FISHERIES RESEARCH BOARD
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(OCEANOGRAPHIC and LIMNOLOGICAL)

No. 89

TITLE

A Study of the Marine Sediments of the Canadian Eastern Arctic Archipelago

AUTHORSHIP

R.B. PERRY

Establishment

Atlantic Oceanographic Group

Dated April 1, 1961

Programmed
by
THE CANADIAN COMMITTEE ON OCEANOGRAPHY

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NOTE

This is the reproduction of a Thesis submitted by Richard Baker Perry in partial fulfilment of the requirements for a degree of a

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January, 1959

The work was carried out at the Department of Oceanography and Meteorology of the Agricultural and Mechanical College of Texas from data and material gathered in the Canadian Arctic in 1957 by H. M. C. S. "Labrador" and the Fisheries Research Board of Canada, Atlantic Oceanographic Group.

N. J. Campbell
Oceanographer-in-charge
Atlantic Oceanographic Group

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ABSTRACT

An investigation of the marine sediments in the area has been made in order to study the type of sediments and their probable modes of deposition. Examinations were made of 126 grab samples and 30 cores taken from the area.

The sediments were mostly poorly-sorted olive gray material, with fragments in all grade sizes from cobbles to fine clay. The rock fragments were generally subrounded to subangular. The larger fragments were faceted and often had the tabular and flat-iron shapes associated with glacial transport. Pitting was common on the fragments found in the marine sediments and on the rocks of the surrounding land.

Pebbles and cobbles occurred most abundantly in zones extending for several miles from shore. The sediments in the deeper waters far from shore were predominantly silts.

The cores showed that sedimentary conditions have generally remained constant over most of the area for the length of time represented by the samples. Several cores taken adjacent to the northern part of Baffin Island contained layers which indicated changing conditions of deposition.

The relief of the sea floor is apparently determined by the attitude of the underlying rock beds.

The rate of marine sedimentation is apparently quite rapid due to rapid erosion on the surrounding land, with little vegetation to retard runoff. The extensive ice-rafting is able to transport material from the beaches to areas offshore.

The composition of the sediments is comparable to that

of tills described elsewhere in the world. It is possible that some till deposits formed in the past were deposited under conditions similar to those of the Arctic Archipelago.

INTRODUCTION

STATEMENT OF THE PROBLEM

The purpose of this investigation is to provide a preliminary survey of the marine sediments of the Canadian Eastern Arctic Archipelago. For much of the area under investigation there are no reported studies of the marine sediments. This was the first time that coring was done in the area. Since grab samplers with relatively small openings and capacity had been used, it was not known if material larger than pebbles existed in these sediments. The use of relatively large capacity grab samples made possible the recovery of many fragments of cobble size.

The scope of this study is limited to primarily a size analysis for the purpose of obtaining a more complete understanding of the effect of the modes of transportation in the arctic regions. Further investigations of the microscopic and geochemical nature of the samples will be necessary before a total picture of their sedimentary history may be completed.

DESCRIPTION OF THE CRUISE

The samples were collected while on board the icebreaker H.M.C.S. "Labrador" from July to October, 1957. The collection was part of the general Arctic program of the Atlantic Oceanographic Group, Fisheries Research Board of Canada. A total of 30 cores and 126 grab samples were taken during the cruise.

The area covered included the waters off the coast of Labrador, and in Hudson Strait, Baffin Bay, Lancaster Sound, Franklin Strait, Prince Regent Inlet, the Gulf of Boothia, Wellington Channel, Peel

Sound, and adjacent smaller bodies of water (Fig. 1). The majority of sediment samples were collected during the occupation of regular oceanographic stations, but some additional ones were taken during various other operations of the ship. The general oceanographic program also included observation of the physical oceanography and the marine biology of the waters.

ACKNOWLEDGEMENTS

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Dr. Neil J. Campbell of the Atlantic Oceanographic Group directed the oceanographic program and was very helpful in making the arrangements for all phases of the collection program. Appreciation is extended to Mr. A. E. Collin and Mr. F. D. Forgeron who assisted in the collection of the samples and to the Officers and men of H.M.C.S. "Labrador" who contributed a great deal of time and effort to make this investigation possible.

Mr. C. S. Wells and Mr. G. Moskovits assisted in the photographing of samples. Mr. F. C. Marland identified the macrofauna.

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DISCUSSION OF THE LITERATURE

The Arctic Archipelago has had a long history of scientific exploration, but only in the last thirty years, with the development of bottom sampling devices and fathometers has any significant work been done on the marine sediments. The development of large icebreakers has made it possible to conduct oceanographic observations over a large area in a single season, even if widespread ice is encountered.

ICE RAFTING

It is fortunate that a great many recorded accounts concerning transport of material by ice are available from the early expeditions. These have been summarized by Tarr (1897a), Kindle (1924), Fuchs and Whittard (1930), and Emery (1949). The dominant factor in transportation of detritus in the region is the ice, both sea ice derived from salt water and the berg ice from glaciers. The sea ice very probably exerts a greater influence on the sedimentation than does the berg ice. As the sea ice is formed in the fall, a great deal of material is frozen into the base of the ice in shallow water areas. When thawing starts in the spring, great quantities of material are moved onto the ice by flooding streams. Owing to the nature of the frozen ground, the meltwater is unable to sink into it. If rain occurs at the same time, tremendous flooding may occur, such that whole hillsides are covered by one great sheet of water, capable of rolling huge boulders down the slopes (Tarr, 1897b).

As this sea ice breaks up, it may be driven against the shore by the wind, by other ice floes, or by the rise and fall of the tide.

The pressure exerted is tremendous and the entire beach may be rapidly changed as the ice plows up the sediments. The grounding of this sea ice influences the microrelief near shore (Rex, 1955; Carsola, 1954b). The movement of boulders and other sediments by ice on the tidal flats of the St. Lawrence River has been studied by Brochu (1957). He found that the ice tended to move the boulders away from shore and deposit them in a chain along the low tide mark.

Another way in which material is transported onto the ice is by the wind. Great winds blow down off the land and it is reported that material as large as pebbles is moved several miles off shore (Kindle, 1924; Fuchs and Whittard, 1930). The wind is especially effective after the meltwater streams have begun to dry up. This leaves the fine material available for erosion and transport by the wind (Hobbs, 1948).

If sediment is present in the ice in sufficient concentrations it may impart a distinct "dirty" color to the ice. The sea ice formed in Foxe Basin presents a very good example. This sediment-laden ice is found many miles from shore, yet deposition by wind or by streams is not considered plausible due to the low surrounding terrain and adverse meteorological conditions for wind transport. Campbell and Collin (1958) postulate a mechanism of suspension freezing as an explanation. The fine sediments are believed to be brought into fluid suspension by wind and tidal agitation of the shallow waters of Foxe Basin. Freezing of the turbid water results in the formation of sediment-contaminated ice, while thawing brings about a surface accumulation of sediment. Surface sediment concentrations measured 0.5 to 2.0 grams per kilogram of ice. In one yearly cycle in Foxe Basin, the amount of ice-borne sediment is of the order of four to eight million tons (Campbell and Collin, 1958).

As the sea ice moves out from shore, it eventually melts and dumps its load. The material on the bottom of the ice which has been frozen into the ice is trapped if the floe does not melt during the summer. When this happens, more ice is formed under the detritus during the next winter. Meanwhile, the top of the ice has melted off in the summer, and the material gradually works its way up to the surface of the floe, sometimes taking several years to be released. Sea ice is often observed to be clear at the start of the summer and dirty later on as the surface is melted away (Sverdrup, 1931, 1938).

Prior to the publishing of the <u>Ice Atlas of the Northern Hemisphere</u> (U. S. Hydrographic Office, 1946), there was little information on the coverage and movement of sea ice in the area. This work has been supplemented by an extensive ice program of the U. S. Navy Hydrographic Office since 1953. The use of airplanes for ice reconnaissance has now made it possible to study the formation, breaking up, and movement of the ice over large regions (Schule and Wittman, 1958). As more detailed studies of the process of ice-rafting of detritus are made, the observations should become of great value to the marine geologist. By the use of daily photographic reconnaissance, it should be possible to learn the route and distance covered by ice carrying detritus from one area to another.

The polar ice, sea ice which does not melt during the summer, has also been described as a carrier of detritus. Most of this ice is found to the north of the area under investigation, but some is carried southeastward into the region and among the other islands to the west (Bader and Henry, 1958). Crary (1958) has taken samples of sediment layers trapped in the ice island T-3. These layers, extending down into the ice for 90 feet, all contain sediment layers of the same type. This was detritus from metamorphic rocks and fragments of altered volcanic rocks, with the dominent particle size that of fine silt (Crary et al., 1955).

There are glaciers now in existence in the area on Baffin, Bylot, Devon, and Ellesmere Islands. Bergs from Northwest Greenland pass along the Baffin Island and Labrador Coasts on their way southward. While most of the material carried by bergs is derived from land, some additional material may be picked up by grounding of the ice. Bergs doubtless have a great effect on the marine geology by grounding in the shallow waters which they traverse, thus stirring up and altering the relief of the bottom. Kane (1857) reports one berg grounded in 525 feet of water which rotated with each change in the tide.

GENERAL OCEANOGRAPHY

Previous to observations made from H.M.C.S. "Labrador" in the last few years, it was felt that water movement in the area was a simple one from northwest to southeast. It is now apparent that the situation is far more complex, with currents reported moving in both directions in the major passages such as Lancaster Sound and Hudson Strait (Collin, MS 1958; Campbell, MS 1958). In the Eastern Archipelago region the bottom topography is one of deep channels, but a sill with a depth of 175 metres in the Lancaster Sound-Barrow Strait passage somewhat restricts a free interchange of waters between Baffin Bay and the open waters to the northwest of the Archipelago (Hachey, Lauzier, and Bailey, 1956). Water temperatures in the area range from about -1.50°C to 2.0°C and salinities from about 29.00 to 33.00 parts per thousand.

GEOLOGY OF THE AREA

Portions of the area have been examined by early expeditions and reported on by such men as Schei (1903). The information gained from these early expeditions has been summed up by Armstrong (1947). In recent years more detailed work has been done on many of the islands such as Baffin Island where iron deposits of economic importance have been reported. Aerial photography is now used to examine the structure over wide areas such as the Parry Islands folded belt (Fortier and Thorsteinsson, 1953).

Fortier and Morley (1956) have accounted for the pattern of islands by a former river drainage system. The postulated system is divided into two dendritic patterns separated into an Atlantic and an Arctic watershed, with a divide running from northeastern Ellesmere Island to the mainland, approximately halfway between the southeastern tip of Baffin Island and the southwestern tip of Banks Island.

The regional geology is one of generally flat-lying beds which become successively younger from southeast to northwest. These range from Precambrian to Triassic or Jurassic in age, with small basins of Tertiary sedimentary rocks containing coal in many localities. All the belts of folded strata occur in the northern half of the Archipelago.

A brief description of the terrestrial rocks adjacent to the sampling area (after Armstrong, 1947) is of importance to the regional marine geology. Baffin Island is mountainous along its northeast coast from Cumberland Sound to Pond Inlet, the general elevation being about 5,000 feet. The southern and northern areas of the island are plateaus and the west coast consists of low flat land with a few rolling hills. This western area and the southern and eastern parts are underlain by crystalline Precambrian rocks. Most of the east coast rock consists of granitic intrusions, gneiss, and schist, while those of the southern coast are mostly crystalline limestone. The rocks of the Brodeur and Borden Peninsulas consist mainly of limestone, with some shale and sandstone. At Arctic Bay shales are overlain by sandstones and limestones, all of which are cut by basic dikes.

Devon Island is also mountainous in its eastern part, with lower elevations in the west. It is made up of granite, gneiss, shale, sandstone, and limestone.

Along the east coast of Somerset Island there are 1000 foot limestone cliffs and along the coast of Boothia Peninsula are granitic hills of 1,500 feet elevation. The rest of Somerset Island and Boothia Peninsula, which are separated only by the narrow Bellot Strait, is made up of flat-lying limestones and a north-south trending belt of Precambrain granite and gneiss.

Cornwallis and Bathurst Islands have cliffs 400 to 700 feet high, and the islands have elevations of over 1000 feet. They consist mainly of a series of late Paleozoic white sandstones containing coal seams, overlain by a series of limestones. The southeast tip of Bathurst Island also has volcanic rocks.

To the south of the area, on the mainland, Pleistocene marine deposits have been described by Wickenden (1947). These are found over much of the lowland of eastern Canada, which was flooded at the end of glacial times. This is shown by the numerous fossil beaches in the area, in Hudson Bay some being at least 900 feet above present sea-level. The marine deposits are mostly blue-gray clay or silty clay with some sand and gravel. The thickness may be as much as 200 feet, but is usually less than 100 feet. These clays commonly contain marine shells and may contain bones of fish, whales, and seals. Old strand lines have not been described or observed in the area under study, but they are reported immediately to the west on Victoria Island (Washburn, 1947).

MARINE SEDIMENTS

The first reported marine sediment samples in the area were studied by Trask (1932), as a result of the "Marion" expedition to Davis Strait in 1928. Trask made a petrologic examination and studied the particle sizes by mechanical analysis. The samples all showed rock fragments which seemed to be distributed about the whole area. The average gravel content of the sediments was 14 per cent, occurring as faceted, subrounded pebbles. However, some samples lying in deep water showed only four per cent gravel and were mostly silts. Most of the samples were well-sorted, fine grained sands, but the gravel often masked this sorting. All the samples contained some frosted sand grains; their abundance in the sediment decreasing away from shore. Trask attributed this to wind transportation.

The dominant rock types found in the samples were gneiss, quartzite, gray and buff noncrystalline limestone, hornblendite, and various types of granitic rocks. In general, the calcium carbonate content increased as the sediments became finer, with well-sorted sands showing less than five per cent and finer deposits 20 to 40 per cent. The organic content was usually about one per cent.

The texture of the sediments varied with the configuration of the bottom and with the surface currents and tides. The sediments were relatively coarse on the steep slopes, in Hudson Strait, and on the ridge that separates Davis Strait from Baffin Bay. At greater depths, where current velocities were lower, the sediments were finer.

The sampling instrument used by Trask had an internal diameter of four centimetres and could not procure pebbles larger than that size.

Samples have also been collected and studied from Foxe Basin, the Gulf of Boothia, and Prince Regent Inlet as a result of the 1955 and 1956 summer cruises of H.M.C.S. "Labrador" (Forgeron, MS 1959). There were 174 samples collected, 130 of which were from Foxe Basin and Foxe Channel. These sediments were collected with a Dietz-Lafond sampler.

Mechanical analyses on approximately one-half of the samples showed that the sediments were composed mainly of sand and silt, with some particles up to cobble size present. A microscopic examination of the 2.0 to 0.5 millimetres diameter particles of 30 samples showed quartz and limestone particles to be the dominant constituents except in a few cases where mollusk shell fragments or Foraminifera tests were dominant. A microscopic examination of the particles greater than 2.0 millimetres diameter showed that limestone was the dominant constituent, with quartz, granite, gneiss, schist, or quartzite usually present but in small quantities.

The U. S. Navy Hydrographic Office collected a few sediment samples in the area. The results of any analysis on these samples are not presently available.

The sediments of the Western Canadian and Alaskan Arctic Archipelago have been reported by Carsola (1954a). He reports that mud covers the slope and most of the shelf. On the shelf the sediments are poorly sorted and in many places contain large amounts of sand and gravel. The sediments become better sorted and the average grain size decreases with increasing distance from shore and depth.

A number of short cores have been taken in the Arctic Ocean near Ellesmere Island by Crary (Hattersley-Smith et al., 1955); these are now being analysed. One of these cores, described by Ewing and Donn (1956) was 81 centimetres in length, the upper 20 centimetres containing abundant Foraminifera, which decrease in the next 10 centimetres. The rest of the core consisted of lutite, with granules and pebbles distributed throughout.

The general work on the sediments of the Arctic Basin has been summarized by Emery (1949), indicating that they are fine grained, much the same as in other oceans of the world. Recent Russian work in the Arctic Basin confirms that the sediments are principally sea-oozes, but states that pebbles and boulders by drifting ice are also present (Laktionov, 1955).

Glacial marine deposits are also described in cores from the open oceans throughout most of the world, evidencing the wide travels of icebergs during the glacial stages. In the North Atlantic these sediments are characterized by coarse sand, granules and pebbles up to more than a centimetre in diameter (Bramlette and Bradley, 1942). There are also accounts of cobbles and boulders being dredged from the North Atlantic, showing some striated and faceted surfaces as in glacial moraine material. In the Northeastern Pacific and the Gulf of Alaska, similar ice-rafted material is found (Menard and Dietz, 1951; Menard, 1953).

Glacial marine deposits in the Antarctic show a great deal more fine material, much of it glacial rock flour of the type found in the Arctic Basin. There are some pebbles, but in general the sand content is much less. The abundance of fine material and the generally poor sorting is probably due to the predominance of sea ice, lack of berg ice, and lack of currents. The Antarctic marine sediments are also characterized by a high diatom content and red clay (Stetson and Upson, 1937; Hough, 1950, 1953, 1956).

Much of the area under study has fjords and inlets, some with sills which could restrict water circulation and cause anaerobic conditions in the sediments. Such conditions have been studied extensively in Norwegian fjords by Strom (1936), where the sediments showed a high per cent of hydrogen sulphide. Recent studies made of British Columbia inlets by Pickard (1956) and Toombs (1956) showed only one case of stagnation. Pickard attributes this general lack of stagnation to a greater sill depth than in the Norwegian fjords, making possible a greater interchange of bottom waters.

In recent years several extensive studies of Arctic Foraminifera have been made (Cushman, 1948; Loeblich and Tappan, 1953). These will probably be used eventually for studies in climatology. There is increasing interest in the sediments of the Arctic as a guide to evaluation of some of the theories of continental ice-sheet formation. The recent ocean-control theories of Stokes (1955) and Ewing and Donn (1956) might be studied by samples from the Arctic Ocean. Samples from the area in this study are too close to their origin to provide climatological information since rates of sedimentation may vary considerably.

