

10169

Diagram No. 4116-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. RA-2.5-2-84
Office No. H-10169

LOCALITY

State Hawaii
General Locality Southeast Coast of Molokai
Locality Kamalo and Kalaeloa Harbor

1984

CHIEF OF PARTY
CDR J.P. Vandermeulen.....

LIBRARY & ARCHIVES

DATE August 20, 1985

☆U.S. GOV. PRINTING OFFICE: 1980-766-230

10169

Area 6
CHTS

19353
19347
19351
19340
19004

19010-KC

TO SIGN OFF SEE
"RECORD OF APPLICATION"

HYDROGRAPHIC TITLE SHEET

H-10169

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

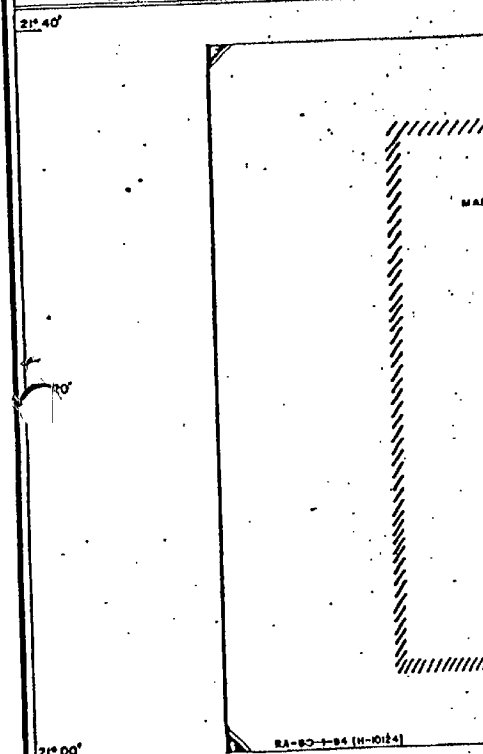
FIELD NO.

RA 2.5-2-84

State HawaiiGeneral locality Southeast Coast of MolokaiLocality Kamalo and Kalaeloa HarborsScale 1:2500 Date of survey March 29 & May 1-3, 1984Instructions dated January 9, 1984 Project No. OPR-T126-RA-84Vessel Launch (2126)Chief of party CDR J. P. VandermuelenSurveyed by LT S.R. Iwamoto, ENS J.L. Judson, ENS K.W. Barton, ENS C.C. Wilson,
ENS J.S. Griffin, ENS M.H. PickettSoundings taken by echo sounder, ~~hand lead, pole~~ DSF-6000NGraphic record scaled by RAINIER PersonnelGraphic record checked by PAINIER Personnel

Evaluated

~~Processed~~ by A. Luceno Automated plot by PMC Xynetics PlotterVerification by P. NilandSoundings in ~~fathoms~~ feet at ~~MLW~~ MLLWREMARKS: Marginal notes in black by Evaluator. Separates are filed with the
Hydrographic data.STANDARDS C'D 8-23-85C. LayAWOIS/SURF M&M 12/31/86SC 4-3-97



