H10651

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Multibeam/Side Scan

Field No.: H

Registry No.: H-10651

LOCALITY

State: Massachusetts

General Locality: Vineyard Sound

Sublocality: Entrance to Woods Hole to Lucas Shoal

1995

CHIEF OF PARTY

Walter Simmons (SAIC)

LIBRARY & ARCHIVES

DATE: August 15, 1997

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NO. H-10651
	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. H

State MASSACHUSETTS

General locality VINEYARD SOUND

Locality ENTRANCE TO WOODS HOLE TO LUCAS SHOAL

Scale 1:10,000 Date of survey 22-24 Sept 1995; 27-29 Sept 1995; 6-7 Oct 1995; 14-18 Oct 1995; 20 Oct 1995; 22 Oct 1995; 27 Oct 1995

Instructions dated September 30, 1994 as amended Project No. OPR-B389-CN

Vessel M/V ATLANTIC SURVEYOR (ID # D582365)

Chief of party WALTER SIMMONS

Surveyed by J. Miller, S. Ferguson, A. Gagnon, D. Allen, J. Kieman, P. Selvitelli, R. Watson, L. Gates, E. DeAngelo; J. Case; A. Maddock; S. Cook; R. Franchuck; T. Hamel

Soundings taken by (echo sounder) hand lead, pole MULTIBEAM RESON SEABAT 9002

Graphic record scaled by Survey Personnel

Graphic record checked by Survey Personnel

Protracted by EVALUATED GARY NELSON Automated plot by HP650 ~~J. Kieman, J. Case~~

Verification by D. Reifsteck

Soundings in fathoms (meters) feet at MLW (MLLW) AND DECIMETERS

REMARKS: * Contract # 50-DGNC-4-00035
Contractor Name: Science Applications International Corp.;
221 Third Street; Newport, R. I. 02840;
Subcontractor Name: Ocean Surveys Inc.;
91 Shefield Street; Old Saybrook; CT 06475

TIME REFERENCE : UTC
SUPPLEMENTAL REPORTS FILED WITH HYDROGRAPHIC DATA
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NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

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* Marginal notes and revisions to the Descriptive Report were generated at the Pacific Hydrographic Branch during review of the survey work.

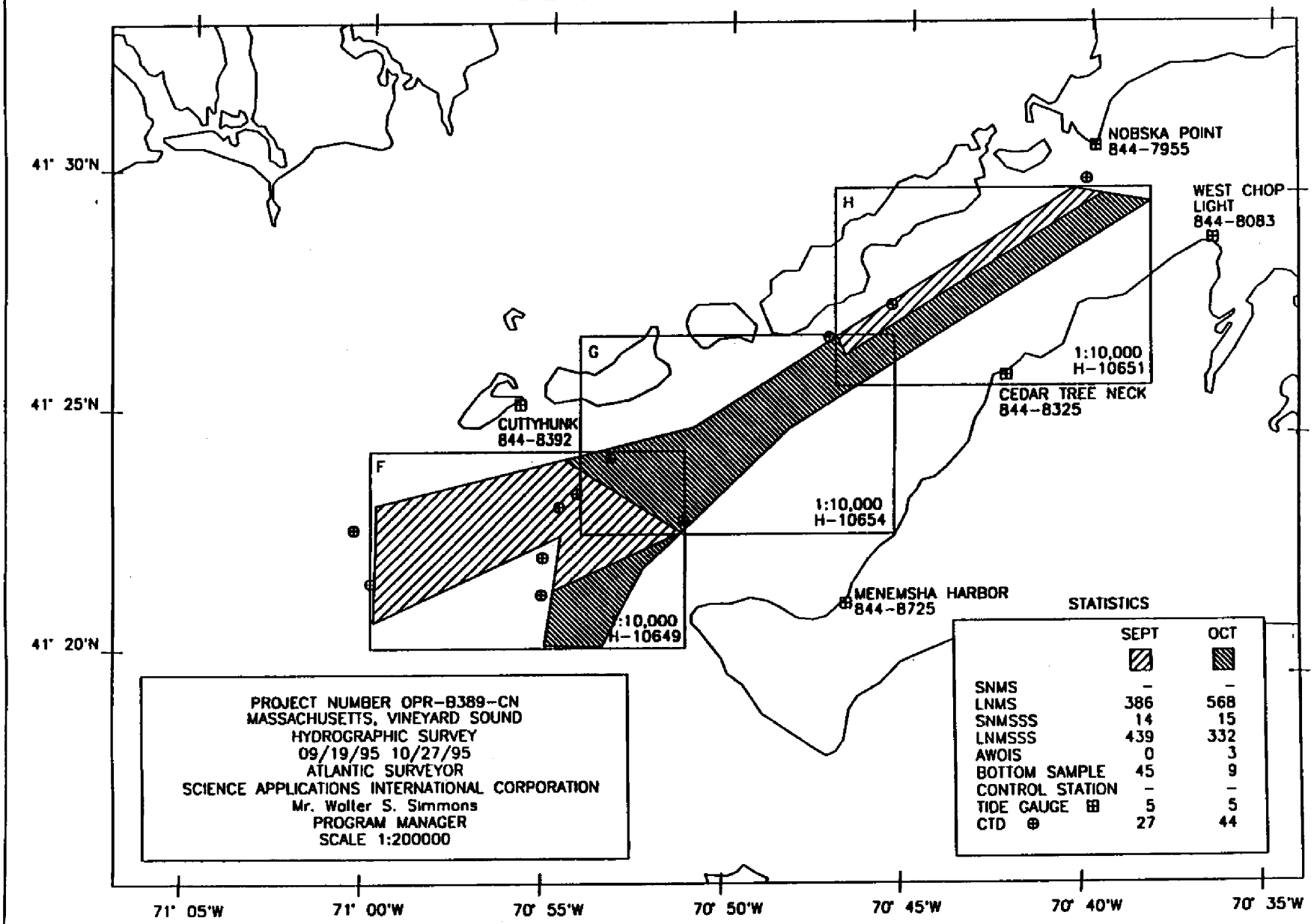
AWOIS / SURF ~ 7/10/97 SJV

INDEX OF SHEETS

The Progress Sketch on the following page indicates:

1. Smooth Sheet Layout
2. Surveys and Registry Numbers
3. Tide Gauge Locations
4. CTD (Sound Velocity) Stations
5. Work Accomplished by Month

PROGRESS SKETCH



Science Applications International Corporation (SAIC) warrants only that the survey data acquired by SAIC and delivered to NOAA under Contract 50-DGNC-4-00035 reflect the state of the sea floor in existence on the day and at the time the survey was conducted.

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Descriptive Report to Accompany
Hydrographic Survey H-10651

A. PROJECT

Project number: OPR-B389-CN

Dates of instructions:	**30 September 1994**	**Original 50-DGNC-4-00035**
	21 March 1995	**Modification #1**
	03 April 1995	**Modification #2**
	06 June 1995	**Modification #3**
	23 June 1995	**Project limit definition, Execution Rocks**
	10 July 1995	**Modification #4**
	07 September 1995	**Modification #5**
	20 October 1995	**56-DGNC-6-13002**

Sheet letter: H
Registry number: H-10651
Purpose: Obtain 100% multibeam sonar coverage and 200% side scan sonar coverage within the survey area limits

B. AREA SURVEYED — See Evel Rpt., Section B.

The area surveyed is located in Vineyard Sound, Massachusetts and is bounded approximately by the following coordinates:

LAT	LONG
41° 25.85'N	070° 45.83'W
41° 26.85'N	070° 46.50'W
41° 30.00'N	070° 40.00'W
41° 29.75'N	070° 37.83'W

Dates of data acquisition:

09/22/95 - 09/24/95	JD 265 - 267
09/27/95 - 09/29/95	JD 270 - 272
10/06/95 - 10/07/95	JD 279 - 280
10/14/95 - 10/18/95	JD 287 - 291
10/20/95	JD 293
10/22/95	JD 295
10/27/95	JD 300

C. SURVEY VESSELS

M/V ATLANTIC SURVEYOR (ID# D582365) was the platform for all multibeam sonar, side scan sonar, sound velocity and bottom sampling operations. Data acquisition and post processing systems were mounted in CONEX containers which were welded in place on the aft

deck. The gyro compass was mounted in the pilot house, and the TSS-335B motion sensor was mounted on the aft end of the deck house just above the main deck.

Multibeam sounder transducers were mounted back to back on a plate at the bottom of a stainless steel pipe at the starboard waist. Bearing plates were welded to the main deck, and a stabilizing alignment bracket was welded to the side of the boat. The primary GPS navigation antenna was mounted directly above the transducer pole and the reference GPS antenna was mounted just inboard on the same mount.

The side scan sonar tow position was located at the "A" frame aft center. An armored cable on a hydraulic winch, remotely controlled at the side scan operator's station, was used for this configuration.

The vessel layout is depicted in Figures C-1, C-2, and C-3, the coordinate systems in use are shown in Figure C-4, and the vessel offsets are shown in Tables C-1 and C-2. The antenna was raised at 1200 on October 3, 1992, causing the change in configuration shown in Figure C-3 and the coordinate systems as shown in Table C-2.

The Reference Point for the entire system is located on the transducer pole at the water line. For surveys conducted September through November 1995, the transducer draft was recorded as 2.30 meters, therefore the pole was marked with the reference point at 2.30 meters. Lead line comparisons confirmed 2.30 meters as the correct draft.

As discussed in the Phase IIB Summary Report, the SAIC Integrated Hydrographic Survey System (IHSS), the RESON SeaBat multibeam system and the TSS-335B vertical reference, all have different coordinate systems, and therefore care must be taken when inputting correctors to the system. The IHSS considers "z" to be positive down, while both the RESON and TSS consider "z" positive up. Both the IHSS and TSS consider "x" positive forward, the RESON considers "x" as positive athwartships to starboard. IHSS considers "y" positive athwartships to starboard, the TSS considers "y" positive athwartships to port and the RESON considers "y" as positive forward.

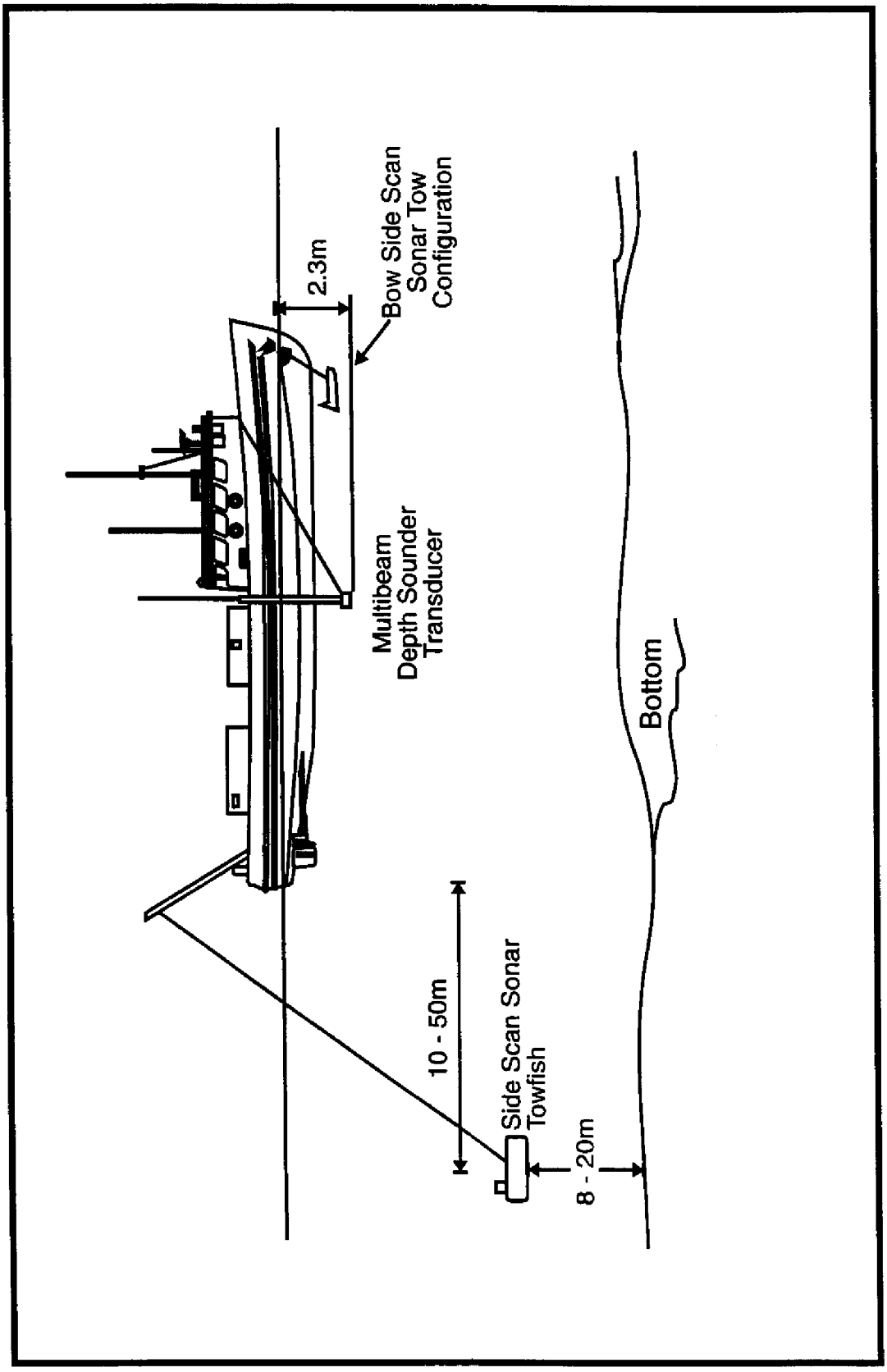

Figure C-1. Configuration of MV Atlantic Surveyor During Survey Operations

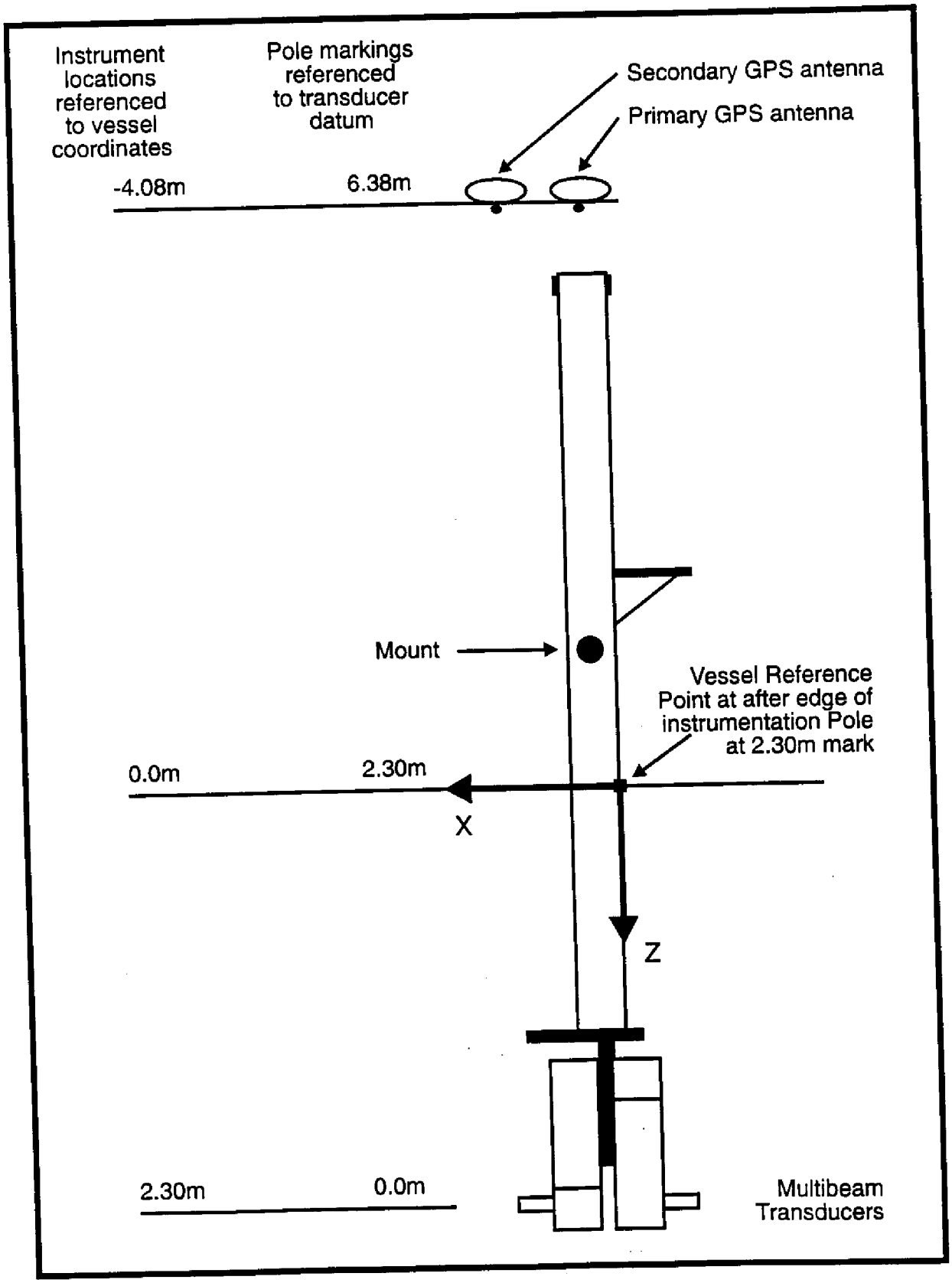

Figure C-2. Configuration of Multibeam Transducer Pole (September 19 - October 3, 1995)

