LAMONT-DOHERTY GEOLOGICAL OBSERVATORY OF
COLUMBIA UNIVERSITY
Palisades, New York 10964

LAMONT-DOHERTY SURVEY OF THE WORLD OCEAN

General Editor, Maurice Ewing

Preliminary Report of Volume 20
U.S.N.S. ELTANIN
CRUISES 16-21
January, 1965 - January, 1966

Part A

NAVIGATION

and

Part B

BATHYMETRIC AND GEOMAGNETIC MEASUREMENTS

James R. Heirtzler, Dennis E. Hayes, Ellen M. Herron, and Walter C. Pitman III

Technical Report No. 3-CU-3-69
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INTRODUCTION

The purpose of this report is to present navigation, bathymetric, and geomagnetic data collected aboard U.S.N.S. ELTANIN during cruises 16-21 inclusive. These data and those obtained on other U.S.N.S. ELTANIN cruises constitute a significant portion of all existing measurements of this type for high latitude in the southern ocean. A major part of the data presented here have not yet been studied in detail, although some segments of it have been used in publications. Because of the current interest in the analysis of marine geomagnetic anomalies and marine morphology in terms of global tectonic processes, the data should be made available in preliminary form. A substantial effort on the part of many individuals has gone into the collection and reduction of approximately 40,000 nautical miles of data summarized here. These cruises are much shorter than the typical ones reported in this series of publications. To facilitate use of the same format throughout the series, the individual cruises in this volume will be treated as though each were one leg of a longer cruise.

The main contents of the report are introductory matter, tabulations of navigational information in Part A, and profiles of topography and total magnetic field intensity anomaly plotted against distance along the ship's track, in Part B. Index maps show the ship's track and indicate distance along the track by means of tick marks at intervals of 100 nautical miles. These maps and the lists of navigational data allow one to obtain the geographic coordinates for any point or section of the plotted profiles. The profiles of topography are plotted at a vertical exaggeration of 100:1. The units of depth used are nominal fathoms (1/400 sec reflection time). Geomagnetic anomalies are plotted in gammas (10^5 gammas = 1 oersted). They are obtained by subtracting the regional magnetic field from the observations of the total magnetic field as described in the section on data reduction. The topographic and geomagnetic profiles are plotted with respect to distance, which is annotated at intervals of 200 nautical miles near the bottom of each profile. In addition, tick marks shown below the distance scale indicate the distance at which any change in course or speed occurred. The course and speed at any time (or distance) can be determined by examining the navigational listings. West longitudes are designated as negative as are the south latitudes. All times are Greenwich Mean Times. Mileage is accumulated distance in nautical miles along the ship's track, reset to zero at the beginning of each new cruise. The course and speed applies to the time interval following the entry.

INSTRUMENTATION

A Varian proton precession magnetometer was used for all magnetic measurements. The instrument was towed approximately 800 ft. astern of the ship. The accuracy of this type of instrument has been discussed by many (e.g. Heirtzler, 1961, Bullard and Mason, 1963) and is generally accepted to be about $\pm$ 10-15 gammas. Data were recorded continuously on an analog strip chart recorder and also digitally on punched paper tape at a one minute sampling interval.

A 12 KHZ transducer with an effective half angle of 30° was used with a Times Facsimile recorder for the precision depth measurements. Relative depths can be resolved to about one fathom (1/400 sec reflection time) in any depth in regions of low to moderate relief. Side echoes are common in areas of high relief and the resolution of small amplitude relief is extremely difficult in such areas.

For ELTANIN Cruises 16-19 inclusive the primary source of navigation was celestial navigation supplemented by dead reckoning information (E-M log and gyrocompass). Under extremely favorable conditions, celestial fixes can be obtained with an accuracy of about $\pm$ 1 nautical mile. Weather conditions during the austral winter were such that reliable celestial fixes were sometimes separated by several days. Under these conditions, the inferred position of the ship during these intervals could be in error by several tens of miles. No attempt has been made here to evaluate these errors by comparing uncertain tracks with satellite controlled tracks for discrepancies in observed geophysical parameters (e.g. depth). This could be done, but a unique solution for resolving the discrepancies would be unlikely in view of the sparse number of ship's tracks in the areas in question. The users of this data should allow for the fact that data collected on cruises 16-19 are subject to large positional uncertainties.

Beginning with ELTANIN Cruise 20 the Navy navigation satellite system (Guier, 1966) was used to obtain frequent and precise fixes. The ship's electromagnetic (E-M) log and gyrocompass were used by navigating officers to interpolate the ship's track between satellite fixes. Some experiences with the satellite navigation system at sea have been reported by Talwani *et al*. (1966).

The digitized navigation data contained in this report were taken directly from the daily deck logs at each change of course or speed. Positions as found in the deck log are given only to the nearest whole minute of latitude and longitude. Positions based on satellite navigation should be generally accurate to one nautical mile, though errors of five nautical miles or more are possible under extremely unfavorable conditions.

Occasionally obvious errors are present in the deck log entries and these have been corrected in the digitized navigational data.

DATA REDUCTION

All data were digitized and reduced with the aid of an IBM 1620 digital computer and on-line Calcomp plotter. The navigational information (time, latitude, longitude) is first put in digital form and stored in the computer. All data (depth and total field) are then reduced in terms of geographic coordinates and distance along the track, using time as the dependent variable. The precision echo-grams were digitized on a Thomson digitizing table at an irregular sampling interval of one to 15 minutes, depending on the relief. The average sampling represents about one sounding per nautical mile. Topographic relief of smaller wave-length cannot be usefully resolved on plots at the scales presented here. Slope corrections have not been applied and the soundings plotted here have not been corrected for variation of sound velocity in water. The latter corrections are of the order of 100 fm in about 3000 fm in water. The bathymetric reduction program allows the user the option to apply sound velocity corrections according to Matthews 1939 tables.

The magnetometer data were introduced into the computer by either digitizing the analog records or by using the carefully edited digital punched tape--depending on the quality of the respective records. The geographic coordinates and track distance were computed for each sampling point, again using the navigational data with time as the dependent variable. The regional field was determined, using a modified computer program (Heirtzler and Nabighian) from the Goddard Space Flight Center, which describes the regional field by spherical harmonics of degree and order 7 (Cain *et al.*, 1964).

No indications have been given about magnetically quiet or disturbed days and no corrections have been applied for diurnal variations of the magnetic field. The latter variations are of the order of 50 gammas per day in the area of interest and would have long apparent wavelengths not likely to be confused with anomalies arising from sources in the earth's crust. Secular variations are effectively removed as part of the regional field by considering the time derivatives of the harmonic coefficients which define the regional field.

ACKNOWLEDGEMENTS

The data presented here are the result of conscientious efforts by many individuals. These include technicians, scientists, ship's personnel and administrators. Although it is impossible to acknowledge each individual by name, the contribution of these individuals is recognized and gratefully acknowledged. The computerized data processing techniques used were developed in large part by M. Talwani. The following persons were responsible for a substantial part of the data reduction: E. Haff, M. Schneck, T. Stillman, T.S. Applegate. The research was supported by the National Science Foundation under grants NSF GA-305, NSF GA-175, NSF GA-894, NSF GA-1121, NSF GA-1523.

Lamont-Doherty Geological Observatory Personnel - Geophysics Party-
Aboard U.S.N.S. ELTANIN

Cruise #16	28/I/65	-	25/II/65
	Auckland, N.Z.		Wellington, N.Z.

Robert Houtz
David Massey
Lawrence Oblinger
James Raymond
Donald Wickland

Cruise #17	12/III/65	-	13/V/65
	Wellington, N.Z.		Valparaiso, Chile

Robert Leyden
David Massey
Lawrence Oblinger
Fred Rosselot
Thomas Wustenberg

Cruise #18	25/V/65	-	16/VI/65
	Valparaiso, Chile		Talcahuano, Chile

David Massey
Lawrence Oblinger
Thomas Wustenberg

Cruise #19	6/VII/65	-	3/IX/65
	Talcahuano, Chile		Auckland, N.Z.

George Carpenter
David Massey
Lawrence Oblinger
Thomas Wustenberg

Cruise #20	14/IX/65	-	12/XI/65
	Auckland, N.Z.		Valparaiso, Chile

Ellen Herron
Lawrence Oblinger
Walter Pitman
Thomas Wustenberg

Cruise #21	23/XI/65	-	7/I/66
	Valparaiso, Chile		Punta Arenas, Chile

David E. Epp
Bruce F. Molnia
Lawrence Oblinger
Thomas Wustenberg

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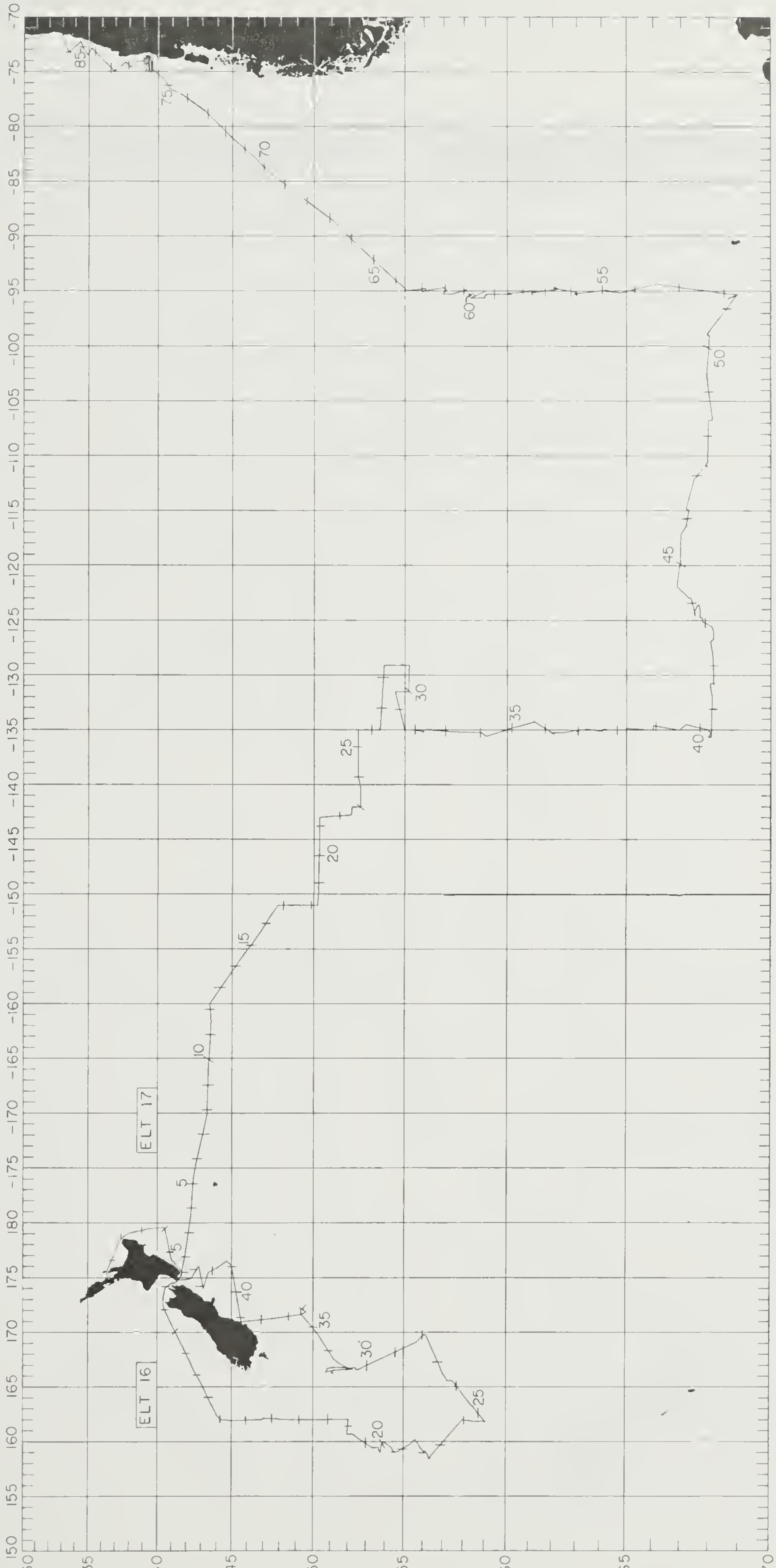
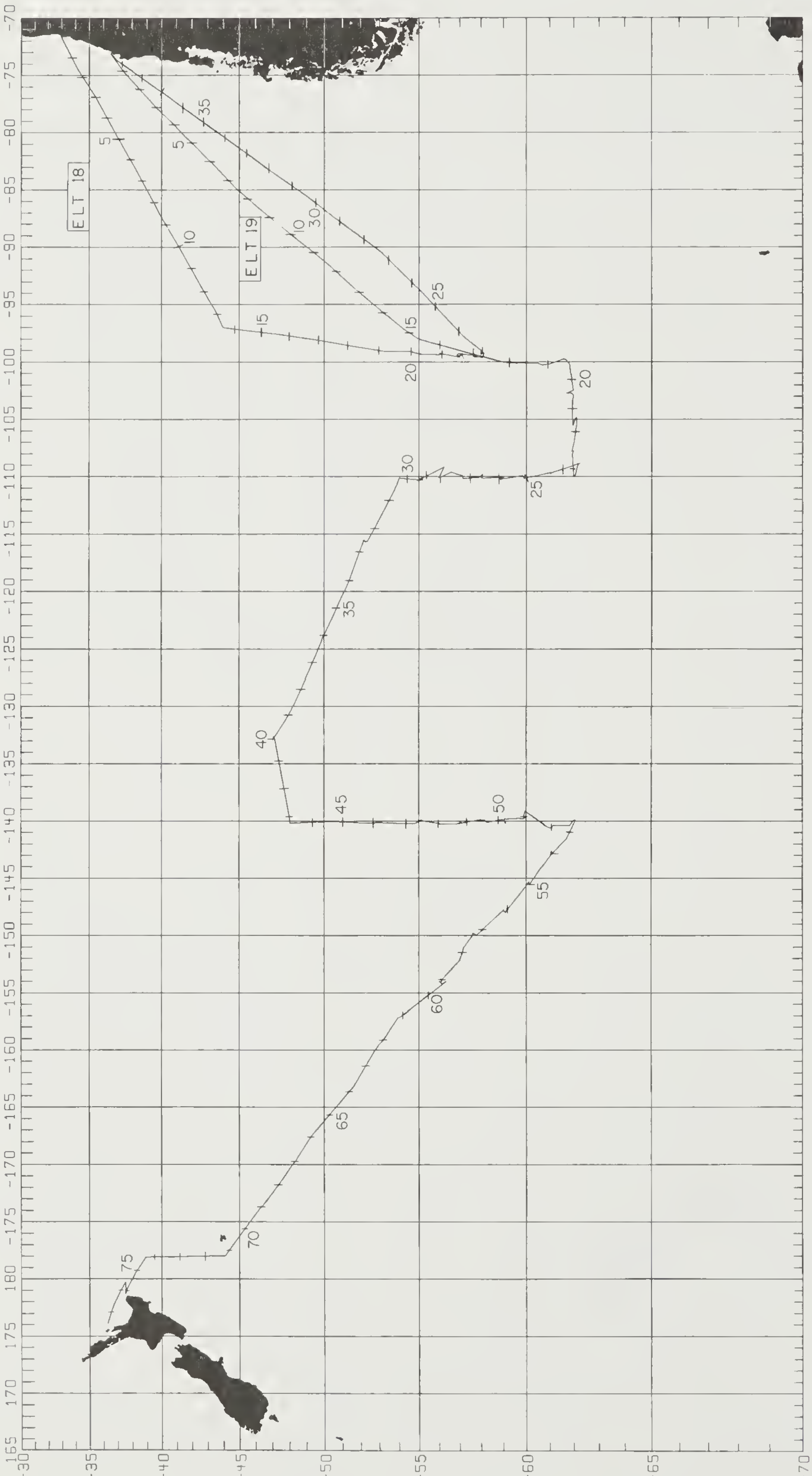

ELT 17
ELT 16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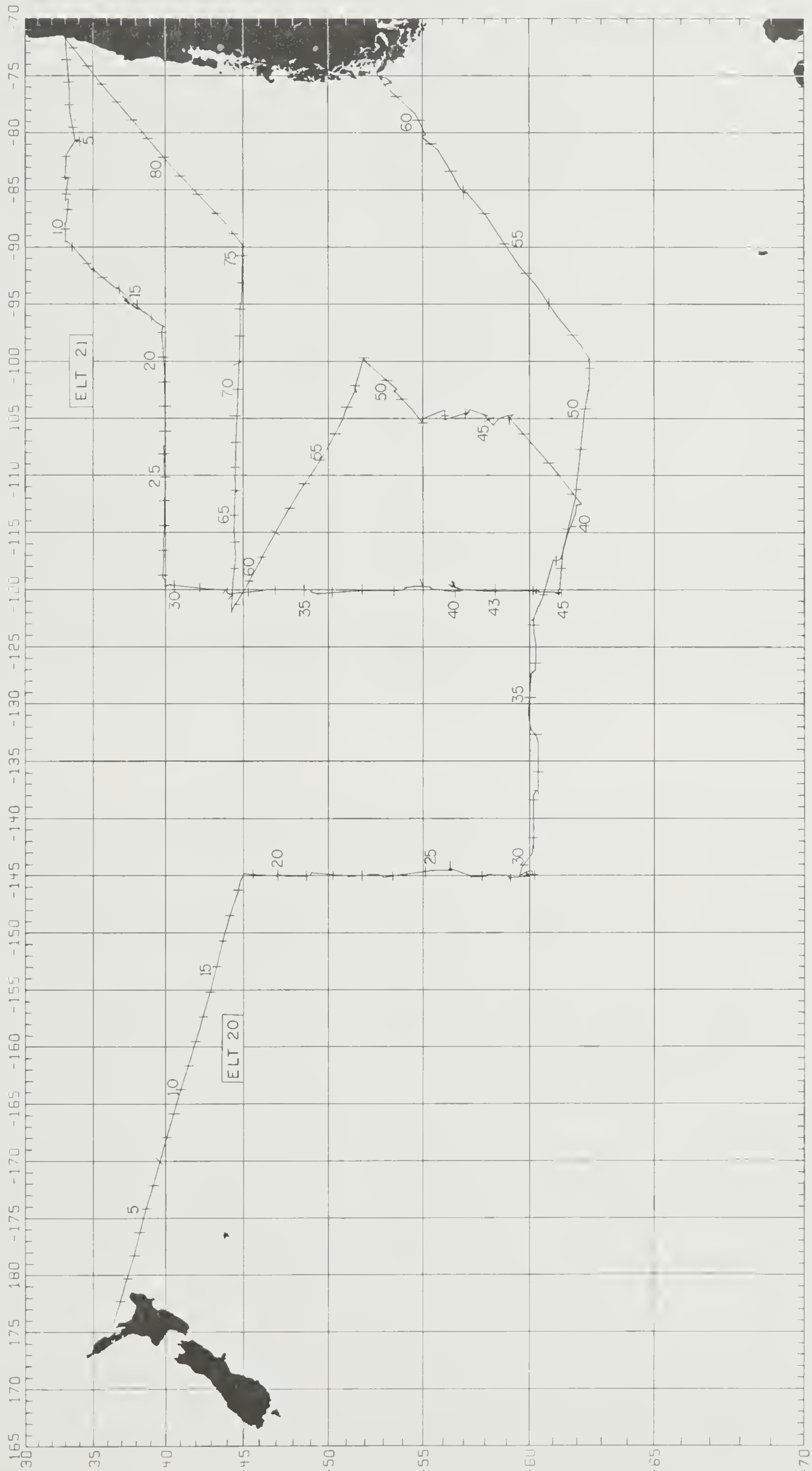
ELT 19


ELT 21
ELT 20

ELTANIN 16 NAVIGATION

MILES	HOUR	DY	MO	LATITUDE	LONGITUDE	COUR	KTS
0.0	18	28	1	-36 46.0	174 49.0	90	0.0
0.0	24	28	1	-36 46.0	174 49.0	44	10.9
6.9	102	28	1	-36 41.0	174 55.0	50	11.8
33.2	315	28	1	-36 24.0	175 20.0	90	8.7
34.8	326	28	1	-36 24.0	175 22.0	102	10.2
39.7	355	28	1	-36 25.0	175 28.0	90	5.6
41.4	412	28	1	-36 25.0	175 30.0	104	8.2
45.5	442	28	1	-36 26.0	175 35.0	116	9.6
50.0	510	28	1	-36 28.0	175 40.0	103	7.2
63.2	700	28	1	-36 31.0	175 56.0	141	6.4
64.5	712	28	1	-36 32.0	175 57.0	114	12.2
86.5	900	28	1	-36 41.0	176 22.0	90	9.6
88.1	910	28	1	-36 41.0	176 24.0	113	12.5
98.5	1000	28	1	-36 45.0	176 36.0	117	10.5
156.6	1530	28	1	-37 11.0	177 41.0	110	10.2
180.3	1748	28	1	-37 19.0	178 9.0	109	7.7
189.5	1900	28	1	-37 22.0	178 20.0	122	9.3
191.4	1912	28	1	-37 23.0	178 22.0	104	8.7
195.5	1940	28	1	-37 24.0	178 27.0	142	9.5
196.8	1948	28	1	-37 25.0	178 28.0	136	9.7
209.3	2105	28	1	-37 34.0	178 39.0	130	7.4
212.4	2130	28	1	-37 36.0	178 42.0	122	7.4
214.3	2145	28	1	-37 37.0	178 44.0	142	15.3
218.1	2200	28	1	-37 40.0	178 47.0	152	10.1
228.3	2300	28	1	-37 49.0	178 53.0	122	18.6
230.1	2306	28	1	-37 50.0	178 55.0	150	14.0
242.8	0	29	1	-38 1.0	179 3.0	166	8.0
265.5	249	29	1	-38 23.0	179 10.0	142	5.4
266.8	303	29	1	-38 24.0	179 11.0	171	8.7
301.2	700	29	1	-38 58.0	179 18.0	163	9.0
328.3	1000	29	1	-39 24.0	179 28.0	174	9.1
344.4	1145	29	1	-39 40.0	179 30.0	176	9.5
394.6	1700	29	1	-40 30.0	179 35.0	253	10.3
404.9	1800	29	1	-40 33.0	179 22.0	258	9.3
409.6	1830	29	1	-40 34.0	179 16.0	255	9.8
413.5	1854	29	1	-40 35.0	179 11.0	257	8.5
431.4	2100	29	1	-40 39.0	178 48.0	258	9.3
436.0	2130	29	1	-40 40.0	178 42.0	249	11.3
441.7	2200	29	1	-40 42.0	178 35.0	263	8.3
450.1	2300	29	1	-40 43.0	178 24.0	257	8.9
468.0	100	30	1	-40 47.0	178 1.0	270	9.7
474.8	142	30	1	-40 47.0	177 52.0	217	12.5
476.1	148	30	1	-40 48.0	177 51.0	259	8.7
492.2	339	30	1	-40 51.0	177 30.0	270	8.2
493.8	350	30	1	-40 51.0	177 28.0	256	9.5
531.1	745	30	1	-41 0.0	176 40.0	270	15.0
531.9	748	30	1	-41 0.0	176 39.0	236	9.0
533.7	800	30	1	-41 1.0	176 37.0	236	7.2
535.5	815	30	1	-41 2.0	176 35.0	221	12.3
544.7	900	30	1	-41 9.0	176 27.0	230	10.2
596.4	1402	30	1	-41 42.0	175 34.0	270	9.9
599.4	1420	30	1	-41 42.0	175 30.0	270	6.4
600.1	1427	30	1	-41 42.0	175 29.0	90	0.0
600.1	1441	30	1	-41 42.0	175 29.0	294	.7
602.6	1800	30	1	-41 41.0	175 26.0	270	.4
603.3	1935	30	1	-41 41.0	175 25.0	90	0.0
603.3	2000	30	1	-41 41.0	175 25.0	270	1.4
604.8	2100	30	1	-41 41.0	175 23.0	217	1.5
606.1	2148	30	1	-41 42.0	175 22.0	270	6.3
606.8	2155	30	1	-41 42.0	175 21.0	90	0.0
606.8	2200	30	1	-41 42.0	175 21.0	270	8.9
609.0	2215	30	1	-41 42.0	175 18.0	270	8.9
611.3	2230	30	1	-41 42.0	175 15.0	315	10.1
615.5	2255	30	1	-41 39.0	175 11.0	0	12.0
616.5	2300	30	1	-41 38.0	175 11.0	300	12.0
622.6	2330	30	1	-41 35.0	175 4.0	307	13.1
629.1	0	31	1	-41 31.0	174 57.0	307	11.6
635.7	34	31	1	-41 27.0	174 50.0	0	12.0
636.7	39	31	1	-41 26.0	174 50.0	270	7.4

ELT. 16 NAVIGATION CONT'D

637.5	45	31	1	-41	26.0	174	49.0	14	12.3
640.6	100	31	1	-41	23.0	174	50.0	90	0.0
640.6	102	31	1	-41	23.0	174	50.0	270	7.5
641.3	108	31	1	-41	23.0	174	49.0	270	6.4
642.1	115	31	1	-41	23.0	174	48.0	246	6.5
647.0	200	31	1	-41	25.0	174	42.0	325	7.2
661.6	400	31	1	-41	13.0	174	31.0	356	10.0
671.6	500	31	1	-41	3.0	174	30.0	343	10.4
676.8	530	31	1	-40	58.0	174	28.0	323	10.0
681.8	600	31	1	-40	54.0	174	24.0	326	10.8
692.7	700	31	1	-40	45.0	174	16.0	329	11.6
698.5	730	31	1	-40	40.0	174	12.0	308	9.6
703.4	800	31	1	-40	37.0	174	7.0	309	7.8
711.2	900	31	1	-40	32.0	173	59.0	281	9.5
716.7	934	31	1	-40	31.0	173	52.0	285	9.0
720.6	1000	31	1	-40	30.0	173	47.0	276	9.1
729.8	1100	31	1	-40	29.0	173	35.0	270	6.0
731.3	1115	31	1	-40	29.0	173	33.0	286	9.0
745.6	1250	31	1	-40	25.0	173	15.0	270	9.1
747.1	1300	31	1	-40	25.0	173	13.0	270	9.6
776.0	1600	31	1	-40	25.0	172	35.0	259	10.8
786.9	1700	31	1	-40	27.0	172	21.0	249	11.3
798.2	1800	31	1	-40	31.0	172	7.0	245	11.7
810.0	1900	31	1	-40	36.0	171	53.0	245	11.7
833.5	2100	31	1	-40	46.0	171	25.0	249	11.3
844.8	2200	31	1	-40	50.0	171	11.0	245	11.7
856.5	2300	31	1	-40	55.0	170	57.0	241	10.3
866.8	0	1	2	-41	0.0	170	45.0	246	5.5
889.1	400	1	2	-41	9.0	170	18.0	242	8.0
921.4	800	1	2	-41	24.0	169	40.0	243	7.1
948.2	1145	1	2	-41	36.0	169	8.0	243	6.2
976.7	1620	1	2	-41	49.0	168	34.0	246	5.8
979.1	1645	1	2	-41	50.0	168	31.0	243	5.9
992.5	1900	1	2	-41	56.0	168	15.0	236	8.9
994.3	1912	1	2	-41	57.0	168	13.0	257	5.7

998.8	2000	1	2	-41	58.0	168	7.0	236	3.5
1000.6	2030	1	2	-41	59.0	168	5.0	246	4.8
1003.1	2100	1	2	-42	0.0	168	2.0	246	4.8
1007.9	2200	1	2	-42	2.0	167	56.0	246	4.8
1012.8	2300	1	2	-42	4.0	167	50.0	249	5.5
1018.4	0	2	2	-42	6.0	167	43.0	251	3.1
1021.5	100	2	2	-42	7.0	167	39.0	236	5.3
1026.9	200	2	2	-42	10.0	167	33.0	236	5.3
1032.3	300	2	2	-42	13.0	167	27.0	246	4.8
1037.1	400	2	2	-42	15.0	167	21.0	228	4.2
1040.1	442	2	2	-42	17.0	167	18.0	270	7.3
1040.9	448	2	2	-42	17.0	167	17.0	249	4.2
1052.0	724	2	2	-42	21.0	167	3.0	259	4.7
1057.2	830	2	2	-42	22.0	166	56.0	243	8.2
1074.7	1037	2	2	-42	30.0	166	35.0	240	8.6
1086.6	1200	2	2	-42	36.0	166	21.0	242	9.6
1154.0	1900	2	2	-43	8.0	165	0.0	245	10.4
1175.0	2100	2	2	-43	17.0	164	34.0	245	8.5
1231.9	338	3	2	-43	41.0	163	23.0	216	10.5
1233.1	345	3	2	-43	42.0	163	22.0	244	8.1
1275.8	900	3	2	-44	1.0	162	29.0	241	8.2
1279.9	930	3	2	-44	3.0	162	24.0	231	9.0
1292.7	1055	3	2	-44	11.0	162	10.0	245	5.6
1295.1	1120	3	2	-44	12.0	162	7.0	245	14.2
1297.5	1130	3	2	-44	13.0	162	4.0	206	3.3
1304.1	1330	3	2	-44	19.0	162	0.0	180	.2
1307.1	300	4	2	-44	22.0	162	0.0	180	5.3
1311.1	345	4	2	-44	26.0	162	0.0	190	3.8
1315.2	448	4	2	-44	30.0	161	59.0	180	4.9
1316.2	500	4	2	-44	31.0	161	59.0	180	2.5
1318.2	548	4	2	-44	33.0	161	59.0	180	4.9
1319.2	600	4	2	-44	34.0	161	59.0	180	3.3
1321.2	636	4	2	-44	36.0	161	59.0	200	5.3
1323.3	700	4	2	-44	38.0	161	58.0	180	4.0
1327.3	800	4	2	-44	42.0	161	58.0	189	9.1

1336.4	900	4	2	-44	51.0	161	56.0	190	8.1
1340.5	930	4	2	-44	55.0	161	55.0	179	7.3
1386.5	1545	4	2	-45	41.0	161	56.0	180	8.0
1396.5	1700	4	2	-45	51.0	161	56.0	175	8.0
1412.5	1900	4	2	-46	7.0	161	58.0	180	8.0
1424.5	2030	4	2	-46	19.0	161	58.0	180	8.0
1428.5	2100	4	2	-46	23.0	161	58.0	176	9.0
1437.6	2200	4	2	-46	32.0	161	59.0	180	11.0
1448.6	2300	4	2	-46	43.0	161	59.0	180	10.0
1453.6	2330	4	2	-46	48.0	161	59.0	180	11.2
1459.6	2	5	2	-46	54.0	161	59.0	161	4.8
1461.7	28	5	2	-46	56.0	162	0.0	90	0.0
1461.7	40	5	2	-46	56.0	162	0.0	134	3.4
1464.5	130	5	2	-46	58.0	162	3.0	180	6.0
1465.5	140	5	2	-46	59.0	162	3.0	138	3.6
1469.6	246	5	2	-47	2.0	162	7.0	146	5.1
1470.8	300	5	2	-47	3.0	162	8.0	186	.7
1477.8	1255	5	2	-47	10.0	162	7.0	180	4.2
1479.8	1323	5	2	-47	12.0	162	7.0	180	4.5
1494.8	1642	5	2	-47	27.0	162	7.0	184	5.0
1531.9	0	6	2	-48	4.0	162	3.0	193	2.6
1535.0	110	6	2	-48	7.0	162	2.0	180	2.4
1537.0	200	6	2	-48	9.0	162	2.0	90	0.0
1537.0	205	6	2	-48	9.0	162	2.0	180	11.9
1538.0	210	6	2	-48	10.0	162	2.0	193	3.6
1541.1	300	6	2	-48	13.0	162	1.0	180	12.0
1543.1	310	6	2	-48	15.0	162	1.0	180	5.9
1544.1	320	6	2	-48	16.0	162	1.0	181	6.8
1577.1	810	6	2	-48	49.0	162	0.0	180	6.0
1579.1	830	6	2	-48	51.0	162	0.0	180	3.7
1588.1	1055	6	2	-49	0.0	162	0.0	90	0.0
1588.1	1100	6	2	-49	0.0	162	0.0	180	1.2
1604.1	2350	6	2	-49	16.0	162	0.0	180	5.9
1605.1	0	7	2	-49	17.0	162	0.0	90	0.0
1605.1	1	7	2	-49	17.0	162	0.0	180	2.5

1606.1	25	7	2	-49	18.0	162	0.0	180	5.0
1637.1	630	7	2	-49	49.0	162	0.0	180	5.1
1660.1	1100	7	2	-50	12.0	162	0.0	180	5.9
1667.1	1210	7	2	-50	19.0	162	0.0	180	6.0
1690.1	1600	7	2	-50	42.0	162	0.0	180	6.9
1697.1	1700	7	2	-50	49.0	162	0.0	180	4.0
1710.1	2015	7	2	-51	2.0	162	0.0	90	0.0
1710.1	2055	7	2	-51	2.0	162	0.0	0	1.4
1711.1	2136	7	2	-51	1.0	162	0.0	32	7.8
1712.3	2145	7	2	-51	0.0	162	1.0	90	0.0
1712.3	2147	7	2	-51	0.0	162	1.0	180	1.3
1713.3	2233	7	2	-51	1.0	162	1.0	148	.8
1714.5	0	8	2	-51	2.0	162	2.0	90	1.8
1715.1	20	8	2	-51	2.0	162	3.0	180	6.0
1719.1	100	8	2	-51	6.0	162	3.0	203	1.6
1722.3	255	8	2	-51	9.0	162	1.0	180	.7
1723.3	418	8	2	-51	10.0	162	1.0	180	11.4
1772.3	835	8	2	-51	59.0	162	1.0	158	.6
1775.6	1347	8	2	-52	2.0	162	3.0	275	10.0
1808.9	1706	8	2	-51	59.0	161	9.0	276	9.4
1826.9	1900	8	2	-51	57.0	160	40.0	180	6.3
1842.9	2130	8	2	-52	13.0	160	40.0	180	6.0
1845.9	2200	8	2	-52	16.0	160	40.0	180	6.6
1846.9	2209	8	2	-52	17.0	160	40.0	231	3.9
1848.5	2233	8	2	-52	18.0	160	38.0	211	5.0
1852.0	2315	8	2	-52	21.0	160	35.0	211	2.0
1853.2	2350	8	2	-52	22.0	160	34.0	216	9.2
1859.4	30	9	2	-52	27.0	160	28.0	218	10.3
1872.1	144	9	2	-52	37.0	160	15.0	213	12.2
1887.7	300	9	2	-52	50.0	160	1.0	214	12.8
1926.3	600	9	2	-53	22.0	159	25.0	175	12.7
1945.4	730	9	2	-53	41.0	159	28.0	270	12.0
1954.8	817	9	2	-53	41.0	159	12.0	180	6.4
1957.8	845	9	2	-53	44.0	159	12.0	180	6.0
1958.8	855	9	2	-53	45.0	159	12.0	180	1.2

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1959.8	944	9	2	-53	46.0	159	12.0	0	11.9
1961.8	954	9	2	-53	44.0	159	12.0	211	.9
1963.0	1110	9	2	-53	45.0	159	11.0	270	7.3
1966.0	1134	9	2	-53	45.0	159	6.0	270	11.8
1967.1	1140	9	2	-53	45.0	159	4.0	270	2.3
1968.3	1210	9	2	-53	45.0	159	2.0	222	.6
1971.0	1600	9	2	-53	47.0	158	59.0	97	9.7
1995.4	1830	9	2	-53	50.0	159	40.0	129	6.6
2008.2	2025	9	2	-53	58.0	159	57.0	240	2.6
2010.2	2111	9	2	-53	59.0	159	54.0	191	1.6
2013.3	2300	9	2	-54	2.0	159	53.0	191	2.0
2016.4	30	10	2	-54	5.0	159	52.0	221	10.4
2040.3	247	10	2	-54	23.0	159	25.0	221	12.2
2042.9	300	10	2	-54	25.0	159	22.0	247	13.0
2050.5	335	10	2	-54	28.0	159	10.0	316	10.0
2054.7	400	10	2	-54	25.0	159	5.0	311	9.2
2056.3	410	10	2	-54	24.0	159	3.0	270	6.9
2057.4	420	10	2	-54	24.0	159	1.0	90	0.0
2057.4	423	10	2	-54	24.0	159	1.0	90	0.0
2057.4	427	10	2	-54	24.0	159	1.0	90	0.0
2057.4	432	10	2	-54	24.0	159	1.0	210	1.7
2058.6	512	10	2	-54	25.0	159	0.0	90	0.0
2058.6	535	10	2	-54	25.0	159	0.0	139	1.7
2061.2	708	10	2	-54	27.0	159	3.0	191	10.1
2064.3	726	10	2	-54	30.0	159	2.0	90	0.0
2064.3	728	10	2	-54	30.0	159	2.0	180	4.1
2066.3	757	10	2	-54	32.0	159	2.0	90	0.0
2066.3	820	10	2	-54	32.0	159	2.0	90	0.0
2066.3	845	10	2	-54	32.0	159	2.0	90	0.0
2066.3	915	10	2	-54	32.0	159	2.0	90	0.0
2066.3	925	10	2	-54	32.0	159	2.0	330	.9
2067.4	1039	10	2	-54	31.0	159	1.0	90	0.0
2067.4	1106	10	2	-54	31.0	159	1.0	90	0.0
2067.4	1201	10	2	-54	31.0	159	1.0	330	4.9
2068.6	1215	10	2	-54	30.0	159	0.0	113	1.6

2071.1	1346	10	2	-54	31.0	159	4.0	180	8.5
2073.1	1400	10	2	-54	33.0	159	4.0	180	10.9
2077.1	1422	10	2	-54	37.0	159	4.0	196	10.8
2081.3	1445	10	2	-54	41.0	159	2.0	148	12.5
2109.6	1700	10	2	-55	5.0	159	28.0	150	10.9
2131.4	1900	10	2	-55	24.0	159	47.0	133	2.3
2150.7	302	11	2	-55	37.0	160	12.0	228	3.1
2152.2	331	11	2	-55	38.0	160	10.0	239	5.2
2175.7	800	11	2	-55	50.0	159	34.0	228	5.3
2177.2	817	11	2	-55	51.0	159	32.0	235	4.8
2180.7	900	11	2	-55	53.0	159	27.0	236	5.3
2186.1	1000	11	2	-55	56.0	159	19.0	227	4.8
2200.7	1301	11	2	-56	6.0	159	0.0	29	4.7
2202.9	1330	11	2	-56	4.0	159	2.0	128	2.4
2207.9	1530	11	2	-56	7.0	159	9.0	239	2.7
2209.8	1612	11	2	-56	8.0	159	6.0	231	3.5
2216.2	1800	11	2	-56	12.0	158	57.0	232	4.9
2221.1	1900	11	2	-56	15.0	158	50.0	248	3.5
2237.3	2330	11	2	-56	21.0	158	23.0	43	4.9
2241.4	20	12	2	-56	18.0	158	28.0	90	1.9
2241.9	37	12	2	-56	18.0	158	29.0	180	2.4
2242.9	101	12	2	-56	19.0	158	29.0	180	1.9
2244.9	204	12	2	-56	21.0	158	29.0	270	.1
2245.5	525	12	2	-56	21.0	158	28.0	180	1.2
2247.5	700	12	2	-56	23.0	158	28.0	90	0.0
2247.5	712	12	2	-56	23.0	158	28.0	110	9.8
2250.4	730	12	2	-56	24.0	158	33.0	90	9.9
2253.7	750	12	2	-56	24.0	158	39.0	132	10.0
2295.8	1200	12	2	-56	52.0	159	36.0	131	10.8
2377.0	1930	12	2	-57	45.0	161	30.0	132	11.3
2397.8	2120	12	2	-57	59.0	161	59.0	187	13.9
2435.1	0	13	2	-58	36.0	161	50.0	179	11.7
2459.1	203	13	2	-59	0.0	161	51.0	166	8.8
2461.2	217	13	2	-59	2.0	161	52.0	226	.2
2462.6	900	13	2	-59	3.0	161	50.0	252	.6

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2465.9	1355	13	2	-59	4.0	161	44.0	51	5.4
2504.3	2100	13	2	-58	40.0	162	42.0	46	6.1
2505.7	2114	13	2	-58	39.0	162	44.0	54	6.0
2522.6	0	14	2	-58	29.0	163	10.0	38	5.0
2527.7	100	14	2	-58	25.0	163	16.0	46	6.2
2529.1	114	14	2	-58	24.0	163	18.0	46	2.1
2530.6	155	14	2	-58	23.0	163	20.0	90	6.2
2531.1	200	14	2	-58	23.0	163	21.0	38	4.7
2533.6	232	14	2	-58	21.0	163	24.0	46	6.2
2536.5	300	14	2	-58	19.0	163	28.0	58	6.3
2542.1	353	14	2	-58	16.0	163	37.0	58	5.0
2544.0	415	14	2	-58	15.0	163	40.0	46	3.8
2546.9	500	14	2	-58	13.0	163	44.0	51	4.7
2556.4	700	14	2	-58	7.0	163	58.0	90	2.6
2557.0	712	14	2	-58	7.0	163	59.0	53	5.4
2588.7	1300	14	2	-57	48.0	164	47.0	51	4.7
2612.7	1800	14	2	-57	33.0	165	22.0	50	5.1
2620.5	1930	14	2	-57	28.0	165	33.0	0	6.0
2626.5	2030	14	2	-57	22.0	165	33.0	0	4.2
2631.5	2140	14	2	-57	17.0	165	33.0	350	.9
2634.5	50	15	2	-57	14.0	165	32.0	59	2.7
2652.2	710	15	2	-57	5.0	166	0.0	52	2.1
2657.0	925	15	2	-57	2.0	166	7.0	90	1.0
2657.5	955	15	2	-57	2.0	166	8.0	29	4.8
2658.7	1009	15	2	-57	1.0	166	9.0	66	10.2
2683.7	1236	15	2	-56	51.0	166	51.0	66	9.7
2786.5	2310	15	2	-56	9.0	169	41.0	40	1.4
2789.1	100	16	2	-56	7.0	169	44.0	48	1.4
2790.6	200	16	2	-56	6.0	169	46.0	29	3.4
2794.0	300	16	2	-56	3.0	169	49.0	314	4.7
2827.4	1000	16	2	-55	40.0	169	6.0	334	4.9
2845.2	1336	16	2	-55	24.0	168	52.0	335	4.7
2895.0	0	17	2	-54	39.0	168	15.0	335	5.6
2985.4	1600	17	2	-53	17.0	167	10.0	329	5.8
2991.3	1700	17	2	-53	12.0	167	5.0	334	6.4

3029.2	2253	17	2	-52	38.0	166	37.0	90	0.0
3029.2	2300	17	2	-52	38.0	166	37.0	329	4.6
3030.4	2315	17	2	-52	37.0	166	36.0	351	8.0
3034.4	2345	17	2	-52	33.0	166	35.0	0	4.0
3035.4	0	18	2	-52	32.0	166	35.0	354	6.0
3041.5	100	18	2	-52	26.0	166	34.0	90	2.4
3042.7	130	18	2	-52	26.0	166	36.0	112	2.1
3045.3	245	18	2	-52	27.0	166	40.0	57	1.1
3049.0	600	18	2	-52	25.0	166	45.0	90	0.0
3049.0	618	18	2	-52	25.0	166	45.0	0	6.6
3052.0	645	18	2	-52	22.0	166	45.0	354	4.1
3064.0	940	18	2	-52	10.0	166	43.0	0	4.4
3066.0	1007	18	2	-52	8.0	166	43.0	351	6.3
3078.2	1201	18	2	-51	56.0	166	40.0	0	11.9
3079.2	1206	18	2	-51	55.0	166	40.0	168	6.1
3082.2	1236	18	2	-51	58.0	166	41.0	180	6.6
3083.2	1245	18	2	-51	59.0	166	41.0	62	1.5
3085.3	1407	18	2	-51	58.0	166	44.0	0	2.8
3086.3	1428	18	2	-51	57.0	166	44.0	2	7.5
3129.4	2010	18	2	-51	14.0	166	47.0	343	8.3
3131.5	2025	18	2	-51	12.0	166	46.0	356	8.0
3139.5	2125	18	2	-51	4.0	166	45.0	0	3.9
3140.5	2140	18	2	-51	3.0	166	45.0	348	6.1
3143.6	2210	18	2	-51	0.0	166	44.0	354	6.9
3149.6	2302	18	2	-50	54.0	166	43.0	328	4.1
3150.8	2319	18	2	-50	53.0	166	42.0	0	5.4
3151.8	2330	18	2	-50	52.0	166	42.0	0	1.9
3152.8	0	19	2	-50	51.0	166	42.0	90	0.0
3152.8	3	19	2	-50	51.0	166	42.0	0	.9
3153.8	105	19	2	-50	50.0	166	42.0	288	10.8
3163.7	200	19	2	-50	47.0	166	27.0	305	13.9
3170.7	230	19	2	-50	43.0	166	18.0	140	2.3
3174.6	410	19	2	-50	46.0	166	22.0	148	2.8
3175.8	435	19	2	-50	47.0	166	23.0	176	8.3
3193.8	645	19	2	-51	5.0	166	25.0	270	4.5

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3195.7	710	19	2	-51	5.0	166	22.0	90	0.0
3195.7	718	19	2	-51	5.0	166	22.0	239	5.6
3201.6	820	19	2	-51	8.0	166	14.0	328	7.8
3202.8	829	19	2	-51	7.0	166	13.0	68	3.6
3205.5	913	19	2	-51	6.0	166	17.0	90	4.0
3208.6	1000	19	2	-51	6.0	166	22.0	118	2.7
3210.7	1046	19	2	-51	7.0	166	25.0	90	2.6
3211.4	1100	19	2	-51	7.0	166	26.0	90	7.5
3212.0	1105	19	2	-51	7.0	166	27.0	90	7.5
3212.6	1110	19	2	-51	7.0	166	28.0	168	4.5
3221.8	1310	19	2	-51	16.0	166	31.0	163	11.4
3223.9	1321	19	2	-51	18.0	166	32.0	180	3.9
3226.9	1407	19	2	-51	21.0	166	32.0	177	9.3
3281.0	1954	19	2	-52	15.0	166	36.0	61	4.1
3285.1	2055	19	2	-52	13.0	166	42.0	90	0.0
3285.1	2100	19	2	-52	13.0	166	42.0	0	11.0
3296.1	2200	19	2	-52	2.0	166	42.0	0	8.1
3299.1	2222	19	2	-51	59.0	166	42.0	180	10.5
3302.1	2239	19	2	-52	2.0	166	42.0	180	5.4
3303.1	2250	19	2	-52	3.0	166	42.0	0	.8
3304.1	0	20	2	-52	2.0	166	42.0	90	0.0
3304.1	18	20	2	-52	2.0	166	42.0	32	8.8
3307.7	42	20	2	-51	59.0	166	45.0	22	9.7
3310.9	102	20	2	-51	56.0	166	47.0	28	8.0
3326.8	300	20	2	-51	42.0	166	59.0	28	8.5
3343.8	500	20	2	-51	27.0	167	12.0	41	8.2
3350.4	548	20	2	-51	22.0	167	19.0	40	9.1
3366.1	730	20	2	-51	10.0	167	35.0	59	10.8
3396.9	1021	20	2	-50	54.0	168	17.0	52	11.3
3403.4	1055	20	2	-50	50.0	168	25.0	57	10.6
3468.3	1700	20	2	-50	15.0	169	51.0	54	10.2
3488.8	1900	20	2	-50	3.0	170	17.0	49	9.8
3508.5	2100	20	2	-49	50.0	170	40.0	50	10.9
3530.4	2300	20	2	-49	36.0	171	6.0	48	10.4
3540.9	0	21	2	-49	29.0	171	18.0	51	9.5

3560.0	200	21	2	-49	17.0	171	41.0	90	7.8
3560.7	205	21	2	-49	17.0	171	42.0	33	7.1
3561.9	215	21	2	-49	16.0	171	43.0	90	7.8
3562.5	220	21	2	-49	16.0	171	44.0	90	9.7
3563.9	228	21	2	-49	16.0	171	46.0	90	0.0
3563.9	230	21	2	-49	16.0	171	46.0	90	4.5
3569.1	339	21	2	-49	16.0	171	54.0	90	13.0
3570.4	345	21	2	-49	16.0	171	56.0	90	8.5
3578.2	440	21	2	-49	16.0	172	8.0	90	6.1
3581.5	512	21	2	-49	16.0	172	13.0	0	9.9
3582.5	518	21	2	-49	15.0	172	13.0	90	1.7
3583.1	540	21	2	-49	15.0	172	14.0	0	6.0
3585.1	600	21	2	-49	13.0	172	14.0	33	1.5
3586.3	645	21	2	-49	12.0	172	15.0	90	7.8
3587.0	650	21	2	-49	12.0	172	16.0	214	15.8
3616.C	840	21	2	-49	36.0	171	51.0	330	12.3
3635.6	1015	21	2	-49	19.0	171	36.0	152	13.6
3642.4	1045	21	2	-49	25.0	171	41.0	0	14.4
3648.4	1110	21	2	-49	19.0	171	41.0	249	8.3
3651.2	1130	21	2	-49	20.0	171	37.0	90	0.0
3651.2	1140	21	2	-49	20.0	171	37.0	327	2.8
3652.4	1205	21	2	-49	19.0	171	36.0	90	1.3
3653.0	1235	21	2	-49	19.0	171	37.0	90	3.5
3654.3	1257	21	2	-49	19.0	171	39.0	351	9.9
3764.6	0	22	2	-47	30.0	171	14.0	354	8.9
3845.0	900	22	2	-46	10.0	171	2.0	358	10.2
3863.0	1045	22	2	-45	52.0	171	1.0	348	8.1
3873.2	1200	22	2	-45	42.0	170	58.0	0	9.6
3878.2	1231	22	2	-45	37.0	170	58.0	90	0.0
3878.2	1233	22	2	-45	37.0	170	58.0	19	3.9
3880.4	1305	22	2	-45	35.0	170	59.0	215	3.4
3882.8	1348	22	2	-45	37.0	170	57.0	90	7.9
3887.7	1425	22	2	-45	37.0	171	4.0	79	9.9
3903.4	1600	22	2	-45	34.0	171	26.0	80	9.2
3959.0	2200	22	2	-45	24.0	172	44.0	83	8.4

FLT. 16 NAVIGATION CONT'D

3967.5	2300	22	2	-45	23.0	172	56.0	70	8.9
3970.4	2320	22	2	-45	22.0	173	0.0	90	0.0
3970.4	2322	22	2	-45	22.0	173	0.0	90	5.2
3971.1	2330	22	2	-45	22.0	173	1.0	90	4.2
3971.8	2340	22	2	-45	22.0	173	2.0	70	8.9
3974.8	0	23	2	-45	21.0	173	6.0	81	8.9
4026.1	545	23	2	-45	13.0	174	18.0	80	9.1
4037.6	700	23	2	-45	11.0	174	34.0	77	9.0
4050.6	826	23	2	-45	8.0	174	52.0	90	7.6
4052.0	837	23	2	-45	8.0	174	54.0	81	9.5
4102.8	1355	23	2	-45	0.0	176	5.0	90	7.9
4104.9	1411	23	2	-45	0.0	176	8.0	35	2.3
4111.0	1645	23	2	-44	55.0	176	13.0	40	9.4
4130.7	1850	23	2	-44	40.0	176	31.0	324	9.7
4171.3	2300	23	2	-44	7.0	175	58.0	270	3.5
4172.0	2312	23	2	-44	7.0	175	57.0	90	0.0
4172.0	2322	23	2	-44	7.0	175	57.0	0	11.9
4173.0	2327	23	2	-44	6.0	175	57.0	180	.9
4175.0	130	24	2	-44	8.0	175	57.0	340	5.5
4177.1	153	24	2	-44	6.0	175	56.0	333	8.9
4218.6	630	24	2	-43	29.0	175	30.0	291	7.8
4227.2	735	24	2	-43	26.0	175	19.0	283	6.7
4231.6	815	24	2	-43	25.0	175	13.0	286	9.2
4288.5	1426	24	2	-43	9.0	173	58.0	78	9.3
4378.1	0	25	2	-42	51.0	175	58.0	77	10.0
4382.6	27	25	2	-42	50.0	176	4.0	301	9.0
4405.8	300	25	2	-42	38.0	175	37.0	304	5.3
4409.4	340	25	2	-42	36.0	175	33.0	302	5.1
4443.3	1015	25	2	-42	18.0	174	54.0	0	2.6
4445.3	1100	25	2	-42	16.0	174	54.0	348	2.8
4452.5	1330	25	2	-42	9.0	174	52.0	352	4.0
4457.5	1445	25	2	-42	4.0	174	51.0	353	5.8
4476.7	1800	25	2	-41	45.0	174	48.0	349	4.0
4480.7	1900	25	2	-41	41.0	174	47.0	0	3.9
4482.7	1930	25	2	-41	39.0	174	47.0	13	6.8
4493.0	2100	25	2	-41	29.0	174	50.0	0	5.0
4494.0	2112	25	2	-41	28.0	174	50.0	0	6.6
4496.0	2130	25	2	-41	26.0	174	50.0	0	4.9

ELTANIN 17 NAVIGATION

MILES	HOUR	DY	MO	LATITUDE	LONGITUDE	COUR	KTS
0.0	310	12	3	-41 26.0	174 49.0	134	13.7
11.4	400	12	3	-41 34.0	175 0.0	129	11.5
21.0	450	12	3	-41 40.0	175 10.0	101	11.6
81.0	1000	12	3	-41 51.0	176 29.0	100	5.9
117.2	1606	12	3	-41 57.0	177 17.0	103	11.4
121.8	1630	12	3	-41 58.0	177 23.0	90	9.2
125.5	1654	12	3	-41 58.0	177 28.0	102	6.5
135.4	1824	12	3	-42 0.0	177 41.0	97	7.4
151.1	2030	12	3	-42 2.0	178 2.0	99	10.8
196.9	43	13	3	-42 9.0	179 3.0	96	9.2
206.6	146	13	3	-42 10.0	179 16.0	99	9.7
267.2	800	13	3	-42 19.0	-179 23.0	93	10.0
418.1	2300	13	3	-42 28.0	-175 59.0	100	9.9
448.1	200	14	3	-42 33.0	-175 19.0	102	10.5
681.8	5	15	3	-43 23.0	-170 7.0	90	10.9
692.7	105	15	3	-43 23.0	-169 52.0	90	5.2
694.9	130	15	3	-43 23.0	-169 49.0	90	10.3
709.4	254	15	3	-43 23.0	-169 29.0	90	3.3
710.8	320	15	3	-43 23.0	-169 27.0	90	4.3
711.6	330	15	3	-43 23.0	-169 26.0	92	10.7
856.9	1700	15	3	-43 27.0	-166 6.0	94	10.4
930.3	0	16	3	-43 32.0	-164 25.0	93	10.8
1039.1	1000	16	3	-43 37.0	-161 55.0	97	8.0
1047.2	1100	16	3	-43 38.0	-161 44.0	87	10.6
1089.9	1500	16	3	-43 35.5	-160 45.0	83	8.0
1098.0	1600	16	3	-43 34.5	-160 34.0	87	9.8
1122.7	1830	16	3	-43 33.0	-160 0.0	125	10.3
1335.6	1500	17	3	-45 34.0	-155 54.0	126	10.7
1352.8	1636	17	3	-45 44.0	-155 34.0	126	4.2
1354.6	1700	17	3	-45 45.0	-155 32.0	90	0.0
1354.6	1703	17	3	-45 45.0	-155 32.0	134	6.4
1357.5	1730	17	3	-45 47.0	-155 29.0	127	10.9
1390.6	2032	17	3	-46 7.0	-154 51.0	126	12.8
1392.3	2040	17	3	-46 8.0	-154 49.0	129	10.7
1406.6	2200	17	3	-46 17.0	-154 33.0	145	5.6
1407.8	2213	17	3	-46 18.0	-154 32.0	120	10.7
1419.7	2320	17	3	-46 24.0	-154 17.0	125	10.9
1454.3	230	18	3	-46 44.0	-153 36.0	126	4.2
1456.0	254	18	3	-46 45.0	-153 34.0	90	13.6
1456.7	257	18	3	-46 45.0	-153 33.0	138	5.4
1460.8	342	18	3	-46 48.0	-153 29.0	122	10.3
1530.6	1028	18	3	-47 25.0	-152 2.0	126	4.5
1532.3	1050	18	3	-47 26.0	-152 0.0	124	10.4
1580.9	1530	18	3	-47 53.0	-151 0.0	180	10.9
1652.9	2205	18	3	-49 5.0	-151 0.0	180	2.4
1653.9	2230	18	3	-49 6.0	-151 0.0	180	9.8
1722.9	530	19	3	-50 15.0	-151 0.0	91	10.3
1765.1	935	19	3	-50 16.0	-149 54.0	90	5.4
1765.7	942	19	3	-50 16.0	-149 53.0	90	10.1
1779.8	1105	19	3	-50 16.0	-149 31.0	90	3.8
1781.0	1125	19	3	-50 16.0	-149 29.0	91	10.2
1864.8	1935	19	3	-50 18.0	-147 18.0	90	10.0
1899.3	2300	19	3	-50 18.0	-146 24.0	180	11.9
1900.3	2305	19	3	-50 19.0	-146 24.0	90	9.8
2030.5	1218	20	3	-50 19.0	-143 0.0	175	10.3
2089.8	1800	20	3	-51 18.0	-142 52.0	176	11.0
2122.8	2100	20	3	-51 51.0	-142 48.0	180	9.4
2133.8	2210	20	3	-52 2.0	-142 48.0	153	8.9
2140.6	2255	20	3	-52 8.0	-142 43.0	95	9.5
2151.7	5	21	3	-52 9.0	-142 25.0	97	12.9
2160.3	45	21	3	-52 10.0	-142 11.0	90	6.1
2163.4	115	21	3	-52 10.0	-142 6.0	270	3.3
2164.0	126	21	3	-52 10.0	-142 7.0	270	1.9
2165.8	224	21	3	-52 10.0	-142 10.0	90	1.5
2168.3	400	21	3	-52 10.0	-142 6.0	90	4.2
2170.8	435	21	3	-52 10.0	-142 2.0	180	9.8
2197.8	720	21	3	-52 37.0	-142 2.0	180	5.9
2198.8	730	21	3	-52 38.0	-142 2.0	90	10.0
2258.8	1330	21	3	-52 38.0	-140 23.0	78	9.9

FLT. 17 NAVIGATION CONT'D

2298.6	1730	21	3	-52	30.0	-139	19.0	90	10.8
2456.2	800	22	3	-52	30.0	-135	0.0	180	5.2
2498.2	1600	22	3	-53	12.0	-135	0.0	180	7.9
2500.2	1615	22	3	-53	14.0	-135	0.0	180	8.0
2518.2	1830	22	3	-53	32.0	-135	0.0	180	5.2
2525.2	1950	22	3	-53	39.0	-135	0.0	180	1.1
2526.2	2040	22	3	-53	40.0	-135	0.0	17	2.5
2528.3	2130	22	3	-53	38.0	-134	59.0	130	2.2
2533.0	2335	22	3	-53	41.0	-134	53.0	109	2.9
2536.1	38	23	3	-53	42.0	-134	48.0	93	10.1
2638.0	1040	23	3	-53	48.0	-131	56.0	93	8.1
2738.4	2300	23	3	-53	54.0	-129	6.0	180	7.3
2766.4	248	24	3	-54	22.0	-129	6.0	180	8.7
2818.4	845	24	3	-55	14.0	-129	6.0	274	7.1
2833.3	1050	24	3	-55	13.0	-129	32.0	273	6.3
2853.3	1400	24	3	-55	12.0	-130	7.0	270	6.8
2863.6	1530	24	3	-55	12.0	-130	25.0	270	6.7
2900.7	2100	24	3	-55	12.0	-131	30.0	0	9.0
2924.7	2340	24	3	-54	48.0	-131	30.0	0	9.8
2942.7	130	25	3	-54	30.0	-131	30.0	256	10.0
3017.7	900	25	3	-54	48.0	-133	36.0	256	9.8
3064.5	1345	25	3	-54	59.0	-134	55.0	251	3.0
3067.5	1445	25	3	-55	0.0	-135	0.0	90	0.0
3067.5	2100	25	3	-55	0.0	-135	0.0	180	1.9
3069.5	2200	25	3	-55	2.0	-135	0.0	180	3.8
3074.5	2318	25	3	-55	7.0	-135	0.0	180	3.6
3084.5	204	26	3	-55	17.0	-135	0.0	180	15.0
3085.5	208	26	3	-55	18.0	-135	0.0	180	2.6
3087.5	254	26	3	-55	20.0	-135	0.0	180	5.0
3089.5	318	26	3	-55	22.0	-135	0.0	186	11.9
3121.7	600	26	3	-55	54.0	-135	6.0	239	3.9
3123.7	630	26	3	-55	55.0	-135	9.0	270	3.8
3125.9	705	26	3	-55	55.0	-135	13.0	134	.7
3137.5	2150	26	3	-56	3.0	-134	58.0	184	8.7
3181.6	254	27	3	-56	47.0	-135	3.0	180	10.0

3183.6	306	27	3	-56	49.0	-135	3.0	188	4.4
3187.6	400	27	3	-56	53.0	-135	4.0	180	.5
3196.6	2103	27	3	-57	2.0	-135	4.0	189	9.3
3217.9	2320	27	3	-57	23.0	-135	10.0	181	9.0
3302.9	845	28	3	-58	48.0	-135	14.0	218	4.6
3313.0	1055	28	3	-58	56.0	-135	26.0	220	.4
3319.5	32	29	3	-59	1.0	-135	34.0	163	3.5
3324.7	200	29	3	-59	6.0	-135	31.0	163	7.0
3361.3	712	29	3	-59	41.0	-135	10.0	166	7.7
3367.5	800	29	3	-59	47.0	-135	7.0	163	7.8
3383.2	1000	29	3	-60	2.0	-134	58.0	162	2.9
3386.3	1105	29	3	-60	5.0	-134	56.0	18	.7
3389.5	1515	29	3	-60	2.0	-134	54.0	171	2.8
3392.6	1618	29	3	-60	5.0	-134	53.0	166	7.9
3442.1	2230	29	3	-60	53.0	-134	28.0	154	2.2
3443.2	2300	29	3	-60	54.0	-134	27.0	26	1.1
3444.3	2400	29	3	-60	53.0	-134	26.0	167	1.2
3461.8	1400	30	3	-61	10.0	-134	18.0	109	.6
3464.8	1855	30	3	-61	11.0	-134	12.0	212	9.8
3481.3	2035	30	3	-61	25.0	-134	30.0	224	6.6
3484.0	2100	30	3	-61	27.0	-134	34.0	212	9.8
3516.0	15	31	3	-61	54.0	-135	10.0	215	2.7
3520.9	200	31	3	-61	58.0	-135	16.0	191	.4
3526.0	1430	31	3	-62	3.0	-135	18.0	19	1.3
3530.2	1745	31	3	-61	59.0	-135	15.0	180	3.2
3534.2	1900	31	3	-62	3.0	-135	15.0	180	9.7
3556.2	2115	31	3	-62	25.0	-135	15.0	169	10.0
3588.9	30	1	4	-62	57.0	-135	1.0	193	4.1
3590.9	100	1	4	-62	59.0	-135	2.0	218	1.2
3596.0	500	1	4	-63	3.0	-135	9.0	156	.5
3598.2	900	1	4	-63	5.0	-135	7.0	61	.5
3602.4	1642	1	4	-63	3.0	-134	59.0	177	5.4
3610.4	1810	1	4	-63	11.0	-134	58.0	177	9.2
3627.4	2000	1	4	-63	28.0	-134	56.0	188	8.6
3647.6	2220	1	4	-63	48.0	-135	2.0	90	0.0

ELT. 17 NAVIGATION CONT'D

3647.6	2230	1	4	-63	48.0	-135	2.0	188	4.7	4072.8	1520	7	4	-68	8.0	-130	21.0	90	2.8
3653.6	2347	1	4	-63	54.0	-135	4.0	192	3.2	4076.2	1630	7	4	-68	8.0	-130	12.0	87	10.1
3655.7	25	2	4	-63	56.0	-135	5.0	187	1.9	4121.7	2100	7	4	-68	6.0	-128	10.0	80	9.4
3662.7	400	2	4	-64	3.0	-135	7.0	103	.4	4145.2	2330	7	4	-68	2.0	-127	8.0	90	6.2
3667.2	1324	2	4	-64	4.0	-134	57.0	180	4.2	4147.8	2355	7	4	-68	2.0	-127	1.0	48	1.5
3671.2	1420	2	4	-64	8.0	-134	57.0	182	7.2	4149.3	55	8	4	-68	1.0	-126	58.0	143	.6
3683.2	1600	2	4	-64	20.0	-134	58.0	181	9.8	4158.0	1400	8	4	-68	8.0	-126	44.0	90	1.1
3720.2	1945	2	4	-64	57.0	-135	0.0	128	.2	4160.3	1600	8	4	-68	8.0	-126	38.0	86	10.9
3725.1	1403	3	4	-65	0.0	-134	51.0	180	3.7	4176.3	1728	8	4	-68	7.0	-125	55.0	68	10.2
3727.1	1435	3	4	-65	2.0	-134	51.0	184	10.1	4184.4	1815	8	4	-68	4.0	-125	35.0	30	10.2
3781.2	1955	3	4	-65	56.0	-134	59.0	186	3.6	4206.3	2023	8	4	-67	45.0	-125	6.0	114	11.4
3785.2	2102	3	4	-66	0.0	-135	0.0	96	.7	4208.8	2036	8	4	-67	46.0	-125	0.0	57	15.5
3795.0	1020	4	4	-66	1.0	-134	36.0	189	3.4	4210.6	2043	8	4	-67	45.0	-124	56.0	74	11.2
3811.2	1500	4	4	-66	17.0	-134	42.0	180	6.6	4214.1	2102	8	4	-67	44.0	-124	47.0	28	10.9
3813.2	1518	4	4	-66	19.0	-134	42.0	198	7.5	4219.8	2133	8	4	-67	39.0	-124	40.0	131	7.5
3818.4	1600	4	4	-66	24.0	-134	46.0	189	7.7	4221.3	2145	8	4	-67	40.0	-124	37.0	90	10.6
3847.8	1948	4	4	-66	53.0	-134	58.0	189	5.0	4224.0	2200	8	4	-67	40.0	-124	30.0	90	9.8
3852.9	2048	4	4	-66	58.0	-135	0.0	136	1.0	4233.8	2300	8	4	-67	40.0	-124	4.0	76	9.1
3869.7	1300	5	4	-67	10.0	-134	30.0	187	4.0	4246.0	20	9	4	-67	37.0	-123	33.0	311	9.1
3878.7	1515	5	4	-67	19.0	-134	33.0	206	8.8	4247.5	30	9	4	-67	36.0	-123	36.0	311	5.2
3883.2	1545	5	4	-67	23.0	-134	38.0	193	8.1	4250.6	105	9	4	-67	34.0	-123	42.0	302	10.3
3918.0	2000	5	4	-67	57.0	-134	58.0	231	1.9	4260.0	200	9	4	-67	29.0	-124	3.0	281	2.5
3927.6	100	6	4	-68	3.0	-135	18.0	312	3.0	4265.1	400	9	4	-67	28.0	-124	16.0	255	.7
3935.1	330	6	4	-67	58.0	-135	33.0	249	1.8	4272.6	1424	9	4	-67	30.0	-124	35.0	72	9.2
3937.9	500	6	4	-67	59.0	-135	40.0	163	.5	4275.9	1445	9	4	-67	29.0	-124	27.0	90	3.0
3943.1	1500	6	4	-68	4.0	-135	36.0	90	4.1	4277.4	1515	9	4	-67	29.0	-124	23.0	76	11.5
3948.4	1615	6	4	-68	4.0	-135	22.0	90	11.2	4311.0	1810	9	4	-67	21.0	-122	58.0	0	10.3
3957.7	1705	6	4	-68	4.0	-134	57.0	91	10.8	4316.0	1839	9	4	-67	16.0	-122	58.0	45	10.5
4021.9	2300	6	4	-68	5.0	-132	5.0	81	10.1	4351.3	2200	9	4	-66	51.0	-121	54.0	98	10.9
4047.3	130	7	4	-68	1.0	-130	58.0	103	3.2	4392.6	145	10	4	-66	57.0	-120	10.0	111	.3
4051.9	255	7	4	-68	2.0	-130	46.0	173	.7	4398.0	1840	10	4	-66	59.0	-119	57.0	90	8.7
4058.0	1129	7	4	-68	8.0	-130	44.0	251	3.6	4403.9	1920	10	4	-66	59.0	-119	42.0	91	11.5
4061.1	1220	7	4	-68	9.0	-130	52.0	71	4.7	4463.7	30	11	4	-67	0.0	-117	9.0	123	13.5
4064.2	1300	7	4	-68	8.0	-130	44.0	90	2.7	4484.1	200	11	4	-67	11.0	-116	25.0	100	5.8
4069.8	1500	7	4	-68	8.0	-130	29.0	90	8.9	4519.4	802	11	4	-67	17.0	-114	55.0	14	1.1

ELT. 17 NAVIGATION CONT'D

4525.6	1330	11	4	-67	11.0	-114	51.0	104	5.9
4546.3	1700	11	4	-67	16.0	-113	59.0	106	9.9
4591.1	2130	11	4	-67	28.0	-112	7.0	129	10.8
4628.9	100	12	4	-67	52.0	-110	50.0	169	1.0
4631.0	300	12	4	-67	54.0	-110	49.0	252	.6
4634.1	800	12	4	-67	55.0	-110	57.0	349	.5
4636.2	1200	12	4	-67	53.0	-110	58.0	99	2.0
4642.3	1500	12	4	-67	54.0	-110	42.0	137	1.8
4645.0	1630	12	4	-67	56.0	-110	37.0	92	12.1
4675.5	1900	12	4	-67	57.0	-109	16.0	90	11.2
4732.1	3	13	4	-67	57.0	-106	45.0	180	.7
4741.1	1200	13	4	-68	6.0	-106	45.0	77	3.9
4745.7	1310	13	4	-68	5.0	-106	33.0	82	9.6
4821.3	2100	13	4	-67	55.0	-103	13.0	90	2.4
4831.1	100	14	4	-67	55.0	-102	47.0	282	.4
4836.1	1220	14	4	-67	54.0	-103	0.0	90	3.4
4838.7	1306	14	4	-67	54.0	-102	53.0	90	7.1
4841.0	1325	14	4	-67	54.0	-102	47.0	93	11.4
4859.0	1500	14	4	-67	55.0	-101	59.0	94	9.9
4925.3	2140	14	4	-68	0.0	-99	3.0	90	3.3
4926.4	2200	14	4	-68	0.0	-99	0.0	5	5.3
4930.4	2245	14	4	-67	56.0	-98	59.0	108	.3
4933.6	700	15	4	-67	57.0	-98	51.0	339	.4
4935.7	1145	15	4	-67	55.0	-98	53.0	129	16.4
4942.0	1208	15	4	-67	59.0	-98	40.0	124	6.2
4947.4	1300	15	4	-68	2.0	-98	28.0	127	10.6
4974.0	1530	15	4	-68	18.0	-97	31.0	160	4.2
4975.1	1545	15	4	-68	19.0	-97	30.0	127	11.5
5031.7	2040	15	4	-68	53.0	-95	26.0	0	5.9
5033.7	2100	15	4	-68	51.0	-95	26.0	0	6.0
5034.7	2110	15	4	-68	50.0	-95	26.0	342	5.7
5045.2	2300	15	4	-68	40.0	-95	35.0	336	1.4
5049.6	200	16	4	-68	36.0	-95	40.0	159	1.3
5072.0	1900	16	4	-68	57.0	-95	18.0	5	10.2
5113.2	2300	16	4	-68	16.0	-95	8.0	20	5.3
5118.5	0	17	4	-68	11.0	-95	3.0	8	2.0
5126.6	400	17	4	-68	3.0	-95	0.0	7	.4
5132.7	1850	17	4	-67	57.0	-94	58.0	21	3.7
5133.7	1907	17	4	-67	56.0	-94	57.0	7	11.3
5189.1	0	18	4	-67	1.0	-94	40.0	18	3.1
5195.4	200	18	4	-66	55.0	-94	35.0	201	.2
5198.6	1530	18	4	-66	58.0	-94	38.0	11	3.0
5200.7	1610	18	4	-66	56.0	-94	37.0	8	10.0
5249.1	2100	18	4	-66	8.0	-94	21.0	348	.7
5260.4	1218	19	4	-65	57.0	-94	27.0	352	4.3
5263.4	1300	19	4	-65	54.0	-94	28.0	346	9.6
5326.2	1930	19	4	-64	53.0	-95	4.0	350	.5
5333.3	845	20	4	-64	46.0	-95	7.0	0	3.6
5336.3	935	20	4	-64	43.0	-95	7.0	6	4.9
5348.4	1200	20	4	-64	31.0	-95	4.0	8	6.0
5351.4	1230	20	4	-64	28.0	-95	3.0	5	10.0
5371.5	1430	20	4	-64	8.0	-94	59.0	176	.7
5383.5	725	21	4	-64	20.0	-94	57.0	11	3.8
5390.7	915	21	4	-64	13.0	-94	54.0	354	9.0
5470.1	1800	21	4	-62	54.0	-95	13.0	210	2.0
5478.2	2200	21	4	-63	1.0	-95	22.0	105	.4
5482.0	600	22	4	-63	2.0	-95	14.0	50	.9
5486.7	1100	22	4	-62	59.0	-95	6.0	90	.1
5487.1	1415	22	4	-62	59.0	-95	5.0	13	2.7
5489.2	1500	22	4	-62	57.0	-95	4.0	10	10.3
5541.0	2000	22	4	-62	6.0	-94	44.0	13	4.1
5545.1	2100	22	4	-62	2.0	-94	42.0	148	1.7
5548.7	2300	22	4	-62	5.0	-94	38.0	155	1.1
5550.9	100	23	4	-62	7.0	-94	36.0	311	.7
5554.0	500	23	4	-62	5.0	-94	41.0	196	.9
5564.3	1623	23	4	-62	15.0	-94	47.0	352	7.3
5635.0	200	24	4	-61	5.0	-95	7.0	263	1.9
5642.8	600	24	4	-61	6.0	-95	23.0	90	2.1
5651.5	1000	24	4	-61	6.0	-95	5.0	158	1.4
5663.3	1820	24	4	-61	17.0	-94	56.0	352	4.9

5670.4	1945	24	4	-61	10.0	-94	58.0	346	8.2
5676.5	2030	24	4	-61	4.0	-95	1.0	0	2.4
5677.5	2055	24	4	-61	3.0	-95	1.0	355	9.2
5738.8	332	25	4	-60	2.0	-95	12.0	270	1.0
5741.3	600	25	4	-60	2.0	-95	17.0	120	1.0
5745.3	1000	25	4	-60	4.0	-95	10.0	188	2.3
5752.4	1300	25	4	-60	11.0	-95	12.0	292	2.6
5755.1	1400	25	4	-60	10.0	-95	17.0	0	9.5
5822.1	2100	25	4	-59	3.0	-95	17.0	0	3.0
5825.1	2200	25	4	-59	0.0	-95	17.0	174	.6
5830.1	600	26	4	-59	5.0	-95	16.0	327	3.1
5839.6	900	26	4	-58	57.0	-95	26.0	281	1.5
5844.8	1230	26	4	-58	56.0	-95	36.0	207	.9
5846.0	1342	26	4	-58	57.0	-95	37.0	0	10.5
5886.0	1730	26	4	-58	17.0	-95	37.0	156	10.9
5935.3	2200	26	4	-59	2.0	-94	58.0	359	8.0
5991.3	500	27	4	-58	6.0	-95	0.0	0	6.0
5997.3	600	27	4	-58	0.0	-95	0.0	332	3.3
6000.7	700	27	4	-57	57.0	-95	3.0	143	1.7
6009.5	1200	27	4	-58	4.0	-94	53.0	152	.4
6012.9	2000	27	4	-58	7.0	-94	50.0	342	8.4
6038.2	2300	27	4	-57	43.0	-95	5.0	344	8.7
6060.0	130	28	4	-57	22.0	-95	16.0	0	10.0
6065.0	200	28	4	-57	17.0	-95	16.0	0	4.9
6085.0	600	28	4	-56	57.0	-95	16.0	118	1.4
6102.2	1800	28	4	-57	5.0	-94	48.0	29	.8
6106.8	2320	28	4	-57	1.0	-94	44.0	70	3.7
6109.7	6	29	4	-57	0.0	-94	39.0	345	6.9
6111.8	24	29	4	-56	58.0	-94	40.0	350	9.9
6157.5	500	29	4	-56	13.0	-94	55.0	344	8.3
6161.7	530	29	4	-56	9.0	-94	57.0	350	10.1
6171.8	630	29	4	-55	59.0	-95	0.0	340	5.4
6175.0	705	29	4	-55	56.0	-95	2.0	154	1.2
6183.9	1400	29	4	-56	4.0	-94	55.0	90	.5
6186.1	1800	29	4	-56	4.0	-94	51.0	90	.7

6189.5	2240	29	4	-56	4.0	-94	45.0	344	6.2
6191.6	2300	29	4	-56	2.0	-94	46.0	354	10.0
6206.7	30	30	4	-55	47.0	-94	49.0	350	4.9
6216.8	232	30	4	-55	37.0	-94	52.0	354	10.0
6226.9	332	30	4	-55	27.0	-94	54.0	0	10.0
6251.9	602	30	4	-55	2.0	-94	54.0	323	8.0
6255.6	630	30	4	-54	59.0	-94	58.0	114	.4
6260.6	1800	30	4	-55	1.0	-94	50.0	71	.7
6263.7	2200	30	4	-55	0.0	-94	45.0	43	3.7
6270.5	2348	30	4	-54	55.0	-94	37.0	41	13.2
6273.1	0	1	5	-54	53.0	-94	34.0	44	8.3
6281.4	100	1	5	-54	47.0	-94	24.0	41	7.9
6297.3	300	1	5	-54	35.0	-94	6.0	42	9.8
6326.9	600	1	5	-54	13.0	-93	32.0	43	7.8
6358.1	1000	1	5	-53	50.0	-92	56.0	43	8.9
6429.5	1800	1	5	-52	58.0	-91	34.0	43	10.1
6480.2	2300	1	5	-52	21.0	-90	37.0	45	8.1
6585.5	1200	2	5	-51	7.0	-88	36.0	37	10.0
6877.4	1700	3	5	-47	15.0	-84	5.0	47	11.7
6947.6	2300	3	5	-46	27.0	-82	50.0	41	10.7
7076.6	1100	4	5	-44	49.0	-80	50.0	45	9.9
7207.8	12	5	5	-43	17.0	-78	40.0	36	10.2
7328.2	1200	5	5	-41	39.0	-77	5.0	26	10.0
7383.7	1730	5	5	-40	49.0	-76	33.0	59	10.8
7432.4	2200	5	5	-40	24.0	-75	38.0	39	9.8
7493.8	415	6	5	-39	36.0	-74	48.0	91	8.9
7547.7	1015	6	5	-39	37.0	-73	38.0	0	6.6
7562.7	1230	6	5	-39	22.0	-73	38.0	273	7.7
7597.6	1700	6	5	-39	20.0	-74	23.0	270	7.7
7624.7	2030	6	5	-39	20.0	-74	58.0	0	6.9
7635.7	2205	6	5	-39	9.0	-74	58.0	92	7.8
7696.2	545	7	5	-39	11.0	-73	40.0	153	13.5
7699.6	600	7	5	-39	14.0	-73	38.0	180	6.4
7706.6	705	7	5	-39	21.0	-73	38.0	159	5.1
7708.7	730	7	5	-39	23.0	-73	37.0	72	6.4

FLT. 17 NAVIGATION CONT'D

7711.9	800	7	5	-39	22.0	-73	33.0	14	4.6
7718.1	920	7	5	-39	16.0	-73	31.0	234	5.9
7724.9	1028	7	5	-39	20.0	-73	38.0	270	1.2
7725.7	1105	7	5	-39	20.0	-73	39.0	280	8.2
7731.2	1145	7	5	-39	19.0	-73	46.0	303	3.6
7733.0	1215	7	5	-39	18.0	-73	48.0	229	6.1
7739.1	1315	7	5	-39	22.0	-73	54.0	270	2.9
7740.7	1346	7	5	-39	22.0	-73	56.0	311	3.0
7743.7	1447	7	5	-39	20.0	-73	59.0	270	1.9
7746.1	1600	7	5	-39	20.0	-74	2.0	311	2.9
7749.1	1702	7	5	-39	18.0	-74	5.0	270	1.6
7751.4	1825	7	5	-39	18.0	-74	8.0	224	5.3
7757.0	1927	7	5	-39	22.0	-74	13.0	270	.9
7758.6	2107	7	5	-39	22.0	-74	15.0	270	3.2
7760.9	2150	7	5	-39	22.0	-74	18.0	270	.4
7761.6	2335	7	5	-39	22.0	-74	19.0	270	2.3
7763.2	14	8	5	-39	22.0	-74	21.0	270	1.1
7765.5	212	8	5	-39	22.0	-74	24.0	270	4.2
7767.8	245	8	5	-39	22.0	-74	27.0	90	.3
7768.6	445	8	5	-39	22.0	-74	26.0	270	4.8
7771.7	523	8	5	-39	22.0	-74	30.0	270	1.6
7774.8	716	8	5	-39	22.0	-74	34.0	247	3.1
7777.3	804	8	5	-39	23.0	-74	37.0	270	2.2
7781.9	1007	8	5	-39	23.0	-74	43.0	270	2.8
7783.5	1039	8	5	-39	23.0	-74	45.0	270	.7
7785.0	1244	8	5	-39	23.0	-74	47.0	270	8.7
7790.5	1321	8	5	-39	23.0	-74	54.0	90	1.1
7792.8	1525	8	5	-39	23.0	-74	51.0	63	2.7
7794.9	1612	8	5	-39	22.0	-74	48.5	90	.9
7797.7	1912	8	5	-39	22.0	-74	45.0	263	9.1
7809.3	2029	8	5	-39	23.5	-75	0.0	90	.4
7810.9	2350	8	5	-39	23.5	-74	58.0	123	1.9
7811.8	18	9	5	-39	24.0	-74	57.0	214	2.8
7821.5	340	9	5	-39	32.0	-75	4.0	90	7.6
7866.2	930	9	5	-39	32.0	-74	6.0	53	7.7
7877.8	1100	9	5	-39	25.0	-73	54.0	60	8.0
7885.8	1200	9	5	-39	21.0	-73	45.0	180	7.1
7890.8	1242	9	5	-39	26.0	-73	45.0	296	6.7
7918.3	1645	9	5	-39	14.0	-74	17.0	0	11.0
7930.3	1750	9	5	-39	2.0	-74	17.0	90	7.5
7964.5	2220	9	5	-39	2.0	-73	33.0	182	3.4
7984.5	405	10	5	-39	22.0	-73	34.0	291	5.2
7992.8	540	10	5	-39	19.0	-73	44.0	0	10.0
7997.8	610	10	5	-39	14.0	-73	44.0	49	9.1
8000.9	630	10	5	-39	12.0	-73	41.0	315	10.1
8026.2	900	10	5	-38	54.0	-74	4.0	0	8.6
8052.2	1200	10	5	-38	28.0	-74	4.0	314	9.0
8088.3	1600	10	5	-38	3.0	-74	37.0	49	7.5
8118.7	2000	10	5	-37	43.0	-74	8.0	323	7.0
8182.4	500	11	5	-36	52.0	-74	56.0	45	8.2
8323.3	2200	11	5	-35	13.0	-72	52.0	301	6.9
8357.8	300	12	5	-34	55.0	-73	28.0	54	6.8
8392.2	800	12	5	-34	35.0	-72	54.0	70	6.3
8427.2	1330	12	5	-34	23.0	-72	14.0	314	6.9
8444.5	1600	12	5	-34	11.0	-72	29.0	320	7.6
8501.7	2330	12	5	-33	27.0	-73	13.0	70	6.8
8539.1	500	13	5	-33	14.0	-72	31.0	72	6.0

MILES	HOUR	DY	MO	LATITUDE		LONGITUDE		COUR	KTS
0.0	2330	25	5	-33	0.0	-71	40.0	242	5.3
50.4	900	26	5	-33	24.0	-72	33.0	243	7.3
161.2	0	27	5	-34	14.0	-74	32.0	237	7.8
294.0	1700	27	5	-35	26.0	-76	48.0	241	7.9
485.9	1700	28	5	-36	59.0	-80	16.0	241	6.2
635.6	1700	29	5	-38	12.0	-83	1.0	242	8.7
854.5	1800	30	5	-39	56.0	-87	9.0	240	8.7
1064.3	1800	31	5	-41	41.0	-91	9.0	240	8.3
1265.1	1800	1	6	-43	20.0	-95	6.0	239	11.8
1282.8	1930	1	6	-43	29.0	-95	27.0	245	11.9
1339.5	15	2	6	-43	53.0	-96	38.0	246	11.5
1356.8	145	2	6	-44	0.0	-97	0.0	187	9.2
1562.3	0	3	6	-47	24.0	-97	35.0	188	7.6
1700.7	1800	3	6	-49	41.0	-98	5.0	190	8.3
1920.9	2015	4	6	-53	18.0	-99	5.0	180	8.5
1925.9	2050	4	6	-53	23.0	-99	5.0	180	8.3
1968.9	200	5	6	-54	6.0	-99	5.0	180	6.2
1993.9	600	5	6	-54	31.0	-99	5.0	180	4.0
2001.9	800	5	6	-54	39.0	-99	5.0	206	1.5
2009.7	1300	5	6	-54	46.0	-99	11.0	192	1.1
2029.1	515	6	6	-55	5.0	-99	18.0	185	4.8
2035.1	630	6	6	-55	11.0	-99	19.0	181	10.8
2073.1	1000	6	6	-55	49.0	-99	20.0	191	.6
2076.2	1500	6	6	-55	52.0	-99	21.0	185	1.0
2082.2	2100	6	6	-55	58.0	-99	22.0	180	.2
2083.2	100	7	6	-55	59.0	-99	22.0	169	.6
2089.3	1000	7	6	-56	5.0	-99	20.0	48	.9
2093.8	1430	7	6	-56	2.0	-99	14.0	191	9.0
2153.0	2100	7	6	-57	0.0	-99	35.0	117	2.1
2164.0	200	8	6	-57	5.0	-99	17.0	245	.5
2166.4	600	8	6	-57	6.0	-99	21.0	335	.8
2174.1	1500	8	6	-56	59.0	-99	27.0	352	1.1
2182.2	2200	8	6	-56	51.0	-99	29.0	121	1.3
2189.8	345	9	6	-56	55.0	-99	17.0	185	8.0
2244.1	1030	9	6	-57	49.0	-99	26.0	344	.9
2255.5	2218	9	6	-57	38.0	-99	32.0	185	6.8
2281.6	208	10	6	-58	4.0	-99	36.0	112	3.3
2294.7	600	10	6	-58	9.0	-99	13.0	28	.2
2297.0	1400	10	6	-58	7.0	-99	11.0	332	.7
2306.1	200	11	6	-57	59.0	-99	19.0	102	2.4
2315.8	600	11	6	-58	1.0	-99	1.0	37	5.9
2339.6	1000	11	6	-57	42.0	-98	34.0	38	9.1
2376.4	1400	11	6	-57	13.0	-97	52.0	47	11.4
2558.9	600	12	6	-55	8.0	-93	53.0	45	14.4
2732.1	1800	12	6	-53	5.0	-90	25.0	37	12.8
3040.6	1800	13	6	-48	59.0	-85	29.0	36	12.1
3320.7	1700	14	6	-45	11.0	-81	30.0	36	12.3
3691.7	2300	15	6	-40	10.0	-76	35.0	35	12.6
3906.3	1600	16	6	-37	15.0	-73	56.0	35	12.4
3933.0	1809	16	6	-36	53.0	-73	37.0	54	12.8

ELTANIN 19 NAVIGATION

MILES	HOUR	DY	MO	LATITUDE		LONGITUDE		COUR	KTS
0.0	1500	6	7	-36	41.0	-73	3.0	22	11.7
2.1	1511	6	7	-36	39.0	-73	2.0	0	9.6
6.1	1536	6	7	-36	35.0	-73	2.0	296	11.2
10.6	1600	6	7	-36	33.0	-73	7.0	234	12.1
98.1	2313	6	7	-37	24.0	-74	36.0	227	11.1
106.8	0	7	7	-37	30.0	-74	44.0	229	12.6
144.7	300	7	7	-37	55.0	-75	20.0	228	12.3
305.6	1600	7	7	-39	43.0	-77	53.0	224	12.1
378.8	2200	7	7	-40	36.0	-78	59.0	223	11.0
389.8	2300	7	7	-40	44.0	-79	9.0	226	11.0
457.6	510	8	7	-41	31.0	-80	14.0	224	12.8
498.2	820	8	7	-42	0.0	-80	52.0	228	8.9
501.2	840	8	7	-42	2.0	-80	55.0	225	12.6
600.6	1630	8	7	-43	12.0	-82	31.0	216	9.2
601.9	1638	8	7	-43	13.0	-82	32.0	226	12.3
742.7	400	9	7	-44	50.0	-84	54.0	215	13.7
750.1	432	9	7	-44	56.0	-85	0.0	223	8.8
754.2	500	9	7	-44	59.0	-85	4.0	219	14.3
771.0	610	9	7	-45	12.0	-85	19.0	221	11.5
827.0	1100	9	7	-45	54.0	-86	12.0	218	7.6
837.2	1220	9	7	-46	2.0	-86	21.0	224	10.4
844.1	1300	9	7	-46	7.0	-86	28.0	219	10.4
1105.0	1400	10	7	-49	30.0	-90	32.0	220	11.1
1133.9	1635	10	7	-49	52.0	-91	1.0	220	10.5
1163.9	1925	10	7	-50	15.0	-91	31.0	213	7.1
1165.1	1935	10	7	-50	16.0	-91	32.0	222	10.0
1186.8	2145	10	7	-50	32.0	-91	55.0	212	7.1
1188.0	2155	10	7	-50	33.0	-91	56.0	221	10.1
1209.2	0	11	7	-50	49.0	-92	18.0	232	6.4
1215.7	100	11	7	-50	53.0	-92	26.0	221	6.6
1249.0	600	11	7	-51	18.0	-93	1.0	222	8.2
1295.8	1140	11	7	-51	53.0	-93	51.0	219	4.6
1299.6	1230	11	7	-51	56.0	-93	55.0	221	9.3
1309.0	1330	11	7	-52	3.0	-94	5.0	220	9.2
1387.4	2200	11	7	-53	3.0	-95	28.0	222	7.0
1392.8	2246	11	7	-53	7.0	-95	34.0	211	9.9
1395.1	2300	11	7	-53	9.0	-95	36.0	230	8.2
1399.8	2334	11	7	-53	12.0	-95	42.0	221	8.8
1411.7	55	12	7	-53	21.0	-95	55.0	211	7.5
1416.3	132	12	7	-53	25.0	-95	59.0	219	10.2
1482.3	800	12	7	-54	16.0	-97	10.0	213	10.0
1535.0	1315	12	7	-55	0.0	-98	0.0	196	9.9
1539.1	1340	12	7	-55	4.0	-98	2.0	191	6.1
1542.2	1410	12	7	-55	7.0	-98	3.0	196	11.0
1573.4	1700	12	7	-55	37.0	-98	18.0	195	10.6
1703.1	510	13	7	-57	42.0	-99	21.0	195	6.2
1705.2	530	13	7	-57	44.0	-99	22.0	194	10.6
1755.8	1015	13	7	-58	33.0	-99	46.0	199	6.3
1759.0	1045	13	7	-58	36.0	-99	48.0	195	2.0
1773.4	1740	13	7	-58	50.0	-99	55.0	193	1.3
1793.9	920	14	7	-59	10.0	-100	4.0	181	9.2
1857.0	1610	14	7	-60	13.0	-100	7.0	180	8.7
1873.0	1800	14	7	-60	29.0	-100	7.0	180	5.2
1875.0	1823	14	7	-60	31.0	-100	7.0	201	.4
1885.7	1833	15	7	-60	41.0	-100	15.0	176	9.1
1899.7	2005	15	7	-60	55.0	-100	13.0	171	7.2
1902.8	2030	15	7	-60	58.0	-100	12.0	160	11.4
1941.1	2350	15	7	-61	34.0	-99	45.0	155	4.4
1942.2	5	16	7	-61	35.0	-99	44.0	189	.2
1945.2	1310	16	7	-61	38.0	-99	45.0	215	6.5
1950.1	1355	16	7	-61	42.0	-99	51.0	231	1.2
1962.9	15	17	7	-61	50.0	-100	12.0	263	11.1
1987.1	225	17	7	-61	53.0	-101	3.0	223	5.4
1988.5	240	17	7	-61	54.0	-101	5.0	263	9.9
2027.8	637	17	7	-61	59.0	-102	28.0	337	4.7
2046.2	1028	17	7	-61	42.0	-102	43.0	180	2.9
2060.2	1515	17	7	-61	56.0	-102	43.0	235	.3
2065.4	720	18	7	-61	59.0	-102	52.0	270	2.0
2069.7	925	18	7	-61	59.0	-103	1.0	270	2.8

ELT. 1° NAVIGATION CONT'D

2070.6	945	18	7	-61	59.0	-103	3.0	335	4.4
2071.7	1000	18	7	-61	58.0	-103	4.0	278	2.2
2078.8	1306	18	7	-61	57.0	-103	19.0	270	9.1
2123.5	1800	18	7	-61	57.0	-104	54.0	270	4.0
2125.9	1835	18	7	-61	57.0	-104	59.0	205	.7
2127.0	2000	18	7	-61	58.0	-105	0.0	270	4.5
2142.0	2320	18	7	-61	58.0	-105	32.0	112	3.9
2158.2	324	19	7	-62	4.0	-105	0.0	120	.4
2164.1	1610	19	7	-62	7.0	-104	49.0	270	4.6
2173.5	1810	19	7	-62	7.0	-105	9.0	270	8.4
2174.9	1820	19	7	-62	7.0	-105	12.0	270	12.6
2183.3	1900	19	7	-62	7.0	-105	30.0	281	12.5
2193.8	1950	19	7	-62	5.0	-105	52.0	270	5.8
2196.1	2014	19	7	-62	5.0	-105	57.0	281	13.6
2206.6	2100	19	7	-62	3.0	-106	19.0	270	5.6
2207.1	2105	19	7	-62	3.0	-106	20.0	277	12.8
2223.2	2220	19	7	-62	1.0	-106	54.0	270	18.7
2224.1	2223	19	7	-62	1.0	-106	56.0	283	11.6
2245.8	15	20	7	-61	56.0	-107	41.0	298	3.0
2248.0	57	20	7	-61	55.0	-107	45.0	317	6.3
2249.3	110	20	7	-61	54.0	-107	47.0	159	.2
2254.7	2125	20	7	-61	59.0	-107	43.0	285	4.9
2262.5	2300	20	7	-61	57.0	-107	59.0	270	6.1
2265.8	2332	20	7	-61	57.0	-108	6.0	266	9.3
2314.2	443	21	7	-62	0.0	-109	49.0	270	6.7
2316.6	504	21	7	-62	0.0	-109	54.0	212	3.7
2320.1	600	21	7	-62	3.0	-109	58.0	113	.7
2325.2	1230	21	7	-62	5.0	-109	48.0	102	1.0
2348.7	1015	22	7	-62	10.0	-108	59.0	140	2.9
2355.2	1230	22	7	-62	15.0	-108	50.0	347	8.2
2359.3	1300	22	7	-62	11.0	-108	52.0	340	9.5
2368.9	1400	22	7	-62	2.0	-108	59.0	339	9.6
2375.3	1440	22	7	-61	56.0	-109	4.0	343	7.9
2424.6	2050	22	7	-61	9.0	-109	35.0	338	5.5
2431.1	2200	22	7	-61	3.0	-109	40.0	270	.1
2433.0	800	23	7	-61	3.0	-109	44.0	136	.1
2434.4	1650	23	7	-61	4.0	-109	42.0	50	.4
2437.5	2335	23	7	-61	2.0	-109	37.0	334	6.6
2439.7	2355	23	7	-61	0.0	-109	39.0	348	9.7
2463.3	220	24	7	-60	37.0	-109	49.0	351	5.2
2466.3	255	24	7	-60	34.0	-109	50.0	346	9.9
2504.4	645	24	7	-59	57.0	-110	8.0	351	6.0
2507.4	715	24	7	-59	54.0	-110	9.0	68	.3
2512.8	2110	24	7	-59	52.0	-109	59.0	72	.5
2516.0	323	25	7	-59	51.0	-109	53.0	346	5.6
2518.0	345	25	7	-59	49.0	-109	54.0	350	9.9
2572.8	915	25	7	-58	55.0	-110	12.0	333	3.8
2575.1	950	25	7	-58	53.0	-110	14.0	90	.7
2576.6	1150	25	7	-58	53.0	-110	11.0	105	.2
2580.4	35	26	7	-58	54.0	-110	4.0	175	2.1
2586.4	320	26	7	-59	0.0	-110	3.0	207	.4
2587.5	600	26	7	-59	1.0	-110	4.0	57	.4
2589.4	1015	26	7	-59	0.0	-110	1.0	354	6.7
2594.4	1100	26	7	-58	55.0	-110	2.0	357	9.8
2646.5	1616	26	7	-58	3.0	-110	8.0	47	5.6
2649.4	1647	26	7	-58	1.0	-110	4.0	90	.9
2650.4	1755	26	7	-58	1.0	-110	2.0	103	1.3
2654.8	2115	26	7	-58	2.0	-109	54.0	113	.9
2660.0	232	27	7	-58	4.0	-109	45.0	270	.1
2660.5	545	27	7	-58	4.0	-109	46.0	227	.9
2661.9	715	27	7	-58	5.0	-109	48.0	326	2.5
2675.2	1230	27	7	-57	54.0	-110	2.0	350	6.0
2678.3	1300	27	7	-57	51.0	-110	3.0	355	9.5
2713.4	1640	27	7	-57	16.0	-110	9.0	356	4.4
2720.4	1815	27	7	-57	9.0	-110	10.0	270	1.0
2721.0	1845	27	7	-57	9.0	-110	11.0	84	.5
2730.3	1145	28	7	-57	8.0	-109	54.0	20	6.3
2733.4	1215	28	7	-57	5.0	-109	52.0	15	10.8
2748.0	1335	28	7	-56	51.0	-109	45.0	15	6.2
2750.0	1355	28	7	-56	49.0	-109	44.0	19	13.7

