

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

**Cape Hatteras to the Mid-Atlantic Ridge --
Demultiplexing and Archiving
A Unique Multichannel Seismic Reflection Data Set**

by

W.F. Agena¹, D.R. Hutchinson², M.W. Lee¹, and H.L. Oliver¹

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¹ U.S. Geological Survey, Box 25046, MS 960, DFC, Denver, CO 80225

² U.S. Geological Survey, Woods Hole, MA 02543

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ABSTRACT

We have demultiplexed and compressed data from a 3400-km-long multichannel seismic-reflection line collected between Cape Hatteras to the Mid-Atlantic Ridge in a continuing effort to reduce the amount of data loss due to old, deteriorating magnetic tapes.

INTRODUCTION

In 1974, Digicon Inc. recorded a 3400 km-long multichannel seismic-reflection profile (Line 1) extending from Cape Hatteras to the rift valley of the Mid-Atlantic Ridge (Figure 1). Also acquired simultaneously were two small lines totalling 80 km (Lines A and B), connecting the main line to two coastal wells in North Carolina (Figure 2.) Jointly funded by the U.S. Geological Survey (USGS) and the National Science Foundation's Deep Sea Drilling Project (DSDP), the experiment was part of the International Phase of Ocean Drilling (IPOD). The data were recorded from the marine vessel Gulf Seal using a Texas Instruments DFS III recording system. A tuned airgun array totaling 1,700 in.³ was used as the seismic source and a streamer with 48-non-linearly spaced hydrophone groups was used to detect the returning seismic signals. Shotpoint locations, generally spaced every 50 meters, are shown in Figures 1 and 2. A summary of the shooting and recording parameters is shown in Table 1. Segments of the western half of the data totalling approximately 1,520 km, or just under half of the line, were processed by Geophysical Services, Inc. (GSI) in the spring of 1975. A geologic overview of this line can be found in Grow and Markl (1977). Copies of the demultiplexed field tapes are currently stored at the USGS seismic data processing center in Denver, Colorado.

DEMULTIPLEXING AND COMPRESSION

Testing revealed that the data on our original field tapes were deteriorating. In order to prevent further loss of data, we demultiplexed the original 631 field tapes and transferred the output to 183 new magnetic tapes at 6250 bpi in SEG-Y (32-bit IBM floating-point) format, an industry accepted standard (Barry and others, 1975). Our efforts yielded a data compression ratio of more than 3 to 1. Although there were segments on some of the field tapes where the magnetic oxide had actually fallen off the tapes, we preserved as much of the data as possible. Close monitoring of the processing system during demultiplexing enabled the computer operators to prevent any further data loss (or misreading of data) due to parity read errors. When excessive parity errors were found on input tapes, operators either passed the tapes through a tape cleaner or, in more severe cases, made a bit-for-bit tape copy. Less than .2 percent of the original data could not be recovered during demultiplexing. Shown in appendix I are the slot numbers, shotpoint and field file ranges of all the output tapes. Slot numbers refer to storage locations numbers within the Denver tape library and reel numbers refer to the database reference number of our processing system. Observer's notes are also archived at the Denver processing center and can be obtained from the authors.

In order to help users better locate points of interest along the IPOD lines, we have included displays of the near offset traces. Figure 3 includes a near trace from every shot for line A and figures 4-22 include near traces from every 4th shot of lines B and 1. Because of the small scales of these displays, the amplitudes of the near traces are modulated to enhance visual clarity. Details of how we apply the amplitude modulation are given in Lee et al.(1988).

REFERENCES

- Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats: Geophysics, v. 40, p. 344-352.
- Grow, J.A., and Markl, R.G., 1977, IPOD-USGS multichannel seismic reflection profile from Cape Hatteras to the Mid-Atlantic Ridge: Geology, v. 5, p. 625-630.
- Lee, M.W., Agena, W.F., and Hutchinson, D.R., 1988, Processing of GLIMPCE multichannel Seismic Data: U.S. Geological Survey Open-File Report 88-225, 46 p.

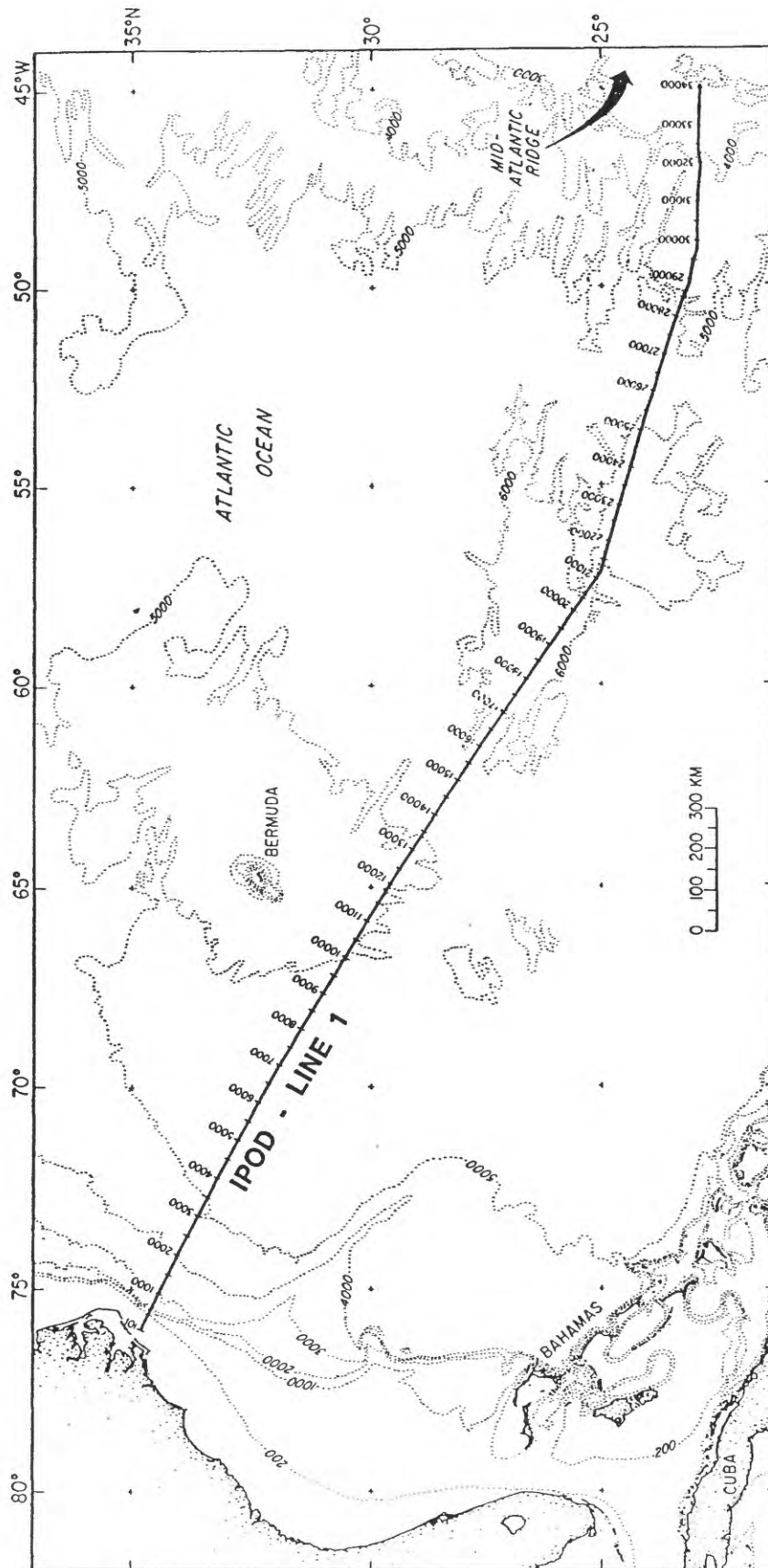


Figure 1 --- Shotpoint Map of Survey Area (Main IPOD line)

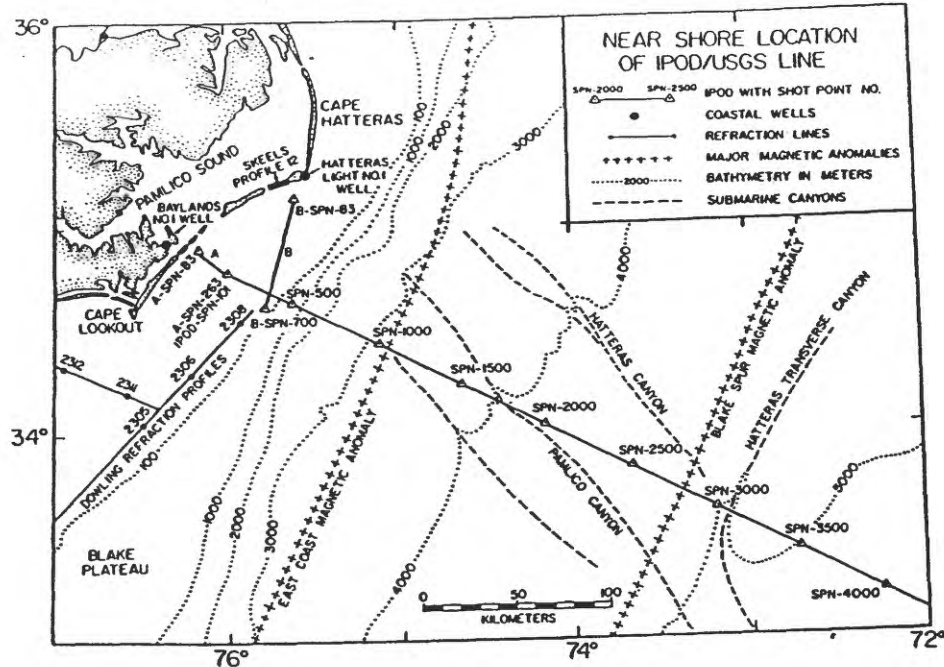


Figure 2 --- Shotpoint Map of IPOD close to Cape Hatteras showing lines A and B shot to tie the main IPOD line closer to wells (From Grow and Markl, 1977).

DFS-III	Instrument
346 m	Near Offset Distance
50 m	Spacing between center of traces 48 through 25
75 m	Spacing between center of trace 25 and trace 24
100 m	Spacing between center of traces 24 through 1
4 ms	Sample Rate
10-12 s	Recording length
36	Fold Coverage
9 m	Gun Depth
1700 in. ³	Displacement of Airgun Array
8-62 Hz	Recording Filter (with slopes of 18dB/octave)

Table 1 --- Field parameters used in survey

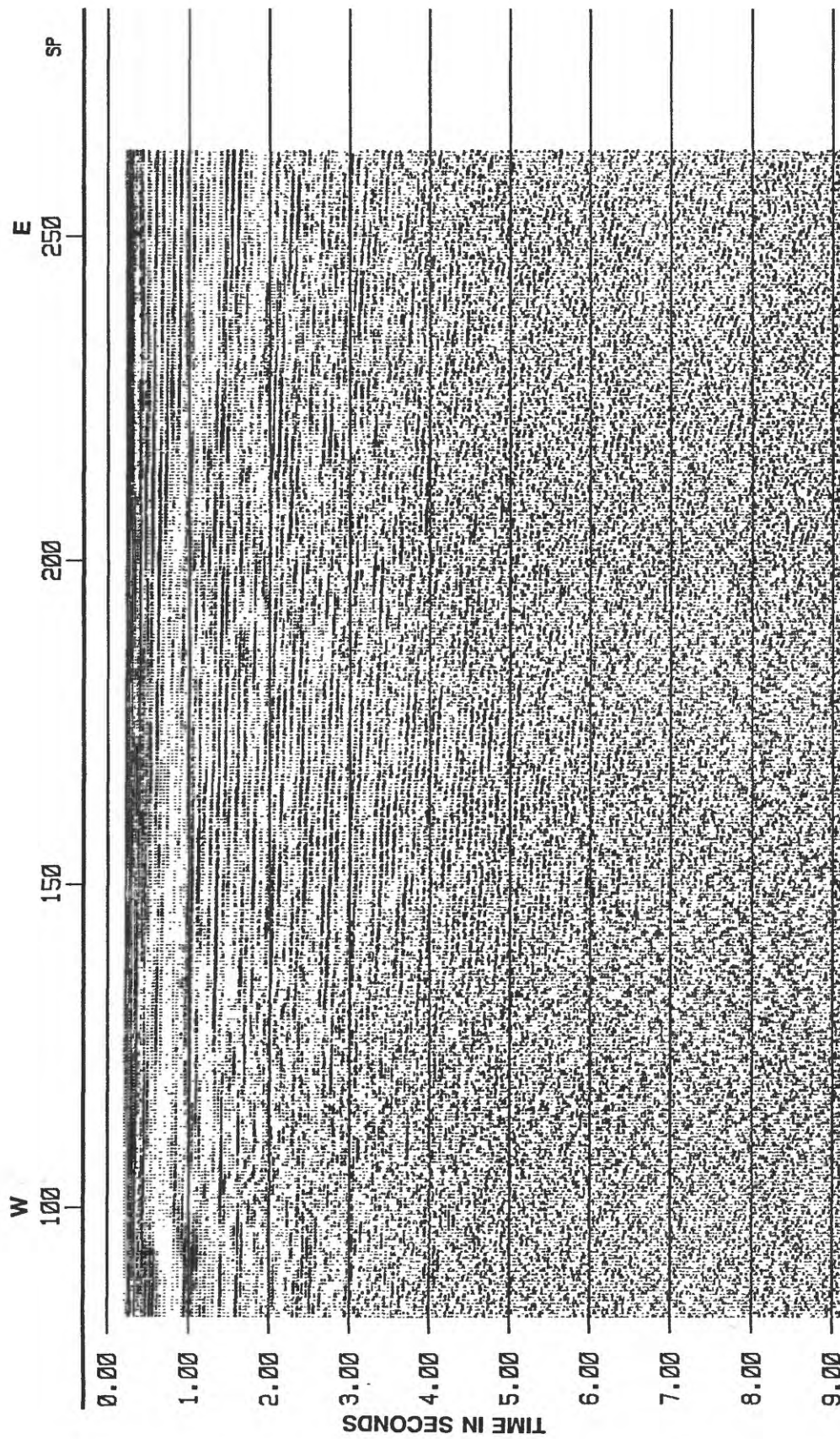


Figure 3 --- IPOD Line "A"

