

9609

Diag. Cht. No. 904-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT
(HYDROGRAPHIC)

Type of Survey HYDROGRAPHIC
Field No. MI-5-1-76
Office No..... H-9609

LOCALITY

State PUERTO RICO
General Locality SOUTHEAST COAST
Locality PUERTO YABUCOA AND VICINITY

1976

CHIEF OF PARTY
Wesley V. Hull

LIBRARY & ARCHIVES

DATE May 5, 1978

9609

HYDROGRAPHIC TITLE SHEET

H-9609

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

FIELD NO.

MI-5-1-76

State Puerto Rico

General locality Southeast Coast

Locality Puerto Yabucoa and ^{Vicinity} ~~surrounding waters~~

Scale 1:5000 Date of survey 29 Mar 1976 to 14 Apr 1976

Instructions dated 1 October 1975 Project No. OPR-423-MI-76

Vessel Vesnos 2223, 2225, 2226, 2227
MT. Mitchell launchers

Chief of party Wasley V. Hull, CDR. NOAA Commanding Officer

Surveyed by ENS D. Terry, ENS W. Dewhurst, ENS J. Bailey, ENS D. Rice

Soundings taken by echo sounder, ~~XXX~~ Raytheon 717B, ^{723D} and Ross Models 5000 & 200A Fathline

Graphic record scaled by D.T., W.D., J.B., D.R., P.S., F.L., F.S., W.D., E.M.

Graphic record checked by P.S., F.L., F.S., W.D., E.M. Verif. Branch (AMC)

Protracted by N/A Automated plot by CalComp ^(BDP) 618 AMC

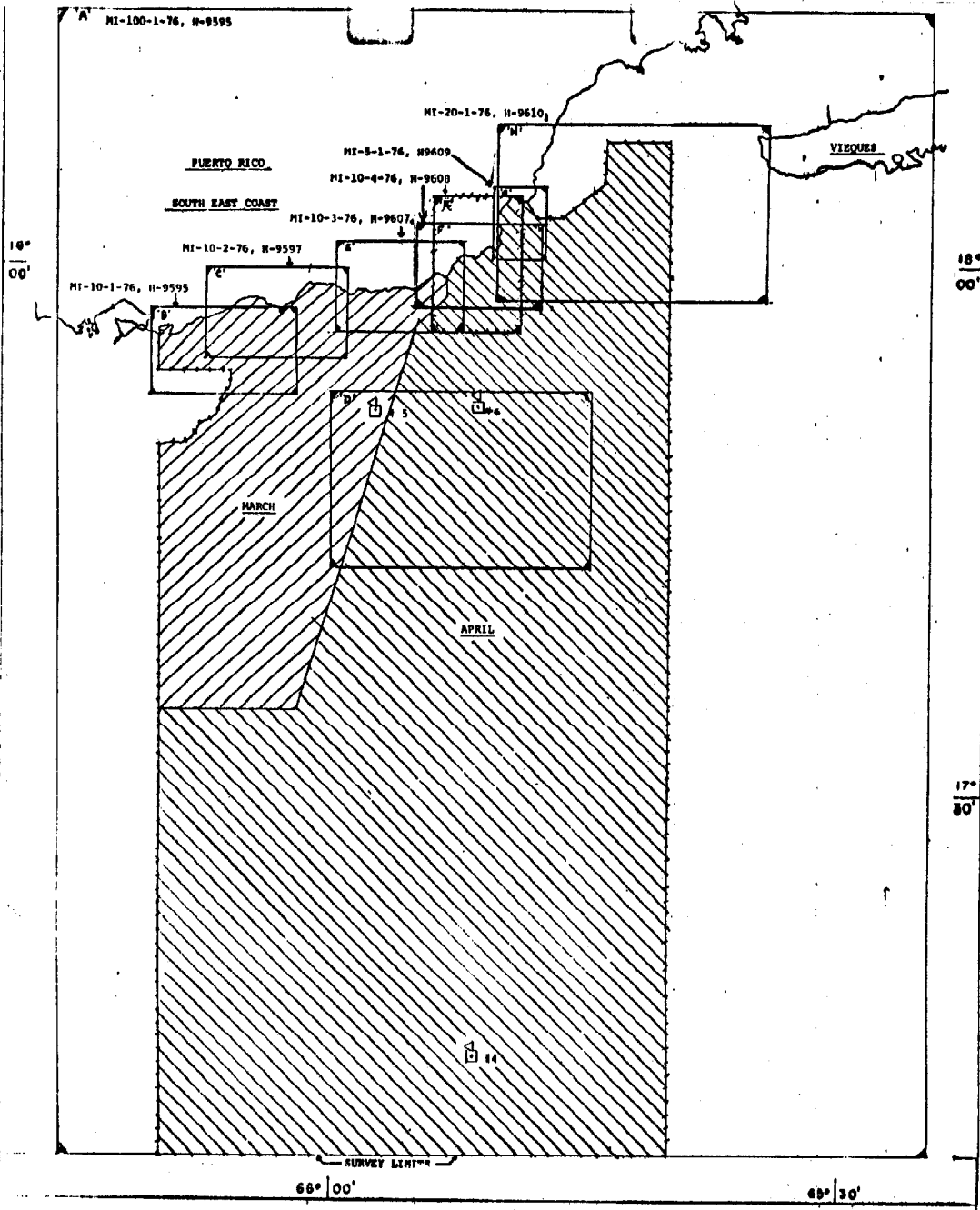
Verification by N/A L.G. Croom

Soundings in ~~XXXXXX~~ feet at MLW ~~XXXXXX~~

REMARKS: changes in red pen made during verification by L.G. Croom

Miscellaneous data filed with field records

Applied to Standards 9-6-78



PROGRAM SKETCH

OPR-421-MI-76

MARCH-APRIL 1976

NOAA SHIP MT. MITCHELL MMS-22

SCALE OF HORIZONTAL DISTANCE 1:25000

WILSON & WILSON, INC., WASHINGTON, D.C.

SHEET LEGEND

MAR.	APR.
226	1,295
205	1,162
640	154
31	0
2	1
796	4

- 100' SOUNDING AREA SHIP
- 200' SOUNDING AREA SHIP
- 100' SOUNDING AREA LAUNCH
- 200' SOUNDING AREA LAUNCH
- NAUTICAL CHART (DEPTH/TEMP.)
- BOTTOM SAMPLES

A. PROJECT

This survey was carried out in accordance with Project Instructions OPR-423-MI-76 issued 1 October 1975 as amended by Change No. 1 dated 16 January 1976.

B. AREA SURVEYED

This survey covered an area east of Yabucoa, Puerto Rico from shore to a maximum depth in which the launches could keep a fathometer trace (100 feet in all places and 200+ feet in most areas). The southern limit of this survey was Latitude 18°01'30" North and the northern limit was a line connecting the point 18°03'39" North Latitude 65°48'00" West Longitude and 18°02'57" North Latitude 65°46'51" West Longitude.

This survey was a 1:5,000 scale survey using 50 meter spacing with 25 meter spacing in ^{many} _{monk} areas due to shoal depths and Pre-Survey Review items.

Survey operations were conducted from Julian Day 089 to 105. The survey dates for each launch are listed in the table below.

<u>Vessel Number:</u>	<u>Survey Dates:</u>
2223	089,090,091,092,097,098
2225	089,090,091,092,097
2226	098,099,105
2227	099

C. SOUNDING VESSELS

The major portion of this survey was performed with NOAA Launch #1002 (Vesno 2225) and NOAA Launch #1207 (Vesno 2223). Launch #1002 is a 28 foot aluminum hulled Jensen which is an automated launch equipped with a Hydroplot System. This launch was assigned to work on MI-5-1-76, East Sheet. Launch #1207 is a 26 foot Pacific Plastics Launch also equipped with a Hydroplot System. Launch #1207 was assigned to the western portion of MI-5-1-76 and was also responsible for collecting bottom samples for both sheets. Launch #1207 was equipped with a Raytheon DE 723D fathometer which could carry a trace to deeper depths than the other fathometers using fathom input. For this reason, Launch #1207 was used to extend the offshore limits of both boat sheets.