ELT. 19 NAVIGATION CONT'D

2764.9	1500	28	7	-56	35.0	-109	35.0	334	10.2
2801.6	1835	28	7	-56	2.0	-110	4.0	344	8.3
2803.7	1850	28	7	-56	0.0	-110	5.0	116	1.4
2840.2	2035	29	7	-56	16.0	-109	6.0	323	8.9
2844.0	2100	29	7	-56	13.0	-109	10.0	333	11.9
2925.0	348	30	7	-55	1.0	-110	16.0	330	5.8
2929.6	435	30	7	-54	57.0	-110	20.0	148	.9
2944.9	2100	30	7	-55	10.0	-110	6.0	248	3.4
2952.9	2320	30	7	-55	13.0	-110	19.0	11	7.3
2956.0	2345	30	7	-55	10.0	-110	18.0	5	9.5
3025.2	700	31	7	-54	1.0	-110	8.0	293	10.2
3030.3	730	31	7	-53	59.0	-110	16.0	292	2.8
3041.1	1120	31	7	-53	55.0	-110	33.0	270	2.6
3042.9	1200	31	7	-53	55.0	-110	36.0	295	2.8
3059.7	1800	31	7	-53	48.0	-111	2.0	270	2.3
3060.9	1830	31	7	-53	48.0	-111	4.0	298	5.0
3086.4	2330	31	7	-53	36.0	-111	42.0	270	2.9
3087.0	2342	31	7	-53	36.0	-111	43.0	298	9.2
3240.4	1615	1	8	-52	25.0	-115	29.0	295	4.3
3245.1	1720	1	8	-52	23.0	-115	36.0	347	2.2
3253.3	2100	1	8	-52	15.0	-115	39.0	51	1.2
3254.9	2215	1	8	-52	14.0	-115	37.0	43	2.5
3260.3	22	2	8	-52	10.0	-115	31.0	270	2.0
3261.0	40	2	8	-52	10.0	-115	32.0	290	10.2
3418.6	1600	2	8	-51	16.0	-119	31.0	296	10.2
3436.7	1746	2	8	-51	8.0	-119	57.0	328	8.8
3437.9	1754	2	8	-51	7.0	-119	58.0	292	11.5
3446.0	1836	2	8	-51	4.0	-120	10.0	328	8.8
3447.2	1844	2	8	-51	3.0	-120	11.0	295	10.2
3480.5	2200	2	8	-50	49.0	-120	59.0	295	7.0
3494.5	0	3	8	-50	43.0	-121	19.0	289	7.2
3500.6	50	3	8	-50	41.0	-121	28.0	294	10.0
3529.8	345	3	8	-50	29.0	-122	10.0	298	7.3
3534.1	420	3	8	-50	27.0	-122	16.0	295	10.0
3614.7	1220	3	8	-49	53.0	-124	10.0	291	8.2

3620.2	1300	3	8	-49	51.0	-124	18.0	292	9.9
3678.3	1850	3	8	-49	29.0	-125	41.0	270	7.7
3678.9	1855	3	8	-49	29.0	-125	42.0	293	9.7
3747.7	200	4	8	-49	2.0	-127	19.0	291	6.3
3753.3	253	4	8	-49	0.0	-127	27.0	297	7.7
3755.5	310	4	8	-48	59.0	-127	30.0	287	5.8
3759.0	345	4	8	-48	58.0	-127	35.0	291	5.6
3761.8	415	4	8	-48	57.0	-127	39.0	294	6.6
3846.8	1700	4	8	-48	23.0	-129	37.0	299	10.6
3919.3	2350	4	8	-47	48.0	-131	12.0	303	9.5
3979.2	608	5	8	-47	15.0	-132	26.0	326	4.5
3980.4	624	5	8	-47	14.0	-132	27.0	270	.5
3981.1	740	5	8	-47	14.0	-132	28.0	303	3.2
3999.6	1325	5	8	-47	4.0	-132	51.0	111	.6
4010.6	646	6	8	-47	8.0	-132	36.0	180	.4
4011.6	905	6	8	-47	9.0	-132	36.0	244	6.8
4013.9	925	6	8	-47	10.0	-132	39.0	260	12.2
4217.3	200	7	8	-47	47.0	-137	35.0	260	10.0
4311.3	1120	7	8	-48	4.0	-139	53.0	270	6.9
4314.0	1143	7	8	-48	4.0	-139	57.0	263	9.2
4322.8	1240	7	8	-48	5.0	-140	10.0	178	9.7
4446.8	125	8	8	-50	9.0	-140	3.0	180	5.9
4447.8	135	8	8	-50	10.0	-140	3.0	173	8.6
4452.9	210	8	8	-50	15.0	-140	2.0	180	11.9
4453.9	215	8	8	-50	16.0	-140	2.0	182	9.7
4470.9	400	8	8	-50	33.0	-140	3.0	130	6.6
4472.9	418	8	8	-50	35.0	-140	3.0	180	14.1
4476.9	435	8	8	-50	39.0	-140	3.0	90	0.0
4476.9	439	8	8	-50	39.0	-140	3.0	182	9.9
4534.9	1030	8	8	-51	37.0	-140	6.0	187	6.7
4540.0	1115	8	8	-51	42.0	-140	7.0	182	10.8
4587.0	1535	8	8	-52	29.0	-140	10.0	178	9.3
4615.0	1835	8	8	-52	57.0	-140	8.0	180	4.7
4617.0	1900	8	8	-52	59.0	-140	8.0	182	8.3
4681.1	240	9	8	-54	3.0	-140	12.0	180	7.9

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4683.1	255	9	8	-54	5.0	-140	12.0	181	9.5
4718.1	636	9	8	-54	40.0	-140	13.0	191	7.6
4721.1	700	9	8	-54	43.0	-140	14.0	164	2.6
4731.5	1100	9	8	-54	53.0	-140	9.0	150	.9
4746.5	220	10	8	-55	6.0	-139	56.0	180	2.5
4750.5	355	10	8	-55	10.0	-139	56.0	210	3.4
4751.7	415	10	8	-55	11.0	-139	57.0	189	9.1
4797.3	915	10	8	-55	56.0	-140	10.0	209	3.4
4798.4	935	10	8	-55	57.0	-140	11.0	209	.3
4803.0	2220	10	8	-56	1.0	-140	15.0	180	5.0
4856.0	853	11	8	-56	54.0	-140	15.0	180	2.9
4857.0	913	11	8	-56	55.0	-140	15.0	145	1.0
4865.6	1700	11	8	-57	2.0	-140	6.0	287	.9
4869.0	2046	11	8	-57	1.0	-140	12.0	138	1.8
4873.0	2300	11	8	-57	4.0	-140	7.0	331	2.6
4878.7	110	12	8	-56	59.0	-140	12.0	168	.4
4883.8	1130	12	8	-57	4.0	-140	10.0	180	6.0
4884.8	1140	12	8	-57	5.0	-140	10.0	170	8.9
4936.5	1728	12	8	-57	56.0	-139	54.0	172	5.5
4940.6	1812	12	8	-58	0.0	-139	53.0	227	.3
4942.0	2200	12	8	-58	1.0	-139	55.0	180	3.0
4952.0	120	13	8	-58	11.0	-139	55.0	90	0.0
4952.0	200	13	8	-58	11.0	-139	55.0	6	3.0
4957.1	340	13	8	-58	6.0	-139	54.0	208	1.0
4969.5	1500	13	8	-58	17.0	-140	5.0	180	10.0
4972.5	1518	13	8	-58	20.0	-140	5.0	169	9.3
5009.1	1913	13	8	-58	56.0	-139	52.0	180	6.6
5012.1	1940	13	8	-58	59.0	-139	52.0	221	1.0
5016.1	2324	13	8	-59	2.0	-139	57.0	239	2.9
5025.7	240	14	8	-59	7.0	-140	13.0	90	0.0
5025.7	300	14	8	-59	7.0	-140	13.0	52	3.2
5032.2	500	14	8	-59	3.0	-140	3.0	90	.7
5040.4	1625	14	8	-59	3.0	-139	47.0	194	6.1
5042.5	1645	14	8	-59	5.0	-139	48.0	179	9.4
5082.5	2100	14	8	-59	45.0	-139	46.0	180	4.7

5084.5	2125	14	8	-59	47.0	-139	46.0	207	1.4
5086.8	2300	14	8	-59	49.0	-139	48.0	162	2.8
5096.3	220	15	8	-59	58.0	-139	42.0	90	0.0
5096.3	240	15	8	-59	58.0	-139	42.0	41	3.3
5101.6	415	15	8	-59	54.0	-139	35.0	105	1.0
5117.1	1850	15	8	-59	58.0	-139	5.0	231	9.6
5120.3	1910	15	8	-60	0.0	-139	10.0	216	9.3
5179.5	130	16	8	-60	48.0	-140	20.0	224	5.5
5182.3	200	16	8	-60	50.0	-140	24.0	206	2.6
5191.2	520	16	8	-60	58.0	-140	32.0	90	0.0
5191.2	545	16	8	-60	58.0	-140	32.0	206	2.7
5196.7	745	16	8	-61	3.0	-140	37.0	134	.6
5206.8	2330	16	8	-61	10.0	-140	22.0	180	6.0
5207.8	2340	16	8	-61	11.0	-140	22.0	181	9.6
5244.8	330	17	8	-61	48.0	-140	23.0	180	6.0
5247.8	400	17	8	-61	51.0	-140	23.0	123	2.8
5262.4	910	17	8	-61	59.0	-139	57.0	164	.3
5267.6	125	18	8	-62	4.0	-139	54.0	270	3.1
5268.1	134	18	8	-62	4.0	-139	55.0	296	5.5
5316.3	1015	18	8	-61	43.0	-141	27.0	301	5.1
5320.1	1100	18	8	-61	41.0	-141	34.0	314	6.6
5373.1	1900	18	8	-61	4.0	-142	53.0	316	4.9
5374.5	1917	18	8	-61	3.0	-142	55.0	101	1.4
5384.8	223	19	8	-61	5.0	-142	34.0	257	4.0
5393.7	435	19	8	-61	7.0	-142	52.0	106	.6
5397.3	1000	19	8	-61	8.0	-142	45.0	310	9.4
5400.4	1020	19	8	-61	6.0	-142	50.0	307	8.7
5443.6	1515	19	8	-60	40.0	-144	1.0	316	4.8
5446.4	1550	19	8	-60	38.0	-144	5.0	305	8.9
5476.4	1910	19	8	-60	21.0	-144	55.0	315	5.6
5477.8	1925	19	8	-60	20.0	-144	57.0	304	9.4
5497.5	2130	19	8	-60	9.0	-145	30.0	315	6.5
5498.9	2143	19	8	-60	8.0	-145	32.0	90	1.2
5506.9	400	20	8	-60	8.0	-145	16.0	305	6.0
5519.1	600	20	8	-60	1.0	-145	36.0	270	2.9

ELT. 19 NAVIGATION CONT'D

5519.6	610	20	8	-60	1.0	-145	37.0	308	6.3
5543.8	1000	20	8	-59	46.0	-146	15.0	308	8.1
5610.3	1807	20	8	-59	5.0	-147	58.0	270	1.3
5610.9	1830	20	8	-59	5.0	-147	59.0	180	.5
5612.9	2210	20	8	-59	7.0	-147	59.0	43	1.3
5619.7	320	21	8	-59	2.0	-147	50.0	69	.2
5622.4	1535	21	8	-59	1.0	-147	45.0	303	4.4
5624.3	1600	21	8	-59	0.0	-147	48.0	317	7.9
5695.4	100	22	8	-58	8.0	-149	21.0	317	8.4
5721.6	405	22	8	-57	49.0	-149	55.0	313	5.8
5723.0	420	22	8	-57	48.0	-149	57.0	28	2.2
5735.5	1000	22	8	-57	37.0	-149	46.0	290	.9
5747.4	2230	22	8	-57	33.0	-150	7.0	332	6.8
5748.6	2240	22	8	-57	32.0	-150	8.0	305	7.5
5784.9	330	23	8	-57	11.0	-151	3.0	285	10.7
5800.1	455	23	8	-57	7.0	-151	30.0	270	4.3
5801.2	510	23	8	-57	7.0	-151	32.0	313	8.8
5802.7	520	23	8	-57	6.0	-151	34.0	270	9.7
5804.3	530	23	8	-57	6.0	-151	37.0	291	9.3
5818.3	700	23	8	-57	1.0	-152	1.0	270	3.2
5819.4	720	23	8	-57	1.0	-152	3.0	270	.2
5821.5	1600	23	8	-57	1.0	-152	7.0	314	6.6
5836.0	1810	23	8	-56	51.0	-152	26.0	331	4.2
5837.1	1826	23	8	-56	50.0	-152	27.0	314	7.2
5854.5	2050	23	8	-56	38.0	-152	50.0	306	4.7
5857.9	2133	23	8	-56	36.0	-152	55.0	312	7.8
5896.7	230	24	8	-56	10.0	-153	47.0	320	6.2
5899.3	255	24	8	-56	8.0	-153	50.0	288	3.6
5905.8	440	24	8	-56	6.0	-154	1.0	6	6.0
5910.8	530	24	8	-56	1.0	-154	0.0	221	2.7
5922.7	946	24	8	-56	10.0	-154	14.0	142	1.1
5935.4	2100	24	8	-56	20.0	-154	0.0	317	4.9
5939.5	2150	24	8	-56	17.0	-154	5.0	322	9.8
6027.1	643	25	8	-55	8.0	-155	41.0	330	9.8
6028.3	650	25	8	-55	7.0	-155	42.0	322	9.6

6077.5	1155	25	8	-54	28.0	-156	34.0	229	9.1
6079.0	1205	25	8	-54	29.0	-156	36.0	324	9.8
6111.0	1520	25	8	-54	3.0	-157	8.0	337	11.3
6118.6	1600	25	8	-53	56.0	-157	13.0	303	10.6
6139.0	1755	25	8	-53	45.0	-157	42.0	304	10.4
6162.0	2007	25	8	-53	32.0	-158	14.0	310	5.1
6163.5	2025	25	8	-53	31.0	-158	16.0	301	10.6
6175.3	2131	25	8	-53	25.0	-158	33.0	304	6.3
6178.9	2205	25	8	53	23.0	-158	38.0	302	9.0
6190.1	2320	25	8	-53	17.0	-158	54.0	299	10.2
6192.2	2332	25	8	-53	16.0	-158	57.0	309	9.6
6225.5	300	26	8	-52	55.0	-159	40.0	270	6.0
6226.7	312	26	8	-52	55.0	-159	42.0	311	10.6
6238.8	420	26	8	-52	47.0	-159	57.0	301	9.8
6258.5	620	26	8	-52	37.0	-160	25.0	90	0.0
6258.5	627	26	8	-52	37.0	-160	25.0	300	9.9
6373.6	1800	26	8	-51	39.0	-163	7.0	310	9.9
6395.5	2012	26	8	-51	25.0	-163	34.0	317	9.1
6398.2	2030	26	8	-51	23.0	-163	37.0	314	10.3
6402.5	2055	26	8	-51	20.0	-163	42.0	298	14.1
6404.6	2104	26	8	-51	19.0	-163	45.0	310	9.9
6443.8	100	27	8	-50	54.0	-164	33.0	310	9.8
6519.6	840	27	8	-50	5.0	-166	4.0	308	8.1
6521.3	852	27	8	-50	4.0	-166	6.0	327	8.9
6523.7	908	27	8	-50	2.0	-166	8.0	270	4.2
6524.3	917	27	8	-50	2.0	-166	9.0	310	7.7
6592.2	1800	27	8	-49	18.0	-167	29.0	303	9.3
6618.0	2045	27	8	-49	4.0	-168	2.0	327	7.9
6619.2	2054	27	8	-49	3.0	-168	3.0	291	10.5
6622.0	2110	27	8	-49	2.0	-168	7.0	270	4.9
6622.6	2118	27	8	-49	2.0	-168	8.0	303	9.7
6697.5	500	28	8	-48	21.0	-169	43.0	306	10.0
6747.0	955	28	8	-47	52.0	-170	43.0	270	4.0
6747.7	1005	28	8	-47	52.0	-170	44.0	301	12.3
6751.6	1024	28	8	-47	50.0	-170	49.0	270	5.7

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6752.2	1031	28	8	-47	50.0	-170	50.0	306	10.1
6828.5	1800	28	8	-47	5.0	-172	21.0	307	9.7
6861.8	2124	28	8	-46	45.0	-173	0.0	270	3.7
6862.5	2135	28	8	-46	45.0	-173	1.0	318	9.7
6866.5	2200	28	8	-46	42.0	-173	5.0	270	5.8
6867.2	2207	28	8	-46	42.0	-173	6.0	309	10.4
6897.3	100	29	8	-46	23.0	-173	40.0	309	9.3
6940.7	537	29	8	-45	56.0	-174	29.0	307	9.6
6973.9	903	29	8	-45	36.0	-175	7.0	325	6.1
6975.1	915	29	8	-45	35.0	-175	8.0	295	8.7
6977.5	931	29	8	-45	34.0	-175	11.0	306	8.6
6979.2	943	29	8	-45	33.0	-175	13.0	307	9.5
7067.5	1900	29	8	-44	40.0	-176	53.0	305	10.2
7126.2	45	30	8	-44	6.0	-178	0.0	0	9.4
7135.2	142	30	8	-43	57.0	-178	0.0	90	0.0
7135.2	148	30	8	-43	57.0	-178	0.0	0	9.4
7172.2	542	30	8	-43	20.0	-178	0.0	359	10.3
7228.2	1106	30	8	-42	24.0	-178	1.0	0	7.5
7229.2	1114	30	8	-42	23.0	-178	1.0	0	11.7
7238.2	1200	30	8	-42	14.0	-178	1.0	358	10.0
7318.2	2000	30	8	-40	54.0	-178	4.0	0	9.0
7327.2	2100	30	8	-40	45.0	-178	4.0	0	10.3
7338.2	2204	30	8	-40	34.0	-178	4.0	0	8.5
7341.2	2225	30	8	-40	31.0	-178	4.0	0	12.0
7344.2	2240	30	8	-40	28.0	-178	4.0	0	5.4
7345.2	2251	30	8	-40	27.0	-178	4.0	0	9.5
7356.2	0	1	9	-40	16.0	-178	4.0	0	9.7
7395.2	400	1	9	-39	37.0	-178	4.0	349	8.1
7399.3	430	1	9	-39	33.0	-178	5.0	359	9.4
7435.3	818	1	9	-38	57.0	-178	6.0	304	8.5
7518.1	1800	1	9	-38	11.0	-179	34.0	297	8.8
7526.9	1900	1	9	-38	7.0	-179	44.0	298	10.5
7583.0	20	2	9	-37	41.0	179	13.0	322	3.8
7585.5	100	2	9	-37	39.0	179	11.0	280	2.2
7591.2	330	2	9	-37	38.0	179	4.0	38	.9
7592.4	448	2	9	-37	37.0	179	5.0	285	13.0
7611.3	615	2	9	-37	32.0	178	42.0	113	3.4
7613.9	700	2	9	-37	33.0	178	45.0	90	12.4
7660.7	1045	2	9	-37	33.0	179	44.0	302	2.2
7664.5	1225	2	9	-37	31.0	179	40.0	299	10.6
7723.8	1800	2	9	-37	2.0	178	35.0	295	6.3
7768.0	100	3	9	-36	43.0	177	45.0	288	6.1

MILES	HOUR	DY	MO	LATITUDE		LONGITUDE		COUR	KTS
0.0	913	14	9	-36	27.0	175	43.0	107	7.7
3.3	939	14	9	-36	28.0	175	47.0	90	8.0
4.1	945	14	9	-36	28.0	175	48.0	102	9.0
14.0	1050	14	9	-36	30.0	176	0.0	108	9.3
68.8	1641	14	9	-36	47.0	177	5.0	113	10.4
71.4	1656	14	9	-36	48.0	177	8.0	90	10.6
73.0	1705	14	9	-36	48.0	177	10.0	107	10.5
79.7	1743	14	9	-36	50.0	177	18.0	109	10.3
89.0	1837	14	9	-36	53.0	177	29.0	90	10.6
90.6	1846	14	9	-36	53.0	177	31.0	106	10.2
116.4	2116	14	9	-37	0.0	178	2.0	122	6.6
118.3	2133	14	9	-37	1.0	178	4.0	107	10.1
135.0	2312	14	9	-37	6.0	178	24.0	90	5.9
135.8	2320	14	9	-37	6.0	178	25.0	103	9.8
148.9	40	15	9	-37	9.0	178	41.0	90	9.5
149.7	45	15	9	-37	9.0	178	42.0	107	13.3
153.0	100	15	9	-37	10.0	178	46.0	122	11.2
154.9	110	15	9	-37	11.0	178	48.0	105	8.3
185.4	448	15	9	-37	19.0	179	25.0	113	7.3
190.6	530	15	9	-37	21.0	179	31.0	107	9.7
301.0	1650	15	9	-37	54.0	-178	16.0	104	6.1
305.1	1730	15	9	-37	55.0	-178	11.0	102	9.2
323.6	1930	15	9	-37	59.0	-177	48.0	104	9.2
407.1	430	16	9	-38	19.0	-176	5.0	106	8.0
414.4	525	16	9	-38	21.0	-175	56.0	102	8.2
419.2	600	16	9	-38	22.0	-175	50.0	90	0.0
419.2	618	16	9	-38	22.0	-175	50.0	142	10.8
420.5	625	16	9	-38	23.0	-175	49.0	90	8.5
422.1	636	16	9	-38	23.0	-175	47.0	104	9.0
476.8	1240	16	9	-38	36.0	-174	39.0	106	7.3
484.2	1340	16	9	-38	38.0	-174	30.0	106	9.6
523.9	1747	16	9	-38	49.0	-173	41.0	108	6.9
570.4	27	17	9	-39	3.0	-172	44.0	90	7.7
571.2	33	17	9	-39	3.0	-172	43.0	107	8.9
602.0	400	17	9	-39	12.0	-172	5.0	90	5.8
602.8	408	17	9	-39	12.0	-172	4.0	106	9.2
720.0	1644	17	9	-39	44.0	-169	38.0	117	7.2
724.3	1720	17	9	-39	46.0	-169	33.0	104	9.2
748.9	2000	17	9	-39	52.0	-169	2.0	106	8.7
784.8	5	18	9	-40	2.0	-168	17.0	101	5.9
790.2	100	18	9	-40	3.0	-168	10.0	105	9.4
802.1	215	18	9	-40	6.0	-167	55.0	105	7.1
806.0	248	18	9	-40	7.0	-167	50.0	123	9.1
807.9	300	18	9	-40	8.0	-167	48.0	90	4.5
808.6	310	18	9	-40	8.0	-167	47.0	106	9.6
823.0	439	18	9	-40	12.0	-167	29.0	110	6.7
831.9	558	18	9	-40	15.0	-167	18.0	108	9.3
841.5	700	18	9	-40	18.0	-167	6.0	90	6.3
844.6	729	18	9	-40	18.0	-167	2.0	114	7.8
847.1	748	18	9	-40	19.0	-166	59.0	90	6.5
847.8	755	18	9	-40	19.0	-166	58.0	108	10.5
857.5	850	18	9	-40	22.0	-166	46.0	114	9.9
859.9	905	18	9	-40	23.0	-166	43.0	106	9.1
1050.8	553	19	9	-41	17.0	-162	41.0	103	5.6
1055.5	642	19	9	-41	18.0	-162	35.0	108	9.0
1103.6	1200	19	9	-41	33.0	-161	34.0	105	7.7
1107.5	1230	19	9	-41	34.0	-161	29.0	109	8.5
1128.8	1500	19	9	-41	41.0	-161	2.0	90	8.9
1130.3	1510	19	9	-41	41.0	-161	0.0	106	9.2
1190.9	2143	19	9	-41	58.0	-159	42.0	124	6.3
1192.7	2200	19	9	-41	59.0	-159	40.0	106	9.8
1229.0	140	20	9	-42	9.0	-158	53.0	114	7.3
1231.4	200	20	9	-42	10.0	-158	50.0	106	9.5
1253.0	415	20	9	-42	16.0	-158	22.0	103	6.8
1257.6	455	20	9	-42	17.0	-158	16.0	104	9.6
1273.6	635	20	9	-42	21.0	-157	55.0	109	7.4
1279.8	725	20	9	-42	23.0	-157	47.0	106	9.0
1290.6	836	20	9	-42	26.0	-157	33.0	90	7.3
1291.3	842	20	9	-42	26.0	-157	32.0	105	9.6

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1311.1	1045	20	9	-42	31.0	-157	6.0	109	5.8
1314.3	1117	20	9	-42	32.0	-157	2.0	107	9.3
1377.2	1800	20	9	-42	50.0	-155	40.0	90	7.3
1378.6	1812	20	9	-42	50.0	-155	38.0	105	8.9
1401.4	2044	20	9	-42	56.0	-155	8.0	144	4.6
1402.7	2100	20	9	-42	57.0	-155	7.0	104	8.9
1595.2	1824	21	9	-43	43.0	-150	50.0	103	6.6
1599.6	1904	21	9	-43	44.0	-150	44.0	103	8.8
1625.6	2200	21	9	-43	50.0	-150	9.0	106	8.7
1651.1	55	22	9	-43	57.0	-149	35.0	109	5.8
1654.1	126	22	9	-43	58.0	-149	31.0	107	9.7
1664.6	231	22	9	-44	1.0	-149	17.0	115	7.5
1667.0	250	22	9	-44	2.0	-149	14.0	98	8.7
1674.3	340	22	9	-44	3.0	-149	4.0	90	8.6
1675.0	345	22	9	-44	3.0	-149	3.0	108	9.5
1782.8	1500	22	9	-44	37.0	-146	40.0	115	5.8
1785.1	1524	22	9	-44	38.0	-146	37.0	109	9.0
1788.2	1544	22	9	-44	39.0	-146	33.0	103	11.5
1814.4	1800	22	9	-44	45.0	-145	57.0	102	7.7
1837.7	2100	22	9	-44	50.0	-145	25.0	118	2.1
1844.1	0	23	9	-44	53.0	-145	17.0	120	1.7
1858.0	800	23	9	-45	0.0	-145	0.0	106	2.0
1865.4	1140	23	9	-45	2.0	-144	50.0	161	.2
1867.5	2116	23	9	-45	4.0	-144	49.0	185	8.0
1883.6	2315	23	9	-45	20.0	-144	51.0	187	6.5
1889.6	10	24	9	-45	26.0	-144	52.0	183	8.6
1935.7	530	24	9	-46	12.0	-144	56.0	180	7.9
1937.7	545	24	9	-46	14.0	-144	56.0	184	8.2
1948.7	705	24	9	-46	25.0	-144	57.0	184	12.0
1978.8	935	24	9	-46	55.0	-145	0.0	180	5.9
1979.8	945	24	9	-46	56.0	-145	0.0	146	4.8
1981.0	1000	24	9	-46	57.0	-144	59.0	199	1.6
1985.2	1235	24	9	-47	1.0	-145	1.0	180	1.7
1988.2	1415	24	9	-47	4.0	-145	1.0	70	.5
1994.0	20	25	9	-47	2.0	-144	53.0	180	9.0

1997.0	40	25	9	-47	5.0	-144	53.0	190	10.6
2032.5	400	25	9	-47	40.0	-145	2.0	179	10.6
2070.5	735	25	9	-48	18.0	-145	1.0	179	10.2
2112.6	1140	25	9	-49	0.0	-145	0.0	90	.7
2123.0	145	26	9	-49	0.0	-144	44.0	192	9.2
2126.1	205	26	9	-49	3.0	-144	45.0	184	8.7
2160.2	600	26	9	-49	37.0	-144	49.0	198	7.4
2162.3	617	26	9	-49	39.0	-144	50.0	184	9.2
2238.5	1430	26	9	-50	55.0	-144	59.0	189	6.9
2242.6	1505	26	9	-50	59.0	-145	0.0	170	.6
2249.7	135	27	9	-51	6.0	-144	58.0	285	5.1
2253.6	220	27	9	-51	5.0	-145	4.0	90	.4
2254.2	340	27	9	-51	5.0	-145	3.0	180	.5
2257.2	936	27	9	-51	8.0	-145	3.0	173	6.5
2262.3	1022	27	9	-51	13.0	-145	2.0	177	8.3
2314.4	1637	27	9	-52	5.0	-144	57.0	173	7.1
2319.4	1719	27	9	-52	10.0	-144	56.0	180	8.5
2320.4	1726	27	9	-52	11.0	-144	56.0	168	6.3
2323.5	1755	27	9	-52	14.0	-144	55.0	180	8.6
2353.5	2122	27	9	-52	44.0	-144	55.0	195	2.5
2362.8	100	28	9	-52	53.0	-144	59.0	241	2.0
2364.8	200	28	9	-52	54.0	-145	2.0	207	.6
2371.6	1310	28	9	-53	0.0	-145	7.0	180	7.9
2373.6	1325	28	9	-53	2.0	-145	7.0	172	9.7
2433.1	1933	28	9	-54	1.0	-144	53.0	174	7.5
2439.2	2021	28	9	-54	7.0	-144	52.0	172	9.7
2484.6	100	29	9	-54	52.0	-144	41.0	180	9.0
2487.6	120	29	9	-54	55.0	-144	41.0	173	10.2
2509.8	330	29	9	-55	17.0	-144	36.0	90	1.7
2510.4	350	29	9	-55	17.0	-144	35.0	157	.6
2514.7	1032	29	9	-55	21.0	-144	32.0	180	6.0
2520.7	1132	29	9	-55	27.0	-144	32.0	180	8.8
2573.7	1730	29	9	-56	20.0	-144	32.0	180	6.3
2578.7	1817	29	9	-56	25.0	-144	32.0	90	1.7
2580.9	1934	29	9	-56	25.0	-144	28.0	0	4.7

2584.9	2025	29	9	-56	21.0	-144	28.0	121	.7
2586.9	2253	29	9	-56	22.0	-144	25.0	347	2.5
2594.1	140	30	9	-56	15.0	-144	28.0	144	1.1
2601.5	755	30	9	-56	21.0	-144	20.0	215	8.3
2606.4	830	30	9	-56	25.0	-144	25.0	200	7.9
2659.6	1512	30	9	-57	15.0	-144	58.0	190	6.5
2662.6	1540	30	9	-57	18.0	-144	59.0	258	.5
2667.6	3	1	10	-57	19.0	-145	8.0	152	8.0
2669.8	20	1	10	-57	21.0	-145	6.0	174	7.5
2674.9	100	1	10	-57	26.0	-145	5.0	180	6.0
2680.9	200	1	10	-57	32.0	-145	5.0	178	8.6
2706.9	500	1	10	-57	58.0	-145	3.0	180	4.8
2708.9	525	1	10	-58	0.0	-145	3.0	208	.2
2710.0	1025	1	10	-58	1.0	-145	4.0	131	2.9
2717.7	1300	1	10	-58	6.0	-144	53.0	295	1.2
2720.0	1450	1	10	-58	5.0	-144	57.0	322	4.9
2722.6	1521	1	10	-58	3.0	-145	0.0	139	1.1
2726.6	1855	1	10	-58	6.0	-144	55.0	170	5.2
2729.6	1930	1	10	-58	9.0	-144	54.0	182	9.0
2777.7	50	2	10	-58	57.0	-144	57.0	190	7.9
2780.7	113	2	10	-59	0.0	-144	58.0	226	1.7
2785.0	340	2	10	-59	3.0	-145	4.0	270	1.5
2786.0	420	2	10	-59	3.0	-145	6.0	153	.5
2787.2	613	2	10	-59	4.0	-145	5.0	242	3.0
2793.6	820	2	10	-59	7.0	-145	16.0	194	.4
2795.6	1300	2	10	-59	9.0	-145	17.0	0	1.4
2797.6	1423	2	10	-59	7.0	-145	17.0	104	.5
2801.8	2200	2	10	-59	8.0	-145	9.0	180	4.0
2803.8	2230	2	10	-59	10.0	-145	9.0	177	8.0
2847.9	400	3	10	-59	54.0	-145	5.0	173	6.9
2851.9	435	3	10	-59	58.0	-145	4.0	90	3.2
2854.9	530	3	10	-59	58.0	-144	58.0	45	.8
2856.3	714	3	10	-59	57.0	-144	56.0	43	3.5
2864.5	933	3	10	-59	51.0	-144	45.0	0	.8
2868.5	1430	3	10	-59	47.0	-144	45.0	207	2.4

2871.9	1553	3	10	-59	50.0	-144	48.0	252	.8
2875.0	1940	3	10	-59	51.0	-144	54.0	45	2.0
2876.4	202[illegible]	3	10	-59	50.0	-144	52.0	270	.2
2877.5	2355	3	10	-59	50.0	-144	54.0	180	8.0
2879.5	10	4	10	-59	52.0	-144	54.0	180	9.0
2888.5	110	4	10	-60	1.0	-144	54.0	180	5.9
2889.5	120	4	10	-60	2.0	-144	54.0	90	0.0
2889.5	135	4	10	-60	2.0	-144	54.0	182	6.9
2907.5	410	4	10	-60	20.0	-144	55.0	90	0.0
2907.5	730	4	10	-60	20.0	-144	55.0	0	1.3
2909.5	900	4	10	-60	18.0	-144	55.0	90	0.0
2909.5	1000	4	10	-60	18.0	-144	55.0	0	3.0
2921.5	1400	4	10	-60	6.0	-144	55.0	90	7.4
2926.4	1440	4	10	-60	6.0	-144	45.0	90	8.5
2931.4	1515	4	10	-60	6.0	-144	35.0	0	12.0
2932.4	1520	4	10	-60	5.0	-144	35.0	346	4.1
2934.5	1550	4	10	-60	3.0	-144	36.0	355	9.4
2945.5	1700	4	10	-59	52.0	-144	38.0	333	8.7
2960.1	1840	4	10	-59	39.0	-144	51.0	324	7.8
2968.7	1946	4	10	-59	32.0	-145	1.0	90	8.6
2969.7	1953	4	10	-59	32.0	-144	59.0	135	6.5
2971.2	2006	4	10	-59	33.0	-144	57.0	107	9.4
2981.2	2110	4	10	-59	36.0	-144	38.0	90	4.3
2982.3	2124	4	10	-59	36.0	-144	36.0	112	8.4
2995.8	2300	4	10	-59	41.0	-144	11.0	127	9.8
3037.7	315	5	10	-60	6.0	-143	4.0	98	13.3
3058.9	450	5	10	-60	9.0	-142	22.0	109	6.2
3062.0	520	5	10	-60	10.0	-142	16.0	270	1.3
3072.5	1320	5	10	-60	10.0	-142	37.0	90	7.4
3075.0	1340	5	10	-60	10.0	-142	32.0	90	9.2
3209.3	415	6	10	-60	9.0	-138	2.0	90	7.4
3209.8	419	6	10	-60	9.0	-138	1.0	117	8.3
3212.0	435	6	10	-60	10.0	-137	57.0	121	10.7
3221.8	530	6	10	-60	15.0	-137	40.0	63	4.7
3224.1	558	6	10	-60	14.0	-137	36.0	0	3.9

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3226.1	628	6	10	-60	12.0	-137	36.0	143	1.7
3228.6	753	6	10	-60	14.0	-137	33.0	166	1.0
3230.6	955	6	10	-60	16.0	-137	32.0	206	1.8
3235.1	1220	6	10	-60	20.0	-137	36.0	243	2.6
3237.3	1310	6	10	-60	21.0	-137	40.0	270	.5
3243.2	35	7	10	-60	21.0	-137	52.0	90	5.9
3246.7	110	7	10	-60	21.0	-137	45.0	90	8.5
3274.4	425	7	10	-60	21.0	-136	49.0	90	6.5
3275.4	434	7	10	-60	21.0	-136	47.0	90	9.0
3376.3	1540	7	10	-60	21.0	-133	23.0	72	8.6
3395.6	1754	7	10	-60	15.0	-132	46.0	45	4.4
3397.0	1813	7	10	-60	14.0	-132	44.0	90	2.4
3398.5	1850	7	10	-60	14.0	-132	41.0	50	2.1
3417.3	330	8	10	-60	2.0	-132	12.0	79	8.5
3438.7	600	8	10	-59	58.0	-131	30.0	82	9.6
3453.8	734	8	10	-59	56.0	-131	0.0	94	9.9
3557.6	1802	8	10	-60	3.0	-127	33.0	90	2.9
3559.1	1832	8	10	-60	3.0	-127	30.0	77	1.4
3563.7	2140	8	10	-60	2.0	-127	21.0	153	.5
3569.3	700	9	10	-60	7.0	-127	16.0	72	1.0
3572.4	1000	9	10	-60	6.0	-127	10.0	206	1.3
3573.5	1050	9	10	-60	7.0	-127	11.0	145	1.1
3582.1	1812	9	10	-60	14.0	-127	1.0	90	6.4
3584.6	1835	9	10	-60	14.0	-126	56.0	90	10.2
3594.0	1930	9	10	-60	14.0	-126	37.0	94	6.9
3608.0	2130	9	10	-60	15.0	-126	9.0	90	11.9
3637.7	0	10	10	-60	15.0	-125	9.0	90	10.2
3647.2	55	10	10	-60	15.0	-124	50.0	82	9.6
3681.8	430	10	10	-60	10.0	-123	41.0	90	9.0
3714.2	805	10	10	-60	10.0	-122	36.0	117	6.6
3716.4	825	10	10	-60	11.0	-122	32.0	337	2.6
3724.0	1115	10	10	-60	4.0	-122	38.0	207	1.4
3725.1	1200	10	10	-60	5.0	-122	39.0	180	.3
3728.1	1946	10	10	-60	8.0	-122	39.0	112	8.0
3730.8	2006	10	10	-60	9.0	-122	34.0	112	9.3

3751.8	2220	10	10	-60	17.0	-121	55.0	112	6.4
3754.4	2245	10	10	-60	18.0	-121	50.0	113	11.3
3770.0	7	11	10	-60	24.0	-121	21.0	124	8.9
3771.8	19	11	10	-60	25.0	-121	18.0	114	11.5
3791.2	200	11	10	-60	33.0	-120	42.0	106	9.5
3889.2	1219	11	10	-61	0.0	-117	29.0	90	4.2
3892.1	1300	11	10	-61	0.0	-117	23.0	200	3.5
3900.7	1525	11	10	-61	8.0	-117	29.0	156	1.2
3913.8	150	12	10	-61	20.0	-117	18.0	0	3.9
3915.8	220	12	10	-61	18.0	-117	18.0	136	1.1
3917.2	330	12	10	-61	19.0	-117	16.0	113	4.4
3919.8	405	12	10	-61	20.0	-117	11.0	106	8.7
3982.3	1114	12	10	-61	37.0	-115	5.0	111	8.8
4035.9	1716	12	10	-61	56.0	-113	19.0	90	5.2
4037.3	1732	12	10	-61	56.0	-113	16.0	100	9.7
4054.0	1915	12	10	-61	59.0	-112	41.0	90	5.6
4056.4	1940	12	10	-61	59.0	-112	36.0	167	1.6
4058.4	2056	12	10	-62	1.0	-112	35.0	165	.6
4067.7	1225	13	10	-62	10.0	-112	30.0	51	7.1
4072.5	1305	13	10	-62	7.0	-112	22.0	48	9.1
4077.0	1334	13	10	-62	4.0	-112	15.0	90	5.1
4077.9	1345	13	10	-62	4.0	-112	13.0	48	7.0
4082.4	1423	13	10	-62	1.0	-112	6.0	43	6.8
4083.7	1435	13	10	-62	0.0	-112	4.0	53	8.9
4162.8	2327	13	10	-61	12.0	-109	52.0	55	4.0
4164.5	2353	13	10	-61	11.0	-109	49.0	49	9.2
4176.7	112	14	10	-61	3.0	-109	30.0	71	10.2
4179.8	130	14	10	-61	2.0	-109	24.0	48	11.0
4232.2	616	14	10	-60	27.0	-108	4.0	56	5.6
4234.0	635	14	10	-60	26.0	-108	1.0	49	9.5
4264.4	945	14	10	-60	6.0	-107	15.0	45	5.6
4265.8	1000	14	10	-60	5.0	-107	13.0	45	11.3
4268.6	1015	14	10	-60	3.0	-107	9.0	56	8.3
4270.4	1028	14	10	-60	2.0	-107	6.0	50	10.1
4361.9	1930	14	10	-59	3.0	-104	48.0	226	1.2

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4363.3	2038	14	10	-59	4.0	-104	50.0	262	.8
4384.1	2125	15	10	-59	7.0	-105	30.0	90	12.3
4399.5	2240	15	10	-59	7.0	-105	0.0	123	5.5
4401.3	2300	15	10	-59	8.0	-104	57.0	136	1.5
4413.9	720	16	10	-59	17.0	-104	40.0	349	9.6
4433.2	920	16	10	-58	58.0	-104	47.0	340	3.9
4455.6	1500	16	10	-58	37.0	-105	2.0	311	4.5
4478.5	2000	16	10	-58	22.0	-105	35.0	47	10.7
4510.8	2300	16	10	-58	0.0	-104	50.0	65	.5
4515.5	740	17	10	-57	58.0	-104	42.0	196	1.8
4524.9	1245	17	10	-58	7.0	-104	47.0	19	9.5
4578.8	1825	17	10	-57	16.0	-104	14.0	312	5.8
4596.9	2130	17	10	-57	4.0	-104	39.0	29	.7
4598.1	2300	17	10	-57	3.0	-104	38.0	185	2.4
4604.1	130	18	10	-57	9.0	-104	39.0	133	.6
4613.0	1410	18	10	-57	15.0	-104	27.0	345	8.2
4617.1	1440	18	10	-57	11.0	-104	29.0	343	8.2
4674.7	2140	18	10	-56	16.0	-105	0.0	346	8.5
4686.0	2300	18	10	-56	5.0	-105	5.0	0	4.7
4688.0	2325	18	10	-56	3.0	-105	5.0	118	1.7
4694.3	300	19	10	-56	6.0	-104	55.0	77	1.5
4698.9	600	19	10	-56	5.0	-104	47.0	90	1.1
4716.8	2117	19	10	-56	5.0	-104	15.0	337	6.8
4721.1	2155	19	10	-56	1.0	-104	18.0	339	10.3
4738.3	2334	19	10	-55	45.0	-104	29.0	337	9.4
4782.7	415	20	10	-55	4.0	-104	59.0	330	6.9
4786.1	445	20	10	-55	1.0	-105	2.0	330	2.7
4789.6	600	20	10	-54	58.0	-105	5.0	251	.8
4792.6	945	20	10	-54	59.0	-105	10.0	270	.7
4794.9	1240	20	10	-54	59.0	-105	14.0	262	.8
4801.9	2026	20	10	-55	0.0	-105	26.0	41	7.1
4804.5	2048	20	10	-54	58.0	-105	23.0	53	9.5
4859.0	230	21	10	-54	25.0	-104	8.0	46	9.4
4902.6	706	21	10	-53	55.0	-103	14.0	60	6.0
4904.6	726	21	10	-53	54.0	-103	11.0	46	9.6

4921.9	913	21	10	-53	42.0	-102	50.0	50	5.0
4925.0	950	21	10	-53	40.0	-102	46.0	50	9.3
4931.2	1030	21	10	-53	36.0	-102	38.0	61	4.0
4933.2	1100	21	10	-53	35.0	-102	35.0	31	6.9
4936.7	1130	21	10	-53	32.0	-102	32.0	244	3.0
4941.3	1300	21	10	-53	34.0	-102	39.0	230	2.3
4942.9	1340	21	10	-53	35.0	-102	41.0	109	1.3
4946.0	1555	21	10	-53	36.0	-102	36.0	119	.8
4950.1	2100	21	10	-53	38.0	-102	30.0	156	.7
4954.4	237	22	10	-53	42.0	-102	27.0	50	12.1
4959.1	300	22	10	-53	39.0	-102	21.0	31	9.3
4961.4	315	22	10	-53	37.0	-102	19.0	41	8.7
5068.1	1526	22	10	-52	17.0	-100	22.0	37	9.4
5073.1	1558	22	10	-52	13.0	-100	17.0	43	5.4
5075.8	1628	22	10	-52	11.0	-100	14.0	43	8.5
5078.5	1647	22	10	-52	9.0	-100	11.0	17	6.6
5080.6	1706	22	10	-52	7.0	-100	10.0	43	9.6
5086.1	1740	22	10	-52	3.0	-100	4.0	51	7.3
5087.6	1753	22	10	-52	2.0	-100	2.0	67	.9
5103.0	930	23	10	-51	56.0	-99	39.0	285	5.7
5110.7	1050	23	10	-51	54.0	-99	51.0	285	8.6
5204.6	2145	23	10	-51	29.0	-102	17.0	292	6.4
5210.0	2235	23	10	-51	27.0	-102	25.0	231	3.8
5211.6	2300	23	10	-51	28.0	-102	27.0	231	.9
5213.2	43	24	10	-51	29.0	-102	29.0	245	2.6
5222.7	420	24	10	-51	33.0	-102	43.0	79	1.1
5233.5	1346	24	10	-51	31.0	-102	26.0	270	.9
5234.7	1505	24	10	-51	31.0	-102	28.0	328	4.4
5235.9	1521	24	10	-51	30.0	-102	29.0	298	8.4
5238.0	1536	24	10	-51	29.0	-102	32.0	295	8.0
5315.0	110	25	10	-50	56.0	-104	23.0	287	8.1
5336.1	345	25	10	-50	50.0	-104	55.0	270	7.5
5338.0	400	25	10	-50	50.0	-104	58.0	180	0.0
5339.0	2050	25	10	-50	51.0	-104	58.0	308	6.4
5342.2	2120	25	10	-50	49.0	-105	2.0	297	5.8

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5431.1	1225	26	10	-50	8.0	-107	6.0	300	4.0
5477.7	2355	26	10	-49	45.0	-108	9.0	308	1.6
5479.4	56	27	10	-49	44.0	-108	11.0	302	4.8
5538.2	1304	27	10	-49	13.0	-109	28.0	304	7.5
5590.4	2000	27	10	-48	44.0	-110	34.0	304	7.5
5635.1	156	28	10	-48	19.0	-111	30.0	301	8.6
5713.6	1100	28	10	-47	39.0	-113	11.0	317	5.8
5714.3	1107	28	10	-47	38.5	-113	11.7	300	8.4
5791.9	2020	28	10	-47	0.0	-114	51.0	299	7.8
5828.7	100	29	10	-46	42.0	-115	38.0	299	3.9
5876.6	1310	29	10	-46	19.0	-116	39.0	296	8.6
5904.2	1622	29	10	-46	7.0	-117	15.0	270	4.6
5905.6	1640	29	10	-46	7.0	-117	17.0	299	10.7
6001.8	137	30	10	-45	21.0	-119	18.0	301	8.7
6096.2	1222	30	10	-44	32.0	-121	12.0	303	8.8
6116.6	1440	30	10	-44	21.0	-121	36.0	289	9.0
6134.8	1640	30	10	-44	15.0	-122	0.0	93	9.4
6228.7	237	31	10	-44	20.0	-119	49.0	122	5.6
6230.3	255	31	10	-44	20.9	-119	47.0	95	10.0
6244.0	416	31	10	-44	22.0	-119	28.0	90	7.1
6244.7	422	31	10	-44	22.0	-119	27.0	96	10.5
6338.7	1318	31	10	-44	32.0	-117	16.0	87	9.1
6443.8	50	1	11	-44	26.0	-114	49.0	90	7.4
6448.8	130	1	11	-44	26.0	-114	42.0	92	9.4
6587.3	1608	1	11	-44	30.0	-111	28.0	90	6.6
6590.9	1640	1	11	-44	30.0	-111	23.0	158	.8
6598.4	148	2	11	-44	37.0	-111	19.0	340	5.0
6600.5	213	2	11	-44	35.0	-111	20.0	270	3.2
6601.3	226	2	11	-44	35.0	-111	21.0	325	5.4
6603.7	253	2	11	-44	33.0	-111	23.0	270	2.8
6604.4	308	2	11	-44	33.0	-111	24.0	313	4.1
6607.4	350	2	11	-44	31.0	-111	27.0	90	9.5
6647.3	800	2	11	-44	31.0	-110	31.0	79	1.2
6652.4	1212	2	11	-44	30.0	-110	24.0	90	5.5
6654.5	1235	2	11	-44	30.0	-110	21.0	90	2.7

6655.9	1306	2	11	-44	30.0	-110	19.0	90	10.7
6656.7	1310	2	11	-44	30.0	-110	18.0	90	1.5
6657.4	1338	2	11	-44	30.0	-110	17.0	92	9.2
6729.4	2123	2	11	-44	32.0	-108	36.0	90	7.1
6730.8	2135	2	11	-44	32.0	-108	34.0	90	10.3
6743.0	2245	2	11	-44	32.0	-108	17.0	0	4.0
6744.0	2300	2	11	-44	31.0	-108	17.0	270	11.4
6746.8	2315	2	11	-44	31.0	-108	21.0	180	12.0
6747.8	2320	2	11	-44	32.0	-108	21.0	92	8.4
6856.2	1212	3	11	-44	35.0	-105	49.0	94	6.1
6857.6	1226	3	11	-44	35.1	-105	47.0	94	9.7
6870.4	1345	3	11	-44	36.0	-105	29.0	90	0.0
6870.4	1350	3	11	-44	36.0	-105	29.0	93	9.0
6933.1	2044	3	11	-44	39.0	-104	1.0	90	6.6
6936.7	2116	3	11	-44	39.0	-103	56.0	92	8.5
7072.6	1310	4	11	-44	44.0	-100	45.0	90	5.3
7074.0	1326	4	11	-44	44.0	-100	43.0	92	8.7
7103.8	1651	4	11	-44	45.0	-100	1.0	93	6.7
7106.0	1710	4	11	-44	45.1	-99	58.0	132	.4
7108.8	2300	4	11	-44	47.0	-99	55.0	90	8.7
7119.5	13	5	11	-44	47.0	-99	40.0	90	5.9
7123.7	56	5	11	-44	47.0	-99	34.0	91	8.6
7193.3	900	5	11	-44	48.0	-97	56.0	90	6.9
7197.5	937	5	11	-44	48.0	-97	50.0	92	7.9
7203.2	1020	5	11	-44	48.2	-97	42.0	119	3.6
7204.8	1047	5	11	-44	49.0	-97	40.0	91	8.5
7318.3	0	6	11	-44	50.0	-95	0.0	90	6.3
7321.2	27	6	11	-44	50.0	-94	56.0	137	.9
7325.3	438	6	11	-44	53.0	-94	52.0	125	1.6
7327.0	540	6	11	-44	54.0	-94	50.0	180	2.9
7327.5	550	6	11	-44	54.5	-94	50.0	100	5.7
7330.4	620	6	11	-44	55.0	-94	46.0	91	8.5
7459.3	2128	6	11	-44	57.0	-91	44.0	94	5.1
7463.5	2218	6	11	-44	57.3	-91	38.0	91	8.5
7527.2	545	7	11	-44	58.0	-90	8.0	90	8.4

ELT. 20 NAVIGATION CONT'D

7531.5	615	7	11	-44	58.0	-90	2.0	90	1.1
7535.0	925	7	11	-44	58.0	-89	57.0	170	1.9
7539.1	1130	7	11	-45	2.0	-89	56.0	90	0.0
7539.1	1145	7	11	-45	2.0	-89	56.0	35	9.7
7541.5	1200	7	11	-45	0.0	-89	54.0	52	8.6
7645.0	0	8	11	-43	56.0	-88	0.0	51	9.9
7656.1	107	8	11	-43	49.0	-87	48.0	36	6.1
7657.4	119	8	11	-43	48.0	-87	47.0	45	10.4
7664.5	200	8	11	-43	43.0	-87	40.0	90	5.4
7665.2	208	8	11	-43	43.0	-87	39.0	47	9.4
7876.8	38	9	11	-41	18.0	-84	10.0	48	6.6
7879.8	105	9	11	-41	16.0	-84	7.0	47	9.5
7955.7	900	9	11	-40	24.0	-82	54.0	50	8.7
8036.1	1810	9	11	-39	32.0	-81	34.0	38	5.0
8037.3	1825	9	11	-39	31.0	-81	33.0	48	11.5
8050.8	1935	9	11	-39	22.0	-81	20.0	38	7.5
8052.1	1945	9	11	-39	21.0	-81	19.0	51	8.7
8180.1	1024	10	11	-38	0.0	-79	12.0	50	9.5
8231.0	1545	10	11	-37	27.0	-78	23.0	38	7.6
8232.3	1555	10	11	-37	26.0	-78	22.0	50	11.3
8238.5	1628	10	11	-37	22.0	-78	16.0	90	11.9
8239.3	1632	10	11	-37	22.0	-78	15.0	47	9.0
8248.0	1730	10	11	-37	16.0	-78	7.0	50	8.1
8251.1	1753	10	11	-37	14.0	-78	4.0	50	10.5
8260.5	1846	10	11	-37	8.0	-77	55.0	58	8.0
8262.4	1900	10	11	-37	7.0	-77	53.0	49	9.4
8355.1	450	11	11	-36	6.0	-76	26.0	49	10.1
8421.3	1122	11	11	-35	23.0	-75	24.0	52	9.9
8515.8	2050	11	11	-34	25.0	-73	53.0	53	10.2
8558.6	100	12	11	-33	59.0	-73	12.0	51	9.8
8633.4	835	12	11	-33	12.0	-72	2.0	59	14.0
8639.3	900	12	11	-33	9.0	-71	56.0	50	7.7
8647.0	1000	12	11	-33	4.0	-71	49.0	68	.6

ELTANIN 21 NAVIGATION

MILES	HOUR	DY	MO	LATITUDE		LONGITUDE		COUR	KTS
0.0	1130	23	11	-33	0.0	-71	40.0	257	8.6
4.3	1200	23	11	-33	1.0	-71	45.0	239	7.8
6.2	1215	23	11	-33	2.0	-71	47.0	180	.2
7.2	1646	23	11	-33	3.0	-71	47.0	270	9.1
13.9	1730	23	11	-33	3.0	-71	55.0	270	4.1
18.1	1830	23	11	-33	3.0	-72	0.0	270	6.7
19.8	1845	23	11	-33	3.0	-72	2.0	270	5.7
29.8	2030	23	11	-33	3.0	-72	14.0	266	9.0
148.3	934	24	11	-33	12.0	-74	35.0	265	9.5
185.2	1327	24	11	-33	15.0	-75	19.0	270	.5
189.4	2041	24	11	-33	15.0	-75	24.0	140	4.1
190.7	2100	24	11	-33	16.0	-75	23.0	268	12.0
332.0	845	25	11	-33	21.0	-78	12.0	259	11.0
455.9	2000	25	11	-33	44.0	-80	38.0	248	5.2
458.5	2031	25	11	-33	45.0	-80	41.0	186	1.7
481.7	950	26	11	-34	8.0	-80	44.0	270	1.7
482.5	1018	26	11	-34	8.0	-80	45.0	220	5.3
485.1	1047	26	11	-34	10.0	-80	47.0	140	.8
486.4	1220	26	11	-34	11.0	-80	46.0	20	13.3
508.7	1400	26	11	-33	50.0	-80	37.0	314	9.8
514.5	1435	26	11	-33	46.0	-80	42.0	40	.2
515.8	2100	26	11	-33	45.0	-80	41.0	320	1.1
518.4	2315	26	11	-33	43.0	-80	43.0	0	2.9
519.4	2335	26	11	-33	42.0	-80	43.0	90	0.0
519.4	2355	26	11	-33	42.0	-80	43.0	297	9.8
532.5	115	27	11	-33	36.0	-80	57.0	320	5.2
536.4	200	27	11	-33	33.0	-81	0.0	270	1.1
537.2	245	27	11	-33	33.0	-81	1.0	301	4.2
541.1	340	27	11	-33	31.0	-81	5.0	270	2.5
541.9	400	27	11	-33	31.0	-81	6.0	307	10.0
550.3	450	27	11	-33	26.0	-81	14.0	309	7.6
553.5	515	27	11	-33	24.0	-81	17.0	301	7.3
594.4	1048	27	11	-33	3.0	-81	59.0	301	4.8
596.3	1112	27	11	-33	2.0	-82	1.0	270	1.6
597.2	1142	27	11	-33	2.0	-82	2.0	248	.8
602.6	1820	27	11	-33	4.0	-82	8.0	270	4.1
606.8	1920	27	11	-33	4.0	-82	13.0	270	1.6
607.6	1950	27	11	-33	4.0	-82	14.0	270	5.1
614.3	2108	27	11	-33	4.0	-82	22.0	90	0.0
614.3	2121	27	11	-33	4.0	-82	22.0	270	5.2
616.0	2140	27	11	-33	4.0	-82	24.0	275	7.8
690.9	715	28	11	-32	58.0	-83	53.0	270	2.2
692.6	800	28	11	-32	58.0	-83	55.0	257	2.1
696.9	1000	28	11	-32	59.0	-84	0.0	245	4.6
701.5	1100	28	11	-33	1.0	-84	5.0	239	2.1
703.5	1155	28	11	-33	2.0	-84	7.0	97	1.6
711.9	1700	28	11	-33	3.0	-83	57.0	59	.9
715.8	2100	28	11	-33	1.0	-83	53.0	207	4.4
721.4	2215	28	11	-33	6.0	-83	56.0	270	3.3
722.2	2230	28	11	-33	6.0	-83	57.0	209	4.5
729.1	0	29	11	-33	12.0	-84	1.0	220	2.0
730.4	39	29	11	-33	13.0	-84	2.0	90	1.3
731.3	115	29	11	-33	13.0	-84	1.0	279	8.6
816.0	1100	29	11	-33	0.0	-85	41.0	270	8.8
827.8	1220	29	11	-33	0.0	-85	55.0	270	8.8
830.3	1237	29	11	-33	0.0	-85	58.0	90	1.5
835.3	1555	29	11	-33	0.0	-85	52.0	180	2.8
837.3	1637	29	11	-33	2.0	-85	52.0	90	1.4
839.0	1745	29	11	-33	2.0	-85	50.0	180	2.0
840.0	1815	29	11	-33	3.0	-85	50.0	140	1.7
841.3	1900	29	11	-33	4.0	-85	49.0	180	3.4
852.3	2210	29	11	-33	15.0	-85	49.0	90	3.3
853.1	2225	29	11	-33	15.0	-85	48.0	287	6.9
856.6	2255	29	11	-33	14.0	-85	52.0	275	9.3
946.5	830	30	11	-33	6.0	-87	39.0	290	9.5
960.9	1000	30	11	-33	1.0	-87	55.0	320	6.5
963.5	1024	30	11	-32	59.0	-87	57.0	270	1.1
965.1	1155	30	11	-32	59.0	-87	59.0	320	2.1
966.5	1232	30	11	-32	58.0	-88	0.0	59	2.2

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968.4	1325	30	11	-32	57.0	-87	58.0	220	1.5
969.7	1416	30	11	-32	58.0	-87	59.0	107	.5
973.2	2035	30	11	-32	59.0	-87	55.0	220	1.7
974.5	2120	30	11	-33	0.0	-87	56.0	270	3.3
975.4	2135	30	11	-33	0.0	-87	57.0	270	8.0
1044.1	610	1	12	-33	0.0	-89	19.0	270	6.7
1045.8	625	1	12	-33	0.0	-89	21.0	270	3.7
1050.8	745	1	12	-33	0.0	-89	27.0	270	3.3
1051.7	800	1	12	-33	0.0	-89	28.0	270	4.5
1053.4	822	1	12	-33	0.0	-89	30.0	270	3.7
1055.0	849	1	12	-33	0.0	-89	32.0	270	2.7
1056.7	926	1	12	-33	0.0	-89	34.0	90	0.0
1056.7	930	1	12	-33	0.0	-89	34.0	180	.3
1057.7	1212	1	12	-33	1.0	-89	34.0	239	1.6
1059.7	1322	1	12	-33	2.0	-89	36.0	134	.7
1065.5	2100	1	12	-33	6.0	-89	31.0	140	.8
1066.8	2230	1	12	-33	7.0	-89	30.0	180	4.0
1067.8	2245	1	12	-33	8.0	-89	30.0	226	8.2
1146.0	815	2	12	-34	2.0	-90	38.0	239	4.6
1148.0	840	2	12	-34	3.0	-90	40.0	239	5.8
1149.9	900	2	12	-34	4.0	-90	42.0	228	7.8
1200.3	1523	2	12	-34	38.0	-91	27.0	242	8.9
1223.6	1800	2	12	-34	49.0	-91	52.0	224	9.9
1231.9	1850	2	12	-34	55.0	-91	59.0	219	3.1
1233.2	1915	2	12	-34	56.0	-92	0.0	109	.9
1239.2	200	3	12	-34	58.0	-91	53.0	192	2.7
1243.3	330	3	12	-35	2.0	-91	54.0	158	.8
1245.5	610	3	12	-35	4.0	-91	53.0	263	3.8
1253.7	820	3	12	-35	5.0	-92	3.0	219	1.3
1255.0	918	3	12	-35	6.0	-92	4.0	90	.9
1255.8	1010	3	12	-35	6.0	-92	3.0	202	3.4
1258.0	1048	3	12	-35	8.0	-92	4.0	221	9.2
1304.7	1550	3	12	-35	43.0	-92	42.0	180	.9
1306.7	1753	3	12	-35	45.0	-92	42.0	231	5.1
1309.9	1830	3	12	-35	47.0	-92	45.0	220	8.7

1377.7	215	4	12	-36	39.0	-93	39.0	219	10.2
1380.3	230	4	12	-36	41.0	-93	41.0	105	.8
1387.8	1100	4	12	-36	43.0	-93	32.0	238	2.2
1389.7	1150	4	12	-36	44.0	-93	34.0	223	8.9
1397.9	1245	4	12	-36	50.0	-93	41.0	219	5.1
1399.1	1300	4	12	-36	51.0	-93	42.0	223	8.8
1521.7	248	5	12	-38	21.0	-95	27.0	0	8.8
1539.7	450	5	12	-38	3.0	-95	27.0	43	10.1
1601.2	1055	5	12	-37	18.0	-94	34.0	39	5.8
1603.8	1121	5	12	-37	16.0	-94	32.0	43	10.1
1618.9	1250	5	12	-37	5.0	-94	19.0	39	5.1
1620.2	1305	5	12	-37	4.0	-94	18.0	219	15.3
1622.7	1315	5	12	-37	6.0	-94	20.0	180	3.9
1623.7	1330	5	12	-37	7.0	-94	20.0	219	7.6
1625.0	1340	5	12	-37	8.0	-94	21.0	219	2.5
1627.6	1440	5	12	-37	10.0	-94	23.0	202	4.3
1629.7	1510	5	12	-37	12.0	-94	24.0	214	6.9
1644.1	1715	5	12	-37	24.0	-94	34.0	253	1.9
1647.4	1900	5	12	-37	25.0	-94	38.0	238	1.1
1649.3	2042	5	12	-37	26.0	-94	40.0	22	.7
1651.5	2335	5	12	-37	24.0	-94	39.0	38	5.8
1652.8	2348	5	12	-37	23.0	-94	38.0	322	.9
1655.3	234	6	12	-37	21.0	-94	40.0	22	2.2
1659.6	430	6	12	-37	17.0	-94	38.0	321	.6
1663.4	1026	6	12	-37	14.0	-94	41.0	219	5.4
1664.7	1040	6	12	-37	15.0	-94	42.0	210	9.6
1736.6	1805	6	12	-38	17.0	-95	28.0	201	8.5
1738.7	1820	6	12	-38	19.0	-95	29.0	123	1.1
1740.6	2000	6	12	-38	20.0	-95	27.0	218	10.6
1749.5	2050	6	12	-38	27.0	-95	34.0	218	5.4
1755.9	2200	6	12	-38	32.0	-95	39.0	90	0.0
1755.9	2215	6	12	-38	32.0	-95	39.0	212	5.7
1761.8	2317	6	12	-38	37.0	-95	43.0	218	2.1
1765.6	105	7	12	-38	40.0	-95	46.0	90	0.0
1765.6	110	7	12	-38	40.0	-95	46.0	201	6.4

FLT. 21 NAVIGATION CONT'D

1767.7	130	7	12	-38	42.0	-95	47.0	220	6.7
1825.4	1000	7	12	-39	26.0	-96	35.0	218	5.8
1826.6	1013	7	12	-39	27.0	-96	36.0	213	10.1
1833.8	1055	7	12	-39	33.0	-96	41.0	218	15.1
1835.0	1100	7	12	-39	34.0	-96	42.0	218	9.4
1838.8	1124	7	12	-39	37.0	-96	45.0	208	8.7
1858.2	1337	7	12	-39	54.0	-96	57.0	207	8.7
1861.5	1400	7	12	-39	57.0	-96	59.0	42	.6
1869.6	323	8	12	-39	51.0	-96	52.0	90	3.2
1870.3	337	8	12	-39	51.0	-96	51.0	270	2.7
1874.2	500	8	12	-39	51.0	-96	56.0	270	3.3
1877.3	555	8	12	-39	51.0	-97	0.0	38	.7
1878.5	740	8	12	-39	50.0	-96	59.0	282	6.2
1883.2	825	8	12	-39	49.0	-97	5.0	280	6.8
1900.4	1055	8	12	-39	46.0	-97	27.0	261	10.6
1912.9	1205	8	12	-39	48.0	-97	43.0	270	5.5
1915.2	1230	8	12	-39	48.0	-97	46.0	266	10.3
2001.4	2050	8	12	-39	54.0	-99	38.0	270	9.2
2002.9	2100	8	12	-39	54.0	-99	40.0	265	10.0
2062.9	300	9	12	-39	59.0	-100	58.0	271	8.8
2137.2	1125	9	12	-39	58.0	-102	35.0	270	5.2
2140.3	1200	9	12	-39	58.0	-102	39.0	267	11.2
2158.7	1338	9	12	-39	59.0	-103	3.0	270	8.9
2164.1	1414	9	12	-39	59.0	-103	10.0	270	7.6
2165.6	1426	9	12	-39	59.0	-103	12.0	270	11.4
2168.7	1442	9	12	-39	59.0	-103	16.0	270	5.1
2169.5	1451	9	12	-39	59.0	-103	17.0	269	9.2
2248.4	2325	9	12	-40	0.0	-105	0.0	270	4.5
2249.9	2345	9	12	-40	0.0	-105	2.0	270	1.5
2253.0	140	10	12	-40	0.0	-105	6.0	270	7.6
2259.9	234	10	12	-40	0.0	-105	15.0	270	8.3
2313.5	900	10	12	-40	0.0	-106	25.0	267	11.7
2334.2	1046	10	12	-40	1.0	-106	52.0	273	9.2
2356.4	1310	10	12	-40	0.0	-107	21.0	270	2.5
2357.2	1328	10	12	-40	0.0	-107	22.0	349	1.2

2361.3	1651	10	12	-39	56.0	-107	23.0	270	.1
2362.8	140	11	12	-39	56.0	-107	25.0	303	2.1
2364.6	230	11	12	-39	55.0	-107	27.0	270	1.3
2366.9	415	11	12	-39	55.0	-107	30.0	0	1.3
2367.9	500	11	12	-39	54.0	-107	30.0	270	3.3
2372.5	623	11	12	-39	54.0	-107	36.0	90	0.0
2372.5	628	11	12	-39	54.0	-107	36.0	247	2.1
2377.5	850	11	12	-39	56.0	-107	42.0	90	2.6
2379.1	925	11	12	-39	56.0	-107	40.0	270	3.0
2379.8	940	11	12	-39	56.0	-107	41.0	217	4.7
2381.1	956	11	12	-39	57.0	-107	42.0	271	9.4
2469.3	1915	11	12	-39	55.0	-109	37.0	254	6.4
2480.5	2058	11	12	-39	58.0	-109	51.0	270	5.4
2482.0	2115	11	12	-39	58.0	-109	53.0	114	7.5
2484.5	2135	11	12	-39	59.0	-109	50.0	246	1.5
2487.0	2310	11	12	-40	0.0	-109	53.0	270	5.7
2488.5	2326	11	12	-40	0.0	-109	55.0	270	9.5
2526.1	322	12	12	-40	0.0	-110	44.0	270	6.1
2527.6	337	12	12	-40	0.0	-110	46.0	272	8.2
2592.0	1125	12	12	-39	58.0	-112	10.0	270	4.5
2593.5	1145	12	12	-39	58.0	-112	12.0	90	10.2
2595.1	1154	12	12	-39	58.0	-112	10.0	90	.9
2596.6	1330	12	12	-39	58.0	-112	8.0	270	5.1
2598.1	1348	12	12	-39	58.0	-112	10.0	271	7.9
2687.8	105	13	12	-39	57.0	-114	7.0	270	3.6
2689.3	130	13	12	-39	57.0	-114	9.0	272	7.8
2760.0	1027	13	12	-39	54.0	-115	41.0	270	3.2
2761.5	1055	13	12	-39	54.0	-115	43.0	270	3.0
2763.0	1125	13	12	-39	54.0	-115	45.0	90	0.0
2763.0	1130	13	12	-39	54.0	-115	45.0	270	6.9
2767.6	1210	13	12	-39	54.0	-115	51.0	269	7.8
2815.2	1813	13	12	-39	55.0	-116	53.0	270	4.3
2817.5	1845	13	12	-39	55.0	-116	56.0	270	4.6
2818.3	1855	13	12	-39	55.0	-116	57.0	273	9.5
2879.7	120	14	12	-39	52.0	-118	17.0	274	9.8

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2908.2	413	14	12	-39	50.0	-118	54.0	233	9.2
2924.6	600	14	12	-40	0.0	-119	11.0	270	7.7
2942.3	817	14	12	-40	0.0	-119	34.0	270	3.2
2943.8	845	14	12	-40	0.0	-119	36.0	270	3.2
2947.6	955	14	12	-40	0.0	-119	41.0	90	0.0
2947.6	1005	14	12	-40	0.0	-119	41.0	270	3.9
2953.0	1126	14	12	-40	0.0	-119	48.0	129	.9
2965.7	24	15	12	-40	8.0	-119	35.0	201	2.5
2967.9	115	15	12	-40	10.0	-119	36.0	217	1.5
2969.1	205	15	12	-40	11.0	-119	37.0	0	2.3
2970.1	230	15	12	-40	10.0	-119	37.0	90	0.0
2970.1	245	15	12	-40	10.0	-119	37.0	90	1.6
2970.9	312	15	12	-40	10.0	-119	36.0	159	.8
2973.1	538	15	12	-40	12.0	-119	35.0	180	1.5
2974.1	616	15	12	-40	13.0	-119	35.0	90	0.0
2974.1	620	15	12	-40	13.0	-119	35.0	180	10.6
2982.1	705	15	12	-40	21.0	-119	35.0	143	.5
2983.3	911	15	12	-40	22.0	-119	34.0	201	6.7
2985.4	930	15	12	-40	24.0	-119	35.0	186	9.6
3140.3	130	16	12	-42	58.0	-119	57.0	182	9.9
3200.4	732	16	12	-43	58.0	-120	0.0	180	8.0
3202.4	747	16	12	-44	0.0	-120	0.0	90	2.3
3203.1	805	16	12	-44	0.0	-119	59.0	292	.3
3208.5	2230	16	12	-43	58.0	-120	6.0	245	3.1
3210.9	2315	16	12	-43	59.0	-120	9.0	235	1.5
3212.6	25	17	12	-44	0.0	-120	11.0	324	.6
3215.1	417	17	12	-43	58.0	-120	13.0	206	6.4
3218.4	448	17	12	-44	1.0	-120	15.0	227	2.6
3221.4	555	17	12	-44	3.0	-120	18.0	90	2.5
3222.1	612	17	12	-44	3.0	-120	17.0	216	6.1
3227.0	700	17	12	-44	7.0	-120	21.0	216	2.1
3229.5	808	17	12	-44	9.0	-120	23.0	144	1.7
3230.7	850	17	12	-44	10.0	-120	22.0	180	2.5
3231.7	914	17	12	-44	11.0	-120	22.0	172	10.8
3267.1	1230	17	12	-44	46.0	-120	15.0	180	6.6

3268.1	1239	17	12	-44	47.0	-120	15.0	180	10.0
3270.1	1251	17	12	-44	49.0	-120	15.0	175	9.2
3347.4	2110	17	12	-46	6.0	-120	5.0	167	4.6
3350.5	2150	17	12	-46	9.0	-120	4.0	180	11.9
3352.5	2200	17	12	-46	11.0	-120	4.0	161	11.0
3356.7	2223	17	12	-46	15.0	-120	2.0	90	0.0
3356.7	2227	17	12	-46	15.0	-120	2.0	171	8.0
3369.8	5	18	12	-46	28.0	-119	59.0	180	9.4
3384.8	140	18	12	-46	43.0	-119	59.0	180	9.5
3411.8	430	18	12	-47	10.0	-119	59.0	180	5.4
3413.8	452	18	12	-47	12.0	-119	59.0	180	7.4
3414.8	500	18	12	-47	13.0	-119	59.0	180	6.0
3416.8	520	18	12	-47	15.0	-119	59.0	180	9.5
3519.9	1610	18	12	-48	58.0	-120	0.0	180	4.0
3520.9	1625	18	12	-48	59.0	-120	0.0	233	1.3
3524.1	1854	18	12	-49	1.0	-120	4.0	233	.7
3525.8	2100	18	12	-49	2.0	-120	6.0	270	.3
3526.5	2245	18	12	-49	2.0	-120	7.0	233	1.3
3528.1	0	19	12	-49	3.0	-120	9.0	243	.7
3530.3	246	19	12	-49	4.0	-120	12.0	198	.3
3532.4	915	19	12	-49	6.0	-120	13.0	213	4.7
3533.6	930	19	12	-49	7.0	-120	14.0	192	3.1
3536.7	1028	19	12	-49	10.0	-120	15.0	90	0.0
3536.7	1038	19	12	-49	10.0	-120	15.0	180	4.2
3537.7	1052	19	12	-49	11.0	-120	15.0	198	7.0
3539.8	1110	19	12	-49	13.0	-120	16.0	198	4.2
3546.1	1240	19	12	-49	19.0	-120	19.0	180	2.1
3547.1	1308	19	12	-49	20.0	-120	19.0	213	6.5
3548.3	1319	19	12	-49	21.0	-120	20.0	198	4.6
3550.4	1346	19	12	-49	23.0	-120	21.0	192	1.7
3553.5	1530	19	12	-49	26.0	-120	22.0	147	1.3
3554.7	1624	19	12	-49	27.0	-120	21.0	180	4.9
3555.7	1636	19	12	-49	28.0	-120	21.0	180	6.6
3556.7	1645	19	12	-49	29.0	-120	21.0	176	10.3
3574.7	1830	19	12	-49	47.0	-120	19.0	90	0.0

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3574.7	1835	19	12	-49	47.0	-120	19.0	175	10.2
3614.8	2230	19	12	-50	27.0	-120	14.0	168	6.1
3617.9	2300	19	12	-50	30.0	-120	13.0	180	10.9
3621.9	2322	19	12	-50	34.0	-120	13.0	176	9.6
3638.9	108	20	12	-50	51.0	-120	11.0	175	9.9
3686.1	552	20	12	-51	38.0	-120	5.0	176	9.3
3706.1	800	20	12	-51	58.0	-120	3.0	180	8.5
3708.1	814	20	12	-52	0.0	-120	3.0	163	1.4
3710.2	940	20	12	-52	2.0	-120	2.0	192	9.1
3713.3	1000	20	12	-52	5.0	-120	3.0	180	9.0
3722.3	1100	20	12	-52	14.0	-120	3.0	180	9.2
3726.3	1126	20	12	-52	18.0	-120	3.0	180	8.9
3743.3	1320	20	12	-52	35.0	-120	3.0	181	9.1
3811.3	2046	20	12	-53	43.0	-120	4.0	180	8.2
3815.3	2115	20	12	-53	47.0	-120	4.0	172	8.0
3827.4	2245	20	12	-53	59.0	-120	1.0	180	4.0
3828.4	2300	20	12	-54	0.0	-120	1.0	164	.9
3830.5	118	21	12	-54	2.0	-120	0.0	113	2.5
3833.1	217	21	12	-54	3.0	-119	56.0	196	1.0
3835.1	420	21	12	-54	5.0	-119	57.0	90	0.0
3835.1	450	21	12	-54	5.0	-119	57.0	90	0.0
3835.1	500	21	12	-54	5.0	-119	57.0	109	1.6
3838.2	650	21	12	-54	6.0	-119	52.0	90	1.0
3841.2	935	21	12	-54	6.0	-119	47.0	210	3.7
3844.6	1030	21	12	-54	9.0	-119	50.0	270	1.1
3845.2	1100	21	12	-54	9.0	-119	51.0	180	1.9
3846.2	1130	21	12	-54	10.0	-119	51.0	90	1.9
3848.0	1225	21	12	-54	10.0	-119	48.0	90	5.0
3848.6	1232	21	12	-54	10.0	-119	47.0	150	3.0
3849.7	1255	21	12	-54	11.0	-119	46.0	90	.5
3850.3	1405	21	12	-54	11.0	-119	45.0	186	9.5
3856.3	1443	21	12	-54	17.0	-119	46.0	172	6.5
3860.4	1520	21	12	-54	21.0	-119	45.0	180	2.8
3865.4	1704	21	12	-54	26.0	-119	45.0	90	3.4
3866.0	1714	21	12	-54	26.0	-119	44.0	180	5.0
3869.0	1750	21	12	-54	29.0	-119	44.0	164	2.9
3871.1	1833	21	12	-54	31.0	-119	43.0	90	1.2
3871.6	1900	21	12	-54	31.0	-119	42.0	90	0.0
3871.6	1930	21	12	-54	31.0	-119	42.0	180	4.6
3872.6	1943	21	12	-54	32.0	-119	42.0	178	10.7
3894.6	2146	21	12	-54	54.0	-119	41.0	180	9.9
3898.6	2210	21	12	-54	58.0	-119	41.0	210	13.8
3899.8	2215	21	12	-54	59.0	-119	42.0	183	15.0
3911.8	2303	21	12	-55	11.0	-119	43.0	184	11.1
3919.8	2346	21	12	-55	19.0	-119	44.0	214	15.9
3927.0	13	22	12	-55	25.0	-119	51.0	246	8.7
3929.5	30	22	12	-55	26.0	-119	55.0	229	11.3
3931.0	38	22	12	-55	27.0	-119	57.0	164	1.4
3933.1	205	22	12	-55	29.0	-119	56.0	180	4.0
3934.1	220	22	12	-55	30.0	-119	56.0	180	5.9
3935.1	230	22	12	-55	31.0	-119	56.0	196	7.3
3937.2	247	22	12	-55	33.0	-119	57.0	185	7.9
3944.2	340	22	12	-55	40.0	-119	58.0	270	8.4
3944.8	344	22	12	-55	40.0	-119	59.0	184	8.4
3961.8	545	22	12	-55	57.0	-120	1.0	196	3.1
3963.9	625	22	12	-55	59.0	-120	2.0	187	8.0
3992.1	954	22	12	-56	27.0	-120	8.0	178	9.4
4009.1	1142	22	12	-56	44.0	-120	7.0	177	8.4
4020.1	1300	22	12	-56	55.0	-120	6.0	24	8.5
4062.9	1800	22	12	-56	16.0	-119	34.0	29	6.8
4065.2	1820	22	12	-56	14.0	-119	32.0	195	10.6
4077.6	1930	22	12	-56	26.0	-119	38.0	200	6.3
4080.8	2000	22	12	-56	29.0	-119	40.0	114	3.4
4083.3	2042	22	12	-56	30.0	-119	36.0	209	5.7
4084.4	2054	22	12	-56	31.0	-119	37.0	239	1.0
4086.3	2250	22	12	-56	32.0	-119	40.0	43	6.6
4090.4	2327	22	12	-56	29.0	-119	35.0	209	1.1
4091.5	28	23	12	-56	30.0	-119	36.0	220	.9
4096.7	541	23	12	-56	34.0	-119	42.0	48	6.0
4101.2	625	23	12	-56	31.0	-119	36.0	77	1.6

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4105.7	908	23	12	-56	30.0	-119	28.0	90	1.3
4110.1	1225	23	12	-56	30.0	-119	20.0	180	2.1
4112.1	1320	23	12	-56	32.0	-119	20.0	312	3.5
4113.6	1345	23	12	-56	31.0	-119	22.0	270	5.5
4114.2	1351	23	12	-56	31.0	-119	23.0	270	8.2
4114.7	1355	23	12	-56	31.0	-119	24.0	90	0.0
4114.7	1400	23	12	-56	31.0	-119	24.0	90	0.0
4114.7	1406	23	12	-56	31.0	-119	24.0	90	0.0
4114.7	1409	23	12	-56	31.0	-119	24.0	270	8.2
4115.3	1413	23	12	-56	31.0	-119	25.0	320	2.3
4117.9	1520	23	12	-56	29.0	-119	28.0	151	.9
4119.0	1630	23	12	-56	30.0	-119	27.0	66	4.8
4126.3	1800	23	12	-56	27.0	-119	15.0	48	1.6
4127.8	1855	23	12	-56	26.0	-119	13.0	301	4.6
4129.7	1920	23	12	-56	25.0	-119	16.0	294	3.6
4132.2	2000	23	12	-56	24.0	-119	20.0	294	2.9
4134.6	2050	23	12	-56	23.0	-119	24.0	110	2.1
4140.5	2338	23	12	-56	25.0	-119	14.0	180	2.7
4141.5	0	24	12	-56	26.0	-119	14.0	246	1.6
4158.4	1000	24	12	-56	33.0	-119	42.0	40	2.5
4161.0	1100	24	12	-56	31.0	-119	39.0	0	6.0
4163.0	1120	24	12	-56	29.0	-119	39.0	0	2.0
4164.0	1150	24	12	-56	28.0	-119	39.0	350	1.1
4170.1	1710	24	12	-56	22.0	-119	41.0	192	9.4
4190.6	1920	24	12	-56	42.0	-119	49.0	192	2.8
4195.7	2106	24	12	-56	47.0	-119	51.0	180	1.4
4196.7	2148	24	12	-56	48.0	-119	51.0	270	4.4
4198.4	2210	24	12	-56	48.0	-119	54.0	239	1.1
4200.3	2350	24	12	-56	49.0	-119	57.0	209	3.7
4201.4	8	25	12	-56	50.0	-119	58.0	183	6.7
4237.5	530	25	12	-57	26.0	-120	2.0	184	9.1
4271.6	914	25	12	-58	0.0	-120	6.0	180	11.2
4274.6	930	25	12	-58	3.0	-120	6.0	180	8.6
4287.6	1100	25	12	-58	16.0	-120	6.0	180	10.1
4350.6	1712	25	12	-59	19.0	-120	7.0	180	4.2

4352.6	1740	25	12	-59	21.0	-120	7.0	179	9.7
4387.6	2115	25	12	-59	56.0	-120	6.0	166	9.5
4389.6	2128	25	12	-59	58.0	-120	5.0	180	10.0
4396.6	2210	25	12	-60	5.0	-120	5.0	180	4.4
4398.6	2237	25	12	-60	7.0	-120	5.0	180	11.4
4402.6	2258	25	12	-60	11.0	-120	5.0	180	3.5
4403.6	2315	25	12	-60	12.0	-120	5.0	180	4.7
4406.6	2353	25	12	-60	15.0	-120	5.0	154	2.3
4407.8	21	26	12	-60	16.0	-120	4.0	284	.3
4411.8	1225	26	12	-60	15.0	-120	12.0	270	1.2
4413.8	1400	26	12	-60	15.0	-120	16.0	270	.9
4414.3	1430	26	12	-60	15.0	-120	17.0	270	2.3
4416.3	1520	26	12	-60	15.0	-120	21.0	135	1.9
4419.1	1645	26	12	-60	17.0	-120	17.0	90	1.9
4427.6	2110	26	12	-60	17.0	-120	0.0	90	1.7
4430.5	2250	26	12	-60	17.0	-119	54.0	243	2.5
4432.8	2342	26	12	-60	18.0	-119	58.0	230	2.5
4440.5	245	27	12	-60	23.0	-120	10.0	154	2.0
4441.6	318	27	12	-60	24.0	-120	9.0	206	4.7
4442.7	332	27	12	-60	25.0	-120	10.0	182	8.5
4495.8	946	27	12	-61	18.0	-120	14.0	193	6.4
4497.8	1005	27	12	-61	20.0	-120	15.0	0	10.9
4507.8	1100	27	12	-61	10.0	-120	15.0	0	9.6
4512.8	1131	27	12	-61	5.0	-120	15.0	216	1.2
4515.3	1330	27	12	-61	7.0	-120	18.0	136	1.6
4516.7	1420	27	12	-61	8.0	-120	16.0	206	.6
4518.9	1750	27	12	-61	10.0	-120	18.0	270	2.2
4519.4	1803	27	12	-61	10.0	-120	19.0	90	0.0
4519.4	1810	27	12	-61	10.0	-120	19.0	206	1.9
4520.5	1845	27	12	-61	11.0	-120	20.0	235	2.3
4522.3	1930	27	12	-61	12.0	-120	23.0	216	1.4
4524.7	2110	27	12	-61	14.0	-120	26.0	166	1.6
4526.8	2225	27	12	-61	16.0	-120	25.0	30	.6
4532.6	720	28	12	-61	11.0	-120	19.0	113	5.6
4537.8	815	28	12	-61	13.0	-120	9.0	107	3.6

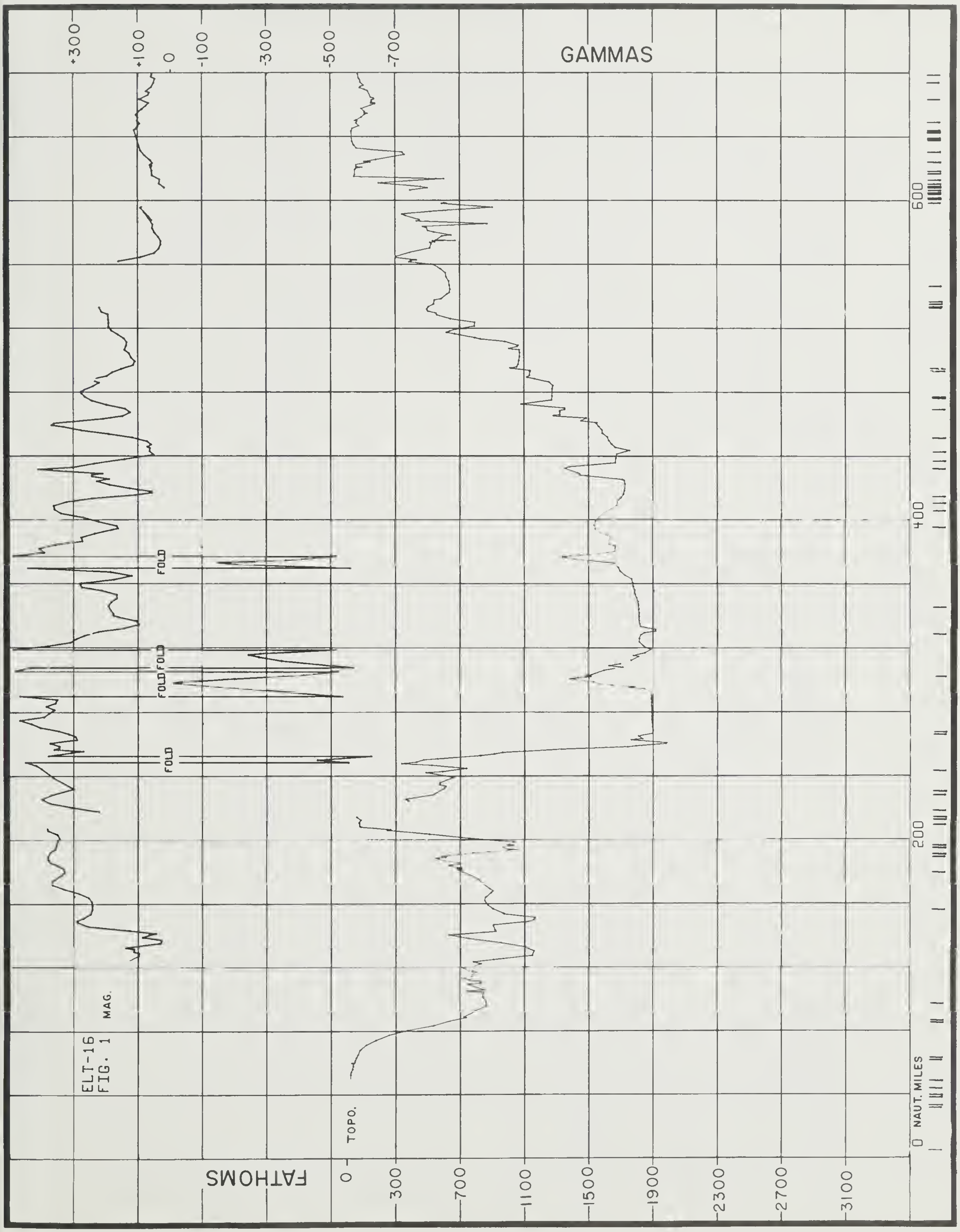
4541.3	913	28	12	-61	14.0	-120	2.0	0	2.5
4542.3	937	28	12	-61	13.0	-120	2.0	128	5.5
4547.2	1030	28	12	-61	16.0	-119	54.0	136	2.6
4550.0	1132	28	12	-61	18.0	-119	50.0	44	1.6
4551.3	1224	28	12	-61	17.0	-119	48.0	90	5.0
4553.3	1247	28	12	-61	17.0	-119	44.0	95	9.5
4577.4	1518	28	12	-61	19.0	-118	54.0	95	10.7
4650.5	2205	28	12	-61	26.0	-116	22.0	104	10.7
4675.1	22	29	12	-61	32.0	-115	32.0	103	6.9
4679.5	100	29	12	-61	33.0	-115	23.0	103	8.3
4710.3	440	29	12	-61	40.0	-114	20.0	104	11.0
4734.3	650	29	12	-61	46.0	-113	31.0	104	8.5
4772.6	1120	29	12	-61	55.0	-112	12.0	101	7.9
4777.9	1200	29	12	-61	56.0	-112	1.0	95	8.8
4842.5	1920	29	12	-62	2.0	-109	44.0	113	2.8
4845.1	2013	29	12	-62	3.0	-109	39.0	90	6.5
4848.4	2043	29	12	-62	3.0	-109	32.0	96	9.7
4991.5	1120	30	12	-62	18.0	-104	27.0	101	9.8
5039.2	1610	30	12	-62	27.0	-102	46.0	90	5.5
5041.0	1630	30	12	-62	27.0	-102	42.0	90	10.6
5043.4	1643	30	12	-62	27.0	-102	37.0	137	10.2
5044.7	1651	30	12	-62	28.0	-102	35.0	98	10.6
5058.7	1810	30	12	-62	30.0	-102	5.0	90	4.1
5060.1	1830	30	12	-62	30.0	-102	2.0	90	1.5
5062.0	1940	30	12	-62	30.0	-101	58.0	90	1.0
5064.3	2146	30	12	-62	30.0	-101	53.0	90	4.7
5066.6	2215	30	12	-62	30.0	-101	48.0	90	11.0
5067.5	2220	30	12	-62	30.0	-101	46.0	90	10.2
5076.7	2314	30	12	-62	30.0	-101	26.0	90	10.3
5092.4	45	31	12	-62	30.0	-100	52.0	90	11.7
5116.0	245	31	12	-62	30.0	-100	1.0	70	9.8
5118.9	303	31	12	-62	29.0	-99	55.0	54	5.1
5120.6	323	31	12	-62	28.0	-99	52.0	43	4.3
5122.0	342	31	12	-62	27.0	-99	50.0	180	1.0
5126.0	731	31	12	-62	31.0	-99	50.0	54	4.8

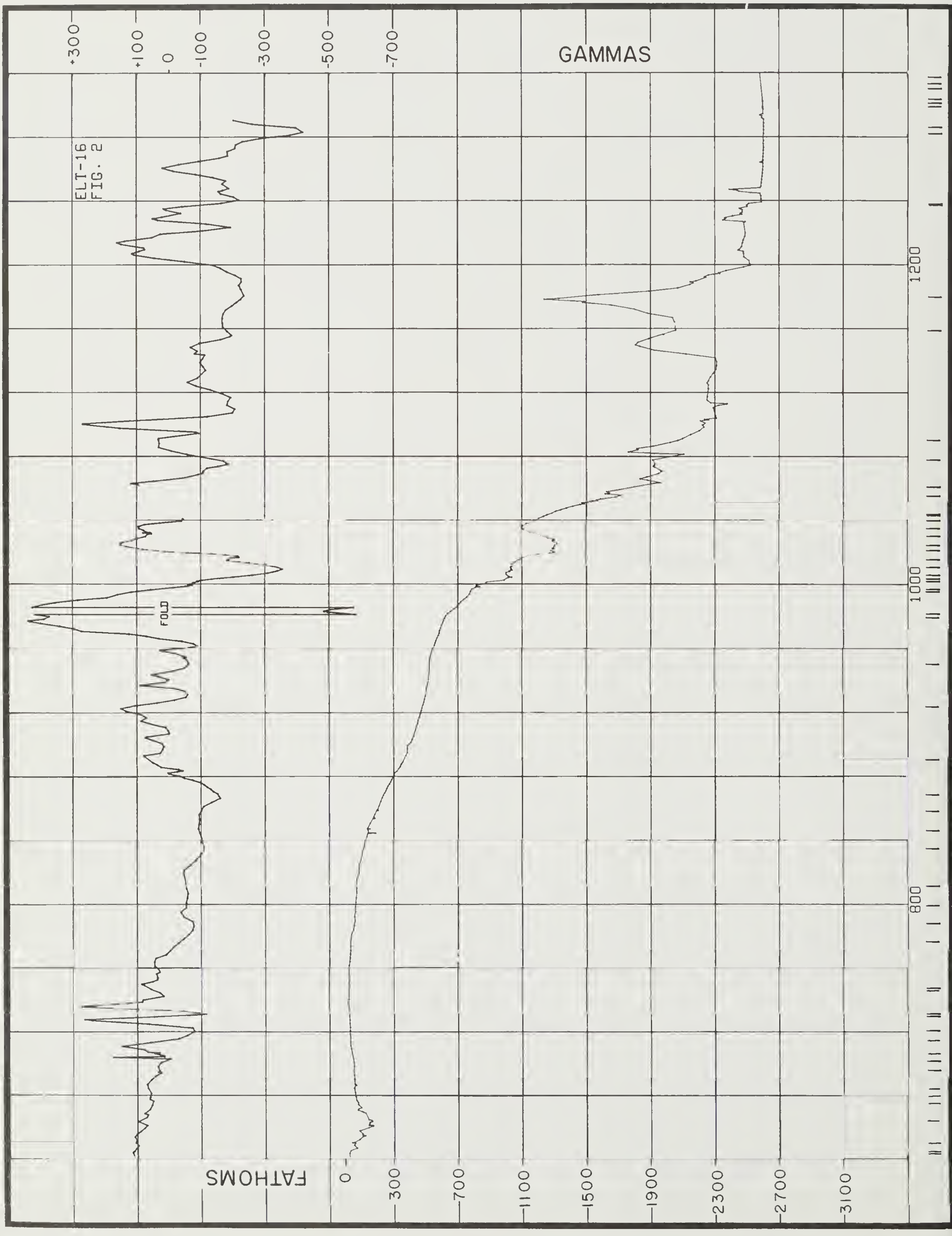
5127.7	752	31	12	-62	30.0	-99	47.0	58	9.6
5165.1	1145	31	12	-62	10.0	-98	39.0	51	9.4
5222.6	1748	31	12	-61	34.0	-97	4.0	44	3.9
5223.9	1809	31	12	-61	33.0	-97	2.0	0	4.6
5224.9	1822	31	12	-61	32.0	-97	2.0	205	1.7
5226.0	1900	31	12	-61	33.0	-97	3.0	90	7.1
5226.5	1904	31	12	-61	33.0	-97	2.0	51	9.7
5264.7	2300	31	12	-61	9.0	-96	0.0	56	8.6
5304.4	335	1	1	-60	47.0	-94	52.0	44	5.5
5307.2	405	1	1	-60	45.0	-94	48.0	58	8.2
5331.5	702	1	1	-60	32.0	-94	5.0	55	9.5
5366.1	1038	1	1	-60	12.0	-93	9.0	56	9.7
5369.7	1100	1	1	-60	10.0	-93	3.0	49	9.5
5429.4	1717	1	1	-59	31.0	-91	33.0	45	4.7
5430.8	1735	1	1	-59	30.0	-91	31.0	225	1.7
5432.2	1825	1	1	-59	31.0	-91	33.0	57	5.7
5434.1	1844	1	1	-59	30.0	-91	30.0	56	9.9
5584.4	946	2	1	-58	7.0	-87	28.0	57	10.2
5597.1	1100	2	1	-58	0.0	-87	8.0	51	10.1
5619.1	1310	2	1	-57	46.0	-86	36.0	39	5.1
5621.7	1340	2	1	-57	44.0	-86	33.0	50	9.7
5654.5	1702	2	1	-57	23.0	-85	46.0	47	5.5
5656.0	1718	2	1	-57	22.0	-85	44.0	270	1.2
5657.0	1809	2	1	-57	22.0	-85	46.0	58	4.9
5658.9	1832	2	1	-57	21.0	-85	43.0	51	6.5
5671.5	2028	2	1	-57	13.0	-85	25.0	58	9.0
5677.3	2106	2	1	-57	10.0	-85	16.0	35	9.4
5690.6	2231	2	1	-56	59.0	-85	2.0	270	.8
5694.4	300	3	1	-56	59.0	-85	9.0	115	1.1
5696.8	500	3	1	-57	0.0	-85	5.0	270	5.4
5699.6	530	3	1	-57	0.0	-85	10.0	270	3.0
5702.8	635	3	1	-57	0.0	-85	16.0	151	3.4
5704.0	655	3	1	-57	1.0	-85	15.0	185	8.0
5710.0	740	3	1	-57	7.0	-85	16.0	180	4.0
5714.0	840	3	1	-57	11.0	-85	16.0	208	3.7

