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M E M O R A N D U M

TO: Dr. Arthur E. Maxwell

FROM: Yosio Nakamura

SUBJECT: Cruise Report: FM-22

The R/V Fred H. Moore cruise FM 22 took place on the 3rd through the 15th of February, 1984. The primary purpose of the cruise was to collect OBS refraction data from five 90-km lines in the Green Canyon area of the northern Gulf of Mexico off Louisiana. The experiment was a part of our continuing study of the deep crustal structure in the Gulf of Mexico using large capacity airguns as seismic sources and ocean bottom seismometers as signal detectors, and was conducted in similar fashion as the preceding ones during the Fred H. Moore cruises FM 17, 19 and 20-02. This particular cruise, however, was supported by a single industrial sponsorship. In addition to the OBS data, multichannel reflection data from a 5-channel streamer and sonobuoys were also acquired for the same five lines.

Unlike the preceding three OBS cruises, this cruise was quite eventful. The experimental site happened to be right in the area where a large number of oil company and contractor's seismic ships were operating because of an impending lease sale. Our shooting with large capacity airguns, therefore, started up many interesting verbal exchanges over the ship's radios, and ended up in meetings in Austin and Houston to deal with the problem. The effect of other seismic ship's shooting on the quality of our data appears to be minimal because of the vastly different signal characteristics of our airguns for the deep refraction work from others. The effect of our shooting on their data is unknown.

The weather was less than ideal. Two cold fronts which passed the area during the experiment forced us to delay the remaining portions of the experiment on February 5 and again on February 12, in addition to those delays in consideration for other seismic ships. In all, the cruise took 12 days instead of 10 days as originally planned.

On February 13 at about 05:43 cst, about half an hour after the last OBS on the last line was deployed and while the ship was heading to the starting point of the line, the bow transducers used for the 3.5 kHz echo sounder were hit by an unknown object and were completely disabled. Although

this had little effect on our experiment because the aft transducers were usable at a slow speed for bathymetry, we were directed to go to a dry dock in Freeport after the completion of the experiment instead of returning directly to Galveston.

The first line we shot was a near disaster. Of the four OBS's we deployed on this line, three of them did not record any data because of instrumental malfunction. Fortunately, the problem was later solved, but this line had to be reshot. Despite these troubles, we were quite successful in acquiring data as planned. A total of 24 OBS deployments were made instead of 20 as originally planned because of the reshoot of the first line. All were recovered successfully on time, and 20 of them recorded data as programmed.

The following personnel participated in the scientific party:

Chief Scientist:	Yosio Nakamura
Deputy Chief Scientist:	Bill O'Brien
OBS Operation:	Paul McPherson, Mike Butterfield
Navigation:	Patty Ganey, Dale Sawyer, Jan Garmany
Laboratory Assistant:	Subir Chatterjee
Navigation/Electronics:	Ken Griffiths, Sterling Gilfillan
Airgun Operation:	Oscar Febres-Cordero, George Pearcy

A copy of the pre-cruise test plan is attached. All five lines were shot successfully at planned locations, though the actual times of execution of the lines and their order were not as planned because of the delays as described above. Also attached is a report on electronics and multichannel by Ken Griffiths. A summary of activities during the cruise follows:

Friday, February 3

14:02	Departed from Galveston dock two hours behind schedule because of repairs on a damaged generator gear
15:30	Conducted a fire drill

Saturday, February 4

Line 4 Operation

15:34:50	Deployed OBS No. 1 (see table 1 for location coordinates and water depth)
16:49:50	Deployed OBS No. 2
19:25:35	Deployed OBS No. 3
20:35:45	Deployed OBS No. 4
21:30 - 22:20	Deployed 5-channel streamer

23:32 - 23:40	Deployed port gun; starboard airgun cable was broken and had to be repaired

Sunday, February 5

00:00:01	Started shooting with the port gun only (see Table 2 for coordinates and water depth) about 2.4 miles short of the planned starting point, cruising at about 4 knots and shooting at 45 second intervals, or approximately every 93 m
01:32	Starboard gun cable repaired; now shooting with both guns
02:36	Deployed sonobuoy No. 1 (see Table 3 for location)
05:30:45	Deployed sonobuoy No. 2
07:25 - 10:00	Several radio contacts with Arco Resolution were made during this time period
08:07:24	Deployed sonobuoy No. 3
12:00:01	Completed the primary shooting within 0.3 mile of planned end-point, and reduced the shot interval to 30 seconds for the extension line.
13:00:07	Completed the extension line
13:05 - 13:20	Retreaved airguns
13:20 - 13:53	Retreaved streamer
14:59:25	OBS No. 1 surfaced
15:04:15	Recovered OBS No. 1: data on tape
16:44:30	OBS No. 2 surfaced
16:52:00	Recovered OBS No. 2: no data
19:49:45	OBS No. 3 surfaced
20:04:25	Recovered OBS No. 3 : no data
21:34:25	OBS No. 4 surfaced
21:40:50	Recovered OBS No. 4: no data
	Weather was getting bad with 75 mph gust and 15-20 ft sea forecast; decided to delay the next line, possibly for 12 hours

