

H10755

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. PHP-10-1-97
Registry No. H-10755

LOCALITY

State Washington
General Locality Northern Puget Sound
Sublocality Middle Bank and Vicinity

19 97

CHIEF OF PARTY
LTJG Eric W. Berkowitz, NOAA

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DATE AUG 25 1998

HYDROGRAPHIC TITLE SHEET

H-10755

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.

PHP-10-1-97

State Washington

General locality Northern Puget Sound

Locality Middle Bank and Vicinity

Scale 1:10,000 Date of survey June 5, - October 6, 1997

Instructions dated May 7, 1997 Project No. OPR-N368-PHP

Vessel Jensen Launch 1101(EDP0651), SeaArk Launch 1102(EDP0652)

Chief of party LTJG Eric W. Berkowitz, NOAA

Surveyed by Pacific Hydrographic Parties Personnel

Soundings taken by echo sounder, ~~hand lead, pot~~ ^{Dives} ~~XXXXXX~~ ^{DSF-6000, Innerspace 448, ODUM SF 3200, MODIII} ~~XXXXXX~~ ^{Side Scan Sonar, EG&G Model 260,272} Depth Gage

Graphic record scaled by PHP Personnel

Graphic record checked by PHP Personnel

Evaluation by: L. Deodato Automated plot by HP Design Jet 650C

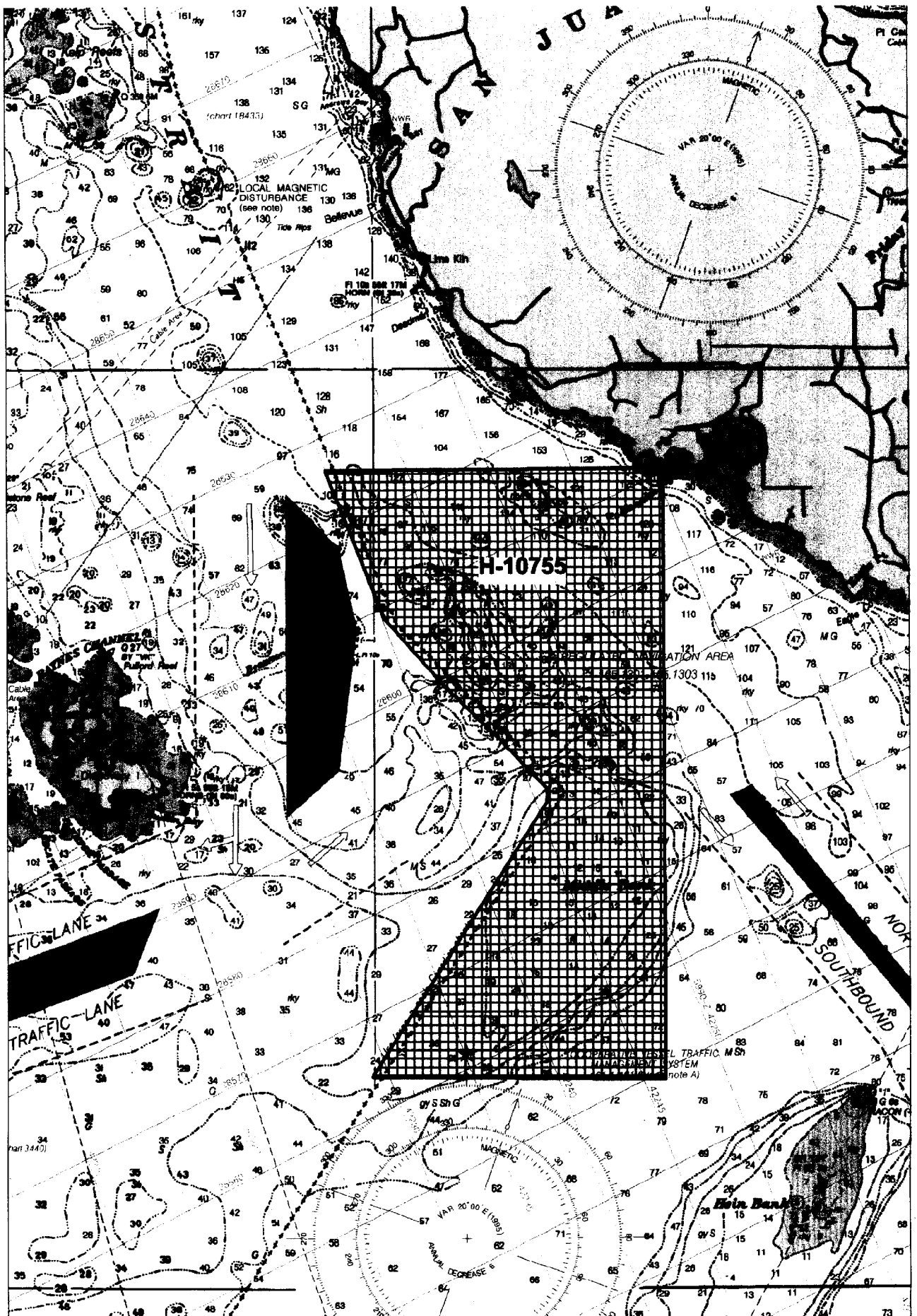
Verification by M. Bigelow, D. Doles, R. Mayor, L. Deodato

Soundings in fathoms ~~XXXX~~ at ~~MSL~~ ^{MLLW} and tenths

REMARKS: All times are UTC, revisions and marginal notes in black were generated during office processing. All separates are filed with the hydrographic data, as a result page numbering may be interrupted or non-sequential.

All depths listed in this report are referenced to mean lower low water unless otherwise noted.

AWOIS ✓ SURF ✓ by MBH 8/5/98



Descriptive Report to Accompany Hydrographic Survey H-10755

Field Number PHP-10-1-97

Scale 1:10,000

June - October 1997

Pacific Hydrographic Field Party

Chief of Party: Lieutenant (jg) Eric W. Berkowitz, NOAA

A. PROJECT ✓

This navigable area survey was conducted in accordance with Hydrographic Project Instructions OPR-N368-PHP, Northern Puget Sound, Washington, dated May 7, 1997.

The project was authorized in response to requests from the Puget Sound Pilots, the Thirteenth Coast Guard District, and the National Ocean Service, Office of Ocean and Coastal Resource Management. The objective of this project is to supersede the charted wire drag clearance depths with modern full-bottom coverage hydrography. The charted wire drag depths are often considered controlling depths and originate from surveys conducted in 1935, 1943, 1962 and 1972.

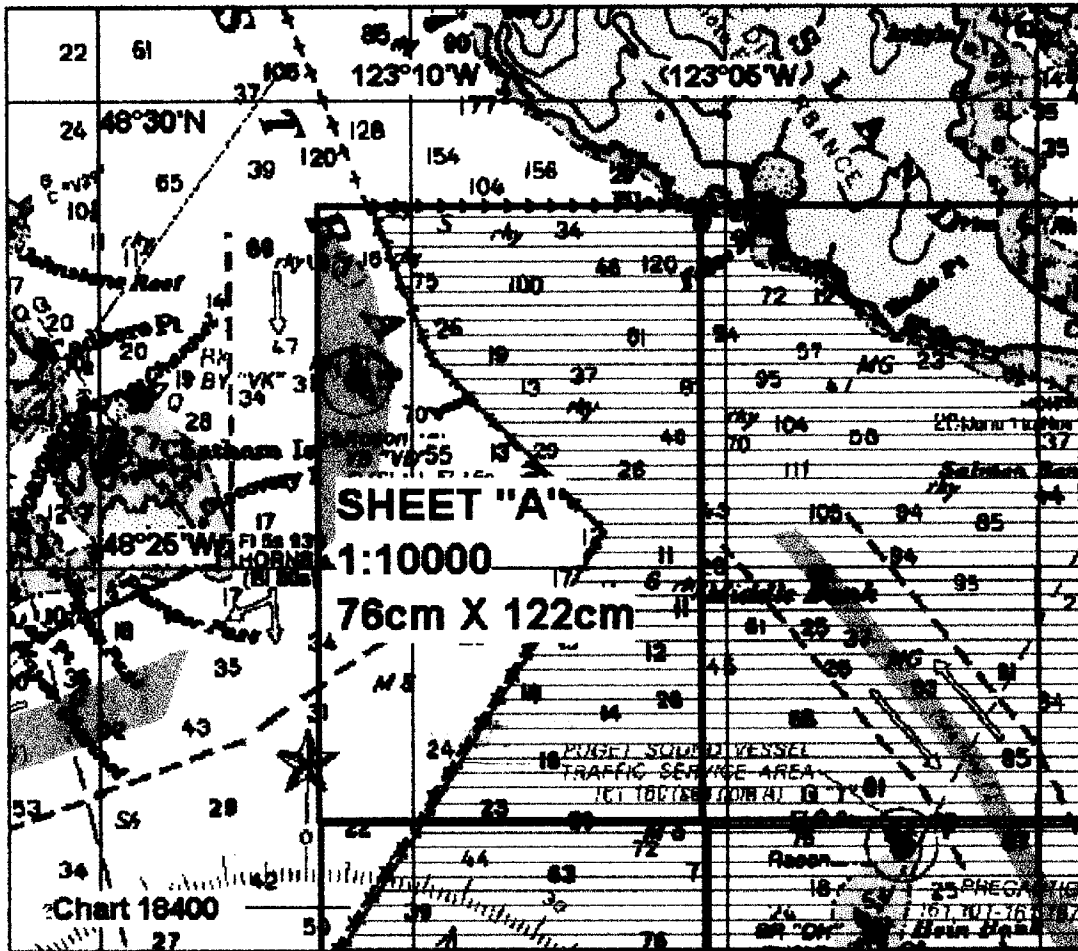
The project area includes parts of the Strait of Juan De Fuca, Rosario Strait, Haro Strait, Bellingham Channel, Middle Channel and San Juan Channel. The area is transited extensively by both commercial and pleasure vessels.

