) antenna. Positions obtained using DGPS should be referenced to NAD 83 coordinate system only. All sites are broadcasting RTCM Type 9-3 correction messages.

DGPS Latest Status for sites in the area of ALASKA COAST

Back to the HomePage

ANNETTE ISLAND, AK

Status:	Operational
RBn Antenna Location:	55,4.1N;131, 36W
REFSTA Ant Location (A):	55,4.1441N;131, 35.97093W
REFSTA Ant Location (B):	55, 4.13276N;131, 35.95144W
REFSTA RTCM SC-104 ID (A):	278
REFSTA RTCM SC-104 ID (B):	279
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	889
Transmission Frequency:	323 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 170 NM

Outages:

No Current Outages.

CAPE HINCHINBROOK, AK

Status:	Operational
RBn Antenna Location:	60,14.3N;146, 38.8W
REFSTA Ant Location (A):	60,14.24813N;146, 38.81767W

REFSTA Ant Location (B):	60, 14.24604N;146, 38.80669W
REFSTA RTCM SC-104 ID (A):	288
REFSTA RTCM SC-104 ID (B):	289
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	894
Transmission Frequency:	292 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 120 NM

Outages:

No Current Outages.

COLD BAY, AK

Status:	Operational
RBn Antenna Location:	55,5.5N;162, 31.9W
REFSTA Ant Location (A):	55,11.41638N;162, 42.42832W
REFSTA Ant Location (B):	55, 11.42518N;162, 42.40463W
REFSTA RTCM SC-104 ID (A):	296
REFSTA RTCM SC-104 ID (B):	297
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	898
Transmission Frequency:	289 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 180 NM

Outages:

No Current Outages.

GUSTAVUS, AK

Status:	Operational
RBn Antenna Location:	58,25.1N;135, 41.8W
REFSTA Ant Location (A):	58,25.049N;135, 41.83917W
REFSTA Ant Location (B):	58, 25.06524N;135, 41.8217W
REFSTA RTCM SC-104 ID (A):	284
REFSTA RTCM SC-104 ID (B):	285
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	892
Transmission Frequency:	288 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 170 NM

Outages:

No Current Outages.

KENAI, AK

Status:	Operational
RBn Antenna Location:	60,40.1N;151, 21W
REFSTA Ant Location (A):	60,40.50477N;151, 21.00955W
REFSTA Ant Location (B):	60, 40.48834N;151, 21.00847W
REFSTA RTCM SC-104 ID (A):	292
REFSTA RTCM SC-104 ID (B):	293
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	896
Transmission Frequency:	310 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 170 NM

Outages:

No Current Outages.

KODIAK, AK

Status:	Operational
RBn Antenna Location:	57,37.1N;152, 11.6W
REFSTA Ant Location (A):	57,37.06143N;152, 11.60436W
REFSTA Ant Location (B):	57, 37.05542N;152, 11.6315W
REFSTA RTCM SC-104 ID (A):	294
REFSTA RTCM SC-104 ID (B):	295
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	897
Transmission Frequency:	313 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 180 NM

Outages:

No Current Outages.

POTATO POINT, AK

Status:	Operational
RBn Antenna Location:	61,3.4N;146, 41.8W
REFSTA Ant Location (A):	61,3.38794N;146, 41.83412W
REFSTA Ant Location (B):	61, 3.38057N;146, 41.79811W
REFSTA RTCM SC-104 ID (A):	290
REFSTA RTCM SC-104 ID (B):	291
REFSTA FIRMWARE VERSION:	RC00-1C19
Broadcast Site ID:	895
Transmission Frequency:	298 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV at 100 NM

Outages:

