UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Notes on the acquisition of high-resolution seismic reflection profiles, side-scanning sonar records, and sediment samples from lower Cook Inlet and Kodiak Shelf, R/V SEA SOUNDER cruise S8-79-WG July-August, 1979.

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INTRODUCTION

The fourth U.S. Geological Survey geo-environmental cruise in lower Cook Inlet and on Kodiak Shelf and adjacent continental slope, Gulf of Alaska, was conducted aboard the R/V SEA SOUNDER from 29 July to 15 August, 1979 (Fig. 1). The objectives of the cruise were to study in detail specific potentially hazardous geologic conditions identified as a result of the first reconnaissance cruise conducted in June and July of 1976 and from work by other investigators, and to expand the regional coverage on Kodiak Shelf. Seismic reflection profiling (sparker, Uniboom*, 3.5 kHz, 12 kHz) and side-scanning sonar surveys formed the basis for selecting stations for observation with bottom television and 70 mm bottom camera as well as for sampling of surficial sediment (gravity corer, vibracorer, grab sampler).

Generalized trackline charts are given in Figures 2 and 3. Detailed shot-point charts could not be constructed clearly, because of the overlap and coincidence of many of the lines. Station locations are shown in Figure 4 and 5, and sampling information is given in Table 4. Table 5 contains the navigation records from the cruise.

The results of our investigations to date can be found in the references listed at the end of this text. Background information in lower Cook Inlet with several references is given in Open-File Report 75-429 (Magoon and others, 1979), and on Kodiak Shelf in Open-File Report 76-325 (von Huene and others, 1976).

In addition, this report accompanies the basic seismic-reflection and side-scanning sonar records acquired on the cruise. The seismic-reflection records are publicly available from the National Geophysical and Solar Terrestrial Data Center EDS/NOAA, Boulder, Colorado 80302. These records can be inspected at U.S. Geological Survey offices at Rm B-164, Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California 94303.

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INSTRUMENTATION AND PROCEDURES

Navigation

Navigational systems used by the scientific party consisted of integrated Magnavox satellite-Loran C and Motorola Mini-Ranger units. (Mini-Ranger was used only in lower Cook Inlet.) The data from the integrated systems were automatically recorded on magnetic tape, as well as typed out on a keyboard printer.

Every 15 minutes the positions were plotted manually on a 1:250,000 scale chart in lower Cook Inlet and on a 1:500,000 scale chart on Kodiak Shelf. For easy reference a shot-point number was given to each 15-minute position. In addition to the routine plots, the locations of course changes were plotted. Furthermore, dead-reckoning positions based on satellite data, the ship's single-axis speed log and the gyro, were computed every two seconds by the integrated system and stored on magnetic tape.

The Mini-Ranger system recived its return signals from shore-based transponders positioned at strategic locations by a land-based support group. A maximum line-of-sight range over 80 nautical miles was obtained for some transponder locations. The Mini-Ranger was used as the primary navigational system in lower Cook Inlet because of the high frequency and accuracy of the data and because most tracklines were within range limits of the system.

In addition to the navigation by the scientific party, the ship's officers frequently succeeded in using radar and obtaining line-of-sight bearings. Correspondence between the ship's and scientific positions generally was good.

Seismic Profiling and Visual Format Systems

Sparker: Sparker data were recorded on Kodiak Shelf using a Teledyne system at a power of 10 to 20 kilojoules. Seismic signals were received on a Teledyne 100-element, single-channel hydrophone, and the reocrd was printed on a Raytheon model UGR1900 Precision Recorder. Sweep firing rates were 2 seconds. Filters were adjusted to receive signals between 40 and 125 hertz. Records were annotated at ½ -hour intervals with shot-point number, time (Greenwich Mean Time, GMT), and water depth.

Uniboom: The Uniboom system used four EG&E model 234 power sources of 200 joules each driving hull-mounted plates. The hydrophone was an EG&E model 265. Data were recorded on an EPC 4100 recorder. Sweep and firing rates were typically at one-half second, and filter settings at about 600 to 1700 hertz. Annotations were made in the same manner as those on the sparker system, except at 15-minute intervals.

High-resolution: A Ratheon TR-109 3.5 kilohertz seismic system, with a Raytheon 105 PTR transceiver and a CESP-II correlator, was used to gather high-resolution shallow-penetration seismic data as well as bathymetry. The system operated with 12 hull-mounted transducers, and the data were recorded on an EPC 4100 recorder. Sweep and firing rates were at one-half second.

Annotations were made in the same manner as those on the Uniboom system.
Bathymetry: A Raytheon TR-73A transducer and a Raytheon 105 PTR transceiver 12 kilohertz system was used to gather bathymetric data, which were displayed on a digital readout and recorded on magnetic tape. Sweep and firing rates typically were at 1/2 second, and annotations were made the same as for the other acoustic systems.
Record quality: Four factors that significantly affected quality of the seismic rcords were: 1) the typically coarse-grained and hard nature of the unconsolidated surficial sediment, 2) the shallow water depth throughout most of both areas, 3) acoustic vibrations from the vessel, and 4) rough seas.

Coarse-grained and hard sediment most severely affected the Uniboom and 3.5 kHz records, causing much of the outgoing energy from these high-frequency systems to be reflected directly from the sea bottom with only a minor amount of energy penetrating through to subbottom reflectors. Some of the uniboom records show subtle, irregular traces of subbottom reflectors, which can be traced and correlated only with difficulty. Many of the 3.5 kHz records show no sign of subbottom reflectors and can be used only as indicators of water depth.

The shallow water depth caused multiple reflections to appear at short time intervals after the initial sea-bottom reflection, partially or totally obscuring signals from deeper reflectors.

Although these four factors each have a deleterious effect on record quality, it was found by varying ship speeds and filter settings that the nature of the bottom sediment was the main reason for the seismic systems to display "poor" subbottom acoustic reflections on the records. Depth of penetration and details in the record consequently varied with type of bottom and water depth. Except for certain parts, the records allow adequate subbottom interpretation of geology.
Side-scanning sonar: The side-scanning sonar unit used was an EG&G digital model, normally operated at a 125 m scale and towed above the bottom at 10% of the scale employed. Data were recorded on magnetic type and printed on a continuous, dry-paper recorder. High quality records were generally obtained. Although most side-scan sonar surveys were run at a ship speed of 4 to 4.5 knots, currents could be responsible for a different speed over the bottom.

Normally the uniboom and 3.5 kHz units were run simultaneously with side-scan sonar for depth control and possible subbottom information.
Bottom television and bottom camera: A Hydro Products bottom television unit, underwater mercury lights, and a 70 mm camera were mounted in a large frame. Photographic exposures could be made by remote control by the TV-screen observer. A multiconductor cable, leading to the camera and light, was taped at 5 m intervals to the winch cable.

Because currents are always present in the lower Cook Inlet area it was impossible to fly the sled slowly and at a uniform distance over the bottom. Consequently a system of jumping had to be used, lowering the sled to the bottom and giving some slack wire. Due to ship's drift, the cables became taut after a few seconds and the sled was then dragged over the bottom. At

that time, it was lifted and allowed to drift rapidly before it was again lowered to the bottom.

Sampling Devices

Gravity corer: The gravity corer consisted of a 1500 pound weight to which one to three 3 m, 7.6 cm ID steel core barrels were attached. A clear polybutyrate liner was inserted in the barrels, and the sediment was retained by a stainless steel core catcher.

The cores were cut into 1.5 m sections, and 10 cm long pieces were cut from the ends of some sections for hydrocarbon gas analysis. The remaining core was x-rayed and then split lengthwise into working and archive halves. From the working half, vane shear measurements were made, and samples were taken for grain size, water content, and Atterberg limits. The archive half was described and photographed. Both sections were put into storage tubes that were capped, taped, labelled, and stored under refrigeration.

Grab samplers: A standard Van Veen grab sampler proved to be too light for adequate sampling of the typically sandy-gravelly seafloor. Generally, successful attempts were obtained with a heavy modified grab sampler constructed by Andy Soutar of Scripps Institution of Oceanography.

Vibracorer: A Kiel vibracorer, capable of collecting 2 m cores, was used in areas of coarse-grained sediment. Two types of barrels were used; one with square cross-section, 10 cm on a side, made of stainless steel, and the other identical to those used for the gravity corer. Generally, the square barrels retrieved longer cores, but they were not collected in plastic liners and were therefore difficult to store.

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Table I. Itinerary of R/V SEA SOUNDER cruise S8-79-WG in lower Cook Inlet and on Kodiak Shelf, Alaska.

Port	Arrive	Depart	Remarks
Homer		29 July - 0700 (210/1700)	Start leg 1, to lower Cook Inlet.
Homer	5 Aug - 1430 (218/0030)		End leg 1.
Homer		6 Aug - 0700 (218/0700)	Start leg 2, to Kodiak Shelf.
Kodiak	15 Aug - 0800 (227/1800)		End leg 2.

NOTE: Julian day and GMT time are given between brackets.

Total underway time: 392 hr.
Total trackline miles/time: 957.8 nm/191.6 hr.
Stations occupied/total time on station: 57/55.7 hr.

Table 2. Types and amounts of data collected on board the R/V SEA SOUNDER cruise S8-79-WG in lower Cook Inlet and on Kodiak Shelf.

Data type	Trackline	Remarks
Single channel arcer	408.5nm (756.5km)	2 rolls recording paper
Uniboom	788.8nm (1460.9km)	13 rolls recording paper
3.5kHz	1302.9nm (2413.0km)	14 rolls recording paper
12kHz	1793.0nm (3320.7km)	11 rolls recording paper
Side-scanning sonar	517.9nm (959.3km)	14 rolls recording paper
Navigation	1862.0nm (3448.6km)	18 reels mag. tape
Gravity core		14 recoveries
Piston core		1 recovery
Vibracore		8 recoveries
Soutar grab		23 recoveries
TV/Camera		6.6 hours, 3 reels mag. tape
Profiling current meter		1 station

Table 3. Scientific personnel on board the R/V SEA SOUNDER cruise S8-79-WG in lower Cook Inlet and on Kodiak Shelf.

Name	Affiliation	Duties	Leg
Arnold Bouma	USGS, PAB*	co-chief scientist	1-2
Monty Hampton	"	co-chief scientist	1-2
Robert Orlando	"	geologist	1-2
Michael Torresan	"	"	1-2
Melvyn Rappeport	"	"	1-2
Michael Underwood	"	"	1-2
Edward Clukey	"	soils engineer	1-2
Phyllis Swenson	"	geologist	1
John Whitney	USGS, Conservation Division, Anchorage	"	1
George Redden	USGS, PAB	"	2
Karen Weliky	"	"	2
Richard Garlow	"	navigator	1-2
Kaye Kinoshita	"	"	1-2
James Nicholson	"	electronics technician	1-2
Ronald Schmitz	"	"	1-2
Jon Ericson	"	mechanical technician	1-2
Robert Wilson	"	"	1-2
Scott Rainsford	"	"	1-2

Ship's Officers

Vernon Pilgrim	captain
Scott Conrad	chief engineer
Paul Bates	chief mate

* USGS, PAB = U.S. Geological Survey, Branch of Pacific-Arctic Marine Geology, Menlo Park, California.

Table 4. Information about sampling stations and samples, cruise S8-79-WG in lower Cook Inlet and on Kodiak Shelf.

Sample number	Latitude Longitude	Water depth (m)	Equipment type	Comments
400	59°36.9'N 152°19.6'W	57	vibracorer	No recovery
401	59°33.0'N 152°07.3'W	39	vibracorer	Shell hash, 36 cm
402	59°34.4'N 152°12.8'W	44	vibracorer	Pebbly, shelly sand, 40 cm
403	59°27.1'N 152°38.2'W	61	vibracorer	Clean sand, wash out
404	59°31.2'N 153°07.6'W	39	grab sampler	Gray mud
405	59°28.2'N 153°11.8'W	35	grab sampler	Gray mud
406	59°27.4'N 152°38.0'W	60	vibracorer	Sand, 130 cm
407	58°52.7'N 152°55.4'W	171	gravity corer	Gray to green sandy mud, 215cm
408	58°52.5'N 152°56.1'W	168	gravity corer	Gray to green sandy mud
409	58°55.6'N 152°57.0'W	171	gravity corer	Gray to green sandy mud, 200cm
410	58°55.3'N 152°57.5'W	172	gravity corer	Gray to green sandy mud, 240cm
411	58°53.9'N 152°58.4'W	167	gravity corer	Gray to green sandy mud, 200cm
412	58°52.4'N 152°57.9'W	167	gravity corer	Gray to green sandy mud, 260cm
413	59°07.6'N 153°07.4'W to 59°06.8'N 153°06.9'W	100	TV/Camera	Observations of comet marks

414	59°27.6'N 152°33.2'W	65	vibracorer	Sand, 150 cm
415	59°31.0'N 152°38.7'W	64	vibracorer	No recovery
416	59°46.3'N 152°29.0'W	75	vibracorer	No recovery
417	59°46.5'N 152°29.0'W	80	vibracorer	No recovery
418	59°41.9'N 152°26.1'W	81	grab sampler	Sand with boulders
419	59°39.8'N 152°20.6'W	57	grab sampler	Sand with boulders
420	59°39.9'N 152°45.1'W	32	grab sampler	Shelly, pebbly sand
421	59°45.1'N 152°45.2'W	33	grab sampler	Shelly sand
422	59°49.7'N 152°37.9'N	34	grab sampler	Sand with boulders
423	59°50.1'N 152°29.5'W	40	grab sampler	Sandy gravel
424	59°54.7'N 152°14.6'W	70	grab sampler	Sand
425	60°00.0'N 152°09.2'W	72	grab sampler	Gravelly sand
426	60°00.1'N 151°59.8'W	52	grab sampler	Bouldery, gravelly sand
427	59°50.1'N 151°55.2'W	35	grab sampler	Bouldery gravelly sand
428	59°50.0'N 152°06.8'W	45	grab sampler	Gravel
429	59°50.0'N 152°14.6'W	75	grab sampler	Shelly, gravelly sand
430	59°49.1'N 152°20.1'W	84	grab sampler	Gravelly sand

431	59°44.8'N 152°33.5'W to 59°47.6'N 152°29.7'W	35	TV/Camera	Observe wall of Cook Trough
432	57°25.5'N 151°23.3'W	175	gravity corer, vibracorer	Green, ash-rich mud, 180cm
433	57°26.7'N 151°25.3'W	174	vibracorer	Green, ash-rich mud, 165cm
434	57°24.4'N 151°21.3'W	176	vibracorer	Ash-rich mud, 30cm
435	57°15.0'N 151°17.1'W	158	vibracorer	Ash-rich mud, 100cm
436	57°16.1'N 151°13.3'W	143	gravity corer	No recovery
437	57°01.1'N 152°10.3'W	77	vibracorer	Shelly, sandy gravel, 10cm
438	57°01.2'N 152°10.6'W to 57°01.2'N 152°01.4'W	76	TV/Camera	Attempt to observe gas seep; no success
439	56°40.6'N 153°12.6'W	159	gravity corer	Ash-rich mud, 224cm
440	56°39.2'N 153°06.4'W	156	gravity corer	Ash-rich mud, 243cm
441	56°39.5'N 153°04.6'W	164	gravity corer	Ash-rich mud, 214cm
442	56°39.1'N 153°02 1'W	135	vibracorer	Ash-rich mud, 111cm
443	56°38.6'N 152°57.4'W	82	vibracorer	Muddy sandy gravel few cm
444	56°22.9'N 153°15.8'W	42	grab sampler	Gravelly sand
445	56°11.2'N 153°17.3'W	1003	gravity corer	Mud, 225cm
446	56°05.9'N 153°51.5'W	213	vibracorer	Sandy mud

447	56°20.7'N 153°50.8'W	94	grab sampler	Gravelly sand
448	56°23.2'N 154°18.8'W	42	grab sampler	Sand
449	56°08.1'N 154°17.3'W	97	grab sampler	Gravelly sand
450	55°56.1'N 154°14.1'W	390	gravity corer	Sandy mud
451	55°56.7'N 154°41.9'W	371	grab sampler	Muddy sand
452	56°00.0'N 155°07.1'W	67	grab sampler	Sand
453	56°14.1'N 155°09.8'W	32	grab sampler	Shelly pebbly gravel
454	56°12.1'N 154°42.8'W	89	grab sampler	Shelly, pebbly sand
455	56°12.4'N 152°58.4'W	1750	gravity corer	Gray-green mud, 228cm

Table 5. Navigation logs from cruise S8-79-WG in Lower Cook Inlet and on the Kodiak Shelf and Slope.