This is the first survey of the project and it covers the area known as Middle Bank. The sheet letter is "A" as specified by the project instructions; registry number H-10755; designation Middle Bank to South Haro Strait, Northern Puget Sound, Washington.

B. AREA SURVEYED ✓ *See Eval Report, Section B*

The area surveyed for H-10755 covers Middle Bank north to the southern end of Haro Strait. Hydrographic limits extend from longitude 123°05'00" W, West to the United States/Canadian Border. North limit is latitude 48°27'00"; South limit is latitude 48°22'30".

The chartlet on the following page shows the approximate survey limits.



Data acquisition was conducted from June 5, 1997 (DN 176) through October 6, 1997 (DN 279).

C. SURVEY VESSELS ✓

NOAA Launch 1101, a 29-foot Jensen and NOAA Launch 1102, a 21-foot SeaArk were used for data acquisition operations as noted in the table below:

Vessel	EDP Number	Operation
1101	0651	Side Scan Sonar, Hydrography, Detached Positions, Bottom Samples, Sound Velocity Casts, and Diving.
1102	0652	Hydrography, Detached Positions, Bottom Samples, and Sound Velocity Casts.

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

HYPACK Software produced by Coastal Oceanographics was used for all data acquisition. HSDUTILS, a program developed by Hydrographic Surveys Division, Systems Support Branch, N/CS32, was used to convert HYPACK data to HPS format. HPS was used for post-processing and MapInfo Professional/Vertical Mapper were used in conjunction with HPS as project design and quality assurance tools.

The following table lists all software used in field work for data supporting this survey:

Program Name	Version	Date	Usage
HYPACK	6.4a	1996	Data Acquisition
HSDUTILS	3.18	1997	Data Conversion
HPS	N/A	1997	Data Processing
HPS MI	N/A	1997	Project Design/Analysis
MAPINFO PROFESSIONAL	4.1	1996	Project Design and Quality Assurance
Vertical Mapper	1.5	1995-1996	Quality Assurance/Contouring
VELOCITY	3.0	1997	Sound Velocity Correctors
SMLGAUGE	3.0	1997	Diver Least Depth
CAT	3.0	1997	Velocity Cast
NADCON	1.01	1989	NAD83 to NAD27
INVERS3D	1.00	1991	Horizontal Control
MONITOR	2.00	1994	DGPS Beacon Check
GEOID93	2.00	1993	GPS Ellipsoidal Elevation

E. SONAR EQUIPMENT ✓

Side scan sonar (SSS) operations were conducted using an EG&G model 260 slant-range correcting SSS recorder and an EG&G 272-T dual-channel (single frequency) towfish. The following sonar equipment was used throughout the survey:

Type	Serial Number
272-T Towfish	015598
260 Recorder	015602

The towfish was operated on the 100 kHz frequency and was configured with a 20° beam depression. It was deployed from the aft starboard quarter using a kevlar cable passed through a block and powered by a Superwinch Model W115. Block and winch were mounted to a swing-arm davit. The kevlar cable was connected to the EG&G recorder cabling with a slip-ring assembly cable. Tape markings measured at intervals indicated length of cable deployed from the block up to 55 meters, the maximum deployable. Markings were at one-meter intervals up to 10 meters and at five-meter intervals thereafter.

SSS operations were conducted at a speed of 5 knots or slower, using a range scale of 100 meters. At higher range scales the survey speed was 4 knots or slower. Range scales of 100, 150 and 200 meters were used. The SSS towfish was maintained at a height off the bottom equivalent to 8 to 20 percent of the range scale except where depths exceeded the limits of the cable or when depths shoaled quickly. In such cases, the hydrographer believes the resolution of the sonagram is adequate for identification of all significant contacts. Two hundred percent side scan coverage was acquired for all depths less than the 24-fathom curve. *Concur*

Track lines for 100% side scan coverage were oriented east-west. Lines for 200% coverage were oriented north-south perpendicular to the 100% lines. Position numbers used: 10000-14107. The northern SSS area of the sheet contained an extremely irregular bottom and the sonagram was difficult to interpret and scan for contacts. Therefore, this northern region was further developed by echosounder with 50-meter splits. *Concur*

The SSS recorder gain was adjusted for the best return for the prevalent bottom material. Contacts or identifiable features (e.g. bouy anchors, change in bottom texture) visible on the outer edge of the sonargram assure acceptable SSS recorder tuning and served as confidence checks during operations.

Following guidelines in section 7.2.2 of the Project Instructions, sonargrams were manually scanned for significant contacts; these were labeled and entered in a HPS contact table. Where contacts appeared in a cluster on the sonargram, only the most significant was entered. Contact heights and raw depths were derived using HPS "Side Scan Contact Utilities".

The HPS "Group Contacts" utility was used to locate duplicate contacts within a 15-meter radius and a 30-meter radius. A Mapinfo plot of the significant contacts and the sonargram were reviewed together to identify contacts requiring further investigation. Contacts were selected for development based on the following factors: charting considerations and calculated significance outlined in section 7.2.2 of the Project Instructions, computed height, offset from towfish, and sonargram review; the review process included a comparison of duplicate contacts. *No Contact (DBF) was provided by the Field.*

All investigated contacts were developed by echosounder using procedures outlined in the Field Procedures Manual (FPM). Except, contact 12816.8s which was developed using the MOD III Diver Least Depth Gauge. ✓

Contact tables, grouping printouts, and contact investigation reports are included in Separate V (Side Scan Sonar Data). *Concur*

F. SOUNDING EQUIPMENT ✓

An Innerspace model 448 (INN-448) single frequency echosounder, Serial Number 239, was used on Vessel 0652.

A Raytheon, dual frequency, Digital Sounding Fathometer (DSF) 6000N, serial number A121N, was used on Vessel 0651 (DN156-176 and DN203-267). The high-frequency beam was selected for plotting throughout the survey. The low frequency depth was scanned and edited only when the high frequency did not track the bottom or when a more significant depth was acquired with the low-frequency beam.

The ODOM DF3200 MKII S/N 9551 digital fathometer was used on vessel 0651 between DN181-198. Comparison among the ODOM, DSF6000, and the Innerspace soundings show no systematic errors. *Concur*

Soundings were recorded in meters with an assumed speed-of sound through water of 1500m/sec. Depths encountered in the survey area range from 9.2 meters/5 fathoms (Pos. No. 7799.8, DN 205) to 291.6 meters/159.4 fathoms (Pos. No. 7899, DN 205) at MLLW based on preliminary tide data from the Port Townsend gauge (944-4900). *Concur* Five fathom depth is located approximately 100 meters south of Pike Point. Deepest depths on present survey (159) exist 2.2 nautical miles west of Pike Point. Metric leadlines were used for depth comparison with the echosounder. PHP fabricated the leadlines following Hydrographic Survey Guideline (HSG) 69. Leadline calibration forms are included in Separate IV (Sounding Equipment Calibration and Corrections).

The MOD III S/N 68335 Diver Least Depth Gauge was used to calculate the least depth on contact 12816.8s. The unit was operated in accordance with section 7.2.2.1 of the FPM. The MOD III was calibrated on March 6, 1997 by NOAA Diving Center. The calibration report is in Separate IV. *

G. CORRECTIONS TO SOUNDINGS ✓

Velocity of Sound

Corrections for the speed of sound through the water column were computed from the data obtained with a Seacat conductivity, temperature and depth recorder. SBE Model 19-03, 335m, S/N 1912344-1892 was

used for all casts. The recorder was initialized and data downloaded using CAT v3.0. The VELOCITY program was used to compute sound velocity correctors. Data from the following casts were used to determine velocity correctors:

HPS Table	Day Number Acquired	Day Number Range	Extrapolated Depth	Extended Depth	Cast Latitude	Cast Longitude
1 *	156	156-169	153.2m	N/A	48°22'56"N	123°05'07"W
2 *	170	170-194	165.0m	N/A	48°26'20"N	123°03'33"W
3	195	195-208	156.5m	344.1m	48°27'38"N	123°06'27"W
4 *	209	209-222	126.1m	344.1m	48°24'32"N	123°02'28"W
5	223	223-236	127.4m	N/A	48°25'56"N	123°07'42"W
6	237	237-253	179.6m	344.1m	48°28'20"N	123°05'48"W
7 *	251	251-251	173.1m	N/A	48°25'00"N	123°04'24"W
8 *	265	265-279	179.6m	344.1m	48°24'06"N	122°59'54"W
9	288	-288	344.1m	N/A	48°28'06"N	123°08'48"W

* Casts fall outside survey limits. The depths of the casts were limited to the length of line on hand. Data collected on casts 3, 4, 6, and 8 contained depths deeper than the calculated extrapolated depths. Upon completion of the survey a final deep cast was taken (cast #9). The deepest correctors on casts 3, 4, 6, and 8 compared well to the correctors in cast #9 (see Separate IV). Thus, the correctors from cast #9 were applied beyond the extrapolated depths of casts 3, 4, 6, and 8. *Concur*

Cast 7 was obtained to use with the MOD III diver least depth gauge for application to contact 12816.8s. The least depth was obtained using the SMLGAUGE program.