The NGS Data Sheet

```
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 5.77
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = MARCH 19, 1999
 TT0543 ***********************************************************************
 TT0543  TIDAL BM     -  This is a Tidal Bench Mark.
 TT0543  DESIGNATION  -  NIK
 TT0543  PID          -  TT0543
 TT0543  STATE/COUNTY-  AK/ANCHORAGE BOROUGH
 TT0543  USGS QUAD    -
 TT0543
 TT0543                          *CURRENT SURVEY CONTROL
 TT0543
 TT0543* NAD 83(1986)-  60 40 58.70650(N)     151 23 57.33065(W)      ADJUSTED
 TT0543* NAVD 88      -         9.000  (meters)       29.53   (feet)  ADJUSTED
 TT0543
 TT0543  LAPLACE CORR-          -20.51  (seconds)                       DEFLEC96
 TT0543  GEOID HEIGHT-            7.88  (meters)                        GEOID96
 TT0543  DYNAMIC HT   -           9.011 (meters)       29.56   (feet)  COMP
 TT0543  MODELED GRAV-      981,818.5   (mgal)                          NAVD 88
 TT0543
 TT0543  HORZ ORDER   -  SECOND
 TT0543  VERT ORDER   -  FIRST     CLASS II
 TT0543
 TT0543.The horizontal coordinates were established by classical geodetic methods
 TT0543.and adjusted by the National Geodetic Survey in July 1986.
 TT0543
 TT0543.The orthometric height was determined by differential leveling
 TT0543.and adjusted by the National Geodetic Survey in June 1991.
 TT0543
 TT0543.This mark is designated as VM 1323 in the Oceanographic Products
 TT0543.and Services Division Tidal Bench Mark database.
 TT0543
 TT0543.The Laplace correction was computed from DEFLEC96 derived deflections.
 TT0543
 TT0543.The geoid height was determined by GEOID96.
 TT0543
 TT0543.The dynamic height is computed by dividing the NAVD 88
 TT0543.geopotential number by the normal gravity value computed on the
 TT0543.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 TT0543.degrees latitude (G = 980.6199 gals.).
 TT0543
 TT0543.The modeled gravity was interpolated from observed gravity values.
 TT0543
 TT0543;                     North         East      Units   Scale      Converg.
 TT0543;SPC AK 4      -   744,992.050   423,547.879   MT  0.99997160 -1 13 12.4
 TT0543;UTM  05       - 6,728,541.433   587,433.029   MT  0.99969367 +1 23 44.9
 TT0543
 TT0543:                  Primary Azimuth Mark                     Grid Az
 TT0543:SPC AK 4      -   SALAM 1964                                162 49 41.9
 TT0543:UTM  05       -   SALAM 1964                                160 12 44.6
 TT0543
 TT0543|---------------------------------------------------------------------|
 TT0543| PID    Reference Object                        Distance      Geod. Az |
 TT0543|                                                              dddmmss.s |
 TT0543|        NIK RM 1                               11.430 METERS 05302    |
 TT0543| TT0542 945 5760 TIDAL 1                      307.388 METERS 07204    |
 TT0543|        NIK RM 2                               18.581 METERS 13041    |
 TT0543| UW5922 SALAM 1964                            APPROX.11.6 KM 1613629.5 |
 TT0543| UW5933 BOO 1961                               23.387 METERS 34521    |
 TT0543|---------------------------------------------------------------------|
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TT0543
TT0543                          SUPERSEDED SURVEY CONTROL
TT0543
TT0543  NAD 27       -  60 41 00.75931(N)     151 23 49.25239(W) AD(        ) 2
TT0543  NGVD 29      -         7.193  (m)             23.60   (f) ADJ UNCH    1 2
TT0543
TT0543.Superseded values are not recommended for survey control.
TT0543.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
TT0543.See file dsdata.txt to determine how the superseded data were derived.
TT0543
TT0543_MARKER: DS = TRIANGULATION STATION DISK
TT0543_SETTING: 38 = SET IN THE ABUTMENT OR PIER OF A LARGE BRIDGE
TT0543_STAMPING: NIK 1964
TT0543_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
TT0543_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
TT0543+SATELLITE: SATELLITE OBSERVATIONS - May 06, 1996
TT0543
TT0543  HISTORY      - Date      Condition        Recov. By
TT0543  HISTORY      - 1964      MONUMENTED       CGS
TT0543  HISTORY      - 1966      GOOD             CGS
TT0543  HISTORY      - 1969      GOOD             CGS
TT0543  HISTORY      - 1971      GOOD             NGS
TT0543  HISTORY      - 1973      GOOD             NGS
TT0543  HISTORY      - 1974      GOOD             NGS
TT0543  HISTORY      - 1976      GOOD             NGS
TT0543  HISTORY      - 19960506  GOOD             NGS
TT0543
TT0543                          STATION DESCRIPTION
TT0543
TT0543'DESCRIBED BY COAST AND GEODETIC SURVEY 1964 (VBM)
TT0543'STATION IS LOCATED ABOUT 9 MILES NORTH OF KENAI ON THE EAST SIDE
TT0543'OF COOK INLET, AND ON THE WEST SIDE OF THE KENAI PIPE LINE PIER
TT0543'THAT PROJECTS ABOUT 1000 FEET OUT INTO THE INLET.
TT0543'
TT0543'TO REACH FROM THE POST OFFICE IN KENAI, GO EAST 0.05 MILE TO
TT0543'CROSSROADS, TURN LEFT AND GO NORTH ON THE MAIN ROAD FOR 2.7
TT0543'MILES AT THE WILDWOOD ARMY STATION ON THE RIGHT, CONTINUE NORTH
TT0543'ON THE MAIN GRAVEL ROAD FOR 8.0 MILES TO A SIDE ROAD LEFT,
TT0543'CONTINUE NORTH FOR 0.25 MILE, AT THE OFFICE OF THE KENAI PIPE
TT0543'LINE COMPANY, TURN LEFT, WEST, AND PASS THROUGH GATE ON NORTH
