H10611

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. D

Registry No. H-10611

LOCALITY

State New York

General Locality Western Long Island Sound

Sublocality Eatons Neck Point to Greenwich Point

1995

CHIEF OF PARTY
Walter Simmons (SAIC)

LIBRARY & ARCHIVES

DATE October 22, 1997

NOAA FORM 77-28 (11-72)

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

REGISTRY NO.
H-10611

HYDROGRAPHIC TITLE SHEET

FIELD NO.
D

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

State NEW YORK

General locality WESTERN LONG ISLAND SOUND

Locality EATONS NECK POINT TO GREENWICH POINT

Scale 1:10,000 Date of survey ~~May - July~~ 14 May-4 July 1995; ~~Nov 1995~~ Nov 1 - 13, 1995

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

Vessel M/V ATLANTIC SURVEYOR

Chief of party WALTER SIMMONS

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

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 BY GARY NELSON Automated plot by HP 650 ~~J. Kiernan, J. Case~~

Verification by D. Reifsteck

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

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

SUPPLEMENTAL REPORTS ARE FILED WITH THE HYDROGRAPHIC DATA

Time Reference: UTC

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 6

* MARGINAL NOTES AND REVISIONS TO THE DESCRIPTIVE REPORT WERE GENERATED AT THE PACIFIC HYDROGRAPHIC DURING REVIEW OF THE SURVEY WORK

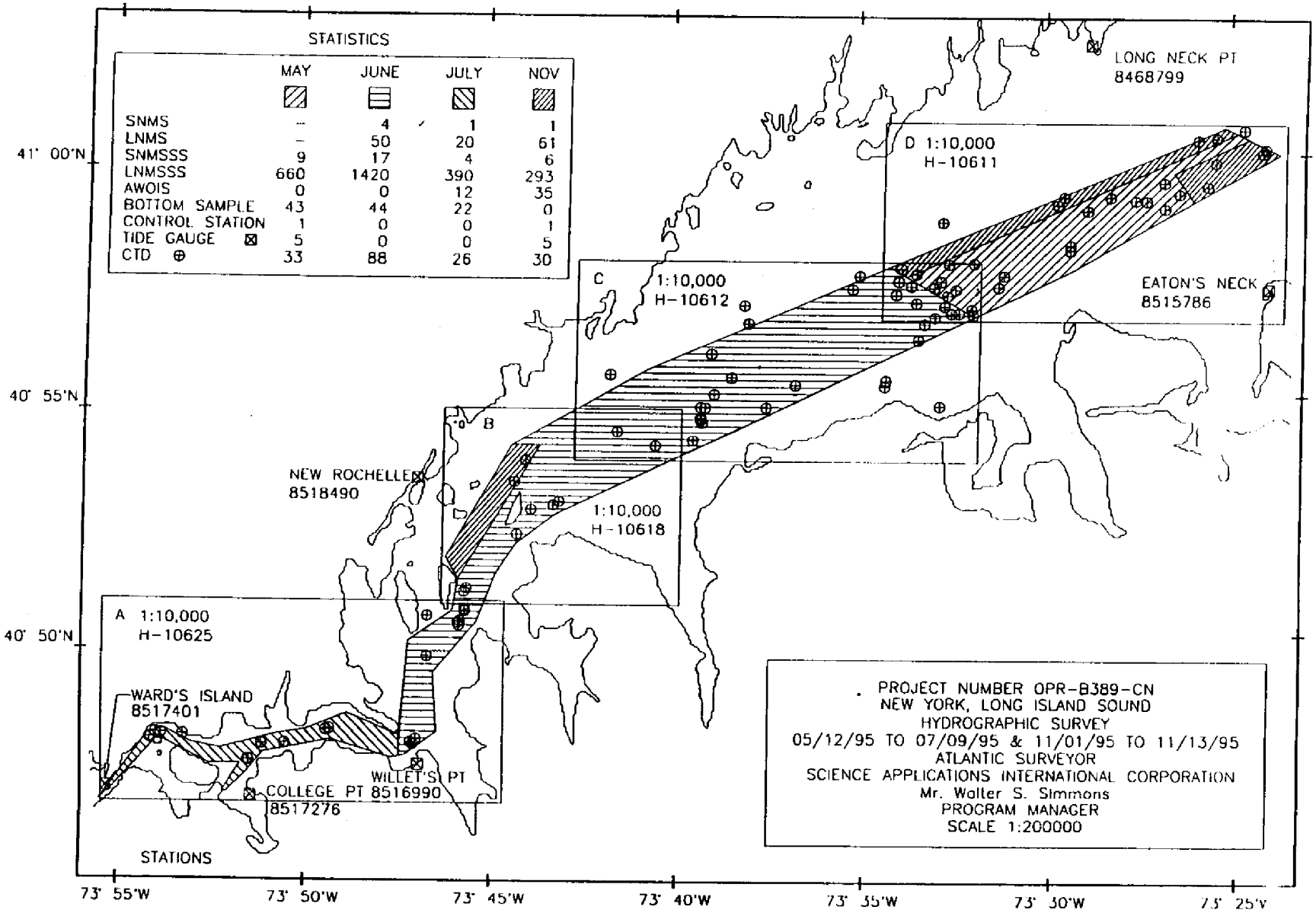
AWOIS/SURF ✓ 9/15/97 SJV ✓

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.

Page

Descriptive Report to Accompany
Hydrographic Survey H-10611

A. PROJECT ✓

Project number: OPR-B389-CN

Dates of instructions:	**30 September 1994**	**Original**
	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**
	07 November 1995	**56-DGNC-6-13003**

Sheet letter: D
Registry number: H-10611

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

General locality: New York, Western Long Island Sound, Eatons Neck Point to Greenwich Point. Bounded approximately by the following points:

LAT	LONG.
41° 00.55' N	073° 25.17' W
41° 00.02' N	073° 23.72' W
40° 57.67' N	073° 29.28' W
40° 56.63' N	073° 32.85' W
40° 57.68' N	073° 34.35' W

Dates of data acquisition:
14 May (day 134) through 16 May 1995 (day 136)
18 May (day 138) through 19 May 1995 (day 139)
22 May (day 142) through 25 May 1995 (day 145)
29 May (day 149) through 30 May 1995 (day 150)
01 June (day 152) through 02 June 1995 (day 153)
08 July (day 189) through 09 July 1995 (day 190)
01 November (day 305) through 06 November 1995 (day 310)
11 November 1995 (day 315)
13 November 1995 (day 317)

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 TSS335B 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 through C-4, the coordinate systems in use are shown in Figure C-5, and the vessel offsets are shown in Tables C-1, and C-2.

The Reference Point for the entire system is located on the transducer pole at the water line.

For surveys conducted May through July 1995, the transducer draft was recorded as 2.20 meters, therefore the pole was marked with the reference point at 2.20 meters. Lead Line comparisons revealed an 0.11 meter error in the recorded transducer depth, and a corrector of +0.11m was applied to soundings in post processing.

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 IIA 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.

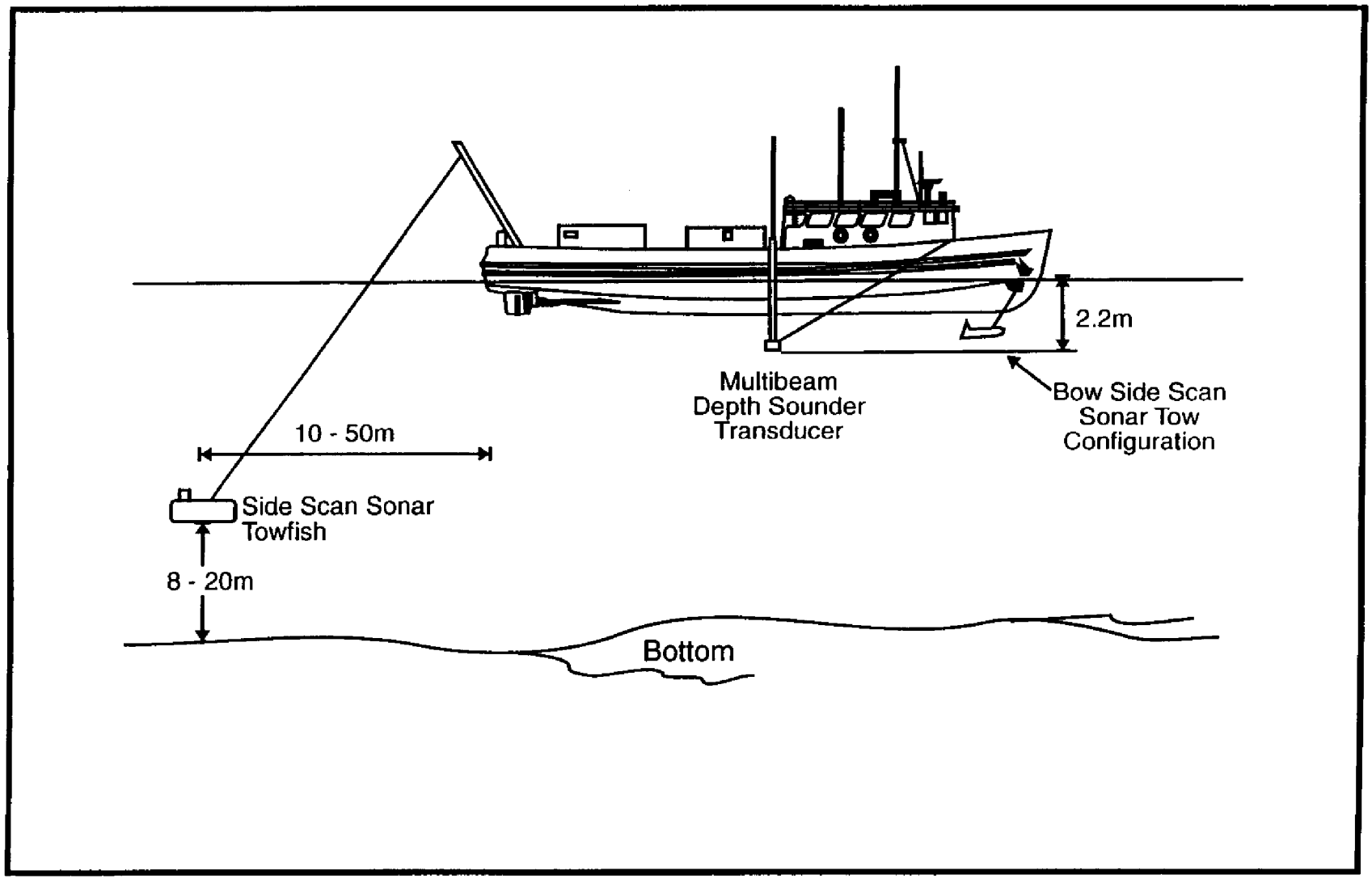


Figure C-1. Configuration of M/V Atlantic Surveyor During Operations (May - July 1995)

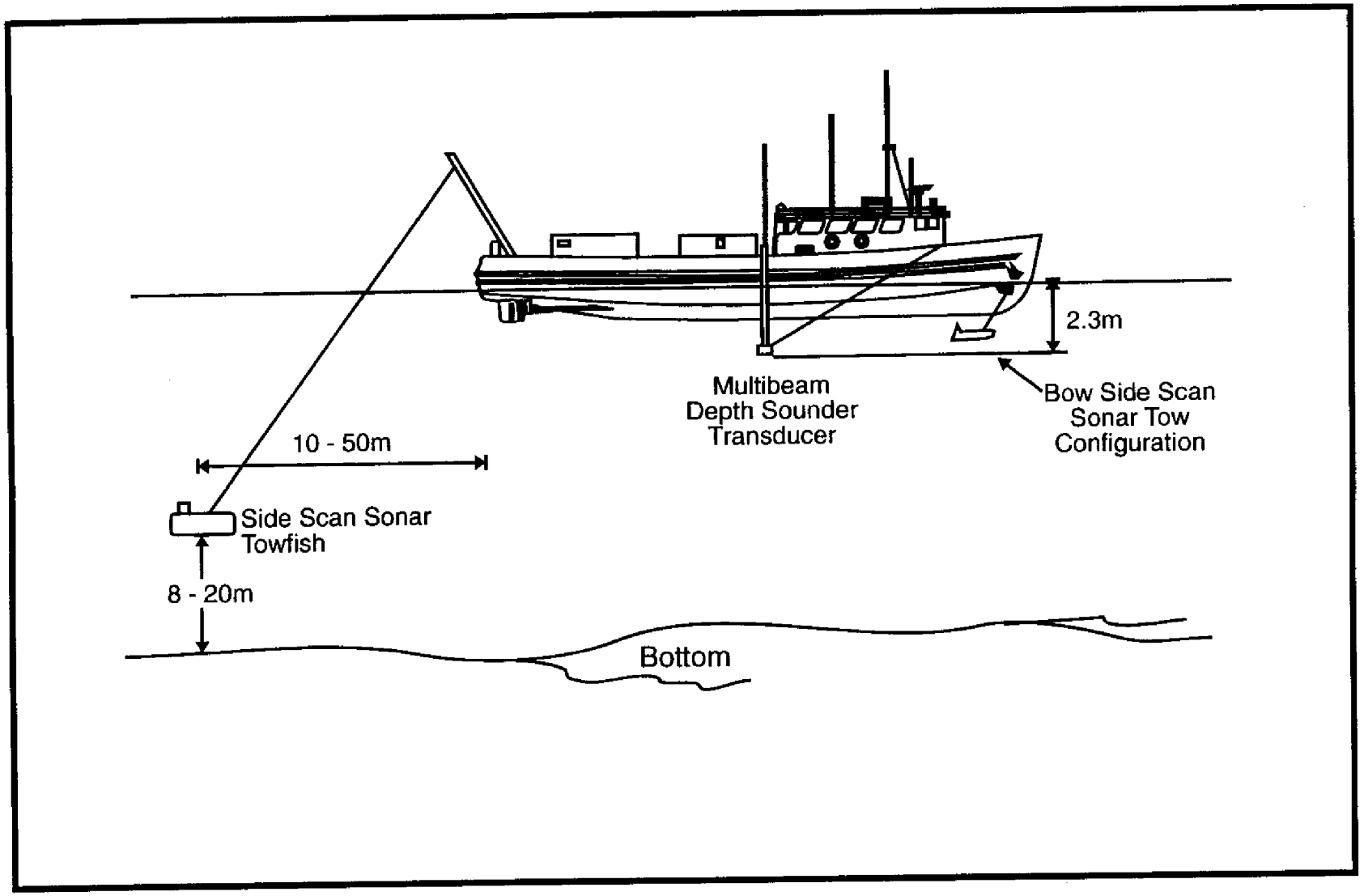


Figure C-2. Configuration of M/V Atlantic Surveyor During Operations (Oct. - Nov. 1995)

