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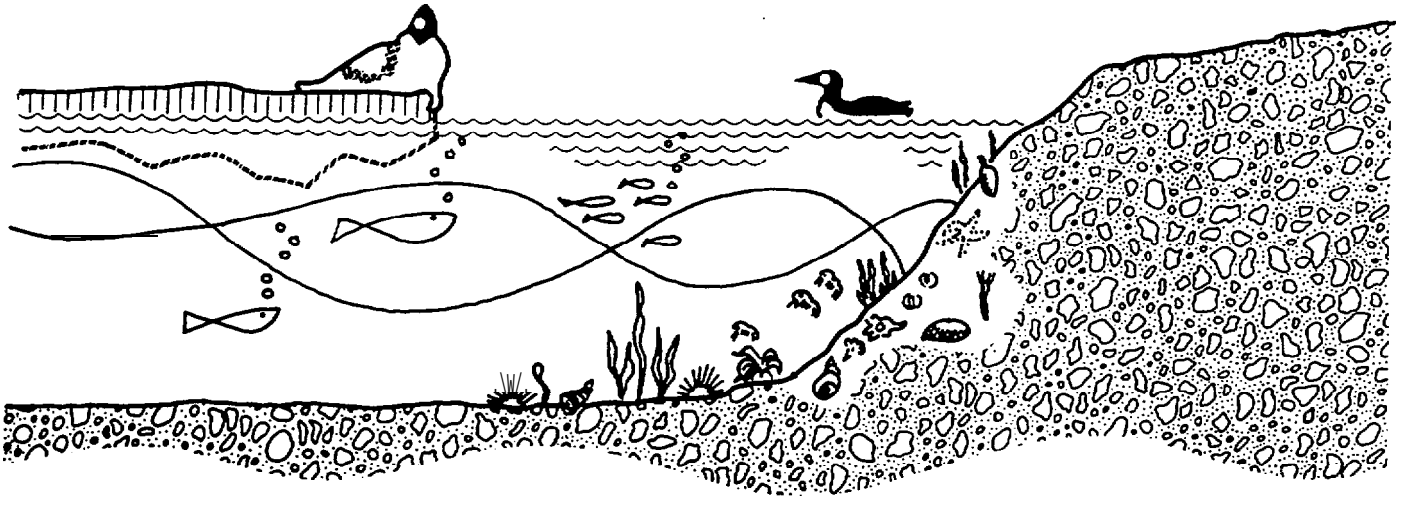

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THE COASTAL MORPHOLOGY AND SEDIMENTOLOGY OF CAPE HATT : IMPLICATIONS FOR THE BAFFIN ISLAND OIL SPILL PROJECT (BIOS)

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Abstract

Cape Hatt, a small peninsula that protrudes into Eclipse Sound at the north end of Baffin Island is the site for an experimental oil spill to take place in the summer of 1981. Three small bays are required: one as a control; a second to study the effects of oil spilled on the surface and allowed to impinge the shoreline; and a third to use an oil-dispersant mix for comparison with the oil-only experiment.

The chosen site contains at least 13 bays potentially suitable for the experiments. Analyses of data from baseline studies in 1980 has resulted in selection of 3 suitable bays (bays 9, 10 and 11). Geomorphic and sedimentologic criteria indicate that the processes of winds, waves and ice action are greatest in bay 10 and least in bay 11. On the assumptions that cross-contamination must be minimal and longevity of the oil in the environment is desirable to ensure reasonable and measurable detrimental effects, we suggest that bay 10 should be used for control, bay 11 for the oil-dispersant mix and bay 9 for the oil-only experiments.

Introduction

Background

Since 1978, staff of the Arctic Marine Oilspill Program (AMOP) of which Environment Canada is the lead agency has undertaken to identify and coordinate research needs associated with experimental oil spills in cold Canadian waters (AMOP, 1979). Cape Hatt on the north coast of Baffin Island (Fig. 1), was chosen as the site for these experiments which had two principal objectives: (i) to determine if the use of dispersants in the arctic nearshore will reduce or increase the environmental effects of spilled oil; and (ii) to determine, under actual field conditions, the relative effectiveness and environmental impact of various shoreline protection and cleanup techniques. The most important site requirement demanded three small bays having similar physical and biological properties. Using one bay as a control the experiment will document the various effects of oil and dispersant in the second bay and compare the results with the third bay in which oil alone has been placed,

During 1980 extensive biological, chemical, ice and sedimentological baseline studies were undertaken including some aspects of the oil-on-shoreline experiments (Environmental Protection Service, 1980) . Cape Hatt, probably one of the few ideal locations in the arctic for the experiments, has over 13 bays (or "boomable" localities) potentially suitable for the spills (Fig. 1) which are to take place in August and September, 1981. As a result of the baseline studies, the three bays that have been chosen for the experiments are numbers 9, 10 and 11 located in Ragged Channel (Fig. 1).

The purposes of this report are to (i) describe the geomorphology and sedimentology for the Cape Hatt area as a whole using the data contained in Appendix I ; (ii) discuss each of the geomorphic and sedimentologic criteria with respect to the objectives of the spill experiments; and (iii) choose among bays 9, 10 and 11 the most suitable bay for each component of the experiment.

We have attempted the latter by assessing each geomorphic/ sedimentologic criterion as a factor that may be considered in the selection of the bays, The relative importance of the factors are assessed qualitatively on a scale of 1 to 5. Each factor is by no means exclusive of the others and each demands slightly differing points of view and assumptions for an importance rating. The values we have provided may reflect assumptions that are invalid with respect to other aspects of the innumerable goals of the experiments and, if so, we encourage modifications.

Field Methods

In late May and early June 1980, sediment cores and grab samples were taken through the ice in bays 9, 10, 13, 102, 103, 104, 105, 106, 108 and 109 using a vibracorer and "a Foerst-Peterson grab sampler. Bathymetric observations and sea bottom profiles were also obtained during this time period. In late July and early August, the beaches in all the bays were profiled using a method described by Emery (1961) and samples were obtained of all representative morphological and sedimentological features in a procedure described by McLaren et al. (1981) . Diving was performed in bays 9, 10, 11 and 13 for detailed observation and sampling. Altogether 34 cores, 61 grabs, 29 diver-

collected samples and 114 beach samples were obtained and analyzed for their grain size distribution (Barrie et al., 1981).

Acknowledgements

The scope of the BIOS project necessitates complex logistics and unique interaction among scientists of many disciplines. Numerous individuals and organizations provided field, scientific and analytical support for this part of the total project. In expressing congratulations and thanks to P. Blackall, project manager of BIOS we hope to encompass the large number of people who gave the necessary support. Full details of the experiments can be obtained from him, c/o BIOS Project, Environmental Protection Service, No. 804, 9942 - 108 St., Edmonton, ALTA, T5K 2J5 (403-420-2592).

Special acknowledgement is made to Captain Pelland, Commanding Officer of CCGS "Pierre Radisson" and his officers and crew who, in Oct. 1979, provided the means to choose Cape Hatt as the site for the spill experiments. His decision to use the ship and accompanying helicopter in support of the quest for a suitable location undoubtedly enabled BIOS to continue on schedule.

Physical Setting

Cape Hatt is located on the northern tip of a small peninsula that extends into southwestern Eclipse Sound. The peninsula itself is roughly oval in shape with an average radius of about 3 km. It is bordered on the north by Eclipse Sound and on each side by fjords.

Two elongated hills, both trending northeasterly are present at the northwest and southeast ends of the peninsula (Fig. 1) . Reaching altitudes of 400 m and 500 m respectively, they are separated by a northeasterly trending saddle-shaped valley that extends between an embayment on Ragged Channel (bays 11 and 12) and the southwestern end of "Z''-lagoon (bay 106). The valley is generally less than 50 m elevation.

The peninsula is divided geologically by a prominent fault which trends southeast from the southern end of bay 10 and is expressed morphologically by a deeply incised drainage valley. North of this fault the rocks consist mostly of Archaean and Aphebian migmatites of highly variable composition as well as a few ultrabasic bodies. The migmatites are made up of alternating light and dark banks of quartz monzonite to granodiorite and amphibolites, paragneiss and minor ultramafics respectively (Jackson et al., 1974).

South of the fault are two Neohelikian sedimentary sequences; the Victor Bay Formation consisting of thinly bedded black shale, siltstone and limestone, and the Athole Point Formation composed principally of argillaceous limestone and calcareous shale and siltstone. The Athole Point Formation overlies conformably the Victor Bay and in the area south of bay 9 it forms the core of a northwesterly plunging syncline.

The area was probably ice-covered during the late Wisconsin and an emerged ice-contact delta, the top of which is at 70 m elevation, is located immediately south of Tukayat Lake (Fig. 1)

partially constricting the low valley between "Z" Lagoon and Ragged Charnel. The delta represents the margin of the ice front during its retreat towards the south about 10 to 12,000 years ago. Since its retreat the peninsula has emerged at least 80 m, the result of isostatic re-adjustment (Hodgson et al., 1974).

The bays on the peninsula are separated by steep rocky promontories with the exception of a small delta separating bays 9 and 10. Coarse sand, gravel and cobble beaches within the bays owe their origin to till or glacial-marine deposits which blanket the valleys and lower slopes of the peninsula. The nearshore sediments in the outer bays are also derived from the glacial deposits although they have undergone modification by currents, waves and ice scouring. The sediments within "Z''-Lagoon are exceptional consisting mainly of poorly sorted mud probably derived from the bottomset beds of the uplifted delta which have since infilled the lagoon during Holocene emergence.

Ice covers the waters surrounding Cape Hatt for about 9 or 10 months each year. The mean date for the area to be free of ice is July 31 but can be as early as July 15 and as late as August 20. The mean date for freezeup is October 6 and extends from September 24 to October 15 (Dickens, 1991). As a result of the presence of ice the shoreline of Cape Hatt exhibits numerous features unique to polar beaches. These include ice push ridges, pitted beaches and ice mounds. The latter feature appears to play an important role on the Cape Hatt beaches and are described in some detail in Dickens (1981).

Shoreline Morphology and Sedimentology

Backshore/berm

Definition

The backshore is the part of the beach between the uppermost level of wave activity and the mean high water line. It normally includes a berm and overwash deposits; however at Cape Hatt such features are not always present because of ice effects which limit wave processes to only several weeks each year. A berm is a nearly horizontal terrace or bench formed by material thrown up and deposited by waves above the mean high water level.

"Z" - Lagoon

In "Z" - Lagoon most of the bays have gently sloping shorelines that grade into a backshore and foreshore with no morphological expression (Fig. 2). With the exception of bays 108 and 109 which have steeper slopes, the backshore reaches widths of about 16 metres (Table 1). In bays 108 and 109 small berms 3 and 6 metres wide respectively are probably the result of the steeper topography and waves derived from southwest winds funnelled through the valley separating "Z" - Lagoon from bays 11 and 12. Backshore samples from bays 103, 104 and 105 show a fairly consistent gravel content of about 15 per cent whereas the sand and mud contents show wide variability ranging from 45 to 74 per cent sand and from 4 to 30 per cent mud (Table 2). The mean grain size, excluding gravel, falls in the medium to very fine sand range and all samples are poorly sorted and positively skewed.

Eclipse Sound

These bays (101 and 102), exposed to the highest wave energies generated in Eclipse Sound, contain the widest backshores of 28 and 21 metres (Fig. 3). Within the backshore each bay contains a well developed berm, the largest being in the most exposed bay (102) and is about 12 metres wide (Table 1). Samples from bay 102 show the backshore to be principally very coarse, fairly well sorted sand with gravel contents usually less than 20 per cent (Table 2).

Ragged Channel

In bays 9, 10 and 11 small berms, the maximum width being 7 metres in bay 11 (Table 1), make up the entire backshore. They are, however, not always present around the length of the bay particularly where eroding bluffs adjoin the foreshore (Fig. 4). In bay 13, the most exposed of the bays in Ragged Channel, the backshore extends as much as 15 metres and contains a berm (maximum 4 metres) within this width (Table 1). Backshore samples were taken only from bay 13 and show a similarity with the sediments in the Eclipse Sound bays although the sand is finer and more poorly sorted. The gravel content is more or less the same at about 9 per cent.

Implications to BIOS

A berm is a depositional feature dependent on wave activity for its formation. At Cape Hatt the widest, best formed berms are found in the most exposed bays (Table 1) and reflect the relative energy levels. Because a berm is a potential reservoir for oil above normal wave activity, there is a greater probability for oil to be stored on the surface or buried on shorelines with a well developed berm should wave activity be sufficient to contaminate the backshore during the spill experiments.

In bays 9, 10 and 11 the width of the backshore and berm is least in bay 9 and greatest in bay 11 (Table 1). Bay 11 therefore has the greatest potential to retain oil on the shoreline for the longest time whereas in bay 9, the absence of a berm means the oil can only be retained on the beach face and will be subject to continuous tides, waves and ice activity.

Based on the assumption that the experiments will yield the most useful results if the oil and oil-dispersant mixture have a maximum possibility of affecting the environment (i.e. longevity and interaction with biota and sediments is maximized) we suggest the following order:

(i) Bay 11 for oil-only because there is the best probability for long term retention on the shoreline;

(ii) Bay 9 for the oil-dispersant mix because the lack of a backshore indicates a low energy regime and thus there is the maximum possibility of the mixture remaining in the water column and/or bottom sediments for greater lengths of time than the other two bays;

(iii) Bay 10 for control (by default)

Practical considerations during the spill experiments demand weather conditions amenable for boom handling, sampling, observations etc., thus it is unlikely that oil will be thrown by waves onto the backshore when the experiments take place. We have therefore placed a low importance to the backshore as a factor determining the choice of bays (Table 3).

Beach Face

Definition

The beach face is the part of the beach that is subject to wave uprush and lies roughly between mean high and mean low water levels.

"Z"-Lagoon

The gentle slopes and low wave activity in bays 103, 104, 105 and 106 preclude the formation of a berm and beach face (Table 1). Where the shoreline slopes are steeper in bays 107, 108 and 109 a beach face has developed which ranges from 23 to 28 metres wide with slopes from 5.1 to 7.7 degrees. The beach face sediments have a relatively narrow range in their sand content (51 to 67%) but contain more variable amounts of gravel and mud (Fig. 5). The range of the sand sizes is, however, quite variable extending from 0.30ϕ (coarse sand) to 3.32ϕ (very fine sand). Sorting is always poor and the skewness positive.

Eclipse Sound

The exposure to high wave activities in bays 101 and 102 have resulted in the widest beaches at Cape Hatt (Table 1). They are about 30 metres wide, slopes are typically 6.5 degrees and they are composed almost entirely of sand and gravel having little or no mud content (Fig. 5). The sands are either very coarse or coarse, and compared with most of the other bays, they are well sorted (Table 2).

Ragged Channel

Of all the bays in Ragged Channel, bay 9 has the least width (average 17 metres) and greatest slope (10.7 degrees) whereas bay 11 has the greatest width (31 metres) and least slope (3.9 degrees). The controlling parameter for the slope is the mean grain size which is coarsest for

bay 9 (0.364) and finest for bay 11 (0.84ϕ). The beach face sediments contain more sand than those in Eclipse Sound or "Z"-Lagoon (Fig. 5) and their texture tends to be more consistent than in the other environments. Mud content is generally less than 4 per cent and gravel ranges from about 14 to 24 per cent (Table 2). The mean grain size falls in the coarse sand category and the sediments are generally poorly sorted.

Ice Mounds

At the time of sampling (late July) nearly all the beaches contained a distinct linear Ice mound or berm that paralleled the length of the beach close to the mean low water level (Fig. 6). The ice mound contained sediment both within and on its surface that was added to the beach face during its melt. These sediments were sampled in an effort to determine the origin of the ice mounds which is not clearly understood. Dickens (1981) has a more complete description and reviews possible processes that could result in ice mound formation.

The sediments within the ice mounds show no significant differences from the corresponding tidal flat or beach face sediments they are formed on. In "Z"-Lagoon there is a tendency for the ice mound sediments to contain more sand than the beach face sediments whereas in Eclipse Sound and Ragged Channel the ice mound sediments have greater amounts of gravel than the corresponding beach face sediments (Table 2). Generally the sediments in the ice mounds are coarse relative to beach face sediments although there appear to be no constant trends among sorting and skewness values.

Implications to BIOS Experiments

In bays 9, 10 and 11 the beach face width becomes progressively larger and the slope progressively smaller (Table 1). Thus oil alone

should be spilled in bay 11 because there is a greater area of beach available for contamination, a better chance of oil being retained in the sediments and a greater probability for increased oil longevity due to wave attenuation over the shallow slope than in the other two bays. To ensure the oil-dispersant mixture remaining in the nearshore for as long as possible the bay with the steepest beach face should be chosen which may help to minimize nearshore turbulence (i.e. bay 9).

This factor of beach face width and slope will have a significant effect on the fate and behaviour of the oil. There is little difference between bays 9 and 10 (Table 1) but bay 11 has substantially smaller slopes. We suggest that the importance rating should be higher than for the backshore factor and we have arbitrarily placed the rating at 3 (Table 3).

Grain size and the degree of sorting of beach face sediments may also have an effect on the behaviour of the spilled oil. In general, coarser, better sorted sediments will have a greater permeability and porosity than those which are finer and poorly sorted. On this basis, oil will have a better chance to penetrate and be retained by the sediments in bay 9, which contains the coarsest and best sorted beach face (Table 2). The beaches in bay 10 are coarser and better sorted than those in bay 11 indicating bay 10 to be a better choice for the oil-dispersant mix and leaving bay 11 for control. The variability of grain-size and beaches is not, however, very great and we have put the lowest importance rating of 1 for this as a factor affecting the choice of bays (Table 3).

Ice mound development on the beach face is apparently ubiquitous in each of the three bays. The exact effects of oil on its formation and decay are presently unknown; however, it seems clear that the net result

of the ice mound will be either to remove oil from the beach during the melt or to "dilute" the oil-in-sediment concentration through excessive disturbance and admixing of sediments. Removal of contaminated sediments may occur if the ice mound rafts away during breakup. Such an occurrence is most likely in bay 10, the most exposed of the three bays. Therefore bay 11, the least exposed bay, should be used for the oil-only experiment to maximize its residence time on the beach face. Bay 9 is slightly less exposed than bay 10 and should have the oil-dispersant mixture. The importance rating of the ice mound as a factor in choosing the bays has been kept very low because there is little understanding of this phenomenum and we can only speculate on how it may affect the experiments (Table 3).

Intertidal Flat

Wide, gently sloping, intertidal flats occur only in bays 103 to 106 of "Z''-Lagoon. They range in width from about 42 to 74 metres (Table 1) and are composed principally of poorly sorted coarse to fine sand. There is a tendency for the sediments to become finer and more poorly sorted with increasing shelter inside the lagoon. Intertidal flats do not occur in any of the bays selected for the spill experiments.

Nearshore

Nearshore profiles perpendicular to the shoreline in each of the bays indicate consistently shallow slopes in "Z''-Lagoon of less than 4 degrees (Table 1). Sediments contain a high mud content (> 75%) and consist of poorly sorted medium and fine silt with gravel and sand making up less than 3 and 20 per cent respectively (Fig. 7). In several of the bays (i.e. 106 and 109) there is a good relationship between grain size parameters and water depth. Mean grain size decreases, sorting becomes poorer and the positive skewness becomes less with increasing depth. These relationships

are not, however, consistent from bay to bay and no simple generalized model is apparent to explain these observations.

One profile in Eclipse Sound (bay 102) indicates a nearshore slope of about 5 degrees and corresponding bottom samples contained relatively high amounts of sand and gravel compared with either "Z''-Lagoon or Ragged Channel (Fig. 7). In the latter, bays 9 and 10 have similar nearshore slopes (8 and 10 degrees respectively) but bay 11 is significantly shallower at approximately 4 degrees. The sediments in Ragged Channel have a similar gravel content to those in "Z''-Lagoon (generally less than 8 per cent) whereas the sand content is much greater and ranges from about 50 to 70 per cent (Table 3).

All of the nearshore samples in Ragged Channel have a good correlation between the grain size measures and water depth. As water depth increases, the mean grain size becomes finer, the sorting poorer and the skewness less positive (data in Barrie et al., 1981). The sediments, on average, are principally poorly sorted very fine sand or coarse silt (Table 2).

Implications to BIOS

In arctic environments the dominant process affecting nearshore sediments is moving ice, gouging and scraping the bottom resulting in considerable sediment disturbance. This process has increasing impact with decreasing depth. Thus oil that has been deposited onto the substate, as is to be hoped for the oil-dispersant mix experiment, will be subject to burial, mixing or even resuspension and removal by ice scouring in shallow water. It is suggested that oil in or on the substrate will have a better chance of remaining on bottoms where ice scour is least. Although diving observations show that ice scour has occurred in all three bays, the bay with the greatest slope (bay 9) should have the largest area unaffected by ice

impinging on the bottom and bay 11, with the least slope, should have considerably more. We suggest that this factor (ice scouring; Table 3) indicates that bay 9 would be best for the oil-dispersant mix, bay 10 for oil only and bay 11 for control. We recognize that there are factors such as exposure, ice ridging, probability of multi-year ice blocks entering the bays etc. that may complicate this concept and therefore the importance rating is very low (1; Table 3).

Similar to the arguments used for the beach face, sediment sorting may affect the behaviour of oil in the nearshore. The best sorted sediment may enable maximum penetration of the oil; therefore bay 10 (sorting 2.54ϕ) would be the choice for the oil-dispersant mix, bay 11 for oil only and bay 9, with the poorest sorting (3.00ϕ), would be control (Table 3). The spread of values is, however, insufficient to increase the importance rating of this factor above one (Table 3).

The relationship of the grain size parameters with depth is a probable indication of the relative importance or the energy level of the processes operating in each bay. The best correlations of mean grain size, sorting and skewness with depth are found in bay 10 ($r = 0.89$) the most exposed of the three bays: bay 9 is next ($r = 0.81$), followed by bay 11 which is much lower ($r = 0.53$). Bay 11 appears to be the least energetic of the three bays suggesting that the oil-dispersant mix would have the best chance for long term interaction with the biota. Oil only should be palced in bay 9 because its longevity will be greater than in bay 10 which should be kept for control. This factor (grain size parameters with depth) is considered by us to be important and we have given it a high importance rating (4; Table 3) .

Sediment Trends

Introduction

The mean grain size, sorting and skewness of a sedimentary deposit are dependent on the sediment grain size distribution of its source and the sedimentary processes of (i) winnowing (erosion), (ii) selective deposition of the grain size distribution in transport, and (iii) total deposition of the sediment in transport. If a source sediment undergoes erosion, and the resultant sediment in transport is deposited completely, the deposit must be finer, better sorted and more negatively skewed than the source. This trend is referred to as Case I. The lag remaining after erosion, on the other hand, must be coarser, better sorted and more positively skewed (Case II). If sediment in transport undergoes selective deposition, the resultant deposit can either be finer (Case 111A) or coarser (Case IIIB) than the source, but the sorting will be better and the skew more positive (McLaren, 1981). In a system of related environments, these trends can be used to identify both the probable source and the probable deposit and, by inference, the net sediment transport paths among sedimentary deposits. The transport paths represent an integration of all the time-dependent variables such as winds, waves and currents and may suggest the probable fate and behaviour, particularly in the long term, of oil in coastal environments (McLaren, 1980).

Sediment trends at Cape Hatt based on the data presented in Barrie et al. (1981) and in Table 2 suggest the following conclusions.

"Z''-Lagoon

(i) The deposits in the lagoon are the source sediments for the intertidal and beach sediments. In general the shoreline deposits are a lag of the lagoon sediments that have undergone winnowing of fines (Case II) by the small levels of wave and ice activity.

(ii) Bay 103 is the most exposed and the nearshore sediments are a lag derived from the original sediments deeper in the lagoon. The fines winnowed from bay 103 do not appear to be deposited in the rest of the lagoon and are evidently lost through the channel exiting into Eclipse Sound. (Fig. 8).

(iii) Bays 104 and 109 are partially lag deposits; however fines from these two bays appear to be undergoing total deposition in bay 106. The latter is the most sheltered in the lagoon and is the only bay that may be receiving sediments from both the land and the other bays. (Fig. 8).

(iv) Source-deposit relationships between all sediment samples and ice mound deposits show no consistent trends. It appears probable that they are derived from the in-situ beach face deposits present at the time of their formation.

Eclipse Sound

(i) The original source for all the nearshore and beach sediments is the subsurface deposits found in a core from bay 102 (Table 2). This sediment, composed of sandy silt, is probably of glacial marine origin from which the surface deposits are a lag. Through the processes of ice and wave action, fines are increasingly lost as the water shallows resulting in the coarsest, best sorted and most positively skewed sediments at the beach. The fines are

probably transported and deposited farther offshore below the depth of ice scour (McLaren, 1980).

(ii) The beach sediments in bay 101 appear to be the source for those in bay 102 and suggest net movement of sediments from east to west. The same east to west movement of sediments is particularly strong within bay 102. (Fig. 8)

(iii) Similar to the ice mounds in "Z''-Lagoon their sediments are not clearly derived from farther up on the beach face or from the nearshore suggesting an in-situ mode of formation incorporating the existing beach sediments,

Ragged Channel

(i) Similar to "Z''-Lagoon and Eclipse Sound, the shoreline sediments in Ragged Channel are a winnowed lag derived from the subsurface sediments in the nearshore (Table 2). The source sediment is also evident in the eroding bluffs that occur in bays 9 and 10.

(ii) In bay 9, both nearshore and beach sediments show very few consistent trends indicating that longshore sediment transporting processes are rare in either direction. There is a slight northward trend in the beach face sediments that may suggest a preferred direction of south and southwest winds at this location (Fig. 8).

(iii) Sediment trends suggest that the bluffs in bay 10 are more actively eroding than the bluffs in bay 9. Consistent trends show that the bluffs as well as the nearshore sediments are supplying the beach deposits. Storms probably erode the

bluffs and deposit the sediments in the nearshore where they are further modified in their transport to the beach.

Both nearshore and beach sediments have dominant trends in the southward direction (Fig. 8) indicating that north and northwest winds are more effective than the south and southwest winds that move sediments in bay 9.

(iv) The delta that divides bays 9 and 10 is also a sediment source for the deposits in the two bays. Sediment trends clearly show that bay 10 receives a much greater sediment input from the delta than in bay 9 indicating a northward transport in opposition to southerly transport indicated by the beach and nearshore sediments. We suggest that a clockwise gyre in bay 10 would account for these observations (Fig. 8). There is supporting evidence for such a gyre in the time-lapse photography showing ice movements in the bay (Dickens, pers. comm.) and in current data (de Lange Boom and Buckley, 1981).

(v) In bay 11 there is an indication of northeast sediment movement in both the nearshore and beach sediments (Fig. 8). The trends, though not particularly strong may be the result of south and southwest winds or of the refraction, of waves into bay 11 generated by northwest winds.

(vi) Beach face sediments in bay 13 show a strong southward transport direction which is not reflected in the nearshore sediments (Fig. 8).

Implications to BIOS

One of the most important considerations in the selection of bays is minimizing the possibility of cross-contamination between the bays with oil in them, and particularly, contamination of the control bay. This problem is two-fold because contamination must be considered on both the short term (immediately after the spills have taken place) and in the long term (over the 3 years of data gathering and observation). The insights provided by the sediment-trends (Fig. 8) are especially valuable in assessing long-term cross-contamination potential because they indicate the probable transport paths if oil becomes entrained in the sediments.

The most difficult experiment to control is the oil-dispersant mix. Because bay 10 shows the strongest trends and is therefore the most "active" of the bays, we suggest bay 10 is a poor choice for this experiment. Bay 11, on the other hand, has weak trends in a direction away from the other bays (Fig. 8) and is consequently the best choice for the oil-dispersant mix experiment. Bay 9 also has weak trends compared to bay 10 and is the next least possible source for cross-contamination. Thus bay 9 is a logical choice for the oil onlv experiment which leaves bay 10 as the control. The factor of cross-contamination is sufficiently important to receive the highest importance rating (5; Table 3).

Finally, the strength of the sediment trends summarizes the level of activity In each of the bays. We suggest that the overall longevity of the oil in the environment is maximized in the least active of the bays . Therefore oil and dispersants should be put into bay 11, oil in

bay 9 and bay 10 left for control because this is the sequence of increasing energy in each bay. We have placed an importance rating of 4 on this factor, only slightly less than the cross-contamination factor.

Conclusions

(i) The coastal sediments in the Cape Hatt bays originate from glacial and glacial-marine deposition during late Wisconsin or early Holocene time. These sediments, presently occurring in the nearshore subsurface or in eroding bluffs, are modified at the shoreline by waves and ice action resulting in sediments that become increasingly coarser, better sorted and positively skewed as water depth decreases.

(ii) In general the coarsest and best sorted sediments occur in bays 101 and 102 which have the highest exposure to wave and ice activity. "Z''-Lagoon is the most sheltered environment and contains finer and more poorly sorted sediments. The bays in Ragged Channel fall between these two extremes.

(iii) Trends in sediment grain size distributions indicate westerly transport directions in the Eclipse Sound bays (101 and 102). In "Z''-Lagoon fines are winnowed in the most exposed bays (103, 104 and 109) and are either deposited in the vicinity of bay 106 or are removed out of the lagoon into Eclipse Sound. Bays 10 and 13 in Ragged Channel show strong southerly trends whereas bays 9 and 11 have weak northerly and northeasterly transport directions. There is an indication of a clockwise gyre in bay 10.

(iv) Based on a qualitative importance rating value applied to each

geomorphic/sedimentologic criterion that may affect the BIOS experiments it is suggested that bay 10 should be used for a control, bay 9 for the oil-only and bay 11 for the oil-dispersant mix experiments.

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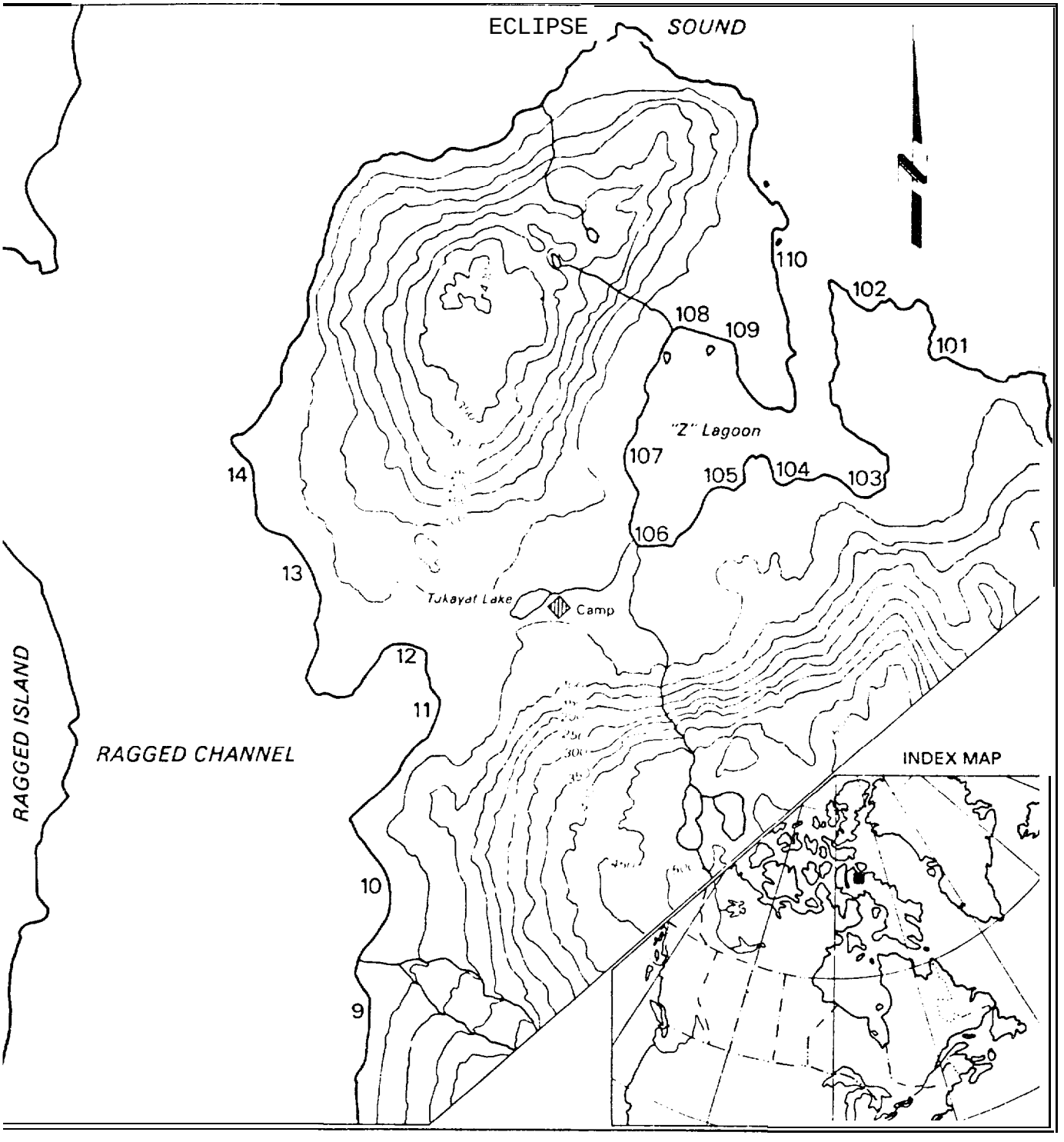

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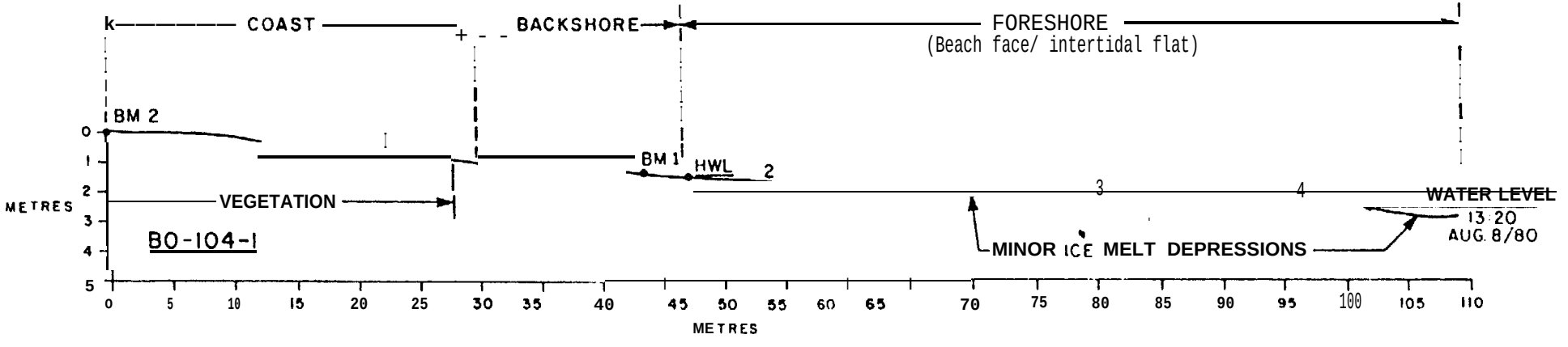
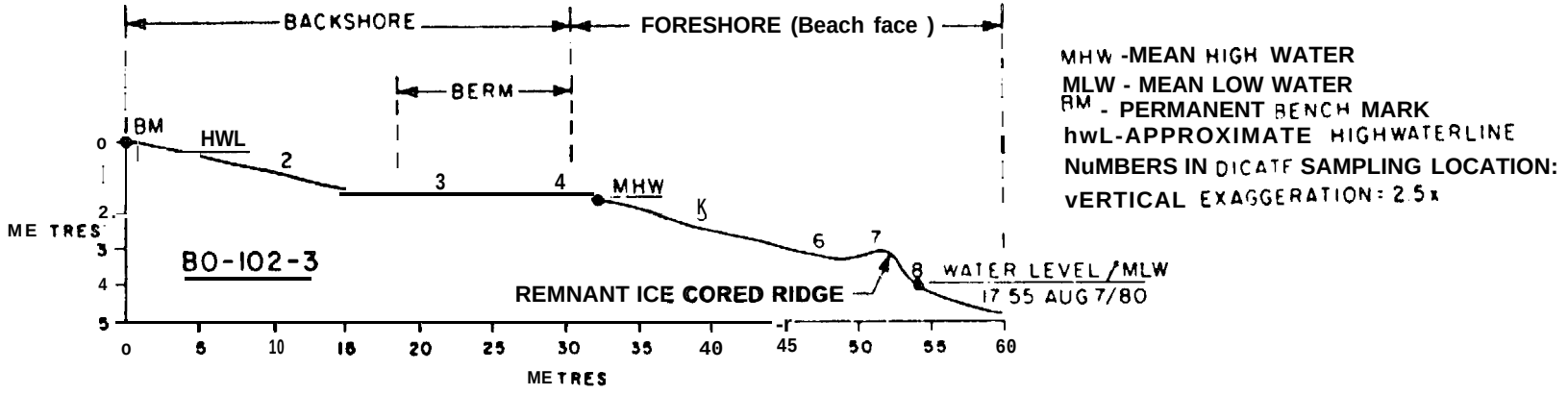


BM - PERMANENT BENCH MARK
HWL APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2.5 x

FIGURE 2: BEACH PROFILES IN BAY 104; "Z" LAGOON



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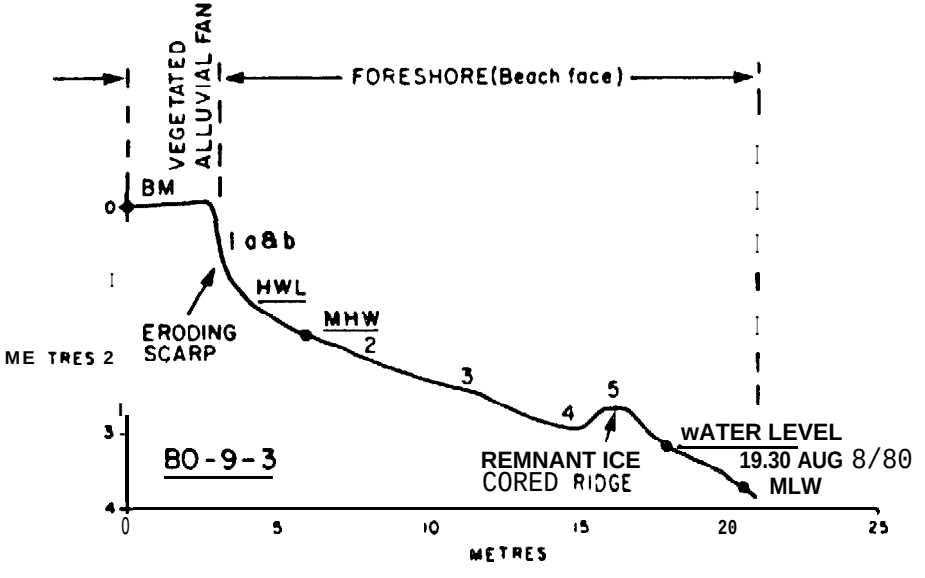

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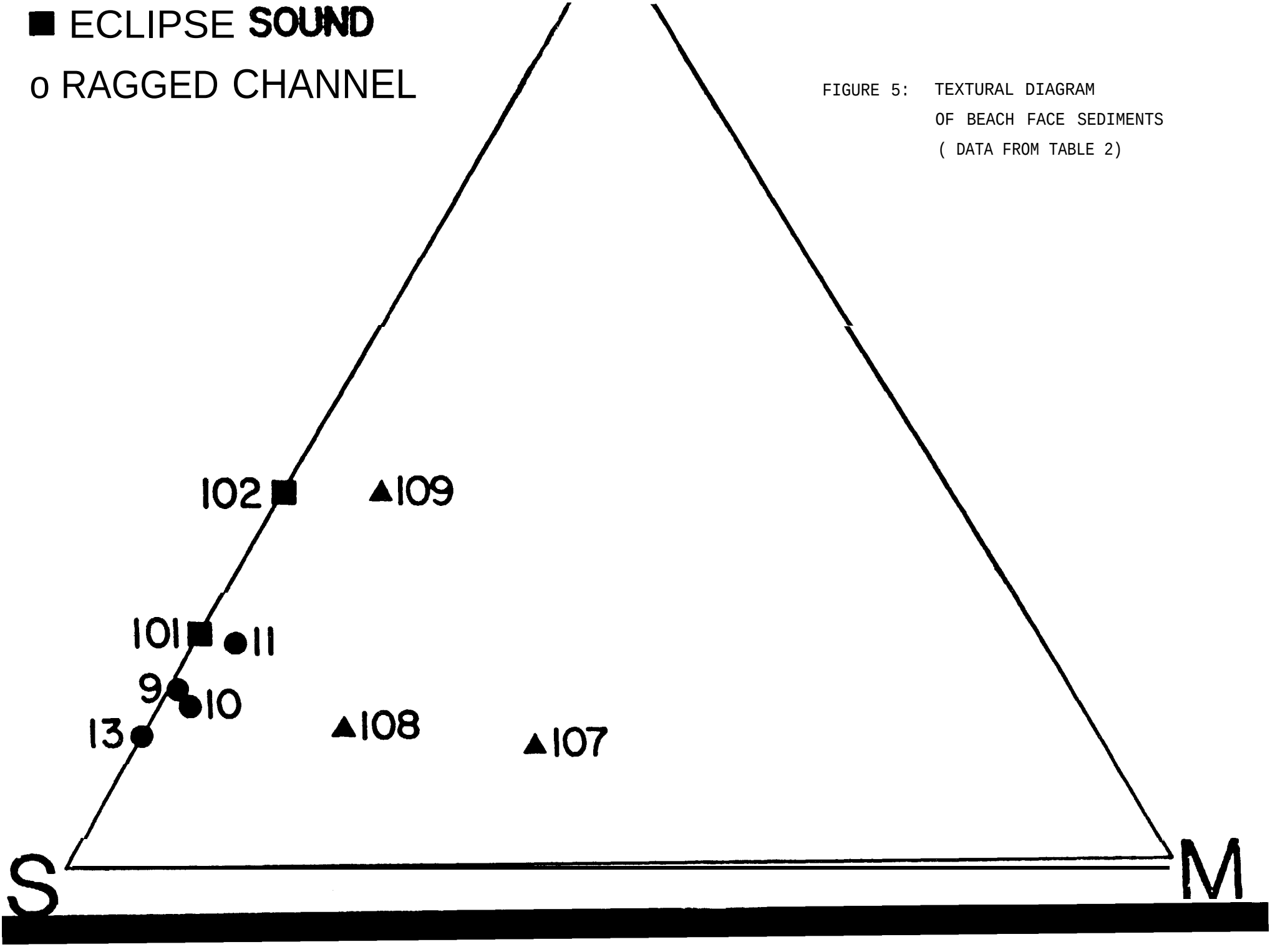

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❑ ECLIPSE SOUND

● RAGGED CHANNEL

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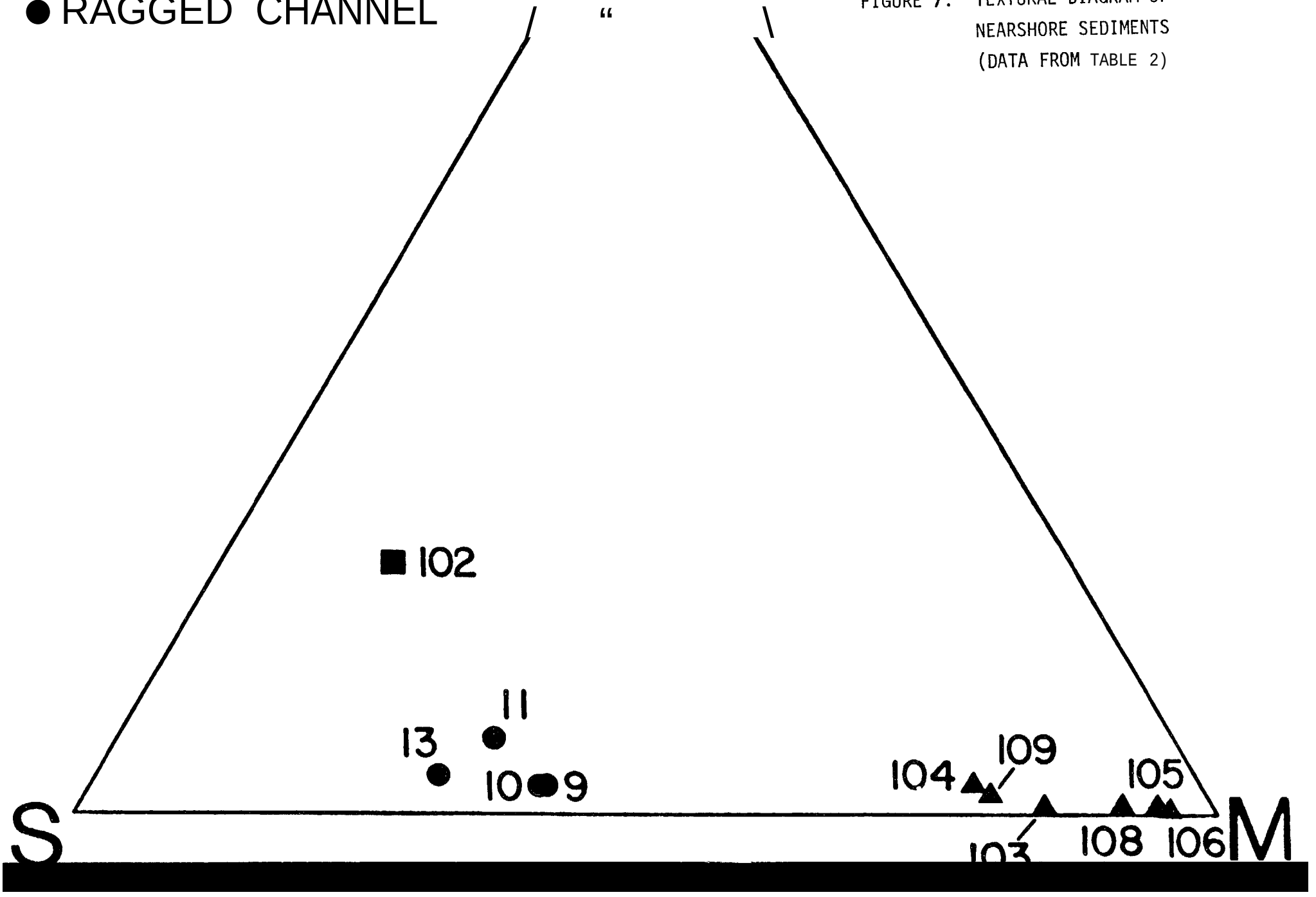

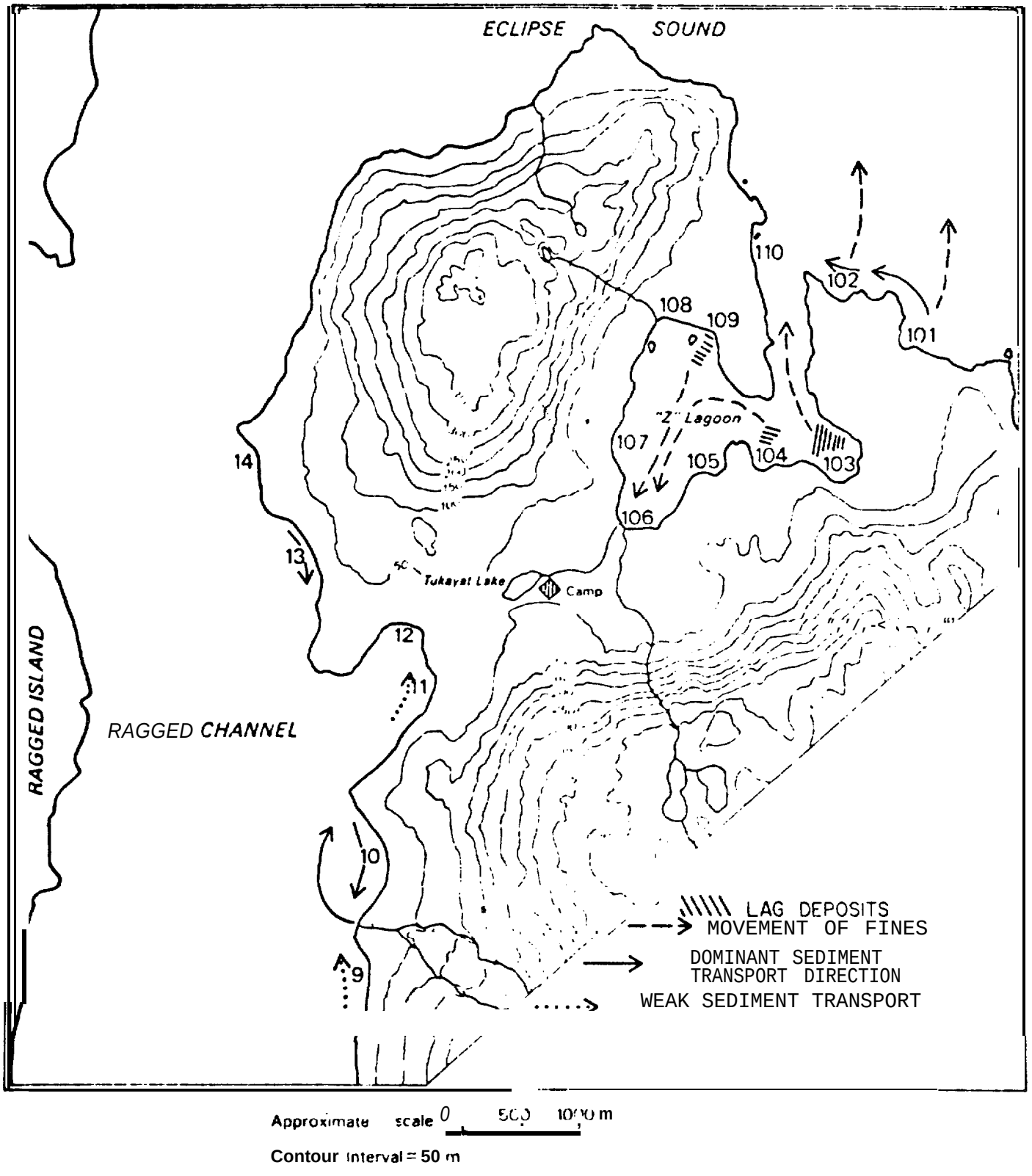

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2. Summary of shoreline sedimentology

3. Factors affecting choice of bays for BIOS experiments

4. Summary of importance ratings for the bay selection

Table 1: Summary of shoreline morphology

Morphologic Unit	Measured Parameter		Bays in "Z" Lagoon							Bays in Eclipse Sound		Bays in Ragged Channel			
			103	104	105	106	107	108	109	101	102	9	10	11	13
Backshore (including berm if present)	width (m)	max.								30	30	2	5	7	15
		min.								26	12	0	0	2	3
		mean	10	16	5	0	0	3	6	28	21	1	2	4	10
Berm	width (m)	max.								6	12	2	5	7	4
		min.	NP[1]	NP	NP	NP	NP	-		8	12	0	0	2	0
		mean						3	6	7	12	1	2	4	2
Beach face	width (m)	max.								33	31	19	26	18	23
		min.	NP	NP	NP	N P	-			30	26	12	15	40	14
		mean					23	28	28	32.	29	17	18	31	18
	slope (°)	max.								7.1	6.3	14.0	11.0	6.2	9.2
		min.	NP	NP	NP	NP	-			6.4	5.8	8.2	6.8	3.1	5.6
		mean					7.7	5.1	5.3	6.8	6.1	10.7	8.6	3.9	7.'2
intertidal flat	width (m)	max.													
		min.			-		NP	NP	NP	NP	NP	NP	NP	NP	NP
		mean	50	64	42	75									
Nearshore profile	slope (°)	max.										11.1[2]	9.9[2]		7.4[2]
		min.					no			no		9.9[2]	7.4[2]		6.7[2]
		mean	.2.2	3.5	2.5	2.2	data	- 3.6	- 2.9	data	4.7[2]	10.5[2]	8.3[2]	= 4	7.1[2]
No. of measurements			1	1	1	1		1	1	2	2	7	7	6	6

1 - NP : not present
2 - measured from one profile only

Table 2: Summary of Shoreline Sedimentology

	Bay	Morphologic Unit	Texture: % Gravel	Texture: Z Sand	Texture: % Mud	Moment Measures[1]: Mean Size	Moment Measures[1]: Sorting	Moment Measures[1]: Skewness	No. of Samples	Water Depth (m)
Bays in "Z" Lagoon	103	Backshore	19	74	7	1.30	2.12	1.49	2	
		Intertidal flat	16 ± 7	82 ± 7	2 ± 1	0.46 ± .20	1.48 ± .28	2.01 + .68	4	
		Ice mound	13	83	5	1.50	2.01	1.77	2	
		Nearshore surface	1 ± 0	15 ± 13	85 + 13	6.11 ± .56	2.26 ± .84	0.88 ± .26	10	9 + 2
	104	Backshore	12	45	44	3.72	3.65	0.72	2	
		Intertidal flat	20	70	11	1.40	2.51	1.79	2	
		Ice mound	29	67	4	0.88	2.02	1.54	1	
		Nearshore surface	3 ± 3	20 ± 9	78 ± 10	6.36 ± 1.15	3.31 ± .22	0.15 ± .37	9	11 ± 4
	105	Backshore	15	55	30	2.58	3.30	0.99	1	
		Intertidal flat	14 ± 5	51 ± 8	36 ± 12	3.08 ± 1.01	3.67 ± .19	0.87 ± .33	4	
		Nearshore surface	< 1	5 ± 1	95 ± 1	6.60 ± 1.73	2.56 ± .31	0.65 ± .72	7	7 ± 2
	106	Intertidal flat	12 ± 3	59 ± 2	29 ± 4	2.81 ± .37	3.28 ± .$0	1.06 ± .11	3	
		Intertidal flat - subsurface	2	15	83	6.91	3.46	-0.16	1	
		Nearshore	< 1	5 ± 3	95 ± 3	7.71 ± .56	2.79 ± .13	0.00 ± .22	8	5 ± 1
	107	Beach face	1.3	51	36	3.32	3.46	0.99	2	
		Ice mound	15	74	11	1.44	2.29	1.56	1	
	108	Beach face	15	67	19	2.14	2.94	1.28	2	
		Ice mound	22	73	5	0.73	1.97	2.15	1	
		Nearshore	< 1	8 ± 4	92 ± 4	6.76 ± .61	2.59 ± .28	0.77 ± .46	9	9 ± 2
	109	Beach face	40 ± 22	51 ± 29	9 ± 7	0.30 ± .12	2.42 ± .78	2.77 ± .80	3	
		Ice mound	13 ± 5	74 ± 10	13 ± 12	1.64 ± 1.18	2.62 ± .80	1.94 ± .68	3	
		Nearshore	2 ± 1	16 ± 11	82 ± 12	6.86 ± .87	3.33 ± .46	0.08 ± .39	9	4 ± 2

[1] Moment measures are in ϕ units and refer to sand size and smaller fractions only (i.e. > -1.0ϕ)

Table 2: Summary of Shoreline Sedimentology (Con't)

	Bay	Morphologic Unit	Texture			Moment Measures[1]			No. of Samples	Water Depth (m)
			% Gravel	% Sand	% Mud	Mean Size	Sorting	Skewness		
Bays in Eclipse Sound	101	Beach face	25 ± 12	75 ± 12	< 1	0.17 ± .22	1,04 ± .15	0.24 ± .22	5	
		Ice mound	53	48	< 1	-0.51	0,86	.86	2	
	102	Back shore	6 ± 9	92 ± 8	2 ± 1	0.68 ± .50	0.95 ± .23	1.95 ± 1.33	5	
		Berm	16 ± 17	84 ± 17	1 ± 0	0.13 ± .55	0.71 ± .15	0.55 ± 1.53	5	
		Beach face	40 ± 18	60 ± 17	1 ± 0	-0.41 ± .43	0.67 ± .33	1.26 ± 1,04	8	
		Ice mound	54 ± 23	46 ± 23	1 ± 0	-0.73 ± .43	0.62 ± .25	3.42 ± 2.70	3	
		Nearshore surface	26	59	15-	1.77	2.82	2.22	2	12
		Nearshore subsurface	4	30	66	6.65	4.30	-0.23	1	15
Bays in Ragged Channel	9	Eroding bluff	23 ± 9	57 ± 13	19 ± 17	1.91 ± 1.76	3.08 ± 1.14	1.51 ± .89	6	
		Beach face	19 ± 5	80 ± 6	1 ± 0	0.36 ± .19	1.16 ± .15	0.53 ± .56	9	
		Ice mound	45 ± 27	55 ± 26	1 ± 0	-0.03 ± .87	1.19 ± .34	1.85 ± 1.55	4	
		Nearshore surface	3 ± 3	57 ± 14	40 ± 14	4.24 ± .73	3.00 ± .49	1.11 ± .50	16	11 ± 5
		Nearshore subsurface	3 ± 1	41 ± 18	56 ± 19	5.35 ± 1.41	3.49 ± .39	0.45 ± .66	3	13 ± 6
	10	Eroding bluff	11 ± 6	57 ± 11	32 ± 17	3.02 ± 1.62	3.32 ± .49	1.23 ± .81	7	
		Beach face	17 ± 9	80 ± 10	4 ± 3	0.70 ± .49	1.57 ± .59	1.74 ± 1.50	8	
		Ice mound	27 ± 12	71 ± 10	3 ± 3	0.54 ± .60	1.715.45	1.60 ± .80	4	
		Nearshore surface	3 ± 2	57 ± 20	41 ± 20	4.09 ± .85	2.54 ± .53	1.40 ± .80	20	10 ± 6
		Nearshore subsurface	1 ± 1	53 ± 28	46 ± 28	4.54 ± 1.40	2.70 ± .74	1.25 ± .98	3	6 ± 1
	11	Beach face	24 ± 12	72 ± 11	4 ± 2	0.84 ± .68	1,76 ± .28	1.48 ± 1.02	13	
		Nearshore surface	8 ± 7	59 ± 19	33 ± 22	3.39 ± 1.58	2.88 ± .75	0.86 ± .60	15	6 ± 5
	13	Backshore	9 ± 10	87 ± 13	4 ± 3	1.25 ± .18	1.53 ± .45	2.76 ± 1.04	3	
		Beach face	14 ± 11	86 ± 11	1 ± 0	0.64 ± .47	0.97 ± .25	0.08 ± .62	6	
		Ice mound	24 ± 4	76 ± 4	1 ± 0	0.08 ± .24	1.06 ± .23	0.67 ± .23	3	
		Nearshore surface	4 ± 2	66 ± 16	30 ± 16	3.80 ± 1.03	2.97 ± .62	1.26 ± .62	19	10 ± 5
		Nearshore subsurface	6 ± 2	50 ± 13	44 ± 15	4.52 ± 1.04	3.66 ± .56	0.61 ± .36	8	13 ± 3

[1] Moment measures are in ϕ units and refer to sand size and smaller fractions only (i.e. > -1.0ϕ)

Table 3

FACTORS AFFECTING CHOICE OF BAYS FOR BIOS EXPERIMENTS

Factor	Cent rol	oil	oil/ Dispersant	Importance Rating[1]
Backshore	10	11	9	1
Beach face width and slope	10	11	9	3
Beach face grain size and sorting	11	9	10	1
Ice mounds	10	11	9	1
Ice scouring	11	10	9	1
Nearshore sediment sorting	9	11	10	1
Grain size parameters with depth	10	9	11	4
Cross-contamination	10	9	11	5
Longevity	10	9	11	4

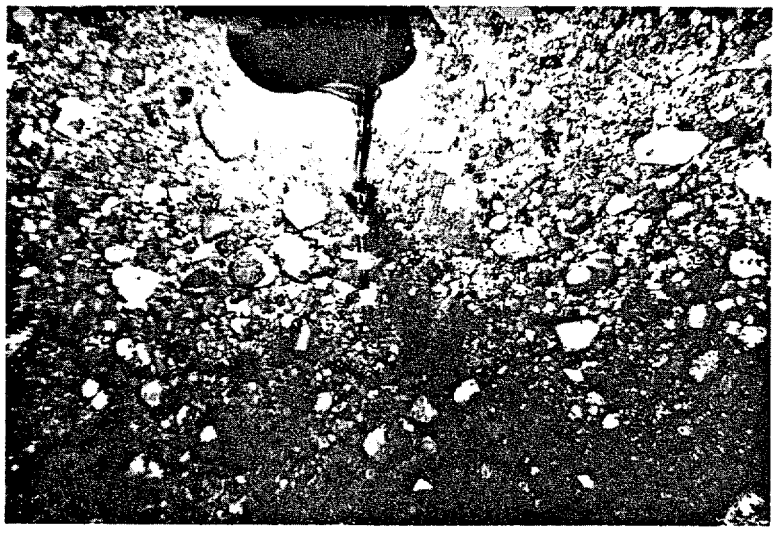
[1] This rating is a qualitative assessment of the importance of the factor in deciding the best sequence of bays for the experiments. The scale is 1 to 5 in increasing importance and can be manipulated as required.

