PRELIMINARY DATA SUMMARY

January 1985

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility in Duck, North Carolina. The data were collected and the analyses performed by the FRF staff. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig.1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. Herman C. Miller at (919) 261-3511.

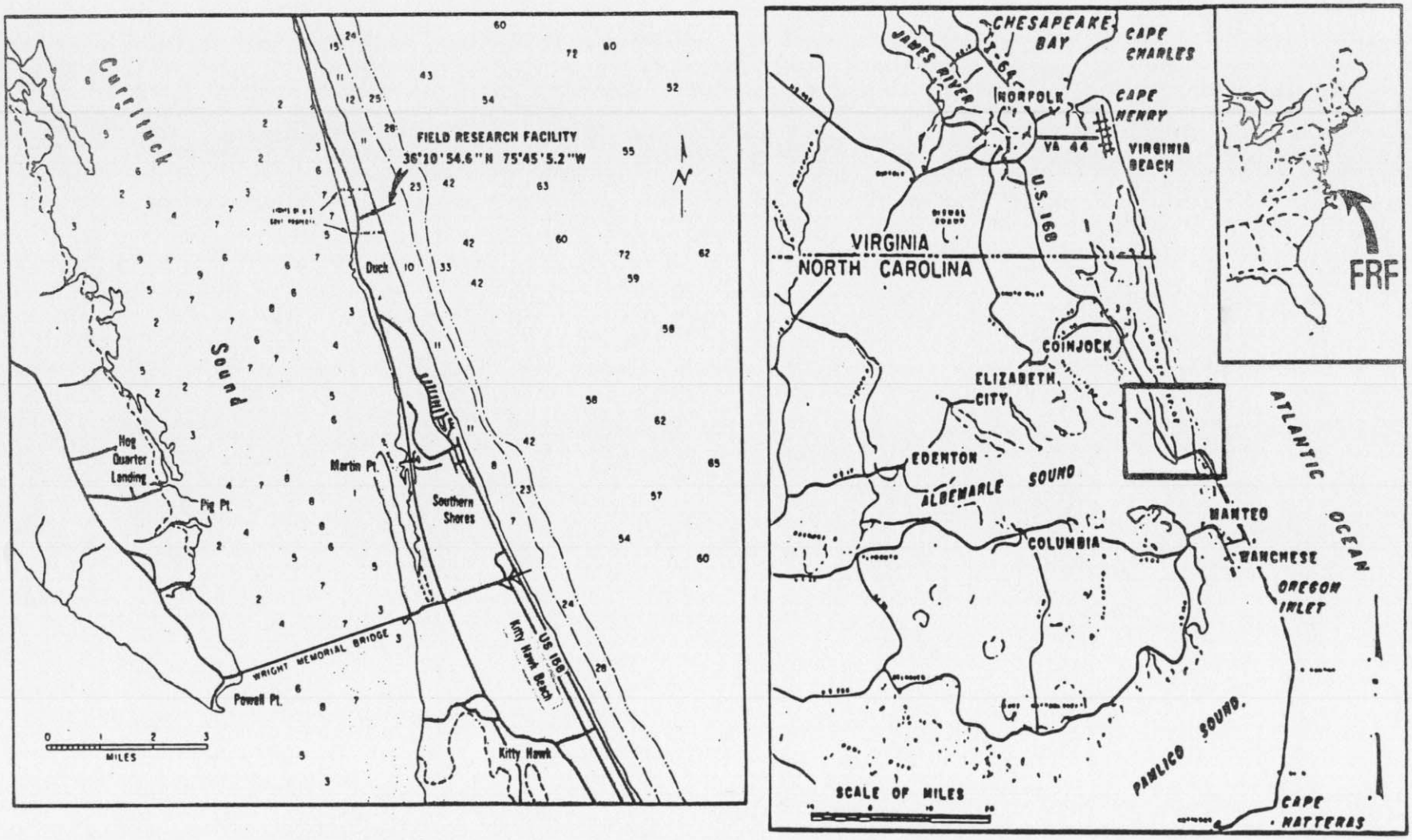
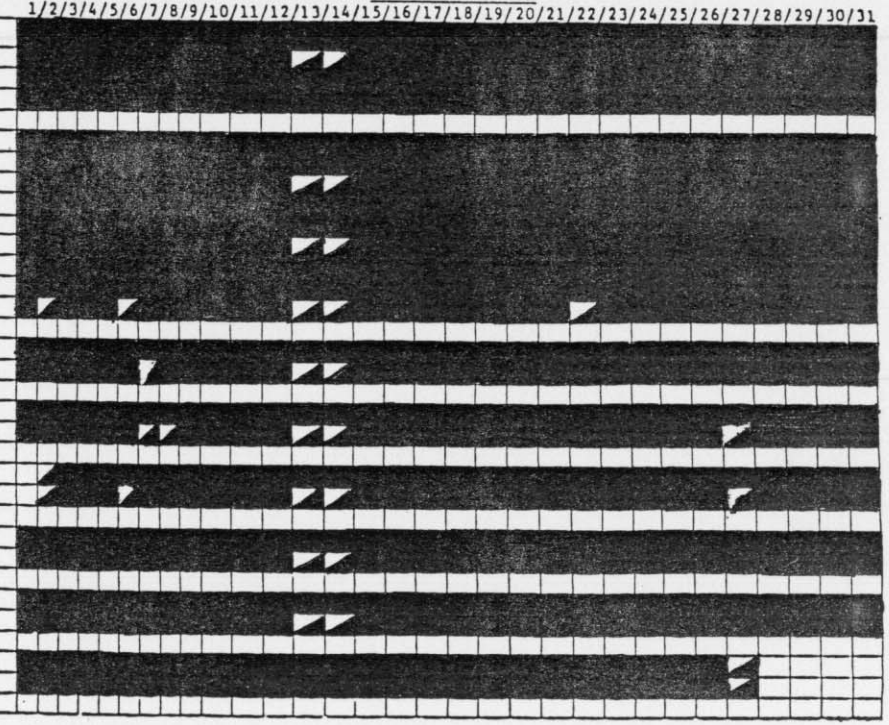


Figure 1. FRF Location Map

TABLE 1
INSTRUMENT STATUS/DATA AVAILABILITY
January 1986

GAGE NUMBER	DESCRIPTION/REMARKS	DEPTH AT SENSOR	
	Barometric Pressure		Instrument Status
			Data Collected
			Analog Record
	Precipitation		Instrument Status
			Data Collected
			Analog Record
	Air Temperature		Instrument Status
			Data Collected
			Maximum/Minimum
	Anemometer on Lab Bldg - Elevation 19m (MSL)		Instrument Status
			Data Collected
			Analog Record
645	Baylor staff located at station 7+80 on FRF pier	See profile data	Instrument Status
			Data Collected
625	Baylor staff located at station 19+00 on FRF pier	See profile data	Instrument Status
			Data Collected
640	Waverider buoy located 1.0 km from shore	Approx. 8.5 m. MSL	Instrument Status
			Data Collected
630	Waverider buoy located 6.0km from shore	Approx. 18 m. MSL	Instrument Status
			Data Collected
639	Current meter at station 14+20 on FRF pier	See profile data	Instrument Status
			Data Collected
679	Current meter 500M south (0.5km offshore)	Approx. 6 m MSL	Instrument Status
			Data Collected
865-1370	NOAA primary tide station located at seaward end of FRF pier		Instrument Status
			Data Collected



Instrument Status: Operational ■ - Daily Observation: YES ■
Data Collected: ALL ■, SOME ◪
Analog Record: ALL ■, PARTIAL ◪
Preliminary Analysis: ALL ■, SOME ◪

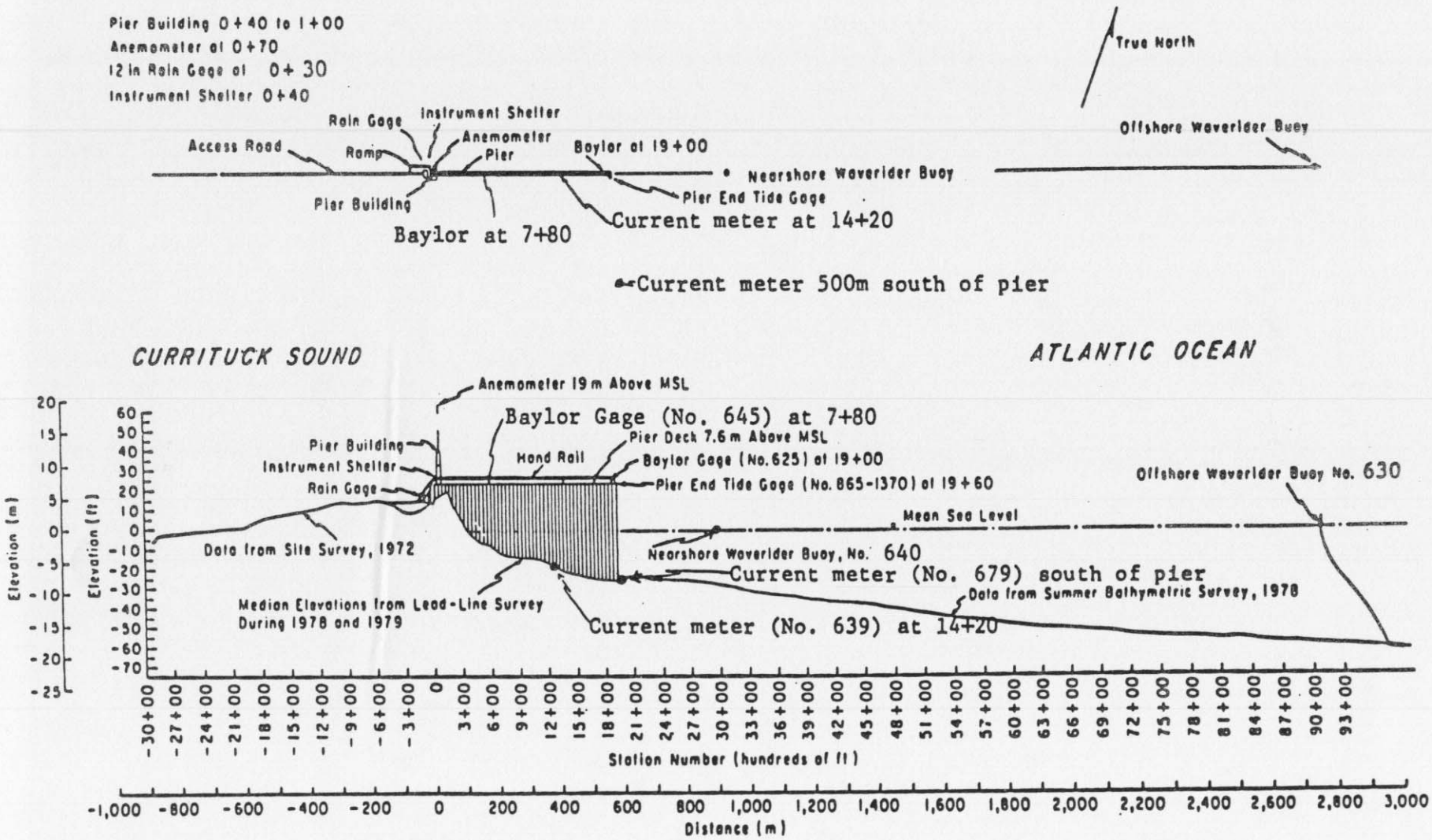


Figure 2. Instrument locations at FRF.