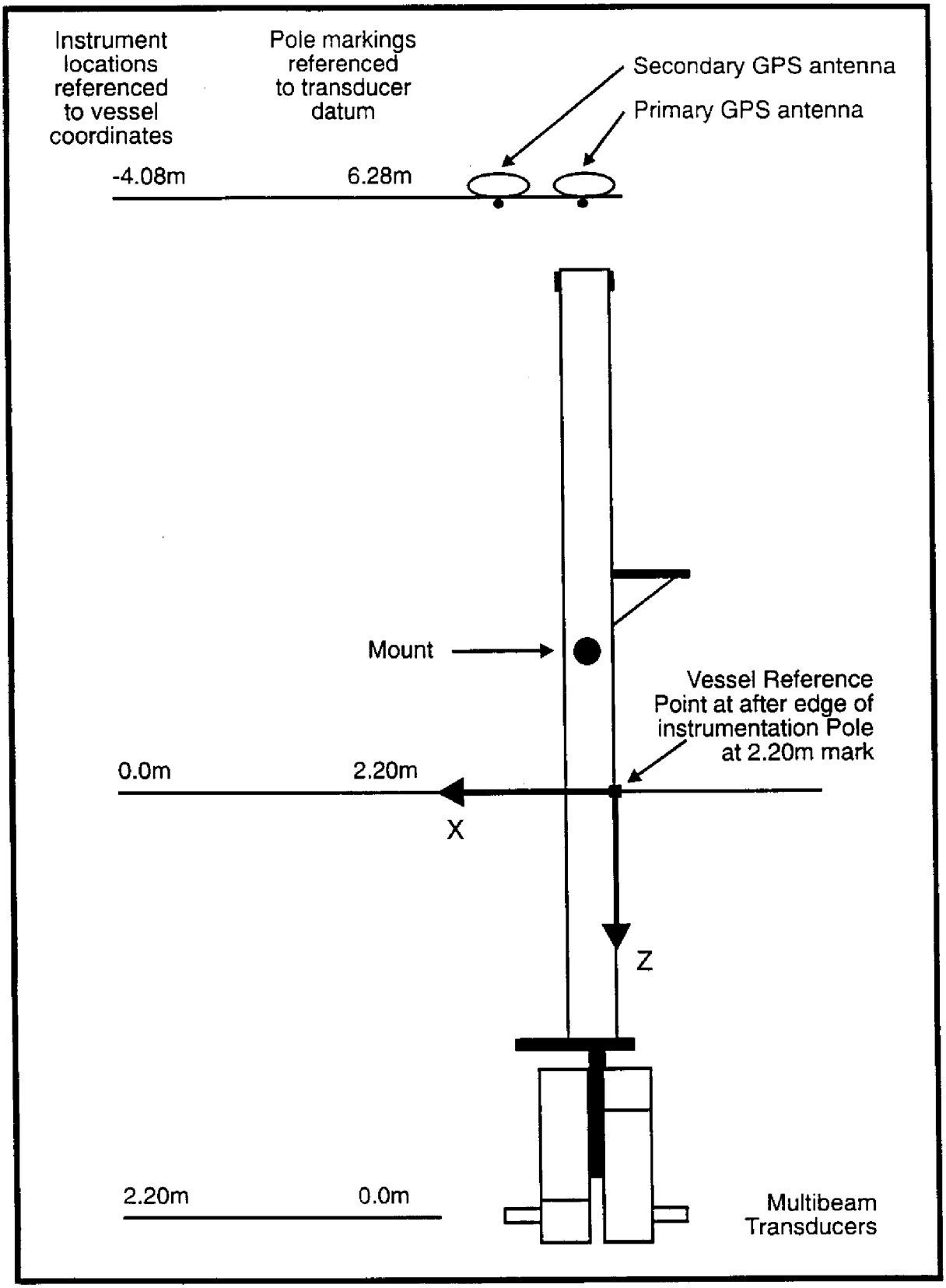


Figure C-3. Configuration of Multibeam Transducer Pole (May - July 1995)

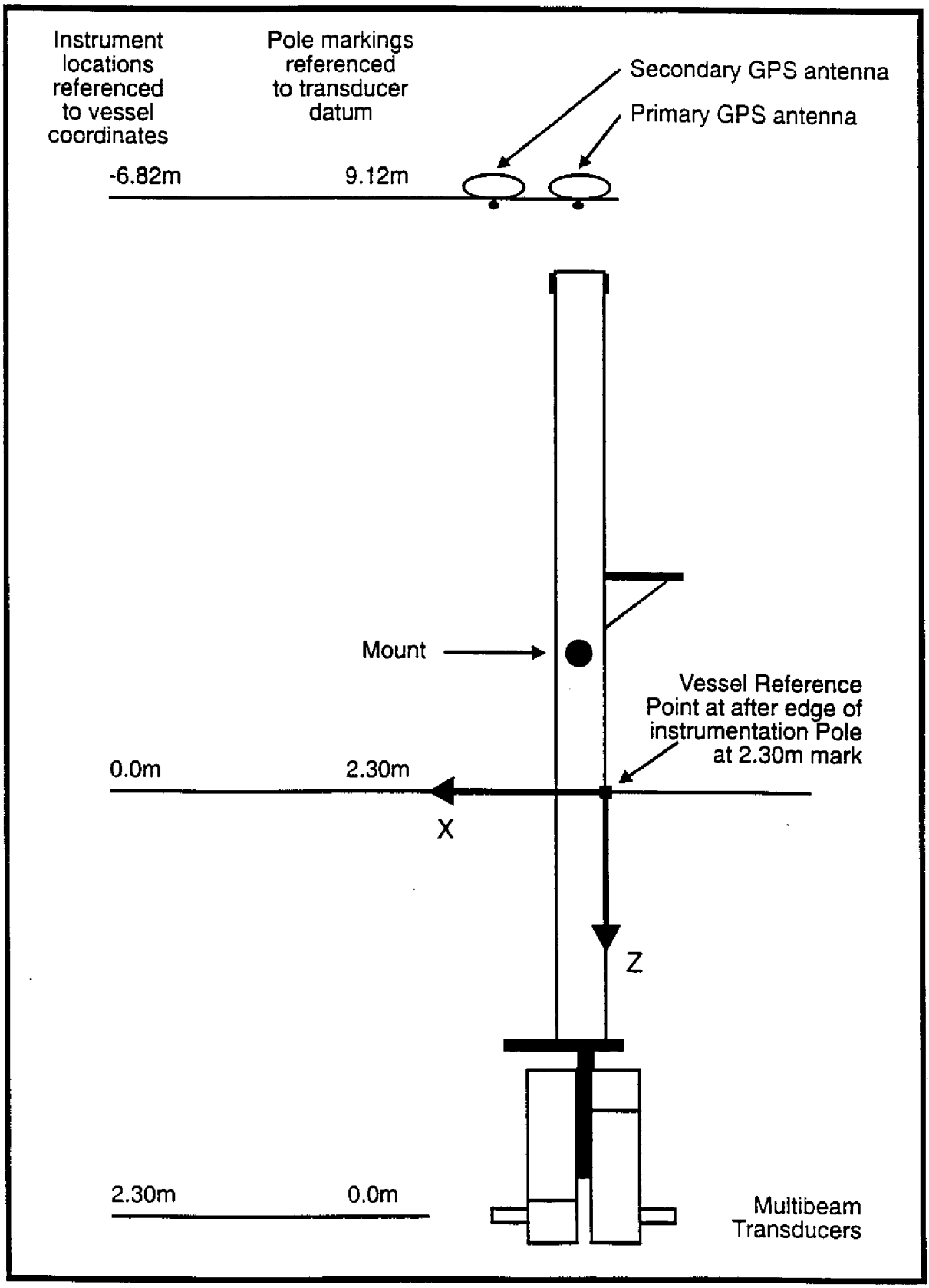


Figure C-4. Configuration of Multibeam Transducer Pole (Oct. - Nov. 1995)

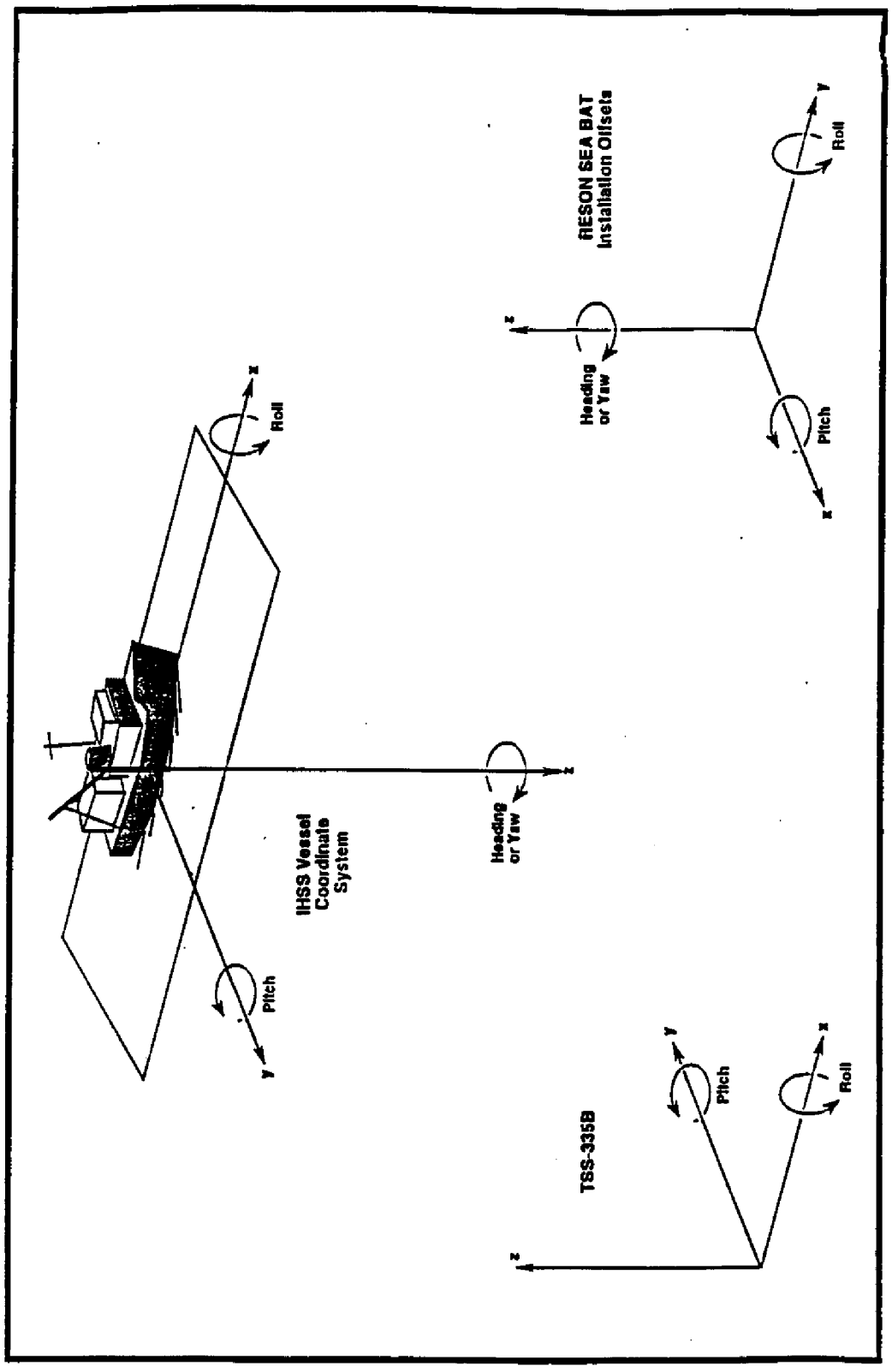


Figure C-5. Relevant IHSS Instrument Coordinate Systems

Table C-1. Antenna and Transducer Locations Relative to Vessel Reference Point May - July, 1995

Sensor	Offset in IHSS	IHSS Coordinate, m	Offset in RESON 6042	RESON Coordinate, m
Multibeam	x	0	x(port)	-0.07
	y	0	y(port)	+0.11
	z	0	z(port)	-2.20
			x(stbd)	+0.07
			y(stbd)	-0.02
			z(stbd)	-2.20
Trimble 4000DS	x	0		
	y	0		
	z	-4.08		
TSS335B	x			-3.204
	y			+3.169
	z			+1.200
Sidescan 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 October - November, 1995

Sensor	Offset in IHSS	IHSS Coordinate, m	Offset in RESON 6042	RESON Coordinate, m
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		
TSS335B	x			-3.020
	y			+3.320
	z			+1.300
Sidescan 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

The following SAIC IHSS software modules were used in the real time acquisition of MULTIBEAM data during the spring survey operation (May 14 - July 9, 1995):

Program	Modification Date
ap9	May 20, 1995
auto_archive	May 4, 1995
cbatdtc	May 11, 1995
	May 13, 1995
	May 15, 1995
cbatout	May 11, 1995
	May 13, 1995
	May 15, 1995
chutil	May 9, 1995
datamgr	May 4, 1995
dtc_data_display	May 4, 1995
eoscandtc	May 10, 1995
	May 18, 1995
	May 30, 1995
filemgr	May 4, 1995
irig-b pdd	May 8, 1995
kfstub	May 5, 1995
klein595	May 8, 1995
	May 23, 1995
mbmgr	May 4, 1995
	May 18, 1995
mergeserve	May 4, 1995
	May 27, 1995
messagemgr	May 4, 1995
mk32	Apr 26, 1995
navmgr	May 5, 1995
	May 17, 1995
	May 28, 1995
nms	May 9, 1995
ntimesrv	Apr 06, 1995
kflog	Apr 10, 1995
	May 18, 1995
	May 30, 1995
helm_display	May 05, 1995
	May 17, 1995
	May 28, 1995
rtkfst	Apr 29, 1995
setclock	Apr 22, 1995
sb_sssv	Apr 26, 1995
	May 22, 1995
spmgr	May 05, 1995
stateb	May 04, 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

Program	Modification Date
timechk telrx	May 04, 1995
tr4000	May 08, 1995
	May 16, 1995
tr4ref	May 08, 1995
	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 during the spring survey operation (May 14 - July 9, 1995):

Program	Modification Date
eoscan.exe	May 15, 1995
sonar.bin	May 15, 1995
eoscan.cfg	May 15, 1995
sonar.bin/eoscan.exe	May 16, 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 IHSS software modules were used in the real-time acquisition of MULTIBEAM data during the fall survey operation (September 19 - November 13, 1995):

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

Program	Modification Date
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 during the fall survey operation (September 19 - November 13, 1995):

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	Aug. 1995
corrtarg	Sept. 18, 1995
corrtarg	Oct. 17, 1995
datamgr	May 4, 1995
datasumm	Aug. 15, 1995
examgyro	Jun 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	Jan 5, 1996
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	Jan 5, 1996
MBHAT>new_ss_cover	Nov. 28, 1995
MBHAT>noaagsf	Nov. 8, 1995
MBHAT>set_eoflag	Oct. 2, 1995
MBHAT>target_dxf	Jan. 5, 1996
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

Program	Modification Date
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) 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 D 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° 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.

Under the 08 May 1995 version of the *klein595* module, annotation commands were sent to the Klein 595 every second. This overloaded the Klein buffer and caused irregular time differences between annotations on the paper record. On 23 May 1995 the *klein595* module was modified to send annotations every 15 seconds so that the paper record annotations were regularly spaced at 15 second intervals.