The SEACAT instrument was calibrated by Northwest Regional Calibration Center on February 24, 1997. A copy of the calibration report is included in Separate IV. *

Lead line Comparison ✓

Periodic leadline comparisons confirmed proper digitization of the echosounder depths. *Concur*

Static Draft ✓

Static Draft for VN 0651 was determined on June 27, 1997 (DN 178). First, the depth of the transducer face from a reference mark on the hull was measured. Next, with the launch in the water (fuel tanks half full and two crewmen aboard) the depth from this reference mark to the waterline was measured. Combining the two measurements, a static draft of 0.4 meters was calculated. (NOTE: Historical draft on 0651 has been .5-meters. In May 1997, a new flush-mount transducer was installed changing its draft to .4 meters.)

A static draft of 0.4 meters was determined for vessel 0652 on June 3, 1997, (DN 154) using a similar method as above.

Dynamic Draft ✓

Settlement and squat measurements for VN 0651 were conducted June 18, 1997, (DN 169) in Guemes Channel, WA. Data from these measurements are included in Offset Table 1.

Settlement and squat measurements for VN 0652 were conducted June 3, 1997, (DN 154) in Guemes Channel, WA. Data from these measurements are included in Offset Table 2. *

Field records are included in Separate IV. *

Settlement and squat correctors are reapplied during processing in HPS using the "Reapply Sounding Corrector" utility.

Corrections to Echosoundings ✓

Occasional problems with misdigitization or bottom tracking were encountered during this survey. Where the echogram trace was adequate and unambiguous, the digital record was corrected to reflect the analog trace. Where the echogram trace was discontinuous, the selected sounding(s) was deselected or rejected; in those cases where the resulting sounding interval was greater than 6mm at the scale of the survey, the line was resurveyed. *Correct*

Tide Correctors ✓

In accordance with section 5.7.1 of the Project Instructions, the existing primary tide stations at Port Townsend, WA (944-4900); Cherry Point, WA (944-4900); and Friday Harbor, WA (944-9880) will be used to determine MLLW for the project area. In compliance with Section 5.8 of the Project Instructions, one tide station was established to provide information on zoning, tidal datum's (reducers), and harmonic constants for predictions on sheet "A". A Real time portable acoustic gage with satellite capability was installed at the following station:

Station Number	Station Name	Latitude	Longitude
944-9982	Richardson, Lopez Island	48° 26.8'N	122° 54.0'W

Four tide zones (NPS20, NPS13, NPS12, NPS11) were established on sheet "A" as specified by section 5.9 of the Project Instructions. HPS's "DPAS Tide Utilities" were used to apply zones to Pacific Hydrographic Party (PHP) hydro data.

Tidal Zone	HPS DPAS Zone #	Time Corrector	Height Corrector Ratio
NPS11	3	-24 mins	0.82
NPS 12	4	-18 mins	0.84
NPS 13	5	-12 mins	0.86
NPS 20	6	-6 mins	0.86

In accordance with 5.9 of the Project Instructions the Port Townsend station was used as a reference for tidal data on this survey. The real-time, six-minute, unverified tide data from this gauge was downloaded from the Ocean and Lake Levels Division web site (<http://www.olld.nos.noaa.gov/prelimwl.html>). HPS was used to convert the tide data into a preliminary smooth tide table. Using zone information, HPS calculated preliminary smooth tide correctors for application to data.

No tide stations experienced down time during periods of hydrography. An email confirmation from Pacific Operations Section N/OES214 is included in Appendix VI (Supplemental Correspondence). *

Approved tide note dated February 13, 1998 is attached.
H. CONTROL STATIONS ✓ *See Eval Report, Section H*

Horizontal Datum

The horizontal control datum for this project is North American Datum of 1983 (NAD 83). A separate Horizontal Control Report for this project was submitted to the Pacific Hydrographic Branch (PHB) in June 1997.

Two DGPS performance check stations were established to Third Order, Class 1, standards using static GPS observations:

- (1) Cornet Bay Marina (piling)
- (2) Skyline Marina (piling)

Davidson Rock Light, a published Third Order Control Station, was also used as a DGPS performance check site in accordance with section 3.4.4.2 of the FPM.

A list of horizontal control stations can be found in Appendix III. * *

I HYDROGRAPHIC POSITIONING CONTROL ✓

Position Control

Differential GPS (DGPS) provided hydrographic position control throughout this survey. The following beacons were used during hydrographic operations:

<u>Reference station</u>	<u>Frequency</u>
USCG Beacon, Whidbey Island, WA	302 kHz
Richmond B.C., Canada	320 kHz

The Richmond B.C. beacon was used for data collection on DN224 exclusively. All other position data was collected using the Whidbey Island DGPS beacon.

Accuracy requirements were met as specified in the Hydrographic Manual and FPM. *Concur*

Per FPM, section 3.4.6.3 the reference sites were confirmed using the program MONITOR. Copies of the scatter plots are included in Separate III (Horizontal Position Control and Corrections to Position Data) and were included in the Horizontal Control Report submitted for this project.

DGPS Performance Checks ✓

Fixed-point DGPS performance checks were obtained per FPM, section 3.4.4.1, using the sites established at Cornet Bay, and Skyline Marina and the Third Order station, Davidson Rock Light. All DGPS performance checks were successful; check forms are included with the raw data in Separate III. *

Positioning equipment ✓

The following GPS equipment was used:

Equipment location	Type of Receiver/Antenna	Receiver Serial No.	Antenna Serial No.
VN 0651	Ashtech (v. 1E08d) CSI Beacon Rcvr MBXI	700417B1042 X-1112	700378A0272
VN 0652	Ashtech (v. 1E08d) CSI Beacon Rcvr MBXI	700417B1043 X-1212	700378A0402

J. SHORELINE ✓ *See Eval Rpt., Section J.*

No shoreline features are within the limits of this survey.

K. CROSSLINES ✓

The 100% side scan coverage was run perpendicular to the mainscheme hydro for 55 crossline miles, or 18% of the mainscheme hydrography. Agreement is excellent. *Concur*

L. JUNCTIONS ✓

H-10755 does not junction with any completed contemporary surveys. *Concur* Adjacent sheets to the South and East comprise future surveys of project OPR-N368-PHP. *Concur*

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* Filed with the hydrographic data.
** Copy attached to this report.

M. COMPARISON WITH PRIOR SURVEYS ✓ *See Eval Report, Section M.*

A cursory comparison of soundings with prior surveys H-6818 (1943), and H-6819WD (1943) indicate only minor changes in the contours. Over prior wire drag surveys with depths less than 24 fathoms 200% SSS coverage was obtained, all other areas were covered with 100% 'mainscheme hydrography.' Coverage and depths obtained are adequate to supercede prior surveys within their common areas. Priors H-2211 (1894) and H-6653 (1943), were not received by PHP. A more rigorous comparison will be performed by PHB following the application of smooth tides. *concur*

* 100% bottom coverage was not obtained in the wire drag quadrant area centered at latitude 43° 25' 45" N, longitude 123° 05' 45" W. Depths in this area range from 39-57 fathoms.

N. ITEM INVESTIGATION REPORTS

No AWOIS items are within the limits of this survey. *concur*

Item Investigation Reports for the following developed features are included in *this report* Separate VI.

N1	SSS Contact	12783.2P	✓
N2	SSS Contact	12786.7P	✓
N3	SSS Contact	10316.4S	✓
N4	SSS Contact	13835.6P	✓
N5	SSS Contact	10487.6S	✓
N6	SSS Contact	12674.3S	✓
N7	SSS Contact	10500.7S	✓
N8	SSS Contact	10115.5S	✓
N9	SSS Contact	10522.6S	✓
N10	SSS Contact	11372.9P	✓
N11	SSS Contact	11833.5P	✓
N12	SSS Contact	12038.6S	✓
N13	SSS Contact	10900.8S	✓
N14	SSS Contact	10906.7P	✓
N15	SSS Contact	13636.2P	✓
N16	SSS Contact	13645.5P	✓
N17	SSS Contact	10214.8P	✓
N18	SSS Contact	10219.5S	✓
N19	SSS Contact	12520.8P	✓
N20	SSS Contact	13491.5S	✓
N21	SSS Contact	12820.4S	✓
N22	SSS Contact	10527.5P	✓
N23	SSS Contact	11903.3p	✓
N24	SSS Contact	10487.7S	✓
N25	SSS Contact	12816.8S	✓

O. COMPARISON WITH THE CHART ✓ *See Eval Report, Section O.*

This survey was compared in MapInfo to the following charts:

Chart	Scale	Edition	Date
18421	1:80,000	40 th	January 25, 1997
18433	1:25,000	3 rd	April 20, 1991

Dangers to Navigation ✓

No dangers to navigation were identified within the limits of this survey. *Concur*

