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DRAFT

CRUISE REPORT

**R. V. GYRE
Cruise GC-6
Gulf of Mexico
17 May-8 June 1992**

J. D. Phillips - Chief Scientist

30 June 1992

University of Texas Institute for Geophysics Technical Report No. _____

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Summary. A cooperative, marine geophysical/geological and mammal bioacoustic monitoring investigation was conducted in the western Gulf of Mexico by the University of Texas Institute for Geophysics (UTIG), Scripps Institution of Oceanography, (SIO), Centro de Investigaciones Científicas y Educación Superior de Ensenada (CICESE) of Mexico and Texas A and M University (TAMU). The research was done aboard the Research Vessel GYRE (Cruise GC-6) of Texas A and M University during the period 17 May-8 June 1992.

The ship departed and returned to Galveston, Texas with a brief intermediate stop at Port Isabel, Texas. The primary area of interest for the geophysical/geological investigations was the Sigsbee abyssal plain near 24°N, 94°W (Figures 1 and 2, and Table 1). The bioacoustic monitoring was done on the transit lines between Galveston/Port Isabel and the geophysical work area. Navigational control was provided by GPS (Magnavox models MX200 and 1107, Trimble and NavTrac) and Loran-C (Northstar model 6000) receivers. All navigation and geophysical data were digitally recorded using Macintosh and IBM personal computer systems.

This report briefly describes the objectives and shipboard results for each of the investigations conducted aboard the cruise. A cruise log narrative is also provided (Appendix A).

1. Heatflow. Previous widely-spaced, heatflow measurements in the western Gulf of Mexico basin appear to be anomalously low for its estimated crustal age (~160 my), even after corrections are applied to account for sediment radioactivity and sedimentation rate. Accordingly, closely-spaced thermal gradient and conductivity observations were made in the vicinity of IODP Sea Drilling Program (SDP) sites 90 (23°47.80'N, 94°46.09'W, Depth 3713m) and 91 (26°46.40'N, 93°20.77'W, Depth 3763m) and along a 150 km transect between the sites (Figure 1 and Table 2), in an attempt to verify this apparent anomaly.

The digital recording, UTIG heat flow probe was used for these observations. The instrument provided fifty-nine (59) thermal gradient and forty (40) *in-situ* thermal conductivity measurements at multiple penetration sites during 7 of the 11 heat flow probe survey runs. A total of 40 independent measurements of thermal conductivity were made on sediments from piston coring sites taken along the other four (4) heat flow probe survey runs as well as at five (5) other piston coring sites.

2. Piston Coring/3.5 Khz Shallow Penetration Seismic Profiling. Detailed 3.5 Khz seismic surveys were carried out at/between each of the SDP sites to examine the recent sediment depositional pattern, sedimentation rate history along the heat flow survey transect (Figure 2, Table 3). These surveys were then used to locate the core stations. One piston coring station was made at each SDP site with five (5) additional core stations along the heat flow profile between SDP sites 90 and 91 (Table 3). The thermal conductivity of these seven cores was measured to verify the *in-situ* measurements made with the heat flow probe.

In addition to the above work, two (2) piston core stations and 3.5 KHz profiles were made in the area of the modern sediment wave field located immediately to the west-northwest of the heat flow survey area (Core Stations 2 and 9, Table 3). This work was done during the transits between the heat flow survey area and Port Isabel/Galveston, respectively, as time permitted.

Laboratory analyses of the piston cores described above as well as the sediment cores from the DSDP sites (down to 900m sub-bottom depth) will be used to evaluate the thermal effects of sedimentation and sediment radioactivity.

3. Ocean Bottom Seismometer (OBS) and Single Channel, Seismic Reflection Observations The purpose of the seismic work was four-fold: i) to determine the velocity-depth profile of the overlying sediments and oceanic crust along the heat flow transect connecting DSDP sites 90 and 91 (Figure 3); ii) to examine possible velocity anisotropy in the crust and upper mantle; iii) to identify the top of the oceanic crust from interpretation of the normal incidence, seismic reflection pattern of the acoustic basement between Sites 90 and 91 and iv) to field test our newly upgraded, digital recording OBS instruments

Two (2) orthogonal, wide angle seismic reflection and refraction profiles, were shot across the heat flow survey area (Figure 2, Table 1). The UTIG, large 2000 cu. in. airgun array and the UTIG OBS instruments were used for this work. A single channel, seismic reflection profile was also acquired by digitally recording sub-bottom reflection information (4ms sample interval, 16 second record length) received on the towed bioacoustic hydrophone streamer (~300m maximum offset, 150m group length) during the airgun shooting. The OBS experiment and the seismic shooting line locations are summarized in Figures 2 and 3, Table 4 and Appendix 2.

4. Magnetic and Gravity Anomaly Mapping A regional scale magnetic survey was conducted to map possible weak (<100 nT) seafloor spreading-type, lineated magnetic anomalies which are believed to trend nearly east-west across the heat flow survey area. Such anomaly profiles may be correlatable with the Mesozoic geomagnetic polarity reversal history and thus provide a more precise age determination and spreading direction for oceanic crust beneath the Sigsbee plain. Gravity data were also acquired to verify and map the large negative free-air anomaly reported here which appears to coincide with region of low heat flow.

Closely-spaced track line loops extending 50 nm, north and south of the transect connecting DSDP sites 90 and 91 were run at night after the daytime heat flow probe runs. Three E-W cross track tie line were also acquired (Figure 2, Table 1). For the magnetic surveying, two proton magnetometer sensors was towed in a horizontal gradient configuration (Far starboard sensor 1578ft/481m astern; near port sensor 678ft/207m astern, yielding 900ft/274.3m total separation). Numerical integration techniques will be used to remove temporal geomagnetic noise which may obscure any weak total field geologic anomalies (generally <50 ntesla/gamma).

A LaCoste-Romberg marine gravimeter was used to measure the gravity field during the entire cruise. The north-south orientation of the GPS navigated, primary grid lines across the heat flow transect between Sites 90/91 should provide a high resolution gravity survey, requiring only minor Etvos corrections

5. Bioacoustic Monitoring The distribution of cetacean in the southwestern Gulf of Mexico has not been well surveyed by experienced marine mammal scientific observers. Accordingly, a multichannel hydrophone streamer was towed to detect and locate whale and other biologic sound sources during Leg 1 of the cruise. Simultaneous visual monitoring was also done. This work was part of the long-term seasonal observation program, GULFCET, currently being conducted by TAMU in the Gulf of Mexico (Figure 1, Table 5).

The monitoring was conducted along a transect extending from the 100m depth contour Galveston (28° 03'N, 94° 10'W) southward to the 2000m depth contour (26° 28'N, 94° 10'W) then southwestward along the 2000m depth contour to 24° N latitude. and then eastward along the geophysical survey area and northwestward during the transit to Port Isabel. The hydrographic streamer was also towed during the OBS airgun shooting. Table 5 shows the combined bioacoustic streamer towing log. Seawater temperature was observed at twenty-seven expendable bathythermographs (XBT) stations along the bioacoustic monitoring lines and geophysical survey area as well (Table 6). Appendix 3 includes a brief report of the bioacoustic observations.

6. Post-Cruise Research Responsibilities/Institution:

1. Heat Flow - S. Nagihara/SIO, J. Sclater/SIO
2. Piston-coring/3.5 KHz Profiling - W. Behrens/UTIG, A. Martin/CICESE
- 3a. Ocean Bottom Seismometers (OBS) - Y. Nakamura/UTIG, J. Garmany/UTIG
- 3b. Single Channel Seismic Reflection - K. Griffiths/UTIG, J. Phillips/UTIG
4. Magnetics/Gravity Profiling - J. Phillips/UTIG, K. Griffiths/UTIG, J. Garcia/CICESE
5. Bioacoustic Monitoring - J. Norris/TAMU, W. Evans/TAMU

7. Personnel

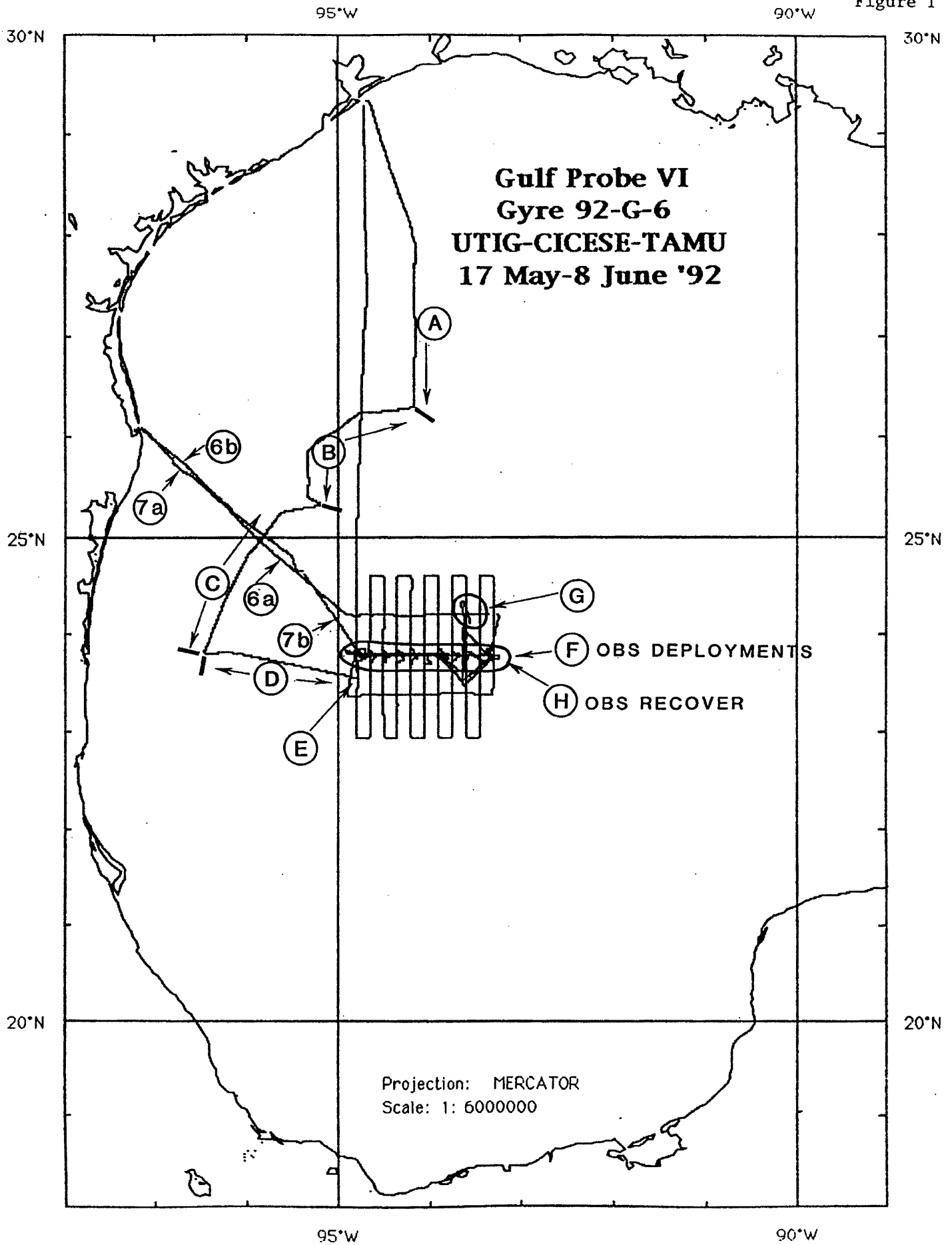
Leg 1 (17 May-24 May)

1. J. D. Phillips
2. Y. Nakamura
3. J. Garmany
4. M. Riedesel
5. W. Behrens
6. A. Roberts
7. K. Griffiths
8. Y. Hello
9. J. Norris TAMU
10. M. Duncan "
11. S. Leatherwood "
12. T. Jefferson "
13. W. Stevens "
14. D. Letzring GYRE
14. D. Barrows "
15. D. Rolf "
16. R. V. Pittman "
17. W. Green "
18. J. Garcia CICESE
19. G. Diaz "
20. R. Vazquez "
21. Darcy Brooks UTIG Student

