UNITED STATES

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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 S8-78-WG, August 1978.

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INTRODUCTION

The third U.S. Geological Survey geo-environmental cruise in lower Cook Inlet and on the Kodiak shelf and adjacent continental slope, Gulf of Alaska, was conducted aboard the R/V SEA SOUNDER from 2 August to 22 August, 1978 (Fig. 1, 2, and 3). The objectives of the cruise were to study in detail specific potentially hazardous environmental 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 initiate reconnaissance characterization studies on the continental slope. High-resolution 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 sediments (gravity corer, 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, 1975), and on the 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

Two independent navigational systems were used by the scientific party. One unit consisted of a Magnavox integrated satellite–Loran C system, the other was a Motorola Mini-Ranger unit that was used only in lower Cook Inlet. The data from the integrated system were automatically recorded on magnetic tape, as well as typed out on a keyboard printer. The Mini-Ranger data were recorded on paper.

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 the Kodiak shelf and slope. 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 received its return signals from shore-based transponders positioned at desirable 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 very high.

Seismic Profiling and Visual Format Systems

Sparker: Sparker data were recorded on the Kodiak shelf and slope using a Teledyne system at a power of 40 to 80 kilojoules. Seismic signals were received on a Teledyne 100-element, single-channel hydrophone, and the record was printed on a Raytheon model 1900 Precision Recorder. Usually, sweep firing rates were at 4 seconds, although 2 and 3 seconds were also used. Several different settings were used, but filters generally were adjusted to receive signals between 50 and 200 hertz. Records were annotated at 15-minute intervals with shot-point number, time (Greenwich Mean Time, GMT), and water depth.

Uniboom: The Uniboom system used four EG&G model 234 power sources of 200 joules, each driving hull-mounted plates. The hydrophone was an EG&G 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 500 to 1100 hertz. Annotations were made in the same manner as those on the sparker system.

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 records were 1) the typically coarse-grained and hard nature of the unconsolidated surficial sediments, 2) the shallow water depth throughout most of both areas, 3) acoustic vibrations from the vessel, and 4) rough seas.

Coarse-grained and hard sediments most severely effected 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 multiples to appear at small distances below 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 sediments 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 model, normally operated at a 125 m scale and towed above the bottom at 10% of the scale employed. High quality records were generally obtained. Although most side-scan sonar surveys were run at a ship speed of 4 to 4-½ 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 brass-fingered 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: The normal Van Veen grab sampler proved to be too light for adequate sampling of the typically sandy-gravelly bottoms. Generally, successful attempts were obtained with a heavy modified grab sampler constructed by Andy Soutar of Scripps Institution of Oceanography.

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Table 1. Itinerary of R/V SEA SOUNDER cruise S8-78-WG in lower Cook Inlet and on the Kodiak shelf and slope, Alaska.

Port	Arrive	Depart	Remarks
Homer		2 Aug. - 5:03 am (214/1530)	Start leg 1, to lower Cook Inlet.
Homer	10 Aug. - 1:10 pm (222/2310)		End leg 1.
Homer		11 Aug. - 1:07 pm (223/2307)	Start leg 2, to Kodiak shelf and slope.
Kodiak	22 Aug. - 5:00 am (234/1500)		End leg 2.

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

Total underway time: 455 hrs.

Total trackline miles/time: 901.0 nm/187.8 hr.

Stations occupied/total time on station: 62/82.1 hr.

Table 2. Types and amounts of data collected on board the R/V SEA SOUNDER cruise S8-78-WG in lower Cook Inlet and on the Kodiak shelf and slope.

Data type	Trackline	Remarks
Single-channel arcer	319.6 nm (591.9 km)	1 roll recording paper
Uniboom	638.3 nm (1182.1 km)	10 rolls recording paper
Side-scanning sonar	434.6 nm (804.9 km)	16 rolls recording paper
3.5 kHz	411.5 nm (762.1 km)	10 rolls recording paper
12 kHz	1869.2 nm (3461.7 km)	21 rolls recording paper
Navigation	1933.7 nm (3581.3 km)	5 reels mag. tape
Gravity core		35 recoveries
Soutar grab		21 recoveries
TV/camera		7.8 hours, 8 reels mag. tape
Profiling current meter		3 stations

Table 3. Scientific personnel on board the R/V SEA SOUNDER cruise S8-78-WG in lower Cook Inlet and on the Kodiak shelf and upper slope.

Name	Affiliation	Duties	Leg
Arnold Bouma	USGS, PAB	co-chief scientist	1-2
Monty Hampton	USGS, PAB	co-chief scientist	1-2
Glen Barker	USGS, PAB	marine technician	1-2
Ed Clukey	USGS, PAB	soil engineer	2
Rod Combellick	NOAA, Juneau	geologist	1
Rich Garlow	USGS, PAB	navigator	1-2
Louis Garrison	USGS, Corpus Christi	geologist	1
Helen Gibbons	USGS, PAB	navigator	1-2
David Kestley	Sandia Corp., Albuquerque	geologist	2
Robert Orlando	USGS, PAB	navigator	1-2
Robert Patrick	USGS, PAB	electronics technician	1-2
Melvin Rappeport	USGS, PAB	geologist	1-2
George Redden	USGS, PAB	geologist	2
David Rubin	USGS, PAB	geologist	1
Dwight Sangrey	Cornell Univ., Ithaca	soil engineer	2
William Schwab	USGS, PAB	geologist	1-2
Phyllis Swenson	USGS, PAB	geologist, data curator	1-2
Michael Torresan	USGS, PAB	geologist	1-2
Bruce Turner	USGS, Anchorage	geologist	2
John Whitney	USGS, Anchorage	geologist	1

Ship's Officer's

Kenneth Simpson	captain
William Soulle	chief engineer
John Langoir	chief mate

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

Table 4. Information on sampling stations and samples, cruise S8-78-WG in lower Cook Inlet and on the Kodiak shelf and slope.

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
300	59°36.0'N 152°03.9'W to 59°34.7'N 152°02.1;W	36 40	TV/camera grab sample	TV: pebbly bottom with some very thin, discontinuous, rippled sand patches. Sample: sandy with some pebbles. Concentration of shell fragments and sand dollars on the surface.
301	59°35.3'N 152°12.7'W to 59°35.6'N 152°13.0'W	40	TV/camera	Sand wave contact. Adjacent to sand a pavement of primarily shells. Some thin sand patches. We missed the actual sand waves.
302	59°35.8'N 152°18.9'W to 59 36.6'N 152°18.1'W	56	TV/camera grab sample	TV: 1/2 mile stretch. Small sand waves, 5-8 cm high, 3-8 m wave length. Broad troughs with clams, followed by sand patches, followed by straight-crested ripples, followed by small slip face. Sample: sand with shell fragments and few complete shells.
303	59°33.5'N 152°35.6'W to 59°31.8'N 152°36.3'W	77	TV/camera grab sample	TV: medium sized sand waves, 3-5 m high. Superposed are small sand waves: shell lag in trough, bulbou ripples on lower stoss side, sinuous ripples on upper stoss side slip face sometimes with straight ripples parallel to flow. Sample: sand with some shell hash.
304	59°31.6'N 152°29.8'W to 59°31.4'N 152°32.7'W	55	TV/camera	Large bedforms with flat troughs. Features too large to obtain good characterization.
305	59°30.7'N 152°30.2'W	57	Grab sample	Trough of large sand wave. Clean sand with a few shell fragments.
306	59°30.8 152°30.6	57	Grab sample	Same as #305

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
307	59°32.5'N 152°30.0'W	54	Grab sample	No recovery.
308	59°31.4'N 152°28.9'W to 59°32.3'N 152°28.2'W	52	TV/camera	Field of large sandwaves up to 9 m high. Two smaller orders observed, with heights of about 1 m and a few cm.
309	59°30.7'N 152°31.0'W to 59°31.0'N 152°29.8'W		TV/camera	Similar setting and observations as #308. Better than #308.
310	59°30.8'N 152°29.9'W	52	Grab sample	Crest of 5-m high, solitary sand wave. Clean sand with some broken shell material.
311	59°30.8'N 152°30.1'W	55	Grab sample	Trough between large sand waves. Gravelly sand.
312	59°30.4'N 152°30.4'W	55	Grab sample	Same as #311. Shelly sand.
313	59°27.4'N 152°38.6'W to 59°27.4'N 152°38.6'W	57	TV/camera, current meter	Anchor station over large sand wave. Mechanical problems with film transport. (see sta. 314).
314	59°27.0'N 152°37.8'W to 59°26.4'N 152°40.4'W	56 58	TV/camera	Anchor station, same bedform as sta. 313. Five lowerings at different tidal stages. Observations of bottom used to study results of current meter lowerings
315	59°25.7'N 153°19.2'W	42	Gravity core	Clayey silt.
316	59°25.7'N 153°19.2'W	58	Gravity core	Clayey silt with pebbles.

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
317	59°23.1'N 153°18.8'W to 59°23.6'N 153°19.4'W	36	TV/camera	Bottom characterization ENE off Augustine Island. Heavy overgrowth of plants and animals. Few volcanic rocks visible.
318	59°09.8'N 152°38.4'W	137	Grab sample	Base of Cook Ramp. Flat bottom. Pebbly, muddy sand.
319	59°13.6'N 152°38.4'W	79	Grab sample	Large bedforms on Cook Ramp. Sand with shells.
320	59°17.3'N 152°36.4'W to 59°19.0'N 152°42.3'W		TV/camera grab sample	Area of no bedforms, above Cook Ramp. Fine sand. TV: area covered with small ripple Sinuous to straight, some interference pattern. Animal trails common. Sea pens and sand dollars. Few flounders and crabs.
321	59°22.9'N 152°38.2'W	64	Grab sample	Medium to fine sand.
322	59°31.2'N 152°38.5'W	67	Grab sample	Shelly sand
323	59°31.1'N 152°38.8'W	65	TV/camera, current meter	Medium to fine sand.
324	59°32.5'N 152°30.8'W to 59°32.8'N 152°30.8'W	59 / 59	TV/camera, current meter	At anchor. Sand waves up to 12 m high. Small sand waves can be distinguished, larger sizes noted.
325	59°33.0'N 152°25.2'W to 59°33.0'N 152°25.3'W	56	TV/camera	Sand ribbons. Bottom smooth outside ribbons with irregular patches of rock, pebbles and shells: heavily overgrown. Very low small sand waves on ribbons.
326	59°32.8'N 152°25.4'W	55	Grab sample	Slightly muddy sample with abundance of shells and shell fragments.

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
327	59°33.8'N 152°25.0'W	55	Grab sample	Sandy, shell hash, pebbles, algae, bryoroa, pecten.
328	58°27.8'N 153°16.0'W	177	Gravity core	Shelikof Strait. Slightly sandy mud.
329	57°39.0'N 151°57.8'W	218	Gravity core	Near head of Chiniak Trough. Gray-green sandy mud. Gas expansion voids. H_2S odor.
330	57°39.0'N 151°57.8'W	135	Gravity core	Northern Albatross Bank; acoustically unstratified zone. Shelly muddy sand.
331	57°33.2'N 147°38.5'W	4895	Gravity core	Aleutian Trench. Grey-green mud.
332	57°39.3'N 148°12.2'W	3273	Gravity core	Open continental slope. Stiff grey-green mud.
333	57°38.5'N 148°45.3'W	2787	Gravity core	Continental slope basin. Silty clay with sand beds (turbidites). Volcanic ash on top.
334	57°32.8'N 148°57.4'W	2857	Gravity core	Continental slope; axis of canyon. Silty clay.
335	57°28.3'N 149°04.1'W	2695	Gravity core	Continental slope basin. Stiff grey clay with graded sand beds (turbidites). Volcanic ash at surface.
336	57°46.6'N 149°02.4'W	1700	Gravity core	Open continental slope. Siff grey-green pebbly mud.
337	57°00.3'N 149°44.8'W	3512	Gravity core	Lower continental slope. Yellow-green mud; becomes semilithified at 2 m.
338	57°14.2'N 150°07.1'W	1586	Gravity core	Continental slope basin. Grey-green silty mud.
339	57°14.2'N 150°17.4'W	1100	Gravity core	Landward of continental slope basin. Gravelly sandy green mud.
340	57°17.5'N 150°24.7'W	761	Gravity core	Continental slope basin. Silty clay.

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
341	56°59.0'N 152°21.5'W	80	Grab sample	Middle Albatross Bank; in acoustic-anomaly zone. Muddy shelly sand with gravel layer on top.
342	56°55.8'N 152°15.4'W	79	Grab sample	Middle Albatross Bank; in acoustic anomaly zone. Pebbly muddy sand.
343	56°40.0'N 153°05.5'W	153	Gravity core	Kiliuda Trough; in acoustic-anomaly zone. Green to yellow mud with black mottling.
344	56°39.6'N 153°05.6'W	155	Gravity core	Kiliuda Trough; adjacent to acoustic anomaly zone of #344. Gray-green mud with darker mottling. Gas expansion voids.
345	56°34.8'N 153°17.3'W	119	Gravity core	Flank of Kiliuda Trough; within acoustic-anomaly zone. Grey-green mud with black laminae.
346	56°36.6'N 153°17.8'W	120	Gravity core	Kiliuda Trough; within acoustic-anomaly zone. Sandy mud.
347	56°36.2'N 153°17.8'W	138	Gravity core	Kiliuda Trough; within acoustic-anomaly zone. Dark green mud.
348	56°37.3'N 153°18.6'W	143	Gravity core	Kiliuda Trough; within acoustic-anomaly zone. Dark green mud with gas expansion voids.
349	56°38.0'N 153°19.4'W	145	Gravity core	Kiliuda Trough; near edge of acoustic-anomaly zone. Dark green mud.
350	56°46.4'N 153°10.4'W	154	Gravity core	Kiliuda Trough; at base of fault scarp. Green mud. H_2S odor.
351	56°46.7'N 153°10.8'W	125	Gravity core	Kiliuda Trough; above fault scarp Green to blue mud.
352	56°41.0'N 153°10.9'W	150	Gravity core	Kiliuda Trough; within acoustic-anomaly zone. Green mud.
353	56°40.0'N 153°11.1'W	148	Gravity core	Kiliuda Trough. Green mud.
354	56°37.8'N 153°15.6'W	143	Gravity core, grab sample	Kiliuda Trough. Grey-green mud.

Sample number	Latitude Longitude	Water depth(m)	Equipment type	Comments
355	56°08.8'N 153°29.6'W	314	Gravity core	East side of Sitkinak Trough. Green to blue mud.
356	56°05.6'N 153°31.3'W	370	Gravity core	Axis of Sitkinak Trough. Pebbly sandy mud, with gas-expansion voids.
357	56°07.6'N 153°38.4'W	240	Gravity core	Axis of Sitkinak Trough. Grey-green mud.
358	56°47.2'N 153°11.6'W	122	Gravity core	Kiliuda Trough, above fault scarp Same as #351. Green sandy mud.
359	56°46.6'N 153°10.7'W	152	Gravity core	Kiliuda Trough, at base of fault scarp. Same as #350. Green mud.

Table 5. Navigation logs from curise S8-78-WG in lower Cook Inlet and on the Kodiak Shelf and Slope.

U.S.G.S. NAVIGATION LOG

Form 2/78

Cruise Locator S8 - 78 - WG (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist BOUMA/HAMPTON Affiliation USGS

Page 1 of ___

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude +/-	Lat. Deg	Lat. Minutes	Longitude +/-	Long. Deg	Long. Minutes	Wind Dir.	Wind SPD	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS or TB	Time %	SPP
																			STA	NORTHING			STA	EASTING				
214	15	39				LEAVE HOMER DCK			DRC	124	6.2	+	59	3613	-	151	2461											
214	20	34				TARMULD			MWR	177	2.4	+	59	3570	-	151	5580		1	6604995.66			2	560424.22				
〃	20	45							MWR	192	1.0			3594			5589			6606126.76				560381.83				
〃	20	55								265	9.0			3474			5610			6604902.94				560209.35				
〃	20	57		310		SOL 310				265	4.0			3462			5620			6604748.48				560089.96				
〃	21	05				2315 SP 2			MWR	311	4.6			3570			5915			6605850				557744.30				
〃	21	30				SP 3			MWR	311	5.4			3616	-	152	0097			6607155.95				555593.42				
〃	21	39				C/C			MWR	243	5.4			3661	-	152	0196			6608245.51				554610.02				
〃	21	45				SP 4			MWR	212	4.3			3670			0268			6608592.06				553966.43				
〃	22	00				SP 5			MWR	222	4.2			3642			0348			6607716.41				553352.60				
〃	22	15				SP 6			MWR	222	4.2			3627			0450			6606857.09				552336.88				
〃	22	30				SP 7			MWR	232	4.1			3552			0528			6606137.40				551519.25				
〃	22	45				SP 8			MWR	232	4.0			3505			0641			6605352.18				550974.55				
〃	22	52				C/C			MWR	245	4.1									6605072.79				550142.83				
〃	23	00				SP 9			MWR	245	3.7			3485			0762			6605046.27				549099.14				
〃	23	13				C/C			MWR	275	2.7									6605247.73				547831.65				
〃	23	15				SP 10			MWR	275	3.6			3588			0750			6605418.57				547568.78				
〃	23	30				SP 11			MWR	275	3.4			3513			1130			6605419.37				545948.36				
〃	23	45				SP 12			MWR	275	4.0			3570			1255			6605626.25				544409.79				
〃	23	51				SP/K			MWR	276	4.0			3582			1388			6605681.10				543441.90				
215	00	00				SP 13			MWR	276	4.0			3546			1475			6605814.08				542689.22				
	00	15				SP 14			MWR	276	4.0			3543			1650			6605768.99				540982.45				
	00	30				SP 15			MWR	277	3.9			3553			1842			6606026.93				541932.77				
	00	45				SP 16			MWR	211	4.1			3570			2010			6606222.47				535521.76				
	00	57				C/C			MWR	303	4.5									6606337.71				536217.30				
	01	00				SP 17			MWR	303	4.1			3512			2190			6608336.60				535916.05				
	01	15				SP 18			MWR	303	4.1			3611			2322			6607155.00				524561.56				
	01	16				C/C			MWR	125	4.2									6607210.35				514462.18				
	01	30				SP 19			MWR	222	7.7			3559			2487											
	01	45				SP 20			MWR	232	4.8			3490			2632			6606018.78				531086.38				
215	02	00				SP 21			MWR	247	3.1			3417			2341			6607252.36				530711.72				

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship Sea Sounder Chief Scientist Boone/Arlington Affiliation USGS

D-E 2/78

Page 2 of ___

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude N/S	Latitude Deg	Latitude Minutes	Longitude E/W	Longitude Deg	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading		Time	GFP
																	SP	NORTHING			SP		EASTING			
215	0215	310		SP 22			MNR	227	3.2		59	3328	-	152	2850		1	6602615.48			2		529709.36			
	0226			CN			MNR	243	2.5			3335			2902			6601855					529008.35			
	0230			SP 23			MNR	268	2.9			3330			2960			6601782.28					528686.35			
	0245			SP 24			MNR	271	3.9			3326			3112			6601878.80					527247.79			
	0300			25			MNR	297	3.8			3331			3285			6601760.46					525655.41			
	0308						MNR	293	3.[illegible]			3334			3370			6601805.95					534790.35			
	0315			26			MNR	298	3.4			3339			3443			6601895.21					524101.13			
	0330			27			MNR	295	3.4			3347			3615			6602039.66					522476.50			
	0338						MNR	299	3.5			3352			3700			6602139.00					521677.87			
	0344	310		END LINE 310			MNR	280	3.2			3353			3767			6602126.77					521064.88			
	0400						MNR	357	4.1			3405			3775			6603129.22					520038.68			
	~~0430~~	~~311~~		~~START LINE 311~~			~~MNR~~	~~022~~	~~3.7~~			~~[illegible]~~			~~3750~~			~~6604546.32~~					~~[illegible]~~			
	0430	311		START LINE 311			MNR	149	4.2			3437			3561			6603682.25					523003.78			
	0438						MNR	221	4.5			3392			3619			6602681.44					522457.40			
	0445			SP 1			MNR	219	5.0			3340			3685			6601883.65					521836.16			
	0500			SP 2			MNR	187	4.7			3229			3801			6599816.89					520943.97			
	0515			SP 3			MNR	189	5.1			3113			3843			6597706.24					520347.35			
	0530			SP 4			MNR	180	5.0			3006			3958			6595601.43					519288.76			
	0545			SP 5			MNR	196	5.0			2886			4035			6593433.49					518564.66			
	0625						MNR	197	4.4			2618			4257			6588453.83					516483.38			
	0645			SP 9			MNR	199	4.2			2492			4378			6586200.80					515358.32			
	0700			SP 10			MNR	194	4.2			2402			4437			6584460.01					514814.44			
	0730			SP 12			MNR	192	3.1			2242			4581		1	6581499.15			5		513459.45			
	0745			SP 13			MNR	200	3.2			2168			4641			6580110.06					512887.44			
	0800			SP 14			MNR	197	3.5			2102			4712			6578824.21					512214.98			
	0824			SAT 14			S					1968			4818											
	0845			SP 17			DRC	189	4.5			1822			4927											
	0900			SP 18			DRC	197	4.3			1723			5032											
	0915			SP 19			DRC	185	4.2			1626			[illegible]											
	0910			SAT 13			SAT	[illegible]	4.4			1571			5082											
	0930			SP 20			MNR	196	4.4			[illegible]			[illegible]			6568114.63					507854.74			
216	0945	311		SP 21			DRC	194	4.4			1424			5267											

U.S.G.S. NAVIGATION LOG

Cruise Locator SP - 78 - WG
(ID. - YR - AREA)

Ship Sea Sounder Chief Scientist Bouma / Hampton Affiliation USGS

Page 3 of ___

Date 2/78

Julian Day	SMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. Deg	Lat. Minutes	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Off
215	0942	311		SAT 20			SAT			+59	1446	-152	5243											
	1000			SP 22			DRC	196	4.1		1328		5353											
	1015			SP 23			DRC	178	2.0		1294		5376			01-656545.83				05-506768.69				
	0951			SIDE SCAN OUT			MAR																	
				BROUGHT INBOARD																				
	1030			SP 24			DRC	188	2.0		1283		5414											
	1045			SP 25			DRC	189	2.3		1233		5459											
	1115			SP 27			DRC	018	6.7		1312		5324											
	1130			SP 28			DRC	022	6.6		1460		5257											
	1128						SAT				1439		5269											
	1145			SP 29			DRC	212	2.5		1574		5180											
	1200			SP 30			DRC	200	4.2		1485		5212											
	1215			SP 31			DRC	207	4.0		1390		5300											
	1230			SP 32			DRC	171	3.7		[illegible]		[illegible]											
	1245			SP 33			DRC	208	3.4		[illegible]		[illegible]											
	1300	311		END OF LINE 311			DRC	208	4.1		1125		5530											
	1315						DRC	116	6.1		1032		5376											
	1330						DRC	071	7.6		1047		5060											
	1345						DRC	071	7.9		1184		4624											
	1400	312		SOL 312			DRC	012	4.0		1282		4560											
	1415			SP 1			DRC	009	4.2		1316		4314											
	1430			SP 2			DRC	004	3.9		1413		4230			01-656399.57				05-516770.63				
	1445			SP 3			DRC	011	4.0		1500		4162											
	1500			SP 4			NVR	141	3.8		1591		4071			01-656926 1.07				05-518270.14				
	1515			SP 5			DRC	315	3.9		1685		4026											
	1530			SP 6			DRC	021	4.0		1746		3950											
	1545			SP 7			DRC	011	3.6		1863		3883											
	1600			SP 8			DRC	[illegible]	[illegible]		1943		3817											
	1615			SP 9			DRC	011	2.0		20[illegible]		[illegible]											
	1616			SAT 10			SAT				2[illegible]		[illegible]											
	1630			SP 10			DRC	012	2.9		2016		[illegible]											
215	1645	312		SP 11												657954.28				572493.22				