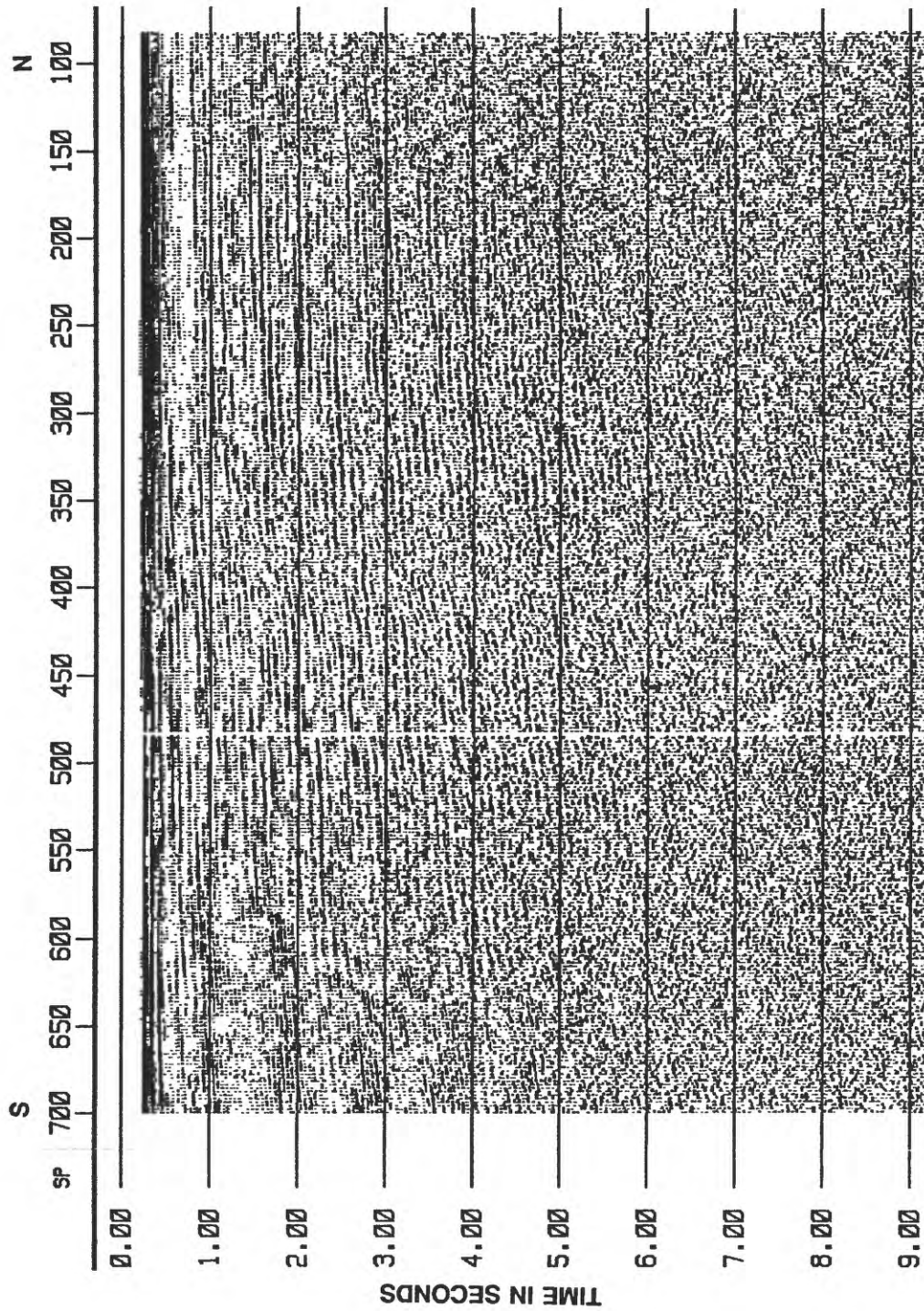


Figure 4 --- IPOD Line "B"

