Appendix E
Sand Compatibility Analysis

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Sand Compatibility Analysis

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Appendix E
Sand Compatibility Analysis
(Native Beach Sand versus Borrow Sand)

1. **Introduction.** A major effort in the development of storm damage reduction plans for the beaches of Dare County north of Oregon Inlet were associated with the search for borrow material that would be compatible with the existing or native beach sand. Sands making up the native beach are generally hydraulically sorted with the coarser grain sizes concentrated in the nearshore region, where wave energy is the greatest, and the finer grain sizes located in the offshore areas seaward of the surf zone. In order for the borrow material to be compatible with the native beach sand, the borrow material must contain essentially all of the same grain sizes that exist on the active beach profile of the project area. In this regard, the active beach profile is generally defined in engineering terms as the portion of the profile from the top of the beach berm seaward to depths where significant sand transport by wave energy is negligible. In Dare County, the active beach profile appears to end in a water depth of approximately 27 feet below National Geodetic Vertical Datum (NGVD). Note that sediment movement in water depths greater than 27 feet below NGVD is known to occur. However, the rate of sediment movement in these deeper depths is relatively small compared to rate of movement in the shallower depths and are therefore of minor importance in the day to day and year to year behavior of the beach profile.

2. **Native Beach Sampling.** The characteristics of the native beach material in Dare County Study Area north of Oregon Inlet were determined through an extensive sampling program. The details and results of the sampling are discussed below. The sampling of the native beach material was concentrated in two areas. The foreshore, which extends from mean low water (approximately 1.8 feet below NGVD in the study area) landward to the seaward toe of the dune and the offshore area, which extends seaward to a depth of 27 feet below NGVD. The foreshore samples were collected at 1,000-foot intervals along the study area in order to evaluate grain size differences that appeared to exist from north to south along the study area. The offshore samples were collected at 5,000- to 6,000-foot intervals. These offshore samples were combined with the foreshore samples collected at the corresponding foreshore stations to develop the composite characteristics of the native beach material to be used in the compatibility analysis of the borrow material. The composite characteristics of the native beach material refers to a singular grain size distribution, in terms of percent passing a particular sieve size, that contains all of the sand grain sizes on the active beach profile.

3. **Borrow Material Sampling.** The search for borrow materials was concentrated in the ocean waters off Dare County beginning in water depths of 30 feet below NGVD and extending seaward to the North Carolina State

Territorial Limit (within 3 nautical miles of the coastline). Details of this offshore search for beach compatible material is described in Geotechnical Appendix I and consisted of a combination of seismic surveys followed by the collection of vibracores at 208 locations. Boring logs were developed for each vibracore based on visual classifications of the material in the cores. The sand layers in each vibracore were sampled for grain size analysis. Material visually classified as silt, clay, and/or peat was obviously incompatible with the native beach material and was not analyzed for grain size. The results of the grain size analysis of the vibracore material combined with the seismic bottom profile data, was used to delineate the boundaries of 5 potential borrow areas. Composite grain size characteristics of the material in each of the 5 potential borrow areas were computed for comparison with the composite characteristics of the native beach material.

4. **Beach Placement Losses.** When material is removed from a borrow area and placed on a receiving beach, the deposited material will be hydraulically sorted by wave action. If the borrow material contains all of the same grain sizes that exist on the native beach, the borrow material will be redistributed by waves and currents to quasi-equilibrium positions on the active beach profile. In this regard, the coarser grained material will remain on the foreshore while the finer fractions will move to the deeper portions of the profile. Since the borrow material will rarely match the native material exactly, the amount of borrow material needed to result in a net cubic yard of beach fill material will generally be greater than one cubic yard. The excess material needed to yield one net cubic yard of material in place on the beach profile is referred to as the overfill factor. The overfill factor is defined as the ratio of the volume of borrow material needed to yield one net cubic yard of fill material. For example, if 1.5 cubic yards of fill material is needed to yield one net yard in place, the overfill factor would equal 1.5.

5. **Native Beach Material – Foreshore Samples.** Samples of the native beach material were collected from the seaward toe of the dune (DT), center of the berm (BC), mean high water (MHW), mean sea level (MSL), and mean low water (MLW) at 1,000-foot intervals along the study area shoreline. The grain size distribution of each sample was determined by standard sieve analysis, from which the mean, standard deviation, and variance of the grain size distribution of each sample were determined. This detailed sampling program of the foreshore material was undertaken to document the visually observed difference in foreshore material from north to south throughout the study area.

6. **Grain Size Nomenclature.** Note that the mean grain sizes of the native and borrow area materials are reported in both millimeters (mm) and phi (N) units in this report where phi is related to the grain size as follows:

$$N = -\log_2(d)$$

where:
d = grain size in millimeters (mm)
$\log_2$ = logarithm to the base 2

Since the distribution of the sand samples can generally be represented as log-normal distributions, the standard deviations and variances of the particle size distributions are reported in phi units.

7. **Foreshore Grain Size Distribution.** Plots of the variation in the mean grain size of the 5 foreshore samples collected at each station along the study area shoreline are shown on figures E-1 through E-5. The mean grain size of the samples collected at the toe of the dune and the center of the berm (figures E-1 and E-2) tend to decrease in size from north to south along the study area. A similar, but weaker trend, can be discerned for the samples collected from the mean high water and mean sea level points on the foreshore (figures E-3 and E-4). However, the samples collected from the mean low water point (figure E-5) did not mimic this trend, as grain sizes decreased from station 0+00 to around 350+00, increased from 350+00 to around 650+00, and then decreased from station 650+00 to station 1020+00. Some of the variability in mean grain size across the foreshore, i.e., from the dune toe to mean low water, could be associated with the mechanical redistribution of the foreshore material as a result of beach scraping or bulldozing. This is a common practice in the area as local residents and towns frequently move material from the lower portion of the foreshore to rebuild dunes. The larger grain sizes on the upper part of the foreshore may also be lag deposits left by previous high water and/or high wave events.

8. **Composite Foreshore Characteristics.** The average grain size of the foreshore samples were computed from the 5 samples collected at each 1,000-foot station and plotted versus distance along the shoreline. This plot is shown on figure E-6. This average mix of the foreshore samples also shows a tendency for the foreshore material to decrease in average grain size from north to south along the study area. Also shown on figure E-6 is the composite standard deviation of the 5 foreshore samples. The foreshore samples appear to be well sorted, i.e.; the distribution of grain sizes is relatively small, particularly in the northern portions of the study area (baseline station 0+00 to about 600+00). In the southern portions of the study area south of station 600+00, the foreshore samples are not as well sorted. The smaller grain sizes and the larger standard deviations in the southern portions of the area are probably due to the high rate of erosion in the area, which is reintroducing large quantities of dune material into the active littoral zone. The material in the dunes is normally composed of wind blow sand and therefore of smaller grain size.

9. **Active Beach Profile Zone.** While the foreshore samples provide some insight into the local shore processes in the area, the success of any beach nourishment project depends on the ability to find borrow material that is

compatible with all of the material on the active beach profile, not just the foreshore. As mentioned above, active or engineeringly significant sand transport extends across the nearshore profile to depths of 25 to 30 feet below NGVD. In the case of Dare County, this active littoral zone appears to extend to a depth of 27 feet below NGVD. Accordingly, samples were obtained from profiles spaced at 5,000- to 6,000-foot intervals along the study area with samples collected in 2-foot depth increments along each profile, extending well beyond 30-foot depths. Sampling based on water depth accounts for the natural hydraulic sorting of sand grain sizes that occurs as a result of wave and tide action.

10. Composite Characteristics for Project Areas. The size distributions of all of the beach samples collected from each of the profiles are given in table E-1. The composite characteristics of the native beach sands along the Dare County Beaches study area were computed for the North Project Area, which includes the towns of Kitty Hawk and Kill Devil Hills, and the South Project Area, consisting of Nags Head and South Nags Head. The composite characteristics were computed by mathematically mixing all of the samples collected from the active beach profile to obtain a singular mean and standard deviation representative of all of the sediment on the active beach profile. The composite characteristics for each project area are summarized in table E-2. The composite mean for the North Project Area is 1.70 phi (0.31 mm) with a standard deviation of 1.50 phi while the South Project Area has a mean of 1.95 phi (0.26 mm) and a standard deviation of 1.52. As was the case for the foreshore samples, the sands along the entire active profile of the North Project Area are coarser than the sands on the active profile of the South Project area. Both the North and South Project Area beaches have essentially the same standard deviation indicating that the sediments are well sorted in both areas.

11. Borrow Material Vibracores. The search for suitable borrow material for construction and periodic nourishment of the Dare County Beaches was concentrated in an area seaward of the 30-foot NGVD depth contour from the South Project Area northward to Kitty Hawk. The search was conducted in two major phases. Phase one consisted of the collection of over 535 miles of seismic subbottom profiles while phase two involved the collection of 208 vibracores. The search area and the seismic lines surveyed in this effort are displayed in Geotechnical Appendix I. The seismic survey data was analyzed to determine areas where beach quality material of sufficient depth appeared likely. Based on the interpretation of the seismic data, a vibracore drilling plan was developed to determine the characteristics of the subbottom material. In this regard, the seismic data only provides information on the layering of material and does not provide information of the granular characteristics of the material. The vibracores consist of vibrating a 20-foot long plastic core into the ocean bottom. The plastic core is then split and the material characteristics in the core visually classified. Material that appeared to be predominantly sand was sampled and the size distribution of that material was determined through standard sieve analysis. In

general, the cores were sampled in two-foot intervals or more frequently if a significant difference in the character of the material was visually apparent. The locations of the vibracores collected in this study are shown on figure E-7 for the North Project Area and figure E-8 for the South Project Area. Logs of each of the vibracores are provided in Geotechnical Appendix I. Vibracores were taken during two separate operations, the summer of 1995 and the summer of 1998.

12. Borrow Site Vibracore Analysis. The results of the grain size analysis was used to delineate potential borrow areas. A total of 5 potential borrow areas were identified. The five defined borrow areas, and the vibracores taken within each of the areas, are shown on figures E-7 and E-8. Two potential borrow areas (designated as N1 and N2) were identified offshore of the northern portion of the study area and are shown on figure E-7. Three potential areas (designated as S1, S2, and S3) were found in the southern portion of the study area and are shown on figure E-8. The size characteristics of all of the samples collected from each of the cores within the five potential borrow areas during the 1995 operation are given in tables E-3A through E-7A for areas N1 through S3, respectively. Similarly, samples collected from N1 through S3 during the 1998 operation are given in tables E-3B through E-7B, respectively. The grain size characteristics of the borrow area samples were used to develop weighted composite grain size distribution representative of all of the material in each of the borrow areas. The weighting was based on the thickness of the core represented by a particular sample in each core from which a weighted composite distribution for each core was determined. The weighted core distributions were used to compute the overall composite characteristics for the entire borrow area. Included in the analysis was an estimated of the amount of fine-grained sediments in each core, that is sediment finer than the 200 sieve (0.074-mm). With regard to the percentage of fine-grained sediments, borrow areas containing more than 10 percent fines are generally considered to be incompatible for placement on the beach due to potential problems with increased turbidity and siltation during placement.

13. Overfill Factors. The final weighted composite characteristics for each of the five borrow areas are given in tables E-8 to E-12 for borrow areas N1 through S3, respectively. Based on these composite characteristics, potential borrow areas S2 and S3 were eliminated from further consideration due to their high (greater than 10 percent) silt content. The two northern borrow areas, N1 and N2, have acceptable levels of silt as does the largest borrow area in the southern area, S1.

14. Computation of Overfill Ratio. The suitability of the borrow material for placement on the beach is based on the overfill factor. The overfill factor is an indication of the volume of borrow material required to produce one net cubic yard sorted beach fill material. The overfill factor is computed by numerically comparing the size distribution characteristics of the native beach sand with that in the borrow area and includes an adjustment for the percent of fines in the

borrow area. The overfill factor is primarily based on the assumption that the borrow material will undergo sorting and winnowing once exposed to waves and currents in the littoral zone, with the resulting sorted distribution approaching that of the native sand. The numerical procedure for computing the overfill factor is contained in a suite of computer programs contained in the Automated Coastal Engineering System (ACES) produced by the U.S. Army Coastal Engineering Research Center (1). The procedure is also described in the U.S. Army Coastal Engineering Research Center Shore Protection Manual (2). A summary of beach and borrow characteristics, as well as, the computed overfill factors is shown in table E-13.

15. North Project Borrow Sand Sources. The volume of borrow material available in borrow areas N1 and N2 totals about 7.5 million cubic yards. This volume would only be sufficient to initially construct beach fill projects along Kitty Hawk and Kill Devil Hills. Periodic nourishment of projects in these areas would have to come from borrow area S1. The overfill factor for borrow area N1 is 1.5 while the overfill factor for borrow area N2 is 1.4. These overfill factors were determined by comparing the borrow material characteristics in N1 and N2 with the native beach sand comprising the North Project Area. The rather large overfill factors for these northern borrow areas is due to the small composite mean grain size of the material in the borrow areas compared to the composite mean grain size of the native beach sand. The composite mean grain size in borrow area N1 is 2.18 phi (0.22 mm) while N2 has a composite mean of 2.03 phi (0.24 mm). Applying the overfill factors to the in situ volume of material in the two borrow areas results in a net borrow area volume of approximately 5 million cubic yards. The overfill factor for periodic nourishment along the North Project Area is 1.1. Again, periodic nourishment would be accomplished with material from borrow area S1.

16. South Project Borrow Sand Sources. Borrow area S1 is the largest of the 5 potential sites with a total available volume of about 105 million cubic yards. The volume of material in S1 is sufficient to satisfy the initial construction and periodic nourishment requirements for the full 50-year economic life of the project, both the North and South Project Areas. The composite mean grain size of material in borrow area S1 is 1.54 phi (0.34 mm) which is coarser than the composite mean grain size of the native beach sand in both the North and South Project Areas. As a result of the relatively coarse grain size, the overfill factor for S1 is 1.1 for both the North and South Project Areas. As stated earlier, borrow areas S2 and S3 were eliminated due to high silt content.

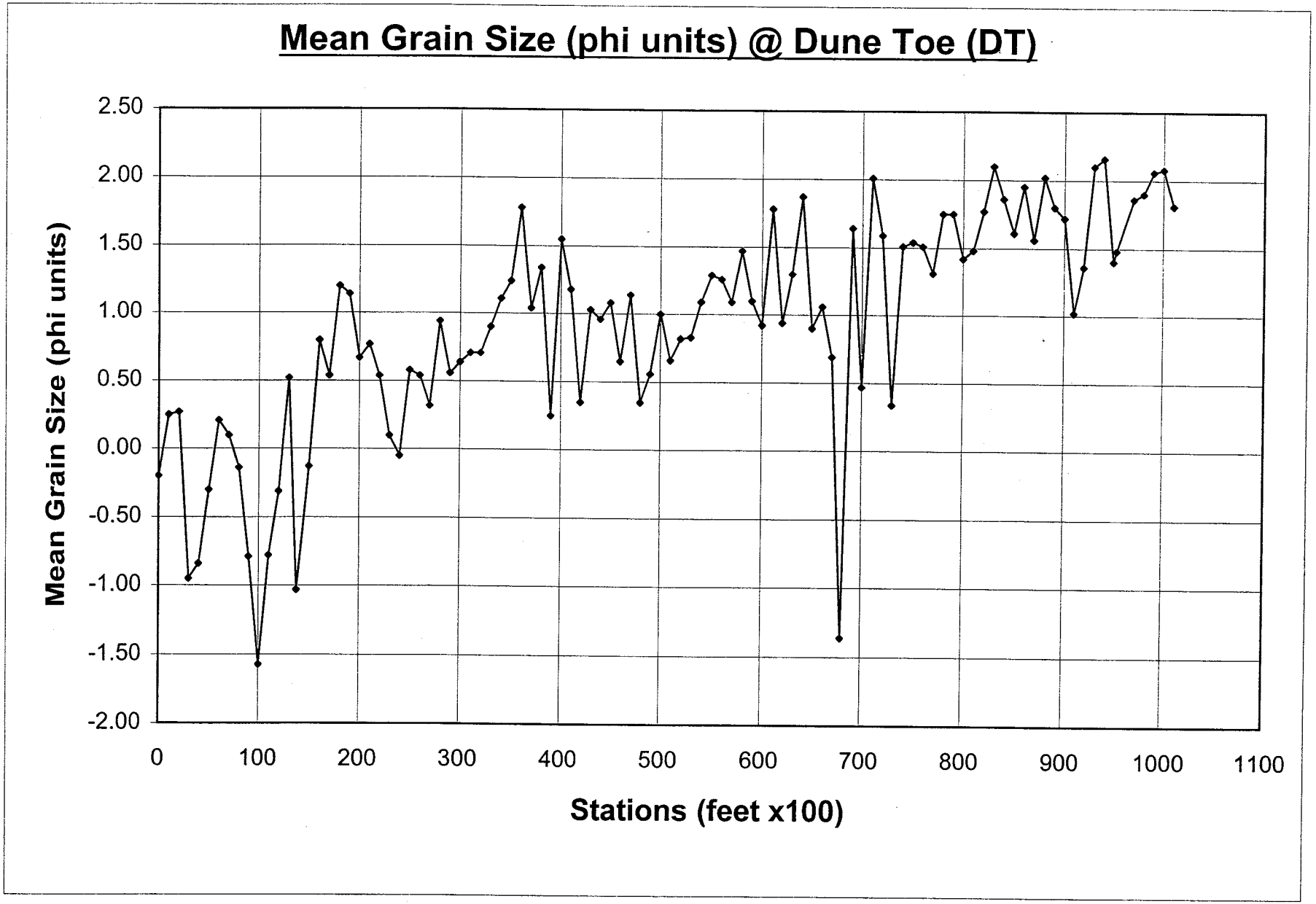

Mean Grain Size (phi units) @ Dune Toe (DT)
Mean Grain Size (phi units)
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)

Figure E-1

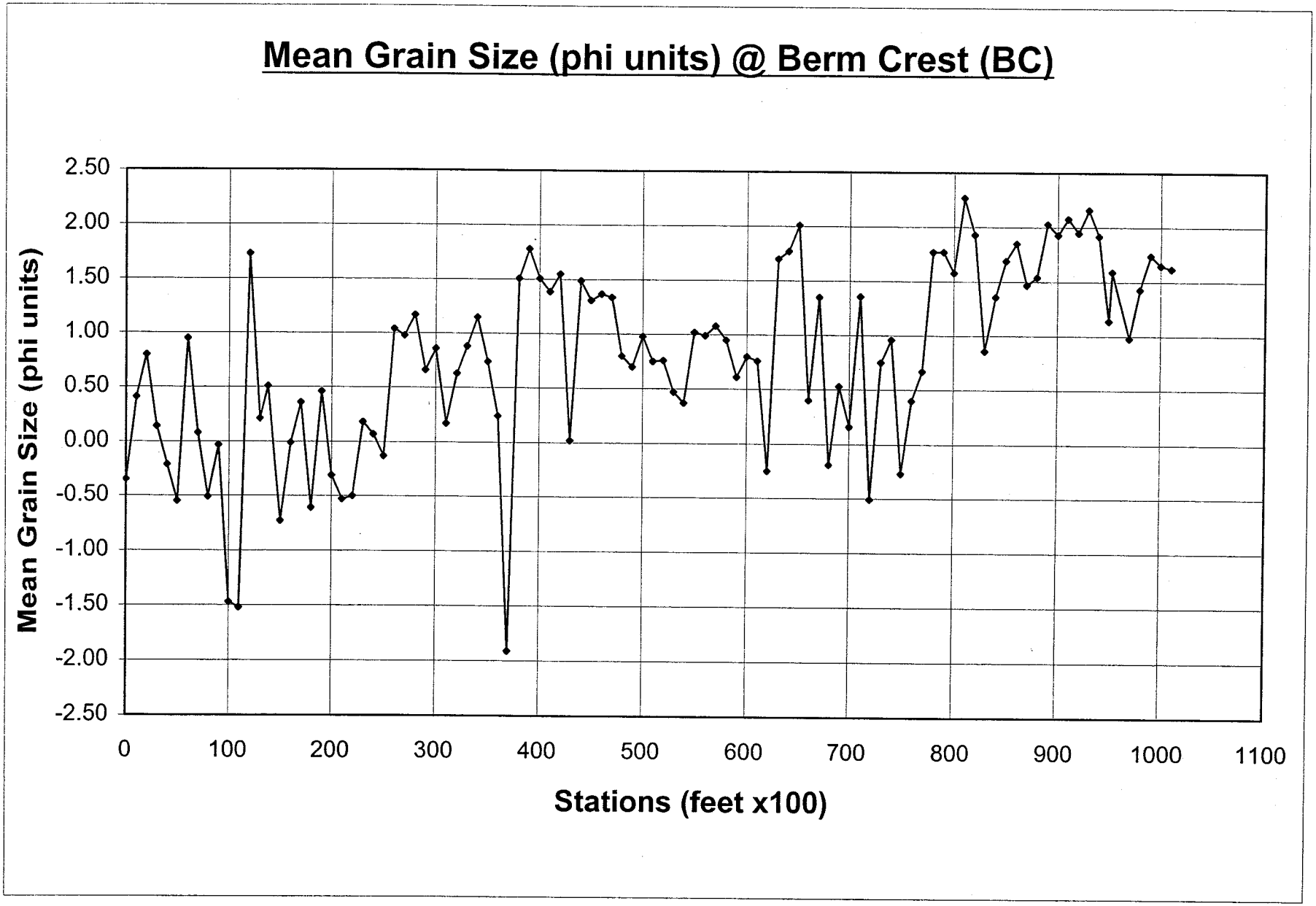

Mean Grain Size (phi units) @ Berm Crest (BC)
Mean Grain Size (phi units)
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)

Figure E-2

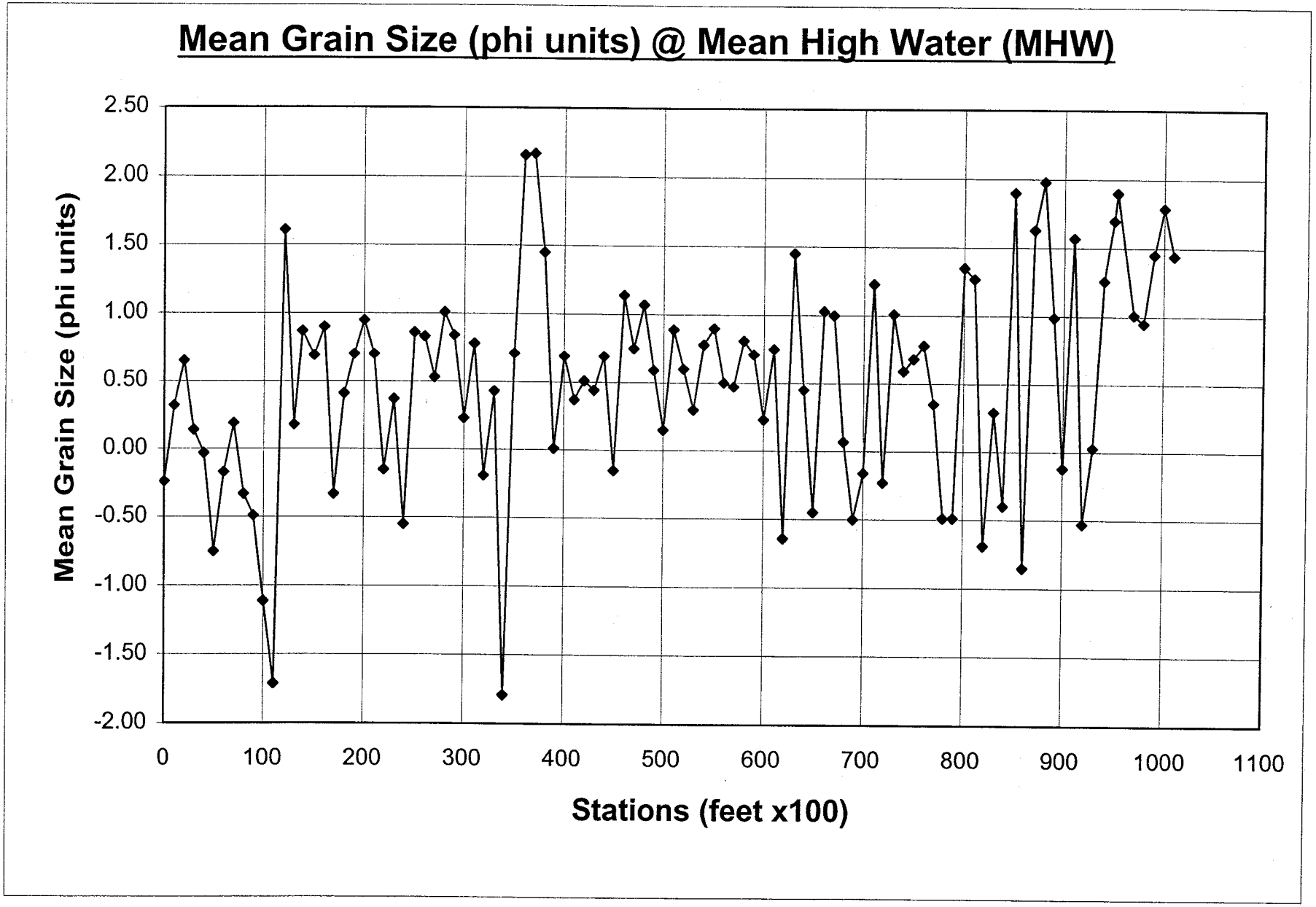

Mean Grain Size (phi units) @ Mean High Water (MHW)
Mean Grain Size (phi units)
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)

Figure E-3

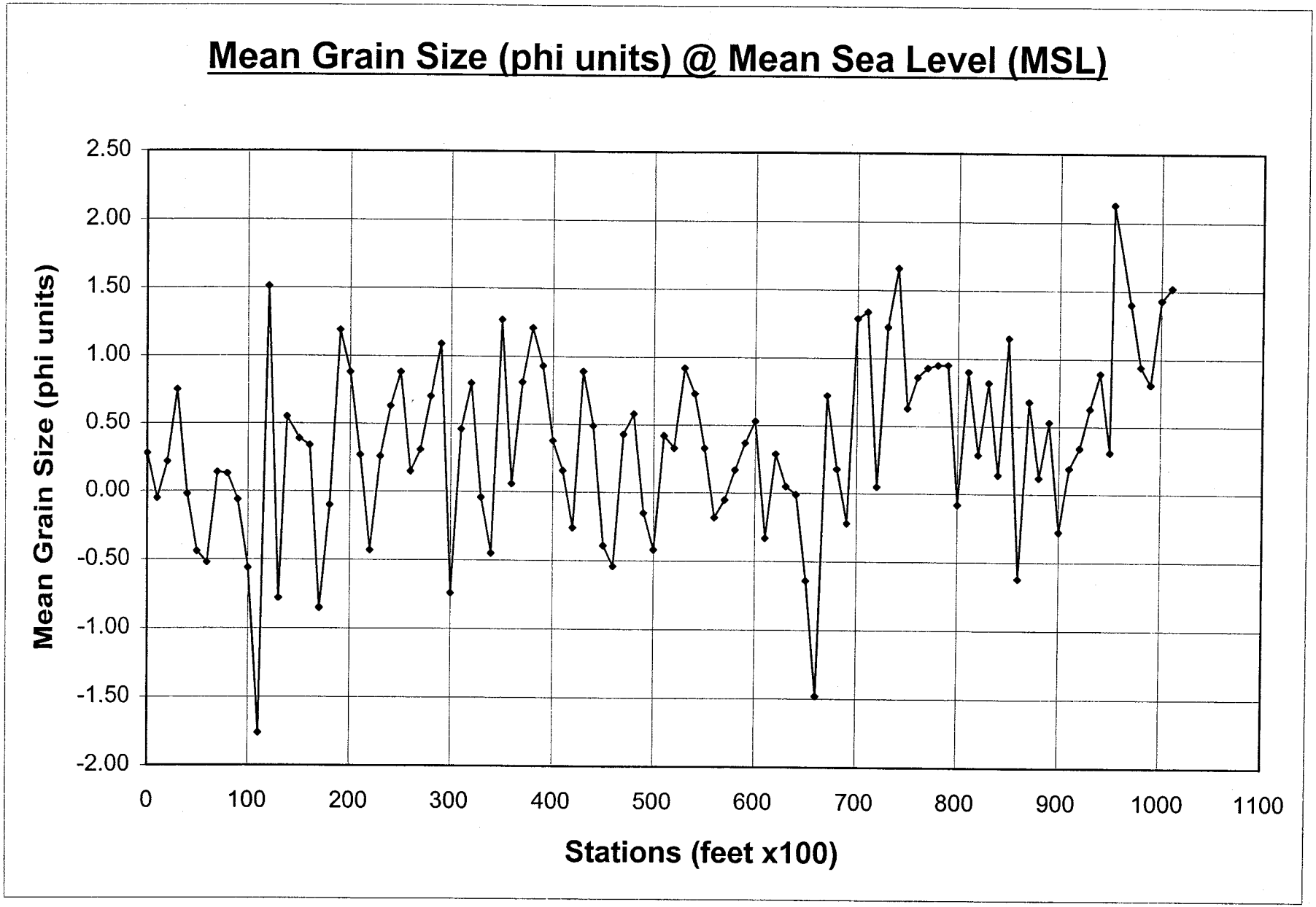

Mean Grain Size (phi units) @ Mean Sea Level (MSL)
Mean Grain Size (phi units)
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)

Figure E-4

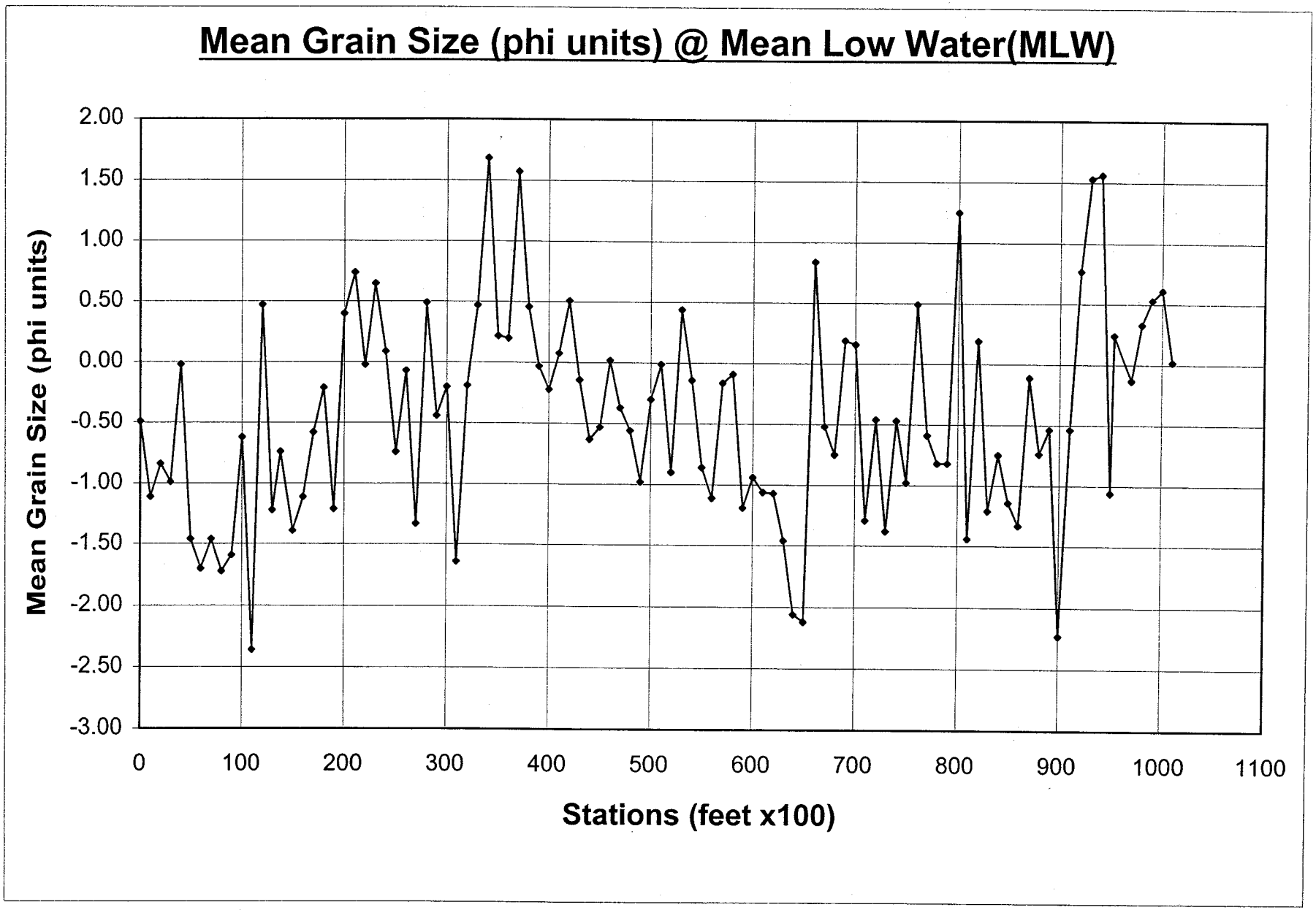

Mean Grain Size (phi units) @ Mean Low Water(MLW)
Mean Grain Size (phi units)
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)

Figure E-5

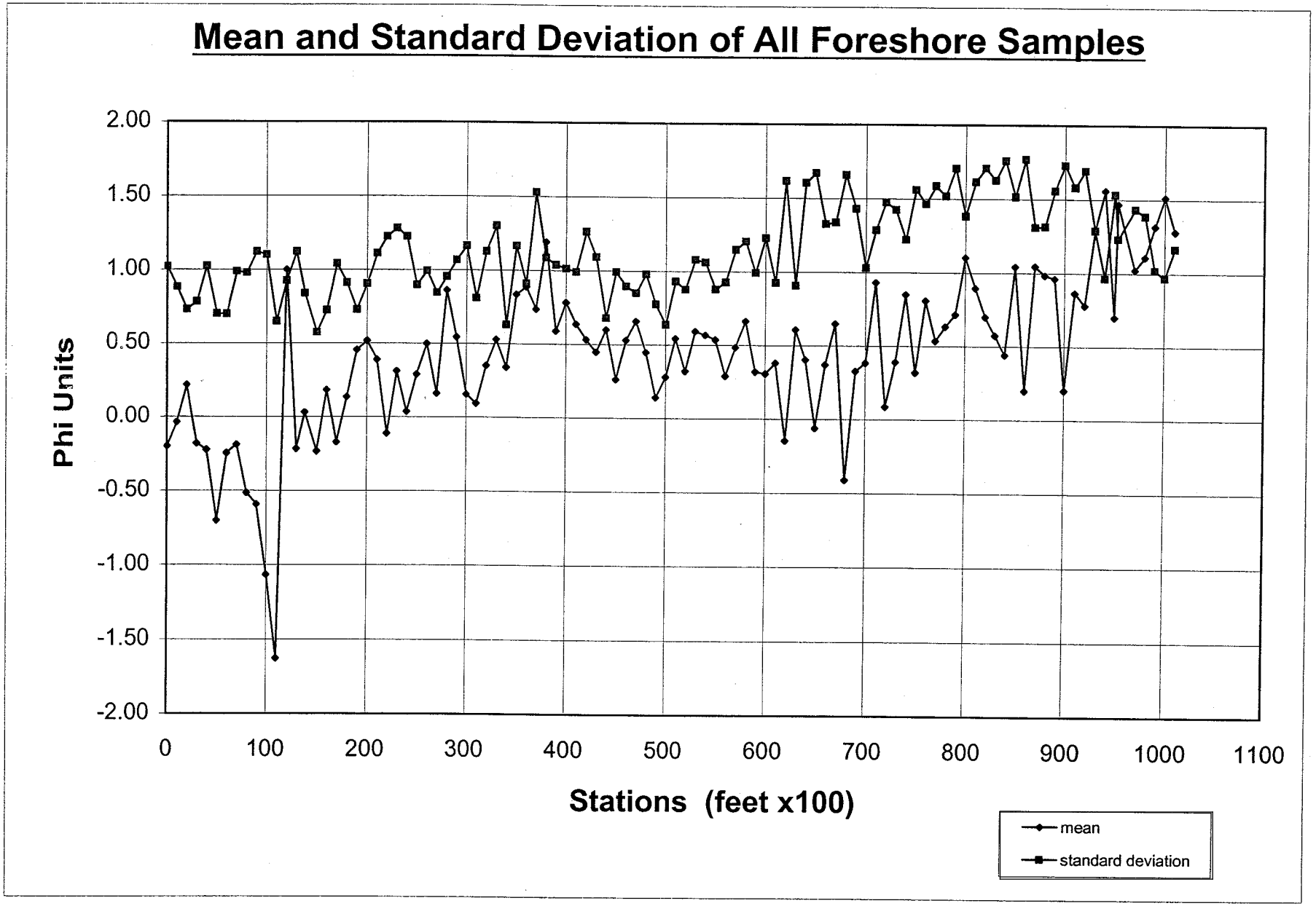
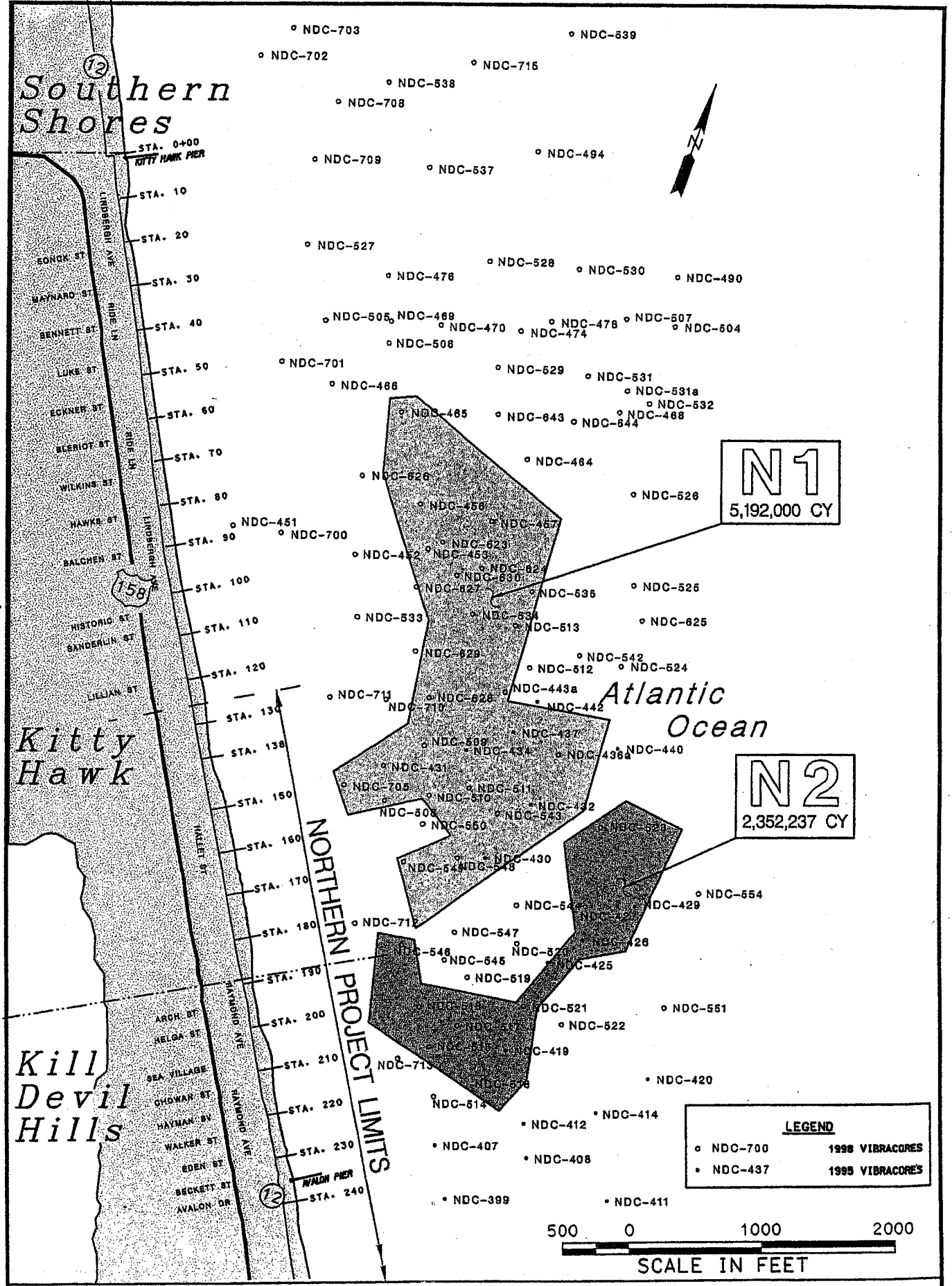

Mean and Standard Deviation of All Foreshore Samples
Phi Units
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
0
100
200
300
400
500
600
700
800
900
1000
1100
Stations (feet x100)
mean
standard deviation

Figure E-6



NORTHERN BORROW AREA

Figure E-7

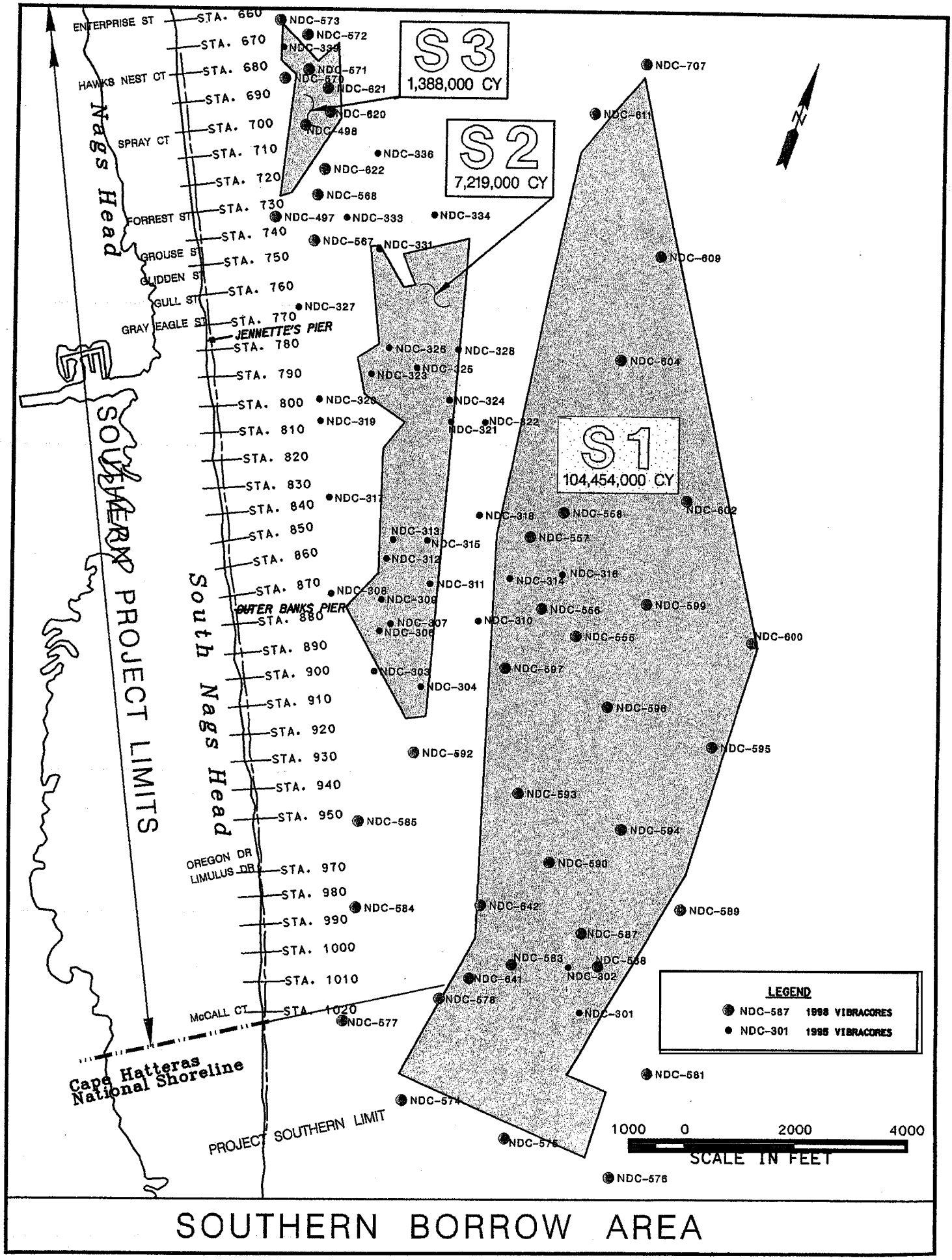

S3
1,388,000 CY
S2
7,219,000 CY
S1
104,454,000 CY
ENTERPRISE ST
HAWKS NEST CT
SPRAY CT
FORREST ST
GROUSE ST
GLIDDEN ST
GULL ST
GRAY EAGLE ST
JENNETTE'S PIER
OUTER BANKS PIER
McCALL CT
OREGON DR
LIMULUS DR
Nags Head
South Nags Head
SOUTHERN PROJECT LIMITS
PROJECT SOUTHERN LIMIT
Cape Hatteras National Shoreline
LEGEND
NDC-587 1998 VIBRACORES
NDC-301 1995 VIBRACORES
1000 0 2000 4000
SCALE IN FEET
SOUTHERN BORROW AREA

Figure E-8

Table E-1 Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "0"						
DCN-0-DT	7.1	100	-0.20	7.1	0.96	0.92
DCN-0-BC	6.8	100	-0.35	6.8	0.75	0.56
DCN-0-MH	4.4	100	-0.24	4.4	1.18	1.40
DCN-0-MS	1.8	100	0.28	1.8	1.06	1.13
DCN-0-ML	1.8	100	-0.49	1.8	1.22	1.49
DCN-0-10	-8.7	100	2.46	-8.7	0.79	0.62
DCN-0-12	-10.8	100	2.66	-10.8	0.65	0.43
DCN-0-14	-12.8	100	2.60	-12.8	1.01	1.02
DCN-0-16	-14.8	100	2.78	-14.8	0.63	0.40
DCN-0-18	-16.9	100	2.82	-16.9	0.56	0.31
DCN-0-20	-19.0	100	2.81	-19.0	0.73	0.54
DCN-0-22	-21.0	100	2.82	-21.0	1.04	1.08
DCN-0-24	-23.1	100	2.93	-23.1	0.81	0.65
DCN-0-26	-25.2	100	3.09	-25.2	0.43	0.19
DCN-0-28	-27.3	100	3.07	-27.3	0.44	0.20
STATION "50"						
DCN-50-DT	10.0	100	-0.30	10.0	1.16	1.35
DCN-50-BC	7.5	100	-0.55	7.5	0.58	0.34
DCN-50-MH	5.4	100	-0.75	5.4	0.72	0.52
DCN-50-MS	1.8	100	-0.44	1.8	0.47	0.22
DCN-50-ML	-0.5	100	-1.46	-0.5	0.77	0.59
DCN-50-8	-8.9	100	2.65	-8.9	0.53	0.28
DCN-50-10	-10.9	100	2.33	-10.9	0.63	0.40
DCN-50-12	-13.0	100	2.64	-13.0	0.60	0.36
DCN-50-14	-15.0	100	1.28	-15.0	0.85	0.73
DCN-50-16	-17.0	100	2.92	-17.0	0.52	0.27
DCN-50-18	-19.5	100	2.79	-19.5	0.67	0.44
DCN-50-20	-21.6	100	2.00	-21.6	1.10	1.21
DCN-50-22	-24.0	100	2.82	-24.0	0.75	0.56
DCN-50-24	-26.2	100	2.84	-26.2	0.93	0.87
DCN-50-26	-28.3	100	2.96	-28.3	0.63	0.40
DCN-50-28	-30.4	100	2.99	-30.4	0.85	0.72
DCN-50-30	-32.6	100	3.04	-32.6	0.50	0.25

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "110"						
DCN-110-DT	6.0	100	-0.78	6.0	1.44	2.07
DCN-110-BC	5.2	100	-1.52	5.2	0.58	0.33
DCN-110-MH	3.5	100	-1.71	3.5	0.36	0.13
DCN-110-MS	1.9	100	-1.76	1.9	0.49	0.24
DCN-110-ML	0.4	100	-2.36	0.4	0.60	0.36
DCN-110-8	-7.5	100	2.38	-7.5	1.10	1.22
DCN-110-10	-9.5	100	2.55	-9.5	0.55	0.31
DCN-110-12	-11.5	100	2.59	-11.5	0.86	0.74
DCN-110-14	-13.5	100	2.50	-13.5	0.67	0.44
DCN-110-16	-15.5	100	2.83	-15.5	0.54	0.29
DCN-110-18	-17.5	100	0.54	-17.5	0.86	0.74
DCN-110-20	-19.5	100	1.35	-19.5	0.87	0.76
DCN-110-22	-21.5	100	2.01	-21.5	0.79	0.63
DCN-110-24	-23.5	100	2.56	-23.5	0.53	0.28
DCN-110-24A	-23.5	100	-0.21	-23.5	1.06	1.12
DCN-110-26	-25.5	100	2.89	-25.5	0.55	0.30
DCN-110-28	-27.5	100	2.95	-27.5	0.52	0.28
DCN-110-30	-29.6	100	2.87	-29.6	0.53	0.28
STATION "160"						
DCN-160-DT	12.5	100	0.80	12.5	1.05	1.11
DCN-160-BC	6.0	100	-0.01	6.0	0.97	0.94
DCN-160-MH	3.9	100	0.90	3.9	0.85	0.73
DCN-160-MS	0.7	100	0.34	0.7	0.91	0.82
DCN-160-ML	-1.5	100	-1.11	-1.5	0.84	0.70
DCN-160-10	-9.9	100	2.48	-9.9	0.62	0.38
DCN-160-12	-11.9	100	2.52	-11.9	0.55	0.30
DCN-160-14	-13.8	100	2.59	-13.8	0.70	0.48
DCN-160-16	-15.7	100	2.56	-15.7	0.87	0.76
DCN-160-18	-17.7	100	2.83	-17.7	0.61	0.37
DCN-160-20	-19.7	100	2.60	-19.7	0.63	0.39
DCN-160-22	-21.7	100	2.84	-21.7	0.48	0.23
DCN-160-24	-23.7	100	2.77	-23.7	0.58	0.34
DCN-160-26	-25.7	100	2.45	-25.7	0.83	0.68
DCN-160-28	-27.6	100	2.80	-27.6	0.60	0.36
DCN-160-30	-29.5	100	2.93	-29.5	0.61	0.37

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "210"						
DCN-210-DT	-10.3	100	0.77	-10.3	0.99	0.98
DCN-210-BC	6.7	100	-0.53	6.7	1.29	1.67
DCN-210-MH	4.4	100	0.70	4.4	1.11	1.23
DCN-210-MS	2.6	100	0.27	2.6	1.34	1.81
DCN-210-ML	-2.1	100	0.74	-2.1	1.11	1.24
DCN-210-8	-8.5	100	2.48	-8.5	0.62	0.39
DCN-210-10	-10.5	100	2.41	-10.5	0.68	0.46
DCN-210-12	-12.4	100	2.67	-12.4	0.50	0.25
DCN-210-14	-14.4	100	2.63	-14.4	0.60	0.36
DCN-210-16	-16.3	100	2.88	-16.3	0.55	0.30
DCN-210-18	-18.3	100	0.74	-18.3	1.59	2.52
DCN-210-20	-20.3	100	2.47	-20.3	1.03	1.05
DCN-210-22	-22.3	100	2.47	-22.3	1.44	2.08
DCN-210-24	-24.2	100	2.94	-24.2	0.47	0.22
DCN-210-26	-26.2	100	2.92	-26.2	0.45	0.21
DCN-210-28	-28.2	100	2.98	-28.2	0.70	0.49
DCN-210-30	-30.1	100	3.04	-30.1	0.40	0.16
STATION "260"						
DCN-260-DT	12.7	100	0.54	12.7	1.31	1.71
DCN-260-BC	8.9	100	1.04	8.9	0.96	0.92
DCN-260-MH	6.1	100	0.83	6.1	0.84	0.71
DCN-260-MS	4.6	100	0.15	4.6	1.02	1.04
DCN-260-ML	0.0	200	-0.07	0.0	1.03	1.06
DCN-260-8	-9.4	100	2.33	-9.4	0.61	0.37
DCN-260-10	-11.3	100	2.55	-11.3	0.62	0.38
DCN-260-12	-13.2	100	2.62	-13.2	0.61	0.37
DCN-260-14	-15.2	100	2.63	-15.2	0.62	0.38
DCN-260-16	-17.1	100	2.53	-17.1	0.48	0.23
DCN-260-18	-19.1	100	1.39	-19.1	1.05	1.10
DCN-260-20	-21.0	100	2.10	-21.0	1.25	1.57
DCN-260-22	-23.0	100	2.89	-23.0	0.64	0.41
DCN-260-24	-24.9	100	2.88	-24.9	0.52	0.27
DCN-260-26	-26.8	100	2.98	-26.8	0.54	0.29
DCN-260-28	-28.8	100	1.62	-28.8	0.70	0.49
DCN-260-30	-30.7	85	1.85	-30.7	0.71	0.51

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "320"						
DCN-320-DT	14.6	100	0.71	14.6	0.69	0.48
DCN-320-BC	13.1	100	0.63	13.1	0.82	0.67
DCN-320-MH	5.7	100	-0.19	5.7	1.55	2.39
DCN-320-MS	3.5	100	0.80	3.5	1.10	1.20
DCN-320-ML	-1.3	200	-0.19	-1.3	1.42	2.02
DCN-320-12TR	-15.3	200	-1.02	-15.3	1.13	1.28
DCN-320-8	-11	100	2.29	-11	0.64	0.40
DCN-320-10	-13.4	100	2.28	-13.4	0.60	0.36
DCN-320-12	-15.4	100	1.89	-15.4	0.80	0.64
DCN-320-14	-17.5	100	2.32	-17.5	0.78	0.61
DCN-320-16	-19.4	100	2.62	-19.4	0.67	0.45
DCN-320-18	-21.4	100	2.41	-21.4	0.69	0.48
DCN-320-20	-24.5	100	0.85	-24.5	1.36	1.85
DCN-320-22	-25.4	100	1.64	-25.4	1.35	1.82
DCN-320-24	-27.5	100	2.78	-27.5	0.93	0.86
DCN-320-26	-29.5	100	2.68	-29.5	1.01	1.03
DCN-320-28	-31.4	100	2.85	-31.4	0.84	0.71
DCN-320-30	-33.4	100	2.73	-33.4	1.08	1.16
STATION "370"						
DCN-370-DT	7.1	100	1.04	7.1	0.78	0.61
DCN-370-BC	6.1	200	-1.91	6.1	0.86	0.74
DCN-370-MH	3.1	100	2.17	3.1	0.83	0.69
DCN-370-MS	0.3	100	0.81	0.3	1.36	1.86
DCN-370-ML	-1.7	100	1.57	-1.7	0.94	0.88
DCN-370-8	-10.9	200	0.17	-10.9	1.78	3.17
DCN-370-10	-12.9	100	2.32	-12.9	0.70	0.49
DCN-370-12	-15.0	100	0.97	-15.0	1.97	3.88
DCN-370-14 TR	-17.0	100	2.53	-17.0	1.00	1.00
DCN-370-TR-16	-19.1	200	-0.63	-19.1	1.78	3.18
DCN-370-TR-18	-21.1	200	0.01	-21.1	1.23	1.51
DCN-370-14	-17.1	100	2.59	-17.1	0.70	0.49
DCN-370-16	-19.1	100	2.45	-19.1	0.56	0.31
DCN-370-18	-21.1	100	2.87	-21.1	0.60	0.36
DCN-370-20	-23.2	100	2.97	-23.2	0.48	0.23
DCN-370-22	-25.2	100	3.07	-25.2	0.50	0.25
DCN-370-24	-27.2	100	3.07	-27.2	0.45	0.20
DCN-370-26	-29.3	100	3.03	-29.3	0.56	0.32
DCN-370-28	-31.3	100	3.03	-31.3	0.64	0.41
DCN-370-30	-33.3	100	2.80	-33.3	1.16	1.34

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "420"						
DCN-420-DT	9.6	100	0.35	9.6	1.37	1.89
DCN-420-BC	6.2	100	1.55	6.2	0.71	0.50
DCN-420-MH	3.9	100	0.51	3.9	1.25	1.55
DCN-420-MS	0.7	200	-0.26	0.7	1.90	3.60
DCN-420-ML	-1.3	100	0.51	-1.3	1.35	1.82
DCN-420-10B	-11.8	100	2.46	-11.8	0.72	0.52
DCN-420-TR-12B	-13.9	100	2.51	-13.9	0.57	0.32
DCN-420-TR-14B	-15.9	100	2.44	-15.9	0.56	0.31
DCN-420-TR-16A	-18.0	100	1.23	-18.0	1.34	1.79
DCN-420-TR-14A	-16.1	200	0.78	-16.1	1.08	1.18
DCN-420-TR-12A	-14.3	100	1.30	-14.3	0.60	0.36
DCN-420-10	-12.3	100	2.00	-12.3	0.72	0.52
DCN-420-12	-14.3	100	2.18	-14.3	0.73	0.54
DCN-420-14	-16.4	100	2.38	-16.4	0.77	0.60
DCN-420-16	-18.6	100	2.83	-18.6	0.57	0.32
DCN-420-18	-20.7	100	3.00	-20.7	0.43	0.18
DCN-420-20	-22.7	100	3.03	-22.7	0.45	0.20
DCN-420-22	-24.7	100	3.13	-24.7	0.39	0.15
DCN-420-24	-26.7	100	3.16	-26.7	0.33	0.11
DCN-420-26	-28.8	100	3.10	-28.8	0.69	0.48
DCN-420-28	-30.8	100	3.17	-30.8	0.28	0.08
DCN-420-30	-32.9	100	3.19	-32.9	0.26	0.07
STATION "480"						
DCN-480-DT	9	100	0.35	9	1.36	1.85
DCN-480-BC	8.3	100	0.80	8.3	0.89	0.79
DCN-480-MH	2.8	100	1.07	2.8	0.84	0.70
DCN-480-MS	0	100	0.58	0	1.11	1.23
DCN-480-ML	-2.5	200	-0.56	-2.5	1.15	1.33
DCN-480-10	-10.8	100	2.36	-10.8	0.50	0.25
DCN-480-12	-12.9	100	2.46	-12.9	0.55	0.31
DCN-480-14	-15.0	100	2.49	-15.0	0.53	0.28
DCN-480-16	-17.1	100	2.44	-17.1	0.92	0.85
DCN-480-18	-19.1	100	2.70	-19.1	0.58	0.34
DCN-480-20	-21.2	100	2.83	-21.2	0.81	0.66
DCN-480-22	-23.3	100	2.94	-23.3	0.78	0.61
DCN-480-24	-25.3	100	3.07	-25.3	0.44	0.19
DCN-480-26	-27.4	100	3.02	-27.4	0.48	0.23
DCN-480-28	-29.5	100	3.12	-29.5	0.44	0.20
DCN-480-30	-31.6	100	3.15	-31.6	0.40	0.16

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "530"						
DCN-530-DT	11.2	100	0.83	11.2	0.90	0.80
DCN-530-BC	9.8	100	0.47	9.8	0.88	0.78
DCN-530-MH	5.1	100	0.30	5.1	1.05	1.10
DCN-530-MS	1.2	100	0.92	1.2	0.97	0.94
DCN-530-ML	-1.3	150	0.44	-1.3	1.54	2.36
DCN-530-TR-6A	-6.4	100	2.25	-6.4	0.69	0.47
DCN-530-TR-8A	-8.5	100	2.10	-8.5	0.58	0.34
DCN-530-TR-10A	-10.5	100	1.69	-10.5	0.93	0.86
DCN-530-8	-8.3	100	2.31	-8.3	0.63	0.40
DCN-530-10	-10.3	100	2.54	-10.3	0.52	0.27
DCN-530-12	-12.3	100	2.73	-12.3	0.82	0.68
DCN-530-14	-14.3	100	2.82	-14.3	0.54	0.29
DCN-530-16	-16.2	100	2.68	-16.2	0.54	0.29
DCN-530-18	-18.1	100	1.72	-18.1	0.86	0.74
DCN-530-20	-20.1	100	2.91	-20.1	0.52	0.27
DCN-530-22	-22.0	100	2.89	-22.0	0.48	0.23
DCN-530-24	-23.9	100	2.89	-23.9	0.49	0.24
DCN-530-26	-25.9	100	3.05	-25.9	0.47	0.22
DCN-530-28	-27.9	100	3.12	-27.9	0.37	0.14
DCN-530-30	-29.8	100	3.13	-29.8	0.36	0.13
STATION "580"						
DCN-580-DT	11.1	100	1.47	11.1	1.23	1.51
DCN-580-BC	9.5	100	0.95	9.5	1.15	1.31
DCN-580-MH	4.6	100	0.81	4.6	1.43	2.04
DCN-580-MS	0.4	100	0.17	0.4	1.08	1.17
DCN-580-ML	-2.6	200	-0.09	-2.6	1.50	2.24
DCN-580-6	-5.7	100	2.54	-5.7	0.57	0.33
DCN-580-8	-7.7	100	2.80	-7.7	0.75	0.56
DCN-580-10	-9.7	100	2.41	-9.7	0.55	0.30
DCN-580-12	-11.7	100	2.48	-11.7	0.58	0.33
DCN-580-14	-13.7	100	2.73	-13.7	0.54	0.30
DCN-580-16	-15.7	100	2.82	-15.7	0.50	0.25
DCN-580-18	-17.7	100	2.95	-17.7	0.56	0.31
DCN-580-20	-19.7	100	2.87	-19.7	0.62	0.38
DCN-580-22	-21.7	100	2.86	-21.7	0.59	0.35
DCN-580-24	-23.8	100	3.03	-23.8	0.42	0.17
DCN-580-26	-25.7	100	3.03	-25.7	0.46	0.21
DCN-580-28	-27.7	100	3.09	-27.7	0.39	0.16
DCN-580-30	-29.7	100	3.14	-29.7	0.32	0.10

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "630"						
DCN-630-DT	8.0	100	1.30	8.0	1.48	2.19
DCN-630-BC	7.0	100	1.70	7.0	0.92	0.84
DCN-630-MH	4.0	100	1.45	4.0	1.50	2.26
DCN-630-MS	0.7	150	0.05	0.7	1.56	2.43
DCN-630-ML	-2.1	150	-1.46	-2.1	0.75	0.56
DCN-630-TR-10B	-9.8	150	0.52	-9.8	1.52	2.32
DCN-630-TR-12B	-11.8	150	-0.06	-11.8	1.39	1.92
DCN-630-TR-14A	-13.8	150	-0.21	-13.8	1.33	1.78
DCN-630-TR-10A	-9.8	100	1.60	-9.8	0.76	0.57
DCN-630-TR-12A	-11.8	100	1.62	-11.8	0.59	0.35
DCN-630-10	-9.8	100	1.72	-9.8	0.82	0.67
DCN-630-12	-11.8	100	2.60	-11.8	0.63	0.40
DCN-630-14	-13.9	100	2.71	-13.9	0.60	0.35
DCN-630-16	-15.9	100	2.79	-15.9	0.53	0.28
DCN-630-18	-17.9	100	2.87	-17.9	0.57	0.32
DCN-630-20	-19.9	100	2.94	-19.9	0.60	0.36
dcn-630-22	-21.8	100	2.95	-21.8	0.50	0.25
dcn-630-24	-23.9	100	2.97	-23.9	0.60	0.37
DCN-630-26	-26.0	100	2.98	-26.0	0.50	0.25
DCN-630-28	-28.1	100	3.01	-28.1	0.50	0.25
DCN-630-30	-30.1	100	2.24	-30.1	0.42	0.17
STATION "690"						
DCN-690-DT	9.5	100	1.64	9.5	1.20	1.44
DCN-690-BC	8.6	100	0.53	8.6	1.25	1.57
DCN-690-MH	5.8	100	-0.50	5.8	1.26	1.58
DCN-690-MS	1.4	150	-0.22	1.4	1.42	2.03
DCN-690-ML	-0.3	100	0.19	-0.3	1.31	1.71
DCN-690-8	-10.8	100	2.49	-10.8	0.80	0.64
DCN-690-10	-12.7	100	2.62	-12.7	0.63	0.40
DCN-690-12	-14.0	100	2.68	-14.0	0.56	0.32
DCN-690-14	-16.6	100	2.55	-16.6	0.56	0.31
DCN-690-16	-18.5	100	2.73	-18.5	0.61	0.37
DCN-690-18	-20.4	100	2.79	-20.4	0.70	0.50
DCN-690-20	-22.4	100	2.74	-22.4	0.52	0.27
DCN-690-22	-24.3	100	2.47	-24.3	0.72	0.52
DCN-690-24	-26.3	100	2.79	-26.3	0.61	0.37
DCN-690-26	-28.2	100	2.92	-28.2	0.57	0.32
DCN-690-28	-30.1	100	3.02	-30.1	0.52	0.27
DCN-690-30	-32.0	100	3.08	-32.0	0.37	0.14

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation	Sample Weight	Phi Mean	Elevation	Phi Std Dev	Phi Variance
	(NAVD88)	(grams)		(NAVD88)		
STATION "740"						
DCN-740-DT	7.7	100	1.51	7.7	0.59	0.35
DCN-740-BC	7.4	100	0.96	7.4	0.58	0.34
DCN-740-MH	4.1	100	0.59	4.1	1.38	1.90
DCN-740-MS	3.1	100	1.66	3.1	0.78	0.60
DCN-740-ML	0.7	200	-0.47	0.7	1.55	2.39
DCN-740-8	-11.2	100	2.32	-11.2	0.59	0.35
DCN-740-10	-13.2	100	2.58	-13.2	0.58	0.34
DCN-740-12	-15.2	100	2.67	-15.2	0.59	0.35
DCN-740-14	-17.1	100	2.61	-17.1	0.69	0.47
DCN-740-16	-19.1	100	2.80	-19.1	0.76	0.58
DCN-740-18	-21.1	100	2.59	-21.1	0.51	0.26
DCN-740-20	-23.1	100	2.88	-23.1	0.67	0.46
DCN-740-22	-25.1	100	2.60	-25.1	0.84	0.71
DCN-740-24	-27.0	100	2.77	-27.0	0.71	0.51
DCN-740-26	-29.0	100	2.80	-29.0	0.67	0.45
DCN-740-28	-31.0	100	2.89	-31.0	0.61	0.37
DCN-740-30	-32.9	100	2.97	-32.9	0.44	0.19
STATION "790"						
DCN-790-DT	5.5	100	1.74	5.5	0.94	0.87
DCN-790-BC	4.4	200	-0.37	4.4	2.23	4.95
DCN-790-MH	3.0	100	1.45	3.0	1.21	1.47
DCN-790-MS	0.3	100	1.38	0.3	1.38	1.90
DCN-790-ML	-3.1	200	-0.63	-3.1	1.73	3.00
DCN-790-8B-TR	-11.0	100	2.43	-11.0	0.49	0.24
DCN-790-TR-10B	-13.0	100	2.54	-13.0	0.54	0.29
DCN-790-TR-12B	-15.0	100	2.41	-15.0	0.63	0.40
DCN-790-TR-14A	-17.1	100	0.44	-17.1	1.59	2.54
DCN-790-12A	-15.1	100	2.58	-15.1	0.61	0.38
DCN-790-10	-13.2	100	2.56	-13.2	0.57	0.32
DCN-790-12	-15.2	100	2.51	-15.2	0.60	0.36
DCN-790-14	-17.2	100	2.53	-17.2	0.55	0.31
DCN-790-16	-19.2	100	2.72	-19.2	0.55	0.30
DCN-790-18	-21.3	100	2.81	-21.3	0.58	0.34
DCN-790-20	-23.3	100	2.76	-23.3	0.66	0.44
DCN-790-22	-25.3	100	2.73	-25.3	0.78	0.60
DCN-790-24	-27.2	100	2.56	-27.2	0.86	0.75
DCN-790-26	-29.2	100	2.72	-29.2	0.79	0.63
DCN-790-28	-31.2	100	2.85	-31.2	0.59	0.35
DCN-790-30	-33.2	100	2.92	-33.2	0.54	0.29

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation (NAVD88)	Sample Weight (grams)	Phi Mean	Elevation (NAVD88)	Phi Std Dev	Phi Variance
STATION "850"						
DCN-850-DT	9.4	100	1.61	9.4	0.68	0.46
DCN-850-BC	4.3	100	1.69	4.3	0.80	0.63
DCN-850-MH	3.2	100	1.90	3.2	0.87	0.75
DCN-850-MS	1.5	100	1.15	1.5	1.42	2.03
DCN-850-ML	0.0	150	-1.14	0.0	1.94	3.78
DCN-850-TR-10B	-12.6	100	2.31	-12.6	0.52	0.27
DCN-850-13.5A	-16.2	100	0.46	-16.2	1.55	2.39
DCN-850-10	-12.7	100	2.29	-12.7	0.71	0.51
DCN-850-12	-14.7	100	2.62	-14.7	0.64	0.40
DCN-850-14	-16.8	100	2.58	-16.8	0.62	0.39
DCN-850-16	-18.8	100	2.72	-18.8	0.58	0.33
DCN-850-18	-20.8	100	2.68	-20.8	0.54	0.30
DCN-850-20	-22.8	100	2.78	-22.8	0.56	0.32
DCN-850-22	-24.9	100	2.53	-24.9	0.63	0.39
DCN-850-24	-26.9	100	2.24	-26.9	1.01	1.03
DCN-850-26	-28.9	100	2.73	-28.9	0.54	0.29
DCN-850-28	-30.9	100	2.77	-30.9	0.60	0.36
DCN-850-30	-34.0	100	2.89	-34.0	0.50	0.25
STATION "900"						
DCN-900-DT	5	100	1.72	5	0.66	0.44
DCN-900-BC	3.6	100	1.93	3.6	0.64	0.41
DCN-900-MH	0.7	100	-0.12	0.7	1.75	3.06
DCN-900-MS	-0.1	200	-0.28	-0.1	1.76	3.09
DCN-900-ML	-2.1	200	-2.23	-2.1	0.85	0.72
DCN-900-10B	-12.3	100	2.48	-12.3	0.65	0.42
DCN-900-14A	-16.3	100	2.65	-16.3	0.49	0.24
DCN-900-12	-14.2	100	2.52	-14.2	0.54	0.29
DCN-900-14	-16.2	100	2.54	-16.2	0.55	0.30
DCN-900-16	-18.1	100	2.69	-18.1	0.51	0.26
DCN-900-18	-20.1	100	2.65	-20.1	0.72	0.52
DCN-900-20	-22.0	100	2.80	-22.0	0.59	0.35
DCN-900-22	-24.0	100	2.29	-24.0	1.01	1.02
DCN-900-24	-25.9	100	2.76	-25.9	0.68	0.46
DCN-900-26	-27.8	100	2.64	-27.8	0.72	0.52
DCN-900-28	-29.8	100	2.53	-29.8	0.54	0.29
DCN-900-30	-31.8	100	2.79	-31.8	0.55	0.31

Table E-1 (continued)						
Native Beach Samples						
Sample Description	Elevation (NAVD88)	Sample Weight (grams)	Phi Mean	Elevation (NAVD88)	Phi Std Dev	Phi Variance
STATION "950"						
DCN-950-DT	9.2	100	1.40	9.2	1.02	1.03
DCN-950-BC	5.7	100	1.14	5.7	1.23	1.50
DCN-950-MH	4.1	100	1.70	4.1	0.66	0.44
DCN-950-MS	-0.8	100	0.31	-0.8	1.81	3.26
DCN-950-ML	-2.9	200	-1.06	-2.9	1.51	2.29
DCN-950-8B	-9.5	100	2.34	-9.5	0.40	0.16
DCN-950-TR-10A	-11.4	100	2.29	-11.4	0.45	0.20
DCN-950-8A	-9.4	100	2.47	-9.4	0.51	0.26
DCN-950-10	-11.4	100	2.47	-11.4	0.58	0.34
DCN-950-12	-13.3	100	2.72	-13.3	0.54	0.30
DCN-950-14	-15.2	100	2.72	-15.2	0.69	0.47
DCN-950-16	-17.2	100	2.74	-17.2	0.53	0.28
DCN-950-18	-19.1	100	2.75	-19.1	0.53	0.28
DCN-950-20	-21.1	100	2.67	-21.1	0.72	0.52
DCN-950-22	-23.1	100	2.71	-23.1	0.65	0.43
DCN-950-24	-25.0	100	2.52	-25.0	0.46	0.22
DCN-950-26	-26.9	100	2.50	-26.9	0.82	0.68
DCN-950-28	-28.9	100	1.99	-28.9	0.53	0.28
DCN-950-30	-30.8	100	2.18	-30.8	0.88	0.77
STATION "1000"						
DCN-1000-DT	8.2	100	2.08	8.2	0.60	0.36
DCN-1000-BC	5.8	100	1.65	5.8	0.77	0.60
DCN-1000-MH	5.1	100	1.79	5.1	0.71	0.50
DCN-1000-MS	2.0	100	1.43	2.0	0.75	0.57
DCN-1000-ML	-1.3	100	0.61	-1.3	1.33	1.77
DCN-1000-8	-8.4	100	2.24	-8.4	0.52	0.28
DCN-1000-10	-10.4	100	2.25	-10.4	0.54	0.29
DCN-1000-12	-12.4	100	2.58	-12.4	0.50	0.25
DCN-1000-14	-14.4	100	2.61	-14.4	0.54	0.29
DCN-1000-16	-16.3	100	2.72	-16.3	0.49	0.24
DCN-1000-18	-18.2	100	2.66	-18.2	0.59	0.34
DCN-1000-20	-20.2	100	2.63	-20.2	0.66	0.44
DCN-1000-22	-22.1	100	2.72	-22.1	0.53	0.28
DCN-1000-24	-24.0	100	2.76	-24.0	0.51	0.26
DCN-1000-26	-26.0	100	2.72	-26.0	0.55	0.30
DCN-1000-28	-28.0	100	2.67	-28.0	0.55	0.31
DCN-1000-30	-30.0	100	2.14	-30.0	0.89	0.78

Table E-2

Composite Characteristics of the Native Beach Sands

(All Beach Samples, including North and South Project Areas)

	Stations	B (phi)	A (phi)	N	Average Mean (phi)	Average Variance (phi)	Station Variance (phi)	Station Std Dev (phi)	Active Depth (feet)
No	0	3.09	-0.49	15	1.80	0.73	1.95	1.40	-27
Project Area	50	2.96	-1.46	15	1.45	0.57	2.43	1.56	-27
	110	2.95	-2.36	17	0.99	0.60	3.25	1.80	-27
North	160	2.84	-1.10	15	1.82	0.57	2.05	1.43	-27
Project	210	2.98	-0.53	16	1.85	0.95	2.12	1.46	-27
Area	260	2.98	-0.07	16	1.81	0.71	1.59	1.26	-27
	320	2.78	-1.02	15	1.32	1.03	2.41	1.55	-27
Composite >>>	**160-320**	2.98	-1.10	62	1.70	0.82	2.25	1.50	-27
	370	3.07	-1.91	17	1.53	1.17	3.49	1.87	-27
No	420	3.16	-0.26	19	1.85	0.87	1.95	1.40	-27
Project Area	480	3.07	-0.56	14	1.90	0.69	1.95	1.40	-27
	530	3.12	0.30	19	2.03	0.60	1.34	1.16	-27
	580	3.09	-0.09	17	2.17	0.70	1.65	1.28	-27
	630	3.01	-1.46	20	1.87	0.94	2.78	1.67	-27
	690	2.92	-0.50	15	1.89	0.82	1.94	1.39	-27
	740	2.88	-0.47	14	2.00	0.69	1.77	1.33	-27
South	790	2.81	-0.63	19	1.95	1.08	2.18	1.48	-27
Project	850	2.78	-1.14	15	1.89	0.93	2.40	1.55	-27
Area	790	2.81	-0.63	19	1.95	1.08	2.18	1.48	-27
	850	2.78	-1.14	15	1.89	0.93	2.40	1.55	-27
	900	2.80	-2.23	15	1.81	0.81	3.22	1.79	-27
	950	2.75	-1.06	17	2.02	0.74	2.11	1.45	-27
	1000	2.76	0.61	16	2.26	0.44	0.88	0.94	-27
Composite >>>	**630-1020**	3.01	-1.14	165	1.95	0.85	2.30	1.52	-27

Note: For stations 370, 630, and 900, the value for "A" was not considered representative of the beach composition and was, therefore, excluded from the composite analysis.

Table E-3A

1995 USACOE/Dare County Offshore Borings for Borrow Area N1

Boring Hole #	Sample Depth (cm)		Layer Depth (cm)		Layer Thickness	WTD Mean (Ø)	WTD StDev (Ø)	WTD Var (Ø)	% Silt	WTD % Silt	NCGS SAMPLE DATA Mean (Ø)	NCGS SAMPLE DATA StDev (Ø)	NCGS SAMPLE DATA Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
430	000	004	0	10	10	-0.54	18.40	33.84	3.1	31	-0.05	1.84	3.38
430	016	020	10	20	10	0.26	18.46	34.07	2.5	25	0.03	1.85	3.41
430	020	024	20	37	17	50.87	25.15	37.19	7.5	127	2.99	1.48	2.19
430	050	054	37	77	40	140.07	34.45	29.68	16.8	673	3.50	0.86	0.74
430	100	104	77	127	50	181.39	43.75	38.29	27.3	1364	3.63	0.88	0.77
430	150	154	127	176	49	184.12	29.89	18.24	31.6	1547	3.76	0.61	0.37
430	225	229							53.8		3.98	0.60	0.36
430	275	279									4.09	0.55	0.30
430	295	300									3.72	0.50	0.25
430	325	329									3.85	0.52	0.27
430	360	365									3.81	0.59	0.35
430	385	389									3.85	0.54	0.29
430	400	404									3.94	0.54	0.29
430	450	454									4.03	0.56	0.32
430	485	489									3.85	0.99	0.97
430	500	504									2.37	1.37	1.87
430			Top	77 cm	77	2.48	1.25	1.75		11			
				2.5 feet									
432	0	4	0	10	10	31.19	10.02	10.03	24.9	249	3.12	1.00	1.00
432	50	54	10	75	65	234.11	35.24	19.11	19.2	1249	3.60	0.54	0.29
432	100	104	75	125	50	155.75	53.69	57.64	13.7	683	3.12	1.07	1.15
432	150	154	125	175	50	69.66	53.46	57.16	4.0	202	1.39	1.07	1.14
432	200	204	175	204	29	43.65	46.37	74.15	13.4	388	1.51	1.60	2.56
432			Top	204 cm	204	2.62	0.97	1.07		14			
				6.7 feet									
434	0	10	0	10	10	16.62	8.83	7.80	0.7	7	1.66	0.88	0.78
434	25	29	10	37	27	51.94	17.16	10.91	0.8	22	1.92	0.64	0.40
434	37	41	37	42	5	7.05	4.70	4.42	0.8	4	1.41	0.94	0.88
434	50	54	42	59	17	23.93	15.45	14.03	1.2	20	1.41	0.91	0.83
434	75	79	59	100	41	81.91	28.33	19.57	1.3	53	2.00	0.69	0.48
434	100	104	100	134	34	60.01	31.67	29.50	1.4	48	1.77	0.93	0.87
434	150	154	134	175	41	100.66	27.74	18.77	2.1	86	2.46	0.68	0.46
434	180	184	175	200	25	78.15	23.59	22.26	8.4	210	3.13	0.94	0.89
434	200	204	200	230	30	90.98	29.66	29.32	4.7	141	3.03	0.99	0.98
434	230	234	230	240	10	20.77	12.29	15.11	5.3	53	2.08	1.23	1.51
434	250	254	240	283	43	65.07	64.52	96.80	2.3	99	1.51	1.50	2.25
434	290	294	283	290	7	22.87	8.40	10.07	35.3	247	3.27	1.20	1.44
434	300	304	290	350	60	31.19	112.87	212.31	3.8	228	0.52	1.88	3.54
434	350	354	350	400	50	162.01	33.74	22.76			3.24	0.67	0.46
434	400	404	400	404	4	12.67	2.85	2.03			3.17	0.71	0.51
434			Top	350 cm	350	1.86	1.10	1.40		3			
				11.5 feet									
437	0	4	0	15	15	23.69	13.97	13.02	1.6	24	1.58	0.93	0.87
437	50	54	15	75	60	123.32	49.36	40.60	1.6	96	2.06	0.82	0.68
437	100	104	75	125	50	86.16	43.29	37.48	1.5	75	1.72	0.87	0.75
437	150	154	125	175	50	112.98	37.95	28.80	3.5	175	2.26	0.76	0.58
437	200	204	175	224	49	93.00	37.21	28.26	1.9	93	1.90	0.76	0.58
437	250	254	224	265	41	42.79	51.79	65.42	1.5	62	1.04	1.26	1.60
437	280	285	265	280	15	21.81	18.39	22.55	3.2	48	1.45	1.23	1.50
437	305	309	300	305	5	10.33	4.47	3.99	2.1	11	2.07	0.89	0.80
			Top	305 cm	285	1.80	0.90	0.84		2			
				10.0 feet									
440	000	004	0	10	10	23.67	6.90	4.76	1.3	13	2.37	0.69	0.48
440	050	054	10	100	90	207.58	68.97	52.85	1.7	152	2.31	0.77	0.59
440	100	104	100	130	30	73.36	20.52	14.04	2.1	62	2.45	0.68	0.47
440	150	154	130	160	30	81.61	24.71	20.35	5.2	155	2.72	0.82	0.68
440	200	204	160	205	45	113.19	34.30	26.14	2.4	108	2.52	0.76	0.58
440	250	254	205	275	70	171.91	64.39	59.24	3.1	219	2.46	0.92	0.85
440	300	304	275	301	26	72.21	24.58	23.23	9.4	244	2.78	0.95	0.89
440	350	354	301	350	49	163.46	28.77	16.89	8.2	399	3.34	0.59	0.34
440	385	389	350	400	50	127.25	65.15	84.90	5.3	266	2.54	1.30	1.70
440	400	404	400	450	50	149.71	55.03	60.57	11.7	584	2.99	1.10	1.21
440	450	454	450	490	40	140.33	20.49	10.49	11.6	465	3.51	0.51	0.26
440	500	504	490	500	10	28.27	19.65	38.63			2.83	1.97	3.86
440	525	529	500	534	34	102.06	37.82	42.08			3.00	1.11	1.24
440	540	544	534	547	13	55.63	7.65	4.50			4.28	0.59	0.35
440	580	584	547	580	33	99.77	26.75	21.68			3.02	0.81	0.66
			Top	400 cm	400	2.59	0.85	0.76		4			
				19.0 feet									
442	0	4	0	46	46	107.18	23.75	12.26	1.0	44	2.33	0.52	0.27
442	50	54	46	80	34	80.93	18.30	9.85	1.0	33	2.38	0.54	0.29
442	85	89	80	100	20	41.59	15.50	12.02	1.7	34	2.08	0.78	0.60
442	100	104	100	125	25	61.13	16.88	11.39	3.8	94	2.45	0.68	0.46
442	150	154	125	175	50	112.68	35.31	24.93	2.8	139	2.25	0.71	0.50
442	200	204	175	208	33	88.04	20.14	12.29	3.1	102	2.67	0.61	0.37
442	250	254	208	254	46	84.10	50.88	56.28	2.5	115	1.83	1.11	1.22
			Top	254 cm	254	2.27	0.71	0.55		2			
				8.3 feet									

Table E-3B

1998 USACOE/Dare County Offshore Borings for Borrow Area N1

Boring						Layer				Weighted	Weighted	Weighted	
Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Thickness	Mean	Std Dev	Variance	Mean	Std Dev	Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-431	1	0.5	1.0	40.9	43.9	3.0	2.23	1.32	1.74	6.69	3.96	5.23	4
NDC-431	2	3.0	3.5	43.9	46.4	2.5	2.89	0.77	0.59	7.23	1.93	1.48	14
NDC-431	3	5.5	6.0	46.4	48.7	2.3	3.35	0.59	0.35	7.71	1.36	0.80	18
				EL 40.9-46.4	Total D=	5.5	2.53	1.07				1.22	9
NDC-436A	1	0.5	1.0	57.7	60.7	3.0	0.95	1.84	3.39	2.85	5.52	10.16	3
NDC-436A	2	3.0	3.5	60.7	63.2	2.5	2.17	1.05	1.10	5.43	2.63	2.76	8
NDC-436A	3	5.5	6.0	63.2	65.7	2.5	1.72	1.15	1.32	4.30	2.88	3.31	5
NDC-436A	4	8.0	8.5	65.7	67.2	1.5	2.45	1.05	1.10	3.68	1.58	1.65	11
				EL 57.7-67.2	Total D=	9.5	1.71	1.33				1.88	6
NDC-443A	1	0.5	1.0	54.7	56.2	1.5	2.13	1.52	2.31	3.20	2.28	3.47	11
NDC-443A	2	1.5	2.0	56.2	57.5	1.3	1.65	1.46	2.13	2.15	1.90	2.77	10
				EL 54.7-57.5	Total D=	2.8	1.91	1.49				2.23	11
NDC-453	1	0.5	1.0	45.7	47.5	1.8	1.48	0.73	0.53	2.66	1.31	0.96	1
NDC-453	2	2.5	3.0	47.5	49.7	2.2	1.36	0.79	0.62	2.99	1.74	1.37	1
NDC-453	3	5.0	5.5	49.7	51.2	1.5	1.58	0.79	0.62	2.37	1.19	0.94	1
				EL 45.7-51.2	Total D=	5.5	1.46	0.77				0.59	1
NDC-456	1	0.0	0.5	47.1	48.1	1.0	3.96	1.09	1.19	3.96	1.09	1.19	83
NDC-456	2	1.5	2.0	48.1	51.1	3.0	2.30	1.00	1.00	6.90	3.00	3.00	9
NDC-456	3	4.0	4.5	51.1	54.3	3.2	1.95	1.01	1.02	6.24	3.23	3.26	7
NDC-456	4	7.2	7.7	54.3	55.7	1.4	1.18	1.72	2.96	1.65	2.41	4.14	6
				EL 47.1-55.7	Total D=	8.6	2.18	1.13				1.35	16
NDC-457	1	0.5	1.0	51.6	55.6	4.0	1.03	1.10	1.21	4.12	4.40	4.84	1
NDC-457	2	4.0	4.5	55.6	58.1	2.5	1.97	0.95	0.90	4.93	2.38	2.26	3
NDC-457	3	6.5	7.0	58.1	62.1	4.0	2.12	1.23	1.51	8.48	4.92	6.05	9
NDC-457	4	10.5	11.0	62.1	64.0	1.9	3.57	1.46	2.13	6.78	2.77	4.05	71
				EL 51.6-62.1	Total D=	10.5	1.67	1.11				1.25	5
NDC-464	1	0.5	1.0	49.3	54.3	5.0	2.47	0.69	0.48	12.35	3.45	2.38	4
NDC-464	2	5.0	5.5	54.3	55.0	0.7	3.60	1.29	1.66	2.52	0.90	1.16	64
NDC-464	3	5.7	6.2	55.0	56.3	1.3	2.98	0.98	0.96	3.87	1.27	1.25	17
NDC-464	4	7.0	7.5	56.3	59.0	2.7	4.15	0.63	0.40	11.21	1.70	1.07	84
				EL 49.3-54.3	Total D=	5.0	2.47	0.69				0.48	4
NDC-465	1	1.0	1.5	44.7	47.2	2.5	2.59	1.39	1.93	6.48	3.48	4.83	9
NDC-465	2	2.5	3.0	47.2	48.7	1.5	2.25	0.66	0.44	3.38	0.99	0.65	3
				EL 44.7-48.7	Total D=	4.0	2.46	1.12				1.37	6
NDC-508	1	1.0	1.5	36.4	39.9	3.5	2.92	0.96	0.92	10.22	3.36	3.23	15
NDC-508	2	3.5	4.0	39.9	42.4	2.5	3.00	0.71	0.50	7.50	1.78	1.26	7
NDC-508	3	6.0	6.5	42.4	45.4	3.0	3.27	0.52	0.27	9.81	1.56	0.81	12
NDC-508	4	9.0	9.5	4.5	46.4	41.9	3.47	0.55	0.30	145.25	23.02	12.66	24
				EL 36.4-42.4	Total D=	6.0	2.95	0.86				0.75	11
NDC-509	1	0.5	1.0	48.2	49.7	1.5	1.25	0.93	0.86	1.88	1.40	1.30	2
NDC-509	2	1.5	2.0	49.7	52.2	2.5	3.16	0.96	0.92	7.90	2.40	2.30	21
NDC-509	3	4.0	4.5	52.2	55.2	3.0	3.12	0.69	0.48	9.36	2.07	1.43	13
NDC-509	4	7.0	7.5	55.2	57.9	2.7	3.29	0.73	0.53	8.88	1.97	1.44	19
				EL 48.2-49.7	Total D=	1.5	1.25	0.93				0.86	2

Table E-3B (continued)

1998 USACOE/Dare County Offshore Borings for Borrow Area N1

Boring Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Layer Thickness	Mean	Std Dev	Variance	Weighted Mean	Weighted Std Dev	Weighted Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-510	1	0.0	0.5	46.5	47.5	1.0	1.45	0.84	0.71	1.45	0.84	0.71	2
NDC-510	2	1.0	1.5	47.5	49.5	2.0	1.92	1.32	1.74	3.84	2.64	3.48	10
NDC-510	3	3.0	3.5	49.5	50.1	0.6	2.78	1.03	1.06	1.67	0.62	0.64	26
			EL 46.5-49.5		Total D=	3.0	1.76	1.16				1.40	7
NDC-511	1	0.5	1.0	42.5	44.5	2.0	1.45	0.82	0.67	2.90	1.64	1.34	2
NDC-511	2	3.0	3.5	44.5	48.0	3.5	1.70	0.72	0.52	5.95	2.52	1.81	1
NDC-511	3	5.5	6.0	48.0	48.6	0.6	1.83	0.93	0.86	1.10	0.56	0.52	4
			EL 42.5-48.6		Total D=	6.1	1.63	0.77				0.60	2
NDC-512	1	0.5	1.0	52.6	54.1	1.5	2.25	1.07	1.14	3.38	1.61	1.72	7
NDC-512	2	1.5	2.0	54.1	57.6	3.5	4.08	0.68	0.46	14.28	2.38	1.62	81
NDC-512	3	5.0	5.5	57.6	60.8	3.2	4.25	0.45	0.20	13.60	1.44	0.65	92
			EL 52.6-54.1		Total D=	1.5	2.25	1.07				1.14	7
NDC-513	1	0.5	1.0	51.8	54.8	3.0	0.82	2.01	4.04	2.46	6.03	12.12	3
NDC-513	2	3.0	3.5	54.8	57.8	3.0	1.63	1.30	1.69	4.89	3.90	5.07	10
NDC-513	3	6.0	6.5	57.8	59.8	2.0	3.34	1.17	1.37	6.68	2.34	2.74	50
NDC-513	4	8.0	8.5	59.8	61.5	1.7	2.70	1.01	1.02	4.59	1.72	1.73	22
			EL 51.8-57.8		Total D=	6.0	1.23	1.66				2.87	6
NDC-534	1	1.0	1.5	49.9	53.4	3.5	2.34	0.63	0.40	8.19	2.21	1.39	3
NDC-534	2	3.5	4.0	53.4	55.9	2.5	2.53	0.75	0.56	6.33	1.88	1.41	5
NDC-534	3	6.0	6.5	55.9	57.9	2.0	2.74	0.95	0.90	5.48	1.90	1.81	7
NDC-534	4	8.0	8.5	57.9	59.9	2.0	1.85	1.13	1.28	3.70	2.26	2.55	6
NDC-534	5	10.0	10.5	59.9	62.2	2.3	1.39	1.24	1.54	3.20	2.85	3.54	3
			EL 49.9-62.2		Total D=	12.3	2.19	0.90				0.87	4
NDC-535	1	0.5	1.0	57.8	61.8	4.0	4.26	0.54	0.29	17.04	2.16	1.17	95
NDC-535	2	4.0	4.5	61.8	66.8	5.0	3.60	0.93	0.86	18.00	4.65	4.32	55
NDC-535	3	9.0	9.5	66.8	71.6	4.8	3.93	0.64	0.41	18.86	3.07	1.97	64
NDC-535	4	13.5	14.3	71.6	73.8	2.2	3.20	1.13	1.28	7.04	2.49	2.81	44
NDC-535	5	16.0	16.5	73.8	75.8	2.0	1.94	1.34	1.80	3.88	2.68	3.59	8
NDC-535	6	18.0	18.5	75.8	77.0	1.2	1.03	1.35	1.82	1.24	1.62	2.19	3
			EL 57.8-61.8		Total D=	4.0	4.26	0.54				0.29	95
NDC-543	1	0.0	0.0	56.6	60.6	4.0	3.55	0.66	0.44	14.20	2.64	1.74	33
NDC-543	2	4.0	4.5	60.6	63.6	3.0	3.64	0.65	0.42	10.92	1.95	1.27	70
NDC-543	3	7.0	7.5	63.6	65.5	1.9	3.31	0.94	0.88	6.29	1.79	1.68	27
			EL 56.6-60.6		Total D=	4.0	3.55	0.66				0.44	33
NDC-548	1	0.5	1.0	48.7	51.7	3.0	1.76	0.86	0.74	5.28	2.58	2.22	2
NDC-548	2	3.0	3.5	51.7	55.7	4.0	2.58	1.00	1.00	10.32	4.00	4.00	20
NDC-548	3	7.0	7.5	55.7	58.7	3.0	3.39	0.51	0.26	10.17	1.53	0.78	17
NDC-548	4	10.0	10.5	58.7	62.7	4.0	3.58	0.57	0.32	14.32	2.28	1.30	32
NDC-548	5	14.0	14.5	62.7	67.5	4.8	3.66	0.61	0.37	17.57	2.93	1.79	39
			EL 48.7-51.7		Total D=	3.0	1.76	0.86				0.74	2
NDC-549	1	1.0	1.5	45.9	49.9	4.0	3.28	0.87	0.76	13.12	3.48	3.03	20
NDC-549	2	4.0	4.5	49.9	53.9	4.0	3.48	0.57	0.32	13.92	2.28	1.30	25
NDC-549	3	8.0	8.5	53.9	57.9	4.0	3.46	0.56	0.31	13.84	2.24	1.25	23
NDC-549	4	12.0	12.5	57.9	61.9	4.0	3.48	0.55	0.30	13.92	2.20	1.21	24
NDC-549	5	16.0	16.5	61.9	65.2	3.3	3.67	0.63	0.40	12.11	2.08	1.31	40
			EL 45.9-53.9		Total D=	8.0	3.38	0.72				0.54	23

Table E-3B (continued)

1998 USACOE/Dare County Offshore Borings for Borrow Area N1

Boring Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Layer Thickness	Mean	Std Dev	Variance	Weighted Mean	Weighted Std Dev	Weighted Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-550	1	1.0	1.5	46.8	50.3	3.5	2.44	1.23	1.51	8.54	4.31	5.30	16
NDC-550	2	3.8	4.3	50.3	54.8	4.5	2.38	2.12	4.49	10.71	9.54	20.22	18
NDC-550	3	8.0	8.5	54.8	58.8	4.0	3.45	0.53	0.28	13.80	2.12	1.12	21
NDC-550	4	12.0	12.5	58.8	63.8	5.0	3.74	0.64	0.41	18.70	3.20	2.05	48
NDC-550	5	17.0	17.5	63.8	66.8	3.0	3.38	0.48	0.23	10.14	1.44	0.69	15
			EL 46.8-54.8		Total D=	8.0	2.41	1.73				3.19	17
NDC-623	1	0.0	0.5	44.9	46.9	2.0	0.73	1.51	2.28	1.46	3.02	4.56	1
NDC-623	2	2.0	2.5	46.9	48.9	2.0	1.46	1.05	1.10	2.92	2.10	2.21	1
NDC-623	3	4.0	4.5	48.9	49.4	0.5	2.08	0.65	0.42	1.04	0.33	0.21	2
			EL 44.9-49.4		Total D=	4.5	1.20	1.21				1.55	1
NDC-624	1	0.5	1.0	50.2	53.2	3.0	-1.16	1.66	2.76	-3.48	4.98	8.27	1
NDC-624	2	3.0	3.5	53.2	56.5	3.3	0.02	1.81	3.28	0.07	5.97	10.81	1
NDC-624	3	6.3	6.8	56.5	57.8	1.3	3.63	1.28	1.64	4.72	1.66	2.13	68
NDC-624	4	7.6	8.1	57.8	60.2	2.4	1.81	1.10	1.21	4.34	2.64	2.90	4
NDC-624	5	10.0	10.5	60.2	62.2	2.0	1.69	1.22	1.49	3.38	2.44	2.98	5
NDC-624	6	12.0	12.5	62.2	65.2	3.0	2.11	1.41	1.99	6.33	4.23	5.96	14
NDC-624	7	15.0	15.5	65.2	68.4	3.2	2.25	1.10	1.21	7.20	3.52	3.87	13
			EL 50.2-62.2		Total D=	12.0	0.75	1.47				2.26	10
NDC-626	1	0.5	1.0	44.1	46.0	1.9	3.32	0.60	0.36	6.31	1.14	0.68	16
NDC-626	2	2.5	3.0	46.0	48.1	2.1	2.56	1.39	1.93	5.38	2.92	4.06	10
NDC-626	3	4.0	4.5	48.1	49.9	1.8	2.05	0.88	0.77	3.69	1.58	1.39	3
			EL 44.1-49.9		Total D=	5.8	2.65	0.97				1.06	10
NDC-627	1	0.5	1.0	46.5	48.5	2.0	1.72	0.79	0.62	3.44	1.58	1.25	2
NDC-627	2	2.0	2.5	48.5	50.0	1.5	1.66	1.58	2.50	2.49	2.37	3.74	13
NDC-627	3	3.5	4.0	50.0	51.6	1.6	2.32	0.86	0.74	3.71	1.38	1.18	5
NDC-627	4	5.5	6.0	51.6	53.2	1.6	2.48	1.04	1.08	3.97	1.66	1.73	12
			EL 46.5-53.2		Total D=	6.7	2.03	1.04				1.18	7
NDC-628	1	0.5	1.0	48.3	50.8	2.5	2.21	1.18	1.39	5.53	2.95	3.48	5
NDC-628	2	2.5	3.0	50.8	52.8	2.0	2.74	0.84	0.71	5.48	1.68	1.41	11
NDC-628	3	4.5	5.0	52.8	54.7	1.9	1.53	0.77	0.59	2.91	1.46	1.13	2
			EL 48.3-54.7		Total D=	6.4	2.17	0.95				0.94	6
NDC-629	1	0.5	1.0	46.7	48.7	2.0	1.78	1.00	1.00	3.56	2.00	2.00	3
NDC-629	2	2.0	2.5	48.7	51.9	3.2	2.97	0.92	0.85	9.50	2.94	2.71	15
NDC-629	3	5.2	5.7	51.9	53.7	1.8	2.41	0.84	0.71	4.34	1.51	1.27	5
			EL 46.7-53.7		Total D=	7.0	2.49	0.92				0.85	9
NDC-630	1	0.5	1.0	45.2	46.5	1.3	2.03	0.69	0.48	2.64	0.90	0.62	2
NDC-630	2	2.0	2.5	46.5	48.1	1.6	2.16	0.59	0.35	3.46	0.94	0.56	2
NDC-630	3	3.5	4.0	48.1	49.9	1.8	2.24	0.53	0.28	4.03	0.95	0.51	1
			EL 45.2-49.9		Total D=	4.7	2.15	0.59				0.36	1
NDC-705	1	0.5	1.0	27.8	29.3	1.5	2.13	1.46	2.13	3.20	2.19	3.20	3
NDC-705	2	4.0	4.5	29.3	34.8	5.5	2.43	1.41	1.99	13.37	7.75	10.93	3
NDC-705	3	7.0	7.5	34.8	37.3	2.5	3.27	0.59	0.35	8.18	1.48	0.87	13
NDC-705	4	10.0	10.5	37.3	39.4	2.1	3.13	0.61	0.37	6.57	1.28	0.78	7
			EL 27.9-39.4		Total D=	11.6	2.70	1.09				1.36	6
NDC-712	1	0.0	0.0	28.8	32.8	4.0	2.58	0.75	0.56	10.32	3.00	2.25	3
NDC-712	2	4.0	4.5	32.8	36.8	4.0	2.99	1.50	2.25	11.96	6.00	9.00	30
NDC-712	3	7.0	7.5	36.8	39.3	2.5	3.08	0.68	0.46	7.70	1.70	1.16	12
			EL 28.8-32.8		Total D=	4.0	2.58	0.75				0.56	3

Table E-4A

1995 USACOE/Dare County Offshore Borings for Borrow Area N2

Boring					Layer	WTD	WTD	WTD		WTD	NCGS SAMPLE DATA		
Hole #	Sample Depth (cm)		Layer Depth (cm)		Thickness	Mean (Ø)	StDev (Ø)	Var (Ø)	% Silt	% Silt	Mean (Ø)	StDev (Ø)	Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
419	0	4	0	25	25	20.80	24.49	23.99	1.5	38	0.83	0.98	0.96
419	50	54	25	75	50	18.75	64.63	83.53	1.9	96	0.38	1.29	1.67
419	100	104	75	115	40	-4.24	53.25	70.89	1.4	56	-0.11	1.33	1.77
419	150	154	115	190	75	86.75	77.79	80.69	1.7	125	1.16	1.04	1.08
419	200	204	190	215	25	55.15	25.22	25.45	2.0	49	2.21	1.01	1.02
419	226	230	215	230	15	28.22	17.15	19.60	5.5	83	1.88	1.14	1.31
419			Top	230 cm	230	0.89	1.14	1.32		2			
				7.5	feet								
425	0	4	0	30	30	34.77	27.26	24.77	0.8	23	1.16	0.91	0.83
425	50	54	30	57	27	46.54	18.63	12.85	0.9	23	1.72	0.69	0.48
425	60	64	57	68	11	6.88	12.26	13.67	0.6	6	0.63	1.11	1.24
425	74	78	68	80	12	20.46	9.32	7.24	0.9	11	1.71	0.78	0.60
425	85	89	80	96	16	9.05	20.86	27.21	1.4	22	0.57	1.30	1.70
425	100	104	96	113	17	22.31	16.16	15.37	1.7	29	1.31	0.95	0.90
425	130	134	113	140	27	45.64	27.58	28.18	2.1	55	1.69	1.02	1.04
425	150	154	140	180	40	110.06	32.61	26.58			2.75	0.82	0.66
425	190	194	180	200	20	68.07	15.56	12.10			3.40	0.78	0.60
425			Top	140 cm	140	1.33	0.94	0.92		1			
				4.6	feet								
426	0	4	0	23	23	51.94	16.41	11.71	2.4	54	2.26	0.71	0.51
426	50	54	23	59	36	85.12	21.60	12.96	2.9	103	2.36	0.60	0.36
426	70	74	59	61	2	4.06	1.72	1.48	6.2	12	2.03	0.86	0.74
426	90	94	61	90	29	34.12	35.76	44.09	3.3	95	1.18	1.23	1.52
426	100	104	90	119	29	37.96	38.53	51.20	3.2	93	1.31	1.33	1.77
426	150	154	119	185	66	141.00	54.85	45.58	5.1	338	2.14	0.83	0.69
426	185	189	185	189	4	9.77	2.52	1.59	2.3	9	2.44	0.63	0.40
426	191	195	189	200	11	18.39	11.41	11.84	3.4	37	1.67	1.04	1.08
426	200	204	200	220	20	38.98	18.46	17.04	2.6	53	1.95	0.92	0.85
426	250	254	220	250	30	86.33	23.25	18.02	7.6	229	2.88	0.78	0.60
426	280	284	250	285	35	91.10	36.50	38.06	6.3	219	2.60	1.04	1.09
426	290	294	285	300	15	50.87	10.34	7.13			3.39	0.69	0.48
426	300	304	300	325	25	88.06	14.88	8.85			3.52	0.60	0.35
426	350	354	325	350	25	89.54	11.94	5.70			3.58	0.48	0.23
426	360	363	350	363	13	45.39	6.34	3.09			3.49	0.49	0.24
426			Top	285 cm	285	2.10	3.02	1.81		4			
				9.4	feet								

Table E-4A (continued)

1995 USACOE/Dare County Offshore Borings for Borrow Area N2

Boring					Layer	WTD	WTD	WTD		WTD	NCGS SAMPLE DATA		
Hole #	Sample Depth (cm)		Layer Depth (cm)		Thickness	Mean (Ø)	StDev (Ø)	Var (Ø)	% Silt	% Silt	Mean (Ø)	StDev (Ø)	Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
427	0	4	0	50	50	132.76	53.34	56.90	6.6	331	2.66	1.07	1.14
427	50	54	50	74	24	81.40	16.48	11.31	13.7	329	3.39	0.69	0.47
427	100	104	74	112	38	131.89	32.13	27.16	15.5	589	3.47	0.85	0.71
427	117	121	112	130	18	12.15	39.11	84.97	7.8	140	0.68	2.17	4.72
427	130	134	130	140	10	34.87	7.46	5.57	14.7	147	3.49	0.75	0.56
427	143	147	140	155	15	10.32	31.08	64.40	5.9	89	0.69	2.07	4.29
427	200	204	155	230	75	272.24	31.28	13.04			3.63	0.42	0.17
427	250	254	230	288	58	215.90	30.89	16.45			3.72	0.53	0.28
427	300	304	288	320	32	117.07	13.70	5.87			3.66	0.43	0.18
427	350	354	320	378	58	214.14	27.88	13.41			3.69	0.48	0.23
427	380	384	378	400	22	63.90	28.31	36.44			2.90	1.29	1.66
427	400	404	400	425	25	96.44	14.87	8.85			3.86	0.59	0.35
427	450	454	425	460	35	133.10	19.40	10.75			3.80	0.55	0.31
427	500	504	460	500	40	155.22	22.45	12.60			3.88	0.56	0.32
427	524	528	500	524	24	94.00	13.99	8.15			3.92	0.58	0.34
427			Top	155 cm	155	2.60	1.16	1.61		10			
				5.1	feet								
429	0	4	0	10	10	25.00	9.70	9.50	3.7	37	2.50	0.97	0.95
429	50	54	10	87	77	231.77	54.67	38.50	7.1	547	3.01	0.71	0.50
429	100	104	87	128	41	141.86	27.06	17.63	14.2	583	3.46	0.66	0.43
429	128	132	128	135	7	20.65	10.22	14.98	26.1	183	2.95	1.46	2.14
429	135	139	135	140	5	2.30	7.80	12.10	3.5	18	0.46	1.56	2.42
429	145	149	140	154	14	36.40	19.46	26.88	6.1	86	2.60	1.39	1.92
429	155	159	154	161	7	0.49	10.92	17.15	2.7	19	0.07	1.56	2.45
429	175	179	161	175	14	51.10	10.08	7.14			3.65	0.72	0.51
429	200	204	175	200	25	92.25	15.25	9.25			3.69	0.61	0.37
429	220	224	200	220	20	75.80	20.20	20.20			3.79	1.01	1.01
429	230	234	220	240	20	62.40	28.00	39.20			3.12	1.40	1.96
429	250	254	240	300	60	227.40	34.80	20.40			3.79	0.58	0.34
429	300	304	300	340	40	154.00	21.60	12.00			3.85	0.54	0.30
429	340	344	340	350	10	39.90	6.20	3.90			3.99	0.62	0.39
429	350	354	350	370	20	77.80	11.80	7.00			3.89	0.59	0.35
429	370	374	370	385	15	55.50	7.95	4.35			3.70	0.53	0.29
429	385	389	385	400	15	58.50	8.10	4.35			3.90	0.54	0.29
429	400	404	400	450	50	193.00	27.50	15.00			3.86	0.55	0.30
429	450	454	450	500	50	198.00	28.50	16.50			3.96	0.57	0.33
429	500	504	500	506	6	23.70	3.30	1.80			3.95	0.55	0.30
429			Top	161 cm	161	2.85	0.87	0.85		9			
				5.3	feet								

Table E-4B

1998 USACOE/Dare County Offshore Borings for Borrow Area N2

Boring Hole #	Sample #	Sample Depth (ft) Top	Sample Depth (ft) Bottom	Layer Depth (ft) Top	Layer Depth (ft) Bottom	Layer Thickness (feet)	Mean (phi)	Std Dev (phi)	Variance	Weighted Mean (phi)	Weighted Std Dev (phi)	Weighted Variance	% Silt <200mm
NDC-514	1	0.5	1.0	29.6	31.4	1.8	1.86	0.59	0.35	3.35	1.06	0.63	1
NDC-514	2	2.5	3.0	31.4	33.2	1.8	1.75	0.68	0.46	3.15	1.22	0.83	1
			EL 29.6-33.2		Total D=	3.6	**1.81**	**0.64**				**0.41**	**1**
NDC-515	1	0.5	1.0	34.5	36.4	1.9	1.17	0.90	0.81	2.22	1.71	1.54	1
			EL 34.5-36.4		Total D=	1.9	**1.17**	**0.90**				**0.81**	**1**
NDC-516	1	0.5	1.0	37.0	39.5	2.5	0.63	1.43	2.04	1.58	3.58	5.11	2
NDC-516	2	2.5	3.0	39.5	40.5	1.0	2.96	0.99	0.98	2.96	0.99	0.98	17
NDC-516	3	3.5	4.0	40.5	41.0	0.5	3.97	1.03	1.06	1.99	0.52	0.53	82
NDC-516	4	4.0	4.5	41.0	42.5	1.5	2.93	1.87	3.50	4.40	2.81	5.25	40
			EL 37.0-40.5		Total D=	3.5	**1.30**	**1.30**				**1.74**	**6**
NDC-517	1	0.5	1.0	41.9	44.9	3.0	1.29	1.46	2.13	3.87	4.38	6.39	2
NDC-517	2	3.0	3.5	44.9	47.4	2.5	2.61	0.82	0.67	6.53	2.05	1.68	9
NDC-517	3	5.5	6.0	47.4	49.9	2.5	3.05	0.87	0.76	7.63	2.18	1.89	22
NDC-517	4	8.0	8.5	49.9	52.3	2.4	3.21	0.65	0.42	7.70	1.56	1.01	16
			EL 41.9-49.9		Total D=	8.0	**2.25**	**1.08**				**1.25**	**10**
NDC-518	1	0.5	1.0	38.3	41.3	3.0	0.60	1.74	3.03	1.80	5.22	9.08	1
NDC-518	2	3.0	3.5	41.3	43.2	1.9	1.05	1.44	2.07	2.00	2.74	3.94	0
			EL 38.3-43.2		Total D=	4.9	**0.77**	**1.62**				**2.66**	**1**
NDC-519	1	0.0	0.5	50.7	52.7	2.0	2.82	0.79	0.62	5.64	1.58	1.25	10
NDC-519	2	2.0	2.5	52.7	53.8	1.1	3.29	0.58	0.34	3.62	0.64	0.37	16
			EL 50.7-52.7		Total D=	2.0	**2.82**	**0.79**				**0.62**	**10**
NDC-521	1	1.0	1.5	43.5	47.0	3.5	1.26	1.12	1.25	4.41	3.92	4.39	2
NDC-521	2	3.5	4.0	47.0	51.5	4.5	3.20	1.25	1.56	14.40	5.63	7.03	37
NDC-521	3	0.0	0.0	51.5	55.5	4.0	3.07	0.77	0.59	12.28	3.08	2.37	14
NDC-521	4	12.0	12.5	55.5	60.5	5.0	3.93	0.66	0.44	19.65	3.30	2.18	64
NDC-521	5	17.0	17.5	60.5	62.8	2.3	3.48	0.57	0.32	8.00	1.31	0.75	24
			EL 43.5-47.0		Total D=	3.5	**1.26**	**1.12**				**1.25**	**2**
NDC-523	1	0.5	1.0	51.2	54.2	3.0	3.27	0.70	0.49	9.81	2.10	1.47	18
NDC-523	2	3.0	3.5	54.2	57.8	3.6	3.37	0.82	0.67	12.13	2.95	2.42	25
NDC-523	3	6.6	7.1	57.8	59.2	1.4	4.11	0.70	0.49	5.75	0.98	0.69	83
NDC-523	4	8.0	8.5	59.2	63.2	4.0	3.53	0.64	0.41	14.12	2.56	1.64	30
NDC-523	5	12.0	12.5	63.2	67.2	4.0	3.62	0.64	0.41	14.48	2.56	1.64	37
NDC-523	6	16.0	16.5	67.2	70.6	3.4	3.73	0.61	0.37	12.68	2.07	1.27	45
			EL 51.2-54.2		Total D=	3.0	**3.27**	**0.70**				**0.49**	**18**
NDC-545	1	1.0	1.5	45.7	49.7	4.0	2.69	0.73	0.53	10.76	2.92	2.13	6
NDC-545	2	4.0	4.5	49.7	53.7	4.0	2.86	0.69	0.48	11.44	2.76	1.90	8
NDC-545	3	8.0	8.5	53.7	57.7	4.0	3.32	0.57	0.32	13.28	2.28	1.30	18
NDC-545	4	12.0	12.5	57.7	60.7	3.0	3.45	0.55	0.30	10.35	1.65	0.91	23
NDC-545	5	15.0	15.5	60.7	62.4	1.7	3.43	0.51	0.26	5.83	0.87	0.44	19
NDC-545	6	18.0	18.5	62.4	65.7	3.3	3.48	0.55	0.30	11.48	1.82	1.00	24
			EL 45.7-53.7		Total D=	8.0	**2.78**	**0.71**				**0.50**	**7**
NDC-546	1	0.5	1.0	41.0	43.2	2.2	0.13	1.47	2.16	0.29	3.23	4.75	1
NDC-546	2	2.2	2.7	43.2	44.8	1.6	3.24	1.21	1.46	5.18	1.94	2.34	31
			EL 41.0-43.2		Total D=	2.2	**0.13**	**1.47**				**2.16**	**1**
NDC-713	1	0.5	1.0	30.8	33.8	3.0	2.70	0.93	0.86	8.10	2.79	2.59	3
NDC-713	2	3.0	3.5	33.8	36.8	3.0	3.06	0.70	0.49	9.18	2.10	1.47	12
NDC-713	3	0.0	0.0	36.8	39.8	3.0	3.25	0.58	0.34	9.75	1.74	1.01	12
NDC-713	4	0.0	0.0	39.8	44.8	5.0	3.32	0.58	0.34	16.60	2.90	1.68	17
NDC-713	5	0.0	0.0	44.8	47.8	3.0	3.13	0.68	0.46	9.39	2.04	1.39	13
NDC-713	6	0.0	0.0	47.8	50.8	3.0	3.27	0.56	0.31	9.81	1.68	0.94	14
			EL 30.8-39.8		Total D=	9.0	**3.00**	**0.74**				**0.56**	**9**

Table E-5A

1995 USACOE/Dare County Offshore Borings for Borrow Area S1

Boring					Layer	WTD	WTD	WTD		WTD	NCGS SAMPLE DATA		
Hole #	Sample Depth (cm)		Layer Depth (cm)		Thickness	Mean (Ø)	StDev (Ø)	Var (Ø)	% Silt	% Silt	Mean (Ø)	StDev (Ø)	Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
301	0	4	0	40	40	60.68	29.69	22.03	1.0	41	1.52	0.74	0.55
301	50	54	40	60	20	32.28	12.03	7.23	1.1	21	1.61	0.60	0.36
301	100	104	60	130	70	106.27	48.82	34.05	1.0	70	1.52	0.70	0.49
301	150	154	130	195	65	92.50	55.09	46.69	1.2	79	1.42	0.85	0.72
301	200	204	195	220	25	38.56	15.89	10.10	1.4	34	1.54	0.64	0.40
301	250	254	220	275	55	82.85	53.05	51.16	3.3	180	1.51	0.96	0.93
301	300	304	275	345	70	112.34	53.35	40.66	0.9	62	1.60	0.76	0.58
301	345	349	345	349	4	6.41	2.67	1.78	1.2	5	1.60	0.67	0.44
301			Top	349 cm	349	1.52	0.78	0.61		1			
				11.4	feet								
302	0	4	0	12	12	19.61	12.65	13.34	1.2	15	1.63	1.05	1.11
302	50	54	12	50	38	87.57	27.06	19.27	3.5	134	2.30	0.71	0.51
302	100	104	50	150	100	232.20	80.55	64.88	4.0	396	2.32	0.81	0.65
302	150	154	150	193	43	104.38	36.48	30.95	4.0	170	2.43	0.85	0.72
302	195	197	193	200	7	27.81	7.72	8.52	76.6	536	3.97	1.10	1.22
302	200	204	200	202	2	5.50	3.84	7.38	42.6	85	2.75	1.92	3.69
302	205	209	202	205	3	2.32	4.45	6.60	3.2	10	0.77	1.48	2.20
302	250	254	205	250	45	169.64	26.72	15.87			3.77	0.59	0.35
302	300	304	250	300	50	189.76	27.42	15.03			3.80	0.55	0.30
302	330	334	300	330	30	113.09	26.36	23.15			3.77	0.88	0.77
302	350	354	330	350	20	75.98	13.05	8.51			3.80	0.65	0.43
302	383	387	350	387	37	141.42	22.19	13.31			3.82	0.60	0.36
302			Top	205 cm	205	2.34	0.84	0.74		7			
				6.7	feet								
310	0	4	0	50	50	10.07	66.12	87.44	1.7	85	0.20	1.32	1.75
310	50	54	50	79	29	56.80	60.24	125.15	26.6	770	1.96	2.08	4.32
310	80	84	79	88	9	37.74	5.68	3.58	74.8	674	4.19	0.63	0.40
310	90	94	88	100	12	-4.20	21.23	37.55	8.1	97	-0.35	1.77	3.13
310	100	104	100	130	30	9.38	64.93	140.53	13.7	411	0.31	2.16	4.68
310	150	154	130	190	60	217.76	51.86	44.82	36.9	2213	3.63	0.86	0.75
310	200	204	190	250	60	61.25	143.80	344.63	24.2	1454	1.02	2.40	5.74
310	250	254	250	264	14	53.30	20.44	29.85			3.81	1.46	2.13
310	300	304	264	348	84	359.88	70.35	58.91			4.28	0.84	0.70
310	350	354	348	400	52	198.37	58.13	64.99			3.81	1.12	1.25
310	400	404	400	450	50	148.33	65.92	86.91			2.97	1.32	1.74
310	450	454	450	500	50	140.55	70.74	100.10			2.81	1.41	2.00
310	500	504	500	522	22	45.62	30.18	41.40			2.07	1.37	1.88
310			Top	79 cm	79	0.85	1.60	2.69		11			
				2.6	feet								
314	0	4	0	30	30	43.84	25.68	21.98	1.0	30	1.46	0.86	0.73
314	50	54	30	78	48	85.91	32.17	21.56	1.4	65	1.79	0.67	0.45
314	80	84	78	92	14	31.08	21.47	32.92	17.1	240	2.22	1.53	2.35
314	95	99	92	100	8	18.61	10.44	13.63	10.5	84	2.33	1.31	1.70
314	100	104	100	125	25	59.91	24.27	23.56	6.2	155	2.40	0.97	0.94
314	125	129	125	136	11	27.97	21.11	40.53	34.8	383	2.54	1.92	3.68
314	150	154	136	180	44	164.08	21.64	10.64			3.73	0.49	0.24
314	180	184	180	200	20	84.62	12.58	7.91			4.23	0.63	0.40
314	200	204	200	250	50	205.75	30.81	18.98			4.11	0.62	0.38
314	250	254	250	270	20	77.57	10.63	5.65			3.88	0.53	0.28
314	277	281	270	277	7	25.78	4.85	3.36			3.68	0.69	0.48
314			Top	136 cm	136	1.97	0.99	1.13		7			
				4.5	feet								
316a	0	4	0	50	50	46.28	53.85	58.01	1.4	70	0.93	1.08	1.16
316a	50	54	50	100	50	65.82	47.95	45.99	1.1	54	1.32	0.96	0.92
316a	100	104	100	140	40	45.93	43.27	46.82	2.3	92	1.15	1.08	1.17
316a	140	145	140	145	5	7.86	4.98	4.97	3.7	19	1.57	1.00	0.99
316a					145	1.14	1.03	1.07		2			
				4.8	feet								

Table E-5B

1998 USACOE/Dare County Offshore Borings for Borrow Area S1

Boring Hole #	Sample #	Sample Depth (ft) Top	Sample Depth (ft) Bottom	Layer Depth (ft) Top	Layer Depth (ft) Bottom	Layer Thickness (feet)	Mean (phi)	Std Dev (phi)	Variance	Weighted Mean (phi)	Weighted Std Dev (phi)	Weighted Variance	% Silt <200mm
NDC-555	NDC-555-1	0.5	1.0	49.3	52.3	3.0	1.45	1.62	2.62	4.35	4.86	7.87	15
NDC-555	NDC-555-2	3.0	3.5	52.3	54.8	2.5	1.12	0.90	0.81	2.80	2.25	2.03	1
NDC-555	NDC-555-3	5.5	6.0	54.8	58.3	3.5	1.97	0.85	0.72	6.90	2.98	2.53	2
NDC-555	NDC-555-4	9.0	9.5	58.3	61.3	3.0	2.24	1.05	1.10	6.72	3.15	3.31	16
NDC-555	NDC-555-5	12.0	12.5	61.3	62.9	1.6	1.88	0.57	0.32	3.01	0.91	0.52	1
			EL 49.3-62.9		**Total D=**	**13.6**	**1.75**	**1.04**				**1.20**	**8**
NDC-556	NDC-556-1	0.5	1.0	47.3	50.3	3.0	0.58	1.42	2.02	1.74	4.26	6.05	2
NDC-556	NDC-556-2	3.0	3.5	50.3	52.8	2.5	0.97	1.16	1.35	2.43	2.90	3.36	0
NDC-556	NDC-556-3	5.5	6.0	52.8	55.0	2.2	1.16	0.99	0.98	2.55	2.18	2.16	1
NDC-556	NDC-556-4	8.0	8.5	55.0	57.9	2.9	1.69	0.86	0.74	4.90	2.49	2.14	2
			EL 47.3-57.9		**Total D=**	**10.6**	**1.10**	**1.12**				**1.29**	**1**
NDC-557	NDC-557-1	0.5	1.0	51.8	55.8	4.0	0.75	1.66	2.76	3.00	6.64	11.02	2
NDC-557	NDC-557-2	4.0	4.5	55.8	58.8	3.0	1.66	0.99	0.98	4.98	2.97	2.94	2
NDC-557	NDC-557-3	7.0	7.5	58.8	61.8	3.0	2.03	0.62	0.38	6.09	1.86	1.15	3
NDC-557	NDC-557-4	10.0	10.5	61.8	63.8	2.0	2.48	1.13	1.28	4.96	2.26	2.55	17
NDC-557	NDC-557-5	13.0	13.5	63.8	66.3	2.5	2.37	0.52	0.27	5.93	1.30	0.68	3
			EL 51.8-66.3		**Total D=**	**14.5**	**1.72**	**1.04**				**1.27**	**5**
NDC-558	NDC-558-1	0.5	1.0	50.1	53.1	3.0	0.19	1.16	1.35	0.57	3.48	4.04	0
NDC-558	NDC-558-2	3.0	3.5	53.1	55.1	2.0	1.11	1.03	1.06	2.22	2.06	2.12	2
NDC-558	NDC-558-3	5.0	5.5	55.1	57.6	2.5	1.18	0.99	0.98	2.95	2.48	2.45	0
NDC-558	NDC-558-4	7.5	8.0	57.6	59.0	1.4	1.56	0.76	0.58	2.18	1.06	0.81	0
NDC-558	NDC-558-5	10.0	10.5	59.0	61.3	2.3	2.24	1.17	1.37	5.15	2.69	3.15	15
			EL 50.1-61.3		**Total D=**	**11.2**	**1.17**	**1.05**				**1.12**	**4**
NDC-574	NDC-574-1	0.5	1.0	40.6	45.6	5.0	2.90	1.13	1.28	14.50	5.65	6.38	10
NDC-574	NDC-574-2	5.0	5.5	45.6	50.6	5.0	2.99	0.66	0.44	14.95	3.30	2.18	7
NDC-574	NDC-574-3	10.0	10.5	50.6	56.6	6.0	3.31	0.71	0.50	19.86	4.26	3.02	15
NDC-574	NDC-574-4	16.0	16.5	56.6	60.6	4.0	3.55	0.72	0.52	14.20	2.88	2.07	34
			EL 40.6-50.6		**Total D=**	**10.0**	**2.95**	**0.90**				**0.86**	**9**
NDC-575	NDC-575-1	0.5	1.0	56.8	57.8	1.0	-0.30	2.17	4.71	-0.30	2.17	4.71	4
NDC-575	NDC-575-2	1.0	1.5	57.8	60.8	3.0	3.59	0.95	0.90	10.77	2.85	2.71	42
NDC-575	NDC-575-3	4.0	4.5	60.8	63.8	3.0	3.62	1.03	1.06	10.86	3.09	3.18	51
NDC-575	NDC-575-4	7.0	7.5	63.8	67.3	3.5	3.35	1.81	3.28	11.73	6.34	11.47	56
NDC-575	NDC-575-5	10.0	10.5	67.3	70.4	3.1	4.14	0.75	0.56	12.83	2.33	1.74	87
			EL 56.8-57.8		**Total D=**	**1.0**	**-0.30**	**2.17**				**4.71**	**4**
NDC-576	NDC-576-1	0.5	1.0	51.7	54.7	3.0	3.09	0.86	0.74	9.27	2.58	2.22	14
NDC-576	NDC-576-2	3.0	3.5	54.7	57.7	3.0	3.47	0.62	0.38	10.41	1.86	1.15	28
NDC-576	NDC-576-3	6.0	6.5	57.7	61.7	4.0	2.56	2.29	5.24	10.24	9.16	20.98	30
NDC-576	NDC-576-4	10.0	10.5	61.7	64.7	3.0	3.39	0.85	0.72	10.17	2.55	2.17	26
NDC-576	NDC-576-5	13.0	13.5	64.7	65.2	0.5	3.99	1.36	1.85	2.00	0.68	0.92	89
NDC-576	NDC-576-6	13.5	14.0	65.2	67.8	2.6	0.91	1.88	3.53	2.37	4.89	9.19	4
			EL 51.7-54.7		**Total D=**	**3.0**	**3.09**	**0.86**				**0.74**	**14**
NDC-578	NDC-578-1	1.0	1.5	50.8	53.8	3.0	0.68	1.10	1.21	2.04	3.30	3.63	2
NDC-578	NDC-578-2	3.0	3.5	53.8	55.8	2.0	0.87	1.26	1.59	1.74	2.52	3.18	7
NDC-578	NDC-578-3	5.0	5.5	55.8	57.3	1.5	1.56	1.54	2.37	2.34	2.31	3.56	19
NDC-578	NDC-578-4	6.5	7.0	57.3	59.7	2.4	3.04	1.89	3.57	7.30	4.54	8.57	48
			EL 50.8-57.3		**Total D=**	**6.5**	**0.94**	**1.25**				**1.59**	**7**

Table E-5B (continued)

1998 USACOE/Dare County Offshore Borings for Borrow Area S1

Boring Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Layer Thickness	Mean	Std Dev	Variance	Weighted Mean	Weighted Std Dev	Weighted Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-583	NDC-583-1	0.5	1.0	39.1	42.1	3.0	1.10	1.05	1.10	3.30	3.15	3.31	3
NDC-583	NDC-583-2	3.0	3.5	42.1	44.6	2.5	1.29	0.89	0.79	3.23	2.23	1.98	3
NDC-583	NDC-583-3	5.5	6.0	44.6	47.1	2.5	1.23	0.93	0.86	3.08	2.33	2.16	3
NDC-583	NDC-583-4	8.0	8.5	47.1	49.6	2.5	1.11	0.88	0.77	2.78	2.20	1.94	1
NDC-583	NDC-583-5	10.5	11.0	49.6	52.1	2.5	1.28	0.89	0.79	3.20	2.23	1.98	3
NDC-583	NDC-583-6	13.0	13.5	52.1	54.1	2.0	1.21	1.11	1.23	2.42	2.22	2.46	5
			EL 39.1-54.1		**Total D=**	**15.0**	**1.20**	**0.96**				**0.92**	**3**
NDC-587	NDC-587-1	0.5	1.0	31.4	34.4	3.0	1.32	1.05	1.10	3.96	3.15	3.31	4
NDC-587	NDC-587-2	3.0	3.5	34.4	36.0	1.6	1.29	0.98	0.96	2.06	1.57	1.54	3
NDC-587	NDC-587-3	6.2	6.7	36.0	38.1	2.1	1.22	0.98	0.96	2.56	2.06	2.02	3
			EL 31.4-38.1		**Total D=**	**6.7**	**1.28**	**1.01**				**1.02**	**4**
NDC-588	NDC-588-1	0.0	0.5	41.0	43.0	2.0	1.31	0.94	0.88	2.62	1.88	1.77	3
NDC-588	NDC-588-2	2.0	2.5	43.0	45.0	2.0	1.82	0.75	0.56	3.64	1.50	1.13	3
NDC-588	NDC-588-3	4.0	4.5	45.0	46.2	1.2	1.36	0.94	0.88	1.63	1.13	1.06	2
			EL 41.0-46.2		**Total D=**	**5.2**	**1.52**	**0.87**				**0.76**	**3**
NDC-589	NDC-589-1	0.5	1.0	57.6	59.6	2.0	2.43	0.84	0.71	4.86	1.68	1.41	9
NDC-589	NDC-589-2	2.0	2.5	59.6	62.1	2.5	2.51	1.18	1.39	6.28	2.95	3.48	12
NDC-589	NDC-589-3	4.5	5.0	62.1	65.1	3.0	3.18	0.85	0.72	9.54	2.55	2.17	19
NDC-589	NDC-589-4	7.5	8.0	65.1	66.8	1.7	4.16	0.87	0.76	7.07	1.48	1.29	90
NDC-589	NDC-589-5	9.2	9.7	66.8	71.0	4.2	3.70	1.34	1.80	15.54	5.63	7.54	70
NDC-589	NDC-589-6	13.4	13.9	71.0	74.6	3.6	1.09	1.65	2.72	3.92	5.94	9.80	9
			EL 57.6-62.1		**Total D=**	**4.5**	**2.47**	**1.03**				**1.09**	**11**
NDC-590	NDC-590-1	0.5	1.0	35.7	38.7	3.0	0.60	1.42	2.02	1.80	4.26	6.05	2
NDC-590	NDC-590-2	3.0	3.5	38.7	41.7	3.0	1.16	0.92	0.85	3.48	2.76	2.54	3
NDC-590	NDC-590-3	6.0	6.5	41.7	44.7	3.0	1.45	0.95	0.90	4.35	2.85	2.71	4
NDC-590	NDC-590-4	9.0	9.5	44.7	47.7	3.0	1.61	0.79	0.62	4.83	2.37	1.87	2
NDC-590	NDC-590-5	12.0	12.5	47.7	49.5	1.8	1.47	0.97	0.94	2.65	1.75	1.69	5
			EL 35.7-49.5		**Total D=**	**13.8**	**1.24**	**1.01**				**1.08**	**3**
NDC-593	NDC-593-1	0.5	1.0	44.2	47.2	3.0	1.46	0.89	0.79	4.38	2.67	2.38	1
NDC-593	NDC-593-2	3.0	3.5	47.2	50.2	3.0	1.68	0.70	0.49	5.04	2.10	1.47	3
NDC-593	NDC-593-3	6.0	6.5	50.2	53.2	3.0	2.11	1.25	1.56	6.33	3.75	4.69	20
NDC-593	NDC-593-4	9.0	9.5	53.2	56.2	3.0	2.10	1.12	1.25	6.30	3.36	3.76	16
NDC-593	NDC-593-5	12.0	12.5	56.2	59.7	3.5	1.73	0.58	0.34	6.06	2.03	1.18	0
NDC-593	NDC-593-6	15.5	16.0	59.7	64.2	4.5	3.81	0.60	0.36	17.15	2.70	1.62	52
			EL 44.2-59.7		**Total D=**	**15.5**	**1.81**	**0.90**				**0.87**	**8**
NDC-594	NDC-594-1	0.5	1.0	35.5	38.5	3.0	1.18	1.05	1.10	3.54	3.15	3.31	4
NDC-594	NDC-594-2	3.0	3.5	38.5	41.5	3.0	1.20	0.89	0.79	3.60	2.67	2.38	3
NDC-594	NDC-594-3	6.0	6.5	41.5	44.0	2.5	1.65	0.97	0.94	4.13	2.43	2.35	2
NDC-594	NDC-594-4	8.5	9.0	44.0	46.5	2.5	1.15	0.98	0.96	2.88	2.45	2.40	4
NDC-594	NDC-594-5	11.0	11.5	46.5	49.5	3.0	1.68	0.77	0.59	5.04	2.31	1.78	4
NDC-594	NDC-594-6	14.0	14.5	49.5	51.6	2.1	1.21	0.67	0.45	2.54	1.41	0.94	1
			EL 35.5-51.6		**Total D=**	**16.1**	**1.35**	**0.90**				**0.82**	**3**

Table E-5B (continued)

1998 USACOE/Dare County Offshore Borings for Borrow Area S1

Boring Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Layer Thickness	Mean	Std Dev	Variance	Weighted Mean	Weighted Std Dev	Weighted Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-595	NDC-595-1	1.0	1.5	44.2	47.2	3.0	1.19	1.09	1.19	3.57	3.27	3.56	3
NDC-595	NDC-595-2	3.0	3.5	47.2	50.2	3.0	1.45	0.95	0.90	4.35	2.85	2.71	4
NDC-595	NDC-595-3	6.0	6.5	50.2	53.2	3.0	1.34	0.82	0.67	4.02	2.46	2.02	2
NDC-595	NDC-595-4	9.0	9.5	53.2	55.2	2.0	1.73	0.89	0.79	3.46	1.78	1.58	5
NDC-595	NDC-595-5	11.0	11.5	55.2	56.4	1.2	1.74	0.85	0.72	2.09	1.02	0.87	4
NDC-595	NDC-595-6	14.0	14.5	56.4	58.9	2.5	1.84	1.01	1.02	4.60	2.53	2.55	5
			EL 44.2-58.9		**Total D=**	**14.7**	**1.50**	**0.95**				**0.90**	**4**
NDC-596	NDC-596-1	0.5	1.0	36.3	38.3	2.0	0.50	1.18	1.39	1.00	2.36	2.78	2
NDC-596	NDC-596-2	3.0	3.5	38.3	42.3	4.0	1.27	1.04	1.08	5.08	4.16	4.33	4
NDC-596	NDC-596-3	6.0	6.5	42.3	45.3	3.0	1.07	1.08	1.17	3.21	3.24	3.50	4
NDC-596	NDC-596-4	9.0	9.5	45.3	48.3	3.0	1.70	0.79	0.62	5.10	2.37	1.87	4
NDC-596	NDC-596-5	12.0	12.5	48.3	50.0	1.7	1.89	1.01	1.02	3.21	1.72	1.73	3
			EL 36.3-50.0		**Total D=**	**13.7**	**1.28**	**1.01**				**1.04**	**3**
NDC-597	NDC-597-1	1.0	1.5	47.7	51.7	4.0	1.11	1.53	2.34	4.44	6.12	9.36	2
NDC-597	NDC-597-2	4.0	4.5	51.7	54.5	2.8	2.03	1.29	1.66	5.68	3.61	4.66	8
NDC-597	NDC-597-3	6.8	7.3	54.5	55.2	0.7	3.83	0.81	0.66	2.68	0.57	0.46	59
NDC-597	NDC-597-4	7.5	8.0	55.2	55.7	0.5	4.30	0.36	0.13	2.15	0.18	0.06	95
NDC-597	NDC-597-5	8.0	8.5	55.7	59.1	3.4	4.07	0.59	0.35	13.84	2.01	1.18	76
NDC-597	NDC-597-6	11.4	11.9	59.1	59.7	0.6	4.22	0.46	0.21	2.53	0.28	0.13	88
NDC-597	NDC-597-7	12.0	12.5	59.7	63.8	4.1	4.00	1.07	1.14	16.40	4.39	4.69	81
			EL 47.7-54.5		**Total D=**	**6.8**	**1.49**	**1.43**				**2.06**	**4**
NDC-599	NDC-599-1	0.5	1.0	40.4	43.4	3.0	1.19	1.00	1.00	3.57	3.00	3.00	3
NDC-599	NDC-599-2	3.0	3.5	43.4	46.4	3.0	1.25	0.96	0.92	3.75	2.88	2.76	3
NDC-599	NDC-599-3	6.0	6.5	46.4	47.6	1.2	1.85	0.68	0.46	2.22	0.82	0.55	3
NDC-599	NDC-599-4	8.0	8.5	47.6	49.9	2.3	1.84	0.78	0.61	4.23	1.79	1.40	1
			EL 40.4-49.9		**Total D=**	**9.5**	**1.45**	**0.89**				**0.81**	**2**
NDC-600	NDC-600-1	0.5	1.0	38.9	41.9	3.0	1.34	0.92	0.85	4.02	2.76	2.54	3
NDC-600	NDC-600-2	3.0	3.5	41.9	44.9	3.0	1.57	0.90	0.81	4.71	2.70	2.43	3
NDC-600	NDC-600-3	6.0	6.5	44.9	47.9	3.0	1.68	0.80	0.64	5.04	2.40	1.92	4
NDC-600	NDC-600-4	9.0	9.5	47.9	49.9	2.0	1.52	0.98	0.96	3.04	1.96	1.92	3
NDC-600	NDC-600-5	11.0	11.5	49.9	51.4	1.5	1.78	0.81	0.66	2.67	1.22	0.98	4
			EL 38.9-51.4		**Total D=**	**12.5**	**1.56**	**0.88**				**0.78**	**3**
NDC-602	NDC-602-1	0.5	1.0	41.7	44.7	3.0	0.88	1.02	1.04	2.64	3.06	3.12	1
NDC-602	NDC-602-2	3.0	3.5	44.7	47.7	3.0	1.22	0.97	0.94	3.66	2.91	2.82	3
NDC-602	NDC-602-3	6.0	6.5	47.7	50.2	2.5	1.06	1.06	1.12	2.65	2.65	2.81	3
NDC-602	NDC-602-4	8.5	9.0	50.2	52.7	2.5	1.43	0.83	0.69	3.58	2.08	1.72	1
NDC-602	NDC-602-5	11.0	11.5	52.7	55.7	3.0	1.69	0.95	0.90	5.07	2.85	2.71	5
NDC-602	NDC-602-6	14.0	14.5	55.7	58.4	2.7	1.85	0.83	0.69	4.99	2.24	1.86	3
			EL 41.7-58.4		**Total D=**	**16.7**	**1.35**	**0.95**				**0.90**	**3**
NDC-604	NDC-604-1	0.5	1.0	43.3	46.3	3.0	0.44	1.44	2.07	1.32	4.32	6.22	3
NDC-604	NDC-604-2	3.0	3.5	46.3	49.3	3.0	1.39	1.02	1.04	4.17	3.06	3.12	4
NDC-604	NDC-604-3	6.0	6.5	49.3	52.3	3.0	2.13	0.65	0.42	6.39	1.95	1.27	2
NDC-604	NDC-604-4	9.0	9.5	52.3	55.3	3.0	2.21	0.65	0.42	6.63	1.95	1.27	4
NDC-604	NDC-604-5	12.0	12.5	55.3	59.3	4.0	3.10	0.88	0.77	12.40	3.52	3.10	21
NDC-604	NDC-604-6	16.0	16.5	59.3	63.3	4.0	2.86	1.49	2.22	11.44	5.96	8.88	30
			EL 43.3-59.3		**Total D=**	**16.0**	**1.93**	**0.93**				**0.94**	**8**

Table E-5B (continued)

1998 USACOE/Dare County Offshore Borings for Borrow Area S1

Boring Hole #	Sample #	Sample Depth (ft)		Layer Depth (ft)		Layer Thickness	Mean	Std Dev	Variance	Weighted Mean	Weighted Std Dev	Weighted Variance	% Silt
		Top	Bottom	Top	Bottom	(feet)	(phi)	(phi)		(phi)	(phi)		<200mm
NDC-609	NDC-609-1	0.5	1.0	48.4	52.4	4.0	1.01	1.29	1.66	4.04	5.16	6.66	3
NDC-609	NDC-609-2	4.0	4.5	52.4	54.4	2.0	1.86	0.86	0.74	3.72	1.72	1.48	1
NDC-609	NDC-609-3	6.0	6.5	54.4	57.4	3.0	2.14	0.95	0.90	6.42	2.85	2.71	5
NDC-609	NDC-609-4	9.0	9.5	57.4	59.4	2.0	3.11	0.94	0.88	6.22	1.88	1.77	21
NDC-609	NDC-609-5	11.0	11.5	59.4	64.4	5.0	4.20	0.57	0.32	21.00	2.85	1.62	90
NDC-609	NDC-609-6	16.0	16.5	64.4	68.4	4.0	3.96	0.85	0.72	15.84	3.40	2.89	79
				EL 48.4-57.4	**Total D=**	**11.0**	**1.85**	**1.06**				**0.99**	**6**
NDC-611	NDC-611-1	0.5	1.0	54.2	56.7	2.5	-0.46	1.89	3.57	-1.15	4.73	8.93	1
NDC-611	NDC-611-2	2.5	3.0	56.7	59.2	2.5	1.39	0.95	0.90	3.48	2.38	2.26	3
NDC-611	NDC-611-3	5.0	5.5	59.2	61.2	2.0	2.11	0.88	0.77	4.22	1.76	1.55	4
NDC-611	NDC-611-4	7.0	7.5	61.2	64.2	3.0	0.26	1.88	3.53	0.78	5.64	10.60	2
NDC-611	NDC-611-5	10.0	10.5	64.2	65.7	1.5	0.69	1.15	1.32	1.04	1.73	1.98	0
				EL 54.2-65.7	**Total D=**	**11.5**	**0.73**	**1.41**				**2.20**	**2**
NDC-641	NDC-641-1	0.5	1.0	45.5	48.5	3.0	1.05	1.11	1.23	3.15	3.33	3.70	3
NDC-641	NDC-641-2	3.0	3.5	48.5	51.0	2.5	1.72	0.63	0.40	4.30	1.58	0.99	2
NDC-641	NDC-641-3	5.5	6.0	51.0	54.0	3.0	1.87	1.04	1.08	5.61	3.12	3.24	10
NDC-641	NDC-641-4	8.5	9.0	54.0	56.5	2.5	1.95	0.82	0.67	4.88	2.05	1.68	5
NDC-641	NDC-641-5	11.0	11.5	56.5	60.5	4.0	2.98	1.40	1.96	11.92	5.60	7.84	28
NDC-641	NDC-641-6	15.0	15.5	60.5	63.0	2.5	4.02	0.56	0.31	10.05	1.40	0.78	70
				EL 45.5-56.5	**Total D=**	**11.0**	**1.63**	**0.92**				**0.87**	**5**
NDC-642	NDC-642-1	0.5	1.0	45.7	48.7	3.0	1.48	1.32	1.74	4.44	3.96	5.23	5
NDC-642	NDC-642-2	3.0	3.5	48.7	51.7	3.0	3.57	0.74	0.55	10.71	2.22	1.64	36
NDC-642	NDC-642-3	6.0	6.5	51.7	56.7	5.0	3.50	0.78	0.61	17.50	3.90	3.04	31
NDC-642	NDC-642-4	11.0	11.5	56.7	59.7	3.0	4.20	0.51	0.26	12.60	1.53	0.78	87
NDC-642	NDC-642-5	16.0	16.5	59.7	62.8	3.1	3.94	1.16	1.35	12.21	3.60	4.17	80
				EL 45.7-48.7	**Total D=**	**3.0**	**1.48**	**1.32**				**1.74**	**5**
NDC-707	NDC-707-1	0.5	1.0	51.5	54.5	3.0	1.35	1.10	1.21	4.05	3.30	3.63	1
NDC-707	NDC-707-2	3.0	3.5	54.5	56.0	1.5	1.18	1.20	1.44	1.77	1.80	2.16	1
NDC-707	NDC-707-3	4.5	5.0	56.0	57.5	1.5	2.23	1.07	1.14	3.35	1.61	1.72	9
NDC-707	NDC-707-4	6.0	6.5	57.5	61.2	3.7	1.86	1.00	1.00	6.88	3.70	3.70	5
NDC-707	NDC-707-5	9.7	10.2	61.2	65.5	4.3	3.60	1.58	2.50	15.48	6.79	10.73	72
NDC-707	NDC-707-6	14.0	14.5	65.5	67.2	1.7	4.26	0.38	0.14	7.24	0.65	0.25	91
				EL 51.5-61.2	**Total D=**	**9.7**	**1.65**	**1.07**				**1.16**	**4**

Table E-6A

1995 USACOE/Dare County Offshore Borings for Borrow Area S2

Boring Hole #	Sample Depth (cm)		Layer Depth (cm)		Layer Thickness	WTD Mean (Ø)	WTD StDev (Ø)	WTD Var (Ø)	% Silt	WTD % Silt	NCGS SAMPLE DATA Mean (Ø)	StDev (Ø)	Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
303	0	4	0	30	30	64.71	20.72	14.31	1.5	45	2.16	0.69	0.48
303	50	54	30	50	20	41.18	12.31	7.58	1.0	20	2.06	0.62	0.38
303	100	104	50	100	50	96.69	32.55	21.19	1.9	95	1.93	0.65	0.42
303	150	154	100	150	50	105.16	39.80	31.67	3.9	195	2.10	0.80	0.63
303	180	184	150	190	40	96.30	42.35	44.83	9.7	388	2.41	1.06	1.12
303	200	204	190	204	14	47.81	18.40	24.18	52.7	738	3.42	1.31	1.73
303	250	254	204	254	50	180.81	42.29	35.77	31.8	1590	3.62	0.85	0.72
303	300	304	254	304	50	181.62	33.45	22.38	25.2	1260	3.63	0.67	0.45
303	350	354	304	354	50	179.17	29.90	17.88	19.8	990	3.58	0.60	0.36
303	400	404	354	404	50	190.61	30.19	18.23	37.5	1875	3.81	0.60	0.36
303	445	449	404	449	45	169.31	28.67	18.27	35.0	1575	3.76	0.64	0.41
303			Top	190 cm	190	2.13	0.78	0.63		4			
				6.2	feet								
304	0	4	1	36	35	93.34	39.10	43.67	10.2	358	2.67	1.12	1.25
304	40	44	36	47	11	1.23	16.88	25.90	2.9	32	0.11	1.53	2.35
304	50	54	47	79	32	90.07	50.84	80.79	14.7	472	2.81	1.59	2.52
304	80	84	79	94	15	19.31	29.01	56.09	13.5	202	1.29	1.93	3.74
304	100	104	94	110	16	55.07	23.46	34.40	38.6	617	3.44	1.47	2.15
304	150	154	110	155	45	102.72	98.63	216.16	34.8	1566	2.28	2.19	4.80
304	200	204	155	250	95	106.43	204.16	438.74	21.8	2073	1.12	2.15	4.62
304	250	254	250	285	35	42.69	84.59	204.43	29.6	1036	1.22	2.42	5.84
304	300	304	285	335	50	178.63	82.19	135.09	69.4	3472	3.57	1.64	2.70
304	350	354	335	390	55	206.39	63.83	74.07	50.9	2797	3.75	1.16	1.35
304	400	404	390	435	45	98.94	95.18	201.30	32.2	1449	2.20	2.12	4.47
304	450	454	435	454	19	47.13	18.85	18.71	8.2	155	2.48	0.99	0.98
304	463	467	454	467	13	34.52	12.94	12.87	11.0	143	2.66	1.00	0.99
304			Top	94 cm	94	2.19	1.44	2.22		11			
				3.1	feet								
306	0	4	0	20	20	39.13	15.35	11.78	0.7	14	1.96	0.77	-0.55
306	50	54	20	90	70	144.98	48.25	33.26	1.0	70	2.07	0.69	-0.62
306	100	104	90	126	36	68.76	30.34	25.58	1.3	47	1.91	0.84	-0.34
306	150	154	126	166	40	114.50	32.67	26.68	7.0	280	2.86	0.82	-0.50
306			Top	166 cm	166	2.21	0.76	0.59		3			
				5.4	feet								
307	0	4	0	30	30	71.10	18.25	11.11	1.0	30	2.37	0.61	-0.26
307	50	54	30	70	40	96.31	25.37	16.09	1.7	68	2.41	0.63	-0.65
307	100	104	70	140	70	177.70	47.49	32.22	2.6	182	2.54	0.68	-0.13
307	150	154	140	180	40	84.77	37.64	35.42	1.8	72	2.12	0.94	-1.00
307	200	204	180	210	30	83.68	23.45	18.34	4.6	138	2.79	0.78	-0.79
307	250	254	210	280	70	225.39	45.75	29.90	9.9	693	3.22	0.65	-0.07
307	300	304	280	330	50	160.80	33.90	22.98	7.7	385	3.22	0.68	-1.14
307	350	354	330	390	60	210.29	31.72	16.77	13.7	822	3.50	0.53	-0.25
307	400	404	390	410	20	-11.57	29.06	42.21	3.1	62	-0.58	1.45	2.32
307	415	419	410	419	9	19.37	21.56	51.63	35.6	320	2.15	2.40	-0.42
307			Top	419 cm	419	2.67	0.75	0.66		7			
				13.7	feet								
309	0	4	0	20	20	29.71	28.04	39.31	7.2	145	1.49	1.40	0.02
309	35	39	20	41	21	12.39	32.24	49.49	2.8	59	0.59	1.54	0.34
309	50	54	41	80	39	151.98	33.55	28.87			3.90	0.86	-2.67
309	100	104	80	105	25	89.72	15.72	9.89			3.59	0.63	-0.30
309	150	154	132	173	41	157.83	25.27	15.58			3.85	0.62	-0.85
309			Top	41 cm	41	1.03	1.47	2.17		5			
				1.4	feet								

Table E-6A (continued)

1995 USACOE/Dare County Offshore Borings for Borrow Area S2

Boring Hole #	Sample Depth (cm)		Layer Depth (cm)		Layer Thickness	WTD Mean (Ø)	WTD StDev (Ø)	WTD Var (Ø)	% Silt	WTD % Silt	NCGS SAMPLE DATA Mean (Ø)	NCGS SAMPLE DATA StDev (Ø)	NCGS SAMPLE DATA Var (Ø)
311	0	4	0	21	21	42.83	16.81	13.46	0.7	14	2.04	0.80	0.64
311	30	34	21	40	19	46.43	13.65	9.81	2.2	42	2.44	0.72	0.52
311	50	54	40	50	10	11.44	14.22	20.21	2.3	23	1.14	1.42	2.02
311	80	84	50	92	42	141.42	25.33	15.27	8.1	341	3.37	0.60	0.36
311	95	99	92	100	8	10.21	14.70	27.02	9.1	73	1.28	1.84	3.38
311	100	104	100	110	10	13.18	18.38	33.77	15.1	151	1.32	1.84	3.38
311	120	124	110	140	30	126.08	25.68	21.98	86.3	2590	4.20	0.86	0.73
311	140	144	140	149	9	17.43	19.04	40.26	17.6	158	1.94	2.12	4.47
311	150	154	148	170	22	71.60	38.63	67.83	42.1	927	3.25	1.76	3.08
311	170	174	170	200	30	108.03	34.17	38.92	37.3	1119	3.60	1.14	1.30
311	200	204	200	220	20	75.17	20.60	21.23	47.0	940	3.76	1.03	1.06
311	250	254	220	295	75	50.98	164.28	359.82	17.4	1304	0.68	2.19	4.80
311	300	304	295	325	30	44.82	75.73	191.19	35.8	1075	1.49	2.52	6.37
311	350	354	325	360	35	151.56	27.94	22.30			4.33	0.80	0.64
311	400	404	360	450	90	310.29	161.34	289.21			3.45	1.79	3.21
311	450	454	450	471	21	62.40	17.07	13.88			2.97	0.81	0.66
311			Top	110 cm	110	2.41	0.94	1.09		6			
				3.6	feet								
312	0	4	0	43	43	46.48	42.54	42.09	0.7	31	1.08	0.99	-0.52
312	50	54	43	90	47	72.23	34.32	25.06	1.4	66	1.54	0.73	0.23
312	100	104	90	114	24	30.70	26.95	30.26	2.8	68	1.28	1.12	0.11
312	150	154	114	168	54	169.29	71.92	95.78	19.1	1031	3.13	1.33	-1.85
312	180	184	168	180	12	27.44	10.76	9.64	5.0	60	2.29	0.90	0.47
312	200	204	180	220	40	94.11	39.81	39.63	7.0	280	2.35	1.00	0.47
312	250	254	220	250	30	94.82	26.97	24.25	12.8	384	3.16	0.90	-0.95
312	300	304	250	300	50	166.23	47.34	44.83	14.1	707	3.32	0.95	-2.63
312	350	354	300	350	50	161.56	82.10	134.80	40.2	2010	3.23	1.64	-1.58
312	370	374	350	400	50	33.49	104.54	218.57	8.9	445	0.67	2.09	0.66
312	400	404	400	430	30	48.15	69.36	160.35	16.7	502	1.60	2.31	-0.13
312	440	444	430	440	10	30.09	18.27	33.39	35.9	359	3.01	1.83	-1.29
312			Top	440 cm	440	2.21	1.31	1.95		14			
				14.4	feet								
313	0	4	0	50	50	54.81	46.25	42.78	0.8	38	1.10	0.92	-0.31
313	50	54	50	85	35	50.68	32.24	29.71	0.9	33	1.45	0.92	-0.79
313	100	104	85	114	29	39.48	26.75	24.67	1.5	43	1.36	0.92	-0.10
313	150	154	114	173	59	191.82	43.34	31.84			3.25	0.73	-1.04
313			Top	173 cm	114	1.27	0.92	0.85		1			
				3.7	feet								
315	000	004	0	27	27	46.02	21.89	17.74	1.4	39	1.70	0.81	0.66
315	050	054	27	67	40	123.71	42.24	44.61	17.0	680	3.09	1.06	1.12
315	070	074	67	77	10	25.28	16.25	26.39	17.5	175	2.53	1.62	2.64
315	085	089	77	85	8	29.52	7.11	6.31	37.8	302	3.69	0.89	0.79
315	100	104	85	125	40	77.80	73.40	134.68	16.9	676	1.95	1.83	3.37
315	150	154	125	180	55	179.87	82.96	125.13			3.27	1.51	2.28
315	180	184	180	186	6	23.96	3.45	1.99			3.99	0.58	0.33
315			Top	125 cm	125	2.42	1.29	1.84		15			
				4.1	feet								
321	0	4	0	22	22	39.94	20.71	19.49	1.8	40	1.82	0.94	0.89
321	23	27	22	30	8	1.77	13.03	21.21	3.6	29	0.22	1.63	2.65
321	35	39	30	40	10	-0.49	18.96	35.95	8.7	87	-0.05	1.90	3.60
321	50	54	40	70	30	113.96	32.35	34.89	51.4	1541	3.80	1.08	1.16
321	70	74	70	100	30	116.75	24.60	20.16	50.6	1519	3.89	0.82	0.67
321	100	104	100	113	13	51.93	10.66	8.74	62.0	806	3.99	0.82	0.67
321	150	154	113	165	52	73.47	122.09	286.68	27.5	1430	1.41	2.35	5.51
321	200	204	165	250	85	351.48	97.92	112.81			4.14	1.15	1.33
321	250	254	250	289	39	166.30	37.52	36.09			4.26	0.96	0.93
321	300	304	289	350	61	160.23	67.59	74.88			2.63	1.11	1.23
321	350	354	350	400	50	156.11	50.71	51.42			3.12	1.01	1.03
321	400	404	400	443	43	110.03	34.31	27.38			2.56	0.80	0.64
321	443	447	443	448	5	11.39	5.72	6.55			2.28	1.14	1.31
321			Top	40 cm	40	1.03	1.32	1.92		4			
				1.3	feet								

Table E-6A (continued)

1995 USACOE/Dare County Offshore Borings for Borrow Area S2

Boring Hole #	Sample Depth (cm)		Layer Depth (cm)		Layer Thickness	WTD Mean (Ø)	WTD StDev (Ø)	WTD Var (Ø)	% Silt	WTD % Silt	NCGS SAMPLE DATA Mean (Ø)	StDev (Ø)	Var (Ø)
323	0	4	0	46	46	39.35	42.07	38.47	0.8	35	0.86	0.91	0.84
323	46	50	46	50	4	9.09	5.11	6.53	14.2	57	2.27	1.28	1.63
323	80	84	50	100	50	13.68	98.85	195.43	4.5	225	0.27	1.98	3.91
323	100	104	100	115	15	3.86	26.19	45.73	6.6	100	0.26	1.75	3.05
323	150	154	115	200	85	313.16	68.92	55.89	34.9	2964	3.68	0.81	0.66
323	200	204	200	250	50	180.38	45.34	41.12			3.61	0.91	0.82
323	250	254	250	300	50	193.31	39.81	31.70			3.87	0.80	0.63
323	300	304	300	350	50	188.62	59.88	71.71			3.77	1.20	1.43
323	350	354	350	400	50	210.75	34.19	23.38			4.22	0.68	0.47
323	400	404	400	420	20	40.43	45.29	102.55			2.02	2.26	5.13
323	450	454	420	490	70	191.49	145.90	304.10			2.74	2.08	4.34
323	500	504	490	543	53	216.37	46.04	39.99			4.08	0.87	0.75
323	550	554	543	590	47	24.42	93.52	186.08			0.52	1.99	3.96
323	596	600	590	596	6	5.74	11.50	2190.36			0.96	1.92	3.68
323			Top	115 cm	115	0.57	1.50	2.49		4			
				3.8	feet								
325	0	4	0	30	30	48.31	25.94	22.43	2.1	63	1.61	0.86	0.75
325	50	54	30	75	45	84.33	34.78	26.88	1.9	86	1.87	0.77	0.60
325	100	104	75	124	49	49.80	68.52	95.82	2.0	96	1.02	1.40	1.96
325	135	139	124	150	26	-4.37	38.47	56.93	1.9	50	-0.17	1.48	2.19
325	150	154	150	168	18	37.02	36.11	72.45	7.9	142	2.06	2.01	4.03
325	150	154	168	200	32	113.74	33.88	35.86	35.2	1126	3.55	1.06	1.12
325	200	204	200	250	50	171.10	58.39	68.18			3.42	1.17	1.36
325	250	254	250	275	25	96.94	15.55	9.68			3.88	0.62	0.39
325	300	304	275	310	35	109.87	59.09	99.77			3.14	1.69	2.85
325	350	354	310	370	60	169.90	126.02	264.68			2.83	2.10	4.41
325	390	394	370	390	20	87.10	12.83	8.23			4.36	0.64	0.41
325	400	404	390	425	35	142.73	32.49	30.17			4.08	0.93	0.86
325	450	454	425	470	45	195.15	29.33	19.11			4.34	0.65	0.42
325	500	504	470	500	30	106.85	30.59	31.19			3.56	1.02	1.04
325	550	554	500	604	104	370.77	77.25	57.38			3.57	0.74	0.55
325			Top	200 cm	200	1.64	1.19	1.55		8			
				6.6	feet								
326	0	4	0	40	40	78.91	93.45	218.33	20.56	822	1.97	2.34	5.46
326	50	54	46	100	54	146.01	110.75	227.15	30.93	1670	2.70	2.05	4.21
326	100	104	100	150	50	167.10	68.88	94.90	31.14	1557	3.34	1.38	1.90
326	150	154	150	176	26	84.87	37.42	53.85	28.19	733	3.26	1.44	2.07
326	176	180	176	181	5	19.42	5.67	6.44	59.42	297	3.88	1.13	1.29
326			Top	175 cm	175	2.84	1.81	3.43		29			
				5.7	feet								
328	0	4	0	5	5	12.99	7.29	10.62	21.13	106	2.60	1.46	2.12
328	10	14	5	19	14	21.79	14.59	15.21	2.21	31	1.56	1.04	1.09
328	30	34	19	50	31	76.95	54.38	95.39	24.64	764	2.48	1.75	3.08
328	50	54	50	75	25	-8.82	34.72	48.21	2.65	66	-0.35	1.39	1.93
328	75	79	75	100	25	88.24	36.13	52.20	46.88	1172	3.53	1.45	2.09
328	100	104	100	150	50	178.74	74.79	111.87	52.39	2620	3.57	1.50	2.24
328	150	154	150	200	50	44.59	114.43	261.89	19.89	995	0.89	2.29	5.24
328	200	204	200	250	50	185.45	83.36	138.99			3.71	1.67	2.78
328	250	254	250	300	50	180.46	76.18	116.05			3.61	1.52	2.32
328	300	304	300	350	50	169.97	78.64	123.68			3.40	1.57	2.47
328	350	354	350	40	-310	-938.30	-421.63	-573.45			3.03	1.36	1.85
328	400	404	400	450	50	142.01	68.21	93.05			2.84	1.36	1.86
328	450	454	450	485	35	94.65	51.64	76.20			2.70	1.48	2.18
328	485	489	485	491	6	17.46	8.12	11.00			2.91	1.35	1.83
328			Top	200 cm	200	2.07	1.68	2.98		29			
				6.6	feet								
331	0	4	0	35	35	-14.52	40.83	47.62	1.31	46	-0.41	1.17	1.36
331	13	17	35	50	15	-4.63	26.74	47.67	7.54	113	-0.31	1.78	3.18
331	40	44	50	68	18	27.54	15.89	14.03	3.19	57	1.53	0.88	0.78
331			Top	68 cm	68	0.12	1.23	1.61		3			
				2.2	feet								

Table E-7A

1995 USACOE/Dare County Offshore Borings for Borrow Area S3

Boring					Layer	WTD	WTD	WTD		WTD	NCGS SAMPLE DATA		
Hole #	Sample Depth (cm)		Layer Depth (cm)		Thickness	Mean (Ø)	StDev (Ø)	Var (Ø)	% Silt	% Silt	Mean (Ø)	StDev (Ø)	Var (Ø)
	Top	Bottom	Top	Bottom	(cm)								
339	0	4	0	30	30	86.63	27.07	24.43	6.34	190.20	2.89	0.90	0.81
339	50	54	30	90	60	163.33	104.91	183.44	25.77	1546.20	2.72	1.75	3.06
339	100	104	90	120	30	97.12	35.16	41.21	33.96	1018.80	3.24	1.17	1.37
339	150	154	120	165	45	84.70	42.65	40.42	2.52	113.40	1.88	0.95	0.90
339	200	204	165	220	55	53.32	85.58	133.16	5.01	275.55	0.97	1.56	2.42
339	250	254	220	290	70	52.68	99.47	141.34	2.83	198.10	0.75	1.42	2.02
339	290	294	290	300	10	29.39	14.05	19.74	17.59	175.90	2.94	1.40	1.97
339	300	304	300	310	10	22.81	15.38	23.67	16.06	160.60	2.28	1.54	2.37
339	350	354	310	380	70	-0.96	78.46	87.95	0.83	58.10	-0.01	1.12	1.26
339	380	384	380	385	5	1.18	7.85	12.32	4.49	22.45	0.24	1.57	2.46
339			**Top**	**385 cm**	**385**	**1.53**	**1.33**	**1.84**		**10**			
				12.6 feet									

Table E-7B

1998 USACOE/Dare County Offshore Borings for Borrow Area S3

Boring Hole #	Sample #	Sample Depth(ft) Top	Sample Depth(ft) Bottom	Layer Depth(ft) Top	Layer Depth(ft) Bottom	Layer Thickness (feet)	Mean (phi)	Std Dev (phi)	Variance	Weighted Mean (phi)	Weighted Std Dev (phi)	Weighted Variance	% Silt <200mm
NDC-497	NDC-497-1	1.0	1.5	34.5	37.8	3.3	2.93	0.80	0.64	9.67	2.64	2.11	5
NDC-497	NDC-497-2	3.3	3.8	37.8	39.5	1.7	3.64	1.02	1.04	6.19	1.73	1.77	62
NDC-497	NDC-497-3	5.0	5.5	39.5	43.5	4.0	3.65	1.08	1.17	14.60	4.32	4.67	64
NDC-497	NDC-497-4	9.0	9.5	43.5	46.5	3.0	3.61	0.90	0.81	10.83	2.70	2.43	52
NDC-497	NDC-497-5	12.0	12.5	46.5	48.3	1.8	3.46	0.76	0.58	6.23	1.37	1.04	34
			EL 34.5-37.8		**Total D=**	**3.3**	**2.93**	**0.80**				**0.64**	**5**
NDC-498	NDC-498-1	0.5	1.0	45.3	47.5	2.2	2.24	0.69	0.48	4.93	1.52	1.05	3
NDC-498	NDC-498-2	3.0	3.5	47.5	49.5	2.0	2.78	0.87	0.76	5.56	1.74	1.51	9
NDC-498	NDC-498-3	4.2	4.7	49.5	51.8	2.3	1.09	1.47	2.16	2.51	3.38	4.97	5
NDC-498	NDC-498-4	6.5	7.0	51.8	54.1	2.3	1.08	0.90	0.81	2.48	2.07	1.86	5
			EL 45.3-54.1		**Total D=**	**8.8**	**1.76**	**0.99**				**1.07**	**5**
NDC-568	NDC-568-1	0.5	1.0	48.9	51.4	2.5	2.97	0.61	0.37	7.43	1.53	0.93	7
NDC-568	NDC-568-2	2.5	3.0	51.4	53.4	2.0	3.67	0.62	0.38	7.34	1.24	0.77	42
NDC-568	NDC-568-3	4.5	5.0	53.4	54.6	1.2	2.44	0.60	0.36	2.93	0.72	0.43	2
			EL 48.9-51.4		**Total D=**	**2.5**	**2.97**	**0.61**				**0.37**	**7**
NDC-570	NDC-570-1	0.0	0.5	40.4	42.0	1.6	2.67	0.71	0.50	4.27	1.14	0.81	3
NDC-570	NDC-570-2	2.5	3.0	42.0	44.4	2.4	2.56	0.52	0.27	6.14	1.25	0.65	2
NDC-570	NDC-570-3	4.0	4.5	44.4	46.2	1.8	2.15	0.98	0.96	3.87	1.76	1.73	2
			EL 40.4-46.2		**Total D=**	**5.8**	**2.46**	**0.72**				**0.55**	**2**
NDC-571	NDC-571-1	0.5	1.0	47.1	50.6	3.5	4.19	0.69	0.48	14.67	2.42	1.67	93
NDC-571	NDC-571-2	3.5	4.0	50.6	53.1	2.5	3.18	0.96	0.92	7.95	2.40	2.30	22
NDC-571	NDC-571-3	6.0	6.5	53.1	55.0	1.9	4.06	0.76	0.58	7.71	1.44	1.10	85
			EL 47.1-53.1		**Total D=**	**6.0**	**3.07**					**2.84**	**63**
NDC-572	NDC-572-1	0.5	1.0	47.0	49.5	2.5	3.30	0.55	0.30	8.25	1.38	0.76	14
NDC-572	NDC-572-2	2.5	3.0	49.5	51.5	2.0	2.48	1.83	3.35	4.96	3.66	6.70	11
NDC-572	NDC-572-3	4.5	5.0	51.5	53.0	1.5	2.82	1.12	1.25	4.23	1.68	1.88	28
NDC-572	NDC-572-4	6.0	6.5	53.0	54.6	1.6	3.32	0.66	0.44	5.31	1.06	0.70	20
			EL 47.0-51.5		**Total D=**	**4.5**	**2.94**	**1.12**				**1.66**	**12**
NDC-573	NDC-573-1	0.5	1.0	39.3	42.3	3.0	2.47	1.01	1.02	7.41	3.03	3.06	11
NDC-573	NDC-573-2	3.0	3.5	42.3	44.3	2.0	3.07	1.48	2.19	6.14	2.96	4.38	44
NDC-573	NDC-573-4	8.0	8.5	44.3	46.0	1.7	4.19	0.70	0.49	7.12	1.19	0.83	92
			EL 39.3-42.3		**Total D=**	**3.0**	**2.47**	**1.01**				**1.02**	**11**
NDC-620	NDC-620-1	0.5	1.0	52.0	53.8	1.8	3.09	0.85	0.72	5.56	1.53	1.30	13
NDC-620	NDC-620-2	1.8	2.3	53.8	55.0	1.2	-0.21	1.77	3.13	-0.25	2.12	3.76	0
NDC-620	NDC-620-3	3.5	4.0	55.0	56.8	1.8	1.35	0.83	0.69	2.43	1.49	1.24	4
			EL 52.0-56.8		**Total D=**	**4.8**	**1.61**	**1.07**				**1.31**	**6**
NDC-621	NDC-621-1	0.5	1.0	51.5	54.5	3.0	2.94	0.96	0.92	8.82	2.88	2.76	14
NDC-621	NDC-621-2	3.0	3.5	54.5	56.9	2.4	0.39	1.40	1.96	0.94	3.36	4.70	3
			EL 51.5-56.9		**Total D=**	**5.4**	**1.81**	**1.16**				**1.38**	**9**
NDC-622	NDC-622-1	0.5	1.0	49.4	53.4	4.0	3.16	0.72	0.52	12.64	2.88	2.07	14
NDC-622	NDC-622-2	4.0	4.5	53.4	57.4	4.0	3.47	1.16	1.35	13.88	4.64	5.38	44
NDC-622	NDC-622-3	8.0	8.5	57.4	62.4	5.0	3.89	0.75	0.56	19.45	3.75	2.81	64
NDC-622	NDC-622-4	13.0	13.5	62.4	65.5	3.1	4.11	0.59	0.35	12.74	1.83	1.08	82
NDC-622	NDC-622-5	18.0	18.5	65.5	68.8	3.3	4.05	0.90	0.81	13.37	2.97	2.67	82
			EL 49.4-53.4		**Total D=**	**4.0**	**3.16**	**0.72**				**0.52**	**14**

Table E-8

Composite Characteristics for Borrow Area N1

Boring Hole #	Depth (feet)	% Silt	Wtd % Silt	Var (Øb)	Wtd Var (Øb)	A	B	n	M (Øb)	Wtd M (Øb)	S2 (Øb)	S (Øb)
430	2.5	11	27.5	1.75	4.38	3.5	-0.1	4	2.48	6.20	3.03	1.741
431	5.5	9	49.5	1.22	6.71	2.9	2.2	2	2.53	13.92	1.38	1.174
432	6.7	14	93.8	1.07	7.17	3.6	1.4	5	2.62	17.55	1.57	1.251
434	11.5	3	34.5	1.40	16.10	3.3	0.5	13	1.86	21.39	2.09	1.446
436A	9.5	6	57.0	1.88	17.86	2.5	1.0	4	1.71	16.25	2.15	1.467
437	10.0	2	20.0	0.84	8.40	2.3	1.0	8	1.80	18.00	1.01	1.006
440	13.1	4	52.4	0.76	9.96	3.3	2.3	9	2.59	33.93	0.86	0.930
442	8.3	2	16.6	0.55	4.57	2.7	1.8	7	2.27	18.84	0.64	0.802
443A	2.8	11	30.8	2.23	6.24	2.1	1.7	2	1.91	5.35	2.31	1.520
453	5.5	1	5.5	0.59	3.25	1.6	1.4	3	1.46	8.03	0.61	0.781
456	8.6	16	137.6	1.35	11.61	4.0	1.2	4	2.18	18.75	2.16	1.469
457	10.5	5	52.5	1.25	13.13	2.1	1.0	3	1.67	17.54	1.44	1.201
464	5.0	4	20.0	0.48	2.40	2.5	2.5	2	2.47	12.35	0.48	0.693
465	4.0	6	24.0	1.37	5.48	2.6	2.3	2	2.46	9.84	1.43	1.195
508	6.0	11	66.0	0.75	4.50	3.0	2.9	2	2.95	17.70	0.77	0.876
509	1.5	2	3.0	0.86	1.29	1.3	1.3	2	1.25	1.88	0.86	0.927
510	3.0	7	21.0	1.40	4.20	1.9	1.5	2	1.76	5.28	1.48	1.217
511	6.1	2	12.2	0.60	3.66	1.8	1.5	3	1.63	9.94	0.63	0.795
512	1.5	7	10.5	1.14	1.71	2.3	2.3	2	2.25	3.38	1.14	1.068
513	6.0	6	36.0	2.87	17.22	1.5	0.8	2	1.23	7.38	3.03	1.740
534	12.3	4	49.2	0.87	10.70	2.7	1.4	5	2.19	26.94	1.07	1.032
535	4.0	95	380.0	0.29	1.16	4.3	4.3	2	4.26	17.04	0.29	0.539
543	4.0	33	132.0	0.44	1.76	3.6	3.6	2	3.55	14.20	0.44	0.663
548	3.0	2	6.0	0.74	2.22	1.8	1.8	2	1.76	5.28	0.74	0.860
549	8.0	23	184.0	0.54	4.32	3.5	3.3	2	3.38	27.04	0.58	0.759
550	8.0	17	136.0	3.19	25.52	2.4	2.4	2	2.41	19.28	3.19	1.786
623	4.5	1	4.5	1.55	6.98	2.1	0.7	3	1.20	5.40	1.83	1.353
624	12.0	10	120.0	2.26	27.12	3.6	-1.2	5	0.75	9.00	4.38	2.093
626	5.8	10	58.0	1.06	6.15	3.3	2.1	3	2.65	15.37	1.28	1.131
627	6.7	7	46.9	1.18	7.91	2.5	1.7	4	2.03	13.60	1.28	1.130
628	6.4	6	38.4	0.94	6.02	2.7	1.5	3	2.17	13.89	1.16	1.077
629	7.0	9	63.0	0.85	5.95	3.0	1.8	3	2.49	17.43	1.07	1.034
630	4.7	1	4.7	0.36	1.69	2.2	2.0	3	2.15	10.11	0.38	0.616
705	11.6	6	69.6	1.36	15.78	3.3	2.1	4	2.70	31.32	1.55	1.244
712	4.0	3	12.0	0.56	2.24	2.6	2.6	2	2.58	10.32	0.56	0.748

Weighted Characteristics		Composite Characteristics		Site Data				
						% Silt =	9	
Wtd Mean =	2.18	Mean =	2.18	B=	4.3	Avg D=	6.6	feet
Wtd Std Dev =	1.10	Std Dev =	1.93	A=	-1.2	Max =	13.1	feet
Wtd Var =	1.20	Var =	3.74	n=	35	Min =	1.5	feet

Table E-9

Composite Characteristics for Borrow Area N2

Boring Hole #	Depth (feet)	% Silt	Wtd % Silt	Var (Øb)	Wtd Var (Øb)	A	B	n	M (Øb)	Wtd M (Øb)	S2 (Øb)	S (Øb)
419	7.5	2	15.0	1.32	9.90	2.2	-0.1	6	0.89	6.68	1.84	1.356
425	4.6	1	4.6	0.92	4.23	1.7	0.6	7	1.33	6.12	1.05	1.025
426	9.4	4	37.6	1.81	17.01	2.9	1.2	11	2.10	19.74	2.08	1.442
427	5.1	10	51.0	1.61	8.21	3.5	0.7	6	2.60	13.26	2.36	1.535
429	5.3	9	47.7	0.85	4.51	3.5	0.1	7	2.85	15.11	1.91	1.381
514	3.6	1	3.6	0.41	1.48	1.9	1.8	2	1.81	6.52	0.43	0.654
515	1.9	1	1.9	0.81	1.54	1.2	1.2	2	1.17	2.22	0.81	0.900
516	3.5	6	21.0	1.74	6.09	3.0	0.6	2	1.30	4.55	2.62	1.619
517	8.0	10	80.0	1.25	10.00	3.1	1.3	3	2.25	18.00	1.67	1.292
518	4.9	1	4.9	2.66	13.03	1.0	0.6	2	0.77	3.77	2.74	1.655
519	2.0	10	20.0	0.62	1.24	2.8	2.8	2	2.82	5.64	0.62	0.787
521	3.5	2	7.0	1.25	4.38	1.3	1.3	2	1.26	4.41	1.25	1.118
523	3.0	18	54.0	0.49	1.47	3.3	3.3	2	3.27	9.81	0.49	0.700
545	8.0	7	56.0	0.50	4.00	2.9	2.7	2	2.78	22.24	0.54	0.733
546	2.2	1	2.2	2.16	4.75	0.1	0.1	2	0.13	0.29	2.16	1.470
713	9.0	9	81.0	0.56	5.04	3.3	2.7	3	3.00	27.00	0.64	0.800

Weighted Characteristics		Composite Characteristics		Site Data			
						% Silt =	6
Wtd Mean =	2.03	Mean =	2.03	B=	3.50	Avg D=	5.1 feet
Wtd Std Dev =	1.09	Std Dev =	1.52	A=	-0.10	Max =	9.4 feet
Wtd Var =	1.19	Var =	2.31	n=	16	Min =	1.9 feet

Table E-10

Composite Characteristics for Borrow Area S1

Boring Hole #	Depth (feet)	% Silt	Wtd % Silt	Var (Øb)	Wtd Var (Øb)	A	B	n	M (Øb)	Wtd M (Øb)	S2 (Øb)	S (Øb)
301	11.4	1	11.4	0.61	6.95	1.6	1.4	8	1.52	17.33	0.62	0.786
302	6.7	7	46.9	0.74	4.96	4.0	0.8	7	2.34	15.68	1.68	1.297
310	2.6	11	28.6	2.69	6.99	2.0	0.2	2	0.85	2.21	3.26	1.806
314	4.5	7	31.5	1.13	5.09	2.5	1.5	6	1.97	8.87	1.25	1.117
316A	4.8	2	9.6	1.07	5.14	1.6	0.9	4	1.14	5.47	1.15	1.072
555	13.6	8	108.8	1.20	16.32	2.2	1.1	5	1.75	23.80	1.35	1.160
556	10.6	1	10.6	1.29	13.67	1.7	0.6	4	1.10	11.66	1.45	1.205
557	14.5	5	72.5	1.27	18.42	2.5	0.8	5	1.72	24.94	1.58	1.258
558	11.2	4	44.8	1.12	12.54	2.2	0.2	5	1.17	13.10	1.54	1.240
574	10.0	9	90.0	0.86	8.60	3.0	2.9	2	2.95	29.50	0.88	0.937
575	1.0	4	4.0	4.71	4.71	-0.3	-0.3	2	-0.30	-0.30	4.71	2.170
576	3.0	14	42.0	0.74	2.22	3.1	3.1	2	3.09	9.27	0.74	0.860
578	6.5	7	45.5	1.59	10.34	1.6	0.7	3	0.94	6.11	1.73	1.316
583	15.0	3	45.0	0.92	13.80	1.3	1.1	6	1.20	18.00	0.93	0.964
587	6.7	4	26.8	1.02	6.83	1.3	1.1	3	1.28	8.58	1.04	1.020
588	5.2	3	15.6	0.76	3.95	1.8	1.3	3	1.52	7.90	0.82	0.907
589	4.5	5	20.3	1.09	4.91	2.5	2.4	2	2.47	11.12	1.11	1.052
590	13.8	3	41.4	1.08	14.90	1.6	0.6	5	1.24	17.11	1.21	1.098
593	15.5	8	124.0	0.87	13.49	2.1	1.5	5	1.81	28.06	0.93	0.962
594	16.1	3	48.3	0.82	13.20	1.7	1.2	6	1.35	21.74	0.86	0.926
595	14.7	4	58.8	0.90	13.23	1.8	1.2	6	1.50	22.05	0.95	0.975
596	13.7	3	41.1	1.04	14.25	1.9	0.5	5	1.28	17.54	1.26	1.123
597	6.8	4	27.2	2.06	14.01	2.0	1.1	2	1.49	10.13	2.28	1.509
599	9.5	2	19.0	0.81	7.70	1.9	1.2	4	1.45	13.78	0.89	0.943
600	12.5	3	37.5	0.78	9.75	1.8	1.3	5	1.56	19.50	0.82	0.906
602	16.7	3	50.1	0.90	15.03	1.9	0.9	6	1.35	22.55	1.02	1.008
604	16.0	8	128.0	0.94	15.04	3.1	0.5	5	1.93	30.88	1.61	1.270
609	11.0	6	66.0	0.99	10.89	2.1	1.0	3	1.85	20.35	1.18	1.087
611	11.5	2	23.0	2.20	25.30	2.1	-0.5	5	0.73	8.40	2.87	1.695
641	11.0	5	55.0	0.87	9.57	2.0	1.1	4	1.63	17.93	0.99	0.994
642	3.0	5	15.0	1.74	5.22	1.5	1.5	2	1.48	4.44	1.74	1.319
707	9.7	4	38.8	1.16	11.25	2.2	1.2	4	1.65	16.01	1.30	1.140

Weighted Characteristics		Composite Characteristics		Site Data				
						% Silt =	5	
Wtd Mean =	1.54	Mean =	1.54	B=	3.1	Avg D =	9.8	feet
Wtd Std Dev =	1.04	Std Dev =	1.43	A=	-0.3	Max =	16.7	feet
Wtd Var =	1.08	Var =	2.06	n=	32	Min =	1.0	feet

Table E-11

Composite Characteristics for Borrow Area S2

Boring Hole #	Depth (feet)	% Silt	Wtd % Silt	Var (Øb)	Wtd Var (Øb)	A	B	n	M (Øb)	Wtd M (Øb)	S2 (Øb)	S (Øb)
303	6.2	4	24.8	0.63	3.91	2.4	1.9	5	2.13	13.21	0.67	0.820
304	3.1	11	34.1	2.22	6.88	2.8	0.1	4	2.19	6.79	2.98	1.726
306	5.4	3	16.2	0.59	3.19	2.9	1.9	4	2.21	11.93	0.73	0.854
307	13.7	7	95.9	0.66	9.04	3.5	-0.6	10	2.67	36.58	2.14	1.462
309	1.4	5	7.0	2.17	3.04	1.5	0.6	2	1.03	1.44	2.39	1.545
311	3.7	6	22.2	1.09	4.03	3.4	1.1	6	2.41	8.92	1.61	1.268
312	14.4	14	201.6	1.95	28.08	3.3	0.7	12	2.21	31.82	2.55	1.598
313	3.7	1	3.7	0.85	3.15	1.5	1.1	3	1.27	4.70	0.90	0.947
315	4.1	15	61.5	1.84	7.54	3.7	1.7	5	2.42	9.92	2.26	1.502
321	1.3	4	5.2	1.92	2.50	1.8	-0.1	3	1.03	1.34	2.38	1.542
323	3.8	4	15.2	2.49	9.46	2.3	0.3	4	0.56	2.13	2.93	1.713
324	3.3	3	9.9	1.45	4.79	1.7	-0.1	4	0.97	3.20	1.82	1.349
325	6.6	8	52.8	1.55	10.23	3.6	-0.2	6	1.64	10.82	2.88	1.697
326	5.7	29	165.3	3.43	19.55	3.9	2.0	5	2.84	16.19	3.81	1.952
328	6.6	29	191.4	2.98	19.67	3.6	-0.4	7	2.07	13.66	4.42	2.103
331	2.2	3	6.6	1.61	3.54	1.5	-0.4	3	0.12	0.26	2.07	1.438

Weighted Characteristics		Composite Characteristics		Site Data				
						% Silt =	11	
Wtd Mean =	2.03	Mean =	2.03	B=	3.90	Avg D=	5.3	feet
Wtd Std Dev =	1.28	Std Dev =	1.83	A=	-0.60	Max =	14.4	feet
Wtd Var =	1.63	Var =	3.36	n=	16	Min =	1.3	feet

Table E-12

Composite Characteristics for Borrow Area S3

Boring Hole #	Depth (feet)	% Silt	Wtd % Silt	Var (Øb)	Wtd Var (Øb)	A	B	n	M (Øb)	Wtd M (Øb)	S2 (Øb)	S (Øb)
339	12.6	10	126.0	1.84	23.18	3.2	0.0	10	1.53	19.28	2.75	1.659
497	3.3	5	16.5	0.64	2.11	2.9	2.9	2	2.93	9.67	0.64	0.800
498	8.8	5	44.0	1.07	9.42	2.8	1.1	4	1.76	15.49	1.41	1.185
568	2.5	7	17.5	0.37	0.93	3.0	3.0	2	2.97	7.43	0.37	0.608
570	5.8	2	11.6	0.55	3.19	2.7	2.2	3	2.46	14.27	0.61	0.783
571	6.0	63	378.0	2.84	17.04	4.2	3.2	2	3.07	18.42	3.09	1.758
572	4.5	12	54.0	1.66	7.47	3.3	2.5	2	2.94	13.23	1.85	1.359
573	3.0	11	33.0	1.02	3.06	2.5	2.5	2	2.47	7.41	1.02	1.010
620	4.8	6	28.8	1.31	6.29	3.1	-0.2	3	1.61	7.73	2.49	1.579
621	5.4	9	48.6	1.38	7.45	3.0	0.4	2	1.81	9.77	2.38	1.542
622	4.0	14	56.0	0.52	2.08	3.2	3.2	2	3.16	12.64	0.52	0.721

Weighted Characteristics		Composite Characteristics		Site Data			
						% Silt =	13
Wtd Mean =	2.23	Mean =	2.23	B=	3.2	Avg D=	5.5 feet
Wtd Std Dev =	1.16	Std Dev =	1.27	A=	1.5	Max =	12.6 feet
Wtd Var =	1.35	Var =	1.60	n=	11	Min =	2.5 feet

Table E-13

Compatibility of Native and Borrow Sand

Native Beach Material (phi Mean)	Mean	Std Dev
North Project (NP)	1.70	1.50
South Project (SP)	1.95	1.52

Borrow Site	% Silt	Borrow Material (phi Mean)		Overfill Ratio		Silt Correction	Final Overfill Ratios (corrected for silt content)	
		Mean	Std Dev	NP	SP	Factor	NP	SP
N1	9	2.18	1.93	1.3	1.2	1.10	1.5	1.3
N2	6	2.03	1.52	1.3	1.0	1.06	1.4	1.1
S1	5	1.54	1.43	1.0	1.0	1.05	1.1	1.1
S2	11	2.03	1.83	1.2	1.1	1.12	1.4	1.3
S3	13	2.23	1.27	2.0	1.5	1.15	2.3	1.7