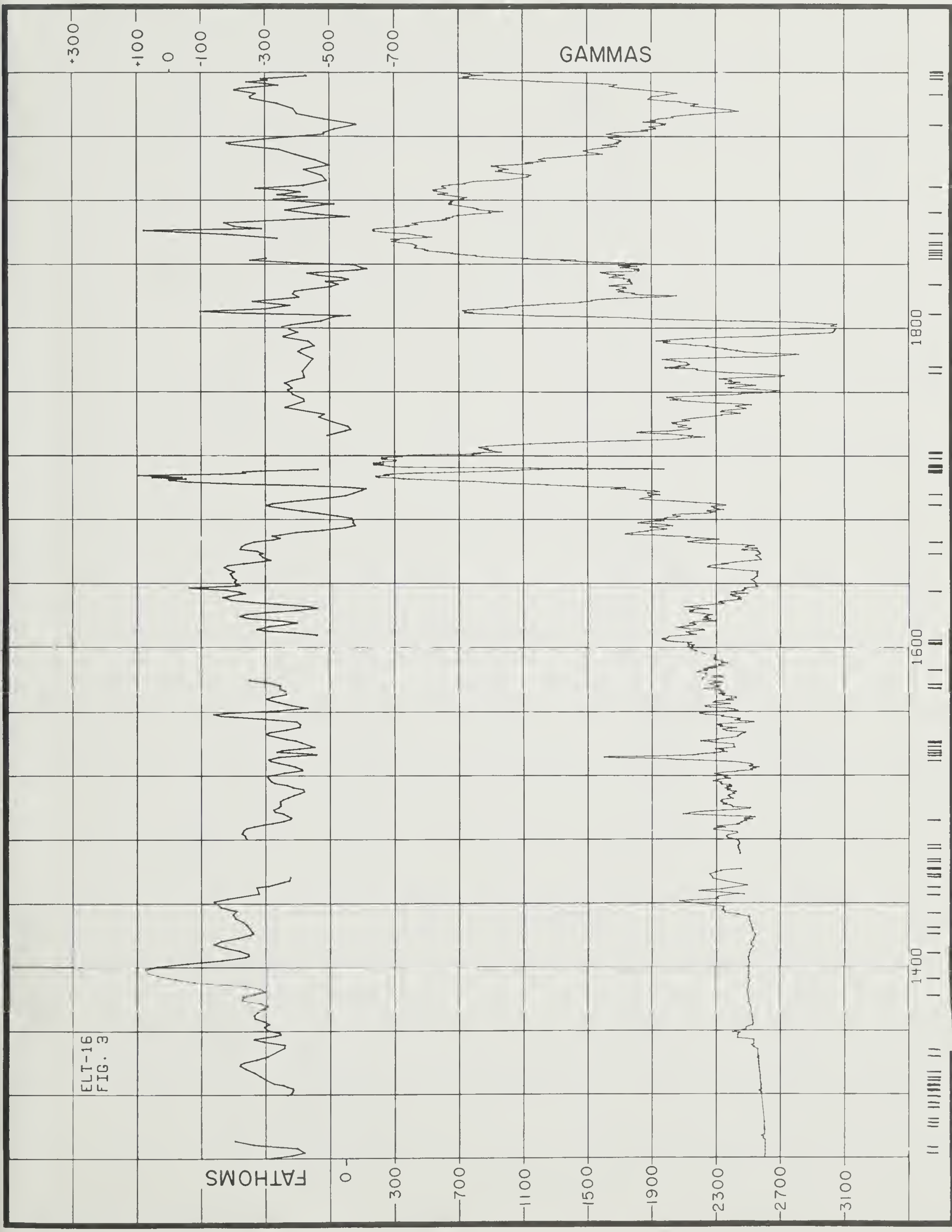
5715.1	858	3	1	-57	12.0	-85	17.0	270	3.6	6166.9	2210	5	1	-53	9.0	-75	49.0	31	9.3
5715.7	907	3	1	-57	12.0	-85	18.0	28	3.7	6169.2	2225	5	1	-53	7.0	-75	47.0	156	1.2
5716.8	925	3	1	-57	11.0	-85	17.0	19	10.2	6173.6	157	6	1	-53	11.0	-75	44.0	149	3.4
5728.5	1033	3	1	-57	0.0	-85	10.0	36	4.9	6174.8	217	6	1	-53	12.0	-75	43.0	130	1.6
5732.2	1118	3	1	-56	57.0	-85	6.0	45	10.3	6176.3	315	6	1	-53	13.0	-75	41.0	197	1.8
5740.7	1207	3	1	-56	51.0	-84	55.0	61	10.1	6178.4	421	6	1	-53	15.0	-75	42.0	169	3.7
5746.9	1244	3	1	-56	48.0	-84	45.0	62	7.9	6181.5	510	6	1	-53	18.0	-75	41.0	149	3.2
5783.0	1715	3	1	-56	31.0	-83	47.0	90	.7	6185.0	615	6	1	-53	21.0	-75	38.0	90	2.3
5783.6	1800	3	1	-56	31.0	-83	46.0	29	4.8	6185.6	630	6	1	-53	21.0	-75	37.0	180	4.5
5784.7	1814	3	1	-56	30.0	-83	45.0	90	11.0	6188.6	710	6	1	-53	24.0	-75	37.0	180	3.4
5785.3	1817	3	1	-56	30.0	-83	44.0	57	9.8	6192.6	820	6	1	-53	28.0	-75	37.0	90	.9
5794.5	1913	3	1	-56	25.0	-83	30.0	63	4.3	6193.2	857	6	1	-53	28.0	-75	36.0	38	10.6
5798.8	2013	3	1	-56	23.0	-83	23.0	60	9.9	6209.6	1030	6	1	-53	15.0	-75	19.0	42	12.9
5821.2	2227	3	1	-56	12.0	-82	48.0	59	5.4	6215.0	1055	6	1	-53	11.0	-75	13.0	12	10.6
5825.0	2310	3	1	-56	10.0	-82	42.0	66	9.7	6235.5	1250	6	1	-52	51.0	-75	6.0	270	3.2
5827.5	2325	3	1	-56	9.0	-82	38.0	48	8.9	6237.9	1335	6	1	-52	51.0	-75	10.0	108	4.0
5829.0	2335	3	1	-56	8.0	-82	36.0	58	10.1	6241.1	1422	6	1	-52	52.0	-75	5.0	270	4.0
5873.0	355	4	1	-55	45.0	-81	29.0	39	10.4	6247.7	1600	6	1	-52	52.0	-75	16.0	270	1.9
5916.9	808	4	1	-55	11.0	-80	40.0	40	11.2	6248.9	1637	6	1	-52	52.0	-75	18.0	270	7.2
5928.6	910	4	1	-55	2.0	-80	27.0	41	7.9	6249.5	1642	6	1	-52	52.0	-75	19.0	211	4.1
5931.2	930	4	1	-55	0.0	-80	24.0	270	.3	6254.2	1750	6	1	-52	56.0	-75	23.0	90	2.1
5932.9	1350	4	1	-55	0.0	-80	27.0	90	2.5	6256.0	1840	6	1	-52	56.0	-75	20.0	108	3.4
5937.5	1536	4	1	-55	0.0	-80	19.0	90	2.0	6259.2	1935	6	1	-52	57.0	-75	15.0	35	8.0
5940.4	1700	4	1	-55	0.0	-80	14.0	173	5.2	6266.5	2030	6	1	-52	51.0	-75	8.0	28	6.1
5950.5	1855	4	1	-55	10.0	-80	12.0	90	4.2	6276.7	2210	6	1	-52	42.0	-75	0.0	79	9.6
5951.0	1903	4	1	-55	10.0	-80	11.0	90	0.0	6287.2	2315	6	1	-52	40.0	-74	43.0	90	10.4
5951.0	1939	4	1	-55	10.0	-80	11.0	49	4.3	6288.4	2322	6	1	-52	40.0	-74	41.0	112	8.7
5952.5	2000	4	1	-55	9.0	-80	9.0	64	9.8	6291.0	2340	6	1	-52	41.0	-74	37.0	90	4.0
6021.5	300	5	1	-54	39.0	-78	21.0	43	10.3	6292.3	2358	6	1	-52	41.0	-74	35.0	130	2.6
6147.5	1509	5	1	-53	7.0	-75	55.0	56	4.7	6297.0	143	7	1	-52	44.0	-74	29.0	130	1.4
6151.1	1555	5	1	-53	5.0	-75	50.0	45	8.4	6298.5	250	7	1	-52	45.0	-74	27.0	127	8.3
6155.3	1625	5	1	-53	2.0	-75	45.0	50	2.6	6306.9	350	7	1	-52	50.0	-74	16.0	119	4.7
6156.9	1700	5	1	-53	1.0	-75	43.0	180	1.0	6308.9	416	7	1	-52	51.0	-74	13.0	149	5.8
6159.9	1950	5	1	-53	4.0	-75	43.0	226	3.3	6311.3	440	7	1	-52	53.0	-74	11.0	124	2.5
6165.7	2135	5	1	-53	8.0	-75	50.0	149	1.9	6314.9	604	7	1	-52	55.0	-74	6.0	90	2.2

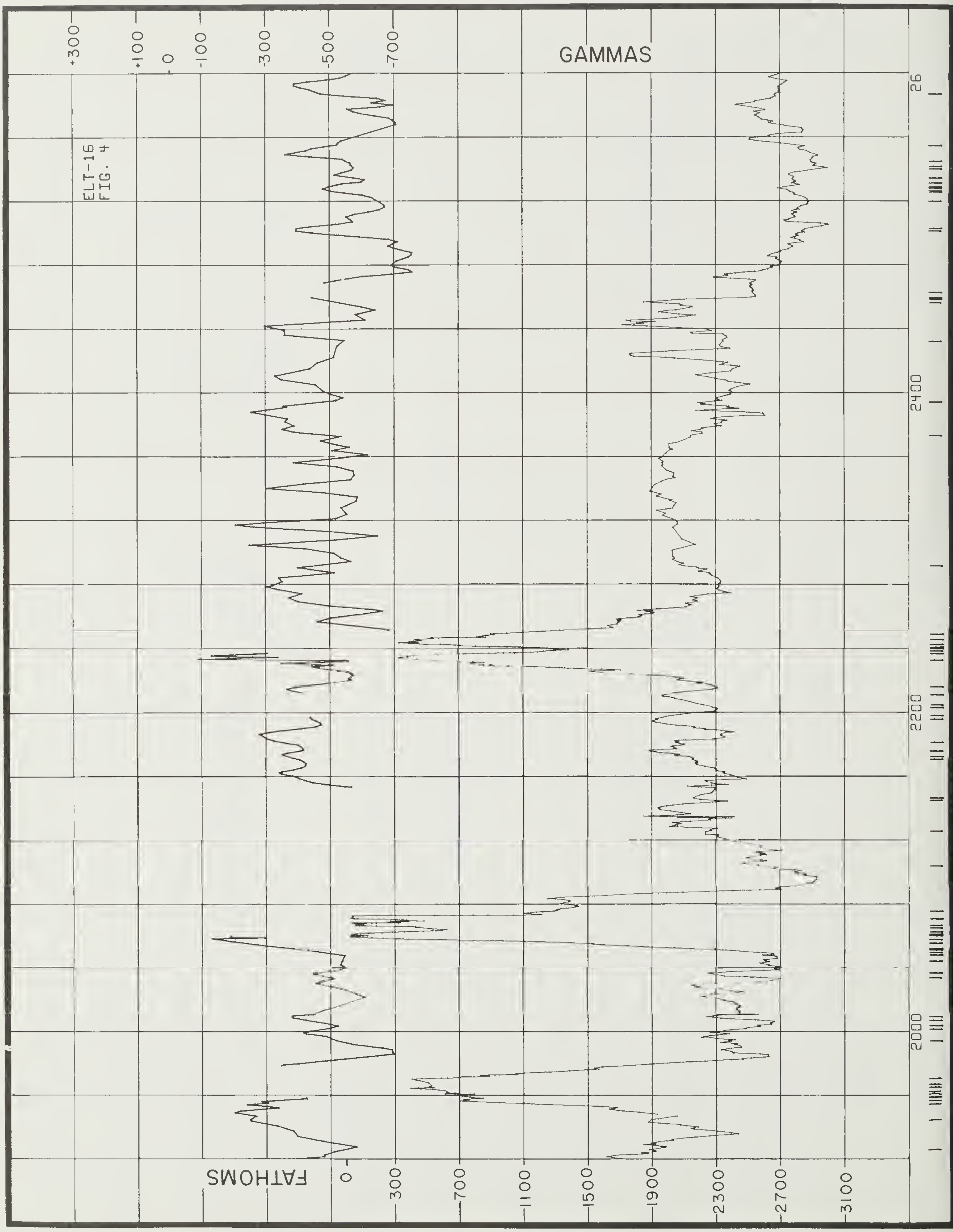
ELT. 21 NAVIGATION CONT'D

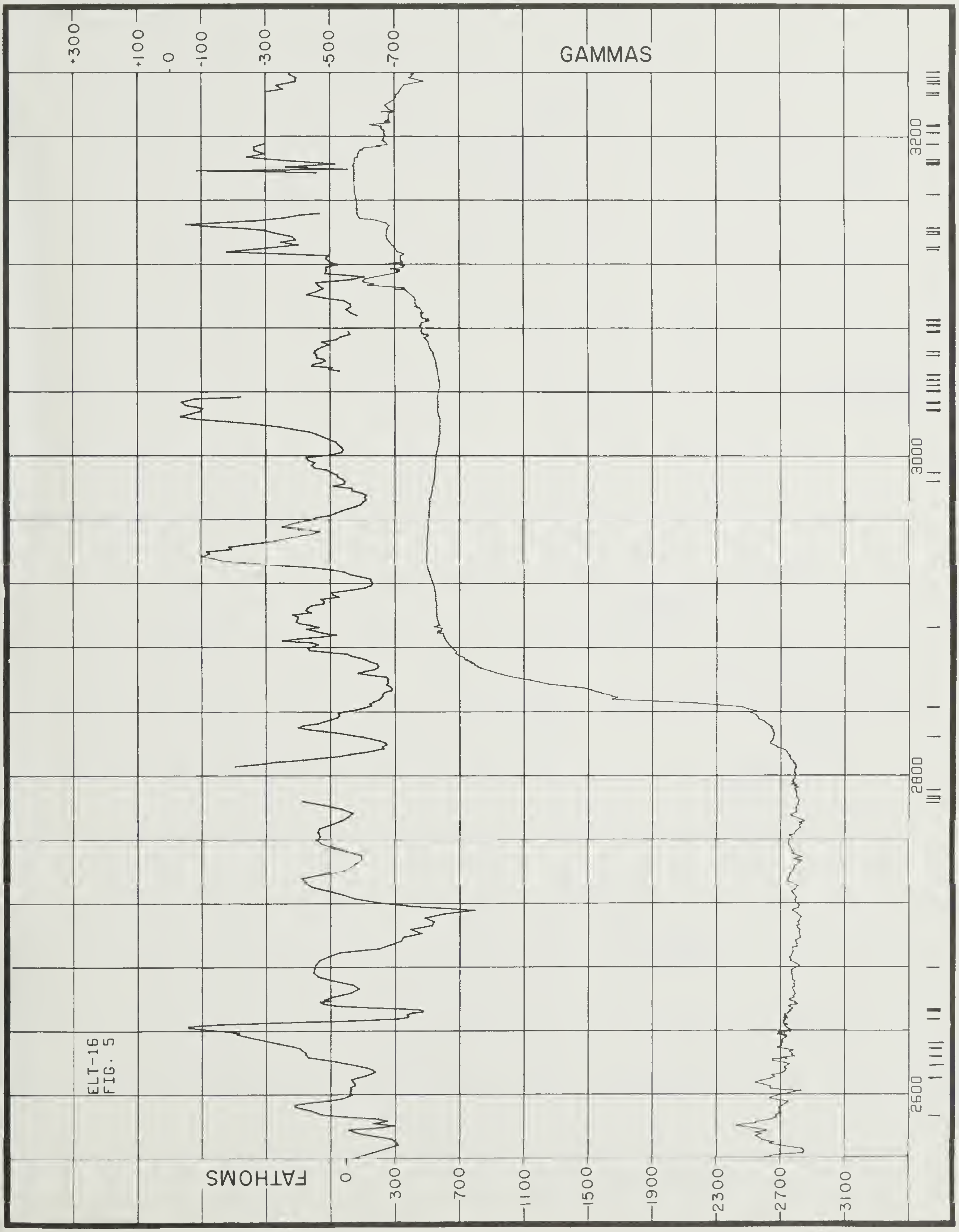
6315.5	620	7	1	-52	55.0	-74	5.0	115	7.0
6320.2	700	7	1	-52	57.0	-73	58.0	90	3.6
6323.8	800	7	1	-52	57.0	-73	52.0	130	9.3
6333.2	900	7	1	-53	3.0	-73	40.0	119	10.3
6343.5	1000	7	1	-53	8.0	-73	25.0	139	11.9
6355.4	1100	7	1	-53	17.0	-73	12.0	127	13.3
6368.8	1200	7	1	-53	25.0	-72	54.0	125	12.3
6381.1	1300	7	1	-53	32.0	-72	37.0	108	9.9
6391.0	1400	7	1	-53	35.0	-72	21.0	130	10.8
6401.9	1500	7	1	-53	42.0	-72	7.0	117	13.2
6415.2	1600	7	1	-53	48.0	-71	47.0	119	10.1
6425.3	1700	7	1	-53	53.0	-71	32.0	95	12.4
6437.7	1800	7	1	-53	54.0	-71	11.0	59	11.6
6449.4	1900	7	1	-53	48.0	-70	54.0	7	10.0
6459.5	2000	7	1	-53	38.0	-70	52.0	8	13.1
6472.6	2100	7	1	-53	25.0	-70	49.0	9	11.1
6483.8	2200	7	1	-53	14.0	-70	46.0	321	12.7

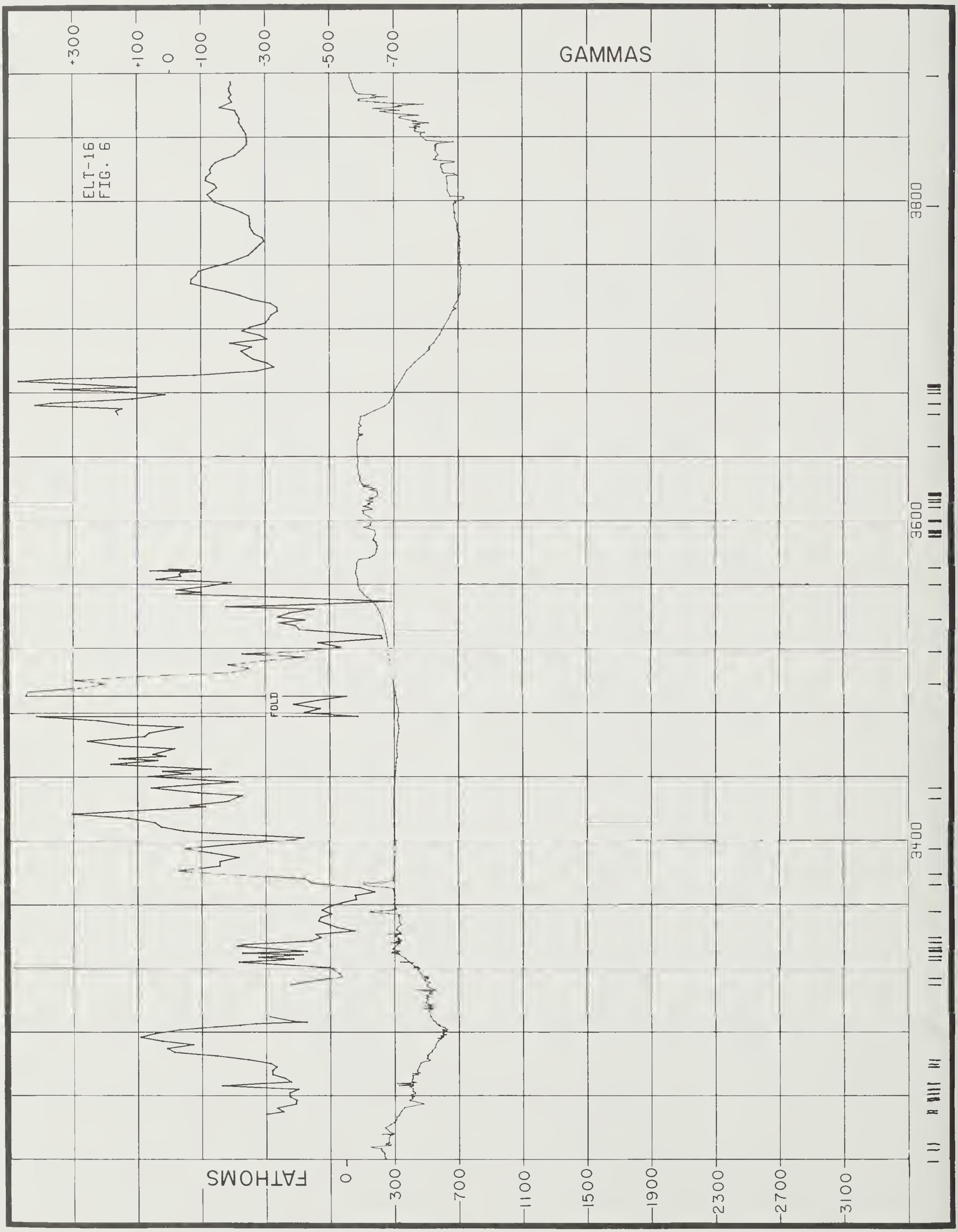

ELT-16
FIG. 1
MAG.
TOPO.
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
FOLD
FOLD
FOLD
FOLD
0 NAUT. MILES
200
400
600

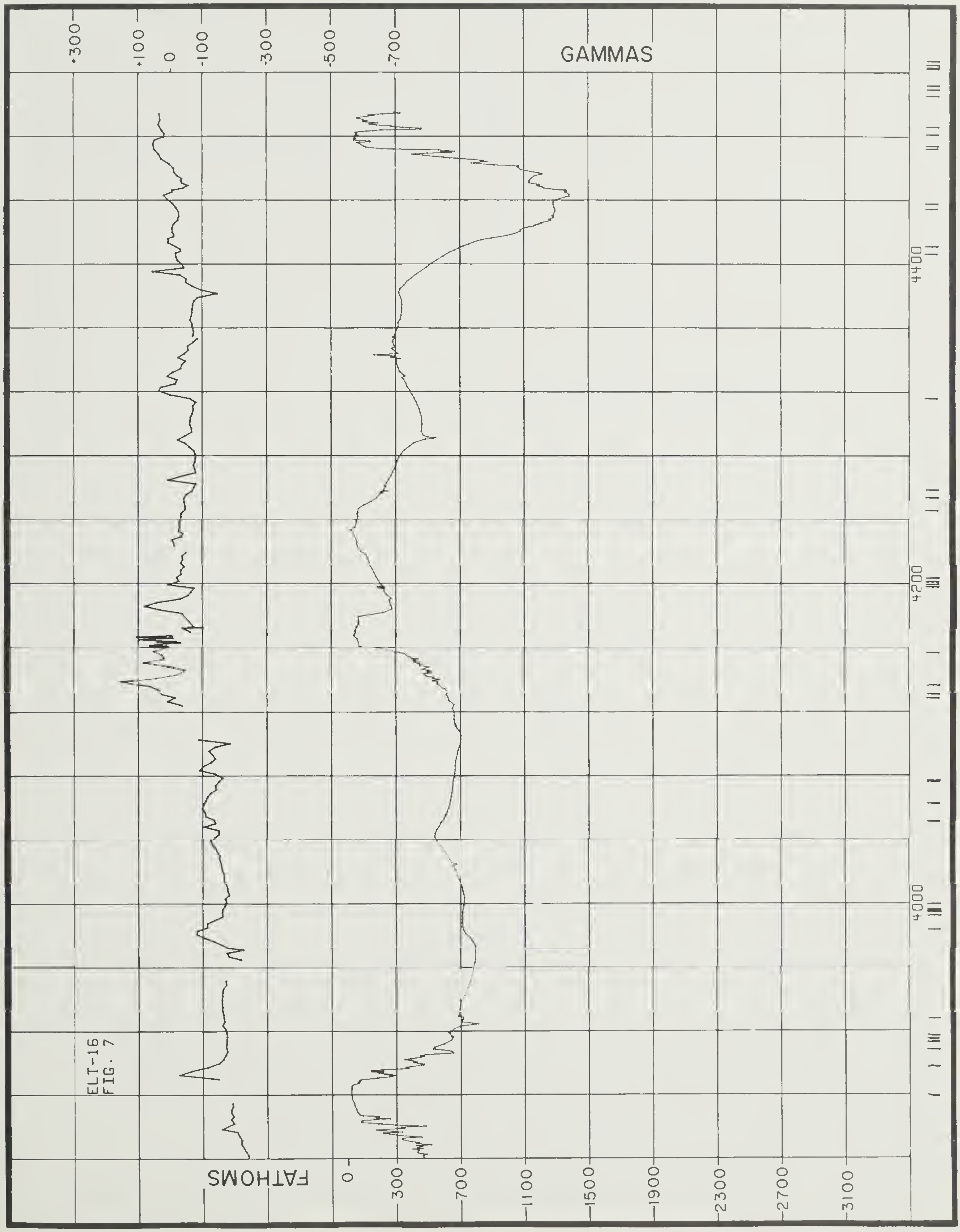

ELT-16
FIG. 2
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
FOLD
1200
1000
800

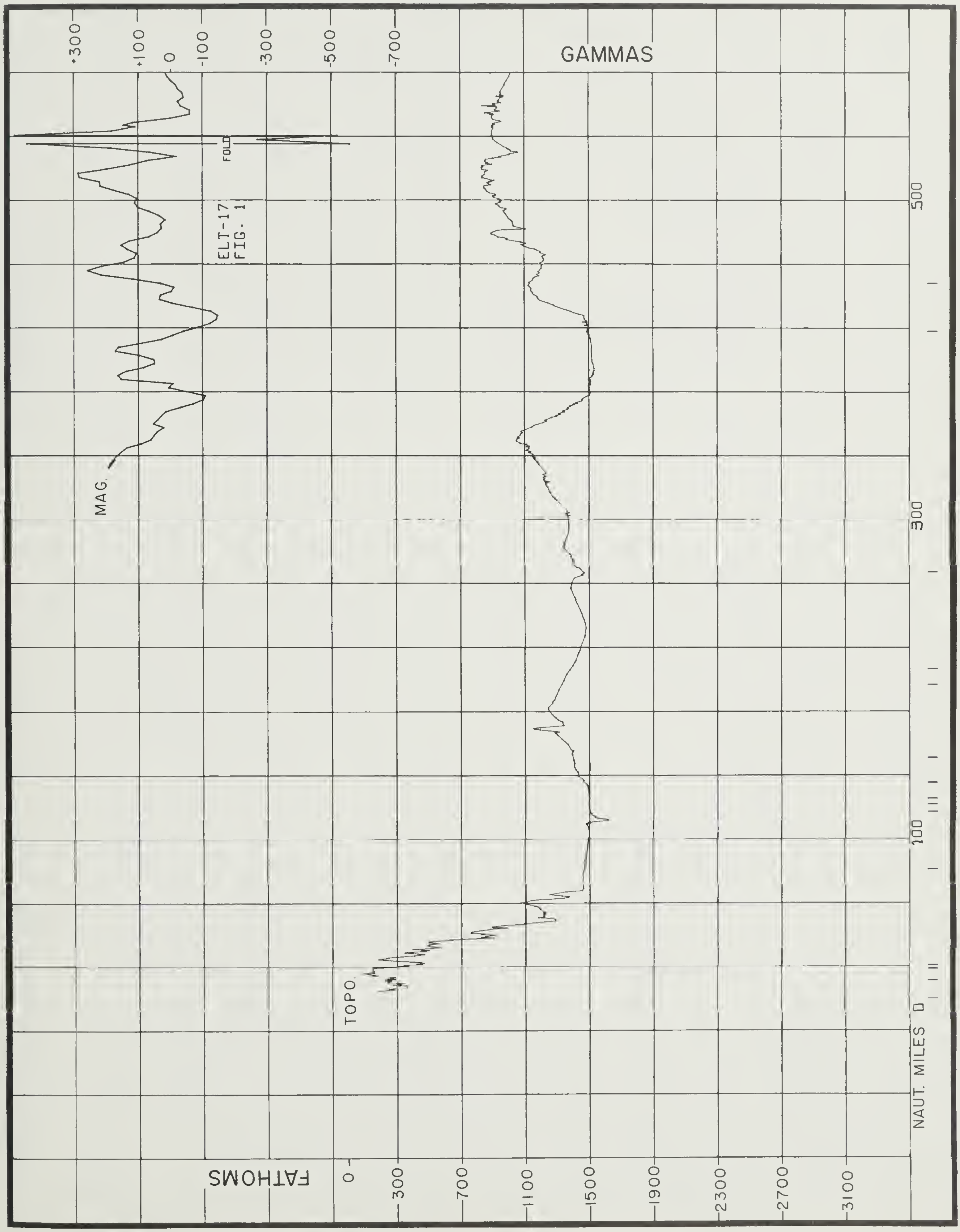

GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
1800
1600
1400
ELT-16
FIG. 3

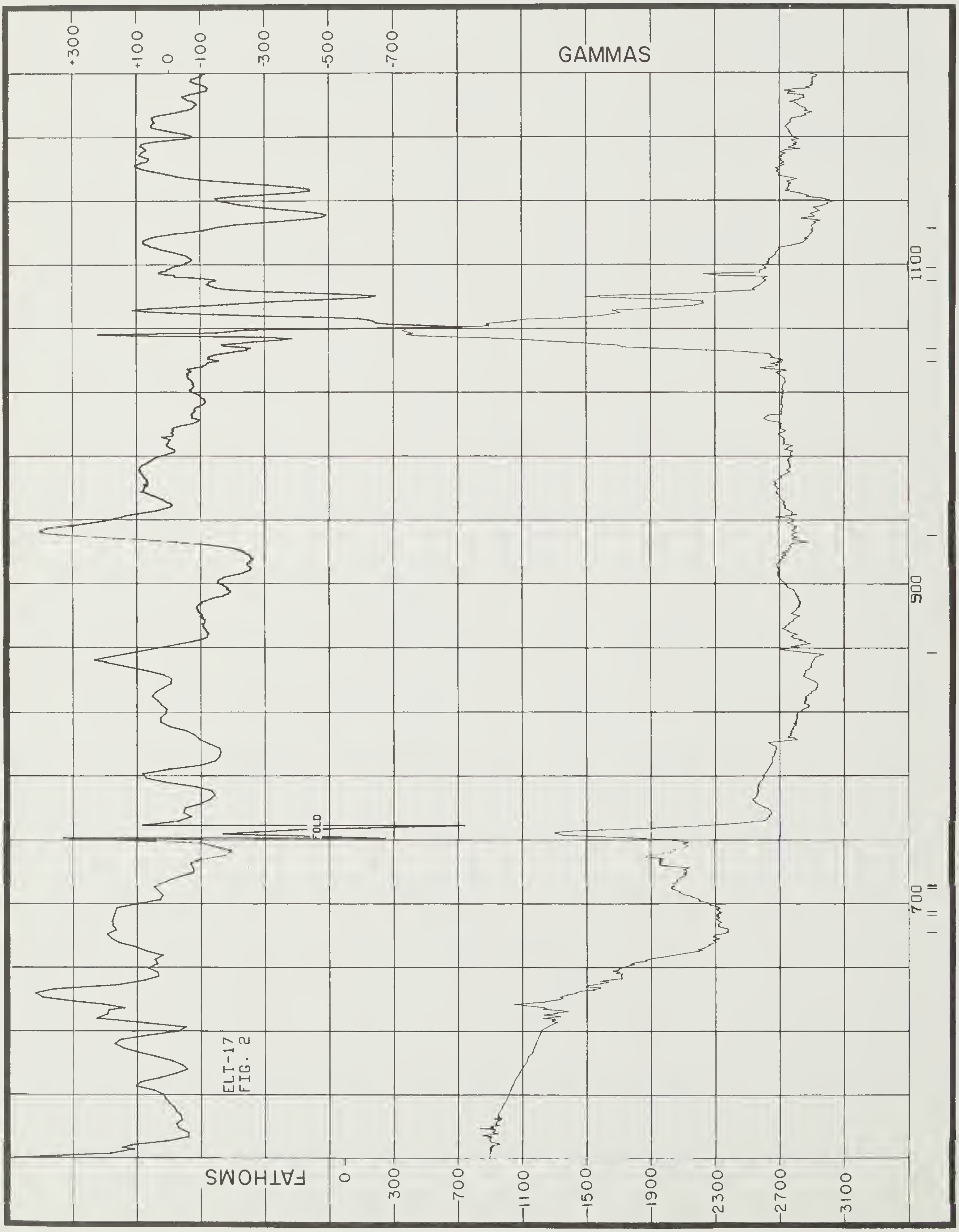

ELT-16
FIG. 4
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
26
2400
2200
2000

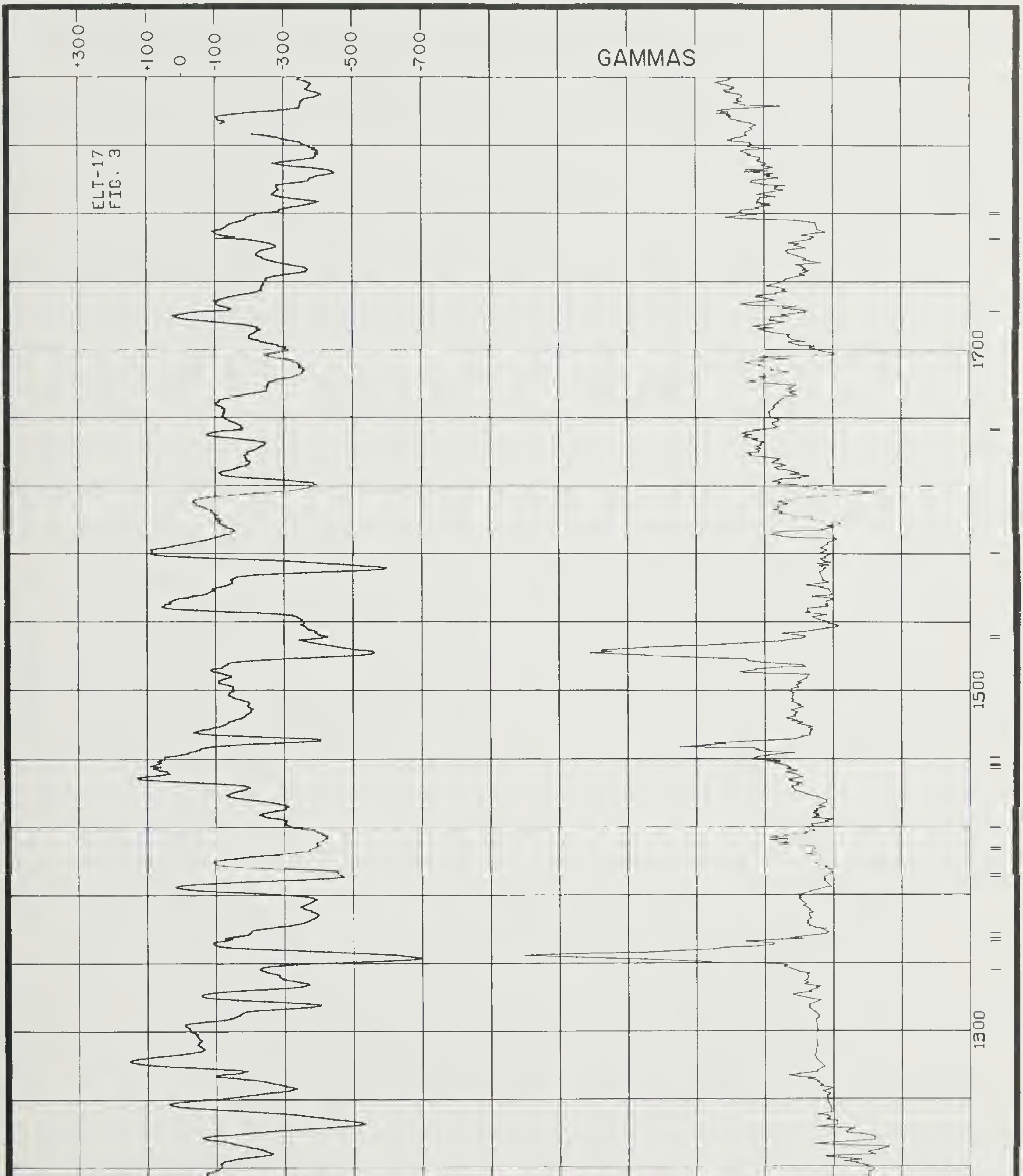

ELT-16
FIG. 5
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
2600
2800
3000
3200

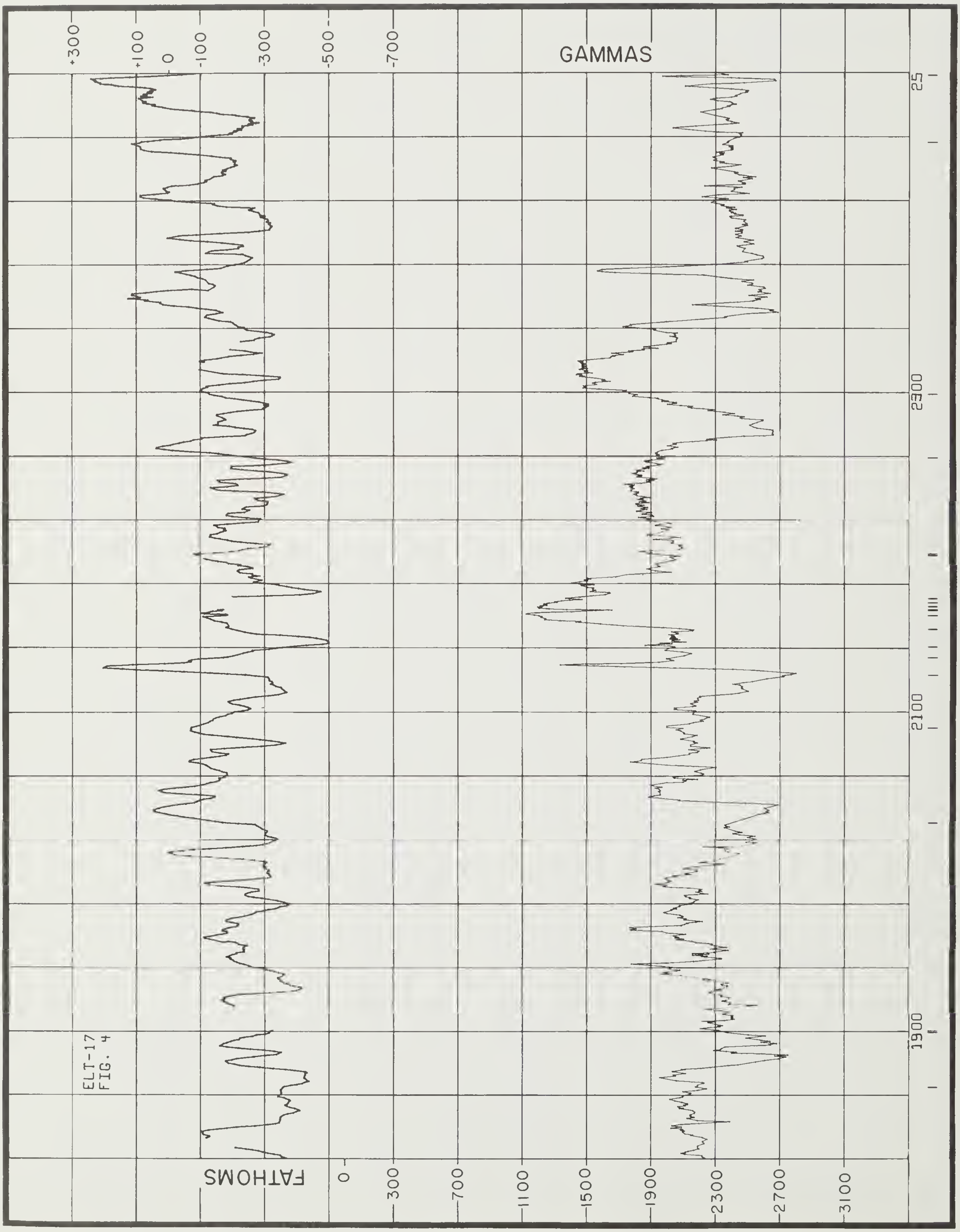

ELT-16
FIG. 6
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
3800
3600
3400
FOLD

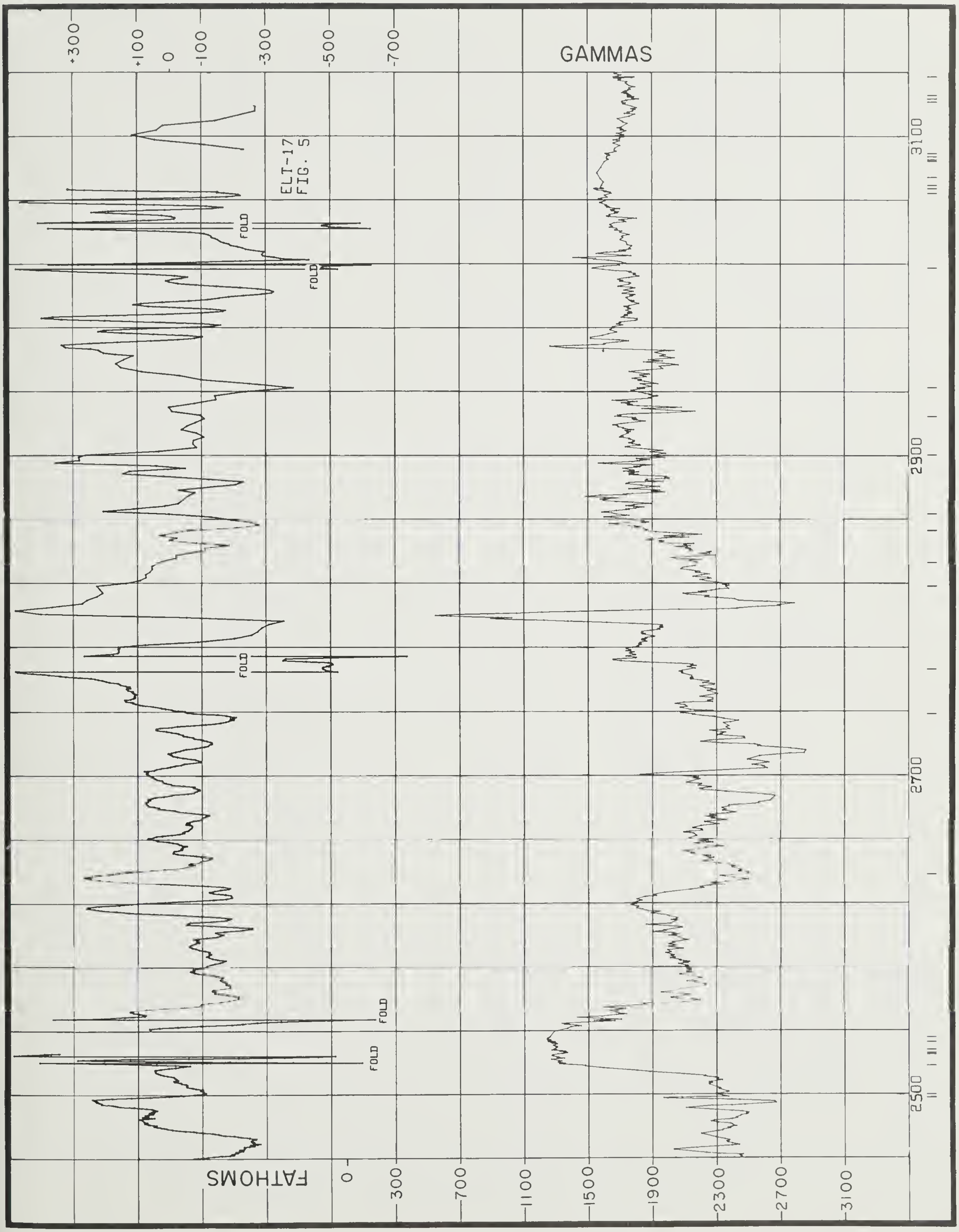

GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
4400
4200
4000
ELT-16
FIG. 7

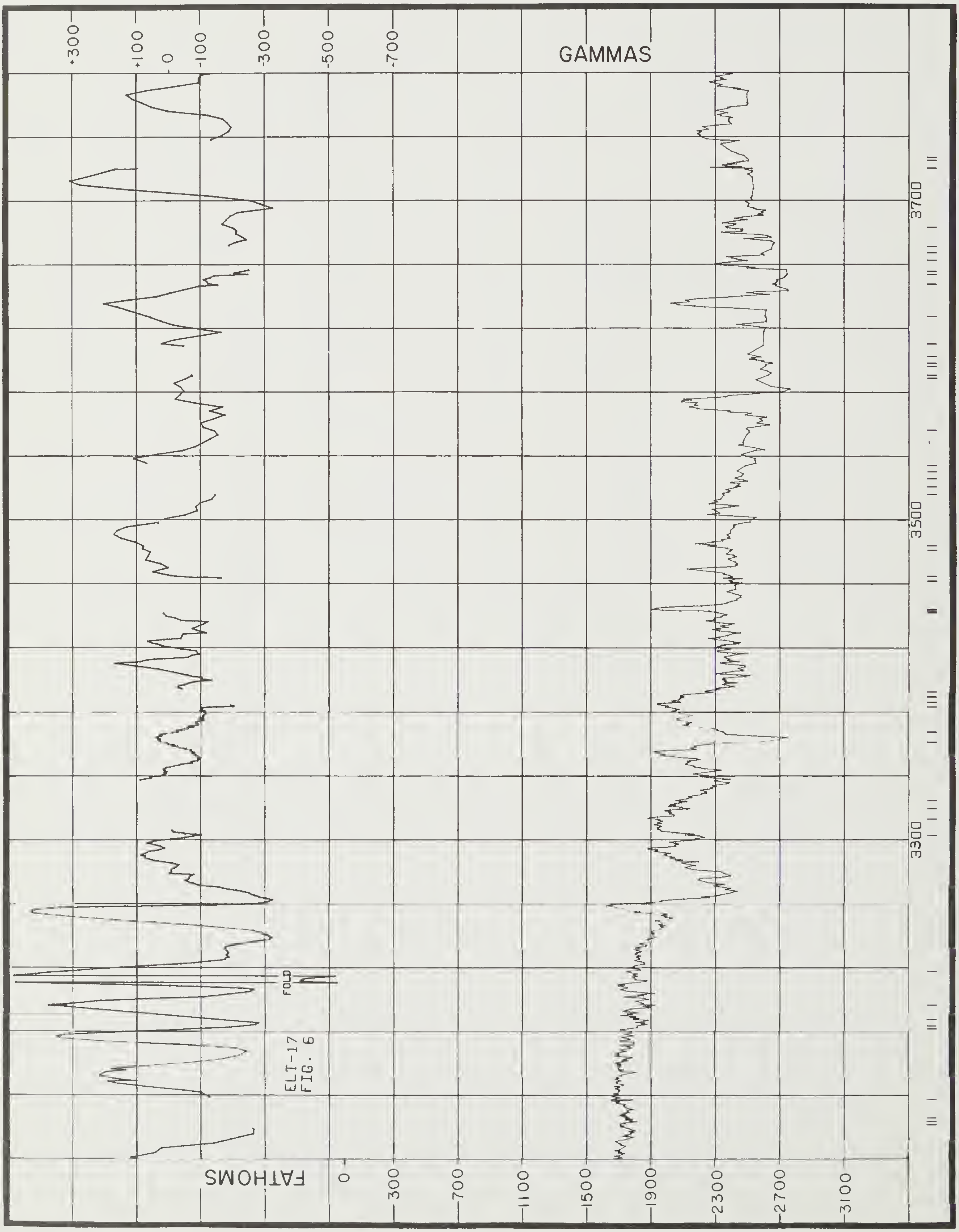

GAMMAS
+300
+100
0
-100
-300
-500
-700
FOLD
ELT-17
FIG. 1
MAG.
TOPO.
NAUT. MILES
0
100
300
500
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100


GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
ELT-17
FIG. 2
FOLD
700
900
1100

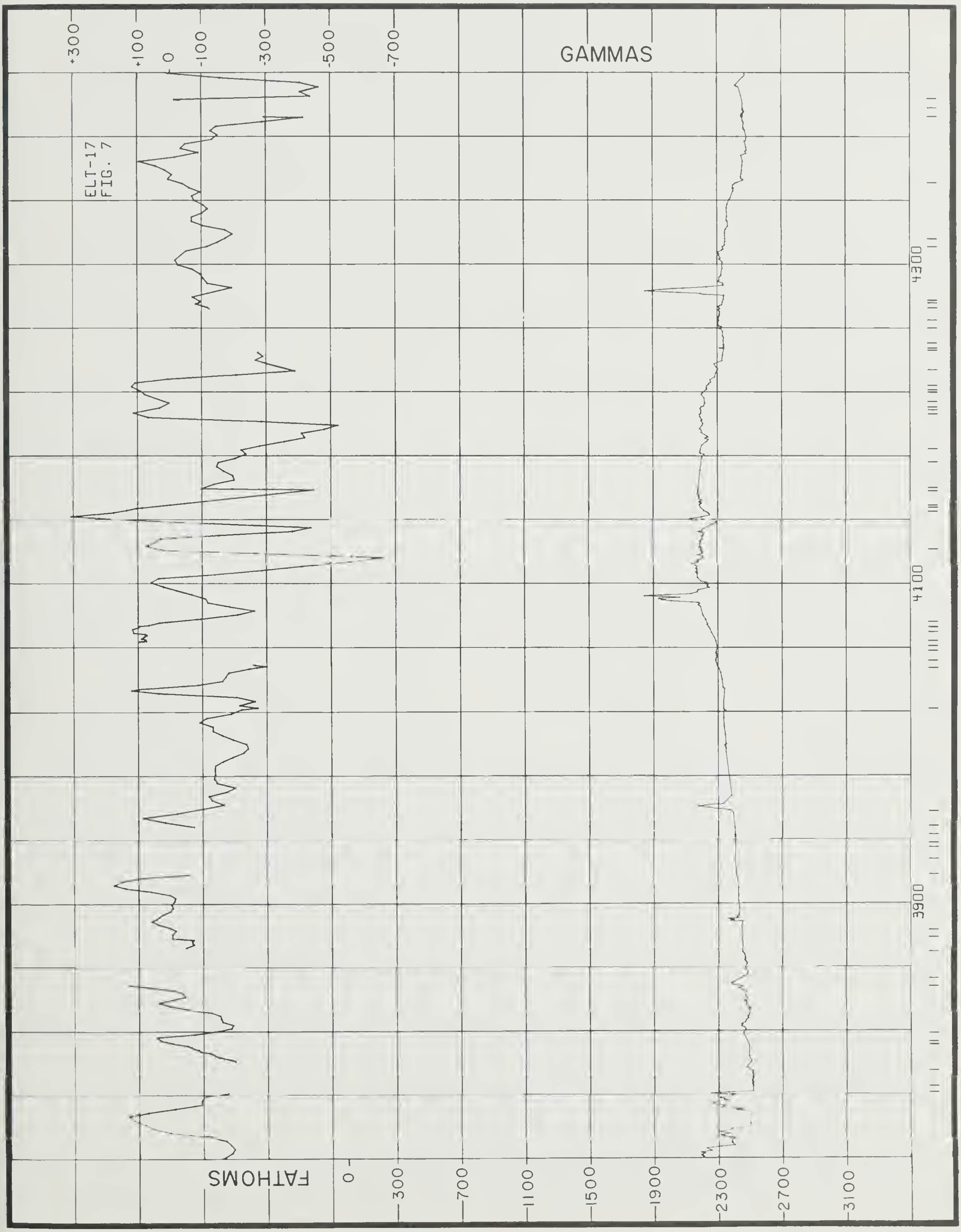

ELT-17
FIG. 3
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
1300
1500
1700

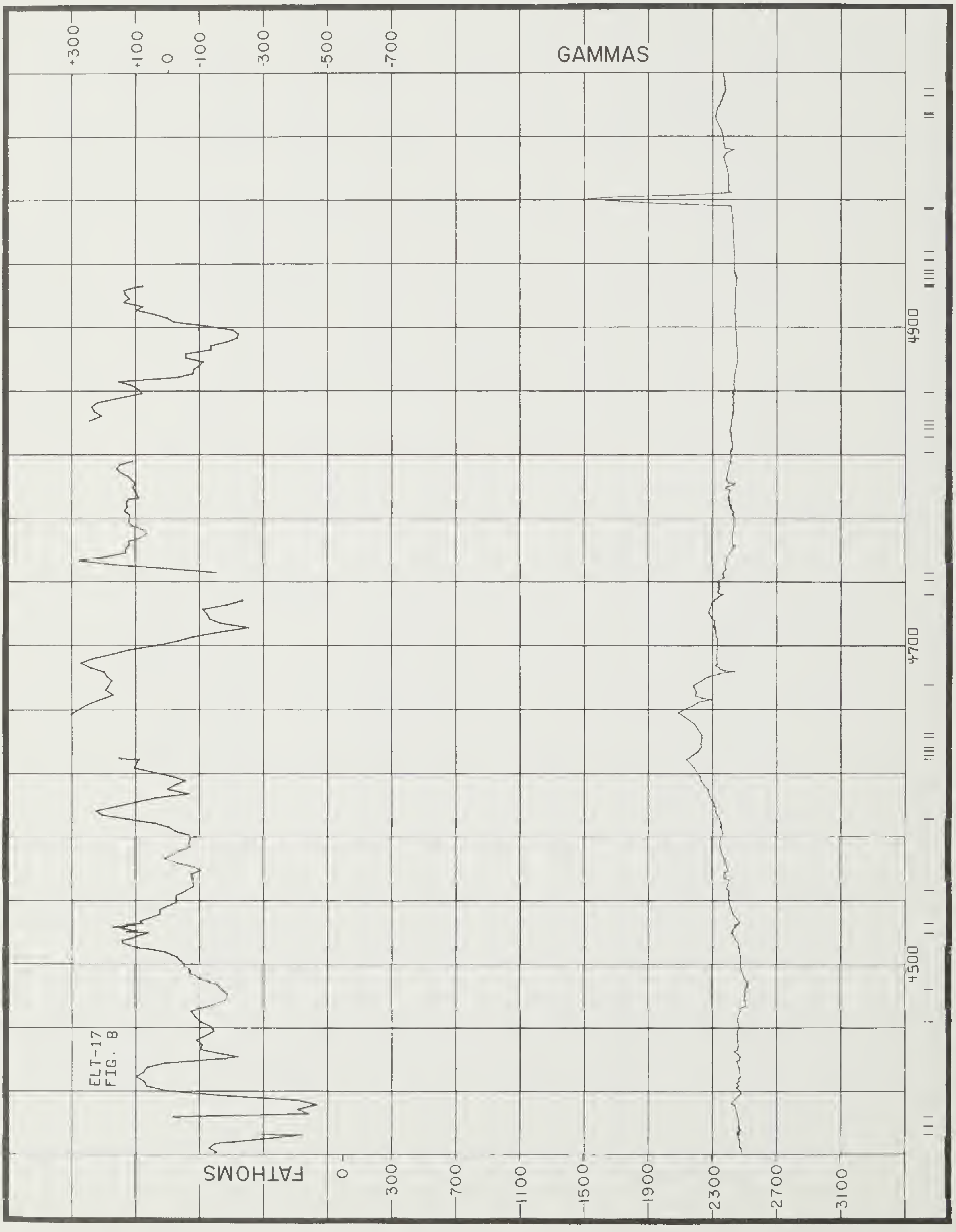

ELT-17
FIG. 4
GAMMAS
FATHOMS
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
25
2300
2100
1900

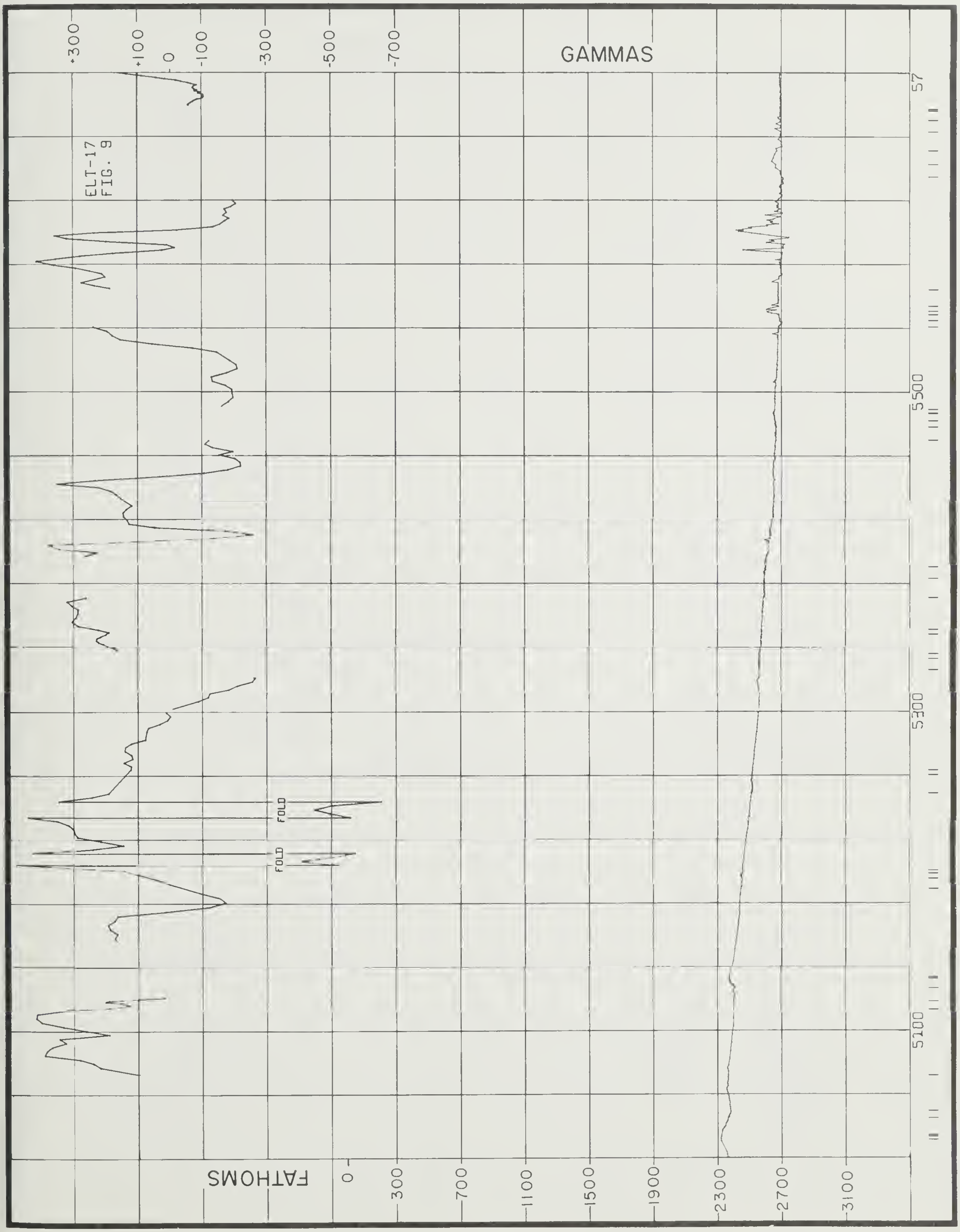

GAMMAS
+300
+100
0
-100
-300
-500
-700
ELT-17
FIG. 5
FOLD
FOLD
FOLD
FOLD
FOLD
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
2500
2700
2900
3100

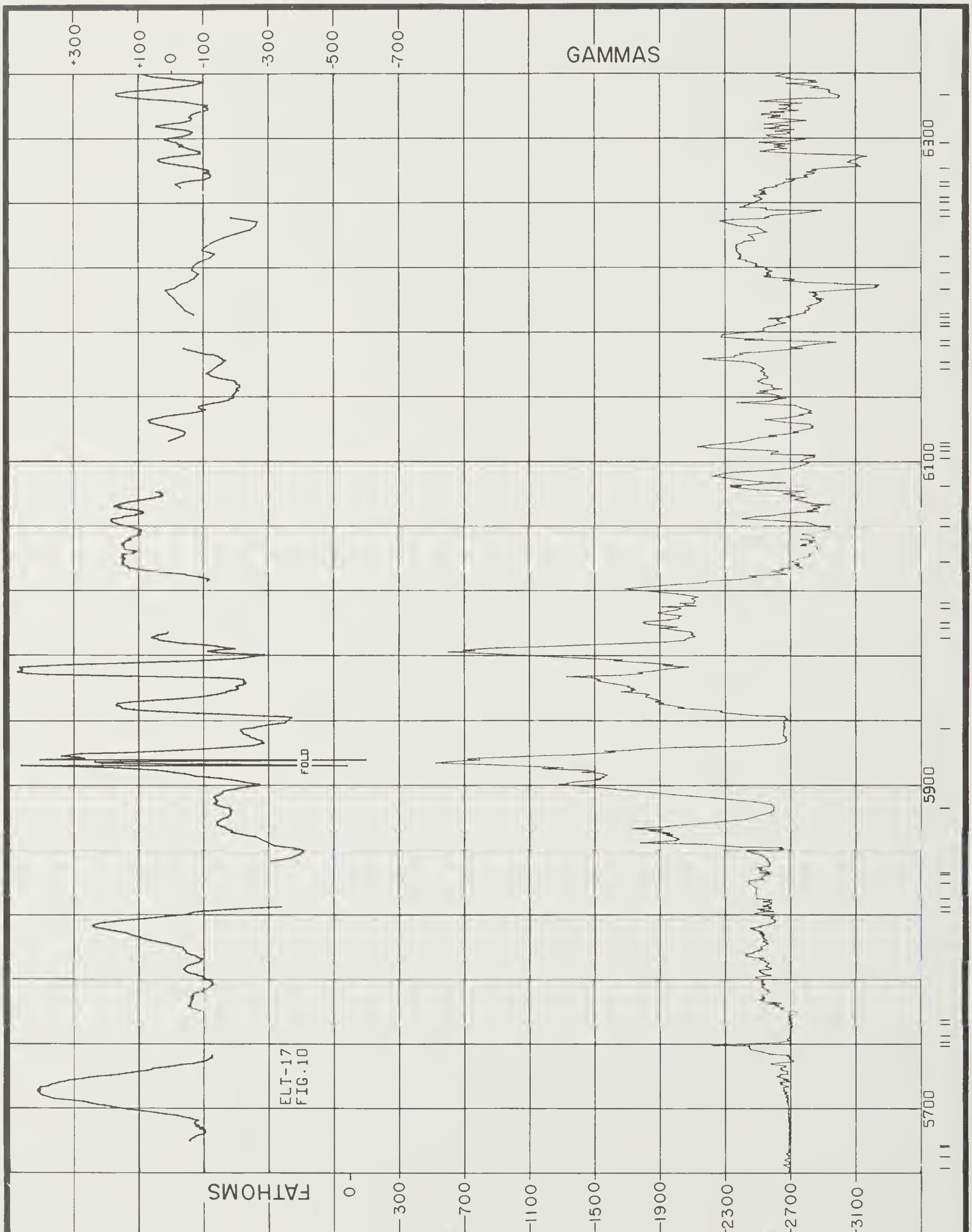


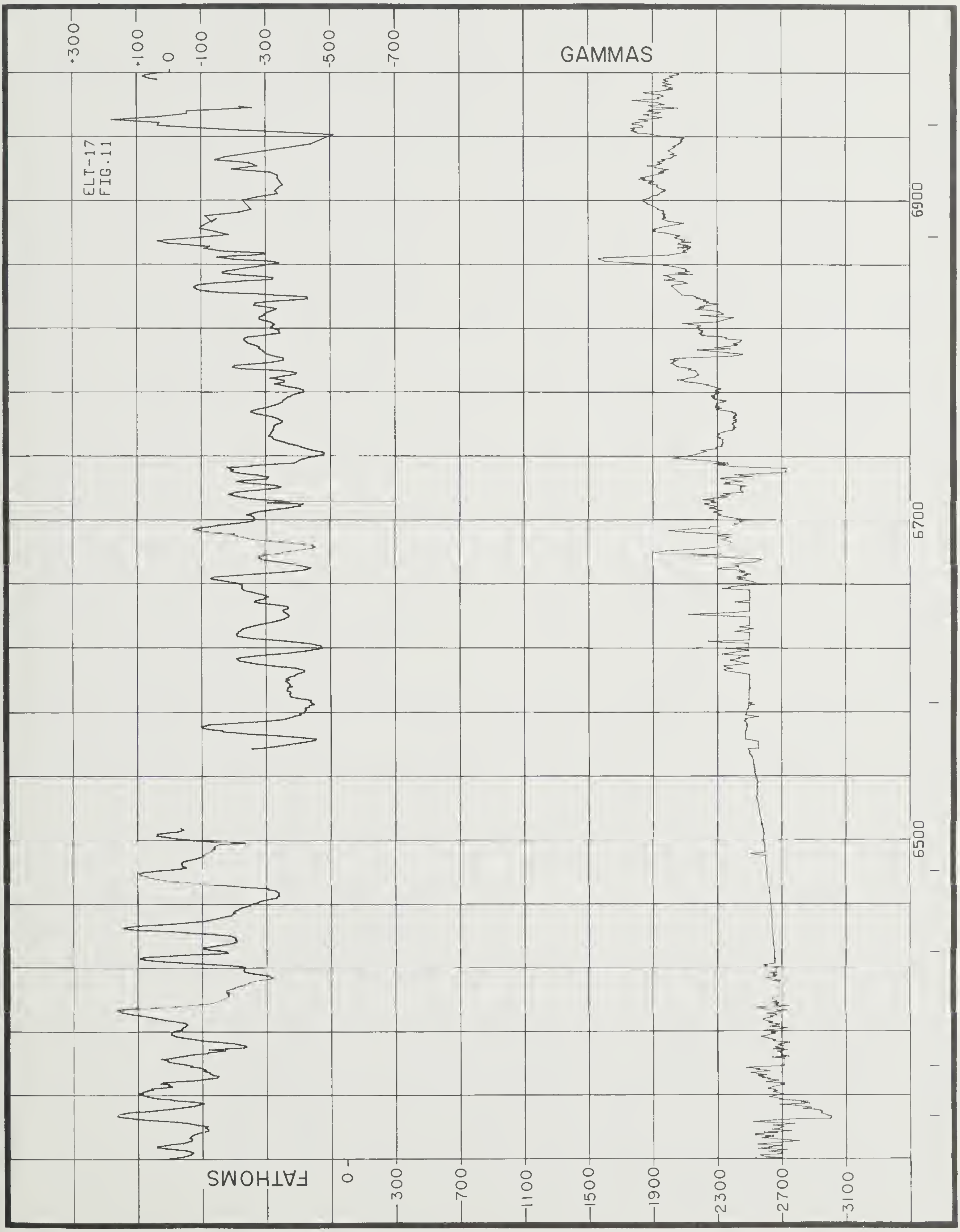
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
3300
3500
3700
ELT-17
FIG. 6
FOLD

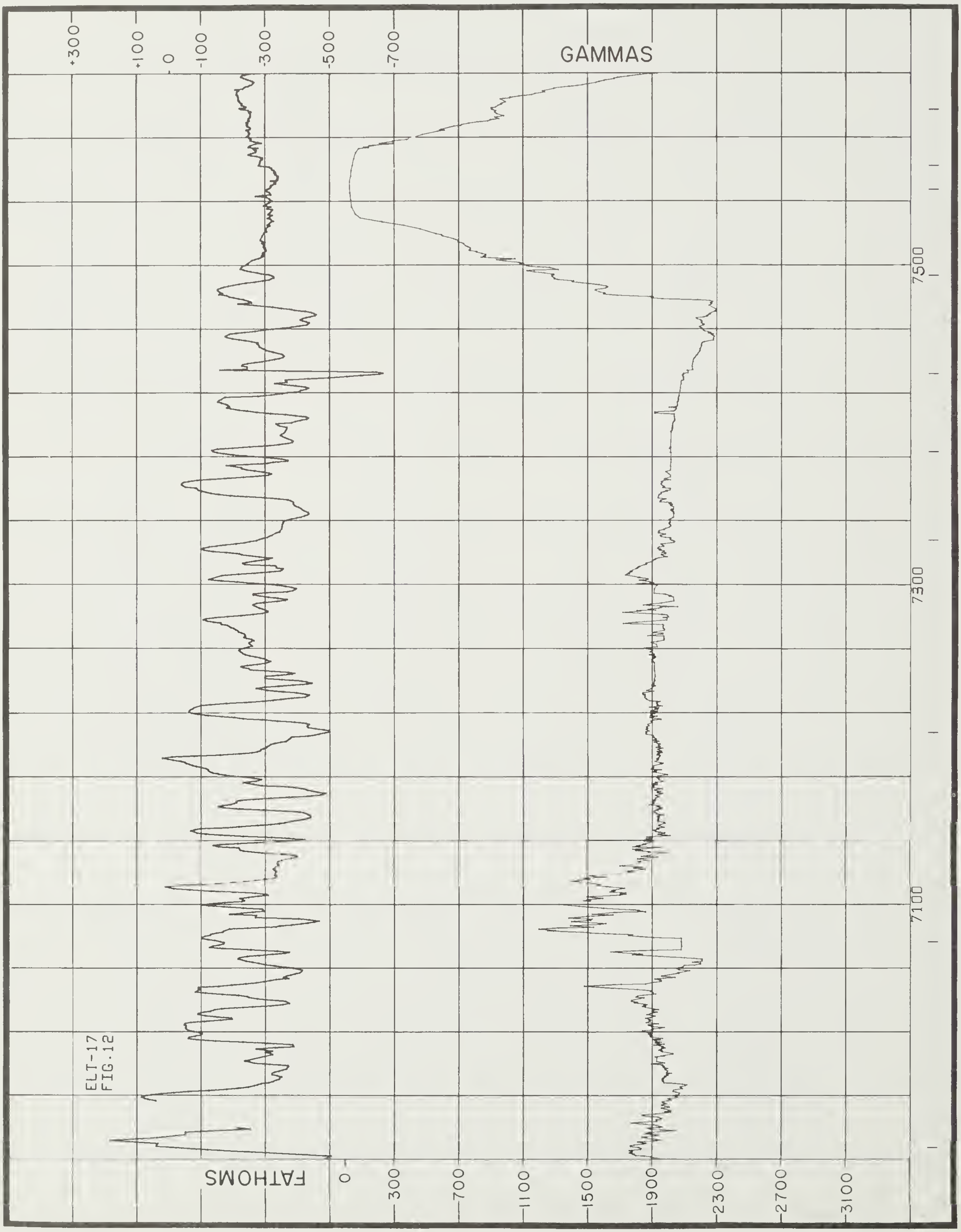

ELT-17
FIG. 7
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
3900
4100
4300

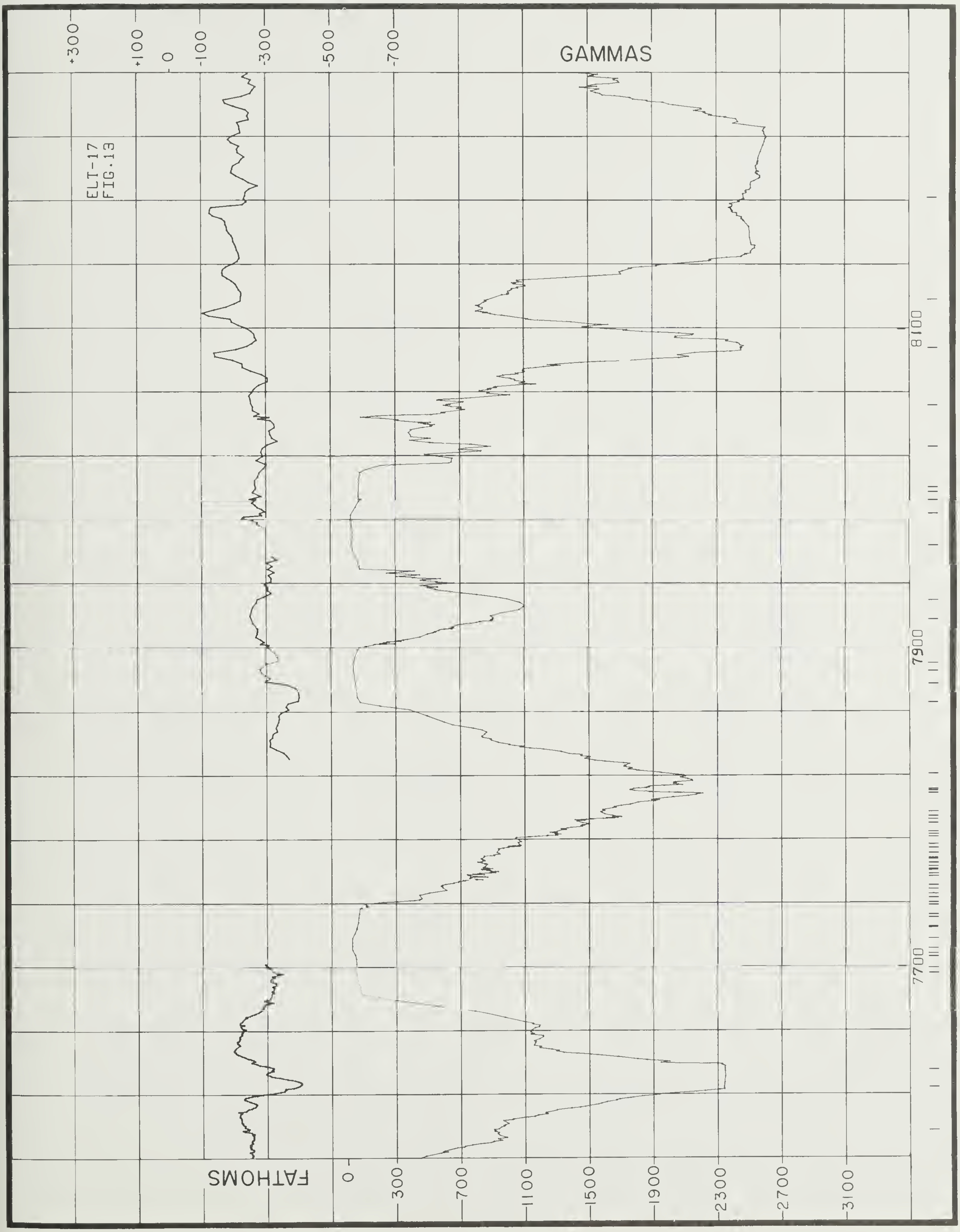

GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
4900
4700
4500
ELT-17
FIG. 8

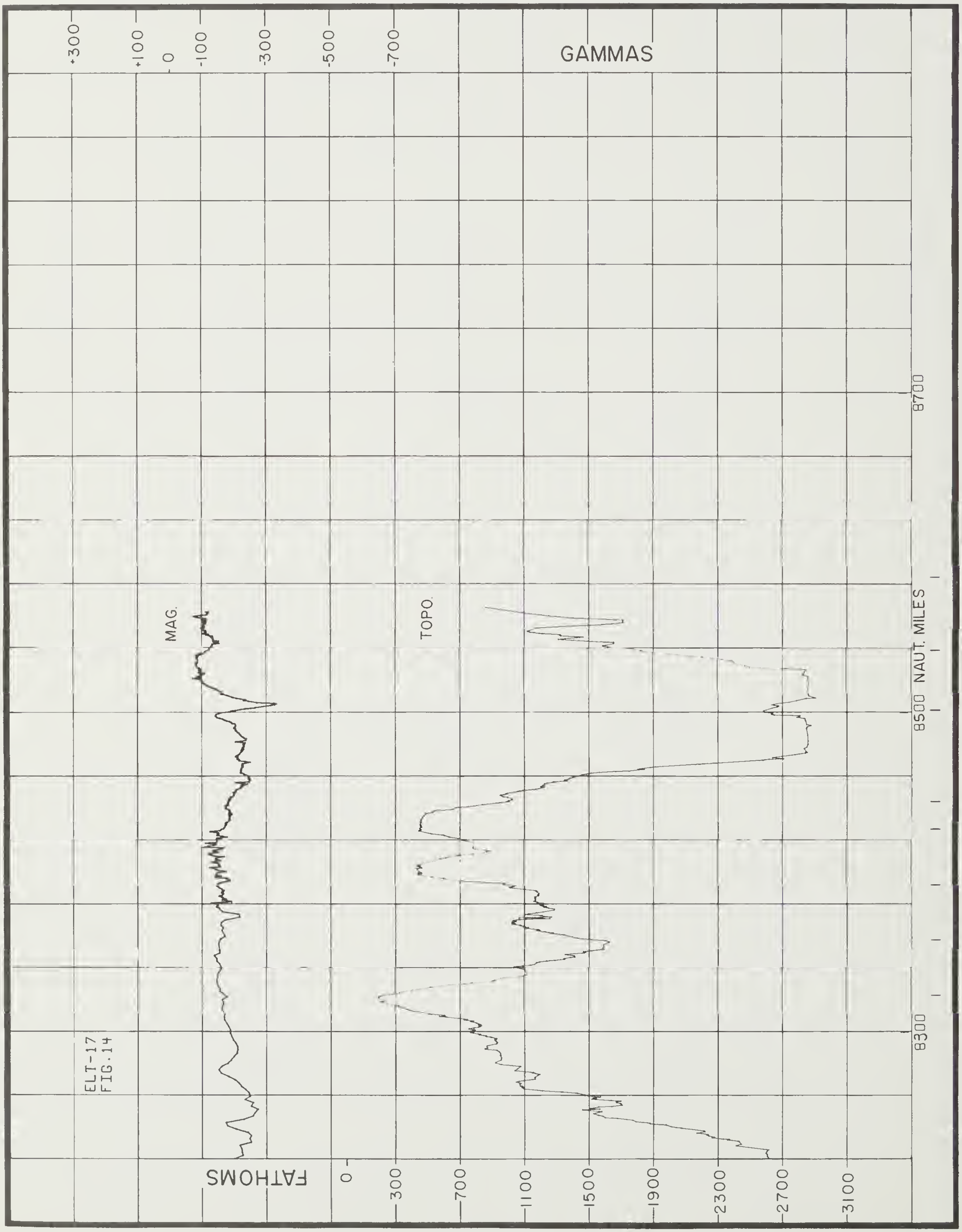

ELT-17
FIG. 9
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
FOLD
FOLD
57
5500
5300
5100


GAMMAS
FATHOMS
ELT-17
FIG.10
FOLD
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
5700
5900
6100
6300

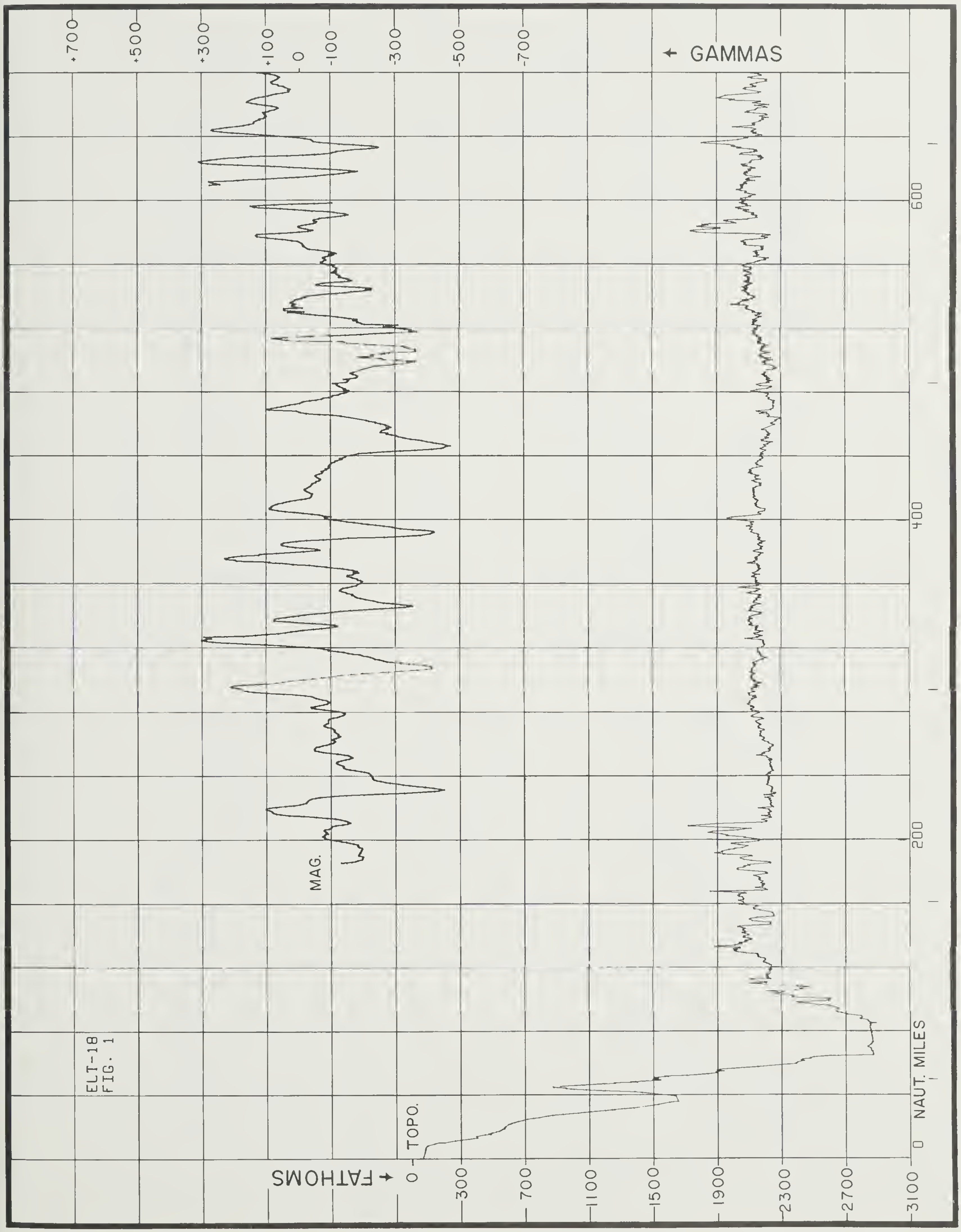

ELT-17
FIG.11
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
6900
6700
6500

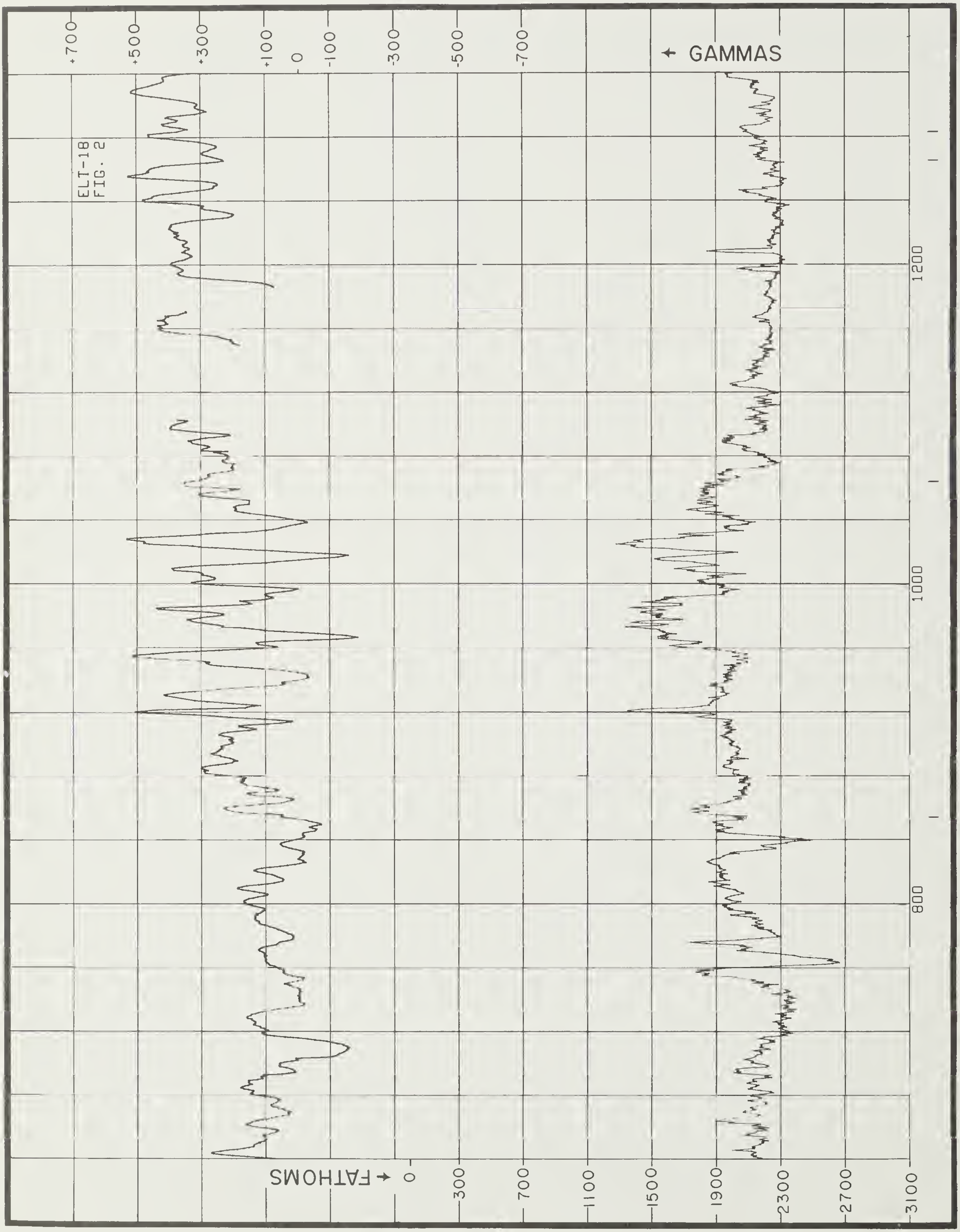

GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
7100
7300
7500
ELT-17
FIG.12

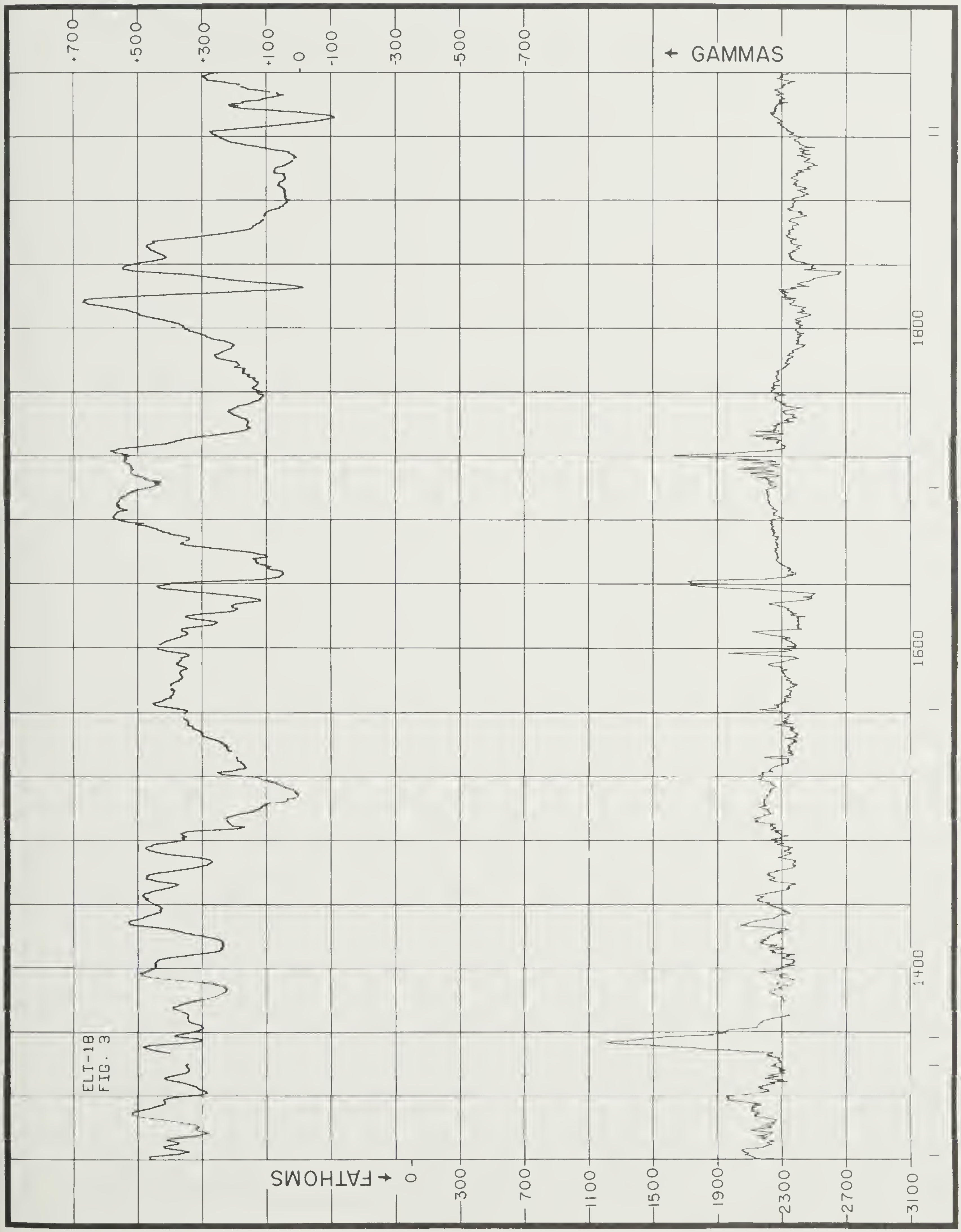

ELT-17
FIG.13
GAMMAS
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
8100
7900
7700

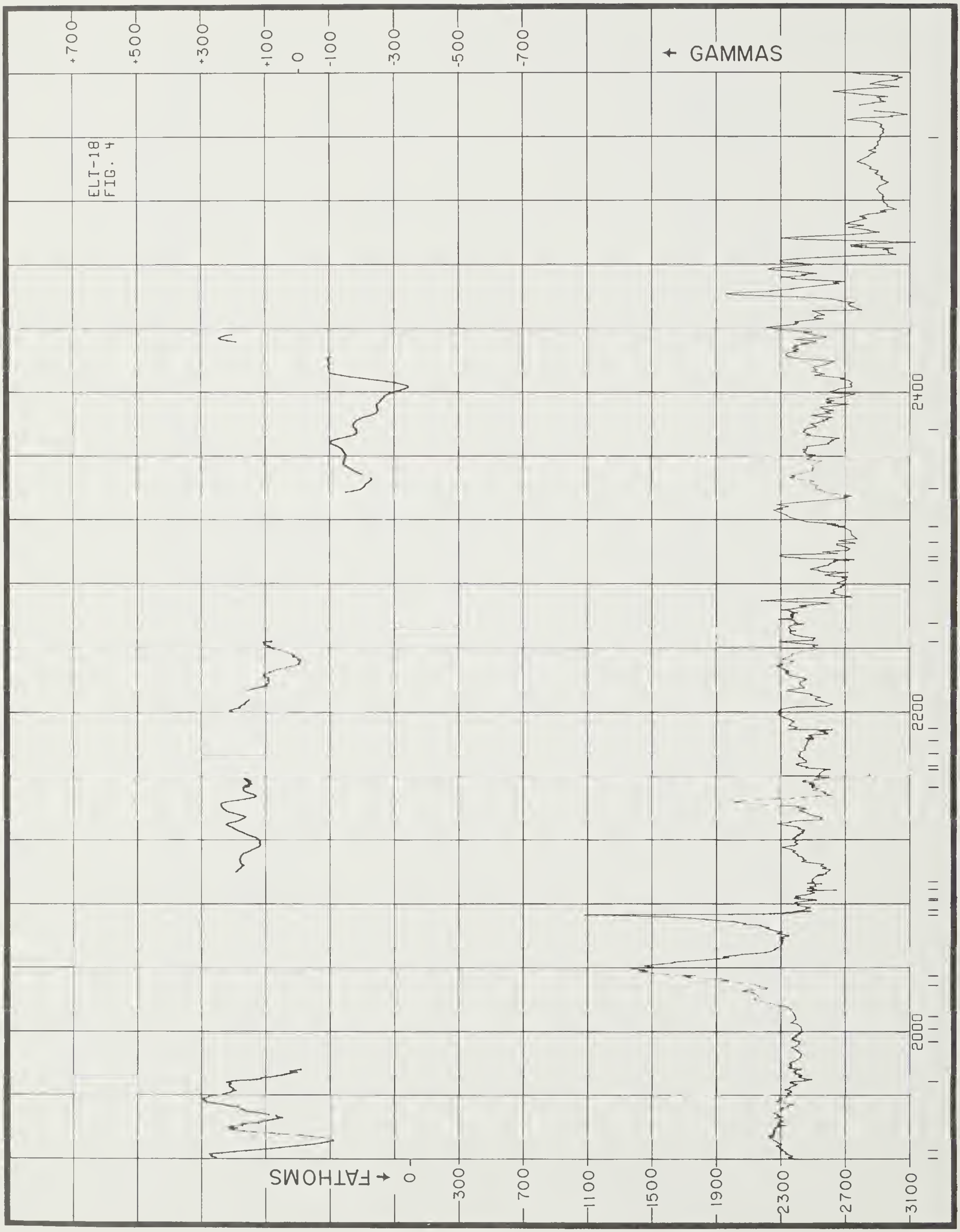


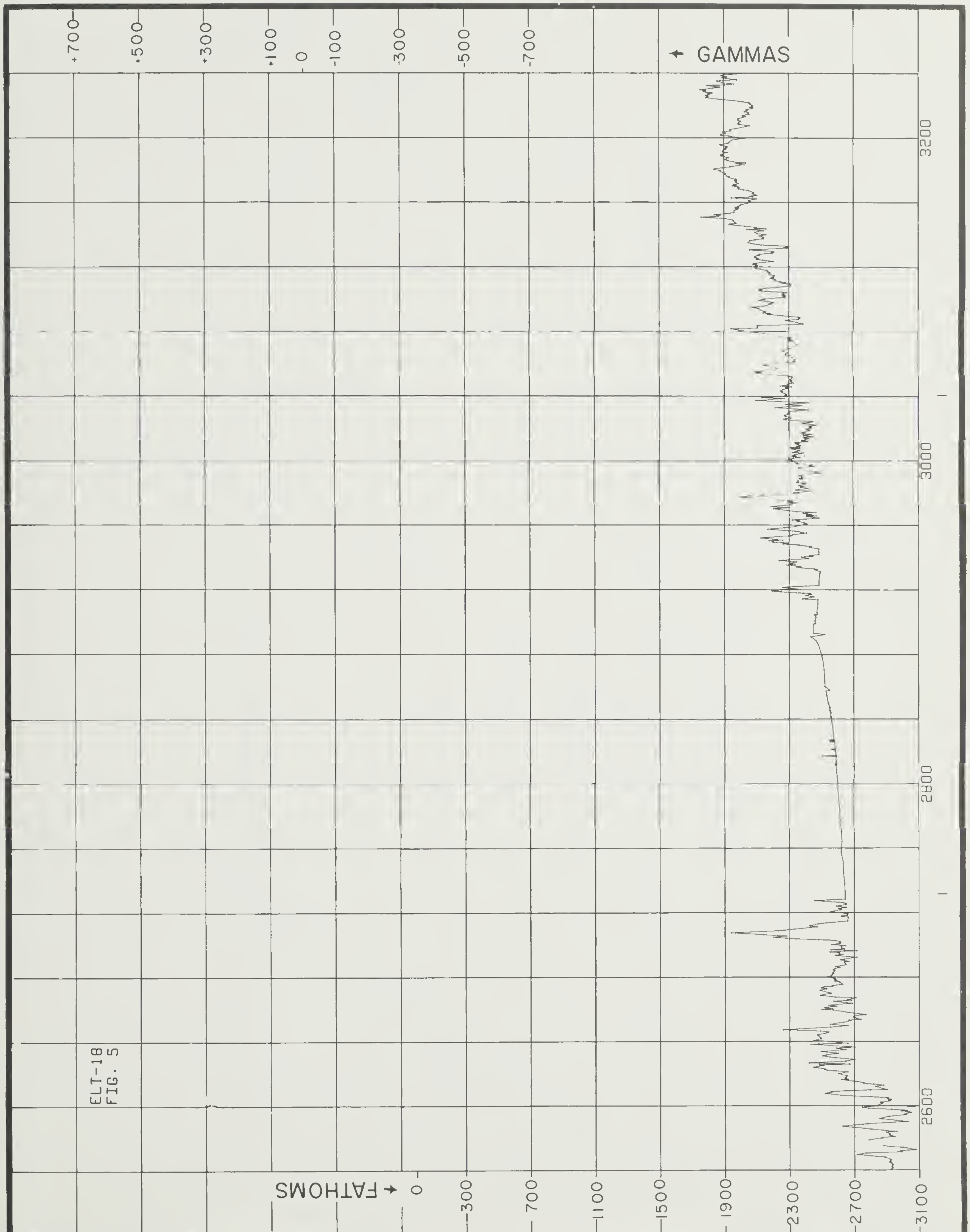
GAMMAS
+300
+100
0
-100
-300
-500
-700
MAG.
TOPO.
8700
8500 NAUT. MILES
8300
ELT-17
FIG.14
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100

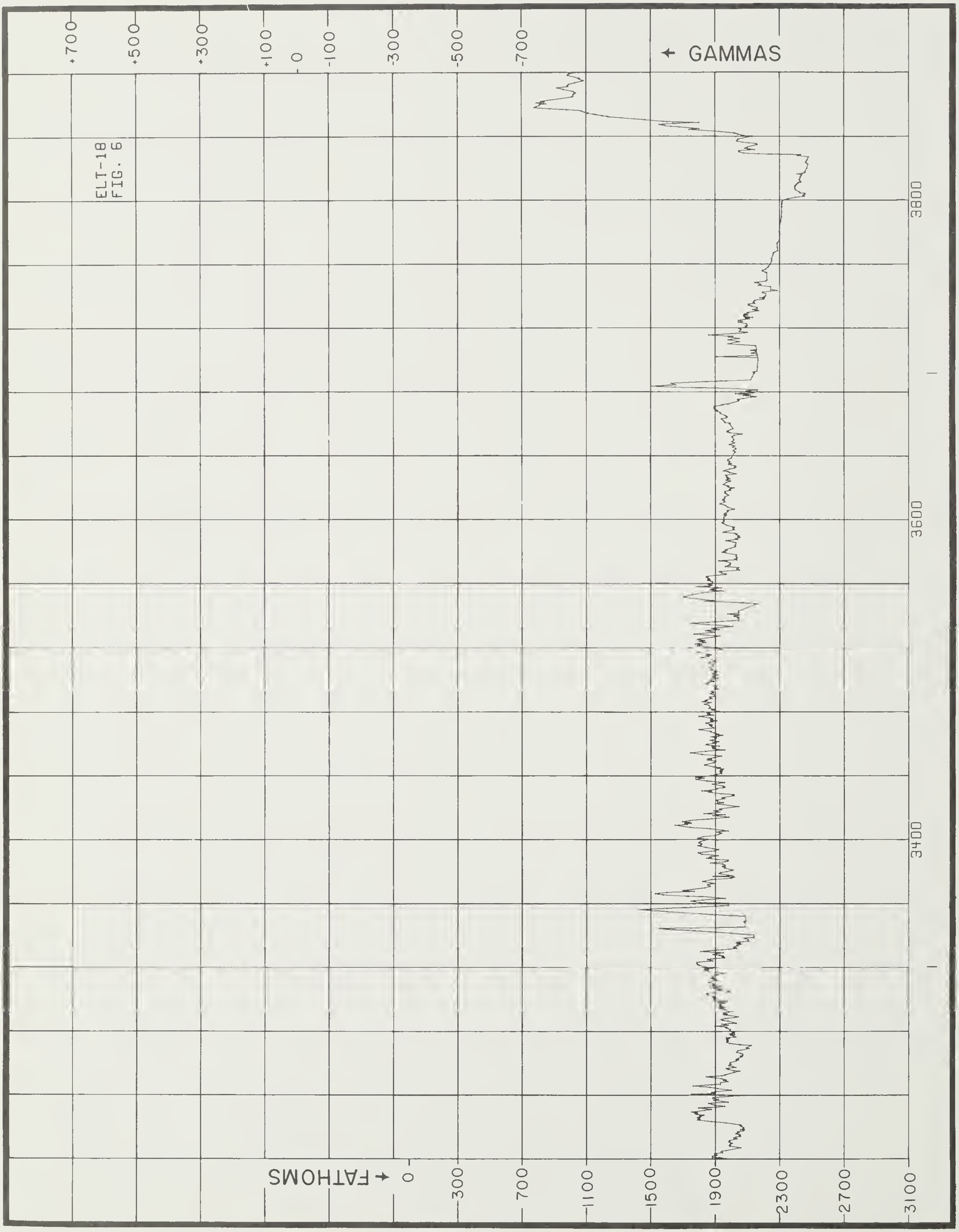

ELT-18
FIG. 1
TOPO.
MAG.
GAMMAS
FATHOMS
NAUT. MILES
+700
+500
+300
+100
0
-100
-300
-500
-700
-1100
-1500
-1900
-2300
-2700
-3100
200
400
600