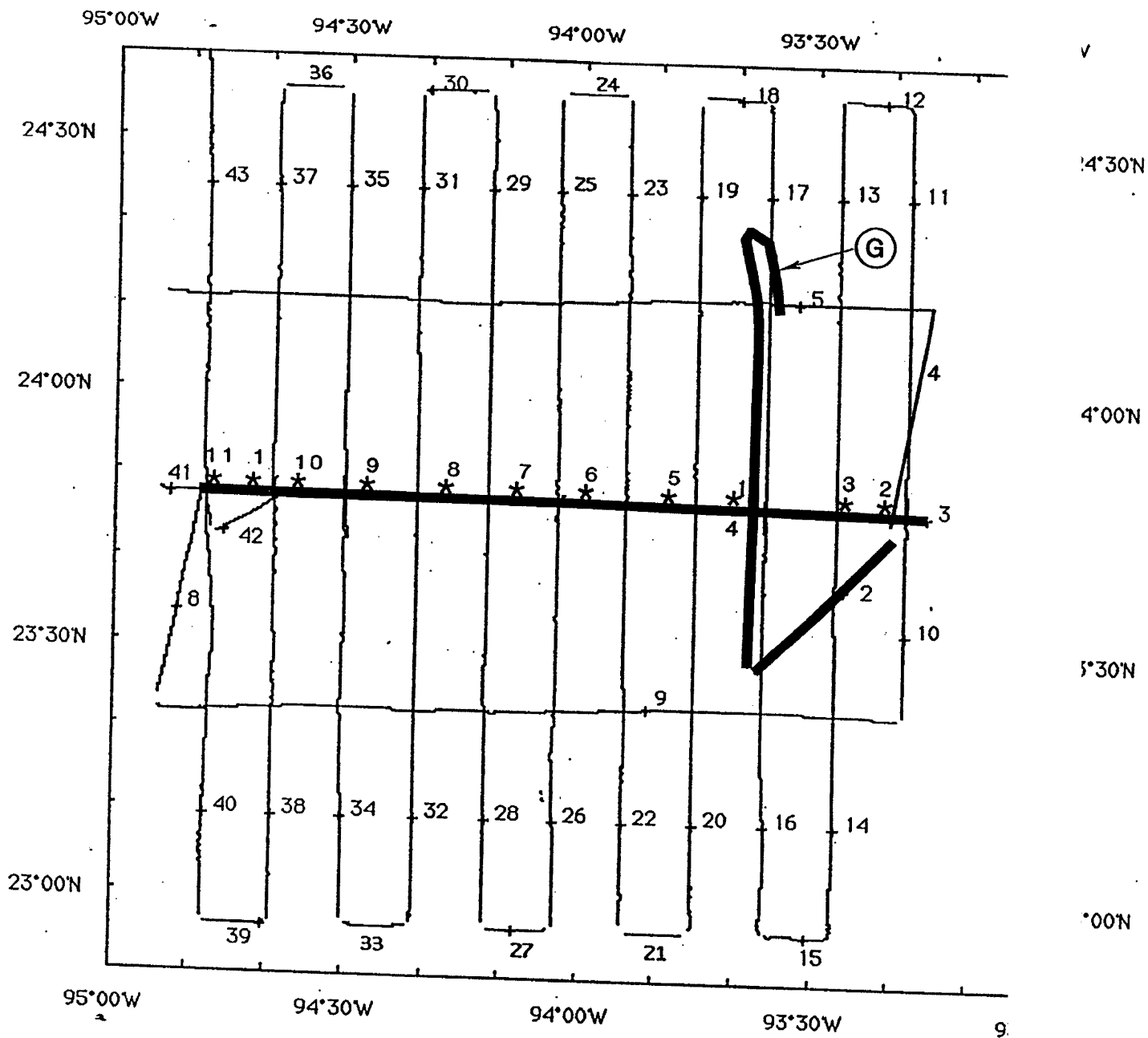
Leg 2 (24 May-8 June)

- J. D. Phillips
- J. Sclater
- L. Lawver
- S. Nagihara
- W. Behrens
- A. Roberts
- K. Griffiths
- D. Letzring GYRE
- D. Rolf "
- W. Green "
- R. V. Pittman "
- J. Garcia CICESE
- G. Diaz "
- R. Vazquez "
- Sally Zellers UTIG Student
- Sheryl Stouffer "
- Nick Hazel "
- Shannon D. Wilson "

Figure 1



Gulf Probe VI



* HEAT FLOW PROBE STATION

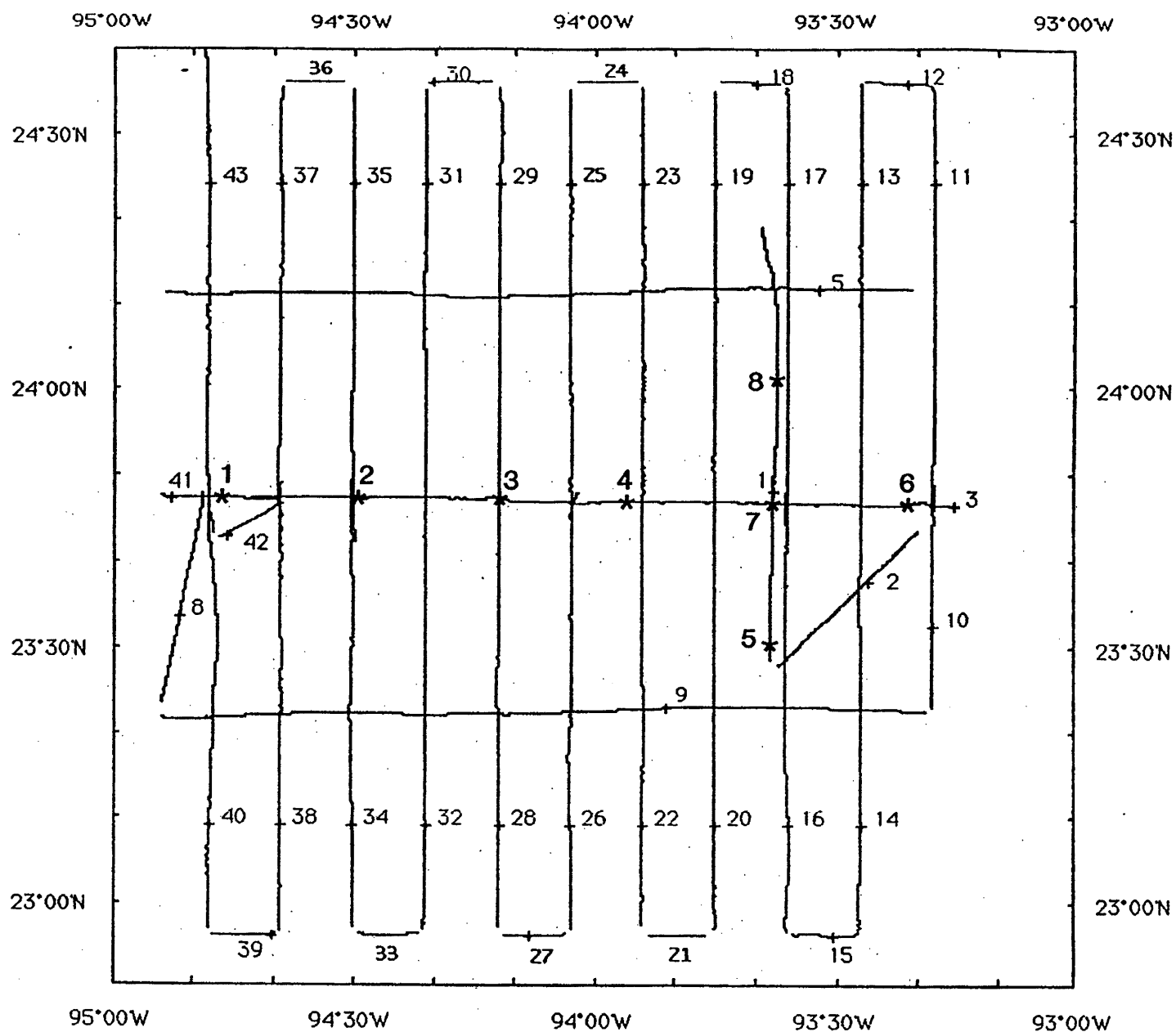
— AIRGUN SHOOTING LINES

Projection: MERCATOR

Scale: 1: 1400000

Figure 3

Gulf Probe VI



* OBS STATIONS

Projection: MERCATOR
Scale: 1: 1400000

Table 1

Gulf Probe 6 - Line/Time Definition										
Line No.	Description	Dir.	Day Start	Time Start	Day End	Time End	3.5	DATA TYPE Mag	Grv	SCS
1	OBS Shooting line	N-S	21-May	05:15	21-May	15:59	x	x	x	x
2	OBS Shooting line	SW-NE	21-May	16:21	21-May	20:30	x	x	x	x
3	OBS Shooting line	E-W	21-May	22:00	22-May	18:49	x	x	x	x
	Core Station 1		23-May	15:00	23-May	18:00	x		x	
4	Transit to E-W North Tie		23-May	18:01	23-May	20:24	x	x	x	
5	North E-W tie line	E-W	23-May	20:25	24-May	05:00	x	x	x	
	Core Station 2		26-May	04:30	26-May	08:30	x		x	
	Core Station 3									
	Heat Flow Probe 1.1		26-May	14:21	26-May	23:39	x		x	
8	Transit to South W-E Tie		26-May	23:40	27-May	02:00	x	x	x	
9	South W-E tie line	W-E	27-May	02:10	27-May	11:00	x	x	x	
10	Transit to site91	S-N	27-May	11:05	27-May	13:30	x	x	x	
	Core Station 4									
	Aborted Heat Flow		27-May	13:31	28-May	04:00	x		x	
	HF Pressure Case Tests									
11	Magnetic/Gravity	S-N	28-May	04:01	28-May	08:39	x	x	x	
12	Survey-North Loop	E-W	28-May	08:49	28-May	09:49	x	x	x	
13		N-S	28-May	10:00	28-May	15:51	x	x	x	
	Heat Flow Probes 2.1-2.4		28-May	15:52	29-May	00:19	x		x	
14	Magnetic/Gravity	N-S	29-May	00:20	29-May	05:38	x	x	x	
15	Survey-South Loop	E-W	29-May	05:40	29-May	06:27	x	x	x	
16		S-N	29-May	06:31	29-May	11:33	x	x	x	
	Heat Flow Probes 3.1-3.7		29-May	11:34	30-May	00:47				
17	Magnetic/Gravity	S-N	30-May	00:48	30-May	05:38	x	x	x	
18	Survey-North Loop	E-W	30-May	05:45	30-May	06:23	x	x	x	
19		N-S	30-May	06:32	30-May	12:15	x	x	x	
	Core Station 5									
	Heat Flow Probes 4.1-4.6		30-May	12:16	31-May	00:19				
20	Magnetic/Gravity	N-S	31-May	00:20	31-May	05:58	x	x	x	

Table 1

21	Survey-South Loop	E-W	31-May	06:06	31-May	06:43	x	x	x		
22		S-N	31-May	06:53	31-May	11:54	x	x	x		
	Heat Flow Probes		31-May	11:55	1-Jun	01:56	x		x		
	5.1-5.6										
23	Magnetic/Gravity	S-N	1-Jun	01:57	1-Jun	06:16	x	x	x		
24	Survey-North Loop	E-W	1-Jun	06:22	1-Jun	06:59	x	x	x		
25		N-S	1-Jun	07:07	1-Jun	13:24	x	x	x		
	Heat Flow Probes										
	6.1-6.6		1-Jun	13:25	2-Jun	02:15	x		x		
	Core Station 6										
26	Magnetic/Gravity	N-S	2-Jun	02:16	2-Jun	07:29	x	x	x		
27	Survey-South Loop	E-W	2-Jun	07:35	2-Jun	08:18	x	x	x		
28		S-N	2-Jun	08:26	2-Jun	13:30	x	x	x		
	Heat Flow Probes		2-Jun	13:31	3-Jun	00:48	x		x		
	7.1-7.6										
29	Magnetic/Gravity	S-N	3-Jun	00:49	3-Jun	06:15	x	x	x		
30	Survey-North Loop	E-W	3-Jun	06:23	3-Jun	07:02	x	x	x		
31		N-S	3-Jun	07:08	3-Jun	12:32	x	x	x		
	Heat Flow Probes										
	8.1-8.6		3-Jun	12:33	4-Jun	00:02	x		x		
	Core Station 7										
32	Magnetic/Gravity	N-S	4-Jun	00:03	N-S	05:10	x	x	x		
33	Survey-South Loop	E-W	4-Jun	05:15	E-W	05:58	x	x	x		
34		S-N	4-Jun	06:05	S-N	11:43	x	x	x		
35	Magnetic/Gravity	S-N	4-Jun	22:10	5-Jun	03:11	x	x	x		
36	Survey-North Loop	E-W	5-Jun	03:20	5-Jun	03:59	x	x	x		
37		N-S	5-Jun	04:05	5-Jun	09:19	x	x	x		
	Core Station 8										
	Heat Flow Probes		5-Jun	09:20	5-Jun	21:49	x		x		
	10.1-10.6										
38	Magnetic/Gravity	N-S	5-Jun	21:50	6-Jun	02:53	x	x	x		
39	Survey-South Loop	E-W	6-Jun	02:57	6-Jun	03:43	x	x	x		
40		S-N	6-Jun	03:49	6-Jun	09:33	x	x	x		
	Heat Flow Probes										
	11.1-11.6		6-Jun	09:34	6-Jun	21:53	x		x		
	Core Station 9										
41	Magnetic/Gravity	W-E	6-Jun	21:54	6-Jun	23:16	x	x	x		

Table 1

42	Survey-North Loop	NE-SW	6-Jun	23:20	7-Jun	00:05	x	x	x	
43		S-N	7-Jun	00:11	7-Jun	05:40	x	x	x	
Regional Transit Lines										
A	from Galveston		17-May	04:00	18-May	03:00	x	x	x	
B	from Galveston		18-May	03:00	18-May	20:00	x	x	x	
C	from Galveston		18-May	20:00	19-May	16:00	x	x	x	
D	from Galveston		19-May	16:00	20-May	06:30	x	x	x	
E	from Galveston		20-May	06:30	20-May	08:40	x	x	x	
F	OBS Deployment		20-May	09:00	20-May	15:00	x		x	
G	Shooting, no OBS		21-May	02:30	21-May	08:00	x	x	x	x
H	OBS Recover		22-May	18:50	23-May	15:00	x		x	
6a	to Port Isabel		24-May	05:00	24-May	14:00	x	x	x	
6b	to Port Isabel		24-May	15:00	24-May	21:00	x	x	x	
7a	from Port Isabel		25-May	15:00	26-May	04:30	x	x	x	
7b	from Port Isabel		26-May	08:00	26-May	14:20	x	x	x	
I	to Galveston		7-Jun	05:41	8-Jun	09:00	x	x	x	