Table 4

SUMMARY OF IMPORTANCE RATINGS FOR THE BAY SELECTION

Bay	Total Importance Rating		
	Cent rol	oil	Oil-Dispersant
9	1	14	6
10	18	1	2
11	2	6	13

A P P E N D I X I



GEOMORPHOLOGY

BAFFIN ISLAND OIL SPILL PROJECT

DATA REPORT
FEBRUARY 1981

BAFFIN ISLAND OIL SPILL PROJECT

GEOMORPHOLOGY

DATA REPORT

February 1981

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Jean-Marie Sempels (Petro-Canada)

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Abstract

Prior to the field season, a "portavibe" coring device was constructed to obtain bottom samples for sedimentological and chemical analyses. The sea ice cover present in late May and June 1980 enabled the use of this device to obtain 20 cores for chemical analyses, and 34 cores for sedimentological and foraminiferal studies from bays 9, 10, 13 and 102. During the same time period, 13 grab samples were obtained for chemical analyses, and 61 grabs for geological and foraminiferal studies from bays 10, 103, 104, 105, 106, 107, 108 and 109. Permanent bench marks were installed in these bays and bathymetric observations were recorded along all profiles.

In late July and August 1980, the beaches of all bays were profiled, described, and 114 samples were obtained from backshores, foreshores and locations of interest. Diving was performed in bays 9, 10, 11, 13, and 29 grab samples were obtained. A coastal aerial photographic survey was carried out and thermal observations were obtained from bay 106. All samples were subjected to grain size analysis and the weight percentages and the standard moment measures of the resulting frequency distributions were used to formulate a model of nearshore and beach processes.

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INTRODUCTION

This report is a compilation of the geomorphological data collected in the spring and summer of 1980 in the vicinity of Cape Hatt on northern Baffin Island (Figure 1). The data were obtained to understand the coastal environment of the area and to help design the Baffin Island Oil Spill Project (BIOS) the purpose of which is discussed elsewhere (Thornton, 1979). The interpretation of the data compiled in this report is published elsewhere (McLaren et al., 1981).

The main emphasis of this work was to obtain beach, nearshore and offshore material for sedimentological and chemical analyses. The work was undertaken by W.B. Barrie, on contract to Petro-Canada, under the direction of and with assistance from Dr. Jean Marie Sempels during the full course of the study. Dr. P. McLaren of the Geological Survey of Canada guided and assisted in beach and nearshore studies conducted during the summer open water season and provided a model (McLaren, 1980, in press) to aid in the interpretation of grain size data.

Sediment cores and grab samples were obtained between May 21 and June 16, prior to spring breakup of the landfast ice cover. Reach and nearshore sampling were accomplished, in the latter case by diving, during open water conditions between July 25 and August 11.

A komatik pulled by skidoo was used to transport all sampling equipment and served as a working platform. Sediment cores and grab samples were transported by skidoo to the camp laboratory for examination and processing. An eight-wheeled all-terrain vehicle (Argo) and a small inflatable boat (Zodiac) equipped with motor were used during beach studies. Nearshore diving work was performed using a helicopter for transporting gear and personnel. In this report, the transition from nearshore to offshore is defined to occur at a water depth of 10 meters.

FIELD METHODS

Photography

Approximately 100 slides (35 mm and 57 mm) were taken during an aerial survey of the study area on June 11. The coastal zone was photographed obliquely at altitudes that varied between 150 and 1500 metres.

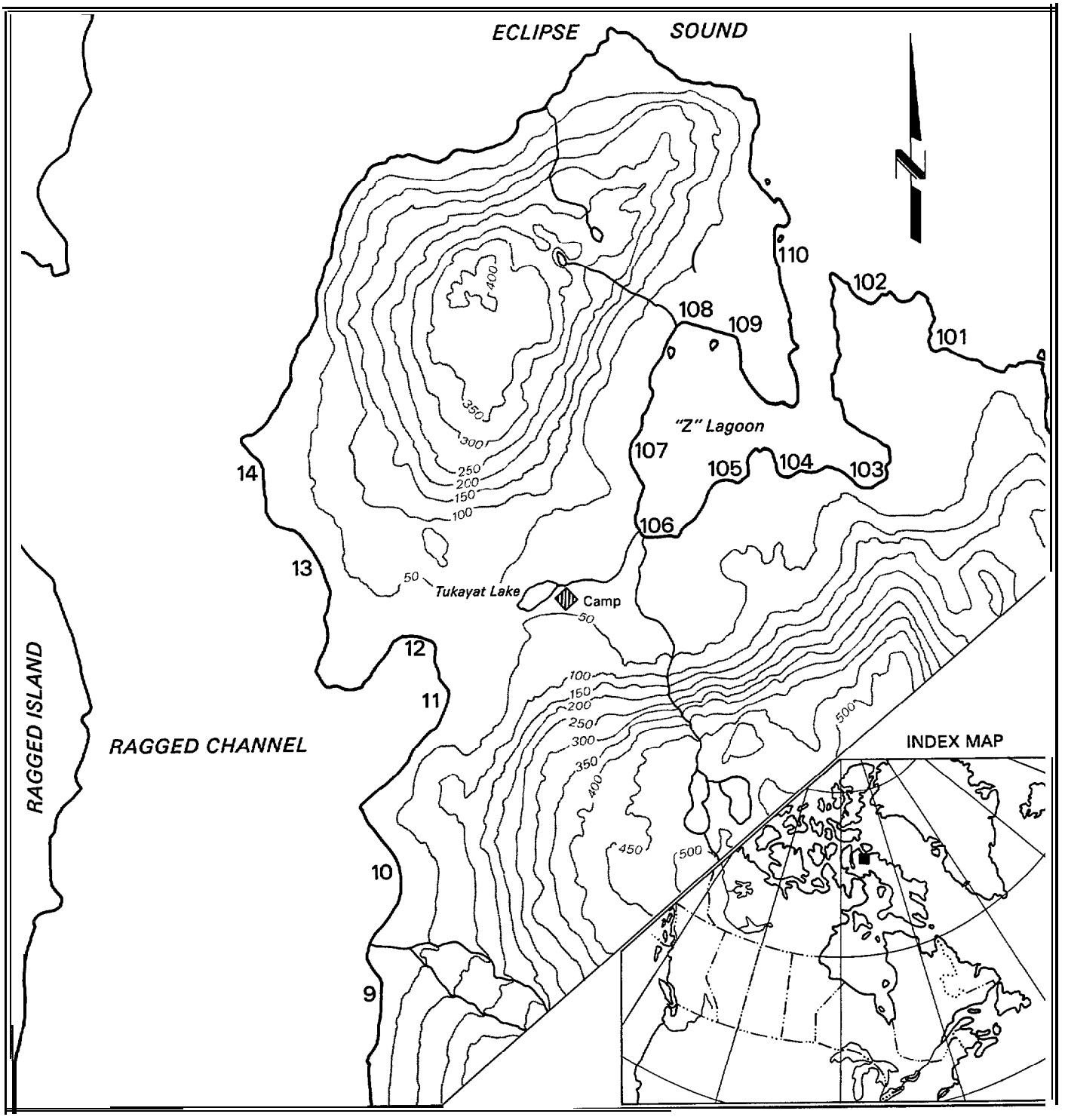

Figure 1: Bay numbers, general topography, and location of Cape Hatt

All core and grab samples obtained during May and June were photographed in the laboratory prior to examination. Sea bottom photography at core and grab sample locations was attempted before sampling; however, due to flash unit malfunction and defective flash bulbs, only a few photographs were obtained.

A second aerial photographic survey was performed on August 4th, after the ice and snow had cleared. Approximately 160 oblique coastal photographs (35 mm and 57 mm slides) were taken at altitudes between 100 and 300 metres.

During beach and nearshore studies, extensive photographic coverage was obtained at all sample locations; at each of the beach profile and observation locations; and along one of the dive profiles in Bay 9.

A complete set of photographs of all phases of the 1980 work is kept at Petro-Canada and can be seen by contacting Dr. J.M. Sempels, Department of Environmental and Social Affairs, P.O. Box 2844, Calgary, Alberta, T2P 3E3, 403-232-4953.

Sediment Coring and Grab Sampling

During the May and June period, permanently marked profiles were established at the 1/4, 1/2 and 3/4 way points around bays 9, 10 and 13 and at the half way points around bays 102, 103, 104, 105, 106, 108 and 109. At each profile, two steel rods, spaced approximately 10 metres apart and oriented perpendicular to the shoreline, were driven into the permafrost to serve as permanent bench marks. Profiles in Bay 11 were denoted by temporary bench marks only.

Beginning from a point assumed (because of ice and snow cover) to be on the beach face, 10 equally spaced sampling locations were surveyed along a line extending offshore over the ice surface. A theodolite and stadia rod were used to position each point along the profiles.

Holes of 8 or 12 inches diameter were then augered through the ice at each point on the profiles and water depth, water level in relation to the ice surface, ice thickness, snow cover thickness and time were recorded. Sediment cores and chemistry cores were obtained at selected locations

along the profiles using a vibrating coring system designed and fabricated at the Geography workshop of Carleton University. This system was designed after a version developed and used by the Bedford Institute of Oceanography (Fowler, et al., 1977) and is illustrated in Appendix II. Sixty cm lengths of 11.5 cm inside diameter plexiglass tubing split into two two halves were used to obtain cores for geological analysis. Each core was transported to the camp laboratory where it was separated into two halves, photographed, logged and subsampled for grain size analysis and biological examination. A small sample of sediment from the surface of each core was retained and preserved in formaldehyde for foraminiferal study. Chemically cleaned sections of the same 11.5 cm I.D. plexiglass tubing were used to obtain cores for chemical analysis. Upon extrusion from the core barrel both ends of the cores were protected from contamination with chemically cleaned teflon sheeting, capped and transported to the camp, and immediately frozen prior to shipment south for hydrocarbon content analysis.

Geology and chemistry grab samples were also obtained using a 'Foerst Petersen' grab lowered sideways through a twelve inch diameter ice hole. Because of the gravelly bottoms of Bays 9, 10 and 13, many casts were required to obtain a sufficient quantity of sediment. The geology grab samples were placed in large plastic bags and transported to the laboratory where they were photographed, logged and subsampled for grain size analysis, foraminiferal and biological examination. Grab samples obtained for chemical analysis were transferred at the sampling location into chemically cleaned glass jars, transported to the camp, and immediately frozen.

No cores or grab samples were taken from *Flay* 11 during the May and June field period. All sampling along offshore profiles in this bay was accomplished by divers during August.

Nearshore and Offshore Geomorphology

Nearshore and offshore sampling and observations of the sea floor to depths of approximately 20 metres were undertaken in Bays q, 10, 11 and 13 using scuba equipment. Each dive profile was run offshore from positions thought to be part of potential test sections. Samples and descriptions were taken in all bays by a team of divers and photographs were taken along the dive profile in bay 9.

Beach Geomorphology

Beach profiles were surveyed in all bays at each of the beach observation sites and at the profile sites from which offshore grab sampling and coring were performed. Surveying was accomplished using two profiling rods following a

method described by Emery (1961). The elevation along each profile was measured approximately every 1.5 metres and at intervening topographic inflections or facies changes. The top 15 to 20 centimetres of sediment in each facies encountered was sampled and retained for grain size analysis. At every profile, hand-held vertical photographs were taken of each sample location, landward and seaward along the profile, and along the beach. Local features such as icefoot, ice push, ice pitting and thermal erosion were also photographed.

Beach Thermal Observations

In early August four thermocouple temperature measuring probes were inserted approximately 1.8 metres into the beach face along the profile in bay 106. Each probe contains 8 underground and 1 or 2 above-ground sensors, evenly spaced along the probe. The above-ground sensors were used to provide an estimate of air temperature during the period of recording which extends from August 7 to September 15. Readings were taken on an opportunity basis. The temperature observations are listed in Appendix III.

GRAIN SIZE ANALYSIS

Sediment samples submitted to the Geotechnical Science Laboratory of Carleton University, Ottawa, for grain size analysis included: 1) representative subsamples of facies within each vibra core based on structure, colour, and texture; 2) subsamples from Petersen surface grabs; 3) bulk diver-collected grab samples; and 4) bulk channel samples of facies along each beach profile.

All cores and grab samples were subsampled in the wet state to obtain approximately 50 g dry weight of sediment. These subsamples were treated with peroxide for removal of organics, dispersed in Calgon, agitated, and wet sieved through a 4Ø sieve. The material retained on the sieve (sand fraction) was then oven dried and dry sieved at 1/2 Ø intervals. The material passing through the 4Ø sieve was then submitted to the standard pipette method with results reported at 1Ø intervals.

Beach samples were air-dried, then passed through a -1Ø sieve. Material retained on the -1Ø sieve was gravel sieved to size fractions of -6, -5, -4, and -3Ø. 100 g samples of the material passing through the -1Ø sieve were retained. These were dispersed with Calgon, wet-sieved through a 4Ø sieve, oven-dried and dry-sieved at 1/2 Ø intervals to 4Ø. When the sieved portion accounted for more than 98% of the sample, pipetting of the fine fractions was not carried out.

Dry weight in each Ø size intervals were then sent to the Pacific Geoscience Centre (Sydney, B.C.) for statistical analysis. Weight percentages and the *standard* moment measures of the resulting frequency distributions were calculated using a computer program. Only the first, second and third moments (mean, standard deviation and skewness) were used in the interpretation of grain sizes data (McLaren et al., 1981).

ACKNOWLEDGEMENTS

The contribution of the following persons have made this project possible:

Larry Boyle and Alan Pendlington (Geography Workshop, Carleton University) designed and constructed a vibratory coring system capable of obtaining large diameter, chemically clean, sediment cores;

Ted Gorveatt (Atlantic Geoscience Centre) loaned a portavibe core head and engineering drawings for same;

Ken Torrance (Geotechnical Science Laboratories, Carleton University) supervised the grain size analysis of all samples;

Francois Sempels constructed a tripod and camera activating mechanism for sea bottom photography; (see cover photographs)

Paul Koolerk (Pond Inlet Hamlet Council), David Angnatsiak, Bill Werner, Moses Koomoo, Sandy MacKenzie, Howard Hume, Paul Idlout and Glen Fawkes assisted during field work;

John Harper and Carl Forget (Woodward-Clyde Consultants) performed beach profiling and sampling in Bay 11;

Richard Clark (Petro-Canada) monitored temperature probes from August to October;

Robin Brown (Seakem Oceanography) collected beach samples in Bay 11;

Personnel from LGL Limited and Norm Snow (Petro-Canada) collected nearshore samples in Bay 11;

Bob Taylor (Atlantic Geoscience Centre) loaned a rock drill and a soil auger;

Rod Klassen (Geological Survey of Canada) loaned an underwater flash unit; and

Bruce Craig (Geological Survey of Canada) loaned a mini- shipek grab sampler.

This report was prepared by Bill Barrie and revised by Jean-Marie Sempels (Petro-Canada) with contributions from Patrick McLaren (Pacific Geoscience Centre). Preliminary sections were typed by Anne Buie and the final report was typed by Pat Blackburn (Petro-Canada). All figures were drafted by personnel from Petro-Canada, under the supervision of Ed Dobrowolski and Peter Boorman.

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FIELD OBSERVATIONS

BAY 9

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BAY **9**

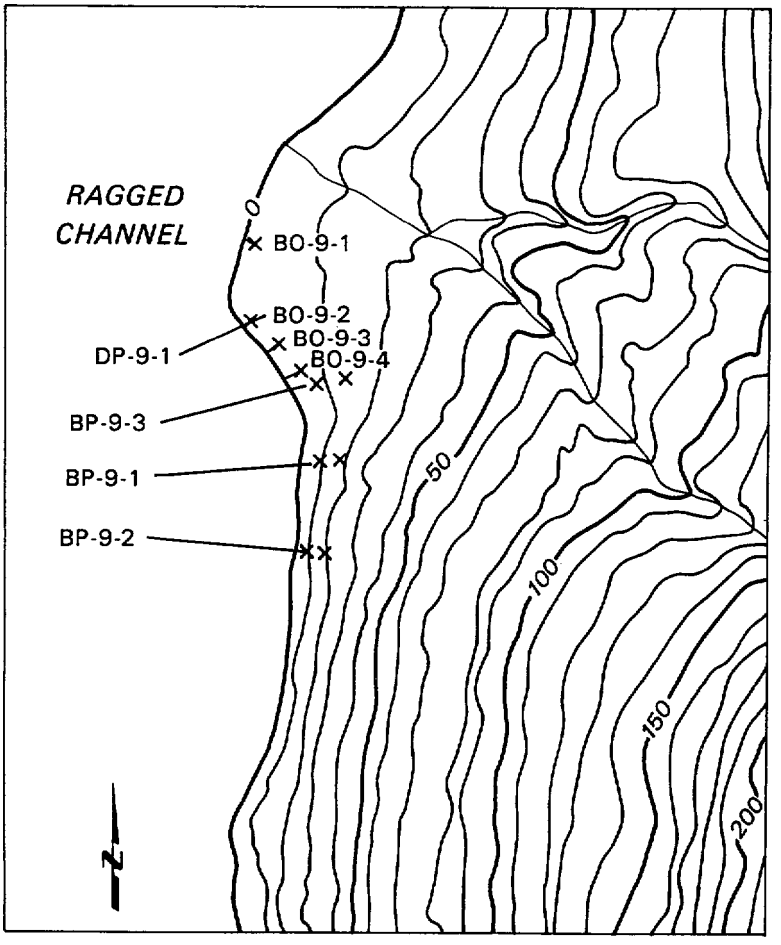
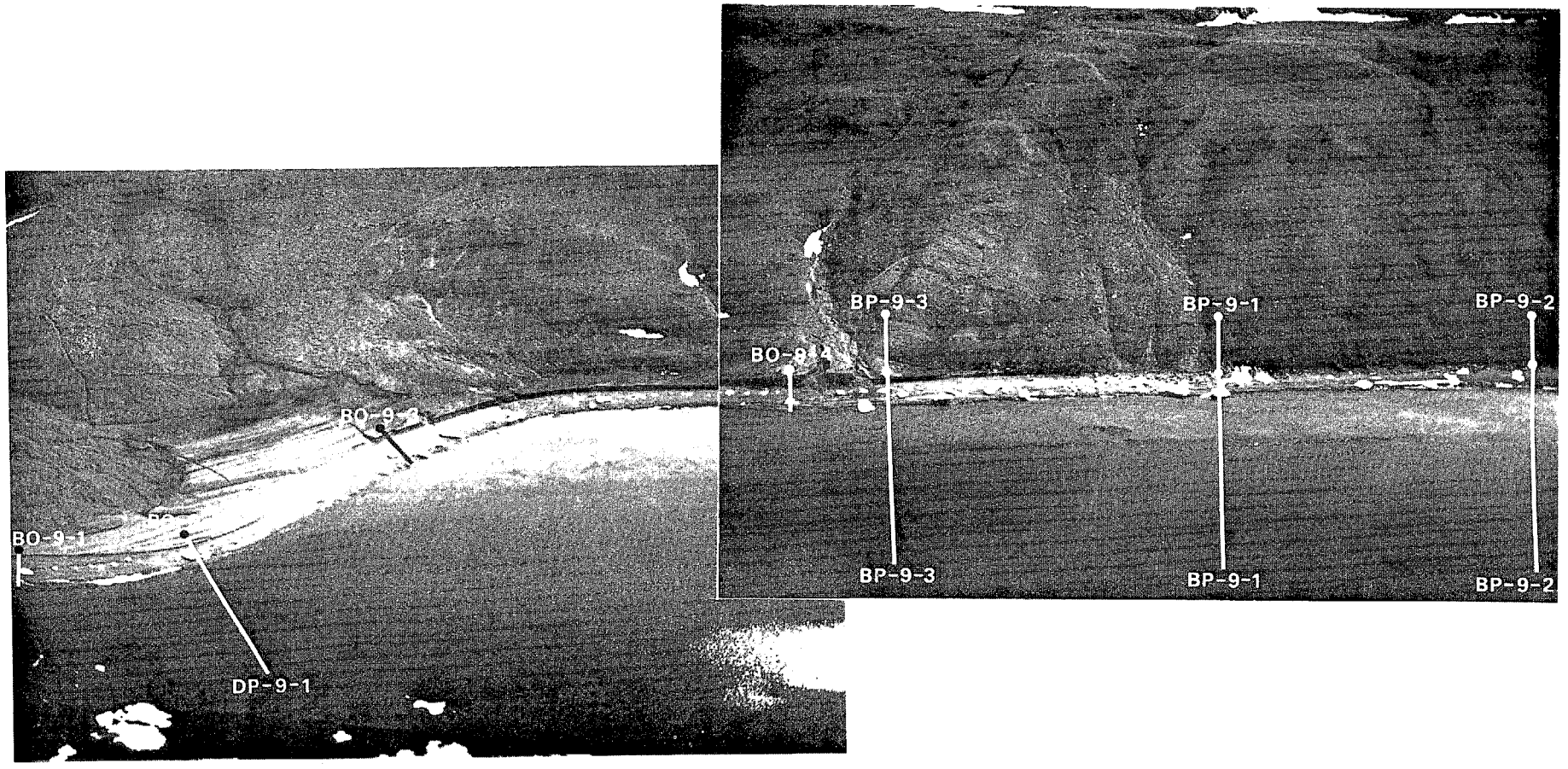


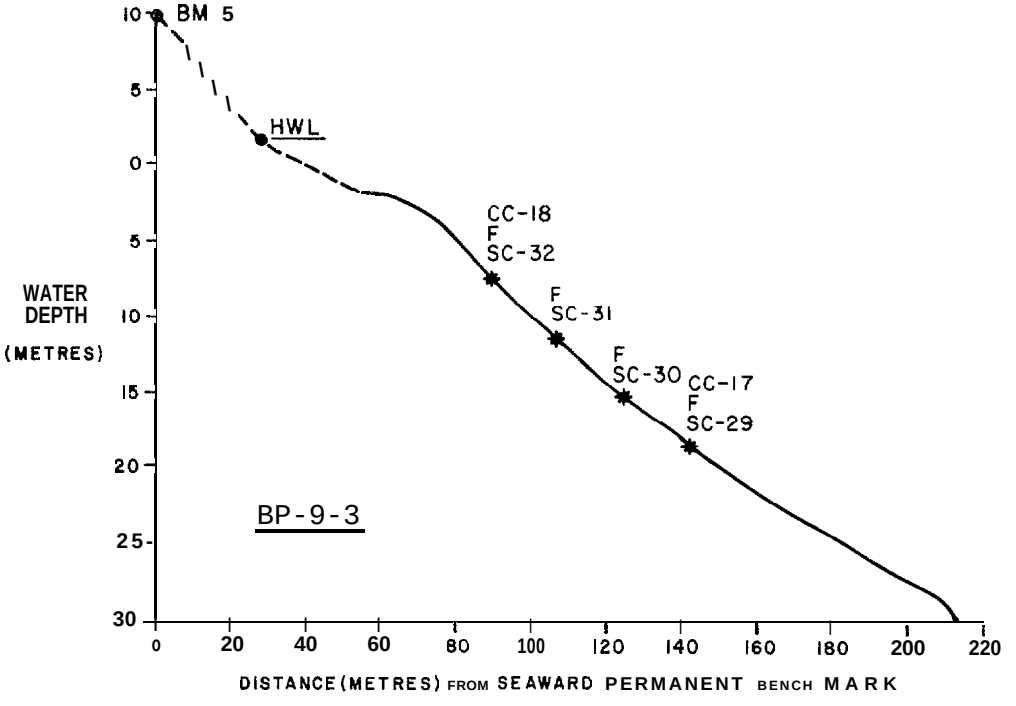
Figure 1-1: Location of beach observations and profiles (BO); beach, nearshore and offshore profiles (BP); dive profile (DP); permanent bench marks(x); and general topography of Bay 9

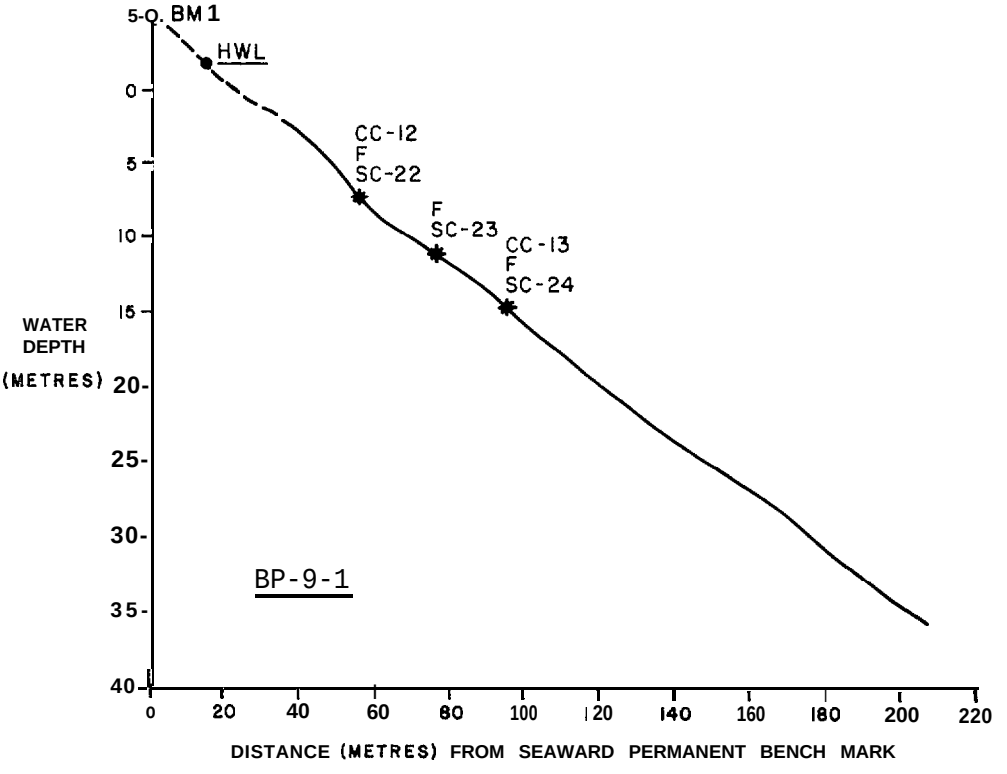


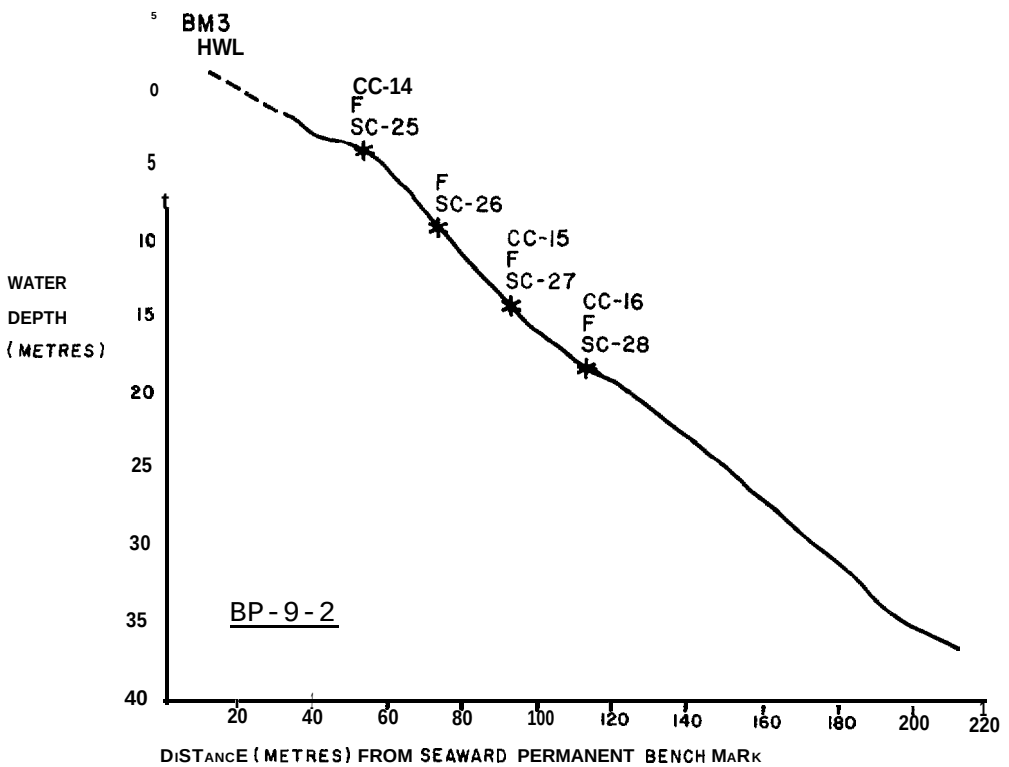
RA

OFFSHORE AND NEARSHORE PROFILE -BAY 9

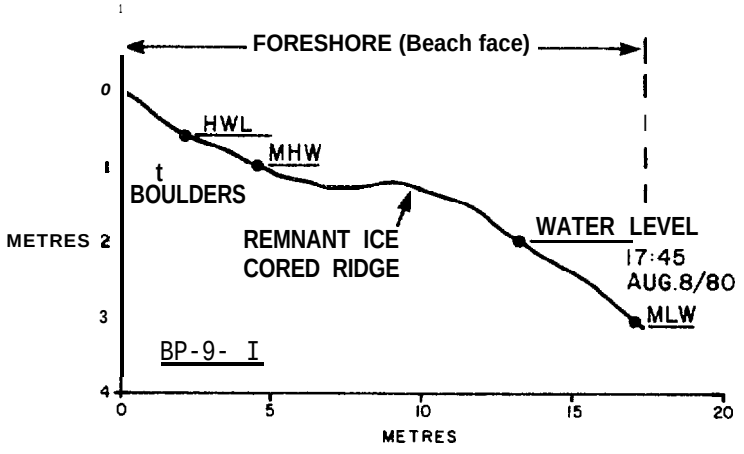
CC - CHEMISTRY CORE
F – FORAMINIFERA SAMPLE
SC - SPLIT CORE (GEOLOGY)
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4 x

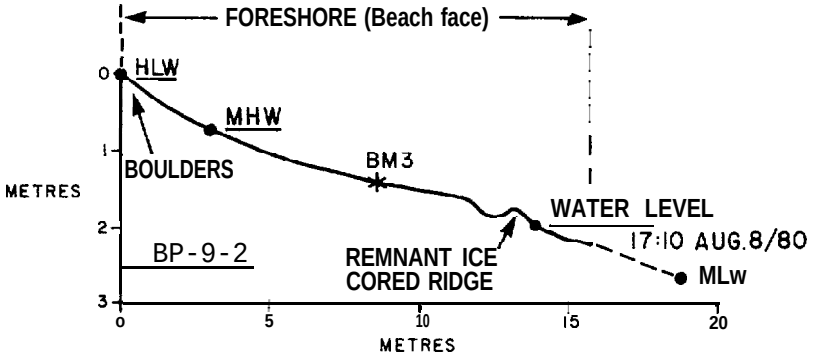


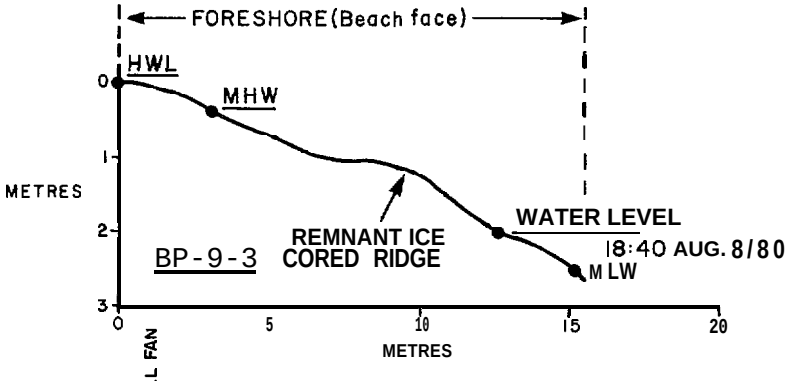


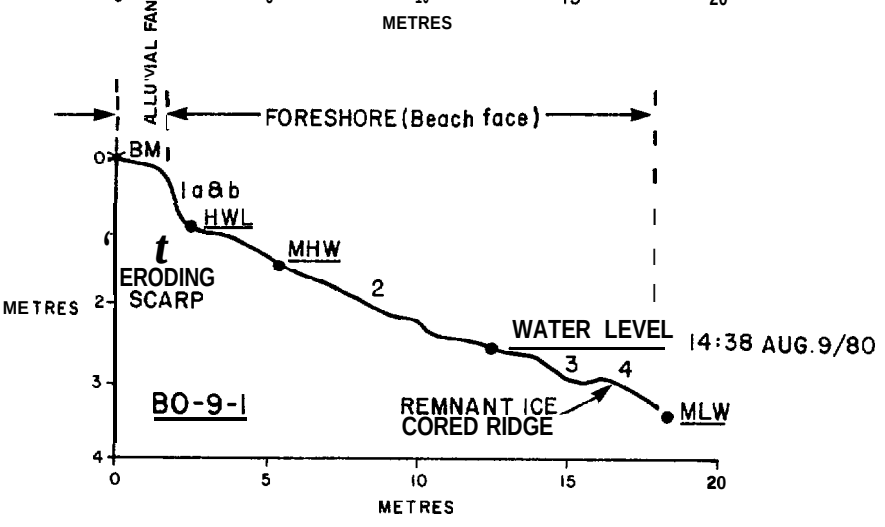

BM3
HWL
CC-14
F
SC-25
F
SC-26
CC-15
F
SC-27
CC-16
F
SC-28
BP-9-2
WATER
DEPTH
(METRES)
5
0
5
10
15
20
25
30
35
40
20
40
60
80
100
120
140
160
180
200
220
DISTANCE (METRES) FROM SEAWARD PERMANENT BENCH MARK

BEACH PROFILES - BAY 9

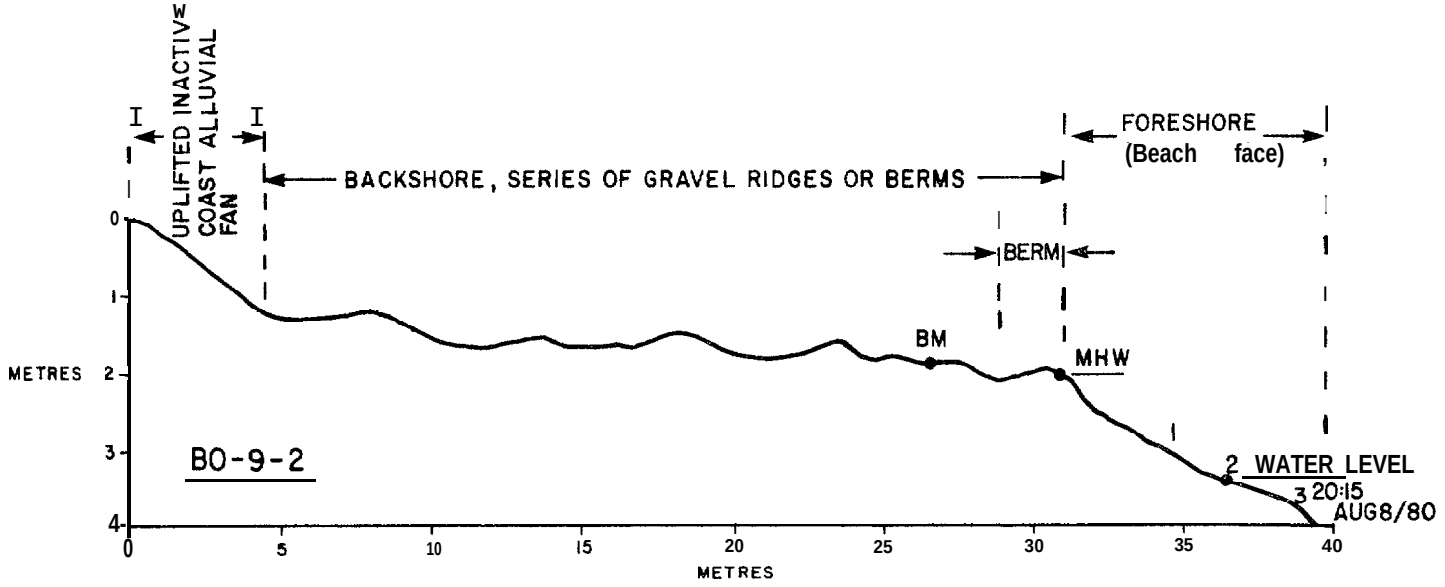


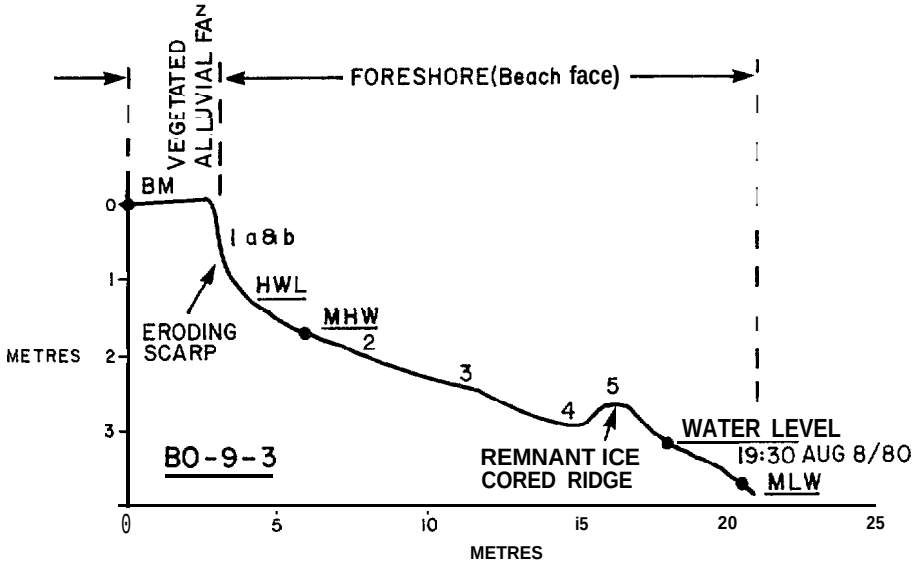






MHW -MEAN HIGH WATER
MLW -MEAN LOW WATER
HWL –APPROXIMATE HIGH WATER LINE
BM-PERMANENT BENCHMARK
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2 .5x


UPLIFTED INACTIVE COAST ALLUVIAL FAN
BACKSHORE, SERIES OF GRAVEL RIDGES OR BERMS
FORESHORE (Beach face)
BERM
BM
MHW
METRES
BO-9-2
2 WATER LEVEL
3 20:15 AUG8/80
METRES


VEGETATED ALLUVIAL FAN
FORESHORE(Beach face)
BM
1a&b
HWL
MHW
ERODING SCARP
METRES
BO-9-3
REMNANT ICE CORED RIDGE
WATER LEVEL
19:30 AUG 8/80
MLW
METRES

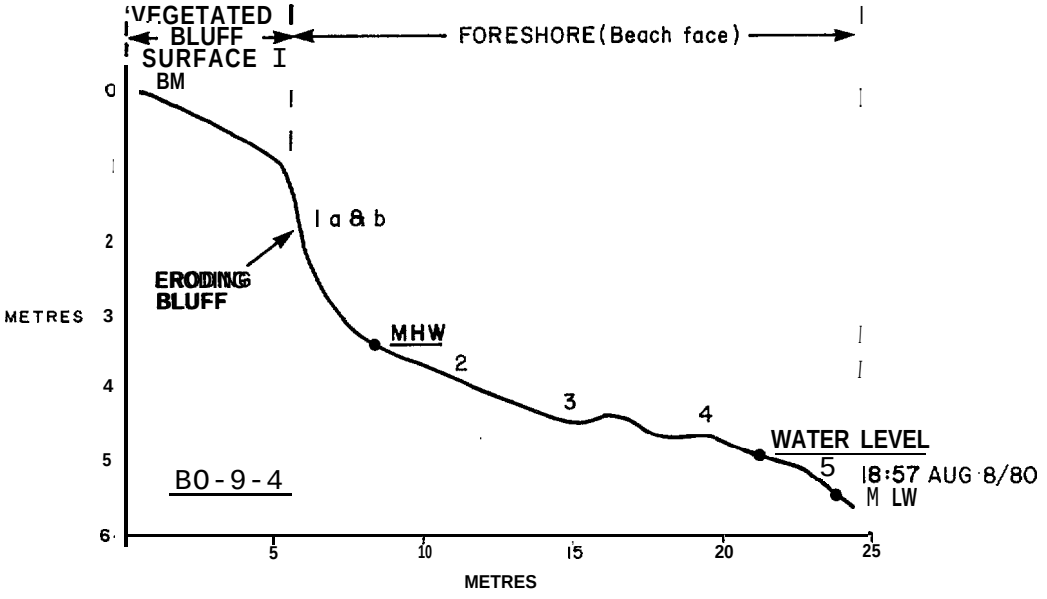

VEGETATED BLUFF SURFACE
FORESHORE(Beach face)
BM
1a&b
ERODING BLUFF
MHW
METRES
BO-9-4
WATER LEVEL
18:57 AUG 8/80
M LW
METRES

Table 1-1: Grain size data for sediment cores, grabs and diver collected samples of Bay 9 .

SAMPLE NUMBER	WATER DEPTH	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
SEDIMENT CORES									
9-1-2-SC-22	7.38	+3.58	2.44	+1 .65	2	73	18	7	
9-l-3-SC-23	11.(-)7	+4.86	3.09	+0.99	1	50	33	16	
9-1-4-SC-24A	14.31	+4. 53	3.38	+0.77	4	51	29	16	0-20CM. FACIES
9-1-4-SC-24P.	14.31	+4.75	3.33	+0.81	3	50	30	17	20-29CM. FACIES
9-2-12-SC-25	3.93	+2.61	2.37	+1.14	10	75	11	4	
9-2-13-SC-26	8.85	+4.45	2.96	+1 .25	1	5a	27	13	
9-2-14-SC-27	14.02	+4.73	3.26	+0.80	4	49	31	16	
9-2-15-SC-28	18.17	+4. 94	3.31	+0.67	3	42	38	17	
9-3-26-SC-29A	18.49	+4.05	3.99	+0.62	8	49	25	18	0-1 CM FACIES '
%3-26-SC-29P	18.49	+6. 96	3*Q4	-0.31	3	20	36	41	1-25 CM FACIES
9-3-25-SC-30	15.35	+4.91	3.19	+0.85	2	46	36	16	
q-3-24-SC-31	11.26	+4.42	3.18	+0.95	3	54	29	14	
9-3-23-SC-32A	7.37	+4.18	2.94	+1.14	3	58	28	11	0-4 CM. FACIES
9-3-23-SC-32P	7.37	+4.34	3.21	+0.86	4	53	30	13	4-29 CM. FACIES
DIVER COLLECTED SAMPLES									
DP-9-1-1	1.52	+2.92	2.16	+2.13	A	84	8	4	
DP-9-1-2	6.1	+3.46	2.24	+2.28	<1	79	15	6	SCOUR Depression!
DP-9-1-3	9.14	+4.41	3.39	+0.71	5	47	33	15	
DP-9-1-4	10.97	+4. 90	3.13	+0.79	2	42	41	15	
DP-9-1-5	16.76	+4.87	3.01	+1 .01	1	46	38	15	

Table 1-2: Grain size data for beach samples of Bay 9.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REVARKS
MI-9-1-1A	+0.78	2.26	+1 .84	30	62	6	2	Eroding scarp
30-9-1-1B	+0.95	2.12	+1 .86	20	73	5	2	Eroding scarp
30-9-1-2	+0.35	1.01	+0.35	15	84	<1		Reach face
30-9-1-3	+0.30	1.15	+0.31	24	75	<1		Beach face
BO-9-1-4	+1 .09	1.56	+1 .34	18	80	1	<1	Ice mound crest
BO-9-2-1	+0.19	1.05	+0.71	17	82	<1		Reach face
BO-9-2-2	+0.04	1.22	+0.82	31	68	<1		Reach face
BO-9-2-3	+0.16	1.19	+0.63	26	74	<1		Ice mound crest
BO-9-3-1A	+4.51	4.60	+0.27	12	39	23	26	Eroding scarp
130-9-3-113	+3.80	4.47	+0. 54	15	44	19	22	Eroding scarp
WI-9-3-2	+0.69	1.50	+1 .78	21	78	1	<1	Beach face
BO-9-3-3	+0.29	1.03	+0.02	17	83	<1		Reach face
BO-9-3-4	+0.50	1.24	+0.32	18	81	<1		Beach face
BO-9-3-5	-0.43	1.26	+1 .32	62	38	<1		Ice mound crest
BO-9-4-1A	+0.80	2.57	+2.12	33	58	6	3	Eroding bluff
BO-9-4-1B	+0.60	2.47	+2.45	28	64	5	3	Eroding bluff
BO-9-4-2	+0.36	1.14	+0.58	17	82	<1		Reach face
BO-9-4-3	+0.51	1.07	-0.11	13	87	<1		Beach face
BO-9-4-4	-0.94	0.74	+4.12	73	27	<1		Ice mound crest
BO-9-4-5	+2.35	2.14	+1 .47	7	81	0	3	Sediment on grounded ice

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-1-2-SC-22

PROFILE NO. 1

STATION NO. 2

SPLIT CORE NO. 22

WATER DEPTH (Lead line) 7.38 m.