Monday, February 6

Drifted south overnight in 10-20 ft. sea and winds gusting over 70 knots; decided to shoot line 2 next, avoiding the high activity area (lines 1 and 3) for a while

Line 2 Operation

15:05:55	Deployed OBS No. 1
16:46:57	Deployed OBS No. 2
19:45:15	Deployed OBS No. 3
20:59:47	Deployed OBS No. 4
23:37 - 23:37	Deployed Streamer

Tuesday, February 7

00:26 - 00:36	Deployed airguns
01:00:01	Started shooting; about 2.7 miles behind the planned starting point, or about 40 minutes behind schedule
03:12	Deployed sonobuoy No. 4
06:23	Deployed sonobuoy No. 5
09:10 - 09:44	Data logger was out of order (also for short intervals at around 11:51-11:52, 12:02-12:05, and 12:59-13:01)
10:26	Deployed sonobuoy No. 6
13:00:01	Completed the primary line shooting, about 2 miles short of the planned end point
14:00:07	Completed the extension line shooting
14:05 - 14:20	Retreaved airguns
14:20 - 14:47	Retreaved streamer
16:23:30	OBS No. 1 surfaced
16:28:45	Recovered OBS No. 1; data on tape
17:42:44	OBS No. 2 surfaced
17:46:45	Recovered OBS No. 2; no data on tape
20:54:15	OBS No. 3 surfaced

21:00:53	Recorded OBS No. 3; data on tape
22:36:15	OBS No. 4 surfaced
22:40:30	Recovered OBS No. 4; data on tape
	At this point, a decision was made to shoot line 5 next, waiting for the outcome of a meeting in Austin on Wednesday before attempting to shoot lines 1 and 3

Wednesday, February 8

08:00	Arco Resolution was again in contact

Line 5 Operation

11:58:25	Deployed OBS No. 1
13:39	Deployed OBS No. 2
17:51:41	Deployed OBS No. 3
18:33 - 18:45	Radio contacts with Western Inlet; they were cooperative and offered to coordinate with other seismic ships
19:22:57	Deployed OBS No. 4
20:03 - 20:25	Deployed streamer
20:30 - 20:40	Deployed airguns
21:00:02	Started shooting; 3 miles short of the planned starting point because of ship traffic in the area; delayed shot times by 1 second to compensate for the mislocation of ship
22:34:07	Deployed sonobuoy No. 7, bad
22:49:20	Deployed sonobuoy No. 8

Thursday, February 9

01:35	Deployed sonobuoy No. 9, very noisy
02:20	Deployed sonobuoy No. 10, good
06:02	Deployed sonobuoy No. 11, died shortly
06:17	Deployed sonobuoy No. 12, also died shortly
06:37	Deployed sonobuoy No. 13, good
08:55	Received a message from Austin to go ahead and shoot lines 1, 3 and 4-re-shoot

09:00:02	Completed primary line shooting; 3/4 miles beyond planned end point
10:00:07	Completed extension line
10:03 - 10:26	Retreaved airguns
10:26 - 10:52	Retreaved streamer
12:03:20	OBS No. 1 surfaced
12:07	Recovered OBS No. 1; data on tape
13:39:40	OBS No. 2 surfaced
13:44	Recovered OBS No. 2; data on tape
16:54:55	OBS No. 3 surfaced
17:01	Recovered OBS No. 3; data on tape
18:30:40	OBS No. 4 surfaced
18:38	Recovered OBS No. 4; data on tape

Friday, February 10

Line 3 Operation

04:38:11	Deployed OBS No. 1
05:00	Radio contacts with Niobi and Western Inlet to inform them of our shooting schedule
06:19:53	Deployed OBS No. 2
09:14:44	Deployed OBS No. 3
10:41:21	Deployed OBS No. 4
13:00	Deployed streamer
13:30	Deployed airguns
14:00:01	Started shooting; ship location 1.7 miles short of planned starting point
15:41	Deployed sonobuoy No. 14
19:14	Deployed sonobuoy No. 15, bad
19:25	Deployed sonobuoy No. 16, bad again

19:57	Deployed sonobuoy No. 17, another bad one
20:18	Deployed sonobuoy No. 18, this was also bad
20:35	Deployed sonobuoy No. 19, good at last

Saturday, February 11

02:00:01	Completed primary line shooting; 1.3 miles short of planned end point
03:00:07	Completed extension line
03:06	Retreaved airguns
03:18	Retreaved streamer
05:10:50	OBS No. 1 surfaced
05:17	Recovered OBS No. 1; data on tape
05:50	Relayed line 1 shooting schedule to Western Passage, which was coordinating shooting schedule of other seismic ships
06:38:45	OBS No. 2 surfaced
06:48	Recovered OBS No. 2; data on tape
09:35:10	OBS No. 3 surfaced
09:40:39	Recovered OBS No. 3; data on tape
11:14:30	OBS No. 4 surfaced
11:18	Recovered OBS No. 4; data on tape