TT0543'SIDE OF OFFICE FOLLOWING MAIN TRAVELED ROAD FOR 0.4 MILE TO
TT0543'LARGE PIER.  STATION IS AT EXTREME WEST END OF THE PIER.
TT0543'
TT0543'STATION MARK IS A STANDARD TRIANGULATION STATION MARK DISK,
TT0543'CEMENTED IN A DRILL HOLE IN THE CONCRETE PIER.  IT IS STAMPED
TT0543'NIK 1964.  MARK IS 76 FEET SOUTH OF A BOOM WITH TWO ARMS AND
TT0543'4.6 FEET EAST OF WEST EDGE OF PIER.
TT0543'
TT0543'REFERENCE MARK NUMBER 1 IS A PUNCH MARK IN THE SOUTHWEST BOLT
TT0543'HOLDING A METAL LIGHT POLE TO THE CEMENT PIER.  IT IS THE
TT0543'FIRST LIGHT POLE ON THE RIGHT AS YOU ENTER THE MAIN PART OF
TT0543'THE PIER.
TT0543'
TT0543'REFERENCE MARK NUMBER 2 IS A PUNCH MARK IN A BOLT HOLDING A
TT0543'LARGE CAT-HEAD TO THE CEMENT PIER.  THE CAT-HEAD IS ON THE
TT0543'SOUTHEAST END OF THE MAIN PART OF THE PIER.
TT0543
TT0543                          STATION RECOVERY (1966)
TT0543
TT0543'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1966 (GLS)
TT0543'STATION RECOVERED IN GOOD CONDITION AS DESCRIBED IN 1964.
TT0543'ADDITION SHOULD BE MADE TO DESCRIPTION THAT PERMISSION MUST
TT0543'BE OBTAINED AT KENAI PIPELINE COMPANY OFFICE FOR ACCESS TO PIER.
TT0543
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TT0543                              STATION RECOVERY (1969)
TT0543
TT0543'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (EAT)
TT0543'STATION RECOVERED IN GOOD CONDITION.  DESCRIPTION ADEQUATE.
TT0543
TT0543                              STATION RECOVERY (1971)
TT0543
TT0543'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971
TT0543'1 MI W FROM NORTH KENAI.
TT0543'THE STATION IS LOCATED ABOUT 1 MILE WEST OF THE NORTH KENAI POST
TT0543'OFFICE ON THE EAST SIDE OF COOK INLET AND ON THE WEST SIDE OF THE
TT0543'KENAI PIPELINE PIER WHICH IS THE NORTHERN ONE OF 3 PIERS THAT PROJECT
TT0543'ABOUT 1,000 FEET OUT INTO THE INLET.  TO REACH FROM THE POST OFFICE IN
TT0543'NORTH KENAI, DRIVE NORTH ON THE PAVED HIGHWAY 0.7 MILES, AT THE OFFICE
TT0543'OF THE KENAI PIPELINE COMPANY TURN LEFT WEST AND PASS THROUGH GATE ON
TT0543'NORTH SIDE OF OFFICE FOLLOWING MAIN TRAVELED ROAD FOR 0.4 MILES TO
TT0543'LARGE PIER.  ACCESS TO GATE AND PIER MUST BE OBTAINED FROM KENAI
TT0543'PIPELINE COMPANY OFFICE.  STATION IS AT EXTREME WEST END OF THE PIER.
TT0543'STATION MARK IS A STANDARD TRIANGULATION STATION MARK DISK, CEMENTED
TT0543'IN A DRILL HOLE IN THE CONCRETE PIER.  IT IS STAMPED NIK 1964. MARK IS
TT0543'76 FEET SOUTH OF BOOM WITH 2 ARMS 4.7 FEET EAST OF WEST EDGE OF PIER,
TT0543'13 FEET FROM CENTER OF THE APPROACH PIER, 46 FEET WEST FROM NORTHWEST
TT0543'CORNER OF HOUSE AND 11 FEET SOUTH OF 3RD BIT FROM SOUTH END OF DOCK.
TT0543'SEC 21, T 6N, R 12W.
TT0543
TT0543                              STATION RECOVERY (1973)
TT0543
TT0543'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1973 (RBM)
TT0543'THE STATION AND REFERENCE MARKS WERE RECOVERED IN GOOD CONDITION
TT0543'EXCEPT REFERENCE MARK 2 IS A PUNCH MARK ON A LARGE BOLT THAT
TT0543'SECURES A CAPSTAN TO THE DECK OF THE PIER.
TT0543'
TT0543'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN--9 MILES
TT0543'NORTH OF KENAI
TT0543
TT0543                              STATION RECOVERY (1974)
TT0543
TT0543'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1974 (CAB)
TT0543'THE STATION MARK WAS RECOVERED IN GOOD CONDITION APPROXIMATELY 23
TT0543'METERS FROM TRIANGULATION STATION BOO 1961.  THE ORIGINAL
TT0543'DESCRIPTION WAS NOT AVAILABLE.
TT0543'
TT0543'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN--9 MILES N OF
TT0543'KENAI.
TT0543
TT0543                              STATION RECOVERY (1976)
TT0543
TT0543'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1976 (REA)
TT0543'THE STATION WAS RECOVERED IN GOOD CONDITION BY THE NOAA SHIP
TT0543'FAIRWEATHER AS DESCRIBED BY V.B.M. IN 1964 EXCEPT THE PIER IS
TT0543'NOW OPERATED BY THE STANDARD OIL COMPANY.  PERMISSION TO OCCUPY
TT0543'THE STATION MAY BE OBTAINED BY VISITING THEIR OFFICE APPROXIMATELY
TT0543'1/2 MILE NORTH OF THE PIER.
TT0543'
TT0543'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN--9 MILES NORTH
TT0543'OF KENAI
TT0543
TT0543                              STATION RECOVERY (1996)
TT0543
TT0543'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
TT0543'RECOVERED AS DESCRIBED.  THE PROPERTY IS NOW OWNED BY THE TESORO OIL
TT0543'COMPANY.  PERMISSION TO ACCESS THE PROPERTY MUST BE OBTAINED FROM THE
TT0543'TESORO PEOPLE ACROSS THE STREET AT THE REFINERY.  A TELEPHONE NUMBER
TT0543'TO START WITH IS 907-776-3560 OR 8191.
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TERRA SURVEYS LLC

ADVANCE INFORMATION

March 16, 1999

Commander (OAN)
Seventeenth Coast Guard District
P.O. Box 25517
Juneau, Alaska 99802-5517

Reference: NOAA Survey Number H-10819
Contract Number OPR-P367-KR

Dear Sir:

While conducting hydrographic survey operations for the approaches to Nikiski, Alaska (NOAA survey H-10819), Terra Surveys, LLC found shoal soundings and rocks either uncharted or shown deeper than this survey indicates. Attached is the Danger to Navigation Report and a section of chart 16662 indicating the position of these dangers.

Differential GPS and multibeam sonar were used to determine the position and depth. These data are preliminary and subject to office review.