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - 66 (ID. - YR - AREA)

Ship SEA SOUNDER Chief Scientist BOUMA/HAMPTON Affiliation [illegible]

Page 4 of ___

Form 2/75

Julian Day	HR	MIN	Line No.	Comments	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Visual, Radar, etc. Object	Loran, Raydist, etc. Reading
215	17	00	312	SP12	MNR	009	3.2		59	2212	-	152	3590	6580980.99	522820.84
	17	15	312	SP13	MNR	022	3.4			2291			3545	6582440.66	523319.44
	17	30		SP 14	MNR	026	2.5			2567			3471	6583598.94	523964.56
	17	45		SP 15	MNR	018	2.5			2408			3401	6584617.12	524570.07
	18	00		SP 16	MNR	023	2.6			2475			3370	6585802.90	524856.59
	18	15		SP 17	MNR	038	2.4			2528			3305	6586867.78	525448.78
	18	30		SP 18	MNR	038	2.4			2585			3263	6587863.90	525827.78
	18	45		SP 19	MNR	035	2.5			2644			3205	6589015.89	526331.04
	19	00		SP 20	MNR	035	2.8			2705			3152	6590164.13	526793.23
	19	15		SP 21	MNR	032	2.6			2779			3116	6591509.97	527223.52
	19	30		SP 22	MNR	040	3.2			2854			3062	6592586.88	527721.12
	19	45		SP 23	MNR	040	3.3			2918			2990	6594105.69	528454.57
	20	00		SP 24	MNR	041	3.3			3002			2915	6595651.67	529052.33
	20	15		SP 25	MNR	018	3.7			3070			2840	6597303.47	529630.07
	20	30		SP 26	MNR	045	4.2			3178			2780	6599[illegible]03.98	530413.76
	20	32	312	EOL 312	MNR	040	4.3			3175			2745	6599327.30	530534.61
	20	51	313	SOL 313	MNR	113	3.6			3200			2860	6599341.76	529636.59
	21	00	313	SP 1	MNR	179	3.2			3161			2895	6598565.47	529316.10
	21	15		SP 2	MNR	180	2.8			3090			2943	6597215.94	528590.69
	21	30		SP 3	MNR	180	2.7			3030			3025	6596155.65	528020.65
	21	45		SP 4	MNR	181	2.4	+	59	2978	-	152	3050	6595135.86	527409.64
	22	00		SP 5	MNR	179	1.9			2925			3125	6594296.15	526916.87
	22	15		SP 6	MNR	180	1.9			2879			3182	6593565.41	526515.58
	22	30		SP 7	MNR	178	2.0			2818			3210	6592694.99	526267.77
	22	34	313	EOL 313	MNR	179	5.8			2834			3217	6592510.75	526231.76
	22	40	314	SOL 314	MNR	092	5.0			2811			3150	6592769.32	526915.56
	22	45	314	SP 1	MNR	072	3.3			2835			3110	6593157.50	527460.60
	23	00		SP 2	MNR	002	5.2			2919			3213	6594402.29	529757.29
	23	18			MNR	091	5.2		3	3001			2533	6595711.35	532612.34
	23	45		SP 5	MNR	120	4.2			3041			2145	6596478.48	536994.08
216	00	00		SP 6	MNR	147	3.5			3013			1940	6595966.49	538122.60
	00	15		SP 7	MNR	150	3.8			2930			1921	6594647.63	539513.56

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - 06
ID. YR AREA

Ship SEA SOUNDER Chief Scientist BOUMA/HAMPTON

Affiliation U. S. G. S.

Date 2/78

Page 5 of ___

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/- DEG	Lat MINUTES	Long +/- DEG	Long MINUTES	Wind Dir.	Wind SPD	Visual Object	Angles	Brgs	Distance	Loran Rate	Reading	TB or TA	Time	GFP
																		6593376.56					540566	50		
216	00	30		314		SP 8			WWR	140	4.0	+59	28.72	-152	16.48											
1	00	45				SP 9			WWC	125	4.2		28.11		15.17			6592226.00					542295.22			
	00	50		314		EOC 314			WWRC	095	4.5	+59	27.93	-152	14.85											
216	00	53		315		SOC 315			MWC	23	3.1	+59	28.09	-152	14.69											
	01	00		315		SP 1			WWC	248	4.4	+59	29.09	-152	14.69			6593083.06					543097.93			
	01	15				SP 2			WWC	342	4.4		29.68		14.36			6595153.07					542600.51			
216	01	30		315		SP 3			MWC	349	4.5		30.81		14.90			6597240.07					542340.16			

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WC (ID. - YR - AREA) Date 2/78

Ship SEA SOUNDER Chief Scientist BOUMA/HAMPTON Affiliation ______

Page 6 of ___

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude N/S DEG	Latitude Minutes	Longitude E/W DEG	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate / Reading	TD	Time	Off
																STA	NORTHING			STA	EASTING			
216	0100		315		SP 1			NAV8	349	4.4	+59	2854	-152	1440		1	6593083.06			2	543097.95			
	0115				SP 2				343	4.4		2972		1498			6595153.07				542600.51			
	0130				SP 3				349	4.5		3079		1510			6597240.03				542340.16			
	0145				SP 4				357	4.3		3186		1526			6599164.36				642224.29			
	0200				SP 5				343	3.8		3289		1535			6601091.26				542098.20			
	0215				SP 6				350	3.2		3380		1559			6602816.15				541852.33			
	0230				SP 7				356	3.4		3488		1565			6604490.23				541289.61			
	0245		315		SP 8 EOL 315				353	3.4		3580		1595			6606517.96				541520.56			
	0300				~~SP 9~~				086	7.5		3606		1443			6607032.40				542898.49			
	0315				~~SP 10~~				083	6.6		3556		1156			6606133.15				545592.14			
	0330				~~SP 11~~				070	6.2		3557		0880			6606175.23				548215.70			
	0345				~~SP 12~~				072	4.9		3542		0653			6605973.93				550272.10			
	0400								054	5.0		3537		0470			6605872.93				552085.34			
	0415								352	4.4		3575		0345			6606589.55				553213.35			
	0420								~~442~~	~~2.2~~		3591		0363			6606905.24				553056.58			
	0430								012	2.2		3597		0468			6607023.21				552064.66			
	0440											3603		0359			6607111.06				553096.69			
	0445			300S	CAMERA STATION				059	1.9		3594		0339			6606932.96				553278.93			STA 300-S-1
	0500								035	1.7		3562		0295			6606356.29				553697.74			
	0515								335	0.8		3527		0290			6605691.17				553743.41			
	0519				END CAMERA STA				230	0.8		3522		0283			6605606.38				553780.00			
	0530								334	0.9		3510		0274			6605365.41				553892.46			
	0545								354	0.8		3492		0248			6605038.58				554150.52			
	0559				VAN VEEN OTB				005	0.7		3482		0223			6604863.93				554391.41			
	0600								007	0.7		3482		0222			6604842.25				554407.58			
	0618				VAN VEEN OTB				291	0.3		3472		0202			6604650.79				554602.98			
	0615								305	0.4		3470		0200			6604676.34				554583.12			
	0632			300S	END STA 300-S-1				308	0.7		3470		0200			6604610.95				554643.82			
	0645								276	4.1		3472		0458			6604678.02				552186.37			
	0700								271	6.7		3472		0776			6604991.44				549223.58			
	0715								276	4.8		3512		1002			6605326.27				546193.97			
	0730			301	ON STA 301				269	2.7		3520		1238			6605441.19				544819.93			

U.S.G.S. NAVIGATION LOG

Date 2/78

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship R/V Sea Sounder Chief Scientist BOUMA/HAMPTON Affiliation U.S.G.S.

Page 7 of ____

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. ±	Lat. Deg	Lat. Minutes	Long. ±	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg.	Distance	Loran, Raydist, etc. Rate	Reading	TS-TA	Time %	Err
																			STP	NORTHING			STA	EASTING				
216	07	45			301	ON STA 301			MAR	243	1.0	+	59	3524	-	152	1267		1	6605554.07			2	544554.32				
	08	00							MAR	200	0.6			3529			1297			6605612.27				544243.55				
	08	12								237	0.8			3543			1271			6606888.13				544201.62				
	08	21			301	END STA 301				213	0.3			3552			1296			6606022.84				544201.64				
	08	30				MOVE TO NEXT ST.				223	0.9			3547			1320			6605942.71				544261.46				
	08	45								271	6.4			3558			1525			6606134.17				542109.11				
	09	00								248	2.3			3578			1755			6606489.11				539967.22				
	09	15								248	2.4			3591			1851			6606718.71				539066.60				
	09	30								154	0.6			3571			1881			6606353.09				538742.49				
	09	45			302	ON STA 302				182	1.2			3572			1875			6606367.14				538838.67				
	09	51				TV CAM OTB				162	1.5			3585			1884			6606639.01				538734.84				
	10	00								152	1.9			3611			1895			6607076.25				538628.55				
	10	08				LAST TV SHOT				112	2.0			3627			1903			6607566.01				538546.76				
	10	15								128	2.2			3663			1909			6608054.35				538490.15				
	10	21				TURN TO STA RES				161	1.7			3685			1914			6608458.48				538492.82				
	10	30								164	0.9			3677			1912			6608335.46				538436.68				
	10	45								162	3.8			3607			1888			6607014.59				538692.44				
	11	00								162	0.7			3570			1861			6606335.61				538972.24				
	11	03				BACK ON STA 302				126	1.4			3671			1851			6606429.28				539035.04				
	11	17				VANVEEN				158	1.9			3613			1823			6607137.75				539297.04				
	11	30			302	LEAVE STA 302				129	2.2			3658			1803			6607986.92				539494.32				
	11	45								249	7.2			3633			2081			6607459.16				536835.35				
	12	00								249	7.2			3625			2428			6607292.29				533589.86				
	12	15								235	6.7			3610			2783			6606973.09				530232.79				
	12	30								230	6.7			3551			3103			6605849.96				527268.64				
	12	45								223	5.8			3470			3333			6604325.90				525113.00				
	13	00								223	4.3			3382			3468			6602681.25				523346.83				
	13	07								251	4.9			3345			3583			660[illegible]426.23				5228[illegible]9.11				
	13	12								235	2.1			3337			3593			6601588.87				522637.44				
	13	17							MAR	244	1.5			3344			3591			6601795.00				522752.91				
	13	24			303	ON STA 303			DRC					3345			3565											
216	13	28				SO[illegible] ON BOTTOM														6601976.90				521460.32				

U.S.G.S. NAVIGATION LOG

Date 2/70

Cruise Locator 58 (ID.) - 78 (YR) - WG (AREA)

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

Page 8 of ___

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. DEG	Lat. Minutes	Long. DEG	Long. Minutes	Wind Dir.	Wind SPD	Object	Angle	Brg	Distance	Rate	Reading	TD	Time	SPD
216	1337			304	2ND ATT SOUTER			MNC			C59	3345	-152	3515			01-6601862	.25			02-	523438	.16		
	1345							MNC				3339		3494			01-6601776	.50			02-	523639	.07		
	1403							MNC				3335		3540											
	1415											3357		3615											
	1425				START TV							3345		3632			01-6601867	78			01-	522344	.66		
	1430											3340		3628			6601742	.04				522372	.97		
	1445							MNC	032	1.1		3316		3611			6601518	.45				522556	.26		
	1500							MNC	[illegible]	1.4		[illegible]		3611			[illegible]	.73				522668	[illegible]		
	1515							MNC	042	[illegible]		3240		3602											
	1516			303	END TV			MNC	357	1.5		[illegible]		3601			[illegible]	[illegible]				[illegible]	97		
	1531				[illegible]							[illegible]		[illegible]			[illegible]	[illegible]				[illegible]	.29		
	1539		316		START LINE 316			MNR				3148		3607			6598376	89				522607	.08		
	1546							MNR	079	4.4		3124		3513			6597923	68				523529	.02		
	1600							MNR	061	3.4		3088		3338			6597248	41				525106	.61		
	1615							MNR	037	3.2		3064		3204			6597232	62				526473	.82		
	1630							MNR	021	3.0		3126		3068			6597999	.05				52767[illegible]	.52		
	1645							MNR	335	2.1		3166		3011			6598753	77				527897	.14		
	1700		316		~~S 317~~			MNC	191	3.5		3100		3087			6597513	19				527518	57		
	1715							MNC	201	2.0		3012		3050			6595806	62				527895	.42		
	1716				SAT 19			SAT				3010		3041											
	1730							MNC	010	1.5		3043		3047			6596522	.03				527682	.98		
	1745							MNC	002	1.5		3076		3071			6597067	.52				527626	.70		
	1800							MNC	014	1.5		3112		3282			6597826	.49				527541	.79		
	1815							MNC	050	2.6		3152		3026			6598520	.73				527595	.23		
	1830		316		EX 316			MNC	150	2.0		3155		2975			6598681	.83				52855	.17		
	1845			304	SOS 304 T.V.			MNC	222	2.0		3162		2970			6598627	.10				528603	.75		
	1900							MNC	025	1.5		3132		3049			6598162	.57				527832	.47		
	1915							MNC	027	1.4		3125		3117			6598097	.76				527215	.89		
	1930							MNC	027	1.2		3125		3183			6597977	.54				526563	.61		
	1945							MNC	096	1.0		3126		3238			6598065	.04				526046	.41		
	1950			304	END STA 309 T.V.			MNC	050	1.1		3132		3268			6598100	.08				525862	.56		
216	2015				TRANSIT			MNC	007	2.5		3141		3295			6598099	.01				525583	.44		

U.S.G.S. NAVIGATION LOG

Cruise Locator S7 - 78 - WG (ID. YR AREA)

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

Page 9 of ___

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. Deg	Lat. Minutes	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Object	Loran Rate	Loran Reading
																D		E
216	2016			TRANSIT			MAR	102	2.4	59	3133	-152	3290					
	2020			TRANSIT			MAR	102	2.5		3102		2185			6597515.02		526637.58
	2100			"			MAR	090	11.0		3093		3022			6597374.42		528091.97
	2136			"			MAR	148	2.8		3087		3062			6597213.75		527670.43
	2201		305	ON STA 305 BOTM			MAR	351	2.1		3075		3000			6597037.86		528320.08
	2210		305	OFF STA 305			MAR	176	2.0		3109		3025			6597600.87		528012.22
	2247		306	ON STA 306 BOTM			MAR	160	2.6		3101		3045			6597561.39		527880.70
	2322		306	OFF STA 306			MAR	175	2.4		3260		2995			6600441.92		528346.20
	2341		307	ON STA + ON BOTM			MAR	253	2.7		3244		2983			6600222.36		528448.31
216	2357		307	OFF STA N/B			MAR	253	2.1		3311		2955			6601441.67		528265.83
217	0027		308	TU STA on BOTTOM			MAR	187	2.3		3138		2875			6598014.17		529776.46
	0045		308	T.U. STA ~~END~~			MAR	174	1.5		3185		2831			6599030.13		529853.52
	0054		308	T.U. STA END			MAR	183	1.7		3205		2912			6599430.9		530041.03
	0100		308	LEAVE STA 308				206	2.0		3221		2802			6599774.00		530156.88
	0116			TRANSIT TO STA.				217	5.6		3150		2938			6598462.46		528885.69
	0125							211	5.2		3028		3048			6597090.76		527859.83
	0130			END TRANSIT				211	2.3		3052		3080			6596606.13		527579.07
	0131		309	ON STA 309				222	0.0		3054		3228			6596639.54		527591.64
	0145		309	TU DOWN IN H_2O				146	1.8		3080		3020			6597109.47		528132.61
	0158		309	END STA 309				168	1.9		3109		2963			6597650.15		528639.34
	0205			TRANSIT				159	1.8		3120		2972			6597865.64		528925.41
	0215							226	6.0		3068		3043			6596880.62		527882.92
	0225			TURNING TO LINE				297	4.9		3014		3190			6595898.24		526521.40
	0232	317		START LINE 317				049	2.8		3069		3067			6596922.36		527685.58
	0245			SP 1				049	3.5		3091		2987			6597334.		528406.
	0300			SP 2				032	3.2		3127		2800			6598018.		530187.
	0308	317		END LINE 317				044	3.4		3135		2790			6598196.69		530261.86
	0326			WANDERING ABOUT				280	4.9		3126		2222			6598001.67		530430.21
	0334							245	5.4		3123		2913			6597973.95		529153.02
	0345							231	8.4		3029		3121			6596149.18		527189.85
	0350							218	2.1		2990		3192			6595387.31		526461.45
	0352			180° TURN				223	1.6		2983		3198			6595291.08		526464.18

8/78

U.S.G.S. NAVIGATION LOG

Cruise Locator 57 - 78 - NG
ID. YR AREA

Ship R/V Sea Sounder Chief Scientist [illegible] Affiliation [illegible]

Page 10 of ____

8/75

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Ctr. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Long ±	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran Rate	Loran Reading	TB	Time	GPP
																				NORTHING				EASTING				
217	04	05				TRANSIT TO STA			MNR	241	0.8	+	59	2968	-	152	3181		1	6595020.61				2	526618.76			
	04	15								027	8.1			3032			3022			6596304.32					528108.98			
	04	23				END TRANSIT				101	2.5			3073			2977			6597003.80					528358.16			
	04	24			310	ON STA 310				107	2.7			3071			2971			6596923.24					528400.20			
	04	31			310	ON BOTTOM				104	1.3			3078			3000			6597452.93					528335.75			
	04	45			310	END STA 310				112	1.3			3033			2924			6596251.95					529031.40			
	04	62				TRANSIT				096	1.5			3020			2879			6596037.28					529287.89			
	05	15				END TRANSIT				341	2.7			3048			3008			6596525.35					528260.95			
	05	24			311	ON STATION 311				016	.9			3065			3025			6596871.32					528094.60			
	05	27			311	ON BOTM-END STA				083	2.5			3059			3028			6596224.02					528048.51			
	05	36			312	ON STA 312				071	1.8			3032			3055			6596311.11					527786.91			
	05	38			312	ON BOTTOM #1				072	1.7			3032			3063			6596223.35					527713.12			
	05	48			312	ON BOTTOM #2				074	1.7			3012			3102			6595831.36					527264.39			
	06	00			312	END STA 312				065	1.7			3030			3184			6596182.10					526571.83			
	06	34				TRANSIT				072	1.8			2938			3345			6594459.25					525082.67			
	06	45								061	6.5			2976			3156			6595183.93					526875.90			
	07	00								051	6.8			3049			2848			6596541.88					529732.35			
	07	15								050	7.1			3148			2569			6598402.11					532376.32			
	07	30								049	7.7			3253			2262			6600396.26					535331.97			
	07	45								048	7.8			3358			1947			6602380.62					538204.94			
	08	03				END TRANSIT				044	4.6			3472			1602			6604536.90					541387.40			
	08	07				STEADY ON CSE				007	4.7			3479			1597			6605023.54					541458.48			
	08	16		318		START LINE 318				001	5.0			3574			1580			6606445.21					541623.20			
	08	30				SP1				003	4.6			3679			1589			6608358.76					541517.58			
	08	45				SP2				359	4.8			3798			1588			6610541.71					541526.57			
	09	00				SP3				347	4.9			3916			1578			6612800.55					541576.68			
	09	15				SP4				[illegible]	5.2			[illegible]			[illegible]			6615822.64					541245.23			
	09	30				SP5				[illegible]	5.6			[illegible]			[illegible]			6617123.78					541490.76			
	09	45				SP6				[illegible]	[illegible]			[illegible]			[illegible]			6620310.13					541469.55			
	10	00				SP7			MNR	348	6.1			4477			1577			6623135.55					541501.62			
	10	15				SP8			DRC	346	6.2			4637			1580											
217	10	28		318		SP9			DRC	351	6.0			4772			1582											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG (ID. YR AREA)

Ship R/V Sea Sounder Chief Scientist Bouma/Hampton

Affiliation USGS

BLUFF, #2 LAT: 59° 39.627' LON: -151° 39.750' N: 6614149.88 E: 575365.75

SLOPE, #1 or 4 LAT: 60° 03.214' LON: -151° 38.352 N: 6657224.19 E: 520092.54

ELIZABETH, #3 & 5 LAT: 59° 09.294' LON: -151 51.104 N: 6557659.31 E: 565763.63

2/78

Page 11 of ____

Julian Day	Time HR MIN	Line No.	Station No.	Comments	Fix Type	New Course	New Speed	Lat Deg	Lat Minutes	Long Deg	Long Minutes	Wind	Visual, Radar, etc. Object	LORAN, Raydist Rate	LORAN, Raydist Reading
													NORTHING		EASTING
212	1040	318		END LINE 318	DRC	002	5.8	+59	4884	-152	1579	#1		#2	
	1045				DRC	113	4.3		4719		1539				
	1059	319		START LINE 319	DRC	180	2.3		4879		1408				
	1115			SP1	DRC	194	1.3		4834		1383				
	1130			SP2	DRC	206	1.3		4802		1396				
	1145			SP3	DRC	195	1.4		4767		1401				
	1200			SP4	DRC	193	3.0		4718		1402				
	1215			SP5	DRC	186	3.3		4634		1401				
	1230			SP6	DRC	182	3.7		4548		1401				
	1245				DRC	186	4.0		4456		1402		6622570.78		543115.00
	1246			SP7	MNR	186	4.0		4416		1400		6620614.05		543216.06
	1300			SP8	MNR	187	4.2		4344		1395				
	1315			SP9	MNR	182	4.5		4229		1384		6618615.38		543328.42
	~~1318~~			~~DRILLING RIG~~											
	1318			PASSED OIL RIG	MNR	183	4.5						~~6618221.80~~		~~543341.69~~
	1322				MNR	180	4.6		4172		1389		6617532.36		543314.74
	1325	319		END LINE 319	MNR	186	4.9		4078		1393		6615757.60		543264.99
	1343			COURSE CHANGE	MNR	180	5.1		4013		1229		6614596.24		543336.86
	1400				MNR	229	8.4		3865		1740		6611805.08		540036.48
	1415				MNR	328	8.4		3721		2042		6609133.23		537229.29
	1430				MNR	230	8.7		3584		2412		6606554.52		534230.08
	1445				MNR	232	8.7		3445		2657		6603926.02		531460.41
	1500				MNR	236	8.7		3302		2983		6601223.38		528449.97
	1515				MNR	234	9.2		[illegible]		3344		6598562.95		525034.01
	1530				MNR	239	8.1		2799		3627		6595547.19		521848.75
	1537	320		START LINE 320	MNR	237	3.2		2860		3712		6594869.02		521141.67
	1541			ON COURSE	MNR	176	6.5		[illegible]		3782		6594356.30		520959.03
	1606			BOUY STARBDBEAM	MNR	179	4.9		[illegible]		[illegible]		6590993.41		520840.19
	1616	320		END LINE 320	MNR				[illegible]		3800		6588871.51		520766.56
	1619			CHANGE COURCE	MNR	282	3.0		[illegible]		[illegible]		6588874.24		520737.75
	1625	321		START LINE 321	MNR	356	4.6		2662		3817		6589302.58		520662.19
[illegible]	1640	321		BOUY ABEAM	MNR	356	3.0		2745		3842		6590840.98		520416.03

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG
ID. YR AREA

Ship Sea Sounder Chief Scientist Bouma/Hampton Affiliation U.S.G.S.