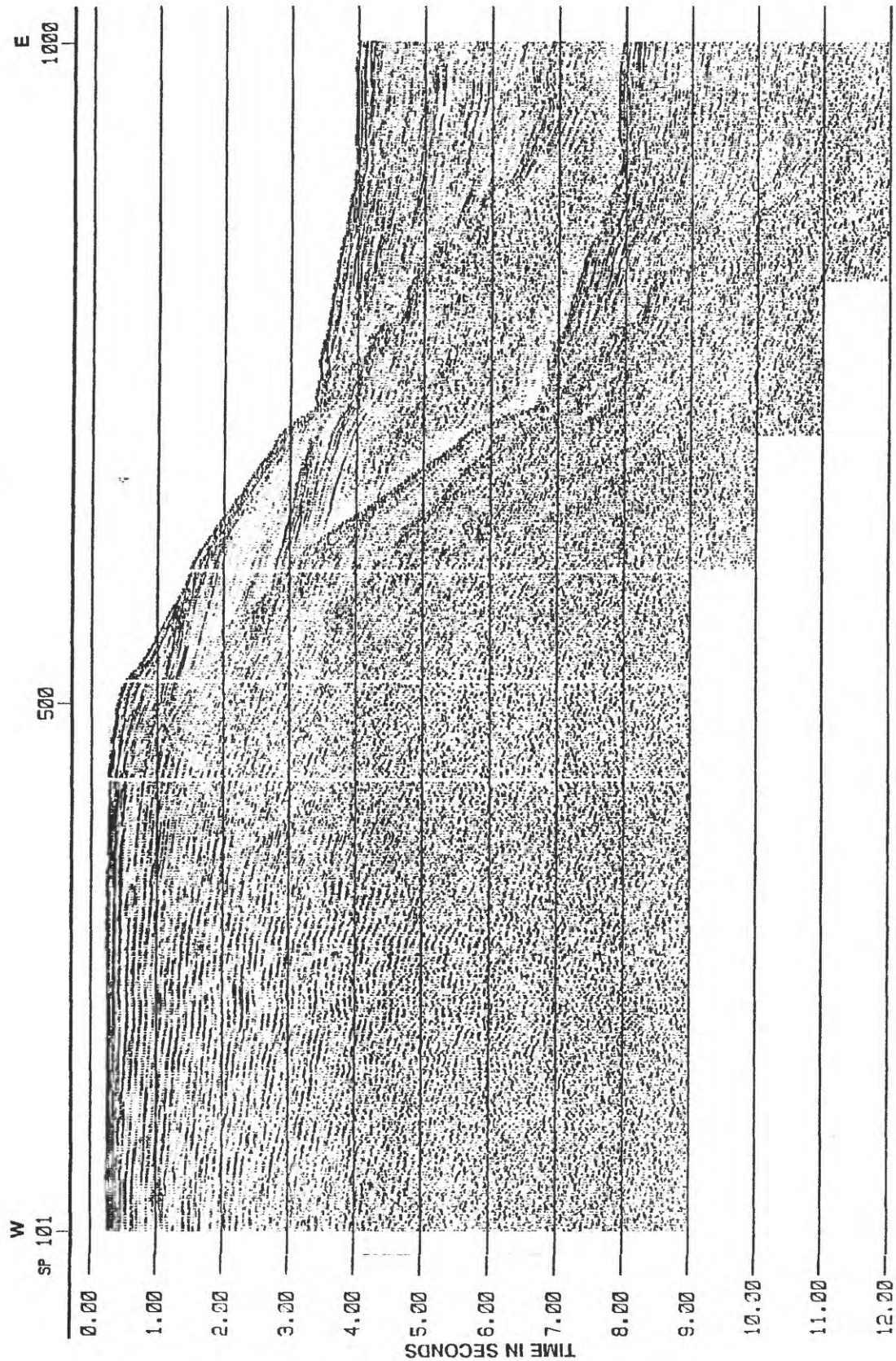


Figure 5 --- IPOD Line "1" Shotpoints 101-1000

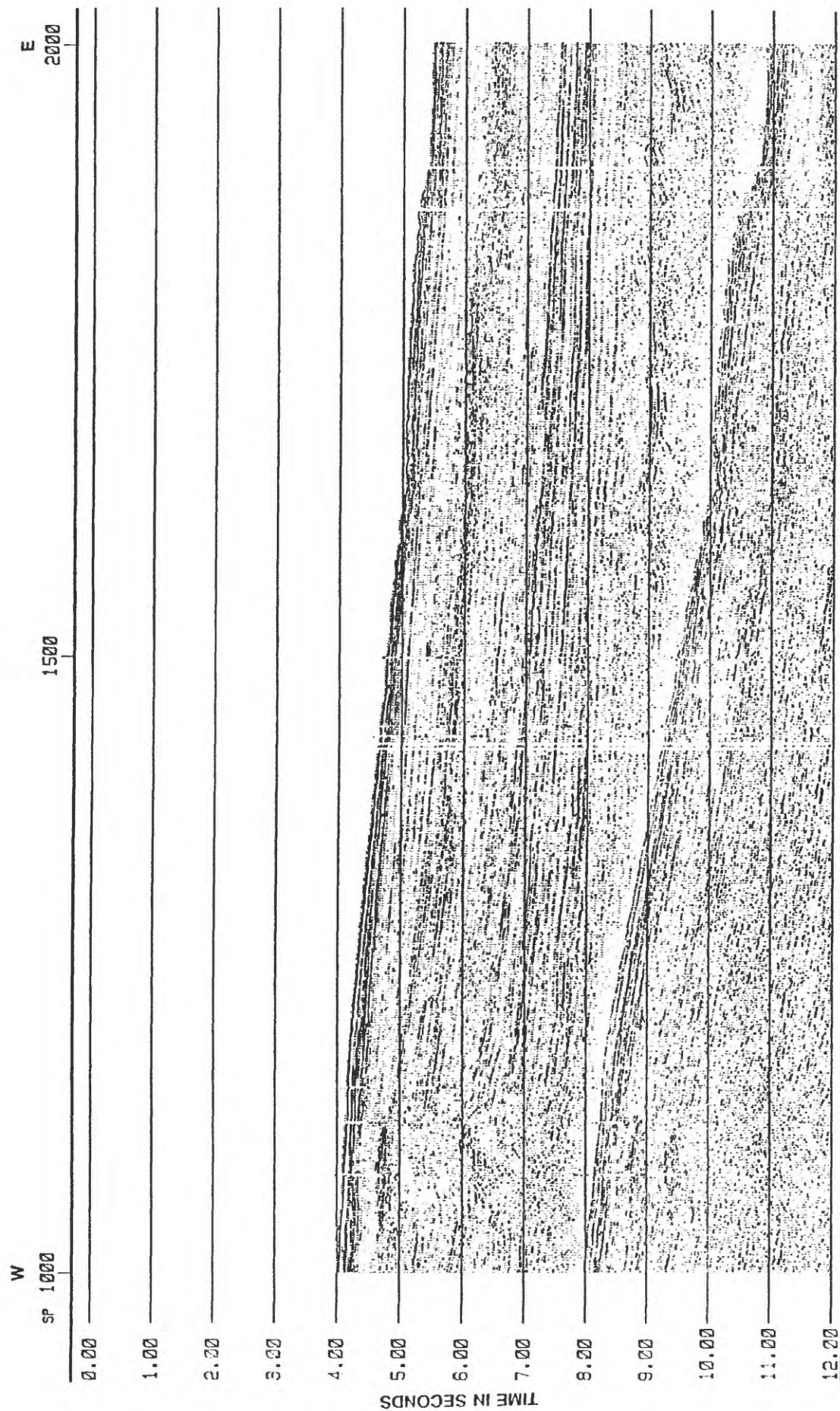


Figure 6 --- IPOD Line "1" Shotpoints 1000-2000

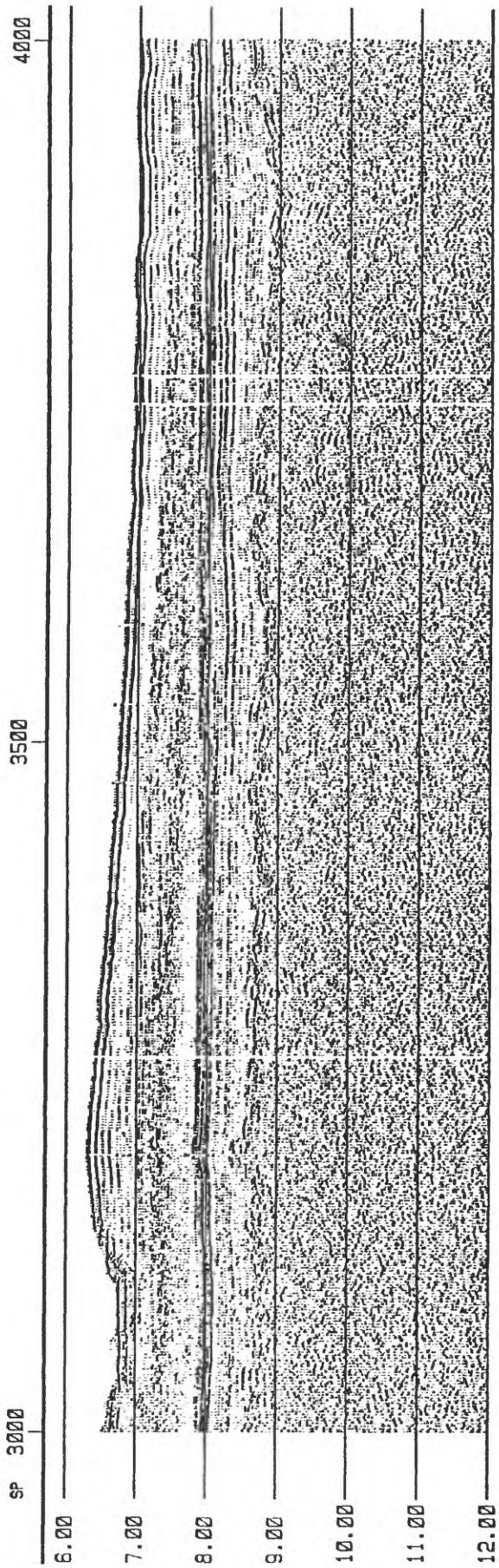
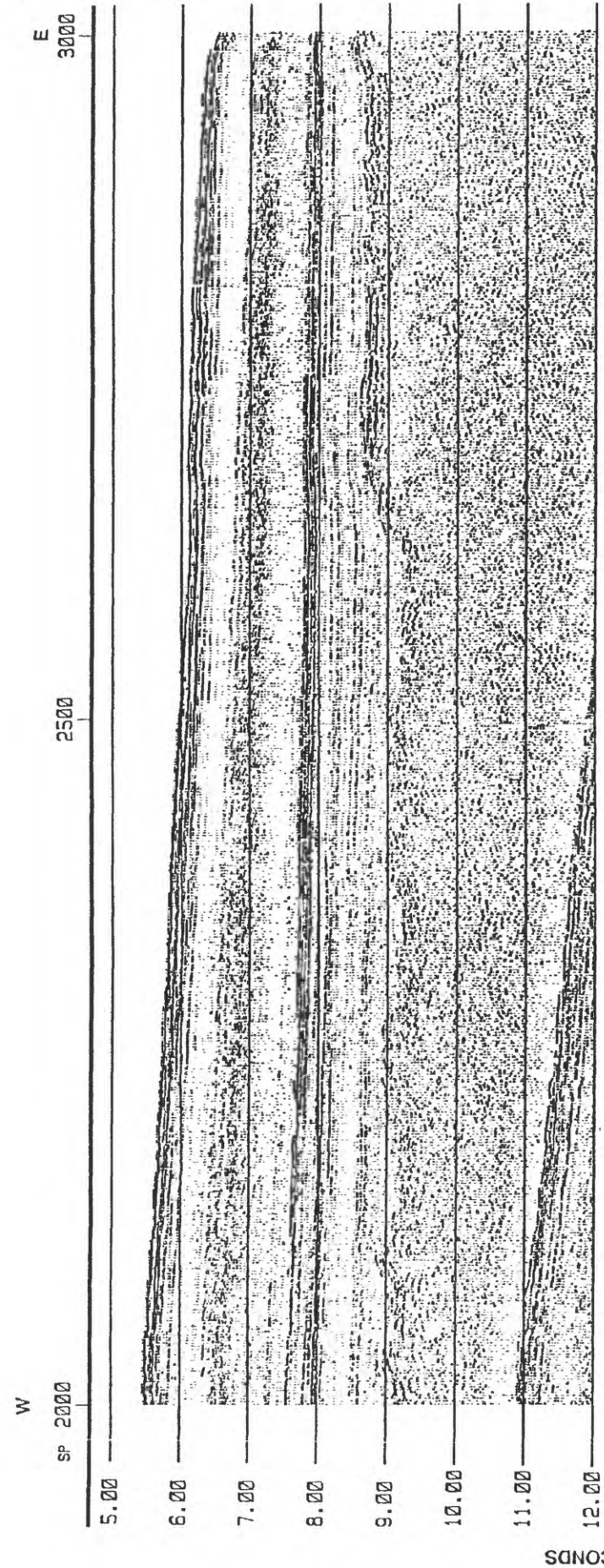