NOAA Launch #1004 (Vesno 2226), a Jensen similar to Launch 1002, was used on Julian days 098, 099, and 105.

Launch #2227, also used on this sheet, is a 16 foot aluminum hulled skiff built by MonArk, Incorporated of Monticello, Arkansas equipped with an 85 horsepower Evinrude outboard engine, remote steering, and throttle. The MonArk (Vesno 2227) was also equipped with a Raytheon 719B fathometer powered by a 12-volt battery and a Del Norte Trisponder. The MonArk was used to obtain depths on the submerged reef on the West sheet of MI-5-1-76.

A list of the sounding equipment and their respective serial numbers is given for each launch in Section D of this report.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

The following sounding equipment was used to obtain depth and positioning data for this survey:

Vesno 2223	Fathometer-Raytheon Model DE 723D S/N 37010
Vesno 2225	Fathometer-Ross Model 5000, Fineline, S/N 1053
Vesno 2226	Fathometer-Ross Model 200A, Fineline, S/N 1039
Vesno 2227	Fathometer-Raytheon DE719B Survey Fathometer, S/N 3947

All regular interval soundings were automatically entered into the Hydroplot System from the digitizers on the automated launches. The graphic records were scanned by trained personnel in accordance with the Hydrographic Manual (Publ. 20-2) and were spot checked by the survey Officer-in-Charge. Erroneous soundings caused by wave action or digitizer problems were corrected and replaced with appropriate inserted soundings in the records by inclusion on the Electronic Corrector Tape. Phase and initial checks were performed on the Ross Recorders and A-F, phase, arc length, frequency, alignment, initial, and speed checks were performed on the Raytheon recorder as often as possible and at least once a day. Bar checks were taken before the start of survey operations each day. These were incorporated into an instrument error which is applied on the TC/TI tape.

Velocity corrections were obtained from Nansen Casts: one performed on 4 March 1976 at Latitude 17°15' North, Longitude 65°51'36" West and a second cast on 5 March 1976 at 17°51'36" North Latitude 65°57'18" West Longitude. Another Nansen Cast was taken 17 April 1976 at 17°52'30" North Latitude 65°50'48" West Longitude to see if there were any significant changes during survey operations. A depth versus velocity correction curve was made for each cast and compared.

Printouts of the velocity tape and all tables are included at the end of this report.

Changes in the draft are included on the TC/TI Tape included with the survey data. A printout of this tape is included with this report. A copy of the settlement and squat correctors versus engine RPM's is also included with the survey records.

This survey was plotted with TRA, velocity of sound, and positioning correctors. Predicted tides were not used due to the small range of tide in the area, however, several tide gauges were installed on the island of Puerto Rico to determine real tides. A list of tide gauges and their locations is included in this report in APPENDIX II, FIELD TIDE OR WATER LEVEL NOTE. A copy of the letter requesting real tides is included in APPENDIX II.

E. HYDROGRAPHIC SHEETS ✓

Field sheets for this survey were prepared using the Hydroplot System aboard the Mt Mitchell MSS-22. MI-5-1-76 was divided into an East and a West Sheet. The sheets were constructed with a skew of 155° to enable the survey to be contained on two boat sheets.

The following tapes and their printouts will be forwarded with the records to the Atlantic Marine Center:

- Master Range-Range Data Tapes
- Electronic Corrector Tapes
- Parameter Tapes
- Signal Tape
- Velocity Correction Tape
- TC/TI Tape

F. CONTROL STATIONS ✓

Control Stations used for this survey were:

<u>SIGNAL NAME</u>	<u>SIGNAL NUMBER</u>	<u>LATITUDE (North)</u>	<u>LONGITUDE (West)</u>	<u>UNIT</u>
Breakwater	068	18°03'15.831"	65°49'42.585"	B
Nav Aid #2	069	18°02'39.671"	65°48'34.233"	C
Guayanes 2	045	18°03'48.175"	65°48'22.539"	A

Breakwater and Nav Aid #2 were located using third order traverse or triangulation.

Two other stations were established to enable survey operations to be performed in Yabucoa Harbor. They are station TB-1, signal number 081, located at 18°03'09.382" North Latitude 65°50'12.507" West Longitude and signal number 082 named Turn Dolphin at 18°03'21.395" North Latitude 65°50'01.160" West Longitude. These stations were located using third order traverse or triangulation and are not recoverable.

All stations were used for range-range hydrography and the datum used is listed in Appendix VI, LIST OF STATIONS, of this report. Recoverable stations are indicated by cartographic codes 139 or 250.

G. HYDROGRAPHIC POSITION CONTROL ✓

Positioning for this survey was range-range using distance measuring equipment by Del Norte Technology of Euless, Texas. The following equipment was used.

Launch #1207 (Vesno 2223)	Master S/N 179
	DMU S/N 169
Launch #1002 (Vesno 2225)	Master S/N 219
	DMU S/N 188

		<u>Julian Days 096-105</u>	
Launch #1004	(Vesno 2226)	Master S/N 227	Master S/N 263
		DMU S/N 190	DMU S/N 159
MonArk	(Vesno 2227)	Master S/N 272	
		DMU S/N 090	

CALIBRATION OF ELECTRONIC CONTROL SYSTEM

A specific Distance Measuring Unit (DMU), master unit, and antenna were assigned to each launch. Each 'system' was calibrated every inport period. In addition, each launch was steered past at least two navigation aids, once before beginning survey operations and at the end of each work day to determine if the range readings varied an appreciable amount from each Del Norte station to the navigation aid. This distance was determined by the use of Program RK 300, UTILITY COMPUTATIONS.

At the end of survey operations on OPR-423-MI-76, all Del Norte 'systems' were calibrated over a known distance determined by an AGA Model 76 Geodimeter, Serial Number 1012.

H. SHORELINE

Sounding lines were run parallel to the shore at the inshore limit of safe navigation of the sounding vessels. A second line was run offshore of this to allow a safe turning margin for launches running mainscheme lines toward the shore.

Shoreline details were transferred to the field sheet from T-12143¹ T-12144². Shoreline for Yabucoa Harbor was determined with geodimeter and theodolite using range and azimuth methods. A Field Edit was performed and any changes and or corrections have been transferred to the field sheets.

Station Navigation Aid #2 (Signal Number 069) used as a control station for this survey is located at the offshore end of the channel leading to Yabucoa Harbor. The Del Norte remote unit was placed on top of the aid which is a dolphin extending 30 meters above the water. This station is described in more detail in Section F, Control Stations and also in Section N, Aids to Navigation. * doubtful

I. CROSSLINES

Crosslines made up 15.5% of the sounding lines. Crosslines were run at an angle of at least 45° to the mainscheme hydrography. Agreement between crosslines and mainscheme hydrography was good, two feet or less. Launch #1004 (Vesno 2226) was used on Julian Day 105 to run two crosslines; agreement between crossline depths of Vesno 2226 and lines run by Vesno 2223 was good.

