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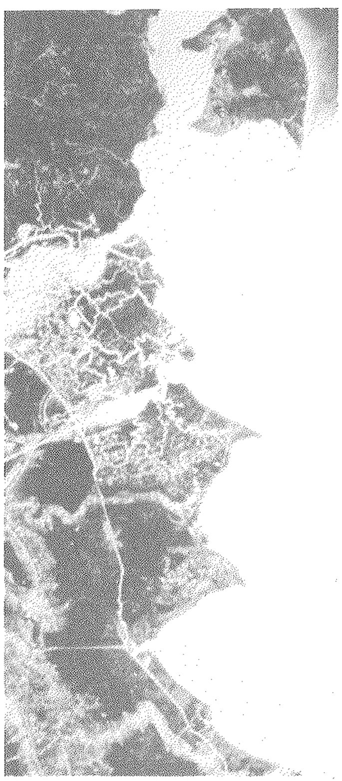

HYDRAULICS LABORATORY

TECHNICAL REPORT HL-82-15

THE ATCHAFALAYA RIVER DELTA

Report 2

FIELD DATA

SECTION 1: ATCHAFALAYA BAY PROGRAM DESCRIPTION AND DATA

VOLUME I: MAIN TEXT

by

Clara J. Coleman, Allen M. Teeter, Barbara P. Donnell, George M. Fisackerly, David A. Crouse, Joseph W. Parman

Hydraulics Laboratory

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
PO Box 631, Vicksburg, Mississippi 39180-0631

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This report describes data collected for use in development and verification of numerical and physical models employed to predict the evolution of the Atchafalaya Bay Delta. Stemming from a data collection program in this area during 1980 through 1983, this report presents representative results. To make the data accessible for use by others and to provide a permanent record of the instrumentation and techniques is the purpose of this report in the series.

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PREFACE

The work described herein was performed by the Hydraulics Laboratory (HL) of the US Army Engineer Waterways Experiment Station (WES) during 1980 through 1984 as a part of the overall investigation of the Atchafalaya Bay Delta. The study was authorized by the US Army Engineer District, New Orleans, on 18 July 1977.

This work was performed under the direction of Messrs. H. B. Simmons, former Chief, HL; F. A. Herrmann, Jr., Chief, HL; R. A. Sager, former Chief, Estuaries Division; G. M. Fisackerly, former Chief, Harbor Entrance Branch, and W. H. McAnally, Jr., Project Manager. The data collection program was designed by Messrs. A. M. Teeter, Fisackerly, and McAnally and executed under the direction of Messrs. Fisackerly and D. A. Crouse. The WES field crew involved in the data collection program included Messrs. Crouse, J. W. Parman, S. E. Varnell, J. T. Hilbun, E. A. Frost, B. G. Moore, and J. A. Ashley. Data reduction was assisted by Messrs. S. A. Adamec, Parman, and J. D. Ethridge, Jr., and Mses. C. J. Coleman, B. P. Donnell, and P. G. Kee. This report was prepared by Mses. Coleman and Donnell and Messrs. Teeter, Fisackerly, Crouse, and Parman. Editing was done by Mrs. Gilda Miller, with layout coordinated by Mrs. Josephine Head and Ms. Frances Williams, Information Products Division, Information Technology Laboratory, WES.

COL Dwayne G. Lee, CE, is the Commander and Director of WES. Dr. Robert W. Whalin is Technical Director.

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* A limited number of copies of Appendixes A, B, C, and D were published under separate cover. Copies are available from National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151.

CONVERSION FACTORS, NON-SI TO SI (METRIC) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
cubic feet	0.02831685	cubic metres
Fahrenheit degrees	5/9	Celsius degrees or kelvins*
feet	0.3048	metres
gallons per minute	3.785	litres per minute
inches	2.540	centimetres
microns	0.001	millimetres
ounce (mass)	28.34952	grams
pounds (mass)	0.4535924	kilograms

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: C = (5/9)(F - 32). To obtain kelvin (K) readings, use: K = (5/9)(F - 32) + 273.15.

THE ATCHAFALAYA RIVER DELTA

FIELD DATA

Section 1. Atchafalaya Bay Program Description and Data

PART I: INTRODUCTION

1. This report presents representative results of a data collection program in the Atchafalaya Bay area during 1980 through 1983. This program was performed by the Estuaries Division, Hydraulics Laboratory of the US Army Engineer Waterways Experiment Station (CEWES-HE). The purpose of the report is to provide a permanent record of the instrumentation and techniques employed and to make the data available for use.

2. The data described herein were collected for use in development and verification of numerical and physical models employed to predict the evolution of the Atchafalaya Bay Delta. Analysis and applications of the data will be presented in subsequent sections to this report.

3. The objectives of the Atchafalaya Bay investigation are to answer these questions:

a. For existing conditions and no actions other than those already practiced (i.e., maintenance of navigation channels), how will the delta evolve over the short-to-medium term (<10 years) and the long term (>10 years)?

b. How will its evolution affect:

   (1) Flood stages?

   (2) Maintenance dredging of the navigation channels?

   (3) Flow distribution between lower Atchafalaya River and Wax Lake Outlet?

   (4) Salinity in the Atchafalaya Bay system?

c. What would be the impact of various alternatives on all of the above?

A description of the overall study is given by McAnally and Heltzel.*

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* W. H. McAnally, Jr. and S. B. Heltzel. "A Plan for Predicting the Evolution of Atchafalaya Bay, Louisiana" (in preparation), US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

PART II: DATA COLLECTION PROGRAM

4. Data were collected in Atchafalaya Bay from February 1980 through June 1983. During this time, tidal elevation gages were in place almost continuously. Five major data collection schedules were structured around the time of deployment of in situ recording velocity-conductivity-temperature (VCT) meters. For these periods, bed sediment samples were collected and suspended sediment was measured at various locations in the system. Wind data were collected during each study, while wave data were collected during only one of the periods. Upstream discharge data were obtained from US Army Engineer District, New Orleans. Additional data were collected in both Atchafalaya Bay and Terreborne Marshes from June 1983 to February 1986 in support of expansion of the study area to include Terreborne Marshes. This data collection effort is described independently in Report 2, Section 4 of this series.

Equipment and Methods

Tidal elevations

5. Tidal elevations were measured by a system consisting of a stilling well-contained float that is connected to a recording device by a wire rope. The recorders were Fischer and Porter Company Type 1550 punched tape level recorders. They record elevations to the nearest 0.01 ft* and have a range of 100 ft. A timer activates the recording mechanism every 15 min, and the float elevation at that time is punched on 16-channel, foil-backed paper tapes. The float is a 3-in.-diam aluminum cylinder, and the stilling well is a 4-in.-diam plastic pipe. Water in the stilling well responds to water levels outside the well by flow through a 15-ft-long, 3/8-in.-diam copper tube. The tube's outer end is protected against clogging by a cylindrical copper filter.

6. Vertical control for the tide gage assemblies was arbitrary. The 15-ft-long tube used as the stilling well port was designed to minimize short-period oscillations and to cause the well to respond linearly to fluctuations in the outside water level. Response characteristics of the tide wells have

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* A table of factors for converting non-SI units of measurement to SI (metric) units is presented on page 3.

been determined by drainage tests.* Figure 1 shows the derived amplitude and phase response characteristics of the tide wells. It can be seen that amplitude decreases sharply in less than 50 min and is less than 10 percent for periods under 1 min. The half-amplitude period is 9 min, while the amplitude response is essentially unity and phase lag approaches zero at tidal periods.

