H10796

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. RA-5-2-98

Registery No. H-10796

LOCALITY

State Washington

General Locality Puget-Sound

Sublocality Sinclair Inlet

1998

CHIEF OF PARTY
Captain Alan D. Anderson, NOAA

☆U.S. GOV. PRINTING OFFICE: 1985—566-054

NOAA FORM 77-28 (11-72)

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

HYDROGRAPHIC TITLE SHEET

REGISTER NO.: H-10796

FIELD NO.: RA-5-2-98

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

State: Washington

General locality: Puget Sound

Locality: Sinclair Inlet

Scale: 1:5,000 Date of survey: 4/8/98 - 4/11/98

Instructions dated: April 17, 1998 Project No.: S-N904-RA

Vessel: RA-1(2121),RA-3(2123),RA-4(2124),RA-5(2125)

Chief of party: CAPT Alan D. Anderson, NOAA

Surveyed by: CAPT A.Anderson,LT R.Fletcher,LCDR T.Niichel,LT D.Baird,LTJG Rick Sipos, ST J.Lazar,ST A.Lim

Soundings taken by echo sounder, ~~hand lead, pole~~ DSF-6000N,Knudsen 320M,Reson Seabat 8101(SWMB)

Graphic record scaled by: RAINIER Personnel

Graphic record checked by: RAINIER Personnel

Evaluation by: I. Almacen, LCDR J.Ferguson Automated plot by: HP Design Jet 650C

Verification by: M. Bigelow, D. Doles, E. Domingo, I. Almacen, LCDR J. Ferguson

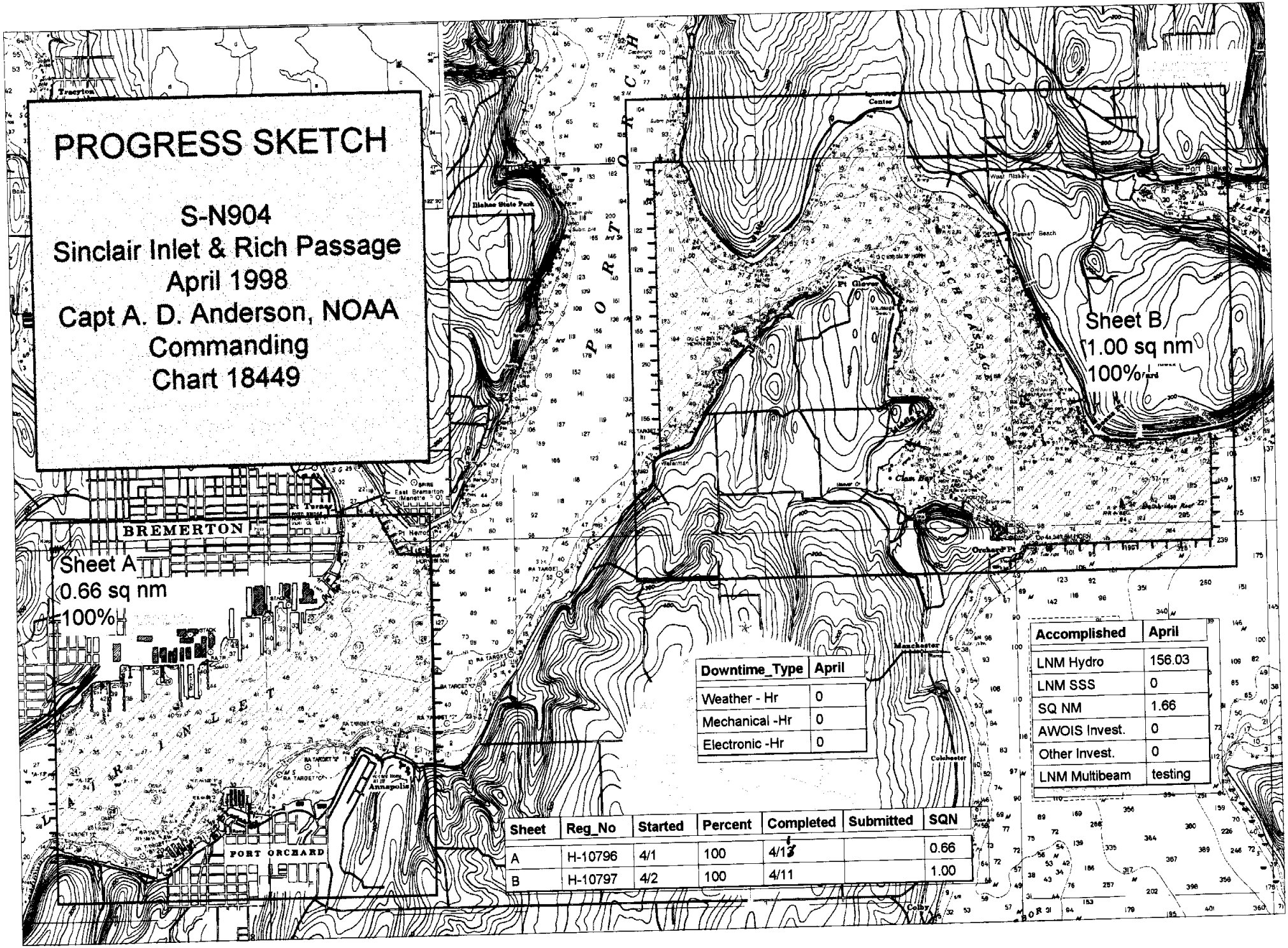
Soundings in ~~fathoms~~ feet at ~~MLW~~ MLLW

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 4/29/99 mcK

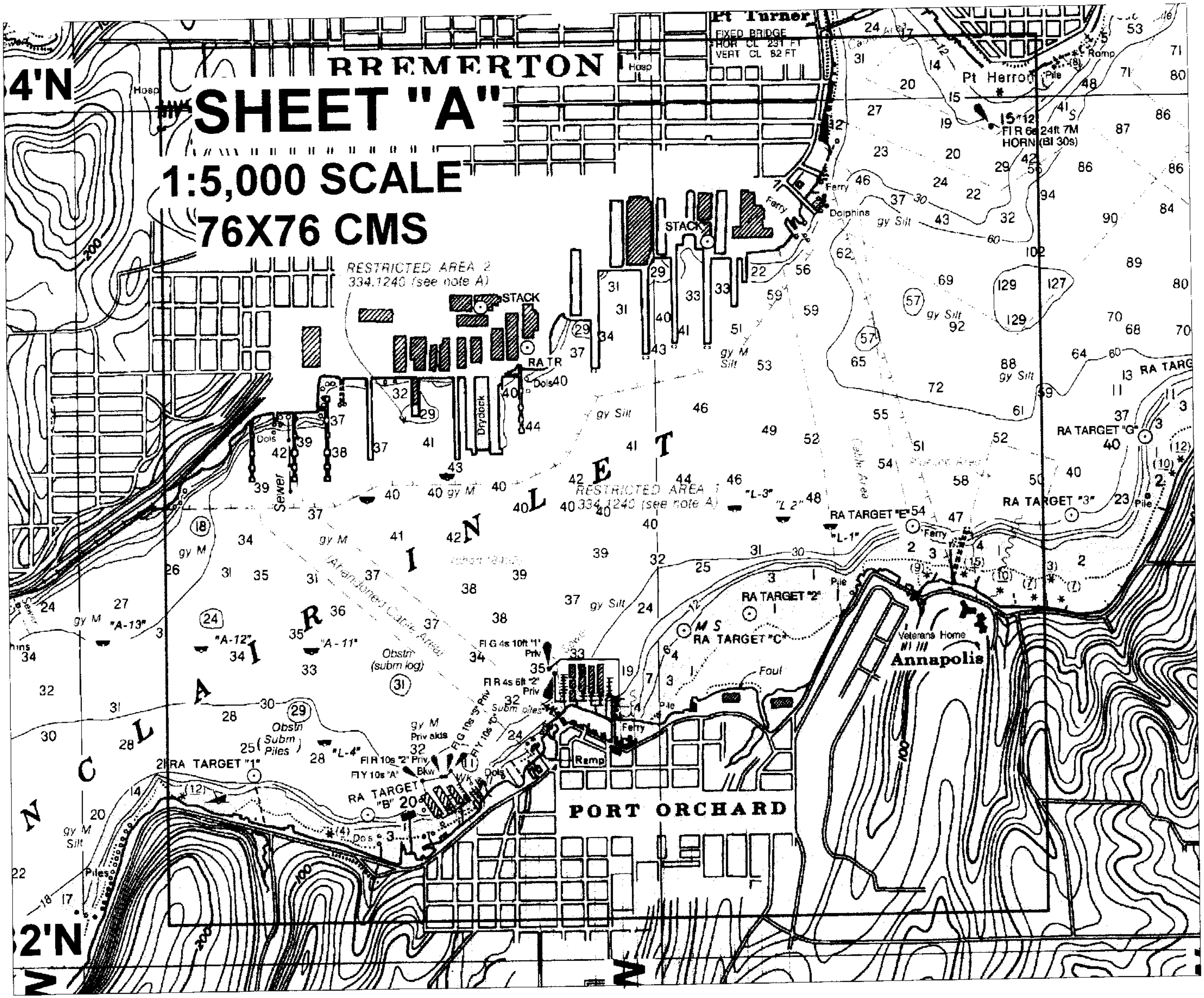
U.S. GOVERNMENT PRINTING OFFICE: 1986 - 652-007/41215