J. JUNCTIONS

This survey junctions with contemporary surveys M-10-4-76 (H-9608)⁽¹⁹⁷⁶⁾ to the south and MI-20-1-76 (H-9610)⁽¹⁹⁷⁶⁾ and also with Prior Survey H-8673⁽¹⁹⁶²⁾ (1:10,000) performed by the Explorer in 1962 to the northeast. All junctions were in good agreement. *Junction with H-9610 is poor! The problem with this junction is due in part to the steep slope on the continental slope where the junction takes place. Recommend the use of the curves from this survey be used out to the slope area and*

K. PRIOR SURVEYS *the curves from H-9610 be used on the slope and remaining area.*

No prior surveys were provided.
H-2564 (1902) *See Verifiers Report.*

PRE-SURVEY REVIEW ITEMS

Pre-survey Review Item #1¹ at 18°03.55' North Latitude 65°48.47' West Longitude reported as a wreck or a rock awash was developed by Vesno 2225 on Julian Day 091 and a least depth of 8⁹ feet was found on Detached Positions 2729 (bow), 2730 (midships), and 2731 (stern). *This item is a wreck. However, a large rock is also present in the area. It is recommended that this item be charted as a wreck at the depth indicated.* *Concur* S.W.

Pre-survey Review Item #14³, a wreck reported at 18°03.60' North Latitude 65°48.47' West Longitude, appears to be the same as Pre-survey Review Item #13. *This item was located on day 092 w/detached position 2773 Lat 18°03'32.16" Long 65°48'27.13"* *It is a sunken wreck covered by 2.2 feet, a large rock is in the area. Recommend charting the Rock awash from 11-12-14.* +

Pre-survey Item #15, an area referred to as Bajo Luckenbach in the area of 18°03'20" North Latitude 65°48'35" West Longitude was developed by Vesno 2225 on Julian Day 091 and a least depth of 8⁶ feet was found during development at 18°03'20" North Latitude 65°48'35" West Longitude between positions 2743 and 2744 and between positions 2760 and 2761. It is recommended that the limits of "Bajo Luckenbach" be ascertained from this survey and the least depths charted at the position indicated above. *Recommend revising charted depths to agree with this survey.*

Pre-survey Review Item "C" is an 18 foot sounding reported at 18°03.01' North Latitude 65°49.23' West Longitude. This area was developed and the least depth in the area was an 18²¹ foot sounding at 18°03' North Latitude 65°49'14" West Longitude. It is recommended that this depth be relocated at the position indicated above. This sounding was recorded by Vesno 2225 on Julian Day 097 between positions 31⁵⁵ and 31⁵⁶. *Concur* BP 806/2 (971)

An un-numbered depth of 14 feet reported at 18°03'14" North Latitude 65°49'27" West Longitude was developed by Vesno 2225 on Julian Day 097 and a least depth of 13 feet was found at that point between positions 3118 and 3119. *Lat 18°03'13.02" Long 65°49'28.26" Recommend charting this depth on future Editions of chart* ✓

An un-numbered shoal depth of 4 feet reported at 18°03'21" North Latitude 65°49'19" West Longitude was investigated by Vesno 2225 on Julian Day 092 and a least depth of 5 feet was found at that point between positions 284²⁸ and 284²⁹. *Lat 18°03'21.97" Long 65°49'19.00 Recommend charting this depth on future editions of chart.* C of E, BP 30718 (936) Retain 4 foot depth. ✓

An un-numbered pre-survey review item, a 5 foot sounding reported at 18°03'32" North Latitude 65°49'12" West Longitude was investigated and a least depth of 5 feet was found at 18°03'34.4" North Latitude 65°49'10.7" West Longitude on Julian Day 092 by Vesno 2225 between positions 2861 and 2862 and also between positions 2867 and 2868. *Recommend retaining the 5 foot sounding as charted.*

Two un-numbered pre-survey review items; the first a 16 foot sounding at 18°03'31" North Latitude 65°48'54" West Longitude and the second a 16 foot depth reported at 18°03'29" North Latitude 65°48'49" West Longitude were investigated and the least depth in the area was a 19 foot sounding at 18°03'32.1" North Latitude 65°48'52" West Longitude. This least depth was found between positions 2881 and 2882. *Recommend replacing the 16 ft. soundings with the 19 ft. from present survey unless subsequent information indicates otherwise.* Origin H.4302 WD (1923) Retain 16 Foot depths

An un-numbered pre-survey review item, a 14 foot sounding at 18°03'24" North Latitude 65°48'38" West Longitude was developed Vesno 2225 on Julian Day 092 and the least depth in the area was found to be 18 feet at 18°03'23.4" North Latitude 65°48'49.5" West Longitude. Also in the area was a 17 foot sounding at 18°03'24" North Latitude 65°48'51" West Longitude. These shoal soundings were found between positions 2872 and 2873. *Recommend replacing the 14 ft sounding with one or the other of the 17th present survey depths on future editions of the chart.* Origin H.4302 WD (1923) Retain 14 foot depths

An un-numbered shoal depth, a 10 foot sounding at 18°03'20" North Latitude 65°48'58" West Longitude was developed by Vesno 2225 on Julian Day 092 and a least depth of 8 feet was found at that point between positions 2884 and 2885. *Lat 18° 03' 19.94" Long. 65° 48' 58.48" Recommend charting this depth on future editions of the chart in this area.*

An un-numbered 13 foot sounding at 18°03'15" North Latitude 65°48'59" West Longitude was investigated along with a 14 foot sounding reported at 18°03'16" North Latitude 65°48'52" West Longitude on Julian Days 091 and 097 by Vesno 2225. The least depth in this area was 8 feet in the area of a submerged reef at 18°03'12.4" North Latitude 65°48'55.8" West Longitude between positions 2811 and 2812 and between positions 2995 and 2996. *Lat 18°03'16.81" Long 65°48'56.28" Recommend revising future editions of chart to indicate the submerged reef and the shoal soundings.*

An un-numbered shoal depth of 12 feet reported at 18°03'20" North Latitude 65°48'42" West Longitude was developed by Vesno 2225 on Julian Day 091 and a least depth of 8 feet was found at 18°03'19.8" North Latitude 65°48'41.3" West Longitude between positions 2770 and 2775. Also in the area was an 11 foot sounding at 18°03'17" North Latitude 65°48'43" West Longitude between positions 2774 and 2775. *Recommend revising future editions of chart by adding these shoal soundings.*

An un-numbered pre-survey review item, a reported 9 foot sounding at 18°03'14" North Latitude 65°48'44" West Longitude was investigated by Vesno 2225 on Julian Day 090 and the least depth found was a 13 foot sounding at that point between positions 2251 and 2252. *Lat 18°03'14.54" Recommend replacing the 9 ft sounding with the 11 ft from the present survey on future editions of the chart in this area. C of E. BP 30718 (1936) For compilers concurrence"*

An un-numbered shoal depth of 17 feet reported at 18°03'05" North Latitude 65°48'17" West Longitude was investigated and no evidence of shoaling was found in this immediate area. Development for this item was performed by Vesno 2225 on Julian Day 092 using positions 2894 through 2946. *Shoalest depth is 20 ft in Lat. 18°03'1.11" Long 65°48'19.43" Recommend deleting 17 foot on adding the 20 ft depth on future editions of the chart. C of E BP 30718 (1936) For compilers concurrence"*

An un-numbered pre-survey review item, a 29 foot depth reported at 18°03'03" North Latitude 65°48'09" West Longitude was developed by

Vesno 2225 on Julian Day 092 and the least depth found in this area was a 27⁶ foot depth at 18°03'04" North Latitude 65°48'12" West Longitude between positions 2914 and 2915. ²³¹⁴ ²³¹⁵ Recommend replacing the 29 ft⁸⁵ sounding with the 26 ft sounding from present survey on future editions of the chart.

An un-numbered 30 foot depth was reported at 18°03'04" North Latitude 65°48'03" West Longitude. This area was developed by Vesno 2225 on Julian Day 092 and the least depth found was a 35²⁷ foot sounding at 18°03'05" North Latitude 65°48'46" West Longitude between positions 2995 and 2926. ²⁴⁸⁷ ²³¹⁴ ²³¹⁵ The ~~30~~ 30 ft shoal ^{10.88} area that extends beyond the previous discussed 26 ft sounding. Recommend replacing the charted depths with the ones on the present survey to delineate this shoal.

