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**EXAMINATION OF THE SUPENDED PARTICULATE  
MATTER WITHIN ARCTIC FJORDS**

by

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## ABSTRACT

Information is presented on 700 suspended sediment samples collected within the waters of 9 Baffin Island fjords during September, 1982, including data on size characteristics (Coulter Counter® analysis) and particle-particle morphology (scanning electron microscope analysis). Geochemical information obtained from energy-dispersive X-ray analysis of selected samples and particles is also presented.

Suspended particulate matter within these fjords is mostly composed of particles in the silt and clay size range. Particle morphological types included floccules, planktonic fecal pellets, agglomerates including organo-mucoids, biogenic debris from mineralized phytoplankton and zooplankton, and debris resuspended from the seafloor.



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## INTRODUCTION

This open file sets out to report results on the primary properties of suspended particulate matter (SPM) collected in nine Baffin Island fjords (Fig. A) during the autumn season of 1982. The collection of these samples and their subsequent analysis is an integral part of the Sedimentology of Arctic Fjords Experiment (SAFE) described in Syvitski and Schafer (1985). Project SAFE sets out to understand the modern and paleo processes that affect the deposition and erosion of sediment within arctic fjords. Data presented herein will provide a valuable aid in interpreting the movement of water and particle interactions that take place within these fjords.

Additional information on the mineralogy, size characteristics (mean, mode, standard deviation, skewness and kurtosis of the size frequency distribution) and organic composition (concentration of carbon, hydrogen and nitrogen, and atomic C/N ratio) and morphology (as based on binocular microscope description) of these SPM samples can be found in Asprey et al. (1983) and Winters et al. (1984). Supporting oceanographic data are described in detail in Syvitski and Blakeney (1983) and Syvitski (1984). Field instruments and techniques are described in Syvitski (1982). In situ manned submersible observations and descriptions of the suspended matter within these fjords is given in Syvitski et al. (1985).

## METHODS

Water samples were collected with a rosette sampler that was coupled with a Guildline CTD. The rosette was fitted with 9, 5-L Niskin® sampling bottles. One litre subsamples were suction-filtered through preweighed Nucleopore® 47 mm diameter filters with a 0.45 µm nominal pore diameter. For 1/3 of the water samples a second one-litre aliquot was similarly suction-filtered through a 47 mm diameter, Selas Flotronic®, Ag-filter of a 0.45 µm nominal pore throat diameter. Consequently, the background filter material seen on the enclosed SEM micrographs can be of either of these filter types. In all cases, the filtered samples were washed with deionized water to remove sea-salts. On rare occasions, salt crystals remained and such samples are identified within this report. Filters were immediately oven-dried in individual petri dishes at 50 °C for 12 hours.

In the A.G.C. Soft Sediment Laboratory, the Nucleopore filters were reweighed and the total suspended sediment concentrations were determined by difference ( $\pm 0.005$  mg). Half of each Nucleopore filter was ultrasonified in a sodium hexametaphosphate solution ( $40 \text{ g L}^{-1}$ ) to put back the filtrate into solution. The resulting suspensions were analyzed for particle size distribution with a computerized Coulter Counter® model TAPII with two overlapping apertures (30 µm and 200 µm). This approach provided a particle size range resolution from 0.63 µm to 80 µm nominal volume diameters. The results are in terms of the de-flocculated size spectrum, for sonification breaks up flocs, fecal pellets and agglomerates into their individual constituents. The size frequency distribution for most of the suspended sediment samples, as processed on the AGC READY program (Hackett et al., 1986), are included in this report. The size frequency distributions for the suspended sediment samples that were collected in Itirbilung Fiord have been published elsewhere (Winters et al., 1984).

A portion of the silver filters were coated with carbon and examined with a Cambridge Stereoscan® 180 scanning electron microscope equipped with an E.G. & G. ORTEC® X-ray energy-dispersive elemental analyser. The chemical data given herein are based on the number of counts for elements detected by the X-ray energy dispersive spectrometer (sodium and heavier elements). The total number of counts is measured for each elemental peak and calculated by the peak width at half maximum and corrected for background (SEMIQ program). No matrix correction (Z,A,F) was attempted and the results must be considered as semi-quantitative. Moreover, no correction for peak overlap was made and thus abundance of some elements may be overestimated.

For each analysis the total number of counts for each significant element, the normalized percentages:

of these elements, and a ratio (usually to Al) of these elements are given. It must be noted that when an element concentration is below detection, the SEMI-Q program will sometimes give a negative count rate. The negative values in the count and ratio/Al lists should be considered as nil. When these negative values exist in an analysis, they will adversely affect the normalized results.

The SEM micrographs enclosed are at various levels of magnification. For each of the micrographs presented, the scale in micrometres given below the picture corresponds to the distance between 2 white squares at the lower edge of the micrographs.

## DATA PRESENTATION

A standard format is used in the presentation of data on each fjord. Firstly, a short environmental description of the fjord is provided, with emphasis on characteristics that make the fjord geologically interesting, including a figure showing the sample locations. This description is based on data from Winters et al. (1984, 1985), Syvitski and Blakeney (1983), Syvitski and Praeg (1987), Syvitski (1984, 1985, 1987a,b).

Secondly, a description of each sample collected from a station is presented (in order of shallowest to deepest water sample), including: (a) sample ID number, i.e. 82-03153; (b) suspended particulate matter (SPM) concentration (in units of  $\text{mg L}^{-1}$ ); (c) figure number of the associated grain size spectra when available; and (d) general observations on SPM particle associations through SEM examination, with references to supporting micrographs and elemental data. The stations are presented from the lowest number, i.e. closest to the head of the fjord, to the highest number, i.e. towards or on the Baffin shelf.

Thirdly, the de-flocculated size spectra of each SPM sample is provided, and in terms of: (a) cumulative probability frequency percentiles (solid curve) and (b) logarithmic relative frequency percentiles (histogram). Each figure includes a header with the AGC Coulter Counter sample ID number (i.e. 378), project scientist, ship sample number, station number with water depth in metres, and fjord name.

Fourthly, a series of scanning electron micrographs grouped according to their station and water depth is provided. Each micrograph contains a short description of the dominant feature of interest, occasionally including information on the geochemical nature of the particle or reference to an elemental spectrum (a five digit number prefixed with a letter, i.e. A15008). It should be noted that throughout the text, clay refers to clay minerals.

Lastly, a series of tables on specific geochemical spectra are provided, including counts, elemental ratios (usually to Al) and normalized percentages. In the latter case, negative values have not been readjusted to nil values and the spectra subsequently renormalized.

This information format is repeated for each fjord.

## ACKNOWLEDGEMENTS

We thank Dr. Patricia Stoffyn-Egli for help with the SEM-EDS facilities at the Bedford Institute of Oceanography. G.V. Winters and P. Stoffyn-Egli kindly reviewed this report for release to GSC open file. The success of this project was largely dependent on a Canadian federal labour incentive program (Needs) that allowed the employment of the third author.

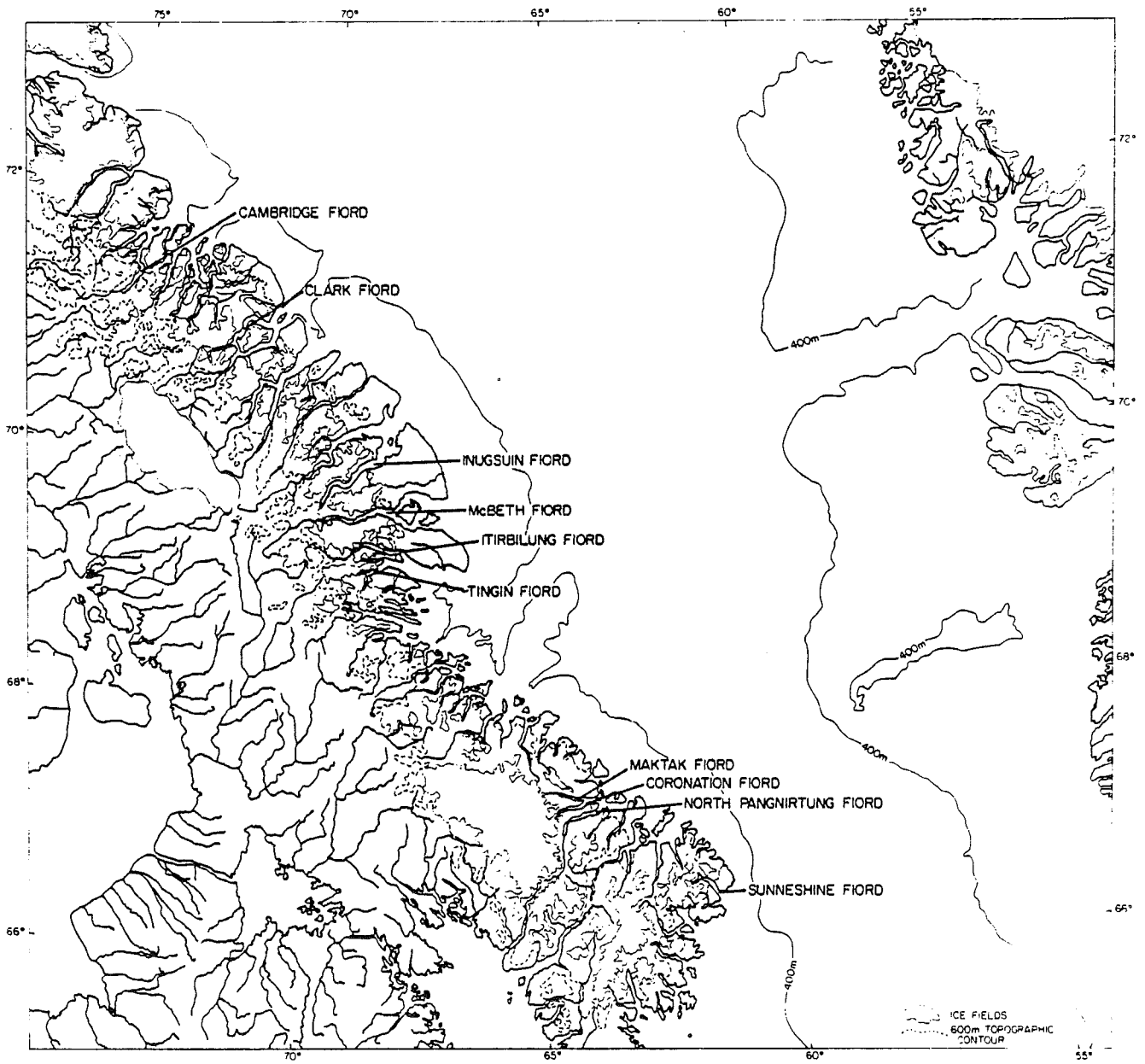


Fig. A- East Coast of Baffin Island Showing Location of Fiords



### CORONATION FIORD

This fjord has a maximum water depth of 606 m, no sill and is 41 km long with a mean width of 3.2 km. It receives 0.25 km<sup>3</sup> of freshwater runoff every year. Coronation Fiord merits special attention within the SAFE project for it contains the largest tidewater glacier of any Baffin fjord and receives the largest supply of suspended sediment (1.7 million tonnes per annum) of any of the SAFE-investigated fjords. Seventy percent of the fjord hinterland is covered in glacial ice of which 50 % of the land is at elevations in excess of 1000 m. Of particular importance is that almost 100 % of the suspended sediment enters the fjord at the head of the fjord which is occupied by the Coronation Glacier. This glacier has its tidewater position retreating at a rate of 12 m a<sup>-1</sup>.

Coronation Fiord contains a water volume of 30 km<sup>3</sup> and, at the time of sampling, the surface waters were relatively warm, up to 3.6 °C (except near the glacier: -0.35 °C), coldest at 50 m water depth (-1.5 °C) and warming thereafter with depth to -0.53 °C at 497 m at station CO5 (Fig. B). The salinity increased from 26.8 ‰ at the water surface to 33.9 ‰ at depth. The waters were well oxygenated with the lowest dissolved oxygen value of ≈ 5.9 ml L<sup>-1</sup> at 400 m.

Fifty-eight SPM samples were collected (Fig. B). The mean grain size of the deflocculated SPM ranged from 7.5 Ø at station CO1 (near the glacier) to 6.8 Ø at CO5 at the fjord mouth. The clay fraction of this SPM ranged from 18 % to 59 %, the remaining SPM fraction was composed of silt particles. The atomic C/N of the suspended sediment was usually quite low (<3) except near the fjord head where values up to 14 were observed. The organic carbon fraction of the SPM was usually less than 20 % (as low as 0.05 mg L<sup>-1</sup>) but occasionally exceeded 30 % (up to 0.35 mg L<sup>-1</sup>). The bottom sediments contain little organic carbon --- always <0.5 % and as little as < 0.1 %.

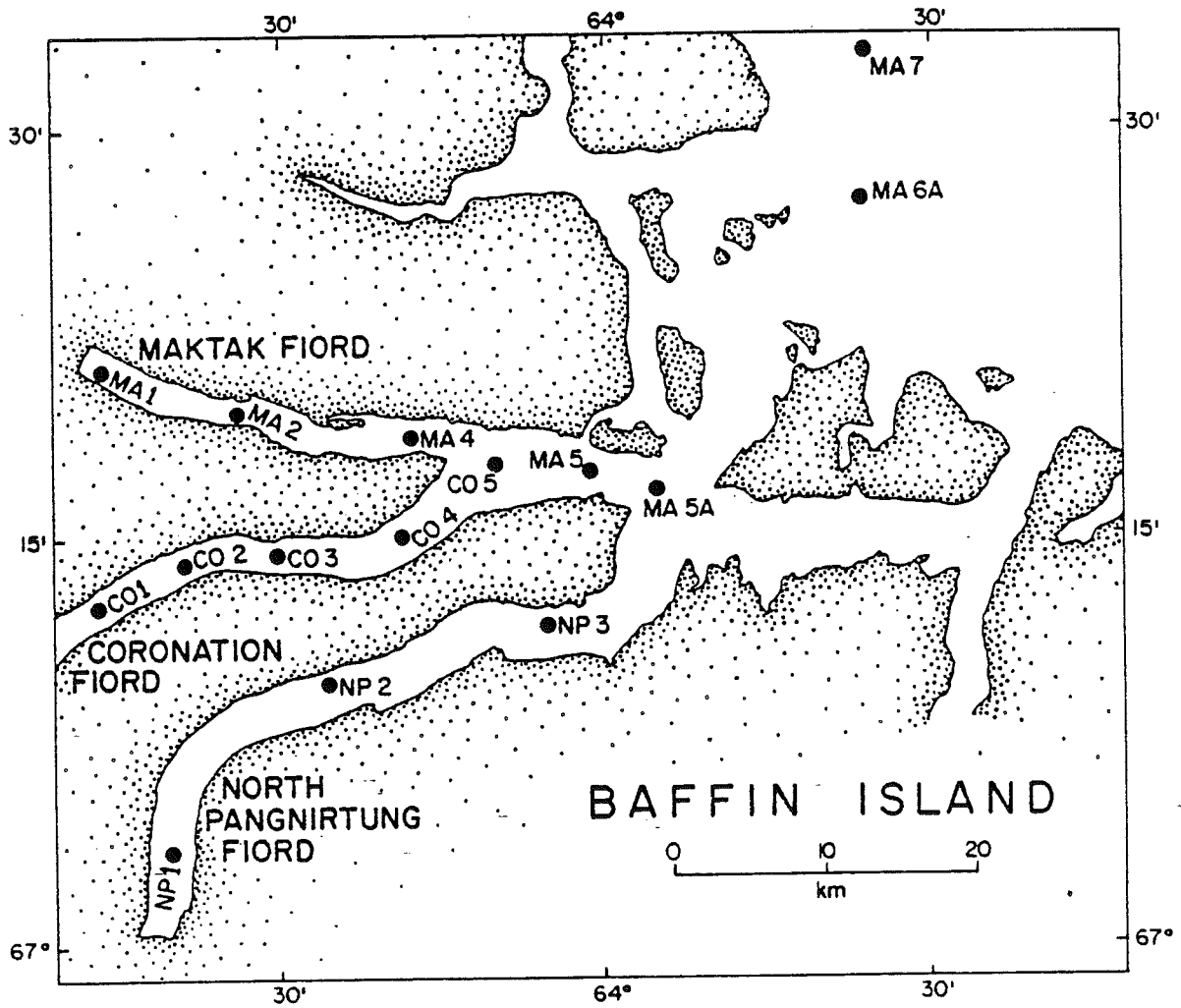


Fig. B- Stations of Coronation Fiord

### Coronation Fiord

Station CO-1: 10 m (82-03153)

SPM conc. = 1.427 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 1

Description from SEM micrographs -

Main components of this sample are large mucoid fragments with numerous small clay grains of 5-10 µm.

Station CO-1: 20 m (82-03152)

SPM conc. = 1.907 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 2

Description from SEM micrographs -

The main constituents of this sample are mucoids ranging in size from 20 µm to 200 µm as well as individual grains of feldspar (K), mica (biotite) and other clays.

Station CO-1: 30 m (82-03151)

SPM conc. = 0.997 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 3

Description from SEM micrographs -

This sample contains very fine individual particles of ~ 5 µm. There are also organic grains, possibly the exoskeleton of zooplankton. Elemental analysis indicates their composition is Na, Mg, Al, Si, S, Cl, K, Ca, Ti and Fe. Agglomerates containing concentric diatom material, biogenics and clay minerals (aluminum rich with silicon and potassium) can also be seen along with dark, organic, mucoid-like material.

Station CO-1: 50 m (82-03150)

SPM conc. = 1.179 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 4

Description from SEM micrographs -

This sample has an aggregate containing quartz from 5 µm to 30 µm in size. It also is composed of mucoids with minute grains too small to analyse.

Station CO-1: 75 m (82-03149)

SPM conc. = 1.427 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 5

Description from SEM micrographs -

This sample contains numerous inorganic floccules of very fine clay particles, one of which is 1 µm to 5 µm in size. This floc is comprised of Si, Al, K and Ca with traces of Mg, Ti and Fe. Another such floc contains grains of 1 µm to 40 µm.

10  
Large individual grains of K-feldspars and quartz along with some mucoids of very fine particles ( $< 1\mu\text{m}$ ) can also be seen. Some organic agglomerates of  $\sim 60\mu\text{m}$  mucoids holding very small to large fragments ( $\sim 30\mu\text{m}$ ) are also present. The sample contains clays, biogenics, diatoms, vegetation and fecal pellets.

Station CO-1: 92 m, bottom (82-03148)

SPM conc. =  $1.557\text{ mg L}^{-1}$

Histogram of grain size distribution - Fig. 6

Description from SEM micrographs -

This sample contains mucoids, mucoid agglomerates, floccules, inorganic material and pellets containing clays. (Micrographs 01.301 (2 of this) and 82.148).

Station CO-2: 5 m, (82-03171)

SPM conc. = 1.840 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 7

Description from SEM micrographs -

The majority of individual grains are smaller than 10 µm, however, a few larger particles are present.

Station CO-2: 100 m, (82-03165)

SPM conc. = 0.877 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 8

Description from SEM micrographs -

This sample is comprised of numerous fine to coarse grained particles, a moderate amount of mucoids and a few long, stringy organics. Micrographs 16.501 and 16.502 show a general photo of the sample and a closeup of a fecal pellet. Spectrum A16502 gives the elemental composition.

Station CO-2: 225 m (82-03163)

SPM conc. = 1.669 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 9

Description from SEM micrographs -

Numerous fecal pellets made up primarily of diatoms can be found in this sample. There are a few dinoflagellates present (100µm) as well as long, stringy organics. Micrograph 16.301 is a general photo of the sample.

Station CO-3: 10 m (82-03181)

SPM conc. = not determined

Histogram of grain size distribution - Fig. 10

Description from SEM micrographs -

This sample contains numerous mucoids of various sizes as well as individual grains of K-feldspar, quartz, etc. Most of these grains are caught up in a thin mucus.

Station CO-3: 100 m (82-03176)

SPM conc. =  $0.380 \text{ mg L}^{-1}$

Histogram of grain size distribution - Fig. 11

Description from SEM micrographs -

There are numerous large particles with a high concentration of organic matter. Floccs are common throughout ( $\sim 30 \mu\text{m}$  in size). There is very little organic matter in these floccs however. Also present are some agglomerates with slightly more organic material than the floccs. Individual particles are  $\sim 20 \mu\text{m}$  in size comprised of micas, organic matter and quartz. Other agglomerates are rich in diatoms and clay particles which have the same composition as fecal pellets. There are very few isolated diatoms as the sample is composed mainly of mineral particles. There are also some salt grains present (calcium, magnesium) and dolomite. Micrograph 17.601 is a general photo of the sample.

Station CO-3: 250 m (82-03173)

SPM conc. =  $0.642 \text{ mg L}^{-1}$

Histogram of grain size distribution - Fig. 12

Description from SEM micrographs -

This sample is composed of numerous individual particles. Mucoids composed of clay grains ( $5 \mu\text{m}$  in size) are rich in aluminum. Most particles are less than  $10 \mu\text{m}$  in size. Zooplankton, fecal pellets and a few dark, dry looking mucoids are also present.

Station CO-4: 5 m (82-03191)

SPM conc. = 1.414 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 13

Description from SEM micrographs -

This sample contains a lot of individual grains including K-feldspars, micas, Al-silicates, plagioclases, quartz and organics. Spectrum A19101 shows the composition of the Al-silicates. There is a moderate amount of mucoids and other biogenics such as diatoms, silicoflagellates and fecal pellets.

Station CO-4: 100 m (82-03186)

SPM conc. = 0.570 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 14

Description from SEM micrographs -

This sample consists mainly of individual grains, most of which are larger than 30  $\mu\text{m}$ . There are, however, a few small agglomerates containing particles < 10  $\mu\text{m}$  in size. These small particles are held together by a smooth mucus. Micrograph 18.601 is a general photo of the sample.

Station CO-4: 352 m (82-03183)

SPM conc. = 0.529 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 15

Description from SEM micrographs -

This sample is mainly composed of small individual grains (< 10  $\mu\text{m}$ ) of quartz, K-feldspars and clays. There are a few flocs made up of clay particles. There are also diatoms (pennates and chains) and mucoids present.

Station CO-5: 1 m (82-03202)

SPM conc. = 0.834 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 16

Description from SEM micrographs -

Sample consists of mucoids, organic matter and individual grains of quartz, biotite, clays, plagioclase, K-feldspars and numerous iron-rich grains. Some fecal pellets and diatoms are also present. Micrograph 20.201 is a general photo of this sample.

Station CO-5: 5 m (82-03201)

SPM conc. = 0.914 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 17

Description from SEM micrographs -

The sample consists of small clay rosettes (10 µm), numerous fibres and some individual clay and quartz grains.

Station CO-5: 10 m (82-03200)

SPM conc. = 1.631 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 18

Description from SEM micrographs -

This sample contains numerous individual organic particles, clays quartz and feldspars, as well as fibres or filaments. There are also many clay aggregates and mucoid flocs containing clays. Some fecal pellets are also present. The sample appears to contain the leg of a zooplankton and intact concentric and pennate diatoms. There are also several chain diatoms.

Station CO-5: 20 m (82-03199)

SPM conc. = 1.060 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 19

Description from SEM micrographs -

The majority of this sample consists of organics including chain diatoms, spines, fecal pellets, remnant rings from diatoms, and other intact diatoms.

Station CO-5: 100 m (82-03196)

SPM conc. = 0.690 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 20

Description from SEM micrographs -

Small individual grains are abundant in this sample. The largest is ~30 µm. The composition of these minerals is quartz, clays and Mg and Si. Spectrum A19601 gives the general analysis. There are also K-feldspars, calcium phosphate, organic chains, silicoflagellates, diatoms, mucoids and fecal pellets filled with fibrous material. No photos were saved.

Station CO-5: 200 m (82-03195)

SPM conc. = 2.489 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 21



Description from SEM micrographs -

This sample is mostly composed of individual particles 10-40  $\mu\text{m}$  in size with a few chain diatoms, quartz, micas and feldspars throughout. Some mucoids with fine particles as well as occasional flocs and pellets made of clays can also be detected. No photos were taken.

Station CO-5: 400 m (82-03194)

SPM conc. = 1.318  $\text{mg L}^{-1}$

Histogram of grain size distribution - Fig. 22

Description from SEM micrographs -

Numerous mucoids are present in this sample along with small individual grains of quartz, K-feldspars and micas. One such grain contains Si and Al in a 3:1 ratio with traces of Na and Ca. Flocs containing clays and K-feldspars are common as well as remnant biogenics and concentric diatoms.

Station CO-5: 497 m (82-03193)

SPM conc. = 1.688  $\text{mg L}^{-1}$

Histogram of grain size distribution - Fig. 23

Description from SEM micrographs -

This sample is made up of numerous individual grains including quartz, K-feldspars and clays, many of which are  $< 1 \mu\text{m}$  in size. Remnant biogenics are common with a few flocs and clay rosettes. One small floc is snow-flake-like and contains mainly aluminum with minor amounts of sulfur, chlorine and calcium and traces of silicon, sodium and magnesium. Spectrum A19301 shows the general composition.

Coronation Fiord - Ice Front Study

Station CO1D-B (82-04978)

SPM conc. = 1.43 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 24

Description from SEM micrographs -

Individual particles constitute the majority of this sample and are < 10 µm in size. These particles include K-feldspars, biotite, plagioclase and another iron-rich mineral, the spectrum of which is very common is included (A97803). There are a few larger particles of up to 100 µm as well as minor amounts of mucoids which contain a great deal of chlorine. Spectrum B97801 shows this analysis.

Station CO4D-B (82-04982)

SPM conc. = 8.0 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 25

Description from SEM micrographs -

Most grains in this sample are smaller than 10 µm including plagioclase, K-feldspars, biotite and iron-rich minerals. There are numerous larger particles as well.

Station CO8D-B (82-04987)

SPM conc. = 1.7 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 26

Description from SEM micrographs -

This sample has a very minute concentration of sediment, the major portion of which is small individual particles of plagioclase, biotite, clay rosettes and quartz. There is an unknown mineral showing cleavage as well; the composition of this mineral is shown in spectrum A98701. A few biogenic remnants, mucoids and diatoms can also be found. Also noted is an iron-rich mineral which is similar to that found in the previous two delta samples. No photos of this sample were taken.

Station CO12D-A (82-04993)

SPM conc. = 5.3 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 27

Description from SEM micrographs -

This sample is basically the same as the other 3 delta samples. It consists of individual grains of K-feldspars, plagioclase, quartz, clays (biotite) and an iron-rich mineral. A few organics (mucoids) and diatoms are also found.