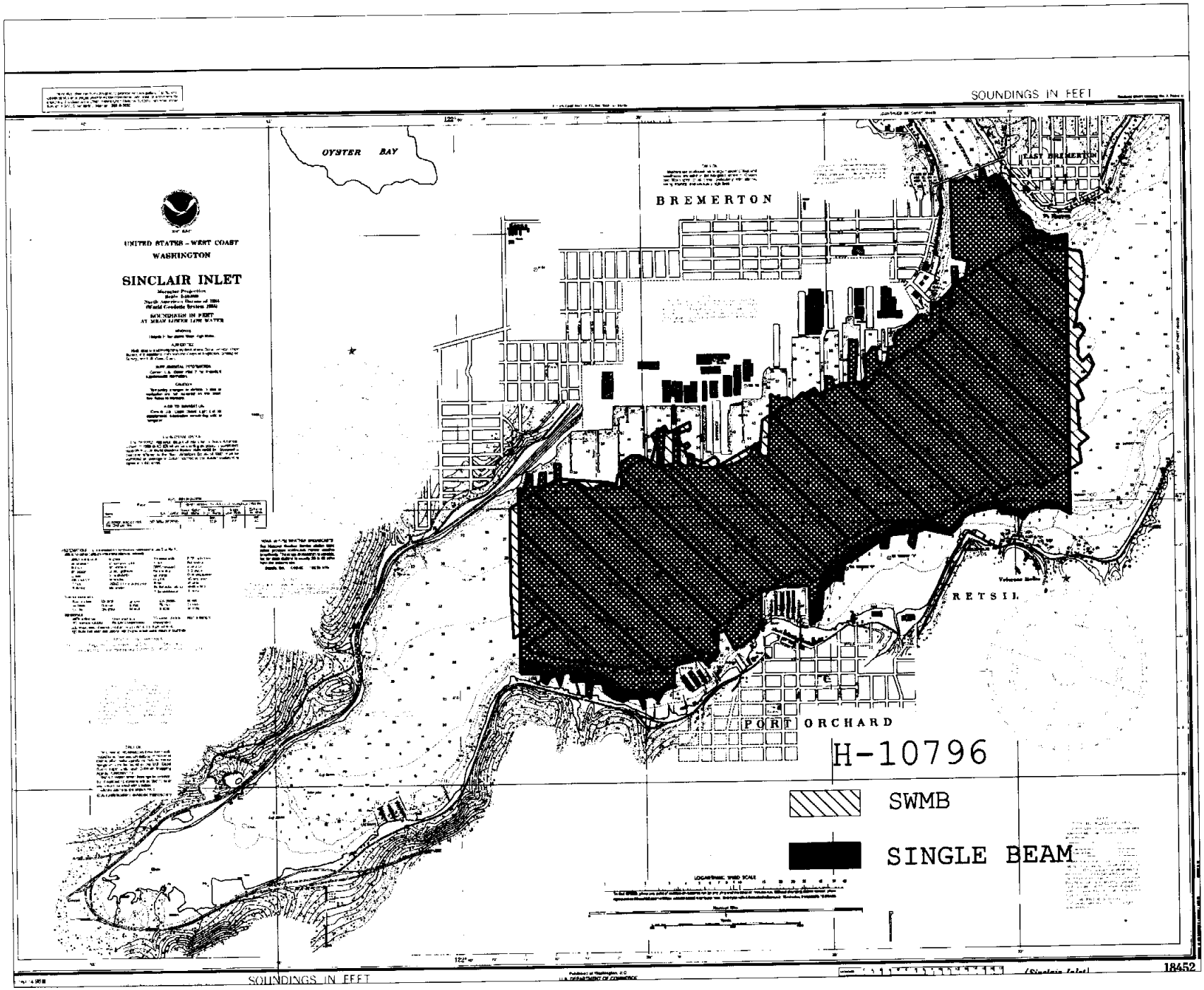


Downtime_Type	April
Weather - Hr	0
Mechanical -Hr	0
Electronic -Hr	0

Accomplished	April
LNM Hydro	156.03
LNM SSS	0
SQ NM	1.66
AWOIS Invest.	0
Other Invest.	0
LNM Multibeam	testing

Sheet	Reg_No	Started	Percent	Completed	Submitted	SQN
A	H-10796	4/1	100	4/13		0.66
B	H-10797	4/2	100	4/11		1.00


SHEET "A"
1:5,000 SCALE
76X76 CMS
BREMERTON
PORT ORCHARD
Annapolis
SINCLAIR INLET
Pt Turner
FIXED BRIDGE
HOR CL 231 FT
VERT CL 82 FT
Pt Herron
Fl R 6s 24ft 7M
HORN (Bl 30s)
RESTRICTED AREA 2
334.1240 (see note A)
RESTRICTED AREA 1
334.1240 (see note A)
STACK
Drydock
Sewer
Dolphins
Ferry
Veterans Home
RA TARGET "1"
RA TARGET "2"
RA TARGET "3"
RA TARGET "B"
RA TARGET "C"
RA TARGET "E"
RA TARGET "G"
"A-11"
"A-12"
"A-13"
"L-1"
"L-2"
"L-3"
"L-4"
Obstn
(subm log)
Subm Piles
Ramp
Foul
Hosp
4'N
2'N


SOUNDINGS IN FEET
OYSTER BAY
BREMERTON
EAST BREMERTON
UNITED STATES - WEST COAST
WASHINGTON
SINCLAIR INLET
SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER
RETSIL
PORT ORCHARD
H-10796
SWMB
SINGLE BEAM
SOUNDINGS IN FEET
18452

Descriptive Report to Accompany Hydrographic Survey H-10796

Field Number RA-10-02-98
Scale 1:10,000
April 1998
NOAA Ship RAINIER
Chief of Party: Captain Alan D. Anderson, NOAA

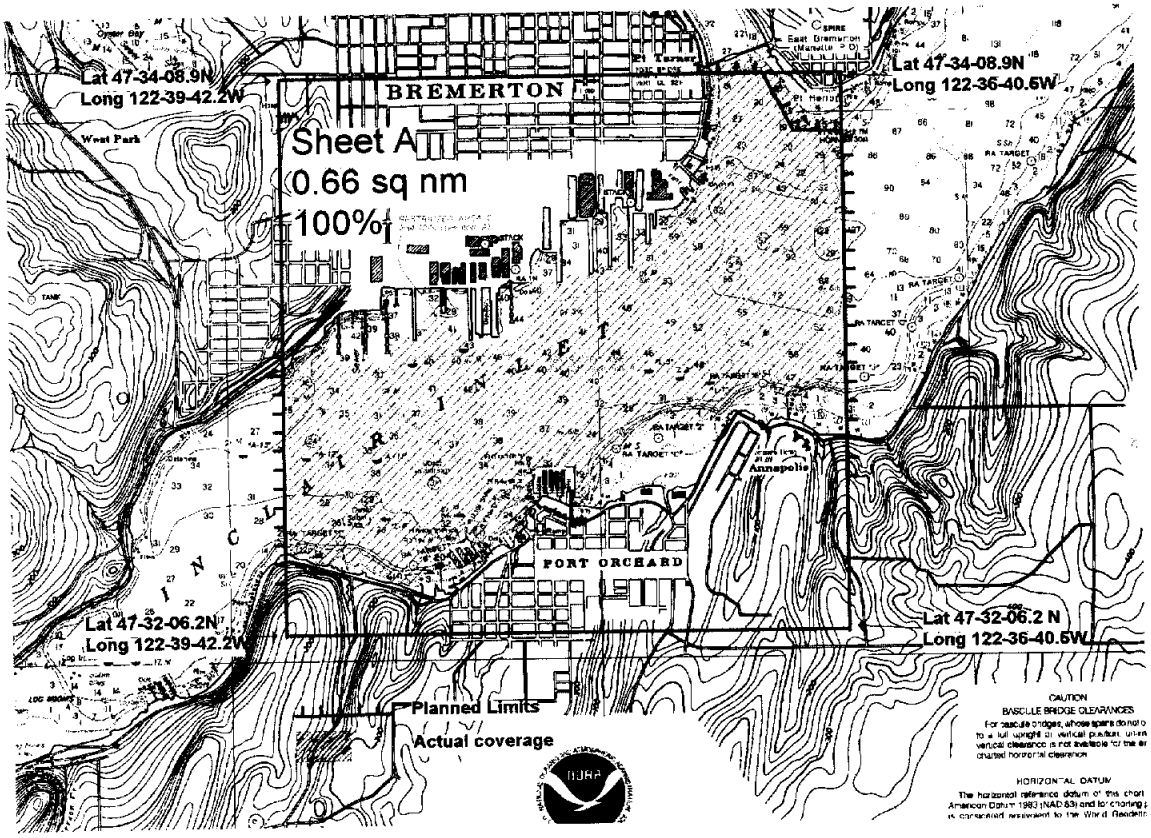
A. PROJECT

This navigable area hydrographic survey was completed as specified by Project Instructions S-N904-RA dated April 17, 1998. Survey H-10796 corresponds to **sheet A** as defined in the sheet layout and **sheet 02** as defined in the Hydrographic Processing System (HPS) program. This survey will provide data to update existing National Ocean Service (NOS) nautical charts. This project responds to a request from the Department of the Navy (Naval Surface Group Pacific Northwest), the USCG 13th District OAN, which is conducting a Waterway Management Study, and from further concerns raised by the Washington State Ferry vessels.

