

C R U I S E   R E P O R T

FM07-2

Abbreviated Narrative with Comments	-	-	-	1
Summary and Discussion	-	-	-	3

ABBREVIATED NARRATIVE WITH COMMENTS

17 Feb. 1981 Depart Galveston about 1500 with a crew of 8, a scientific party of 11, and the new marine superintendent, Mr. William Mitchell. Fire and man-overboard drills were held on the transit to the study area. All participated properly in a smooth operation.

18 Feb. 0700 stopped to drift to determine direction streamer party should be run (seas calm). 0830-1610 streamer deployed.

Sections were numbered from outboardmost dead section (= 1); live sections are evenly numbered (/2 = trace #); inboardmost dead section = #49. 60 lbs of lead weights were added with the resulting distribution: 15 lbs per trace for traces 1-9 and 16-24 (7 lbs per live section, 8 lbs per dead); 16 lbs per trace (8 & 8) for traces 10-15. Depth control birds (pressured to 21½ psi for 48' depth) were placed on dead sections 1, 9, 17, 23, 29, 35, 43, and two on 49. Depth transducers existed between sections 2 & 3, 18 & 19, 38 & 39, and 48 & 49. An additional transducer was inserted between sections 28 & 29. Four patches were made or repaired. The inboard dead section and stretch section were estimated at 106 and 62 m respectively. The portion of the leader let out was 79 m. Thus the near trace was centered about 265 m (870') astern of the fantail, and the far trace was centered about 1,870 m (6,135' or 1.01 n. mi.) astern.

1700-2400 deployed guns, magnetometer, and 3.5 kHz fish and maneuvered to begin first line. Fired guns at different repetition rates to determine highest possible shooting rate (whole second intervals only were available). Some guns would fire at 15 seconds, but the fastest all guns would fire fairly consistently was 16 seconds. This defined our 24 fold ship's speed at 4.3 knots.

19 Feb. 0030 began first line (CS-38, 24 fold). Tape drive A inoperative - repaired 0100-0500; 0530 returned to rebegin line. Guns fired erratically over much of the line; this apparently due to air blockage due to hose lining flaking off and jamming supply. Air hoses were replaced one by one over the next several days.

2300-0100 19-29 Feb. Deck compressor shut down to replace water pump on compressor engine.

20-23 Feb. Lines 37, 36, and 35 were shot at 12 fold. In order to modify the subsequent track to add about 160 miles to attempt to define the continuity of salt downslope of a series of intraslope basins. These became lines <sup>new</sup> 34A - 34M and were also run at 12 fold. Single channel monitor results suggest that the salt ridge or salt front hypothesis is incorrect.

*(34 A-M) to gain some time to add lines added track*

23-24 Feb. Finished lines 34N and 33 at 12 fold and began upper slope and lease block survey lines 32 to 27 at 24 fold.

25 Feb. Dissatisfied with data on lines 27 and 28 so reshot them (4 additional miles - 10 hours) and proceeded on to lines 26 (24 fold), 25 (24 fold), and 24 (12 fold).

26 Feb. Completed lines 24 (12 fold), 23 (24 fold), and began 22 (24 fold).

27 Feb. Lost tail buoy in early morning hours apparently due to chafed line, but source of chafing is unknown. Finished lines 22 & 21 at 24 fold, but with less tension the inboard end of the streamer was much deeper than usual (80-90'), and the ship had to be speeded up occasionally to pull it up above 100'. So a streamer party was conducted between lines 21 and 20. The streamer was brought in to the second inboard most depth sensor which was checked and found well calibrated. Since it had been running shallow, 3 lead weights were added, one each to sections 38, 39, and 40. To keep the inboard end from sinking so quickly with the reduced tension of having no tail buoy, 19 lead weights (many were multiple) or about 30 lbs were removed from section 49 (leaving 30 to 40 lbs on this section). (This section has a non-standard length (106 m instead of 39 m) and is rather more patched than most of the rest of the streamer. Thought should be given in the near future to replacing this section - perhaps with 2 or 3 standard dead.)