SLOPE, #104
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, #3r5
LAT: 59° 09.294'
LON: -151° 51.108'
N: 6557659.11
E: 565703.65

BLUFF, #2
LAT: 59° 39.627' N: 6614149.88
LON: -151° 29.250' E: 575365.25

2/78

Page 12 of ___

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind SPD	Visual, Radar Object	Angles	Brgs	Distance	Loran Rate	Loran Reading	TD or TA	Time	SPP
																	SM	Ab				SM	E			
217	1700	321					MNR	358	2.9	+	59	2810	-	152	3858		1	6597400.41				2	520460.62			
	1705	320		EOL 321			MNR	356	2.9									6592876.70					520135.20			
	1745			TRANSIT			MNR	092	2.8			2845			2856			6597780.00					519183.20			
217	1803			AT ANCHOR			MNR	178	0.9			2721			3522			6590781.14					520446.89			
218	0024		314	ON STA 314TI TV			MNR	184	0.1			2754			3832			6590984.00					520420.69			
	0051		314	EOFSTA314TI			MNR	172	1.0			2752			3845			6590905.78					520351.94			
	0115			AT ANCHOR			MNR	191	0.1			2749			3838			6590949.25					520466.84			
	0400			TIDE TURNING			MNR	302	0.1			2744			3838			6590832.12					520444.72			
	0745			TIDE TURNED			MNR	044	0.0			2742			3750			6590791.70					520353.29			
	1145			AT ANCHOR			MNR	171	0.2			2751			3840			6590975.02					520424.48			
218	1700			AT ANCHOR			MNR	351	0.2			2742			3853			6590772.02					520423.60			
219	0100			TRANSIT			MNR	203	5.7			2622			4020		1	6588573.89				2	518721.11			
	0115						MNR	211	7.4			2496			4348			6586214.93					516384.67			
	0130						MNR	208	5.2			2364			4520		1	6583759.15				3	514026.57			
	0145			OFF UTM - ON DRC			DRC	280	8.7			2429			4807			6584727.61					511290.22			
	0200						DRC	282	8.9			2506			5130			6586277.53					507945.60			
	0215						DRC	112	9.7			2553			4983			6587036.00					509473.09			
	0218	322	[illegible]	START LINE 322			DRC	130	9.3			2546			4930			6586999.47					509884.88			
	0230		[illegible]	SP1			DRC	149	4.6			2504			4727			6586264.40					511158.40			
	0245		[illegible]	BACK ON UTM SP2			DRC	111	4.6			2424			4622											
	0245		[illegible]	SP3			MNR	111	4.6			2416			4639			6584714.09					512879.27			
	0300		[illegible]	STRONG CURRENTS			MNR	109	4.4			2391			4409			6584258.66					515087.30			
	0315		[illegible]	SP5			MNR	122	4.5			2348			4204			6583470.74					517030.05			
	0330		[illegible]	SP6			MNR	113	4.4			2293			3998		9	6582465.50				5	518978.11			
	0345		[illegible]	SP7			MNR	090	8.8			2250			3784			6581679.24					521048.78			
	0400		[illegible]	SP8			MNR	106	5.2			2203			3551			6580877.67					523207.59			
219	0415		[illegible]	SP9			MNR	100	5.0			2166			3325			6580119.97					525346.26			
	~~[illegible]~~						~~MNR~~	~~097~~	~~4.9~~			~~[illegible]~~			~~[illegible]~~			~~[illegible]~~					~~[illegible]~~			
	~~[illegible]~~						~~MNR~~	~~099~~	~~4.9~~									~~65780[illegible]~~					~~[illegible]~~			
	~~[illegible]~~						~~MNR~~	~~091~~	~~4.7~~									~~6577920.[illegible]~~					~~[illegible]~~			

U.S.G.S. NAVIGATION LOG

Ship R/V Sea Sounder Chief Scientist Bouma/Hampton

Cruise Locator S8 - 78 - WG
ID. YR AREA

Affiliation U.S.G.S.

SLOPE, #1+4
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, # 3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

Page 13 of ___

BLUFF, # 2
LAT: 59° 39.627'
LON: -151° 39.750'
N: 6614149.88
E: 575365.75

Julian Day	GMT HR	GMT MIN	GMT SEC	Line No.	Station No.	Comments	Fix Quality	Cir. Code	Fix Type	New Course	New Speed	Lat ± DEG	Lat Minutes	Lon ± DEG	Lon Minutes	Wind Dir.	Wind Spd	Visual Object	Rate	Reading
																	STA	NORTHING	STA	EASTING
217	04	30		322		SP10			MNR	097	4.8	+59	3116	-152	3095		4	6579207.29	5	527991.77
	04	45				SP11				097	4.9		2068		2826			6578348.77		529605.39
	05	00				SP12				091	4.9		2021		2650			6577442.81		531253.03
	05	15				SP13				089	5.2		1977		2430			6576676.30		533889.60
	05	30				SP14				089	5.2		1932		2189			6575840.40		536156.31
	05	45				SP15				090	5.2		1877		1957			6574825.24		538389.71
	06	00				SP16				080	5.3		1823		1720			6573946.16		540642.28
	06	15				SP17				080	5.3		1783		1477			6573196.20		542942.79
	06	30				SP18				087	5.2		1737		1246			6572238.07		545167.16
	06	45				SP19				080	4.8		1678		1030			6571280.19		547204.59
	07	00				SP20				073	4.3		1652		0838			6570835.05		549043.02
	07	15				SP21				099	3.8		1616		0671			6570197.49		550668.58
	07	30				SP22				099	3.6		1577		0499			6569424.47		552286.49
	07	45		322		END LINE 322				102	3.3		1551		0337			6569016.15		553896.62
	07	49		323		START LINE 323				138	3.2		1535		0301			6568705.19		554184.14
	08	00				SP1				154	2.7		1493		0255			6567938.09		554654.40
	08	15				SP2			MNR	152	1.7		1442		0230			6566981.35		554892.75
	08	32							DRC	152	2.0		1373		0105					
	08	47							DRC	144	4.0		1326		0164			off UTM GRID		
	09	15				SP7			DRC	158	4.1		1150	-151	5986					
	~~09~~	~~30~~																		
	09	31		323		EOL 323			DRC	147	4.6		1053		5890					
	09	39		324		SOL 324			DRC	201	8.4		1041	~~-152~~	0015					
	09	45				SP1			DRC	311	8.1		1097	-152	0140					
	10	00				SP2			DRC	254	5.6		1184		0376					
													~~1184~~							
	10	15				SP3			DRC	257	5.7		1203		0622					
	10	20				SP4			DRC	280	7.0		1284		0906					
	10	30				SAT 20			SAT				1771		0882					
	10	45				SP5			DRC	271	6.4		1327		1167					
	11	00				SP6			DRL	273	5.8		1379		1437					
218	11	20							DRC	268	4.0		1470		1294					

U.S.G.S. NAVIGATION LOG

Ship R/V SEA SOUNDER Chief Scientist BOUMA/HAMPTON

Cruise Locator S8 - 78 - WG
ID. YR AREA

Affiliation U. S. G. S.

SLOPE, N104
LAT: 60°03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.59

ELIZABETH, W3-5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

BLUFF, W2
LAT: 59° 39.627'
LON: -151° 39.250'
N: 6614199.88
E: 575365.25

8/78

Page 14 of

Julian Day	GMT Time HR MIN	Line No.	Station No.	Comments	Fix Type	New Course	New Speed	Lat ± Deg	Lat Minutes	Lon ± Deg	Lon Minutes	Wind Spd	Object	Distance	Rate	Reading
												STA	NORTHING		STA	EASTING
219	1130	324		SP8 ON UTM MAP	MNR	272	6.1	+59	1498	-152	1978	04	6567862.56		05	538766.65
	1200			SP9	MNR	258	5.1		1600		1487		6569725.13			533391.90
	1215			SP10	MNR	282	5.9		1647		2730		6570539.44			531072.68
	1230			SP11	MNR	261	5.5		1706		2984		6571619.86			528660.12
	1245			SP12	MNR	267	4.9		1752		3219		6572401.24			526451.85
	~~1300~~				~~MNR~~	~~273~~	~~5.3~~		~~1803~~		~~3364~~		~~6573381.99~~			~~525136.89~~
	1315			SP14	MNR	265	4.3		1845		3526		6574203.40			522547.07
	1330			SP15	MNR	268	4.8		1879		3657		6574806.51			520323.29
	1600			SP16	MNR	273	5.3		1801		3441		6573359.72			524360.55
	1345			SP17	MNR	279	4.7		1925		4057		6575608.27		518869.14	~~519200.43~~
	1400			SP18	MNR	275	4.1		1969		4260		6576395.85			516436.22
	1415			SP19	MNR	278	4.9		2015		4473		6577227.11			514461.78
	1430			SP20	MNR	277	4.9		2060		4685		6578049.15			512481.77
	1354			SAT 12	SAT				1957		4190					
	1445			SP21	DRC	270	4.6		2109		4904					
	1500	324		EOL 324	DRC	270	4.7		2147		5115		CRAB POTS	shortened line		
	1515	325		SOL 325	DRC	291	5.9		2188		5378					
	1530			SP1	DRC	270	6.5		2206		5613					
	1545			SP2	DRC	269	6.6		2213		5934					
	1558			SAT 12	DRC	~~269~~	~~7.0~~		2200		5990					
	1600			SP3	DRC	268	7.0		2202	-153	0075					
	1618				DRC	267			2171		0702					
	1630			SP5	DRC	273	6.6		2171		1011					
	1643	325		EOL 325	DRC	302	2.1		2154		1374					
	1645	326		SOL 326	DRC	318	7.7									
	1700			SP 1	DRC	318	4.7		2344		1629					
	1719			SP 2	DRC	315	4.2		2427		1771					
	1732			SP 3	DRC	314	4.1		2499		1897					
	1737	326		EOL 326	DRC	341	4.0		2533		1955					
	1750	327		SOL 327	DRC	170	6.0		2529		1891					
	1800	327		SP 1	DRC	178	4.6		2451		1862					
219	1815			SP 2	DRC	178	4.9		2929		1040					

U.S.G.S. NAVIGATION LOG

Cruise Locator SR - 78 - WG
ID. YR AREA

Ship BIG SEA SOUNDER Chief Scientist [illegible]/HAMPTON

Affiliation USGS

SLOPE, #1+4
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, # 3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31 / 6557643.63
E: 56576[illegible]

BLUFF, # 2
LAT: 59° 39.627' N: 6614147.88
LON: -151° 39.750' E: 675365.75

Page 15 of

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Object	Angle	Brg	Distance	Rate	Reading	TD	Time	Diff
219	1830		327		SP 3			DRC	180	5.9	+	59	2193	-	153	1830		STD	NORTHING			5	STA	EASTING			
	1843				C/C			DRC	191	5.3			2073			1837											
	1845				SP 4			DRC	184	5.2			2062			1819											
	1900				SP 5			DRC	171	5.3			1923			1906											
	1915				SP 6			DRC	178	5.8			1801			1837											
	1925		327		EOL 327			DRC	176	5.6			1695			1978											
	1933		328		SOL 328			DRC	033	2.0			1669			1926											
	1945				SP 1			DRC	042	4.2			1743			1942											
	2000				SP 2			DRC	040	4.2			1817			1837											
	2015				SP 3			DRC	031	4.1			1897			1712											
	2030				SP 4			DRC	030	4.4			1979			1583											
	2045				SP 5			DRC	026	4.5			2076			1473											
	2100		328		SP 6 EOL 328			DRC	035	5.1			2180			1345											
	2107		329		329 SOL 329			DRC	299	5.7			2816			1412											
	2115				SP 1			DRC	287	6.3			2242			1543											
	2140		329		SP EOL 329			DRC	293	6.1			2370			2022											
	2215				AT ST AUGUSTINE			DRC	060	6.9			2520			2162											
	2240			315	STA 315G1 ELSTM			DRC	036	0.9			2571			1925											
	2248			315	OFF STAT ON RX			DRC	359	1.1			2577			1968											
	[illegible]				TRANSIT TO STA			DRC																			
	2340			316	ONSTA 316G1			DRC	177	0.6			2183			1373											
	2350			316	OFFSTA 316G1			DRC	116	1.1			2207			1233											
	2350				TRANST TO TUSTA																						
220	0000							DRC	260	6.0			2250			1543											
	0029			317	ONSTA 317T1			DRC	292	1.7			2319			1891											
	0048			317	OFFSTA 317T1			DRC	276	1.6			2367			1995			NEVER HAVE I SEEN SUCH SLOPPY WRITING.								
	0100							DRC	277	1.5			2367			1945											
	0215				START TRANSIT			DRC	102	3.2			2379			2136											
	0230								092	10.1			2337			1685											
	0245								095	8.5			2340			1238											
	0300								097	8.6			2318			0810											
220	0315								086	9.0			2325			0407											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - NG
(ID. - YR - AREA)

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

SLOPE, #1+4
LAT: 60°03.214
LON: -151° 38.352
N: 6657224.19
E: 520092.54

ELIZABETH, #3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

BLUFF, #2
LAT: 59° 39.627'   N: 6614149.83
LON: -151° 39.750'   E: 575365.75

2/78

Page 16 of ___

LAST LINE-329

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. Deg	Lat. Minutes	Long. Deg	Long. Minutes	Wind	Visual, Radar, etc.	Loran, Raydist, etc.
														180	NORTHING	SFB EASTING
220	0230			TRANSIT			DRC	100	8.5	+59	2229	-152	5959			
	0345			MANEUVERING				106	7.4		2179		5502			
	0400			CRAB POTS, LOTS				094	5.9		2140		5100			
	0415							110	5.7		2110		4828			
	0421			END TRANSIT				062	4.7		2094		4648			
	0404			SAT 18			S				2136		5011			
	0441	330		START LINE 330			DRC	174	4.5		2047		4716			
	0445							176	4.7		2010		4726			
	0500							169	5.3		1887		4736			
	0498			SAT 19			S				1789		4742			
	0515						DRC	157	3.8		1791		4736			
	0530							164	3.8		1697		4727			
	0545							173	4.4		1591		4737			
	0600							171	4.5		1483		4757			
	0615							156	4.6		1369		4774			
	0620			CRAB POTS				150	4.6		1326		4760		MANUEVERING TO AVOID CRAB POTS	
	0608			SAT 12			S				1422		4785			
	0630						DRC	179	4.8		1257		4724		END OF CRAB POTS	
	0645							183	4.3		1143		4726			
	0700			STOPING-SIDE SCAN				190	4.0		1041		4752		A FEW CRAB POTS SIGHTED - SIDE SCAN RELEASED	
	0650			SAT 13			S				1108		4725			
	0715			SIDE SCAN IN			DRC	180	4.9		0969		4717		SIDE SCAN IN - UNDERWAY	
	0730							185	4.7		0843		4728			
	0734	330		END LINE 330				155	4.7		0812		4725			
	0736			START TRANSIT				079	5.2		0808		4690			
	0785			SP1				060	8.6		0825		4445			
	0738			SAT 14			S				0806		4626			
	0800			SP2			DRC	071	8.8		0869		4021			
	0805			END TRANSIT				074	8.5		0881		3861			
	0808	331		START LINE 331				008	4.6		0898		3847			
	0815			SP1				354	4.9		0955		3834			
220	0825	331		END LINE 331				335	4.8		1042		3837			

U.S.G.S. NAVIGATION LOG

LINE 331

Cruise Locator S8 -78 -WG
ID. YR AREA

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

SLOPE, #100
LAT. 60° 02.3W'
LON: -151° 58.352'
N: 6657224.19
E: 520093.54

ELIZABETH, # 3-5
LAT: 59° 09.290'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

8/78

BLUFF, #2
LAT: 59° 39.627' N: 6614149.88
LON: -151° 39.250' E: 575365.75

Page 17 of ____

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind SPD	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD or TD	Time %	OFF
																	STA	NORTHING				STA	EASTING			
220	0830			NEARING STA 318			DRC	169	3.0	+	59	1028	-	152	3842											
	0827			SAT 19			S					1047			3741											
	0839		318	ON STATION 318			DRC	054	0.9			0983			3836											
	0847							045	0.1			0984			3838											
	0856			ON BOTTOM				040	0.6			0918			3852											
	0902							043	0.7			0992			3855											
	0905		318	END STA 318				044	0.7			0996			3862											
	0919	331		RESUME LINE 331				004	6.0			1042			3866											
	0930							359	5.5			1143			3849											
	0924			SAT 20								1084			3870											
	0945							002	5.5			1268			3838											
	1000							012	5.8			1409			3840											
	1006	331		END LINE 331				009	5.8			1472			3846											
	1015			NEARING STA 319				178	5.4			1454			3828											
	1030			NEARING STA 319				113	0.7			1358			3854											
	1035		319	ON STA 319				067	0.5			1356			3844											
	1038			ON THE BOTTOM				060	0.8			1359			3844											
	1041		319	END STA 319				042	0.9			1363			3849											
	1045							082	0.9			1365			3850											
	1100	331		RESUME LINE 331			DRC	009	6.3			1457			3861			~~4:6569209.13~~				~~5:~~	~~520499.96~~			
	1115						MNR	026	4.7			1580			3844			4:6569209.13				5:	520499.96			
	1108			SAT 20			S					1529			3858											
	1130	331		END LINE 331			MNR	017	4.7			1695			3827			6571370.03					520654.25			
	1137		320	ON STA 320			MNR	017	1.4			1721			3840			6571836.15					520497.73			
	1145						MNR	300	1.4			1725			3875			6571924.23					520179.51			
	1200						MNR	329	1.6			1744			3935			6572268.71					519584.47			
	1210			SUTAR ON BOTTOM			MNR	349	1.7			1758			3982			6572537.20					519171.39			
	1215						MNR	012	1.8			1768			4000			6572712.32					518994.41			
	1230						MNR	011	1.6			1795			4059			6573206.52					518435.86			
	1245						MNR	011	1.6			1822			4112			6573715.63					517916.81			
	1300			~~START TV~~			MNR	143	1.0			1845			4132			6574155.05					517720.69			
220	1307			TV CAMERA ON			MNR	127	1.3			1855			4151			6574347.72					517564.99			

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist BOUMA/HAMPTON

Affiliation U.S.G.S.

SLOPE, #1+4
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, #3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

BLUFF, #2
LAT: 59° 39.627' N: 6614149.88
LON: -151° 39.750' E: 575365.75

DATE 2/78

Page 18 of ___

Julian Day	GMT HR	GMT MIN	GMT SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Object	Angle	Brg	Distance	Rate	Reading	T.D.	Time	GRP
																				NORTHING					EASTING			
220	13	15			320				MNR	060	1.1	+	59	1866	-	152	4171		3:	6574560.60				6:	517444.25			
	13	30							MNR	296	1.6			1873			4197			6574703.66					517121.39			
	13	46			320	END STATION 320			MNR	072	2.1			1883			4214			6575123.79					516963.58			
	14	00							MNR	112	5.0			1900			4010			6575168.13					518881.40			
	14	09				CHANGE COURSE			MNR	096	5.8			1886			3820			6574966.74					520597.13			
	14	14		331		RESUME LINE 331			MNR	359	5.2			1910			3759			6575374.19					521366.06			
	14	31		〃					MNR	347	6.0			2083			3803			6578562.56					520820.97			
	14	51		331		END LINE 331			MNR	001	4.9			2272			3797			6582059.81					520830.41			
	14	54			321	ON STA 321			MNR	020	1.3			2277			3739			6582167.86					520834.56			
	15	00				SUTAR ON BOTTOM			MNR	170	0.3			2282			3800			6582209.34					520779.73			
	15	14				2ND SUTAR ONBOT			MNR	058	0.5			2281			3787			6582213.01					520942.44			
	15	30							MNR	049	0.4			2284			3769			6582289.83					521162.73			
	15	43			321	END STA 321			MNR	051	0.4			2283			3757			6582244.55					521338.80			
	15	51		331		RESUME LINE 331			MNR	347	6.1			2315			3741			6582845.69					521509.92			
	16	00				SP 10			MNR	346	8.0			2440			3778			6585171.55					521049.80			
	16	15				SP 11			MNR	350	8.5			2641			3810			6588906.64					520671.13			
	16	30				SP 12			MNR	350	8.2			2845			3779			6592685.64					520759.93			
	16	45				SP 13			MNR	344	7.4			3042			3830			6596351.69					520520.30			
	16	56		331		EOL 331			MNR	051	1.4			3112			3856			6597802.34					520235.62			
	17	17			322	STA 322 SI			MNR	012	0.1			3109			3835			6597631.91					520085.50			
	17	32			322	OFF STA 322			MNR	305	2.8														5			
	17	37			323	ON STA 323			MNR	027	1.1			3086			3886			6597208.42					519926.32			
	18	00			323	OFF STA 323 SJ			MNR	011	1.4																	
	18	40		—	—	TRANSIT				—	—																	
	20	00				FIXING MINI RANG			DPC	002	1.7			2710			3876											
	21	10				UNDERWAY			MNR	170	6.4			2557			4231		1	6587547.32				2	517371.82			
	21	00				〃			MNR	250	4.3			2777			3790			6591415.89					520958.45			
	22	40				GRAPLING FOR UN			MNR	035	4.0			2816			3850			6592084.72					519324.15			
	23	22				〃 〃			MNR	101	3.7			2808			3621			6591969.05					521965.13			
220	23	45				EOF GRAPLING			MNR	324	4.1			2827			3574			6592554.39					519931.22			
221	00	00				TRANSIT			MNR	023	6.3									6594839.12					521582.47			
221	00	45		332		SOL 332 SP 1			MNR	083	5.1			3026			3540			6595997.52					523310.38			

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WC
ID. YR AREA

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

BLUFF, #2
LAT: 59° 39.627' N: 6614149.85
LON: -151° 39.250' E: 525365.75

SLOPE, #104
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, #905
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.11
E: 565762.63

2/78

Page 19 of ____

Julian Day	GMT Time HR MIN	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	Brgs	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	OFF
															STN	NORTHING				STN	EASTING			
221	0030	332		SP 2			MIR	023	4.7	+58	3050	-152	3310		1	6596683.59			2	525470.55				
	0045			SP 3			MIR	123	4.7		3089		3067			6597283.25				527613.99				
	0100			SP 4			MIR	090	5.1		3120		2836			6597932.50				529924.09				
	0115			SP 5			MWR	093	5.1		3157		2602			6598588.93				532059.62				
	0130			SP 6				084	5.4		3193		2407		1	6599266.84				2	534378.21			
	0145			SP 7				085	5.5		3232		2090			6600022.27					536828.72			
	0200			SP 8				075	6.0		3283		1825			6600988.54					539254.48			
	0215			SP 9				075	5.9		3341		1570			6602037.71					541236.96			
	0230			SP 10				090	5.9		3396		1277			6603122.92					544302.39			
	0245			SP 11				091	5.6		3413		1013			6603504.89					546957.88			
	0300			SP 12				076	5.9		3430		0753			6604025.20					549454.60			
	0315			SP 13				073	3.5		3487		0459			6604921.78					552168.91			
	0330			SP 14				074	5.7		3528		0303			6605717.61					554548.73			
	0345			SP 15				082	6.0		3562	-151	5918			6606408.44					557223.38			
	0356	332		END LINE 332				075	5.8		3583		5704			6606855.53					659289.17			
	0400	333		SP 1 ~~16~~, START 333				179	5.6		3558		5672			6606341.92					559570.17			
	0415			SP 2 ~~17~~				182	4.7		3423		5691			6603871.68					554432.20			
	0430	333		SP 3 ~~18~~, END 333				179	4.9		3300		5708			6601501.90					559312.72			
	0434	334		START LINE 334				257	4.9		3280		5751			6601173.15					558890.64			
	0445			SP ~~19~~ 1				262	4.9		3261		5915			6600807.14					557353.70			
	0500			SP ~~20~~ 2				268	4.9		3232	-152	0161			6600228.96					555041.10			
	0515			SP ~~21~~ 3				270	4.9		3201		0400			6599643.93					552295.28			
	0530			SP ~~22~~ 4				276	5.0		3173		0648			6599109.26					550495.00			
	0545			SP ~~23~~ 5				283	4.8		3156		0890			6598716.37					548192.40			
	0600			SP ~~24~~ 6				273	5.2		3131		1132			6598295.42					545925.07			
	0615			SP ~~25~~ 7				275	5.0		3107		1358			6597676.59					543796.28			
	0624	334		END LINE 334				284	4.7		3086		1494			6597365.63					542519.65			
	0628	335		START LINE 335				332	3.1		3088		1548			6597392.79					542011.52			
	0630			SP ~~26~~ 1				335	3.7		3094		1558			6597510.38					541899.11			
	0645			SP ~~27~~ 2				351	3.2		3173		1636			6598943.16					541166.18			
	0700			SP ~~28~~ 3				335	3.6		3247		1722			6600313.07					540372.36			
221	0715			SP ~~29~~ 4				352	3.3		3322		1804			6601706.49					539536.00			

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - NC
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist BOUMA/HAMPTON

Affiliation U.S.G.S.