Sincerely,
Terra Surveys, LLC

Thomas S. Newman, PLS
Partner

Enclosures

Cc: Gary Nelson
NOAA (COTR)

1930 South Whiting Circle – P.O. Box 1549 – Palmer, Alaska 99645 – Phone: (907) 745-7215 – Fax: (907) 746-5197 – Email: terra@alaska.net

ADVANCE
INFORMATION

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry: H-10819
State: Alaska
General Locality: Cook Inlet
Sublocality: Northern Approach to Port of Nikiski
Project Number: OPR-P367-KR

The following items were found during hydrographic survey operations:

Objects Discovered: Rocks and Shoal Soundings

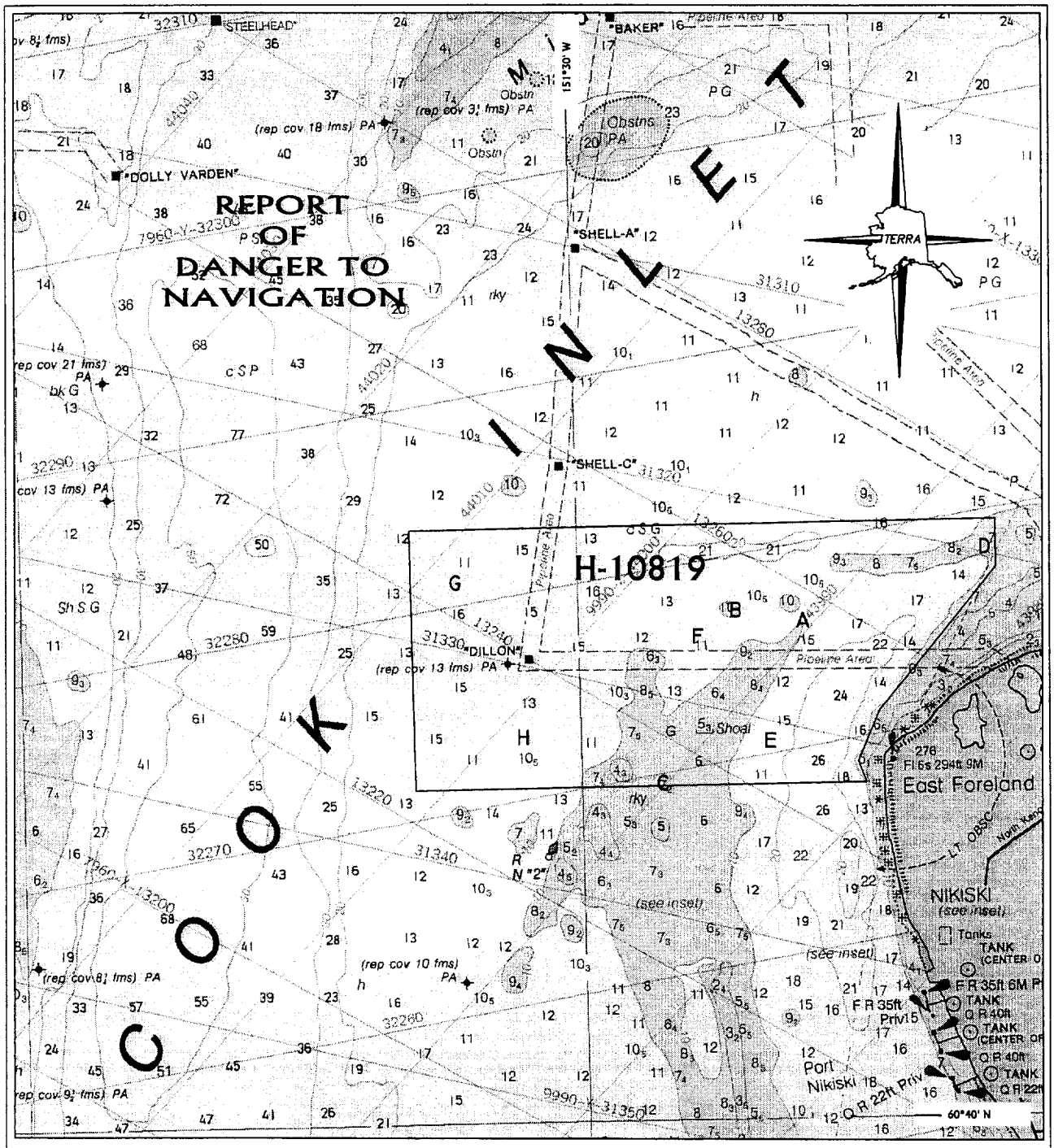
Within the survey area bounded by Latitude 60°43.0'N and 60°44.8'N and Longitudes 151°22.5'W and 151°30.0'W numerous rocks were found. Within the 10 fathom curve rocks as shallow as 4 fathoms 1 foot were found. Shoal soundings and rocks were found within the survey area, the most significant of which are listed below.

All items listed were corrected to Mean Lower Low Water using observed tide correctors and affect charts:

Chart Number	Edition (Number / Date)
16662	5 / July 05, 1997
16663	5 / July 12, 1996
16660	27 / April 19, 1997

ITEM	RADIUS	REPORTED DEPTH	CHARTED HORIZ. DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
A	N/A	8 Fathoms 5 feet	NAD83	60° 44' 23.6 " N	151° 26' 00.0 " W
B	N/A	9 Fathoms 0 feet	NAD83	60° 44' 29.8 " N	151° 27' 11.4 " W
C	N/A	6 Fathoms 2 feet	NAD83	60° 42' 58.7 " N	151° 28' 33.7 " W
D	N/A	4 Fathoms 5 feet	NAD83	60° 45' 00.3 " N	151° 22' 42.1 " W
E	N/A	10 Fathoms 5 feet	NAD83	60° 43' 20.1 " N	151° 26' 37.7 " W
F	N/A	8 Fathoms 5 feet	NAD83	60° 44' 16.2 " N	151° 27' 52.3 " W
G	N/A	10 Fathoms 4 feet	NAD83	60° 44' 47.0 " N	151° 32' 13.1 " W
H	N/A	9 Fathoms 4 feet	NAD83	60° 43' 24.3 " N	151° 31' 02.7 " W

TERRA SURVEYS LLC



ADVANCE INFORMATION

REFER TO ACCOMPANYING TEXT FOR ITEM DETAILS

OPR-P367-KR
H-10819
Northern Approach to Port of Nikiski
Surveyed By Terra Surveys, LLC
Lead Hydrographer: Robert Kohut
Survey Vessel: Sea Ducer
Chart 16662 5th Ed., July 5, 1997
Scale of Sketch: 1:100,000
Scale of Survey 1:10,000

0 1 2 3
Nautical Miles

TERRA SURVEYS LLC

March 19, 1999
Commander (OAN)
Seventeenth Coast Guard District
P.O. Box 25517
Juneau, Alaska 99802-5517

ADVANCE INFORMATION

Reference: NOAA Survey Number H-10819
Contract Number OPR-P367-KR

Dear Sir:

While conducting hydrographic survey operations for the approaches to Nikiski, Alaska (NOAA survey H-10819), Terra Surveys, LLC found two pipelines outside there charted corridor. Attached is the Danger to Navigation Report and a section of chart 16662 indicating the position of this pipelines.

Differential GPS and multibeam sonar were used to determine the position of the pipelines. These data are preliminary and subject to office review.

Sincerely,
Terra Surveys, LLC

Thomas S. Newman, PLS
Partner

Enclosures

Cc: Gary Nelson
NOAA (COTR)

1930 South Whiting Circle – P.O. Box 1549 – Palmer, Alaska 99645 – Phone: (907) 745-7215 – Fax: (907) 746-5197 – Email: terra@alaska.net

ADVANCE
INFORMATION

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry:	H-10819
State:	Alaska
General Locality:	Cook Inlet
Sublocality:	Northern Approach to Port of Nikiski
Project Number:	OPR-P367-KR

The following items were found during hydrographic survey operations:

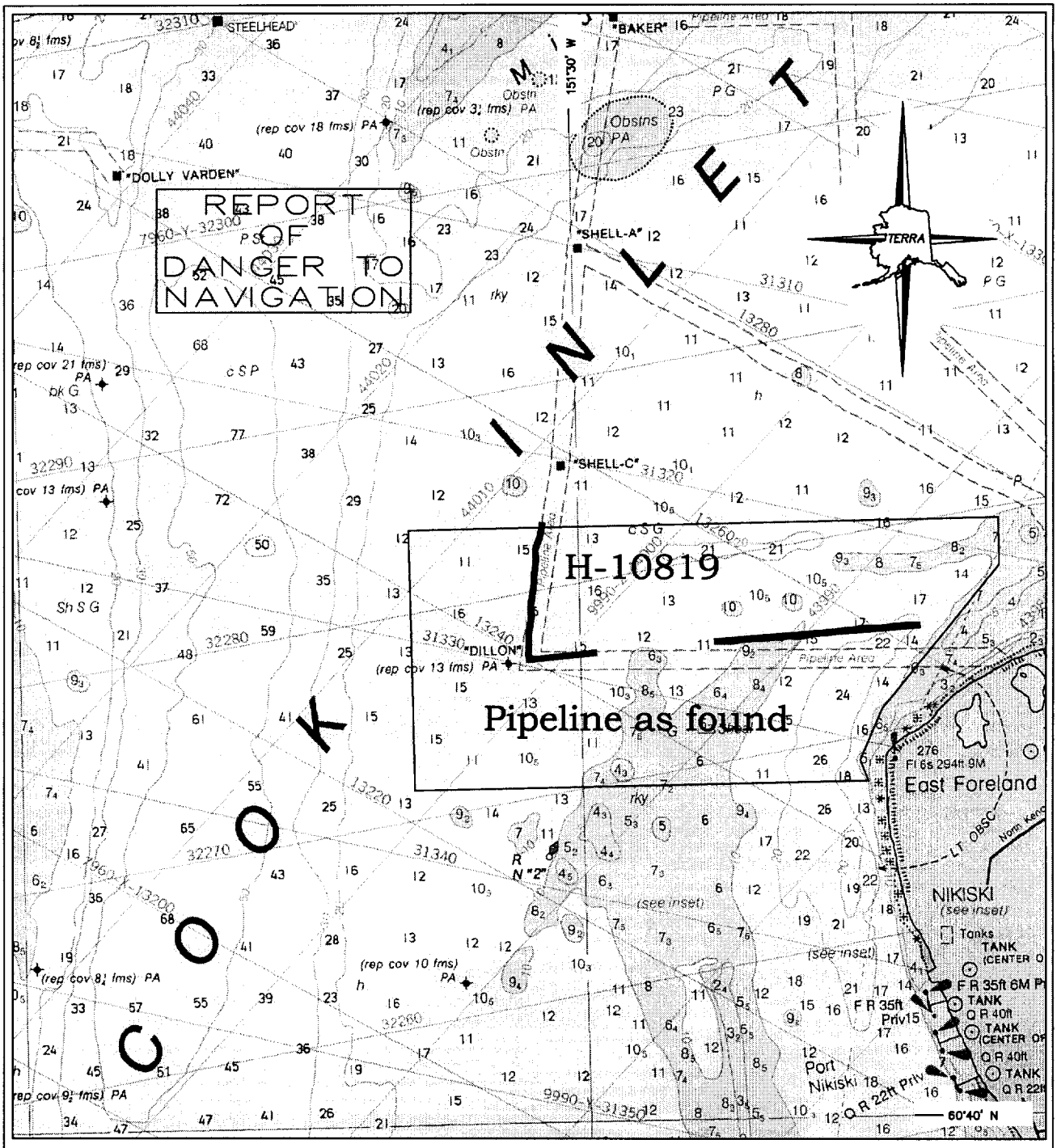
Objects Discovered: Pipelines outside their charted corridor.

Within the survey area bounded by Latitude 60°43.0'N and 60°44.8'N and Longitudes 151°22.5'W and 151°30.0'W a pair of parallel pipelines were found outside their charted corridor. The pipelines were detected following a course from Latitude 60°44'05"N and Longitude 151°30'54"W to Latitude 60°44'19"N and Longitude 151°23'57"W. Position of the pipelines east of this section is unknown.

This affects charts:

Chart Number	Edition (Number / Date)
16662	5 / July 05, 1997
16663	5 / July 12, 1996
16660	27 / April 19, 1997

TERRA SURVEYS LLC



OPR–P367–KR
H–10819
Northern Approach to Port of Nikiski
Surveyed By Terra Surveys, LLC
Lead Hydrographer: Robert Kohut
Survey Vessel: Sea Ducer
Chart 16662 5th Ed., July 5, 1997
Scale of Sketch: 1:100,000
Scale of Survey 1:10,000

ADVANCE INFORMATION

REFER TO ACCOMPANYING TEXT FOR ITEM DETAILS

0 1 2 3
Nautical Miles

TERRA SURVEYS LLC

ADVANCE INFORMATION

March 25, 1999

Commander (OAN)
Seventeenth Coast Guard District
P.O. Box 25517
Juneau, Alaska 99802-5517

Reference: NOAA Survey Number H-10819
Contract Number OPR-P367-KR

Dear Sir:

A Danger to Navigation report mailed on March 16, 1999 contained a typographical error. A sentence on the second page should have been omitted. The sentence "Within the 10 fathom curve rocks as shallow as 4 fathoms 1 foot were found" should not have been included. Please use the second page from this letter to revise the previous report.

Sincerely,
Terra Surveys, LLC

Thomas S. Newman, PLS
Partner

Enclosures

Cc: Gary Nelson
NOAA (COTR)

1930 South Whiting Circle – P.O. Box 1549 – Palmer, Alaska 99645 – Phone: (907) 745-7215 – Fax: (907) 746-5197 – Email: terra@alaska.net

ADVANCE
INFORMATION

REPORT OF DANGER TO NAVIGATION

Hydrographic Survey Registry: H-10819
State: Alaska
General Locality: Cook Inlet