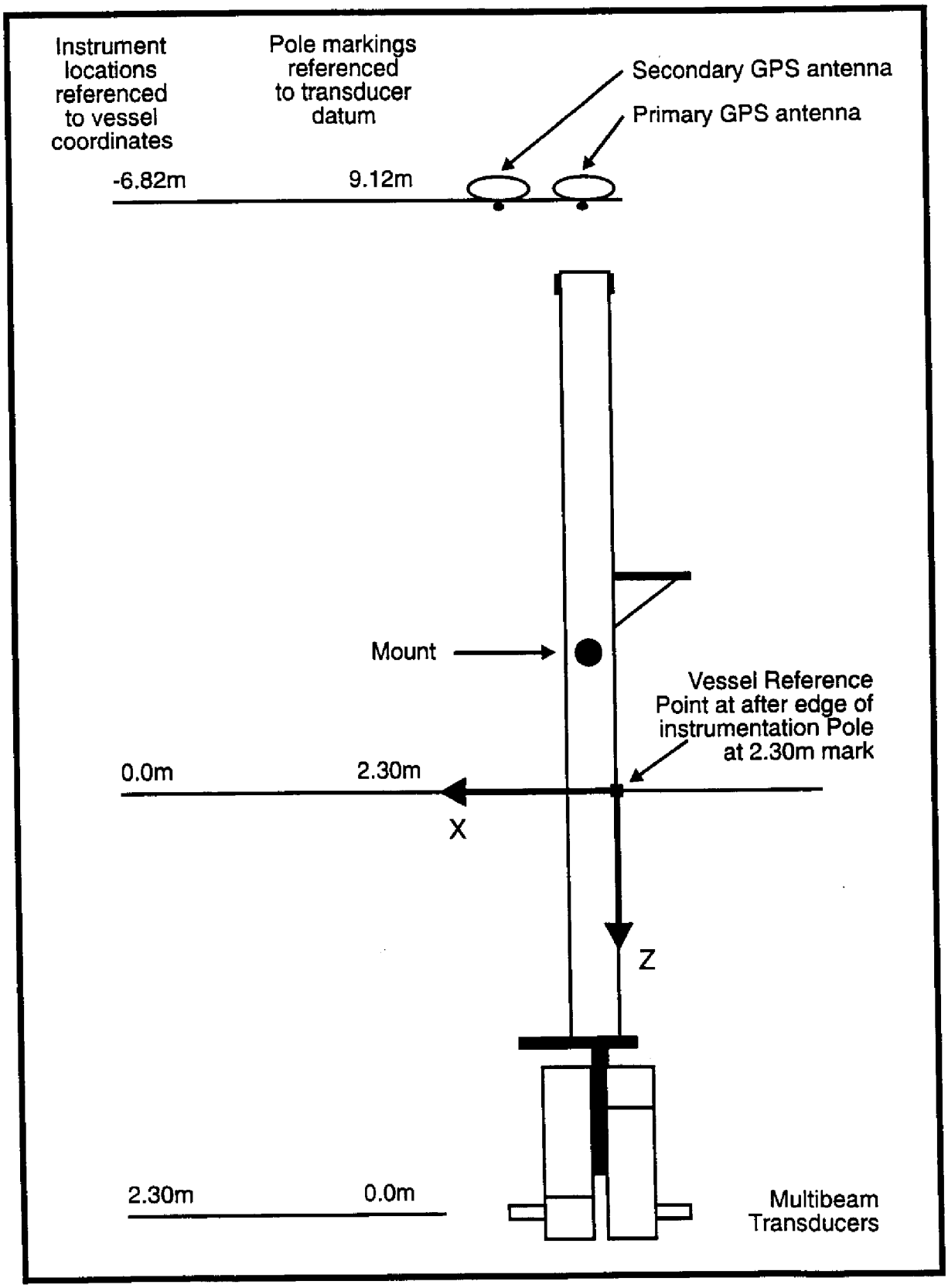

Figure C-3. Configuration of Multibeam Transducer Pole (October 3 - November 13, 1995)

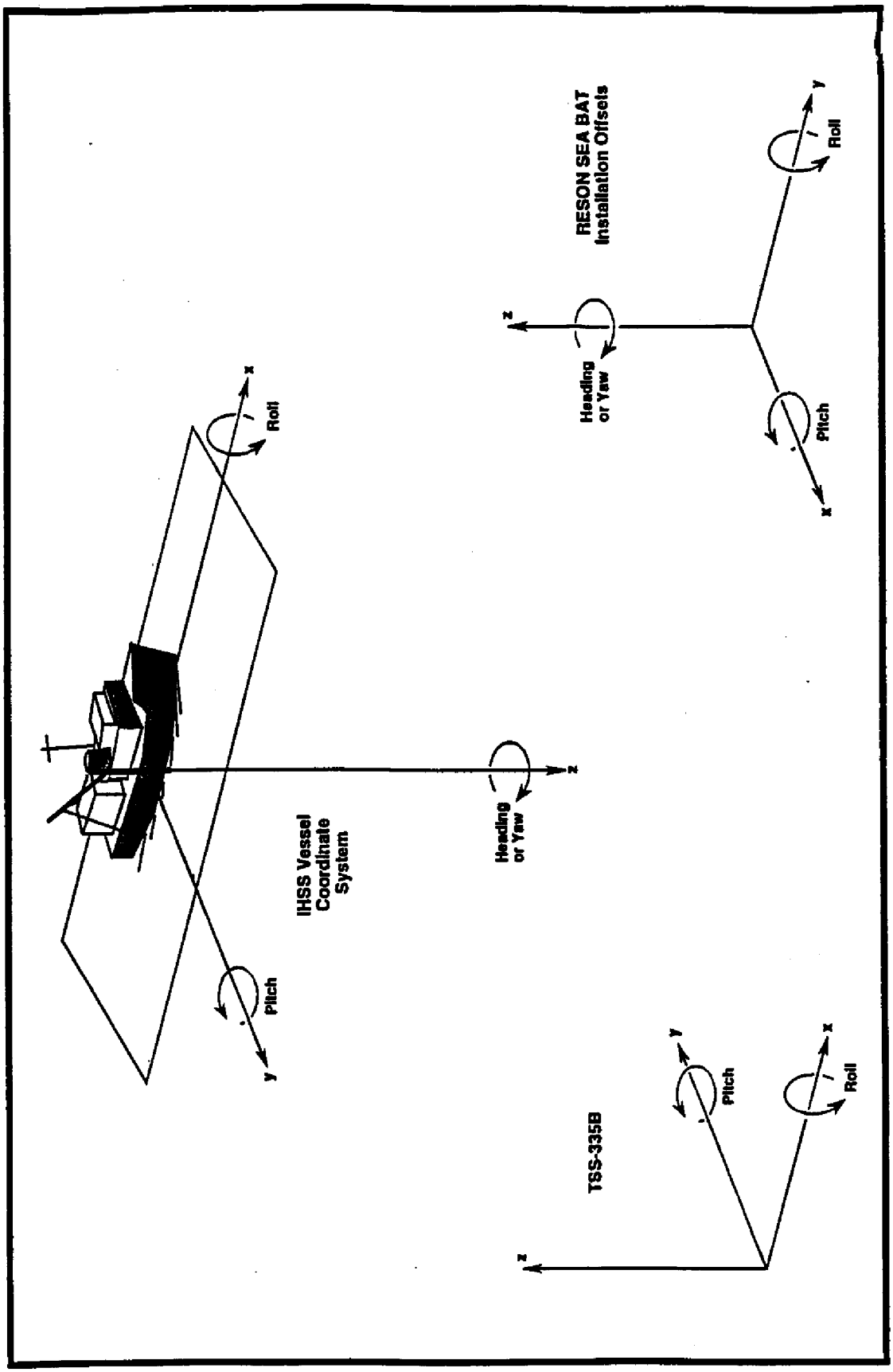

Figure C-4 Relevant IHSS Instrument Coordinate Systems

Table C-1. Antenna and Transducer Locations Relative to Vessel Reference Point Sept. 19 - Oct. 3, 1995

Sensor	Offset in IHSS	IHSS Coordinate	Offset in RESON 6042	Reson Coordinate
Multibeam	x	0	x(port)	-0.07
	y	0	y(port)	+0.11
	z	0	z(port)	-2.30
			x(stbd)	+0.07
			y(stbd)	-0.02
			z(stbd)	-2.30
Trimble 4000DS	x	0		
	y	0		
	z	-4.08		
TSS-335B	x			-3.020
	y			+3.320
	z			+1.300
Side scan Tow PT	x	-15.90		
"A" frame aft	y	-2.46		
	z	-5.18		

Table C-2. Antenna and Transducer Locations Relative to Vessel Reference Point Oct. 3 - Nov. 13, 1995

Sensor	Offset in IHSS	IHSS Coordinate	Offset in RESON 6042	Reson Coordinate
Multibeam	x	0	x(port)	-0.07
	y	0	y(port)	+0.11
	z	0	z(port)	-2.30
			x(stbd)	+0.07
			y(stbd)	-0.02
			z(stbd)	-2.30
Trimble 4000DS	x	0		
	y	0		
	z	-6.82		
TSS-335B	x			-3.020
	y			+3.320
	z			+1.300
Side scan Tow PT	x	-15.90		
"A" frame aft	y	-2.46		
	z	-5.18		

Note that offsets relative to depth measurement are input to the RESON, while those for navigation are input to the IHSS.

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓ SEE EVAL. RAT, SECT. D

The following SAIC IHSS software modules were used in the real-time acquisition of MULTIBEAM data.

Program	Modification Date
ap9	May 20, 1995
auto_archive	May 4, 1995
cbatdtc	May 15, 1995
cbatout	May 15, 1995
chutil	May 9, 1995
datamgr	May 4, 1995
dtc_data_display	May 4, 1995
eoscandtc	Sept. 19, 1995
eoscandtc	Sept. 23, 1995
filemgr	May 4, 1995
irig-b pdd	May 8, 1995
kfstub	May 5, 1995
klein595	May 23, 1995
mbmgr	May 18, 1995
mergeserve	May 27, 1995
messagemgr	May 4, 1995
mk32	Apr 26, 1995
navmgr	May 28, 1995
nms	May 9, 1995
ntimesrv	Apr 06, 1995
kflog	May 30, 1995
helm_display	May 28, 1995
rtkfst	Apr 29, 1995
seabird seasoft (4.210)	Feb. 23, 1995
setclock	Apr 22, 1995
sb_sssv	May 22, 1995
spmgr	May 05, 1995
stateb	May 04, 1995
strip	May 09, 1995
svpmon	May 04, 1995
swathplot	May 04, 1995
sync_os2	Apr 23, 1995
sync_ux	May 04, 1995
syscon	May 04, 1995
Teltx	May 04, 1995
telrx	May 04, 1995
timechk telrx	May 04, 1995
tr4000	May 16, 1995
tr4ref	May 16, 1995
tss335b	May 08, 1995
utilitymgr	May 04, 1995

The following Polaris Imaging and SAIC IHSS software modules were used in real-time acquisition of SIDE SCAN Data. ✓

Program	Modification Date
eoscan.exe	May 15, 1995
sonar.bin	May 15, 1995
eoscan.cfg	May 15, 1995
sonar.bin/eoscan.exe	May 17, 1995
eoscan.cfg	May 18,1995
sonar.bin/eoscan.cfg	May 19, 1995
DSP Card (Hardware), eoscan.exe	May 21, 1995
eoscan.exe, eoscan.cfg	June 13 ,1995

The following SAIC software modules were used in the processing of all data.

Program	Modification Date
appcors	May 17, 1995
applydft	July 26, 1995
applysqt	July 26, 1995
chutil	May 05, 1995
corrtarg	Sept. 18, 1995
corrtarg	Oct. 17, 1995
datamgr	May 4, 1995
datasumm	Aug. 15, 1995
examgyro	June 22, 1995
exammb	May 19, 1995
gsf2hdcs	May 22, 1995
gsfedit	Sept. 4, 1995
gsfupdat	June 30, 1995
MBHAT>check_cover	Sept. 19, 1995
MBHAT>check_z	Nov. 21, 1995
MBHAT> contact_dxf	Nov. 8, 1995
MBHAT>cover_dxf	Nov. 16, 1995
MBHAT>feature_gsf	Nov. 16, 1995
MBHAT> get_contact	Nov. 8, 1995
MBHAT>init_sheet	July 19, 1995
MBHAT>junction	Oct. 23, 1995
MBHAT>main_x_diff	June 29, 1995
MBHAT>make_contours	Dec. 22, 1995
MBHAT>make_final_contours	Nov. 3, 1995
MBHAT>makeacadpcx	July 20, 1995
MBHAT>new_select	Dec. 10, 1995
MBHAT>new_ss_cover	Nov. 28, 1995
MBHAT>noaagsf	Nov. 8, 1995
MBHAT>set_eoflag	Oct. 2, 1995
MBHAT>target_dxf	Oct. 31, 1995
MBHAT>track_dxf	July 20, 1995
MBHAT>update_contact	Nov. 6, 1995
MBHAT>view3d	July 21, 1995
MBHAT>ztogsf	Oct. 5, 1995
navup	Sept. 19, 1995
rangeflt	Sept. 4, 1995
rangeflt	Oct. 5, 1995
refdraft	Sept. 20, 1995
resetflg	Sept. 18, 1995
resonflt	May 05, 1995
setsound	July 25, 1995
swathmap	May 05, 1995
tid2hmps	May 17, 1995

Throughout this descriptive report wherever software is mentioned (in bold print) it is inferred that the most current version of the software available was used.

E. SONAR EQUIPMENT (Side scan sonar operations)

The following side scan sonar equipment was used for the entire Sheet H survey:

- Klein 595 Side Scan Sonar Recorder, Klein Associates, Serial Number 658.
- Klein 595 Dual Frequency Towfish, Klein Associates, Serial Number 700.
- Klein 595 Dual Frequency Towfish, Klein Associates, Serial Number 894.
- Eoscan Digital Side Scan Recording and Target Analysis, Polaris Imaging, Serial Number 10270A.

The vertical beam width of the Klein 595 side scan was 40° at 3dB. A depression angle of 20 degrees was used on the tow fish. The dual frequency fish had the 500 kHz frequency disabled, and the 100 kHz frequency was used at all times.

Side scan operations were conducted in water depths ranging from 8-33 meters. The side scan range was maintained at 100 meters for Sheet H and the side scan altitude off the bottom was maintained between 8 and 20 meters, except as noted for restricted range time periods indicated in the Sheet H Processing Report and the *hssl.p00* file. The amount of cable deployed was determined by using the 1-meter markings on the cable. As the cable length was adjusted to maintain the proper fish altitude, the operator would note the markings on the cable and enter the amount of cable deployed into the IHSS, which calculated layback and fish height, as described in the Phase IIB Summary Report.

To verify that the side scan signal reached the full extent of the slant range setting, records were checked for location of known objects at the far edge of the slant range. Sheet H analog records were of high quality and were rigorously analyzed by at least 2 operators/processors to reject suspect data.

Side-Scan Target and Feature Processing

For a full discussion of side scan processing, refer to the Phase IIB Summary Report; for complete side scan processing file listings, refer to Sheet H Processing Summary Report.

Sheet H side scan targets were collected with the **Eoscan_DTC**, September 19, 1995 and September 23, 1995 versions, both of which include layback in the record output. As discussed in the Phase IIB Summary Report, the September 23, 1995 version has a revised layback calculation. All targets were read into an Excel spreadsheet, which calculated slant range. Using the output listing from the spreadsheet, two side-scan processors reviewed each graphic record and the associated target file. Additions, corrections and deletions of target ranges, shadows, and times were agreed upon and entered into the spreadsheet. The **corr_targ** program was then run to update target positions, ranges, and heights for all targets.

Targets were correlated with multibeam features using the **get_contact** program, which produces the *hfeature* file and modifies the *htargets.ctv* file. There were 463 targets which were resolved into 144 features for Sheet H. Each feature was reevaluated with reference to its position and relation to soundings on the smoothsheet. *hfeature* and *htargets.ctv* files were combined into the *hupdate.out* file using **update_contact** to provide a correlated features-to-targets listing. The *hfeatgsf.out* file was created using the **feature_gsf** program, which traces each feature to a multibeam file, ping and beam number. The 143 features in Sheet H were directly correlated with 1 x IHO multibeam depths; three of these (#85, 107, and 155) were correlated by examination using the **gsfedit** program.