During this operation a cut (looked like a shark bite) was repaired in the inboard stretch section. While subsequently replacing Naroma, it was noticed that some salt water was in this section. Electrical performance of the streamer was perfect, so draining and refilling was not done. However, it should be done before the next cruise.

Completed lines 20 and 19 at 12 fold in order to rendezvous with a helicopter tomorrow afternoon - chief scientist had to depart to attend father's funeral (was notified of death this morning). Sonobuoy deployed near end of line 19 - recorded on EPC. First successful use of new sonobuoy radio receiving system.

28 Feb. Completed line 18 B at 12 fold and 18 A at 24 fold. Lines done at 12 noon; ship turned toward Galveston for helicopter rendezvous. Chief scientist departs about 1300 after reviewing remaining track with co-chief Scientist, Eric Rosencrantz, and each scientific watch. Remainder of report is from co-Chief scientist's and data logs.

Encountered problems with TAPE DRIVE A. Drive is slow starting, so missed recording shot and D wave. Problem was overcome by inserting 100 ms delay in master gun control system.

Lost input to all gyro repeaters, including that of autopilot. The cause of the failure was unknown. Although the repeaters were quickly brought on line again, continued steering manually until satisfied that the problems were corrected. Shot line 17 at 12 fold (6.0 knots) as the higher speed gave better steering control. The autopilot system itself remains operative. This steering failure was most unfortunate as it occurred at a point high on the slope and on a line passing through lease sale blocks - both important reasons for shooting for 24 fold stacking.

1 March Completed line 17. On line 16 discovered that master relay had been removed from gun control box causing tape drive A again not to pick up the D wave, also the galvo-camera indicated that the outboard 12 traces were not recording. The problem was traced to a faulty connector within the DFS system and was corrected. Line 16 was reshot, with an extra line inserted in order to pick up track where it was left off at 24 fold (11 extra hours). Temporal order of lines: 16C (bad data), 16B (different track), 16A (original track reshot). Also completed line 15 and began line 14. All subsequent lines were shot at 24 fold.

2-6 March Completed lines 14 - 5 and half of line 4. Numerous gun failures on line 8. Two sonobuoys deployed near end of line 5.

7 March 0518 finished line 4; 0800 completed recovery of guns, magnetometer, streamer, and 3.5 fish and began steaming for Galveston. 1900 arrived MSI dock in Galveston.

## REVIEW & DISCUSSION

The 24 trace - 24 fold mode of operation seemed to cause a relatively high frequency of gun malfunctions - probably the highest ranking cause of lost or poor data. This was somewhat expected, because this mode requires firing at the maximum repetition rate. This could account for a 5 to 10% increase in survey time or that much loss of 4-gun quality data in future cruises with the same mode of operation. We should make all due effort to correct existing gun problems and refit the system for higher rep. rates. Observations re 12 vs. 24 fold shooting:

1) Guns fire extremely steadily at 23 seconds, satisfactorily, but with much more frequent adjustment at 16 seconds.

2) Streamer tows very steadily at 6.0 knots. At 4.3 knots, operations are marginal.

a. heading into the seas or current works well, two engines can be run slightly above idle.

b. 1) A following sea or current requires cycling back and forth from one to two engines with consequent steering difficulties;

2) Following seas also reduce depth control on the streamer so that the heavily weighted inboard end sinks and other sections tend to follow or float if overly, positively buoyant.

c. Streamer flotation or sinking (as in b.2) is an effect of lack of bird control which is, in turn, due to low relative speed of the birds through the water. The same effect is produced by reduced, overall tension on the streamer which also results from loss of the tail buoy.

The second most extensive detriment to the survey was the failures of the ship's automatic steering system. This could cause considerable hardship on the ship's crew, because manual steering bridge watches require two-men instead of one. Also our experience showed that it is more difficult to steer a smooth turn with hand steering. We strongly recommend that the autopilot be overhauled prior to the next cruise.