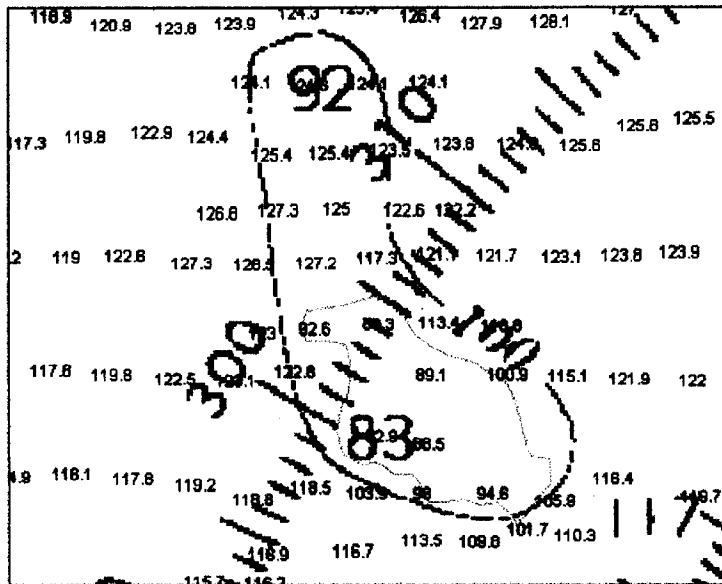
Comparison of Soundings ✓

The following table lists soundings that are shoaler than the charted soundings:

Fix Number	Charted Depth Fathoms	Chart 18421	Chart 18433	H-10755 Depth Fathoms/Meters	Latitude N	Longitude W
5,707	37	X	X	35.2/64.2	48/27/09.566	123/07/14.409
7,979	46		X	45.4/83.1	48/26/33.289	123/06/49.221
13,380-1	13	X	X	11.9/21.8	48/26/47.370	123/07/52.309
7860-1	81	X	X	74.8/137.1	48/28/51.497	123/08/06.230
20,504	41		X	38.7/70.2	48/25/35.100	123/06/18.268
22,101	19	X	X	18.5/33.9	48/27/20.091	123/08/38.277
23,386	100	X	X	92.8/171.2	48/28/10.260	123/08/23.780
23,453-1	28	X	X	26.3/48.2	48/26/07.290	123/06/27.422
23,850	46	X	X	43.8/80.1	48/28/21.291	123/06/58.817
23,935-1	20		X	18.8/34.4	48/26/53.382	123/08/11.552

On chart 18433, the northern extent of the 100-fathom contour indicating a small shoal near the 310° bearing of the compass rose has changed. Fix number 23,959 contained a corrected depth of 124.6 fathoms/228meters while charted as 92 fathoms (see chartlet below). The charted sounding in the southern portion of the shoal coincides with the surveyed soundings. Fifty-meter splits were run in this area and no indication of shoaling was found. At 125 fathoms/228meters the DSF600N has an athwartship coverage of 100 meters port and starboard for low frequency.

Delete 92 fm from chart. Chart this area based on the present survey information.



On chart 18433, the charted depth of 39 fathoms at latitude 48°26'28"N, longitude 123°07'23" W, was not confirmed. * Surveyed least depth in the immediate vicinity of the charted sounding is 44.9 fathoms/82.2 meters located at position number 21,374. Twenty-five meter splits were run in this area.

*Delete 39 fm from chart. * Present survey depths of 36-39 fathoms were found kilometers east of charted 39 at latitude 48/26/29, longitude 123/07/15W. Chart 39 fm sounding from present survey.*

On charts 18421 and 18433 the charted depth of 34 fathoms at latitude 48°26'05" N, longitude 123°06'12" W, was not confirmed. Surveyed least depth in the immediate vicinity of the charted sounding is at position number 23,987, 46.3 fathoms/84.8 meters. Twenty-five meter splits were run in this area.

Delete 34 fm from charts. 100% Bottom Coverage was obtained over the charted 34 fathom depth and no indication of shoaling was found. H-10755

** Depth originates from H-4607 (1926) and was likely an error in depth measurement. Chart this area based on the present survey information.*

On charts 18421 and 18433 the charted depth of 34 fathoms at latitude 48°28'44"N, longitude 123° 07'24"W, was not confirmed. Surveyed least depth in the immediate vicinity of the charted sounding is at position number 23,800, 35.1 fathoms/82.1 meters. Twenty-five meter splits were run in this area.

Delete 34 fm from charts. Chart 35 fathom sounding from present survey.
All other soundings and contours are, in general, in good agreement with the charts. *Do not concur. See Eval Rpt, section M.*

Comparison of Non-sounding Features ✓ *See Eval Rpt., section M.*

The charted green tint designating areas cleared to specific depths by wire drag should be removed from the chart in all areas common to 200 percent SSS coverage. The SSS investigations together with the echosounder development conclusively indicate the least depths to be found in these areas. *concur.*

P. ADEQUACY OF SURVEY ✓ *See Eval Report, section P.*

The survey is a complete navigable area hydrographic survey and is adequate to supercede all prior surveys within their common areas. One hundred meter line spacing was run throughout the survey area and 200% side scan coverage in areas with depths less than the 24-fathom curve as per section 7.2 of the Project Instructions.

Q. AIDS TO NAVIGATION ✓

No aids to navigation were located within the survey limits. *concur*

R. STATISTICS ✓

<u>Description</u>	<u>Quantities</u>
Total Positions	16429
Total Detached Positions	48
Total Nautical Miles Hydrography	473
Nautical Miles Sidescan Hydrography	108
Velocity Casts	9
Days of Production	43
Bottom Samples	15
Tide Stations	1
Dives	1

S. MISCELLANEOUS ✓

Mainscheme data was assigned position numbers 1 to 9,999 and 20,000 and up; Side Scan Sonar 10,000 to 14,001

Bottom samples were acquired and forwarded to the Smithsonian Institute in accordance with section 6.7 of the Project Instructions. A copy of the Oceanographic Log Sheet-M, Bottom Sediment Data (NOAA Form 75-44) is included in Separate II. *

No magnetic disturbances were observed

T. RECOMMENDATIONS ✓

None

U. REFERRAL TO REPORTS ✓

Title

Date

Horizontal Control Report
OPR-N368-PHP

June 1997

Coast Pilot Report

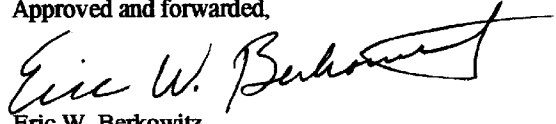
To follow

Submitted for approval,

Approved and forwarded,



Marc W. Rothmeyer
Survey Technician



Eric W. Berkowitz
Lieutenant, NOAA
Chief, PHP

Reference Stations ✓

Northern Puget Sound

<u>Station</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Frequency</u>	<u>Trans. Rate</u>
Whidbey Island, WA	48°18.8' N	122°41.8' W	302 kHz	100 BPS
Richmond, BC	49°10' 25" N	123°07' 05" W	320 kHz	200 BPS

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N1
12783.2P
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 2.9m

SOURCE POSITION: Latitude: 48°24'47.1"
Longitude: 123°05'41.7"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'46.4"N and Longitude 123°05'41.0"W. Two detached positions were taken at position numbers 23,692 and 23,694. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 10.76 fathoms/19.5 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 11 fathoms is charted at latitude 48° 24'37.6⁰N and longitude 123°04'47.6³W, 220 meters SSE of surveyed sounding. Delete charted 11 fathoms at 48° 24'37.6⁰N and longitude 123°04'47.6³W and chart 10.9 fathom sounding at 48° 24'46.4"N and longitude 123°05'41.0"W. *Concur with clarification. A 10.3 fm sounding also exists 400m NNW of the above position and should also be charted. Chart both Smooth Sheet depths as follows;*

10.6 = 10 ₃ Chart 18434	10.3 = 10 ₂ Chart 18434
10.6 = 10 Chart 18421	10.3 = 10 Chart 18421

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N2
12786.7P
SURVEY: H-10755

18434 / 1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 5.1m

SOURCE POSITION: Latitude: 48°24'45.4"
Longitude: 123°05'50.4"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'45.0" N and longitude 123°05'50.4"W. One detached position was taken at position number 23,700. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 10.9 ^{approved} fathoms/20.0 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 11 fathoms is charted at latitude 48°24'37.60"N and longitude 123°05'37.31"W, ~~360~~ 180 meters SE of surveyed position. The charted depths adequately depict the hydrography in this area. Concur chart this area based on the present survey information.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N3
10316.4S
SURVEY: H-10755

18434/1:25p00
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.5m

SOURCE POSITION: Latitude: 48° 24' 37.6"
Longitude: 123° 06' 07.1"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24' 37.9" N and Longitude 123° 06' 06.0" W. Two detached positions were taken at position number 23,701 and 23,702. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 14.8 fathoms/27 meters ^{approved}

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 11 fathoms is charted at latitude 48° 24' 29.71"N and longitude 123° 06' 02.83"W, 230m SSE of the surveyed sounding. The charted depths adequately depict the hydrography in this area. *Chart this area based on the present survey information.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N4
13835.6P
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.8m

SOURCE POSITION: Latitude: 48°24'43.8"
Longitude: 123°06'22.3"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search found no significant contacts in the vicinity of the source position. Disproval DP taken at fix number 23,703.