After completion of item investigations, the target/feature correlations were redone using all multibeam data. As a result, some features were judged non-significant and removed from the features list. In some cases, non-significant features had been placed on the list and were therefore removed. In other cases item investigation resulted in 1xIHO depths which showed the feature to be non-significant. The following features were item investigation subjects and removed from the features list as non-significant after analysis using 1xIHO data, but were maintained in the target and correlated features list:

Feature Number	Latitude North	Longitude West	Depth Meters	Feature Type	1 or 2 x IHO	Description
1	41 26.99978	070 45.38054	28.39	ROCK	1	depression in 26.0m
4	41 27.75590	070 43.83015	21.87	ROCK	1	in 22.9m
6	41 27.95455	070 43.52651	20.37	ROCK	1	in 21.2m
9	41 28.38799	070 42.47598	19.26	ROCK	2	in 20.3m
15	41 27.67027	070 44.17341	21.92	ROCK	2	in 22.9m
21	41 28.47730	070 42.61124	20.03	ROCK	1	in 21.1m
22	41 28.09220	070 43.42814	19.84	ROCK	2	in 20.4m
24	41 27.24770	070 45.20446	23.25	ROCK	1	in 24.8m
34	41 28.80681	070 42.50930	19.11	ROCK	1	in 19.8m
35	41 28.56456	070 42.88374	19.92	ROCK	2	in 20.9m
38	41 28.26571	070 43.60660	18.57	ROCK	1	in 19.5m
41	41 29.76489	070 40.38528	26.11	ROCK	2	in 27.4m
45	41 28.76271	070 42.35434	19.25	ROCK	2	in 20.1m
46	41 28.52277	070 42.96745	20.2	ROCK	2	in 21.6m
50	41 27.30291	070 45.44729	28.88	ROCK	1	in 30.4m
54	41 29.74823	070 40.22953	26.51	ROCK	1	in 27.2m
55	41 28.71195	070 42.35016	19.18	ROCK	2	in 20.2m
56	41 28.44112	070 42.89851	19.22	ROCK	2	in 20.3m
68	41 27.08142	070 45.54551	26.93	ROCK	1	in 27.8m
72	41 28.33183	070 42.54635	21.7	OBSTR	1	depression in 20.3m
73	41 29.07302	070 40.98555	21.38	ROCK	1	in 22.2m
77	41 27.57616	070 43.89152	20.75	ROCK	2	in 22.3m
80	41 29.21504	070 40.32732	25.09	ROCK	1	depressioin in25.1m
99	41 28.18043	070 41.08885	12.56	ROCK	1	in 13.6m
100	41 28.18331	070 41.11042	12.8	ROCK	1	in 13.8m
103	41 28.30588	070 40.89517	14.06	ROCK	1	in 14.3m
105	41 28.32424	070 40.82177	15.37	ROCK	2	in 15.7m
107	41 28.30273	070 40.81469	15.2	ROCK	1	in 16.0m on slope
108	41 28.37670	070 40.74544	15.88	ROCK	1	in 16.5m
110	41 29.54264	070 38.40793	24.57	ROCK	2	in 25.4m
111	41 28.41008	070 40.82465	14.98	ROCK	2	in 15.6m
112	41 28.36624	070 40.91122	13.31	ROCK	2	in 14.6m non-plot for congestion
116	41 28.31460	070 40.96089	12.44	ROCK	1	on slope 10m horiz. distance from 12.1m depth
118	41 28.20738	070 41.01921	11.91	ROCK	1	in 12.7m
120	41 28.26784	070 40.91149	13.35	ROCK	1	in 14.0m
121	41 29.49885	070 38.55709	24.51	OBSTR	2	in 24.9m
123	41 28.38385	070 40.81032	15.15	ROCK	2	in 15.5m
124	41 28.22113	070 41.08638	14.14	ROCK	1	in 14.3m
126	41 28.22468	070 41.27470	13.39	ROCK	1	in 14.7m
131	41 28.43037	070 40.95516	13.59	ROCK	2	in 15.6m significant non-plot 2xIHO
132	41 28.55322	070 40.79598	17.47	ROCK	1	in 18.8m on slope
134	41 28.58001	070 40.81472	18.87	ROCK	1	in 19.8m
137	41 28.41272	070 41.05750	15.21	ROCK	1	in 16.0m
141	41 28.37360	070 41.14202	14.32	ROCK	1	in 15.0m
142	41 28.30687	070 41.22869	13.6	ROCK	1	in 14.5m
144	41 28.38315	070 41.23206	15.25	ROCK	1	in 17.0m on slope

151	41 28.45485	070 41.20594	17.39	ROCK	2	in 18.1m on slope
152	41 28.53564	070 41.03622	15.85	ROCK	2	in 16.8m on slope
154	41 28.59827	070 40.96390	14.7	ROCK	1	in 15.5m
160	41 28.48380	070 41.03867	15	ROCK	1	in 15.6m approx. 20 m horiz. distance from #101 11.3m Rk
161	41 29.01887	070 40.36888	23.69	ROCK	2	in 24.8m
164	41 28.57009	070 41.08597	15.93	ROCK	2	in 16.1m
167	41 29.92892	070 40.18114	24.52	ROCK	2	in 25.0m
170	41 28.83198	070 42.34822	19.39	ROCK	2	in 19.6m
174	41 28.22512	070 40.95565	12.47	ROCK	2	in 12.9m approx. 30 m horiz. distance from #159 14.7m Rk
177	41 27.91760	070 43.61101	19.42	ROCK	1	in 20.2m
180	41 28.56443	070 40.84743	17.53	ROCK	1	in 18.3m on slope
181	41 28.32514	070 41.31318	16.93	ROCK	1	in 18.2m on slope between #145 16.8m Rk and 16.8m depth up slope

Features were reviewed during office processing. Evaluator concurs with hydrographer as to non-significance.

Side Scan Coverage Analysis

The side scan lines in Sheet H were, in general, run with a line spacing of 90 meters and a side scan range setting of 100 m, providing the required 200 percent side scan coverage with a 10% overlap of lines, as shown on the side scan coverage plot. The coverage was calculated using the **ss_cover** program (see Phase IIB Summary Report for discussion of parameter settings) with settings of a=20, r=30, p=30, and b=10, with the *gss.p00.* and *geos.lst* files as input.

F. SOUNDING EQUIPMENT

The following components were used for acquisition of multibeam bathymetric data:

- RESON SeaBat 9002 multibeam system consisting of:
  - Three SeaBat Transducers, Serial Numbers port 332217, starboard 332202 and 214010.
  - Two SeaBat 9001 Processors, Serial Numbers 6597 and 5230
  - SeaBat 6042 Controller and Processing Unit, Serial Number 590 P0 794-387

On Julian Day 271 (Sept 28) the Starboard Transducer Head (332202) was replaced with a spare (214010). Alignment tests were run on this day and the new head was used for survey beginning on Julian Day 272 (Sept. 29).

A lead line made of Kevlar line with a 35-pound steel plate as a weight was used for checking the center beams of the multibeam echo sounder. The line was marked in feet and was calibrated against a steel tape.

G. CORRECTIONS TO SOUNDINGS

SEE EVAL. RPT., SECT. 6

Speed of sound ALSO, SEE SECTION O, HYDROGRAPHER'S REPORT

The following systems were used to determine sound velocity profiles for corrections to multibeam sonar soundings.

- Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 1801, Calibration Date 08 March 1995, (CTW in file names).
- Sea-Bird Electronics, Inc., Model 19 CTD, Serial Number 565, Calibration Date 11 April 1995, (CTG in file names).

Speed of sound profiles were computed from casts taken with the Sea-Bird Electronics, Inc. Model 19 CTD's. The primary unit was SBE19 #1801. Daily confidence checks were obtained from simultaneous casts with the primary CTD and with SBE19 #565. All profiles were computed using **SBE Term19** software. Computed profiles were copied to the **IHSS** for comparison on the screen. A selected profile was applied to the system, recorded, and sent to the RESON 6042 where a refraction lookup table was computed for application of depth, angle and range correctors to the multibeam sounding data. If sounding depths exceeded the cast depth, the 6042 used the bottom of the table to extend correctors below the table.

Positions and dates of all casts are shown in Table G-1. Confidence check profiles from simultaneous casts were compared using the multibeam display program and were, in general, identical. If not satisfactory, at least one more profile was done.

Table G-1. CTD Files and Locations

CTD File Name	Confidence Check	Apply to Reson	Cast Depth (m)	Latitude (N)	Longitude (W)
ctw26505.cnv	X		32	41° 27.5'	70° 45.1'
ctg26506.cnv	X	X	32	41° 27.5'	70° 45.1'
ctw26601.cnv		X	33	41° 26.9'	70° 44.0'
ctw26602.cnv	X		33	41° 27.5'	70° 45.0'
ctg26603.cnv	X	X	33	41° 27.5'	70° 45.0'
ctw26701.cnv		X	33	41° 23.5'	70° 53.7'
ctw27101.cnv		X	32	41° 27.3'	70° 44.9'
ctw27102.cnv		X	32	41° 27.5'	70° 45.0'
ctw27901.cnv		X	31	41° 26.6'	70° 46.5'
ctw27902.cnv	X	X	28	41° 30.0'	70° 39.2'
ctg27903.cnv	X		28	41° 30.0'	70° 39.2'
ctw28701.cnv		X	30	41° 30.0'	70° 39.2'
ctw28801.cnv		X	28	41° 30.0'	70° 39.2'
ctg28802.cnv	X		28	41° 30.0'	70° 39.2'
ctw28802.cnv	X	X	28	41° 30.0'	70° 39.2'
ctw28901.cnv		X	28	41° 30.0'	70° 39.2'
ctw28902.cnv		X	28	41° 30.0'	70° 39.2'
ctw29001.cnv	X		28	41° 30.0'	70° 39.2'
ctg29002.cnv	X	X	28	41° 30.0'	70° 39.2'
ctg29302.cnv		X	30	41° 26.6'	70° 46.5'
ctg29303.cnv	X	X	30	41° 26.6'	70° 46.5'
ctg29510.cnv		X	28	41° 30.0'	70° 39.1'
ctw30001.cnv		X	32	41° 26.6'	70° 46.5'
ctw30002.cnv		X	32	41° 26.6'	70° 46.5'

* POSITION OF CAST IS INCORRECT JK

Corrections determined from vertical casts

Leadline comparisons to multibeam center beam soundings were made weekly to verify the transducer draft and echo sounder instrument correctors. For each comparison, a CTD cast was taken and the sound velocity profile loaded into the **IHSS** and the RESON 6042. Ten leadline readings were recorded along with the UTC time of observation while the **IHSS** recorded the multibeam readings. **Exammb** was used to find the port and starboard center beam readings for the time of each leadline reading.

The results of these readings were entered into a spreadsheet along with the draft reading from the transducer pole and any squat corrector which may have been entered in the **IHSS**. The spreadsheet applied a calibration corrector to the leadline readings and converted the readings from feet to meters. It also applied correctors for the difference between the draft and 2.30 meter reference point and for any settlement and squat inadvertently left in the **IHSS** to the port and starboard multibeam readings.

Each corrected cast depth was compared to the simultaneous multibeam readings and correctors were calculated by the spreadsheet. The ten comparisons were averaged for each transducer

and the standard deviations were computed. The mean of the results for six sets of comparisons resulted in a corrector of 0.006 meters for each transducer. Therefore, no instrument or draft corrector was applied to sounding for this survey.

The leadline comparisons are included in the Phase IIB Summary Report.

Static draft

At a minimum, the static draft was observed on a daily basis by reading the markings on the transducer pole while the vessel was stationary. If the static draft value changed from the previously noted value, the new value was entered into the RESON system. The static draft value was recorded at the beginning of a GSF file or whenever values in the header were changed. All results are reported in the Processing and Multibeam Data Summary.

Settlement and squat

Measurements of settlement and squat were conducted at the breakwater north of Coddington Cove, Narragansett Bay, Rhode Island on May 5, 1995, in 14 meters of water.

The results were compiled into a lookup table of the vessel's engine rpm vs settlement and squat. Rpm settings were entered into the Multibeam parameters by the real-time system operator, the computer applied settlement and squat correctors interpolated from the lookup table, and recorded it in the "Depth Corrector" field of the GSF data file for each ping.

All results are reported in the Phase IIB Summary Report-Settlement and Squat Test.

Roll, Pitch and Heading

The following sensors were used for acquisition of Roll, Pitch and Heading data:

- TSS 335B Vertical Reference Units, Serial Numbers 001615 and 593
- Sperry MK32 Gyrocompass, Serial Number 208

The TSS 335B Vertical Reference Units and their corresponding junction boxes, were used for heave, roll, and pitch. The accuracy of the sensor is 5 percent of 1 m or 5 cm for heave; ± 0.10° dynamic accuracy for roll and pitch, and ± 0.05° static accuracy for roll and pitch. The Sperry MK32 was used for heading. The dynamic heading accuracy of the unit at 3 sigma was 0.6° times the secant of latitude.

On Julian Day 297 (Oct. 24) TSS-335B (001615) was replaced with TSS 335B (593). Alignment tests were run on this day and the new vertical reference was used for survey beginning on 298.

Occasional power fluctuations affected the Sperry Mk 32 gyrocompass for periods of approximately .01 seconds. These fluctuations were identified and corrected in processing using the program **examgyro**.

Heading, roll, and pitch biases were determined in a series of tests performed in Narragansett Bay prior to the start of the survey and were redetermined each time a transducer or Vertical Reference Unit was changed. Prior to conducting any of the tests, a CTD cast was taken to determine the sound velocity profile and entered into the RESON system. In the RESON the port and starboard roll biases were initially set to +30° and -30° respectively, heading biases were initially set to 0° and 180°, and pitch biases were set to 0. The roll bias test was run first in an area with relatively flat bottom. The range scale was set to 100 meters. Three lines were run spaced 40 meters apart and each line run in both directions. The data from parallel lines in the same direction were used for roll bias calculations for each head separately; the ideal data set was positioned so that the depths from the center beams from a transducer were compared against the depths of the mid-swath beams. Tidal corrections were applied to all data before roll corrections were calculated using routines in the **MBHAT** software. All results are reported in the Phase IIB Summary Report.

After the roll biases were calculated and entered into the RESON system, the pitch bias test was conducted. The pitch test was conducted on multiple reciprocal runs of a single line perpendicular to a slope of approximately five degrees. The range scale of the RESON was set to 50 meters and ships speed was maintained approximately constant. Pitch biases were computed by comparing runs in opposite directions. Tidal corrections were applied to all data before pitch corrections were calculated using routines in the **MBHAT** software. All results are reported in the Phase IIB Summary Report.

After measurement, calculation, and entry of the pitch bias correctors, heading bias tests were conducted. For the heading bias test 5 parallel lines were run in opposing directions so that the inner beams from a transducer head overlay the intermediate or outer beams of the same head. The heading bias was then determined by measuring the distance between equal depths and calculating the angle subtended by that distance. Tidal corrections were applied to all data before heading corrections were calculated using routines in the **MBHAT** software. All results are reported in the Phase IIB Summary Report.

Roll, pitch, and heading biases applied in H-10651 are shown in Table G-2.

Table G-2. Roll, Pitch, and Heading Bias ✓

	Days 265-271		Days 272-295		Day 300	
	Port	Starboard	Port	Starboard	Port	Starboard
Roll	+29.930	-29.475	+30.146	-29.105	+29.668	-29.289
Pitch	-1.02	-1.02	-1.02	-1.02	-0.963	-0.363
Heading	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25

Tide and water level correctors ✓

Tide data were acquired using the following gauges:

- Sea Data, Model TDR-3A, Serial Numbers 018, 220/338, 221 and 517

Smooth sheet soundings were corrected for water level through application of observed data from the Cedar Tree Neck, MA (844-8325), and Nobska Point, MA (844-7955) stations. A

staff MLLW datum was computed at each station by simultaneous comparison with Newport, RI (845-2660) and with Woods Hole, MA (844-7930) using the NOAA Form 248 method prescribed by Marmer (Tidal Datum Planes, Spec. Pub. 135, U.S. Dept. of Commerce.) The simultaneous comparison computations are included in the Phase IIB Summary Report - Tides.

The boundaries of tide zones used are listed in the Phase IIB Summary Report - Tides. Gage readings were recorded in relation to staff zero; therefore, the MLLW datum height was subtracted from gage readings before applying the time and ratio correctors.

Full data for all project water level gages are in the Phase IIB Summary Report - Tides.

H. CONTROL STATIONS SEE EVAL RPT, SECTION H ✓

The horizontal datum used for the survey was the North American Datum (NAD) 1983.

Existing horizontal control stations were used to establish a DGPS reference station at Gay Head Light to provide primary navigation control for hydrographic positioning. Station 31435 (LW5817) was used to verify the DGPS performance of the Gay Head Light station. Horizontal control data are included in the Phase IIB Summary Reports.

I. HYDROGRAPHIC POSITION CONTROL SEE EVAL RPT, SECTION I ✓

The following equipment was used for positioning:

- Trimble 4000 GPS Receiver, Serial Number 3504A09516
- Magnavox MX50R Differential Beacon Receiver, Serial Number 154
- Trimble 4000 GPS Receiver, Serial Number 3430A07030
- Pacific Crest Differential Beacon Receiver various Serial Numbers
- DGPS shore station [OSI], Serial Number 3433A07356

The primary hydrographic positioning control equipment was a Trimble 4000 GPS using differential correctors from the contractor established station at Gay Head Light. HDOP, number of satellites, elevation of satellites, and age of correctors were monitored so that the resulting hydrographic positioning control meets the specifications.

Positioning confidence checks were established by recording a separate (reference) Trimble DGPS using correctors from the U.S. Coast Guard station at Montauk, NY. A real time monitor raised an alarm when the two DGPS positions differed by more than 10 meters horizontally. During all times when differential correctors were being received, positioning confidence checks were well within tolerance.

In daily post processing, the reference DGPS positioning was substituted for the primary DGPS positioning during those times when the reference met the specifications, but the primary did not.

J. SHORELINE ✓

Not Applicable.

K. CROSSLINES

Crosslines constituted approximately 5 percent of the mainscheme length. Comparisons of all crossing data in the 1xIHO swaths, using **MBHAT** software, show that more than 97.9 percent of comparisons are within 30 centimeters and 99.5 percent of comparisons are within 50 centimeters. These data include areas of sharp relief as well as relatively flat bottom.

