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THE WAVE RECORD PROGRAM AT CERC

MISCELLANEOUS PAPER NO. 1-67
JANUARY, 1967

DEPARTMENT OF THE ARMY
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JANUARY, 1967 MISCELLANEOUS PAPER NO. 1-67

THE WAVE RECORD PROGRAM AT CERC

by
John M. Darling and Demetrius G. Dumm

U.S. ARMY
COASTAL ENGINEERING RESEARCH CENTER

ABSTRACT

This paper presents a summary and history of the wave recording program at the Coastal Engineering Research Center (CERC) and its predecessor, the Beach Erosion Board (BEB). There is a brief description of the types of sensors and recorders that have been used, and of the methods of analysis utilized. The main body of the paper is a listing of the wave gage stations, their locations, date of establishment, equipment used, present status, and periods of time over which records and analyses have been made. This listing is followed by a list of stations which have supplied visual-observation records in a program made possible by the cooperation of the United States Coast Guard. The location of each station is given along with the date of establishment, present status, and periods of time for which observations have been made.

FOREWORD

The Coastal Engineering Research Center is publishing this paper at this time to make known the nature and status of its wave recording program.

This paper was prepared in the Research Division by John M. Darling and Demetrius G. Dumm.

At the present time Colonel F. O. Diercks is Director of CERC and J. M. Caldwell is Chief Technical Advisor. T. Saville, Jr. is Chief of the Research Division, in which the work was carried out, and L. C. Williams, Chief of the Instrument and Equipment Branch, Research Division, is in charge of research, development, and production of sensor and analysis equipment.

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THE WAVE RECORD PROGRAM AT CERC

by

John M. Darling and Demetrius G. Dumm
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Section I SUMMARY OF PROGRAM

1. Introduction

The purpose of this paper is to make available information concerning the wave data collection program at the Coastal Engineering Research Center (CERC), formerly the Beach Erosion Board (BEB).

The program started in April 1948, when the first two gages were installed in New Jersey at Long Branch and Atlantic City. Since then there has been a steady increase in the number of wave-gage stations and a marked improvement in sensors, recording equipment, and analysis procedures.

Following a brief description of the equipment and analysis procedures is a listing of the wave-gage stations that have been operated during the program. The operation of each station is summarized by listing location of the gage, date established, equipment used, periods for which records are available, and periods for which analysis is available.

In addition to the wave recording program, CERC has also cooperated in a program that utilizes visual observation for the collection of wave data. The United States Coast Guard (USCG) has made this possible by training and using their personnel to make visual observations at many of the stations. The men on watch collect the data at 4-hour intervals during daylight. A summary of visual-observation data follows the summary of recorded wave data.

2. Equipment

The various types of wave sensors that have been used can be divided into two main classes, the surface type and the submerged type. CERC uses the step-resistance gage, a surface type sensor. Three basic types of step-resistance gage are: series, parallel, and relay. The submerged-type sensors used are of the pressure variety. These can be further distinquished as the thermopile and those that measure pressure variations through strain gages and various types of potentiometers.

The step-resistance gage comprises a series of electrical contact points installed normally at 0.2-foot intervals. The original gages of this type were known as the spark-plug type as the contact points consisted of modified spark plugs connected to a resistance circuit housed within the sealed pipe along which the spark plugs were located. These gages were

Figure 1 - Sparkplug Type Step-Resistance Gage

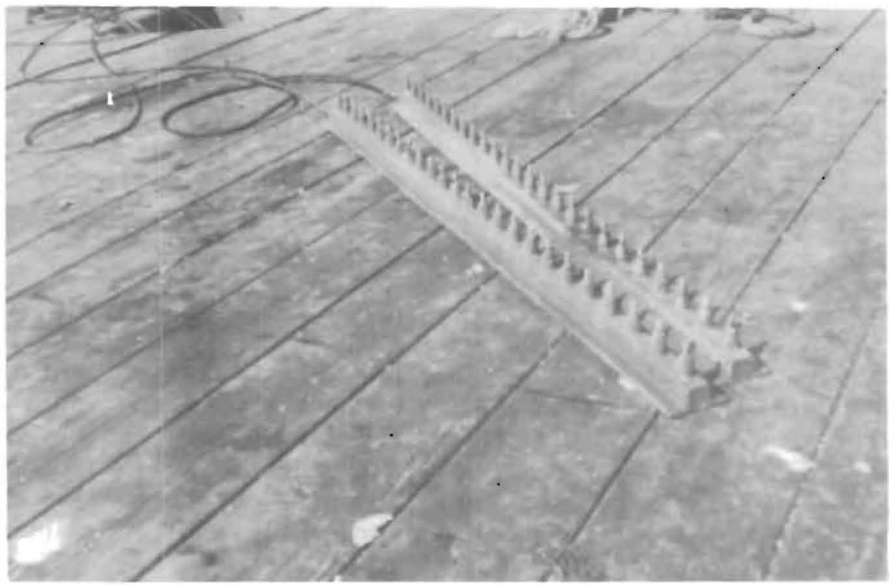

Figure 2 - Two 5-foot Plastic Sections of Present Type Step-Resistance Gage

usually 25 feet in length, Figure 1. The present step-resistance gages are fabricated in 5-foot plastic sections with contacts made of lead and normally spaced at 0.2-foot intervals, Figure 2. The difference between the series, parallel, and relay types is in the wiring of the resistors. The resistors are wired in series in the series type; in parallel in the parallel type. In the relay type, the contacts are copper and each one is wired to a separate relay. Each 5-foot section of gage has a bank of relays. These relays are activated when the ocean wave touches the contact to complete the circuit. Usually 5 of these 5-foot sections are mounted together to form a 25-foot gage.