II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
   mm x .03937 = in

2. Millibars (mb) to inches of mercury (in Hg) -
   mb x 0.02953 = in Hg

3. Degrees Celcius (C) to degrees Fahrenheit (F) -
   (C x 9/5) + 32 = F

4. Meters per second (m/s) to knots (kn) -
   m/s x 1.943 = kn

TABLE 2: METEOROLOGICAL DATA

PART 1

JANUARY 1986

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	5	255	8.0	1014.2	0
	700	4	282	6.6	1014.6	0
	1300	10	14	7.4	1019.0	0
	1900	4	341	4.8	1022.7	0
2	100	6	43	6.7	1025.1	0
	700	2	353	2.8	1026.0	0
	1300	3	12	11.3	1025.6	0
	1900	2	117	9.4	1023.7	0
3	100	5	160	11.2	1019.1	0
	700	7	193	14.4	1013.1	0
	1300	9	257	13.5	1009.4	0
	1900	5	254	10.2	1012.8	0
4	100	5	343	5.3	1018.5	0
	700	9	21	7.6	1021.8	0
	1300	2	66	9.6	1021.7	0
	1900	3	65	9.7	1017.5	0
5	100	4	196	11.9	1010.3	0
	700	3	245	7.9	1007.6	0
	1300	7	296	10.0	1008.4	0
	1900	7	274	6.2	1016.1	0
6	100	9	256	3.3	1018.0	0
	700	9	244	3.2	1018.2	0
	1300	8	245	9.5	1016.7	0
	1900	5	245	8.1	1018.7	0
7	100	3	295	5.9	1020.0	0
	700	10	28	6.4	1022.1	0
	1300	13	0	3.7	1023.1	0
	1900	9	326	-.3	1027.6	0
8	100	13	348	-1.3	1032.4	0
	700	8	321	-4.2	1035.4	0
	1300	8	344	-.9	1036.8	0
	1900	5	320	-2.3	1038.5	0
9	100	5	302	-2.4	1037.5	0
	700	3	292	-3.5	1035.4	0
	1300	4	224	3.1	1030.7	0
	1900	4	210	3.6	1027.7	0
10	100	6	234	2.6	1024.9	0
	700	4	214	3.9	1021.9	0
	1300	5	233	8.0	1018.2	0
	1900	3	316	7.7	1017.2	0
11	100	14	11	7.3	1016.5	0
	700	14	8	5.1	1018.2	0
	1300	11	352	5.0	1019.9	0
	1900	6	348	4.0	1022.6	0
12	100	1	247	.6	1022.2	0
	700	4	206	1.7	1020.9	0
	1300	6	203	10.3	1010.0	0
	1900	8	200	7.7	1011.7	0
13	100	5	215	6.6	1009.0	0
	700	5	285	4.1	1005.3	0
	1300	0		8.6	1006.0	0
	1900	UPS Power Problem			1004.6	0
14	100				1010.4	0
	700	4	283	-1.7	1018.5	0
	1300	1	179	1.1	1015.5	0
	1900	0		-1.7	1013.8	0
15	100	7	325	-.1	1019.4	0
	700	6	323	-2.3	1028.1	0
	1300	6	11	-.4	1031.4	0
	1900	0		-1.3	1033.2	0
16	100	3	164	-1.5	1033.3	0
	700	3	181	.7	1033.4	0
	1300	4	206	10.1	1032.7	0
	1900	1	184	5.6	1027.7	0

TABLE 2: METEOROLOGICAL DATA

PART 2

JANUARY 1986

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	3	199	5.5	1027.4	0
	700	4	207	7.2	1026.0	0
	1300	4	222	13.7	1029.2	0
	1900	5	164	13.3	1028.9	0
18	100	4	193	11.9	1027.1	0
	700	3	200	12.6	1026.2	0
	1300	2	124	13.7	1023.2	0
	1900	4	152	13.4	1020.6	0
19	100	6	93	11.6	1016.1	0
	700	7	153	14.9	1010.7	6
	1300	3	205	14.0	1002.6	13
	1900	4	190	12.5	999.6	0
20	100	8	219	9.7	999.2	0
	700	10	223	6.4	1001.1	0
	1300	11	262	7.7	1002.8	0
	1900	7	265	8.4	1006.3	0
21	100	7	273	4.0	1012.7	0
	700	6	299	3.0	1017.7	0
	1300	4	240	8.8	1019.6	0
	1900	3	191	7.4	1021.5	0
22	100	4	200	6.6	1021.9	0
	700	4	207	6.7	1021.9	0
	1300	5	201	16.4	1019.6	0
	1900	6	197	13.1	1018.3	0
23	100	16	2	8.4	1022.6	0
	700	12	20	7.2	1024.5	0
	1300	14	10	5.3	1024.0	0
	1900	14	11	5.5	1024.4	0
24	100	13	13	5.0	1025.6	0
	700	13	8	5.0	1028.1	0
	1300	13	12	7.5	1029.8	0
	1900	12	50	7.8	1030.5	0
25	100	10	55	8.7	1029.6	0
	700	3	95	8.9	1026.1	3
	1300	5	192	11.8	1022.7	0
	1900	5	144	9.2	1019.7	0
26	100	5	161	13.8	1013.6	14
	700	5	212	11.9	1008.7	8
	1300	2	275	8.8	1004.6	0
	1900	8	347	6.0	1000.4	0
27	100	8	289	3.2	997.0	0
	700	0		2.4	997.9	0
	1300	10	242	2.0	996.8	0
	1900	6	270	-1.3	998.4	0
28	100	11	273	-4.6	1005.3	0
	700	10	275	-7.7	1013.1	0
	1300	9	248	-4.3	1015.3	0
	1900	8	266	-3.6	1017.1	0
29	100	6	268	-4.0	1019.4	0
	700	5	218	-1.6	1019.6	0
	1300	3	180	6.8	1013.4	0
	1900	5	242	5.1	1011.3	0
30	100	4	328	1.8	1012.0	0
	700	9	328	-.7	1021.4	0
	1300	8	329	.9	1024.4	0
	1900	6	330	-.2	1027.6	0
31	100	4	304	-.6	1029.0	0
	700	3	298	-.7	1030.4	0
	1300	1	59	4.4	1030.1	0
	1900	3	161	2.4	1030.2	0

III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage Nos. 625 and 645) and Waverider buoys (CERC gage Nos. 630 and 640, Table 1 and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20- minute records.

Wave height (Hmo) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period (Tp) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the Hmo and Tp values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA PART 1

JANUARY 1986

GAGE		645		625		640		630	
		Baylor at 7+80		Baylor at 19+00		Nearshr Wvrdr		Farshr Wvrdr	
DAY	TIME	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)
1	1	.22	10.89	.39	10.89	.37	12.34	Gage Inoperative	
	7	.22	6.40	.39	7.42	.37	10.89		
	13	1.41	5.31	1.27	5.63	1.35	5.31		
	19	1.07	5.63	1.18	5.31	1.12	5.63		
2	1	.88	5.63	.92	5.99	.93	9.75		
	7	.54	9.75	.78	9.75	.75	9.75		
	13	.48	9.75	.62	9.75	.64	8.83		
	19	*		.60	7.42	.61	9.75	.66	9.75
3	1	.43	9.75	.55	8.06	.59	9.75	.69	8.06
	7	.51	4.32	.78	4.53	.75	4.76	.71	4.53
	13	.59	6.87	.79	6.87	.88	6.87	1.16	6.87
	19	.47	7.42	.65	8.06	.64	7.42	.84	8.06
4	1	.29	6.87	.41	8.83	.44	8.83	.62	7.42
	7	1.04	5.02	1.20	5.02	1.08	4.76	1.14	5.02
	13	.83	5.31	.87	5.63	.87	5.99	1.17	5.99
	19	.57	5.02	.70	6.40	.62	8.06	.72	6.87
5	1	.54	3.51	.65	3.51	.71	9.75	.79	9.75
	7	.56	5.99	.66	6.40	.62	6.87	.78	6.40
	13	.45	3.15	.56	10.89	.57	3.51	.71	3.38
	19	.54	4.53	.55	9.75	.49	9.75	.76	4.32
6	1	.46	4.76	.47	5.02	.52	5.31	.80	5.31
	7	*		.31	9.75	.28	9.75	*	
	13			.26	14.22	.22	9.75		
	19	.24	5.02	.15	10.89	.28	7.42	.35	6.87
7	1	.21	5.63			.26	7.42	.28	7.42
	7	1.28	5.99			1.29	5.63	1.53	5.99
	13	1.37	5.31	1.57	5.99			1.75	5.99
	19	1.31	6.40	1.73	6.40	*		1.94	6.87
8	1	1.31	6.87	1.98	6.87			2.24	6.40
	7	1.40	6.40	1.45	7.42			1.98	6.87
	13	1.17	8.06	1.86	8.83	1.58	7.42	1.93	8.83
	19	.84	5.31	1.10	8.06	1.07	8.83	1.30	8.83
9	1	.50	3.95	.98	8.06	.91	6.87	.95	8.06
	7	.45	8.83	.63	8.06	.65	9.75	.84	8.83
	13	.19	10.89	.66	7.42	.57	7.42	.66	7.42
	19	.17	10.89	.40	10.89	.45	10.89	.51	9.75
10	1	.09	3.64	.33	8.06	.33	8.83	.42	9.75
	7	.17	9.75	.23	9.75	.23	9.75	.34	8.83
	13	.07	9.75	.23	9.75	.20	9.75	.32	9.75
	19	.15	9.75	.21	9.75	.20	8.83	.27	8.83
11	1	1.11	4.32	1.34	4.53	1.24	4.32	1.18	4.13
	7	1.68	7.42	2.02	6.87	2.01	6.87	2.51	6.87
	13	1.14	6.40	1.86	8.06	1.66	6.87	1.74	8.06
	19	1.09	5.31	1.18	8.06	1.26	8.06	1.38	7.42
12	1	.80	5.99	1.04	7.42	.91	6.87	1.06	7.42
	7	.47	8.83	.78	6.40	.73	6.87	.89	6.40
	13	.36	9.75	.63	8.06	.54	9.75	.67	9.75
	19	.49	9.75	.71	9.75	.66	9.75	.82	9.75
13	1	.35	9.75	.56	9.75	.49	9.75	.64	9.75
	7	.29	9.75	.45	9.75	.44	8.83	.54	9.75
	13	1.05	5.63	1.25	5.31	1.12	5.31	1.34	5.31
	19	UPS Power Problems							
14	1								
	7	.94	5.99	.89	6.40	.93	5.63	1.12	6.87
	13	.62	5.63	.74	5.99	.77	6.40	.85	6.40
	19	.38	4.76	.79	8.06	.71	8.06	.83	7.42
15	1	.84	4.13	.88	4.53	.94	3.79	1.05	4.13
	7	1.14	5.99	1.34	6.40	1.35	6.40	1.69	5.99
	13	.93	6.40	1.24	6.40	1.19	6.87	1.36	6.87
	19	.93	5.31	1.23	7.42	1.20	7.42	1.39	8.06
16	1	.49	6.40	.76	6.87	.78	5.99	.80	8.06
	7	.46	2.48	.67	6.87	.61	6.87	.67	6.87
	13	.19	9.75	.47	10.89	.46	10.89	.62	8.83
	19	.20	16.79	.45	8.06	.42	8.83	.43	8.83