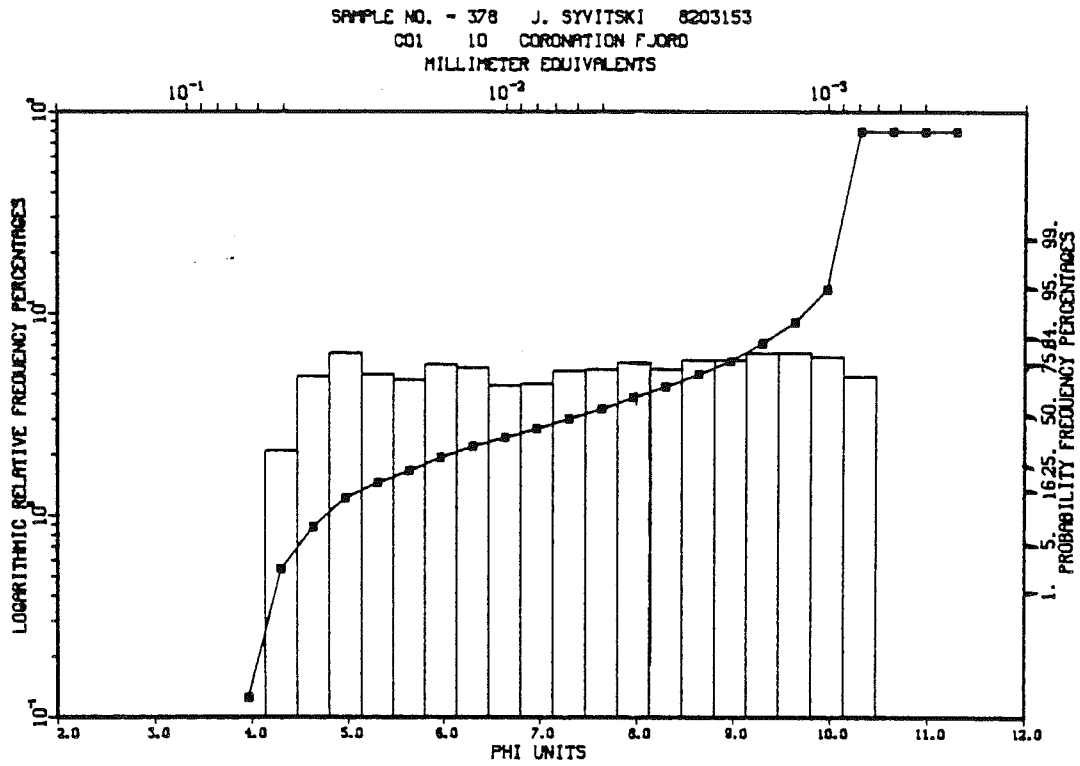


Fig. 1

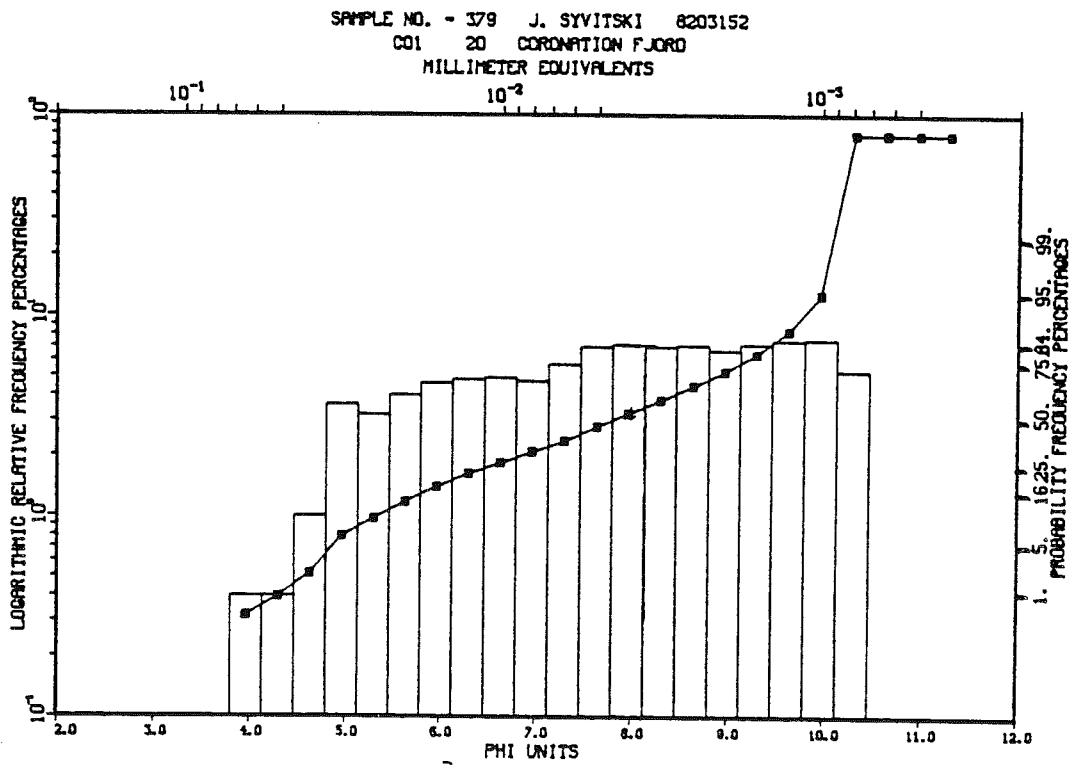


Fig. 2

SAMPLE NO. - 380 J. SYVITSKI 8203151  
CO1 30 CORONATION FJORD  
MILLIMETER EQUIVALENTS

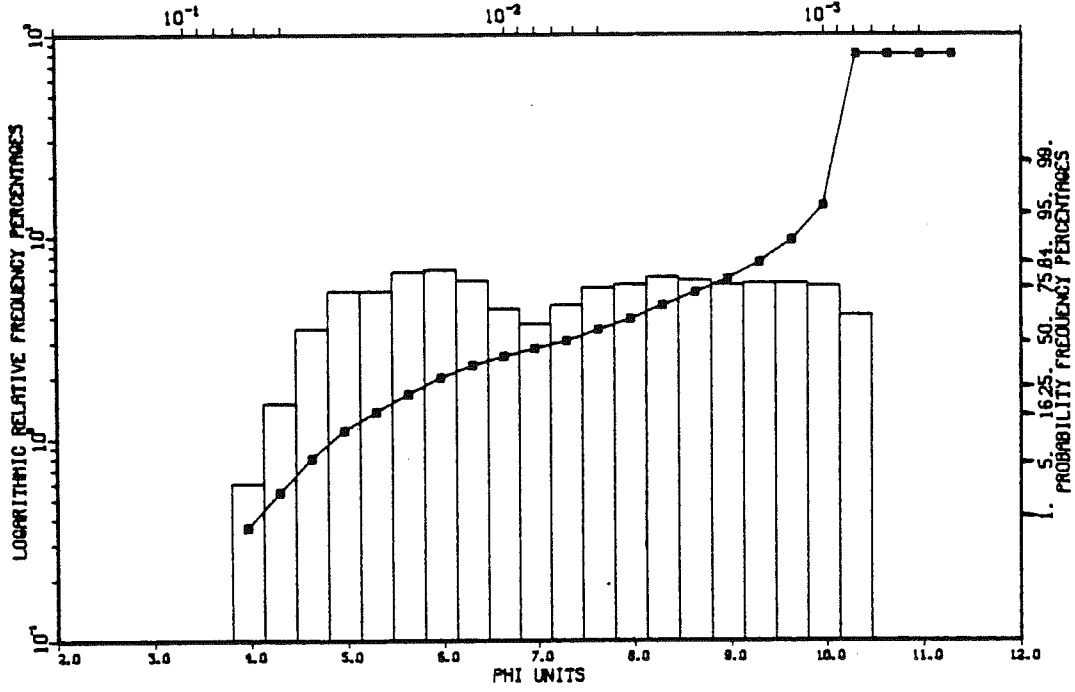


Fig. 3

SAMPLE NO. - 381 J. SYVITSKI 8203150  
CO1 50M CORONATION FJORD  
MILLIMETER EQUIVALENTS

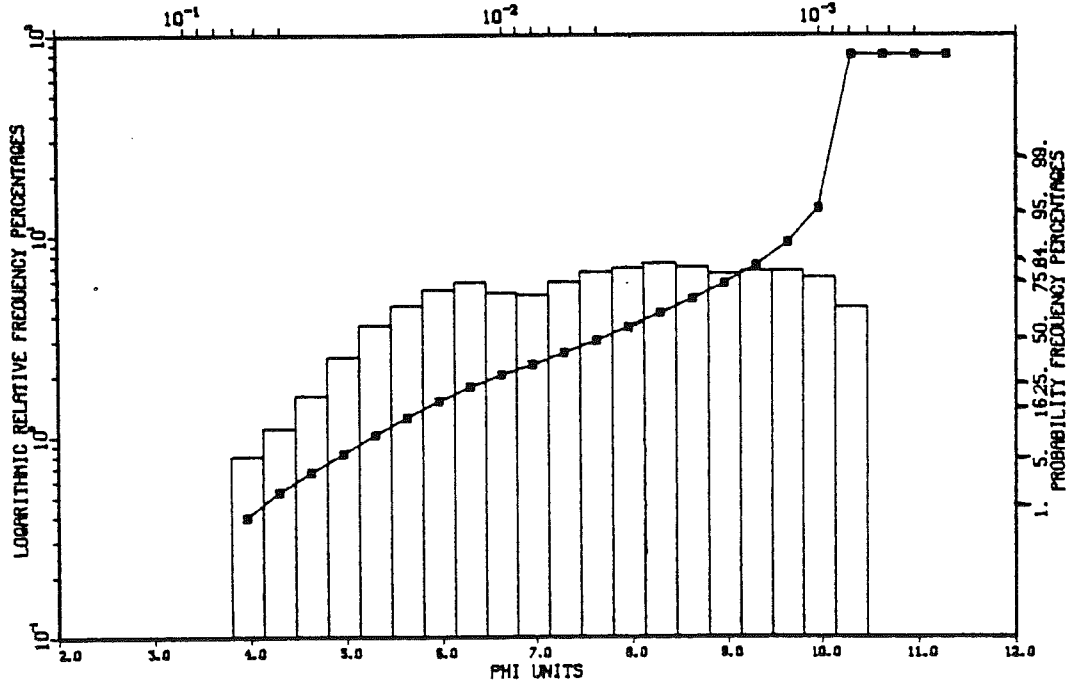


Fig. 4

SAMPLE NO. - 382 J. SYVITSKI 8203149  
 CO1 75 CORONATION FJORD  
 MILLIMETER EQUIVALENTS

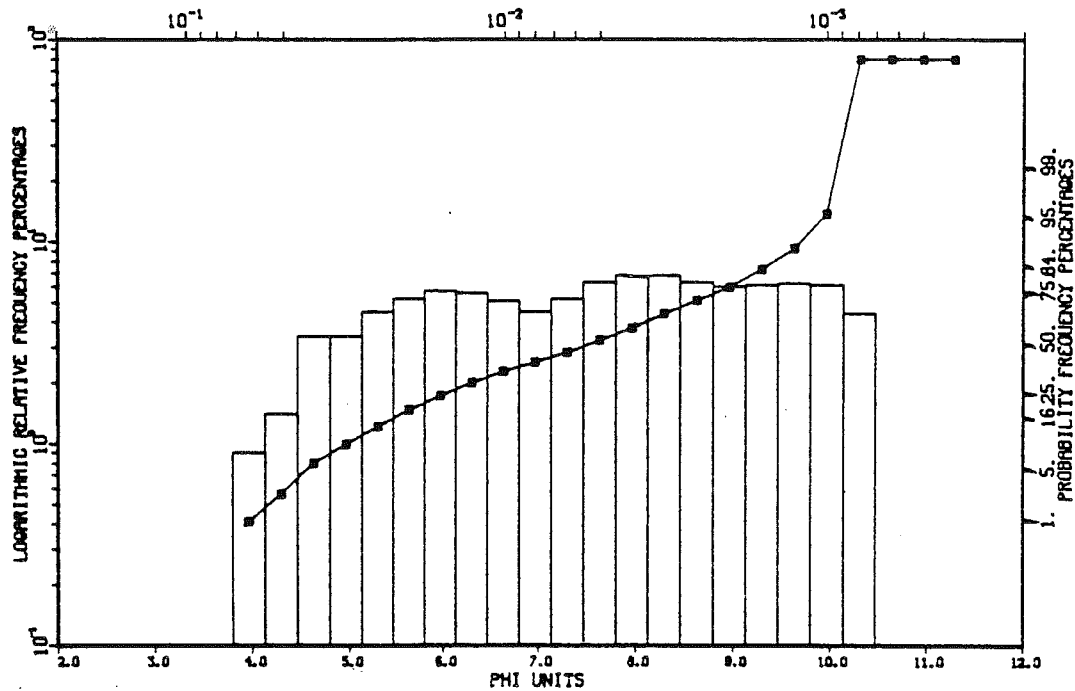


Fig. 5

SAMPLE NO. - 383 J. SYVITSKI 8203148  
 CO1 92 CORONATION FJORD  
 MILLIMETER EQUIVALENTS

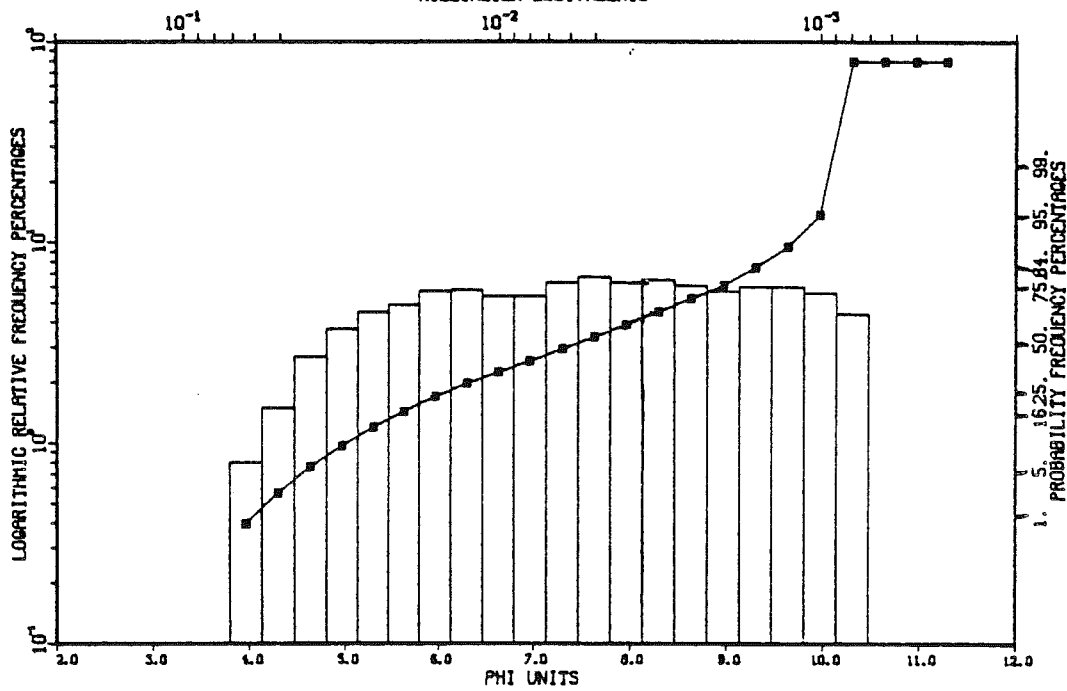


Fig. 6

SAMPLE NO. - 385 J. SYVITSKI 8203171  
CO2 5 CORONATION FJORD  
MILLIMETER EQUIVALENTS

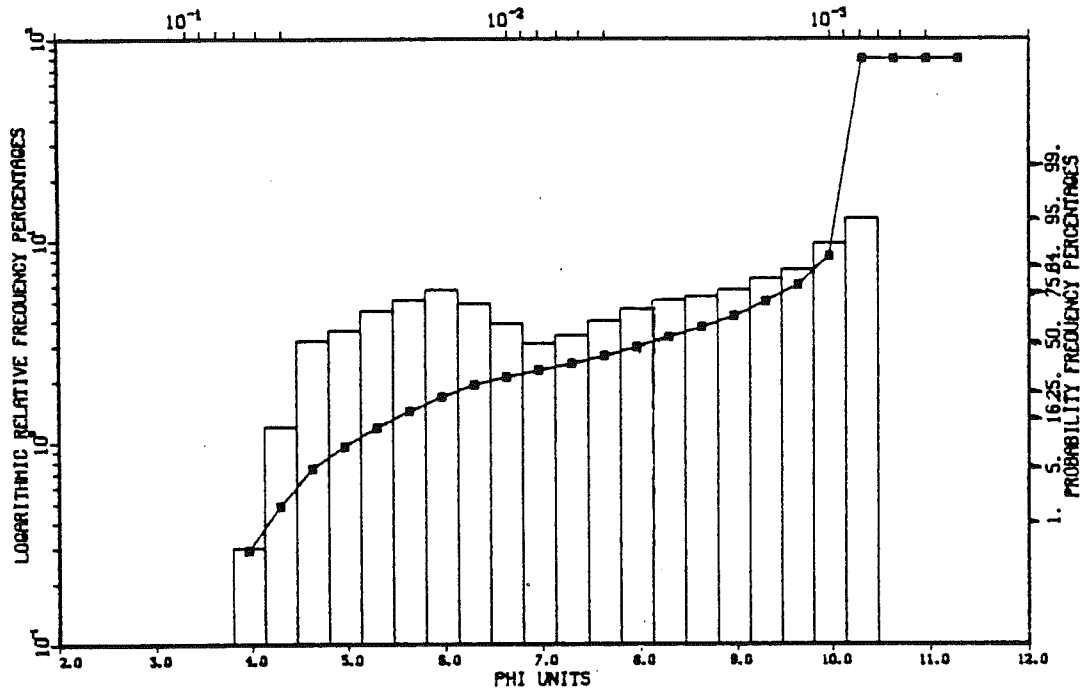


Fig. 7

SAMPLE NO. - 391 J. SYVITSKI 8203165  
CO2 100 CORONATION FJORD  
MILLIMETER EQUIVALENTS

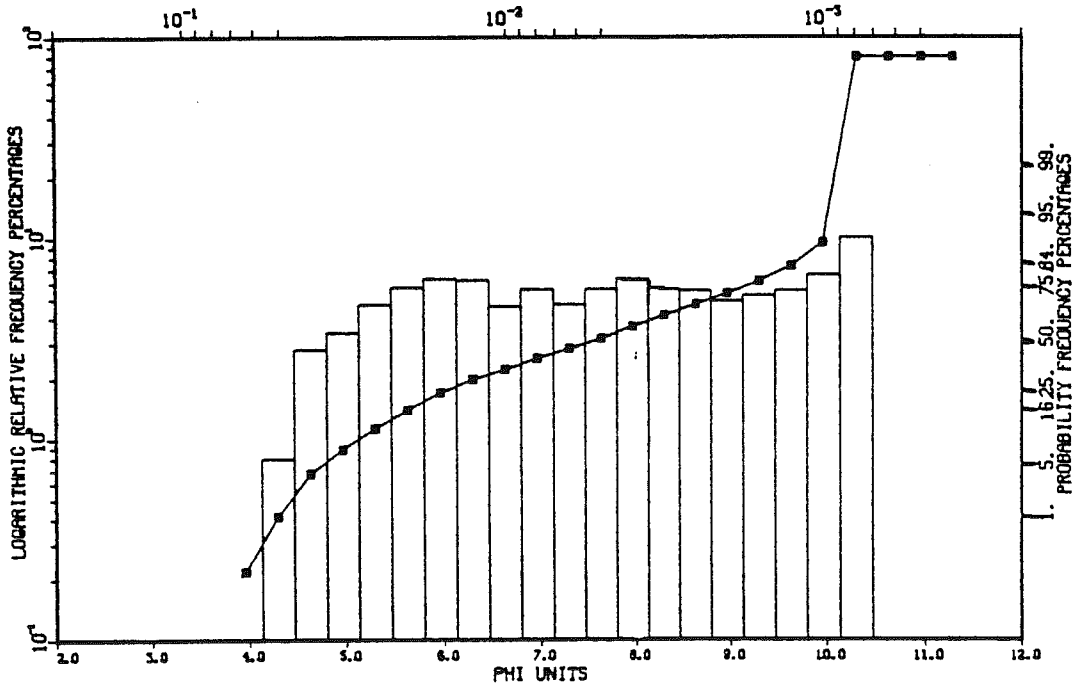


Fig. 8

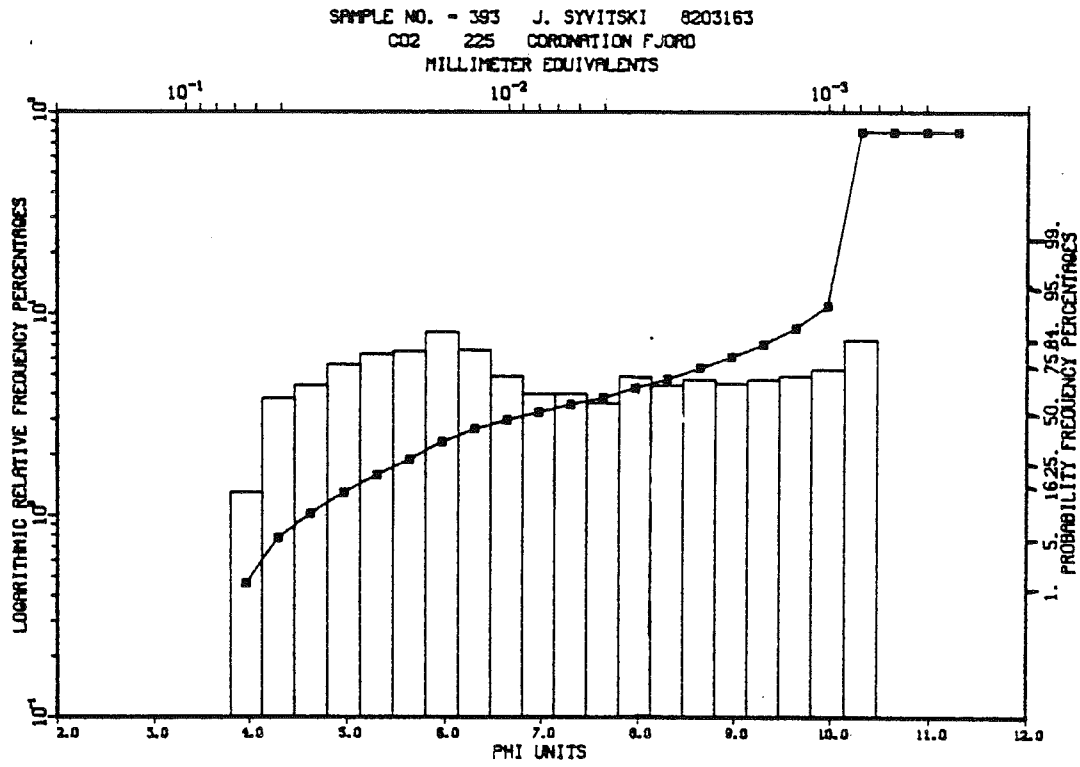


Fig. 9

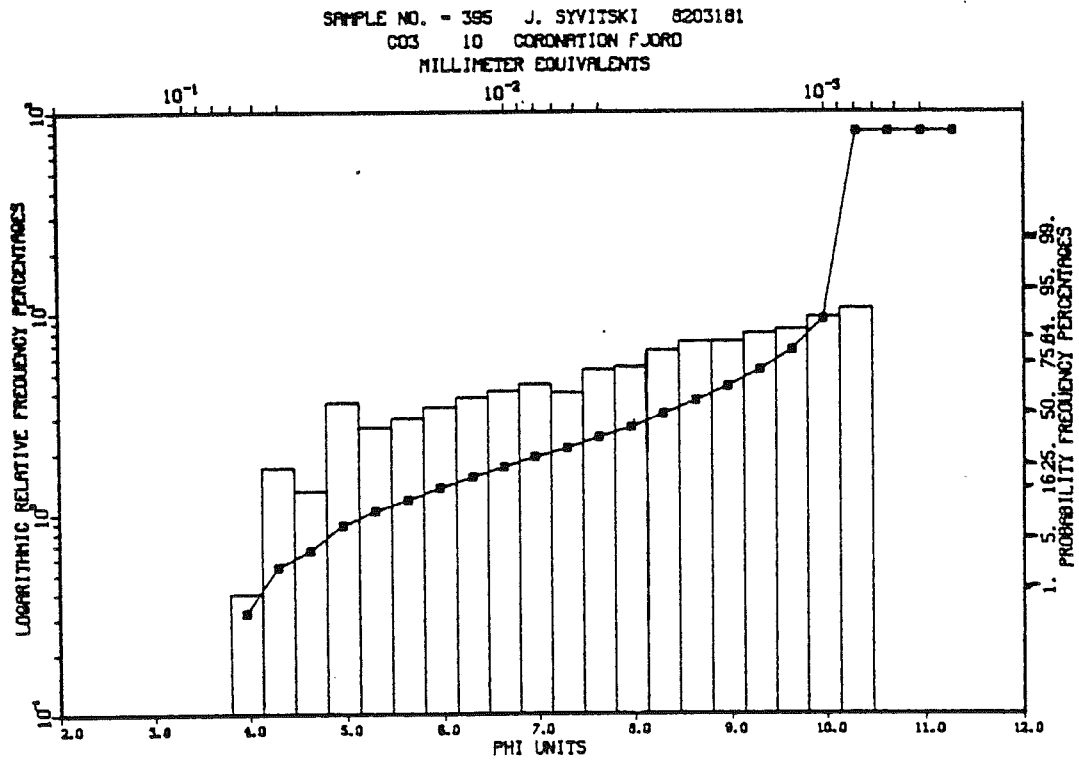


Fig. 10

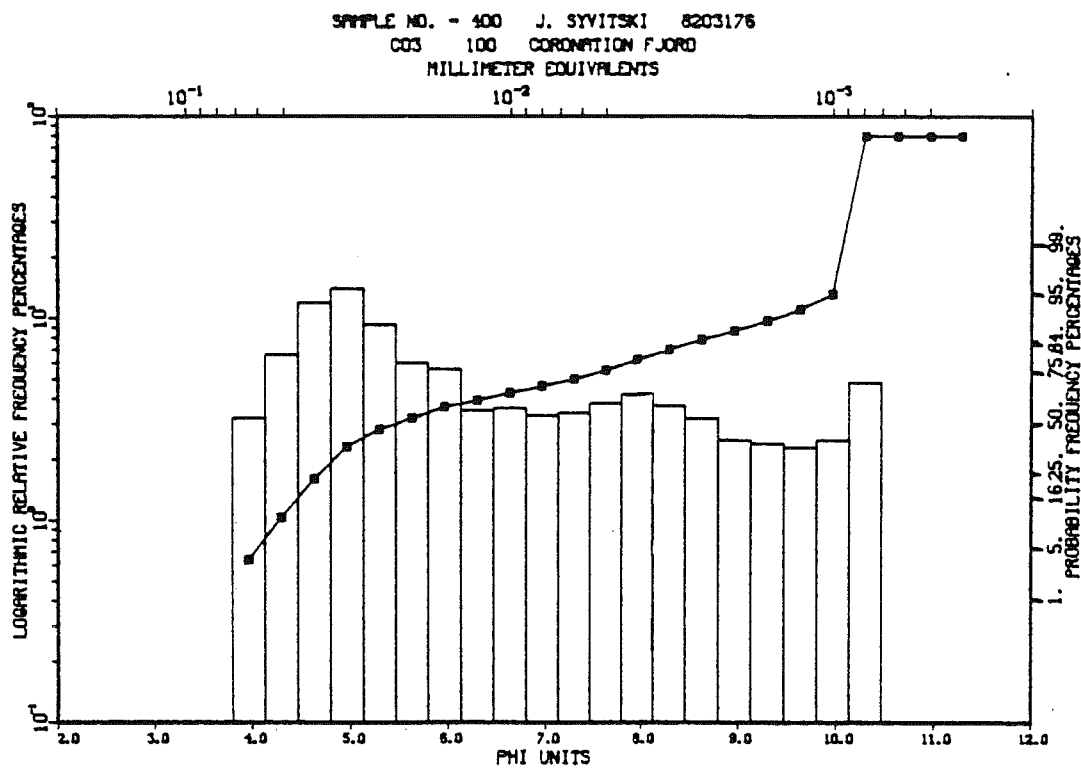


Fig. 11

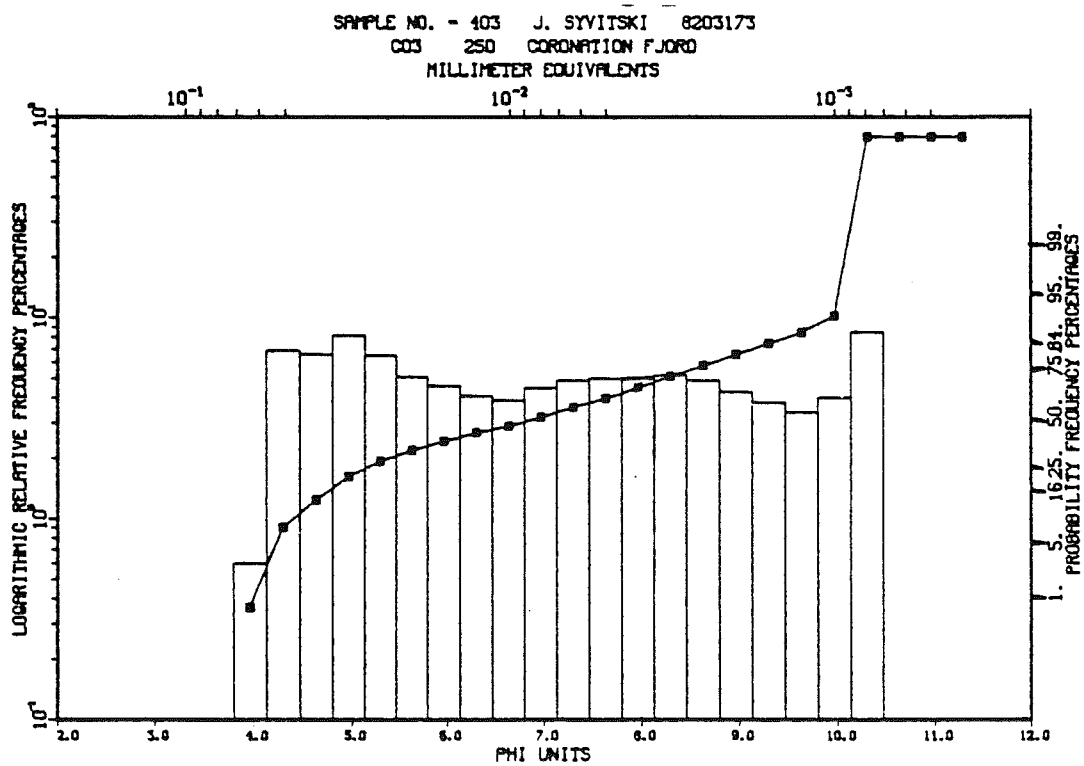


Fig. 12



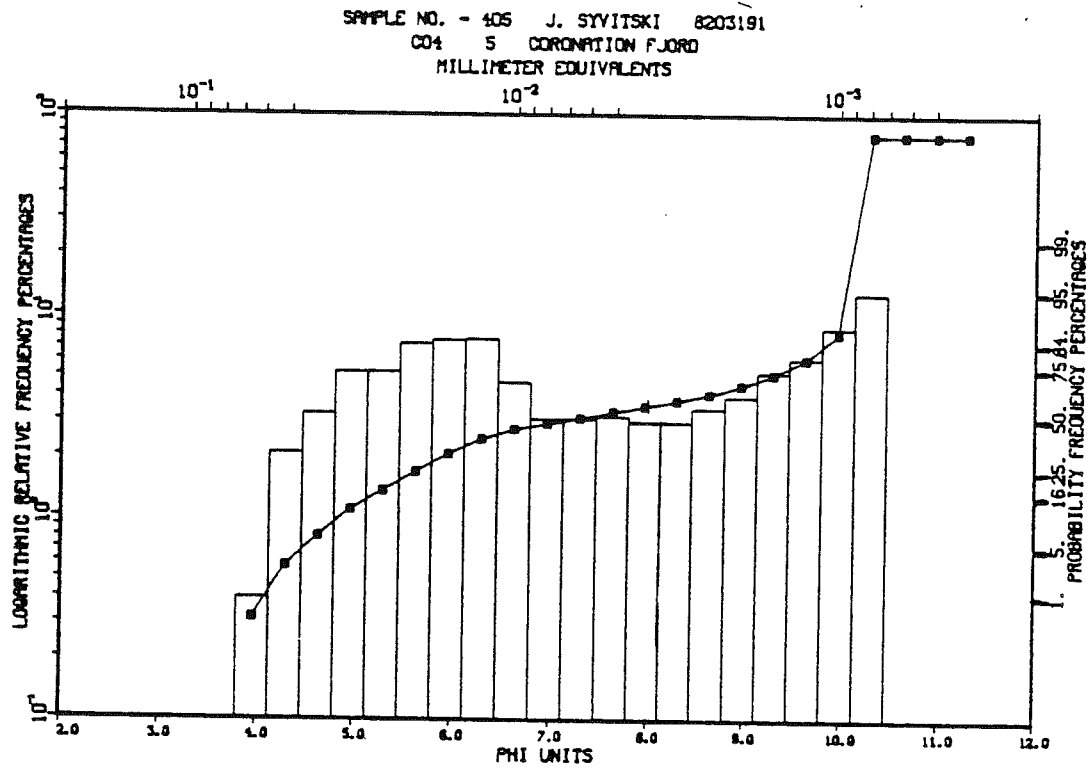


Fig. 13

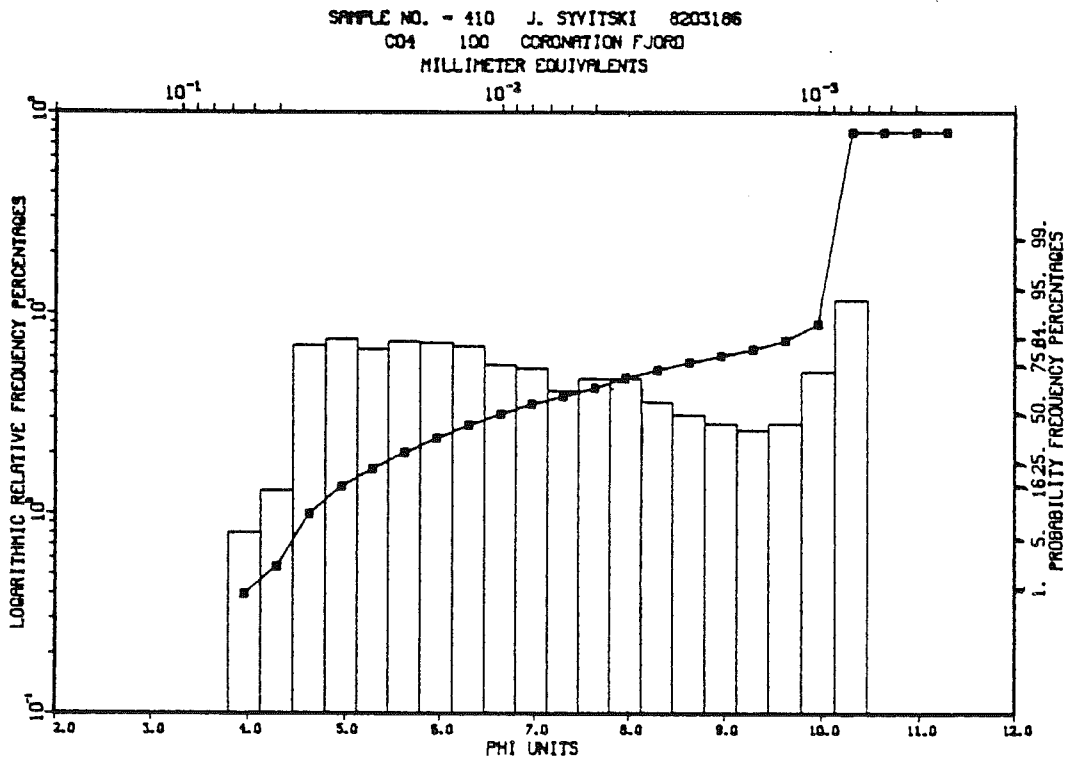


Fig. 14

SAMPLE NO. - 413 J. SYVITSKI 8203183  
 CD4 352 CORONATION FJORD  
 MILLIMETER EQUIVALENTS