The project area of Sinclair Inlet is home to the Puget Sound Naval Shipyard. Nuclear submarines and naval aircraft carriers routinely travel the project area. The project area is also routinely traveled by Washington State Ferry vessels, sailing vessels, and recreational motor vessels. The deepest draft vessel observed in the project area during survey operations was a naval aircraft carrier with a draft of approximately 45 feet.

B. AREA SURVEYED (See EVAL RPT., Sec. B)

The limit of the survey area is shown below on a detail of Chart 18449.



The areas in between and along the piers at the Puget Sound Naval Shipyard were congested with naval warships and access was severely restricted for security reasons. Consequently, hydrographic data acquisition in these areas was very limited.

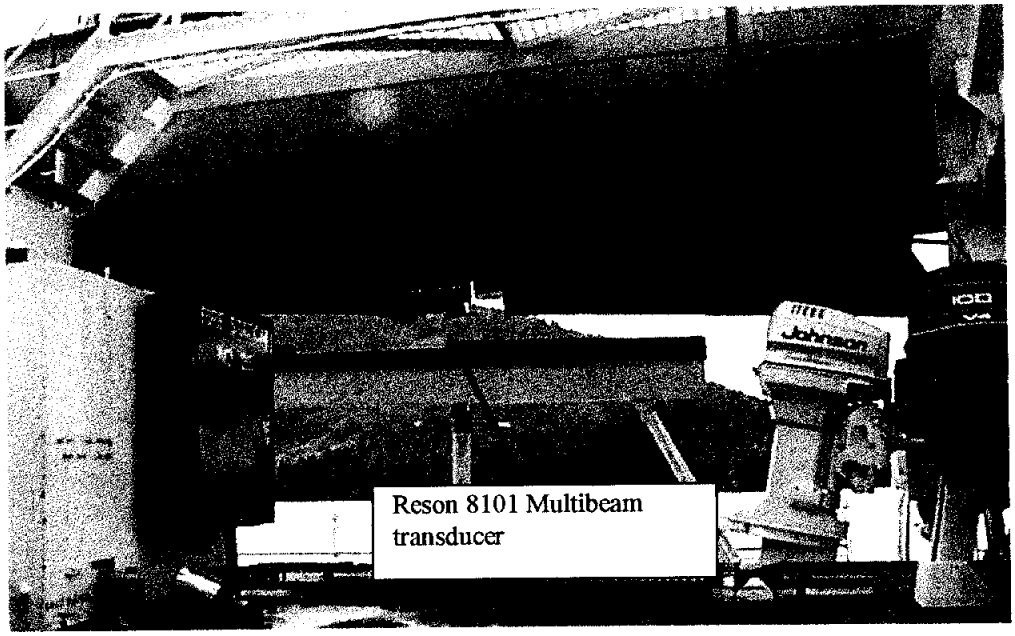
Data acquisition was conducted from April 8, 1998 (DN 098) to April 11, 1998 (DN 101).

C. SURVEY VESSELS

Data were acquired by RAINIER's survey launches (2121, 2123, 2124, and 2125) as described below and as noted in more detail in the Survey Information Summary included with this report.

VN	DN	TYPE OF HYDROGRAPHY
2121	101	Multibeam (SWMB)
2123	100	Multibeam (SWMB)
2124	100-101	Splits
2125	98	Mainscheme
2125	99	Mainscheme, BS
2125	101	Mainscheme, DP

This project included the use of a new vessel configuration. Launches 2121 and 2123 were configured during the 1997-1998 winter inport period with Reson SeaBat 8101 Shallow Water Multibeam (SWMB) systems. The Reson SeaBat 8101 is a multibeam echosounder system that measures relative water depths across a wide swath perpendicular to the vessel's path. The Reson SeaBat 8101 ensonifies the seafloor with a 150° swath consisting of 101 individual 1.5° x 1.5° beams. The system was designed to meet International Hydrographic Organization standards to measure the seafloor at a maximum range of 320 meters. The center of the keel was cut and modified to house the transducer. The originally installed DSF-6000N singlebeam transducer remained installed as before. A photograph of the new configuration is shown below with the launch resting in the davits:



Reson 8101 Multibeam transducer

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓ See Evel Rpt, section D.

Single beam echosounder data were acquired using Hypack version 7.9 from Coastal Oceanographics and processed using Hydrographic Processing System (HPS). Shallow water multibeam (SWMB) echosounder data were acquired using the Reson Seabat 8101 and processed using CARIS software by HSD and will be submitted under a separate cover. The final field sheet submitted by RAINIER depicts single beam data only and was generated using MapInfo (Version 4.5) and MapBasic software developed by N/CS32 and modified by RAINIER personnel. The SWMB data will be processed at the Pacific Hydrographic Branch where it will be combined with the single beam data. SWMB data has been combined with single beam data during office processing and portrayed on the smooth sheet.

E. SONAR EQUIPMENT ✓

Traditional side scan sonar (SSS) equipment such as a side scan sonar towfish was not used during this survey. However, it should be noted that the Reson SeaBat 8101 SWMB system provides a low resolution digital SSS record of the SWMB swath. This SSS imagery is primarily used to aid in final processing of the SWMB depth data but it can also be used to provide imagery of features such as rocks, wrecks, and obstructions. Concur

F. SOUNDING EQUIPMENT ✓

The Raytheon DSF-6000N and Knudsen 320M are dual frequency (100 kHz, 24 kHz), digital recording fathometers with analog paper traces. Serial numbers are included in the Separates.* Both high and low frequency depths were digitally recorded. The high frequency depths were used as the primary soundings for this survey. No problems that affect survey data were encountered. Concur

The Reson SeaBat 8101 SWMB system previously described in section C has a sonar operating frequency of 240 kHz. This project was the first to use the launch SWMB configuration and served to better evaluate the new configuration under actual field conditions. The need for further improvements in the SWMB processing software was identified as a result of this evaluation. At the time of submittal of this report, the improvements in the SWMB processing software were still being finalized. Consequently, SWMB echosounder data will be evaluated and submitted at a later date. It should be noted that 100% of the minimum required mainscheme and roughly 30 % of the required splits were acquired using traditional single beam echosounders. All crosslines, item investigations, developments, as well as the remainder of the required splits, were performed using the new SWMB configuration. Do not concur. There were no crosslines, investigations, developments or splits done in the field utilizing the SWMB system. Refer to section N of this report concerning the (7) features targeted for investigations during this survey. Only mainscheme lines were run by SWMB.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

The following sound velocity cast was used for corrections to single beam data for this survey:

DN	Time (UTC)	Position	TABLE No.	TABLE DEPTH
✓098	1707	47° 33′ 28″ N 122° 36′ 39″ W	3 (98098170.RS)	46.1 m

The following sound velocity casts were used for corrections to SWMB data for this survey:

DN	Time (UTC)	Position	Vessel	TABLE DEPTH
✓100	1633	47° 33′ 34″ N 122° 36′ 36″ W	RA-3 (2123)	40.6 m
✓100	2026	47° 33′ 35″ N 122° 36′ 36″ W	RA-3 (2123)	48.5 m
✓101	1636	47° 33′ 26″ N 122° 36′ 24″ W	RA-1 (2121)	37.0 m
✓101	2016	47° 33′ 30″ N 122° 36′ 32″ W	RA-1 (2121)	29.0 m

* Filed with the hydrographic data.

Information on the casts is included in the Survey Information Summary report. (attached)

The sound velocity casts were acquired with SBE SEACAT Profilers SN 2543 and SN 2477, calibrated January 10, 1998 and February 6, 1998 respectively. Velocity correctors were computed using the PC programs SEACAT and VELOCITY, version 3.3, 1996. Printouts of the Sound Velocity Corrector Tables used are included in the "Separates to be Included with Survey Data, IV. Sounding Equipment Calibrations and Corrections". *

Static draft and transducer offsets for launches 2121, 2123, 2124, and 2125 were measured on March 26, 1998.

Settlement and squat values for launch 2121 were last measured on March 26, 1998 in Port Angeles, WA
Settlement and squat values for launch 2123 were last measured on March 24, 1998 in Port Angeles, WA.
Settlement and squat values for launch 2124 were last measured on March 14, 1996 in Shilshole Bay, WA.
Settlement and squat values for launch 2125 were last measured on March 25, 1997 at Scull Island, AK. No changes to the vessel configurations have occurred since the time of these measurements. Corresponding settlement and squat correctors have been computed in accordance with Hydrographic Manual Section 4.9.4.2., using FPM Fig. 2.3, and are included with project data for S-N904-RA.