An un-numbered shoal depth of 17 feet reported at 18°03'26" North Latitude 65°48'18" West Longitude was investigated by Vesno 2225 on Julian Day 090 and a least depth of 2² feet was found at 18°03'22.5" North Latitude 65°48'18.01" West Longitude between positions 2454 and 2455. ^{18.01} ²⁹⁶⁷ ²⁹⁶⁷ Recommend carrying the 17 ft wire drag long forward from the wire drag H-4302 (1923).

An un-numbered depth of 17 feet reported at 18°03'29" North Latitude 65°48'26" West Longitude was developed by Vesno 2225 on Julian Day 092 and the least depth found was a 26² foot depth at that point between positions 2994 and 2948. ²⁹⁹⁴ ²⁹⁴⁸ Lat 18° 03' 21.92" Long 65° 48' 25.35" Recommend replacing the ¹⁹²³ ^{Retain} charted 17 ft with the 17 ft sounding to the south from the present survey.

An un-numbered 16 foot shoal depth reported at 18°03'31" North Latitude 65°48'29" West Longitude was investigated by Vesno 2225 on Julian Day 097089 and a least depth of 18¹¹ feet was found at 18°03'31" North Latitude 65°48'29" West Longitude between positions 2988 and 2989. ²⁹⁸⁸ ²⁹⁸⁹ Recommend replacing the charted depth with the 11 ft present survey depth.

An un-numbered shoal depth of 21 feet at 18°03'08" North Latitude 65°48'44" West Longitude was developed by Vesno 2225 on Julian Day 091089 and a least depth of 19 feet was found at that point between positions 2816 and 2817. ²²⁰² ²²⁰³ at lat 18° 03' 08.65" Long 65° 48' 43.08" Recommend retaining the 21 as charted on future editions of chart.

An un-numbered depth of 17 feet ~~was reported~~ at 18°03'03" North Latitude 65°48'47" West Longitude. This area was developed by Vesno 2225 on Julian Day 091 and the least depth found was 20 feet at 18°03'07" North Latitude 65°48'20" West Longitude between positions 2804 and 2805. ²⁸⁰⁴ ²⁸⁰⁵ Recommend charting the 20 ft depth from the present survey on future editions of the chart.

An un-numbered depth of 29 feet ²⁸ reported at 18°03'00" North Latitude 65°48'46" West Longitude was investigated by Vesno 2225 on Julian Day 091 and a least depth of 29 feet was found at 18°03'02" North Latitude 65°48'45" West Longitude between positions 2794 and 2795. ²⁷⁹⁴ ²⁷⁹⁵ No indication of the 29 ft depth in the area. ²⁸ least depth is 49 ft there is a 27 ft at Lat 18°03'00.13" Long 65°48'43.38" Recommend deleting the 29 ft from the chart. Disregard 29 ft depth, poor control.

An un-numbered 18 foot sounding at 18°03'00" North Latitude 65°48'41" West Longitude was investigated by Vesno 2225 on Julian Day 091 and a least depth of 17 feet was found at that point between positions 2794 and 2795. ²⁷⁹⁴ ²⁷⁹⁵ Lat 18° 02' 58.97" Long 65° 48' 48.53" Recommend replacing the charted 18 ft sounding with the 17 ft from present survey on future editions of chart.

An un-numbered shoal depth of 18 feet reported at 18°03'03" North Latitude 65°48'38" West Longitude was developed on Julian Day 091 by Vesno 2225 and no evidence of shoaling was found in the immediate area. This development was conducted on Julian Day 091, Development #2, positions 2784 through 2830. This investigation was not very complete however there is no indication of any shoaling on the lines running thru this area. Recommend deleting the 18 ft and charting present survey depths in this area unless subsequent information indicates otherwise. C of E. BP. 30718 (1936)

An un-numbered pre-survey review item, an 18' foot sounding reported at 18°03'03" North Latitude 65°48'21" West Longitude was investigated by Vesno 2225 on Julian Day 092 and the shoalest depth found in the area C of E. BP. 30718 (1936)

was 18 feet in an area about 75 meters to the west of this point between positions 2911 and 2912. Lat 18°03' 02.92" Long 65°48' 23.03" *Recommend charting the 18 ft. from the present survey with other sounding to delineate a shoal feature in this area.*

An un-numbered pre-survey review item, a 13 foot sounding reported at 18°02'56" North Latitude 65°48'34" was developed by Vesno 2225 on Julian Day 089 and a least depth of 16 feet was found at that point between positions 2191 and 2192. Lat. 18°02'56.37" Long 65°48'33.47" *Recommend replacing the charted 13 ft depth with the 17 ft from the present survey. Retain 13 foot depth.* CofE. BP 30718 (1936)

An un-numbered depth of 15 feet was reported at 18°03'17" North Latitude 65°48'29" West Longitude. This area was developed by Vesno 2225 on Julian Day 091 and least depth of 10 feet was found at 18°03'19" North Latitude 65°48'30" West Longitude between positions 2754 and 2755. This area is just east of the area referred to as Bajo Luckenbach where depth shoal up to 5 feet. No un-numbered 15 ft found on pre-survey reviews dated 1961 up-dated 12/18/75

An un-numbered depth of 29 feet reported at 18°02'50" North Latitude 65°49'16" West Longitude was developed by Vesno 2226 on Julian Day 098 and a least depth of 22 feet was found at this point between positions 3294 and 3295. Lat. 18°02'50.04" Long 65°49'15.51" *Recommend replacing the 29 ft charted sounding with the 17 ft present survey depth. There is extensive shoaling in this area that should be charted from the present survey. Probably spoil from dredging.*

An un-numbered shoal sounding of 13 feet reported at 18°02'44" North Latitude 65°49'23" West Longitude was developed by Vesno 2223 on Julian Day 090 and the least depth found was a 13 foot sounding at 18°02'43"44.53" North Latitude 65°49'23" West Longitude at position 527. The area around this sounding is shoal with depths of 13-18 feet in the area. *Recommend charting the shoal depths from the present survey in this area.*

An un-numbered pre-survey review item, a 17 foot sounding reported at 18°02'13 North Latitude 65°49'09" West Longitude was developed by Vesno 2223 on Julian Day 090 and a depth of 17 feet was found at this point between positions 225 and 226. *There is shoaler water immediately to the north of this point. Lat 18°02'13.62 Long 65°49'09.86 Recommend revising the charted 18 ft curve to reflect the present survey depths in this area.*

An un-numbered shoal depth of 27 feet reported at 18°01'51" North Latitude 65°49'31" West Longitude was investigated by Vesno 2223 on Julian Day 089 and the least depth found was 23 feet at 18°01'51" North Latitude 65°49'31" West Longitude between positions 051 and 052. *Recommend deleting the 27 ft charted depth and revising the 30 ft curve in this area to agree with the depths from the present survey.*

An un-numbered pre-survey review item, a 28 foot shoal depth reported at 18°01'46" North Latitude 65°49'35" West Longitude was investigated by Vesno 2223 on Julian Day 089 and the least depth found was a 23 foot sounding at that point between positions 020 and 021. *Recommend revising the charted 30 ft curve in this area to agree with present survey depths.*

L. COMPARISON WITH THE CHART

Shoreline manuscript T-12143 provided prior to the survey dates show a large reef in the vicinity of 18°02'30" North Latitude 65°49'20" West Longitude with smaller reefs on the northern and western sides of the larger reef. Chart 25661 (formerly C&GS Chart 918), 1:10,000 7th edition, May 24, 1975 shows the large reef and one smaller reef as exposed or awash, however, breakers were visible on all except for the western side of the reef. *Concur*

The MonArk (Vesno 2227) was used to obtain depths on the reef itself. The MonArk used various courses to steer a Del Norte arc taking random depths. These were incorporated into a Master Tape (J.D. 099, pos 1032-1075) which is included with this report.