OPR-TI26-RA-84
HYDROGRAPHIC SURVEY
HAWAII, HAWAIIAN ISLANDS

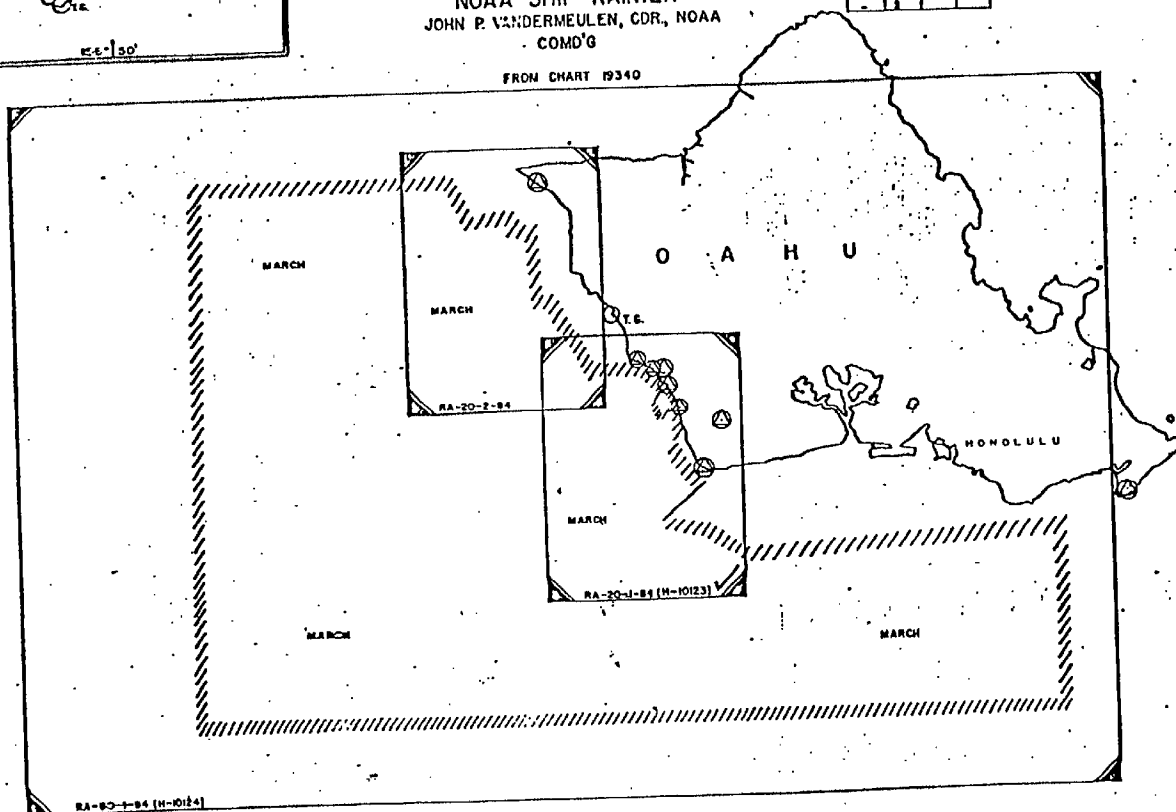
FEB. 28 - MAR. 31, 1984

NOAA SHIP RAINIER
JOHN P. VANDERMEULEN, CDR, NOAA
COMD'G

FROM CHART 19340

FEB	MAR	APR	MAY
	728.25		
	1302.4		
	0.83		
	20.4		
	400.7		
	3		
	1		
3	6		
-	-		
-	1		
1	2		
	2		

90 NM SOUNDING
 LNM SOUNDING LINE
 90 NM SIDE SCAN SONAR
 LNM SIDE SCAN SONAR
 LNM MISCELLANEOUS DISTANCE
 BOTTOM SAMPLES (GRAB)
 WATER SAMPLES ANALYZED (SALINITY)
 CONTROL STATIONS (ELECTRONIC)
 HANSEN CAST (B)
 SOUND VELOCITY, TEMPERATURE, DEPTH CAST
 TIDE GAGE (O)
 STATIONS ESTABLISHED BY TRAVERSE



BA-83-1-84 (H-10124)

A. PROJECT

This hydrographic survey was conducted in accordance with Project Instruction OPR-T126-RA-84 dated 9 January 1984, change number 1 dated 16 February 1984, and change number 2 dated 16 April 1984. The PMC OPORDER, Hydrographic Manual (4th Edition), and Hydrographic Guidelines are also applicable. ✓

B. AREA SURVEYED

This is a navigable area survey of the harbors of Kamalo and ~~Pukoo~~^{Kalaeloa} on the southeast side of the island of Molokai, Hawaii. An investigation of Kalaeloa Harbor which lies between Kamalo and Pukoo harbors was performed at the request of the Army Corps of Engineers. The survey area extends from Latitude 21°02'00"N. to 21°04'37"N and from Longitude 156°47'37"W to 156°53'03"W. Hydrographic operations began on 29 March 1984 (JD 089) and were completed on 3 May 1984 (JD 124). ✓

C. SOUNDING VESSEL

Hydrographic data for this survey was collected from Jensen survey launches ~~RA-5 and RA-6~~ designated vessel numbers ~~2125 and 2126, respectively.~~ ✓

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

~~Both~~^{The} survey launches ~~were~~^{was} equipped with Raytheon DSF-6000N dual beam echo sounders. See Table I, SOUNDING EQUIPMENT, for a list of equipment used by each launch and inclusive dates. ✓

Depths on this survey ranged from 1 foot to ~~81~~⁷⁷ feet.

TABLE I
SOUNDING EQUIPMENT

<u>LAUNCH</u>	<u>DATES</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>
2125	JD 120-124	Raytheon DSF-6000N	A119N
2126	JD 089-124	Raytheon DSF-6000N	⁰ A143N

The DSF-6000N echo sounder was set to digitize on the narrow beam at all times, therefore there were no junctioning problems resulting from the use of the wide and narrow beams.

During this survey the DSF-6000N (S/N A103N) in vessel 2126 could not be made to operate in the dual beam mode without extraneous stray appearing in the water column of the graphic record. Therefore this echo sounder was operated in the narrow beam only mode.

Bar checks were performed daily for both beams of the DSF-6000N fathometer as per the Provisional Operating and Processing Instructions for the DSF-6000N Echo Sounder. All bar checks were performed within the survey area. The bar checks were used to confirm proper system function, and bar check data were used to determine velocity corrections. ✓

To determine the velocity corrections the draft was taken to be the historical value 1.8 feet and the correction table derived from the bar check data indicates an apparent instrument error of 0.8 foot for survey launches ~~2125 and~~ 2126. The bar check data was extrapolated beyond the bar check depth of 36 feet in order to obtain velocity correctors to the maximum survey depth of ~~81~~ feet.

*Refer to sect. 1
of Eval. Report.*

The final field sheets were plotted with a preliminary velocity correction table. It was necessary to create the preliminary velocity table with 0.4 foot correction increments instead of the required 0.2 foot increments due to a bug in Hydroplot program RK-216 which would not allow a longer velocity tape when using the new ASR-43 Teletypes. A printout of the preliminary velocity correction table may be found in the separates following the text.

*see processed
data listing for
revised velocity
table.*

Sea conditions during this survey were variable depending on the launches location in relation to land and coral formations; winds varied from 15 to 30 knots and seas from 1 to 3 feet. The persistent easterly trade winds resulted in unavoidable marginal survey conditions making it impractical to suspend surveying operations as per Hydrographic Guideline 31. Corrections for heave were applied during the scanning of the graphic records when required, as per section 4.9.8.2 of the Hydrographic Manual.

Launches ~~2125 and 2126~~ ^{was} ~~were~~ tested for settlement and squat, and correctors were determined in increments of 0.2 feet as required by Section 4.4.9.2 of the Hydrographic Manual. All settlement and squat correctors for this survey were less than 0.2 foot and were not applied to sounding data as per Section 4.4.9.2. ✓

TC/TI tapes were made in accordance with PMC OPORDER, Appendix Q. Printouts of the TC/TI tapes are included in the separates following the text.

For further details on corrections to echo soundings for this survey see Corrections to Echo Soundings Report OPR-T126-RA-84.

E. HYDROGRAPHIC SHEETS

The ~~two final field sheets~~ designated RA-2.5-1W-84 (Kamalo Harbor) and ~~RA-2.5-1E-84 (Pukee Harbor)~~ ^{was} ~~were~~ prepared on the RAINIER using the PDP8/E Hydroplot system which produces modified transverse Mercator projections. A list of parameters used to define these field sheets is provided in the separates following the text. *Refer to sect. 1 of Eval. Report.*

A sheet designated RA-2.5-1C-84 for the chart investigation of Kalaeloa Harbor was prepared and forwarded to N/CG222 through the Pacific Marine Center.

All data and accompanying field records will be sent to Pacific Marine Center for verification.