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: N/A

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N5
10487.6S
SURVEY: H-10755

18434 / 1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 2.8m

SOURCE POSITION: Latitude: 48°24'32.7"
Longitude: 123°06'34.8"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'32.2" N and Longitude 123°06'34.8"W. Detached positions were taken at position numbers 23,704 and 23,706. The least depth was converted to MLLW using ~~unverified~~ ^{approved} smooth tides to obtain a depth of 12.4 ✓ fathoms/22.7 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 12 fathoms is charted at latitude 48°24'33.12"N and longitude 123°06'42.28"W, 140m west of surveyed soundings. The charted depths adequately depict the hydrography in this area. *Chart this area based on the present survey information.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N6
12674.3s
SURVEY: H-10755

18434/1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.9m

SOURCE POSITION: Latitude: 48°24'30.4"
Longitude: 123°06'23.3"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48°24'30.9" N and Longitude 123°06'23.4"W. Detached position were taken at position number 23,707 and 23,710. The least depth was converted to MLLW using ~~inverted~~ smooth tides to obtain a depth of 14.5 fathoms/26.2 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 13 fathoms is charted at latitude 48°24'33.22"N and longitude 123°06'25.78, 70 meters North of the surveyed sounding. The charted depths adequately depict the hydrography in this area. Chart this area based on the present survey information. 12-13 Fathom depths were found within 200 meters west of the charted 13 Fathom depth.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N7
10500.7S
SURVEY: H-10755

CHART NO: 18434/1:25000
18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.2m

SOURCE POSITION: Latitude: 48°24'10.7"
Longitude: 123°06'32.7"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'10.9" N and Longitude 123°06'32.0"W. One detached position was taken at position number 23,713. The least depth was converted to MLLW using ~~unverified~~ ^{approved} smooth tides to obtain a depth of 16.5⁶ fathoms/30.3 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: Surrounding survey depths are shoaler than this item. Current survey depths should be charted in this area. *Concur*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N8
10115.5S
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.5m

SOURCE POSITION: Latitude: 48°24'00.4"
Longitude: 123°05'42.9"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'00.6" N and Longitude 123°05'42.6"W. One detached position was taken at position number 23,720. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 20.2 fathoms/36.8 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: Surrounding survey depths are shoaler than this item. Current survey depths should be charted in this area. ~~Concur~~

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N9
10522.6S
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4m

SOURCE POSITION: Latitude: 48°23'35.2"
Longitude: 123°06'34.3"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 23'35.1" N and Longitude 123°06'34.2"W. One detached position was taken at position number 23,704. The least depth to obtain a depth of ~~14.8~~ 12.7 fathoms/~~27.1~~ meters was converted to MLLW using ~~unverified~~ smooth tides. ^{23.2}

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: Surrounding survey depths are shoaler than this item and should be used to define the hydrography in the area. Do not concur * Chart 12 fathoms at position as found by the present survey.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N10
11372.9P
SURVEY: H-10755

18434/11:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 5.1m

SOURCE POSITION: Latitude: 48°22'57.9"
Longitude: 123°08'43.1"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 22'57.9" N and longitude 123°08'42.8"W. One detached position was taken at position number 23,738. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 24 fathoms/44 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 27 fathoms is charted at latitude 48°23'06.71"N and longitude 123°08'35.45"W, 290 meters NNE of the surveyed sounding. Delete charted 27 fathom at 48°23'06.71"N and longitude 123°08'35.45"W and chart 24 fathoms at latitude 48°22'57.9" N and longitude 123°08'42.8"W. *Do not Concur* *Charted 27 Fathom

Sounding should be superseded by depths as found on the present survey.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N11
11833.5p
SURVEY: H-10755

18434/1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.3m

SOURCE POSITION: Latitude: 48°22'59.8"
Longitude: 123°07'37.1"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 48°14'55.91" N and Longitude 123°26'17.91"W. One detached position was taken at position number 23,739. A least depth was converted to MLLW using ~~unadjusted~~ ^{adjusted} smooth tides to obtain a depth of 17.1^{2m} fathoms/31.4 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 18 fathoms is charted at latitude 48°22'58.38"N and longitude 123°07'44.83"W, 160m West of the surveyed sounding. Delete charted 18 fathom at latitude 48°22'58.38"N and longitude 123°07'44.83"W and chart surveyed sounding at latitude 48°14'55.91"N and Longitude 123°26'17.91"W. *Do not concur. A 17.1 fm exist directly 150m east of the above position.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N12
12038.6s
SURVEY: H-10755

18434 / 1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.5m

SOURCE POSITION: Latitude: 48°23'26.8"
Longitude: 123°07'39.1"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search found no significant contacts in the vicinity of the source position. A disapproval DP was taken at position number 23,740. ✓

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: N/A A 16.2 fathom sounding was found on the present survey in depths ranging from 16-19 fathoms. Chart this area based on the present survey information. ✓

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N13
10900.8S
SURVEY: H-10755

18434/1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 10.1m

SOURCE POSITION: Latitude: 48°23'32.5"
Longitude: 123°07'21.5"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 23'32.0"N and longitude 123°07'21.8"W. One detached position was taken at position number 23,742. The least depth was converted to MLLW using ~~unverified~~^{approved} smooth tides to obtain a depth of 18.2 fathoms/33.3 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 15 fathoms is charted at latitude 48°23'24.62"N and longitude 123°07'23.99"W, 200 meters to the south of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *concur. Chart this area based on the present survey information. A 14.9 fathoms sounding was found on the present survey near the charted 15 fm depth. See item N14 on following page.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N14
10906.7P
SURVEY: H-10755

CHART NO: 18434/1:25,000
18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 5.2m

SOURCE POSITION: Latitude: 48°23'22.6"
Longitude: 123°07'19.3"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 23'22.7" N and Longitude 123°07'19.6"W. One detached position was taken at position number 23,745. The least depth was converted to MLLW using ~~unverified~~ ^{soundings} smooth tides to obtain a depth of 14.9 fathoms/27.2 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 15 fathoms is charted at latitude 48°23'24.62"N and longitude 123°07'23.99"W, 100 meters NW from the surveyed sounding. Delete Charted 15 fathom at latitude 48°23'24.62"N and longitude 123°07'23.99"W and chart surveyed sounding at latitude 48°23'22.7" N and longitude 123°07'19.6"W. *Concur.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N15
13636.2P
SURVEY: H-10755

18434 / 1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.1m

SOURCE POSITION: Latitude: 48°23'14.5"
Longitude: 123°07'04.1"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 23'17.3"N and Longitude 123°07'04.2"W. One detached position was taken at position number 23,746. The least depth was converted to MLLW using ~~unverified~~ ^{approved} smooth tides to obtain a depth of 15.6⁷ fathoms/28.6 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 15 fathoms is charted at latitude 48° 23'26.69"N and longitude 123°07'24.18"W, 470m NW of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *concur*

Chart this area based on the present survey information.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N16
13645.5P
SURVEY: H-10755

18434/1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 10.1m

SOURCE POSITION: Latitude: 48°23'32.5"
Longitude: 123°07'03.4"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 23'31.9" N and Longitude 123°07'03.2"W. One detached position was taken at position number 23,752. The least depth was converted to MLLW using ~~unreduced~~ smooth tides to obtain a depth of 15.2 fathoms/27.9 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 14 fathoms* is charted at latitude 48°23'29.87"N and longitude 123°06'47.30"W, 360 meters East of the surveyed sounding. The charted depths adequately depict the hydrography in this area. Do not chart. *A 13 fathom depth was found approximately 220 meters west of charted 14 at latitude 48/23/30N, longitude 123/06/52 W. Chart 13 fathoms.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N17
10214.8P
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 7.5m

SOURCE POSITION: Latitude: 48°24'00.3"
Longitude: 123°05'57.8

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'00.2" N and Longitude 123°05'57.7"W. One detached position was taken at position number 23,757. The least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of 14.3⁴ fathoms/26.2³ meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 12 fathoms is charted at latitude 48°24'08.89"N and longitude 123°06'05.68"W, 310 meters NW of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *Concur Chart this area based on the present survey information.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N18
10219.5s
SURVEY: H-10755

18434 / 1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4m

SOURCE POSITION: Latitude: 48°24'08.0"
Longitude: 123°05'55.0"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'07.8" N and Longitude 123°05'54.9"W. One detached position was taken at position number 23,758. A least depth was converted to MLLW using ~~unverified~~ smooth tides to obtain a depth of ~~12.9~~ ^{13.0} fathoms/23.6 meters

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 12 fathoms is charted at latitude 48°24'08.89"N and longitude 123°06'05.68"W, 200 meters west of the surveyed sounding. The charted depths adequately depict the hydrography in this area. *concur* Chart this area based on the present survey information. A 12.4 fathom sounding was found on the present survey near the charted 12 fathom depth.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N19
12520.8P
SURVEY: H-10755

CHART NO: 18424/1:25,000
18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 2.8m

SOURCE POSITION: Latitude: 48°24'12.7"
Longitude: 123°06'01.3"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'11.9" N and Longitude 123°06'02.0"W. One detached position was taken at position number 23,760. The least depth was converted to MLLW using ~~unadjusted~~ ^{adjusted} smooth tides to obtain a depth of 13.7⁸ fathoms/25.1 meters.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 12 fathoms is charted at latitude 48°24'08.89"N and longitude 123°06'05.68", 130 meters South of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *concur* Chart this area based on the present Survey information. A 12.4 fathom sounding was found on the present survey near the charted 12 fathom depth.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N20
13491.5s
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.3m

SOURCE POSITION: Latitude: 48°24'14.7"
Longitude: 123°06'36.6"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48° 24'14.7" N and Longitude 123°06'36.5"W. One detached position was taken at position number 23,763. The least depth was converted to MLLW using ^{2.8 fms} unverified smooth tides to obtain a depth of 12.8 fathoms/23.2 meters. This 12.8 fathom sounding cannot be shown at chart scale based on compiled 12.8 fathom listed below.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 15 fathoms* is charted at latitude 48°24'10.77"N and longitude 123°06'49.91"W, 290 meters SSW of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *Do not concern *Chart 13 fathom depth found (12.8 fms) approximately 100 meters ENE of charted 15 fathom at latitude 48/24/14N, longitude 123/06/45 W.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N21
12820.4s
SURVEY: H-10755

CHART NO: 18421/1:80,000
18434/1:2500
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 2.3m

SOURCE POSITION: Latitude: 48°24'47.4"
Longitude: 123°06'51.6"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search found no significant contacts in the vicinity of the source position. One disapproval DP was taken at position number 23,768. ✓

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: N/A *Chart this area based on the present survey information.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N22
10527.5p
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.2m

SOURCE POSITION: Latitude: 48°23'26.4"
Longitude: 123°06'30.9"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search found no significant contacts in the vicinity of the source position. Disproval DP was taken at position number 23,769. ✓

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: N/A
on the present survey information.