Table 2

HEAT FLOW PROBE STATIONS						
Station #	Date	Time	Latitude (N)	Longitude (W)	Depth* (Uncor m)	Comments
Heat 1.1	26-May	2015	23° 46.953	94° 42.292	3714	enter, No conductivity
(~Site 90)	26-May	2030	23° 46.817	94° 42.400	3714	pullout, Heat pulse
Heat 2.1	28-May	1800	23° 44.743	93° 20.479	3739	enter, No conductivity
(~Site 91)	28-May	1812	23° 44.888	93° 20.576	3739	pullout, Heat pulse
Heat 2.2	28-May	1914	23° 45.574	93° 20.884	3739	enter "
"	28-May	1927	23° 45.674	93° 20.945	3739	pullout "
Heat 2.3	28-May	1955	23° 46.018	93° 21.106	3739	enter "
"	28-May	2006	23° 46.142	93° 21.173	3739	pullout "
Heat 2.4	28-May	2100	23° 46.809	93° 21.422	3739	enter "
"	28-May	2112	23° 46.879	93° 21.428	3739	pullout "
Heat 3.1	29-May	1405	23° 43.116	93° 25.759	3741	enter, No conductivity
	29-May	1424	23° 43.203	93° 26.846	3741	pullout, Heat pulse
Heat 3.2	29-May	1506	23° 43.543	93° 26.206	3741	enter "
	29-May	1520	23° 43.616	93° 26.352	3741	pullout "
Heat 3.3	29-May	1601	23° 43.878	93° 26.651	3741	enter "
	29-May	1614	23° 43.986	93° 26.783	3741	pullout "
Heat 3.4	29-May	1701	23° 44.322	93° 27.205	3741	enter "
	29-May	1711	23° 44.419	93° 27.308	3741	pullout "
Heat 3.5	29-May	1755	23° 44.806	93° 27.622	3741	enter "
	29-May	1809	23° 44.895	93° 27.725	3741	pullout "
Heat 3.6	29-May	1953	23° 45.679	93° 28.742	3741	enter "
	29-May	2006	23° 45.586	93° 28.800	3741	pullout "
Heat 3.7	29-May	2119	23° 46.631	93° 31.134	3741	enter "
	29-May	2230	23° 46.698	93° 31.236	3741	pullout "
Heat 4.1	30-May	1725	23° 45.565	93° 40.129	3741	enter, No conductivity
	30-May	1739	23° 45.655	93° 40.177	3741	pullout, Heat pulse
Heat 4.2	30-May	1826	23° 45.906	93° 40.288	3741	enter "
	30-May	1839	23° 45.956	93° 40.269	3741	pullout "
Heat 4.3	30-May	1926	23° 46.154	93° 40.398	3741	enter "
	30-May	1939	23° 46.237	93° 40.509	3741	pullout "
Heat 4.4	30-May	2026	23° 46.414	93° 40.796	3741	enter "
	30-May	2039	23° 46.459	93° 40.929	3741	pullout "
Heat 4.5	30-May	2124	23° 46.645	93° 41.341	3741	enter "
	30-May	2136	23° 46.708	93° 41.430	3741	pullout "
Heat 4.6	30-May	2226	23° 46.9651	93° 41.965	3741	enter "
	30-May	2237	23° 46.4247	93° 42.063	3741	pullout "
*Uncorrected meters(m), computed by converting observed fathoms(fms) recorded on						
echo-sounder to one-way traveltime and multiplying by 1500 m/sec						
Uncorrected Depth(m)=(Observed fms/(800 fms/sec))*1500m/sec						

Table 2

Heat 5.1	31-May	1607	23° 45.092	93° 48.176	3741	enter
	31-May	1617	23° 45.160	93° 48.208	3741	pullout
Heat 5.2	31-May	1703	23° 45.541	93° 48.480	3741	enter
	31-May	1733	23° 45.775	93° 48.640	3741	pullout
Heat 5.3	31-May	1816	23° 46.088	93° 48.869	3741	enter
	31-May	1841	23° 46.303	93° 49.049	3741	pullout
Heat 5.4	31-May	1932	23° 46.680	93° 49.379	3741	enter
	31-May	1954	23° 46.878	93° 49.564	3741	pullout
Heat 5.5	31-May	2041	23° 47.236	93° 49.862	3741	enter
	31-May	2105	23° 47.508	93° 50.115	3741	pullout
Heat 5.6	31-May	2146	23° 47.795	93° 50.336	3741	enter
	31-May	2151	n/a	n/a	3741	No data,
						Batteries Failed
Heat 6.1	1-Jun	1508	23° 42.577	93° 59.751	3743	enter
	1-Jun	1522	23° 42.736	93° 59.902	3743	pullout
Heat 6.2	1-Jun	1614	23° 43.135	94° 00.171	3743	enter
	1-Jun	1624	23° 43.281	94° 00.242	3743	pullout
Heat 6.3	1-Jun	1717	23° 43.558	94° 00.369	3743	enter
	1-Jun	1734	23° 43.706	94° 00.425	3743	pullout
Heat 6.4	1-Jun	2008	23° 47.114	94° 01.177	3741	enter
	1-Jun	2027	23° 47.263	94° 01.263	3741	pullout
Heat 6.5	1-Jun	2108	23° 47.518	94° 01.250	3741	enter
	1-Jun	2126	23° 47.554	94° 01.209	3741	pullout
Heat 6.6	1-Jun	2207	23° 47.693	94° 01.204	3741	enter
	1-Jun	2228	23° 47.758	94° 01.202	3741	pullout
Heat 7.1	2-Jun	1531	23° 44.695	94° 08.105	3743	enter
	2-Jun	1548	23° 44.858	94° 08.148	3743	pullout
Heat 7.2	2-Jun	1629	23° 45.184	94° 08.218	3743	enter
	2-Jun	1646	23° 45.359	94° 08.257	3743	pullout
Heat 7.3	2-Jun	1730	23° 45.624	94° 08.202	3743	enter
	2-Jun	1748	23° 45.732	94° 08.210	3743	pullout
Heat 7.4	2-Jun	1828	23° 45.972	94° 08.161	3743	enter
	2-Jun	1846	23° 46.035	94° 08.119	3743	pullout
Heat 7.5	2-Jun	1929	23° 46.423	94° 07.978	3743	enter
	2-Jun	1948	23° 46.467	94° 07.937	3743	pullout
Heat 7.5	2-Jun	2233	23° 47.077	94° 07.003	3743	enter
	2-Jun	2252	23° 47.076	94° 07.049	3743	pullout
Heat 8.1	3-Jun	1410	23° 44.761	94° 17.437	3743	enter
	3-Jun	1426	23° 44.917	94° 17.460	3743	pullout
Heat 8.2	3-Jun	1509	23° 45.150	94° 17.537	3743	enter
	3-Jun	1526	23° 45.254	94° 17.561	3743	pullout
Heat 8.3	3-Jun	1609	23° 45.500	94° 17.766	3743	enter
	3-Jun	1626	23° 45.627	94° 17.797	3743	pullout
Heat 8.4	3-Jun	1715	23° 46.058	94° 17.993	3743	enter
	3-Jun	1734	23° 46.168	94° 18.039	3743	pullout

Table 2

Heat 8.5	3-Jun	1828	23° 46.596	94° 18.151	3743	enter
	3-Jun	1851	23° 46.693	94° 18.184	3743	pullout
Heat 8.6	3-Jun	1947	23° 47.130	94° 18.181	3743	enter
	3-Jun	2005	23° 47.179	94° 18.170	3743	pullout
Heat9.1	4-Jun	1349	23° 45.597	94° 27.120	3743	enter
	4-Jun	1406	23° 45.703	94° 27.229	3743	pullout
Heat9.2	4-Jun	1450	23° 45.966	94° 27.436	3743	enter
	4-Jun	1506	23° 46.085	94° 27.542	3743	pullout
Heat9.3	4-Jun	1551	23° 46.393	94° 27.722	3743	enter
	4-Jun	1607	23° 46.501	94° 27.777	3743	pullout
Heat9.4	4-Jun	1651	23° 46.832	94° 27.942	3743	enter
	4-Jun	1708	23° 46.955	94° 28.026	3743	pullout
Heat9.5	4-Jun	1753	23° 47.323	94° 28.194	3743	enter
	4-Jun	1810	23° 47.465	94° 28.286	3743	pullout
Heat9.6	4-Jun	1857	23° 47.725	94° 28.425	3743	enter
	4-Jun	1913	23° 47.386	94° 28.523	3743	pullout
Heat9.7	4-Jun	1957	23° 47.049	94° 28.659	3743	enter
	4-Jun	2003	n/a	n/a	3743	No data,
						Batteries Failed
Heat 10.1	5-Jun	1400	23° 47.390	94° 34.535	3737	enter
	5-Jun	1415	23° 47.495	94° 34.701	3737	pullout
Heat 10.2	5-Jun	1501	23° 47.581	94° 35.071	3737	enter
	5-Jun	1518	23° 07.349	94° 38.989	3737	pullout
Heat 10.3	5-Jun	1601	23° 47.826	94° 35.48	3737	enter
	5-Jun	1619	23° 47.884	94° 35.612	3737	pullout
Heat 10.4	5-Jun	1724	23° 47.362	94° 36.002	3737	enter
	5-Jun	1743	23° 47.490	94° 36.140	3737	pullout
Heat 10.5	5-Jun	1842	23° 47.039	94° 36.478	3737	enter
	5-Jun	1900	23° 47.150	94° 36.578	3737	pullout
Heat 10.6	5-Jun	1953	23° 47.047	94° 37.136	3737	enter
	5-Jun	2009	23° 47.038	94° 37.191	3737	pullout
Heat 11.1	6-Jun	1125	23° 45.233	94° 44.578	3699	enter
	6-Jun	1144	23° 45.199	94° 44.738	3697	pullout
Heat 11.2	6-Jun	1244	23° 45.766	94° 45.184	3694	enter
	6-Jun	1304	23° 45.811	94° 45.289	3694	pullout
Heat 11.3	6-Jun	1410	23° 46.400	94° 45.873	3688	enter
	6-Jun	1422	23° 46.385	94° 45.949	3688	pullout
Heat 11.4	6-Jun	1534	23° 47.051	94° 46.468	3686	enter
	6-Jun	1551	23° 47.032	94° 46.572	3684	pullout
Heat 11.5	6-Jun	1628	23° 46.999	94° 46.785	3684	enter
	6-Jun	1646	23° 46.991	94° 46.897	3684	pullout
Heat 11.6	6-Jun	1709	23° 46.997	94° 47.068	3683	enter
	6-Jun	1731	23° 46.993	94° 47.190	3683	pullout

TABLE 3 Piston Core Stations

Station	Date	Time	Lat	Long	Depth(cor)*	Comment L
CORE 1 (Site 91)	23-MAY	1652	23° 45.86	-93° 20.547	3753 m.	start trip 8.79
	23-MAY	1751	23° 46.377	-93° 20.912	3753 m.	
CORE 2 (Wave Field)	26-MAY	0504	24° 38.54	-95° 26.65	3362 m.	start trip 7.50
	26-MAY	0619	24° 38.603	-95° 24.516	3368 m.	
CORE 3 (Site 90)	26-MAY	1507	23° 47.53	-94° 46.059	3697 m.	start trip 6.44
	26-MAY	1624	23° 47.625	-94° 46.098	3697 m.	
CORE 4	27-MAY	1652	23° 45.86	-93° 20.547	3753 m.	start trip 7.64
	27-MAY	1751	23° 46.377	-93° 20.912	3753 m.	
CORE 5	30-MAY	1318	23° 46.369	-93° 40.882	3755 m.	start trip 4.60
	30-MAY	1433	23° 46.58	-93° 40.39	3755 m.	
CORE 6	1-JUNE	2356	23° 46.819	-94° 00.904	3755 m.	start trip 4.36
	2-JUNE	0057	23° 47.2271	-94° 00.9206	3755 m.	
CORE 7	3-JUNE	2130	23° 47.4453	-94° 17.9485	3755 m.	start trip 4.44
	3 JUNE	2228	23° 47.7293	-94° 17.9013	3755 m.	
CORE 8	5-JUNE	1026	23°46.548'N	-94°35.167'	3753 m.	start trip 4.90
	5-JUNE	1128	23°46.248'N	-94°35.950'	3753 m.	
CORE 9 (Wave Field)	6-JUNE	1938	23° 49.489	-94° 53.503	3643 m.	start trip 7.50
	6-JUNE	2037	23° 49.440	-94° 54.163	3643 m.	

* Matthews' Tables (1939) correction applied. Add 3m for Transducer hull depth

TABLE 4

Ocean Bottom Seismometer Station Locations

Station	Date(1992)	Time(GMT)	Latitude(N)	Longitude(W)	Depth*	Comments
OBS1	18-May	1002 23°	47.794	94° 46.09	3686 m.	drop
	20-May	1904 23°	46.479	94° 46.479	3686 m.	pickup
OBS2	18-May	1153 23°	47.586	94° 29.009	3749 m.	drop
	20-May	2105 23°	46.667	94° 29.471	3753 m.	pickup
OBS3	18-May	1347 23°	47.300	94° 11.973	3751 m.	drop
	20-May	2346 23°	46.606	94° 12.449	3755 m.	pickup
OBS4	18-May	1552 23°	47.027	93° 54.890	3755 m.	drop
	21-May	238 23°	46.853	93° 55.168	3758 m.	pickup
OBS5	18-May	1820 23°	31.044	94° 38.175	3753 m.	drop
	21-May	612 23°	31.437	93° 37.950	3757 m.	pickup
OBS6	18-May	2116 23°	46.416	93° 20.723	3757 m.	drop
	21-May	1536 23°	47.094	93° 20.856	3758 m.	pickup
OBS7	18-May	2303 23°	46.745	93° 37.626	3757 m.	drop
	21-May	923 23°	47.404	93° 37.791	3757 m.	pickup
OBS8	19-May	47 24°	02.380	93° 37.467	3757 m.	drop
	21-May	1153 24°	02.910	93° 38.199	3758 m.	pickup

* Matthews' Tables corrections applied (1980, 3rd Edition) and Transducer hull depth (3m) added.