F. CONTROL STATIONS

One new control station was established and ^{two} ~~five~~ stations were recovered for this survey. Station KAMALO 3 1984 was established to Third Order Class I standards. Refer to the Horizontal Control Report, OPR-T126-RA-84 for details. ✓

G. HYDROGRAPHIC POSITION CONTROL

Range-Azimuth was the only method used for hydrographic position control. Motorola Mini-Rangers and Wild T-2 theodolites (S/N 75599E and S/N 57259) were the instruments used. The following tables summarize the location of all Mini-Ranger mobile and shore equipment.

MINI-RANGER MOBILE EQUIPMENT

<u>VESSEL</u>	<u>CONSOLE</u>	<u>R/T S/N</u>
2125	715	1635
2126	711	B1405

MINI-RANGER SHORE EQUIPMENT

<u>CODE</u>	<u>TRANSPONDER S/N</u>	<u>STATION #</u>
E	911721	101
F	911711	100
0	C1789	100
2	B1106	101

Initial Mini-Ranger calibrations for vessel 2126 were performed in Honolulu, Hawaii on 26 April 1984. ~~Initial calibrations for vessel 2125 were performed in Kamale Herber, Molokai, Hawaii on 29 March 1984. An ending baseline calibrations for vessel 2126 was not performed. Ending calibrations for vessel 2125 were performed in Seattle, Washington 23 May 1984.~~

Two Mini-Rangers were set up at each Range-Azimuth station and both rates were collected by the ASI data loggers. The two rates were averaged and when the average was within a meter of range 1, range 1 was taken to be the truth. When the difference between range 1 and the average was greater than a meter, then the average, taken to the nearest even meter, was taken to be the truth. Obvious flyers were eliminated by interpolating between fixes. The final baseline corrections for the two ranges were averaged together to obtain a final range corrector for each Range-Azimuth setup. This procedure was necessary in order to meet the horizontal accuracy requirements for the 1:2500 survey scale and is in accordance with change number two of the project instructions.

Two calibrations were performed daily on vessel 2126 using Day Beacon #4 as a static calibration check. ~~Twice daily calibration for vessel 2125 were done using direct comparisons with the Hewlett Packard Model 3808 geodimeter.~~ Mini-Ranger performance was good and confirmed baseline corrector values. For more information concerning electronic control for this survey refer to the Electronic Control Report, OPR-T126-RA-84.

*Initial base line
calib. used.*

H. SHORELINE

The ~~shoreline~~^{shoreline} was transferred^{to the fieldsheet} from enlargements of chart 19353 9th edition April 22 1978 and is for orientation only.

Sounding operations were conducted as near to shore and reef areas as necessary to meet the requirements of a navigable area survey. Numerous rocks and reefs previously shown on the chart and prior hydrographic surveys but outside the navigable area were not specifically investigated.

I. CROSSLINES

A total of ^{1.6}~~2.5~~ nautical miles of crosslines were run during the survey, representing 20 percent of the mainscheme mileage. Agreement of soundings at the crossings was excellent, generally within 1 foot and not exceeding 2 feet in areas of steep bottom gradients.

J. JUNCTIONS

This survey does not junction with any contemporary surveys.

K. COMPARISON WITH PRIOR SURVEYS

This survey was compared to the following prior surveys:

<u>SURVEY</u>	<u>SCALE</u>	<u>YEAR</u>
H-4456	1:5,000	1925
H-4457	1:5,000	1925
H-8829	1:5,000	1965
H-8882	1:10,000	1965
H-8881	1:5,000	1965

See sect. 6
of Eval. Report.

In the ^{northern} area of Kamalo Harbor survey soundings were generally 5^{to 10} percent ^{shallower} deeper when compared to prior survey H-4457. In areas of steeply sloping bottom near the harbor entrance and the reef edges differences of up to 10 feet exist. These differences can be expected to occur in these areas of steeply sloping bottom when surveying at a very large scale using narrow beam echo sounders.

~~In the area of Pukeo Harbor soundings south of latitude 21-04-10N were generally within 2 feet when compared to prior survey H-8829. North of latitude 21-04-10N dredging has occurred with the development of Pukeo Harbor into a small boat harbor. The depths in this area have been increased from an average of 8 to 13 feet. On JD 124 divers performed a search in the area of the submerged piles at 21-04-20N, 156-47-57W and could not find any remaining evidence of their existence. Also on JD 124 divers verified the existence of the dangerous submerged ruins at the entrance to the Pukeo Fishpond at 21-04-22N, 156-48-03W. The following features were discovered during this survey which are not found on survey H-8829.~~

~~a) A submerged rock covered by 4 foot water at MLLW at 21-04-08.5N 156-48-04.9 (pos. # 5025) was found during this survey. It is recommended that this rock be charted.~~

~~b) A submerged coral head covered by 5 foot water at MLLW at 21-04-13.4N 156-48-05.2W (pos. # 5056) was found during this survey. It is recommended that this coral head be charted.~~

~~c) A submerged rock covered by 1 foot water at MLLW at 21-04-18.4N 156-48-00.8W was found during this survey. It is recommended that this rock be charted.~~

~~In comparing this survey with prior survey H-4456, the depths in the area of Pukeo Harbor follow the same general pattern as prior survey H-8829 above. Survey H-4456 does show that the pier which is now gone was in existence at that time. Also shown on that survey was a pair of range markers which would be extremely useful for present users attempting to navigate through the reef entrance.~~

No comparisons were made between prior surveys and the chart investigation of Kalaeloa Harbor as there are no prior surveys available.

L. COMPARISON WITH CHART

This survey was compared with a 1:2500 scale enlargement of Chart 19353, 9th edition, dated 22 April 1978.

In the area of Kamalo Harbor survey soundings were generally 10 percent deeper than the charted soundings. The charted soundings also did not agree with prior survey H-4457 in this area. Numerous differences exist in areas of steeply sloping bottom as noted in section K. Most notably a 6 foot shoal charted at 21-02-17.1N, 156-42-47W is most probably the same shoal found at 21-02-16.7N, 156-42-47.5W. The following are major differences found between this survey and chart 19353 in the area of Kamalo Harbor.