BLUFF, #2
LAT: 59° 39.627' N:6614149.89
LON: -151° 39.750' E:573363.75

SLOPE, 1+4
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, #3+5
LAT: 59° 09.294'
LON: -151° 51.108'
N: 6557659.31
E: 565763.63

Date 2/78

Page 20 of

Julian Day	GMT HR	GMT MIN	GMT SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/-	Lat Deg	Lat Minutes	Lon +/-	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Object	Angle	Brg	Distance	Rate	Reading	TD or TO	Time %	EFF
																			STR	NORTHING				STR	EASTING			
221	07	10		335		SP ~~20~~ 5			MNR	337	4.9	+	59	34113	-	152	1891		1	6603462.08				2	538693.44			
	07	45				SP ~~21~~ 6				347	4.5			3522			2040			6605409.49					537577.27			
	08	00				SP ~~22~~ 7				344	4.9			3627			2107			6607364.22					536631.55			
	08	11		335		END LINE 335				339	5.0			3706			2195			6608835.99					535774.27			
	08	15		336		START 336, ~~SP 23~~				269	6.1			3713			2267			6608970.72					535115.57			
	08	30				SP ~~24~~ 2				293	4.8			3697			2555			6608669.63					532432.10			
	08	45				SP ~~25~~ 3				307	4.9			3675			2798			6608528.85					530179.02			
	08	47		336		END LINE 336				311	4.9			3693			2822			6608507.31					529883.42			
	08	54		337		START LINE 337				105	4.1			3652			2903			6607739.23					529165.30			
	09	00				SP ~~36~~ 1				108	3.8			3619			2876			6607132.13					529419.60			
	09	15				SP ~~37~~ 2				102	3.5			3583			2773			6606536.42					530361.61			
	09	30				SP ~~38~~ 3				065	2.4			3487			2652			6604682.79					531621.19			
	09	45				SP ~~39~~ 4				137	4.3			3414			2541			6603367.22					532546.97			
	10	00				SP ~~40~~ 5				140	4.3			3315			2430			6601518.13					533624.18			
	10	15				SP ~~41~~ 6				138	4.3			3223			2323			6599820.40					534642.28			
	10	30				SP ~~42~~ 7				145	4.0			3132			2233			6598148.22					535539.14			
	10	45				SP ~~43~~ 8				142	2.9			3047			2147			6596560.99					536459.42			
	10	54		337		END LINE 337				146	4.0			2995			2078			6595596.34					537014.98			
	11	00				~~SP 44~~				120	4.0			2952			2072			6594817.37					537047.42			
	11	05		338		START LINE 338				038	4.2			2968			2018			6595123.57					537620.98			fault
	11	15				SP ~~45~~ 1				035	3.5			3033			1915			6596335.49					538536.99			
	11	30				SP ~~46~~ 2				034	5.6			3152			1750			6598544.97					540039.92			
	11	45				SP ~~47~~ 3				036	6.0			3266			1619			6600666.02					541309.97			
	12	00				SP 48 4			MNR	042	5.7			3385			1437			6602919.32					542977.59			
	~~12~~	~~15~~								~~040~~	~~6.6~~									~~6602784.38~~					~~544410.??~~			
	12	15				SP ~~49~~ 5			DRK	040	6.0			3510			1259											
	12	30				SP ~~50~~ 6			MNR	046	6.6			3614			1088			6607329.13					546200.71			
	12	38		338		EOL 338				045	6.5			3690			0970			6608655.79					549371.79			
	12	41		339		SOL 339				042	6.0			3717			0920			6609158.36					548044.88			
	12	51		339		EOL 339				103	5.2			3720			0733			6609232.50					549593.68			
	13	04		340		SOL 340				175	2.3			3758			0717			6609937.45					549750.81			
	13	15				~~SP 55~~ SP 1				184	1.7			3705			0725			6608922.55					549659.90			

U.S.G.S. NAVIGATION LOG

Ship R/V SEA SOUNDER Chief Scientist Bouma/Hampton

Cruise Locator SB - 78 - KG
10. YR AREA

Affiliation U.S.G.S.

SLOPE, N14W
LAT: 60° 03.214
LON: -151° 38.352
N: 6657224.19
E: 520092.54

ELIZABETH, #3-5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565576863

Date 2/78

Page 21 of ____

BLUFF, #2
LAT: 59° 39.627' N: 6614149.88
LON: -151° 39.750' E: 575365.75

Julian Day	GMT Time HR MIN	Line No.	Station No.	Comments	Fix Type	New Course	New Speed	Lat DEG	Lat MINUTES	Long DEG	Long MINUTES	Wind SPD	Visual, Radar, etc. Object	Loran Rate	Loran Reading
												STA	NORTHING	STA	EASTING
271	1330	340		~~SP 54~~ SP 542	MNR	178	3.3	+59	3628	-152	0723	01	6607505.78	02	549767.01
	1345			SP ~~55~~ 3		174	3.3		3549		0718		6606039.37		549719.67
	1400			SP ~~56~~ 4		178	3.4		3470		0716		6604601.88		549753.58
	1245			SP 51 5		102	5.7		3714		0838		6609114.27		548521.98
	1300			SP 52 6		294	5.9		3737		0653		6609966.07		550202.19
	1415			SP 57 7		183	2.4		3325		0697		6602994.28		549966.62
	1430			SP 58 8		186	3.4		3303		0702		6601457.52		549912.83
	1445			SP 59 9		182	8.9		3208		0718		6599731.90		549800.09
	1458	340		END LINE 340		176	4.1		3128		0722		6598227.44		549781.89
	1500			~~SP 60~~		119	3.6		3111		0716		6597912.76		549859.45
	1515			~~SP 61~~		103	4.0		3175		0685		6599085.58		550106.79
	1523	341		START LINE 341		306	3.6		3172		0716		6599048.18		549837.07
	1530			SP 62 01		307	4.0		3194		0781		6599453.97		549238.17
	1545			SP 63 02		306	3.9		3260		0941		6600066.65		547686.66
	1600			SP ~~64 02~~ 03		306	6.7		3311		1080		6601515.54		546339.23
	615			SP ~~65 03~~ 04		328	3.2		3365		1222		6602541.26		544996.85
	1630			SP ~~66 04~~ 05		327	3.1		3414		1319		6603541.34		544088.29
	1645			SP ~~67 05~~ 06		325	3.2		3475		1425		6604578.72		543066.61
	1700			SP ~~68 06~~ 07		321	3.1		3555		1573		6605768.73		541910.59
	1646			SAT 19	SAT	326	3.3		3485		1441				
	1715			SP 08	MNR	329	2.8		3593		1641		6608263.18		541010.89
	1730			SP 09	MNR	323	4.3		3655		1799		6608863.90		539576.53
	1736	341		EOL 341	MNR	324	4.4		3698		1823		6608731.07		539156.98
	1746	342		SOL 342 SP D	MNR	215	6.4		3261		1960		6607927.81		538008.36
	1800			SP 21	MNR	250	5.1		3560		2152		6605997.47		536218.61
	1815			SP 32	MNR	256	5.0		3497		2282		6604838.86		534097.09
	1830			SP 43	MNR	248	5.5		3421		2605		6603523.02		531985.51
	1945			SP 54	MNR	253	5.6		3376		2845		6602681.43		529720.44
	1900			SP 65	MNR	246	5.8		3268		2057		6600472.74		527759.50
	1915	342		SP 76 EOL 342	MNR	211	6.2		3163		3275		6598679.31		525779.86
	1945	343		SP 80	MNR	024	7.3		3081		3088		6597193.61		527544.76
221	2000			SP 81	MNR	245	9.6		3128		3011		6597713.78		528193.99

U.S.G.S. NAVIGATION LOG

Cruise Locator SB - 78 - WC
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist BOUMA/HAMPTON

Affiliation U.S.G.S.

SLOPE, NNW
LAT: 60° 07.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, N 3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

D.E. 2/78

Page 22 of ___

BLUFF, N2
LAT: 59° 37.627'
LON: -151° 39.750'
N: 6614149.88
E: 575365.75

Day	HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Object	Angle	Brg.	Distance	Rate	Reading	TD	Time	EFF
221	20	15		343		S.P 92			MNR	014	4.4	+	59	3238	-	152	3084		STA	NORTHING				STA	EASTING			
	20	25		343		~~SP 4~~ EOL 343			MWR	005	4.6			2713			3186			6600116.58					527436.92			
	20	37		344		SOL 344			MAR	169	5.8			3329			3109			6601432.62					527468.28			
	20	45				SP 1			MAR	162	5.7			3255			3106			6601743.56					527254.60			
	20	47		344		EOL 344			MAR	162	5.7			3250			3106			6600341.29					527310.34			
221	22	18			324	AT ANCHOR			MAR	067	0.6			3243			3105			~~66004410~~					~~527265.36~~			
222	01	11				BLASTER DOWN			MNR	178	0.4			3253			3071			6600144.10					527265.36			
	01	13				BLASTER DOWN			DRC	178	0.4			3253			3108			6600312.31					527432.75			
	04	00			324	MINRANGER DOWN				216	0.9			3254			3107											
	04	52			324	LEAVE STA 324				001	4.3			3287			3074											
	04	57		345		START LINE 345				103	5.3			3312			3023											
	04	58		345		SAT 19			S					3311			3013											
	05	00				SP 1			DRC	104	5.9			3306			2965											
	05	15				SP 2				087	5.1			3301			2721											
	05	18				SAT 13			S					3301			2668											
	05	30				SP 3			DRC	096	4.9			3300			2475											
	05	45				SP 4				076	4.4			3296			2251											
	06	00				SP 5				069	4.2			3296			2041											
	06	15				SP 6				076	4.1			3301			1839											
	06	30				SP 7				062	3.8			3300			1696											
	06	45				SP 8				065	3.8			3297			1457											
	06	50				SAT 19			S					3295			1380											
	07	00				SP 9			DRC	065	3.7			3301			1275											
	07	15				SP 10			DRC	063	4.3			3278			1071											
	07	30				SP 11			DRC	065	4.4			3303			0856											
	07	45				SP 12			DRC	068	4.2			3300			0640											
	07	42				SAT 14			S					3297			0700											
	08	00				SP 13			DRC	065	4.7			3298			0430											
	08	15				SP 14			DRC	071	4.9			3299			0193											
	08	30				SP 15			DRC	068	4.9			3276	-	151	5950											
	08	40		345		END LINE 345			DRC	069	5.0			3301			5183											
222	08	49				~~SP 16~~			DRC	324	2.2			3315			5761											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 (ID.) - 78 (YR) - WG (AREA)

Ship R/V SEA SOUNDER Chief Scientist BOUMA/HAMPTON Affiliation U.S.G.S.

SLOPE, 104
LAT: 60° 03.214'
LON: -151° 38.352'
N: 6657224.19
E: 520092.54

ELIZABETH, N 3+5
LAT: 59° 09.294'
LON: -151° 51.104'
N: 6557659.31
E: 565763.63

BLUFF, # 2
LAT: 59° 39.627' N: 6614149.88
LON: -151° 39.750' E: 575365.25

Dur € 2/78

Page 23 of ___

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat DEG	Lat MINUTES	Long ±	Long DEG	Long MINUTES	Wind Dir.	Wind Spd.	Visual, Radar, etc. Object	Angle	Brg.	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Diff
																	STA	NORTHING				STA	EASTING			
222	0847	346		START LINE 346			DRC	213	2.8	+	59	3318	-	151	5784											
	0832			sar 19			S					3298			5922											
	0900			SP 1			DRC	313	4.2			3376			5701											
	0914	346		END LINE 346			DRC	310	4.3			2437	-	152	0048											
	0915						DRC	285	4.3			3441			0065											
	0917	347		START LINE 347			DRC	285	4.5			3442			0075			Computer stopped at 09 25 11. Quick start at								
	0950						DRC	267	5.6			3451			0626			~ 09 33 but timing off by 38 secs.								
	1000			SP 3			DRC	271	5.5			3449			0821			Sat 14 updated time. Everything back in order 0950.								
	1015			SP 4			DRC	275	4.4			3451			1055											
	1030			SP 5			DRC	271	5.3			3451			1293			Sidescan problems								
	1045			SP 6			DRC	275	4.5			3450			1530			"								
	1100			SP 7			DRC	273	4.4			3450			1747			"								
	1112	347		END LINE 347			DRC	27[illegible]	4.4			3451			1924			Sidescan fixed. Transit back to 1030 position to repeat								
	1115						DRC	321	4.4			3463			1960			line with sidescan.								
	1130						DRC	086	5.4			3451			1760											
	1145						DRC	087	6.6			3451			1439											
	1151			CHANGE COURSE			DRC	093	6.1			3451			1313											
	1200	348		SOL 348, SP 1			DRC	269	3.9			3458			1265											
	1215			SP 2			DRC	254	4.7			3453			1493											
	1230			SP 3			DRC	263	5.2			3452			1744											
	1245			SP 4			DRC	255	5.3			3454			1999											
	1250			COURSE CHANGE			DRC	252	5.1			3454			2078											
	1253			ON NEW COURSE			DRC	202	3.8			3444			2117											
	1300			SP 5			DRC	191	4.0			3403			2153											
	1315			SP 6			DRC	195	3.7			3312			2227											
	1317			COURSE CHANGE			DRC	232	3.8			3304			2248											
	1330			SP 7			DRC	245	3.6			3303			2141											
	1345			SP 8, EOL 348			DRC	244	4.1			3301			2674											
	1336			SAND RIBBONS			DRC	250	4.6			[illegible]			[illegible]											
	1345	348		EOL 348			DRC	244	4.9			3301			2674											
	1400						DRC	107	5.1			3321			2640											
222	1411		325	ON STATION 325			DRC	189	0.4			3299			1514											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 (ID.) -78 (YR) -WG (AREA)

Ship Sea Sounder Chief Scientist Bouma\Hampton Affiliation ______

Rev. 2/75

Page 24 of ___

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dic Code	Fix Type	New Course	New Speed	Lat N/S	Lat Deg	Lat Minutes	Lon W/E	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Visual Object	Angle	Brg	Distance	Loran Rate	Reading	TD/TA	Time	Eff
222	1419		325	BEGIN TV 1			DRC	174	0.7		033	3310	-	152	2517											
	1444		325	ENDED FIRST TV			DRC	251	1.8			3380			2501											
	1440			SAT 12			S					3361			2447											
	1500			TRANSIT			DRC	197	4.3			3335			2496											
	1515			TRANSIT			DRC	212	0.8			3273			2543											
	1518		325	ON STA TV2 BEG			DRC	219	1.0			3780			2538											
	1534		325	ENDED TV2			DRC	227	3.7			3297			2530											
	1550			TRANSIT			DRC	312	1.7			3329			2535											
	1604		326	SPUTAR SI			DRC	136	0.9			3283			2533											
	1556			SAT 19			SAT	176	3.2			3303			2541											
	1630			TRANSIT TO STA			DRC	010	2.9			3343			2496											
	1653		327	ON STA 327S			DRC	303	0.5			3394			2501											
	1700		327	OFF STA 327SI			DRC	343	0.1			3384			2505											
	1711	349		SOL 349			DRC	145	4.2			3384			2463											
	1715			SP1			DRC	154	4.7			3352			2424											
	1730			SP 2			DRC	136	5.1			3265			2299											
	1734			SAT 20			SAT	133	5.4			3238			2252											
	1745			SP 3			DRC	127	5.1			3165			2132											
	1750			C/C			DRC	097	4.2			3143			2072											
	1800			SP4			DRC	078	3.5			3140			1711											
	1815			SP5			DRC	075	3.2			3141			1659											
	1814			SAT 12			S	~~070~~	~~3.2~~			3138			1676											
	1830			SP6			DRC	070	5.0			3148			1419											
	1838			SAT 14			S					3054			1286											
	1845			SP7			DRC	078	4.8			3135			1180											
	1900			SP8			DRC	072	5.1			3145			0942											
	1915			SP9			DRC	061	4.4			3148			0718											
	1930											3148			0446											
	1930			SP10			DRC	067	4.2			3148			1506											
	1914			SAT 20			S					3144			0733											
	1932			SAT 19			S					3150			0177											
222	0930	349					DRC	069	4.7			3150			0206											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG (ID. YR AREA)

Ship Sea Sounder Chief Scientist Bouma \ Hampton Affiliation ____

8/78

Page 25 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.	Wind SPD	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	OFF
222	20	00		349		SP 12			DRC	068	4.7		[illegible]	3149	-	152	0048											
	20	15				SP 13			DRC	075	4.6			3148	-	151	5824											
	20	30				SP 14			DRC	071	4.8			3157			5396											
	20	40		349		EOL 349			DRC	074	4.4			3162			5437											
	21	00				TO HOMER			DRC	063	8.3			3227			5026											
	21	30							DRC	081	8.4			3349			4250											
222	23	30				TIED TO DOCK			DRC	128	0.10			3607			2448											
						IN HOMER FOR 24 HRS														IN HOMER FOR ABOUT 24 HRS. END LEG 1								
223	20	30				SPT 19			S					3615			2457											
	20	48				SPT 13			S					3612			2459											
	22	07				START LEG 2			DRC	143	0.1			3615			2459			START LEG 2								
	22	15				SP 1			DRC	219	4.6			3522			2444											
	22	30				SP 2			DRC	257	7.5			3511			2690											
	22	45				SP 3			DRC	254	7.8			3460			3049											
	23	00				SP 4			DRC	256	8.4			3409			3437											
	23	15				SP 5				255	8.6			3359			3837											
	23	30				SP 6				253	8.4			3308			4246											
	23	32				SPT 20			S					3346			3970											
223	23	45				SP 7			DRC	254	8.4			3268			4655											
224	00	00				SP 8				253	8.1			3210			5040											
	00	15				SP 9				258	7.8			3161			5413											
	00	30		350		SP 0, LINE 350				254	7.8			3118			5785											
	00	45				SP 1				214	7.7			3008	-	152	0046											
	01	00				SP 2				213	7.5			2854			0273											
	01	15				SP 3				211	7.2			2706			0477											
	01	30				SP 4				211	6.3			[illegible]			0680											
	01	45				SP 5				210	6.6			2438			0851											
	02	00				SP 6				210	7.7			2302			1068											
	02	15				SP 7				211	7.9			2168			1327											
	02	30				SP 8				210	7.4			2035			1603											
	02	45				SP 9				210	7.7			1910			1875											
224	03	00				SP 10				209	7.6			1772			2125											

U.S.G.S. NAVIGATION LOG

Cruise Locator SB - 78 - WG
ID. YR AREA

Ship SEA SOUNDER Chief Scientist Hampton/Bouma Affiliation USGS

Date 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 ±	DEG	MINUTES	LONGITUDE ±	DEG	MINUTES	WIND Dir.	SPD	VISUAL, RADAR, ETC. OBJECT	Angle	Brg	Distance	LORAN, RAYDIST, etc. Rate	Reading	TD	Time	GRP
224	03	15		350		SP 11			DRC	210	7.9	+	57	1612	-	152	2342											
	03	30				SP 12				210	8.1			1450			2573											
	03	45				SP 13				209	8.3			1291			2828											
	04	00				SP 14				210	7.8			1150			3016											
	04	12				SAT 14			S					1031			3330											
	04	15				SP 15			DRC	210	8.3			0999			3353											
	04	30				SP 16				210	8.5			0828			3636											
	04	45				SP 17				207	8.7			0654			3880											
	05	00				SP 18				203	9.0			0463			4093											
	05	06				SAT 19			S					0341			4170											
	05	15				SP 19			DRC	203	8.7			0266			4231											
	05	30				SP 20				202	9.0			0075			4505											
	05	45				SP 21				202	8.2	+	58	5870			4676											
	06	00				SP 22				204	8.5			5713			4826											
	06	15				SP 23				204	8.3			5530			[illegible]											
	06	30				SP 24				203	8.8			5345			5344											
	06	45				SP 25				202	9.0			5157			5568											
	07	00				SP 26				198	8.3			4956			5740											
	07	15				SP 27				201	8.5			4778			5917											
	07	30				SP 28				201	8.6			4585	-	153	0085											
	07	45				SP 29				202	8.8			4386			0244											
	07	46				SAT 14			S					4381			0252											
	08	00				SP 30			DRC	199	9.3			4185			0424											
	08	15				SP 31				200	9.8			3967			0607											
	08	30				SP 32				200	9.5			3749			0781											
	08	26				SAT 20			S					3826			0739											
	08	45				SP 33			DRC	200	9.7			[illegible]			[illegible]											
	09	00				SP 34			DRC	201	9.0			3316			1177											
	09	15				SP 35			DRC	198	5.9			3102			1350											
	09	30				SP 36			DRC	195	5.4			3130			1457											
	09	45				SP 37			DRC	192	4.0			2901			1547											
224	10	00		350		SP 38			DRC	190	4.2			2803			1609											