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 (ID.) -79 (YR) - WG (AREA)

Ship Sea Sounder Chief Scientist HAMPTON/BOUMA Affiliation USGS

Page 33 of ____

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dis. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Baseline	TD or TR	Time ½	DATE
218	17	18				CASTING			DRC	134	10.0	+	59	36.16	-	151	24.67											
	17	30		TR		START TRANSIT				128	6.9			35.04			23.96											
	17	41								246	8.9			35.22			25.94											
	18	00								239	9.8			32.59			[illegible]											
	18	15								245	7.8			32.74			[illegible]											
	18	30								243	10.4			31.46			39.48											
	18	45								233	8.3			30.46			42.35											
	19	00								237	8.7			29.48			45.99											
	19	15								239	10.0			28.16			50.05											
	19	30								234	9.9			26.83			54.20											
	19	45								243	6.7			26.08			57.46											
	19	41				SAT 19			S					27.02			53.50			ELEV.	60.5	OFFSET	1.242					
	20	00							DRC	212	7.0			25.67			56.44											
	20	15							DRC	211	6.4			24.30			58.45											
	20	12				SAT 13			S					24.55			58.09			ELEV.	31.7	OFFSET	.080					
	20	30							DRC	210	6.2			22.97			59.87											
	20	45								212	6.3			21.74	-	152	01.78											
	21	00								202	6.7			20.38			03.73											
	21	15								204	7.5			18.90			05.67											
	21	12				SAT 20								17.18			05.43			ELEV.	42.2	OFFSET	.082					
	21	30								202	8.1			15.79			07.79											
	21	45								206	8.7			15.39			09.99											
	22	00								203	10.0			13.48			12.32											
	22	16								201	8.3			11.73			15.02											
	22	30								207	8.4			10.17			16.95											
	22	45								193	8.4			08.25			18.91											
	23	00								191	8.0			06.36			19.79											
	23	16				SAT 20			S					05.37			19.79			ELEV.	62	OFFSET	.226					
	23	15				SAT - MOW SHUT DOWN			DRC	196	8.5			04.49			21.78			SHUT DOWN SYSTEM TO MAKE PATCHES - WHEN STARTED UP TO GRAPPLE - RELOAD - RE PATCH WOULD NOT TRACE SAT - RECORD WIND AND PATCH										

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist HAMPTON/BOWMA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	New Course	New Speed	LATITUDE ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND Dir.	Speed	VISUAL, RADAR, ETC. DR FIX	Angle	Range	Distance	LORAN, RAYDIST, etc. Ratio	Stopping	TD or LR	Time %	Off
215	0116			TR		SAT 114			S			+	58	46.98	-	152	14.97			SYSTEM CRASHED BY OPERATOR TO PUT IN								
	0300					ROUTINE				153	111.4			30.14	-	151	53.99			PATCH - WAITING FOR SAT-FIX								
	0300					SAT 114			S					30.19			53.97			START REGULAR DATES								
	0315								DRC	150	10.8			27.87			51.17											
	0330								DRC	147	10.0			25.60			48.47											
	0350					SAT 112			S					22.55			44.91			EL = 45.1	OFFSET =	.256						
	0400								DRC	147	10.8			21.09			44.91											
	0419					SAT 119			S					18.00			41.34			EL = 16.7	OFFSET =	.064						
	0430								DRC	168	10.5			16.10			40.95											
	0445								DRC	161	10.0			13.90			37.57											
	0447					SAT 119			S					13.38			37.41			EL = 60.5	OFFSET =	.016						
	0500								DRC	169	10.5			11.13			38.66											
	0515					ROUTINE			DRC	173	10.5			08.36			38.72											
	0530					ROUTINE			DRC	171	10.2			05.80			35.03											
	0536					SAT 112			S					04.66			37.63			EL = 51.2	OFFSET =	0.034						
	0545					ROUTINE			DRC	164	10.3			03.28			37.08											
	0600					ROUTINE			DRC	164	10.2			00.87			25.70											
	0604					SAT 119			S					00.18			35.31			EL = 50.8	OFFSET =	.031						
	0615					ROUTINE			DRC	162	9.7	+	57	58.52			34.41											
	0630					ROUTINE			DRC	166	9.9			56.37			33.23											
	0645					ROUTINE			DRC	167	9.0			54.12			32.31											
	0700					ROUTINE			DRC	166	8.9			51.73			31.28											
	0715					ROUTINE			DRC	165	9.6			49.70			30.41											
	0730					ROUTINE			DRC	167	9.4			47.39			29.30											
	0745					ROUTINE			DRC	174	9.1			45.07			28.58											
	0751					SAT 119			S					44.19			28.24			EL = 51.2	OFFSET =	.023						
	0800					ROUTINE			DRC	171	9.7			41.85			27.75											
	0815					ROUTINE			DRC	170	9.2			40.64			27.07											
	0830					ROUTINE			DRC	173	9.5			38.32			26.44											
	0834					SAT 113			S					37.24			26.66			EL = 26.3	OFFSET =	.018						
	0845					ROUTINE			DRC	180	9.6			35.86			26.28											
	0900					ROUTINE			DRC	181	9.6			33.79			26.15											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - 66 (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON/BOWNA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE DEG	LATITUDE MINUTES	LONGITUDE DEG	LONGITUDE MINUTES	WIND Dir.	WIND SPD	VISUAL, RADAR, ETC. OBJECT	Angles	Bngs	Distances	LORAN, RAYDIST, etc. Rate	Reading	TD or T.D.	Time ½	SPP
279	08	15		TR					DRC	188	4.3	157	3158	-151	2641											
	09	30		TR					DRC	173	4.2		3053		2649											
	08	38		TR		SAT 19			S	176	4.6		2987		2690			ll. 16.4		offset	.058					
	09	45		TR					DRC	180	4.3		2940		2629											
	10	00		TR					DRC	178	4.8		2830		2615											
	10	13		TR		EOL TR			DRC	184	4.8		2795		2597											
	10	15		TR		TURNING			DRC	159	5.0		2714		2594											
	10	16		452		SOL 452			DRC	192	5.2		2707		2585											
	10	30		452					DRC	144	4.9		2622		2452											
	10	45		452					DRC	149	4.6		2536		2302											
	11	00		452					DRC	146	4.7		2448		2158											
	11	15		452					DRC	143	4.7		2357		2006											
	11	22		452		EOL 452			DRC	137	4.8		2314		1956											
	11	30				TURNING			DRC	028	4.4		2314		1854											
	11	34		453		SOL 453			DRC	350	4.3		2338		1857											
	11	34		453		SAT 20			S	350	4.3		2341		1837			ll. 34.0		offset	.004					
	11	45		453					DRC	349	6.5		2456		1889											
	12	00		453					DRC	352	7.0		2623		1945											
	12	05		453		EOL 453			DRC	350	6.8		2662		1954											
	12	09		454		SOL 454			DRC	235	5.0		2690		2004											
	12	15		454					DRC	247	4.9		2751		2061											
	12	30		454					DRC	259	4.8		2596		2297											
	12	45		454					DRC	255	4.8		2539		2456											
	13	00		454					DRC	258	4.0		2485		2659											
	13	15		454					DRC	261	4.0		2435		2806											
	13	28		454		EOL 454			DRC	257	4.5		2394		2966											
	13	32		455		SOL 455			DRC	052	3.9		2345		2990											
	13	45		455					DRC	031	6.4		2995		2875											
	14	00		455					DRC	032	6.4		2691		2726											
	13	58		455		SAT 19			S	031	6.3		2666		2734			ll. 22.6		offset	.005					
	14	15		455					DRC	034	6.7		2773		2559											
	14	16		455		EOL 455			DRC	032	6.7		2782		2596											

U.S.G.S. NAVIGATION LOG

Cruise Locator 18 - 79 - WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Page 36 of ____

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPB	VISUAL, RADAR, ETC. OBJECT	Angles	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD	Time ½ min	Sep
219	1419			456		SOL 456			DRC	143	6.0	1	57	2795	-	151	2503											
	1430			456					DRC	137	5.1			2717			2421											
	1445			456					DRC	137	5.3			2608			2278											
	1500			456					DRC	127	4.9			2502			3133											
	1515			456					DRC	125	4.7			2415			2001											
	1529			456		EOL 456			DRC	127	4.6			2377			1960											
	1530			TR					DRC	127	4.6			2320			1870			pulling side scan								
	1533			TR		START TR TO STA			DRC	134	4.5			2303			1835			Start transit to station 432								
	1545			TR					DRC	316	7.5			2363			1935											
	1600			TR					DRC	319	6.6			2479			2025											
	1615			TR					DRC	236	6.6			2570			2306											
	1619				432	ON STATION A32			DRC	191	0.7			2546			2332											
	1630				432				DRC	279	0.4			2556			2355											
	1645				430				DRC	261	1.2			2598			2360											
	1650				A32	ON BOTTOM A32P1			DRC	257	1.1			2590			2369	P-1										
	1700				432				DRC	265	0.8			2510			2386											
	1705				432	START 19			S					2436			2405	ELEV.	29.5	OFFSET	.889							
	1715				432				DRC	262	0.9			2515			2432											
	1730				432				DRC	248	1.1			2413			2467											
	1733				432	START 14			S					2415			2482	ELEV.	30.2	OFFSET	.023							
	1745				432				DRC	227	1.0			2409			2505											
	1800				432				DRC	002	2.0			2411			2551	DATUM AT STATION - STEAMING BACK										
	1815				432	MANUVER ON STA			DRC	047	4.1			2533			2367											
	1824				432	ON BOTTOM G-1			DRC	095	1.1			2550			2543	G-1										
	1830				432				DRC	113	0.9			2537			2346											
	1845				432				DRC	095	0.4			2551			2339											
	1900				432				DRC	106	0.7			2557			2345											
	1915				432				DRC	105	1.2			2552			2365											
	1920				432	ON BOTTOM V-1			DRC	107	0.5			2555			2377	V-1										
	1930				432				DRC	227	0.5			2548			2351											
	1945				432				DRC	110	0.3			2553			2343											
	1953				432	END STA 432			DRC	142	1.0			2552			2339											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 (ID.) -79- (YR) -WC (AREA)

Ship Sea Sounder Chief Scientist Hampton / Barnard Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC OBJECT	Angles	Dist.	Dimensions	LORAN, RAYDIST, etc. Rate	Reading	TS	Time	SPP
219	1959			TR		START TRANSIT			DRC	320	7.1	+	57	25.59	-	151	23.69											
	2000			TR					DRC	321	2.9			25.65			23.80											
	2010			TR		END TRANSIT			DRC	323	3.4			26.51			25.06											
	2015					MANUVERING			DRC	010	3.2			26.69			25.23											
	2030					MANUVERING			DRC	142	1.3			26.68			25.23											
	2036				4333	ON STATION			DRC	168	1.2			26.68			25.23											
	2045				4333				DRC	146	0.2			26.71			25.75											
	2050				4333	ON BOTTOM V-2			DRC	193	0.1			26.74			25.26			V-2								
	2100				4333				DRC	223	2.4			26.75			25.38			VIBRA CORE DANGLES, HOLD STATION UNTIL								
	2115				4333				DRC	301	2.7			27.11			25.85			IT IS RETRIEVED								
	2130				4333				DRC	127	3.1			27.07			25.98											
	2145				4333	END STATION			DRC	177	.4			26.65			25.17											
	2152			TR		START TRANSIT			DRC	135	4.5			26.64			24.98											
	2149					SAT 20			S					26.84			25.54	EQU		67.7		~~MAGET~~	.216					
	2200			TR					DRC	140	3.0			26.41			24.53											
	2215			TR					DRC	146	5.7			25.46			22.79											
	2230			TR					DRC	146	2.7			24.89			22.10											
	2239			TR		END TRANSIT			DRC	126	0.9			24.52			21.65											
	2240				4334	ON STATION			DRC	199	1.3			24.47			21.49											
	2245				4334				DRC	129	0.6			24.12			20.84											
	2300				4334				DRC	301	1.9			24.36			21.11											
	2309				4334	ON BOTTOM, V-2			DRC	278	0.5			24.45			21.30	V2										
	2315				4334				DRC	304	0.2			24.47			21.33											
	2330				4334				DRC	109	0.8			24.55			21.33											
	2345				4334	END STATION			DRC	010	0.3			24.72			21.36			LOST VIBRA CORE 1121								
220	0000					SEARCH			DRC	004	0.4			24.86			21.50											
	0015								DRC	175	2.3			24.68			21.60											
	0030								DRC	17[illegible]	2.8			24.6[illegible]			21.0[illegible]											
	0045								DRC	285	1.0			24.46			21.11											
	0100								DRC	330	1.3			24.51			21.36											
	0115								DRC	24[illegible]	0.5			24.58			21.40											
	0130								DRC	058	3.6			24.51			21.40											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WC (ID. YR AREA)