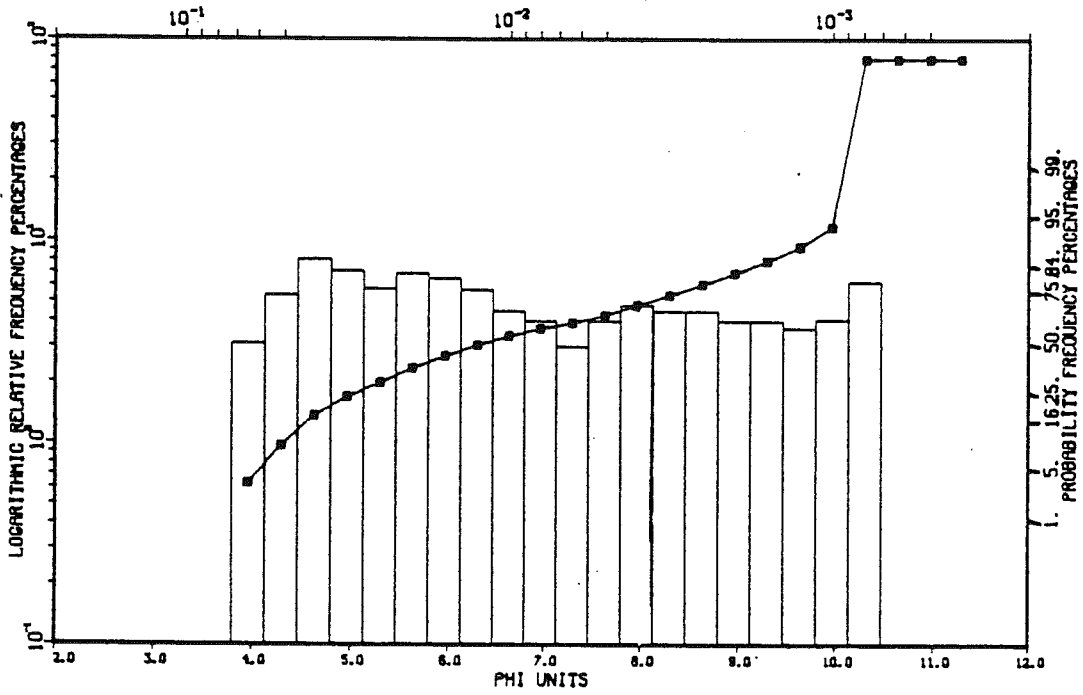


Fig. 15

SAMPLE NO. - 414 J. SYVITSKI 8203202  
 CD5 1 CORONATION FJORD  
 MILLIMETER EQUIVALENTS

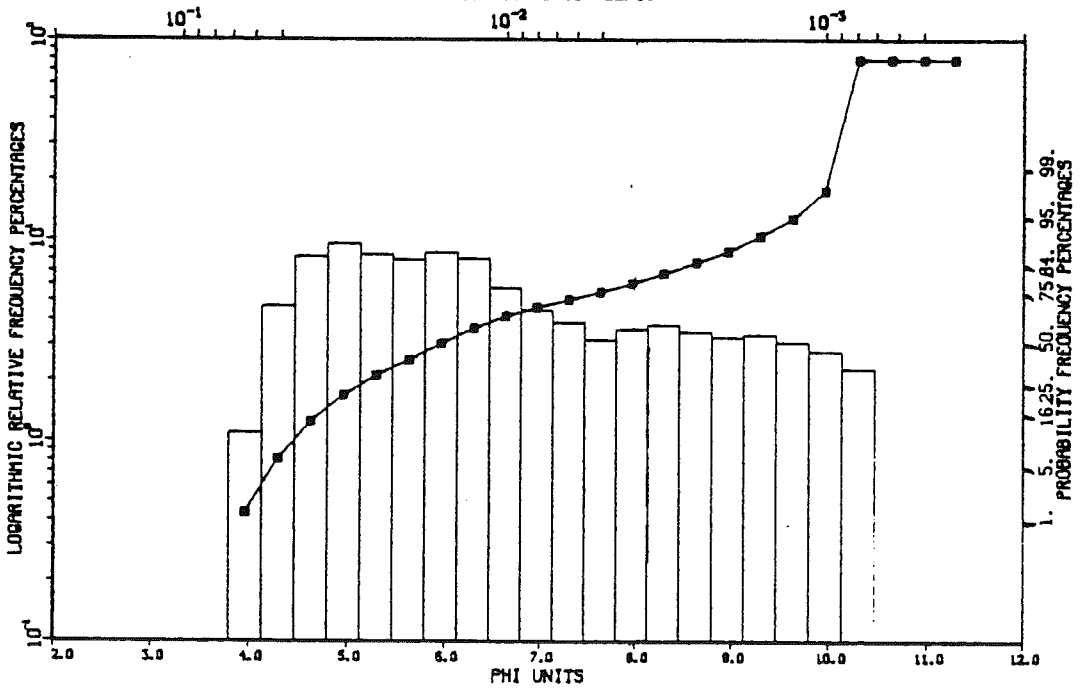


Fig. 16

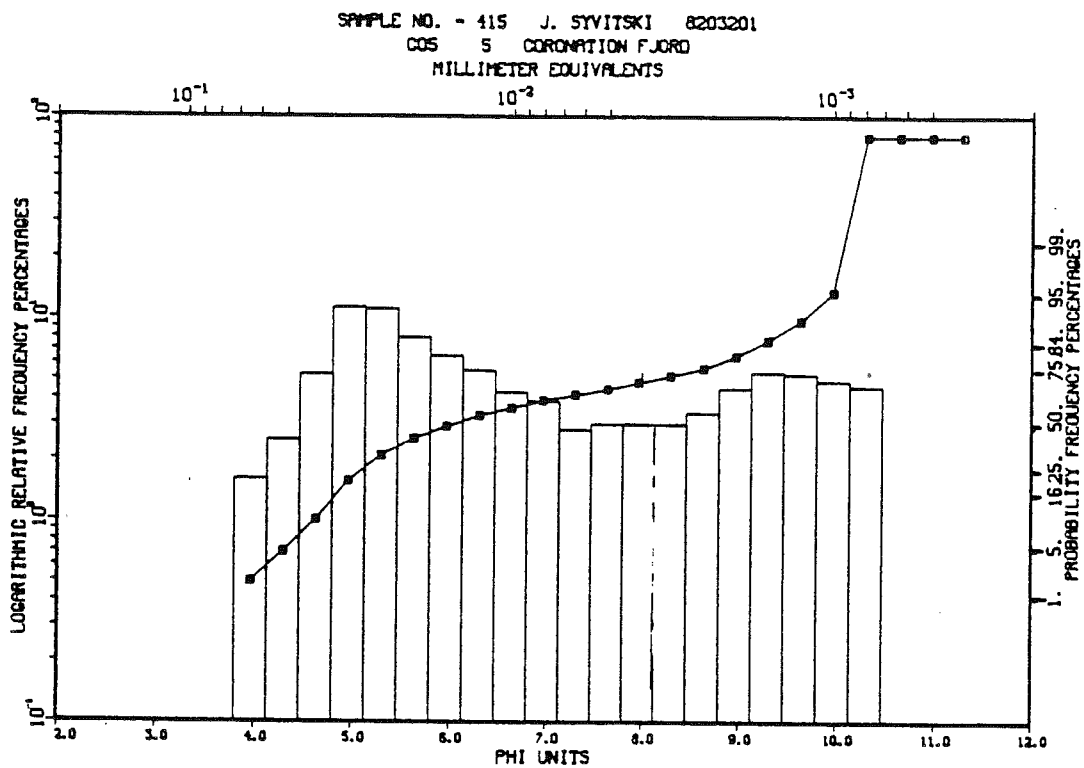


Fig. 17

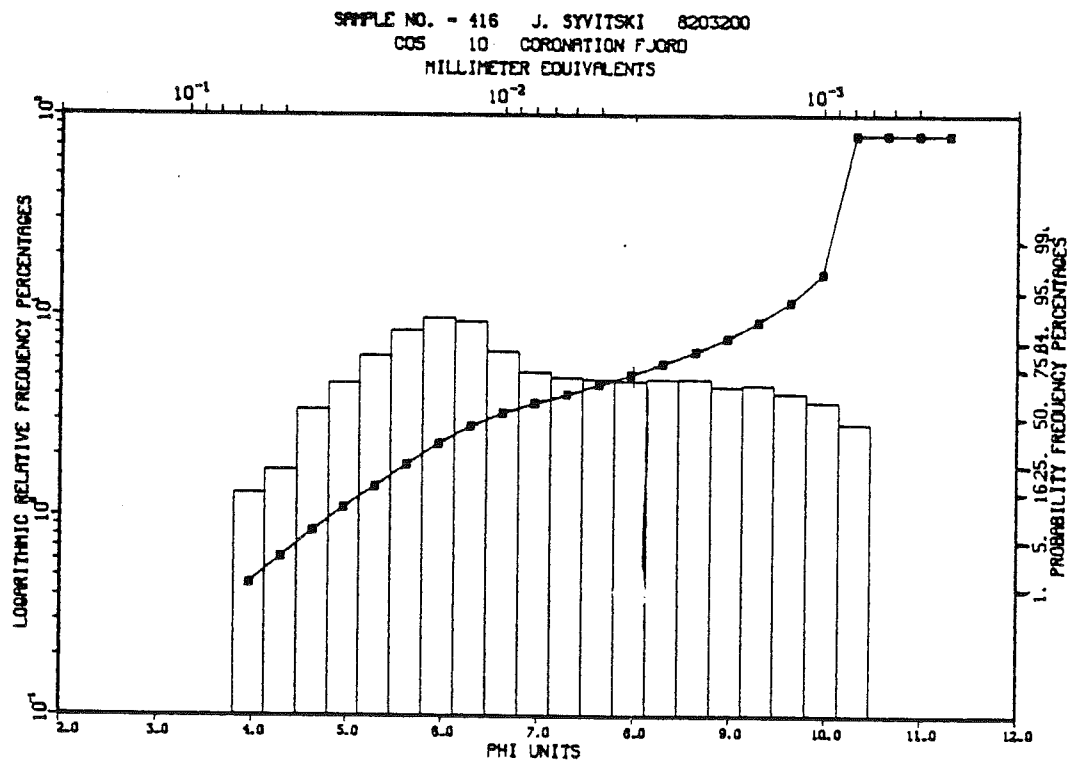


Fig. 18

SAMPLE NO. - 417 J. SYVITSKI 8203199  
COS 20 CORONATION FJORD  
MILLIMETER EQUIVALENTS

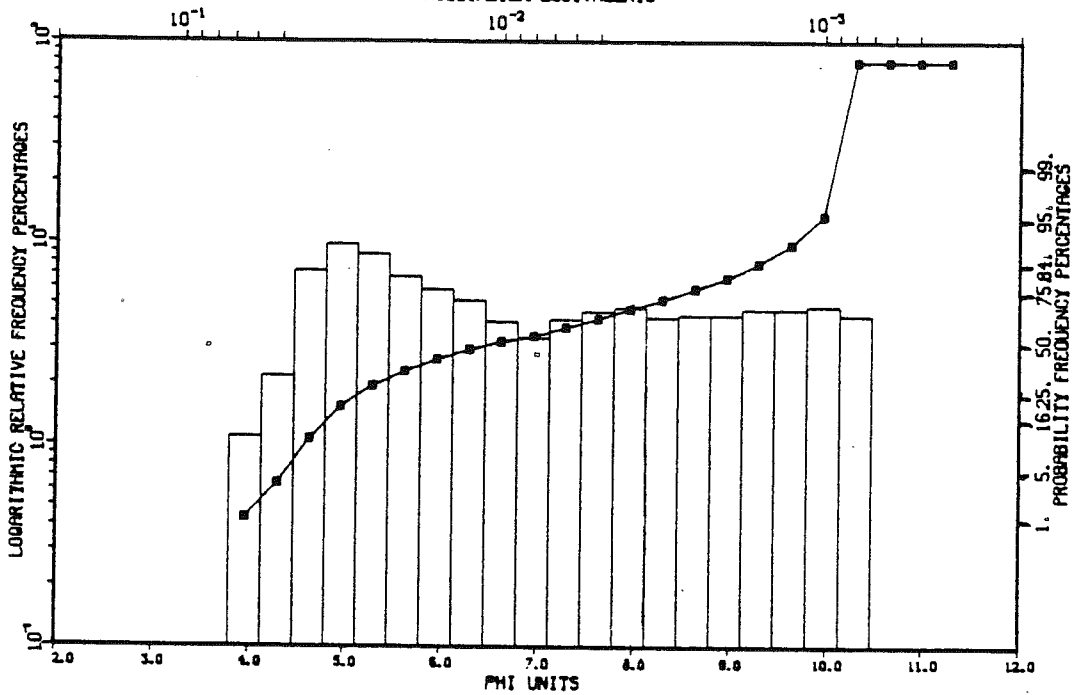


Fig. 19

SAMPLE NO. - 420 J. SYVITSKI 8203196  
COS 100 CORONATION FJORD  
MILLIMETER EQUIVALENTS

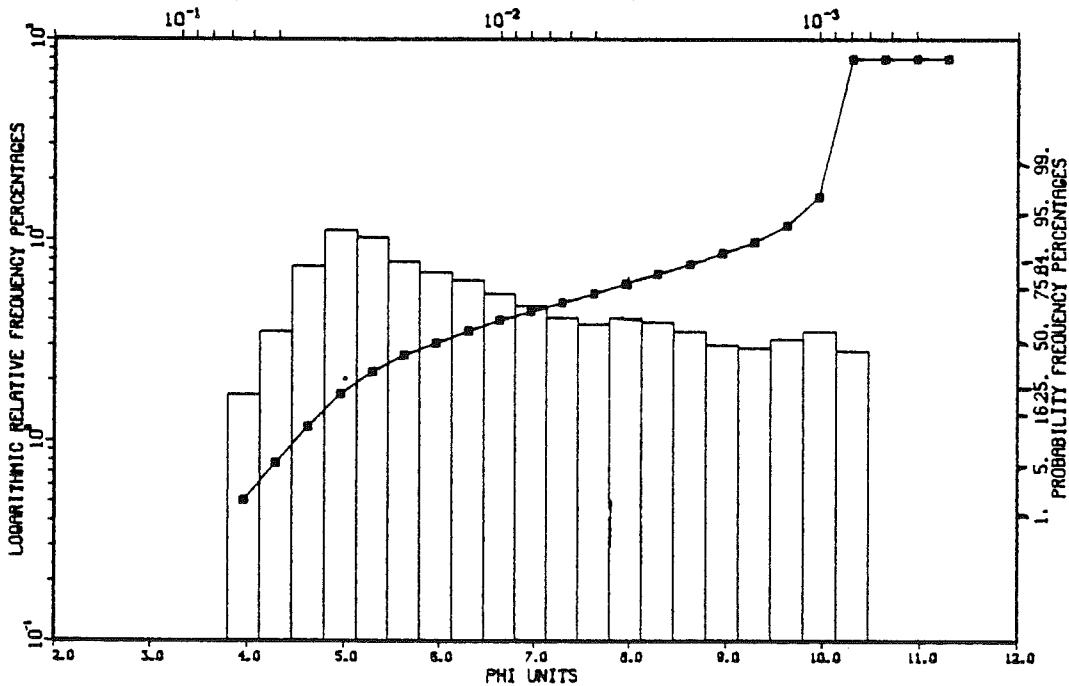


Fig. 20

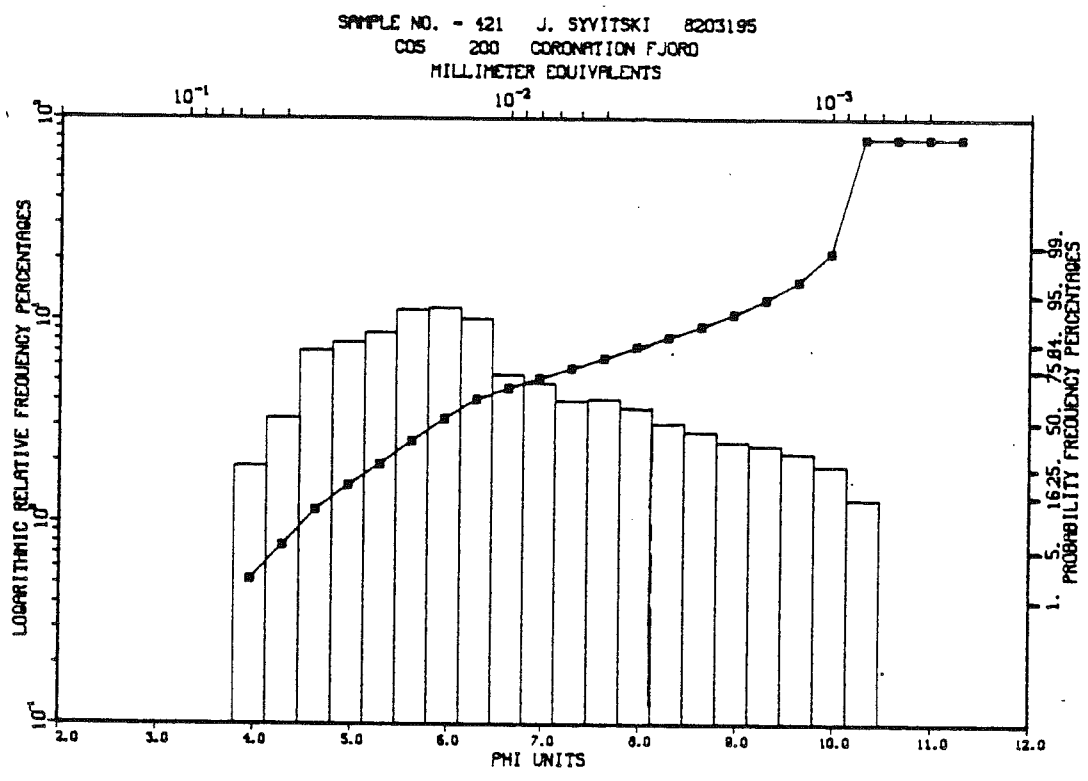


Fig. 21

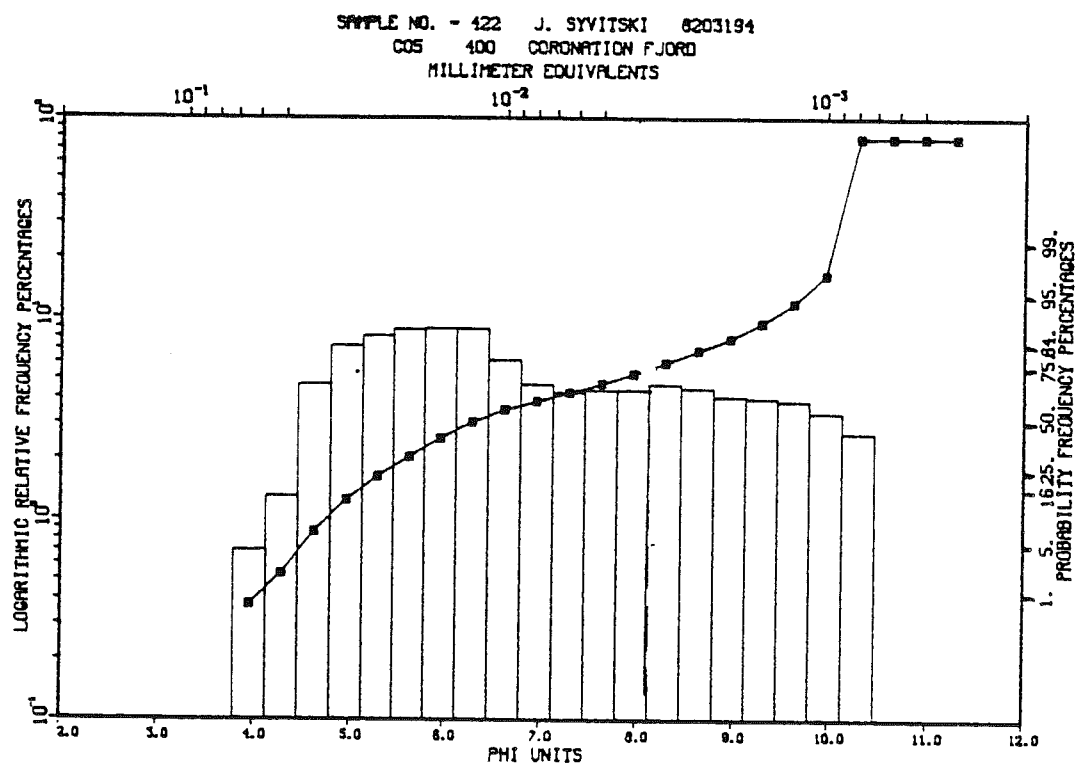


Fig. 22

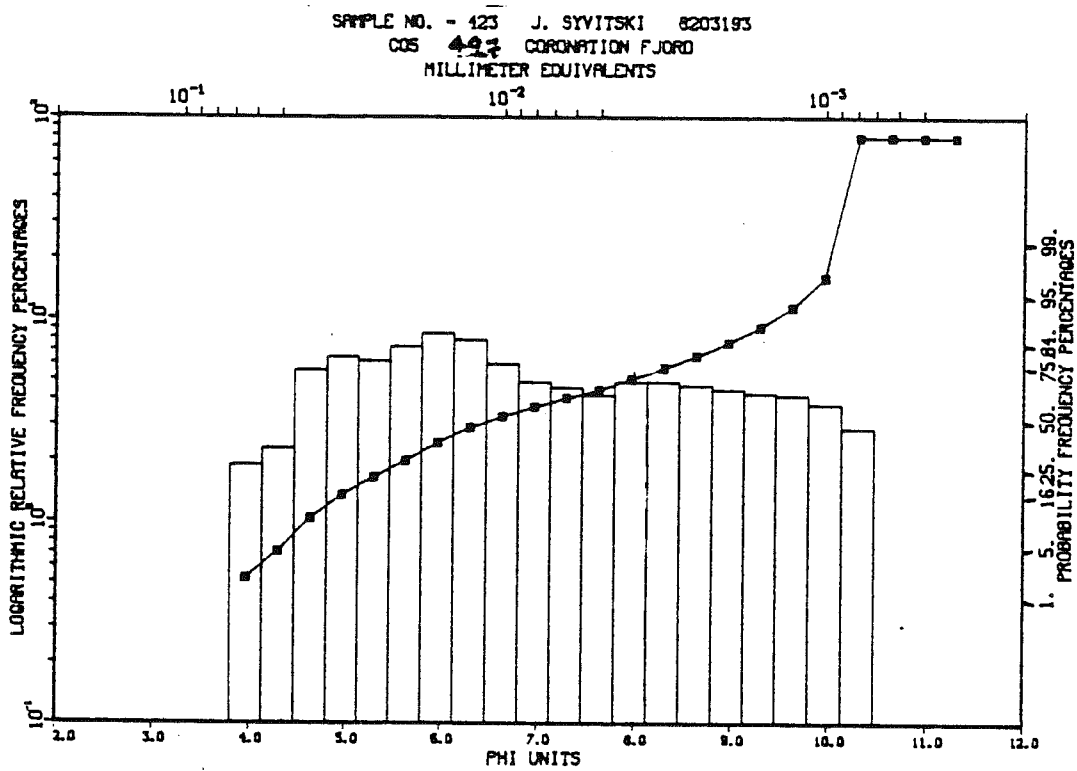


Fig. 23

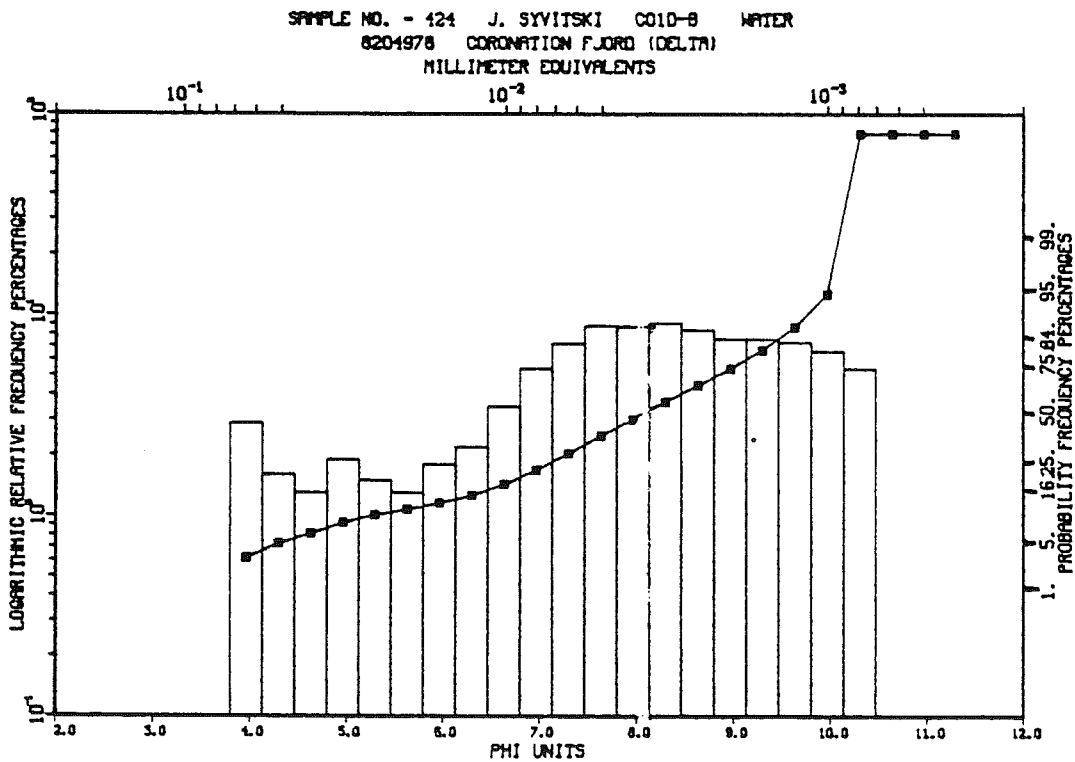


Fig. 24

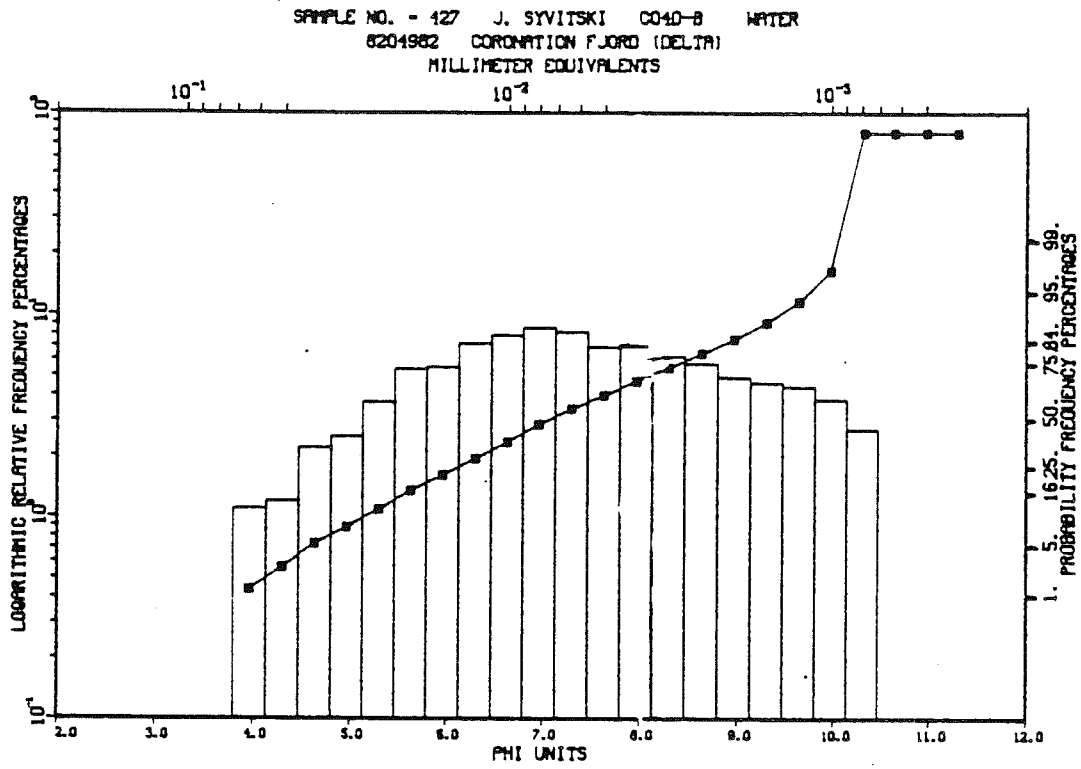


Fig. 25

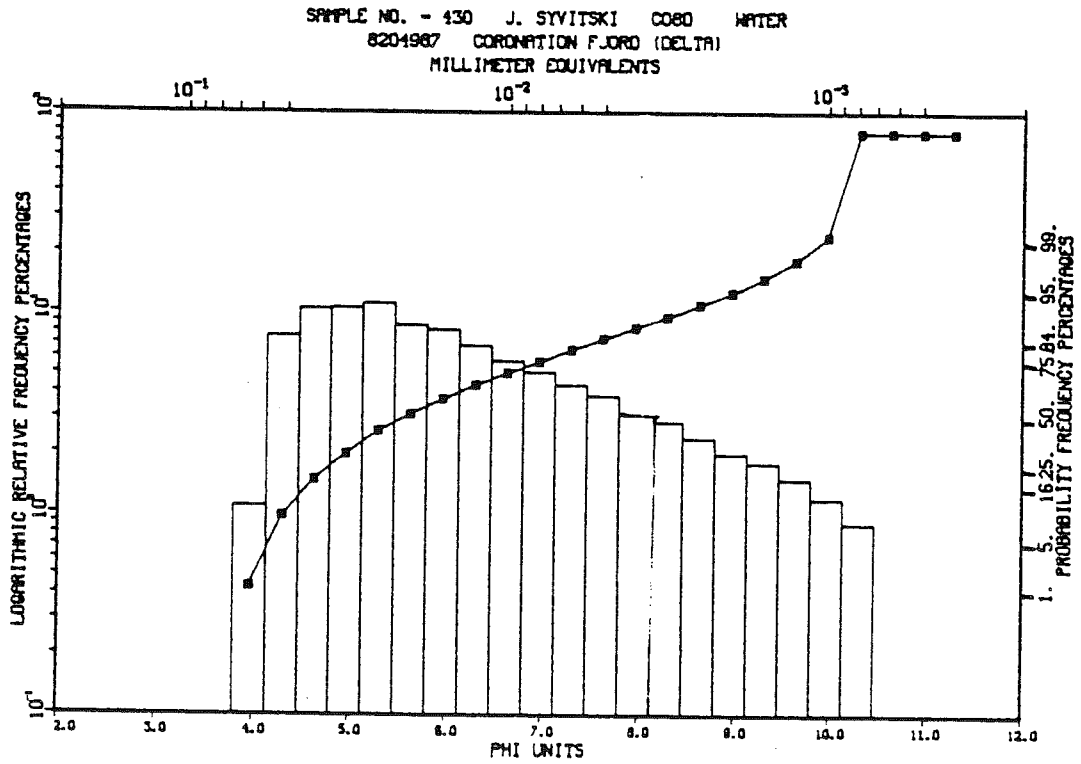


Fig. 26

SAMPLE NO. - 132 J. SYVITSKI CO120-A WATER  
 8204993 CORDONATION FJORD (DELTA)  
 MILLIMETER EQUIVALENTS

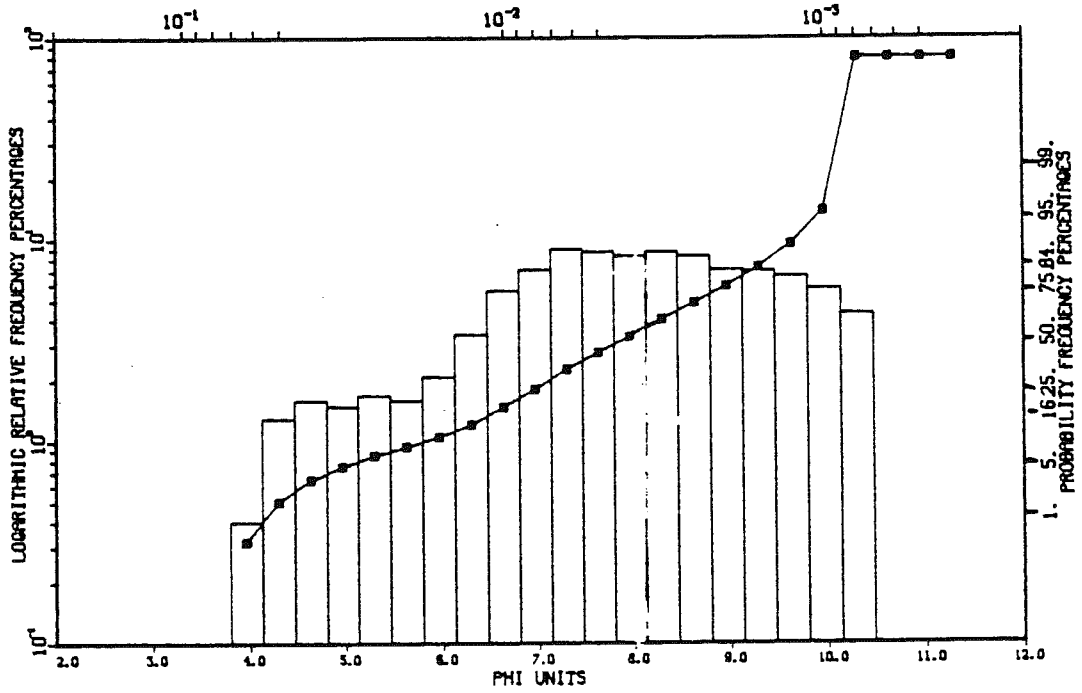
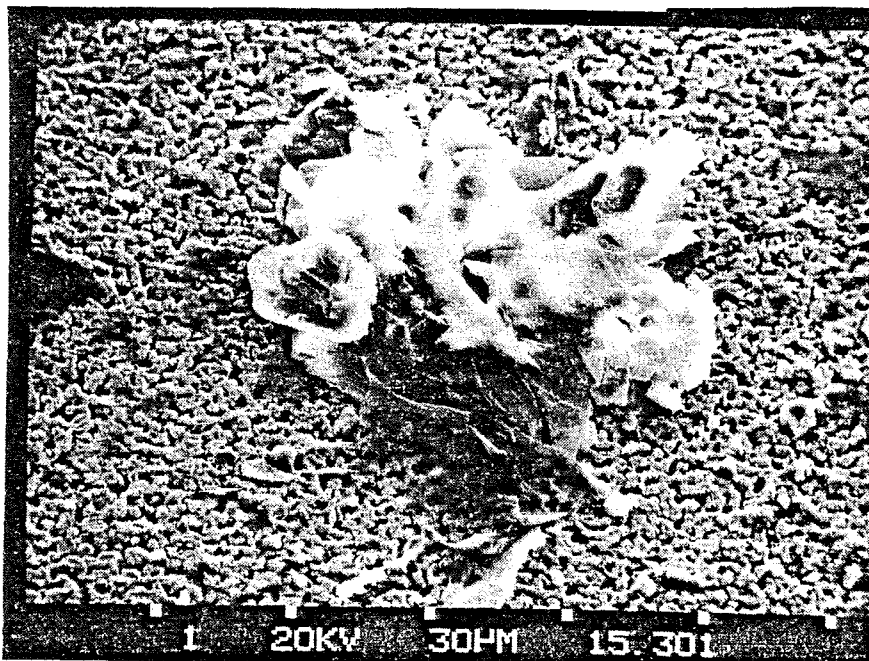


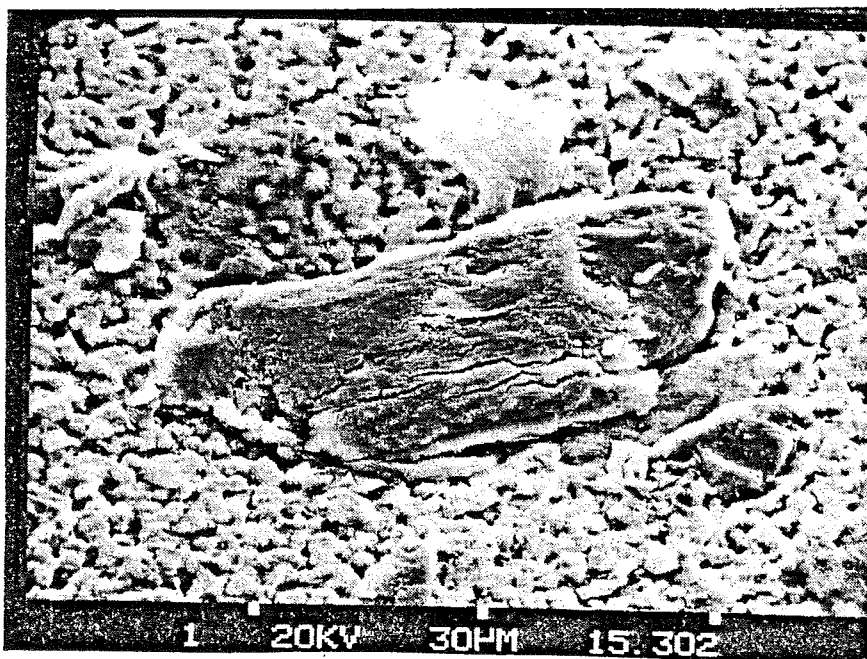
Fig. 27



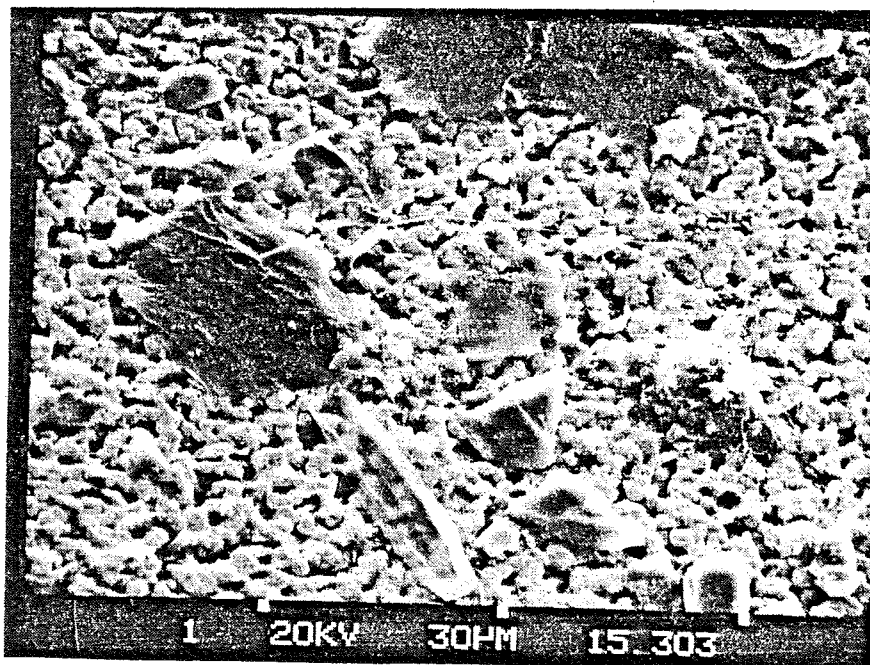
Station CO-1:10 m (82-03153)



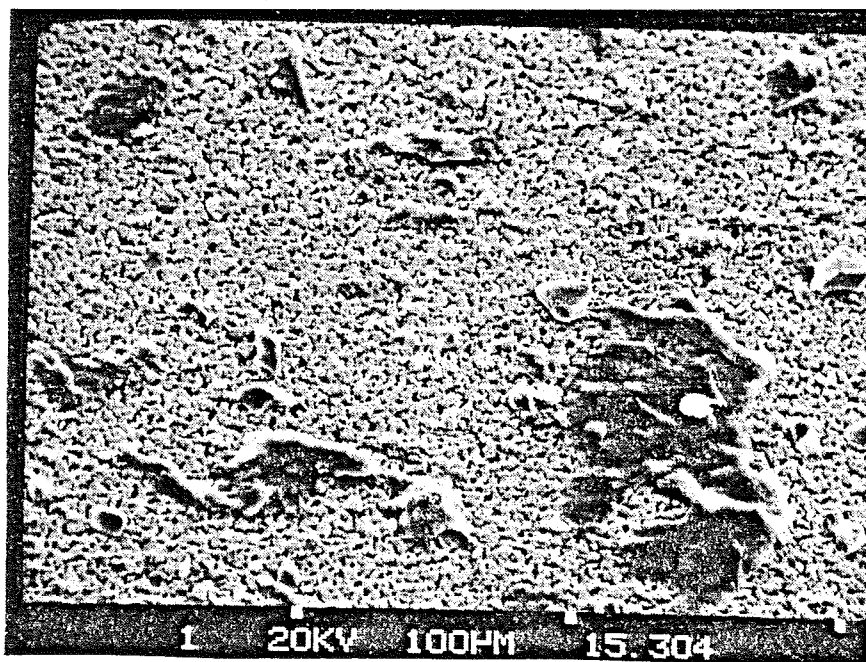
Micrograph 15.301 - this photo shows a large floccule (~ 90  $\mu\text{m}$ ) composed of magnesium and silicon with sodium as a minor component.