Figure 7 --- IPOD Line "1" Shotpoints 2000-4000

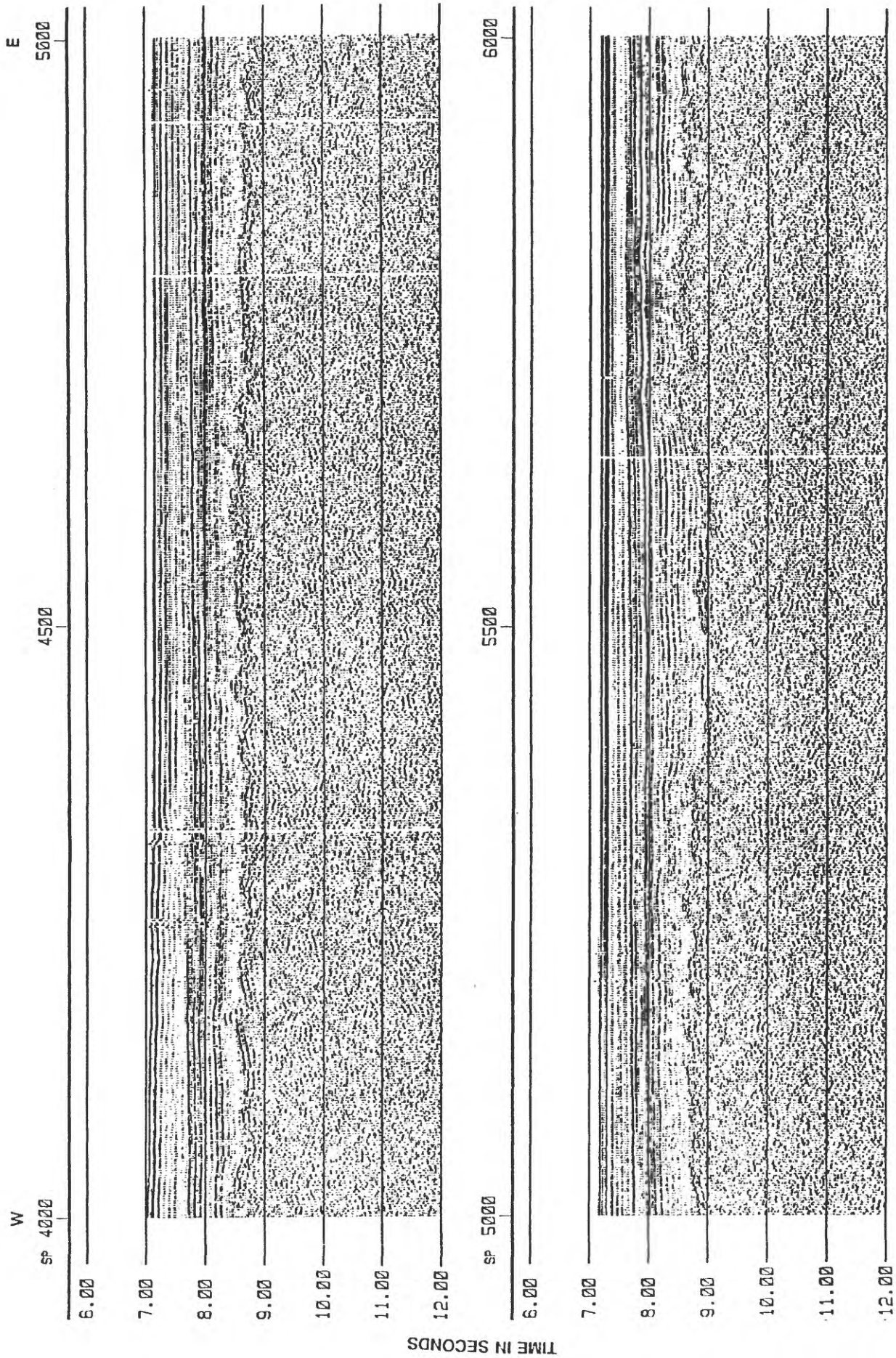


Figure 8 --- IPOD Line "1" Shotpoints 4000-6000

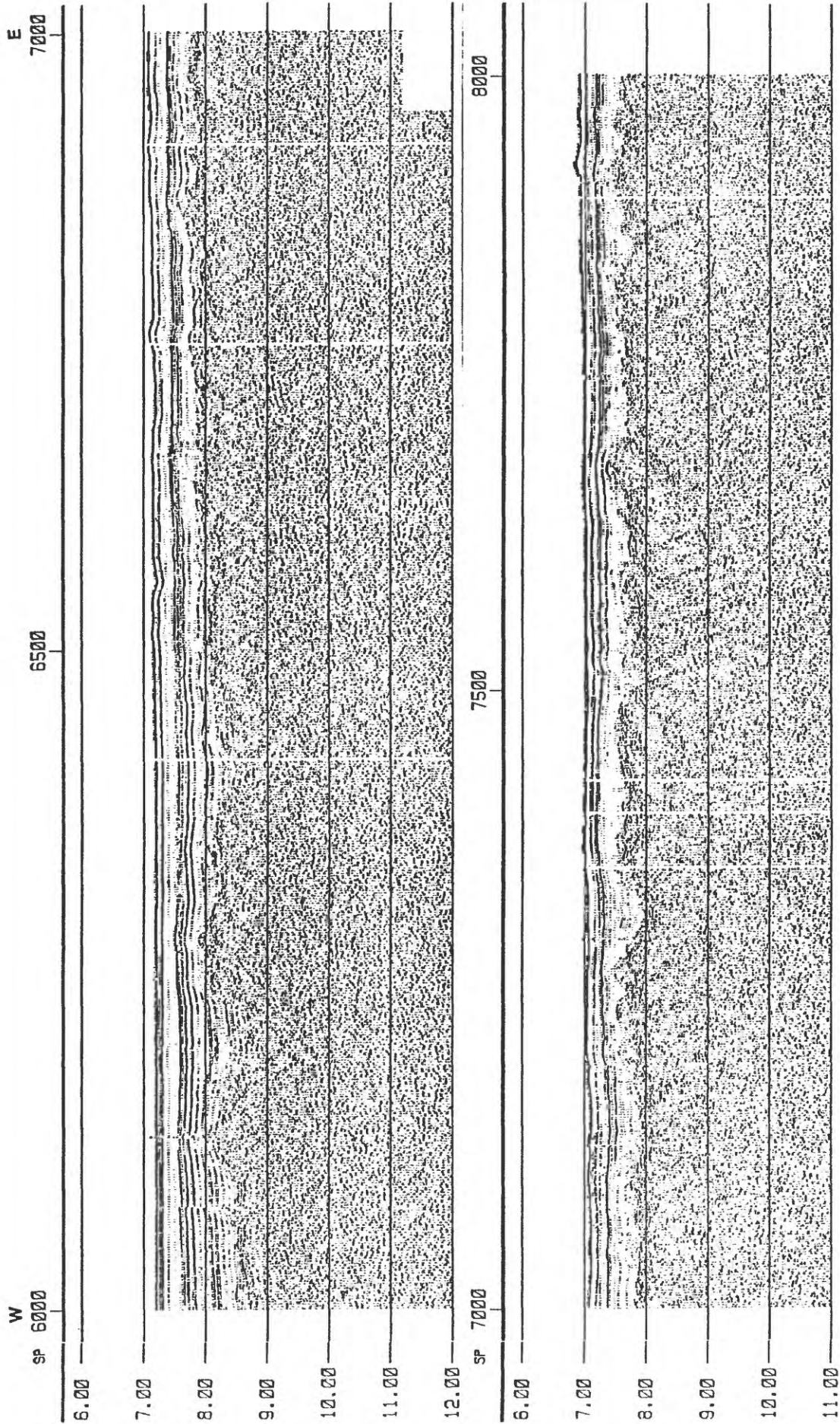


Figure 9 --- IPOD Line "1" Shotpoints 6000-8000

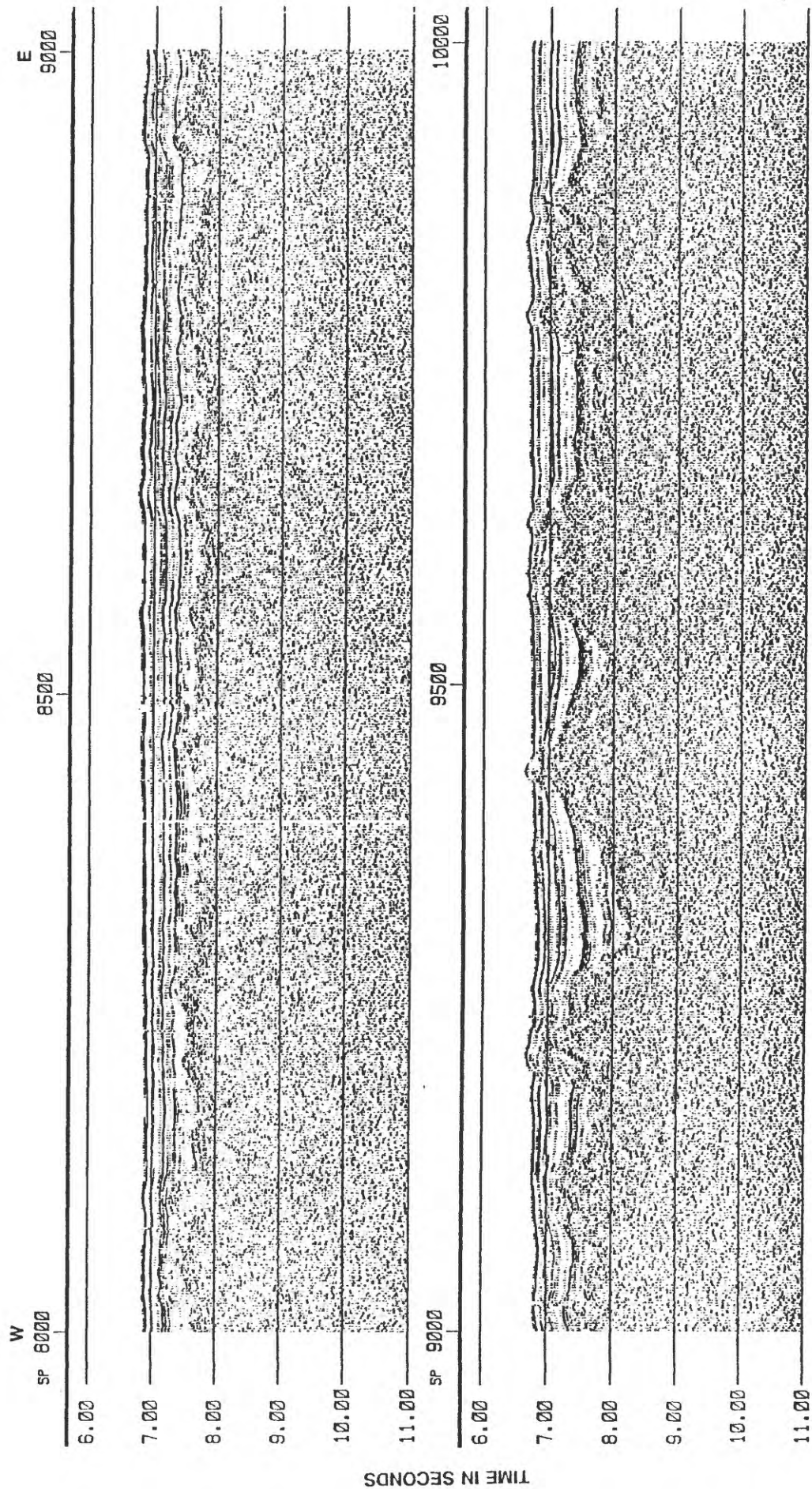


Figure 10 --- IPOD Line "1" Shotpoints 8000-10000

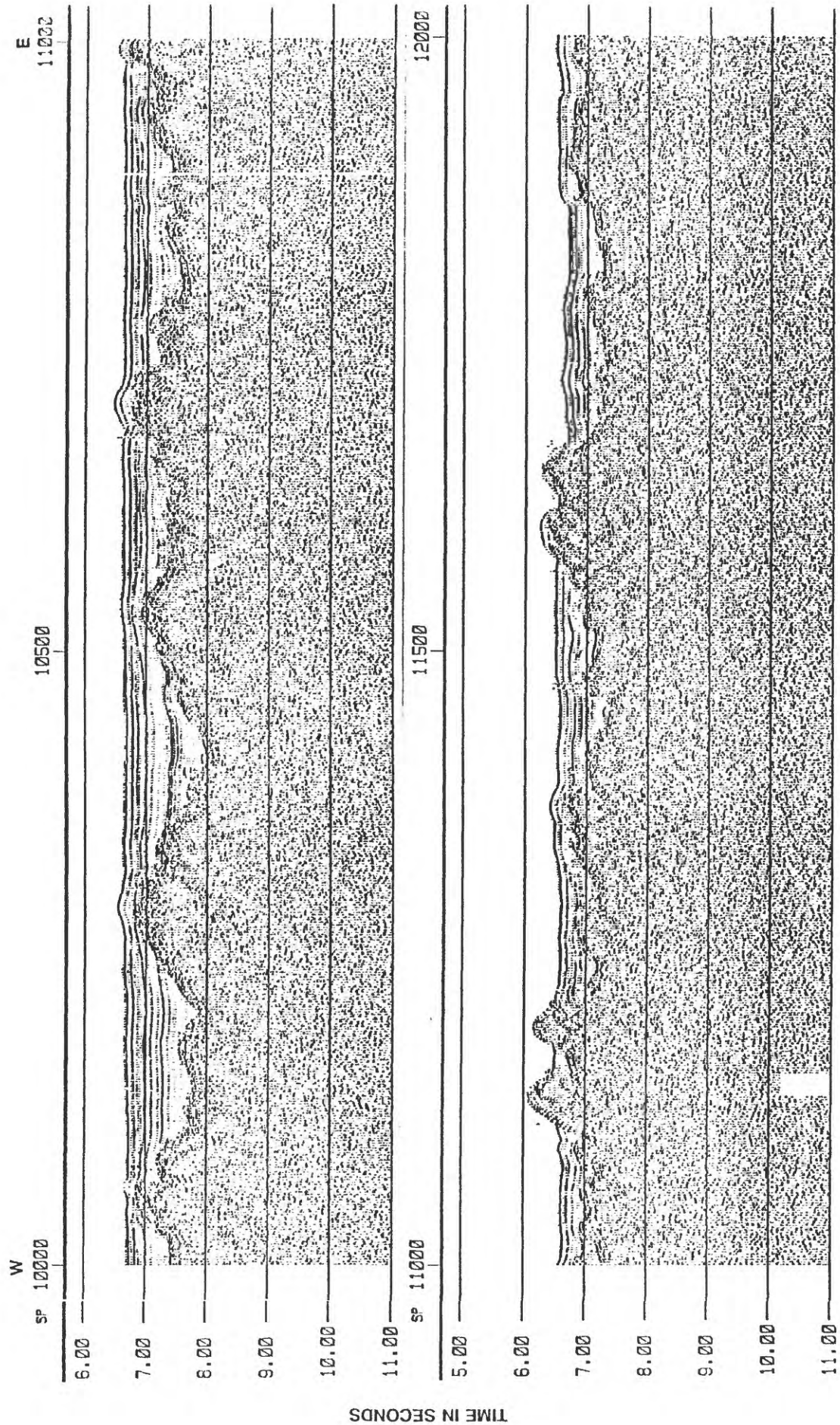


Figure 11 --- IPOD Line "1" Shotpoints 10000-12000

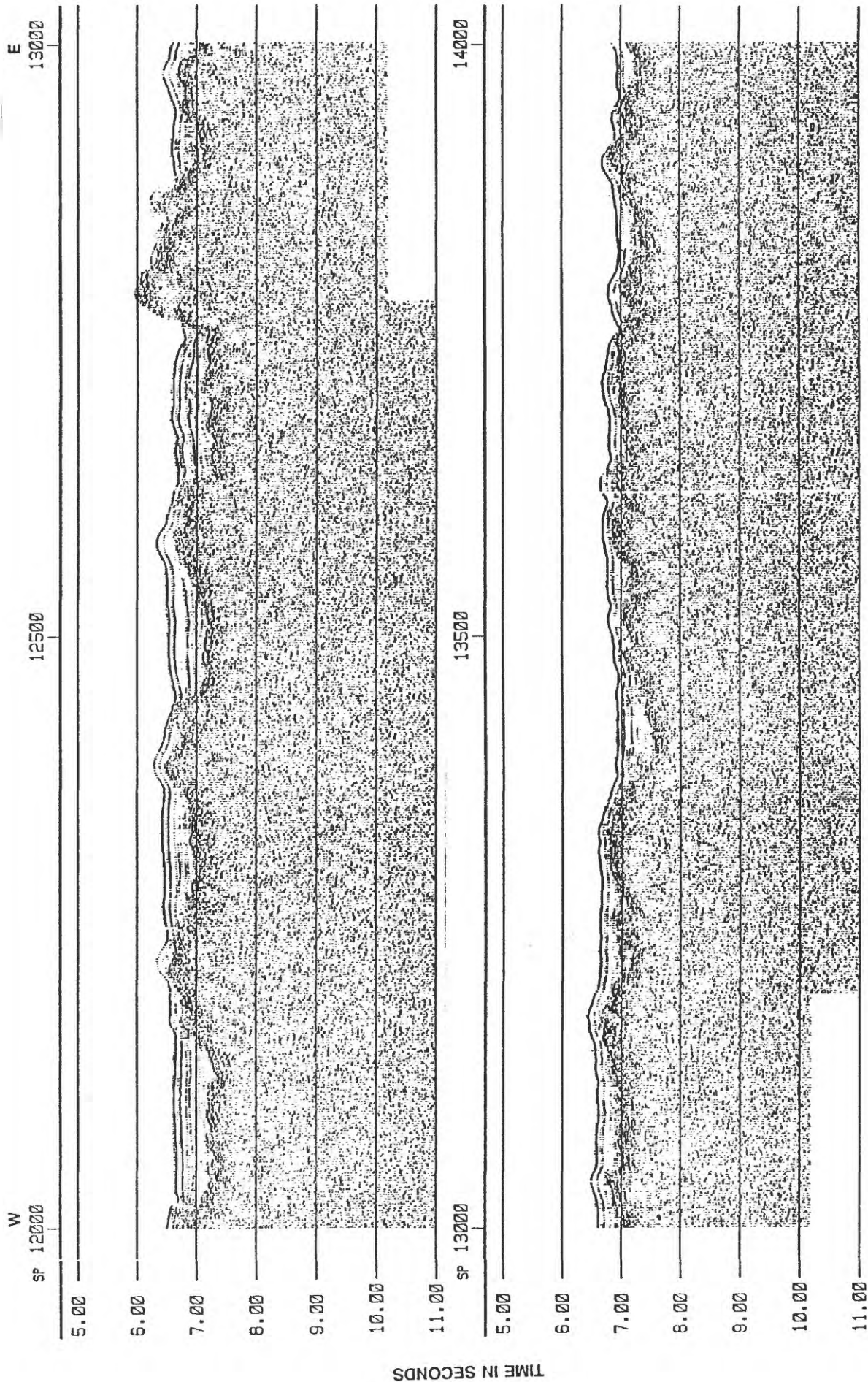


Figure 12 --- IPOD Line "1" Shotpoints 12000-14000

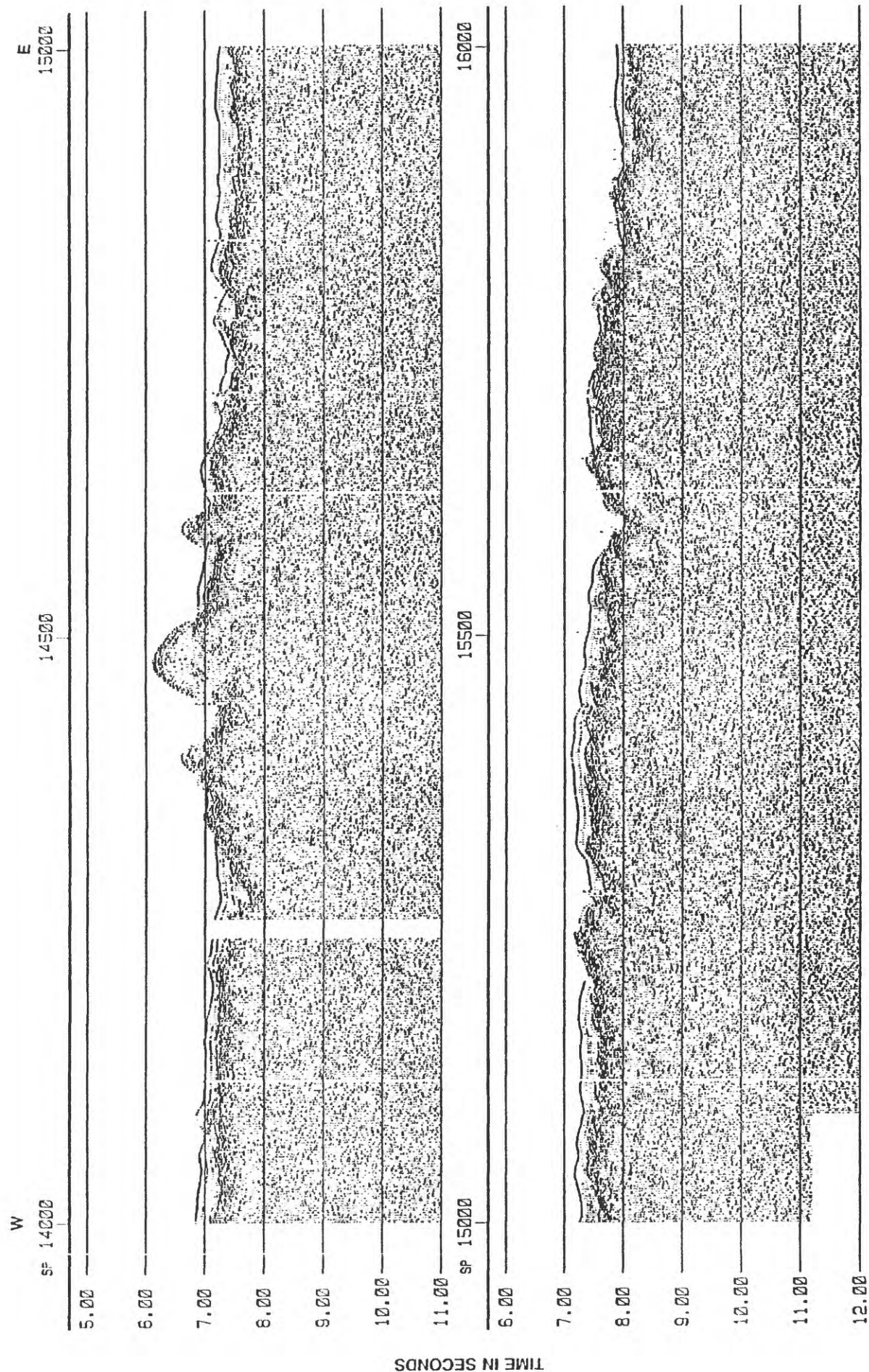


Figure 13 --- IPOD Line "1" Shotpoints 14000-16000

TIME IN SECONDS

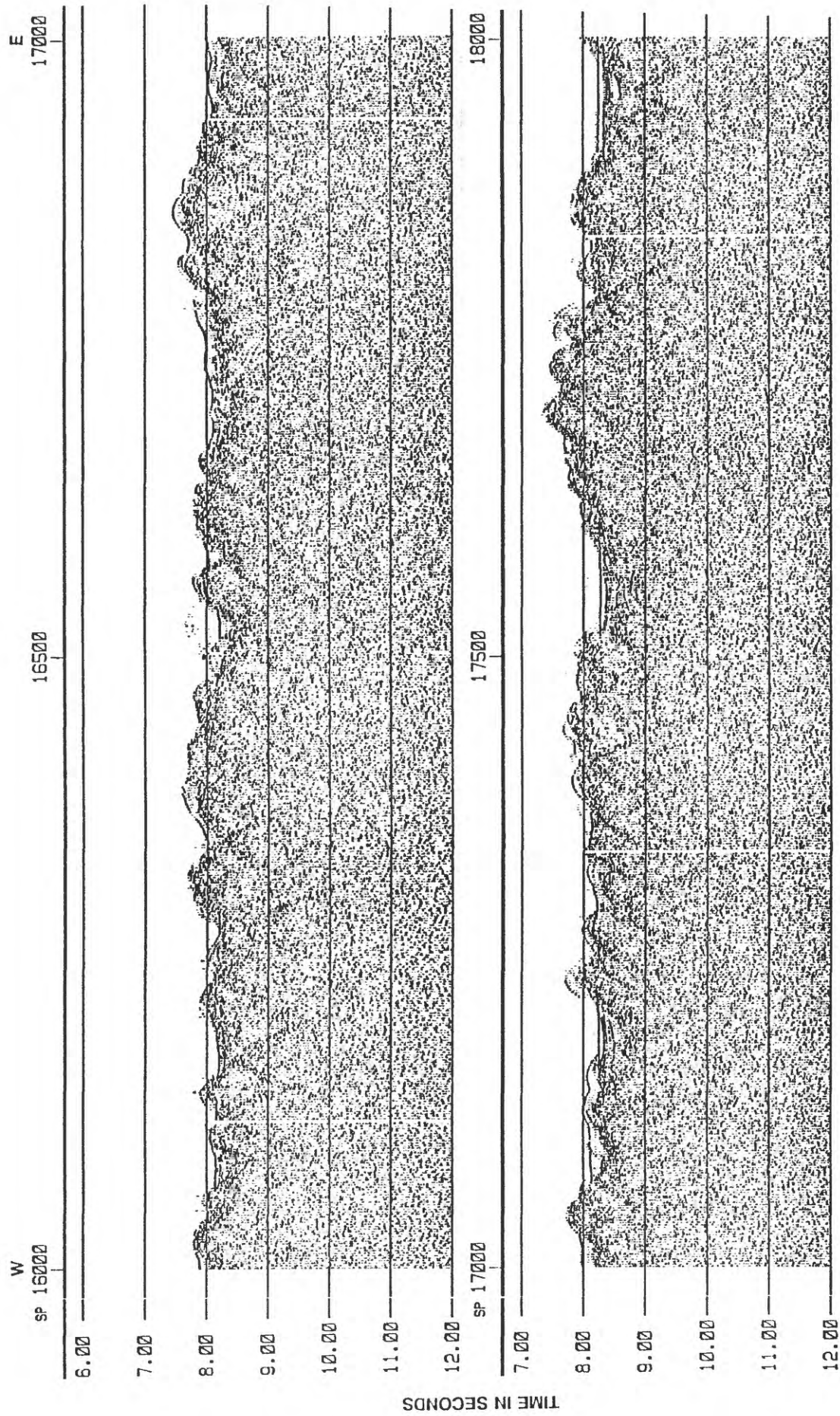


Figure 14 --- IPOD Line "1" Shotpoints 16000-18000

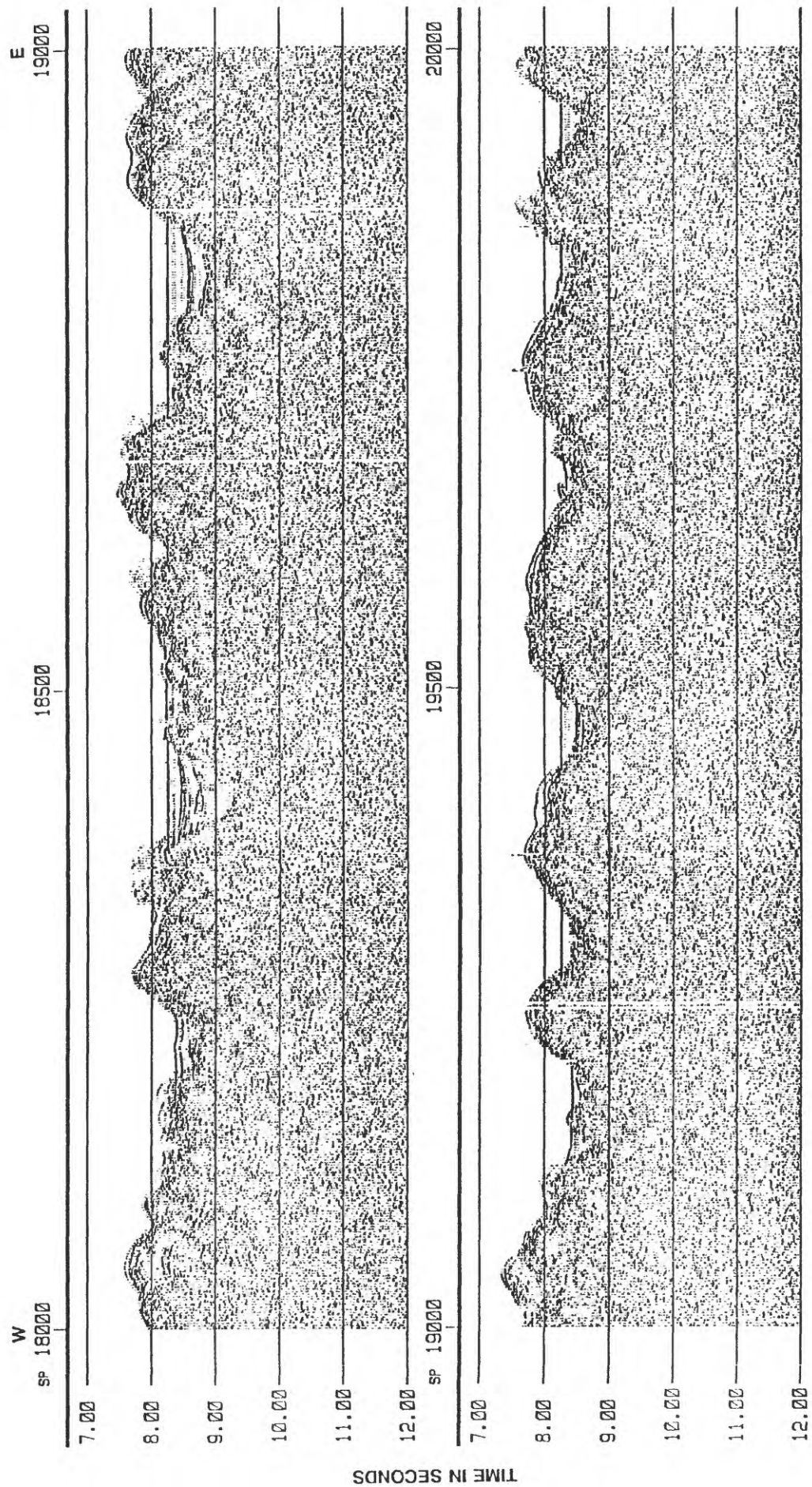


Figure 15 --- IPOD Line "1" Shotpoints 18000-20000

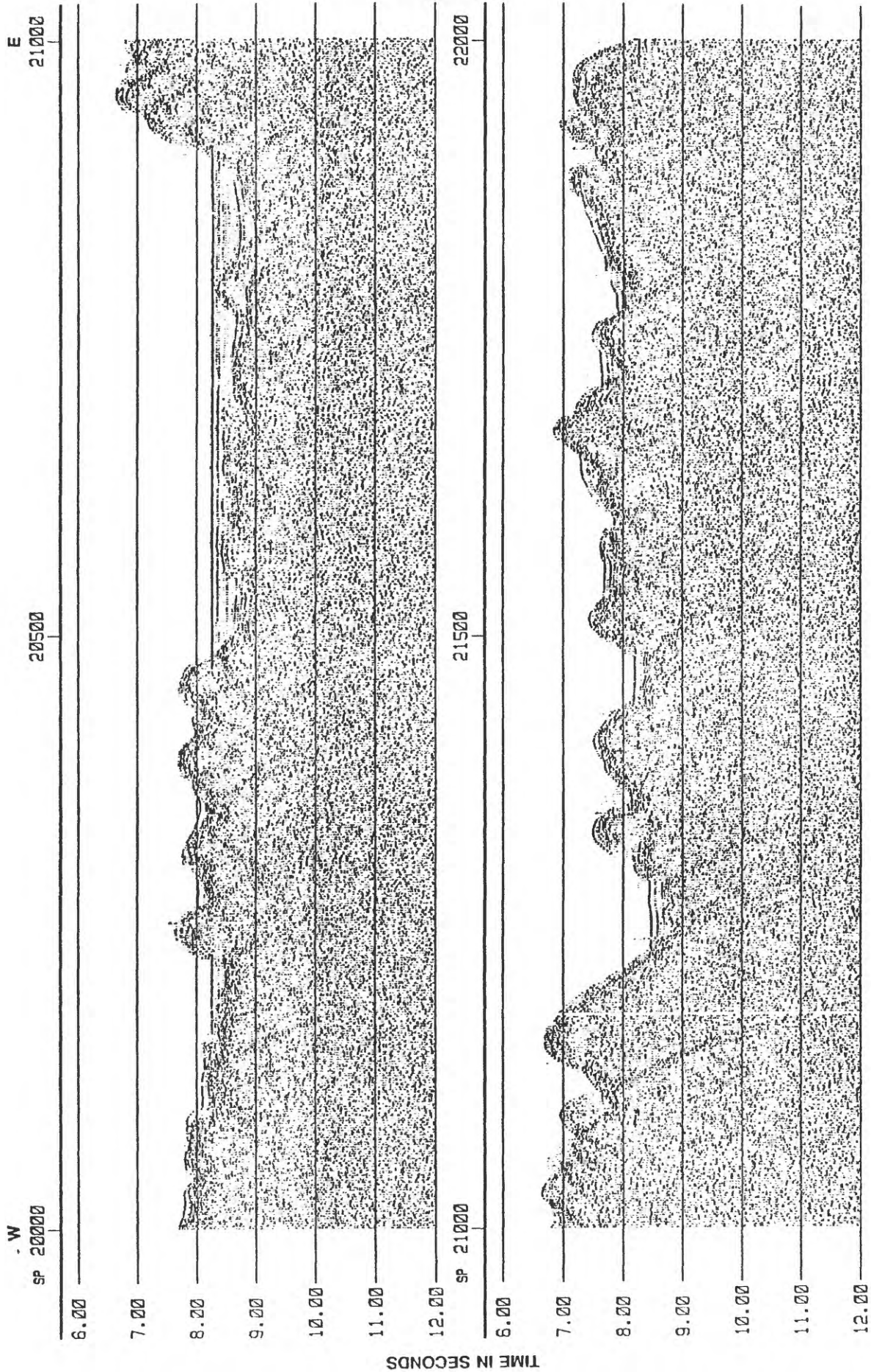


Figure 16 --- IPOD Line "1" Shotpoints 20000-22000

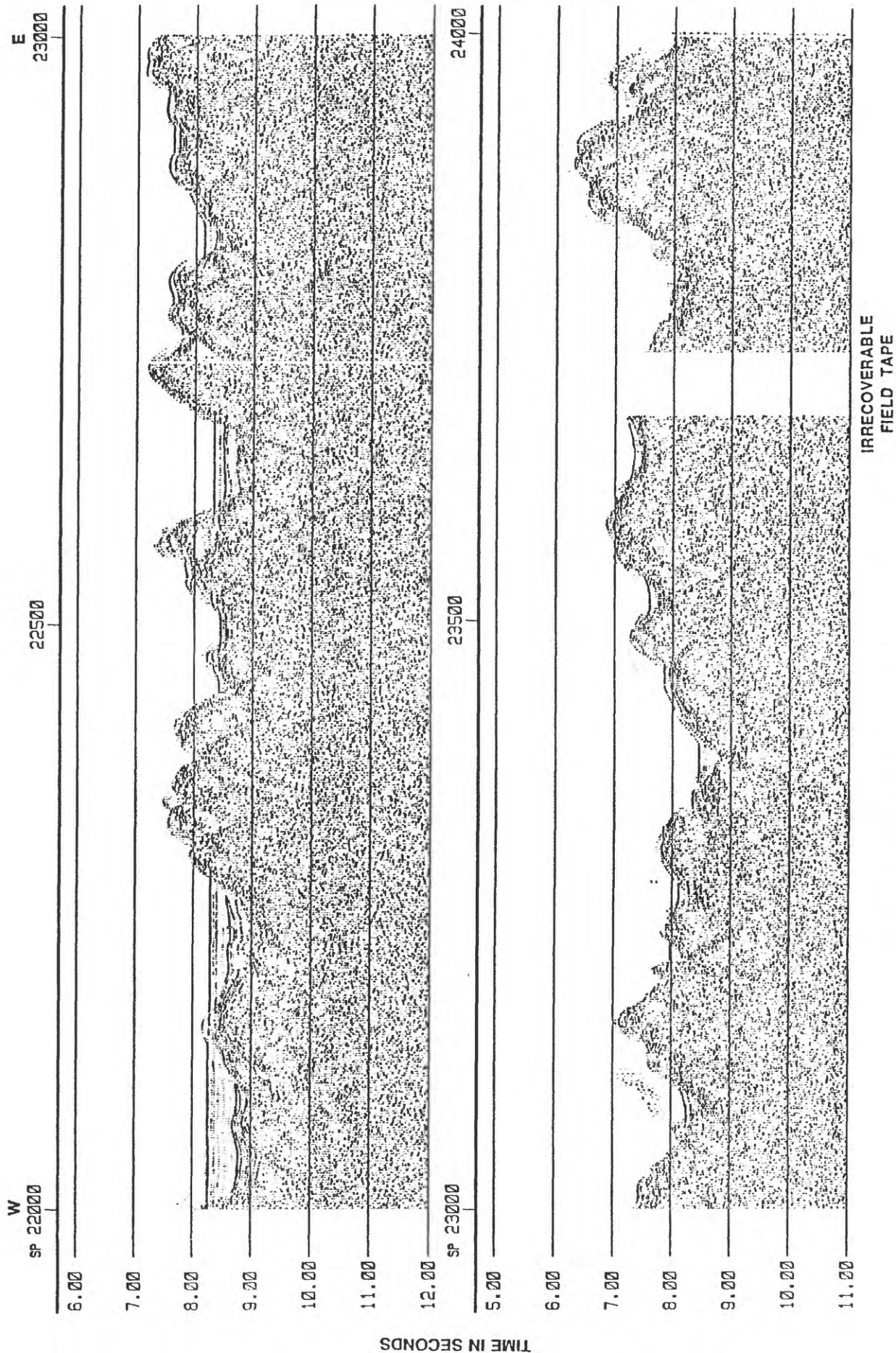


Figure 17 --- IPOD Line "1" Shotpoints 22000-24000

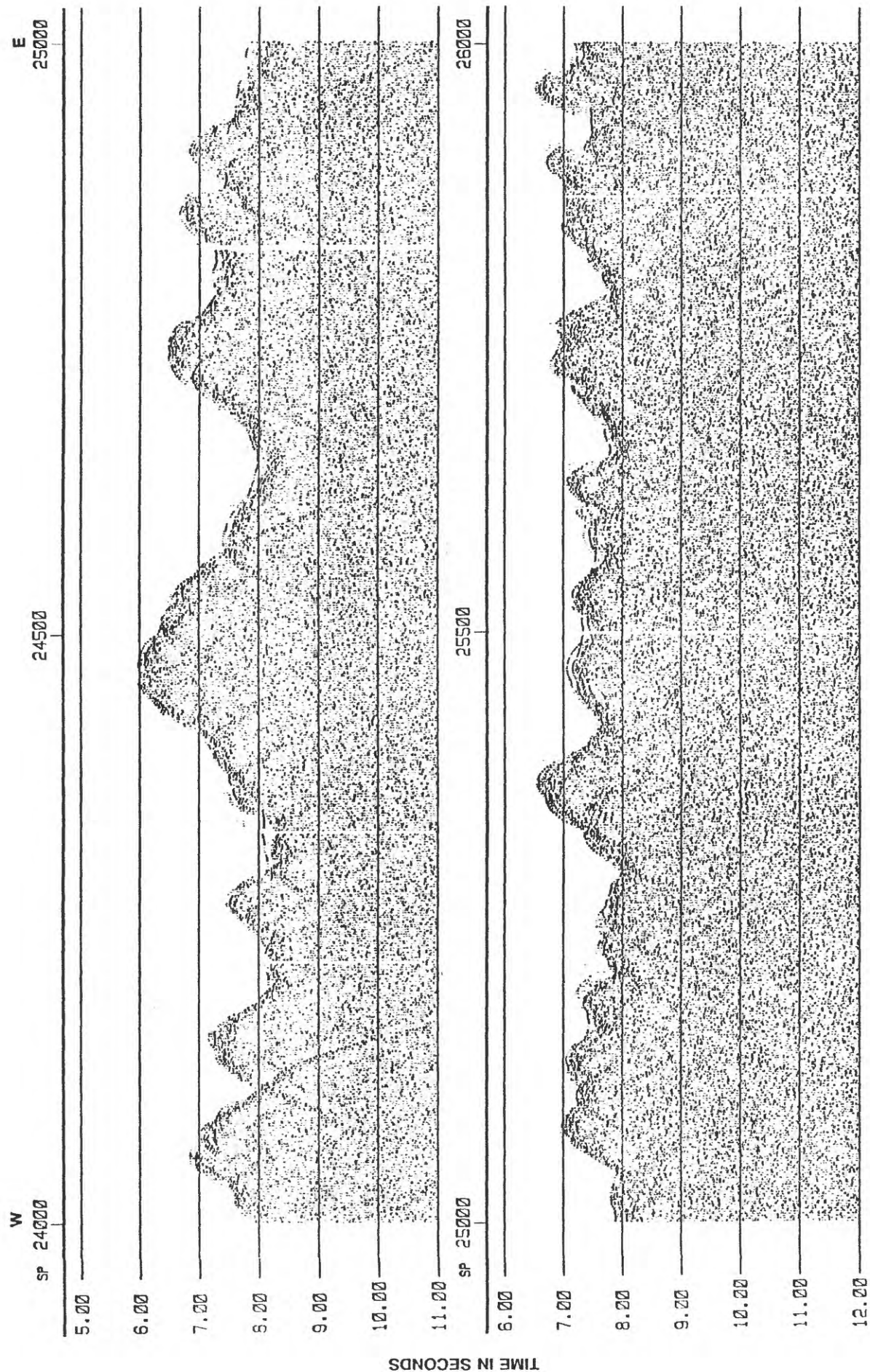


Figure 18 --- IPOD Line "1" Shotpoints 24000-26000