Ship Sea Sounder Chief Scientist HAMPTON/BRAHA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angles	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or T.B.	Time Zone	OFF
220	02	00		SRC		SEARCH FOR V-COR	F		DRC	277	11.6	+	57	24.18	-	151	21.21											
	02	30		SRC					DRC	013	6.9			24.53			21.23											
	03	00		SRC					DRC	201	3.9			24.49			21.23											
	03	15				RECOVERED V-CORE			DRC	164	0			24.37			21.77											
	03	50		TRANS		TRANSIT FOR LUN			DRC	135	6.2			24.17			21.06											
	04	00							DRC	131	4.7			23.95			19.76											
	04	15							DRC	132	6.1			23.9			17.80											
	04	30				TRANSIT			DRC	136	6.6			23.43			15.88											
	04	45							DRC	125	5.4			20.37			14.40											
	05	00				TRANSIT			DRC	139	5.1			19.49			12.49											
	05	15							DRC	135	5.4			17.57			10.71											
	05	30							DRC	137	4.6			17.73			09.40											
	05	34		TRN		END TRANSIT				135	3.7			17.55			09.10											
	05	41		457		SOL 457			DRC	198	3.9			17.09			09.06											
	05	45				SP1			DRC	242	4.4			16.98			09.29											
	06	00				SP2			DRC	247	4.4			16.68			11.26											
	06	15				SP3			DRC	206	5.4			16.12			13.40											
	06	30				SP4			DRC	243	5.6			15.46			15.63											
	06	45				SP5			DRC	236	5.4			15.81			17.87											
	07	00		U		SP6			DRC	243	5.5			14.15			20.15											
	07	15		457		SP7			DRC	234	6.0			[illegible]		15.50	[illegible]			22.50								
	07	16		457		END 457								[illegible]			[illegible]											
	07	30		458		SOL 458			DRC	120	[illegible]			18.[illegible]			20.[illegible]											
	07	34				START 13				[illegible]				19.57			26.17			ELEV. 44.6			Fig. -.595	OFFSET 1.199				
	07	45				SP1			DRC	[illegible]	6.2			16.03			23.66											
	08	00				SP2			DRC	031	6.1			17.14			24.71											
	08	15				SP3			DRC	031	6.6			18.51			25.13											
	08	30		458		END 458			DRC	027	4.9			18.78			22.69											
	08	34		459		SOL 459			DRC	155	5.10			18.60			20.05											
	08	45				SP1			DRC	161	4.5			18.13			20.28											
	09	00							DRC	164	4.3			17.23			19.97											
	09	15							DRC	161	4.6			16.[illegible]			[illegible]											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - 416 (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

2/75

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	Y.E. or Y.R.	Time ½	Dev
220	0930			459					DRC	159	5.4	+37	15.15		-151	17.35												
	0945			459					DRC	155	5.9		13.94			16.53												
	1000			459					DRC	153	5.5		12.72			15.21												
	1015			459					DRC	149	5.0		11.60			13.98												
	1026			459		EOL 459			DRC	148	4.5		10.95			13.27												
	1030								DRC	150	4.8		10.67			12.97			parking in gear									
	1043			TR		SOL TR TO STA 435			DRC	153	5.8		09.60			11.78			transit to station 435									
	1045			TR					DRC	151	6.2		09.55			11.75												
	1100			TR					DRC	330	10.0		11.13			13.07												
	1115			TR					DRC	329	9.5		13.20			15.99												
	1130			TR					DRC	334	7.3		15.15			17.56												
	1145				435	ON STATION 435			DRC	136	1.6		13.06			17.37												
	1145				435				DRC	121	0.4		15.01			17.20												
	1153				435	ON BOTTOM V-1			DRC	117	0.3		15.04			17.10			V-1									
	1200				435				DRC	132	0.11		16.06			17.10												
	1215				435				DRC	111	0.7		14.98			16.81												
	1812				435	SAT 20			3	119	0.7		15.48			17.36			H. 20.4	offset	.551							
	1230				435				DRC	111	0.2		15.44			17.17												
	1245				435				DRC	116	0.3		15.35			17.17												
	1300				435				DRC	124	0.6		15.24			17.15												
	1304				435	LV STA 435			DRC	067	0.9		15.19			17.11												
	1515			TR					DRC	059	8.9		13.71			14.67												
	1323				436	ON STATION 436			DRC	095	11.0		16.14			13.30												
	1328				436	ON BOTTOM G-1			DRC	108	10.0		16.14			13.29			G-1, no recovery									
	1330				436				DRC	089	0.0		16.14			13.30												
	1345				436				DRC	151	0.1		16.13			13.30												
	1358				436	ON BOTTOM G-2			DRC	163	11.3		16.01			13.53			G-2, no recovery									
	1400				436				DRC	199	0.8		15.98			13.51												
	1406				436	ON BOTTOM G-3			DRC	196	0.9		15.90			13.65			G-3,									
	1415				436				DRC	197	10.9		15.81			13.85												
	1419				436	LV STATION 436			DRC	239	11.0		15.75			13.91			Start Transit to line 460									
	1424			TR					DRC	243	9.5		15.47			14.39												

U.S.G.S. NAVIGATION LOG

Cruise Locator A8 -79- WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	T.D. T.D.	Time ½	EPP
220	19	45		TR					DRC	260	10.0	+	57	13.78	-	151	19.85			Transit to line 460								
	19	55		TR		SAT 19			9	248	10.2			12.74			20.95			el. 44.6		offset	.240					
	15	00		TR					DRC	249	10.4			12.47			23.95											
	15	15		TR					DRC	246	10.2			10.98			28.38											
	15	30		TR					DRC	243	10.1			09.71			32.40											
	15	45		TR					DRC	239	10.6			08.31			36.46											
	16	00		TR					DRC	239	10.3			06.91			40.54											
	16	15		TR					DRC	237	10.1			05.65			44.59											
	16	30		TR					DRC	243	9.9			04.32			48.31											
	16	42		TR		SAT 14			S	241	9.8			03.35			51.95			el. 53.4		offset	.023					
	16	45		TR					DRC	240	9.9			03.07			52.21											
	17	00		TR						237	10.2			01.77			56.14											
	17	15		TR						241	10.1			00.42	-	153	00.52											
	17	30		TR						232	10.0	+	56	59.23			04.25											
	17	45		TR		END TRANSIT				233	9.3			57.78			07.65											
	17	51			460	START LINE 460				225	4.6			57.65			08.32											
	18	00								273	4.8			57.71			08.96											
	18	04				SAT 19			S					57.60			10.06			ELEV. 48.2		OFFSET	.142					
	18	15							DRC	220	4.6			57.61			11.65											
	18	28				SAT-NAV CRASH														PROGRAM DOWN - NO APPARANT REASON								
220	18	58			460				S			+	56	58.08	-	152	17.26			ELEV. 8.3		OFFSET	2.132					
	19	15							DRC	269	4.5			58.17			19.58											
	19	30								250	4.0			58.05			21.49											
	19	45								252	4.1			57.91			23.50											
	19	50				SAT 19			S					57.82			23.90			ELEV. 48.3		OFFSET	.135					
	20	00							DRC	275	5.4			57.53			25.19											
	20	09			460	END LINE 460			DRC	278	4.8			57.65			26.54											
	20	17			461	START LINE 461				120	3.4			57.23			26.70											
	20	30			461					116	4.1			56.91			25.87											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist HAMPTON/BOUMA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND DIR.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Dip	Distance	LORAN, RAYDIST, etc Rate	Reading	T.D.	Time Zone	Diff
220	20	21		461		SOT 13			S			+	56	5724	-	152	2663	ELEV		24.6	OFFSET		.034					
	20	45							DRC	127	4.1			5627			2446											
	20	42				SOT 20			S					5643			2446	ELEV		30.4	OFFSET		-.028					
	21	00							DRC	132	4.4			5555			2280											
	21	15								132	4.6			5474			2129											
	21	30								132	4.5			5394			1998											
	21	45								133	4.8			5312			1825											
	21	48		461		END LINE 461				134	4.5			5296			1778											
	21	53		462		START LINE 462				358	7.7			5320			1760											
	22	00								008	4.6			5329			1721											
	22	15								004	4.4			5341			1721											
	22	45								011	4.6			5319			1771											
	23	00								008	4.5			5332			1769											
	23	15								001	4.7			5344			1765											
	23	30								359	4.3	+	52	0062			1768											
	23	45								001	4.6			0076			1771											
	23	49		462		END LINE 462				004	4.5			0088			1770											
	23	58		463		START LINE 463				031	3.9			0227			1747											
221	00	00								105	4.4			0232			1654											
	00	15								103	4.8			0221			1445											
	00	13				SOT 20			S					0225			1470	ELEV		22.2	OFFSET		.041					
	00	30							DRC	105	4.8			0216			1233											
	00	43		463		END LINE 463				101	4.8			0211			1043											
	00	46		464		START LINE 464				184	4.2			0301			1017											
	01	00		464					DRC	184	4.0			0110			1025			observed			pos. in ocean records					
	01	15		464					DRC	175	4.1			0015			1035											
	01	30		464					DRC	[illegible]	[illegible]	30		3802			1064											
	01	45		464					DRC	[illegible]	4.1			[illegible]			[illegible]											
	02	00		464					DRC	172	4.1			[illegible]			[illegible]											
	00	15		464					DRC	172	4.0			[illegible]			[illegible]											
	00	30		464					DRC	182	3.9			5525			1108											
	00	35		464		END LINE 464			DRC	183	3.9			5493			1146											

U.S.G.S. NAVIGATION LOG

Cruise Locator 88 - 79 - WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE	DEG	MINUTES	LONGITUDE	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Bearing	Range	Comments	LORAN, RAYDIST, etc. Rate	Reading	TD or TR	Time to Zero	EPF
221	0245					Building in equip.			DRC	180	0.2	+56	54.41		-152	11.90												
	0250			TR		START TR TO STA 437			DRC		11.3		53.80			11.50				Begin transit to station 437								
	0300			TR					DRC	5	9.1		54.96			11.61												
	0303			TR		SAT 14			S				53.95			11.65				elev = 40.6 freq. -.205 offset .095								
	0316			TR					DRC	6	10.1		53.37			11.19												
	0330			TR					DRC	8	9.7		59.77			10.57												
	0342				437	ON STA 437			DRC			+57	01.18			10.12												
	0414				437	ON BOTTOM V1			DRC				01.14			10.31				one bag ~~[illegible]~~ seds. recovered								
	0507				437	ON BOTTOM V2			DRC				01.10			10.23												
	0537				437	ON BOTTOM V3			DRC				00.76			10.03												
	0620				435	ON STA 438			DRC				01.87			12.18												
	0640				432	CAMERA IN WATER			DRC				01.96			10.71				~~camera in water~~ camera in water								
	0650				438	ON BOTTOM			DRC				01.91			10.58				camera on bottom - begin survey								
	0700				432				DRC	107	1.5		01.16			10.3[illegible]												
	0730				438				DRC	124	1.5		01.12			13.26												
	0751				438	CAMERA OFF BOT			DRC	12[illegible]	1.5		01.23			10.28												
	0802				438	END STN 438			DRC	197	1.5		01.50			10.49												
	0805			TR		SOL TRANSIT			DRC	60	2.7		01.87			10.08				start transit to line 465								
	0600			TR		SAT 19			S				02.19			11.14				elev 43.2 freq -.361 offset .976								manual update
	0815			TR					DRC	201	6.3		01.47			12.81												
	0830			TR					DRC	211	9.8	+56	59.92			19.13												
	0832			TR		SAT 13			S	210	9.2		59.61			19.92				el. 22.0 offset .039								
	0845			TR					DRC	214	9.0		58.04			16.35												
	0900			TR					DRC	223	9.4		56.41			19.28												
	0915			TR					DRC	220	9.3		59.76			20.32												
	0900			TR		SAT 20			S	229	8.7		59.17			23.85				el. 44.8 offset .029								
	0930			TR					DRC	223	9.4		53.11			25.37												
	0945			TR					DRC	225	9.5		51.97			28.91												
	1000			TR					DRC	230	9.2		49.82			31.43												
	1015			TR					DRC	228	9.3		48.15			34.40												
	1030			TR					DRC	232	9.4		46.55			37.99												
	1045			TR					DRC	224	8.5		44.94			40.34												

U.S.G.S. NAVIGATION LOG

Cruise Locator 18 - 79 - 06
ID. YR AREA

Ship Sea Sounder Chief Scientist Thompson/Bouma Affiliation USGS

Page 43 of ____

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE %	DEG	MINUTES	LONGITUDE %	DEG	MINUTES	WIND DIR.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD LR	Time % Min	SPT
221	11	00		TR					DRC	246	8.5	T	56	4367	-	152	1365											
	11	05		TR		SAT 20			S	201	8.9			4327			1399			el. 46.7	offset	.021						
	11	15		TR					DRC	212	8.5			4313			1617											
	11	20		TR					DRC	222	9.2			4036			1810											
	11	45		TR					DRC	219	9.0			3875			1165											
	11	52		TR		EDL TR			DRC	219	9.2			3795			1303											
	11	55		A65		SDL A65			DRC	203	5.1			3796			1361											
	12	00		A65					DRC	264	4.7			3801			1430											
	12	15		A65					DRC	275	4.8			3830			1644											
	12	30		A65					DRC	276	4.6			3857			1847											
	12	45		A65					DRC	276	4.7			3880	-	153	1038											
	13	00		A65					DRC	278	4.7			3909			1232											
	13	15		A65					DRC	289	4.6			3940			1453											
	13	30		A65					DRC	279	4.5			3968			1656											
	13	45		A65					DRC	290	5.5			3992			1860											
	14	00		A65					DRC	293	2.9			4024			2071											
	14	02		A65		SAT 19			DRC	291	5.6			4030			1101			el. 23.1	offset	.013						
	14	15		A65					DRC	292	4.5			4058			1264											
	14	16		A65		EDL A65			DRC	289	4.2			4066			1299											
	14	29		A66		SDL A66			DRC	285	5.0			4065			1397											
	14	33		A66					DRC	278	4.2			4073			1419											
	14	45		A66					DRC	293	4.3			4087			1696											
	15	00		A66					DRC	285	4.7			4112			1861											
	15	15		A66					DRC	293	4.5			4130			2080											
	15	30		A66					DRC	287	4.5			4154			2255											
	15	45		A66					DRC	290	4.9			4177			2411											
	16	00		A66					DRC	291	4.6			4197			2148											
	16	15		A66		C/C			DRC	321	3.5			4204			2846											
	16	45		A66					DRC	102	3.7			4219			2942											
	17	00		A66					DRC	132	4.4			4101			2624											
	17	15		A66					DRC	134	5.1			3957			2765											
	17	19		A66					S					3926			2776			EDL 26.2	offset	.041						