Settlement and squat, static draft, transducer offset, and GPS antenna offset correctors were entered into an offset table for each vessel and applied to raw sounding data during post processing. Offset tables 1-6 correspond to the last digit of the vessel number. The offset tables are included with project data for S-N904-RA. *

The SWMB launches 2121 and 2123 are equipped with POS-MV heave, roll and pitch sensors. Single beam launches 2124 and 2125 are not equipped with heave, roll, and pitch sensors.

Predicted Tidal correctors for this survey were generated by importing predicted tidal data for Seattle tide station 944-7130 from commercial Tide and Current software into HPS. This survey area corresponds to Zone Station PS7 of the Project Instructions and has a time corrector of +12 minutes and a range ratio corrector of 1.04 from the predicted reference station 944-7130. Approved Tide Note dated October 13, 1998 is attached to this report.

H. CONTROL STATIONS (See EVAL RPT., Sec. H)

The horizontal datum for this project is NAD 83. The list of control stations used for this survey is included in this report ~~are listed in Appendix III.~~ See the S-N904-RA-98 Horizontal Control Report for more information.

I. HYDROGRAPHIC POSITION CONTROL (See EVAL RPT., Sec. I)

All soundings were positioned using differential GPS (DGPS). The USCG differential beacon at Whidbey Island served as the primary method of control. The USCG beacon at Robinson Point served as alternate control.

Launch-to-launch DGPS performance checks were performed in accordance with Section 3.4.4 of the FPM. Two observations of position were made from two different DGPS base stations while the launches were rafted together with their GPS antennae within 2-3 meters of each other.

J. SHORELINE (See EVAL RPT., Sec. J)

There was no photogrammatic shoreline manuscript provided for this survey. Shoreline shown was traced in MapInfo by NOAA Ship RAINIER personnel and is a generalization of shoreline from NOS Chart 18452, Shoreline maps DM-10042 & DM-10040 were provided in digital format by the Coastal Mapping Program and used during office processing.

* Filed with the hydrographic data.

15th edition, September 14, 1996, and is shown in brown for orientation purposes only.

The Project Instructions required that NOAA Ship RAINIER complete survey operations by April 13, 1998 and transit to Alaska. Consequently, shoreline verification was not performed due to the limited allotted time for fieldwork. Concur

K. CROSSLINES ✓

Approximately 30 nautical miles of crosslines were collected using the SWMB system, equating to approximately 75% of mainscheme mileage. As of the date of submittal of this report, the SWMB data has yet to be fully processed and reviewed. Consequently, a crossline comparison has yet to be performed. It is recommended that the Pacific Hydrographic Branch perform a crossline comparison by comparing SWMB data to singlebeam mainscheme data once the SWMB data has been fully processed. Concur.
See Section D. hydrographer's report. Crossline soundings generally agree within one foot.

L. JUNCTIONS (See EVAL RPT., Sec. L)

There are no contemporary surveys that junction with this survey. Concur.

M. COMPARISON WITH PRIOR SURVEYS (See EVAL RPT., Sec. M)

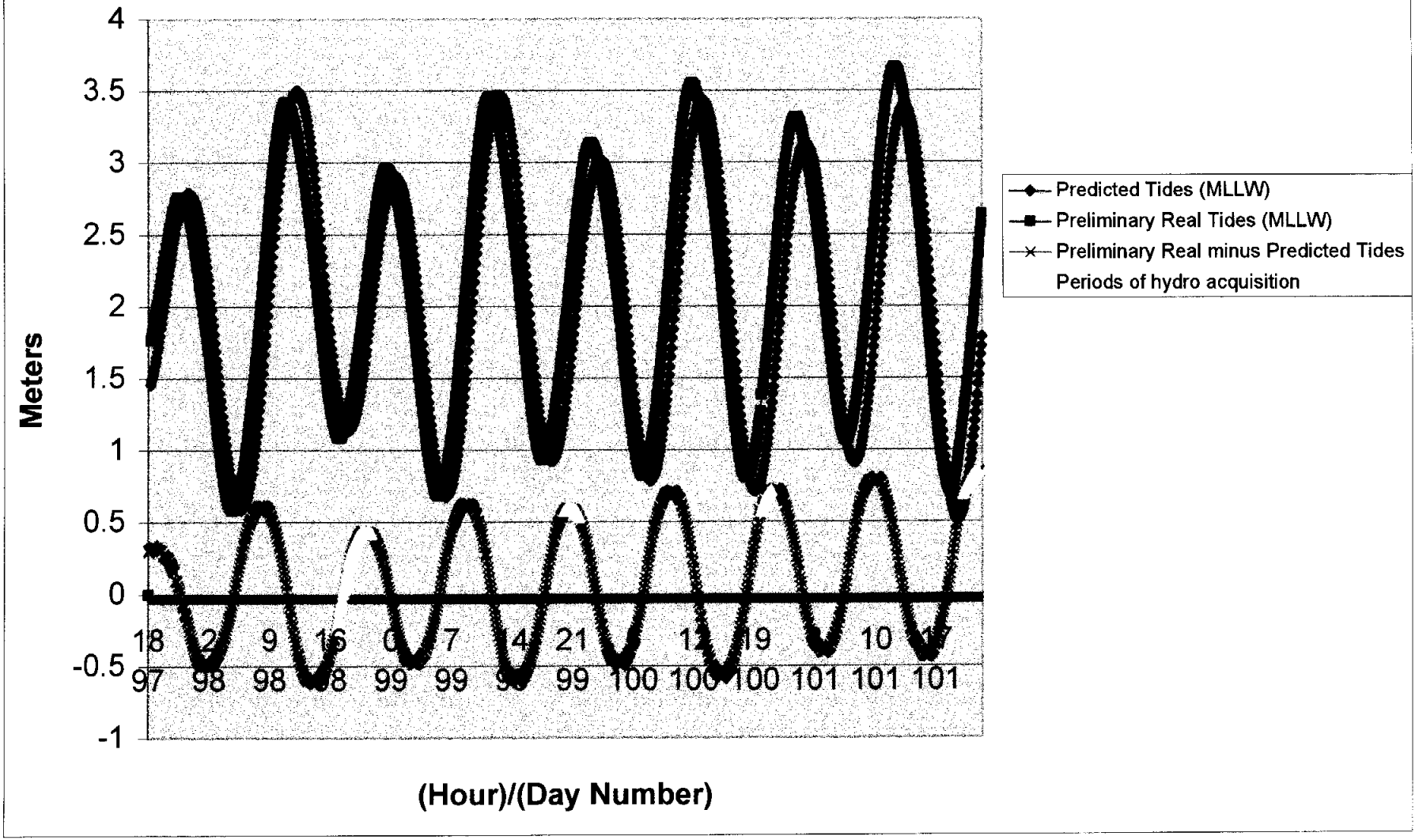
Prior surveys covering this survey area are as follows:

Prior Survey	Scale	Date
H-9862	1:5,000	1980 ✓
H-5933	1:10,000	1935
H-5652	1:10,000	1934
H-2985	1:10,000	1904
H-2483	1:10,000	1900
H-2300	1:1,000	1897
H-2299	1:1,000	1897
H-2300	1:120	1897
H-1694	1:20,000	1885

These prior surveys were superseded by H-9862 for areas of common coverage.

Only prior survey H-9862 was compared with this survey. Due to the fact that the SWMB data has yet to be fully processed, only single beam soundings from H10796 were used for comparison. Single beam soundings from the current survey were generally found to be 2-4 ft deeper than soundings from H-9862. Based on a review of preliminary real tides, the difference is largely attributed to real tides being 1-3 ft greater (higher) than predicted tides during almost all of data acquisition. (See the graph titled "Sinclair H10796 Tides" on the following page.) Concur. The greatest discrepancies are in the area to the south-west of navy pier "D" and in the areas in between navy piers 5, 6, and 7, where the soundings from this survey are 5-15 ft deeper than soundings from H-9862, possibly due to subsequent dredging activity. Concur. It should be noted that the areas in between the navy piers were congested with moored naval warships and access was severely restricted. Consequently, hydrographic data acquisition in between the navy piers was very limited. Concur.

Section M. Insert
"Sinclair H10796 Tides"



Eight specific point features (wrecks, obstructions, and shoal soundings) shown on prior survey H-9862 were investigated using the SWMB system and are addressed in section N, Item Investigations. Final comparisons will be done at PHB after reduction to final sounding datum using tidal information collected concurrently with this survey.