On the eastern crossline 98.6 percent of comparisons were within 30 centimeters, 99.9 percent were within 50 centimeters and none were more than 70 centimeters. Only 6 of 29,037 comparisons exceeded 50 centimeters.

The second crossline from the east included a sharp feature and a ridge. For the entire line. 94.2 percent of comparisons were within 30 centimeters, 99.3 percent were within 50 centimeters, and 426 of 62,038 comparisons exceeded 50 centimeters. Without the feature and the ridge, 54 of 49,852 comparisons exceeded 50 centimeters, 95.2 percent were within 30 centimeters and 99.8 percent were within 50 centimeters.

Similar comparisons existed on the other crosslines. Comparisons against all crosslines over relatively flat bottom gave results of 95 percent to 99.7 percent within 30 centimeters, and of 99.93 percent to 99.99 percent within 50 centimeters.

In all cases larger differences between mainscheme and crossline soundings correspond to areas of steep slope and rapid slope changes. Comparisons across all days of operation are uniform and do not reveal any problem with water level corrections.

Table K-1. Junction Analysis Mainscheme - Crosslines

Category	Count	Percent	Total Percent
to 10 cm	900918	73.83	73.83
to 20 cm	222511	18.23	92.06
to 30 cm	71548	5.86	97.92
to 40 cm	16241	1.33	99.25
to 50 cm	4115	0.34	99.59
to 60 cm	1660	0.14	99.73
to 70 cm	942	0.08	99.80
to 80 cm	614	0.05	99.85
to 90 cm	422	0.03	99.89
to 100 cm	311	0.03	99.91
> 100 cm	1046	0.09	100.00
Total Counts =	1220328		

L. JUNCTIONS

SEE EVAL RPT, SECTION L

~~There were no requirements for junctioning with prior surveys~~. The junction with sheet G (H-10654) was satisfactory and is discussed in that descriptive report. Additional junctions (surveys are H-10556 (1994) and H-10563 (1994)).
JUNCTION WITH H-10654, H-10556 and H-10563 SHOWED GOOD AGREEMENT.

M. COMPARISON WITH PRIOR SURVEYS

SEE EVAL. RPT., SECTION M.

H-10651 was compared to prior surveys H-8902 and H-8903 (1966), scale 1:10,000. Along the south central edge of the survey, between 070° 41.25'W and 070° 43.0'W, large sand waves are present. This portion of Middle Ground appears to have migrated westward and depths have changed on the order of 1 to 8 meters. Between 070° 41.25'W and 070° 42.0'W depths are shoaler than the prior surveys, between 070° 42.0'W and 070° 42.6'W depths are deeper than the prior surveys, and between 070° 42.6'W and 070° 43.0'W depths are shoaler than the prior surveys. CONCUR

In other areas, H-10651 in general agrees with the prior survey depths within 1 meter. CONCUR

Surveys H-10563, 1994, and H-10566, 1994 were not made available for comparison. ~~H-10563 AND H-10566 ARE JUNCTION SURVEYS BOTH WERE REVIEWED DURING OFFICE PROCESSING AND SHOWED GOOD AGREEMENT~~ JL H-10563 AND H-10566 ARE JUNCTION SURVEYS SEE SECTION L OF THE EVALUATION REPORT

AWOIS item #7206, identified as a 8.7 cm diameter metal pipe at least 12m long sunk in 23 meters of water, called for a 1000 meter search radius centered at 41° 29.00'N, 070° 39.57'W. This position and more than half the search circle were within the survey area. Coverage comprised 100 percent multibeam and 200 percent side scan bottom coverage. Within the search radius seven side scan targets were identified. Two targets were associated with feature #155, a rock with 22.5 meter depth, five were judged insignificant. Four of the insignificant targets (289-8:07:54, 289-11:13:04, 289-11:57:00, 289-14:57:23) in the vicinity of 41° 29.17'N, 070° 39.7'W appeared to be a linear object about .6m high and 12m long in 23.8 meters of water. These targets are believed to be the pipe in AWOIS #7206. Based on this survey it is recommended that the charted obstruction PA at 41° 29 0'N, 070° 39.57'W be removed. Concur NO LEAST DEPTHS WERE DETERMINED BY MULTIBEAM FOR THE FOUR INSIGNIFICANT TARGETS NOTED ABOVE, RECOMMEND THAT THE CHARTED OBSTN PA AT 41° 29.0'N, 70° 39.57W BE CHARTED AS ~~THE CHARTED (DTH)~~ 77' Obstn - CENTERED AT 41° 29.17'N, 70° 39.7'W. JL THIS CONFIRMS POSITION AND DEPTH AS FOUND ON H-10566 (1994)

AWOIS item #8145, identified as unexploded WWII ordinance, called for a 750 meter search radius centered at 41° 29.57'N, 070° 41.25'W. The nature and size of the ordinance was not listed. This position was outside the survey area. Approximately one-third of the search area was within the survey area. Coverage of this portion comprised 100 percent multibeam and 200 percent sidescan bottom coverage. Nine side scan targets were identified within the search radius. Three targets were correlated to feature #18, a 21.2 meter deep rock, one was correlated to feature #169, a 23.4 meter deep rock, and five were judged non-significant. All the targets appeared to be rocks and none could be associated with the unexploded ordinance.

Since a thorough investigation of the entire search area was not completed it is recommended that the Charted Unexploded Ordinance PA (rep. 1990) in 41° 29.57'N, 070° 41.25'W be retained as charted. CONCUR JL

Item investigations under Task Order 56-DGNC-6-13002 comprised three multibeam sounding lines over 2xIHO features to determine 1xIHO depths as follows:

#88 at 41° 28.044'N, 070° 42.578'W	1xIHO Minimum Depth = 18.4m
#93 at 41° 26.808'N, 070° 44.802'W	1xIHO Minimum Depth = 21.6m
#91 at 41° 26.394'N, 070° 45.873'W	1xIHO Minimum Depth = 19.8m

#88 - CHART AS 60 RK
#93 - CHART AS 71 RK
#91 - CHART AS 64 RK

N. COMPARISON WITH THE CHART

SEE SECTION O, EVALUATION REPORT

H-10651 was compared with Chart 13230, 40th Edition, April 29, 1995, 1:40,000 scale. Danger to Navigation Reports were submitted on October 19, 1995, October 21, 1995, December 14, 1995 and December 30, 1995 August 14, 1996 are included in Appendix A. The first two reports were based on the application of Newport, RI observed tides with zoning as specified in the contract. The December 30, 1995, and the August 14, 1996 reports are based upon tides observed in Vineyard Sound with datums and zoning as determined by Science Applications International Corporation.

The changes discussed in the comparison to prior surveys also apply to the comparison to chart 13230. In addition several soundings indicate a general drift of the bottom toward the southwest. CONCUR JL

The charted 15.8 meter (52 ft) at 41° 28.~~1~~20'N, 070° 43.~~1~~25'W was not found on this survey. Depths from this survey were 19.8~~20.1~~ meters (65~~66~~ ft) with 100 percent multibeam coverage, and no targets were seen within the 200 percent side scan coverage. CONCUR JL

It is recommended that the entire common area of charts 13218, 13230, and 13233 be replaced with data from H-10651. CONCUR JL

It is also recommended that 4.8 meters (16 feet) be charted outside the survey area at 41° 27.86'N, 070° 41.43'W as reported in Danger to Navigation Reports October 19, 1995 and December 14, 1995. ~~DO NOT CONCUR~~ (CHARTED DEPTHS (CHART 13230, 40TH ED.) ADEQUATELY DEPICT THE BOTTOM ~~JL~~ ~~CONCUR JL~~ DO NOT CONCUR

O. ADEQUACY OF SURVEY

DATA FROM H-10556 SHOW THIS SDG TO BE IN AN AREA WHERE SDGS RANGE FROM 14-16'. RECOMMEND THAT DATA FROM H-10556 BE USED FOR CHARTING.

Survey H-10651 is complete and adequate to supersede all prior surveys. CONCUR JL

Data for all tracks shown on the track plot are included in the accepted survey data. The decision was made to retain all of the data to provide more 1xIHO coverage. In many cases, the extra lines were run to fill in side scan gaps and the multibeam data were recorded simultaneously.

Soundings corresponding to wrecks, rocks, and obstructions are shown in bold print on the smooth sheet so that they may be easily related to the corresponding text label. The density of soundings on this survey, while necessary to fairly depict the bottom, made it difficult to place text within the sheet. For that reason, text for features (wrecks, rocks, and obstructions), for floating aids to navigation, and for bottom characteristics are shown in reduced height bold characters. This makes them stand out from the soundings and eases their placement. Even so, it was often necessary to deviate from the traditionally preferred placement of text.

No plot on mylar or paper can fully represent the tremendous amount of data which are available in this survey. Manipulation of and viewing of the data with a computer is much more satisfactory for many applications. In particular, the ***mbmz*** layer viewed with the **MBHAT** software gives an excellent picture of the shape and character of the bottom.

The following discussion provides guidance for evaluation of this survey against the specifications.

Multibeam

From 41° 29.69'N, 70° 37.96'N, to 41° 29.67'N, 70° 38.00'W there is a multibeam gap that is 72 meters long and varies from 1 to 3 meters wide. This gap runs along the southern bound of the survey. It is covered by 200% side scan. Concur JL

Sound Velocity Corrections

For two periods of time during the survey, an incorrect sound velocity profile was applied to the multibeam data and used for depth determination. This occurred due to a design defect in the real-time software that caused it to incorrectly record the name of the current sound velocity profile. At 272 00:36:48, the profile CTW26701.CNV was downloaded instead of CTW27102.CNV. This profile affected data recorded from 272 00:57:43 to 272 02:37:34. During that time, one line was run from and to the following locations:

FROM 41° 29.91' N, 070° 39.17' W TO 41° 26.44' N, 070° 46.23' W

The resultant depth and position errors (Table O-1) were estimated by comparing depths as determined by the two Sound Velocity Profiles (SVP) in the SAIC error model. The model indicates that 1xIHO data recorded during this time are shoal biased between 0.12 and 0.25m and have horizontal errors as great as 0.21m. The errors were not removed from the data.

Table O-1. Depth and Position Errors Due to Incorrect Sound Velocity Profile (Julian Day 272)

Beam Angle, deg.	Depth Error, m	Position Error, crosstrack distance, m
0	0.12 too shallow	0.0
45	0.25 too shallow	0.21 too close to nadir

The second incorrect sound velocity profile was applied at 287 18:07:35 when CTW27902.CNV was downloaded instead of CTW28701.CNV. This affected data recorded from 287 18:34:07 to 288 01:31:34. During that time, lines were run from and to the following locations:

FROM 41° 29.89' N, 070° 39.07' W TO 41° 26.40' N, 070° 46.20' W,
FROM 41° 29.88' N, 070° 38.98' W TO 41° 26.35' N, 070° 46.17' W,
FROM 41° 29.88' N, 070° 38.85' W TO 41° 26.31' N, 070° 46.14' W,
FROM 41° 29.86' N, 070° 38.78' W TO 41° 26.26' N, 070° 46.11' W.

The resultant depth and position errors (Table O-2) were estimated by comparing depths as determined by the two Sound Velocity Profiles (SVP) in the error model. The model indicates that 1xIHO data recorded during this time are shoal biased between 0.02 and 0.03m and have horizontal errors as great as 0.01m. The errors were not removed from the data.

Table O-2. Depth and Position Errors Due to Incorrect Sound Velocity Profile (Julian Day 287)

Beam Angle, deg.	Depth Error, m	Position Error, crosstrack distance, m
0	0.03 too deep	0.0
45	0.02 too deep	0.01 too far away from nadir

Examination of the junction of all these lines with crosslines revealed a slight bias toward mainscheme lines being shoaler. This bias also appeared in the overall crossline comparison. In the relatively flat portion of the second crossline from the east, overall comparisons showed 95.2 percent of comparisons within 30 cm and comparison of the lines with incorrect SVP's applied showed 98 percent of comparisons within 20 cm. These favorable crossline comparisons indicate that the model analysis suggesting a minimal effect from Sound Velocity Profile errors was correct and that sounding data meet the specifications. Concur

Side Scan ✓

At 41° 26.83'N, 70° 46.48'W and at 41° 26.50'N, 70° 46.25'W only 100 percent side scan coverage is shown. However, these areas are completely within the overlap of Sheet G. Thus 200 percent side scan coverage is available. Concur JL

At 41° 26.40'N, 70° 45.60'W, there are two 5x5 m cells with 100 percent side scan coverage due to course deviation on the side scan tracks at 289-13:21:00 and 289-03:36:10. One hundred percent coverage is provided by the side scan data at 290-17:01:00. All of these side scan records were examined, as well as the 100 percent multibeam data from the *hmbmz* layer. There were no targets in the area and no features were selected. Concur JL

At 41° 29.75'N, 70° 40.34'W, there are two 5x5 m cells with only 100 percent side scan coverage due to course deviation on the side scan tracks at 271-05:34:30 and 271-16:32:00. One hundred percent coverage is provided by the side scan data at 271-13:15:45. All of these side scan records were examined, as well as the 100 percent multibeam data from the *hmbmz* layer. There were no targets in the area and no features were selected. Concur JL

There is also a gap at 41° 26.45'N, 70° 45.55'W caused by short-term (less than 1 minute) apparent course variations not compensated for by the parameter settings in the **new_ss_cover** program. These apparent course variations near 288-03:37:30 are caused by a combination of GPS antenna motion and fish position calculations due to layback. The **new_ss_cover** program did not correctly smooth the track of the towfish through these variations. In fact, full 200% side scan coverage is available at this location, although the gap is shown on the side scan coverage plot.

The designation of wreck, rock, or obstruction was assigned to features from examination of the side scan images and the multibeam data. If a feature could not be clearly judged a wreck or a rock it was designated an obstruction. Two or more side scan processors agreed upon the designation. The hydrographer and the Government Contracting Officer's Technical Representative reviewed and approved the designations.

Contours

One meter contours were generated from 1 x IHO data gridded to select the shoalest sounding in a 15 meter true cell size. This method has the potential for a small horizontal offset of contours if the shoal sounding occurs in the corner of the cell. However, it does generate contours corresponding to the least depths for the survey. Smooth sheet contours were compared to the selected soundings plotted on the smooth sheet, and were modified as necessary for a clear and safe hydrographic presentation. Shoal curves were enlarged when necessary to make them visible around the shoal sounding. Curves were also modified toward deeper water to ensure inclusion of soundings equal to the curve depth. Small deep curves were removed for clarity, but deep curves were sometimes retained on the smooth sheet even though the density of soundings precluded placing a deep sounding within them. The hydrographer felt that the shape of the bottom was more adequately defined by making use of these contours derived from the data too dense for depiction on the smooth sheet in numeric form. CONTOUR LINES WERE REVISED, ON AN OVERLAY, BY THE PACIFIC HYDROGRAPHIC BRANCH TO CONFORM WITH THE SOUNDINGS SHOWN ON THE SMOOTH SHEET

P. AIDS TO NAVIGATION

SEE EVAL RPT SECTION P

Middle Ground Lighted Bell Buoy "27" was on station at 41° 28.06'N, 070° 41.57'W with characteristics F1 G 4s BELL and a green structure. This is in agreement with Charts 13230 and 13233, and with Light List, volume 1, Atlantic Coast, 1994 #15575. Buoy "27" adequately serves its apparent purpose. Concur

Q. STATISTICS

Survey statistics are as follows:

698.5km	Lineal kilometers of sounding lines
25.39km^2	Square kilometers of hydrography
6	Days of production
3	Days of weather downtime
7	Days of mechanical, electronic or operational downtime
2	Number of tide stations
24	Number of velocity casts
0	Number of XBT drops

R. MISCELLANEOUS

The southwest end of Middle Ground is a field of large sand waves with apparent migration to the west and possibly south. Two portions of Middle Ground extend into H-10651 as discussed in Comparison to Prior Surveys.

S. RECOMMENDATIONS

Recommend the entire common area of Charts 13218, 13230 and 13233 be reconstructed with data from this survey. After full processing and evaluation there were no significant features unresolved in the 2xIHO portion of the multibeam swath. CONCUR

T. REFERRAL TO REPORTS SUPPLEMENTARY REPORTS ARE FILED WITH THE HYDROGRAPHIC DATA

- Phase IIB Summary Report.
- Sheet H Processing Summary Report
- Phase I - NOAA Acquisition of Sounding Data in Western Long Island Sound, Phase I Test Results, December 3, 1994. Submitted to NOAA COTR aboard M/V Beavertail.
- Processing and Multibeam Data Summary
- Sheet H Real Time Log Notebook
- Sheet H Sound Velocity Notebook
- Sheet H Processing Notebook
- Sheet H Digital Data Listing Notebook
- Sheet H Digital Data
- Sheet H Side Scan Sonar Analog Records
- Sheet H Plots

APPENDIX A:

DANGER TO NAVIGATION REPORTS

Science Applications International Corporation
An Employee-Owned Company

ADVANCE INFORMATION

August 14, 1996

Lieutenant Commander David A. Cole, NOAA
Field Manager, Contract Hydrographic Surveys
Office of Coast Survey, N/CS3x3, National Ocean Service
1315 East West Highway, SSMC3, Station 6856
Silver Spring, MD 20910

Subject: NOAA Contract 50-DGNC-4-00035.
Reference: (a) NOAA Letter dated July 3, 1996
(b) NOAA Letter dated February 26, 1996
(c) Danger to Navigation Report dated October 31, 1995
(d) Danger to Navigation Report dated December 30, 1995

Dear Lieutenant Commander Cole:

During final processing of data for sheet H (H-10651), Science Applications International Corporation (SAIC) determined that the 42ft MLLW sounding reported in References (c) and (d) as located in 41° 28.50'N, 070° 40.83'W (NAD-1983) was caused by an outlier in the data. After the outlier was removed, the data indicate a sounding of 15.3m (50ft) MLLW at the reported position. Soundings of 14.2m (46ft) MLLW are within 50m south west and north-north-west of the reported position.