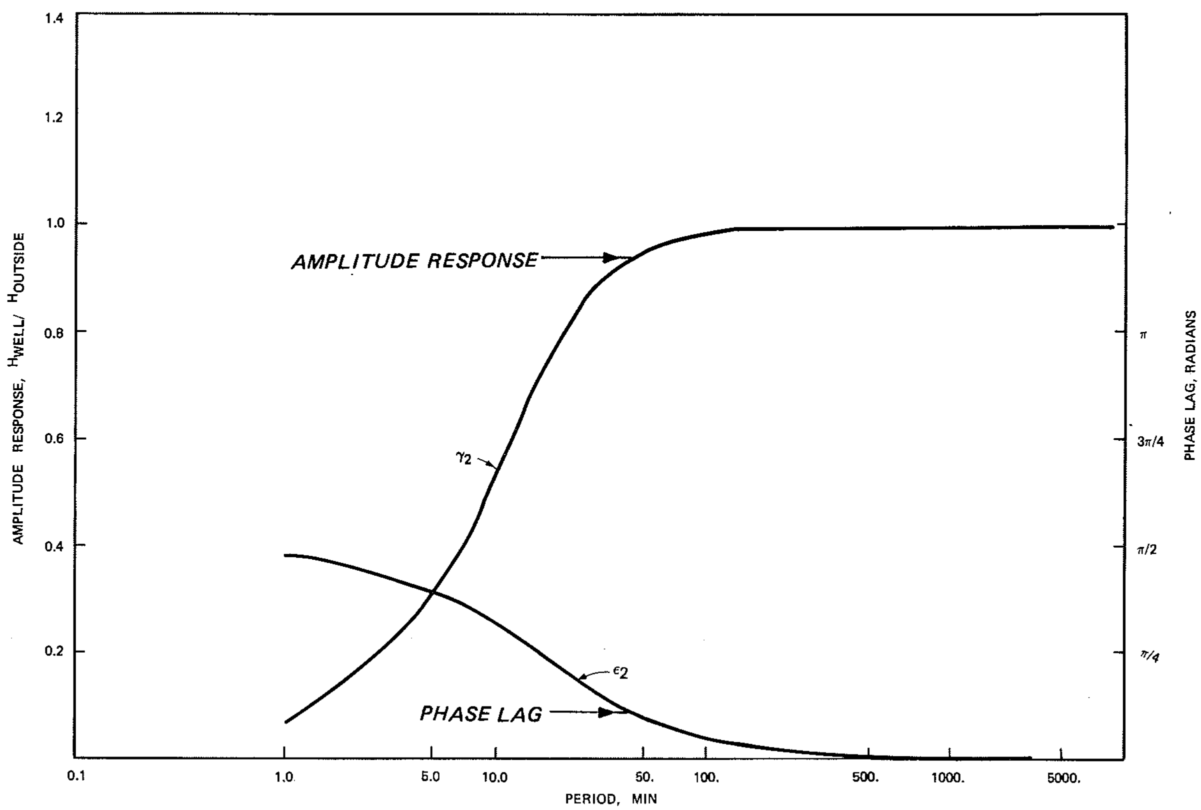

Figure 1. Response characteristics of Standard Tide Well Port used by CEWES-HE

7. Initial synchronization of the tide recorder timer is within ±5 sec of the National Bureau of Standards (NBS) time standard. Bench tests of the timers have shown them to exhibit negligible error for individual readings over a 1-hr period. Gage time is generally accurate to ±2 min per month, except for occasional malfunctions that can cause large time errors. In practice, gage and NBS times are recorded when tapes are removed so that timing errors can be identified.

8. Relative accuracy is affected by temperature of the water, float,

* W. H. McAnally, Jr. 1979. "Water Level Measuring by Estuaries Division, Hydraulics Laboratory," Memorandum for Record, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

and wire, plus salinity changes of the water inside the well. Relative accuracy is considered to be within 0.1 ft.

Over-the-side equipment

9. The equipment used to obtain discrete samples from a boat consists of a current meter, direction indicator, and weight, each suspended by a wire rope, plus remote readout devices and a support frame. The assembly (Photo 1) is mounted on a boat that moves from station to station collecting data. The current meter is vertical-axis, cup-type (Gurley Model 665) with remote, direct-reading speed indicator. The direction indicator consists of a remote-reading magnesyn compass mounted just above the current meter in a waterproof cylindrical housing. Suspended below the meter is a finned, streamlined weight (fish) that holds the sensors in a vertical attitude facing into the flow. The sensor assembly is supported by a 1/8-in. wire rope from a portable support frame that is equipped with a winch to raise and lower the assembly. An indicator on the winch shows the sensor's depth below the water's surface. Water samples are taken at the depth of measurement by pumping through a 3/8-in. plastic tube with tip mounted just below the current meter and pointed into the flow. A small pump on board the boat pumps the water through a bimetal thermometer and into sample bottles. The pumping rate is 2.8 gpm for a 3-ft lift.

10. The Gurley current meters have a threshold speed of less than 0.2 fps and at 75° F to give the correct current speed to within +3 to -5 percent for speeds of 1 to 7 fps and ±0.1 fps for speeds less than 1 fps.* Error due to temperature change is approximately 0.05 percent per degree Fahrenheit deviation from 75° F. At flow speeds greater than 3 fps, readings near the surface tend to be somewhat low due to sensor inclination. Accuracy of the direction indicator is within 10 deg at speeds greater than 0.5 fps, but strong wave action moving the boat can cause temporary errors greater than this. Accuracy of the in-line thermometer is approximately ±2° F.

11. Water samples to be used for suspended sediment measurements were placed in 8-oz plastic bottles.

12. Salinities of discrete water samples were measured in the laboratory, using a Beckman Model RA5 salinometer with automatic temperature

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* W. H. McAnally, Jr. 1978. "Calibration Check of Harbor Entrance Branch Prototype Current Measurement Equipment," Memorandum for Record, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

compensation. The salinometer was calibrated with standard seawater and was accurate to within ±0.2 ppt.

Recording current meters

13. The self-contained recording current meters used for longer term measurements were Environmental Devices Corporation (ENDECO) Type 174 meters. The meter (Photo 2) floats horizontally at the end of a tether, measuring current speed with ducted impeller and direction with an internal compass. The ENDECO 174 also measures temperature with a thermilinear thermistor and conductivity with an induction type probe. Data are recorded on cartridge-loaded, endless loop, magnetic tape. Threshold speed is less than 0.08 fps, maximum speed of the unit used was 8.44 fps, and stated speed accuracy was ±3 percent of full scale. The manufacturer states that direction accuracy is ±7.2 deg above 0.08 fps. Time accuracy is ±4 sec per day. A typical tethering arrangement is shown in Figure 2.

Recording wave gages

14. Sea Data Corporation Model 635 digital recording pressure gages were used during the wave-monitoring portion of the program. The gages employ quartz pressure sensors with an absolute pressure resolution equivalent to 0.1 mm. The water pressure is integrated over the sample interval (selectable from 0.5 sec to 16 sec) and stored on magnetic tape (cassette). The wave data can be recorded in bursts of 64 to 2,048 samples. The wave data burst interval can range from 0.5 to 24 hr. Data may also be recorded in a continuous mode. The sampling interval for all gages was set at 1 sec, and the total sample record was 1,024 sec, obtained every 3 hr.

Suspended sediment concentration

15. Total suspended materials (TSM) were determined by filtration of samples. Nuclepore (Registered Trademark) polycarbonate filters with 0.40 micron pore size were used. They were desiccated and preweighed, then a vacuum system (8-lb vacuum maximum) was used to draw the sample through the filter. After the filters and holders were washed with distilled water, the filters were dried at 105° C for 1 hr and reweighed. The TSM were calculated based on the weight of the filter and the volume of the filtered sample.

16. A density analysis was done using wide-mouth, 25-cm^3 constant-volume pycnometers. They were calibrated for tare weight and volume. A pycnometer was partially filled with sediment and weighed, then topped off with distilled water. Care was taken to remove any bubbles before the pycnometer