TABLE 5
BIOACOUSTIC STREAMER DEPLOYMENT LOG

DATE (GMT)	TIME	MILES	SPEED	COMMENT	ie #
1300/17 May					
1804/18 May	29.0 hrs	190nm	6.6 kts	Dedicated	B
2000/18 May					
1620/19 May	20.3 hrs	130 nm	6.4 kts	Dedicated	
1830/19 May					
0815/20 May	13.75 hrs	88nm	6.4 kts	Dedicated*	E
Subtotal	63.05 hrs	408 nm	6.5 kts		
0200/21 May					
0815/22 May	30.25 hrs	152.0 nm	5.0 kts	Shooting Fixed SOA 5.0 kts	2,3
1400/22 May					
1545/22 May	1.75 hrs	9.0 nm	5.0 kts	Shooting Fixed SOA 5.0 kts	
Subtotal	32.00 hrs	161.0 nm	5.0 kts		
1545/22 May					
1800/22 May	2.25 hrs	22.5 nm	10.0	Transit	
1845/23 May					
1900/24 May	24.25 hrs	242.5 nm	10.0 kts	Transit	6
Subtotal	26.50 hrs	265.0 nm	10.0 kts		
TOTAL	121.55 hrs	834.0 nm			

*Required a minimum Speed of Advance (SOA) = 6.0 kts

APPENDIX 1

CRUISE LOG NARRATIVE

GYRE Cruise 92GC-6

Leg 1 17 May-24 May 1992
Leg 2 25 May -8 June 1992

Date 1992 Time(Z)

COMMENTS

GYRE CRUISE 92GC-6 Leg 1

Dr Joseph D. Phillips - Chief Scientist

17-May 0300 Depart TAMU Dock, Pelican Island, Galveston, Texas

17-May 0330 Clear Bolivar Pass Breakwater

17-May 1300 Begin Underway Watch

17-May Behrens, Garcia Diaz on 4-8 Watch

17-May 1330 Slow to 4.0kt to deploy bioacoustic streamer

17-May 1346 Streamer out resume speed to 6-8kts

17-May 1400 change course C/C 185

17-May 1425 Sib Maggie deployed (Far 1575' Astern)

17-May 1500 Port Maggie deployed (Near 675' Astern)

Both maggies operating appear to be measuring 3-4

gamma gradient

3.5 KHz E/S running

17-May 1505 XBT 1

17-May 2100 change watch, Brooks & Riedesel to Garmany & Vazquez

2336 turn off maggies for noise check; out of synch now

17-May 2340 Both maggies back

18-May 0053 Bio Acoustic Way Points

27° 57' , 94° 10'

26° 17' , 94° 10'

26° 12' , 94° 47'

25° 50' , 95° 20'

25° 29' , 95° 19'

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APPENDIX 1

24° 49' , 95° 58'
23° 48' , 94° 45'

18-May

0245 Change course @ 3°/min to 261°

0300 change reate of turn to 6°/min

0310 End of Turn

0440 GPS>LORANC

lat - 0.42 ±.02; long - 0.25 ±.02

1341 Change course @ 9°/min to 180

18-May 1400 Magnetometers off to switch sensors

1445 Port magnetometer on

1545 Magnetometers back to work

1500 GPS>LORANC

lat - 0.41±0.08; long - 0.19±0.04

1730 bring in streamer

1804 streamer on board; pulling in maggies

1809 port maggie coming in

1816 port mag in, starboard on way

1831 starboard mag on board

1839 airgun deployed and pressurized

1841 several test shots

1919 airgun retrieved

1928 airgun secured, redeploying port maggie

1936 begin slow turn to right

1945 starboard mag deployed + connected

1955 port mag on

2020 gps-loran c: lat 0.43; lon 0.16'

2230 Having to supply event marks on PDR for time when A delayed by B

2300 time marks present but partial when A only used, Generator has

drifted?

0052 Yes, generator drifts. Mark goes in analog input and may.

miss print enabling

0431 18° turn to next leg

0445 XBT #10

0540 GPS>LORANC; lat - 0.58±.13 long - 0.11±.03

1130 zero adjusted on red maggie. cal - ok.

1300 zero adjusted on red maggie. cal - ok.

19-May 1353:20 magnetometers off to switch connections

1356 maggies back on

1429 magnetometers off to work on the consol

1435 both maggies back on

1445 GPS>LORANC; lat - 0.70±.13 long - 0.5±.03

1551 XBT #11

1555 streamer starting in

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200.0 6.9

181.0 6.3

APPENDIX 1

1602 streamer on board , recovering magnetometer sensors
 1620 maggles both aboard
 1624 maggles off
 1713-57 airgun #2 tested successfully
 1757- maggles & streamer redeployed
 1830 1838 - maggles on
 19-May 2010 BRIDGE GPS vs. LORANC: lat - GPS>LC 0.20±0.3
 long - LC>GPS 0.13±0.2

20-May 0942 c/c 090 to approach obs 1 site
 day 141 1002:03 obs1 away. 23 47.794,-94 46.097, -1963 fm, OAR "A" and Nov "F" beacons

1004 way on for site 2
 20-May 1153:44 obs2 away, 23 47.586, -94 29.009, -1991 fm, Oar C+D beacons
 1156 way on for site 3
 1347 Deployment of OBS 3
 20-May 1552 Deployment of OBS 4

20-May 2116:11 obs 6 away 23 46.416, -93 20.723, h=-1995
 2118 way on for site 7
 2120 swapping port armored cable for starboard magnetometer electrical connect
 2303:00 obs 7 away 23 46.745, -93 37.626, h=-1995
 20-May 2304 way on for site 8

21-May 0047:45 obs 8 away 24 02.380, -93 37.467, h=-1995
 21-May 0101 air gun in the water for testing
 0107 first shot
 0126-51 deploy both maggles & streamer
 0151 begin shooting test line to 15 n.mi. north of line one
 0215 begin monitor record
 21-May 0224 begin recording on disk; line TEST
 Ideal speed = 4.86 kt = 100 m shot spacing@ 40 Sec

21-May 0453 begin turn onto line 1

21-May 0807 1 mile from 1st sta. to begin shooting to OBSs

21-May 1558 XBT #16

21-May 1602 begin turn to line 2

21-May 1610 last shot on line 1 - 1252

21-May 1621 begin line 2 on shot #1
 at shot 4, add 5 db gain @ SIE amps

21-May 1752 Griffiths reset magnetometer data loggers because of
 a glitch in power

APPENDIX 1

21-May 2125 begin turn onto line 3

22-May 0001 begin reflection recording for line 3

22-May -0040 XBT 17

22-May 0205 XBT 18

0625 XBT 19

-0815 airgun stopped firing

-0840 begin turaround

22-May 0855 airgun brought on board

0905 splice on the gun may be open; repairs underway

1055 streamer & maggles being brought aboard;

begin preparing for a coremaggles turned off

1117 maggles turned off

1130 all gear aboard

1313 ship's electrical power off

1318 power restored

1355 coring postponed; underway for gun deployment

1358 gun deployed

22-May 1530 Nakamura advises to continue shooting to 1045Z
 Ship's HF radio judged adequate to pick-up OBS radio
 xmit @ 10 miles. Therefore will shoot past OBS #3
 about 2-3 miles to survey-in site and then pull
 airgun & proceed to OBS site 1 (DSDP 90)

22-May 1543 stopped shooting

1547 airgun on board

22-May 1551 full speed (9 10 kt) for DSDP 90 to pickup OBS1

AT PICK-UP SITES NEED: TIME LOCATION & WATER DEPTH

22-May 1716 xbt-20

1800 OBS #1 at surface (radio heard)

1815 OBS #1 at surface @ 5.5 miles. Beaching 270

1828 Maggles turned off.

1835 Port maggie secured on deck.

1847 Starboard maggie secured on deck.

1904 OBS #1 coming out of water

Lat 23° 46.479

Long -94° 46.479

1920 Wave field surfaces

1921 Underway @ 10 knots for OBS #2. Pick-up

scheduled surface time 1550 Z

2058 OBS #2 visually acquired

2105 OBS #2 on board, position:

Lat 23° 46.667

Long- 94° 29.471

2108 Underway @ 10 knots for OBS site 3

scheduled surface time 1835 L

2346 OBS #3 on deck

Lat 23° 46.606

APPENDIX 1

22-May Long -94 12.449 23:46:37
23:48 Getting underway for OBS site 4 @ 10 kts

23-May 0130 on station waiting for OBS #4 (released 15min ago;
due up in 50 min)

23-May 0150 Chief Scientist moves us to 1.5 mi SW of site
0230 OBS # 4 - Radio is not functional
it will be located visually (No transmission is received)

23-May 0238 OBS #4 Secure at:
Lat. 23° 46.853
Long. 93° 55.168 (GPS)

0241 getting underway for OBS #5
one steel strap broken, radios in the water
not transmitting

23-May 0552 OBS #5 on surface

23-May 0612 OBS #5 attached to ship at:
Lat. 23° 31.437
Long. -93 37.950

0923 OBS #7 on board at:
Lat. 23° 47.404
Long. -93° 37.791

23-May 1153 OBS #8 on deck
Lat. 24° 02.910
Long. -93 38.199

Novatech beacon flooded

1155 Getting underway to OBS #6 7.8 kts 133°

1536 OBS #6 on deck
Lat. 23° 47.094 (GPS)
Long. -93° 20.856

1545 core over the side

1546 Trigger weight attached

1554 Core #1 started down
Lat. 23° 47.344
Long. 23°20.753

1600 Pinger on 51m above core head
Core is 45 feet head-cutter

23-May 1601 Core going down

1615 941m and going down

1616 942m winch stopped Level wind broke!!

1620 winch is working, going down

1621 1000m depth

1628 1500m depth

1630 winch stopped at 1668 m

1633 winch started again

1638 2000 m water depth

23-May 1644 winch stopped at 2400 m depth

1650 started again at 2401 m depth

1657 3000 m depth

1703 3500 m slowing to 50 m/s

1705 3600 m slowing to 20 m/s

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APPENDIX 1

1717 3927 m, pinger at about 100m above sea floor

1720 3985m wire - pinger on sea floor

TRIP!!! pinger left on bottom, wire clamp failed !!!

23-May 1726 3500 wire is coming up

1729 3000m - core on way up

1736 2000m

1740 1500m

1743 1000m

1746 500m

1748 200m

1749 100m

1810 Core on board at 18:10:30

Confirmed that pinger was lost

1815 Underway - deploy magnetometers

1830 Magnetometers on line

1845 Streamer deployed

2023 Reached way point 2, starting to turn

23-May

24-May 0500 Turn to direct line to Port Isabel

1438 Circling back to whale sighting

1457 Turning back to Port Isabel

1610 Turn completed

1931 Streamer secured on board

2000 Magnetometers secured

2200 Watch secured Gyre cruise 92g-6

End of leg 1

2355 Secured at the dock- Port Isabel

24-May

BEGIN LEG 2 GYRE CRUISE GC-6

Dr. Joseph D. Phillips - Chief Scientist

25-May 0930L Leaving dock Port Isabel

25-May 0951L Coring site set at 24° 37.7N 95° 26.4' W

25-May 1016L Leaving jetties

25-May 1045L Starboard maggie deployed

25-May 1050L Port maggie deployed

25-May 1059L Maggies on and recording 1559Z - GMT - 1059L

1819 Change speed to 5 kts slowing due to engine overheating

1822 Return to 7.5 kts.

25-May 1830 Change speed to 5.7 kts.

25-May 1832 Return to 7.6 kts remain slow to solve engine problem

25-May 1842 Increase speed to 9.9 kts stabilized at 10.6 kts

26-May 0328 Course change to 162° E

26-May 0415 maggies turned off. Port maggie starting on board.

26-May 0420 Slow to 6 kts

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26-May 0426 slow to dead slow
 26-May 0427 Port maggie secure on board
 26-May 0437 Starboard maggie secure on board
 26-May 0449 HDG 157.7
 26-May 0450 Core #2 over the water GPS 24° 38.622 -95° 26.711
 Loran-C 24° 38.08 -95° 26.56
 26-May 0455 Trigger wt. over side GPS 24° 38.54 -95° 26.65
 Loran-C 24° 37.94 -95° 26.49
 26-May 0501 Moving core down to attach pinger
 0504 Attached pinger at 100M
 0513 Wire out 395M out. Wire rate 60M/Minute.
 0516 500M wire out
 0525 1000M wire out
 0532 1500M wire out
 0539 2000M wire out
 0547 2500M wire out
 0554 3000M wire out
 0605 3500M wire out
 26-May 0613 Stopped, first attempt no good, going back up
 0616 Going back down for second attempt
 0619 Going back up attempt seems good
 GPS 24° 38.603 -95° 24.516
 Loran-C 24° 38.17 -95° 24.37
 26-May 0659 Pinger on the surface
 0706 trigger arm at surface
 0720 core on deck
 0724 Power failure for about 45 seconds
 0738 Deploying magnetometers starboard
 0745 deploying magnetometers port side
 0807 Magnetometers turned on and recording
 0911 Finished rigging core, increased speed
 0915 Beginning of wave field
 1017 Speed slowed to 6 kts
 1025 Speed increase to 9 kts
 1344 Change course 2° E
 26-May 1424 Magnetometers turned off
 1432 Port magnetometer secured on deck
 1433 Starboard magnetometer secured on board
 1449 Slow to dead slow
 1450 Coring station #3 - 1966 fms
 1507 Core lowered
 GPS: 23°47.53' N, 94°46.059'W
 Loran-C: 94°45.86'W
 26-May 1511 attached pinger at 118 m
 1523 500m of wire out
 1528 crossing on record 4 sec
 1531 1000m of wire out
 1538 1500m of wire out
 1540 crossing on record 3 sec

APPENDIX 1

1546 2000m of wire out
 1553 crossing on record 2 sec
 1554 2500m of wire out
 1600 3000m of wire out
 1604 crossing on record 1 sec
 1608 3500m and stopping
 1610 resume lowering
 1615 reduce to 10 m/min
 1621 hit, going back up
 GPS 23°47.625'N, 94°46.098'W
 1636 power down for 15 seconds - winch down
 1648 Stop lowering - working on level wind
 1717 ~1700m of wire
 1724 ~800m of wire
 1732 ~550m to the pinger (from PDR)
 1744 Pinger at surface
 1758 core at surface
 26-May ~1810 core on deck
 1822 c/c to get on station
 1838 Underway to station 084° @ 5.6 kts.
 1913 On station; heat flow station #1
 1917 Tilting probe above water.
 1920 Now back on deck
 1925 Probe in water and going down, 1983 fms. (3717 m.)
 1929 Pinger attached @ 100 m.
 1944 1000 m. out.
 1949 3 second crossing.
 1952 2000 m. out.
 1956 2 second crossing.
 2001 3000 m. out.
 2004 1 second crossing.
 2009 3700 m. out.
 2010 3850 out, probe stopped 85 m. above bottom.
 2014 starting down, 3958 m. above bottom.
 2015 in the bottom: GPS 23° 46.953N, 94° 42.292W
 Loran 23° 46.49N, 94° 42.15W
 2021 Probe turns on. Wire angle 2° to starboard.
 2028 Winch started in, 3978 m.
 2030 Time of pull-out.
 Loran 23° 46.33N GPS 23° 46.817N
 94° 42.21N 94° 42.400N
 head to the Northwest and pull up probe to 1000 m.
 from the surface.
 2040 Reset gravity metre spring valve
 screen dial
 was; 10183.2 10183.2 0.9 diff.
 now; 10183.2 10183.2 0.0 diff.
 2104 Winch stopped.
 2129 200 m. out.
 1633 Pinger is coming to deck.