SAIC requests NOAA remove the reported 42ft MLLW sounding from the Dangers to Navigation reporting system.

Sincerely,
Science Applications International Corporation

Walter S. Simmons
Program Manager

cc: Mr. Gary C. Nelson

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

ADVANCE INFORMATION

Science Applications International Corporation
An Employee-Owned Company

October 19, 1995

* SUPERSEDED BY REPORT DATED DECEMBER 14, 1995

Lieutenant Commander David A. Cole, NOAA
Field Manager, Contract Hydrographic Surveys
Office of Coast Survey, N/CG24x3
National Ocean Service
1315 East West Highway, SSMC3, Station 6856
Silver Spring, MD 20910

Subject: NOAA Contract 50-DGNC-4-00035: Danger to Navigation Report

Dear Lieutenant Commander Cole:

Science Applications International Corporation (SAIC) has discovered dangers to navigation on Charts 13218, 13230, and 13233 during surveys in Vineyard Sound, MA, under the subject contract.

The shoal charted in 41 27.85 N from 070 40.90 W to 070 41.35 W appears to have migrated westward, and consists of large sand waves. Soundings of 16 feet were found in 41 27.86 N 070 41.43 W while off line in a turn between crosslines. Additional shoal soundings were found while surveying H-10651 as follows:

Feet	Latitude	Longitude
28	41 27.93 N	070 41.57 W
37	41 28.06 N	070 41.45 W
43	41 28.10 N	070 41.54 W
43	41 28.02 N	070 41.62 W
41	41 27.84 N	070 41.76 W

The shoal charted in 070 42.55 W 41 27.25 N to 41 27.50 N also appears to have migrated south west, and consists of large sand waves. Shoal soundings were found while surveying H-10651 as follows:

Feet	Latitude	Longitude
39	41 27.32 N	070 42.80 W
39	41 27.25 N	070 42.96 W
43	41 27.42 N	070 42.78 W
44	41 27.33 N	070 43.11 W
50	41 27.34 N	070 43.25 W

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

The listed positions are NAD 1983 and the depths are MLLW corrected using Newport, RI, observed water levels with zoning as.stated in the subject contract. Depths are subject to change after post processing with local observed water levels.

In view of the above dangers, SAIC recommends removal of the following soundings charted in Chart 13230:

Feet	Latitude	Longitude
51	41 27.24 N	070 42.90 W
59	41 27.30 N	070 43.16 W

A copy of a section of chart 13230 is enclosed.

Sincerely,
Science Applications International Corporation

Walter S. Simmons
Program Manager

Enclosure

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

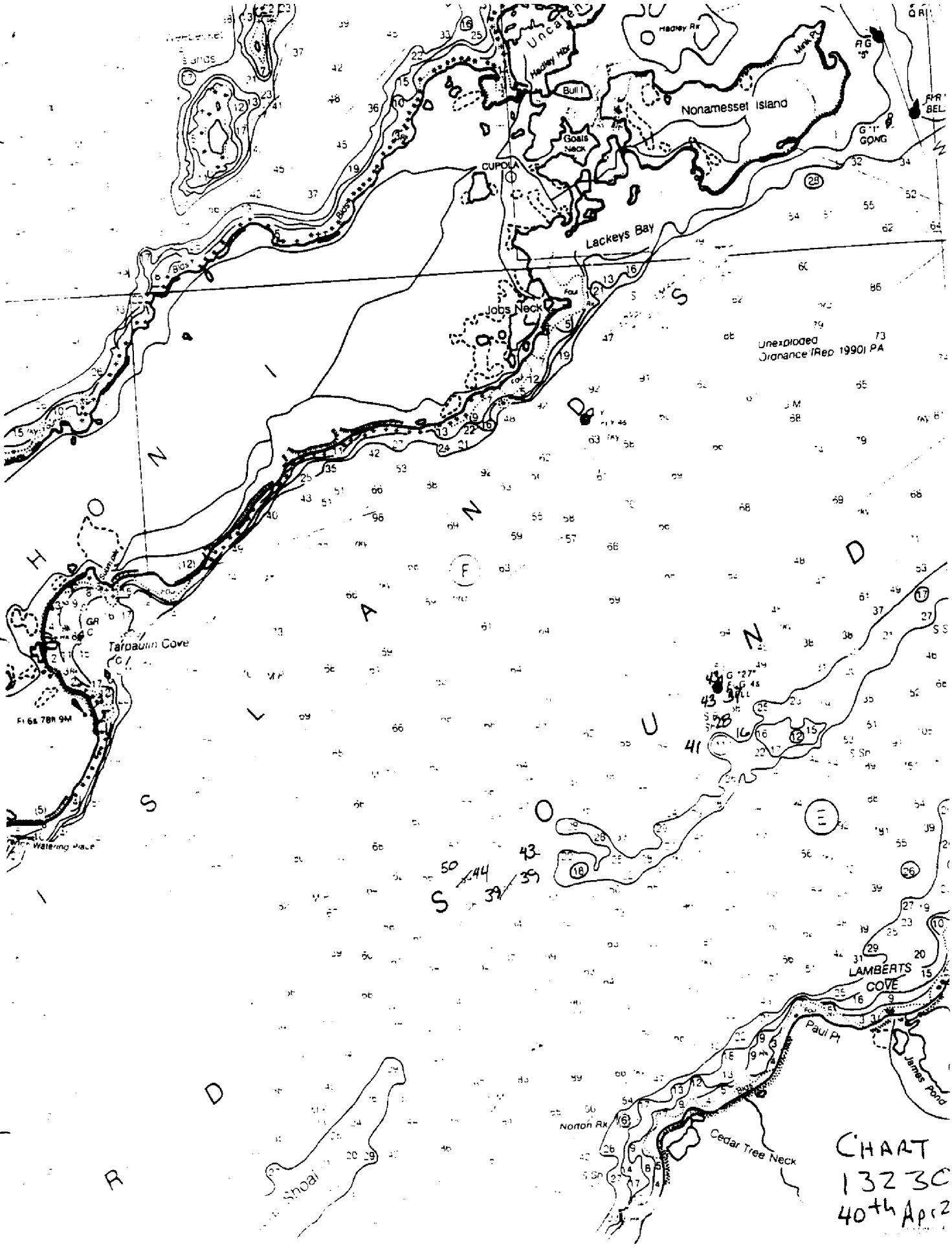

CHART
1323C
40th Apr 2

Science Applications International Corporation
An Employee-Owned Company

ADVANCE INFORMATION

December 14, 1995

Lieutenant Commander David A. Cole, NOAA
Field Manager, Contract Hydrographic Surveys
Office of Coast Survey, N/CG24x3
National Ocean Service
1315 East West Highway, SSMC3, Station 6856
Silver Spring, MD 20910

Subject: NOAA Contract 50-DGNC-4-00035
Reference: 1) Danger to Navigation Report, October 19, 1995

Dear Lieutenant Commander Cole:

Science Applications International Corporation (SAIC) reported dangers to navigation on Charts 13218, 13230, and 13233 discovered during conduct of surveys in Vineyard Sound, MA, via Reference 1.).

Having post processed the survey data using local observed water levels, SAIC is pleased to present an update to Reference 1.)

The shoal charted in 41 27.85 N from 070 40.90 W to 070 41.35 W appears to have migrated westward, and consists of large sand waves. SAIC recommends charting the following soundings at the listed positions:

Feet	Meters	Latitude	Longitude
28	8.5	41 27.93 N	070 41.57 W
36	11.0	41 28.06 N	070 41.45 W
42	12.9	41 28.10 N	070 41.54 W
40	12.3	41 28.01 N	070 41.62 W
40	12.2	41 27.84 N	070 41.76 W

A sounding of 16 feet was found in 41 27.86 N 070 41.43 W while off line in a turn between crosslines. SAIC recommends charting 16 feet at this position.

The shoal charted in 070 42.55 W 41 27.25 N to 41 27.50 N also appears to have migrated south west, and consists of large sand waves. SAIC recommends charting the following soundings at the listed positions:

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585
Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

Feet	Latitude	Longitude
39	41 27.32 N	070 42.80 W (An 11.2 meter sdg, 36Ft plots at this coordinate)
39	41 27.25 N	070 42.96 W (An 11.4 meter sdg, 37Ft plots at this coordinate)
43	41 27.42 N	070 42.78 W (A 13.0 meter sdg, 43 Ft plots at this coordinate)
44	41 27.33 N	070 43.11 W (A 13.3 meter sdg, 43Ft plots at this coordinate)
50	41 27.34 N	070 43.25 W (A 15meter sdg, 49Ft plots at this coordinate)

The listed positions are NAD 1983 and the depths are MLLW corrected using Nobska Point and Cedar Tree Neck, MA, observed water levels with zoning determined by SAIC.

In view of the above dangers, SAIC recommended removal of the following soundings charted in Chart 13230: Concur

Feet	Latitude	Longitude
51	41 27.24 N	070 42.90 W
59	41 27.30 N	070 43.16 W

Sincerely,
Science Applications International Corporation

Walter S. Simmons
Program Manager

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

Science Applications International Corporation
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ADVANCE INFORMATION

October 21, 1995

Lieutenant Commander David A. Cole, NOAA
Field Manager, Contract Hydrographic Surveys
Office of Coast Survey, N/CG24x3
National Ocean Service
1315 East West Highway, SSMC3, Station 6856
Silver Spring, MD 20910

* SUPERSEDED BY DANGER TO NAVIGATION REPORT DATED DECEMBER 30, 1995

Subject: NOAA Contract 50-DGNC-4-00035: Danger to Navigation Report

Dear Lieutenant Commander Cole:

Science Applications International Corporation (SAIC) has discovered dangers to navigation on Charts 13218, 13230, and 13233 during surveys in Vineyard Sound, MA, under the subject contract.

Many features appear to have migrated to the south and west. Much of the area consists of large sand waves which are subject to change from the action of high curents and storms.. Shoal soundings were found while surveying H-10649 and H-10654 as follows:

Feet	Latitude	Longitude
42	41 28.50 N	070 40.83 W
49	41 24.70 N	070 51.24 W
42	41 24.54 N	070 50.68 W
48	41 24.48 N	070 50.66 W
49	41 24.48 N	070 50.48 W
43	41 24.16 N	070 50.28 W
50	41 24.63 N	070 49.65 W
35	41 24.70 N	070 50.34 W
29	41 24.79 N	070 50.36 W
30	41 24.84 N	070 50.37 W
36	41 24.93 N	070 50.39 W
37	41 24.89 N	070 50.18 W
47	41 25.32 N	070 49.38 W
43	41 25.36 N	070 49.36 W
32	41 25.46 N	070 49.32 W
45	41 25.30 N	070 48.40 W
31	41 25.15 N	070 47.28 W

- Reference letter dated August 14 1996 (Attached) 42 Foot sounding revised to 50 Feet.

THESE SOUNDINGS ARE NOT ON IN THE SURVEY BOUNDARIES OF H-10651

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

ADVANCE INFORMATION

Feet	Latitude	Longitude
43	41 25.35 N	070 48.12 W
44	41 25.31 N	070 48.07 W
48	41 25.25 N	070 48.05 W
37	41 25.08 N	070 48.04 W
33	41 25.01 N	070 48.03 W
35	41 25.09 N	070 47.61 W
34	41 25.14 N	070 47.52 W
37	41 25.23 N	070 47.42 W

THESE SOUNDINGS ARE NOT IN THE SURVEY BOUNDARIES OF H-10651

The listed positions are NAD 1983 and the depths are MLLW corrected using Newport, RI, observed water levels with zoning as stated in the subject contract. Depths are subject to change after post processing with local observed water levels.

In view of the above dangers, SAIC recommends removal of the following soundings charted in Chart 13230:

Feet	Latitude	Longitude
47	41 24.95 N	070 50.08 W
54	41 25.38 N	070 49.34 W
45	41 25.37 N	070 48.40 W

THESE SOUNDINGS ARE NOT IN THE SURVEY BOUNDARIES OF H-10651

Copies of sections of chart 13230 are enclosed.

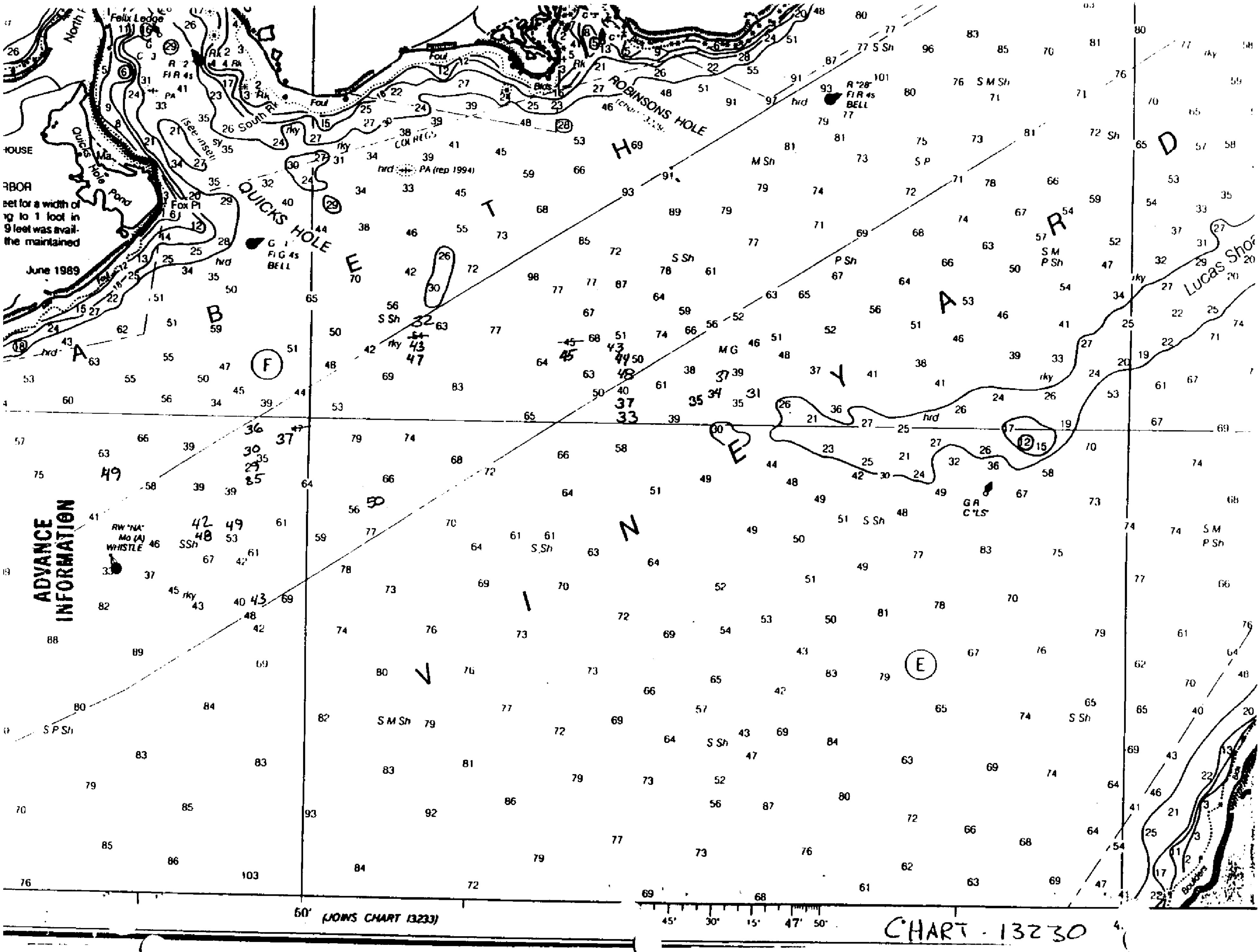
Sincerely,
Science Applications International Corporation

Walter S. Simmons
Program Manager

Enclosures

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson


ADVANCE INFORMATION
VINEYARD SOUND
QUICKS HOLE
ROBINSONS HOLE
Felix Ledge
Quicks Hole Pond
Fox Pt
South Rk
Lucas Shoal
June 1989
RW "NA" Mo (A) WHISTLE
G "1" Fl G 4s BELL
R "28" Fl R 4s BELL
G A C "LS"
PA (rep 1994)
60' (JOINS CHART 13233)
CHART · 13230