Vesno 2223 was used to develop the smaller reefs. There are 3 such reefs. The first is located at 18°02'32" North Latitude 65°49'35" West Longitude where a least depth of 4⁵ feet was found between positions 1020 and 1021. The second is located at 18°02'34" North Latitude 65°49'31" West Longitude where a least depth of 4³ feet was recorded with a Detached Position Number 1025, and the third is at 18°02'33" North Latitude 65°49'31" West Longitude where a least depth of 2' feet was found by MonArk (Vesno 2227) at Detached Position 1063.

Launch #1002 (Vesno 2225) encountered one small reef not indicated on the chart. It is located at 18°03'25" North Latitude 65°49'07" West Longitude with a least depth of 8⁸ feet found at position 2239. It is recommended that aerial photographs, shoreline manuscript T-12143 and this survey be consulted to ascertain the boundaries and least depths of these reefs and that Chart 25661 be amended to show these reefs and indicate the reef to the northwest of the large reef as submerged rather than exposed at Mean Low Water. *Concur*

The channel leading to Yabucoa Harbor was dredged to 49 feet as of May 1971 as indicated on Chart 25661. This survey shows depths of around 40³ feet in ^{the northwest part} some areas of the channel. It is recommended that a note in Notice to Mariners be made and the local authorities be notified as to the results of this survey. *See Verifiers Report.*

Depth agreement between this survey and the charted depths were in good agreement with the exception of a few shoal depths mentioned in the Pre-survey Review Items.

M. ADEQUACY OF THE SURVEY

This survey is complete and adequate to supersede all prior surveys.

N. AIDS TO NAVIGATION

There are ¹⁰ 11 fixed aids to navigation located within the survey limits of MI-5-1-76 (H-9609). They are aids indicating the limits of the channel leading to Yabucoa Harbor. These aids were located by ship's personnel using third order traverse or triangulation. The positions of the aids were determined and incorporated onto the Signal Tape and plotted on the Development Overlay Sheet using Program RK 201, Grid, Signal, and Lattice Plot. All aids adequately served their purpose.

O. STATISTICS

Linear Nautical Miles Mainscheme - - - - -	170.5
Linear Nautical Miles Development - - - - -	33.3
Linear Nautical Miles Crosslines - - - - -	22.0
Total Linear Miles Hydrography - - - - -	225.8
Total Square Nautical Miles Surveyed - - -	6.5
Total Position Used - - - - - - - - - - -	2509
Bottom Samples - - - - - - - - - - - - - - -	70

P. MISCELLANEOUS

Fresh to strong easterly winds predominant during survey operations created dangerous surf conditions. This limited hydrography to relatively deep water in many areas.

The heavy surf and small range of tide prohibited delineation of the low water line by hydrographic methods.

Yabucoa Harbor itself is manmade and due to dredging operations at the Union Carbide facility on the eastern shore the bottom is constantly subject to change. Also, the water on either side of the channel leading to Yabucoa Harbor is shoaler than the channel water indicating runoff into the channel could cause a change of depth in the channel. This is borne out by this survey as depths of around 40 feet were recorded in the channel where the charted depth is 49 feet.

Q. RECOMMENDATIONS

It is recommended that the changes referred to under Section K, Pre-survey Review Items and Section L, Comparisons With the Chart be incorporated onto a new chart of the area.

R. AUTOMATED DATA PROCESSING

The following Hydroplot programs were used for this survey:

RK 111	Range-Range Real Time Plot	Version 8/7/74,1/30/76
RK 201	Grid, Signal and Lattice Plot	Version 4/18/75
RK 211	Range-Range Non-Real Time Plot	Version 8/16/74
RK 300	Utility Computations	Version 5/22/75
RK 301	Visual Station Table Indicator (VISTA)	Version 8/12/74
RK 330	Data Reformat and Checker	Version 3/12/76
PM 360	Electronic Corrector Abstract	Version 3/21/74
AM 602	Extended Line Oriented Editor (ELINORE)	Version 5/21/75

Note: Both versions of RK 111 had to be used as the 'new' version would not load into the launch computers on many occasions.

S. REFERENCES TO REPORTS

Horizontal Control Report OPR-423-MI-76

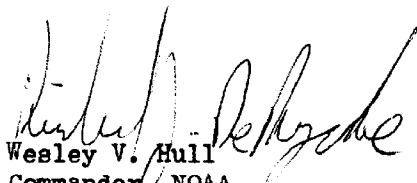
Respectfully submitted,

Robert G. Mann for
Douglas L. Terry, ENS. NOAA

APPROVAL SHEET

The field work and data processing for this hydrographic survey were performed under my immediate daily supervision and are approved by me.

This survey is considered adequate and complete for charting.



Wesley V. Hull
Commander, NOAA

SIGNAL LIST

12	03	48175	065	48	22539	250	0123	000000
13	03	15331	065	49	42535	250	0010	000000
13	02	39671	065	48	34233	250	0010	000000
13	03	09382	065	50	12507	243	0003	000000
13	03	21395	065	50	21160	254	0007	000000

SIGNAL NAMES LIST

12	03	48175	065	48	22539	250	0123	000000	0180653, 1968A
13	03	15331	065	49	42535	250	0010	000000	VOL 1, P 33
13	02	39671	065	48	34233	250	0010	000000	VOL 1, P 26
13	03	09382	065	50	12507	243	0003	000000	VOL 4, P 1
13	03	21395	065	50	21160	254	0007	000000	VOL 1, P 42

ALL SIGNAL CONTROL REFERENCED TO QUAD AND STATION NUMBER OR USGS. PREVIOUSLY ESTABLISHED SUPPLEMENTAL CONTROL ARE REFERENCED TO AMC CODES. SUPPLEMENTAL CONTROL ESTABLISHED DURING CURRENT SEASON REFERENCED TO FIELD OBSERVATION VOLUMES AND PAGE. COMPUTATIONS AND COORDINATIONS ARE CONTAINED IN THE COMPUTATION NOTEBOOK ACCOMPANYING ORIGINAL CONTROL REPORT, 1976. PHOTO POINTS ARE REFERRED TO AS FOLLOWS.

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

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

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- PHOTO FIELD PARTY
- COMPILATION ACTIVITY
- FINAL REVIEWER
- QUALITY CONTROL & REVIEW GRP.
- COAST PILOT BRANCH

(See reverse for responsible personnel)

Replaces C&GS Form 567.

TO BE CHARTED REPORTING UNIT (Field Party, Ship or Office)
 TO BE REVISED MT MITCHELL MSS-22 STATE PUERTO RICO LOCALITY PUERTO YABUCOA DATE 6-15-76
 TO BE DELETED