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2137 Pinger aboard.
 2146 Probe aboard for check-out.
 2329 Changing cse. to 180°
 2340 Cse. 180° (Loran C) 11.1 knots.
 0204 Change cse. to 090° E. 10.8 knots.
 1100 Changing course to 0°N
 1109 Heading North towards site 91
 1335 maggies off
 1342 port maggie secured on board
 1354 starboard maggie secured on board
 1557 reduced speed to dead slow
 1401 on station for pressure testing of heat probe
 1412 heat flow probe in water - 1995 fms
 1422 1000m out
 1432 2000m out
 1441 3000m out
 1450 testing
 1500 begin recovery of probe
 1511 2000m to the surface
 1520 1000m to surface
 1524 500m to surface
 1528 100m to surface
 1531 probe at surface
 1537 probe secured on deck
 1544 heading S.W. to core station #4
 1630 Core Station #4
 1634 core at surface 1995 fms (3730m)
 1645 core begins descent
 1649 stop for pinger attachment (118m)
 1652 resume descent
 GPS: 23°45.86'N, 93°20.54'W
 Loran-C: 23°45.50'N, 93°20.32'W
 1659 500m out
 bottom profile signal went out
 Discovered lost pinger on the sea floor
 1705 1000m out
 1713 1575m out
 1719 2000m out
 increased gain on PDR
 1724 2 sec crossing
 1725 2500m out
 1731 3000m out
 1734 1 sec crossing
 1737 3500m out
 1741 stop at 3700m
 1743 250m off bottom (from PDR)
 stopped at 215 m and changed rate
 1750 125m off the bottom
 1751 core triggered

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GPS: 23°46.377'N, 93°20.912'W
 Loran-C: 23°46.12'N, 93°20.73'
 27-May 1804 3000m out
 1814 2000m out
 1823 1000m out
 1829 300m out
 1832 Pinger at surface
 1839 Core at surface
 27-May ~1900 core secured
 1955 Probe above water surface.
 2000 Attaching pinger
 2004 pinger attached and going down
 3730 water depth
 GPS
 23° 48.748 23° 48.43'
 93° 21.483 93° 21.26
 2014 1000 meters out
 2023 Lost signal from instrument
 2036 1000 meters to go.
 2040 500 meters to go.
 2046 Pinger at surface.
 2053 Probe at surface.
 2144 Begin acceleration to unknown way point
 2149 Steam South at 155° to 23° 44 and 93° 18 at
 starting pt. of maggie survey line (7.6 knots)
 Heat flow pressure test and then start survey.
 2305 Slowing to test heat flow probe.
 28-May Heat flow pressure casing lowered into water for
 testing.
 0115 3000 meters and stopping for five minutes.
 0120 Begin recovery of probe.
 0135 1000 meters to surface. Hold for five minutes.
 0140 Go down to 3500 meters.
 0245 3500 meters and holding for five minutes.
 0249 Begin recovery of probe.
 0258 3000 meters to surface.
 0305 2500 meters to surface.
 0316 1500 meters to surface.
 0321 1000 meters to surface.
 0322 casing on board and secured
 0334 Begin cse. 000°N to put out maggies. Spd. 5 knots.
 0344 Starboard maggie out.
 0358 Port maggie out.
 0402 Maggies turned on.
 0403 Increase speed to full power to reach waypoints
 1724° 36' 1724° 36'
 93°18' 93°27'
 then head due South to :
 23°42' 93°27'

APPENDIX 1

28-May	0842 Change cse. to 270° 0914 Slow to allow ship to pass 0957 XBT # 21 0948 Change cse. to 180° E. 1124 EPC stopped. Turned off and on, back to normal recording. 1150 c/c to 080° @ 10°/min 1603 turn completed 1613 reduce speed to 6 kts 1613 maggies turned off c/c to 090° 1620 Port maggie secured on deck. 1631 Starboard maggie secured on deck. 1636 Determining drift. 1646 Steaming due East. 1656 On location, stop to dead stop. GPS: 23° 43.707, -93° 20.043 Loran: 23° 43.40, -93° 19.80 1703 Riggig heat flow probe. 1706 Probe entering water. GPS: 23° 43.904, -93° 20.049 Loran: 23° 43.64, 93° 19.86 1714 Pinger attached. 1722 4 second crossing 1723 1000 meters out 1728 3 second crossing. 1732 2000 meters out 1735 2 second crossing 1741 3000 meters out 1744 1 second crossing 1749 3750 meters of wire when stopped. 1751 Going out an additional 100 meters. 1752 3850 meters of wire when stopped., move down another 50 meters. 1755 3900 meters out and stop. 1800 In the bottom. GPS: 23° 44.743, -93° 20.479 Loran: 23° 44.38, -93° 20.479 Wire reading when stopped 4010 meters and letting more out. Heater pulse did not turn on. 1809 Pull out probe 4080 meters of wire. 1812 Pulled out of bottom. 4045 meters. 1824 1 second crossing 1828 3000 meters out 1833 2 second crossing. 1838 Stopped at 2000 meters of wire. 1847 Probe descends from 2000 meters of wire. GPS: 23°45.265, 93° 20.747 Loran: 23°44.97, 93° 45.265 1850 2 second crossing	
28-May	1857 3000 meters out 1900 1 second crossing 1904 3700 meters and stop put out another 200 meters 1908 3900 meters of wire and stopped. Probe stopped at 85 meters. 1912 Probe lowered GPS: 23° 45.574, -93° 20.884 Loran: 23°45.025, 93°20.70 1914 On the bottom. 1915 4060 meters of wire when stopped 1916 5 meters of wire let out. 1917 Another 5 meters let out. 1919 Another 6 meters let out. 1922 Let out another 5 meters 1922 Start up slowly. GPS: 23°45.674, 93°20.945 Loran: 23°45.39, 93°20.945 1938 3500 meters of wire out and stopped at 575 meters off bottom from pinger 1944 Let down again another 400 meters water depth 1995 fms. of 3730 meters 1948 3900 meters stopped above bottom. 1953 Going down 1955 GPS: 23°46.018, 93°21.106 Loran:23°45.77, -93°20.94 1956 4070 meters when stopped, let out another 5 meters 2000 Let out another 5 meters 2003 Start up 2006 Pull out GPS:23°46.142, 93°21.173 Loran:23°45.83, 93°20.95 Going up to 2000 meters below surface. 2021 3000 meters out 2029 2200 meters of wire and stopped 2036 Probe descending. GPS: 23°46.564, 93°21.348 Loran:23°46.18, 93°21.11 2043 3000 meters out 2051 3700 meters out 2053 3900 meters out 2058 Going down 2100 Entered bottom GPS:23° 46.809, 93°21.422 Loran:23° 46.59, 93°21.24 2108 Bring out slowly 2112 Pullout from bottom GPS:23°46.879 Loran:23°46.59, 93°21.24 2152 1000 meters out Daddy in steam and not out of tank	

APPENDIX 1

APPENDIX 1

28-May 2302 Slowing to begin heat flow probing.
2310 Pinger failure- bring probe in.
28-May 2330 Probe on surface
2338 Probe on board, holding cse. until instruments are in lab.
28-May 2340 Deploying maggies
28-May 2345 c/c due West.
28-May 2357 Riset maggie logger clock. (Port and starboard)
28-May 2358 Maggies on.

29-May 0100 Waypoints:22°47', 93°27' turning West 270°
22°56', 93°36' to
23° 49', 93°36'

0540 c/c to 270°
0544 XBT #23
0624 c/c to 000°
0650 c/c to 125°
1205 Turn off magnetometers
1220 Maggies on board.
1251 Reaching the heat probe site.
1300 Adrift NW 1 kts.
1313 Probe in water
GPS: 23° 42.991, 93°25.272
Loran:23° 42.64, 93°25.07

29-May 1320 Pinger attached
1328 4 Second crossing
1329 1000 meters out
1335 3 second crossing
1339 2000 meters out
1343 2 second crossing
1349 3000 meters out
1352 1 second crossing
1357 3700 meters full stop.
1358 Another 200 meters
1400 3900 meters stop.
1404 Going down.
1405 Entering bottom
GPS: 23° 43.116, 93° 25.759
1413 Heater pulse not coming on, come out of bottom five miles per miles.
1424 Pull up 500 meters, drift for 5 to 10 minutes
1432 3500 meters out
1450 Heat flow station 3, penetration 2
GPS: 23° 43.417, 93° 26.142
1458 Begin lowering probe.
1459 Slowing
1500 3850 meters out , go to 3900 meters
1501 3900 meters full stop.
GPS: 23° 43.0496, 93° 26.171
1506 Probe entering bottom at 3750 water depth.

APPENDIX 1

29-May 1508 10 more meters out.
1509 Stopping with 4050 meters out
1513 Additional five meters.
1516 Begin pull out.
1520 Pull out. Go up to 3500 meters for 10-20 minutes of drifting.
1523 Drift NNW to nest station.
1529 All stop 3500 meters
1553 Penetration #3
GPS: 23° 43.807, 93° 26.565
1557 3900 meters
1601 Probe enters bottom
1603 Stop, 4043 wire meter reading
1606 Another five meters out
1607 Begin pullout
1614 Pullout complete
GPS: 23°43.986, 93° 26.783
1614 Pull up to 3500 meters and drift to nest site.
1622 Full stop at 3500 meters , drift.
1651 Penetration #4
GPS:23° 44.239, 93° 27.107
Loran: 23° 43.90, 93° 26.88
lowering to 3900 meters.
1656 3900 meters, all stop
1700 Going down.
1701 4005 meters out when stopped.
GPS: 23°44.322, 93°27.205
Loran: 23°43.97, 93° 26.98
Let out another 35 meters
Let out another 5 meters.
1708 Start up again.
1711 Out of bottom.
GPS: 23°44.419, 93°27.308
Loran: 23°44.01, 93°27.04
1745 Lowered again.Penetration # 5
GPS: 23°44.691, 93°27.514
Loran:23° 44.47, 93°27.38
1750 Stop above bottom.
1754 Starting down again
1755 Hit bottom
GPS: 23°44.806, 93°27.622
Loran: 23° 44.44, 93°27.40
1801 Let out 5 meters of wire
1809 Probe pulled out
GPS:23° 44.895, 93°27.725
Loran 23°44.44, 93°27.40
1814 Pulling up and then steaming.
1832 2000 meters out
1842 All stop at 1000
1849 Starting to steam at 312°

29-May

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1909 all stop for probe station
 1915 probe lowered for Station # 6
 1924 2000m out
 1934 3000m out
 1942 3700 m and stopped
 1943 3900m out and stopped
 1952 going down again
 1953 Probe in bottom
 GPS: 23° 45.679'N, 93° 28.742'W
 Loran-C: 23° 45.36'N, 93° 28.54'W
 2000 pull up probe
 2006 pulled out of bottom
 going up to 1000m
 GPS: 23° 45.586'N, 93° 28.800'W
 Loran-C: 23° 45.27'N, 93° 28.61'W
 2018 3000m out
 2028 2000m
 2039 1000m out
 2046 underway to NW
 2045 Echosound transceiver has problem and data is scattered
 2143 Probe starting down - Station 3, Penetration 7
 GPS: 23° 46.525'N, 93° 30.686'W
 Loran-C: 23° 46.14' N, 93° 30.48'W
 2152 2000m of wire out
 2202 3000m out
 2213 3900m out
 2219 probe hit bottom
 GPS: 23° 46.631'N, 93° 31.134'W
 Loran-C: 23° 46.28'N, 93° 30.93'W
 2226 winch started in
 2230 probe out of bottom
 GPS: 23° 46.688'N, 93° 31.236'W
 Loran-C: 23° 46.41'N, 93° 31.03'W
 2302 probe started up - batteries weakening
 2321 2000m out
 2330 1000m out
 2340 pinger on board
 2349 heat probe on deck
 2357 headed towards waypoint 1 at 23° 44' N & 93° 36' W
 0000 First (port?) maggie is flying (?)
 second (starboard) maggie is out
 second maggie is out
 heading northward
 0400 way points for another cruizin' night
 i) 24° 36'N 93° 36'W
 ii) 24° 36'N 93° 45'W
 iii) 23° 42'N 93° 45'W