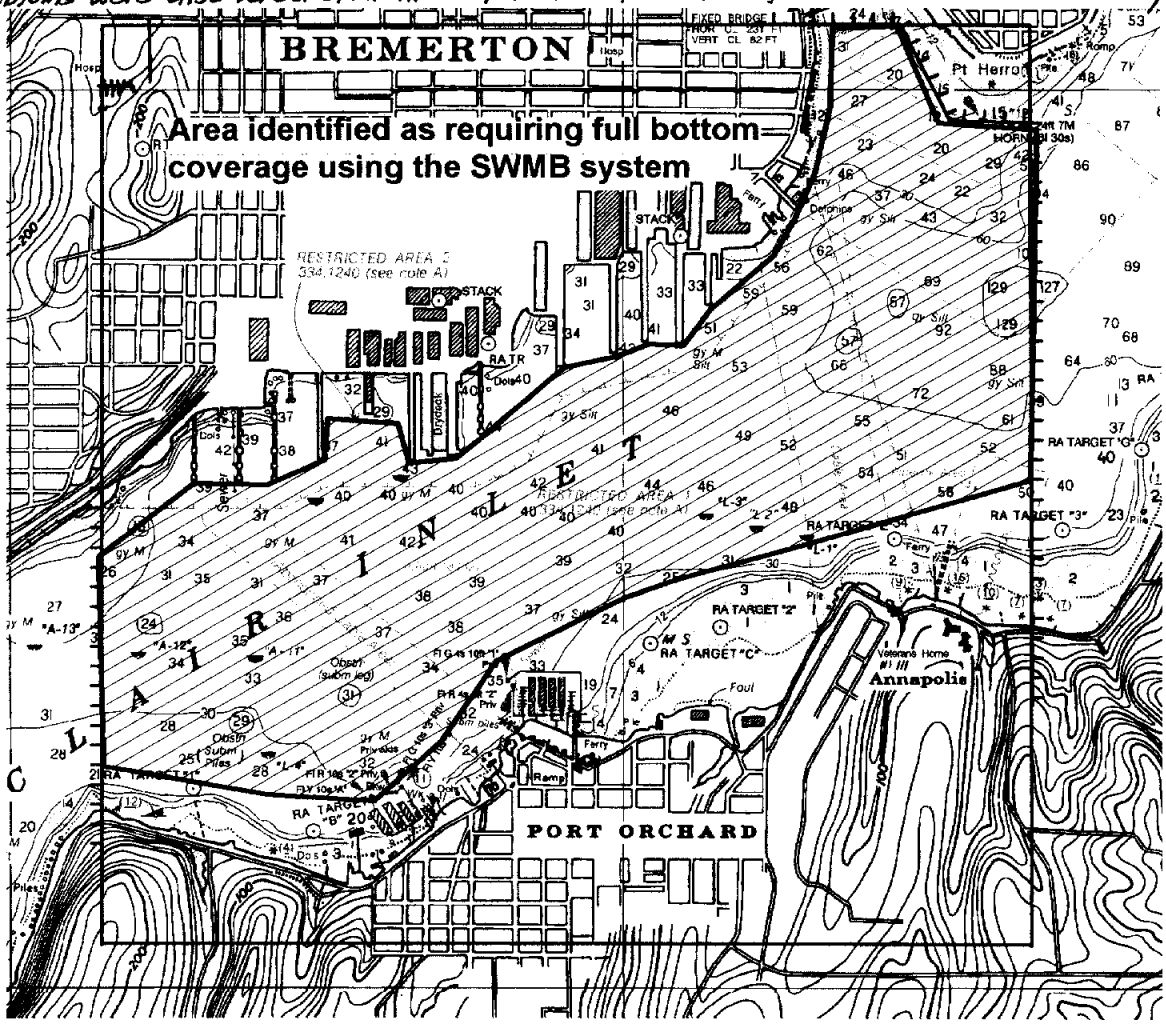
N. ITEM INVESTIGATIONS ✓

concur.

There were no AWOIS items assigned for survey H-10796. However, paragraph 6.12.1 of the Project Instructions required that attention should be directed at the following:

"Deep draft vessels, such as aircraft carriers, of over 39 feet frequent Bremerton Harbor (Sinclair Inlet). In this area depths of 31 to 42 feet are not uncommon off the naval base. In the approaches to Bremerton, in Rich Passage, depths of 40 feet exist. Full bottom coverage of these areas are required."

Consequently, full bottom coverage* of the area shown below was acquired using the SWMB system. Note that the area shows the approximate, planned SWMB coverage. The final coverage area of the actual, fully approved SWMB data will vary slightly. *Due to the problems with ISIS, which resulted in the rejection of the outer 30 beams on each side, a 100% bottom coverage was not completed. These problems were discovered after the ship had completed the field work. See section F of this report.



The following 7 features are shown on prior survey H-9862, as well as on Chart 18452, 15th edition, September 14, 1996, and were specifically targeted for investigation using the SWMB system, meaning that line plans were devised such that a near center-beam would be acquired over the feature. It should be noted

that the actual, fully processed SWMB coverage may vary and that the data should be closely reviewed to ascertain if the features were adequately covered: Based on the results of SWMB office processing and review the features listed below were not adequately covered during this survey and were retained as charted.

Item	Feature	CH 18452 Charted Position (NAD83)	
N1	31 ft Obstruction (subm log)	47° 32′ 39″ N, 122° 38′ 52″ W ✓	Revise G.P. to Lat 47/32/41 N Long 122/38/52 W as shown on ES.
N2	29 ft Obstruction (subm pile)	47° 32′ 36″ N, 122° 39′ 15″ W ✓	Retain as charted.
N3	24 ft Sounding	47° 32′ 48″ N, 122° 39′ 33″ W ✓	Retain as charted.
N4	18 ft Sounding	47° 33′ 02″ N, 122° 39′ 33″ W ✓	Retain as obstn
N5	18 ft Wreck	47° 32′ 27″ N, 122° 38′ 42″ W ✓	Retain as charted
N6	17 ft Obstruction	47° 32′ 26″ N, 122° 38′ 42″ W ✓	" " "
N7	11 ft Wreck	47° 32′ 27″ N, 122° 38′ 39″ W ✓	" " "

The following feature from prior survey H9862 is not depicted on Chart 18452, 15th edition, September 14, 1996, but was also targeted for investigation using the SWMB system:

Item	Feature	H9862 Position (NAD27)	
N8	30 ft Sounding *	47° 33′ 00″ N, 122° 38′ 49″ W ✓	Do not chart 30-foot sounding.
		Converted Position (NAD83)	
		47° 32′ 59.346″ N, 122° 38′ 54.469″ W ✓	

* This depth was subsequently disproved by 1994 Navy investigation (CL-1582/94). Source document depicts 34 ft sdgs.

The following feature is not shown on prior survey H9862 but is depicted on Chart 18452, 15th edition, September 14, 1996 and was also targeted for investigation using the SWMB system:

Item	Feature	CH 18452 Charted Position (NAD83)	
N9	(No depth) subm pile	47° 32′ 32.9″ N, 122° 39′ 07.1″ W ✓	Retain subm pile as charted.

Due to the time constraints specified in the Project Instructions, no other items within the survey area were specifically investigated. It is recommended that the Pacific Hydrographic Branch closely review the SWMB data during processing in order to confirm or disprove the existence of these nine features. It is also recommended that the SWMB data be closely reviewed in order to discover possible new features. Concur.

Refer to Memorandum for the record from the Multibeam Processing Officer dated Sept. 22, 1998, for additional information included in the survey records. No new features were found from SWMB during office review.

O. COMPARISON WITH THE CHART (See EVAL RPT., Sec. O)

Only single beam data from this survey was compared in the field to features portrayed on the following chart: Concur

Chart	Scale	Edition Number	Date	Datum
18452	1:10,000	15th	September 16, 1996	NAD 83

Single beam soundings from this survey were generally 2-4 ft deeper than charted soundings. Based on a review of preliminary real tides, the difference is largely attributed to real tides being 1-3 ft greater (higher) than predicted tides during almost all of the data acquisition period. Concur (See the graph titled "Sinclair H10796 Tides" in Section M. Comparison with Prior Surveys.) The greatest discrepancies are in the area to the south-west of navy pier "D" and in the areas in between navy piers 5, 6, and 7, where the soundings from this survey are 5-15 ft deeper than soundings from H-9862, possibly indicating subsequent dredging activity that has yet to be charted. Point features such as wrecks, shoal soundings, and obstructions are addressed in Section N, Item Investigations. Final sounding comparisons will be made at PHB after reduction to final vertical datum.

Dangers to Navigation ✓

There was no Danger to Navigation report submitted in conjunction with this survey. Concur.

P. ADEQUACY OF SURVEY (See EVAL RPT., Sec. P)

Survey H-10796 is not complete.* At the time of submittal of this report, the shallow-water multibeam (SWMB) data that was collected has yet to be fully processed and reviewed. The SWMB data is necessary for splits, crosslines, item investigations, and shoal developments. Survey H-10796 should not be considered complete and adequate to supercede prior soundings and features within the common areas until such time when the SWMB data can be incorporated into the survey. In addition, final chart and prior survey comparisons should be performed after the SWMB data is fully incorporated into the survey. Concur. (See hydrographic report, Section D, in regards to office processing of SWMB). Shallow water multibeam data has been incorporated into the survey during office processing.
Additionally, it should be noted that the Project Instructions required NOAA Ship RAINIER to complete survey operations prior to April 13, 1998, and transit to Alaska for the Lynn Canal Project. Consequently, with field time limited, shoreline verification was not performed and only one aid to navigation was positioned. It is recommended that shoreline verification and the remainder of the aid to navigation positioning be considered for a future work assignment. Concur.

Q. AIDS TO NAVIGATION (See EVAL RPT., Sec. Q)

There were no floating aids to navigation positioned by this survey. Concur.

The following non-floating aid to navigation was positioned by this survey using static GPS (See the following "Section Q: Descriptive Report Inserts"):

Name	Light List No.
Point Herron Light "12"	18085 ✓

The aid to navigation positioned by this survey adequately serves its intended purpose. Concur.