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -70-W6 (ID. / YR AREA)

Ship Sea Sounder Chief Scientist HAMPTON / BENOIT Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND DIR.	SPD	VISUAL, RADAR, ETC. OBJECT				LORAN, RAYDIST, etc.				
221	17	45		466					DRC	179	9.5	+	56	37.77	-	153	21.65											
	18	01								161	5.8			36.48			20.58											
	18	15								152	5.3			35.28			19.64											
	18	30								152	5.2			34.13			18.65											
	18	45								154	4.8			32.49			17.36											
	19	00								140	4.6			31.39			16.53											
	19	15								143	4.7			30.37			15.41											
	19	30				CHANGE COURSE				164	5.4			29.28			14.39											
	19	44								232	4.4			28.48			14.20											
	20	00								215	5.3			27.84			17.92											
	20	15								200	9.2			26.91			19.83											
	20	18		466		END LINE 466				201	9.0			26.77			20.10											
	20	28		467		START LINE 467				324	8.4			26.64			21.44											
	20	30								335	6.5			26.76			21.67											
	20	45								330	4.0			27.72			22.26											
	21	00								300	4.0			28.25			23.39											
	21	15								322	3.7			29.40			24.72											
	21	20				SAT 20			S					29.99			24.30	ELEV.	46.8		OFFSET	.614						
	21	30							DRC	316	4.8			30.63			25.14											
	21	45								305	5.3			31.27			27.40											
	22	00								330	4.6			32.08			28.76											
	22	15								324	4.7			32.86			30.34											
	22	30								328	4.0			33.81			31.55											
	22	45								327	4.5			34.59			32.73											
	23	00								320	4.6			35.55			34.37											
	23	05				SAT 20			S					35.97			35.70	ELEV.	50.0		OFFSET	.516						
	23	15							DRC	318	5.0			36.40			36.79											
	23	30								331	5.9			37.66			37.90											
	23	45								313	5.2			38.67			39.44											
222	00	00								312	5.2			39.65			40.06											
	00	15								329	4.0			40.47			42.39											
	00	30								324	4.7			41.37			43.80											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79- WG (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Comments	LORAN, RAYDIST, etc. Rate	Reading	TD Int.	Time %	STP
228	00	45		467		SP 17			DRC	320	5.0	+56	49	33.6	-153	45	34											
	01	00				SP 18			DRC	317	5.5		46	27		46	51											
	00	52				SAT 20			S				49	06		46	09			EL= 13.9		OFFSET:	.727					
	01	15		467		SP 19 EOL 467			DRC	318	5.4		48	85		48	92											
	01	20		TRN		SP TRANSIT			DRC	185	4.4		48	51		47	97											
	01	30		TRN					DRC	160	3.6		43	01		48	75											
	01	45		TRN					DRC	116	7.0		41	77		48	44											
	02	00							DRC	186	7.0		40	23		48	52											
	02	15							DRC	186	6.8		38	91		48	79											
	02	12				SAT 14			S				38	67		48	62			elev 22.4		offset	.083	freq	.703			
	02	30							DRC	198	7.2		36	07		47	87											
	02	45							DRC	120	6.5		34	88		49	57											
	03	00							DRC	164	7.1																	
	03	00							DRC	164	7.1		33	20		48	65											
	02	50				SAT 13			S				39	25		47	19			elev 21.8		offset .075		freq	.644			
	03	13		TRN		EOL TRANSIT			DRC	149	6.0		31	67		49	83											
	03	15		468		SP 20 468			DRC	136	9.0		31	65		49	16											
	03	30		468					DRC	131	3.7		30	77		48	53											
	03	45		468					DRC	138	4.9		30	00		49	19											
	04	00		468					DRC	142	3.5		29	23		49	56											
	04	15		468					DRC	149	4.2		28	39		44	75											
	04	30		468					DRC	132	4.5		27	58		43	64											
	04	45		468					DRC	139	4.7		26	82		42	58											
	[illegible]			468		SAT 18			S				[illegible]			[illegible]				elev [illegible]		Freq 136	offset 158					
	05	00		468					DRC	143	6.0		25	66		40	58											
	05	15		468					DRC	145	5.5		24	94		39	13											
	05	30		468					DRC	141	4.3		24	03		37	73											
	05	24		468		SAT 19			S				24	49		38	94			elev. 32.5		offset .151		freq	-.394			
	05	45		468					DRC	139	5.4		23	47		36	09											
	05	45		468		SAT 14			S				23	39		36	31			elev 27.5		offset .029		freq	.391			
	06	00		468					DRC	152	5.3		22	42		35	05											
	06	15		468					DRC	145	3.6		21	51		33	64											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WG (ID. / YR / AREA)

Ship RV Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE %	DEG	MINUTES	LONGITUDE %	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Bran	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or T.A.	Time % Miles	SPD
222	06	30		468					DRC	132	5.3	+	56	2075	-	153	3028											
	06	45		468					DRC	148	3.6			1976			3115											
	07	00		468					DRC	1.1	5.0			[illegible]			2963											
	07	15		468					DRC	150	3.2			1858			2817											
	07	30		468					DRC	165	5.1			1752			2704											
	07	45		468					DRC	159	5.2			1646			2603											
	07	48		468		SAT 12			S					1558			2615			elev. = 39.3			offset = .053 freq = .546					
	08	00		468					DRC	133	4.7			1554			2414											
	08	15		468					DRC	144	5.7			1457			2238											
	08	30		467					DRC	137	5.8			1344			2074											
	08	45		466					DRC	1.7	4.8			1254			1942											
	09	00		468					DRC	157	4.4			1159			1793											
	09	06		468		EOL 468			DRC	190	5.0			1112			1719											
	09	09		TR		SOL TR TD 50969			DRC	174	5.0			1096			1705											
	09	15		TR					DRC	222	7.0			1045			1626											
	09	30		TR					DRC	219	7.3			0909			1491											
	09	45		TR					DRC	214	6.9			0711			1168											
	10	00		TR					DRC	212	7.1			0629			0362											
	10	15		TR					DRC	216	6.9			0499			0558											
	10	23		TR		EOL TR			DRC	211	7.5			0414			2672											
	10	23		469		SOL 469			DRC	273	6.6			0390			2757											
	10	30		469					DRC	331	7.4			0317			2751											
	10	45		469					DRC	334	4.0			0512			2873											
	11	00		469					DRC	317	4.3			0595			2994											
	11	15		469					DRC	324	4.4			0628			2129											
	11	30		469					DRC	323	4.2			0760			3253											
	11	43		469		SAT 20			S	30	4.0			0828			3368			el. 27.8	freq. .292		offset .029					
	11	45		469					DRC	329	5.7			0835			3374											
	12	00		469					DRC	329	4.7			2111			3999											
	12	15		469					DRC	324	4.2			0791			4621											
	12	30		469					DRC	322	4.9			1082			5763											
	12	45		469					DRC	320	5.0			1117			6913											

U.S.G.S. NAVIGATION LOG

Cruise Locator 13 - 79 - WG (ID. / YR / AREA)

Ship Mr Anderson Chief Scientist Harpster/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angles	Dist	Remarks	LORAN, RAYDIST, etc. Rate	Condition	TS or TD	Time ½ Lt	Diff
227	13	00		469					DRC	323	4.8	+	56	12.69	-	153	9059											
	13	15		469					DRC	319	4.8			13.60			4203											
	13	30		469					DRC	320	5.0			14.53			4356											
	13	45		469					DRC	320	6.6			15.57			4519											
	14	00		469					DRC	313	6.4			16.42			4654											
	14	15		469					DRC	317	3.7			17.12			4764											
	14	30		469					DRC	315	4.1			18.09			4919											
	14	45		469					DRC	318	5.5			19.08			5079											
	14	58		469		SAT 14			S	323	4.2			19.79			5206			el. 44.7	freq. - .771		offset .042					
	15	00		469					DRC	326	4.2			19.85			5217											
	15	15		469					DRC	332	4.4			20.78			5351											
	15	30		469					DRC	320	4.9			21.69			5495											
	15	45		469					DRC	322	4.8			22.61			5697											
	16	00		469					DRC	333	4.5			23.52			5791											
	16	15		469					DRC	326	4.6			24.43			5934											
	16	30		469					DRC	339	4.7			25.31	-	154	0083											
	16	45		469					DRC	330	4.7			26.24			0216											
	16	51		469		EOL 469			DRC	326	4.9			26.60			0276											
	16	53		TR		SOL TR			DRC	267	5.9			26.70			0319			Mark transit to 470								
	16	55		469		SAT 14			S					26.26			0224			elev. 51.1	offset .038							
	17	00		TR					DRC	264	5.8			26.66			0416											
	17	15								275	6.6			26.70			0684											
	17	30								265	6.7			26.72			0992											
	17	45								268	6.7			26.71			1703											
	18	00				CHANGE CRS				225	6.6			26.44			1608			FISHING LINE	BOUYS							
	18	15								145	4.7			25.24			1658											
	18	43				SAT 14			S					26.93			1668			ELEV: 52.8	OFFSET: .058							
	18	30							DRC	195	6.8			24.42			1609											
	18	45				END TRANSIT				192	6.5			23.49			1881											
	18	46		470		START LINE 470				130	6.4			23.32			1874											
	19	00								131	4.1			22.63			1947											
	19	15								141	5.1			21.69			1592											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - W6 (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON/BOWMA Affiliation U.S.G.S.

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	Drift	VISUAL, RADAR, ETC. OBJECT	Angles	Dirgs	Distances	LORAN, RAYDIST, etc. Ratio	Readings	TD or TR	Time % Dev.	Diff
232	19	30		470					DRC	119	5.5	+	56	20.66	-	1	54											
	19	45								127	5.2			19.78			12.85											
	20	00								129	5.5			18.59			11.33											
	20	00				SAT 19								18.76			11.37			ELEV: 41.9		OFFSET	.036					
	20	15								130	4.7			17.75			09.77											
	20	30								128	4.1			16.89			08.22											
	20	30				SAT 13			S					16.85			25.17			ELEV 21.3		OFFSET	.011					
	20	45							DRC	140	5.8			15.91			06.58											
	21	00								140	5.6			14.92			05.17											
	21	15								141	5.0			14.01			03.72											
	21	30								130	5.5			13.00			02.19											
	21	45								135	5.0			12.11			00.66											
	22	00								135	4.5			11.17	-	1	53	59.25										
	22	15								136	5.9			10.09			57.63											
	22	30								132	6.0			09.11			56.03											
	22	45								135	5.6			08.16			54.52											
	23	00								135	5.3			07.16			53.04											
	23	15								135	4.7			06.27			51.55											
	23	30								132	4.8			05.02			50.06											
	23	45							DRC	135	4.8			04.40			48.63											
	23	43				SAT 20			S					04.51			48.70			ELEV 29.8		OFFSET	.077					
233	00	00							DRC	121	3.8			03.51			[illegible]											
	00	15								130	4.6			02.70			49.70											
	00	30								135	4.5			01.75			48.48											
	00	45								138	4.2	-	1	00.84			47.26											
	01	00							DRC	135	4.7	-	55	59.92			46.64											
	01	15							DRC	121	4.2			58.90			45.34											
	01	30							[illegible]	127	4.1			57.92			43.71											
	01	45							[illegible]	134	[illegible]			[illegible]			42.91											
	02	00				SAP 9			[illegible]	134	5.0			[illegible]			40.17											
	02	15				SAP 10			DRC	139	4.3			55.66			39.98											
	02	30		470		DRC 430			[illegible]	131	5.6			54.59			38.43											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WG (ID. / YR / AREA)

Ship R.V. Sea Sound Chief Scientist Hampton / Bouma Affiliation USGS

2/78

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Range	Brg.	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TD	Time %	Off
223	02	35		TR		SOL TR			DRC	287	10.1	+	56	4932	-	162	2983											
	02	45		TR					C	219	7.7			5462			3015											
	03	00		TR					DRC	277	8.1			5439			3802			LORAN SHUT OFF TO CORRECT FAULTY SPEED READING								
	03	15		TR					DRC	278	9.1			5496			4143											
	03	30		TR					DRC	273	6.8			5516			4521											
	03	45		TR					DRC	272	6.0			5535			4897											
	03	48		TR		SAT 12			S					5977			4270			manual update		elev. 42.6	offset 3.145		freq 1.005			
	04	00		TR					DRC	278	6.8			5523			4654											
	04	15		TR					DRC	279	4.8			5544			4899											
	04	30		TR					DRC	271	5.2			5549			5125											
	04	45		TR					DRC	276	5.7			5565			5386											
	04	56				SAT 19			S					5[illegible]4			4953			LORAN ON AGAIN manual update		elev. 19.1		offset 1.648				
	04	52				SAT 19			S					5[illegible]00			[illegible]			manual update		elev. 49.4		offset 2.145				
	05	00							DRC	274	5.7			5613			5354											
	05	30							DRC	270	7.5			5590			5345											
	05	45		471		SOL 471 COLTR			DRC	295	6.1			5550			5438											
	06	00		471					DRC	299	5.5			5674			5132											
	06	15		471					DRC	357	4.5			5[illegible]0			4770											
	05	28		TR		SAT 12			S					5966			[illegible]			elev. 50.8	freq. 1.66		offset 1.642			manual update		
	06	30		471					DRC	317	5.2			5[illegible]	-	1154	0574											
	06	42		471		SAT 19			S					5[illegible]			0011			manual update		elev. 62.9		offset .505		freq 1.601		
	06	45							DRC	238	4.0			5898			0183											
	07	00								310	—																	
	07	15							DRC	316	—	+	56	5906			0511											
	07	30							DRC	351	—			0171			0604											
	07	45							DRC	325	4.5			0211			[illegible]			manual speed								
	08	03							DRC	312	4.2			0316			0562											
	08	15							DRC	319	4.5			0[illegible]			0[illegible]											
	08	31				SAT 19			S					0330			0767			manual update		elev. 58.1		offset .850		freq -.742		
	08	30							DRC	096	4.5			0410			0190											
	08	45					P		DRC	214	4.[illegible]			0511			0713											
	09	00				SAT 30			[illegible]					0[illegible]			1125			elev. 30	freq 1.32		offset .093					