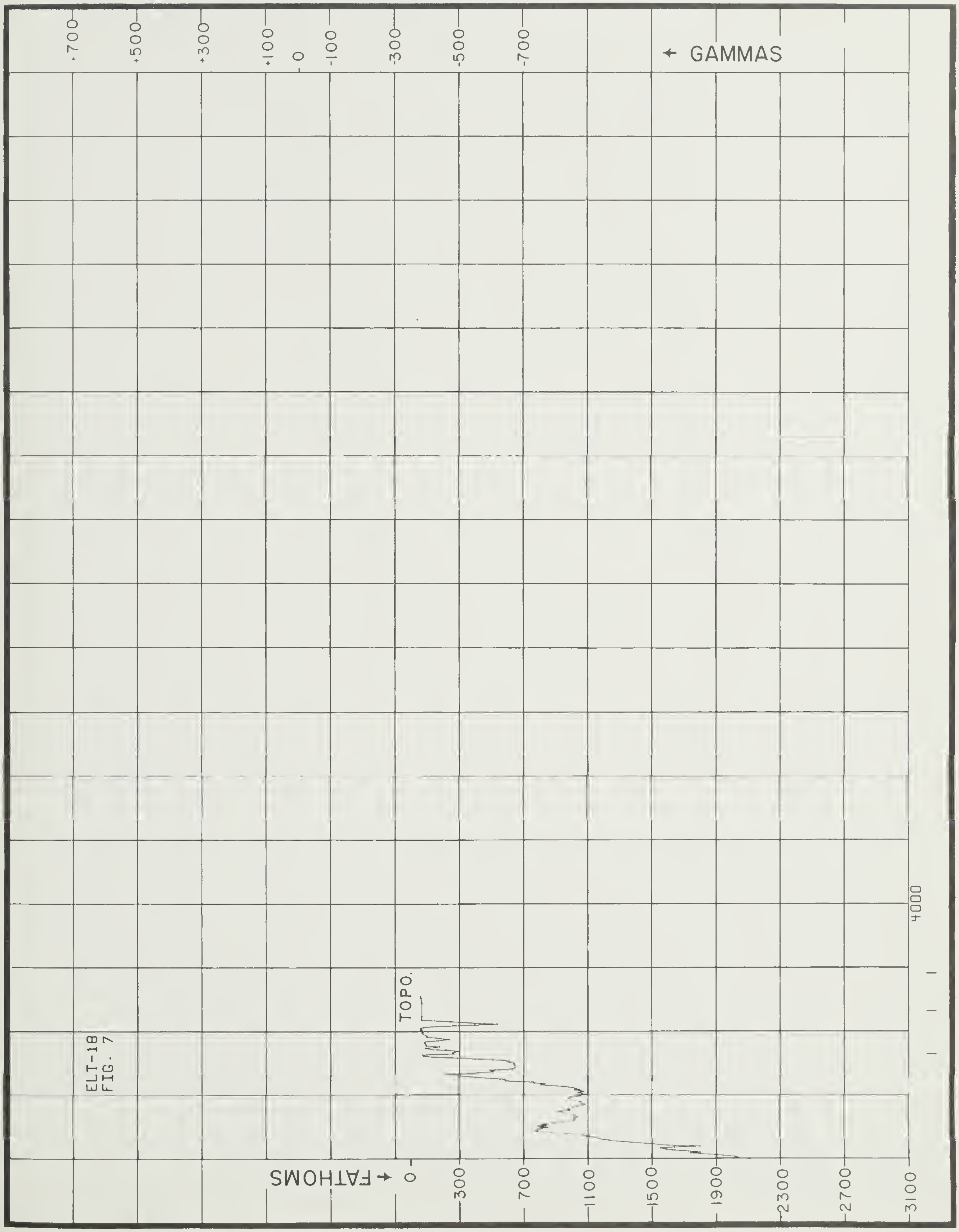

ELT-18
FIG. 2
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
800
1000
1200

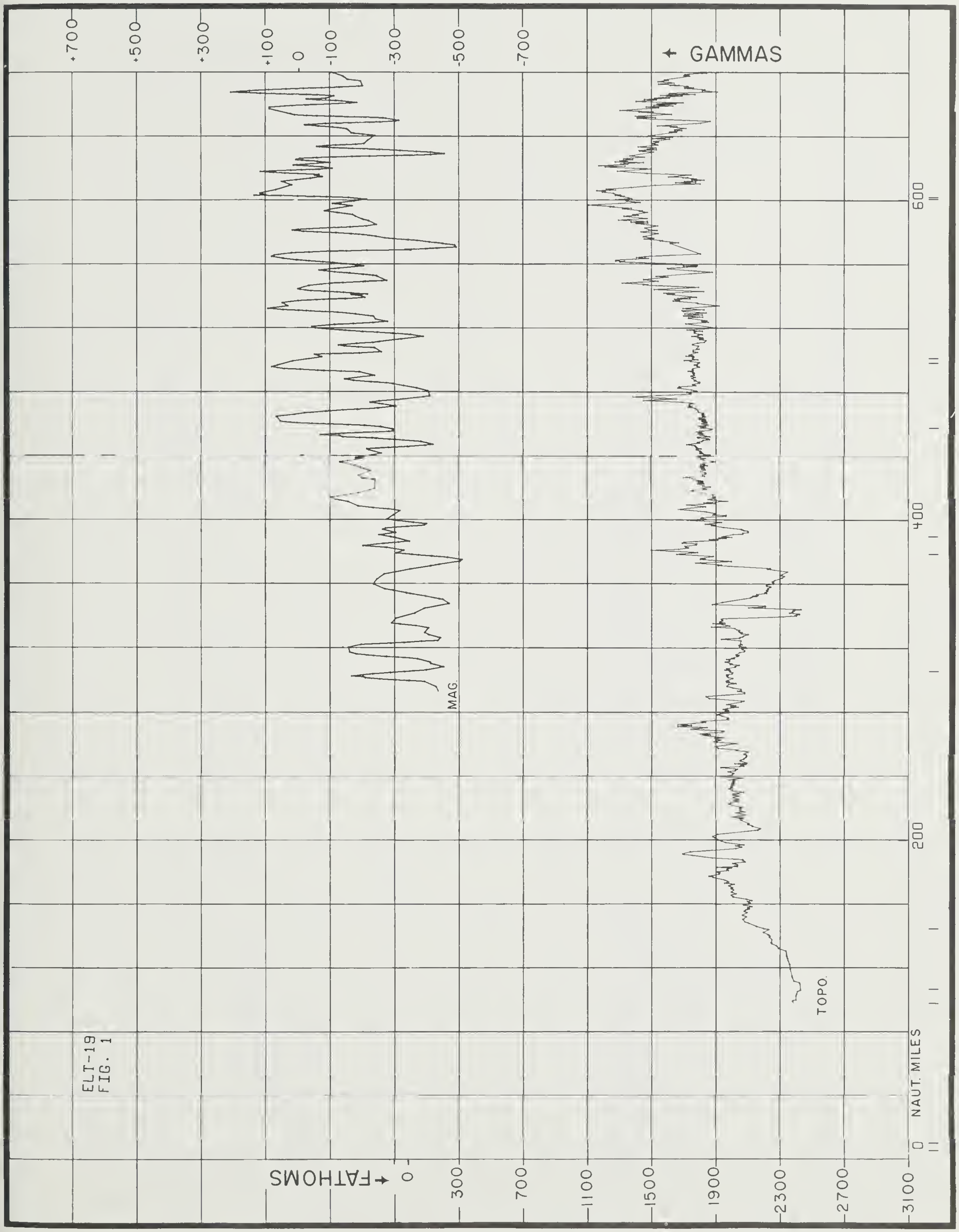

GAMMAS
FATHOMS
ELT-18
FIG. 3
+700
+500
+300
+100
0
-100
-300
-500
-700
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
1400
1600
1800

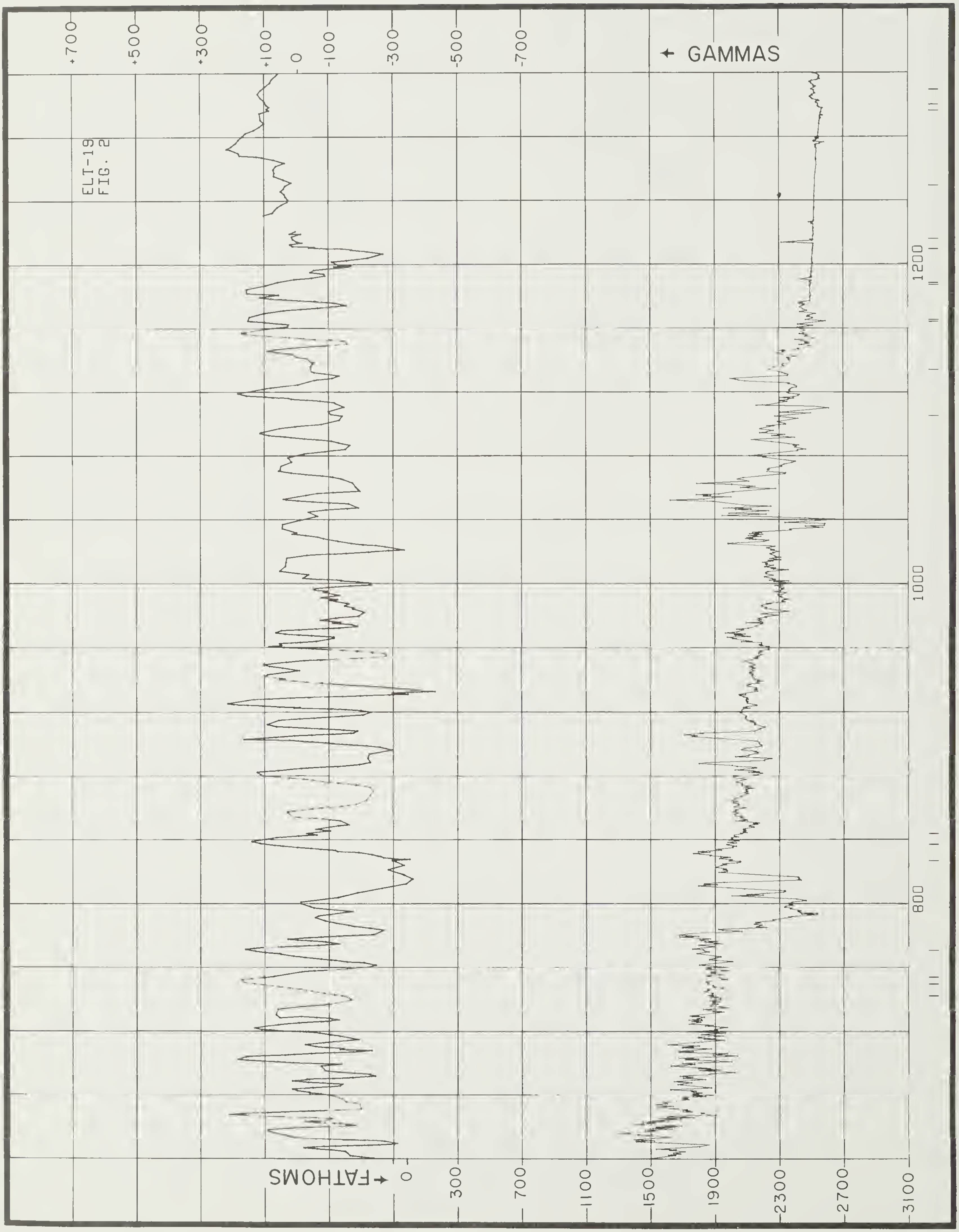

ELT-18
FIG. 4
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
2000
2200
2400

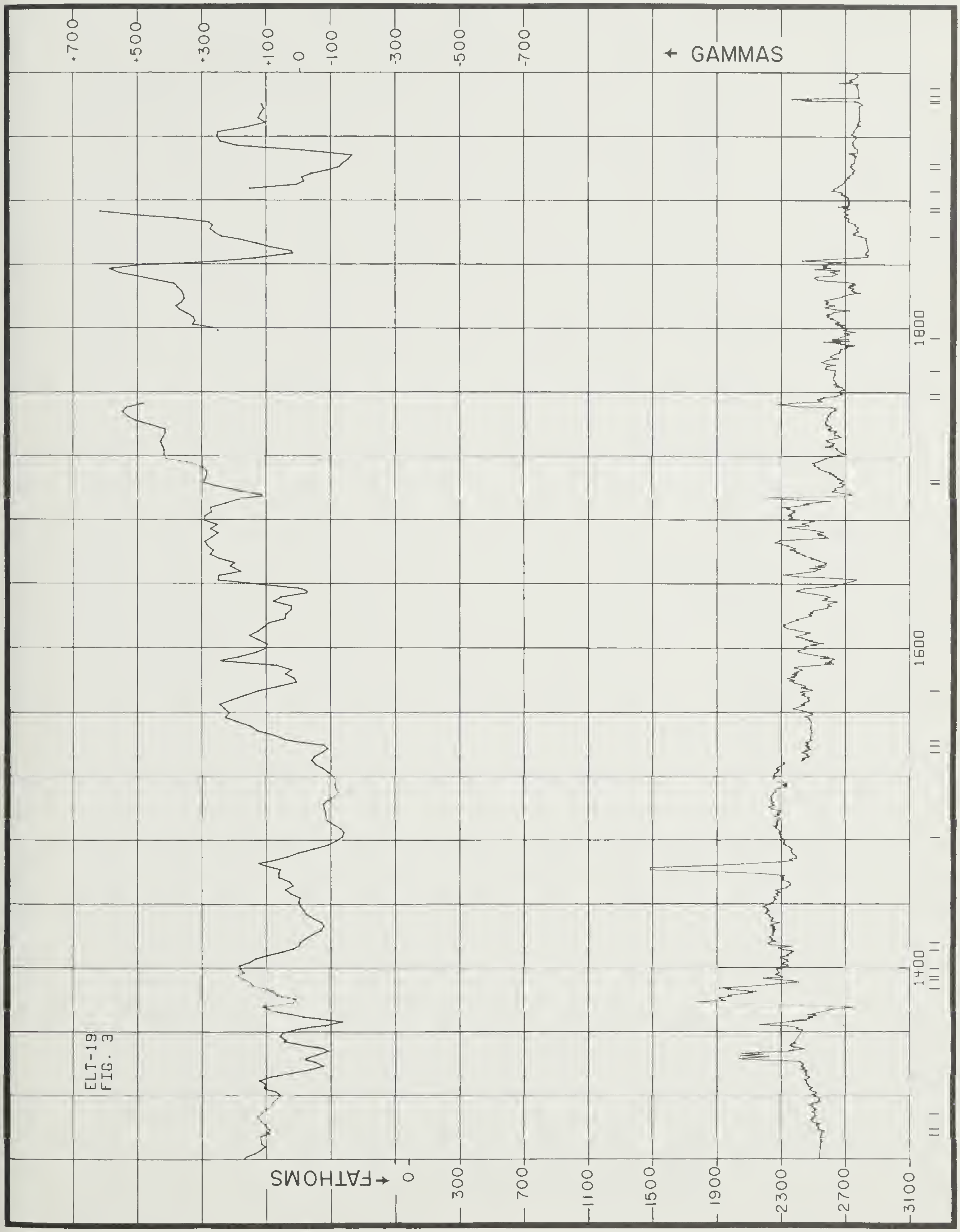

GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
-300
-700
-1100
-1500
-1900
-2300
-2700
-3100
2600
2800
3000
3200
ELT-18
FIG. 5

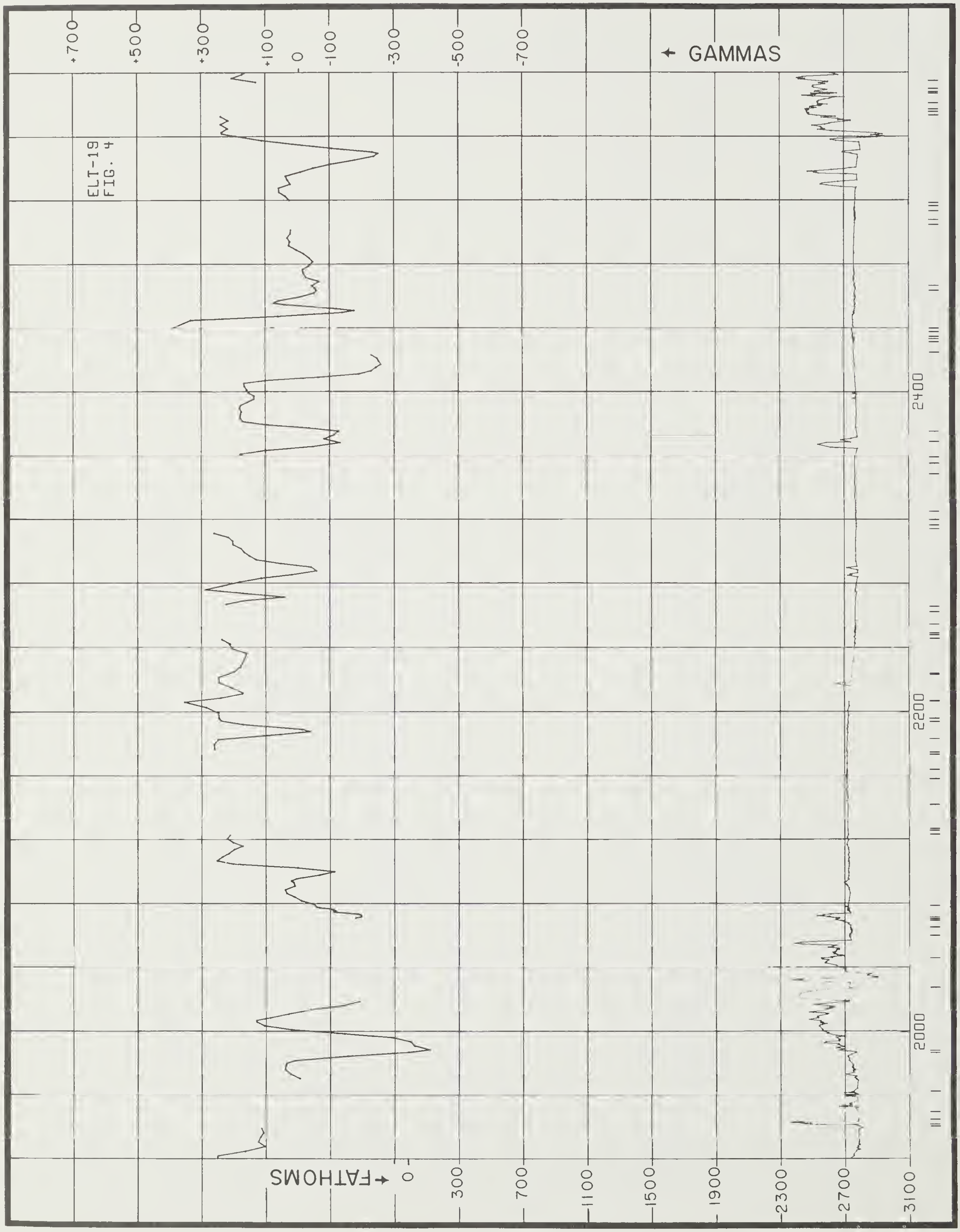

+700
+500
+300
+100
0
-100
-300
-500
-700
+ GAMMAS
ELT-18
FIG. 6
3800
3600
3400
+ FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100

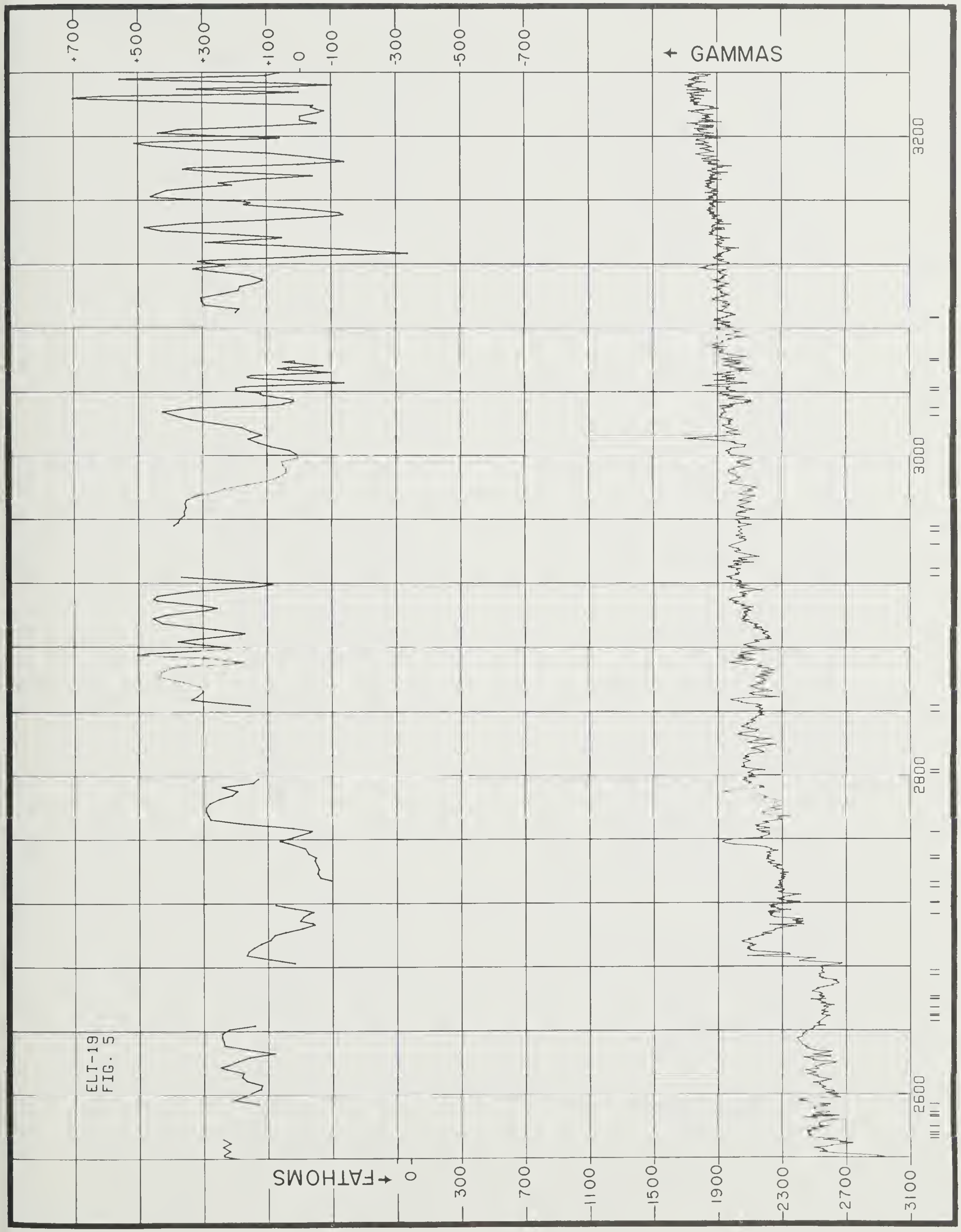

+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
4000
TOPO.
ELT-18
FIG. 7
FATHOMS ←
0
300
700
1100
1500
1900
2300
2700
3100

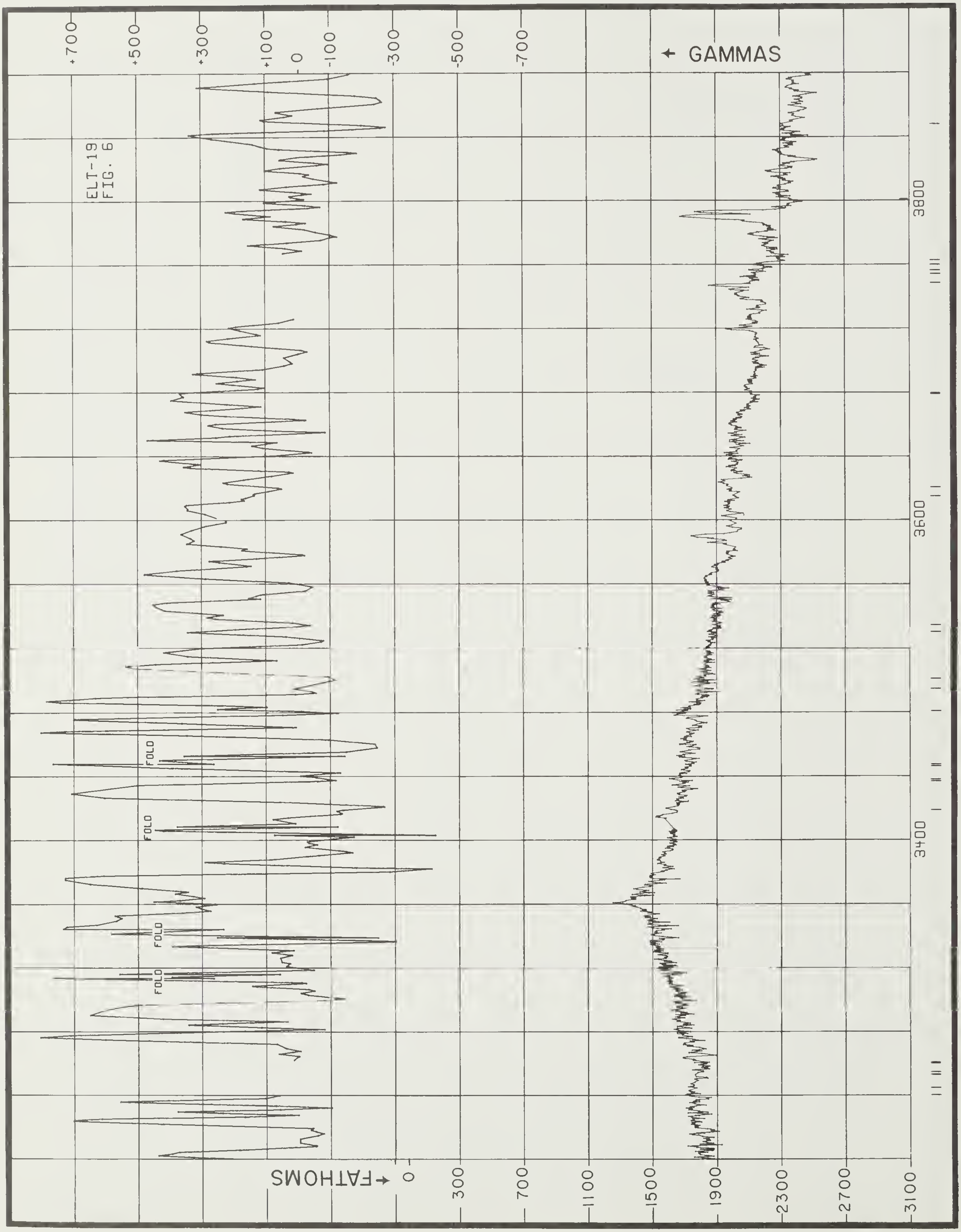

ELT-19
FIG. 1
GAMMAS
+700 +500 +300 +100 0 -100 -300 -500 -700
FATHOMS
0 300 700 1100 1500 1900 2300 2700 3100
MAG.
TOPO.
NAUT. MILES
0 200 400 600

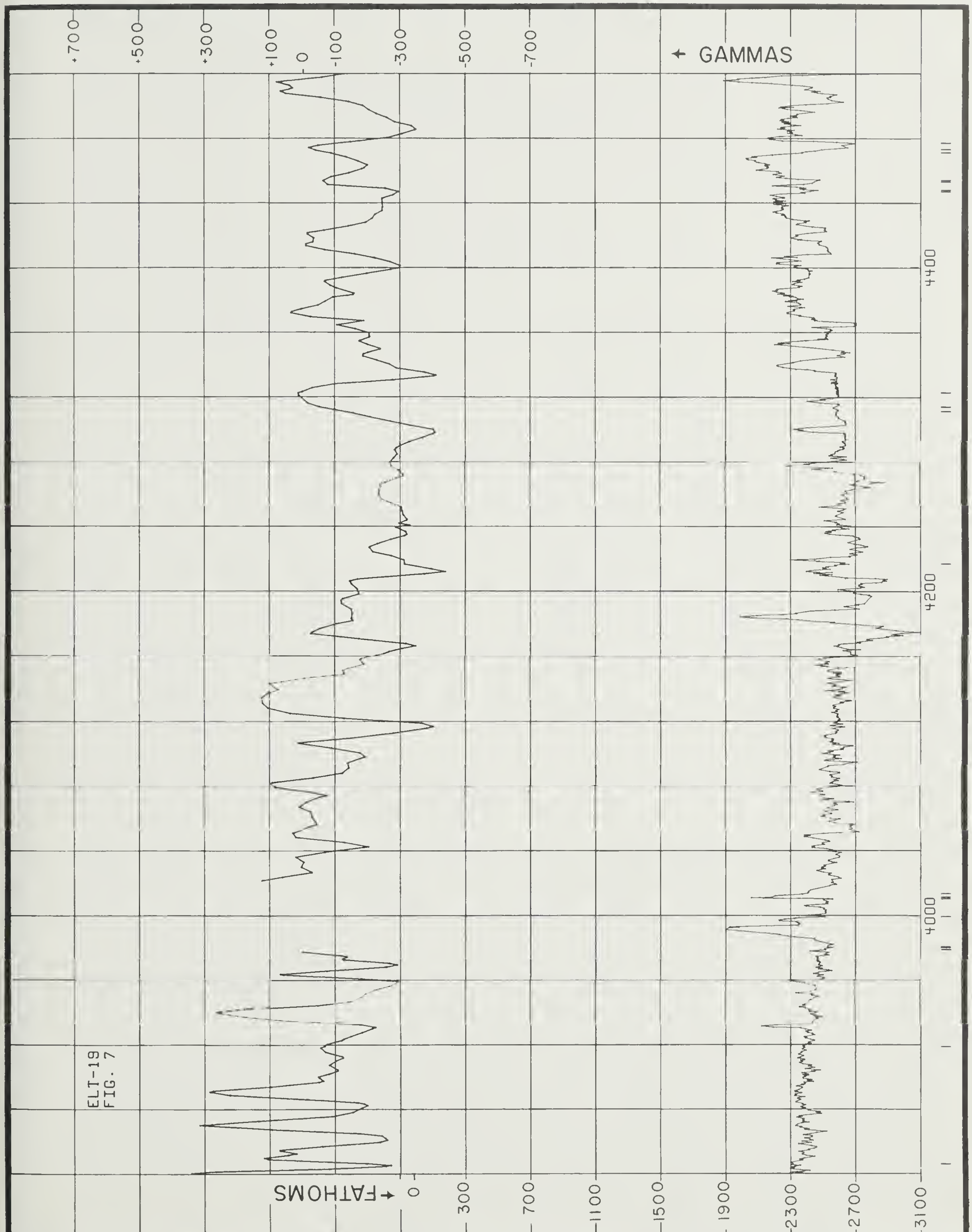

ELT-19
FIG. 2
GAMMAS
+700 +500 +300 +100 0 -100 -300 -500 -700
FATHOMS
0 300 700 1100 1500 1900 2300 2700 3100
800 1000 1200

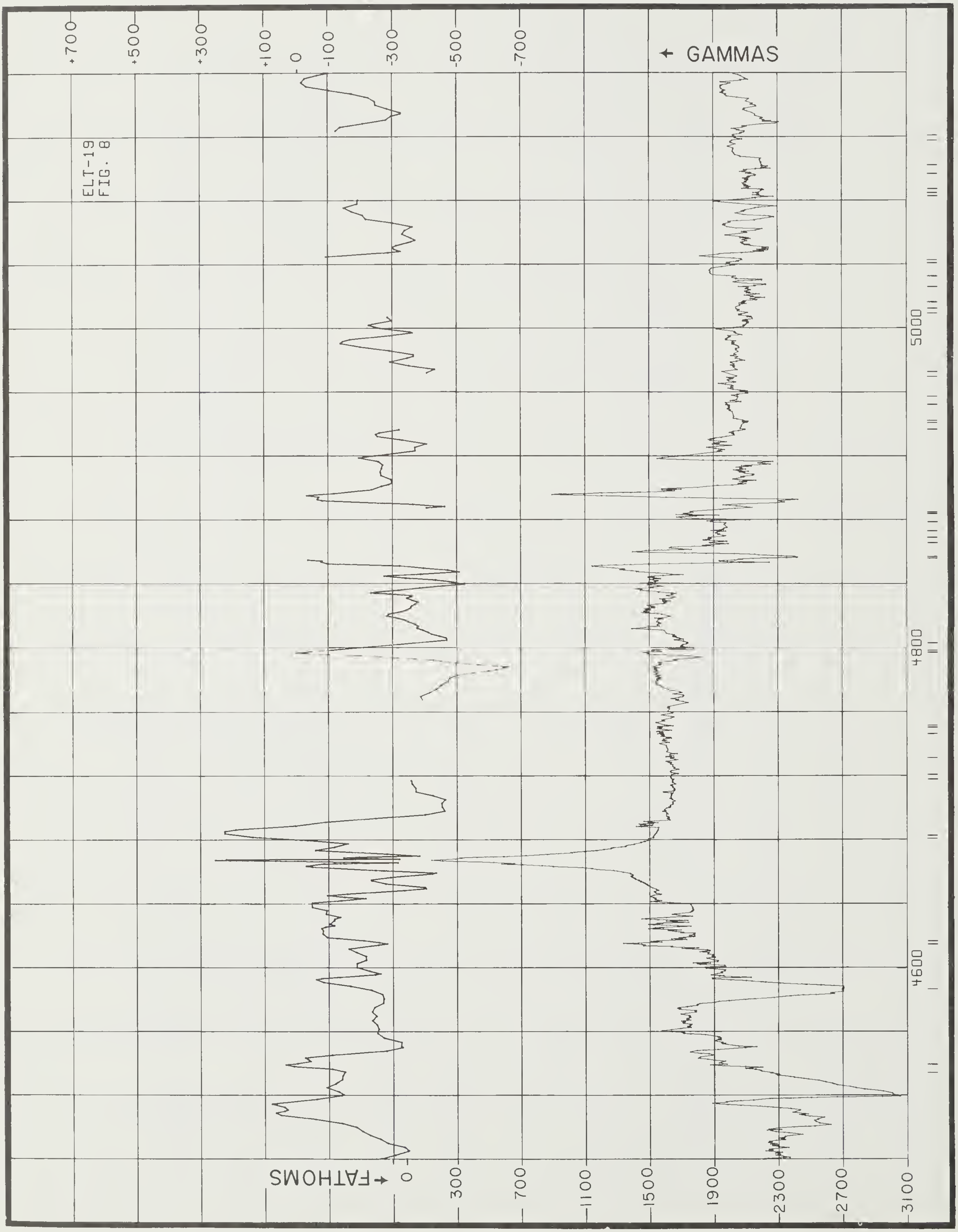

ELT-19
FIG. 3
← GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
← FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
1400
1600
1800

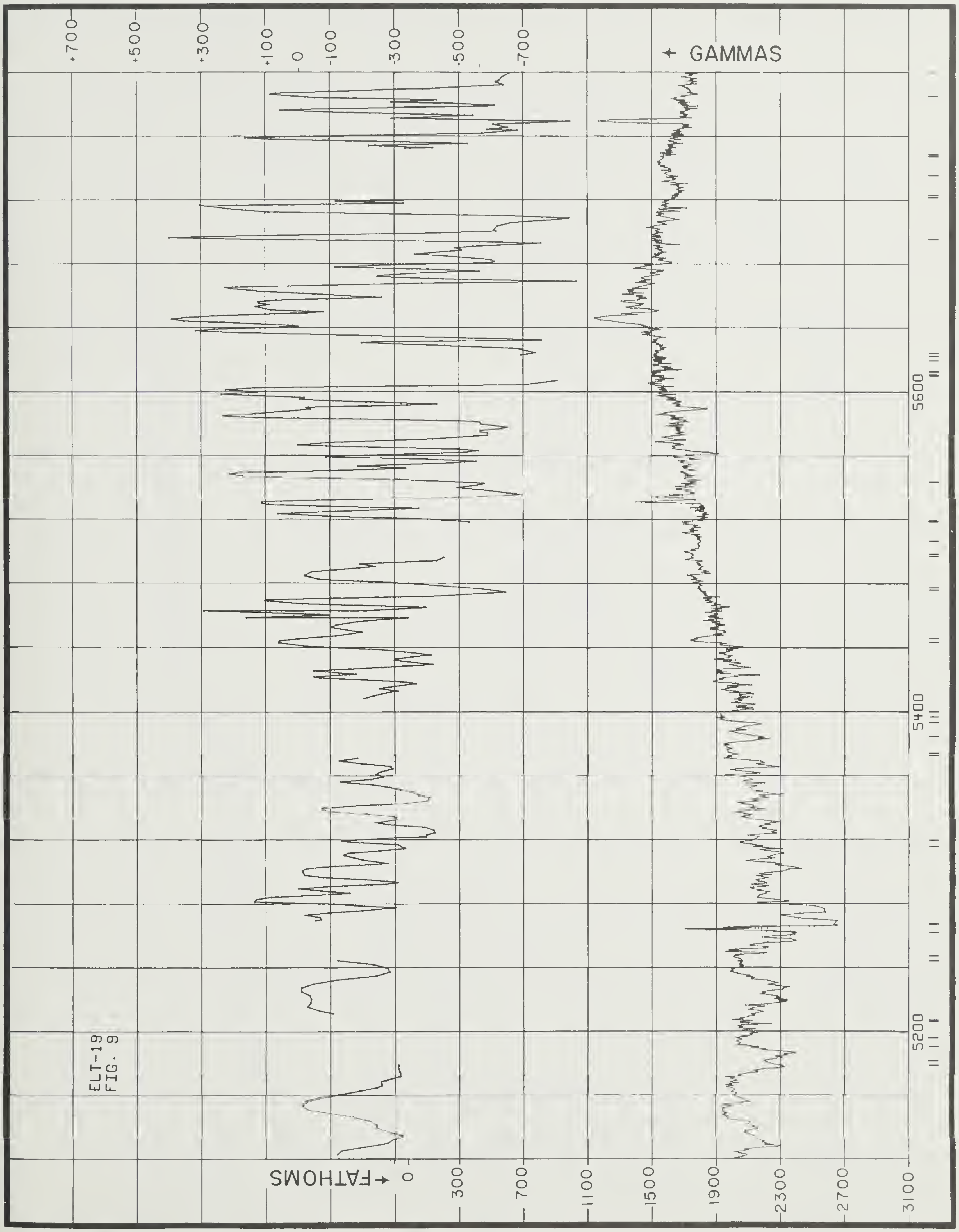

ELT-19
FIG. 4
← GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
← FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
2000
2200
2400

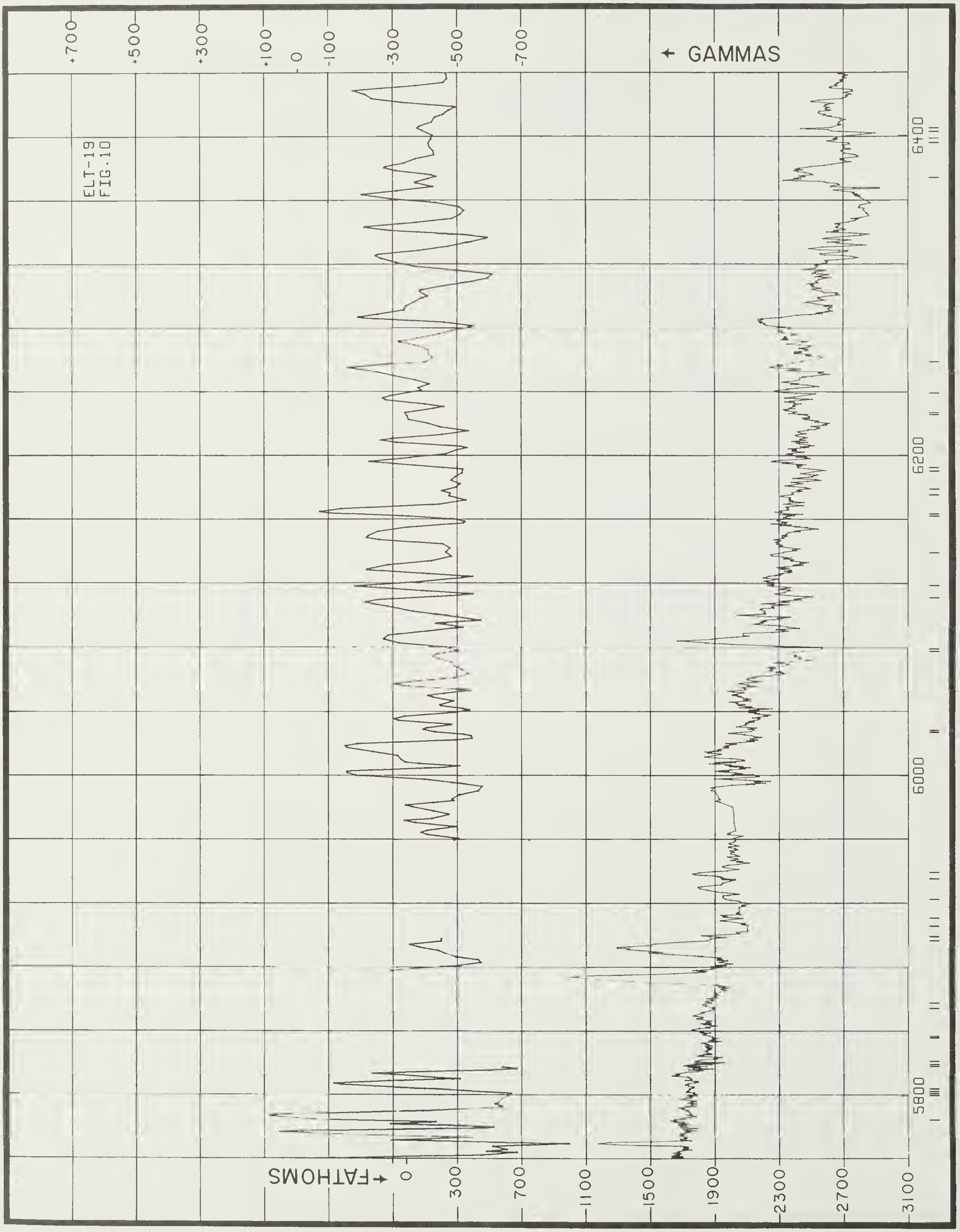

ELT-19
FIG. 5
← GAMMAS
← FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
2600
2800
3000
3200


ELT-19
FIG. 6
+ GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
FOLD
FOLD
FOLD
FOLD
3400
3600
3800

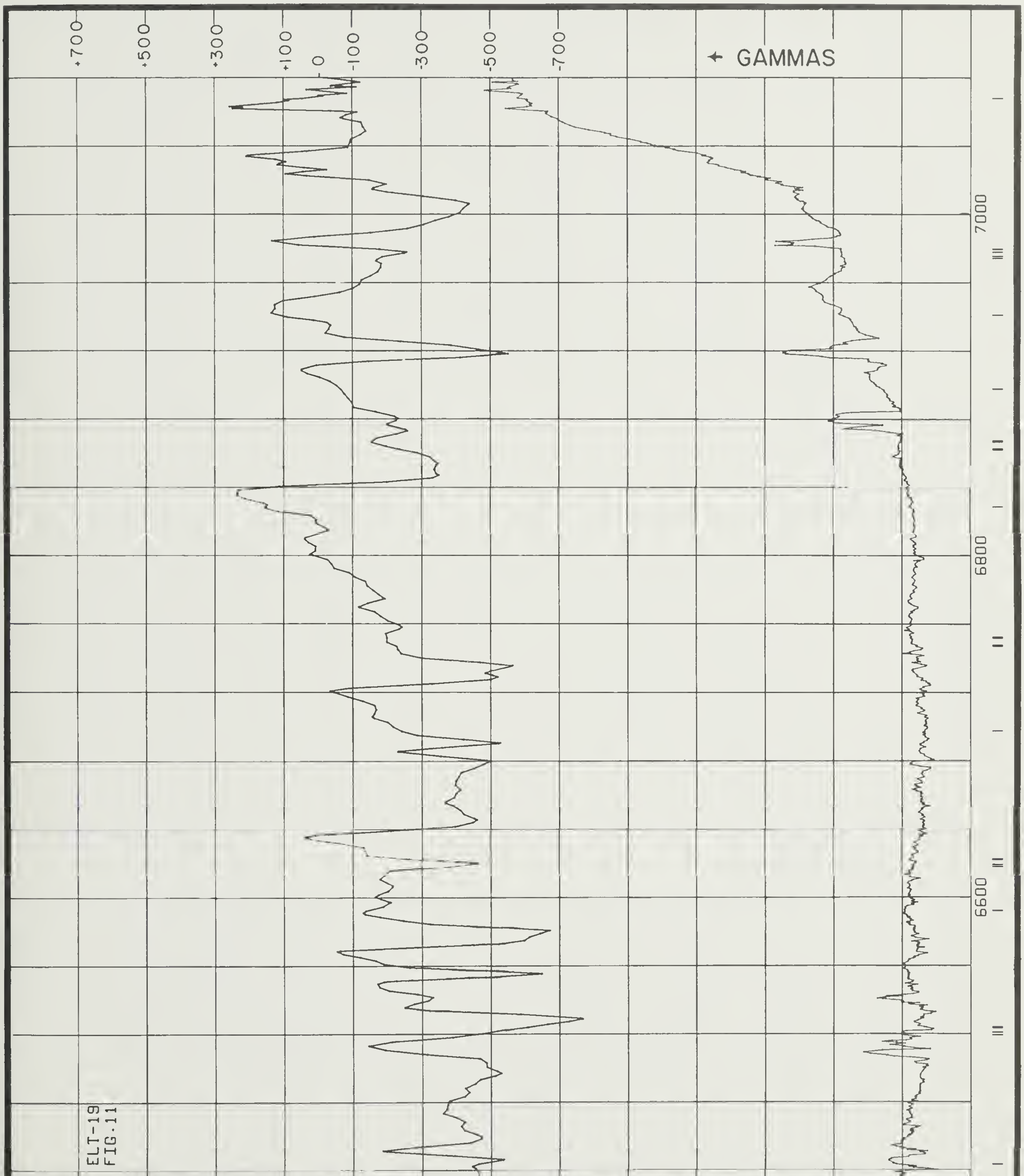

ELT-19
FIG. 7
+ GAMMAS
+700 +500 +300 +100 0 -100 -300 -500 -700
+ FATHOMS
0 300 700 1100 1500 1900 2300 2700 3100
4000 4200 4400

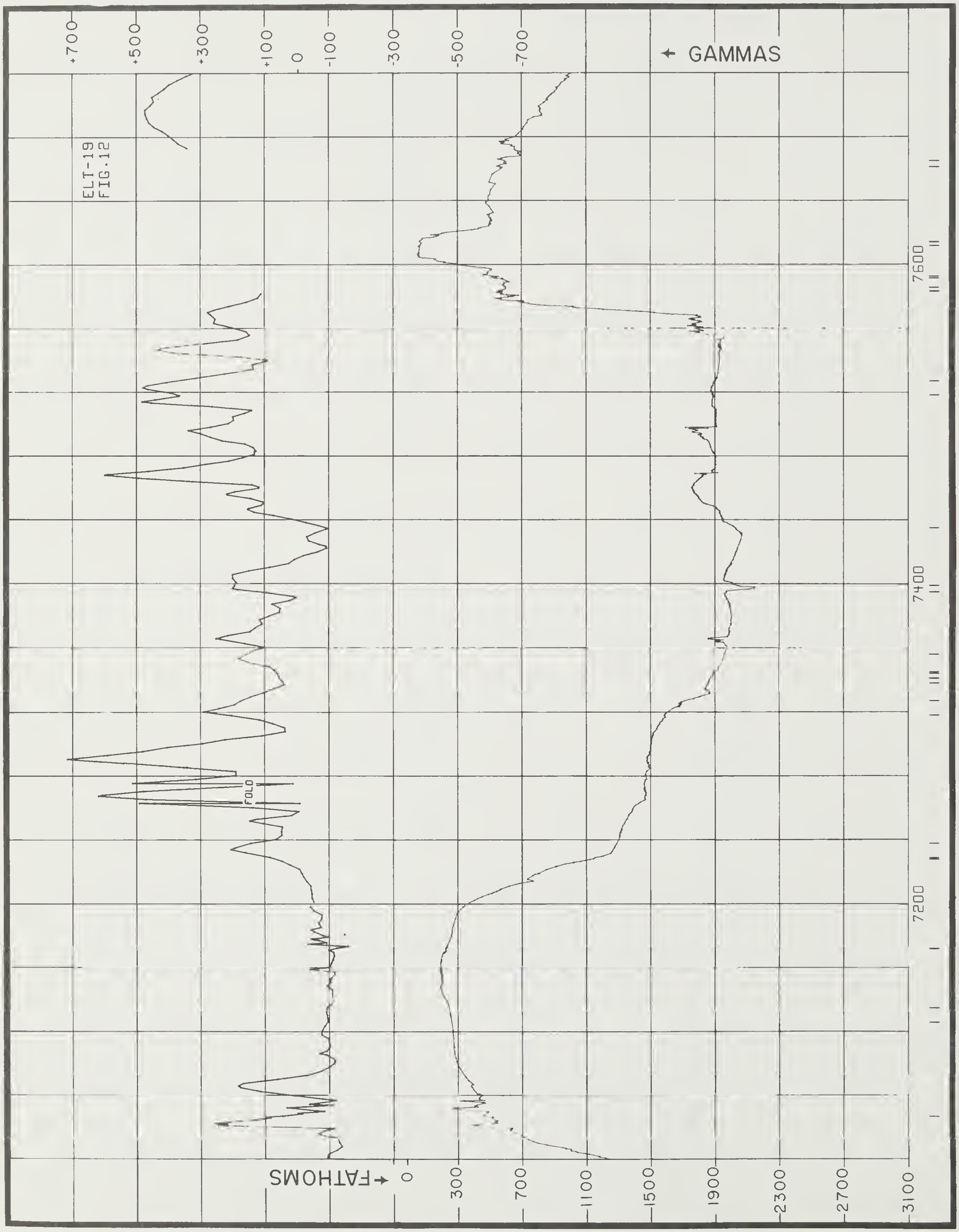

ELT-19
FIG. 8
← GAMMAS
← FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
4600
4800
5000

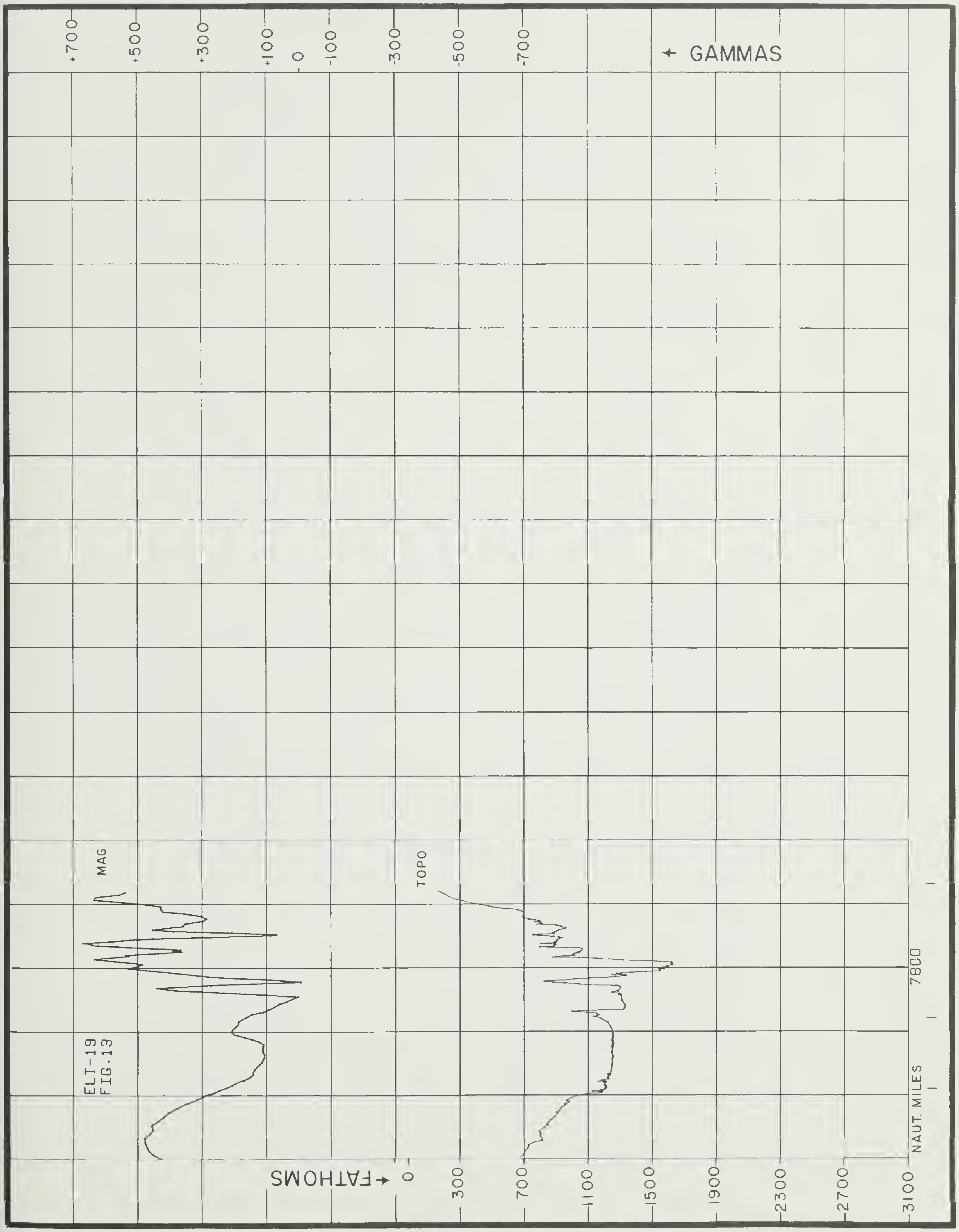

ELT-19
FIG. 9
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
5200
5400
5600



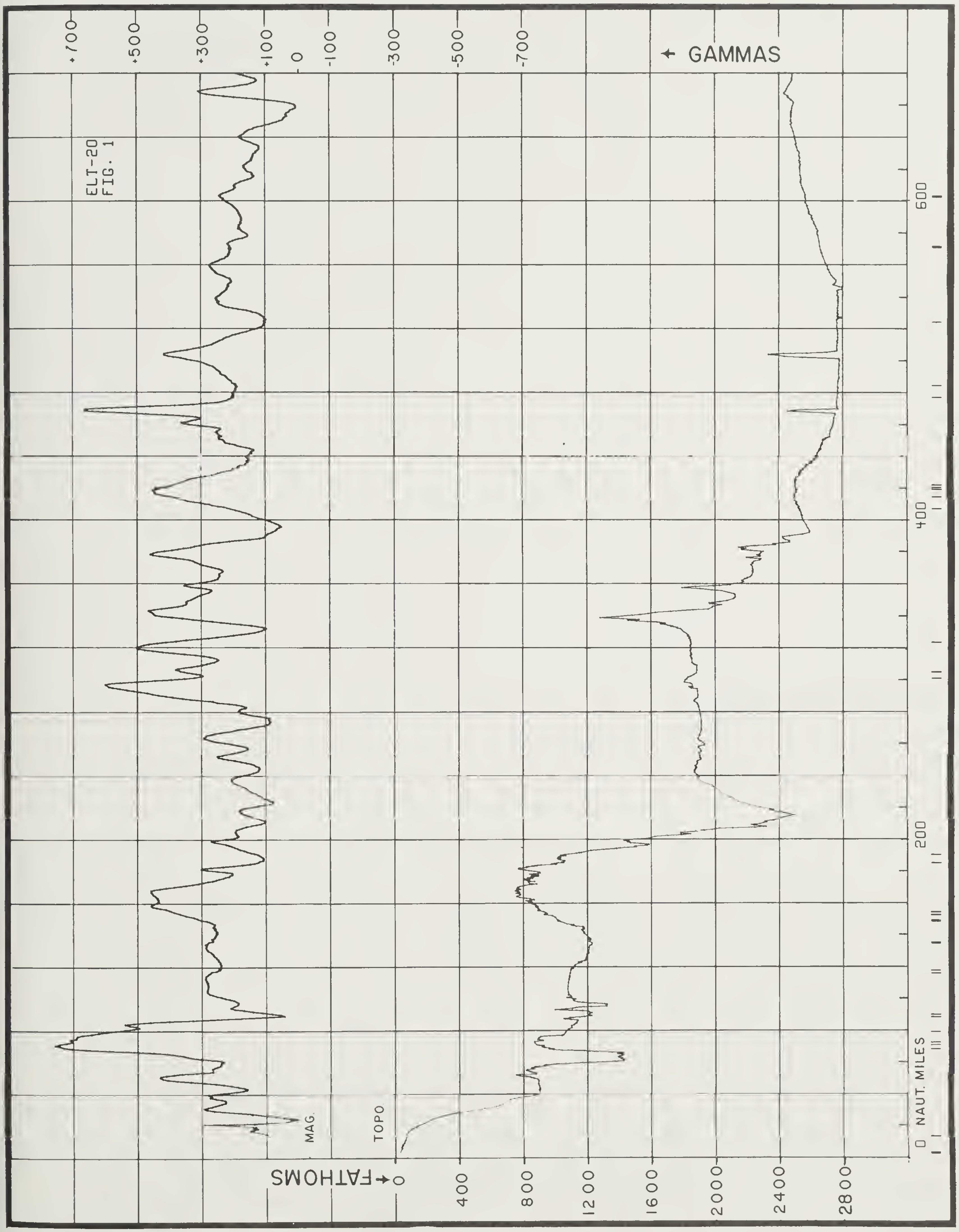
ELT-19
FIG.10
GAMMAS
FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
5800
6000
6200
6400

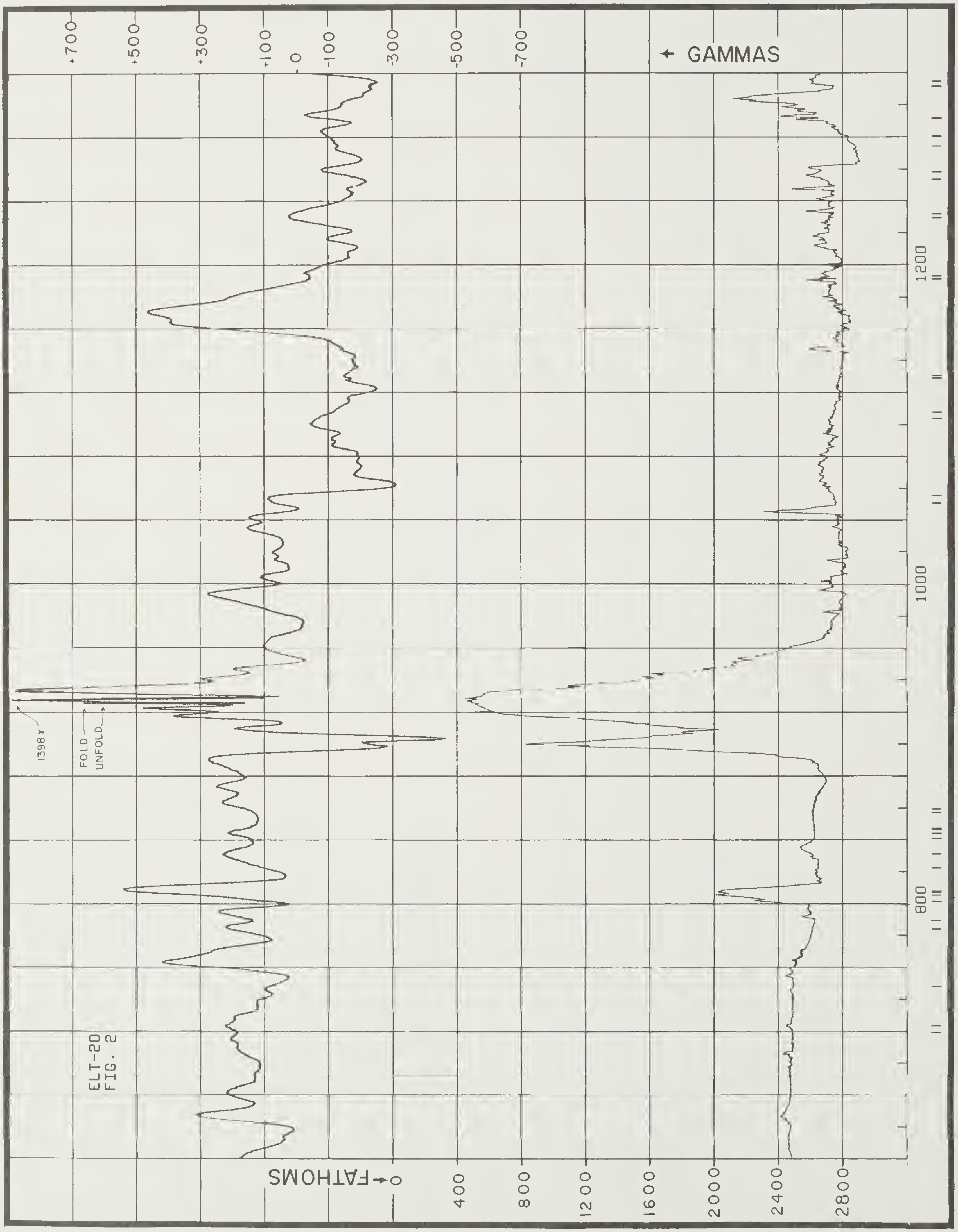

+700
+500
+300
+100
0
-100
-300
-500
-700
GAMMAS
FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
7000
6800
6600
ELT-19
FIG.11


ELT-19
FIG.12
GAMMAS
FATHOMS
FOLD
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
7200
7400
7600

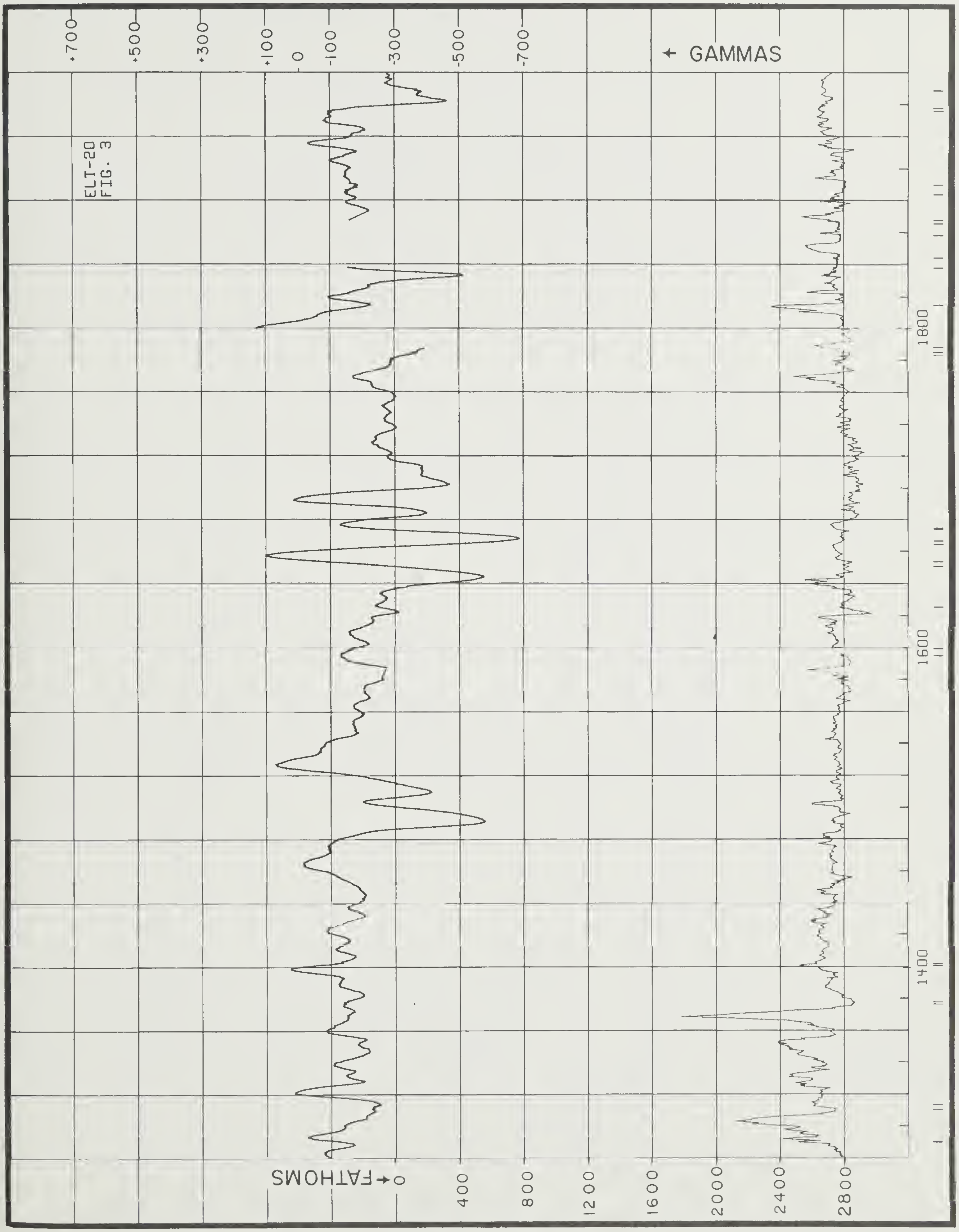


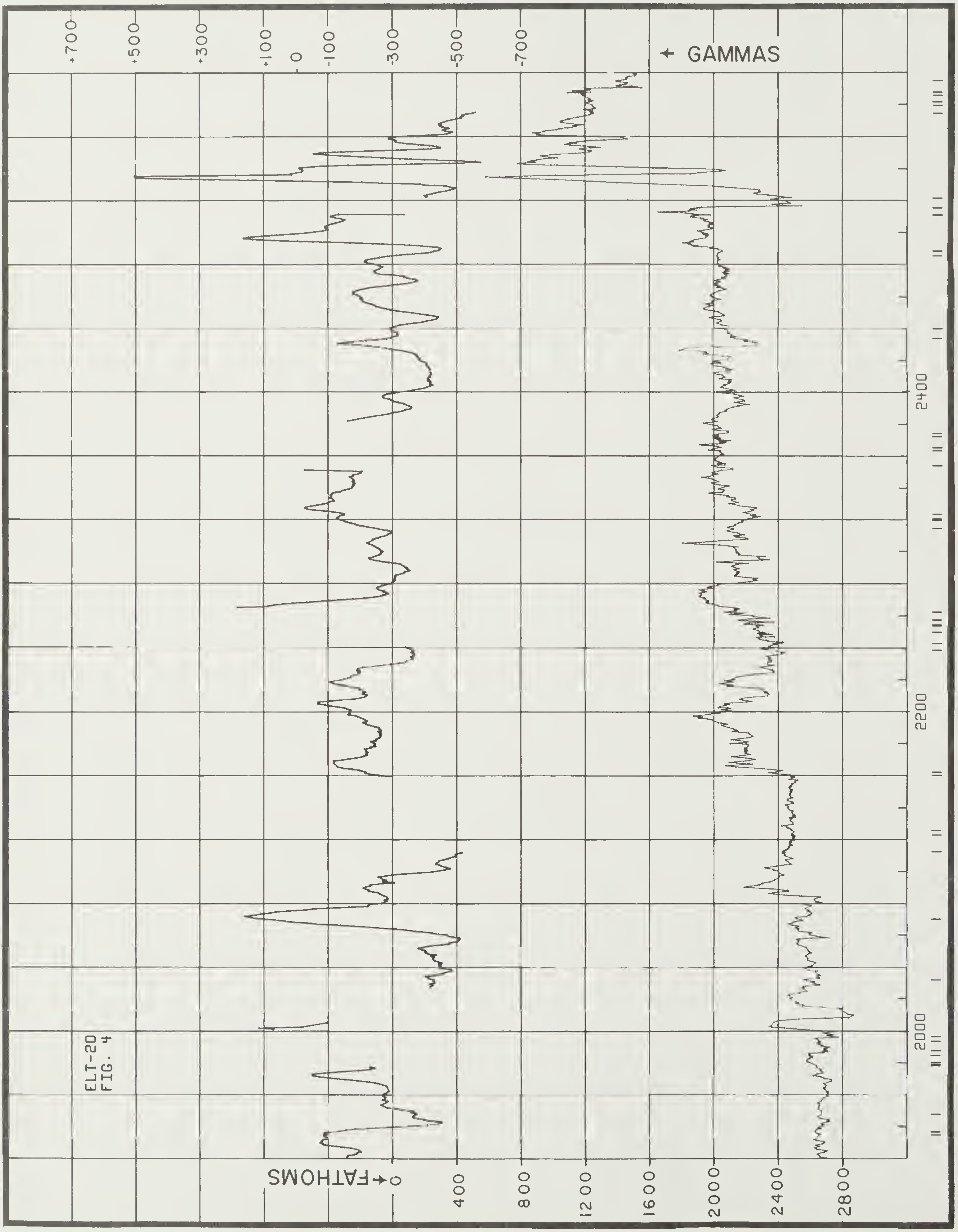
+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
MAG
TOPO
7800
ELT-19
FIG.13
NAUT. MILES
←FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100

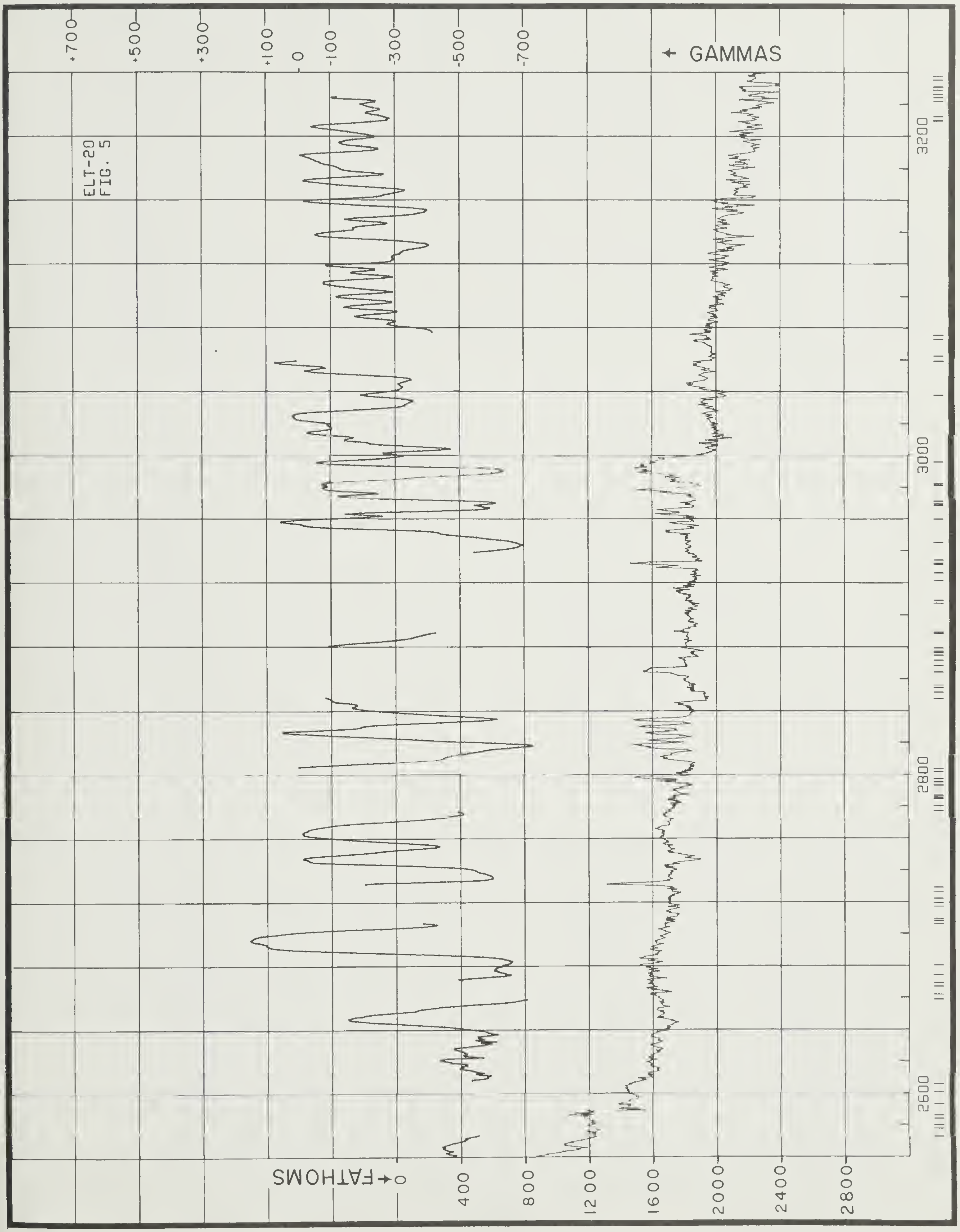

ELT-20
FIG. 1
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
MAG.
TOPO
FATHOMS
0
400
800
1200
1600
2000
2400
2800
0 NAUT. MILES
200
400
600

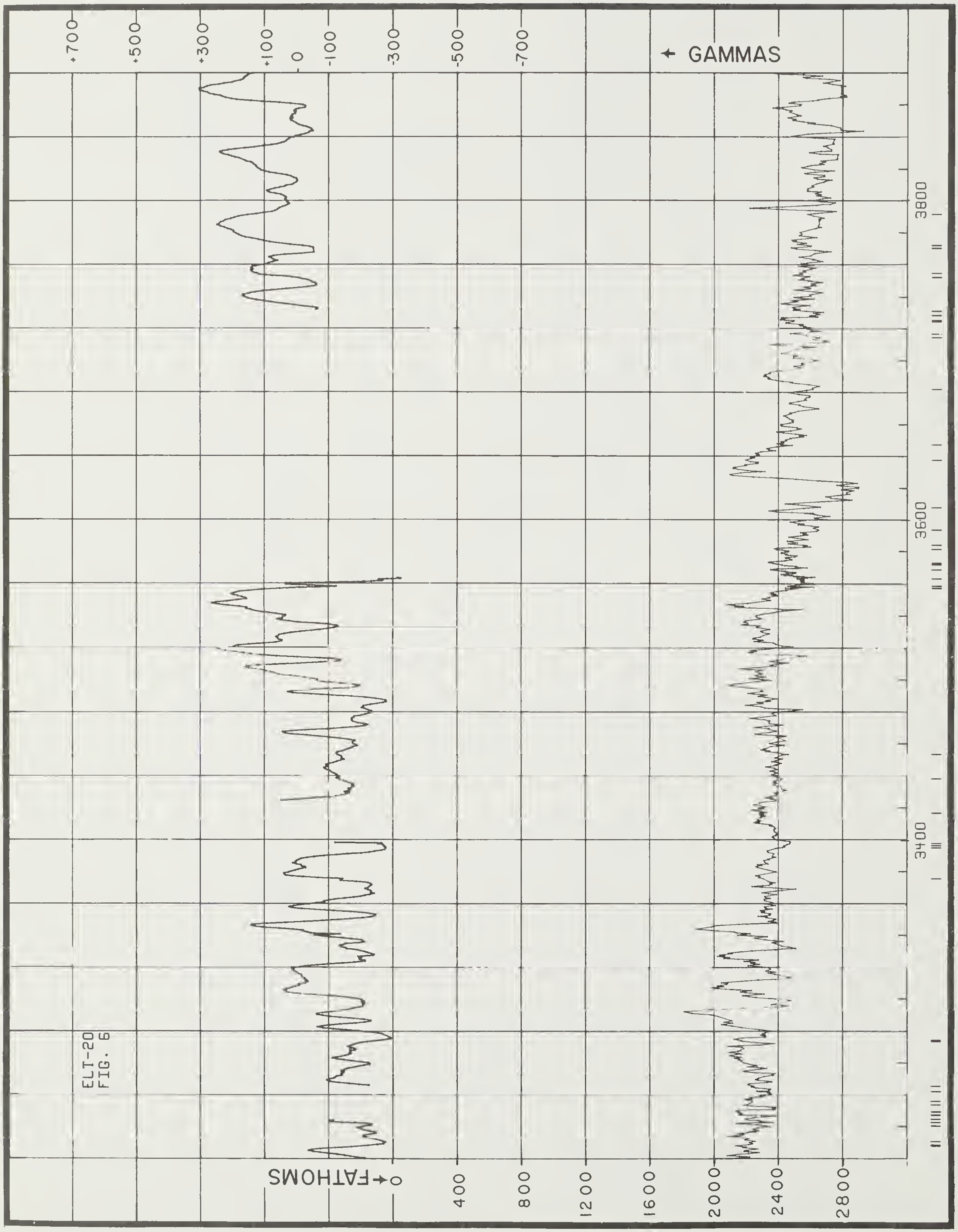

+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
1398γ
FOLD
UNFOLD
1200
1000
800
0 ← FATHOMS
400
800
1200
1600
2000
2400
2800

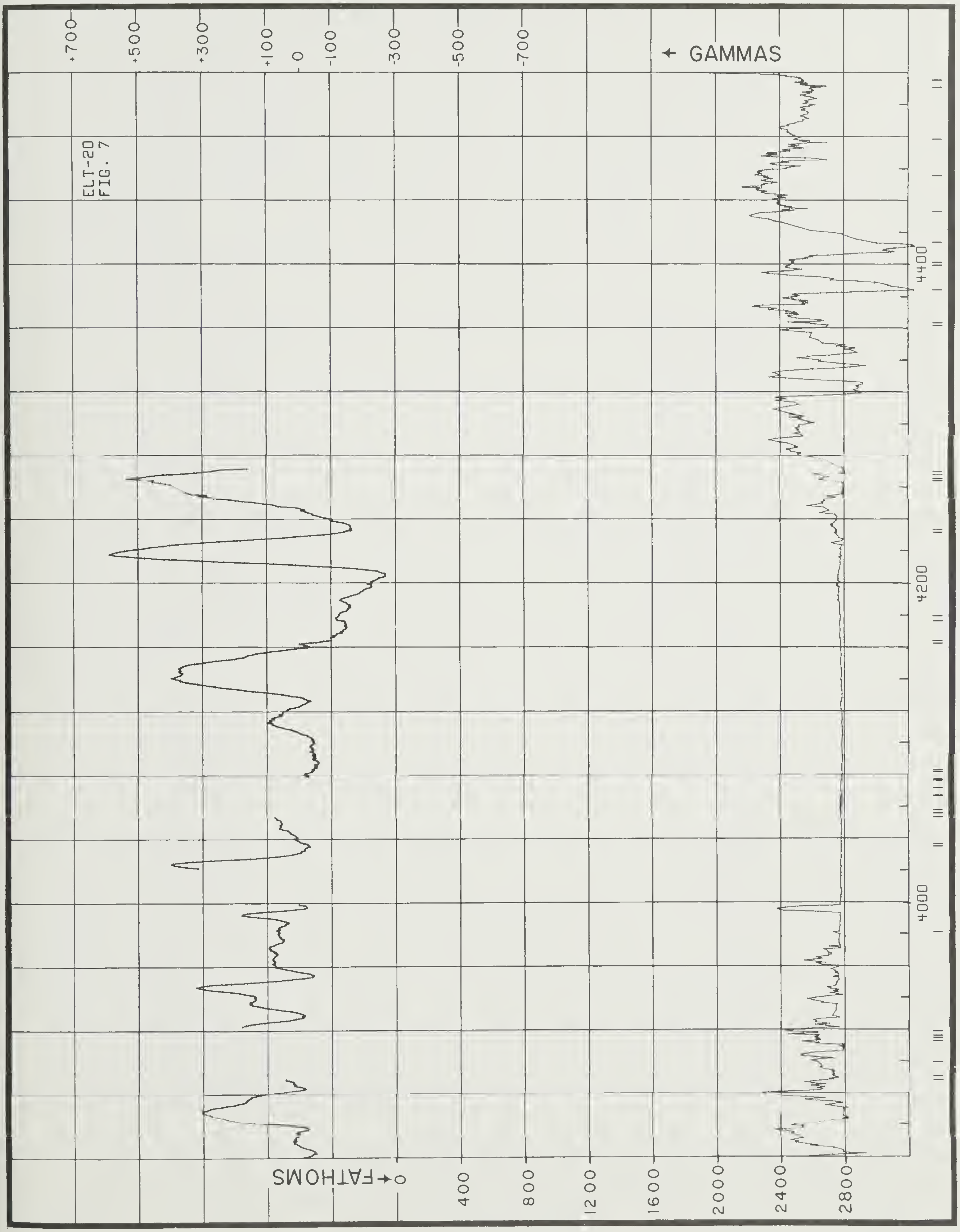
ELT-20
FIG. 2

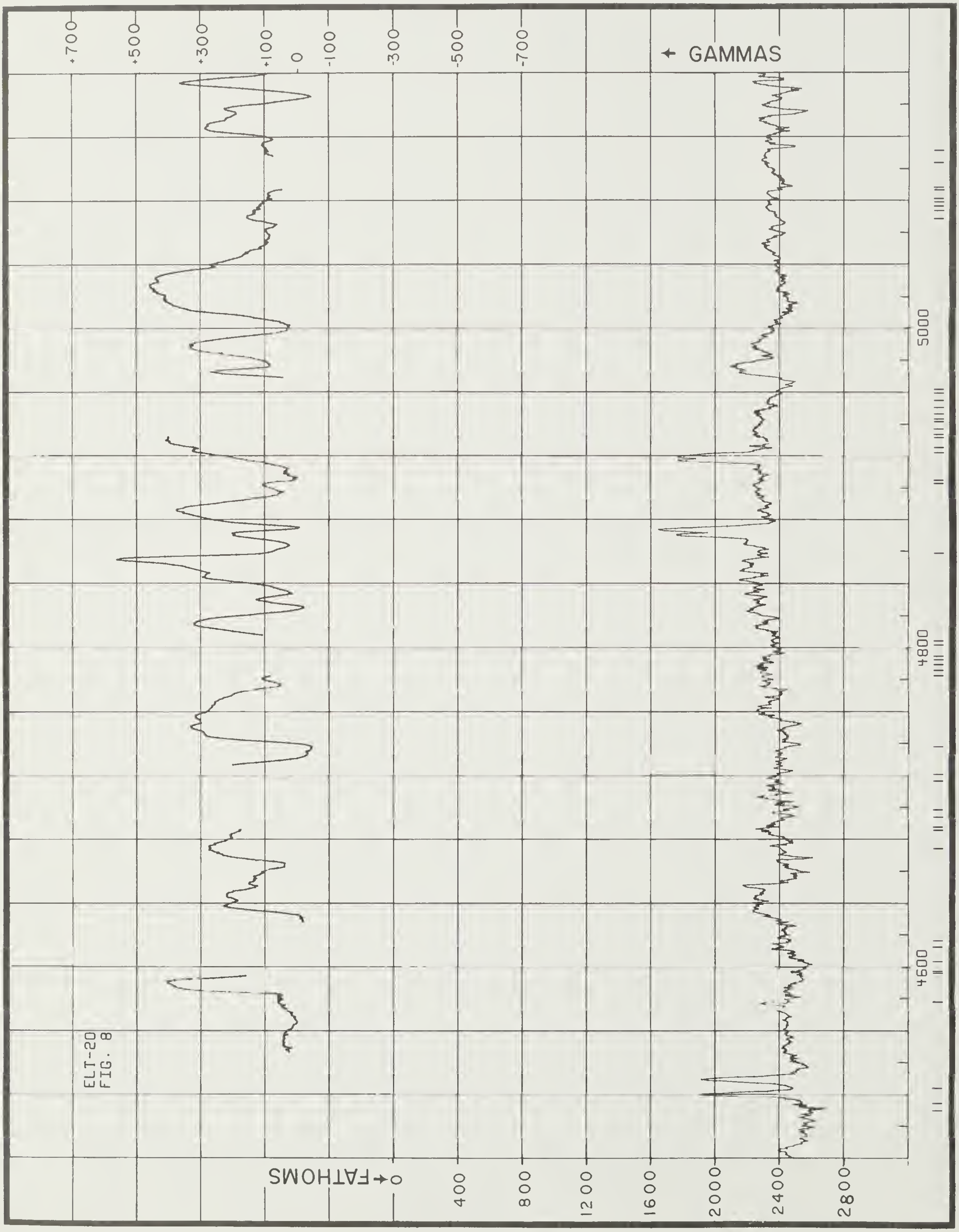

ELT-20
FIG. 3
← GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
0 ← FATHOMS
400
800
1200
1600
2000
2400
2800
1400
1600
1800

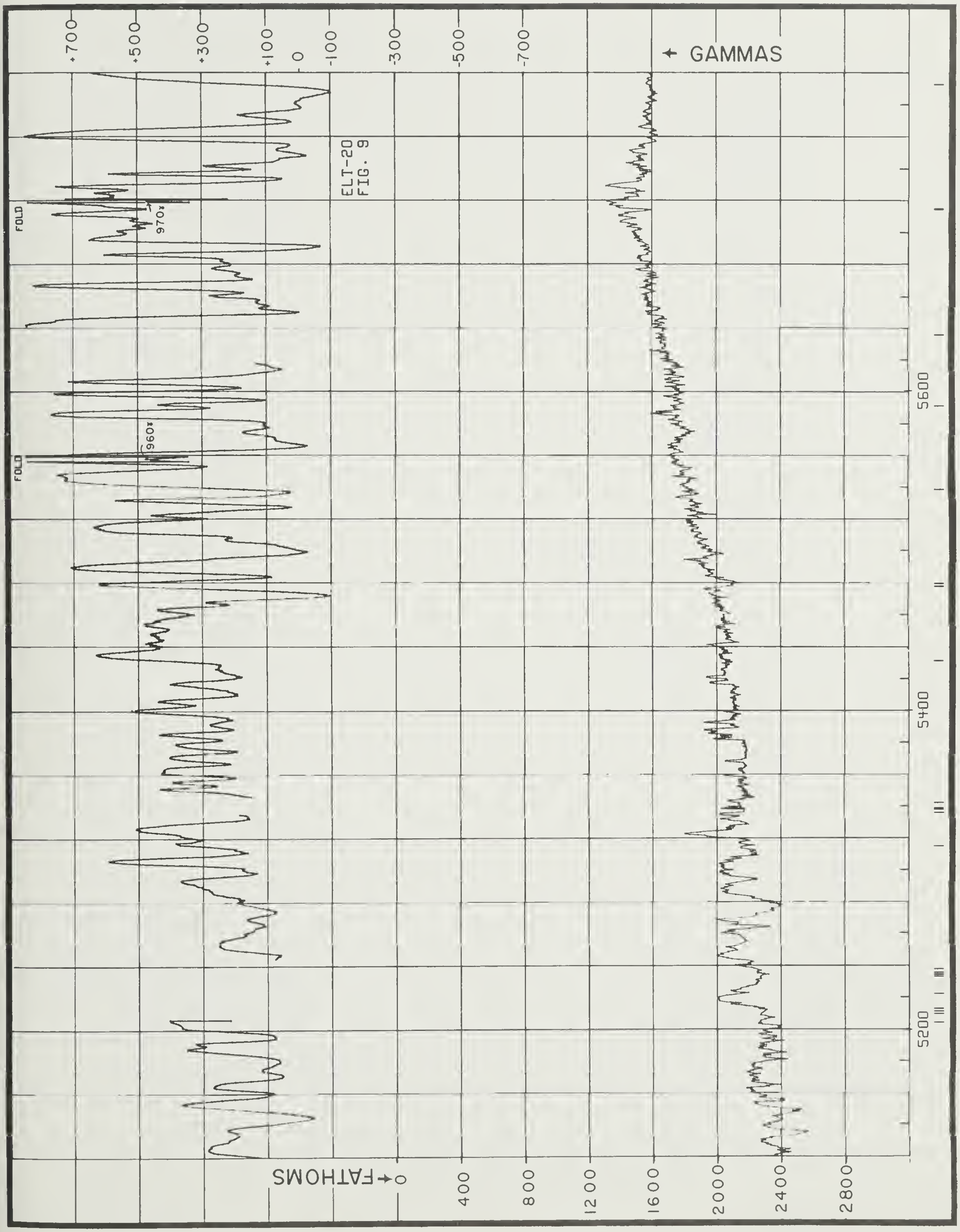

ELT-20
FIG. 4
+ GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
0 + FATHOMS
400
800
1200
1600
2000
2400
2800
2000
2200
2400

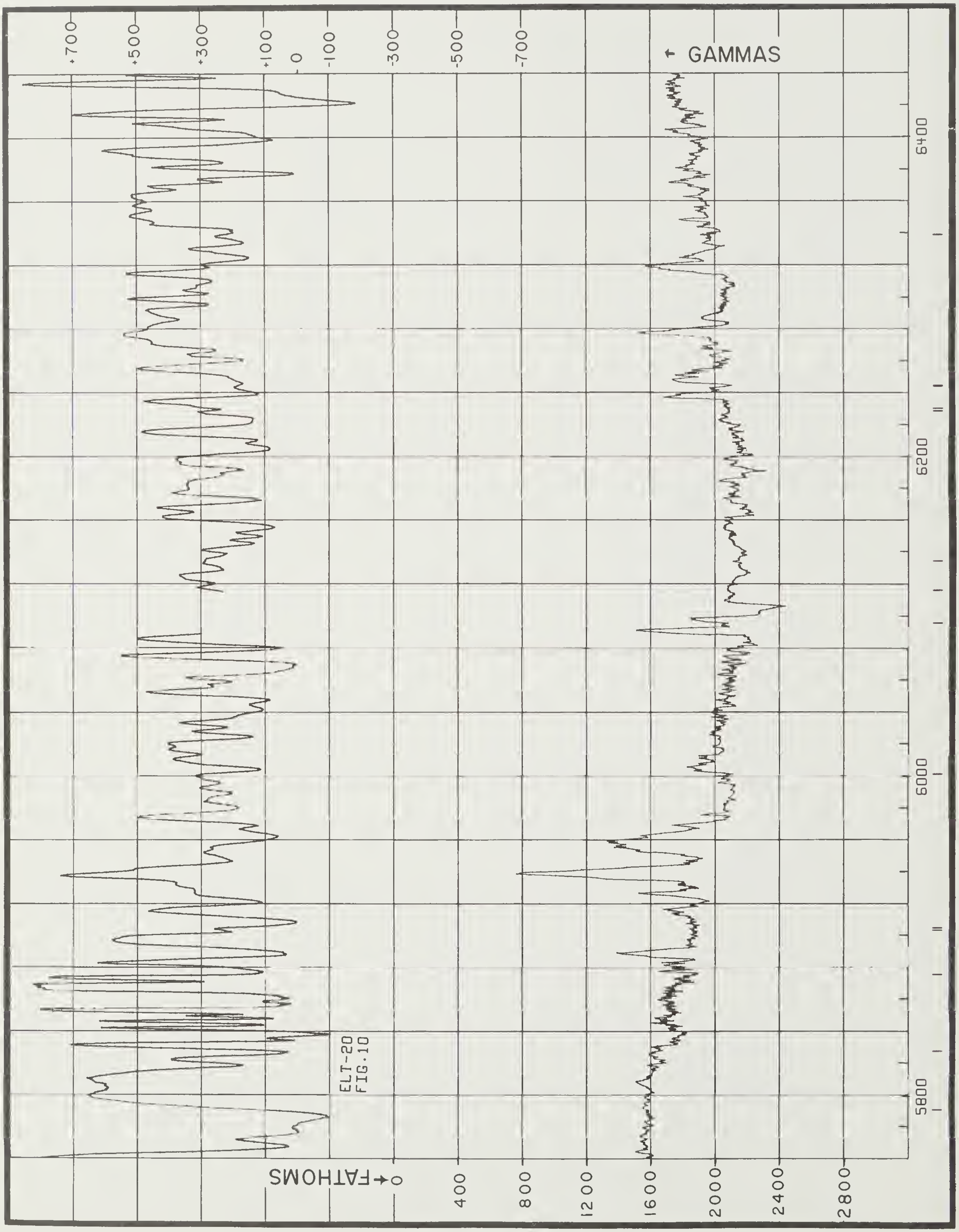

ELT-20
FIG. 5
GAMMAS
FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
400
800
1200
1600
2000
2400
2800
2600
2800
3000
3200

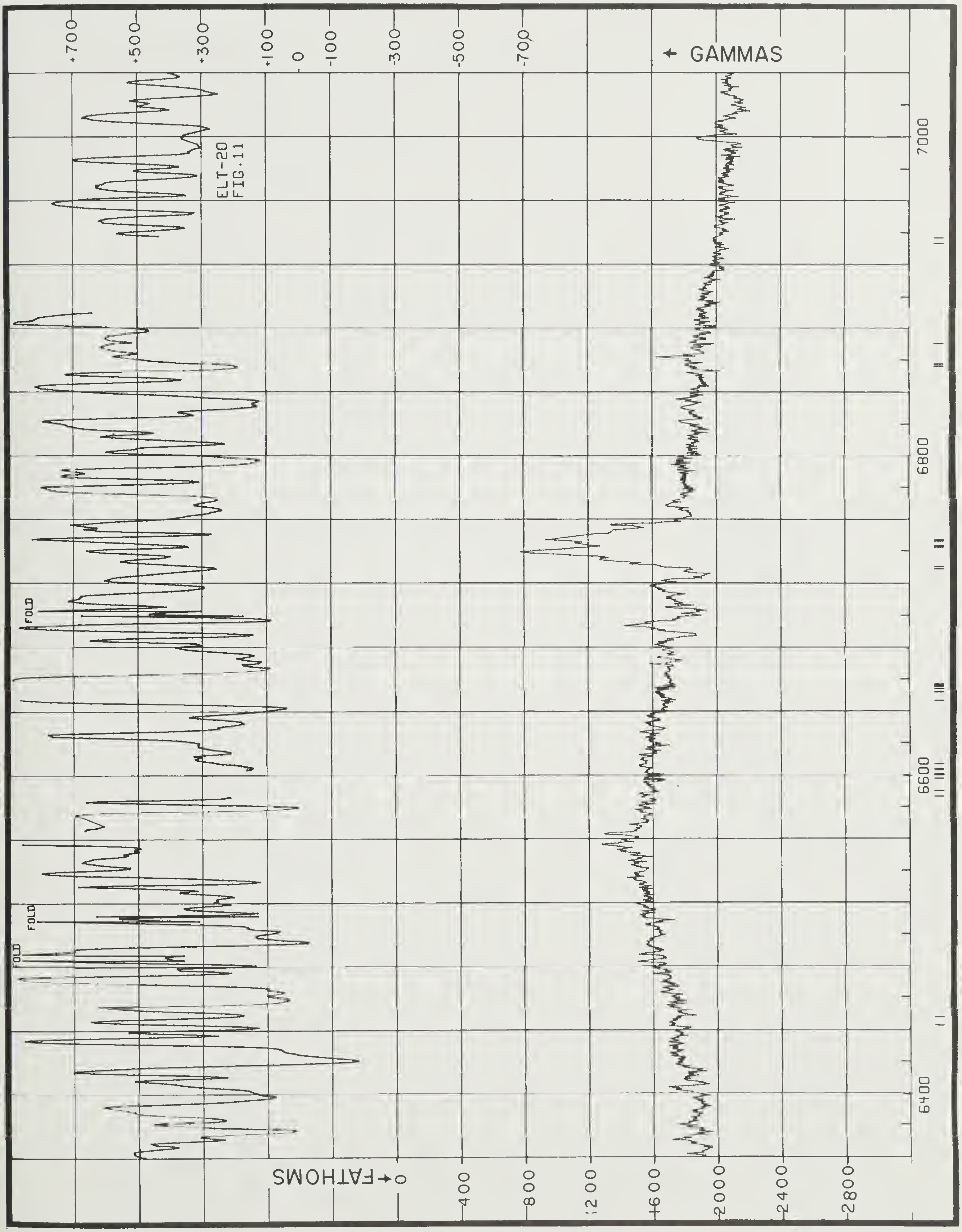

+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
0 ← FATHOMS
400
800
1200
1600
2000
2400
2800
3800
3600
3400
ELT-20
FIG. 6


ELT-20
FIG. 7
GAMMAS
FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
400
800
1200
1600
2000
2400
2800
4000
4200
4400

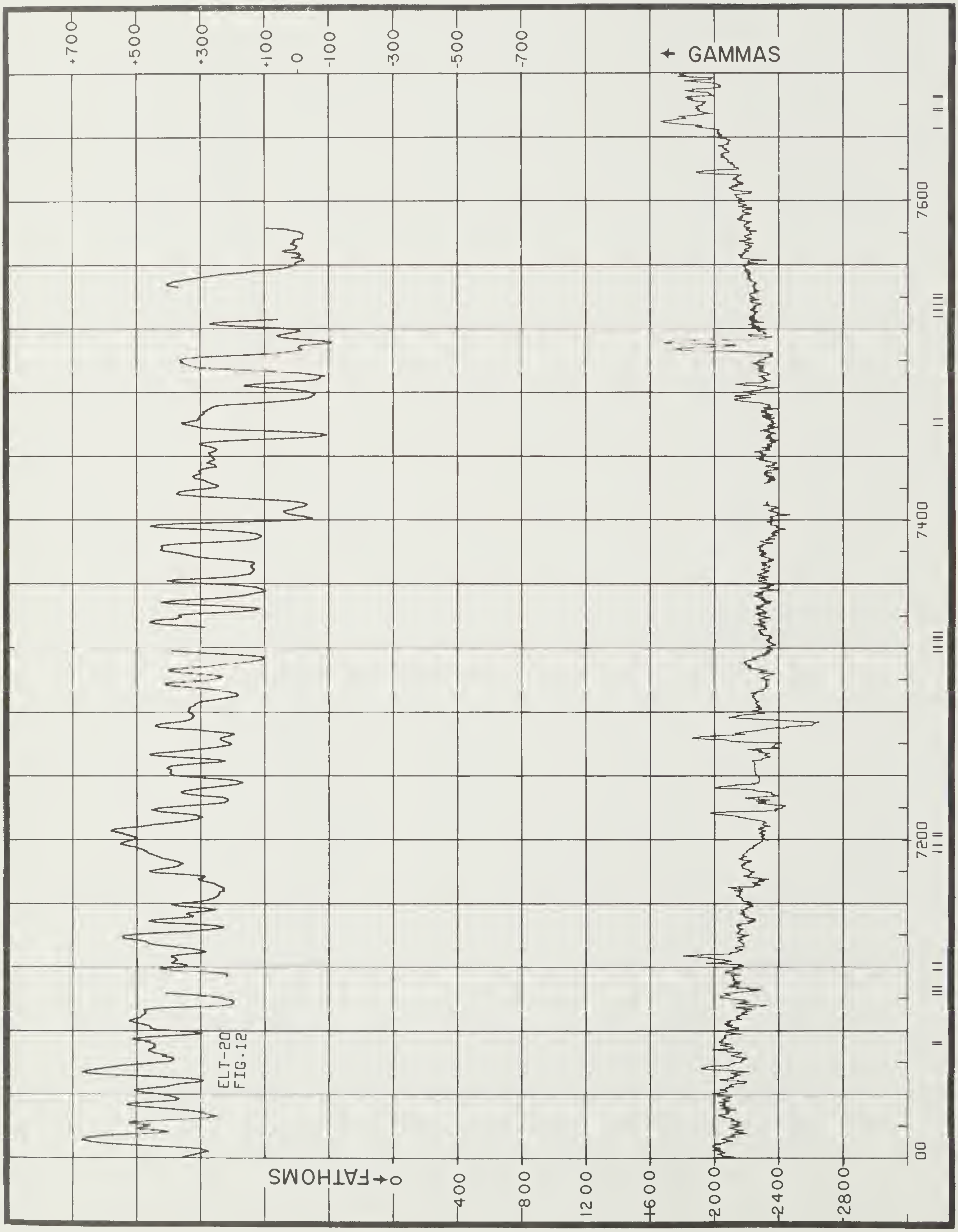

ELT-20
FIG. 8
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
400
800
1200
1600
2000
2400
2800
4600
4800
5000


ELT-20
FIG. 9
GAMMAS
FATHOMS
FOLD
FOLD
970
960
+700
+500
+300
+100
0
-100
-300
-500
-700
0
400
800
1200
1600
2000
2400
2800
5200
5400
5600