The pressure gages employ various types of transducers to convert water pressure fluctuations into the electrical current or voltage signals required to record the fluctuations, Figure 3. Some utilize such instruments as inductance bridges, strain gages, potentiometers attached to bellows, and thermocouples. The thermopile consists of a number of thermoelectric couples designed to determine slight differences in temperature resulting from pressure variations.

Figure 3 - Pressure Gage

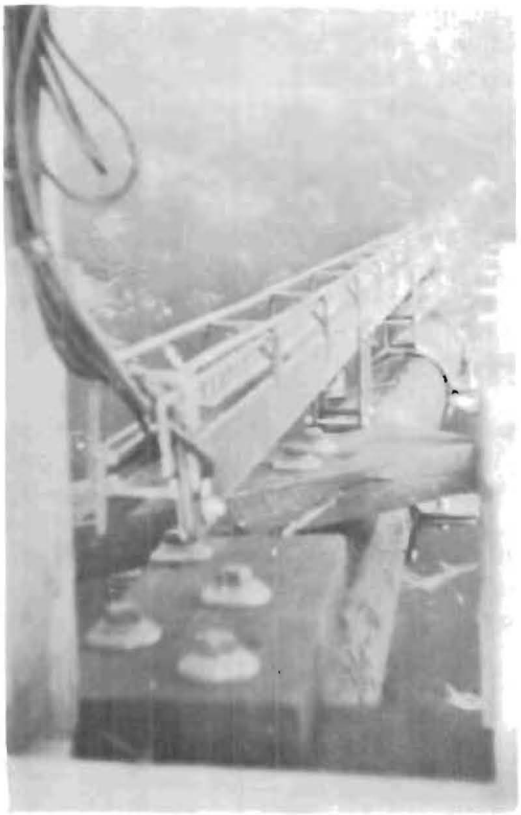

Figure 4 - Typical Mount for Step-Resistance Gages

Figure 5 - Cabinet Containing Both Paper Tape and Magnetic Tape Recorders

The step-resistance gage is attached in a vertical position to a supporting structure such as a pier, Figure 4. The pressure unit is extremely useful when no substantial supporting structure is available.

In the early days of the program, wave data from the various type sensors were recorded on paper-tape recorders, Figure 5. Since 1959, wave data have been recorded on both paper tape and magnetic tape. On paper tape, the recorder is usually programmed to record 7-minute samples at 4-hour intervals at a chart speed of 6 inches per minute. Wave data are recorded continuously on magnetic tape at a speed of 1/2 inch per minute.

3. Analysis

The paper records are analyzed for significant wave height and period for each sampling interval, in general, a 7-minute run each 4 hours. The significant wave is defined as the average of the 1/3 highest waves in the sample.

A spectrum analysis of the magnetic tape is presently being made by CERC of only one 20-minute sample per day, but this rate will be increased to perhaps as many as 6 samples a day as new equipment is made operational. This analysis includes linear average, square average, and peak heights. See Figure 6 on page 6.

Efforts are now being made at CERC to publish these wave records, both recorded and observed, in statistical form so that they will be readily available in more usable form for those who need the information. This effort is first being directed at the vast amount of surf observation in our files. This data is being punched on cards so they may be statistically analyzed by automatic data processes.

Wave records will be listed as continuous provided breaks in record involve only a short time. Under "Recording wave gage stations" the items "Records available" and "Analyses available" include only paper tape (pen and ink) records unless otherwise indicated. All available records and analyses can be found at CERC unless otherwise designated.