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - UX7 (ID. / YR AREA)

Ship Sea Sander Chief Scientist Hampton/Bourne Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Fix Type	Now Course	Now Speed	LATITUDE ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. Object	Bearing	Range	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TR	Time %	Diff
223	09	00		471				DRC	320	3.8	+	52	3522	-	154	1179											
	09	15		471				DRC	316	4.5			0400			1269											
	09	30		471				DRC	316	4.9			0682			1917											
	09	45		471				DRC	318	4.3			0758			1540											
	10	00		471				DRC	309	3.8			0833			1055											
	10	15		471				DRC	318	5.6			0921			1295											
	10	30		471				DRC	309	4.9			0983			1382											
	10	45		471				DRC	317	3.5			1051			2013											
	10	56		471		SAT 20		J	312	4.3			1020			1999			el. 66.7	offset	.091		freq. -.039				
	11	00		471				DRC	314	3.6			1127			2130											
	11	15		471				DRC	318	3.8			1207			2360											
	11	30		471				DRC	319	5.7			1315			2432											
	11	45		471				DRC	317	5.3			1408			2581											
	12	00		471				DRC	319	5.1			1501			2735											
	12	15		471				DRC	319	4.8			1595			2879											
	12	30		471				DRC	318	5.1			1686			3043											
	12	50		471		SAT 20		S	318	4.8			1731			2937			el. 17.0	freq. 1.210	offset	.094					
	12	39		471		EOL 471		DRC	321	4.2			1740			3131			line ended	2.4 mi short	due to	other	jobs	ahead			
	12	42		TR		SOL TR		DRC	291	5.4			1745			3171											
	12	56		TR				DRC	295	5.3			1722			3212											
	13	00		TR				DRC	231	5.0			1654			3372											
	13	15		TR				DRC	237	5.0			1570			3543											
	13	30		TR				DRC	233	5.3			1486			3703											
	13	45		TR				DRC	240	5.0			1405			3876											
	14	00		TR				DRC	239	5.8			1324			4057											
	14	15		TR				DRC	243	5.1			1242			4223											
	14	17		TR		EOL TR		DRC	243	5.3			1231			4248											
	14	20		472		SOL 472		DRC	184	6.6			1209			4269											
	14	30		472				DRC	125	5.4			1141			4122											
	14	45		472				DRC	120	4.8			1070			4009											
	15	00		472				DRC	136	4.7			0989			3860											
	15	15		472				DRC	138	5.1			0899			3719											

U.S.G.S. NAVIGATION LOG

Cruise Locator 38 -79-WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	DEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Comments	LORAN, RAYDIST, etc. Rate	Reading	TD	Corr %	SPD
223	1530			472					DRC	134	4.9	+	56	0810	-	154	3565											
	1545			472					DRC	133	5.1			0726			3418											
	1600			472					DRC	128	5.1			0641			3267											
	1600			472		SAT 19			S	131	4.5			0607			3201			L. 16.0	Freq.	- 087	offset .078					
	1615			472					DRC	131	5.3			0559			3111											
	1630			472					DRC	133	4.8			0480			2978											
	1645			472					DRC	123	4.2			0393			2839											
	1700									121	5.7			0314			2692											
	1715									126	4.1			0244			2522											
	1730									124	5.1			0172			2445											
	1724					SAT 19			S					0199			2499			ELEV. 29.6	OFFSET	.022						
	1745								DRC	120	3.4			0095			2319											
	1800									116	6.6			0026			2187											
	1815									129	3.7	+	55	5954			2069											
	1830									129	3.8			5887			1963											
	1845									130	5.2			5800			1862											
	1900									141	3.5			5727			1631											
	1915									151	4.0			5651			1520											
	1930									142	4.6			5564			1403											
	1937			472		END LINE 472				133	4.3			5596			1460											
	1945			473		START LINE 473				060	4.8			5628			1377											
	1941			TRN		SAT 19 LINE TURN			S					5610			1422			ELEV 36.2	OFFSET	.028						
	2000			473					DRC	077	4.6			5665			1397											
	2015									077	4.8			5718			0958											
	2030									058	5.3			5785			0810											
	2045									052	5.2			5869			0629											
	2050					SAT 20			S					5902			0561			ELEV 34.5	OFFSET	.024						
	2100								DRC	052	5.0			5954			0456											
	2115									052	4.9	+	56	0036			0288											
	2130									044	4.7			0116			0119											
	2145									048	4.8			0197	-	153	5955											
	2200									054	4.8			0277	-	153	5776											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79- WG (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON / BOWMA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TR	Time to G.	Diff
223	22	15		473					DRC	055	4.7	+	56	03.52	-	153	56.31											
	22	30							→	054	5.6			04.31			54.77											
	22	45								055	4.6			05.07			53.19											
	22	56				SAT 20			S					04.67			54.15			ELEV.	65.4		OFFSET	.016				
	23	00							DRC	049	4.6			05.78			51.57											
	23	15							→	054	4.9			06.57			49.98											
	23	30								058	5.1			07.92			48.21											
	23	45								052	5.1			08.80			46.50											
224	00	00								062	5.4			09.16			44.71											
	00	15								056	5.6			10.05			42.93											
	00	30								057	5.7			10.57			40.58											
	00	42				SAT 20			S					10.98			41.81			ELEV.	26		OFFSET	.012				
	00	45							DRC	054	5.9			11.98			38.86											
	01	00							DRC	057	5.7			12.[illegible]			36.[illegible]											
	01	15							[illegible]	054	5.5			13.35			35.00											
	01	30								055	5.9			14.73			33.05											
	01	45								052	6.1			15.71			30.96											
	02	00								054	5.4			16.64			28.73											
	02	15							FIX	050	5.6			17.[illegible]			26.[illegible]											
	02	41				SAT 19			S					18.91			26.97			ELEV.	25.8		OFFSET	.024	FIX	.703		
	02	50							FIX	049	5.5			18.47			25.11											
	02	45							DRC	049	5.6			19.37			23.29											
	02	45				SAT 19			S					18.96			22.59			EL = 23.0			OFFSET	0.027				
	03	00							DRC	058	5.4			20.27			21.45											
	03	15							DRC	048	5.5			21.13			19.51											
	03	30							DRC	052	5.5			22.03			17.57											
	03	45			473	FOV 473			[illegible]	[illegible]	5.6			22.72			15.67											
	04	00			TRM	FOV TRANSIT			DRC	[illegible]	4.7			23.60			14.29											
	04	15							DRC	036	4.9			24.32			11.78											
	04	16				SAT 19			S	[illegible]	[illegible]			24.61			11.25			EL = 19.0			OFFSET:	.056	FIX	1.230		
	04	30							DRC	025	4.0			25.16			09.16											
	04	45							DRC	037	4.5			25.94			07.[illegible]											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 -79-WG (ID. / YR AREA)

Ship RV Sea Sounder Chief Scientist Hampton / Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Bearing	Drift	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TR	Time ½	GPP
224	0500			TRN					DRC	037	9.4	+	56	30.78	-	153	04.12											
	0515									036	9.6			32.61			01.24											
	0530									026	11.6			34.51	-	152	58.67											
	0533					SAT 19			S	[illegible]	[illegible]			24.89			58.10			EL = 40.5		OFFSET = .047		Freq - .332				
	0545								DRC	033	10.4			26.[illegible]			40.[illegible]											
	0600			TRN					DRC	046	5.[illegible]			37.[illegible]			23.[illegible]											
	0610			434		SOL 434	SOL TR		DRC	032	2.[illegible]			18.16			22.73											
	0615								DRC	035	5.[illegible]			28.27			34.46											
	0630									281	5.[illegible]			36.23			56.14											
	0645									267	4.0			26.[illegible]			28.62											
	0700									020	4.8			27.23	-	153	00.54											
	0715									280	4.6			37.[illegible]			22.16											
	0720					SAT 19			S					29.11			23.47			EL = 61.8		OFFSET = .234		Freq = -.214				
	0730								DRC	025	4.6			31.[illegible]			04.57											
	0745								DRC	027	4.6			39.21			06.63											
	0800								S	[illegible]	[illegible]			40.08			07.21											
	0801					SAT 13			S					37.75			07.57			EL 31.9		OFFSET .036		manual update				
	0815								DRC	022	4.6			40.21			10.24											
	0830								DRC	020	4.7			40.36			10.39											
	0832			434		SOL 434			DRC	020	4.7			40.56			12.67											
	0845			TRN					DRC	026	5.[illegible]			40.25			14.56											
	0900			TR					DRC	107	1.8			40.59			14.51											
	0911				439	ON STATION A39			DRC	113	5.3			40.51			12.21											
	0919				439	ON BOTTOM G-1			DRC	114	2.0			40.56			12.59			G-1, full recovery								
	0939				439	ON BOTTOM G-2			DRC	144	0.1			40.51			12.30			G-2, full recovery, 217 cm recovery								
	0959				439	LV STATION			DRC	112	8.0			40.46			12.04											
	1015			TR					DRC	113	8.8			39.64			08.23											
	1029				440	ON STATION A40			DRC	132	1.0			39.17			06.40											
	1030				440				DRC	118	0.5			39.16			06.37											
	1031				440	ON BOTTOM G-1			DRC	122	0.0			39.15			06.36			G-1 243 cm recovery, unsat for geo								
	1045				440				DRC	120	0.0			39.15			06.36											
	1052				440	LV STATION A40			DRC	068	0.8			38.20			06.44											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79 -WG (ID. / YR / AREA)

Ship R/V [illegible] Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT				LORAN, RAYDIST, etc. Rate	Reading		Time %	GPP
204	11	00		TR					DRC	091	8.9	+56		3943	-1	53	0503											
	11	04			441	ON STATION 441			DRC	140	0.6			3949			0962											
	11	07			441	ON BOTTOM G-1			DRC	119	0.4			3950			0462			G-1, ≈210 cm recovery, used fa gps								
	11	14			441	SAT 20			S	128	0.3			3956			0511			el. 35.8 offset .253 freq. .205								
	11	15			441				DRC	129	0.3			3952			0467											
	11	30			441				DRC	081	1.2			3969			0543											
	11	45			441				DRC	128	0.8			3976			0525											
	11	45			441	LV STATION 441			DRC	125	0.9			3976			0576											
	12	00		TR					DRC	111	7.6			3924			0243											
	12	03			442	ON STATION 442			DRC	122	1.0			3916			0218											
	12	15			442				DRC	117	0.2			3913			0206											
	12	18			442	ON BOTTOM 442 V2			DRC	112	0.4			3915			0211	V4,										
	12	30			442				DRC	119	0.2			3918			0216											
	12	45			442				DRC	032	1.1			3925			0291											
	13	00			442				DRC	033	0.8			3933			0271											
	13	15			442				DRC	123	1.2			3936			0275											
	13	12			442	SAT 14			DRC	116	0.3			3922			0256			el. 15.0 freq. 5458 offset .253								
	13	30			442				DRC	074	0.1			3905			0194											
	13	42			442	LV STATION 442			DRC	021	0.7			3903			0217											
	13	45		TR					DRC	109	7.5			3910			0193											
	14	00		TR					DRC	106	3.9			3883	-1	52	5977											
	14	15		TR					DRL	166	3.1			3849			5752											
	14	21			443	ON STATION 443			DRC	108	2.0			3861			5774											
	14	30			443				DRC	108	0.7			3857			576[illegible]											
	14	32			443	ON BOTTOM V-2			DRC	097	0.7			3856			57[illegible]											
	14	45			443				DRC	157	0.7			3858			57[illegible]											
	15	00			443				DRC	087	1.0			3871			5795											
	15	01			443	SAT 14			S	097	1.1			3891			5905			el. 54.0 offset .639 freq. .898								
	15	15			443				DRC	105	0.6			3892			5894											
	15	25			443	LV STATION 443			DRC	119	1.2			3895			5932											
	15	30		TR					DRC	214	8.7			3863			5954											
	15	45		TR					DRC	211	8.3			3815	-1	53	0115											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WG (ID. / YR / AREA)

Ship R/V Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	New Course	New Speed	LATITUDE DEG	MINUTES	LONGITUDE DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or T.D.	Time to Zero	EPP
259	1600			TR					DRC	211	7.3	56	3566	-153	0278											
	1615			TR					DRC	211	7.1		3414		0942											
	1630			TR					DRC	210	7.3		3258		0607											
	1639			TR		SAT 119			DRC	210	7.3		3227		0708			el. 18.5	offset	.367	freq. - 512				
	1645			TR					DRC	207	8.0		3103		0801											
	1700			TR					DRC	203	8.0		0152		0967											
	1715								DRC	207	9.2		2749		1113											
	1730									207	10.4		2527		1333											
	1745									195	10.1		2302		1563											
	1747			TR		END TRANSIT				145	2.3		2272		1575											
	1800				444	ON STA 444				113	.2		2292		1582											
	1802				444	ON BOTTOM				113	1.1		2291		1575											
	1814				444	LEAVE STA 444				127	0.5		2281		1582											
	1816			TR		START TRANSIT				181	7.2		2269		1539											
	1822					SAT 119			S				2203		1589			ELEV	68.0	offset	.180					
	1830								DRC	188	9.4		2075		1618											
	1845								DRC	187	8.7		1867		1732											
	1852					SAT 113			S				1769		1764			ELEV	61.0	offset	.028					
	1900								DRC	191	8.7		1650		1883											
	1915									183	7.9		1446		1979											
	1930									176	7.2		1247		1801											
	1941			TR		END TRANSIT				132	5.4		1132		1757											
	1945				445	STATION 445				141	0.8		1013		1731											
	2000				445					118	0.6		1010		1715											
	2008				445	ON BOTTOM				125	0.1		1017		1718											
	2015				445					127	0.3		1116		1726											
	2028				445	SAT 119			S				1118		1725			ELEV	32.5	offset	.017					
	2030				445				DRC	132	0.3		1111		1710											
	2034				445	END STA 445				134	0.3		1109		1707											
	2038			TR		START TRANSIT				254	9.4		1084		1753											
	2058					SAT 113			S				1125		1735			ELEV	16.7	offset	.401					
	2100								DRC	251	9.2		1099		1736											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - W6 (ID. / YR / AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON/BOWN Affiliation USGS