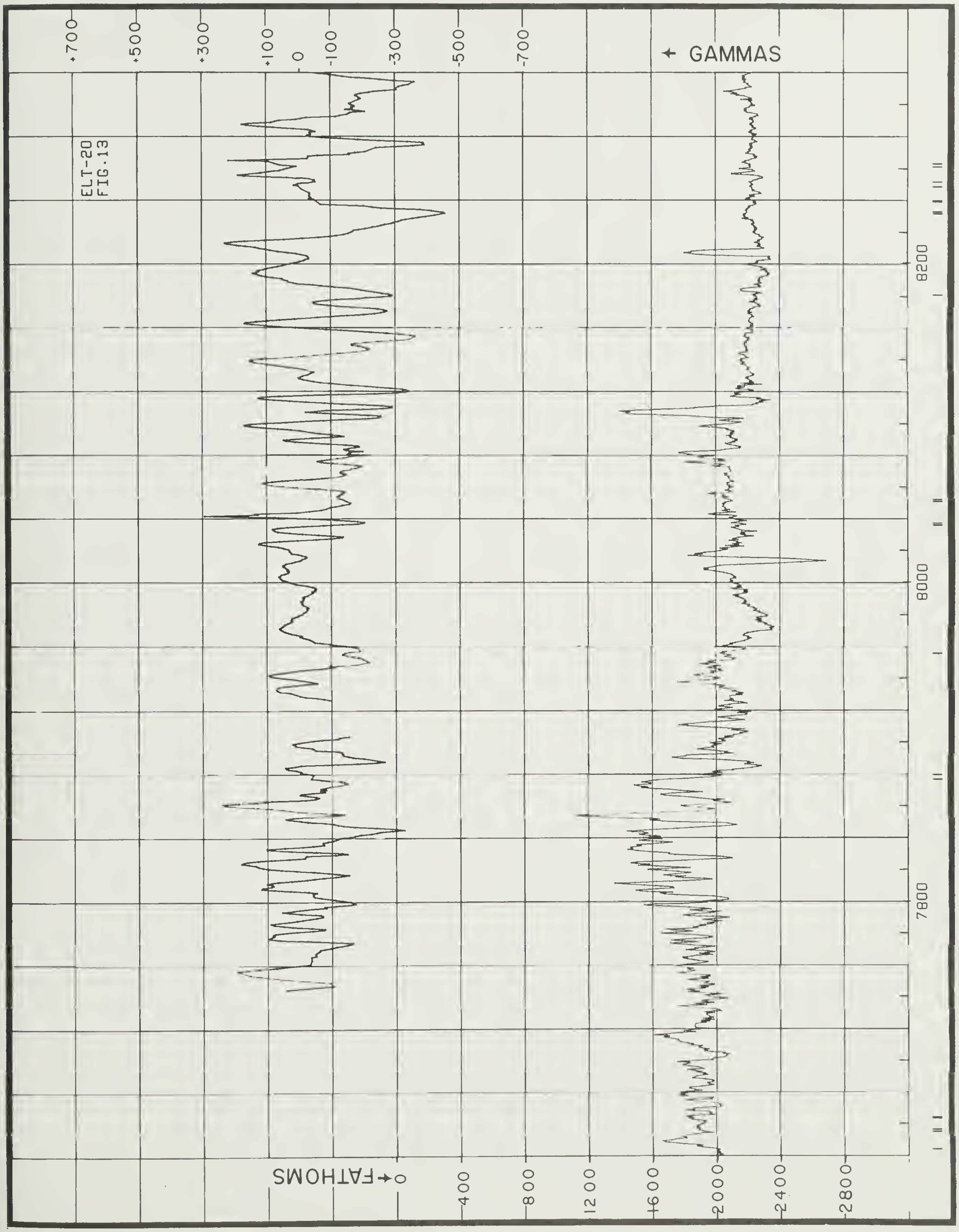

ELT-20
FIG.10
GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
FATHOMS
0
400
800
1200
1600
2000
2400
2800
5800
6000
6200
6400

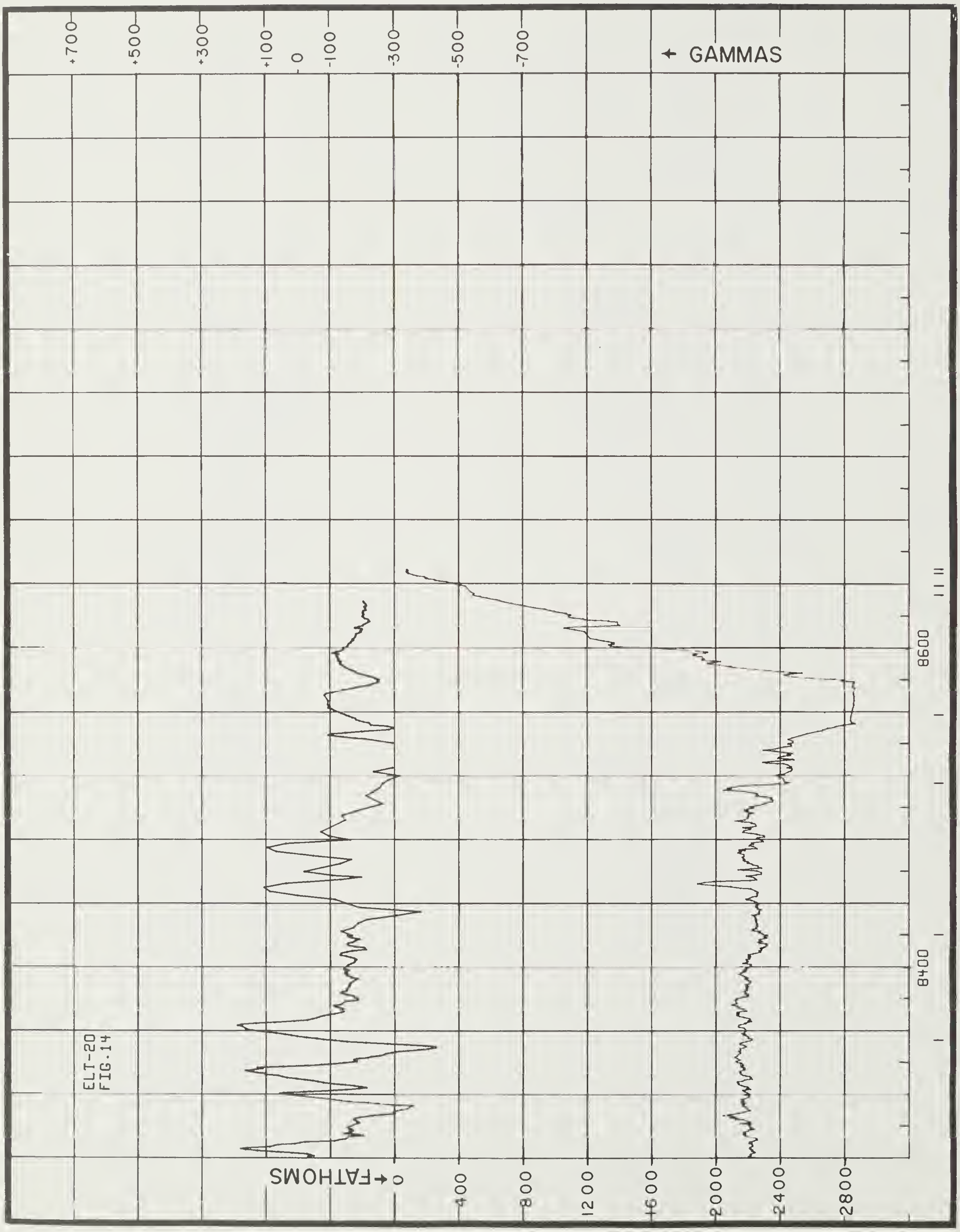


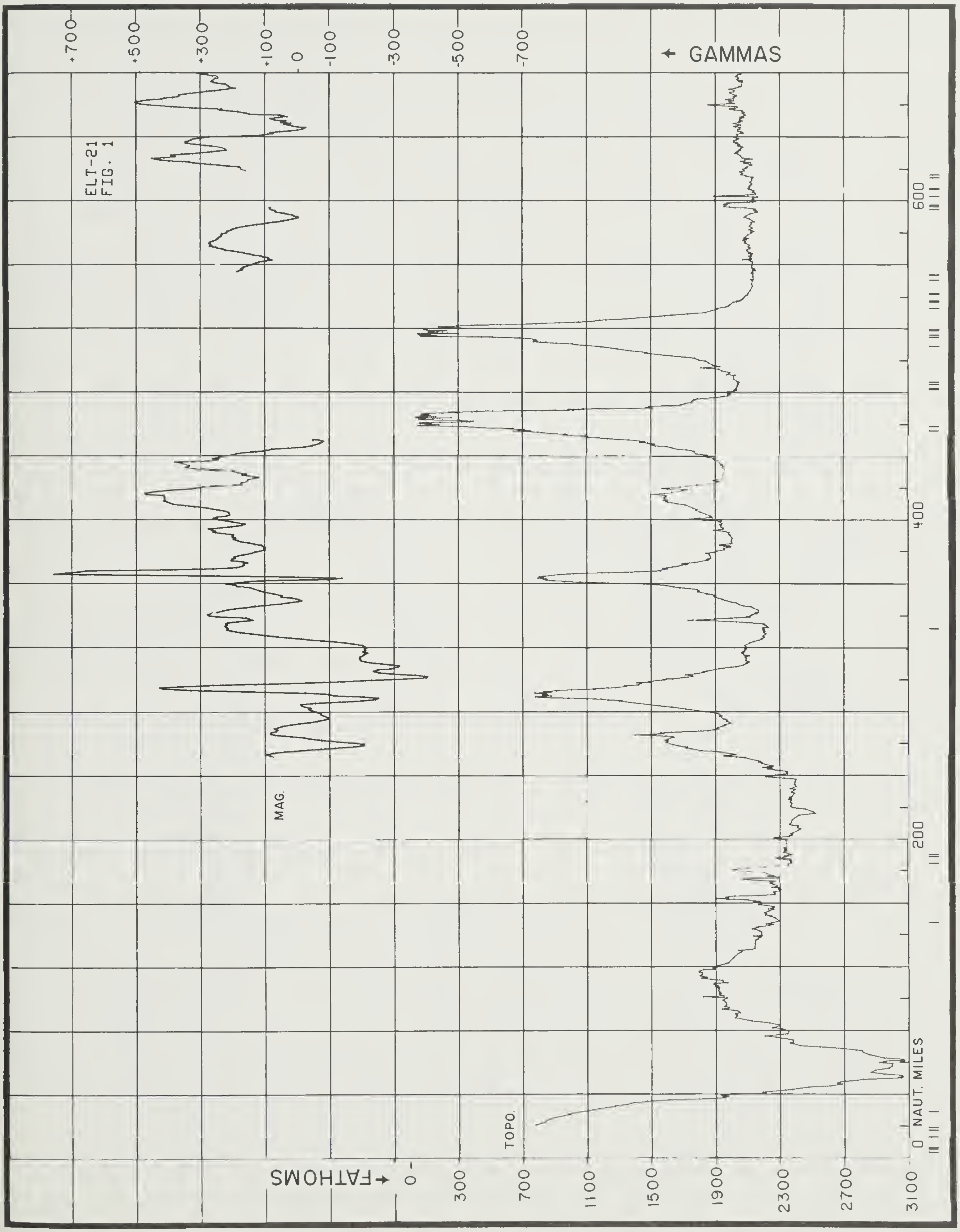
ELT-20
FIG.11
+ GAMMAS
0 ← FATHOMS
FOLD
FOLD
FOLD
6400
6600
6800
7000

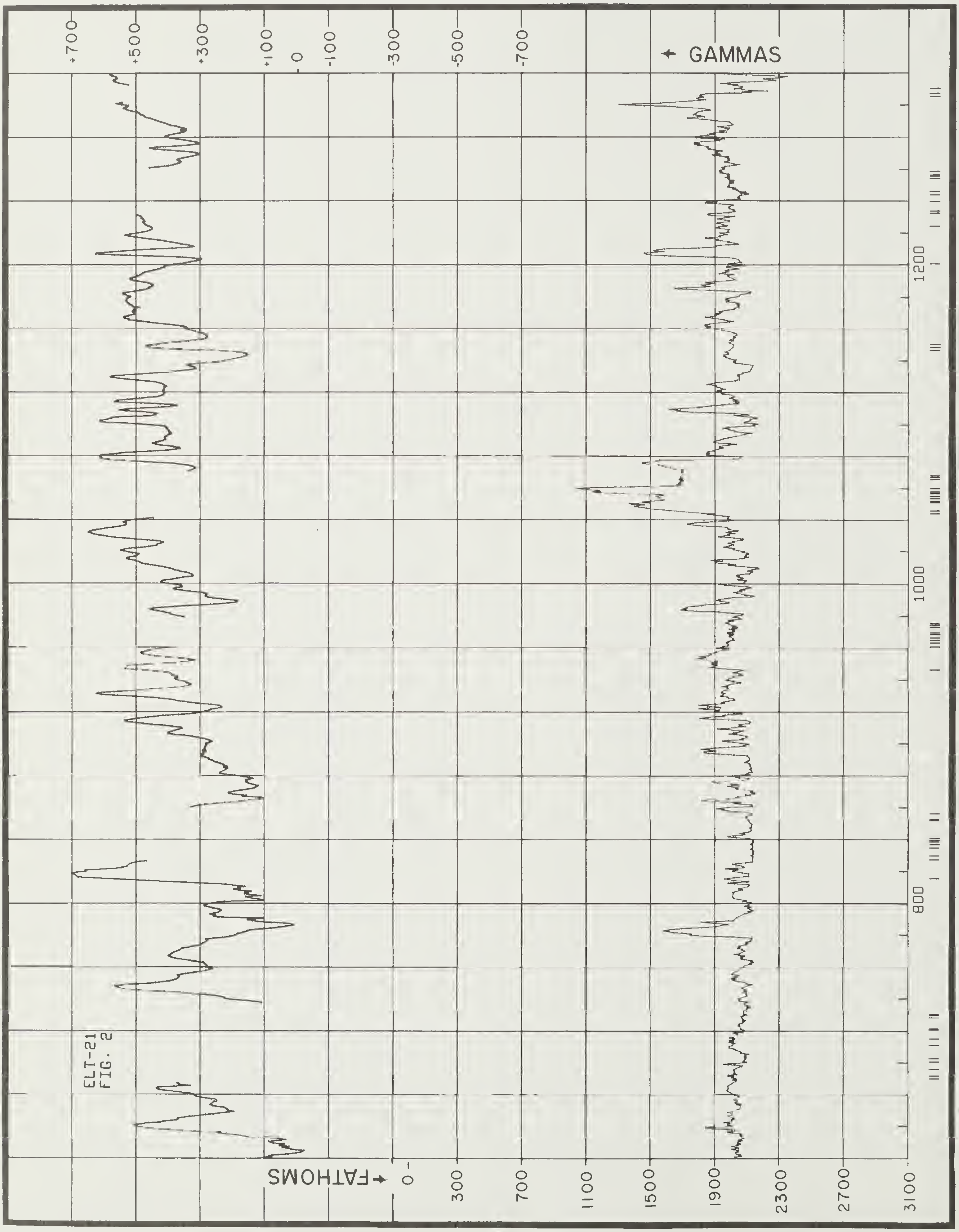


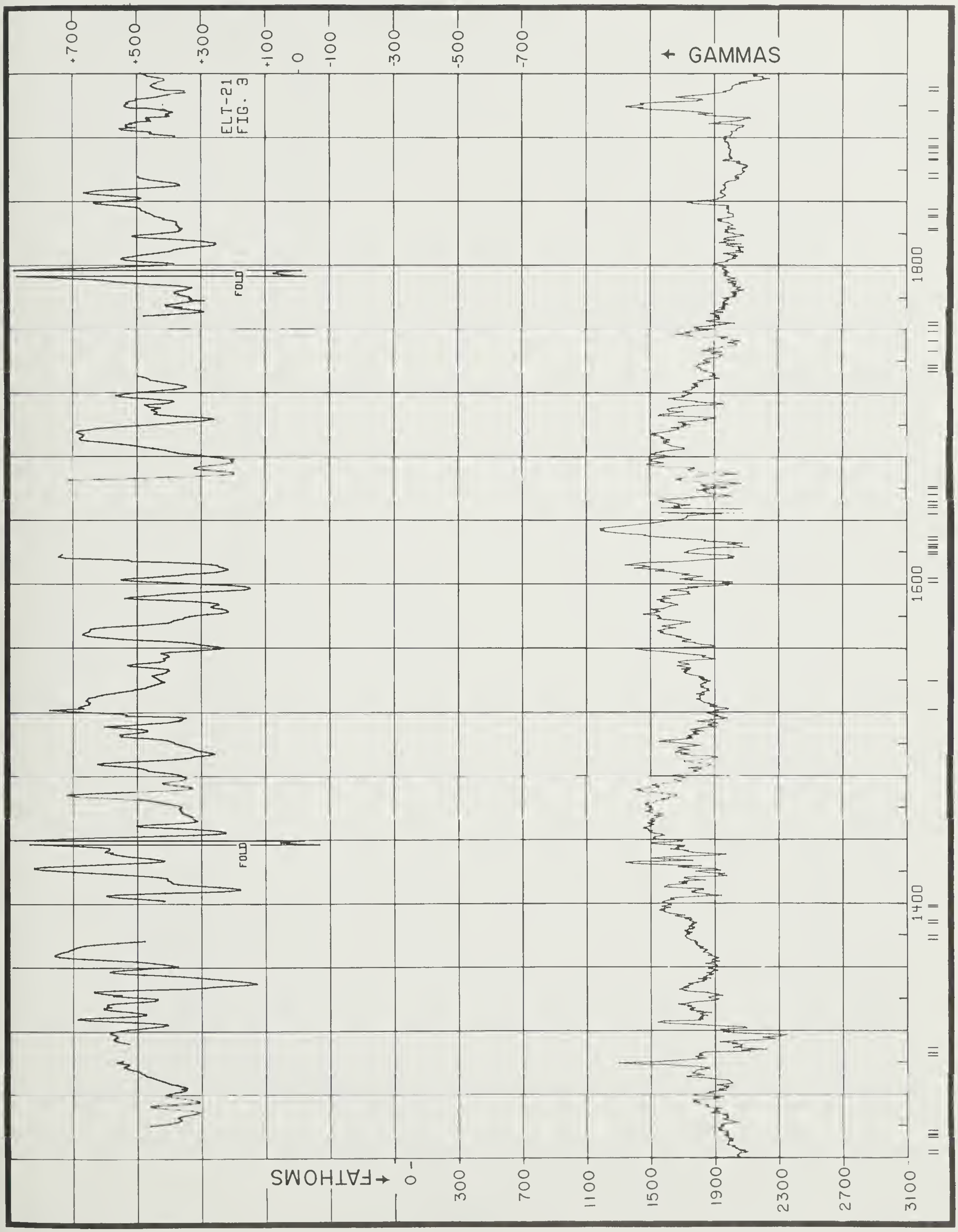
+700
+500
+300
+100
0
-100
-300
-500
-700
GAMMAS
0 FATHOMS
400
800
1200
1600
2000
2400
2800
00
7200
7400
7600
ELT-20
FIG.12

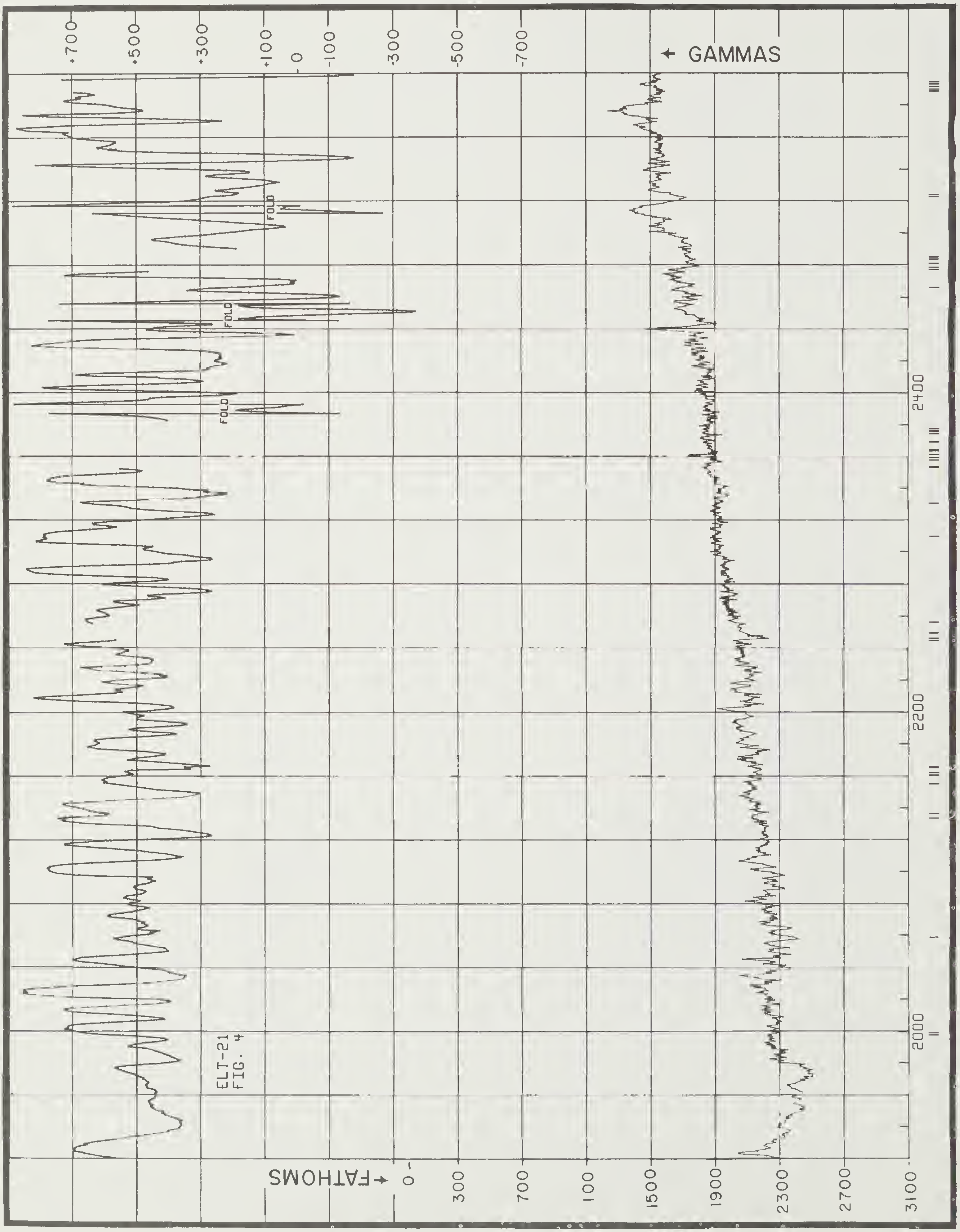

ELT-20
FIG.13
GAMMAS
FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
400
800
1200
1600
2000
2400
2800
7800
8000
8200


+700
+500
+300
+100
0
-100
-300
-500
-700
GAMMAS
FATHOMS
0
400
800
1200
1600
2000
2400
2800
8400
8600
ELT-20
FIG.14

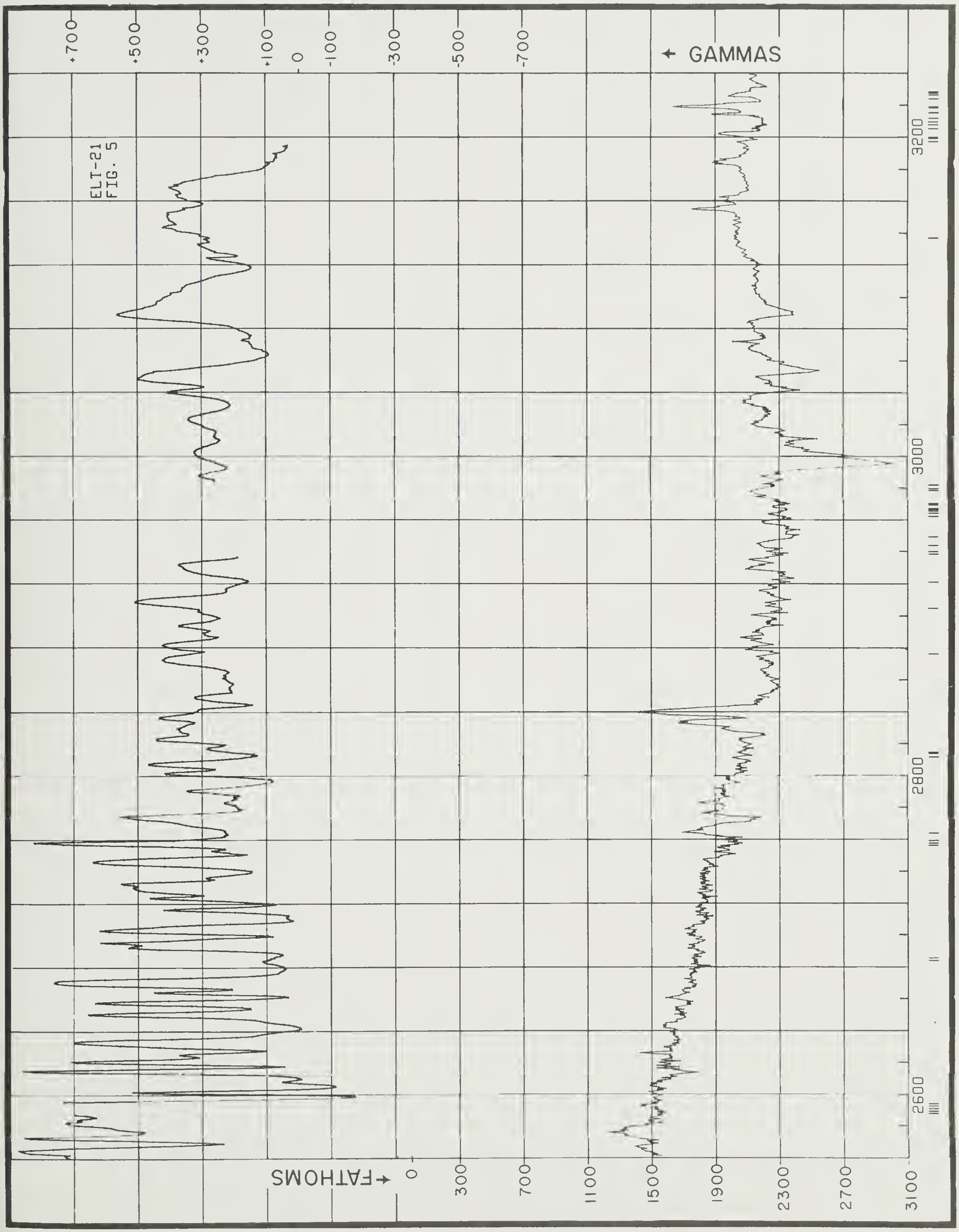

ELT-21
FIG. 1
GAMMAS
FATHOMS
MAG.
TOPO.
NAUT. MILES
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
0
200
400
600

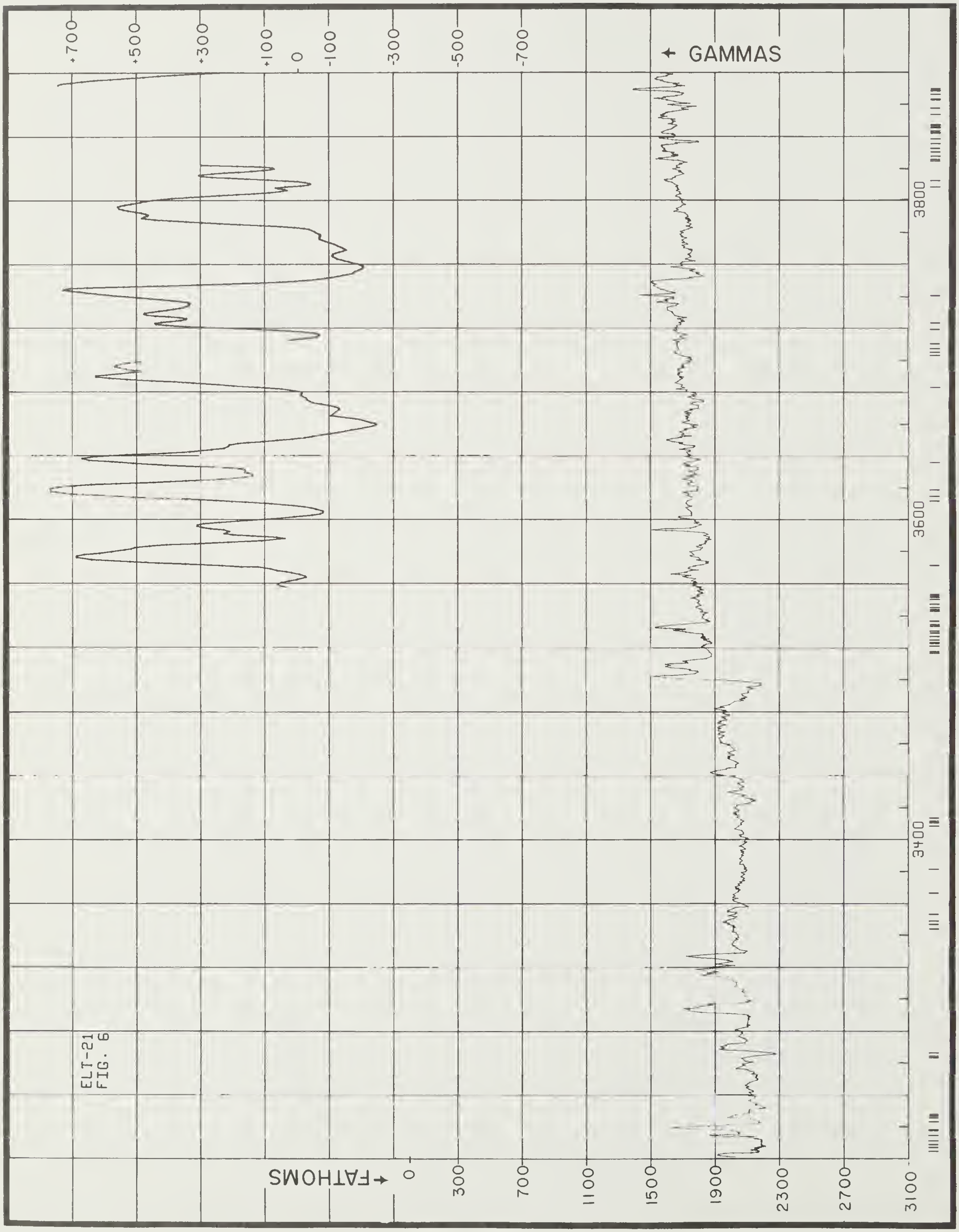

+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
ELT-21
FIG. 2
←FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
800
1000
1200

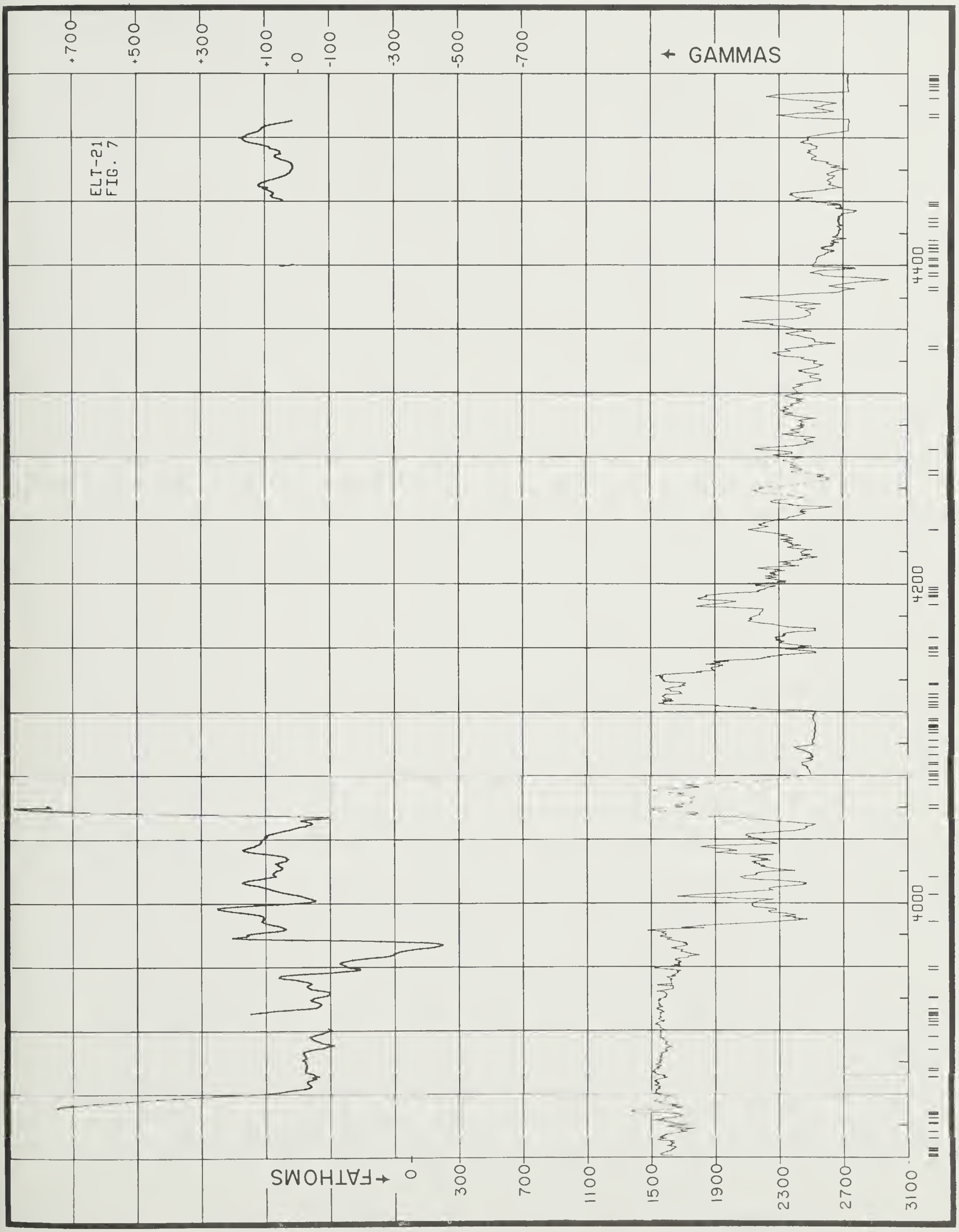

ELT-21
FIG. 3
GAMMAS
FATHOMS
FOLD
FOLD
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
1400
1600
1800

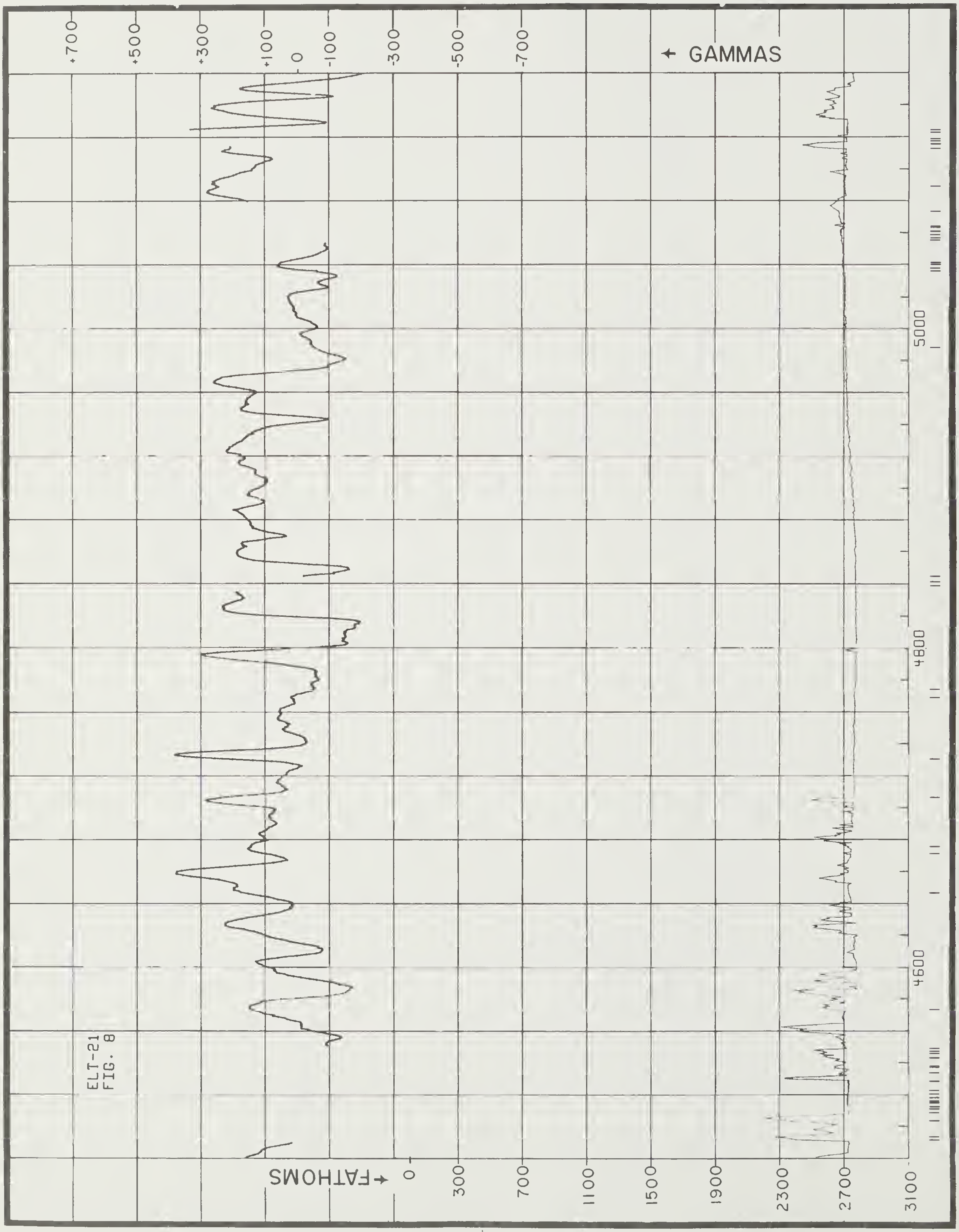


ELT-21
FIG. 4
GAMMAS
FATHOMS
FOLD
FOLD
FOLD

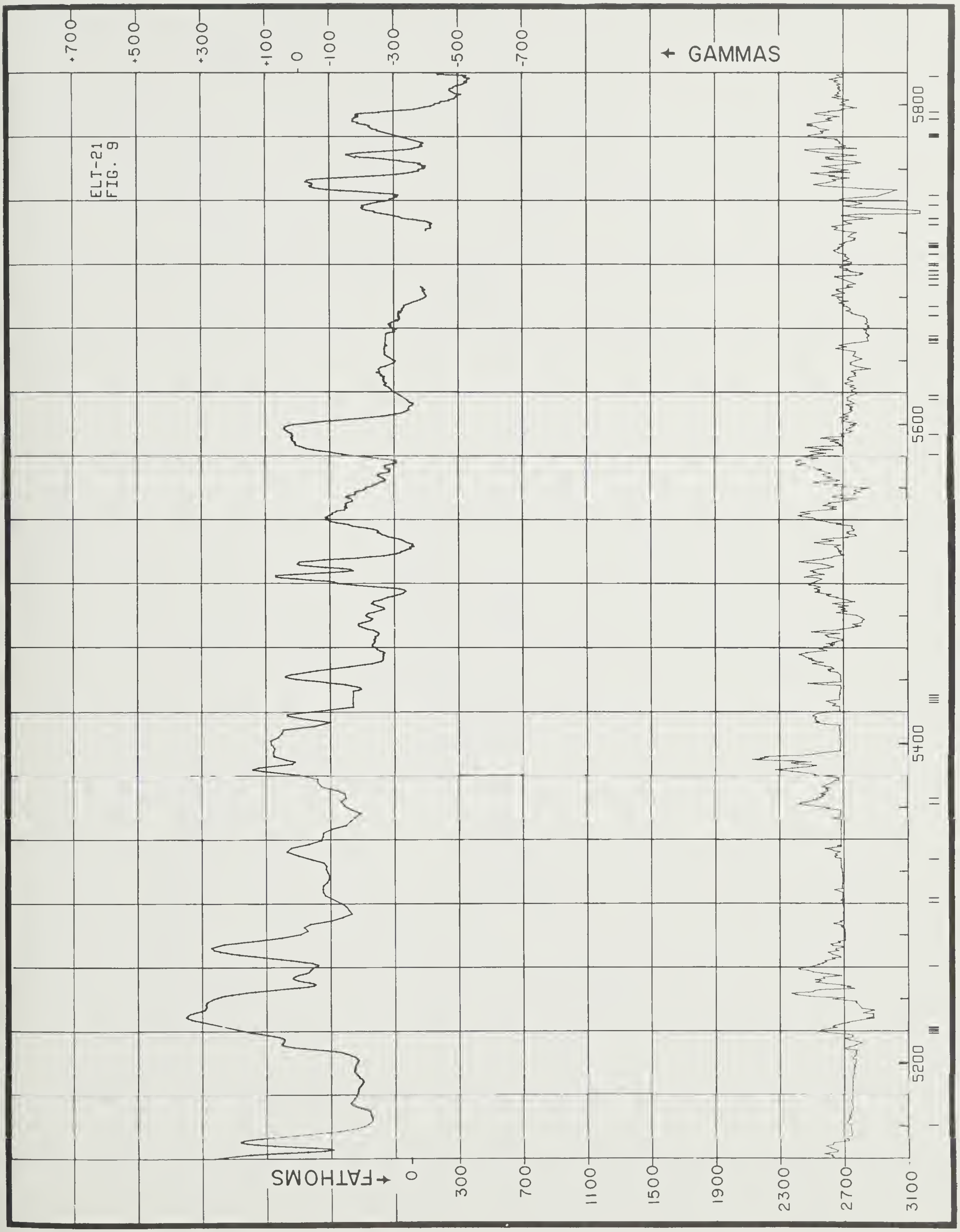

ELT-21
FIG. 5
+ GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
← FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
2600
2800
3000
3200

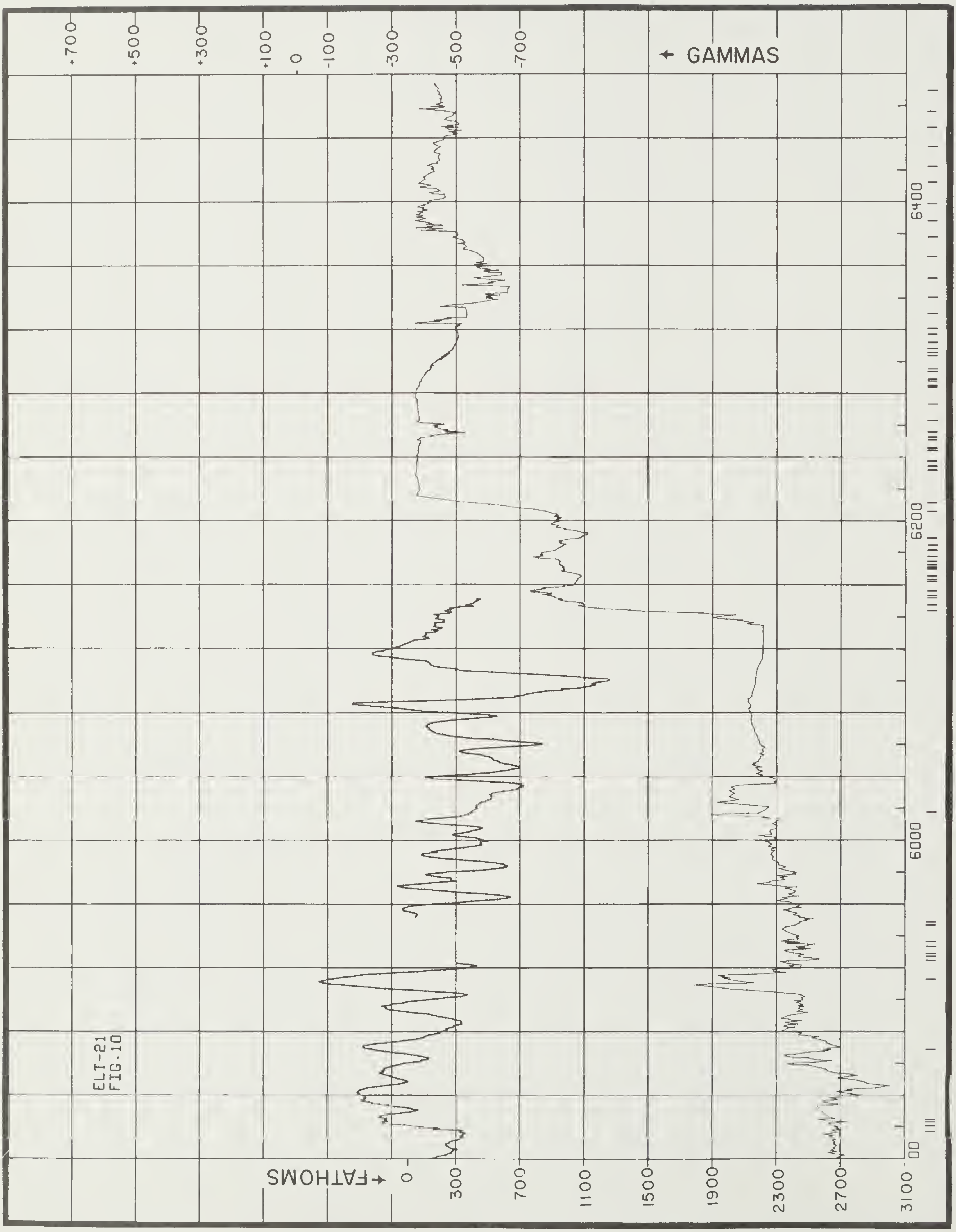

+700
+500
+300
+100
0
-100
-300
-500
-700
+ GAMMAS
3800
3600
3400
ELT-21
FIG. 6
+ FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100


ELT-21
FIG. 7
GAMMAS
FATHOMS
+700
+500
+300
+100
0
-100
-300
-500
-700
0
300
700
1100
1500
1900
2300
2700
3100
4000
4200
4400



+700
+500
+300
+100
0
-100
-300
-500
-700
← GAMMAS
← FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
5000
4800
4600
ELT-21
FIG. 8


ELT-21
FIG. 9
← GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
← FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
5200
5400
5600
5800



ELT-21
FIG.10
+ GAMMAS
+700
+500
+300
+100
0
-100
-300
-500
-700
+ FATHOMS
0
300
700
1100
1500
1900
2300
2700
3100
00
6000
6200
6400

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY
OF COLUMBIA UNIVERSITY
Palisades, New York

A PREDICTION OF SONIC PROPERTIES OF DEEP-SEA CORES, HATTERAS ABYSSAL PLAIN AND ENVIRONS

by

D. R. Horn, Maurice Ewing, B. M. Horn and M. N. Delach

Technical Report No. 1

CU-1-69 NAVSHIPS N00024-69-C-1184

NOVEMBER 1969

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ILLUSTRATIONS

INTRODUCTION

The ocean floor is divided into large physiographic provinces each of which is covered by deposits with a common set of characteristics. An understanding of the inter-relationships between physiography and sediment type is fundamental to effective use of the ocean floor as an acoustic interface. A prime objective of the Marine Geophysical Survey Project of the U.S. Naval Oceanographic Office was to define the effects of physiography and sediment on sound reflection, refraction, and absorption at or near the water-sediment interface. The problem is receiving considerable attention today (Egs. Heezen et al., 1967; Hamilton, 1969a; 1969b; 1969c; Hamilton et al., 1969; and Horn et al., 1968a, 1968b).

A survey of bottom topography and acoustic properties of the floor of the Hatteras Abyssal Plain was conducted as part of the Marine Geophysical Project (Atlantic Area 2, Alpine Geophysical Associates). Our study presents additional information on sediments of the same area. Lamont has collected 320 cores from the region which represents an increase in control on the distribution and properties of sediments of over 30 times that provided by coring activities of the MGS Project. With these data on hand it should be possible to test whether or not sonic properties of the ocean floor are strongly related to topography and/or sediment.

In Figure 1 are given MGS Atlantic Area 2 and the area described in this report. The latter is slightly larger in order to include all regions within and around the Hatteras Abyssal Plain which constitute distinct sedimentary environments. A complementary report on the Sohm Abyssal Plain is available (Horn et al., 1969b).

METHODS

Most cores at Lamont were taken by scientists and crews of research vessels VEMA and ROBERT D. CONRAD under the direction of Professor Maurice Ewing. All were examined and 101 selected as relevant to the purpose of the investigation. Of these, 66 have been matched to 75 acoustic stations of the Marine Geophysical Survey Project, some cores being related to more than one station. Matching of core data to MGS stations is shown on maps depicting submarine physiography and sediments of the area (Figs. 4 and 5); whereas specific data on each core are listed in the Appendices.

Diameter of the cores is 2 1/2 inches, and they range in length from 3 to 54 feet (average 23 feet). A complete description of the coring procedure and storage methods at the Observatory has been given by Ericson et al., 1961.

Mean grain size has been adopted as an index of the speed at which sound travels through unconsolidated deep-sea sediments

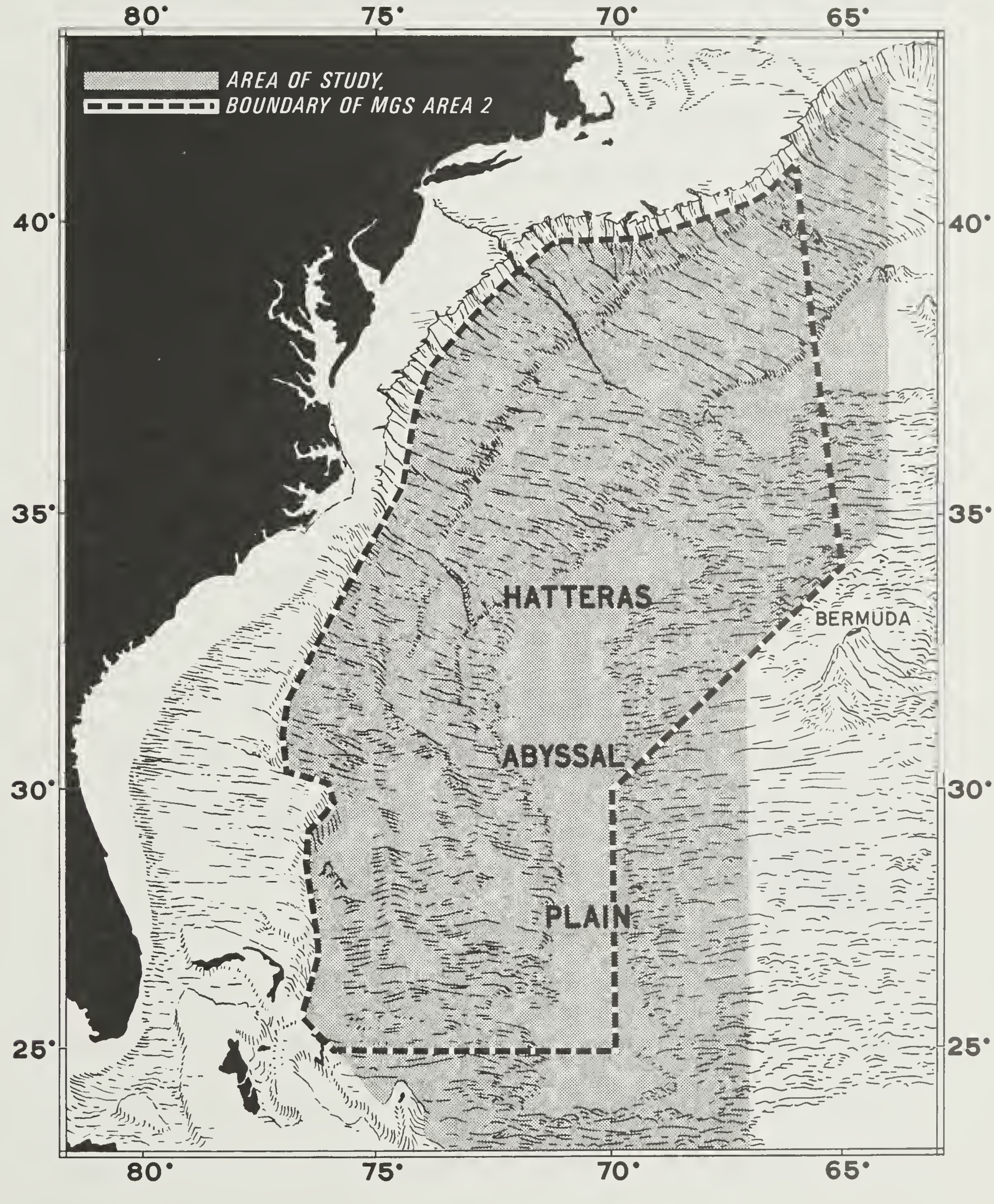

Figure 1. Index map showing locations of study area and MGS AREA 2, Northwest Atlantic. (Submarine physiography is from a portion of the Physiographic Diagram, Atlantic Ocean, published by The Geological Society of America. Copyright © 1957 by Bruce G. Heezen. Reproduced by permission.)

(hereafter referred to as sound velocity or velocity) because there is a strong correlation between particle size and sound velocity (Horn et al., 1968, 1968b). Cores were first described then sampled for textural analysis. Mechanical analysis followed the combined sieve-pipette technique outlined by Folk (1968). Gravel and sand fractions were sieved through calibrated nests of 8-inch sieves at 1/4 phi intervals. Mud and clay were analyzed by the pipette method with aliquotes taken at 1/2 phi intervals.

Under a separate program, sound velocities were determined through linered cores which were immediately split and sampled at the precise points where velocity measurements had been made. The results enable us to relate sound velocities to 562 determinations of mean size and 1093 of wet density. Plots of mean grain size versus velocity and wet density versus velocity are given in Figures 2 and 3. All laboratory measurements of velocity are adjusted to 23°C and a pressure of 1 atmosphere. Least squares curves to the third order were then fitted to these data by computer and predictions of the velocities made at specific intervals of mean size and wet density. Appendix C lists velocities related to a range of mean grain size from 0.50 to 500 microns and wet densities from 1.18 g/cc to 2.28 g/cc. If the results are to be compared with in situ measurements they must first be corrected to prevailing conditions of temperature and pressure (see Hamilton, 1963, 1969c).

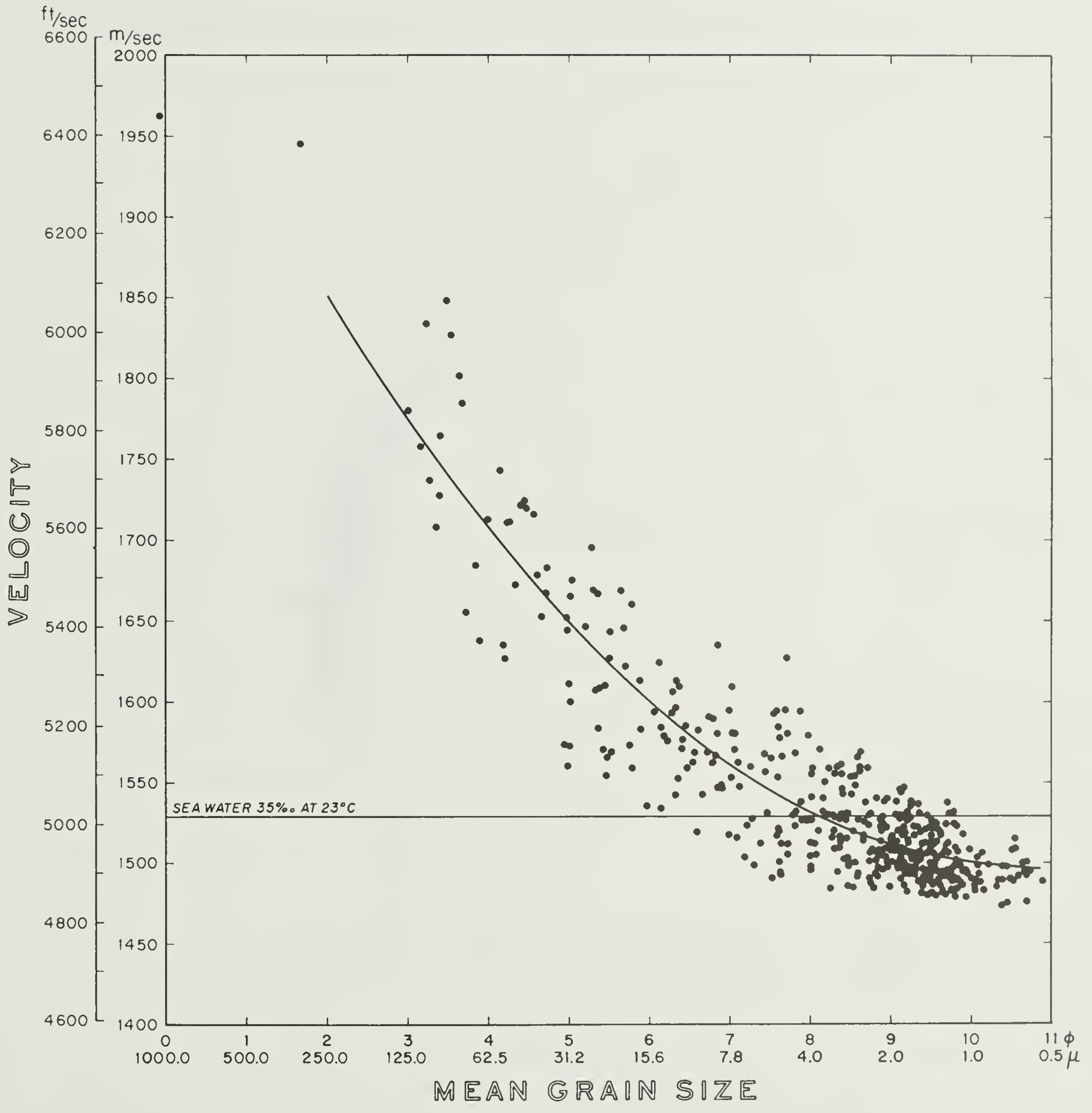

Figure 2. Mean grain size of unconsolidated deep-sea sediments plotted against sound velocity through sediment.

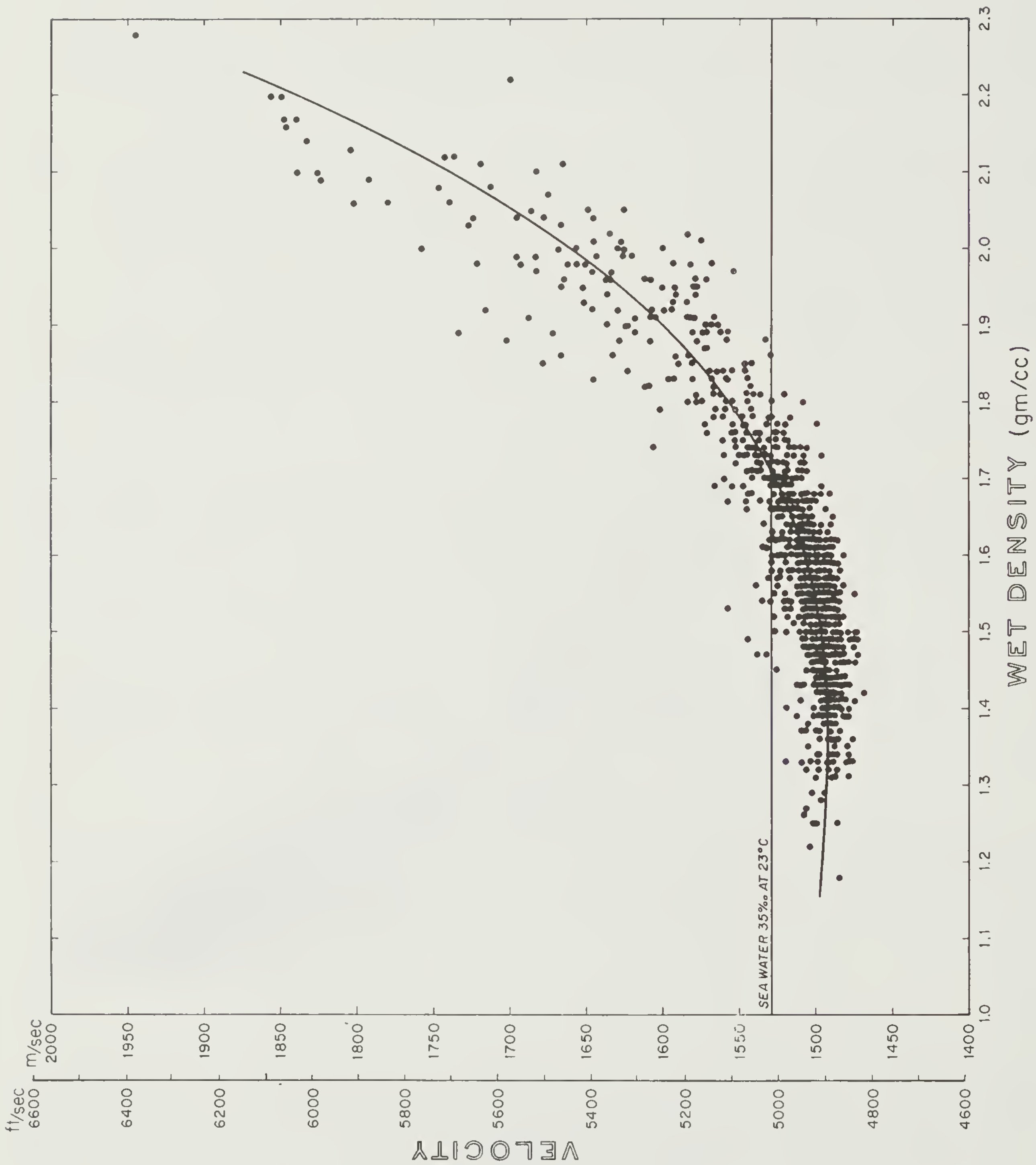

Figure 3. Wet density of unconsolidated deep-sea sediments plotted against sound velocity through sediment.

Predictions of wet densities and sound velocities of cores from the Hatteras Abyssal Plain are given in Appendix D. They were determined using the listing presented in Appendix C. The method employed in predicting wet densities and velocities is to determine the mean size of a given layer by conducting a textural analysis of a representative sample from the layer. The resulting average size is then entered into the listing given in Appendix C and corresponding densities and velocities are taken from the table. These values in conjunction with others are used to draw the velocity and wet density profiles of the cores in Appendix D. Tests of the predictions against laboratory measurements are in progress and initial successes afford confidence in the procedure.

The format of the report is constructed such that the reader can locate either an MGS station or core within his area of study by referring to Figures 4 and 5. After selecting a station or core, Appendix D can be used to obtain details of sediment lithology along with predictions of wet density and sound velocity.

ACOUSTIC DOMAINS OF THE OCEAN FLOOR

In recent years attention has been directed toward understanding properties of the ocean floor which bear on the use of low frequency profiling equipment and sonic devices employing the bottom as an acoustic interface. Initially most investigations of sonic properties of sediments were confined to laboratory measurement of sound velocity through cores of marine deposits (e.g., Hamilton *et al.*, 1956;

Sutton *et al.*, 1957; Nafe and Drake, 1957, 1961, 1963; Shumway, 1958, 1960a, 1960b; Schreiber, 1968; Horn *et al.*, 1968a; and many others). Under the leadership of Hamilton, critical information is being gathered by divers and submersibles which links experimental and *in situ* results (Hamilton *et al.*, 1956, 1969; Hamilton, 1963). The entire subject of acoustic and related properties of marine sediments is thoroughly described in a series of excellent reports by Hamilton (1969a, 1969b, 1969c). The main conclusion drawn from the investigations is that a strong correlation exists between acoustic and other physical properties of unconsolidated marine sediments.

The success of relating sound velocity to certain properties of sediments has led to considerable expansion of efforts which combine marine geology and acoustics of the sea floor. Current research is directed toward defining major regions of the world's oceans which possess similar sonic properties (Heezen *et al.*, 1967). Heezen and his associates pointed out that acoustic domains coincide with major physiographic provinces of the world's oceans.

At the same time, Hamilton (personal communication) advocated that in order to understand the acoustic character of the sea floor, it was necessary to have knowledge of submarine physiography along with sedimentary environments and processes. He discusses the thesis in detail in his recent reports (Hamilton, 1969a and 1969c).

Such reasoning led to compilation of physiographic maps and definition of sedimentary provinces of the North Pacific by Horn et al. (1968b, 1969a, 1970a, 1970b).

The concept very briefly stated is that physiography plus sediment determine the acoustic nature of the ocean floor. A final test of the thesis remains to be made. The northwest Atlantic possibly offers the most complete set of data for such work. This report provides details of sediment types and their distribution within and around the Hatteras Abyssal Plain. In addition, the position, thickness and character of reflective horizons are given. Predictions of parameters used to calculate acoustic impedance of layers comprising cores are listed in Appendix D. Acoustic measurements and descriptions of physiography are contained in the reports of the Marine Geophysical Survey Project (e. g., Schreiber, 1967) and on physiographic diagrams compiled by Heezen and Tharp (1957 and 1968). If the underlying premise is correct, there should be a strong correlation between reflectivity, physiography and sediment type.

DISTRIBUTION OF LAYERS CONSIDERED POTENTIAL REFLECTORS OF SOUND, HATTERAS ABYSSAL PLAIN AND ENVIRONS

General statement

Sound reflection at or just below the water-sediment interface is a function of many variables, not the least of which are roughness (geometry, shape) and distribution of sediment layers which represent abrupt impedance contrasts within the sediment section. The relation of roughness to acoustic properties of the sea floor is the subject of research being conducted by Dr. G. M. Bryan at Lamont-Doherty Geological Observatory. Only major submarine physiographic elements of the Hatteras Abyssal Plain and contiguous areas are presented here (Figs. 4 and 5). In the region of the Hatteras Abyssal Plain, distribution of reflecting horizons is directly related to coarse layers deposited by turbidity currents.

Well-defined sand and silt units of intermediate to high sound velocity and wet density (sharp contrasts of acoustic impedance) have been divided into four qualitative classes. They are considered potential reflectors of sound and include: 1) Good reflector -- $>$10 cm thick, 2) Intermediate reflector -- 5 to 10 cm thick, 3) Poor reflector -- $<$5 cm thick with clear-cut upper and lower limits, and 4) Questionable -- $<$5 cm thick with poorly defined limits. Position and thickness of these layers are shown graphically in Appendix D.

Distribution, thickness and position in the sediment section of good and intermediate reflectors (classes 1 and 2) are given in Figure 4. Thinner layers (classes 3 and 4) are not included in Figure 4 for the following reasons: 1) they may be acoustically transparent, and 2) they tend to blur boundaries between areas of good reflectors and regions where there are none. Should a need arise for information on the distribution of lower ranks of potential reflectors they occur along the western margin of the Hatteras Abyssal Plain within two regions identified as predominantly clay with occasional silt layers (Fig. 5). Their position and thickness are also indicated in Appendix D. If major textural divisions of the sediments (i.e., sand, silt, mud, clay) are required, they are given in Figure 5.

Considerable care and effort have gone into preparation of Figures 4 and 5 to eliminate the need of lengthy discussion and to facilitate rapid visual communication of the location and nature of potential reflectors. Comparison of the figures reveals good and intermediate reflectors coincide with areas where the normal clay section is abruptly interrupted by graded, coarse deposits. The latter provide sharp impedance contrasts close to the surface of the sediment sequence. The abyssal plain has both the geometry and sediment necessary for good reflection of sound.

Reflectivity within the limits of Hatteras Abyssal Plain

The northern portion of the plain is characterized by sand and silt intercalated with clay. Coarse units act as good reflectors and strong reflection of sound should take place. It is speculated that the highest values of reflectivity encountered in the Hatteras Plain will occur in regions where sand layers constitute a significant portion of the sediment section. The northern part of the Hatteras

Abyssal Plain is the site of sand accumulation and presumably will reflect sound better than the remainder of the plain.

Central and southern regions lie beyond sand emplacement. Sediments are silt interstratified with clay. Here silt layers serve as multiple sub-bottom reflectors. Their finer grain size and thinner layering offer less impedence contrast with intercalated clays. Overall reflectivity of the sea floor will be lower. A slight thickening of silts at the southern end of Hatteras Plain suggests ponding of turbidity currents behind its southern topographic limit. Thickening of the layers may result in slightly better reflection of sound at the southern end of the plain.

Acoustic properties of sediments from areas surrounding Hatteras Abyssal Plain

To the east, south and southwest of the plain, uniform brown and gray clay cover the ocean floor (Fig. 5). Potential reflecting horizons are extremely rare (Fig. 4). The change from interstratified coarse- and fine-grained deposits of the plain to monotonous clay sequences of abyssal hills is abrupt. The boundary coincides very well with limits of the Hatteras Abyssal Plain presented on physiographic diagrams (Heezen and Tharp, 1957 and 1968). A combination of increase in bottom roughness with low velocity sediments in regions of abyssal hills suggests areas surrounding the abyssal plain will be characterized by poor reflectivity.

The situation is slightly different along the northwestern limit of the plain. Here widely spaced and very thin layers (predominantly 1 cm thick) of silt and sand are interlayered with thick units of clay. They are either products of settling of finest fractions of turbidity currents or may be coarse materials deposited by geostrophic currents (e. g., Hubert, 1964; Heezen and Hollister, 1964; Heezen et al., 1967). Distribution of the layers is limited to the outer continental rise. These thin but relatively coarse layers may be acoustically transparent when taken individually. Nonetheless, they occur throughout the length of the cores and when combined may have an additive effect which produces an over-all value of intermediate reflectivity at the outer limits of this physiographic province.

The inner continental rise and continental slope are covered by thick sections of hemipelagic muds and clays (Fig. 5). There is a slight and progressive increase in mean grain size toward land. Lack of discrete layering, rapid variation in mean grain size over short distances, and progressive increase in bottom slope and roughness presumably cancel out improvement in reflectivity normally associated with increase in mean grain size. Prediction of bottom reflectivity in this region is hazardous. Hamilton (1969c) indicates a need for detailed sediment charts of the continental shelf before making predictions of its acoustic properties. Heezen et al. (1967) report considerable variation in the reflectivity of the continental slope and continental rise. Our examination of cores from these physiographic provinces corroborates their findings. Sediments are extremely variable and are laid down on a highly irregular surface. Shape of the ocean floor and nature of the sediments combine to give a bleak picture of predicting the regional acoustic character of either the inner continental rise or continental slope.

Blake-Bahama Abyssal Plain

The narrow Blake-Bahama Abyssal Plain lies immediately seaward of the Bahama Islands (Fig. 4). Two acoustic stations of the Marine Geophysical Survey Project are located on the abyssal plain. There is a wealth of core data available at Lamont from the plain; however, only a brief description is given here. The Blake-Bahama Abyssal Plain is covered by thick, coarse sands and sometimes gravels interstratified with carbonate-rich mud and clay. Coarse layers are common in most cores and are composed of fragmental biogenic carbonate. The material is derived from reefs associated with the Bahama Islands. Periodically, coarse debris from reefs slumps down steep insular slopes and accumulates as thick units covering the abyssal plain. The coarse layers have both massive and graded textures suggesting deposition by local submarine slumping and turbidity-current activity. Cores matched to the MGS stations are shown in Figure 4, whereas the area of gravel and sand derived from the Bahama Islands is given in Figure 5.

TURBIDITY CURRENT DEPOSITS AND THEIR BEARING ON THE DISTRIBUTION OF POTENTIAL REFLECTORS

Inspection of Figures 4 and 5 shows most reflectors are located within the limits of Hatteras Plain and associated gently sloping deep-sea fans. This portion of the western North Atlantic has been filled in and leveled by intermittent addition of coarse sediment by turbidity currents. Progressive burial of pre-existing topography has ultimately produced the flat surface of the plain. Every core from the plain is composed of turbidites interlayered with clay. The coarse layers are the only potential reflectors of sound within the sediment section penetrated by the cores. Therefore, in order to understand the reflectivity of the sea floor of this region it is important to understand the process which emplaced the sediments capable of reflecting sound. Several complete reviews and bibliographies covering the subject of turbidity currents are already available (e. g., Society of Economic Paleontologists and Mineralogists, Special Publication No. 2, 1951; Bally, 1957; Kuenen and Humbert, 1964; and Dzulynski and Walton, 1965).

It is not the purpose of this report to review the research done on turbidity flows. However, a very brief statement is included. Turbidity currents are dense clouds of suspended sediment triggered by natural phenomena such as earthquakes or slope failure due to overloading. After movement is initiated, bottom-seeking currents move downslope under the influence of gravity from points of origin on the outer continental shelf or upper continental slope. Submarine canyons serve as main avenues of transfer. Currents often reach high velocities (e.g., 50 knots, Heezen and Ewing, 1952) and have the ability to transfer enormous volumes of sand and silt to abyssal depths in a short time. Forward momentum of flows is checked by decrease in gradient at the line of juncture of the continental rise and adjacent abyssal plain. These density currents have emplaced the sands and silts of Hatteras Plain.

Distribution of coarse sediment within the plain (Fig. 5) suggests Hudson and Hatteras Canyons have served as prime routes of flow of turbidity currents. Areas of sand lie at seaward ends of the canyons where velocity of the currents has been checked by an abrupt reduction of slope. Here sand is dropped from the advancing currents because lower velocities render impossible the maintenance of sand in suspension. Sand is limited to cores from Hudson and Hatteras Deep-Sea Fans, and areas immediately seaward (Figs. 4, 5).

Beyond deep-sea fans, velocities of turbidity currents are lower, flows advance more slowly, and the upper size limit of sediment carried in suspension is coarse silt. With farther and farther transport down the plain there is progressive slowing of the current and silt is dropped from suspension. These graded layers cover much of the middle and southern portions of Hatteras Plain (Fig. 5). The silts are distal equivalents of the sands.

There is a slight increase in thickness of many silt layers at the extreme southwestern corner of the abyssal plain. Currents which successfully negotiate the entire length of the plain appear to pond against abyssal hills. Heezen et al. (1967) suggested ponding occurs at the greatest depth attainable by turbidity currents. It is interesting to note there is not an equivalent thickening of silt units in the southeastern corner of the plain. This may be indirect evidence lending support to the idea that some turbidity currents spill out of Hatteras Abyssal Plain, pass through Vema Gap, and deposit sediment on Nares Abyssal Plain.

CONCLUSIONS

Sands and silts intercalated with clay dominate sediments of the Hatteras Abyssal Plain. The coarse layers have high velocity and wet density characteristics and offer sharp contrasts in acoustic impedance both at or just below the water-sediment interface.

Thickest and coarsest sands occur on the Hatteras and Hudson Deep-Sea Fans and immediately seaward of the fans. Where the sea floor is level and sand dominates, reflectivity should be very good. The central portion of the Hatteras Abyssal Plain is covered by sequences of alternating silt and clay. The silts offer multiple reflectors and over-all reflectivity should be good. At the extreme southwestern corner of the plain ponding of silt has taken place, potential reflectors are thicker, and sound reflection should be good (slightly higher than that of the central area of the plain). Based on the small number of cores available from the southeastern corner of the Hatteras Abyssal Plain, reflectivity should be moderate.

Cores taken immediately east, south, and southwest of the Hatteras Abyssal Plain consist of uniform, low velocity clay. Unless reflective horizons lie at depths greater than those reached by coring, sound reflection in these regions should be at a minimum.

Reflectivity should decrease in a landward direction within the limits of the outer continental rise. Prediction of the acoustic properties of the inner continental rise and, more particularly, the continental slope without detailed surveys of topography and sediments is not possible. Our survey reveals both bottom roughness and highly variable textural properties of sediments in these physiographic provinces present a poor and unpredictable acoustic interface.

The Blake-Bahama Abyssal Plain is covered with carbonate sands and gravels interstratified with carbonate-rich muds and clays. Cores suggest bottom reflectivity will be good.

Results of a survey of sediment cores from the Hatteras Abyssal Plain indicate submarine physiography and abyssal sedimentation may well control reflection of sound at the ocean floor. A single sedimentary process, the turbidity current, has leveled the region of the abyssal plain providing an interface with perfect shape for sound reflection. In addition, turbidity currents have laid down interstratified coarse- and fine-grained layers, the former being potential surface and near-surface reflecting horizons. The survey lends weight in favor of the argument that, to predict sound reflection at the sea floor, it is first necessary to understand submarine physiography, sediment properties, and sediment processes (Heezen et al., 1967; Hamilton, 1969c; Horn et al., 1968b).

ACKNOWLEDGMENTS

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APPENDIX A

CORE NUMBER, LOCATION, WATER DEPTH AND LENGTH OF CORE

Location, Depths and Lengths of Cores

MGS Area & Station	Core No.	Location		Water Depth		Core Length	
		Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-1	R12-3	25° 29' N	75° 59' W	2610	4773	32.2	980
2-2	V21-12	25° 23' N	74° 15' W	2665	4874	30.4	928
2-5	V21-233	25° 25' N	73° 03' W	2961	5416	30.8	938
2-7	V24-6	24° 58' N	71° 06' W	3020	5524	25.3	772
2-8	V24-5	28° 35' N	71° 05' W	2961	5415	30.4	928
2-9	RC4-2	28° 00' N	72° 59' W	2610	4773	29.1	888
2-10	V21-6	26° 42' N	73° 54' W	2509	4589	33.9	1033
2-11	A167-38	26° 23' N	76° 14' W	2530	4627	8.0	243
2-12	V15-199	27° 29' N	76° 05' W	2656	4857	31.1	949
2-13	NO MATCHED CORE						
2-14	V21-246	28° 31' N	75° 19' W	2721	4976	37.1	1132
2-15	A179-17	28° 00' N	73° 47' W	2400	4389	17.7	540
2-16	RC4-2	28° 00' N	72° 59' W	2610	4773	29.1	888
2-17	SHL80-3	28° 00' N	70° 30' W	2981	5452	11.6	353

Location, Depths and Lengths of Cores

MGS Area & Station	Core No.	Location		Water Depth		Core Length	
		Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-18	V7-33	29° 14' N	69° 55' W	2973	5437	23.1	705
2-19	RC9-11	29° 30' N	72° 18' W	2850	5212	41.2	1257
2-20	RC2-1	29° 48' N	74° 19' W	2478	4532	36.3	1107
2-21	A164-29	29° 45' N	75° 21' W	2531	4630	12.2	372
2-22	NO MATCHED CORE						
2-23	RC4-8	30° 38' N	76° 16' W	2049	3748	18.8	572
2-24	R12-7	31° 41' N	76° 07' W	1500	2743	30.2	920
2-25	V15-207	31° 11' N	75° 06' W	1873	3426	37.9	1154
2-26	A167-10	31° 47' N	73° 24' W	2750	5029	17.0	517
2-27	V15-2	32° 12' N	74° 10' W	2680	4901	5.5	168
2-28	R12-7	31° 41' N	76° 07' W	1500	2743	30.2	920
2-29	RC9-4	33° 19' N	75° 13' W	1942	3552	31.7	965
2-30	RC9-4	33° 19' N	75° 13' W	1942	3552	31.7	965
2-31	V22-2	39° 15' N	73° 12' W	2895	5295	7.6	232

Location, Depths and Lengths of Cores

MGS Area		Location		Water Depth		Core Length	
& Station	Core No.	Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-32	SHL80-2	33° 08' N	71° 25' W	2942	5381	15.8	483
2-33	V21-248	32° 39' N	72° 39' W	2903	5309	7.4	227
2-34	V7-34	31° 17' N	71° 05' W	2952	5400	16.1	490
2-35	V26-169	31° 14' N	69° 52' W	2966	5424	39.0	1190
2-36	V10-99	31° 29' N	68° 03' W	2978	5446	16.1	490
2-37	A179-21	32° 18' N	68° 51' W	2798	5118	16.1	490
2-38	V19-4	32° 36' N	71° 19' W	2948	5391	33.0	1007
2-39	RC10-287	33° 36' N	71° 10' W	2923	5347	38.1	1162
2-40	RC10-287	33° 36' N	71° 10' W	2923	5347	38.1	1162
2-41	RC9-3	33° 38' N	72° 09' W	2826	5169	32.2	980
2-42	NO MATCHED CORE						
2-43	RC7-1	35° 10' N	73° 52' W	1861	3404	37.9	1155
2-44	RC10-288	35° 31' N	73° 24' W	2011	3678	28.3	862
2-45	V24-2	34° 26' N	71° 42' W	2499	4570	4.0	123

Location, Depths and Lengths of Cores

MGS Area & Station	Core No.	Location		Water Depth		Core Length	
		Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-46	V24-1	36° 30' N	73° 30' W	1647	3012	12.2	373
2-47	A164-33	36° 54' N	73° 58' W	1397	2556	7.1	216
2-48	A167-1	37° 39' N	72° 58' W	1479	2706	25.6	780
2-49	RC10-289	37° 00' N	72° 32' W	1735	3173	37.8	1151
2-51	V21-2	36° 05' N	70° 24' W	2436	4455	6.7	203
2-52	A150-35	36° 21' N	67° 46' W	2687	4914	4.0	123
2-53	A164-19	36° 46' N	67° 23' W	2738	5007	9.4	285
2-54	A164-35	33° 30' N	67° 48' W	2816	5151	13.2	402
2-55	A179-21	32° 18' N	68° 51' W	2798	5118	16.1	490
2-56	A179-21	32° 18' N	68° 51' W	2798	5118	16.1	490
2-57	V18-368	33° 03' N	69° 42' W	2944	5385	9.5	290
2-58	A164-35	33° 30' N	67° 48' W	2816	5151	13.2	402
2-59	NO MATCHED CORE						
2-60	A179-23	34° 56' N	16° 15' W	2760	5048	20.0	610

Location, Depths and Lengths of Cores

MGS Area & Station	Core No.	Location		Water Depth		Core Length	
		Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-61	A179-22	34° 07' N	68° 20' W	2798	5118	6.2	188
2-62	A167-4	34° 57' N	70° 05' W	2650	4846	17.1	522
2-63	A164-17	35° 47' N	68° 56' W	2638	4824	23.2	706
2-64	A164-13	35° 43' N	67° 20' W	2790	5103	7.4	225
2-65	A172-33	36° 43' N	68° 32' W	2570	4700	16.1	490
2-66	V20-253	38° 17' N	68° 32' W	2673	4889	39.3	1197
2-67	V23-145	37° 05' N	69° 36' W	2378	4349	28.5	870
2-68	A185-63	37° 48' N	72° 03' W	1330	2433	16.1	490
2-69	V15-213	38° 56' N	72° 03' W	1340	2450	17.3	526
2-70	V13-1	38° 38' N	70° 42' W	1660	3036	32.2	980
2-71	A164-61	39° 33' N	68° 47' W	1488	2722	14.0	428
2-72	A164-61	39° 33' N	68° 47' W	1488	2722	14.0	428
2-73	C25-2	40° 11' N	67° 38' W	960	1756	12.4	378
2-74	V7-69	40° 46' N	65° 33' W	1626	2974	20.1	612

Location, Depths and Lengths of Cores

MGS Area		Location		Water Depth		Core Length	
& Station	Core No.	Latitude	Longitude	Fathoms	Meters	Feet	Cm.
2-75	NO MATCHED CORE						
2-76	A164-57	39° 20' N	67° 13' W	1853	3390	16.3	497
2-77	A164-59	38° 42' N	67° 52' W	2222	4064	15.2	464
2-78	A173-2	38° 30' N	66° 01' W	2449	4480	29.9	910
2-79	A173-3	37° 50' N	66° 22' W	2683	4907	16.1	490
2-80	V20-252	37° 14' N	66° 32' W	2729	4991	37.7	1149
2-81	V23-143	36° 39' N	66° 11' W	2735	5002	25.3	772
2-82	A164-14	36° 06' N	67° 19' W	2720	4974	17.0	518
2-83	V12-1	34° 38' N	66° 36' W	2847	5207	40.2	1225
2-84	V12-1	34°38' N	66° 36' W	2847	5207	40.2	1225

APPENDIX B

GRAIN SIZE DATA USED TO PREDICT SOUND VELOCITIES AND WET DENSITIES OF LAYERS FROM MEAN GRAIN SIZES OF SEDIMENTS

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-1												
R12-3	4773	55	0.00	55.62	29.27	15.11	.66	4.78	36.10	2.52	+.66	.69
		175	1.51	75.69	10.88	11.92	.48	2.80	143.20	2.98	+.53	.65
		425	5.30	79.40	6.31	8.99	.41	1.32	400.00	2.77	+.57	.71
MGS 2-2												
V21-12	4874	0	0.00	1.35	26.90	71.75	.27	9.69	1.21	2.69	-.05	.46
		820	0.00	.43	22.85	76.72	.23	10.21	.84	2.73	-.21	.47
		900	0.00	.00	18.25	81.75	.18	10.32	.78	2.38	-.06	.46
MGS 2-5												
V21-233	5416	230	0.00	.48	33.05	66.47	.33	9.68	1.22	2.76	-.04	.44
		257	0.00	.73	80.48	18.79	.81	6.20	13.60	2.19	+.69	.65
		381	0.00	2.40	85.74	11.86	.88	5.33	24.80	1.78	+.72	.72
		673	0.00	4.20	35.18	60.62	.37	9.13	1.78	2.65	+.13	.55
		687	0.00	28.70	53.18	18.12	.75	5.57	20.90	2.51	+.67	.61
		900	0.00	6.10	37.83	56.07	.40	8.62	2.52	3.31	-.01	.43

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-7												
V24-6	5524	0	0.00	.02	26.66	73.32	.27	9.87	1.07	2.54	.00	.44
		113	0.00	17.80	76.89	5.31	.94	4.67	39.20	1.13	+.53	.66
		410	0.00	.05	12.15	87.80	.12	10.64	.63	2.13	-.05	.45
		449	0.00	.03	89.52	10.45	.90	6.18	13.79	1.35	+.46	.69
		510	0.00	8.30	89.26	2.44	.97	4.60	41.10	.60	+.36	.57
MGS 2-8												
V24-5	5415	0	0.00	.04	31.42	68.54	.31	9.68	1.22	2.59	+.04	.43
		85	0.00	4.20	87.48	8.32	.91	4.76	36.80	1.17	+.56	.76
		482	0.00	.16	23.49	76.35	.24	10.05	.94	2.34	+.05	.43
		498	0.00	1.70	95.25	3.05	.97	4.73	37.50	.57	+.56	.58
MGS 2-9, MGS 2-16												
RC4-2	4773	0	0.00	.93	17.10	81.97	.17	10.17	.86	2.27	+.08	.45
		860	0.00	.01	20.54	79.45	.21	9.92	1.03	2.77	-.15	.49

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
MGS 2-10												
V21-6	4589	0	0.00	2.30	17.16	80.54	.18	10.15	.88	2.58	-.08	.50
		72	0.00	.01	13.50	86.49	.14	10.45	.71	2.15	+.04	.44
		930	0.00	.60	15.05	84.35	.15	10.17	.87	2.20	+.15	.46
MGS 2-11												
A167-38	4627	20	0.00	4.32	58.60	37.08	.61	7.22	6.67	2.94	+.57	.43
		82	0.00	.07	17.01	82.92	.17	10.32	.78	2.25	+.03	.42
		208	0.00	75.00	15.57	9.43	.62	3.45	91.00	2.07	+.53	.70
MGS 2-12												
V15-199	4857	0	0.00	14.60	31.36	54.04	.37	8.21	3.36	3.54	-.08	.41
		160	0.00	.94	29.68	69.38	.30	9.58	1.30	2.78	-.05	.45
		320	0.00	34.50	53.13	12.37	.81	4.78	36.20	2.03	+.54	.69
MGS 2-13	NO MATCHED CORE											

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-14												
V21-246	4976	0	0.00	10.10	34.50	55.40	.38	8.40	2.95	3.49	-.05	.44
		150	0.00	.05	21.62	78.33	.22	10.02	.96	2.34	+.09	.46
		590	0.00	.01	22.99	77.00	.30	9.89	1.05	2.33	+.13	.45
		629	0.00	1.28	86.26	12.46	.87	5.44	23.03	1.68	+.60	.75
MGS 2-15												
A179-17	4389	200	0.00	.01	15.93	84.06	.16	10.33	.77	2.25	+.02	.45
MGS 2-17												
SHL80-3	5452	13	0.00	.74	75.77	23.49	.76	7.42	5.81	2.15	+.65	.63
		49	0.00	.70	14.18	85.12	.14	10.38	.75	2.20	+.04	.45
		102	0.00	47.17	49.39	3.44	.93	4.26	51.90	.81	+.31	.61
		110	0.00	.08	15.24	84.68	.15	10.42	.73	2.23	-.01	.45

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
MGS 2-18												
V7-33	5437	76	0.00	1.76	80.30	17.94	.82	6.19	13.69	2.22	+.73	.66
		353	0.00	71.90	21.10	7.00	.75	3.71	76.20	1.47	+.56	.73
		391	0.00	74.60	16.60	8.80	.65	3.53	86.50	1.83	+.52	.72
		435	0.00	.17	40.39	59.44	.40	9.10	1.82	2.76	+.13	.42
		535	0.00	24.18	61.86	13.96	.82	5.23	26.52	2.09	+.73	.68
		580	0.00	69.10	26.96	3.94	.87	3.65	79.20	.95	+.25	.62
MGS 2-19												
RC9-11	5212	0	0.00	.12	34.59	65.29	.35	9.28	1.60	2.72	+.08	.42
		545	0.00	.00	15.70	84.30	.16	10.46	.71	2.19	.00	.43
		555	0.00	.15	69.80	30.05	.70	7.44	5.73	2.74	+.59	.49
MGS 2-20												
RC2-1	4532	40	0.00	2.05	18.19	79.76	.19	10.12	.89	2.47	-.02	.47
		1050	0.00	.04	13.65	86.31	.14	10.46	.71	2.17	+.02	.45

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K_G'
								ϕ	μ			
MGS 2-21												
A164-29	4630	85	0.00	.11	12.96	86.93	.13	10.53	.68	2.16	.00	.44
MGS 2-22	NO MATCHED CORE											
MGS 2-23												
RC4-8	3748	100	0.00	.04	23.34	76.62	.23	10.17	.87	2.44	-.05	.43
MGS 2-24, MGS 2-28												
R12-7	2820	200	0.00	2.00	29.81	68.19	.30	9.55	1.33	2.66	+.02	.45
MGS 2-25												
V15-207	3426	0	0.00	4.40	29.95	65.65	.31	9.12	1.80	2.97	-.01	.48
MGS 2-26												
A167-10	5029	5	0.00	.60	32.33	67.07	.33	9.45	1.43	2.68	+.05	.44
		472	0.00	1.90	93.82	4.28	.96	5.07	29.63	.88	+.36	.61
MGS 2-27												
V15-2	4901	82	0.00	.10	48.19	51.71	.48	8.77	2.28	2.66	+.30	.46
		130	0.00	3.66	93.39	2.95	.97	4.81	35.60	.64	+.34	.55

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-29, MGS 2-30												
RC9-4	3552	0	0.00	4.87	31.20	63.93	.33	9.16	1,74	2.94	+.01	.48
		911	0.00	.44	34.34	65.22	.34	9.44	1.44	2.70	+.07	.44
MGS 2-31												
V22-2	5295	10	0.00	19.80	73.32	6.88	.91	4.52	43.20	1.33	+.61	.77
		72	0.00	80.89	14.98	4.13	.78	3.78	72.70	.66	+.21	.75
		108	0.00	3.83	44.44	51.73	.46	8.28	3.21	3.24	+.09	.43
		170	0.00	71.90	22.28	5.82	.79	3.83	69.90	1.19	+.42	.80
MGS 2-32												
SHL80-2	5381	0	0.00	1.19	47.99	50.82	.49	8.27	3.23	3.04	+.18	.42
		55	0.00	.35	63.89	35.76	.64	7.50	5.49	2.88	+.60	.43
		212	0.00	48.80	32.38	18.82	.63	5.30	25.20	3.07	+.62	.56
		379	0.00	23.40	74.07	2.53	.97	4.34	49.30	.55	+.34	.60
		475	0.00	66.53	30.39	3.08	.91	3.96	63.80	.43	+.18	.62

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-33												
V21-248	5309	80	0.00	.19	29.02	70.79	.29	9.71	1.19	2.62	+.02	.44
		90	0.00	29.07	61.52	9.41	.87	4.63	40.20	1.51	+.65	.74
		119	0.00	80.00	18.24	1.76	.91	3.73	75.10	.42	+.14	.59
		140	0.00	56.69	35.52	7.79	.82	3.99	62.70	1.54	+.41	.73
		225	0.00	84.74	10.60	4.66	.69	3.52	86.90	.93	+.36	.75
MGS 2-34												
V7-34	5400	0	0.00	.15	30.02	69.83	.30	9.79	1.12	2.52	+.07	.43
		74	0.00	.82	47.09	52.09	.47	8.62	2.54	2.94	+.19	.42
		154	0.00	38.60	27.64	33.76	.45	6.40	11.81	3.75	+.36	.43
		265	0.00	38.18	29.10	32.72	.47	6.33	12.40	3.70	+.35	.43
		409	0.44	88.88	4.69	5.99	.78	1.83	281.00	1.89	+.49	.74

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-35												
V26-169	5424	165	0.00	.05	21.59	78.36	.22	10.22	.83	2.45	-.10	.44
		367	0.00	.12	92.16	7.72	.92	6.27	12.89	1.16	+.40	.69
		900	0.00	2.12	22.84	75.04	.23	9.74	1.16	2.77	-.06	.49
		908	0.00	23.30	68.55	8.15	.89	4.63	40.30	1.59	+.62	.74
		915	0.00	20.21	72.86	6.93	.91	4.64	40.00	1.41	+.55	.74
		925	0.00	34.59	59.97	5.44	.92	4.29	51.00	1.10	+.55	.75
MGS 2-36												
V10-99	5446	0	0.00	.01	6.07	93.92	.06	11.01	.48	1.93	-.07	.44
MGS 2-37, MGS 2-55, MGS 2-56												
A179-21	5118	103	0.00	.58	14.25	85.17	.14	10.53	.67	2.31	-.10	.47

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-38												
V19-4	5391	0	0.00	.68	41.00	53.32	.41	8.81	2.22	2.94	+.09	.44
		30	0.00	3.18	93.48	3.34	.97	4.85	34.50	.68	+.40	.57
		45	0.00	23.20	72.93	3.87	.95	4.32	49.80	.67	+.52	.70
		425	0.00	.04	25.95	74.01	.26	9.82	1.10	2.46	+.09	.45
		800	0.00	.48	37.63	61.89	.38	9.14	1.77	2.95	+.01	.42
		810	0.00	.36	93.13	6.51	.93	5.48	22.25	1.20	+.47	.73
		940	0.16	63.34	24.17	12.33	.66	4.20	54.20	2.53	+.56	.70
MGS 2-39, MGS 2-40												
RC10-287	5347	63	0.00	.02	27.40	72.58	.27	9.83	1.10	2.50	+.06	.43
		81	0.00	.48	79.82	19.70	.80	6.24	13.19	2.37	+.74	.62
		870	0.00	.13	24.97	74.90	.25	10.05	.94	2.45	.00	.43
		884	0.00	1.20	91.61	7.19	.93	5.69	19.28	1.43	+.38	.70

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-41												
RC9-3	5169	45	0.00	.23	39.97	59.80	.40	9.05	1.88	2.84	+.07	.44
		610	0.00	.06	80.05	19.89	.80	6.81	8.89	2.23	+.65	.65
		650	0.00	.06	33.55	66.39	.34	9.18	1.72	3.27	-.23	.36
MGS 2-42	NO MATCHED CORE											
MGS 2-43												
RC7-1	3404	0	0.00	21.90	36.26	41.84	.46	7.43	5.77	3.44	+.19	.42
		165	0.00	27.20	37.56	35.24	.52	6.69	9.66	3.32	+.31	.44
		303	5.42	61.52	20.79	12.27	.63	2.16	223.20	3.65	+.80	.52
		425	0.00	19.70	42.69	37.61	.53	7.34	6.15	3.40	+.29	.42
		441	0.00	89.50	8.24	2.26	.78	3.36	96.90	.52	+.21	.60
		570	0.00	.82	47.90	51.28	.48	8.60	2.56	2.86	+.24	.44
		670	0.00	24.10	48.54	27.36	.64	6.13	14.21	2.94	+.61	.47
		1138	0.00	17.81	42.40	39.79	.52	7.25	6.56	3.32	+.27	.44

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
MGS 2-44												
RC10-288	3678	5	0.00	4.30	35.18	60.52	.37	8.84	2.17	2.98	+.02	.47
		511	0.00	.62	32.31	67.07	.33	9.51	1.37	2.62	+.11	.45
		522	0.00	48.80	28.13	23.07	.55	5.65	19.78	3.10	+.75	.49
MGS 2-45												
V24-2	4570	40	0.00	2.88	22.52	74.60	.23	9.88	1.06	2.60	+.01	.47
MGS 2-46												
V24-1	3012	6	0.00	3.98	38.31	57.71	.40	8.51	2.74	3.04	+.01	.46
		170	0.00	1.59	34.42	63.99	.35	9.36	1.52	2.66	+.13	.46
		350	0.00	.24	29.42	70.34	.29	9.62	1.26	2.76	-.03	.44
MGS 2-47												
A164-33	2556	0	0.00	8.30	57.50	34.20	.63	6.95	8.06	2.83	+.38	.47
		72	0.00	1.14	77.58	21.28	.78	6.45	11.38	2.44	+.69	.58
		178	0.00	31.50	59.04	9.46	.86	4.48	44.60	1.43	+.57	.75

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-48												
A167-1	2706	100	0.00	.06	27.32	72.62	.27	9.78	1.13	2.59	-.01	.45
		630	0.00	2.01	42.87	55.12	.44	8.72	2.37	3.01	+.11	.42
MGS 2-49												
RC10-289	3173	85	0.00	.56	33.26	66.18	.33	9.45	1.43	2.80	+.02	.45
		1121	0.00	.55	34.68	64.77	.35	9.34	1.54	2.80	+.07	.45
MGS 2-51												
V21-2	4455	0	0.00	1.87	39.60	58.53	.40	8.93	2.05	2.69	+.17	.48
		200	0.00	1.14	32.95	65.91	.33	9.19	1.71	2.29	+.26	.55
MGS 2-52												
A150-35	4914	40	0.00	87.80	8.70	3.50	.71	3.13	113.40	1.42	+.38	.77
		54	0.00	.05	33.55	66.40	.34	9.50	1.38	2.65	+.08	.44
		73	0.09	83.19	10.79	5.93	.65	2.33	198.40	1.98	+.74	.79
		95	0.00	29.20	44.09	26.71	.62	6.06	14.95	3.31	+.35	.49

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-53												
A164-19	5007	35	0.00	44.30	50.09	5.61	.90	4.03	60.70	1.08	+.29	.76
		265	0.00	46.52	47.93	5.55	.90	3.96	63.90	1.03	+.42	.76
MGS 2-54, MGS 2-58												
A164-35	5151	0	0.00	2.80	25.25	71.95	.26	9.63	1.26	2.71	-.01	.47
		130	0.00	.02	13.07	86.91	.13	10.59	.65	2.23	-.06	.47
MGS 2-57												
V18-368	5385	0	0.00	1.19	26.12	72.69	.26	9.78	1.13	2.67	-.02	.46
		85	0.00	.78	40.96	58.26	.41	9.07	1.85	2.88	+.08	.43
		271	0.00	.05	19.35	80.60	.19	9.56	1.32	1.99	-.45	.47
MGS 2-59 NO MATCHED CORE												
MGS 2-60												
A179-23	5048	25	0.00	93.00	4.71	2.29	.67	2.67	156.40	.81	+.21	.53
		428	0.00	95.52	2.81	1.67	.63	2.36	193.80	.73	+.26	.52
		440	0.00	1.42	46.24	52.34	.47	8.56	2.63	2.95	+.19	.43

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-61												
A179-22	5118	0	0.00	1.82	29.54	68.64	.30	9.43	1.44	2.73	+.02	.46
		55	0.00	73.90	23.87	2.23	.91	3.64	80.00	.79	+.32	.61
		115	0.00	89.10	10.19	.71	.93	3.28	102.70	.56	+.06	.51
		169	0.00	87.60	10.49	1.91	.85	3.24	105.30	.83	+.26	.63
MGS 2-62												
A167-4	4846	100	0.00	.27	27.84	71.89	.28	9.75	1.16	2.58	.00	.44
		432	0.00	24.90	44.56	30.54	.59	6.40	11.75	3.26	+.39	.46
MGS 2-63												
A164-17	4824	115	0.00	.03	28.50	71.47	.29	9.72	1.18	2.64	+.01	.44
MGS 2-64												
A164-13	5103	0	0.00	2.23	34.10	63.67	.35	9.25	1.63	2.84	+.04	.46
		40	0.00	89.60	7.43	2.97	.71	2.97	127.60	.92	+.23	.58
		58	0.00	94.25	3.93	1.82	.68	2.76	146.90	.64	+.29	.52

