

W00260

NOAA Form 76-35A

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey: Outside Source

Registry Number: W00260

LOCALITY

State: Alaska

General Locality: Bering Sea

Sub-locality: Southeast of the Diomed Islands

2012

CHIEF OF PARTY
Naval Oceanographic
Office

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Date:

NOAA FORM 77-28 (11-72)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		REGISTRY NUMBER:	
HYDROGRAPHIC TITLE SHEET				W00260	
INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.					
State:		Alaska			
General Locality:		Bering Sea			
Sub-Locality:		Southeast of the Diomed Islands			
Scale:		N/A			
Dates of Survey:		07/06/2012 to 08/06/2012			
Instructions Dated:		N/A			
Project Number:		OSD-PHB-13			
Field Unit:		USNS Sumner			
Chief of Party:		NAVOCEANO DET 128			
Soundings by:		Multibeam Echo Sounder			
Imagery by:		N/A			
Verification by:		Pacific Hydrographic Branch			
Soundings Acquired in:		meters at Mean Lower Low Water			
H-Cell Compilation Units:		<i>meters at Mean Lower Low Water</i>			
Remarks: <i>Horizontal Coordinate System: UTM Zone 02N. This survey was conducted by the Naval Oceanographic office and provide to the National Ocean Service to update nautical charts. All separates are filed with the hydrographic data. Any revisions to the submitted documentation generated during office processing are shown in bold, red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</i>					

LEAD NP4 REPORT
SURVOP 6106-12
06 July – 06 August 2012
Sandra D. Hernandez

1.0. OVERVIEW

1.1. GENERAL

This survey was UNCLASSIFIED and conducted in the Bering Sea. All surveying was done within oparea one as detailed in CONOPS message DTG050541ZMAR12 and 'Technical Specifications, Bering Sea, 24 May 2012'. Archive No. 12B5R01.

The primary survey systems used were the Kongsberg EM122 and EM710. Digital Nautical Charts employed were GEN27B and COA27b.

1.2. TASKED DATA COLLECTION

The primary mission of 610612 was to collect high resolution multibeam bathymetry to IHO Order 1b in depths < 100m and Order 2 in depths > 100m. Additionally, all areas dangerous to both surface and subsurface navigation including doubtful soundings, shoals, wrecks and other hazards larger than 2 cubic meters (2m³) were to be located and positioned. Additional data collected included Acoustic Doppler Current Profiler (ADCP), Biolite Underway Survey, Sea Surface Temperature (SST), Expendable Bathythermograph (XBT) and Conductivity Temperature and Depth (CTD).

1.3. SURVEY PLANNING

Survey Plan: 610612.pln	Zone: 02	Datum: WGS-84	Projection: UTM
OP Area: ONE	Area: 1_7survey.ARE 1_7prime.ARE	Surveys: 1_7survey.srv 1_7prime.srv	Coverage: OP_1.cov OP_1-2.cov

Table 1: Survey Files used.

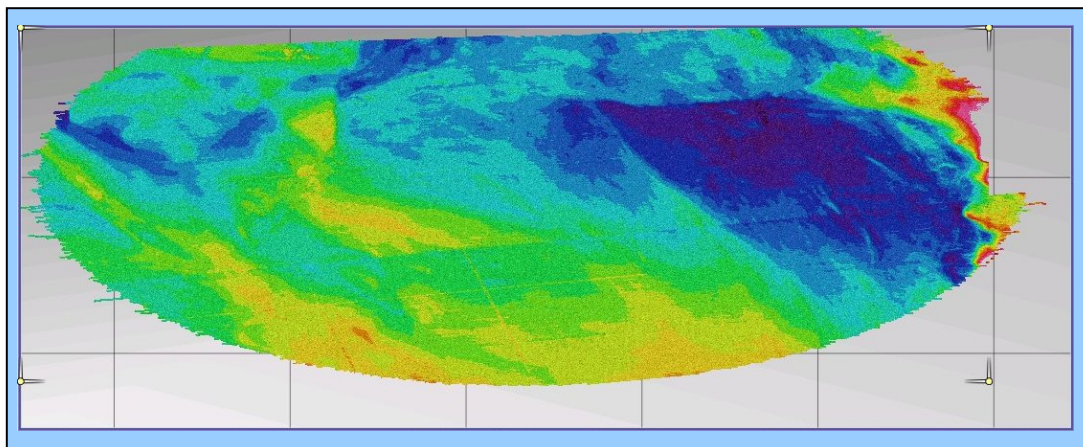


Figure 1: Graphic Survey Area (610612).