U.S.G.S. NAVIGATION LOG

Date 2/75

Cruise Locator 58 - 78 - WG (ID. - YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation USGS

Page 27 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	Latitude Minutes	Longitude +/- DEG	Longitude Minutes	Wind Dir.	Wind SPD	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD or TA	Time % Tr	SPP
224	1015	350		SP 39			DRC	197	4.3	058	2702	-153	1632											
	1019	350		COL 350			DRC	201	4.1		2677		1658											
	1012			SAT 20			SAT	200	4.7		2729		1614											
	1045		328	ON STA 328G			DRC	141	0.7		2785		1585											
	1107		328	ON BOTTOM			DRC	147	0.9		2756		1619											
	1150		328	OFF STA 328G1			DRC	037	1.9		2790		1710											
	1200	TRN		TRANSIT			DRC	033	8.4		2885		1611											
	1230	TRN					DRC	028	8.6		3253		1185											
	1300						DRC	067	8.8		3562		0645											
	1330						DRC	045	8.2		3846		0065											
	1400						DRC	046	8.1		4140	-152	5500											
	1430						DRC	045	7.3		4427		4119											
	1438			SAT 12			SAT	046	6.8		4483		4876											
	1500						DRC	044	6.3		4453		4578											
	1508			SAT 14			SAT	052	5.6		4468		4457											
	1530						DRC	095	5.9		4611		4059											
	1600						DRC	027	6.3		4709		3453											
	1606			SAT 19			SAT	090	6.4		4726		3377											
	1630						DRC	057	4.4		4754		2956											
	1645							087	5.5		4766		2705											
	1700							091	4.8		4726		2466											
	1656			SAT 14			S	(			4780		2512											
	1715						DRC	090	5.2		4788		2194											
	1730						DRC	092	5.5		4795		1947											
	1745						DRC	135	4.6		4714		1793											
	1754			SAT 19			S				4660		1688											
	1800						DRC	136	5.7		4616		1672											
	1815						DRC	136	5.2		4512		1447											
	1808			SAT 13			S				4567		1541											
	1830						DRC	137	6.0		4404		1267											
	1845						DRC	135	6.1		4291		1076											
	1842			SAT 14			S				4316		1130											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - NC (ID. YR AREA)

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

2/75

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dr. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Long ±	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran Rate	Reading	TD	Time	Spd
224	1900	TRN		TRANSIT			DRC	131	7.0	+	58	4169	-	157	0853											
	1915							130	7.3			4047			0590											
	1930							138	7.1			3922			0743											
	1945							138	7.0			3793			0107											
	1940			SAT 19			S					3840			0197											
	1958			SAT 13			S					3674	-	151	5909											
	2000						DRC	134	8.1			3655			5858											
	2015							137	8.5			3507			5587											
	2030							136	7.9			3360			5328											
	2045							136	7.7			3216			5064											
	2100							135	8.0			3070			4803											
	2115							134	7.8			2924			4548											
	2130							138	8.4			2777			4285											
	2145							137	8.1			2624			4030											
	2140			SAT 13			S					2678			4147											
	2200						DRC	135	8.5			2465			3801											
	2215							133	1.5			2314			3542											
	2216			SAT 20			S					2319			3532											
	~~2220~~			~~SAT-NAV-CRASH~~																						
	2230						DRC	135	7.8			2172			3254											
	2232			SAT-NAV CRASH			—																			
224	2343			SAT-NAV RUNNING			—									NO POSITION-WAIT FOR SATELLITE UPDATE										
225	0000	TRN		SAT 20-TRANSIT			S			+	58	0757			3605	OFF SET 3.26 NM.										
	0015						DRC	181	8.1			0250			3447											
	0020							182	8.2			0550			3477											
	0045							181	7.3			0349			3508											
	0100							184	7.3			0160			3529											
	0115							171	7.2	+	57	5980			3498											
	0130							170	7.0			5803			3456											
	0145							182	6.4			5633			3435											
	0200							181	6.3			5470			3437											
225	0215							180	5.9			5320			3441											

U.S.G.S. NAVIGATION LOG

Dn.€ 8/75

Cruise Locator 58 (ID.) -78 (YR) -WG (AREA)

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

Page 29 of ___

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. +/-	Lat. Deg	Lat. Minutes	Long. +/-	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Object	Range	Brg	Distance	Rate	Reading	TD	Time	Off
225	0230						DRC	149	5.4	+	57	5191	-	151	3375											
	0245	351		START 351 SP 1				143	5.9			5085			3227											
	0300			SP 2				147	4.5			4992			3093											
	0315			SP 3				152	4.3			4907			2962											
	0318			SAT 12			S	[illegible]	[illegible]			4903			2927											
	0330			SP 4			DRC	158	4.2			4834			2828											
	0345			SP 5				152	4.3			4795			2712											
	0356	351		COURSE CHANGE				186	4.5			4672			2608											
	0400			~~SP 6~~ TRAN				314	4.8			4675			2654											
	0415			~~SP 7~~ TRAN				228	4.4			4650			2841											
	0430			~~SP 8~~ TRAN				228	4.5			4588			3008											
	0418			SAT 19			S					4636			2871											
	0433			CHANGE COURSE			DRC	235	4.0			4574			3037											
	0437	352		START LINE 352				290	6.2			4579			3094											
	0445			SP 1				278	4.9			4611			3213											
	0452			COURSE CHANGE				282	5.0			4634			3314											
	0500			SP 2				317	6.4			4696			3401											
	0515			SP 3				288	4.3			4780			3546											
	0530			SP 4				297	4.5			4862			3698											
	0545			SP 5				295	4.3			4930			3852											
	0554	352		END LINE 352				240	3.6			4990			3378											
	0600			TRAN				230	4.2			4974			4001											
	0615			MISSED-PWR OFF																						
	0642			TRAN				230	4.7			4912			4146											
	0630			TRAN				230	4.6			4821			4344											
	0645			IN TURN				124	5.5			4734			4403											
	0700	353		SP 1 SOL 353				134	5.8			4647			4176											
	0652			SAT 14			S					4674			4273											
	0715	353		SP 2			DRC	146	4.1			4553			4005											
	0730			SP 3				142	5.8			4471			3872											
	0730			SAT 20			S					4532			[illegible]											
225	0745			SP 4			DRC	150	4.7			4386			3723											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship R/V Sea Sounder Chief Scientist Hampton/Bouma 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	Lat +/-	Lat Deg	Lat Minutes	Long +/-	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD/TA	Time	Dev
225	08	00		353		SP 5			DRC	142	4.5	+	57	4302	-	151	3523											
	07	52				SAT 19			S					4349			3648											
	08	15				SP 6			DRC	130	5.0			4220			3424											
	08	30				SP 7				151	3.9			4138			3214											
	08	35		353		END LINE 353				141	4.9			4110			3248											
	08	45				IN TRANSIT				256	4.0			4067			3305											
	09	00								258	4.0			4041			3486											
	09	15							PRC	256	4.0			4009			3662											
	09	16				SAT 20			SAT	257	4.0			4029			3557											
	09	27		354		SOL 354			DRC	318	3.6			3952			3624											
	09	30				SP 1			DRC	317	4.5			4005			3722											
	09	45				SP 2			DRC	319	4.0			4087			3956											
	10	00				SP 3				318	4.2			4165			4079											
	10	15				SP 4				325	4.6			4248			4213											
	10	30				SP 5				317	4.5			4348			4376											
	10	45				SP 6				319	4.7			4416			4482											
	11	00				SP 7				321	4.5			4502			4633											
	11	15		354		EOL 354				321	4.7			4590			4776											
	11	30				TRANSIT				211	4.9			4516			4917											
	11	45								212	5.1			4403			5018											
	11	53		355		SOL 355				140	4.1			4337			5121											
	12	00				SP 1				130	6.0			4300			5044											
	12	15				SP 2				137	4.8			4207			4890											
	12	30				SP 3				147	4.6			4113			4759											
	12	45				SP 4				136	4.8			4017			4626											
	13	00				SP 5				140	4.4			3926			4407											
	13	15				SP 6				136	4.6			3836			4358											
	13	20		355		EOL 355				140	4.5			3805			4314											
	13	30				TRANSIT				224	4.7			3756			4382											
	13	35							DRC	232	4.8			3679			4558											
	13	42				SAT 12			SAT	231	4.2			3705			4515											
225	14	00							DRC	219	4.8			3615			4750											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - 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	Lat ±	Lat Deg	Lat Minutes	Long ±	Long Deg	Long Minutes	Wind Dir.	Wind SPD	Object	Angle	Brg	Distance	Rate	Reading	TD	Time	SPP
225	1406	356		SOL 356			DRC	330	5.1	+	57	3630	-	151	4828											
	1415			SP1				313	4.4			3694			4901											
	1430			SP2				224	4.9			2757			5040											
	1445			SP3				320	4.7			3879			5175											
	1500			SP4				317	4.6			3962			5327											
	1515			SP5				314	4.4			4043			5434											
	1530			SP6				320	4.7			4128			5574											
	1533	356		EOL 356				309	3.8			4140			5602											
	1545			TRANSIT				207	4.2			4114			5700											
	1600							224	4.1			4038			5845											
	1615						DRC	219	4.9			3965			5962											
	1604			SAT 14			SAT	225	1.6			4022			5986											
	1630						DRC	228	4.7			3885	-	152	0170											
	1639	357		SOL 357				125	3.9			3838			0216											
	1645			SP1				141	4.7			2804			0143											
	1700			SP2				147	4.3			3726			0005											
	1715			SP3				140	4.3			3653	-	151	5856											
	1730			SP4				141	4.2			3582			5698											
	1704			SAT 19, ~~[illegible]~~			S					3705			5762											
	1745			~~[illegible]~~ SP5			DRC	159	4.1			3507			5558											
	1800			SP6				151	3.9			3431			5441											
	1750			SAT 14			S					3487			5521											
	1815			SP7			DRC	149	4.2			3353			5300											
	1830			SP8				140	4.5			3282			5148											
	1842	357		END LINE ~~[illegible]~~ 357				146	4.1			3222			5038											
	1845							142	4.3			3206			5010											
	1900	TRN		TURNING-TRANSIT				321	6.1			3171			4903											
	1852			SAT 19			S					3164			4954											
	1915						DRC	302	9.1			3327			5238											
	1935						DRC	302	8.3			3541			5529											
	1945			3				320	4.2			3662			5725											
225	1947	TRN		END TRANSIT				315	7.6			3681			5774											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
(ID. - YR - AREA)

Ship R/V SEA SOUNDER   Chief Scientist HAMPTON / BOUMA   Affiliation U.S.G.S.

2/78

Page 32 of ___

Julian Day	HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Long ±	Long Deg	Long Minutes	Wind	Visual, Radar, etc.	Loran, Raydist, etc.
225	19	55		358		SPO-START 358			DRC	349	4.3	+	57	3742	-	151	5796			
	20	00				SP1				352	4.0			3775			5808			
	20	15				SP2				349	4.1			3883			5792			
	20	30				SP3				355	4.7			3995			5798			
	20	41		358		END LINE 358				004	4.9			4086			5794			
	20	42		TRN		START TRANSIT				212	3.1			4088			5823			
	20	40		358		SAT 19			S					4084			5769			
	21	00		TRN					DRC	224	6.9			3977	-	152	0031			
	20	52				SAT 11			S					4042	-	151	5915			
	21	08		TRN		END TRANSIT			DRC	227	7.0			3711	-	152	0157			
	21	12		359		SPO START 359				084	4.1			3891			0141			
	21	15				SP1				085	5.3			3891			0089			
	21	30				SP2				075	4.5			3895	-	151	5868			
	21	45				SP3				090	4.1			3700			5674			
	22	00				SP4				091	4.2			3899			5487			
	22	03		359		END LINE 359				090	3.9			3899			5450			
	22	15		TRO		TRANSIT TO STA.				273	4.6			3894			5578			
	22	27			329					255	3.6			3702			5783			
	22	30								257	0.1			3901			5793			
	22	45								182	0.7			3896			5803			
	22	46				GRAV. CORE OTB				201	0.5			3895			5803			
	23	00								238	0.0			3895			5801			
	23	23			329	END STA 329				294	3.4			3895			5822			
	23	54			329	SAT 20			S					3896			5795			
	23	15		TRN		TRANSIT LINE			DRC	053	9.2			3994			5582			
	23	30								049	8.7			4123			5251			
	23	45								048	9.1			4257			4926			
226	00	00								051	8.9			4351			4593			
	00	15								050	8.8			4524			4265			
	00	30								051	9.1			4661			3931			
	00	45								049	8.8			4791			3603			
	01	00								046	8.9			4923			3278			

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG
(ID. - YR AREA)

Ship R/V Sea Sounder Chief Scientist Hampton/Bouma

Affiliation USGS

2/75

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. ±	Lat. DEG	Lat. MINUTES	Long. ±	Long. DEG	Long. MINUTES	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg.	Distance	Loran, Raydist, etc. Rate	Reading	TD or TA	Time %	Diff
226	01	15		TRN					DRC	051	9.1	+	57	5057	−	151	2940											
	01	30		TRN						052	8.9			5190			2611											
	01	45								050	9.0			5321			2282											
	02	00								054	9.5			5464			1919											
	02	15								052	9.2			5598			1585											
	02	30								049	8.6			5729			1250											
	02	45								053	9.3			5857			0927											
	03	00								053	9.0			5993			0586											
	02	24				SAT 12			S					5669			1388											
	03	15							DRC	055	8.8	+	58	0124			0248											
	03	30								051	8.8			0260	−	150	5920											
	03	45								059	8.9			0387			5583											
	03	50				CHANGE COURSE				056	8.7			0425			5475											
	04	05				IN TURN				150	4.8			0332			5340											
	04	15		360		SOL 360 SP 1				142	4.8			0262			5262											
	04	10		TRN		SAT 12			S					0300			5322											
	04	30		360		SP 2			DRC	142	4.9			0174			5141											
	04	45				SP 3				145	5.0			0073			5015											
	05	00				SP 4				146	4.7	+	57	5970			4893											
	05	15				SP 5				138	5.2			5874			4742											
	05	14				SAT 19			S					5880			4752											
	05	30		360		SP 6 EOL 360			DRC	155	6.4			5768			4609											
	05	33		TRN		COURSE CHANGE			DRC	150	4.0			5712			4555											
	05	45				IN TRANSIT				296	8.9			5733			4678											
	06	00								281	8.6			5816			5053											
	05	56				SAT 12			S					5798			4962											
	06	15							DRC	278	9.2			5883			5454											
	06	20				COURSE CHANGE				290	9.0			5914			5586											
	06	30		361		SOL 361 SP 1				075	4.6			5956			5473											
	06	45				SP 2				056	4.9	+	58	0018			5278											
	07	00				SP 3				058	5.0			0086			5090											
226	07	02				SAT 19			S					0095			5060											

U.S.G.S. NAVIGATION LOG

Ship R/V Sea Sounder Chief Scientist Hampton/Bouma Cruise Locator 38 - 78 - WG (ID. YR AREA) Affiliation USGS

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. ±	Lat. Deg	Lat. Minutes	Long. ±	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Object	Angles	Brg	Distance	Rate	Reading	TD or TB	Time % Gr.	Spf
226	0715	361		SP 4			DRC	056	5.3	+	58	0157	-	150	4894											
	0730	361		SP 6				052	4.4			0226			4705											
	0745	361		SP 6 EOL 361				057	4.5			0287			4532											
	0754	TRN		COURSE CHANGE				064	4.6			0327			4424											
	0800			IN TRANSIT				238	7.5			0292			4484											
	0815							234	8.2			0193			4807											
	0830							235	2.7			0102			5040											
	0834		330	ON STATION 330				261	1.5			0094			5061											
	0845							284	1.9			0091			5048											
	0853			GRAV CORE ONBOT				268	0.3			0096			5059											
	0900							258	0.2			0098			5057											
	0915							173	2.5			0086			5045											
	0929			33062 ON BOTTOM				248	1.2			0090			5062											
	0945		3306	TRANSIT OFFSTA				342	0.5			0089			5050											
	1000	TRN						101	8.9			0045			4656											
	1030							100	9.1		057	5940			3810											
	1100							102	9.4			5816			2976											
	1130							097	9.7			5650			2114											
	1200							100	9.8			5536			1227											
	1230							098	9.9			5392			0320											
	1300							094	9.1			5285	-	149	5462											
	1330							094	8.9			5217			4661											
	1400							091	8.5			5157			3854											
	1430							087	9.2			5140			3551											
	1500						DRC	081	5.0			5141			2274											
	1512	TRI		SAT 14			SAT	093	4.0			5136			2137											
	1540	362		SOL 362			DRC	248	4.8			5087			2227											
	1545			SP 1				245	4.5			5076			2095											
	1600			SP 2				245	4.9			5042			2314											
	1615			SP 3				213	4.9			4987			2527											
	1630			SP 4				209	4.9			4898			2660											
	1645			SP 5				216	4.9			4807			2825											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG (ID. YR AREA)

Ship SEA SOUNDER Chief Scientist HAMPTON / BOUMA Affiliation USGS

Page 35 of ___

8/78

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat N/S	Lat Deg	Lat Minutes	Lon E/W	Lon Deg	Lon Minutes	Wind Dir. Spd	Visual, Radar, etc. / Loran, Raydist, etc.
226	1700		362		SP6			DRC	225	4.7	+	57	4722	-	149	2985		
	1715				SP7				220	5.6			4617			3161		
	1717		362		END LINE 362				222	6.0			4578			3191		LORAN C SIGNAL OFF - RECEIVER WILL NOT
	1721		363		START LINE 363	F			181	5.3			4567			3202		TRACK - PROBABLE CAUSE - OVER
	1730				SP1	F			168	5.7			4483			3179		HEATED - NO AIR CONDITIONING
	1745				SP2	F			167	5.8			4341			3120		
	1800				SP3	F			170	5.9			4195			3066		
	1815				SP4	F			163	5.9			4048			3013		
	1830				SP5	F			168	6.0			3902			2946		
	1834		363		END LINE 363	P			168	6.0			3862			2933		
	1839		364		START LINE 364	P			044	5.3			3854			2867		
	1845				SP1	P			043	6.2			3901			2778		
	1900				SP2	P			056	6.1			3973			2537		1 MILE OFFSET - NO LORAN C
	1846				SAT 14	S		S					4010			2829		
	1915				SP3	F		DRC	077	6.1			4143			2324		
	1930				SP4	F			071	6.1			4188			2047		
	1945				SP5	F			064	6.2			4258			1789		
	2000				SP6	F			057	6.1			4350			1565		
	1952				SAT 19	S		S					4263			1846		
	2015				SP7	F		DRC	065	6.1			4374			1482		
	2030				SP8	F			052	6.1			4465			1235		
	2045				SP9	F			056	6.1			4554			0997		
	2100				SP10	P			089	6.7			4648			0753		
	2115				SP11	P			050	4.4			4708			0576		
	2117		364		END LINE 364	P			046	9.7			4716			0551		
	2127		365		START LINE 365	P			128	4.6			4744			0458		
	2130				SP1	P			130	4.1			4731			0429		
	2145				SP2	P			128	5.5			4459			0264		
	2200				SP3	P			118	3.6			4525			0093		
	2215				SP4	P			118	6.9			4943	-	148	5757		LORAN C BACK ON BUT QUESTIONABLE - READINGS
	2230				SP5	P			121	4.0			4441			5517		WRONG ON CHAIN
	2245				SP6	P			105	5.4			3369			5774		

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG (ID. YR AREA)

Ship R/V SEA SOUNDER Chief Scientist HAMPTON / BOUMA Affiliation U.S.G.S.

Page 36 of ___

2/78

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/-	Lat DEG	Lat MINUTES	Long +/-	Long DEG	Long MINUTES	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD or TA	Time	Off
226	23	00		365		SP7			DRC	113	5.5	+	57	4314	-	148	5049											
	23	15				SP8				111	5.7			4253			4810											
	23	30				SP9				102	6.2			4182			4563											
	23	35		365		END LINE				118	6.1			4162			4475											
	23	37		366		START LINE SP0				218	5.0			4130			4485											
	23	45		366		SP1				218	5.8			4096			4558											
226	23	32		366		SAT 20			S					4112			4820											
227	00	00		366		SP2			DRC	203	5.7			3899			4973											
	00	15				SP3				207	6.1			3759			5067											
	00	30				SP4				210	6.2			3639			5228											
	00	45				SP5				212	6.0			3518			5400											
	01	00				SP6				212	5.8			3400			5572											
	01	15				SP7				217	6.1			3283			5742											
	01	30				SP8				217	6.1			3171			5910											
	01	28				SAT 18			S					3157			5998											
	01	45				SP9			DRC	224	6.6			3056	-	149	0076											
	02	00				SP10				216	5.8			2942			0248											
	02	15				SP11				216	5.7			2827			0415											
	02	30				SP12				217	6.4			2706			0591											
	02	45				SP13				219	5.7			2590			0763											
	03	00				SP14				219	6.0			2478			0921											
	03	15				SP15				221	6.5			2347			1111											
	03	30				SP16				224	5.8			2227			1285											
	03	45				SP17				221	5.9			2104			1467											
	04	00		366		SP18 EOL 366				221	6.8			1982			1643											
	04	08		367		START LINE 367				066	6.4			2006			1657											
	04	15				SP1				065	6.3			2028			1512											
	04	30				SP2				047	5.5			2102			1310											
	04	32				SAT 19								2061			1284											
	04	45				SP3				031	5.5			2133			1102											
	05	00				SP4				041	5.5			2247			0948											
	05	15				SP5				052	5.5			2309			0721											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 (ID.) -78- WG (YR AREA)

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

2/75

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat. +/-	Lat. Deg	Lat. Minutes	Long. +/-	Long. Deg	Long. Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS TA	Time	Dep
127	0502		367		SAT 12			S			+	57	2257	-	149	0331											
	0545				~~SP6~~ SP7			DRC	044	5.4			2463			0305											
	0530				SP6			DRC	050	5.6			2383			0508											
	0600				SP8				044	5.4			2551			0104											
	0615				SP9				052	5.5			2635	-	148	5902											
	0630				SP10				047	5.5			2711			5682											
	0645				SP11				046	5.4			2790			5474											
	0700				SP12				044	5.5			2866			5264											
	0715				SP13				049	5.3			2946			5049											
	0730				SP14				046	5.7			3027			4836											
	0745				SP15				048	5.6			3106			4621											
	0800				SP16			DRC	052	5.6			3182			4410											
	0802				SAT 19			SAT					3187			4388											
	0815				SP17			DRC	048	5.4			3259			4202											
	0830				SP18				050	5.4			3332			4005											
	0845				SP19			DRC	051	5.6			3408			3785											
	0836				SAT 20			SAT					3366			3924											
	0900				SP20			DRC	049	5.6			3487			3552											
	0915				SP21				052	5.6			3564			3371											
	0930				SP22				052	5.6			3643			3154											
	0945				SP23				050	5.8			3724			2936											
	1000				SP24				050	5.4			3801			2720											
	1015				SP25				052	5.6			3850			2506											
	1030				SP26				050	5.6			3959			2286											
	1040		367		EOL 367				049	5.7			4010			2145											
	1045		368		SOL 368 SP0				090	6.0			4013			2058											
	1100				SP1			DRC	094	6.1			3987			1774											
	1024				SAT 20			SAT					3725			2379											
	1115				SP 2			DRC	094	6.0			3961			1499											
	1130				SP 3				093	5.9			3934			1221											
	1145				SP 4				094	6.5			3907			0935											
	1158		368		EOL 368			DRC	100	6.5			3881			0673											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 -78 -WG
(ID. YR AREA)

2/78

Ship SEA SOUNDER Chief Scientist HAMPTON/BNUMA Affiliation USGS

Page 38 of ____

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude N/S	Latitude DEG	Latitude MINUTES	Longitude E/W	Longitude DEG	Longitude MINUTES	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TE/TB	Time	Diff
227	12	00				TURNING			DRC	159	5.4		57	3869		146	0673											
	12	03		369		SOL 369			DRC	229	4.5			3847			0670											
	12	15				SP1			DRC	226	4.9			3775			0801											
	12	30				SP2				225	6.0			3672			0991											
	12	45				SP3				220	5.7			3560			1172											
	13	00				SP4				214	5.9			3467			1364											
	13	15				SP5				212	5.7			3323			1532											
	13	30				SP6				216	5.7			3219			1719											
	13	45				SP7			DRC	222	5.5			3107			1895											
	13	36				SAT 12			SAT					3173			1784											
	14	00				SP8			DRC	219	6.2			2992			2075											
	14	15				SP9				218	6.0			2810			2254											
	14	30				SP10				213	6.1			2767			2435											
	14	45				SP11				213	5.7			2654			2611											
	15	00				SP12				212	5.7			2536			2770											
	15	12		369		EOL 369				213	6.2			2447			2933											
	15	15		—						139	5.6			2422			2937											
	15	20		370		SOL 370				018	6.7			2453			2874											
	15	30				SP1				018	6.2			2559			2805											
	15	45				SP2				029	6.4			2703			2691											
	16	00				SP3				029	6.5			2840			2531											
	16	15				SP4			DRC	025	6.4			2974			2374											
	16	08				SAT 14			SAT					2912			2448											
	16	30				SP5			DRC	027	6.5			3115			2230											
	16	45				SP6			DRC	026	6.1			3251			2084											
	17	00				SP7				012	5.8			3379			1947											
	17	13		370		END LINE 370				026	6.0			3492			1824											
	17	16		371		START LINE SP0				099	5.8			3504			1777											
	17	30				SP1				084	6.1			3506			1501											
	17	28				SAT 13			S					3501			1549											
	17	45				SP2			DRC	090	6.8			3477			1209											
	18	00				SP3			DRC	093	5.6			3467			0932											

U.S.G.S. NAVIGATION LOG

Form 2/78

Cruise Locator 58 (ID.) - 78 (YR) - WG (AREA)

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation U.S.G.S.