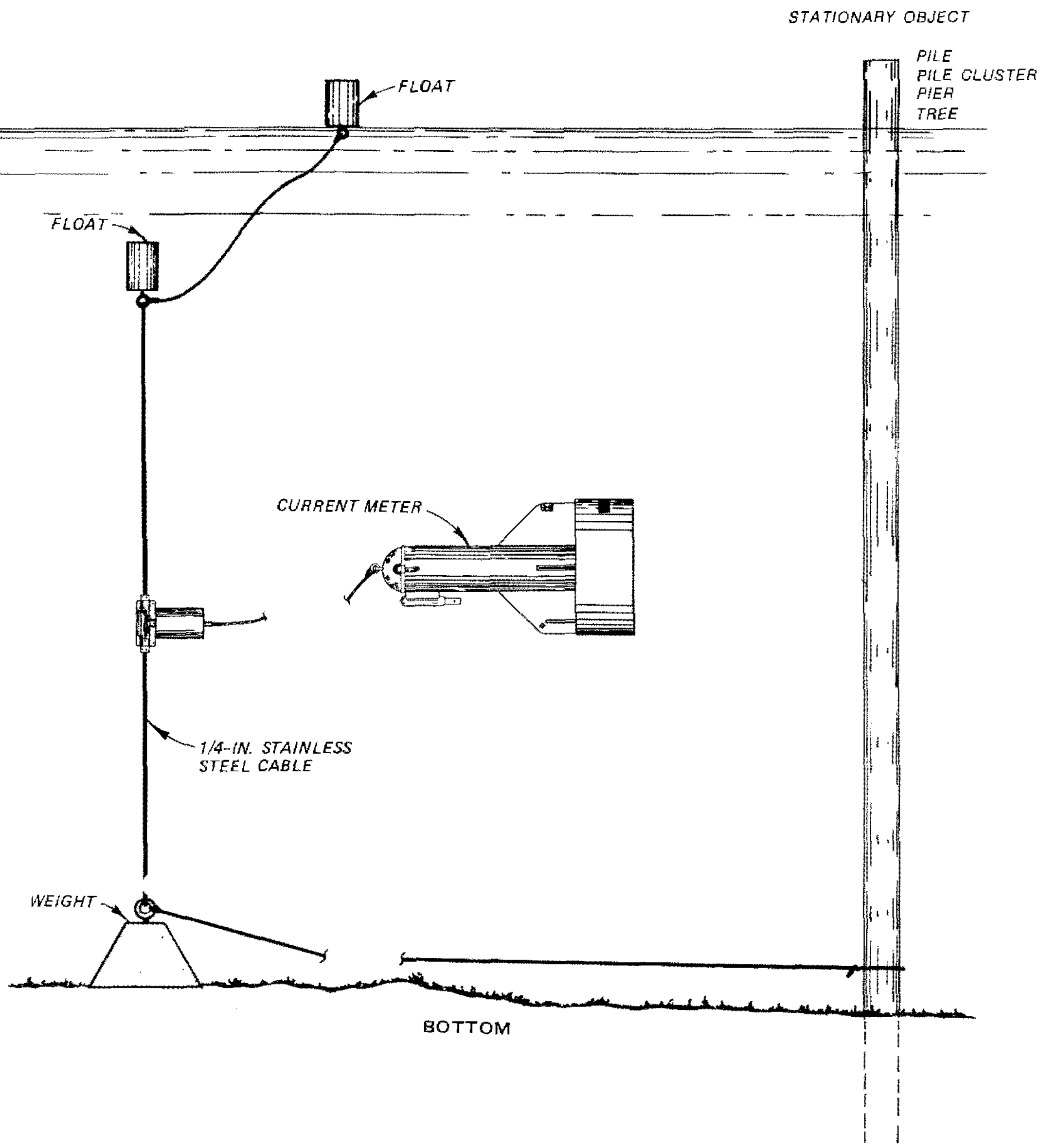

Figure 2. Model 174 tethering arrangement

was reweighed. The bulk density (BSG) of the sediment was then calculated by the equation:

$$BSG = \frac{(p_w)(\text{sed wt} - \text{tare wt})}{(p_w)(\text{vol pyc}) + (\text{sed wt}) - (\text{sed} + \text{water wt})}$$

where

p_w = density of water at temperature of analysis

sed wt = weight of pycnometer with sediment tare wt = tare weight of pycnometer

vol pyc = volume of pycnometer

sed + water wt = weight of pycnometer with sediment and water

Fall velocities of suspended sediment

17. A horizontal Niskin (Registered Trademark) sampler (Photo 3) was used for field determination of the settling velocities. With the ends of the sampler opened, it was lowered to sampling depth and the ends were closed by messenger.* The sampler was then retrieved and placed in a vertical position. The first subsample was drawn off the bottom with the time and bottle number being logged. A log was kept of currents, water depth, wave conditions, and location of each sample.

18. With sampler kept as steady as possible, subsequent subsamples were withdrawn at about 8, 15, 30, 60, 120, 180, and 240 min from initial time. Bottle numbers and times were noted.

19. Subsamples were analyzed for TSM in the laboratory. Data and analyses of fall velocities and suspended sediment will be presented in Section 2 of Report 2 in this series.

Bottom sediments

20. Bottom grab samples and core borings were collected within the Atchafalaya Bay. These data are described and analyzed in Section 3 of Report 2 in this series.

Meteorological data

21. Data were collected with a Weather Measure Corporation Model M800. The data acquisition system was a battery-powered microcomputer with a real-time clock, a serial data interface, and a programmable analog-to-digital (A/D) converter. Six times each minute, the M800 sampled the input signals according to controls specified in a user-entered input table, then processed that data and stored them in formats specified in a user-entered output table. Input programs specified the type signal conditioning and A/D conversion to be done, including linearization of selected input signals. Output programs further processed the sensor outputs to obtain averages, maximums, minimums, etc.

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* M. W. Owens. 1971. "The Effect of Turbulence on the Settling Velocities of Silt Flocs," Proceedings of the International Association for Hydraulic Research, Rotterdam, The Netherlands, pp 27-32.

Data Collected

Tidal elevations

22. Tidal elevations were measured at locations in the Bay as shown in Figure 3. Table 1 shows the status of data from each station for the period of record. Elevations were recorded at 15-min intervals. Only that portion of the available data corresponding to the in situ velocity surveys has been presented in Appendix A.

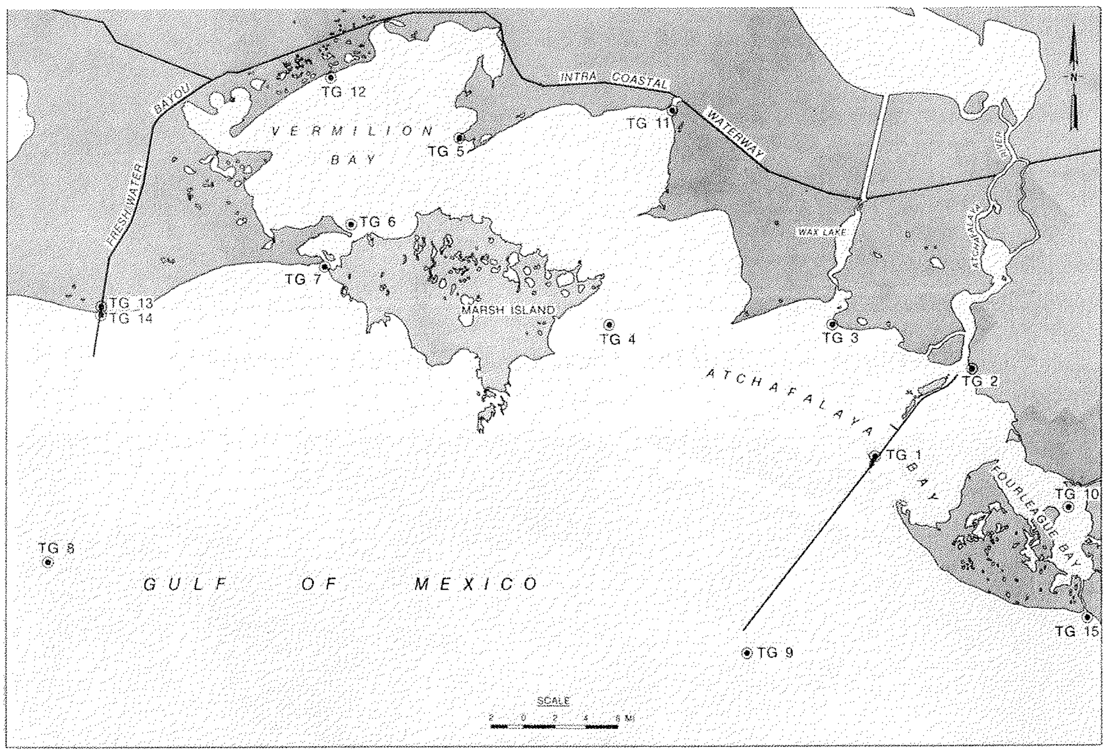

Figure 3. Tide gage locations

Velocity/conductivity/temperature

23. In situ VCT data were taken during five surveys and recorded at 2-min intervals. Survey 1 was conducted in July and August 1980. Station locations are shown in Figure 4. Survey 2 (January through March 1981), Survey 3 (June and July 1981), Survey 4 (June through August 1982), and Survey 5 (January through June 1983) station locations are shown in Figure 5. These data are presented in Appendix B.