Actually two steering problems occurred: 1) on autopilot, a small, automatic course correction would continue into a runaway turn. 2) gyro repeaters simply stopped working but came back on when simply turned off and back on. The first problem was apparently solved when the mechanical apparatus was sprayed heavily with WD-40. The unit returned to working condition and improved to being very reliable through the latter 1/2 of the cruise. However, the causes and effects of failure and repair are basically unknown, so the system needs a thorough overhaul. This system provides a high degree of control on turns and all types of maneuvering operations. Thus alteration or replacement should be done only with serious thought being given to any change in operational capacities or procedures that might ensue.

The crew should be commended for quick detection and correction of the steering problems. The mode of failure of runaway automatic turning (undetected) very probably was the cause of the streamer being repeatedly run-over on a previous cruise. It should be noted that the daylight, online operations on a calm sea on this cruise were more favorable to the discovery of steering errors than were the night time, interrupted streamer party conditions of the previous cruise.

Overall, crew support of the scientific operation was highly satisfactory, especially the bridge - lab - navigation communication under difficult steering circumstances. Capt, DeWeese's efforts to make this communication unambiguous was especially helpful.

The streamer probably needs a slight further balancing. In this regard I would recommend removing one weight from each of the following sections: 20, 22, 24, 26, 28, & 30.

Speed Tests for Towing Depths, done before first line (CS-38)

speed (knots)	depths in feet					comments
	inboard end			outboard end		
0	100	67	64	65	50	heavily weighted leader pulls down inboard end
3.2	57	33	56	57	50	
4.0	55	35	57	54	48	
4.3	59	36	56	53	49	24 fold towing speed
4.4	46	35	59	55	47	
5.0	43	34	56	53	45	
5.7	43	37	57	53	45	
6.1	40	30	60	53	45	6.0 is 12 fold towing speed
6.4	42	27	55	50	48	

The above demonstrated that:  
 Most sections towed at steady depths, but the center 20% was heavy and the next 20% inboard was light.  
 The inboard end was, of course, affected most by towing speed, but it was at acceptable depth for both 12 and 24 fold shooting. The streamer as a whole, appeared a little heavy, but the streamer floated during recovery once leader, stretch and section #49 were aboard. Thus sinking was due to over-weighted inboard end. The additional 24 channels to be added for the next cruise will change the towing characteristics, mostly of the inboard end. This end will be pulled shallower by the increased tension of more streamer and a tailbuoy. I recommend that instead of countering this by replacing more weights on the inboard dead section or leader, that depressors be tried to keep the inboard end depressed. For the water temperatures encountered (68°F), near neutral buoyancy seems to have been achieved with 8 lbs per dead section and 7 lbs per live section. Naroma loss on the deck under the winch indicates that there is at least one current leak somewhere in the streamer.

Tapes 994 field tapes were aboard for FM07-2; 496 were used for data, and 31 were found bad for various reasons, leaving 467 aboard. Degaussing seemed to be less than complete for some tapes; so redegaussing aboard prior to mounting each tape is recommended as a standard procedure. Since 6% of the tapes we tried to use seemed unusable, it is estimated that 440 usable tapes remain onboard.

The cruise objective was to cover 1,530 n.mi. of line. Line miles accomplished were approximately 1,056 (58%) at 24 fold and 776 (42%) at 12 fold for a total of 1,832 or 120% of the objective. The 302 additional miles of new line included 159 miles of new line, 90 miles of reshooting to improve data quality, and 53 miles of line extensions. This was accomplished in 18 1/6 days in contrast to the 17 days projected. The 302 additional miles cost 55 hours, 51 of which were saved by surveying (776 mi.) at 12 fold rather than 24 fold. Thus the added day was essentially for contingencies (extra streamer party, helicopter rendezvous, compressor pump change, oil changes, and other down times).

In combination with FM07-1 the total slope geophysical survey was about 2,200 mi. or about 110% of the proposed coverage.

Respectfully submitted,

*E. William Robinson*  
 \_\_\_\_\_  
 Chief Scientist  
*Eric Kozmaruk*  
 \_\_\_\_\_  
 Co-Chief Scientist