Line 1 Operation

12:12:04	Deployed OBS No. 1
13:51:15	Deployed OBS No. 2
16:37:26	Deployed OBS No. 3
18:06:40	Deployed OBS No. 4
19:25	Deployed streamer
	Deployed airguns
21:00:01	Started shooting; 1/2 mile beyond planned starting point
22:20	Deployed sonobuoy No. 20

Sunday, February 12

01:49:30	Deployed sonobuoy No. 21; good carrier but no signal
02:07:31	Deployed sonobuoy No. 22
04:10	Radio contact with Western Narrows; very uncooperative
04:50	Deployed sonobuoy No. 23, bad
04:56	Deployed sonobuoy No. 24
05:05	Western Narrows in same heading and speed as ours at 7.59 miles off port bow, bearing 260°, shooting possibly without recording as they said they would
06:49	China Seal in radio contact, requested our shooting schedule
08:40	Coral Seal in radio contact, we gave our shooting schedule
09:00:01	Completed primary line shooting, ½ mile beyond planned end point
09:05	Shut down starboard gun because single compressor could not handle two guns at 30 second repetition rate.
09:52 - 09:57	Retreaved starboard airgun
10:00:07	Completed extension line
	Retreaved port airgun
10:13 - 10:30	Retreaved streamer
10:39 - 10:55	Circled around Amoco rig Rowan Louisiana on South Timbalier Block 221 at ½ to 1 mile distance for LORAN-C calibration
11:37:59	OBS No. 1 surfaced while we were circling at distance to let a freighter pass very close to the OBS site
11:55	Recovered OBS No. 1, data on tape
13:04:00	OBS No. 2 surfaced
13:20	Recovered OBS No. 2, data on tape
	Cold front approaching
16:43:38	OBS No. 3 surfaced
16:49	Recovered OBS No. 3 while the cold front is passing the area with high wind and rough sea; data on tape
18:28:40	OBS No. 4 surfaced

18:37	Recovered OBS No. 4, data on tape
	Decided to delay the line 4 reshoot operation by 3 hours because of heavy sea

Monday, February 13

Line 4 Reshoot Operation

00:07:46	Deployed OBS No. 5 near the OBS No. 4 location of the original line 4
01:35:50	Deployed OBS No. 6 near the OBS No. 3 location of the original Line 4
03:53:15	Deployed OBS No. 7 about 8 miles east of the OBS No. 2 location of the original line 4
05:16:40	Deployed OBS No. 8 near the OBS No. 2 location of the original line 4
05:43	The bow transducers were hit by an unknown object; echo sounder lost signal
05:50	Relayed shooting schedule to Western Passage, Arco Resolution and Western Narrows
07:45 - 08:09	Deployed streamer
08:28	Deployed airguns
09:00:01	Started shooting, 2.0 miles short of planned starting point
09:25	Echo sounder back in operation using aft transducers
12:30	Deployed sonobuoy No. 25
21:00:01	Completed primary line shooting, 1.6 miles short of planned end point
22:00:07	Completed extension line
22:05 - 22:16	Retreaved airguns
22:16 - 22:44	Retreaved streamer
23:56:20	OBS No. 5 surfaced

Tuesday, February 14

00:03	Recovered OBS No. 5, data on tape
01:35:50	OBS No. 6 surfaced

?	Recovered OBS No. 6, data on tape
03:51:00	OBS No. 7 surfaced
03:57	Recovered OBS No. 7, data on tape
05:24:36	OBS No. 8 surfaced
05:30	Recovered OBS No. 8, data on tape End of line 4 reshoot; proceeded to return to Galveston
17:00	Directed to proceed to Freeport to inspect the damage to the bow transducers in a dry dock

Wednesday, February 15

08:30	Arrived at Freeport Swift Shipyard; all scientific party except K. G. and Y. N. left the ship; transducers removed
13:30	Departed from Freeport; Tom Shipley on board
19:15	Returned to Galveston

In spite of many problems we encountered, the cruise was generally quite successful. As usual, the ship's crew performed admirably, and the navigation team maintained excellent ship track by maintaining good communication with the bridge. Those in contact with other seismic ships in the area over the radio, both from the ship's crew and from the navigation team, remained calm and deplomatic even when comments from other ships were rather nasty.

Airguns worked excellently throughout the experiment. Both Oscar and George worked very hard to achieve this excellence. Following the 75% failure of the first line, the OBS operation recovered after Ken and Paul came up with a solution. They achieved a 100% data recovery for the last four lines. Everybody worked very hard, often under trying sea conditions during this cruise, and should be highly commended for the success of the experiment.