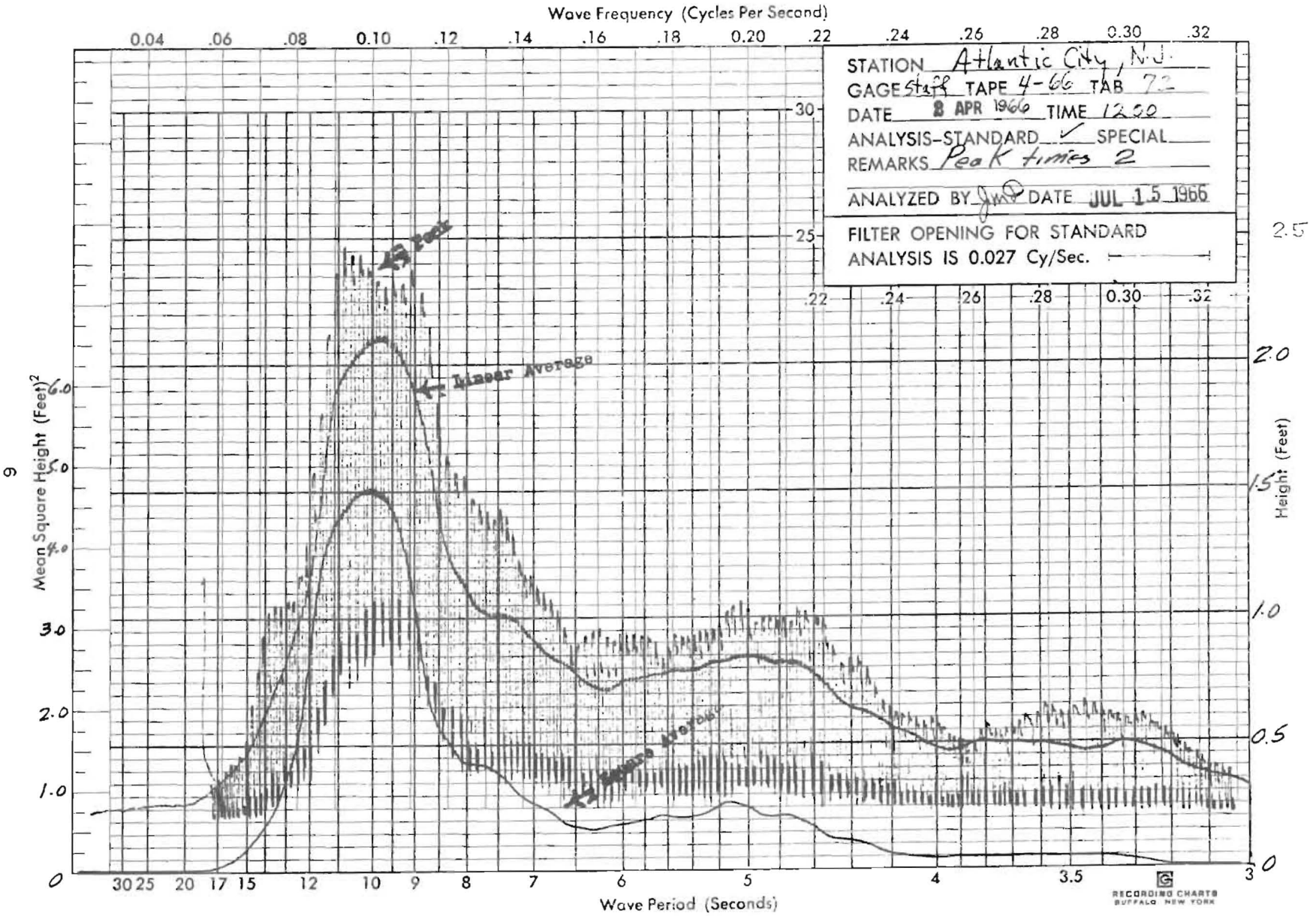

Figure 6 - Sample Spectrum Analysis

Section II LIST OF RECORDS AVAILABLE FROM WAVE-GAGE STATIONS

I. Atlantic Coast

Marthas Vineyard, Massachusetts

Location - Southeast coast near Nashaquitsa Cliffs.

Established - 20 September 1951.

Equipment - Pressure gage, placed about 500 feet offshore (with buoy) connected to a paper-tape recorder.

Status - Discontinued 15 November 1951.

Records available - 20 September 1951 to November 1951.

Analyses available - 20 September 1951 to 15 November 1951.

Buzzards Bay, Massachusetts

Location - Coast Guard Light Tower at entrance to Buzzards Bay, 4 1/2 miles WSW of Cuttyhunk Island.

Established - 19 November 1962.

Equipment - Relay-type step-resistance gage consisting of nine 5-foot sections, for a total of 45 feet. Mounted on southeast leg of tower in 61 feet MLW. Bottom of gage approximately 5 feet below MLW, 19 November 1962 to 23 January 1964 and 12 May 1965 to 24 October 1965. Pressure-type with static head 4.5 feet MLW, 23 January 1964 to 12 May 1965 and 24 October 1965 to 3 February 1966. Paper-tape, and magnetic-tape recorders throughout period.

Status - Temporarily out of operation.

Records available - 17 June 1963 to 1 February 1966, except for short periods when gage has malfunctioned. Records are on both paper and magnetic tape during most of the time.

Analyses available - 17 June 1963 to 21 November 1963, 23 January 1964 to 1 March 1965 and 11 May to 13 August 1965, except for short intervals.

Gilgo Beach, Long Island, New York

Location - 4400 feet offshore from Gilgo Coast Guard Tower in about 30 feet MLW.

Established - 8 June 1950.

Equipment - Originally a thermopile sensor was used. It was replaced by a pressure sensor on 26 September 1951. This type wave sensor was used throughout the remainder of the operation of this gage. Paper tape recorder was used.

Status - Discontinued 24 May 1954.