Sublocality: Northern Approach to Port of Nikiski
Project Number: OPR-P367-KR

The following items were found during hydrographic survey operations:

Objects Discovered: Rocks and Shoal Soundings

Within the survey area bounded by Latitude 60°43.0'N and 60°44.8'N and Longitudes 151°22.5'W and 151°30.0'W numerous rocks were found. Shoal soundings and rocks were found within the survey area, the most significant of which are listed below.

All items listed were corrected to Mean Lower Low Water using observed tide correctors and affect charts:

Chart Number	Edition (Number / Date)
16662	5 / July 05, 1997
16663	5 / July 12, 1996
16660	27 / April 19, 1997

ITEM	RADIUS	REPORTED DEPTH	CHARTED HORIZ. DATUM	GEOGRAPHIC POSITION	
				LATITUDE	LONGITUDE
A	N/A	8 Fathoms 5 feet	NAD83	60° 44' 23.6 " N	151° 26' 00.0 " W
B	N/A	9 Fathoms 0 feet	NAD83	60° 44' 29.8 " N	151° 27' 11.4 " W
C	N/A	6 Fathoms 2 feet	NAD83	60° 42' 58.7 " N	151° 28' 33.7 " W
D	N/A	4 Fathoms 5 feet	NAD83	60° 45' 00.3 " N	151° 22' 42.1 " W
E	N/A	10 Fathoms 5 feet	NAD83	60° 43' 20.1 " N	151° 26' 37.7 " W
F	N/A	8 Fathoms 5 feet	NAD83	60° 44' 16.2 " N	151° 27' 52.3 " W
G	N/A	10 Fathoms 4 feet	NAD83	60° 44' 47.0 " N	151° 32' 13.1 " W
H	N/A	9 Fathoms 4 feet	NAD83	60° 43' 24.3 " N	151° 31' 02.7 " W

TERRA SURVEYS LLC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-0070

June 24, 1999

Commander (OAN)
Seventeenth Coast Guard District
P.O. Box 25517
Juneau, AK 99802

Dear Sir:

During office review of hydrographic survey H-10819, Alaska, Cook Inlet, Approach to Port Nikiski, thirteen additional shoal soundings were found and are considered to be potential dangers to navigation.

It is recommended that the enclosed Report of Dangers to Navigation be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Hydrographic Branch at (206) 526-6836.

Sincerely,

James C Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch

Enclosure

cc: NIMA
NCS/261

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10819

Survey Title: State: ALASKA
Locality: COOK INLET
Sublocality: NORTHERN APPROACH TO PORT NIKISKI

Project Number: OPR-P367-KR

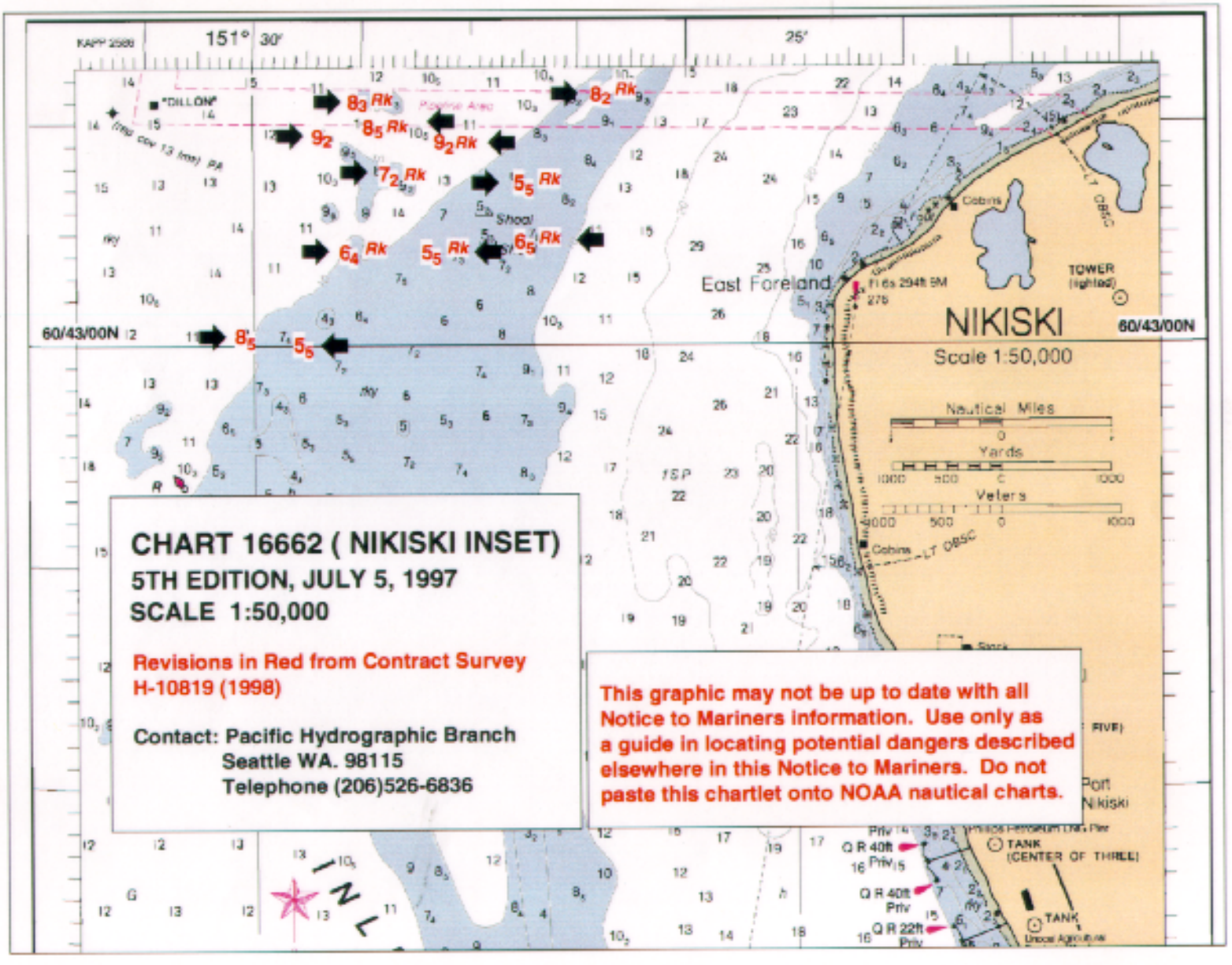
Survey Date: JUNE - OCTOBER 1998

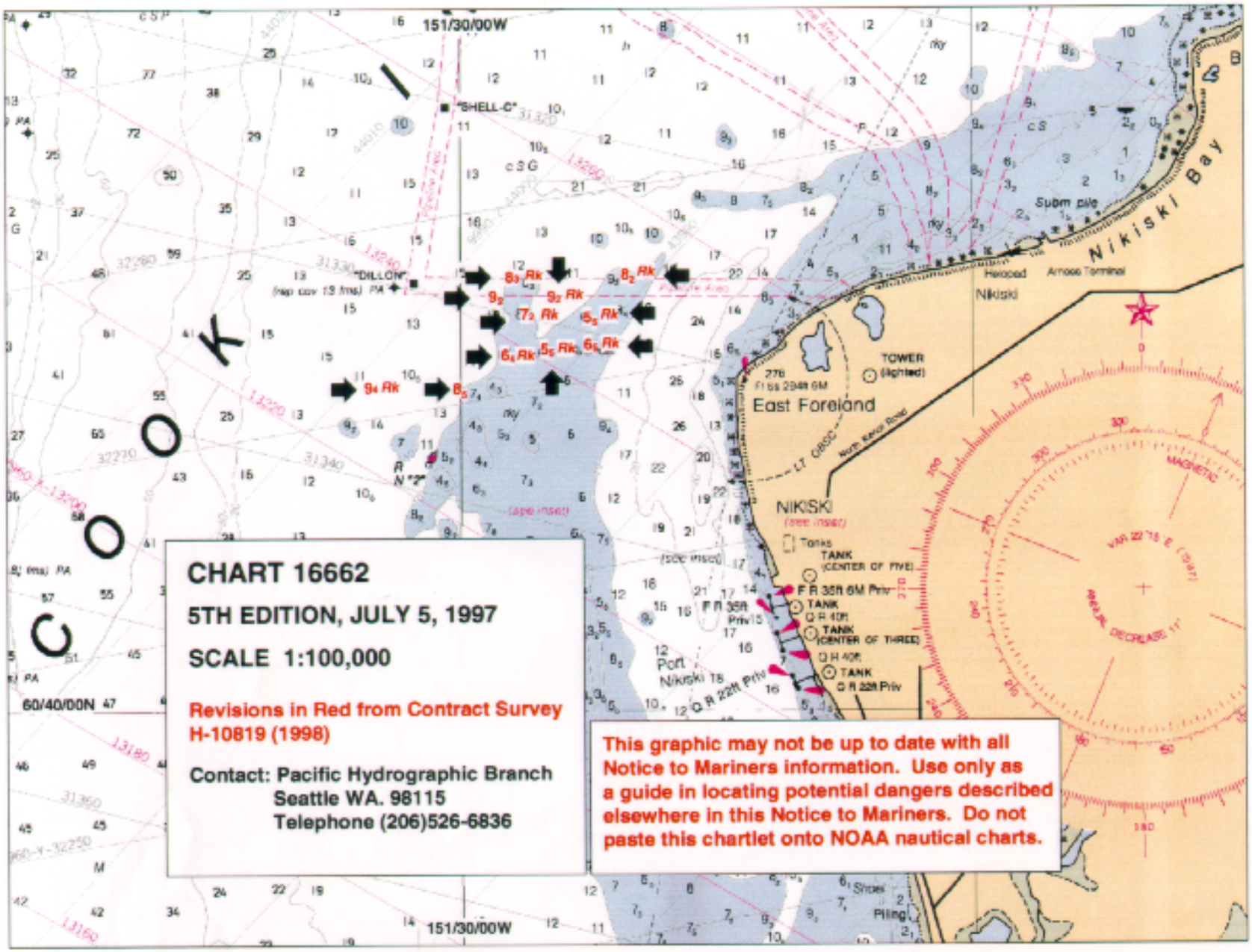
Soundings are reduced to Mean Lower Low Water using approved tides and are positioned on NAD 83.

Chart affected: 16662 5TH Edition July 5, 1997, scale 1:100,000 and Inset 1:50,000 NAD 83

DANGER TO NAVIGATION	LATITUDE(N)	LONGITUDE(W)
9 fathom 4 feet (Rk)	60/43/02	151/31/49
5 fathom 5 feet	60/43/01	151/29/33
6 fathom 4 feet (Rk)	60/43/25.5	151/29/07
5 fathom 5 feet (Rk)	60/43/26	151/28/22
6 fathom 5 feet (Rk)	60/43/28.5	151/27/31
5 fathom 5 feet (Rk)	60/43/44.5	151/27/30.5
7 fathom 2 feet (Rk)	60/43/47	151/28/46.5
9 fathom 2 feet	60/43/57	151/29/23
8 fathom 5 feet (Rk)	60/44/00	151/28/54
8 fathom 3 feet (Rk)	60/44/06.5	151/29/03
8 fathom 2 feet (Rk)	60/44/09	151/26/48
9 fathom 2 feet (Rk)	60/43/56	151/28/14.5
8 fathom 5 feet	60/43/03	151/30/04

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206)526-6836.


151° 30'
25'
"DILLON"
East Foreland
Shoal
Cabins
TOWER
(lighted)
NIKISKI
60/43/00N
Scale 1:50,000
Nautical Miles
Yards
Meters
Cabins
TANK
(CENTER OF THREE)
TANK
Q R 40ft
Priv
Q R 40ft
Priv
Q R 22ft
Priv
CHART 16662 (NIKISKI INSET)
5TH EDITION, JULY 5, 1997
SCALE 1:50,000
Revisions in Red from Contract Survey
H-10819 (1998)
Contact: Pacific Hydrographic Branch
Seattle WA. 98115
Telephone (206)526-6836
This graphic may not be up to date with all Notice to Mariners information. Use only as a guide in locating potential dangers described elsewhere in this Notice to Mariners. Do not paste this chartlet onto NOAA nautical charts.


151/30/00W
"SHELL-C"
"DILLON"
Nikiski Bay
Subm pile
Nikiski
East Foreland
TOWER
(lighted)
NIKISKI
(see inset)
TANK
(CENTER OF FIVE)
TANK
(CENTER OF THREE)
Port
Nikiski
60/40/00N
151/30/00W
CHART 16662
5TH EDITION, JULY 5, 1997
SCALE 1:100,000
Revisions in Red from Contract Survey H-10819 (1998)
Contact: Pacific Hydrographic Branch
Seattle WA. 98115
Telephone (206)526-6836
This graphic may not be up to date with all Notice to Mariners information. Use only as a guide in locating potential dangers described elsewhere in this Notice to Mariners. Do not paste this chartlet onto NOAA nautical charts.

TERRA SURVEYS LLC
Terrestrial and Sea Floor Mapping

LETTER OF APPROVAL

REGISTRY NO. H-10819

This report and the accompanying smooth sheet are respectfully submitted.

Field operations contributing to the accomplishment of survey H-10819 were conducted under my direct supervision with frequent checks of progress and adequacy. This report and smooth sheets have been closely reviewed and are considered complete and adequate as per the Statement of Work.

Thomas S. Newman
Hydrographer
Terra Surveys, LLC
July 17th, 2000

1930 South Whiting Circle - P.O. Box 1549 - Palmer, Alaska 99645-1549 - Phone: (907) 745-7215 - Fax: (907) 745-7273 - Email: terra@terra-surveys.com - Web Site: www.terra-surveys.com

NOAA FORM 76-155
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10819

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
ALASKA (title)	X		X							1
COOK INLET	X		X							2
EAST FORELAND	X		X							3
PORT NIKISKI (title)	X		X							4
										5
										6