Micrograph 15.302 - another large grain (90  $\mu\text{m}$ ) composed mostly of silicon; however, there are traces of Mg, Na, Al, Ca and Ti. This photo also shows a small mucoïd, clay fragments and feldspar.

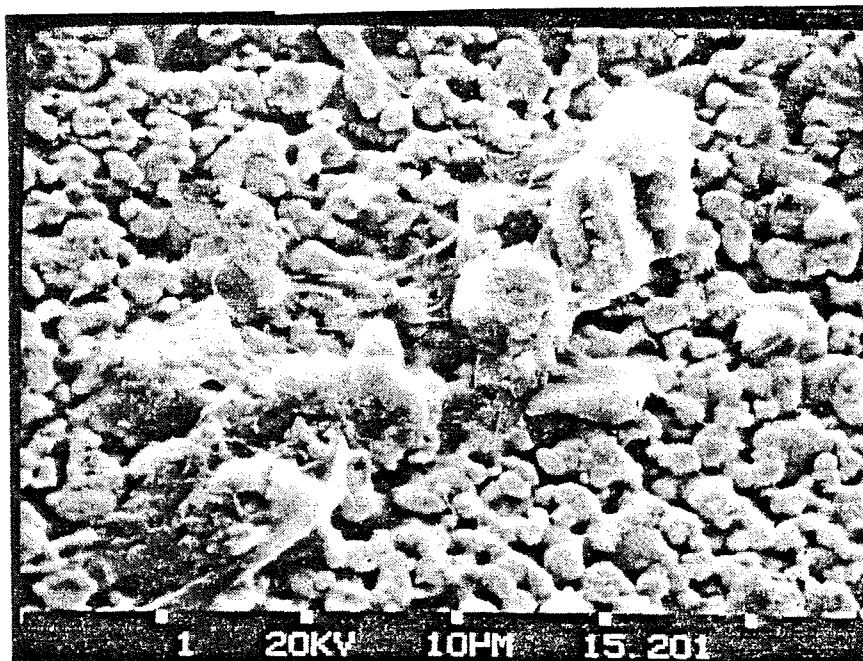


Micrograph 15.303 - assortment of quartz grains, mucoids and plankton debris.

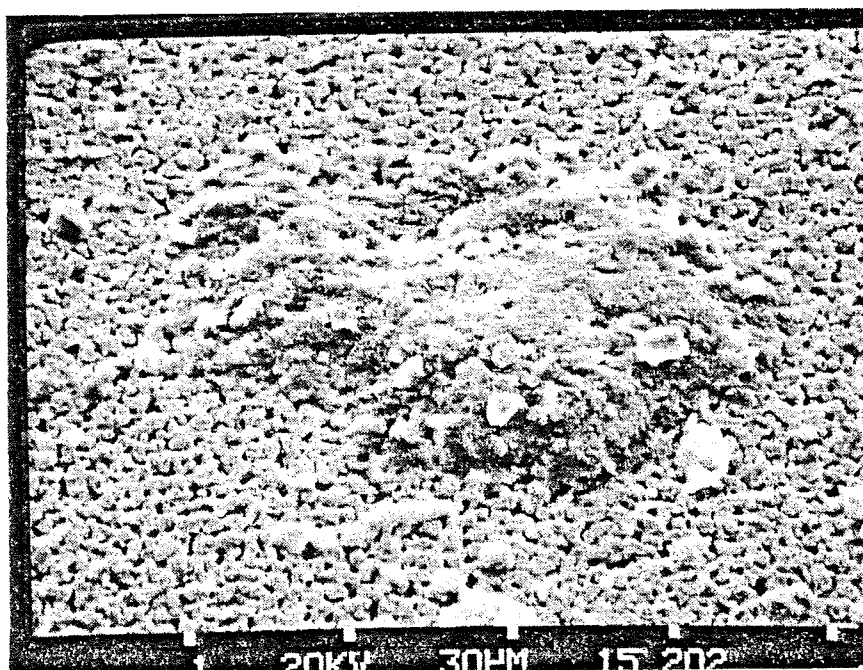


Micrograph 15.304 - this is a general photo showing mucoids and individual grains: there are quartz and feldspar fragments of about 30  $\mu\text{m}$  as well as an agglomerate comprised of an organic mucoid holding large clays together.

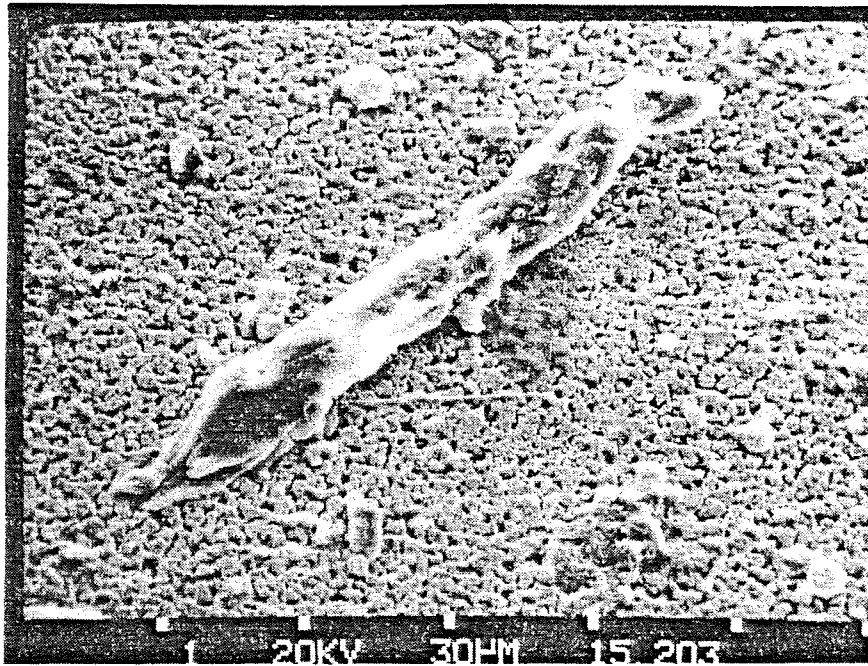
Station CO-1: 20 m (82-03152)



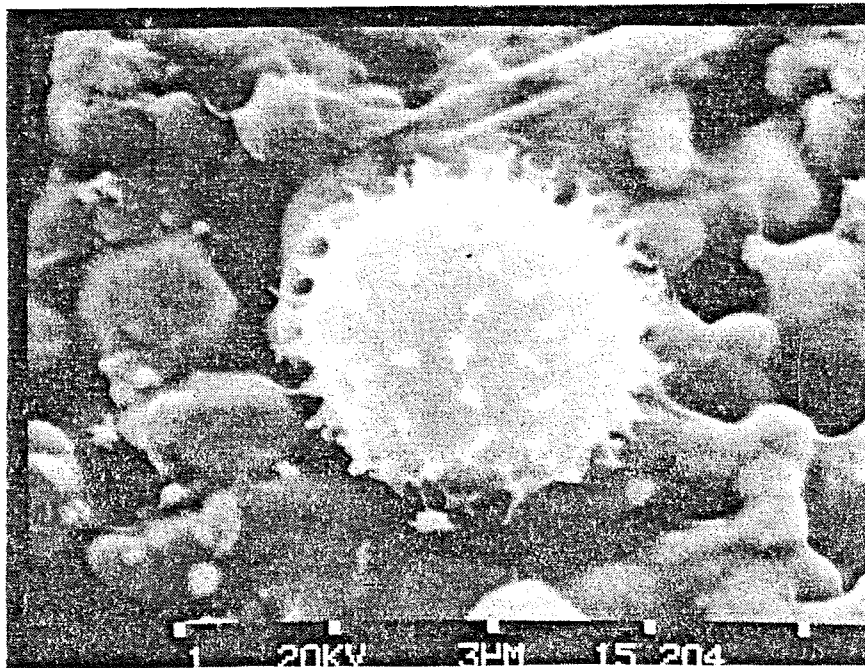
Micrograph 15.201 - this is a floccule of biogenics and clays covered by a mucoid film, possibly part of a pellet.



Micrograph 15.202 - This photo is of a floccule composed of small clay particles having major amounts of Si, Al and K with traces of Fe, Ca and Mg.

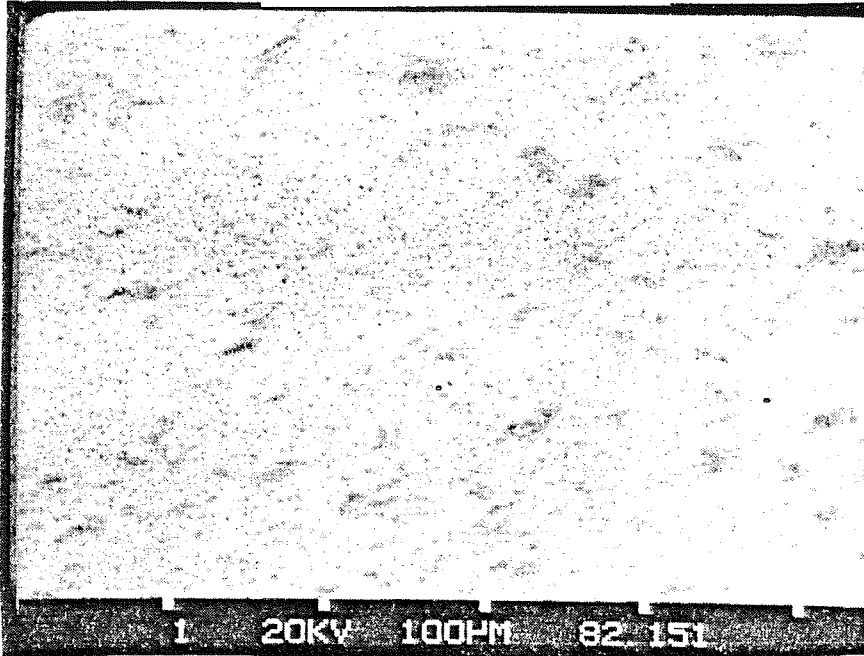


Micrograph 15. 203 - this sample shows numerous pellets made up of clays. One such pellet had a smooth appearance and contained major amounts of chlorine with minor amounts of Si, Na, Ca, Al and Mg. Diatoms are abundant along with thin fibres (mainly silicon), possibly sponges or radiolarian fragments ~ 60  $\mu$ m.