Records available - 8 June 1950 to 30 July 1951; 4 October 1951 to 24 May 1952, 17 December 1952 to 9 July 1953, 22 January 1954 to 24 May 1954, except for short periods due to gage malfunctioning.

Analyses available - 8 June 1950 to 14 November 1950, 17 December 1950 to 30 July 1951, 4 October 1951 to 23 May 1952, and 17 December 1952 to 4 July 1953.

Jones Beach, Long Island, New York

Location - 6000 feet offshore from water tower at Jones Beach in 31 feet MLW.

Established - 12 July 1950.

Equipment - Pressure gage attached to paper tape recorder.

Status - Discontinued 7 December 1950. Gage destroyed by storm.

Records available - 12 July 1950 to 25 November 1950.

Analyses available - 12 July 1950 to 25 November 1950. Visual observations available from 26 November 1950 to 29 February 1952.

Long Branch, New Jersey

Locations - Northeast corner of fishing pier in 25 feet MLW, 22 April 1948 to 4 April 1949; in 19 feet MLW 800 feet offshore 10 October 1949 to 26 June 1950; 1500 feet offshore in 30 feet MLW 29 August 1950 to 7 November 1953.

Established - 22 April 1948.

Equipment - Spark-plug type step-resistance gage from 22 April 1948 to 4 April 1949. Pressure gage from 10 October 1949 to 26 June 1950; thermopile from 29 August 1950 to 5 March 1951. Pressure gage from 6 March 1951 to 7 November 1953. Paper-tape recorders used.

Status - Discontinued 7 November 1953.

Records available - 22 April 1948 to 26 June 1950; 29 August 1950 to 6 November 1953.

Analyses available - 22 April 1948 to 26 June 1950; 29 August 1950 to 5 March 1951; from 6 March 1951 to 11 September 1953.

Atlantic City, New Jersey

Locations - Southeast corner of Steel Pier in 23 feet MLW from 21 April 1948 to 11 August 1948. On seaward end of Steel Pier in about 15 feet MLW from 28 September 1957 to 31 December 1966.

Established - Spark-plug type step-resistance gage from 21 April 1948 to 11 August 1948. 25-foot relay type step-resistance gage from 28 September 1957 to 31 December 1966. Paper-tape recorder, and since 6 May 1959, a magnetic tape recorder also.

Status - Operating.

Records available - 21 April 1948 to 11 August 1948; 28 September 1957 to 6 March 1962; 31 August 1962 to 31 December 1966. On magnetic tape from 6 May 1959 to 6 March 1962; from 31 August 1962 to 31 December 1966.

Analyses available - 21 April 1948 to 11 August 1948; 28 September 1957 to 6 March 1962; 31 August 1962 to 31 December 1966. Magnetic tape analyses from 6 May 1959 to 17 February 1962 and 31 August 1962 to 31 December 1966.

Cape Henry, Virginia

Location - Mounted on pile in 20 feet MLW.

Established - Installed June 1950 but inoperative until 2 November 1950.

Equipment - 20-foot sparkplug type step-resistance gage.

Status - Discontinued 6 April 1956.

Records available - 2 November 1950 to 21 October 1954; 4 April 1955 to April 1956.

Analyses available - 2 November 1950 to 21 October 1954; 4 April 1955 to 6 April 1956.

Virginia Beach, Virginia

Location - Fishing pier at 15th Street, mounted on north side in 18 feet MLW, 60 feet from seaward end.

Established - 13 October 1962; gage destroyed 26 November 1962; re-installed 2 March 1963.

Equipment - 25-foot relay type step-resistance gage. Recorders include both paper tape and magnetic tape.

Status - Gage lost 26 November 1962 when pier was damaged. Reestablished 2 March 1963. Gage lost when pier was destroyed 17 January 1965. Reestablished 19 October 1965 when pier was rebuilt and new gage was installed.

Records available - 13 October 1962 to 26 November 1962; 2 March 1963 to 17 January 1965; 19 October 1965 to 31 December 1966.

Analyses available - From 2 March 1963 to 31 December 1966.

Nags Head, North Carolina

Location - Mounted on fishing pier owned by Warren H. Jennette in 15 feet MLW.

Established - March 1962 by Robert Dolan from Louisiana State University; destroyed by storm of 5-7 March 1962; reinstalled on 8 October 1963 by L.S.U. personnel who operated gage until June 1964, at which time the Coastal Engineering Research Center (CERC) assumed operation.

Equipment - Pressure unit until pier was destroyed in March 1962; 25-foot relay type step-resistance gage from 8 October 1963 to 31 December 1966. Recorders include paper and magnetic tape.

Status - Operating.

Records available - 8 October 1963 to 31 December 1966. (paper tape and magnetic tape).

Analyses available - 2 July 1964 to 31 December 1966.

Frying Pan Shoals, off Cape Fear, North Carolina

Location - Mounted on northwest leg of Coast Guard tower 2.45 feet below MLW; depth of water, 45 feet.

Established - 29 June 1965.

Equipment - Pressure unit; recorders include both paper tape and magnetic tape.

Status - Temporarily out of operation.