Chart this area based

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N23
11903.3P
SURVEY: H-10755

18434 / 1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 4.8m

SOURCE POSITION: Latitude: 48°23'09.8"
Longitude: 123°08'06.5"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search located the item at latitude 48°
~~23° 09.96~~^{23 09.96} and longitude ~~123° 08' 17.96~~^{123 08 04.76} W. One detached position was taken
at position number 24,046. The least depth was converted to MLLW using
~~unverified~~ smooth tides to obtain a depth of ~~19.9~~^{18.8} fathoms/~~36.4~~^{34.4} meters.

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 19 fathoms is
charted at latitude 48°23'09.96"N and longitude 123°08'04.76"W, 270
meters North of the surveyed soundings. The charted depths adequately
depict the hydrography in this area. *concur. Chart this area based on the
present survey information.*

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N24
10487.7S
SURVEY: H-10755

18434/1:25,000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 2.8m

SOURCE POSITION: Latitude: 48°24'32.7"
Longitude: 123°06'34.8"

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar

RESULTS OF INVESTIGATION: Drift search found no significant contacts in the vicinity of the source position. Disproval DP at position number 23,764. ✓

COMPARISON WITH PRIOR SURVEYS: N/A

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: ~~N/A~~ A 12.4 fathom depth was found in the area of the contact at latitude 48°24'32.5" N, longitude 123°06'35" W. Chart 12.4 (12 fms) as found by the present survey.

ITEM INVESTIGATION REPORT ✓

ITEM NO.: N25
12816.8s
SURVEY: H-10755

18434 / 1:25000
CHART NO: 18421/1:80,000
EDITION: 40th
CHART DATE: January 25, 1997

DESCRIPTION: SSS Contact
Computed height 3.5m

SOURCE POSITION: Latitude: 48°24'45.7 N
Longitude: 123°06'42.3 W

SURVEY REQUIREMENTS: N/A

METHOD OF INVESTIGATION: Echosounder, Side Scan Sonar, Dive

RESULTS OF INVESTIGATION: On Dn 251 PHP Divers investigated contact 12816.8s. Divers located two rocks at latitude 48° 24' 44.78" N and longitude 123°06'42.61"W, and took the least depth measurement on the shoalest. One detached position was taken at position number 23,543. The least depth was converted to MLLW using ~~untidied~~ smooth tides to obtain a depth of 12.7⁵ fathoms/22.7⁸ meters. 12⁵ RK* is shown on smooth sheet.

COMPARISON WITH PRIOR SURVEYS: Priors H-2211 (1894) and H-6653 (1943) were not received by PHP.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS: 11 fathoms is charted at latitude 48°24'48.68"N and longitude 123°06'47.45"W, 160 meters NW of the surveyed soundings. The charted depths adequately depict the hydrography in this area. *CONCUR*. *An 11 fathom depth was found by the present survey approximately 170 meters west of 12⁵ RK at latitude 48/24/46.5 N, longitude 123/06/51/W. Chart 11 fathoms.

APPROVAL SHEET

for

H-10755

Standard field surveying and processing procedures were followed in producing this survey in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1997. The data were reviewed daily during acquisition and processing.

The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

Approved and forwarded,



LTjg Eric Berkowitz, NOAA
Chief
Pacific Hydrographic Party



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: February 13, 1998

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-N368-PHP

HYDROGRAPHIC SHEET: H-10755

LOCALITY: Northern Puget Sound

TIME PERIOD: June 5 - Oct 6, 1997

TIDE STATION USED: 944-9880 Friday Harbor, WA
Lat. 48° 32.8'N Lon. 123° 00.6'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.150 meters

TIDE STATION USED: 944-9982 Richardson Point, Lopez Island, WA
Lat. 48° 26.8'N Lon. 122° 54.0'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.012 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: NPS11, NPS12, NPS13 & NPS20

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (Meters), relative to MLLW and on Greenwich Mean Time.

Note 2: Use tide data from the appropriate station for each zone according to the order in which they are listed in the "Tidezone" corrector files. For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available. All zones within a survey sheet may not have the same order of applicable tide stations.

D. J. Gill

CHIEF, OPERATIONAL ANALYSIS BRANCH

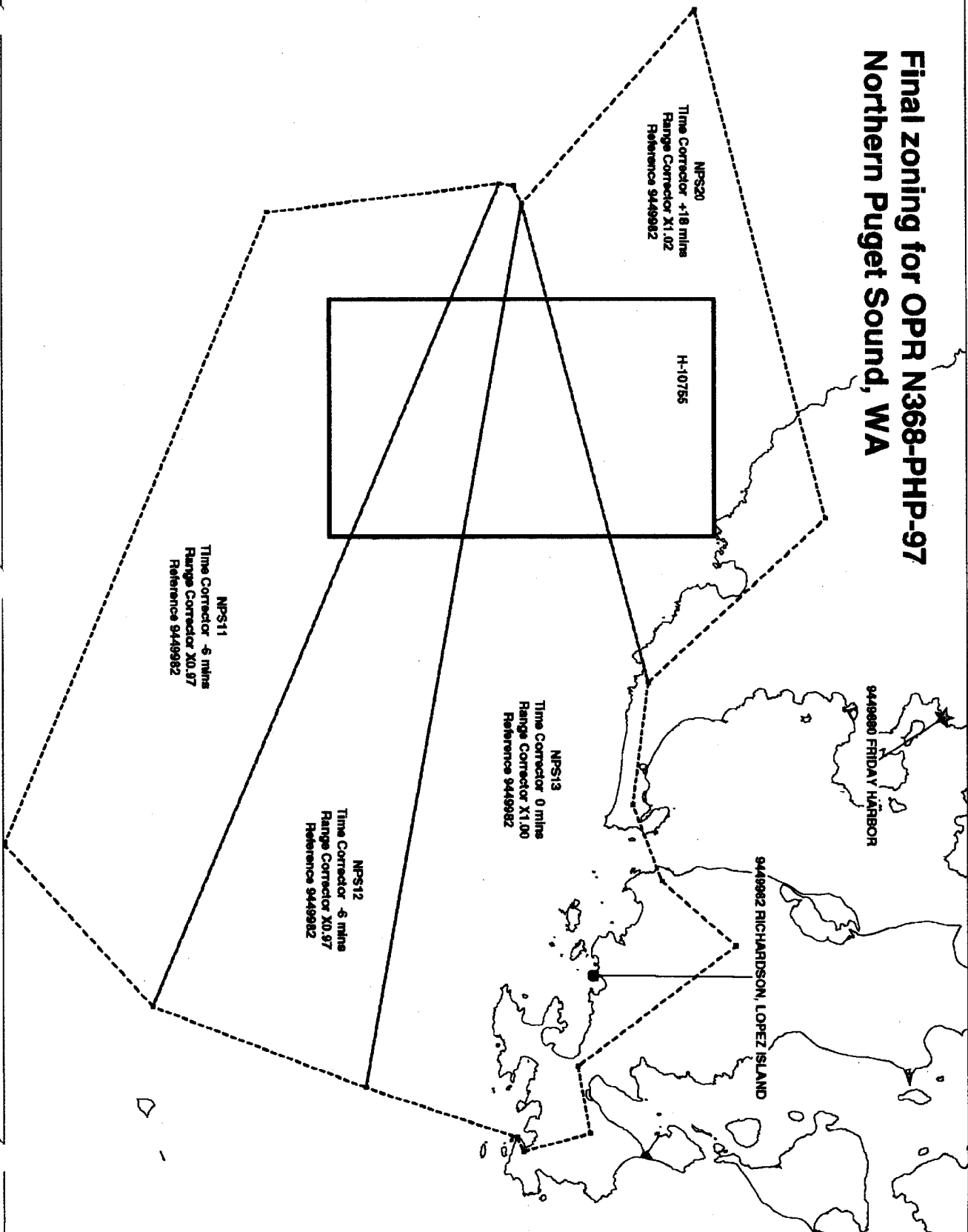


Final tide zone node point locations for OPR N368-PHP-97,
Sheet H-10755.