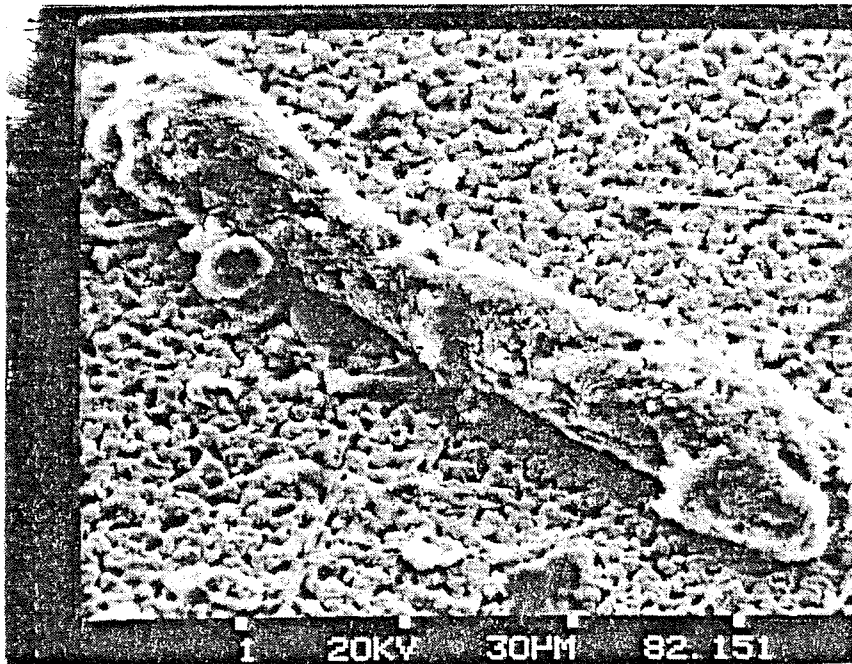


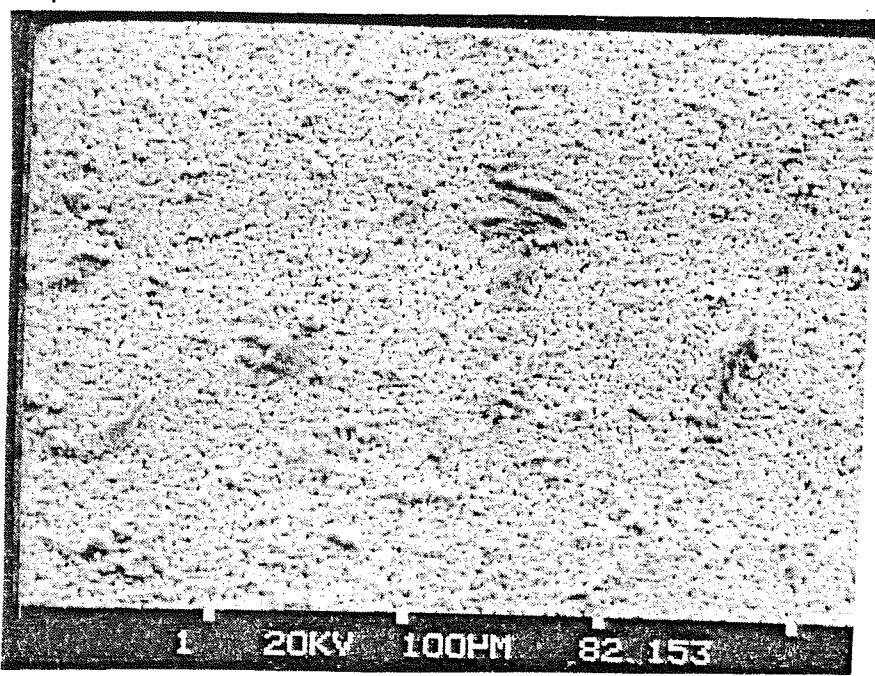
Micrograph 15.204 - a small diatom.

Station CO-1: 30 m (82-03151)

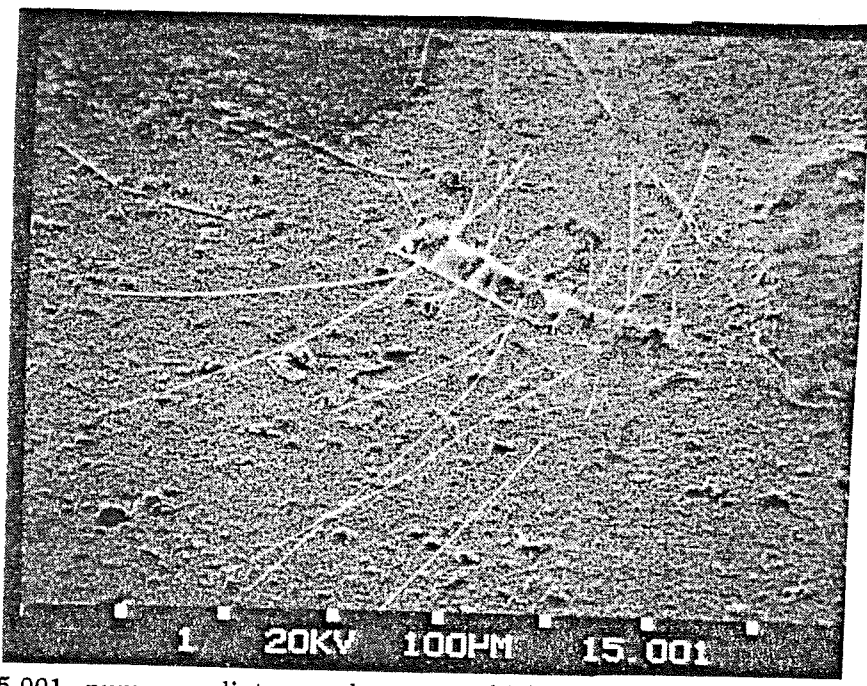


Micrographs 82.151 (2 of these) and 82-153 show quartz grains of  $\sim 5 \mu\text{m}$ , some larger sand grains (possibly K-feldspar) and a few pellets.

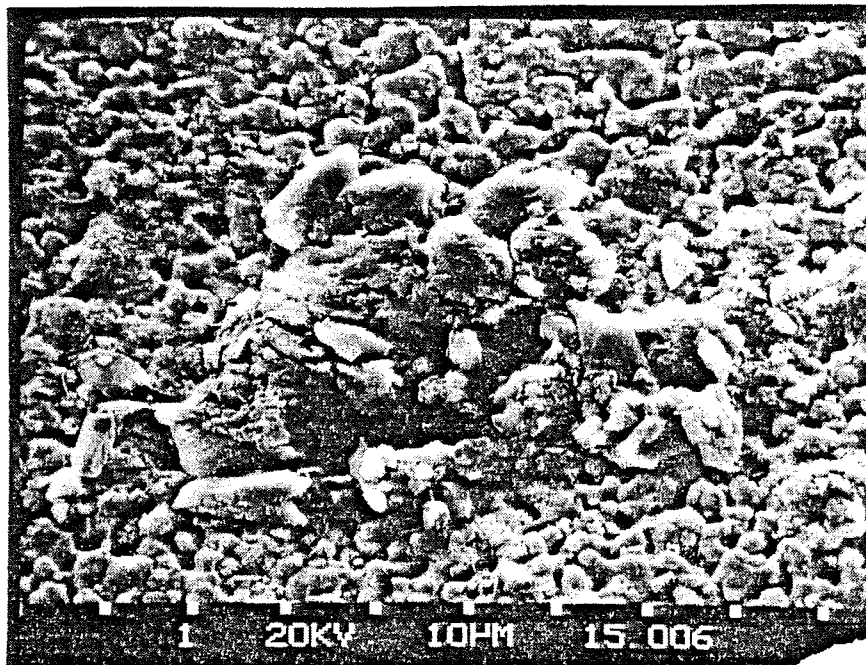




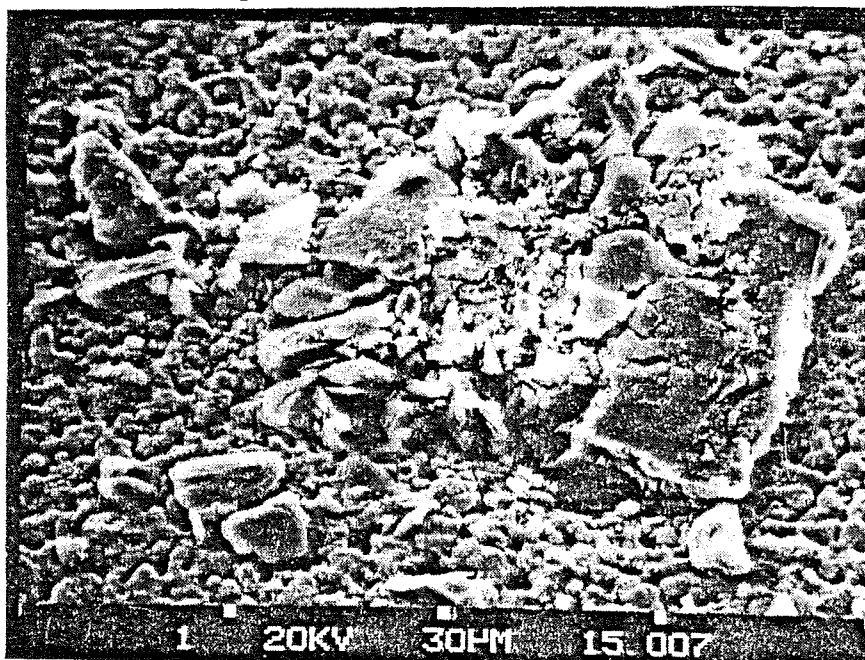
Station CO-1: 50 m (82-03150)



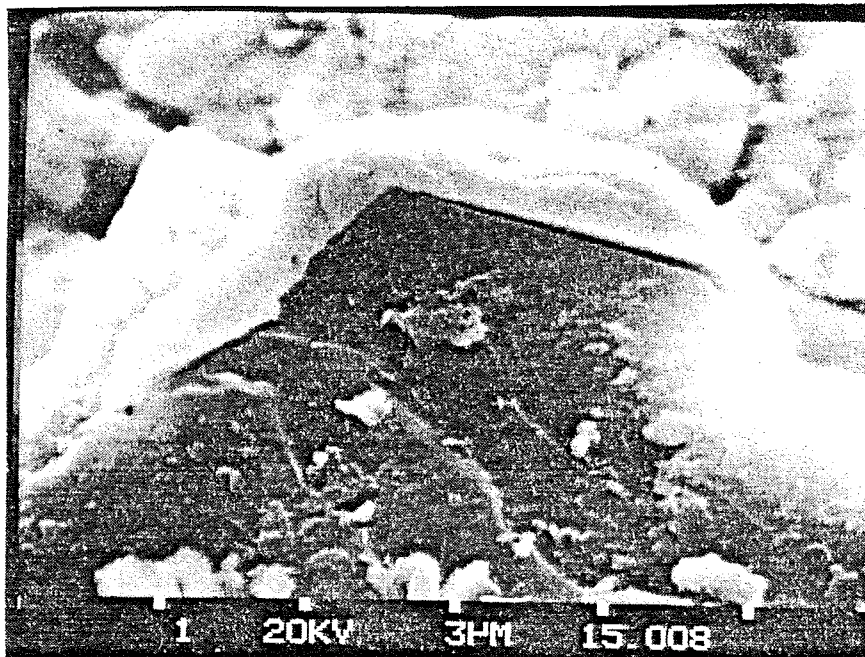
Micrograph 15.001 - numerous diatoms, a large one which is possibly a type of chaetoceros.



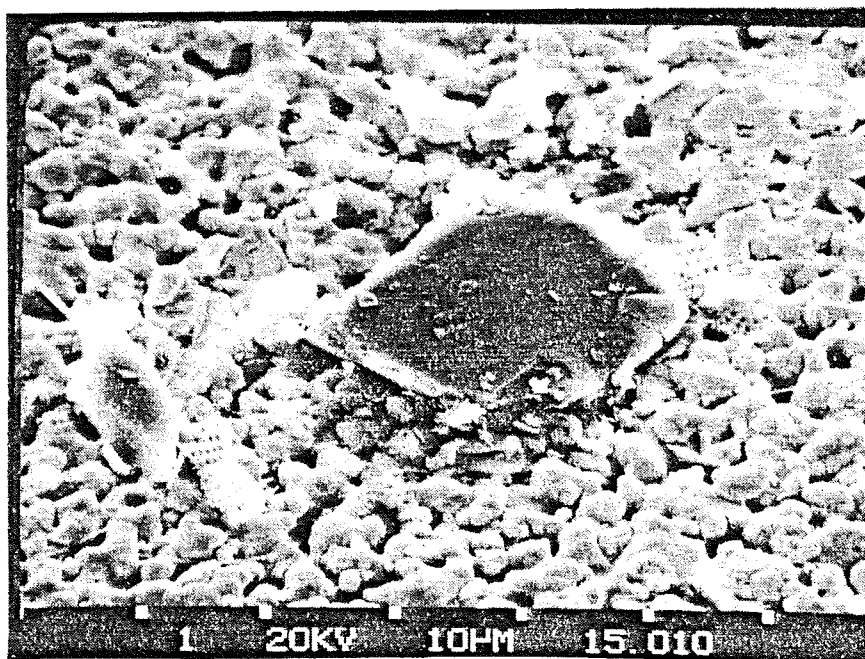
Micrograph 15.006 - shows quartz, feldspars and mucoids. The feldspars are of 2 types: Si/Al/Ca and Si/Al/K. This photo also shows remnant biogenics, diatoms and pennates. There is an inorganic aggregate, which appears to be a K-feldspar with a chromium, iron and nickel coating on the edges (see A15.008 and B15.008).



Micrographs 15.007 and 15.008 - these photos show whole grain and a closeup of the coating along feldspars respectively.



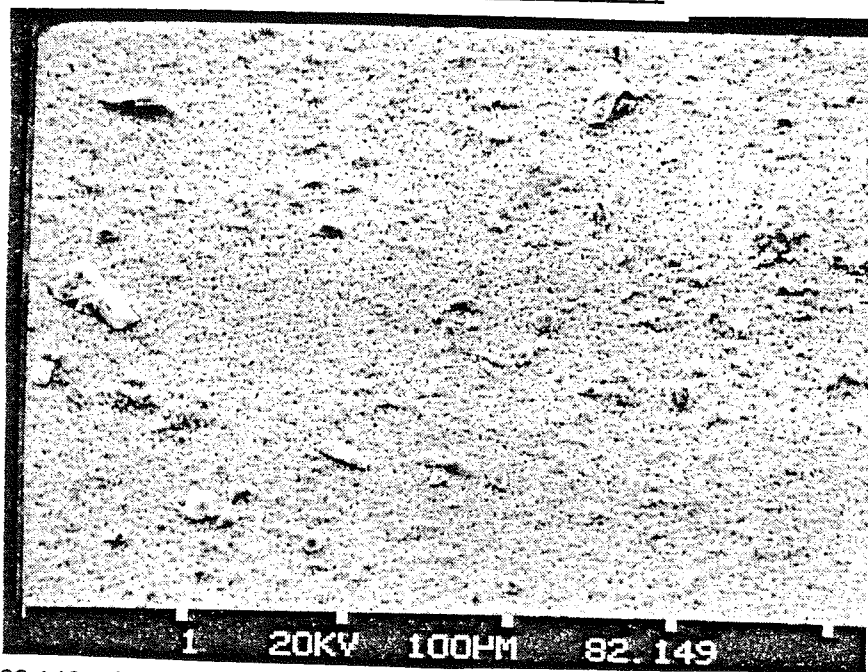
Micrographs 15.007 and 15.008 - these photos show whole grain and a closeup of the coating along feldspars respectively.



Micrograph 15.010 - large grain of 20  $\mu\text{m}$  in diameter comprised of Mg and Fe (2:1 ratio) with trace amounts of Al, Si and Mn. This grain is possibly brucite, periclase or magnesite.

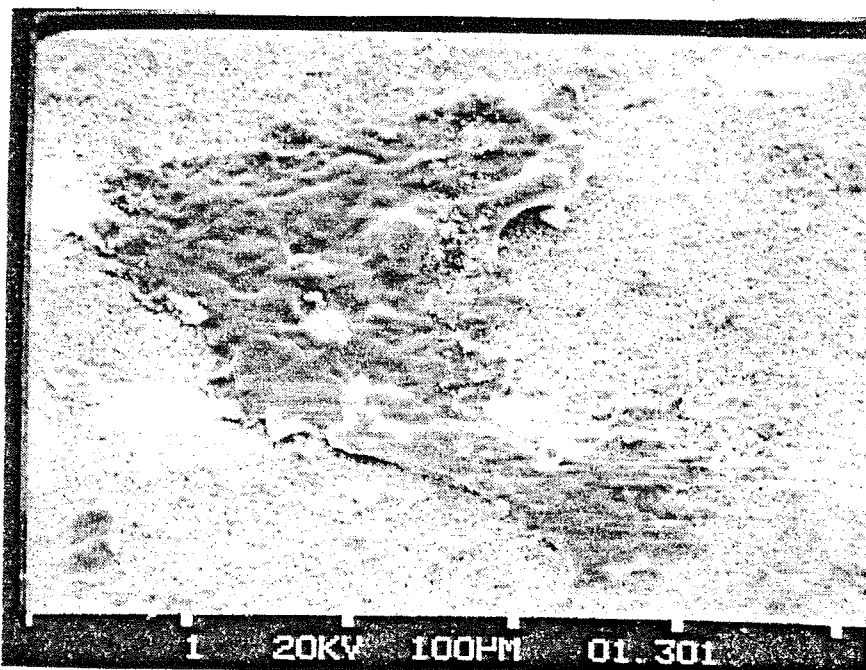


Station CO-1: 75 m (82-03149)

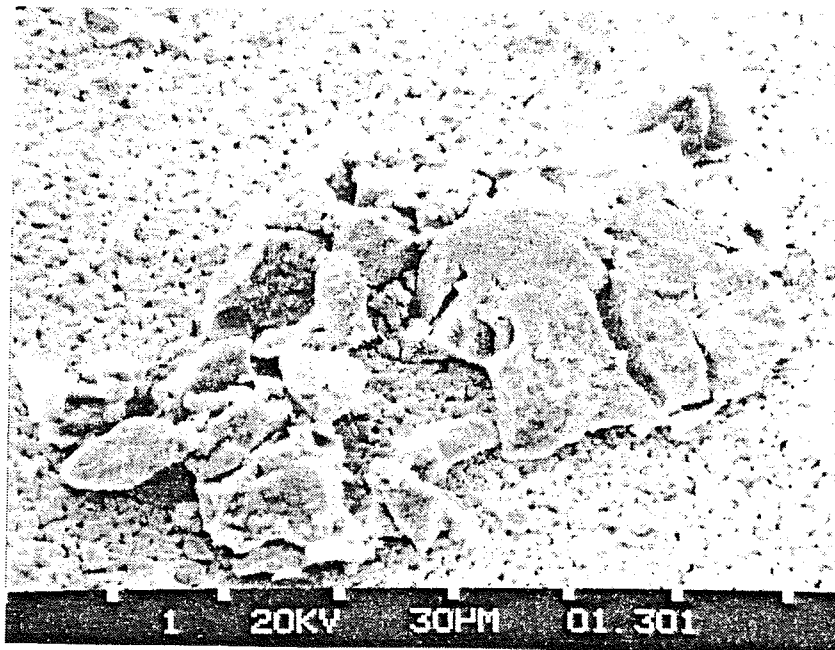


Micrograph 82.149 - shows a diatom ring, floc, mucoid agglomerate and small to large particles.

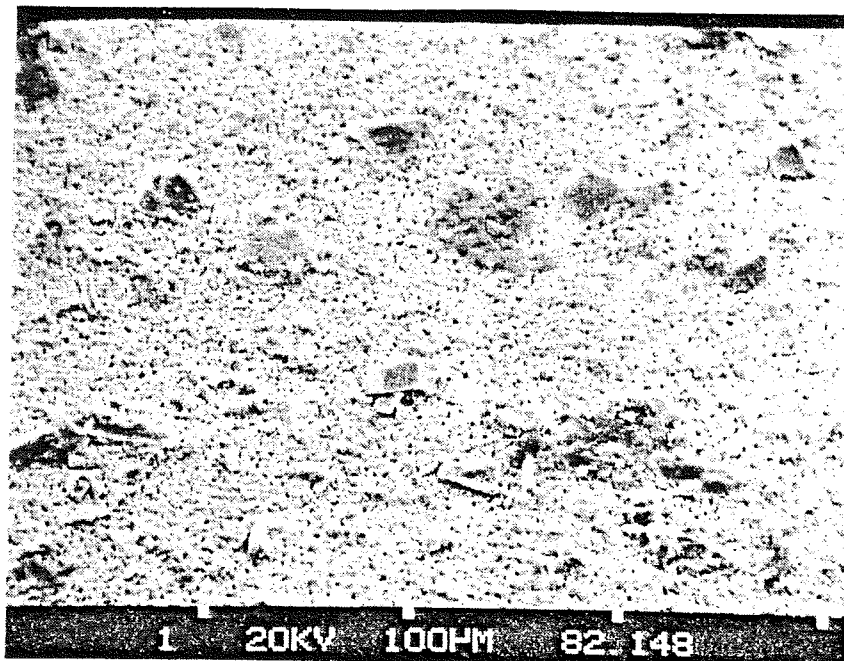
Station CO-1: 92 m, bottom (82-03148)



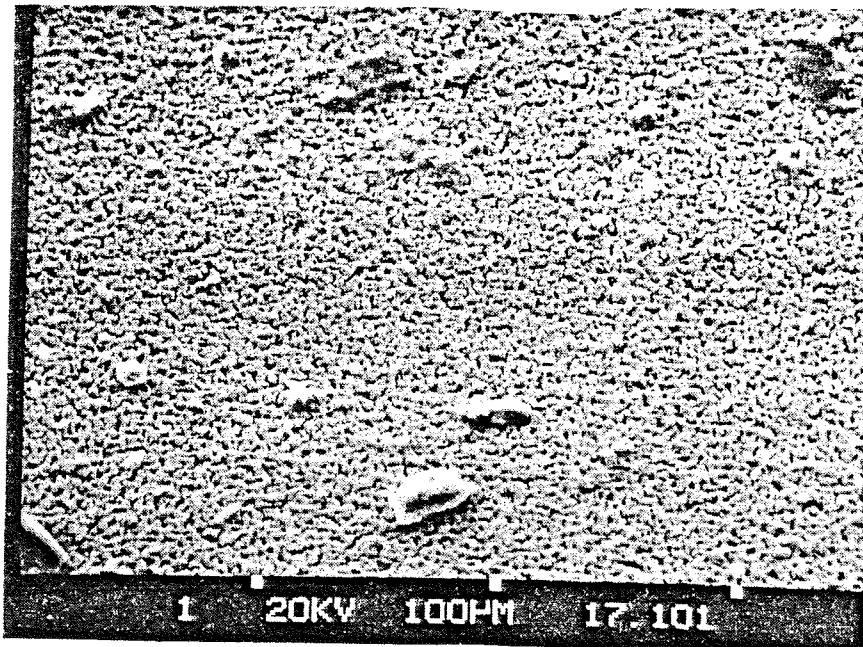
Micrograph 01.301 (2 of these) and 82.148 - mucoids, mucoid agglomerates, floccules, inorganic material and pellets of clays.



Micrograph 01.301 (2 of these) and 82.148 - mucoids, mucoid agglomerates, floccules, inorganic material and pellets of clays.

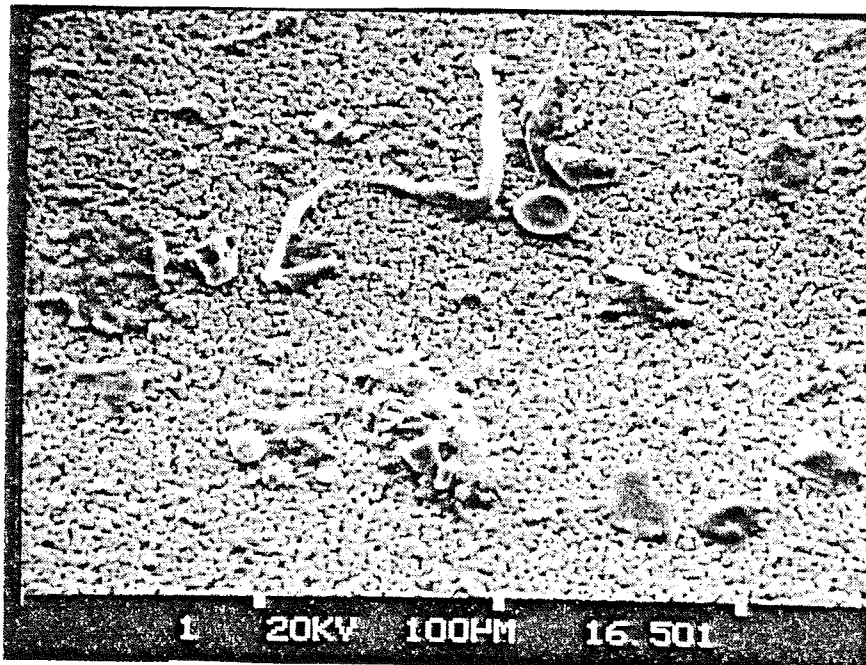


Station CO-2: 5 m (82-03171)

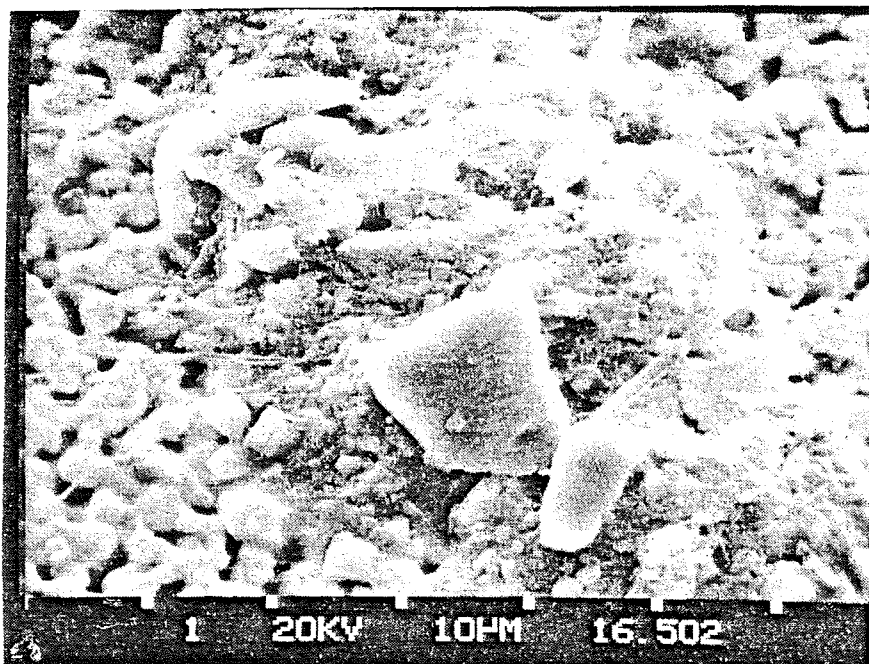


Micrograph 17.101 is a general photo of this sample.

Station CO-2: 100 m (82-03165)

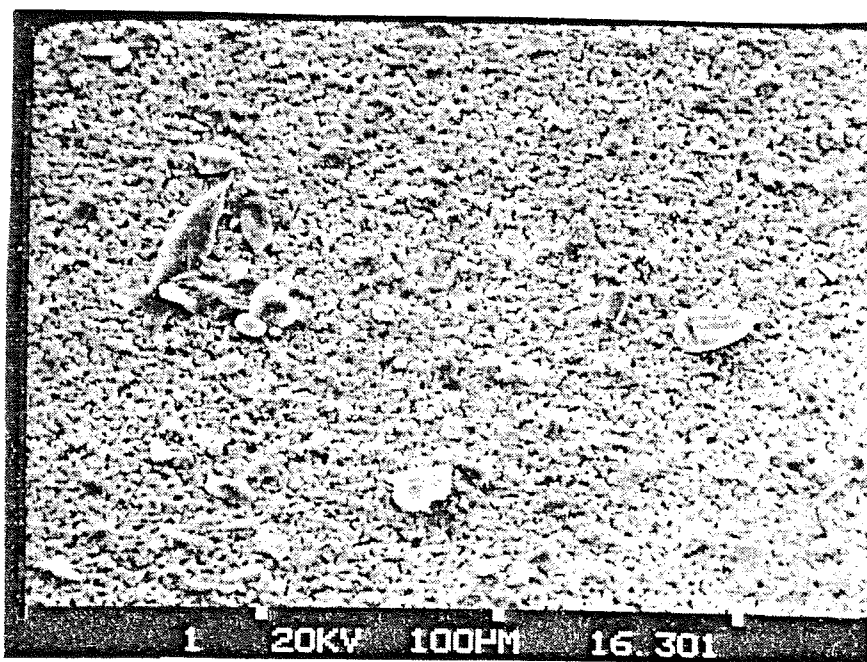


Micrograph 16.501 - general photo of sample.



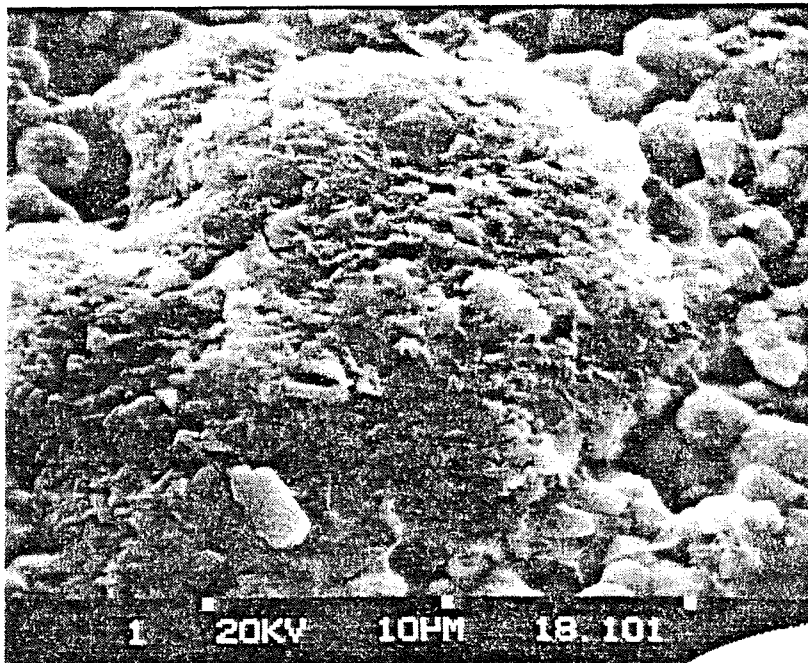
Micrograph 16.502 - close up of fecal pellet.