Suspended material

24. Suspended material sampling was conducted intermittently from July 1980 through June 1983. Sampling stations for suspended material are shown in

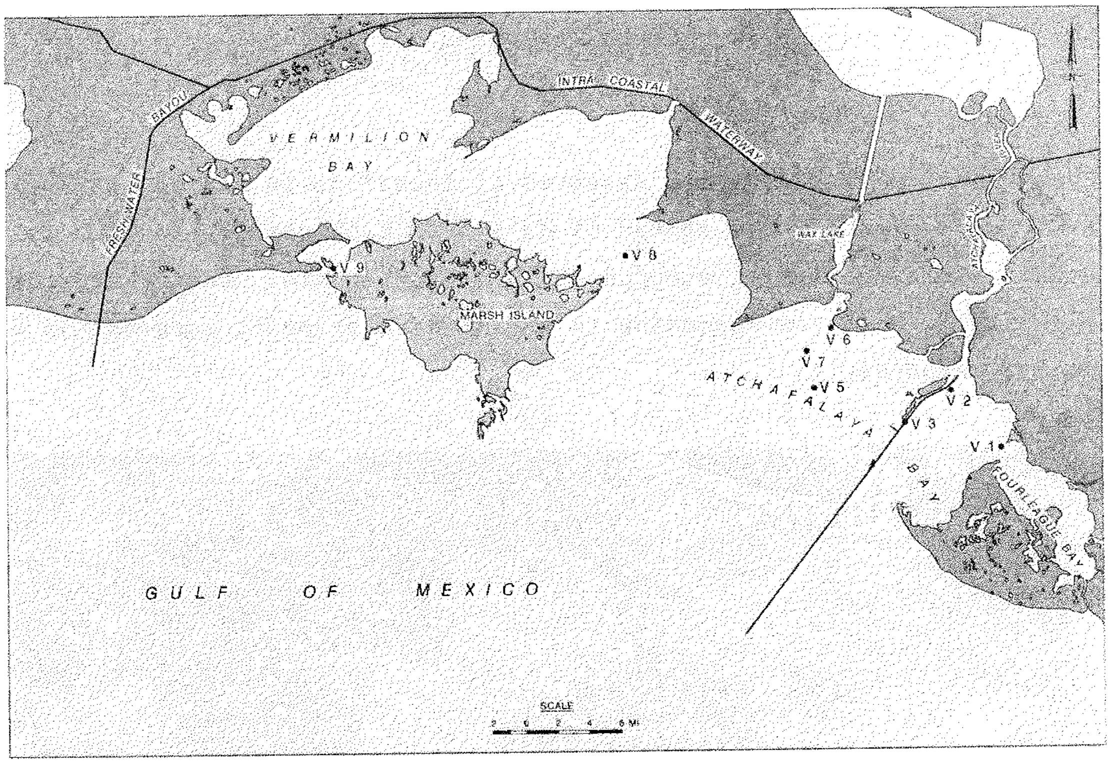

Figure 4. Station locations, Velocity Survey 1

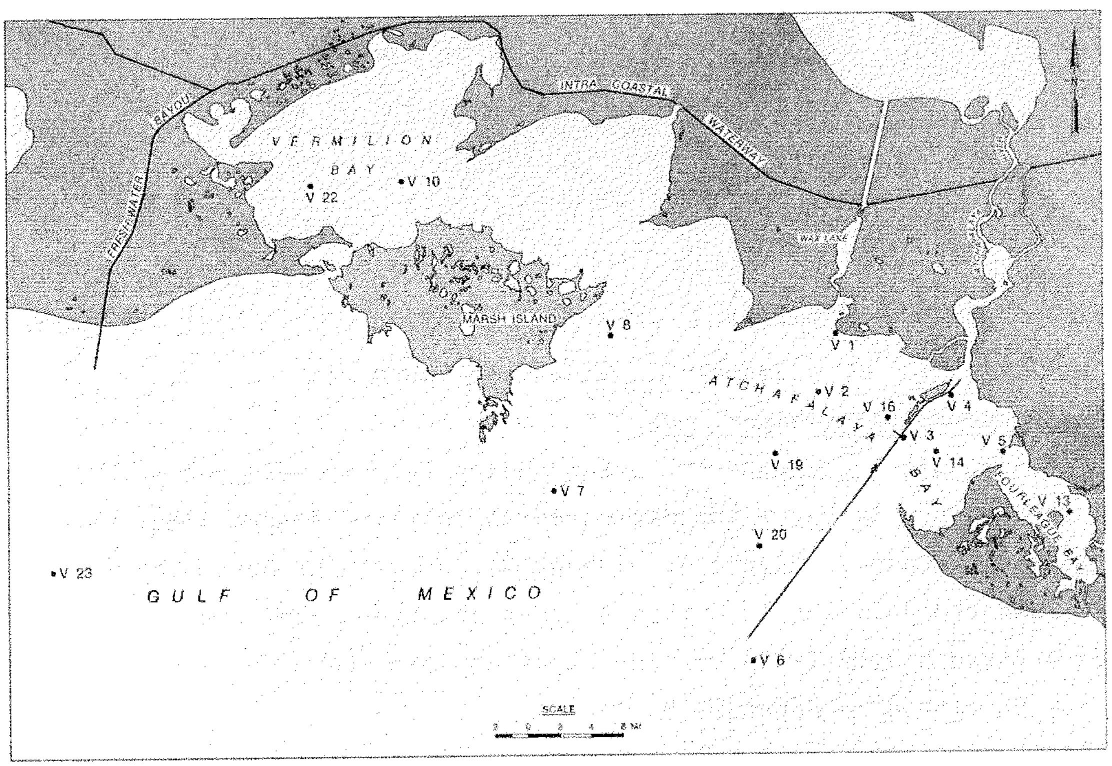

Figure 5. Station locations, Velocity Surveys 2 through 5

Figure 6. These data are presented in Appendix C.

Weather data

25. Weather data were recorded at times corresponding to the VCT surveys. Station locations are shown in Figure 7.

Wave data

26. Wave data were collected from November 1981 through February 1982. Station locations for this data are shown in Figure 7.

Supplemental salinity data

27. Supplemental salinity data were obtained by discrete sampling and timing from January 1980 until June 1983. Sampling locations are shown in Figure 6, and these data are presented in Appendix D.

Conditions During Data Collection

28. A wide variety of hydrodynamic and weather conditions were sampled during the three years of data collection. Most of these conditions are documented by the data themselves (water levels, winds, etc.). Another important condition, Atchafalaya River flows, is given by stages at Simmesport, La. These data are presented in Figure 8. Conversion of stages to discharges may be accomplished using the rating curve shown in Figure 9.

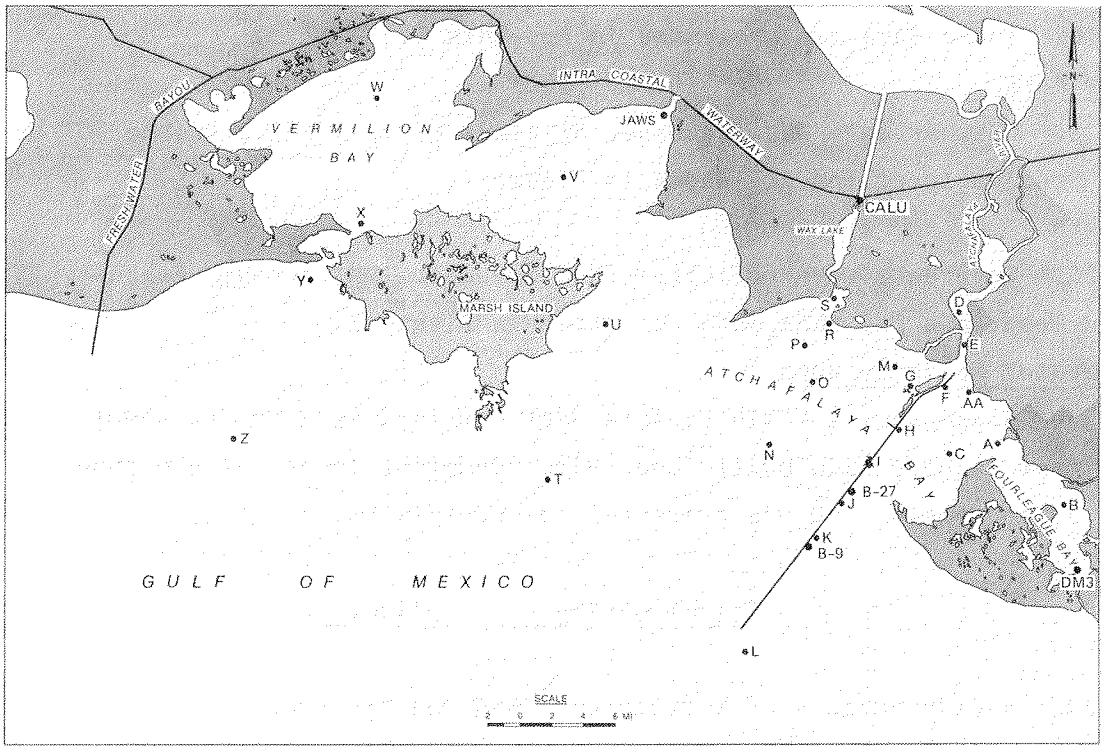

Figure 6. Sampling station locations for sediment fall velocity determination and supplemental salinity data