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
A164-13	5103	120	0.00	95.90	3.40	.70	.83	2.53	173.10	.72	+.15	.52
		130	0.00	93.71	4.40	1.89	.70	2.61	163.40	.77	+.27	.56
		213	0.00	92.50	5.12	2.38	.68	2.65	158.50	.81	+.40	.57
MGS 2-65												
A172-33	4700	0	0.00	3.25	55.42	41.33	.57	7.87	4.25	2.97	+.31	.49
		70	0.00	68.70	29.57	1.73	.94	3.76	73.80	.63	+.18	.54
		150	0.00	.91	32.34	66.75	.33	9.39	1.48	2.87	-.05	.45
		299	0.00	18.40	72.60	9.00	.89	4.76	36.80	1.49	+.68	.73
		380	0.00	17.39	56.58	26.03	.68	6.38	12.00	2.78	+.43	.49
MGS 2-66												
V20-253	4889	15	0.00	4.40	51.24	44.36	.54	8.13	3.54	3.05	+.26	.44
		315	0.00	80.60	18.45	.95	.95	3.60	82.20	.46	+.33	.53
		625	0.00	.08	25.41	74.51	.25	9.92	1.03	2.47	+.04	.44
		1173	0.00	87.30	11.21	1.49	.88	3.51	87.70	.41	+.35	.57

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-67												
V23-145	4349	5	0.00	1.90	40.64	57.46	.41	8.89	2.09	2.80	+.13	.45
		124	0.00	87.50	10.63	1.87	.85	2.94	130.00	1.10	-.32	.48
		712	0.00	75.00	18.09	6.91	.72	3.54	85.70	1.43	+.38	.75
		836	0.00	.23	30.20	69.57	.30	9.59	1.30	2.61	+.05	.44
MGS 2-68												
A185-63	2433	100	0.00	1.41	37.07	61.52	.38	9.02	1.92	3.10	-.05	.44
		400	0.00	2.26	38.33	59.41	.39	8.97	1.98	2.99	+.05	.43
MGS 2-69												
V15-213	2450	51	0.00	9.10	42.38	48.52	.47	8.09	3.65	3.42	+.08	.44
		500	0.00	2.62	37.36	60.02	.38	8.97	1.98	3.00	.00	.44
MGS 2-70												
V13-1	3036	5	0.00	5.10	46.78	48.12	.49	8.20	3.39	2.80	+.14	.52
		940	0.00	2.94	42.66	54.40	.44	8.49	2.77	3.09	+.05	.45

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz ϕ	Mz μ	σ_I	Sk_I	K'_G
MGS 2-71, MGS 2-72												
A164-61	2722	170	0.00	1.35	34.72	63.93	.35	9.16	1.74	2.93	+.02	.45
		216	0.00	92.30	6.26	1.44	.81	3.25	104.60	.46	+.13	.55
MGS 2-73												
C25-2	1756	100	0.00	6.19	44.24	49.57	.47	8.29	3.18	3.17	+.15	.45
MGS 2-74												
V7-69	2974	25	0.29	24.01	39.06	36.64	.52	6.84	8.68	3.45	+.29	.45
		468	0.00	4.21	56.08	39.71	.59	7.65	4.95	3.03	+.33	.45
MGS 2-75	NO MATCHED CORE											
MGS 2-76												
A164-57	3390	160	0.57	6.43	36.15	56.85	.39	8.67	2.44	3.24	.00	.45
MGS 2-77												
A164-59	4064	50	0.00	15.15	43.85	41.00	.52	7.44	5.71	3.23	+.27	.42
		153	0.00	90.35	7.02	2.63	.73	3.12	114.40	.73	+.06	.55
		370	0.00	29.31	51.87	18.82	.73	5.73	18.75	2.61	+.77	.62

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
MGS 2-78												
A173-2	4480	45	0.00	8.51	52.68	38.81	.58	7.45	5.70	3.19	+.37	.42
		624	0.00	.03	26.47	73.50	.26	9.97	1.00	2.27	+.17	.41
		625	0.00	.00	76.29	23.71	.76	7.27	6.46	2.28	+.65	.60
		828	0.00	7.22	90.36	2.42	.97	4.35	48.80	.32	+.27	.64
		839	0.00	82.28	14.79	2.93	.83	3.55	85.30	.67	+.20	.60
		852	0.00	94.89	3.71	1.40	.73	2.92	131.50	.58	+.05	.53
MGS 2-79												
A173-3	4709	210	0.00	1.29	35.23	63.48	.36	9.29	1.60	2.91	-.01	.43
		312	0.00	67.65	27.31	5.04	.84	2.67	157.10	.79	+.37	.55
		374	0.00	91.30	7.18	1.52	.83	3.94	65.10	.93	+.40	.77
MGS 2-80												
V20-252	4991	10	0.00	31.68	36.56	31.76	.54	6.03	15.23	4.09	+.16	.43
		50	0.00	14.70	38.14	47.16	.45	7.95	4.03	3.71	+.02	.46

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
V20-252	4991	532	0.00	77.00	16.10	6.90	.70	3.15	111.80	1.97	+.46	.67
		556	0.00	89.73	6.45	3.82	.63	2.39	190.30	1.44	+.13	.60
		650	0.00	37.50	41.48	21.02	.66	5.54	21.39	3.32	+.44	.53
		746	0.00	1.90	94.79	3.31	.97	4.89	33.70	.59	+.34	.59
		782	0.00	42.40	54.10	3.50	.94	4.11	57.60	1.07	+.07	.65
		920	0.06	86.13	9.07	4.74	.66	2.32	198.80	1.74	+.33	.68
		998	0.38	80.25	12.65	6.72	.65	2.73	150.00	2.22	+.50	.67
		1080	0.20	65.60	23.08	11.12	.67	3.81	70.90	2.62	+.59	.61
MGS 2-81												
V23-143	5002	68	0.00	88.10	7.76	4.14	.65	2.80	142.50	1.18	+.44	.70
		270	0.00	1.92	20.59	77.49	.21	9.89	1.05	2.53	+.03	.49
		505	0.00	.04	24.28	75.68	.24	10.19	.86	2.67	-.23	.44

GRAIN SIZE DATA

Core No.	Depth (m)	Depth in Core(cm)	% Gravel	% Sand	% Silt	% Clay	$\frac{z}{z+c}$	Mz		σ_I	Sk_I	K'_G
								ϕ	μ			
MGS 2-82												
A164-14	4974	25	0.00	79.80	15.93	4.27	.79	3.40	94.20	1.03	+.40	.67
		78	0.00	89.60	6.28	4.12	.60	2.67	156.00	1.15	+.46	.70
		100	0.00	.99	49.33	49.68	.50	8.18	3.43	3.46	+.19	.35
		190	0.00	10.50	81.72	7.78	.91	4.82	35.20	1.48	+.62	.73
		287	0.00	66.87	22.49	10.64	.68	4.23	52.90	1.84	+.67	.76
		310	0.00	80.50	11.87	7.63	.61	3.58	83.20	1.41	+.55	.81
		350	0.00	93.70	3.95	2.35	.63	2.78	145.20	.64	+.25	.53
MGS 2-83, MGS 2-84												
V12-1	5207	50	0.00	.03	37.05	62.92	.37	9.30	1.58	2.72	+.10	.42
		400	0.00	.15	33.52	66.33	.34	9.33	1.55	2.68	+.06	.44
		1008	0.00	1.03	9.37	89.60	.09	10.63	.63	2.19	-.05	.47

APPENDIX C

TABLE OF PREDICTED SOUND VELOCITIES AND WET DENSITIES

BASED UPON MEAN GRAIN SIZES OF SEDIMENTS

(ALL DATA ARE ADJUSTED TO 23° CENTIGRADE)

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc	Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc
1497	4911	-	1.18-1.19	1592	5223	14.0	1.89
1496	4907	0.50	1.20-1.22	1596	5238	15.0	1.89
1495	4905	-	1.23-1.25	1601	5251	16.0	1.90
1494	4902	-	1.26-1.29	1605	5264	17.0	1.91
1493	4898	-	1.30-1.34	1608	5277	18.0	1.92
1492	4895	-	1.35-1.41	1612	5289	19.0	1.92
1493	4898	-	1.42-1.45	1616	5300	20.0	1.93
1494	4902	-	1.46-1.48	1619	5311	21.0	1.94
1495	4906	0.75	1.49	1622	5322	22.0	1.94
1497	4911	1.00	1.52	1625	5333	23.0	1.95
1500	4920	1.25	1.55	1628	5343	24.0	1.95
1502	4929	1.50	1.57	1631	5353	25.0	1.96
1505	4939	1.75	1.60	1634	5362	26.0	1.96
1508	4948	2.0	1.62	1637	5371	27.0	1.97
1514	4967	2.5	1.65	1640	5380	28.0	1.97
1519	4985	3.0	1.68	1643	5389	29.0	1.98
1525	5002	3.5	1.70	1645	5398	30.0	1.98
1529	5018	4.0	1.72	1648	5406	31.0	1.98
1538	5047	5.0	1.75	1651	5414	32.0	1.99
1546	5073	6.0	1.78	1653	5422	33.0	1.99
1554	5097	7.0	1.80	1655	5430	34.0	1.99
1560	5119	8.0	1.81	1657	5437	35.0	2.00
1566	5139	9.0	1.83	1660	5445	36.0	2.00
1572	5158	10.0	1.84	1662	5452	37.0	2.00
1578	5176	11.0	1.86	1664	5459	38.0	2.01
1583	5193	12.0	1.87	1666	5466	39.0	2.01
1588	5208	13.0	1.88	1668	5473	40.0	2.01

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc	Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc
1670	5479	41.0	2.02	1714	5625	68.0	2.07
1672	5486	42.0	2.02	1716	5629	69.0	2.07
1674	5492	43.0	2.02	1717	5634	70.0	2.08
1676	5499	44.0	2.02	1718	5638	71.0	2.08
1678	5505	45.0	2.03	1720	5642	72.0	2.08
1680	5511	46.0	2.03	1721	5647	73.0	2.08
1682	5517	47.0	2.03	1722	5651	74.0	2.08
1683	5523	48.0	2.03	1724	5655	75.0	2.08
1685	5529	49.0	2.04	1725	5659	76.0	2.09
1687	5535	50.0	2.04	1726	5663	77.0	2.09
1689	5540	51.0	2.04	1727	5667	78.0	2.09
1690	5546	52.0	2.04	1729	5671	79.0	2.09
1692	5551	53.0	2.04	1730	5675	80.0	2.09
1694	5557	54.0	2.05	1731	5679	81.0	2.09
1695	5562	55.0	2.05	1732	5683	82.0	2.09
1697	5567	56.0	2.05	1733	5687	83.0	2.09
1698	5572	57.0	2.05	1734	5690	84.0	2.10
1700	5577	58.0	2.06	1736	5694	85.0	2.10
1702	5583	59.0	2.06	1737	5698	86.0	2.10
1703	5587	60.0	2.06	1738	5701	87.0	2.10
1705	5592	61.0	2.06	1739	5705	88.0	2.10
1706	5597	62.0	2.06	1740	5709	89.0	2.10
1707	5602	63.0	2.06	1741	5712	90.0	2.10
1709	5607	64.0	2.07	1742	5716	91.0	2.10
1710	5611	65.0	2.07	1743	5719	92.0	2.11
1712	5616	66.0	2.07	1744	5723	93.0	2.11
1713	5620	67.0	2.07	1745	5726	94.0	2.11

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

Velocity		Mean Size	Wet Density	Velocity		Mean Size	Wet Density
m/sec	ft/sec	μ	g/cc	m/sec	ft/sec	μ	g/cc
1746	5730	95.0	2.11	1772	5812	122.0	2.14
1747	5733	96.0	2.11	1772	5815	123.0	2.14
1748	5736	97.0	2.11	1773	5818	124.0	2.14
1749	5740	98.0	2.11	1774	5821	125.0	2.14
1750	5743	99.0	2.11	1775	5823	126.0	2.14
1751	5746	100.0	2.11	1776	5826	127.0	2.14
1752	5750	101.0	2.11	1777	5829	128.0	2.14
1753	5753	102.0	2.12	1777	5831	129.0	2.14
1754	5756	103.0	2.12	1778	5834	130.0	2.14
1755	5759	104.0	2.12	1779	5837	131.0	2.14
1756	5762	105.0	2.12	1780	5839	132.0	2.14
1757	5765	106.0	2.12	1781	5842	133.0	2.14
1758	5768	107.0	2.12	1781	5844	134.0	2.14
1759	5772	108.0	2.12	1782	5847	135.0	2.15
1760	5775	109.0	2.12	1783	5849	136.0	2.15
1761	5778	110.0	2.12	1784	5852	137.0	2.15
1762	5781	111.0	2.13	1784	5854	138.0	2.15
1763	5784	112.0	2.13	1785	5857	139.0	2.15
1764	5787	113.0	2.13	1786	5859	140.0	2.15
1765	5789	114.0	2.13	1787	5862	141.0	2.15
1766	5792	115.0	2.13	1787	5864	142.0	2.15
1766	5795	116.0	2.13	1788	5867	143.0	2.15
1767	5797	117.0	2.13	1789	5869	144.0	2.15
1768	5801	118.0	2.13	1790	5872	145.0	2.15
1769	5804	119.0	2.13	1790	5874	146.0	2.15
1770	5807	120.0	2.13	1791	5876	147.0	2.15
1771	5810	121.0	2.13	1792	5879	148.0	2.16

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc
1793	5881	149.0	2.16
1793	5883	150.0	2.16
1794	5886	151.0	2.16
1795	5888	152.0	2.16
1795	5890	153.0	2.16
1796	5893	154.0	2.16
1797	5895	155.0	2.16
1797	5897	156.0	2.16
1798	5900	157.0	2.16
1799	5902	158.0	2.16
1800	5904	159.0	2.16
1800	5906	160.0	2.16
1801	5908	161.0	2.16
1802	5911	162.0	2.16
1802	5913	163.0	2.16
1803	5915	164.0	2.17
1804	5917	165.0	2.17
1804	5919	166.0	2.17
1805	5921	167.0	2.17
1806	5924	168.0	2.17
1806	5926	169.0	2.17
1807	5928	170.0	2.17
1808	5930	171.0	2.17
1808	5932	172.0	2.17
1809	5934	173.0	2.17
1809	5936	174.0	2.17
1810	5938	175.0	2.17
1811	5940	176.0	2.17
1811	5942	177.0	2.17
1812	5944	178.0	2.18
1812	5946	179.0	2.18
1813	5948	180.0	2.18
1814	5950	181.0	2.18
1814	5952	182.0	2.18
1815	5954	183.0	2.18
1815	5956	184.0	2.18
1816	5958	185.0	2.18
1817	5960	186.0	2.18
1817	5962	187.0	2.18
1818	5964	188.0	2.18
1818	5966	189.0	2.18
1819	5968	190.0	2.18
1820	5970	191.0	2.18
1820	5972	192.0	2.18
1821	5974	193.0	2.18
1821	5976	194.0	2.18
1822	5977	195.0	2.18
1823	5979	196.0	2.18
1823	5981	197.0	2.19
1824	5983	198.0	2.19
1824	5985	199.0	2.19
1825	5987	200.0	2.19
1825	5989	201.0	2.19
1826	5990	202.0	2.19

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc	Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc
1826	5992	203.0	2.19	1841	6039	230.0	2.20
1827	5994	204.0	2.19	1841	6040	231.0	2.20
1828	5996	205.0	2.19	1842	6042	232.0	2.20
1828	5998	206.0	2.19	1842	6044	233.0	2.20
1829	5999	207.0	2.19	1843	6045	234.0	2.20
1829	6001	208.0	2.19	1843	6047	235.0	2.20
1830	6003	209.0	2.19	1844	6048	236.0	2.21
1830	6005	210.0	2.19	1844	6050	237.0	2.21
1831	6006	211.0	2.19	1845	6052	238.0	2.21
1831	6008	212.0	2.19	1845	6053	239.0	2.21
1832	6010	213.0	2.19	1845	6055	240.0	2.21
1832	6012	214.0	2.19	1846	6056	241.0	2.21
1833	6013	215.0	2.20	1846	6058	242.0	2.21
1833	6015	216.0	2.20	1847	6059	243.0	2.21
1834	6017	217.0	2.20	1847	6061	244.0	2.21
1834	6019	218.0	2.20	1848	6063	245.0	2.21
1835	6020	219.0	2.20	1848	6064	246.0	2.21
1836	6022	220.0	2.20	1849	6066	247.0	2.21
1836	6024	221.0	2.20	1849	6067	248.0	2.21
1837	6025	222.0	2.20	1850	6069	249.0	2.21
1837	6027	223.0	2.20	1850	6070	250.0	2.21
1838	6029	224.0	2.20	1853	6078	255.0	2.21
1838	6030	225.0	2.20	1855	6085	260.0	2.21
1839	6032	226.0	2.20	1857	6092	265.0	2.22
1839	6034	227.0	2.20	1859	6100	270.0	2.22
1840	6035	228.0	2.20	1861	6107	275.0	2.22
1840	6037	229.0	2.20	1863	6114	280.0	2.22

MEAN GRAIN SIZE, WET DENSITY AND EQUIVALENT SOUND VELOCITIES

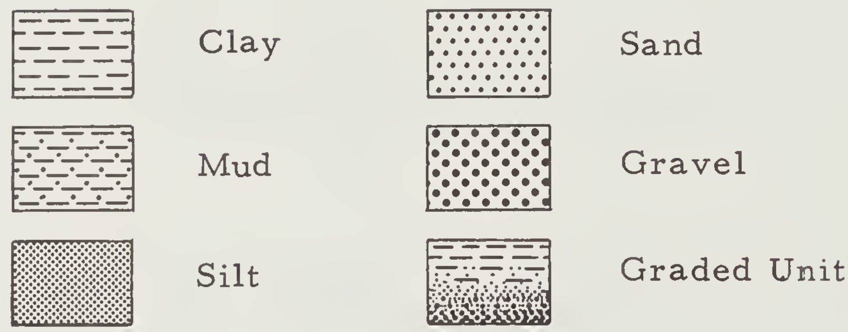
Velocity m/sec	Velocity ft/sec	Mean Size μ	Wet Density g/cc
1866	6121	285.0	2.22
1868	6127	290.0	2.23
1870	6134	295.0	2.23
1872	6141	300.0	2.23
1874	6147	305.0	2.23
1876	6153	310.0	2.23
1877	6160	315.0	2.23
1879	6166	320.0	2.24
1881	6172	325.0	2.24
1883	6178	330.0	2.24
1885	6184	335.0	2.24
1887	6190	340.0	2.24
1888	6196	345.0	2.24
1890	6202	350.0	2.24
1892	6207	355.0	2.25
1894	6213	360.0	2.25
1895	6218	365.0	2.25
1897	6224	370.0	2.25
1899	6229	375.0	2.25
1900	6235	380.0	2.25
1902	6240	385.0	2.25
1904	6245	390.0	2.26
1905	6250	395.0	2.26
1907	6255	400.0	2.26
1908	6261	405.0	2.26
1910	6266	410.0	2.26
1911	6271	415.0	2.26
1913	6275	420.0	2.26
1914	6280	425.0	2.26
1916	6285	430.0	2.27
1917	6290	435.0	2.27
1919	6295	440.0	2.27
1920	6299	445.0	2.27
1921	6304	450.0	2.27
1923	6309	455.0	2.27
1924	6313	460.0	2.27
1926	6318	465.0	2.27
1927	6322	470.0	2.27
1928	6326	475.0	2.27
1930	6331	480.0	2.27
1931	6335	485.0	2.28
1932	6339	490.0	2.28
1934	6344	495.0	2.28
1935	6348	500.0	2.28

APPENDIX D

CORE DATA MATCHED TO ACOUSTIC STATIONS OF ALPINE GEOPHYSICAL ASSOCIATES, AREA 2 - ATLANTIC, MARINE GEOPHYSICAL SURVEY PROJECT U.S. NAVAL OCEANOGRAPHIC OFFICE

LEGEND TO ACCOMPANY APPENDIX D

Lithology



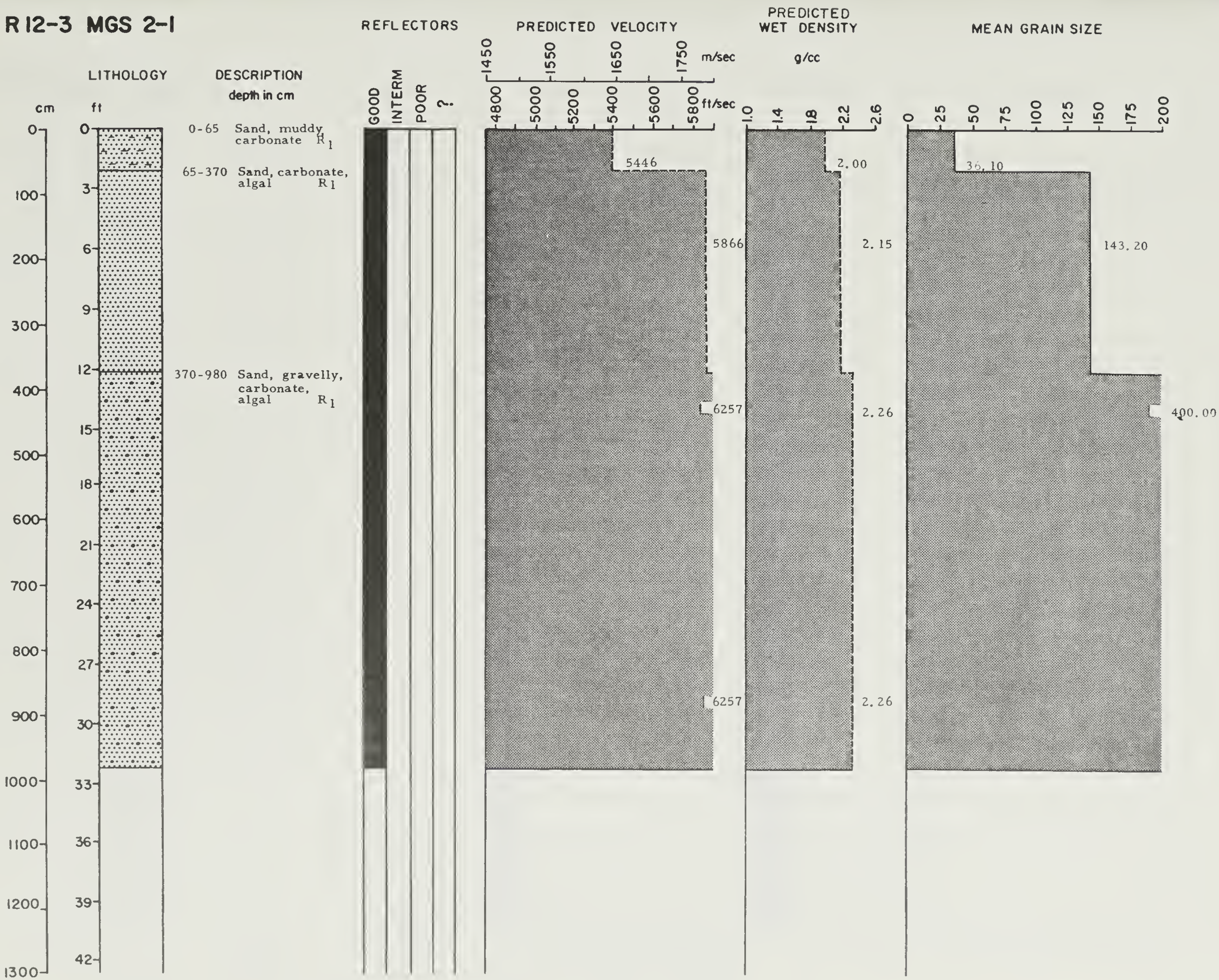
Reflectors: Solid black bars in columns give position and thickness of potential reflecting horizons. Reflectors are layers whose physical properties present high contrasts in acoustic impedance relative to the overlying seawater or sediments with which they are interstratified. The breakdown is qualitative: 1) good reflector -- >10 cm thick, 2) intermediate reflector -- 5 to 10 cm thick, 3) poor reflector -- <5 cm thick with well-defined upper and lower limits, and 4) questionable reflector -- <5 cm thick with poorly-defined limits.

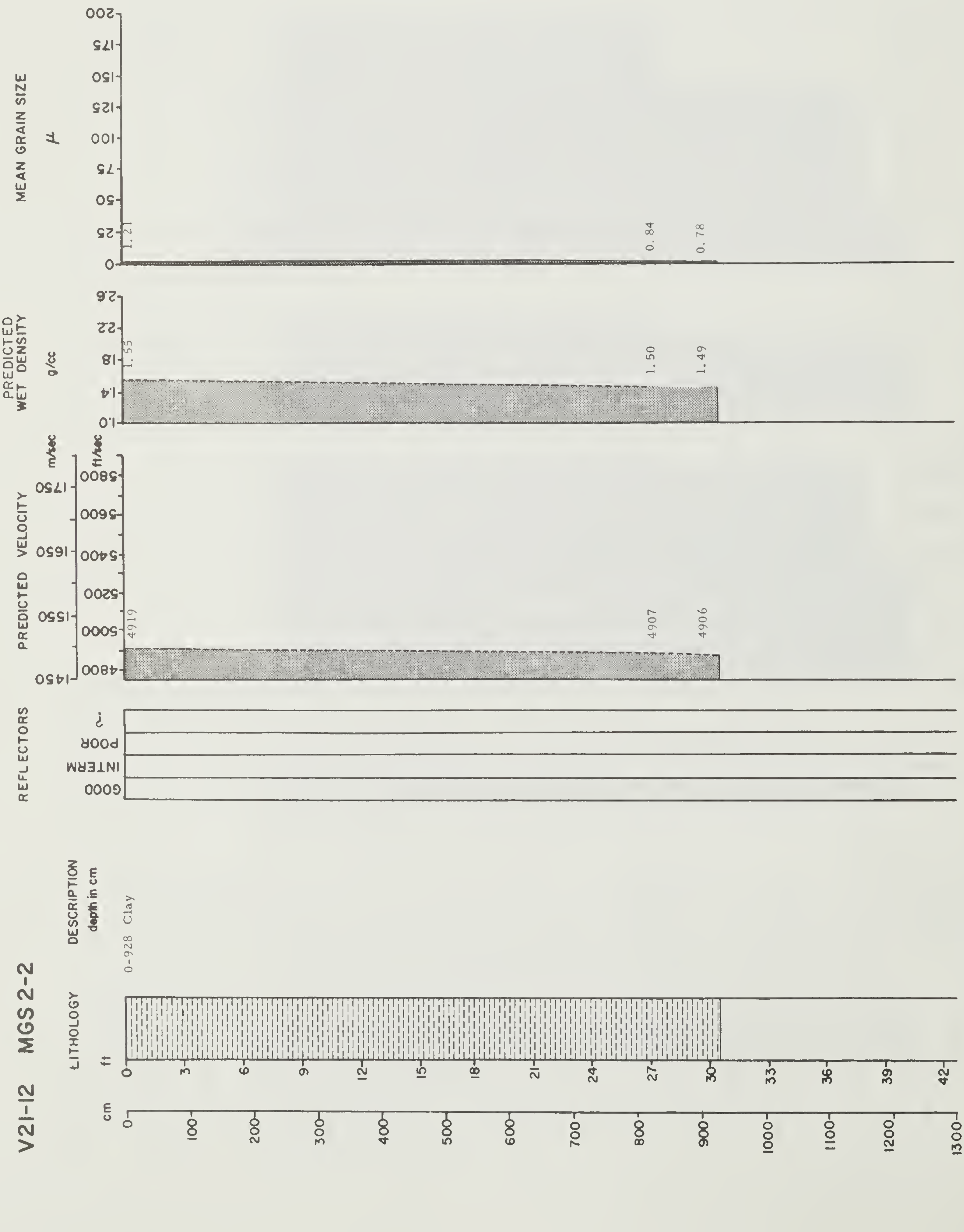
Predicted velocity: Dashed line outlining the velocity profile of core represents predictions taken from table given in Appendix C. Velocities are adjusted to 23°C at 1 atmosphere pressure. They must be corrected to in situ conditions prior to use in the field. Prediction of sound velocity is based on mean grain size of sediment.

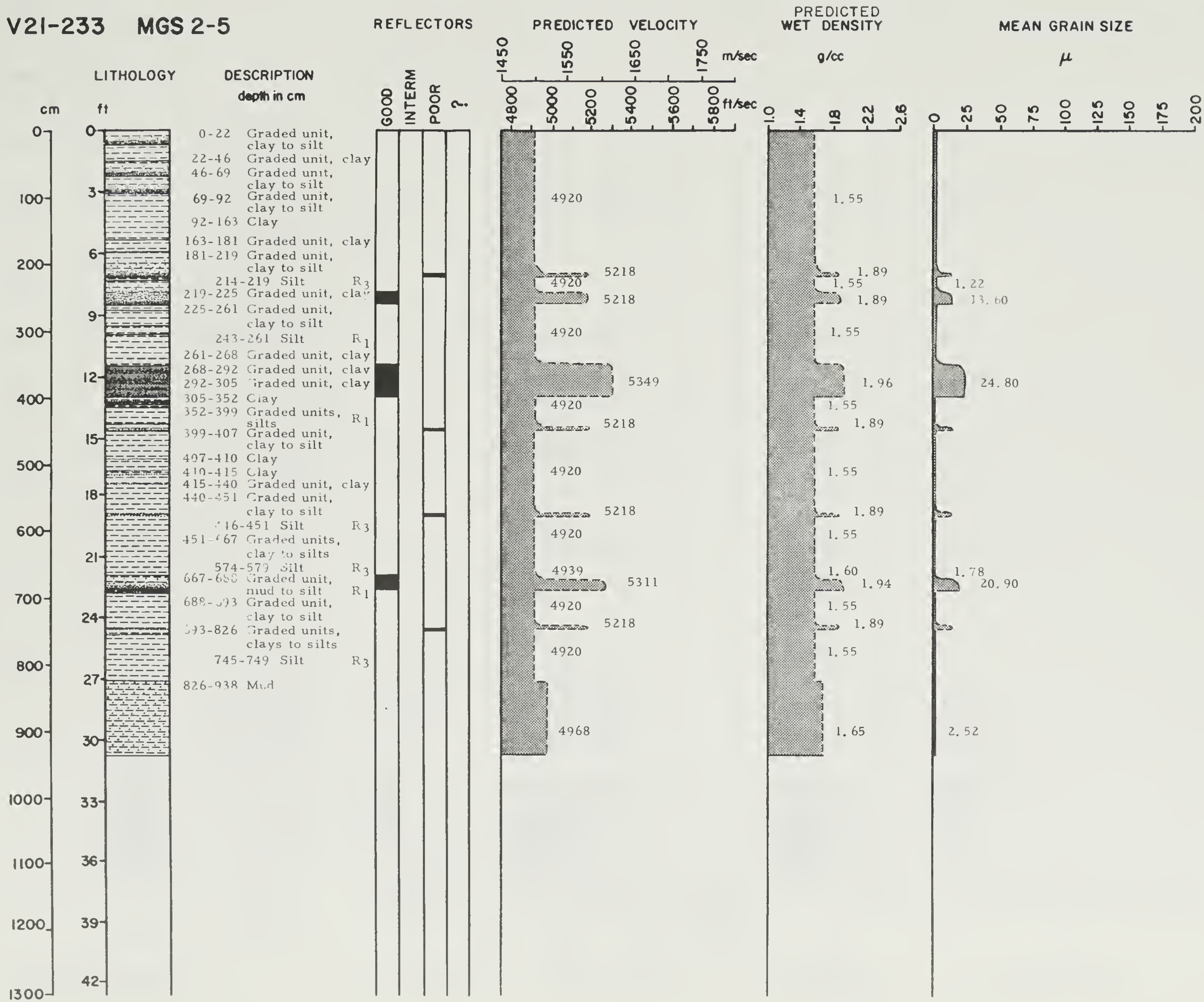
Wet density: The profile of wet density is a prediction using mean grain size as an index to physical properties of the cores. These predictions are arrived at indirectly and should be used with this understanding.

Mean grain size: Solid line on textural profile of core indicates actual laboratory measurement. Dashed line includes sections of core where direct measurement was not made, but data were determined from representative samples of similar layers comprising core.

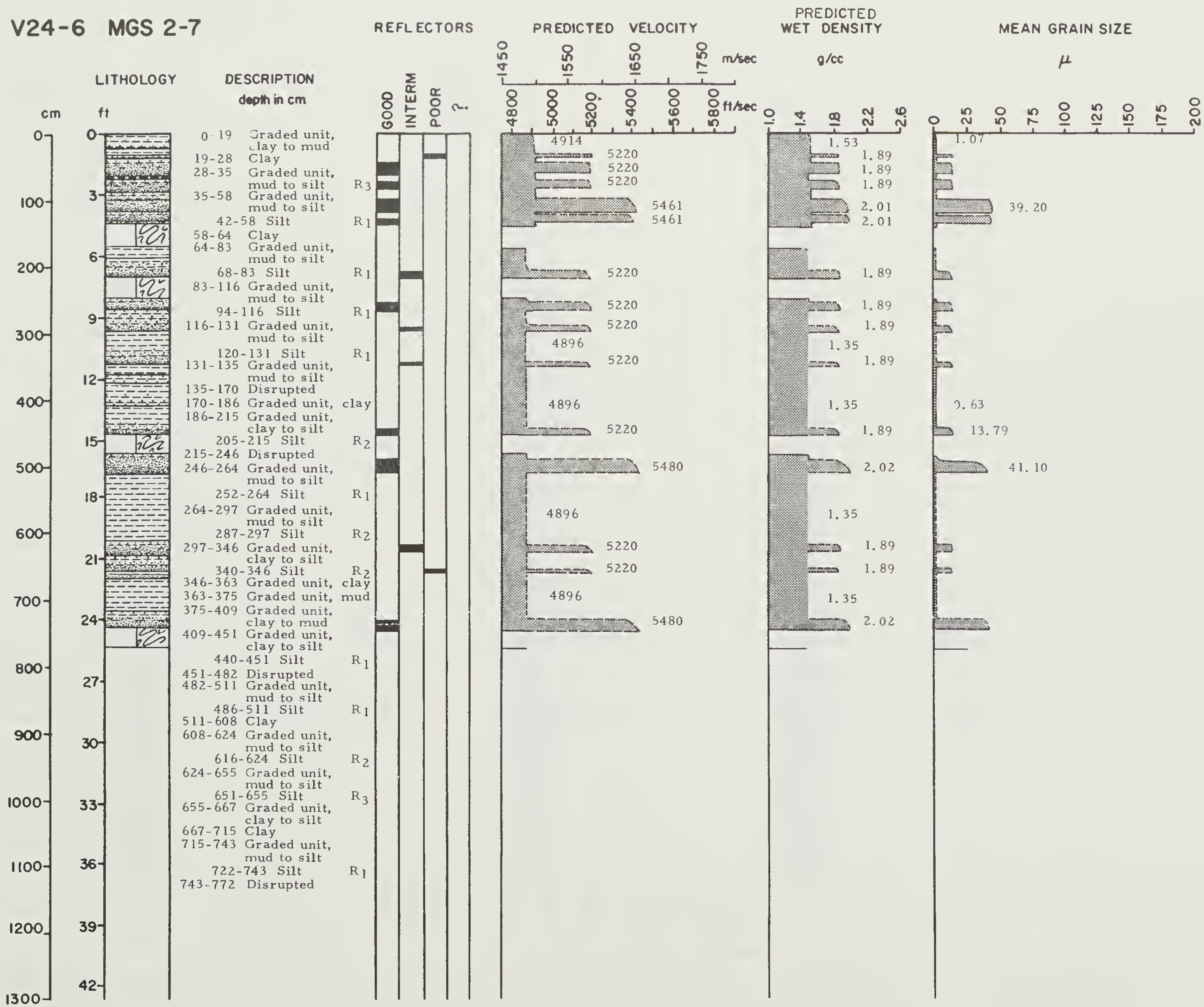
R 12-3 MGS 2-1

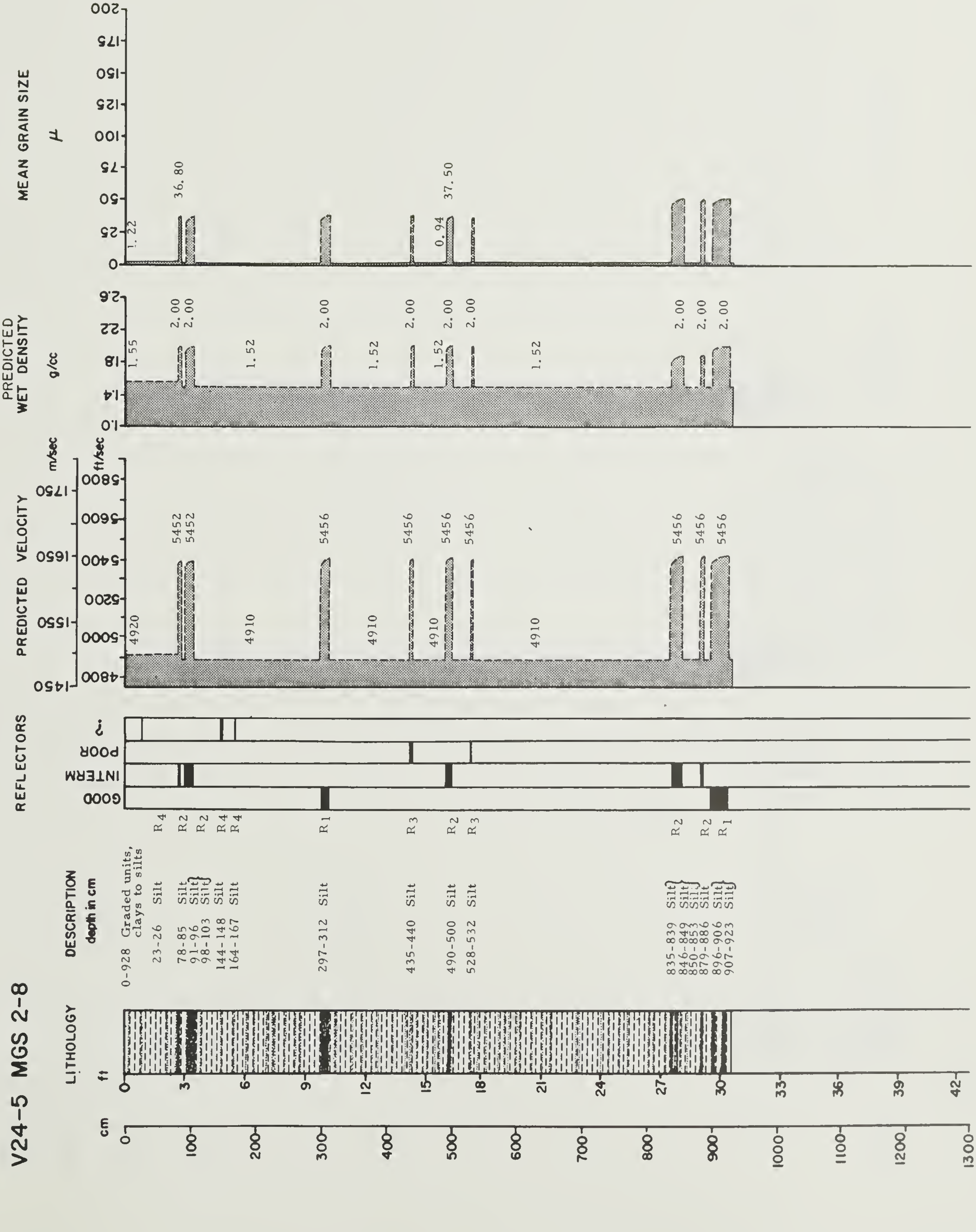

LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-65 Sand, muddy carbonate R1
65-370 Sand, carbonate, algal R1
370-980 Sand, gravelly, carbonate, algal R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5446
5866
6257
6257
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
2.00
2.15
2.26
2.26
MEAN GRAIN SIZE
0
25
50
75
100
125
150
175
200
143.20
400.00

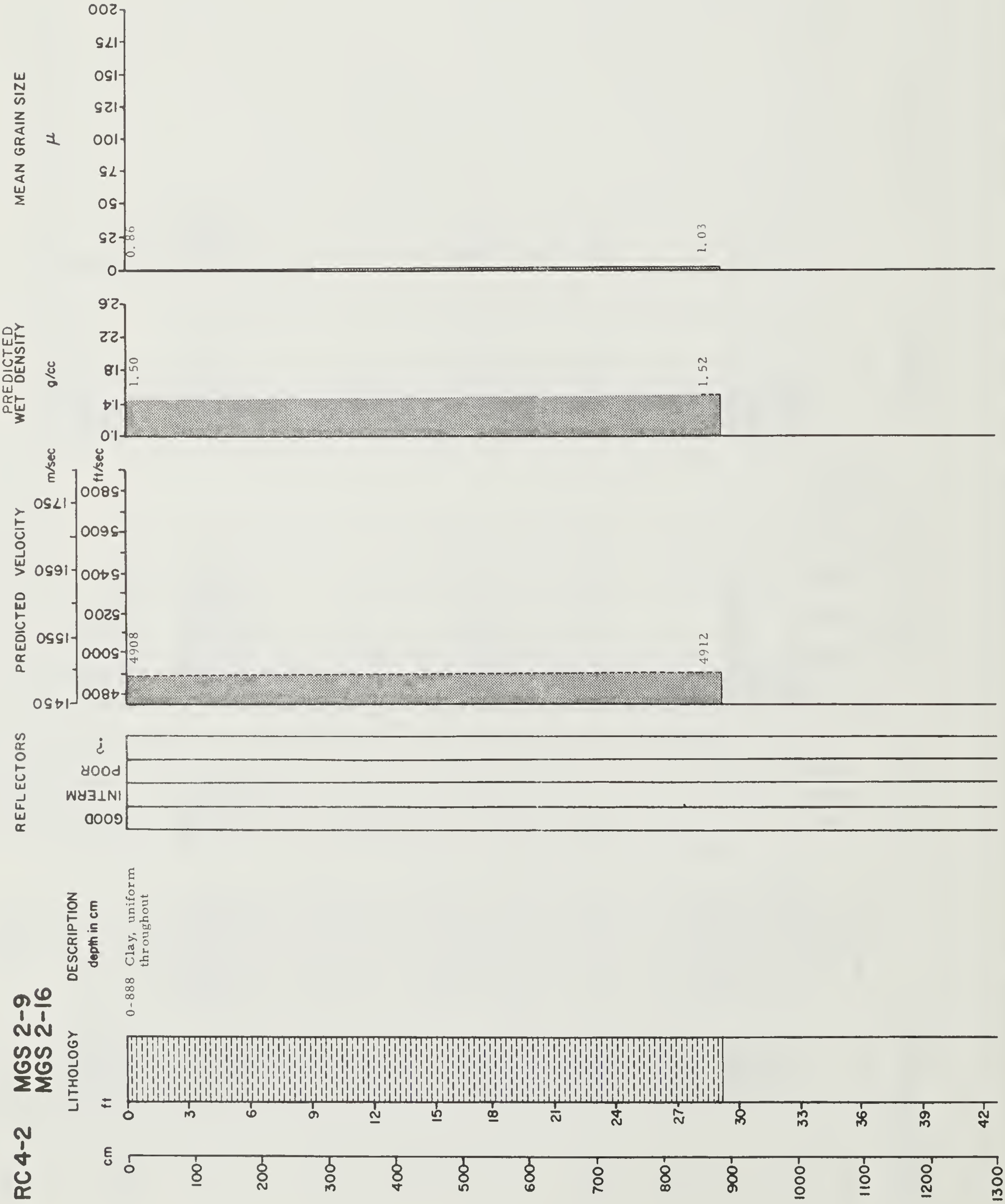

V21-12 MGS 2-2
LITHOLOGY
cm
ft
DESCRIPTION depth in cm
0-928 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4919
4907
4906
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.55
1.50
1.49
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.21
0.84
0.78
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

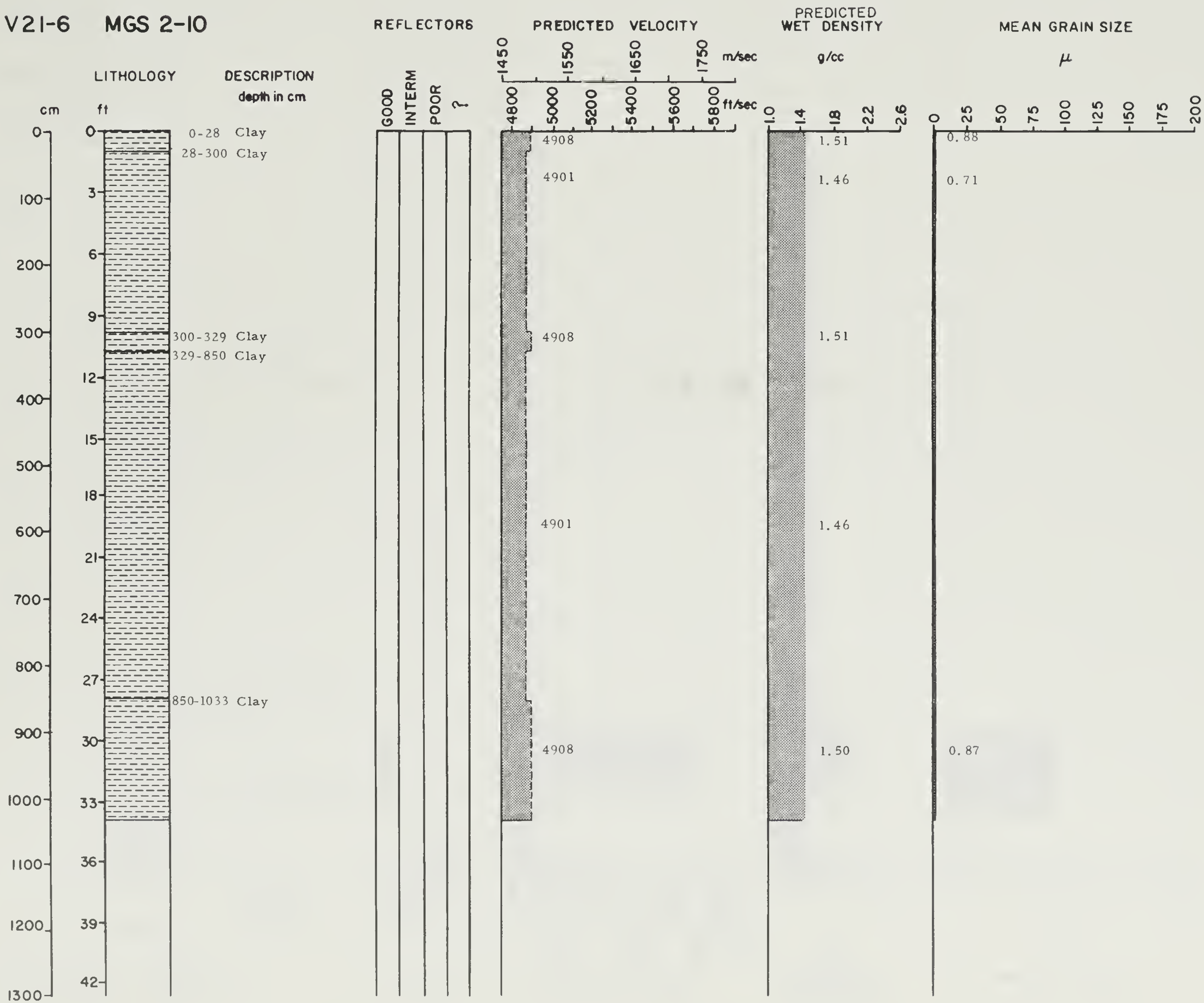

V21-233 MGS 2-5
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-22 Graded unit, clay to silt
22-46 Graded unit, clay
46-69 Graded unit, clay to silt
69-92 Graded unit, clay to silt
92-163 Clay
163-181 Graded unit, clay
181-219 Graded unit, clay to silt
214-219 Silt R3
219-225 Graded unit, clay
225-261 Graded unit, clay to silt
243-261 Silt R1
261-268 Graded unit, clay
268-292 Graded unit, clay
292-305 Graded unit, clay
305-352 Clay
352-399 Graded units, silts R1
399-407 Graded unit, clay to silt
407-410 Clay
410-415 Clay
415-440 Graded unit, clay
440-451 Graded unit, clay to silt
446-451 Silt R3
451-?67 Graded units, clay to silts
574-579 Silt R3
667-688 Graded unit, mud to silt R1
688-?93 Graded unit, clay to silt
?93-826 Graded units, clays to silts
745-749 Silt R3
826-938 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
PREDICTED WET DENSITY
g/cc
MEAN GRAIN SIZE
μ

V24-6 MGS 2-7

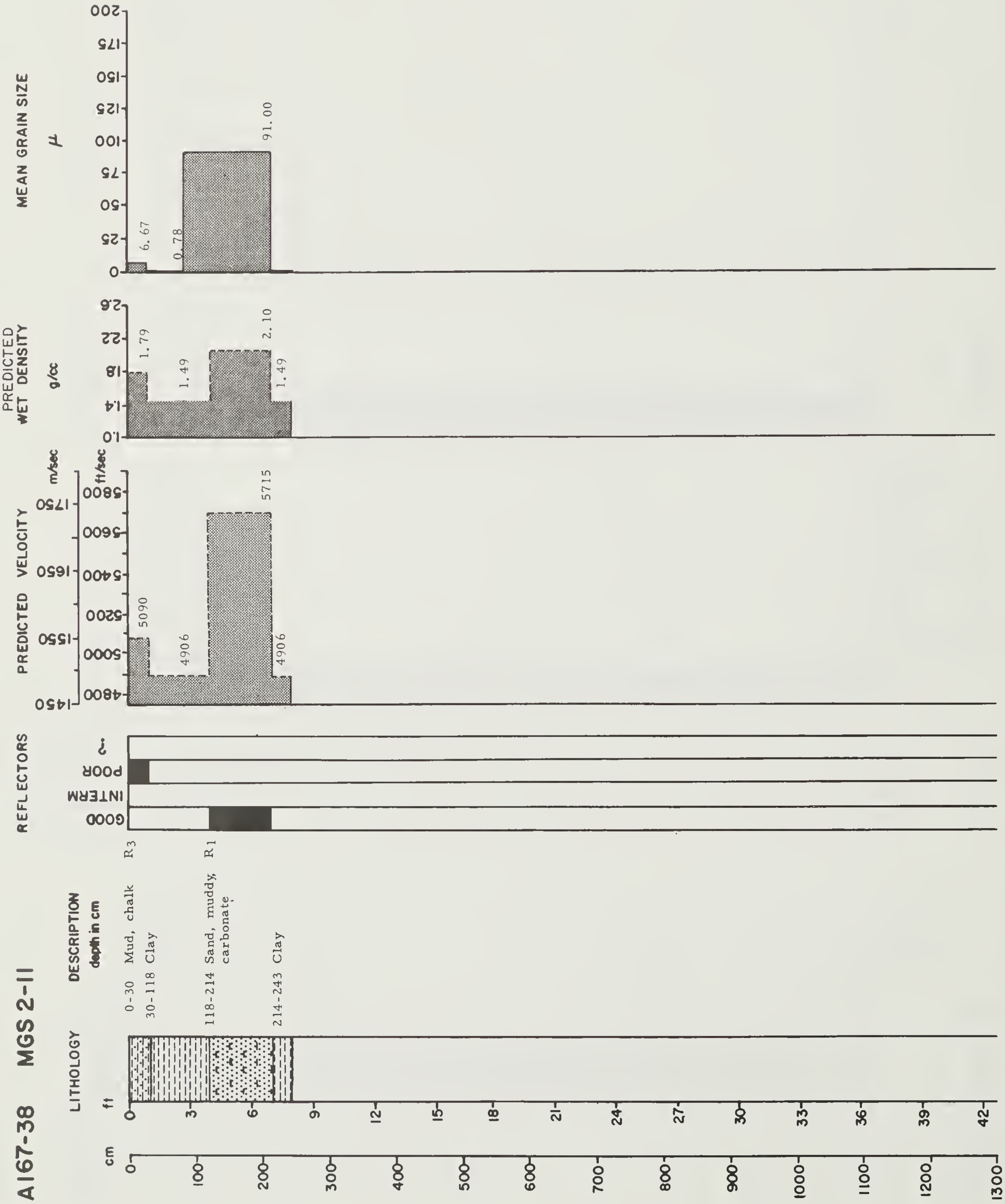

LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
PREDICTED WET DENSITY
g/cc
MEAN GRAIN SIZE
μ
0-19 Graded unit, clay to mud
19-28 Clay
28-35 Graded unit, mud to silt
35-58 Graded unit, mud to silt R3
42-58 Silt R1
58-64 Clay
64-83 Graded unit, mud to silt
68-83 Silt R1
83-116 Graded unit, mud to silt
94-116 Silt R1
116-131 Graded unit, mud to silt
120-131 Silt R1
131-135 Graded unit, mud to silt
135-170 Disrupted
170-186 Graded unit, clay
186-215 Graded unit, clay to silt
205-215 Silt R2
215-246 Disrupted
246-264 Graded unit, mud to silt
252-264 Silt R1
264-297 Graded unit, mud to silt
287-297 Silt R2
297-346 Graded unit, clay to silt
340-346 Silt R2
346-363 Graded unit, clay
363-375 Graded unit, mud
375-409 Graded unit, clay to mud
409-451 Graded unit, clay to silt
440-451 Silt R1
451-482 Disrupted
482-511 Graded unit, mud to silt
486-511 Silt R1
511-608 Clay
608-624 Graded unit, mud to silt
616-624 Silt R2
624-655 Graded unit, mud to silt
651-655 Silt R3
655-667 Graded unit, clay to silt
667-715 Clay
715-743 Graded unit, mud to silt
722-743 Silt R1
743-772 Disrupted
1450 1550 1650 1750
4800 5000 5200 5400 5600 5800
4914 5220 5220 5220 5461 5461 5220 5220 5220 4896 5220 4896 5220 5480 4896 5220 5220 4896 5480
1.0 1.4 1.8 2.2 2.6
1.53 1.89 1.89 1.89 2.01 2.01 1.89 1.89 1.89 1.35 1.89 1.35 1.89 2.02 1.35 1.89 1.89 1.35 2.02
0 25 50 75 100 125 150 175 200
1.07 39.20 0.63 13.79 41.10
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42

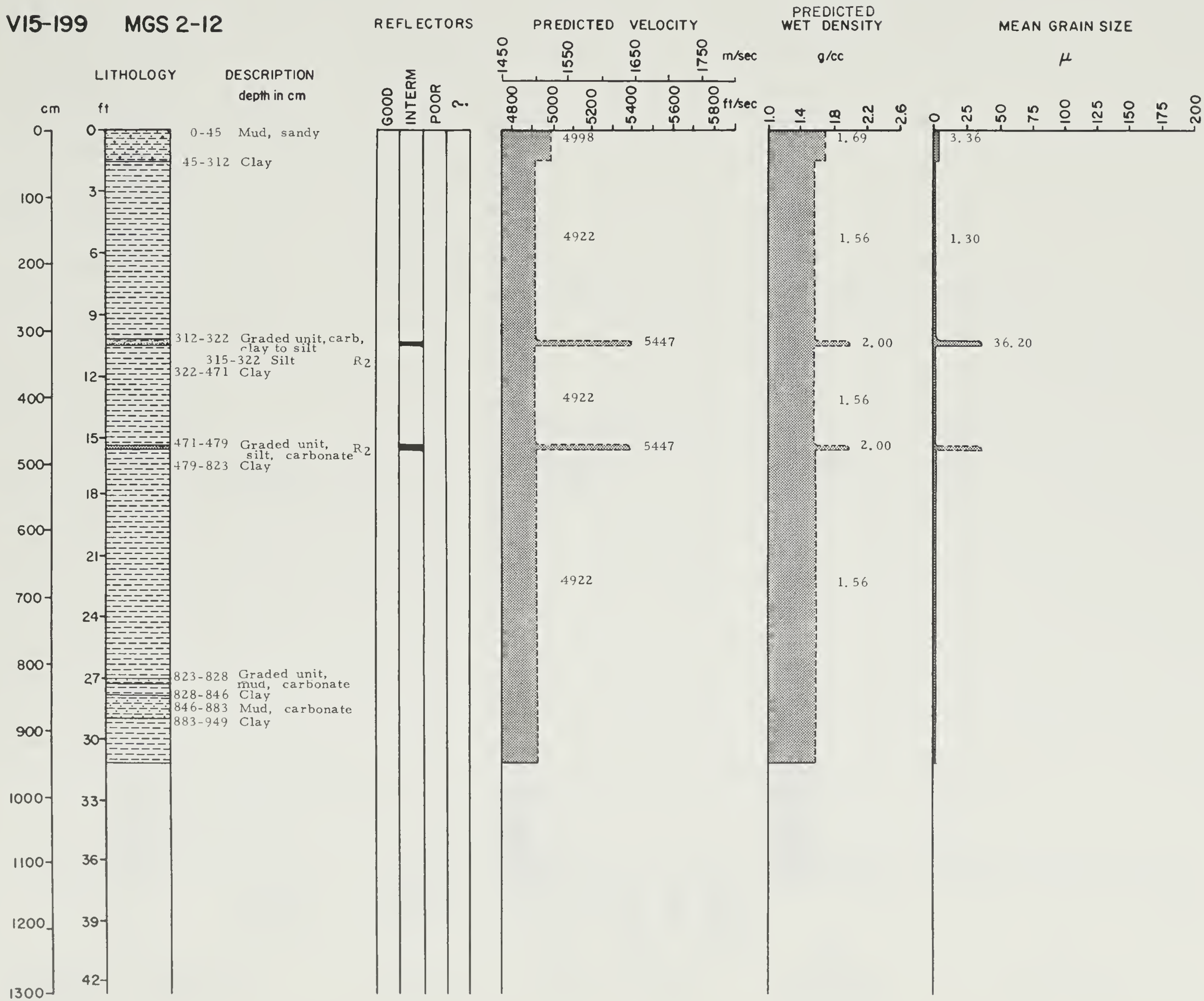

V24-5 MGS 2-8
LITHOLOGY
cm
ft
DESCRIPTION
depth in cm
0-928 Graded units, clays to silts
23-26 Silt
78-85 Silt
91-96 Silt
98-103 Silt
144-148 Silt
164-167 Silt
297-312 Silt
435-440 Silt
490-500 Silt
528-532 Silt
835-839 Silt
846-849 Silt
850-853 Silt
879-886 Silt
896-906 Silt
907-923 Silt
REFLECTORS
GOOD
INTERM
POOR
?
R 4
R 2
R 2
R 4
R 4
R 1
R 3
R 2
R 3
R 2
R 2
R 1
PREDICTED VELOCITY
m/sec
ft/sec
4920
4910
4910
4910
4910
5452
5452
5456
5456
5456
5456
5456
5456
5456
PREDICTED WET DENSITY
g/cc
1.55
1.52
1.52
1.52
1.52
2.00
2.00
2.00
2.00
2.00
2.00
2.00
2.00
2.00
MEAN GRAIN SIZE
μ
1.22
36.80
0.94
37.50

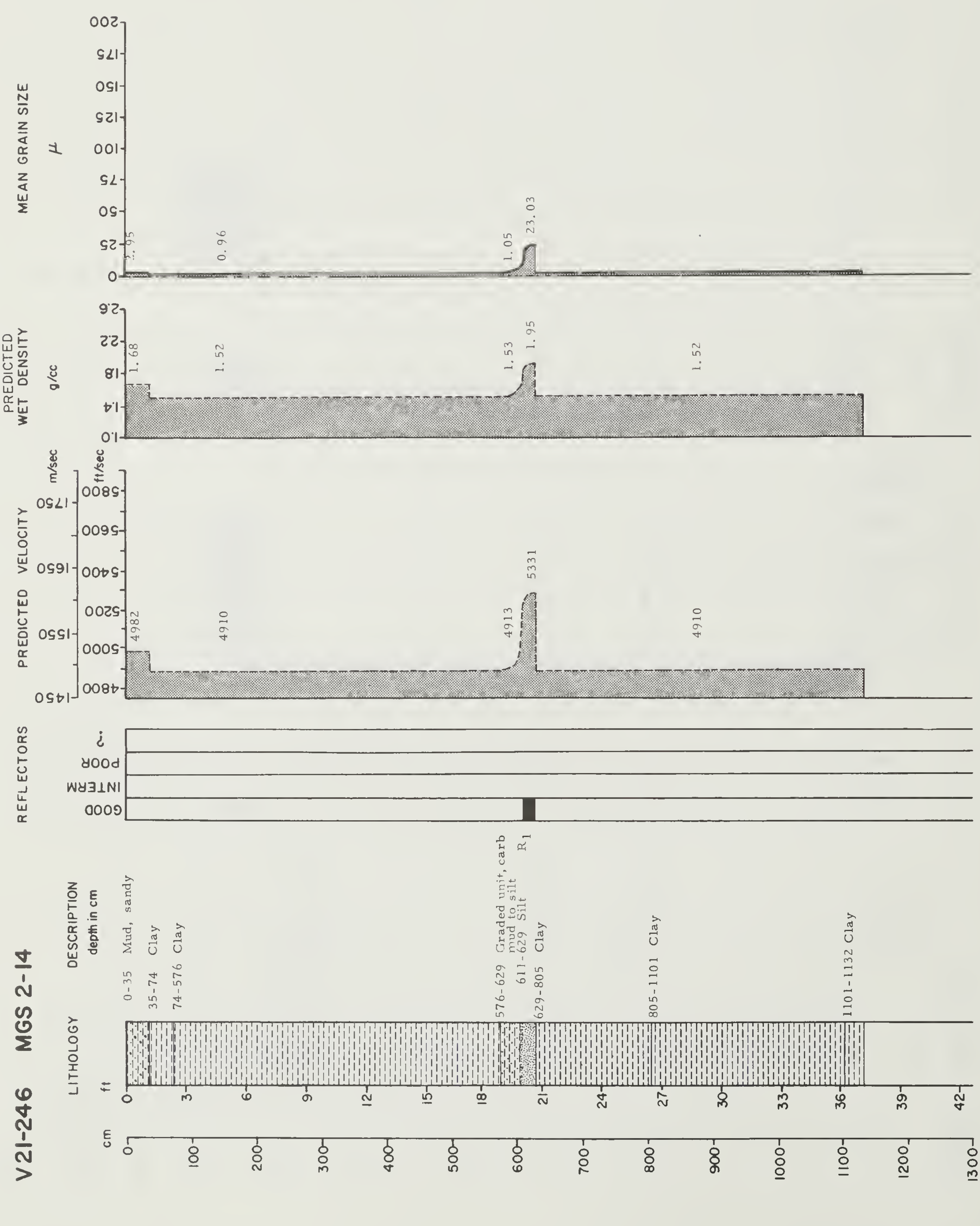

RC 4-2
MGS 2-9
MGS 2-16
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
LITHOLOGY
DESCRIPTION
depth in cm
0-888 Clay, uniform throughout
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
1450
1550
1650
1750
ft/sec
4800
5000
5200
5400
5600
5800
4908
4912
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.50
1.52
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
0.86
1.03



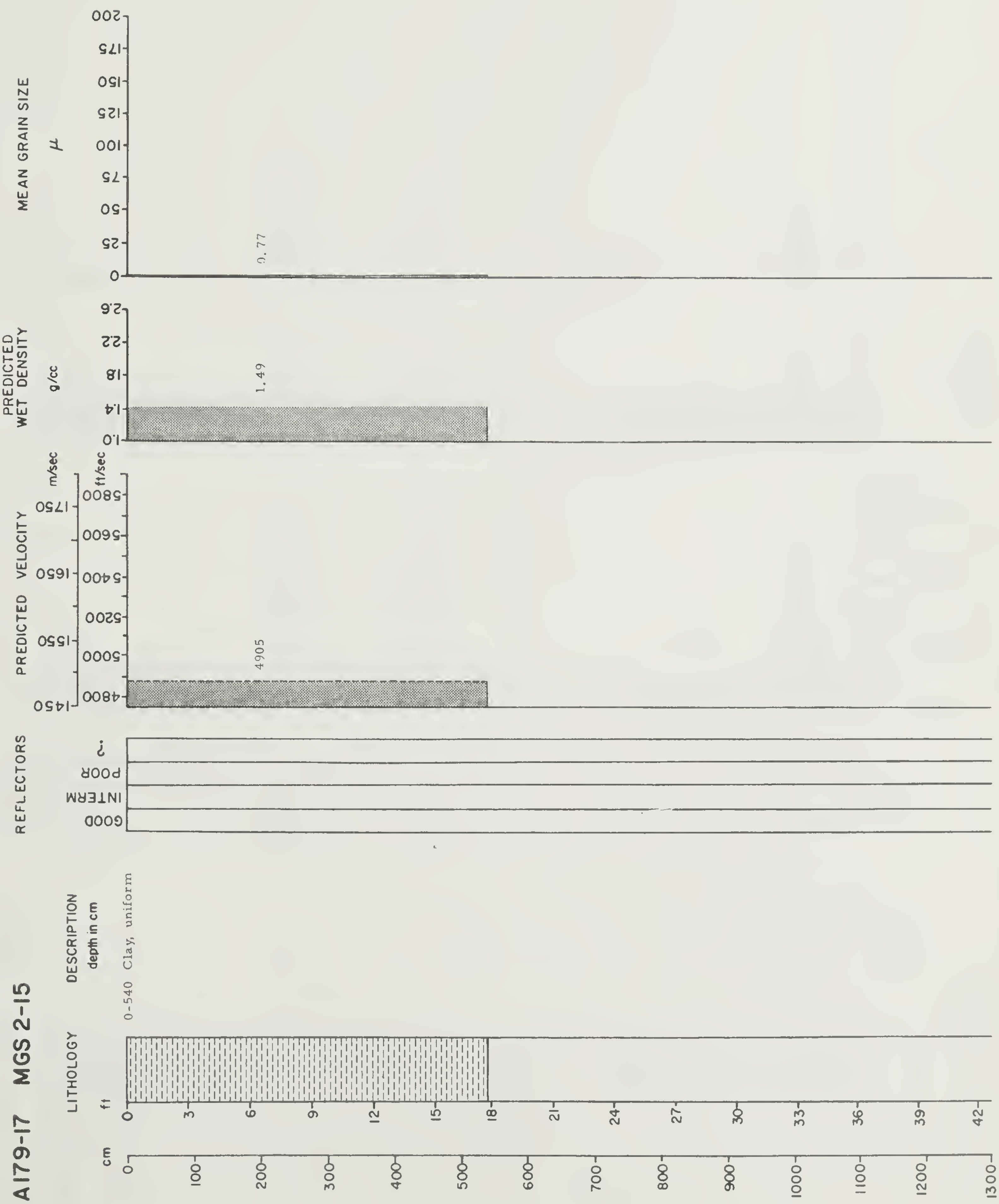
V21-6 MGS 2-10
LITHOLOGY
DESCRIPTION depth in cm
cm
ft
0-28 Clay
28-300 Clay
300-329 Clay
329-850 Clay
850-1033 Clay
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
1450 1550 1650 1750 m/sec
4800 5000 5200 5400 5600 5800 ft/sec
4908
4901
4908
4901
4908
PREDICTED WET DENSITY
g/cc
1.0 1.4 1.8 2.2 2.6
1.51
1.46
1.51
1.46
1.50
MEAN GRAIN SIZE
μ
0 25 50 75 100 125 150 175 200
0.88
0.71
0.87


A167-38
MGS 2-11
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-30 Mud, chalk
30-118 Clay
118-214 Sand, muddy, carbonate
214-243 Clay
R3
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5090
4906
5715
4906
PREDICTED WET DENSITY
g/cc
1.79
1.49
2.10
1.49
MEAN GRAIN SIZE
μ
6.67
0.78
91.00

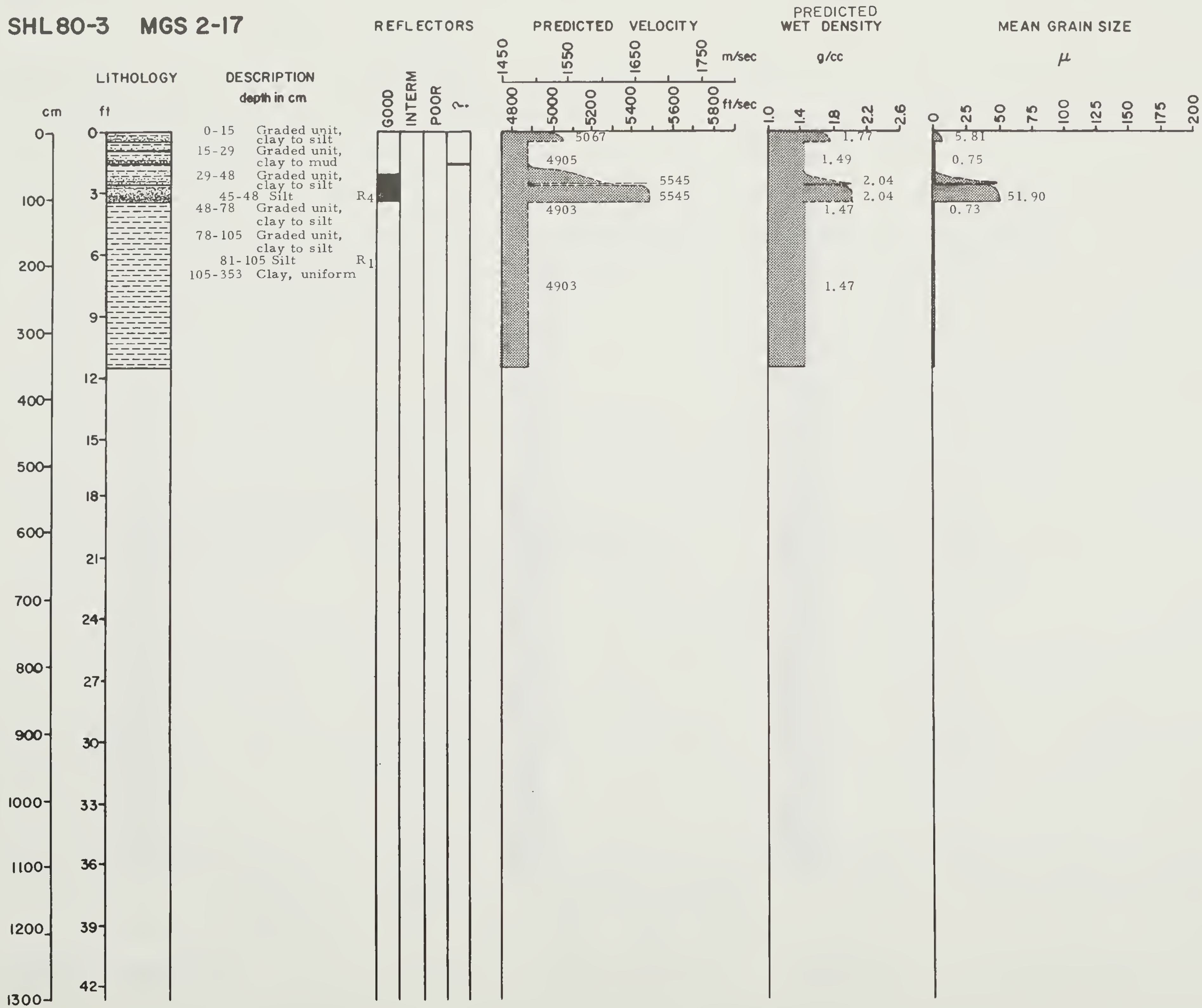

V15-199 MGS 2-12
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-45 Mud, sandy
45-312 Clay
312-322 Graded unit, carb, clay to silt
315-322 Silt
322-471 Clay
471-479 Graded unit, silt, carbonate
479-823 Clay
823-828 Graded unit, mud, carbonate
828-846 Clay
846-883 Mud, carbonate
883-949 Clay
R_2
R_2
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4998
4922
5447
4922
5447
4922
PREDICTED WET DENSITY
g/cc
1.69
1.56
2.00
1.56
2.00
1.56
MEAN GRAIN SIZE
μ
3.36
1.30
36.20

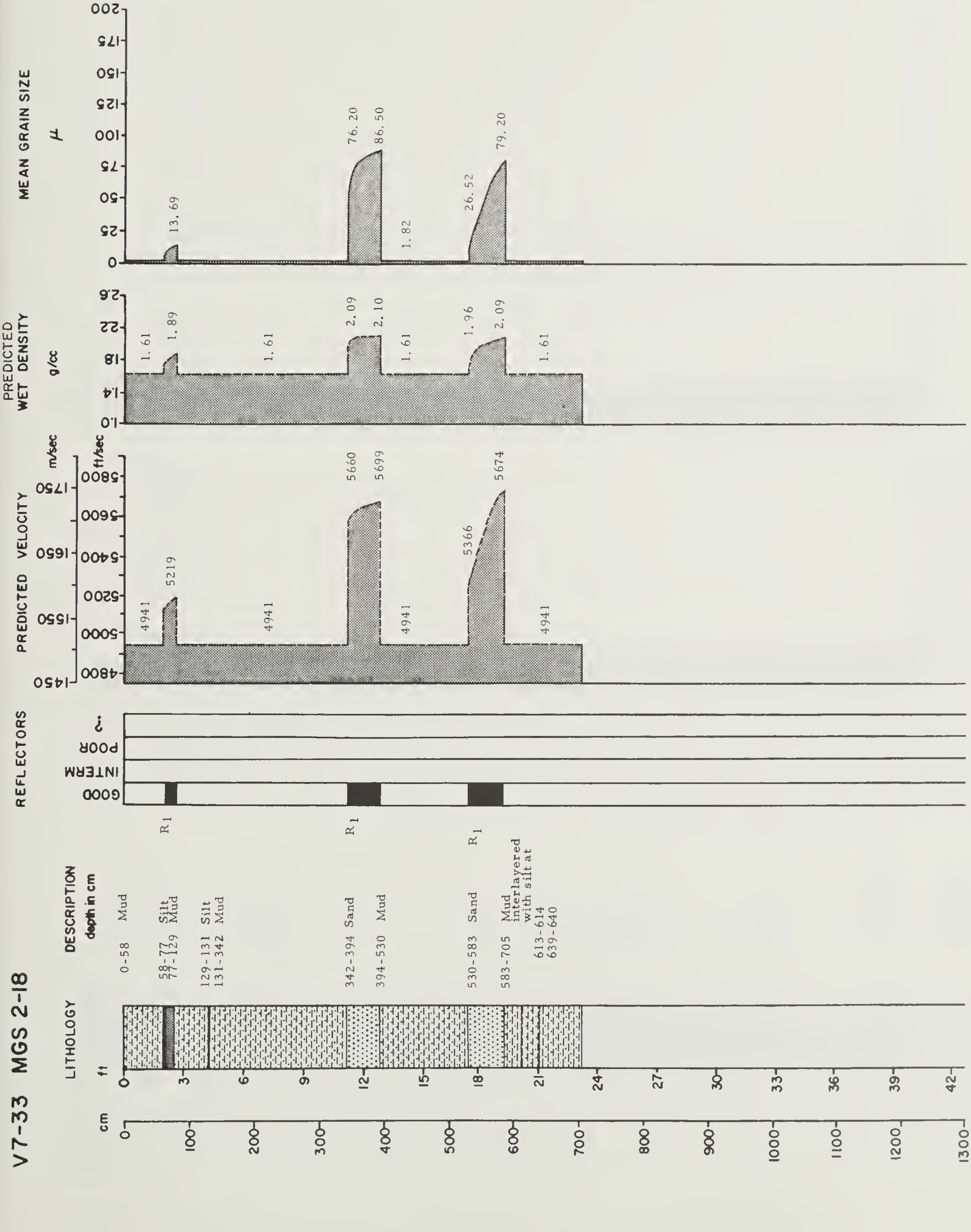


V21-246 MGS 2-14
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-35 Mud, sandy
35-74 Clay
74-576 Clay
576-629 Graded unit, carb mud to silt
611-629 Silt
629-805 Clay
805-1101 Clay
1101-1132 Clay
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4982
4910
4913
5331
4910
PREDICTED WET DENSITY
g/cc
1.68
1.52
1.53
1.95
1.52
MEAN GRAIN SIZE
μ
0.96
1.05
23.03

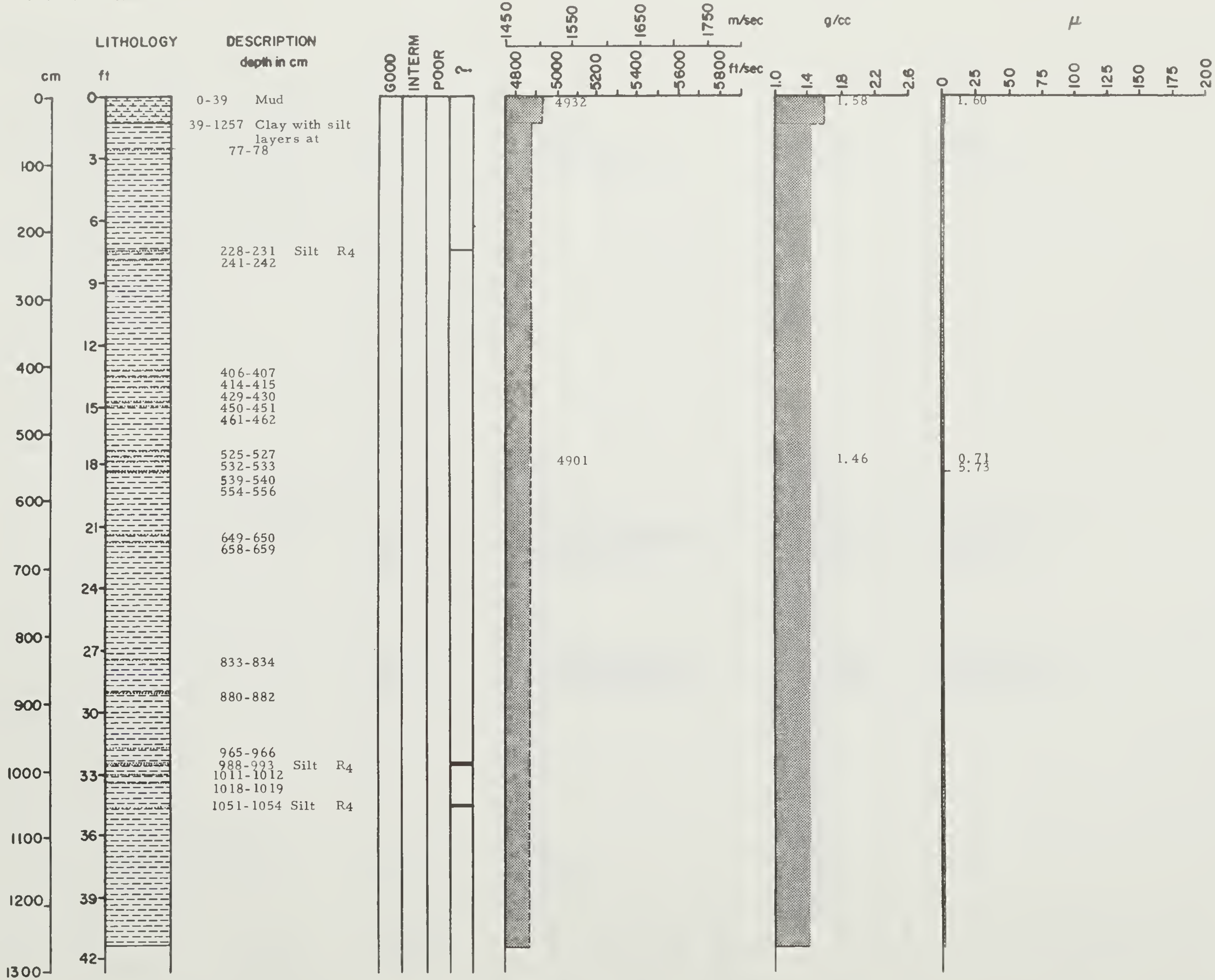


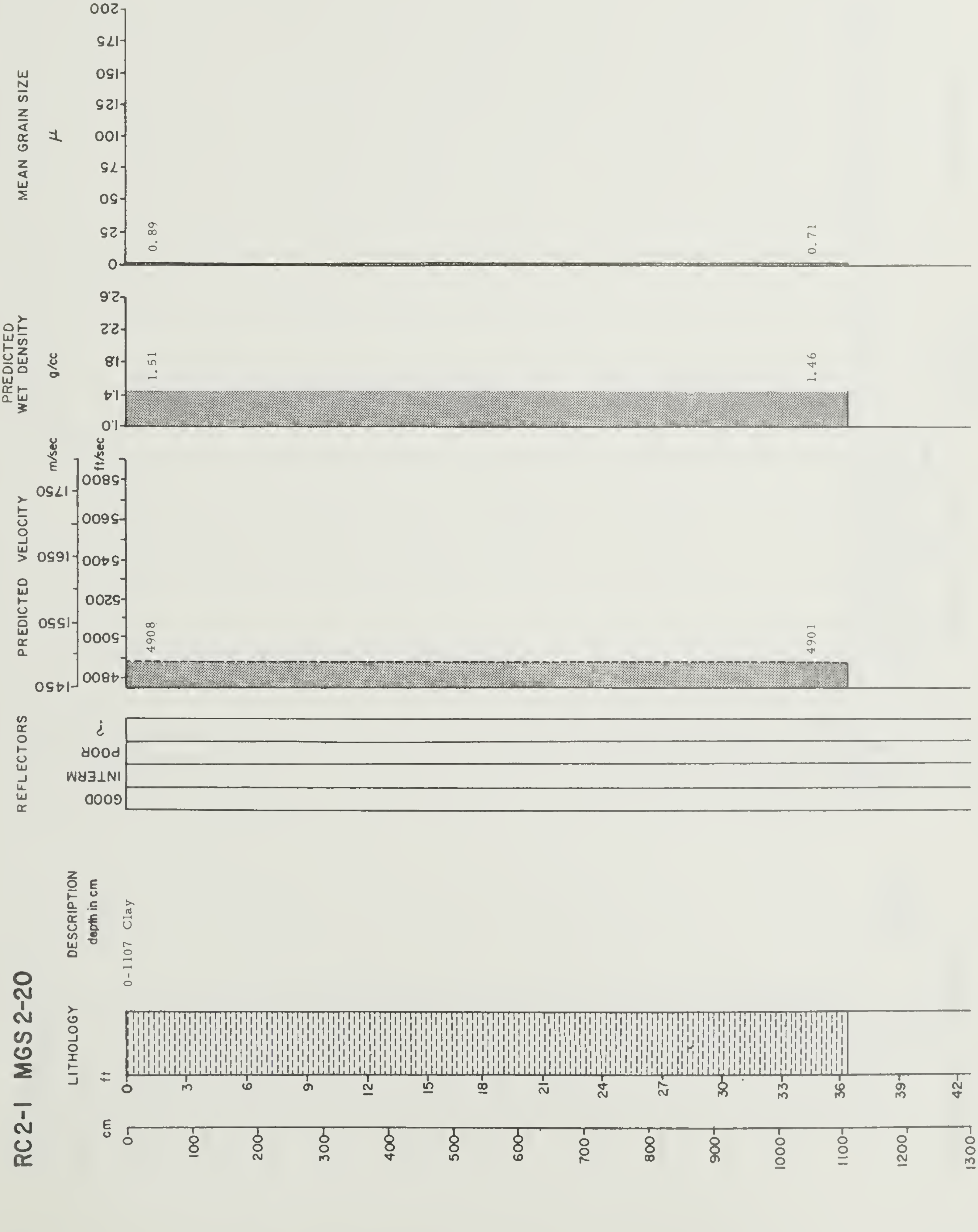
A179-17 MGS 2-15
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-540 Clay, uniform
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4905
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.49
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
0.77
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

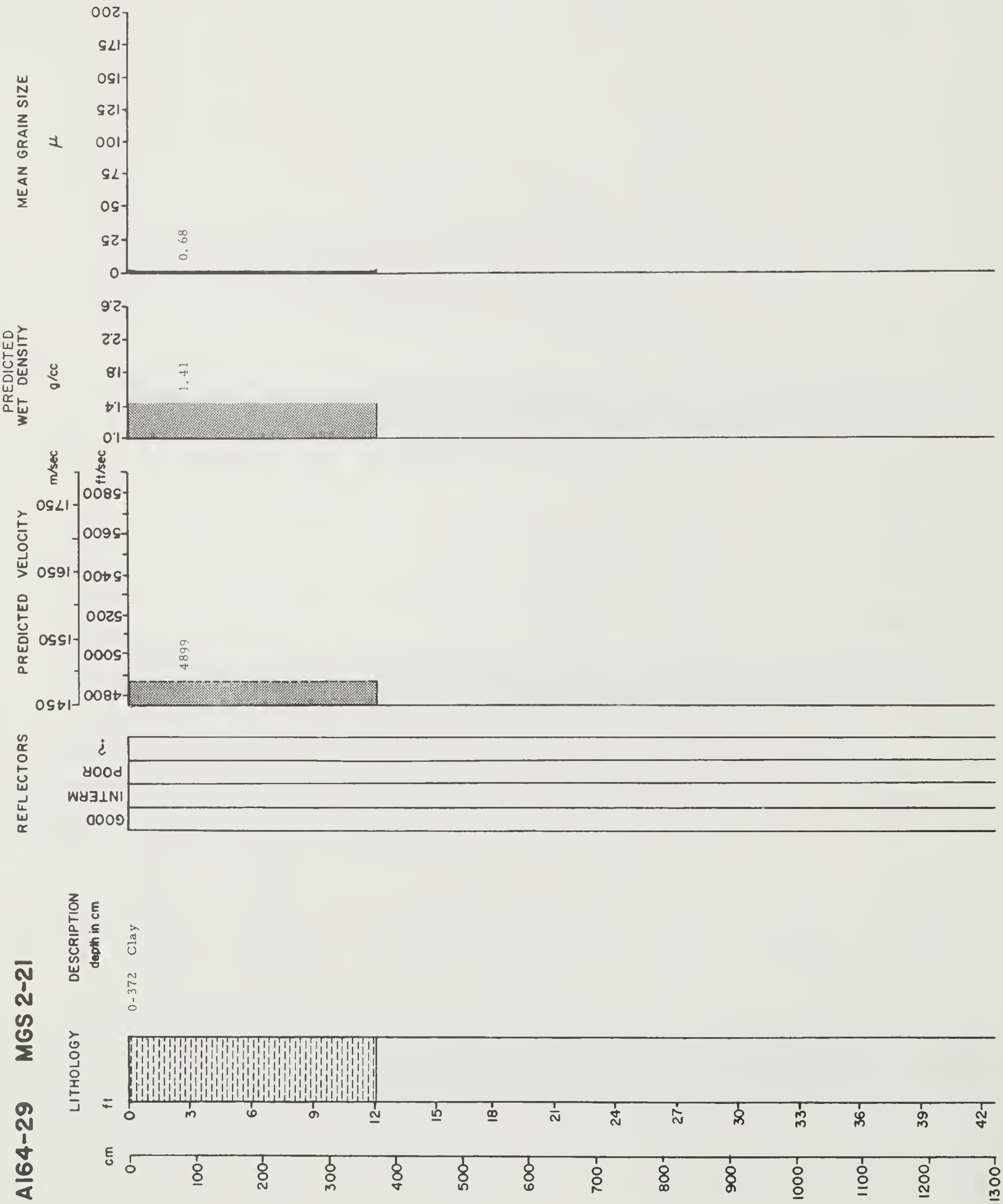

SHL80-3 MGS 2-17
LITHOLOGY
DESCRIPTION
depth in cm
REFLECTORS
PREDICTED VELOCITY
PREDICTED WET DENSITY
MEAN GRAIN SIZE
cm
ft
0-15 Graded unit, clay to silt
15-29 Graded unit, clay to mud
29-48 Graded unit, clay to silt
45-48 Silt
48-78 Graded unit, clay to silt
78-105 Graded unit, clay to silt
81-105 Silt
105-353 Clay, uniform
R4
R1
GOOD
INTERM
POOR
?
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5067
4905
5545
5545
4903
4903
g/cc
1.0
1.4
1.8
2.2
2.6
1.77
1.49
2.04
2.04
1.47
1.47
μ
0
25
50
75
100
125
150
175
200
5.81
0.75
51.90
0.73


V7-33 MGS 2-18
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-58 Mud
58-77 Silt
77-129 Mud
129-131 Silt
131-342 Mud
342-394 Sand
394-530 Mud
530-583 Sand
583-705 Mud interlayered with silt at
613-614
639-640
REFLECTORS
GOOD
INTERM
POOR
?
R 1
PREDICTED VELOCITY
m/sec
ft/sec
4941
5219
5660
5699
5366
5674
PREDICTED WET DENSITY
g/cc
1.61
1.89
2.09
2.10
1.96
MEAN GRAIN SIZE
μ
13.69
76.20
86.50
1.82
26.52
79.20

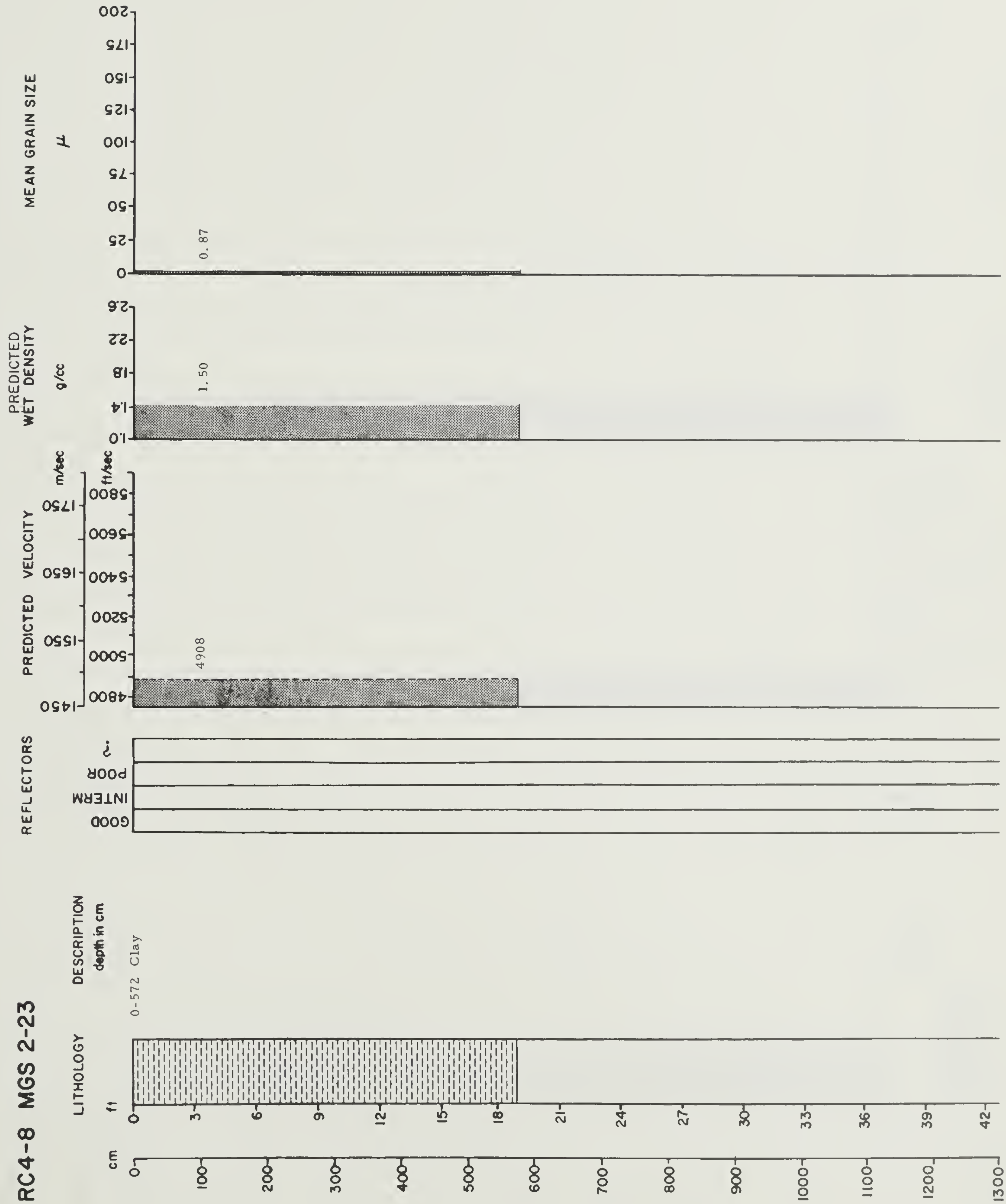
RC 9-11 MGS 2-19

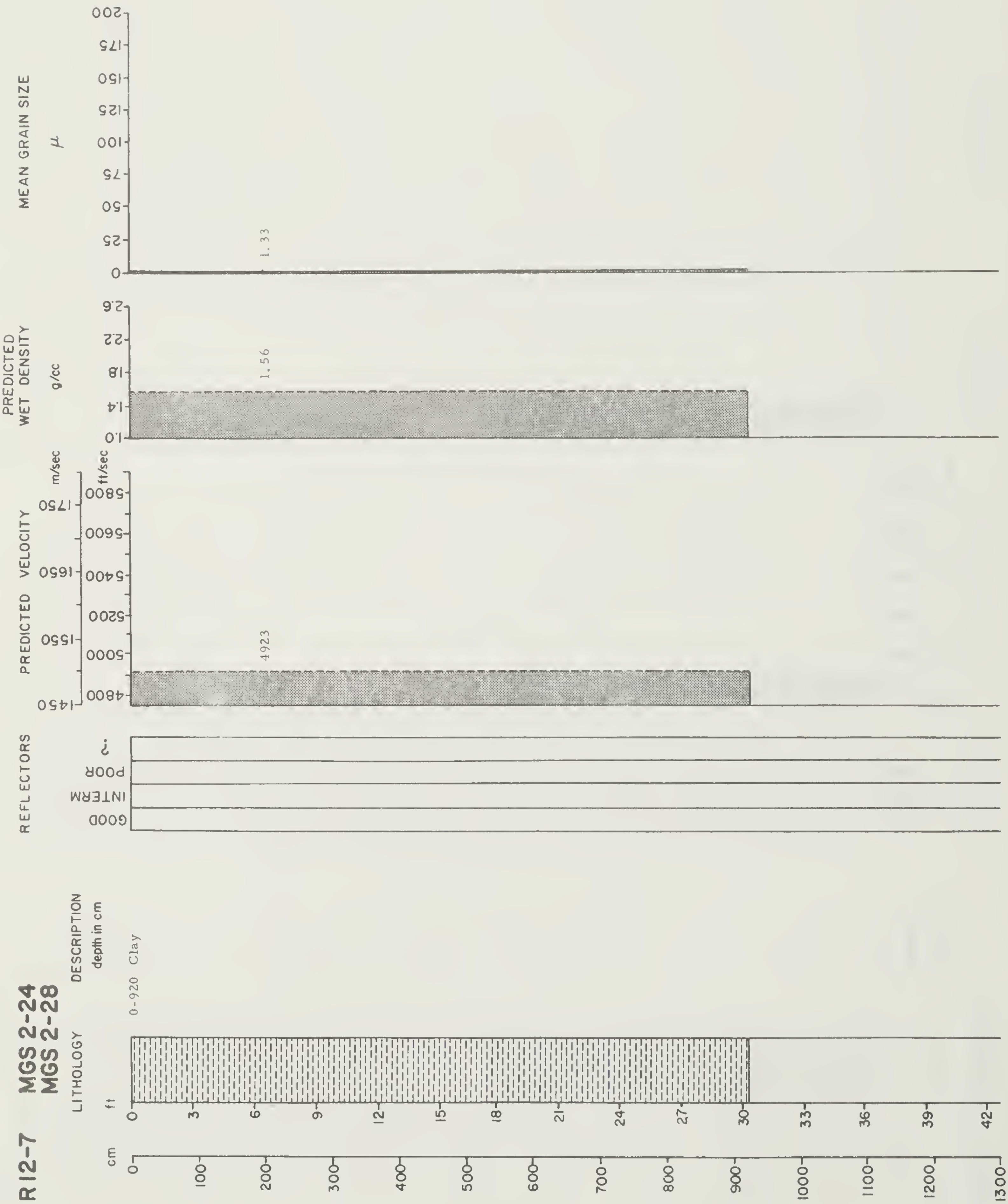


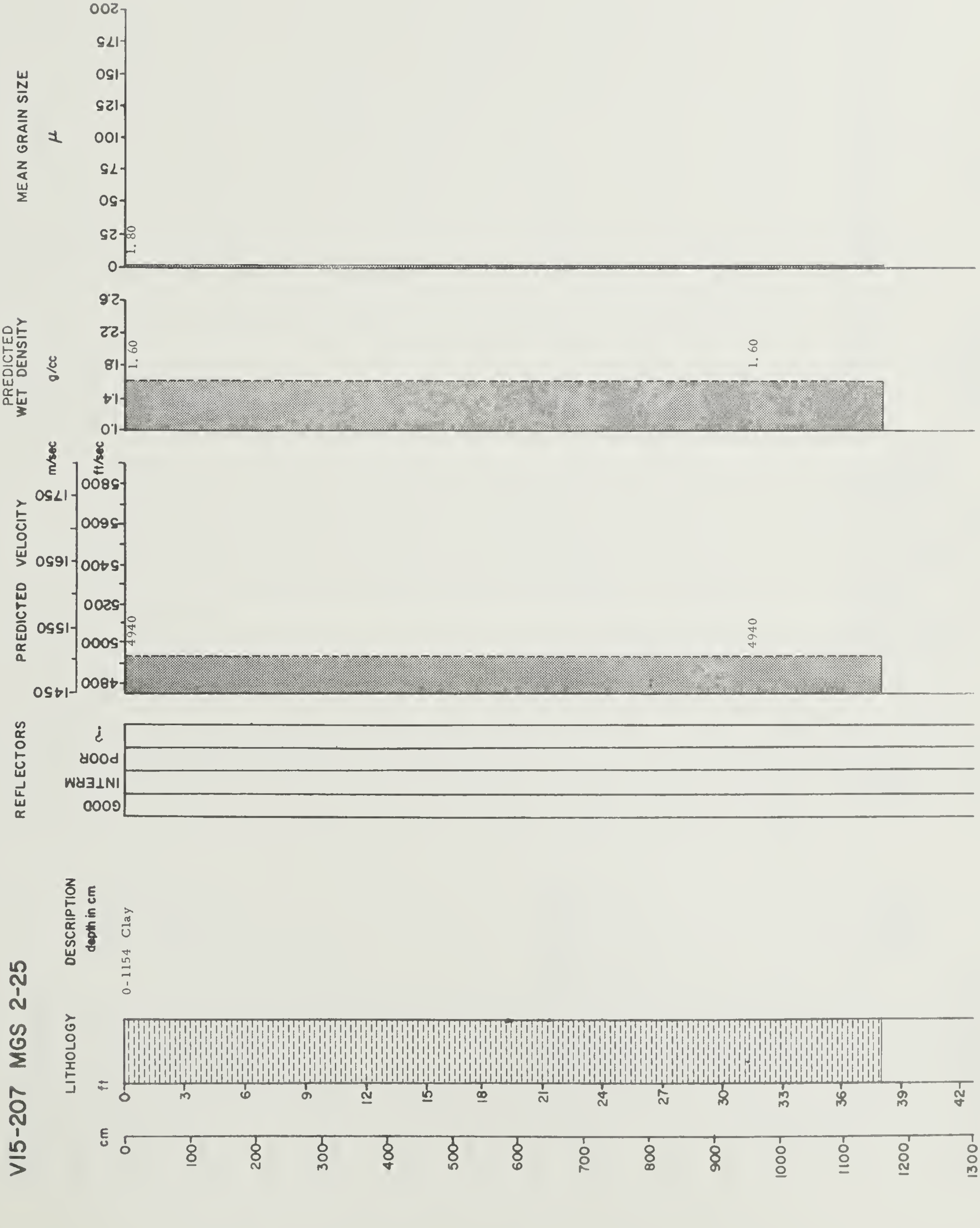

RC2-1 MGS 2-20
LITHOLOGY
DESCRIPTION
depth in cm
0-1107 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4908
4901
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.51
1.46
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
0.89
0.71
cm
ft
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
3
6
9
12
15
18
21
24
27
30
33
36
39
42