*=Electronic problems

TABLE 3: WAVE DATA PART 2

JANUARY 1986

GAGE		645 Baylor at 7+80		625 Baylor at 19+00		640 Neersht Wvrdr		630 Farsht Wvrdr	
DAY	TIME	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)
17	1	.20	8.06	.40	8.83	.39	9.75	.35	8.83
	7	.22	9.75	.39	9.75	.39	10.89	.42	10.89
	13	.18	9.75	.35	10.89	.35	10.89	.39	8.83
	19	.23	9.75	.43	10.89	.33	8.83	.43	10.89
18	1	.36	4.32	.41	9.75	.46	9.75	.53	9.75
	7	.35	4.76	.47	8.83	.47	9.75	.60	8.83
	13	.30	4.32	.44	9.75	.44	9.75	.58	4.32
	19	.34	9.75	.46	9.75	.42	9.75	.49	9.75
19	1	.36	9.75	.42	9.75	.43	10.89	.58	9.75
	7	.84	6.87	.98	6.87	.98	6.87	1.33	6.87
	13	.81	6.87	.89	6.40	.87	7.42	1.12	9.75
	19	1.04	9.75	1.17	8.06	1.21	8.83	1.45	9.75
20	1	.91	9.75	.99	8.83	1.01	9.75	1.33	8.83
	7	.76	10.89	1.06	10.89	.96	10.89	1.48	10.89
	13	.34	10.89	.61	10.89	.65	8.83	1.01	10.89
	19	.30	10.89	.58	10.89	.53	10.89	.74	10.89
21	1	.27	10.89	.53	12.34	.56	10.89	.72	9.75
	7	.57	3.38	.78	10.89	.77	9.75	.96	10.89
	13	.62	9.75	.76	10.89	.72	10.89	.77	9.75
	19	.30	9.75	.60	10.89	.57	10.89	.59	9.75
22	1	.26	9.75	.51	9.75	.51	9.75	.54	9.75
	7	.24	9.75	.44	10.89	.46	9.75	.56	9.75
	13	.32	10.89	.50	10.89	.48	9.75	.53	9.75
	19	*		.52	10.89	.47	10.89	.54	9.75
23	1	1.20	5.02	1.49	5.02	1.41	5.02	1.71	5.02
	7	1.39	5.63	1.34	5.63	1.45	5.99	1.67	5.99
	13	.97	5.99	1.92	6.40	1.85	6.40	2.23	6.87
	19	1.20	6.87	1.84	6.87	1.93	5.99	2.42	6.40
24	1	1.03	6.87	2.05	6.87	1.84	6.87	2.11	6.87
	7	1.33	7.42	2.10	7.42	2.14	8.06	2.37	6.40
	13	1.00	7.42	2.09	6.87	2.10	7.42	2.19	7.42
	19	1.25	10.89	2.34	10.89	2.52	8.83	2.59	7.42
25	1	1.25	12.34	2.67	10.89	2.81	10.89	2.74	10.89
	7	1.57	5.99	2.17	7.42	2.10	8.83	2.21	8.06
	13	1.33	6.87	2.04	10.89	2.08	10.89	1.96	9.75
	19	1.32	12.34	1.86	7.42	2.02	6.87	2.20	8.06
26	1	1.33	8.83	1.80	10.89	1.77	9.75	1.89	8.06
	7	1.54	8.06	1.86	8.83	2.05	8.83	2.43	8.83
	13	1.29	9.75	1.52	9.75	1.53	9.75	1.92	9.75
	19	1.21	9.75	1.40	10.89	1.56	9.75	1.58	10.89
27	1	.86	8.83	1.26	10.89	1.19	9.75	1.42	10.89
	7	.71	8.06	.94	10.89	.98	10.89	1.09	8.83
	13	.44	12.34	.76	12.34	*			
	19	.52	10.89	.67	9.75	.76	12.34	.89	9.75
28	1	.59	3.64	.79	10.89	.74	12.34	.85	12.34
	7	.51	4.76	.63	12.34	.74	12.34	.96	12.34
	13	.30	12.34	.55	10.89	.51	10.89	.66	10.89
	19	.20	14.22	.44	10.89	.41	12.34	.70	12.34
29	1	.28	14.22	.48	14.22	.44	14.22	.46	12.34
	7	.21	14.22	.37	14.22	.38	14.22	.42	12.34
	13	.31	4.32	.52	12.34	.46	12.34	.61	14.22
	19	.27	3.64	.42	14.22	.41	12.34	.50	10.89
30	1	.26	14.22	.45	12.34	.41	12.34	.47	12.34
	7	1.36	5.99	1.56	5.99	1.54	5.99	2.00	5.99
	13	1.05	5.31	1.27	5.63	1.34	5.31	1.37	5.02
	19	.92	5.99	1.16	8.06	1.16	6.87	1.41	6.87
31	1	.89	8.06	1.18	8.06	1.10	8.83	1.29	8.83
	7	.63	5.63	1.05	7.42	.95	8.06	1.10	7.42
	13	.53	7.42	.83	7.42	.88	5.63	.98	7.42
	19	.44	8.83	.87	8.83	.82	8.83	.87	7.42
	MEAN	.68	7.70	.92	8.76	.89	8.67	1.09	8.34
	STD	.42	2.84	.55	2.55	.55	2.24	.62	2.51

*=Electronic problems

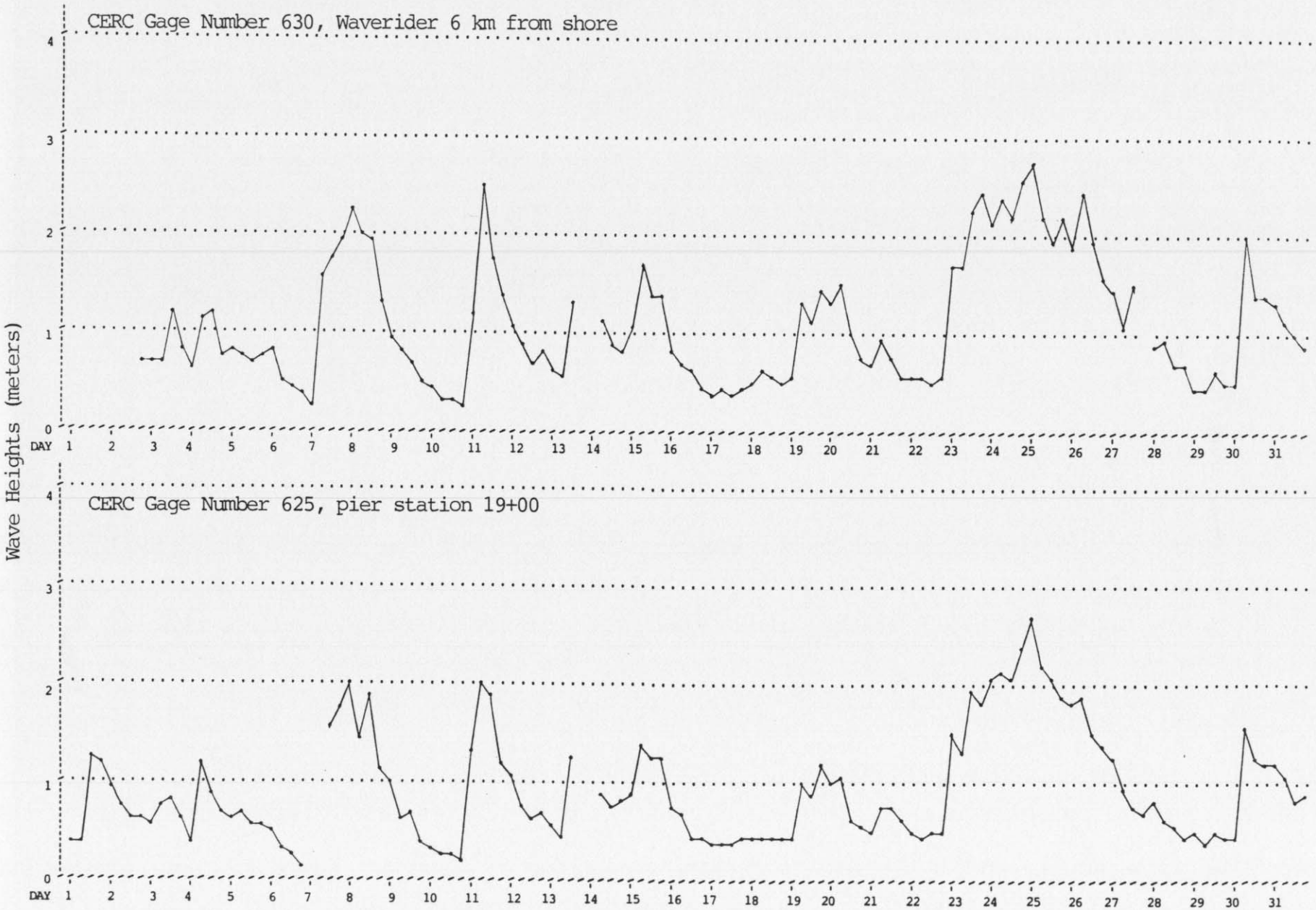


FIGURE 3. Time History of Wave Heights and Periods - January 1986 Part I: Heights