<u>Latitude</u>	<u>Longitude</u>	<u>Chart 19353</u>	<u>Survey Depth</u>
21-02-33N	156-52-42W	14 Ft	37-40 Ft
21-02-31.5N	156-52-46W	26 Ft	43-45 Ft
21-02-30N	156-52-46.5W	29 Ft	44-47 Ft
21-02-21N	156-52-44W	23 Ft	48-51 Ft
21-02-12N	156-52-48W	23 Ft	64-67 Ft
21-02-12N	156-52-46W	23 Ft	34-35 Ft

It is recommended that the above charted soundings be *concur* superseded by soundings from the present survey.

~~In the area of Pukoo Harbor the charted soundings are generally 2-3 foot deeper than the survey depths. The shoaling of 12 foot in the main channel reported in 1973 was not found during this survey. Other discrepancies were noted in section K above.~~

No comparisons were made between charted soundings and surveyed depths in the area of Kalaeloa Harbor as there is only a very small scale chart covering the area. *Refer to sect. 7 of Eval. Report*

M. ADEQUACY OF SURVEY

This navigable area survey of ^{Kalaeloa} ~~Pukoo~~ and Kamalo Harbors is complete and sufficient to supersede all prior surveys for charting purposes in the areas actually surveyed. The soundings taken during the chart investigation of Kalaeloa are adequate for charting purposes. *Refer to sections 6 & 8 of Eval. Report.*

N. AIDS TO NAVIGATION

No new Aids to Navigation were found during this survey.

Kamalo Bay Reef Lighted Buoy #2 (Light List # 3736) charted at 21-02-04.6N, 156-52-43.8W was found to be located at 21-02-05.7N, 156-52-44.5W (pos #6367). The charted position and the position of the light as described in the Light List is adequate and fulfills the intended purpose. ✓

Kamalo Harbor Day Beacon #4 (no # in Light List) charted at 21-02-48.3N, 156-52-39.2W was found to be located at 21-02-48.1N, 156-52-39.4W using a Hewlett Packard Model 3808 geodimeter range and a T-2 cut. It is recommended that it be recharted at this position. The Light List description is adequate. A NOAA Form 76-40 form is attached. *Refer to sect. 2 of Eval. Report*

The position of the Kaamola Point Light (Light List #3735) was determined to Third Order Class I standards during the Kalaeloa Harbor investigation. The charted position (chart 19347 13th edition dated 7 January 1984) and the position of the light as described in the light list should be superseded. A NOAA Form 76-40 is attached.

concur

O. STATISTICS

<u>Launch</u>	<u>Linear Nautical Miles of Hydro</u>	<u>Square Nautical Miles of Hydro</u>	<u>Number of Positions</u>
2125	6.5	0.8	485
2126	8.5	0.9	343
TOTALS	15.0	1.7	828

Bottom Samples: 5

Tide Stations: 2

P. MISCELLANEOUS

No anomalous currents or tidal situations were observed or reported during this survey.

On JD 124 divers obtained a bottom sample on the coral sill at 21-02-15N, 156-52-46W. This sill is composed of dead coral and thus is not expected to grow further and possibly shoal this entrance to Kamalo Harbor.

✓

Q. RECOMMENDATIONS

This navigable area survey is complete and adequate for charting purposes and no additional field work is recommended at this time.

concur

R. AUTOMATED DATA PROCESSING

Data acquisition and processing were accomplished in accordance with the Hydrographic Manual (4th Edition), Manual Automated Hydrographic Surveys, the PMC OPCODE, Hydrographic Survey Guidelines and the Hydrographic Data Requirements for the 1984 field season.

Soundings and positions were collected by an Aircraft Systems Inc. (ASI) data logger. The daily logger, master and corrector tapes are included as part of this survey. The following is a list of all computer programs and version dates used for data acquisition and processing.

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>VERSION</u>
RK 201	Grid, Signal, and Lattice Plot	4/18/75
RK 212	Visual Station Table Load	4/01/74
RK 216	Range-Azimuth Non-Real Time Plot	2/24/84
RK 300	Utility Computations	10/21/80
RK 330	Reformat and Data Check	5/04/76
PM 360	Electronic Corrector Abstract	2/02/76
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 500	Predicted Tide Generator	11/10/72
RK 561	H/R Geodetic Calibration	12/01/82
AM 602	Elinore--Line Oriented Editor	12/08/82
RK 606	Tape Duplicator	8/22/74
AM 607	Self-Starting Binary Loader	8/10/80
RK 610	Binary Tape Duplicator	12/01/82
RK 612	Line Printer List	3/22/78

S. REFERENCES TO OTHER REPORTS

The following reports contain information related to this survey.

<u>Report</u>	<u>Project</u>	<u>Date Submitted</u>
Echo Sounding Report	OPR-T126-RA-84	June 1984
Electronic Control Report	OPR-T126-RA-84	June 1984
Horizontal Control Report	OPR-T126-RA-84	June 1984
Coast Pilot Report	OPR-T126-RA-84	June 1984



Hawaii 1/1/84

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

June 6, 1984

Michael M. Jenks
Colonel, U.S. Army Corps of Engineers
District Engineer, Honolulu
Ft. Shafter, Hawaii 96858

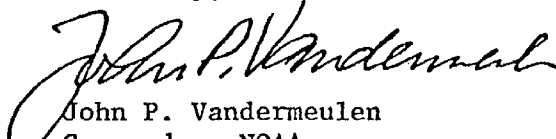
Dear Sir:

Enclosed are preliminary copies of our hydrographic surveys of Kalaeloa, Pukoo and Kamalo Harbors completed on May 3, 1984. These surveys are preliminary and subject to office review. Final results will be available from:

Chief, Nautical Chart Branch
N/MOP21
7600 Sand Point Way N.E.
Seattle, WA 98115
Phone: (206) 526-6835

We were unable to survey Honouliwai Bay due to weather and time constraints.