Records available - 29 June 1965 to 10 November 1966.

Analyses available - None.

Daytona Beach, Florida

Location - Installed in 13 feet MLW on 24 February 1954. At seaward end of Sunglow Fishing Pier in 8.5 feet MLW, 8 November 1964 to 12 December 1966.

Established - 24 February 1954; abandoned 20 May 1957; reestablished 8 November 1964.

Equipment - 25 foot (in 5-foot sections) parallel type step-resistance gage, 24 February 1954 to 8 December 1954; 20-foot (5-foot sections) gage from 10 February 1955 to 20 May 1957; BE-2 pressure gage, in conjunction with both paper-tape and magnetic-tape recorders, 8 November 1964 to 12 December 1966.

Status - Temporarily out of operation.

Records available - 24 February 1954 to 11 April 1957; 8 November 1964 to 12 December 1966.

Analyses available - 7 April 1954 to 11 April 1957; 8 November 1964 to 1 February 1966.

Melbourne, Florida

Location - 3,000 feet offshore in 30 feet MLW at Patrick Air Force Base, opposite Service Road.

Established - 10 July 1951.

Equipment - Pressure gage with paper-tape recorder.

Status - Discontinued 26 September 1952.

Records available - Intermittent record from 10 July 1951 to 26 September 1952.

Analyses available - 11 July 1951 to 12 May 1952.

Palm Beach, Florida

Location - Seaward end of pier in 143 feet MLW.

Established - 17 February 1954.

Equipment - 5-section, parallel type, step-resistance gage with paper-tape recorder; magnetic-tape recorder was added 15 January 1962.

Status - Destroyed along with pier by storm 4 March 1962.

Records available - 17 February 1954 to 15 October 1954
9 December 1954 to 20 October 1955
27 February 1956 to 22 October 1956
25 February 1957 to 31 March 1958
30 June 1958 to 25 April 1961
24 June 1961 to 28 February 1962.
Magnetic tape 15 January 1962 to 28 February 1962.

Analyses available - 17 February 1954 to 14 October 1954
9 December 1954 to 20 October 1955
27 February 1956 to 22 October 1956
25 February 1957 to 31 March 1958
30 June 1958 to 25 April 1961
24 June 1961 to 28 February 1962

Lake Worth, Florida

Location - Lake Worth Municipal Fishing Pier, 800 feet out, 16.9 feet MLW.

Established - 19 January 1966.

Equipment - 20-foot (4 sections) relay type step-resistance gage, paper-tape and magnetic-tape recorders.

Status - Operating.

Records available - Start to 31 December 1966.

Analysis available - Start to 31 December 1966.

2. Gulf Coast

Naples, Florida

Location - Installed on seaward end of Municipal Pier in about 15 feet MLW.

Established - 1 June 1957.

Equipment - 20-foot (5-foot sections) parallel type step-resistance gage with paper-tape recorder. A magnetic-tape recorder was added 15 January 1962.

Status - Operating.

Records available - 4 June 1957 to 9 February 1959; 8 June 1959 to 1 August 1960; 24 October 1961 to 31 December 1966.

Analyses available - 4 June 1957 to 9 February 1959; 8 June 1959 to 1 August 1960; 24 October 1961 to 31 December 1966.

Clearwater, Florida

Location - Installed on seaward end of fishing pier in about 13 feet MLW.

Established - 10 February 1954.

Equipment - 15-foot (5-foot sections) parallel type, step-resistance gage and paper-tape recorder.

Status - Discontinued 3 June 1957.

Records available - 10 February 1954 to 8 August 1956; 13 November 1956 to 6 May 1957.

Analyses available - 10 February 1954 to 20 February 1956; 2 May 1956 to August 1956; 14 November 1956 to 5 December 1956.

Grand Isle, Louisiana

Location - Humble Oil Company drill platform #36, approximately 6 miles from shore in 50 feet MLW.

Established - 9 July 1948.

Equipment - 24-foot step-resistance gage and paper-tape recorder.

Status - Discontinued 1 November 1949.

Records available - 9 July 1948 to 1 November 1949.

Analyses available - 6 March 1949 to 1 November 1949.

Galveston, Texas

Location - Installed on end of Pleasure Pier about 2,000 feet offshore in 16 feet MLW.

Established - 24 March 1965.

Equipment - a 25-foot (5 sections) relay type step-resistance gage along with paper-tape and magnetic-tape recorders.

Status - In operation by the District Engineers' office in Galveston, Texas.

Records available - 24 March 1965 to 29 April 1965; 23 July 1965 to 31 December 1966, paper tape and magnetic tape.

Analyses available - 24 March 1965 to 29 April 1965; 23 July 1965 to 24 July 1966.

3. Pacific Coast

Huntington Beach, California

Location - Installed on seaward end of Huntington Beach Municipal Pier in 23 feet MLLW.

Established - May 1948.

Equipment - 24-foot step-resistance gage (parallel sparkplug type) from May 1948 to February 1955. February 1955 to 31 December 1966, a 25-foot (5 sections) parallel type step-resistance gage with paper-tape recorder. Magnetic tape also in use since 23 January 1962.