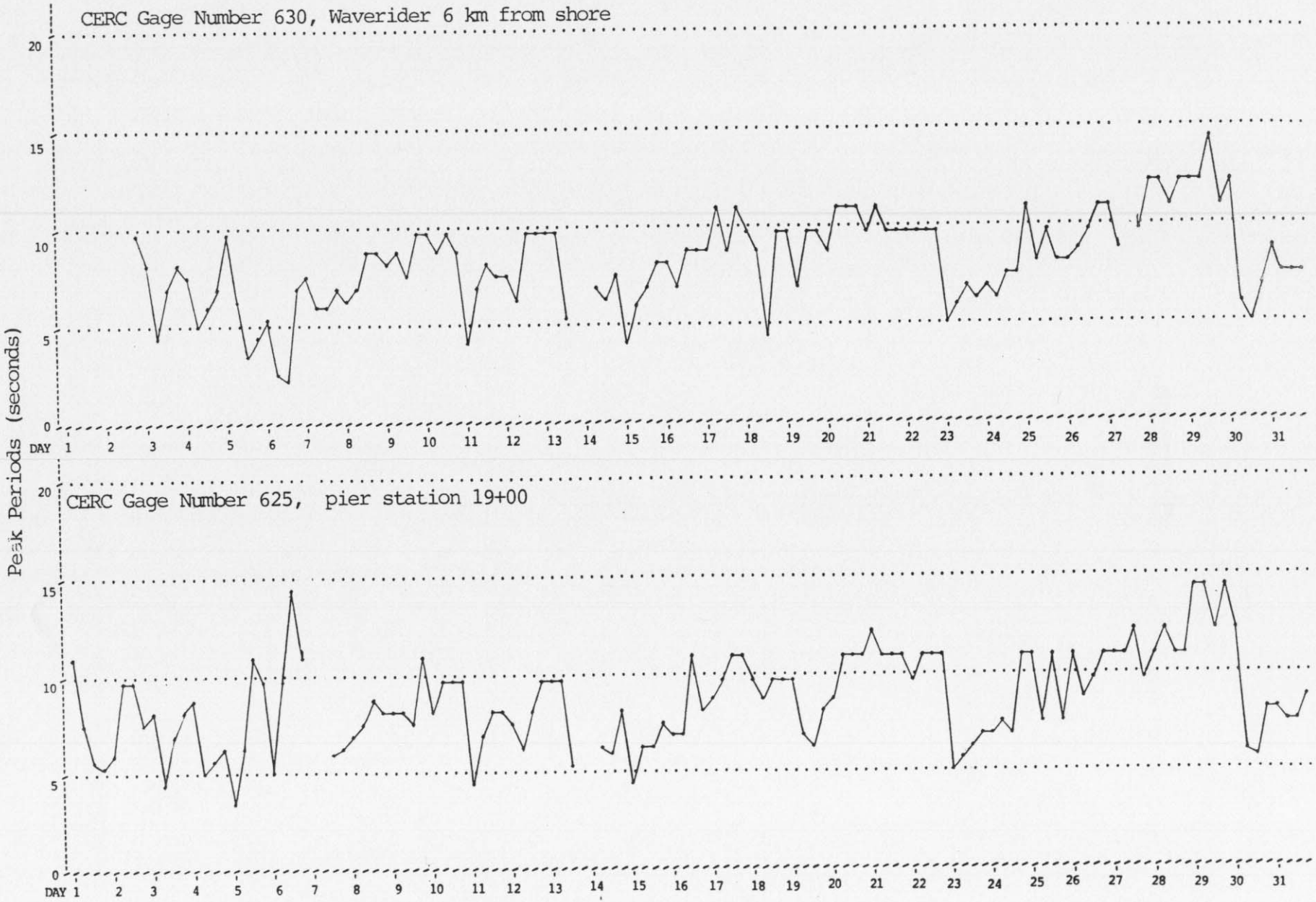


FIGURE 3. Time History of Wave Heights and Periods - January 1986 Part II: Periods

IV. CURRENT DATA

Current data (Table 4) are collected from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, alongshore currents flow either toward 340 (i.e. northward) or toward 160 (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

January 1986

		PIER MEASUREMENTS						BEACH MEASUREMENTS (500 UPDRIFT)					
		DYE AT 1900 (579m) (SURFACE)		CURRENT METER AT 1420 (433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM			DYE 12M OFFSHORE (SURFACE)		CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679		
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED	DIR
1	0100-Alongshore			4	N							6	N
	Cross-shore			5	OF							1	OF
	Resultant			6	30							7	345
1	0700-Alongshore	28	S	4	N		203	S		87	S	9	N
	Cross-shore	0	0	5	OF	119	0	0	North			1	OF
	Resultant	28	160	7	30		203	160				9	348
1	1300-Alongshore			16	S							29	S
	Cross-shore			2	ON							6	OF
	Resultant			16	168							29	148
1	1900-Alongshore			14	S							24	S
	Cross-shore			3	ON							5	OF
	Resultant			14	174							25	148
2	0100-Alongshore			12	S							23	S
	Cross-shore			1	ON							6	OF
	Resultant			12	164							24	145
2	0700-Alongshore	7	S	0			13	S		8	N	6	S
	Cross-shore	1	On	4	OF	128	13	Off	North			5	OF
	Resultant	7	166	4	70		19	115				8	116
2	1300-Alongshore			5	S							9	S
	Cross-shore			2	OF							8	OF
	Resultant			6	137							12	120
2	1900-Alongshore			5	S							10	S
	Cross-shore			1	ON							1	OF
	Resultant			5	167							10	155
3	0100-Alongshore			0								9	S
	Cross-shore			5	OF							2	OF
	Resultant			5	70							9	146
3	0700-Alongshore	0	0	7	N		38	N		71	N	2	S
	Cross-shore	4	Off	11	OF	128	10	Off	South			5	OF
	Resultant	4	70	13	38		39	354				6	90
3	1300-Alongshore			1	S							7	N
	Cross-shore			0								11	OF
	Resultant			1	160							13	39
3	1900-Alongshore			2	S							0	
	Cross-shore			3	OF							3	OF
	Resultant			4	98							3	70
4	0100-Alongshore			10	S							12	S
	Cross-shore			4	OF							12	OF
	Resultant			11	139							17	115
4	0700-Alongshore	25	S	10	S		34	S		55	S	16	S
	Cross-shore	13	Off	1	OF	152	14	Off	North			7	OF
	Resultant	28	133	10	156		36	138				18	137
4	1300-Alongshore			4	S							10	S
	Cross-shore			1	OF							9	OF
	Resultant			4	146							14	117
4	1900-Alongshore			2	S							8	S
	Cross-shore			3	OF							5	OF
	Resultant			3	104							10	129
5	0100-Alongshore			3	N							5	N
	Cross-shore			4	OF							4	OF
	Resultant			5	36							7	18
5	0700-Alongshore	0	0	1	S		44	N		20	N	2	S
	Cross-shore	3	Off	2	OF	143	9	Off	South			1	OF
	Resultant	3	70	2	105		44	351				3	134
5	1300-Alongshore			2	S							3	N
	Cross-shore			2	OF							2	OF
	Resultant			3	109							4	16
5	1900-Alongshore			5	S							12	S
	Cross-shore			1	OF							2	OF
	Resultant			5	145							13	146
6	0100-Alongshore			1	S							3	S
	Cross-shore			2	OF							2	OF
	Resultant			2	111							4	126
6	0700-Alongshore	27	N	4	N		18	N		39	N	10	N
	Cross-shore	8	Off	6	OF	135	16	Off	South			1	OF
	Resultant	28	357	7	35		24	20				10	348
6	1300-Alongshore			4	N							14	N
	Cross-shore			5	OF							4	ON
	Resultant			7	32							15	326
6	1900-Alongshore			3	N							9	N
	Cross-shore			5	OF							2	OF
	Resultant			6	41							9	350