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.
 HAVE NOT

OPR PROJECT NO. OPR-516-MI-76 JOB NUMBER SURVEY NUMBER

CHARTING NAME	DESCRIPTION <small>(Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)</small>	LATITUDE		LONGITUDE		METHOD AND DATE OF LOCATION <small>(See Instructions on reverse side)</small>	OFFICE	FIELD	CHARTS AFFECTED
		° /	D.M. Meters	° /	D.P. Meters				
LIGHT	BREAKWATER 51 FT HIGH RADAR REFLECTOR FIXED RED LIGHT (PRIVATE MAINTAINED)	18 03	15.831	65 49	42.585	F-2-6-V 3-27-76			918(25661) 904(25650)
CHANNEL BEACON #2	30 FT HIGH FLASHING RED LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 02	39.671	65 48	34.233	F-3-6-V 3-27-76			918 904
CHANNEL BEACON #3	15 FT HIGH QUICK FLASHING GREEN LIGHT RADAR REFLECTOR PRIVATE MAINTAINED	18 02	36.715	65 48	44.482	F-3-6-V 3-27-76			918 904
CHANNEL BEACON #5	15 FT HIGH FLASHING GREEN LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 02	46.571	65 49	04.526	F-3-6-V 3-27-76			918
CHANNEL BEACON #6	15 FT HIGH FLASHING RED LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 02	52.966	65 49	01.408	F-3-6-V 3-27-76			918
CHANNEL BEACON #7	15 FT HIGH FLASHING GREEN LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 02	58.610	65 49	29.043	F-3-6-V 3-27-76			918
CHANNEL BEACON #8	15 FT HIGH FLASHING RED LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 03	04.770	65 49	25.713	F-3-6-V 3-27-76			908
CHANNEL BEACON #9	15 FT HIGH FLASHING GREEN LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 03	09.643	65 49	51.882	F-2-6-V 3-27-76			918
CHANNEL BEACON #10	15 FT HIGH FLASHING RED LIGHT EVERY 4 SEC RADAR REFLECTOR PRIVATE MAINTAINED	18 03	17.578	65 49	50.809	F-2-6-V 3-27-76			918
FRONT RANGE LIGHT	YABUCOA CHANNEL FRONT RANGE LIGHT 75 FT HIGH QUICK FLASHING PRIVATE MAINTAINED	18 03	23.498	65 50	12.181	F-3-6V 3-30-76			918 904

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	Commanding Officer Mt. Mitchell
POSITIONS DETERMINED AND/OR VERIFIED	Commanding Officer Mt. Mitchell
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
	FIELD ACTIVITY REPRESENTATIVE
	OFFICE ACTIVITY REPRESENTATIVE
	<input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64.)	
OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75	FIELD (Cont'd) B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982
FIELD I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection 5 - Field identified 6 - Theodolite 7 - Planetable 8 - Sextant A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75	II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75
*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.	**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

RESPONSIBLE PERSONNEL		ORIGINATOR
TYPE OF ACTION	NAME	<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
OBJECTS INSPECTED FROM SEAWARD	Commanding Officer Mt. Mitchell	
POSITIONS DETERMINED AND/OR VERIFIED	Commanding Officer Mt. Mitchell	FIELD ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		<input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64.)		
OFFICE I. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75	FIELD (Cont'd) B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982	
FIELD I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75	II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75	
III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75	**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.	
*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.		

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

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

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
- GEODETIC PARTY
- PHOTO FIELD PARTY
- COMPILATION ACTIVITY
- FINAL REVIEWER
- QUALITY CONTROL & REVIEW GRP.
- COAST PILOT BRANCH

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT: **MT MITCHELL MSS-22** STATE: **PUERTO RICO** LOCALITY: **GUAYANES (PT FRAILLE) (PALMAS DEL MAR)** DATE: **6-15-76**

The following objects HAVE HAVE NOT been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO. _____ JOB NUMBER _____ SURVEY NUMBER _____

USCG REQUESTED _____ SPECIAL PROJECT _____

CHARTING NAME	DESCRIPTION <small>(Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses.)</small>	POSITION				METHOD AND DATE OF LOCATION <small>(See instructions on reverse side)</small>		CHARTS AFFECTED
		LATITUDE ° / ' / D.M. Meters	LONGITUDE ° / ' / D.P. Meters	DATE	FIELD			
LIGHT #6	PDM NORTH BREAKWATER LIGHT 16 FT OK FL W VIS 3 M RED SECTOR 203.5 TO 295.5 DEGREES TRUE	18 04	65 47	47.164	F-3-6-L 3/76	904 (25650) 918 (25551) 920 (25640)		
LIGHT #5	PDM SOUTH BREAKWATER LIGHT 11.5 FT FL G EV 6 SEC VIS 3 M	18 04	65 47	47.551	F-3-6-L 3/76	904 918 920		
LIGHT	PDM INNER NORTH BREAKWATER LIGHT	18 04	65 47	55.285	F-3-6-L 3/76	904 918 920		
LIGHT	PDM INNER SOUTH BREAKWATER LIGHT	18 04	65 47	45.920	F-3-6-L 3/76	904 918 920		

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	Commanding Officer Mt. Mitchell
POSITIONS DETERMINED AND/OR VERIFIED	Commanding Officer Mt. Mitchell
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	
INSTRUCTIONS FOR ENTRIES UNDER "METHOD AND DATE OF LOCATION" (Consult Photogrammetric Instructions No. 64)	
OFFICE I. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75	FIELD (Cont'd) B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982
FIELD I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field P - Photogrammetric L - Located Vis - Visually V - Verified 1 - Triangulation 5 - Field identified 2 - Traverse 6 - Theodolite 3 - Intersection 7 - Planetable 4 - Resection 8 - Sextant A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75	II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75 III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75
**FIELD POSITIONS are determined by field observations based entirely upon ground survey methods. **PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.	

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

U.S. DEPARTMENT OF COMMERCE

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

MT MITCHELL MSS-22

STATE

PUERTO RICO

LOCALITY

YABUCCA HARBOR

DATE

6-15-76

ORIGINATING ACTIVITY
 HYDROGRAPHIC PARTY
 GEODETIC PARTY
 PHOTO FIELD PARTY
 COMPILATION ACTIVITY
 FINAL REVIEWER
 QUALITY CONTROL & REVIEW GRP.
 COAST PILOT BRANCH
(See reverse for responsible personnel)

The following objects HAVE ~~XX~~ HAVE NOT been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO. OPR-516-MI-76

JOB NUMBER

SURVEY NUMBER

DATUM

POSITION

LATITUDE

LONGITUDE

OFFICE

FIELD

CHARTS
AFFECTED

DESCRIPTION
(Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)

REAR RANGE LIGHT
YABUCCA REAR RANGE LIGHT
140 FT HIGH, EQUAL INTERVAL LIGHT
PRIVATE MAINTAINED 6 SEC

18 03

35.882
D.M. Meters

65 50

37.686
D.P. Meters

F-3-6-V
3-30-76

918 (25661)
904 (25650)

RESPONSIBLE PERSONNEL		ORIGINATOR	
TYPE OF ACTION	NAME	<input type="checkbox"/> PHOTO FIELD PARTY	<input type="checkbox"/> HYDROGRAPHIC PARTY
OBJECTS INSPECTED FROM SEAWARD	Commanding Officer Mt. Mitchell	<input checked="" type="checkbox"/> HYDROGRAPHIC PARTY	<input type="checkbox"/> GEODETIC PARTY
POSITIONS DETERMINED AND/OR VERIFIED	Commanding Officer Mt. Mitchell	<input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> FIELD ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		<input type="checkbox"/> OFFICE ACTIVITY REPRESENTATIVE	<input type="checkbox"/> REVIEWER
		<input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE	
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64.)			
OFFICE 1. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75		FIELD (Cont'd) B. Photogrammetric field positions* require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982	
FIELD I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection P - Photogrammetric Vis - Visually 5 - Field Identified 6 - Theodolite 7 - Planetable 8 - Sextant A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75		II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75	
*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.		**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.	