Status - Operating.

Records available - 28 May 1948 to 31 December 1966, except from 20 November 1953 to 24 February 1955, and several short periods. Magnetic tape records available from 23 January 1962 to 31 December 1966.

Analyses available - all paper tape records analyzed. Magnetic tape records analyzed from 23 January 1962 to 14 April 1965.

El Segundo, California

Location - Installed on northwest corner of the Standard Oil Company Landing Pier in 27 feet MLLW.

Established - 26 July 1948.

Equipment - 24-foot parallel step-resistance gage (sparkplug type) with paper-tape recorder.

Status - Destroyed by storm 5 January 1953 and abandoned.

Records available - 26 July 1948 to 5 January 1953.

Analyses available - All records analyzed

Los Angeles, California

Location - Venice Pier at foot of Washington Street.

Established - 12 January 1966.

Equipment - 25-foot (5 sections) step-resistance gage, paper-tape and magnetic-tape recorders.

Status - Operated by Los Angeles District.

Records available - 12 January 1966 to 31 December 1966.

Analyses available - None.

Port Hueneme, California

Location - Gages have been operated at three general locations off Silver Strand Beach: Latitude 34° 09' 19" N, Longitude 119° 13' 39" W, March 1954 to 5 October 1959, 27 September 1962 to 30 June 1964. Latitude 34° 09' 43" N, Longitude 119° 13' 56" W, 12 April 1960 to 27 October 1960, 11 November 1961 to 30 June 1964. Latitude 34° 09' 46" N, Longitude 119° 13' 57" W, 12 April 1960 to 8 June 1960, 9 December 1960 to 6 March 1961, 9 November 1961 to 30 June 1964, 15 June 1965 to 31 December 1966.

Established - Gage location designated as gage #1, #2, NCEL #2 and #717, March 1954. Location designated as gage #30, B, and #716, 12 April 1960, Location designated as gage #25, A, #23, and #715, 12 April 1960.

Equipment - Gages #1, #2, #3, A, B, #25, #30, and NCEL #2 were pressure gages. Gages #715, 716, and 717 were 25-foot step-resistance gages, parallel type. The records from these gages are on paper tape. Gages #715 and #716 were equipped with magnetic-tape recorders in November 1961. Gage #717 was equipped with magnetic-tape recorder in September 1962.

Status - Gages #716 and #717 were discontinued 30 June 1964. Gage #715, maintained by the Los Angeles District, was the only one still in operation December 1965. It is temporarily out of operation.

Records available - Gage #717:	7 April	1954	to	5 October	1959
	27 September	1962	to	30 June	1964
Magnetic tape:	28 September	1962	to	30 June	1964
Gage #716:	12 April	1960	to	27 October	1960
	13 November	1961	to	30 June	1964
Magnetic tape:	13 April	1960	to	27 October	1960
	13 November	1961	to	28 September	1962
	11 April	1963	to	30 June	1964

Records available (continued)

Gage #715:	12 April	1960	to	8 June	1960
	9 December	1960	to	6 March	1961
	9 November	1961	to	30 June	1964
	15 June	1965	to	9 December	1965
Magnetic tape:	13 April	1960	to	2 June	1960
	9 November	1961	to	30 June	1964
	15 June	1965	to	9 December	1965

Analyses available - Gage #717:	7 April	1954	to	5 October	1959
	27 September	1962	to	30 June	1964
Gage #716:	12 April	1960	to	13 September	1960
	24 February	1962	to	30 June	1964
Gage #715:	12 April	1960	to	8 June	1960
	9 December	1960	to	17 February	1961
	9 November	1961	to	30 June	1964
Magnetic tape:	1 December	1961	to	28 March	1964

Point Conception, California

Location - Approximately 1.5 miles offshore, south of Point Conception, on Phillips Petroleum Company Production Platform. Depth, 100 feet. Latitude 34° 25' 57" N, Longitude 120° 23' 35" W.

Established - 28 April 1966.

Equipment - 30-foot (6 sections) step-resistance gage, with a range of -9 to 21 feet MLLW, paper-tape and magnetic-tape recorders.

Status - Operated by Los Angeles District.

Records available - 28 April 1966 to 31 December 1966.

Analyses available - None.

Umpqua River, Oregon

Location - Installed on a piling in 60 feet MLLW, approximately 1 mile off the mouth of the Umpqua River.

Established - 13 August 1964.

Equipment - Pressure unit with static head 23.7 feet MSL. Recorders include both paper tape and magnetic tape.

Status - Not operating.

Records available - 13 August 1964 to 13 September 1964 on magnetic tape. 16 June 1966 to 15 August 1966 on magnetic tape.

Analyses available - None.