Page 39 of ____

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude N/S	DEG	MINUTES	Longitude E/W	DEG	MINUTES	Wind Dir.	Spd.	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	etc.
227	17	58		371		SAT 14			S			N	57	3472	-	148	0982											
	18	15				SP4			DRC	091	5.9			3453			0677											
	18	30				SP5				078	5.9			3440			0405											
	18	45				SP6				095	6.0			3426			0135											
	19	00				SP7				093	5.9			3412	-	147	5861											
	18	54				SAT 20			S					3419			5970											
	19	15				SP8			DRC	096	6.7			3397			5577											
	19	14				SAT 13			S					3398			5573											
	19	30				SP9			DRC	097	6.1			3382			5291											
	19	45				SP10				097	6.2			3367			5005											
	20	00				SP11				090	6.5			3355			4715											
	20	15				SP12				090	6.1			3335			4422											
	20	30				SP13				098	6.5			3318			4127											
	20	45				SP14				091	6.2			3316			3861											
	21	00		371		SP15, END LINE				090	5.9			3292			3528											
	21	15								085	4.4			3277			3335											
	21	02				SAT 13			S					3278			3553											
	21	25				TURN TO STA. 331			DRC	329	3.2			3283			3210											
	21	30								278	6.9			3287			3324											
	21	45								275	6.5			3305			3625											
	22	00				SLOWING FOR STA				281	2.8			3313			3836											
	22	06			331	ON STA 331				018	0.6			3317			3851											
	22	15								342	0.7			3324			3821											
	22	30								244	0.6			3324			3817											
	22	22				SAT 20			S					3331			3807											
	22	45				ON BOTTOM			DRC	272	0.5			3314			3802			POSSIBLY ON BOTTOM-CARL CORE								
	23	00								286	0.8			3313			3827											
227	23	15								291	0.1			3314			3832											
228	00	00				G-1, NO RECOVERY				300	0.4			3314			3846			SAMPLE G-1 WASHED OUT, GOING DOWN AGAIN								
	00	15								308	0.1			3315			3847											
	00	30								302	0.1			3316			3849											
	00	45								299	0.4			3313			3848											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG (ID. YR AREA)

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

Page 40 of

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 ±	DEG	MINUTES	Longitude ±	DEG	MINUTES	Wind Dir.	Spd	Visual, Radar, etc. Object	Range	Brg	Comments	Loran, Raydist, etc. Rate	Reading	TE/TB	Time	SPP
228	01	00			331				DRC	305	0.3	+	57	3317	-	147	3851											
	01	15								278	0.1			3318			3846											
	01	30								290	0.3			3319			3848											
	01	45								294	0.4			3327			3859											
	02	00								290	0.2			3329			3858											
	02	15								210	0.6			3337			3863											
	02	30								178	0.3			3340			3841											
	02	45								178	0.2			3345			3829											
	03	00			331	END STA 331				188	0.2			3350			3817											
	03	15		TRN		IN TRANSIT				284	8.8			3374			4023											
	03	30								284	8.5			3445			4402											
	03	40				SAT 19			S					3491			4672											
	03	45							DRC	287	8.7			3520			4782											
	04	00								286	8.6			3593			5182											
	04	15								285	8.2			3663			5538											
	04	30								287	8.2			3731			5896											
	04	45								284	8.4			3797	-	148	0259											
	05	00								282	8.1			3855			0621											
	05	15								282	8.5			3910			0992											
	05	30		TRN		APPROACH STA 332				265	2.9			3936			1209											
	~~05~~	~~32~~			~~332~~	~~START STA 332~~				~~250~~	~~1.9~~																	
	05	34			332	START STA 332				198	0.6			3934			1220											
	05	45								256	0.8			3940			1200											
	06	00				GI ON BOTTOM			DRC	247	0.1			3941			1203											
	06	02				SAT 14			S					3942			1179											
	06	15								272	0.5			3943			1208											
	06	30								269	0.3			3949			1167											
	06	45								232	0.3			3952			1162											
	07	00			332	END STATION 332				304	0.9			3960			1123			CONRAC ~~HD~~ HEADING OFF								
	07	15		TRN						091	9.3			3979			0881			"								
	07	30								272	7.9			3956			0975			"								
	07	45								270	8.0			3965			1328			"								

U.S.G.S. NAVIGATION LOG

8/78

Cruise Locator S8 - 78 - WG (ID. YR AREA)

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

Page 41 of ____

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ± DEG	Lat Minutes	Long ± DEG	Long Minutes	Wind Dir.	Wind SPD	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS/TB	Time	Off
228	0800	TRN					DRC	271	8.1	+57	3374	-148	1712			CONRAC HDING GONE BESERK								
	0815							268	8.2		3371		2098			"								
	0836			SYSTEM OFF				266	8.7		3766		2653			system off to reload tape.								
	0846			SYSTEM ON		Q		262	7.8		3175		2610			system on, heading seems to be corrected.								
	0945					Q		293	5.7		3770		4126											
	1037	372		SOL 372		Q		271	4.4		3854		4572											
	1045	"		SP1		Q		280	4.4		3875		4698											
	1100			SP2			DRC	275	5.2		3899		4911											
	1100			SAT 20			S				3857		5141											
	1115	372		SP3 EOL 372			DRC	246	5.1		3887		5322											
	1130			TRANSIT			DRC	077	4.5		4525		5487											
	1145							099	8.2		3895		5125											
	1200							056	8.2		3858		4742											
	1224		333	ON STA 33362			DRC	100	1.4		3845		4522											
	1245		"	ON BOTTOM							3845		4512											
	1345		333	OFF STA 33361				216	3.3		3756		4531											
	1400	TST		TRANSIT				221	4.7		3723		4679											
	1415							220	5.0		3737		4864											
	1430							217	3.5		3757		5066											
	1445							217	4.8		3674		5200											
	1500							217	4.8		3579		5340											
	1515						DRC	216	4.8		3487		5479											
	1516			SAT 14			S	219	5.5		3482		5491											
	1530						DRC	219	5.5		3391		5617											
	1545							218	5.7		3287		5718											
	1600						DRC	219	5.6		3180	-148	5948											
	1612			SAT 12			S				3105	-149	0069											
	1695						DRC	036	4.2		3163	-148	5945											
	1700							029	4.0		3241		5822											
	1715							137	11.4		3294		5771											
	1737	TRN		EOL TRANSIT				116	11.8		3287		5761											
	1750		334	ON STA 334				135	11.6		3284		5744											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 (ID.) - 78 (YR) - WG (AREA)

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation U.S.G.S.

Page 42 of ___

TRNSTST = TRANSIT

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind SPD	Object	Angles	Brg	Distance	Rate	Reading	TD or TA	Time %/Kn	SFP
228	17	30			334				DRC	184	0.0	+	57	3298	-	148	5742											
	17	40				G-1, ON BOTTOM				181	0.0			3297			5742							LORAN C ACTING UP				
	17	45								158	0.0			3297			5742							LOTS OF NOISE -				
	18	00								209	0.2			3292			5748							LOTS OF BLINK				
	18	15								199	0.4			3288			5748											
	18	25			334	LEAVE STA 334				137	2.2			3268			5751											
	18	30		TRN		TRANSIT				236	4.0			3178			5814											
	18	45		TRN		END TRANSIT				207	3.0			3126			5726			FIRING UP SPARKERS								
	19	00		373		SP 1, START LINE				202	2.8			3052	-	149	0064			SPEEDING UP TO 5 KNTS								
	18	54				SAT 14			S					3065			0118											
	19	15				SP 2			DRC	208	5.0			2941			0259											
	19	30				SP 3			DRC	220	5.0			2840			0373											
	19	30				SAT 20			S					2828			0471											
	19	45				SP 4			DRC	201	4.1			2734			0611											
	20	00				SP 5				211	5.0			2629			0708											
	20	04		373		END LINE 373				218	4.4			2603			0792											
	20	11		374		START LINE 374				005	5.4			2617			0811											
	20	15				SP 1				008	7.1			2863			0779											
	20	12				SAT 13			S					2608			0821											
	20	30				SP 2			DRC	013	7.0			2823			0743											
	20	39		374		END LINE 374				004	6.5			2926			0726											
	20	43		375		SP0-START LINE				146	9.0			2937			0683											
	20	45				SP 1				136	5.2			2922			0664											
	21	00				SP 2				133	6.6			2817			0421											
	21	15		375		SP 3, END LINE				129	6.0			2722			0202											
	21	26		TST		TO STA 335 TRAN				067	4.7			2674			0074											
	21	30								304	5.4			2699			0106											
	21	45		TST		END TRANSIT				256	3.4			2832			0349											
	21	55			335	ON STA 335				220	1.2			2831			0411											
	22	00								166	1.0			2821			0418											
	22	15								169	0.5			2517			0374											
	22	30								148	0.4			2833			0392											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WC
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist HAMPTON / BOUMA Affiliation NONE

Page 43 of ____

Dec 2/78

Julian Day	GMT Time HR MIN	Line No.	Station No.	Comments	Fix Quality	Fix Type	New Course	New Speed	Lat +/-	Lat Deg	Lat Minutes	Long +/-	Long Deg	Long Minutes	Wind / Visual, Radar, etc. / Loran, Raydist, etc.
228	2245		335			DRC	149	0.5	+	57	2837	-	149	0390	
	2309		335	END STATION 335			142	1.4			2877			0373	
	2309			SAT-NAV CRASH											TYPED IN NEW WAYPOINT AND SYSTEM CRASHED - SCREEN FROZE & WOULD NOT QUICK START - WAITING FOR SATELLITE FOR TIME & POSITION UPDATE
228	2335			SAT-NAV RUNNING											
231	0124			SAT 12		S			+	57	4399	-	149	0124	
	0145			TRANSIT		DRC	318	6.2			4640			0224	
	0157		336	ON STATION 336			301	1.3			4661			0235	
	0200						300	1.4			4661			0222	
	0207			GI ON BOTTOM			272	0.1			4660			0208	
	0215						283	0.6			4660			0211	
	0230						253	0.9			4654			0180	
	0245						326	1.4			4645			0119	
	0252		336	END STATION 336			276	1.7			4638			0081	
	0256	TST		START TRANSIT			249	4.3			4624			0114	
	0300						248	5.1			4610			0157	
	0315						251	7.1			4541			0407	
	0330						250	6.3			4470			0665	
	0346						251	6.5			4397			0946	
	0400						248	7.0			4324			1212	
	0415						251	7.2			4248			1503	
	0430						253	6.9			4170			1778	
	0436			SAT 19		S					4136			1908	
	0445					DRC	248	6.5			4048			2021	
	0500						254	7.0			4026			2357	
	0458			SAT 12		S					4032			2311	
	0515					DRC	253	7.2			3962			2659	
	0530						262	6.9			3844			2962	
	0537			SAT NAV CRASH											SCREEN FROZE & WOULD NOT QUICK START,
	0615			SAT NAV RUNNING											JUST UPDATED SAT 19.
	0622			SAT 19	Q	S					3701			4196	Fix considered Q because satellite update had to
	0645				Q	DRC	254	7.0			3697			4700	be manually [illegible]

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG (ID. - YR - AREA)

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

Page 44 of ____

Julian Day	GMT HR	GMT MIN	GMT SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Lon ±	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc.	Loran, Raydist, etc.
229	07	00		TRN			Q		DRC	254	7.3	+	57	3614	-	149	5020				
229	07	02				SAT 14	G		S					3602			5007			Fix considered G, satellite update was automatically accepted	
	07	30							DRC	254	7.7			3561			5645				
	07	45								252	7.8			3511			5986				
	08	00								251	8.0			3468	-	150	0327				
	08	02				SAT NAV CRASH														Screen froze for no apparent reason, Quick Start	
	08	35				SAT NAV RUNNING														would not work. Awaiting satellite update.	
	09	00					Q		DRC	249	8.8			3274			1502				
	09	11				SAT NAV CRASHED															
	11	25				SAT NAV RUNNING														Position wrong, waiting for SAT UPDAT	
	11	30				SAT 12			S					2667			4204			GOOD SAT - NOW ON THE MOVE	
	15	12		376		376 SOL 376			DRC	140	7.2			2678			4613				
	15	15				SP1			DRC	132	6.5			2653			4589				
	15	30				SP2			DRC	098	4.9			2549			4460				
	15	45				SP3			DRC	105	5.7			2477			4137				
	16	00				SP4			DRC	105	5.9			2397			4019				
	16	15				SP5 C/C SHIP			DRC	096	5.7			2337			3896				
	16	10				SAT 14			S					2345			3879				
	16	30				SP6			DRC	137	6.4			2225			3597				
	16	45				SP7			DRC	109	5.8			2141			3411				
	17	00				SP8			DRC	116	5.2			2055			3212				
	17	15				SP9				122	5.0			1972			3011				
	17	30				SP10				109	4.6			1879			2827				
	17	45				SP11				101	5.2			1821			2678				
	18	00				SP12				119	5.4			1753			2477				
	17	58				SAT 14			S					1762			2511				
	18	15				SP13			DRC	102	5.7			1666			2284				
	18	30				SP14				115	4.7			1591			2099				
	18	45				SP15				112	5.2			1511			1912				
	19	00				SP16				118	5.3			1428			1737				
	19	15				SP17				113	5.6			1353			1545				
	19	30				SP18				110	5.6			1260			1340				

Rev. 2/75

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WC
(ID. YR AREA)

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation UNKNOWN

Page 45 of ___

2/75

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Ctr. Code	Fix Type	New Course	New Speed	Lat. ± DEG	Lat. MINUTES	Long. ± DEG	Long. MINUTES	Wind Dir.	Wind Spd.	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Diff
229	1924		376		SAT 13			S			+57	1288	-150	1432											
	1945				SP19			DRC	109	5.5		1125		1128											
	2000				SP20				117	6.3		1074		0921											
	2015				SP21				104	5.7		0985		0742											
	2030				SP22				104	6.4		0905		0478											
	2045				SP23				108	6.5		0795		0255											
	2100				SP24				118	6.4		0669		0011											
	2115				SP25				120	6.8		0584	-149	5222											
	2130				SP26				111	6.1		0495		5542											
	2145				SP27				111	6.6		0399		5322											
	2200				SP28				119	6.9		0276		5083											
	2152				SAT 20			S				0350		5230											
	2215				SP29			DRC	121	7.3		0190		4827											
	2230				SP30				117	6.4		0086		4607											
	2245				SP31				126	6.3	+56	5988		4349											
	2300				SP32				117	6.4		5886		4145											
	2315				SP33				121	6.3		5787		3916											
	2330				SP34				126	6.4		5689		3688											
	2345				SP35				124	6.0		5591		3469											
230	0000				SP36				125	6.4		5996		3245											
	0015				SP37				128	6.2		5395		3029											
	0030		376		SP38, END LINE				119	6.5		5295		2801			PULL IN SPARKERS								
	0045		TST		START TRANSIT				095	4.3		5275		2589			SPARKERS IN - ON TO STATION								
	0100								307	7.1		5368		2745											
	0115								303	7.2		5468		2187											
	0130								304	7.0		5579		5245											
	0145								305	7.2		5688		3504											
	0200								301	7.3		5797		3766											
	0215								302	7.0		5888		4041											
	0216				SAT 12			S				5906		4040											
	0230		TST					DRC	294	7.1		5994		4299											
	0243			337	START STA 337				278	2.2	+57	0030		4434											

U.S.G.S. NAVIGATION LOG

Cruise Locator ~~S78~~ S8 - 78 - WG (ID. - YR - AREA)

Ship R/V Sea Sounder Chief Scientist Bouma/Hampton Affiliation Just Friends

Page 46 of ____

Dec 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 DEG	Latitude Minutes	Longitude DEG	Longitude Minutes	Wind	Visual, Radar, etc. Object	Loran, Raydist, etc.
230	0245			337				DRC	256	0.2	57	0031	-149	4490			
	0236				SAT 14			S				0016		4403			
	0300							DRC	260	0.5		0032		4464			
	0315								245	0.2		0032		4508			
	0330								283	0.5		0036		4506		GI ON BOTTOM AT 0335.	
	0345								35E	0.2		0037		4504			
	0348				SAT 19			S				0032		4510			
	0400							DRC	260	0.0		0034		4478			
	0415			337	END STATION 337			DRC	278	0.6		0029		4489			
	0408		~~TST~~	337	SAT 12			S				0027		4496			
	0430		TST		IN TRANSIT			DRC	310	6.6		0025		4656			
	0445								307	6.5		0202		4832			
	0500								306	7.5		0319		5108			
	0515								307	7.4		0430		5305			
	0530								308	8.3		0551		5578			
	0545								304	8.8		0675		5871			
	0600								303	7.0		0789	-150	0135			
	0615								302	7.8		0883		0464			
	0608				SAT 14			S				0820		0302			
	0630		TST					DRC	319	3.8		0954		0662			
	0640			338	ON STATION 338				321	0.4		0984		0711			
	0645								252	2.2		0973		0708			
	0700				GI ON BOTTOM				282	0.9		0917		0638			
	0715								310	1.4		0924		0662			
	0702				SAT 20			S				0946		0621			
	0730							DRC	287	1.0		0617		0657			
	0734				G2 ON BOTTOM			DRC	302	1.0		0913		0664			
	0722				SAT 19			S				0918		0653			
	0745							DRC	266	11.3		0871		0660			
	0757			338	END STATION 338				305	11.1		0848		0661			
	0800		TST						316	7.4		0863		0708			
	0815								314	7.9		0982		0984			

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 -78-WG (ID. YR AREA)

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

2/78

un 377

Julian Day	GMT HR	GMT MIN	GMT SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	LAT ±	LAT DEG	LAT MINUTES	LONG ±	LONG DEG	LONG MINUTES	WIND Dir.	WIND Spd	VISUAL, RADAR, ETC. OBJECT	Angle	Brg	Distance	LORAN, RAYDIST, etc Rate	Reading	TS or TB	Time %	Off
230	08	30		TST					DRC	321	8.6	+	57	1101	-	150	1257											
	08	45							DRC	330	9.8			1232			1524											
	08	46				SAT 20			S					1246			1533											
	09	00							DRC	346	5.2			1373			1710											
	09	16			339	ON STA 339				116	1.4			1423			1741											
	09	25				ON BOTTOM GI								1415			1754											
	10	10			339	OFF STA 33761				264	3.7			1429			1799											
	10	15		TST						313	9.5			1462			1906											
	10	30								315	9.1			1611			2218											
	10	45							DRC					1742			2466											
	10	32		TST		SAT 20			S					1631			2241											
	10	48			340	ON STA 340			DRC	314	0.6			1750			2475											
	11	00				ON BOTTOM				186	1.3			1748			2492											
	11	32			340	OFF STA				340	0.6			1755			2543											
	11	45		TST		TRANSIT				255	9.2			1730			2365											
	12	00								257	8.7			1695			2276											
	13	00								254	8.4			1541			4785											
	14	00							DRC	253	8.3			1290	-	151	0240											
	14	22				SAT 12			S	255	7.9			1209			0268											
	15	00							DRC	255	7.9			1073			1735											
	15	18				SAT 14			S					0993			2163											
	16	00							DRC	254	8.3			0790			3195											
	16	38				SAT 19			S					0614			4133											
	17	00							DRC	258	9.0			0522			4712											
	19	00								254	8.6			0320	-	152	0228											
	18	30		TST		END TRANSIT LIN				248	5.9			0228			0947											
	18	34		377		SPO START LINE				191	4.9			0210			1023											
	18	22		TST		SAT 19			S					0248			0821											
	18	45		377		SP1			DRC	175	3.8			0130			1023											
	18	52				SAT 14			S					0081			1027											
	19	00				SP2			DRC	177	3.9			0027			1045											
	19	15				SP3				200	4.3	+	56	5923			1062											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 (ID.) - 78 (YR) - WC (AREA)

Ship RV SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation [illegible]