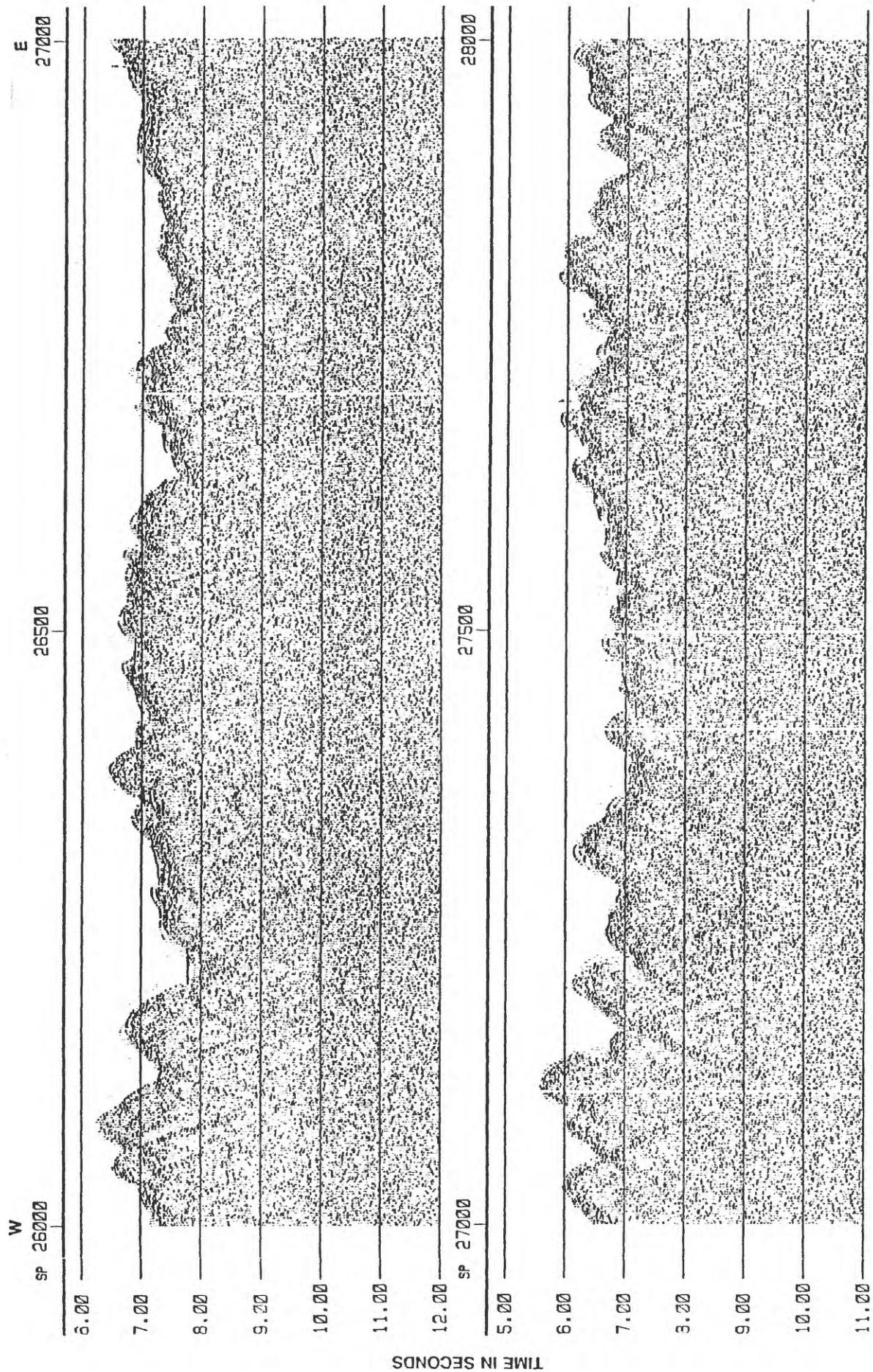


Figure 19 --- IPOD Line "1" Shotpoints 26000-28000

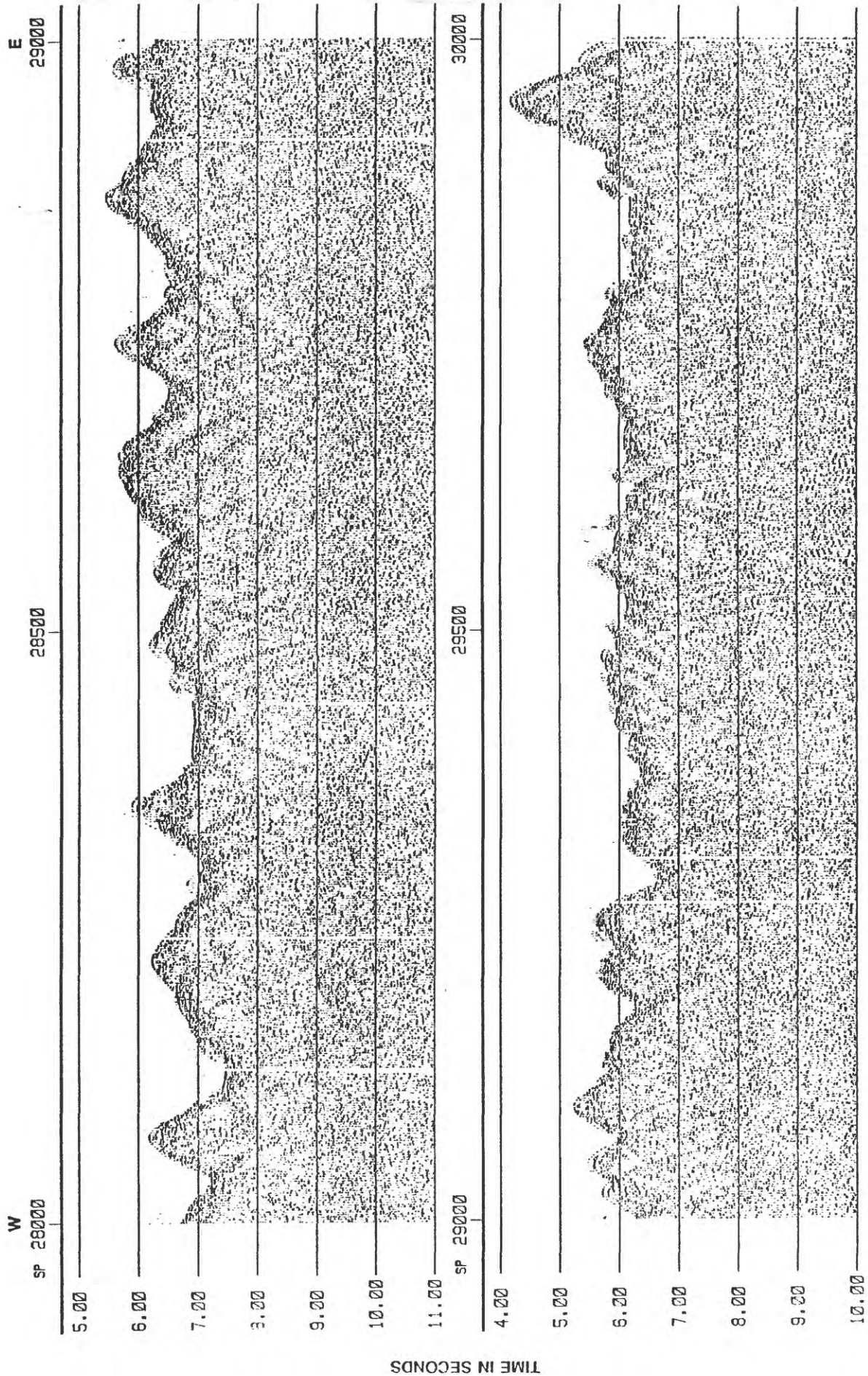


Figure 20 --- IPOD Line "1" Shotpoints 28000-30000

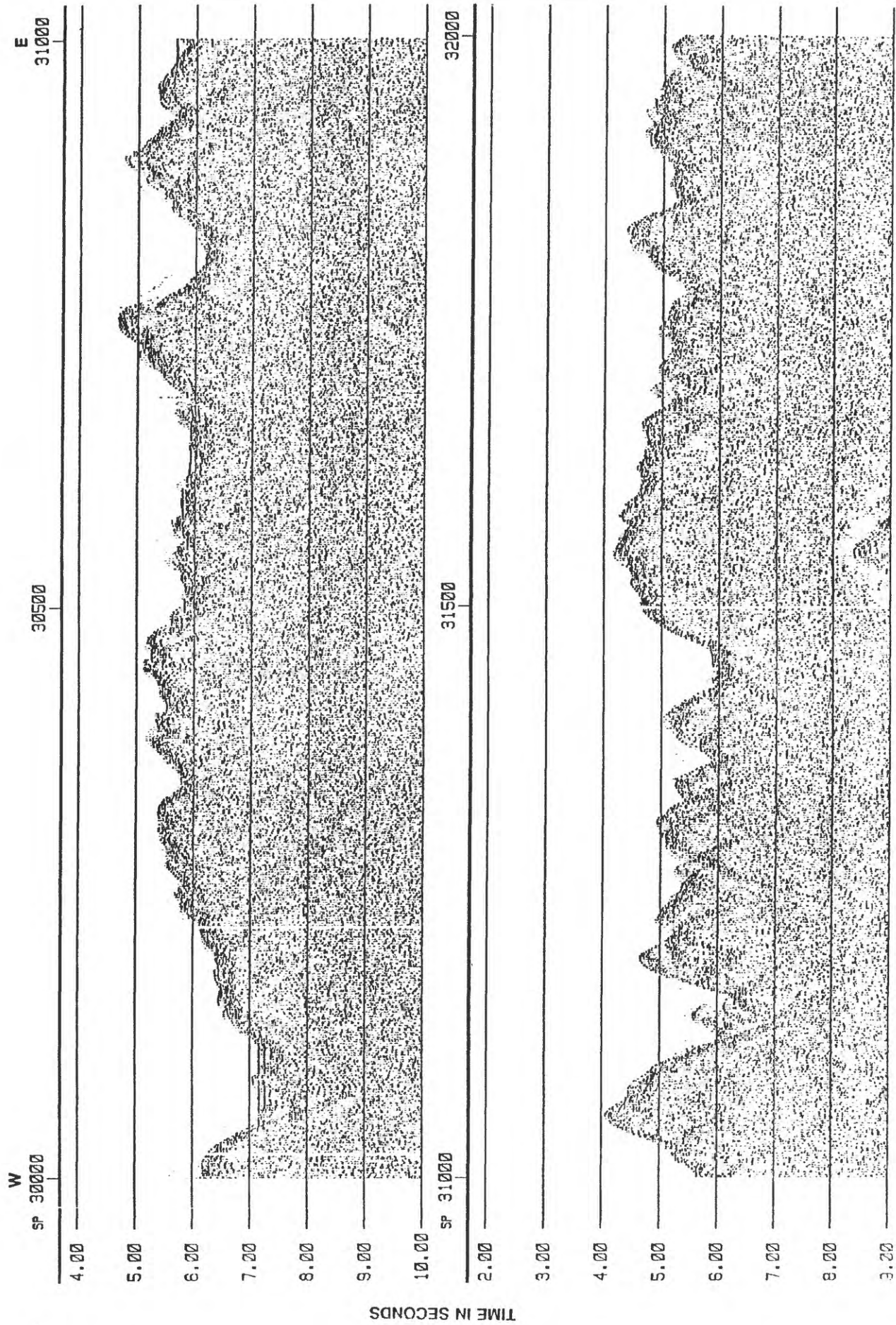


Figure 21 --- IPOD Line "1" Shotpoints 30000-32000

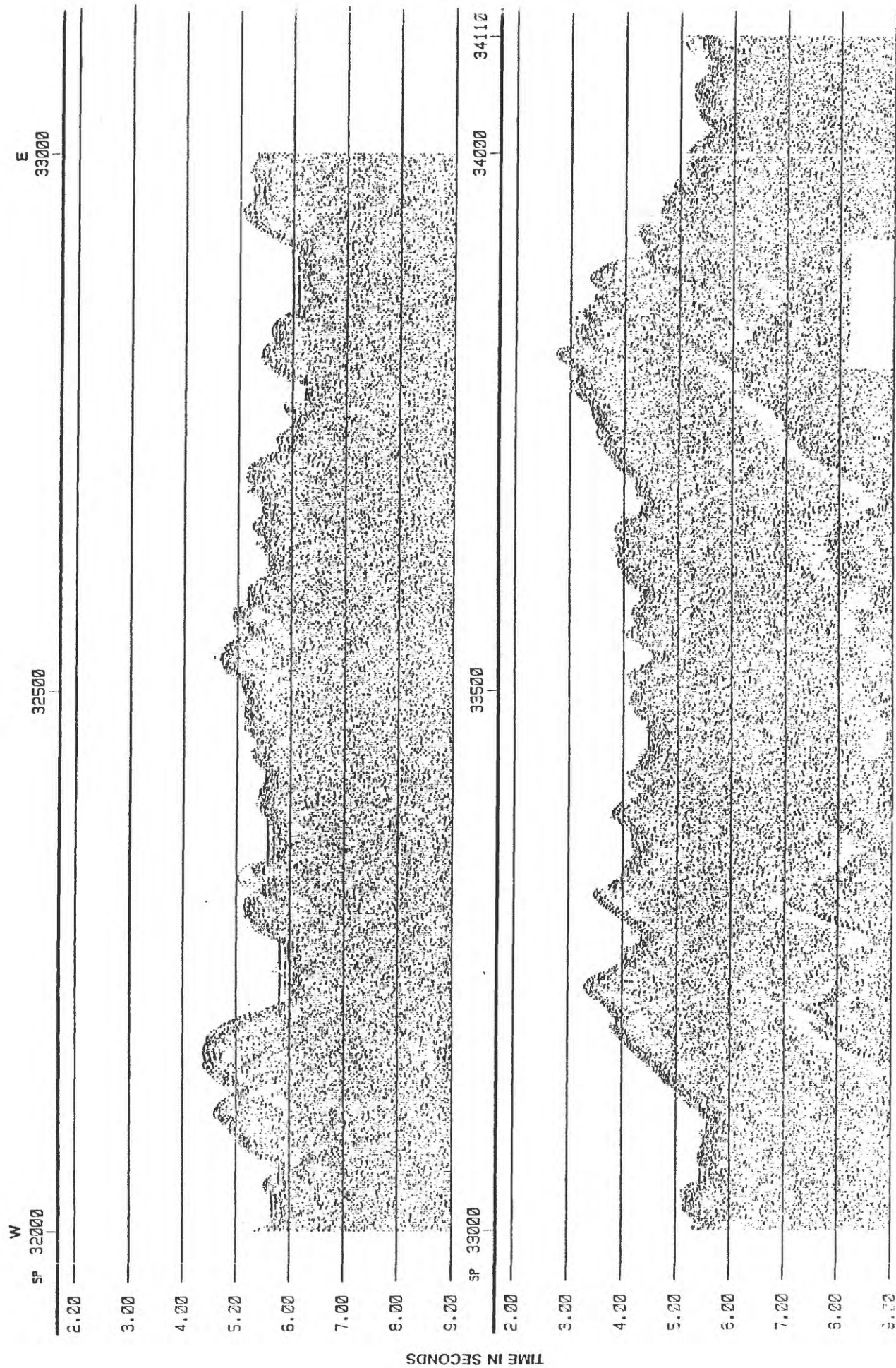


Figure 22 --- IPOD Line "1" Shotpoints 32000-34110

APPENDIX I

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
15054	GULF SEAL	IPOD-A	A-1	263-135	1-256	DEMUX
15055	GULF SEAL	IPOD-A	A-2	135-83	257-362	DEMUX
8372	GULF SEAL	IPOD-B	B-1	700-578	1-246	DEMUX
8373	GULF SEAL	IPOD-B	B-2	577-453	246-495	DEMUX
8374	GULF SEAL	IPOD-B	B-3	454-329	494-743	DEMUX
8375	GULF SEAL	IPOD-B	B-4	329-203	743-996	DEMUX
8376	GULF SEAL	IPOD-B	B-5	203-151	996-99	DEMUX
8377	GULF SEAL	IPOD-B	B-6	151-83	99-235	DEMUX
4567	GULF SEAL	IPOD	IPOD1A	101-228	1-256	DEMUX
4566	GULF SEAL	IPOD	IPOD1B	228-422	256-643	DEMUX
6453	GULF SEAL	IPOD	IPOD1C	422-549	643-897	DEMUX
4565	GULF SEAL	IPOD	IPOD1D	549-600	897-999	DEMUX
13244	GULF SEAL	IPOD	IPOD-1	600-727	999-254	DEMUX