There were a few things which were tried for the first time during this cruise:

(1) The engineering support group in Galveston devised a new OBS deployment mechanism which allows one standing at distance, to deploy an OBS simply by a pull on a rope. The new device is so easy to use and has greatly increased the safety of the personnel involved in OBS deployment from the aft deck.

(2) The engineering support group in Galveston also devised a long pole with a hook to be used for the recovery of OBS's. This simple tool has significantly shortened the OBS recovery time.

(3) Ken worked on and completed during this cruise a real-time hook up between the Northstar 6000 LORAN-C receiver and the Tektronix terminal for a real-time plotting of the ship's position on the Tektronix screen. This display was especially helpful in guiding the ship during OBS deployment.

(4) A ship-board OBS data playback system was installed on the DEMUX computer just before the cruise and was used for the first time during this cruise. With programs written for the PDP 11/34 during the cruise, we were able to get a quick plotting of an OBS record section within a half hour of each OBS recovery, and to make preliminary SEG-Y tapes on board. Further improvements in these programs will allow more processing of OBS data on board in future cruises.

There were a few problems which surfaced during the cruise:

(1) The most frequently heard complaint during this cruise was the quality of water on board. It appears the water on the Fred Moore is not fit for drinking, including making coffee or tea, to many people. Ample supply of separate drinking water may solve the problem.

(2) Small (11 inch) Versatec printer-plotter for the PDP 11/34 was out of order for the entire cruise. I understand that it has been out of order since the close of cruise FM 20-02, when someone

borrowed some circuit boards out of it. Equipment like this should not be left out of order for such a long time.

(3) Data logger 'bombed' several times during the cruise. I understand that certain program changes will prevent this problem from occurring. The data logger also appears to consume exceptionally large quantities of tape for the amount of data recorded. Recorded data are sometimes ambiguous. I recommend that someone look into these software problems and correct them in the near future.

(4) The doppler sonar for the satellite navigation was out of order for the entire experiment, although I understand that it was fixed after the last line was completed.

(5) The satellite clock is still unreliable after several returns to the factory. Are any better clocks available?

(6) As described in Ken Griffith's report, one compressor was down for some of the lines.

(7) We felt a shortage of support personnel in the lab area for the cruise. This was especially so when we were shooting during the very early morning hours and the navigator was the only one up. We did not have any students for this cruise because of conflicts with exams, etc. We should try to get one or two more support personnel for a similar cruise next time.

YN/rm

Table 1. OBS Deployment and Recovery Locations

Line	OBS	D/L	Latitute deg,min N	Longitude deg,min W	LORAN-C TDW	LORAN-C TDX	LORAN-C TDY	Water Depth fm
4	1	D	27 50.61	90 41.32	11742.0	27721.1	46569.9	417
		R	27 50.59	90 41.22	11742.6	27722.0	46569.8	417
	2	D	27 53.30	90 29.51	11792.9	27850.4	46568.6	310
		R	27 53.22	90 29.42	11793.6	27851.0	46568.3	313
	3	D	27 59.10	90 02.86	11922.1	28139.8	46564.5	323
		R	27 59.01	90 02.73	11923.0	28140.6	46564.0	324
	4	D	28 01.64	89 51.12	11985.1	28266.7	46562.3	380
		R	28 01.54	89 51.06	11985.7	27266.6	46561.8	381
2	1	D	26 59.82	89 32.16	12201.1	28152.6	46272.4	1321
		R	26 59.88	89 32.15	12201.0	28153.0	46272.8	1320
	2	D	27 10.28	89 35.38	12168.7	28172.0	46322.6	1193
		R	27 10.37	89 35.33	12168.8	28172.8	46322.9	1194
	3	D	27 33.72	89 42.67	12089.5	28214.6	46434.0	585
		R	27 33.80	89 42.65	12089.6	28215.2	46434.0	561
	4	D	27 44.12	89 45.90	12051.6	28233.3	46482.4	540
		R	27 44.18	89 45.88	12051.7	28233.7	46482.6	540
5	1	D	26 44.45	91 26.41	11719.1	26991.7	46381.3	973
		R	26 44.41	91 26.35	11719.4	26992.0	46381.1	965
	2	D	26 55.38	91 26.24	11694.9	27037.1	46418.8	1208
		R	26 55.37	91 26.25	11694.9	27037.1	46418.9	1204
	3	D	27 19.77	91 25.75	11637.4	27143.3	46502.3	676
		R	27 19.75	91 25.80	11637.3	27142.7	46502.5	673
	4	D	27 30.57	91 25.59	11610.0	27191.2	46539.5	507
		R	27 30.64	91 25.48	11610.3	27192.6	46539.7	504
3	1	D	27 36.56	90 35.49	11805.9	27715.0	46510.9	605
		R	27 36.68	90 35.58	11805.3	27714.6	46511.3	614
	2	D	27 47.42	90 34.20	11784.9	27777.0	46550.8	454
		R	27 47.53	90 34.32	11783.8	27776.3	46551.4	456
	3	D	28 11.59	90 31.23	11734.4	27917.8	46640.0	44
		R	28 11.61	90 31.21	11734.4	27918.1	46640.1	45
	4	D	28 22.32	90 29.91	11710.0	27980.8	46679.5	25
		R	28 22.40	90 29.91	11709.9	27981.0	46679.9	25
1	1	D	28 22.71	90 29.69	11710.1	27984.7	46680.9	24
		R	28 22.87	90 29.82	11709.0	27984.1	46681.5	25
	2	D	28 16.17	90 20.04	11781.5	28050.4	46648.6	38
		R	28 16.29	90 20.12	11780.8	28050.2	46648.8	38
	3	D	28 01.40	89 58.12	11944.1	28197.1	46569.1	302
		R	28 01.37	89 58.12	11944.3	28197.0	46568.8	302
	4	D	27 54.77	89 48.50	12015.3	28259.3	46530.8	407
		R	27 54.73	89 48.59	12014.7	28258.1	46530.6	399
4R	1	D	28 01.63	89 51.52	11982.8	28262.7	46562.6	372
		R	28 01.58	89 51.51	11982.9	28262.5	46562.6	
	2	D	27 59.07	90 03.34	11919.3	28134.8	46564.9	323
		R	27 59.01	90 03.40	11919.1	28133.9	46564.7	
	3	D	27 55.20	90 21.03	11831.8	27943.0	46567.5	369
		R	27 55.09	90 21.08	11831.8	27941.9	46567.2	
	4	D	27 53.17	90 30.04	11790.6	27844.6	46568.7	309
		R	27 53.12	90 30.09	11790.4	27843.9	46568.5	

