# LONGSHORE SEDIMENT TRANSPORT

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# LONGSHORE SEDIMENT TRANSPORT

## DESCRIPTION

This application provides estimates of the *potential* longshore transport rate under the action of waves. The method used is based on the empirical relationship between the longshore component of wave energy flux entering the surf zone and the immersed weight of sand moved (Galvin, 1979). Three methods are available to the user depending on whether available input data are breaker wave height and direction, deepwater wave height and direction, or using a Wave Information Study hindcast data file created by the Coastal Engineering Data Retrieval System (CEDRS). The material presented herein can be found in Chapter 4 of the *Shore Protection Manual* (1984) and in Gravens (1988).

## INPUT

All data input for this application is done on one screen. The following list describes the necessary input parameters with their corresponding units and range of data recognized by this application:

| Mandatory item | Symbol | Units | Data Range | | |
|---|---|---|---|---|---|
| Breaking wave height | $H_b$ | ft, m | 0.1 | to | 100.0 |
| Deepwater wave height | $H_o$ | ft, m | 0.1 | to | 100.0 |
| Wave crest angle with shoreline | $\alpha_b$ | deg | 0.0 | to | 90.0 |
| Deepwater angle of wave crest | $\alpha_o$ | deg | 0.0 | to | 90.0 |
| Empirical coefficient | $K$ | | 0.0 | to | 1.0 |

These items are required when using a CEDRS data file. *For information on CEDRS and input requirements see section entitled "Coastal Engineering Data Retrieval System."*

| | | | | | |
|---|---|---|---|---|---|
| Shore-normal azimuth | $\Theta$ | deg | 0.0 | to | 360.0 |
| Empirical coefficient | $K$ | | 0.0 | to | 1.0 |
| External CEDRS file name | | | ??xxx.810 | | |

### Coastal Engineering Data Retrieval System

The CEDRS (available only to Corps of Engineers offices) is an interactive microcomputer resident database system, distinct and separate from ACES, which provides both hindcast and measured wind and wave data for use in the field of coastal engineering. The general goal of CEDRS is to assemble, archive, and make available regional databases containing data applicable to requirements of individual coastal Districts of the Corps of Engineers. The CEDRS databases contain both measured data from several sources and computer-model-generated hindcast data. The CEDRS system resides completely on an auxiliary hard disk furnished for each regional database. For more information regarding the system, forward inquiries to:

Coastal Engineering Research Center
US Army Engineer Waterways Experiment Station
ATTN: CEWES-CR-O
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

### CEDRS Percent Occurrence Table Files

In addition to time series of wave and wind parameters, CEDRS has available a series of tables of basic statistics calculated from the 20- or 32-year time series for all stations. The CEDRS data file (table) used by this ACES application is the percent occurrence (see Example 6-1-3) of wave height and period by direction. Values in this table represent the percentage of a 20- or 32-year period during which waves occur from specified azimuth ranges for the indicated height and period ranges. The CEDRS data file contains percent occurrence of waves for 16 directional bands centered on 22.5-deg increments of 0, 22.5, 45, 67.5, etc. (see Table 6-1-1 and Figure 6-1-1). (See reports in the *References and Bibliography* section dealing with Wave Information Studies (WIS) of US Coastlines for more information).

This ACES application will extract from the CEDRS data file the percentage of waves for a particular wave height, period range, and direction and compute the contributing transport rate. This procedure is repeated for all percentages of wave height, period, and direction, but only for those wave directions that approach the specified shoreline as defined by the user-supplied shore-normal azimuth (see Example 6-1-3).

| Table 6-1-1<br>Ranges for Direction Intervals in<br>CEDRS Percent Occurrence Tables | | | | | | |
|---|---|---|---|---|---|---|
| Band | Midband Azimuth (D) | Wave Band Range (Degrees) | | | | |
| 1 | 0.0 | 348.75 | ≤ | D | < | 11.25 |
| 2 | 22.5 | 11.25 | ≤ | D | < | 33.75 |
| 3 | 45.0 | 33.75 | ≤ | D | < | 56.25 |
| 4 | 67.5 | 56.25 | ≤ | D | < | 78.75 |
| 5 | 90.0 | 78.75 | ≤ | D | < | 101.25 |
| 6 | 112.5 | 101.25 | ≤ | D | < | 123.75 |
| 7 | 135.0 | 123.75 | ≤ | D | < | 146.25 |
| 8 | 157.5 | 146.25 | ≤ | D | < | 168.75 |
| 9 | 180.0 | 168.75 | ≤ | D | < | 191.25 |
| 10 | 202.5 | 191.25 | ≤ | D | < | 213.75 |
| 11 | 225.0 | 213.75 | ≤ | D | < | 236.25 |
| 12 | 247.5 | 236.25 | ≤ | D | < | 258.75 |
| 13 | 270.0 | 258.75 | ≤ | D | < | 281.25 |
| 14 | 292.5 | 281.25 | ≤ | D | < | 303.75 |
| 15 | 315.0 | 303.75 | ≤ | D | < | 326.25 |
| 16 | 337.0 | 326.25 | ≤ | D | < | 348.75 |

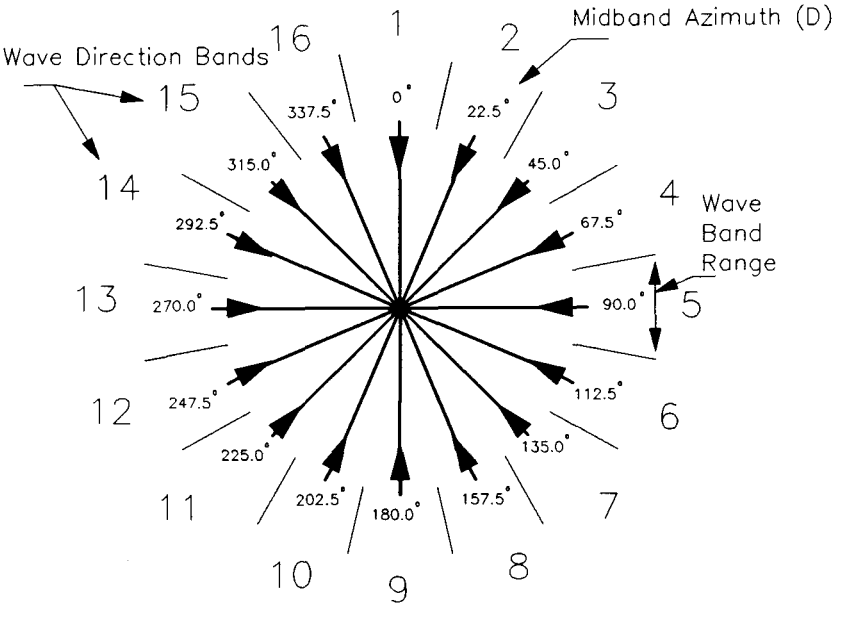


Figure 6-1-1. Diagram Indicating Wave Direction Bands

This ACES application will read the various regional data files containing the percent occurrence statistical data in the form of tables that reside on the CEDRS auxiliary hard disk. These data files have the following DOS name convention:

??xxx.810

where

?? = coast (see Table 6-1-2)

xxx = station on the coast

Table 6-1-2
Coast Designation

| ?? | Region |
|---|---|
| a2 | Atlantic |
| g1 | Gulf |
| p2 | Pacific |
| e0 | Lake Erie |
| h0 | Lake Huron |
| m0 | Lake Michigan |
| s0 | Lake Superior |
| o0 | Lake Ontario |

To use a particular regional data file in this ACES application, type in the regional data file name and directory path name to the CEDRS directory where the regional file exists.

### Sediment Transport Direction Convention

For calculation of potential longshore sand transport using the CEDRS percent occurrence data files, a right-handed coordinate system is used, in which waves approaching normal to the shoreline are given an angle of 0 deg. Looking seaward, waves approaching from the right are associated with negative angles, and waves approaching from the left are associated with positive angles such that positive transport is directed to the right. The shore-normal azimuth $\Theta$ is measured clockwise from true north (see Figure 6-1-2).

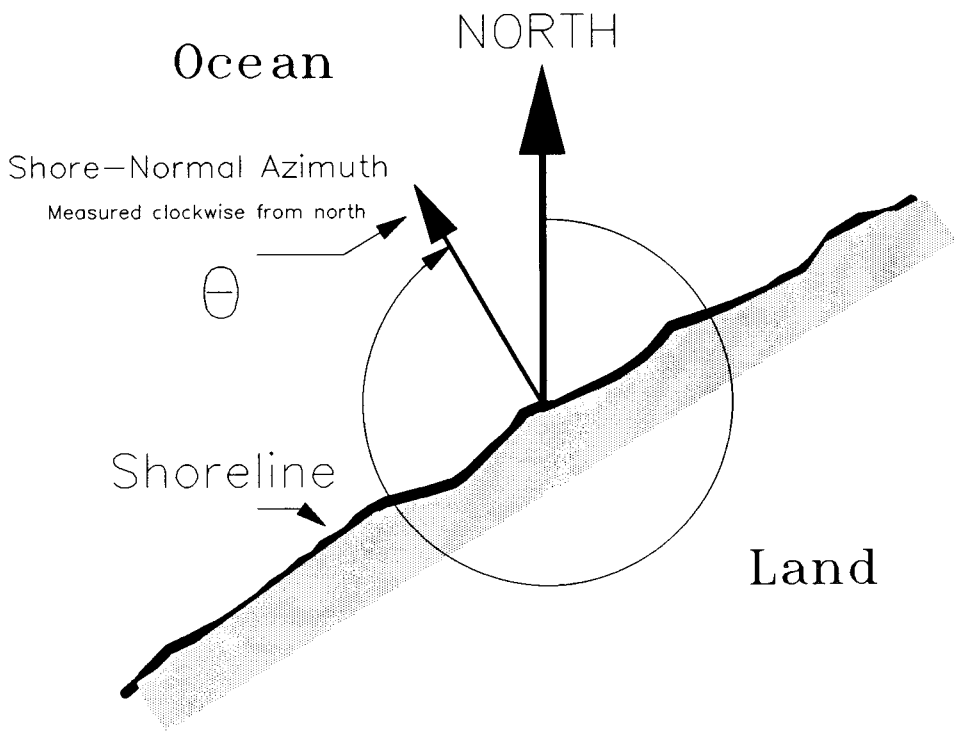


Figure 6-1-2. Definition Diagram for Shore-Normal Azimuth

## OUTPUT

Results from this application are displayed on one screen. Those data include the original input values (in final units) and the following:

| Item | Symbol | English Units | Metric Units |
|---|---|---|---|
| Transport rate | $Q$ | $yd^3/yr$ | $m^3/yr$ |

When the CEDRS data file is used, the following additional data are output: The wave bands that approach the specified shoreline; the wave direction angle associated with the wave band; and the percentage of the transport rate for each contributing wave band (see Example 3).

## PROCEDURE

The bulleted items in the following lists indicate potentially optional instruction steps. Any application in ACES may be executed in a given session without quitting the program. The bulleted items provide instructions for accessing the application from various menu areas of the ACES Program. Ignore bulleted instruction steps that are not applicable.

### Single Case Mode

- Press [F1] on the Main Menu to select Single Case Mode.
- Fill in the highlighted input fields on the General Specifications screen (or leave the default values). Press [F1] when all data on this screen are correct.
- Press [F6] on the Functional Area Menu to select Littoral Processes.
- Press [F1] on the Littoral Processes Application Menu to select Longshore Sediment Transport.
- On the Longshore Sediment Transport Menu, press <u>one</u> of the following:

  [F1] Estimate the transport rate using deepwater wave conditions.

  [F2] Estimate the transport rate using breaking wave conditions.

  [F3] Estimate the transport rate using CEDRS statistical data: Percent Occurrence of Wave Height & Period by Direction. *For information on CEDRS and input requirements see section entitled "Coastal Engineering Data Retrieval System."*

  [F10] Exit application

1. Fill in the highlighted input fields on the Longshore Sediment Transport screen. Respond to any corrective instructions appearing at the bottom of the screen. Press [F1] when all data on this screen are correct.
2. All input and output data are displayed on the screen in the final system of units.
3. Press <u>one</u> of the following keys to select the appropriate action:

   [F1] Return to Step 1 for a new case.

   [F3] Send a summary of this case to the print file or device.

[F10] Exit this application and return to the Littoral Processes Menu.

**Multiple Case Mode**

- Press [F2] on the Main Menu to select Multi Case Mode.
- Fill in the highlighted input fields on the General Specifications screen (or leave the default values). Press [F1] when all data on this screen are correct.
- Press [F6] on the Functional Area Menu to select Littoral Processes.
- Press [F1] on the Littoral Processes Application Menu to select Longshore Sediment Transport.
- On the Longshore Sediment Transport Menu, press <u>one</u> of the following:

  [F1] Estimate the transport rate using deepwater wave conditions.

  [F2] Estimate the transport rate using breaking wave conditions.

1. Move the cursor to select a variable on the Longshore Sediment Transport screen (the selected variable name blinks). The current set of values for the variable is displayed on the right portion of the screen. When all variable sets are correct, go to Step 3.
2. Enter a set of values for the subject variable by following <u>one</u> of the input methods:

   a. Press [R] to select random method. Enter up to 20 values constituting a set for this variable (<u>one</u> in each field) on the right side of the screen. The set of 20 values originally displayed (first execution) in these fields contains the "delimiting" value, which "delimits" or "ends" the set. The "delimiting" value is *not* included as a member in the set unless it is the sole member.

   b. Press [I] to select incremental method. Fill in the fields for minimum, maximum, and increment values for this variable on the right side of the screen. In this method, the members of the set include all values from the minimum to the maximum (both inclusive) at the specified increment.

The units field should also be specified for the variable regardless of input method. All members of a set of values for a subject variable are assigned the specified units. When all data are correct for the subject variable, press [F10] to return to Step 1. Errors are reported at the bottom of the screen and are corrected by pressing [F1] to allow respecification of the data for the subject variable.

3. Press [F1] to process the cases resulting from the combinations of the sets of data for all variables. The summary of each case will be sent to the print file or device. The screen will display the total number of cases to be processed as well as report progress. Errors are reported at the bottom of the screen and are corrected by pressing [F1] to allow respecification of variable sets.

4. Press one of the following keys to select the appropriate action:

   [F1] Return to Step 1 to specify new sets.

   [F10] Exit this application and return to the Littoral Processes Menu.

## EXAMPLE PROBLEMS

### Example 1 - Deepwater Wave Condition

#### Input

All data input for this application is done on one screen. The values and corresponding units selected for this first example problem are shown below.

| Item | Symbol | Value | Units |
|---|---|---|---|
| Deepwater wave height | $H_o$ | 1.75 | ft |
| Deepwater angle of wave crest | $\alpha_o$ | 15.00 | deg |
| Empirical coefficient | $K$ | 0.39 | |

#### Output

Results from this application are displayed on one screen. Those data include the original input values and the following parameter:

| Item | Symbol | Value | Units |
|---|---|---|---|
| Transport rate | $Q$ | 220,181 | $yd^3/yr$ |

---

### Example 2 - Breaking Wave Condition

#### Input

All data input for this application is done on one screen. The values and corresponding units selected for this second example problem are shown below.

| Item | Symbol | Value | Units |
|---|---|---|---|
| Breaking wave height | $H_b$ | 3.75 | ft |
| Wave crest angle with shoreline | $\alpha_b$ | 12.00 | deg |
| Empirical coefficient | $K$ | 0.39 | |

#### Output

Results from this application are displayed on one screen. Those data include the original input values and the following parameter:

| Item | Symbol | Value | Units |
|---|---|---|---|
| Transport rate | $Q$ | 2,130,286 | $yd^3/yr$ |

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### Example 3 - Transport Using CEDRS Percent Occurrence Data

#### Input

All data input for this application is done on one screen. The values and corresponding units selected for this second example problem are shown below.

| Item | Symbol | Value | Units |
|---|---|---|---|
| Shore-Normal Azimuth (see Figure 6-1-3) | $\Theta$ | 40.0 | deg |
| Empirical coefficient | $K$ | 0.39 | |
| External CEDRS File (see Table 6-1-3) (WIS Report 18, pp. C73-C77) | | G1033.810 | |

#### Output

Results from this application are displayed on one screen. Those data include the original input values and the following:

| Band | Angle From Shore-Normal | Contributing Percentage | Transport Rate (cu yd/yr) |
|---|---|---|---|
| 15 | 85.00 | 72.22 | 7858.11 |
| 16 | 62.50 | 100.00 | 54339.38 |
| 1 | 40.00 | 100.00 | 71378.84 |
| 2 | 17.50 | 100.00 | 48554.56 |
| 3 | -5.00 | 100.00 | -24439.33 |
| 4 | -27.50 | 100.00 | -223345.99 |
| 5 | -50.00 | 100.00 | -445583.30 |
| 6 | -72.5 | 100.00 | -172636.96 |
| 7 | -95.00 | 27.78 | -27.21 |
| | | Total | -683901.92 |

NOTE: Looking seaward, negative transport is directed to the left.

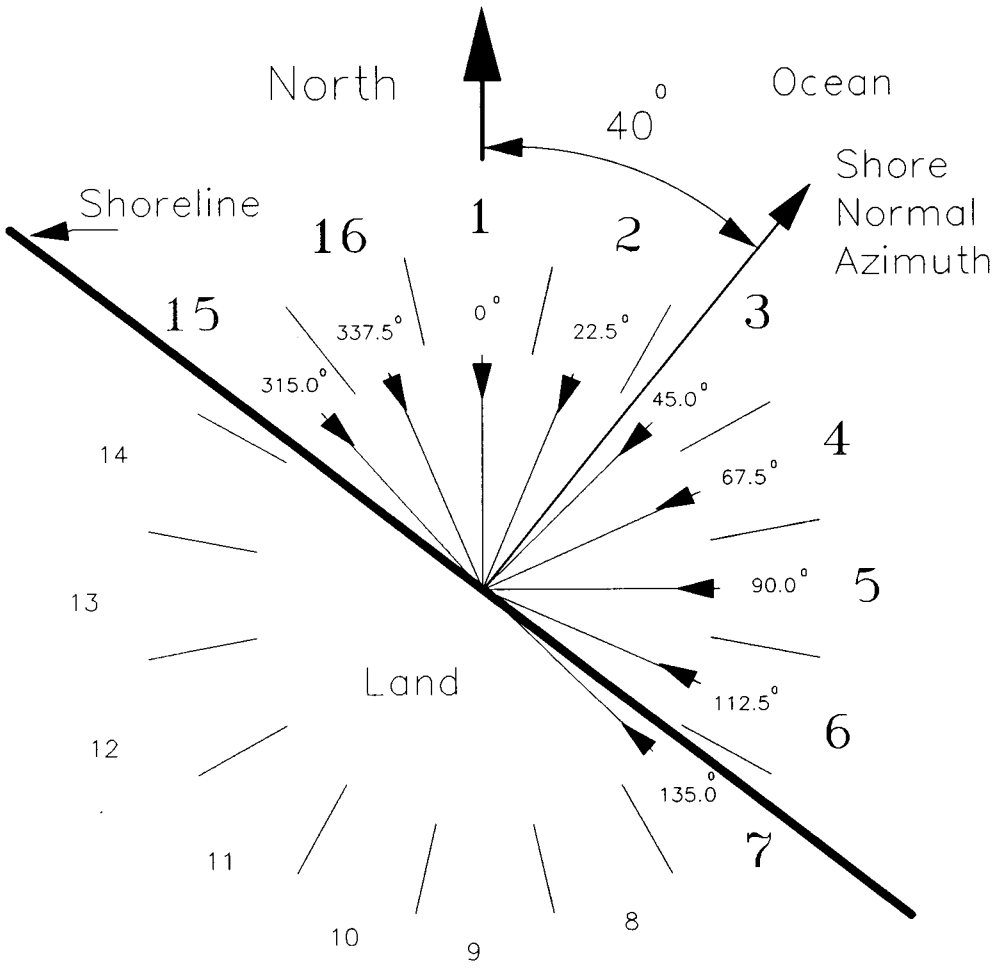


**Figure 6-1-3. Shore-Normal Azimuth Definition for Example 6-1-3**

Table 6-1-3
CEDRS Statistical File for Gulf of Mexico Station No. 33
(File G1033.810)
(WIS Report 18, pp. C73-C77)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 0.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 1335
% OF TOTAL: 2.3

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 34 | 30 | 5 | . | . | . | . | . | . | . | 69 |
| 0.50-0.99 | 378 | 532 | 30 | . | . | . | . | . | . | . | 940 |
| 1.00-1.49 | . | 780 | 99 | . | . | . | . | . | . | . | 879 |
| 1.50-1.99 | . | . | 345 | 3 | . | . | . | . | . | . | 348 |
| 2.00-2.49 | . | . | 42 | . | . | . | . | . | . | . | 42 |
| 2.50-2.99 | . | . | 1 | . | . | . | . | . | . | . | 1 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 412 | 1342 | 522 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.5 MEAN TP(SEC) = 4.8

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 22.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 1471
% OF TOTAL: 2.5

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 66 | 41 | 15 | . | . | . | . | . | . | . | 122 |
| 0.50-0.99 | 321 | 602 | 56 | . | . | . | . | . | . | . | 979 |
| 1.00-1.49 | 1 | 888 | 104 | . | . | . | . | . | . | . | 993 |
| 1.50-1.99 | . | . | 359 | 1 | . | . | . | . | . | . | 360 |
| 2.00-2.49 | . | . | 58 | . | . | . | . | . | . | . | 58 |
| 2.50-2.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 388 | 1531 | 592 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.4 MEAN TP(SEC) = 4.8

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 45.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 2256
% OF TOTAL: 3.9

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4-LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 75 | 18 | 23 | . | . | . | . | . | . | . | 116 |
| 0.50-0.99 | 629 | 915 | 39 | . | . | . | . | . | . | . | 1583 |
| 1.00-1.49 | 1 | 1302 | 135 | . | . | . | . | . | . | . | 1438 |
| 1.50-1.99 | . | . | 592 | . | . | . | . | . | . | . | 592 |
| 2.00-2.49 | . | . | 126 | . | . | . | . | . | . | . | 126 |
| 2.50-2.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 705 | 2235 | 915 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.4 MEAN TP(SEC) = 4.7

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 67.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 4915
% OF TOTAL: 8.4

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4-LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 213 | 53 | 135 | . | . | . | . | . | . | . | 401 |
| 0.50-0.99 | 675 | 2250 | 181 | . | . | . | . | . | . | . | 3106 |
| 1.00-1.49 | . | 3151 | 532 | 3 | . | . | . | . | . | . | 3686 |
| 1.50-1.99 | . | 3 | 1052 | 6 | . | . | . | . | . | . | 1061 |
| 2.00-2.49 | . | . | 147 | 3 | . | . | . | . | . | . | 150 |
| 2.50-2.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 888 | 5457 | 2047 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.4 MEAN TP(SEC) = 4.8

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 90.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 9243
% OF TOTAL: 15.8

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 472 | 296 | 75 | . | . | . | . | . | . | . | 843 |
| 0.50-0.99 | 980 | 4433 | 374 | . | . | . | . | . | . | . | 5787 |
| 1.00-1.49 | . | 2320 | 4712 | 159 | . | . | . | . | . | . | 7191 |
| 1.50-1.99 | . | 18 | 874 | 831 | 44 | . | . | . | . | . | 1767 |
| 2.00-2.49 | . | . | 71 | 39 | 100 | . | . | . | . | . | 210 |
| 2.50-2.99 | . | . | 5 | . | 5 | . | . | . | . | . | 10 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 1452 | 7067 | 6111 | 1029 | 149 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 2.8 MEAN TP(SEC) = 5.2

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 112.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 8139
% OF TOTAL: 13.9

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 412 | 345 | 112 | . | . | . | . | . | . | . | 869 |
| 0.50-0.99 | 925 | 4404 | 545 | . | . | . | . | . | . | . | 5874 |
| 1.00-1.49 | . | 716 | 4609 | 547 | . | . | . | . | . | . | 5872 |
| 1.50-1.99 | . | . | 246 | 828 | 58 | . | . | . | . | . | 1132 |
| 2.00-2.49 | . | . | 6 | 23 | 102 | 1 | . | . | . | . | 132 |
| 2.50-2.99 | . | . | . | 3 | 27 | . | . | . | . | . | 30 |
| 3.00-3.49 | . | . | . | . | 1 | 5 | . | . | . | . | 6 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 1337 | 5465 | 5518 | 1401 | 188 | 6 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 3.2 MEAN TP(SEC) = 5.3

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 135.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 6876
% OF TOTAL: 11.8

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 496 | 381 | 39 | . | . | . | . | . | . | . | 916 |
| 0.50-0.99 | 853 | 3417 | 662 | 1 | . | . | . | . | . | . | 4933 |
| 1.00-1.49 | 1 | 638 | 3307 | 513 | 3 | . | . | . | . | . | 4462 |
| 1.50-1.99 | . | . | 119 | 961 | 136 | . | . | . | . | . | 1216 |
| 2.00-2.49 | . | . | . | 23 | 160 | 3 | . | . | . | . | 186 |
| 2.50-2.99 | . | . | . | . | 15 | 15 | . | . | . | . | 30 |
| 3.00-3.49 | . | . | . | . | . | 11 | . | . | . | . | 11 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 1350 | 4436 | 4127 | 1498 | 314 | 29 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 3.4 MEAN TP(SEC) = 5.3

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 157.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 4619
% OF TOTAL: 7.9

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 133 | 128 | 77 | . | . | . | . | . | . | . | 338 |
| 0.50-0.99 | 627 | 1875 | 477 | 6 | . | . | . | . | . | . | 2985 |
| 1.00-1.49 | 1 | 487 | 2345 | 319 | 1 | . | . | . | . | . | 3153 |
| 1.50-1.99 | . | . | 119 | 766 | 203 | . | . | . | . | . | 1088 |
| 2.00-2.49 | . | . | . | 25 | 249 | 6 | . | . | . | . | 280 |
| 2.50-2.99 | . | . | . | . | 39 | 5 | . | . | . | . | 44 |
| 3.00-3.49 | . | . | . | . | 3 | . | . | . | . | . | 3 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 761 | 2490 | 3018 | 1116 | 495 | 11 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 3.0 MEAN TP(SEC) = 5.5

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 180.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 3024
% OF TOTAL: 5.2

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4-LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 131 | 71 | 90 | . | . | . | . | . | . | . | 292 |
| 0.50-0.99 | 453 | 1483 | 277 | . | . | . | . | . | . | . | 2213 |
| 1.00-1.49 | . | 369 | 1185 | 191 | 8 | . | . | . | . | . | 1753 |
| 1.50-1.99 | . | . | 100 | 503 | 97 | . | . | . | . | . | 700 |
| 2.00-2.49 | . | . | 1 | 34 | 159 | 1 | . | . | . | . | 195 |
| 2.50-2.99 | . | . | . | . | 6 | 5 | . | . | . | . | 11 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 584 | 1923 | 1653 | 728 | 270 | 6 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 2.9 MEAN TP(SEC) = 5.4

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 202.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 2470
% OF TOTAL: 4.2

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4-LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 75 | 66 | 66 | . | . | . | . | . | . | . | 207 |
| 0.50-0.99 | 458 | 1401 | 241 | 11 | . | . | . | . | . | . | 2111 |
| 1.00-1.49 | . | 241 | 922 | 160 | 17 | . | . | . | . | . | 1340 |
| 1.50-1.99 | . | . | 87 | 302 | 53 | 6 | 1 | . | . | . | 449 |
| 2.00-2.49 | . | . | 1 | 15 | 71 | . | . | . | . | . | 87 |
| 2.50-2.99 | . | . | . | . | 15 | 3 | . | . | . | . | 18 |
| 3.00-3.49 | . | . | . | . | . | 3 | . | . | . | . | 3 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 533 | 1708 | 1317 | 488 | 156 | 12 | 1 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 3.0 MEAN TP(SEC) = 5.3

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 225.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 3459
% OF TOTAL: 5.9

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 78 | 210 | 124 | . | . | . | . | . | . | . | 412 |
| 0.50-0.99 | 557 | 1810 | 272 | 25 | 1 | . | . | . | . | . | 2665 |
| 1.00-1.49 | . | 361 | 1630 | 188 | 22 | 6 | . | . | . | . | 2207 |
| 1.50-1.99 | . | . | 83 | 311 | 59 | 5 | . | . | . | . | 458 |
| 2.00-2.49 | . | . | . | 20 | 85 | 3 | . | . | . | . | 108 |
| 2.50-2.99 | . | . | . | 1 | 35 | 6 | . | . | . | . | 42 |
| 3.00-3.49 | . | . | . | . | . | 13 | . | . | . | . | 13 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 635 | 2381 | 2109 | 545 | 202 | 33 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 3.3 MEAN TP(SEC) = 5.3

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 247.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 2885
% OF TOTAL: 4.9

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 131 | 191 | 73 | . | . | . | . | . | . | . | 395 |
| 0.50-0.99 | 557 | 1813 | 260 | 6 | . | . | . | . | . | . | 2636 |
| 1.00-1.49 | 1 | 278 | 968 | 181 | 6 | . | . | . | . | . | 1434 |
| 1.50-1.99 | . | . | 80 | 244 | 37 | . | . | . | . | . | 361 |
| 2.00-2.49 | . | . | . | 23 | 63 | . | . | . | . | . | 86 |
| 2.50-2.99 | . | . | . | . | 6 | . | 1 | . | . | . | 7 |
| 3.00-3.49 | . | . | . | . | . | 1 | 3 | . | . | . | 4 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 689 | 2282 | 1381 | 454 | 112 | 1 | 4 | 0 | 0 | 0 | |

MEAN HS(M) = 0.9 LARGEST HS(M) = 3.3 MEAN TP(SEC) = 5.1

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 270.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 2210
% OF TOTAL: 3.8

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 121 | 97 | 46 | . | . | . | . | . | . | . | 264 |
| 0.50-0.99 | 391 | 1031 | 361 | 10 | . | . | . | . | . | . | 1793 |
| 1.00-1.49 | 1 | 140 | 740 | 189 | 10 | . | . | . | . | . | 1080 |
| 1.50-1.99 | . | . | 106 | 290 | 68 | . | . | . | . | . | 464 |
| 2.00-2.49 | . | . | 8 | 46 | 90 | . | . | . | . | . | 144 |
| 2.50-2.99 | . | . | . | . | 25 | 1 | . | . | . | . | 26 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 513 | 1268 | 1261 | 535 | 193 | 1 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 2.8 MEAN TP(SEC) = 5.3

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 292.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 2189
% OF TOTAL: 3.7

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 44 | 56 | 58 | . | . | . | . | . | . | . | 158 |
| 0.50-0.99 | 301 | 939 | 330 | 1 | . | . | . | . | . | . | 1571 |
| 1.00-1.49 | . | 210 | 869 | 116 | 1 | . | . | . | . | . | 1196 |
| 1.50-1.99 | . | 1 | 179 | 453 | 6 | . | . | . | . | . | 639 |
| 2.00-2.49 | . | . | 8 | 119 | 42 | . | . | . | . | . | 169 |
| 2.50-2.99 | . | . | . | . | 3 | . | . | . | . | . | 3 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 345 | 1206 | 1444 | 689 | 52 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.7 MEAN TP(SEC) = 5.5

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Continued)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 315.0 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 1884
% OF TOTAL: 3.2

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 49 | 71 | 35 | . | . | . | . | . | . | . | 155 |
| 0.50-0.99 | 256 | 872 | 106 | . | . | . | . | . | . | . | 1234 |
| 1.00-1.49 | . | 669 | 588 | 27 | . | . | . | . | . | . | 1284 |
| 1.50-1.99 | . | 1 | 285 | 200 | 1 | . | . | . | . | . | 487 |
| 2.00-2.49 | . | . | 10 | 37 | 1 | . | . | . | . | . | 48 |
| 2.50-2.99 | . | . | 1 | 5 | . | . | . | . | . | . | 6 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 305 | 1613 | 1025 | 269 | 2 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.1 LARGEST HS(M) = 2.9 MEAN TP(SEC) = 5.1

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
22.5 DEGREES ABOUT 337.5 DEGREES AZIMUTH

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 1465
% OF TOTAL: 2.5

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4- LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 63 | 41 | 10 | . | . | . | . | . | . | . | 114 |
| 0.50-0.99 | 369 | 619 | 100 | . | . | . | . | . | . | . | 1088 |
| 1.00-1.49 | 1 | 795 | 123 | . | . | . | . | . | . | . | 919 |
| 1.50-1.99 | . | 5 | 306 | 3 | . | . | . | . | . | . | 314 |
| 2.00-2.49 | . | . | 58 | 3 | . | . | . | . | . | . | 61 |
| 2.50-2.99 | . | . | 3 | 1 | . | . | . | . | . | . | 4 |
| 3.00-3.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 433 | 1460 | 600 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 2.7 MEAN TP(SEC) = 4.7

(Table 6-1-3 Continued on the Next Page)

(Table 6-1-3 Concluded)

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD
FOR ALL DIRECTIONS

STATION: G1033 (29.0N, 85.5W / 68.0M) NO. CASES: 58440

| HEIGHT IN METERS | PEAK PERIOD (IN SECONDS) <4.2 | 4.2-5.3 | 5.4-6.5 | 6.6-7.4 | 7.5-8.7 | 8.8-9.5 | 9.6-10.5 | 10.6-11.8 | 11.9-13.3 | 13.4-LONGER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00-0.49 | 2600 | 2103 | 990 | . | . | . | . | . | . | . | 5693 |
| 0.50-0.99 | 8740 | 8403 | 4317 | 65 | 1 | . | . | . | . | . | 1526 |
| 1.00-1.49 | 11 | 3352 | 2876 | 2599 | 71 | 6 | . | . | . | . | 8915 |
| 1.50-1.99 | . | 30 | 4940 | 5710 | 768 | 11 | 1 | . | . | . | 1460 |
| 2.00-2.49 | . | . | 542 | 417 | 1129 | 17 | . | . | . | . | 2105 |
| 2.50-2.99 | . | . | 11 | 11 | 181 | 37 | 1 | . | . | . | 241 |
| 3.00-3.49 | . | . | . | . | 5 | 35 | 3 | . | . | . | 43 |
| 3.50-3.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.00-4.49 | . | . | . | . | . | . | . | . | . | . | 0 |
| 4.50-4.99 | . | . | . | . | . | . | . | . | . | . | 0 |
| 5.00+ | . | . | . | . | . | . | . | . | . | . | 0 |
| TOTAL | 11351 | 43888 | 33676 | 8802 | 2155 | 106 | 5 | 0 | 0 | 0 | |

MEAN HS(M) = 1.0 LARGEST HS(M) = 3.4 MEAN TP(SEC) = 5.2

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# NUMERICAL SIMULATION OF TIME-DEPENDENT BEACH AND DUNE EROSION

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# NUMERICAL SIMULATION OF TIME-DEPENDENT BEACH AND DUNE EROSION

# NUMERICAL SIMULATION OF TIME-DEPENDENT BEACH AND DUNE EROSION

## DESCRIPTION

This application is a numerical beach and dune erosion model that predicts the evolution of an equilibrium beach profile from variations in water level and breaking wave height as occur during a storm. The model is one-dimensional (only onshore-offshore sediment transport is represented). It is based on the theory that an equilibrium profile results from uniform wave energy dissipation per unit volume of water in the surf zone. The general characteristics of the model are based on a model described by Kriebel (1982, 1984a, 1984b, 1986). Because of the complexity of this methodology and the input requirements, familiarization with the above references is strongly recommended.

## INPUT

The input requirements of this application consist of four general types of information.

- General data describing temporal data to run the model.
- Beach characteristics (actual prestorm profile or a generic profile).
- Changes in water elevation relative to mean water level due to storm surge and/or tides.
- Wave parameters (height, period, direction) and associated water depth.

Data input to this application is accomplished through numerous input screens or through data saved in external files, i.e., ACES trace file or the Interactive Survey Reduction Program (ISRP) (Birkemeier, 1984) beach profile output file. Detailed lists of the screens and input parameters are presented in the *Procedure* section of this document.

## OUTPUT

Results from this application are written to the plot output files (1, 2). The contents and organization of output data in the plot output files are summarized below. In addition, this application generates one plot (see section titled **Plot Output Data**).

### Plot Output File 1

This file contains simulated profile data representing the original profile and evolving, time-dependent profiles. Each point along the profile is defined by some distance seaward of a baseline and a corresponding elevation. Profiles are reported at the *Tabular Output Time Interval*. Plot output file 1 is written in the following format:

| Field | Columns | Format | Data |
|---|---|---|---|
| 1 | 1-9 | F9.0 | Distance Seaward from Baseline (X Coordinate) |
| 2 | 18-23 | F6.2 | Elevation (Corresponding Y Coordinate) |

### Plot Output File 2

This file contains a table consisting of changes in sand volume and changes (advance/retreat) in position of the 0-, +5-, +10-, and +15-ft contours. Erosion statistics are reported at the *Tabular Output Time Interval*.

| Field | Columns | Format | Data |
|---|---|---|---|
| 1 | 8-11 | I4 | Time (hours) when erosion statistics are reported |
| 2 | 19-28 | F10.2 | Change in sand volume above mean water level |
| 3 | 34-43 | F10.2 | Change in shoreline position at the 0-ft contour |
| 4 | 44-53 | F10.2 | Change in shoreline position at the +5-ft contour |
| 5 | 54-63 | F10.2 | Change in shoreline position at the +10-ft contour |
| 6 | 64-73 | F10.2 | Change in shoreline position at the +15-ft contour |

## PROCEDURE

This application provides only a Single Case Mode. The Multiple Case Mode is not available. The Single Case Mode requires interaction with the application and provides three options of interactive participation. The first option allows entering a new data set via screen input, the second option allows editing of data sets read from an external ACES trace file, and the third option allows editing of X,Y profile coordinates read from an external ISRP output file.

### Single Case Mode

The bulleted items in the following lists indicate potentially optional instruction steps. Any application in ACES may be executed in a given session without quitting the program. The bulleted items provide instructions for accessing the application from various menu areas of the ACES Program. Ignore bulleted instruction steps that are not applicable.

- Press [F1] on the Main Menu to select Single Case Mode.
- Fill in the highlighted input fields on the General Specifications screen (or leave the default values). Press [F1] when all data on this screen are correct.
- Press [F6] on the Functional Area Menu to select Littoral Processes.
- Press [F2] on the Littoral Processes Menu to select Numerical Simulation of Time-Dependent Beach and Dune Erosion.

**Data Entry Options Menu**

This menu provides two options of interactive participation with the application.

[F1] **Initial Case Data Entry**

Use this option to enter an initial (new) set of data. These data will be written to the *Trace Output* file (default name **TRACE.OUT**) and become available for subsequent editing and use.

[Alt] [F1] **Edit Case in External File: XSHORE1.IN**

Use this option to access and modify data saved in an external ACES trace file. This external data file is created by saving (or copying) a *trace file* from a previous execution of this application. The format and contents of the *trace file* for this application match exactly the requirements of this input file. The default input file name is **XSHORE1.IN**, but other file names (including path name) are acceptable. After entering the file name, press [ENTER] to accept this file. *For more information on files, see the section of this manual entitled "General Instructions and Information."*

**Activity Menu**

The Activity Menu is a pivotal point from which all options for Single Case data entry, modification, and execution are accessible. The options are:

| | |
|---|---|
| [F1] | Begin Computations. |
| [F2] | General Time & Output Specifications Data Entry. |
| [F3] | Beach Characteristics Data Entry. |
| [F4] | Water Level Data Entry. |
| [F5] | Wave Parameter Data Entry. |
| [F6] | Plot Output Data. |
| [F10] | Exit Menu. |

Each option and the required data are described below.

### (F1) Begin Computations

Use this option only after all data have been entered.

---

### (F2) General Time & Output Specifications

This screen provides for input of general parameters required to run the application. Values for all parameters listed are required.

| Item | Units | Data Range |
|---|---|---|
| Simulation start time: | | |
| Year | | 1900 to 2050 |
| Month | | 1 to 12 |
| Day | | 1 to 31 |
| Hour | | 0 to 24 |
| Length of simulation | hr | 1 to 120 |
| Tabular Output Time | | interval or specific times |

Select a *Tabular Output Time* by moving the cursor to the desired type and pressing (X). Choices available are:

- Interval
- Specific Times

Selecting either of these choices will display a *requestor* for further input. The format and data requirements of these *requestors* are described next.

*Interval Output Time Requestor*

Enter an integer value identifying a constant output time *interval* for results to be written to the plot output files. The range of values allowed for the constant *interval* is:

| Item | Units | Data Range |
|---|---|---|
| Interval | hours | 1 to 120 |

After entering an interval value, press one of the following keys to select the next appropriate action:

[F1] Accept Data & Exit Requestor.

[Alt][F10] Return to Activity Menu.

*Specific Output Times Requestor*

Enter as many as 30 integer values indicating the *specific times* from beginning of simulation for results to be written to the plot output files. The range of values allowed for the *specific times* is:

| Item | Units | Data Range |
|---|---|---|
| Specific Times | hours | 1 to 120 |

After entering the desired specific times, press one of the following keys to select the next appropriate action:

[Alt][F1] More Input.

**NOTE:** Ten values can be displayed/entered on a screen. Press [ALT][F1] to re-invoke the screen for subsequent values.

[F1] Accept Data & Exit Requestor.

[Alt][F10] Return to Activity Menu.

## (F3) Beach Characteristics Data Entry

This option provides an interactive capability to enter new or edit existing input of an original prestorm beach profile. The beach profile may be described by one of two methods:

1. Actual profile - A series of X,Y coordinate pairs that define points along the profile. The X coordinate represents distance seaward from a baseline. The Y coordinate represents a corresponding elevation relative to mean water level (MWL = 0). In addition, the user defines elevations for the top of dune and berm and mean grain size.
2. Generic profile - A schematic representation of a simple berm-dune and offshore system. See Figure 6-2-1 for definition of profile terms.

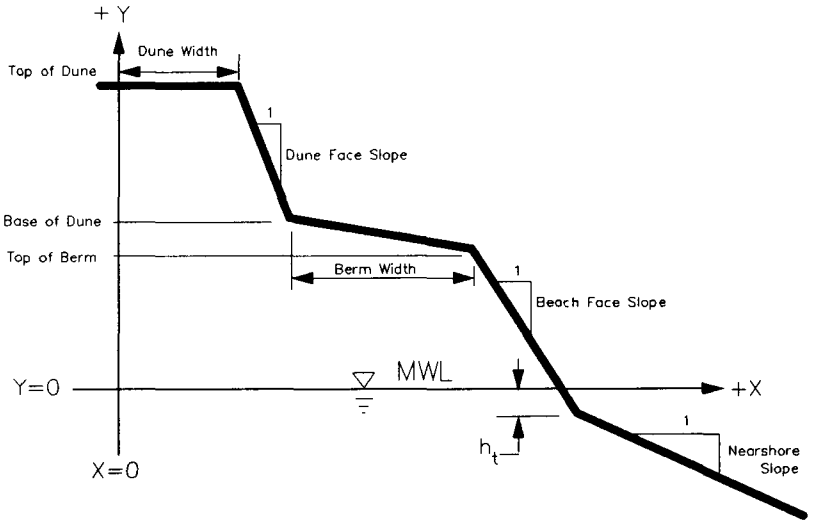


**Figure 6-2-1. Idealized Berm, Dune, and Offshore System**

The following list describes parameters on the *General Beach Characteristics* screen with corresponding units and ranges of values recognized by this application:

| Item | Units | Data Range | | |
|---|---|---|---|---|
| Elevation at top of dune | ft,m | 0.0 | to | 9,999.0 |
| Elevation at base of dune | ft,m | 0.0 | to | below dune top |
| Elevation at top of berm | ft,m | 0.0 | to | 9,999.0 |
| Dune width from baseline | ft,m | 0.0 | to | 100.0 |
| Berm width | ft,m | 0.0 | to | 500.0 |
| Mean grain size | mm | 0.1 | to | 0.5 |
| Profile | | actual | or | generic |

Select a beach profile by moving the cursor to the desired type and pressing ⊠. The choices are:

- Actual Beach Profile
- Generic Beach Profile

Selecting either of these will display *requestors* for further input. The format and data requirements of these *requestors* are described next.

### Actual Beach Profile Requestor

When this option is selected, the *Actual Beach Profile Point Data Entry Options* requestor is displayed. This *requestor* invokes other *requestors* that collect choices and input to complete an actual beach profile definition for this application. As a minimum, these parameters are required to define an actual profile:

- Elevations at top of dune and berm.
- Mean grain size.
- 20 survey points (X,Y coordinate pairs) along the profile.

The *Actual Beach Profile Data Entry Options* requestor provides these choices to complete a profile definition:

- Enter/Edit/View Profile Data.
- Read an ISRP Data File.
- Select an ISRP Profile/ Survey Number.

To make a selection, move the cursor to the desired choice and press ⊠. Selecting a choice will display *requestors* for further input.

### Enter/Edit/View Profile Data

This choice invokes the *Actual Beach Profile Point Data* requestor that allows for interactively entering a data set of survey points along a profile, editing a profile data set, or viewing a profile data set. The following list describes parameters on the *Actual Beach Profile Point Data* requestor with their corresponding units and range of data recognized by this application:

| Item | Units | Data Range |
|---|---|---|
| Profile data units | ft,m | |
| Distance from baseline (X) | ft,m | 0.0 to 4,000.0 |
| Elevation (Y) | ft,m | -999.0 to 9,999.0 |

The first survey point on the profile should have a *Distance from baseline (X)* value of zero, and the corresponding *Elevation (Y)* value should match the value for *Elevation at Top of Dune* **(General Beach Characteristics)**.

> **NOTE:** Minimum input parameters required to define an actual profile are *Elevations at Top of Dune and Berm, Mean Grain Size*, and 20 survey points (X,Y coordinate pairs) along the profile.

Press one of the following keys to select the next appropriate action:

(Alt)(F1) Display/Enter More Data.

> **NOTE:** Twenty survey points can be displayed/entered on a screen. Press (Alt)(F1) to re-invoke the screen for subsequent points. The maximum number of X/Y pairs allowed to define the profile is 200.

(F1) Accept Data & Exit.

(Alt)(F10) Exit Requestor (do not accept data).

**Read an ISRP Data File**

If available, an ISRP data file may be input as an alternative to interactively keying in actual profile data or reading them from an external ACES trace file. This choice provides a *requestor* as a mechanism for declaring the name of the external file containing two-dimensional profile data in ISRP *Edit-2* format. Typically, data have been saved in the file from a previous execution of ISRP. The default ISRP file name is **ISRP1.IN**, but other file names (including path name) are acceptable. After entering the file name, press (Enter) to accept this file. For more information on ISRP files, see the following section, titled *Format of an ISRP Data File.*

After specifying the name of the file, press one of the following keys to select the appropriate action:

(F1) Accept Data & Exit Requestor.

> **NOTE:** Use this option to open and read the ISRP file. A message, "Please Wait - Reading data file," is displayed at the bottom of the screen until the file is read.

Only the first 216 profile definitions in the file are read by this application. If the file contains more definitions, they are ignored. A message indicating this limitation is displayed at the bottom of the screen. *This is not an error, the program will continue accepting commands.*

A maximum of 200 survey points along the profile are read by this application. Any additional points on that profile are skipped. A message to that effect is displayed at the bottom of the screen. *This is not an error, the program will continue to read the file.*

Upon successfully reading the file, a profile data set can be selected and edited using procedures described in *Select an ISRP Profile* and *Enter/Edit/View Profile Data* sections of this manual.

(Alt)(F10) Exit Requestor (do not accept data).

**Select an ISRP Profile**

This choice invokes the *Select One ISRP Profile Number* requestor that allows selecting an ISRP profile by tagging the desired profile number. All profile numbers identifying profiles read from the ISRP file are displayed as an aid for selection and tagging. To tag a profile for selection, move the cursor to the desired choice and press (X). Only one profile selection is needed for each computation.

When selection is complete, press one of the following keys to select the next appropriate action:

(Alt)(F1) Next Screen.

**NOTE:** As many as 60 ISRP profile names are displayed on a screen. If more than 60 are read from the ISRP file, press (Alt)(F1) to display more profile names on the next screen. A maximum of 216 names can be displayed.

(F1) Accept Data, Exit Requestor.

(Alt)(F10) Exit Requestor (selection is not accepted).

### Format of an ISRP Data File

The ISRP primary output is a file defining profile line data sets (distance offshore and elevation) for a specific area in ISRP *Edit-2* format. The ISRP has more than one data file format; however, only *Edit-2* type data files are recognized by this application.

The first record in an ISRP *Edit-2* type data file is a *Header* record that provides general information about data in the file. Other records in the file define profile data sets.

The following sections describe the records including format, parameters, and corresponding range of values recognized by this application. See Figure 6-2-2 for a sample of an ISRP *Edit-2* file.

*Header Record*

| Column | Type | Item | Data Range |
|---|---|---|---|
| 1-2 | Integer | Header Record Identifier | 00 |
| 11 | Integer | Edit-2 Identifier | 1 |
| 12 | Integer | Number of places to right of decimal for distance coordinates | 0 to 3 |
| 13 | Integer | Number of places to right of decimal for elevation coordinates | 0 to 3 |
| 14-15 | Character | Abbreviation for units of measurements of recorded data | ft or m |
| 16-19 | Character | Vertical datum reference | MSL<br>NGVD |
| 20-69 | Character | Description | |
| 70-75 | Integer | Date file was created | yymmdd |
| 77-80 | Character | Initials of person creating file | |

*Profile Data Set Record*

| Column | Type | Item | Data Range |
|---|---|---|---|
| 1-2 | Character | Locality code | any characters |
| 3-5 | Integer | Profile line number | 1 to 999 |
| 6-9 | Integer | Survey identification number | 1 to 9999 |
| 10 | Character | First record of profile definition | 1 |
| 11-16 | Integer | Date of survey | yymmdd |
| 18-21 | Integer | Time of survey (24-hour clock) | 0001 to 2400 |
| 22-24 | Integer | Number of X,Y pairs in profile definition | 20 to 200 |
| 25-29 | Integer | Minimum elevation on profile | -9999 to 99999 |
| 41-45 | Integer | Distance coordinate | 0 to 99999 |
| 46-50 | Integer | Elevation coordinate | -9999 to 99999 |
| 51-55 | Integer | Distance coordinate | 0 to 99999 |
| 56-60 | Integer | Elevation coordinate | -9999 to 99999 |
| 61-65 | Integer | Distance coordinate | 0 to 99999 |
| 66-70 | Integer | Elevation coordinate | -9999 to 99999 |
| 71-75 | Integer | Distance coordinate | 0 to 99999 |
| 76-80 | Integer | Elevation coordinate | -9999 to 99999 |

*Profile Data Set Continuation Record*

| Column | Type | Item | Data Range |
|---|---|---|---|
| 1-2 | Character | Locality code | any characters |
| 3-5 | Integer | Profile line number | 1 to 999 |
| 6-9 | Integer | Survey identification number | 1 to 9999 |
| 10 | Character | Continuation record counter | 2 to 9 and A to Z |
| 11-15 | Integer | Distance coordinate | 0 to 99999 |
| 16-20 | Integer | Elevation coordinate | -9999 to 99999 |
| 21-25 | Integer | Distance coordinate | 0 to 99999 |
| 26-30 | Integer | Elevation coordinate | -9999 to 99999 |
| 31-35 | Integer | Distance coordinate | 0 to 99999 |
| 36-40 | Integer | Elevation coordinate | -9999 to 99999 |
| 41-45 | Integer | Distance coordinate | 0 to 99999 |
| 46-50 | Integer | Elevation coordinate | -9999 to 99999 |
| 51-55 | Integer | Distance coordinate | 0 to 99999 |
| 56-60 | Integer | Elevation coordinate | -9999 to 99999 |
| 61-65 | Integer | Distance coordinate | 0 to 99999 |
| 66-70 | Integer | Elevation coordinate | -9999 to 99999 |
| 71-75 | Integer | Distance coordinate | 0 to 99999 |
| 76-80 | Integer | Elevation coordinate | -9999 to 99999 |

```
00        101ft    Little River Inlet data                                                    MAC
LR 50   21810430 1200 74 -181                0   93   20  127   25  117   35   98
LR 50   22   50   95   75   85  100   60  125   46  150   36  175   31  200   27
LR 50   23  225   23  250   18  275   15  300   12  325    6  350    1  375   -6
LR 50   24  400  -11  425  -17  450  -13  500  -42  550  -43  600  -42  650  -53
LR 50   25  700  -61  750  -71  800  -71  850  -85  900  -90  950  -96 1000  -99
LR 50   26 1050 -109 1100 -118 1150 -120 1200 -115 1250 -125 1300 -129 1350 -133
LR 50   27 1400 -135 1450 -134 1500 -140 1550 -141 1600 -142 1650 -150 1700 -148
LR 50   28 1750 -150 1800 -153 1850 -155 1900 -157 1950 -164 2000 -163 2050 -165
LR 50   29 2100 -160 2150 -174 2200 -165 2250 -173 2300 -172 2350 -175 2400 -168
LR 50   2A 2450 -169 2500 -171 2550 -171 2600 -171 2650 -172 2700 -176 2750 -176
LR 50   2B 2800 -175 2850 -180 2900 -178 2950 -181 3000 -180 3050 -180 3100 -180
LR 50   31810715 1200 76 -193                0   92   20   26   35   96   40   95
LR 50   32   60   85   80   76  100   60  120   49  140   37  160   35  180   33
LR 50   33  200   29  220   22  240   26  260   21  280   15  300    9  320    3
LR 50   34  340   -2  360   -8  380  -13  400  -15  420  -11  440  -11  460  -14
LR 50   35  480  -29  500  -40  550  -40  600  -44  650  -60  700  -63  750  -80
LR 50   36  800  -86  850  -90  900 -104  950 -109 1000 -102 1050 -116 1100 -121
LR 50   37 1150 -128 1200 -133 1250 -132 1300 -138 1350 -144 1400 -143 1450 -150
LR 50   38 1500 -152 1550 -154 1600 -152 1650 -158 1700 -159 1750 -159 1800 -160
LR 50   39 1850 -159 1900 -168 1950 -162 2000 -170 2050 -170 2100 -168 2150 -172
LR 50   3A 2200 -170 2250 -173 2300 -173 2350 -174 2400 -180 2450 -178 2500 -183
LR 50   3B 2550 -180 2600 -181 2650 -185 2700 -190 2750 -188 2800 -188 2850 -190
LR 50   3C 2900 -191 2950 -193    0    0    0    0    0    0    0    0    0    0
LR 50   41811015 1200 67 -200                0   93   20  127   25  118   50   94
LR 50   42   75   79  100   63  125   53  150   40  175   32  200   29  225   19
LR 50   43  250   15  275   10  300    5  325   -1  350   -4  375   -8  400  -20
LR 50   44  450  -71  500  -82  550  -86  600  -92  650 -100  700 -104  750 -117
LR 50   45  800 -109  850 -126  900 -121  950 -125 1000 -130 1050 -137 1100 -140
LR 50   46 1150 -140 1200 -143 1250 -145 1300 -146 1350 -148 1400 -153 1450 -147
LR 50   47 1500 -160 1550 -153 1600 -160 1650 -161 1700 -160 1750 -159 1800 -168
LR 50   48 1850 -161 1900 -169 1950 -164 2000 -172 2050 -169 2100 -171 2150 -180
LR 50   49 2200 -171 2250 -179 2300 -180 2350 -175 2400 -180 2450 -183 2500 -182
LR 50   4A 2550 -181 2600 -184 2650 -181 2700 -190 2750 -191 2800 -190 2850 -200
LR 50   51820115 1200 60 -190                50   93   75   79  100   66  125   49
LR 50   52  150   40  175   34  200   28  225   23  250   19  275   14  300    9
LR 50   53  325    7  350    3  375   -2  400   -7  450  -82  500  -88  550  -97
LR 50   54  600 -102  650 -104  700 -114  750 -120  800 -120  850 -123  900 -132
LR 50   55  950 -134 1000 -136 1050 -140 1100 -145 1150 -149 1200 -147 1250 -153
LR 50   56 1300 -157 1350 -158 1400 -155 1450 -160 1500 -161 1550 -159 1600 -168
LR 50   57 1650 -167 1700 -163 1750 -170 1800 -164 1850 -168 1900 -172 1950 -172
LR 50   58 2000 -170 2050 -177 2100 -176 2150 -177 2200 -179 2250 -180 2300 -186
LR 50   59 2350 -182 2400 -188 2450 -185 2500 -186 2550 -187 2600 -190 2650 -190
```

Figure 6-2-2. Sample of an ISRP Edit-2 File

### Generic Beach Profile Requestor

This choice invokes the *Generic Beach Profile Parameters* requestor that collects additional input for completing a schematic representation of an idealized profile. When *Elevation At Top of Dune* is entered, then *Elevation At Base of Dune* and *Cotangent of Dune Face Slope* are required. When *Elevation At Top of Berm* is entered, then *Cotangent of Beach Slope* is required. In addition, *Mean Grain Size* and *Cotangent of Nearshore Slope* are always required. The following list describes parameters on the *Generic Beach Profile Parameters* requestor with their corresponding units and range of data recognized by this application:

| Item | Data Range | | |
|---|---|---|---|
| Cotangent of dune face slope | 1.0 | to | 10.0 |
| Cotangent of beach face slope | 1.0 | to | 20.0 |
| Cotangent of nearshore slope | 20.0 | to | 60.0 |

Press one of the following keys to select the next appropriate action:

F1 Accept Data & Exit Requestor.

Alt F10 Exit Requestor (do not accept data).

---

### F4 Water Level Data Entry

This series of screens provides for input of water level variations for the model. Water levels may be described by one or both of the following methods:

1. *Tabulated* entries (100 maximum) collected by a tide gage at a constant sampling interval.

2. Tides as a *constituent* tide record with an amplitude and corresponding epoch for any of 37 constituents. The major tidal constituents accepted by this application are listed in Table A-5 in Appendix A.

> **NOTE:** The final water level used in the model will be the sum of *tabulated* entries and a *constituent* tide record. The model will also run without water level data.

From the menu on the screen *Identify Type of Time-Series Water Level Data*, press:

[F1] To access the screen for entering tabulated data.

[F2] To access the screen for entering constituent tide data.

**Tabulated Data**

| Item | Units | Data Range |
|---|---|---|
| $\Delta t$ for hydrograph input | hr | 1.0 to 120.0 |
| Water level units | ft,m | |
| Water levels$_m$ ($m = 1 \ldots M$, $M \leq 100$) | ft,m | 0.0 to 20.0 |

**NOTE:** Enter water levels relative to Mean Water Level (MWL) = 0. First water level must be 0.0. Each screen will accept a maximum of 20 values.

Press one of the following keys to select the next appropriate action:

[F1] More Input.

**NOTE:** Use this option to continue *tabulated* input (maximum 100 values).

[Alt][F10] Return.

**Constituent Tide Data**

| Item | Units | Data Range |
|---|---|---|
| Gage longitude | deg WEST | -180.0 to 180.00 |
| Amplitude units | ft,m | |
| Amplitude of individual constituent$_n$ | ft,m | 0.0 to 999.99 |
| Epoch of individual constituent$_n$ | deg | 0.0 to 360.00 |

**NOTE:** The names of 37 common harmonic constituents (see Table A-5, Appendix A) are displayed on a series of screens. Place the values of amplitude and epoch at the appropriate desired constituent name.

Press one of the following keys to select the next appropriate action:

F1 More Input.
**NOTE:** Use this option to continue additional *constituent* input on subsequent screens.
Alt F10 Return.

---

### F5 Wave Parameter Data Entry

This series of screens provides for input of wave parameters and an associated water depth for the model. Wave parameters are collected at a constant time interval and constant water depth.

| Item | Units | Data Range |
|---|---|---|
| $\Delta t$ for wave parameters | hr | 1.0 to 120.00 |
| Wave height units | ft,m | |
| Water depth | ft,m | 5.0 to 9,999.99 |
| Wave height | ft,m | 1.0 to 30.00 |
| Wave period | sec | 1.0 to 30.00 |
| Wave crest angle | deg | 0.0 to 89.00 |

Press one of the following keys to select the next appropriate action:

F1 More Input.
**NOTE:** Ten wave records can be displayed/entered on a screen. Press ALT F1 to re-invoke the screen for subsequent values.
Alt F10 Return to Activity Menu.

---

### F6 Plot Output Data

This application generates one plot with two curves (see Figure 6-2-3). The two curves are:

- Original profile.
- Computer profile at the end of the simulation time.

---

## Application Restrictions, Requirements, and Limitations

Listed below are some restrictions, requirements, and limitations of this application.

- If the profile used in this application is a *Generic* profile, then the water depth at the gage must be at least twice the maximum wave height that is used.

- If the profile that is used is an *Actual* profile, then the maximum profile depth must be equal to or greater than twice the maximum wave height that is used.

- If the entire profile becomes submerged during execution of this application, then the program will stop and the user will be requested to check the *water depth* entry and **Water Level Data Entry** option.

- This application can be used to determine the beach response profile in front of a seawall by assuming that the seawall is located at X = 0 on the profile.

- Calculations over the horizontal grid of the model are carried out to a maximum depth of 45 ft.

## EXAMPLE PROBLEMS

### Example 1 - Generic Profile with Constituent Tide Data

**Input**

All input is accomplished through screens accessible from the **Activity Menu**.

**(F2) General Time & Output Specifications Data Entry**

| Item | Value | Units |
|---|---|---|
| Simulation start time: | | |
| Year | 1989 | |
| Month | 1 | |
| Day | 10 | |
| Hour | 10.00 | |
| Length of simulation | 20.00 | hr |
| Tabular output time (Interval) | 2.00 | hr |

**(F3) Beach Characteristics Data Entry**

| Item | Value | Units |
|---|---|---|
| Elevation at top of dune | 20.000 | ft |
| Elevation at base of dune | 6.000 | ft |
| Elevation at top of berm | 6.000 | ft |
| Dune width from baseline | 50.000 | ft |
| Berm width | 100.000 | ft |
| Mean grain size | 0.220 | mm |
| Profile | GENERIC | |

**Generic Profile Data**

| Item | Value | Units |
|---|---|---|
| Cotangent of dune face slope | 2.000 | |
| Cotangent of beach face slope | 10.000 | |
| Cotangent of nearshore slope | 20.000 | |

### (F4) Water Level Data Entry

(F2) Constituent Tide Data (see Table A-5, Appendix A)

| Item | Value | Units |
|---|---|---|
| Gage longitude | 75.00 | deg WEST |
| Amplitude units | | ft |
| Amplitude of individual constituent$_n$ (M4) | 4.00 | ft |
| Epoch of individual constituent$_n$ (M4) | 90.00 | deg |

**NOTE:** All other common harmonic constituents are 0.0 for this example.

### (F5) Wave Parameter Data Entry

| Item | Value | Units |
|---|---|---|
| $\Delta t$ for wave parameters | 20.00 | hr |
| Wave height units | | ft |
| Water depth | 60.00 | ft |
| Wave height | 8.00 | ft |
| Wave period | 8.00 | sec |
| Wave crest angle | 10.00 | deg |

### Output

Results from this application are written to two plot output files. In addition, this application generates one screen plot.

### Plot Output File 1

This file contains simulated profile data representing the original profile and evolving, time-dependent profiles. Each point along the profile is defined by some distance seaward of a baseline and a corresponding elevation. Profiles are reported at the *Tabular Output Time Interval*. Table 6-2-1 is a partial listing of plot output file 1 (default name **PLOTDAT1.OUT**). Figure 6-2-3 is a plot comparing the original profile with the 20-hr profile.

Table 6-2-1
Listing of Plot Output File 1 for Example Problem 1

Original Profile Data

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 212. | 2.40 |
| 216. | 2.00 |
| 220. | 1.60 |
| 224. | 1.20 |
| 228. | 0.80 |
| 232. | 0.40 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

---

Profile Data at 2 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 212. | 2.10 |
| 216. | 1.46 |
| 220. | 1.08 |
| 224. | 0.78 |
| 228. | 0.49 |
| 232. | 0.22 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

(Table 6-2-1 Continued on the Next Page)

(Table 6-2-1 Concluded)

Profile Data at 20 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 204. | 1.63 |
| 208. | 1.26 |
| 212. | 0.91 |
| 216. | 0.59 |
| 220. | 0.29 |
| 224. | 0.00 |
| 228. | -0.28 |
| 232. | -0.55 |
| 236. | -0.81 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

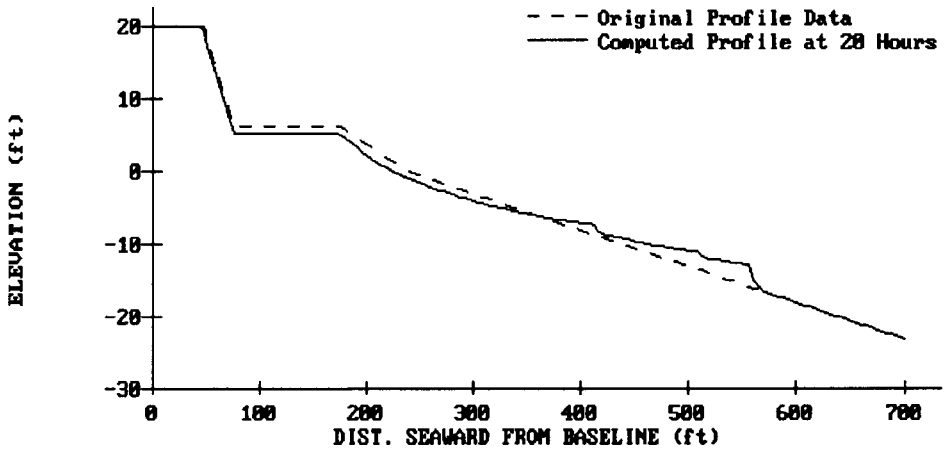


Figure 6-2-3. Profile Change After 20 Hr

### Plot Output File 2

This file contains a table consisting of changes in sand volume and changes (advance/retreat) in position of the 0-, +5-, +10-, and +15-ft contours. Erosion statistics are reported at the *Tabular Output Time Interval*. Table 6-2-2 is a listing of plot output file 2 (default name **PLOTDAT2.OUT**).

Table 6-2-2
Listing of Plot Output File 2 for Example Problem 1

| Hour | Change in Volume ($yd^3/ft$) | Contour Change (ft) | | | |
|---|---|---|---|---|---|
| | | 0 | +5 | +10 | +15 |
| 2 | -1.05 | -0.63 | -2.98 | -0.14 | -0.14 |
| 4 | -0.94 | -0.40 | -2.84 | -0.11 | -0.11 |
| 6 | -1.13 | -5.13 | -2.94 | -0.14 | -0.14 |
| 8 | -2.87 | -6.28 | -4.84 | -0.52 | -0.52 |
| 10 | -2.80 | -6.12 | -4.73 | -0.49 | -0.49 |
| 12 | -2.96 | -7.21 | -4.97 | -0.54 | -0.54 |
| 14 | -4.87 | -9.26 | -8.05 | -1.16 | -1.16 |
| 16 | -4.87 | -10.43 | -8.04 | -1.16 | -1.16 |
| 18 | -4.82 | -10.37 | -7.97 | -1.14 | -1.14 |
| 20 | -6.80 | -12.05 | -11.66 | -1.74 | -1.74 |

(Example 1 Concluded)

## Example 2 - Generic Profile with No Water Level Data

### Input

All input is accomplished through screens accessible from the **Activity Menu**.

### (F2) General Time & Output Specifications Data Entry

| Item | Value | Units |
|---|---|---|
| Simulation start time: | | |
| Year | 1989 | |
| Month | 1 | |
| Day | 17 | |
| Hour | 3.00 | |
| Length of simulation | 20.00 | hr |
| Tabular output time (Interval) | 2.00 | hr |

### (F3) Beach Characteristics Data Entry

| Item | Value | Units |
|---|---|---|
| Elevation at top of dune | 20.000 | ft |
| Elevation at base of dune | 6.000 | ft |
| Elevation at top of berm | 6.000 | ft |
| Dune width from baseline | 50.000 | ft |
| Berm width | 100.000 | ft |
| Mean grain size | 0.220 | mm |
| Profile | GENERIC | |

**Generic Profile Data**

| Item | Value | Units |
|---|---|---|
| Cotangent of dune face slope | 2.000 | |
| Cotangent of beach face slope | 10.000 | |
| Cotangent of nearshore slope | 20.000 | |

### (F5) Wave Parameter Data Entry

| Item | Value | Units |
|---|---|---|
| $\Delta t$ for wave parameters | 20.00 | hr |

| | | |
|---|---|---|
| Wave height units | | ft |
| Water depth | 60.00 | ft |
| Wave height | 8.00 | ft |
| Wave period | 8.00 | sec |
| Wave crest angle | 10.00 | deg |

### Output

Results from this application are written to two plot output files. In addition, this application generates one screen plot.

### Plot Output File 1

This file contains simulated profile data representing the original profile and evolving, time-dependent profiles. Each point along the profile is defined by some distance seaward of a baseline and a corresponding elevation. Profiles are reported at the *Tabular Output Time Interval*. Table 6-2-3 is a partial listing of plot output file 1 (default name **PLOTDAT1.OUT**). Figure 6-2-4 is a plot comparing the original profile with the 20-hr profile.

Table 6-2-3
Listing of Plot Output File 1 for Example Problem 2

Original Profile Data

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 208. | 2.80 |
| 212. | 2.40 |
| 216. | 2.00 |
| 220. | 1.60 |
| 224. | 1.20 |
| 228. | 0.80 |
| 232. | 0.40 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

(Table 6-2-3 Continued on the Next Page)

(Table 6-2-3 Concluded)

Profile Data at 2 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 208. | 2.78 |
| 212. | 2.38 |
| 216. | 1.98 |
| 220. | 1.58 |
| 224. | 1.18 |
| 228. | 0.78 |
| 232. | 0.38 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

---

Profile Data at 20 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 208. | 1.59 |
| 212. | 1.19 |
| 216. | 0.79 |
| 220. | 0.39 |
| 224. | -0.01 |
| 228. | -0.61 |
| 232. | -0.97 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

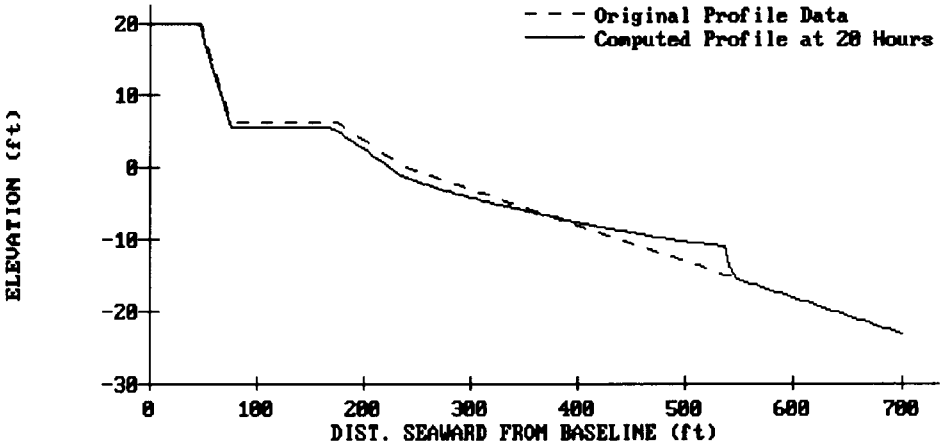


Figure 6-2-4. Profile Change After 20 Hr

## Plot Output File 2

This file contains a table consisting of changes in sand volume and changes (advance/retreat) in position of the 0-, +5-, +10-, and +15-ft contours. Erosion statistics are reported at the *Tabular Output Time Interval.* Table 6-2-4 is a listing of plot output file 2 (default name **PLOTDAT2.OUT**).

Table 6-2-4
Listing of Plot Output File 2 for Example Problem 2

| Hour | Change in Volume ($yd^3/ft$) | Contour Change (ft) | | | |
|---|---|---|---|---|---|
| | | 0 | +5 | +10 | +15 |
| 2 | -0.01 | -0.18 | -0.18 | 0.00 | 0.00 |
| 4 | -0.41 | -1.94 | -1.94 | 0.00 | 0.00 |
| 6 | -0.89 | -4.14 | -4.14 | 0.00 | 0.00 |
| 8 | -1.51 | -5.90 | -5.90 | -0.10 | -0.10 |
| 10 | -2.13 | -7.24 | -6.82 | -0.28 | -0.28 |
| 12 | -2.85 | -7.92 | -7.88 | -0.49 | -0.49 |
| 14 | -3.59 | -8.98 | -8.98 | -0.71 | -0.71 |
| 16 | -4.34 | -10.09 | -10.09 | -0.94 | -0.94 |
| 18 | -4.98 | -11.40 | -11.03 | -1.13 | -1.13 |
| 20 | -5.69 | -12.14 | -12.07 | -1.34 | -1.34 |

(Example 2 Concluded)

## Example 3 - Generic Profile with Tabulated Water Data

### Input

All input is accomplished through screens accessible from the **Activity Menu**.

### (F2) General Time & Output Specifications Data Entry

| Item | Value | Units |
|---|---|---|
| Simulation start time: | | |
| Year | 1989 | |
| Month | 1 | |
| Day | 17 | |
| Hour | 2.50 | |
| Length of simulation | 20.00 | hr |
| Specific output times from beginning of the simulation (Tabulated) | 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 | hr |

### (F3) Beach Characteristics Data Entry

| Item | Value | Units |
|---|---|---|
| Elevation at top of dune | 14.100 | ft |
| Elevation at base of dune | 6.000 | ft |
| Elevation at top of berm | 6.000 | ft |
| Dune width from baseline | 50.000 | ft |
| Berm width | 100.000 | ft |
| Mean grain size | 0.220 | mm |
| Profile | GENERIC | |

**Generic Profile Data**

| Item | Value | Units |
|---|---|---|
| Cotangent of dune face slope | 2.000 | |
| Cotangent of beach face slope | 10.000 | |
| Cotangent of nearshore slope | 20.000 | |

### (F4) Water Level Data Entry

(F1) Tabulated Tide Data

| Item | Value | Units |
|---|---|---|
| $\Delta t$ for hydrograph input | 4.000 | hr |
| Water level units | | ft |
| Water $\text{levels}_m$ ($m = 1 \ldots M$, $M \leq 100$) | 0, 3, 5, 7, 5, 2 | |

### (F5) Wave Parameter Data Entry

| Item | Value | Units |
|---|---|---|
| $\Delta t$ for wave parameters | 5.00 | hr |
| Wave height units | | ft |
| Water depth | 60.00 | ft |
| Wave heights | 8, 5, 3, 12 | ft |
| Wave periods | 8, 5, 4, 10 | sec |
| Wave crest angles | 10, 45, 30, 0 | deg |

## Output

Results from this application are written to two plot output files. In addition, this application generates one plot.

### Plot Output File 1

This file contains simulated profile data representing the original profile and evolving, time-dependent profiles. Each point along the profile is defined by some distance seaward of a baseline and a corresponding elevation. Profiles are reported at the *Tabular Output Time Interval*. Table 6-2-5 is a partial listing of plot output file 1 (default name **PLOTDAT1.OUT**). Figure 6-2-5 is a plot comparing the original profile with the 20-hr profile.

Table 6-2-5
Listing of Plot Output File 1 for Example Problem 3

Original Profile Data

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| 12. | 20.00 |
| ⇓ | ⇓ |
| 208. | 2.80 |
| 212. | 2.40 |
| 216. | 2.00 |
| 220. | 1.60 |
| 224. | 1.20 |
| 228. | 0.80 |
| 232. | 0.40 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

---

Profile Data at 1 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| 12. | 20.00 |
| ⇓ | ⇓ |
| 208. | 2.82 |
| 212. | 2.42 |
| 216. | 2.02 |
| 220. | 1.62 |
| 224. | 1.22 |
| 228. | 0.82 |
| 232. | 0.42 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

(Table 6-2-5 Continued on the Next Page)

(Table 6-2-5 Concluded)

Profile Data at 20 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 20.00 |
| 4. | 20.00 |
| 8. | 20.00 |
| ⇓ | ⇓ |
| 200. | 1.77 |
| 204. | 1.58 |
| 208. | 1.39 |
| 212. | 1.19 |
| 216. | 1.00 |
| 220. | 0.80 |
| 224. | 0.60 |
| 228. | 0.40 |
| 232. | 0.20 |
| 236. | 0.00 |
| 240. | -0.21 |
| ⇓ | ⇓ |
| 1128. | -44.60 |
| 1132. | -44.80 |
| 1136. | -45.00 |

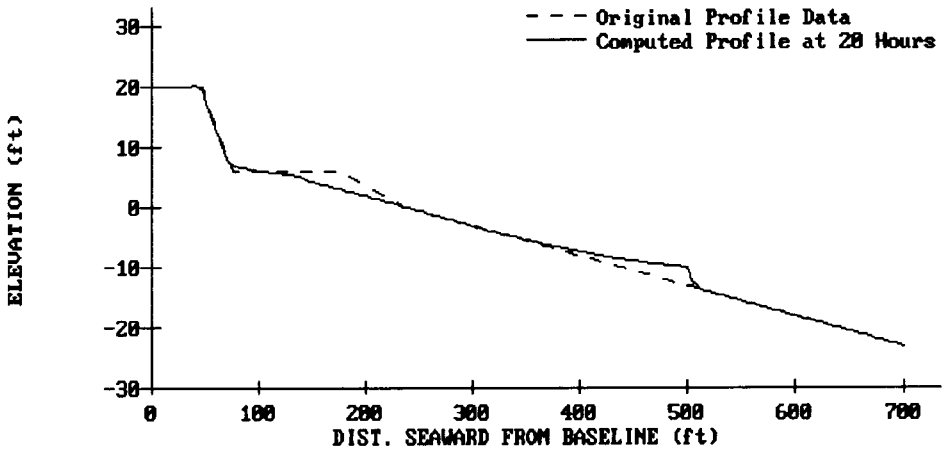


Figure 6-2-5. Profile Change After 20 Hr

### Plot Output File 2

This file contains a table consisting of changes in sand volume and changes (advance/retreat) in position of the 0-, +5-, +10-, and +15-ft contours. Erosion statistics are reported at the *Tabular Output Time Interval*. Table 6-2-6 is a listing of plot output file 2 (default name **PLOTDAT2.OUT**).

Table 6-2-6
Listing of Plot Output File 2 for Example Problem 3

| Hour | Change in Volume ($yd^3/ft$) | Contour Change (ft) | | | |
|---|---|---|---|---|---|
| | | 0 | +5 | +10 | +15 |
| 1 | 0.08 | 0.23 | 0.22 | 0.00 | 0.00 |
| 2 | -0.01 | -0.18 | -0.18 | 0.00 | 0.00 |
| 4 | -0.41 | -1.94 | -1.94 | 0.00 | 0.00 |
| 6 | -1.98 | -1.17 | -10.14 | 0.00 | 0.00 |
| 8 | -2.87 | 1.45 | -11.07 | -0.29 | -0.29 |
| 10 | -3.54 | 23.19 | -13.00 | -0.82 | -0.82 |
| 12 | -3.95 | 34.73 | -14.31 | -1.28 | -1.28 |
| 14 | -6.15 | 34.73 | -46.76 | -1.95 | -1.95 |
| 16 | -5.56 | 34.73 | -52.90 | -1.64 | -1.64 |
| 18 | -5.78 | 8.86 | -48.78 | -1.42 | -1.42 |
| 20 | -7.41 | -0.07 | -48.45 | -1.40 | -1.40 |

(Example 3 Concluded)

## Example 4 - Actual Profile Data with No Water Level Data

### Input

All input is accomplished through screens accessible from the **Activity Menu**.

### (F2) General Time & Output Specifications Data Entry

| Item | Value | Units |
|---|---|---|
| Simulation start time: | | |
| Year | 1989 | |
| Month | 1 | |
| Day | 17 | |
| Hour | 3.00 | |
| Length of simulation | 20.00 | hr |
| Tabular output time (Interval) | 2.00 | hr |

### (F3) Beach Characteristics Data Entry

| Item | Value | Units |
|---|---|---|
| Elevation at top of dune | 14.100 | ft |
| Elevation at base of dune | 6.000 | ft |
| Elevation at top of berm | 6.000 | ft |
| Dune width from baseline | 50.000 | ft |
| Berm width | 100.000 | ft |
| Mean grain size | 0.220 | mm |
| Profile | ACTUAL | |

**Actual Profile Data**

| Pt | Distance Seaward from Baseline X | Elevation Y | Pt | Distance Seaward from Baseline X | Elevation Y |
|---|---|---|---|---|---|
| 1 | 0.000 | 14.100 | 28 | 772.900 | -9.000 |
| 2 | 4.000 | 13.400 | 29 | 821.800 | -7.600 |
| 3 | 11.200 | 13.100 | 30 | 883.900 | -7.500 |
| 4 | 25.100 | 10.600 | 31 | 957.000 | -10.000 |
| 5 | 45.000 | 15.000 | 32 | 975.600 | -11.300 |
| 6 | 54.400 | 14.100 | 33 | 998.000 | -12.000 |
| 7 | 75.700 | 12.500 | 34 | 1028.000 | -13.400 |
| 8 | 105.200 | 12.900 | 35 | 1076.000 | -16.100 |
| 9 | 139.600 | 13.500 | 36 | 1120.000 | -18.100 |
| 10 | 163.900 | 12.500 | 37 | 1153.000 | -19.200 |
| 11 | 189.400 | 10.500 | 38 | 1190.000 | -20.500 |
| 12 | 205.500 | 8.600 | 39 | 1226.000 | -21.500 |
| 13 | 242.500 | 4.300 | 40 | 1285.000 | -22.900 |
| 14 | 281.600 | 2.300 | 41 | 1316.000 | -23.000 |
| 15 | 320.600 | 1.100 | 42 | 1372.000 | -24.400 |
| 16 | 374.700 | 0.400 | 43 | 1421.000 | -25.500 |
| 17 | 393.700 | 0.200 | 44 | 1485.000 | -26.500 |
| 18 | 421.300 | -0.500 | 45 | 1532.000 | -27.200 |
| 19 | 453.600 | -3.100 | 46 | 1585.000 | -28.300 |
| 20 | 497.300 | -6.900 | 47 | 1625.000 | -29.200 |
| 21 | 539.200 | -7.000 | 48 | 1682.000 | -30.100 |
| 22 | 577.400 | -6.600 | 49 | 1723.000 | -30.400 |
| 23 | 626.700 | -7.600 | 50 | 1777.000 | -31.100 |
| 24 | 638.700 | -8.700 | 51 | 1821.000 | -31.500 |
| 25 | 672.600 | -9.800 | 52 | 1870.000 | -32.200 |
| 26 | 721.900 | -9.700 | 53 | 1916.000 | -32.400 |
| 27 | 735.700 | -8.800 | | | |

**(F5) Wave Parameter Data Entry**

| Item | Value | Units |
|---|---|---|
| $\Delta t$ for wave parameters | 20.00 | hr |
| Wave height units | | ft |
| Water depth | 60.00 | ft |
| Wave height | 8.00 | ft |
| Wave period | 8.00 | sec |
| Wave crest angle | 10.00 | deg |

### Output

Results from this application are written to two plot output files. In addition, this application generates one plot.

### Plot Output File 1

This file contains simulated profile data representing the original profile and evolving, time-dependent profiles. Each point along the profile is defined by some distance seaward of a baseline and a corresponding elevation. Profiles are reported at the *Tabular Output Time Interval*. Table 6-2-7 is a partial listing of plot output file 1 (default name **PLOTDAT1.OUT**). Figure 6-2-6 is a plot comparing the original profile with the 20-hr profile.

Table 6-2-7
Listing of Plot Output File 1 for Example Problem 4

Original Profile Data

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 14.10 |
| 4. | 13.40 |
| 8. | 13.24 |
| 12. | 13.01 |
| ⇓ | ⇓ |
| 200. | 9.29 |
| 204. | 8.79 |
| 208. | 8.28 |
| 212. | 7.77 |
| 216. | 7.26 |
| 220. | 6.75 |
| 224. | 6.26 |
| 228. | 5.78 |
| 232. | 5.33 |
| 236. | 4.91 |
| 240. | 4.52 |
| ⇓ | ⇓ |
| 1908. | -32.39 |
| 1912. | -32.39 |
| 1916. | -32.40 |

(Table 6-2-7 Continued on the Next Page)

(Table 6-2-7 Concluded)

Profile Data at 2 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 14.10 |
| 4. | 13.40 |
| 8. | 13.24 |
| 12. | 13.01 |
| ⇓ | ⇓ |
| 208. | 8.28 |
| 212. | 7.77 |
| 216. | 7.26 |
| 220. | 6.63 |
| 224. | 6.00 |
| 228. | 5.53 |
| 232. | 5.08 |
| ⇓ | ⇓ |
| 1908. | -32.39 |
| 1912. | -32.39 |
| 1916. | -32.40 |

Profile Data at 20 hr

| Dist. Seaward from Baseline (ft) | Elev.(ft) |
|---|---|
| 0. | 14.10 |
| 4. | 13.40 |
| 8. | 13.24 |
| 12. | 13.01 |
| ⇓ | ⇓ |
| 212. | 7.11 |
| 216. | 6.51 |
| 220. | 5.88 |
| 224. | 5.26 |
| 228. | 4.78 |
| 232. | 4.33 |
| 236. | 3.91 |
| ⇓ | ⇓ |
| 1908. | -32.39 |
| 1912. | -32.39 |
| 1916. | -32.40 |

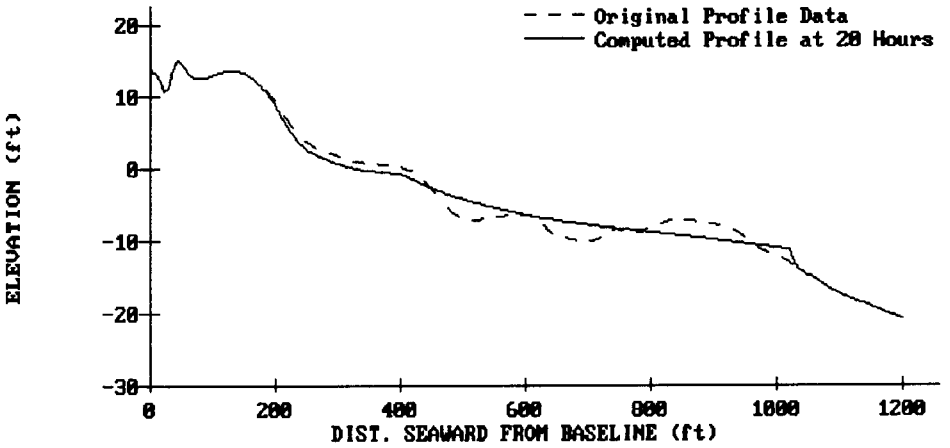


Figure 6-2-6. Profile Change After 20 Hr

## Plot Output File 2

This file contains a table consisting of changes in sand volume and changes (advance/retreat) in position of the 0-, +5-, +10-, and +15-ft contours. Erosion statistics are reported at the *Tabular Output Time Interval*. Table 6-2-8 is a listing of plot output file 2 (default name **PLOTDAT2.OUT**).

Table 6-2-8
Listing of Plot Output File 2 for Example Problem 4

| Hour | Change in Volume ($yd^3/ft$) | Contour Change (ft) | | | |
|---|---|---|---|---|---|
| | | 0 | +5 | +10 | +15 |
| 2 | -1.68 | -17.54 | -2.41 | 0.00 | 0.00 |
| 4 | -2.76 | -34.67 | -3.98 | 0.00 | 0.00 |
| 6 | -3.50 | -48.52 | -5.09 | 0.00 | 0.00 |
| 8 | -4.07 | -58.17 | -5.96 | -0.18 | 0.00 |
| 10 | -4.54 | -64.89 | -6.69 | -0.84 | 0.00 |
| 12 | -4.94 | -69.85 | -7.29 | -1.39 | 0.00 |
| 14 | -5.28 | -73.61 | -7.79 | -1.86 | 0.00 |
| 16 | -5.59 | -76.76 | -8.25 | -2.33 | 0.00 |
| 18 | -5.85 | -79.29 | -8.65 | -2.73 | 0.00 |
| 20 | -6.07 | -81.33 | -8.99 | -3.09 | 0.00 |

(Example 4 Concluded)

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# CALCULATION OF COMPOSITE GRAIN-SIZE DISTRIBUTIONS

# CALCULATION OF COMPOSITE GRAIN-SIZE DISTRIBUTIONS

## TABLE OF CONTENTS

# CALCULATION OF COMPOSITE GRAIN-SIZE DISTRIBUTIONS

## DESCRIPTION

The major concern in the design of a sediment sampling plan for beach-fill purposes is determining the composite grain-size characteristics of both the native beach and the potential borrow site. This application calculates a composite grain-size distribution that reflects textural variability of the samples collected at the native beach or the potential borrow area.

## INPUT

The input requirements of this application consist of (a) entering and/or editing sand sample weights and germane identification characteristics, (b) selecting samples to be used in calculating the composite grain-size distribution, and (c) selecting multiple samples and/or composites for plotting on one screen. Data input and selection are accomplished through screens and pop-up windows (hereafter called *requestors*). Detailed lists and descriptions of the *requestors* and input parameters are presented in the *Procedure* section of this document.

## OUTPUT

Results from composite calculations may be displayed on screens, written to plot output files 1 and 2 (default name **PLOTDAT1.OUT** and **PLOTDAT2.OUT**), and displayed via plots. Detailed descriptions of the screen output and plots are given in the *Procedure* section of this document. The plot output files are described below.

### Plot Output File 1

The contents and format of plot output file 1 (default name **PLOTDAT1.OUT**) duplicate that of option F4: **View Output Data** accessible from the *Activity Menu.* Information reported is:

a. Wentworth and Unified Soils Classification schemes identifying percentage of the composite's sand weight in various categories (gravel, sand, silt, etc.)

b. Statistics of the composite calculated by Method of Moments and Folk Graphics Measures.

c. Header information and percentage by sand weight of specific grain sizes in the composite.

d. When the composite is composed from core samples, the percentage of the total core length that each sample represents is also provided.

### Plot Output File 2

Composite data (header information and percent of sand weight distribution are written to plot output file 2 (default name **PLOTDAT2.OUT**). The format of this file duplicates that of sand samples read from an external file or written to the trace output file with one exception. A "C" in line 4 of this file indicates to the application that it is composite data rather than sample data. Data in this file may be used as input to the second major function of this application, *Plot Samples/Composites on the Same Screen.*

### Trace Output File

Sand samples selected for composite calculations are written to the trace output file (default name **TRACE.OUT**). The format and contents of this file match exactly the requirements of input files for this application.

## PROCEDURE

This application provides only a Single Case Mode. The Multiple Case Mode is not available. The Single Case Mode requires interaction with the application through numerous *requestors*.

- Press [F1] on the Main Menu to select Single Case Mode.
- Fill in the highlighted input fields on the General Specifications screen (or leave the default values). Press [F1] when all data on this screen are correct.
- Press [F6] on the Functional Area Menu to select Littoral Processes.
- Press [F3] on the Littoral Processes Menu to select Calculation of Composite Grain-Size Distributions.

### Select Unit of Measurement for Composite Particle Diameter

This item refers only to the *final* system of units (phi, millimeter, or American Society for Testing Materials (ASTM) mesh sizes) in which the composite grain-size distribution is displayed and printed. The units allowed for *Particle Diameter* are:

phi, mm, or ASTM mesh sizes

Table A-4 in Appendix A lists sediment particle diameters (in phi units, equivalent millimeters, and ASTM mesh sizes) recognized by this application. After selecting the desired units, press one of the following keys to select the appropriate action:

F1 Proceed.

F10 Exit Application.

### Application's Major Activities

This application provides two *major* activities:

F1 Compute and View a Composite.

F2 Plot Samples/Composites on Same Screen.

F10 Exit Menu.

### F1 Compute and View a Composite

The following sections describe the various activity menus and screen requestors enabling data entry, data selection, composite calculations, viewing a composite, and plotting a composite.

### Data Entry Options Menu

This menu provides two options for interactive participation with the application. The first option allows entering new data sets and the second option allows editing of data sets in an external file.

F1 Initial Case Data Entry.

Use this option to enter an initial (new) set of data. These data, referred to as a **case**, will be stored in a temporary file and will be accessible to the program only while processing this **case**. All data in the **case** are *not* automatically written to the Trace Output File. The only data that are written to

the Trace Output File are those identified for calculating the composite grain-size characteristics. Data identification is made via the **Identify Samples for Composite** option.

(Alt) (F1) Edit Existing Case from File: **CGS1.IN**.

Use this option to access and modify data saved in an external file and to add additional data. Addition of data is accomplished via the **Enter Sample Data** option. Modification of data is made via the **Edit Sample Data** option. Additions and/or modifications are written to a temporary file and are accessible to the program only while processing this **case**. All new and/or modified samples are *not* automatically written to the Trace Output file. The only data that are written to the Trace Output File are those identified for calculating the composite grain-size characteristics. Data identification is made via the **Identify Samples for Composite** option.

Typically this data file has been saved as a trace output file from a previous execution of this application. The default input file name is **CGS1.IN**, but other file names (including path name) are acceptable. After entering the file name, press (ENTER) to accept this file. *For more information on files, see the section of this manual entitled "General Instructions and Information."*

**NOTE:** The file **CGS1.IN** contains 128 core samples collected in 1984 for the beach nourishment project at Panama City, Florida.

### Activity Menu

The Activity Menu is a point from which all options for Single Case data entry, modification, execution, and plotting are accessible. The options are:

(F1) Begin Computations.
(F2) Enter/Edit Sample Data.
(F3) Identify Samples for Composite.
(F4) View Output Data.
(F5) Plot Output Data.
(F10) Exit Menu.

Each option and the required input are described below.

### (F1) Begin Computations

Use this option only after all sample data have been entered and/or modified and selected for computations. Before executing the composite grain-size calculations, a *requestor* **(Enter Header Information for Composite)** requiring identification and commentary parameters specific to the composite is displayed.

#### Enter Header Information for Composite

Enter an accurate description of data used in calculating the composite. This information is helpful for immediate as well as future uses of the composite grain-size distribution. The following list describes parameters required on the **Enter Header Information for Composite** *requestor*.

| Item | Description |
|---|---|
| Composite Name | Unique name assigned to this composite |
| Analyzer | Person/company/agency analyzing the data |
| Title | Project title |
| Comment | Any helpful information |

When the header information has been entered, press one of the following keys to select the next appropriate action:

(F1) Accept Data & Begin Computations.

(F10) Exit Window.

---

### (F2) Enter/Edit Sample Data

This option provides an interactive capability to enter new or edit existing sand sample data that are used for calculating composite grain-size distributions. The set of data that is entered or edited is referred to as the **case**. Input is accomplished through numerous *requestors*. A flowchart showing *requestors* available under the **Enter/Edit Sample Data** option is shown in Figure 6-3-1. The format and data requirements for these *requestors* are described below.

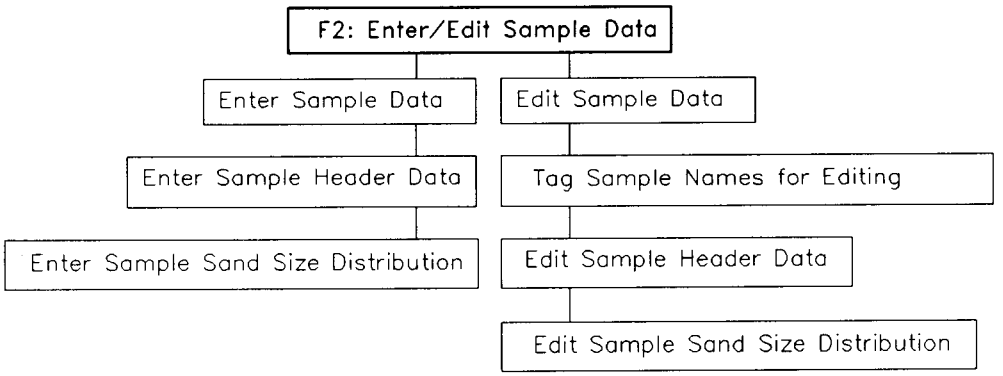


**Figure 6-3-1. Flowchart of Requestors for Option F2, "Enter/Edit Sample Data"**

When the F2 option (**Enter/Edit Sample Data**) from the **Activity Menu** is selected, the **Enter/Edit Sample Data** *requestor* is displayed.

### Enter/Edit Sample Data

This *requestor* provides options for:

- Entering new sand sample data **(Enter Sample Data)**.
- Editing existing sand sample data **(Edit Sample Data)**.

To select an option, move the cursor to the desired choice and press ⊠. Selecting either of these choices will display *requestors* for further input.

---

### Enter Sample Data

This option allows for interactively adding new sand sample data to an existing **case** or creating a new **case**. Two *requestors* are required to record data. The first *requestor* (**Enter Sample Header Data**) is used to collect header data and germane information for each sample in the **case**. The second *requestor* (**Enter Sample Sand-Size Distribution**) is used to record sand-size distribution data for each sample. A **case** can contain a maximum of 144 samples. These *requestors* are described in detail below.

### Enter Sample Header Data

This *requestor* collects header data and general information unique to each sand sample in the **case**. The following list describes parameters on the **Enter Sample Header Data** *requestor* with their corresponding units and range of data recognized by this application:

| Item | Description |
|---|---|
| Sample Name | Unique name assigned to this sample (each sample *must* be uniquely identified) |
| Title | Project title |
| Date Collected | Date the sand sample was collected |
| Analyzer | Person/company/agency analyzing the data |
| Comment | Any helpful information |
| Position on Beach | Location where sand sample was taken (nearshore, offshore, etc.) |
| Type of Sample | Method of collection of sample (surface, core, vibracore, etc.) |

| Item | Units | Data Range | | |
|---|---|---|---|---|
| Profile Number | | 0 | to | 9,999 |
| Surface/Core Elevation | ft, m | -100.0 | to | 100.0 |
| Core Length (Core Sample only) | ft, m | 0.0 | to | 50.0 |
| Top of Sample (Core Sample only) | ft, m | 0.0 | to | 50.0 |
| Bottom of Sample (Core Sample only) | ft, m | 0.0 | to | 50.0 |
| Latitude | | 0.0 | to | 9,999,999. |
| Longitude | | 0.0 | to | 9,999,999. |
| Total Sand Weight | grams | 0.0 | to | 500.0 |

Particle Diameter Units phi, mm, ASTM mesh size

**NOTE:** Particle Diameter units declared on the **Enter Sample Header Data** *requestor* identify the units of measurement for grain sizes collected on the **Enter Sample Sand-Size Distribution** *requestor*.

When data have been entered, press one of the following keys to select the next appropriate action:

(ALT)(F1) Continue Input (invokes the **Enter Sample Sand-Size Distribution** *requestor*).

(F1) Accept Data & Return.

(F10) Return to Menu (Activity Menu).

### Enter Sample Sand-Size Distribution

This *requestor* collects sand weight in grams for standard particle diameters (see Table A-4 in Appendix A). The standard particle diameters are displayed as an aid for inputting sand weights. The particle diameter unit (phi, millimeter, or ASTM mesh size) specified on the **Enter Sample Header Data** *requestor* determines the unit of measurement for sand weights recorded on the **Enter Sample Sand-Size Distribution** *requestor*. A maximum of 56 sand weights can be entered. The range of sand weight values allowed by this application is listed below.

| Item | Units | Data Range |
|---|---|---|
| Sand Weight | grams | -1.0 to 3000.0 |

> **NOTE:** A sand weight of *-1.0* indicates to the application that **NO** weight was recorded for the associated grain size. This allows sand distributions to be entered independently of the sieve interval. Thus, mixed and/or well-sorted sand populations may be recorded.

> **LIMITATION:** Sediment particle diameters accepted by this application are listed in Table A-4 in Appendix A.

When finished entering sand weights on this *requestor*, press one of the following keys to select the next appropriate action:

(ALT)(F1) Continue Input.

> **NOTE:** A maximum of 28 particle diameters and associated sand weights can be displayed and entered on one screen. To display the remaining 28 standard particle diameters and enter corresponding sand weights, press (ALT) (F1). After all sand weights have been entered, press (ALT) (F1) again to invoke the **Enter Sample Header Data** *requestor* for entering data for the next sand sample.

(F1) Accept Data & Return.

(F10) Return to Menu (to Activity Menu).

---

### Edit Sample Data

This option allows for interactively editing sand sample data. Three *requestors* guide the user through the editing procedure. The first *requestor* (**Tag Sample Names for Editing**) provides an easy process to identify samples for editing. The second *requestor* (**Edit Sample Header Data**) is used to edit header data and general information for each sample selected. The *third requestor* (**Edit Sample Sand-Size Distribution**) is used to edit sand-size distribution data for each sample. These *requestors* are described in detail below.

### Tag Sample Names for Editing

This *requestor* allows identifying samples for editing by tagging the name of the sample. All sample names in the **case** are displayed as an aid for identification and tagging. To select and tag a sample, move the cursor to the desired choice and press ⊠. Continue this procedure until all desired samples are tagged.

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

[ALT][F1] More Input.

**NOTE:** A maximum of 60 sample names are displayed on one screen. If more than 60 samples are in the **case**, press [ALT] [F1] to display more sample names.

[F1] Accept Data, Exit Window (invokes the **Edit Sample Header Data** *requestor* to begin the editing process).

[F10] Exit Window (Activity Menu).

### Edit Sample Header Data

This *requestor* allows editing the header data and general information unique to the tagged sand samples. The following list describes the specific parameters on the **Edit Sample Header Data** *requestor* that can be edited, with their corresponding units and range of data recognized by this application:

| Item | Description |
|---|---|
| Sample Name | Unique name assigned to this sample (each sample *must* be uniquely identified) |
| Title | Project title |
| Date Collected | Date the sand sample was collected |
| Analyzer | Person/company/agency analyzing the data |
| Comment | Any helpful information |
| Position on Beach | Location where sand sample was taken (nearshore, offshore, etc.) |
| Type of Sample | Method of collection of sample (surface, core, vibracore, etc.) |

| Item | Units | Data Range | | |
|---|---|---|---|---|
| Profile Number | | 0 | to | 9,999 |
| Surface/Core Elevation | ft, m | -100.0 | to | 100.0 |
| Core Length (Core Sample only) | ft, m | 0.0 | to | 50.0 |
| Top of Sample (Core Sample only) | ft, m | 0.0 | to | 50.0 |
| Bottom of Sample (Core Sample only) | ft,. m | 0.0 | to | 50.0 |
| Latitude | | 0.0 | to | 9,999,999. |
| Longitude | | 0.0 | to | 9,999,999. |
| Total Sand Weight | grams | 0.0 | to | 500.0 |

Particle Diameter Units phi, mm, ASTM mesh size

**NOTE:** Particle diameter units declared on the **Edit Sample Header Data** *requestor* determine the units of measurement that will appear on the **Edit Sample Sand-Size Distribution** *requestor*.

When data have been edited, press one of the following keys to select the next appropriate action:

(ALT)(F1) Continue Input (invokes the **Edit Sample Sand-Size Distribution** *requestor* to continue the editing process).

(F1) Accept Data & Return.

(F10) Return to Menu (Activity Menu).

### Edit Sample Sand-Size Distribution

This *requestor* displays sand weights in grams for standard particle diameters for the tagged sand samples. The standard particle diameters are displayed as an aid for inputting sand weights. The particle diameter unit (phi, millimeter, or ASTM mesh size) specified on the **Edit Sample Header Data** *requestor* determines the unit of measurement for sand weights recorded on the **Edit Sample Sand-Size Distribution** *requestor*. A maximum of 56 sand weights can be entered. The range of sand weight values allowed by this application is listed below.

| Item | Units | Data Range |
|---|---|---|
| Sand Weight | grams | -1.0 to 3,000.0 |

> **NOTE:** A sand weight of *-1.0* indicates to the application that **NO** weight was recorded for the associated grain size. This allows sand distributions to be entered independently of the sieve interval. Thus, mixed and/or well-sorted sand populations may be recorded.

> **LIMITATION:** Sediment particle diameters accepted by this application are listed in Table A-4 in Appendix A.

When finished editing sand weights on this *requestor*, press one of the following keys to select the next appropriate action:

(ALT)(F1) Continue Input.

> **NOTE:** A maximum of 28 particle diameters and associated sand weights can be displayed and recorded on one screen. To display the remaining standard particle diameters and corresponding sand weights, press (ALT) (F1). After all sand weights have been edited, press (ALT) (F1) again to invoke the **Edit Sample Header Data** *requestor*. This will display recorded data for the next tagged sand sample.

(F1) Accept Data & Return.

(F10) Return to Menu (Activity Menu).

### F3 Identify Samples for Composite

This option provides an interactive capability to identify and select data samples from the **case** for use in calculating the composite grain-size distribution. Selection of the data is accomplished through numerous *requestors*. A flowchart depicting *requestors* available via the **F3: Identify Samples for Composite** option is shown in Figure 6-3-2. The samples selected from the **case** via this option are written to the **Trace Output File** (default name **TRACE.OUT**) and then used in the composite grain-size calculations. The format and data requirements for these *requestors* are described below.

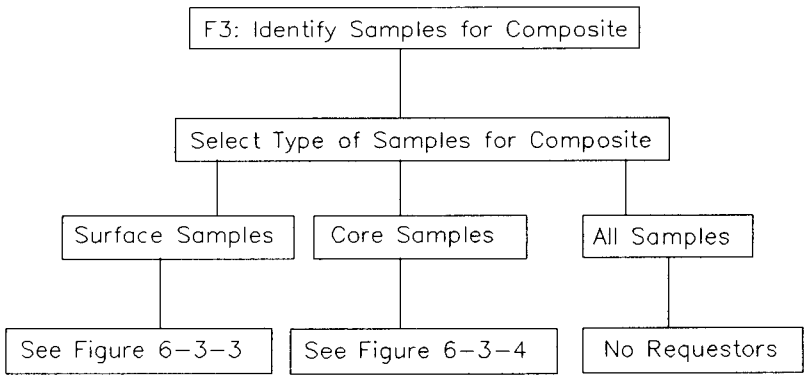


**Figure 6-3-2. Flowchart of Requestors for Option F3, "Identify Samples for Composite"**

When the **F3: Identify Samples for Composite** option is selected, the **Select Type of Samples for Composite** *requestor* is displayed.

*Select Type of Samples for Composite*

This *requestor* provides three options for identifying the type of samples that will make up the data set used in the composite grain-size calculations. The options are:

- Surface Samples.
- Core Samples.
- All Samples.

To select an option, move the cursor to the desired choice and press ⊠. Selecting either **Surface Samples** or **Core Samples** will display more *requestors* for further input. Selecting **All Samples** requires no further *requestors*.

## Surface Samples

When the **Surface Samples** option is selected, the **Select Surface Samples By** *requestor* is displayed. This *requestor* invokes other *requestors* (Figure 6-3-3) that collect choices and input to determine the data set for composite grain-size calculations.

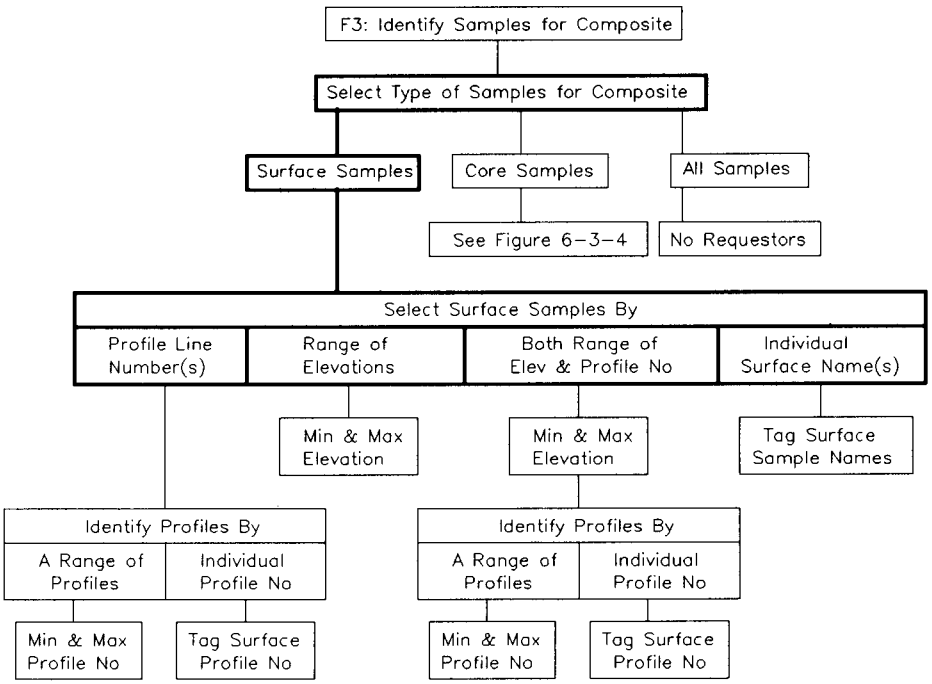


**Figure 6-3-3. Flowchart of Requestors for the Surface Samples Option**

The **Select Surface Samples By** *requestor* provides four choices for selecting samples. These choices are:

- Profile Line Number(s)
- A Range of Elevations
- Both Range of El. & Profile No.
- Individual Surface Name(s)

Make a selection by moving the cursor to the desired choice and pressing ⊠. Each choice will display more *requestors* for identifying desired surface samples. The format and data requirements of resulting *requestors* are described below. After samples are identified and selected, the program returns to the **Select Surface Samples By** *requestor*. To accept samples that were selected, press F1. The program now writes this data set to the **Trace Output File** (default name **TRACE.OUT**) and these data are used in the composite grain-size calculations.

**Profile Line Number(s)**

This option allows selecting samples by a specific number assigned to a profile line. Choosing this option invokes the **Identify Profiles By** *requestor*. The choices offered by this *requestor* are:

- A Range of Profiles.
- Individual Profile(s).

Select one of the two choices by moving the cursor to the desired choice and pressing ⊠. Both choices display more *requestors* that ultimately identify a set of surface samples for the composite data set. These *requestors* are described below.

*A Range of Profiles*

This choice invokes the **Enter Profile Range** *requestor*, which allows selecting samples that fall within a certain range of profile numbers.

The range of profile number values allowed by this application is given below:

| Item | Data Range |
|---|---|
| Minimum Profile Number | 0 to 9999 |
| Maximum Profile Number | 0 to 9999 |

When the range of profile numbers has been entered, press one of the following keys to select the next appropriate action:

F1 Accept Data & Exit Window.

ALT F10 Exit Window.

*Individual Profile(s)*

This choice invokes the **Tag Surface Sample Profile Numbers for Composite** *requestor*, which allows selecting samples by tagging the desired profile line number(s). All sample profile line numbers in the **case** are displayed as an aid to identification and tagging. To select and tag a sample, move the cursor to the desired choice and press ⊠. Continue this procedure until all desired samples are tagged.

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

(ALT)(F1) More Input.

**NOTE:** A maximum of 60 sample names are displayed on one screen. If more than 60 samples are in the **case**, press (ALT) (F1) to display more sample names.

(F1) Accept Data, Exit Window.

(F10) Exit Window.

**A Range Of Elevations**

This option allows selecting only those samples that fall within a certain range of elevations. Choosing this option invokes the **Enter Elevation Range** *requestor*.

The units and range of elevation values allowed by this application are given below:

| Item | Units | Data Range |
|---|---|---|
| Minimum Elevation | ft, m | -100.0 to 100.0 |
| Maximum Elevation | ft, m | -100.0 to 100.0 |

When the range of elevations has been entered, press one of the following keys to select the next appropriate action:

(F1) Accept Data & Exit Window.

(ALT)(F10) Exit Window.

**Both Range of El. & Profile No.**

This option allows selecting samples that fall within a certain range of elevations **and** for specific profile number(s). A sample must meet **both** elevation and profile number criteria to be selected for the data set. Selection of samples is made through numerous *requestors*. The first *requestor* that appears is the **Enter Elevation Range** *requestor* that was described earlier. After the maximum and minimum elevations have been entered, the **Identify Profiles By** *requestor* is invoked by responding *yes* to the question *To Profile Screens*? Selection of samples can then continue through two more *requestors*.

- See **A Range of Profiles** (described earlier).
- See **Individual Profile(s)** (described earlier).

**Individual Surface Name(s)**

This option invokes the **Tag Surface Samples Names for Composite** *requestor*, which allows selecting samples by tagging the desired surface sample name(s). All sample names in the **case** are displayed as an aid for identification and tagging. To select and tag a surface sample, move the cursor to the desired name and press ⊗. Continue this procedure until all desired samples are tagged.

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

(ALT)(F1) More Input.

**NOTE:** A maximum of 60 sample names are displayed on one screen. If more than 60 samples are in the **case**, press (ALT) (F1) to display more sample names.

(F1) Accept Data, Exit Window.

(F10) Exit Window.

## Core Samples

When the **Core Samples** option is selected, the **Select Core Samples By** *requestor* is displayed. This *requestor* invokes other *requestors* (Figure 6-3-4) that collect choices and input to determine the data set for composite grain-size calculations.

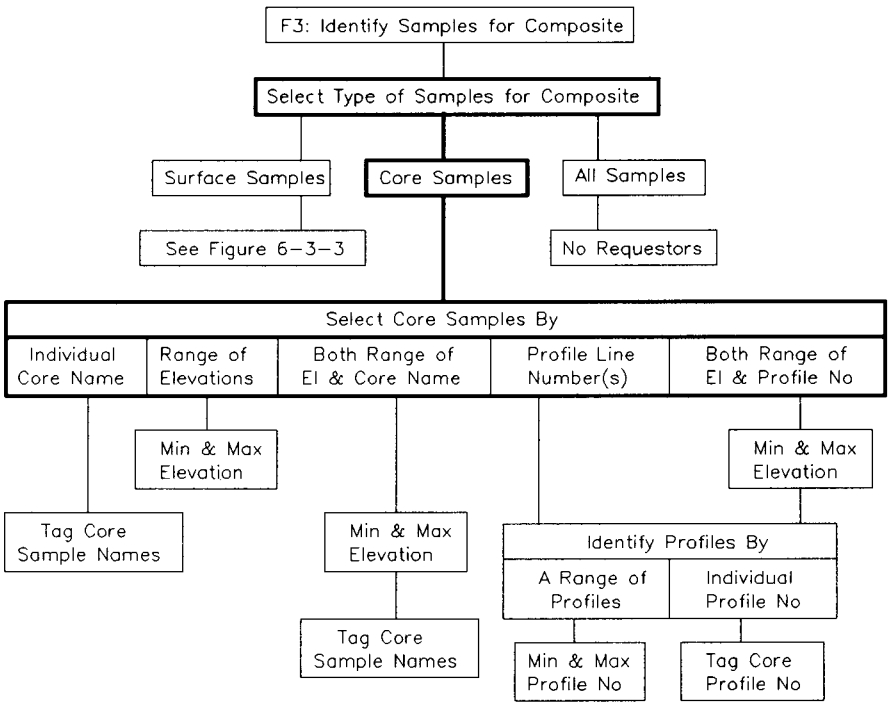


**Figure 6-3-4. Flowchart of Requestors for the Core Samples Option**

The **Select Core Samples By** *requestor* provides five choices for selecting samples. These choices are:

- Individual Core Name(s)
- A Range of Elevations
- Both Range of El. & Core Name
- Profile Line Number(s)
- Both Range of El. & Profile No.

Make a selection by moving the cursor to the desired choice and pressing ⊠. Each choice displays more *requestors* for identifying desired core samples. The format and data requirements of resulting *requestors* are described below. After samples are identified and selected, the program returns to the **Select Core Samples By** *requestor*. To accept samples that were selected, press F1. The program now writes this data set to the **Trace Output File** (default name **TRACE.OUT**) and these data are used in the composite grain-size calculations.

### Individual Core Name(s)

This option invokes the **Tag Core Samples Names for Composite** *requestor*, which allows selecting samples by tagging the desired core name(s). All sample names in the **case** are displayed as an aid for identification and tagging. To select and tag a core sample, move the cursor to the desired name and press ⊠. Continue this procedure until all desired samples are tagged.

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

(ALT)(F1) More Input.

**NOTE:** A maximum of 60 sample names are displayed on one screen. If more than 60 samples are in the **case**, press (ALT) (F1) to display more sample names.

(F1) Accept Data, Exit Window.

(F10) Exit Window.

### A Range of Elevations

This option allows selecting only those samples that fall within a certain range of elevations. Choosing this option invokes the **Enter Elevation Range** *requestor*.

The units and range of elevation values allowed by this application are given below:

| Item | Units | Data Range |
|---|---|---|
| Minimum Elevation | ft, m | -100.0 to 100.0 |
| Maximum Elevation | ft, m | -100.0 to 100.0 |

When the range of elevations has been entered, press one of the following keys to select the next appropriate action:

(F1) Accept Data & Exit Window.

(ALT)(F10) Exit Window.

**Both Range of El. & Core Name**

This option allows selecting samples that fall within a range of elevations **and** for specific core name(s). A sample must meet **both** elevation and name criteria to be selected for the data set. Selection of samples is made through two *requestors*.

- Enter Elevation Range.
- Tag Core Samples for Composite.

The first *requestor* displayed is the **Enter Elevation Range** *requestor*, which was described earlier in the section titled **A Range of Elevations**. After maximum and minimum elevations have been entered, the **Tag Core Sample Names for Composite** *requestor* (described earlier in the section titled **Individual Core Name(s)**) is invoked by responding *yes* to the question *To Core Name Screens*?

**Profile Line Number(s)**

This option allows selecting samples by a specific number assigned to a profile line. Choosing this option invokes the **Identify Profiles By** *requestor*. The choices offered by this *requestor* are:

- A Range of Profiles.
- Individual Profile(s).

Select one of the two choices by moving the cursor to the desired choice and pressing ⊠. Both choices display more *requestors* that ultimately identify a set of core samples for the composite data set. These *requestors* are described below.

*A Range of Profiles*

This choice invokes the **Enter Profile Range** *requestor* which allows selecting samples that fall within certain profile numbers.

The range of profile number values allowed by this application is given below:

| Item | Data Range |
|---|---|
| Minimum Profile Number | 0 to 9999 |
| Maximum Profile Number | 0 to 9999 |

When the range of profile numbers has been entered, press one of the following keys to select the next appropriate action:

F1 Accept Data & Exit Window.
ALT F10 Exit Window.

*Individual Profile(s)*

This choice invokes the **Tag Core Sample Profile Numbers for Composite** *requestor*, which allows selecting samples by tagging the desired profile line number(s). All sample profile line numbers in the **case** are displayed as an aid to identification and tagging. To select and tag a sample, move the cursor to the desired choice and press ⊠. Continue this procedure until all desired samples are tagged.

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

(ALT)(F1) More Input.

**NOTE:** A maximum of 60 sample names are displayed on one screen. If more than 60 samples are in the **case**, press (ALT) (F1) to display more sample names.

(F1) Accept Data, Exit Window.

(F10) Exit Window.

**Both Range of El. & Profile No.**

This option allows selecting samples that fall within certain elevations **and** for specific profile number(s). A sample must meet **both** elevation and profile number criteria to be selected for the data set. Selection of samples is made through numerous *requestors*. The first *requestor* that appears is the **Enter Elevation Range** *requestor* described earlier. After the maximum and minimum elevations have been entered, the **Identify Profiles By** *requestor* is invoked by responding *yes* to the question *To Profile Screens*? Selection of samples can then continue through two more *requestors*.

- See **A Range of Profiles** (described earlier).
- See **Individual Profile(s)** (described earlier).

---

### All Samples

Selecting **All Samples** requires no further *requestors*, and all samples in the **case** make up the data set used for the composite grain-size calculations. The program then writes this data set to the **Trace Output file** (default name **TRACE.OUT**). This same data set is used to determine properties of the composite when the application is executed.

> **SUGGESTION:**
> After an initial or new set of sample data has been entered, it is suggested that the **All Samples** choice be selected to save *all* the data that were entered. This file can then be recalled, and desired samples from it can be selected for the composite calculations.

---

### F4 View Output Data

This option allows for viewing the results of this application, which are displayed on two screens.

- The first screen displays percentage by weight (for the composite) of the various sediment categories on the Wentworth and Unified Soils classification schemes. This screen also displays the following statistics of the composite sample calculated by Method of Moments and Folk Graphics Measures.
    - Median Diameter.
    - Mean Diameter.
    - Standard Deviation.
    - Skewness.
    - Kurtosis.
- The second screen displays parameters for the composite.
    - Header information.
    - Percent weight distribution.

---

### F5 Plot Output Data

This application generates three plots. The plots may be accessed from the **Composite Grain-Size Distribution Plot Selection Menu** which is displayed when the **Plot Output Data** (F5) option is requested. To access a plot, move the cursor (using the arrow keys) to the desired plot and press F1. (Appendix C describes options to customize plots.) Available plots are:

- Frequency Weight Percent.
- Cumulative Weight Percent.
- Probability Weight Percent.
- ALL PLOTS.

  **NOTE:** This option will make all the plots available for viewing. Use the **NEXT** option of the graphics package (Appendix C) to view each plot successively.

- EXIT MENU.

### F2 Plot Samples/Composites on the Same Screen

This option from the *Application's Major Activities* menu is used to plot individual samples, composites, or a combination of individual samples and composites. As many as five may be plotted on a screen. The following sections describe various screen *requestors* enabling data entry, selection, and plotting.

**Read Data in External File**

Use this option to read sample and/or composite data saved in an external file. Normally the data file is created with a text editor, or saved as a trace file (default name **TRACE.OUT**) or as plot output file 2 (default name **PLOTDAT2.OUT**) from a previous execution of this application. The format and contents of a trace file and a plot output file 2 produced by this application match exactly the requirements of this input file. The default input file name is **CGSPLT.IN** but other file names (including path name) are acceptable. After entering the file name, press ENTER to accept this file. *For more information on files, see the section of this manual entitled "General Instructions and Information."*

Press one of the following keys to select the next appropriate action:

ALT F10 Accept Data & Exit (after reading the data file, invoke **Tag Names for Plotting** *requestor*).

F1 Exit Window.

**Tag Names for Plotting**

This *requestor* allows identifying sample and/or composites for plotting by tagging the name. All names in the file are displayed as an aid for identification and tagging. To select and tag a name, move the cursor to the desired choice and press ⊠. Continue this procedure until all desired names (maximum of five) are tagged. (Allowing more than five on a plot may produce a cluttered display.)

When selection and tagging are complete, press one of the following keys to select the next appropriate action:

ALT F1 More Input.

**NOTE:** A maximum of 60 composite and/or sample names are displayed on one screen. If more than 60 names are in the **file**, press ALT F1 to display more names.

F1 Accept Data, Exit Window (invokes the **Enter Title for Plots** *requestor*).

F10 Exit Window.

### Enter Title(s) for Plots

The following list describes parameters on the **Enter Title(s) for Plot** *requestor*:

| Item | Description |
|---|---|
| Title 1 | Text displayed on the first title line of the plot (a maximum of 60 characters). |
| Title 2 | Text displayed on the second title line of the plot (a maximum of 60 characters). |

When text for the title(s) has been entered, press one of the following keys to select the next appropriate action:

F1 Accept Data & Begin Plotting (invokes the **Plot Selection Menu** *requestor*).

ALT F10 Exit Window.

### Plot Selection Menu

This option provides a visual comparison of the selected data. Three plotting options are available:

- Frequency Weight Percent.
- Cumulative Weight Percent.
- Probability Weight Percent.
- ALL PLOTS.

  **NOTE:** This option will make all the plots available for viewing. Use the **NEXT** option of the graphics package (Appendix C) to view each plot successively.

- EXIT MENU.

To access a plot, move the cursor (using the arrow keys) to the desired plot and press F1. (Appendix C describes options to customize plots.)

### Application Limitations and Error Provisions

Provisions are available for correcting input data errors detected by the program. If an error in a sample is encountered, a message is displayed at the bottom of the screen. This message, while terse, is usually enough to identify which sample and field are causing the error. Errors must be corrected before a sample is selected for computing or plotting. Use the **Edit Sample Data** option to make corrections.

A limitation of this application is that it accepts only specific particle diameters in phi units, millimeters, or ASTM mesh sizes. These particle diameters are listed in Table A-4 of Appendix A.

## EXAMPLE PROBLEM

This example will demonstrate how to interactively enter an initial/new **case** of sand sample data, save it in the Trace Output File, execute the computations, and describe output options.

### Input

The input for this example consists of entering germane identification characteristics and sand weights for sand samples collected from a core taken in Panama City, Florida. Since this is an initial/new data **case**, it is suggested that the data be saved in a file. Therefore, it is required that the default name (**TRACE.OUT**) for the Trace Output File be renamed at the time the **General Data Specifications** screen is displayed. (This is the second screen displayed when the ACES Program is started.) Rename the Trace Output File to **CGSEX.IN**. Now proceed to the **Calculation of Composite Grain-Size Distributions** application.

### (F2) Enter/Edit Sample Data

This example consists of entering data for two samples collected from a core boring taken in Panama City, Florida, in 1984.

### First Sample

### Enter Sample Header Data

| Item | Value |
|---|---|
| Sample Name | 2-84 1 |
| Title | Panama City Beach Nourishment |
| Date Collected | 1984 |
| Analyzer | CEWES-GL |
| Comment | 1st of 2 samples from boring |
| Profile Number | 0 |
| Surface/Core Elevation | -38. |
| Surface/Core Elevation Units | Feet |
| Core Length | 19.4 |

| | |
|---|---|
| Core Length Units | Feet |
| Top of Sample | 0.0 |
| Top of Sample Units | Feet |
| Bottom of Sample | 18.1 |
| Bottom of Sample Units | Feet |
| Latitude | 1606792 (state plane coordinate system) |
| Longitude | 406465 (state plane coordinate system) |
| Position on Beach | Offshore |
| Type of Sample | Vibracore |
| Total Sand Weight | 72.519 grams |
| Particle Diameter Units | PHI |

**Enter Sample Sand-Size Distribution**

| Particle Diameter (phi) | Sand Weight (grams) |
|---|---|
| 0.75 | 0.000 |
| 1.00 | 2.498 |
| 1.25 | 0.606 |
| 1.50 | 0.984 |
| 1.75 | 2.195 |
| 2.00 | 3.179 |
| 2.25 | 7.721 |
| 2.50 | 11.431 |
| 2.75 | 16.805 |
| 3.00 | 17.184 |
| 3.25 | 5.677 |
| 3.50 | 3.028 |
| 3.75 | 0.984 |
| 4.00 | 0.227 |

**Second Sample**

**Enter Sample Header Data**

| Item | Value |
|---|---|
| Sample Name | 2-84 2 |
| Title | Panama City Beach Nourishment |
| Date Collected | 1984 |
| Analyzer | CEWES-GL |
| Comment | 2nd of 2 samples from boring |
| Profile Number | 0 |
| Surface/Core Elevation | -38. |
| Surface/Core Elevation Units | Feet |
| Core Length | 19.4 |
| Core Length Units | Feet |
| Top of Sample | 18.1 |
| Top of Sample Units | Feet |
| Bottom of Sample | 19.4 |
| Bottom of Sample Units | Feet |
| Latitude | 1606792 (state plane coordinate system) |
| Longitude | 406465 (state plane coordinate system) |
| Position on Beach | Offshore |
| Type of Sample | Vibracore |
| Total Sand Weight | 37.706 grams |
| Particle Diameter Units | PHI |

**Enter Sample Sand-Size Distribution**

| Particle Diameter (phi) | Sand Weight (grams) |
|---|---|
| 0.75 | 0.000 |
| 1.00 | 5.112 |
| 1.25 | 1.595 |
| 1.50 | 2.908 |
| 1.75 | 5.065 |
| 2.00 | 5.090 |
| 2.25 | 6.425 |
| 2.50 | 3.283 |
| 2.75 | 3.517 |
| 3.00 | 2.204 |
| 3.25 | 0.985 |
| 3.50 | 0.281 |
| 3.75 | 0.328 |
| 4.00 | 0.094 |

### F3 Identify Samples for Composite

After the sample data have been entered, they need to be saved in a file that can be edited and used later. The procedure is outlined below.

1. At the main activity menu, press F3.
2. Move cursor to **Core Sample** and press ⊠.
3. Move cursor to **Individual Core Name(s)** and press ⊠.
4. Move cursor to each name and press ⊠.
5. Press F1 (Accept Data & Exit Window).
6. Press F1 (Accept Data & Exit).

---

### F1 Begin Computations

The data have now been identified and tagged, and computations can begin.

1. Press F1 at the main activity menu to enter header information for the composite.

2. Enter header information for composite.

| Item | Value |
|---|---|
| Composite Name | Panama, FL |
| Analyzer | CEWES-CERC |
| Title | Example for ACES User's Guide |
| Comment | This is a Composite of Data from the File CGSEX.IN |

3. Press F1 (Accept Data & Begin Computations).
   The file **CGSEX.IN** is now created and saved and computations are started.

---

### Output

Results from this application are displayed on two screens, written to plot output files 1 and 2 (default names **PLOTDAT1.OUT** and **PLOTDAT2.OUT**), and displayed on three plots.

### Screen Output

From the Activity Menu, press F4 (**View Output Data**) to display the output. The first screen (Figure 6-3-5) displays percentage by weight (for the composite) of the various sediment categories on the Wentworth and Unified Soils classification schemes. This screen also displays statistics of the composite sample calculated by Method of Moments and Folk Graphics Measures. The second screen (Figure 6-3-6) displays header information and percentage by weight of specific grain sizes for the composite.

| Method | Gravel | | | | Silt | Clay |
|---|---|---|---|---|---|---|
| | | Coarse | Medium | Fine | | |
| Wentworth | 0.00 | 4.12 | 11.71 | 84.17 | 0.00 | 0.00 |
| Unified | 0.00 | 0.00 | 5.19 | 94.51 | 0.31 | 0.00 |

| Standard Statistics | Method of Moments | Folk Graphic Measures | Grain Size |
|---|---|---|---|
| Median Diameter | | 2.59 phi | 0.166 mm |
| Mean Diameter | 2.49 phi | 2.52 phi | 0.179 mm |
| Standard Deviation | 0.58 phi | 0.56 phi | |
| Skewness | -0.90 | -0.27 | |
| Kurtosis | 3.98 | 1.29 | |

Figure 6-3-5. First Screen Output for Example Problem

| Composite of Grain-Size Distributions | | | |
|---|---|---|---|
| Composite | Title | | Date Analyzed |
| Panama, FL | Example for ACES User's Guide | | 07/02/92 |
| Analyzer | Comment | | Total Weight |
| CEWES-CERC | This is a composite of Data from File CGSEX.IN | | 100.00 |
| Type of Samples | Samples in Composite | Top of Composite | Bottom of Composite |
| Offshore | 2 | 0.00 feet | 0.00 feet |

| ASTM MESH | MM Size | PHI Size | Weight (%) | ASTM MESH | MM Size | PHI Size | Weight (%) | ASTM MESH | MM Size | PHI Size | Weight (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.00 | 0.59 | 0.75 | 0.000 | 35.00 | 0.50 | 1.00 | 4.122 | 40.00 | 0.42 | 1.25 | 1.063 |
| 45.00 | 0.35 | 1.50 | 1.783 | 50.00 | 0.30 | 1.75 | 3.724 | 60.00 | 0.25 | 2.00 | 5.140 |
| 70.00 | 0.21 | 2.25 | 11.075 | 80.00 | 0.177 | 2.50 | 15.290 | 100.00 | 0.149 | 2.75 | 22.245 |
| 120.00 | 0.125 | 3.00 | 22.500 | 140.00 | 0.105 | 3.25 | 7.479 | 170.00 | 0.088 | 3.5 | 3.946 |
| 200.00 | 0.074 | 3.75 | 1.324 | 230.00 | .0625 | 4.00 | 0.309 | | | | |

Figure 6-3-6. Second Screen Output for Example Problem

## Plot Output File 1

This file (default name **PLOTDAT1.OUT**) contains the following composite information:

a. Wentworth and Unified Soils Classification schemes identifying percentage of the composite's sand weight in various categories (gravel, sand, silt, etc.)
b. Statistics of the composite calculated by Method of Moments and Folk Graphics Measures.
c. Header information and percentage by sand weight of specific grain sizes in the composite.
d. When the composite is composed of core samples, the percentage of the total core length that each sample represents is also provided.

Table 6-3-1 is a listing of plot output file 1 for this example.

Table 6-3-1
Listing of Plot Output File 1 for Example Problem

Calculation of Composite Grain-Size Distribution
Sample: 2-84 1 represents 93.3% of the core
Sample: 2-84 2 represents 6.7% of the core

Calculation of Composite Grain-Size Distribution

| SIZE CLASSIFICATION: (By Percent Weight) | Gravel | ------- Coarse | Sand Medium | ------ Fine | Silt | Clay |
|---|---|---|---|---|---|---|
| Wentworth | 0.00 | 4.12 | 11.71 | 84.17 | 0.00 | 0.00 |
| Unified | 0.00 | 0.00 | 5.19 | 94.51 | 0.31 | 0.00 |

| STANDARD STATISTICS: | Method of Moments | Folk Graphic Measures | Grain Size |
|---|---|---|---|
| Median Diameter | | 2.59 phi | 0.166mm |
| Mean Diameter | 2.49 phi | 2.52 phi | 0.179mm |
| Standard Deviation | 0.58 phi | 0.56 phi | |
| Skewness | -0.90 | -0.27 | |
| Kurtosis | 3.98 | 1.29 | |

| Composite | Title | Date Analyzed |
|---|---|---|
| Panama, FL | Example for ACES User's Guide | 07/02/92 |
| Analyzer | Comment | Total Weight |
| CEWES-CERC | This is a composite of Data from File CGSEX.IN | 100.00 |
| Type of Samples | Samples in Composite / Top of Composite / Bottom of Composite | |
| Offshore | 2 / 0.00 feet / 0.00 feet | |

| ASTM MESH | MM Size | PHI Size | Weight (%) | ASTM MESH | MM Size | PHI Size | Weight (%) | ASTM MESH | MM Size | PHI Size | Weight (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.00 | 0.59 | 0.757 | 0.000 | 60.00 | 0.25 | 2.00 | 5.140 | 140.0 | 0.105 | 3.25 | 7.479 |
| 35.00 | 0.50 | 1.00 | 4.122 | 70.00 | 0.21 | 2.25 | 11.075 | 170.0 | 0.088 | 3.50 | 3.946 |
| 40.00 | 0.42 | 1.25 | 1.063 | 80.00 | 0.177 | 2.50 | 15.290 | 200.0 | 0.074 | 3.75 | 1.324 |
| 45.00 | 0.35 | 1.50 | 1.783 | 100.0 | 0.149 | 2.75 | 22.245 | 230.0 | .0625 | 4.00 | 0.309 |
| 50.00 | 0.30 | 1.75 | 3.724 | 120.0 | 0.125 | 3.00 | 22.500 | | | | |

### Plot Output File 2

This file (default name **PLOTDAT2.OUT**) contains header information and percent of sand weight distribution for the composite generated by the example problem.

Table 6-3-2 is a listing of plot output file 2 for this example.

Table 6-3-2
Listing of Plot Output File 2 for Example Problem

```
Panama, FL Example for ACES User's Guide                    1984
CEWES-CERC  This is a composite of data from file CGSEX.IN
   0.00f     0.00f     0.00f     00.0f  1606792.00     406465.00     07/02/92
Offshore    Vibracore   100.00    14    PHI  C
  0.75   0.000   1.00   4.122   1.25   1.063   1.50   1.783   1.75   3.724
  2.00   5.140   2.25  11.075   2.50  15.290   2.75  22.245   3.00  22.500
  3.25   7.479   3.50   3.946   3.75   1.324   4.00   0.309
```

A "C" in line 4 of this file indicates to the application that this is composite data rather than sample data. Otherwise, the format is the same as that of sand samples read from an external file or written to the trace output file. Composite data may be stored in a file containing other composite or sample data to be plotted. See section titled **Plot Samples/Composites on the Same Screen** for more information.

## Screen Plots

This application generates three plots. The plots may be accessed from the **Composite Grain-Size Distribution Plot Selection Menu**, which is displayed when the **Plot Output Data** (F5) option is requested. The plots generated by the example problem are shown below (Figures 6-3-7 to 6-3-9).

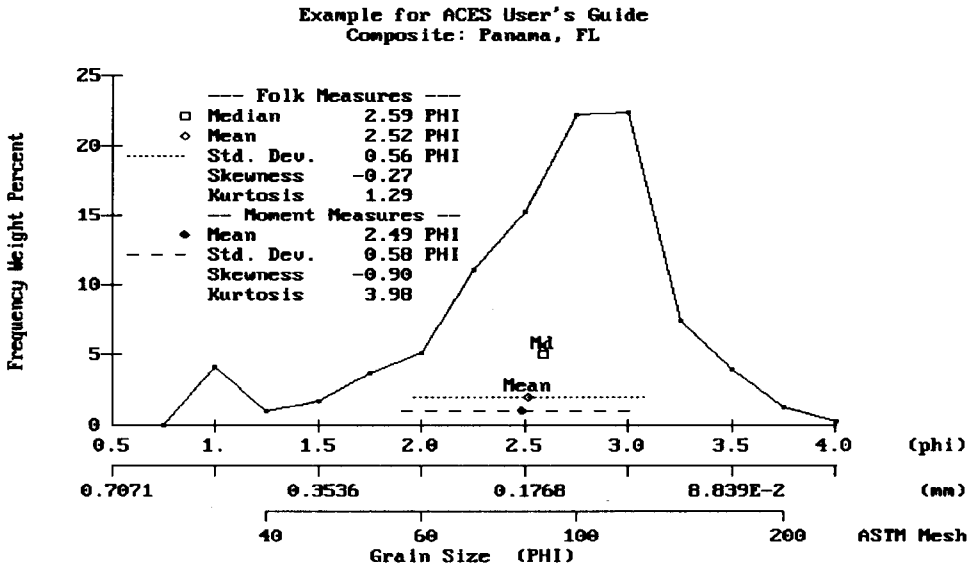


Figure 6-3-7. Frequency Weight Percent for Example Problem

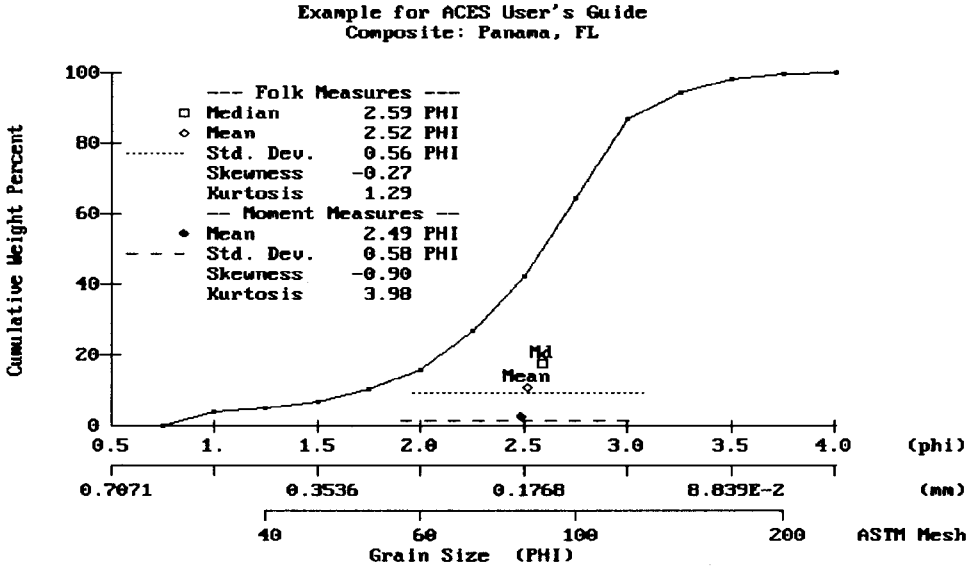


Figure 6-3-8. Cumulative Weight Percent for Example Problem

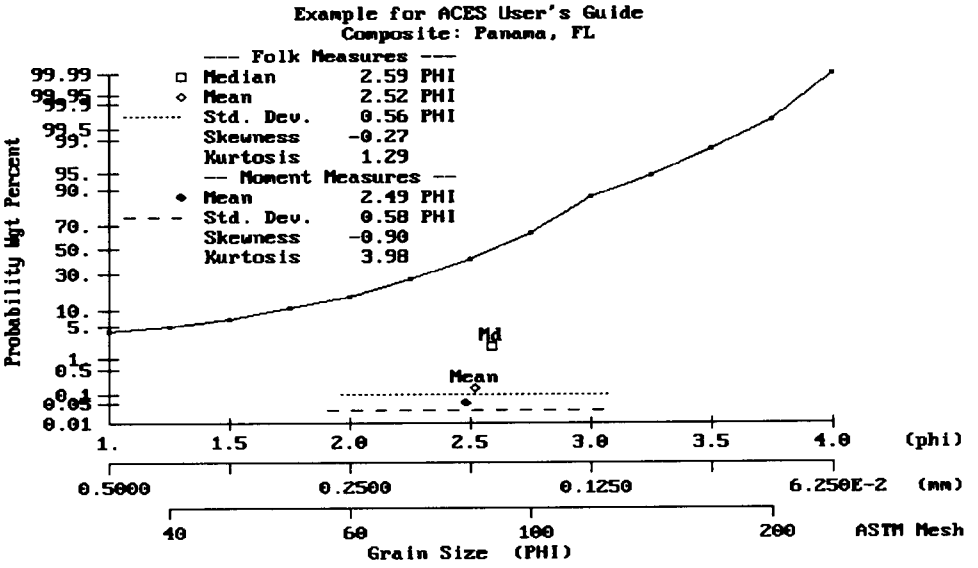


Figure 6-3-9. Probability Weight Percent for Example Problem

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# Beach Nourishment Overfill Ratio and Volume

## Table of Contents

# BEACH NOURISHMENT OVERFILL RATIO AND VOLUME

## DESCRIPTION

The methodologies represented in this ACES application provide two approaches to the planning and design of nourishment projects. The first approach is the calculation of the *overfill ratio*, which is defined as the volume of actual borrow material required to produce a unit volume of usable fill. The second approach is the calculation of a *renourishment factor* which is germane to the long-term maintenance of a project and addresses the basic question of how often renourishment will be required if a particular borrow source is selected that is texturally different from the native beach sand.

## INPUT

All data input for this application is done on one screen. The following list describes the necessary input parameters with their corresponding units and range of data recognized by this application:

| Mandatory item | Symbol | Units | Data Range | | |
|---|---|---|---|---|---|
| Initial Volume | $VOL_I$ | $yd^3$, $m^3$ | 1 | to | 1 x $10^8$ |
| Native Mean | $M_n$ | phi, mm | -5.0 | to | 5.0 |
| Native Standard Deviation | $\sigma_n$ | phi | 0.01 | to | 5.0 |
| Borrow Mean | $M_b$ | phi, mm | -5.0 | to | 5.0 |
| Borrow Standard Deviation | $\sigma_b$ | phi | 0.01 | to | 5.0 |

**NOTE:** Table A-4 in Appendix A provides a comparison of grain-size scales and classification systems.

## OUTPUT

Results from this application are displayed on one screen. Those data include the original input values (in final units) and the following parameters:

| Item | Symbol | English Units | Metric Units |
|---|---|---|---|
| Overfill Ratio | $R_a$ | | |
| Renourishment Factor | $R_j$ | | |
| Design Volume | $VOL_D$ | $yd_3$ | $m_3$ |

## PROCEDURE

This application provides only a Single Case Mode. The Multiple Case Mode is not available. The bulleted items in the following lists indicate potentially optional instruction steps. Any application in ACES may be executed in a given session without quitting the program. The bulleted items provide instructions for accessing the application from various menu areas of the ACES program. Ignore bulleted instruction steps that are not applicable.

**Single Case Mode**

- Press [F1] on the Main Menu to select Single Case Mode.
- Fill in the highlighted input fields on the General Specifications screen (or leave the default values). Press [F1] when all data on this screen are correct.
- Press [F6] on the Functional Area Menu to select Littoral Processes.
- Press [F4] on the Littoral Processes Application Menu to select Beach Nourishment Overfill Ratio and Volume.

1. Fill in the highlighted input fields on the Beach Nourishment Overfill Ratio and Volume screen. Respond to any corrective instructions appearing at the bottom of the screen. Press [F1] when all data on this screen are correct.

2. All input and output data are displayed on the screen in the final system of units.

3. Press one of the following keys to select the appropriate action:

   [F1] Return to Step 1 for a new case.

   [F3] Send a summary of this case to the print file or device.

   [F10] Exit this application and return to the Littoral Processes Menu.

## EXAMPLE PROBLEM

### Input

All data input for this application is done on one screen. The values and corresponding units selected for this example problem are shown below.

| Item | Symbol | Value | Units |
|---|---|---|---|
| Initial Volume | $VOL_I$ | 800,000.0 | $yd_3$ |
| Native Mean | $M_n$ | 1.800 | phi |
| Native Standard Deviation | $\sigma_n$ | 0.450 | phi |
| Borrow Mean | $M_b$ | 2.250 | phi |
| Borrow Standard Deviation | $\sigma_b$ | 0.760 | phi |

### Output

Results from this application are displayed on one screen. Those data include the original input values and the following parameters:

| Item | Symbol | Value | Units |
|---|---|---|---|
| Overfill Ratio | $R_a$ | 2.003 | |
| Renourishment Factor | $R_j$ | 1.077 | |
| Design Volume | $VOL_D$ | 1,602,521.0 | $yd_3$ |

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