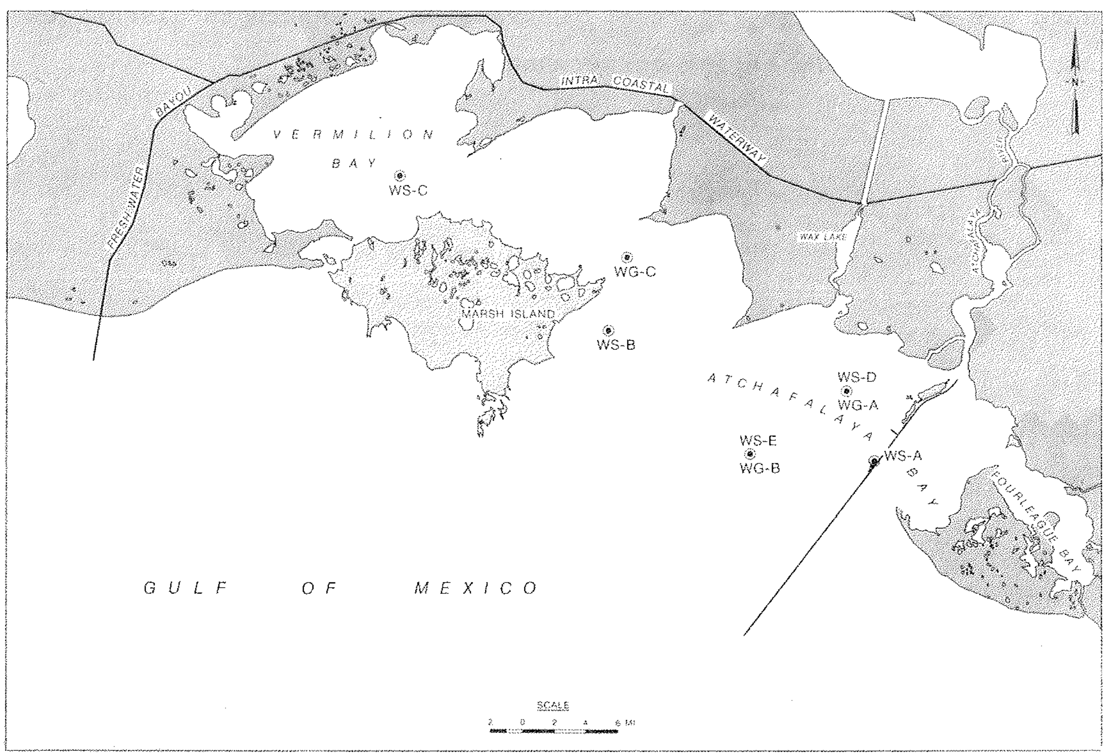

Figure 7. Station locations for weather stations and wave gages

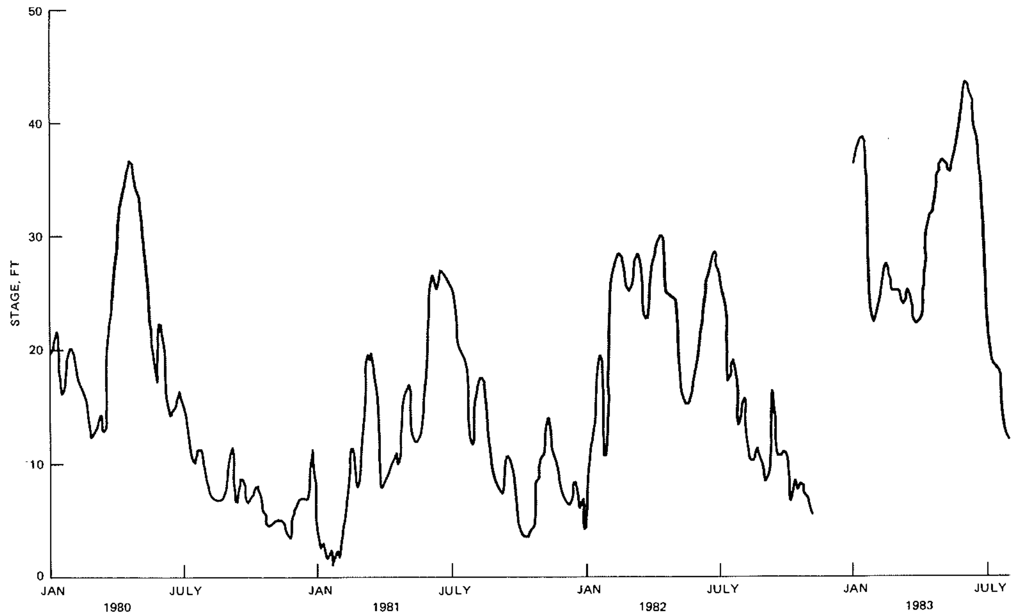

Figure 8. Stages at Simmesport, La.

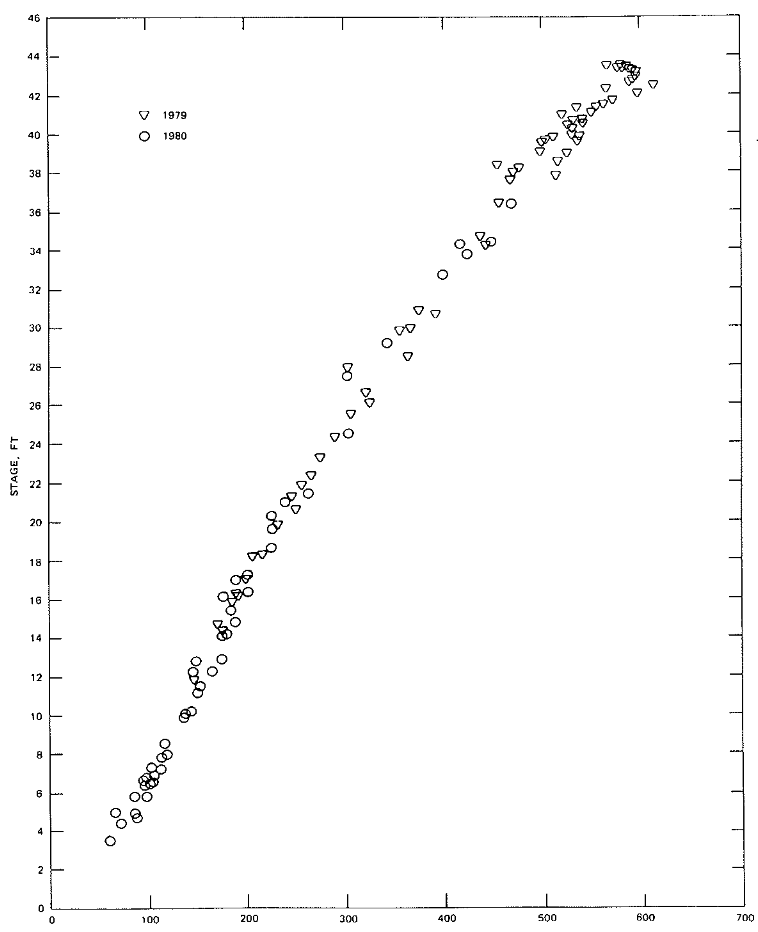

Figure 9. Stage-discharge relationship at Simmesport, La.

PART III: THE DATA

29. The data described here, except for wind and wave data, are presented in tabular form in Appendixes A through D. Figures 10 through 13 are portions of these tables shown as samples. The tidal data are presented in Appendix A and Figure 10 illustrates the format. Time is given in hours and minutes, Central Standard Time (CST), for the first elevation on each line. Subsequent elevations on that line are for successive 30-min intervals. Missing data or breaks in the record are indicated by elevation values of -999. Datum planes for the tide data are arbitrary, since no vertical control has been established in the area. Analyses have been used to establish approximate datum planes.

30. Velocity data for the surveys presented herein are shown in Appendix B and illustrated in Figure 11. Time is given as CST, current speed is in feet per second, and direction is in degrees from magnetic north and indicates the direction to which the current is flowing. The tables in Appendix B also show water temperature at the sampling point in degrees Celsius and conductivity in mmhos/cm.

31. Total suspended material data are shown in Appendix C. Table C1 includes CST, station, and TSM as illustrated in Figure 12.

32. Supplemental salinity data are shown in Appendix D as is illustrated in Figure 13. Table D1 includes the date, CST, station, depth, salinity (ppt), water temperature (°C), discharge (cfs), and some velocities as noted.

33. Analyzed data from the weather stations are presented in Report 9 of this series, "Wind Climatology."* Field data are on file at WES.

34. Analyzed data from the wave stations are presented in Report 10 of this series, "Wave Hindcasts."**

35. The stages at Simmesport, La. for the period of data collection, furnished by the US Army Engineer District, New Orleans, are presented in Figure 8. Estimates of discharge at Simmesport were derived using a stage-discharge relationship (Figure 9).