Coordinates and TD values are from Northstar 6000.
D: Deploymnet site, R: Recovery site

Table 2. End Points of Shooting Lines

Line	Shot No.	Latitude deg,min N	Longitude deg,min W	TDW	LORAN-C TDX	TDY	Water Depth fm
4	1	28 02.32	89 45.83	12015.7	28321.4	46559.4	391
	961	27 50.33	90 42.61	11736.8	27707.1	46570.1	350
	1081	27 49.45	90 47.28	11717.3	27656.7	46571.2	292
2	1	27 48.14	89 46.98	12037.6	28242.3	46500.7	539
	961	27 00.54	89 32.24	12199.6	28155.2	46275.7	1312
	1081	26 56.69	89 31.04	12211.4	28148.3	46257.0	1349
5	1	27 34.86	91 25.90	11597.3	27206.6	46554.7	575
	961	26 42.39	91 26.47	11723.4	26982.9	46374.3	1092
	1081	26 38.15	91 26.52	11732.5	26965.8	46359.9	935
3	1	28 25.38	90 28.90	11706.3	28004.9	46690.5	23
	961	27 36.56	90 35.56	11805.6	27714.2	46510.9	605
	1081	27 32.51	90 35.99	11813.4	27691.7	46495.8	525
1	1	27 53.67	89 46.91	12027.0	28269.3	46524.1	440
	961	28 23.17	90 30.57	11704.0	27978.0	46683.3	24
	1081	28 25.46	90 34.27	11677.4	27951.7	46694.5	22
4R	1	27 49.66	90 45.51	11725.0	27675.3	46570.4	
	961	28 01.53	89 51.78	11981.3	28259.6	46562.7	365
	1081	28 02.54	89 47.34	12006.0	28307.8	46562.0	405

Coordinates and TD values are from Northstar 6000, thus are preliminary. Shot Nos. 1, 961 and 1081 represent beginning and end of primary line and end of extension line, respectively.

Table 3. Active Sonobuoy Deployment Locations

Line	Sonobuoy No.	Latitude deg,min N	Longitude deg,min W	TDW	LORAN-C TDX	TDY	Water Depth fm
4	1	28 00.36	89 56.10	11958.3	28211.8	46562.4	307
	2	27 57.32	90 10.52	11883.2	28056.1	46565.2	300
	3	27 54.52	90 23.61	11819.9	27914.2	46567.5	382
2	4	27 39.44	89 44.54	12068.4	28224.0	46460.7	571
	5	27 26.88	89 40.46	12114.0	28202.9	46401.4	736
	6	27 10.67	89 35.43	12167.9	28173.4	46324.2	1188
5	8	27 26.16	91 25.66	11621.4	27171.6	46524.5	565
	10	27 10.26	91 25.87	11660.8	27102.0	46469.5	1199
	13	26 52.38	91 26.25	11701.7	27024.9	46408.4	998
3	14	28 18.62	90 30.26	11719.1	27960.0	46666.1	30
	19	27 58.12	90 32.81	11763.5	27839.9	46590.3	228
1	20	27 56.87	89 51.65	11992.2	28238.6	46543.0	401
	22	28 06.18	90 05.44	11890.2	28147.9	46595.9	180
	24	28 13.21	90 15.70	11813.8	28079.5	46633.2	55
4R	25	27 53.13	90 29.96	11791.1	27845.3	46568.6	310

Coordinates and TD values are from Northstar 6000, thus are preliminary. Sonobuoy Nos. 7, 9, 11, 12, 15, 16, 17, 18, 21 and 23 were duds.