KEY = ALL SPEEDS IN CM/SEC
N =NORTHWARD, SHORE PARALLEL
S =SOUTHWARD, SHORE PARALLEL
ON=ONSHORE
OF=OFFSHORE

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19400 (579m) (SURFACE)		CURRENT METER AT 14420(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#6[illegible]	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED	DIR
7	0100-Alongshore			2	N							8	N
	Cross-shore			5	OF							0	
	Resultant			6	49							8	340
7	0700-Alongshore	38	S	15	S		61	S		57	S	19	S
	Cross-shore	8	On	1	ON	150	15	On	North			8	OF
	Resultant	39	171	15	163		63	174				21	137
7	1300-Alongshore			24	S							34	S
	Cross-shore			5	ON							6	OF
	Resultant			25	171							34	149
7	1900-Alongshore			26	S							52	S
	Cross-shore			6	ON							8	OF
	Resultant			27	173							53	152
8	0100-Alongshore			42	S							60	S
	Cross-shore			9	ON							6	OF
	Resultant			43	172							60	154
8	0700-Alongshore	55	S	15	S		76	S		36	S	41	S
	Cross-shore	11	Off	6	ON	176	11	On	North			3	OF
	Resultant	57	149	16	182		77	169				41	156
8	1300-Alongshore			24	S							41	S
	Cross-shore			5	ON							5	OF
	Resultant			25	172							41	153
8	1900-Alongshore			15	S							31	S
	Cross-shore			6	ON							3	OF
	Resultant			16	182							31	154
9	0100-Alongshore			5	S							16	S
	Cross-shore			1	ON							3	OF
	Resultant			5	171							16	149
9	0700-Alongshore	27	S	9	S		25	S		3	S	7	S
	Cross-shore	7	Off	0		131	2	Off	North			4	OF
	Resultant	27	146	9	160		26	154				8	130
9	1300-Alongshore			4	S							9	S
	Cross-shore			1	OF							6	OF
	Resultant			4	146							11	126
9	1900-Alongshore			2	S							0	
	Cross-shore			3	OF							6	OF
	Resultant			4	104							6	70
10	0100-Alongshore			5	N							18	N
	Cross-shore			6	OF							1	OF
	Resultant			8	30							18	343
10	0700-Alongshore	22	N	6	N		5	N		2	N	16	N
	Cross-shore	14	Off	6	OF	125	1	Off	South			3	ON
	Resultant	26	13	8	25		5	354				16	329
10	1300-Alongshore			2	N							12	N
	Cross-shore			5	OF							0	
	Resultant			5	48							12	340
10	1900-Alongshore			1	N							8	N
	Cross-shore			4	OF							0	
	Resultant			4	56							8	340
11	0100-Alongshore			13	S							26	S
	Cross-shore			1	ON							8	OF
	Resultant			13	164							27	143
11	0700-Alongshore	47	S	38	S		102	S		64	S	50	S
	Cross-shore	12	On	9	ON	176	15	On	North			9	OF
	Resultant	48	174	39	173		103	169				51	150
11	1300-Alongshore			28	S							49	S
	Cross-shore			4	ON							8	OF
	Resultant			28	168							50	151
11	1900-Alongshore			22	S							33	S
	Cross-shore			9	ON							6	OF
	Resultant			24	182							34	150
12	0100-Alongshore			4	S							12	S
	Cross-shore			4	OF							7	OF
	Resultant			6	115							14	130
12	0700-Alongshore	9	N	4	S		23	N		11	N	8	S
	Cross-shore	6	Off	5	OF	125	8	Off	South			4	OF
	Resultant	11	11	6	109		25	359				9	133
12	1300-Alongshore			2	N							9	N
	Cross-shore			6	OF							6	OF
	Resultant			6	52							11	14
12	1900-Alongshore			12	N							24	N
	Cross-shore			11	OF							0	
	Resultant			16	23							24	340

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ON=ONSHORE
OF=OFFSHORE

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR		LOCATION	SPEED	DIR	SPEED	DIR
13	0100-Alongshore			4	N								13	N
	Cross-shore			8	OF								2	OF
	Resultant			9	43								13	349
13	0700-Alongshore	13	S	3	N		34	S			20	S	10	N
	Cross-shore	2	On	7	OF	119	10	On		North			0	
	Resultant	13	169	8	47		35	177					10	340
13	1300-Alongshore			15	S								26	S
	Cross-shore			1	ON								6	OF
	Resultant			15	164								27	147
13	1900-Alongshore													
	Cross-shore			UPS POWER PROBLEMS										
	Resultant													
14	0100-Alongshore													
	Cross-shore													
	Resultant													
14	0700-Alongshore	0	0	6	S		34	S			41	S	4	S
	Cross-shore	7	Off	3	OF	137	15	Off		North			2	OF
	Resultant	7	70	7	136		37	136					4	132
14	1300-Alongshore			7	S								2	S
	Cross-shore			3	OF								3	OF
	Resultant			7	138								4	102
14	1900-Alongshore			2	S								5	N
	Cross-shore			5	OF								3	OF
	Resultant			5	97								6	9
15	0100-Alongshore			11	S								20	S
	Cross-shore			1	OF								6	OF
	Resultant			11	157								21	143
15	0700-Alongshore	41	S	12	S		102	S			89	S	25	S
	Cross-shore	0	0	1	ON	213	30	Off		North			4	OF
	Resultant	41	160	12	167		106	143					25	151
15	1300-Alongshore			11	S								26	S
	Cross-shore			1	OF								7	OF
	Resultant			11	152								27	146
15	1900-Alongshore			8	S								21	S
	Cross-shore			0									6	OF
	Resultant			8	160								22	145
16	0100-Alongshore			8	S								13	S
	Cross-shore			0									5	OF
	Resultant			8	160								14	141
16	0700-Alongshore	22	N	6	N		36	N			4	N	14	N
	Cross-shore	9	Off	7	OF	116	27	Off		South			2	OF
	Resultant	23	2	9	29		45	17					14	346
16	1300-Alongshore			2	N								12	N
	Cross-shore			6	OF								1	ON
	Resultant			7	53								12	337
16	1900-Alongshore			4	N								12	N
	Cross-shore			9	OF								2	OF
	Resultant			9	45								12	350
17	0100-Alongshore			1	N								4	N
	Cross-shore			6	OF								2	OF
	Resultant			6	63								4	7
17	0700-Alongshore	14	N	1	N		27	N			25	N	4	N
	Cross-shore	4	Off	6	OF	140	13	Off		South			0	
	Resultant	14	357	6	62		30	7					4	340
17	1300-Alongshore			1	N								7	N
	Cross-shore			6	OF								0	
	Resultant			6	61								7	340
17	1900-Alongshore			2	N								8	N
	Cross-shore			7	OF								1	OF
	Resultant			7	56								8	349
18	0100-Alongshore			1	N								5	N
	Cross-shore			6	OF								3	OF
	Resultant			6	58								6	5
18	0700-Alongshore	14	N	2	N		34	N			16	N	7	N
	Cross-shore	8	Off	6	OF	149	3	Off		South			2	OF
	Resultant	16	11	7	54		34	346					7	354
18	1300-Alongshore			2	N								9	N
	Cross-shore			7	OF								4	OF
	Resultant			7	51								10	5
18	1900-Alongshore			0									3	N
	Cross-shore			6	OF								2	OF
	Resultant			6	70								3	15

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OF=OFFSHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR		LOCATION	SPEED	DIR	SPEED	DIR
18	0100-Alongshore			1	S								0	
	Cross-shore			4	OF								5	OF
	Resultant			5	83								5	70
19	0700-Alongshore	40	N	5	N		152	N			71	N	9	N
	Cross-shore	0	0	7	OF	152	0	0		South			5	OF
	Resultant	40	340	8	34		152	340					10	8
19	1300-Alongshore			2	N								6	N
	Cross-shore			4	OF								2	OF
	Resultant			4	46								6	355
19	1900-Alongshore			1	N								4	N
	Cross-shore			6	OF								2	OF
	Resultant			6	61								4	9
20	0100-Alongshore			4	N								10	N
	Cross-shore			7	OF								1	OF
	Resultant			8	37								10	345
20	0700-Alongshore	20	N	6	N		51	N			24	N	10	N
	Cross-shore	10	Off	9	OF	201	25	Off		South			0	
	Resultant	22	7	11	36		57	7					10	340
20	1300-Alongshore			7	N								17	N
	Cross-shore			8	OF								0	
	Resultant			11	29								17	340
20	1900-Alongshore			1	N								5	N
	Cross-shore			4	OF								2	OF
	Resultant			4	62								5	8
21	0100-Alongshore			1	N								8	N
	Cross-shore			5	OF								2	OF
	Resultant			5	54								8	356
21	0700-Alongshore	4	S	1	S		12	S			42	S	4	N
	Cross-shore	3	Off	4	OF	140	4	Off		North			3	OF
	Resultant	5	125	4	80		13	141					5	17
21	1300-Alongshore			1	N								9	N
	Cross-shore			9	OF								1	OF
	Resultant			9	66								9	344
21	1900-Alongshore			1	N								7	N
	Cross-shore			5	OF								4	OF
	Resultant			5	54								8	11
22	0100-Alongshore			4	N								14	N
	Cross-shore			6	OF								3	OF
	Resultant			7	35								14	350
22	0700-Alongshore	28	N	4	N		41	N			21	N	11	N
	Cross-shore	6	Off	6	OF	140	8	Off		South			1	OF
	Resultant	28	351	7	38		41	351					11	343
22	1300-Alongshore			4	N								14	N
	Cross-shore			6	OF								0	
	Resultant			7	36								14	340
22	1900-Alongshore			3	N								13	N
	Cross-shore			6	OF								3	OF
	Resultant			6	43								13	352
23	0100-Alongshore			22	S								29	S
	Cross-shore			5	ON								7	OF
	Resultant			22	172								30	147
23	0700-Alongshore	51	S	24	S		102	S				S	40	S
	Cross-shore	0	0	7	ON	176	0	0		North			9	OF
	Resultant	51	160	25	176		102	160					41	148
23	1300-Alongshore			35	S								50	S
	Cross-shore			7	ON								7	OF
	Resultant			36	172								50	151
23	1900-Alongshore			35	S								55	S
	Cross-shore			8	ON								9	OF
	Resultant			36	174								56	150
24	0100-Alongshore			35	S								49	S
	Cross-shore			8	ON								8	OF
	Resultant			36	173								50	150
24	0700-Alongshore	0	0	29	S		102	S			86	S	49	S
	Cross-shore	0	0	7	ON	201	0	0		North			8	OF
	Resultant	0	0	30	174		102	160					50	150
24	1300-Alongshore			33	S								46	S
	Cross-shore			8	ON								6	OF
	Resultant			34	174								46	153
[illegible]	1900-Alongshore			33	S								42	S
	Cross-shore			6	ON								9	OF
	Resultant			34	170								43	148