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* B. A. Ebersole. 1985. "The Atchafalaya River Delta, Report 9, Wind Climatology," TR HL-82-15, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

** R. E. Jensen. 1985. "The Atchafalaya River Delta, Report 10, Wave Hindcasts," TR HL-82-15, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

TABLE A1

TIDAL DATA SURVEY NO. 1

ATCHAFALAYA TIDAL ELEVATIONS AT EUGENE ISLAND (STATION NO. 1), SURVEY 1

DATE	TIME OF FIRST READING CST	ELEVATION FT									
7- 1-80	130	18.49	18.52	18.56	18.64	18.74	18.86	18.93	18.97	19.01	19.04
7- 1-80	630	19.06	19.07	19.09	19.10	19.11	19.13	19.12	19.13	19.13	19.14
7- 1-80	1130	19.15	19.15	19.16	19.17	19.17	19.18	19.19	19.19	19.20	19.21
7- 1-80	1630	19.22	19.23	19.23	19.27	19.24	19.24	19.24	19.24	19.23	19.21
7- 1-80	2130	19.19	19.16	19.14	19.11	19.07	19.05	19.02	19.00	18.99	18.99
7- 2-80	230	18.99	18.99	18.99	19.00	19.01	19.04	19.07	19.09	19.11	19.12
7- 2-80	730	19.14	19.15	19.16	19.17	19.17	19.18	19.18	19.19	19.19	19.20
7- 2-80	1230	19.20	19.21	19.22	19.22	19.23	19.23	19.24	19.26	19.26	19.27
7- 2-80	1730	19.28	19.28	19.29	19.29	19.29	19.29	19.27	19.26	19.25	19.23
7- 2-80	2230	19.21	19.20	19.17	19.15	19.03	18.93	18.91	18.91	18.98	19.06
7- 3-80	330	19.15	19.27	19.33	19.41	19.50	19.57	19.64	19.75	19.85	19.92
7- 3-80	830	19.98	20.04	20.08	20.11	20.12	20.11	20.11	20.10	20.08	20.07
7- 3-80	1330	20.07	20.07	20.07	20.08	20.09	20.09	20.09	20.09	20.09	20.09
7- 3-80	1830	20.09	20.09	20.09	20.07	20.04	19.97	19.88	19.78	19.68	19.57
7- 3-80	2330	19.47	19.38	19.31	19.27	19.24	19.24	19.24	19.27	19.32	19.36
7- 4-80	430	19.42	19.49	19.56	19.65	19.73	19.81	19.88	19.94	-999.00	20.04
7- 4-80	930	20.07	20.08	20.08	20.07	20.03	19.97	19.90	19.83	19.76	19.70
7- 4-80	1430	19.63	19.59	19.54	19.51	19.51	19.51	19.54	19.58	19.62	19.68
7- 4-80	1930	19.74	19.81	19.85	19.89	19.91	19.92	19.92	19.91	19.88	19.83
7- 5-80	30	19.79	19.74	19.69	19.65	19.62	19.60	19.59	19.59	19.61	19.63
7- 5-80	530	19.67	19.72	19.77	19.83	19.89	19.96	20.02	20.09	20.13	20.17
7- 5-80	1030	20.20	20.20	20.18	20.13	20.05	19.97	19.88	19.79	19.70	19.62
7- 5-80	1530	19.53	19.45	19.42	19.40	19.40	19.41	19.43	19.44	19.46	19.47
7- 5-80	2030	19.48	19.49	19.50	19.51	19.51	19.52	19.53	19.54	19.54	19.55
7- 6-80	130	19.55	19.56	19.56	19.56	19.57	19.57	19.57	19.58	19.58	19.59
7- 6-80	630	19.59	19.59	19.60	19.61	19.61	19.62	19.63	19.63	19.64	19.64
7- 6-80	1130	19.64	19.64	19.65	19.65	19.65	19.64	19.64	19.63	19.61	19.60
7- 6-80	1630	19.58	19.55	19.52	19.51	19.50	19.50	19.52	19.54	19.56	19.58
7- 6-80	2130	19.61	19.63	19.64	19.66	19.67	19.68	19.68	19.69	19.69	19.70
7- 7-80	230	19.70	19.70	19.70	19.71	19.71	19.71	19.71	19.71	19.71	19.72
7- 7-80	730	19.72	19.72	19.72	19.72	19.72	19.73	19.73	19.73	19.73	19.73
7- 7-80	1230	19.73	19.71	19.70	19.68	19.66	19.63	19.59	19.54	19.49	19.45
7- 7-80	1730	19.40	19.35	19.31	19.29	19.27	19.26	19.23	19.21	19.20	19.21
7- 7-80	2230	19.24	19.28	19.34	19.39	19.45	19.53	19.60	19.67	19.74	19.82
7- 8-80	330	19.85	19.86	19.86	19.86	19.87	19.87	19.87	19.87	19.87	19.88

(CONTINUED)

NOTE: SEQUENTIAL ELEVATIONS PRINTED HORIZONTALLY AT 30-MINUTE INTERVALS.

(SHEET 1 OF 72)

Figure 10. A portion of Table A1 is shown as a sample of tidal data presented in tabular form

TABLE B1

VELOCITY-CONDUCTIVITY-TEMPERATURE DATA SURVEY 1

ATCHAFALAYA VELOCITY STATION V1, SURVEY 1

DATE	TIME CST	SPEED FPS	DIRECTION DEG	TEMPERATURE DEG C	CONDUCTIVITY MMHOS/CM	TIME CST	SPEED FPS	DIRECTION DEG	TEMPERATURE DEG C	CONDUCTIVITY MMHOS/CM
8- 7-80	930	-9.99	-999.9	-99.9	-9.9	1000	0.72	305.0	29.4	1.6
8- 7-80	1030	0.49	319.0	29.5	1.7	1100	0.23	18.0	29.5	1.7
8- 7-80	1130	0.29	73.0	29.7	1.7	1200	0.32	105.0	29.8	1.7
8- 7-80	1230	0.03	64.0	29.8	1.7	1300	0.23	130.0	29.8	1.7
8- 7-80	1330	0.26	292.0	29.7	1.7	1400	0.29	191.0	29.7	1.7
8- 7-80	1430	0.39	251.0	29.6	1.7	1500	0.49	275.0	29.6	1.7
8- 7-80	1530	0.69	272.0	29.5	1.7	1600	0.75	279.0	29.6	1.7
8- 7-80	1630	0.92	279.0	29.6	1.7	1700	0.95	282.0	29.7	1.7
8- 7-80	1730	1.02	289.0	29.8	1.7	1800	0.95	288.0	29.8	1.7
8- 7-80	1830	0.95	281.0	29.8	1.7	1900	0.79	284.0	29.8	1.7
8- 7-80	1930	0.79	288.0	29.7	1.7	2000	0.56	291.0	29.6	1.7
8- 7-80	2030	0.59	281.0	29.6	1.7	2100	0.46	293.0	29.5	1.7
8- 7-80	2130	0.26	302.0	29.4	1.7	2200	0.23	32.0	29.4	1.7
8- 7-80	2230	0.42	74.0	29.3	1.7	2300	0.65	82.0	29.3	1.7
8- 7-80	2330	0.69	88.0	29.2	1.7	2400	0.85	91.0	29.2	1.7
8- 8-80	30	0.95	99.0	29.1	1.7	100	0.98	101.0	29.0	1.7
8- 8-80	130	1.08	102.0	28.9	1.7	200	1.12	101.0	28.8	1.7
8- 8-80	230	1.12	106.0	28.7	1.7	300	1.12	106.0	28.7	1.7
8- 8-80	330	1.08	106.0	28.4	1.7	400	0.95	105.0	28.4	1.7
8- 8-80	430	0.92	99.0	28.5	1.7	500	0.75	112.0	28.4	1.7
8- 8-80	530	0.36	125.0	28.4	1.7	600	0.06	113.0	28.4	1.7
8- 8-80	630	0.13	0.	28.3	1.7	700	0.19	336.0	28.3	1.7
8- 8-80	730	0.26	327.0	28.3	1.7	800	0.36	315.0	28.3	1.7
8- 8-80	830	0.39	312.0	28.3	1.7	900	0.52	309.0	28.3	1.7
8- 8-80	930	0.75	306.0	28.4	1.7	1000	0.82	303.0	28.5	1.7
8- 8-80	1030	0.95	313.0	28.5	1.7	1100	0.95	315.0	28.6	1.7
8- 8-80	1130	0.95	316.0	28.8	1.7	1200	0.95	317.0	29.0	1.7
8- 8-80	1230	0.82	327.0	29.1	1.7	1300	0.79	320.0	29.2	1.7
8- 8-80	1330	0.82	315.0	29.3	1.7	1400	0.82	306.0	29.4	1.7
8- 8-80	1430	0.85	313.0	29.4	1.7	1500	0.85	309.0	29.4	1.7
8- 8-80	1530	0.92	306.0	29.4	1.7	1600	0.82	300.0	29.4	1.7
8- 8-80	1630	1.05	310.0	29.5	1.7	1700	0.89	305.0	29.5	1.7
8- 8-80	1730	0.89	300.0	29.5	1.7	1800	0.89	292.0	29.4	1.7
8- 8-80	1830	0.89	292.0	29.4	1.7	1900	0.69	295.0	29.4	1.7
8- 8-80	1930	0.59	296.0	29.4	1.7	2000	0.62	295.0	29.3	1.7
8- 8-80	2030	0.69	298.0	29.2	1.7	2100	0.59	305.0	29.0	1.7
8- 8-80	2130	0.26	315.0	28.9	1.7	2200	0.26	334.0	28.8	1.7