OFFSHORE LOUISIANA OBS REFRACTION EXPERIMENT PLAN

Dates: February 3-13, 1984 (Friday-Monday)

Lines:
Line 1: 28°23.14'N, 90°30.43'W to 27°53.96'N, 89°47.26'W
Line 2: 27°45.09'N, 89°46.20'W to 26°58.51'N, 89°31.72'W
Line 3: 27°35.41'N, 90°35.66'W to 28°23.69'N, 90°29.73'W
Line 4: 27°50.27'N, 90°43.27'W to 28°01.97'N, 89°49.64'W
Line 5: 27°31.87'N, 91°25.57'W to 26°43.78'N, 91°26.40'W
Each line consists of a 90 km (48 nm) primary line, whose coordinates are given above, and a 7 km (4 nm) extension.

Signal Source: Two 2000 cubic inch 2000 psi air guns.

Detectors:

(1) OBS's: Four OBS's, 4.5 Hz vertical, at 2.5, 22.5, 67.5 and 87.5 km (1.3, 12.1, 36.4 and 47.2 nm) from one end of each primary line.
(2) Streamer: 600 m, 5-channels
(3) Sonobuoys: At 11.3, 33.8 and 56.3 km (6.1, 18.2 and 30.4 nm) from one end of each primary line.

Ship Schedule: (R/V Fred H. Moore)

Fri., Feb. 3	12:00	Sail from Galveston	
Sat., Feb. 4	15:00	Start line 4	(225 nm from seabuoy)
Sun., Feb. 5	22:00	End line 4	
Mon., Feb. 6	05:00	Start line 1	(7 nm from line 4)
Tues.,Feb. 7	12:00	End line 1	
	15:00	Start line 3	(1 nm from line 1)
Wed., Feb. 8	22:00	End line 3	
Thurs.,Feb. 9	05:00	Start line 2	(45 nm from line 3)
Fri., Feb. 10	12:00	End line 2	
Sat., Feb. 11	05:00	Start line 5	(104 nm from line 2)
Sun., Feb. 12	12:00	End line 5	
Mon., Feb. 13	10:00	Return to Galveston	(200 nm to seabuoy)

Detailed Schedule for Each Line:

Lines 4 & 3	Lines 1, 2 & 5	Activity
15:00-15:30	05:00-05:30	Deploy OBS #1
16:40-17:10	06:40-07:10	Deploy OBS #2 (10.8 nm from OBS #1)
19:50-20:20	09:50-10:20	Deploy OBS #3 (24.3 nm from OBS #2)
21:30-22:00	11:30-12:00	Deploy OBS #4 (10.8 nm from OBS #3)
22:00-24:00	12:00-14:00	Deploy streamer, turn; deploy and test air guns

Detailed Schedule for Each Line: (Cont'd)

Lines 4 & 3	Lines 1, 2 & 5	Activity
00:00	14:00	Commence primary line shooting (48 nm @ 4.0 knots)
01:30	15:30	Deploy Sonobuoy #1
04:30	18:30	Deploy sonobuoy #2
07:30	21:30	Deploy sonobuoy #3
12:00	02:00	Start extension line (4 nm @ 4.0 knots)
13:00	03:00	End shooting
13:00-14:30	03:00-04:30	Retrieve air guns; turn; retrieve streamer
15:00-15:30	05:00-05:30	Recover OBS #1
16:40-17:20	06:40-07:20	Recover OBS #2
19:50-20:20	09:50-10:20	Recover OBS #3
21:30-22:00	11:30-12:00	Recover OBS #4

Shooting Schedule:

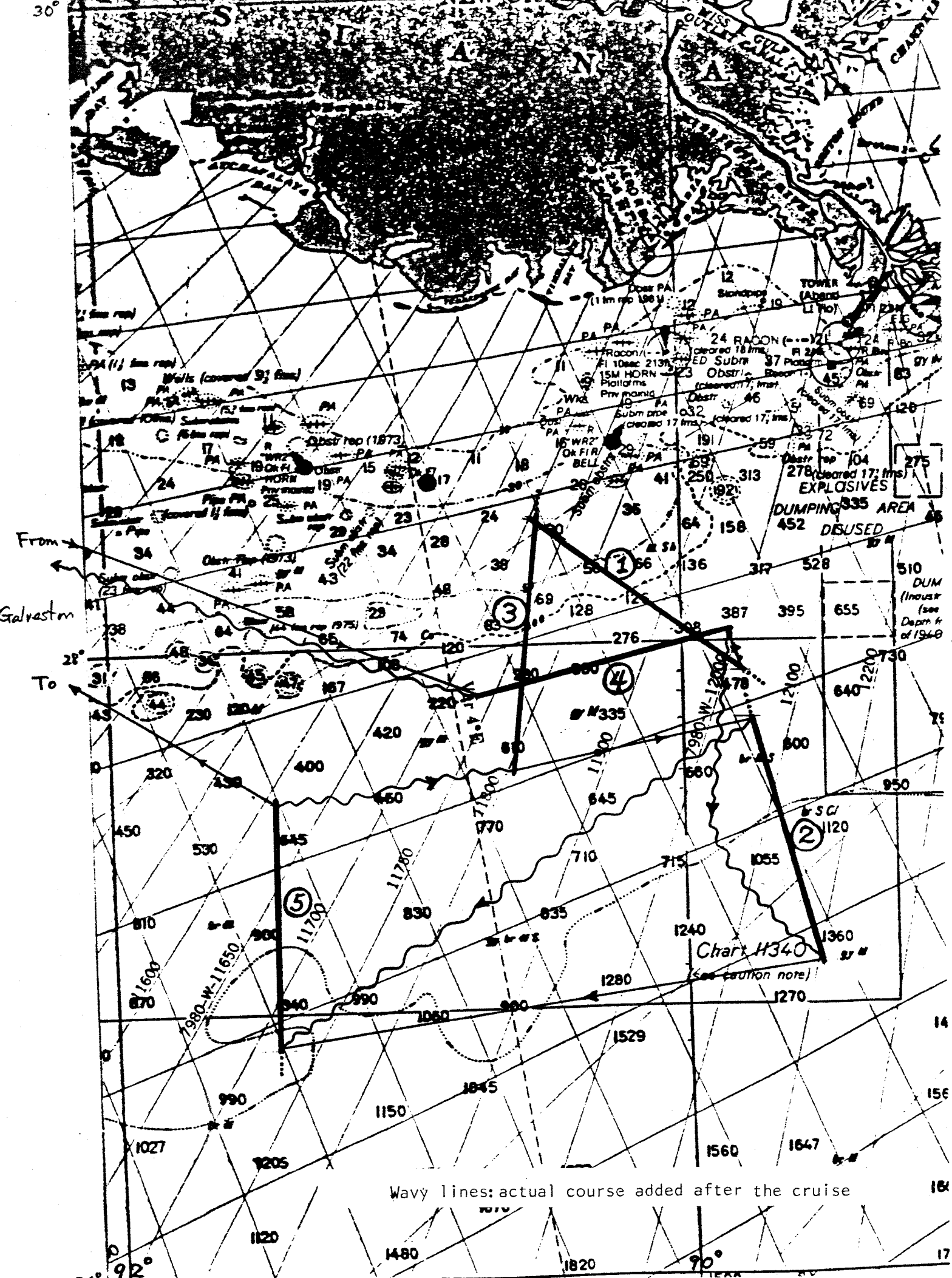
Shot Nos.	Lines 4 & 3	Lines 1, 2 & 5	Interval
1- 961	00:00:01-12:00:01	14:00:01-02:00:01	45 sec.
962-1081	12:00:37-13:00:07	02:00:37-03:00:07	30 sec.

Recording Schedule:

Sampling Interval: 10.008 msec

Record Length: 20.416 sec

OBS #	Shot No.	Recording Start Time Lines 4 & 3	Recording Start Time Lines 1, 2 & 5	Interval sec
1	1- 460	00:00:10-05:44:25	14:00:10-19:44:25	45
	461- 760	05:45:10-09:29:15	19:45:10-23:29:15	45-1/30
	761- 961	09:30:00-12:00:00	23:30:00-02:00:00	45
	962-1081	12:00:30-13:00:04	02:00:30-03:00:04	30+1/30
2	1- 240	00:00:10-02:59:25	14:00:10-16:59:25	45
	241- 540	03:00:10-06:44:15	17:00:10-20:44:15	45-1/30
	541- 961	06:45:00-12:00:00	20:45:00-02:00:00	45
	962-1081	12:00:40-13:00:14	02:00:40-03:00:14	30+1/30
3	1- 420	00:00:00-05:14:15	14:00:00-19:14:15	45
	421- 720	05:15:00-08:59:25	19:15:00-22:59:25	45+1/30
	721- 961	09:00:10-12:00:14	23:00:10-02:00:14	45+1/60
	962-1081	12:00:50-13:00:22	02:00:50-03:00:22	30+1/60
4	1- 200	00:00:00-02:29:15	14:00:00-16:29:15	45
	201- 500	02:30:00-06:14:25	16:30:00-20:14:25	45+1/30
	501- 961	06:15:10-12:00:17.7	20:15:10-02:00:17.7	45+1/60
	962-1081	12:00:50-13:00:22	02:00:50-03:00:22	30+1/60