Prior to the 23 May 1995 revision of the *klein595* module, the times sent to the Klein 595 were incorrect. All Klein side scan paper records produced for H-10611 prior to 23 May 1995 (day 143) at 08:47:06 UTC were annotated with a time stamp which was 3 seconds earlier than the actual time of the record. For all side scan records prior to that time, 3 seconds were manually added to the machine annotation on the paper record. After the *klein595* module was corrected, the time annotations on the side scan record were correct.

Side scan operations were conducted in water depths ranging from 9 to 60 meters. The point of deployment of the tow fish was the center A-frame at the stern of the vessel. The 100 meter range scale was used throughout the survey. Since the range scale was chosen to be 100 m, the survey vessel's speed was maintained at 4.5 knots or less. If the speed exceeded 4.5 knots for time periods in excess of 30 seconds the data were rejected.

The side scan altitude off the bottom was maintained between 8 and 20 m for the 100 m range scale setting except as noted in restricted range time periods indicated in the Sheet D Processing and Multibeam Summary Report and the *dssl.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 for layback calculations. If, during on-line

survey times, the fish height was outside of these limits, a restricted range was used to calculate coverage.

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. Lobster pots, which were common in Sheet D, were also useful as confidence checks because they were good sonar targets extending across the area of coverage.

The Sheet D side scan records were scrutinized by three to five operators to detect unacceptable conditions such as excessive speed, low signal strength, and interference from lobster float snags and boat wakes. All lines noted as unacceptable were rerun during the autumn deployment.

In areas of poor return quality due to suspected low seafloor reflectivity, data were scrutinized to delimit the extent of the bottom conditions. Selected lines were rerun in autumn 1995 to confirm bottom conditions and the side scan system was carefully tuned to maximize returns.

The autumn, 1995, side scan records were of better quality than those collected in the spring in the areas of low bottom reflectivity. However, the number and location of targets in these areas of low bottom reflectivity was essentially the same in both data sets. Thus, both autumn and spring records were used for calculation of side scan coverage in these areas.

Side Scan Target and Feature Processing

For a full discussion of side scan processing, refer to the Phase IIA Summary Report, for complete Sheet D processing lists to the Sheet D Processing and Multibeam Summary Report.

Sheet D side scan targets were collected with the **Eoscan_DTC**, versions as noted in Section D of this report. Layback is not independently recorded in the records collected during the spring deployment, but layback is included in the records from the November deployment. Target and fish positions prior to Sept. 23 are calculated with a different layback equation than those collected after this date, as described in the Phase IIA Summary Report.

For the targets collected during the spring deployment, all targets were read into an Excel spreadsheet, which calculated slant range and target height. Using the output listing from the spreadsheet, two or more 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 positions, corrected ranges, and target heights for all targets were recalculated using the August 1995 **corr_targ** program. The target heights for these recalculated targets are overestimated because of an error in this version of the **corr_targ** program. These heights were not recalculated with later versions of the program because the target to feature correlation with multibeam soundings had already been accomplished.

All Sheet D targets collected during the November deployment were read into a revised Excel spreadsheet, which calculated only 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** (17 Oct 1995 version) program was then run to update target positions, ranges, and heights for these targets.

Targets were correlated with multibeam features using the **get_contact** program, which produces the *dfeature* file and modifies the *dtargets.ctv* file. Correlations were made in two phases. First, targets collected during the spring deployment were processed as described above and correlated with features during July and August 1995 in order to provide recommendations for item investigation. Because feature-to-target correlations were made and features selected at this time, targets collected during the spring were not reprocessed with a revised layback estimate nor using the **corr_targ** (17 Oct 1995 version) program. The second processing phase was during November when 328 additional targets were identified; these were processed as described above and added to the *dtargets.ctv* file.

There were 159 features and 1007 targets for Sheet D. Each feature was reevaluated with reference to its position and relation to soundings on the smooth sheet. *Dfeature* and *dtargets.ctv* files were combined into the *dupdate.out* file using **update_contact** to provide a correlated features-to-targets listing. The *dfeatgsf.out* file was created using the **feature_gsf** program, which traces a feature to a multibeam file, ping and beam number. 153 features were correlated directly to corresponding multibeam 1xIHO least depths using the **feature_gsf** program; 6 features were correlated with 1xIHO multibeam least depths using the **gsfedit** program.

After completion of item investigations, the target/feature correlations were redone using all multibeam data with all correctors applied. 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 features to be non-significant. The following features were removed from the features list as non-significant after analysis of data with all correctors applied:

Feat. #	Latitude North	Longitude West	Least Depth	Feature Type	1 or 2 x IHO	Description
3 ✓	40 58.21334	73 32.37131	14.94	ROCK	1	Contact in 15.0m, approx. 40m horiz. distance from #2, 14.4m Rk
13 ✓	41 00.36349	73 25.09728	13.00	ROCK	1	Contact in 13.5m on slope, approx. 15m horiz. distance from 12.8m depth
16 ✓	41 00.42507	73 25.02093	12.52	ROCK	1	Contact in 13.1m on slope, approx. 10m horiz. distance from 12.4m depth
18 ✓	41 00.43836	73 25.03982	12.19	ROCK	1	Contact in 12.9m on slope, approx. 20m horiz. distance from 12.7m depth
49 ✓	40 59.56732	73 26.88171	25.44	ROCK	1	Contact in 25.8m
76 ✓	40 59.78295	73 25.28731	33.07	ROCK	1	Contact in 35.1m and approx. 35m horiz. distance from 31.0 Wk
110 ✓	40 58.08711	73 32.82184	12.15	ROCK	2	Contact in 12.8m
111 ✓	40 58.22811	73 32.51578	12.50	ROCK	2	Contact in 12.8m
112 ✓	40 58.22582	73 32.59058	11.69	ROCK	1	Contact in 11.8m
113 ✓	40 58.24151	73 32.55178	11.62	ROCK	1	Contact in 11.8m
154 ✓	41 00.23889	73 24.37253	30.79	OBSTR	1	Contact in 30.7m
157 ✓	40 59.43892	73 27.06088	32.78	OBSTR	1	Contact in 33.0m
161 ✓	40 58.16217	73 32.72968	11.08	ROCK	2	Contact in 11.6m

Plots near 12.4 meter sdg. ✓

Plots near 11' Rk and 10' Rk

Same as above

Plots near 10 sdg and 11' Rk. ✓

Plots near 11' Rk

163	40 58.15407	73 32.85888	10.42	ROCK	2	Contact in 11.0m and approx. 40m horiz. distance from 10.0m depth
165	41 00.37463	73 25.79404	21.57	ROCK	2	Contact in 23.2m
168	41 00.24331	73 25.20215	22.01	OBSTR	1	Contact in 22.6m on slope
172	41 00.30342	73 24.77694	17.70	OBSTR	2	Contact in 18.7m on slope

Also plot near 10' Pk on SS

Features were analyzed during office processing. EVALUATOR CONCURS THAT THESE ITEMS ARE NON-SIGNIFICANT

Side Scan Coverage Analysis

The side scan lines in Sheet D were, in general, run with line spacings of 50 - 60 meters and a side scan range setting of 100 m, providing the required 200% side scan coverage with at least a 50% overlap of lines, as shown on the side scan coverage plot. Side scan coverage for Sheet D is 300% or more for at least 95% of the area. This coverage was calculated using the **new_ss_cover** program (see processing summary for discussion of parameter settings) with settings of a=20, r=30, p=30, and b=10, with the *dssl.p00* and *deos.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 214010, 332217 and 332202
- Two SeaBat 9001 Processors, Serial Numbers 6597 and 5230
- SeaBat 6042 Controller and Processing Unit, Serial Number 590 P0 794-387

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

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. See page 29, Adequacy of Survey.

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 the comparison was 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	Longitude
ctd13402.cnv	X		45.4	41 00.04N	73 24.15W
ctd13403.cnv	X		45.4	41 00.04N	73 24.15W
ctd13404.cnv	X		63	41 00.16N	73 24.05W
ctd13405.cnv	X		63	41 00.16N	73 24.05W
ctd13406.cnv	X	X	62	41 00.22N	73 24.01W
ctd13407.cnv	X		62	41 00.22N	73 24.01W
ctd13501.cnv	X		62	41 00.08N	73 24.12W
ctd13502.cnv		X	62	41 00.08N	73 24.12W
ctd13802.cnv		X	48	41 00.00N	73 24.30W
ctd13803.cnv	X		51	41 00.52N	73 24.65W
ctd13804.cnv	X	X	51	41 00.52N	73 24.65W
ctd13901.cnv		X	19	40 57.23N	73 33.58W
ctd14201.cnv		X	18	40 57.31N	73 31.31W
ctd14202.cnv		X	23	40 57.54N	73 31.15W
ctd14302.cnv		X	24	40 58.80N	73 26.80W
ctd14303.cnv	X	X	27	40 58.89N	73 26.79W
ctd14304.cnv	X		27	40 58.89N	73 26.79W
ctd14305.cnv		X	22	40 58.20N	73 30.50W
ctd14402.cnv		X	56	41 00.10N	73 24.20W
ctd14403.cnv		X	18	40 57.19N	73 33.49W
ctd14404.cnv		X	34	40 59 07N	73 27 58W
ctd14501.cnv	X		61.4	41 00.10N	73 24.00W
ctd14502.cnv	X		61.4	41 00.10N	73 24.00W
ctd14503.cnv	X	X	44.3	40 59.35N	73 25.63W
ctd14504.cnv	X	X	44.3	40 59.35N	73 25.63W
ctd14901.cnv		X	20	40 58.15N	73 29.35W
ctd14902.cnv			62	41 00.19N	73 24.09W
ctd14903.cnv		X	64	41 00.17N	73 24.08W
ctd14904.cnv	X	X	31	40 59.44N	73 26.80W
ctd14905.cnv	X		31	40 59.44N	73 26.80W
ctw14906.cnv		X	30	40 58.66N	73 32.79W
ctd15001.cnv			62	41 00.12N	73 24.07W

Table G-1. CTD Files and Locations (Continued) ✓

CTD File Name	Confidence Check	Apply To RESON	Cast Depth (m)	Latitude	Longitude	
ctw15002.cnv		X	60	41 00.12N	73 24.05W	
ctw15003.cnv			28	40 58.87N	73 28.88W	
ctw15004.cnv		X	21	40 58.04N	73 29.36W	
ctw15005.cnv		X	29	40 59.00N	73 29.70W	
ctw15101.cnv		X	18	40 57.27N	73 32.44W	
ctw15102.cnv			20	40 57.79N	73 32.62W	
ctw15103.cnv			20	40 56.99N	73 38.11W	Plots outside survey limits
ctw15104.cnv			19	40 56.62N	73 38.00W	" " " "
ctw15201.cnv			18	40 56.00N	73 39.00W	Plots outside survey limits
ctw15202.cnv		X	22	40 58.30N	73 32.00W	
ctw15203.cnv		X	35	40 59.17N	73 29.53W	
ctw15301.cnv		X	34	40 59.15N	73 28.26W	
ctw15302.cnv	X	X	23	40 57.80N	73 31.95W	
ctg15302.cnv	X	X	23	40 57.80N	73 31.95W	
ctw15303.cnv		X	34	41 00.36N	73 25.39W	
ctw15304.cnv			33	41 00.42N	73 25.39W	
ctw15305.cnv			40	40 59.85N	73 25.41W	
ctw15306.cnv		X	24	41 00.32N	73 25.89W	
ctg30501.cnv	X		62	41 00.20N	73 24.20W	
ctw30501.cnv	X	X	62	41 00.20N	73 24.20W	
ctw30503.cnv		X	60	41 00.20N	73 24.20W	
ctw30504.cnv			60	41 00.20N	73 24.20W	
ctw30505.cnv		X	60	41 00.20N	73 24.20W	
ctw30601.cnv		X	60	41 00.20N	73 24.20W	
ctw30701.cnv	X	X	35	40 59.00N	73 28.60W	
ctg30702.cnv	X		35	40 59.00N	73 28.60W	
ctw30703.cnv		X	33	40 58.90N	73 32.80W	
ctw30704.cnv	X		33	40 58.90N	73 32.80W	
ctg30705.cnv	X	X	33	40 58.90N	73 32.80W	
ctw30903.cnv	X		35	40 58.90N	73 32.70W	
ctg30904.cnv	X	X	35	40 58.90N	73 32.70W	
ctw31001.cnv		X	25	40 57.30N	73 31.20W	
ctw31002.cnv		X	54	40 59.50N	73 25.40W	
ctw31503.cnv		X	24	40 57.30N	73 31.10W	
ctw31504.cnv		X	35	40 59.20N	73 29.50W	
ctw31603.cnv		X	20	40 57.20N	73 33.40W	

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 to the port and starboard multibeam readings for the difference between the observed draft and reference point (2.20 meter - spring, 2.30 meter - fall), and for any settlement and squat inadvertently left in the **IHSS**.

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.

During the May - July, 1995, deployment, comparisons revealed a consistent system bias with the multibeam soundings being too shallow by 0.11 meters. Correctors of +0.11 meters were applied to all May - July, 1995, multibeam soundings in post processing. Records of the comparisons are included in the Phase IIA Summary Report.

During the autumn 1995, deployment, 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 soundings for this deployment. The leadline comparisons are included in the Phase IIA 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 vessel's engine rpm vs settlement and squat. Rpm settings were entered into the Multibeam parameters by the real-time system operator, and the computer-applied settlement and squat correctors interpolated from the lookup table. This corrector is saved in the "Depth Corrector" field of the GSF data file for each ping.

See the Settlement and Squat Test Report in the Phase IIA Summary Report.

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, 593 and 536
- 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.

Occasional power fluctuations affected the Sperry MK 32 gyrocompass for periods of approximately 0.01 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 Long Island Sound for the spring survey, and in Narragansett Bay for the fall survey prior to the start of the surveys. Appropriate biases 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 6042 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. In the IHSS heading 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 was 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. Results are reported in the Phase IIA Accuracy and Alignment Report and in the Phase IIA 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 vessel's 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. Results are reported in the Phase IIA Accuracy and Alignment Report and in the Phase IIA 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. Results are reported in the Phase IIA Accuracy and Alignment Report and in the Phase IIA Summary Report.

Roll, pitch, and heading biases applied in H-10611 are shown in Table G-2. Equipment changes were; day 149, port transducer; day 297, TSS335B; day 311, TSS335B; day 314, port transducer.

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

	Days 134-149		Days 149-190		Days 305-310		Days 315-317	
	Port	Stbd	Port	Stbd	Port	Stbd	Port	Stbd
Roll	+29.85	-29.57	+29.98	-29.59	+30.095	-29.051	+29.985	-29.044
Pitch	-0.82	-0.92	-0.16	-0.13	-1.079	-0.511	-2.062	-1.847
Heading	-1.65	-1.65	-1.65	-1.65	+1.25	+1.25	+1.25	+1.25

Tide and water level correctors

The reference stations for H-10611 were Willets Point, NY (851-6990) and Bridgeport, CT (846-7150).