Sincerely,


John P. Vandermeulen
Commander, NOAA
Commanding Officer





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

*Hawaii
Project*

June 6, 1984

Mr. Peabody
Star Route, Box 179
Kaunakakai, Molokai, HI 96748

Dear Mr. Peabody:

Enclosed is a preliminary copy of our hydrographic survey of Pukoo Harbor completed on May 3, 1984. This survey is preliminary and subject to office review. Final results will be available from:

Chief, Nautical Chart Branch
N/MOP21
7600 Sand Point Way, N.E.
Seattle, Washington 98115
Phone: (206) 526-6835

Sincerely,

John P. Vandermeulen
John P. Vandermeulen
Commander, NOAA
Commanding Officer

enclosure





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

June 7, 1984 S221-1601-01/SRI

Commander
Fourteenth Coast Guard District
Prince Kalanianoʻle Federal Building
300 Ala Moana Blvd.
Honolulu, HI 96850

Dear Sir:

In response to your request to NOAA dated September 21, 1983, we have conducted a navigable area hydrographic survey of Kamalo Harbor, Molokai. Surveys were also conducted in Pukoo and Kalaeloa Harbors in early May, 1984 in response to other agencies' requests. Preliminary copies of these surveys are enclosed for your use. The surveys are subject to office review and final surveys will be available through:

Chief, Nautical Chart Branch
N/MOP21 - BIN C15700
7600 Sand Point Way N.E.
Seattle, WA 98105

Accurate positions were determined for three aids to navigation in the course of the survey:

Kamalo Bay Reef Buoy 2 (LLNR 3736) 21/02/06N, 156/52/45W
Kamalo Harbor Daybeacon 4 21/02/48.ON, 156/52/39.4W
Kaamola Point Light 21/03/09.756N, 156/51/07.957W
(Third Order, Class 1 Geodetic Position)

The location of buoy 2 is very close to the charted location and adequately marks the entrance to Kamalo Harbor. For future positioning of buoy 2 the following additional landmarks and associated Third-order positions could be used:

Gable (Kaunakakai) 21/05/02.471N, 157/01/54.190W
Tank (Kawela) 21/04/33.720N, 156/57/46.972W

We hope this information will satisfy your requirements.

Sincerely,

John P. Vandermeulen
John P. Vandermeulen
Commander, NOAA
Commanding Officer

cc: N/MOP21



APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY

H-10126

RA-2.5-1-84

In producing this sheet, standard procedures were observed in accordance with the Hydrographic Manual, PMC OPORDER, Hydrographic Survey Guidelines, 1984 Data Requirements Letter, and the Instruction Manual for Automated Hydrographic Surveys. The data was examined daily during the execution of the survey.

The boatsheet and the accompanying records have been examined by me, are considered to be complete and adequate for charting purposes, and are approved.

Submitted By:

Timothy D. Rulon

Timothy D. Rulon
LT. NOAA

Approved By:

John P. Vandermeulen
John P. Vandermeulen
CDR. NOAA
Commanding Officer

MASTER STATION LIST
OPR-T126-RA-84
HAWAII, HAWAIIAN ISLANDS
MOLOKAI ISLAND

FINAL VERSION

100 1 21 02 57611 156 52 37783 250 0001 000000
/KAMALO 3 1984 RAINIER

~~101 1 21 04 22380 156 48 00766 250 0001 000000~~
~~/HARBOR 1983 FAIRWEATHER~~

200 1 21 03 57974 156 54 08536 139 020/ 000000
/PUU PAPAI 1915-1962 NGS LISTING

~~201 1 21 03 07756 156 51 07957 139 0005 000000~~
~~/KAAMOLA POINT LIGHT RAINIER~~

~~202 1 21 02 59404 156 52 38049 250 0001 000000~~
~~/RAYKAMA 1961 NGS LISTING~~

~~203 1 21 04 02052 156 46 47465 139 0286 000000~~
~~/PUU HANO 1898 NGS LISTING~~

~~204 1 21 04 28427 156 48 07076 139 0002 000000~~
~~/HARBOR 02 1983 FAIRWEATHER~~

206 1 21 02 48091 156 52 39406 139 0000 000000
/KAMOLA DAYBEACON 4 RAINIER

[illegible]

RESPON		LE PERSONNEL	
TYPE OF ACTION		NAME	
OBJECTS INSPECTED FROM SEAWARD		<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETTIC PARTY <input type="checkbox"/> OTHER (Specify)	
POSITIONS DETERMINED AND/OR VERIFIED		FIELD ACTIVITY REPRESENTATIVE	
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		OFFICE ACTIVITY REPRESENTATIVE	
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64, FIELD (Cont'd))			
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		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 *FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.		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.	

[illegible]

RESPONDENT		LE PERSONNEL	
TYPE OF ACTION		NAME	
OBJECTS INSPECTED FROM SEAWARD		<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)	
POSITIONS DETERMINED AND/OR VERIFIED		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		FIELD (Cont'd)	
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		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		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	
A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 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.	

DATE: 9/19/84

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Marine Center: Pacific

OPR: T126

Hydrographic Sheet: ~~H-10126~~ & FOR 10,169

Locality: Kamalo Harbor, Kalaeloa Harbor, Pukoo Harbor, SE Coast Molokai
Island, Hawaii

Time Period: March 29 - May 3, 1984

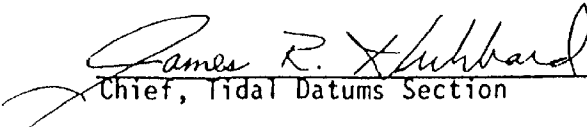
Tide Station Used: 161-3077 Kamalo Harbor, HI
161-3155 Pukoo Harbor, HI

Plane of Reference (Mean Lower Low Water): 161-3077 = 31.39 ft.
161-3155 = 1.76 ft.

Height of Mean High Water Above Plane of Reference: 161-3077 = 1.7 ft.
161-3155 = 1.8 ft.

Remarks: Recommended Zoning:

1. In Kamalo Harbor Zone Direct on 161-3077.
2. In Kalaeloa Harbor Zone Direct on 161-3077.
3. In Pukoo Harbor Zone Direct on 161-3155.