VELOCITY CORRECTOR TAPE LISTING

Vesnos 2223, 2225, 2226

000080 0 0002 0001 000 222300 009609
000120 0 0004
000160 0 0006
000220 0 0008
000260 0 0010
000320 0 0012
000360 0 0014
000400 0 0016
000450 0 0018
000500 0 0020
000550 0 0022
000590 0 0024
000650 0 0026
000680 0 0028
000730 0 0030
000760 0 0032
000810 0 0034
000860 0 0036
000900 0 0038
000940 0 0040
000980 0 0042
001030 0 0044
001150 0 0050
001310 0 0060
001560 0 0070
001760 0 0080
001960 0 0090
002160 0 0100
002360 0 0110
002560 0 0120
002750 0 0130
002950 0 0140
003150 0 0150
003350 0 0160
999999 0 0170

VELOCITY CORRECTOR TAPE LISTING

MI-5-1-76

H-9609

VESNO 2227

000000	1	0001	0002	000	222700	009609
000003	0	0000				
000006	0	0001				
000009	0	0002				
000012	0	0003				
000015	0	0004				
000018	0	0005				
000021	0	0006				
000024	0	0007				
000027	0	0008				
000030	0	0009				
000033	0	0010				
000036	0	0011				
000039	0	0012				
000042	0	0013				
000045	0	0014				
000048	0	0015				
000051	0	0016				
000054	0	0017				
000057	0	0018				
000060	0	0019				
000063	0	0020				
000066	0	0021				
000069	0	0022				
000072	0	0023				
000075	0	0024				
000078	0	0026				
000081	0	0027				
000084	0	0028				
000087	0	0029				

8/10/76

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center:

Hourly heights are approved for

Tide Station Used (NOAA Form 77-12): Yabucoa Harbor

Period: March 3 - April 18, 1976

HYDROGRAPHIC SHEET: H-9609

OPR: 423

Locality: Off the southeast coast of Puerto Rico

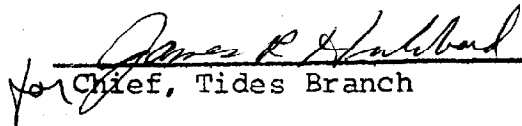
diurnal

Plane of reference (mean ~~LOW~~ low water): 1.62 ft.

Height of Mean High Water above Plane of Reference is

0.8 ft.

Remarks: Zone direct


for Chief, Tides Branch

GEOGRAPHIC NAMES

Name on Survey	Source of Name										
	A	B	C	D	E	F	G	H	K		
	ON CHART NO.	ON PREVIOUS SURVEY NO.	ON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	GRAND McNALLY ATLAS	U.S. LIGHT LIST			
BAYO LUCKENBACH											1
CAÑO DE SANTIAGO ✓											2
CARIBBEAN SEA ✓											3
PLAYA DE GUAYANÉS ✓											4
PUERTO YABUICOA											5
PUNTA GUAYANÉS ✓											6
PUNTA QUEBRADA HONDA ✓											7
RÍO GUAYANÉS ✓											8
											9
											10
											11
											12
											13
											14
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											20
											21
											22
											23
											24
											25

APPROVED

Chas. B. Harrington

CHIEF GEOGRAPHER - C3x8

10 July 1978

APPROVAL SHEET
FOR
SURVEY H- 9609

- A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position printout has ~~has not been made~~. A new final sounding printout has ~~has not been made~~.
- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Provisional Hydrographic Manual. Exceptions are listed in the Verifier's Report.

Date: 4/19/78

Signed: Billy Stephenson
Acting
Title: Chief, Verification Branch

HYDROGRAPHIC SURVEY STATISTICS

H-9609

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET		1	BOAT SHEETS & PRELIMINARY OVERLAYS		2 & 4	
DESCRIPTIVE REPORT		1	SMOOTH OVERLAYS: POS. ARC, EXCESS		2	
DESCRIP-TION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES	X		X			1-tides & misc. data
CAHIERS	1 with printouts		X			
VOLUMES	4					
BOXES			1-smooth			

T-SHEET PRINTS (List) 1-Chart mark-up (25661)
SPECIAL REPORTS (List) Horizontal Control & Calibrations Report, Field Ed. Report

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

PROCESSING ACTIVITY	AMOUNTS		
	PRE-VERIFICATION	VERIFICATION	TOTALS
POSITIONS ON SHEET			2509
POSITIONS CHECKED		250	
POSITIONS REVISED		25	
SOUNDINGS REVISED		50	
SOUNDINGS ERRONEOUSLY SPACED		0	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		0	
	TIME - HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	6		
VERIFICATION OF CONTROL		4	
VERIFICATION OF POSITIONS		69	
VERIFICATION OF SOUNDINGS		78	
COMPILATION OF SMOOTH SHEET		64	
APPLICATION OF TOPOGRAPHY		24	
APPLICATION OF PHOTOBATHYMETRY		0	
JUNCTIONS		16	
COMPARISON WITH PRIOR SURVEYS & CHARTS		32	
VERIFIER'S REPORT		16	
OTHER		0	
TOTALS	6	303	309

Pre-Verification by J. Bradford, F. Lamison	Beginning Date 08/12/77	Ending Date 09/15/77
Verification by J. Bradford, R. Hill, L. Cram	Beginning Date 10/15/77	Ending Date 04/03/78
Verification Check by G. Trefethen	Time (Hours) 10	Date 04/14/78
Marine Center Inspection by Hydrographic Inspection Team (AMC)	Time (Hours) 15	Date 04/19/78
Quality Control Inspection by RW Derkazarian	Time (Hours) 64	Date 6/24/78
Requirements Evaluation by J. Baumgardner	Time (Hours) 7	Date 8/25/78

6KM

Reg. No. 9609

The Computer and Excess Sounding Cards for this survey have not been corrected to reflect the changes made to the Computer Card and Excess Card Printouts at this time of the review.

When the cards have been updated to reflect the final results of the survey the following shall be completed:

CARDS CORRECTED

DATE _____ TIME REQ'D _____ INITIALS _____

REMARKS:

Reg. No. _____

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE 9-23-80 TIME REQ'D _____ INITIALS JMa

REMARKS:

2. Control and Shoreline

a. The control for this survey is adequately described in Section F of the Descriptive Report. For additional information see the Horizontal Control Report for OPR-423-MI-76.

b. The shoreline for this survey was transferred from final reviewed photogrammetric manuscripts T-12143 and T-12144 of 1970-76. All rocks and elevations come from these T-sheets as the field did no work on these items close inshore.

3. Hydrography

a. The agreement of soundings at crossings on this survey is adequate.

b. The depth curves are adequate to delineate the basic bottom configuration, with the following exceptions:

(1) No low-water line was delineated as called for in the project instructions under Section 4.9. *Heavy seas and strong winds precluded hydro. operations.*

(2) The inshore 6-foot curve could not be drawn with any continuity due to lack of hydrographic information.

(3) It would have been desirable to run additional lines in the offshore area to better delineate the deep water curves (120, 140, and 180). *Deep water curves are adequately defined.*

c. The field unit adequately developed the bottom configuration and least depths, with the exceptions noted above in item b.

4. Condition of Survey

The smooth sheet and accompanying overlays, hydrographic records and reports are adequate to conform to the requirements of the Hydrographic Manual, with the following exceptions:

a. No comparison was made with prior surveys on the boat sheet.

b. Poor selection of control on the southeast edge of the sheet required that over 100 positions with soundings be deleted from the data on the smooth, sounding in excess level "9". A close examination of the boat sheet may have resulted in this problem being resolved in the field.

5. Junctions

Adequate junctions were effected with the following surveys:

- H-8637 (1962) to the northeast (unverified)
- H-9610 (1976) to the southeast
- H-9608 (1976) to the southwest

Attention is directed to the following items necessary to complete the junctions:

a. H-8637 (1962) has been forwarded to headquarters and a copy was used at Atlantic Marine Center to junction with. It will be necessary to ink the junction on H-8637 (1962) at headquarters. *Adequacy of jct. will be considered at time of review of H-8637.*

b. Some difficulty was encountered when junctioning with H-9610 (1976). It was considered that the problem lies with the scale difference between H-9609 (1:5,000) and H-9610 (1:20,000). Another source of possible problems could be that the junctional area is on the extreme slope of the continental slope. The curves used for charting should come from the larger scale survey in applicable areas.

c. The junction with H-9608 (1976) and the present survey is from a junctional strip from the magnetic tape at Atlantic Marine Center as the smooth sheet for H-9608 is at headquarters. It will be necessary for Quality Control to ink the curves on the smooth sheet for H-9608. *See Q.C. Report*

6. Comparison With Prior Surveys

- a. H-2584 (1902) 1:20,000 ✓
- H-3007 (1909) 1:10,000 ✓

These are the most recent surveys that cover the entire survey area. A comparison between prior and present survey depths during verification reveals variable differences of 1 to 4 feet, except in areas along the offshore slope. Here, deeper soundings substantially differ in depth. These differences are attributed to different survey methods.