Page 48 of ____

Julian Day	GMT Time (HR MIN SEC)	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/-	Lat Deg	Lat Minutes	Lon +/-	Lon Deg	Lon Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran Rate	Reading	TD	Time	OFF
230	1930	377		SP4			DRC	190	5.3	+	56	5834	-	152	1072			LORAN C PROBLEMS								
	1945			SP5			DRC	188	5.5			5729			1115			LORAN C CORRECTED								
	2000			SP6				175	7.8			5617			1158											
	2015			SP7				176	4.4			5513			1173											
	2021	377		END LINE				174	4.4			5469			1182											
	2027	378		SP0 START LINE				294	4.6			5474			1175											
	2030			SP1				295	5.1			5483			1212											
	2045			SP2				325	4.6			5546			1493											
	2100			SP3				311	4.4			5634			1614											
	2115			SP4				310	4.3			5711			1755											
	2130			SP5				308	4.4			5785			1904											
	2145			SP6				305	4.5			5852			2049											
	2200	378		SP7, END LINE				300	3.6			5917			2184											
	2210	TST		TURN TO STATION				244	5.2			5864			2300											
	2215							117	8.0			5940			2280											
	2226	TST		END TRANSIT				126	1.1			5900			2153											
	2228		341	ON STA 341				148	0.5			5900			2148											
	2230			ON BOTTOM-GI				162	0.6			5900			2147											
	2232			SPT 20			S					5903			2137											
	2245						DRC	198	0.3			5901			2149											
	2253			ON BOTTOM VANV				227	0.4			5903			2144											
	2300		341	END STATION				226	0.0			5903			2145											
	2304	TST		TRANSIT TO STA				156	5.3			5896			2153											
	2315							134	8.5			5792			1980											
	2330							128	8.5			5648			1701											
	2342	TST		END TRANSIT				141	3.4			5582			1545											
	2345		342					141	1.6			5577			1536											
230	2351			ON BOTTM-VAN VN				314	1.1			5577			1558											
231	0000							167	0.8			5589			1552											
	0015							173	0.7			5604			1527											
	0026			ON BOTTOM-GI				203	0.4			5582			1525											
	0050							216	0.7			5584			1522											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation [illegible]

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude N/S DEG	Latitude Minutes	Longitude E/W DEG	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Off
231	0036		342	ON BOTTOM-G7			DRC	208	0.4	+56	5580	-152	1531											
	0043			ON BOTTOM-G7				216	0.4		5577		1531											
	0045							212	0.2		5576		1531											
	0049		342	END STATION 342				159	0.5		5576		1528											
	0053	TST		ON TRANSIT				241	7.2		5559		1564											
	0100							242	7.6		5523		1706											
	0115							243	7.2		5442		2021											
	0130							242	8.3		5363		2353											
	0120			SAT 12			S				5417		2131											
	0145						DRC	243	7.8		5294		2685											
	0200							244	7.7		5217		2999											
	0215							243	7.6		5141		3313											
	0230							244	7.2		5053		3618											
	0245							243	7.7		[illegible]		[illegible]											
	0300							244	8.0		[illegible]		[illegible]											
	0315							242	8.1		4779		4545											
	0330							242	8.1		4690		4874											
	0345							244	8.6		4615		5178											
	0400							244	9.0		4525		5523											
	0415							245	8.4		4433		5874											
	0430							244	8.1		4348	-153	0209											
	0445							242	8.7		4264		0558											
	0446			SAT 19			S				4263		0558											
	0500						DRC	235	8.1		4172		0874											
	0505			COURSE CHANGE				235	8.7		4135		0188											
	0515	TST						217	4.9		4061		1079											
	0521	379		START LINE 379				220	4.8		4024		1131											
	0530							220	4.0		3968		1201											
	0545							216	4.3		3880		1316											
	0600							216	4.4		3789		1452											
	0605	379		END OF LINE 379				216	3.8		3761		1473											
	0615	TST						214	4.4		3708		1542											

Rev. 2/75

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG (ID. - YR - AREA)

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

2/78

Page 50 of ___

Julian Day	GMT HR	GMT MIN	GMT SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/-	Lat DEG	Lat MINUTES	Lon +/-	Lon DEG	Lon MINUTES	Wind Dir.	Wind SPD	Object	Angles	Brg.	Distance	Rate	Reading	TS-TA	Time	SPF
231	06	20		TST		COURSE CHANGE			DRC	317	4.3	+	58	3676	-	153	1583											
	06	30								039	9.5			3746			1540											
	06	45								030	8.7			3907			1286											
	06	30				SAT 19			S					3737			1543											
	07	00							DRC	036	8.8			4088			1059											
	07	11		TST		COURSE CHANGE				010	8.3			4218			0884											
	07	15								198	4.0			4207			0910											
	07	18		380	~~380~~	START LINE 380																						
	07	30								218	3.8			4128			0996											
	07	45								212	4.0			4053			1096											
	07	40				SAT 20			S					4082			1064											
	08	00							DRC	212	3.9			3976			1195											
	08	15								213	3.9			3898			1294											
	08	30		380		EOL 380				212	3.8			3824			1389											
	08	45								002	5.1			3856			1402											
	08	32				SAT 13			S					3821			1402											
	08	48				CHANGE COURSE			DRC	258	5.0			3884			1458											
	09	00		TST		TRANSIT				145	4.5			387[illegible]			1[illegible]4											
	09	10		381		SOL 381				150	3.2			3327			1310											
	09	15				SP1				163	3.4			3809			1285											
	09	30				SP2				146	4.1			3731			1160											
	09	45				SP3				150	3.7			3453			1034											
	10	00				SP4				146	4.2			3573			0908											
	10	15				SP5				150	4.0			3495			0781											
	10	30				SP6				141	4.2			3418			0660											
	10	45				SP7				14[illegible]	4.2			3341			0535											
	11	00				SP8				145	4.0			3264			0413											
	11	15		381		EOL 381				153	4.2			3176			0290											
	11	12				SAT 20T								3193			0315											
	11	45		TST		TRANSIT				248	7.8			3078			0565											
	12	05		382		SOL 382				348	5.0			3016			0971											
231	12	15				SP1			DRC	304	3.6			3063			1023											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG
ID. YR AREA

Ship SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation ______

Page 51 of ____

DATE 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 ±	Latitude Deg	Latitude Minutes	Longitude ±	Longitude Deg	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angles	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS or TB	Time ½ TTo	SPF
231	12	30		382		SP2			DRC	317	4.2	+	56	3140	-	153	1126											
	12	45				SP3				319	4.4			3230			1240											
	13	00				SP4				317	4.4			3319			1350											
	13	15				SP5				321	4.5			3412			1464											
	13	30				SP6				321	4.3			3502			1557											
	13	45				SP7				326	4.3			3597			1688											
	13	28				SAT 12								3480			1567											
	14	00				SP8				322	4.0			3678			1788											
	14	15				SP9				327	4.1			3764			1877											
	14	30				SP10				325	4.4			3852			2005											
	14	45				SP11				321	4.0			3945			2185											
	15	00				SP12				321	4.0			4032			2225											
	15	15				SP13				329	4.6			4118			2342											
	15	30		382		SP14 EOL 382				323	4.5			4215			2453											
	15	40		383		SOL 383				110	4.9			4229			2443											
	15	46				SP1				092	4.9			4223			2164											
	16	00				SP2			DRC	099	4.8			4187			2184											
	15	46				SAT 19			S					4223			2231											
	16	15				SP3			DRC	102	4.8			4169			1969											
	16	30				SP4			DRC	098	4.9			4136			1760											
	16	14				SAT 14			S					4172			1846											
	16	45				SP5			DRC	095	4.8			4103			1579											
	17	00				SP6				101	4.4			4076			1355											
	17	02				SAT 12			S	099	4.2			4072			1322											
	17	15				SP7			DRC					4039			1161											
	17	30				SP8				105	3.8			4014			0929											
	17	34				SAT 19			S					4010			0928											
	17	45				SP9			DRC	101	4.2			3985			0796											
	18	00				SP10				110	4.5			3955			0587											
	18	15				SP11				108	4.2			3928			0404											
	18	30				SP12				104	3.7			3901			0221											
	18	45				SP13				109	4.3			3880			0049											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

WEST SEA 783 Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation SHB ARUGAU GAS

Page 52 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	Latitude MINUTES	Longitude DEG	Longitude MINUTES	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg.	Distance	Loran, Raydist, etc. Rate	Reading	TD or TA	Time Diff	Off
231	1900	383		SP14			DAC	114	9.1	+56	3848	-152	5866											
	1915	383		END LINE 383				113	3.9		3817		5690											
	1920	TST		ON TRANSIT, SPO				270	6.8		3797		5640											
	1930			SP1				283	8.3		3850		5910											
	1941			SLOW TO 4 KNOTS				274	5.7		3894	-153	0176											
	1945			SP2				278	9.4		3903		0226											
	2000			SP2				271	3.9		3931		0378											
	2004			GAS SEEP				272	4.0		3937		0441											
	2007			SAT-NAV CRASH				276	4.4		3944		0481			DAMN								
	2026			SAT-NAV RUNNING	R			251	1.7		4000		0790			POSITIONS WRONG UNTIL SAT UPDATE								
	2100				P			115	8.0		3971		0627											
	2115			180 TURN	P			117	4.4		3936		0426											
	2130				P			284	4.1		3767		0479											
	2122			SAT 13 MANUAL	F		5	281	3.7		3971		0510			AT 13° BUT LOOK GOOD + AGREE'S WITH ANOTHER LOW PASS.								
	2145				F			288	3.8		4054		0466											
	2200			TURN TO STA	F			297	0.2		4103		0618											
	2207			STEADY ON	F			169	3.9		4108		0576											
	2215				F			163	3.9		4057		0556											
	2230				F			162	3.7		3969		0954											
	2241			TURN TO STA	F			182	3.7		3902		0464											
	2245	TST		END TRANSIT	F			015	4.8		3711		0476											
	2248		343	ON STA 343	F			349	3.3		3731		0463											
	2251			ON BOTTOM, 6-1	F			272	1.4		3937		0472											
	2300				F			220	1.9		3926		0477											
	2310		343	END STATION 343	F			201	0.8		3938		0460											
	2312	TST		TO NEXT STATION	F			263	1.8		3940		0464											
	2315				F			245	5.4		3943		0500											
	2320	TST		END TRANSIT	F			241	1.0		3940		05[illegible]2											
	2321		344	ON STATION 344	F			222	1.4		3941		0571											
	2324			ON BOTTOM, 6-1	F			288	1.5		3947		0563											
	2330		344	END STA	F			302	1.1		3959		0561											

2/78

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Ship R/V SEA SOUNDER Chief Scientist Hampton/Bouma Affiliation ______

Page 51 of ____

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Ctr. Code	Fix Type	New Course	New Speed	Latitude +/-	Lat. DEG	Lat. MINUTES	Longitude +/-	Long. DEG	Long. MINUTES	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS-TO	Time	Spd
231	23	45		TST			F		DRC	228	5.2	+	56	3767	-	153	0552											
232	00	00					F			222	6.6			3858			0728											
	00	15					F			221	6.6			3745			1002											
	00	21		TST		END TRANSIT	F			208	6.1			3700			1082											
	00	23		~~TST~~			F			156	3.8			3687			1083											
	00	30		384		SP1, START LINE	F			155	4.0			3648			1027											
	00	45				SP2	F			155	4.1			3566			0911											
	01	00				SP3	F			152	4.1			3487			0786											
	01	09		384		END LINE 384	F			152	4.0			3442			0729											
	01	15		TST		IN TRANSIT	F			310	8.2			3482			0740											
	01	30		TST			F			295	4.0			3600			0943											
	01	38			345	START STA 345	F			266	1.5			3612			0991											
	01	45					F			330	0.8			3612			0997											
	01	50				GI ON THE BOTTM	F			239	0.5			3611			1000											
	02	00					F			254	1.6			3610			1018											
	02	06			345	END STATION 345	F			250	0.4			3614			1027											
	02	08		TST		START TRANSIT	F			241	0.2			3615			1026											
	02	15					F			192	2.9			3585			1018											
	02	30				COURSE CHANGE	F			189	4.5			3468			1010											
	02	34		~~385~~		~~START LINE 385~~	F			283	4.5			3451			1033											
	02	46		TST			F			280	3.4			3453			1172											
	03	00					F			255	3.1			3453			1340											
	03	15		385		START LINE 385	F			313	4.5			3453			1496											
	03	30					F			314	4.2			3533			1610											
	03	45		385			F			309	3.7			3616			1715											
	03	58		TST		COURSE CHANGE	F			277	4.1			3680			1797											
	03	54		385		END LINE 385	F			322	3.9			3656			1777											
	04	00		TST			F			185	4.3			3618			1818											
	04	09			346	START STA 346	F			231	1.9			3616			1752											
	04	12				GI ON BOTTOM	F			262	0.4			3622			1751											
	04	15					F			271	0.4			3621			1749											
	04	21			346	OFF STA 346	F							3620			1734											

2/78

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG
(ID. - YR - AREA)

Ship R/V Sea Sounder Chief Scientist Hampton/Bouma

Affiliation U.S.G.S.

Date 2/75

Page 54 of ___

Julian Day	GMT Time HR MIN SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat N/S	Lat Deg	Lat Minutes	Long E/W	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Visual, Radar, etc.	Visual, Radar, etc.	Visual, Radar, etc. Distance	Loran, Raydist, etc. Rate	Loran, Raydist, etc. Reading	Loran, Raydist, etc. TS	Loran, Raydist, etc. Time	Loran, Raydist, etc. STP
132	0430	TST			F		DRC	309	4.1	+	56	3665	-	153	1771											
	0433		347	ON STA 347	F		DRC	250	1.4			3678			1799											
	0435		↓	ON BOT G1	F			260	0.7			3676			1792											
	0445		347	END STATION 347	F			262	0.8			3676			1779											
	0500	TST			F			319	5.1			3728			1838											
	0510		348	ON STA 348	F			244	0.6			3768			1900											
	0515			G1 ON BOTTOM	F			282	0.8			3766			1887											
	0530				F			246	1.1			3773			1890											
	0535		348	END STATION 348	F			217	0.8			3773			1891											
	0545	TST			F			326	6.2			3837			1982											
	0549		349	ON STATION 349	F			236	0.7			3852			2002											
	0554			G1 ON BOTTOM	F		↓	267	0.3			3850			2002											
	0600				F		DRC	263	0.7			3859			2007											
	0556			SAT 13	G		S					3874			1980											
	0615		↓				DRC	242	0.8			3846			1991											
	0627		349	END STATION 349				332	0.9			3853			1998											
	0645	TST		TRANSIT				033	8.5			4016			1717											
	0700							043	8.7			4172			1452											
	0715							043	8.9			4330			1136											
	0730							033	9.0			4490			0817											
	0734			CHANGE COURSE			↓	048	9.4			4531			0824											
	0730			SAT 19			S					4479			0888											
	0745	↓					DRC	146	6.3			4535			0762											
	0800	TST		COURSE CHANGE				138	7.4			4407			0489											
	0815	386		START LINE 386				301	4.4			4441			0566											
	0830			SP2			↓	293	4.9			4508			0720											
	0818			SAT 20			S					4456			0596											
	0845			SP3			DRC	301	4.6			4582			0691											
	0900			SP4				300	4.3			4652			1048											
	0915			SP5				302	4.4			4720			1202											
	0930			SP6				303	4.1			4787			1353											
↓	0945			SP7				308	4.2			4856			1509											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG
(ID. YR AREA)

Ship SEA SQUADER Chief Scientist HAMPTON/BOUMA Affiliation ______

Page 55 of ___

Julian Day	GMT Time HR	MIN	SEC	LINE NO.	STATION NO.	COMMENTS	Fix Quality	Dis. Code	Fix Type	New Course	New Speed	Lat +/-	Lat DEG	Lat MINUTES	Lon +/-	Lon DEG	Lon MINUTES	Wind Dir.	Wind SPD	Visual, Radar, etc. OBJECT	Range	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TS or TG	Time % Ma	SPP
232	10	00		286		SP8 EOL 386			DRC	304	4.4	+	56	4921	-	153	1660											
	10	13		387		SOL 387			DRC	127	5.2			4954			1665											
	10	04				SAT 20			S	134	4.1			4942			1304											
	10	32				SP2			DRC	135	4.3			4983			1514											
	10	45				SP3				133	4.5			4809			1238											
	11	00				SP4				134	4.3			4736			1257											
	11	15				SP5				131	4.2			4666			1108											
	11	30		387		SP6 EOL 387				110	4.3			4598			0959											
	11	56		~~350~~	350	ON STATION 350				238	0.7			4627			1002											
	12	00				ON BOTTOM				257	0.6			4620			1000											
	12	21		~~35~~	350	OFF STA 350				317	0.8			4622			0957											
	12	30		TST		TRANSIT				317	1.9			4666			1048											
	12	41			351	ON STA 351				343	0.6			4686			1049											
	12	45			351	ON BOTTOM				343	0.4			4686			1088											
	13	07			351	OFF STATION				185	4.5			4697			1074											
	13	15		TST		TRANSIT				180	7.2			4613			1077											
	14	12			352	ON STA 352				219	1.2			4028			1099											
	14	21				ON BOTTOM				245	0.5			4019			1088											
	14	58			352	OFF STA 352				210	1.3			4019			0995											
	15	20		TST						245	2.7			4017			1007											
	14	48				SAT 112								4019			1115											
	15	14			353	ON STA 353			DRC	275	0.6			3990			1111											
	15	16				ON BOTTOM				289	1.6			3980			1108											
	15	27			353	OFF STATION 353				247	1.3			3975			1048											
	16	00		TST		TRANSIT				240	4.7			3852			1329											
	16	29			354	ON STA 354				202	1.9			3789			1630											
	16	41				ON BOTTOM				342	0.5			3792			1626											
	16	46				SAT 19			S	-				3785			1625											
	17	00								240	0.8			3771			1590											
	17	15				RETURN TO LOCAR				244	0.5			3754			1546											
	17	27				ON BOTTOM 6-2				302	1.0			3786			1653											
	18	01				ON BOTTM VANV-1				276	0.4			3766			1624											

DATE 2/78

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG (ID. - YR - AREA)

Date 2/75

Ship NV SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation ____

Page 56 of ____

NEXT LINE 388

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat +/-	Lat Deg	Lat Minutes	Long +/-	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Object	Angle	Brg	Distance	Rate	Reading	TD or TA	Time % Ht.	SPP
232	18	30			354				DRC	165	0.8	+	56	3750	-	153	1579											
	18	36			354	END S18 354			M	237	4.6			3742			1571											
	18	32			354	SAT 19			S					3726			1570											
	18	38		TST		ON TRANSIT XRS			DRC	237	7.2			3735			1583											
	18	45								235	9.9			3671			1742											
	19	00								225	8.5			3470			2047											
	19	15								226	9.0			3356			2326											
	20	00								222	9.2			2872			3209											
	20	30								220	9.2			2558			3830											
	20	18				SAT 20			S					2680			3593											
	21	00							DRC	215	9.9			2214			4394											
	21	15								214	9.1			2035			4650											
	21	29		TST		END TRANSIT				231	3.0			1940			4775											
	21	45								194	8.6			1822			4850											
	22	00		388		START LINE, SP1				195	5.0			1705			4906											
	22	02				SAT 20			S					1698			0912											
	22	30				SP3			DRC	182	4.2			1425			5023											
	22	45				SP4				194	4.2			1371			5026											
	23	00				SP5				194	4.9			1259			5133											
	23	15				SP6				207	4.1			1155			5187											
	23	30				SP7				207	4.9			1052			5241											
232	23	45				SP8				197	5.3			0937			5301											
233	00	00				SP9				202	5.2			0820			5361											
	00	15				SP10				205	4.5			0698			5472											
	00	30				SP11				199	5.3			0581			5485											
	01	00				SP13				180	5.0			0326			5617											
	01	15		388		SP14 ENDLINE388				192	4.7			0203			5679											
	01	25				CHANGE COURSE				196	2.1			0143			5711											
	01	16				SAT 12			S					0118			5631											
	01	30		TST		IN TRANSIT			DRC	036	4.3			0153			5740											
	01	45								084	7.4			0139			5407											
233	02	00								077	6.7			0106			5080											

U.S.G.S. NAVIGATION LOG

Date 2/75

Cruise Locator S8 -78-WG
ID. YR AREA

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

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	Angle	Brg.	Distance	Loran, Raydist, etc. Rate	Reading	T.D.	Time	Off
233	02	15		TST					DRC	089	6.6	+56	0082	-153	4784											
	02	30								092	8.3		0060		4450											
	02	40				CHANGE COURSE				097	8.1		0034		4221											
	02	45								015	3.5		0062		4171											
	03	00		389		START LINE, SP1				331	2.4		0135		4145											
	03	15				SP2				020	4.1		0235		4107											
	03	30				SP3				007	4.9		0341		4049											
	03	45				SP4				005	4.2		0444		3996											
	04	00				SP5				010	4.4		0549		3948											
	04	15				SP6				011	4.5		0654		3898											
	04	30				SP7				010	4.4		0758		3845											
	04	45				SP8				016	4.2		0863		3794											
	05	00				SP9				021	4.6		0963		3736											
	04	50				SAT 12			S				0897		3767											
	05	15				SP10			DRC	011	4.5		1073		3692											
	05	30				SP11				006	4.3		1178		3637											
	05	45		389		SP12 ENDLINE389				007	4.5		1281		3591											
	05	59		TST		COURSE CHANGE				012	4.5		1386		3539											
	06	15				INTRANSIT				084	4.9		1409		3330											
	06	30								074	8.9		1442		2971											
	06	45								076	8.0		1482		2606											
	06	51				COURSE CHANGE				084	8.1		1500		2485											
	07	00		390		START LINE, SP1				197	3.1		1446		2495											
	07	15				SP2				198	3.3		1354		2528											
	07	14				SAT 20			S				1360		2533											
	07	30		390		IN TRANSIT F[illegible]			DRC	192	7.8		1251		2577											
	07	45				TOO ROUGH TO [illegible]				201	7.7		1065		2653											
	08	00								201	6.8		0890		2740											
	08	15								190	7.5		0711		2828											
	08	30								197	7.7		0530		[illegible]											
	08	45								190	8.0		0347		2995											
	09	00		390						194	7.5		0161		3079											

U.S.G.S. NAVIGATION LOG

Cruise Locator S8 - 78 - WG (ID. / YR / AREA)

Date 2/78

Ship SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation ________

Page 58 of ____

Julian Day	GMT Time HR MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Ctr. Code	Fix Type	New Course	New Speed	Latitude +/- DEG	Latitude Minutes	Longitude +/- DEG	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Off
233	0914		~~[illegible]~~		TRANSIT			DRC	189	4.4	+55	5985	-153	2157											
	0930		~~390~~		~~SOL 390~~				226	0.7		5861		3243											
	1058		391		SOL HDG 391				021	4.0		5718		3602											
	1106				SP1				009	4.1		5773		3541											
	1130				SP3				008	3.9		5955		3426											
	1145				SP4				005	4.6	+56	0034		3388											
	1200				SP5				005	4.7	+56	0130		3339											
	1215				SP6				012	4.3		0240		3285											
	1230				SP7				003	4.6		0344		3231											
	1245				SP8				006	4.1		0447		3119											
	1300				SP9				003	4.4		0557		3127											
	1315				SP10				001	4.4		0661		3078											
	1330				SP11			DRC	005	4.1		0764		3010											
	1324				SAT 12			S				0727		3048											
	1345				SP12			DRC	005	4.0		0877		2955											
	1400				SP13				003	4.0		0967		2917											
	1415				SP14				006	4.0		1063		2867											
	1430		391		SP15 EOL 391				028	4.2		1161		2816											
	1445		TST		TRANSIT				356	2.4		1246		2766											
	1500		TST						198	4.9		1173		2731											
	1531			355	ON STA 355				142	4.6		0876		2457											
	1548			355	ON BOTTOM				301	1.4		0853		2441											
	1603			355	OFF STA 355				341	1.1		0817		2545											
	1615		TST		START TRANSIT				289	2.4		0820		2897											
	1630								203	3.7		0739		2961											
	1620				SAT 14			S				0802		2920											
	1645							DRC	207	3.2		0655		3021											
	1700		TST		END TRANSIT			DRC	213	3.3		0579		3091											
	1656		TST		SAT 12			S				0602		3074											
	1710			356	ON STA 756			DRC	302	0.8		0558		3127											
	1716				CORE ON BTTM G1				311	1.0		0552		3128											
	1730								297	0.2		0547		3123											