Smooth sheet soundings were corrected for water level through application of observed data from the Long Neck Point, CT (846-8799) station. A new staff datum for MLLW at Long Neck Point was computed from simultaneous comparison with Willets Point, NY (851-6990) and with Bridgeport, CT (846-7150) 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 IIA Summary Report - Tides.

The boundaries of tide zones used are listed in the Phase IIA 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 IIA Summary Report - Tides.

H. CONTROL STATIONS ✓ SEE EVAL. RPT, SECTION H

Horizontal datum is the North American Datum (NAD) 1983. Two existing first order horizontal control stations were used. A DGPS reference station was established at station MANRESA 1983 (LX7443) to provide primary navigation control for hydrographic positioning. Station ZIEGLER 1932 (LX3804) was used to check the DGPS performance. Horizontal control data are included in the Phase IIA Summary Reports.

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

The following equipment was used for positioning:

- Trimble 4000 GPS Receiver, Serial Numbers 3504A09516, antenna 0080176651
- Magnavox MX50R Differential Beacon Receiver, Serial Number 154
- Trimble 4000 GPS Receiver, Serial Number 3430A07030
- 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 MANRESA 1983 (LX7443). HDOP, number of satellites, elevation of satellites, and age of correctors were monitored so that the resulting hydrographic positioning control met 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.

During 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% of the main scheme length. Comparisons of all crossing data in the 1xIHO swaths, using **MBHAT** software, show that more than 90.3% of comparisons are within 20 centimeters, and that more than 99.7% of comparisons are within 50 centimeters over all types of bottom. Larger differences occurred in areas of steep slopes, rocks, wrecks, and obstructions. In areas of relatively flat bottoms, more than 95% of comparisons were within 20 cm and more than 99.9% were within 40 cm. Table K-1 shows all the crossline comparisons.

Table K-1. Junction Analysis Main Scheme - Crosslines

Category	Count	Percent	Total Percent
to 10 cm	701122	63.92	63.92
to 20 cm	289713	26.41	90.34
to 30 cm	78761	7.18	97.52
to 40 cm	19224	1.75	99.27
to 50 cm	5135	0.47	99.74
to 60 cm	1406	0.13	99.87
to 70 cm	518	0.05	99.91
to 80 cm	223	0.02	99.93
to 90 cm	131	0.01	99.95
to 100 cm	99	0.01	99.96
> 100 cm	493	0.04	100.00
Total Counts = 1096825			

L. JUNCTIONS SEE EVAL RPT, SECTION L

Junction comparisons were made with surveys:

H-10348	1:10,000 scale	1990
H-10353	1:10,000 scale	1990
H-10354	1:10,000 scale	1990
H-10612	1:10,000 scale	1995

Relative locations are shown in Figure L-1 and in the INDEX OF SHEETS, (page iv).

Comparisons were accomplished using MBHAT software to compare each junction survey sounding to all survey soundings occurring within a 5x5 meter cell encompassing the junction sounding. Junctioning results of H-10611 to H-10348 are shown in Table L-1. More than 95.9% of comparisons were within 40 cm, and more than 98.0% of comparisons were within 50 cm.

Table L-1. Junction Analysis H-10611 - H-10348

Category	Count	Percent	Total Percent
to 10 cm	51701	44.09	44.09
to 20 cm	35844	30.56	74.65
to 30 cm	17892	15.26	89.91
to 40 cm	7058	6.02	95.92
to 50 cm	2513	2.14	98.07
to 60 cm	992	0.85	98.91
to 70 cm	432	0.37	99.28
to 80 cm	221	0.19	99.47
to 90 cm	191	0.16	99.63
to 100 cm	114	0.10	99.73
> 100 cm	316	0.27	100.00
Total Counts = 114760			

Junctioning results of H-10611 to H-10353 are shown in Table L-2.More than 96.8% of comparisons were within 40 cm, and more than 99.0% of comparisons were within 50 cm.

Table L-2. Junction Analysis H-10611 - H-10353

Category	Count	Percent	Total Percent
to 10 cm	7192	39.03	39.03
to 20 cm	5562	30.18	69.21
to 30 cm	3395	18.42	87.63
to 40 cm	1698	9.21	96.85
to 50 cm	407	2.21	99.06
to 60 cm	105	0.57	99.63
to 70 cm	57	0.31	99.93
to 80 cm	12	0.07	100.00
to 90 cm			
to 100 cm			
> 100 cm			
Total Counts = 18428			

Junctioning results of H-10611 to H-10354 are shown in Table L-3. Only 74% of comparisons were within 40 cm, and only 81% of comparisons were within 50 cm. Lines run on H-10611 were continuous across all three surveys, H-10348, H-10353 and H-10354. Comparisons with the first surveys were good with steep comparison curves, normal distribution and a slight bias toward H-10611 being shoaler. Comparisons with H-10354 show different characteristics. The comparison curve is flat, and the apparent bias reverses with H-10611 being deeper.

When viewing the junction layers in **MBHAT**, one may readily see the change from comparison with H-10353 to comparison with H-10354. Larger comparison differences are distributed throughout H-10354, not just in areas of steep terrain, wrecks, rocks and obstructions. The cause for the flat comparison curve has not been determined. As can be seen in Figure L-1, H-10611 covers a substantial portion of H-10354. Because large differences existed throughout the common area, it was not feasible to extend H-10611 to effect an adequate junction. DO NOT CONCUR. A VISUAL COMPARISON OF H-10354 AND H-10611 SHOWS GOOD AGREEMENT. IN GENERAL, H-10611 IS 1-2' SHOALER.

Table L-3. Junction Analysis H-10611 - H-10354

Category	Count	Percent	Total Percent
to 10 cm	24688	29.89	29.29
to 20 cm	18167	21.55	50.85
to 30 cm	11573	13.73	64.58
to 40 cm	8149	9.67	74.25
to 50 cm	5893	6.99	81.24
to 60 cm	4803	5.7	86.94
to 70 cm	3740	4.44	91.37
to 80 cm	2717	3.22	94.60
to 90 cm	1610	1.91	96.51
to 100 cm	876	1.04	97.55
> 100 cm	2068	2.45	100.00
Total Counts = 84284			

Junction comparison was made with H-10612, 1:10,000 scale, 1995 using **MBHAT** as described above. More than 94.7% of comparisons were within 20 cm, and more than 99.99% were within 50 cm. Only 8 of 172627 comparisons exceeded 50 cm. Table L-4 shows the comparisons of all soundings common to the two surveys.

Table L-4. Junction Analysis H-10611 - H-10612

Category	Count	Percent	Total Percent
to 10 cm	111808	64.77	64.77
to 20 cm	51674	29.93	94.70
to 30 cm	8346	4.89	99.59
to 40 cm	639	0.37	99.96
to 50 cm	62	0.04	100.00
to 60 cm	7	0.00	100.00
to 70 cm			100.00
to 80 cm			100.00
to 90 cm	1	0.00	100.00
to 100 cm			
> 100 cm			
Total Counts = 172627			

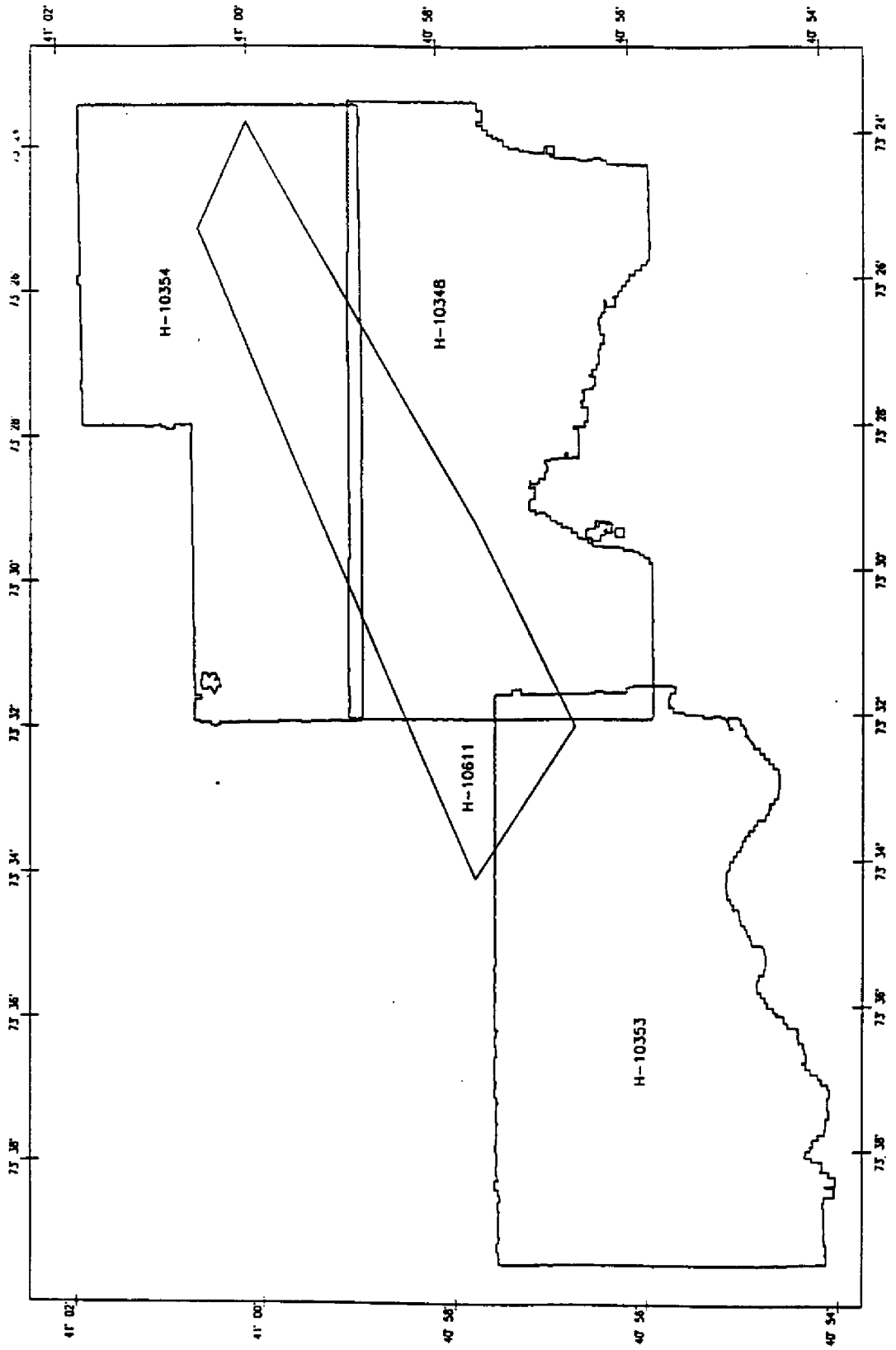


Figure L-1. Junction Surveys

M. COMPARISON WITH PRIOR SURVEYS SEE EVAL RPT, SECTION M

H-10611 (1995) was compared with prior surveys H-5220 (1932) and with H-1732a (1916). The data presently charted on 12365 and 12368 originates from three surveys conducted in 1990 (H-10348, H-10355 and H-10354). In the survey area north of 41° N, the depths are 2-3 m (7-~~10~~ feet) shoaler, on the average, than the soundings taken during the survey of H-5220 (1932). There is significant shoaling of approximately 2-3 m (5-10 feet) in the area of 41° 00.25'N, 073° ~~00.25~~ 04.25'W. In the area around 41° 00.12'N, 073° 26.25'W, the 1995 data show shoaling of 1.5 m (5 feet) since 1932. CONCUR

In the area surrounding 40° 57.75'N, 073° 30.10'W, the 1995 data show depths 6-8 m (20-25 feet) greater than the depths of H-1732a (1916). The average depth in this area is now 19.5 m (64 feet). Significant sand and sediment waves were seen in the multibeam and side scan data. CONCUR

The H-10611 data in the area of 40° 57.75'N, 073° 29.50'W show depths on the order of 1.5-3.5 m (5-12 feet) greater than the depth of 1916. The average depth of this area is now 18.9 m (62 feet). CONCUR

The H-10611 data show that the area bracketed by 073° 28.50'W and 073° 26.00'W was shoaler than the survey of 1916 by an average of 1-2 m (3-7 feet). In the area west of 073° 33.00'W, the average shoaling is 0.3-0.6 m (1-2 feet). The remainder of the H-10611 area contains depth data that are plus or minus 3 feet (1 m) of the data collected during the survey of 1916. CONCUR

In the northeastern end and the south central portion of the survey area, the shoaling appears to be caused by significant sediment movement or deposition around the rock outcroppings and ridges that run through the areas. CONCUR

(15 wk) at 41° 00 12.32'N, 073° 26 29.67'W
AWOIS #4454, is outside the north edge of the survey area and only a portion of its 100 m search radius is included in the area. No features were identified within the search radius. Feature #9, a wreck with least depth of 23.94 m, lies approximately 200 m southeast of AWOIS #4454. It is recommended that AWOIS #4454 remain as listed. CONCUR

During the survey of H-10611 (1995), 159 features were identified from the side scan and multibeam records. Of these, 113 were classified as wrecks. Most wrecks lie in depths of 30-60 m of water and are not considered dangerous. All significant features in the prior surveys were identified in H-10611. CONCUR

N. COMPARISON WITH THE CHART SEE EVAL RPT, SECTION O

H-10611 was compared with charts 12365, 23rd Ed., October 15, 1994, 12367, 20th Ed., February 18, 1995, and 12368. 22nd Ed., July 16, 1994. In general H-10611 compares to within 1 m (3 feet) of the chart. ~~DO NOT~~ CONCUR W/ CHART 12365 22ND EDITION ~~HAS MUCH GREATER DIFFERENCES 1'-25'~~ CHART 12365 DEPTHS GENERALLY DIFFER BY 0'-1'. JL
Several obstructions and rocks are noted on the chart that are not associated with any AWOIS items. The following discussion lists these occurrences with corresponding multibeam and feature data.

The 55' Obstruction shown on Chart 12365 in 40° 57.95'N, 73° 28.9'W corresponds to a multibeam depth of 16.3 m (53 ft). Feature #72, a 16.3 m (53 ft) wreck, identified using side scan records, is shown in 40° 57.96145'N, 73° 28.94219'W. CONCUR. RECOMMEND REMOVAL OF 55' OBSTN WITH BLUE TINT AND CHART 65 WK

The ~~68~~ 63 Obstruction shown on Chart 12365 in 40° 58.7'N, 73° 28.6'W corresponds to a multibeam depth of 18.52 m (60 ft). Two wrecks are identified in the immediate area: Feature #69, a 18.52 m (60 ft) wreck is located in 40° 58.64848'N, 73° 28.61839'W; Feature #173, a 20.21 m (66 ft) wreck is located in 40° 58.68360'N, 73° 28.62316'W. CONCUR. RECOMMEND REMOVAL OF 63 OBSTN WITH BLUE TINT AND CHART 65 WK AT 40° 58.64848'N, 73° 28.61839'W AND CHART 65 WK AT 40° 58.68360'N, 73° 28.62316'W

The 56' Rock shown on Chart 12368 in 41° 00.4'N, 73° 24.7'W corresponds to a multibeam depth of 16.8 m (55 ft). Feature #36, a 16.8 m (55 ft) rock, is located in 41° 00.38840'N, 73° 24.70860'W. CONCUR. RECOMMEND REMOVAL OF 56 FT AND CHART 13218 AT 41° 00.38840'N, 73° 24.70860'W

The 65' Obstruction shown on Chart 12365 in 40° 58.4'N, 73° 31.25'W corresponds to a multibeam depth of 19.9 m (65 ft). Feature #26, a 19.9 m (65 ft) wreck, identified using side scan records, is located in 40° 58.44838'N, 73° 31.26367'W. CONCUR. RECOMMEND REMOVAL OF 65' OBSTN WITH BLUE TINT AND CHART 65 WK AT 40° 58.44838'N, 73° 31.26367'W.