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude Y	Deg	Minutes	Longitude Y	Deg	Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Dist	Source	Loran, Raydist, etc. Pair	Reading	TD or TA	Time +/- Min	Eff
224	21	15		TR					DRC	254	9.1	+	56	0992	-	155	2728											
	21	30							DRC	252	8.9			0930			3159											
	21	28				SAT 20								0903			3095			ELEV. 59.4		OFFSET	.324					
	21	45							DRC	254	9.5			0841			3522											
	22	00								255	8.8			0789			3715											
	22	15								250	9.4			0733			4306											
	22	30								250	8.8			0680			4703											
	22	45								254	7.4			0629			5087											
	22	48		TR		END TRANSIT				135	1.9			0592			5150											
	22	49			446	ON STATION 446				107	2.0			0572			5149											
	22	57			446	ON BOTTOM				105	0.0			0588			5149			V-1								
	23	00			446					112	0.8			0587			5148											
	23	15			446					132	1.3			0577			5170											
	23	23			446	END STA 446				186	1.5			0603			5203											
	23	14			446	SAT 20			S					0607			5213			ELEV. 38.6		OFFSET	.284					
	23	30		TR		START TRANSIT				024	7.1			0624			5213											
	23	45								007	8.6			0577			5277											
225	00	00								001	10.3			1012			5208											
	00	15								000	9.3			1327			5190											
	00	30								005	8.8			1573			5172											
	00	45								007	10.0			1796			5159											
	01	00		TR						016	09.0			2062			5117											
	01	06			447	ON STATION 447								2071			5096											
	01	12			447	ON BOTTOM 54								2068			5084											
	01	28			447	OFF STATION				069	05.4			2076			5065											
	02	00		TR						276	7.0			2054			5181											
	02	15								276	9.1			2044			5311											
	02	30								275	9.2			2170	+	154	0051											
	02	46								280	9.4			2175			0120											
	03	00								011	9.3			2230			0228											
	03	15								046	1.0			2245			0249											
	03	30								293	5.9			2120			1529											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79- 06 (ID. / YR / AREA)

Ship SEA SOUNDER Chief Scientist Hampton / Bouma Affiliation U. S. G. S

Page 57 of ___

Julian Day	GMT TIME HR	MIN	DEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Comments	LORAN, RAYDIST, etc. Rate	Reading	TD Y/X	TIME Y/X	Eff
224	0344				448	ON STATION			DRC	279		1	56	23.24	-	154	18.34											
	0346				448	ON BOTTOM 51			DRC					23.19			18.30											
	0352				448	OFF STATION			DRC	178	[illegible]			23.12			18.17											
	0400			TR					DRC	175	7.6			23.00			18.23											
	0430								DRC	181	7.2			17.97			18.57											
	0500								DRC	176	7.4			16.60			20.55											
	0445					SLOT 19			S					16.07			20.21			EL = 22.8			OFFSET = .941					
	0514			W		SLOT 13			S					18.1			19.76			EL = 37.4			OFFSET = .085					
	0530			TR					DRC	161	6.8			09.65			19.31											
	0556				449	ON STATION			DRC					08.28			17.11											
	0558				449	ON BOTTOM			DRC					08.13			17.33											
	0613				449	OFF STATION			DRC	175				08.13			16.31											
	0630			TTW					DRC	176	10.4			05.30			15.68											
	0701					SLOT 13			S					04.58			17.54			EL = 58.7°			OFFSET = -2.654					
	0705								DRC	165	11.7			03.48			17.64											
	0730								DRC	147	7.5			56.4			15.91											
	0800									011	1.5			50.2			18.20											
	0815									300	11.5			50.2			14.94											
	0816					SLOT 19			S					54.9			16.91			El 31.4			GSZ: 437	PTR = -6.093		manual update		
	0820								DRC	162	1.6			49.46			13.09			manual speed								
	0845									330	5.7			43.4			14.51											
	0900				450	ON STATION				063	[illegible]			59.3			14.59											
	0901				450	ON BOTTOM 61				073	0.1			58.06			14.13											
	0915				450					100	.1			58.13			14.15			Older Loran fix about 4 miles west of system fix								
	0922				450	LV STATION 450			DRC	120	0.6			56.28			14.23											
	0930			TR					DRC	270	16.4			56.33			15.12											
	0945			TR					DRC	269	9.4			56.34			19.54											
	1000			TR					DRC	270	10.4			56.63			24.21											
	1015			TR					DRC	271	10.0			56.86			28.80											
	1030			TR					DRC	265	9.8			56.96			33.29											
	1045			TR					DRC	266	10.0			56.80			37.72											
	1100			TR					DRC	281	3.4			56.72			41.84											

U.S.G.S. NAVIGATION LOG

Cruise Locator 18 - 79 - WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Hampton/Bauna Affiliation USGS

Form 2/75

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Bearing	Range	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TA	Time %	OFF
225	1102				451	ON STATION 451			DRC	191	0.0	1	65	5073	-1	54	4193											
	1111				451	ON BOTTOM S-1			DRC	142	0.7			5681			4198											
	1115				451				DRC	174	0.7			5685			4191											
	1130				451				DRC	258	0.8			5701			4211			waiting for SAT 20 for position								
	1145				451				DRC	238	0.9			5719			4234											
	1152				451	SAT 20			S	263	0.9			5814			4572			ll. 22.2	offset 2.132	freq -.097						
	1120				451	BRIDGE FIX LC			LC					585			458			Loran fix, 451, S-1 probably taken closer to this pt, time approx.								
	1200				451				DRC	267	0.9			5857			4253											
	1205				451	LV STATION 451			DRC	276	0.1			5832			4606											
	1215			TR					DRC	277	10.0			5843			4852											
	1150				451	BRIDGE FIX LC			LC					574			4611			Loran C fix								
	1230			TR					DRC	279	10.0			5855			5300											
	1245			TR					DRC	282	9.9			5879			5336											
	1300			TR					DRC	280	9.9			5951	-1	55	0169											
	1315			TR					DRC	269	9.1	+5	6	0007			0612											
	1329				452	ON STATION 452			DRC	110	0.7	+5	5	5898			0714											
	1327				452	ON BOTTOM S-1			DRC	119	0.7			5997			0708			S-1								
	1330				452				DRC	105	0.5	+5	6	0000			0708											
	1345				452				DRC	156	0.9			0054			0706											
	1357				452	LV STATION 452			DRC	176	1.0			0090			0705											
	1400			TR					DRC	353	9.2			0171			0722											
	1415			TR					DRC	354	9.8			0931			0769											
	1430			TR					DRC	359	9.8			0613			0794											
	1445			TR					DRC	349	9.7			0927			0809											
	1500			TR					DRC	348	8.8			1195			0891											
	1515			TR					DRC	336	9.0			1396			0918											
	1525				453	ON STATION 453			DRC	312	1.0			1414			0971											
	1527				453	ON BOTTOM S-1			DRC	311	1.0			1917			0977			S-1, very little recovery								
	1530				453				DRC	282	1.0			1918			0982											
	1536				453	ON BOTTOM S-2			DRC	232	1.3			1811			0984			S-2								
	1545				453	SAT 112			S	204	2.6			1396			0895			ll. 43.3	offset .386	freq .605	NOW					
	1553				453	LV STATION 453			DRC	115	2.4			1363			0851											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 (ID.) - 79 (YR) - UG (AREA)

Ship San Leandro Chief Scientist Hampton/Bourne Affiliation USGS

Next STA 459 LINE 475

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude Y	Deg	Minutes	Longitude Y	Deg	Minutes	Wind Dir.	Spd	Visual, Radar, etc. Object	Angle	Dist	Distance	Loran, Raydist, etc. Rate	Reading	TD or TR	Time % Min	Off
00	16	00		TR					DRC	092	9.9	+	56	1337	-	155	0690											
	16	15		TR					DRC	092	9.7			1271			0241											
	16	15		TR		SAT 13			S	093	9.7			1276			0223			12. 19.4	offset	081	freq. .175					
	16	30		TR					DRC	092	9.9			1212	-	154	6790											
	16	45		TR					DRC	087	9.6			1178			5378											
	17	00								085	9.4			1157			4950											
	17	15								087	8.9			1158			4548											
	17	25		TR		END TRANSIT				078	2.8			1205			4348											
	17	30			454	ON STATION				070	0.5			1207			4280											
	17	29			—	START 12			S					1198			4256			ELEV 44.3	offset	.115						
	17	32			458	ON BOTTOM			DRC	078	0.5			1208			4277			V-2								
	17	45			454					095	0.2			1200			4282											
	19	00			954					090	0.2			1205			4272											
	18	28			954					089	0.3			1213			4251											
	18	45			454					102	0.3			1211			4244											
	18	55			458	END STATION W54				086	0.5			1214			4244											
	19	00		TR		START TRANSIT				155	1.8			1215			4247											
	19	15								174	8.5			1020			4270											
	19	37				SAT NAV OFF				175	8.2			0717			4245			SAT-NAV OFF FOR MEMORY PATCH!!								
	19	46				SAT NAV ON				—	—			—			—			SAT-NAV ON - WAIT FOR SAT PASS IN PROGRESS								
	19	49				SAT 13			S					0557			4282			ELEV 30.5	offset	.205						
	20	15							DRS	175	8.7			0227			4202											
	20	30							DRC	181	8.1			0023			4200											
	20	22				SAT 20			S					0907			4195			ELEV 25.8	offset	.240						
	20	45							DRC	170	5.0	+	55	5841			4208											
	21	00								169	4.0			5214			4191											
	21	03		TR		END TRANSIT				172	4.7			5688			4187											
	21	10		475		START LINE 475				223	5.0			5688			4246											
	21	05		—		SAT 19			S					5676			4173			ELEV 16.4	offset	.125						
	21	15		475					DRC	231	5.4			5727			4287											
	21	30		—					—	317	5.5			5830			4436											
	21	45								317	5.3			5934			4593											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79- WG (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist Hampton/Bruce Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TR	Time ½	Spd
225	22	00		475					DRC	325	5.1	1	56	0029	-	154	4735											
	22	15								317	5.0			0125			4879											
	22	30								318	5.1			0224			5068											
	22	45								324	5.3			0320			5213											
	23	00								323	5.4			0420			5378											
	23	15								327	5.0			0527			5544											
	23	30								319	5.9			0626			5707											
	23	45								315	6.0			0749			5878											
226	00	00								317	6.8			0830	-	155	0101											
226	23	52				SAT 20			S					0822			0008			EGGU	24.3	OFFSET	.466					
226	00	15							DRC	332	6.8			1021			0366											
	00	30								302	5.4			1138			0520											
	00	45								[illegible]	5.3			[illegible]			[illegible]											
	01	00								[illegible]	6.0			[illegible]			[illegible]											
	01	10		476		EGL 475				301	4.9			1330			0926											
	01	15		476		SOL 476				351	2.3			1407			0786											
	01	30								[illegible]	3.6			[illegible]			1106											
	01	45								[illegible]	4.7			1293			1232											
	02	00								[illegible]	4.8			1221			1298											
	02	15							DRC	314	4.8			1144			1561											
	02	30				SAT 14			S					1156			1381			EG = 27.1	OFFSET =	.208	FIXES	-.136				
	02	30							DRC	301	3.7			1201			1116											
	02	49							DRC	226	4.8			1019			1820											
	02	41				SAT 12			S					1020			1811			EG = 21.7	OFFSET =	0.047						
	03	00		476					DRC	232	4.9			0920			2021											
	03	06		476		EGL 476			DRC	232	4.9			0894			2075											
	03	11		477		SOL 477			DRC	337	3.8			0865			2066											
	03	15		477						140	5.6			0741			2057											
	03	30								142	4.7			0741			1884											
	03	45								160	4.7			0697			1726			LORAN FIXES GIVE SPEED AVG: 4.6								
	04	00								149	5.1			0552			1565											
226	04	15		477					DRC	146	5.0			0450			1421											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - WG (ID. / YR / AREA)

Ship Sea Sounder Chief Scientist Hampton/Bouma Affiliation USGS

Page 61 of ____

Julian Day	GMT TIME HR	MIN	DEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Div. Code	Fix Type	Raw Course	Raw Speed	LATITUDE	DEG	MINUTES	LONGITUDE	DEG	MINUTES	WIND Dir.	Spd	VISUAL, RADAR, ETC. Object	Angle	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or TD	Time to Go	EPP
226	0430			477					DRC	135	5.5	+	56	0455	-	156	1275											
	0426					SAT 13			S					5238			1314			EL = 20.8		OFFSET = .037		Freq = .635				
	0445								DRC	147	5.3			0455			1105											
	0500								DRC	143	5.2			0158			0733											
	0515								DRC	16	4.9			0158			0712											
	0530								DRC	146	5.0		55	5151			0649											
	0542					SAT 17			S					5878			0513			EL = 93.7°		Offset 0.050						
	0545								DRC	124	5.2			5564			0505											
	0600								DRC	190	5.1			5964			0323											
	0615								DRC	126	5.1			5677			0126											
	0630								DRC	139	4.8			5585			0040											
	0645								DRC	140	5.2			5470	-	154	5888											
	0700								DRC	131	5.1			5277			5737											
	0715								DRC	145	5.1			5077			5515											
	0730								DRC	127	4.9			5026			5447											
	0728					SAT 19			S					5197			5491			EL = 54.9		OFFSET = .184		Freq = .361				
	[illegible]																											
	0742			477		SOL 477			DRC	137	4.5			5126			5314											
	0745								DRC	089	4.6			6116			5207											
	0747			478		SOL 478			DRC	050	4.3			5120			5251											
	0800			479					DRC	028	4.6			5198			5149											
	0815								DRC	041	4.9			5271			5006											
	0830								DRC	045	4.6			5350			4837											
	0845								DRC	047	4.8			5428			4679											
	0900								DRC	053	4.9			5510			4517											
	0900					SAT 20			S	053	5.0			5609			4514			EL. 37.7		freq 117		offset .082				
	0915								DRC	049	4.9			5586			4349											
	0917					SAT 19			S	046	4.9			5604			4323			EL. 15.3		freq. - .097		offset .033				
	0930								DRC	041	5.0			5676			4181											
	0945								DRC	047	4.8			5756			4015											
	1000								DRC	053	5.0			5834			3855											
	1015								DRC	045	5.4			5918			3685											

U.S.G.S. NAVIGATION LOG

Cruise Locator 18 - 79 - 10 (ID. / YR / AREA)