Numerous differences occurred in shoreline; a ship basin has been constructed in latitude 18° 03' 15", longitude 65° 50' 00" with a ship channel dredged to a depth of 49 feet in 1971. The reef in latitude 18° 02' 30", longitude 65° 49' 15" uncovers at MLW on prior surveys, now has from 2 to 8 feet of water over it at MLW. In general it appears that some erosion has changed the shoreline.

Numerous dashed-circle items from the Presurvey Review were taken from these prior surveys. Detailed information concerning these items can be found in the Descriptive Report, ~~and the chart mark-up to accompany this survey.~~ Several bottom characteristics have been carried forward.

b. H-4302 (1923) 1:10,000 W.D.

There were 6 soundings charted from this wire drag survey, 1 was a hang and the other 5 were groundings and one of these was a detached sounding on a bottom sample. The field developed each of these and addressed them in the Descriptive Report under Presurvey Review items. The hang located in latitude 18° 03' 26", longitude 65° 48' 18" was brought forward to the present survey as the field development did not disprove the existence of this depth, *several additional sdgs. and bottom characteristics have been carried forward during the Quality Evaluation.*

The present survey is considered adequate to supersede the prior surveys ~~and wire drag survey~~, with the ~~one~~ exceptions noted above, *in the common area.*

7. Comparison With Chart 25661 (7th Edition, May 24, 1975)

a. Hydrography

Most of the charted hydrography originates with the previously discussed prior surveys, some charted hydrography ~~appears to have come from a dredging plan, and other sources not readily available at the time of the comparison.~~ *a U.S.C. & E. BP 30718 (1936).* Significant differences between charted information and the present survey are discussed below:

(1) There are numerous bare rocks and rocks awash in the area from Punta Quebrada Honda to latitude 18° 02' 30". Most of these appear to have been charted from the prior surveys. There are a great many differences in this area when compared to the topographic information (T-12143). Recommend recharting these rocks as shown on the current topographic sheet.

(2) There are two charted dolphins in latitude 18° 03' 17", longitude 65° 50' 17". The topographic information has a catwalk in this area. Recommend charting this as a catwalk.

(3) Pier in ruins charted in latitude 18° 03' 47", longitude 65° 49' 19" originates with a pier from ~~H-3007 (1909)~~. *a U.S.C. & E. BP 30718 (1936).* No hydrographic or topographic information proves the existence of this pier ruins. Recommend this item remain as charted until more detailed information concerning its condition be ascertained.

(4) Numerous differences occur in the number and description of charted rocks from latitude 18° 03' 48", longitude 65° 49' 03" to Punta Guayanes. It was very difficult to ascertain where the charted information originated as the prior survey symbolization on the reproduction of the prior surveys is very unclear. Recommend applying this information from the topographic sheets, T-12143 and T-12144.

(5) There were numerous changes in the charted reef information in the survey area. This is adequately addressed under Section L of the Descriptive Report.

With the exceptions listed above, the present survey is considered adequate to supersede the charted information within the common areas.

b. Controlling Depths

There are three controlling depth notes in the survey area discussed as follows:

(1) A 49-foot controlling depth note for the channel leading to Yabucoa Harbor. The present survey reveals shoal depths from ~~42~~^{36 (change, 279)} to 45 feet in this channel. For further information see Section L of the Descriptive Report.

(2) A controlling depth note of "50 feet April 1971" exists for Yabucoa Harbor. The present survey information has shoal depths of from 45 to 48 feet in this harbor.

(3) The controlling depth notes "36 feet 1971 and 25 feet 1971" that appear on the edges of Yabucoa Harbor are in good agreement with present survey depths.

It is recommended that present survey depths be charted unless subsequent chart information indicates otherwise.

c. Aids to Navigation

The aids to navigation on this sheet are addressed under Section N of the Descriptive Report. The position of the aids adequately mark the intended features.

8. Compliance With Instructions

This survey does not adequately comply with the Project Instructions in the areas listed below:

a. Section 4.9 of the project instructions was not strictly

adhered to as no delineation of the low-water line was done. ^{Heavy seas}

b. No statement was made as to the disposition of the Presurvey Review items in the Descriptive Report. They were added by the verifier.

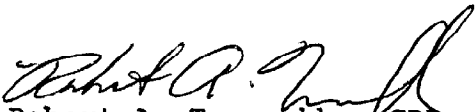
9. Additional Field Work

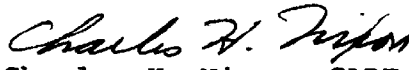
This is a ^{Adequate} ~~good~~ basic survey; however, it is felt that this survey needs additional inshore work to better delineate the 6-foot curve and to delineate the low-water line. ^{Tide range = 1.8 ft.}

Inspection Report
H-

Any verification errors regarding procedures and presentation of survey data detected during inspection by the Hydrographic Inspection Team have been corrected before submission for administrative approval. HIT comments regarding quality of field work, compliance with instructions, and adequacy of the survey have been incorporated within the Verifier's Report.


Examined and Approved:
Hydrographic Inspection Team
Date:


Robert A. Trauschke, CDR, NOAA
Chief, Processing Division

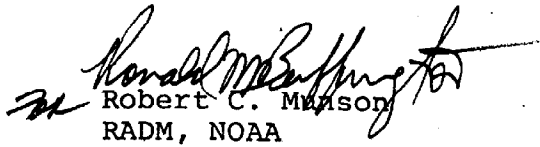

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Director, Atlantic Marine Center



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C352/RWD

June 29, 1978

TO: *A. J. Patrick*
A. J. Patrick
Chief, Marine Surveys Division

THRU: Chief, Quality Control Branch

FROM: R. W. DerKazarian *RW DerKazarian*
Quality Evaluator

SUBJECT: Quality Control Report for H-9609 (1976), Puerto Yabucoa and Vicinity, Southeast Coast, Puerto Rico

A quality control inspection of H-9609 was accomplished to monitor the survey for obvious deficiencies with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, shoreline transfer, smooth plotting, decisions and actions taken by the verifier, and the cartographic presentation of data. In general, it was found to conform to the National Ocean Survey's standards and requirements except as stated in the Verifier's Report, the HIT Report, and as follows:

1. During the quality evaluation of H-9609 it was necessary to transfer shoaler soundings from H-9608 (1978) to the present survey; this should have been accomplished during verification.
2. Station names were added to the position-arc overlay during the quality evaluation.
3. In the superseding statement of the Comparison with Prior Surveys, the verifier superseded wire-drag survey H-4302 (1923). A wire-drag survey is not to be superseded by a conventional survey. Several wire-drag soundings that were not considered disproved by the present survey investigation have been carried forward during the quality evaluation.
4. Several notations of "subm reef" are shown on the smooth sheet. These notations should have been correctly shown as "rky" in accordance with section 7.3.7.6 of the Hydrographic Manual.
5. The shoalest depth in the channel leading into Yabucoa Harbor is 32 feet, not 41 feet as indicated in the Verifier's Report.



6. Section 7a of the Verifier's Report is supplemented by the following:

(6) Several charted shoaler depths that are at variance with the present survey originate with Corps of Engineers Bp-30718 (1936). They are referred to the compiler for identification, evaluation, and appropriate action.

cc:
C35
C351