Freuchen and Salomonsen (1958) have described the feeding habits of walruses and bearded seals in the area. These mammals feed extensively on the mollusks in the sediments at depths of water up to 250 feet. In the feeding process they churn up large quantities of sediment, placing material in suspension. The stomach of a single captured walrus has contained as many as 3000 mollusks. Vibe (1939, 1950) has estimated that a walrus must churn up an area of 200 square metres in order to obtain a meal in the Greenland area.

PROCEDURE

SAMPLING PROGRAM

In order that core samples might be obtained from the area, the expedition was equipped with a gravity-piston coring tube which could use either a 6 or 12 foot barrel with a two inch outside diameter. This instrument is a modified Kullenberg corer and may be used either as a piston or a gravity sampler. The majority of cores recovered were of the gravity type, averaging about four feet in length. The longest core taken was a piston core of 11 3/4 feet in length taken in fine-grained anaerobic material. The material which adhered to the outside of the core barrel showed that in every case penetration was approximately equal to the length of the core taken.

Plastic liners of 1 7/8 inch diameter made of "tulox" were used inside the coring barrels and the sediments were left in these liners for shipment back to the laboratory. After each core was made, it was stored vertically on deck outside of the heated interior spaces of the ship, in order to take advantage of the cool temperatures for preservation. Before leaving the ship the excess water was removed from the liners, the liners were trimmed to the length of the mud sample, and the ends were tightly sealed with cork, tape, and paraffin to deter loss of moisture.

Any material retained in the nose and core-catcher of the instrument was saved in a separate bottle and that bottle was sealed with paraffin.

Results with the instrument were generally unpredictable, with the instrument often hitting rocks, resulting in no sample or a bit of coarse material stuck in the nosepiece. This was primarily true in the shallow waters during the first part of the cruise. For the latter portion of the cruise, good samples were taken in deep water each time the instrument was lowered.

In addition to the gravity-piston instrument, a Phleger corer with one and three foot barrels was used for five of the 30 cores taken. The Phleger did not meet with much success because the sediments generally contained too much coarse material which clogged in the nosepiece. The Phleger samples were preserved in the same manner as those taken with the larger coring instrument.

This sampling program has shown that the ideal coring tube for operations in the area should have a large diameter opening and that it will generally have the best results in deep water several miles from shore.

Three types of bottom samplers were used, a van Veen, an Orange Peel, and a Dietz-Lafond. In areas where the bottom sediments contained gravel or large rock fragments, the van Veen and Orange Peel were used. The van Veen brought up a large sample, but its release mechanism proved to be too undependable for it to be used extensively. The Orange Peel proved to be excellent and it was used for the majority of the 126 samples taken. The Dietz-Lafond, although much smaller, worked well on the deeper fine-grained sediments. It was found that in deep coring operations, where time did not permit the lowering of a grab sampler and then a coring instrument, that the Dietz-Lafond could be used as a release weight on the coring mechanism, assuring a core and grab from the same location.

A representative portion of each sample was placed in a glass preserving jar and sealed. The jar lids were then given a thick coating of preserving wax. Rock fragments too large to fit into the jars were placed in bags.

All samples were shipped to the Texas A. & M. College for analysis in the laboratories of the Department of Oceanography and Meteorology.

LABORATORY

Grab Samples

Each grab sample was removed from its preserving jar and was thoroughly mixed in a pan in order to provide a representative distribution of all particle sizes. A portion was removed by quartering and the unused sample was resealed in the preserving jar. To assure that the pebbles and granules would be representative of the entire sample it was necessary to analyze approximately 400 grams of sediment. It was felt that if a smaller volume were used, there would be too much opportunity for prejudice on the part of the analyst in selection of the larger fragments to be analyzed.

Each sample was dried in an oven at a temperature of 100°C. for a period of two weeks. The material was then crushed by use of a mortar and a rubber-tipped pestle and was placed on a U. S. Standard Seive Number 10 (2.0 millimetres). The seive was shaken in a Tyler RO-TAP Testing Seive Shaker until the sample was completely separated into one portion less than two millimetres. The portion less than two millimetres was returned to an oven for another week of drying and was then weighed. The larger material was weighed and set aside for later analysis.

Approximately 50 grams of the material less than two millimetres was removed for mechanical analysis similar to that described by Krumbein and Pettijohn (1938). This material was placed in the oven for three days, weighed, and placed in a 250 millilitre centrifuge tube with a 0.1 gram/litre solution of the dispersing agent Marasperse N (sodium lignosulfonate). The centrifuge tube was then agitated on a Burrell Wrist Action Shaker, Model DD for at least one hour. The tube was allowed to sit until the material in suspension had settled out. The supernatant liquid was decanted in order to reduce the concentration of marine salts. More Marasperse N solution was added, the bottle was reshaken, and the slaking process was repeated if flocculation was observed in the bottle.

The desalted sample was mixed again for 1/2 hour on the Burrell Wrist Action Shaker and was poured onto a U. S. Standard Seive Number 230 (0.062 millimetres) and washed with Marasperse N solution. The material passing through the seive was caught on a 1000 millilitre graduated cylinder for pipette analysis. The material caught on the seive was dried, weighed, and then seived through a nest of three-inch seives with openings of 1, 1/2, 1/4, 1/8, and 1/16 millimetres. The seives were shaken for ten minutes on an American Instrument Shaker, Model 7-120. The material from each seive was weighed and saved for later examination.

Any material finer than 1/16 millimetres was added to the graduated cylinder for pipette analysis. The pipette material was stirred and samples were taken at intervals using settling velocities calculated from Stokes' Law with a modification according to Wadell. By this method the weight of material of 1/32, 1/64, 1/128, 1/256, 1/512, and 1/1024 millimetres was calculated. There were only two occurrences of flocculation of the samples in the graduated cylinders and the flocculation was eliminated by one decantation of the supernatant liquid.

The per cent in each grade size less than 2.0 millimetres was calculated and cumulated for each sample (Appendix A).

The material larger than two millimetres was seived on a nest of seives of 9.52, 6.35, 4.76, 3.36, and 2.38 millimetres. This material was weighed together with any larger fragments which had been too large to fit into the preserving jars. Any fragments which would not, in any orientation, pass through a square opening of 64 millimetres were placed in the cobble-sized category. The per cent of material of each seive size larger than 2.0 millimetres was then calculated (Appendix B).

The cobble-size material presented a considerable statistical problem because it was transported separately from the sample jars and was representative of the whole sample collected and not just that portion analyzed. Since about 1/2 of each sample was analyzed, the weight of material of cobble size was divided by two before being used in the calculation of material in each grade size. This treatment of the cobble-sized material was arbitrary and the results should only be used as a general indication as to how much cobble-size material was present.

It should also be noted that the division of the total sample at the two millimetre grade size was effected in order to prevent the larger fragments from having a masking effect on the finer grade sizes. If the per cent of material in each grade size were to be worked out including the larger rock fragments, the percentages of the finer material would be so small that it would be very difficult to use the results for study of the sedimentary history of the finer portion. The ratio of the total material less than two millimetres to that of the material less than that size is given in Appendix B in order to show the relative size of each portion.

Each sample was examined microscopically and the results are shown in Appendix C. This examination included the types of rock fragments present. Wet colours were compared with a rock-colour chart (National Research Council, 1948) and the particle size classification of Wentworth was used.

A few samples were examined microscopically. Photographs were made of some of the rock fragments.

Core Samples

The plastic core liners were opened by splitting and each core was split in half lengthwise for examination. One of the lengthwise sections was set aside for later studies and the other was sampled for analysis. Samples of approximately two millimetres in length were removed from the top, centre section, and bottom in cases where no lithology changes with depth were observed. When zones of differing lithology were observed, they were sampled. All samples were then subjected to mechanical analysis by the same method used on the grab samples (Appendix D).

The cores selected for analysis were also measured and described microscopically (Appendix E). A microscopic examination was made of some samples and photomicrographs were made of any particularly interesting features.

RESULTS

FIELD OBSERVATIONS

The deck of an icebreaker affords a very good vantage point for studying the material carried by ice. The action of the ship in sea ice is such that it upends and in many cases overturns the blocks of ice. This affords a clear view of any material carried on the bottom of the ice. In every case where there was material observed on the bottom of the ice, there was also material visible on the top of the block of ice. Along the Labrador coast there was a great deal of brown coloured material in the cavities on the bottoms of the ice blocks. This brown material was probably due to a concentration of plankton, as the waters were coloured light brown with a plankton bloom at that time. It is probable that most ice blocks that were carrying material frozen onto the bottom of the ice blocks were to be found in shallower waters closer to shore since this is where ice may go aground.

Large amounts of "dirty" ice were observed in Hudson Strait, probably having moved out of Foxe Basin. Fig. 2 shows a large area of this ice in Hudson Strait. One block of ice about 70 feet in diameter was boarded by the scientific party. This ice block contained many small boulders which were approximately one foot in diameter. These small boulders were well rounded, indicating that they had been subject to considerable stream action before being picked up by the ice. There were also a number of subrounded pebbles as shown in Fig. 3 and concentrations of silt-sized material along ice ridges and in pools of meltwater. Some material was frozen into the ice all the way to the bottom of the block.

It would seem probable that this ice block received its load by freezing the material into the bottom of the block along a shoreline near the terminus of a river.

In Peel Sound a large block of polar ice was encountered (Fig. 4). This block contained several boulders about three feet in diameter. The boulders showed very poor rounding and freshly broken faces were visible on the coarsely crystalline granitic rock. There was also a conical pile of loose material about four feet in height. The boulders and conical pile of material indicate that the load was picked up next to an overhanging cliff of coarsely crystalline rock.

Over much of the area it was observed that the present beaches are within a few hundred feet of cliffs of several hundred feet in elevation. These cliffs along the shoreline must provide the shore ice with an abundant supply of material each year, thus allowing rapid depletion of the talus slopes in front of the cliffs by ice-rafting. Therefore the process of ice-rafting probably has an influence on the erosion of the terrestrial rocks of much of the area.

Yearly operations at certain beaches in the Arctic have shown that an area near shore cleared of all large boulders during one summer may have boulders of considerable size moved onto it by ice action by the following summer.

In the Greenland area material was observed on berg ice near the terminus of several glaciers. No sediments were visible on the berg ice in other parts of the area.

There were a number of blocks of sea ice with walruses and seals. In many cases these animals had carried mud onto the ice from their bodies after having stirred up the sediments during feeding.

It was observed that the sea ice moves out from the middle of most bodies of water first. The ice near shore moves parallel to the shoreline as it is breaking up. It is probably concentrated along the shoreline by the action of the wind.

The submarine topography of the area was observed by extensive use of an echo sounder. In general the bottom relief may be correlated with the attitude of the rock beds found on adjacent shorelines. In those areas of flat-lying beds, the submarine topography is flat or very gently inclined. Where steeply inclined or folded strata were observed in the adjacent island areas, the submarine relief was one of ridges and depressions, sometimes producing pinnacles with very steep sides. In regions of mountainous terrain and igneous rocks, the bottom relief was quite varied.

When little inlets off the larger bodies of water were entered, there was commonly a sill at the entrance. Nye Harbour, off Frobisher Bay, is a typical example of an entrance sill. The main part of Nye Harbour is about 1/2 mile long and 1/4 mile wide, with a narrow entrance. Vertical rock cliffs of over 100 feet in height surrounded the Harbour. There is a steep mountain within 1/4 of a mile of the head end of the Harbour. The shape of the Harbour was quite similar to glacial cirques observed by the author in other localities. There are several active glaciers within 25 miles of Nye Harbour. It is possible that Nye Harbour and many other little bodies of water similar to it were formed by glaciers at a time when the region was much higher with respect to sea level than it is at present.

GRAB SAMPLES

The grab samples will be briefly described collectively for each of the major sampling areas in order to compare the various types of sediment to be found in the region (Fig. 5). This will be followed by a discussion of the materials making up the various types of sediment found in the area.

The samples taken from Lancaster Sound (Numbers 99-109) were light olive gray mud of predominantly silt size material, with granules and pebbles present in varying amounts. Only samples 101 and 102 from along the southern shore, which were taken in shallower water closer to shore were predominantly rocky, with some cobble material present. The samples were collected in water ranging from 212 to 768 metres in depth. There was little macrofauna in the samples.

Barrow Strait was the area covered by the greatest concentration of samples (Numbers 30-46, 74-77, 6, 97, and 98). The water depth in Barrow Strait is around 164 metres, considerably less than that of Lancaster Sound to the east. The samples were very poorly sorted, with large percentages of pebbles and cobbles. Samples 30 and 39 taken close to the southern shore had only a trace of fine material, the sample being principally rock fragments in the pebble and cobble range. The colour of the samples ranged from light to olive gray to dusky yellow green. There was little macrofauna present.

Samples 47 and 51 taken in Peel Sound, immediately to the southwest of Barrow Strait, show a quite different particle size distribution from that of Barrow Strait and Lancaster Sound. In Peel Sound there were no cobbles, but some granules in the coarser material, while the finer sizes showed a heavy concentration of silt. The colour of the sediments was generally a pale yellowish-brown. In several samples there was a marked layer of pale yellowish-brown silt approximately four centimetres in thickness overlying a light olive gray material. All the granule-size particles were located in this underlying light olive gray material.

The samples (Numbers 20-23, 52-55) from Franklin Strait showed that those samples taken in depths of less than 100 metres had abundant gravel and were poorly sorted. Two samples taken in deeper water showed an absence of any material greater than 1/2 millimetre in size and the greatest per cent of material fell in the silt range. All these samples showed the same pale yellowish-brown colour found in Peel Sound, but there was no underlying light olive green material. There was no macrofauna observed in the samples from Franklin Strait and Peel Sound.

The samples (Numbers 59-70) taken from the Gulf of Boothia showed poor sorting and a great deal of material in the cobble and pebble size ranges, with an increase in the concentration of cobble-sized material closer to shore and to the southward. The one exception to the generally coarse sediments was sample 61 taken in 220 metres of water, the deepest sample from the Gulf of Boothia. This sample contained no material larger than granules and consisted mostly of silt and clay. All samples from this region were pale yellowish-brown colour.

Prince Regent Inlet (Sample numbers 12-19, 24-29, 56-58) contained coarse sediments with considerable material in the pebble and cobble sizes in the shallower southern part of the Inlet. In the deeper northern part of the Inlet, where the samples were taken in more than 180 metres of water, the sediments were primarily in the silt and clay grade sizes. The colour of the sediments was light olive gray, similar to the colour of those in Lancaster Sound to the north. There was little macrofauna in the samples of Prince Regent Inlet and the Gulf of Boothia.

Wellington Channel (Sample numbers 78-96) had poorly sorted light olive gray material with an abundance of coarser fragments in the granule to cobble sizes. The only sample showing macrofauna was taken at a depth of only 13 metres on a gravel covered ridge.

Samples (Numbers 71-73, 127) taken at the eastern and western ends of Bellot Strait in depths of less than 100 metres showed that the sediments were made up almost entirely of material in the granule and pebble size ranges. The fragments were covered with a light red calcareous algae growth.

Sample 110 taken in 61 metres in Arctic Bay was the only sample which was grayish-red in colour. The grayish-red material was primarily silt, but some granules were present.

Samples 111 and 112 from Navy Board Inlet and Pond Inlet taken in 150 metres of water were composed of light olive gray silt, with rock fragments present.

A series of three samples (Numbers 115-117) across the northern part of Baffin Bay showed that the sediments were poorly sorted, and olive gray in colour.

Two samples (Numbers 113 and 114) taken at the entrance to Grise Fjord in Jones Sound were typical of the sediments of Lancaster Sound in colour and particle size distribution. Samples (Numbers 5, 7, 11, 118, 119), taken at widely scattered points along the eastern Baffin Island coast, were silty sands with an increasing amount of shell content as the lower latitudes were approached.

The four samples (Numbers 1-4) taken along the coast of Labrador had poor sorting, but a marked increase in the macrofauna of all types. The material showed a tendency to have greater percentages of sand than the other grade sizes. The colour of the sediments was a dark greenish-gray.

One sample (Number 8) was taken in the Davis Strait at a depth of 438 metres. It was olive gray in colour and had no material greater than two millimetres in diameter, with the greatest percentages in the sand and silt sizes.

The sediments of Frobisher Bay (Sample numbers 120-126) were light olive gray in colour and showed poor sorting. Sample 123 taken about 2/3 of the way from the mouth to the head of the Bay was black and had a distinct odor of hydrogen sulphide, indicating anaerobic conditions. It had a "soupy" consistency and was a silty clay. Upon extensive exposure to air in the laboratory, it turned to the light olive gray colour found in the other Frobisher Bay samples. The sample was found to contain a complete Pelecypod shell without soft parts.

Two samples (Numbers 9 and 10) were taken from Southern Greenland fjords. They showed a great deal of macrofauna, with quantities of broken shell and sea urchins. The generally sandy mud was a dark greenish-gray colour and was poorly sorted.

In summarizing, the most striking feature of all the sediments was the subrounded and faceted shape of the material larger than two millimetres. Both the roundness and the sphericity of the particles ranged from about 0.1 to 0.5. The fragments showed a distinct tendency to be bladed or tabular in shape, especially in those particles of pebble and cobble size. The surface textures were dull and usually quite rough. This rough texture was especially noticeable in the limestone fragments. None of the fragments showed the striations which are commonly attributed to material moved by glacial action. Fig. 6-14 illustrate the typical shapes and textures of the rock fragments.

Several of the limestone fragments had round holes of 0.2 to 2.0 centimetres in diameter extending in some cases through the entire rock fragment (Fig. 15). These holes were apparently caused by the action of boring mollusks. Living mollusks recovered from several of the holes were identified as <u>Barnea</u> sp.