The following aids to navigation were not positioned by this survey due to the time constraints specified in the Project Instructions: Concur Retain as Charted

Name	Light List No.
Port Orchard Marina Entrance Light "1"	18090 ✓
Port Orchard Marina Entrance Light "2"	18095 ✓
Port Orchard Yacht Club Light "A"	18096 ✓
Port Orchard Yacht Club Light "2"	18097 ✓
Port Orchard Yacht Club Light "3"	18098 ✓
Port Orchard Yacht Club Light "D"	18099 ✓

✓

The depiction of the ferry route shown on CH 18452, 15th edition, is correct and adequately serves its intended purpose. ✓ Concur Retain as Charted

Cable areas were not addressed due to the time constraints specified in the Project Instructions. ✓ Concur Retain as Charted

The depictions of Restricted Areas 1 and 2 shown on CH 18452, 15th edition, are correct and adequately serve their intended purposes. ✓ Concur Retain as Charted

R. STATISTICS ✓

Statistics are listed in the Survey Information Summary included with this report.

S. MISCELLANEOUS ✓

Nine bottom samples were collected and sent to the Smithsonian Institute.

T. RECOMMENDATIONS (See EVAL RPT., Sec. T)

Sinclair Inlet is routinely traveled by deep draft vessels enroute to and from the Puget Sound Naval Shipyard. Such vessels include nuclear submarines and aircraft carriers with drafts as large as 45 ft. The largest vessels must often make their approach to the shipyard lightly loaded and at high tide in order to provide adequate underkeel clearances. It is recommended that the charted sounding density for the area immediately south of the shipyard be increased on Chart 18452 in order to better define the navigable sea-room for these larger vessels. Do not concur. The selection of depths from the present survey based on the charted sounding density is considered adequate to define the safe navigable searoom particularly for naval vessels transiting the area.
It is also recommended that the Marine Chart Division investigate if any dredging activity has taken place at Puget Sound Naval Shipyard since prior survey H-9862 (March 1980), and that if dredging has taken place, that the most recent condition survey is on file for application to the chart. The charted soundings within the restricted area of the shipyard originate from H-9862. No information as to the dredging activities inside this restricted area was obtained during office processing.

U. REFERRAL TO REPORTS ✓

The following supplemental reports contain additional information relevant to this survey:

Title	Date Sent	Office
S-N904-RA Horizontal Control Report	May 15, 1998	N/CS34
Project related data for S-N904-RA	May 15, 1998	N/CS34

Respectfully Submitted,

Eric J. Sipos
Lieutenant Junior Grade, NOAA
Sheet Officer

Approved and Forwarded,

Alan D. Anderson
Captain, NOAA
Commanding Officer

Survey Information Summary

Project: OPR-N904-98 **Project Name:** SINCLAIR INLET & RICH PASSAGE

Instructions Dated: 4/17/98 **Project Change Info:**

Sheet Letter: A **Registry Number:** H-10796

Sheet Number: RA-05-02-98

Survey Title: Central Portion of Sinclair Inlet

Data Acquisition Dates: **From:** 01-Apr-98 91 **To:** 11-Apr-98 101

Vessel Usage Summary

VESNO	MS	SPLITS	DEV	XL	S/L	DP	BS	DIVE
2124		2						
2125	4					1	1	

Sound Velocity Cast Information

Launch Table #	Ship Table #	Cast DN	Max Depth	Position	Applicable DN
RA5	RA	98	35.5	47/33/28 122/36/39	098
RA3	RA	100	31.3	47/33/34 122/36/36	100
RA3	RA	100	37.3	47/33/35 122/36/36	100
RA1	RA	101	28.4	47/33/26 122/36/24	101
RA1	RA	101	22.3	47/33/30 122/36/32	101
RA1	RA	101	28.4	47/33/26 122/36/24	101

Tide Zone Information

Zone #	Time Corr.	Height Corr.
PS7	000 hr 12 min	1.04

Tide Gage Information

Tide Gage #	Gage Name	Installed	Removed
944-7130	SEATTLE, WA		
944-5958	BREMERTON, WA	4/7/98	

Statistics Summary

Type	Total:
BS	9
DP	1
MS	40.24
SPLIT	20.38

Percent XL:

SQNM: 0.66

List of Horizontal Control Stations ✓

NAME	STATE	TYPE	LATITUDE	LONGITUDE	SITEID	DEC_LAT	DEC_LON
ROBINSON POINT	WA	USCG Beacon	47 23.3N	122 22.5W	887	47.38833333	-122.37500000
WHIDBEY ISLAND	WA	USCG Beacon	48 18.8N	122 41.8W	888	48.31333333	-122.69666667

APPROVAL SHEET

for

H-10796

Standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1994.

The digital data and supporting records for singlebeam data have been reviewed by me and are approved. However, the singlebeam data by itself is incomplete and should be combined with the shallow water multibeam data before this survey can be considered adequate for charting. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

DATE: August 9, 1998

Approved and Forwarded,

Alan D. Anderson

Alan D. Anderson
Captain, NOAA
Commanding Officer
NOAA Ship RAINIER

NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER

H-10796

Name on Survey	A ON CHART NO. 18449, 18452	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
ANNAPOLIS	X		X							1
BREMERTON	X		X							2
EAST BREMERTON	X		X							3
HERRON, POINT	X		X							4
PORT ORCHARD	X		X							5
PORT WASHINGTON NARROWS	X		X							6
RETSIL	X		X							7
SINCLAIR INLET	X		X							8
TURNER, POINT	X		X							9
WASHINGTON (title)	X		X							10
										11
										12
										13
										14
										15
										16
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										25

SEP 29 1999

NOAA FORM 76-155 SUPERSEDES C&GS 197

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 13, 1998

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: S-N904-RA
HYDROGRAPHIC SHEET: H-10796

LOCALITY: Sinclair Inlet, Washington

TIME PERIOD: April 8 - April 11, 1998

TIDE STATION USED: 944-7130 Seattle, Puget Sound, WA
Lat. 47° 36.2'N Lon. 122° 20.3'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.198 meters

TIDE STATION USED: 944-5958 Bremerton, Sinclair Inlet, WA
Lat. 47° 33.7'N Lon. 122° 37.4'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.310 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: PS7 & PS8.

Refer to attachments for zoning information.

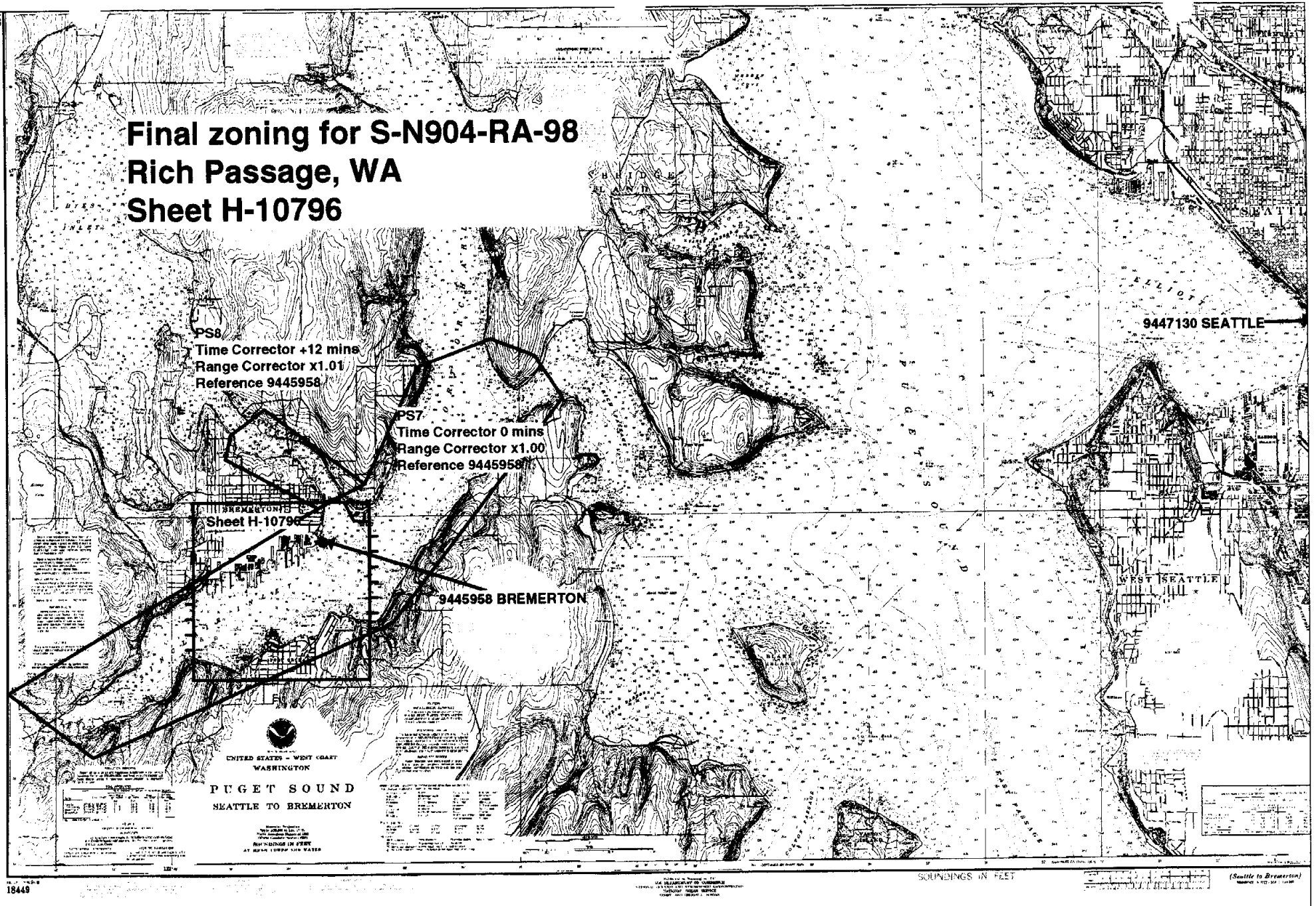
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time.