13245	GULF SEAL	IPOD	IPOD-2	727-854	254-508	DEMUX
13246	GULF SEAL	IPOD	IPOD-3	854-984	508-768	DEMUX
13247	GULF SEAL	IPOD	IPOD-4	984-1102	768-4	DEMUX
13248	GULF SEAL	IPOD	IPOD-5	1102-1229	5-258	DEMUX
13249	GULF SEAL	IPOD	IPOD-6	1229-1356	258-512	DEMUX
13250	GULF SEAL	IPOD	IPOD-7	1356-1482	512-764	DEMUX
13251	GULF SEAL	IPOD	IPOD-8	1482-1575	764-950	DEMUX
13252	GULF SEAL	IPOD	IPOD-9	1539A-1668	1-260	DEMUX
13253	GULF SEAL	IPOD	IPOD-10	1668-1795	260-513	DEMUX
13254	GULF SEAL	IPOD	IPOD-11	1795-1921	513-766	DEMUX
13255	GULF SEAL	IPOD	IPOD-12	1921-2051	766-26	DEMUX
13256	GULF SEAL	IPOD	IPOD-13	2051-2067	26-58	DEMUX
13257	GULF SEAL	IPOD	IPOD-14	2068-2194	59-312	DEMUX
13258	GULF SEAL	IPOD	IPOD-15	2194-2321	312-566	DEMUX
13259	GULF SEAL	IPOD	IPOD-16	2321-2348A	566-98	DEMUX
13260	GULF SEAL	IPOD	IPOD-17	2348A-2478	98-357	DEMUX
13261	GULF SEAL	IPOD	IPOD-18	2478-2585	357-572	DEMUX
13262	GULF SEAL	IPOD	IPOD-19	2586-2740	573-882	DEMUX
13263	GULF SEAL	IPOD	IPOD-20	2740-2881	882-164	DEMUX
13264	GULF SEAL	IPOD	IPOD-21	2882-3057	165-516	DEMUX
13265	GULF SEAL	IPOD	IPOD-22	3057-3102	516-606	DEMUX