The majority of the pebbles and cobbles which were recovered from depths of less than 200 metres were covered by a calcareous algal growth. There were also a great many worm tubes covering these fragments.

The cobble-sized fragments showed a brown stain which indicated the interface between the mud and the water as the cobble lay in the mud. This brown stain shows that most fragments had more than 2/3 of their volume exposed to the water and that the finer material had not been able to cover them over. This could be the result of relatively recent deposition of the fragments or of current action which kept the fine material swept clear of the tops of the fragments. It was observed that in most cases the fragments were oriented so that their largest flat face was serving as a base in the mud. This would suggest that the fragments may be moved about slightly after deposition until a preferred orientation is reached, for one might expect a random orientation as the particles fell from the blocks of ice overhead.

A microscopic examination of the particles from 1/16 to 2.0 millimetres showed the grains to be more rounded and spherical than in the larger fragments just described. Exceptions to this occurred in the shell fragments present, which were often quite angular. The general shapes are illustrated in the photomicrographs shown in Fig. 16 and 17. Although many other minerals were present, frosted quartz grains made up the bulk of the material. It is believed by the writer that this frosting is due to solution rather than to wind abrasion. There are no known places in the area where extensive wind abrasion could occur.

CORES

A series of five cores (Numbers 20-24) were taken in a line across Lancaster Sound. In the deep water in the middle of the Sound the material was predominantly silt with no granules present. In the shallower waters closer to shore there was an increasing concentration of subangular granules and pebbles throughout the entire length of the core. Core 23 had several zones of fine sand interbedded with poorly sorted silt and clay. Cores 20, 21 and 24 taken near shore are very poorly sorted, with abundant pebbles and granules. Core 25 taken in shallower waters 120 miles to the west of the series of cores just described showed a sandy silt with subangular granules and pebbles interspersed throughout. All the Lancaster Sound cores were light olive gray in colour.

The cores taken in Barrow Strait (Numbers 12-14, and 29) show a continuation of the type of sediment in the core from western Lancaster Sound. They are all poorly sorted olive gray material with abundant subangular granules and pebbles interspersed throughout the length of the core.

Cores 15 to 18 taken in Peel Sound were pale yellowish-brown silt with a few subrounded granules and pebbles. Core 17 had the surface layer found in several of the grab samples from Peel Sound. This 4 1/2 centimetre surface layer was a pale yellowish-brown, while the remainder of the core was a light brownish-gray. The material lower in the core showed a greater amount of coarse sand than the top zone of pale yellowish-brown material which was poorly sorted fine sand and silt.

The four cores from Prince Regent Inlet (Numbers 8-11) showed definite indications of past changes in sedimentary conditions. Core 10 contained moderate yellowish-brown material down to a depth of 17 centimetres. There was then a change to light olive gray material which continued to the bottom of the core. The material was spread throughout the silt and clay sizes, but had a subangular pebble at a depth of 100 centimetres.

Core 11 was pale yellowish-brown over its entire length. The upper 12 centimetres was silty, but below that point the sediments changed abruptly to sandy silt. This sandy silt graded into silty sand to a depth of 100 centimetres. At 100 centimetres there was a change to silty clay for the last 37 centimetres.

Core 9 also had a marked change from silt in the top six centimetres to poorly sorted sand below that level. There were granules throughout and some pebbles at the bottom of the core. A microscopic examination of the sands showed the grains to be subangular and frosted (Fig. 18). There were no Foraminifera present, but a number of Ostracod tests were observed.

Core 8 had silts down to 16 centimetres and then an abrupt change to fine sand for the next 11 centimetres. The fine sand graded back to a poorly sorted sandy silt containing granules and pebbles, which continued to the bottom. The sediment was all a dark yellowish-brown in colour.

In Arctic Bay, core 32 showed uniform conditions of grayish-red material which was poorly sorted. The material in the core was predominantly in the silt and clay sizes.

At Pond Inlet core 26 was taken at a depth of 950 metres. This core showed material concentrated in the sand and silt ranges down to a depth of 28 centimetres. The material then changed abruptly to very fine sand with some brown organic material present. A microscopic examination of this organic material showed it to be probably fragments of plant remains, each with a length of two millimetres (Fig. 19). From a depth of 35 to 61 centimetres the sediments were similar to those found in the top of the core. From 61 centimetres to the bottom the sediments changed to a fine sand, but no noticeable organic material was present. The entire core was olive gray in colour and had no granules or pebbles.

The four cores (Numbers 27, 28, 30, and 31) taken in Wellington Channel and up into Penny Strait lacked sandy layers, but consisted of olive gray, poorly-sorted material with subrounded granules.

Core 5 was taken in Frobisher Bay in the black anaerobic mud which was described in the section on the grab samples. The core was 340 centimetres in length and contained greenish-black silt. The core was taken with a piston and was irregularly distributed in much of the lower part of the plastic core liner. It is quite possible that much of the "soupy" material may have been sucked up into the tube and that the core does not represent a true section of material to a depth of 340 centimetres.

Core 6 in Frobisher Bay was a light olive gray silt clay with no granules. Core 7 at the mouth of Frobisher Bay contained grayish-olive poorly sorted sand with broken shell and subangular granules and pebbles present.

A gravity core (Number 2) was taken from a depth of 1829 metres in Davis Strait. It was light olive gray in colour with fine sand at the top grading to coarse silt at 28 centimetres depth, with the material becoming finer toward the bottom of the core. Some subangular granules and pebbles were found in the upper 15 centimetres. A gastropod was found at a depth of five centimetres in the core.

INTERPRETATION AND DISCUSSION

The observations on the samples taken permit some conclusions as to the general distribution of the sediment types and the prevalent modes of transportation in the area. The cores give a comparison of the conditions of the past with the conditions found today.

The samples show that a wide distribution of grade sizes is present in most of the sediments. In the majority of samples analyzed there is material in every grade size from clay to pebbles and quite often from clay to cobbles. As a result the sediments show poor sorting. When cobbles are deposited by ice-rafting in with silty material, a marked polymodal sorting will result.

A tendency exists for the sediments to have fewer fragments of granule and larger size as the distance from shore and the depth of the water increase. This tendency definitely does not hold in all cases and exceptions to it are frequently encountered. In no case, however, do the sediments become coarser with depth and finer near shore. In bodies of water such as Lancaster Sound and Prince Regent Inlet there is commonly a zone of sediments with granule and larger material extending for 20 miles off one shore. A similar zone 10 miles wide extends off the opposite shore. The deepest water lies in between these two zones and contains predominantly material of silt and clay sizes.

An example of this distribution may be seen in a section across the Gulf of Boothia. Triangular diagrams are presented in Fig. 20 indicating the percentages of gravel, sand, silt, and clay at each location. Sample 59 taken in 43 metres of water and two miles off the eastern shore contains 57.7 per cent gravel. Sample 60 taken 17 miles off the eastern shore contains 66.6 per cent gravel, indicating a continuing trend of coarser material. The deepest sample is number 61 taken 20 miles off the western shore in a depth of 220 metres. This deepest sample shows an absence of gravel, with the material predominantly silt. As the western shore is approached, the percent of gravel increases with sample 62, in 76 metres of water and two miles off shore, having 87.4 per cent gravel.

The mode of transport of the larger fragments and probably much of the finer material is by ice-rafting. The sampling shows, however, that the distribution of ice-rafted material is probably not a result of random movements of the ice. The ice which is near to shore picks up material during the annual freezing; it then breaks up and moves out of the area in zones extending from the shore to about 20 miles offshore, dropping material as it moves. It is probable that the ice with no or little detritus in the middle of the bodies of water breaks up and moves out first. The action of the wind then concentrates the remaining ice along one of the shorelines and it moves along the shore as currents and winds shift it about. This would explain the smaller quantities of gravel in the sediments near the middle of the bodies of water.

As the ice moves along in shallow depths, it will stir up any fine material and place it in suspension. This suspension load could be carried out into the deeper areas of water and be deposited there. The ice moving along in shallow water also must scrape material of boulder size along with it, causing a general migration of the boulders to deeper water. Observations by the writer of the material near and on beaches in the area show that the sediments near shore are largely made up of material from cobble to boulder size.

The presence of broken shells in the samples taken at depths of less than 100 metres and in the waters off Greenland, Baffin Island, and Labrador indicate that the walruses and bearded seals probably are actively feeding in those areas. The action of the walruses probably keeps the sediments in the waters of less than 50 metres depth stirred up, placing a great deal of material in suspension. This stirring process may serve as an important mechanism in the suspension freezing of material into the ice in the shallow areas such as Foxe Basin.

The shape of the rock fragments shows them to be of glacial origin. Extensive studies of glacial cobbles by Wentworth (1936) and von Engeln (1930) have established the general shapes of cobbles which are indicative of glacial action. The general shapes described by those workers correlate very well with the shapes of the fragments found in the area under study. This correlation is especially evident in the many parallel tabular, wedge tabular, and flat-iron shaped fragments. The material smaller than cobbles is often subangular and is also quite likely a result of glacial action.

There are only a few active glaciers in the area now, so it is likely that much of the material was formed in a period of greater glacial activity. The number of large erratics on the beaches and on the surrounding terrain also indicate extensive glaciation in the area.

The boulders and exposed rocks on shore show some rounding and extensive pitting and they are covered by lichen. There is therefore some clay and silt being produced in the region at present, but this is rapidly carried into the water since there is no extensive vegetation to hold it. It is likely that erosion along the beaches is relatively rapid at present due to the ice which carries off great quantities of cobbles each year.

An interesting feature of the sediments is the colour change in different areas. The samples in most of the region, such as those in Lancaster Sound, Barrow Strait, Prince Regent Inlet, and Wellington Channel, are olive gray in colour. The samples of Franklin Strait and the Gulf of Boothia are a pale yellowish-brown. The dividing line for the colour change seems to occur at the southern end of Prince Regent Inlet on the eastern side of Somerset Island. On the western side of Somerset Island in Peel Sound, cores and grab samples show that the light yellowish-brown silt is in the upper few centimetres, with coarser light olive gray material underneath.

The reason for the occurrence of the light yellowish-brown material in these areas is not known. Since the lighter coloured material occurs only near the mainland, it is possible that it may be caused by an influx of material into the area from off the mainland. Another explanation is that the circulation conditions of the waters associated with the lighter coloured material may differ from the circulation conditions in the areas of darker sediments.

The cores show that in general the past sedimentary conditions were similar to those found in the area at present. The sandy layers in some cores in Prince Regent Inlet and in Pond Inlet, however, show that in some places and times the sedimentary conditions have changed.

At present, marine sedimentation in the area is probably rapid. The waters of the Archipelago are all near to land masses. The lack of extensive vegetation enhances rapid erosion on the land and extensive chemical weathering is indicated by the pitting on the rock outcrops and boulders. The active glaciers in the area can also contribute large amounts of material to the waters.

The echo soundings showed that bottom profiles generally could be correlated with the attitude of the surrounding terrestrial rock beds. This would indicate that the present cycle of marine sedimentation has probably not existed for a length of time sufficient to cover the troughs and ridges thus giving a bottom of very low relief.

One of the most significant contributions of marine studies to the field of geology has been a clarification of the probable sedimentary environment of a type of rock by a study of the present marine environments. If the present marine sediments of the area were to be lithified, it is probable that a breccia or angular conglomerate would be formed. From the shapes of the rock fragments and the matrix, the resulting rock would probably be called a tillite.

A description of tillites by Pettijohn (1949) correlates closely with the marine sediments in the area. The matrix of a tillite is characterized by its dark gray to greenish-black colour. The matrix shows a dominance over the pebble components and is graywacke-like in composition. The sediments of the area showed poorly-sorted olive gray subangular material in the fine sand, silt, and clay ranges. In a tillite the boulders and smaller fragments are scattered rather sparsely and wholly at random through the unstratified matrix and the cobbles and boulders may show soled facets and snubbed edges. The cobbles of the area would probably be even more tabular and faceted than those of the average tillite. A last criterion of till and tillite is an extraordinary range of grade sizes. Many of the samples from the area studied show material in every size range from cobbles to fine clay.

It is therefore possible to conclude that some of the tills formed in the past may have been formed in the manner in which the till-like sediments of the area are now being formed. It has been assumed that till was formed from outwash at the end of active glaciers and by the movement of the ice over these deposits. In the area under study, however, extensive glaciation has not been reported for at least the recorded Arctic history of the last 300 years. It is therefore possible that a deposit resembling till may actually be formed by ice-rafting long after the retreat of the continental ice cap.

SUMMARY AND CONCLUSIONS

The marine sediments of the Canadian Eastern Arctic Archipelago are primarily composed of poorly sorted olive gray material. The samples of this material commonly contain fragments in all grade sizes from cobbles to fine clay. It is also possible that many boulders may be present in the area, but the sampling instruments used were not of sufficient size to recover material of boulder size. The rock fragments obtained in the sampling were often pitted. Roundness and sphericity values ranged from 0.1 to 0.5, indicating a short distance of transport from the parent rock or movement by ice-rafting.

There is a tendency for the pebbles and cobbles to be predominant in the sediments in a zone extending for several miles off shore, while the material in the deeper water far from shore is predominantly in the silt size range.

The cores show that over most of the area the sedimentary conditions have remained constant during the intervals represented by the core samples. No dating of material in the cores was attempted on the basis of the examination given to the cores. Several cores did show, however, that variable sedimentary conditions have existed in the Pond Inlet and Prince Regent Inlet areas.

The relief of the sea floor indicates that the shape of the bottom in the area investigated is determined largely by the attitude of the underlying strata. There is strong evidence that the rock formations are continuous underneath the water from one island to another. There were no signs of fault scarps between the islands, since the submarine relief generally followed a smooth progression as the shorelines were approached.

A comparison with glacial marine sediments described from other areas in other parts of the world shows that the fragments in the sediments of the area under study are similar to those found in other glacial marine environments. It is probable that the typical glacial marine sediments of the open oceans have been ice-rafted by icebergs, while the majority of the material in the marine sediments of the Arctic Archipelago has been ice-rafted by sea ice.

The deposits now being formed in the area are quite similar to breccias and tills which were formed in the geological past. It is possible that some tills were formed by the same sedimentary processes as are now found in the area studied.

REFERENCES

Armstrong, J. E. 1947. The Arctic Archipelago; in Geology and economic minerals of Canada; Canada Geological Survey, Economic Geology Series, No. 1, 3rd edition, pp. 311-324.

Bader, R. G. and V. J. Henry. 1959. Marine sediments of the Prince of Wales Strait and Amundsen Gulf, West Canadian Arctic; Journal of Marine Research (in press).

Bramlette, M. N. and W. H. Bradley. 1942. Part 1. Lithology and geologic interpret actions; in geology and biology of North Atlantic deep-sea cores between Newfoundland and Ireland; U. S. Geological Survey, Professional Paper 196.

Brochu, M. 1957. Movement of boulders and other sediments by ice on the tidal flats of the St. Lawrence River; Report No. G-1, Directorate of Physical Research, Defence Research Board, Canada, 8 pp.

Campbell, N. J. and A. E. Collin. 1958. The Discoloration of Foxe Basin Ice. J. Fish. Res. Bd. Canada, 15(6): 1175-1188.

Campbell, N. J. MS 1958. The oceanography of Hudson Strait. Fish. Res. Bd. Canada, MS Rept. (Oceanographic and Limnological) No. 12, 60 pp.

Carsola, A. J. 1954a. Recent marine sediments from Alaskan and Northwest Canadian Arctic; American Association of Petroleum Geologists, vol. 38. No. 7, pp. 1552-86.

Carsola, A. J. 1954b. Microrelief on Arctic sea floor; American Association of Petroleum Geologists, vol. 38, No. 7, pp. 1587-1601.

Collin, A. E. MS 1958. An oceanographic study of Prince Regent Inlet, the Gulf of Boothia, and adjacent waters. Fish. Res. Bd. Canada, MS Rept. (Oceanographic and Limnological) No. 13, 46 pp.

Crary, A. P. 1958. Arctic ice island and ice shelf studies; Arctic vol. 11, No. 1, pp. 3-42.

Crary, A. P., J. L. Kulp, and E. W. Marshall. 1955. Evidences of climatic change from ice island studies; Science, vol. 122, No. 3181, pp. 1171-1173.

Cushman, J. A. 1948. Arctic Foraminifera; Cushman Laboratory for Foraminiferal Research, Spec. Pub. No. 23, 79 pp.

Emery, K. O. 1949. Topography and sediments of the Arctic Basin; Journal of Geology, vol. 57, pp. 512-521.

Ewing, M. and W. L. Donn. 1956. A theory of ice ages; Science, vol. 123, No. 3207, pp. 1061-1066.

Forgeron, F. D. MS 1959. A preliminary study of Foxe Basin sediments. Fish. Res. Bd. Canada, MS Rept. (Oceanographic and Limnological), No. 12, 60 pp.

Fortier, Y. C. and R. Thorsteinsson. 1953. The Parry Islands folded belt in the Canadian Arctic Archipelago; American Journal of Science, vol. 251, pp. 259-267.

Fortier, Y. C. and L. W. Morley. 1956. Geological unity of the Arctic Islands; in Ocean Floors around Canada; Transactions of the Royal Society of Canada, vol. 1; series III, pp. 3-12.

Freuchen, P. and F. Salomonsen. 1958. The Arctic Year; G. P. Putnam's Sons, New York, 438 pp.

Fuchs, V. E. and W. F. Whittard. 1930. The east Greenland pack-ice and the significance of its derived shells; Geographical Journal, vol. 76, pp. 419-425.

Hachey, H. B., L. Lauzier, and W. B. Bailey. 1956. Oceanographic features of submarine topography; in Ocean Floors around Canada; Transactions of the Royal Society of Canada, vol. L: series III, pp. 67-81.

Hattersley-Smith, G. et al. 1955. North Ellesmere Island, 1953 and 1954; Arctic, vol. 8, No. 1, pp. 3-36.

Hobbs, W. H. 1948. American and Eurasian glaciers of the past; Scientific Monthly, vol. 66, No. 2, pp. 99-106.

Hough, J. L. 1950. Pleistocene lithology of Antarctic Ocean bottom sediments; Journal of Geology, vol. 58, pp. 254-260.

Hough, J. L. 1953. Pleistocene climatic record in a Pacific Ocean core sample; Journal of Geology, vol. 61, pp. 252-262.

Hough, J. L. 1956. Sediment distribution in the southern oceans around Antarctic; Journal of Sedimentary Petrology, vol. 26, No. 4, pp. 301-306.

Kane, E. K. 1857. Arctic Explorations; American Journal of Science, vol. 24, p. 242.

Kindle, E. M. 1924. Observations on the ice-borne sediments by the Canadian and other Arctic Expeditions; American Journal of Science, 5th series, vol. 7, No. 40, pp. 251-286.

Krumbein, W. C. and F. J. Pettijohn. 1938. Manual of Sedimentary Petrology; Appleton-Century-Crofts, Inc., New York, 549 pp.

Laktionov, A. F. 1956. Recent Soviet Scientific Investigations in the North Polar Regions; Documentary Research Division, Research Studies Institute, Air University.

Loeblich, A. R., Jr., and H. Tappan. 1953. Studies of Arctic Foraminifera; Smithsonian Miscellaneous Collections, vol. 121, No. 7, publication 4105, pp. 150 and 24 plates.

Menard, H. W. 1953. Pleistocene and recent sediment from the floor of the Northeastern Pacific Ocean; Bulletin of the Geological Society of America, vol. 64, pp. 1279-1294.

Menard, H. W. and R. S. Dietz. 1951. Submarine geology of the Gulf of Alaska; Bulletin of the Geological Society of America, vol. 62, pp. 1263-1285.

National Research Council 1948. Rock-color chart; Prepared by the Rock-Color Chart Committee.

Pettijohn, F. J. 1949. Sedimentary Rocks: Harper & Brothers, New York, 526 pp.

Pickard, G. L. 1956. Physical features of British Columbia inlets; in Ocean Floors around Canada; Transactions of the Royal Society of Canada, vol. L: series III, pp. 47-58.

Rex, R. W. 1955. Microrelief produced by sea ice grounding in the Chukchi Sea near Barrow, Alaska; Arctic, vol. 8, No. 3, pp. 177-186.

Schei, Per. 1903. Summary of geological results; Geographical Journal, vol. 22, pp. 56-65.

Schule, J. J., Jr., and W. I. Wittman. 1958. Comparative ice conditions in North American Arctic, 1953 to 1955, inclusive; Transactions, American Geophysical Union, vol. 39, No. 3, pp. 409-19.

Stokes, W. E. 1956. Another look at the ice age; Science, vol. 112, No. 3174, pp. 815-821.

Stetson, H. C. and J. E. Upson. 1937. Bottom deposits of the Ross Sea; Journal of Sedimentary Petrology, vol. 7, No. 2, pp. 56-66.

Strøm, K. M. 1936. Land locked Waters; Shrifter Utgitt av Det Norske Videnskaps-Akademi I. Mat.-Naturv. Klasse. 1936, No. 7.

Sverdrup, H. U. 1931. The transport of material by pack-ice; Geographic Journal, vol. 77, No. 4, pp. 399-400.

Sverdrup, H. U. 1938. Notes on erosion by drifting snow and transportation of solid material by sea ice; American Journal of Science 5th series, vol. 35, pp. 370-373.

Tarr, R. S. 1897a. The Arctic sea ice as a geological agent; American Journal of Science, 4th series, vol. 3, pp. 223-229.

Tarr, R. S. 1897b. Rapidity of weathering and stream erosion in the Arctic latitudes; American Geologist, vol. XIX, pp. 131-136.

Toombs, R. B. 1956. Some characteristics of Bute Inlet sediments; in Ocean Floors around Canada; Transactions of the Royal Society of Canada, vol. L: series III, pp. 59-65.

Trask, P. D. 1932. The sediments; in the "Marion" Expedition to Davis Strait and Baffin Bay, Scientific Results, Part 1, U. S. Treasury Department, Coast Guard, Bulletin 19, pp. 62-81.

U. S. Hydrographic Office 1946. Ice Atlas of the Northern Hemisphere; H. O. Publication 550, 106 pp.

Vibe, Chr. 1939. Preliminary investigations on shallow water animal communities in the Upernavik- and Thule-districts (Northwest Greenland); Meddelelser om Grønland, vol. 124, No. 2, pp. 1-42.

Vibe, Chr. 1950. The marine mammals and the marine fauna in the Thule District (Northwest Greenland) with observations on ice conditions in 1939-41; Meddelelser om Grønland, vol. 150, No. 6, pp. 1-115.

von Engeln, O. D. 1930. Type form of faceted and striated glacial pebbles; American Journal of Science, vol. 19, 5th series, pp. 9-16.

Washburn, A. L. 1947. Reconnaissance geology of portions of Victoria Island and adjacent regions, Arctic Canada; Geological Society of America, Memoir 22, 142 pp.

Wentworth, C. K. 1936. An analysis of the shapes of glacial cobbles; Journal of Sedimentary Petrology, vol. 6, No. 2, pp. 85-96.

Wickenden, R. T. D. 1947. Pleistocene glacial deposits; Canada Geological Survey, Economic Geology Series No. 1, Geology and Economic Minerals of Canada, 3rd. ed., pp. 325-346.

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
1	5.63	7.85	7.71	33.92	32.50	7.76	0.73	0.00	0.28	0.88	0.63	1.83
	5.63	13.48	21.19	55.11	87.61	95.37	96.10	96.10	96.38	97.26	97.89	99.72
2	1.66	5.05	16.08	10.24	20.00	22.78	4.78	2.96	3.34	3.08	2.58	7.16
	1.66	6.71	22.79	33.03	53.03	75.81	80.59	83.55	86.89	89.97	92.55	99.71
3	0.06	0.18	0.37	2.54	21.65	54.56	8.27	3.91	2.04	1.97	0.86	3.45
	0.06	0.24	0.61	3.15	24.80	79.36	87.63	91.54	93.58	95.55	96.41	99.86
4	.57	5.07	13.70	35.45	24.46	16.16	1.05	0.11	0.46	0.64	0.69	1.42
	.57	5.64	19.34	54.79	79.25	95.41	96.46	96.57	97.03	97.67	98.36	99.78
5	.46	22.89	46.41	27.82	0.78	0.14	0.18	0.00	0.00	0.12	0.06	0.98
	.46	23.35	69.76	97.58	98.36	98.50	98.68	98.68	98.68	98.80	98.86	99.84
7	3.23	3.27	5.36	12.31	16.34	22.84	6.00	5.30	2.92	10.64	4.43	7.18
	3.23	6.50	11.86	24.17	40.51	63.35	69.35	74.65	77.57	88.21	92.64	99.82
8	1.86	5.88	5.33	11.95	17.54	35.68	8.15	3.70	2.97	1.97	1.58	3.30
	1.86	7.74	13.07	25.02	42.56	78.24	86.39	90.09	93.06	95.03	96.61	99.91
9	7.57	7.18	4.53	10.84	12.03	0.64	7.54	4.79	6.61	6.52	5.99	8.96
	7.57	14.75	19.28	30.12	42.15	42.79	50.33	55.12	61.73	68.25	74.24	83.20

APPENDIX A (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
10	38.09	17.67	18.69	10.86	3.47	10.24	0.06	0.08	0.09	0.14	0.15	0.48
	38.09	55.76	74.45	85.31	88.78	99.02	99.08	99.16	99.25	99.39	99.54	100.02
14	2.40	1.59	1.03	2.75	2.65	82.49	1.52	1.15	1.22	1.10	0.63	1.47
	2.40	3.99	5.02	7.77	10.42	92.91	94.43	95.58	96.80	97.90	98.53	100.00
15	4.43	3.51	5.82	5.91	8.16	22.95	12.65	9.92	8.79	6.50	3.80	7.41
	4.43	7.94	13.76	19.67	27.83	50.78	63.43	73.35	82.14	88.64	92.44	99.85
16	9.58	7.30	3.87	6.18	3.45	64.12	1.08	0.90	1.08	0.86	0.56	0.91
	9.58	16.88	20.75	26.93	30.38	94.50	95.58	96.48	97.56	98.42	98.98	99.89
17	10.42	7.19	19.91	13.83	6.42	8.07	7.48	4.35	5.99	5.09	4.01	7.16
	10.42	17.61	37.52	51.35	57.77	65.84	73.32	77.67	83.66	88.75	92.76	99.92
18	5.71	3.16	2.80	4.17	10.74	23.06	12.83	9.38	6.85	6.95	4.33	9.98
	5.71	8.87	11.67	15.84	26.58	49.64	62.47	71.85	78.70	85.65	89.98	99.96
19	3.53	3.92	7.05	8.25	7.47	9.07	9.48	13.87	12.48	8.85	5.56	9.82
	3.52	7.45	14.50	22.75	30.22	39.29	48.77	62.64	75.12	83.97	89.53	99.35
20	0.94	2.37	7.06	20.73	26.54	15.53	5.64	1.94	3.40	3.20	2.59	9.84
	0.94	3.31	10.37	31.10	57.64	73.17	78.81	80.75	84.15	87.35	89.94	99.78

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
21	0.00	0.06	0.10	0.32	0.52	7.15	12.59	28.59	7.81	20.90	9.82	12.21
	0.00	0.06	0.16	0.48	1.00	8.15	20.74	49.33	57.14	78.04	87.86	100.07
22	0.00	0.04	0.07	0.08	0.16	11.29	37.04	1.74	5.28	9.48	13.89	21.28
	0.00	0.04	0.11	0.19	0.35	11.64	48.68	50.42	55.70	65.18	79.07	100.35
23	6.37	4.60	9.01	9.70	13.35	12.99	8.61	8.00	6.99	7.10	5.73	7.04
	6.37	10.97	19.98	29.68	43.03	56.02	64.63	72.63	79.62	86.72	92.45	99.49
24	3.27	3.46	4.71	6.57	8.48	46.04	0.00	4.89	6.74	5.34	3.35	6.75
	3.27	6.73	11.44	18.01	26.49	72.53	72.53	77.42	84.16	89.50	92.85	99.60
25	1.71	1.11	2.35	3.50	6.95	18.76	17.30	13.55	10.37	7.77	5.73	10.33
	1.71	2.82	5.17	8.67	15.62	34.38	51.68	65.23	75.60	83.37	89.10	99.43
26	16.96	6.05	6.15	5.66	6.86	14.47	12.14	11.44	7.92	3.70	0.00	8.98
	16.96	23.01	29.16	34.82	41.68	56.15	68.29	79.73	87.65	91.35	91.35	100.33
27	5.24	6.37	5.20	4.27	7.66	14.29	12.24	14.26	12.23	7.13	4.38	6.40
	5.24	11.61	16.81	21.08	28.74	43.03	55.27	69.53	81.76	88.89	93.27	99.67
29	1.69	1.19	2.30	2.28	4.14	13.53	14.01	14.66	13.89	9.89	7.09	15.16
	1.69	2.88	5.18	7.46	11.60	25.13	39.14	53.80	67.69	77.58	84.67	99.83

APPENDIX A (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
31	8.29	7.77	13.00	10.76	8.84	14.50	7.05	5.57	4.34	4.37	3.27	12.14
	8.29	16.06	29.06	39.82	48.66	63.16	70.21	75.78	80.12	84.49	87.76	99.90
32	6.63	6.07	11.10	13.57	21.77	15.53	5.19	3.66	3.33	3.14	2.35	7.55
	6.63	12.70	23.80	37.37	59.14	74.67	79.86	83.52	86.85	89.99	92.34	99.89
34	1.56	2.19	1.79	2.21	9.87	32.64	14.64	8.58	7.13	5.84	3.04	10.32
	1.56	3.75	5.54	7.75	17.62	50.26	64.90	73.48	80.61	86.45	89.49	99.81
35	4.11	3.16	4.00	4.26	9.20	25.34	12.98	8.91	7.30	6.67	3.88	10.15
	4.11	7.27	11.27	15.53	24.73	50.07	63.05	71.96	79.26	85.93	89.81	99.96
36	15.53	11.14	10.72	7.72	7.45	13.66	7.21	5.90	5.73	4.81	3.70	6.24
	15.53	26.67	37.39	45.11	52.56	66.22	73.43	79.33	85.06	89.87	93.57	99.81
38	9.40	6.25	11.50	14.38	13.05	11.17	8.11	4.61	4.80	5.37	2.56	8.44
	9.40	15.65	27.15	41.53	54.58	65.75	73.86	78.47	83.27	88.64	91.20	99.64
40	7.02	6.00	10.85	11.50	12.50	14.29	7.01	4.95	4.64	4.27	5.00	11.55
	7.02	13.02	23.87	35.37	47.87	62.16	69.17	74.12	78.76	83.03	88.03	99.58
41	3.29	1.72	2.50	4.27	11.20	20.05	9.22	10.35	9.00	7.72	5.42	15.14
	3.29	5.01	7.51	11.78	22.98	43.03	52.25	62.60	71.60	79.32	84.74	99.88

APPENDIX A (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
43	9.29	7.58	19.02	25.57	10.40	8.36	3.64	1.47	3.77	2.60	2.36	5.70
	9.29	16.87	35.89	61.46	71.86	80.22	83.86	85.33	89.10	91.70	94.06	99.76
44	5.00	4.24	3.30	4.01	17.15	22.76	11.56	8.51	7.26	4.83	3.29	7.57
	5.00	9.24	12.54	16.55	33.70	56.46	68.02	76.53	83.79	88.62	91.91	99.48
46	5.86	1.86	5.06	4.45	4.74	13.48	10.55	10.37	9.89	9.15	8.63	15.85
	5.86	7.72	12.78	17.23	21.97	35.45	46.00	56.37	66.26	75.41	84.04	99.89
47	0.16	0.06	0.08	0.32	0.39	16.50	32.19	0.98	9.88	10.74	8.34	20.34
	0.16	0.22	0.30	0.62	1.01	17.51	49.70	50.68	60.56	71.30	79.64	99.98
48	0.50	1.59	1.28	0.65	0.64	6.85	14.74	15.71	15.55	34.94	2.58	4.95
	0.50	2.09	3.37	4.02	4.66	11.51	26.25	41.96	57.51	92.45	95.03	99.98
49	1.88	1.63	2.48	3.24	10.86	24.97	10.33	7.21	6.91	23.44	3.44	3.57
	1.88	3.51	5.99	9.23	20.09	45.06	55.39	62.60	69.51	92.95	96.39	99.96
50	0.42	0.53	0.45	1.70	4.89	17.64	12.82	11.23	11.55	13.81	11.13	13.77
	0.42	0.95	1.40	3.10	7.99	25.63	38.45	49.68	61.23	75.04	86.17	99.94
51	0.01	0.02	0.05	1.65	1.58	21.98	12.20	11.40	11.21	18.16	20.62	1.12
	0.01	0.03	0.08	1.73	3.31	25.29	37.49	48.89	60.10	78.26	98.88	100.00

APPENDIX A (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
52	2.14	2.01	4.95	5.65	8.52	20.04	11.03	6.40	7.45	24.59	3.58	3.59
	2.14	4.15	9.10	14.75	23.27	43.31	54.34	60.74	68.19	92.78	96.36	99.95
53	0.37	0.79	2.37	2.17	1.89	7.86	8.51	8.84	12.93	15.32	13.30	25.60
	0.37	1.16	3.53	5.70	7.59	15.45	23.96	32.80	45.73	61.05	74.35	99.95
54	5.24	9.64	6.59	9.32	6.34	17.91	8.66	5.89	6.13	6.41	5.69	11.89
	5.24	14.88	21.47	30.79	37.13	55.04	63.70	69.59	75.72	82.13	87.82	99.71
55	4.29	4.70	4.06	5.89	5.07	11.09	7.41	7.25	11.10	9.99	9.77	19.18
	4.29	8.99	13.05	18.94	24.01	35.10	42.51	49.76	60.86	70.85	80.62	99.80
58	11.83	28.07	19.90	12.68	16.77	11.19						
	11.83	39.45	59.35	72.03	88.80	99.99						
59	2.62	2.98	4.66	4.96	9.47	16.26	10.35	9.53	10.04	9.59	5.67	13.76
	2.62	5.60	10.26	15.22	24.69	40.95	51.30	60.83	70.87	80.46	86.13	99.89
60	3.30	2.28	3.03	4.75	7.50	17.17	11.02	9.65	8.98	8.13	7.77	16.08
	3.30	5.58	8.61	13.36	20.86	38.03	49.05	58.70	67.68	75.81	83.58	99.66
61	1.14	1.01	1.45	2.13	4.89	15.24	18.88	14.57	11.73	20.81	3.25	4.84
	1.14	2.15	3.60	5.73	10.62	25.86	44.74	59.31	71.04	91.85	95.10	99.94

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	1.00-2.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
62	4.37	2.14	1.99	2.07	3.48	9.01	23.11	15.00	14.38	9.86	5.72	8.68
	4.37	6.51	8.50	10.57	14.05	23.06	46.17	61.17	75.55	85.41	91.13	99.81
63	3.67	3.81	3.24	9.67	5.23	35.24	12.99	6.41	3.93	3.38	3.40	8.77
	3.67	7.53	10.77	20.44	25.67	60.91	73.90	80.31	84.24	87.62	91.02	99.79
64	6.20	17.30	16.62	7.38	6.46	14.01	6.23	3.61	5.50	4.92	4.08	7.41
	6.20	23.50	40.12	47.50	53.96	67.97	74.20	77.81	83.31	88.23	92.31	99.72
65	7.01	5.38	7.22	7.14	14.87	22.48	8.86	5.02	4.34	4.06	4.05	9.55
	7.01	12.39	19.61	26.75	41.62	64.10	72.96	77.98	82.32	86.38	90.43	99.98
66	4.76	3.38	1.74	4.65	7.42	26.29	10.01	7.43	7.58	7.10	6.58	12.87
	4.76	8.14	9.88	14.53	21.95	48.24	58.25	65.68	73.26	80.36	86.94	99.81
67	3.13	3.77	5.35	5.16	12.65	30.07	9.78	5.58	4.19	4.16	3.93	12.04
	3.13	6.90	12.25	17.41	30.06	60.13	69.91	75.49	79.68	83.84	87.77	99.81
85	22.63	22.82	19.78	17.17	13.63	3.96						
	22.63	43.45	63.23	80.40	94.03	97.99						
96	31.20	24.86	19.00	13.15	9.67	2.11						
	31.20	56.06	75.06	88.21	97.88	99.99						
101	8.41	16.36	26.96	27.26	17.95	3.06						
	8.41	24.77	51.73	78.99	96.94	100.00						

APPENDIX B

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	< 2 MM. / > 2 MM.	>64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
17	1.11	0.00	81.62	6.65	2.14	2.64	5.93	1.00
		0.00	81.62	88.27	90.41	93.05	98.98	99.98
18	1.32	0.00	61.68	6.31	6.68	13.27	9.93	2.13
		0.00	61.68	67.99	74.67	87.94	97.87	100.00
19	3.12	0.00	16.88	46.41	15.19	10.55	9.28	1.69
		0.00	16.88	63.29	78.48	89.03	98.31	100.00
20	0.25	92.45	6.55	0.26	0.28	0.18	0.23	0.03
		92.45	99.00	99.26	99.54	99.72	99.95	99.98
23	0.07	74.04	24.76	0.00	0.22	0.27	0.57	0.11
		74.04	98.80	98.80	99.02	99.29	99.86	99.97
24	0.04	73.26	25.97	0.56	0.05	0.06	0.04	0.01
		73.26	99.23	99.79	99.84	99.90	99.94	99.95
25	0.34	0.00	96.35	1.66	0.73	0.73	0.32	0.20
		0.00	96.35	98.01	98.74	99.47	99.79	99.99
26	0.03	0.00	97.56	1.62	0.54	0.09	0.09	0.09
		0.00	97.56	99.18	99.72	99.81	99.90	99.99
27	0.19	45.98	51.28	1.24	0.78	0.33	0.28	0.07
		45.98	97.26	98.50	99.28	99.61	99.89	99.96

APPENDIX B (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	<2MM. / >2MM.	> 64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
28	0.00	29.40	70.27	0.14	0.10	0.02	0.02	0.02
		29.40	99.67	99.81	99.91	99.93	99.95	99.97
29	0.13	33.78	64.42	1.00	0.18	0.31	0.18	0.08
		33.78	98.20	99.20	99.38	99.69	99.87	99.95
30	0.00	0.00	99.74	0.17	0.01	0.03	0.00	0.03
		0.00	99.74	99.91	99.92	99.95	99.95	99.98
31	0.22	49.35	46.88	0.70	0.58	1.00	1.14	0.30
		49.35	96.23	96.93	97.51	98.51	99.65	99.95
32	0.35	0.00	90.04	4.62	2.86	1.13	0.92	0.42
		0.00	90.04	94.66	97.72	98.65	99.57	99.99
33	0.01	92.62	7.27	0.00	0.01	0.00	0.01	0.01
		92.62	99.89	99.89	99.90	99.90	99.91	99.92
34	0.60	51.92	44.40	1.76	0.59	0.59	0.53	0.21
		51.92	96.32	98.08	98.67	99.26	99.79	100.00
35	0.32	0.00	92.88	2.92	2.14	1.31	0.54	0.19
		0.00	92.88	95.80	97.94	99.25	99.79	99.98
36	0.06	44.87	54.16	0.23	0.11	0.26	0.26	0.09
		44.87	99.03	99.26	99.37	99.63	99.89	99.98

APPENDIX B (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	<2 MM. / >2 MM.	>64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
38	0.64	0.00	88.36	3.45	1.44	2.06	3.54	1.15
		0.00	88.36	91.81	93.25	95.31	98.85	100.00
39	0.00	27.18	72.78					
		27.18	99.96					
40	0.26	65.39	31.33	0.77	0.74	0.64	0.81	0.30
		65.39	96.72	97.49	98.23	98.87	99.68	99.98
41	0.17	56.79	40.15	2.36	0.16	0.23	0.23	0.06
		56.79	96.94	99.30	99.46	99.69	99.92	99.98
42	0.07	21.97	76.32	1.42	0.12	0.08	0.02	0.04
		21.97	98.29	99.71	99.83	99.91	99.93	99.97
43	0.16	55.25	40.93	1.68	0.65	0.67	0.57	0.24
		55.25	96.18	97.86	98.51	99.18	99.75	99.99
44	0.09	43.27	54.41	1.04	0.49	0.31	0.31	0.10
		43.27	97.68	98.72	99.21	99.52	99.83	99.93
45	0.00	100.00						
		100.00						
46	0.32	48.82	33.62	6.79	3.05	2.98	3.71	1.03
		48.82	82.44	89.23	92.28	95.26	98.97	100.00

APPENDIX B (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	<2 MM. / >2 MM.	>64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
47	1.91	0.00	99.19	0.59	0.00	0.00	0.15	0.07
		0.00	99.19	99.78	99.78	99.78	99.93	100.00
49	2.32	0.00	68.98	13.59	7.98	5.17	3.40	0.89
		0.00	68.98	82.57	90.55	95.72	99.12	100.01
50	0.69	0.00	99.44	0.18	0.18	0.06	0.06	0.06
		0.00	99.44	99.62	99.80	99.86	99.92	99.98
52	0.77	0.00	92.80	4.03	0.63	1.26	1.03	0.24
		0.00	92.80	96.83	97.46	98.72	99.75	99.99
53	0.95	0.00	99.23	0.60	0.00	0.00	0.09	0.04
		0.00	99.23	99.83	99.83	99.83	99.92	99.96
54	0.46	0.00	93.64	1.45	1.49	1.49	1.70	0.20
		0.00	93.64	95.09	96.58	98.07	99.77	99.97
55	2.03	0.00	75.38	11.01	4.14	5.32	3.55	0.59
		0.00	75.38	86.39	90.53	95.85	99.40	99.99
56	0.00	0.00	100.00					
		0.00	100.00					
57	0.00	0.00	100.00					
		0.00	100.00					

APPENDIX B (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	<2 MM. / >2 MM.	>64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
58	0.00	49.48	50.24	0.01	0.08	0.03	0.02	0.01
		49.48	99.72	99.73	99.81	99.84	99.86	99.87
59	0.42	0.00	85.29	9.95	1.71	1.68	1.09	0.26
		0.00	85.29	95.24	96.95	98.63	99.72	99.98
60	0.26	0.00	98.70	0.59	0.33	0.16	0.13	0.07
		0.00	98.70	99.29	99.62	99.78	99.91	99.98
62	0.08	0.00	92.70	4.83	1.42	0.70	0.28	0.06
		0.00	92.70	97.53	98.95	99.65	99.93	99.99
63	0.23	0.00	95.65	2.78	0.33	0.83	0.33	0.06
		0.00	95.65	98.43	98.76	99.59	99.92	99.98
64	0.53	65.73	32.23	0.18	0.32	0.32	0.81	0.39
		65.73	97.96	98.14	98.46	98.78	99.59	99.98
65	0.05	81.65	16.54	0.67	0.25	0.41	0.25	0.05
		81.65	98.24	98.91	99.16	99.57	99.82	99.87
66	0.10	58.81	37.88	1.39	0.78	0.71	0.32	0.09
		58.81	96.69	98.08	98.86	99.57	99.89	99.98
67	2.68	0.00	73.41	3.45	6.67	8.40	6.44	1.61
		0.00	73.41	76.86	83.53	91.93	98.37	99.98

APPENDIX B (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS GREATER THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

SAMPLE NUMBER	< 2 MM. / > 2 MM.	> 64.00	9.52-64.00	6.35-9.52	4.76-6.35	3.36-4.76	2.38-3.36	2.00-2.38
73	0.00	0.00	100.00					
		0.00	100.00					
81	0.00	0.00	99.87	0.00	0.00	0.05	0.05	0.02
		0.00	99.87	99.87	99.87	99.92	99.97	99.99
85	0.00	0.00	99.89	0.01	0.00	0.03	0.01	0.00
		0.00	99.89	99.90	99.90	99.93	99.94	99.94
96	0.00	0.00	99.92	0.00	0.02	0.00	0.02	0.03
		0.00	99.92	99.92	99.94	99.94	99.96	99.99
101	0.00	39.75	60.03	0.09	0.01	0.01	0.01	0.01
		39.75	99.78	99.87	99.88	99.89	99.90	99.91
102	0.00	69.04	30.92	0.00	0.02			
		69.04	99.96	99.96	99.98			
114	0.00	91.68	8.13	0.03	0.01			
		91.68	99.81	99.84	99.85			
115	0.00	0.00	100.00					
		0.00	100.00					
117	0.00	0.00	100.00					
		0.00	100.00					

APPENDIX C

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
1	58	Newfoundland	van Veen	Grayish-olive green mud, predominantly sand; some faceted, subangular pebbles; several shells and a live worm.
2	115	Labrador	van Veen	Olive gray compact fine sand and silt; subrounded granules, pebbles, and cobbles; abundant macrofauna including two live brachiopods.
3	55	Labrador	van Veen	Light olive gray silt; a few subangular granules and pebbles; abundant macrofauna including many starfish.
4	65	Labrador	van Veen	Dusky yellow green sand; a few subangular granules and pebbles; shell content about 1/12; one live brachiopod.
5	212	Hudson Strait	van Veen	Light olive gray compact sand; no gravel; shell content about 1/10; one live sea urchin.
6	220	Barrow Strait	Orange Peel	A little light olive gray silt stuck to the instrument. No complete sample was obtained.
7	148	Pangnirtung	Orange Peel	Olive gray fine sand; no gravel.
8	438	Davis Strait	van Veen	Olive gray mud, predominantly fine sand and silt; no gravel.
9	50	Narsagg, Greenland	van Veen	Dark greenish-gray sand; some subrounded gravel; a few shells and a worm.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
10	45	Godthaab, Greenland	van Veen	Yellowish-green sand; no gravel; almost entirely shell fragments; abundant macrofauna including many sea urchins.
11	115	Brevoort	van Veen	Greenish-black sand, no gravel; abundant biotite and quartz; one brachiopod.
12	439	Prince Regent Inlet	Orange Peel	Light olive gray silt, no gravel.
13	274	Prince Regent Inlet	Orange Peel	Light olive gray silt; mostly subrounded granules and pebbles.
14	289	Prince Regent Inlet	Orange Peel	Light olive gray silt; some subrounded granules and pebbles.
15	182	Prince Regent Inlet	Orange Peel	Light olive gray silt; some subrounded granules and pebbles.
16	106	Prince Regent Inlet	Orange Peel	Light olive gray silt; some granules and pebbles.
17	73	Prince Regent Inlet	Orange Peel	Light olive gray, poorly-sorted sand; abundant subangular limestone granules and pebbles.
18	100	Prince Regent Inlet	Orange Peel	Light olive gray poorly-sorted mud; abundant subangular limestone granules and pebbles.
19	137	Prince Regent Inlet	Orange Peel	Light olive gray, poorly-sorted mud; abundant subrounded granules and pebbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
20	135	Franklin Strait	Orange Peel	Pale yellowish-brown silty sand; a few limestone pebbles and granules, one subrounded gneiss cobble.
21	412	Franklin Strait	Orange Peel	Pale yellowish-brown silt; no gravel.
22	430	Franklin Strait	Orange Peel	Pale yellowish-brown mud, predominantly silt and clay; no gravel.
23	70	Franklin Strait	Orange Peel	Pale yellowish-brown, poorly-sorted material; some subrounded, calcareous pebbles and granules, several subangular quartzite cobbles.
24	137	Prince Regent Inlet	Orange Peel	Pale yellowish-brown silt; a few subrounded granules and pebbles, several cobbles of aphanitic limestone and fine-grained sandstone.
25	108	Prince Regent Inlet	Orange Peel	Pale yellowish-brown silt; a few subangular limestone granules and pebbles.
26	75	Prince Regent Inlet	Orange Peel	Pale yellowish-brown, poorly-sorted material; some subangular limestone granules and pebbles with holes produced by boring organisms.
27	104	Prince Regent Inlet	van Veen	Light olive gray silt; subrounded granules, pebbles, and cobbles, one cobble being a fragment of breccia.
28	223	Prince Regent Inlet	Orange Peel	Very little fine material of light olive gray colour; mostly subangular granules, pebbles and cobbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
29	260	Prince Regent Inlet	Orange Peel	Light olive gray silt; some subangular granules and pebbles, and a subangular limestone cobble.
30	146	Barrow Strait	Orange Peel	No fine material; subangular granules and pebbles.
31	216	Barrow Strait	Orange Peel	Light olive gray poorly-sorted material; subangular granules and pebbles, and a subangular aphanitic limestone cobble.
32	183	Barrow Strait	Orange Peel	Light olive gray poorly-sorted material; subangular granules and pebbles.
33	110	Barrow Strait	Orange Peel	Light olive gray silt; subangular granules, pebbles, and cobbles, one limestone cobble showing extensive boring by mollusks.
34	132	Barrow Strait	Orange Peel	Light olive gray silt; subangular granules, pebbles, and cobbles.
35	152	Barrow Strait	Orange Peel	Light olive gray silt; subangular granules and pebbles, one brachiopod shell.
36	177	Barrow Strait	Orange Peel	Light olive gray poorly-sorted material; subangular granules and pebbles, several subrounded limestone cobbles.
37	165	Barrow Strait	Orange Peel	Light olive gray silt; subrounded granules, pebbles, and cobbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
38	165	Barrow Strait	Orange Peel	Olive gray, poorly-sorted sand; subrounded granules and pebbles.
39	152	Barrow Strait	Orange Peel	No fine material; subrounded limestone pebbles and cobbles.
40	157	Barrow Strait	Orange Peel	Olive gray, poorly-sorted material; subrounded granules, pebbles, and limestone cobbles.
41	165	Barrow Strait	Orange Peel	Olive gray silt; subrounded granules, pebbles, and limestone cobbles.
42	119	Barrow Strait	Orange Peel	Olive gray silt; subrounded granules, pebbles, and cobbles.
43	137	Barrow Strait	Orange Peel	Olive gray sand; subrounded granules, pebbles, and cobbles.
44	93	Barrow Strait	Orange Peel	Light olive gray silt; subrounded granules, pebbles, and a limestone cobble with holes produced by boring mollusks.
45	165	Barrow Strait	Orange Peel	No fine material; one subrounded cobble.
46	168	Barrow Strait	Orange Peel	Olive gray, poorly-sorted material; subrounded granules, pebbles, and cobbles.
47	240	Peel Sound	Orange Peel	Pale yellowish-brown silt; some subrounded granules and pebbles.
48	277	Peel Sound	Orange Peel	Pale yellowish-brown silt; no gravel.
49	210	Peel Sound	Orange Peel	Pale yellowish-brown silt; a few subrounded granules and pebbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
50	210	Peel Sound	Orange Peel	Pale yellowish-brown silt; a few subrounded granules and pebbles.
51	356	Peel Sound	Orange Peel	Pale yellowish-brown silt; no gravel.
52	90	Franklin Strait	Orange Peel	Pale yellowish-brown silt; subrounded granules and pebbles.
53	95	Franklin Strait	Orange Peel	Pale yellowish-brown, clayey-silt; a few subrounded granules and pebbles.
54	87	Franklin Strait	Orange Peel	Pale yellowish-brown, poorly-sorted material; subrounded granules and pebbles.
55	130	Franklin Strait	Orange Peel	Pale yellowish-brown, poorly-sorted material; subrounded granules and pebbles.
56	70	Prince Regent Inlet	Orange Peel	No fine material; three subangular limestone pebbles.
57	123	Prince Regent Inlet	Orange Peel	No fine material; five subangular limestone pebbles.
58	46	Prince Regent Inlet	Orange Peel	Olive gray sand; subangular limestone granules, pebbles, and cobbles.
59	43	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; subrounded granules and pebbles.
60	174	Gulf of Boothia	Orange Peel	Pale yellowish-brown, poorly-sorted material; subrounded granules and pebbles.
61	220	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; no gravel.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
62	76	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; subrounded granules and pebbles.
63	146	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; subrounded granules and pebbles.
64	128	Gulf of Boothia	Orange Peel	Pale yellowish-brown sand; subrounded granules and pebbles and a granitic cobble-sized fragment.
65	82	Gulf of Boothia	Orange Peel	Pale yellowish-brown, poorly-sorted material; subrounded granules, pebbles, and cobbles.
66	59	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; subrounded granules, pebbles, and cobbles.
67	128	Gulf of Boothia	Orange Peel	Pale yellowish-brown, poorly-sorted material; subrounded granules and pebbles.
68	146	Gulf of Boothia	Orange Peel	Pale yellowish-brown, poorly sorted material; subrounded granules, pebbles, and cobbles.
69	102	Gulf of Boothia	Orange Peel	Pale yellowish-brown sand; subrounded granules, pebbles, and cobbles.
70	78	Gulf of Boothia	Orange Peel	Pale yellowish-brown silt; subrounded granules, pebbles, and cobbles.
71	50	Bellot Strait	Orange Peel	Light olive gray silt; subangular granules, pebbles, and cobbles; some broken shell and calcareous algae on the fragments.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
72	100	Bellot Strait	Orange Peel	Light olive gray silt; subangular granules, pebbles, and cobbles.
73	45	Bellot Strait	Orange Peel	No fine material; subangular pebbles.
74	128	Barrow Strait	Orange Peel	Olive gray silt; subangular granules, pebbles, and cobbles.
75	170	Barrow Strait	Orange Peel	Dusky yellow-green silt; subangular granules, pebbles, and cobbles.
76	192	Barrow Strait	Orange Peel	Pale yellowish-brown silt surface layer; underlain by light olive gray silt with subrounded granules, pebbles, and cobbles.
77	170	Barrow Strait	Orange Peel	A little light olive gray silt; mostly subrounded granules and pebbles.
78	265	Wellington Channel	Orange Peel	Light olive gray material; a few subrounded granules, pebbles, and cobbles.
79	159	Wellington Channel	Orange Peel	Light olive gray silt; subrounded granules and pebbles.
80	131	Wellington Channel	Orange Peel	No fine material; subrounded pebbles.
81	238	Wellington Channel	Orange Peel	A little light olive gray sand; mostly subangular granules and pebbles.
82	146	Wellington Channel	Orange Peel	Light olive gray silt; subrounded granules, pebbles, and cobbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
83	137	Wellington Channel	Orange Peel	Light olive gray silt; a few subangular granules.
84	230	Wellington Channel	Orange Peel	Light olive gray silt; a few subangular granules.
85	67	Wellington Channel	Orange Peel	A little light olive gray sand; mostly subangular granules and pebbles; a barnacle on one pebble.
86	111	Wellington Channel	Orange Peel	Light olive gray, poorly-sorted material; subrounded granules and pebbles; several brachiopod shells.
87	50	Wellington Channel	Orange Peel	Light olive gray, poorly-sorted material; subrounded granules and pebbles.
88	88	Wellington Channel	Orange Peel	Olive gray silt; subrounded granules, pebbles, and cobbles with some limestone fragments having holes caused by boring mollusks.
89	165	Wellington Channel	Orange Peel	Olive gray silty sand; subrounded granules, pebbles, and cobbles.
90	73	Wellington Channel	Orange Peel	Olive gray sand; subrounded granules and pebbles.
91	246	Wellington Channel	Orange Peel	Light olive gray silt; no gravel.
92	150	Wellington Channel	Orange Peel	Light olive gray silt; subangular granules and pebbles.
93	177	Wellington Channel	Orange Peel	A little light olive gray silt; mostly subrounded granules and pebbles.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION.
94	305	Wellington Channel	van Veen	Light olive gray silt; subrounded granules, pebbles, and cobbles; one brachiopod shell.
95	13	Wellington Channel	van Veen	A little light olive gray sand; mostly subangular granules and pebbles; a few shells.
96	104	Wellington Channel	van Veen	A little olive gray sand; subrounded granules and pebbles.
97	119	Lancaster Sound	Orange Peel	Olive gray silt; subangular granules and pebbles.
98	23	Lancaster Sound	Orange Peel	A little olive gray silt; mostly subrounded granules, pebbles, and cobbles.
99	320	Lancaster Sound	Orange Peel	Light olive gray clayey-silt; no gravel.
100	230	Lancaster Sound	Orange Peel	Light olive gray silt; subrounded granules, pebbles, and cobbles.
101	212	Lancaster Sound	Orange Peel	Light olive gray sand; subrounded granules, pebbles, and cobbles.
102	284	Lancaster Sound	Orange Peel	A little light olive gray sand; mostly subrounded granules, pebbles, and cobbles.
103	521	Lancaster Sound	Dietz-LaFond	Light olive gray silt; no gravel.
104	530	Lancaster Sound	Dietz-LaFond	Light olive gray silt; a few subrounded granules.
105	273	Lancaster Sound	Dietz-LaFond	No fine material; one subangular pebble.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
106	665	Lancaster Sound	Dietz-Lafond	Light olive gray silt; a few subrounded granules.
107	768	Lancaster Sound	Dietz-Lafond	Light olive gray silt; one subangular pebble.
108	762	Lancaster Sound	Dietz-Lafond	Light olive gray silt; a few subrounded granules and pebbles.
109	544	Lancaster Sound	Dietz-Lafond	Light olive gray silt; a few subrounded granules and pebbles.
110	61	Arctic Bay	Orange Peel	Grayish-red silt; a few subangular granules.
111	329	Navy Board Inlet	Dietz-Lafond	Light olive gray silt; no gravel.
112	951	Pond Inlet	Dietz-Lafond	Light olive gray silt; no gravel.
113	140	Jones Sound	Orange Peel	Olive gray silt; subrounded granules and pebbles.
114	84	Jones Sound	Orange Peel	No fine material; subrounded granules, pebbles, and cobbles.
115	265	Baffin Bay	Orange Peel	A little olive gray silt; mostly subrounded pebbles.
116	329	Baffin Bay	Orange Peel	Olive gray, poorly-sorted material; subangular granules and pebbles.
117	165	Baffin Bay	Orange Peel	A little olive gray sandy-silt; subangular pebbles.
118	80	Clyde Inlet	Orange Peel	Olive gray sand; subrounded granules; some shells.

DESCRIPTION OF GRAB SAMPLES

SAMPLE NUMBER	DEPTH MÈTRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
119	148	Cape Dyer	Orange Peel	Olive gray sandy-silt; no gravel.
120	34	Frobisher Bay	Orange Peel	Olive gray fine sand; no gravel; a few large shells.
121	600	Frobisher Bay	Orange Peel	Light olive gray silt from the side of the instrument; no complete sample taken.
122	484	Frobisher Bay	Orange Peel	No fine material; four subrounded pebbles.
123	650	Frobisher Bay	van Veen	Black "soupy" silty-clay; no gravel; one shell, Distinct odor of hydrogen sulphide.
124	50	Frobisher Bay	van Veen	Light olive gray to black sandy-silt; subrounded granules, pebbles, and cobbles.
125	50	Frobisher Bay	Orange Peel	Light olive gray silt; no gravel.
126	247	Frobisher Bay	Orange Peel	Light olive gray silt; abundant granules and pebbles; four small pelecypods.
127	128	Bellot Strait	Orange Peel	Pale yellowish-brown sand; subrounded granules and pebbles.

APPENDIX D

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	> 1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	< .00098
2-T	18.03	5.01	8.72	9.54	12.23	17.97	7.28	6.46	5.42	3.33	3.52	2.51
	18.03	23.04	31.76	41.30	53.53	71.50	78.78	85.24	90.48	93.81	97.33	99.84
2-28	3.91	3.03	6.32	6.98	9.54	21.78	13.76	10.75	18.90	3.04	0.71	1.26
	3.91	6.94	13.26	20.24	29.78	51.56	65.32	76.07	94.97	98.01	98.72	99.98
2-65	0.07	0.15	0.80	1.50	3.16	8.12	8.85	15.75	52.60	5.12	1.80	2.03
	0.07	0.22	1.20	2.52	5.68	13.80	22.65	38.40	91.00	96.12	97.92	99.95
2-94	0.18	0.39	1.27	2.12	5.13	8.74	12.10	13.87	50.96	2.85	0.71	1.53
	0.18	0.57	1.84	3.96	9.09	17.83	29.93	43.80	94.76	97.61	98.32	99.85
8-T	0.27	0.27	0.35	0.21	0.50	5.93	15.30	19.26	17.72	14.90	10.13	15.17
	0.27	0.54	0.89	1.10	1.60	7.53	22.83	42.09	59.81	74.71	84.84	100.01
8-22.5	1.86	4.26	20.91	23.23	14.80	8.27	3.92	4.58	4.23	4.53	3.92	5.46
	1.86	6.12	27.03	50.26	65.06	73.33	77.25	81.83	86.06	90.95	94.51	99.97
8-70	3.13	3.07	7.42	11.40	13.96	19.69	10.58	8.35	7.53	4.85	2.92	7.25
	3.13	6.20	13.62	25.02	38.98	58.67	69.25	77.60	85.13	89.98	92.90	100.15
8-139	2.66	1.76	3.86	7.44	12.15	17.29	11.93	11.78	10.13	7.12	3.41	10.35
	2.66	4.42	8.28	15.72	27.87	45.16	57.09	68.87	79.00	86.12	89.53	99.88
9-30	2.40	3.71	30.84	37.41	10.63	7.37	1.74	1.12	1.20	0.75	0.70	2.01
	2.40	6.11	36.95	74.36	84.99	92.36	94.10	95.22	96.42	97.17	97.87	99.88

APPENDIX D (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	>1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
9-78	3.67	7.24	13.12	21.98	10.38	16.20	6.97	4.00	3.79	4.22	4.17	3.69
	3.67	10.91	24.03	46.01	56.39	72.59	79.56	83.56	87.35	91.57	95.74	99.43
9-122	55.89	2.94	4.75	10.67	6.40	8.75	1.70	2.99	1.57	1.10	1.25	1.95
	55.89	58.83	63.58	74.25	80.65	89.40	91.10	94.09	95.66	96.76	98.01	99.96
10-T	0.16	0.39	0.70	0.45	0.26	6.55	13.82	17.99	18.23	14.46	11.94	15.19
	0.16	0.55	1.25	1.70	1.96	8.51	22.33	40.32	58.55	73.01	84.95	100.14
10-85	0.07	0.11	0.48	0.67	0.50	9.07	13.83	18.30	9.66	16.22	21.93	9.21
	0.07	0.18	0.66	1.33	1.83	10.90	24.73	43.03	52.69	68.91	90.84	100.05
12-T	22.13	5.07	3.75	3.64	13.56	18.60	8.53	7.29	5.59	3.93	3.20	4.62
	22.13	27.20	30.95	34.59	48.15	66.75	75.28	82.57	88.16	92.09	95.29	99.91
16-T	0.01	0.02	0.20	0.28	0.33	10.96	18.03	20.79	14.48	12.34	9.69	12.93
	0.01	0.03	0.23	0.51	0.84	11.80	29.83	50.62	65.10	77.44	87.13	100.06
16-75.5	0.00	0.14	1.07	1.08	1.03	11.11	14.20	17.99	13.01	13.74	14.20	12.41
	0.00	0.14	1.21	2.29	3.32	14.43	28.63	46.62	59.63	73.37	87.57	99.98
16-120	0.80	0.23	0.37	0.50	0.68	13.37	13.37	18.54	16.90	12.14	10.83	12.42
	0.80	1.03	1.40	1.90	2.58	15.95	29.32	47.86	64.76	76.90	87.73	100.15

APPENDIX D (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	>1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
17-T	0.26	0.22	0.44	1.49	4.55	22.08	17.80	16.30	11.74	8.70	0.00	16.50
	0.26	0.48	0.92	2.41	6.96	29.04	46.84	63.14	74.88	83.58	83.58	100.08
17-22	22.29	1.84	3.55	3.79	5.11	8.32	8.26	10.61	14.48	15.17	2.27	3.97
	22.29	24.13	27.68	31.47	36.58	44.90	53.16	63.77	78.25	93.42	95.69	99.66
17-56	5.33	1.93	3.43	3.41	4.26	11.81	10.88	13.07	23.17	19.51	1.55	1.55
	5.33	7.26	10.69	14.10	18.36	30.17	41.05	54.12	77.29	96.80	98.35	99.90
20-T	64.95	0.43	0.87	1.11	5.81	12.62	5.32	2.95	2.38	1.22	0.76	1.54
	64.95	65.38	66.25	67.36	73.17	85.79	91.11	94.06	96.44	97.66	98.42	99.96
20-20	2.20	1.40	2.54	2.79	10.57	33.00	14.98	10.77	8.22	5.66	3.60	4.28
	2.20	3.60	6.14	8.93	19.50	52.50	67.48	78.25	86.47	92.13	95.73	100.01
20-38	3.73	2.03	5.79	9.76	16.45	31.88	0.00	8.28	11.09	5.59	3.13	2.26
	3.73	5.76	11.55	21.31	37.76	69.64	69.64	77.92	89.01	94.60	97.73	99.99
22-T	0.93	0.48	0.53	0.81	3.52	16.01	11.83	16.13	15.61	11.83	8.92	13.36
	0.93	1.41	1.94	2.75	6.27	22.28	34.11	50.24	65.85	77.68	86.60	99.96
22-81	0.13	0.36	0.96	1.17	3.35	13.99	12.55	12.08	26.68	20.48	2.91	5.31
	0.13	0.49	1.45	2.62	5.97	19.96	32.51	44.59	71.27	91.75	94.66	99.97
22-66	0.32	0.50	0.59	0.46	1.53	11.03	12.60	17.41	16.51	12.24	13.98	12.78
	0.32	0.82	1.41	1.87	3.40	14.43	27.03	44.44	60.95	73.19	87.17	99.95

APPENDIX D (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	>1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
23-T	2.40	1.71	1.95	2.00	6.82	13.80	12.75	15.19	15.60	8.76	7.70	11.38
	2.40	4.11	6.06	8.06	14.88	28.68	41.43	56.62	72.22	80.98	88.68	100.06
23-27	0.48	0.41	0.77	1.49	8.02	18.78	15.72	12.11	14.03	8.45	10.08	9.57
	0.48	0.89	1.66	3.15	11.17	29.95	45.67	57.78	71.81	80.26	90.34	99.91
23-63	0.86	0.63	1.60	13.64	24.48	21.06	7.07	5.87	5.06	7.82	5.64	6.04
	0.86	1.49	3.09	16.73	41.21	62.27	69.34	75.21	80.27	88.09	93.73	99.77
23-90	3.66	2.09	3.24	3.29	4.78	12.26	10.26	13.60	12.87	21.55	7.84	4.46
	3.66	5.75	8.99	12.28	17.06	29.32	39.58	53.18	66.05	87.60	95.44	99.90
23-120	3.06	2.18	3.25	3.88	5.69	13.68	12.03	13.31	12.87	16.64	6.88	6.45
	3.06	5.24	8.49	12.37	18.06	31.74	43.77	57.08	69.95	86.59	93.47	99.92
26-T	0.22	0.45	0.58	0.43	3.23	14.52	14.71	16.41	16.01	12.71	7.81	12.91
	0.22	0.67	1.25	1.68	4.91	19.43	34.14	50.55	66.56	79.27	87.08	99.99
26-30	0.03	0.54	3.49	6.52	40.95	26.62	4.93	4.09	3.75	2.79	2.19	4.15
	0.03	0.57	4.06	10.58	51.53	78.15	83.08	87.17	90.92	93.71	95.90	100.05
26-50	0.03	0.36	0.84	0.63	5.07	13.15	17.54	15.38	14.88	11.75	8.45	11.90
	0.03	0.39	1.23	1.86	6.93	20.08	37.62	53.00	67.88	79.63	88.08	99.98
26-70	0.00	0.10	4.03	26.18	35.86	4.61	5.72	4.37	4.22	3.37	2.84	4.88
	0.00	0.10	4.13	30.31	66.17	70.78	76.50	80.87	85.09	88.46	91.30	96.18

APPENDIX D (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	>1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195 .0039	.00098-.00195	<.00098
27-T	0.13	0.25	0.17	0.21	0.49	3.54	15.51	21.47	18.31	11.98	8.58	19.46
	0.13	0.38	0.55	0.76	1.25	4.79	20.30	41.77	60.08	72.06	80.64	100.10
27-59	0.03	0.10	0.10	0.15	0.23	3.43	10.91	17.88	21.54	20.72	11.46	13.55
	0.03	0.13	0.23	0.38	0.61	4.04	14.95	32.83	54.37	75.09	86.55	100.10
27-99	28.92	3.08	2.41	2.76	10.01	12.68	8.44	7.61	13.98	7.02	1.59	1.40
	28.92	32.00	34.41	37.17	47.18	59.86	68.30	75.91	89.89	96.91	98.50	99.90
30-T	1.40	0.28	0.19	0.20	0.33	11.96	19.85	20.94	15.79	10.39	7.18	11.61
	1.40	1.68	1.87	2.07	2.40	14.36	34.21	55.15	70.94	81.33	88.51	100.12
30-62	0.01	0.07	0.06	0.06	0.10	0.00	27.48	21.48	16.36	11.73	8.47	14.25
	0.01	0.08	0.14	0.20	0.30	0.30	27.78	49.26	65.62	77.35	85.82	100.07
30-122	0.08	0.06	0.20	0.29	0.36	11.36	18.37	19.58	14.92	10.35	14.59	9.91
	0.08	0.14	0.34	0.63	0.99	12.35	30.72	50.30	65.22	75.57	90.16	100.07
31-T	0.04	0.44	0.60	1.16	4.52	22.87	20.44	6.93	19.13	8.05	5.27	10.59
	0.04	0.48	1.08	2.24	6.76	29.63	50.07	57.00	76.13	84.18	89.45	100.04
31-65	0.08	0.05	0.25	0.88	2.15	20.75	15.07	15.83	12.69	8.73	11.37	12.21
	0.08	0.13	0.38	1.26	3.41	24.16	39.23	55.06	67.75	76.48	87.85	100.06
31-115	0.00	0.04	0.19	0.54	1.87	44.97	14.23	6.37	7.14	5.56	7.72	11.47
	0.00	0.04	0.23	0.77	2.64	47.61	61.84	68.21	75.35	80.91	88.63	100.10

APPENDIX D (CONT'D)

WEIGHT PERCENTAGES AND CUMULATIVE PERCENTAGES OF SIZE FRACTIONS LESS THAN 2 MILLIMETRES

(DIAMETERS IN MILLIMETRES)

CORE SAMPLE	>1.00	.50-1.00	.25-.50	.125-.25	.0625-.125	.0313-.0625	.0156-.0313	.0078-.0156	.0039-.0078	.00195-.0039	.00098-.00195	<.00098
32-T	0.03	0.43	0.68	1.15	2.13	10.80	14.72	17.92	15.74	13.91	8.43	14.06
	0.03	0.46	1.14	2.29	4.42	15.22	29.94	47.86	63.60	77.51	85.94	100.00
32-6.5	1.81	1.42	2.81	2.36	2.90	12.30	13.17	13.38	14.67	12.43	10.14	12.63
	1.81	3.23	6.04	8.40	11.30	23.60	36.77	50.15	64.82	77.25	87.39	100.02
32-16	6.95	1.93	3.13	4.22	7.38	12.95	16.15	13.05	10.48	9.12	6.11	8.64
	6.95	8.88	12.01	16.23	23.61	36.56	52.71	65.76	76.24	85.36	91.47	100.11
32-27	0.08	0.34	0.56	0.76	1.63	13.65	15.06	16.57	13.75	13.44	10.66	13.54
	0.08	0.42	0.98	1.74	3.37	17.02	32.08	48.65	62.40	75.84	86.50	100.04
32-80	0.34	0.77	1.02	1.04	1.53	12.46	13.62	15.28	15.72	14.57	11.49	16.86
	0.34	1.11	2.13	3.17	4.70	17.16	30.78	46.06	61.78	76.35	87.84	104.71
32-95	8.25	1.73	2.08	2.59	3.15	0.00	17.45	13.51	12.82	12.49	15.39	10.49
	8.25	9.98	12.06	14.65	17.80	17.80	35.25	48.76	61.58	74.07	89.46	99.95

APPENDIX E

DESCRIPTION OF CORES

CORE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
1	58	Newfoundland	Phleger	1.5 centimetres; same as grab sample 1.
2	1829	Davis Strait	2" Gravity	96.0 centimetres; light olive gray; upper 15 centimetres very fine sand with subangular granules; 15 to 28 centimetres very fine sand; 28 centimetres to bottom coarse silt grading to fine silt. Gastropod at 5 centimetres.
3	55	Labrador	Phleger	13 centimetres; olive gray fine sand and silt. Same location as grab sample 3.
4	50	Narsagg, Greenland	Phleger	9.0 centimetres; same as grab sample 9.
5	640	Frobisher Bay	2" Piston	340 centimetres; black silt. Mud evenly distributed in lower part of core, indicating a possible uneven sucking by the piston
6	305	Frobisher Bay	2" Piston	140 centimetres; light olive gray silty clay.
7	302	Frobisher Bay	2" Gravity	17 centimetres; grayish olive sand; many shell fragments and granules throughout, subangular pebble in bottom.
8	457	Prince Regent Inlet	2" Gravity	141 centimetres; dark yellowish-brown; upper 16 centimetres silt; 17 to 28 centimetres fine sand; 29 centimetres to bottom poorly-sorted, sandy-silt with granules and pebbles.

DESCRIPTION OF CORES

CORE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
9	439	Prince Regent Inlet	2" Gravity	124 centimetres; light olive gray to pale yellowish-brown; top to 6 centimetres silt; 6 centimetres to bottom poorly-sorted sands with granules throughout, subrounded pebbles at bottom.
10	379	Prince Regent Inlet	2" Gravity	125 centimetres; upper 17 centimetres moderate yellowish-brown, 18 centimetres to bottom light olive gray; silts and clays entire length, one subangular granule at 100 centimetres.
11	393	Prince Regent Inlet	2" Gravity	134 centimetres; pale yellowish-brown; upper 12 centimetres silt; 12 to 100 centimetres sandy-silt grading to silty-sand; 100 centimetres to bottom silty-clay.
12	179	Barrow Strait	2" Gravity	37 centimetres; light olive gray poorly-sorted material with many granules and pebbles.
13	132	Barrow Strait	2" Gravity	33 centimetres; light olive gray silts and clays with subangular granules and pebbles throughout.
14	152	Barrow Strait	Phleger	14.5 centimetres; same as grab sample 39.
15	240	Peel Sound	Phleger	37 centimetres; pale brown silt with some subangular granules.

DESCRIPTION OF CORES

CORE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
16	247	Peel Sound	2" Gravity	130 centimetres; yellowish-brown silts and clays.
17	210	Peel Sound	2" Gravity	57.5 centimetres; upper 4.5 centimetres yellowish-brown silt; 4.5 centimetres to bottom light brownish-gray, silty-sand; subrounded pebbles scattered through the whole length.
18	194	Peel Sound	Phleger	35 centimetres; pale yellowish-brown, silty-clay.
20	273	Lancaster Sound	2" Gravity	40 centimetres; olive gray fine sand and silt, subrounded pebbles in upper 10 centimetres only.
21	677	Lancaster Sound	2" Gravity	20 centimetres; olive gray silt and clay with subangular granules throughout, subangular pebble at 2 centimetres.
22	768	Lancaster Sound	2" Gravity	159 centimetres; olive gray silt.
23	672	Lancaster Sound	2" Gravity	127.5 centimetres; olive gray, poorly-sorted silt and clay, with fine sand in several zones near the middle; occasional subangular granules and pebbles throughout.
24	544	Lancaster Sound	2" Gravity	25 centimetres; olive gray poorly-sorted material.

DESCRIPTION OF CORES

CORE NUMBER	DEPTH METRES	LOCATION	SAMPLER	BRIEF MACROSCOPIC DESCRIPTION
25	230	Lancaster Sound	2" Gravity	28 centimetres; light olive gray sandy-silt with subrounded granules and pebbles throughout.
26	950	Pond Inlet	2" Gravity	72 centimetres; olive gray; top 28 centimetres sand and silt; 28 to 35 centimetres very fine sand with organic material; 35 to 61 centimetres sand and silt; 61 centimetres to bottom very fine sand.
27	293	Wellington Channel	2" Gravity	101 centimetres; olive gray clayey-silt; bottom 4 centimetres are pale brown and have granules.
28	265	Wellington Channel	2" Gravity	13 centimetres; olive gray silt with granules; shells in bottom 2 centimetres.
29	128	Barrow Strait	Phleger	21 centimetres; pale brown silt with granules and shell fragments.
30	230	Wellington Channel	2" Gravity	124.5 centimetres; olive gray silt with some granules and shell fragments in zones throughout.
31	246	Wellington Channel	2" Gravity	117 centimetres; olive gray clayey-silt.
32	61	Arctic Bay	2" Gravity	103 centimetres; grayish-red silts and clays, granule at 16 centimetres.

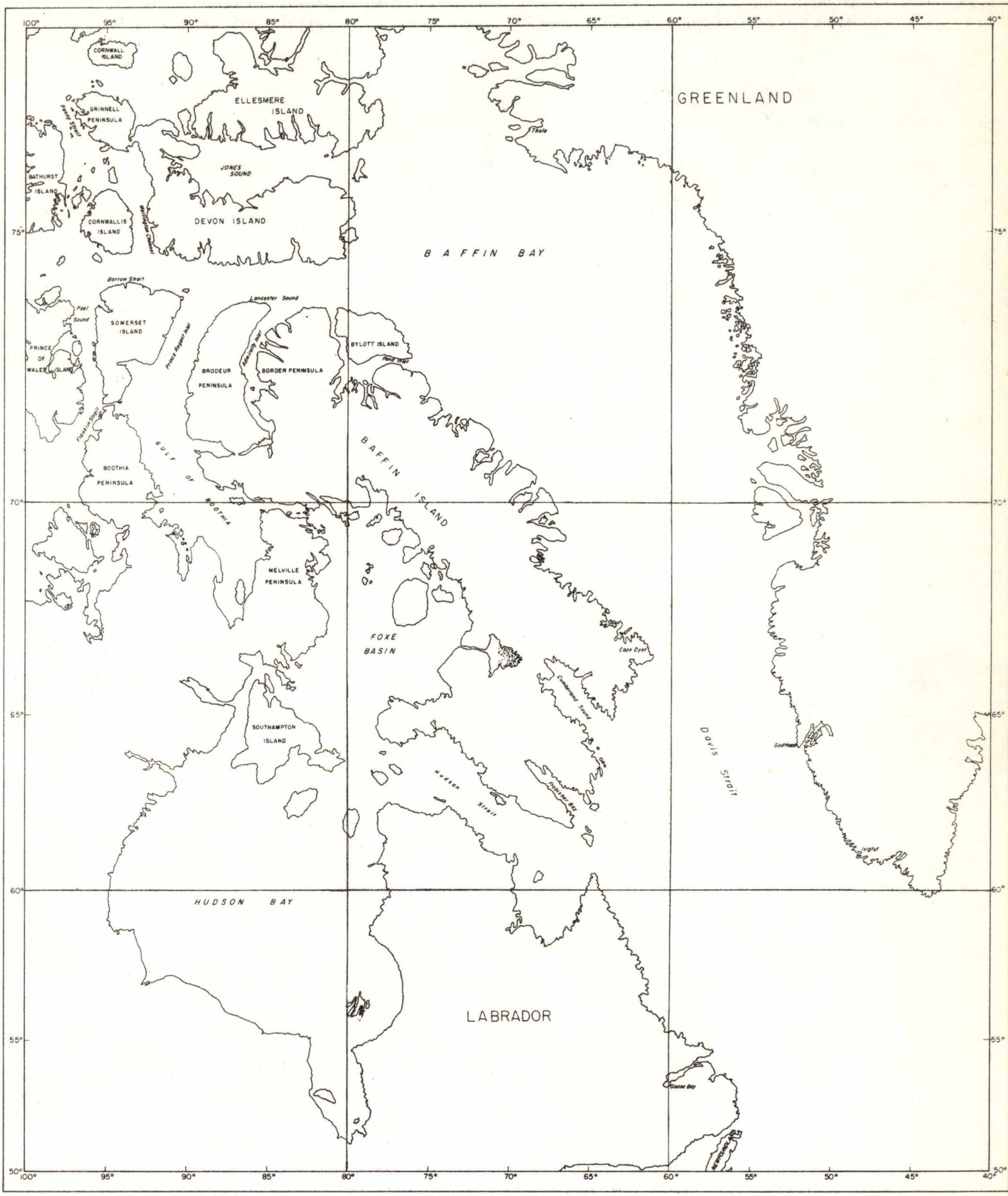


FIG. 1 - AREA OF THE SAMPLING PROGRAM

FIG. 2 - MUD ON SEA ICE IN HUDSON STRAIT
(The relief of the ice ridges is approximately four feet above sea level. Note the open water in right foreground, clear ice in upper left. Photo from an elevation of 20 feet above sea level.)

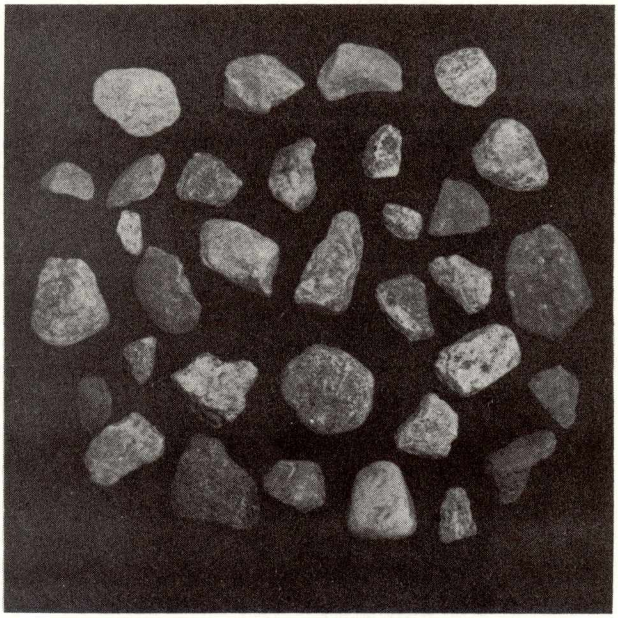


FIG. 3 - PEBBLES FROM SURFACE OF BLOCK OF SEA ICE x 1/3

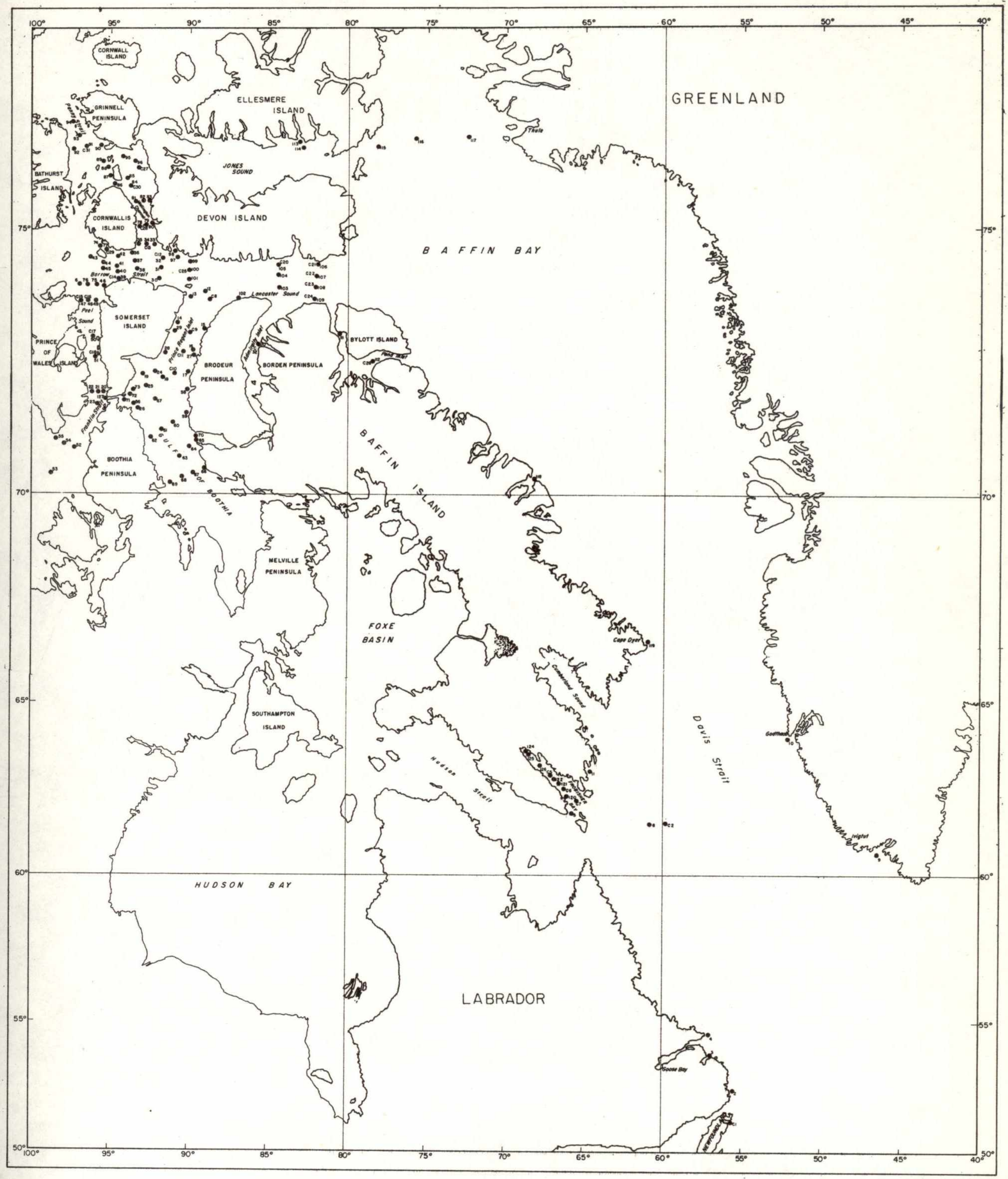


FIG. 5 - SAMPLE LOCATIONS

FIG. 6 - ROCK FRAGMENTS FROM A NUMBER OF SAMPLES. Ruler is one foot.

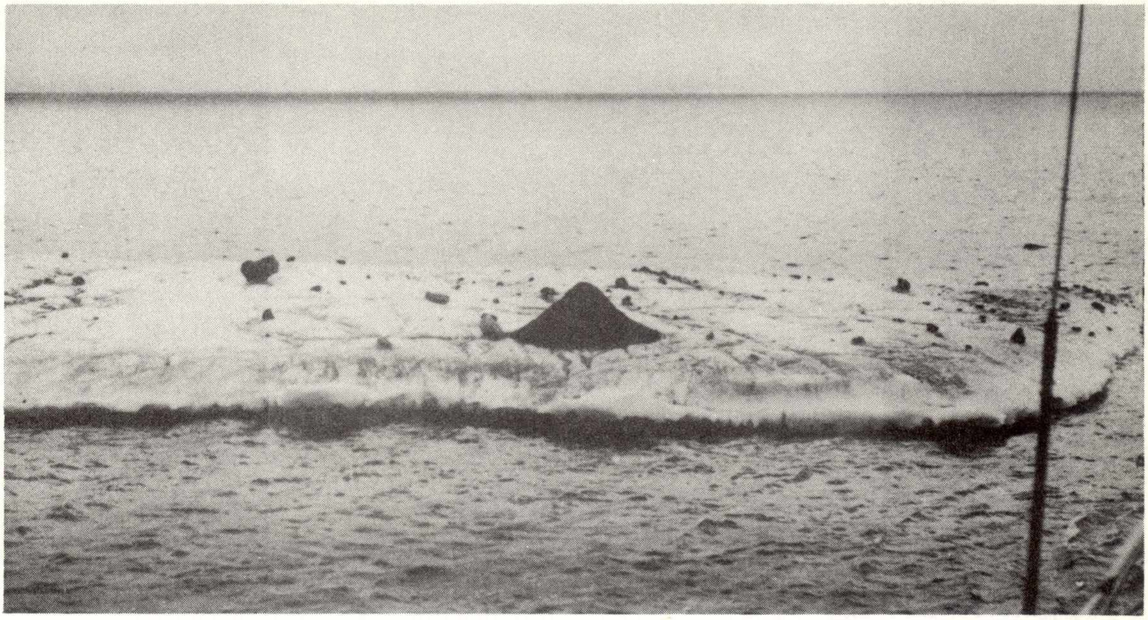


FIG. 4 - BOULDERS AND CONICAL PILE OF DETRITUS ON ICE
(Photograph by Canadian Department of National Defence.)

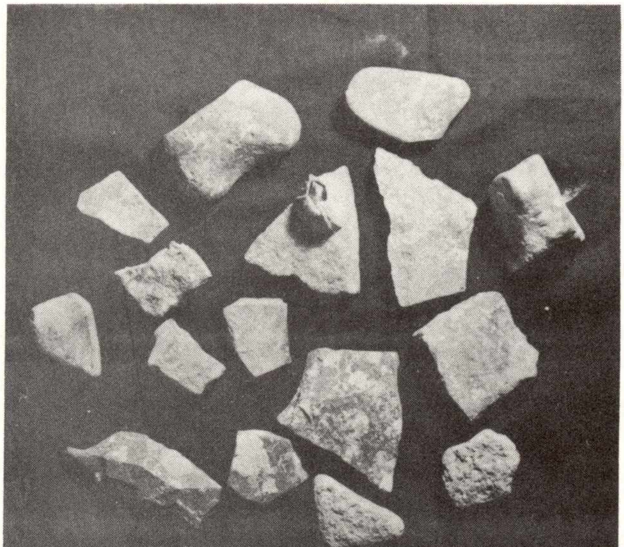


FIG. 7 - SAMPLE 85 x1/3

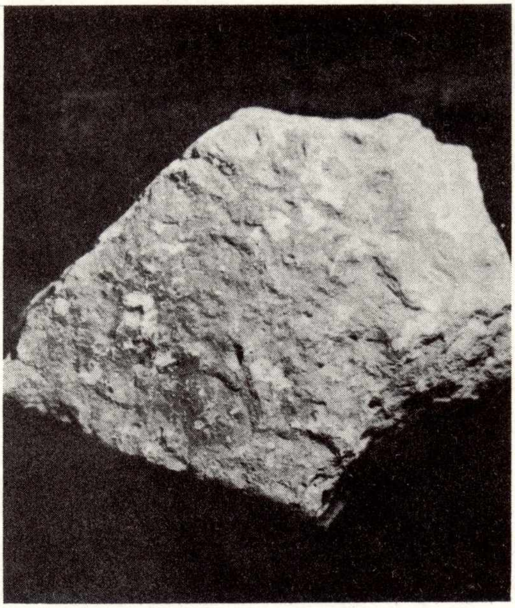


FIG. 8 - FRAGMENT FROM SAMPLE 24 x 1/3

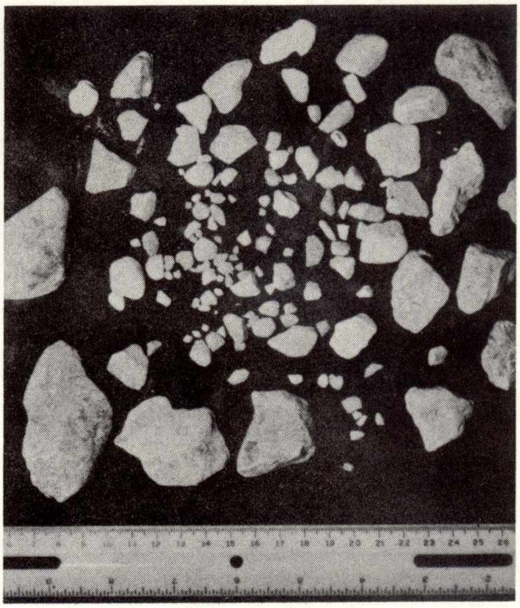


FIG. 9 - SAMPLE 62
GREATER THAN 2.0 MILLIMETERS

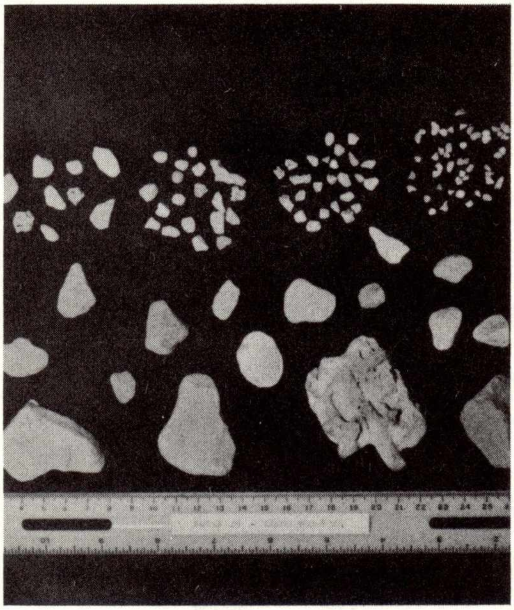


FIG. 10 - SAMPLE 35
GREATER THAN 2.0 MILLIMETERS

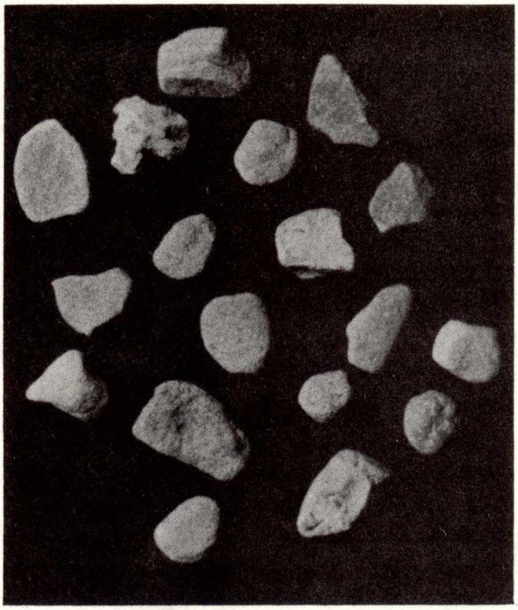


FIG. 11 - SAMPLE 35
4.76 MM. SEIVE FRACTION

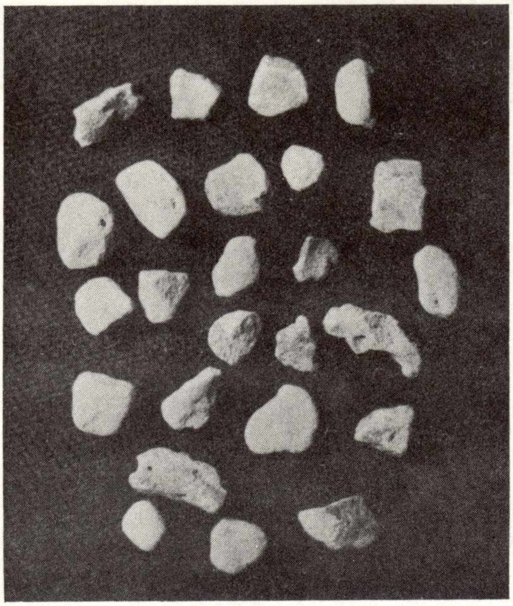


FIG. 12 - SAMPLE 35
3.36 MM. SEIVE FRACTION

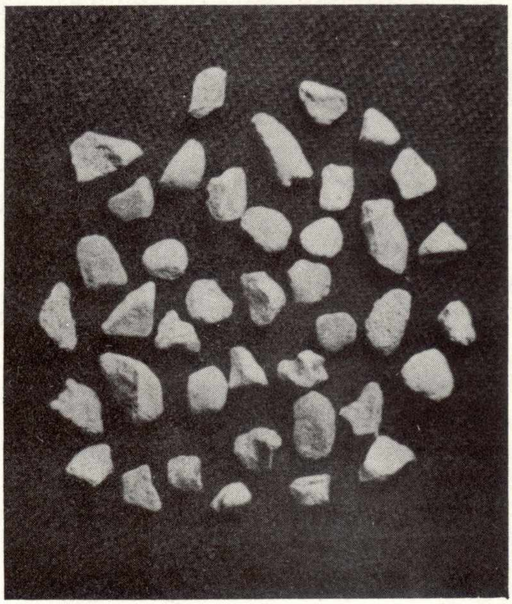


FIG. 13 - SAMPLE 35
2.38 MM. SEIVE FRACTION

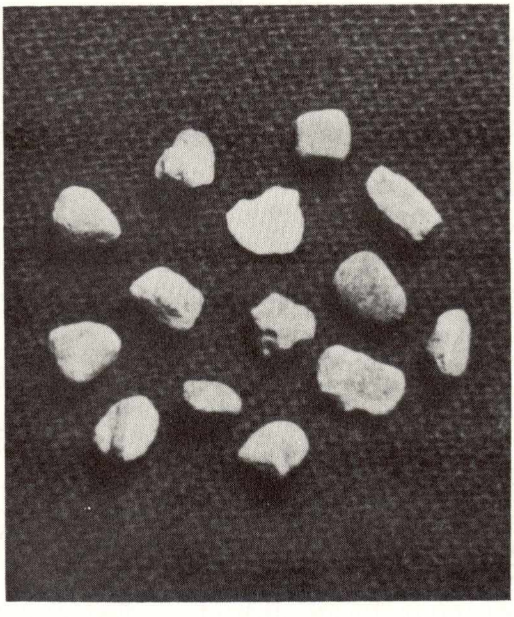


FIG. 14 - SAMPLE 35
1.68 MM. SEIVE FRACTION

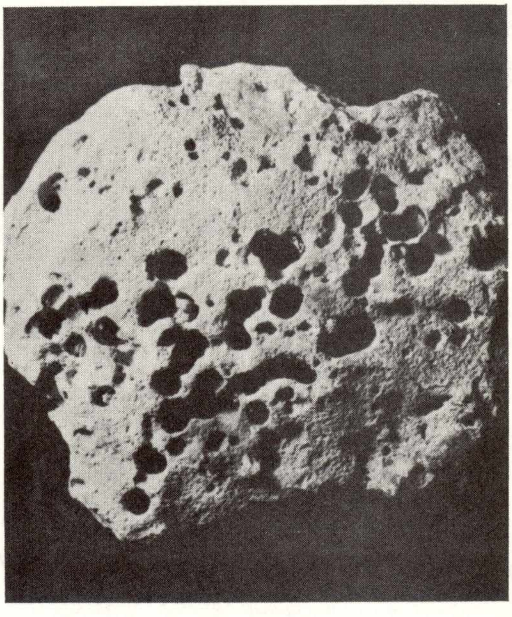


FIG. 15 - FRAGMENT WITH HOLES PRODUCED BY
BORING MOLLUSK x ½

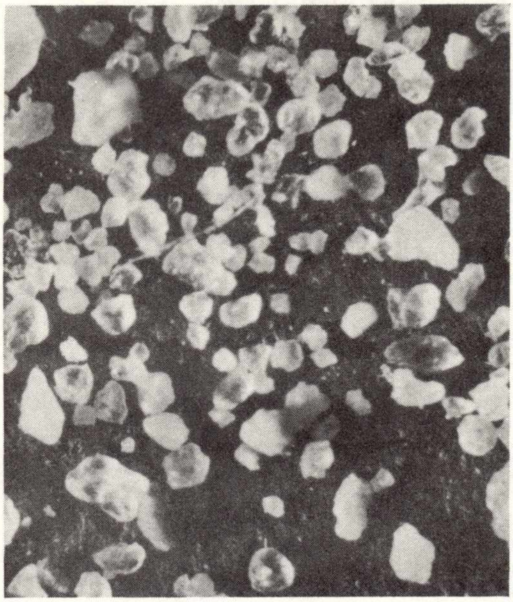


FIG. 16 - SAMPLE 41
0.062 TO 2.0 MM. SIZE FRACTION

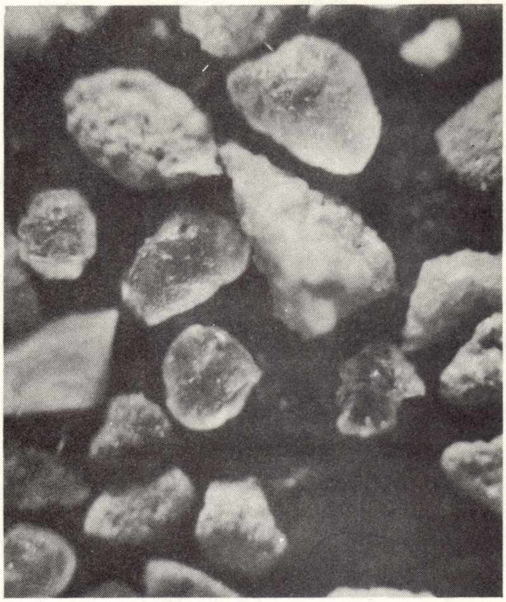


FIG. 17 - SAMPLE 35
0.250 TO 2.0 MM. SIZE FRACTION

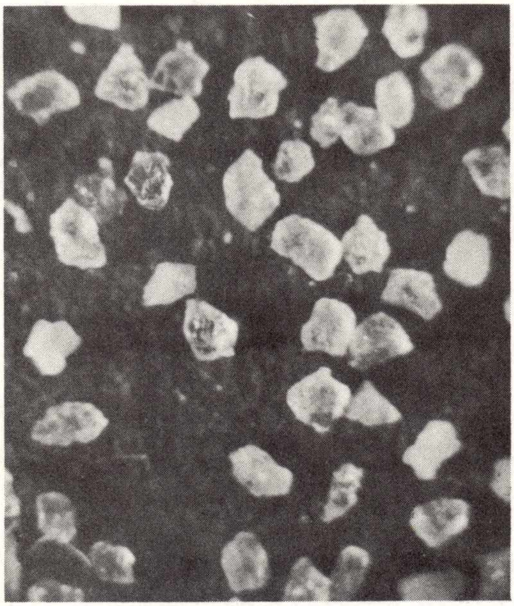
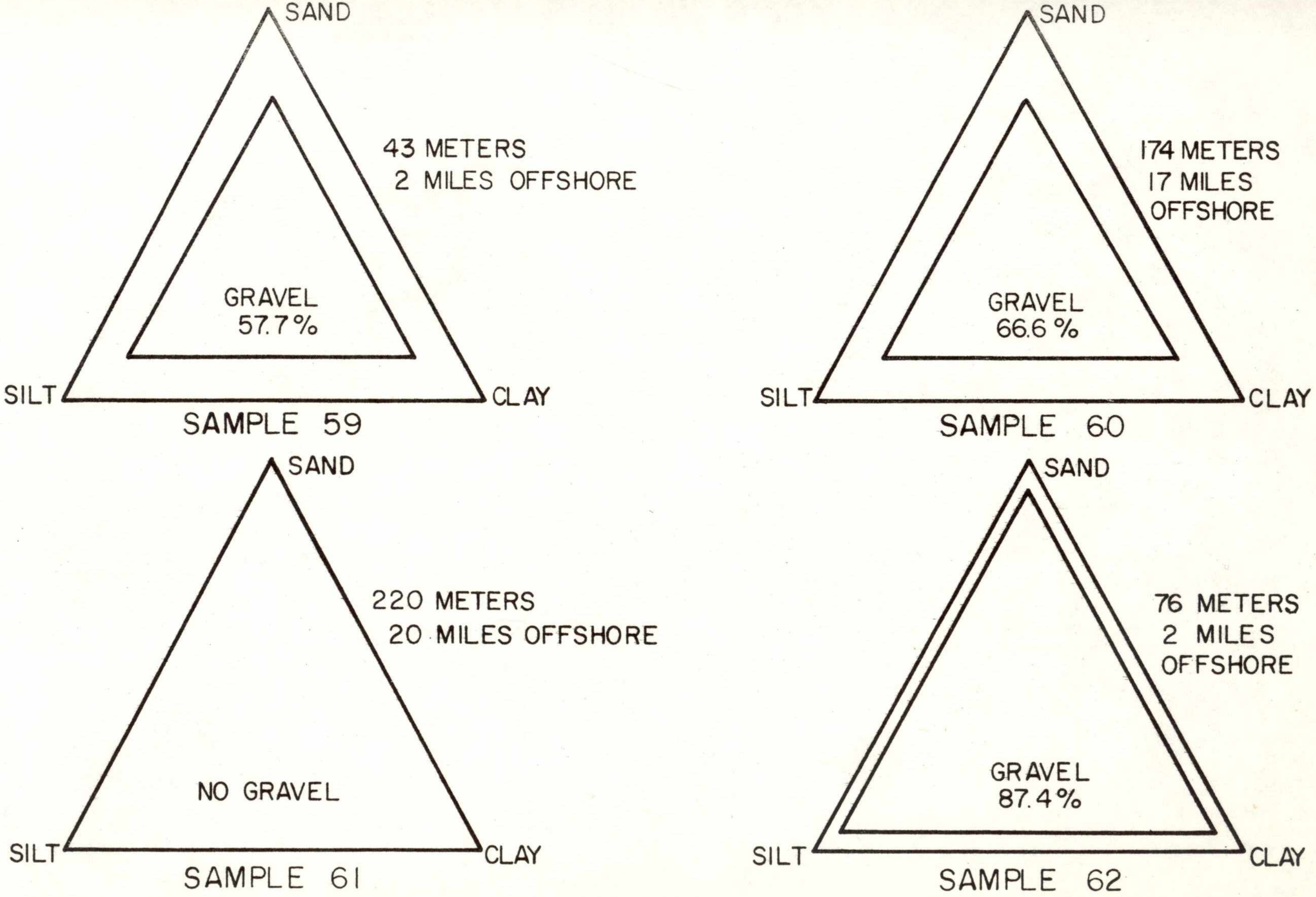


FIG. 18 - FROSTED SAND GRAINS FROM CORE 9

FIG. 19 - ORGANIC MATERIAL IN CORE FROM
POND INLET



SAMPLE 59

SAMPLE 60

SAMPLE 61

SAMPLE 62

FIG. 20 - TRIANGULAR DIAGRAMS SHOWING GRAVEL CONTENT