1.4. TIDE PLANNING:

The Earth Gravitational Model (EGM2008) was applied after data collection and ellipsoidal height merge. It is maintained by the National Geospatial-Intelligence Agency (NGA) and provides the WGS84 Ellipsoid to local Mean Sea Level Separation (SEP) value by interpolating from a 1 minute interval grid world model of SEP values. Two GPS buoys were deployed and recovered.

Buoys	Latitude	Longitude	Deployed	Recovered
1	63° 39.0016N	172° 55.7931W	JD 193	JD 214
2	65° 19.8112N	168° 55.9980W	JD 194	JD 201

Table 2: Buoys Deployed.

2.0. GEODETIC CONTROL

2.1. DATASUMS

Horizontal Datum: World Geodetic System of 1984
Projection: UTM 02
Spheroid: World Geodetic System of 1984
Grid: Universal Transverse Mercator

2.2. SOUNDING DATUM

Predicted tide correctors were not utilized. Instead, SABER's *GPSZ* program was used to achieve geoid-referenced soundings utilizing the 1 minute EGM2008. EGM2008 is the vertical datum for all field-processed data.

3.0. (B/H) HYDROGRAPHY

3.1. (B/H) CALIBRATION REPORT

Waterline

The ship waterline value used during this survop was -2.79 m, and the draft value for EM122 sonar was 6.87 and for EM710 sonar was 6.90. Waterline changes are also dynamic, changing slowly and linearly as fuel is consumed.

Weather

JD / TIME	SKY	VISIBILITY	WIND	SEA TEMPERATURE
194 / 1553	Cloudy	11 NM	11-16 KT	43° F
194 / 2200	Cloudy	11 NM	7-10 KT	44° F

Table 3: Weather Report for JD 194.

CALIBRATION FOR MULTIBEAM SYSTEMS					
VESSEL:	USNS SUMNER TAGS-61				
SYSTEM:	EM710				
DATE / JD:	July 12, 2012 / JD 194				
LOCATION:	Bering Sea				
SSSV Range During Testing: 1469.5 m/s				Depth Range: 49 - 57 meters	
CURRENT SETTINGS (TRANSDUCER)				ADJUSTMENTS	FINAL SETTINGS
Sensor Location		Installation Angles			
		Beam Angle:	55/55		
Forward (X):	.00	Timing:	N/A	none	N/A
Starboard (Y):	.00	Pitch:	0.00	none	0.00
Downward (Z):	.00	Roll:	0.08	none	0.08
Waterline:	-2.79	Heading:	0.00	none	0.00
Line #		1 – timing/pitch/roll		Line #	2 – pitch/roll
ISS_60 File #:		61mbn12194_u_84.d13		ISS_60 File #:	61mbn12194_u_84.d16
Heading (deg):		226		Heading (deg):	46
Speed (knots):		10		Speed (knots):	10
Start Time (Z):		1951		Start Time (Z):	2010
End Time (Z):		2000		End Time (Z):	2021
Line #		3 – timing			
ISS_60 File #:		61mbn121194_u_84.d18			
Heading (deg):		226			
Speed (knots):		5.0			
Start Time (Z):		2036			
End Time (Z):		2057			

Table 4: Calibration Parameters.

3.2. SOUNDING DEVELOPMENT (OVERALL PLAN)

The multibeam sounding collection methodology was constructed in the 610612 plan. Development lines were based on depth and were adjusted accordingly with regard to the dynamic nature of the sea floor. See table below.

Area	Survey	Azimuth	Spacing
1_7survey.ARE	1_7survey.srv	77° / 257°	100
1_7prime.ARE	1_7prime.srv	77° / 257°	90

Table 5: Survey Plan.

3.3. (B/H) JUNCTION ANALYSIS

Junction Analysis:

The depths range from approximately 43 to 64 meters. The calculated error for 43 meters is $\pm .75$ and for 64 meters is $\pm .97$. The junction analysis includes 6 crosscheck lines and 266 development lines.