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ON=ONSHORE
OF=OFFSHORE

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)				
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR		LOCATION	SPEED	DIR	SPEED	DIR
25	0100-Alongshore			10	S								28	S
	Cross-shore			13	OF								8	OF
	Resultant			17	107								29	144
25	0700-Alongshore	12	S	5	S		36	S			9	S	19	S
	Cross-shore	7	On	1	ON	201	18	Off		North			8	OF
	Resultant	14	191	5	169		40	133					21	138
25	1300-Alongshore			13	N								4	N
	Cross-shore			48	OF								27	OF
	Resultant			50	55								27	62
25	1900-Alongshore			11	N								6	N
	Cross-shore			14	OF								12	OF
	Resultant			17	32								14	46
26	0100-Alongshore			8	N								7	S
	Cross-shore			10	OF								9	OF
	Resultant			13	30								11	108
26	0700-Alongshore	0	0	9	N		102	N			61	N	4	N
	Cross-shore	0	0	15	OF	176	0	0		South			1	ON
	Resultant	0	0	17	39		102	340					4	322
26	1300-Alongshore			11	N								5	S
	Cross-shore			17	OF								6	OF
	Resultant			20	36								8	108
26	1900-Alongshore			1	S								13	S
	Cross-shore			1	OF								13	OF
	Resultant			2	112								18	116
27	0100-Alongshore			14	S								21	S
	Cross-shore			2	OF								12	OF
	Resultant			14	151								24	131
27	0700-Alongshore	10	S	10	S		18	N			0	0	17	S
	Cross-shore	4	Off	1	OF	140	9	Off		South			11	OF
	Resultant	11	141	10	154		21	7					20	127
27	1300-Alongshore			4	S								12	S
	Cross-shore			2	OF								3	OF
	Resultant			5	134								13	145
27	1900-Alongshore			13	S								19	S
	Cross-shore			3	ON								4	OF
	Resultant			14	172								20	150
28	0100-Alongshore			13	S								23	S
	Cross-shore			3	ON								3	OF
	Resultant			13	172								23	151
28	0700-Alongshore	20	S	6	S		16	S			15	S	10	S
	Cross-shore	20	Off	1	ON	126	12	Off		North			0	
	Resultant	29	115	6	174		20	123					10	160
28	1300-Alongshore			6	S								7	S
	Cross-shore			5	OF								7	OF
	Resultant			8	120								10	116
28	1900-Alongshore			0									8	N
	Cross-shore			3	OF								1	ON
	Resultant			3	70								8	335
29	0100-Alongshore			7	S								6	S
	Cross-shore			0									4	OF
	Resultant			7	160								8	125
29	0700-Alongshore	36	N	2	N		11	N			13	N	14	N
	Cross-shore	4	Off	4	OF	128	3	Off		South			0	
	Resultant	36	346	4	43		11	354					14	340
29	1300-Alongshore			5	N								14	N
	Cross-shore			5	OF								0	
	Resultant			7	26								14	340
29	1900-Alongshore			2	N								14	N
	Cross-shore			4	OF								1	ON
	Resultant			4	45								14	335
30	0100-Alongshore			0									3	N
	Cross-shore			3	OF								2	OF
	Resultant			3	70								3	15
30	0700-Alongshore	61	S	23	S		102	S			51	S	42	S
	Cross-shore	6	Off	6	ON	176	10	Off		North			6	OF
	Resultant	61	154	24	175		102	154					42	151
30	1300-Alongshore			18	S								40	S
	Cross-shore			5	ON								6	OF
	Resultant			19	177								41	152
30	1900-Alongshore			19	S								29	S
	Cross-shore			6	ON								4	OF
	Resultant			20	176								30	153
31	0100-Alongshore			15	S								29	S
	Cross-shore			7	ON								4	OF
	Resultant			17	185								30	152
31	0700-Alongshore	29	S	10	S		34	S			38	S	22	S
	Cross-shore	0	0	4	ON	176	0	0		North			7	OF
	Resultant	29	160	11	183		34	160					23	143
31	1300-Alongshore			14	S								25	S
	Cross-shore			1	ON								9	OF
	Resultant			14	164								26	140
31	1900-Alongshore			6	S								10	S
	Cross-shore			1	OF								4	OF
	Resultant			6	150								11	141

KEY = ALL SPEEDS IN CM/SEC
N =NORTHWARD, SHORE PARALLEL
S =SOUTHWARD, SHORE PARALLEL
ON=ONSHORE
OF=OFFSHORE

V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is orientated 70 east of true north; consequently, wave angles greater than 70 imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

SUPPLEMENTAL OBSERVATIONS
January 1986

DAY	TIME	WAVE APPROACH ANGLE AT PIER END (° from True N) PRIMARY	SECONDARY	RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE (M)	WATER CHARACTERISTICS AT PIER END TEMP (°C)	DENSITY (g/cc)	SECCI VIS (M)
1	1020	20		30	27	9.4	1.0248	1.2
2	0815	25	100		24	9.1		1.8
3	0800	120			29	8.5		2.4
4	0850	40		60	81	8.6	Hydrometer broken	1.5
5	0900	115		80	52	8.8		2.1
6	0825	No observation			14	8.2		1.8
7	0805	40		40	52	9.5		1.2
8	0800	45		50	122	6.4	1.0243	.9
9	0805	100	40		27	4.8	1.0216	1.5
10	0805	110			8	7.0	1.0235	1.8
11	0930	45		60	182	7.8	1.0250	.6
12	0855	20	120		14	7.3	1.0246	2.1
13	0810	No observation			14	7.7	1.0245	1.8
14	0840	25			49	6.8	1.0245	1.5
15	0800	25		30	164	6.0	1.0246	.9
16	0750	60		60	67	5.3	1.0242	.6
17	0810	80		70	33	7.7	1.0248	1.2
18	0805	100		75	40	8.6	1.0249	1.5
19	0925	125		130	85	9.4	1.0250	1.8
20	0730	90	130	85	146	8.5	1.0260	.6
21	0850	75	10	80	56	9.3	1.0259	1.2
22	0800	85		80	61	9.5	1.0259	1.2
23	0800	40		50	181	9.6	1.0262	.9
24	0815	40		50	217	7.0	1.0255	.9
25	0815	70		70	173	6.6	1.0236	.9
26	0825	110			240	7.7	1.0247	.6
27	0810	80		80	48	7.6	1.0240	.9
28	0815	No observation			30	5.8	1.0240	.9
29	0810	No observation				5.8	1.0245	.9
30	0805	40		40	205	6.3	1.0251	.6
31	0815	50	40	60	95	5.5	1.0246	.9

VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865- 1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the range of each cycle while Figure 5 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects on both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

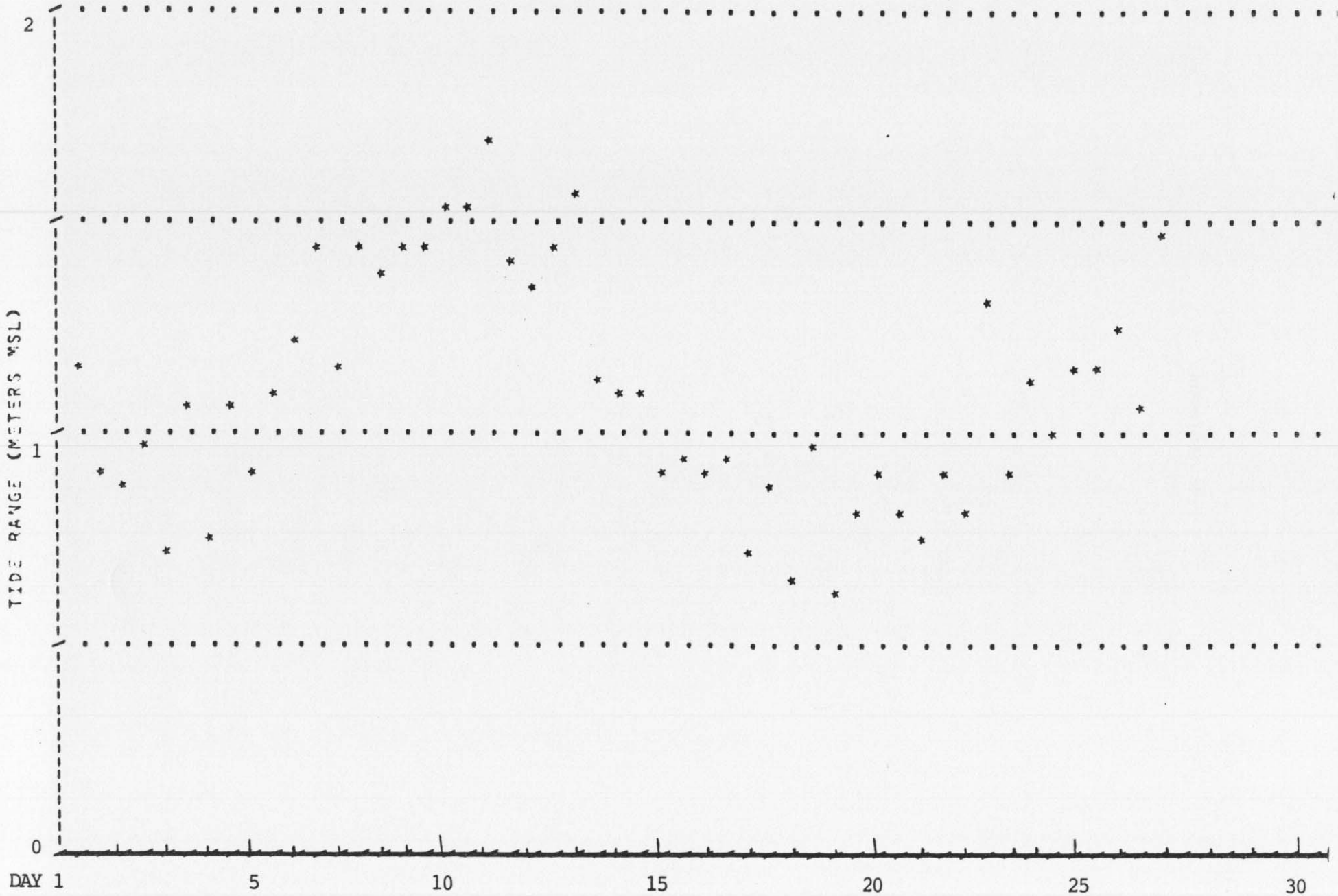

FIGURE 4. Time History of Tide Range, January 1986 (Gage No. 865-1370)