(CONTINUED)

(SHEET 1 OF 58)

Figure 11. A portion of Table B1 is shown as a sample of velocity data presented in tabular form and printed at 30-min intervals

Table C1

Total Suspended Material

Date	Time	Sta*	Depth**	TSM†	Date	Time	Sta*	Depth**	TSM†
8-5-80	1055	H	S	31	8-6-80	1445	Y	S	30
8-5-80	1055	H	M	32	8-6-80	1445	Y	M	34
8-5-80	1055	H	B	35	8-6-80	1445	Y	B	34
8-5-80	1348	L	S	18	8-6-80	1600	X	S	50
8-5-80	1348	L	M	18	8-6-80	1600	X	M	52
8-5-80	1348	L	B	91	8-6-80	1600	X	B	56
8-5-80	1548	O	S	90	8-19-80	0942	E	S	8
8-5-80	1548	O	B	100					
					8-19-80	1035	F	B	23
8-5-80	1640	R	S	165					
8-5-80	1640	R	M	170	8-19-80	1125	H	M	21
8-5-80	1640	R	B	178					
					8-19-80	1335	L	S	10
8-6-80	0755	TG11	S	44	8-19-80	1335	L	B	46
8-6-80	0755	TG11	M	43					
8-6-80	0755	TG11	B	48	8-19-80	1520	O	S	21
					8-19-80	1520	O	B	23
8-6-80	0910	V	S	48					
8-6-80	0910	V	M	44	8-19-80	1600	R	S	54
8-6-80	0910	V	B	44	8-19-80	1600	R	B	69
8-6-80	1007	U	S	38	8-20-80	0800	JAWS	S	44
8-6-80	1007	U	M	39	8-20-80	0800	JAWS	B	61
8-6-80	1007	U	B	50					
					8-20-80	0830	JAWS	S	47
8-6-80	1030	T	S	34					
8-6-80	1030	T	M	34	8-20-80	0950	T	B	39
8-6-80	1030	T	B	34					
					8-20-80	1209	TG8	B	6
8-6-80	1220	TG8	S	23					
8-6-80	1220	TG8	M	28	8-20-80	1440	X	S	27
8-6-80	1220	TG8	B	115					
					8-21-80	0915	H	S	41
8-6-80	1355	Z	S	31					
8-6-80	1355	Z	M	32	8-21-80	0955	C	S	105
					8-21-80	1020	A	S	41

(Continued)

* Station designations are indicated in Figures 3, 5, 6, and 7 in main text.
** Depth is indicated as surface (S), middepth (M), and bottom (B).
† Total suspended material (mg/ℓ).

(Sheet 1 of 9)

Figure 12. A portion of Table C1 is shown as a sample of TSM data presented in tabular form

Table D1

Supplemental Salinity Data

Date	Time	Sta*	Depth**	Salinity ppt	Water Temp °C	Current Speed fps	Current Directions deg	Discharge† 1,000 cfs
1-15-80	905	P	S	0.28	9.0			210
1-15-80	905	P	M	0.3	9.0			210
1-15-80	905	P	B	0.3	9.0			210
1-15-80	942	H	S	0.3	9.0			210
1-15-80	942	H	M	0.3	8.7			210
1-15-80	942	H	B	0.3	8.8			210
1-15-80	1008	I	S	0.3	9.3			210
1-15-80	1008	I	M	0.3	9.2			210
1-15-80	1008	I	B	0.3	9.2			210
1-15-80	1030	K	S	7.0	10.0			210
1-15-80	1030	K	M	11.5	9.5			210
1-15-80	1030	K	B	14.2	9.1			210
1-15-80	1110	L	S	33.0	15.8			210
1-15-80	1110	L	M	33.0	15.8			210
1-15-80	1110	L	B	33.0	15.8			210
1-15-80	1135	B-9	S	29.5	15.2			210
1-15-80	1135	B-9	M	29.5	15.2			210
1-15-80	1135	B-9	B	29.5	15.2			210
1-15-80	1205	B-27	S	3.6	10.7			210
1-15-80	1205	B-27	M	3.6	10.5			210
1-15-80	1205	B-27	B	3.6	10.5			210
2-5-80	1318	L	S	32.2	12.0			220
2-5-80	1318	L	M	32.2	12.0			220
2-5-80	1318	L	B	32.2	11.8			220
2-5-80	1402	B-9	S	31.3	12.5			220
2-5-80	1402	B-9	M	31.3	12.5			220
2-5-80	1402	B-9	B	31.3	12.5			220

(Continued)

* Station designations are indicated in Figures 3, 5, 6, and 7 in main text.
** Depth is indicated as surface (S), middepth (M), and bottom (B).
† Discharge (flow rate) at Simmesport, La.

(Sheet 1 of 23)

Figure 13. A portion of Table D1 is shown as a sample of supplementary salinity data presented in tabular form

Table 1

Status of Tidal Data Records

Tide Gage No.	Data Periods Beginning Date	Ending Date	Comments
1	9-27-79	11- 8-79	
	2- 5-80	2-16-80	
	3- 1-80	5- 2-80	Random erroneous data and periods of stilling well blockage
	6- 8-80	6-26-80	
	6-26-80	7- 2-80	Periods of stilling well blockage
	7- 3-80	1-21-81	
	3- 6-81	4- 8-82	
	5-11-82	8-31-82	
	4-28-83	6-21-83	
2	3- 7-80	8-18-81	
	9- 1-81	11-13-81	
	6- 8-82	8-13-82	
	4-26-83	6-30-83	
3	2- 5-80	3- 3-80	
	3- 3-80	3- 8-80	Recorder malfunctioned intermittently
	3- 8-80	3-27-80	
	6-26-80	8- 4-80	Timing device malfunctioned
	8- 5-80	3-31-81	
	4- 2-81	7-31-81	
	9- 2-81	9- 7-81	
	11-18-81	2-11-82	
	6- 9-82	8-31-82	
	4-26-83	6-22-83	
4	2-25-80	5-14-81	
	6-24-81	12- 9-81	
	1- 5-82	2-16-82	
	3-18-82	9- 1-82	
	4-27-83	6-27-83	
5	2- 6-80	3-18-80	
	3-25-80	4-17-80	
	5-14-80	12- 1-81	
	12- 1-81	1-18-82	No water at gage location during extremely low tides
	1-18-82	2-26-82	
	3-16-82	3-26-82	
	4- 5-82	7- 9-82	
	4-28-83	6-21-83	
6	2- 7-80	3-28-80	
	3-28-80	12- 7-80	
	1- 9-81	9- 1-81	
	4-27-83	5- 3-83	

(Continued)

Table 1 (Concluded)

Tide Gage No.	Data Periods Beginning Date	Ending Date	Comments
7	2- 7-80	4-26-80	
	5-22-80	1-30-81	
	2- 4-81	8-11-81	
	10-20-81	12- 3-81	
	12- 3-81	6-10-82	Timing is progressively slow throughout these data
	4-27-83	5-11-83	
8	6-25-80	7- 7-80	
	7-16-80	10-16-80	
	11-20-80	9- 1-81	
9	2- 5-80	10-27-80	
	11-19-80	11-24-80	
	1- 9-81	4-28-81	
	4-28-81	9- 1-81	Recorder malfunctioned intermittently
	4-26-83	6-22-83	
10	11-21-80	4- 9-81	
	9- 3-81	5-11-82	Stilling well silted up intermittently
	6- 8-82	7- 8-82	
	4-26-83	6-20-83	
11	11-20-80	12-20-81	
	1- 5-82	6-11-82	
	6-11-82	9- 1-82	Stilling well silted up intermittently
	4-27-83	6-30-83	
12	1- 7-81	1-26-81	
	3- 3-81	3-26-81	
	4- 1-81	9- 5-81	
	10-20-81	1- 5-82	
	6-10-82	9- 1-82	
13	1- 7-81	1-16-81	Influenced by navigation lock operation
	3-31-81	6-23-81	Influenced by navigation lock operation
	7-22-81	9- 1-81	Influenced by navigation lock operation and stilling well silted up
14	3-17-82	9- 1-82	
15	1-27-81	5- 8-81	
	6- 4-81	7-21-81	