Station CO-2: 225 m (82-03163)

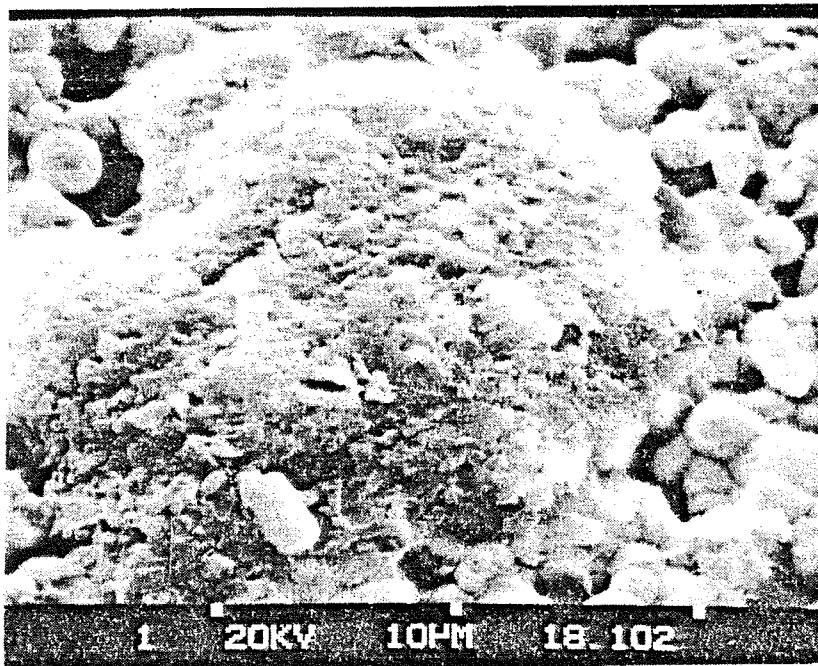


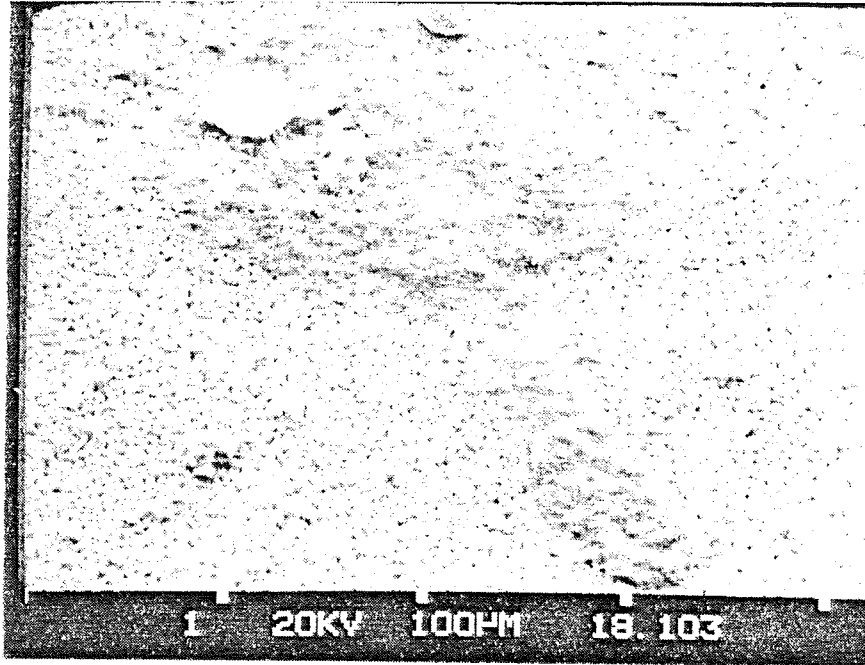
Micrograph 16.301 - general photo of sample.

Station CO-3: 10 m (82-03181)

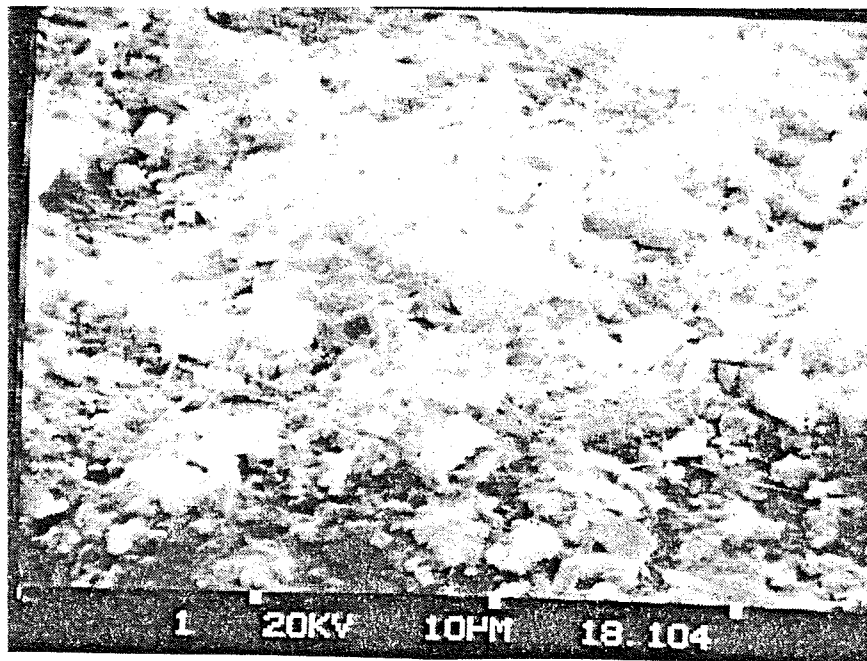


Micrographs 18.101 and 18.102 - numerous flocs of particles  $< 1 \mu\text{m}$  and agglomerates of  $\sim 60 \mu\text{m}$ .



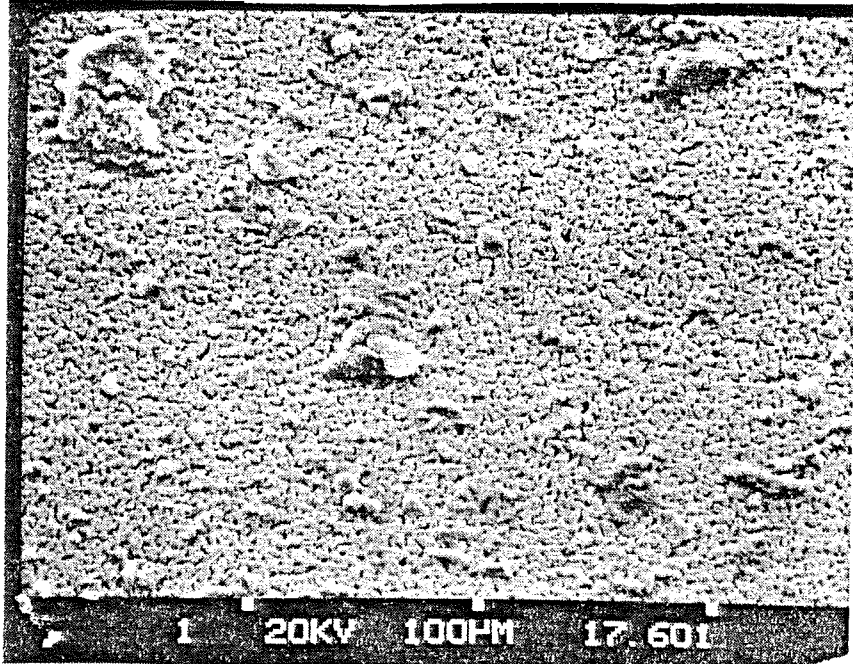


Micrograph 18.103 - agglomerate



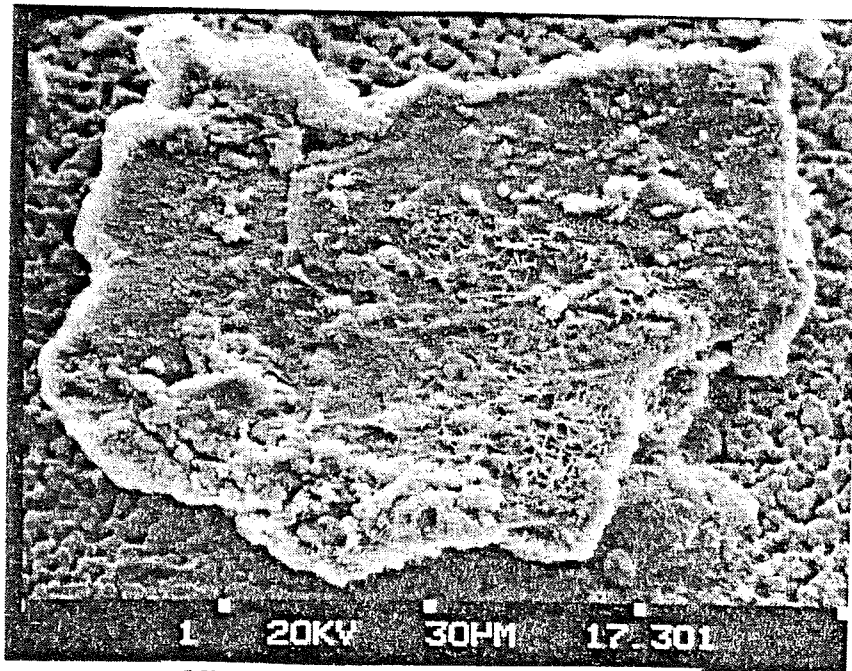
Micrograph 18.104 - close-up of agglomerate. See spectrum A18104 for elemental composition.

Station CO-3: 100 m (82-03176)

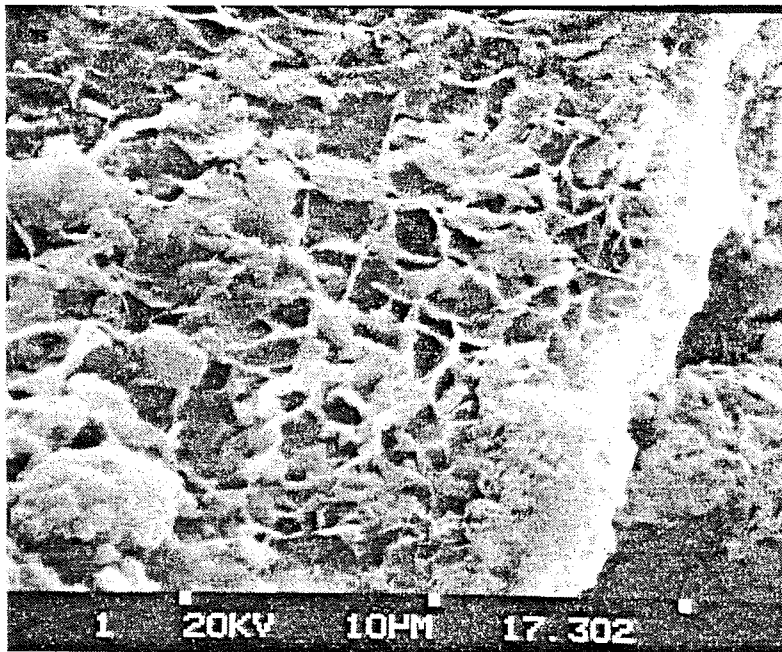


Micrograph 17.601 - general photo of sample.

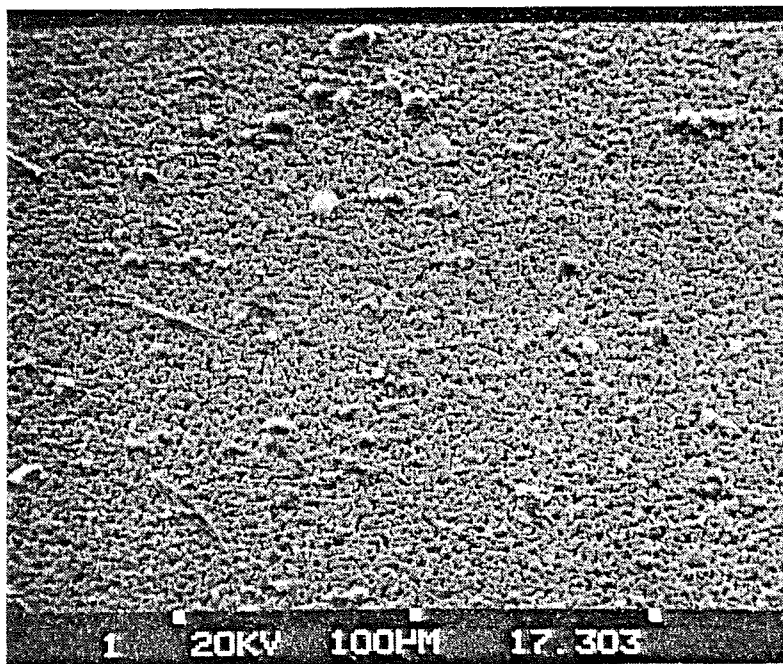
Station CO-3: 250 m (82-03173)



Micrograph 17.301 - shows whole grain.



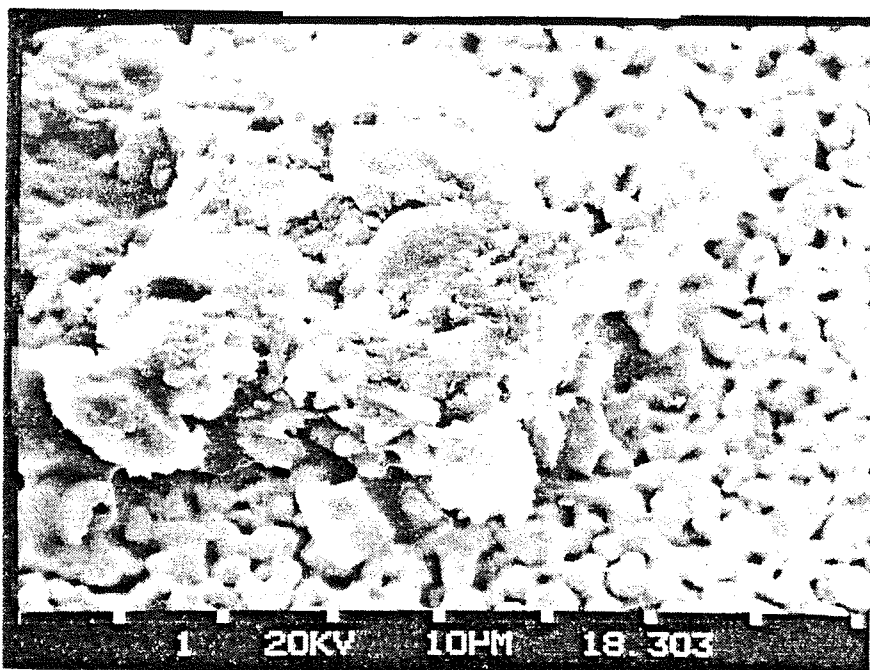
Micrograph 17.302 - close-up of plates in bottom left corner (see spectrum A17301 and B17301 for analysis).



Micrograph 17.303 - general photo of sample.



Station CO-4: 5 m (82-03191)

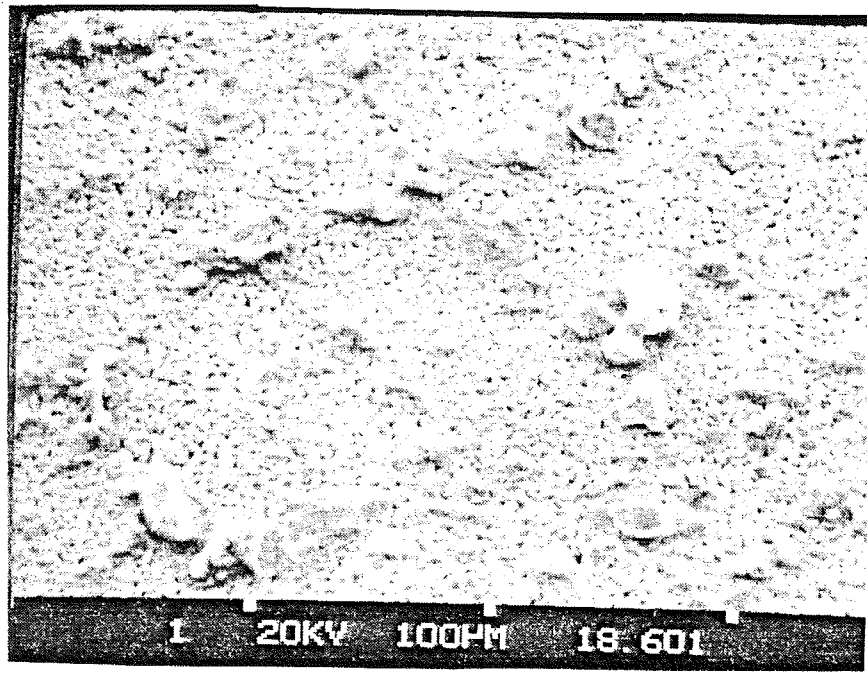


Micrograph 18.303 - sample shows flocs composed of quartz, feldspars and clays.



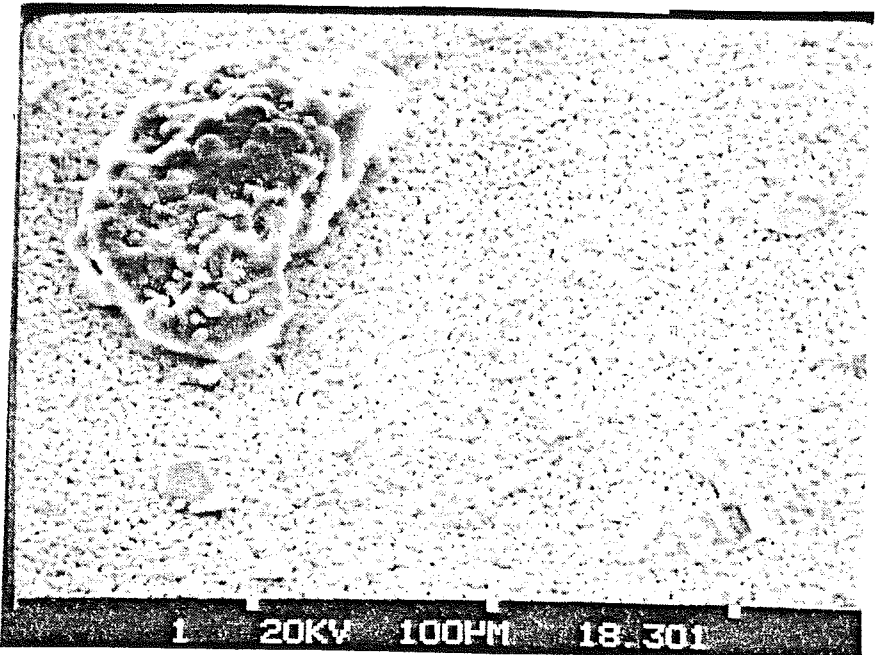
Micrograph 18.304 - mucoid (agglomerate).

Station CO-4: 100 m (82-03186)

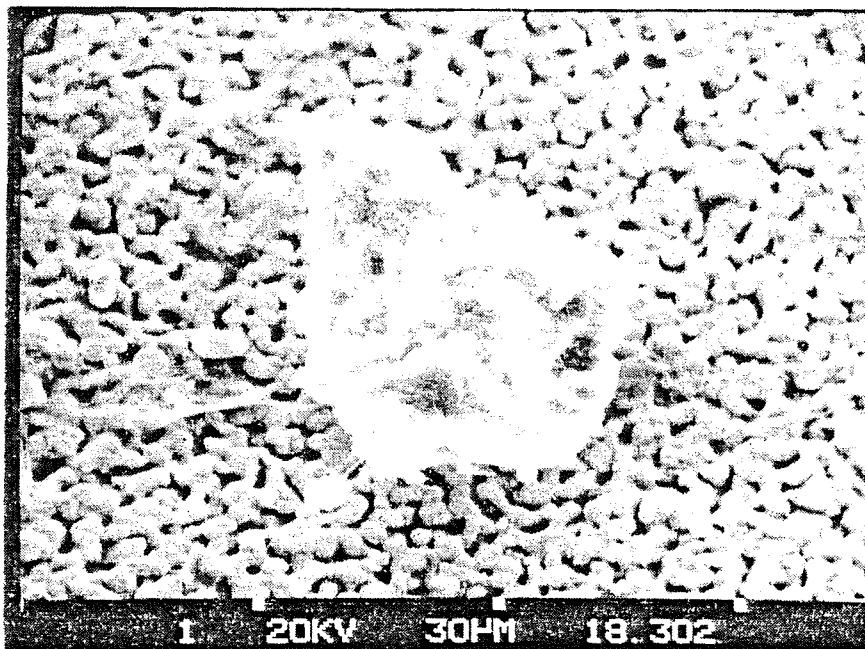


Micrograph 18.601-general photo of sample

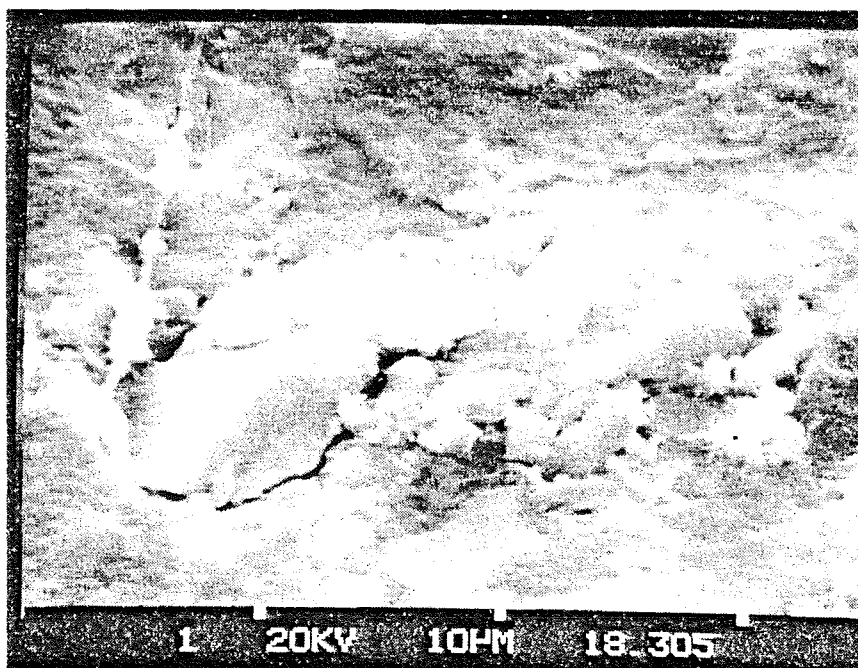
Station CO-4: 352 m (82-03183)



Micrograph 18.301 - this is an odd looking mucoïd with individual grains and diatoms. Spectrum A18301 is the composition of the mucoïd.



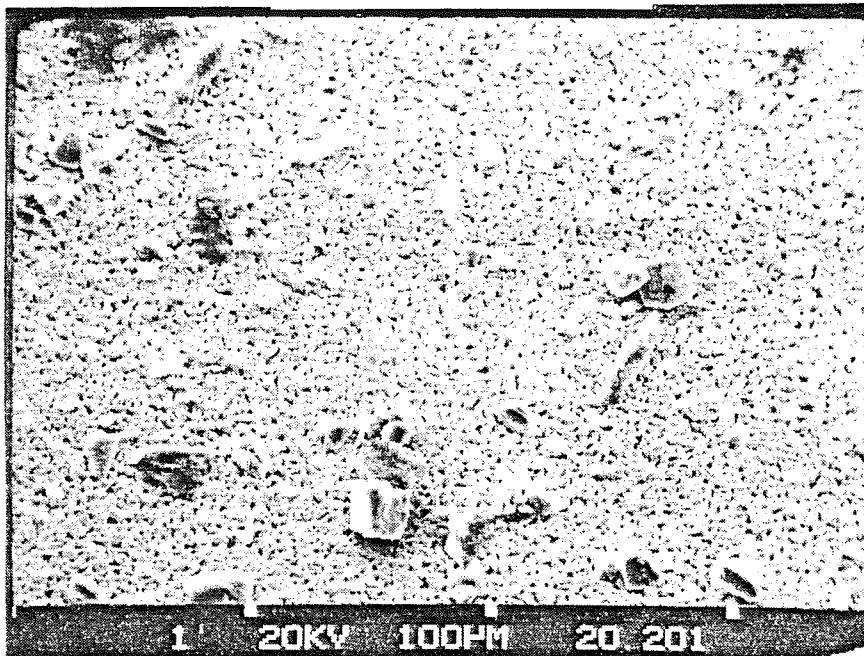
Micrograph 18.302 - close-up of small flaky grains. Spectrum A18302 gives the elemental composition.



Micrograph 18.305 - close-up of mucoid containing small particles.

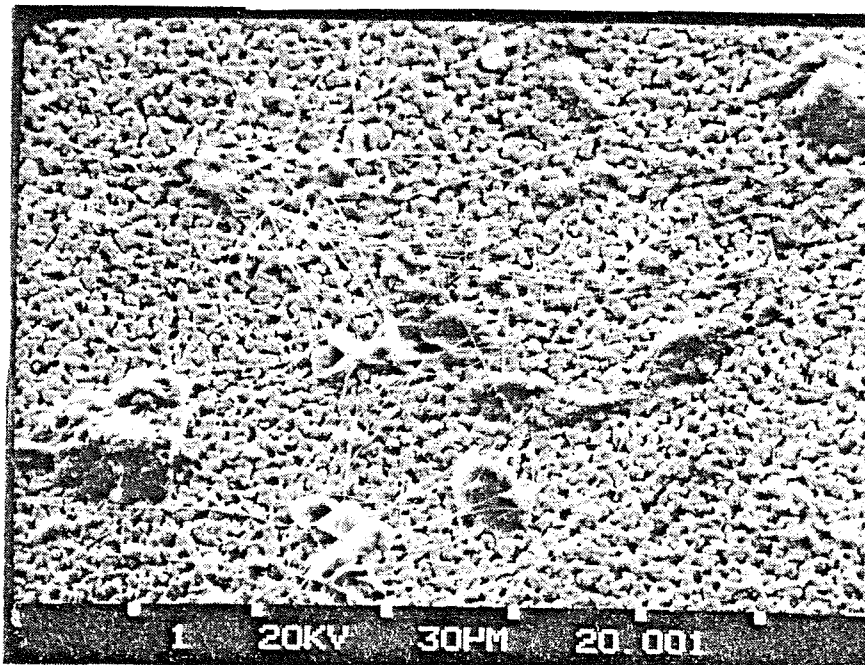
Two more spectra are included for this sample. A18303 and A18304 demonstrate the composition of an aggregate of resuspended particles and a mucoid respectively.