Thomas M. Meo 10/13/98
CHIEF, REQUIREMENTS AND ENGINEERING BRANCH

Final tide zone node point locations for OPR N904-RA-98, Sheet H-10796.

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 PS7			
-122.611291 47.572852	944-5958	0	1.00
-122.624744 47.568119	944-7130	+18	1.03
-122.714093 47.532732			
-122.689364 47.520346			
-122.603443 47.545959			
-122.554147 47.589174			
-122.56219 47.597286			
-122.574826 47.600564			
-122.596011 47.5953			
-122.611291 47.572852			
Zone PS8			
-122.611291 47.572852	944-5958	+12	1.01
-122.639923 47.587228	944-7130	+30	1.05
-122.649791 47.582241			
-122.651255 47.577671			
-122.624744 47.568119			
-122.611291 47.572852			


Final zoning for S-N904-RA-98
Rich Passage, WA
Sheet H-10796
PS8
Time Corrector +12 mins
Range Corrector x1.01
Reference 9445958
PS7
Time Corrector 0 mins
Range Corrector x1.00
Reference 9445958
9447130 SEATTLE
9445958 BREMERTON
Sheet H-10796
BREMERTON
SEATTLE
WEST SEATTLE
PUGET SOUND
UNITED STATES - WEST COAST
WASHINGTON
PUGET SOUND
SEATTLE TO BREMERTON
SOUNDINGS IN FEET
18449

NOAA FORM 77-27(H) (9-83) | U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER

HYDROGRAPHIC SURVEY STATISTICS

H-10796

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

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

SHORELINE DATA

SHORELINE MAPS (List):	DM-10040 & DM-10042
PHOTOBATHYMETRIC MAPS (List):	None
NOTES TO THE HYDROGRAPHER (List):	None
SPECIAL REPORTS (List):	None
NAUTICAL CHARTS (List):	18452, 15th Edition, Sept. 14, 1996

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS VERIFICATION	AMOUNTS EVALUATION	AMOUNTS TOTALS
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISED (Selected)			11,077
CONTROL STATIONS REVISED			
	TIME-HOURS VERIFICATION	TIME-HOURS EVALUATION	TIME-HOURS TOTALS
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS			
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	301.0		301.0
COMPARISON WITH PRIOR SURVEYS AND CHARTS		18.0	18.0
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		23.0	23.0
GEOGRAPHIC NAMES			
OTHER* (Chart Compilation)		55.5	55.5
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	301.0	96.5	397.5

Pre-processing Examination by M. Bigelow	*Beginning Date* 10/13/98	*Ending Date* 10/14/98
Verification of Field Data by M.Bigelow,D.Doles,E.Domingo,I.Almacen,J.Ferguson	*Time (Hours)* 301.0	*Ending Date* 3/24/99
Verification Check by B. Olmstead	*Time (Hours)* 8	*Ending Date* 3/29/99
Evaluation and Analysis by I. Almacen, LCDR J.Ferguson	*Time (Hours)* 41.0	*Ending Date* 3/24/99
Inspection by B. Olmstead	*Time (Hours)* 7	*Ending Date* 4/7/99

☆ U.S. GOVT. PRINTING OFFICE 1983: 764-006/6061

EVALUATION REPORT

H-10796

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

The hydrographer has determined the inshore limits of safe navigation by defining a Navigable Area Limit Line (NALL) throughout the survey. Charted features and soundings inshore of this limit line which have not been specifically addressed during survey operations should be retained as charted. A page-size plot of the charted area depicting the specific limits of supersession accompanies this report as Attachment A.

The bottom consists mainly of silt, sand and pebbles. Depths range from 0 to 143 feet.

C. SURVEY VESSELS

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

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Shallow Water MultiBeam (SWMB) was acquired using the Reson Seabat 8101 and the Triton Elics International ISIS data acquisition system. Shallow Water Multibeam (SWMB) and HYPACK single beam survey data were processed utilizing the same Computer Aided Resource Information System (CARIS) and Hydrographic Processing System (HPS) as used in the field, and MicroStation 95.

During office processing of SWMB data it was found that there was an occasional problem with the Heave/Roll/Pitch(HRP) data. The problem was traced (by Headquarters) to faulty time tagging by the Triton ISIS data acquisition system. Due to this problem, the outer beams, whose accuracies are highly correlated with the accuracy of the HRP data were suspect. Therefore, the outer beams on both sides of the swath were rejected during office processing (beams 1-30 and 71-101 were rejected). The inner beams (41-70) are not susceptible to errors caused by faulty HRP data, and thus were retained. Reviewing the SWMB data has confirmed that the inner beams meet and /or exceed IHO standards.

Digital data for this survey exists in the standard HPS format, a database format using the .dbf extension. In addition, the smooth sheet drawing is filed in the MicroStation format, i.e., dgn extension. Copies of these files have been forwarded to the Hydrographic Surveys Division and a backup copy retained at PHB. Database 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 data is plotted using a Modified Transverse Mercator(MTM) projection and are depicted on a single 1:5,000 scale sheet.

E. SONAR EQUIPMENT

Side Scan Sonar was not utilized during this survey

F. SOUNDING EQUIPMENT

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

G. CORRECTIONS TO SOUNDINGS

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 the reduction of soundings during field processing. During office processing, tide reductions were derived from approved hourly heights zoned from tide gage 944-5958, Bremerton, Sinclair Inlet, WA. Refer to the approved tide note attached to this report concerning recommended tidal zoning. The tide gage at Seattle, Puget Sound, WA, 944-7130, is on the approved tide list but was not used.

H. CONTROL STATIONS

Sections 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 published 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:	-0.658 seconds	(-20.321 meters)
Longitude:	4.516 seconds	(94.249 meters)

I. HYDROGRAPHIC POSITION CONTROL

Hydrographic position control is adequately discussed in the hydrographer's report.

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 1.1 was computed for survey operations. The quality of several positions exceeds limits in terms of HDOP. A review of the data however, suggests that none of these fixes are used to position dangers to navigation. The features and or soundings located by these fixes are consistent with the surrounding information. These fixes are considered acceptable. The reference site confirmation test and daily 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 specific control system type, calibrations and system checks can be found in the hydrographer's report and in the separates related to horizontal position control and correction to position data.

J. SHORELINE

Shoreline maps DM-10040 and DM-10042 were compiled on NAD 83 and apply to this survey. The shoreline and features depicted in black on the smooth sheet originates from these recent topographic information provided in digital format by the Coastal Mapping Program. The digitized shoreline files and the survey file were merged during MicroStation processing.

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

There are no contemporary surveys that junction with survey H-10796. Comparison with the charted depths along the eastern and western limits of the survey reveals fair agreement.

M. COMPARISON WITH PRIOR SURVEYS

Survey	Year	Scale	Datum
H-9862	1980	1:5,000	NAD 27

Prior survey H-9862 covers the entire area of the present survey. A comparison of depths between the prior and the present survey reveals a difference of about 1-3 feet except in the vicinities of the piers and ferry terminals where deeper depths (2-5 feet) were found as the results of periodic dredging operations conducted within these areas. The present configuration of the standard depth curves shows minor changes since the last survey of 1980. There is generally no consistent pattern of shoaling or increase in depths noted during this recent survey.

A series of older surveys listed in the hydrographer's report have been undertaken around Sinclair Inlet from 1885 thru 1935. These prior surveys were superseded by the 1980 survey within their common respective areas of coverage.

The present survey did not extend to shore therefore it was necessary to supplement the present survey with data originating from H-9862. In addition, the shallow water multibeam system employed during the survey was undergoing testing which prevented complete coverage of the bottom. Areas determined to be not adequately sounded are supplemented on the smooth sheet with soundings and features carried forward from the prior survey.

Several other prior survey features and soundings have been brought forward to the present survey in color along the inshore areas of Sinclair Inlet. Most of these items fall near or inside of the NALL and were not specifically addressed by the hydrographer.

Additional information regarding prior survey comparison are found in the hydrographer's report, section M and in the memorandum for the record from the Multibeam Processing Officer dated September 22, 1998 included in the survey records.

With the inclusion of the features mentioned above, survey H-10796 is adequate to supersede the prior survey within the area of common coverage.