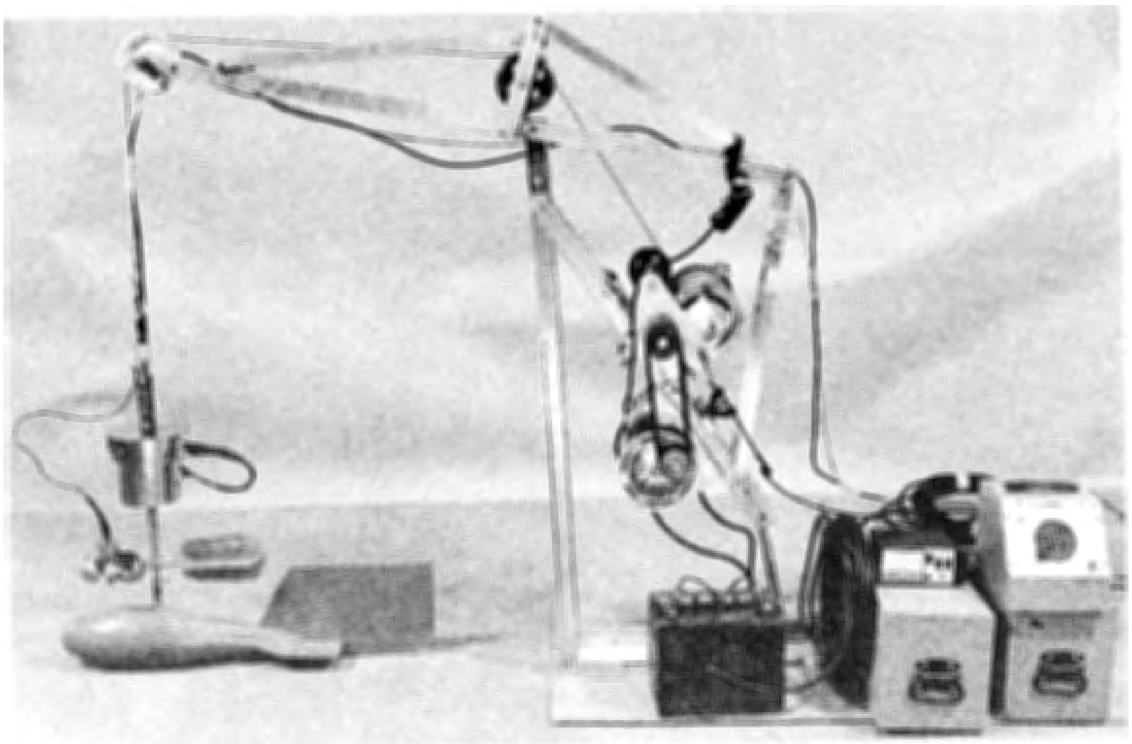

Photo 1. Over-the-side assembly

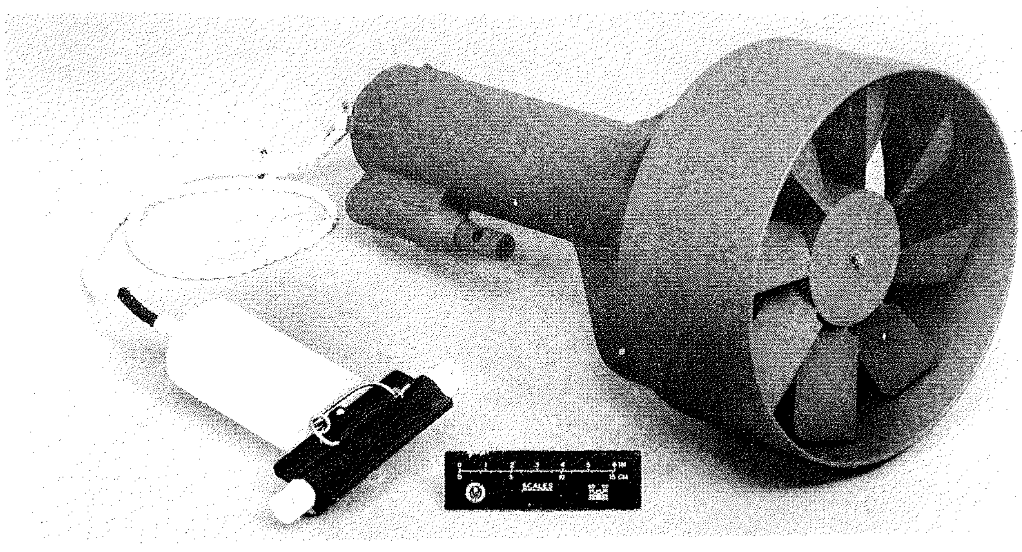

Photo 2. ENDECO 174 meter

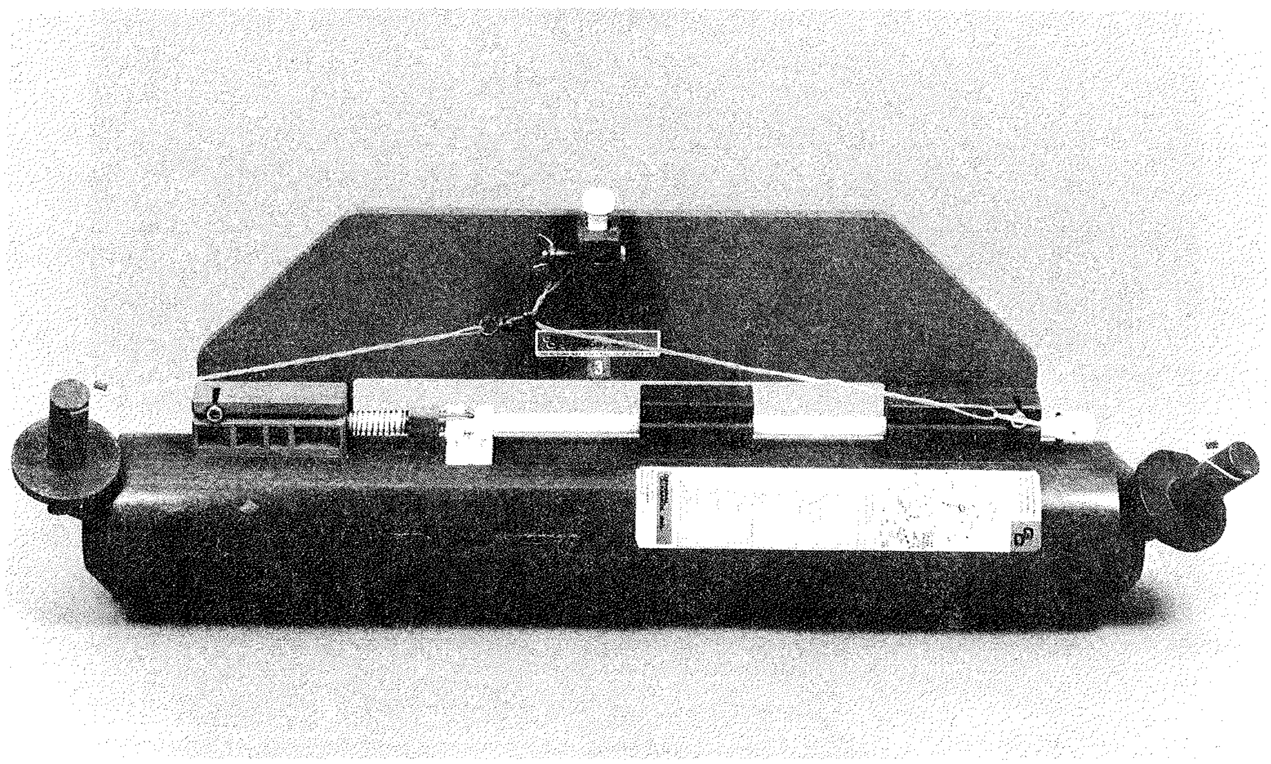

Photo 3. Settling sampler