										7
										8
										9
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										25

Approved:

Dennis J. Romashire
Chief Cartographer
JUN 29 1999

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 77-27(H)
(9-83)

U.S. DEPARTMENT OF COMMERCE

HYDROGRAPHIC SURVEY STATISTICS

REGISTRY NUMBER
H-10819

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	SMOOTH OVERLAYS: POS., ARC, EXCESS	
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	2

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES						
ENVELOPES						
VOLUMES						
CAHIERS						
BOXES						

SHORELINE DATA

SHORELINE MAPS (List):

PHOTOBATHYMETRIC MAPS (List):

NOTES TO THE HYDROGRAPHER (List):

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List):

OFFICE PROCESSING ACTIVITIES

The following statistics will be submitted with the cartographer's report on the survey

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	*EVALUATION*	*TOTALS*
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISED			
CONTROL STATIONS REVISED			
	TIME-HOURS		
	VERIFICATION	*EVALUATION*	*TOTALS*
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS			
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	157		157
COMPARISON WITH PRIOR SURVEYS AND CHARTS			
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		42	42
GEOGRAPHIC NAMES			
OTHER* (Chart Compilation)		39	39
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	157	81	238

Pre-processing Examination by: G. Nelson	*Beginning Date*: 5/1/00	*Ending Date*: 6/14/00
Verification of Field Data by: G. Nelson, R. Davies	*Time (Hours)*: 157	*Ending Date*: 7/18/00
erification Check by: I. Almacen, B. Olmstead	*Time (Hours)*: 12	*Ending Date*: 10/25/00
Evaluation and Analysis by: G. Nelson, R. Davies	*Time (Hours)*: 42	*Ending Date*: 10/25/00
Inspection by: I. Almacen	*Time (Hours)*: 2	*Ending Date*: 10/25/00

EVALUATION REPORT
H-10819

A. PROJECT
Survey H10819 was conducted under contract 50-DGCN-8-90021 awarded on April 10, 1998. A Statement of Work (SOW), dated November 28, 1997 contains specific requirements. The purpose of this contract is to provide NOAA with modern, accurate hydrographic survey data with which to update the existing nautical charts of the area.

This survey was conducted by Terra Surveys, LLC of Palmer, Alaska, which is hereafter referred to as the hydrographer. Specific information pertaining to this contractor may be obtained from NOS Hydrographic Survey Division (N/CS35).

B. AREA SURVEYED
The survey area is adequately described in the hydrographer's report. Page-size plots of the charted area depicting the limits of supersession accompany this report as Attachment 1.

Depths range from 4.7 to 20.8 fathoms. Bottom characteristics are sand, gravel and pebbles.

C. SURVEY VESSELS
The hydrographer's report contains information relating to survey vessels.

D. AUTOMATED DATA ACQUISITION AND PROCESSING
Survey data was processed using USL CARIS /HIPS, the same software used by the hydrographer, and AutoCAD.

Digital data for this survey exists in CARIS/HIPS format, a database format using the .xtf extension. In addition, the smooth sheet drawing is filed in the MicroStation format, i.e., dgn (extension). Copies of these files will be forwarded to the Hydrographic Surveys Division and a backup copy will be retained at PHB. Database records forwarded are in the Internal Data Format (IDF) and are in compliance with specifications in existence at the time of survey processing.

The drawing files necessarily contain information that is not part of the CARIS/HIPS data set such as geographic names text, line-type data, and minor symbolization. In addition, those soundings deleted from the drawing for clarity purposes remain unrevised in the CARIS/HIPS digital files to preserve the integrity of the original hydrographic data set. Cartographic codes used to describe the digital data are those authorized by the NOS Hydrographic Surveys Specifications and Deliverables.

The data are plotted using a Universal Transverse Mercator projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Sonar equipment has been adequately addressed in the hydrographer's report.

F. SOUNDING EQUIPMENT
Sounding equipment has been adequately addressed in the hydrographer's report.

G. CORRECTIONS TO SOUNDINGS
The sounding data have been reduced to Mean Lower Low Water (MLLW). The reducers include corrections for an actual tide, static draft, dynamic draft, heave, pitch and roll and sound velocity. These reducers have been reviewed and are consistent with NOS specifications.
Unverified (preliminary) tides were used for reduction of soundings during field processing. After the survey was completed, the contractor used verified 6-minute heights direct from the Nikiski tide gage, gage number 945-5760, downloaded from the Internet, to reduce these soundings. These verified tides were adjusted to the new vertical datum in Cook Inlet, dated, January 1, 1998. This correction of the datum is intended to correct a situation in which the seafloor is 0.3' – 1.3' higher than it was during the

last tidal datum epoch, 1960-1978. This change is caused by isostatic rebound. See section G of the hydrographer's report for additional information.