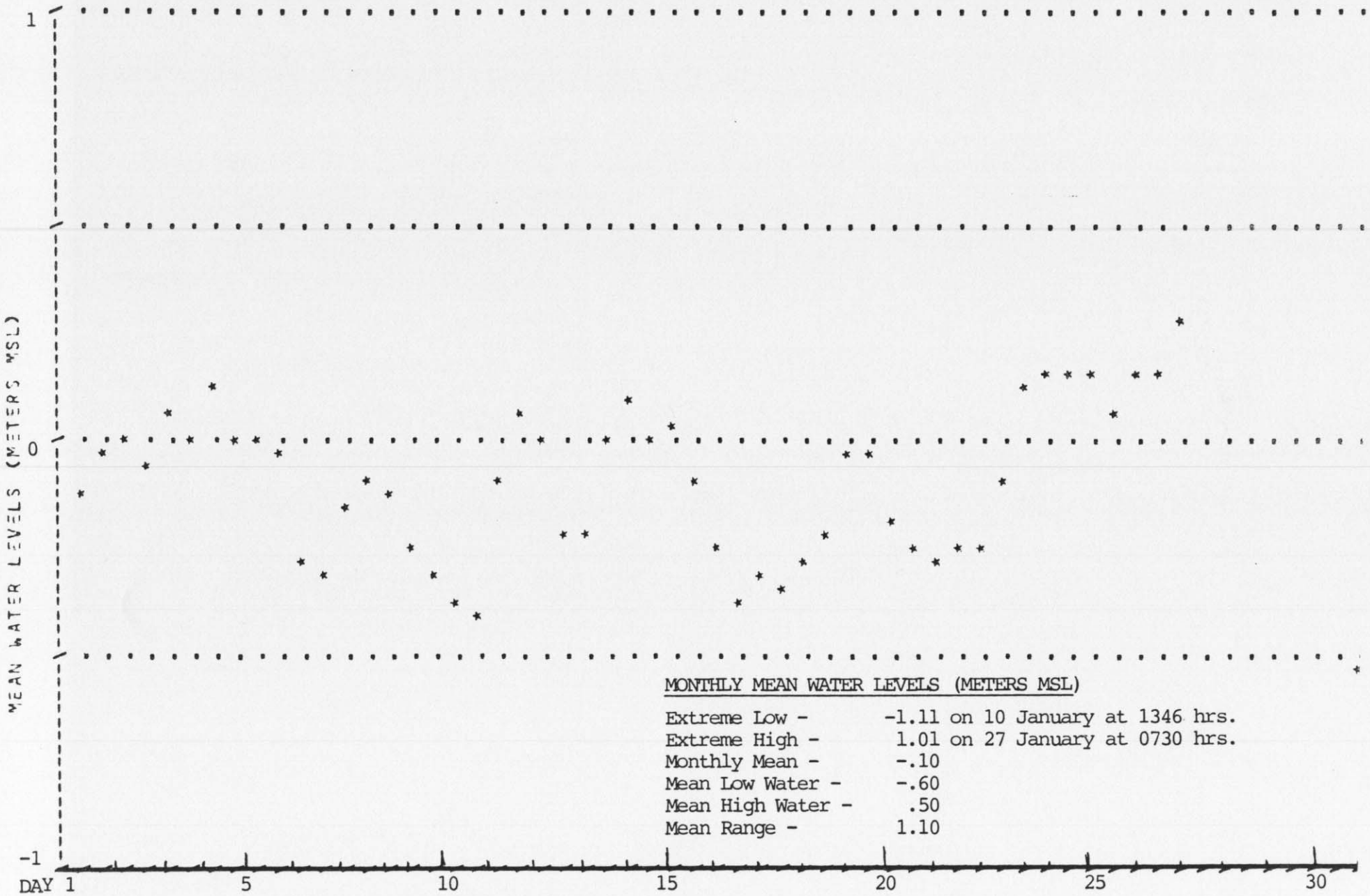

FIGURE 5. Time History of Mean Water Levels, January 1986 (Gage No. 865-1370)

TABLE 6

WATER LEVELS (METERS MSL)
Tidal Characteristics
January 1986

MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-.66	.50	-.13	1.16
1	1637	-.49	.43	-.03	.91
2	702	-.40	.48	.01	.88
2	1928	-.52	.44	-.05	.96
3	753	-.33	.33	.05	.72
3	2018	-.55	.53	-.01	1.08
4	843	-.25	.52	.13	.76
4	2108	-.51	.54	-.01	1.05
5	934	-.42	.48	.01	.90
5	2159	-.55	.53	-.03	1.09
6	1024	-.78	.44	-.28	1.22
6	2249	-.95	.49	-.32	1.44
7	1114	-.73	.41	-.16	1.15
7	2340	-.75	.70	-.11	1.45
8	1205	-.73	.65	-.13	1.38
9	30	-.91	.51	-.26	1.42
9	1255	-.94	.49	-.31	1.43
10	120	-1.09	.44	-.39	1.53
10	1346	-1.11	.41	-.41	1.52
11	211	-.79	.90	-.10	1.69
11	1436	-.59	.81	.06	1.40
12	301	-.63	.71	.00	1.34
12	1526	-.79	.66	-.21	1.44
13	352	-.88	.68	-.22	1.56
13	1617	-.53	.60	-.00	1.14
14	442	-.42	.67	.08	1.09
14	1707	-.50	.60	.01	1.10
15	532	-.38	.52	.04	.91
15	1758	-.52	.43	-.09	.95
16	623	-.65	.25	-.25	.90
16	1848	-.80	.13	-.33	.93
17	713	-.66	.05	-.30	.71
17	1938	-.75	.11	-.35	.86
18	804	-.60	.05	-.23	.65
18	2029	-.64	.33	-.23	.97
19	854	-.34	.29	-.04	.63
19	2119	-.40	.41	-.02	.81
20	944	-.56	.35	-.19	.91
20	2210	-.65	.18	-.25	.83
21	1035	-.58	.16	-.27	.74
21	2300	-.69	.23	-.26	.91
22	1125	-.62	.20	-.25	.82
22	2350	-.61	.70	-.11	1.31
23	1216	-.30	.60	.13	.90
24	41	-.33	.78	.17	1.11
24	1306	-.29	.73	.16	1.01
25	131	-.37	.78	.16	1.15
25	1356	-.45	.71	.07	1.16
26	222	-.43	.81	.15	1.24
26	1447	-.32	.70	.16	1.03
27	312	-.46	1.01	.29	1.48
27	1537				
28	402				
28	1628	Gage Inoperative			
29	453				
29	1718				
30	543				
30	1808				
31					

VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 6 shows the last survey in December and the two surveys taken during January on profile line 188, located 517 m south of the pier. A substantial amount of erosion (up to 0.4 m) occurred on the foreshore (80 to 130 m) in conjunction with a 30 m shoreward shift of the nearshore bar (120 to 200 m). Also, up to 0.25 m of accretion is visible on the storm bar. Surprisingly, most of these changes developed prior to a period of large waves (23-25 January) as documented by the 23 January survey.

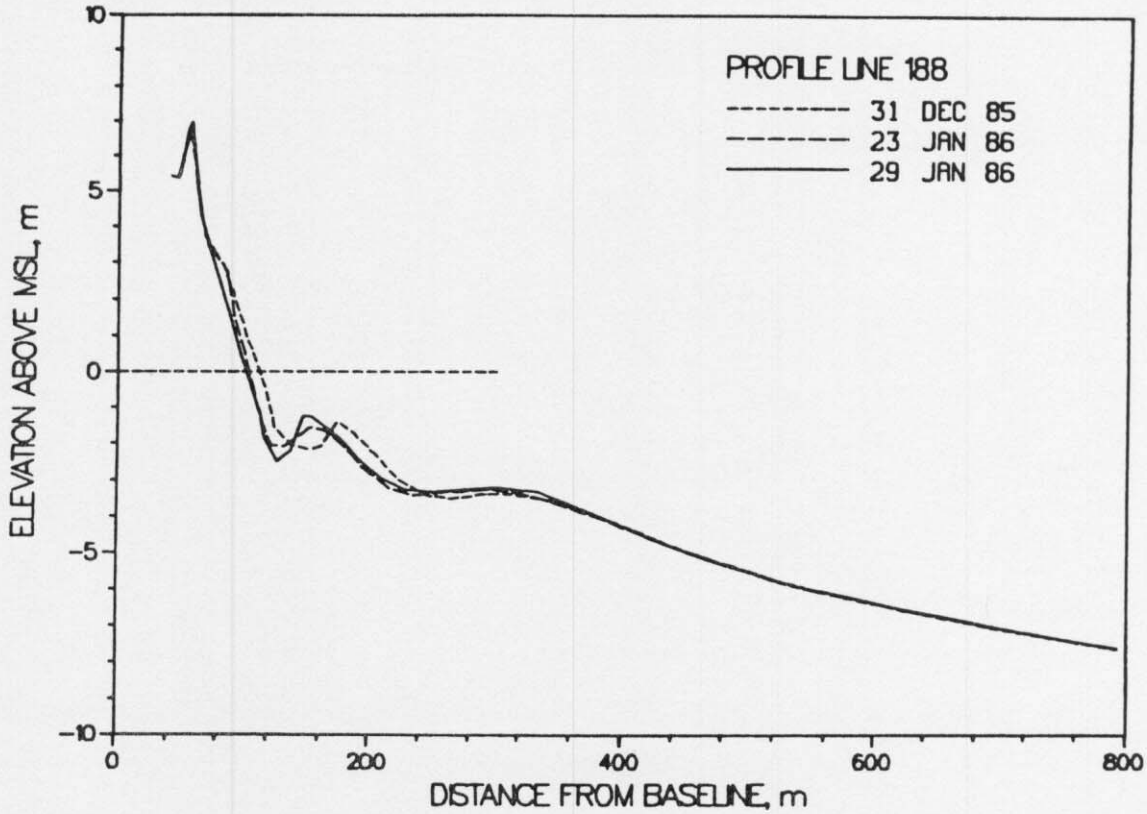

Figure 6. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 7) reflects the maximum changes which occurred on the profile during January.