In two occurrences multibeam depths disagree significantly with charted soundings. These are:

The 95' charted sounding located in 40° 59.72'N, 73° 26.15'W on charts 12365 and 12368 corresponds to a multibeam sounding of ~~31.5 m~~ 31.0m (~~103~~ 101 ft). Feature #158, a 31.5 m (103 ft) wreck, identified by side scan sonar, is located in 40° 59.71026'N, 73° 26.22213'W and Feature #159, a 31.7 m (104 ft) wreck, identified by side scan sonar, is located in 40° 59.74680'N, 73° 26.28762'W. CONCUR. REMOVE CHARTED 95' SOG AND CHART THE TWO (~~103'~~) (101') WRECKS AS FOUND BY THE PRESENT SURVEY. CHANNEL A 28.1 WK (92') PLOTS APPROXIMATELY 210m NORTHWEST OF THE CHARTED 95.

The 101' charted sounding located in 40° 59.7'N, 73° 25.9'W on chart 12365 corresponds to a multibeam depth of 36.9 m (121 ft). Feature #107, a 36.9 m (121 ft) wreck, identified by side scan sonar, is located in 40° 59.72056'N, 73° 25.86874'W. CONCUR. REMOVE CHARTED 101 FT DEPTH AND CHART WRECKS AS FOUND BY THE PRESENT SURVEY. (2 NOTE: SUNKEN WRECKS COVERING 27.5 m, 29.8 m, AND 30.6 m (96 ft, 98 ft, 100 ft) WERE FOUND APPROXIMATELY 300 METERS NORTH NORTHEAST OF THE 101 FT DEPTH.

O. ADEQUACY OF SURVEY

Survey H-10611 is complete and adequate to supersede prior surveys. CONCUR

Data for all tracks shown on the track plot are included in the accepted survey data. The decision was made to retain these 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 were shown in bold print 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 were shown in reduced height bold characters. This made them stand out from the soundings and eased 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. For example, the ***mbmz*** layer viewed with the **MBHAT** software gives an excellent picture of the shape and character of the bottom.

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.

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

Multibeam

Multibeam coverage was near 100%. All gaps were covered by more than 200% side scan. Total area of gaps was less than 1% of the survey area. Concur

In the vicinity of 40° 59.97' N, 073° 26.70' W there were approximately 34 gaps in the multibeam coverage. These gaps appear to have been caused by excessive speed for narrow beam coverage in a shoaling area on the starboard side. Each gap was approximately 1 x 10 meters, gaps were not contiguous, and there was more than 300% side scan coverage. There were no targets or features in the area. Concur

Near 40° 59.12' N, 073° 29.32' W there were approximately 26 gaps of 1 x 1 meter in the multibeam coverage. Gaps were not contiguous and there was more than 300% side scan coverage. There were no targets or features in the area. Concur

Approximately 5 gaps of 1 x 2 meters existed in the multibeam data near 40° 59.16' N, 073° 29.44' W. Gaps were not contiguous and there was more than 300% side scan coverage. There were no targets or features in the area. Concur

One gap in the multibeam data at the south edge of the survey was approximately 7 x 100 meters for a total area of about 686 m^2. This area, near 40° 56.67' N, 073° 32.15' W, was partially covered by multibeam on H-10612, and there was 200% to 300% side scan coverage. There were no targets or features in the area. Concur

There were approximately 24 other 1 x 1 and 2 x 2 meter gaps in multibeam coverage scattered over the survey area. These gaps were not contiguous and there was more than 200% side scan coverage in all cases. No multibeam gaps coincided with the side scan gaps discussed below. Concur

Sound Velocity Corrections

In some cases the sound velocity profile applied did not extend to 95% of the maximum depth observed in the data set. In those cases the RESON SeaBat used the bottom of the sound velocity table to extend corrections to the observed depths greater than the cast depth. To check the validity of this vertical extrapolation, the hydrographer made extrapolations to the bottom using the trend of the bottom of the sound velocity profile. The x, y, z coordinates of maximum soundings in the file were computed at nadir and at 45° off nadir. The following list

shows the errors resulting from using the RESON extrapolation method compared to the trend extrapolation.

Table O-1. Depth and Position Errors Due to Sounding Depth Exceeding Sound Velocity Profile Depth

Dataset	Cast #	Cast Z	Data Z	Delta Z	Beam Angle	Error in Meters		
						X	Y	Z
mba95144.d03	ctw14305.cnv	22.49	25.96	3.47	0	0.000	0.000	0.000
					45	0.000	0.001	0.000
mba95144.d04	ctw14402.cnv	55.66	63.45	7.79	0	0.000	0.000	0.003
					45	0.000	0.006	0.000

The results of these comparisons show the depth and position errors from extending the bottom of the sound velocity table are less than 1 cm and are within the budget for meeting 1xIHO standards. Concur

Side Scan ✓

Side scan coverage for Sheet D is 300% or more for at least 95% of the area. Concur

At 40° 59.67' N 73° 25.25' W, 100% side scan coverage is shown because of a 45 second period between JD 306 02:09:43 and 02:10:27 when the record was rejected because of speed. This record and the 100% multibeam coverage were reviewed and no targets were present in the area. Concur

At 40° 59.43' N 73° 26.55' W, 100% side scan coverage is shown because of a 75 second period between JD 306 07:05:41 and 07:06:56 when the record was rejected because of speed. There is one large target shown on the record during this time period. The target was identified from the 100% multibeam and the corresponding side scan record. This target corresponds to Feature #148, a 27.6 m wreck, also identified by side scan target 306 05:58:27. Concur

At 40° 58.81'N 73° 29.58' W, there is one 5 m cell with 100% coverage shown. At JD 139 07:10, the analog record is of acceptable quality and shows no targets in the area; however, the coverage was rejected because there is no Ecoscan digital data at that time. Concur

At 40° 57.85' N 73° 32.50' W, 100% side scan coverage is shown because two different side scan records in the area were rejected. First, the record between JD 139 08:37:35 and 08:41:03 was rejected because of speed. Secondly, the record prior to JD 153 09:47:32 was rejected because there is no Ecoscan digital data at that time. No targets are shown on either of these records or on the 100% multibeam coverage for the time period. Concur

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. On small steep features the one meter contours are too closely spaced for adequate depiction of the bottom while using contour labels. In those cases the shoalest contour label was offset with a leader pointing to the feature. CONTOUR LINES WERE REVISED, ON AN OVERLAY, BY THE PACIFIC HYDROGRAPHIC BRANCH TO CONFORM WITH THE SOUNDINGS SHOWN ON THE SMOOTH SHEET.
Analysis of all records shows coverage to be adequate to supercede prior surveys.

P. AIDS TO NAVIGATION SEE EVAL RPT., SECTION P

The following aids to navigation were on station in agreement with the chart and with Light List, Volume I, Atlantic Coast:

Eatons Neck Point Lighted Gong Buoy "11B" was on station at 41° 00.025'N, 073° 23.695'W with characteristics Fl G 4s and a green structure. LL#21310. ✓

Cable and Anchor Reef Lighted Bell Buoy "28C" was on station at 41° 00.550'N, 073° 25.150'W with characteristics Fl R 4s and a red structure. LL#21330. ✓

Lloyd Point Shoal Lighted Gong Buoy "15" was on station at 40° 57.653'N, 073° 29.265'W with characteristics Fl G 4s and a green structure. LL#21360. ✓

Western Long Island Sound Dumping Ground Lighted Buoy "WDA" was on station at 40° 59.158'N, 073° 29.003'W with characteristics Fl Y 4s and a yellow structure. LL#21370. ✓ This floating aid plots 200 meters ~~east~~ west of charted position
Twenty-six Foot Spot Lighted Bell Buoy "32A" was on station at 40° 58.118'N, 073° 32.812'W with characteristics Fl R 2.5s and a red structure. LL#21380. ✓

Each of these buoys adequately serves its apparent purpose.

Q. STATISTICS ✓

Survey statistics are as follows:

1524	Lineal kilometers of sounding lines
34	Square kilometers of hydrography
14	Days of production
1	Days of weather downtime
3.5	Days of mechanical, electronic or operational downtime
5	Number of tide stations
68	Number of velocity casts
0	Number of XBT drops

R. MISCELLANEOUS

Large sand waves exist in the area off Lloyd Point, NY.

Numerous non-dangerous wrecks were found in the eastern half of the survey that are not noted on current charts.

S. RECOMMENDATIONS

Based on comparisons with previous surveys and existing charts, it is recommended that the entire common area of charts ~~12366 and 12367~~ 12365, 12367, AND 12368 be reconstructed with data from this survey. CORRECTED

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

- 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.
- Phase IIA - Phase IIA Accuracy and Alignment Tests - submitted to NOAA COTR aboard M/V Atlantic Surveyor.
- Phase IIA - Summary Report - Calibration, Horizontal Control, Real-Time and Processing Procedures
- Phase IIA - Summary Report - Tides (Tide Zoning and Tide Station Reports)
- Sheet D Processing and Multibeam Data Summary
- Sheet D Real Time Log Notebook
- Sheet D Sound Velocity Notebook
- Sheet D Processing Notebook
- Sheet D Digital Data Listing Notebook
- Sheet D Digital Data
- Sheet D Side Scan Sonar Analog Records
- Sheet D Plots

APPENDIX A:

DANGER TO NAVIGATION REPORTS

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

ADVANCE INFORMATION

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

Dear Sir:

During office review of hydrographic survey H-10611, New York, Western Long Island Sound, Eatons Neck Point to Greenwich, two submerged wrecks, one submerged obstruction, and one submerged rock were found and considered potential dangers to navigation affecting the following chart:

Chart	Edition/Date	Datum
12365	23rd, 10/15/94	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

ADVANCE INFORMATION

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10611

Survey Title:
State: NEW YORK
Locality: WESTERN LONG ISLAND SOUND
Sublocality: EATONS NECK POINT TO GREENWICH

Project Number: OPR-B389-CN

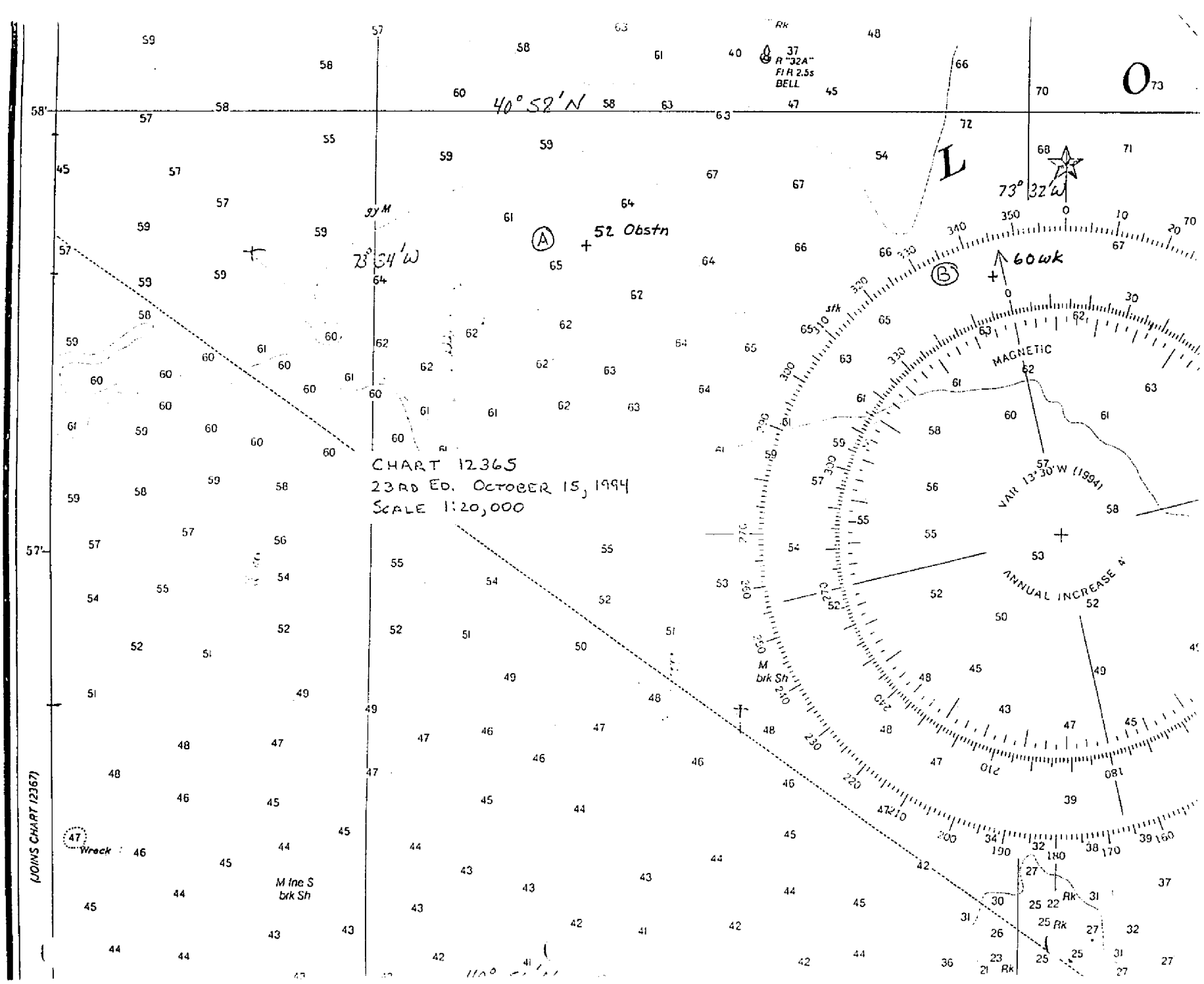
Survey Date: May 14 - July 9, 1995; November 1 - November 13, 1995