H. CONTROL STATIONS

Sections H and I of the hydrographer's report contain adequate discussions of horizontal control and hydrographic positioning.

The positions of horizontal control stations used during hydrographic operations are published values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD 27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections:

Latitude: -2.019 seconds (-62.496 meters)
Longitude: 8.076 seconds(122.384 meters)

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 10.0 meters at the 95% confidence level was computed for survey operations. The quality of some positions exceeds limits in terms of HDOP. These positions are isolated and occur randomly throughout the survey area. A review of the data, however, suggests that none of these fixes are used to position dangers to navigation. The features or soundings located by these fixes are consistent with the surrounding information. These fixes are considered acceptable. DGPS performance checks were conducted in the field and found adequate.

NAD 83 is used as the horizontal datum for plotting and position computations.

Additional information concerning specific control system type, calibrations and system checks can be found in the hydrographer's report and in the separates related to horizontal position control and corrections to position data.

J. SHORELINE

Shoreline shown on the smooth sheet is for orientation only, and originates with Chart 16662, 5th Edition, July 5, 1997.

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10819 junctions with the following surveys.

Survey	Year	Scale	Area
H-10802	1998	1:10,000	Southern
H-10833	1998	1:10,000	Northern and Western Limits

The junctions with survey H-10802, is complete. A "Joins" note has been added to the smooth sheet where applicable. The junction with survey H-10833 has not been completed as the survey is in preliminary office processing. The junction between survey H-10819 and H-10833 will be addressed in the evaluation report of survey H-10833. An "Adjoins" note has been added to the smooth sheet where applicable.

M. COMPARISON WITH PRIOR SURVEYS

Survey	Year	Scale	Datum
H-9621	1976	1:20,000	NAD 27

Prior survey H-9621 covers the entire area of the present survey area. The present survey was compared to a digital copy of H-9621. The registration of this prior survey to the present survey was good. The legibility of the digital copy was good.

Sounding agreement is good with the present survey depths shoaler by 1 to 2 fathoms. Some of this difference is caused by the adjusted vertical datum in Cook Inlet; see section G for further information of the datum adjustment. The shoal centered at latitude 60/43/45N, longitude 151/28/20W, has migrated in a northeast direction and is generally 1 fathom shoaler. These differences are attributed to greater sounding coverage and the new vertical datum adjustment as well as the natural erosion and deposition of bottom sediments in the area.

Survey H-10819 is adequate to supersede the prior survey within the common area.

Survey	Year	Scale	Datum
H-8617WD	1961	1:20,000	NAD27

There are two cleared depths that originate with the wire-drag survey. Each depth was investigated by multibeam and side scan sonar. These soundings are AWOIS items and are listed in section N.

Survey H-10819 is adequate to supersede the prior survey within the common area.

N. ITEM INVESTIGATIONS

There were 3 AWOIS items assigned to this survey.

AWOIS item 52194, charted as a shoal cleared to 5 fathom 3 feet, was adequately investigated by the hydrographer with 100% bottom coverage with multibeam sounding equipment and side scan sonar. A submerged rock with a least depth of 6.0 fathoms located at latitude 60/43/29N, longitude 151/27/51W, was found and should be charted. The charted shoal cleared to 5 fms 3 ft should be removed.

AWOIS item 52195, charted as a shoal cleared to 5 fathoms 3 feet, was adequately investigated by the hydrographer with 100% bottom coverage with multibeam sounding equipment and side scan sonar. A submerged rock with a least depth of 5.3 fathoms located at latitude 60/43/37N, longitude 151/27/53W, was found and should be charted. The charted shoal cleared to 5 fms 3 ft should be removed.

AWOIS item 52197, a submerged wellhead *rep cov 13 fms PA*, charted in the vicinity of latitude 60° 44' 04"N, longitude 151° 31' 17.1"W was investigated by side scan sonar (SSS) and multibeam sonar (SWMB). The item was observed with the SSS at an approximate position of latitude 60° 44' 02.9"N, longitude 151° 31' 18.1"W. The position is considered to be approximate because the hydrographer reported significant cross-track currents which precluded an accurate determination of the SSS fish location. Further, the SSS fish was not equipped with an onboard compass that could have assisted in determining its location. Subsequent investigation of the contact with SWMB was unsuccessful in locating it or determining a least depth. A comparison of the survey position to a previous position reported by the USCG (CL1179/67) reveals an inverse distance between the two positions of 36.9 meters. The ambiguity of the survey position is in excess of NOS specifications for hydrographic positioning. The item, as it appears on the smooth sheet, is therefore positioned approximately. The charted depiction of this submerged wellhead should be revised to remove the "PA" notation. While the survey position is approximate the position discrepancy is considered to be relatively minor when displayed at the existing chart scales of 1:50,000 or 1:100,000.