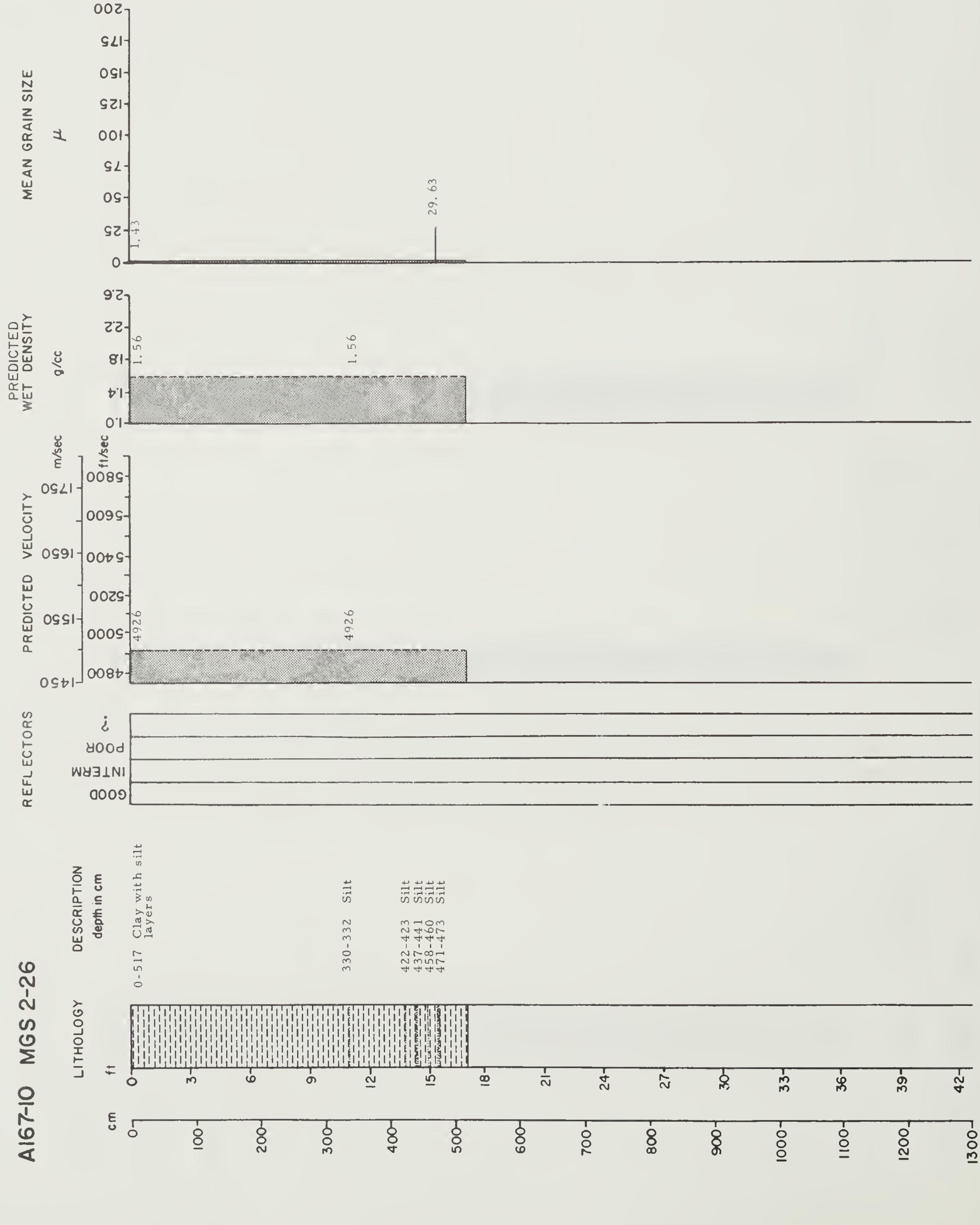

A164-29
MGS 2-21
LITHOLOGY
DESCRIPTION
depth in cm
0-372 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4899
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.41
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
0.68
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300

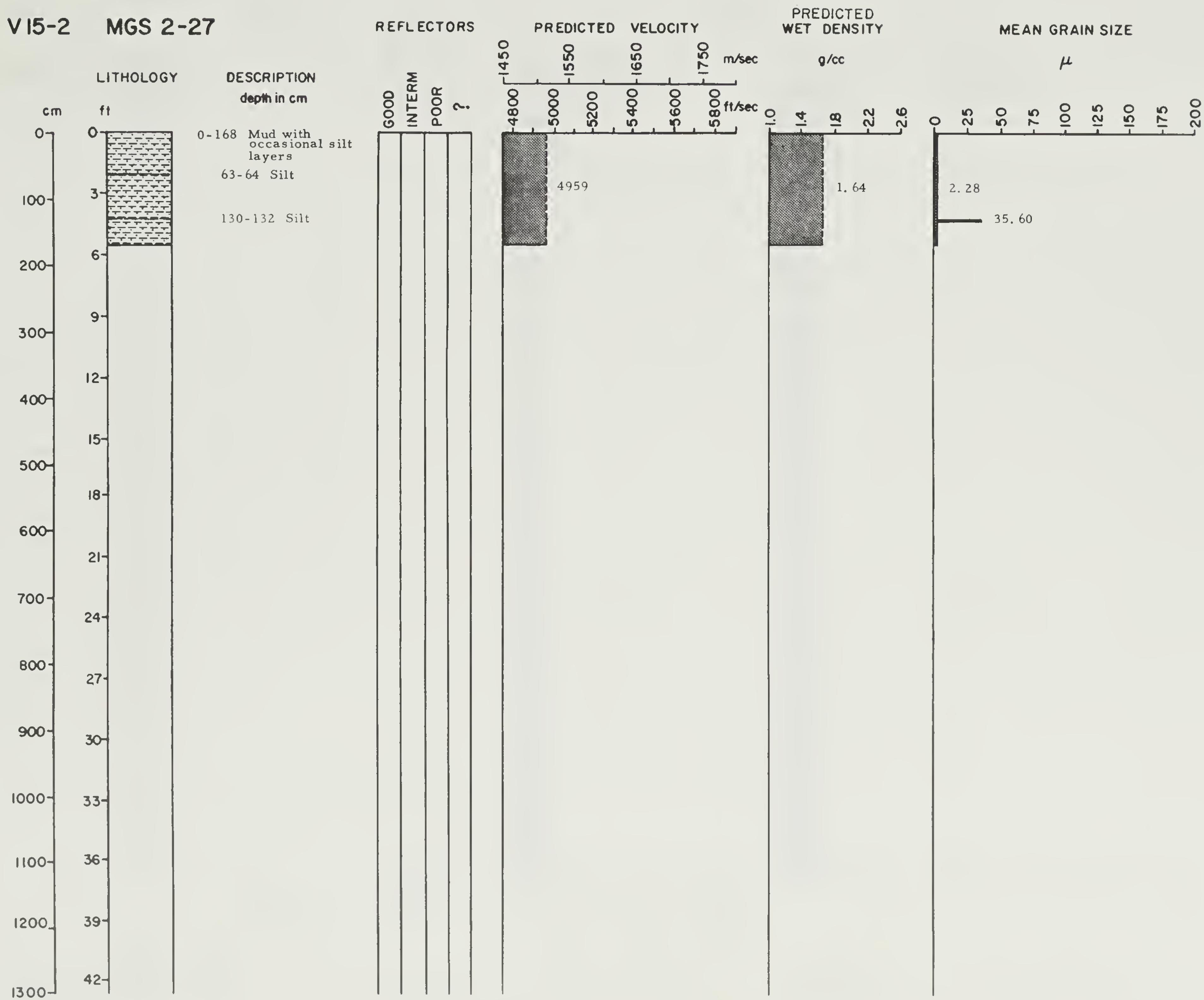
RC4-8 MGS 2-23

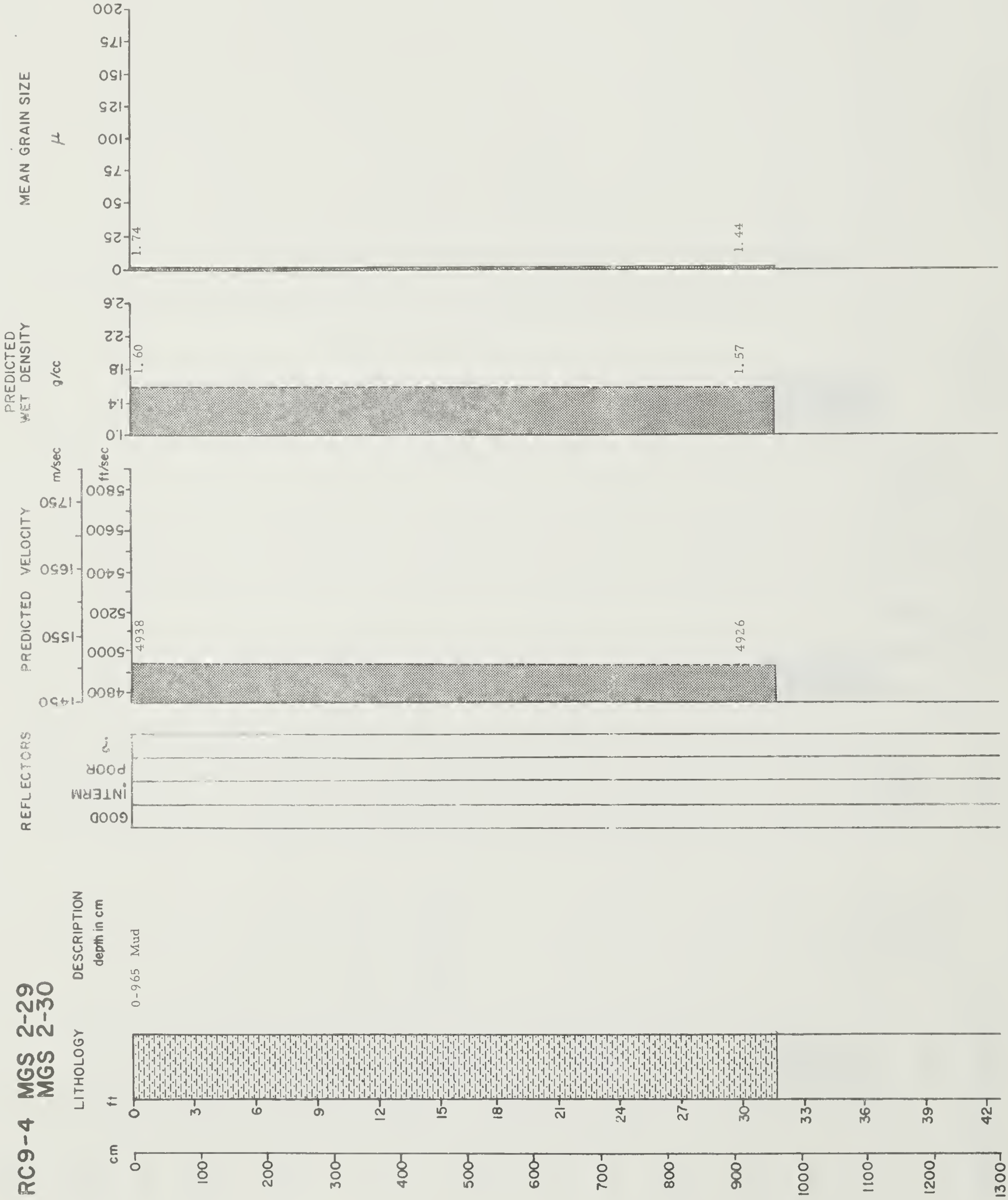

cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-572 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4908
PREDICTED WET DENSITY
g/cc
1.50
MEAN GRAIN SIZE
μ
0.87

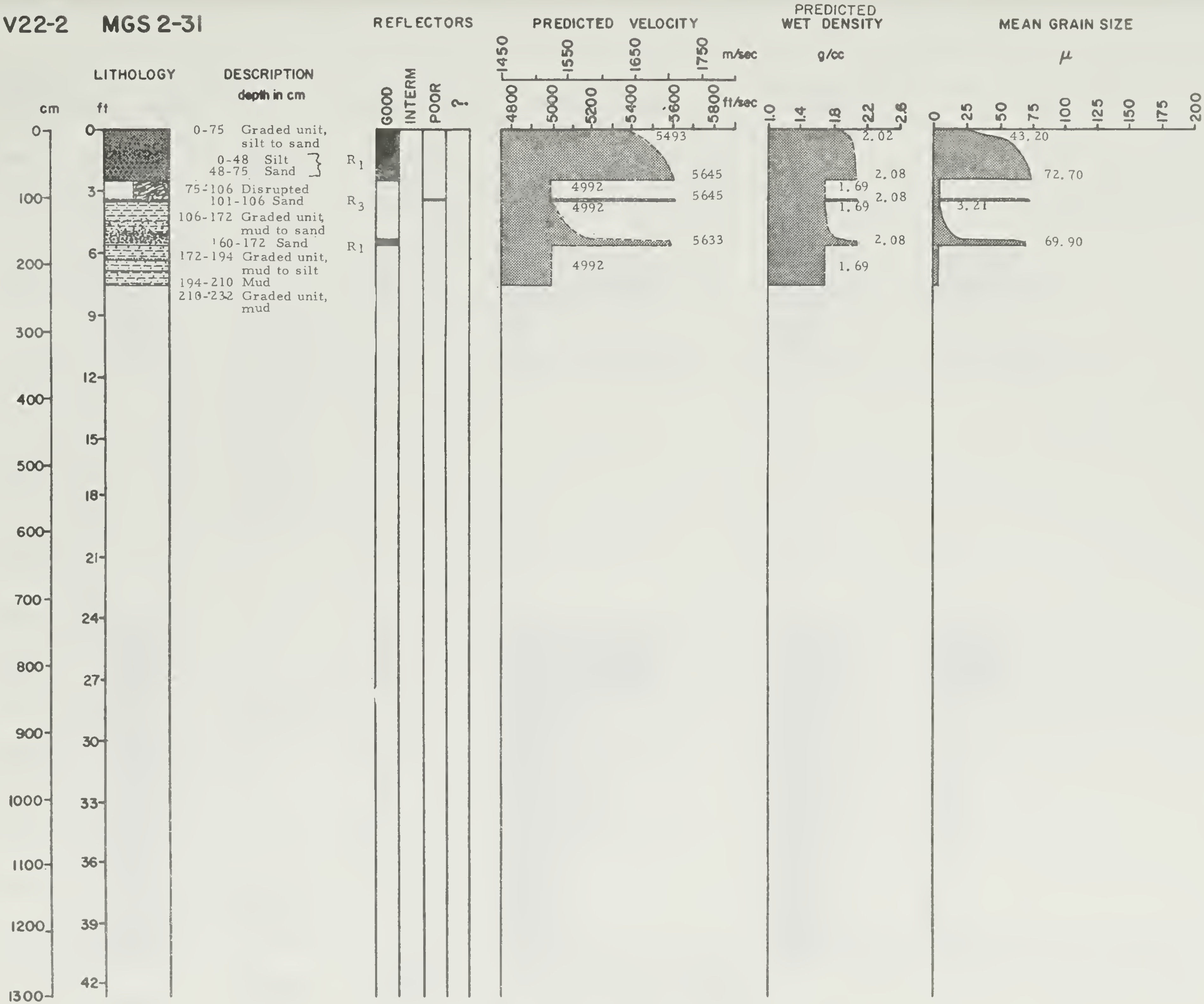

R12-7
MGS 2-24
MGS 2-28
LITHOLOGY
DESCRIPTION
depth in cm
0-920 Clay
cm
ft
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4923
PREDICTED
WET DENSITY
g/cc
1.56
MEAN GRAIN SIZE
μ
1.33

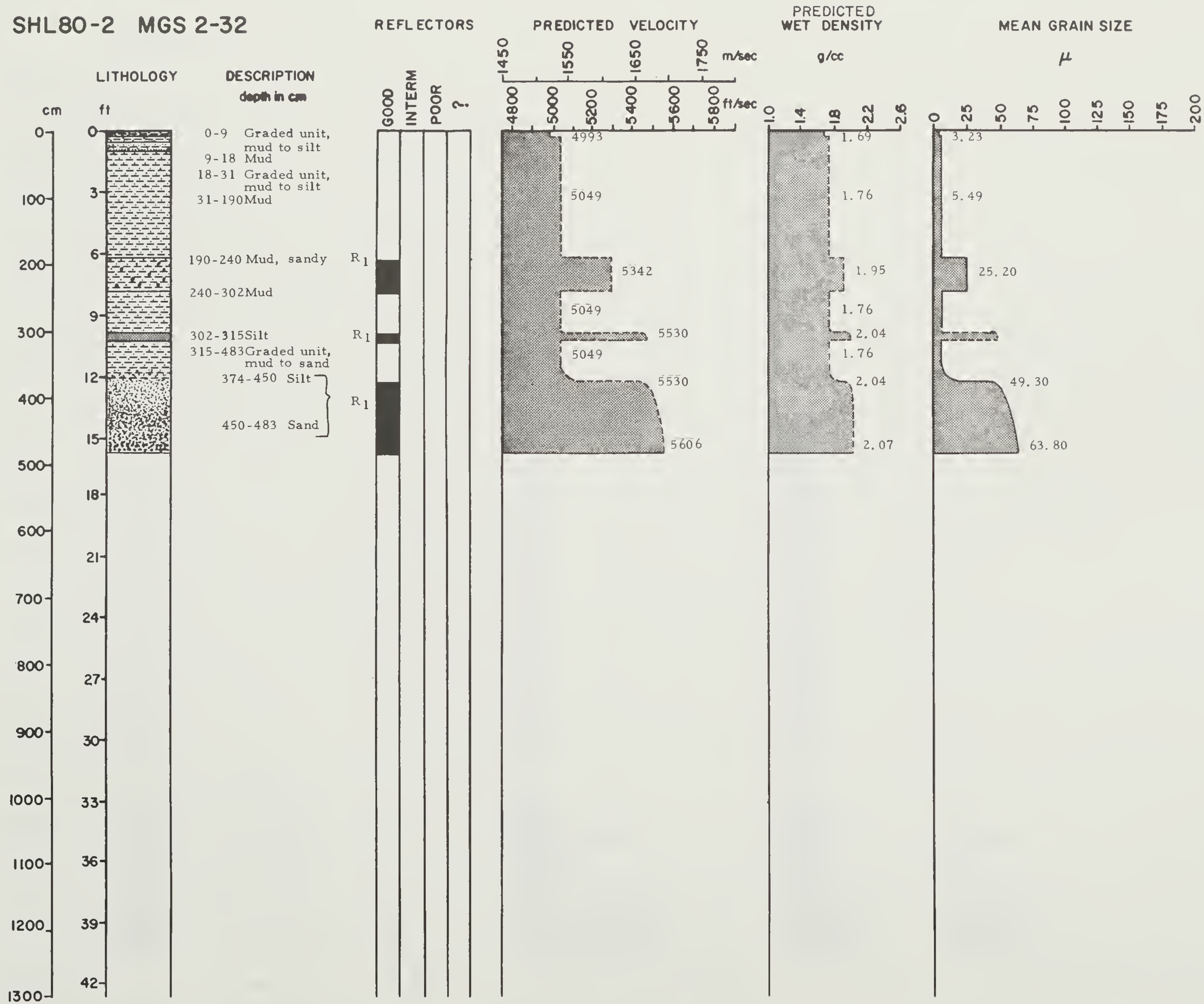

V15-207 MGS 2-25
LITHOLOGY
DESCRIPTION
depth in cm
0-1154 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4940
PREDICTED WET DENSITY
g/cc
1.60
MEAN GRAIN SIZE
μ
1.80
cm
ft

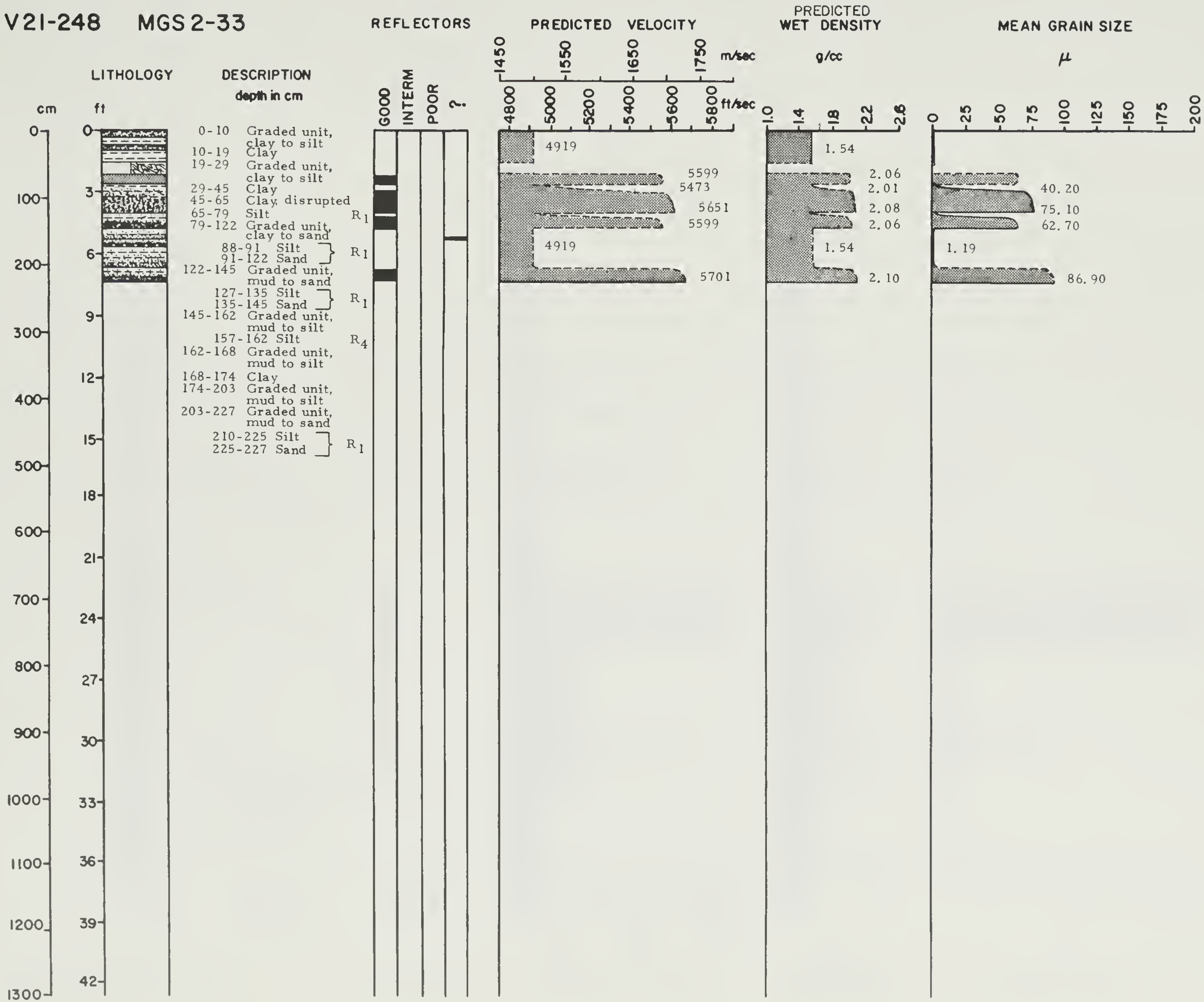

A167-10 MGS 2-26
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
LITHOLOGY
DESCRIPTION
depth in cm
0-517 Clay with silt layers
330-332 Silt
422-423 Silt
437-441 Silt
458-460 Silt
471-473 Silt
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4926
4926
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.56
1.56
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.43
29.63

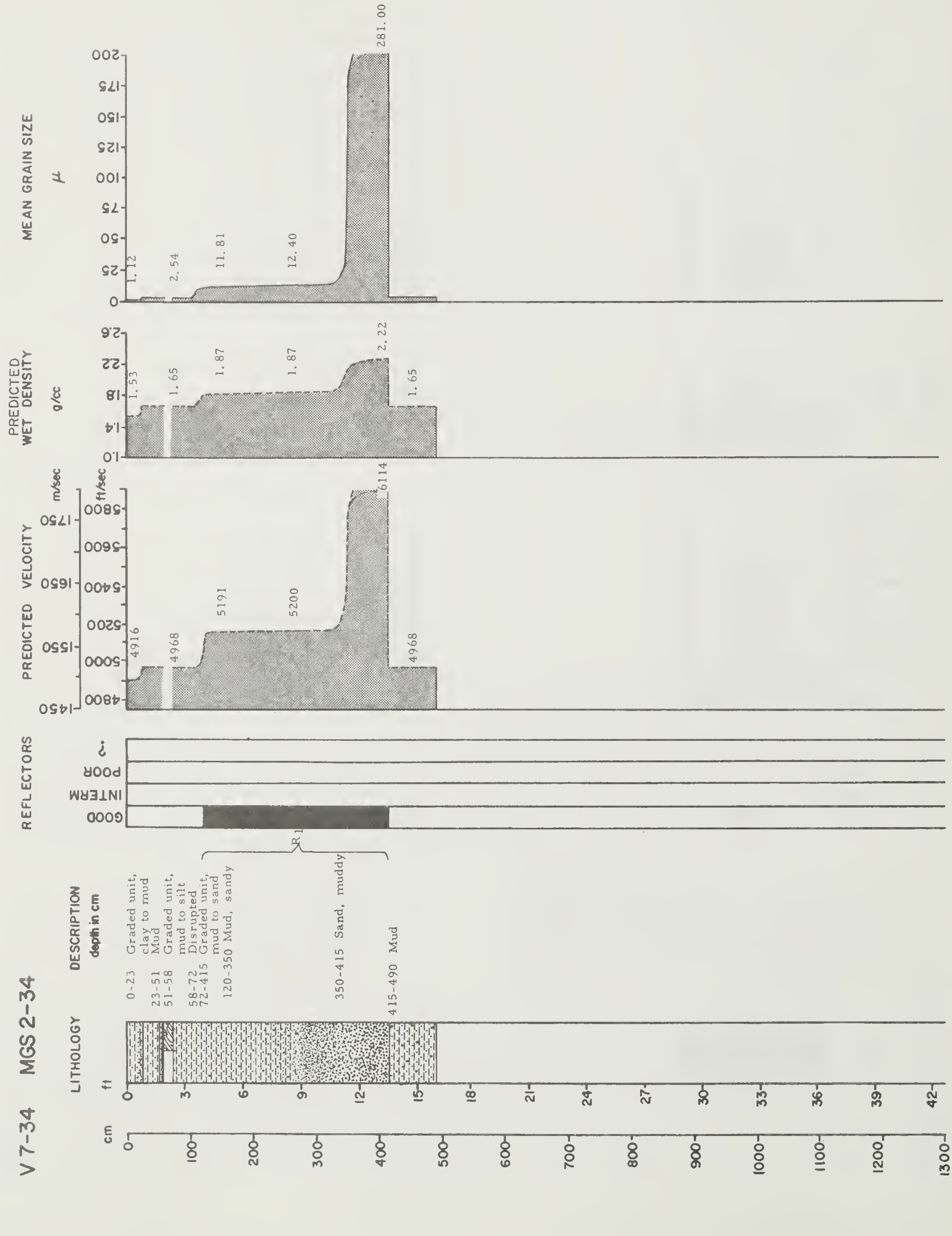

V15-2 MGS 2-27
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-168 Mud with occasional silt layers
63-64 Silt
130-132 Silt
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4959
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.64
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
2.28
35.60
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42


RC9-4 MGS 2-29
MGS 2-30
LITHOLOGY
ft
cm
DESCRIPTION
depth in cm
0-965 Mud
REFLECTORS
GOOD
INTERM.
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4938
4926
PREDICTED WET DENSITY
g/cc
1.60
1.57
MEAN GRAIN SIZE
μ
1.74
1.44

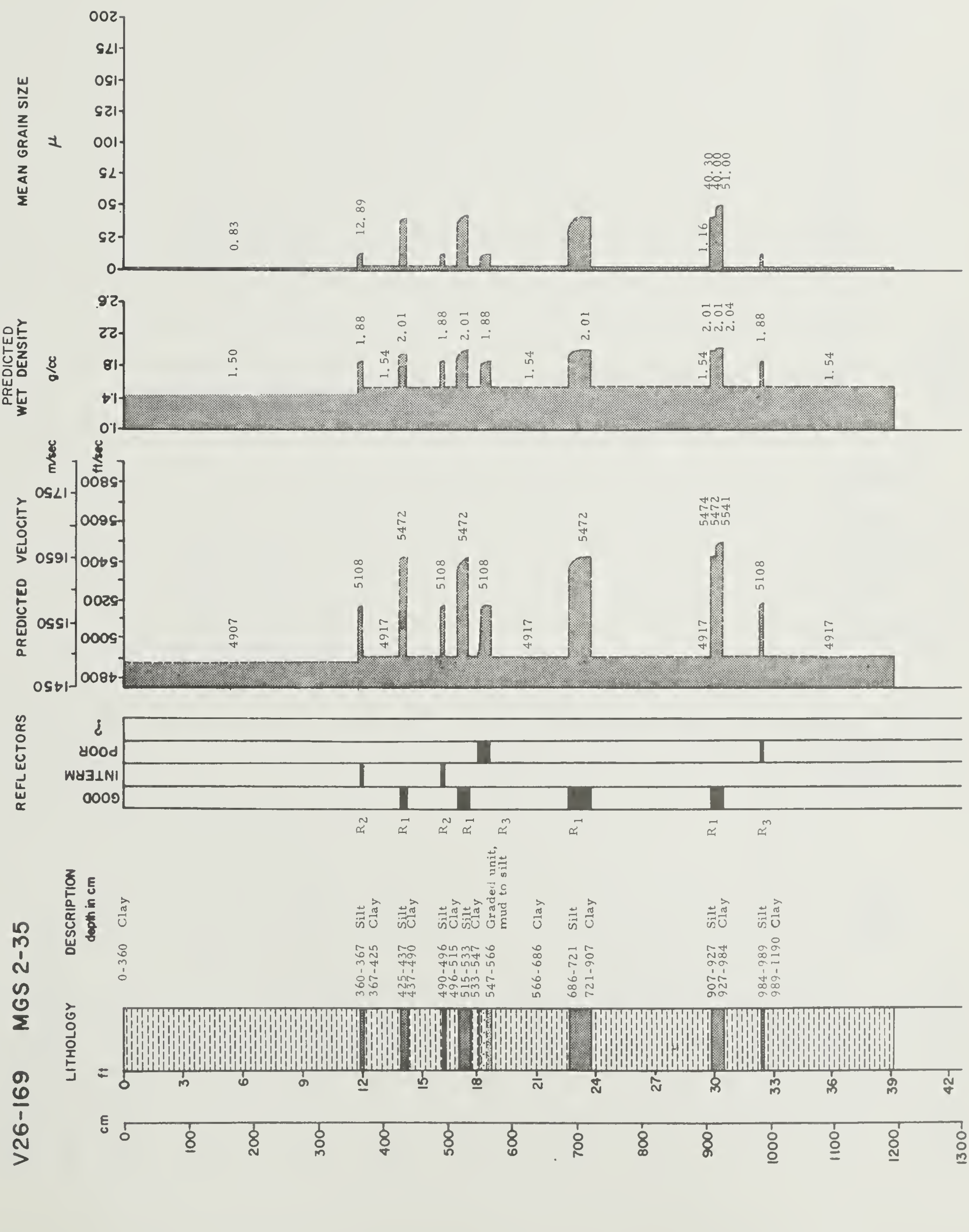

V22-2 MGS 2-31
LITHOLOGY
DESCRIPTION
depth in cm
0-75 Graded unit, silt to sand
0-48 Silt
48-75 Sand
75-106 Disrupted
101-106 Sand
106-172 Graded unit, mud to sand
160-172 Sand
172-194 Graded unit, mud to silt
194-210 Mud
210-232 Graded unit, mud
REFLECTORS
GOOD
INTERM
POOR
?
R1
R3
R1
PREDICTED VELOCITY
m/sec
ft/sec
5493
5645
4992
5645
4992
5633
4992
PREDICTED WET DENSITY
g/cc
2.02
2.08
1.69
2.08
1.69
2.08
1.69
MEAN GRAIN SIZE
μ
43.20
72.70
3.21
69.90
cm
ft

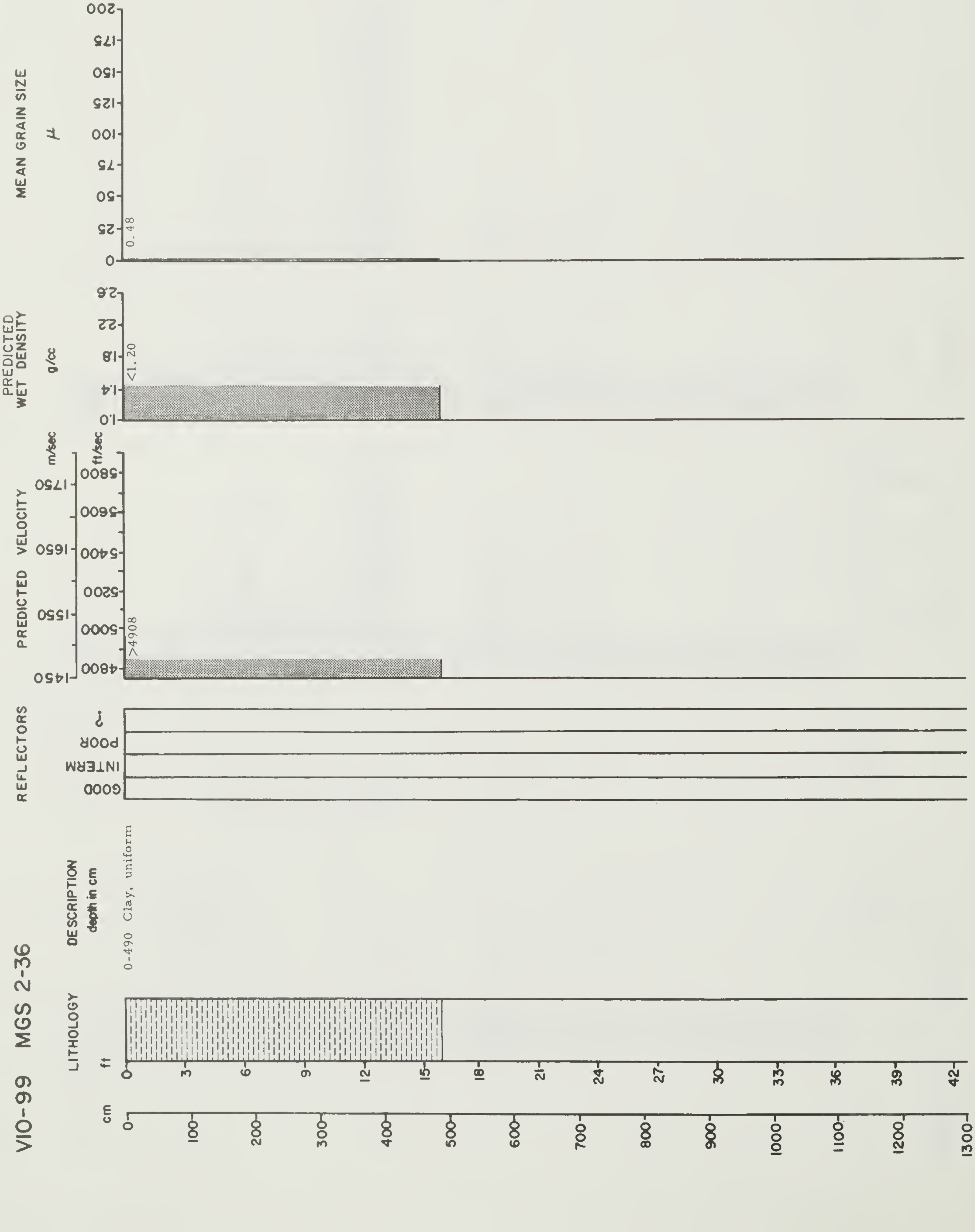

SHL80-2 MGS 2-32
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-9 Graded unit, mud to silt
9-18 Mud
18-31 Graded unit, mud to silt
31-190Mud
190-240 Mud, sandy
240-302Mud
302-315Silt
315-483Graded unit, mud to sand
374-450 Silt
450-483 Sand
REFLECTORS
GOOD
INTERM
POOR
?
R1
R1
R1
PREDICTED VELOCITY
m/sec
ft/sec
4993
5049
5342
5049
5530
5049
5530
5606
PREDICTED WET DENSITY
g/cc
1.69
1.76
1.95
1.76
2.04
1.76
2.04
2.07
MEAN GRAIN SIZE
μ
3.23
5.49
25.20
49.30
63.80

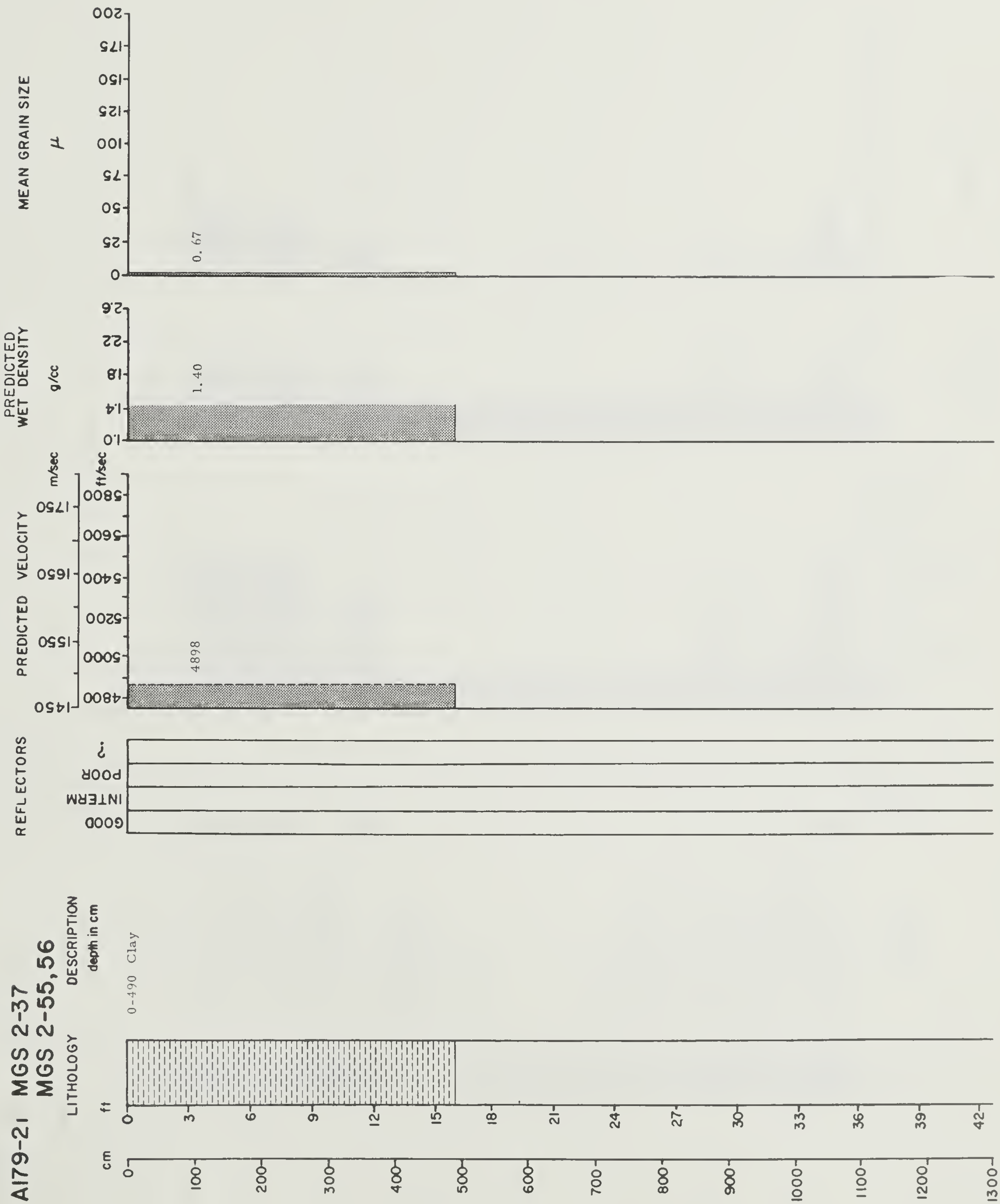

V21-248 MGS 2-33
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-10 Graded unit, clay to silt
10-19 Clay
19-29 Graded unit, clay to silt
29-45 Clay
45-65 Clay, disrupted
65-79 Silt
79-122 Graded unit, clay to sand
88-91 Silt
91-122 Sand
122-145 Graded unit, mud to sand
127-135 Silt
135-145 Sand
145-162 Graded unit, mud to silt
157-162 Silt
162-168 Graded unit, mud to silt
168-174 Clay
174-203 Graded unit, mud to silt
203-227 Graded unit, mud to sand
210-225 Silt
225-227 Sand
R1
R1
R1
R4
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4919
5599
5473
5651
5599
4919
5701
PREDICTED WET DENSITY
g/cc
1.54
2.06
2.01
2.08
2.06
1.54
2.10
MEAN GRAIN SIZE
μ
40.20
75.10
62.70
1.19
86.90



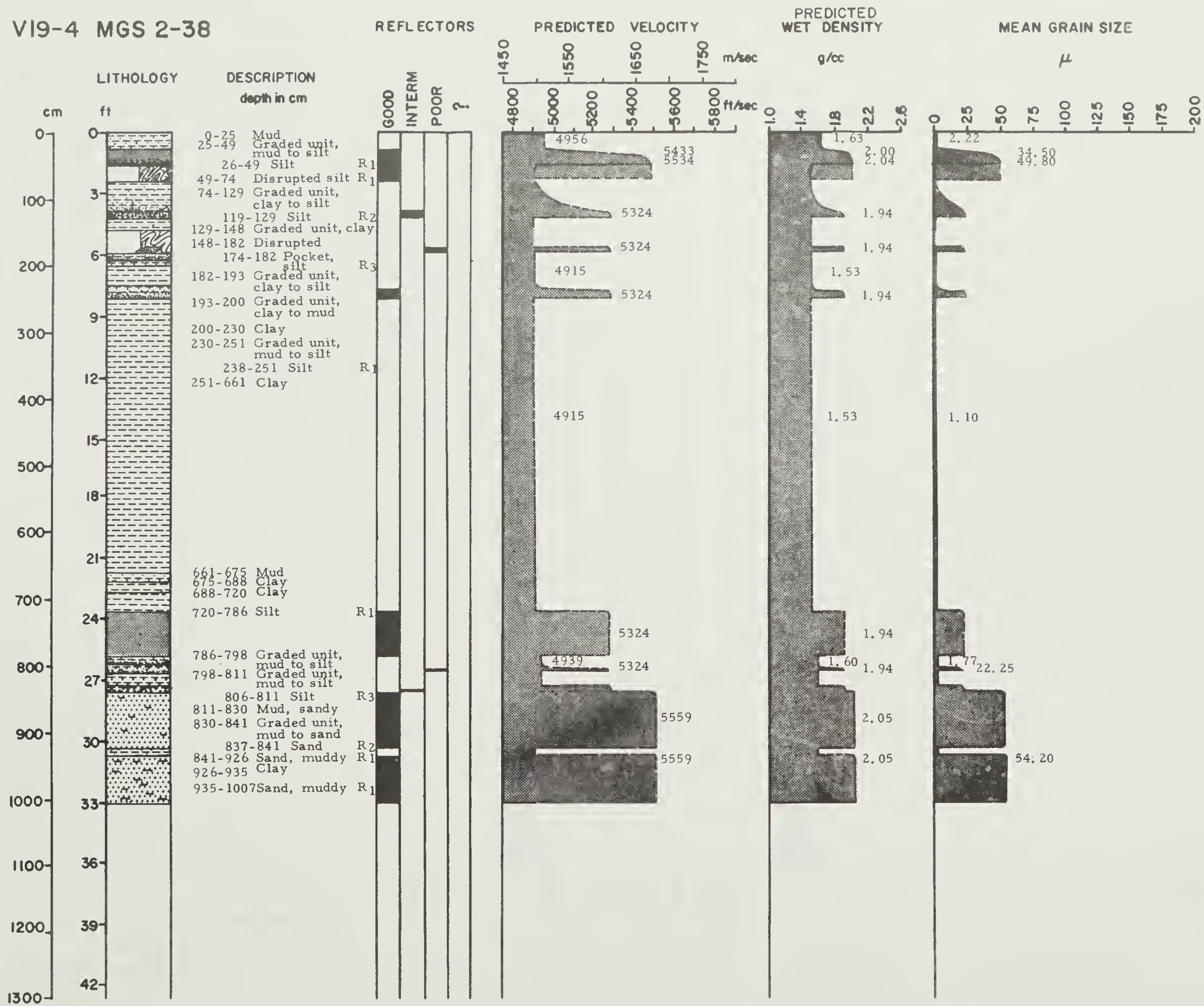
V 7-34
MGS 2-34
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
LITHOLOGY
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
DESCRIPTION
depth in cm
0-23 Graded unit, clay to mud
23-51 Mud
51-58 Graded unit, mud to silt
58-72 Disrupted
72-415 Graded unit, mud to sand
120-350 Mud, sandy
350-415 Sand, muddy
415-490 Mud
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4916
4968
5191
5200
6114
4968
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.53
1.65
1.87
1.87
2.22
1.65
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.12
2.54
11.81
12.40
281.00

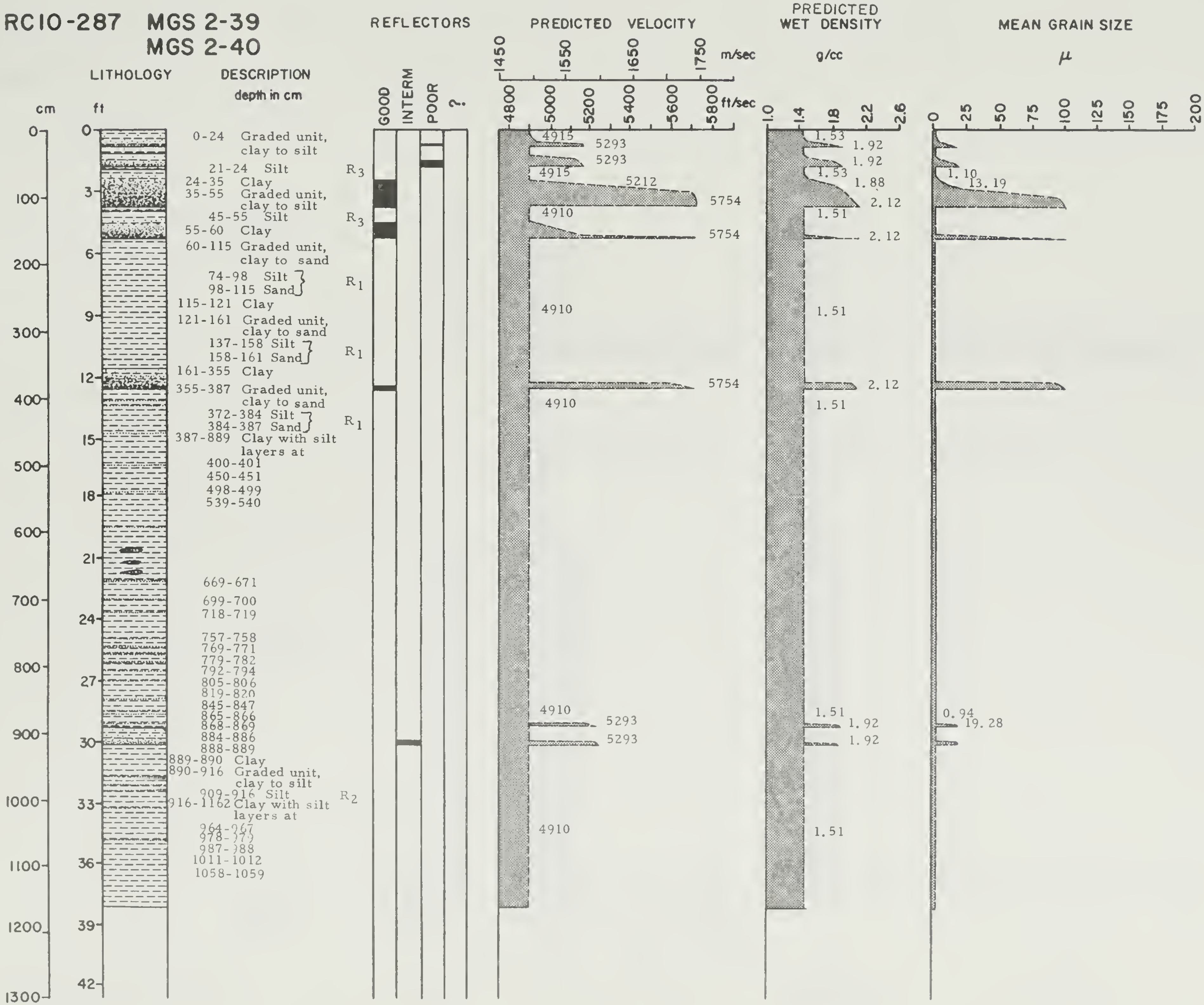

V26-169 MGS 2-35
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-360 Clay
360-367 Silt
367-425 Clay
425-437 Silt
437-490 Clay
490-496 Silt
496-515 Clay
515-533 Silt
533-547 Clay
547-566 Graded unit, mud to silt
566-686 Clay
686-721 Silt
721-907 Clay
907-927 Silt
927-984 Clay
984-989 Silt
989-1190 Clay
REFLECTORS
GOOD
INTERM
POOR
?
R2
R1
R2
R1
R3
R1
R1
R3
PREDICTED VELOCITY
m/sec
ft/sec
4907
5108
4917
5472
5108
5472
5108
4917
5472
4917
5474
5472
5541
5108
4917
PREDICTED WET DENSITY
g/cc
1.50
1.88
1.54
2.01
1.88
2.01
1.88
1.54
2.01
1.54
2.01
2.01
2.04
1.88
1.54
MEAN GRAIN SIZE
μ
0.83
12.89
1.16
40.30
40.00
51.00

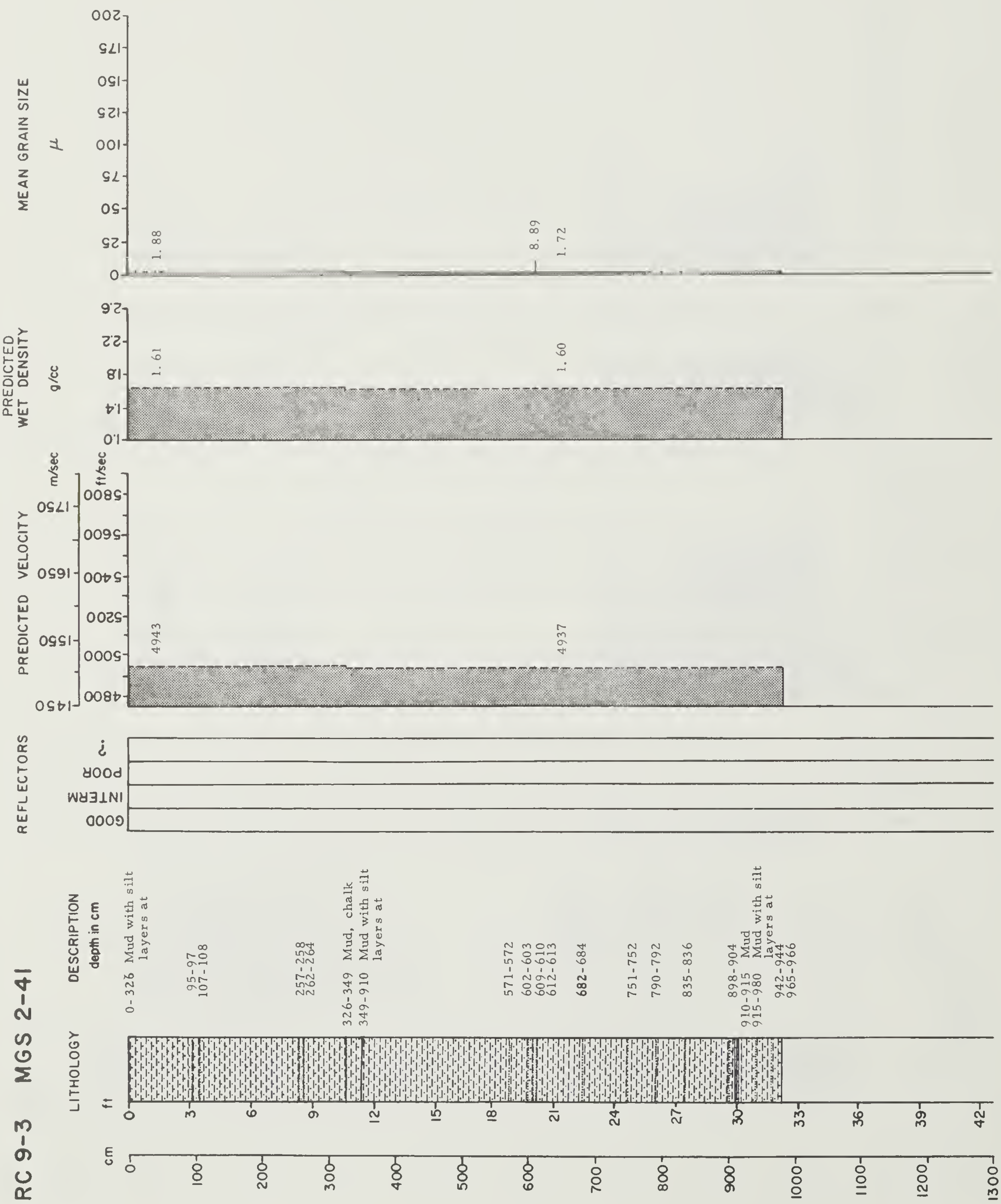

VIO-99 MGS 2-36
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-490 Clay, uniform
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
>4908
PREDICTED WET DENSITY
g/cc
<1.20
MEAN GRAIN SIZE
μ
0.48
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
3
6
9
12
15
18
21
24
27
30
33
36
39
42
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
1.0
1.4
1.8
2.2
2.6
25
50
75
125
150
175
200



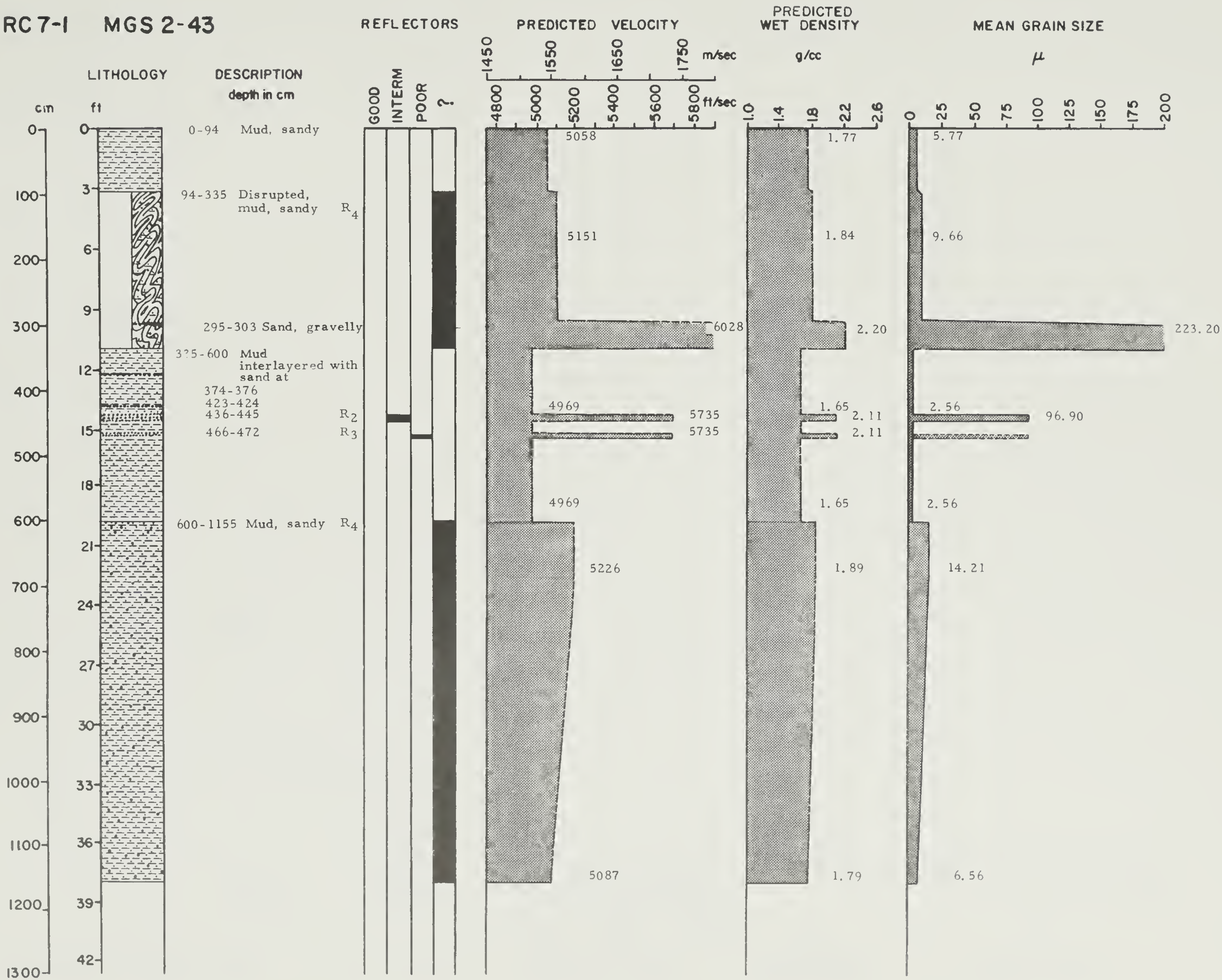
AI79-21 MGS 2-37
MGS 2-55,56
LITHOLOGY
DESCRIPTION
depth in cm
0-490 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4898
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.40
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
0.67
cm
ft
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
3
6
9
12
15
18
21
24
27
30
33
36
39
42


V19-4 MGS 2-38
LITHOLOGY
DESCRIPTION depth in cm
cm
ft
0-25 Mud
25-49 Graded unit, mud to silt
26-49 Silt
49-74 Disrupted silt
74-129 Graded unit, clay to silt
119-129 Silt
129-148 Graded unit, clay
148-182 Disrupted
174-182 Pocket, silt
182-193 Graded unit, clay to silt
193-200 Graded unit, clay to mud
200-230 Clay
230-251 Graded unit, mud to silt
238-251 Silt
251-661 Clay
661-675 Mud
675-688 Clay
688-720 Clay
720-786 Silt
786-798 Graded unit, mud to silt
798-811 Graded unit, mud to silt
806-811 Silt
811-830 Mud, sandy
830-841 Graded unit, mud to sand
837-841 Sand
841-926 Sand, muddy
926-935 Clay
935-1007Sand, muddy
R1
R1
R2
R3
R1
R1
R3
R2
R1
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4956
5433
5534
5324
5324
4915
5324
4915
5324
4939
5324
5559
5559
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.63
2.00
2.04
1.94
1.94
1.53
1.94
1.53
1.94
1.60
1.94
2.05
2.05
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
2.22
34.50
49.80
1.10
1.77
22.25
54.20

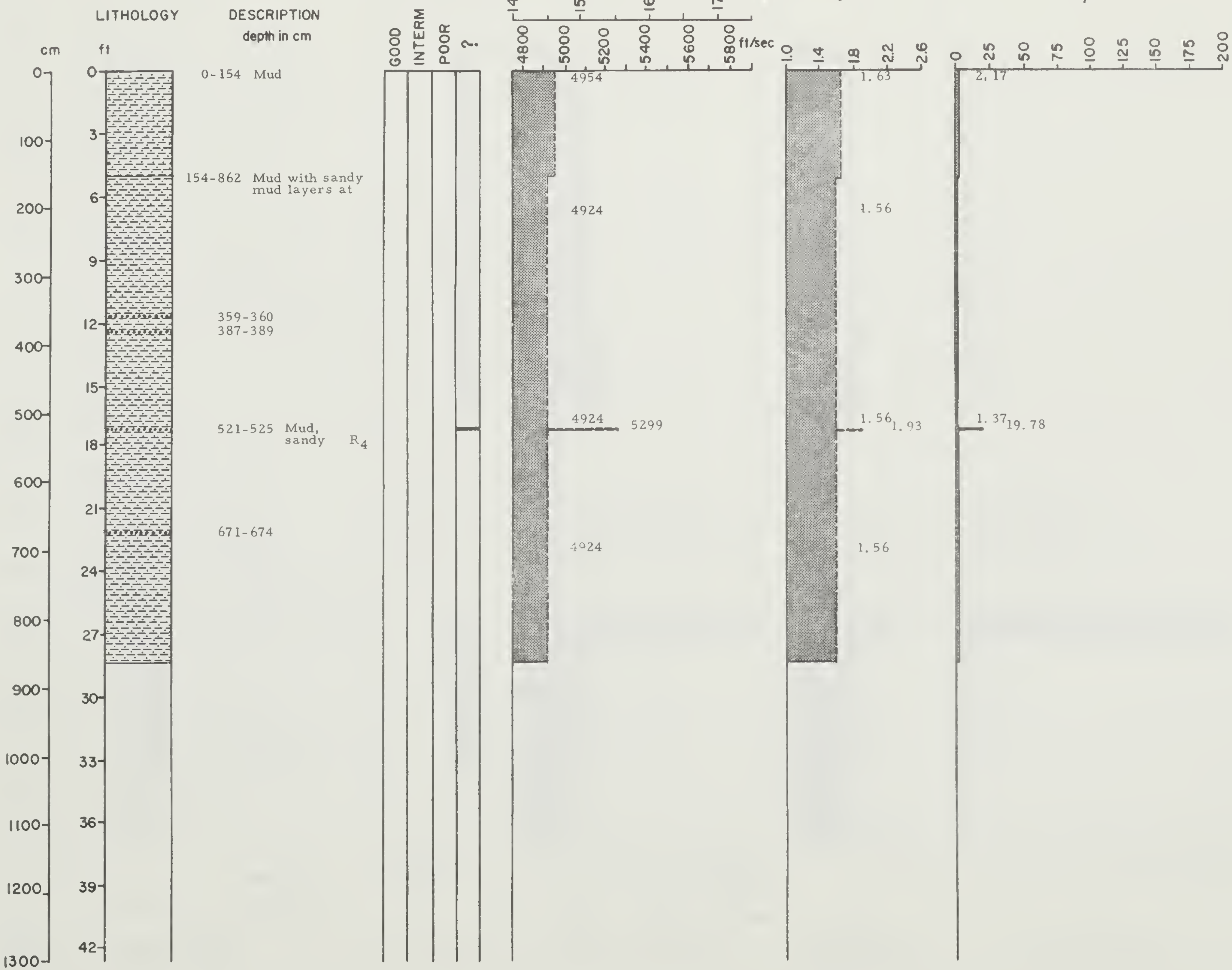

RC10-287 MGS 2-39
MGS 2-40
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-24 Graded unit, clay to silt
21-24 Silt
24-35 Clay
35-55 Graded unit, clay to silt
45-55 Silt
55-60 Clay
60-115 Graded unit, clay to sand
74-98 Silt
98-115 Sand
115-121 Clay
121-161 Graded unit, clay to sand
137-158 Silt
158-161 Sand
161-355 Clay
355-387 Graded unit, clay to sand
372-384 Silt
384-387 Sand
387-889 Clay with silt layers at
400-401
450-451
498-499
539-540
669-671
699-700
718-719
757-758
769-771
779-782
792-794
805-806
819-820
845-847
865-866
868-869
884-886
888-889
889-890 Clay
890-916 Graded unit, clay to silt
909-916 Silt
916-1162 Clay with silt layers at
964-967
978-979
987-988
1011-1012
1058-1059
R3
R3
R1
R1
R1
R2
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4915
5293
5293
4915
5212
5754
4910
5754
4910
5754
4910
4910
5293
5293
4910
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.53
1.92
1.92
1.53
1.88
2.12
1.51
2.12
1.51
2.12
1.51
1.51
1.92
1.92
1.51
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.10
13.19
0.94
19.28

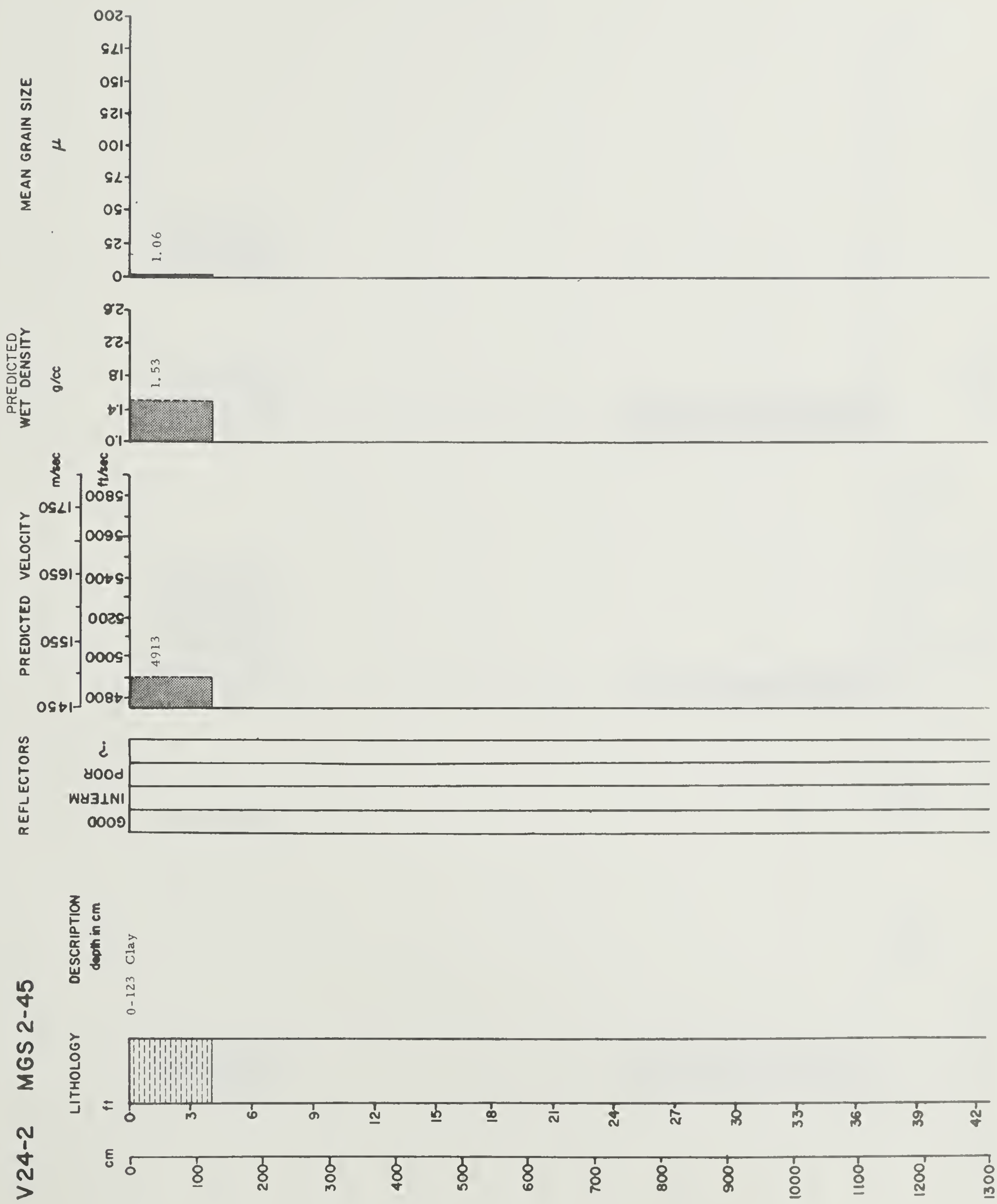

RC 9-3 MGS 2-41
cm
LITHOLOGY
ft
DESCRIPTION
depth in cm
0-326 Mud with silt layers at
95-97
107-108
257-258
262-264
326-349 Mud, chalk
349-910 Mud with silt layers at
571-572
602-603
609-610
612-613
682-684
751-752
790-792
835-836
898-904
910-915 Mud
915-980 Mud with silt layers at
942-944
965-966
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4943
4937
PREDICTED WET DENSITY
g/cc
1.61
1.60
MEAN GRAIN SIZE
μ
1.88
8.89
1.72

RC 7-1 MGS 2-43

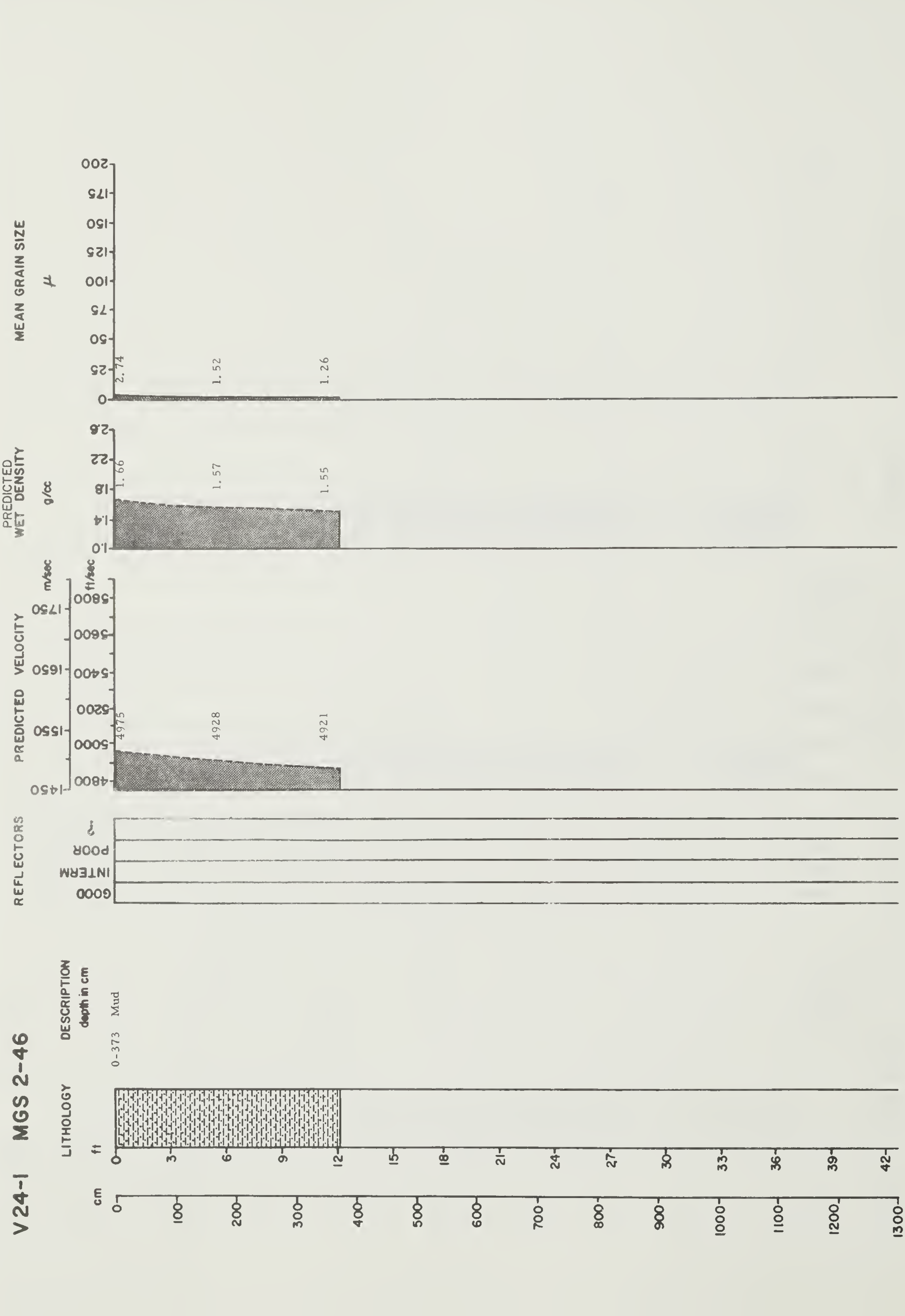

LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-94 Mud, sandy
94-335 Disrupted, mud, sandy R4
295-303 Sand, gravelly
335-600 Mud interlayered with sand at
374-376
423-424
436-445 R2
466-472 R3
600-1155 Mud, sandy R4
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5058
5151
6028
4969
5735
5735
4969
5226
5087
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.77
1.84
2.20
1.65
2.11
2.11
1.65
1.89
1.79
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
5.77
9.66
223.20
2.56
96.90
2.56
14.21
6.56

RC10-288 MGS 2-44

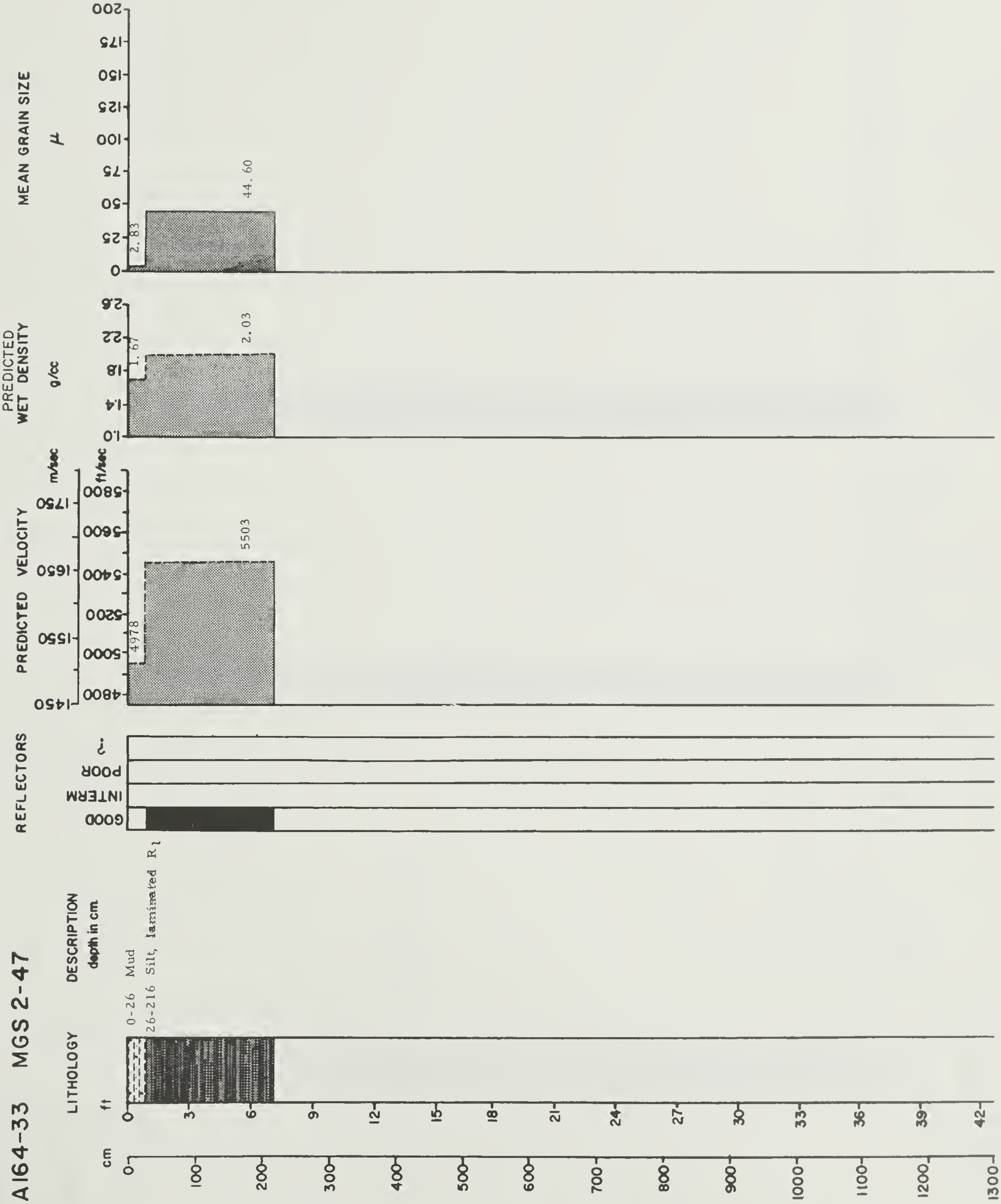




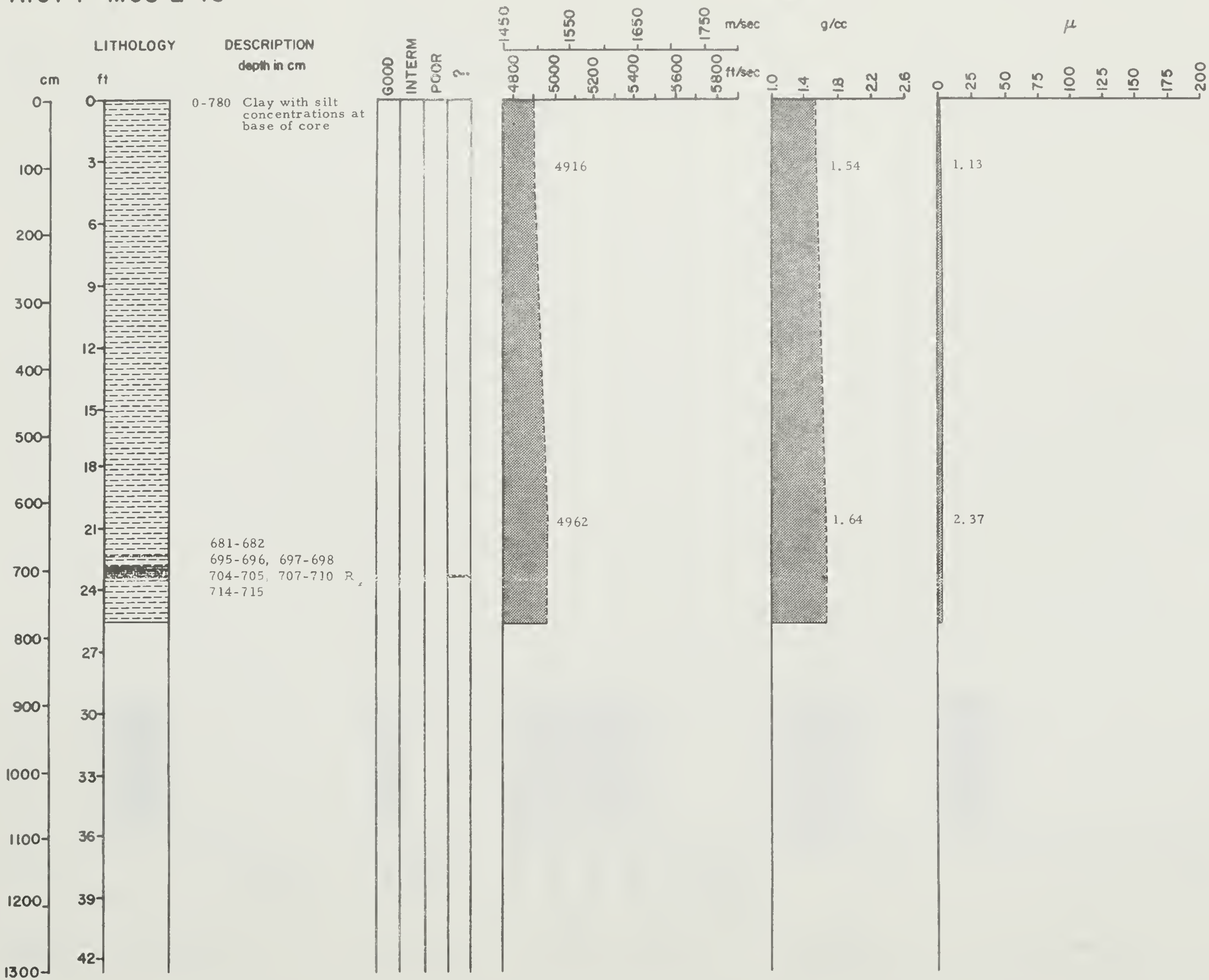
V24-2 MGS 2-45
LITHOLOGY
DESCRIPTION
depth in cm
0-123 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
1450
1550
1650
1750
ft/sec
4800
5000
5200
5400
5600
5800
4913
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.53
MEAN GRAIN SIZE
µ
0
25
50
75
100
125
150
175
200
1.06
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300

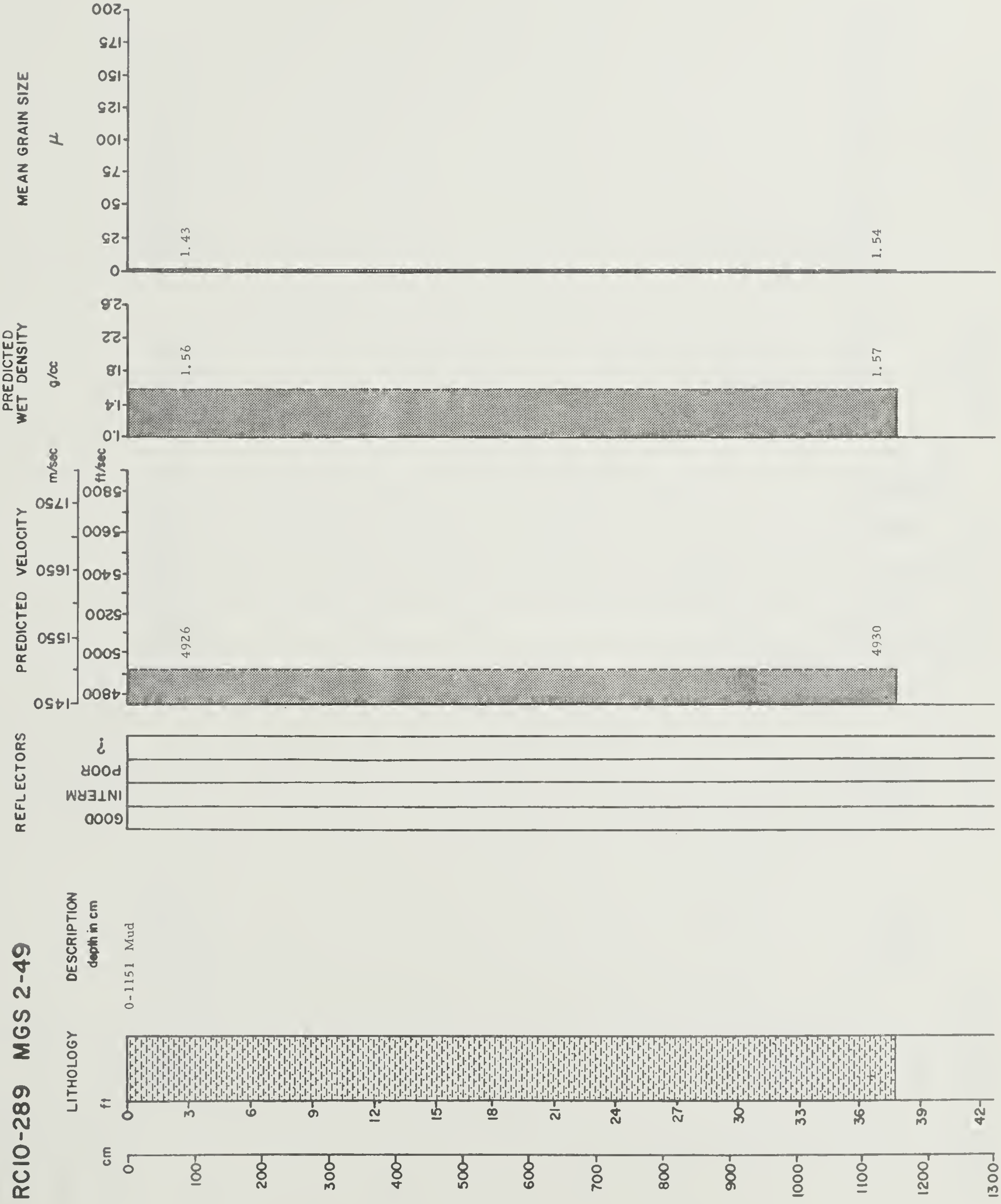


V24-1 MGS 2-46
LITHOLOGY
ft
cm
DESCRIPTION depth in cm
0-373 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4975
4928
4921
PREDICTED WET DENSITY
g/cc
1.66
1.57
1.55
MEAN GRAIN SIZE
μ
2.74
1.52
1.26

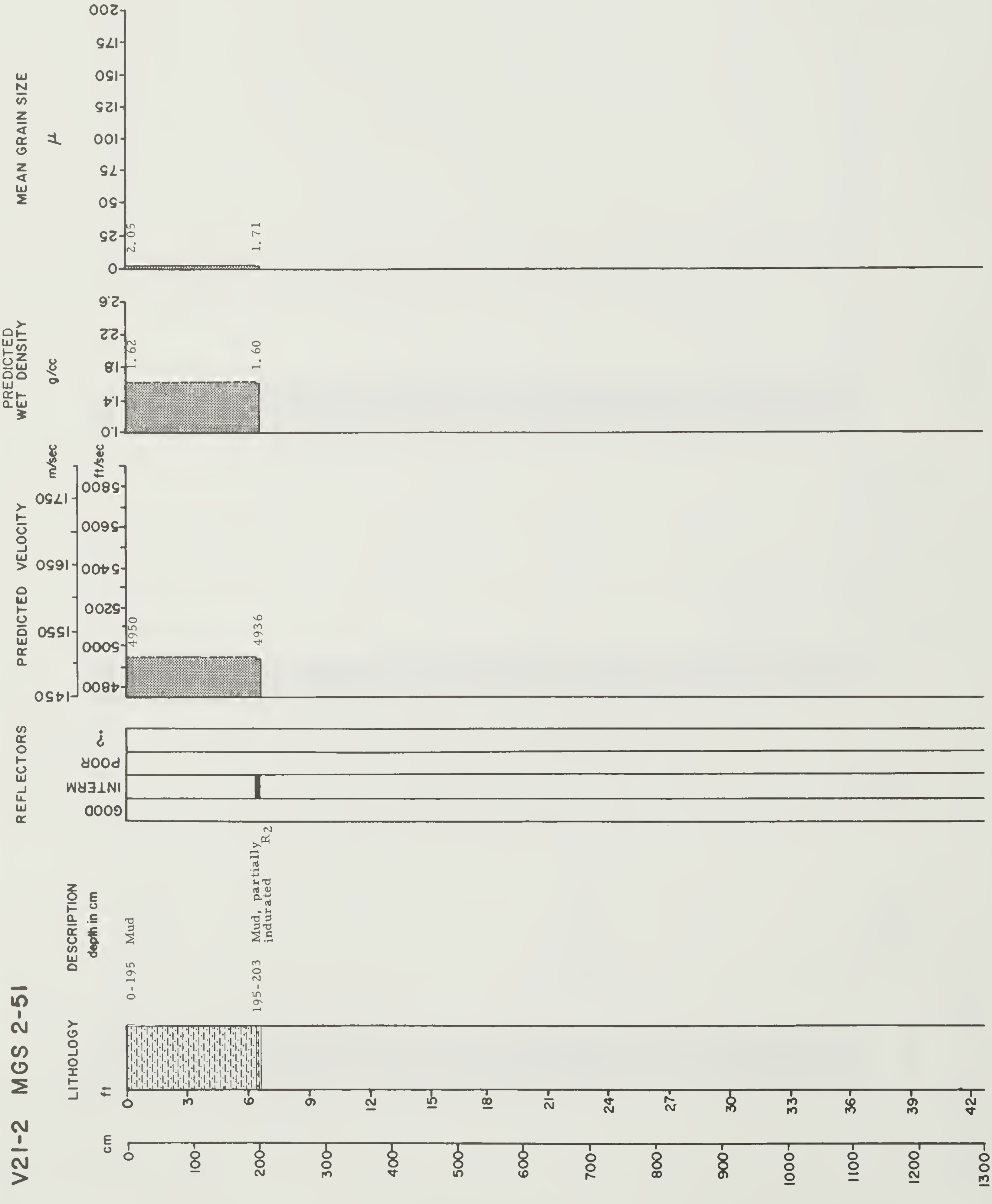

A164-33 MGS 2-47
LITHOLOGY
cm
ft
DESCRIPTION
depth in cm
0-26 Mud
26-216 Silt, laminated R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4978
5503
PREDICTED WET DENSITY
g/cc
1.67
2.03
MEAN GRAIN SIZE
μ
2.83
44.60

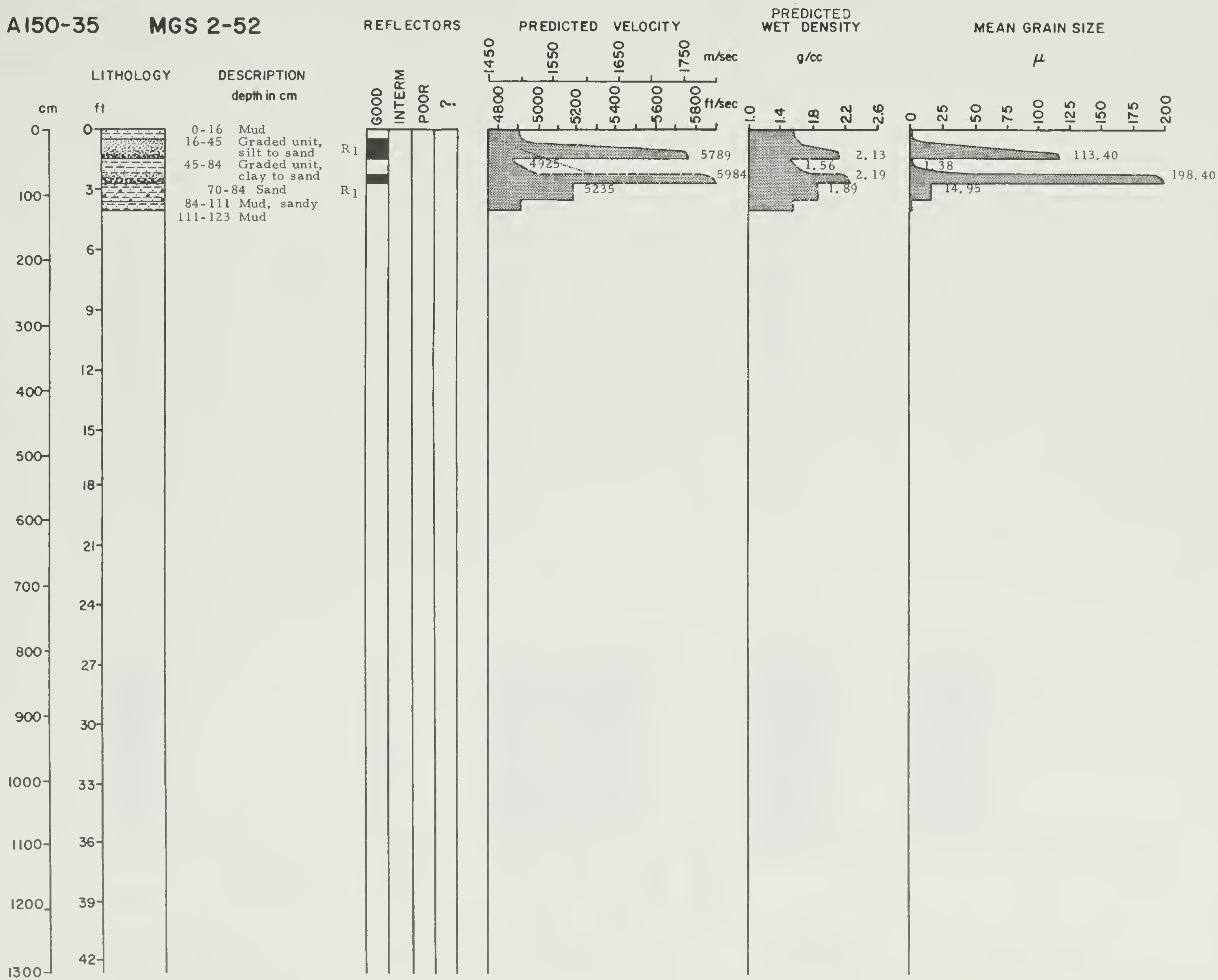
A167-1 MGS 2-48

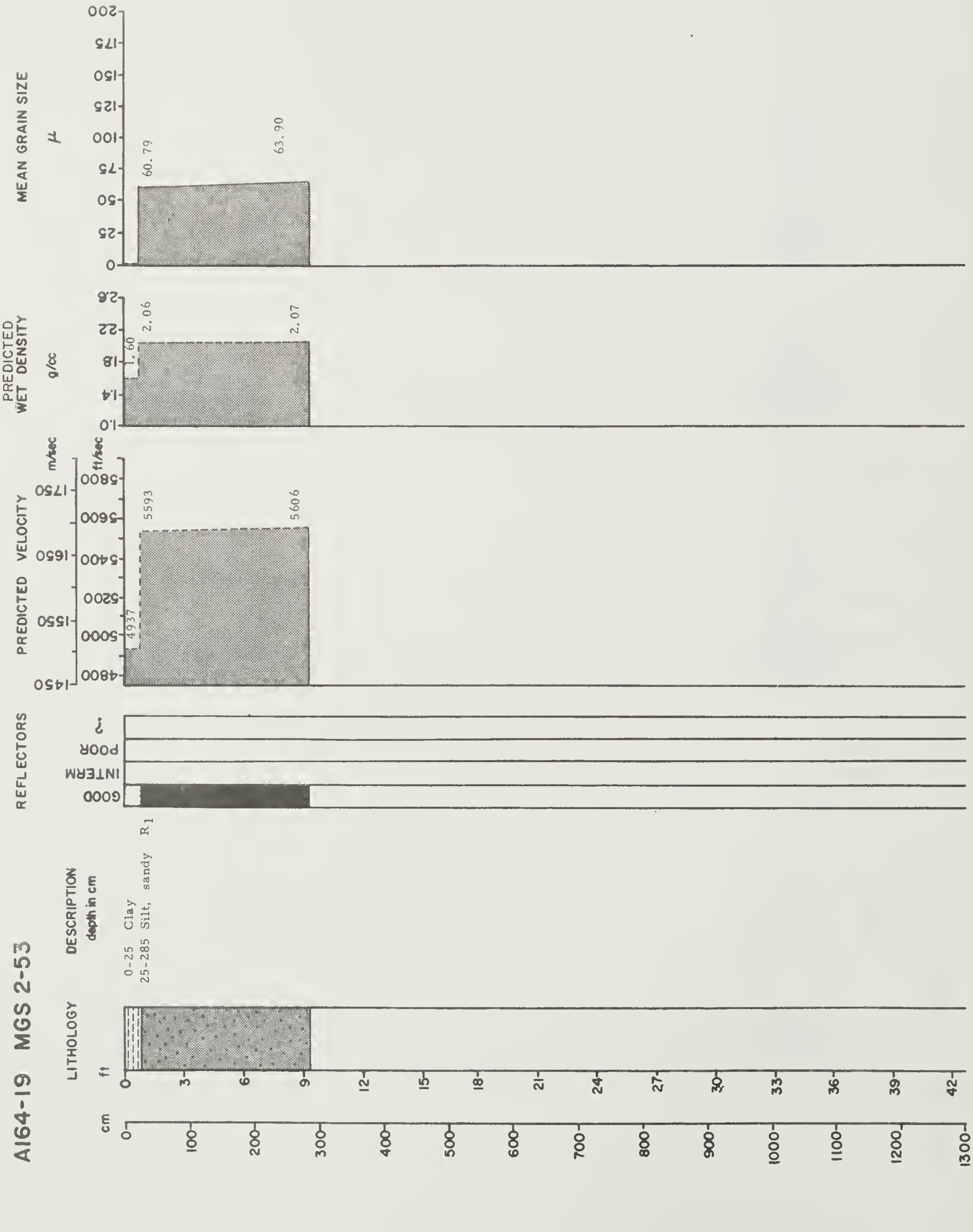


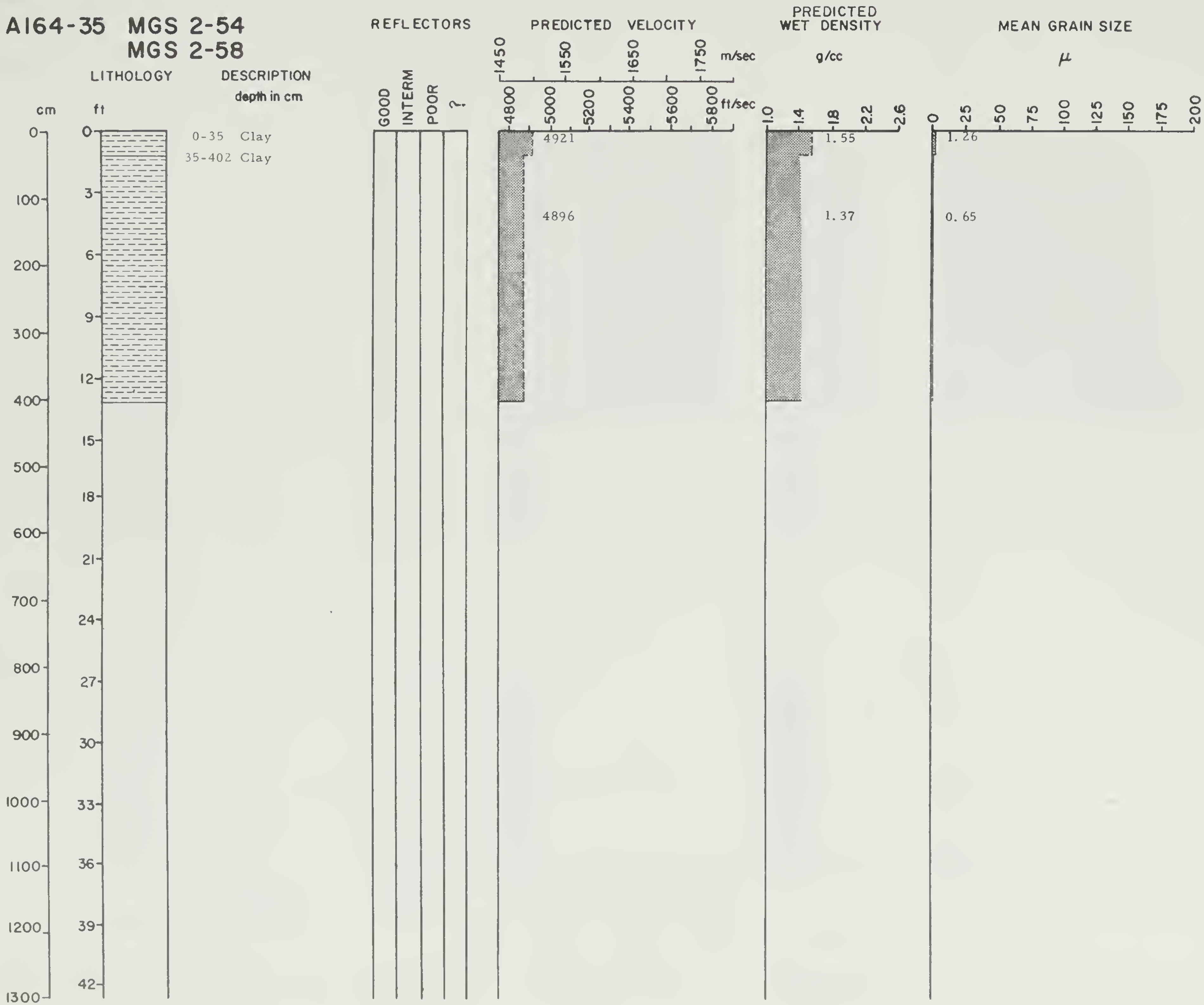


RC10-289 MGS 2-49
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-1151 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4926
4930
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.56
1.57
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.43
1.54
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