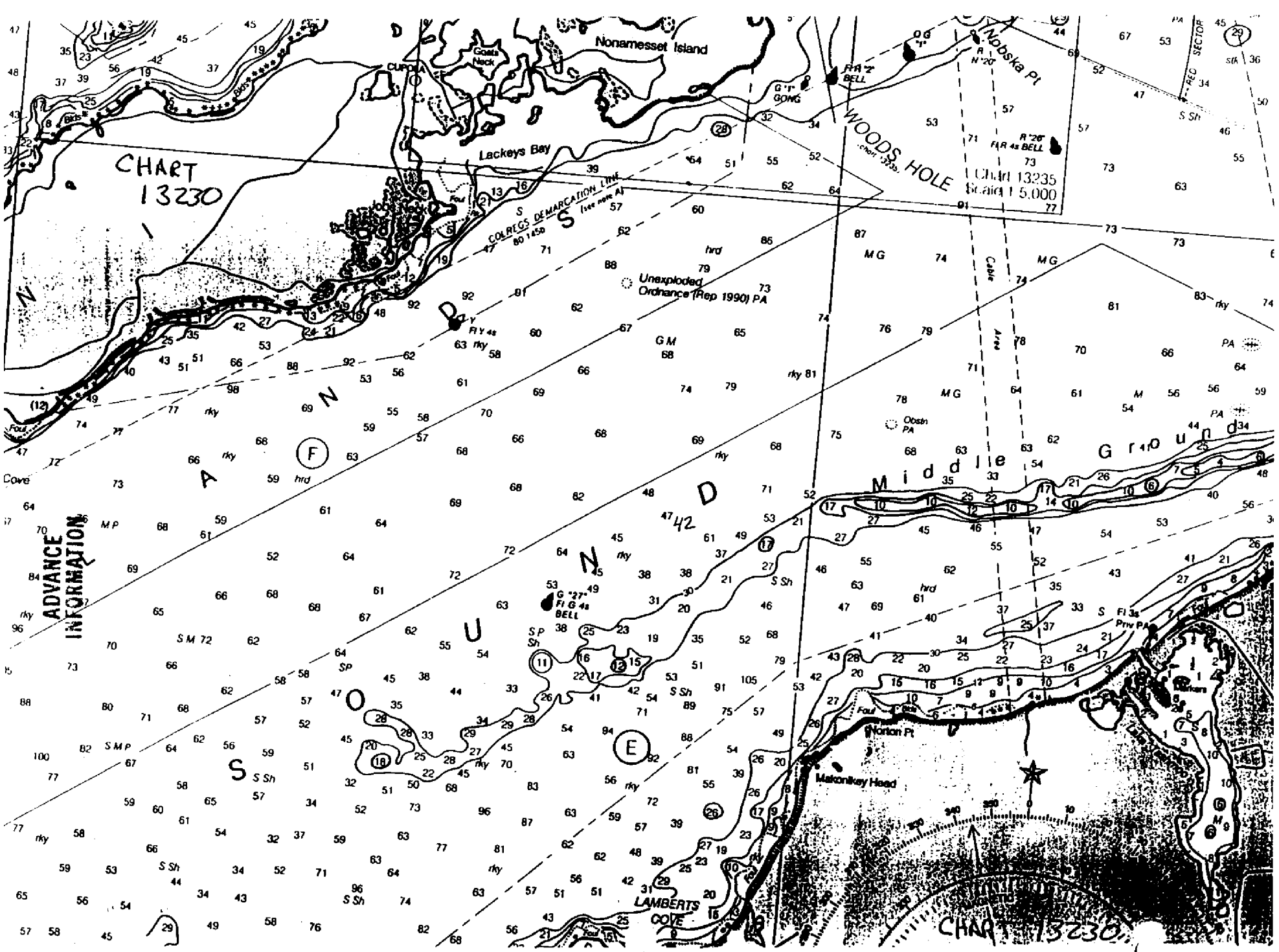


CHART
13230
Nonamesset Island
Goats Neck
CUPOLA
Lackeys Bay
WOODS HOLE
Nobska Pt
COLREGS DEMARCATION LINE
Unexploded Ordnance (Rep 1990) PA
Middle Ground
ADVANCE INFORMATION
Norton Pt
Makonikey Head
LAMBERTS COVE
Chart 13235
Scale 1:5,000
CHART 13230

Science Applications International Corporation
An Employee-Owned Company

ADVANCE INFORMATION

December 30, 1995

Lieutenant Commander David A. Cole, NOAA
Field Manager, Contract Hydrographic Surveys
Office of Coast Survey, N/CG24x3
National Ocean Service
1315 East West Highway, SSMC3, Station 6856
Silver Spring, MD 20910

Subject: NOAA Contract 50-DGNC-4-00035: Danger to Navigation Report
Reference: 1) Danger to Navigation Report dated October 21, 1995
2) Danger to Navigation Report dated December 15, 1995

Dear Lieutenant Commander Cole:

Science Applications International Corporation (SAIC) reported dangers to navigation on Charts 13218, 13230, and 13233 discovered during conduct of surveys in Vineyard Sound, MA, via Reference 1), and Reference 2).

Having post processed the survey data using local observed water levels, SAIC is pleased to present an update to Reference 1), and requests NOAA destroy Reference 2).

Many features appear to have migrated to the south and west. Much of the area consists of large sand waves which are subject to change from the action of high currents and storms.. Shoal soundings were found while surveying H-10651 and H-10654 as follows:

	Post Processing Depth and Position			Reference 1) Reported Depth and Position			
	Feet	Latitude	Longitude	Feet	Latitude	Longitude	
*	42	41 28.50 N	070 40.83 W	42	41 28.50 N	070 40.83 W	- Reference letter dated August 14, 1996
	48	41 24.69 N	070 51.24 W	49	41 24.70 N	070 51.24 W	
	39	41 24.78 N	070 50.68 W				
	38	41 24.68 N	070 50.65 W				
	41	41 24.54 N	070 50.68 W	42	41 24.54 N	070 50.68 W	THESE SOUNDINGS ARE NOT IN THE BOUNDARIES OF SURVEY H-10651
	49	41 24.48 N	070 50.66 W	48	41 24.48 N	070 50.66 W	
	44	41 24.37 N	070 50.45 W				
	43	41 24.30 N	070 50.36 W				
	42	41 24.07 N	070 50.25 W				
	47	41 24.02 N	070 50.23 W				
	49	41 24.48 N	070 50.48 W	49	41 24.48 N	070 50.48 W	

* REPORT ON 42' SOUNDING IS SUPERSEDED BY DANGER TO NAVIGATION REPORTED DATED AUGUST 14, 1996.

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585
Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

ADVANCE INFORMATION

Post Processing Depth and Position			Reference 1) Reported Depth and Position		
Feet	Latitude	Longitude	Feet	Latitude	Longitude
49	41 24.63 N	070 49.65 W	50	41 24.63 N	070 49.65 W
34	41 24.70 N	070 50.34 W	35	41 24.70 N	070 50.34 W
32	41 24.89 N	070 50.38 W			
28	41 24.77 N	070 50.35 W	29	41 24.79 N	070 50.36 W
30	41 24.84 N	070 50.37 W	30	41 24.84 N	070 50.37 W
34	41 24.93 N	070 50.39 W	36	41 24.93 N	070 50.39 W
36	41 24.90 N	070 50.18 W	37	41 24.89 N	070 50.18 W
48	41 25.32 N	070 49.38 W	47	41 25.32 N	070 49.38 W
43	41 25.36 N	070 49.36 W	43	41 25.36 N	070 49.36 W
32	41 25.44 N	070 49.33 W	32	41 25.46 N	070 49.32 W
45	41 25.31 N	070 48.41 W	45	41 25.30 N	070 48.40 W
30	41 25.15 N	070 47.28 W	31	41 25.15 N	070 47.28 W
43	41 25.35 N	070 48.12 W	43	41 25.35 N	070 48.12 W
44	41 25.31 N	070 48.08 W	44	41 25.31 N	070 48.07 W
47	41 25.26 N	070 48.05 W	48	41 25.25 N	070 48.05 W
36	41 25.08 N	070 48.04 W	37	41 25.08 N	070 48.04 W
33	41 25.01 N	070 48.03 W	33	41 25.01 N	070 48.03 W
35	41 25.09 N	070 47.61 W	35	41 25.09 N	070 47.61 W
34	41 25.14 N	070 47.52 W	34	41 25.14 N	070 47.52 W
37	41 25.23 N	070 47.42 W	37	41 25.23 N	070 47.42 W
28	41 25.00 N	070 47.57 W			

THESE SOUNDINGS ARE NOT IN THE BOUNDARIES OF SURVEY H-10651

The listed positions are NAD 1983 and the depths are MLLW corrected using Nobska Point, MA, Cedar Tree Point, MA, and Cuttyhunk, MA, observed water levels with MLLW datum and zoning as determined by SAIC.

Sincerely,
Science Applications International Corporation

Walter S. Simmons

Walter S. Simmons
Program Manager

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 Office: (401) 847-4210 FAX: (401) 849-1585

Other SAIC Offices: Albuquerque, Colorado Springs, Dayton Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando San Diego, Seattle, Tucson

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

March 23, 1997

Commander (OAN)
First Coast Guard District
408 Atlantic Avenue
Boston, Massachusetts 02110-3350

Dear Sir:

During office review of hydrographic survey H-10651, two submerged rocks and a shoal sounding were found and considered potential dangers to navigation affecting the following chart:

Chart	Edition/Date	Datum
13230	40th, 4/29/95	NAD 83

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) 526-6835

Sincerely,

Kathy A. Timmons

Kathy A. Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Enclosures

cc: DMA/HTC
NCS/261

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10651

Survey Title: State: MASSACHUSETTS
Locality: VINEYARD SOUND
Sublocality: ENTRANCE TO WOODS HOLE TO LUCAS SHOAL

Project Number: OPR-B389-CN

Survey Date: September 22, 1995 - October 27, 1995

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

Chart affected: 13230 40th Edition/April 29, 1995, scale 1:40,000, NAD 83

DANGER TO NAVIGATION	LATITUDE(N)	LONGITUDE(W)
A.) Rock, subm 64 feet	41/26.39383	70/45.87314
B.) Shoal, covers 49 feet	41/27.34000	70/43.26000
C.) Rock, subm 59 feet	41/28.47835	70/42.43092

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206) 526-6835.

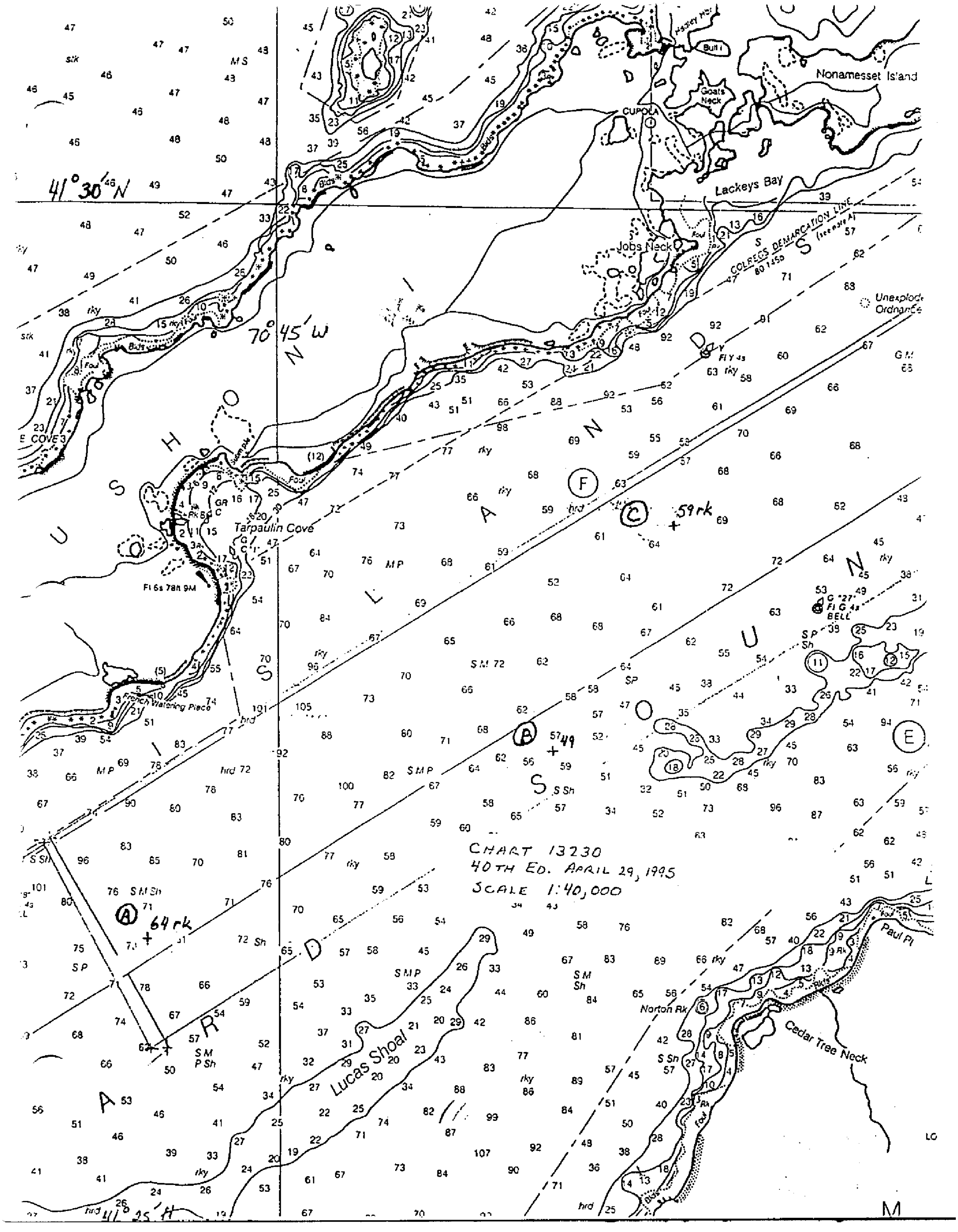


CHART 13230
40TH ED. APRIL 29, 1995
SCALE 1:40,000
41°30'N
70°45'W
41°25'N
Nonamesset Island
Goats Neck
Bull I
CUPOLA
Lackeys Bay
Jobs Neck
COLREGS DEMARCATION LINE
Tarpaulin Cove
French Watering Place
Fl 6s 78ft 9M
Unexploded Ordnance
Lucas Shoal
Norton Rk
Cedar Tree Neck
Paul Pt
64 rk
59 rk

APPENDIX B:

LANDMARKS AND NON-FLOATING AIDS TO NAVIGATION LISTS

Not Applicable.

APPENDIX C:

LIST OF HORIZONTAL CONTROL STATIONS

NAME	LATITUDE	LONGITUDE	ANTENNA ELEVATION	SOURCE	DATES & TIMES (UTC) OCCUPIED
Gay Head Light (OSI offset)	41° 20 54.38790'N	070° 50 05.92574'W	52.0m	051 Survey	06 September 1995, 2232 UTC 07 September 1995, 2239 UTC
31435 (LW5817)	41° 30 55.09542'N	070° 39 20.17711'W	9.6m	Published	17 September 1995, 1358 UTC 17 September 1995, 1415 UTC
B8/9 S 819 (LW0048)	41° 20 50.27680'N	070° 50 13.19474'W	45.0m	Published	15 September 1995, 2225 UTC 15 September 1995, 2245 UTC

APPENDIX D:

LIST OF GEOGRAPHIC NAMES

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10651

GEOGRAPHIC NAMES

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	
VINEYARD SOUND	13230									1
MIDDLE GROUND	13230									2
										3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
NAMES HAVE NOT BEEN APPROVED BY CHIEF, GEOGRAPHIC NAMES										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

APPENDIX E:

TIDE NOTES

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Rockville, Maryland 20852

September 17,1996

MEMORANDUM FOR: LTCDR David A. Cole
Hydrographic Surveys Division

FROM: Stephen K. Gill
Chief, Tidal Analysis Branch

Michael C. O'Hargan
Chief, Sea and Estuarine Section

SUBJECT: Final Evaluation of Contract Deliverables,
Project OPR-B389-

The Ocean and Lake Levels Division (OLLD), as requested, has reviewed information received from; the contractor in teleconference between the contractor, yourself, and Michael O'Hargan and Stephen Gill on July 24, 1996; and, the subsequent written submission from the contractor regarding project-wide compliance issues to you dated August 16, 1996.

The additional information received during the teleconference and the written submission completes the requests for detailed information from OLLD. Major errors noted have been corrected, and missing information has been provided. OLLD now has an acceptable understanding of the contractor's procedures related to the water level field collection, data reduction, data processing, and tidal datum determination.

Based on the review of the recent information in the context of the previous evaluation of the contractor's work on tides, OLLD has estimated a worst-case uncertainty in the tide-reducers applied to the soundings for the contract of 1.0 ft. This estimate includes datum recovery of MLLW datum on the bench marks (a bias error), and uncertainties in the raw tide gauge measurements, the staff-to-gauge settings applied to the data, and the tidal zoning correctors. It is our understanding that this maximum estimated error is within the 1.6 foot (0.50 meter) specified in the contract.

OLLD will provide details of the evaluation in a subsequent in-house program evaluation document. OLLD has determined, based on the evaluation, that the tide data collected for this survey are "single purpose data" for use as tide reducer only. Accepted tidal datums, bench mark elevations, and published bench mark sheets will not be updated or produced as result of the contractor data. This limitation does not affect acceptance of the contract deliverables.

cc:

Richard Barazotto
Philip Morris
Jim Hubbard
Mike Gibson

SITE	LOCATION	PERIOD
Cedar Tree Neck, MA	41° 26.1'N	16 September 1995
8448325	70° 41.8'W	31 October 1995
Nobska Point, MA	41° 30.9'N	14 September 1995
8447955	70° 39.4'W	31 October 1995

Cedar Tree Neck, MA

A Sea Data TDR-3A (S/N 018) and Sea Data TDR-3A (S/N 221) tide gages were installed on 16 September 1995. The staff was installed and leveled on 16 September 1995. Pipes and gages were removed on 31 October 1995.

Nobska Point, MA

A Sea Data TDR-3A (S/N 220/338) and Sea Data TDR-3A (S/N 517) tide gages were installed on 14 September 1995. The staff was installed and leveled on 5 September 1995. Pipes and gages were removed on 01 November 1995.