Ship [illegible] Chief Scientist Nampton/Bouma Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. DEVIATION	Angles	Dist	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD	Time	Diff
226	10	00		478					DRC	049	5.2	+56		00.06	-154		36.06											
	10	45		478					DRC	053	5.0			00.93			33.38											
	10	46		478		SAT 20			S	054	5.0			00.98			33.40			el. 50.4	freq.	.330	offset	.051				
	11	00		478					DRC	050	5.1			01.75			31.74											
	11	15		478					DRC	058	5.6			02.58			30.00											
	11	30		478					DRC	050	5.6			03.46			29.15											
	11	45		478					DRC	056	5.8			04.40			26.23											
	12	00		478					DRC	058	5.8			05.34			24.31											
	12	15		478					DRC	063	5.8			06.30			22.36											
	12	30		478					DRC	060	5.7			07.20			20.46											
	12	45		478					DRC	053	5.7			08.12			18.51											
	13	00		478					DRC	054	5.9			09.10			16.57											
	13	15		478					DRC	052	5.5			09.97			14.68											
	13	30		478					DRC	048	5.5			10.89			12.94											
	13	45		478					DRC	047	5.4			11.77			11.01											
	14	00		478					DRC	048	5.3			12.64			09.05											
	14	15		478					DRC	047	5.1			13.45			07.44											
	14	30		478					DRC	043	5.2			14.33			05.31											
	14	45		478					DRC	053	5.2			15.20			03.98											
	14	46		478		SAT 12			S	054	5.1			15.35			03.52			el. 26.5	freq.	.468	offset	.042				
	15	00		478					DRC	049	5.1			15.99			02.16											
	15	15		478					DRC	050	5.1			16.80			00.97											
	15	04		478		SAT 14			S	050	5.0			16.37			01.63			el. 57.9	freq.	-.097	offset	.027				
	15	30		478					DRC	051	5.0			17.68	-153		58.73											
	15	45		478					DRC	050	5.2			18.54			56.95											
	16	00		478					DRC	053	5.1			19.39			55.22											
	16	15		476					DRC	053	5.2			20.35			53.46											
	16	30		478					DRC	054	5.1			21.07			51.69											
	16	45		478					DRC	054	5.2			21.89			49.90											
	17	00		478					DRC	051	5.1			22.73			48.14											
	16	50		478		SAT 14			S					22.22			47.13											
	17	15		478					DRC	052	5.2	N		23.56	V		46.39											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 -79- WG (ID. / YR AREA)

Ship Sea Sander Chief Scientist Hampton/Barnes Affiliation U.S.G.S.

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE Y	DEG	MINUTES	LONGITUDE Y	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. DIRECT	Angle	Dist.	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD or T.D.	Time ½ Lin	OFF
226	1	7	14	478		START 13			S			N	56	23.51	-	155	46.55	ELEV		44	OFFSET		.017					
	1	7	30						DRC	056	5.7			24.42			44.69											
	1	7	45							035	5.2			25.24			42.95											
	1	8	00							037	7.3			26.11			41.05											
	1	8	15							056	6.0			27.15			39.12											
	1	8	30						W	053	5.5			27.91			37.19											
	1	8	21			START 12			S					27.34			20.35	ELEV		21.3	OFFSET		.017					
	1	8	45						DRC	050	5.1			28.68			35.97											
	1	9	00						DRC	048	5.3			29.58			33.72											
	1	9	00			START 13			S					29.67			33.96	ELEV		50.4								
	1	9	15						DRC	048	5.2			30.92			32.04											
	1	9	30							053	5.3			31.25			30.18											
	1	9	45		478	END LINE 478				053	5.4			32.08			29.32											
	1	9	55		479	START LINE 479				140	9.9			32.12			26.89											
	2	0	00							137	5.2			31.78			26.43											
	2	0	15							158	5.8			30.59			25.12											
	2	0	30							152	5.5			29.93			23.96											
	2	0	17			START 19			S					30.47			22.11	ELEV		26.7	OFFSET		.069					
	2	0	45						DRC	139	6.3			28.35			21.96											
	2	1	00						DRC	137	6.2			27.13			20.19											
	2	1	00			START 20			S					27.13			20.12	ELEV		46.0	OFFSET		.031					
	2	1	15							145	6.1			25.96			18.40											
	2	1	30							143	5.9			24.85			16.66											
	2	1	45							142	5.7			23.78			14.96											
	2	2	00							142	5.7			22.69			13.33											
	2	2	15							142	5.7			21.64			11.74											
	2	2	30							140	5.3			20.60			10.08											
	2	2	45							131	7.0			19.43			08.35											
	2	3	00							135	5.6			18.55			06.63											
	2	3	15							130	5.4			17.46			05.27											
	2	3	30							139	5.5			16.42			03.63											
	2	3	45						F	144	9.5			15.98			02.13											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 79 - 06 (ID. YR AREA)

Ship Sea Sounder Chief Scientist HAMPTON/BOUMA Affiliation USGS

Julian Day	GMT TIME HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LATITUDE ½	DEG	MINUTES	LONGITUDE ½	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angles	Dist	Distance	LORAN, RAYDIST, etc. Rate	Readings	TS	Time ½	GPP
222	00	00	0	479					DRC	136	5.4	+	56	19.46	-	153	00.62											
	00	15		—						137	9.9			13.97	-	152	59.13											
	00	30		6						127	6.6			12.36			57.45											
	00	45		479		END LINE 479				138	4.9			11.91			55.57											
	01	00		SR						127	2.8			10.86			55.08											
	01	15		SR						314	9.5			10.67			56.32											
	01	25			455	ON STATION				161	0.8			12.48			57.70											
	01	30			455					166	1.0			12.41			57.69											
	01	45			455					082	1.0			12.40			58.27											
	01	48			455	ON BOTTOM				080	1.2			12.44			58.36											
	02	00			455					125	0.7			12.53			58.49											
	02	15			455	END STATION				166	1.9			12.46			59.40											
227	18	00				ARR KODIAK																						
						FINIS																						