O. COMPARISON WITH CHART

Survey H-10819 was compared with the following chart.

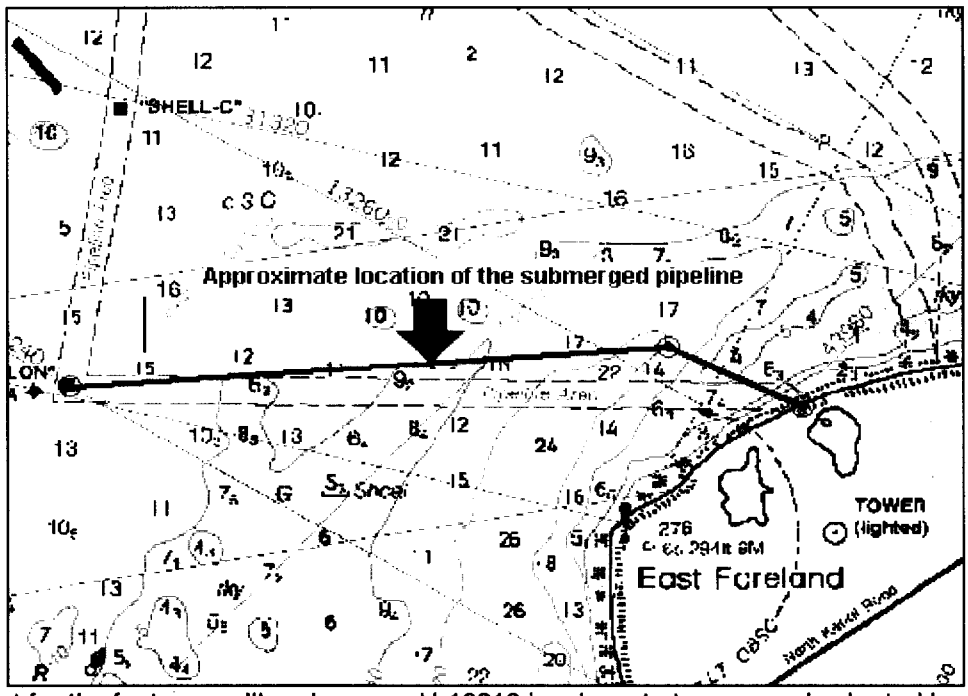
Chart	Edition	Date	Scale
16662	5th	July 5, 1997	1:100,000 and 1:50,000

a. Hydrography

Charted hydrography originates with the previously discussed prior survey. The prior surveys have been adequately addressed in section M and require no further discussion.

Charted miscellaneous source data has been satisfactorily addressed during survey operations, with the exception of AWOIS item 52197. See section N of this report for further information.

The limits of the submerged pipeline charted between latitude 60/44/05N. longitude 151/30/54W and latitude 60/44/00N, longitude 151/22/30W, should be revised as the result of this survey. Multibeam coverage of the area reveals that the pipeline falls outside of the charted pipeline area limits. Consideration should be made on revising the submerged pipeline limits to cover the pipeline between latitude 60/44/04N, longitude 151/30/54W, latitude 60/44/19N, longitude 151/23/57W and latitude 60/44/00N, longitude 151/22/30W. See graphic below.



Except for the feature, wellhead, survey H-10819 is adequate to supersede charted hydrography within the charted area.

b. Dangers To Navigation

Nine dangers to navigation were discovered during survey operations and reported to the USCG on March 19 and 25, 1998. Thirteen additional dangers to navigation were found during office processing. These were reported to the USCG, NIMA and N/CS1 on June 24, 1999. Copies of these reports are attached.

P. ADEQUACY OF SURVEY

With the exception of the following the hydrography contained on survey H-10819 is adequate to:

a. Delineate the bottom configuration, determine least depths, and draw the required depth curves;
b. Reveal there are no significant discrepancies or anomalies requiring further investigation; and
c. Show the survey was properly controlled and soundings are correctly plotted.

The investigation of the submerged wellhead was inadequate. A position of the feature could not be obtained solely by side scan sonar, although there was evidence that the feature does exist near the charted position. This feature, wellhead, will be retained as charted.

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, NOS Hydrographic Surveys Specifications and Deliverables dated November 29, 1997, appended on May 17, 1999 and on September 30, 1999 and the Field Procedures Manual, April 1994 Edition.

Q. AIDS TO NAVIGATION

There are no fixed and floating aids to navigation within the survey area.

There were no features of landmark value located within the area of this survey.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

Miscellaneous information is discussed in the hydrographer's report. No additional miscellaneous items were noted during office processing.

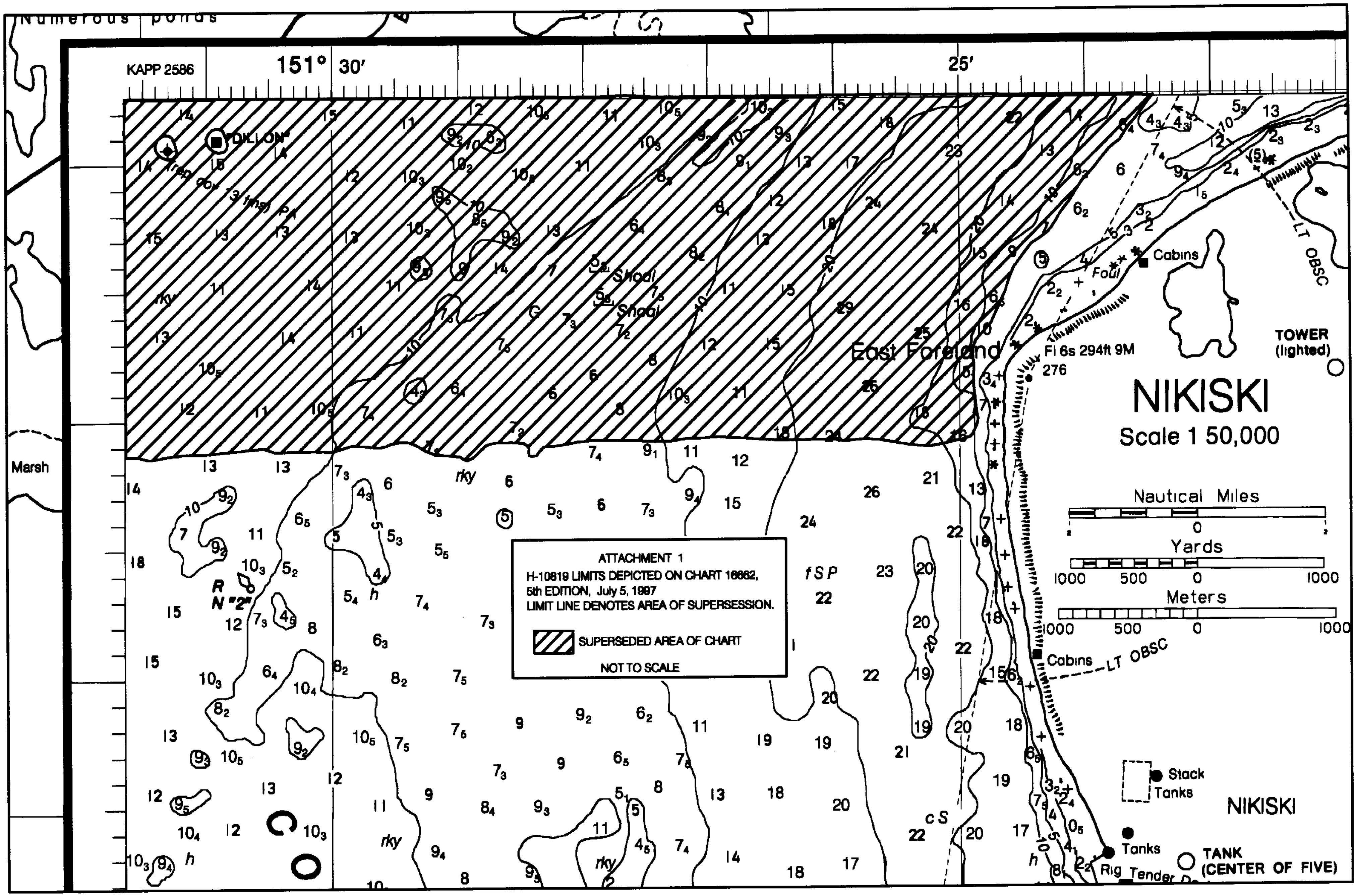
T. RECOMMENDATIONS

This is a good hydrographic survey. Additional fieldwork is recommended on a low priority basis to locate the wellhead mention in section N of the evaluation report.

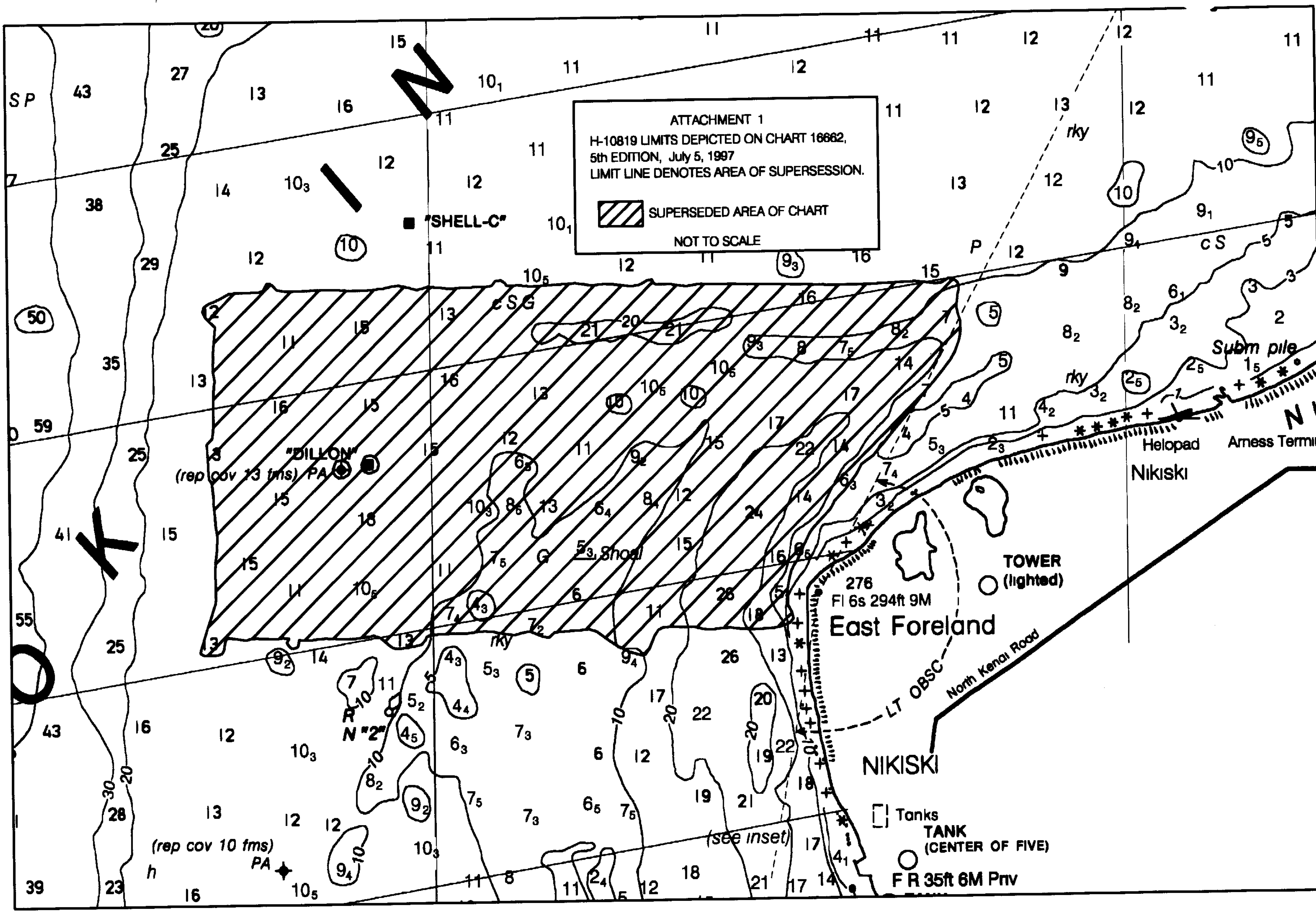
U. REFERRAL TO REPORTS

Referral to reports is discussed in the hydrographer's report.

Charles R. Davies
Cartographer



ATTACHMENT 1
H-10819 LIMITS DEPICTED ON CHART 16662, 5th EDITION, July 5, 1997
LIMIT LINE DENOTES AREA OF SUPERSESSION.
SUPERSEDED AREA OF CHART
NOT TO SCALE
NIKISKI
Scale 1 50,000
Nautical Miles
Yards
Meters
East Foreland
KAPP 2586
151° 30′
25′
Numerous ponds
Marsh
"DILLON"
Shoal
Cabins
Foul
TOWER (lighted)
LT OBSC
Fl 6s 294ft 9M
276
Stack
Tanks
TANK (CENTER OF FIVE)
Rig Tender


ATTACHMENT 1
H-10819 LIMITS DEPICTED ON CHART 16662,
5th EDITION, July 5, 1997
LIMIT LINE DENOTES AREA OF SUPERSESSION.
SUPERSEDED AREA OF CHART
NOT TO SCALE
"SHELL-C"
"DILLON"
(rep cov 13 fms) PA
(rep cov 10 fms)
PA
Subm pile
Helopad
Arness Termi
Nikiski
TOWER
(lighted)
276
Fl 6s 294ft 9M
East Foreland
LT OBSC
North Kenai Road
NIKISKI
Tanks
TANK
(CENTER OF FIVE)
F R 35ft 6M Priv
(see inset)
Shoal
R
N "2"

APPROVAL SHEET
H-10819

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

for _____ Date: 10-25-00
Dennis Hill
Chief, Cartographic Section
Pacific Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

_____ Date: 10/31/00
for James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch

****

Final Approval

Approved:

_____ Date December 5, 2000
Samuel P. DeBow.Jr.
Captain, NOAA
Chief Hydrographic Surveys Division

NOAA FORM 75-96
(10-83)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10819

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
16662	7/17/00	Russ Davies	Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings, curves and
			features from smooth sheet
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
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			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.