The reference stations for H-10651 were Newport, RI (845-2660) and Woods Hole, MA (844-7930).

Soundings for field sheets were corrected daily in post processing using observed water level data from NOAA station Newport, RI (845-2660). Data were acquired by cellular phone modem using the NOAA REALDATA software. Zoning correctors applied to Newport data were:

+ 42 minute time correction and a x.74 range ratio east of 70° 50.0'W and west of 70° 46.0'W
+ 54 minute time correction and a x.65 range ratio east of 70° 46.0'W and west of 70° 42.0'W
+ 114 minute time correction and a x.57 range ratio east of 70° 42.0'W and west of 70° 36.0'W

Smooth sheet soundings were corrected for water level through application of observed data from the Cedar Tree Neck, MA (844-8325), and Nobska Point, MA (844-7955) stations. A staff MLLW datum was computed at each station by simultaneous comparison with Newport, RI (845-2660) and with Woods Hole, MA (844-7930) using the NOAA Form 248 method prescribed by Marmer (Tidal Datum Planes, Spec. Pub. 135, U.S. Dept. of Commerce.) The simultaneous comparison computations are included in the Phase IIB Summary Report - Tides.

The boundaries of tide zones used are listed in the Phase IIB Summary Report - Tides. Gage readings were recorded in relation to staff zero; therefore, the MLLW datum height was subtracted from gage readings before applying the time and ratio correctors.

* FILED WITH HYDROGRAPHIC DATA

Zoning correctors applied to the observed gage values were:

Station	Zone	Correctors			Staff MLLW Datum
		Time (h min)	Ratio	Height	
Cedar Tree Neck	B10	-00 12	*1.20	0.611	0.611
Cedar Tree Neck	B11	+00 00	*1.00	0.611	0.611
Cedar Tree Neck	B12	+00 12	*0.90	0.611	0.611
Nobska Point	B13	-00 12	*1.18	1.242	1.242

All data for project water level gages are reported in the Phase IIB Summary Report - Tides.

The on-line times for acquisition of valid hydrographic data are presented in Table E-1.

Table E-1. Abstract of Times of Hydrography

1995/265 23:05:54.94 to 1995/265 23:13:51.68
1995/265 23:23:38.19 to 1995/265 23:39:57.08
1995/265 23:51:21.35 to 1995/265 23:59:57.43
1995/265 23:59:57.50 to 1995/266 00:10:51.04
1995/266 00:19:07.78 to 1995/266 00:35:13.94
1995/266 00:47:25.01 to 1995/266 01:07:35.88
1995/266 01:16:00.99 to 1995/266 01:33:02.77
1995/266 01:45:15.62 to 1995/266 02:04:03.24
1995/266 02:23:59.38 to 1995/266 02:37:35.63
1995/266 03:12:07.63 to 1995/266 03:32:55.15
1995/266 03:43:45.95 to 1995/266 04:01:04.39
1995/266 04:08:51.21 to 1995/266 04:18:23.28
1995/266 04:31:47.31 to 1995/266 04:37:47.62
1995/266 05:36:42.74 to 1995/266 06:15:55.07
1995/266 06:29:20.80 to 1995/266 06:54:17.84
1995/266 07:01:13.41 to 1995/266 08:19:29.99
1995/266 08:25:46.45 to 1995/266 09:31:44.17
1995/266 09:39:07.30 to 1995/266 10:43:42.96
1995/266 10:53:28.28 to 1995/266 12:05:23.28
1995/266 12:17:04.74 to 1995/266 13:21:56.10
1995/266 13:41:16.22 to 1995/266 14:48:48.97
1995/266 16:50:04.28 to 1995/266 17:55:42.45
1995/266 18:36:27.95 to 1995/266 20:05:25.62
1995/266 20:11:39.42 to 1995/266 20:58:59.67
1995/266 21:31:55.61 to 1995/266 21:55:23.18
1995/266 22:11:25.11 to 1995/266 23:37:39.77
1995/267 00:06:58.03 to 1995/267 01:52:38.15
1995/267 01:58:24.69 to 1995/267 03:26:22.81
1995/267 03:50:38.23 to 1995/267 04:00:37.03
1995/271 01:50:09.28 to 1995/271 02:52:44.63
1995/271 03:20:01.06 to 1995/271 04:26:46.81
1995/271 05:28:12.86 to 1995/271 06:31:43.63
1995/271 07:28:41.32 to 1995/271 07:50:40.45
1995/271 08:03:20.00 to 1995/271 08:40:58.93
1995/271 13:08:56.87 to 1995/271 14:36:02.85

Table E-1. Abstract of Times of Hydrography (Continued)

1995/271 16:24:31.82 to 1995/271 17:48:10.43
1995/271 17:56:17.26 to 1995/271 19:24:56.38
1995/272 00:57:43.08 to 1995/272 02:37:33.19
1995/287 18:34:07.99 to 1995/287 20:04:54.57
1995/287 20:13:51.89 to 1995/287 21:47:38.89
1995/287 21:53:12.39 to 1995/287 23:42:47.97
1995/287 23:52:42.76 to 1995/287 23:59:56.84
1995/287 23:59:57.06 to 1995/288 01:31:33.64
1995/288 01:59:12.03 to 1995/288 03:22:15.88
1995/288 03:30:27.57 to 1995/288 05:04:24.35
1995/288 07:04:36.71 to 1995/288 08:17:14.88
1995/288 08:24:49.55 to 1995/288 09:37:23.57
1995/288 09:44:17.95 to 1995/288 10:59:55.94
1995/288 11:06:18.91 to 1995/288 12:28:30.62
1995/288 15:25:57.38 to 1995/288 16:36:41.79
1995/288 16:50:13.14 to 1995/288 18:13:48.68
1995/288 18:32:30.20 to 1995/288 20:16:08.50
1995/288 20:25:57.96 to 1995/288 22:06:01.79
1995/288 22:18:35.07 to 1995/288 23:46:00.00
1995/289 00:30:03.34 to 1995/289 02:01:02.36
1995/289 02:24:17.02 to 1995/289 04:00:35.11
1995/289 04:18:00.19 to 1995/289 06:09:24.20
1995/289 07:49:33.21 to 1995/289 09:32:51.07
1995/289 11:33:30.10 to 1995/289 11:33:54.46
1995/289 11:40:46.47 to 1995/289 13:27:44.45
1995/289 13:35:16.45 to 1995/289 15:13:43.99
1995/290 14:09:59.96 to 1995/290 14:13:59.99
1995/290 14:20:35.41 to 1995/290 14:29:59.83
1995/290 15:36:37.61 to 1995/290 17:07:13.53
1995/290 17:19:50.96 to 1995/290 17:24:21.81
1995/290 17:35:01.92 to 1995/290 17:38:40.92
1995/290 17:51:48.27 to 1995/290 18:59:19.23
1995/290 19:12:00.00 to 1995/290 19:16:43.21
1995/290 19:36:38.79 to 1995/290 20:01:13.58
1995/290 20:09:06.62 to 1995/290 20:40:31.71
1995/290 20:58:12.79 to 1995/290 21:03:53.26
1995/290 21:19:54.80 to 1995/290 22:03:31.04
1995/290 22:12:09.99 to 1995/290 22:15:35.66
1995/290 22:19:37.62 to 1995/290 22:50:33.38
1995/290 22:58:24.34 to 1995/290 23:02:07.49
1995/290 23:17:04.16 to 1995/290 23:31:05.87
1995/290 23:43:00.35 to 1995/290 23:50:12.65
1995/291 00:07:12.26 to 1995/291 00:14:17.15
1995/291 00:34:59.83 to 1995/291 00:55:25.18
1995/291 01:10:48.81 to 1995/291 01:20:43.45
1995/291 01:29:57.43 to 1995/291 01:52:48.17
1995/291 01:57:28.05 to 1995/291 02:23:21.05
1995/291 02:27:33.38 to 1995/291 02:50:36.63

Table E-1. Abstract of Times of Hydrography (Continued)

1995/291 02:56:16.65 to 1995/291 03:21:20.18
1995/291 03:25:57.69 to 1995/291 03:49:54.86
1995/291 04:05:47.22 to 1995/291 04:15:30.31
1995/291 04:22:42.46 to 1995/291 04:29:50.31
1995/291 04:37:08.39 to 1995/291 04:44:47.94
1995/291 05:14:15.28 to 1995/291 05:20:51.74
1995/291 05:26:59.01 to 1995/291 05:34:39.15
1995/291 05:51:30.77 to 1995/291 06:00:47.78
1995/291 06:13:29.66 to 1995/291 06:18:04.06
1995/293 17:58:26.74 to 1995/293 19:13:18.81
1995/293 19:20:39.85 to 1995/293 19:41:25.35
1995/295 12:51:57.43 to 1995/295 12:57:04.42
1995/295 13:12:29.23 to 1995/295 13:16:51.78
1995/295 13:32:16.29 to 1995/295 13:43:03.08
1995/295 13:49:56.56 to 1995/295 14:23:54.82
1995/295 14:29:39.58 to 1995/295 14:54:27.70
1995/295 14:58:04.78 to 1995/295 15:22:00.98
1995/295 15:26:00.06 to 1995/295 15:55:29.62
1995/295 16:00:42.08 to 1995/295 16:26:41.10
1995/295 16:32:58.15 to 1995/295 17:07:17.53
1995/295 17:11:42.89 to 1995/295 17:37:53.96
1995/295 17:47:18.24 to 1995/295 18:20:31.19
1995/295 18:27:00.02 to 1995/295 18:42:30.40
1995/300 06:58:04.28 to 1995/300 06:59:49.22
1995/300 07:07:53.51 to 1995/300 07:09:41.13
1995/300 07:29:54.18 to 1995/300 07:31:41.50

H Features Correlated with Multibeam Source Data

DEPTHS ARE IN METERS

Feature #	Latitude	Longitude	Feature Least Depth	Feature Type	1 or 2 xIHO	Multibeam File Name	Ping Number	Beam Number	MB Depth
2	41 27.01244N	070 45.32168W	24.64	ROCK	1	mba95266.d05	17948	28	24.64
3	41 27.10192N	070 45.05556W	24.16	ROCK	1	mba95266.d04	124143	5	24.16
5	41 27.94562N	070 43.47310W	20.14	ROCK	1	mba95266.d04	52068	24	20.14
7	41 28.40182N	070 42.52450W	18.32	ROCK	1	mba95266.d04	48423	33	18.32
8	41 28.43010N	070 42.51447W	18.52	ROCK	1	mba95266.d05	108708	32	18.52
10	41 26.64889N	070 46.19241W	23.79	ROCK	1	mba95266.d04	1900	38	23.79
11	41 26.92048N	070 45.61224W	27.69	ROCK	1	mba95266.d05	93504	2	27.69
12	41 27.13227N	070 45.22577W	26.93	ROCK	1	mba95266.d04	5682	23	26.93
13	41 27.15422N	070 45.23929W	22.84	ROCK	1	mba95267.d01	53425	24	22.84
14	41 27.58653N	070 44.34996W	21.77	ROCK	1	mba95267.d01	58057	37	21.77
16	41 28.46737N	070 42.51615W	18.73	ROCK	1	mba95266.d04	16007	47	18.73
17	41 28.47835N	070 42.43092W	18.01	ROCK	1	mba95266.d05	109180	3	18.01
18	41 29.28653N	070 41.02190W	21.22	ROCK	1	mba95295.d01	30810	38	21.22
19	41 28.52654N	070 42.53354W	18.82	ROCK	1	mba95266.d03	147949	35	18.82
20	41 28.49410N	070 42.60809W	18.96	ROCK	1	mba95266.d03	148261	38	18.96
25	41 27.24065N	070 45.24529W	23.21	ROCK	1	mba95266.d03	109794	20	23.21
26	41 27.23368N	070 45.20122W	22.64	ROCK	1	mba95267.d01	38923	45	22.64
27	41 27.21828N	070 45.22161W	22.41	ROCK	1	mba95267.d01	39049	32	22.41
28	41 27.23508N	070 45.14594W	22.88	ROCK	1	mba95266.d03	158882	57	22.88
29	41 27.16888N	070 45.30651W	22.87	ROCK	1	mba95266.d03	159505	34	22.87
30	41 27.17325N	070 45.33679W	23.03	ROCK	1	mba95267.d01	39653	23	23.03
31	41 27.10798N	070 45.40038W	23.16	ROCK	1	mba95266.d03	159924	37	23.16
32	41 26.88587N	070 45.85982W	26	ROCK	1	mba95266.d03	161831	57	26
33	41 27.13512N	070 45.28835W	23.29	ROCK	1	mba95267.d01	53183	14	23.29
36	41 28.36389N	070 43.33112W	19.53	ROCK	1	mba95266.d03	19704	26	19.53
37	41 28.35714N	070 43.38272W	19.12	ROCK	1	mba95271.d01	10915	26	19.12
39	41 28.25054N	070 43.60907W	18.07	ROCK	1	mba95271.d01	12338	1	18.07
40	41 27.24751N	070 45.64266W	24.56	ROCK	1	mba95271.d01	23255	2	24.56
42	41 29.72553N	070 40.45324W	23.83	ROCK	1	mba95266.d03	70163	23	23.83
43	41 29.69700N	070 40.55748W	22.22	ROCK	1	mba95271.d01	75347	34	22.22
44	41 28.75229N	070 42.39866W	17.69	ROCK	1	mba95266.d03	61217	32	17.69
47	41 28.48174N	070 42.96704W	20.29	ROCK	1	mba95266.d03	58416	1	20.29
48	41 28.22827N	070 43.57977W	17.52	ROCK	1	mba95266.d03	20709	27	17.52
49	41 27.33146N	070 45.34681W	27.15	ROCK	1	mba95271.d02	11995	2	27.15
51	41 27.29606N	070 45.50536W	27.84	ROCK	1	mba95266.d03	34389	9	27.84
52	41 29.84859N	070 40.01949W	23.12	ROCK	1	mba95271.d04	1945	40	23.12
53	41 29.82791N	070 40.06488W	23.11	ROCK	1	mba95271.d04	2159	40	23.11
57	41 28.41993N	070 42.91671W	18.63	ROCK	1	mba95271.d04	16915	15	18.63
58	41 28.18456N	070 43.46860W	19.84	ROCK	1	mba95266.d03	90039	35	19.84
59	41 27.95186N	070 43.81592W	19.78	ROCK	1	mba95266.d03	115322	36	19.78
60	41 29.85893N	070 39.94126W	25.21	ROCK	1	mba95271.d04	1608	21	25.21
61	41 29.03659N	070 41.59469W	21.42	ROCK	1	mba95266.d03	123760	9	21.42
62	41 28.69498N	070 42.29078W	19.05	ROCK	1	mba95266.d03	121108	49	19.05
63	41 28.63482N	070 42.41420W	18.53	ROCK	1	mba95266.d03	120648	14	18.53
64	41 28.49600N	070 42.70013W	19.63	ROCK	1	mba95266.d03	119559	44	19.63
65	41 28.38023N	070 42.92633W	18.84	ROCK	1	mba95266.d03	118681	19	18.84
66	41 27.21468N	070 45.31495W	24.58	ROCK	1	mba95266.d03	109541	2	24.58
67	41 27.18181N	070 45.37874W	25.65	ROCK	1	mba95266.d03	109290	43	25.65
69	41 27.06842N	070 45.65233W	23.32	ROCK	1	mba95271.d04	28551	40	23.32
70	41 26.86640N	070 45.99728W	23.92	ROCK	1	mba95266.d03	106767	23	23.92
71	41 26.90527N	070 45.44023W	25.13	ROCK	1	mba95266.d04	125622	24	25.13
74	41 29.47556N	070 40.10613W	20.93	ROCK	1	mba95266.d05	54834	5	20.93
75	41 29.46165N	070 40.01944W	22.3	ROCK	1	mba95271.d01	58241	38	22.3
76	41 28.16201N	070 42.66913W	19.8	ROCK	1	mba95271.d01	48237	60	19.8
78	41 27.12110N	070 44.82330W	26.25	ROCK	1	mba95265.d01	43112	59	26.25
79	41 29.01914N	070 40.86627W	22.47	ROCK	1	mba95287.d02	19203	58	22.47