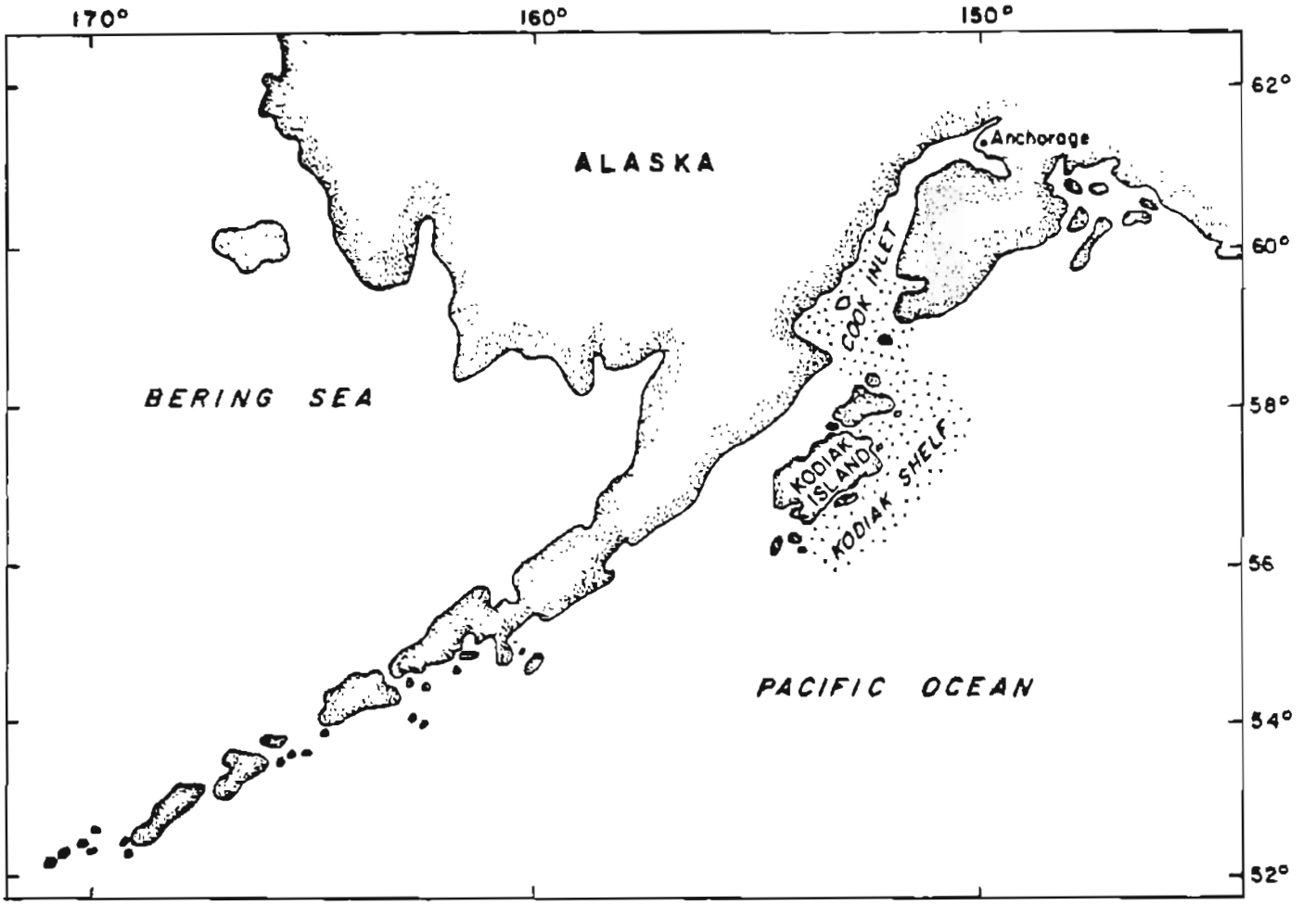

Figure 1.- Generalized location map of the study area

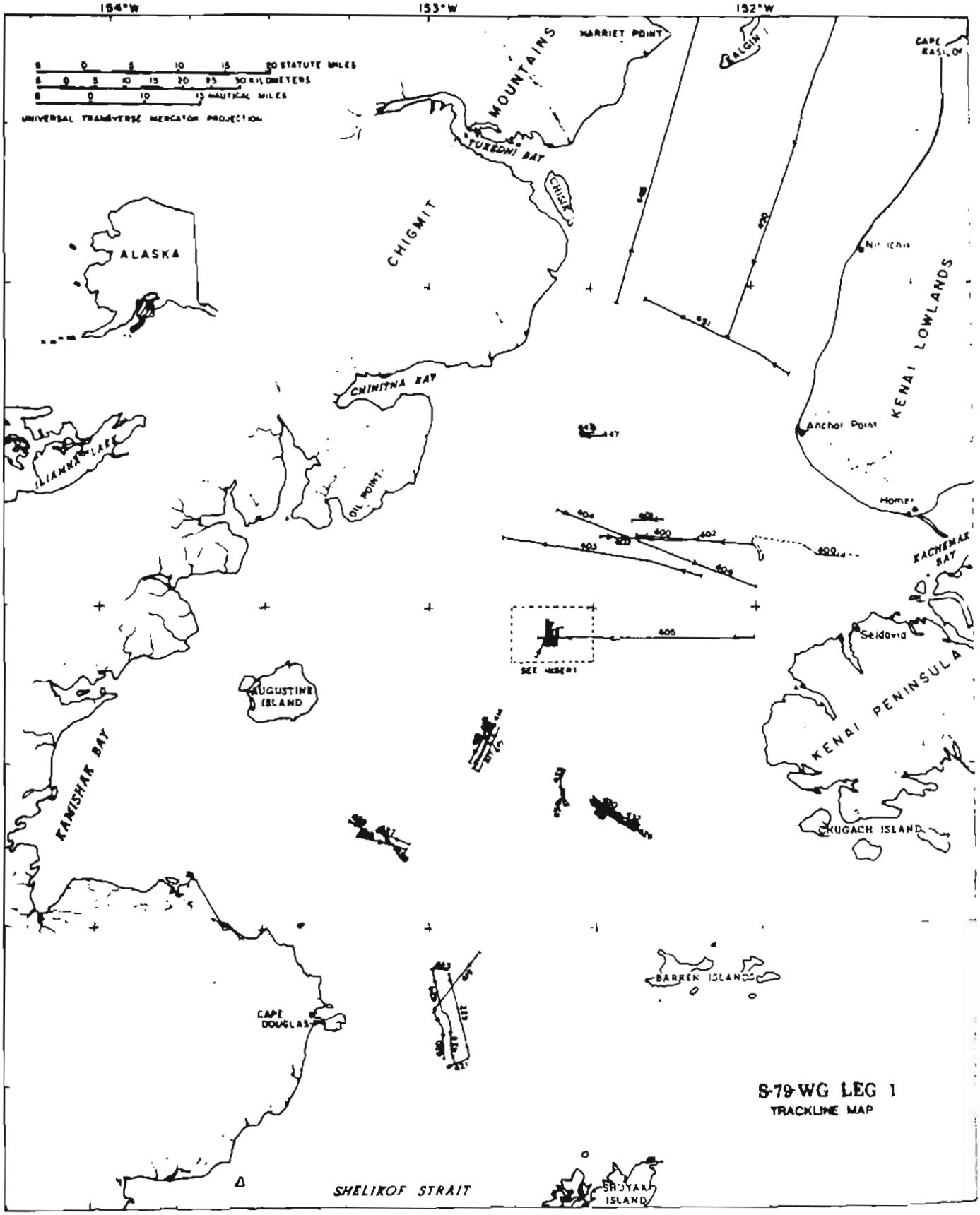

Fig. 2. Tracklines, 88-79-WG, lower Cook Inlet

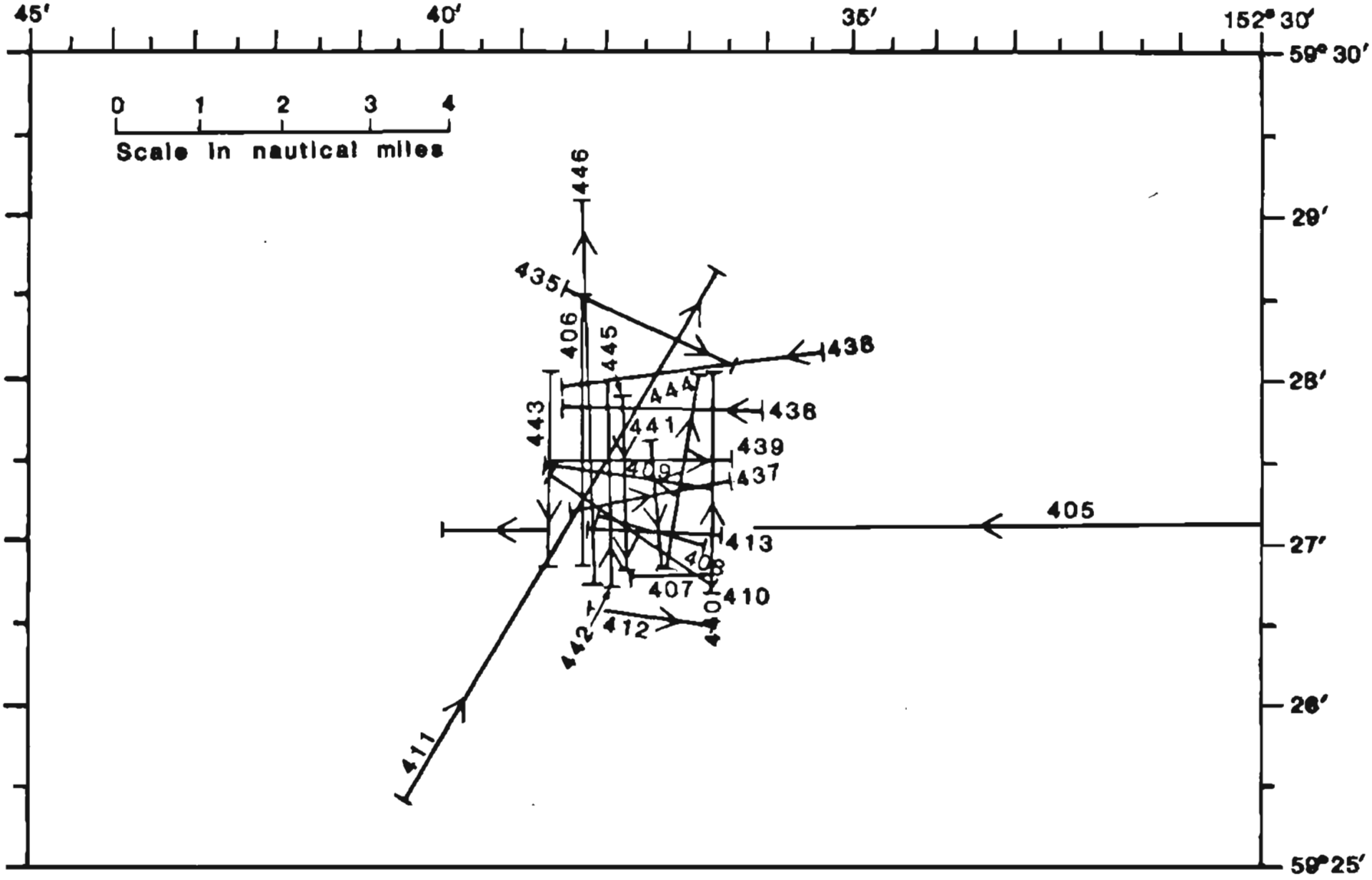
45′
40′
35′
152° 30′
59° 30′
29′
28′
27′
26′
59° 25′
0 1 2 3 4
Scale in nautical miles
446
435
406
445
438
443
441
436
439
409
437
405
413
408
407
410
412
442
411

Fig.2. (Insert)

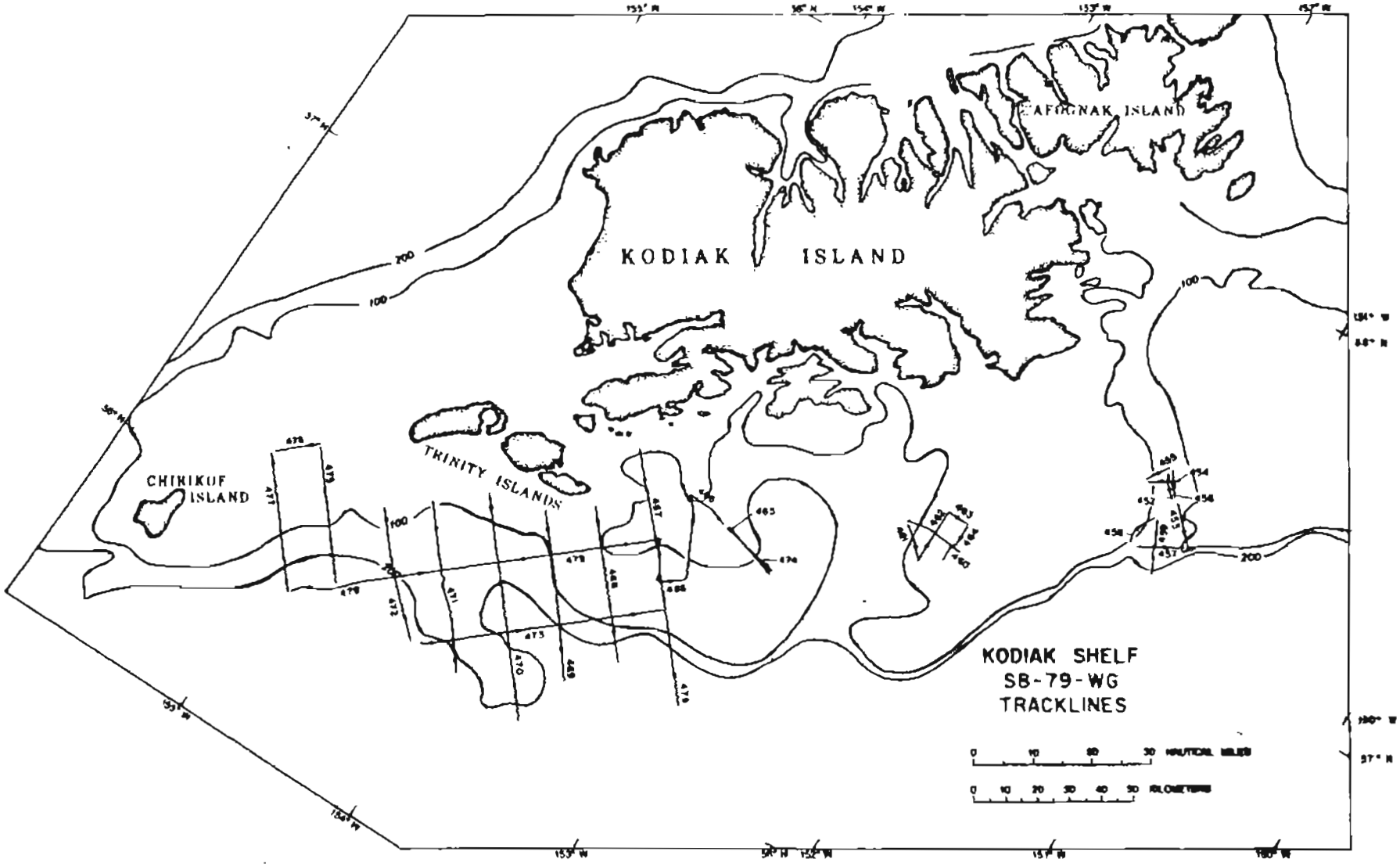

Fig. 3. Tracklines, SB-79-WG, Kodiak Shelf

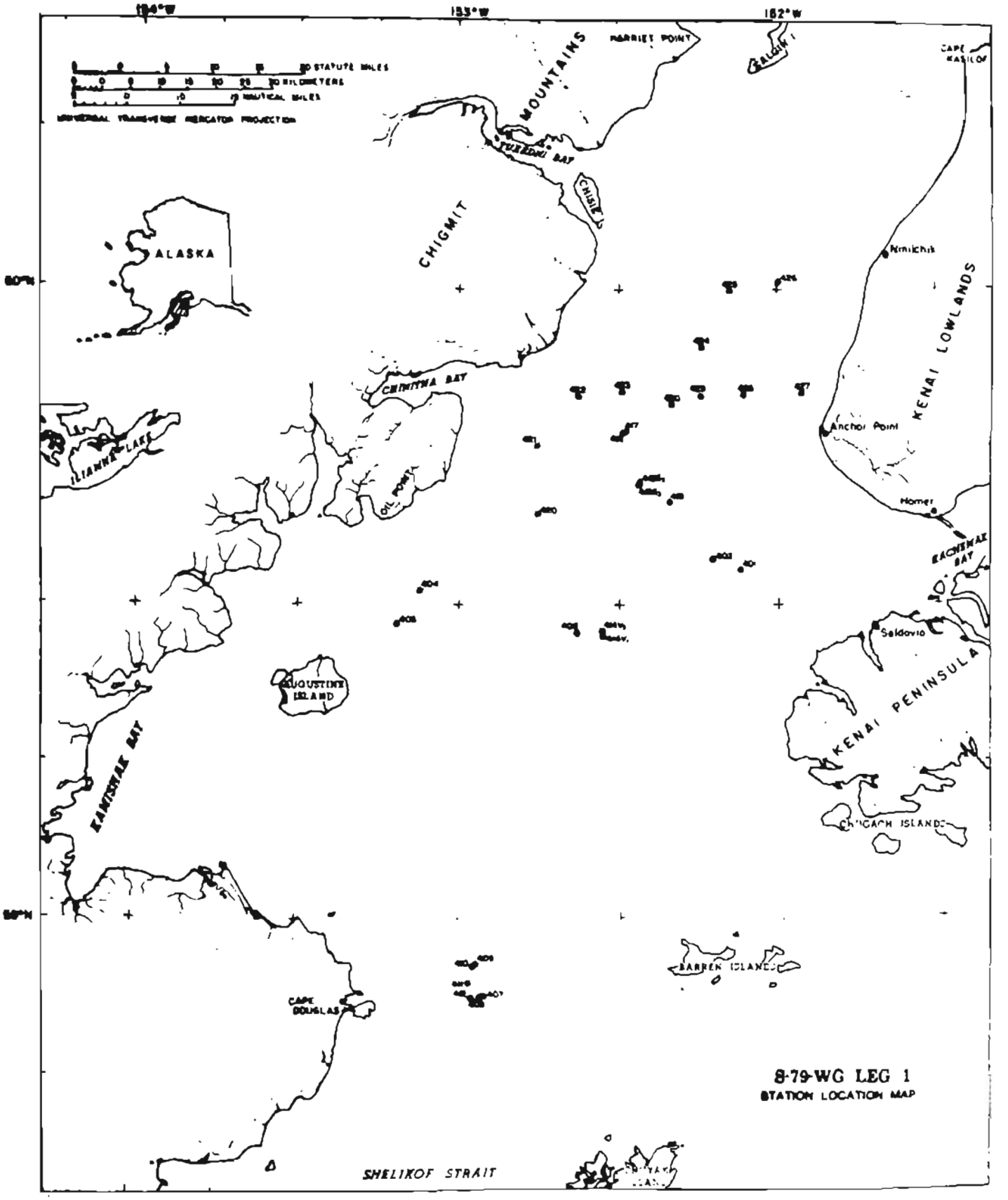

Fig. 4. Station locations, 88-79-WG, lower Cook Inlet

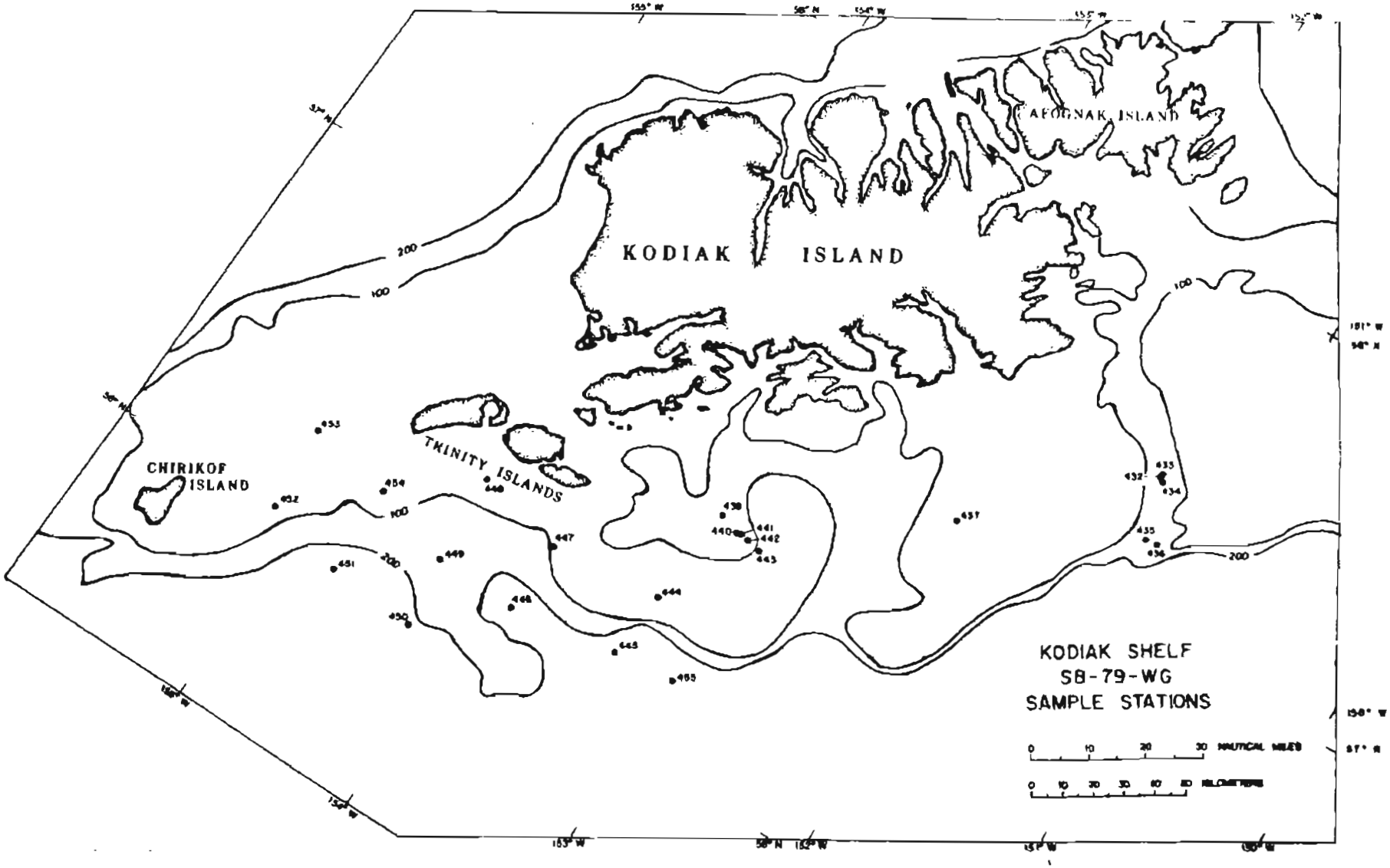

Fig. 5. Station locations, SB-79-WG, Kodiak Shelf