From
Galveston
To
Chart H340
(see caution note)
Wavy lines: actual course added after the cruise

FRED H. MOORE CRUISE 22 ELECTRONICS/MULTICHANNEL

3 Feb 1984 to 15 Feb 1984
Ken Griffiths

DFS/DEMUXER SET-UP

DFS Channel	Signal
1	Trace No. 1 (Far Trace)
2	" " 2
3	" " 3
4	" " 4
5	" " 5 (Near Trace)
6	Sonobuoy (-20dB)
7	" (-40dB)
8	Stbd Gun Blast Phone
9	Port " " "

OBS LINE 4

Deployed 5 trace streamer without any problems. Birds were set for 35 feet and located at the aft end of trace 2 and inboard end of trace 5. Both depth transducers were not working. Streamer was towed from the long tow point and seemed quiet. Near trace monitor was trace 3 and looked good. Segments of all 5 traces were plotted on the wide Versatec with AGC. Data from all traces looked good, including data from trace 2 which was weak to non-existant on the last cruise.

Three sonobuoys were used and all worked. DEMUXR was loaded from BOOT disk V1.5 Copy #1 and worked fine. The printer running late problem from Cruise 21 did not occur. Shooting rep rate was 45 and 30 seconds but the printer seemed to get the line as soon as the header was received from the DFS.

OBS LINE 2

There was no change in Streamer or DFS/DEMUXR setup from line 4. Data quality was good. Plotted 410 records of 3 seconds of data to the wide Versatec--this took about 5 hours. Plot quality is excellent, but it takes too long for quality control requirements. We still need to look into faster plotting schemes. Again 3 sonobuoys were used and all worked.

OBS LINE 5

Rigged streamer and DFS/DEMUXR as on previous lines. Data quality looks good. Started finding some bad Sonobuoys. We had to use 7 buoys to get 3 working. Did not appear to have any problems with fouling Some had radio signal with no audio, and some had no radio at all.

OBS LINE 3

Rigged streamer and DFS/DEMUXR as before. Starting depth on the line was 20 fm., ending depth over 500 fm. When we recovered the streamer we found mud on the outboard bird. Inspection showed no obvious damage to the streamer or bird. A check of the data showed no problems. We were still towing from the long tow point with 200 meters of leader out.

One of the deck compressors went down about halfway through the line. The lab was not notified of this problem. Since the first 12 hours of the line are shot at a 45 second rep rate there was no trouble keeping 2 guns firing at full pressure with one compressor. When we switched to the 30 second rep rate for the final hour the single compressor was not quite able to keep up the pressure. At the end of the line the guns were firing at 1500 psi. and the last 30 shots were somewhat erratic.

We had poor luck with the Sonobuoys on this line. Had to use 6 to get 2 good buoys. Almost all of the failures have been in the older style buoys.

OBS LINE 1

Deployed the streamer at the South end of the line in 500+ fm. of water. On the way out we topped up all 5 of the active sections with Noroma. There are only a few leads on the streamer so this seemed a reasonable way to get it a bit lighter. Towing from the short tow point with 100 meters of leader out. All 5 traces showed good data and we did not pick up any mud on recovery at the shallow end of the line.

Used 5 Sonobuoys to get 3 good ones.

OBS LINE 4 RESHOOT

Deployed streamer without incident. Towing from the short tow point as on line 1. Since this was a reshoot we only used one Sonobuoy. This buoy was used directly over an OBS for comparison purposes. We have used a total of 25 Sonobuoys this cruise, 15 were good.

GENERAL ELECTRONICS NOTES

The OBS tape cartridge reader is installed in the DEMUX 11/34 computer. It is working well and does not interfere with the normal operation of DEMUXR. This provides an efficient means of copying OBS tapes to 9-track tapes.

Rigged the spare Loran-C interface into the Tektronix 4051 graphics system. Set it up to provide a real-time plot of the ship's track. It seems to be useful enough that we need to find a permanent home for this equipment in the lab.

The Doppler Sonar speed input to the Satellite Navigation System not useable for most of the trip. Speeds indicated have been far too great. Problem was in the power cord/power supply. Working ok at the end of the trip.

The small Versatec plotter on the 11/34 computer system has not been repaired. Part of our problem is not being sure which boards belong in the unit. It seems now that the proper boards are the ones out in California for repair and that our spare boards are from an older unit and some will not work.

On Monday 13 Feb at 0544 local we hit a submerged object. Speed at the time was about 9 kts. The extent of the damage to the bow transducers is not yet known, but we were not immediatly able to get a record in the lab. Resistance measurements showed that three of the eight transducers had gone open, leakage to ground was still very high (greater than 10 meg).

We ran for a few hours using two of the old hull transducers for echo sounding. Records were noisy at 4 kts. Wired the after four bow transducers in series/parallel, records improved but still had spike type noise. Fairing damage or loss seems probable.