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at 23° 46.6'N 93° 41'W
 0530 c/c to 270°
 0620 Change cse. to 180°
 1222 c/c to 40°
 1238 Start to recover maggies. Maggies off.
 1302 Slowing speed and steaming towards coring site.
 1315 On coring station #5
 GPS: 23° 46.369, 93° 40.882
 Loran: 23° 46.08, 93° 40.73
 1318 Core descending. 1996 fms.
 13?? Attach pinger 100 meters of wire.
 1339 1000 meters out.
 13?? 3 second crossing
 1346 1500 meter out.
 1353 2000 meters out.
 1354 2 second crossing
 1359 2500 meters out
 1411 3000 meters out
 1417 1 second crossing
 1419 3500 meters out
 1426 3750 meters out
 1428 3900 meters out. Stop and ease down slowing.
 1429 3930 meters out
 1433 3972 hit bottom
 Loran: 23° 46.58, 93° 40.39
 1434 Starting up.
 1440 3500 meters from surface.
 1444 3000 meters from surface.
 1450 2500 meters to surface
 1454 2000 meters to surface
 1459 1500 meters to surface
 1503 1000 meters to surface.
 1508 500 meters to surface
 1516 Pinger at surface, removing it.
 1524 Trigger at surface.
 1532 Core at surface, drift to determine currents.
 1600 Determine drift to be NINE
 1603 Continue to drift.
 1608 Steaming two miles to the South to start station.
 1623 On station, heathrow station # 4, penetration #1
 GPS: 23° 44.901, 93° 39.973
 Loran: 23° 44.57, 93° 39.80
 1633 Probe in water.
 1636 Attaching pinger at 100 meters of wire out.
 1648 4 second crossing
 1650 1000 meters of wire out.
 1656 3 second crossing.
 1659 2000 meters of wire out
 1709 3000 meters of wire out

APPENDIX 1

30-May 1724 Dropped again
1725 Probe entered
GPS: 23° 45.655, 93° 40.129
Loran: 23° 45.41, 93° 40.00
bring up and stop at 3500 meters.
Drifting.
1815 Start down again.
1820 3900 meters out, stopped above bottom.
1824 Heading down
1826 In the bottom
GPS: 23° 45.906, 93° 40.269
Loran: 23° 45.54, 93° 40.04
1839 Out of bottom, bring up to 3500 meters.
1915 On station and lowered.
Loran: 23° 45.72, 93° 40.13
1920 3900 meters and stopped
1925 Going down.
1926 In bottom.
GPS: 23° 46.154, 93° 40.398
Loran: 23° 45.76, 93° 40.19
1934 Winch started in.
1939 Out of bottom
GPS: 23° 46.237, 93° 40.509
Loran: 23° 45.88, 93° 40.28
bring up to 3500 meters and drift.
1948 All stop at 3500 meters.
2014 On station, going down to 3900 meters.
Loran: 23° 45.97, 93° 40.54
2019 Stopped at 3900 meters.
2024 Going down
2026 In bottom
GPS: 23° 46.414, 93° 40.796
Loran: 23° 45.94, 93° 40.55
2034 Bring it on up.
2039 Pulled out
GPS: 23° 46.459, 93° 40.929
Loran: 23° 46.012, 93° 40.71
Pulled up to 3500 meters and drift for 30 minutes.
2048 All stop at 3500 meters.
2114 Go down to 3900 meters
2119 Time at stop above bottom, 3900 meters
2123 Probe in and going down to the bottom.
2124 Probe entered bottom.
GPS: 23° 46.646, 93° 41.3406
Loran: 23° 46.36, 93° 41.16
2132 Bring up the probe
2136 Probe pulled out
GPS: 23° 46.7083, 93° 41.4304
Loran: 23° 46.36, 93° 41.24
Pulled up to 3500 meters and drift for 30 minutes.

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2215 Take it down to 3500 meters to begin heatflow station #4 penetration #6
2221 75 meters above sea floor
2226 Probe entered bottom
GPS: 23° 46.427, 93° 41.9646
Loran: 23° 46.065, 93° 41.81
2235 Winch started in
2237 Time on pullout
GPS: 23° 46.9651, 93° 42.0625
Loran: 23° 46.67, 93° 41.88
2308 Changed bathymetry paper, last mark at 2245.
2210 Changed paper in Loran printer.
2355 Probe aboard, begin transit to nest survey line, (93° 45') at 6 kts.
0000 31, May, 1992
0001 Maggies are being deployed.
0013 Maggies on.
0020 On the survey, 180°, 9 kts.
0030 Slow down to 6 kts. for engine oil change
0040 Resuming speed.
0200 Way points for the evening cruise.
i) 22° 56', 93° 45'
ii) 22° 56', 93° 54'
iii) 23° 49', 93° 54' @ 0800.
0414 slowed to change fuel filters on starboard main engine
0420 resumed speed
Cores: wire out vs. PDR depth.
1. 211 7. 230
2. 303 8. 243
3. 210
4. 220
5. 229
6. 232
31-May 1154 Approaching waypoint.
1156 Magnetometers off
1158 Turning South to 180°
1200 Recovering the maggies.
1215 Maggies on board
1222 Slowing.
1230 Heading towards 23° 43.5, 93° 49.0
1325 Arriving at heat probe station #5 23° 43.5 (lat) 93° 48.88 (long)
1334 probe in water
1335 attach pinger @ 100m of wire out
1344 pulling pinger off
1349 Probe on surface
1351 Probe on board. Questionable pinger.
1357 Holding station for probe repairs.
1512 Probe in water

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APPENDIX 1

31-May 1514 Attach pinger @ 100m of wire out
 1517 Probe going down.
 1520 4 sec. crossing.
 1522 1000m out
 1533 3 sec. crossing.
 1537 2000m out
 1542 2 sec. crossing
 1547 3000m out
 1550 1 sec. crossing.
 1557 Slowing.
 1558 All stop 3900 23°45.092 -93°48.176
 1613 Starting up slowly
 1617 Pullout 4041 m wire out
 1618 Coming off bottom, Go to 3500 m, and drift 30 minutes
 1628 3500 m all stop drift NNW
 1646 Heat probe fired at 3500 m of wire
 1652 start down to 3900 m wire out
 1658 stop at 3900 m GPS(23 45.488, -93 48.436)
 1703 Entered bottom at: GPS(23 45.775, 9348.640)
 LORAN-C (23 45.17, 93 48.27)
 1719 Heater pulse went on
 1724 winch started in
 1733 pulled out of bottom at: GPS(23 45.775, 93 48.640)
 LORAN - C (23 45.48, 93 48.44)
 1741 stop at 3500 m
 1751 stopped at 3600 m
 1802 Back up to 3500 meters.
 1805 Move to 3900 meters.
 1810 Stop at 3900 meters.
 1814 Let down again
 1816 In the bottom.
 GPS: 23° 45.541, 93° 48.480
 Loran:23° 45.48, 93° 48.44
 174? 1741 Stop at 3500 meters.
 1751 3600 meters stopped.
 1802 Back up to 3500 meters.
 1805 Move to 3900 meters.
 1810 Stop at 3900 meters.
 1814 Let down again.
 1816 In the bottom,
 GPS: 23° 46.088, 93° 48.869
 Loran: 23°45.80, 93° 48.71
 1823 Let out 5 meters.
 1825 Let out another 5 meters.
 1828 Let out 5 meters.
 1830 Let out 5 meters.
 1831 Let out 5 more meters.
 1832 Heater pulse on |||||

APPENDIX 1

31-May 1835 Let out 5 meters.
 1838 Bring it up slowly.
 1841 Pulled out.
 GPS: 23° 46.303, 93° 49.049
 Loran: 23° 45.89, 93° 48.82
 1846 Completely off the bottom.
 1854 Stopped at 3500 meters
 1903 Down 100 meters.
 1905 3600 meters all stop
 1915 Down another 50.
 1917
 1927 3900 meters, stop.
 1931 Full speed down.
 1932 Hit the bottom.
 GPS: 23° 46.680, 93° 49.379
 Loran: 23° 46.37, 93° 49.18
 1936 Let out 5 meters
 1937 Let out 5 meters.
 1948 Heater pulse turned on.
 1954 Bring it up.
 GPS: 23° 46.878, 93° 49.564
 Loran: 23° 46.53, 93° 49.42
 2013 Stopped at 3500 meters
 2022 Let down 100 meters
 2024 3600 meters, and stop
 2031 Going down to 3900.
 2035 All stop at 3900 meters.
 2040 Going down to bottom
 2041:41 Probe in bottom.
 2056 Heater pulse turned on.
 2103 Winch started in.
 2105 Pulled out heat probe.
 2130 Heat probe on station # 5 penetration #^
 2140 Time at stop above bottom.
 2146 Probe entered the bottom.
 GPS: 23° 47.7948, 93° 50.3357
 Loran: 23° 47.39, 93° 50.14
 2200 Battery fail, heat probe recovery
 2205 Winch failed. Hydraulic problems.
 2317 Winch is working pulling the heat probe.
 2355 Pinger on deck.
 31-May 0005 Heat probe on deck.
 0013 Deploying the maggies.
 0029 Maggies are streaming.
 0050 Power failure
 0100 Begin 180° turn to the North.
 0102 Power failure
 0103 Power on.
 1-Jun

APPENDIX 1

i) 24° 36', -93° 54'
 ii) 24° 36', -93° 03'
 iii) 23° 42', -93° 03'

0622 XBT 26 24° 36N, 93° 56W
 1306 Approaching final waypoint
 1323 Turn due East and head for 93° 58.5W
 1325 Turning off Maggies. Slow to 4 knots.
 1334 Port maggie on board.
 1343 Starboard maggie on board.
 1344 Steam two miles East to 93° 59'
 1354 Stop to dead stop and drifting to determine drift.
 1400 On station #6, rigging heat probe.
 GPS: 23° 41.65, 93° 59.07
 Loran: 23° 41.27, 93° 58.88

1416 Probe in water for penetration #1
 1420 Pinger attached
 1421 Begin descent
 1429 4 second crossing
 1430 1000 meters of water out
 1436 3 second crossing
 1439 2000 meters out
 1444 2 second crossing
 1449 3000 meters out
 1452 1 second crossing
 1456 All stop, 3500 meters
 Go down to 3900 meters
 1501 Stop at 3900 meters.
 1506 Going down.
 1508 4029 m. or wire out, Hit!
 GPS: 23° 42.577, 93° 59.751
 Loran: 23° 42.19, 93° 59.51

1510 Let 5 more meters out.
 1514 Heat pulse fired!
 1517 4131 meters of wire out.
 1519 Start up slowly
 1522 Pullout at 4094 meters of wire out.
 GPS:
 Loran:

1525 Bring it up to 3500 meters
 1548 All stop at 3500 meters, drift for 5 minutes.
 1553 Penetration # 2
 Going down to 3900 meters.
 GPS: 23° 42.974, 94° 00.050
 Loran: 23° 42.58, 94° 59.86

1554 Heat pulse fired.
 1609 3900 meters all stop for 5 minutes.
 1613 Full speed down.
 1614 Hit 4025 meters of wire out
 Loran: 23° 42.72, 93° 59.97

1615 Take to 4080 m. of wire out and stop.

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1617 Let out 3-4 meters/minute.
 1619 Stop.
 1620 Heat pulse fires.
 1622 Let out five meters.
 1628 Start up slowly
 1637 Out of bottom, bring up to 3500 meters.
 GPS: 23° 43.281, 94° 00.242
 Loran: 23° 42.89, 94° 00.05

1657 All stop at 3500 meters.
 1700 Start down to 3900 meters for penetration #3
 1717 In bottom
 GPS:
 Loran:

1723 Heater pulse fired!
 1729 Start up slowly
 1734 Out of bottom
 GPS: 23° 43.706, 94° 00.425

1750 3000 meters bringing it up.
 1809 1000 meters out.
 1813 500 meters to go to pinger.
 1827 Probe at surface.
 1838 Steam to North@ 330° to lat. 23° 46'
 1846 c/c to 000°

1915 Probe is lowered for penetration #4
 1921 Pinger attached and going down.
 1931 1000 meters out.
 1938 3 second crossing.
 1952 3500 meters out
 1956 EPC stopped recording water depth.
 2002 3900 meters out.
 2008 Probe hit bottom
 GPS:
 Loran:

2014 Heat pulse fired!
 2027 Probe pullout
 GPS:
 Loran:

2050 All stop at 3500 meters.
 2102 Stop above station, penetration #5
 2108 Probe entered bottom, 3740 m. of water.
 GPS: 23° 47.5175, 94° 1.2502
 Loran: 23° 47.014, 94° 1.02

2114 Heater pulse turned on.
 2120 Winch started in.
 2126 Pullout from bottom
 GPS: 23° 47.5541, 94° 1.2094
 Loran: 23° 47.21, 94° 1.02

2127 Pulling the probe up
 2142 Probe stopped at 3500 meters.
 2202 Stop above station, penetration #6

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2207 Probe entered bottom.
GPS: 23° 47.6934, 94° 01.2035
Loran: 23° 47.32, 94° 01.03

2214 Heater pulse on.
2220 Winch started in.
2228 Pull out from bottom. 3740 meters of water.
GPS: 23° 47.7576, 94° 1.2016
Loran: 23° 47.45, 94° 01.02

2309 Pinger up
2315 Probe up
2310 EPC began recording again.
2320 Probe secured on board.
2325 Heading due South for core station # 6.
2356 Core is going down.
GPS: 23° 46.819, 94° 00.904
0018 EPC breaks in recording.
0057 Core trigger
GPS: 23° 47.2271, 94° 00.9206
0145 Pinger on board
0200 Deploying the maggies.
0217 Maggies on.