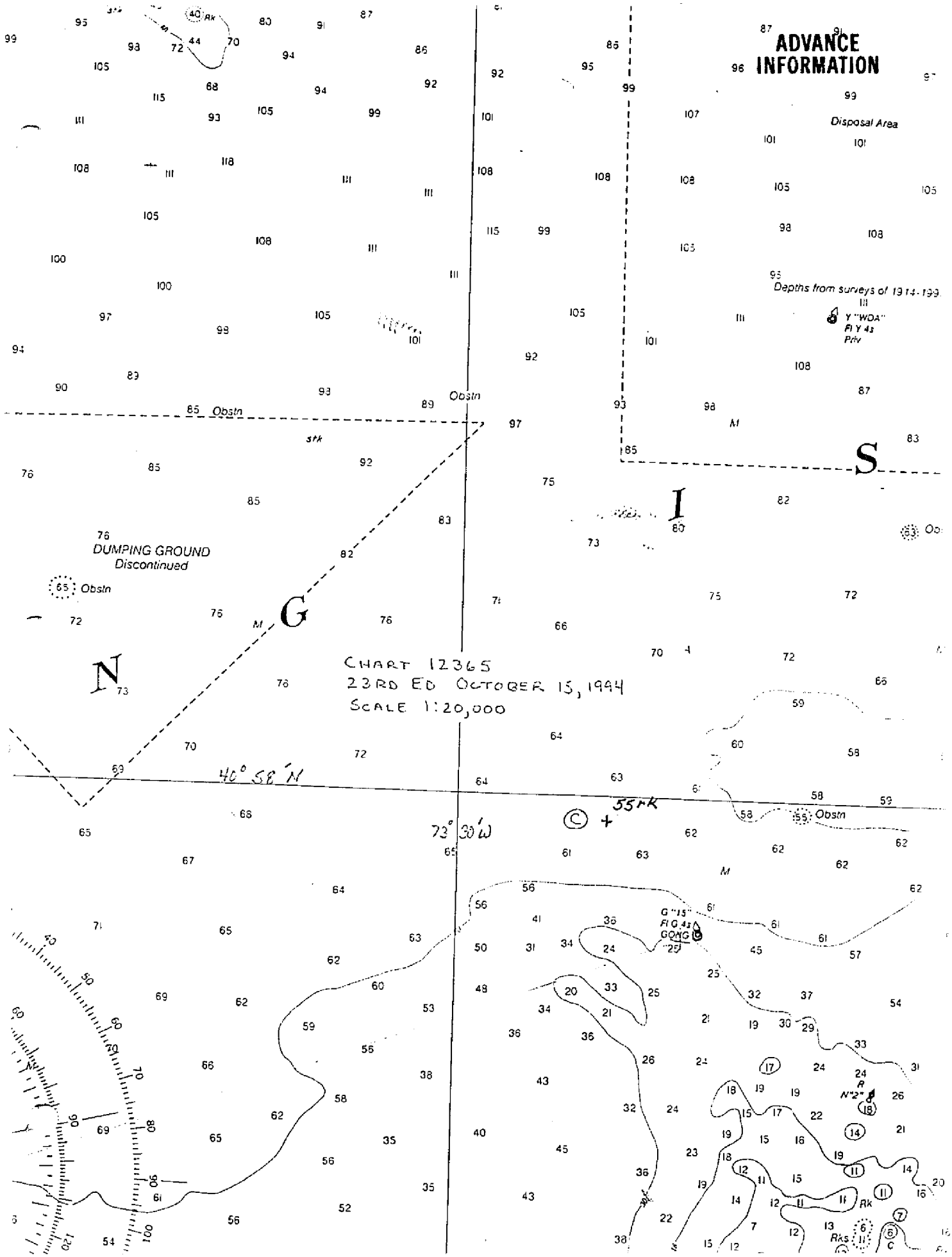
Features are reduced to Mean Lower Low Water using approved tides and are positioned on NAD 83.

Chart affected: 12365 23rd Edition/October 15, 1994, scale 1:20,000, NAD 83

DANGER TO NAVIGATION	LATITUDE(N)	LONGITUDE(W)
A.) Obstruction, subm 52 feet	40/57.70588	73/33.36350
B.) Wreck, subm 60 feet	40/57.61544	73/32.11070
C.) Rock, subm 55 feet	40/57.94594	73/29.53152
D.) Wreck, subm 67 feet	40/59.17151	73/25.82969

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


ADVANCE INFORMATION
40° 52' N
73° 34' W
73° 32' W
52 Obstn
60wk
MAGNETIC
VAR 13° 30' W (1994)
ANNUAL INCREASE 4'
CHART 12365
23RD ED. OCTOBER 15, 1994
SCALE 1:20,000
(JOINS CHART 12367)
Wreck
Mine S
brk Sh
M
brk Sh
37
R "32A"
Fl R 2.5s
BELL
Rk
sfk
gy M


ADVANCE INFORMATION
Disposal Area
Depths from surveys of 1914-199
Y "WOA"
Fl Y 4s
Priv
Obstn
DUMPING GROUND
Discontinued
Obstn
Obstn
Obstn
G "15"
Fl G 4s
GONG
R
N"2"
Rk
Rks
N
G
I
S
CHART 12365
23RD ED OCTOBER 15, 1994
SCALE 1:20,000
40° 58' N
73° 30' W
55 mR

ADVANCE INFORMATION

Formerly C&GS 224, 1st Ed., Jan. 1920 V-1920-197

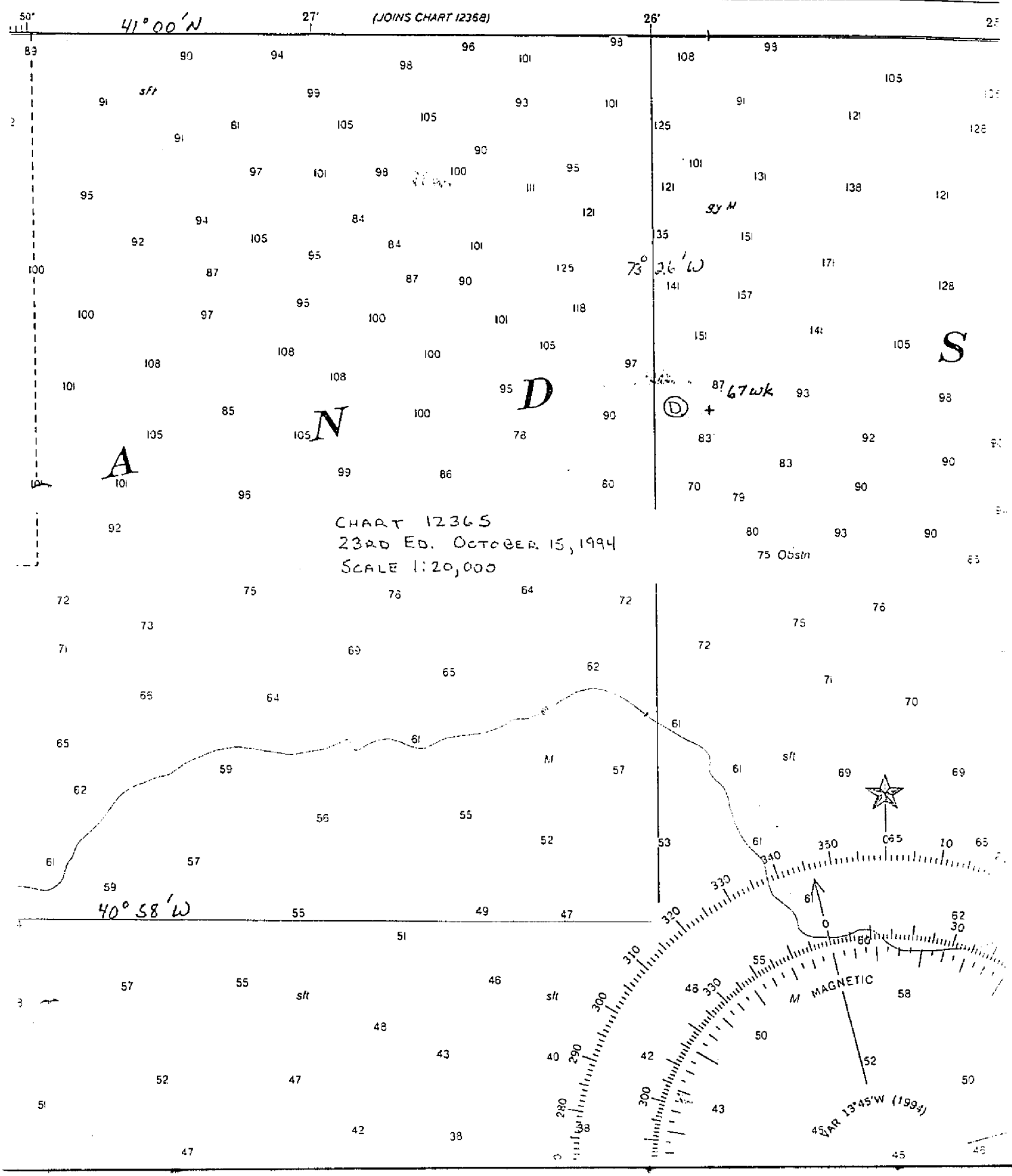


CHART 12365
23RD ED. OCTOBER 15, 1994
SCALE 1:20,000

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
MANRESA 1983 (LX7443)	41 04 22.81236N	073 24 38.93245W	52.56m	Published	28 March 1995 - 10 July 1995
ZIEGLER 1932 (LX3804)	41 02 38.71029N	073 28 40.45528W	16.46m	Published	28 March 1995, 1941 - 29 March 1995, 1623 29 March 1995, 2004 - 31 March 1995, 1312

APPENDIX D:

LIST OF GEOGRAPHIC NAMES

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10611

Name on Survey	A ON CHART NO. 12368	B Chart No. 12365	C	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
LONG ISLAND SOUND	X									1
CABLE AND ANCHOR REEF	X									2
EATONS NECK POINT		X								3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
NAMES HAVE NOT BEEN APPROVED BY										24
CHIEF, GEOGRAPHER, NOAA										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

SHEET D
TIDE NOTES

SITE	LOCATION	PERIOD
Long Neck Point, CT	41° 02.3N	19 April 1995 to 13 July 1995
8468788	73° 28.8W	23 Oct 1995 to 17 Nov 1995

Long Neck Point, CT
Sea Data Model TDR-3A (S/N 018) and Coastal Leasing Microtide (S/N 10302) gages were installed on 19 April 1995. The staff was installed and leveled on 24 April. The Long Neck primary gage, TDR #018, malfunctioned on 31 May and Coastal #10302 became the primary gage. A new backup gage, Coastal #10320, was installed. Both gages were removed 13 July 1995. Coastal Microtide (S/N 10357 and 10353) gages were installed on 23 October 1995. The staff was leveled on 23 October. Both gages were removed on 17 November 1995.

Tide and Water Level Correction

The reference stations for H-10611 were Willets Point, NY (851-6990) and Bridgeport, CT (846-7150).

Soundings for field sheets were corrected using observed water level data from NOAA Station Willets Point, NY (851-6990). Data were acquired by cellular phone modem using the NOAA REALDATA software.

Smooth sheet soundings were corrected for water level through application of observed data from the Long Neck Point, CT (846-8799) station. A staff MLLW datum was computed by simultaneous comparison with Willets Point, NY (851-6990) and with Bridgeport, CT (846-7150) 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 IIA Summary Report - Tides.

The boundaries of tide zones used are listed in the Phase IIA 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.

Zoning correctors applied to the observed gage values were:

		Correctors			
Station	**Zone**	**Time (h min)**	**Ratio**	**Height**	**Staff MLLW Datum**
Long Neck Point	A10	+00 06	*1.00	0.496	0.496
Long Neck Point	A11	+00 03	*1.00	0.496	0.496

All data for project water level gages are reported in the Phase IIA Summary Report - Tides.
* FILED WITH HYDROGRAPHIC DATA.

Table E-1. Abstract of Times of Hydrography

1995/134 19:23:16.05 to 1995/134 19:46:26.88
1995/134 19:49:18.78 to 1995/134 19:53:27.92
1995/134 19:54:25.07 to 1995/134 20:04:56.01
1995/134 20:11:10.60 to 1995/134 20:37:10.31
1995/134 20:39:04.29 to 1995/134 20:56:35.06
1995/134 20:59:54.06 to 1995/134 21:28:38.86
1995/134 21:30:40.89 to 1995/134 21:50:58.36
1995/134 21:54:04.62 to 1995/134 22:25:23.20
1995/134 22:28:23.54 to 1995/134 22:51:46.57
1995/134 22:54:30.76 to 1995/134 23:29:07.95
1995/135 11:32:52.16 to 1995/135 11:45:29.97
1995/135 11:47:30.18 to 1995/135 12:33:39.52
1995/135 13:21:28.19 to 1995/135 14:53:29.93
1995/135 14:56:00.13 to 1995/135 15:14:12.47
1995/135 15:20:44.33 to 1995/135 15:33:59.83
1995/135 15:36:00.03 to 1995/135 16:10:32.87
1995/135 16:10:32.94 to 1995/135 16:40:59.89
1995/135 17:29:07.34 to 1995/135 17:55:07.15
1995/135 18:03:11.14 to 1995/135 18:49:29.94
1995/135 18:56:00.10 to 1995/135 19:01:59.81
1995/135 19:07:30.05 to 1995/135 19:21:59.91
1995/135 19:29:00.21 to 1995/135 19:46:23.67
1995/135 22:19:45.38 to 1995/135 22:21:53.73
1995/135 22:26:06.95 to 1995/135 22:27:55.75
1995/135 22:31:20.97 to 1995/135 22:33:40.28
1995/135 22:33:40.87 to 1995/135 22:34:11.91
1995/135 22:38:37.05 to 1995/135 22:40:52.21
1995/135 22:40:53.03 to 1995/135 22:40:53.10
1995/135 22:45:06.32 to 1995/135 22:46:16.53
1995/135 22:46:17.12 to 1995/135 22:46:28.08
1995/135 22:46:29.04 to 1995/135 22:46:32.30
1995/135 22:46:33.12 to 1995/135 22:46:40.30
1995/135 22:46:41.11 to 1995/135 22:46:48.30
1995/135 22:46:49.11 to 1995/135 22:47:00.44
1995/135 22:47:01.04 to 1995/135 22:47:08.74
1995/135 22:47:09.03 to 1995/135 22:47:34.81
1995/135 22:51:46.25 to 1995/135 22:53:54.89
1995/135 22:57:59.22 to 1995/135 23:00:29.79
1995/135 23:05:00.19 to 1995/135 23:06:44.25
1995/135 23:06:45.43 to 1995/135 23:06:51.65
1995/135 23:12:21.30 to 1995/135 23:13:40.70
1995/135 23:13:41.58 to 1995/135 23:13:42.77
1995/135 23:13:43.44 to 1995/135 23:13:44.92
1995/135 23:13:47.58 to 1995/135 23:14:14.25
1995/135 23:14:15.43 to 1995/135 23:14:51.28
1995/135 23:20:53.22 to 1995/135 23:23:16.01
1995/135 23:49:47.74 to 1995/135 23:50:56.84
1995/135 23:50:58.32 to 1995/135 23:51:01.88
1995/135 23:51:02.17 to 1995/135 23:51:08.99
1995/135 23:51:10.17 to 1995/135 23:51:12.84
1995/135 23:51:14.32 to 1995/135 23:51:38.02