13266	GULF SEAL	IPOD	IPOD-23	3103-3274	607-950	DEMUX
13267	GULF SEAL	IPOD	IPOD-24	3274-3407	950-336	DEMUX
13268	GULF SEAL	IPOD	IPOD-25	3407-3579	336-680	DEMUX
13269	GULF SEAL	IPOD	IPOD-26	3579-3753	680-28	DEMUX
13270	GULF SEAL	IPOD	IPOD-27	3753-3925	28-372	DEMUX
13271	GULF SEAL	IPOD	IPOD-28	3925-3940	372-402	DEMUX
13272	GULF SEAL	IPOD	IPOD-29	3940-4111	403-743	DEMUX
13273	GULF SEAL	IPOD	IPOD-30	4111-4281	743-83	DEMUX
13274	GULF SEAL	IPOD	IPOD-31	4281-4414A	83-10	DEMUX
13275	GULF SEAL	IPOD	IPOD-32	4414A-4583	10-348	DEMUX
13276	GULF SEAL	IPOD	IPOD-33	4583-4779	349-739	DEMUX
13277	GULF SEAL	IPOD	IPOD-34	4779-4972	739-125	DEMUX
13278	GULF SEAL	IPOD	IPOD-35	4972-5058	125-298	DEMUX
13279	GULF SEAL	IPOD	IPOD-36	5059-5256	299-694	DEMUX
13280	GULF SEAL	IPOD	IPOD-37	5256-5454	694-90	DEMUX
13281	GULF SEAL	IPOD	IPOD-38	5454-5652	90-485	DEMUX
13282	GULF SEAL	IPOD	IPOD-39	5652-5850	485-881	DEMUX
13283	GULF SEAL	IPOD	IPOD-40	5850-6047	881-275	DEMUX
13284	GULF SEAL	IPOD	IPOD-41	6047-6246	275-673	DEMUX
13285	GULF SEAL	IPOD	IPOD-42	6246-6422	673-26	DEMUX