Waypoints for the Aloha cruise this evening are:

- i) 22° 56'N, 94° 03'W
- ii) 22° 56'N, 94° 12'W
- iii) 23° 49'N, 94° 12'W
- iv) 23° 46'N, 94° 03'W

0727 c/c to waypoint 2
0815 c/c to waypoint 3
0925 Loran C failed and turned off.
1335 c/c to 145°

1336 Turn off maggies
1352 Maggies secured on deck
1416 Continue steaming for Heat probe site #7

1455 probe 1000 meters down
1505 probe 2000 meters down
1515 probe 3000 meters down
1518 1 sec. crossing
1525 3900 stop
1530 Going down.
1531 Hit 4009m of wire out 23° 44.695N, 94° 08.105W
1532 Go to 4060
1533 Let out 5 more
1537 Heat pulse fires!
1543 Ease up slowly
1548 Pull out up to 3500m 23° 44.853N, -94° 08.148W
1610 Full stop 3500. Wait 5 minutes.
1615 Go to 3900m for penetration #2.
1623 Go to 3900m. Stop for 5 min.
1628 Full speed to bottom.

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1629 4013 wire out. Hit.
1630 Let out 5 meters.
1631 Let out more.
1635 Heater pulse fires.
1644 Startling up slowly.
1646 Pull out . 4051m out. 23° 45.359, 94° 08.257.
1649 Pull up to 3500m and drift.
1700
1710 Stop around 3500m.
1714 Start on down.
1723 Stop @ 3900m.
1730 Hit the bottom. Station 7 #3.
1736 Heater pulse on.
1742 Start back up.
1748 Pull out of bottom.
1808 Stop @ 3500m.
1828: 50 Probe enters bottom. Station 7 #4.
1835 Heater probe turned on.
1846 Probe pulled out.
1903 Stop at 3380.
1923 All stop 3900. Second time.
1929: 51 Probew entered bottom. Station 7 #5.
1936 Heater probe turned on.
1941 Winch started in.
2032 3900m stop.
2037 Pull up 100m then drop back down.
2051 Larry says to bring up to 3700m. Bottom return on heat probe not showing up on 12 KHZ
2054 Sae - licht decides to bring up to 2000m fast. 50-60 meters per minute.
Bottom return not showing due either to excessive bubbles under ship or drastic wire angle.
2110 Stopping ship.
2119 Stopped at 2000m. Turning ship around. Bring it up to 1000m. 25m / min.
2132
2152 1301m of wire. Probe is going down.
2212 3000m of wire.
2218 Winch stops at 3500m. someone wrote "In bottom" here which cannot occur at 3500m.
2245 coming up
2305 3000m to go
2345 Heat probe on deck
2351 Magnetometers deployed
0008 Magnetometers turned on
0600 Loran C out again
0608 Begin turn to way point 3 270°
0624 Completed turn.
0657 Begin turn in way point 4 180°

352.0 1.1
287.0 1

170° .03 kt

17° 0.2 kt
15° 0.6 kt
306° 0.41
343° 0.4
13° 0.5
324° 0.1
270° 0.3

APPENDIX 1

3-Jun	1230 Begin turn to East	
	1234 Maggies shut off.	
	1253 Maggies on board.	
3-Jun	1314 Steaming to line.	
	1319 PROBE in the water	
	1320 PROBE starting down	
	1323 pinger on and starting down	
	1338 3 second crossing.	
	1342 2000m out.	
	1346 2 sec. crossing.	
	1351 3000m out.	
	1354 1 sec. crossing	
	1357 Stop at 3500m	
	1359 Go down to 3900m.	
3-Jun	1404 Stop at 3900m.	
	1409 Full speed down.	
	1410 Bottom. 3983m out. 23° 44.76N, 94° 17. 437W	
	1416 Heat pulse fires.	
	1422 Start in slowly	
	1426 Pullout. 23° 44.917N, 94° 17.460. Up tp 3500m.	
	1447 All sip 3500. Go down to 3900.	
3-Jun	1503 All stop 3900.	
	1508 Full speed down.	
	1509 Bottom. 3997 out. 23° 45.150, 94° 17.537.	
	1515 Heat pulse fires. Let out 5 meters.	
	1521 Begin ascent.	
3-Jun	1526 Pullout. 23° 45. 254, 94° 17. 561. Up to 3500m.	
	1547 All stop 3500m. Go to 3900m. 23° 45.383N, 94° 17.659W	
3-Jun	1603 All stop 3900m.	
	1608 Full speed down.	
	1609 Hill 4052m out. 23° 45.500, 94° 17.766.	
	1615 Fire!	
	1621 Begin up slowly.	
	1626 Pullout. Up to 3500m. 23° 45.627 , 94° 17.797	
3-Jun	1630 Steaming.	
	1649 Stop at 3500.	
	1650 Bring up to unknown depth.	
	1651 Stop. Go slowly down to 3900m.	
	1658 Arrive station #8, penetration #4.	
3-Jun	1710 Stopped at 3899m.	
	1715 Bring it down.	
	1715:55 Bottom. 23° 46.058N , 94° 17.983W	
	1722 Heater pulse fired.	
	1730 Bring it up.	
	1734 Pulling out of bottom. 23° 46.168 , 94° 18.039	
	1738 Underway to steam.	
	1755 All stop. Station 8, # 5. 23° 46.787 , 94° 18.861	
	1758 On way down.	
3-Jun	1813 All stop 3900m.	

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1817	Bring it up 100m and back down.		
1822	All stop 3900m.		349°
1827	On the way in.		
1828:02	Bottom. Heater did not fire. 23° 46.596 , 94° 18.15		
1838	On the way back up.		
1840	Heater fired.		248°
1851:39	Pulled out of bottom. 23° 46.693 , 94° 18.184		
1858	Steaming.		61°
1916	Shipped stopped.		3°
1920	Shannon made delicious cheesecake		16°
1929	All stop 3900m.		
1933	Up 100m. Back 100m.		200°
1941	Stop at 3900.		338°
1946	On the way down.		
1947	Bottom.		192°
1953	Heater pulse fired.		18°
2005	Out of the bottom.		269°
2018	3000m out.		
2029	2000m out.		35.8°
2040	1000m out.		
2044	500m to go. 400m to pinger.		45°
2050	Heat probe at surface.		49.7°
2055	Securing heat probe on deck.		
2130	Piston Core #7 going down. 23° 47.4453 94° 17.9485		35.8°
2137	Pinger on. Going down. 103m (110m to bottom of core.) 23° 47.4964 , 94° 17.9439		45°
2147	1000m out.		49.7°
2157	2000m out.		
2216	3500m.		
2222	3900m.		336°
2228:40	Bottom 23° 47. 7293 , 94° 17.9013		
2240	3000m . On the way up.		
2252	2000m. to go.		
2302	1000m to recover core #7.		
2307	500m.		
2312	Pinger aboard.		
2327	Piston core #7 on board waypoint #1 : 23° 49N , 94° 21 waypoint #2: 22° 56N , 94° 21 waypoint #3: 22°56N , 94° 30W waypoint #4: 23° 49N , 94° 30W		
2347	Maggies out.		305°
2347	Lobster being served on the sunset deck. (Hahl)		6.3
0555	Turn to waypoint #4	0°	
1143	Maggies off.		273.5°
1202	Both maggies are on board.		1.9°
1258	Deploying heat probe.		9.4
1303	Heat probe going down.		304.7°
4-Jun			1.1

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4-Jun	23° 45.248N , 94° 26.620W	1312 1000m out.	
		1331 3000m out.	
		1337 Stop. 3500m out.	
		1338 Down to 3900m.	
		1343 All stop 3900m.	
		1347 Begin descent.	
		1349 Hit. 3997 out. 23° 45.703N , 94° 27.229W.	
		Up to 3500m.	
		1444 Stop at 3900.	
		1450 Probe enters. 23° 45.966N , 94° 27.436W	
		1456 Firell Kabloy!!	
		1501 Start in slowly. 4060m.	
		1506 Pull out. 23° 46.085 , 94° 27.542	
4-Jun		1529 All stop 3500. Back down to 3900.	
		1545 All stop 3900.	
		1551 Probe enters the bottom. 23° 46.501 , 94° 27.722	
		1557 Heat probe fires!!!	
		1603 Begin slow ascent.	
		1607 Pull out. 23° 46.501 , 94° 27.777	
		1629 All stop 3500. Go to 3900.	
		1650 Descend.	
		1651 Hit bottom. 23° 46.832 , 94° 27.942	
		1658 Heat probe fires. Zowie!	
		1703 Starting up.	
		1708 Pulled out of bottom. 23° 46.955 , 94° 28.026	
4-Jun		1730 3500m & stopped	
		1747 stopped @ 3900m	
		1753 in bottom (Sta 9 #5)	
		23° 47.323' N 94° 28.194'W	
		1759 Heater pulse on	
		1810 Probe pulled out	
		1834 stopped at 3500m	
		1851 stopped @ 3900m	
		1857 in bottom	
		23° 47.725'N 94° 28.425	
		1903 Heater pulse turned on	
		1913 Probe pulled out	
4-Jun		1936 all stop @ 3500m	
		1952 all stop @ 3900m	
		1957 in bottom	
		2003 batteries died - bring it up	
		2026 2500m to go	
		2045 500m to go. 400 to the pinger	
		2055 probe at surface	
		2110 Maggies deployed	
		2126 magnetometers on	
		Waypoints:	
		1) 24° 36'N 94° 30'W	

APPENDIX 1

5-Jun	3) 23° 42'N 94° 39'W	Piston Core at: 23° 46.5'N 94° 35' W	
		0309 c/c to 270°	
		0400 c/c to 180°	
		0915 Change course to 180°	
		0921 Magnetometers are off.	
		0939 Maggies on board. Resume speed.	
		1010 On station. Core #8.	
		1026 Core going down 23° 46.548 , 94° 35.167	032° 9.5
		1032 Pinger attached. 110m to trigger core.	352.6° 0.4
		1037 550m out.	
		1042 1000m out.	
		1048 1500m out.	
5-Jun		1055 2000m out.	
		1107 3000m out.	
		1128-30 Hit bottom 3981m. 23° 46.2480 , 94° 35.9496	296° 0.8
		1141 3000m to recover core #8.	
		1151 2000m to go.	
		1201 1000m to go.	
		1206 500m to go. 400m to pinger.	
		1225 Core on board.	
		1226 Change course to 75° E. Heading to heat probe station 10.	277.4° 0.9
		1312 Probe in water.	
		1316 Pinger attached and going down 3736m.	
		23° 47.189 , 94° 33.980	
5-Jun		1325 4 sec. crossing.	
		1326 1000m out.	
		1332 3 sec. crossing	
		1335 2000m out.	
		1339 2 sec. crossing	
		1344 3000m out.	
		1348 1 sec. crossing	
		1349 3500m out. Stop at 3894.	
		1354 3894m #1.	
		1400 Hit bottom. 23° 47.390 , 94° 34.535	
		1406 Fire.	296° 0.9
		1411 Start up slowly.	
5-Jun		1415 Pull out. 23° 47.495 , 94° 34.701 Go up to 3500m	
		1438 all stop at 3900m STA 10 #2	
		1456 stop at 3894m	
		1500 on the way down.	
		1501 probe enters bottom	
		GPS: 23° 47.581'N 94° 35.071'W	
		1508 heater pulse fired	193.0 0.8
		1513 start coming up	
		1518 pulled out	
		23° 47.737'N 94° 35.213'W	

APPENDIX 1

5-Jun	0250 begin turn from 180° to 270°				
	0300 turn completed				
	0340 c/c to 000°				
	0400 change completed				
	0933 turn of maggies				
	0935 c/c to 135°				
	0954 Maggies overboard				
	1030 on heat flow station 11 # 1				
	1039 probe in the water				
	1040 pinger in water				
	1048 1000m out				
	1058 2000m out				
	1108 3000m out				
	1125 probe entered bottom				
	GPS: 23° 45.233 94° 44.578				
	1144 out of bottom				
	GPS: 23° 45.1988N 94° 44.7377W				
	1204 lowered again				
	GPS: 23° 45.6609N 94° 44.9773W				
	1238 stopped at 3850m				
	1244 entered bottom				
	23° 45.766N 94° 45.184W				
	1250 heater pulse on				
	1304 pulled out				
	23° 45.811N 94° 54.289				
	1305 under way at 2 kts on 000°				
	1323 stop at 3450m then go to 3850m				
	1403 stop at 3850m of wire STA 11 #3				
	1409 full speed down				
	1410 penetrates bottom				
	GPS: 23° 46.400N 94° 45.873W				
	1416 heater pulse fired				
	1422 start up slowly				
	1426 pulled out of bottom				
	begin steaming				
	1449 3450m out				
	1504 stop @ 3850m STA 11 #4				
	1507 stop steaming				
	1515 moving probe up and down to avoid heater pulse				
	1533 going down				
	1534 hit the bottom				
	GPS: 23° 47.051N 94° 46.468W				
	1540 Larry belches, heater pulse fires				
	1546 begin up slowly				
	1551 pull out @ GPS: 23° 47.032 94° 46.572				
	1623 stop above bottom at 3850m				
	1627 going down STA 11 #5				
	1628 hit bottom				
	GPS: 23° 46.999 94° 46.785				
	1635 heater pulse fired				
6-Jun	1556 stop at 3894 m				
	1601 start down				
	1601 enter bottom				
	1608 heater pulse fired				
	1614 start up slowly				
	1619 pulled out				
	GPS: 23° 47.884N 94° 35.612W				
	1620 steam due south for 1/2 mile				
	c/c to 180°				
	1341 stopped at 3500m of wire				
	1357 stopped at 3894m				
	go up to 3800m				
	1708 go up to 3700m STA 10 #4				
	1711 go back down to 3900m				
	1713 heater pulse fired too soon in water				
	1719 stop at 3900m				
	1724 heat probe bottom				
	GPS: 23° 47.362N 94° 36.002W				
	1730 heater pulse fired				
	1736 winch started in				
	1800 stopped at 3500 m STA 10 #5				
	23° 47.039N 94° 36.478W				
	1836 stop at 3900m				
	1842 in the bottom				
	GPS: 23° 47.039N 94° 36.478W				
	1853 bring it back out				
	1900 out of the bottom				
	GPS: 23° 47.150N 94° 36.578W				
	1922 stop at 3500 and then back down				
	1931 ship all stop				
	1939 up 100m then down 100 m STA 10 # 6				
	1948 Stop at 3900m above bottom				
	1953 in the bottom				
	GPS:				
	1959 heater pulse on				
	2009 out of the bottom				
	23° 47.038N 94° 37.191W				
	2013 bring it all the way up				
	batteries dead!!!				
	2045 1000m out				
	2059 pinger removed				
	2110 probe secured				
	2123 deploying magnetometers				
	2140 maggies turned on				
	2145 c/c to 180° South				
5-Jun	Way points for this tropical evening				
	1) 22° 56'N 94° 39'W				
	2) 22° 56'N 94° 48'W				
	3) 23° 49'N 94° 48'W				