File=/data1/datasets/610612/layers/Dev_195_211_min_1_7_Xlines_min.dif	
Category	Percent
0-> 5cm	61.01
5-> 10cm	73.81
10-> 15cm	83.45
15-> 20cm	89.77
20-> 25cm	93.64
25-> 30cm	96.02
30-> 35cm	97.57
35-> 40cm	98.59
40-> 45cm	99.25
45-> 50cm	99.65
50-> 60cm	99.95
60-> 70cm	99.99
70-> 80cm	100.00
80-> 90cm	100.00
> 90cm	100.00

**Table 6: Junction Analysis Table,
95% of data residuals fall between 20 and 30 cm**

3.4. (B/H) AGREEMENT WITH EXISTING CHARTS

NGA nautical charts 16005, 16200, and 16220 are the primary charts available for this area. Some comparisons between our survey and this coastal chart were made and the contour tendencies determined during 610612 largely agreed with it. **1**

3.5. (B/H) AGREEMENT WITH PRIOR SURVEYS

There are no prior surveys.

3.6. (B/H) OVERALL ACCURACY OF SOUNDINGS; EQUIPMENT AND PLATFORM LIMITATIONS; TIDAL MODEL EFFECTIVENESS

Area 1_7 correspond to the customer's point number 7. It was conducted using the IHO accuracy parameters for an Order 1b survey. Horizontal Accuracy at 95% Confidence Level for depths shallower than 100 meters is $5m + 5\%$ of depth with a Reduced Depth Accuracy as: $a = .5m$, $b = .013m$ and $d = \text{depth}$: **2**

$$= \sqrt{a^2 + (b*d)^2}$$

3.7. (B/H) BATHY PROCESSING REPORT

PFM / GSF File Processing Log Sheets are located in the Documentation folder Under (Nas1) /home/common/datasets/610612_u_84/report_logs.

Processing programs used and version:

gsf_geoswath:	Version 2.3
SABER:	Version 4.4.0 Build13
Fledermaus:	Version 7.3.0
<i>datasumm:</i>	<i>September 30,2010</i>
<i>exammb:</i>	<i>Version 3.14 (SABER ver.)</i>
<i>fmcommand:</i>	Version 7.3.0
<i>dmagic:</i>	Version 7.3.0
mve:	-vMVE_5.15 (SABER ver.)
abe:	Version 1.10 September 20, 2011

Processing Standard:

TRANSIT DATA (JD 189 – 194 / JD 213-214):

EM122 / EM710 (Transit Data)

All GSF files were transferred individually from NAS1 to the post processing workstation (WS12) and loaded into SABER where Datasumm, Delayed Heave, GPSZ, and Exammb were performed. GSF files were processed with MVE / gsf_geoswath to remove bad pings. Multiple PFMs were built each day using Dmagic. The PFM edits were unloaded to the GSF files and transferred to NAS1.

During the first day of transit JD189 ,we used the EM122 sonar to collect bathy data. Data was extremely noisy, and observed a great deal of sound velocity error. On JD 190 we started to use the EM710 sonar. The noise was reduced, but we continued to have strong sound velocity error. We dropped numerous XBTs to keep the delta value down; however, this measure did not greatly reduce our sound velocity error.

The only way to reduce the sound velocity error was by performing CTD casts, but since we were in transit to our survey area, we were unable to do them.

We also had heavy penetration in some areas during the transit. We tried to fix this problem by using strong penetration filter and changing the along track tilt to 4 degrees on SIS. These measures significantly reduced the penetration.

SURVEY DATA (JD 195 - 213)

All GSF files were transferred individually from NAS1 to the post processing workstation (WS12) and loaded into SABER where Datasumm, Delayed Heave, MergeNav, GPSZ, and recalculate errors were performed. GSF files were pre-processed with MVE / gsf_geoswath to remove bad pings. Multiple PFMs were built each day using Dmagic and processed with Fledermaus. The PFM edits were unloaded to the GSF files and transferred to NAS1.

In all areas, the largest problem was the sound velocity error. To mitigate much of the sound velocity error on the outer beams, the swath was pulled in to +/- 55 degrees and beams between 45-55 degrees were removed with set beam flags program during post processing. See table below.