Several stations have been maintained by District offices for studying special projects for short periods; some of these are indicated below:

Los Angeles District, Corps of Engineers:

Mission Bay, California

Quivira Basin, Mission Bay, California

Glen Rick Cove, Mission Bay, California

Dana Point, Orange County, California

Morro Bay, San Luis Obispo County, California

San Francisco District, Corps of Engineers:

Santa Cruz, California

4. Great Lakes

Chicago, Illinois (Lake Michigan)

Location - Wilson Avenue Crib, approximately 3 miles offshore from east end of Wilson Avenue and 4 miles northeasterly from Navy Pier in the City of Chicago; Latitude 41° 58', Longitude 87° 35' in 34 feet of water.

Established - 16 June 1951.

Equipment - Transducer, composed of two pressure measuring heads mounted on a 25-foot steel tripod attached to recorder.

Status - Discontinued 9 November 1951.

Records available - 16 June 1951 to 9 November 1951.

Analyses available - 16 June 1951 to 9 November 1951.

Evanston, Illinois (Lake Michigan)

Location - 450 feet lakeward of the northeast corner of the Evanston Water Works.

Established - 11 August 1953.

Equipment - Step-resistance gage (series type), 15 feet (3 sections) connected to a paper-tape recorder.

Status - Discontinued 20 October 1954.

Records available - 11 August 1953 to 14 October 1953, 22 May 1954 to 20 October 1954.

Analyses available - 11 August 1953 to 14 October 1953, 22 May 1954 to 20 October 1954.

Bay City, Michigan (Lake Huron)

Location - In Saginaw Bay at Bay City in 13 feet of water.

Established - 8 November 1952.

Equipment - Pressure unit type attached to a paper-tape recorder.

Status - Discontinued 5 October 1953.

Bay City, Michigan (Lake Huron) (Continued)

Records available - 8 November 1952 to 3 February 1953, 2 September 1953 to 5 October 1953.

Analyses available - 8 November 1952 to 3 February 1953, 2 September 1953 to 18 September 1953.

Monroe, Michigan (Lake Erie)

Location - Western end of Lake Erie in 13-foot depth.

Established - 14 November 1952.

Equipment - Pressure unit attached to paper-tape recorder.

Status - Discontinued 29 May 1953.

Records available - 14 November 1952 to 29 May 1953.

Analyses available - 14 November 1952 to 29 May 1953.

Lake Survey District, Detroit, Michigan

Wave gages have been operated on the Great Lakes by the Lake Survey District, Corps of Engineers, for varying periods of time at the locations listed below:

Lake Superior

Eagle Harbor, Michigan
Whitefish Point, Michigan

Lake Michigan

Sturgeon Bay, Wisconsin
Racine Harbor, Wisconsin
Muskegon, Michigan
Point Betsie, Michigan

Lake Huron

Lakeport, Michigan

Lake Erie

Dunkirk, New York

5. Hawaiian Coasts

Black Point, Oahu, Hawaii

Location - Southeast Coast of Oahu in 30 feet MLLW at Latitude 21° 15' 16.8" N, Longitude, 157° 47' 56.2" W.

Established - 27 June 1951.

Equipment - Pressure unit and paper-tape recorder.

Status - Abandoned March 1955.

Records available - 27 June 1951 to 23 March 1953.

Analyses available - 27 June 1951 to 23 March 1953.

Hilo Harbor, Hawaii, Hawaii

Location - Gages #1 and #2 are located on Pier #2.

Established - Gage #1, 27 February 1961. Gage #2, 14 December 1962.

Equipment - Gage #1 is a 10-foot step-resistance gage. Gage #2 is a bubbler type pressure gage. Wave records from both gages are recorded on paper tape and magnetic tape.

Status - Operated by Honolulu District, Corps of Engineers.

Records available - Records have been spotty from both gages. Records available are at Honolulu District.

Analyses available - A few selected records on magnetic tape are available at CERC.

Section III VISUAL-OBSERVATION STATIONS

The United States Coast Guard has cooperated with CERC for many years by collecting wave data from many of the Coast Guard Stations. These records are visual observations made by the men standing watch. In general, they are 1-minute observations made every four hours during daylight. Each Station is identified by its assigned number, and the following list indicates the records available.

I. Atlantic Coast

1. Moose Peak Station

Location - Mistake Island, Maine.

Established - 25 September 1954.

Status - Operating

Records available - 25 September 1954 to 31 December 1966.

2. Hampton Beach Station

Location - Hampton Beach, New Hampshire.

Established - 9 September 1954.

Status - Operating

Records available - 9 September 1954 to 31 December 1966.

3. Nauset Station

Location - Atlantic coast of Cape Cod near Eastham, Massachusetts.

Established - 27 September 1954.

Status - Discontinued 21 June 1958 when this lifeboat station was decommissioned.

Records available - 27 September 1954 to 21 June 1958.

4. Point Judith Station

Location - Point Judith, Rhode Island

Established - 25 September 1954.

Status - Operating.

Records available - 25 September 1954 to 31 December 1966.

5. Stratford Point Station

Location - Long Island Sound at Stratford Point, Stratford, Conn.

Established - 21 September 1954.

Status - Discontinued 16 July 1960.

Records available - 21 September 1954 to 16 July 1960.

6. Short Beach Station

Location - Jones Beach State Park near Jones Inlet on Long Island, New York.

Established - 21 September 1954.