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

1995/135 23:51:38.31 to 1995/135 23:51:47.80
1995/135 23:51:48.31 to 1995/135 23:51:49.87
1995/135 23:51:50.16 to 1995/135 23:52:48.23
1995/135 23:55:44.42 to 1995/135 23:56:30.04
1995/135 23:56:30.41 to 1995/135 23:56:45.82
1995/135 23:56:46.41 to 1995/135 23:56:49.97
1995/135 23:56:50.26 to 1995/135 23:58:22.10
1995/135 23:58:22.40 to 1995/135 23:58:49.95
1995/135 23:58:50.24 to 1995/135 23:58:52.91
1995/136 00:05:25.14 to 1995/136 00:07:09.05
1995/136 00:07:10.53 to 1995/136 00:07:23.86
1995/136 00:12:37.88 to 1995/136 00:13:01.95
1995/136 00:13:02.54 to 1995/136 00:15:50.22
1995/136 00:22:40.45 to 1995/136 00:23:27.92
1995/136 00:23:28.81 to 1995/136 00:24:23.32
1995/136 00:28:37.72 to 1995/136 00:28:53.79
1995/136 00:28:54.98 to 1995/136 00:30:35.11
1995/136 00:30:36.89 to 1995/136 00:30:38.07
1995/136 00:30:38.96 to 1995/136 00:30:57.03
1995/136 00:30:59.03 to 1995/136 00:31:11.84
1995/136 00:35:41.06 to 1995/136 00:37:19.19
1995/136 00:42:58.62 to 1995/136 00:44:45.93
1995/136 00:44:47.04 to 1995/136 00:44:50.08
1995/136 00:44:51.19 to 1995/136 00:44:54.52
1995/136 00:44:55.11 to 1995/136 00:45:41.92
1995/136 00:45:43.11 to 1995/136 00:45:48.74
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1995/307 15:44:31.15 to 1995/307 15:53:35.39
1995/307 15:56:51.13 to 1995/307 16:08:03.62
1995/307 16:11:31.01 to 1995/307 16:21:34.91
1995/307 16:33:46.12 to 1995/307 16:42:23.44
1995/307 16:57:23.88 to 1995/307 17:03:39.38
1995/307 17:37:49.36 to 1995/307 18:00:43.96
1995/307 18:15:37.96 to 1995/307 18:23:03.00
1995/307 18:36:58.05 to 1995/307 18:38:42.99
1995/307 18:44:48.19 to 1995/307 18:50:37.84
1995/307 19:00:43.29 to 1995/307 19:05:00.51
1995/307 19:14:00.49 to 1995/307 19:22:15.89
1995/307 20:13:27.01 to 1995/307 20:45:48.40
1995/307 21:04:37.91 to 1995/307 21:14:18.93
1995/307 21:21:36.71 to 1995/307 22:06:51.18
1995/307 22:14:42.81 to 1995/307 22:19:09.23
1995/307 22:30:35.56 to 1995/307 23:21:37.95
1995/307 23:29:44.79 to 1995/307 23:37:48.08
1995/307 23:41:57.82 to 1995/307 23:50:13.22
1995/308 00:02:22.21 to 1995/308 00:13:12.54
1995/308 00:22:29.71 to 1995/308 00:32:09.54
1995/308 00:45:20.74 to 1995/308 00:51:34.01
1995/308 00:56:29.37 to 1995/308 01:02:44.20
1995/308 01:08:18.00 to 1995/308 01:09:41.02
1995/308 01:16:47.84 to 1995/308 02:05:35.06
1995/308 02:17:59.82 to 1995/308 02:43:43.64
1995/308 02:48:33.00 to 1995/308 02:56:12.85
1995/309 22:50:37.97 to 1995/309 22:58:47.15
1995/309 23:02:47.63 to 1995/309 23:16:55.27
1995/309 23:33:55.54 to 1995/309 23:50:51.67
1995/309 23:56:45.61 to 1995/309 23:59:56.99
1995/315 11:12:28.41 to 1995/315 11:13:49.66
1995/315 11:22:45.80 to 1995/315 11:23:46.01
1995/315 11:32:25.27 to 1995/315 11:40:22.41
1995/315 11:46:21.99 to 1995/315 11:55:18.94
1995/315 11:59:54.48 to 1995/315 12:08:02.18
1995/315 12:20:12.37 to 1995/315 12:21:21.47

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

1995/315 12:30:10.21 to 1995/315 12:31:06.57
1995/315 12:40:26.41 to 1995/315 12:41:38.18
1995/315 12:47:42.79 to 1995/315 12:49:10.26
1995/315 13:32:13.81 to 1995/315 13:33:38.31
1995/315 13:39:24.56 to 1995/315 13:40:42.25
1995/315 13:50:36.46 to 1995/315 13:51:39.93
1995/315 13:59:45.12 to 1995/315 14:00:47.70
1995/315 14:06:10.25 to 1995/315 14:07:25.87
1995/315 14:12:13.10 to 1995/315 14:13:46.20
1995/315 14:24:48.81 to 1995/315 14:26:10.05
1995/315 14:39:44.08 to 1995/315 14:40:48.45
1995/315 15:22:01.19 to 1995/315 15:22:56.67
1995/317 00:42:49.95 to 1995/317 00:43:36.14
1995/317 00:48:30.20 to 1995/317 00:49:15.36
1995/317 00:54:51.18 to 1995/317 00:55:32.43

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

U.S. DEPARTMENT OF COMMERCE

HYDROGRAPHIC SURVEY STATISTICS

REGISTRY NUMBER: H-10611

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	SMOOTH OVERLAYS: ~~POS ARC EXCESS~~ Correction Overlay	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		3			

SHORELINE DATA

SHORELINE MAPS (List):	NA
PHOTOBATHYMETRIC MAPS (List):	NA
NOTES TO THE HYDROGRAPHER (List):	NA
SPECIAL REPORTS (List):	NA
NAUTICAL CHARTS (List):	12365 23rd Ed., 10/15/94;12367, 20thEd.,2/18/95;12368 22nd Ed., 7/16/94

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS: VERIFICATION	AMOUNTS: EVALUATION	AMOUNTS: TOTALS
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISED			
CONTROL STATIONS REVISED			

	TIME-HOURS: VERIFICATION	TIME-HOURS: EVALUATION	TIME-HOURS: 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 6/5/96	Ending Date 6/6/96
Verification of Field Data by G. Nelson	Time (Hours) 64	Ending Date 7/28/96
Verification Check by B. Olmstead	Time (Hours) 6	Ending Date 6/26/97
Evaluation and Analysis by G. Nelson	Time (Hours) 16	Ending Date 6/27/97
Inspection by B. Olmstead	Time (Hours) 12	Ending Date 6/27/97

EVALUATION REPORT
H-10611

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 western Long Island Sound, New York. Depths range from 23.0 feet (6.4 meters) to 204 feet (62 meters). Bottom characteristics are mud, clay, and sand.

C. SURVEY VESSELS

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

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Due to a contractor proprietary 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 and obstructions, revision of depth curves to reflect plotted sounding data, the addition of a few supplemental curves to delineate shoaler depths and junctional notes.

At the time of the survey certification the format for transmission of digital data had not been formally approved. In the interim, digital data for this survey exists in SAIC's Generic Sensor Format (GSF) for multibeam survey data. In addition, the sounding plot 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-10611. 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: .35105 seconds (10.829 meters)
Longitude: -1.56617 seconds (-36.614 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.

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-10611 junctions with the following surveys:

Survey	Year	Scale	Area
H-10348	1990	1:10,000	Southwest
H-10353	1990	1:10,000	Southwest
H-10354	1990	1:10,000	Northeast
H-10612	1995	1:10,000	Southwest

The junction with H-10612 is complete. Soundings are in good agreement within the common area. The junctions with H-10348, H-10353, and H-10354 were not formally completed since these surveys were previously processed and forwarded for charting. Depths on the present survey are consistently 1 foot shoaler than the survey data collected in 1990. An "Adjoins" note has been added to the present survey within the common areas.

The hydrographer's report adequately discussed the junctions, except for the following: There are large common areas in the junctions between H-10354 and H-10611 and between H-10348 and H-10611. Numerous wrecks that are not present on H-10354 and H-10348 are present on H-10611. Also, many of the obstructions that are shown on H-10354 and H-10348 were determined to be wrecks on H-10611. The limits of the common areas are listed below:

H-10348	Latitude (N)	Longitude (W)
	40° 58.97'	73° 26.05'
	40° 58.97'	73° 30.30'
	40° 58.42'	73° 31.97'
	40° 56.72'	73° 31.97'

H-10353	Latitude (N)	Longitude (W)
	40° 56.80'	73° 31.68'
	40° 57.50'	73° 31.68'
	40° 57.50'	73° 34.05'
	40° 56.66'	73° 32.20'

H-10354	Latitude (N)	Longitude (W)
	41° 00.05'	73° 23.60'
	41° 00.58'	73° 25.18'
	40° 58.85'	73° 30.65'
	40° 58.82'	73° 26.28'

As 100% multibeam and 200% side scan were used on H-10611 the sounding data from H-10611 should supersede the junction surveys within the common area.

M. COMPARISON WITH PRIOR SURVEYS

H-5220 (1932) 1:20,000
H-1732a (1916) 1:20,000

Sounding data from H-1732a and H-5220 have largely been superseded by survey work conducted in 1990 and few depths remain charted within the common area of the present survey. A comparison with the present survey reflects shoaler differences of 0 - 2 feet. Additional discussion with the prior surveys can be found in the hydrographer's report, section M.

H-10611 is adequate to supersede the prior surveys within the common area.

N. ITEM INVESTIGATIONS

AWOIS item 4454 was assigned and partially investigated during this survey and should remain as charted. This item has been adequately discussed in the hydrographer's report, section M.

O. COMPARISON WITH THE CHART

Survey H-10611 was compared with the following chart:

Chart	Edition	Date	Scale	Datum
12365	23rd	October 15, 1994	1:20,000	NAD83
12367	20th	February 18, 1995	1:20,000	NAD83
12368	22nd	July 16, 1994	1:20,000	NAD83

a. Hydrography

Junction surveys H-10348, H-10353, and H-10354 conducted in 1990 are the sources for most of the currently charted data. The remaining charted data originates from prior surveys H-1732a, H-5220, and miscellaneous sources. The prior surveys have been adequately discussed in section M of the hydrographer's report and supplemented by additional comments in the Evaluation report. General differences of 0 - 1 foot are noted between the charted depths and the present survey. A few instances are noted where differences range from 2 - 5 feet. The present survey generally reflects shoaler depth information. Charted miscellaneous source data have been adequately discussed in the hydrographer's report, except for the following:

A charted depth of 85 feet (12365) AT 40° 59.16' N, 73° 27.25 W originates from H-10354 (1990). The depth was compiled incorrectly and should have been charted as 95 feet. Data from H-10611 shows a 95 wk at the same location. It is recommended that the 85 foot sounding be removed and the 95 wk be charted.

Survey H-10611 is adequate to supersede charted hydrography within the common area of coverage.

b. Dangers to Navigation

There were no dangers to navigation reported by the hydrographer. Four dangers to navigation were identified during office processing. A copy of the report is attached.

P. ADEQUACY OF SURVEY

Hydrography on survey H-10611 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-10611 adequately complies with the project instructions.

Q. AIDS TO NAVIGATION

There are five floating aids within the survey limits. They are properly positioned and plotted and serve their intended purpose. Of note, the buoy charted at 40° 59.16' N, 73° 28.89' W was located by the present survey approximately 200 meters to the west of its present charted location.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

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

Geographic 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
Cartographer

D Features Correlated with Multibeam Source Data

DEPTHS ARE IN METERS

Feat. #	Latitude	Longitude	Feature Least (m) Depth	Feature Type	1 or 2 x IHO	Multibeam File Name	Ping Number	Beam Number	MB Depth
1	40 58.08481N	073 32.72278W	11.49	ROCK	1	mba95134.d01	21340	39	11.49
2	40 58.22726N	073 32.36379W	14.44	ROCK	1	mba95135.d07	23137	37	14.44
4	40 58.85635N	073 30.34377W	23.85	WRECK	1	mba95315.d01	33944	37	23.85
5	40 58.90879N	073 30.13147W	26.88	OBSTR	1	mba95315.d01	36953	53	26.88
6	40 59.05650N	073 29.82062W	29	WRECK	1	mba95306.d03	45595	32	29
7	40 59.31751N	073 28.86117W	30.63	OBSTR	1	mba95135.d05	28521	29*	30.6*
8	40 59.79797N	073 27.23872W	25.28	WRECK	1	mba95315.d01	53463	21	25.28
9	41 00.09987N	073 26.37564W	23.94	WRECK	1	mba95135.d07	50197	38	23.94
10	41 00.29630N	073 25.63963W	28.48	WRECK	1	mba95306.d04	8413	34	28.48
11	40 57.70588N	073 33.36350W	15.97	OBSTR	1	mba95315.d01	4551	51*	16.0*
12	40 58.63676N	073 31.11611W	22.4	WRECK	1	mba95315.d01	32207	49	22.4
14	41 00.43158N	073 24.82166W	16.64	ROCK	1	mba95138.d07	732	35	16.64
15	41 00.40146N	073 24.83236W	16.86	ROCK	1	mba95135.d05	49237	37	16.86
17	41 00.41327N	073 25.02185W	11.12	ROCK	1	mba95138.d05	2194	37	11.12
19	41 00.39248N	073 25.04299W	10.38	ROCK	1	mba95136.d01	47811	33	10.38
20	41 00.40032N	073 25.06638W	11.32	ROCK	1	mba95138.d04	45875	18	11.32
21	41 00.31208N	073 25.09277W	14.87	ROCK	1	mba95135.d05	50178	55	14.87
22	41 00.07240N	073 26.13934W	26.03	WRECK	1	mba95138.d05	7101	32	26.03
23	40 59.91913N	073 26.68085W	29.49	WRECK	1	mba95150.d03	5956	38	29.49
24	40 59.84373N	073 26.69907W	29	WRECK	1	mba95138.d07	9020	31	29
25	40 59.80875N	073 26.99296W	26.12	WRECK	1	mba95138.d05	10911	39	26.12
26	40 58.44838N	073 31.26367W	19.89	WRECK	1	mba95138.d05	30429	24	19.89
27	40 58.16303N	073 32.07290W	18.23	WRECK	1	mba95150.d01	16686	9	18.23
28	40 58.15665N	073 32.42241W	14.89	ROCK	1	mba95150.d09	58770	60	14.89
29	41 00.38674N	073 24.86126W	16.36	ROCK	1	mba95135.d05	49349	22	16.36
30	40 59.85063N	073 26.48986W	29.38	WRECK	1	mba95139.d01	47469	25	29.38
31	40 59.84109N	073 26.38378W	28.08	WRECK	1	mba95139.d02	34768	39	28.08
32	40 59.86522N	073 26.24911W	30.75	WRECK	1	mba95139.d02	34191	10	30.75
33	40 59.89777N	073 26.13638W	31.08	WRECK	1	mba95139.d02	33689	4	31.08
34	40 59.85149N	073 26.11674W	31.92	WRECK	1	mba95139.d01	321	22	31.92
35	41 00.00296N	073 25.80501W	29.37	WRECK	1	mba95306.d04	35617	24	29.37
36	41 00.38840N	073 24.70860W	16.79	ROCK	1	mba95139.d01	55505	31	16.79
37	41 00.37115N	073 24.67116W	19.42	ROCK	1	mba95306.d04	40087	51	19.42
38	41 00.21367N	073 25.01166W	17.22	ROCK	1	mba95139.d01	60626	45	17.22
39	41 00.17833N	073 25.07671W	20.3	WRECK	1	mba95306.d04	43799	23	20.3
40	41 00.03712N	073 25.34257W	21.71	WRECK	1	mba95139.d02	14516	37	21.71
41	40 59.97291N	073 25.66302W	29.23	WRECK	1	mba95150.d03	11606	32	29.23
42	40 59.91766N	073 25.93471W	33.04	ROCK	1	mba95150.d03	7648	58	33.04
43	40 59.74012N	073 26.50814W	26.83	WRECK	1	mba95139.d01	2081	35	26.83
44	40 58.59136N	073 29.91042W	20.02	WRECK	1	mba95139.d01	31420	30	20.02
45	40 59.41960N	073 27.47143W	27.7	WRECK	1	mba95315.d01	47359	57	27.7
46	40 59.36290N	073 27.31518W	29.9	WRECK	1	mba95306.d02	295	33	29.9
47	40 59.47170N	073 27.29404W	26.7	WRECK	1	mba95315.d01	49999	58	26.7
48	40 59.42527N	073 27.16961W	28.94	WRECK	1	mba95306.d02	65444	29	28.94
50	40 59.79714N	073 26.01955W	36.01	WRECK	1	mba95306.d03	13302	38	36.01
51	40 59.86460N	073 25.80828W	30.58	WRECK	1	mba95153.d01	45104	36	30.58
52	41 00.00702N	073 25.27337W	29.42	ROCK	1	mba95306.d02	60848	4	29.42
53	40 59.76403N	073 26.44057W	31.09	WRECK	1	mba95307.d04	35	39	31.09
54	40 59.69050N	073 26.96156W	31.97	ROCK	1	mba95139.d01	45291	5	31.97
55	40 57.95285N	073 32.25153W	18.82	WRECK	1	mba95149.d04	9478	20	18.82
56	40 59.96683N	073 25.18241W	31.76	WRECK	1	mba95145.d03	4956	35	31.76
57	40 59.89657N	073 25.73257W	27.48	WRECK	1	mba95139.d02	12569	28	27.48
58	40 59.20420N	073 27.73616W	31.24	WRECK	1	mba95139.d03	65017	33	31.24
59	40 59.16086N	073 27.93198W	32.46	WRECK	1	mba95306.d02	1848	24	32.46