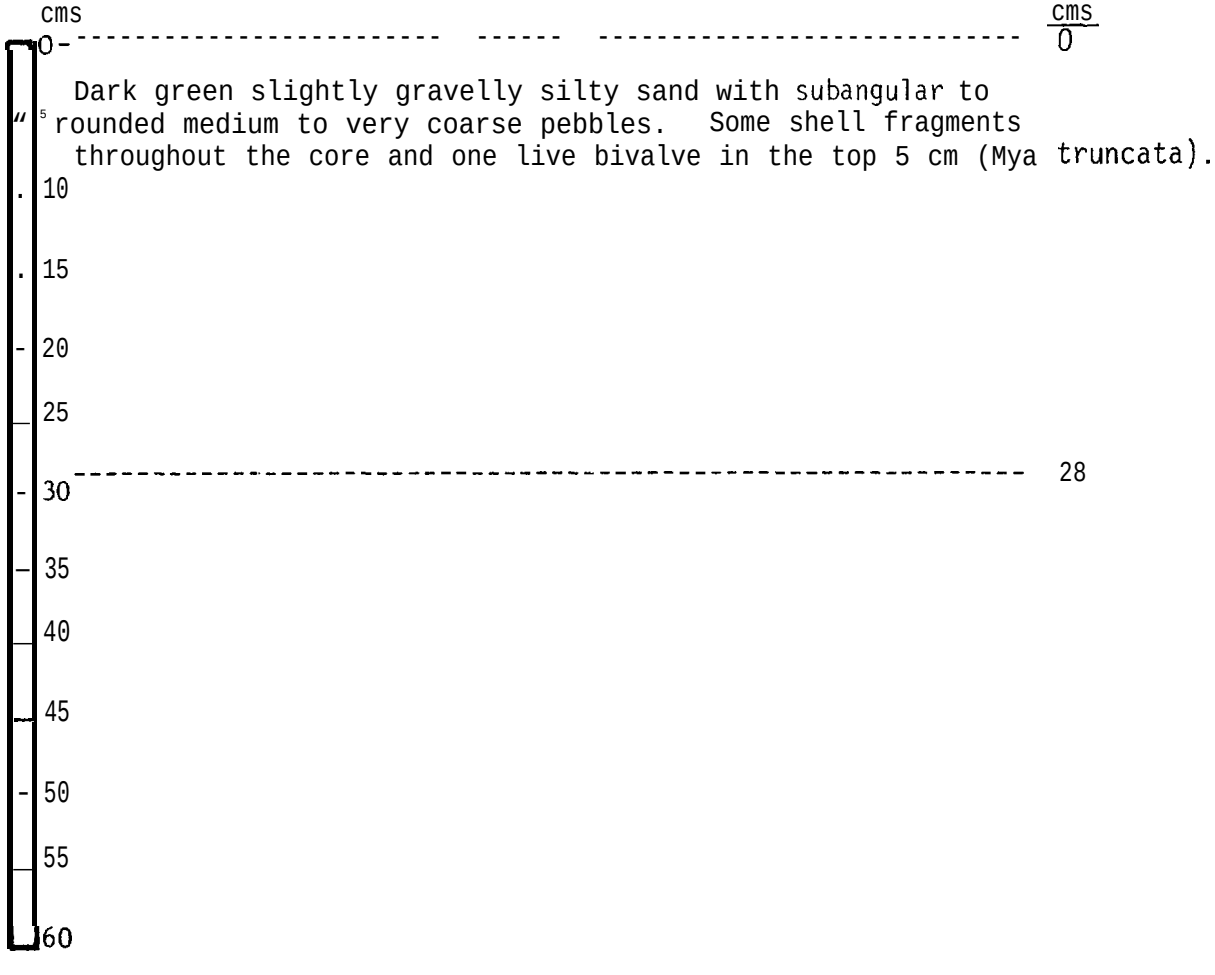
DATE 3/06/80

TIME 17:25 HRS. EDT

SAMPLE NUMBERS 9-l-2-SC-22; 9-1-2-F-30

REMARKS :
Separate core obtained for chemical analysis as 9-1-2-CC-12. Top 10 cm (approx.) of the core were retained for biological analysis as 9-1-2-SC-22T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-l-3-SC-23

PROFILE NO. 1

STATION NO. 3

SPLIT CORE NO. 23

WATER DEPTH (Lead line) 11.07 m.

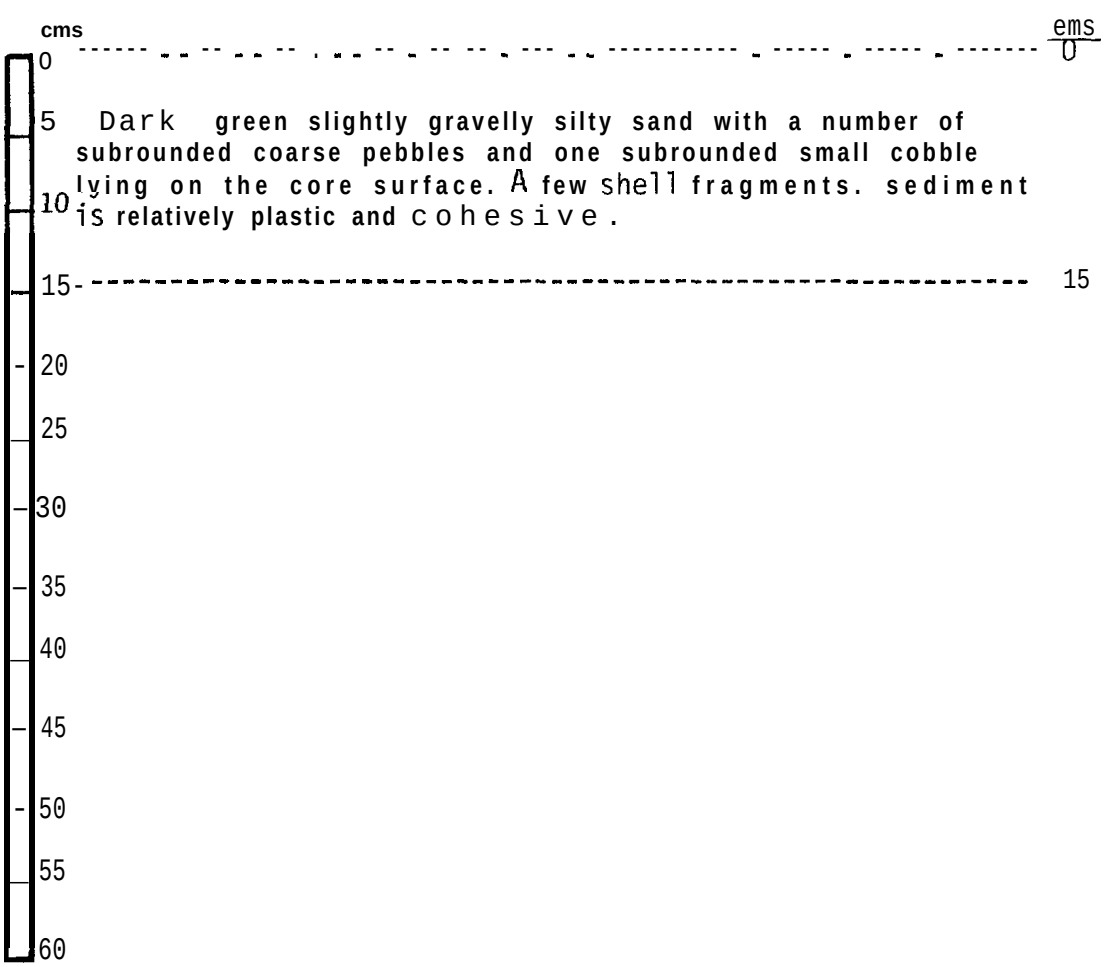
DATE 3/06/80

TIME 17:29 HRS. EDT

SAMPLE NUMBERS 9-1-3-SC-23; 9-1-3-F-31

REMARKS :
Top 10 cm. (approx.) of the core were retained for biological analysis as 9-1-3-SC-23T.

DESCRIPTION



B.I.O.S. **PROJECT** VIBRA **CORE DATA**

BAY NO. 9 _ 9-I-4-SC-24 __ __

PROFILE NO. 1

STATION NO. 4

SPLIT CORE NO. 24

WATER DEPTH (Lead line) 14.31 **m.**

DATE 3/06/80

TIME 16:19 HRS. EDT

SAMPLE NUMBERS 9-l-4-SC-24A (0-20 cm.); 9-1-4-SC-24B (20-29 cm.); 9-l-4-F-32

REMARKS :

Separate core obtained for chemical analysis as 9-1-4-CC-13. Top 10 cm. (approx.) of the core were retained for biological analysis as 9-1-4 -SC-24T.

DESCRIPTION

cms

0

5 Dark green slightly gravelly muddy sand with numerous medium to **very coarse pebbles and one** subangular cobble, partially **covered with** coralline **algae and lying on the core surface. Some lenses** of **medium sand and granules and abundant fragments and 9 complete** shells (Mya truncata and one Hiatella arctica).

10

15

20

25 Dark green/brown slightly gravelly muddy sand with a few coarse and very coarse pebbles. More plastic and cohesive than top section of core.

30

35

40

45

50

55

460

cms

0

20

29

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-2-12-SC-25

PROFILE NO. 2

STATION NO. 1 2

SPLIT CORE NO. 25

WATER DEPTH (Lead line) 3.93 m.

DATE 5/06/80

TIME 17:12 HRS. EDT

SAMPLE NUMBERS 9-2-12-SC-25; 9-2-12-F-33

REMARKS :
Half of the sediment in this core was retained for chemical analysis as 9-2-12-CC-14. Balance of the core after sampling was retained for biological analysis as 9-2-12-SC-25T.

DESCRIPTION

cms cms 0

Dark green gravelly silty sand with a few angular and subrounded medium and coarse pebbles and 1 angular small cobble. Two complete but sediment-filled Hiatella arctica and a few other shell fragments.

7

5 10 15 20 25 30 35 40 45 50 55 60

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-2-13-SC-26

PROFILE NO. 2

STATION NO. 1 3

SPLIT CORE NO. 26

WATER DEPTH (Lead line) 8.85 m.

DATE 5/06/80

TIME 17:15 HRS. EDT

SAMPLE NUMBERS 9-2-13-SC-26; 9-2-13-F-34

REMARKS:
Top 10 cm. (approx.) of the core were retained for biological analysis as 9-2-13-SC-26T.

DESCRIPTION

cms

0

Dark **green slightly gravelly sand with one subrounded small cobble in top 10 cm and numerous angular to subrounded medium to very coarse pebbles scattered throughout the core.**

23

Numerous shell fragments and complete shells (Mya truncata)

34

45

cms

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-2-14-SC-27

PROFILE NO. 2

STATION NO. 14

SPLIT CORE NO. 27

WATER DEPTH (Lead line) 14.02 m.

DATE 5/06/80

TIME 17:16 HRS. EDT

SAMPLE NUMBERS 9-2-14-SC-27; 9-2-14-F-35

REMARKS :

Separate core obtained for chemical analysis as 9-2-24-CC-15. Top 10 cm. (approx.) of the core were retained for biological analysis as 9-2-14-SC-27T.

DESCRIPTION

cms 0 ---------- cms 0

Dark **green slightly gravelly sandy mud with angular to subrounded medium to very coarse pebbles, concentrated** in the top 5 cm. Fine pebbles scattered throughout the core. Relatively plastic consistency. A few shell fragments, some complete shells and 2 live bivalves in the surface of the core (Mya truncata).

28

5 10 15 20 25 30 35 40 45 50 55 60

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-2-15-SC-28

PROFILE NO. 2

STATION NO. 1 5

SPLIT CORE NO. 28

WATER DEPTH (Lead line) 18.17 m.

DATE 5/06/80

TIME 17:20 HRS. EDT

SAMPLE NUMBERS 9-2-15-SC-28; 9-2-15-F-36

REMARKS :
Separate core obtained for chemical analysis as 9-2-15-CC-16, Top 10 cm. (approx.) of core retained for biological analysis as 9-2-15-SC-28T.

DESCRIPTION

cms		cms
0		0
5	Dark green slightly gravelly sandy silt with numerous fine to coarse pebbles, mostly at the surface and one angular small cobble at the bottom of the core. A few shell fragments and 1 live bivalve at the surface (Mya truncata).	5
10	Dark, reduced zone	8
15		14
20		
25		
30		
35		
40		
45		
50		
55		
60		

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-3-26-SC-29 _____

PROFILE NO. 3

STATION NO. 26

SPLIT CORE NO. 29

WATER DEPTH (Lead line) 18.49 m.

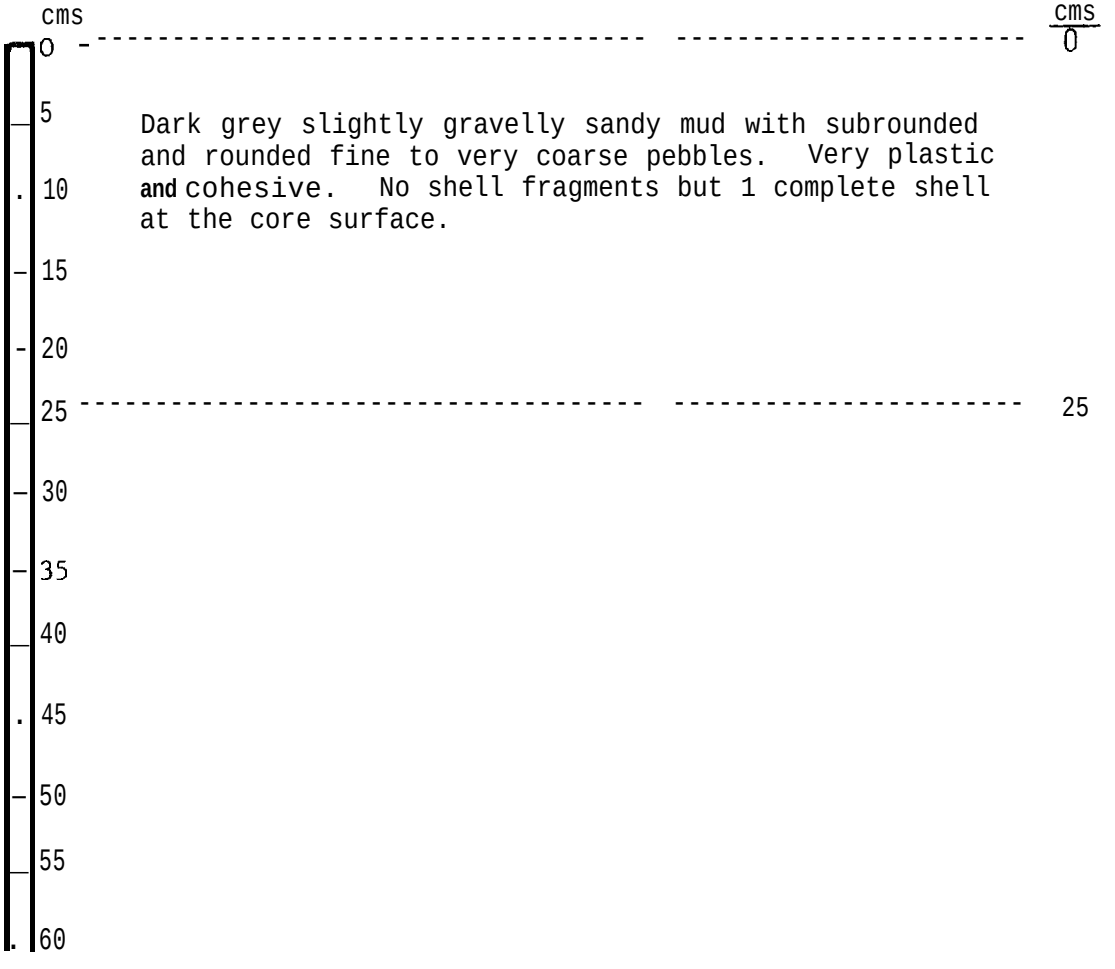
DATE _ 6/06/80

TIME 12:30 HRs. EDT

SAMPLE NUMBERS 9-3-26-SC-29A (O-1 cm.); 9-3-26-SC-29B (l-25 cm.); 9-3-26-F-37

REMARKS :
Separate core obtained for chemical analysis as 9-3-26-CC-17. Top 10 cm. (approx.) **of the core were retained** for biological analysis as 9-3-26 -SC-29T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 _ 9-3-25-SC-30

PROFILE NO. 3

STATION NO. 25

SPLIT CORE NO. 30

WATER DEPTH (Lead line) 15.35 m.

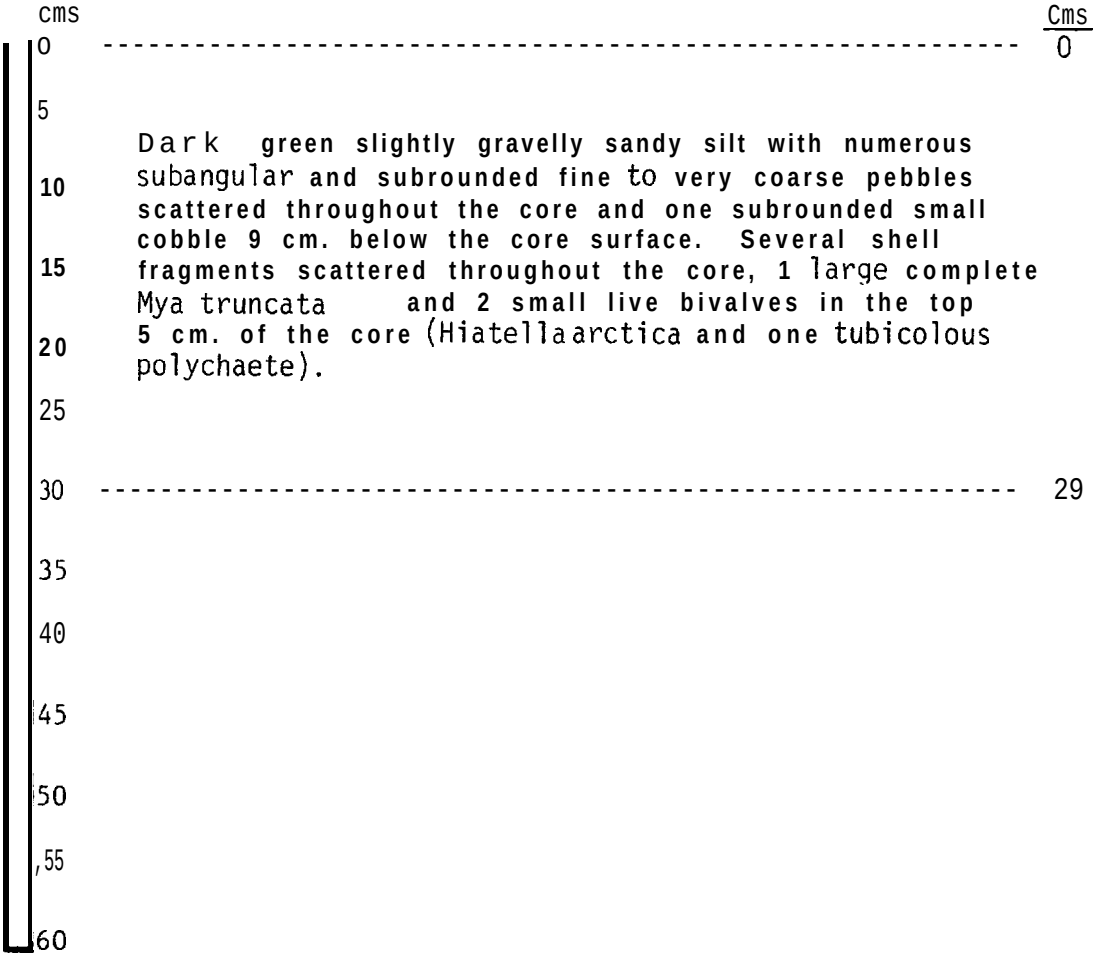
DATE 6/06/80

TIME 12:20 HRS. EDT

SAMPLE NUMBERS 9-3-25-SC-30; 9-3-25-F-37

REMARKS :
Top 10 cm. (approx.) of the core were retained for biological analysis as 9-3-25-SC-30T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 9 9-3-24-SC-31

PROFILE NO. 3

STATION NO. 24

SPLIT CORE NO. 31

WATER DEPTH (Lead line) 11.26 m.

DATE 6/06/80

TINE 12:16 HRS. EDT

SAMPLE NUMBERS 9-3-24-SC-31; 9-3-24-F-39

REMARKS :
Top 10-cm. (approx.) of the core were retained for biological analysis as 9-3-24-SC-31T.

DESCRIPTION

cms		cms
0		0
5	Dark green slightly gravelly silty sand with abundant subangular to sub-rounded fine to very coarse pebbles. Shell fragments throughout the core with minor concentrations at the top and bottom of the core.	
10		1 0
15		Six large, complete but non-orientated Mya truncata.
20		20
25		
30		29
35		
40		
45		
50		
55		
60		

B.I.O.S. **PROJECT** VIBRA **CORE DATA**

BAY NO. 9 9-3-23-SC-32

PROFILE NO. 3

STATION NO. 23

SPLIT CORE NO. 32

WATER DEPTH (Lead line) 7.37 m.

DATE 6/06/80

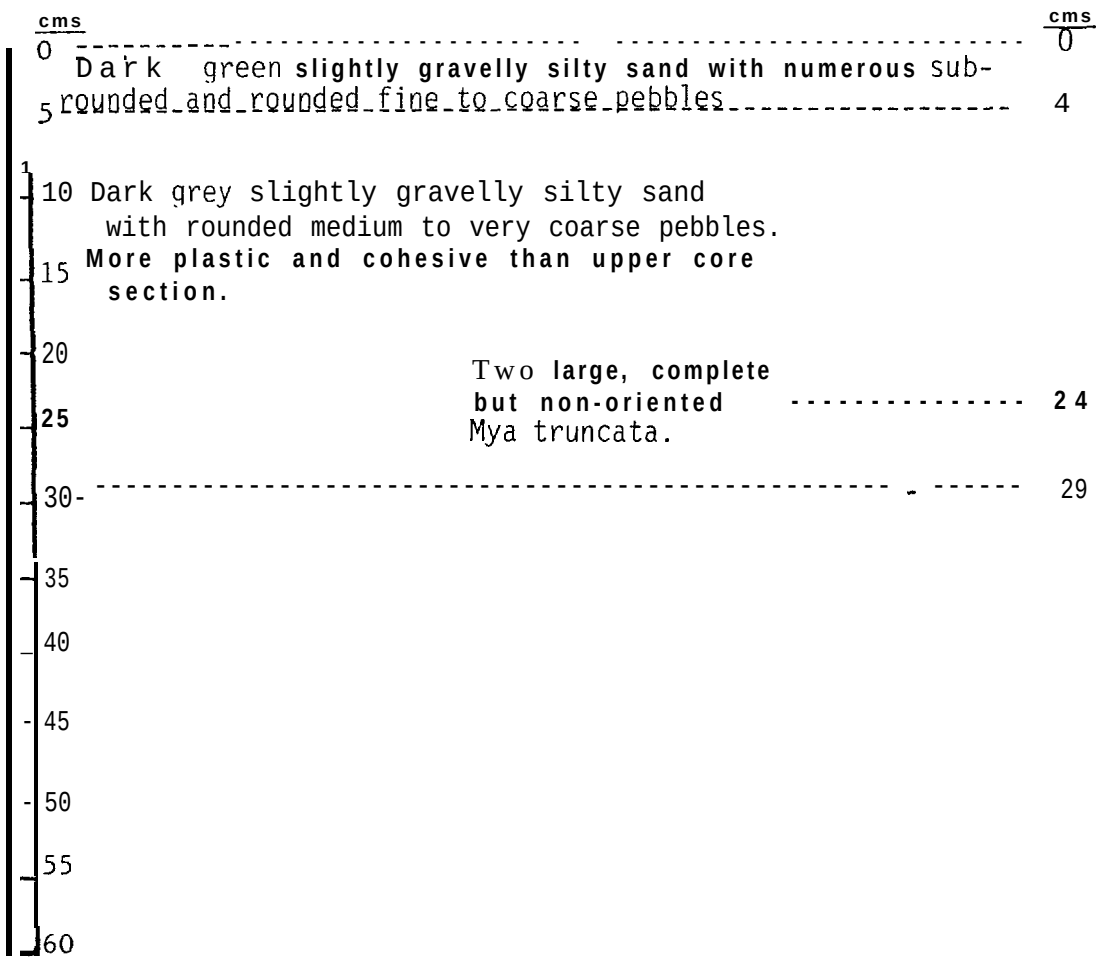
TIME 12:12 HRS. EDT

SAMPLE NUMBERS 9-3-23-SC-32A (O-4 cm.); 9-3-23-SC-32B (4-29 cm.); 9-3-23-F-40

REMARKS :

Separate core obtained **for chemical analysis as 9-3-23-CC-18. Top 10 cm.** (approx.) **of the core were retained** for biological analysis as 9-3-23-SC-32T.

DESCRIPTION



BAY 10

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BAY 10

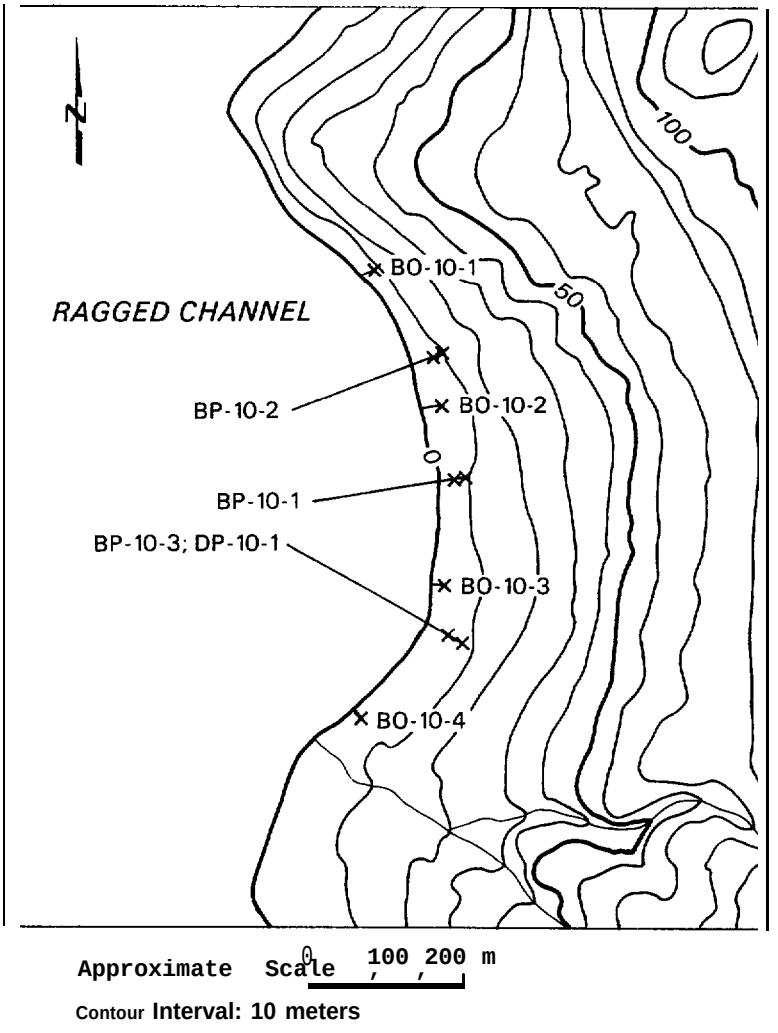
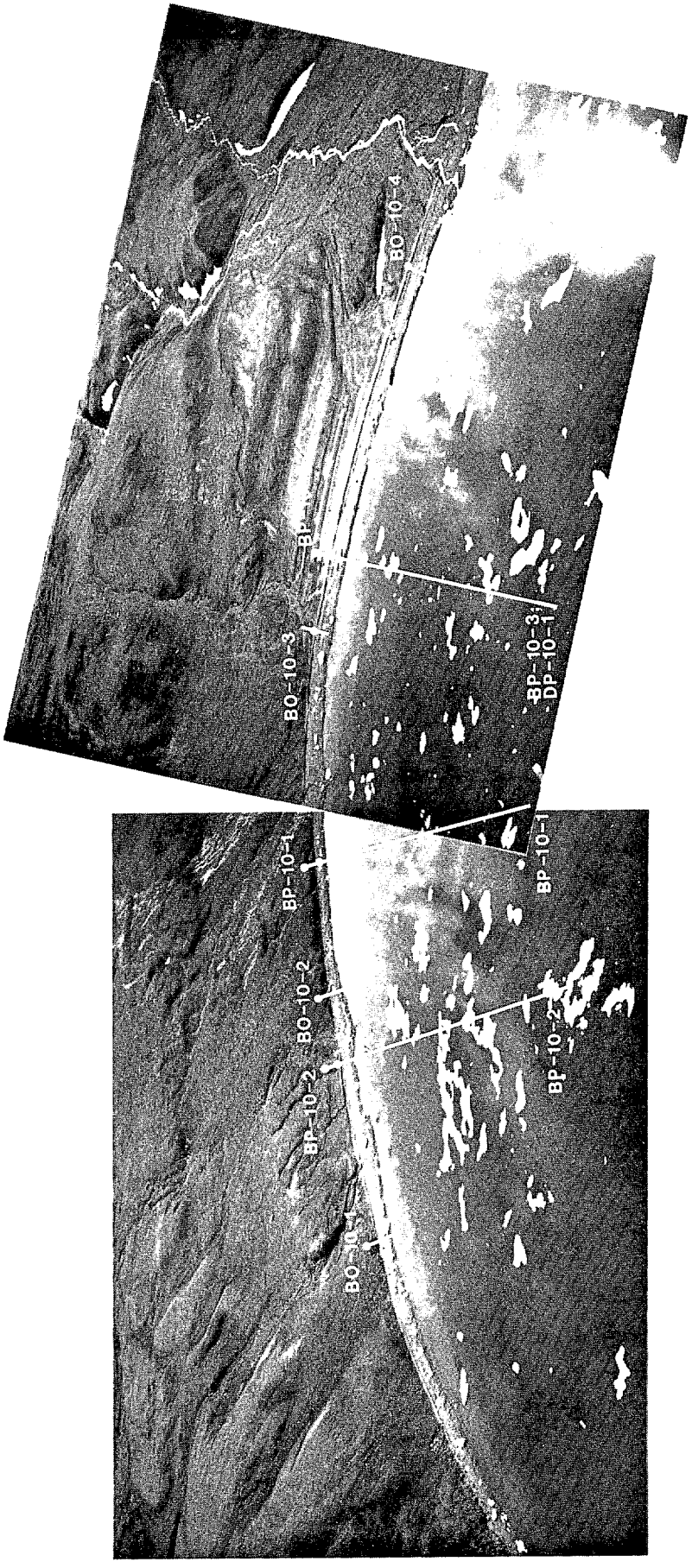
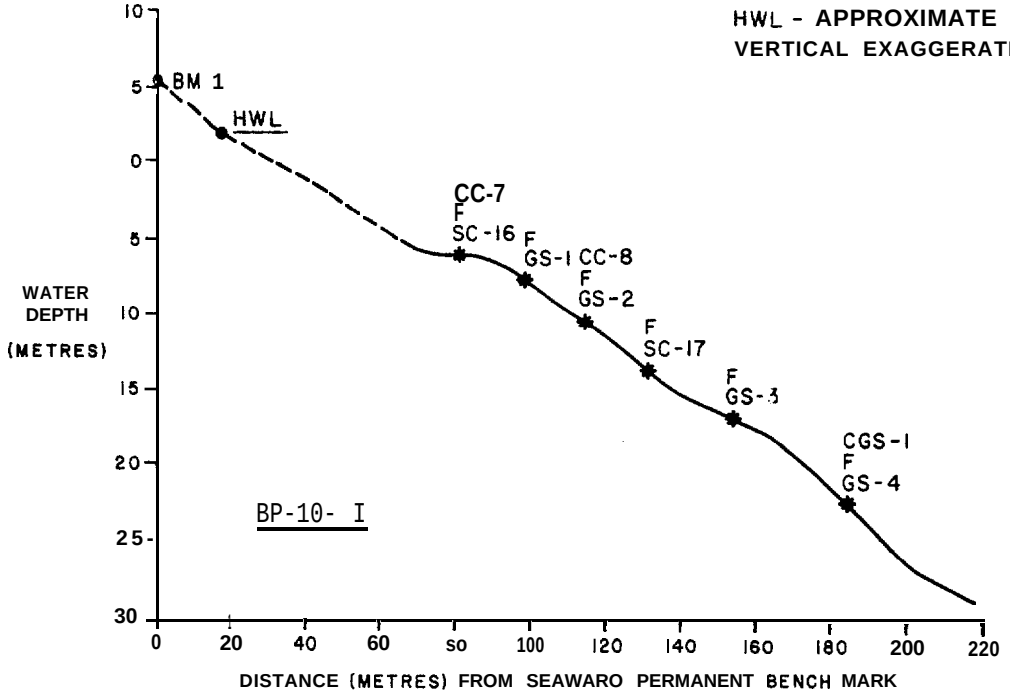


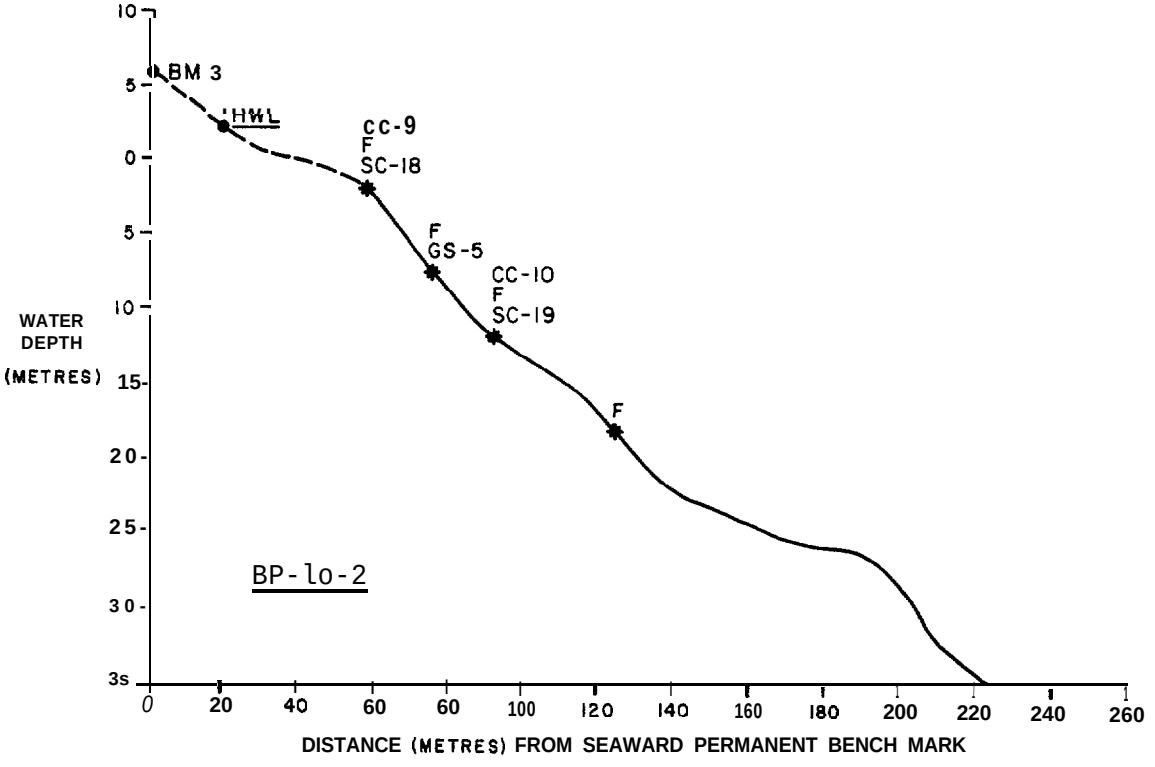
Figure 2-1: Location of beach observations and profiles (BO); beach, nearshore and offshore profiles (BP); dive profile (DP); permanent bench marks (x); and general topography of Bay 10

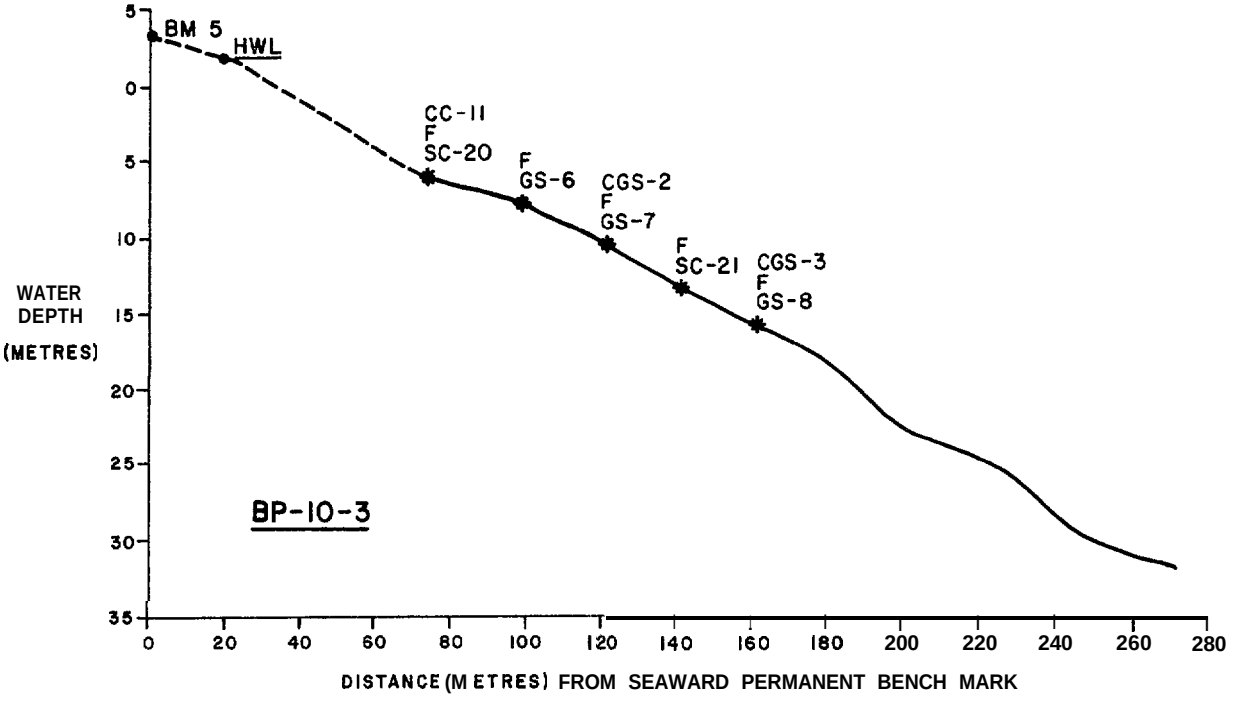

BO-10-4
BP-
BO-10-3
BP-10-3
DP-10-1
BP-10-1
BP-10-1
BO-10-2
BO-10-2
BP-10-2
BP-10-2
BO-10-1

OFFSHORE AND NEARSHORE PROFILES 'BAY 10

CC - CHEMISTRY CORE
CGS - CHEMISTRY GRAB SAMPLE
F – FOR AM INIFERA SAMPLE
Sc - SPLIT cO RE (GEOLOGY)
GS – GEOLOGY GRAB SAMPLE
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4x

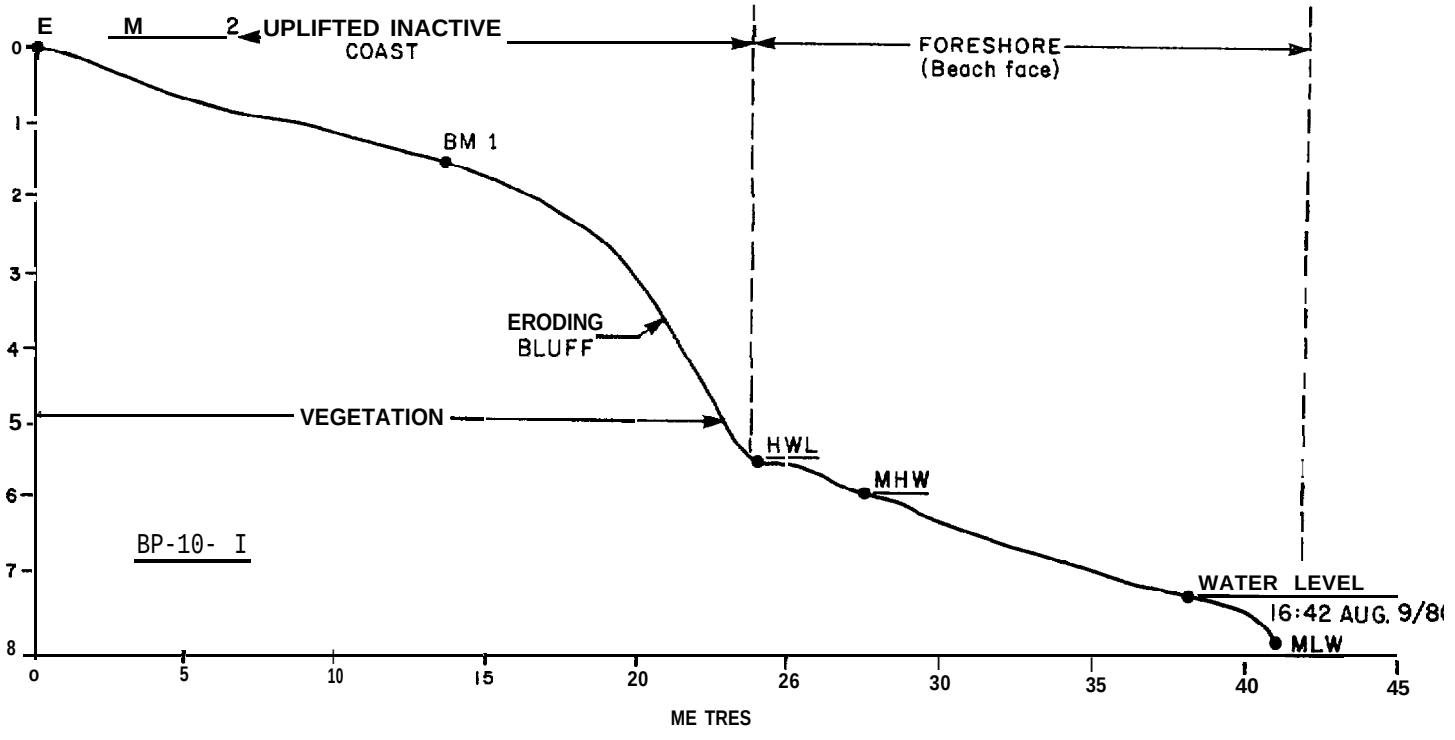


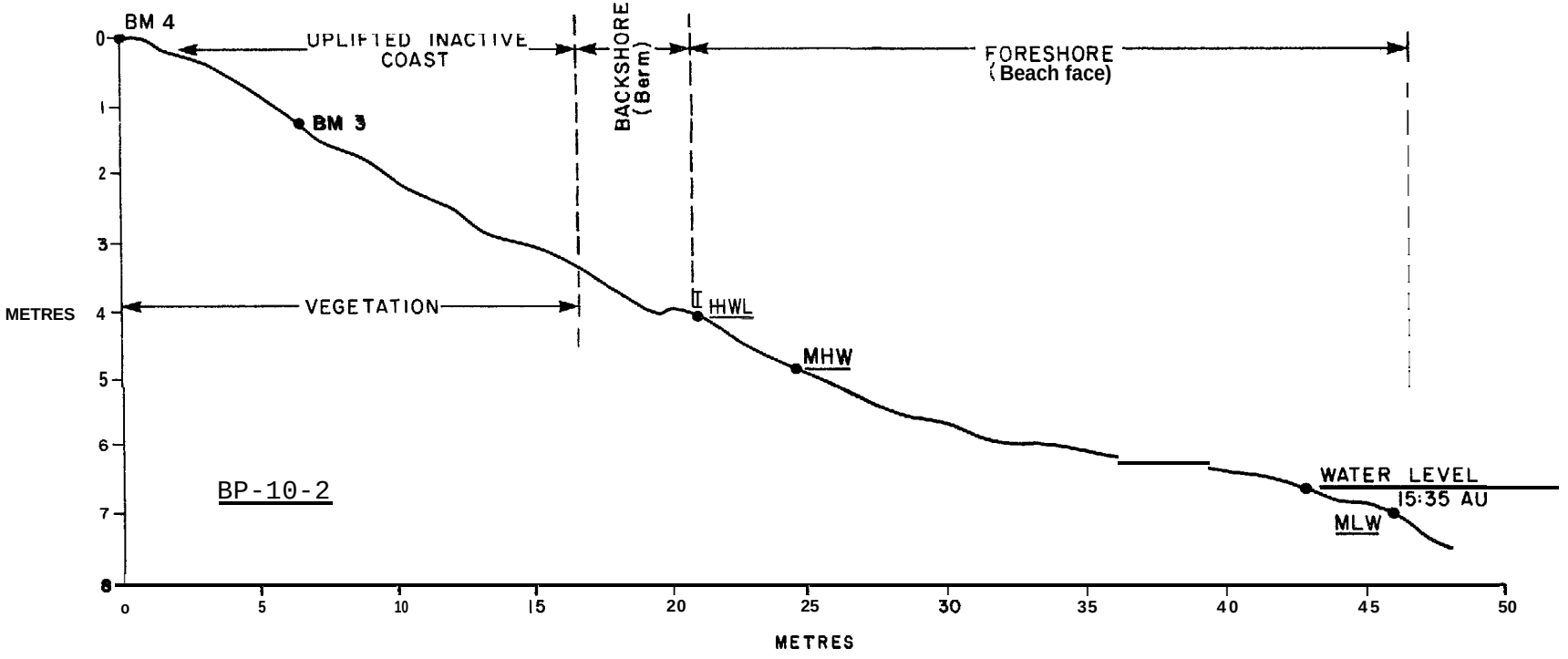


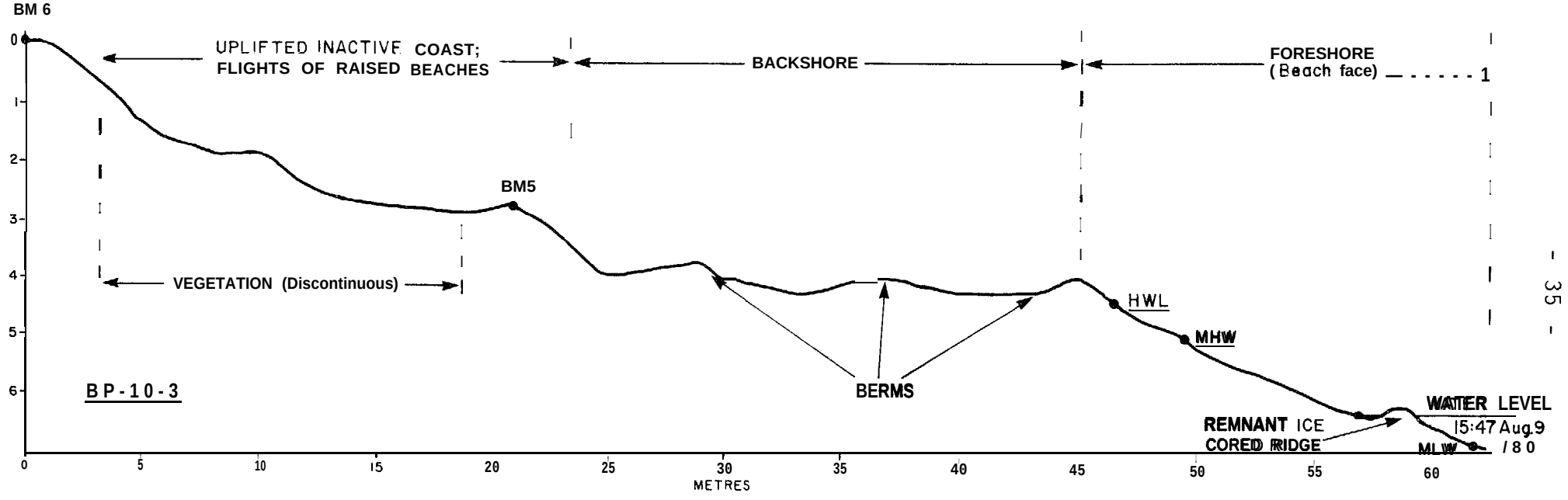

BM 5
HWL
CC-11
F
SC-20
F
GS-6
CGS-2
F
GS-7
F
SC-21
CGS-3
F
GS-8
BP-10-3
WATER DEPTH (METRES)
5
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
DISTANCE (METRES) FROM SEAWARD PERMANENT BENCH MARK

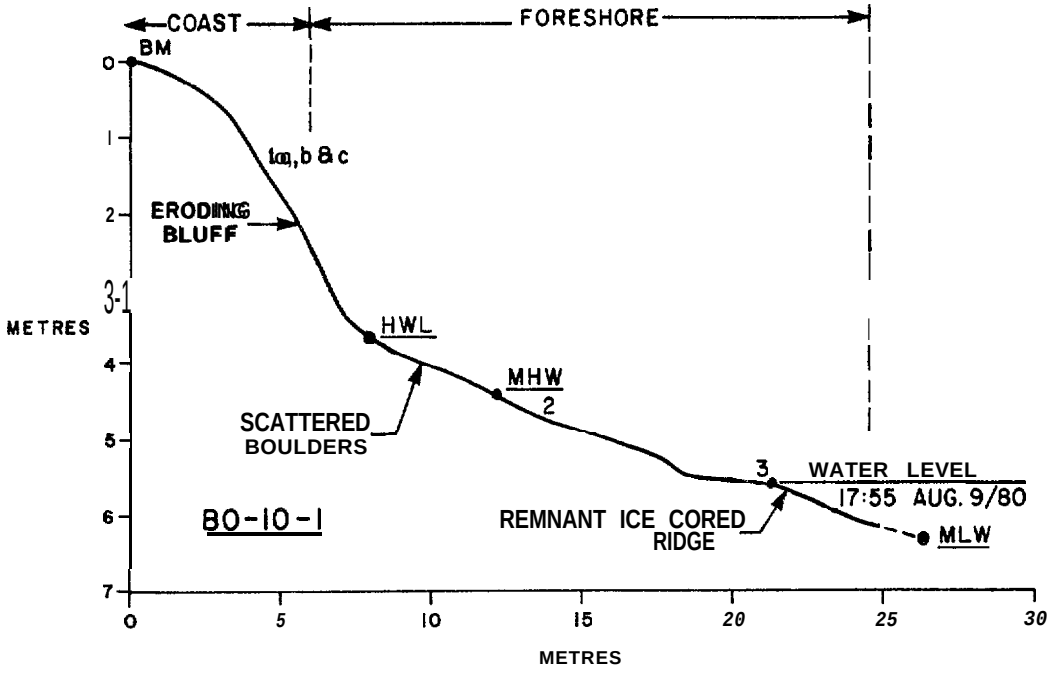
BEACH PROFILES - BAY 10

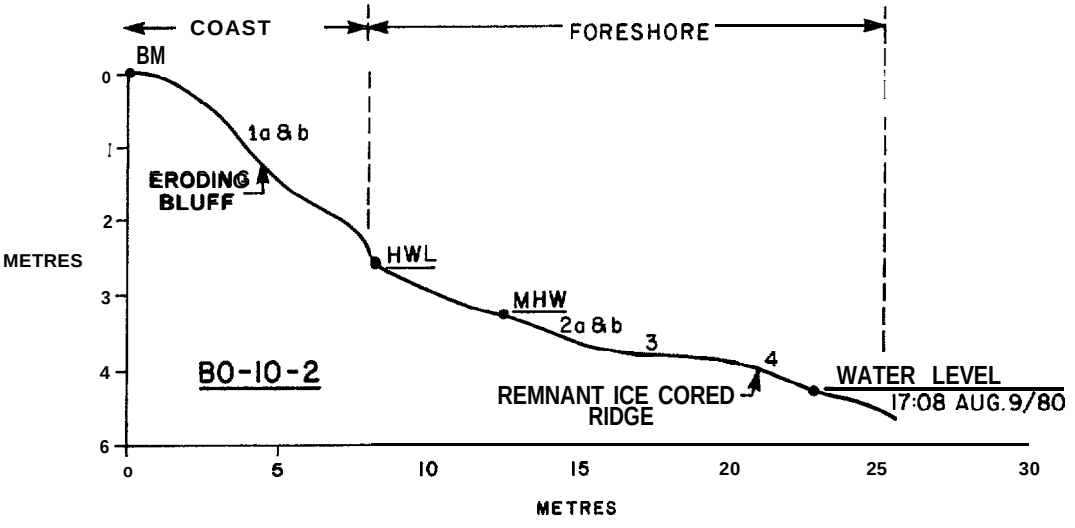
MHW- MEAN HIGH WATER
MLW MEAN LOW WATER
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 2.5x
NUMBERS INDICATE SAMPLING LOCATION

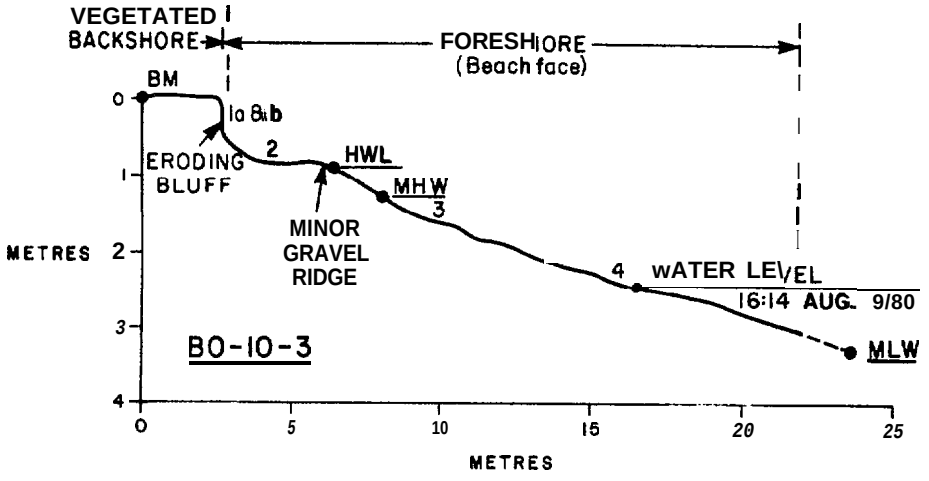



BM 4
UPLIFTED INACTIVE COAST
BACKSHORE (Berm)
FORESHORE (Beach face)
BM 3
VEGETATION
HHWL
MHW
WATER LEVEL
15:35 AU
MLW
BP-10-2
METRES
0
1
2
3
4
5
6
7
8
0
5
10
15
20
25
30
35
40
45
50
METRES


BM 6
UPLIFTED INACTIVE COAST;
FLIGHTS OF RAISED BEACHES
BACKSHORE
FORESHORE
(Beach face)
1
BM5
VEGETATION (Discontinuous)
HWL
MHW
BERMS
BP-10-3
WATER LEVEL
15:47 Aug.9
/80
REMNANT ICE
CORED RIDGE
MLW
0
1
2
3
4
5
6
0
5
10
15
20
25
30
35
40
45
50
55
60
METRES


COAST
FORESHORE
BM
1a,b & c
ERODING BLUFF
HWL
MHW
2
SCATTERED BOULDERS
3
WATER LEVEL
17:55 AUG. 9/80
MLW
80-10-1
REMNANT ICE CORED RIDGE
METRES
METRES
0
1
2
3
4
5
6
7
0
5
10
15
20
25
30


COAST
FORESHORE
BM
1a & b
ERODING BLUFF
HWL
MHW
2a & b
3
4
WATER LEVEL
17:08 AUG. 9/80
80-10-2
REMNANT ICE CORED RIDGE
METRES
METRES
0
1
2
3
4
6
0
5
10
15
20
25
30


VEGETATED BACKSHORE
FORESHORE (Beach face)
BM
0
1a &b
2
ERODING BLUFF
HWL
MHW
3
MINOR GRAVEL RIDGE
METRES
1
2
4 WATER LEVEL
16:14 AUG. 9/80
3
BO-10-3
MLW
4
0
5
10
15
20
25
METRES

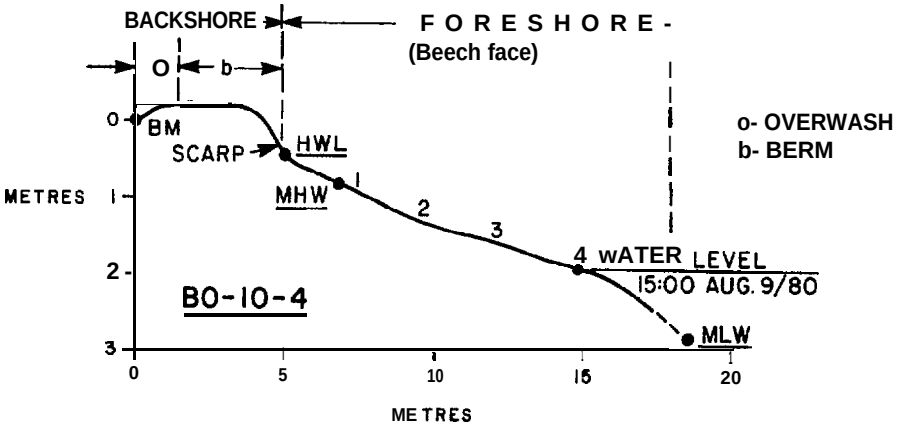

BACKSHORE
FORESHORE - (Beech face)
O
b
0
BM
SCARP
HWL
MHW
1
2
3
4 WATER LEVEL
15:00 AUG. 9/80
METRES
1
2
BO-10-4
3
MLW
0
5
10
15
20
METRES
o- OVERWASH
b- BERM

Table 2-1: Grain size data for sediment cores, grab samples and diver collected samples of Bay 10

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
Sediment Cores									
10-1-2-SC-16A	6.13	+3.26	2.21	1.55	6	74	16	4	0-15 cm. facies
10-1-2-SC-16R	6.13	+2.97	1.88	2.37	1	85	11	3	23-29 cm. facies
10-1-2-SC-16C	6.13	+5.65	3.31	0.51	2	33	44	21	29-48 cm. facies
10-1-5-SC-17	13.51	+5.05	3.00	0.82	2	39	44	15	
10-2-11-SC-18	1.83	+2.91	1.49	3.24	1	89	8	2	
10-2-13-SC-19	11.94	+4.86	3.11	0.80	2	42	41	15	
10-3-22-SC-20A	5.?7	+3.26	2.06	2.?5	1	80	15	4	0-22 cm. facies
10-3-22-SC-20F?	5.07	+4.99	2.91	0.88	1	41	4a	14	20-?5 cm. facies
10-3-25-SC-21	13.36	+4.84	2.83	0.99	1	42	44	13	
Grab Samples									
10-1-3-GS-1	7.91	+3.22	2.70	1.26	5	68	21	6	
10-1-4-GS-2	10.43	+3.60	2.81	1.20	4	62	26	8	
10-I-6-GS-3	16.79	+4.57	2.87	1.06	2	47	39	12	
10-1-8-GS-4	22.12	+4.85	2.85	0.76	3	36	49	12	
10-2-I2-GS-5	7.19	+3.79	2.44	+1.16	3	58	33	6	
10-3-23-GS-6	7.91	+3.44	2.41	+1 .30	3	66	26	5	
10-3-24-GS-7	10.13	+4.24	2.37	+1 .66	<1	55	37	8	
10-3-26-GS-8	15.76	+4.91	3.28	+0.45	5	33	47	15	
10-3-26-GS-25	15.76	+4.79	2.57	0.96	1	39	47	13	
Diver Collected Samples									
DP-10-1	1.8	+2.85	1.56	+2.95	<1	90	7	2	
I-IP-10-2	3*C!	+3.08	1.65	+2.68	<1	85	12	2	
PP-10-3	4.6	+4.20	2.63	+1.14	3	51	38	8	
DP-1 0-4	6.1	+4. 28	2.62	+1.31	2	54	35	9	Scour crater
DP-10-5	12.8	+5.71	3.26	+0. 44	3	22	54	21	Scour crater

Table 2-2: Grain size data for beach samples of Bay 10

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
BO-10-1-1A	+2.88	3.25	+1.15	10	63	19	8	Eroding bluff
BO-10-1-1B	+3.63	3.75	+0.75	10	51	25	14	Eroding bluff
BO-10-1-1C	+3.31	3.66	+0.94	10	58	20	12	Eroding bluff
Be-lo-l-z	-0.03	1.69	+3.31	36	61	2	<1	Beach face
B(-)-10-I-3	-0.02	1.35	+0.95	40	59	1		Ice mound crest
BO-10-2-1A	+4.42	3.68	+0.60	5	48	30	17	Eroding bluff
BO-10-2-1I?	+5.09	3.57	+0.45	4	39	37	20	Eroding bluff
BO-10-2-2A	+1.17	2.67	+2.25	16	73	7	4	Beach face
I3O-10-2-2B	+4.78	3.76	+0.51	4	44	32	20	Beach face
BO-10-2-3	+1.18	2.12	+2.06	18	76	4	7	Peach face
BO-10-2-Q	+1 .26	2.31	+2.25	13	79	5	3	Ice mound crest
RO-10-3-1A	+0.99	2.80	+2.10	21	65	10	4	Eroding bluff
FN-10-3-1B	+0.80	2.51	+2.59	19	72	5	3	Eroding bluff
BO-10-3-2	+0.09	1.46	+3.80	21	77	1	<1	Reach face
BO-10-3-3	+0.72	1.21	+0.46	13	85	2		Beach face
BO-10-3-4	+0.81	1.80	+2.32	20	78	1	1	Ice mound crest
BO-10-4-1	+1.13	1.43	+2.16	8	89	3	<1	Beach face
BO-10-4-2	+0.93	0.83	-0.46	5	94	<1		Beach face
BO-10-4-3	+0.44	1.14	+0.32	16	83	<1		Beach face
B(-)-10-4-4	+0.11	1.37	+0.86	33	66	1		Ice mound crest

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 10 10-1-2-SC-16

PROFILE NO. 1

STATION NO. 2

SPLIT CORE NO. 16

WATER DEPTH (Lead line) 6.13 m.

DATE 29/05/80

TIME 17:24 HRS. EDT

SAMPLE NUMBERS 10-1-2-SC-16A; 10-1-2-SC-16B; 10-1-2-SC-16C; 10-1-2-F-15

REMARKs:
Separate core obtained for chemical analysis as 1O-1-2-CC-7. Top 10 cm. (approx.) of the core were retained for biological analysis as 1O-1-2-SC-16T.

DESCRIPTION

cms		cms
0		0
5	Dark green **gravelly silty sand with some angular to subrounded medium to very coarse pebbles and a few shell fragments.**	
10		
15		15
20	One subrounded small cobble almost completely filling core tube.	
25		23
30	Dark green slightly **gravelly silty sand with numerous shell fragments noticeably smaller than those found in upper and lower core sections**	29
35	Dark **green slightly gravelly sandy silt with numerous** subangular **and surrounded coarse and very coarse pebbles. Some shell fragments.**	
40		
45		
50		48
55		
60		

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 10 10-1-5-SC'-17

PROFILE NO. 1

STATION NO. 5

SPLIT CORE NO. 17

WATER DEPTH (Lead line) 13.51 m.

DATE 29/05/80

TIME 17:16 HRS. EDT

SAMPLE NUMBERS 10-1-5-SC-17 (0-42 cm.); 10-1T5-F-18

REMARKs :

Large conspicuous animals were removed from the core and preserved as 10-1-5-SC-17. Top 10 cm. (approx.) of the core were retained for biological analysis as 10-1-5-SC-17T.

DESCRIPTION

:ms cms

0

Veneer of coarse, rounded pebbles; several living (Mya truncata) bivalves and worms in top 8 cm.

10

15

20

25 Homogeneous dark green/grey slightly gravelly sandy silt with shell fragments and medium to coarse rounded pebbles distributed uniformly throughout the core.

30

35

40

42

45

50

55

50

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 10 . 10-2-11-SC-18

PROFILE NO. 2

STATION NO. 11

SPLIT CORE NO. 18

WATER DEPTH (Lead line) 1.83 m.

DATE 31/05/80

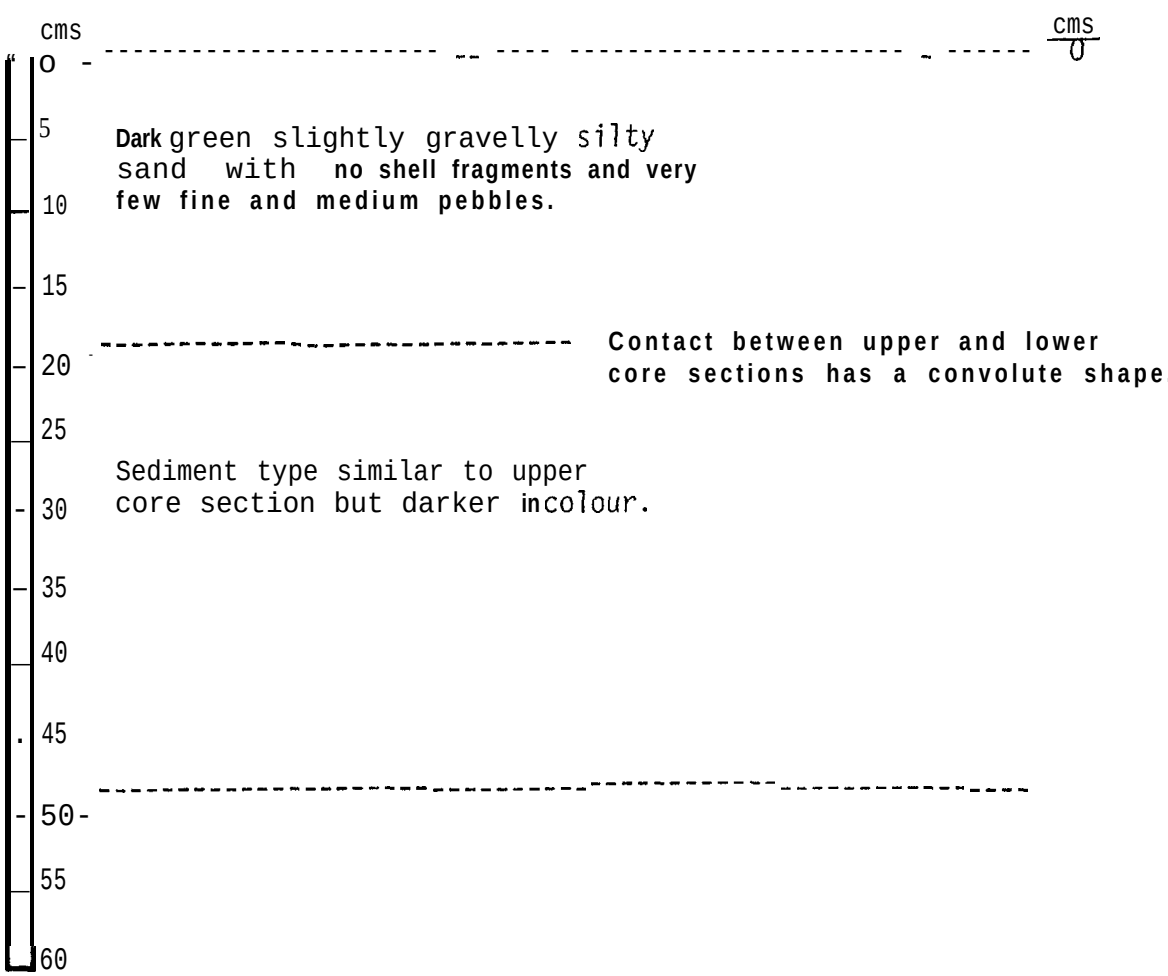
TIME 17:30 HRS. EDT

SAMPLE NUMBERS 10-2-11-SC-18; 10-2-11-F-21

REMARKS :

Separate core obtained for chemical analysis as 10-2-11-CC-9. Top 10 cm. (approx.) of the core were retained for biological analysis as 10-2-11-SC-18T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 10 10-2-13-SC-19

PROFILE NO. 2

STATION NO. 13

SPLIT CORE NO. 19

WATER DEPTH (Lead line) 11.94 m.

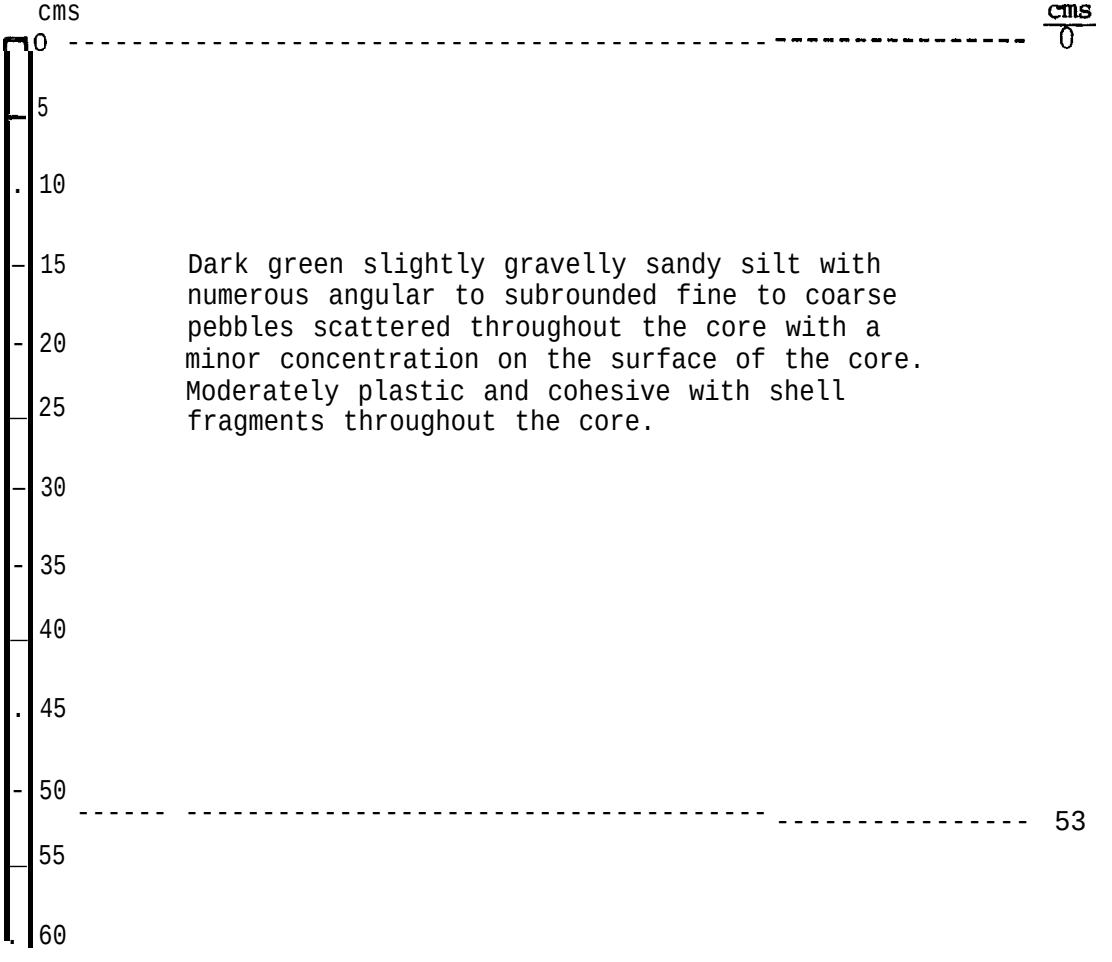
DATE 31/05/80

TIME 17:37 HRs. EDT

SAMPLE NUMBERS 10-2-13-SC-19; 10-2-13-F-23

REMARKS :
Separate core obtained for chemical analysis as 10-1-13-CC-10. Top 10 cm. (approx.) of the core were retained for biological analysis as 10-2-13-SC-19T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 10

10-3-22-SC-20

PROFILE NO. 3

STATION NO. 22

SPLIT CORE NO. 20

WATER DEPTH (Lead line) 5.07 m.

DATE 2/06/80

TIME 15:05 HRS. EDT

SAMPLE NUMBERS 1(1-3-22-SC-20A (0-20 cm.); 10-3-22-SC-20B (20-25 cm.); 10-3-22-F-25

REMARKS :

Separate core obtained for chemical analysis as 10-3-22-CC-11. Top 10 cm. (approx.) of the core were retained for biological analysis as 10-3-22-SC-20T.

DESCRIPTION

cms

0 Dark green slightly gravelly silty sand with a few subangular fine to very coarse pebbles. Two live bivalves in top 2 cm (Mya truncata). No shell fragment.

10 Dark green slightly gravelly silty sand with poorly defined horizontal black bands (reduced).

20 Dark green slightly gravelly sandy silt with black reduced zones.

25

30

35

40

45

50

55

60

cms

0

20

25

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 1 0 10-3-25-SC-21

PROFILE NO. 3

STATION NO. 25

SPLIT CORE NO. 21

WATER DEPTH (Lead line) 13.36 m.

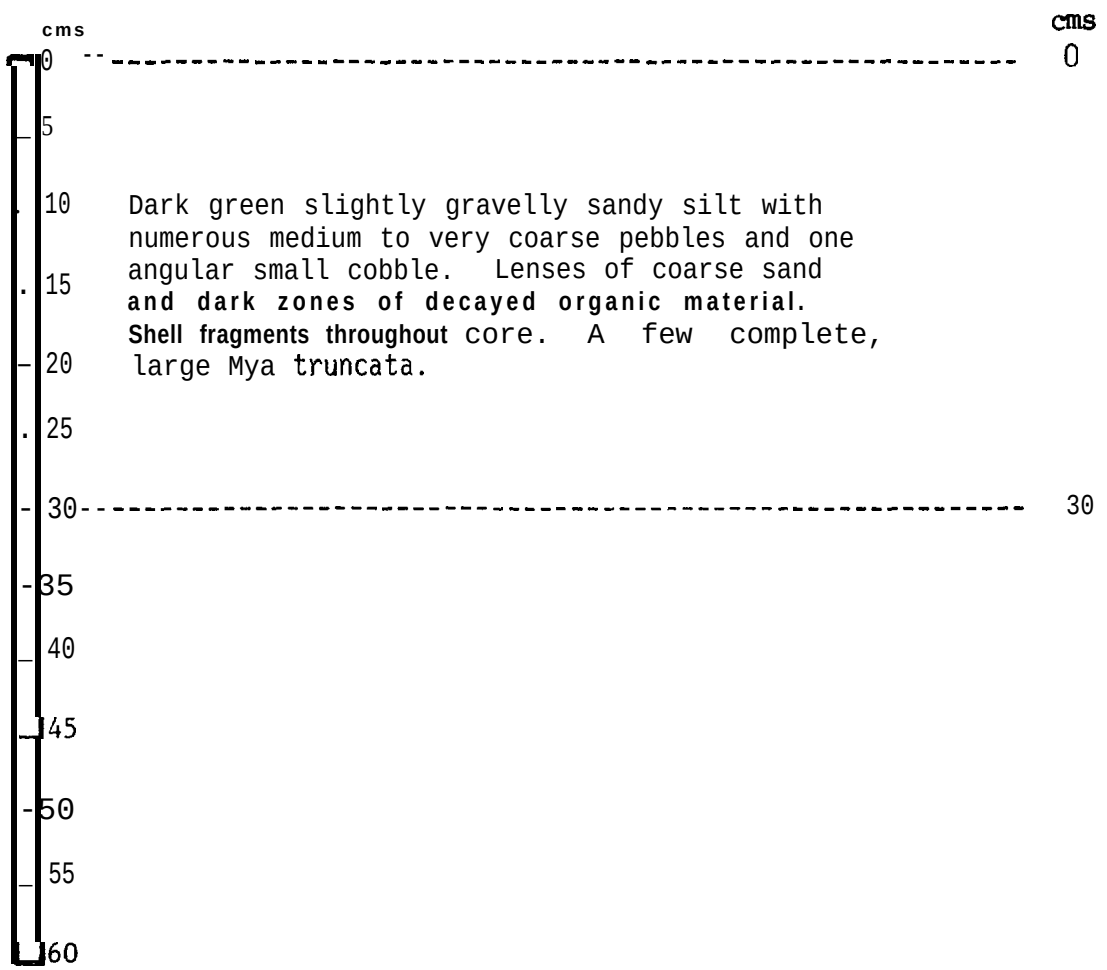
DATE 2/06/80

TIME 15:20 HRS. EDT

SAMPLE NUMBERS 10-3-25-SC-21; 10-3-25-F-28

REMARKS :
Top 10 cm. (approx.) of the core were retained for biological analysis as 10-3-25-SC-21T.

DESCRIPTION



BIOS PROJECT PETERSEN GRAB DATA

10-1-3-GS-1

BAY NO. 10

PROFILE NO. 1

STATION NO. 3

GRAB NO. 1

WATER DEPTH (Lead line) 7.91 m.

DATE 29/05/80

TIME 17:21 HRS. EDT

SAMPLE NUMBERS 10-1-3-GS-1; 10-1-3-F-16

REMARKs :

Part of grab sample retained for biological analysis as 1O-1-3-GS-1T.

DESCRIPTION:

Dark green gravelly silty sand with numerous subangular to sub-rounded medium to very coarse pebbles and one subangular small cobble. A few shell fragments and one large Mya truncata.

BIOS PROJECT PETERSEN GRAB DATA

10-I-4-GS-2

BAY NO. 10

PROFILE NO. 1

STATION NO. 4

GRAB NO. 2

WATER DEPTH (Lead line) 10.43 m.

DATE 29/05/80

TIME 17:19 HRS. EDT

SAMPLE NUMBERS 10-1-4-GS-2, IO-1-4-F-17

REMARKs :

Separate core sample obtained for chemical analysis as 1O-1-4-CC-8. Part of grab sample retained for biological analysis as 1O-1-4-GS-2T.

DESCRIPTION:

Dark green slightly gravelly silty sand with numerous subangular to rounded fine to very coarse pebbles, one small cobble and one large cobble. Numerous shell fragments and complete shells and several live bivalves (Mya truncata and Hiatellaarctica) and soft worms.

BIOS PROJECT PETERSEN GRAB DATA

10-1-6-GS-3

BAY NO. 10

PROFILE NO. 1

STATION NO. 6

GRAB NO. 3

WATER DEPTH (Lead line) 16.79 m.

DATE 29/05/80

TIME 17:14 HRS. EDT

SAMPLE NUMBERS 10-1-6-GS-3, 10-1-6-F-19

REMARKS :

Part of grab sample retained for biological analysis as 10-1-6-GS-3T

DESCRIPTION:

Dark green slightly gravelly sandy silt with numerous angular to subrounded medium to very coarse pebbles and two small cobbles. Some shell fragments and several complete shells (Mya truncata, Hiatella arctica and one live, thick shell Clinocardium ciliatum).

BIOS PROJECT PETERSEN GRAB DATA

1O-1-8-GS-4

BAY NO. 10

PROFILE NO. 1

STATION NO. 8

GRAB NO. 4

WATER DEPTH (Lead line) 22.12 m.

DATE 29/05/80

TIME 17:07 HRS. EDT

SAMPLE NUMBERS 1O-1-8-GS-4, 1O-1-8-F-2O

REMARKS :

Part of grab sample retained for chemical analysis as 1O-1-8-CGS-1

DESCRIPTION:

Dark green slightly gravelly sandy silt with numerous angular to subrounded coarse and very coarse pebbles and one small cobble. No shell fragments present. Several pebbles covered with coral line algae.

BIOS PROJECT PETERSEN GRAB DATA

10-2-12-GS-5

BAY NO. 10

PROFILE NO. 2

STATION NO. 12

GRAB NO. 5

WATER DEPTH (Lead line) 7.19 m.

DATE 31/05/80

TIME 17:35 HRS. EDT

SAMPLE NUMBERS 10-2-12-GS-5, 10-2-12-F-22

REMARKS :

DESCRIPTION:

Dark green slightly gravelly silty sand with abundant coarse pebbles, very coarse pebbles and small cobbles and two large cobbles. Pebbles and cobbles primarily subangular and subrounded. Some shell fragments and live bivalve. Coralline algae on several of the pebbles and cobbles. Live bivalve is Serripes groenlandicus.

BIOS PROJECT PETERSEN GRAB DATA

10-3-23-GS-6

BAY NO. 10

PROFILE NO. 3

STATION NO. 23

GRAB NO. 6

WATER DEPTH (Lead line) 7.91 m.

BATE 2/06/80

TIME 15:12 HRS. EDT

SAMPLE NUMBERS 10-3-23-GS-6, 10-3-23-F-26

REMARKS :

Part of grab sample retained for biological analysis as 1O-3-23-GS-6T.

DESCRIPTION:

Dark green slightly gravelly silty sand with numerous subangular and subrounded medium to very coarse pebbles and two subrounded small cobbles. Some shell **fragments, one brittle star, several worms and** coralline **algae on** the cobbles.

BIOS PROJECT PETERSEN GRAB DATA

1O-3-24-GS-7

BAY NO. 10

PROFILE NO. 3

STATION NO. 24

GRAB NO. 7

WATER DEPTH (Lead line) 10.13 m.

DATE 2/06/80

TIME 15:15 HRS. EDT

SAMPLE NUMBERS 1O-3-24-GS-7, 1O-3-24-F-27

REMARKs :

Separate grab sample obtained for chemical analysis as 1O-3-24-CGS-2.
Part of grab sample retained for biological analysis as 1O-3-24-GS-7T.

DESCRIPTION:

Dark green slightly gravelly silty sand with numerous subangular and subrounded coarse and very coarse pebbles and two subrounded small cobbles. Some shell fragments and a few live bivalves (Astarte).

BIOS PROJECT PETERSEN GRAB DATA

1O-3-26-GS-8

BAY NO. 10

PROFILE NO. 3

STATION NO. 26

GRAB NO. 8

WATER DEPTH (Lead line) 15.76 m.

DATE 2/06/80

TIME 15:22 HRS. EDT

SAMPLE NUMBERS 1O-3-26-GS-8, 1O-3-26-F-29

REMARKs :

Separate grab sample obtained for chemical analysis as 1O-3-26-CGS-3. See also grab data for 1O-3-26-GS-25, a duplicate grab sample courtesy of the Arctic Biological Station personnel. Part of grab sample retained for biological analysis as 1O-3-26-GS-8T.

DESCRIPTION:

Dark green slightly gravelly sandy silt with numerous subangular and subrounded fine to coarse pebbles and one small cobble. Abundant shell fragments and one Mya truncata.

BIOS PROJECT PETERSEN GRAB DATA

10-3-26 -GS-25

BAY NO. 10

PROFILE NO. 3

STATION NO. 26

GRAB *NO.* 25

WATER DEPTH (Lead line) 15.76 m.

DATE 2/06/80

TIME 15:22 HRS. EDT

SAMPLE NUMBERS 10-3-26-GS-25, 10-3-26-F-60

REMARKs :

This grab sample is a duplicate of 10-3-26-GS-8 and was obtained courtesy of the Arctic Biological Station personnel, Ross Harlan and Bernie Petolas.

DESCRIPTION:

Dark green slightly gravelly sandy *silt* with six *subangular* coarse and very coarse pebbles, a few shell fragments and some live Mya truncata.

BAY 11

Contents	Figure/Table	Page
Map of Bay 11	Fig. 3-1	56
Oblique aerial photograph of Bay 11	Fig. 3-2	57
Beach Profiles		
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60-11-3		58
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Grain size data for diver collected samples	Table 3-1	50
Grain size data for beach samples	Table 3-2	61

BAY 11

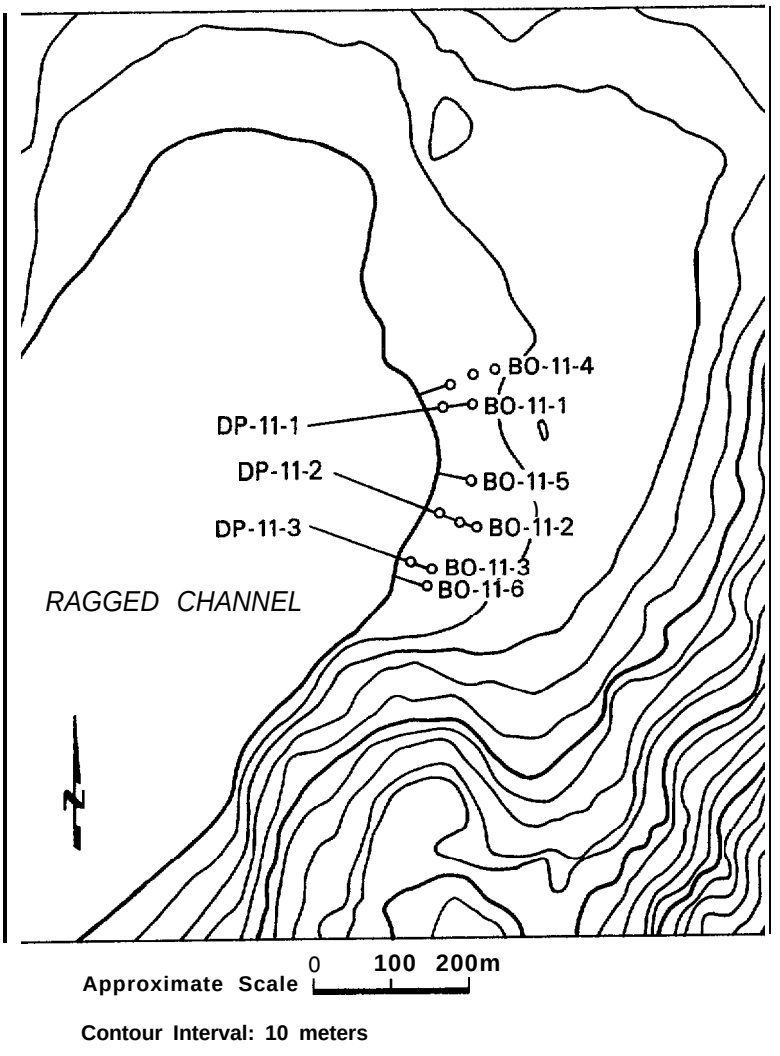


Figure 3-1: Location of beach observations and profiles (BO); dive profiles (DP); temporary bench marks (o); and general topography of Bay 11

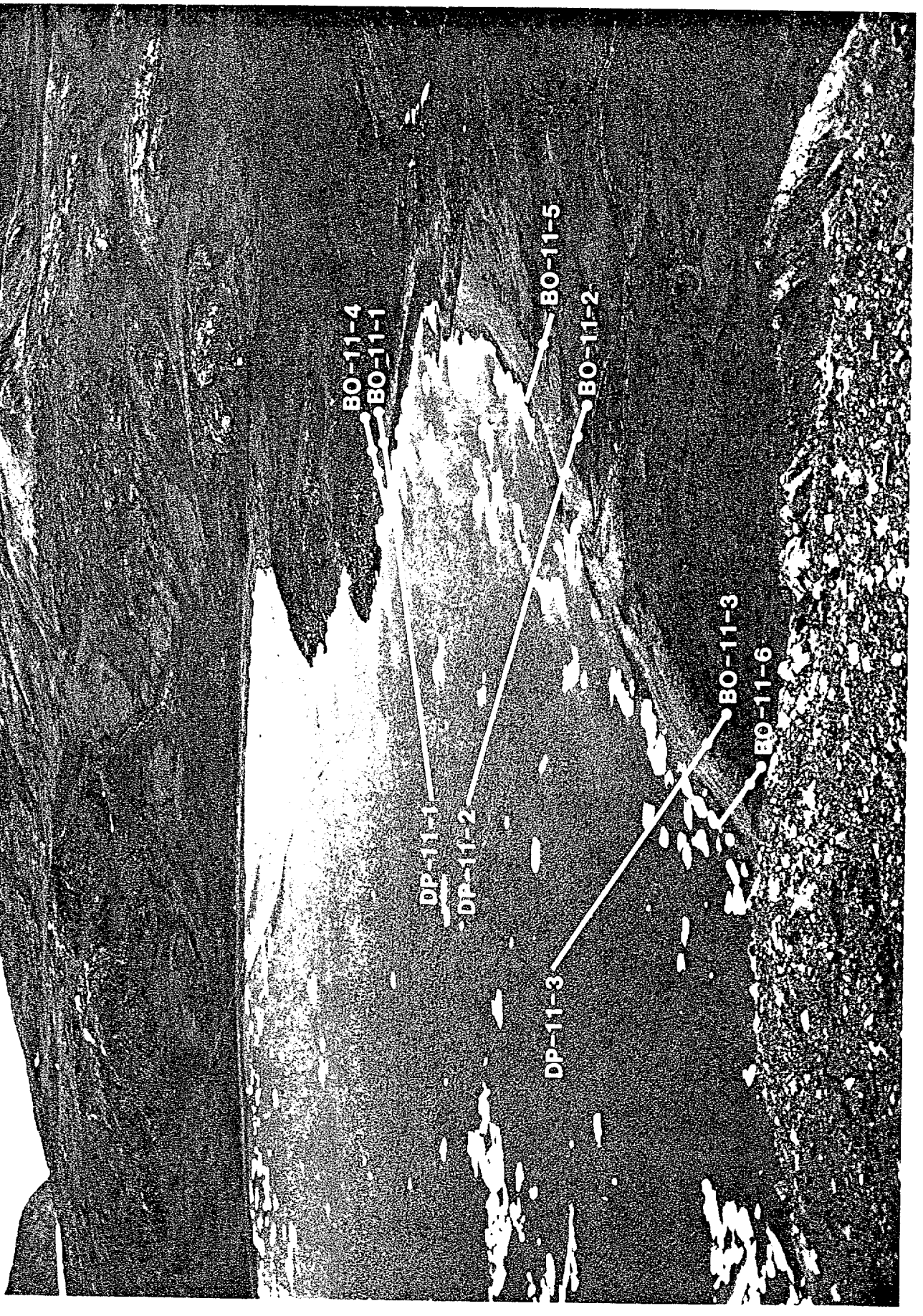
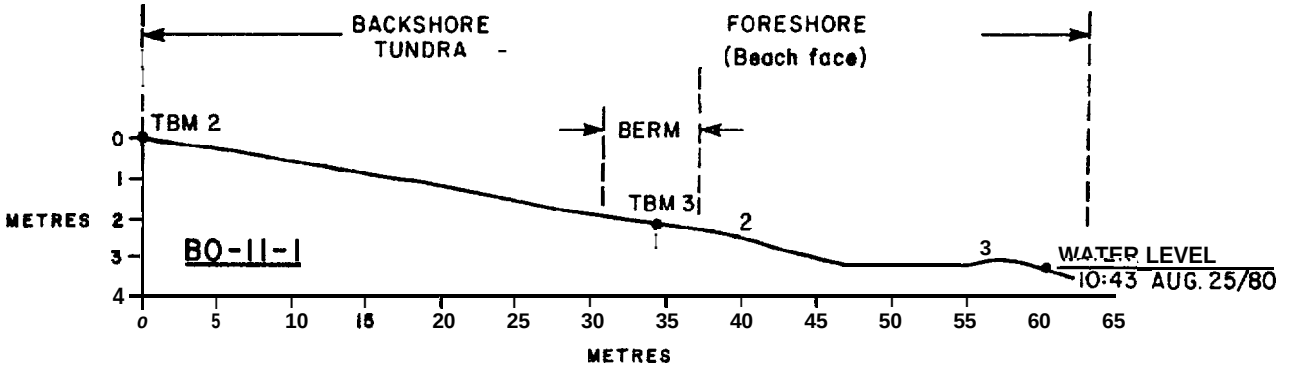
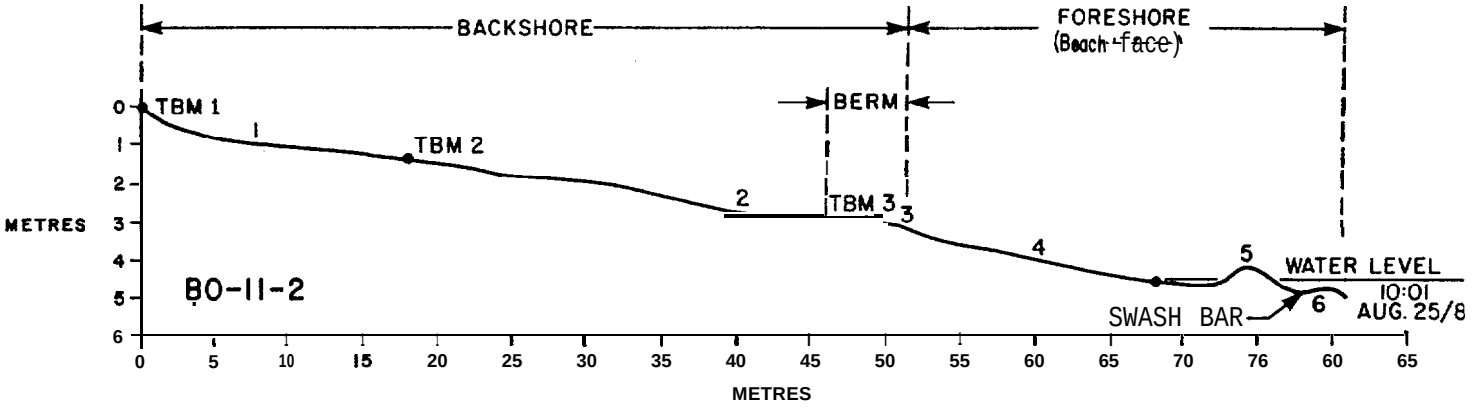
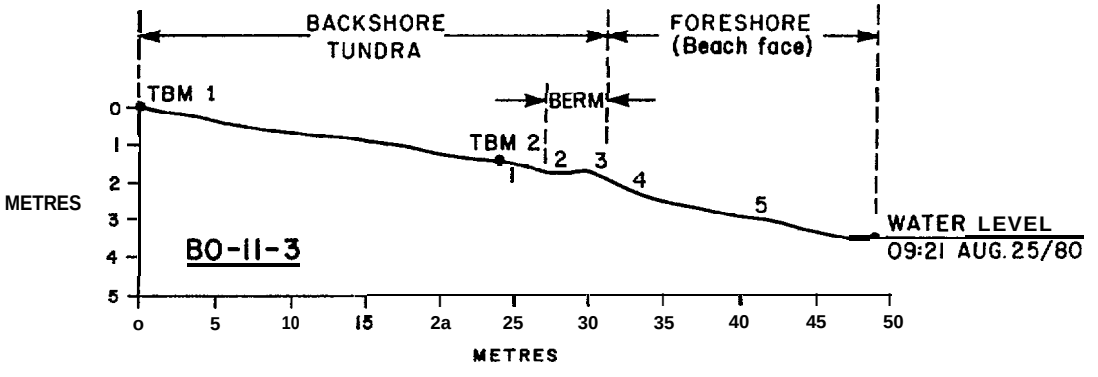


FIG. 3.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 11

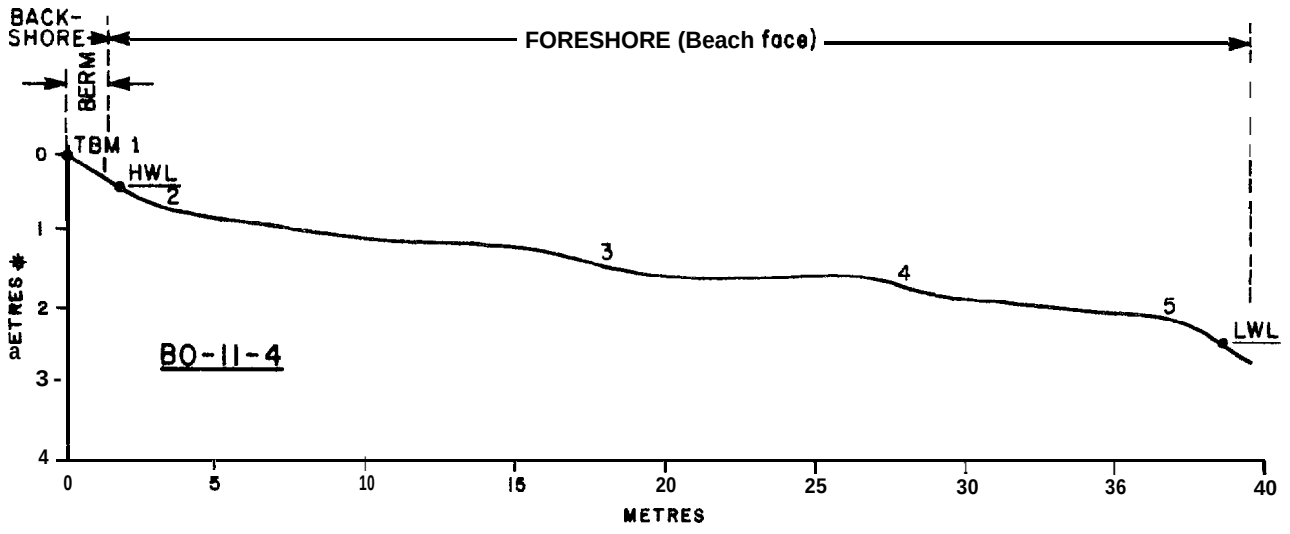
BEACH PROFILES -BAY II

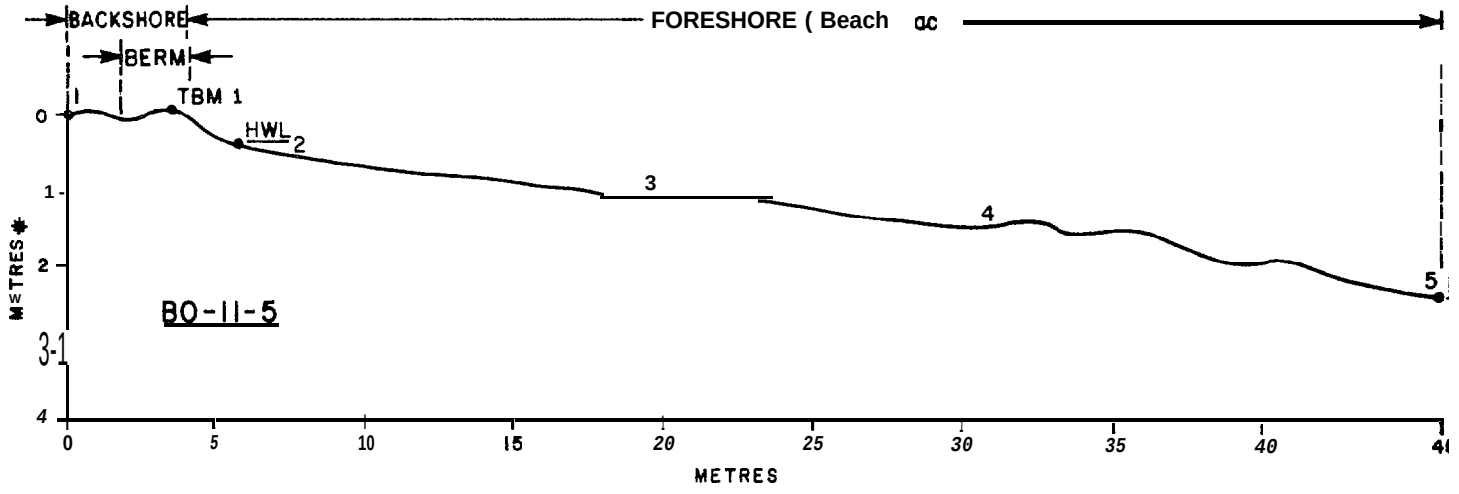


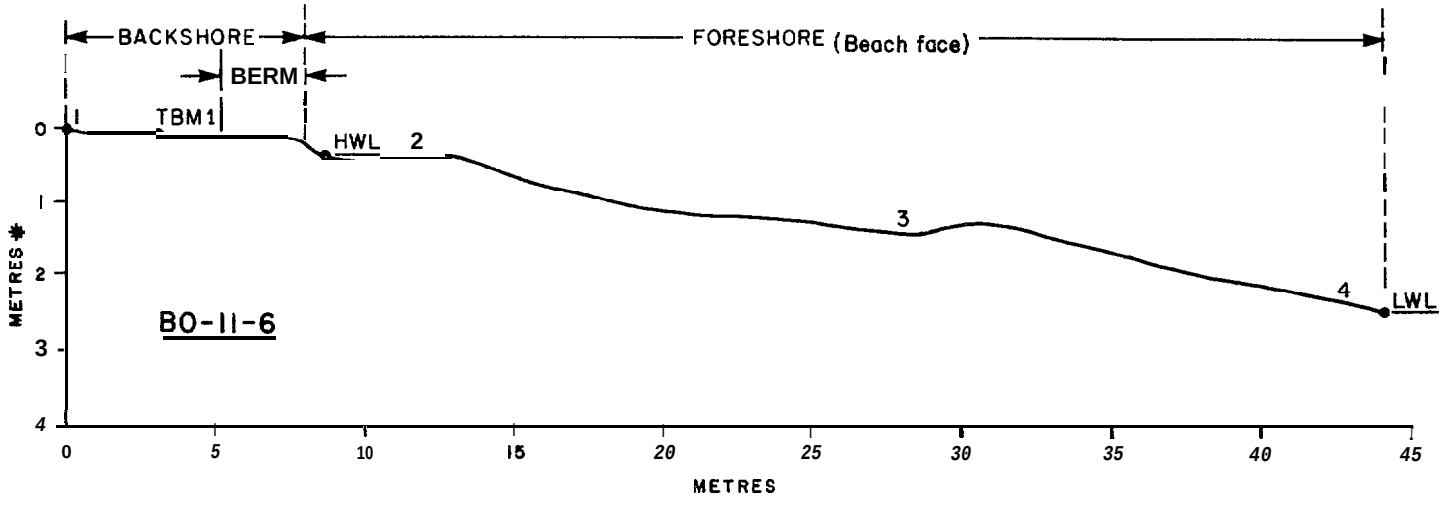




TBM -TEMPORARY BENCH MARK
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2.5 X







TBM-TEMPORARY BENCH MARK
HWL – HIGH WATER LINE (APPROX.)
LWL - LOW WATER LINE (APPROX.)
NUMBERS INDICATE SAM PLING LOCATIONS

*NOTE : THE ABOVE THREE SKETCHES ARE APPROXIMATIONS ONLY, PARTICULARLY IN THE VERTICAL DIRECTION.

Table 3-1: Grain size data for diver collected samples of Bay 11.

SAMPLE NUMBER	WATER DEPTH	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
DP-11-1-1	1.0	+1 .85	0.97	-0.53	<1	100	<1	
DP-11-1-2	3.0	+2.90	2.94	+1 .38	8	72	13	7
DP-11-1-3	5.0	+2.92	3.01	+1.12	12	63	18	7
DP-11-1-4	13.0	+6.80	3.60	-0.06	2	19	43	36
DP-11-1-5	17.0	+4. 40	3.04	+1.12	1	52	34	13
DP-11-2-1	1.0	+0.58	1.33	+0.13	21	78	1	
DP-11-2-2	3.0	+2.63	2.90	+1 .28	12	67	15	6
DP-11-2-3	5.0	+2.99	3.13	+1.17	9	63	20	8
DP-11-2-4	7.0	+4.72	3.49	+0. 60	4	44	35	17
DP-11-2-5	13.0	+4.57	3.10	+1 .01	1	49	36	14
DP-11-3-1	1.0	+1 .63	2.77	+1.69	19	69	8	4
DP-11-3-2	3.0	+2.78	3.08	+1 .22	10	64	19	7
13P-11-3-3	5.0	+2.93	3.20	+1.15	11	62	19	8
DP-11-3-4	7.0	+4.28	3.54	+0.75	3	49	32	16
DP-11-3-5	13.0	+5.03	3.17	+0.85	<1	41	42	17

Table 3-2: Grain size data for beach samples of Bay 11

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
BO-1 -1-2	+1 .21	1.77	+0.91	17	80	2	1	Beach face
BO-1 -4-1	-0.33	1.66	+3.71	47	50	3	<1	Berm
BO-1 -4-2	+0.18	1.67	+2. 98	26	70	3	1	Beach face
BO-1 -4-3	+1 .42	1.97	+1 .45	14	80	5	1	Beach face
BO-1 -4-4	+1 .77	2.14	+1 .08	16	76	6	2	Beach face
BO-1 -4-5	+0. 82	1.46	+0.16	18	81	1		Beach face
BO-1 -5-1	-0.32	1.10	+2.12	36	62	2		Backshore
BO-1 -5-2	-0.36	1..24	+1 .78	49	50	1		Beach face
Be-l -5-3	+1 .48	1.81	+1 .58	12	85	2	1	Beach face
BO-1 -5-4	+1.1	1.99	+1 .27	24	71	4	1	Beach face
BO-1 -5-5	+1 .03	1.35	-0.17	14	85	1		Beach face
BO-1 -6-1	+0.60	1.79	+2.10	24	72	3	1	Backshore
BO-1 -6-2	+0.77	2.06	+1 .80	25	69	5	1	Beach face
BO-1 -6-3	+1 .43	2.05	+1.12	20	75	4	1	Beach face
BO-1 -6-4	+0.44	1.76	+1 .61	32	67	1	<1	Beach face

BAY 13

Contents	Figure/Table	Page
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Grain size data for sediment cores and diver collected samples	Table 4-1	68
Grain size data for beach samples	Table 4-2	69
Vibra core data sheets: SC-1 to SC-15		70 - 84

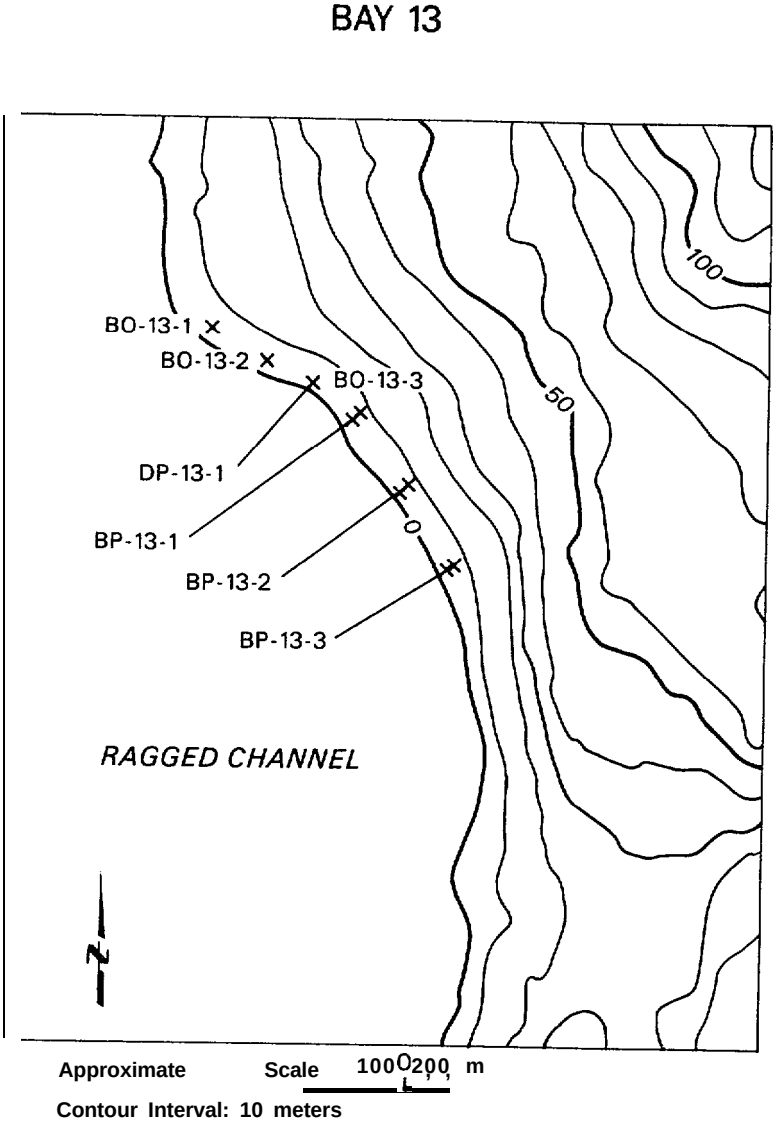
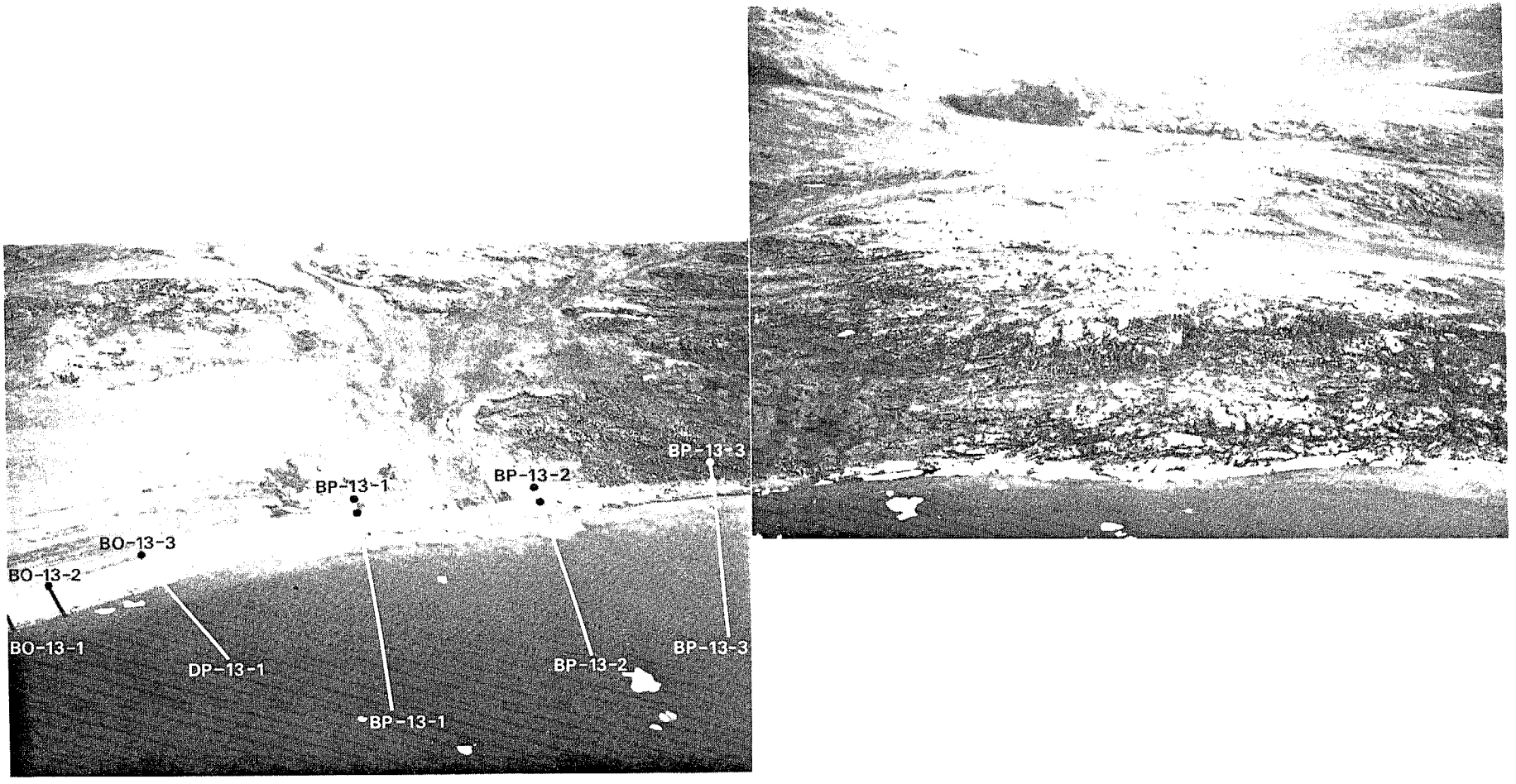


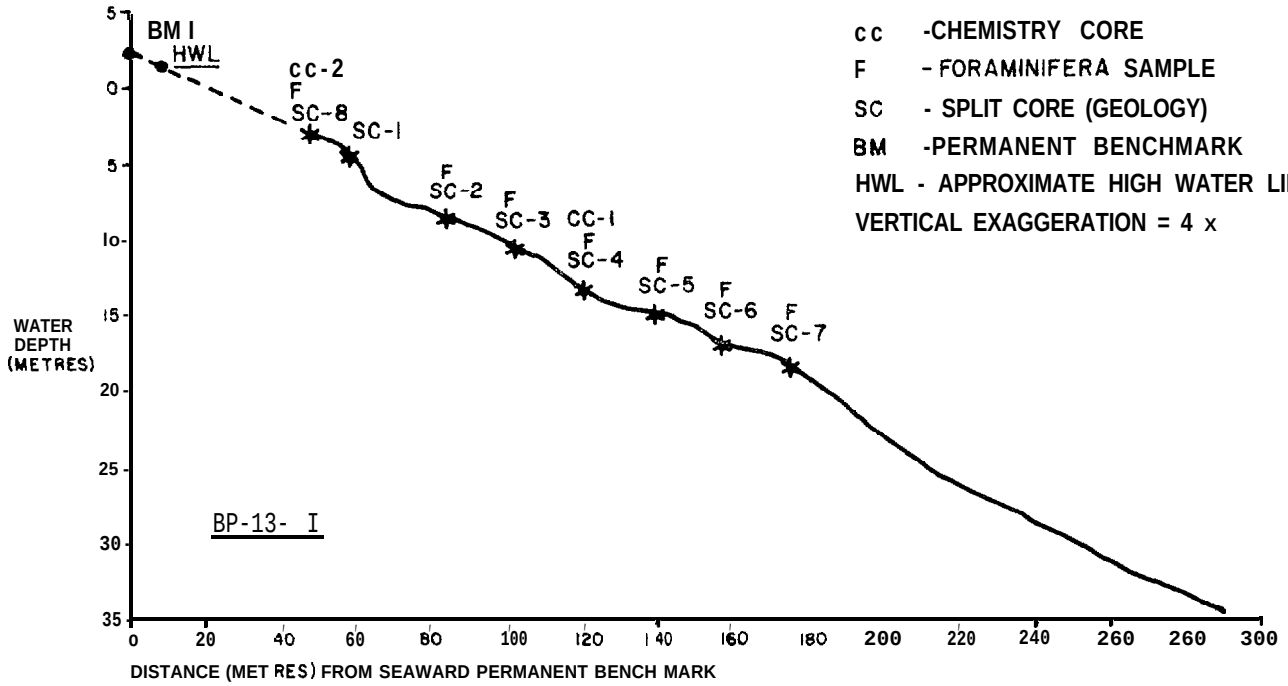
Figure 4-1: Location of beach observations and profiles (BO); beach, nearshore and offshore profiles (BP); dive profile (DP); permanent bench marks (x); and general topography of Bay 13

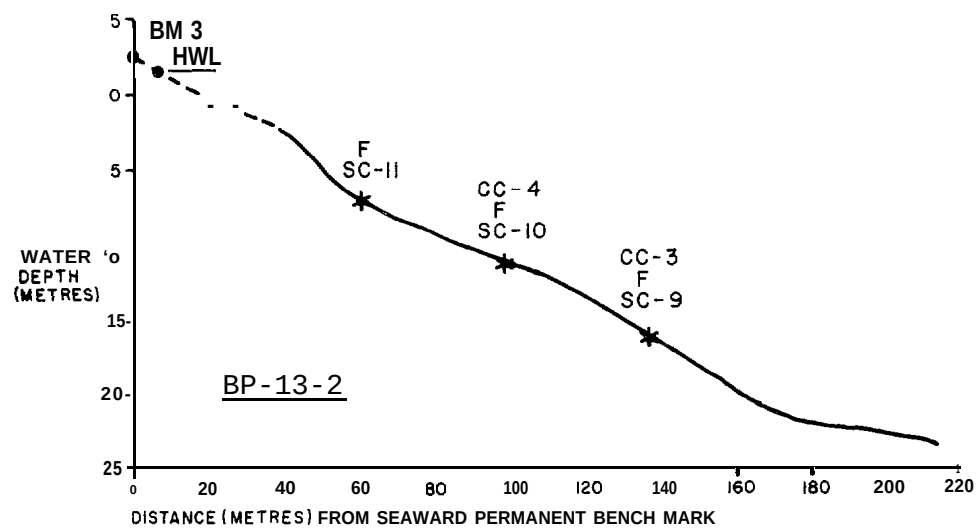

BP-13-3
BP-13-1
BP-13-2
BO-13-3
BO-13-2
BO-13-1
DP-13-1
BP-13-2
BP-13-3
BP-13-1

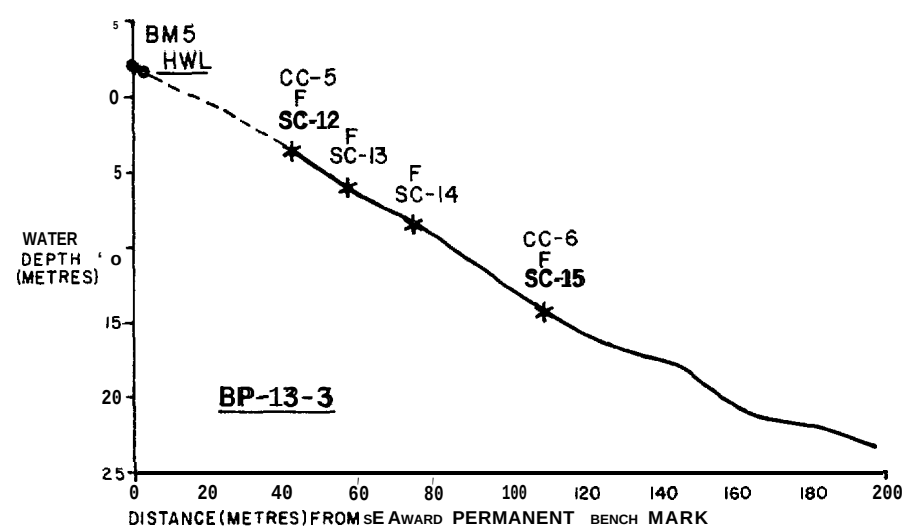
RA

[redacted]

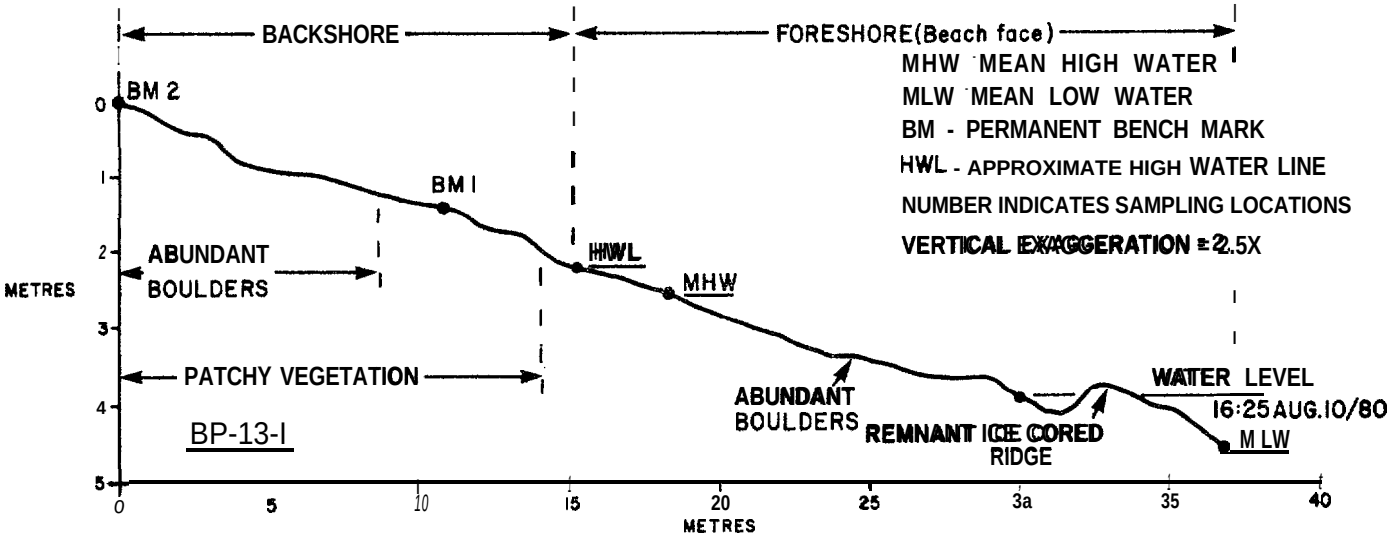
OFFSHORE AND NEARSHORE PROFILE - BAY 13

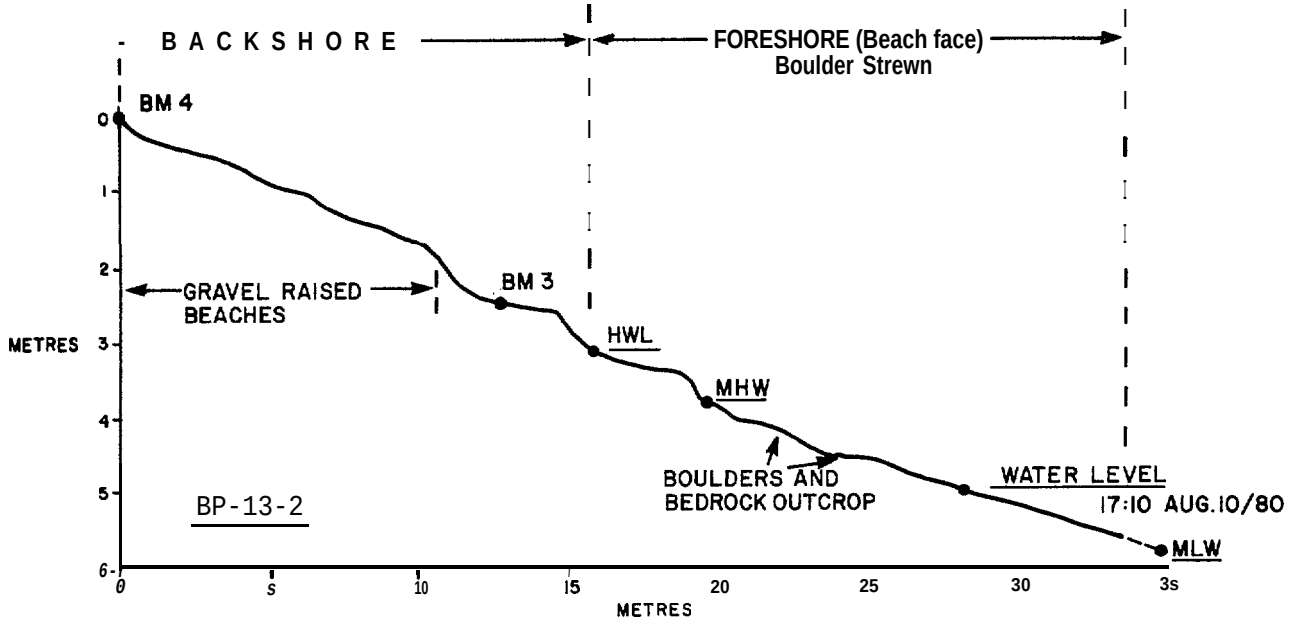


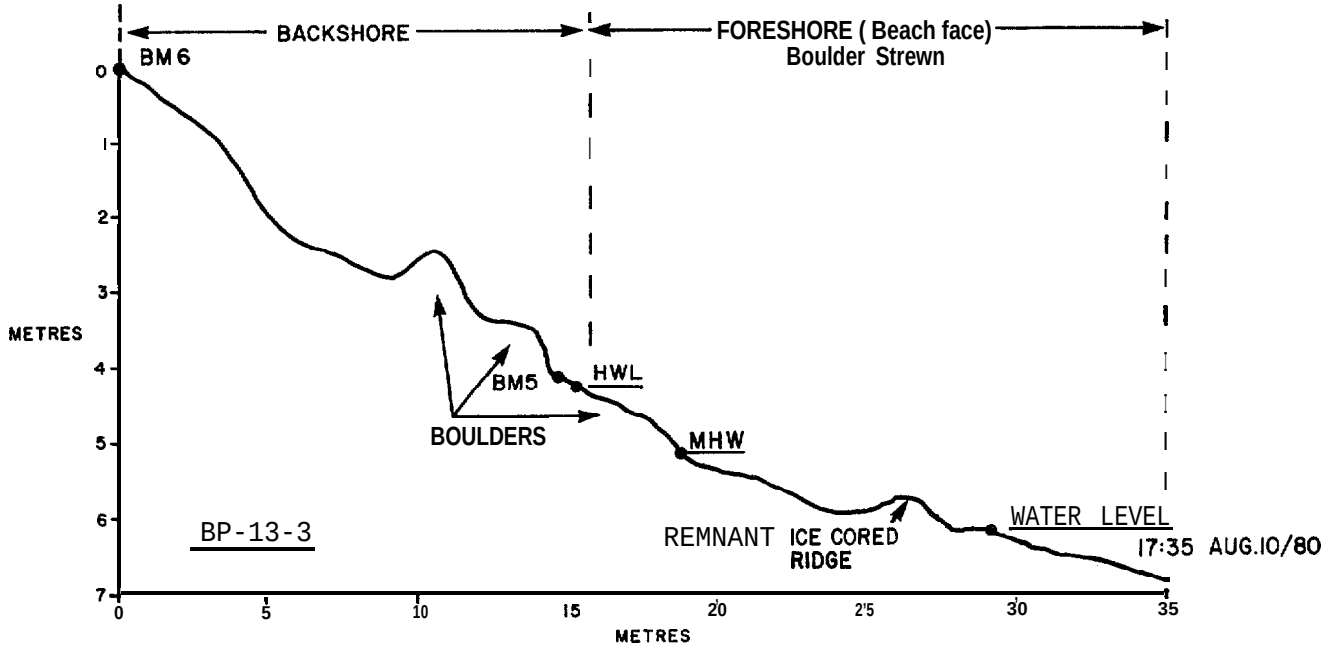


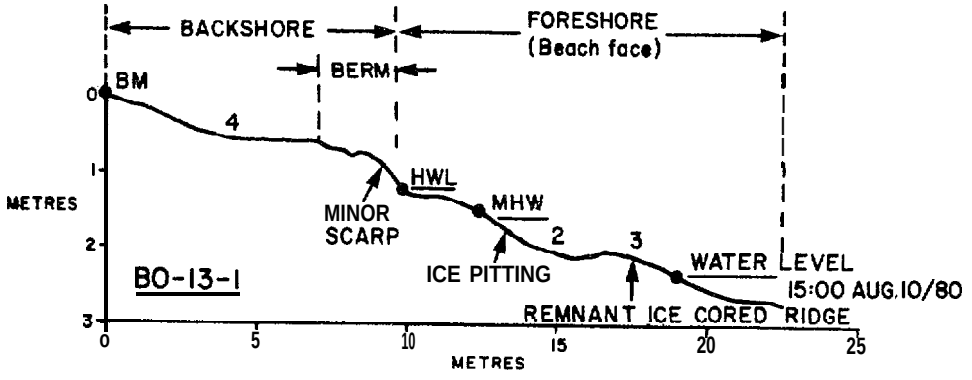


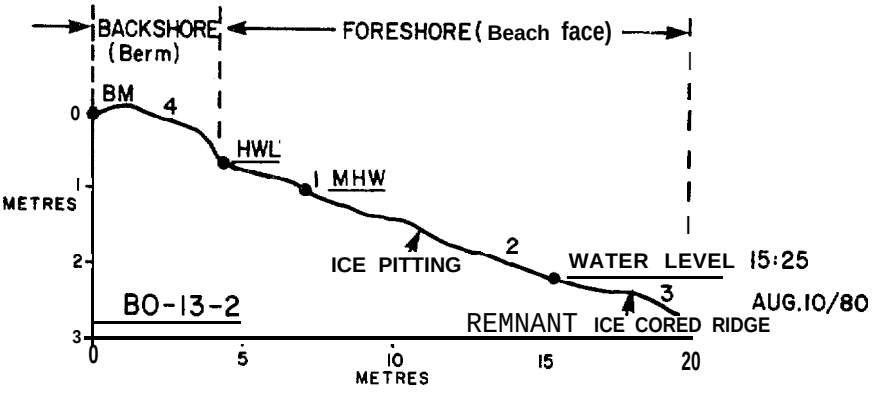
BEACH PROFILES - BAY 13

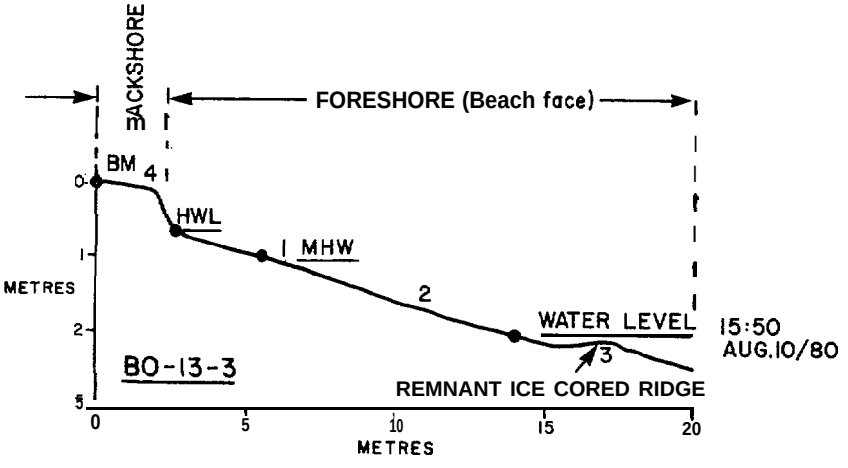







BACKSHORE
FORESHORE
(Beach face)
BERM
BM
4
HWL
MINOR
SCARP
MHW
2
3
ICE PITTING
WATER LEVEL
15:00 AUG.10/80
REMNANT ICE CORED RIDGE
BO-13-1
METRES
0
1
2
3
0
5
10
15
20
25
METRES


BACKSHORE
(Berm)
FORESHORE (Beach face)
BM
4
HWL
1 MHW
2
ICE PITTING
WATER LEVEL 15:25
AUG.10/80
3
REMNANT ICE CORED RIDGE
BO-13-2
METRES
0
1
2
3
0
5
10
15
20
METRES


BACKSHORE
FORESHORE (Beach face)
BM
4
HWL
1 MHW
2
WATER LEVEL
15:50
AUG.10/80
3
REMNANT ICE CORED RIDGE
BO-13-3
METRES
0
1
2
3
0
5
10
15
20
METRES

able 4-1: Grain size data for sediment cores and diver collected samples of Bay 13.

AMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
ediment Cores									
3-I-2-SC-I	4.2	+3.15	2.6	+1 .63	4	78	11	7	
3-l-4-SC-2A	8.27	+3.38	2.98	+1.21	7	68	16	9	0-7 cm. facies
3-I-4-SC-2P	8.27	i-2.96	2.81	+1 .09	9	70	15	6	7-20 cm. facies
3-1-4-SC-2C	8.27	+4. 38	4.14	+0.53	7	48	23	22	20-40 cm. facies
3-l-5-SC-3A	10.39	+3.7	2.71	+1.19	3	68	21	8	0-7 cm. facies
3-1-5-SC-3B	10.39	+3.06	2.89	+1.16	8	69	16	7	7-30 cm. facies
3-l-6-SC-4A	13.37	+4.55	3.65	+0.68	6	52	24	18	0-26 cm. facies
3-1-6-SC-4B	13.37	+5.49	3.59	+0.45	3	41	31	25	26-35 cm. facies
3-l-8-SC-5A	14.91	+3.9	3.73	+0.71	9	52	24	15	0-15 cm. facies
3-1-8-SC-5B	14.91	+4.63	4.07	+0.47	6	46	25	23	15-51 cm. facies
3-l-9-SC-6A	16.87	+4.34	3.44	+0.82	4	55	25	16	0-7 cm. facies
3-1-9-SC-6B	16.87	+5.34	3.51	+0. 58	2	43	33	22	7-29 cm. facies ,
3-1-9-SC-6C	16.87	+4.57	3*94	+0.56	5	50	24	21	29-42 cm. facies
I3-1-10-SC-7	18.23	i-6.56	4.31	-0.24	3	29	27	41	
13-1-1-SC-8	2.66	+2.10	1.91	+2.14	5	89	4	2	
13-2-19-SC-9A	16.02	+4.39	3.64	+0.72	6	52	25	17	0-47 cm. facies
13-2-19-SC-9B	16.02	+5.70	4.29	+0.06	5	35	28	32	47-53 cm. facies
I3-2-17-SC-10	11.37	+4 .04	3.36	+0.93	5	59	22	14	
13-2-15-SC-11	7.10	+3.07	2.62	+1 .61	4	78	11	7	
13-3-24-SC-12	3.58	+2.62	2.42	+1 .89	6	81	8	5	
13-3-25-SC-13	6.1(I	+3.37	2.51	+1 .88	2	78	13	7	
13-3-26-SC-14	8.45	+3.63	2.66	+1 .74	1	75	15	9	
13-3-28-SC-15	14.47	+5.34	3.18	+0. 90	<1	45	35	20	
liver Collected Samples									
1P-13-1-1	4.57	+2.75	2.06	+2.24	2	87	7	4	
1P-13-1-2	7.62	+3.21	2.53	+1 .58	4	77	13	6	Scour crater
1P-13-1-3	9.14	+3. 50	2.76	+1 .44	4	73	15	8	
1P-13-1-4	16.76	+4. 68	3.3	+0.90	2	53	29	16	

Table 4-2: Grain size data for bath samples of Bay 13.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
BO-13-1-1	+0.66	1.13	-o.01	15	84	<1		Beach face
BO-13-1-2	+0. 27	1.3	+0.42	30	69	<1		Beach face
BO-13-1-3	+0.36	1.31	+0. 44	26	73	<1		Ice round crest
W-13-1-4	+1.14	2.02	+1. 77	21	72	6	1	Backshore
BO-13-2-1	+1.52	0.66	-1.13	1	99	<1		Beach face
BO-13-2-2	+0. 29	1.09	+0. 18	21	79	<1		Beach face
BO-13-2-3	-0.04	1.02	+0. 68	26	74	<1		Ice mound crest
BO-13-2-4	+1.15	1.12	+3.84	2	96	1	<1	Backshore
BO-13-3-1	+0.69	0.71	+0.53	3	96	<1		Beach face
BO-13-3-2	+0.42	0.92	+0. 46	11	89	<1		Beach face
BO-13-3-3	-0.07	0.86	+0. 89	19	80	<1		Ice mound crest
BO-13-3-4	+1.45	1.46	+2. 68	4	92	3	<1	Backshore

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 1 3 13-1-2-SC-1

PROFILE NO. 1

STATION NO. 2

SPLIT CORE NO. 1

WATER DEPTH (Lead line) 4.20 m.

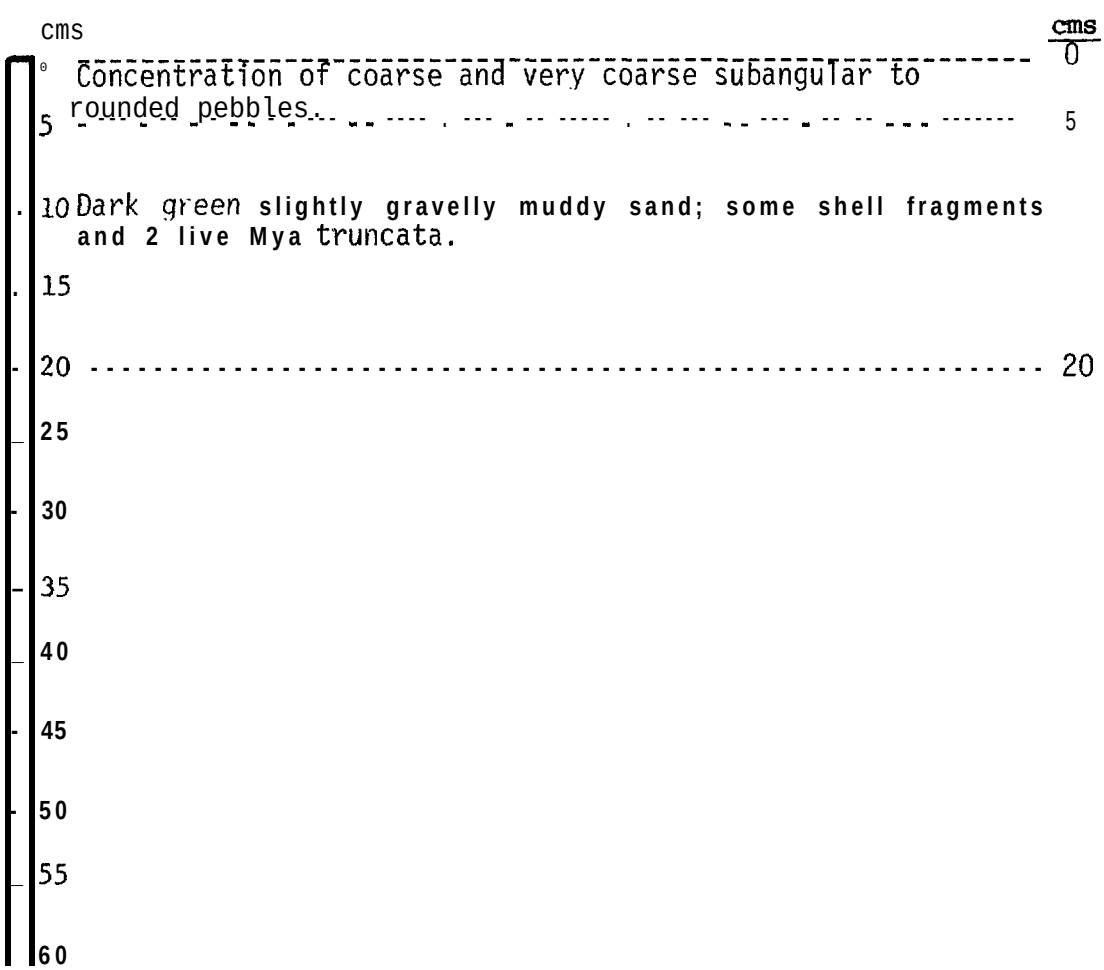
DATE 22/05/80

TIME 15:30 HRS. EDT

SAMPLE NUMBERS 13-1-2-SC-1 (0-20 cm.)

REMARKS :
Large conspicuous animals were removed from the core and preserved as 13-1-2-SC-1.

DESCRIPTION



B. I. O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-4-SC-2

PROFILE NO. 1

STATION NO. 4

SPLIT CORE NO. 2

WATER DEPTH (Lead line) 8.27 m.

DATE 26/05/80

TIME 11:00 HRS. EDT

SAMPLE NUMBERS 13-1-4-SC-2A (0-7 cm); 13-1-4-SC-2B (7-20 cm); 13-1-4-SC-2C (20-40 cm); 13-1-4-t-l

REMARKS :
Large conspicuous animals were removed from the core and preserved as 13-1-4-SC-2A and 13-1-4-SC-2B.

DESCRIPTION

cms

0 ---------- 0

Dark green gravelly muddy sand with medium pebbles and several small cobbles. Some shell fragments.

5

7

10 Dark green gravelly silty sand with some coarse pebbles and abundant **shell fragments.**

15

20 ---------- 20

25 **Dark green gravelly sandy mud with some pebbles and several small** cobbles. Very few shell fragments.

30

35

40 ---------- 40

45

50

55

60

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-5-SC-3

PROFILE NO. 1

STATION NO. 5

SPLIT CORE NO. 3

WATER DEPTH (Lead line) 10.39 m.

DATE 26/05/80

TIME 11:15 HRS. EDT

SAMPLE NUMBERS 13-1-5-SC-3A (0-7 cm); 13-1-5-SC-3B (7-30 cm); 13-1-5-F-2

REMARKS :
Large conspicuous animals were removed from the core and preserved as 13-1-5-SC-3.

DESCRIPTION

cms

0 Subrounded very coarse pebbles and small cobbles with a slightly gravelly silty sand matrix; a few small shell fragments. 7

10

15 Dark green gravelly silty sand with a few medium and fine pebbles and abundant shell fragments up to 5 cm x 4 cm in size. Numerous complete bivalves showing a preferred orientation with syphon pointing towards the core surface Mya truncata.

20

25

30 30

35

40

45

50

55

60

cms

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-6-SC-4

PROFILE NO. 1

STATION NO. 6

SPLIT CORE NO. 4

WATER DEPTH (Lead line) 13.37 m.

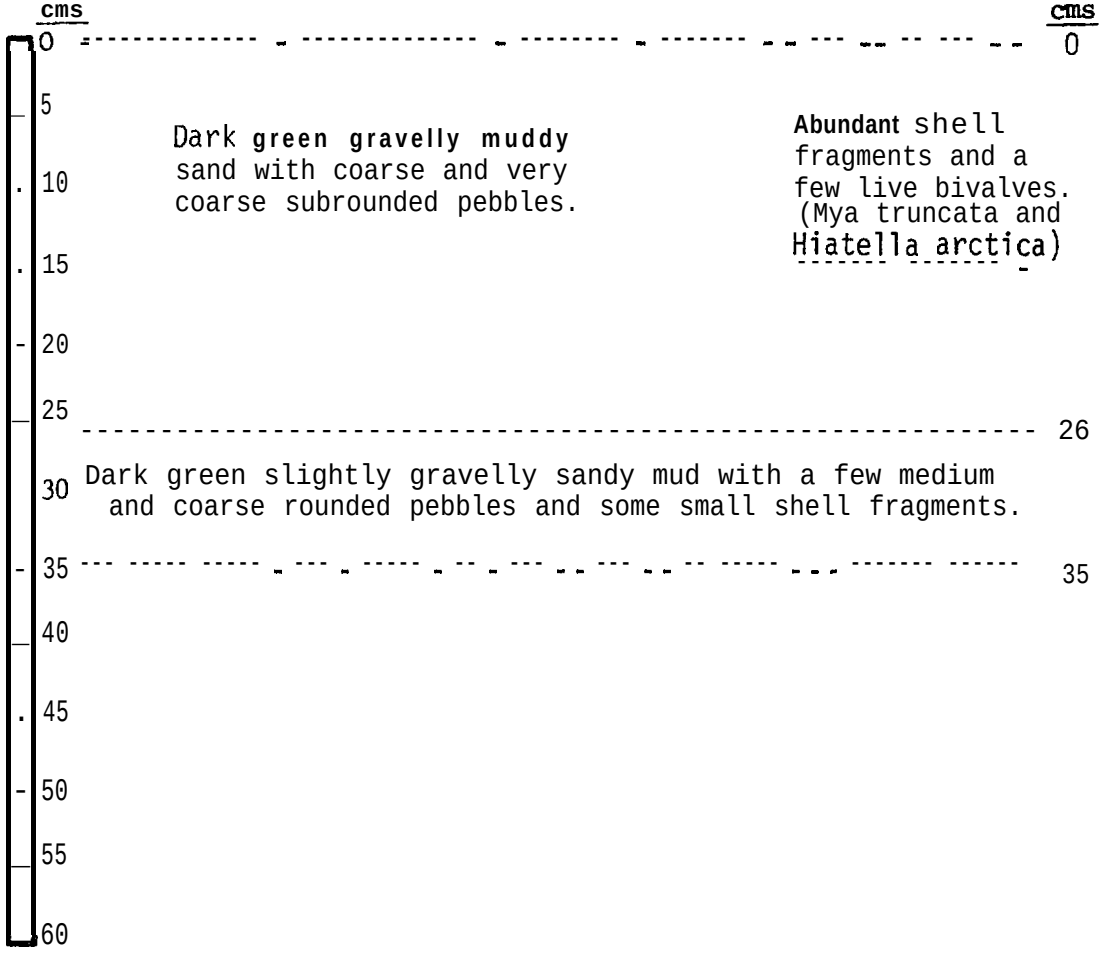
DATE 25/05/80

TIME 12:00 HRS. EDT

SAMPLE NUMBERS 13-1-6-SC-4A (0-26 cm); 13-1-6-SC-4B (26-35 cm); 13-1-6-F-3

REMARKS :
Separate core obtained for chemical analysis as 13-1-6-CC-1. Large conspicuous animals were removed from the core and preserved as 13-1-6-SC-4. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-1-6-SC-4T.

DESCRIPTION



B. I. O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13- - - -5

PROFILE NO. 1

STATION NO. 8

SPLIT CORE NO. 5

WATER DEPTH (Lead line) 14.91 m.

DATE 25/05/80

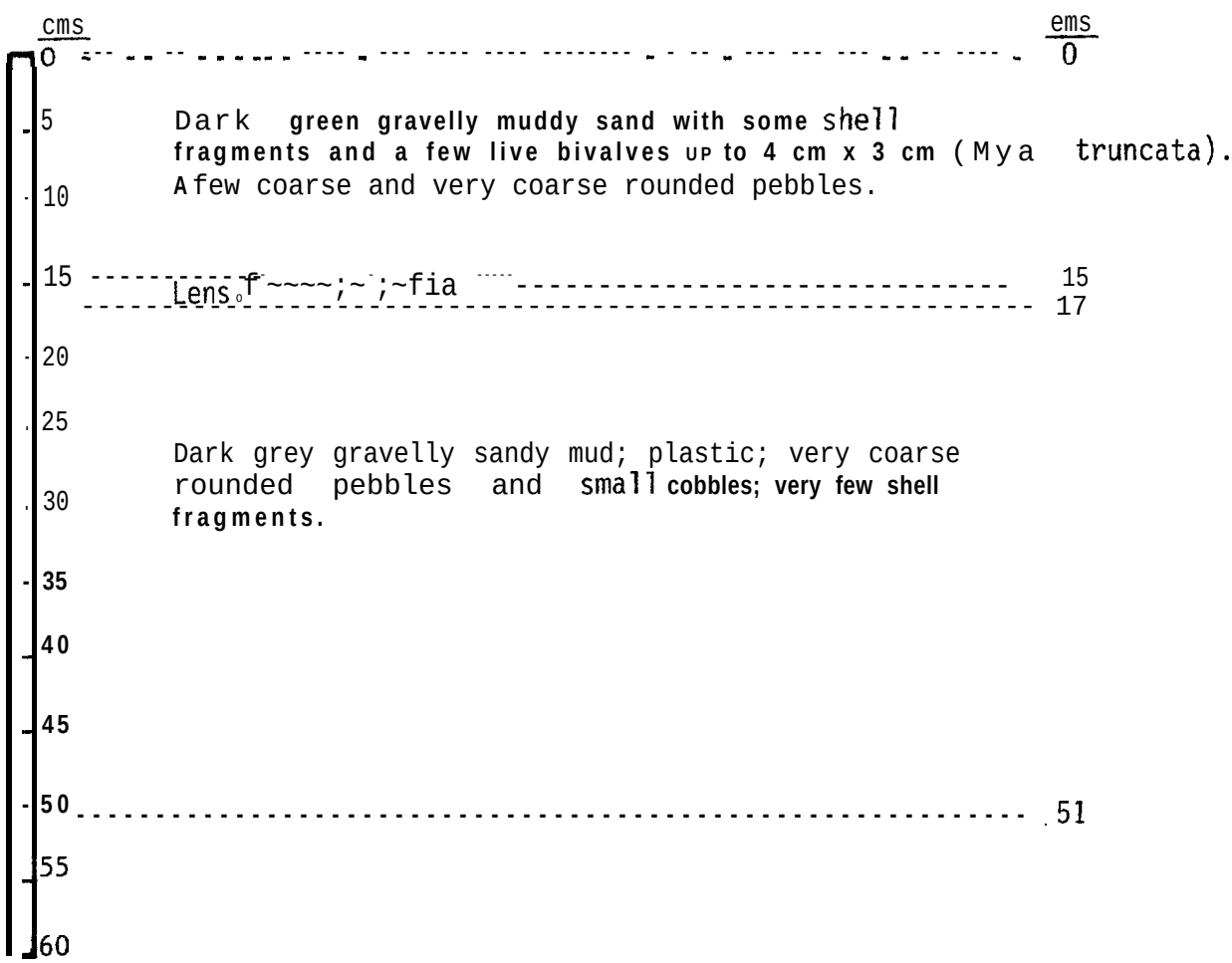
TIME 13.30 HRS. EDT

SAMPLE NUMBERS 13-1-8-SC-5A (0-15 cm); 13-1-8-SC-5B (15-51 cm); 13-1-8-F-4

REMARKS :

Large conspicuous animals were removed from the core and preserved.
Top 10 cm. (approx.) of the core were retained for biological analysis.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-9-SC-6

PROFILE NO. 1

STATION NO. 9

SPLIT CORE NO. 6

WATER DEPTH (Lead line) 16.87 m.

DATE 25/05/80

TIME 14:00 HRS. EDT

SAMPLE NUMBERS 13-1-9-SC-6A (o-7 cm); 13-1-9-SC-6B (7-29 cm); 13-1-9-SC-6C (29-42 cm)
13-1-9-F-5

REMARKS :

Large conspicuous animals were removed from the core and preserved as 13-1-9-SC-6. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-1-9-SC-6T.

DESCRIPTION

cms

0

Dark green slightly gravelly muddy sand with medium to very coarse pebbles near the core surface and a number of large shell fragments.

7 (Mya truncata).

Dark green slightly gravelly sandy mud with granules, fine to coarse pebbles and some small shell fragments.

29

Dark green slightly gravelly sandy mud with five large, complete shells oriented with their openings towards the surface of the core (Mya truncata).

42

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-10-SC-7

PROFILE NO. 1

STATION NO. 10

SPLIT CORE NO. 7

WATER DEPTH (Lead line) 18.23 m.

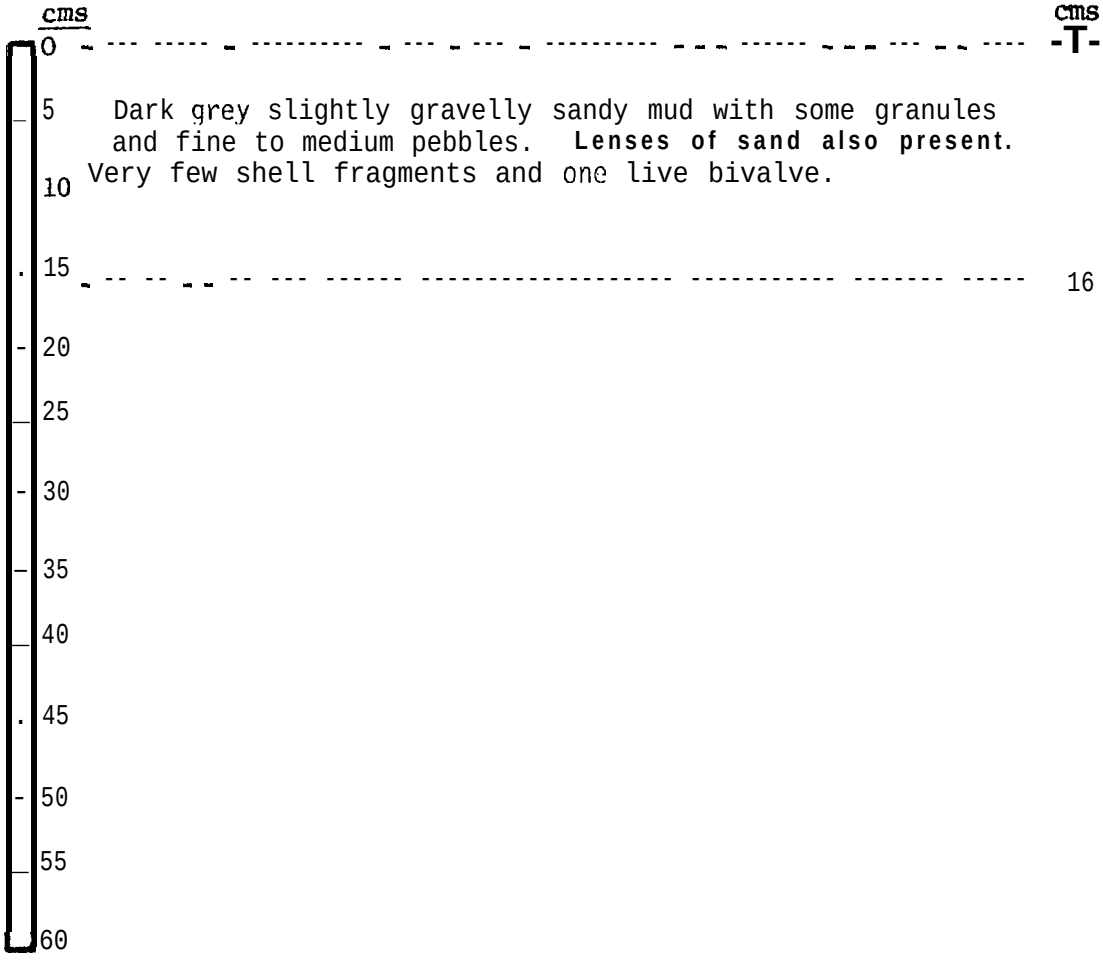
DATE 25/05/80

TIME 15:00 HRS. EDT

SAMPLE NUMBERS 13-1-10-SC-7; 13-1 -1 O-F-6

REMARKS :
Large conspicuous animals were removed from the core and preserved as 13-1-10-SC-7. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-1-1O-SC-7T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-1-1-SC-8

PROFILE NO. 1

STATION NO. 1

SPLIT CORE NO. 8

WATER DEPTH (Lead line) 2,66 m,

DATE 22/05/80

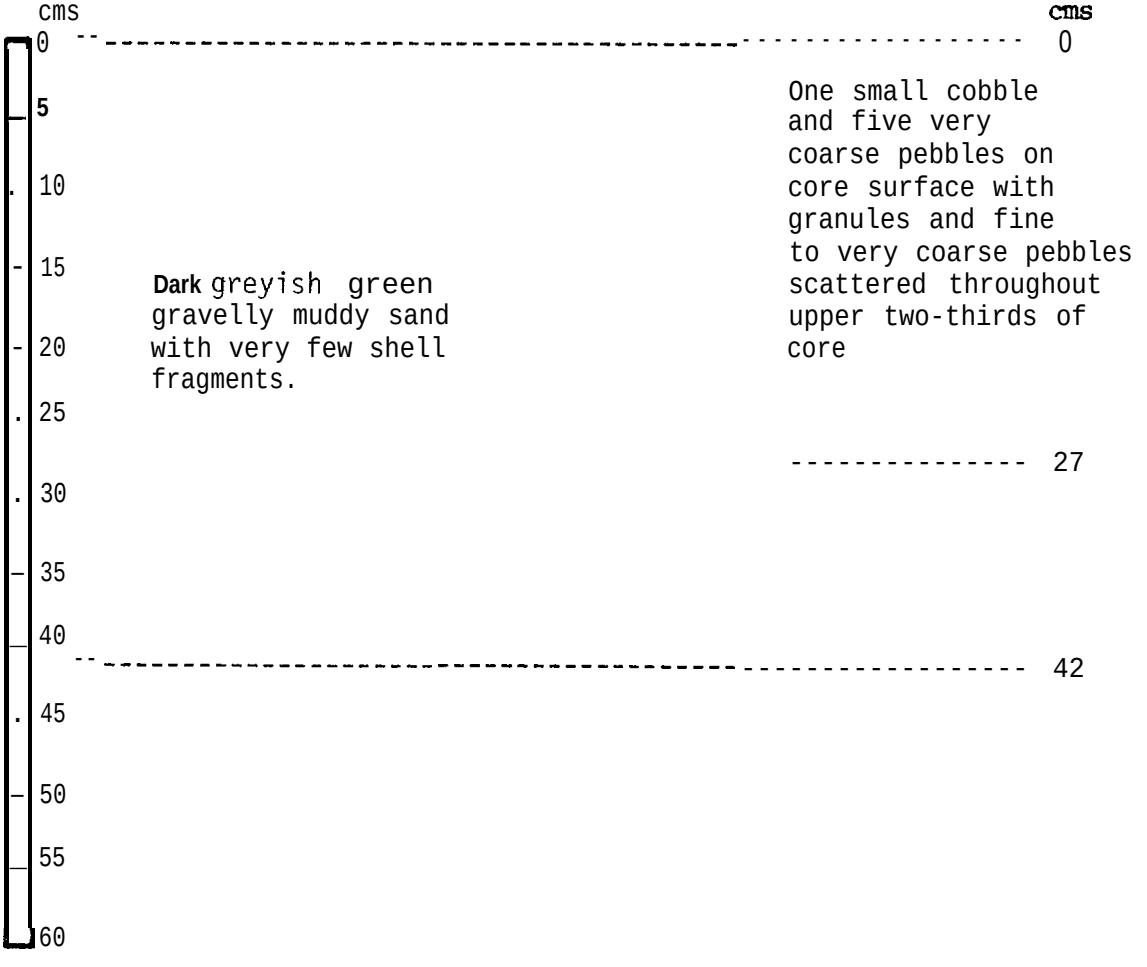
TIME 15:00 HRS. EDT

SAMPLE NUMBERS 13-1-1-SC-8; 13-1-1-F-7

REMARKS :

Separate core obtained for chemical analysis as 13-1-1-CC-2, **Top 10 cm.** (approx.) **of the core were retained for** biological **analysis as** 13-1-1-SC-8T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-2-19-SC-9

PROFILE NO. 2

STATION NO. 19

SPLIT CORE NO. 9

WATER DEPTH (Lead line) 16.02 m.

DATE 26/05/80

TIME 12:48 HRS. EDT

SAMPLE NUMBERS 13-2-19-SC-9A (0-47 cm); 13-2-19-SC-9B (47-53 cm); 13-2-19-F-8

REMARKS :

Separate core obtained for chemical analysis as 13-2-19-CC-3. Large conspicuous animals were removed from the core and preserved as 13-2-19-SC-9. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-2-19-SC-9T.

DESCRIPTION

cms ems

0

5

10

15

20

25

30

35

40

45

50

55

60

Abundant shell fragments (Mya truncata and Hiatella arctica).

Dark green gravelly muddy **sand with some pebbles and one small cobble.**

18

47

Dark grey gravelly sandy mud with a few coarse pebbles; cohesive and plastic

53

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-2-17-SC-10

PROFILE NO. 2

STATION NO. 17

SPLIT CORE NO. 10

WATER DEPTH (Lead line) 11.37 m.

DATE 26/05/80

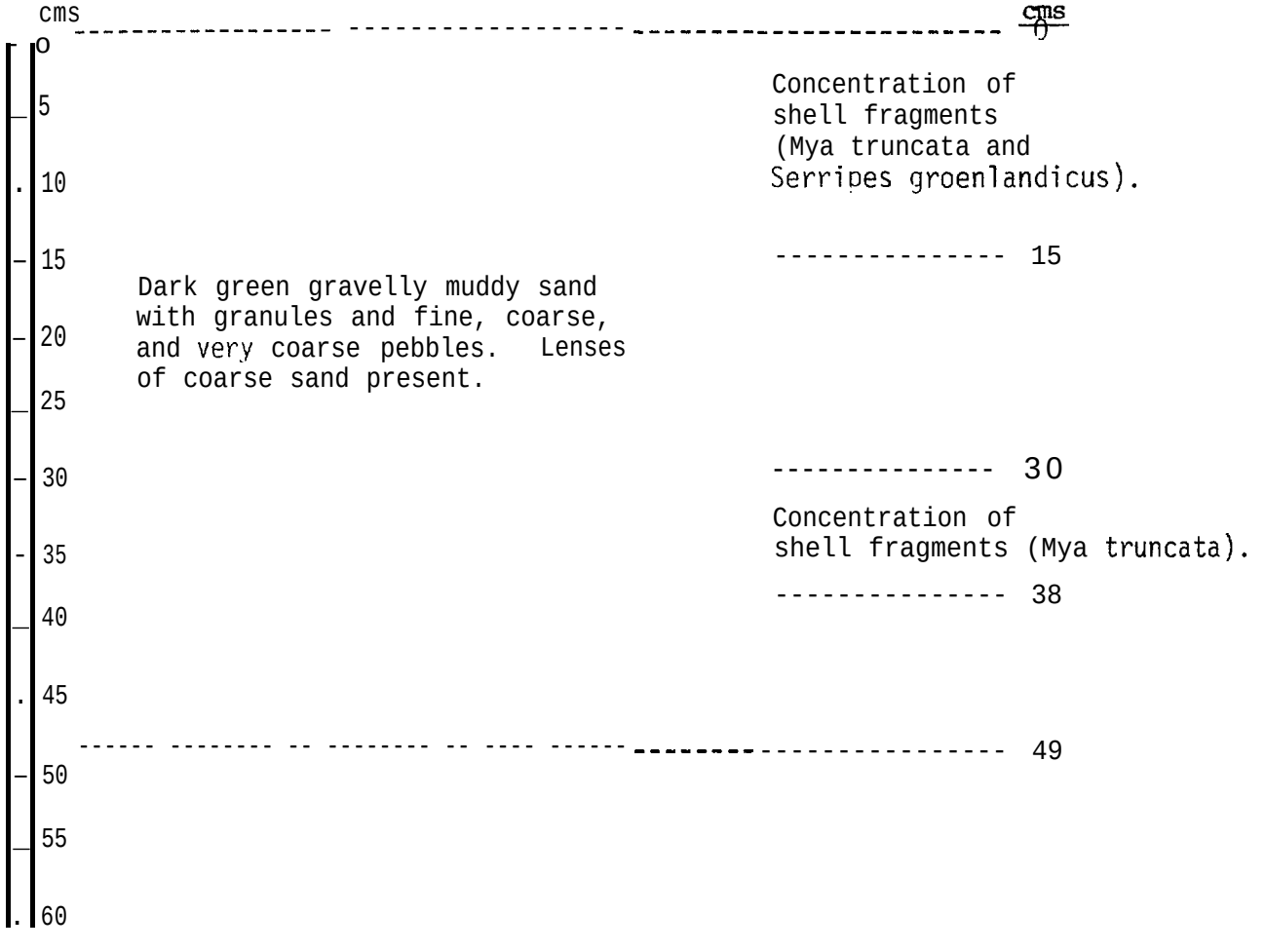
TIME 16:50 HRs. EDT

SAMPLE NUMBERS 13-2-17-SC-10; 13-2-17-F-9

REMARKS :

Separate core obtained for chemical analysis as 13-2-17-CC-4. Large conspicuous animals were removed from the core and preserved as 13-2-17-SC-10. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-2-17-SC-10T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-2-15-SC-11

PROFILE NO. 2

STATION NO. 15

SPLIT CORE NO. 11

WATER DEPTH (Lead line) 7.10 m.

DATE 26/05/80

TIME 18:05 HRS. EDT

SAMPLE NUMBERS 13-2-15-SC-11 (0-23 cm); 13-1-15-F-10

REMARKS :
Large conspicuous animals were removed from the core and preserved as 13-2-15-SC-11. Top 10 cm, (approx.) of the core were retained for biological analysis as 13-2-15-SC-11T.

DESCRIPTION

cms		cms
0		0
	Veneer of subangular to rounded medium to very coarse pebbles	
5		4
10	Dark green slightly gravelly muddy sand with rounded medium and coarse pebbles and a few shell fragments. Several live bivalves near the top of the core (Mya truncata).	
15		
20		
		23
25		
30		
35		
40		
45		
50		
55		
60		

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-3-24-SC-12

PROFILE NO. 3

STATION NO. 24

SPLIT CORE NO. 12

WATER DEPTH (Lead line) 3.58 m.

DATE 27/05/80

TIME 15:45 HRS. EDT

SAMPLE NUMBERS 13-3-24-SC-12; 13-3-24-F-11

REMARKS :
Approximately one half of the split core was retained for chemical analysis and given the sample number 13-3-24-CC-5. Large conspicuous animals were removed from the core and preserved as 13-3-24-SC-12. Balance of the core after sampling was retained for biological analysis as 13-3-24-SC-12T.

DESCRIPTION

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-3-25-SC-13

PROFILE NO. 3

STATION NO. 2_5

SPLIT CORE NO. 13

WATER DEPTH (Lead line) 6.10 m.

'ATE 27/05/80

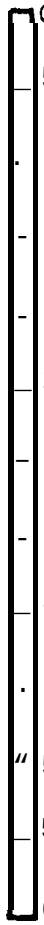
TIME 15:42 HRS. EDT

SAMPLE NUMBERS 13-3-25-SC-13; 13-3-25-F-12

REMARKs :
Large conspicuous animals were removed from the core and preserved as 13-3-25-SC-13. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-3-25-SC-13T.

DESCRIPTION

cms



Cms

0

Dark green slightly gravelly muddy sand with some subrounded to rounded medium to very coarse pebbles primarily near the surface of the core. Numerous shell fragments. One live bivalve and one live echinoderm containing a live, small bivalve.

22

B. I. O.S. PROJECT VIBRA CORE DATA

BAY NO. 13

13-3-26-SC-14

PROFILE NO. 3

STATION NO. 26

SPLIT CORE NO. 14

WATER DEPTH (Lead line) 8.45 m.

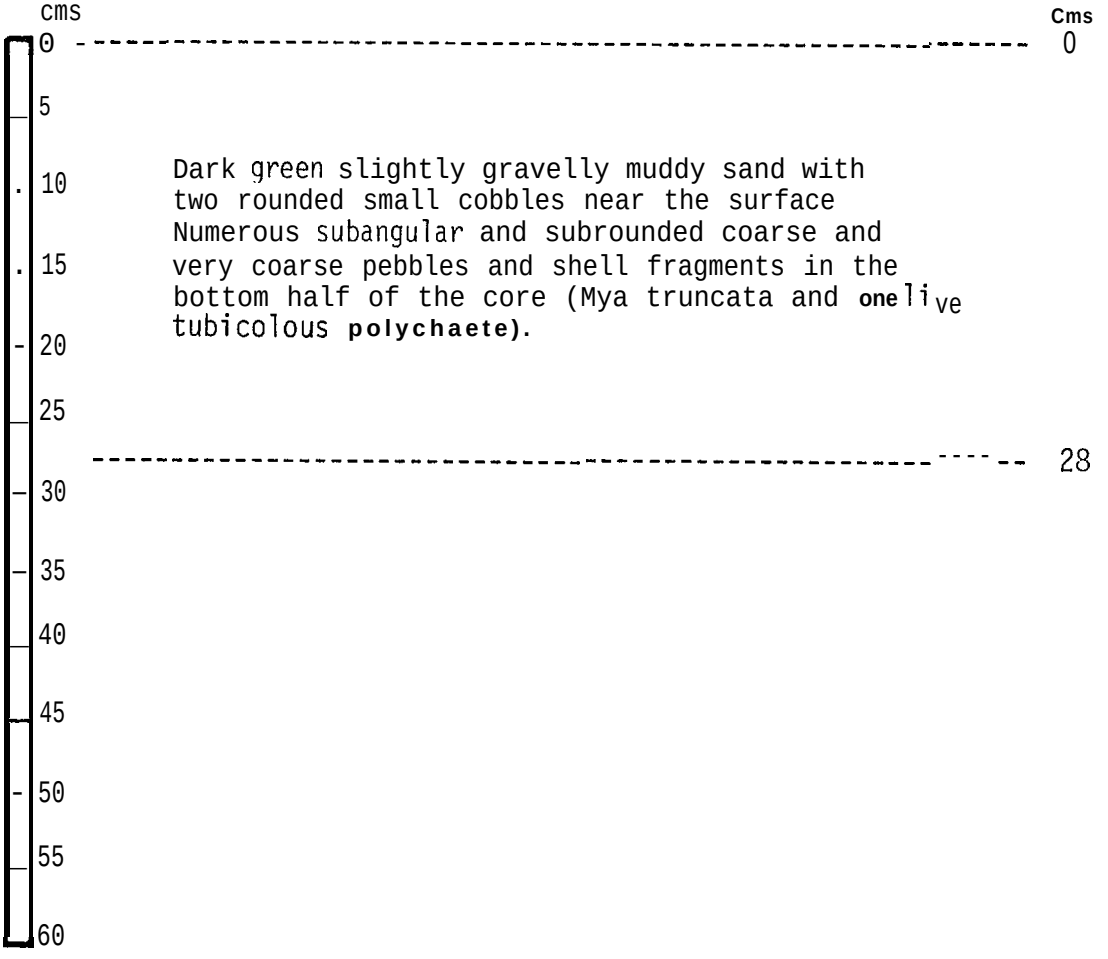
DATE 27/05/80

TIME 15:36 HRS. EDT

SAMPLE NUMBERS 13-3-26-SC-14; 13-3-26-F-13

REMARKS :
Top 10 cm. (approx.) of the core were retained for biological analysis as 13-3-26-SC-14T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 13 13-3-.28-SC-15

PROFILE NO. 3

STATION NO. 28

SPLIT CORE NO. 15

WATER DEPTH (Lead line) 14.47 m.

DATE 27/05/80

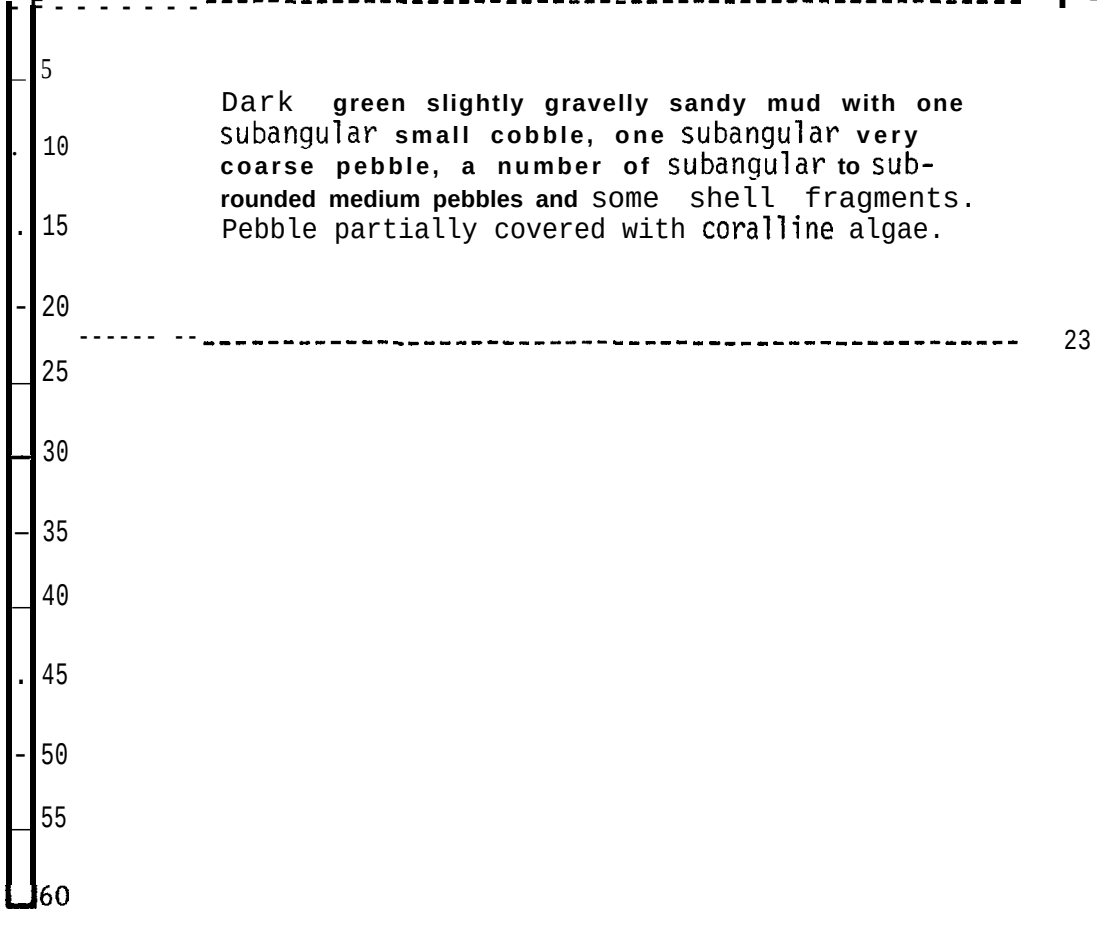
TIME 15:29 HRS. EDT

SAMPLE NUMBERS 13-3-28-SC-15; 13-3-28-F-14

REMARKs :
Separate core obtained for chemical analysis as 13-3-28-CC-6. Top 10 cm. (approx.) of the core were retained for biological analysis as 13-3-28-SC-15T.

DESCRIPTION

cms Cms



Dark green slightly gravelly sandy mud with one subangular small cobble, one subangular very coarse pebble, a number of subangular to sub-rounded medium pebbles and some shell fragments. Pebble partially covered with coralline algae.

BAY 101

Contents	Figure/Table	Page
Map of Bay 101	Fig. 5-1	86
Oblique aerial photograph of Bay 101	Fig. 5-2	87
Beach Profiles		
BO-101-1		88
BO-101-2		88
Grain size data for beach samples	Table 5-1	89

BAY 101

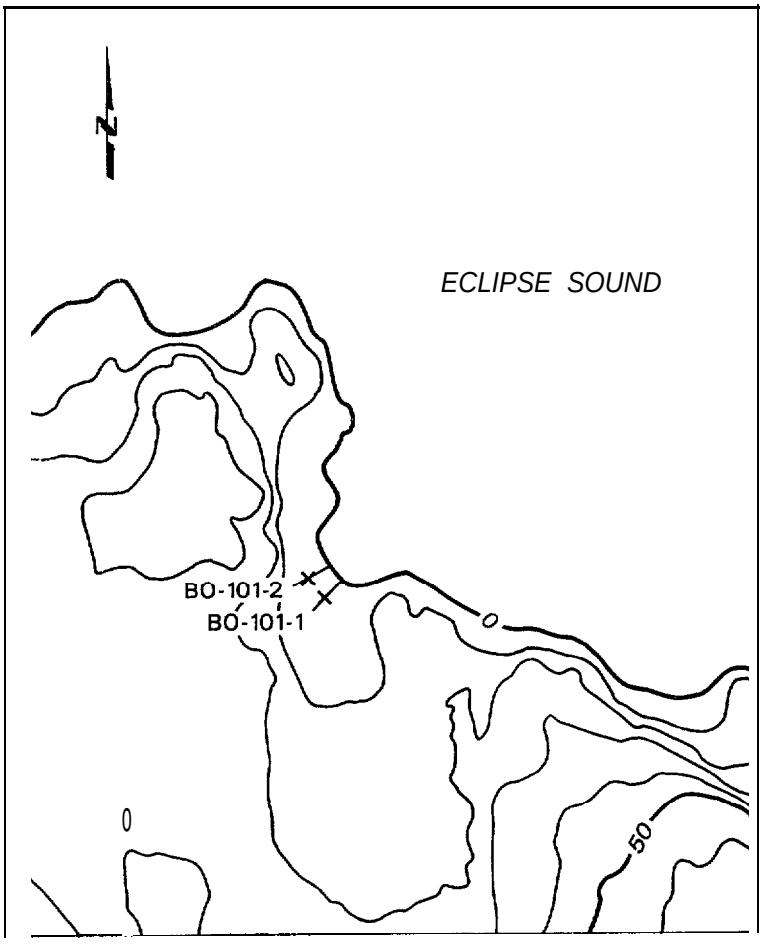
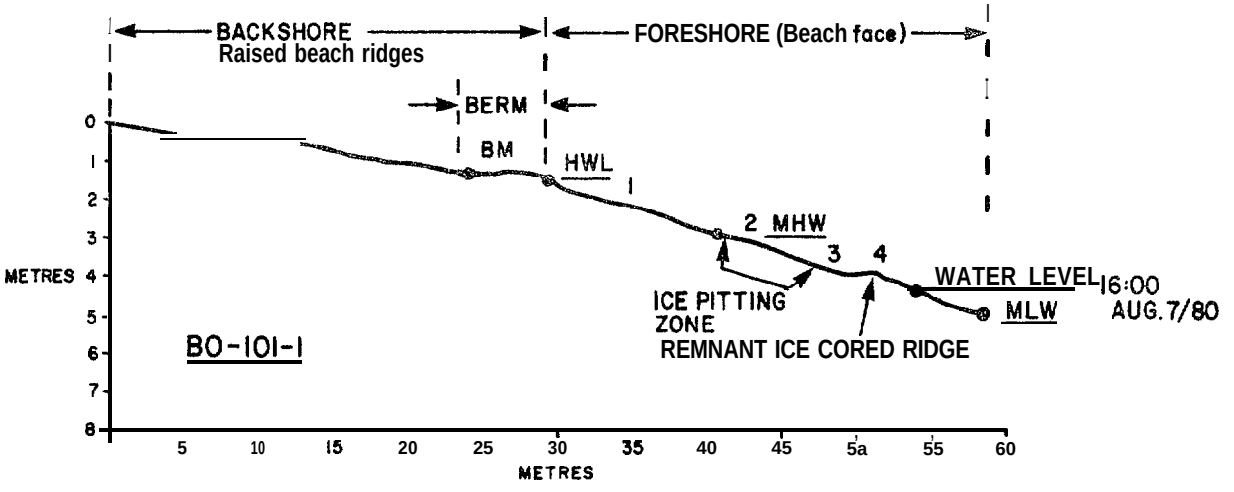
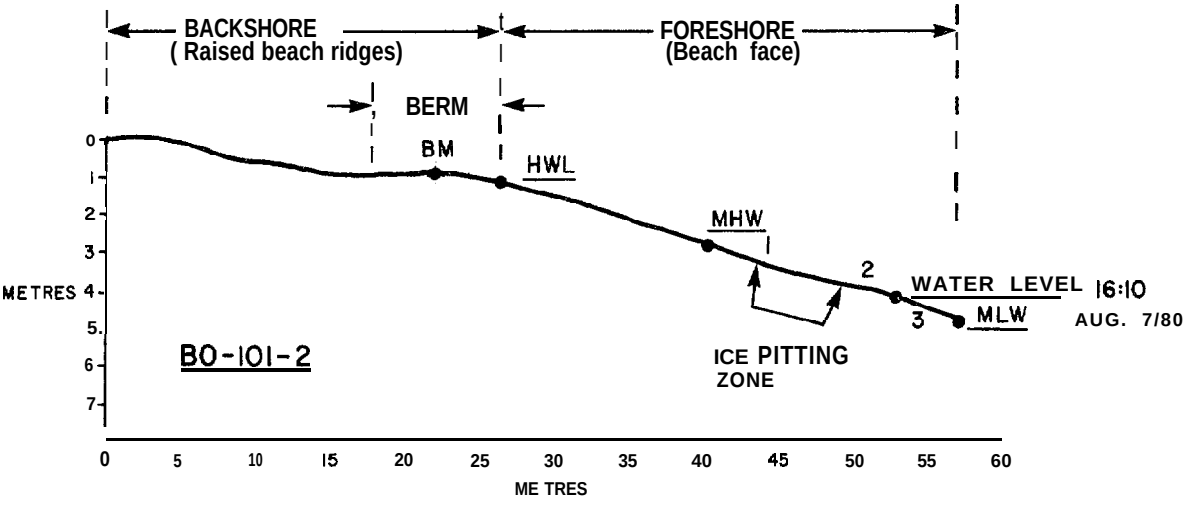


Figure *5-1:* Location of beach observations and profiles (BO); permanent bench marks (x); and general topography of Bay 101

FIG. 5.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 101

BEACH PROFILES BAY 101





MHW MEAN HIGH WATER
MLW MEAN LOW WATER
BM - PERMANENT BENCH MARK
HWL- APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2.5x

Table 5-1: Grain size data for beach samples of Bay 101.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
BO-10I-1-I	+0.01	1.00	+0.49	25	75	<1		Beach face
BO-101-1-2	-0.06	1.07	+0.34	34	66	<1		Beach face
BO-101-1-3	+0.26	0.81	+0.35	9	91	<1		Beach face
BO-101-1-4	-0.31	0.96	+0.53	42	58	<1		Ice mound crest
BO-101-2-1	+0.14	1.19	+0.07	37	62	<1		Beach face
BO-101-2-2	+0.50	1.13	-0.05	18	81	<1		Beach face
60-101-2-3	-0.78	0.76	+1 .73	63	37	<1		Ice mound crest

BAY 102

Contents	Figure/Table	Page
Map of Bay 102	Fig. 6-1	89
Oblique aerial photograph of Bay 102	Fig. 6-2	90
Offshore and nearshore profile		
BP-102-1		91
Beach Profiles		
BO-102-I		92
BO-102-3		92
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Grain size data for sediment cores	Table 6-1	93
Grain size data for beach samples	Table 6-2	94
Vibra core data sheets: SC-33 to SC-34		95 - 96

BAY 102

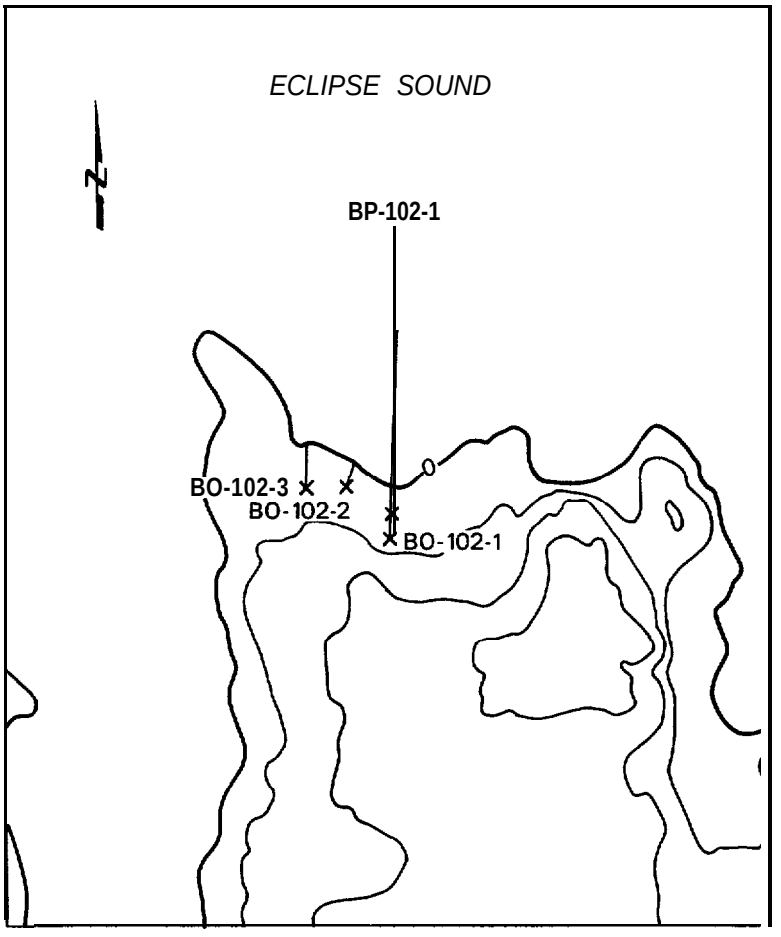


Figure 6-1: Location of beach observations and profiles (BO); beach, nearshore and offshore profiles (BP); permanent bench marks (x); and general topography of Bay 102

● **Note: No profile at BO-102-2**

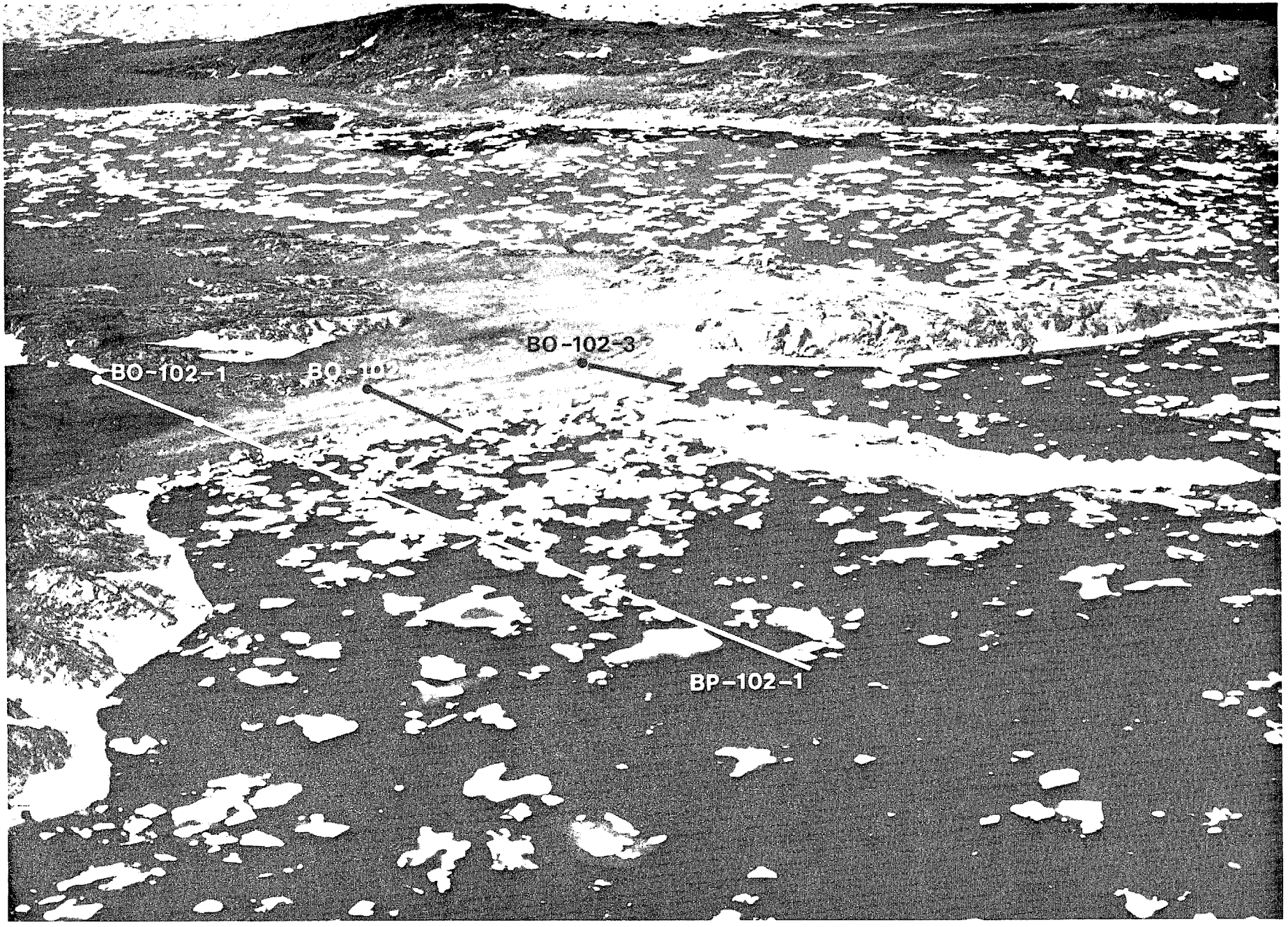
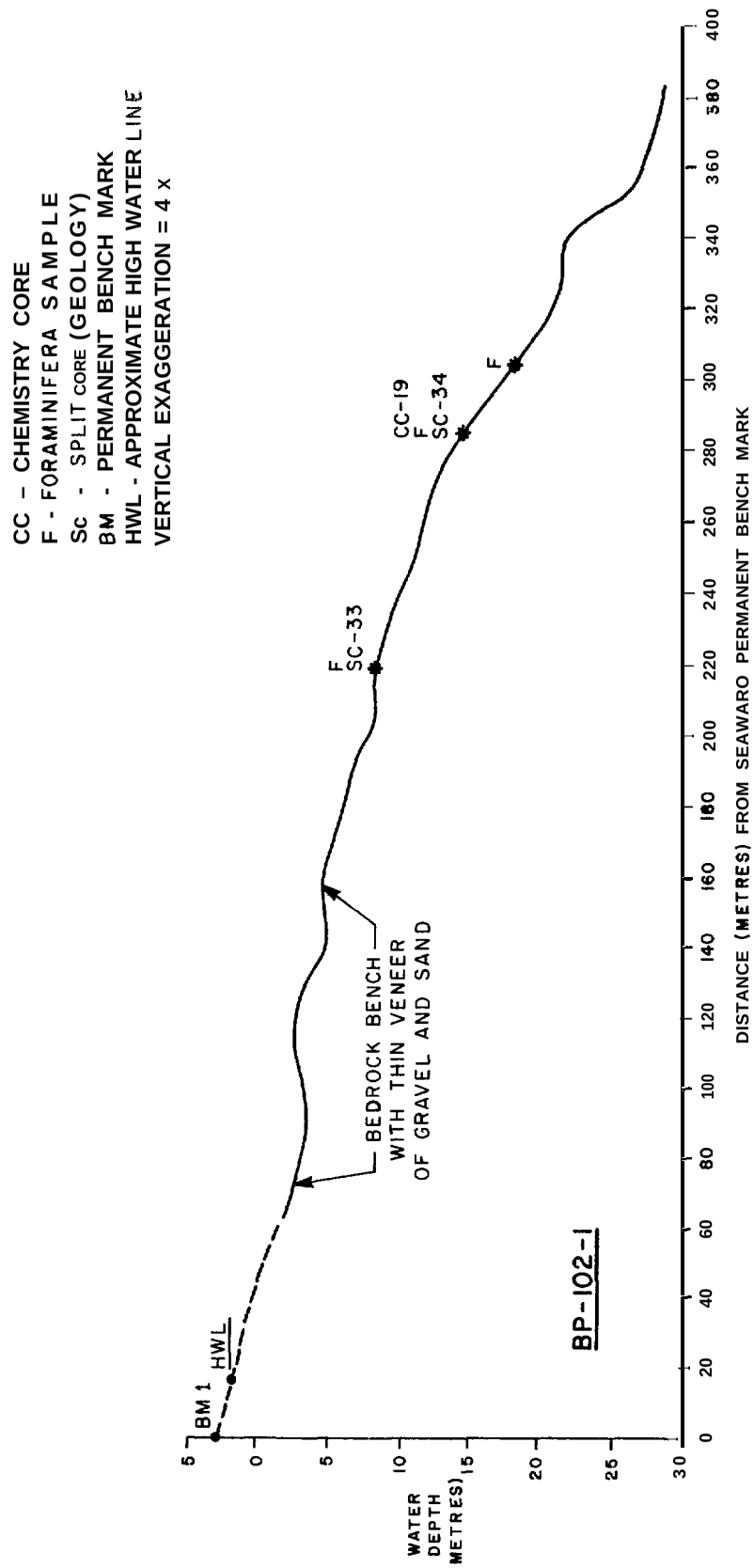
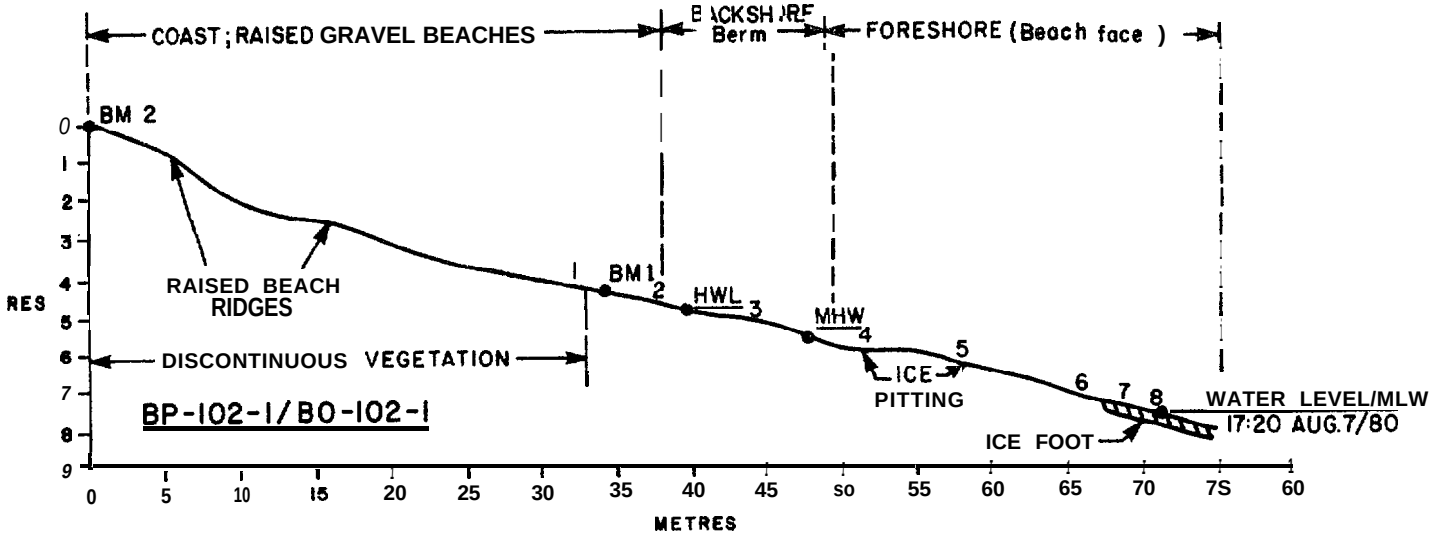


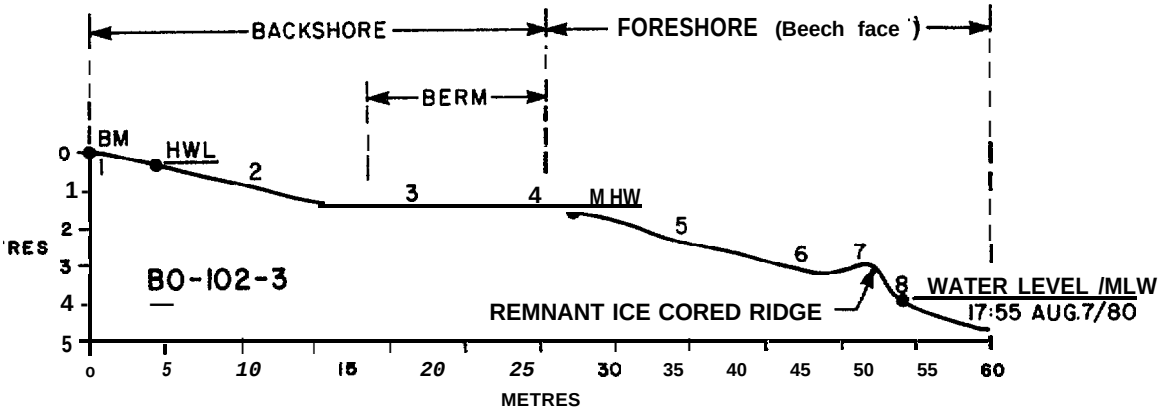
FIG. 6.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 102

OFFSHORE AND NEARSHORE PROFILE - BAY 102

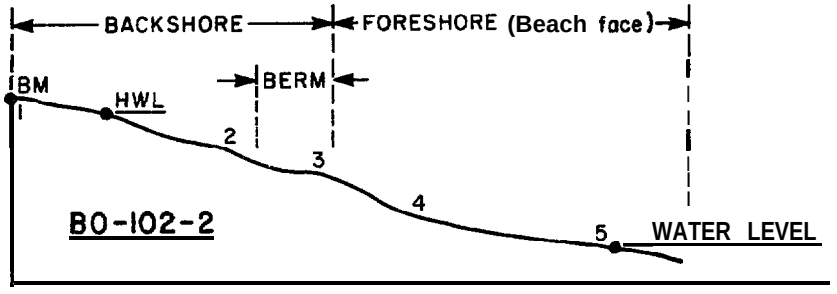


BEACH PROFILES - BAY 102





MHW MEAN HIGH WATER
MLW MEAN LOW WATER
BM - PERMANENT BENCH MARK
HWL-APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATION
VERTICAL EXAGGERATION = 2.5x



NOTE: NO PROFILE WAS COMPLETED FOR BO-102-2; THE ABOVE SKETCH IS AN APPROXIMATION.

Table 6-1: Grain size data for sediment cores of Bay 102.

SAMPLE NUMBER	WATER DEPTH	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
Sediment Cores								
102-1-11-SC-33	8.48	+0.037	2.28	+3.30	46	50	1	3
102-1-15-SC-34A	14.83	+3.49	3.35	+1.14	6	68	14	12
102-1 -15-SC-34B	14.83	+6.65	4.30	-0.23	4	30	24	42

Table 6-2: Grain size data for beach samples of Bay 102.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
BO-102-1-1	+1. 29	1.34	+4.25	2	94	3	<1	Backshore
BO-102-1-2	+0.84	0.80	+1.33	2	97	1		Backshore
KP102-1-3	+0.51	0.8	-0.54	9	90	<1		Berm crest
BO-102-1-4	-0.89	0.57	+2. 15	63	37	<1		Beach face
I32-102-1-5	-0.05	0.97	+0.39	27	72	<1		Beach face
BO-102-1-6	-0.19	0.81	+0. 61	22	77	<1		Beach face
BO-102-1-7	+0.16	0.99	+0.13	24	76	<1		Beach face
BO-102-1-8	-0.25	0.87	+0.86	28	71	<1		Ice mound crest
I33-102-2-1	+0.45	0.80	+1.51	4	95	1		Backshore
BO-.102-2-2	+0. 22	0.66	+0. 98	3	97	<1		Berm crest
BO-102-2-3	-0.81	0.52	+3. 04	43	56	<1		Berm crest
BO-102-2-4	-0.58	0.83	+1.15	50	50	<1		Beach face
ECP102-2-5	-0.05	0.89	+0.64	22	78	<1		Beach face
BO-102-3-1	+0. 86	0.85	+1.83	2	96	2		Backshore
I33-102-3-2	-0.04	0.95	+0.84	22	77	<1		Backshore
BO-102-3-3	+0. 54	0.65	-0.67	3	97			Berm
E?O-102-3-4	+0. 18	0.90	-0.05	20	80	<1		Berm crest
BO-102-3-5	-0.76	0.66	+1.9	53	47	<1		Beach face
EX3-102-3-6	-0.93	0.48	+3. 12	57	43	<1		Beach face
BO-102-3-7	-0.87	0.63	+3. 17	59	40	<1		Ice mound crest
BO-102-3-8	-1.08	0.37	+6. 24	74	26	<1		Ice mound

B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 102 102-1-11-SC-33

PROFILE NO. 1

STATION NO. 11

SPLIT CORE NO. 33

WATER DEPTH (Lead line) 8.48 m.

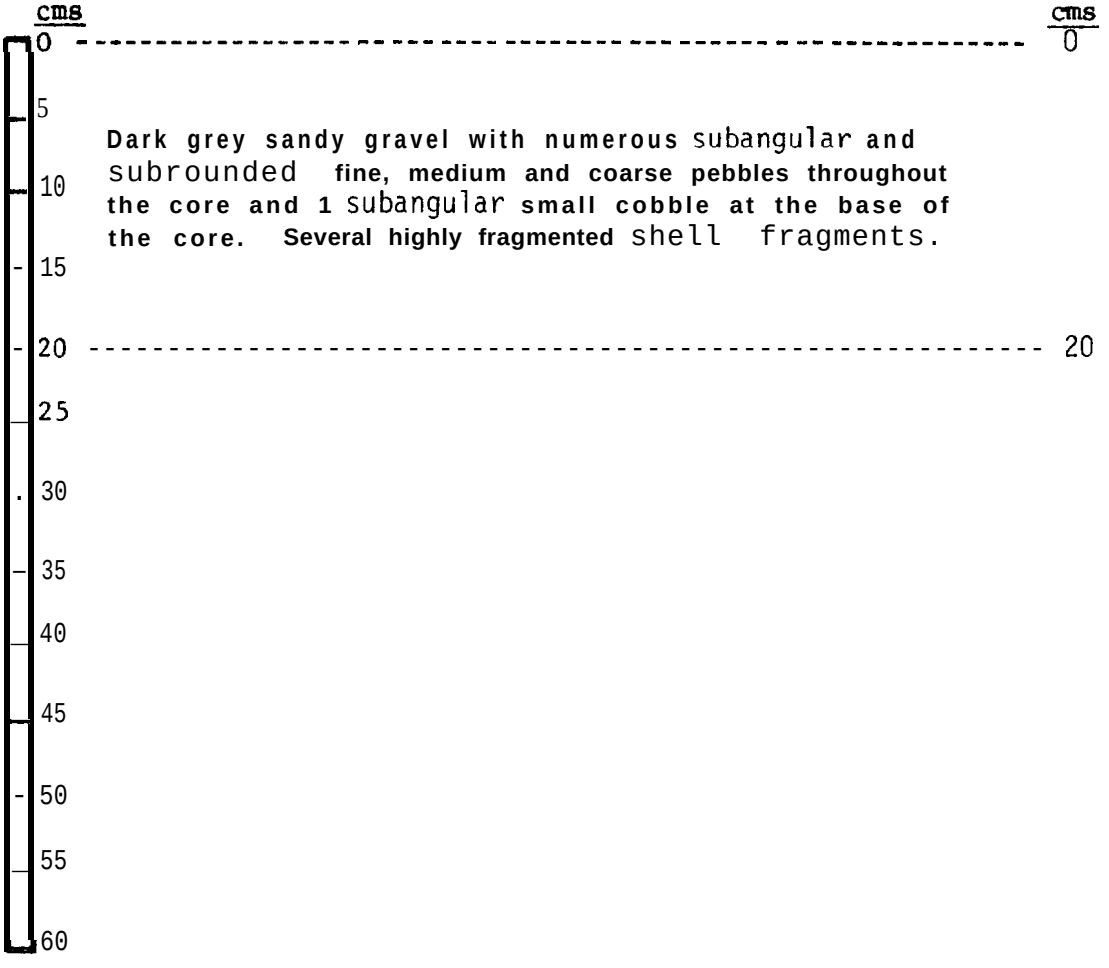
DATE 8/06/80

TIME 19:35 HRS. EDT

SAMPLE NUMBERS 102-1-11-SC-33; 102-1-11-F-41

REMARKS:
Top 10 cm. (approx.) of the core were retained for biological analysis as 102-1-11-SC-33T.

DESCRIPTION



B.I.O.S. PROJECT VIBRA CORE DATA

BAY NO. 102 102-1-15-SC-34

PROFILE NO. 1

STATION NO. 15

SPLIT CORE NO. 34

WATER DEPTH (Lead line) 14.83 m.

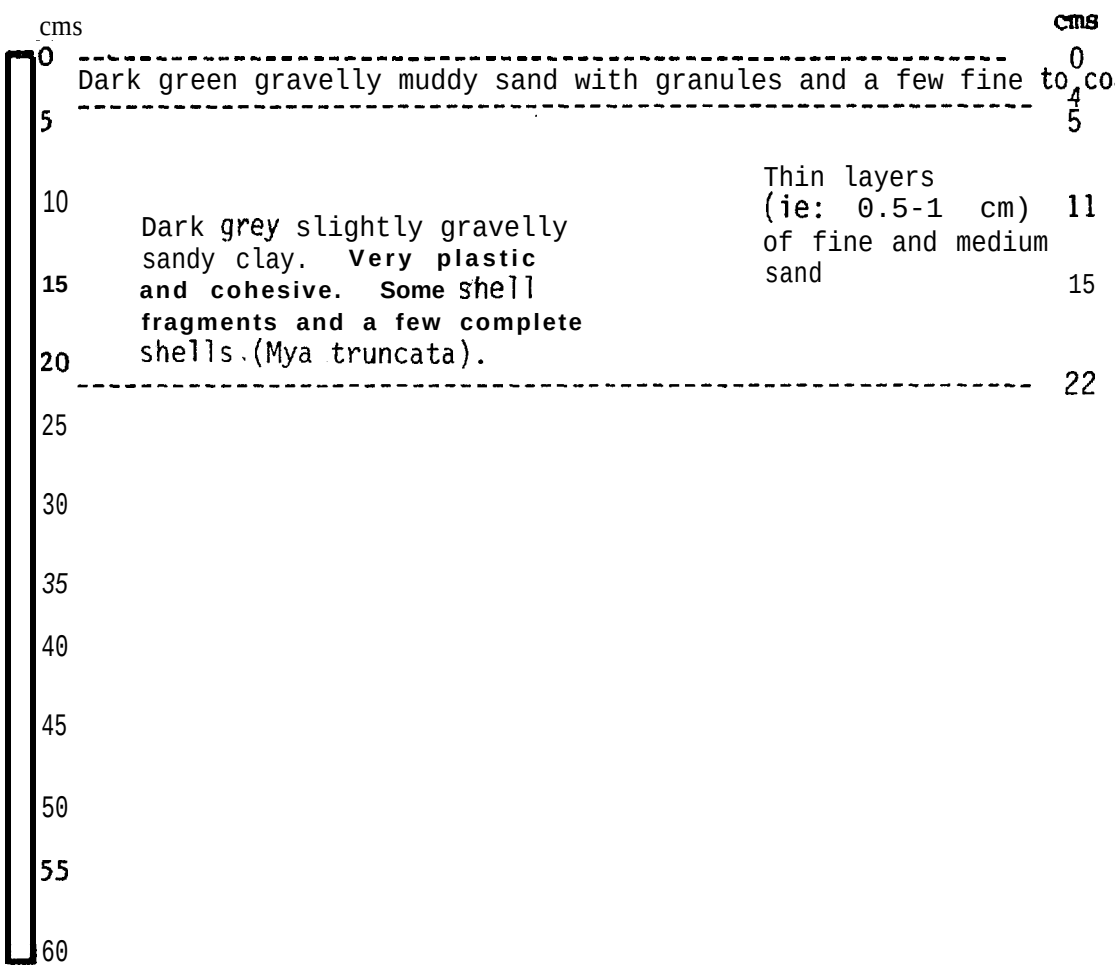
DATE 9/06/80

TIME 11:53 HRS. EDT

SAMPLE NUMBERS 102-1-15-SC-34A (O-4 cm.); 1OZ-1-15-SC-34B (4-22 cm.); 102-1-15-F-42

REMARKS :
Separate core obtained for chemical analysis as 102-1-15-CC-19.
Top 10 cm. (approx.) of the core were retained for biological analysis as 102-1-15-SC-34T.

DESCRIPTION



BAY 103

Contents	Figure/Table	Page
Map of Bay 103	Fig. 7-1	100
Oblique aerial photograph of Bay 103	Fig. 7-2	101
Offshore and nearshore profile RP-103-1		102
Beach Profile BO-103-1		102
Grain size data for grab samples	Table 7-1	103
Grain size data for beach samples	Table 7-2	104
Grab sample data sheets: GS-35 to GS-44		105-114

BAY 103

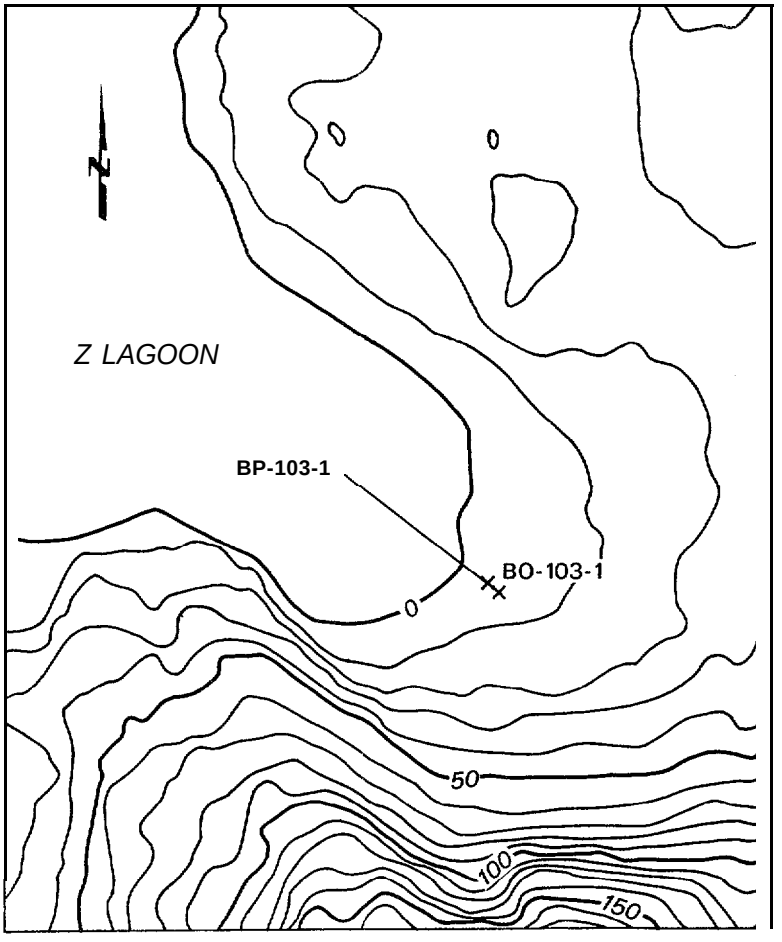


Figure 7-1: Location of beach observations and profile (BO); beach, nearshore and offshore profile (BP); permanent bench marks (x); and general topography of Bay 103

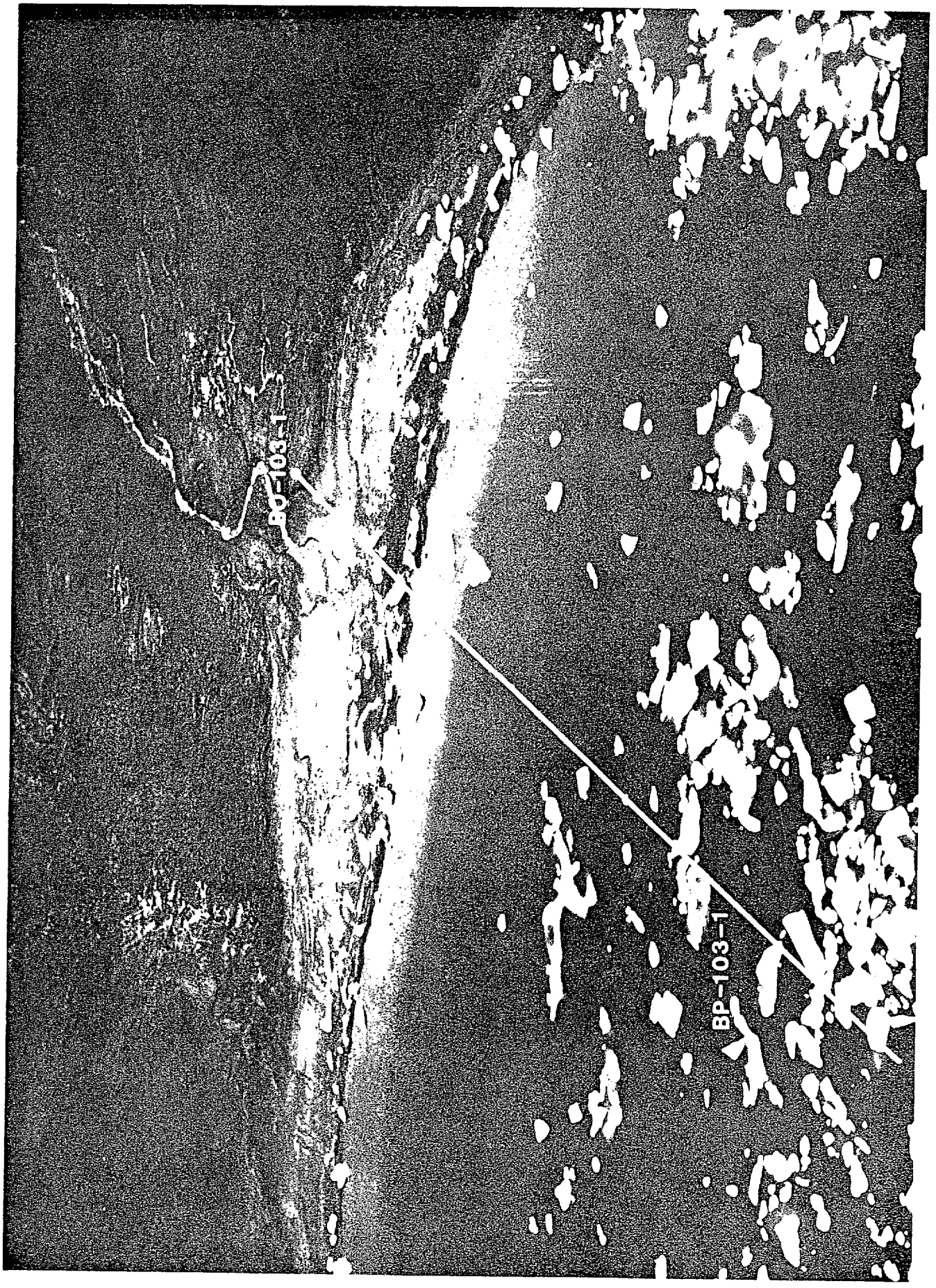
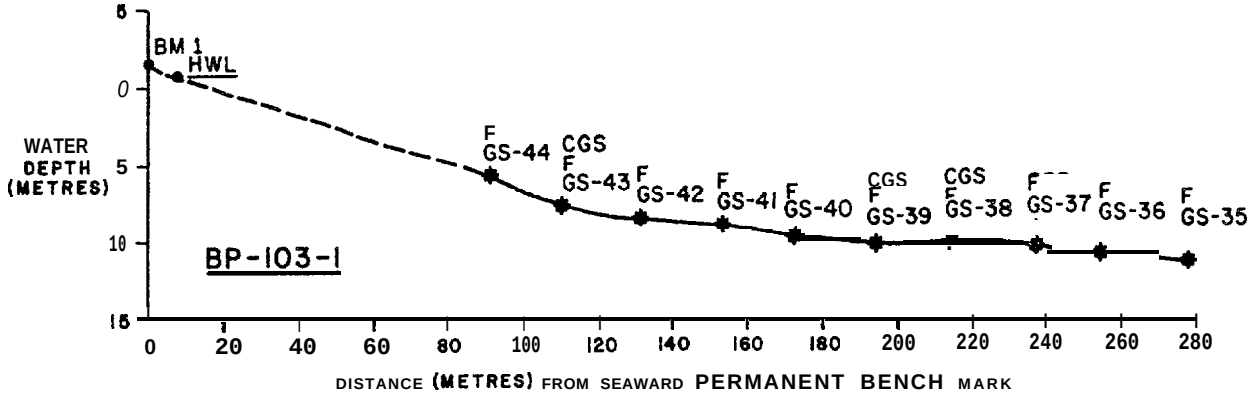


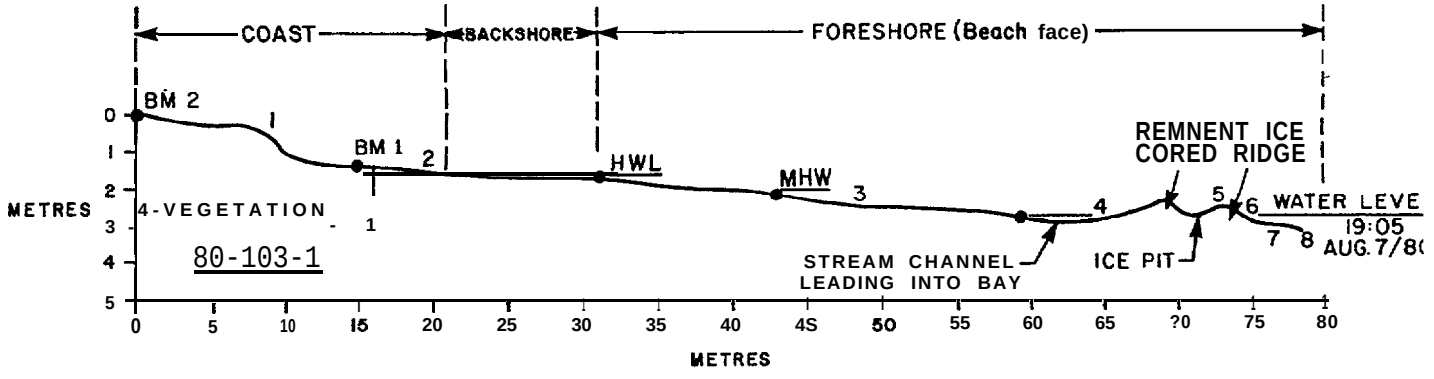
FIG. 7.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 103

OFFSHORE AND NEARSHORE PROFILE BAY 103



CGS - CHEMISTRY GRAB SAMPLE
GS - GEOLOGY GRAB SAMPLE
F - FORAMINIFERA SAMPLE
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION ' 4x

BEACH PROFILE -BAY 103



MHW - MEAN HIGH WATER
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION =2.5x

Table 7-1: Grain size data for grab samples of Bay 103.

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
103-1 -1 0-GS-35	11.1	+5.99	2.45	+1.05	<1	11	74	15
103-1 -9-G3-36	10.81	+6.11	2.41	+1.10	<1	11	74	15
103-1 -8-GS-37	10.55	+6.00	2.36	+1.14	<1	11	74	14
103-1 -7-GS-38	10.16	+6.02	2.29	+1.11	<1	10	77	13
103-1-6 -GS-39	10.13	+6.21	2.43	+0.98	<1	6	78	16
103-1 -5-GS-40	9.63	+6.21	2.37	+0.99	<1	10	75	15
103-1-4-GS-41	9.25	+6.48	2.65	+0.74	<1	10	69	21
103-1-3<S-42	8.64	+6.84	2.85	+0.43	<1	10	64	26
103-1-2-GS-43	7.6	+6.54	2.99	+0.47	<1	16	58	26
103-1-1<-s-44	5.7	+4.71	3.42	+0.77	2	50	31	17

Table 7-2: Grain size data for beach samples of Bay 103.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
30-103-1-1	+1.05	1.95	+1.63	18	76	5	1	Backshore
10-103-1-2	+1. 55	2.28	+1. 35	20	72	6	2	Backshore
?0-103-1-3	+0.42	1.59	+2. 62	17	81	1	<1	Beach face
30-103-1-4	+0. 51	1.75	+2. 18	26	72	1	<1	Beach face
?0-103-1-5	+1.67	2.15	+1.58	14	80	4	2	Ice mound crest
10-103-1-6	+1. 33	1.87	+1.96	11	85	3	1	Ice mound
3C-103-1-7	+0. 21	1.09	+1. 06	12	87	<1		Beach face
30-103-1-8	+0. 70	1.50	+2.32	9	87	3	1	Beach face

BIOS PROJECT PETERSEN GRAB DATA

103-1 -1 O-GS-35.

BAY NO. 103

PROFILE NO. 1

STATION NO. 10

GRAB NO. 35

WATER DEPTH (Lead line) 11.10 m.

DATE 13/06/80

TIME 20:48 HRS . EDT

SAMPLE NUMBERS 103-1-1O-GS-35; 103-1-1O-F-7O

REMARKs :

No photograph **in appendix for this sample.**

DESCRIPTION:

Dark green/brown slightly gravelly sandy silt with 5 very coarse pebbles and several shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

103--1 -9-GS-36

BAY NO. 1 0 3

PROFILE NO. 1

STATION NO. 9

GRAB NO. 36

WATER DEPTH (Lead line) 10.81 m.

DATE 13/06/80

TIME 20:48 HRS . EDT

SAMPLE NUMBERS 103-1 -9-GS-36; 103-1-9-F-71

REMARKS :
No photograph in appendix for this sample.

DESCRIPTION:

Dark green/brown slightly gravelly sandy silt with three coarse pebbles and very few shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

103-1 -8-GS'-37

BAY NO. 103

PROFILE NO. 1

STATION NO. 8

GRAB NO. 37

WATER DEPTH (Lead line) 10.55 m.

DATE 13/06/80

TIME 21.13 HRS. EDT

SAMPLE NUMBERS 103-1 -8-GS-37; 103-1-8-F-72

REMARKs :

Part of grab sample retained for chemical analysis as 103-1-8-GS-37. No photograph in the appendix for this sample. Part of grab sample retained for biological analysis as 103-1-8-GS-37T.

DESCRIPTION:

Light brown slightly gravelly sandy silt with two small cobbles, one very coarse pebble and three coarse pebbles. Very few shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

103-1 -7-GS-38

BAY NO. 103

PROFILE NO. 1

STATION NO. 7

GRAB NO. 38

WATER DEPTH (Lead line) 10.16 m.

DATE 13/06/80

TIME 21:24 HRS . EDT

SAMPLE NUMBERS 103-1-7-GS-38; 103-1-7-F-73

REMARKS :

Part of grab sample retained for chemical analysis as 103-1-7-GS-38. No photograph in the appendix for this sample.

DESCRIPTION:

Light brown slightly gravelly silt with one medium pebble and no shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

103-1-6-GS-39

BAY NO. 103

PROFILE NO. 1

STATION NO. 6

GRAB NO. 39

WATER DEPTH (Lead line) 10.13 m.

DATE 13/06/80

TIME 21.43 HRS. EDT

SAMPLE NUMBERS 103-1-6-GS-39; 103-1-6-F-74

REMARKs :

Part of grab sample retained for chemical analysis as 103-1-6-GS-39. No photograph in the appendix for this sample.

DESCRIPTION:

Light green/brown slightly gravelly silt with three very coarse pebbles, two coarse pebbles and no shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

103-1-5-GS-4O

BAY NO. 103

PROFILE NO. 1

STATION NO. 5

GRAB NO. 40

WATER DEPTH (Lead line) 9.63 m.

DATE 13/06/80

TIME 21:52 HRS. EDT

SAMPLE NUMBERS 103-1-5-GS-40; 103-1-5-F-75

REMARKS :
No photograph in the appendix for this grab sample.

DESCRIPTION:

Light green/brown slightly gravelly sandy silt with no pebbles, cobbles or shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

103-1-4-GS-41

BAY NO. 103

PROFILE NO. 1

STATION NO. 4

GRAB NO. 41

WATER DEPTH (Lead line) 9.25 m.

DATE 13/06/80

TIME 22:05 HRS. EDT

SAMPLE NUMBERS 103-1 -4-GS-41; 103-1-4-F-76

REMARKS :

No photograph in the appendix for this grab sample.

DESCRIPTION:

Light green slightly gravelly sandy silt with one small cobble, one very coarse pebble and no shell fragments. Black reduced zones present.

BIOS PROJECT PETERSEN GRAB DATA

103-1-3-GS-42

BAY NO. 103

PROFILE NO. 1

STATION NO. 3

GRAB NO. 42

WATER DEPTH (Lead line) 8.64 m.

DATE 13/06/80

TIME 22:13 HRS , EDT

SAMPLE NUMBERS 103-1 -3-GS-42; 103-1-3-F-77

REMARKS :

No photograph in the appendix for this grab sample.

DESCRIPTION:

Dark green slightly gravelly silt with one angular small cobble, three angular coarse pebbles and one angular medium pebble. One live bivalve and some algae present. Black reduced zones present.

BIOS PROJECT PETERSEN GRAB DATA

103-1 -2-GS-43

BAY NO. 103

PROFILE NO. 1

STATION NO. 2

GRAB NO. 43

WATER DEPTH (Lead line) 7.6 m.

DATE 13/06/80

TIME 22:28 HRS. EDT

SAMPLE NUMBERS 103-1 -2-GS-43; 103-1-2-F-78

REMARKs:

Part of grab sample retained for chemical analysis as 103-1-2-GS-43. Part of grab sample retained for biological analysis as 103-1-2-GS-43T. No photograph in the appendix for this grab sample.

DESCRIPTION:

Light brown and grey/black slightly gravelly sandy silt with one coarse pebble, two live bivalves and some algae and kelp.

BIOS PROJECT PETERSEN GRAB DATA

103-1 -1-GS-44

BAY NO. 103

PROFILE NO. 1

STATION NO. 1

GRAB NO. 44

WATER DEPTH (Lead line) 5.7 m.

DATE 13/06/80

TIME 22:46 HRS . EDT

SAMPLE NUMBERS 103-1-1-GS-44; 103-1-1-F-79

REMARKS :

No photograph in the appendix for this grab sample.

DESCRIPTION:

Dark green/brown slightly gravelly sandy mud with one large cobble and numerous medium to very coarse pebbles. Some shell fragments and bright green filamentous algae present.

BAY 104

Contents	Figure/Table	Page
Map of Bay 104	Fig. 8-1	116
Oblique aerial photograph of Bay 104	Fig. 3-2	117
Offshore and nearshore profile BP-104-1		118
Beach Profile BO-104-1		119
Grain size data for grab samples	Table 8-1	120
Grain size data for beach samples	Table 8-2	121
Grab sample data sheets: GS-26 to GS-34		122 - 130

BAY 104

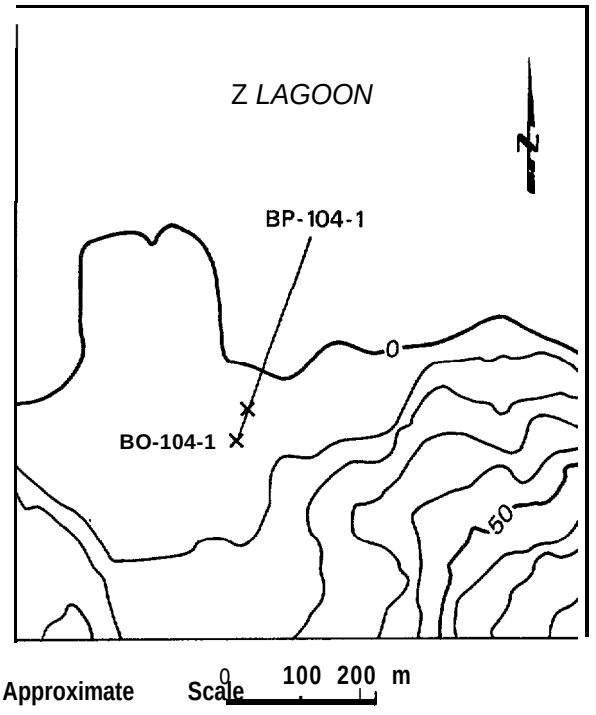
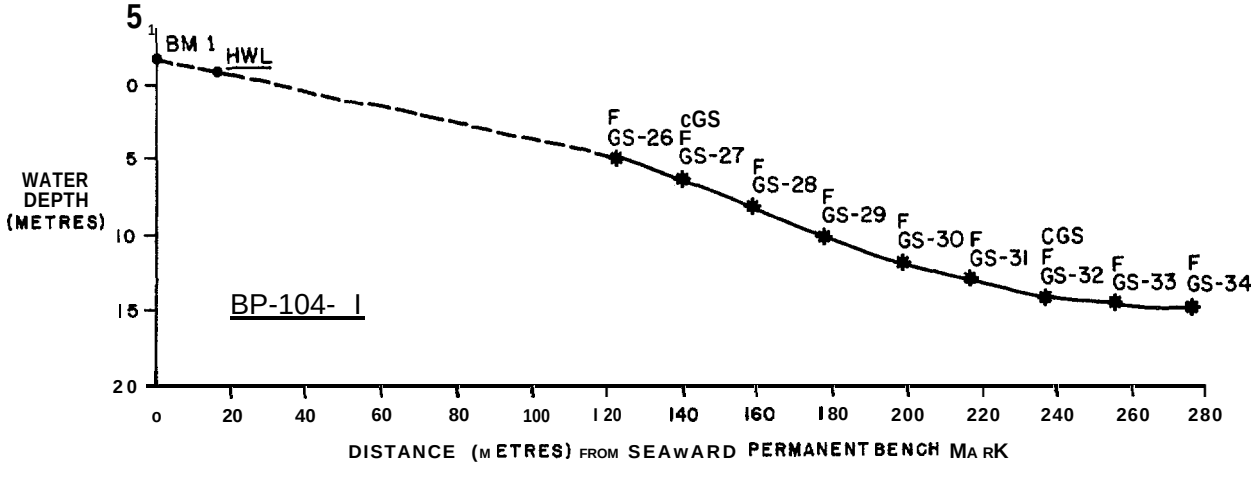


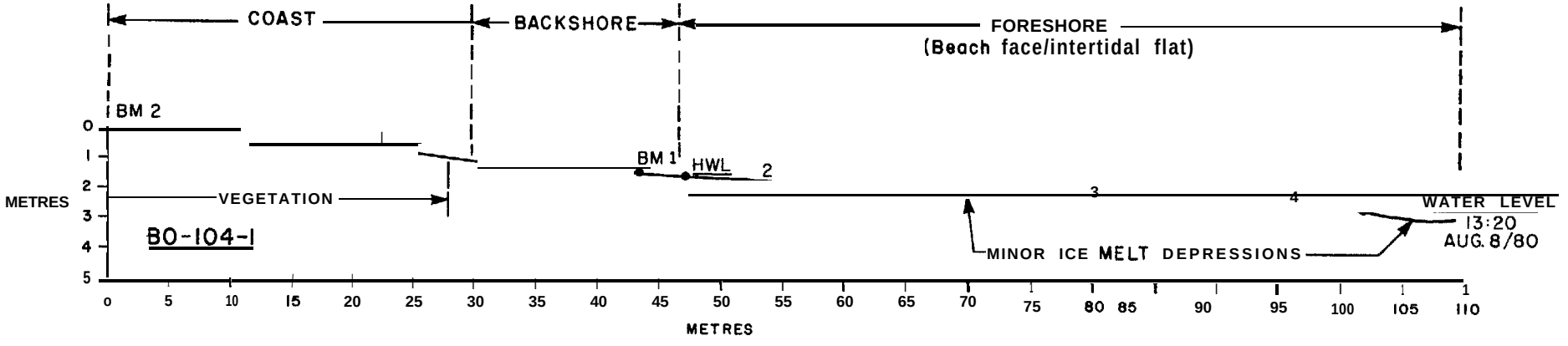
Figure 8-1: Location of beach observations and profile (60); beach, nearshore and offshore profile (BP); permanent bench marks (x); and general topography of Bay 104

FIG. 3.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 104

OFFSHORE AND NEARSHORE PROFILE -BAY 104



CGS - CHEMISTRY GRAB SAMPLE
GS - GEOLOGY GRAB SAMPLE
F – FORAMINIFERA SAMPLE
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4x



BM - PERMANENT BENCH MARK
HWL APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2.5 x

BEACH PROFILE - BAY 104

'able 8-1: Grain size data for grab samples of Bay 104.

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SoF?I'm (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
.04-1-2-GS-26	5.07	+6.65	3.40	+0.06	2	16	51	31
.04-1-3-GS-27	6.47	+5. 41	3.48	+0. 33	4	27	49	20
L04-1-4-GS-28	8.04	+4. 95	3.65	+0. 25	9	27	46	18
L04-1-5-GS-29	10.31	+5.69	3.18	+0.53	2	25	53	20
L04-1-6-GS-30	11.97	+5. 93	3,24	+0.46	2	24	51	23
L04-1-7-GS-31	13.07	+6. 14	3.41	+0.32	1	25	48	26
L04-1-8-GS-32	14.34	+6. 16	3.29	+0. 34	2	20	53	25
104-1-9-GS-33	14.83	+7. 81	3.28	-0.39	1	9	45	45
LO4-1-10-GS-34	15.15	+8. 54	2.87	-0.52	<1	3	44	52

Table 8-2: Grain size data for beach samples of Bay 104.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
EG104-1-1	+4.82	3.33	+0.45	2	40	42	16	Backshore
BO-104-1-2	+2.62	3.96	+0.98	21	49	18	12	Beach face
EK%104-1-3	+1.01	2.39	+1.87	27	65	6	2	Beach face
BO-104-1-4	+1. 78	2.62	+1. 71	13	74	9	4	Beach face
E?O-104-1-5	+0. 88	2.02	+1.54	29	67	3	1	Beach face

BIOS PROJECT PETERSEN GRAB DATA

104-1-2-GS-26

BAY NO. 104

PROFILE NO. 1

STATION NO. 2

GRAB NO. 26

WATER DEPTH (Lead line) 5.07 m.

DATE 13/06/80

TIME 13:40 HRS. EDT

SAMPLE NUMBERS 104-1 -2-GS-26; 104-1-2-F-61

REMARKS :

DESCRIPTION:

Dark green/black slightly gravelly sandy mud with two coarse pebbles and one very coarse pebble. Bright green filamentous algae and numerous worm casings. No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

104-1 -3-GS-27

BAY NO. 104

PROFILE NO. 1

STATION NO. 3

GRAB NO. 27

WATER DEPTH **(Lead line)** 6.47 m.

DATE 13/06/80

TIME 13:50 HRS. EDT

SAMPLE NUMBERS 104-1-3-GS-27; 104-1-3-F-62

REMARKS :

Part of sample retained for chemical analysis as 104-1-3-GS-27.
Part of sample retained for biological analysis as 104-1-3-GS-27T.

DESCRIPTION:

Light green slightly gravelly sandy silt with six medium, coarse and very coarse pebbles and a few shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

104-1-4-GS-28

BAY NO. 104

PROFILE NO. 1

STATION NO. 4

GRAB NO. 28

WATER DEPTH (Lead line) 8"/04 m.

DATE 13/06/80

TIME 14:03 HRS. EDT

SAMPLE NUMBERS 104-1-4-GS-28; 104-1-4-F-63

REMARKS :

DESCRIPTION:

Light green gravelly sandy silt with one subrounded small cobble and a number of angular to subrounded coarse and very coarse pebbles. Numerous shell fragments and two live bivalves.

BIOS PROJECT PETERSEN GRAB DATA

104-1-5-GS-29

BAY NO. 104

PROFILE NO. 1

STATION NO. 5

GRAB NO. 29

WATER DEPTH (Lead line) 10.31 m.

DATE 13/06/80

TIME 14:15 HRS. EDT

SAMPLE NUMBERS 104-1 -5-GS-29; 104-1-5-F-64

REMARKS :

DESCRIPTION:

Light brown/green slightly gravelly sandy silt with numerous angular to subrounded medium, coarse and very coarse pebbles. No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

104-1-6-GS-30

BAY NO. 104

PROFILE NO. 1

STATION NO. 6

GRAB NO. 30

WATER DEPTH (Lead line) 11.97 m.

DATE 13/06/80

TIME 14:30 HRS. EDT

SAMPLE NUMBERS 104-1 -6-GS-3O; 104-1-6-F-65

REMARKs:

DESCRIPTION:

Light brown/green slightly gravelly sandy silt with numerous angular to surrounded coarse and very coarse pebbles. A few shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

104-1 -7-G5-31

BAY *NO.* 104

PROFILE NC). 1

STATION NO. 7

GRAB NO. 31

WATER DEPTH (Lead line)13.07m.

DATE 13/06/80

TIME 14:46 HRS. EDT

SAMPLE NUMBERS 104-1-7-GS-31; 104-1-7-F-66

REMARKS :

DESCRIPTION:

Light green/brown slightly gravelly sandy mud with over 20 angular to subrounded coarse and very coarse pebbles. Some shell fragments and two live bivalves.

BIOS PROJECT PETERSEN GRAB DATA

104-1 --8-GS-32

BAY N(). 104

PROFILE NO. 1

STATION NO. 8

GRAB NO. 32

WATER DEPTH (Lead line) 14.34 m.

DATE 13/06/80

TIME 15:12 HRS. EDT

SAMPLE NUMBERS 104-1 -8-GS-32L. 104-J-8-F-67

REMARKS :

Part of grab sample retained for chemical analysis as 104-1 -8-GS-32. Part of grab sample retained for biological analysis as 104-1-8-GS-32T.

DESCRIPTION:

Light green/brown slightly gravelly sandy silt with four very coarse pebbles, three coarse pebbles and several shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

104-1-9-GS-33..- . . . . . .-

BAY NO. 104

PROFILE NO. 1

STATION NO. 9

GRAB NO. 33

WATER DEPTH (Lead line) 14.83 m.

DATE 13/06/80

TIME 15:28 HRS. EDT

SAMPLE NUMBERS 104-1-9-GS-33; 104-1-9-F-68

REMARKS :

DESCRIPTION:

Light green/brown slightly gravelly mud with approximately ten angular to subrounded coarse and very coarse pebbles. A few shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

104-1 -1 O-GS-34

BAY NO. 104

PROFILE NO. 1

STATION NO. 10

GRAB NO. 34

WATER DEPTH (Lead line) 15.15 m.

DATE 13/06/80

TIME 15:44 HRS. EDT

SAMPLE NUMBERS 104-1-10-GS-34; 104-I-10-F-69

REMARKS :

DESCRIPTION:

Dark green/grey slightly gravelly mud with a few medium and coarse pebbles but no shell fragments. Large amount of kelp.

BAY 105

Contents

	Figure/Table	Page
Map of Bay 105	Fig. 9-1	132
oblique aerial photograph of Bay 105	Fig. 9-2	133
Offshore and nearshore profile BP-105-1		134
Beach Profile BO-105-1		134
Grain size data for grab samples	Table 9-1	135
Grain size data for beach samples	Table 9-2	136
Grab sample data sheets: GS-12 to GS-18		137-143

BAY 105

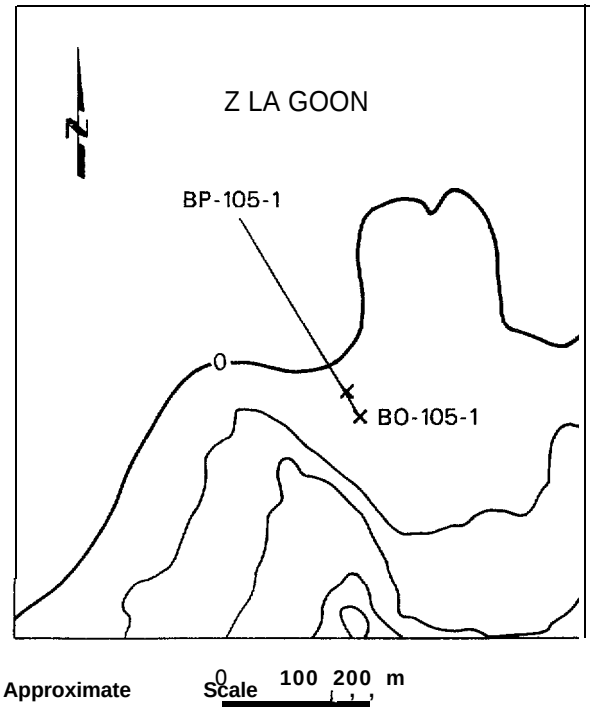


Figure *9-1:* **Location of beach observations and profile (BO); beach, nearshore and offshore profile (BP); permanent bench marks (x); and general topography of Bay 105**

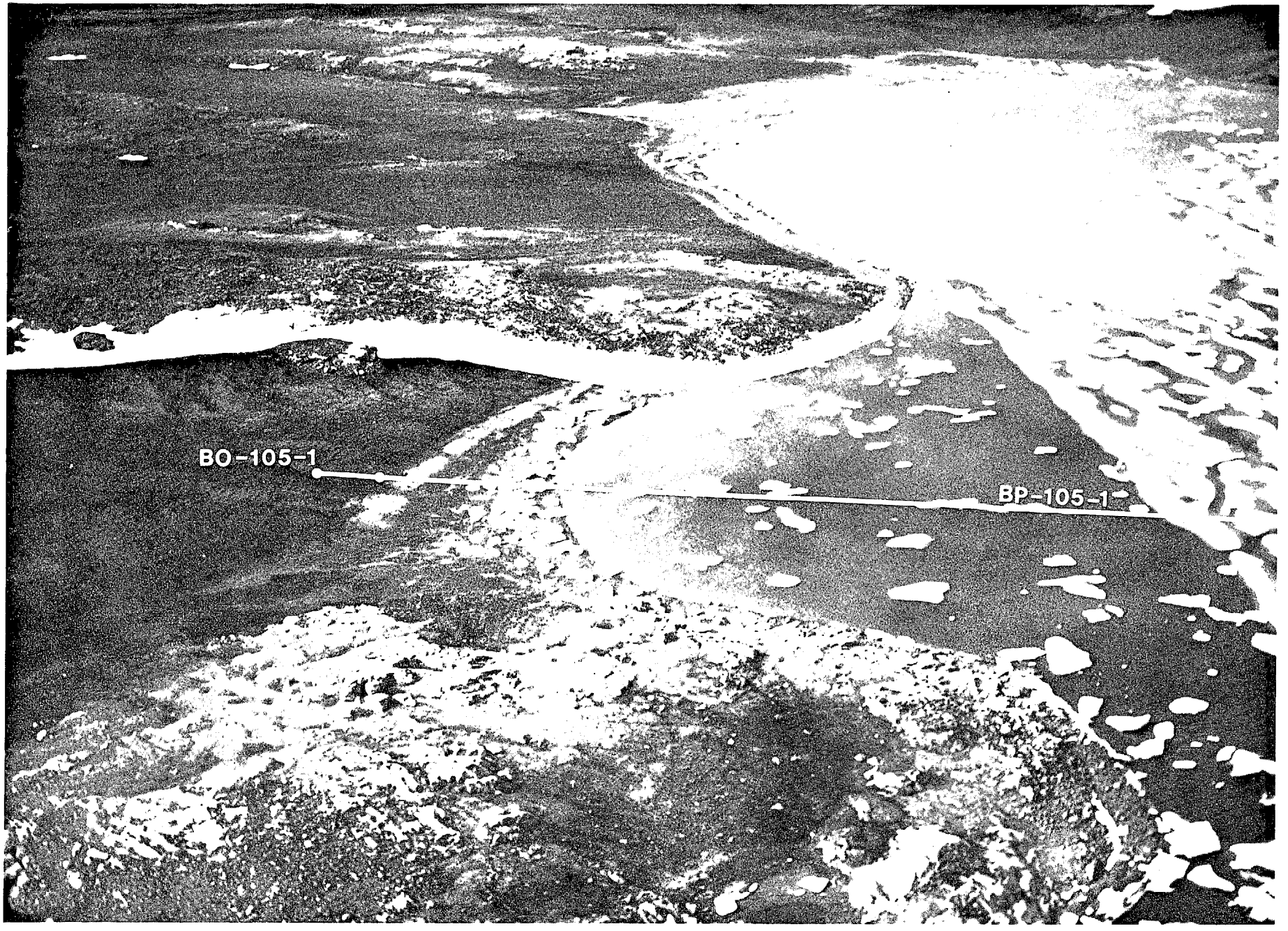
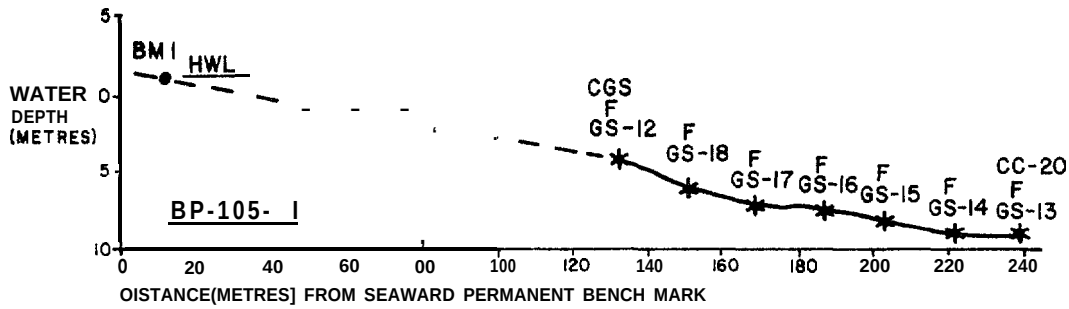


FIG. 9.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 105

OFFSHORE AND NEARSHORE PROFILE - BAY 105



CC -CHEMISTRY CORE

F – FORAMINIFERA SAMPLE

GS -GEOLOGY GRAB SAMPLE

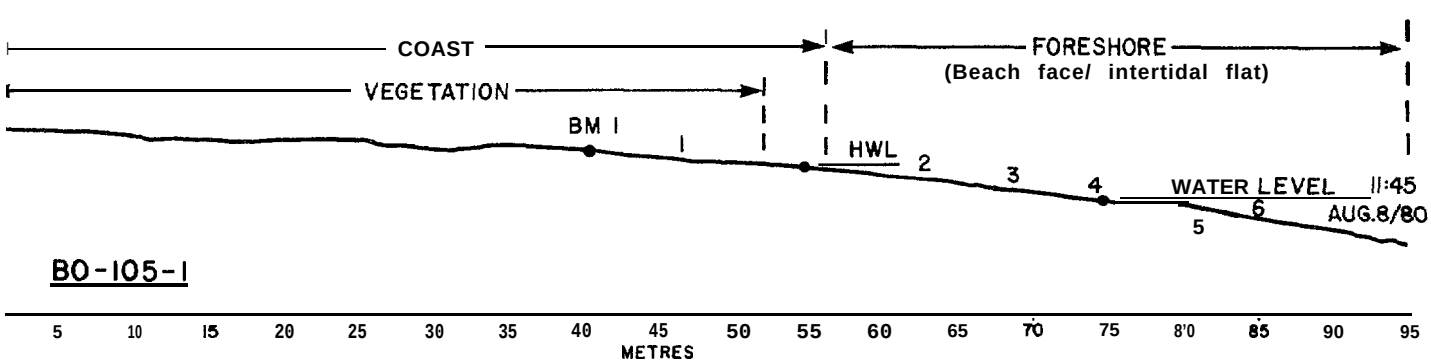
CGS– CHEMISTRY GRAB SAMPLE

HWL-APPROXIMATE HIGH WATER LINE

VERTICAL EXAGGERATION = 4 x

BM = PERMANENT BENCH MARK

BEACH PROFILE – BAY 105



BM -PERMANENT BENCH MARK

HWL- APPROXIMATE HIGH WATER LINE

NUMBERS INDICATE SAMPLING LOCATIONS

VERTICAL EXAGGERATION =2.5 x

Table 9-1: Grain size data for grab samples of Bay 105.

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (#)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
105-1-4-GS-12	4.06	+8. 19	3.0	-0.45	<1	5	47	47
105-1 -1 O-GS-13	9.22	+6. 29	2.31	+1.28		6	78	16
105-1-9-GS-14	9.23	+6. 04	2.11	+1.57		6	82	12
105-1 -8-GS-15	8.44	+6. 84	2.47	+0. 92		4	73	23
105-1 -7-GS-16	7.57	+6.48	2.45	+0.91	<1	6	75	19
105-1-6-GS-17	7.03	+7.31	2.78	+0. 38	<1	5	63	32
105-1-5-GS-18	5.81	+8. 02	2.81	-0.03	<1	3	54	43

able 9-2: Grain size data for beach samples of Bay 105.

AMPLE NUMBER	MEAN GRAIN SIZE (ϕ)	SORTING (ϕ)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
)-105-1-1	2*58	+3. 30	+0.99	15	55	23	7	Backshore
)-105-1-2	2.25	+3. 58	+1.12	20	53	18	9	Beach face
)-105-1-3	2.90	+3.69	+1.02	11	58	20	11	Beach face
>105-1-4	2.63	+3. 49	+0.95	17	52	23	8	Beach face
)-105-1-5	6.23	+3.71	+0. 03	2	27	41	30	On ice block
1-105-1-6	4.55	+3.93	+0. 38	8	39	34	19	Beach face

BIOS PROJECT PETERSEN GRAB DATA

105-1-4-GS-12

BAY NO. 105

PROFILE NO. 1

STATION NO. 4

GRAB NO. 12

WATER DEPTH (Lead line) 4.06 m.

DATE 11/06/80

TIME 12:33 HRS. EDT

SAMPLE NUMBERS 105-1-4-GS-12; 105-1-4-F-47

REMARKS :

Part of grab sample retained for biological analysis as 105-1-4-GS-12T.

DESCRIPTION:

Dark green/grey slightly gravelly mud with no pebbles, cobbles or shell fragments. Abundance of bright green filamentous algae.

BIOS PROJECT PETERSEN GRAB DATA

105-1-10-GS-13

BAY NO. 1(-)5

PROFILE NO. 1

STATION NO. 10

GRAB NO. 13

WATER DEPTH (Lead line) 9.22 m.

DATE 11/06/80

TIME 13:50 HRS. EDT

SAMPLE NUMBERS 105-1-10-GS-13; 105-1-10-F-48

REMARKs:

Separate core sample obtained for chemical analysis as 105-1-10-CC-20. Part of grab sample retained for biological analysis as 105-1-10-GS-13T.

DESCRIPTION:

Dark green/grey silt with no pebbles, cobbles or shell fragments. Some bright green filamentous algae present.

BIOS PROJECT PETERSEN GRAB DATA

105-1-9-GS-14

BAY NO. 105

PROFILE NO. 1

STATION NO. 9

GRAB NO. 14

WATER DEPTH (Lead line) 9.23 m.

DATE 11/06/80

TIME 13:10 HRS. EDT

SAMPLE NUMBERS 105-1-9-GS-14; 105-1-9-F-49

REMARKS :

Part of grab sample retained for biological analysis as 105-1-9-GS-14T.

DESCRIPTION:

Dark grey/green silt with no pebbles, cobbles or shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

105-1-8-GS-15

BAY NO. 105

PROFILE NO. 1

STATION NO. 8

GRAB NO. 15

WATER DEPTH (Lead line) 8.44 m.

DATE 11/06/80

TIME 13:25 HRS. EDT

SAMPLE NUMBERS 105-1-8-GS-I5; 105-1-8-F-5O

REMARKS :

DESCRIPTION:

Light grey/green silt with one angular coarse pebble, one angular very coarse pebble and some bright green filamentous algae. No shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

105-1-7-GS-16

BAY NO, 105

PROFILE NO. 1

STATION NO. 7

GRAB NO. 16 .

WATER DEPTH (Lead line) 7.57 m.

DATE 13:40

TIME 13:40 HRS. EDT

SAMPLE NUMBERS 105-1-7-GS-16; 105-1-7-F-51 _

REMARKs :

DESCRIPTION:

Light grey/green **slightly gravelly silt with no pebbles, cobbles or shell fragments. Some bright green** filamentous **algae present.**

BIOS PROJECT PETERSEN GRAB DATA

105-1-6-GS-17

BAY NO. 105

PROFILE NO. 1

STATION NO. 6

GRAB NO. 17

WATER DEPTH (Lead line) 7.03 m.

DATE 11/06/80

TIME 14:12 HRS. EDT

SAMPLE NUMBERS 105-1 -6-GS-17; 105-1-6-F-52

REMARKS :

DESCRIPTION:

Light grey/green slightly gravelly mud with one angular very coarse pebble and two angular coarse pebbles. One segment of a Hiatella arctica shell.

BIOS PROJECT PETERSEN CRAB DATA

105-1-5-GS-18

BAY NO. 105

PROFILE NO. 1

STATION NO. 5

GRAB NO. 18

WATER DEPTH (Lead line) 5.81 m.

DATE 11/06/80

TIME 13:35 HRS. EDT

SAMPLE NUMBERS 105-1 -5-GS-18; 105-1-5-F-53

REMARKS :

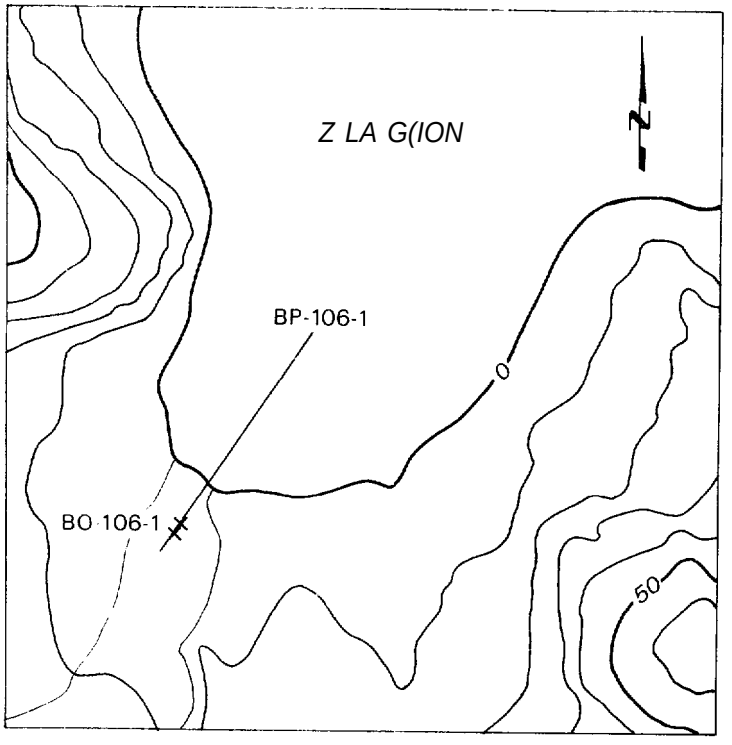
DESCRIPTION:

Dark grey/black slightly gravelly mud with several medium and coarse pebbles. No shell fragments present.

BAY 1(I6

Contents	Figure/Table	Page
Map of Bay 106	Fig. 10-1	145
Oblique aerial photograph of Bay 106	Fig. 10-2	146
Offshore and nearshore profile BP-106-1		147
Beach Profile BO-106-1		148
Grain size data for grab samples	Table 10-1	149
Grain size data for beach samples	Table 10-2	150
Grab sample data sheets: GS-54 to GS-61		151-158

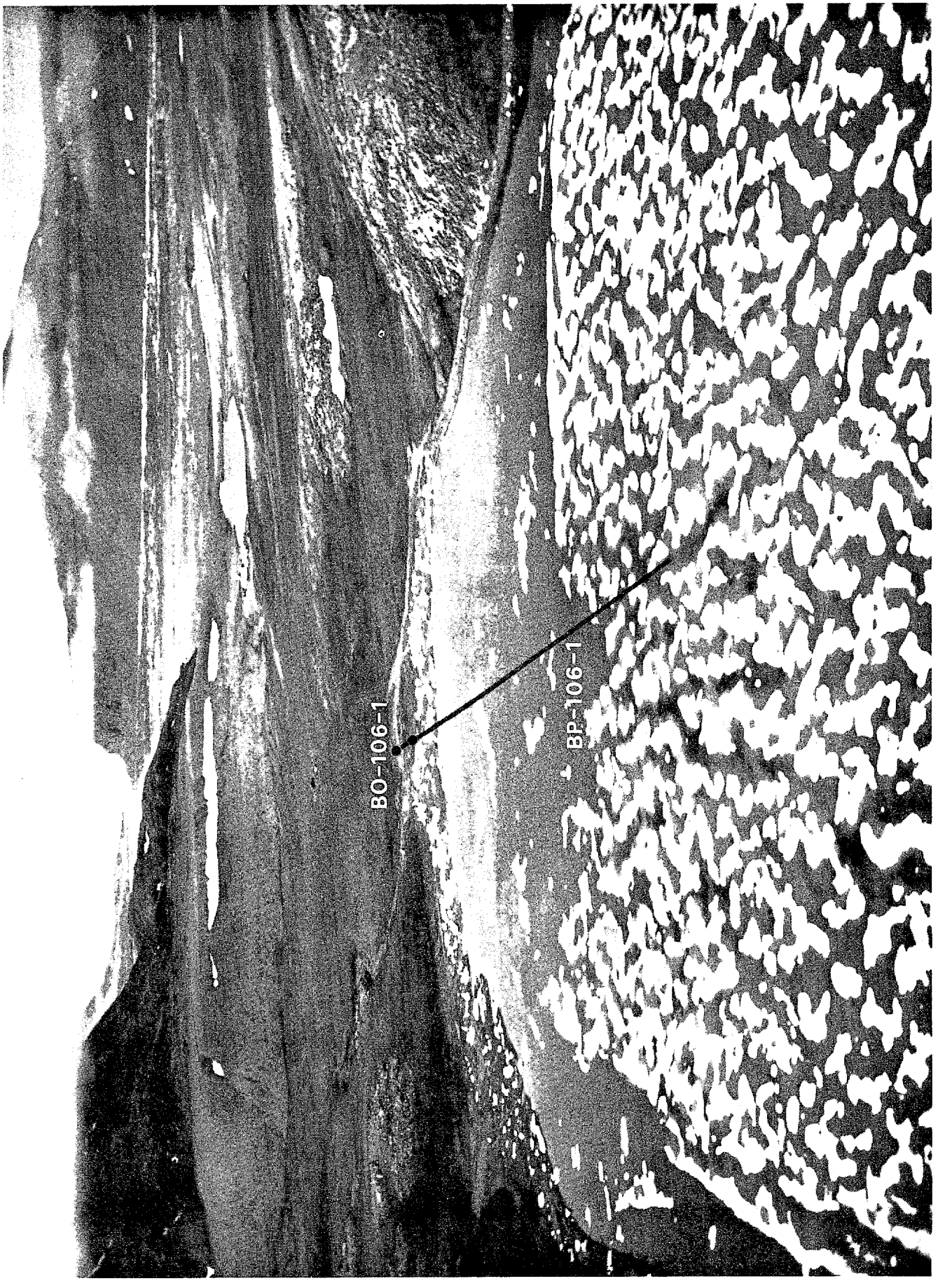
BAY 106



Approximate scale 100 0 100 m

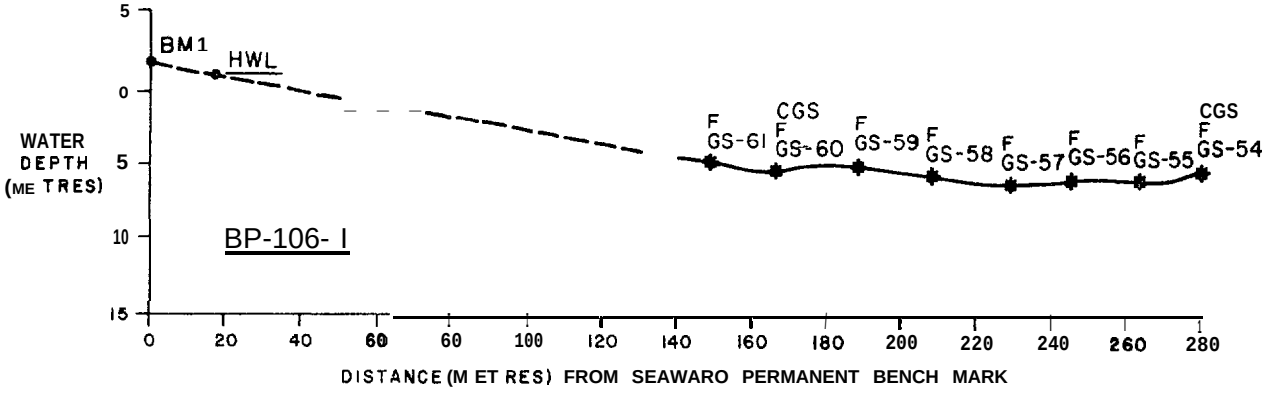
Contour Interval: 10 metres

Figure 10-1: Location of beach observations and profile (BO); beach, nearshore and offshore profile (BP); permanent bench marks (x); and general topography of Bay 106

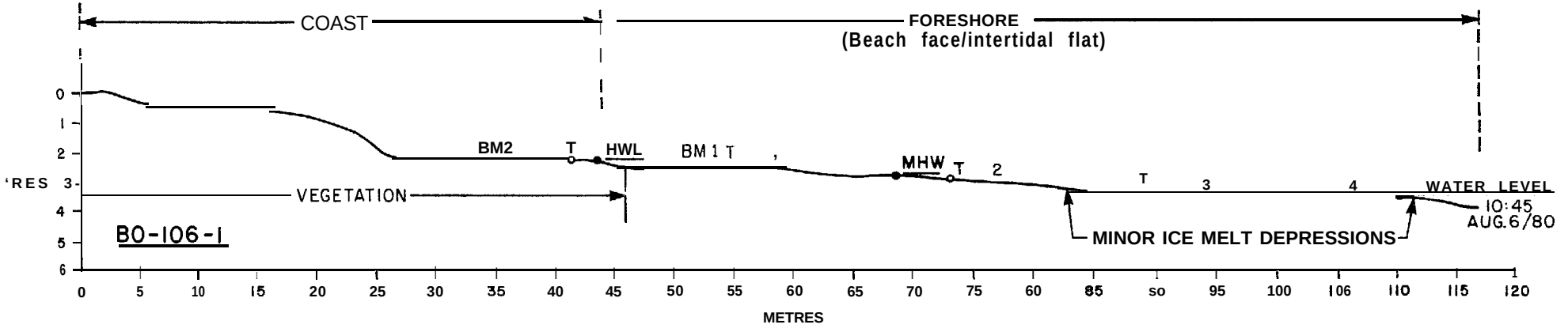


RA

OFFSHORE AND NEARSHORE PROFILE - BAY 106



CGS - CHEMISTRY GRAB SAMPLE
GS - GEOLOGY GRAB SAMPLE
F - FORAMINIFERA SAMPLE
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4x



MHW- MEAN HIGH WATER
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
T - THERMOCOUPLE TEMPERATURE SENSORS
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION =2.5X

BEACH PROFILE - BAY 106

Table 10-1: Grain size data for grab samples of Bay 106.

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
106-1 -9-GS-54	5.34	+7. 87	2.78	+0. 03	<1	3	57	39
106-1-8-GS-55	5.87	+8. 35	2.65	-0.26	<1	3	49	48
106-1 -7-GS-56	5.8	+7.86	2.67	+0.14	<1	2	58	39
106-1 -6GS-57	5.75	+8. 27	2.69	−0.23	<1	3	51	46
106-1 -5<S-58	5.6	+7. 89	2.84	-0.25	<1	4	55	41
106-1-4-GS-59	4.95	+7. 67	2.72	+0. 24	<1	3	60	37
106-1-3-GS-6O	5.06	+6. 90	3.01	+0. 11	<1	10	60	30
106-1-2-GS-61	4.8	+6.85	2.95	+0. 25	<1	9	61	29

able 10-2: Grain size data for beach samples of Bay 106.

AMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
)-106-1-1	+2.68	3.35	+1.08	14	59	19	8	Beach face
)-106-1-2	+2. 52	3.17	+1. 16	13	61	19	7	Beach face
)-106-1-3	+3. 24	3.33	+0. 95	9	58	23	10	Beach face
)-106-1-4	+6. 91	3.46	-0.16	2	15	49	34	Beach face

BIOS PROJECT PETERsEN GRAB DATA

106-1-9-GS-54

BAY NO. 106

PROFILE NO. 1

STATION NO. 9

GRAB NO. 54

WATER DEPTH (Lead line) 5.34 m.

DATE 14/06/80

TIME 23:10 HRS. EDT

SAMPLE NUMBERS 106-1-9-GS-54, 106-1-9-F-89

REMARKs:

Part of grab sample retained for chemical analysis as 106-1-9-GS-54.
Part of grab sample retained for biological analysis as 106-1-9-GS-54T.

DESCRIPTION:

Dark green/brown with black zones slightly gravelly mud with one subangular coarse pebble and some bright **green** filamentous **algae.**
No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1 -8-GS-55

BAY NO. 106

PROFILE NO. 1

STATION NO. 8

GRAB NO. 55

WATER DEPTH (Lead line) 5.87 m.

DATE 14/06/80

TIME 23:20 HRS. EDT

SAMPLE NUMBERS 106-1-8-GS-55, 106-1-8-F-90

REMARKS :

DESCRIPTION:

Dark grey/black slightly gravelly mud with one subrounded coarse pebble and clumps of bright green filamentous algae.
No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1-7-GS-56

BAY NO. 106

PROFILE NO. 1

STATION NO. 7

GRAB NO. 56

WATER DEPTH (Lead line) 5.8 m.

DATE 14/06/80

TIME 23:28 HRS. EDT

SAMPLE NUMBERS 106-1-7-GS-56, 106-1-7-F-91

REMARKS :

DESCRIPTION:

Dark grey/black slightly gravelly mud with one angular very coarse pebble and clumps of bright green filamentous algae.
No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1-6-GS-57

BAY NO. 106

PROFILE NO. 1

STATION NO. 6

GRAB NO. 57

WATER DEPTH (Lead line) 5.75 m.

DATE 14/06/80

TIME 23:40 HRS. EDT

SAMPLE NUMBERS 106-1-6-GS-57, 106-1-6-F-92

REMARKS :

DESCRIPTION:

Dark grey/black slightly gravelly mud with two subangular to subrounded small cobbles and two subangular coarse pebbles. Some bright green filamentous algae but no shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1 -5-GS-58

BAY NO. 106

PROFILE NO. 1

STATION NO. 5

GRAB NO. 58

WATER DEPTH (Lead line) 5.6 m.

DATE 14/06/80

TIME 23:47 HRS. EDT

SAMPLE NUMBERS 106-1 -5-GS-58, 106-1-5-F-93

REMARKs :

DESCRIPTION:

Dark grey/black slightly gravelly mud with two subangular coarse pebbles, some bright green filamentous algae and a few shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

106-1-4-GS-59

BAY NO. 106

PROFILE NO. 1

STATION NO. 4

GRAB NO. 59

WATER DEPTH (Lead line) 4.95 m.

DATE 14/06/80

TIME 23:55 HRS. EDT

SAMPLE NUMBERS 106-1 -4-GS-59, 106-1-4-F-94

REMARKS :

DESCRIPTION:

Dark green with black zones slightly gravelly mud with some bright green filamentous algae. No pebbles, cobbles or shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1 -3-GS-60

BAY NO, 106

PROFILE NO. 1

STATION NO, 3

GRAB NO. 60

WATER DEPTH (Lead line) 5.06 m.

DATE 15/06/80

TIME 00:01 HRS. EDT

SAMPLE NUMBERS 106-1-3-GS-60, 106-1-3-F-95

REMARKS :

Part of grab sample retained for chemical analysis as 106-1-3-GS-6O.

DESCRIPTION:

Dark grey/black slightly gravelly mud with three subrounded very coarse pebbles, four subrounded to subangular coarse pebbles and two subrounded medium pebbles. Small amound of bright green filamentous algae but no shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

106-1-2-GS-61

BAY NO. 106

PROFILE NO. 1

STATION NO. 2

GRAB NO. 61

WATER DEPTH (Lead line) 4.8 m.

DATE 15/06/80

TIME 00:07 HRS. EDT

SAMPLE NUMBERS 106-I-2-GS-61, 106-1-2-F-96

REMARKS :

Part of grab sample retained for biological analysis as 106-1-2-G$6IT.

DESCRIPTION:

Dark grey/black slightly gravelly silt with several subangular coarse pebbles, some bright green filamentous algae and some kelp. No shell fragments present.

BAY 107

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Map of Bay 107	Fig. 11-1	160
Oblique aerial photograph of Bay 107	Fig. 11-2	161
Beach Profile BO-107-1		162
Grain size data for beach samples	Table 11-1	163

BAY 107

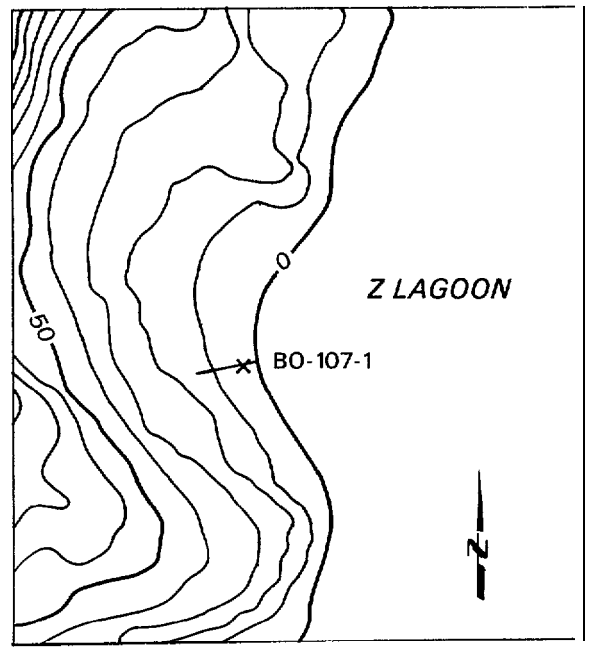


Figure 11-1: Location **of beach observations and profile (BO); permanent bench mark (x); and general topography of Bay 107**

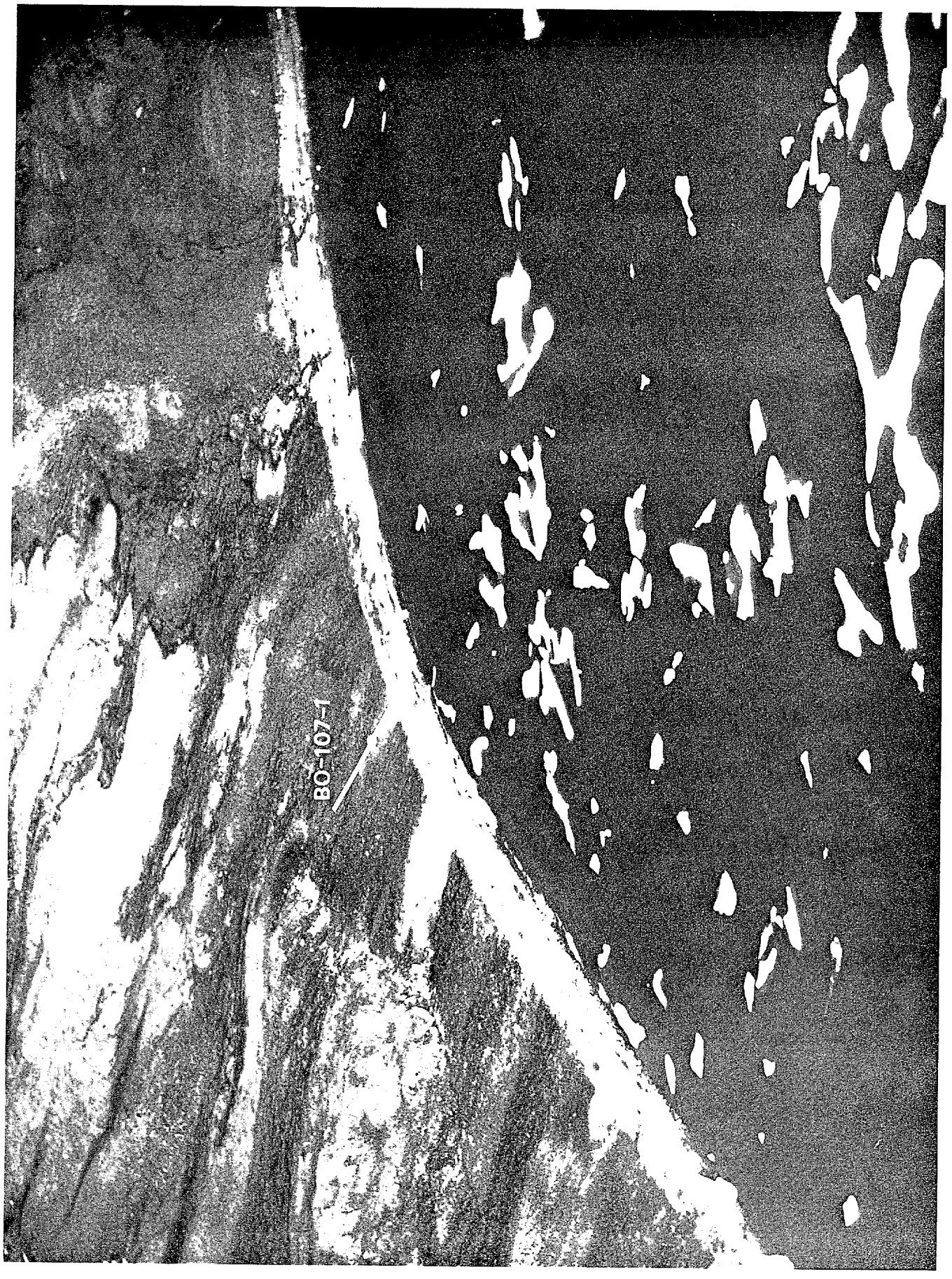
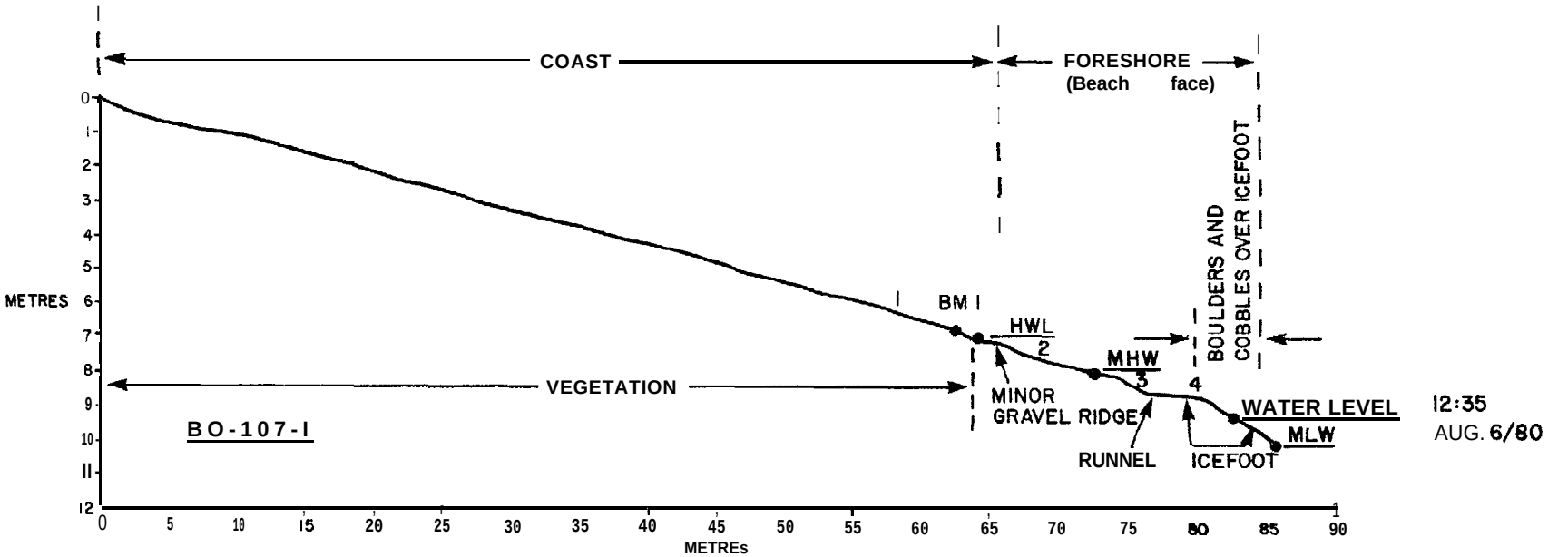


FIG. 11.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 107



MHW-MEAN HIGH WATER

MLW-MEAN LOW WATER

BM -PERMANENT BENCH MARK

HWL- APPROXIMATE HIGH WATER LINE

NUMBERS INDICATE SAMPLING LOCATIONS

VERTICAL EXAGGERATION = 2.5 **X**

BEACH PROFILE – BAY 107

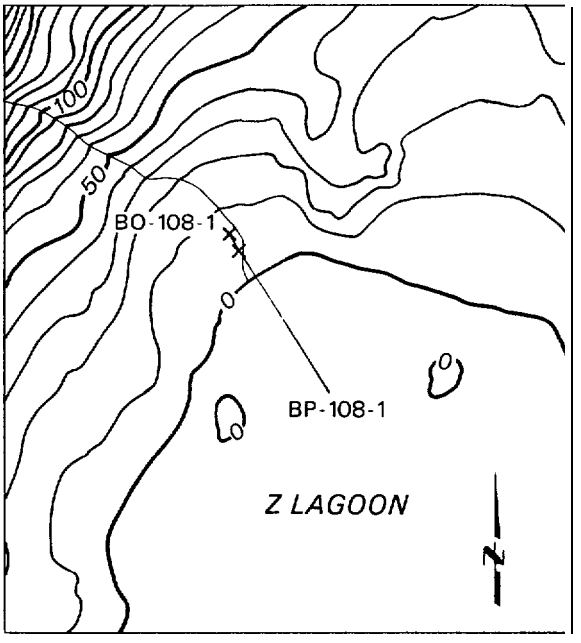
Table 11-1: Grain size data for beach samples of Bay 107.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
30-107-1-1	6.82	+4.00	-0.32	3	21	37	39	Backshore
30-107-1-2	5.21	+4.05	+0.17	6	35	34	25	Beach face
30-107-1-3	1.43	+2.87	+1.81	20	67	8	5	Beach face
30-107-1-4	1.44	+2.29	+1.56	15	74	9	2	Ice mound crest

BAY 108

Contents	Figure/Table	Page
Map of Bay ?08	Fig. 12-1	165
Oblique aerial photograph of Ray 108	Fig. 12-2	166
Offshore and nearshore profile: BP-108-1		167
Beach Profile BO-108-I		167
Grain size data for grab samples	Table 12-1	168
Grain size data for beach samples	Table 12-2	169
Grab sample data sheets: GS-9 to GS-11 and GS-19 to GS-24		170 - 178

BAY 108



Approximate Scale 0 100 200 m

Contour Interval: 10 meters

Figure 12-1: Location of beach observations and profile (BO); beach, nearshore and offshore profile (BP); permanent bench marks (x); and general topography of Bay 108

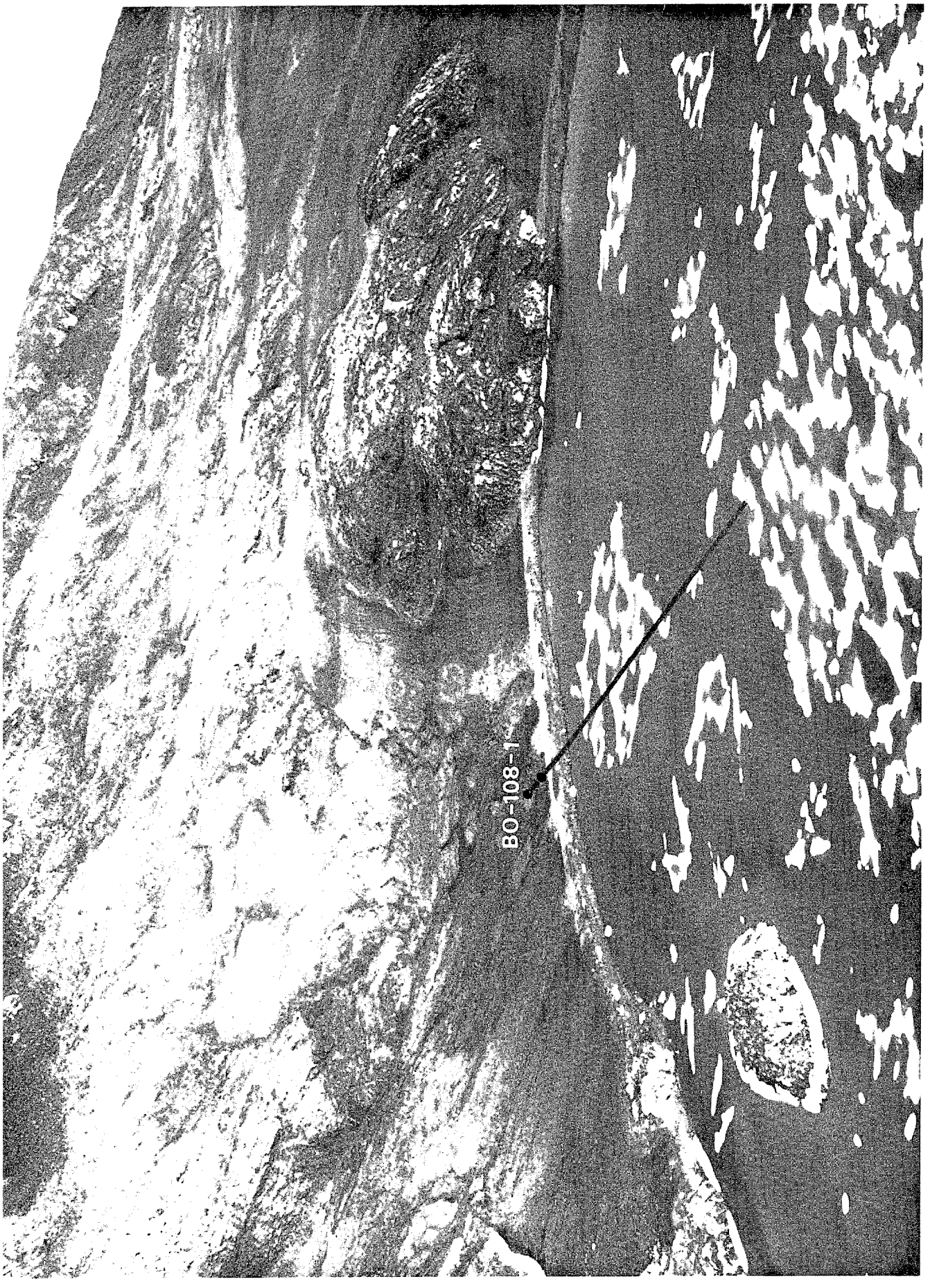
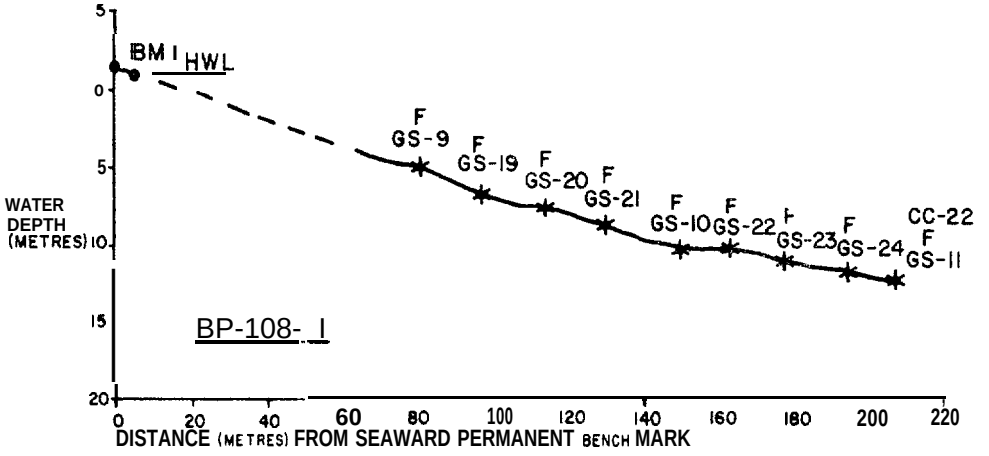


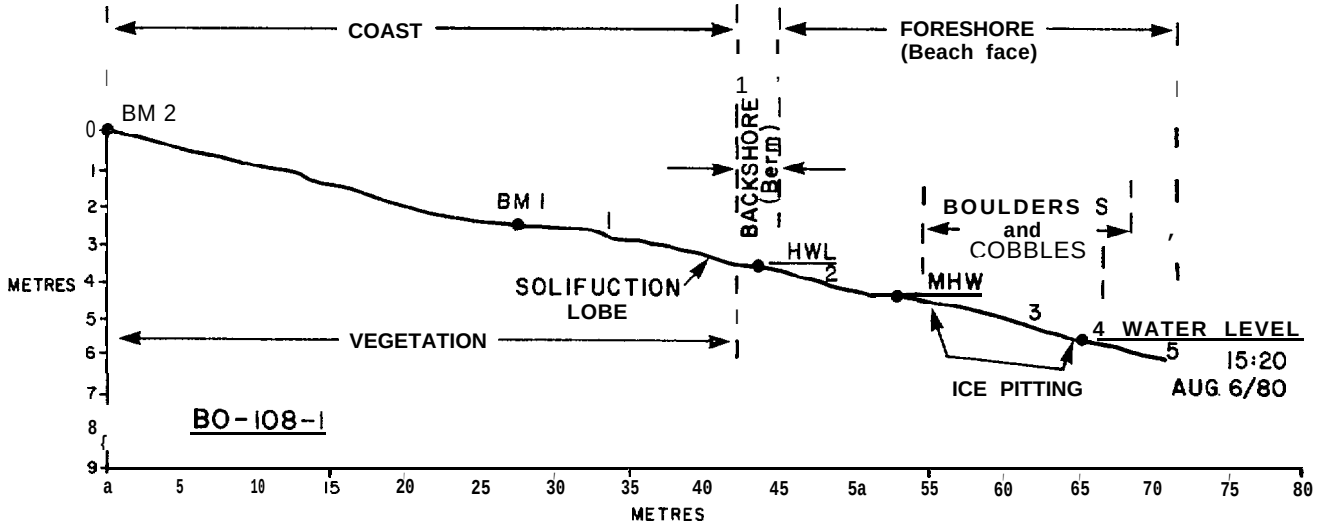
FIG. 12.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 108

OFFSHORE AND NEARSHORE PROFILE - BAY 108



BM -PERMANENT BENCH MARK
cc -CHEMISTRY CORE
F – FORAMINIFERA SAMPLE
GS -GEOLOGY GRAB SAMPLE
HWL- APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4x

BEACH PROFILE – BAY 108



MHW-MEAN HIGH WATER
BM -PERMANENT BENCH MARK
HWL-APPROXIMATE HIGH WATER LINE
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION = 2.5 X

ıble 12-1: Grain size data for grab samples of Bay 108.

AMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT' GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
)8-1-2-GS-9	5.06	+7.19	3.06	+0.21	<1	12	52	36
)8-1 -6-GS-10	10.19	+6. 55	2.76	+0.66	<1	12	64	24
)8-1-1 0-GS-11	12.36	+6. 90	2.38	+0.94		3	75	22
)8-1-3-GS-19	6.7	+7. 36	2.80	+0. 35	<1	7	59	34
)8-1-4-GS-20	7.82	+5. 90	2.34	+1.26		15	71	14
)8-1 -5-GS-21	8.7	+5.91	2.18	+1.47		10	78	12
)8-1-7-GS-22	10.31	+6.75	2.59	+0. 79	<1	6	70	24
)8-1-8-GS-23	11.26	+6. 55	2.42	+1.07		4	76	20
)8-1-9-GS-24	11.8	+7. 70	2.79	+0. 18	<1	3	58	38

Table 1.2-2: Grain size data for beach samples of Bay 108.

SAMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
K)-108-1-1	+6.19	3.79	-0.22	4	23	42	31	Backshore
BO-108-1-2	+2. 55	3.55	+1.12	16	58	17	9	Beach face
BO-108-1-3	+1.73	2.32	+1. 44	13	76	9	2	Beach face
BO-108-1-4	+0.73	1.97	+2. 15	22	73	4	1	Beach face
E?G108-1-5	+0.65	2. 03	+1.85	27	69	3	1	Beach face

BIOS PROJECT PETERSEN GRAB DATA

108-1 -2-GS-9

BAY NO. 108

PROFILE NO. 1

STATION NO. 2

GRAB NO. 9

WATER DEPTH (Lead line) 5.06 m.

DATE 9/06/80

TIME 19:09 HRS. EDT

SAMPLE NUMBERS 108-1-2-GS-9; 108-1-2-F-44

REMARKS :

Part of grab sample retained for biological analysis as 108-1-1-GS-9T

DESCRIPTION:

hark grey slightly gravelly sandy mud with three subangular medium pebbles and two surrounded coarse pebbles.

BIOS PROJECT PETERSEN GRAB DATA

108-1-6-GS-10

BAY NO. 108

PROFILE NO. 1

STATION NO. 6

GRAB NO. 10

WATER DEPTH (Lead line) 10.19 m.

DATE 9/06/80

TIME 18:50 HRS. EDT

SAMPLE NUMBERS 108-1-6-GS-10; 108-1-6-F-L5

REMARKs :

Part of grab sample retained for biological analysis as 108-1-6-GS-1OT

DESCRIPTION:

Dark grey slightly gravelly sandy silt with no pebbles or cobbles and a few shell fragments. Abundant bright green coloured filamentous algae.

BIOS PROJECT PETERSEN GRAB DATA

108-1-1O-GS-11

BAY NO. 108

PROFILE NO. 1

STATION NO. 10

GRAB NO. 11

WATER DEPTH (Lead line) 12.36 m.

DATE 9/06/80

TIME 18:30 HRS. EDT

SAMPLE NUMBERS 108-1 -1 0-GS-11; 108-I -1 0-F-46

REMARKs :

Separate core sample obtained for chemical analysis as 108-1-10-CC-22. Part of grab sample retained for biological analysis as 1OS-1-1O-GS-11T.

DESCRIPTION:

Dark grey silt with no pebbles, cobbles or shell fragments. Small amount of bright green filamentous algae.

BIOS PROJECT PETERSEN GRAB DATA

108-1 -3-GS-19

BAY NO. 108

PROFILE NO. 1

STATION NO. 3

GRAB NO. 19

WATER DEPTH (Lead line) 6.7 m.

DATE 9/06/80

TIME 19:03 HRS. EDT

SAMPLE NUMBERS 108-1-3-GS-19; 108-1-3-F-54

REMARKS:

Part of grab sample **retained for biological analysis as 108-1-3-GS-19T.**

DESCRIPTION:

Dark black/grey slightly gravelly mud with no pebbles, cobbles or shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

108-1-4-GS-20

BAY NO. 108

PROFILE NO. 1

STATION NO. 4

GRAB NO. 20

WATER DEPTH (Lead line) 7.82 m.

DATE 9/06/80

TIME 18:59 HRS. EDT

SAMPLE NUMBERS 108-1-4-GS-20; 108-1-4-F-55

REMARKs :

Part of grab sample retained for biological analysis as 108-1-4-GS-20T.

DESCRIPTION:

Light brown sandy silt with some bright green filamentous algae. No pebbles, cobbles or shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

108-1-5-GS-21

BAY NO, 108

PROFILE NO. 1

STATION NO. 5

GRAB NO. 21

WATER DEPTH (Lead line) 8.7 m.

DATE 9/06/80

TIME 18:55 HRS. EDT

SAMPLE NUMBERS 108-1-5-GS-21: 108-1-5-F-56

REMARKS:

DESCRIPTION:

Mottled light green/dark grey silt with a small amount of bright green filamentous algae. No pebbles, cobbles or shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

108-1 -7-GS-22

BAY NO. 108

PROFILE NO. 1

STATION NO. 7

GRAB NO. 22

WATER DEPTH (Lead line) 10.31 m.

DATE 9/06/80

TIME 18:45 HRS. EDT

SAMPLE NUMBERS 108-1 -7-GS-22; 108-1-7-F-57

REMARKs :

DESCRIPTION:

Dark green/grey slightly gravelly silt with large amount of bright green filamentous algae. No pebbles, cobbles or shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

108-1 -8-GS-23

BAY NO. 108

PROFILE NO. 1

STATION NO. 8

GRAB NO. 23

WATER DEPTH (Lead line) 11.26 m.

DATE 9/06/80

TIME 18:40 HRS. EDT

SAMPLE NUMBERS 108-1 -8-GS-23; 108-1-8-F-58

REMARKs :

DESCRIPTION:

Dark grey/black silt with some kelp and bright green filamentous algae. No pebbles, cobbles or shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

_ 108-1 -9-GS-24

BAY NO. 108

PROFILE NO. 1

STATION NO. 9

GRAB NO. 24

WATER DEPTH (Lead line) 11.8 m.

DATE 9/06/80

TIME 18:33 HRS. EDT

SAMPLE NUMBERS 108-1 -9-GS-24; 108--1-9-F-59

REMARKS:

Part of grab sample retained for biological analysis as 108-1-9-GS-24T.

DESCRIPTION:

Grey/black slightly gravelly mud with no pebbles, cobbles or shell fragments present. Strong odour. Mass of algae and kelp with numerous live invertebrates.

BAY 109

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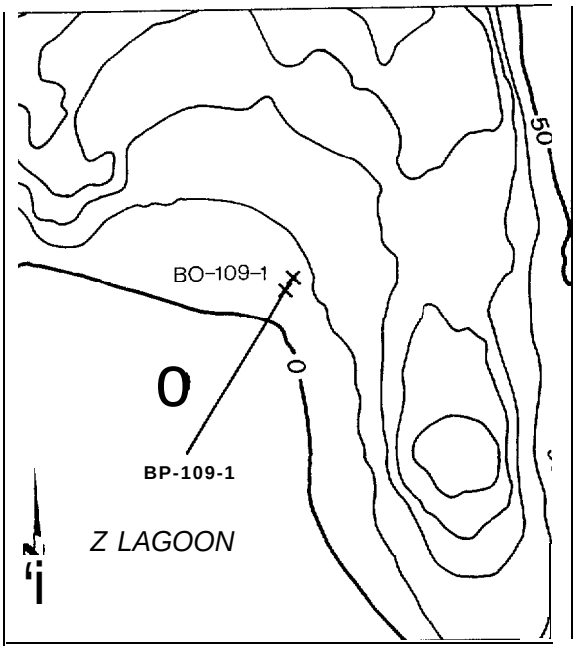
BAY 109



Approximate

Contour Interval: 10 meters

Figure 13-1: Location of beach observations and profile (BO); beach, nearshore and offshore profile (BP); permanent bench marks {x); and general topography of Bay 109

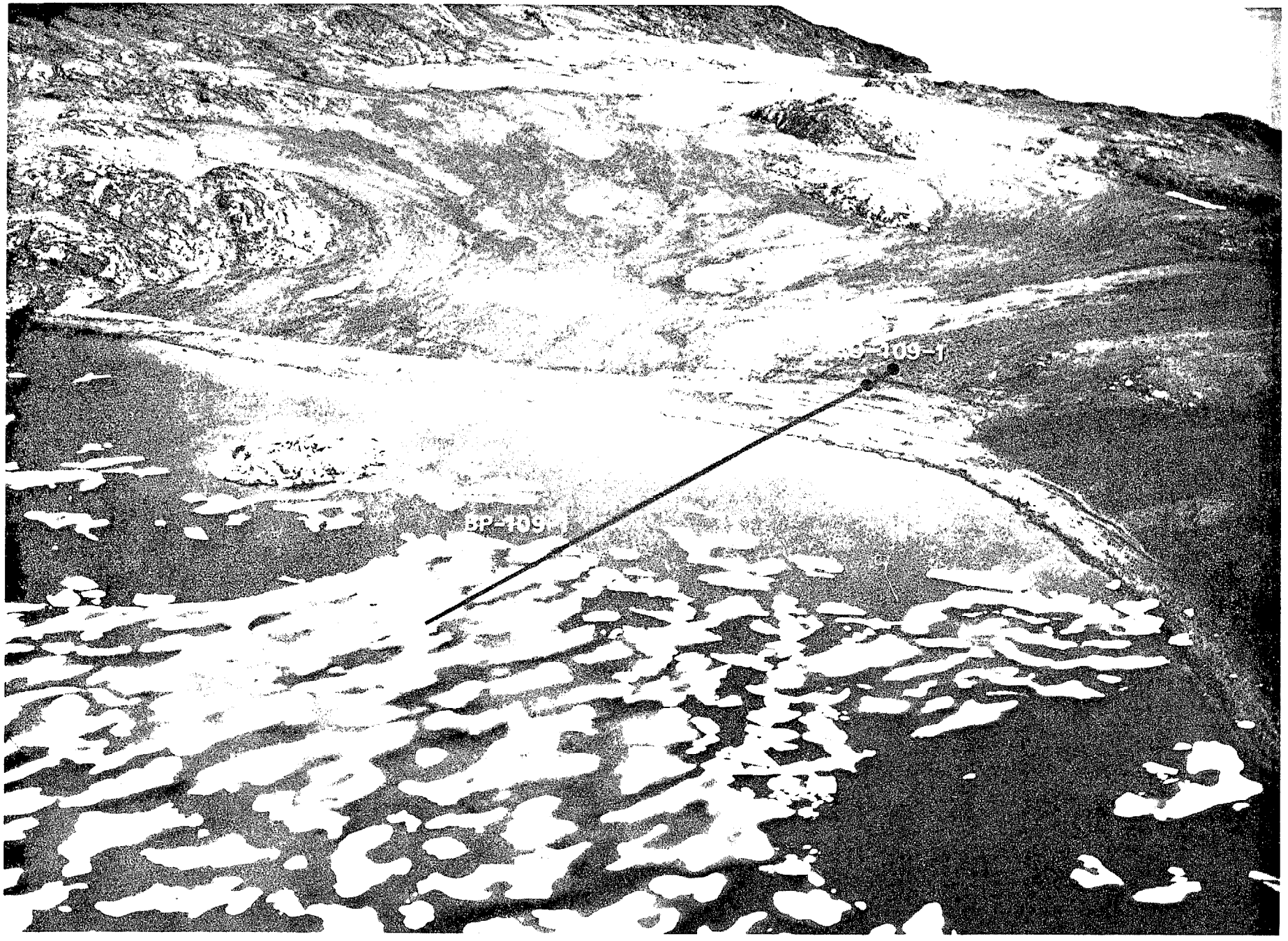
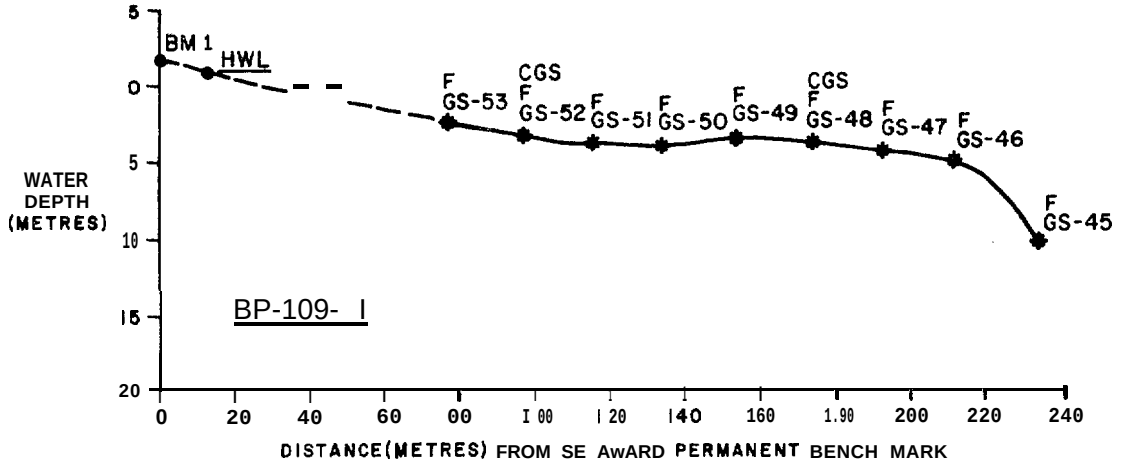


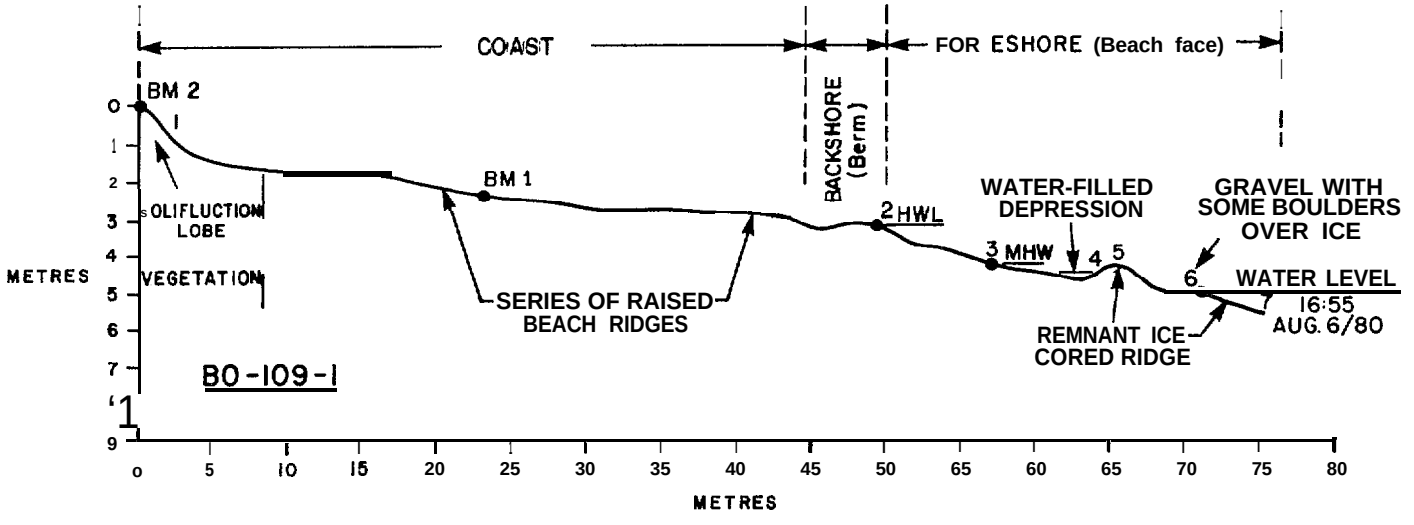
FIG. 13.2 OBLIQUE AERIAL PHOTOGRAPH OF BAY 109

OFFSHORE AND NEARSHORE PROFILE -BAY 109



CGS - CHEMISTRY GRAB SAMPLE
GS - GEOLOGY GRAB SAMPLE
F - FORAMINIFERA SAMPLE
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LINE
VERTICAL EXAGGERATION = 4x

BEACH PROFILE -BAY 109



MHW - MEAN HIGH WATER
BM - PERMANENT BENCH MARK
HWL - APPROXIMATE HIGH WATER LEVEL
NUMBERS INDICATE SAMPLING LOCATIONS
VERTICAL EXAGGERATION =2.5X

Table 13-1: Grain size data for grab samples of Bay 109.

SAMPLE NUMBER	WATER DEPTH (m)	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY
109-1-10-GS-45	10.17	+6. 83	2.73	+0.67	<1	8	66	26
109-1-9-GS-46	4.52	+8. 17	2.85	-0.19	<1	4	50	46
09-1-8-GS-47	4.12	+7. 79	3.72	-0.67	2	13	35	50
09-1-7-GS-48	3.63	+5. 91	3.97	+0.08	4	30	36	30
09-1-6-GS-49	3.4	+6. 63	3.22	+0. 19	1	15	55	29
09-1-5-GS-50	3.99	+7.14	2.89	+0. 41	<1	8	60	32
09-1-4-GS-51	3.95	+7. 45	3.16	-0.05	<1	10	50	39
09-1-3-GS-52	3.25	+6.32	3.59	+0.05	3	21	47	29
09-1-2-GS-53	2.32	+5. 50	3.85	+0.26	3	36	36	25

able 13-2: Grain size data for beach samples of Bay 109.

AMPLE NUMBER	MEAN GRAIN SIZE (Ø)	SORTING (Ø)	SKEWNESS	PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	REMARKS
)-109-1-1	+2. 86	4.12	+0. 71	27	35	25	13	Backshore
>109-1-2	+0. 33	3.12	+2. ll	63	22	ll	4	Berm crest
)-109-1-3	+0. 40	2.55	+2. 53	38	53	6	3	Beach face
3-109-1-4	+0. 17	1.58	+3. 66	19	79	l	1	Beach face
>109-1-5	+0. 97	1.96	+2. 36	11	83	4	2	Beach face
>109-1-6	+0. 95	2.30	+2. 30	l8	75	5	2	Beach faoe
>109-1-7	+3. 00	3.59	+l. 15	9	64	15	12	Beach face

BIOS PROJECT PETERSEN GRAB DATA

109-1 -1 0-GS-45

BAY NO. 109

PROFILE NO. 1

STATION NO. 10

GRAB NO. 45

WATER DEPTH (Lead line) 10.17 m.

DATE 14/06/80

TIME 21:22 HRS . EDT

SAMPLE NUMBERS 109-1-10-GS-45; 109-1-10-F--80

REMARKs :

Part of grab sample retained for chemical analysis as 109-1-10-GS-45. Part of grab sample retained for biological analysis as 109-1-10-GS-45T. No photograph in the appendix for this grab sample.

DESCRIPTION:

Light brown slightly gravelly silt with one complete Hiatella arctica but no other shell fragments, pebbles or cobbles.

BIOS PROJECT PETERSEN GRAB DATA

109-1- - - 6

BAY NO. 109

PROFILE NO. 1

STATION NO. 9

GRAB NO. 46

WATER DEPTH (Lead line) 4.52 m.

DATE 14/06/80

TIME 21:35 HRS. EDT

SAMPLE NUMBERS 109-1-9-GS-46; 109-1-9-F-81

REMARKs :

No photograph in the appendix for this grab sample.

DESCRIPTION:

Light brown slightly gravelly mud with two live bivalves and abundant bright green filamentous algae.

BIOS PROJECT PETERSEN GRAB DATA

109-1-8-GS-47

BAY NO. 109

PROFILE NO. 1

STATION NO. 8

GRAB NO. 47

WATER DEPTH (Lead line) 4.12 m.

DATE 14/06/80

TIME 21:43 HRS. EDT

SAMPLE NUMBERS 109-1-8-GS-47; 109-1-8-F-82

REMARKs :

No photograph in the appendix for this grab sample.

DESCRIPTION:

Dark grey slightly gravelly sandy mud with numerous fine to coarse pebbles and several shell fragments.

BIOS PROJECT PETERSEN GRAB DATA

109-1- -,S-48

BAY NO. 109

PROFILE NO. 1

STATION NO. 7

GRAB NO. 48

WATER DEPTH (Lead line) 3.63 m.

DATE 14/06/80

TIME 21:52 HRS . EDT

SAMPLE NUMBERS 109-1 -7-GS-48; 109-1-7-F-83

REMARKs :
- No photograph in the appendix for this grab sample.

DESCRIPTION:

Dark brown slightly gravelly sandy mud with several medium pebbles and shell fragments and some bright green filamentous algae.

BIOS PROJECT PETERSEN GRAB DATA

109-1 -6-GS-49

BAY NO. 109

PROFILE NO. 1

STATION NO. 6

GRAB NO. 49

WATER DEPTH (Lead line) 3.4 m.

DATE 14/06/80

TIME 22:02 HRS. EDT

SAMPLE NUMBERS 109-1-6-GS-49; 109-1-6-F-84

REMARKS :

DESCRIPTION:

Dark green/grey slightly gravelly sandy mud with one live (Mya truncata) bivalve and an abundance of bright green filamentous algae. No shell fragments, pebbles or cobbles present.

BIOS PROJECT PETERSEN GRAB DATA

109-1 -5-GS-50

BAY NO. 109

PROFILE NO. 1

STATION NO. 5

GRAB NO. 50

WATER DEPTH (Lead line) 3.99 m.

DATE 14/06/80

TIME 22:07 HRS. EDT

SAMPLE NUMBERS 109-1-5-GS-50, 109-I-5-F-85

REMARKS :

DESCRIPTION:

Dark green/grey slightly gravelly mud with one live Clinocardium ciliatum and an abundance of kelp and algae. No shell fragments, pebbles or cobbles present.

BIOS PROJECT PETERSEN GRAB DATA

109-1 -4-GS-51

BAY NO. 109

PROFILE NO. 1

STATION NO. 4

GRAB NO. 51

WATER DEPTH (Lead line) 3.95 m.

DATE 14/06/80

TIME 22:15 HRS. EDT

SAMPLE NUMBERS 109-1 -4-GS-51 , 109-1-4-F-86

REMARKS :

DESCRIPTION:

Light brown with black zones slightly gravelly sandy mud with three subrounded to subangular coarse pebbles and one subrounded very coarse pebble. Two live bivalves and some kelp but no shell fragments present. (Astarte).

BIOS PROJECT PETERSEN GRAB DATA

109-1-3-GS-52

BAY NO. 109

PROFILE NO. 1

STATION NO. 3

GRAB NO. 52

WATER DEPTH (Lead line) 3.25 m.

DATE 14/06/80

TIME 22:21 HRS. EDT

SAMPLE NUMBERS 109-1-3-GS-52, 109-1-3-F-87

REMARKS :

Part of grab sample retained for chemical analysis as 109-1-3-GS-52.

DESCRIPTION:

Dark grey slightly gravelly sandy mud with four surrounded very coarse pebbles, six subrounded to rounded medium pebbles. No shell fragments present.

BIOS PROJECT PETERSEN GRAB DATA

109-1 -2-GS-53

BAY NO. 109

PROFILE NO. 1

STATION NO. 2

GRAB NO. 53

WATER DEPTH (Lead line) 2.32 m.

DATE 14/06/80

TIME 22.38 HRS. EDT

SAMPLE NUMBERS 109-1 -2-GS-53, 109-1-2-F-88

REMARKS:

Part of grab sample retained for biological analysis as 109-1-2-GS-53T.

DESCRIPTION:

Dark brown with grey zones slightly gravelly sandy mud with four subangular coarse pebbles and one subangular medium pebble. Some bright green filamentous algae but no shell fragments present.

APPENDIX 1

CHRONOLOGICAL LIST OF EVENTS

Appendix 1:

Trip Report for Sediment Coring and Grab Sampling Program - BIOS Project, Cape Hatt, N.W.T.

Personnel: W.B. Barrie - 19 May to 16 June, 1980
J-M. Sempels - 19 May to 12 June, 1980

Date

19 May	Left Ottawa for Pond inlet and Cape Hatt
20 May	Rerouted through Resolute due to poor weather at Nanisivik.
21 May	Arrival at Cape Hatt. Shoreline reconnaissance of bays 10, 11, 12, and 13 by snowmobile.
22 May	Surveyed sampling profiles, installed permanent bench marks, and began bathymetry in bay 13. Commenced assembly of vibra corer and underwater camera.
23 May	Completed assembly of vibra corer. Obtained first core in bay 13. Core logging and sample processing.
24 May	Coring and bathymetry in bay 13. Core logging and sample processing.
25 May	Coring and bathymetry in bay 13. Core logging and sample processing.
26 May	Coring and bathymetry in hay 13. Core logging and sample processing.
27 May	Coring and bathymetry in bay 13. Core logging and sample processing. Equipment maintenance and repair.
28 May	Coring and bathymetry completed in bay 13. Trials with mini-Shipek and Foerst-Peterson grab samplers and Nikonos underwater camera. Core logging and sample processing.
29 May	Equipment maintenance and repair. Moved all equipment by komatik and snowmobile to bay 10, surveyed sampling profiles, installed permanent bench marks and began bathymetry. Trials with Ports-Vibe coring system.
30 May	Coring, bathymetry, and grab sampling in bay 10. Core logging and sample processing. Meeting with P. Blackall (BIOS project manager) and G. Sergy.
31 May	Equipment maintenance and repair. Coring, grab sampling and bathymetry in bay 10. Core and grab sample logging and sample processing.
1 June	Equipment maintenance and repair. Coring, grab sampling and bathymetry in bay 10. Underwater camera trials.
2 June	Coring, grab sampling, bathymetry and underwater photography in bay 10. Core and grab sample logging and sample processing.
3 June	Coring and grab sampling completed in bay 10.

	Moved all equipment by komatik and snowmobile to bay 9, surveyed sampling profiles, installed permanent bench marks and began bathymetry and coring. Core logging and sample processing.
4 June	Equipment maintenance and repair. Coring and bathymetry in bay 9. Underwater camera trials.
5 June	Equipment maintenance and repair. Bathymetry and underwater camera trials in bay 9. Graphed bathymetry for bays 9, 10 and 13. Core logging and sample processing.
6 June	Coring and bathymetry in hay 9. Underwater camera trials. Core logging and sample processing.
7 June	Coring and bathymetry in bay 9. Equipment maintenance and repair.
8 June	Completed coring in bay 9. Reconnaissance of bays 101, 102, 103, 104, 105, 106, 107, 108, and 109. Moved equipment by komatik and snowmobile to bay 102, surveyed sampling profile, installed permanent bench marks and began bathymetry. Underwater photography in bay 102 and film processing.
9 June	Completed coring and bathymetry in bay 102. Moved equipment to bay 108, surveyed sampling profile, installed permanent bench marks and completed bathymetry. Core logging and sample processing.
10 June	Grab sampling and underwater photography in bays 108 and 102. Grab sample logging and processing.
11 June	Oblique aerial photography of all bays and by helicopter. Moved equipment to bay 105, surveyed sampling profile, installed permanent bench marks and began bathymetry. Grab sampling and coringin bay 105 and coring in bay 108 and in the centre of Z-Lagoon. Underwater photography in bays 10 and 13. Grab sample logging and processing.
12 June	J-M. Sempels departs for Calgary. Completed bathymetry and grab sampling in hays 105 and 108. Grab sample logging and processing.
13 June	Moved equipment to hay 104, surveyed sampling profile, installed permanent bench marks and completed bathymetry and grab sampling. Moved equipment to bay 103, surveyed sampling profile, installed permanent bench marks and completed bathymetry and grab sampling.
14 June	Grab sample logging and processing. Moved equipment to bay 109, surveyed sampling profile, installed permanent bench marks and completed bathymetry and grab sampling. Moved equipment to bay 106, surveyed sampling profile, installed permanent bench marks and completed bathymetry and grab sampling.
15 June	Grab sample logging and processing. Ground photography in bays 9, 10 and 13. Packing equipment for storage and shipment.

16 June Ground photography in bays 101, 102, 103, 104, 105, 106, 108 and 109. Finished packing equipment Departure of W. Barrie for Ottawa.

Personnel:
W.B. Barrie - 27 July to 11 August
P. McLaren 22 July to 4 August
J-M. Sempels - 27 July to 11 August

Date

22 July P. McLaren leaves Victoria for Pond Inlet and Cape Hatt.

23 July Enroute.

24 July Arrival at Cape Hatt.

25 July General shoreline reconnaissance and photography of bays 9, 10 and 13.

26 July General shoreline reconnaissance and photography of bays 101, 102, 103, 104, 105, 106, 107, 108 and 109.

27 July Beach observations, sampling and photography in bays 10 and 13. W. Barrie and J-M. Sempels leave Ottawa for Pond Inlet and Cape Hatt.

28 July Beach observations, sampling and photography in bay 10. W. Barrie and J-M. Sempels arrive Cape Hatt. Reconnaissance of bays 9 and 10. Discussions

29 July Beach observations, sampling and photography in bays 9 and 10. Sample processing and equipment organization.

30 July Equipment preparation and repair. Reach observations in bays 11, 12 and 13.

31 July Beach observations, sampling and photography in bays 101 and 102. Equipment preparations.

1 August Nearshore dive profile in bay 10. Beach observations, sampling and photography in bay 106 and trials with rock drill.

2 August Beach observations, sampling and photography in bays 103, 107, 108 and 109. Nearshore dive profile in bay 13.

3 August Beach observations, sampling and photography in bays 104 and 105. Discussions.

4 August P. McLaren departs for Victoria. Sample processing. Fabrication and preparation of ground temperature measuring probes.

5 August Calibration of temperature measuring probes and installation of two probes into beach face of bay 106. Equipment maintenance.

6 August Beach profiling and photography in bays 106, 107, 108 and 109. Installation of a temperature measuring probe in the backshore of bay 106. Equipment preparation.

7 August Beach profiling and photography in bays 101, 102 and 103.

8 August Beach profiling and photography in bays 9, 104 and 105. Installation of a temperature measuring probe in the beach face of bay 106.

9 August Nearshore dive profile in bay 9. Beach profiling and photography in bay 10. Equipment maintenance and preparation.

10 August Dive in Utuk Lake, southwest of Pond Inlet, to collect sediment cores for R.A. Klassen, Geological Survey of Canada, and sediment cores and water samples for K. Kranck, Bedford Institute of Oceanography. Beach profiling and photography in Bay 13. Packing equipment and samples for shipment.

11 August Packing completed. W.Barrie and J-M. Sempels depart for Ottawa and Calgary, respectively.

APPENDIX II

VI BRA CORING DEVICE

CROSS SECTIONAL VIEW OF VIBRA CORER

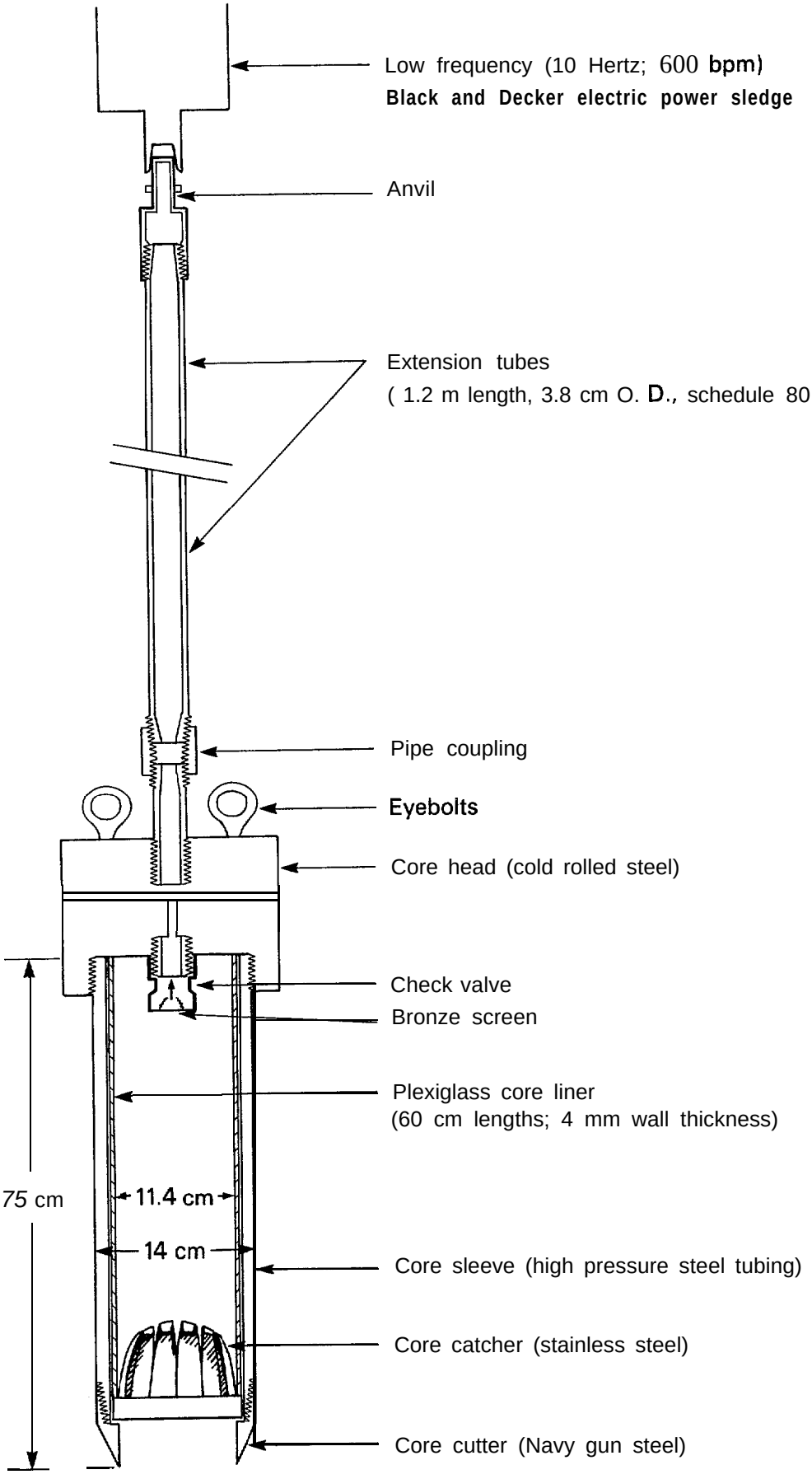
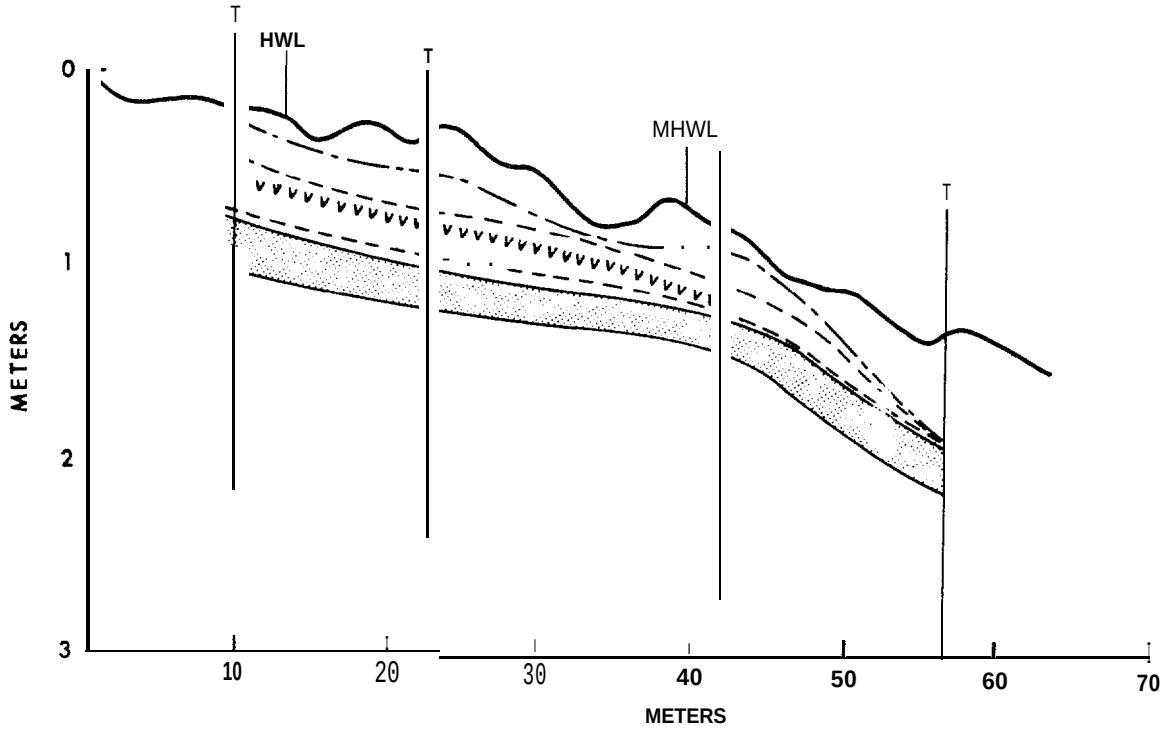


Figure No. 14

APPENDIX III

BEACH THERMAL OBSERVATIONS

BAY 106



ZONE OF FLUCTUATION OF O°C ISOTHERM, FROM AUGUST 11 TO SEPTEMBER 10, 1980

vvvvv O"C ISOTHERM ON SEPTEMBER 12, 1980

—·— 0° C ISOTHERM ON SEPTEMBER 13, 1980

- - - - O"C ISOTHERMS ON SEPTEMBER 15, 1980

T THERMOCOUPLE STRINGS

HWL HIGH WATER LINE

MHWL MEAN HIGH WATER LINE

Figure 15. Behaviour of 0°C isotherm in the intertidal flat

The intertidal zone of bay 106 consists in a very gently sloping area of sand and mud, with pebbles and cobbles scattered at the surface and throughout the top 20 cm. The very gentle slope of this zone (1.2°) and the nature of sediments make this region an intertidal flat.

Four thermocouple strings were installed at 10 to 20 meter intervals across this intertidal zone. Each string was buried to a depth of 1.8 to 2.0 m and contained probes spaced at every 20 cm (Figure 15). This study was not part of the original work definition but was added at the last minute because it was felt that despite the lack of refinement in the equipment and methods of observations, it may nevertheless reveal something about the behaviour of the frost table.

Results show that from August 11 to September 10, the 0°C isotherm fluctuated in a vertical zone extending between 50 and 85 cm. In early September, the 0°C isotherm moved upward to a depth of about 40 cm. One day later (September 13) it had moved upward to a depth of about 15 cm. The last day of record shows the presence of two 0°C isotherms, the top one located at a depth of about 35 cm and the bottom one at a depth of about 50 cm, with a band of unfrozen sediments in between.

These results indicate that 1) during most of the summer, the 0°C isotherm fluctuates in a relatively well defined band; 2) upward migration of the frost table can be rapid and; 3) an unfrozen band of sediments may be present below and above frozen sediments (i.e. the freeze up not only proceeds from bottom to top but also from top to bottom). This last point has been observed elsewhere (Short, 1973) and may play a role in the formation of the ice mounds observed in the spring.