Format: Longitude in decimal degrees (negative value denotes
Longitude West),
Latitude in decimal degrees
Tide Station (in recommended order of use)
Average Time Correction (in minutes)
Range Correction

		Tide Station Order	AVG Time Correction	Range Correction
Zone NPS11				
-122.95547	48.279048	944-9982	-6	0.97
-123.228354	48.354467	944-9880	-66	0.91
-123.240326	48.420619			
-122.885328	48.3214			
-122.95547	48.279048			
Zone NPS12				
-123.240326	48.420619	944-9982	-6	0.97
-123.239336	48.42482	944-9880	-66	0.91
-123.231735	48.426997			
-122.850128	48.382088			
-122.885328	48.3214			
-123.240326	48.420619			
Zone NPS13				
-123.231735	48.426997	944-9982	0	1.00
-123.025485	48.46259	944-9880	-66	0.93
-122.972249	48.458193			
-122.938978	48.466432			
-122.911313	48.487364			
-122.859374	48.442349			
-122.830255	48.445753			
-122.822393	48.426843			
-122.828524	48.425006			
-122.850128	48.382088			
-123.231735	48.426997			
Zone NPS20				
-123.025177	48.462575	944-9982	+18	1.02
-123.095732	48.513065	944-9880	-48	0.95
-123.315463	48.476315			
-123.231735	48.426997			
-123.025177	48.462575			

Final zoning for OPR N368-PHP-97 Northern Puget Sound, WA



GEOGRAPHIC NAMES

H-10755

Name on Survey	A ON PREVIOUS SURVEY B ON PREVIOUS SURVEY C ON U.S. QUADRANGLE MAPS D FROM LOCAL INFORMATION E ON LOCAL MAPS F P.O. GUIDE OR MAP G RAND MCNALLY ATLAS H U.S. LIGHT LIST K										
	A	B	C	D	E	F	G	H	K		
HARO STRAIT	X		X							1	
MIDDLE BANK	X		X							2	
STRAIT OF JUAN DE FUCA	X		X							3	
WASHINGTON (title)	X		X							4	
PILE POINT*										5	
* Added during final approval										6	
										7	
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										25	

Dennis J. Rosenberg
Chief Hydrographer

APR 17 1998

HYDROGRAPHIC SURVEY STATISTICS

H-10755

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

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

SHORELINE DATA

SHORELINE MAPS (List):	NA
PHOTOBATHYMETRIC MAPS (List):	NA
NOTES TO THE HYDROGRAPHER (List):	NA
SPECIAL REPORTS (List):	NA
NAUTICAL CHARTS (List): 18421 41st Ed., 3/21/98; 18433 3rd Ed., 4/20/91; 18434 4th Ed., 4/27/96	

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS			
	VERIFICATION	EVALUATION	TOTALS	
POSITIONS ON SHEET				
POSITIONS REVISED				
SOUNDINGS REVISED				
CONTROL STATIONS REVISED				
	TIME-HOURS			
	VERIFICATION	EVALUATION	TOTALS	
PRE-PROCESSING EXAMINATION	10		10	
VERIFICATION OF CONTROL				
VERIFICATION OF POSITIONS				
VERIFICATION OF SOUNDINGS				
VERIFICATION OF JUNCTIONS				
APPLICATION OF PHOTOBATHYMETRY				
SHORELINE APPLICATION/VERIFICATION				
COMPILATION OF SMOOTH SHEET	156		156	
COMPARISON WITH PRIOR SURVEYS AND CHARTS	30		30	
EVALUATION OF SIDE SCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT		33	33	
GEOGRAPHIC NAMES				
OTHER*				
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	186	33	219

Pre-processing Examination by Pacific Hydrographic Branch	Beginning Date 12/5/97	Ending Date 12/6/97
Verification of Field Data by M. Bigelow, D. Doles, R. Mayor, L. Deodato	Time (Hours) 196	Ending Date 6/23/98
Verification Check by B. Olmstead	Time (Hours) 6	Ending Date 7/1/98
Evaluation and Analysis by L. Deodato	Time (Hours) 33	Ending Date 6/24/98
Inspection by B. Olmstead	Time (Hours) 10	Ending Date 7/17/98

EVALUATION REPORT

H-10755

A. PROJECT

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

B. AREA SURVEYED

The survey area is adequately discussed in the hydrographer's report. Depths generally range from 5 to 159 fathoms. The bottom consists primarily of sand, mud, and pebble.

The hydrographer has determined the survey limits in accordance with the approved sheet layout and project limits created in MapInfo. A page size chartlet of the survey area indicating the limits of supersession is included in this report as Attachment A.

C. SURVEY VESSELS

The hydrographer's report contains information relating to survey vessels.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Survey data were processed using the same Hydrographic Processing System (HPS) software used by the hydrographer, AutoCad (Version 13.0), and MicroStation 95.

Digital data for this survey exists in the standard HPS format, that is a database format using the .dbf extension. In addition, the plot is filed both in the MicroStation drawing format, i.e., dgn (extension); and in the more universally recognized graphics transfer format, .dxf (extension). Copies of these files will be retained at PHB until data forwarded to headquarters has been accepted and approved. Data base records forwarded are in the Internal Data Format (IDF) and are in compliance with specifications in existence at the time of survey processing.

The drawing files necessarily contain information which is not part of the HPS data set such as geographic names text, line-type data, and minor symbolization. In addition, those soundings deleted from the drawing for clarity purposes, remain unrevised in the HPS digital files to preserve the integrity of the original hydrographic data set. Cartographic codes used to describe the digital data are those authorized by Hydrographic Survey Guideline No. 35 and No. 75.

The field sheet parameters have been revised to center the hydrography on the office plot. The data is plotted using a Modified Transverse Mercator projection and are depicted on a single 1:10,000 scale sheet.

E. SONAR EQUIPMENT

Refer to section E of the hydrographer's concerning set-up, operation and processing of side scan sonar data.

F. SOUNDING EQUIPMENT

Sounding equipment has been adequately addressed in the hydrographer's report.

G. CORRECTIONS TO SOUNDINGS

The sounding data have been reduced to Mean Lower Low Water (MLLW). The reducers include corrections for an actual tide, dynamic draft, and sound velocity. These reducers have been reviewed and are consistent with NOS specifications.

Predicted tides were used for reduction of soundings during field processing. During office processing, tide reductions were derived from approved hourly heights zoned direct from the following tide gage: Richardson Point, Lopez Island, Washington, gage 944-9982. Friday Harbor, Washington, gage 944-9880, listed in the approved tide note was not used.

H. CONTROL STATIONS

Section H and I of the hydrographer's report contain adequate discussions of horizontal control and hydrographic positioning.

The positions of horizontal control stations used during hydrographic operations are field values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD 27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude:	-0.652 seconds	(-20.138 meters)
Longitude:	4.654 seconds	(95.675 meters)

The year of establishment of control stations originate with the horizontal control records for this survey.

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 was computed for survey operations. The quality of several positions exceeds limits in terms of horizontal dilution of precision (HDOP). These positions are isolated and occur randomly throughout the survey area. A review of the data, however, suggests that none of these fixes are used to position dangers to navigation. The features or soundings located by these fixes are consistent with the surrounding information. These fixes are considered acceptable. DGPS performance checks were conducted in the field and found adequate.

NAD 83 is used as the horizontal datum for plotting and position computations.

Additional information concerning calibrations and system checks can be found in the hydrographer's report and in the separates related to horizontal position control and corrections to position data.

J. SHORELINE

There are no photogrammetric source data for this survey. The shoreline in brown on the smooth sheet was taken from the raster of chart 18433 and shown for orientation only.

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10755 does not junction with any contemporary survey.

M. COMPARISON WITH PRIOR SURVEYS

H-6653 (1940-43)	1:40,000
H-6818 (1943)	1:20,000
H-8085 (1953-54)	1:10,000

The prior surveys listed above cover the entire area of the present survey. Sounding agreement with the present survey compares well revealing differences of 0 to 2 feet. A comparison of the standard depth curves with the prior surveys reveal little change in configuration. A more thorough bottom ensonification by the present survey has shown some areas to be shoaler than found in 1943. However, there appears to be consistent pattern of either shoaling or an increase in depths since 1943. The following items originating from H-6818 were not addressed by the hydrographer and are discussed below.

The 48 fathom sounding at latitude 48/28/44N, longitude 123/07/35W was investigated with 25 meter line spacing. The present survey found depths ranging from 43 to 87 fathoms. A 35 fathom sounding was found approximately 100 meters east of the charted 48 fathom depth. It is likely the charted sounding was either positioned in error and or erroneously scaled from the fathogram.

A 41 fathom sounding at latitude 48/27/47N, longitude 123/09/32W plots near a 46 fathom sounding on the present survey. The present survey found 41 fathom depths within a 100 meters south of the charted depth. It is likely the charted sounding was positioned in error.

Several bottom characteristics originating from H-6818 were transferred to the present survey and should remain as charted.

Differences with the prior surveys may be attributed to greater sounding coverage, improved positioning and sounding methods and relative accuracy of the data acquisition techniques. H-10755 is adequate to supersede the prior surveys within the common area.