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
13286	GULF SEAL	IPOD	IPOD-43	6422-6621	27-424	DEMUX
13287	GULF SEAL	IPOD	IPOD-44	6621-6748	424-677	DEMUX
13288	GULF SEAL	IPOD	IPOD-45	6748-6918	678-18	DEMUX
13289	GULF SEAL	IPOD	IPOD-46	6918-7100	18-401	DEMUX
13290	GULF SEAL	IPOD	IPOD-47	7100-7294	401-790	DEMUX
13291	GULF SEAL	IPOD	IPOD-48	7294-7483	790-168	DEMUX
13292	GULF SEAL	IPOD	IPOD-49	7483-7677	168-555	DEMUX
13293	GULF SEAL	IPOD	IPOD-50	7677-7681	555-564	DEMUX
16597	GULF SEAL	IPOD	IPOD-51	7682-7935	565-71	DEMUX
16598	GULF SEAL	IPOD	IPOD-52	7935-8188	71-577	DEMUX
16599	GULF SEAL	IPOD	IPOD-53	8188-8441	577-83	DEMUX
16600	GULF SEAL	IPOD	IPOD-54	8441-8695	83-592	DEMUX
16601	GULF SEAL	IPOD	IPOD-55	8695-8948	592-98	DEMUX
16602	GULF SEAL	IPOD	IPOD-56	8948-8967	98-135	DEMUX
16603	GULF SEAL	IPOD	IPOD-57	8967-9220	135-641	DEMUX
16604	GULF SEAL	IPOD	IPOD-58	9220-9295	641-812	DEMUX
16605	GULF SEAL	IPOD	IPOD-59	9296-9556	813-334	DEMUX
16606	GULF SEAL	IPOD	IPOD-60	9556-9810	334-841	DEMUX
16607	GULF SEAL	IPOD	IPOD-61	9810-10063	841-347	DEMUX
16608	GULF SEAL	IPOD	IPOD-62	10063-10316	347-853	DEMUX
16609	GULF SEAL	IPOD	IPOD-63	10316-10569	853-360	DEMUX
16610	GULF SEAL	IPOD	IPOD-64	10569-10823	360-867	DEMUX
16611	GULF SEAL	IPOD	IPOD-65	10823-10861	867-943	DEMUX
16612	GULF SEAL	IPOD	IPOD-66	10861-11108	943-438	DEMUX
16613	GULF SEAL	IPOD	IPOD-67	11108-11117	438-456	DEMUX
16614	GULF SEAL	IPOD	IPOD-68	11118-11328	457-417	DEMUX
16615	GULF SEAL	IPOD	IPOD-69	11328-11581	417-923	DEMUX
16616	GULF SEAL	IPOD	IPOD-70	11581-11827	923-416	DEMUX
16617	GULF SEAL	IPOD	IPOD-71	11827-12074	416-910	DEMUX
16618	GULF SEAL	IPOD	IPOD-72	12074-12320	910-402	DEMUX
16619	GULF SEAL	IPOD	IPOD-73	12320-12567	402-895	DEMUX
16620	GULF SEAL	IPOD	IPOD-74	12567-12820	895-402	DEMUX
16621	GULF SEAL	IPOD	IPOD-75	12820-12834	402-430	DEMUX
16622	GULF SEAL	IPOD	IPOD-76	12835-13057	431-876	DEMUX
16623	GULF SEAL	IPOD	IPOD-77	13057-13279	876-319	DEMUX
16624	GULF SEAL	IPOD	IPOD-78	13279-13501	319-764	DEMUX
16625	GULF SEAL	IPOD	IPOD-79	13501-13722	764-206	DEMUX
16626	GULF SEAL	IPOD	IPOD-80	13722-13944	206-650	DEMUX
16627	GULF SEAL	IPOD	IPOD-81	13944-14111	650-984	DEMUX
16628	GULF SEAL	IPOD	IPOD-82	14112-14363	985-487	DEMUX
16629	GULF SEAL	IPOD	IPOD-82B	14242-14258	246-277	DEMUX
16630	GULF SEAL	IPOD	IPOD-83	14363-14616	487-993	DEMUX
16631	GULF SEAL	IPOD	IPOD-84	14616-14867	993-496	DEMUX
16632	GULF SEAL	IPOD	IPOD-85	14867-15120	496-1	DEMUX
16633	GULF SEAL	IPOD	IPOD-86	15120-15371	1-504	DEMUX
16634	GULF SEAL	IPOD	IPOD-87	15371-15624	504-10	DEMUX
16635	GULF SEAL	IPOD	IPOD-88	15624-15875	10-512	DEMUX
16636	GULF SEAL	IPOD	IPOD-89	15875-16128	512-17	DEMUX
16637	GULF SEAL	IPOD	IPOD-90	16128-16249	17-259	DEMUX
16638	GULF SEAL	IPOD	IPOD-91	16250-16454	260-229	DEMUX
16639	GULF SEAL	IPOD	IPOD-92	16454-16706	229-733	DEMUX
16640	GULF SEAL	IPOD	IPOD-93	16706-16959	733-240	DEMUX
16641	GULF SEAL	IPOD	IPOD-94	16959-17212	240-746	DEMUX
16642	GULF SEAL	IPOD	IPOD-95	17212-17465	746-252	DEMUX
16643	GULF SEAL	IPOD	IPOD-96	17465-17717	252-755	DEMUX
16644	GULF SEAL	IPOD	IPOD-97	17717-17970	755-261	DEMUX
16645	GULF SEAL	IPOD	IPOD-98	17970-18222	261-765	DEMUX
16646	GULF SEAL	IPOD	IPOD-99	18222-18475	765-271	DEMUX
16647	GULF SEAL	IPOD	IPOD-100	18475-18726	271-773	DEMUX

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
16648	GULF SEAL	IPOD	IPOD-101	18726-18979	773-279	DEMUX
16649	GULF SEAL	IPOD	IPOD-102	18979-19197	279-716	DEMUX
16650	GULF SEAL	IPOD	IPOD-103	19198-19420	717-161	DEMUX
16651	GULF SEAL	IPOD	IPOD-104	19420-19643	161-607	DEMUX
16652	GULF SEAL	IPOD	IPOD-105	19643-19865	607-51	DEMUX
16653	GULF SEAL	IPOD	IPOD-106	19865-20087	51-496	DEMUX
16654	GULF SEAL	IPOD	IPOD-107	20087-20309	496-939	DEMUX
16655	GULF SEAL	IPOD	IPOD-108	20309-20531	939-383	DEMUX
16656	GULF SEAL	IPOD	IPOD-109	20531-20753	383-827	DEMUX
16657	GULF SEAL	IPOD	IPOD-110	20753-20970	827-262	DEMUX
16658	GULF SEAL	IPOD	IPOD-111	20970-21180	262-682	DEMUX
16659	GULF SEAL	IPOD	IPOD-112	21181-21403	683-128	DEMUX
16660	GULF SEAL	IPOD	IPOD-113	21403-21626	128-573	DEMUX
16661	GULF SEAL	IPOD	IPOD-114	21626-21847	573-16	DEMUX
16662	GULF SEAL	IPOD	IPOD-115	21848-22053	17-427	DEMUX
16663	GULF SEAL	IPOD	IPOD-116	22053-22276	427-874	DEMUX
16664	GULF SEAL	IPOD	IPOD-117	22276-22498	874-317	DEMUX
16665	GULF SEAL	IPOD	IPOD-118	22498-22719	317-759	DEMUX
16666	GULF SEAL	IPOD	IPOD-119	22719-22941	759-204	DEMUX
16667	GULF SEAL	IPOD	IPOD-120	22941-23128	204-257	DEMUX
16668	GULF SEAL	IPOD	IPOD-121	23128-23346	257-694	DEMUX
16669	GULF SEAL	IPOD	IPOD-122	23346-23567	694-135	DEMUX
16670	GULF SEAL	IPOD	IPOD-123	23567-23730	135-462	DEMUX
16671	GULF SEAL	IPOD	IPOD-124	23732-23954	465-910	DEMUX
16672	GULF SEAL	IPOD	IPOD-125	23954-24173	911-347	DEMUX
16673	GULF SEAL	IPOD	IPOD-126	24173-24391	348-784	DEMUX
16674	GULF SEAL	IPOD	IPOD-127	24392-24614	785-229	DEMUX
16675	GULF SEAL	IPOD	IPOD-128	24614-24836	229-673	DEMUX
16676	GULF SEAL	IPOD	IPOD-129	24836-25057	673-115	DEMUX
16677	GULF SEAL	IPOD	IPOD-130	25057-25101	115-204	DEMUX
16678	GULF SEAL	IPOD	IPOD-131	25102-25325	205-651	DEMUX
16679	GULF SEAL	IPOD	IPOD-132	25325-25544	651-90	DEMUX
16680	GULF SEAL	IPOD	IPOD-133	25544-25767	90-535	DEMUX
16885	GULF SEAL	IPOD	IPOD-134	25767-25989	535-979	DEMUX
16886	GULF SEAL	IPOD	IPOD-135	25989-26210	979-422	DEMUX
16887	GULF SEAL	IPOD	IPOD-136	26210-26432	422-866	DEMUX
16888	GULF SEAL	IPOD	IPOD-137	26432-26647	866-296	DEMUX
16889	GULF SEAL	IPOD	IPOD-138	26647-26870	296-741	DEMUX
16890	GULF SEAL	IPOD	IPOD-139	26870-27091	741-184	DEMUX
16891	GULF SEAL	IPOD	IPOD-140	27091-27314	184-630	DEMUX
16892	GULF SEAL	IPOD	IPOD-141	27314-27536	630-74	DEMUX
16893	GULF SEAL	IPOD	IPOD-142	27536-27759	74-520	DEMUX
16894	GULF SEAL	IPOD	IPOD-143	27759-27766	520-533	DEMUX
16895	GULF SEAL	IPOD	IPOD-144	27766-27988	533-977	DEMUX
16896	GULF SEAL	IPOD	IPOD-145	27988-28211	977-423	DEMUX
16897	GULF SEAL	IPOD	IPOD-146	28211-28433	423-867	DEMUX
16898	GULF SEAL	IPOD	IPOD-147	28433-28655	867-311	DEMUX
16899	GULF SEAL	IPOD	IPOD-148	28655-28878	311-757	DEMUX
16900	GULF SEAL	IPOD	IPOD-149	28878-29100	757-201	DEMUX
16901	GULF SEAL	IPOD	IPOD-150	29100-29322	201-646	DEMUX
16902	GULF SEAL	IPOD	IPOD-151	29322-29544	646-90	DEMUX
16903	GULF SEAL	IPOD	IPOD-152	29544-29768	90-537	DEMUX
16904	GULF SEAL	IPOD	IPOD-153	29768-29886	537-774	DEMUX
16905	GULF SEAL	IPOD	IPOD-154	29886-29911	774-824	DEMUX
16906	GULF SEAL	IPOD	IPOD-155	29912-30133	825-269	DEMUX
16907	GULF SEAL	IPOD	IPOD-156	30134-30356	269-713	DEMUX
16908	GULF SEAL	IPOD	IPOD-157	30356-30580	713-162	DEMUX
16909	GULF SEAL	IPOD	IPOD-158	30580-30803	162-608	DEMUX
16910	GULF SEAL	IPOD	IPOD-159	30803-31026	608-53	DEMUX

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
16911	GULF SEAL	IPOD	IPOD-160	31026-31244	53-490	DEMUX
16912	GULF SEAL	IPOD	IPOD-161	31244-31467	490-936	DEMUX
16913	GULF SEAL	IPOD	IPOD-162	31467-31688	936-378	DEMUX
16914	GULF SEAL	IPOD	IPOD-163	31688-31912	378-825	DEMUX
16915	GULF SEAL	IPOD	IPOD-164	31912-32133	825-268	DEMUX
16916	GULF SEAL	IPOD	IPOD-165	32133-32355	268-711	DEMUX
16917	GULF SEAL	IPOD	IPOD-166	32355-32576	711-153	DEMUX
16918	GULF SEAL	IPOD	IPOD-167	32576-32798	153-598	DEMUX
16919	GULF SEAL	IPOD	IPOD-168	32798-33019	598-40	DEMUX
16920	GULF SEAL	IPOD	IPOD-169	33019-33241	40-484	DEMUX
16921	GULF SEAL	IPOD	IPOD-170	33241-33463	484-927	DEMUX
16922	GULF SEAL	IPOD	IPOD-171	33463-33686	927-374	DEMUX
16923	GULF SEAL	IPOD	IPOD-172	33686-33909	374-819	DEMUX
16924	GULF SEAL	IPOD	IPOD-173	33909-34110	819-222	DEMUX