Chief, Tidal Datums Section

FIELD TIDE NOTE

RA-2.5-²~~1~~-84
H-101²²~~26~~

Field tide reduction of soundings for survey H-10126 was based on predicted tides from Honolulu, Hawaii (161-2340). Corrections were obtained from Preliminary Tidal Zoning OPR-T126-RA-84. The predicted tides were derived using program AM500.

The reference station at Honolulu was leveled on March 3, 1984. Three permanent benchmarks (including the primary mark) were connected to the ETG reading mark. Levels were run at the end of survey operations on April 26, 1984. Initial and final levels compared very well.

Two subordinate stations were installed on Molokai on March 28, 1984 to provide data for this survey. A Fisher/Porter ADR tide gage was installed in Kamalo Harbor (161-3077), 21 02.9'N, 156 52.6"W. A Metercraft bubbler gage was installed in Pukoo Harbor (161-3155), 21 04.3'N, 156 48.0'W.

Two historic benchmarks were recovered at Kamalo Harbor. In addition, two triangulation disks and one reference mark were used for leveling purposes. Installation levels were run on March 29, 1984. Final levels were run on May 3, 1984. The gage was removed on May 4, 1984. Comparison of the initial and final levels showed no appreciable movement of the staff during survey operations.

Pukoo Harbor was not an historical gage site. This gage was to operate for a period of three days or for the duration of hydro operations in the area. No reference marks were established. A triangulation disk ("Harbor 1983") and two reference marks were used for leveling. No tide staff was installed at this site. Therefore, leveling was done to the water's edge. Installation levels were conducted on March 28, 1984.

Due to a change in operation plans, the survey of Pukoo Harbor did not begin until April 29, 1984. The gage did not operate continuously between installation and the beginning of hydro due to lack of maintenance. However, the gage operated well during survey operations. Final levels were run on May 3, 1984. Comparison of initial and final levels indicated no movement of the orifice.

GEOGRAPHIC NAMES

H-10126

Name on Survey	A ON CHART NO. 19323	B ON PREVIOUS SURVEY NO. H-8881	C ON U.S. GOVERNMENT MAPS H-8882	D FROM LOCAL CHART INFORMATION 19347	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND McNALLY ATLAS	H U.S. LIGHT LIST	K
MOLOKAI				X					1
KUPEKE FISHPOND									2
PUKOO HARBOR									3
PUKOO FISHPOND									4
KEAWANUI FISHPOND									5
KALEALOA HARBOR			X	X					6
KAMALO HARBOR	X		X	X					7
KAMALO	X			X					8
									9
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25

HYDROGRAPHIC SURVEY STATISTICS

H-10169

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS, ARC, EXCESS		5
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		2
DESCRIP- TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR- GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS
ACCORDIAN FILES	2				
ENVELOPES					
VOLUMES					
CAHIERS					
BOXES					

SHORELINE DATA

SHORELINE MAPS(List):
 PHOTOBATHYMETRIC MAPS(List):
 NOTES TO THE HYDROGRAPHER(List):
 SPECIAL REPORTS(List):
 NAUTICAL CHARTS(List):

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

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET			840
POSITIONS REVISED	2		2
SOUNDINGS REVISED	60		60
CONTROL STATIONS REVISED			
	TIME - HOURS		
	VERIFICATION	EVALUATION	TOTALS
PRE-PROCESSING EXAMINATION	6		6
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS	14.5		14.5
VERIFICATION OF SOUNDINGS	44.0		44.0
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	24.0		24.0
COMPARISON WITH PRIOR SURVEYS AND CHARTS		21	21.0
EVALUATION OF SIDESCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT	1	14	15.0
OTHER	6	8	14.0
Digitization	16		16.0
TOTALS	111.5	43	154.5

Pre-processing Examination by

M. Kenny

Verification of Field Data by

P. Niland

Verification Check by

J. Stringham, B. Olmstead, J. Green

Evaluation and Analysis by

A. Luceno

Inspection by

Beginning Date

3/29/84

Ending Date

Time(Hours)

5/6/85

Ending Date

5/13/85

Time(Hours)

35

Ending Date

6/26/85

Time(Hours)

5/13/85

Ending Date

6/26/85

Time(Hours)

Ending Date

PACIFIC MARINE CENTER
EVALUATION REPORT
H-10169

1. INTRODUCTION

H-10169 is a navigable area survey of Kamalo and Kalaeloa Harbors, Molokai, Hawaii conducted by the NOAA Ship RAINIER in accordance with the following project instructions:

OPR-T126-RA-84, dated January 9, 1984
Change No. 1, dated February 16, 1984
Change No. 2, dated April 16, 1984

This survey, originally covering Pukoo, Kamalo, and Kalaeloa Harbors was submitted to PMC with assigned registry number H-10126. Only Pukoo Harbor was accepted for Marine Center processing and carried the original H-10126 registry number. Kamalo and Kalaeloa Harbors were not accepted initially for processing because of unresolved sound velocity and TRA correctors. To expedite processing of Pukoo Harbor, a request to process Kamalo and Kalaeloa Harbors under a separate registry number was approved by the Hydrographic Surveys Branch (N/CG24), and H-10169 (RA 2.5-2-84) was assigned. The Descriptive Report for H-10126 was used for H-10169. All items in the report that do not pertain to Kamalo and Kalaeloa Harbors were either crossed out, changed, or discussed in marginal notes.

The velocity correctors submitted by the hydrographer were derived from bar check data with a depth range that is 47 percent of the deepest sounding in the survey area. A comparison of the velocity correction graph from the bar check with the graphs derived from a SVD cast and historical data shows very significant deviations. Therefore, velocity correctors were derived from the SVD cast.

In addition, since velocity corrections were not derived from the bar checks, the TRA correction value of 1.8 feet was derived from bar readings at the 12-foot depth only. (See "Provisional Instructions for the Raytheon DSF-6000N Digital Survey Fathometer"). The hydrographer's statement that an 0.8 foot instrument error exists is not supported by the bar checks and no instrument error correction was applied to the soundings.