JULIAN DAY	FILES	CUT OFF
195	d02, d04, d07, d09, d16, d18	50%
199	d01, d03, d05, d07, d08, d10, d19	50%
199	d12, d14, d16, d18, d20, d21, d22, d23, d25	45%
200	ALL	45%
201 - 213	ALL	50%

Table 7: Beam Flags Program Set Up.

4.0. ASSESSMENT AND EVALUATION

Swath Coverage:

The majority of the EM710 data collected during this survop was done with a swath setting of +/- 55 degrees with approximately 100% overlap with adjacent lines.

During normal data collection the High Density Equidistant mode setting was used.

4.1. DRAFT CORRECTION

A waterline value of -2.79m was computed on 06 July (JD188) immediately before departure from Kodiak, AK. Draft values were not changed throughout the survey and will be read again in port.

4.2. SOUND VELOCITY CORRECTION

Sound speed observations were collected using a Seabird Electronics Model SBE-911 plus CTD (Conductivity, Temperature, and Depth) Instrument. In addition, synoptic XBT drops were collected every six hours to provide intermediate corrections to the SVP. Additional XBT/CTD casts were made in an attempt to lower the SSSV/SVPSSV delta when it and the EM122 / EM710 data quality profile indicated that the MB data quality was deteriorating.

See the NP3 Lead report for more information.

4.3. HEAVE CORRECTION

Heave corrections were applied real time during data collection utilizing FORCE5_1, which feeds the POSM/V and Delay Heave were applied during post-processing.

4.4. TIDE CORRECTION

GPS tidal corrections using the EGM2008 model were applied during post-processing to all GSF files. Two GPS tidal buoys were deployed. The first buoy

was deployed at 63° 39.0016N, 172° 55.7931W from JD193 to JD 214 and the second buoy was deployed at 65° 19.8112, 168° 55.9980W from JD194 to JD 201. Data from this buoy will be use to produce a calibrated SEP model for the entire survey area. Precise Point Positioning (PPP) solutions were generated in the field from raw NAVCOM files (*.v??) and 30-second clocks/ephemerides as soon as available from (ftp://ftp.unibe.ch/aiub/CODE/COD<week><d>.CLK_R). PPP solutions (30s-type) were applied to all data before any further post-processing.

4.5. ROLL AND PITCH

Roll and Pitch corrections were applied real time during data collection.

5.0. OTHER:

I would like to thank the entire survey crew for their dedicated effort in editing the shallow bathy data.

6.0. PROBLEMS AND RECOMENDATIONS

On future SURVOPS, it is highly recommended that a survey vessel be equipped with the Moving Vessel Profiler.

Early during the survey, the Hydrographic Data Monitoring Group notified the survey crew that a large portion of the transit GSF files were unreadable and truncated. Once the nature of the problem was identified, we began using the newly-developed trunc_detect to pinpoint which files were experiencing the problem and to what degree.

The use of trunc_detect as well as a number of other modules of the Data Detective Services Suite (D2S2) provided a way to quickly and thoroughly illuminate problems and other trends in the GSF data. It is imperative that all NP4 leads be given access to and training on D2S2.

1.Chart 16220 - The surveyed soundings disagree with the charted 50 fathom contour and several soundings near the contour.

2. Survey W00260 data should be attributed with CATZOC “B”. While the bathymetry and positioning uncertainties likely meet CATZOC “A1” or “A2” requirements, the uncertainty of this survey cannot be fully assessed from the data provided and the IHO S-44 Order 1b and 2 standards to which it was performed does not require full feature search.

06 August 2012

From: Senior NAVOCEANO Representative, NAVOCEANO DET 128
To: Commanding Officer, Naval Oceanographic Office
Via: (1) N3
(2) NP3
(3) NP4
(4) NP5
(5) NP6
(6) N6
(7) 01
(8) 0T
(9) 00

Subj: CRUISE REPORT FOR SURVOP 6106-12 USNS SUMNER (U)

Ref: (a) NAVOCEANO 050541ZMAR12, CONOPS 6106-12 and 6107-12
(b) NAVOCEANO 0160541ZAPR12, Mod One of Ref(a)
(c) COMPACFLT 302029ZJUN12, Approval of Refs (a) and (b)

Encl: (1) Mission Equipment Report (U)
(2) Data Manager Report (U)
(3) Lead Bathymetrists Report (U)
(4) Lead Oceanographer Report (U)
(5) Tides and Geodesy Report (U)

DETACHMENT 128:

Wayne Korpi	SNR
Mark Barousse	Data Manager
Sandra Hernandez	Lead Bathymetrists
Meagan Bird	Lead Oceanographer
Mary Mabie	Watchstander
Lawrence Haselmaier	Watchstander
Charles Kelley	Lead Electronic Technician
Gerald Strickland	Electronic Technician

NAVY Personnel:

LT Thomas Freismuth	Watchstander
LTJG Nicholas Patria	Watchstander

1. SUMMARY OF OPERATIONS

USNS Sumner departed Kodiak, Alaska on 06 July, 2012 with NAVOCEANO DET 128 embarked, to begin SURVOP 6106-12. USNS Sumner returned to Kodiak on 06 August having completed the survey. The primary mission was to collect bathymetry data in support of USNORTHCOM as outlined in Technical Specification 12MBS07 Bathymetric Survey of the Bering Sea and as directed by references (a) thru (c). Data collected will be used to update the Tactical Ocean Datasets (TOD) and Digital Navigation Charts (DNC).

UNCLASSIFIED

Data types collected during SURVOPS 6106-12 were EM710, EM122, CTD, XBT, USS, Weatherpak, GPS tide buoy, and Acoustic Doppler Current profiles. Security classification for all data collected was UNCLASSIFIED.

Calibrations were performed on the EM710 multibeam system on 11 July. The results were in agreement with the entered values.

Two GPS tide buoys were deployed during the survey. Buoy TAB02222 was deployed on 11 July and remained operational until retrieval on 01 August. Buoy TAB01051 was deployed on 12 July but ceased transmitting information due to water seepage and was retrieved on 18 July.

Ship speed averaged 11.0 knots during transits, 7.5 knots during survey. Weather had minimal impact on the mission.

2. STATISTICAL SUMMARY:

Port of Departure: Kodiak, Alaska 062300Z JUL12 (061500L JUL12)
Port of Arrival: Kodiak, Alaska 061600Z AUG12 (060800L AUG12)

Data Collected _____ (Miles)

Ship Miles	6009
ADCP 38	3541
ADCP 300	4707
SIMRAD EM710 Bathymetry	4412
SIMRAD EM122 Bathymetry	337
SSSV	4853
USS	3471
Weatherpak	1803
CTD (Measurements)	34
XBT (Measurements)	143

3. RECOMMENDATIONS:

The variation of water salinity and temperature necessitated several CTD casts. Future surveys in this area would benefit by having a Mobile Vessel Profiler (MVP) aboard.

4. HABITABILITY

The ship was maintained in a fully habitable condition. Staterooms and work spaces were cleaned regularly and linens were changed weekly. The ambient temperature in the work spaces was maintained at a comfortable level. The food quality was very good and the menus were varied. The

UNCLASSIFIED

movie and book libraries were adequately stocked. Weekly Food Establishment Inspection Reports were submitted to the SNR.

5. NAVOCEANO/CONTRACTOR RELATIONSHIP

The working relationship between NAVOCEANO and the 3PSC crew was very good. The contractor demonstrated considerable competence and responded promptly to all mission requests. The ship had no mechanical issues that delayed the survey. Support during buoy and CTD operations was outstanding. Captain Mangold and the entire crew were very professional and courteous and did everything possible to aid the survey mission.

6. SAFETY

NAVO Detachment 128 personnel attended the following:

- SNR muster and pre-survey brief on 06 July
- Buoy deployment brief on 06 July
- Safety meeting on 25 July
- Fire and boat drills on 07 July, 15 July, 30 July

7. TRAINING

Training topics included:

- CTD procedures
- Deployment and retrieval of GPS tide buoys
- Emergency Destruction of classified materials

8. NAVOCEANO DETACHMENT

I wish to extend my personal gratitude to the survey team for their commitment and professionalism. They worked well together and with the contractor and provided me with invaluable assistance. It has been my pleasure to work with these dedicated professionals.

9. COMMENTS

The survey was very successful the result of the superb effort of the NAVOCEANO detachment and the commendable support from the contractor.

Respectfully submitted,

Wayne Korpi
Senior NAVOCEANO Representative

APPROVAL PAGE

W00260

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- W00260_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- W00260_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: _____

Pete Holmberg

Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

CDR Ben Evans, NOAA

Chief, Pacific Hydrographic Branch