Station CO-5: 1 m (82-03202)

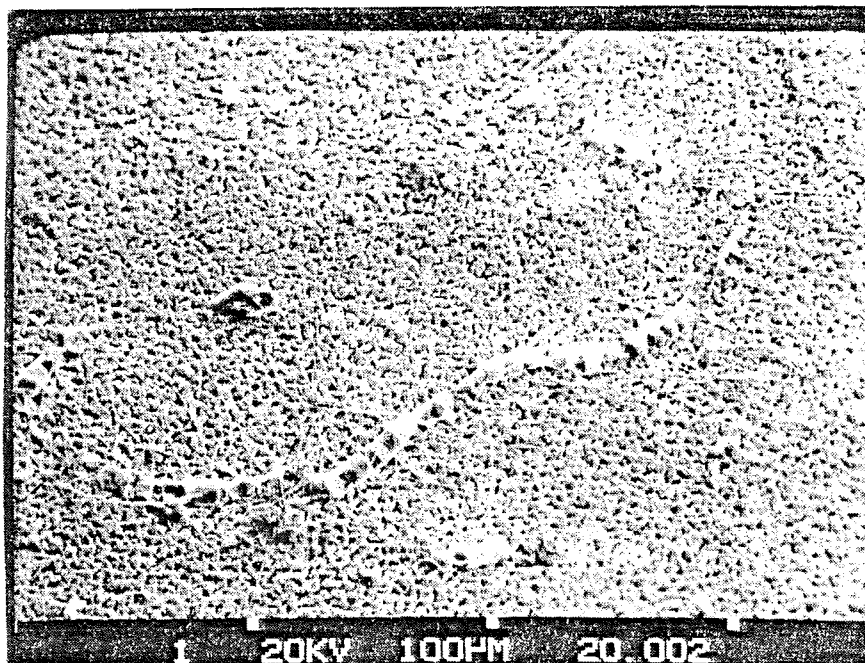


Micrograph 20.201- general photo of sample

Station CO-5: 10 m (82-03200)

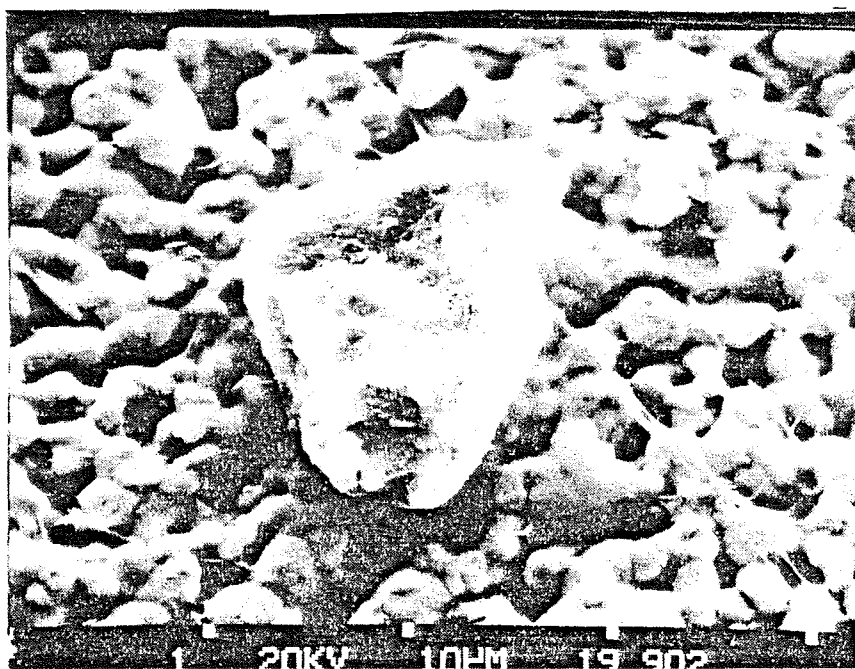


Micrograph 20.001 - filaments probably from diatoms.

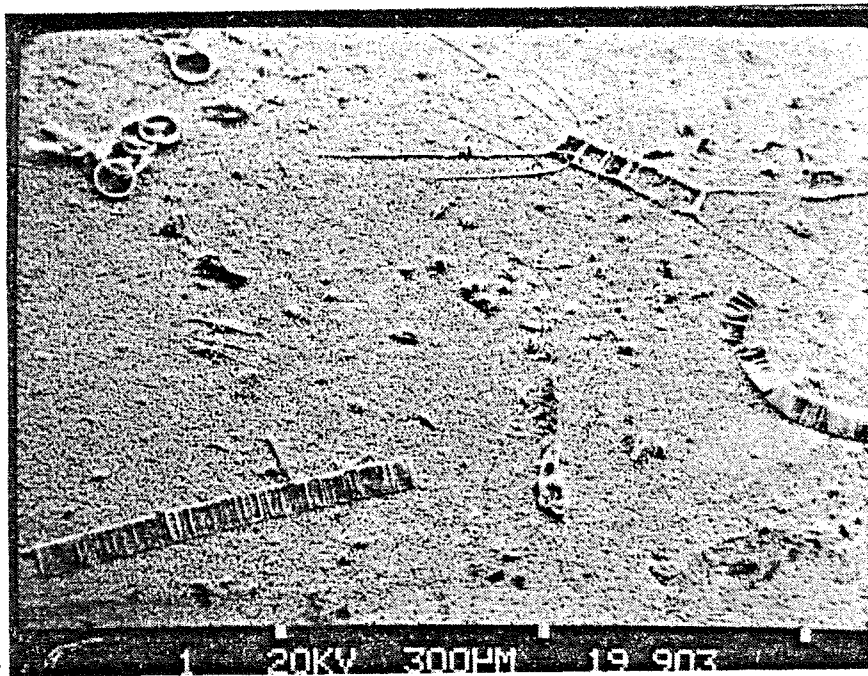


Micrograph 20.002 - this photo shows chain diatoms.

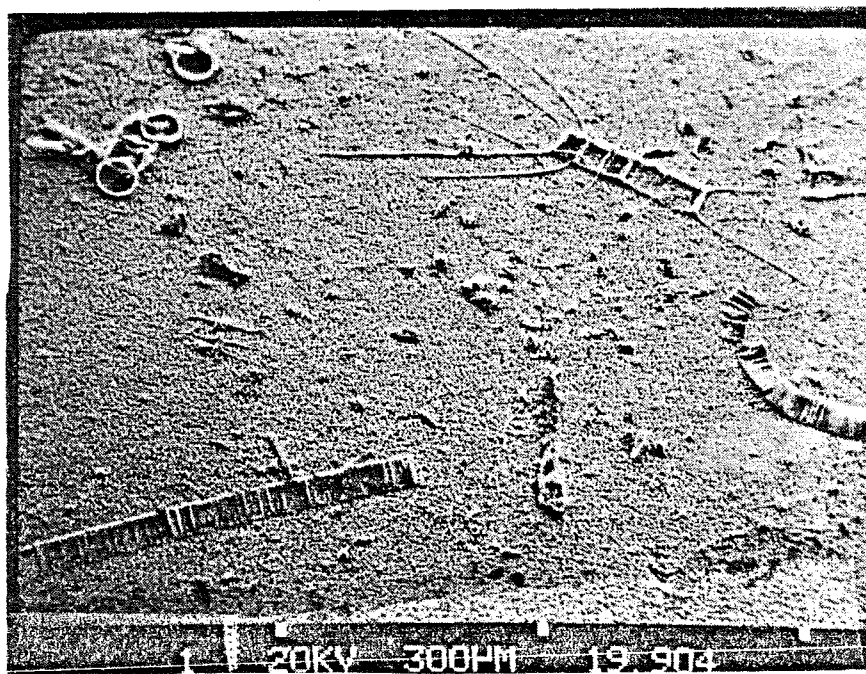
Station CO-5: 20 m (82-03199)



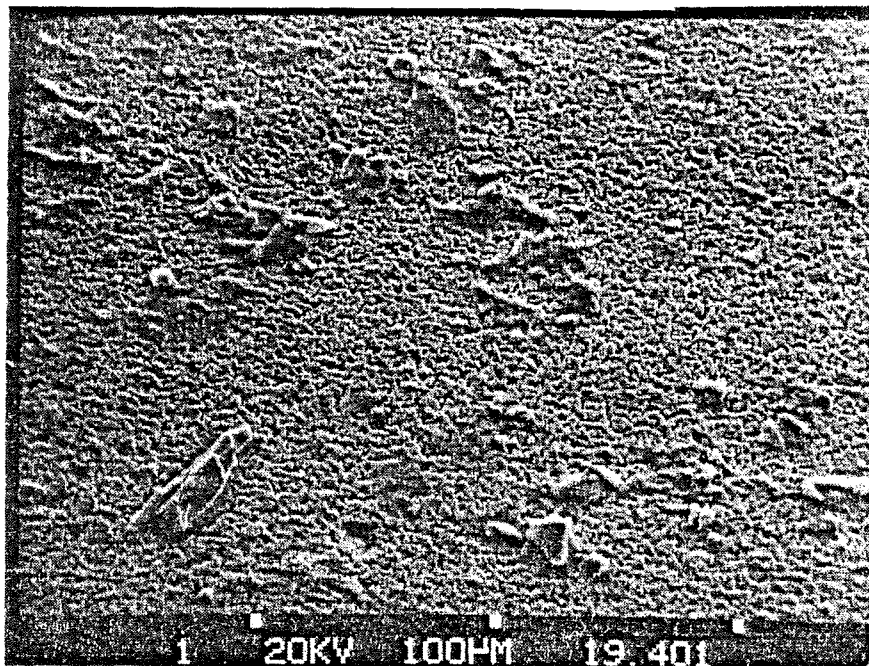
Micrograph 19.902 - individual grain (mostly zinc).



Micrograph 19.903 and 19.904 - these 2 photos show quartz, feldspars, micas, diatoms (chain, ring and spines), fecal pellets and individual grains.

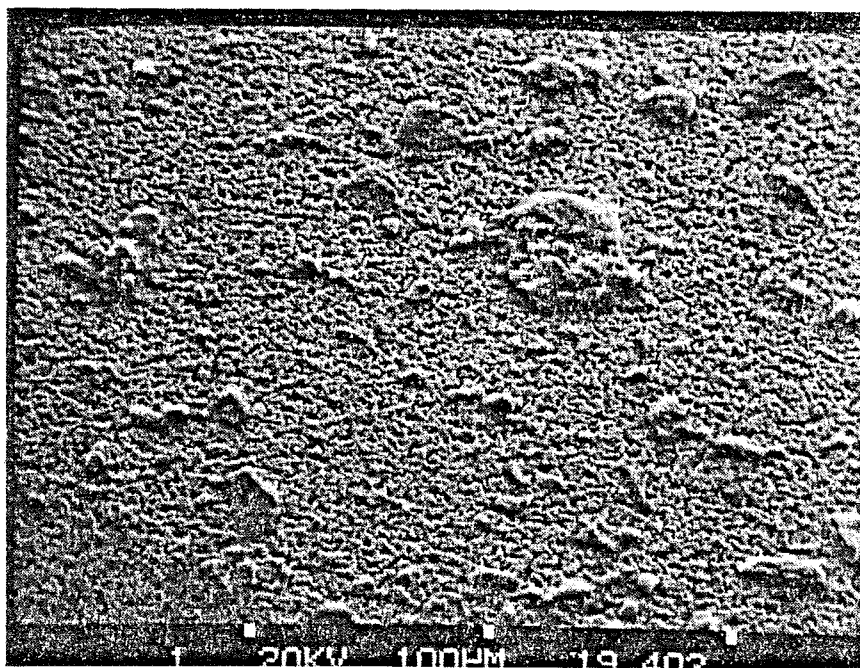


Station CO-5: 400 m (82-03194)

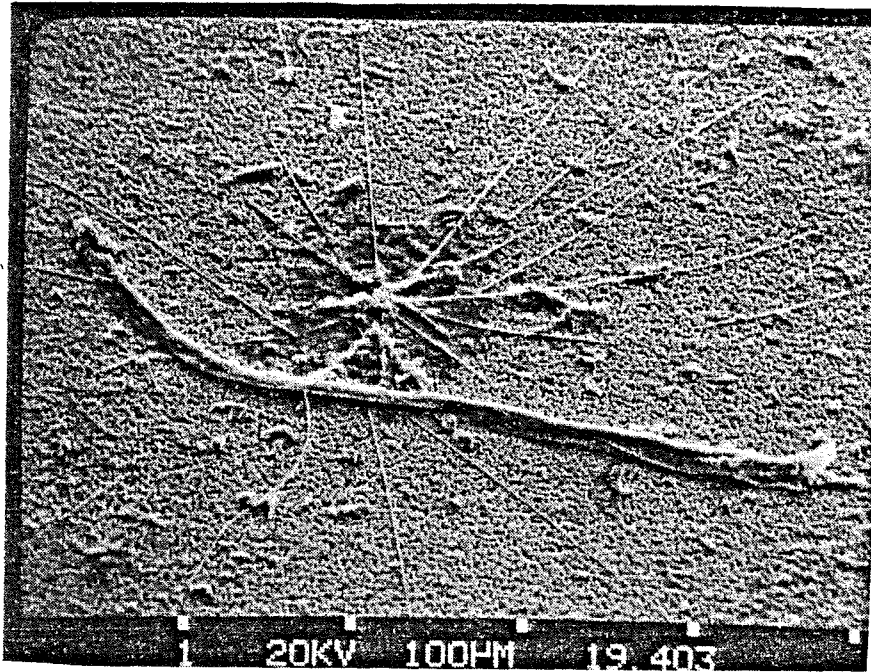


Micrograph 19.401 - individual grains and mucoids.

Spectrum A19401 gives a general analysis of the sample.

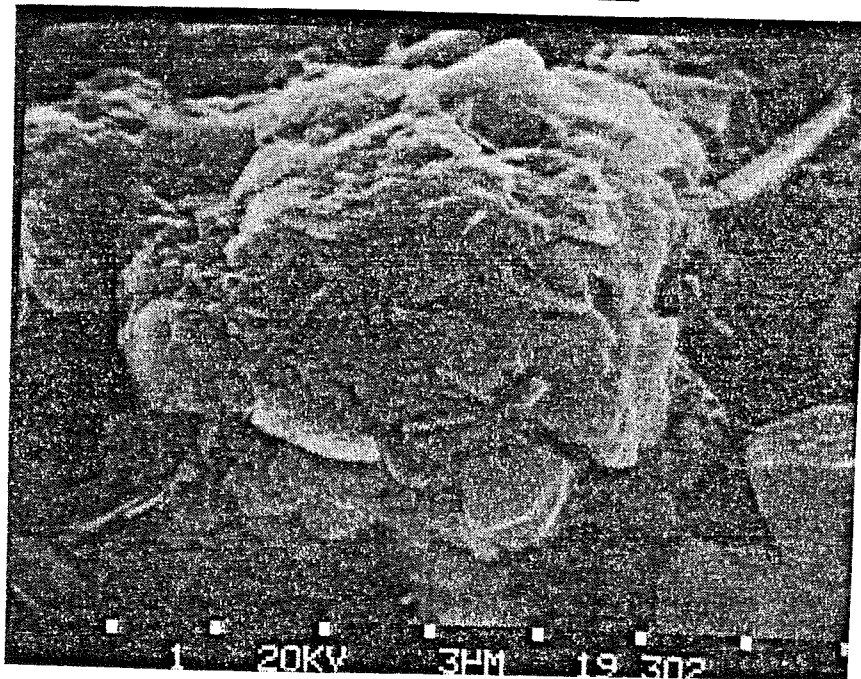


Micrograph 19.402 - floccule, concentric diatoms, mucoids and individual grains.



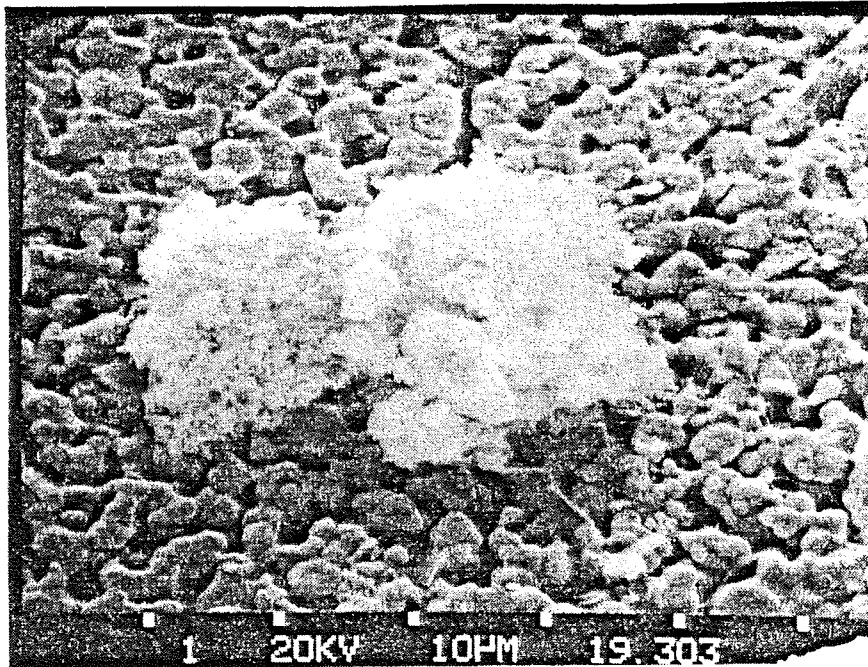
Micrograph 19.403 - spine radiating in a mucoid and an appendage of a zooplankton.

Station CO-5: 497 m (82-03193)

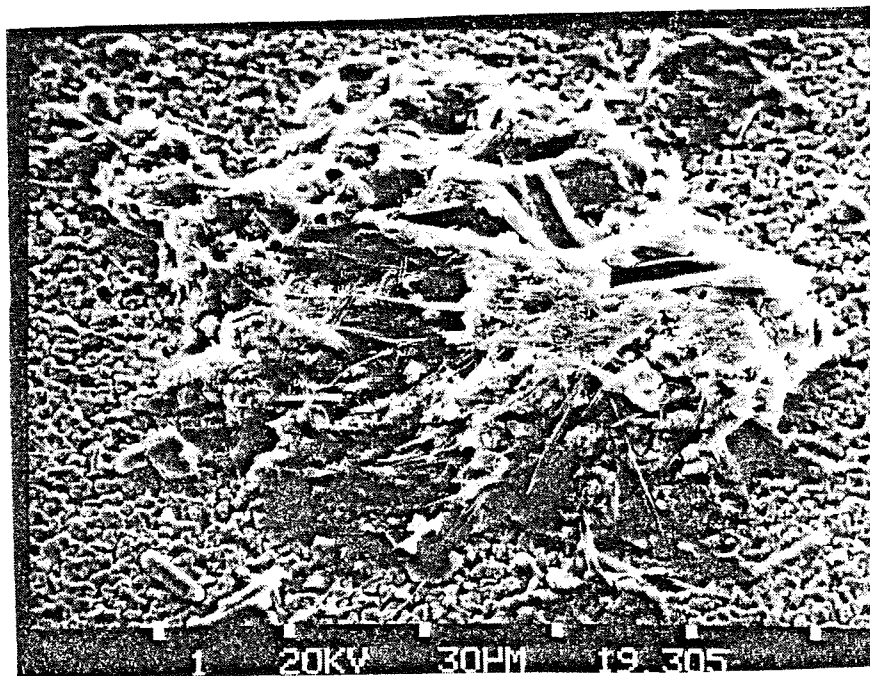


Micrograph 19.302 and 19.303 - clay rosettes.

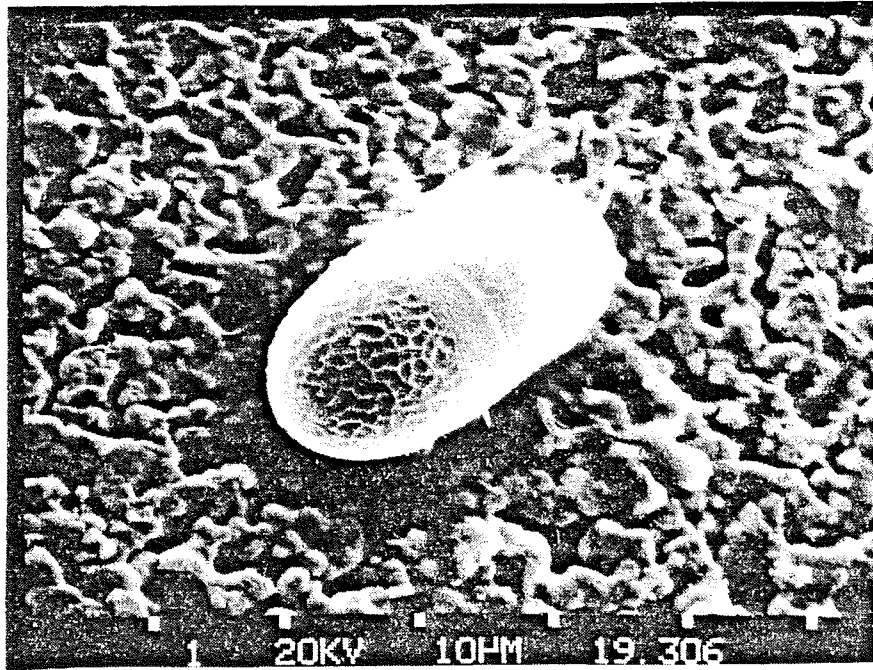




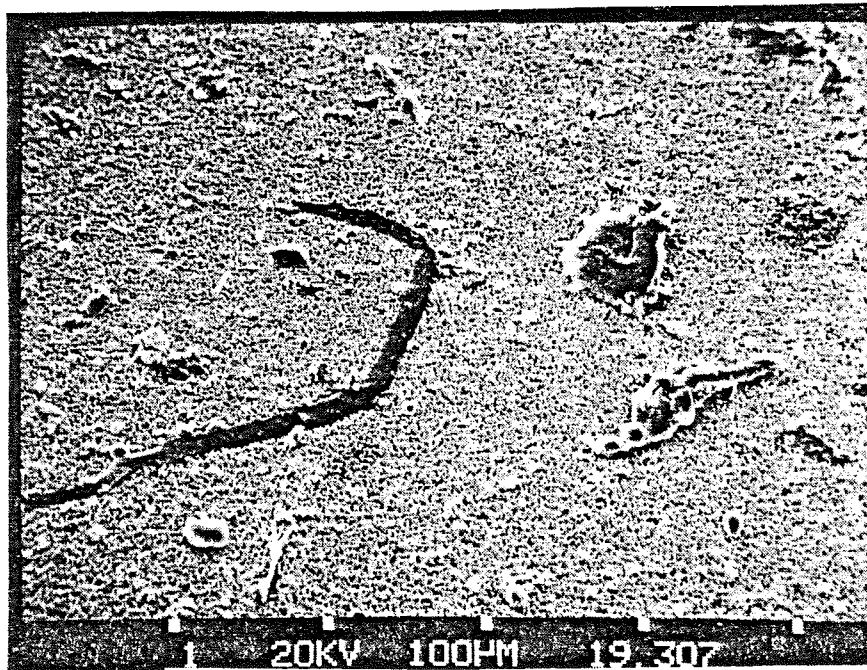
Micrograph 19.302 and 19.303 - clay rosettes.



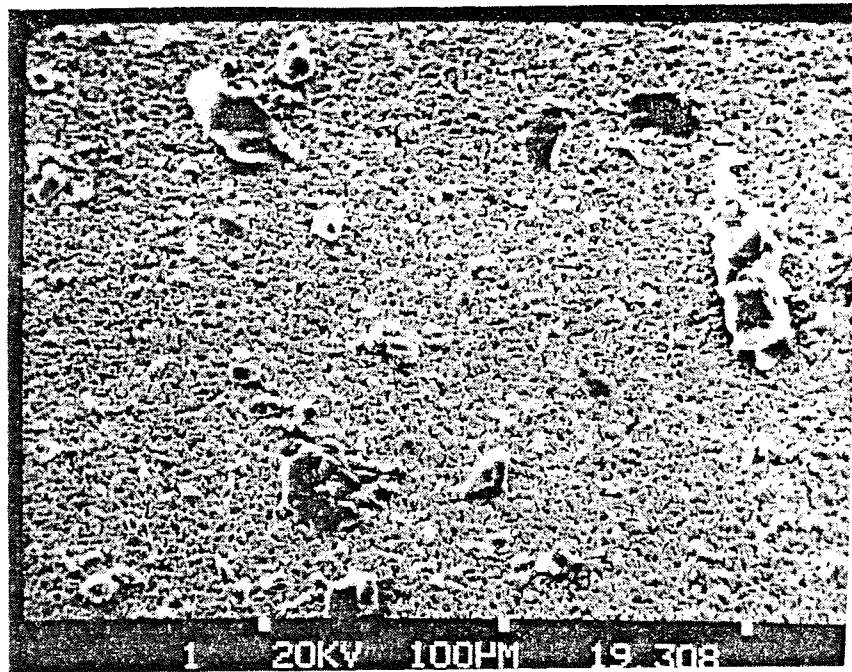
Micrograph 19.305 - agglomerate made up of fibres (biogenics), diatoms and clays.



Micrograph 19.306 - diatom.



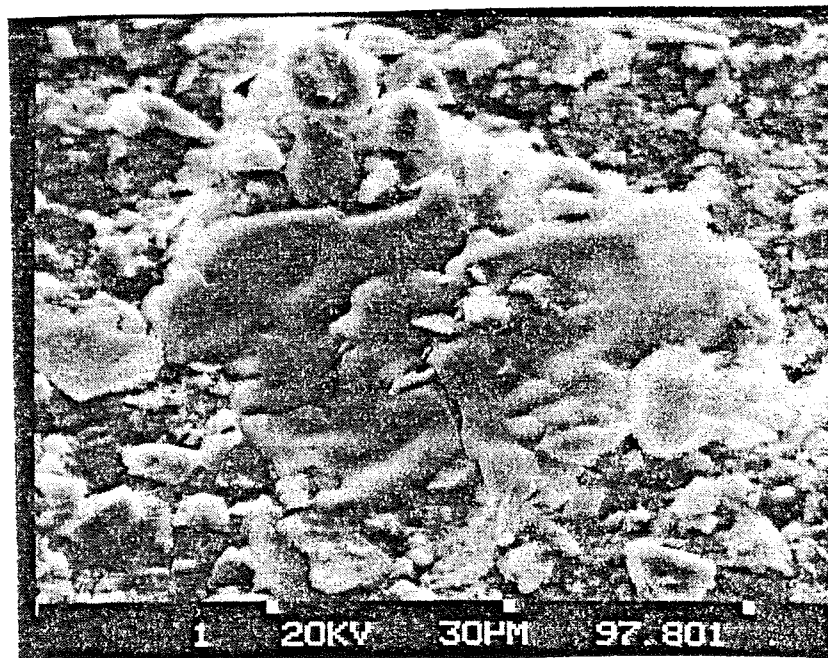
Micrograph 19.307 - mucoids and fecal pellets.



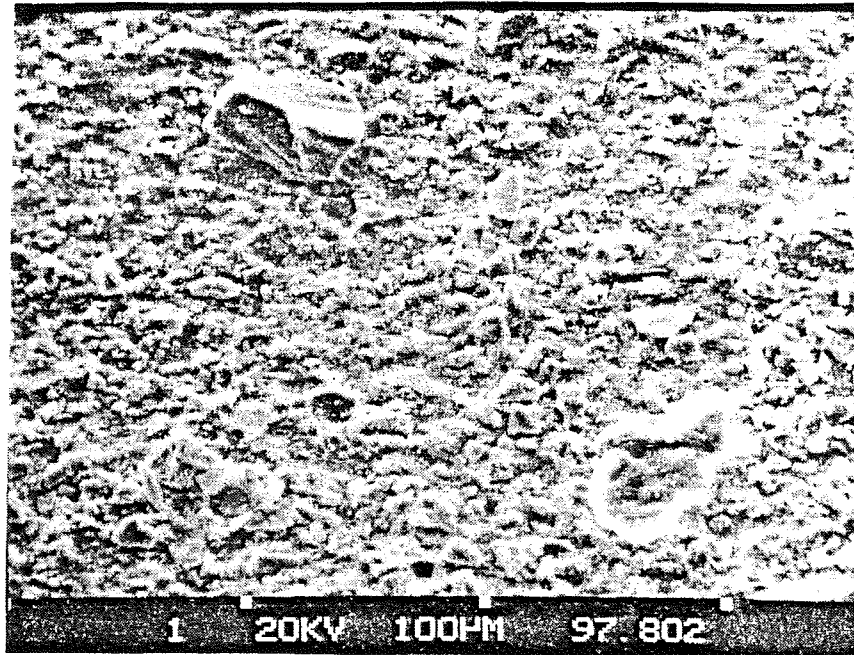
Micrograph 19.308 - fecal pellet, mucoid and several individual grains.

Coronation Fjord - Ice Front Study

Station CO1D-B (82-04978)

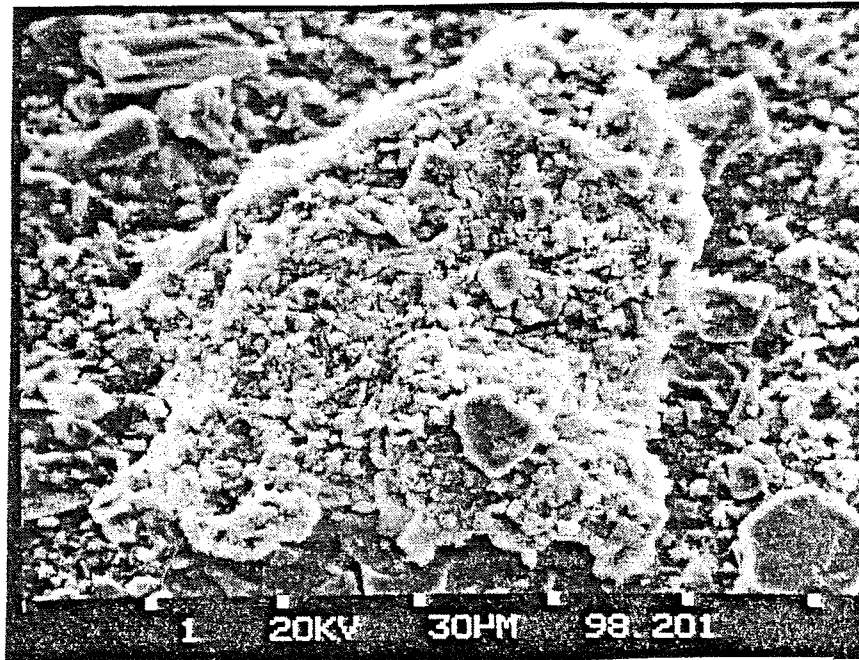


Micrograph 97.801 - mucoids composed mainly of chlorine.