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6-Jun	1641 start in slowly		
	1646 pulled out		
	GPS: 23° 46.991'N 94° 46.897'W		
	1647 up to 3450m	202.0	0.9
	1705 down to 3850m		
	1709 going on down		
	1709 in the bottom	287.0	0.1
	23° 46.997'N 94° 47.190 (GPS)		
	1744 3000m		
	1754 2000m		
	1804 1000m		
	1808 500 to go		
	1815 pinger removed		
	1818 probe at surface	317.3	0.6
	1823 probe on deck		
	1824 crs 295 @ 3° until refiging complete		
	1828 c/speed 6 kts		
	1842 c/speed full		
	1915 c/c to 110°		
	1938 core going over	251.0	1.3
7-Jun	1942 pinger going down	245.6	1.3
	1950 500m out		
	1955 1000m out		
	2001 1500m out		
	2007 2000m out		
	2013 2500m out		
	2019 3000m out		
	2022 3500m out		
	2034 3800m out & stopped		
	2037 in the bottom	261.0	0.2
	GPS: 23° 49.440'N 94° 54.163		
	2048 3000m out		
	2058 2000m out		
	2106 1000m out		
	2139 deploying magnetometers		
	reset maggie logger clocks		
	2154 2154 maggies turned on	8.2	
	0005 s/c 000	000.0	10.2
8-Jun	0046 c/c 005 Heading for Galveston Sea Buoy I	005.0	10.5
	0615 c/c 002	003.8	9.5
	1743 c/c 003 to pass fishing vessel on starboard	10.1	
	0056 Manuever to left to avoid unidentified radar object		
	0500 Magnetometers turned off for end of cruise		
	0520 Maggies secured onboard		
	0900 Watch Secured	357.9	10.4
	END Scientific OBS LEG 2 GYRE CRUISE GC-6		

APPENDIX 2

**Summary of OBS Experiment aboard R/V Gyre Cruise 92G-06,
Gulf Probe 6, Leg 1**

During this cruise, we deployed eight new UTIG OBS's along two intersecting lines and recorded 32 hours of continuous data on each of them. The total amount of data acquired is about 1.1 Giga bytes. In this supplement to the cruise report, we document certain pertinent technical information and performance of the instruments. [All times are given in local Central Daylight Time, which is 5 hours behind UTC.]

Seismic instruments: Upgraded UTIG OBS

Number of channels: 3 channels for 3-component geophone data for entire 32 hours, except the one for station 6, which was programmed to record 26 hours of 4-channel (3-component geophone and a hydrophone) data and 6 hours of single-channel (vertical geophone only) data.

Sensors: UTIG 3-component gimbale geophone assembly with Mark Products L15-B 4.5 Hz geophones for all stations; and for station 6 only, Benthos AQ-12 hydrophone

Sampling interval: 5.000 ms

Anti-aliasing filter: 30 Hz

Seismic signal source: 2000 cubic inch air-gun

Towing depth: 9 m (estimated)

Shot interval: 40 s

Deployment and recovery data

Station	1	2	3	4	5	6	7	8
OBS Chassis	92-5	92-6	92-7	92-8	92-9	90-2	92-10	92-11
Sphere	29034	23644	44398	29036	44568	32527	23640	31615
Deployment Time	May 20 05:02:03	May 20 06:53:43	May 20 08:46:54	May 20 10:52:17	May 20 13:27:46	May 20 16:16:11	May 20 18:03:00	May 20 19:47:45
Deployment Location	23°47.794'N 94°46.097'W	23°47.586'N 94°29.009'W	23°47.300'N 94°11.974'W	23°47.027'N 93°54.890'W	23°31.044'N 93°38.175'W	23°46.416'N 93°20.723'W	23°46.745'N 93°37.626'W	24°02.380'N 93°37.467'W
Water Depth	3686m	3749 m	3751 m	3755m	3753m	3757m	3757 m	3757 m
Release Time	May 22 12:00	May 22 14:45	May 22 17:30	May 22 20:15	May 23 00:00	May 23 09:15	May 23 02:45	May 23 05:30
Surfacing Time	13:00	15:43	18:28	21:13	00:52	10:12:30	04:09	06:26
Recovery Time	14:04:12	16:05:45	18:46:37	21:39:	01:12:36	10:37	04:23:44	06:53
Recovery Location	23°46.479'N 94°46.479'W	23°46.667'N 94°29.471'W	23°46.606'N 94°12.449'W	23°46.853'N 93°55.168'W	23°31.437'N 93°37.950'W	23°47.094'N 93°20.856'W	23°47.404'N 93°37.791'W	24°02.910'N 93°38.199'W
Water Depth	3686m	3753m	3755m	3758m	3757m	3758 m	3757 m	3758m

Deployment and recovery locations are from real-time monitor display of GPS navigation data from the bridge. Water depths have been converted from fathoms read off the echo sounder chart corrected for 'Matthews' table' 3rd ed., 1980, and the ship's draft of 3 m added.

OBS Seismic lines

Line No.	1	2	3
From	24°06.65'N 93°37.28'W	23°28.25'N 93°38.25'W	23°46.35'N 93°17.83'W
To	23°28.32'N 93°38.25'W	23°46.35'N 93°17.78'W	23°47.29'N 94°13.47'W
First shot recorded	May 21 03:00:35.872	May 21 11:00:35.668	May 21 17:23:55.499
Last shot recorded	May 21 10:59:55.669	May 21 17:23:15.500	May 22 10:43:02.138
Line length	70.77 km	37.87 km +	94.53 km
Stations on line	8, 7, 5		6, 7, 4, 3

Line 2 includes turns at each end.

Line 3 was interrupted on May 22 between 02:55:55 and 09:01:42 due to air-gun failure.

Stations 2 and 1 were on the westward extension of line 3 where no shots were fired.

Instrument performance

All eight instruments recorded nearly full 32 hours of data. However, there were some problems of which were hardware related. They are listed below for future corrective and preventive measures.

1. The magnetic tape drives of all eight OBS units experienced difficulty attaining full working status immediately after they were powered up following a long dormancy at low temperature. This problem had been known from pre-cruise cold tests. However, all regained full operating status within a few minutes and little or no data loss resulted.
2. Two instruments, OBS 90-2/sphere 32527 at station 6 and OBS 92-10/sphere 32640 at station 7, showed one horizontal component with reduced and distorted response indicative of a tilted geophone. An examination in the lab after the cruise indicated that the problem with the latter unit was indeed caused by a tilt of the geophone gimbal-mount base plate that appeared to be created by low fluid (silicon oil) level and resulting uneven wetting of the top surface of the plate. Some silicon oil had leaked out of the geophone housing. No apparent problem was found for the former unit after the cruise, and thus the likely cause of its problem remains to be excessive tilting of the whole instrument on the sea floor.
3. One instrument, OBS 92-11 at station 8, suffered a large DC offset on one of the channels (vertical). A test in the lab after the cruise indicated that it was caused by a defective trim pot on the preamplifier board. Since we used automatic gain ranging, the large DC offset degraded the amplitude resolution for small signals. The other two channels were not affected.
4. The signal from a hydrophone, which was used only at station 6, was extremely weak. However, we realized later that the hydrophone we used was designed for a maximum depth of 6000 feet, while we deployed it at 3600-m depth.
5. One of the two strobe lights in each of the spheres 32527 (station 6), 23640 (station 7) and 31640 (station 8) was not working at recovery.
6. One Novatech submersible transmitter, used at station 8, leaked sea water and was damaged.
7. One stainless steel strap holding the sphere inside a yellow plastic hardhat, deployed at station 8, broke. This caused both submersible transmitters, fastened to the strap, to remain under water after the unit surfaced, thus preventing them from transmitting radio signals.

APPENDIX 3

Cruise Report

R/V Gyre

5/16-5/24/92

I. Goals of Cruise

The goal of this cruise was to conduct visual and acoustic observations of cetaceans in the western Gulf of Mexico as adjunct to the cetacean census estimates made for the GulfCet program. These observations were to replicate parts of the GulfCet census area and to extend our observations into Mexican waters south of the main GulfCet research area. These waters have historically been important areas for sperm whale sightings and may serve as seasonal locales where whales that are found off the mouth of the Mississippi congregate. Overall, these southwestern waters have rarely been surveyed by experienced marine mammal observers and this cruise represents one of our few opportunities to gain access to the area.

II. Personnel

A. Acoustics

1. Jeff Norris
2. Mike Duncan

B. Visual observers

1. Steve Leatherwood
2. Tom Jefferson
3. Bill Stevens

III. Cruise Chronology

A summary of this cruise is provided in table 1, with a cruise map provided in figure 1. The marine mammal observation components for this cruise comprised three segments.

A. First Segment: 5/17-5/19

After leaving Galveston at 22:05 on 5/16/94, we deployed the array upon arriving on station at the north end of GulfCet track #4 at 09:18 the next day, 5/17. We sailed south at 6 knots, replicating the census run done precisely a month before during the Long Horn cruise. While no animals were seen, we did record whistles. Upon reaching the end of track #4 at the 2000 m depth we turned west to follow that contour. On 5/18 we briefly hauled recording, at 12:21, to test the seismic air gun. Recordings were begun again two hours later and we continued along the 2000 m isobath. We arrived at the end of this segment and retrieved the array at 10:50 on 5/19 having traversed 309 miles over 46:56 hours. We still had not seen any cetaceans, but we had made further recordings of whistles. Our overall impression of the seas were that they were extraordinarily sterile, with few sightings of fish or birds. According to the cruise plan, as described both in text

Table 1. Cruise Summary for R/V Gyre cruise from 5/16-5/24/92.

Date	Time	Dur.	Dist	Species	Comments
5/16/92	22:05				Leave port : track census
First Segment					
5/17	09:18				Array deploy : head of census to #4 at 100 m d
5/17	21:24	12:06	97		End of Leg : 2000 m depth. d to follow 2000 bath.
5/18	12:21	14:57	93	None seen, whistles recorded.	Stopped re ng; tested s c equip
5/18	14:57				Begin recor again
5/19	10:50	19:53	119	None seen, whistles recorded.	End recor for cetac
Second Segment					
5/19	13:54				Recording n; heading e ver deeper wat t 6 knor
5/20	03:07	13:13	75	<u>Steno</u> <u>bredanensis</u> <u>Stenella</u> <u>longirostris</u>	Stopped re ng; Array broug ; OCS devices dep l.
Third Segment					
5/23	13:58				Other re sh completed ay deployed, ding begins. Ret ng to port at 1 ts.
5/24	13:48	23:50	245	<u>Lagenodelphis</u> <u>hosei</u> , <u>Tursiops</u> <u>trunacatus</u>	End of reco near Pt. Isa
Totals					
		83:59	629		

and on chart, this ended our contracted segment of the cruise. We then began heading east to continue with the physical oceanography components of the cruise.

B. Second Segment: 5/19-5/20

We redeployed the array 17 miles to the east of our last recording position at 13:54 on 5/19. We headed ESE for 75 miles at 5.7 knots for 13:13 hours, moving from the 2000 m contour to the deepest areas of the gulf, the Sigsbee Plain at 3700 m depth. During this transit we both saw and recorded rough-toothed dolphins (Steno bredanensis) and spinner dolphins (Stenella longirostris). Upon reaching Deep Sea Drilling Program (DSDP) site 90, we halted recording and retrieved the array at 03:07 on 5/20. This completed our recordings prior to the intensive physical oceanographic research. By this time we had recorded for a total of 60:09 hours over a distance of 384 miles.

C. Third Segment: 5/23-5/24

Upon completing the physical oceanography research we redeployed the array for the return cruise to Port Isabel at 13:58 on 5/23. However instead of heading directly back as planned we first headed directly north for approximately 25 miles, then directly east for about 110 miles after which we then headed directly to Port Isabel. These course deviations apparently allowed for further magnetic and/or gravitational field research. As we crossed the continental shelf, in approximately 820 m of water we made the first sighting in the Atlantic Ocean and the first recordings ever of Frazer's dolphin (Lagenodelphis hosei). Over 200 animals were observed, including several animals that bow rode on the vessel. We also later saw and recorded Tursiops. As we neared Port Isabel, we retrieved the array at 13:48 on 5/24, having recorded for slightly less than a day, covering 245 miles.

IV. Summary of Findings

During this cruise we uncovered valuable positive and negative data about marine mammal distributions in the Gulf. On the negative side we did not see many the cetaceans we had expected to see, particularly sperm whales and various stenellids. We are interested to know if there was no cold water gyre in the area, since the gulf appeared surprisingly empty, even of such commonly seen animals as flying fish and marine birds. On the positive side we had the first, third, and fourth sightings of three delphinid species. We even saw three humming birds crossing the gulf! We recorded 114 tapes over 629 miles of recording, including 15 acoustic contacts (see appended Taping Record), which can be compared to 126 acoustic contacts over 1240 miles during the Long Horn cruise. Overall, while this data set is meager, it represents valuable information that may allow us to piece together the distribution and abundance of marine mammals in the Gulf of Mexico.

Figure 1. map of R/V Gyre cruise with recording areas in Bla

INE (HEAVY)