Status - Discontinued 1 June 1959.

Records available - 21 September 1954 to 1 June 1959.

7. Monmouth Beach Station

Location - Monmouth Beach, New Jersey.

Established - 22 September 1954.

Status - Discontinued 14 October 1963.

Records available - 22 September 1954 to 14 October 1963 except for the winter periods each year, approximately 15 October to 15 March.

8. Toms River Station

Location - Seaside Heights, New Jersey.

Established - 22 September 1954.

Status - Discontinued 15 November 1959.

Records available - 22 September 1954 to 15 November 1959.

9. Atlantic City Station

Location - Atlantic City, New Jersey; southwest of Absecon Inlet.

Established - 23 September 1954.

Status - Discontinued 18 September 1964.

Records available - 23 September 1954 - 18 September 1964.

10. Ocean City Station

Location - Ocean City, Maryland.

Established - 23 September 1954.

Status - Operating.

Records available - 23 September 1954 to 31 December 1966.

11. Virginia Beach Station

Location - Virginia Beach, Virginia.

Established - 12 April 1954.

Status - Operating.

Records available - 12 April 1954 to 31 December 1966.

12. Nags Head Station

Location - Nags Head, North Carolina

Established - 20 September 1954.

Status - Discontinued 7 July 1956.

Records available - 20 September 1954 to 7 July 1956.

13. Atlantic Station

Location - Atlantic, North Carolina; southwest of Drum Inlet.

Established - 20 September 1954.

Status - Discontinued 7 April 1958.

Records available - 20 September 1954 to 7 April 1958.

14. Oak Island Station

Location - Northwest of Cape Fear River on Oak Island, North Carolina.

Established - 26 September 1954.

Status - Operating.

Records available - 26 September 1954 to 31 December 1966.

15. St. Simons Island Station

Location - Northeast of inlet to St. Simons Sound on St. Simons Island, Georgia.

Established - 25 October 1954.

Status - Discontinued 23 May 1960.

Records available - 25 October 1954 to 23 May 1960.

16. Ponce de Leon Inlet Station

Location - Southeast side of Ponce de Leon Inlet near Smyrna Beach, Florida.

Established - 20 October 1954.

Status - Discontinued 20 July 1959.

Records available - 20 October 1954 to 20 July 1959.

17. Hillsboro Inlet Station

Location - North side of Hillsboro Inlet near Pompano Beach, Florida.

Established - 19 October 1954.

Status - Operating.

Records available - 19 October 1954 to 31 December 1966.

2. Gulf Coast

18. Cape San Blas Station

Location - Cape San Blas near Port Saint Joe, Florida.

Established - 27 September 1954.

Status - Operating.

Records available - 27 September 1954 to 31 December 1966.

19. Santa Rosa Station

Location - Santa Rosa Island, Florida, about 1 1/2 miles east of inlet to Pensacola Bay and Santa Rosa Sound.

Established - 4 October 1954.

Status - Discontinued 5 December 1964.

Records available - 4 October 1954 to 5 December 1964.

20. Grand Isle Station

Location - Midway between Caminada Pass and Baratana Pass on Grand Isle, Louisiana.

Established - 27 September 1954.

Status - Discontinued 16 July 1964.

Records available - 27 September 1954 to 16 July 1964.

3. Pacific Coast

21. Point Loma Station

Location - Southern tip of Point Loma, California.

Established - 2 October 1954.

Status - Operating.

Records available - 2 October 1954 to 31 December 1966.

21.5 Point Conception

Location - Point Conception, California.

Established - 29 October 1963.

Status - Operating.

Records available - 29 October 1963 to 31 December 1966.

22. Point Arguello Station

Location - Point Arguello, California.

Established - 28 September 1954.

Status - Operating.

Records available - 28 September 1954 to 31 December 1966.

22.5 Piedras Blancas Station

Location - Point Piedras Blancas, California.

Established - 28 July 1966.

Status - Operating.

Records available - 28 July 1966 to 31 December 1966.

23. Point Arena Station

Location - Point Arena, California.

Established - 26 September 1954.

Status - Operating.

Records available - 26 September to 31 December 1966.

24. Umpqua River Station

Location - South side of mouth of Umpqua River in Oregon.

Established - 10 October 1954.

Status - Operating.

Records available - 10 October 1954 to 8 November 1964, 16 May 1966 to 31 December 1966.

25. Yaquina Bay Station

Location - North of entrance to Yaquina Bay at Newport, Oregon.

Established - 17 November 1954.

Status - Operating.

Records available - 17 November 1954 to 31 December 1966.

26. Willapa Bay Station

Location - Toke Point, Washington.

Established - 30 September 1954.

Status - Discontinued 25 September 1958.

Records available - 30 September 1954 to 25 September 1958.

27. Cape Flattery Station

Location - Tatoosh Island, Washington

Established - 2 October 1954.

Status - Operating.

Records available - 2 October 1954 to 31 December 1966.

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John M. Darling and Demetrius G. Dumm
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1. Wave Records
2. Wave Analysis
3. Wave Sensors
4.

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