N. ITEM INVESTIGATIONS

There were no AWOIS items assigned for survey H-10796

O. COMPARISON WITH CHART

Survey H-10796 was compared with the following chart.

Chart	Edition	Date	Scale	Datum
18452	15th	Sept. 14, 1996	1:10,000	NAD 83

a. Hydrography

Charted hydrography originates with the previously discussed prior surveys and other miscellaneous source data. The prior surveys have been adequately addressed in section M and require no further discussion.

The charted 31-foot depth at latitude 47/32/54N, longitude 122/39/11W, was not found during this survey. Depths of 37 and 36 feet were found during the prior and present survey respectively. This charted depth has most likely been compiled in error from the source document and should had been shown as a 37. It is recommended that this charted depth be deleted and the area charted based on the recent survey.

The 43-foot depth charted at latitude 47/33/12N, longitude 122/38/10W, was not found on this survey. However, a depth of 48 feet is shown on the prior survey at this location. This charted depth was likely compiled in error from the source document and should have been depicted as a 48. The present survey shows this area to be 47-49 feet in depth. The evaluator recommends deleting the charted 43-foot depth and charting the area based on the present survey.

The submerged pile charted at latitude 47/32/32.9N, longitude 122/39/07.2W, originating from miscellaneous source was not investigated during this recent survey. This feature should be retained as charted.

Several other charted features originating from miscellaneous sources were not investigated during this survey. These features are located seaward of the NALL and should be retained as charted.

The charted cable areas, restricted areas, vessel traffic services area, pipeline areas and ferry route covered on this survey should be retained.

With the exception of features mentioned above and in the preceding sections of this report, survey H-10796 is adequate to supersede charted hydrography within the common area of coverage.

b. Dangers to navigation

No dangers to navigation were discovered during survey operations and/or during office processing.

P. ADEQUACY OF SURVEY

The hydrography contained on survey H-10796 is adequate to:

a. delineate the bottom configuration, determine least depths, and draw the required depth curves;

b. reveal there are no significant discrepancies or anomalies requiring further investigation; and

c. show the survey was properly controlled and soundings are correctly plotted.

The hydrographic records and reports received for processing are adequate and conform to the 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 following exceptions.

During SWMB data processing, some problems with Triton ISIS system were discovered and resulted in the rejection of the outer 30 beams on each side of the swath. Some significant gaps were found between hydro lines and other gaps along sections of lines being partially rejected during the verification process. As a result of these problems, a 100% SWMB bottom coverage of the survey area was not attained. Refer to the memorandum from the Multibeam Processing Officer dated September 22, 1998 included in the survey records.

A review of SWMB data identified the 27 and 29-fathom soundings located at latitude 47/32/41.0N, longitude 122/39/04.9W and latitude 47/32/31.2N, longitude 122/38/49.7W, respectively as obstructions rising about 4 to 7 feet from surrounding bottoms. However, no adequate description as to the type of these obstructions was provided by the hydrographer.

In the event that the field units submission of survey data will exceed four weeks from the completion of field 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-10796 was completed April 11, 1998 but not received for office processing until August 28, 1998.

A few charted and prior survey features located seaward of the NALL were neither investigated nor addressed during survey operations. When conducting "limited" shoreline verification, the hydrographer shall verify all features within the limits of safe navigation. Features located seaward of the NALL should be adequately examined and either verified, changed, or disproved.

Q. AIDS TO NAVIGATION

Fixed and floating aids to navigation located within the area of the present survey have been adequately discussed in the hydrographer's report in section Q and supplemented with the following additional information.

Five (5) charted radar targets (1, 2, B, C, E) and one (1) unmarked target maintained by the U.S. Navy were not verified by the hydrographer during this survey. These aids were shown on the smooth sheet as depicted on shoreline map DM-10042. The locations of these aids as compiled on the shoreline map are in agreement with the chart and should be retained as charted.

The charted mooring buoys (L-1, L-2, L-3, L-4, A-11, A-12) and three (3) unmarked buoys were not located during this survey. These aids should be retained as charted.

Charted landmarks were not verified in the area. There were no new features of landmark value noted during this survey. The locations of two landmarks (stacks) were shown on the smooth sheet as depicted on shoreline map DM-10042. These locations of the aids as compiled on the shoreline map are in agreement with the chart and should be retained as charted.

R. STATISTICS

Statistics are adequately itemized in the hydrographer's report.

S. MISCELLANEOUS

Miscellaneous information is adequately discussed in the hydrographer's report.

T. RECOMMENDATIONS

Survey H-10796 is an adequate hydrographic survey. However, additional work may be required on a low priority basis to determine the condition of the submerged piles and log presently charted within the survey area. See sections M and O of the evaluation report and section P of the hydrographer's report, for specific information regarding additional work.

U. REFERRAL TO REPORTS

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

Isagani A. Almacen
Cartographer

APPROVAL SHEET
H-10796

Initial Approvals:

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

Bruce A. Olmstead Date: 4/8/99
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.

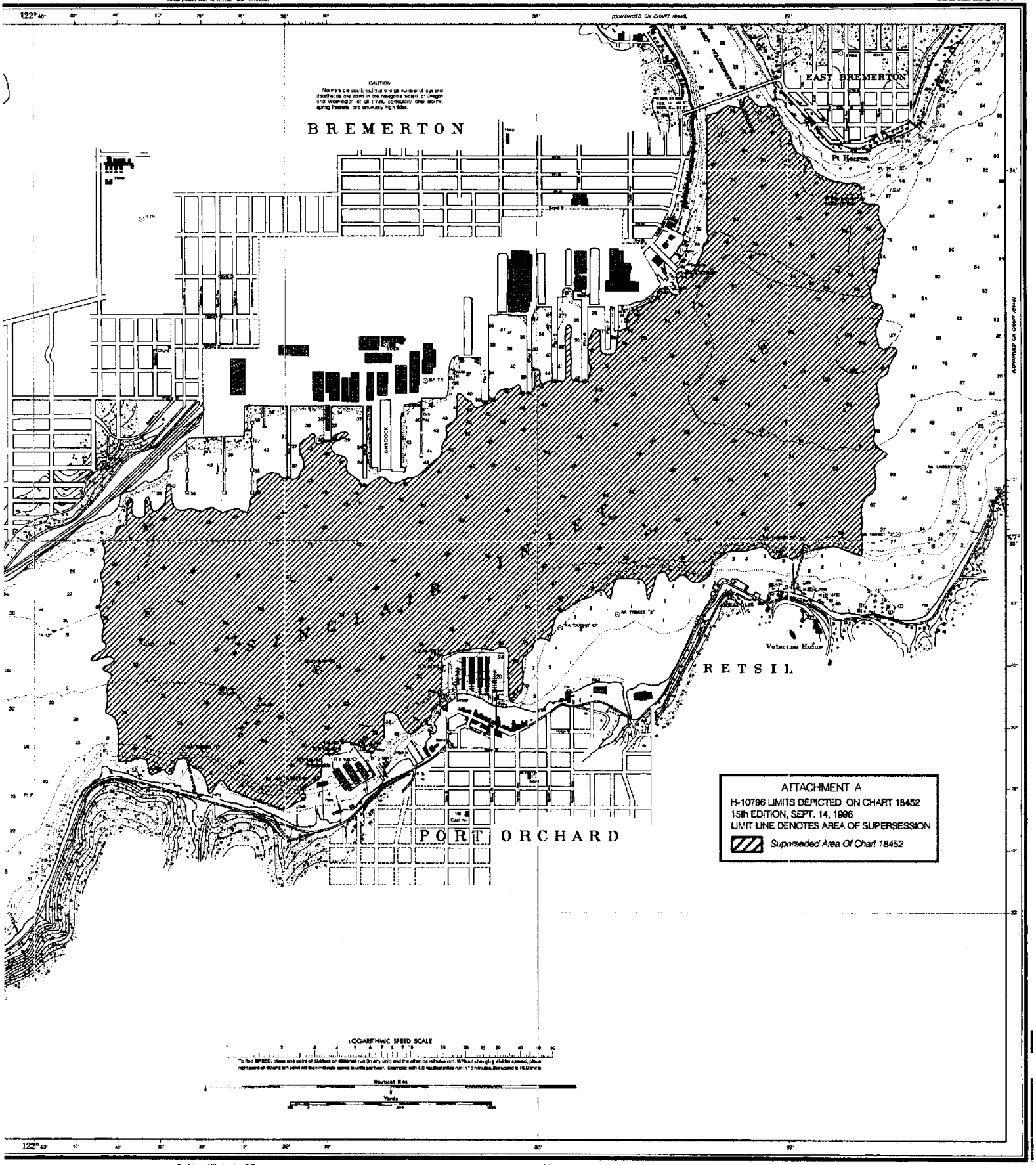
James C. Gardner Date: 4-12-99
James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch

****

Final Approval

Approved:

Samuel P. De Bow Date: September 20, 1999
Samuel P. De Bow
Commander, NOAA
Chief, Hydrographic Surveys Division



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

(Sinclair Inlet)

18452

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H - 10796

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
18452	3/16/99		Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via Full application of
			Drawing No. soundings & features 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.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED