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The Texture of Surficial Sediments in Central Long Island Sound off Milford, Connecticut.

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[Organic Carbon, Hydrogen, and Nitrogen Concentrations in Surficial Sediments from Western Long Island Sound, Connecticut and New York](#)

[Sidescan Sonar Image, Surficial Geological Interpretation, and Bathymetry of the Long Island Sea Floor off Milford, CT.:](#)

[Sidescan Sonar Image, Surficial Geologic Interpretation, and Bathymetry of the Long Island Sound Sea Floor off Hammonasset Beach State Park, Connecticut,](#)

[The Texture of Surficial Sediments in Western Long Island Sound off the Norwalk Islands, Connecticut](#)

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U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

The texture of surficial sediments in central Long Island
Sound off Milford, Connecticut

by

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ABSTRACT

Grain-size analyses were performed on 76 samples from central Long Island Sound. The relative grain-size frequency distributions and related statistics are reported herein. Descriptions of the benthic character from video tapes and still camera photographs of the bottom at these stations, and 35 others, are also presented.

Gravelly sediments occur in the shallow northwestern part of the study area and around Stratford Shoal Middle Ground. These and other lithologies occur in bands that progressively fine toward the deeper parts of the study area where clayey silts and sand-silt-clays dominate.

INTRODUCTION

The purpose of this study was to determine the grain-size distributions and associated statistical parameters of the surficial sediment samples from central Long Island Sound off Milford, Connecticut. These grain-size data, which help to ground-truth a pre-existent sidescan sonar survey (Poppe and others, 1995a; Twichell and others, in press), will eventually be used to describe the sedimentary processes active in this portion of central Long Island Sound. Other potential uses for these textural data include benthic biologic studies that evaluate faunal distributions and relate them to habitats (Zajac and others, 1995), and geochemical studies involving the distribution, transport and deposition of pollutants (Moffett and others, 1994).

STUDY AREA

Long Island Sound is a large (about 182 km long by a maximum of 32 km wide) estuary located between Connecticut and Long Island off the southern coast of new England. The Sound is underlain along the Connecticut coast north of the study area by Paleozoic granitic and gneissic rocks of the Appalachian orogen (Rodgers, 1985; Needell and others, 1987; Lewis and Needell, 1987). Coastal-plain strata of Late Cretaceous age unconformably overlie the bedrock at places beneath the Sound and along the north shore of Long Island, New York (Fuller, 1914; Grim and others, 1970).

Late Wisconsinan-age glaciation extended across the Sound to form the Ronkonkoma and Harbor Hill-Roanoke Point Moraines on Long Island (Donner, 1964; Mills and Wells, 1974; Sirkin, 1982). Less prominent recessional moraine segments have also been recognized along the coast of Connecticut and beneath northern Long Island Sound (Flint, 1971; Goldsmith, 1982; Stone and Borns, 1986; Poppe and others, 1995a,b). After the final retreat of the ice from the Long Island Sound basin, glacial Lake Connecticut formed in the depression behind the moraines on Long Island. Varved lake clays and, along the northern shore, deltaic complexes dominated sedimentation and together are responsible for the thick lacustrine section evident in seismic records (Lewis and Stone, 1991; Stone and others, 1992; Stone and Schafer, in press). The lake level

gradually lowered due to erosion at the spillway until the lake bed was subaerially exposed. Fluvial processes incised the exposed lake bed as streams ran down from high ground on either side of the Sound to join a central river which ran down the axis.

The Holocene eustatic rise flooded the basin creating Long Island Sound. Finer-grained hemipelagic sediments have accumulated in the quieter, lower energy areas of the western Sound; tidal and storm currents, as evidenced by patterns of erosion, reworking, and transport, dominate in shallow areas and the eastern Sound.

A much more detailed discussion of the geological history of Long Island Sound has been published by Lewis and Stone (1991).

METHODS

Surficial sediment samples and bottom photographs were attempted at 110 locations during April-May and August, 1995 cruises aboard the RV John Dempsey using a Van Veen grab sampler (Figs. 1 and 2). This grab sampler was equipped with Osprey video and still camera systems; the video system was attached to an 8 mm video cassette recorder. These photographic systems were used to appraise intra-station bottom variability and to observe boulder fields and bedrock outcrop areas where sediment samples could not be collected (Appendix A). Turbid bottom conditions during the August cruise decreased visibility and degraded the quality of the bottom photography from this cruise. The turbid conditions were related primarily to biological activity throughout the water column, resuspension of organic-rich detritus by tidal currents, and to the presence of a thick (up to 1 m) benthic nepheloid layer. Because of these murky conditions, the still photographs and video from this cruise were only used to describe the benthic character at the textural station locations occupied solely during the August cruise (Stations MIL-92 through MIL-103).

The 0-2 cm interval in the surficial sediments was subsampled from the grab sampler; these samples were frozen and stored for later analysis. Navigation was performed using a differential Global Satellite Positioning system.

A total of 76 samples were collected for textural analysis. The samples were thawed and visually inspected in the laboratory. If the sample contained gravel, the entire sample was analyzed. If the sample was composed of only sand, silt, and clay, an approximately 50 gram (wet), representative split was analyzed. The sample to be analyzed was placed in preweighed 100 ml beaker, weighed, and dried in a convection oven set at 75 °C. When dried, the samples were placed in a desiccator to cool and then reweighed. The decrease in weight due to water loss was used to correct for salt; salinity was assumed to be 20 ‰. The weight of the sample and beaker less the weight of the beaker and the salt correction gave the sample weight.

The samples were disaggregated and then wet sieved through a 62 μm (4ϕ) sieve using distilled water to separate the coarse- and fine-fractions. The fine fraction was sealed in a Mason jar and

Figure 1. Index map showing the location of the study area (hatched polygon). Map also shows the locations of other sidescan sonar and sampling surveys (open polygons) being completed as part of this series (Twichell and others, 1995; Poppe and others, 1995a; Poppe and others, 1995b; Twichell and others, in press) and the major morainal complexes.

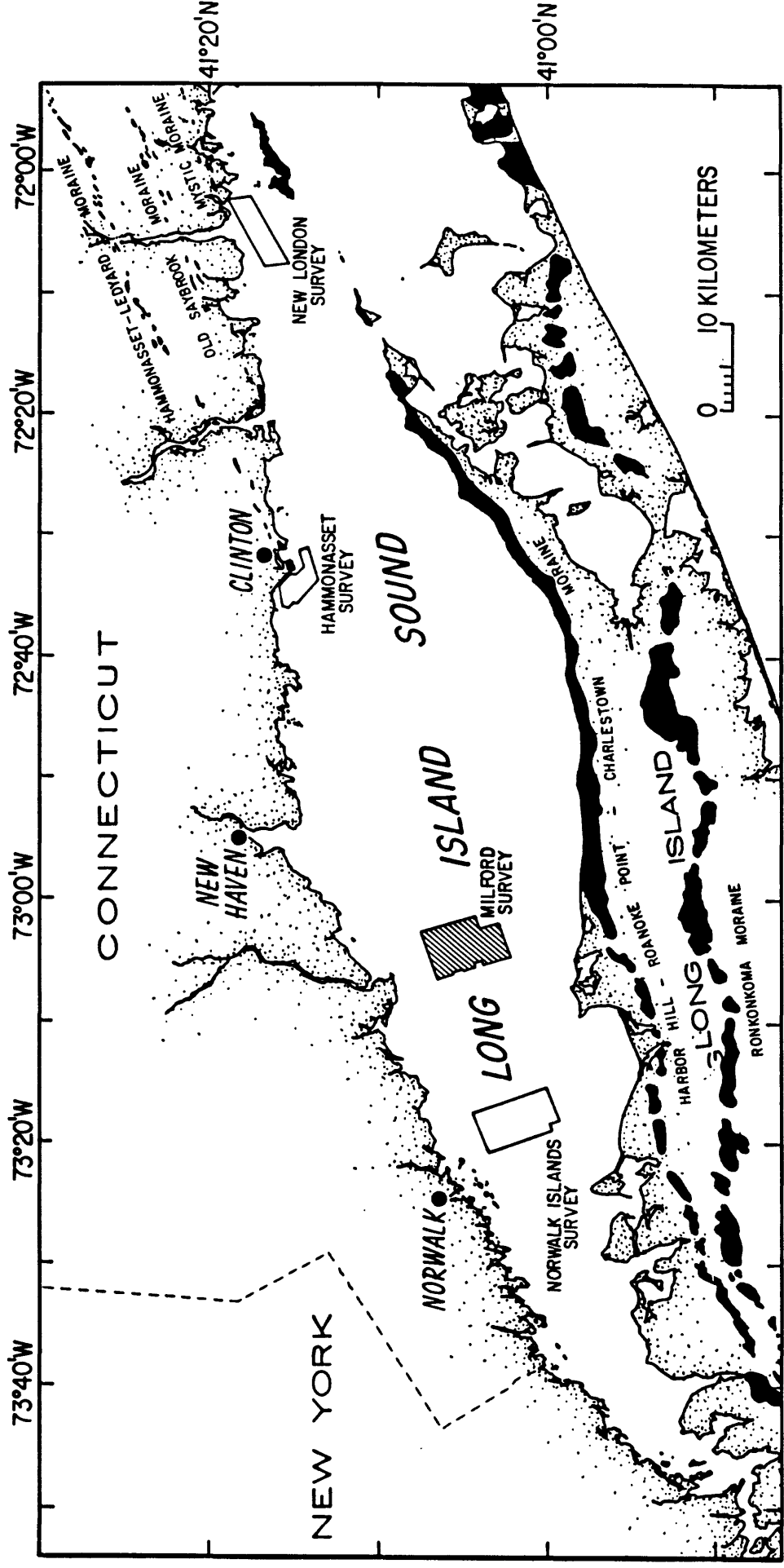
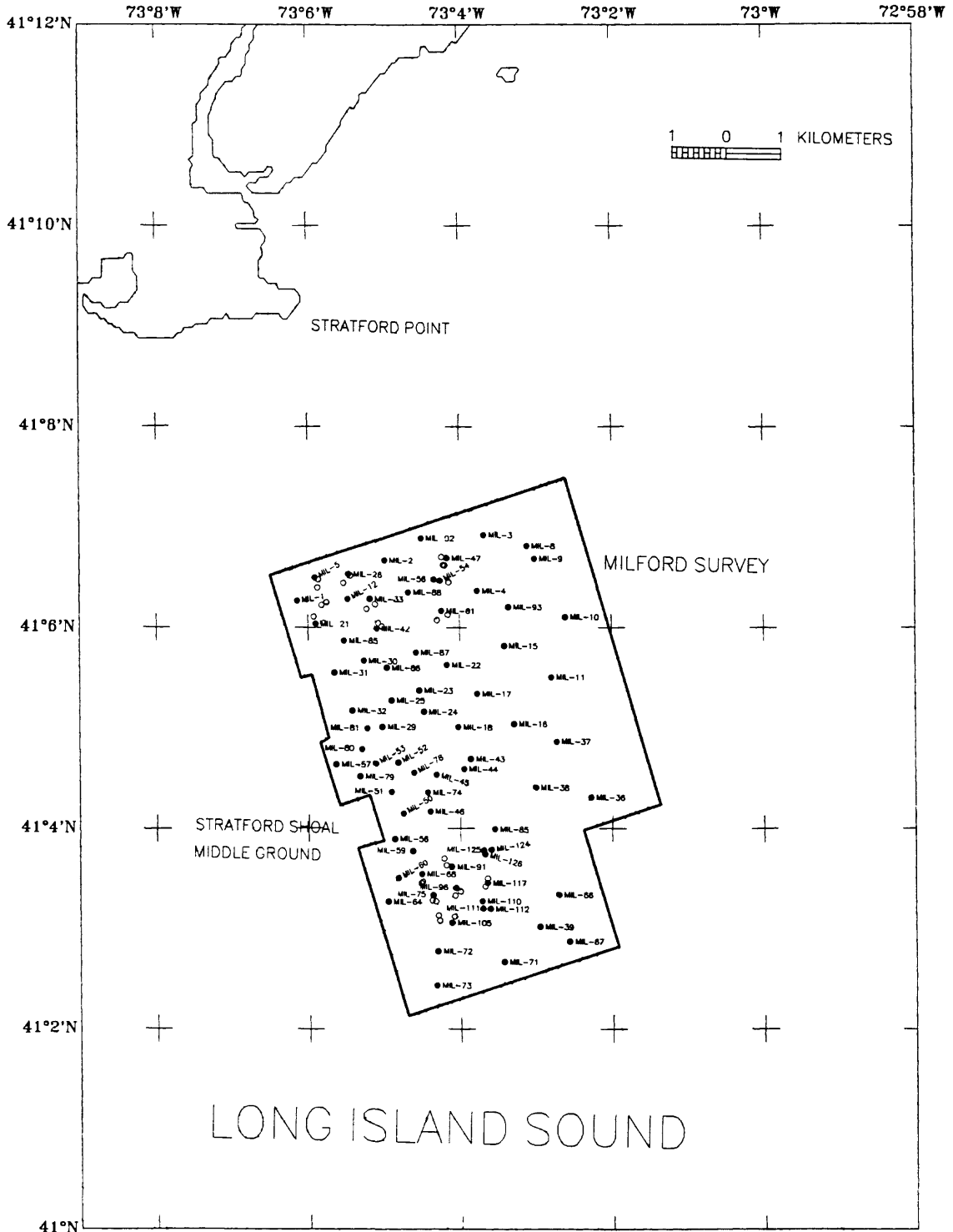


Figure 2. Map of central Long Island Sound off Milford, Connecticut showing the station locations. Stations where surficial sediment samples and bottom photographs were collected are shown as solid circles. Stations where only bottom photographs or biological samples were taken are shown as open circles.



reserved for analysis by Coulter Counter (Shideler, 1976). The coarse fraction was washed and reintroduced into the preweighed beaker. The coarse fraction was dried in the convection oven at about 75 °C and weighed. The weight of the coarse (greater than 62 μm) fraction is equal to the weight sand plus gravel. The weight of the fines (silt and clay) can also be calculated by subtracting the coarse weight from the sample weight. The coarse fraction was dry sieved through a 2.0 mm (-1ϕ) sieve to separate the sand and gravel. The size distribution within the gravel fraction was determined by sieving. Because biogenic carbonates commonly form in situ, they are not representative of the depositional environment from a textural standpoint. Therefore, bivalve shells and other biogenic debris greater than 1.0 mm (0ϕ) were manually removed from the samples and the weights corrected to mitigate this source of error.

If the sand fraction contained more than 16 grams of material (enough to run the analysis twice), a rapid sediment analyzer (Schlee, 1966) was used to determine the sand distribution. If less than 16 grams of sand were available, this fraction was dry sieved using a mechanical shaker.

The fine fraction was analyzed by Coulter Counter; storage in the Mason jars prior to analysis never exceeded five days. The gravel, sand, and fine fraction data were processed by computer to generate the distributions, statistics, and data base (Poppe and others, 1985). One limitation of using a Coulter Counter to perform fine fraction analyses is its ability to detect only those particles for which it has been calibrated. Calibration for this study allowed us to determine the distribution down to 0.72 μm or about two-thirds of the 11ϕ fraction. Because clay particles finer than this diameter and all of the colloidal fraction were not determined, a slight decrease in the 11ϕ fraction is present in the size distributions (Appendix B).

RESULTS AND COMMENTS

Sample locations, water depths, and brief comments on the bottom photography are presented in Appendix A. The relative frequency distributions of the grain-size analyses are presented in Appendix B and the related statistics and verbal equivalents are presented in Appendix C. Size classifications are based on the method proposed by Wentworth (1929); the statistics were calculated using the method of moments (Folk, 1974). The verbal equivalents were calculated using the inclusive graphics statistical method (Folk, 1974) and are based on the nomenclature proposed by Shepard (1954).

Gravelly sediments were confined to two shallow areas: the northwestern part of the study area south of Stratford Point (i.e. MIL-1, MIL-5) and to the west-central part of the study area surrounding Stratford Shoal Middle Ground (i.e. MIL-51, MIL-53, MIL-57, MIL-58). These gravelly sediments range from very poorly to extremely poorly sorted and primarily fine-skewed and

leptokurtic. Boulders were observed at two of the stations around Stratford Shoal Middle Ground (MIL-50 and MIL-78). The rocks at these stations were overgrown by hydrozoans and, to a lesser extent, sponges.

The gravelly sediments progressively grade into bands of sand and finer-grained lithologies as water depth increases. The sands are poorly to very poorly sorted, strongly to fine-skewed, and leptokurtic (i.e. MIL-12, MIL-21, MIL-29). The silty sands and sandy silts surrounding the coarser lithologies tend to have more symmetrical and mesokurtic to platykurtic distributions. Sandy silts present in the southern part of the study area reflect shallowing toward Long Island, NY (i.e. MIL-71, MIL-72, MIL-73). One exception to the relationship between increasing water depth and the trend to finer-grained lithologies occurs in and around the channel between Stratford Point and Stratford Shoal Middle Ground where tidal currents are apparently strong enough to winnow away much of the silt and clay (i.e. MIL-31, MIL-32).

Sand-silt-clays and clayey silts dominate throughout the deeper south-central (main axis of Long Island Sound), north-central (depression at the eastern mouth of the channel between the shoals south of Stratford Point and Stratford Shoal Middle Ground), and eastern portions of the study area. Clayey silts also collect in the slight depression north of a sandy shoal that extends eastward from the gravelly sediments present in the northwestern part of the study area (i.e. MIL-2, MIL-26). These fine-grained sediments are predominantly very poorly sorted and have nearly symmetrical to coarsely skewed distributions. The sand-silt-clays are mainly platykurtic; the clayey silts are primarily mesokurtic.

Observations of the bottom video reveal that benthic biologic activity and tidal currents are important mechanisms that combine to control the reworking and resuspension of bottom sediments. For example, crabs throw the fine-grained sediment directly up into the water column while feeding and the burrowing activity of lobsters, shrimp, and crabs often mounds the sediments. Once these mounded sediments extend above the surrounding sea floor, they can be transported or reshaped by the strong tidal currents into the faint bedforms present in much of the bottom video.

Interested parties can obtain copies of the grain-size analysis data and an explanation of the variable headings in ASCII format and on 3.5" diskettes by contacting any of the authors. Videotapes showing the bottom character of the station locations can be viewed at the U.S. Geological Survey offices in Woods Hole, Massachusetts or at the Long Island Sound Resource Center at Avery Point, Groton, Connecticut.

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APPENDIX A

This table contains a list of the sample numbers, navigation (latitudes and longitudes) in degrees decimal minutes, water depths in meters, and comments on the bottom character. Stations designated by an asterisk were occupied during the August 1995 cruise.

SAMPLE	LATITUDE	LONGITUDE	DEPTH (M)	COMMENTS
MIL-1	41d06.2651'	-73d06.1463'	13.0	GRAVELLY BOTTOM, SHELLS (OYSTER) AND SHELL DEBRIS, CRABS, SNAILS
MIL-2	41d06.671'	-73d04.994'	15.1	BIOTURBATED, WORM TUBES, SPARSE SHELL DEBRIS, CRABS, TRACKS
MIL-3	41d06.921'	-73d03.682'	16.5	FLAT BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, SPARSE SHELL DEBRIS, FISH
MIL-4	41d06.367'	-73d03.770'	18.2	FINE RIPPLES, SEDIMENT MOVING IN CURRENT,, SHELL DEBRIS
MIL-5	41d06.497'	-73d05.909'	13.4	GRAVELLY BOTTOM, SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER), HYDROZOANS
MIL-6	41d06.476'	-73d05.8610'	13.6	GRAVELLY BOTTOM, SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER), HYDROZOANS
MIL-7	41d06.396'	-73d05.870'	13.6	GRAVELLY BOTTOM, SHELLS (OYSTER AND RAZOR CLAM) AND SHELL DEBRIS, CRABS, HYDROZOANS
MIL-8	41d06.815'	-73d03.118'	17.6	FINE CURRENT-RELATED BEDFORMS, WORM TUBES, SHELL DEBRIS
MIL-9	41d06.690'	-73d03.018'	18.2	FINE BEDFORMS (SCOUR AND SHADOW EFFECTS AROUND COARSER DETRITUS) SHRIMP BURROWS, WORM TUBES
MIL-10	41d06.1101'	-73d02.6091'	22.1	UNDULATING BIOTURBATED BOTTOM, WORM TUBES, PATCHY SHELL DEBRIS, ANEMONE FIELD
MIL-11	41d05.5071'	-73d02.7992'	24.4	BIOTURBATED, FINE BEDFORMS, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS, ANEMONE FIELD
MIL-12	41d06.2810'	-73d05.4781'	16.7	BIOTURBATED, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS, CRABS
MIL-13	41d06.2225'	-73d05.8186'	15.0	FINE BEDFORMS (SCOUR AND SHADOW EFFECTS, SHELLS AND SHELL DEBRIS, CRABS
MIL-14	41d06.2514'	-73d05.7510'	15.1	FINE BEDFORMS, GRAVELLY PATCHES, CRABS (SPIDER AND CANCER), SHELLS AND SHELL DEBRIS
MIL-15	41d05.821'	-73d03.422'	22.8	UNDULATING BIOTURBATED BOTTOM WITH FINE BEDFORMS, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS, TRACKS
MIL-16	41d05.0431'	-73d03.2957'	25.3	BIOTURBATED, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS, ANEMONES
MIL-17	41d05.3398'	-73d03.7761'	23.8	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, ANEMONE FIELD
MIL-18	41d05.012'	-73d04.022'	25.0	UNDULATING BIOTURBATED BOTTOM, NONDESCRIPT BURROWS AND TUBES, SCATTERED SHELL FRAGMENTS, FLOUNDER
MIL-19	41d06.109'	-73d05.922'	15.3	GRAVELLY PATCHES, FINE BEDFORMS, SHELLS AND SHELL DEBRIS, CRABS
MIL-20	41d06.0449'	-73d05.7947'	15.9	SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER), FLOUNDER
MIL-21	41d06.0383'	-73d05.8961'	15.7	GRAVELLY PATCHES, FINE BEDFORMS, CRABS (SPIDER AND CANCER), SHELL AND SHELL DEBRIS
MIL-22	41d05.6264'	-73d04.1702'	21.3	BIOTURBATED, FINE CURRENT RIPPLES, LOBSTERS AND BURROWS, SHRIMP BURROWS, WORM TUBES, CRABS, TRACKS
MIL-23	41d05.3726'	-73d04.5351'	28.4	BIOTURBATED, SOME NONDESCRIPT BURROWS AND TUBES, SPARSE SHELL DEBRIS
MIL-24	41d05.1632'	-73d04.476'	32.6	FLAT BIOTURBATED BOTTOM, SHRIMP BURROWS, SCATTERED SHELLS AND SHELL DEBRIS, CRABS, FISH
MIL-25*	41d05.005'	-73d04.908'	25.5	BIOTURBATED, NONDESCRIPT BURROWS AND TUBES, SCATTERED SHELL DEBRIS, CRABS, SNAILS
MIL-25*	41d05.2741'	-73d04.9104'	35.0	TURBID, BIOTURBATED, WORM TUBES, CRABS, TRACKS
MIL-26	41d06.531'	-73d05.470'	15.5	BIOTURBATED, LOBSTER, WORM TUBES, CRABS (CANCER), TRACKS, BLACK WITH H ₂ S ODOOR
MIL-27	41d06.515'	-73d05.441'	15.7	FLAT BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, CRABS (CANCER)

SAMPLE	LATITUDE	LONGITUDE	DEPTH (M)	COMMENTS
MIL-28	41d06.442'	-73d05.529'	15.1	GRAVELLY, FAINT CURRENT RIPPLES, SHELLS AND SHELL DEBRIS, TRACKS, FISH
MIL-29	41d05.0180'	-73d05.0285'	26.7	PATCHY GRAVEL, FAINTLY RIPPLED, ABUNDANT SHELLS AND DEBRIS, CRABS (SPIDER AND CANCER), SNAILS, FLOUNDER
MIL-30	41d05.6687'	-73d05.2733'	19.8	SOME GRAVEL, BIOTURBATED, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER), TRACKS
MIL-31	41d05.5522'	-73d05.6595'	17.5	FAINT BEDFORMS (SCOUR AND SHADOW EFFECTS), SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER)
MIL-32	41d05.1733'	-73d05.4228'	36.5	RIPPLED BOTTOM, SHELLS AND SHELL DEBRIS, CRABS
MIL-33	41d06.2844'	-73d05.1865'	17.5	BIOTURBATED, NONDESCRIPT BURROWS, ABUNDANT SHELL DEBRIS, CRABS, SNAILS, TRACKS
MIL-34	41d06.2317'	-73d05.1167'	17.8	FLAT BIOTURBATED BOTTOM, WORM TUBES, CRAB TRACKS, SCATTERED SHELLS AND SHELL DEBRIS
MIL-35	41d06.1850'	-73d05.2279'	18.0	BIOTURBATED, WORM TUBES, CRABS (CANCER) AND TRACKS, SCATTERED SHELL DEBRIS
MIL-36	41d04.3113'	-73d02.2789'	27.5	UNDULATING BIOTURBATED BOTTOM WITH FAINT RIPPLES, SHRIMP BURROWS, WORM TUBES, ANEMONES, FLOUNDER
MIL-37	41d04.8688'	-73d02.7285'	26.5	FAINT CURRENT RIPPLES, LOBSTER, SHRIMP AND LOBSTER BURROWS, WORM TUBES, SCATTERED SHELL HASH, ANEMONES
MIL-38	41d04.4098'	-73d03.0107'	25.3	FAINT CURRENT RIPPLES, SHRIMP BURROWS, WORM TUBES, TRACKS, SPARSE SHELL DEBRIS, ANEMONES, FLOUNDER
MIL-39	41d03.0182'	-73d02.9608'	26.5	UNDULATING BIOTURBATED BOTTOM WITH FAINT BURROWS, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS, SPARSE ANEMONES
MIL-40	41d06.0513'	-73d05.0801'	18.6	WORM TUBES, SCATTERED SHELL DEBRIS, CRAB TRACKS
MIL-41	41d06.015'	-73d05.030'	18.8	FAINT BEDFORMS, SCATTERED SHELL DEBRIS, CRAB TRACKS
MIL-42	41d05.9949'	-73d05.1023'	18.8	BIOTURBATED, FAINT BEDFORMS, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS
MIL-43	41d04.6959'	-73d03.8609'	25.7	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, CRABS, SOME SHELL DEBRIS, VARIABLE TEXTURE, TRACKS
MIL-44	41d04.5944'	-73d03.9542'	26.3	BIOTURBATED, FAINT BEDFORMS (SCOUR AND SHADOW EFFECTS AROUND COARSER DETRITUS), WORM TUBES, SCATTERED SHELL DEBRIS
MIL-45	41d04.541'	-73d04.313'	26.3	BIOTURBATED, FAINT RIPPLES, SHRIMP BURROWS, SNAILS, SCATTERED SHELL DEBRIS
MIL-46	41d04.1716'	-73d04.3998'	22.3	BIOTURBATED, FAINT BEDFORMS, SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS, FLOUNDER
MIL-47	41d06.691'	-73d04.165'	16.3	FAINT CURRENT RIPPLES, WORM TUBES, PATCHY SHELL DEBRIS, FISH
MIL-48	41d06.705'	-73d04.232'	16.3	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND LOBSTER BURROWS, SCATTERED SHELLS AND SHELL DEBRIS
MIL-49	41d06.623'	-73d04.213'	16.5	FAINT BEDFORMS (SCOUR AND SHADOW EFFECTS AROUND COARSER DETRITUS, WORM TUBES, SCATTERED SHELL DEBRIS
MIL-49B	41d06.6199'	-73d04.1894'	16.5	BIOTURBATED, SHELL DEBRIS, CRABS (CANCER), SNAILS, TRACKS
MIL-50	41d04.1538'	-73d04.7555'	17.8	BOULDERS, SEAWEED, HYDROZOANS
MIL-51	41d04.3660'	-73d04.9137'	19.4	GRAVELLY, SEAWEED, SHELLS, CRABS, HYDROZOANS
MIL-52	41d04.5326'	-73d04.3270'	25.7	FAINT BEDFORMS, LOBSTER BURROWS, SCATTERED SHELL DEBRIS, ANEMONE FIELDS
MIL-53	41d04.6512'	-73d05.1174'	21.9	GRAVELLY, CRABS, HERMIT CRABS, SHELLS AND SHELL DEBRIS
MIL-54	41d06.4662'	-73d04.2571'	16.5	BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS, CRABS

SAMPLE	LATITUDE	LONGITUDE	DEPTH (M)	COMMENTS
MIL-55	41d06.4517'	-73d04.1382'	16.7	FAINT RIPPLES, WORM TUBES, SPARSE SHELL DEBRIS, CRABS, TRACKS
MIL-56	41d06.4314'	-73d04.2370'	16.7	BIOTURBATED BOTTOM WITH FAINT BEDFORMS, SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS, CRABS, TRACKS
MIL-56*	41d06.4782'	-73d04.3338'	16.1	TURBID, BIOTURBATED, SHRIMP AND SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS
MIL-57	41d04.6411'	-73d05.6349'	21.1	GRAVELLY, SHELLS AND SHELL DEBRIS, SPIDER CRABS, STARFISH
MIL-58	41d03.8996'	-73d04.8714'	19.4	BIOTURBATED, FAINT BEDFORMS, LOBSTER AND SHRIMP BURROWS, WORM TUBES, GRAVELLY PATCHES, CRABS, SCATTERED SHELL DEBRIS
MIL-59	41d03.7748'	-73d04.6269'	21.9	BIOTURBATED, FAINT RIPPLES, LOBSTER, LOBSTER AND SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SHELL DEBRIS
MIL-60	41d03.5094'	-73d04.8237'	22.8	UNDULATING BIOTURBATED BOTTOM, NONDESCRIPT BURROWS, WORM TUBES, SOME SHELL DEBRIS, FISH
MIL-61	41d06.1651'	-73d04.2393'	18.0	FAINT CURRENT RIPPLES, SCATTERED SHELL DEBRIS, CRABS, TRACKS
MIL-62	41d06.1292'	-73d04.1512'	18.2	FAINT BEDFORMS, SOME SHELL DEBRIS, TRACKS
MIL-63	41d06.0753'	-73d04.2917'	18.2	BIOTURBATED BOTTOM, FAINT CURRENT-RELATED BEDFORMS, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS, CRABS
MIL-64	41d03.2721'	-73d04.9641'	23.8	GRAVELLY BOTTOM, WORM TUBES, SHELLS AND SHELL DEBRIS, CRABS (SPIDER AND CANCER), HYDROZOANS
MIL-65	41d03.9936'	-73d03.5542'	26.1	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SNAILS, SCATTERED SHELL DEBRIS
MIL-66	41d03.3376'	-73d02.7066'	34.0	UNDULATING BIOTURBATED BOTTOM WITH FAINT CURRENT RIPPLES, LOBSTER AND SHRIMP BURROWS, SCATTERED SHELL DEBRIS, ANEMONES, CRABS
MIL-67	41d02.8701'	-73d02.5701'	36.5	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS, ANEMONES
MIL-68	41d03.5461'	-73d04.5095'	26.5	FAINT CURRENT RIPPLES, BIOTURBATED, LOBSTER AND BURROWS, SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, CRABS (CANCER), SPARSE SHELL DEBRIS
MIL-69	41d03.4589'	-73d04.5201'	26.3	UNDULATING BIOTURBATED BOTTOM WITH FAINT CURRENT RIPPLES, SHRIMP BURROWS, WORM TUBES, SPARCE SHELL DEBRIS, TRACKS, CRABS (CANCER), FLOUNDER
MIL-70	41d03.4706'	-73d04.5010'	26.3	UNDULATING BIOTURBATED BOTTOM WITH FAINT CURRENT RIPPLES, SHRIMP BURROWS, WORM TUBES, SOME SHELLS AND SHELL DEBRIS, CRABS (CANCER), FLOUNDER
MIL-71	41d02.6668'	-73d03.4375'	35.3	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS
MIL-72	41d02.7741'	-73d04.3041'	35.0	BIOTURBATED, FAINT CURRENT RIPPLES, SHRIMP BURROWS, SCATTERED SHELL DEBRIS
MIL-73	41d02.4334'	-73d04.3165'	35.1	UNDULATING BIOTURBATED BOTTOM WITH FAINT CURRENT RIPPLES, SHRIMP BURROWS, FISH
MIL-74*	41d04.3629'	-73d04.4272'	24.8	TURBID, BIOTURBATED, SHRIMP BURROWS, WORM TUBES, SHELLS AND SHELL DEBRIS
MIL-75	41d03.3360'	-73d04.3631'	30.1	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS, STARFISH
MIL-76	41d03.2828'	-73d04.3741'	30.7	UNDULATING BIOTURBATED BOTTOM, LOBSTER, LOBSTER AND SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, CRABS (CANCER)
MIL-77	41d03.2726'	-73d04.3266'	28.6	BIOTURBATED, FAINT CURRENT RIPPLES, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SCATTERED SHELLS AND SHELL DEBRIS, FLOUNDER

SAMPLE	LATITUDE	LONGITUDE	DEPTH (M)	COMMENTS
MIL-78*	41d04.5596'	-73d04.6127'	21.7	TURBID, BOULDERS, COBBLES, SPONGES, SEAWEED, LOBSTER, HYDROZOANS
MIL-79*	41d04.5207'	-73d05.3219'	20.0	TURBID, GRAVEL, SHELLS AND SHELL DEBRIS, HYDROZOANS
MIL-80*	41d04.7961'	-73d05.2990'	22.6	TURBID, GRAVELLY PATCHES, WORM TUBES, SHELLS AND SHELL DEBRIS
MIL-81	41d04.9963'	-73d05.2262'	25.3	TURBID, GRAVELLY PATCHES, WORM TUBES, SHELLS AND SHELL DEBRIS, FISH, CRABS (CANCER)
MIL-82	41d03.1397'	-73d04.3898'	33.6	BIOTURBATED, FAINT CURRENT RIPPLES, LOBSTER AND SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SCATTERED SHELL DEBRIS, TRACKS, FLOUNDER
MIL-83	41d03.1325'	-73d04.2915'	33.0	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SCATTERED SHELL DEBRIS, CRABS
MIL-84	41d03.0814'	-73d04.2781'	33.8	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SOME SHELL HASH, CRABS (CANCER), FLOUNDER
MIL-85*	41d05.8717'	-73d05.5279'	15.5	TURBID, NO BOTTOM VIDEO, GRAVEL, SHELLS AND SHELL DEBRIS
MIL-86*	41d05.6028'	-73d04.9659'	20.1	TURBID, BIOTURBATED, WORM TUBES, TRACE OF SHELL DEBRIS, TRACKS
MIL-87*	41d05.7535'	-73d04.5797'	19.6	VERY TURBID, BIOTURBATED, SCATTERED SHELL DEBRIS, WORM TUBES
MIL-88	41d06.3531'	-73d04.6778'	17.0	TURBID, NO BOTTOM VIDEO, CRABS, NUT CLAMS
MIL-89	41d03.7022'	-73d04.2153'	25.3	FLAT BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SPARSE SHELL DEBRIS, TRACKS, FLOC LAYER
MIL-90	41d03.6342'	-73d04.1846'	26.9	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SOME SHELL DEBRIS
MIL-91	41d03.6193'	-73d04.1146'	27.3	BIOTURBATED, LOBSTER AND SHRIMP BURROWS, SCATTERED SHELL HASH, WORM AND AMPHIPOD TUBES, TRACKS, CRABS (CANCER)
MIL-92*	41d06.8931'	-73d04.5043'	14.6	TURBID, NO BOTTOM VIDEO, NUT CLAMS
MIL-93*	41d06.2063'	-73d03.3595'	18.8	TURBID, SHELLS AND SHELL DEBRIS, FAINT BEDFORMS
MIL-96	41d03.406'	-73d04.062'	29.6	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS, CRABS
MIL-97	41d03.3307'	-73d04.0714'	31.3	BIOTURBATED, LOBSTER, LOBSTER POT, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SPARSE SHELL DEBRIS, TRACKS
MIL-98	41d03.3715'	-73d04.0025'	30.5	UNDULATING BIOTURBATED BOTTOM, FAINT RIPPLES, LOBSTER AND SHRIMP BURROWS, SOME SHELL DEBRIS, CRABS, FLOUNDER
MIL-103	41d03.1145'	-73d04.1625'	32.6	UNDULATING BIOTURBATED BOTTOM, LOBSTER, SHRIMP BURROWS, WORM TUBES, SOME SHELLS AND SHELL DEBRIS, FLOUNDER
MIL-104	41d03.1219'	-73d04.0834'	32.6	BIOTURBATED, LOBSTER, SHRIMP BURROWS, WORM TUBES, CRABS, TRACKS
MIL-105	41d03.0604'	-73d04.1152'	33.0	UNDULATING BIOTURBATED BOTTOM WITH FAINT RIPPLES, LOBSTER, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SCATTERED SHELL DEBRIS
MIL-110	41d03.2741'	-73d03.7251'	31.7	BIOTURBATED, FAINT CURRENT RIPPLES, EXTENSIVE SHRIMP AND WORM BURROWING, SOME SHELL DEBRIS
MIL-111	41d03.2006'	-73d03.7131'	32.1	BIOTURBATED, LOBSTER AND SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SCATTERED SHELL HASH, TRACKS
MIL-112	41d03.2008'	-73d03.6153'	32.1	UNDULATING BIOTURBATED BOTTOM, LOBSTER, SHRIMP BURROWS, WORM TUBES, SOME SHELL DEBRIS
MIL-117	41d03.4580'	-73d03.6531'	28.6	UNDULATING BIOTURBATED BOTTOM, LOBSTER, LOBSTER AND SHRIMP BURROWS, WORM TUBES, ANEMONES, SOME SHELL DEBRIS
MIL-118	41d03.4218'	-73d03.6826'	29.8	BIOTURBATED, FAINT RIPPLES, LOBSTER AND SHRIMP BURROWS, WORM TUBES, ANEMONES, TRACKS

SAMPLE	LATITUDE	LONGITUDE	DEPTH (M)	COMMENTS
MIL-119	41d03.500'	-73d03.651'	28.6	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SCATTERED SHELL DEBRIS, ANEMONES
MIL-124	41d03.789'	-73d03.600'	26.7	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, AMPHIPOD TUBES, SHELLS, TRACKS, CRABS, FLOUNDER
MIL-125	41d03.7831'	-73d03.6996'	27.1	UNDULATING BIOTURBATED BOTTOM, SHRIMP BURROWS, WORM AND AMPHIPOD TUBES, SHELLS, CRABS, TRACKS
MIL-126	41d03.7429'	-73d03.6833'	27.1	UNDULATING BIOTURBATED BOTTOM, LOBSTER AND SHRIMP BURROWS, WORM TUBES, SHELL DEBRIS, TRACKS, CRABS (CANCER)

APPENDIX B

This table contains the relative grain-size frequency distributions by weight in whole phi units for each sample. The -5 ϕ fraction contains all sediment coarser than 32 mm; the 11 ϕ fraction contains sediment with diameters between .001 and .00072 mm.

SAMPLE NUMBER	CLAY			SILT			SAND					GRAVEL						
	11 ϕ	10 ϕ	9 ϕ	8 ϕ	7 ϕ	6 ϕ	5 ϕ	4 ϕ	3 ϕ	2 ϕ	1 ϕ	0 ϕ	-1 ϕ	-2 ϕ	-3 ϕ	-4 ϕ	-5 ϕ	
MIL-1	0.18	0.58	0.85	0.92	1.17	1.22	0.58	0.41	4.81	48.23	16.07	1.86	0.76	1.96	20.40	0.0	0.0	0.0
MIL-2	5.98	11.10	15.30	17.13	18.19	14.49	10.46	3.53	1.20	0.97	0.86	0.78	0.0	0.0	0.0	0.0	0.0	0.0
MIL-3	2.30	7.30	11.20	13.81	15.20	13.03	9.00	3.93	6.99	6.99	4.93	5.30	0.0	0.0	0.0	0.0	0.0	0.0
MIL-4	2.02	5.72	8.64	9.89	9.43	7.53	6.98	9.82	15.49	13.18	6.14	3.40	0.27	1.50	0.0	0.0	0.0	0.0
MIL-5	0.35	1.08	1.69	1.87	2.10	1.75	0.70	0.81	4.06	33.53	24.84	6.89	5.12	10.69	4.52	0.0	0.0	0.0
MIL-8	2.92	9.16	14.02	15.59	17.97	17.11	6.84	3.97	4.44	5.51	1.89	0.57	0.0	0.0	0.0	0.0	0.0	0.0
MIL-9	3.56	11.42	16.63	19.87	21.98	17.58	6.05	1.61	0.65	0.43	0.16	0.08	0.0	0.0	0.0	0.0	0.0	0.0
MIL-10	3.58	10.90	15.51	18.04	19.17	15.61	7.97	6.16	1.58	0.54	0.48	0.46	0.0	0.0	0.0	0.0	0.0	0.0
MIL-11	3.31	10.22	14.82	16.36	18.15	16.90	6.51	7.51	3.61	1.33	0.74	0.55	0.0	0.0	0.0	0.0	0.0	0.0
MIL-12	0.60	1.87	2.83	3.35	3.51	3.00	1.72	5.42	32.88	28.24	11.07	4.02	1.49	0.0	0.0	0.0	0.0	0.0
MIL-15	3.36	9.82	14.51	17.15	18.71	14.76	10.57	5.67	3.35	0.98	0.78	0.35	0.0	0.0	0.0	0.0	0.0	0.0
MIL-16	3.28	10.52	15.66	16.64	15.88	13.37	6.16	8.17	6.80	2.10	0.85	0.57	0.0	0.0	0.0	0.0	0.0	0.0
MIL-17	2.92	8.01	11.78	12.51	13.84	12.08	2.92	6.80	17.30	10.26	1.19	0.40	0.0	0.0	0.0	0.0	0.0	0.0
MIL-18	0.99	3.12	4.56	3.90	4.27	4.34	2.90	3.54	15.04	45.70	10.83	0.81	0.0	0.0	0.0	0.0	0.0	0.0
MIL-21	0.26	0.81	1.17	1.24	1.42	1.12	0.30	0.47	9.66	57.68	19.68	3.05	1.76	1.99	0.0	0.0	0.0	0.0
MIL-22	2.26	7.27	10.97	11.96	12.27	10.20	4.55	7.04	14.97	16.57	1.57	0.28	0.08	0.0	0.0	0.0	0.0	0.0
MIL-23	3.70	11.75	17.09	18.35	19.62	17.93	8.34	2.41	0.24	0.17	0.20	0.19	0.0	0.0	0.0	0.0	0.0	0.0
MIL-24	3.62	10.65	15.47	17.70	19.97	20.50	9.15	2.30	0.27	0.15	0.18	0.05	0.0	0.0	0.0	0.0	0.0	0.0
MIL-25	0.71	2.40	3.83	4.35	3.95	2.93	1.39	4.10	36.07	29.16	8.18	2.65	0.28	0.0	0.0	0.0	0.0	0.0
MIL-26	3.01	9.85	14.50	16.33	16.42	14.85	11.67	3.94	3.65	2.19	1.73	1.84	0.0	0.0	0.0	0.0	0.0	0.0
MIL-29	0.72	2.26	3.13	3.33	3.35	2.49	0.80	4.60	26.36	31.48	11.15	10.07	0.24	0.0	0.0	0.0	0.0	0.0
MIL-30	1.27	3.89	5.89	6.40	5.85	3.54	1.52	2.06	25.49	35.73	2.90	0.70	1.42	0.00	3.34	0.0	0.0	0.0
MIL-31	0.43	1.33	1.94	2.15	2.08	1.35	0.22	0.63	5.37	47.08	21.40	7.65	2.76	1.55	4.06	0.0	0.0	0.0
MIL-32	0.88	2.53	3.95	4.60	5.07	4.46	3.06	11.18	28.74	26.70	7.23	1.45	0.14	0.0	0.0	0.0	0.0	0.0

SAMPLE NUMBER	CLAY					SILT					SAND					GRAVEL				
	11φ	10φ	9φ	8φ	7φ	6φ	5φ	4φ	3φ	2φ	1φ	0φ	-1φ	-2φ	-3φ	-4φ	-5φ			
MIL-33	1.17	3.19	4.82	5.47	5.78	4.32	3.02	6.98	25.95	19.73	11.48	6.84	1.26	0.0	0.0	0.0	0.0			
MIL-36	4.28	12.75	18.14	19.72	19.92	15.73	5.28	2.10	1.02	1.00	0.33	0.0	0.0	0.0	0.0	0.0	0.0			
MIL-37	2.71	8.62	14.25	18.34	19.35	19.76	9.84	4.02	1.56	1.50	0.42	0.12	0.0	0.0	0.0	0.0	0.0			
MIL-38	2.93	9.17	14.44	15.89	15.34	12.20	8.25	5.68	7.07	6.12	1.79	1.11	0.0	0.0	0.0	0.0	0.0			
MIL-39	3.37	10.81	15.39	16.89	18.27	17.97	6.51	5.49	3.44	0.72	0.50	0.63	0.0	0.0	0.0	0.0	0.0			
MIL-42	0.62	1.98	2.93	3.48	3.50	3.14	0.95	3.94	27.16	34.08	8.68	0.42	0.76	3.31	5.06	0.0	0.0			
MIL-43	1.48	4.42	6.12	6.68	7.09	6.33	2.72	9.96	30.29	21.30	3.15	0.46	0.0	0.0	0.0	0.0	0.0			
MIL-44	2.80	8.81	13.44	15.20	16.64	15.44	11.70	9.54	5.02	0.79	0.34	0.28	0.0	0.0	0.0	0.0	0.0			
MIL-45	3.28	9.40	13.50	13.84	13.83	11.14	2.54	6.34	6.96	6.67	3.92	1.38	0.87	0.00	6.33	0.0	0.0			
MIL-46	3.51	9.82	14.76	16.10	16.10	14.53	12.41	9.36	1.41	1.08	0.70	0.20	0.0	0.0	0.0	0.0	0.0			
MIL-47	2.26	6.80	9.58	10.94	13.59	18.69	16.29	5.94	5.24	4.44	3.06	3.18	0.0	0.0	0.0	0.0	0.0			
MIL-51	0.87	2.80	4.39	4.79	4.85	3.55	1.54	2.28	8.96	20.33	17.45	11.45	8.66	8.15	0.0	0.0	0.0			
MIL-52	2.16	6.80	10.07	10.78	11.31	9.16	6.16	10.44	23.04	6.46	2.23	0.56	0.00	0.28	0.0	0.0	0.0			
MIL-53	0.58	1.72	2.54	2.71	2.89	2.38	1.00	2.14	12.98	19.26	12.51	10.49	11.85	11.61	5.35	0.0	0.0			
MIL-54	2.00	6.07	8.82	9.64	12.54	24.91	20.76	4.56	5.50	2.85	1.21	1.13	0.0	0.0	0.0	0.0	0.0			
MIL-56	0.91	3.77	7.16	10.04	11.69	9.68	7.05	12.02	16.27	11.46	5.10	4.84	0.0	0.0	0.0	0.0	0.0			
MIL-57	0.24	0.71	0.94	0.95	0.97	0.63	0.18	1.30	11.81	28.92	19.21	7.32	8.60	5.34	4.51	8.36	0.0			
MIL-58	0.98	2.89	4.21	4.76	4.81	3.98	1.84	8.21	9.58	10.98	9.38	4.59	6.46	8.27	19.07	0.0	0.0			
MIL-59	1.82	5.27	7.42	7.52	8.86	9.58	7.85	13.55	4.69	10.35	10.56	4.19	2.07	1.19	5.09	0.0	0.0			
MIL-60	1.12	4.06	6.61	7.38	6.62	4.49	3.56	10.84	13.27	21.71	12.68	3.75	2.63	1.28	0.0	0.0	0.0			
MIL-61	1.23	3.92	6.53	8.13	9.03	7.49	3.75	7.60	24.54	19.63	4.30	1.85	0.0	0.0	0.0	0.0	0.0			
MIL-64	0.81	1.36	1.83	1.91	1.77	1.19	0.89	5.09	52.17	22.52	7.88	1.86	0.29	0.45	0.0	0.0	0.0			
MIL-65	4.04	12.19	16.12	15.91	15.81	13.46	8.83	7.72	3.29	1.33	0.67	0.64	0.0	0.0	0.0	0.0	0.0			
MIL-66	2.74	8.51	11.75	12.87	14.90	16.73	9.59	13.84	6.92	1.21	0.46	0.48	0.0	0.0	0.0	0.0	0.0			
MIL-67	3.36	10.34	15.06	15.38	15.54	9.55	1.06	12.83	12.73	3.39	0.55	0.22	0.0	0.0	0.0	0.0	0.0			
MIL-68	2.23	6.83	9.66	10.38	11.21	10.96	9.27	16.37	13.48	7.05	1.50	0.52	0.54	0.0	0.0	0.0	0.0			
MIL-71	1.85	5.73	8.34	9.91	10.34	9.21	5.54	18.12	19.22	10.46	0.88	0.39	0.0	0.0	0.0	0.0	0.0			
MIL-72	2.11	6.87	10.30	11.05	10.86	7.51	2.29	18.04	27.20	3.03	0.44	0.31	0.0	0.0	0.0	0.0	0.0			
MIL-73	1.48	4.52	6.26	6.77	6.98	6.28	4.37	17.21	40.22	5.25	0.56	0.13	0.0	0.0	0.0	0.0	0.0			
MIL-74	0.94	3.78	6.79	9.32	10.35	8.63	7.55	18.27	11.10	11.90	6.11	2.32	0.73	2.22	0.0	0.0	0.0			
MIL-75	2.53	7.99	12.11	12.62	11.37	8.82	4.99	15.73	18.61	3.96	0.99	0.27	0.0	0.0	0.0	0.0	0.0			
MIL-78	1.13	4.56	8.17	10.96	11.22	7.12	2.96	6.88	11.78	16.69	8.89	5.03	1.81	2.80	0.0	0.0	0.0			

SAMPLE NUMBER	CLAY										SILT										SAND					GRAVEL										
	11φ	10φ	9φ	8φ	7φ	6φ	5φ	4φ	3φ	2φ	1φ	0φ	-1φ	-2φ	-3φ	-4φ	-5φ	11φ	10φ	9φ	8φ	7φ	6φ	5φ	4φ	3φ	2φ	1φ	0φ	-1φ	-2φ	-3φ	-4φ	-5φ		
MIL-79	0.22	0.96	1.76	2.36	2.38	1.44	0.74	2.82	17.28	26.70	19.81	9.92	8.72	4.89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MIL-80	0.23	0.99	1.88	2.37	2.27	1.38	0.61	2.33	12.86	33.13	23.59	10.20	6.36	1.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-81	0.30	1.25	2.19	2.63	2.54	1.48	0.56	3.42	30.99	40.05	10.36	2.97	1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-82	2.85	8.57	12.11	11.95	10.36	6.40	5.02	15.11	22.55	3.97	0.87	0.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-85	0.19	0.76	1.38	2.02	2.42	1.96	0.65	0.35	3.70	46.51	28.89	7.36	1.13	2.69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-86	0.37	1.55	3.18	4.91	5.98	7.16	8.33	4.00	20.61	37.71	5.17	0.81	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-87	0.83	3.54	6.68	9.03	9.34	6.73	2.17	4.37	23.74	31.87	1.44	0.20	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-88	1.48	5.82	9.91	11.96	11.00	6.92	4.04	9.33	16.13	12.51	5.89	5.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-91	2.89	9.20	13.55	15.23	14.84	13.55	10.23	15.02	3.91	1.13	0.37	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-92	1.43	5.85	10.69	15.80	18.44	16.39	10.61	8.23	4.40	2.55	2.31	3.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-93	0.99	4.04	7.46	9.98	12.03	9.24	8.84	8.77	16.13	19.17	2.62	0.73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-96	2.51	7.79	11.73	12.22	11.98	10.14	3.45	22.20	13.43	3.24	0.94	0.37	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-103	3.40	9.26	12.23	13.08	13.62	12.28	3.94	17.16	13.55	0.97	0.31	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-110	2.91	8.97	12.97	14.28	14.02	12.03	3.22	22.15	7.30	1.08	0.55	0.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-111	2.61	8.57	12.71	14.42	14.77	12.29	5.34	21.10	6.74	0.74	0.35	0.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-112	2.93	9.02	12.75	12.57	12.92	13.22	11.80	19.55	4.38	0.43	0.24	0.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-117	2.67	8.75	12.95	13.37	12.50	12.03	9.36	16.49	9.41	0.93	0.22	0.22	0.00	1.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-124	4.01	12.17	17.20	17.46	16.14	12.10	5.60	8.63	3.54	1.30	0.95	0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-125	2.79	9.61	14.43	15.74	17.06	14.34	5.16	12.20	4.40	1.63	1.40	1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MIL-126	3.45	10.75	15.72	17.46	18.75	16.46	5.05	10.04	1.84	0.23	0.19	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

APPENDIX C

This table contains the sample weight analyzed, percent gravel (>2.0 mm), percent sand (2.0 mm>x>0.062 mm), percent silt (0.063 mm>x>0.004 mm), percent clay (<0.004 mm), the verbal-equivalent sediment classification (Shepard, 1954), and the related method of moments statistics for each sample. Modes are given in the middle of whole phi intervals.

SAMPLE NUMBER	WEIGHT (GRAMS)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	SEDIMENT CLASS	MEDIAN (φ)	MEAN (φ)	STANDARD DEVIATION	SKENNESS	KURTOSIS	MODE 1 (φ)	MODE 2 (φ)	MODE 3 (φ)
MIL-1	40.8836	23.13	71.38	3.88	1.61	GRAVELLY SAND	1.19	0.54	2.56	0.13	1.36	1.5	-3.5	
MIL-2	19.0980	0.00	7.34	60.27	32.38	CLAYEY SILT	6.97	6.89	2.13	-0.29	0.58	6.5		
MIL-3	20.0207	0.00	28.14	51.05	20.81	SAND-SILT-CLAY	5.99	5.45	2.92	-0.23	-0.77	6.5	1.5	-0.5
MIL-4	27.2199	1.76	48.03	33.83	16.38	SILTY SAND	4.03	4.47	3.06	0.04	-0.96	2.5	7.5	
MIL-5	39.4477	20.33	70.14	6.41	3.12	GRAVELLY SAND	0.92	0.91	2.61	0.56	2.18	1.5	-2.5	
MIL-8	19.9553	0.00	16.37	57.52	26.10	CLAYEY SILT	6.54	6.29	2.39	-0.30	-0.12	6.5	1.5	
MIL-9	50.2969	0.00	2.92	65.47	31.61	CLAYEY SILT	7.07	7.11	1.70	-0.14	0.28	6.5		
MIL-10	19.3571	0.00	9.22	60.78	29.99	CLAYEY SILT	6.90	6.81	2.00	-0.25	0.28	6.5		
MIL-11	18.5611	0.00	13.73	57.92	28.34	CLAYEY SILT	6.71	6.58	2.16	-0.25	0.03	6.5	3.5	
MIL-12	36.2630	1.49	81.64	11.58	5.29	SAND	2.16	2.65	2.31	0.71	1.72	2.5		
MIL-15	19.4721	0.00	11.12	61.19	27.69	CLAYEY SILT	6.72	6.61	2.10	-0.22	0.00	6.5		
MIL-16	20.1342	0.00	18.49	52.05	29.46	CLAYEY SILT	6.75	6.46	2.34	-0.25	-0.39	7.5	3.5	
MIL-17	24.4715	0.00	35.94	41.35	22.71	SAND-SILT-CLAY	5.92	5.53	2.75	-0.04	-1.24	2.5	6.5	
MIL-18	33.1314	0.00	75.92	15.40	8.68	SAND	1.84	2.96	2.58	0.69	0.62	1.5		
MIL-21	39.7909	3.75	89.91	4.09	2.25	SAND	1.41	1.59	1.77	1.12	7.99	1.5		
MIL-22	23.6225	0.08	40.44	38.99	20.50	SAND-SILT-CLAY	5.48	5.20	2.83	0.02	-1.32	1.5	6.5	
MIL-23	18.7940	0.00	3.20	64.25	32.55	CLAYEY SILT	7.05	7.06	1.76	-0.13	0.09	6.5		
MIL-24	19.2817	0.00	2.94	67.31	29.75	CLAYEY SILT	6.87	6.96	1.73	-0.02	-0.30	5.5		
MIL-25	33.7075	0.28	80.17	12.62	6.93	SAND	2.27	2.94	2.39	0.71	1.19	2.5		
MIL-26	17.1355	0.00	13.36	59.28	27.36	CLAYEY SILT	6.62	6.38	2.38	-0.35	0.31	6.5		
MIL-29	34.4288	0.24	83.67	9.97	6.12	SAND	1.91	2.49	2.45	0.73	1.59	1.5		
MIL-30	30.4166	4.76	66.88	17.32	11.05	SILTY SAND	2.23	3.25	3.02	0.28	-0.03	1.5	7.5	
MIL-31	38.0347	8.37	82.13	5.80	3.70	SAND	1.27	1.43	2.39	0.68	3.44	1.5		
MIL-32	33.4570	0.14	75.31	17.19	7.36	SAND	2.50	3.26	2.42	0.59	0.52	2.5	6.5	
MIL-33	30.6027	1.26	70.99	18.58	9.17	SILTY SAND	2.41	3.19	2.80	0.43	-0.20	2.5	6.5	
MIL-36	18.4928	0.00	4.18	60.65	35.17	CLAYEY SILT	7.25	7.19	1.81	-0.28	0.75	6.5		
MIL-37	18.0440	0.00	7.12	67.29	25.58	CLAYEY SILT	6.69	6.67	1.87	-0.16	0.16	5.5		
MIL-38	22.1858	0.00	21.76	51.69	26.55	SAND-SILT-CLAY	6.51	6.11	2.57	-0.25	-0.55	7.5	2.5	

SAMPLE NUMBER	WEIGHT (GRAMS)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	SEDIMENT CLASS	MEDIAN (φ)	MEAN (φ)	STANDARD DEVIATION	SKENNESS	KURTOSIS	MODE 1 (φ)	MODE 2 (φ)	MODE 3 (φ)
MIL-39	18.9951	0.00	10.78	59.64	29.57	CLAYEY SILT	6.81	6.71	2.08	-0.27	0.29	6.5		
MIL-42	36.7484	9.13	74.27	11.07	5.54	SAND	1.93	2.30	2.75	0.28	1.14	1.5	-3.5	
MIL-43	28.0586	0.00	65.17	22.82	12.02	SILTY SAND	2.83	3.97	2.65	0.42	-0.58	2.5	6.5	
MIL-44	20.3281	0.00	15.97	58.98	25.05	CLAYEY SILT	6.41	6.34	2.14	-0.10	-0.55	6.5		
MIL-45	22.5048	7.20	25.27	41.34	26.18	SAND-SILT-CLAY	6.28	5.32	3.62	-0.44	0.03	7.5	2.5	-3.5
MIL-46	19.6382	0.00	12.76	59.15	28.10	CLAYEY SILT	6.64	6.55	2.11	-0.14	-0.38	7.5		
MIL-47	20.0791	0.00	21.86	59.50	18.64	SANDY SILT	5.63	5.57	2.55	-0.19	-0.24	5.5		
MIL-51	33.8758	16.81	60.48	14.73	7.97	GRAVELLY SAND	1.21	1.97	3.29	0.43	-0.19	1.5		
MIL-52	27.1513	0.82	42.74	37.41	19.03	SAND-SILT-CLAY	5.03	5.08	2.77	0.03	-0.93	2.5	6.5	
MIL-53	33.5203	28.80	57.38	8.98	4.84	GRAVELLY SAND	0.86	1.05	3.12	0.47	0.59	1.5	-1.5	
MIL-54	20.6719	0.00	15.25	67.86	16.89	CLAYEY SILT	5.56	5.72	2.17	-0.07	0.14	5.5	2.5	
MIL-56	24.5238	0.00	49.69	38.47	11.84	SILTY SAND	4.04	4.43	2.76	0.07	-1.01	2.50	6.5	
MIL-57	239.8800	26.81	68.57	2.73	1.89	GRAVELLY SAND	0.83	0.39	2.63	0.19	1.63	1.5	-1.5	-4.5
MIL-58	34.3005	33.80	42.74	15.38	8.07	GRAVELLY SAND	1.20	1.45	3.96	0.22	-0.84	-3.5	1.5	
MIL-59	26.3233	8.35	43.34	33.81	14.51	SILTY SAND	3.88	3.88	3.52	-0.10	-0.70	3.5	0.5	-3.5
MIL-60	30.1883	3.91	62.25	22.05	11.79	SILTY SAND	2.60	3.47	3.07	0.26	-0.76	1.5	7.5	
MIL-61	29.7383	0.00	59.91	28.41	11.68	SILTY SAND	2.91	4.07	2.72	0.29	-0.89	2.5	6.5	
MIL-64	37.0191	0.74	89.49	5.76	4.00	SAND	2.33	2.57	1.89	1.02	5.44	2.5		
MIL-65	18.7912	0.00	13.65	54.00	32.35	CLAYEY SILT	6.89	6.68	2.24	-0.26	-0.14	8.5		
MIL-66	20.7619	0.00	22.91	54.09	23.00	SAND-SILT-CLAY	6.05	6.06	2.26	-0.05	-0.69	5.5	3.5	
MIL-67	21.2285	0.00	29.71	41.53	28.75	SAND-SILT-CLAY	6.62	6.17	2.55	-0.15	-1.07	6.5	3.5	
MIL-68	23.0914	0.54	38.92	41.82	18.72	SANDY SILT	5.12	5.24	2.61	0.05	-0.90	3.5	6.5	
MIL-71	24.0719	0.00	49.07	35.01	15.92	SILTY SAND	41.7	4.89	2.59	0.18	-1.06	2.5	6.5	
MIL-72	24.6204	0.00	49.01	31.71	19.28	SILTY SAND	4.43	5.16	2.61	0.17	-1.26	2.5	7.5	
MIL-73	27.7646	0.00	63.35	24.39	12.25	SILTY SAND	3.22	4.31	2.42	0.47	-0.41	2.5	6.5	
MIL-74	26.1091	2.95	49.69	35.85	11.51	SILTY SAND	3.86	4.27	2.86	0.00	-0.60	3.5	1.5	
MIL-75	21.2255	0.00	39.56	37.80	22.64	SAND-SILT-CLAY	5.62	5.53	2.62	0.04	-1.26	2.5	7.5	
MIL-78	20.2797	4.61	49.27	32.27	13.86	SILTY SAND	3.44	4.03	3.29	0.02	-1.13	1.5	6.5	
MIL-79	38.0407	13.62	76.53	6.92	2.94	GRAVELLY SAND	1.25	1.44	2.40	0.61	2.10	1.5		
MIL-80	38.3424	8.16	82.10	6.63	3.10	SAND	1.24	1.53	2.25	0.79	3.08	1.5		
MIL-81	37.0666	1.24	87.80	7.22	3.74	SAND	1.88	2.32	2.00	0.95	3.88	1.5		
MIL-82	21.6847	0.00	42.74	33.74	23.52	SAND-SILT-CLAY	5.35	5.45	2.70	0.08	-1.35	2.5	8.5	
MIL-85	38.8455	3.82	86.81	7.05	2.33	SAND	1.21	1.48	2.02	0.98	4.84	1.5		
MIL-86	31.0710	0.22	68.30	26.30	5.10	SILTY SAND	2.30	3.22	2.33	0.52	0.08	1.5	4.5	
MIL-87	29.8459	0.06	61.62	27.27	11.05	SILTY SAND	2.69	3.97	2.70	0.35	-1.00	1.5	6.5	
MIL-88	23.5967	0.00	48.87	33.92	17.21	SILTY SAND	4.28	4.65	3.02	0.04	-1.26	2.5	7.5	

SAMPLE NUMBER	WEIGHT (GRAMS)	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	SEDIMENT CLASS	MEDIAN (ϕ)	MEAN (ϕ)	STANDARD DEVIATION	SKEWNESS	KURTOSIS	MODE 1 (ϕ)	MODE 2 (ϕ)	MODE 3 (ϕ)
MIL-91	21.8545	0.00	20.51	53.85	25.64	SAND-SILT-CLAY	6.39	6.28	2.20	-0.06	-0.85	7.5	3.5	
MIL-92	19.9702	0.00	20.79	61.25	17.97	SANDY SILT	6.12	5.81	2.43	-0.32	0.14	6.5		
MIL-93	24.1864	0.00	47.42	40.09	12.49	SILTY SAND	4.29	4.57	2.65	0.14	-1.13	1.5	6.5	
MIL-96	25.5972	0.00	40.17	37.79	22.04	SAND-SILT-CLAY	5.63	5.57	2.54	0.04	-1.17	3.5	7.5	
MIL-103	22.2384	0.00	32.18	42.92	24.90	SAND-SILT-CLAY	6.12	5.95	2.46	-0.01	-1.15	3.5	6.5	
MIL-110	21.8067	0.00	31.65	43.54	24.80	SAND-SILT-CLAY	6.22	6.02	2.40	-0.05	-0.97	3.5	7.5	
MIL-111	23.3714	0.00	29.29	46.81	23.89	SAND-SILT-CLAY	6.21	6.04	2.31	-0.03	-0.98	3.5	6.5	
MIL-112	22.0762	0.00	24.78	50.51	24.71	SAND-SILT-CLAY	6.02	6.09	2.24	0.04	-1.01	3.5	5.5	8.5
MIL-117	22.5253	1.08	27.27	47.27	24.38	SAND-SILT-CLAY	6.02	5.91	2.49	-0.16	-0.10	3.5	7.5	
MIL-124	18.2533	0.00	15.33	51.30	33.37	CLAYEY SILT	7.05	6.72	2.29	-0.34	0.08	7.5	3.5	
MIL-125	19.3974	0.00	20.87	52.30	26.82	SAND-SILT-CLAY	6.56	6.30	2.37	-0.26	-0.19	6.5	3.5	
MIL-126	18.8722	0.00	12.36	57.72	29.92	CLAYEY SILT	6.86	6.78	1.97	-0.14	-0.48	6.5	3.5	