Predicted tides based on Honolulu, Hawaii gage was used during field processing. Tide correctors for the reduction of final soundings reflect hourly heights zoned from Kamalo Harbor tide gage.

The field sheet parameters were revised to change the projection to polyconic and to center the hydrography on the smooth sheet.

2. CONTROL AND SHORELINE

Hydrographic control and positioning is adequately discussed in the Descriptive Report (sections F and G) and Horizontal and Electronic Control Reports for OPR- T126-RA-84.

No data to support the computation of the geographic position for station Kamalo Daybeacon 4 could be found in the records.

The smooth sheet was plotted using published and field positions based on the Old Hawaiian Datum.

A pipe at latitude 21°02'46"N, longitude 156°51'05"W was plotted on the smooth sheet from comments in the raw data printout. The note did not mention the elevation of the pipe above the water surface.

Two bottom characteristic notes "sand" in the area of latitude 21°02'48"N, longitude 156°51'06"W were transferred directly to the smooth sheet from the field sheet.

There were no shoreline manuscripts applicable to this survey.

Kamalo and Kalaeloa Harbors are pocket openings between reefs and ledges. There is no significant conflict between the hydrography and the charted low water line (reef and ledge limits).

3. HYDROGRAPHY

Soundings at line crossings generally agree within one foot. The depths obtained in this survey are adequate to develop bottom configuration, determine least depths, and to draw the depth curves except as follows:

In the vicinities of the holiday areas at the positions listed below, where depth curves were drawn in dash lines:

<u>Latitude North</u>	<u>Longitude West</u>
21°02'45"	156°51'23"
21°02'55"	156°51'22"
21°03'07"	156°51'24"
21°03'25"	156°51'17"
21°03'16"	156°51'13"
21°02'57"	156°51'03"
21°02'37"	156°52'36"

Also, the present survey did not provide sufficient information to delineate the entrance into Kalaeloa Harbor. There is some information indicating the presence of a significant bar across the entrance; however, the least depth has not been determined. An extension of this survey's southern limit to latitude 21°02'30"N would have provided useful information in determining the extent of this feature.

4. CONDITION OF SURVEY

The smooth sheet, accompanying overlays, and the Descriptive Report are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change 3, except as noted in the Preprocessing Examination Report, dated August 17, 1984, and as follows:

- a. The final velocity correctors submitted by the hydrographer were derived from bar check observations to a maximum depth of 36 feet, which is 47% of the maximum depth sounded. Section 1.5.4 of the Hydrographic Manual requires bar check observations down to at least 75% of the range of depths sounded when bar checks are used for sound velocity computations.
- b. Frequency of bottom sampling as required by the project instructions was not accomplished.

5. JUNCTIONS

Junctions were not required.

6. COMPARISON WITH PRIOR SURVEYS

H-4457 (1925) 1:5,000
 H-8882 (1965) 1:10,000
 H-8881 (1965) 1:5,000

H-4457 (1925) Kamalo Harbor

Refer to section K of the Descriptive Report for a comparison with H-4457.

H-8882 (1965) and H-8881 (1965)

Comparison was also made with these surveys despite the fact that they were not specified in the Project Instructions and have not been reviewed and approved. This comparison is considered valuable since these surveys are classified as being fully applied to applicable charts.

H-8881 covers Kamalo Harbor and soundings generally agree with the present survey within one foot. Two 16-foot soundings with no bottom symbols, located at latitude 21°02'30.2"N, longitude 156°52'45.6"W and latitude 21°02'31.8"N, longitude 156°52'45.2"W on H-8881 were found to be 43 feet and 40 feet respectively in the present survey. The 16-foot no bottom soundings should be replaced by the soundings from the present survey.

An 18-foot sounding at latitude 21°02'47.2"N, longitude 156°52'43.8"W, a 23-foot sounding at latitude 21°02'47.8"N, longitude 156°52'43.8"W, and a 25-foot sounding at latitude 21°02'44.4"N, longitude 156°52'44.7"W were brought forward from H-8881 to delineate the 18-foot depth curve.

H-8881 covers Kalaeloa Harbor, however there are no soundings within the common area of the present hydrography. The prior survey smooth sheet does

show extensive fringing ledge and shallow limit lines together with two isolated areas described as foul. Hydrography on the present survey does not conflict with these features.

H-10169 is adequate to supersede the prior surveys within their common areas.

7. COMPARISON WITH CHART

Chart 19353, 9th Edition, dated April 22, 1978; scale 1:5,000

Chart 19347, 13th Edition, dated January 7, 1984; scale 1:80,000

a. Hydrography - Charted soundings in Kamalo Harbor originate from undetermined sources except at the extreme north and south portion of the chart where soundings and reef and ledge limits originate from H-8881 (1965). Refer to section L of the Descriptive Report for a discussion on differences between the present survey and the charted information in Kamalo Harbor.

In Kalaeloa Harbor a lone sounding, source unknown, of 5½ fathoms (31 feet) at latitude 21°03'18"N, longitude 156°51'21"W on Chart 19347 should be superseded by a 28-foot sounding from the present survey. ✓

Geographic names appearing on the smooth sheet originate with Chart 19353, 9th Edition, dated April 22, 1978 and Chart 19347, 13th Edition, dated January 7, 1984.

H-10169 is adequate to supersede the hydrography within the area of common coverage.

b. Controlling Depths - There are no charted controlling depths within the area of common coverage.

c. Aids to Navigation - Refer to section N of the Descriptive Report for a discussion of aids to navigation in the survey area. The aids adequately mark the features intended.


8. COMPLIANCE WITH INSTRUCTIONS

H-10169 complies adequately with the Project Instructions and changes to the instructions mentioned in section 1 of this report.