D Features Correlated with Multibeam Source Data

60	40 59.18984N	073 27.99019W	32.42	WRECK	1	mba95306.d03	6406	29	32.42
61	40 57.74283N	073 30.37247W	19.07	ROCK	1	mba95315.d01	60910	44	19.07
62	40 58.07923N	073 29.47284W	18.23	ROCK	1	mba95142.d02	28977	58	18.23
63	40 58.92724N	073 26.38753W	21.2	ROCK	1	mba95305.d02	8559	75*	21.2*
64	40 58.18727N	073 29.67790W	18.94	ROCK	1	mba95142.d02	51451	29	18.94
65	40 58.10747N	073 29.98418W	20.09	ROCK	1	mba95144.d07	20111	37	20.09
66	40 57.98298N	073 30.34209W	20.94	ROCK	1	mba95134.d01	893	38	20.94
67	40 58.00897N	073 30.55321W	20.46	OBSTR	1	mba95144.d06	30473	39	20.46
68	40 58.41037N	073 29.29561W	21.51	WRECK	1	mba95144.d06	36616	21	21.51
69	40 58.64848N	073 28.61839W	18.52	WRECK	1	mba95315.d01	39782	12	18.52
70	40 58.53038N	073 29.01045W	22.04	ROCK	1	mba95144.d05	47420	17	22.04
71	40 57.85439N	073 29.64019W	18.89	ROCK	1	mba95143.d03	6601	20	18.89
72	40 57.96145N	073 28.94219W	16.29	WRECK	1	mba95143.d04	48795	35	16.29
73	40 56.76310N	073 32.36120W	14.78	WRECK	1	mba95143.d05	31154	16	14.78
74	40 59.87202N	073 24.85224W	33.58	WRECK	1	mba95317.d01	662	48	33.58
75	40 59.79127N	073 25.26571W	31.02	WRECK	1	mba95145.d05	15554	35	31.02
77	40 59.57791N	073 25.91398W	41.19	WRECK	1	mba95306.d01	65131	32	41.19
78	40 59.15344N	073 27.25453W	28.96	WRECK	1	mba95144.d04	9003	29	28.96
79	40 59.38994N	073 27.03498W	29.54	WRECK	1	mba95145.d03	13301	40	29.54
80	40 57.61544N	073 32.11070W	18.5	WRECK	1	mba95149.d01	57562	26	18.5
81	40 59.02450N	073 27.83871W	28.59	WRECK	1	mba95134.d01	34920	22	28.59
82	40 59.40474N	073 26.40836W	29.59	WRECK	1	mba95149.d02	22161	72*	29.6*
83	40 59.47340N	073 26.24837W	33.42	WRECK	1	mba95144.d04	5382	37	33.42
84	41 00.02157N	073 24.56538W	39.52	WRECK	1	mba95145.d05	18721	23	39.52
85	41 00.05430N	073 24.54323W	39.86	WRECK	1	mba95306.d01	35041	21	39.86
86	40 59.19204N	073 26.43262W	26.86	ROCK	1	mba95142.d02	30406	3	26.86
87	40 59.25665N	073 26.04010W	28.42	WRECK	1	mba95305.d03	54191	20	28.42
88	40 59.45177N	073 26.40868W	32.81	WRECK	1	mba95306.d01	30312	7	32.81
89	40 59.30835N	073 26.59968W	26.28	WRECK	1	mba95149.d02	27884	9	26.28
90	40 57.87114N	073 31.14254W	19.82	ROCK	1	mba95149.d02	49434	24	19.82
91	40 57.64563N	073 32.73948W	18.96	OBSTR	1	mba95315.d01	2589	60	18.96
92	40 59.96896N	073 25.41420W	31.8	WRECK	1	mba95307.d04	3497	30	31.8
93	41 00.02788N	073 25.92996W	25.83	WRECK	1	mba95306.d04	6134	33	25.83
94	40 57.96941N	073 32.83798W	17.84	ROCK	1	mba95309.d01	28221	54	17.84
95	40 58.82271N	073 29.87025W	26.78	ROCK	1	mba95135.d06	2327	31	26.78
96	41 00.11888N	073 25.82577W	21.9	ROCK	1	mba95138.d07	5152	20	21.9
97	40 59.99357N	073 26.11268W	29.5	WRECK	1	mba95306.d04	21116	34	29.5
98	40 59.88689N	073 25.53880W	35.08	WRECK	1	mba95306.d02	52677	15	35.08
99	40 59.83158N	073 25.60432W	31.4	WRECK	1	mba95145.d03	6933	35	31.4
100	40 59.83710N	073 25.69555W	29.85	WRECK	1	mba95306.d02	52280	50	29.85
101	40 59.58270N	073 26.50256W	33.28	WRECK	1	mba95306.d02	50337	8	33.28
102	41 00.07268N	073 24.39077W	47.51	WRECK	1	mba95134.d01	3664	25	47.51
103	40 59.86846N	073 25.02138W	31.86	ROCK	1	mba95145.d05	16646	31	31.86
104	40 59.65811N	073 25.76753W	40.49	WRECK	1	mba95306.d01	31957	1	40.49
105	41 00.05837N	073 24.91687W	33.29	WRECK	1	mba95145.d03	3706	39	33.29
106	40 59.41393N	073 26.61364W	25.4	WRECK	1	mba95306.d02	6048	20	25.4
107	40 59.72056N	073 25.86874W	36.94	WRECK	1	mba95145.d03	8238	24	36.94
108	40 59.91637N	073 25.01307W	36.01	WRECK	1	mba95306.d02	2369	28	36.01
109	40 59.91591N	073 24.93461W	36.36	WRECK	1	mba95306.d01	34043	40	36.36
114	40 58.20439N	073 32.48130W	13.05	ROCK	1	mba95307.d04	19112	34	13.05
115	40 58.25117N	073 32.46314W	11.06	ROCK	1	mba95307.d04	2051	1	11.06
116	40 58.27313N	073 32.40421W	12.32	ROCK	1	mba95307.d04	1845	15	12.32
117	40 59.97830N	073 24.83395W	36.2	WRECK	1	mba95306.d02	1945	36	36.2
118	40 59.98489N	073 24.53059W	41.14	WRECK	1	mba95306.d01	61906	34	41.14
119	40 59.31779N	073 25.77850W	45.66	WRECK	1	mba95305.d03	39385	79*	45.7*
120	40 59.87032N	073 25.27455W	31.28	WRECK	1	mba95306.d02	21870	40	31.28
121	40 59.42000N	073 25.97931W	38.39	WRECK	1	mba95306.d01	32872	54	38.39

D Features Correlated with Multibeam Source Data

122	40 59.68554N	073 24.49003W	31.8	WRECK	1	mba95305.d01	5249	1	31.8
123	40 59.70568N	073 24.50378W	36.68	WRECK	1	mba95305.d01	5249	39	36.68
124	40 59.37305N	073 25.15515W	33.63	WRECK	1	mba95305.d02	55344	20	33.29
125	40 59.37986N	073 25.21706W	37.29	WRECK	1	mba95134.d01	12423	39	37.29
126	40 57.94594N	073 29.53152W	16.88	ROCK	1	mba95143.d02	15969	22	16.88
127	40 59.17151N	073 25.82969W	20.67	WRECK	1	mba95305.d02	57122	24	20.67
128	40 59.48991N	073 25.08682W	39.09	WRECK	1	mba95305.d03	15968	2	39.09
129	40 59.62896N	073 24.82024W	41.37	WRECK	1	mba95305.d03	41622	36	41.37
130	40 59.54299N	073 24.97140W	41.49	WRECK	1	mba95305.d03	15686	28	41.49
131	40 59.28565N	073 25.99891W	34.67	WRECK	1	mba95305.d03	54072	8	34.67
132	40 59.50107N	073 25.18708W	44.46	WRECK	1	mba95305.d03	40761	25	44.46
133	40 59.67184N	073 24.83347W	40.25	WRECK	1	mba95305.d03	51161	36	40.25
134	40 59.65259N	073 24.96516W	43.15	WRECK	1	mba95305.d03	64684	18	43.15
135	40 59.58400N	073 25.20859W	47.19	WRECK	1	mba95305.d03	64106	44	47.19
136	40 59.64300N	073 25.13652W	34.04	WRECK	1	mba95306.d01	2706	8	34.04
137	40 59.86445N	073 24.41793W	41.05	WRECK	1	mba95306.d01	1042	4	41.05
138	40 59.76967N	073 24.79544W	40.18	WRECK	1	mba95306.d01	1897	37	40.18
139	40 59.38596N	073 26.22263W	36.44	WRECK	1	mba95150.d04	4384	14	36.44
140	40 59.93661N	073 24.51002W	45.31	WRECK	1	mba95306.d01	41056	31	45.31
141	40 59.99654N	073 24.27635W	49.72	WRECK	1	mba95306.d01	40485	53	49.72
142	41 00.07846N	073 24.02470W	50.79	WRECK	1	mba95306.d01	39816	17	50.79
143	41 00.07938N	073 24.13386W	51.83	WRECK	1	mba95306.d01	58052	11	51.83
144	40 59.81821N	073 25.06108W	34.58	WRECK	1	mba95144.d04	2641	27	34.58
145	40 59.72786N	073 25.57043W	37.1	WRECK	1	mba95145.d05	14309	34	37.1
146	40 59.62159N	073 26.06869W	36.28	WRECK	1	mba95306.d02	19895	37	36.28
147	40 59.66176N	073 25.95570W	37.47	WRECK	1	mba95306.d02	20179	33	37.47
148	40 59.44567N	073 26.55932W	27.62	WRECK	1	mba95306.d02	5913	13	27.62
149	40 59.80749N	073 25.38734W	38.56	WRECK	1	mba95306.d02	3228	7	38.56
150	41 00.18646N	073 24.17478W	52.81	WRECK	1	mba95306.d02	386	41	52.81
151	41 00.06680N	073 24.50936W	40.69	WRECK	1	mba95306.d02	1199	30	40.69
152	40 59.43792N	073 26.70222W	25.19	WRECK	1	mba95306.d02	17961	17	25.19
153	41 00.09118N	073 24.66871W	27.95	WRECK	1	mba95306.d02	23546	20	27.95
155	40 59.48909N	073 26.69094W	25.07	WRECK	1	mba95145.d03	11667	27	25.07
156	40 59.19008N	073 27.73293W	32.1	WRECK	1	mba95139.d03	65002	25	32.1
158	40 59.71026N	073 26.22213W	31.49	WRECK	1	mba95306.d02	63126	46	31.49
159	40 59.74680N	073 26.28762W	31.74	WRECK	1	mba95139.d02	10122	28	31.74
160	41 00.30175N	073 25.96055W	21.44	WRECK	1	mba95306.d03	44330	54	21.44
162	40 58.18146N	073 32.75418W	10.48	ROCK	1	mba95306.d03	12762	3	10.48
164	40 58.15427N	073 32.83183W	10.08	ROCK	1	mba95306.d03	12407	20	10.08
166	41 00.33644N	073 25.01799W	12.1	ROCK	1	mba95135.d05	49893	24	12.1
167	41 00.04479N	073 25.90244W	21.23	OBSTR	1	mba95135.d05	53752	20	21.23
169	41 00.34967N	073 24.76014W	16.89	ROCK	1	mba95306.d04	39655	26	16.89
170	41 00.25012N	073 25.06784W	14.94	OBSTR	1	mba95306.d04	38113	27	14.94
171	40 59.87484N	073 26.15975W	32.54	WRECK	1	mba95139.d02	33822	20	32.54
173	40 58.68360N	073 28.62316W	20.21	WRECK	1	mba95315.d01	39574	15	20.21
174	40 58.04658N	073 30.49261W	19.82	WRECK	1	mba95143.d01	4865	27	19.82
175	40 57.63457N	073 31.83079W	19.55	WRECK	1	mba95307.d05	14768	92*	19.6*
176	41 00.55817N	073 25.22390W	10.81	ROCK	1	mba95136.d01	23873	56	10.81

* after beam number and mb depth indicates that value was determined using gsfedit

APPROVAL PAGE
H-10611

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: 6/27/97
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 Simmons Date: 6/28/97
Kathy Simmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

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Final Approval

Approved:

Andrew A. Armstrong III Date: Oct. 21, 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-10611

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
12365	5/10/97	Gary C. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full applications of soundings from smooth sheet
12368	4/30/97	Gary C. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet
12367	5/15/97	Gary C. Nelson	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet.
			Full Part Before After Marine Center Approval Signed Via
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			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.