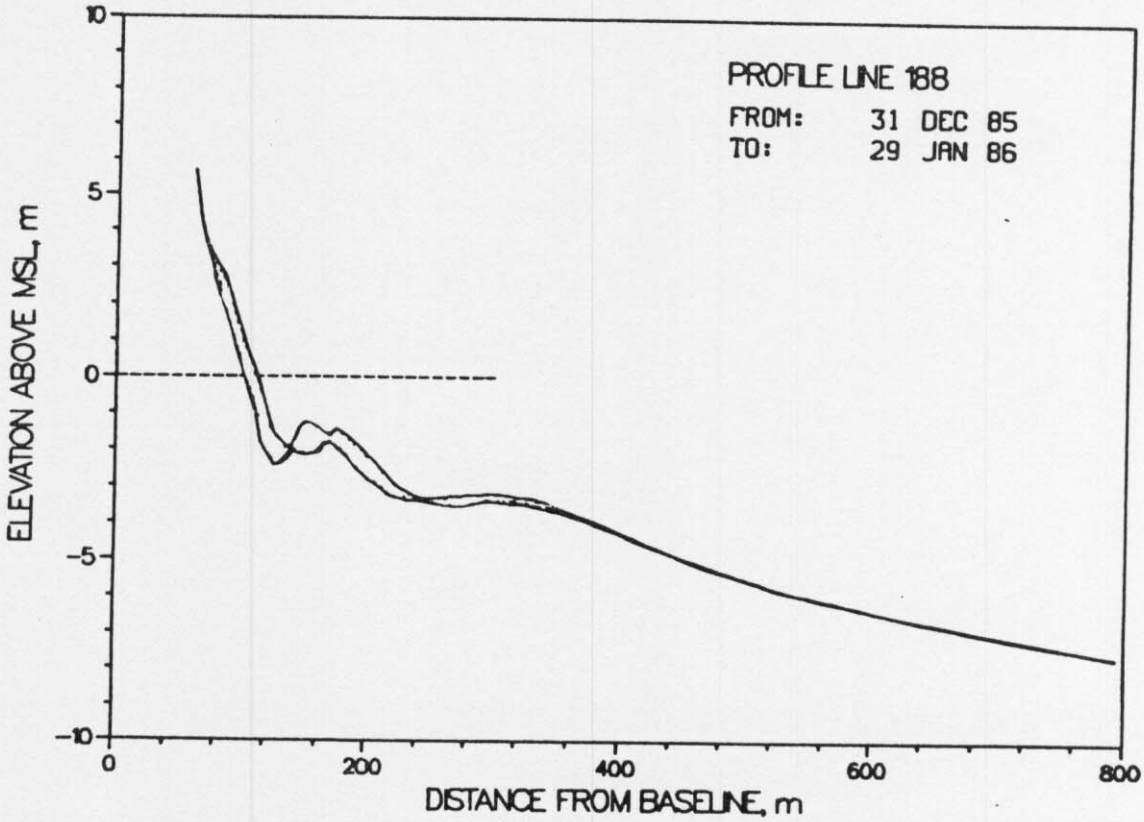

Figure 7. CRAB profile envelope - profile 188.

B. Bathymetry. This month's bathymetric survey (Figure 8) completed on 22 January shows a symmetric trough under the pier and shoal from 50 to 300 m alongshore south of the pier out to a depth of -3 m. In comparison to the previous survey (19 December 1985), within 300 m north and south of the pier, there was up to 1.0 m of erosion of the inshore bar from approximately 150 to 250 m. A corresponding accretion inshore from 100 to 250 m and accretion seaward of 250 m occurred. From 300 to 600 m south of the pier, there was up to 0.75 m of erosion of the beach from 50 to 125 m, accretion centered at 150 m and additional erosion from 175 m to 250 m.

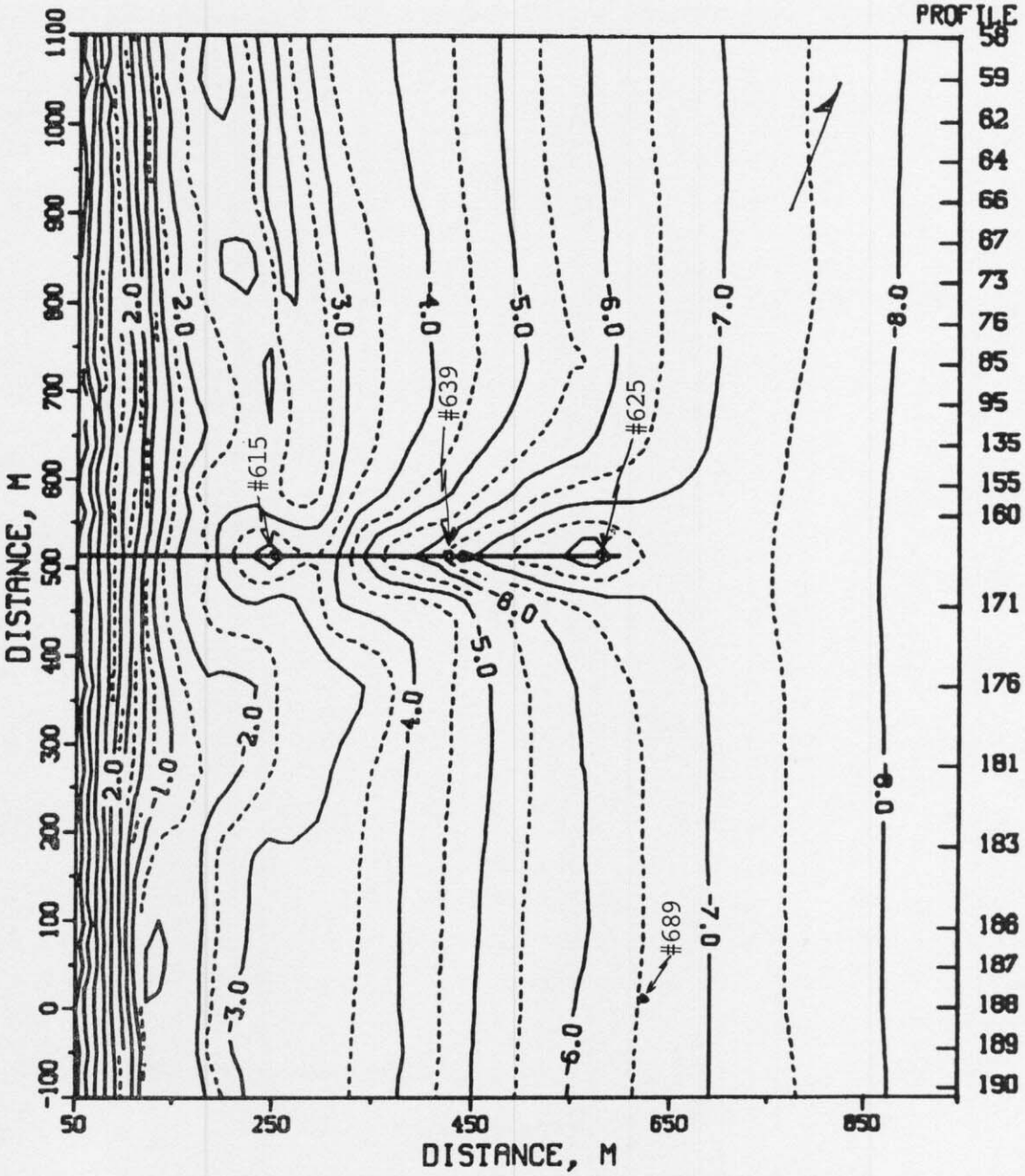

FIGURE 8. FRF BATHYMETRY 22 JAN 86
CONTOURS IN METERS

VIII. SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by the Baylor gage #625 at pier station 19+00) exceeded 2 m and wave records were obtained every hour:

Start	End
11 Jan (0300)	11 Jan (0900)
23 Jan (2200)	25 Jan (2000)

B. Storm Synopsis.

1. 11 January: Developing in the Gulf of Mexico on 9 January, this weak storm tracked across central Florida, moved northeast into the Atlantic, and passed the FRF well offshore. Winds exceeded 14 m/s (NNE) and the maximum Hmo (gage #625) of 2.10 m was recorded at 0600 hrs on 11 January. The lowest barometric pressure reading was 1016.2 mb at 2300 hrs on 10 January. There was no precipitation.

2. 23-25 January: This storm was the result of a huge Arctic high pressure system that moved across Canada on the 23rd. The storm center was positioned north of the Great Lakes on the 24th and over Maine on the 25th. Winds subsided as the storm moved east and offshore. Cold, northerly winds exceeded 16 m/s and wave heights exceeded 2.7 m (gage #630).

Distribution List

Government Agencies:

OCE
BERH
NAO
NASA/Wallops Flight Center
NOAA (NOS, NWS)
SAD
SAW
U.S. Geological Survey
U.S. National Park Service
U.S. Naval Academy
U.S. Naval Civil Eng. Lab
U.S. Naval Facilities Eng. Com.
U.S. Naval Research Lab

Colleges/Universities:

California Inst. of Tech.
Duke University
East Carolina University
Florida Inst. of Tech.
NC State University
Old Dominion University
Oregon State University
Prince George's College
Rutgers University
Scripps Inst. of Oceanography
Southern Illinois University
Stockton State College
Texas A&M University
University of Akron
University of Delaware
University of Florida
University of Maryland
University of Miami
University of North Carolina
University of Northern Colorado
University of Rhode Island
University of Virginia
Virginia Inst. of Marine Science

Others:

City of Va. Beach, VA
Coastal Barge Corporation
Coastal and Est. Res., Inc.
Coastal Science & Eng., Inc.
Dr. Galvin
GEOMET, Inc.
Greenhorne & O'Mara, Inc.
Dr. Hylton
Ms. Johnson
Mary Marr, Inc.
Masonite Corporation
Moffatt & Nichol, Eng.
Offshore Coastal Technologies
Mr. Rowland
Mr. Savage
Sea Port Supply Corp.
Shell Development
Sohio Petroleum Co.
So. CA Coast. Water Res. Pro.
Mr. & Mrs. Valpey
WCTI-TV

Foreign:

W. F. Baird & Asso. Coastal Engineers, Ltd (Canada)
Ministry of Construction, Coastal Division (Japan)
Norwegian Hydrodynamic Laboratories (Norway)
University of New South Wales (Australia)
University of Sydney (Australia)