H-6819WD (1943) 1:20,000

This wire drag survey conducted in 1943 overlaps the present work in the area around Middle Bank and a second smaller area centered at latitude 48/27/00N, longitude 123/08/00W. In these areas, 200 percent side scan coverage was conducted as specified in the project instructions, section 7.2, Side Scan Sonar. The charted green tint denoting the prior wire drag coverage should be removed from charts 18433 and 18434 in the common area of 200 percent coverage. An area of prior wire drag coverage centered at latitude 48/25/42N, longitude 123/05/45W (depths 36-57 fathoms) was not covered by 200 percent side scan coverage and/or surveyed with 100 percent bottom ensonification. This area is located outside the area as specified in the project instruction. ~~The charted green tint in this area should be retained.~~

N. ITEM INVESTIGATIONS

There were no AWOIS items assigned to this survey. Twenty five non item investigations originating from development of side scan sonar contacts were investigated during present survey operations. These items were adequately addressed in the hydrographer's report, section N, and discussed as individual item investigation reports appended to the descriptive report.

Have a bottom consisting of mud in depths of 36 to 57 fathoms is considered adequate to appropriately remove the green tint from the chart.

*GKM
8/20/05*

O. COMPARISON WITH CHART

Survey H-10755 was compared with the following charts.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
18421	41st	March 21, 1998	1:80,000	NAD83
18433	3rd	April 20, 1991	1:25,000	NAD83
18434	4th	April 27, 1996	1:25,000	NAD83

a. Hydrography

Charted hydrography originates with the previously discussed prior surveys and miscellaneous source data. The prior surveys have been adequately addressed in section M and require no further discussion. Charted soundings and features originating with miscellaneous source data have been satisfactorily addressed during survey operations except as follows.

The present hydrography within these areas is not sufficient to disprove or verify the charted depths.

<u>DEPTH</u>	<u>LAT(N)</u>	<u>LONG(W)</u>
22 FMS	48/26/25	123/08/38
13 Rk	48/26/14	123/08/18
17 Rk	48/26/09	123/08/06
17 Rk	48/26/04.4	123/08/09
12 FMS	48/25/27	123/07/06

Survey H-10755 is adequate to supersede charted hydrography within the common area.

b. Dangers to navigation

No dangers to navigation was discovered during survey operations. No additional dangers to navigation were found during office processing.

P. ADEQUACY OF SURVEY

Hydrography contained on survey H-10755 is adequate to:

- delineate the bottom configuration, determine least depths, and draw the required depth curves;
- reveal there are no significant discrepancies or anomalies requiring further investigation; and
- show the survey was properly controlled and soundings are correctly plotted.

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual, April 1994 Edition, with the exception of the following.

In the event that the field units submission of survey data will exceed four weeks from the completion of work, the Chief of Party will submit a written explanation for the delay indicating the anticipated transmittal date to the Chief of the appropriate processing section. Marine Center ships will forward their explanation through the Marine Center Director.

Fieldwork for survey H-10755 was completed on October 6, 1997 but not transmitted for office processing until December 5, 1997.

The present survey reveals a few shoal indications rising approximately 20 percent above the surrounding depths. It is recommended to split the one hundred meter line spacing throughout these areas to better define the bottom and to ensure shoaler depths are not present. Reference section 1.4.3 of the hydrographic manual. Depths recommended for further investigation are listed below.

<u>DEPTH</u>	<u>LAT(N)</u>	<u>LONG(W)</u>
26 FMS	48/26/07.5	123/06/27
28 FMS	48/25/39	123/06/15
47 FMS	48/26/27	123/05/54
32 FMS	48/26/17	123/06/22

Q. AIDS TO NAVIGATION

There are no fixed or floating aids to navigation within the survey area.

There were no features of landmark value located within the area of this survey.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

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

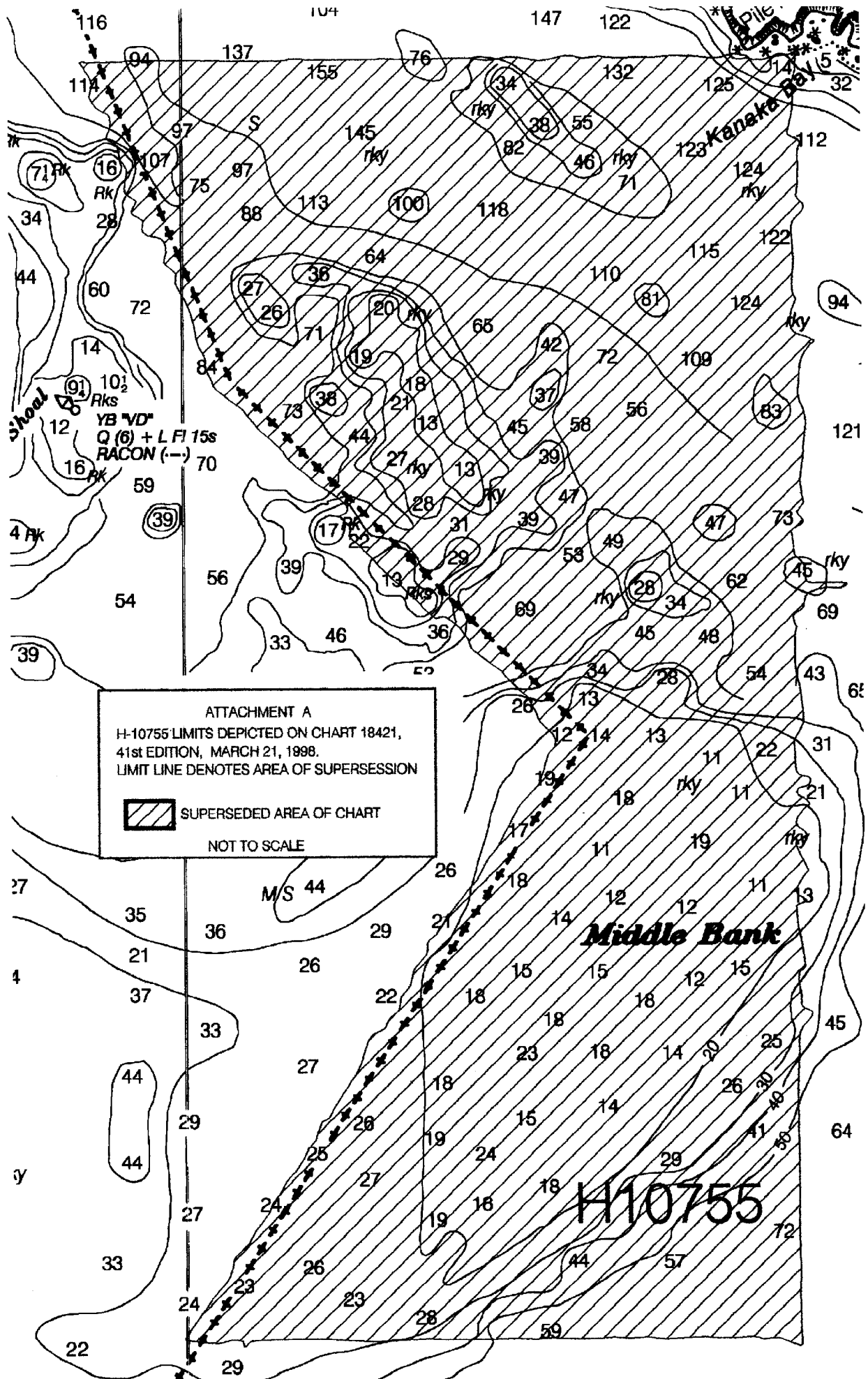
T. RECOMMENDATIONS


This is a good hydrographic survey. Additional work on a low priority is recommended to investigate the items listed in the evaluation report, sections O and P.

U. REFERRAL TO REPORTS

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

Leonardo T. Deodato
Leonardo T. Deodato
Cartographer



ATTACHMENT A
 H-10755 LIMITS DEPICTED ON CHART 18421,
 41st EDITION, MARCH 21, 1998.
 LIMIT LINE DENOTES AREA OF SUPERSESION
 SUPERSEDED AREA OF CHART
 NOT TO SCALE

APPROVAL SHEET
H-10755

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproof of charted data. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Bruce A. Olmstead Date: 7/17/98
Bruce A. Olmstead
Senior Cartographer, Cartographic Section
Pacific Hydrographic Branch

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Kathy Timmons Date: 7/29/98
Kathy Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:

Andrew A. Armstrong III Date: Aug 26, 1998
Andrew A. Armstrong III
Captain, NOAA
Chief, Hydrographic Surveys Division

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10755

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
18421	7/7/98	Dr. T. Durato	Full Part Before After Marine Center Approval Signed Via <i>Rev 10/19/98 TWA</i>
	9/4/98	Jason Rolfe	Drawing No. Full application of soundings and features from smooth sheet and thru charts 18433 and 18434.
18433	6/25/98	Dr. T. Durato	Full Part Before After Marine Center Approval Signed Via <i>Rev 10/23/98 TWA</i>
	9/9/98	Jason Rolfe	Drawing No. Full application of soundings and features from smooth sheet.
18434	7/6/98	Dr. T. Durato	Full Part Before After Marine Center Approval Signed Via <i>Rev 10/22/98 TWA</i>
	9/9/98	Jason Rolfe	Drawing No. Full application of soundings and features from smooth sheet and thru chart 18433.
18433	9/9/98	Jason Rolfe	Full Part Before After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet <i>Rev 10/23/98 TWA</i>
18468	9/9/98	Jason Rolfe	Full Part Before After Marine Center Approval Signed Via
			Drawing No. Full application of soundings from smooth sheet <i>Rev 10/23/98 TWA</i>
18400	9/9/98	Jason Rolfe	Full Part Before After Marine Center Approval Signed Via <i>Rev 10/24/98 TWA</i>
			Drawing No. Full application of soundings from smooth sheet.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
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