H Features Correlated with Multibeam Source Data

Feature #	Latitude	Longitude	Feature Least Depth	Feature Type	1 or 2 xIHO	Multibeam File Name	Ping Number	Beam Number	MB Depth
81	41 29.21020N	070 40.25095W	24.44	ROCK	1	mba95287.d02	97155	24	24.44
82	41 26.87726N	070 45.18732W	24.64	ROCK	1	mba95271.d02	27386	23	24.64
83	41 26.80436N	070 45.35918W	22.27	ROCK	1	mba95287.d02	42185	34	22.27
84	41 27.08271N	070 44.71734W	26.22	ROCK	1	mba95287.d02	57770	20	26.22
85	41 28.17884N	070 42.43957W	20.48	ROCK	1	mba95291.d01	97122	32	20.5*
86	41 29.12635N	070 40.33281W	22.67	ROCK	1	mba95290.d02	22026	25	22.67
87	41 28.68366N	070 41.25996W	24.59	ROCK	1	mba95290.d02	18597	35	24.59
88	41 28.04440N	070 42.57761W	18.41	ROCK	1	mba95300.d01	12995	13	18.41
89	41 28.05727N	070 42.61898W	20.47	ROCK	1	mba95271.d03	50322	29	20.47
90	41 26.93960N	070 44.85140W	23.74	ROCK	1	mba95291.d01	125633	31	23.74
91	41 26.39383N	070 45.87314W	19.63	ROCK	1	mba95300.d01	1704	57	19.63
92	41 26.83814N	070 44.88311W	23.37	ROCK	1	mba95288.d01	71708	1	23.37
93	41 26.80796N	070 44.80191W	21.65	ROCK	1	mba95300.d01	5697	8	21.65
94	41 26.93980N	070 44.66319W	23.81	ROCK	1	mba95288.d01	70678	31	23.81
95	41 27.04029N	070 44.48349W	22.62	ROCK	1	mba95288.d01	69783	21	22.62
96	41 27.08114N	070 44.32221W	23.05	ROCK	1	mba95288.d01	90365	28	23.05
97	41 28.93908N	070 40.49697W	21.76	ROCK	1	mba95288.d02	54956	2	21.76
98	41 28.17155N	070 41.17560W	14.36	ROCK	1	mba95288.d05	25416	31	14.36
101	41 28.22911N	070 40.97511W	11.3	ROCK	1	mba95291.d01	26895	60	11.3
102	41 28.24849N	070 40.97999W	11.93	ROCK	1	mba95291.d01	47301	13	11.93
104	41 28.28858N	070 40.85814W	13.81	ROCK	1	mba95291.d01	26474	22	13.81
106	41 28.32425N	070 40.78935W	15.36	ROCK	1	mba95288.d05	116153	26	15.36
109	41 28.36438N	070 40.70415W	15.12	ROCK	1	mba95288.d05	116581	36	15.12
113	41 28.36480N	070 40.93553W	13.41	ROCK	1	mba95291.d01	73458	49	13.41
114	41 28.38367N	070 40.94397W	13.1	ROCK	1	mba95295.d01	130934	56	13.1
115	41 28.33967N	070 40.91188W	14.14	ROCK	1	mba95291.d01	71310	11	14.14
117	41 28.23179N	070 41.15920W	13.47	ROCK	1	mba95288.d05	62980	16	13.47
119	41 28.27395N	070 40.93535W	12.1	ROCK	1	mba95291.d01	47547	38	12.1
122	41 28.52769N	070 40.51014W	20.36	ROCK	1	mba95289.d01	14493	28	20.36
125	41 28.21314N	070 41.32393W	14	ROCK	1	mba95289.d01	65969	25	14
127	41 28.23012N	070 41.30356W	14.75	ROCK	1	mba95295.d01	92908	25	14.75
129	41 28.31604N	070 41.05661W	14	ROCK	1	mba95288.d04	88556	20	14
130	41 28.43587N	070 40.91519W	14.52	ROCK	1	mba95295.d01	94978	33	14.52
133	41 28.53616N	070 40.82080W	16.25	ROCK	1	mba95295.d01	70958	32	16.25
135	41 28.47267N	070 40.98145W	14.11	ROCK	1	mba95293.d01	21080	24	14.11
138	41 28.43122N	070 41.08752W	13.26	ROCK	1	mba95295.d01	47323	50	13.26
139	41 28.41964N	070 41.13890W	13.54	ROCK	1	mba95289.d02	28487	2	13.54
140	41 28.38309N	070 41.15809W	14.04	ROCK	1	mba95293.d01	20365	39	14.04
143	41 28.46438N	070 41.07329W	13.71	ROCK	1	mba95295.d01	99484	25	13.71
145	41 28.34223N	070 41.32440W	16.8	ROCK	1	mba95295.d01	100717	59	16.8
146	41 28.28600N	070 41.40219W	16.3	ROCK	1	mba95289.d02	29924	26	16.3
147	41 26.72576N	070 44.73655W	23.02	ROCK	1	mba95288.d02	88125	23	23.02
148	41 26.72353N	070 44.70485W	23.1	ROCK	1	mba95289.d03	53358	57	23.1
149	41 26.76175N	070 44.67929W	23.17	ROCK	1	mba95288.d02	87871	36	23.17
150	41 28.44172N	070 41.21209W	16.73	ROCK	1	mba95289.d03	71765	2	16.73
153	41 28.60578N	070 41.00296W	14.09	ROCK	1	mba95289.d03	14395	59	14.09
155	41 29.06032N	070 39.92876W	22.49	ROCK	1	mba95289.d03	78471	35	22.5*
156	41 26.96017N	070 44.46561W	23.96	ROCK	1	mba95290.d01	68948	47	23.96
157	41 26.84607N	070 44.46321W	22.51	ROCK	1	mba95289.d03	54636	47	22.51
158	41 28.45204N	070 41.10520W	13.69	ROCK	1	mba95295.d01	99596	3	13.69
159	41 28.47797N	070 41.02763W	14.69	ROCK	1	mba95289.d02	27874	57	14.69
162	41 28.66607N	070 40.87350W	21.17	ROCK	1	mba95289.d03	13649	60	21.17
163	41 28.66761N	070 40.92430W	19.73	ROCK	1	mba95295.d01	41629	33	19.73
165	41 29.99986N	070 39.90967W	23.25	ROCK	1	mba95290.d02	52198	38	23.25
166	41 30.00661N	070 40.00838W	19.85	ROCK	1	mba95290.d02	52615	33	19.85
168	41 29.73968N	070 40.52679W	22.48	ROCK	1	mba95266.d03	8789	58	22.48

H Features Correlated with Multibeam Source Data

Feature #	Latitude	Longitude	Feature Least Depth	Feature Type	1 or 2 xIHO	Multibeam File Name	Ping Number	Beam Number	MB Depth
169	41 29.43025N	070 41.10319W	23.39	ROCK	1	mba95271.d01	78104	29	23.39
171	41 28.83565N	070 42.42955W	18.61	ROCK	1	mba95271.d01	4783	25	18.61
172	41 28.48038N	070 40.86318W	14.25	ROCK	1	mba95295.d01	73552	57	14.25
173	41 28.27717N	070 41.23429W	13.69	ROCK	1	mba95295.d01	93292	27	13.69
175	41 27.84821N	070 43.90806W	19.22	ROCK	1	mba95266.d03	153775	23	19.22
176	41 27.85040N	070 43.88089W	19.73	ROCK	1	mba95266.d03	153690	26	19.73
178	41 28.47988N	070 41.30072W	19.36	ROCK	1	mba95295.d01	39702	50	19.36
179	41 28.58698N	070 41.07565W	15.33	ROCK	1	mba95295.d01	40838	24	15.33
182	41 28.54339N	070 41.06378W	15.3	ROCK	1	mba95288.d02	72810	7	15.3
183	41 28.53741N	070 40.99032W	13.73	ROCK	1	mba95295.d01	126609	31	13.73

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HYDROGRAPHIC SURVEY STATISTICS

H-10651

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	SMOOTH OVERLAYS: ~~FOG~~, ~~ARO~~, ~~EXCESS~~, COR	1
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	NA

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES						
ENVELOPES						
VOLUMES						
CAHIERS						
BOXES	1		1			

SHORELINE DATA

SHORELINE MAPS (List): NA

PHOTOBATHYMETRIC MAPS (List): NA

NOTES TO THE HYDROGRAPHER (List): NA

SPECIAL REPORTS (List): NA

NAUTICAL CHARTS (List): 13230 40th ED, 13233 14th ED, 13218 32nd ED, 13229 25th ED

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			
COMPARISON WITH PRIOR SURVEYS AND CHARTS		40	40
EVALUATION OF SIDE SCAN SONAR RECORDS		24	24
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		16	16
GEOGRAPHIC NAMES			
OTHER*			
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS		80	80

Pre-processing Examination by G. Nelson	*Beginning Date* 5/30/96	*Ending Date* 6/2/96
Verification of Field Data by G. Nelson	*Time (Hours)* 64	*Ending Date* 7/28/96
Verification Check by B. Olmstead	*Time (Hours)* 8	*Ending Date* 2/5/97
Evaluation and Analysis by G. Nelson	*Time (Hours)* 16	*Ending Date* 6/30/97
Inspection by B. Olmstead	*Time (Hours)* 16	*Ending Date* 6/30/97

EVALUATION REPORT
H-10651

A. PROJECT

The hydrographer's report contains a complete discussion of the project information.

B. AREA SURVEYED

The hydrographer's report lists the geographic coordinates outlining the survey area and lists the dates of data acquisition. The survey area is in central Vineyard Sound, Massachusetts. Depths range from 27.9 feet (8.5 meters) to 105 feet (32 meters). Bottom characteristics are rocky, shells and pebbles. The bottom also has large sand waves as described in section 1.

C. SURVEY VESSELS

Survey vessel information is found in the hydrographer's report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Due to a contractor proprietary data format, final data processing and verification was accomplished using contractor supplied software and a contractor supplied HP workstation. The software, used for processing is discussed in the hydrographer's report. The final smooth sheet is an AutoCAD (version 12) drawing file submitted by the contractor. Data is plotted using a UTM projection and are depicted on a single sheet. A revision overlay was created at PHB during office processing. The overlay includes corrected contour lines and minor cartographic changes. Specifically, the revision overlay reflects the removal of depth curves around wrecks, revision of the depth curves to reflect plotted sounding data, "rky" notations, junctional notes, and an "obstr (pipe)" notation.

At the time of the survey certification the format for archiving of digital data had not been formally identified. In the interim, digital data for this survey exists in SAIC's Generic Sensor Format (GSF) for multibeam survey data. In addition, the smooth sheet is filed both in the AutoCAD drawing format, i.e., .dwg (extension); and in the more universally recognized graphics transfer format, .dxf (extension). Copies of these files will be retained at PHB until data transfer protocols are developed and approved.

E. SONAR EQUIPMENT

Side scan sonar was used on survey H-10651. The side scan sonar equipment, the method of operation, and disposition of significant sonar contacts are adequately discussed in the hydrographer's report.

F. SOUNDING EQUIPMENT

Sounding equipment is discussed 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 actual tide, dynamic draft and sound velocity. Roll, pitch, and heading biases were computed and applied during data acquisition. The reducers have been reviewed and are consistent with NOS specifications.

H. CONTROL STATIONS

Sections H and I of the hydrographer's descriptive report contain adequate discussions of horizontal control and hydrographic positioning. The positions of horizontal control stations used during hydrographic operations are published and field values based on NAD83. The geographic positions of all survey data are based on NAD83.

Data based on NAD27 may be referenced to this survey by applying the following corrections:

Latitude: .39578 seconds (12.210 meters)
Longitude: -1.83480 seconds (-43.939 meters)

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. The maximum allowable horizontal dilution of precision (HDOP) limit of 2.5 was used for this survey. The hydrographer's report adequately describes the methods used to insure all positions were within specifications.

NAD83 is used as the horizontal datum for plotting and position computations. Additional information concerning 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

There is no shoreline within the survey limits.

K. CROSSLINES

Crosslines are adequately discussed in the hydrographer's Report.

L. JUNCTIONS

Survey H-10651 junctions with the following surveys:

Survey	Year	Scale	Area
H-10556	1994	1:10,000	Northeast
H-10563	1994	1:10,000	Southwest
H-10654	1995	1:10,000	Southwest

The junction with H-10654 is complete. Soundings within the common area are in good agreement.

There is a large area of overlap between junction survey H-10556 (1994) and H-10651. There is poor agreement within two sections of the common area with differences from 5 to 19 feet. Generally, H-10651 reflects a pattern of increased shoaling. The boundaries of the two sections with large differences are as follows:

Latitude (N)	Longitude (W)
41° 27.3'	70° 42.8'
41° 27.45'	70° 42.95'
41° 27.63'	70° 42.55'
41° 27.5'	70° 42.45'

Latitude (N)	Longitude (W)
41° 27.78'	70° 41.8'
41° 27.95'	70° 41.95'
41° 28.53'	70° 40.9'
41° 28.3'	70° 40.7'

The common area with H-10556 outside these boundary zones reflect 1 to 2 foot differences with the present survey reflecting shoaler depths.

The junction with H-10563 (1994) and H-10651 showed poor agreement in one section of the common area, with differences ranging from 5 to 15 feet. Generally, H-10651 shows a pattern of increased shoaling. The boundaries of the section with the large differences are as follows:

Latitude (N)	Longitude (W)
41° 27.18'	70° 43.0'
41° 27.35'	70° 43.2'
41° 27.6'	70° 42.73'
41° 27.44'	70° 42.56'

The common area with H-10563 outside of this boundary zone reflect 1 to 2 foot differences with the present survey reflecting shoaler depths.

The large differences in depth noted between the junction surveys and H-10651 can be attributed to the movement of large amounts of sand and sediment along the bottom due to local currents. This has caused a general westward shift of large sand waves.

Based on the changeability of this portion of Vineyard Sound, survey data from H-10651 should supersede those portions of junctional surveys H-10563 and H-10556 within the common areas. An adjoins note has been shown on the smooth sheet overlay. The common areas are listed below:

H-10563	Latitude (N)	Longitude (W)
	41° 27.6'	70° 42.73'
	41° 26.0'	70° 45.9'
	41° 25.8'	70° 45.75'
	41° 27.43'	70° 42.56'

H-10556	Latitude (N)	Longitude (W)
	41° 29.75'	70° 37.8'
	41° 29.98'	70° 39.73'
	41° 28.75'	70° 42.15'
	41° 28.10'	70° 41.67'
	41° 27.48'	70° 42.98'
	41° 27.30'	70° 42.82'

Survey H-10651 is adequate to supersede the junctional surveys within the common area. Dashed lines have been placed on surveys H-10556 and H-10563 to indicate areas that have been superseded.

M. COMPARISON WITH PRIOR SURVEYS

H-8902 (1966) 1:10,000
H-8903 (1966) 1:10,000

The differences between the two prior surveys, H-8902 and H-8903, and H-10651 are adequately discussed in the hydrographers report and supplemented as follows:

Comparison with prior surveys H-8902 and H-8903 reflect general differences of 1 to 3 feet throughout the survey area. However, there are two significant areas in which the present survey reveals shoaler depths of 5 to 19 feet.

H-8902 (1966) showed a sounding of 74' located at 41° 29.7'N, 70° 38.9'W. This sounding is not confirmed by H-10651. Multibeam coverage of 100% and side scan coverage of 200% revealed no evidence of the 74' sounding. The sounding appears to be charted approximately 100 meters east of it's position. It is recommended that the charted 74' sounding be removed and superseded with data from H-10651.

H-10651 is adequate to supersede the prior surveys within the common area.

N. ITEM INVESTIGATIONS

AWOIS items 7206 and 8145 were assigned and investigated during this survey. These items have been adequately discussed and disposed of in the hydrographer's report.

Three investigations under task order 56-DGNC-6-13002 were requested and investigated. These items have been adequately discussed under section M of the hydrographer's report.

O. COMPARISON WITH THE CHART

Survey H-10651 was compared with the following chart:

Chart	Edition	Date	Scale	Datum
13230	40th	April 29, 1995	1:40,000	NAD83

a. Hydrography

Charted hydrography originates with miscellaneous sources and previously mentioned prior surveys. The prior surveys and miscellaneous source data have been adequately discussed in the hydrographer's report, sections M and N, and require no further discussion.

The use of multibeam and side scan on H-10651 revealed the presence of numerous rocks. It is recommended that the label rky (rocky) be displayed at the following locations: 41° 27.9'N, 70° 43.7'W; 41° 28.5'N, 70° 42.6'W; and 41° 27.1'N, 70° 45.25'W.

Survey H-10651 is adequate to supersede charted hydrography within the common area of coverage.

b. Dangers to Navigation

The hydrographer reported eleven shoal soundings as dangers to navigation. During SAIC data processing, one shoal sounding was revised. These dangers were reported to the United States Coast Guard 1st District, DMAHTC, and N\CS261 through letters dated October 19, 1995 (superseded by letter dated December 14, 1995), October 21, 1995 (superseded by letter dated December 30, 1995), December 30, 1995 (superseded by letter dated August 14, 1996). Copies of these reports are attached.

Three additional dangers to navigation were discovered during office processing; two submerged rocks and one shoal sounding. These dangers were reported to the United States Coast Guard 1st District, NIMA, and N\CS261 through a letter dated March 23, 1997. A copy of the report is attached.

P. ADEQUACY OF SURVEY

Hydrography on survey H-10651 is adequate to:

a. delineate the bottom configuration, determine least depths, and draw the standard 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 hydrographic records and reports received for processing are adequate and conform to the contract specifications.

Survey H-10651 adequately complies with the project instructions.

Q. AIDS TO NAVIGATION

There is 1 floating aid within the survey limits. It is properly positioned and plotted and serves its intended purpose.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

Miscellaneous information is discussed in the hydrographer's report. The cable area centered at 41° 29.5' N, 70° 39.0' W was not addressed during survey operations and should be retained on the chart. No additional miscellaneous items were noted during office processing.

Geographical names were not approved by the Chief Geographer.

T. RECOMMENDATIONS

Recommendations are discussed in the hydrographer's report. This is a good hydrographic survey, no additional work is required.

U. REFERRAL TO REPORTS

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

Gary C. Nelson
Gary C. Nelson
Cartographer

APPROVAL PAGE
H-10651

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.

Bruce A. Olmstead Date: 6/30/97
Bruce A. Olmstead
Senior Cartographer, 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.

Kathy Timmons Date: 6/30/97
Kathy Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

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Final Approval

Approved:

Andrew A. Armstrong III Date: July 31, 1997
Andrew A. Armstrong III
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-10651

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
13233	4/15/97	Gary L. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet.
13230	4/15/97	Gary L. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet.
13229 SC	4/15/97	Gary L. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet
13218	4/15/97	Gary L. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings thru Charts 13233, 13230
			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
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.