U.S.G.S. NAVIGATION LOG

DATE 2/75

Cruise Locator 58 (ID.) - 78 (YR) - WC (AREA)

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BOUMA Affiliation NONE

Page 59 of ____

NEXT LINE - 392

NEXT STA - 357

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Lat ±	Lat Deg	Lat Minutes	Long ±	Long Deg	Long Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD	Time	Off
233	17	45			356				PRC	318	0.7	+	56	0519	-	153	3118											
	18	00			356					309	1.0			0548			3162											
	18	02			356	END STA 356				273	1.1			0542			3157											
	18	06		TST		START TRANSIT				296	6.9			0559			3209											
	18	15								298	6.0			0602			3351											
	18	30								297	7.0			0686			3603											
	18	45		TST		END TRANSIT				278	4.5			0755			3832											
	18	49			357	ON STATION				295	0.0			0757			3844											
	18	56				CORE ON BTTM 61				301	0.7			0756			3846											
	19	00								312	0.2			0758			3852											
	19	15								354	0.8			0760			3853											
	19	26			357	END STA				299	0.2			0757			3871											
	19	30		TST		START TRANSIT				032	7.9			0773			3887											
	19	45								020	8.2			0974			3735											
	20	00								021	8.8			1169			3577											
	20	15								020	8.5			1371			3430											
	20	30								022	8.5			1571			3298											
	20	45								023	8.4			1768			3163											
	21	30								023	8.4			2358			2713											
	21	45								022	8.4			2551			2545											
	22	00								020	8.3			2736			2377											
	22	30								022	8.0			3112			2042											
	22	45								022	8.2			3292			1872											
	22	00								017	8.7			3481			1696											
	23	30								015	8.8			3881			1383											
233	23	45								013	8.9			4091			1246											
234	00	00								011	9.0			4301			1114											
	00	15								003	6.5			4512			1006											
	00	25								309	5.2			4622			1008											
	00	30				FOOT OF FAULT				307	6.5			4651			1067											
	00	41				TURN				036	3.6			4736			1203											
	00	51		TST		END TRANSIT				205	4.2			4716			1163											

U.S.G.S. NAVIGATION LOG

Cruise Locator 58 - 78 - WG
ID. YR AREA

Date 2/78

Ship R/V SEA SOUNDER Chief Scientist HAMPTON/BEHMA Affiliation SUB AQUEOUS OOZE

Julian Day	GMT Time HR	MIN	SEC	Line No.	Station No.	Comments	Fix Quality	Dir. Code	Fix Type	New Course	New Speed	Latitude ±	Latitude Deg	Latitude Minutes	Longitude ±	Longitude Deg	Longitude Minutes	Wind Dir.	Wind Spd	Visual, Radar, etc. Object	Angle	Brg	Distance	Loran, Raydist, etc. Rate	Reading	TD or TD	Time %	Off
234	00	51	30		357	ON STATION				205	4.2	+	56	4716	-	153	1163											
	00	56			✓	ON BOTTOM, 61				275	0.7			4703			1170											
	01	00			✓					287	0.9			4703			1142											
	01	07			358	END STA				289	2.1			4700			1129											
	01	10				TO NEW STA				255	0.9			4699			1113											
	01	17			359	ON STATION				172	4.5			9652			1062											
	01	21				ON BOTTOM, 61				270	0.2			4647			1059											
	01	35				ON BOTTOM, 62				274	1.4			9652			1012											
	01	42			359	END STATION				289	0.3			4651			0978											
	01	49			EST	TO KODIAK				340	3.2			4663			0978											
	01	53				END S8-78-WG				044	[illegible].8			4702			0942											

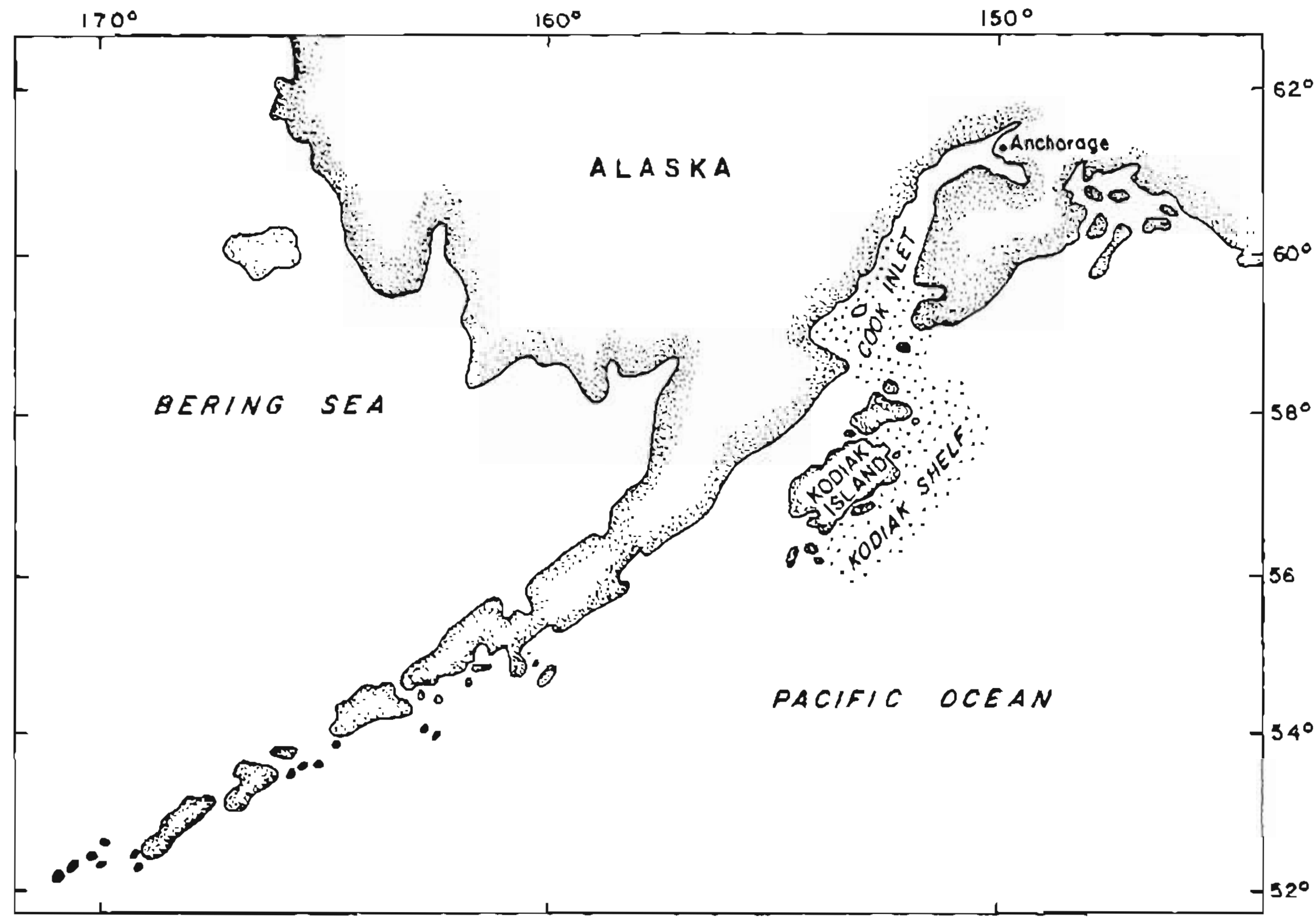

Figure 1.- Generalized location map of the study area

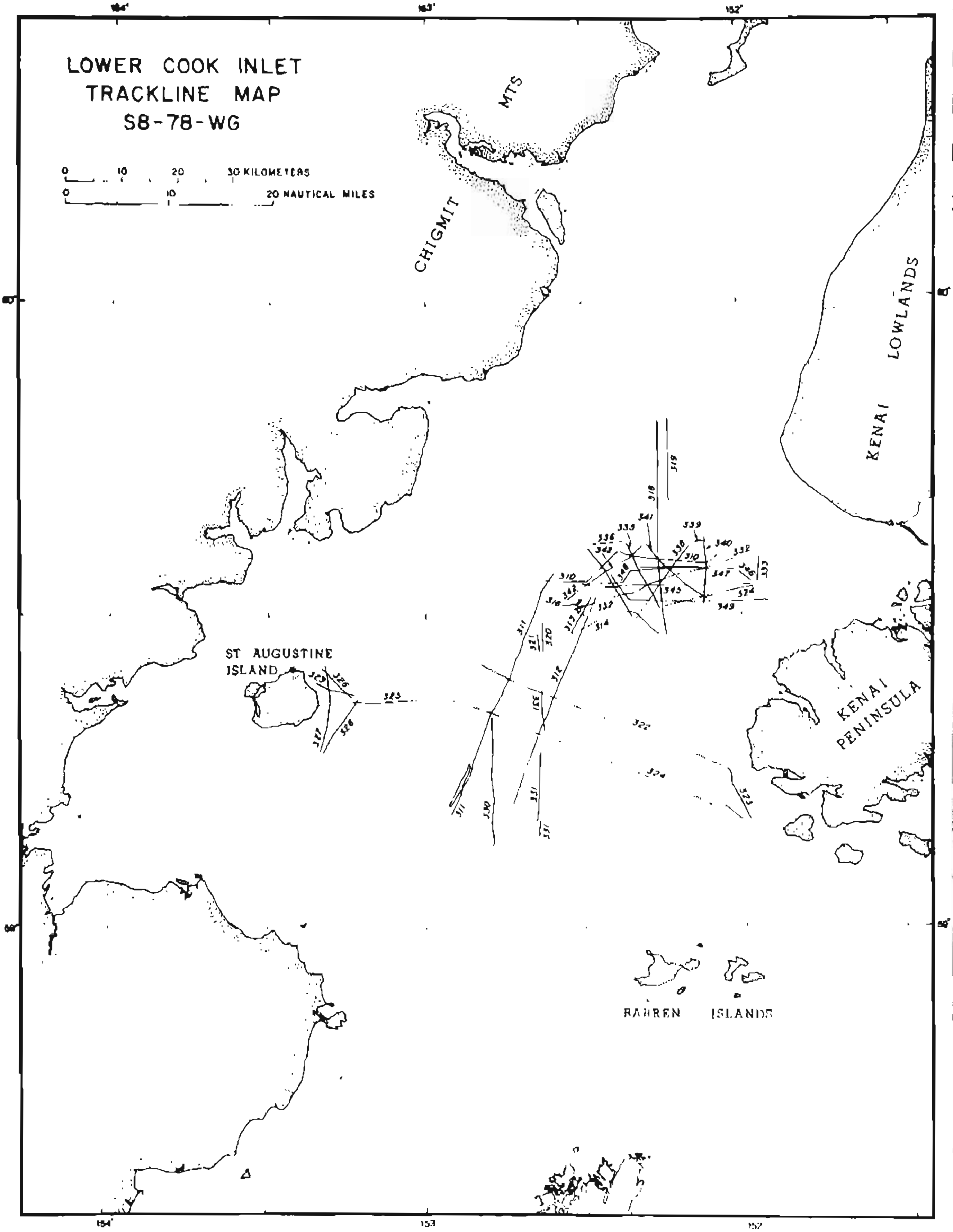

Figure 2. Tracklines, S8-78-WG, lower Cook Inlet

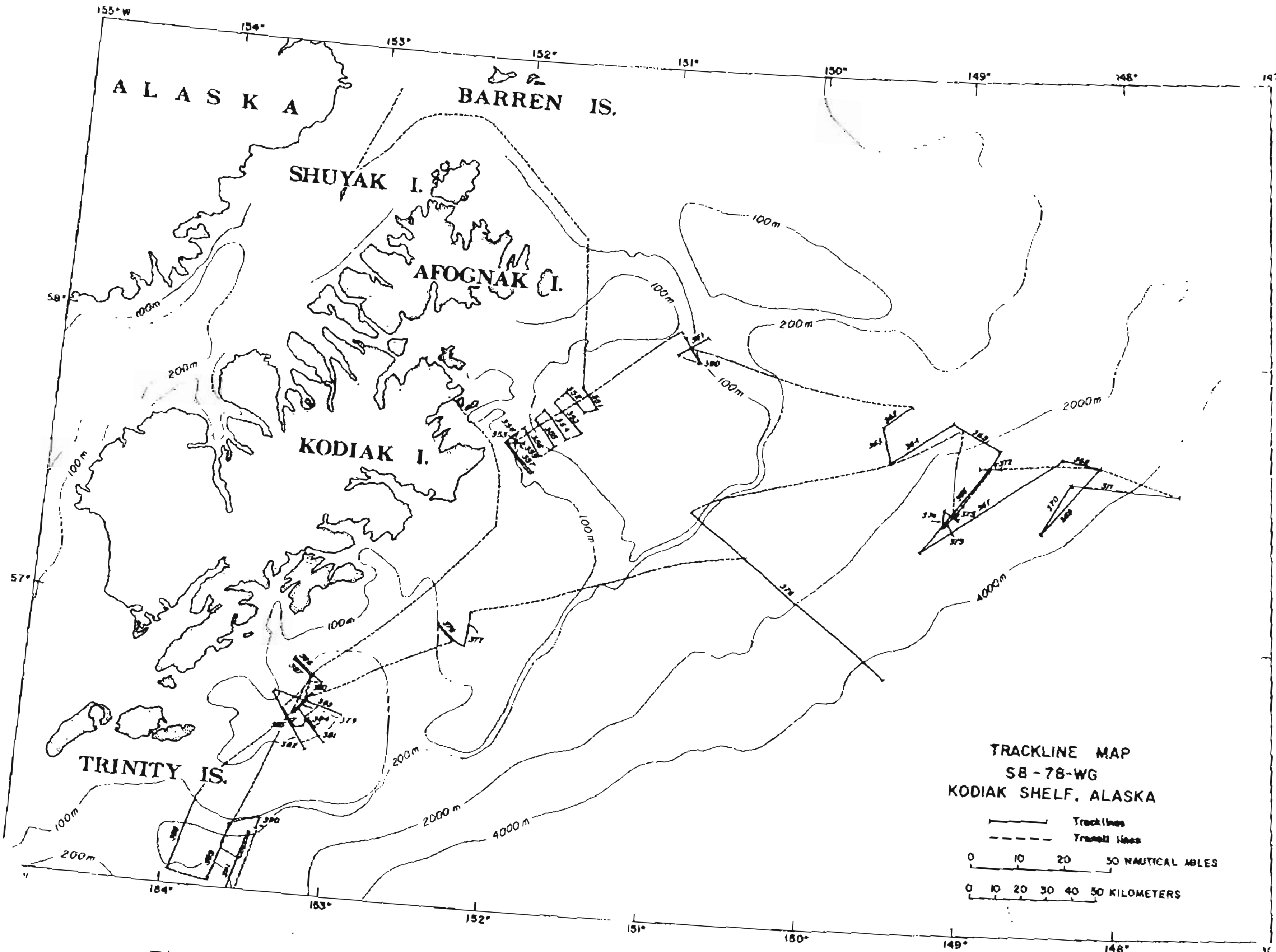

Figure 3. Tracklines, S8-78-WG, Kodiak Shelf.

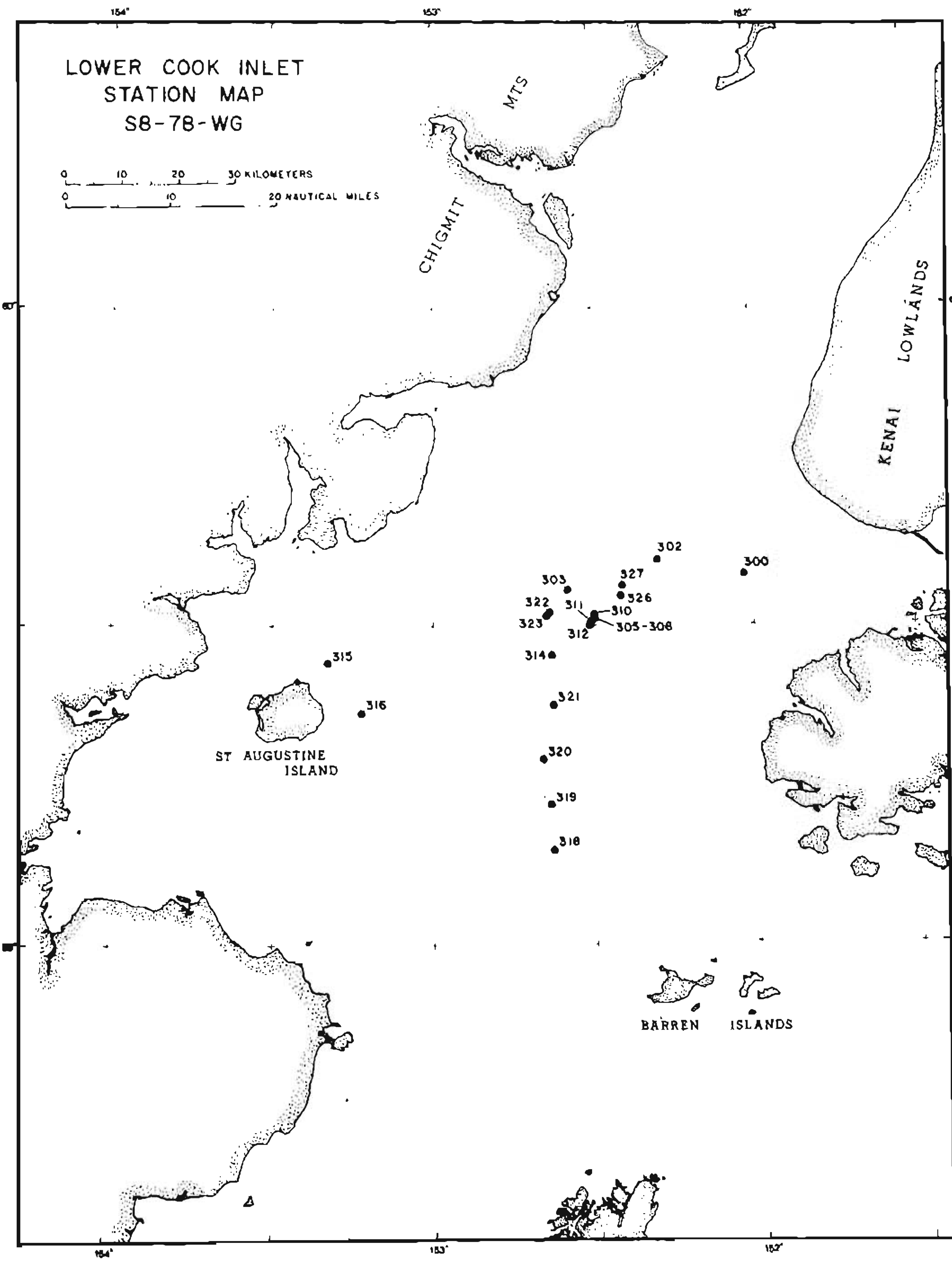

Figure 4. Station locations, S8-78-WG, lower Cook Inlet

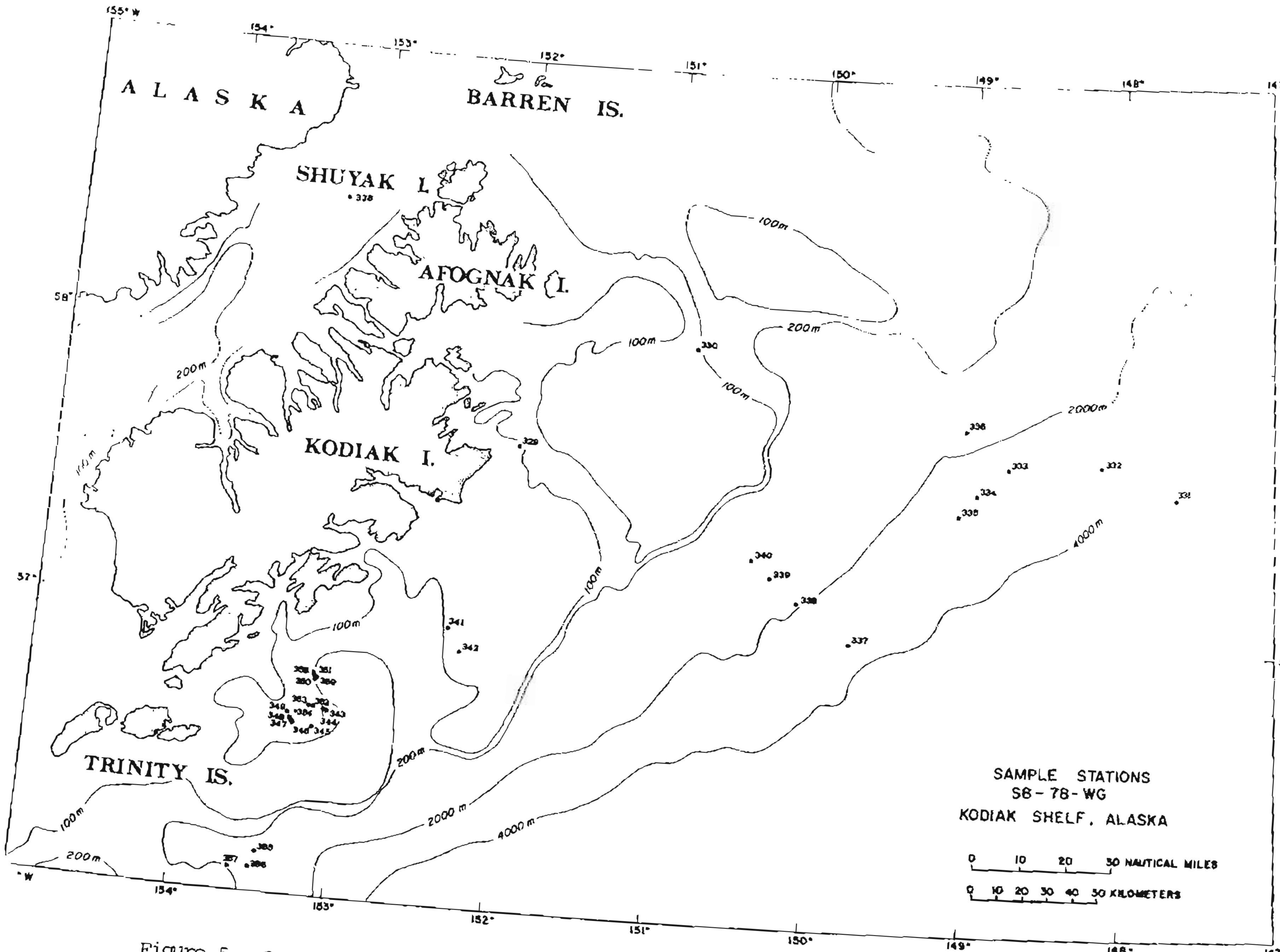

Figure 5. Station locations, S8-78-WG, Kodiak Shelf.