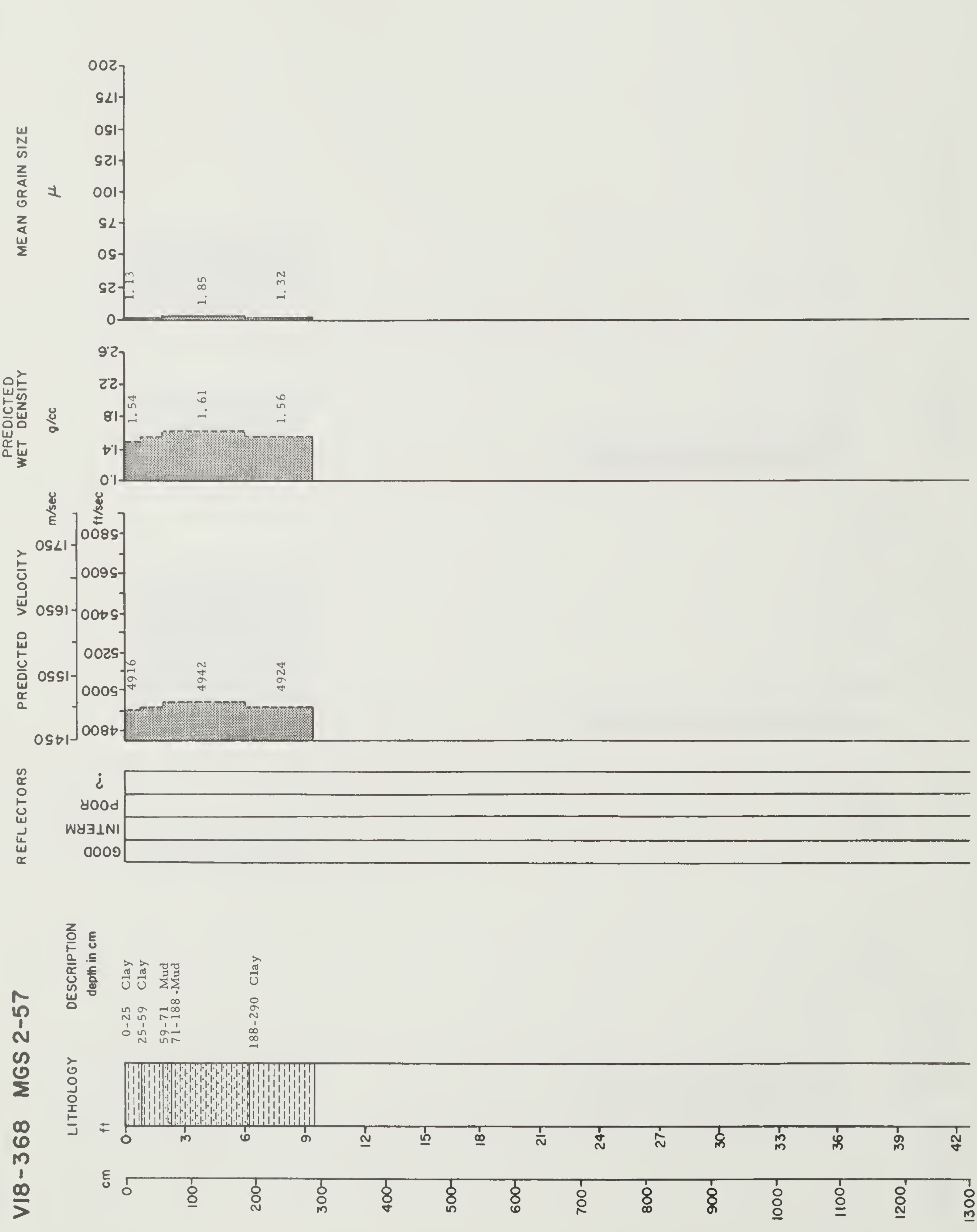

V21-2 MGS 2-51
LITHOLOGY
ft
cm
DESCRIPTION
depth in cm
0-195 Mud
195-203 Mud, partially indurated
R2
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4950
4936
PREDICTED WET DENSITY
g/cc
1.62
1.60
MEAN GRAIN SIZE
μ
2.05
1.71

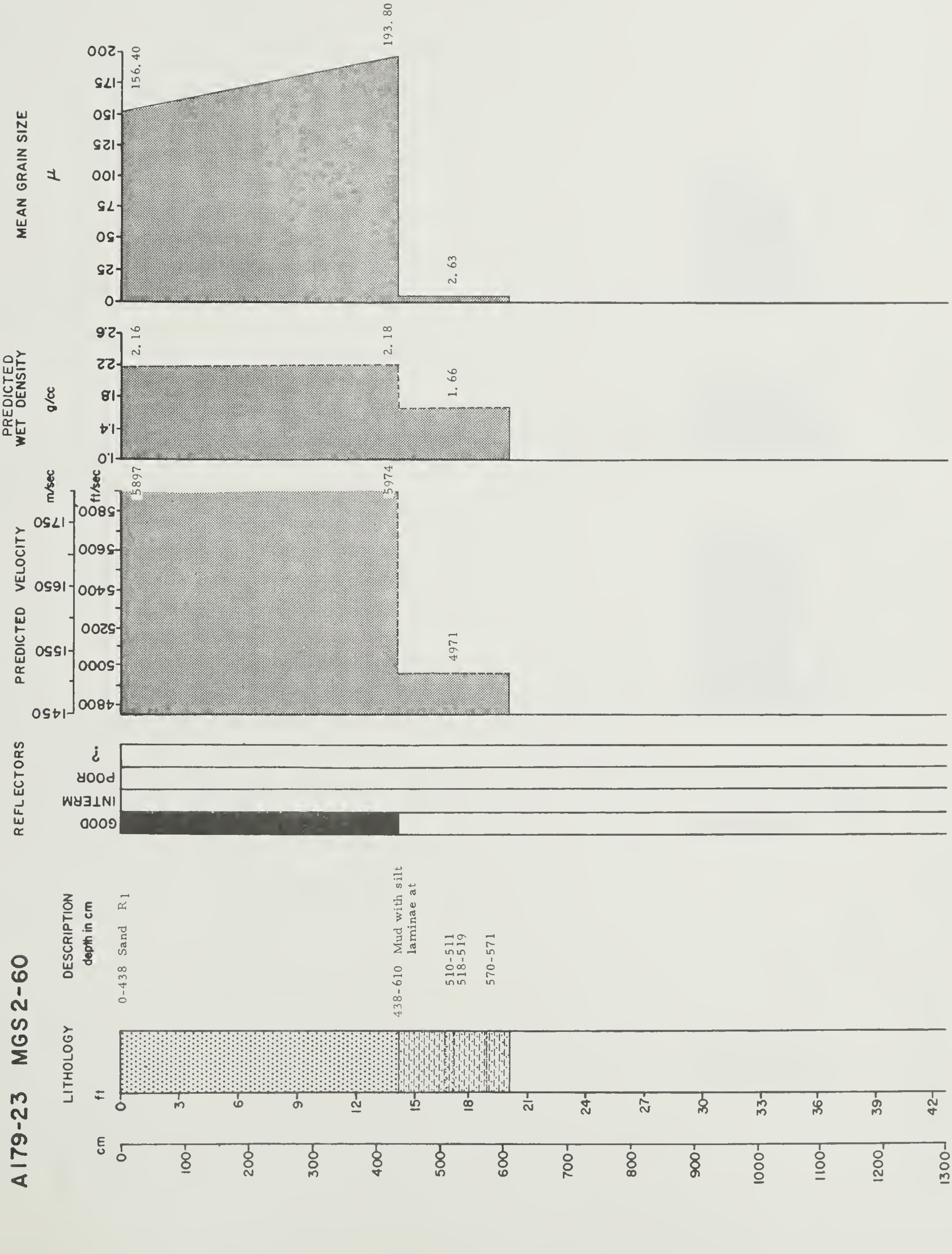

A150-35
MGS 2-52
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-16 Mud
16-45 Graded unit, silt to sand
45-84 Graded unit, clay to sand
70-84 Sand
84-111 Mud, sandy
111-123 Mud
REFLECTORS
GOOD
INTERM
POOR
?
R1
R1
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5789
4925
5984
5235
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
2.13
1.56
2.19
1.89
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
113.40
1.38
198.40
14.95


A164-19 MGS 2-53
LITHOLOGY
DESCRIPTION depth in cm
0-25 Clay
25-285 Silt, sandy
R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4937
5593
5606
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.60
2.06
2.07
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
60.79
63.90
cm
ft
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
3
6
9
12
15
18
21
24
27
30
33
36
39
42

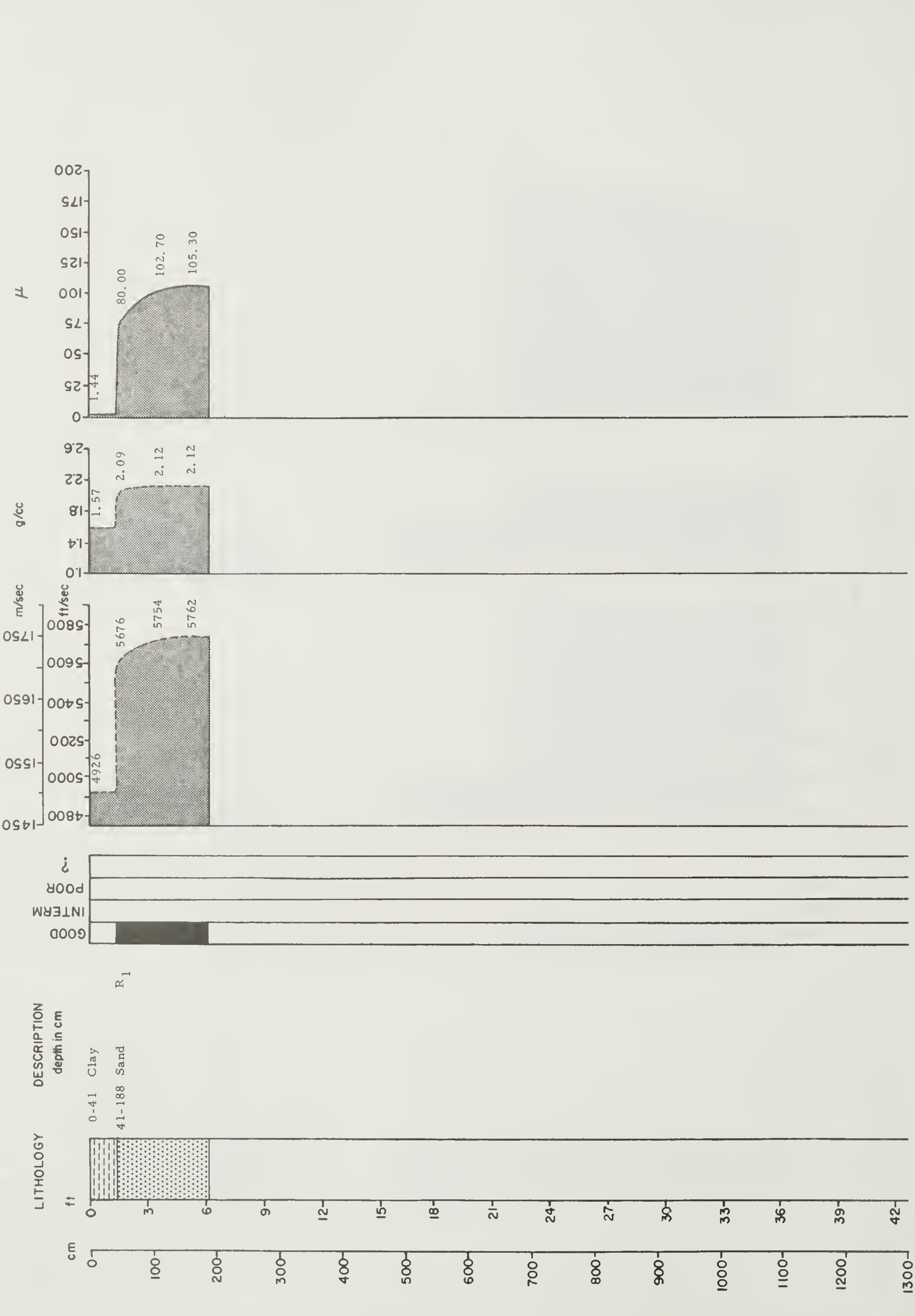


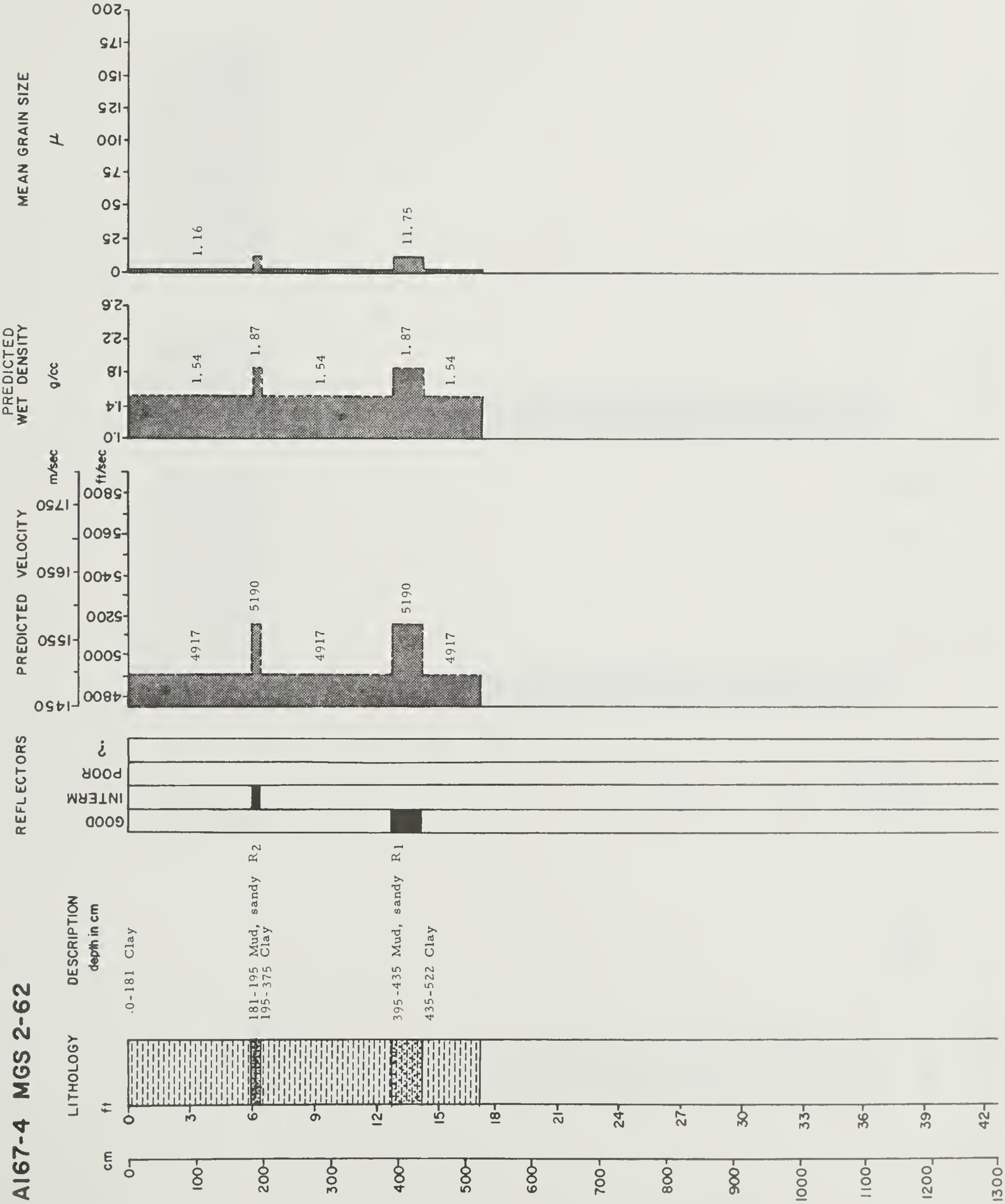
A164-35 MGS 2-54
MGS 2-58
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-35 Clay
35-402 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
1450
1550
1650
1750
m/sec
4800
5000
5200
5400
5600
5800
ft/sec
4921
4896
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.55
1.37
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.26
0.65
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

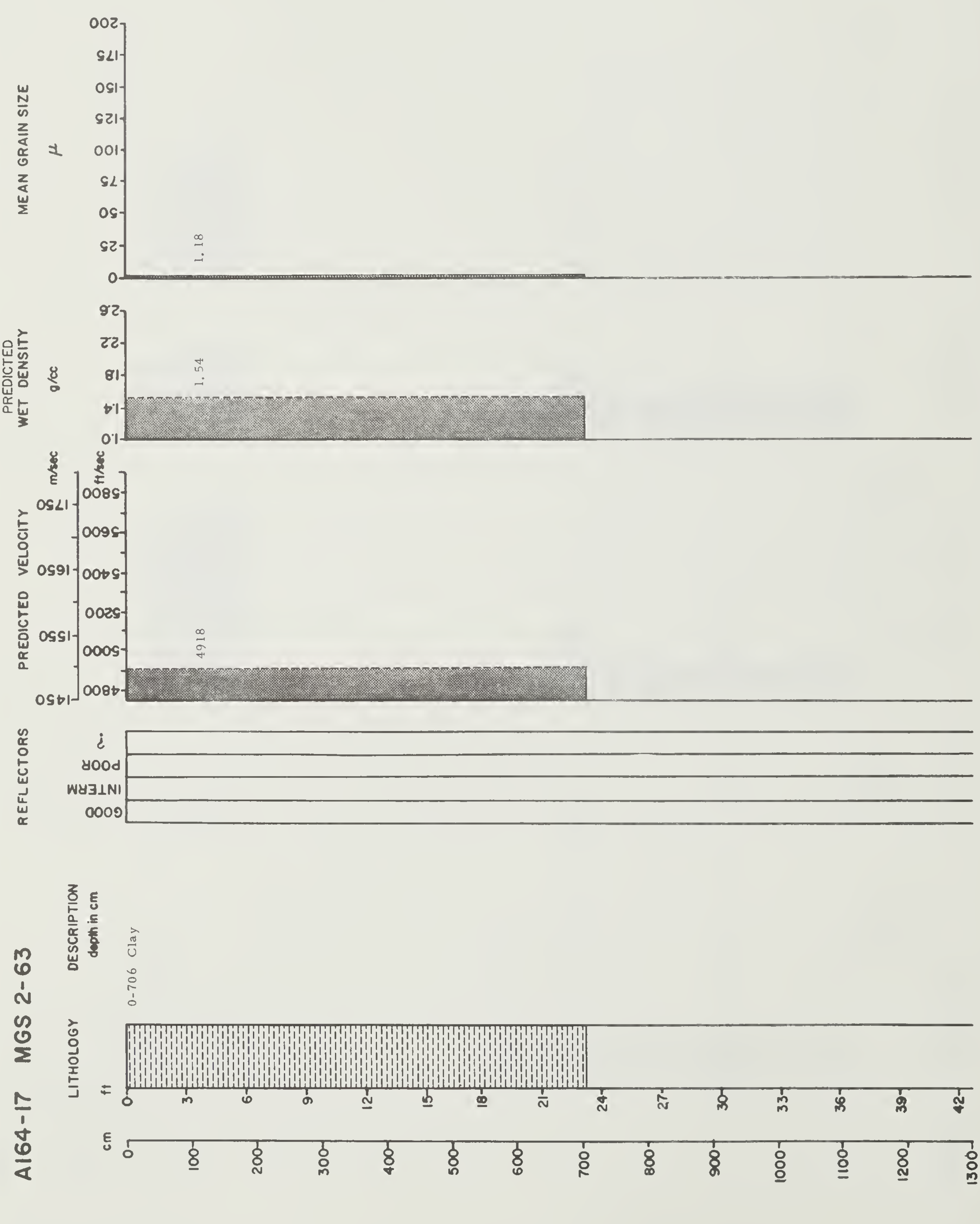

V18-368 MGS 2-57
MEAN GRAIN SIZE
μ
PREDICTED WET DENSITY
g/cc
PREDICTED VELOCITY
m/sec
ft/sec
REFLECTORS
GOOD
INTERM
POOR
?
LITHOLOGY
DESCRIPTION
depth in cm
0-25 Clay
25-59 Clay
59-71 Mud
71-188 -Mud
188-290 Clay
1.13
1.85
1.32
1.54
1.61
1.56
4916
4942
4924
cm
ft

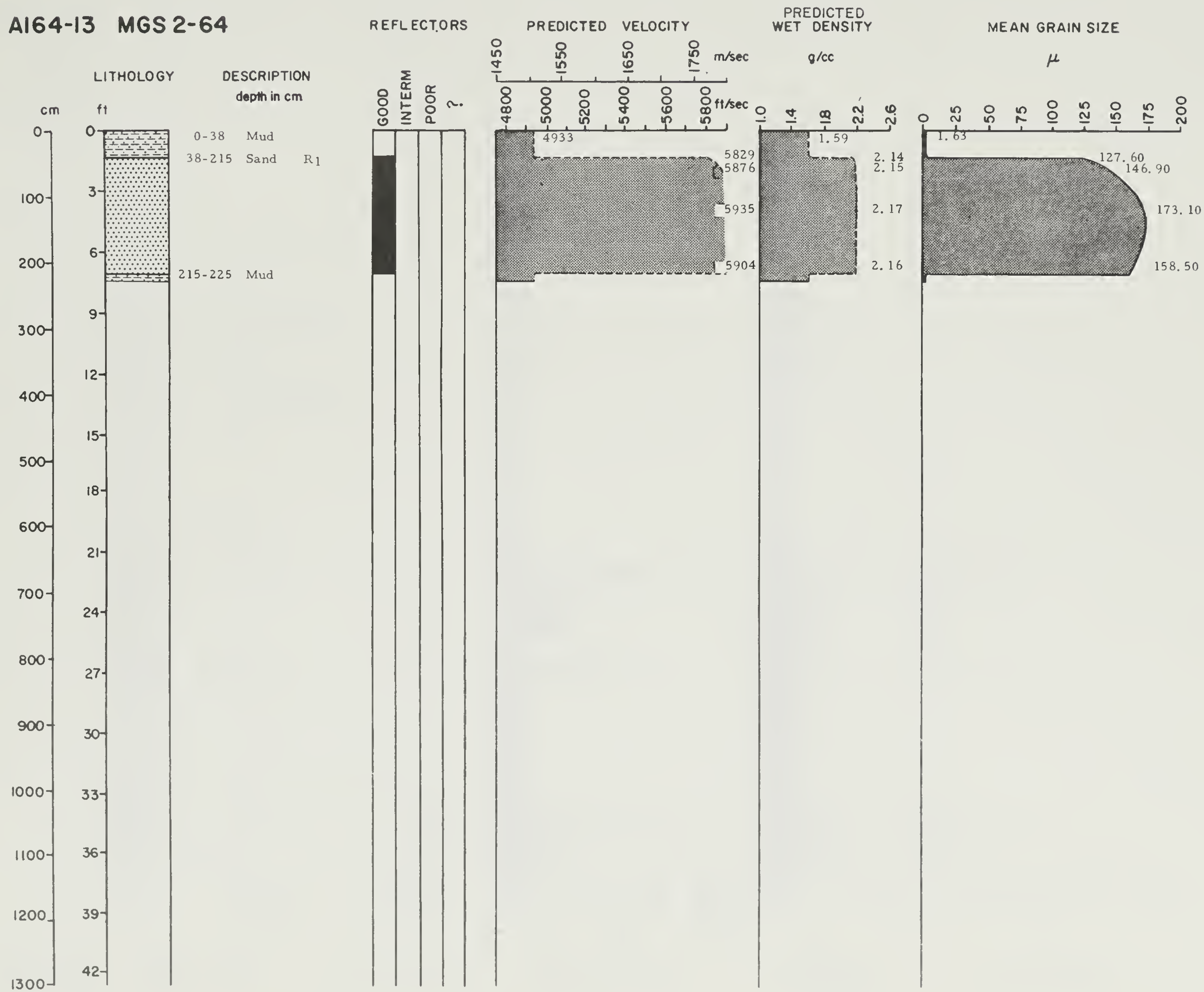

A179-23 MGS 2-60
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-438 Sand R1
438-610 Mud with silt laminae at
510-511
518-519
570-571
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5897
5974
4971
PREDICTED WET DENSITY
g/cc
2.16
2.18
1.66
MEAN GRAIN SIZE
μ
156.40
193.80
2.63

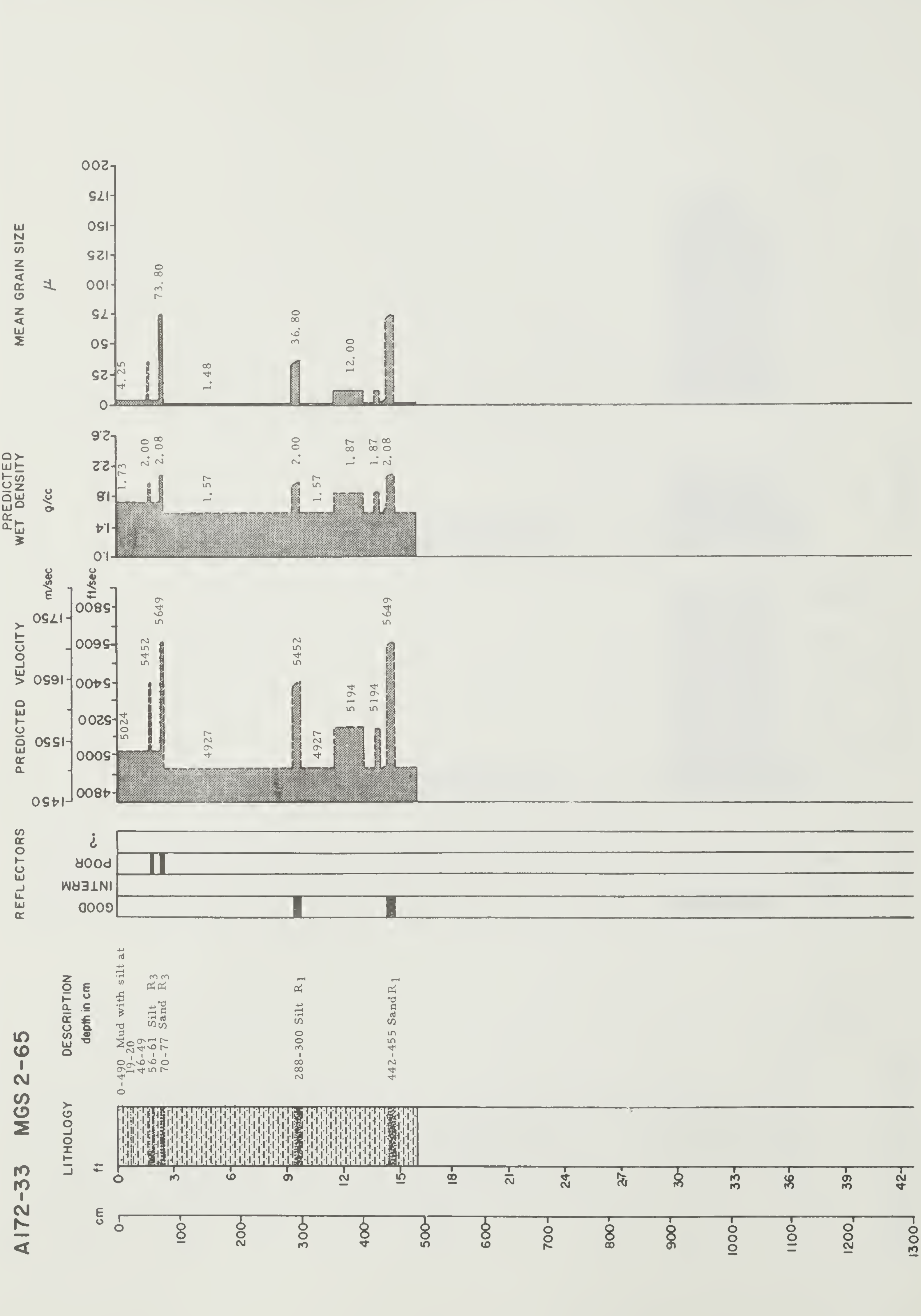
A179-22 MGS 2-61



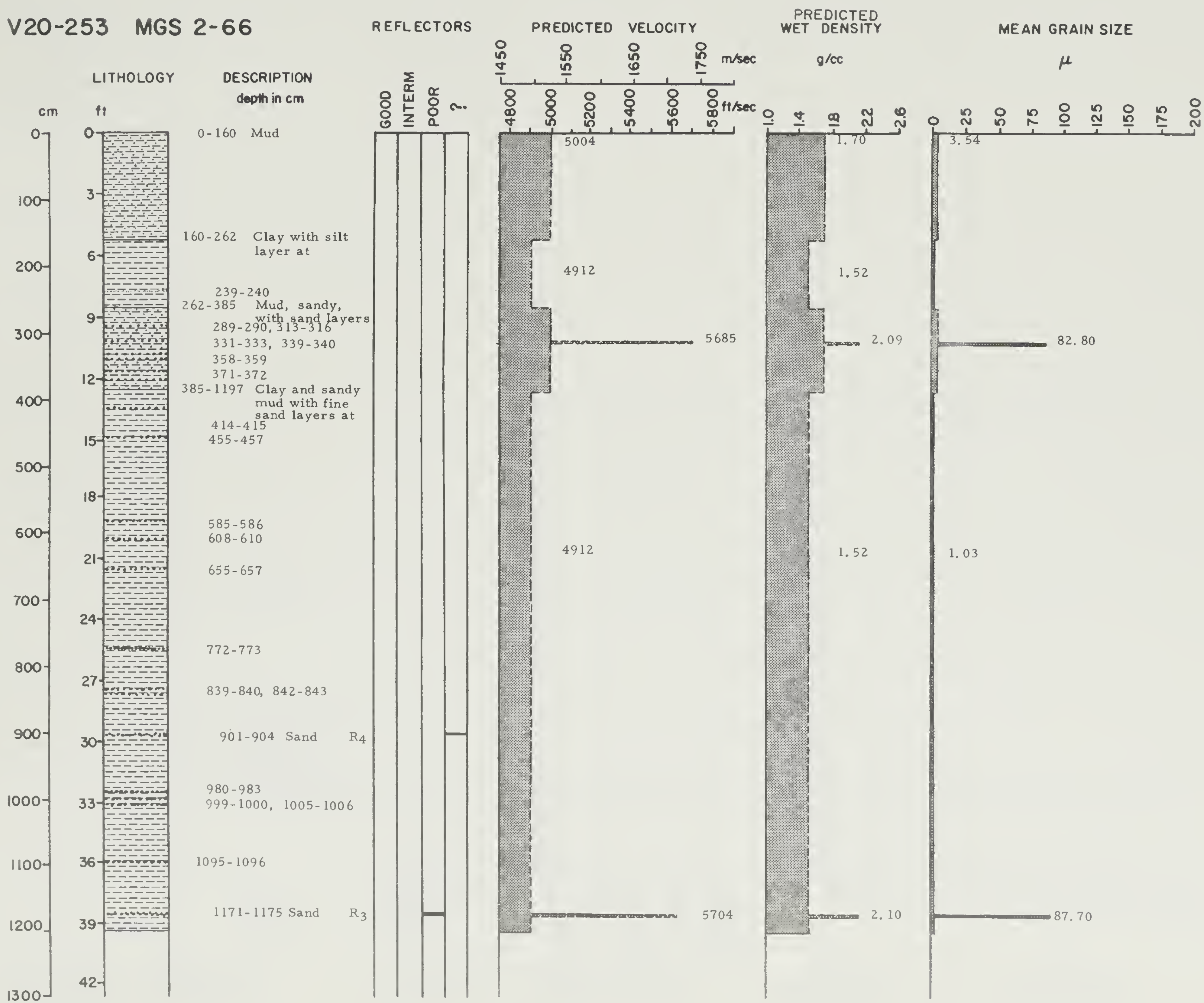

A167-4 MGS 2-62
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
.0-181 Clay
181-195 Mud, sandy R 2
195-375 Clay
395-435 Mud, sandy R 1
435-522 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4917
5190
4917
5190
4917
PREDICTED WET DENSITY
g/cc
1.54
1.87
1.54
1.87
1.54
MEAN GRAIN SIZE
μ
1.16
11.75

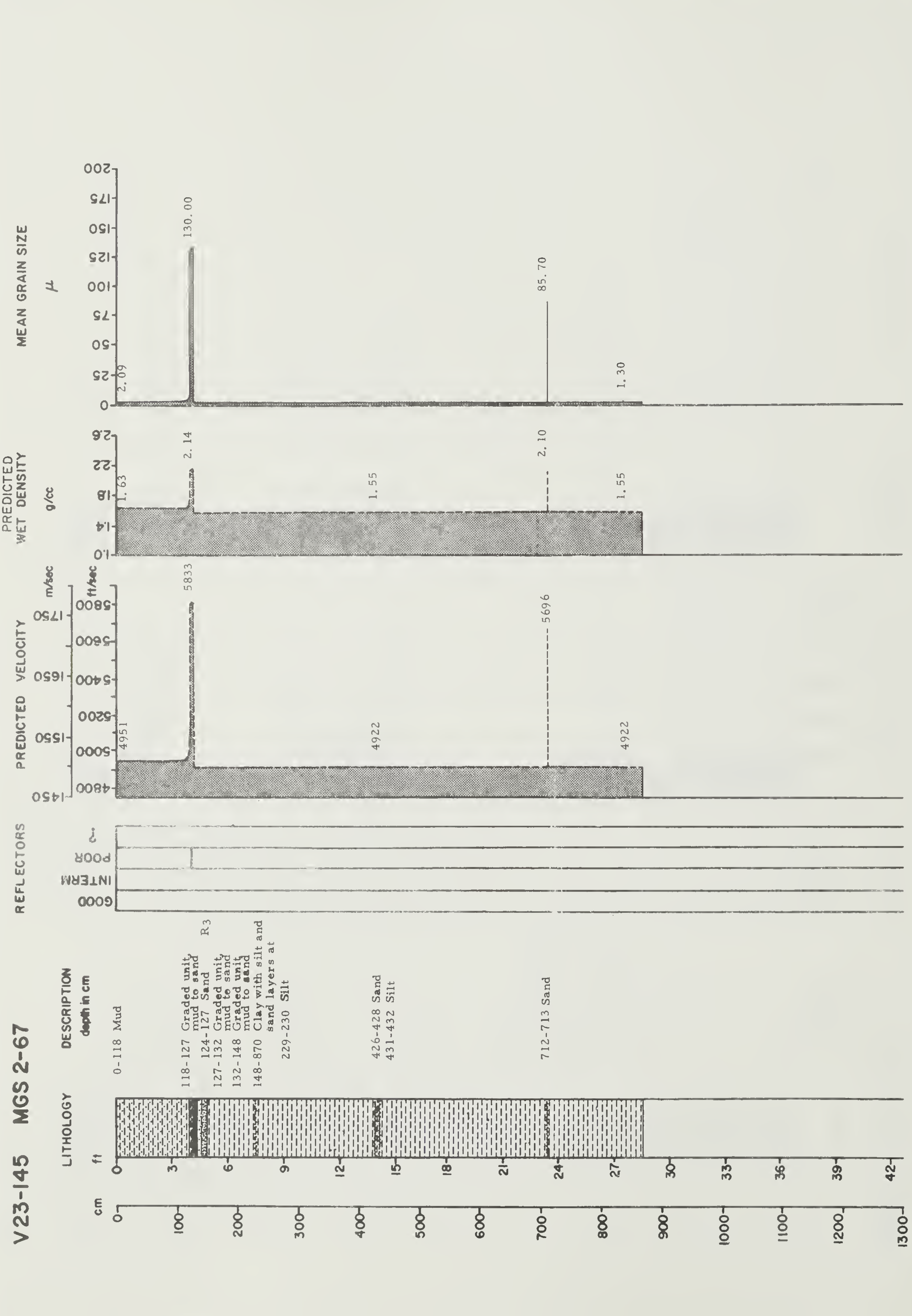

A164-17 MGS 2-63
LITHOLOGY
DESCRIPTION
depth in cm
0-706 Clay
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4918
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.54
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.18
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

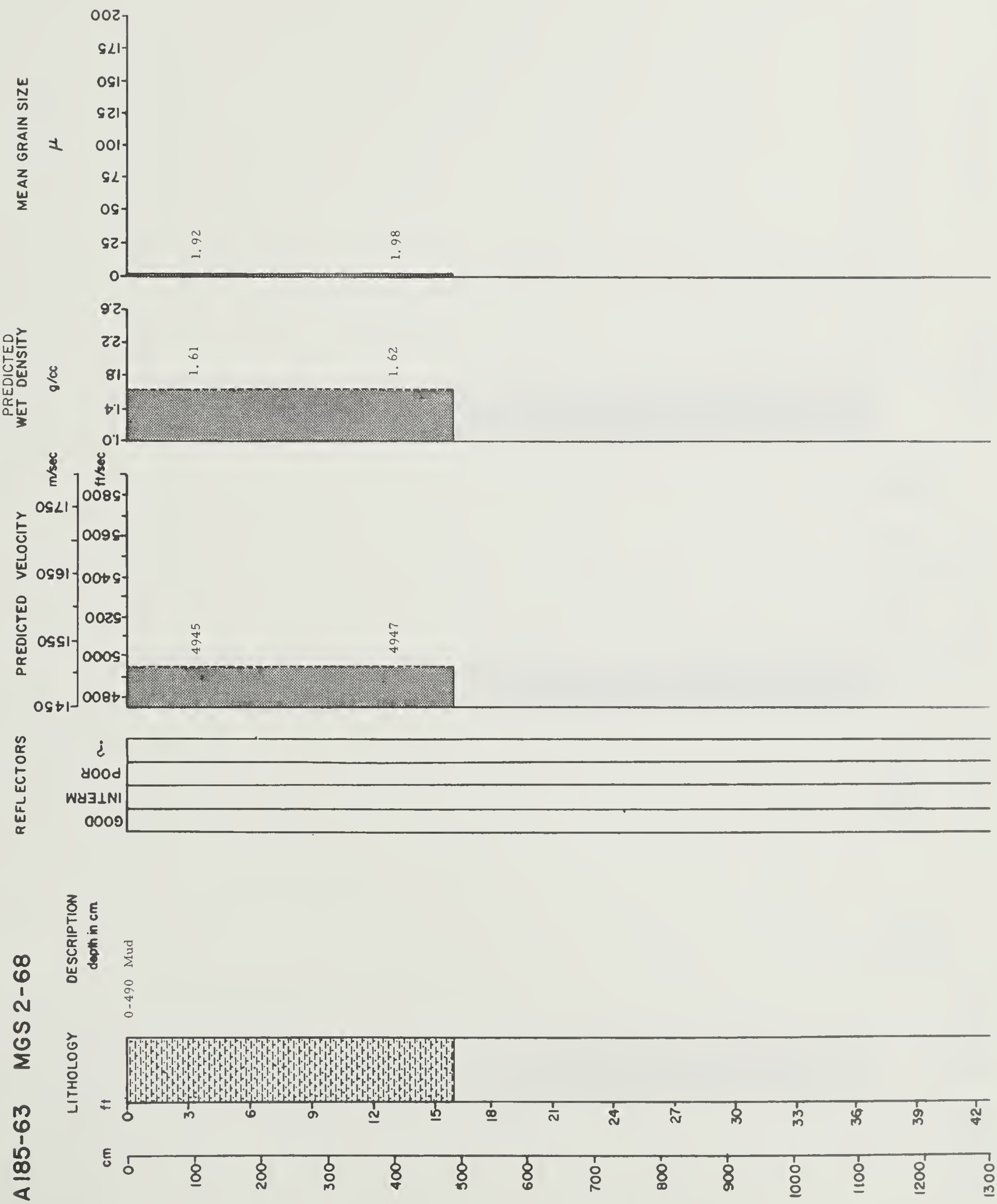

A164-13 MGS 2-64
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-38 Mud
38-215 Sand R1
215-225 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
1450
1550
1650
1750
ft/sec
4800
5000
5200
5400
5600
5800
4933
5829
5876
5935
5904
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.59
2.14
2.15
2.17
2.16
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.63
127.60
146.90
173.10
158.50

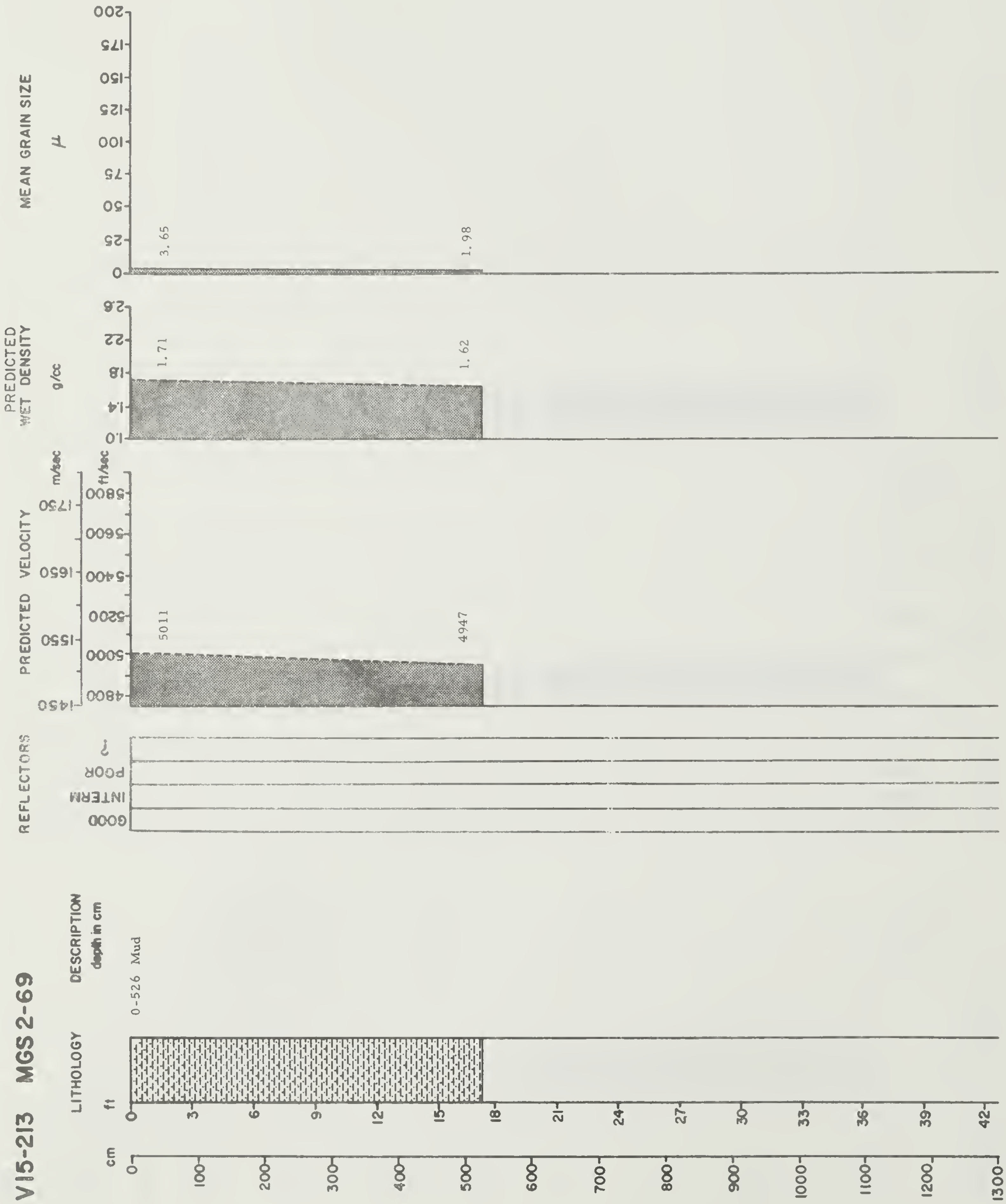

A172-33 MGS 2-65
LITHOLOGY
DESCRIPTION
depth in cm
0-490 Mud with silt at
19-20
46-49
56-61 Silt R3
70-77 Sand R3
288-300 Silt R1
442-455 Sand R1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5024
5452
5649
4927
5452
4927
5194
5194
5649
PREDICTED WET DENSITY
g/cc
1.73
2.00
2.08
1.57
2.00
1.57
1.87
1.87
2.08
MEAN GRAIN SIZE
μ
4.25
73.80
1.48
36.80
12.00
cm
ft

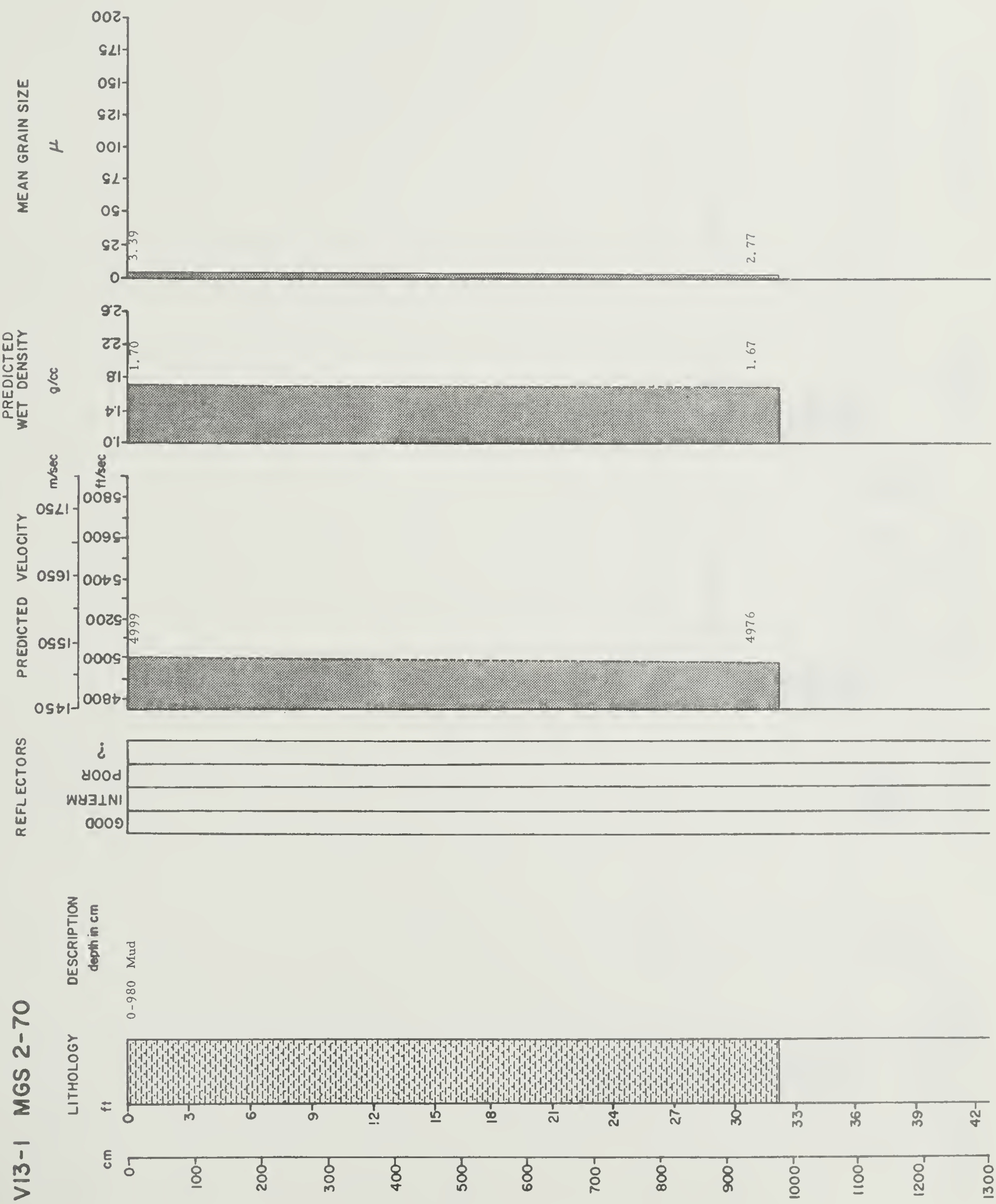
V20-253 MGS 2-66

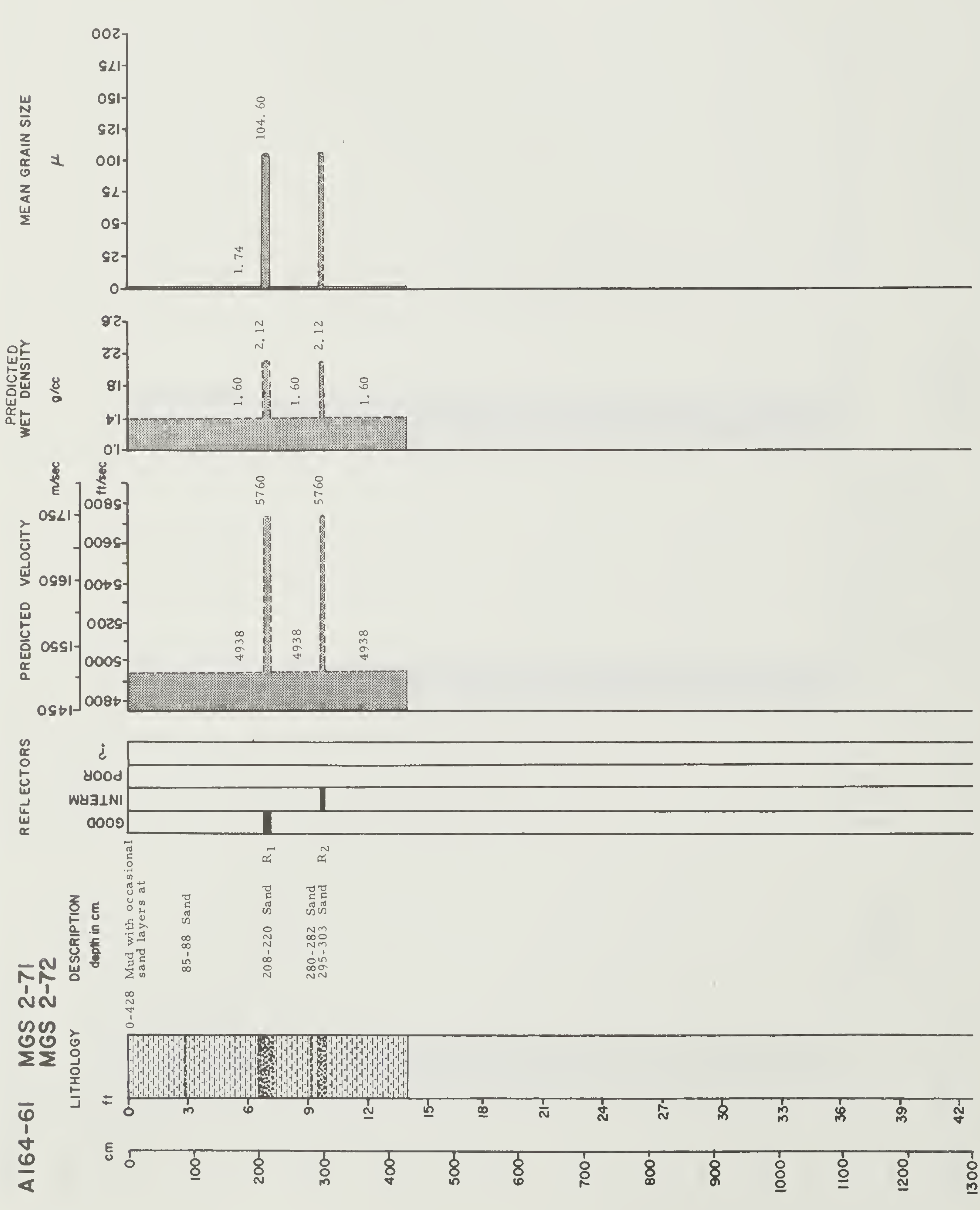


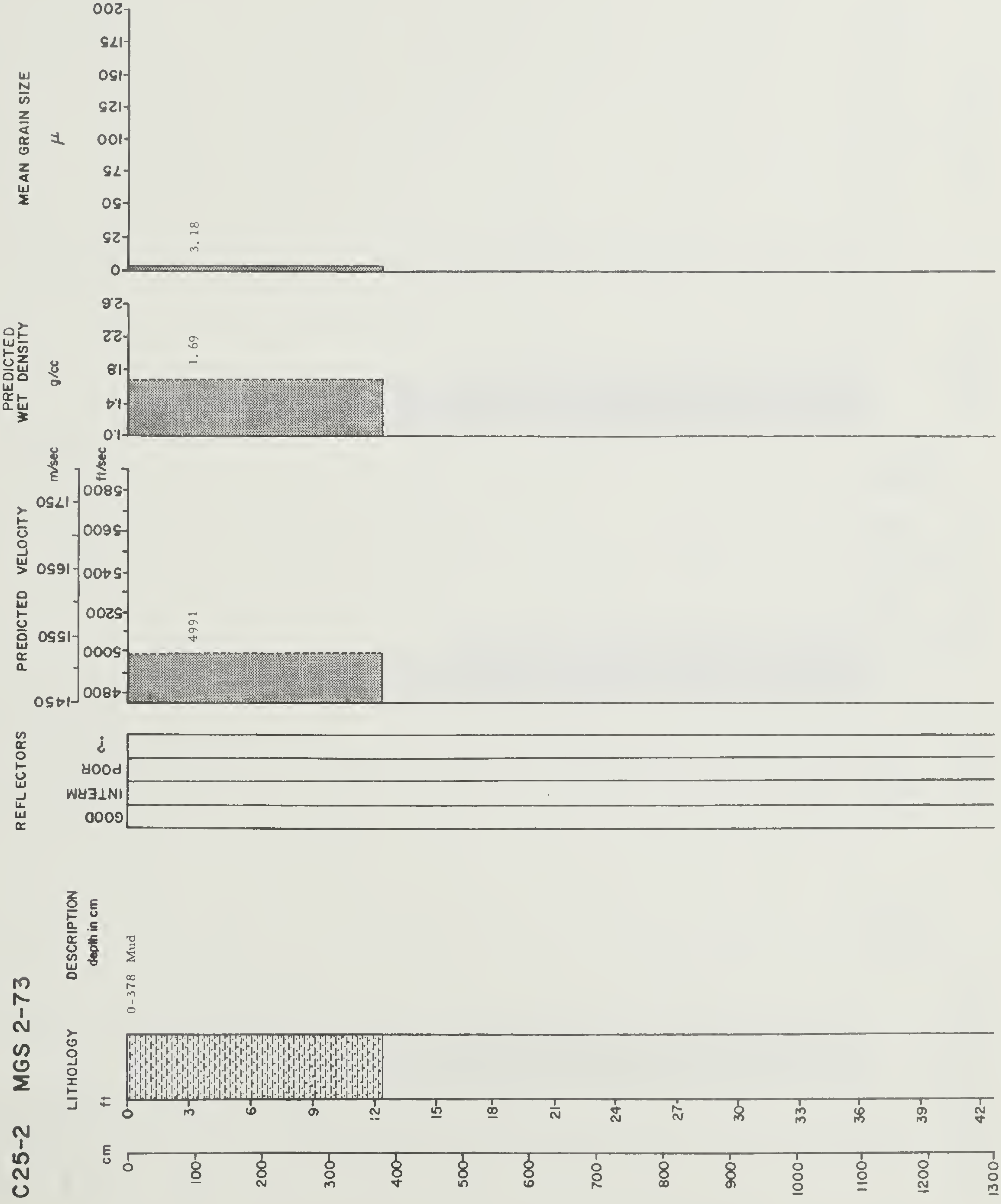

V23-145 MGS 2-67
LITHOLOGY
DESCRIPTION depth in cm
0-118 Mud
118-127 Graded unit mud to sand
124-127 Sand
127-132 Graded unit mud to sand
132-148 Graded unit mud to sand
148-870 Clay with silt and sand layers at
229-230 Silt
426-428 Sand
431-432 Silt
712-713 Sand
R3
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4951
5833
4922
5696
4922
PREDICTED WET DENSITY
g/cc
1.63
2.14
1.55
2.10
1.55
MEAN GRAIN SIZE
μ
2.09
130.00
85.70
1.30
cm
ft

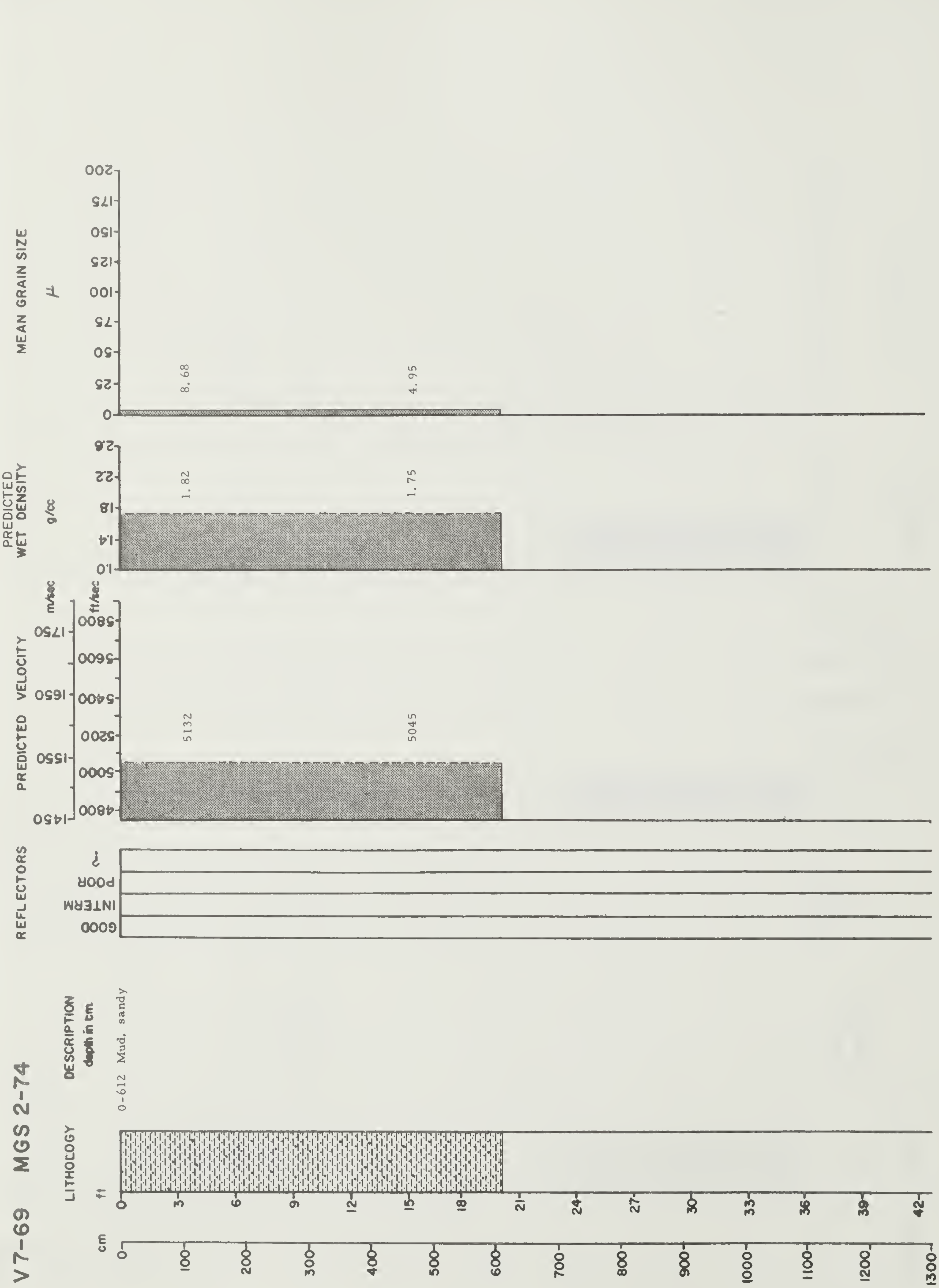

A185-63 MGS 2-68
LITHOLOGY
DESCRIPTION depth in cm
0-490 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4945
4947
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.61
1.62
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.92
1.98
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

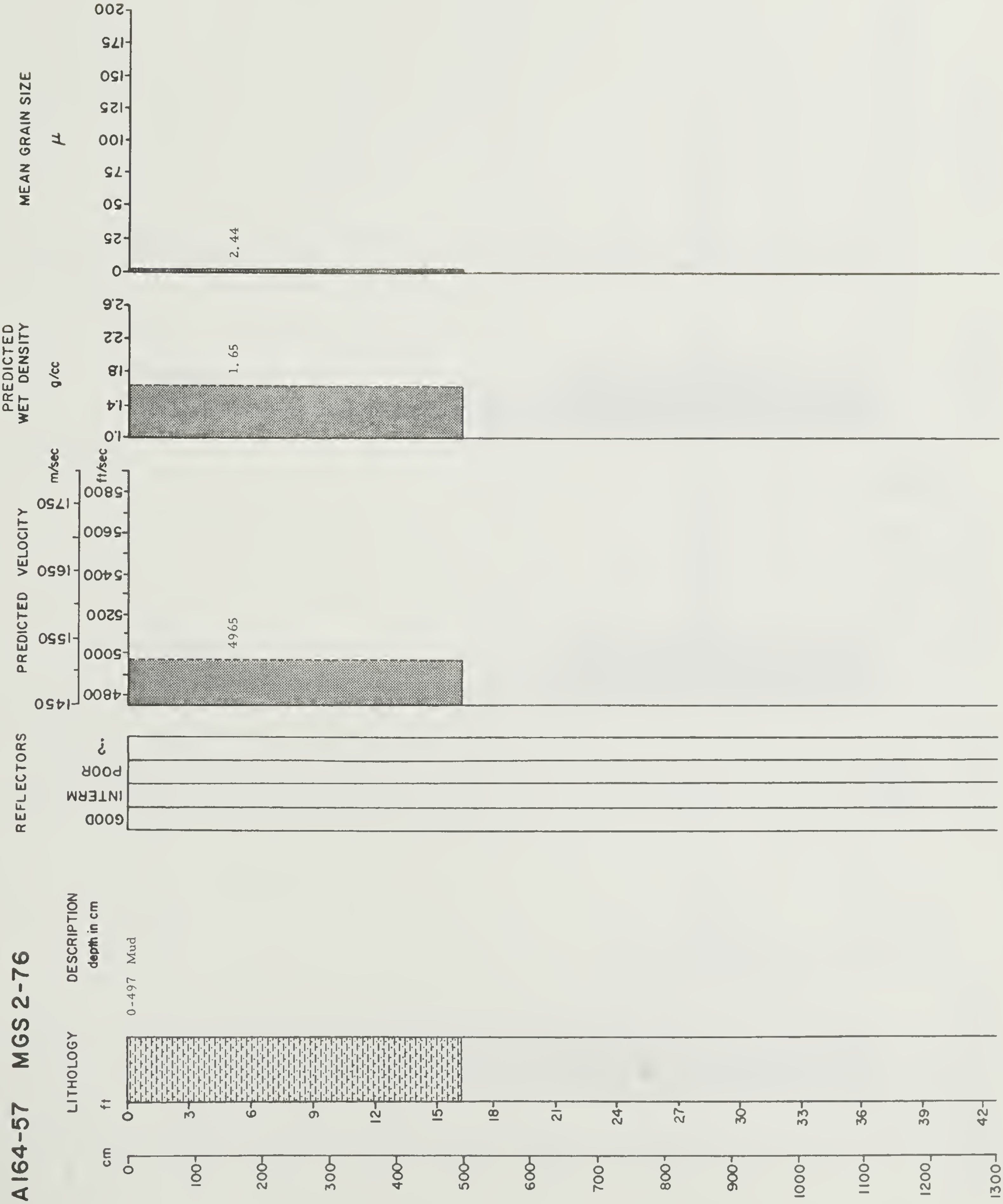

V15-213 MGS 2-69
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-526 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5011
4947
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.71
1.62
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
3.65
1.98
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

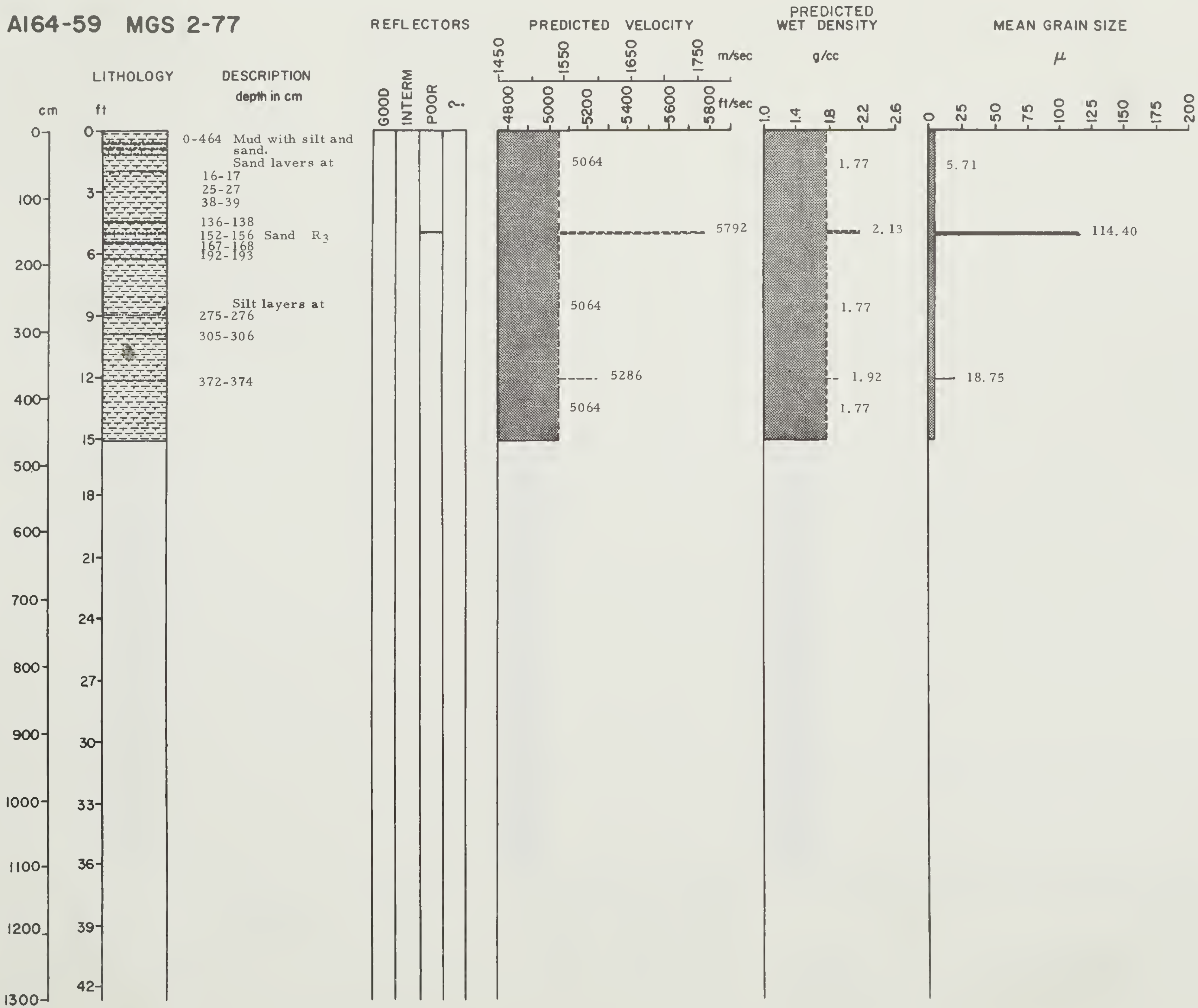

V13-1 MGS 2-70
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
LITHOLOGY
DESCRIPTION
depth in cm
0-980 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
1450
1550
1650
1750
ft/sec
4800
5000
5200
5400
5600
5800
4999
4976
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.70
1.67
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
3.39
2.77

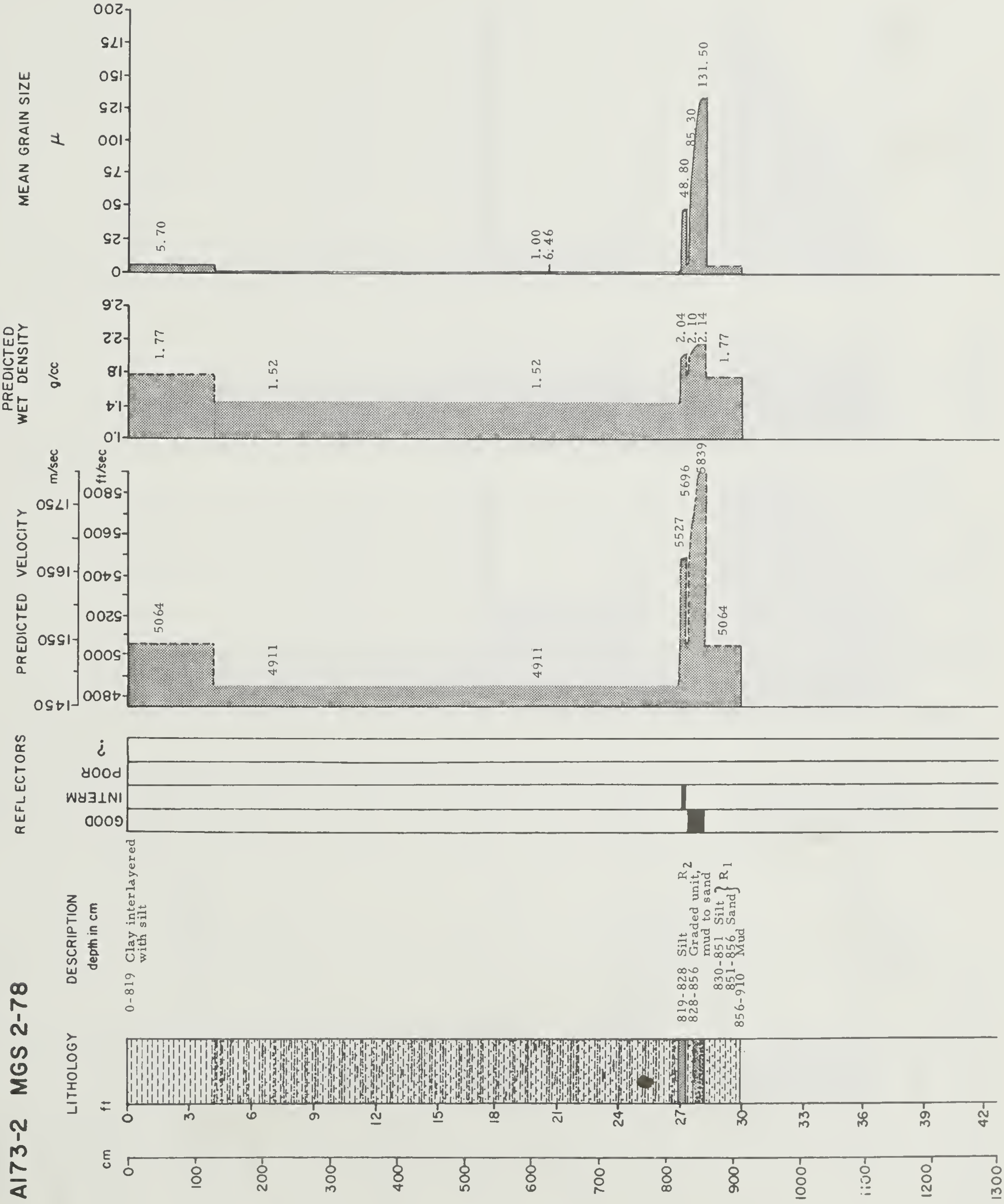

A164-61 MGS 2-71
MGS 2-72
LITHOLOGY
DESCRIPTION
depth in cm
0-428 Mud with occasional sand layers at
85-88 Sand
208-220 Sand
280-282 Sand
295-303 Sand
R1
R2
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4938
5760
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.60
2.12
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
1.74
104.60
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42


C25-2 MGS 2-73
LITHOLOGY
DESCRIPTION
depth in cm
0-378 Mud
cm
ft
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4991
PREDICTED WET DENSITY
g/cc
1.69
MEAN GRAIN SIZE
μ
3.18

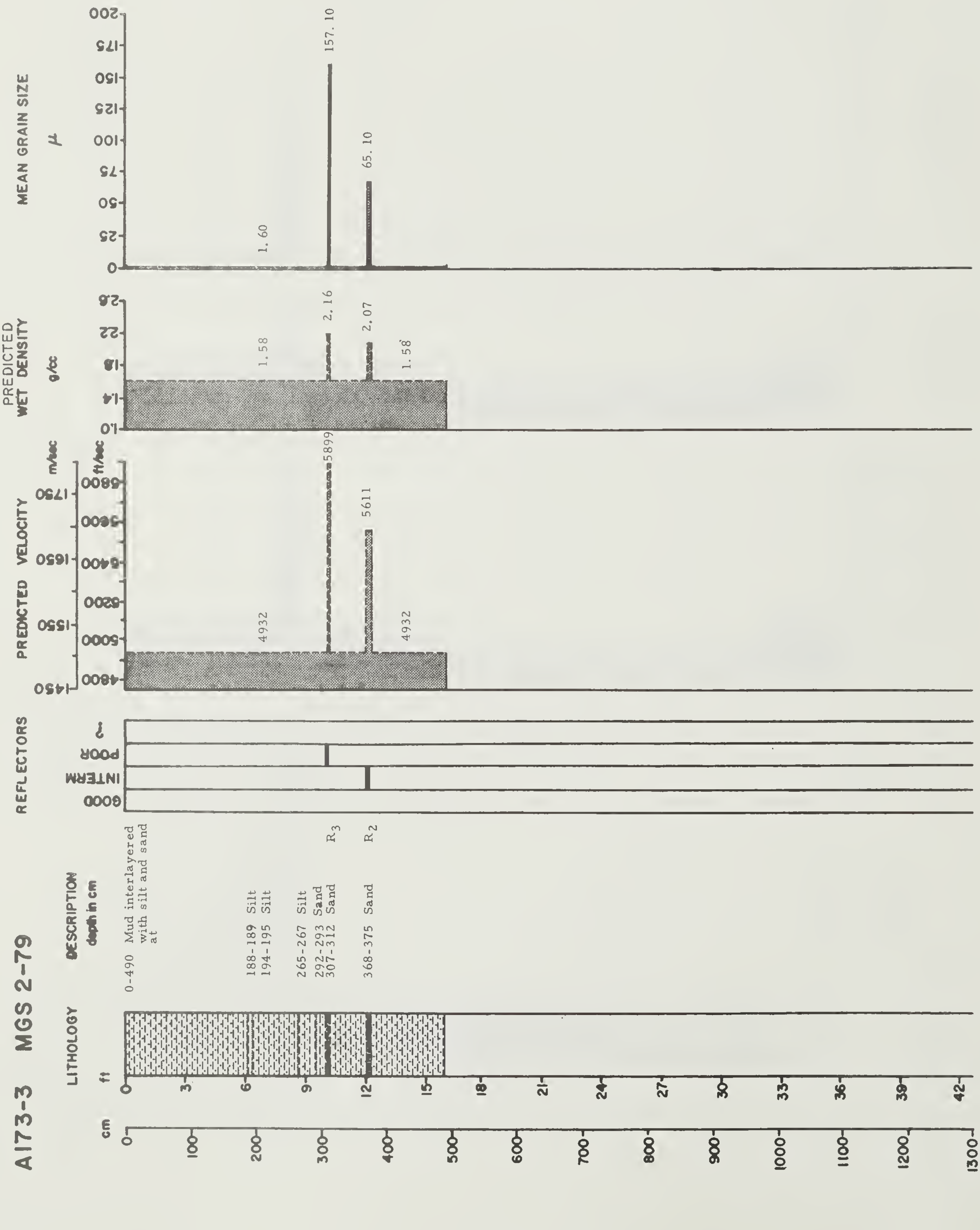

V7-69 MGS 2-74
LITHOLOGY
DESCRIPTION depth in cm
0-612 Mud, sandy
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5132
5045
PREDICTED WET DENSITY
g/cc
1.82
1.75
MEAN GRAIN SIZE
μ
8.68
4.95
cm
ft

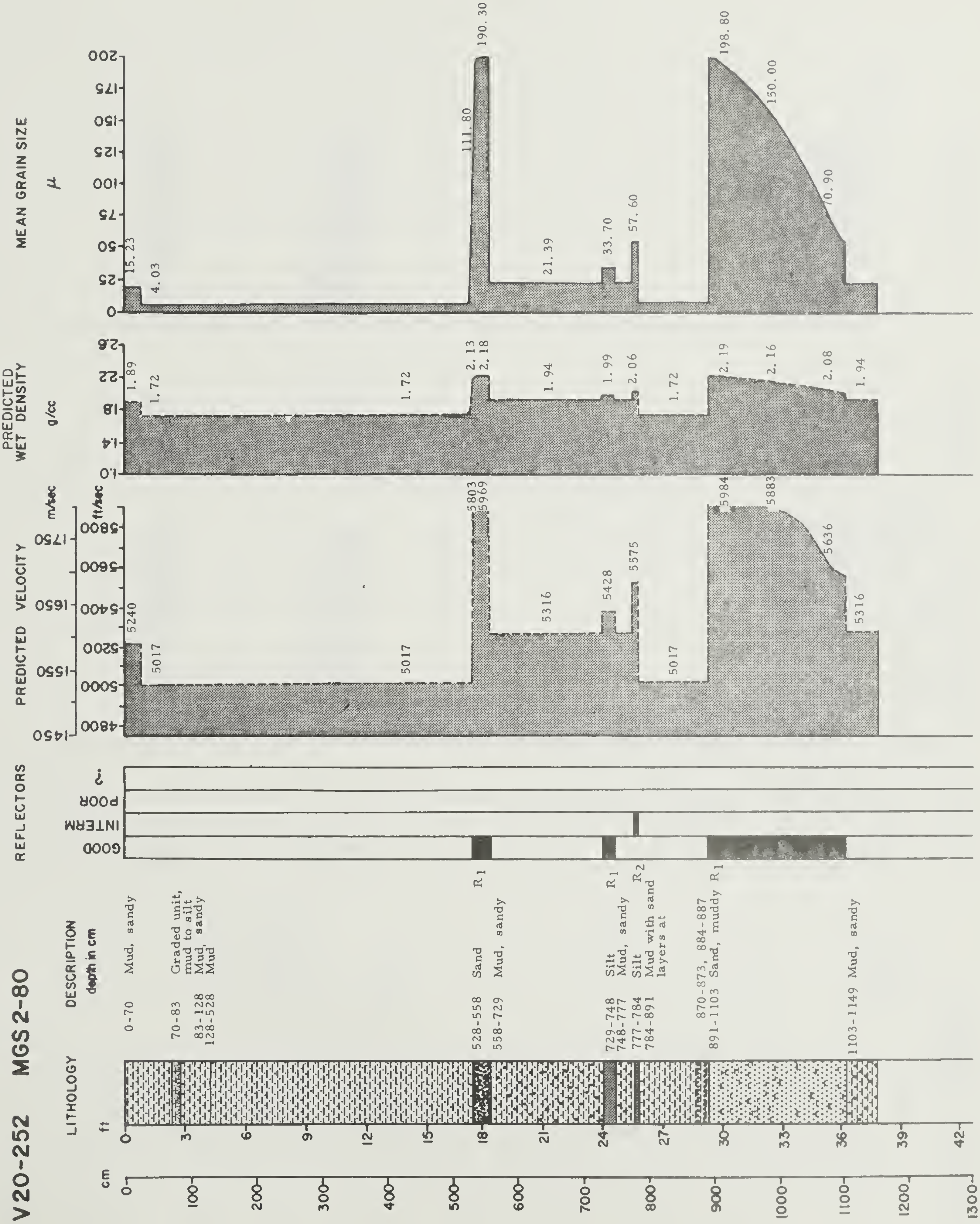

A164-57 MGS 2-76
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-497 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
4965
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.65
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
2.44
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

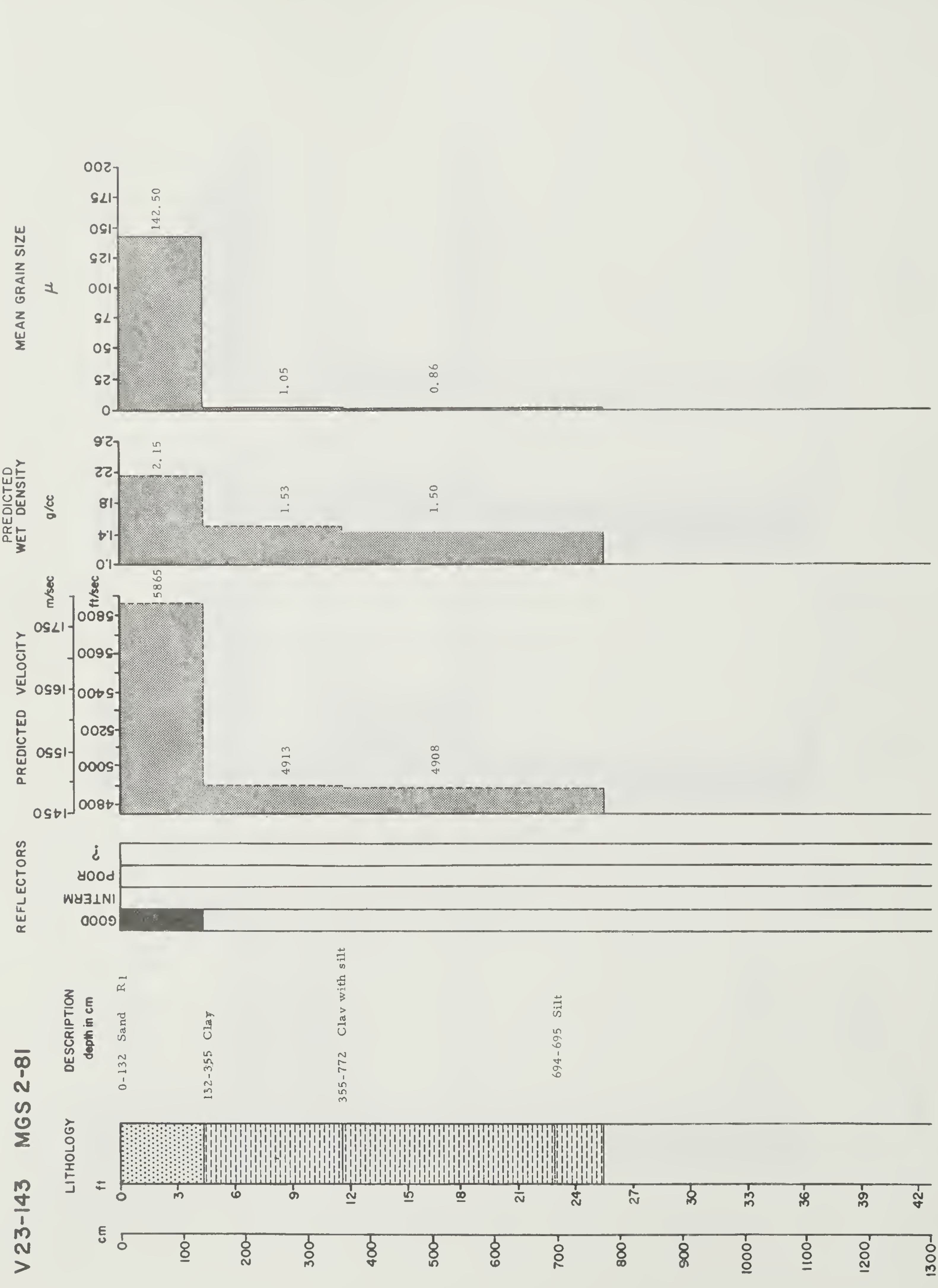

AI64-59 MGS 2-77
LITHOLOGY
DESCRIPTION
depth in cm
cm
ft
0-464 Mud with silt and sand.
Sand layers at
16-17
25-27
38-39
136-138
152-156 Sand R3
167-168
192-193
Silt layers at
275-276
305-306
372-374
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
1450
1550
1650
1750
4800
5000
5200
5400
5600
5800
5064
5792
5064
5286
5064
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
1.77
2.13
1.77
1.92
1.77
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
5.71
114.40
18.75
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42

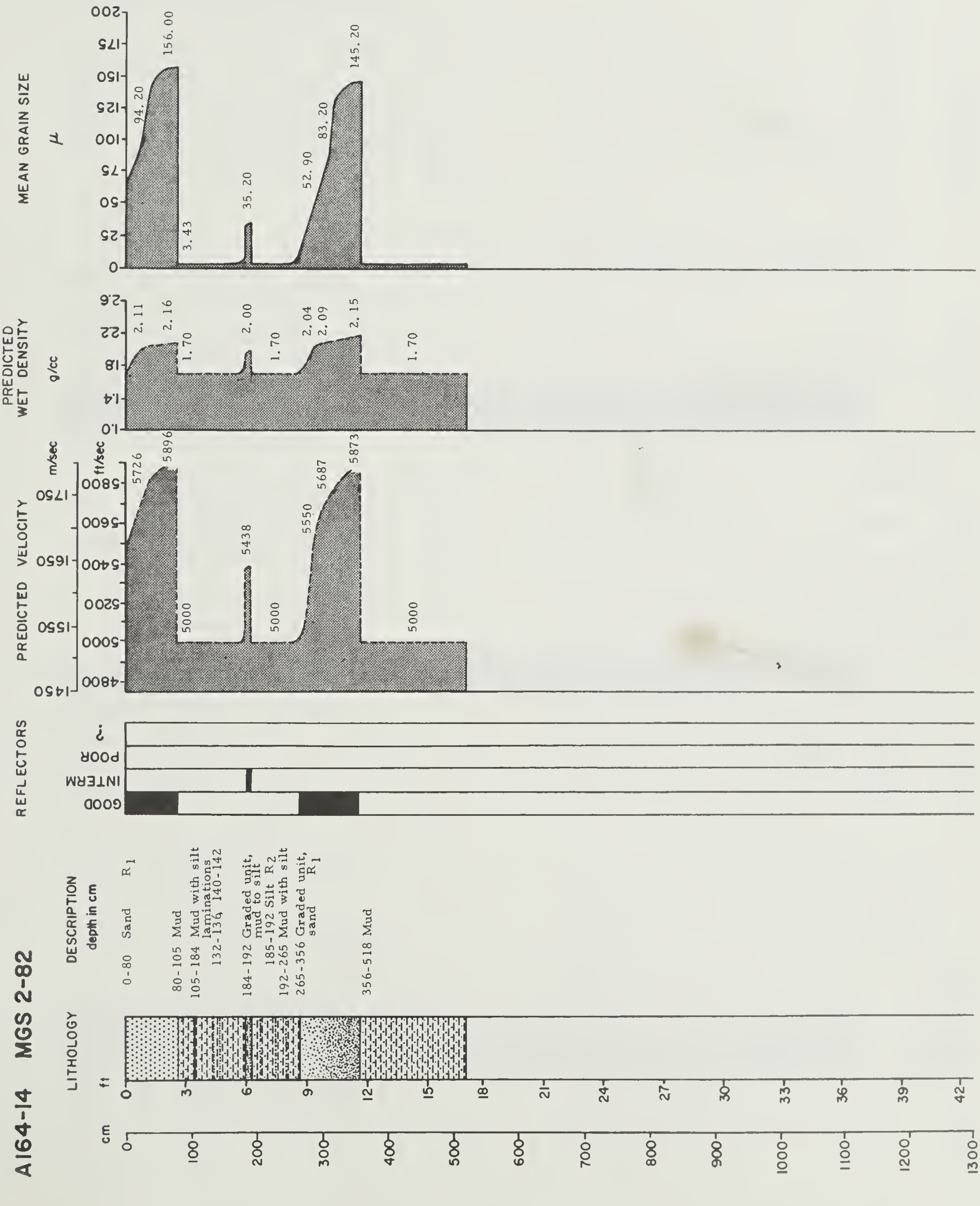


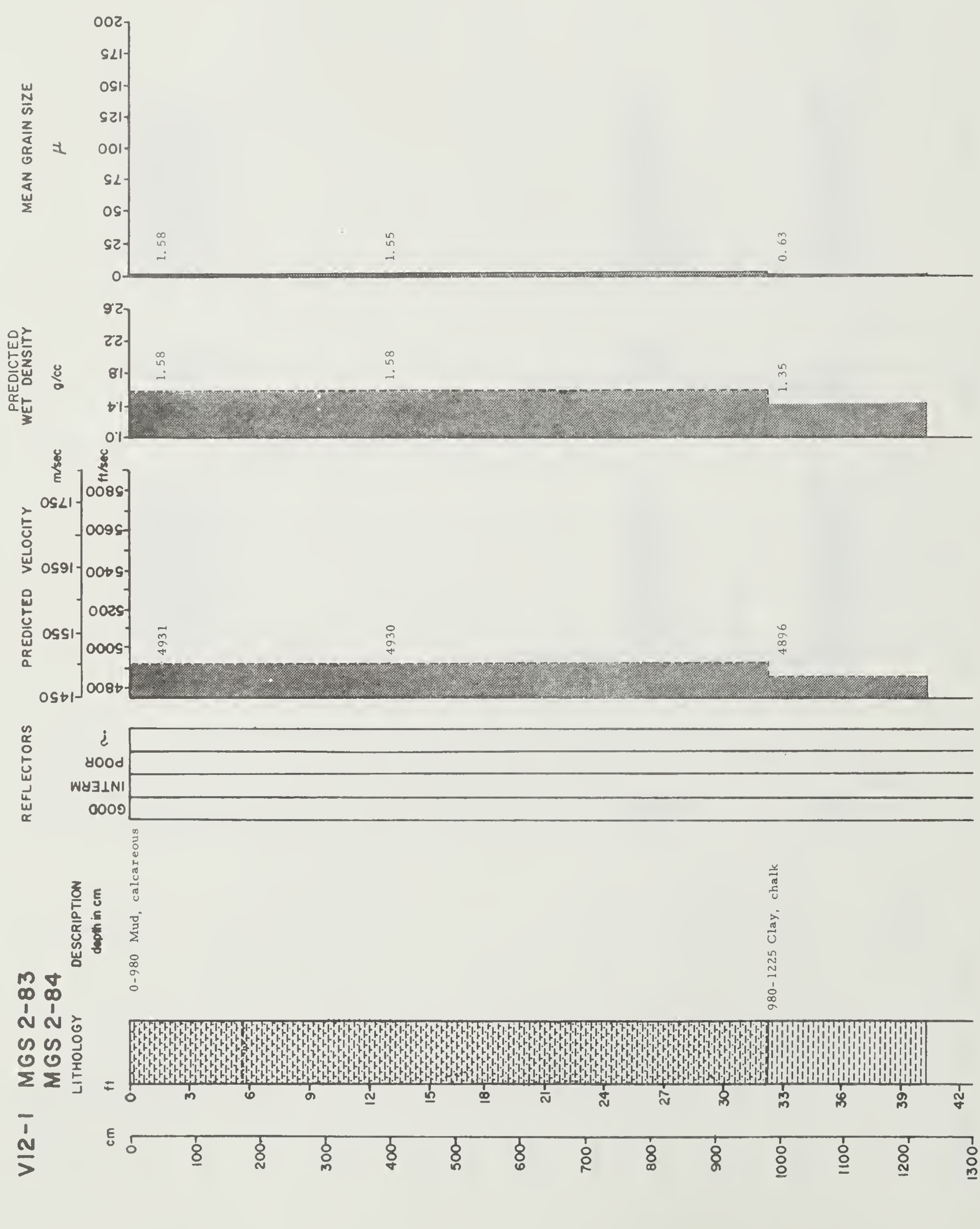
AI73-2 MGS 2-78
cm
ft
LITHOLOGY
DESCRIPTION
depth in cm
0-819 Clay interlayered with silt
819-828 Silt R 2
828-856 Graded unit, mud to sand
830-851 Silt
851-856 Sand } R 1
856-910 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5064
4911
4911
5527
5696
5839
5064
PREDICTED WET DENSITY
g/cc
1.77
1.52
1.52
2.04
2.10
2.14
1.77
MEAN GRAIN SIZE
μ
5.70
1.00
6.46
48.80
85.30
131.50


A173-3 MGS 2-79
LITHOLOGY
DESCRIPTION depth in cm
0-490 Mud interlayered with silt and sand at
188-189 Silt
194-195 Silt
265-267 Silt
292-293 Sand
307-312 Sand
368-375 Sand
R3
R2
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4932
5899
5611
4932
PREDICTED WET DENSITY
g/cc
1.58
2.16
2.07
1.58
MEAN GRAIN SIZE
μ
1.60
157.10
65.10
cm
ft


V20-252 MGS 2-80
LITHOLOGY
DESCRIPTION
depth in cm
0-70 Mud, sandy
70-83 Graded unit, mud to silt
83-128 Mud, sandy
128-528 Mud
528-558 Sand
558-729 Mud, sandy
729-748 Silt
748-777 Mud, sandy
777-784 Silt
784-891 Mud with sand layers at 870-873, 884-887
891-1103 Sand, muddy
1103-1149 Mud, sandy
R 1
R 1
R 2
R 1
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5240
5017
5017
5803
5969
5316
5428
5575
5017
5984
5883
5636
5316
PREDICTED WET DENSITY
g/cc
1.89
1.72
1.72
2.13
2.18
1.94
1.99
2.06
1.72
2.19
2.16
2.08
1.94
MEAN GRAIN SIZE
μ
15.23
4.03
111.80
190.30
21.39
33.70
57.60
198.80
150.00
70.90
cm
ft


V23-143 MGS 2-81
cm
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
ft
0
3
6
9
12
15
18
21
24
27
30
33
36
39
42
LITHOLOGY
DESCRIPTION
depth in cm
0-132 Sand R1
132-355 Clay
355-772 Clay with silt
694-695 Silt
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
1450
1550
1650
1750
ft/sec
4800
5000
5200
5400
5600
5800
5865
4913
4908
PREDICTED WET DENSITY
g/cc
1.0
1.4
1.8
2.2
2.6
2.15
1.53
1.50
MEAN GRAIN SIZE
μ
0
25
50
75
100
125
150
175
200
142.50
1.05
0.86


A164-14 MGS 2-82
LITHOLOGY
DESCRIPTION
depth in cm
0-80 Sand R1
80-105 Mud
105-184 Mud with silt laminations
132-136, 140-142
184-192 Graded unit, mud to silt
185-192 Silt R2
192-265 Mud with silt
265-356 Graded unit, sand R1
356-518 Mud
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
5726
5896
5438
5550
5687
5873
5000
5000
5000
PREDICTED WET DENSITY
g/cc
2.11
2.16
1.70
2.00
1.70
2.04
2.09
2.15
1.70
MEAN GRAIN SIZE
μ
94.20
156.00
3.43
35.20
52.90
83.20
145.20
cm
ft


VI2-1 MGS 2-83
MGS 2-84
LITHOLOGY
ft
cm
DESCRIPTION
depth in cm
0-980 Mud, calcareous
980-1225 Clay, chalk
REFLECTORS
GOOD
INTERM
POOR
?
PREDICTED VELOCITY
m/sec
ft/sec
4931
4930
4896
PREDICTED WET DENSITY
g/cc
1.58
1.58
1.35
MEAN GRAIN SIZE
μ
1.58
1.55
0.63

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Texture, predictions of sound velocity and wet density, along with position and thickness of potential sound reflectors in 66 piston cores are logged and described. Data have been matched to locations of acoustic stations completed under the Marine Geophysical Survey Project, U.S. Naval Oceanographic Office. Tentative statements are made concerning overall reflectivity of the Hatteras Abyssal Plain. Level areas of the northern half of the Plain should be characterized by very good sound reflection, central areas - moderate reflection, southwest corner good reflection, and southeast corner moderate reflection.

Results suggest that effective use of the seafloor as an acoustic interface requires collaboration of acousticians, marine geologists and sedimentologists.

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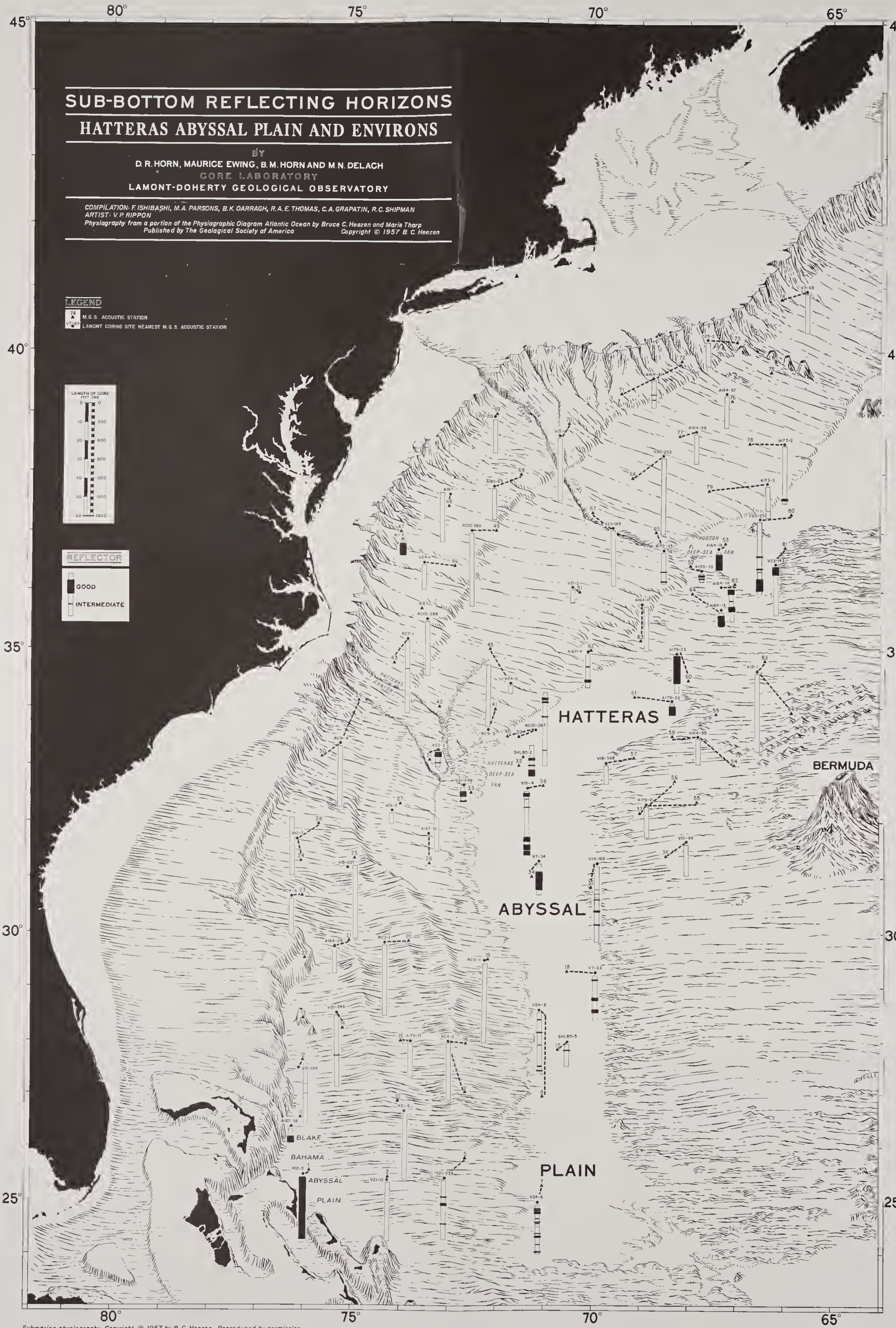

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FIGURE 4