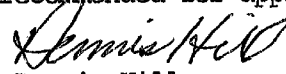
9. ADDITIONAL FIELD WORK

This is a good navigable area survey of Kamalo Harbor and is an adequate navigable area survey of Kalaeloa Harbor. Holidays occur in small coves in Kalaeloa Harbor where standard depth curves could not be delineated completely. Although Kalaeloa Harbor is best protected, its use is limited by the bar across the entrance, which has a depth of 5 feet at latitude 21°02'39.8"N, longitude 156°51'12.2"W. Development of this feature is incomplete and requires additional work to provide controlling depths and to define the entry channels into Kalaeloa Harbor. Additional work on a low ✓

priority basis is also required to fill in the holidays noted in Section 3.0 this report.


Arsenio A. Luceno
Cartographer

This survey has been verified and evaluated. I have examined the survey and it meets Charting and Geodetic Services survey standards and requirements for use in nautical charting. The survey is recommended for approval.


Dennis Hill
Chief, Hydrographic Section

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-10169

I have reviewed the smooth sheet, accompanying data, and reports of this hydrographic survey. Except as noted in the Evaluation Report, the hydrographic survey meets or exceeds Charting and Geodetic Services (C&GS) standards, complies with instructions, and is accurately and completely represented by the smooth sheet and digital data file for use in nautical charting.

David W. Jeager 6/28/85
Chief, Nautical Chart Branch (Date)

CLEARANCE:

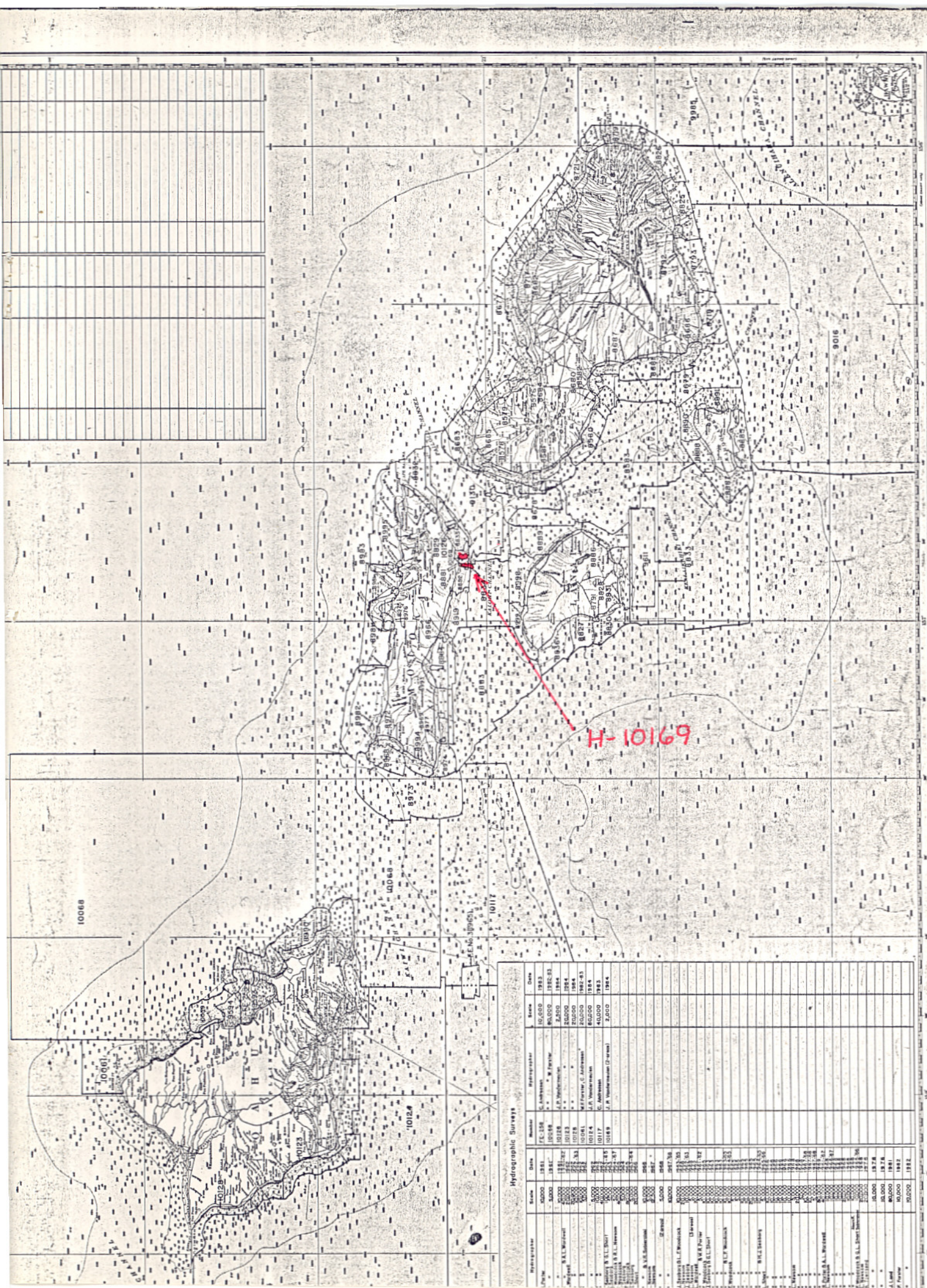
N/MOP2:LWMordock

SIGNATURE AND DATE:

Langston Mordock 6/28/85

After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards with only the exceptions as noted above. The above recommendations are forwarded with my concurrence.

Robert L. Sandert 6-28-85
Director, Pacific Marine Center (Date)



Hydrographic Surveys			
Hydrographic Survey	Scale	Date	Number
10000	1:50,000	1981	10000
10000	1:50,000	1982	10000
10000	1:50,000	1983	10000
10000	1:50,000	1984	10000
10000	1:50,000	1985	10000
10000	1:50,000	1986	10000
10000	1:50,000	1987	10000
10000	1:50,000	1988	10000
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10000	1:50,000	2016	10000
10000	1:50,000	2017	10000
10000	1:50,000	2018	10000
10000	1:50,000	2019	10000
10000	1:50,000	2020	10000

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10169

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.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED

19340 - 9/13/85 H.J. Branski

Exam'd for critical corr's, defer full
application until app'd to larger seats.