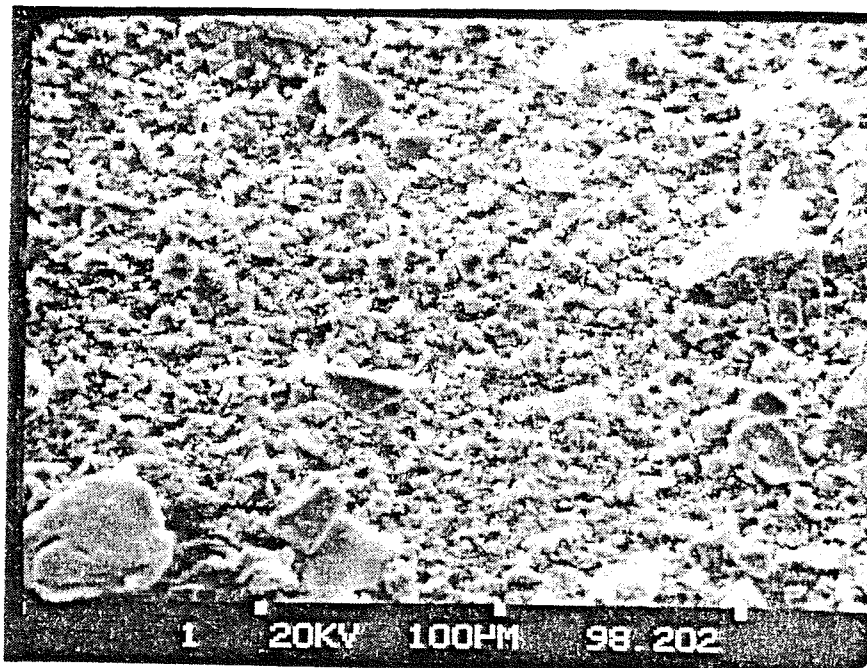


Micrograph 97.802 - general photo which shows the size difference between small and large grains and a mucoid.

Station CO4D-B (82-04982)

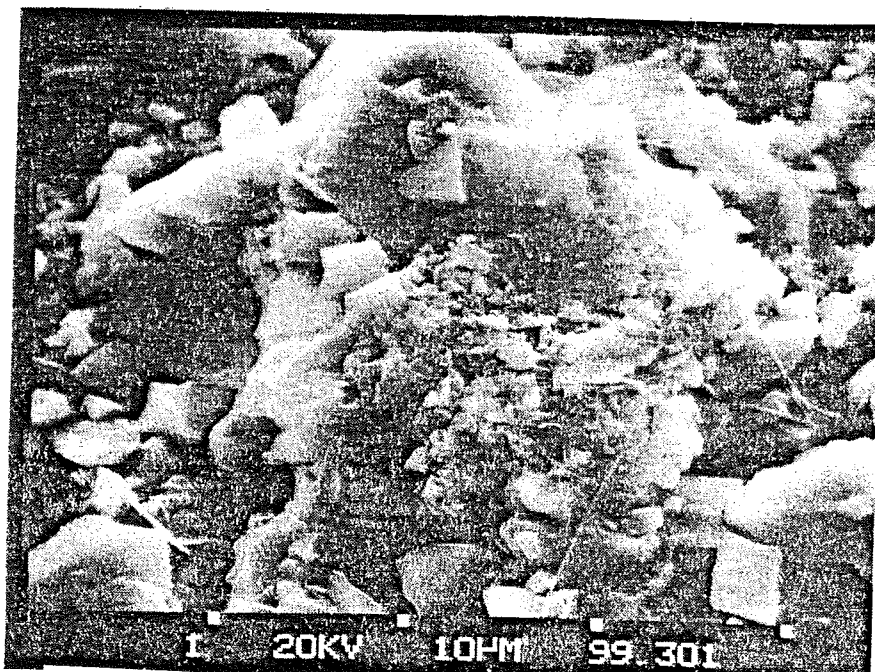


Micrograph 98.201 - floccule made of very small particles.



Micrograph 98.202 - individual silt particles.

Station CO12D-A (82-04993)



Micrograph 99.301 - floccule with very small ( $< 1 \mu\text{m}$ ) particles.

ID:A15008  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	405
Mg	-261
Al	15193
Si	59026
Cl	191
K	18147
Ca	905
Ti	102
Fe	-13
Bg	0

ID:A15008  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.03
Mg	-0.02
Al	1.00
Si	3.88
Cl	0.01
K	1.19
Ca	0.06
Fe	-0.01
Bg	0.00
Ti	0.01

ID:A15008  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.4
Mg	-0.3
Al	16.2
Si	63.0
Cl	0.2
K	19.4
Ca	1.0
Ti	0.1
Fe	-0.0

CO-1: 50 m  
Inorganic Aggregate With  
Cr, Fe and Ni Coating

ID:B15008  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	2
Mg	52
Al	688
Si	2452
Cl	-156
K	1176
Cr	17857
Fe	53940
Ni	3460
Bg	0

ID:B15008  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.00
Mg	0.07
Al	1.00
Si	3.56
Cl	-0.23
K	1.71
Cr	25.94
Fe	78.37
Ni	5.03
Bg	0.00

ID:B15008  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.0
Mg	0.1
Al	0.9
Si	3.1
Cl	-0.9
K	1.5
Cr	22.5
Fe	67.9
Ni	4.4

CO-1: 50 m  
Inorganic Aggregate With  
Cr, Fe and Ni Coating

ID:A16502  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	164
Mg	382
Al	4576
Si	20399
Cl	102
K	3682
Ca	618
Ti	176
Fe	1581
Bg	0

ID:A16502  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.04
Mg	0.08
Al	1.00
Si	4.46
Cl	0.02
K	0.80
Ca	0.13
Ti	0.04
Fe	0.35
Bg	0.00

ID:A16502  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.5
Mg	1.2
Al	14.4
Si	64.4
Cl	0.3
K	11.6
Ca	1.9
Ti	0.6
Fe	5.0

CO-2: 100 m  
Analysis of Fecal Pellet

ID:A18104  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	205
Mg	503
Al	4492
Si	18225
Cl	125
K	2584
Ca	937
Ti	238
Fe	2450
Bg	0

ID:A18104  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.05
Mg	0.11
Al	1.00
Si	4.06
Cl	0.03
K	0.58
Ca	0.21
Ti	0.05
Fe	0.54
Bg	0.00

ID:A18104  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.7
Mg	1.7
Al	15.1
Si	61.2
Cl	0.4
K	8.7
Ca	3.1
Ti	0.8
Fe	8.2

CO-3: 10 m  
Composition of Agglomerate

ID:A17301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-4
Mg	182
Al	516
Si	1759
Cl	111
K	1091
Ca	62
Ti	195
Fe	2538
Bg	0

ID:A17301  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.01
Mg	0.35
Al	1.00
Si	3.41
Cl	0.22
K	2.12
Ca	0.12
Ti	0.38
Fe	4.92
Bg	0.00

ID:A17301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.1
Mg	2.8
Al	8.0
Si	27.3
Cl	1.7
K	16.9
Ca	1.0
Ti	3.0
Fe	39.3

CO-3: 250 m  
Analysis of Plates in  
Micrograph 17.302

ID:B17301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-29
Mg	106
Al	380
Si	1383
Cl	77
K	923
Ca	29
Ti	165
Fe	2722
Bg	0

ID:B17301  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.08
Mg	0.28
Al	1.00
Si	3.64
Cl	0.20
K	2.43
Ca	0.08
Ti	0.43
Fe	7.16
Bg	0.00

ID:B17301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.5
Mg	1.8
Al	6.6
Si	24.0
Cl	1.3
K	16.0
Ca	0.5
Ti	2.9
Fe	47.3

CO-3: 250 m  
Analysis of Plates in  
Micrograph 17.302

ID:A19101  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	110
Mg	24
Al	779
Si	3449
Cl	12
K	2
Ca	39
Ti	1
Fe	31
Bg	0

ID:A19101  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.14
Mg	0.03
Al	1.00
Si	4.43
Cl	0.02
K	0.00
Ca	0.05
Ti	0.00
Fe	0.04
Bg	0.00

ID:A19101  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	2.5
Mg	0.5
Al	17.5
Si	77.6
Cl	0.3
K	0.0
Ca	0.9
Ti	0.0
Fe	0.7

CO-4: 5 m  
Composition of Al-silicates

ID:A18301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	16
Mg	37
Al	79
Si	137
Cl	84
K	74
Ca	147
Ti	26
Fe	67
Bg	0

ID:A18301  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.03
Mg	0.46
Al	1.00
Si	1.73
Cl	1.06
K	0.94
Ca	1.85
Ti	0.32
Fe	0.84
Bg	0.00

ID:A18301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	2.5
Mg	5.5
Al	11.9
Si	20.6
Cl	12.6
K	11.1
Ca	22.0
Ti	3.8
Fe	1.0

Co-4: 352 m  
Mucoid

ID:B18302  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	80
Mg	91
Al	1026
Si	7120
Cl	15
K	769
Ca	273
Ti	63
Fe	306
Bg	0

ID:B18302  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.08
Mg	0.09
Al	1.00
Si	6.94
Cl	0.01
Ca	0.27
K	0.75
Ti	0.06
Fe	0.30
Bg	0.00

ID:B18302  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.8
Mg	0.9
Al	10.5
Si	73.1
Cl	0.2
K	7.9
Ca	2.8
Ti	0.6
Fe	3.1

CO-4: 352 m  
Small Flakey Grains



ID:A18303 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	56
Mg	49
Al	1012
Si	7120
Cl	15
K	833
Ca	273
Ti	63
Fe	368
Bg	0

ID:A18303 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.06
Mg	0.05
Al	1.00
Si	7.04
Cl	0.01
K	0.82
Ca	0.27
Ti	0.06
Fe	0.36
Bg	0.00

ID:A18303 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	0.5
Al	10.3
Si	72.7
Cl	0.1
K	8.5
Ca	2.8
Ti	0.6
Fe	3.8

CO-4: 352 m  
Aggregate of Resuspended  
Particles

ID:B18304  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	45
Mg	109
Al	2002
Si	3742
Cl	125
K	281
Ca	79
Ti	8
Fe	530
Bg	0

ID:B18304  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.02
Mg	0.06
Al	1.00
Si	1.87
Cl	0.06
K	0.14
Ca	0.04
Ti	0.00
Fe	0.26
Bg	0.00

ID:B18304  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.7
Mg	1.6
Al	28.9
Si	54.1
Cl	1.8
K	4.1
Ca	1.1
Ti	0.1
Fe	7.7

CO-4: 352 m  
Mucoid

ID:A19601  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-381
Mg	9319
Al	208
Si	29509
Cl	98
K	27
Ca	-11
Ti	138
Fe	578
Bg	0

ID:A19601  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-1.83
Mg	44.77
Al	1.00
Si	141.77
Cl	0.47
K	0.13
Ca	-0.06
Ti	0.66
Fe	2.78
Bg	0.00

ID:A19601  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-1.0
Mg	23.6
Al	0.5
Si	74.7
Cl	0.2
K	0.1
Ca	-0.0
Ti	0.4
Fe	1.5

CO-5: 100 m  
General Analysis

ID:A19401  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-124
Mg	5074
Al	5741
Si	39882
Cl	132
K	815
Ca	13466
Ti	278
Fe	9941
Bg	0

ID:A19401  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.02
Mg	0.88
Al	1.00
Si	6.95
Cl	0.02
K	0.14
Ca	2.34
Ti	0.05
Fe	1.73
Bg	0.00

ID:A19401  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.2
Mg	9.7
Al	7.6
Si	53.0
Cl	0.2
K	1.1
Ca	17.9
Ti	0.4
Fe	13.2

CO-5: 400 m  
General Analysis

ID:A19301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	446
Mg	429
Al	92191
Si	544
Cl	5642
K	114
Ca	2233
S	7372
Zn	302
Bg	0

ID:A19301  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.01
Mg	0.01
Al	1.00
Si	0.01
Cl	0.06
K	0.00
Ca	0.02
S	0.08
Zn	0.00
Bg	0.00

ID:A19301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.0
Mg	0.4
Al	84.4
Si	0.5
Cl	5.2
K	0.1
Ca	2.0
S	6.7
Zn	0.3

CO-5: 497 m  
General Analysis

ID:A97803  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	13
Mg	66
Al	286
Si	907
Cl	40
K	465
Ca	9
Ti	111
Fe	893
Bg	0

ID:A97803  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.00
Mg	0.23
Al	1.00
Si	3.18
Cl	0.14
K	1.63
Ca	0.12
Ti	0.39
Fe	3.13
Bg	0.00

ID:A97803  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.5
Mg	2.4
Al	10.2
Si	32.5
Cl	1.4
K	16.7
Ca	0.3
Ti	4.0
Fe	32.0

CO-1D-B (Delta)  
Iron-Rich Mineral

ID:B97801  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	235
Mg	-1
Al	140
Si	395
Cl	2309
K	76
Ca	40
Ti	-14
Fe	82
Bg	0

ID:B97801  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	1.68
Mg	-0.01
Al	1.00
Si	2.82
Cl	16.48
K	0.54
Ca	0.29
Ti	-0.10
Fe	0.59
Bg	0.00

ID:B97801  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	7.2
Mg	-0.0
Al	4.3
Si	12.1
Cl	70.8
K	2.3
Ca	1.2
Ti	-0.4
Fe	2.5

CO-1D-B (Delta)  
Mucoid

ID:A98701  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	11
Mg	833
Al	1772
Si	7758
Cl	306
K	432
Ca	2778
Ti	133
Fe	2817
Bg	0

ID:A98701  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.01
Mg	0.47
Al	1.00
Si	4.38
Cl	0.17
K	0.24
Ca	1.57
Ti	0.08
Fe	1.59
Bg	0.00

ID:A98701  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.1
Mg	5.0
Al	10.5
Si	46.1
Cl	1.8
K	2.6
Ca	16.5
Ti	0.8
Fe	16.7

CO-8D (Delta)  
Unknown Mineral Showing  
Cleavage

### McBETH FIORD

This fjord has a maximum water depth of 580 m, a 180 m deep sill situated some 22.5 km from the head of the fjord, and is over 100 km long with a mean width of 4.3 km. McBeth Fiord merits special attention within the SAFE project for it has a very large hinterland (4070 km<sup>2</sup>) and receives the largest annual input of freshwater runoff (0.77 km<sup>3</sup>) of any of the SAFE-investigated fjords. Less than 24 % of the entire fjord hinterland is covered in glacial ice of which 50 % of the land is at elevations in excess of 750 m. Of particular importance is the very large fjord head sandur that drains a hinterland basin of less than 4 % ice. This sandur accounts for 68 % of the 222,000 tonnes of suspended sediment that annually enters the fjord. There are a number of terrestrial glaciers whose melt water enters along the margins of the fjord. These are presently retreating at rates between 10 to 25 m a<sup>-1</sup>.

McBeth Fiord contains a water volume of 137 km<sup>3</sup> and, at the time of sampling, the surface waters were up to 2.5 °C (except near the MC4 where surface temperatures of -0.3 °C are affected by local glacial meltwater), a minimum at 50 m water depth (-1.55 °C) and warming with depth to -1.31 °C at 520 m. The salinity increased from 28.3 ‰ at the water surface to 33.4 ‰ at depth. The waters were well oxygenated with the lowest dissolved oxygen values behind the inner sill (≈ 4.6 ml L<sup>-1</sup> at 318 m at MC1).

Eighty SPM samples were collected (Fig. C). The mean grain size of the deflocculated SPM ranged from 7.3 Ø at station MC1 to 7.0 Ø at MC11 at the fjord mouth. The clay fraction of this SPM ranged from 14 % to 46 %, the remaining SPM fraction was composed of silt particles. The mineralogy is dominated by micas. The atomic C/N of the suspended sediment was relatively high (usually <10 although two values > 35 were observed). The organic carbon fraction of the SPM was ranged from 20 to 46 % (as low as 0.03 mg L<sup>-1</sup> and up to 0.22 mg L<sup>-1</sup> POC). The bottom sediments contain little organic carbon landward of the inner sill (<0.4 %) but increases seaward towards the shelf (up to 1.7 %).

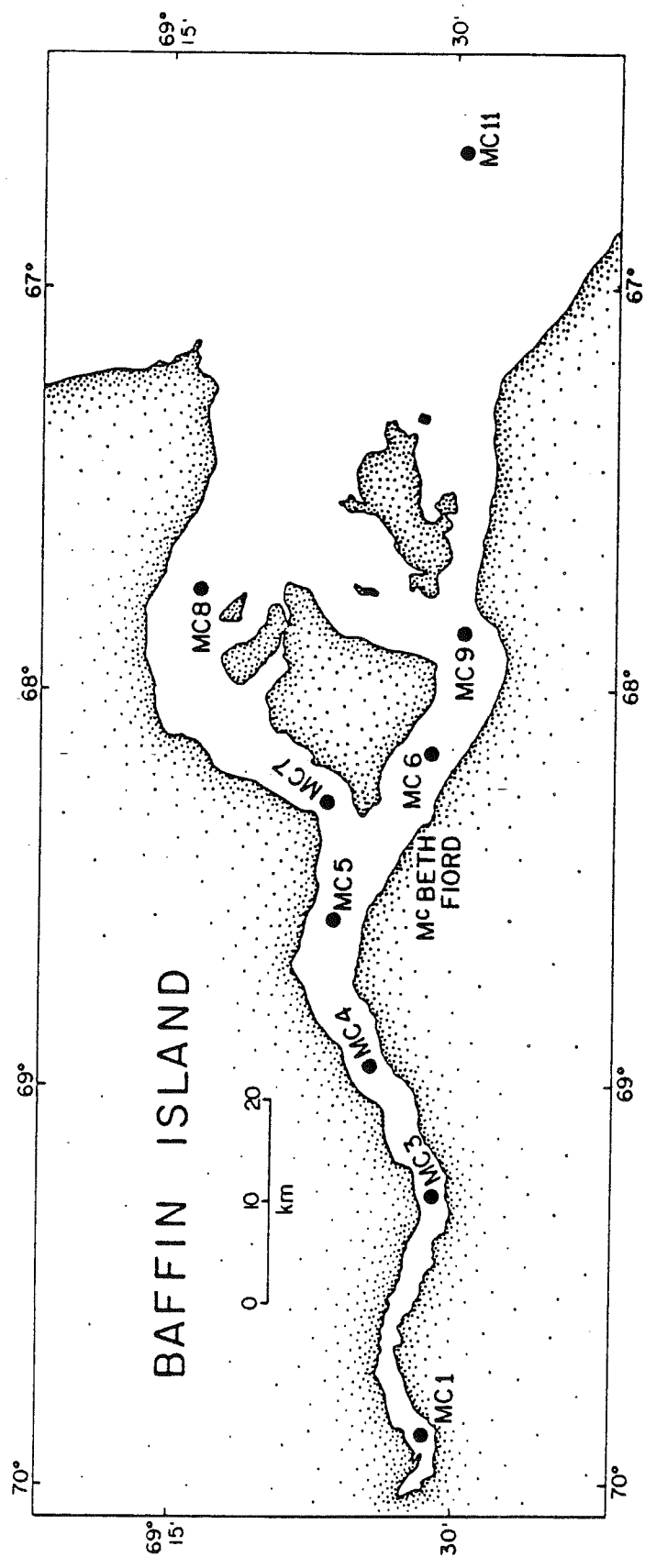


Fig. C- Stations of McBeth Fiord

McBeth Fiord

Station MC-1: 1 m (82-03501)

SPM conc. = 1.392 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

There is an abnormally high amount of silicoflagellates in this sample with numerous individual grains of < 10 µm. Mucoids with organic and inorganic grains are also common. A few chain diatoms, fecal pellets and pollen grains are present. The fecal pellets are smooth and the contents are not discernible.

Station MC-1: 20 m (82-03492)

SPM conc. = 0.942 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 28

Description from SEM micrographs -

There are numerous individual particles of < 10 µm. Planktonic appendages are observed and are composed of phosphorus and sulphur. There are hard looking large floccules of clays whose feature is that of fecal pellets which have been flattened. Mucoids and remnant silicoflagellates are present as well.

Station MC-1: 50 m (82-03490)

SPM conc. = 0.514 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 29

Description from SEM micrographs -

There are numerous small individual grains as well as a few larger ones. They are mostly clays and micas. Concentric diatom needles, zooplankton appendages and dry-looking flocs with both biogenic (diatoms) and mineral (clay rosettes) material are present. Pico plankton are detectable as well. Mucoids are either filled with inclusions (organic and/or inorganic) or are totally devoid of grains.

Station MC-1: 312 m (82-03486)

SPM conc. = 1.558 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 30

Description from SEM micrographs -

Pennate diatoms are common with numerous mucoids and some inorganic flocs.

Station MC-3: 10 m (82-03509)

SPM conc. = 1.141 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 31

Description from SEM micrographs -

This sample contains numerous mucoids, chain and concentric diatoms. Silico (dino) flagellates are present along with individual particles consisting of clays (biotite, quartz, palgioclase and K-feldspar).

Station MC-3: 20 m (82-03508)

SPM conc. = 4.027 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 32

Description from SEM micrographs -

This sample is mostly individual particles, a lot of them are biogenic (diatoms, etc.) with minor clay minerals.

Station MC-3: 30 m (82-03507)

SPM conc. = 0.516 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 33

Description from SEM micrographs -

The sample is scattered with flocs of clays containing organics (chlorine and sulphur in analysis) which appear to be flattened. Individual grains and mucoids are common. More of the small organisms with forked filaments (similar to photo 50.802) are seen.

Station MC-3: 100 m (82-03505)

SPM conc. = 1.220 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 34

Description from SEM micrographs - no general description

Station MC-3: 435 m (82-03502)

SPM conc. = 2.988 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 35

Description from SEM micrographs -

Individual grains of quartz, mica and feldspars are common in this sample. Small and large floccules and large grains are also present.

Station MC-4: 5 m (82-03520)

SPM conc. = 1.419 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 36

Description from SEM micrographs -

No photos were taken of this sample due to a focusing malfunction on the scanning electron microscope.

The sample contained numerous individual grains and mucoids. Small organisms similar to picoplankton, flocs of diatoms, fecal pellets, silicoflagellates and chain diatoms were all present. The following spectra analyses of various types of particles are;

A52001 - feldspar

B52001 - mica

C52001 - diatom material.

Station MC-4: 20 m (82-03518)

SPM conc. = 0.763 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 37

Description from SEM micrographs -

Numerous individual grains, flocs, mucoids and diatoms are found in this sample. The diatoms are both chain and concentric. Fecal pellets and parts of fecal pellets were also noticed.

Station MC-4: 30 m (82-03517)

SPM conc. = 1.263 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 38

Description from SEM micrographs -

This sample (as viewed on the scanning electron microscope) has a low concentration of particulates. There are calcium silicate (pyroxene-Walastonite) grains stuck to the filter. No photos were saved.

Station MC-4: 200 m (82-03514)

SPM conc. = 0.420 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 39

Description from SEM micrographs -

Pollen grains and flocs of organic and inorganic material are frequent in this sample.

Station MC-4: 520 (82-03512)

SPM conc. = 1.077 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 40

Description from SEM micrographs -

Numerous individual grains with flocs and agglomerates are noticed in this sample as well as mucoids, parts of fecal pellets and diatoms.



Station MC-6:1 m (82-03485)

SPM conc. = 0.734 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 41

Description from SEM micrographs -

Silicoflagellates, diatoms, biogenic flocs and agglomerates are abundant in this sample. There are also dry-looking mucoids with very few inclusions.

Station MC-6: 5 m (82-03484)

SPM conc. = 1.352 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 42

Description from SEM micrographs -

This sample is very similar to the 1 m depth sample (82-03485). There are slightly less amounts of chain diatoms but numerous needles are present probably from diatoms. No photos were saved.

Station MC-6: 10 m (82-03483)

SPM conc. = 0.632 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 43

Description from SEM micrographs -

Many diatom chains and other organic matter are present in this sample. Numerous flocs, agglomerates, pellets, micas and quartz are also noticed. Scaly-looking mucoids and 30µm clay flocs are found as well.

Station MC-6: 20 m (82-03482)

SPM conc. = 0.541 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 44

Description from SEM micrographs -

Numerous chain diatoms are seen in this sample. Grains appear to be trapped along filaments. Fecal pellets are present but sparse. Huge agglomerates with clays and organics are also found.

Station MC-6: 30 m (82-03481)

SPM conc. = 0.741 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 45

Description from SEM micrographs - no general description

Station MC-6: 50 m (82-03480)

SPM conc. = 0.417 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 46

Description from SEM micrographs -

This sample consists of many individual particles of an iron-rich mineral (probably magnetite), plagioclase and quartz. Some silicoflagellates and diatoms are found

along with a few fecal pellets. Some fibres or filaments (diatoms possibly) are present in small amounts as well as pico-plankton. No photos were taken.

Station MC-6: 100 m (82-03479)

SPM conc. = 0.384 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 47

Description from SEM micrographs -

This sample is generally composed of individual grains and particles of various sizes with numerous chain diatoms and mucoids.

Station MC-7: 10 m (82-03529)

SPM conc. = 1.324 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 48

Description from SEM micrographs -

There are numerous organics in this sample along with perfectly preserved concentric diatoms. Chain and pennate diatoms are abundant as well as spines of all shapes and sizes. Zooplankton appendages and mucoids which enclose small particles are also present.

Station MC-7: 30 m (82-03527)

SPM concentration = 1.404 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 49

Description from SEM micrographs -

More organic material in this sample and a few agglomerates of mucoids with diatom material and clays. There is a large grain 100µm in size containing only iron. There are numerous diatoms, pico-plankton and a large chain diatom measuring 600µm. No photos were taken.

Station MC-7: 100 m (82-03525)

SPM conc. = 0.502 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 50

Description from SEM micrographs -

Sample is very low in concentration. Fecal pellets, flocs, agglomerates of diatoms, small individual particles and chain diatoms are seen.

Station MC-7: 490 m (82-03522)

SPM conc. = 0.783 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 51

Description from SEM micrographs -

This sample consists of individual organic and inorganic particles of various sizes. Flocs of clays (micas) are present along with fecal pellets. Mucoids are either totally devoid of particles or may be filled with organic and inorganic particles of clays or diatoms. There are also thick chain diatoms present.

Station MC-8: 10 m (82-03539)

SPM conc. = 0.953 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 52

Description from SEM micrographs -

This sample is littered with chain and concentric diatoms and mucoids.

Station MC-8: 75 m (82-03535)

SPM conc. = 0.550 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 53

Description from SEM micrographs -

This sample is mainly small mucoids and individual particles, however, fecal pellets (30µm), concentric diatoms, pico-plankton and diatom needles are also present.

Station MC-8: 287 m (82-03532)

SPM conc. = 1.090 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 54

Description from SEM micrographs -

This sample is abundant with individual particles, a few chain diatoms, several mucoids, flocs containing both organic and inorganic material, pico-plankton, K-feldspar, micas (biotite) and quartz (30-60µm).

Station MC-9: 10 m (82-03473)

SPM conc. = 0.711 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 55

Description from SEM micrographs -

Biogenics, chain diatoms of all types, stringers, pennate diatoms, silicoflagellates, dinoflagellates and fecal pellets are all found in this sample. A few mucoids, biogenic flocs and silt grains are also present.

Station MC-9: 200 m (82-03467)

SPM conc. = 1.846 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 56

Description from SEM micrographs -

This sample includes a wide variety of particles and organisms. Chain diatoms, biogenic remnants, small (< 10µm) particles, mucoids, flocs of debris (diatoms), clays, pennate diatoms, concentric diatoms and silicoflagellates are all present. Small plant and diatom debris of < 30µm are also seen.

Station MC-11: 1 m (82-03465)

SPM conc. = 0.657 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 57

Description from SEM micrographs -

Numerous biogenics, chain and pennate diatoms, needles and spicules (sponges) are seen. Small individual grains and flocs are noticed along with plant debris and mucoids. Some mucoids are filled with biogenic material. Silt grains are present but in rare quantities.

Station MC-11: 10 m (82-03463)

SPM conc. = 1.546 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 58

Description from SEM micrographs -

Numerous diatoms and individual grains are seen in this sample. Some concentric diatoms are as large as 100 µm. Small grains of NaCl are common along with flocs.

Station MC-11: 50 m (82-03460)

SPM conc. = 8.080 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 59

Description from SEM micrographs -

This samples high concentration may be due to salt contamination. The sample consists of small clay flocs and individual particles. There are a few organics (plant remains), silicoflagellates, concentric diatoms and pico-plankton. Interpretation was difficult due to contamination of large salt grains (NaCl), thus, no photos were taken.

Station MC-11: 200 m (82-03457)

SPM conc. = 1.393 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 60

Description from SEM micrographs -

Small individual particles, small to large clay flocs, biogenic debris, concentric and pennate diatoms, silicoflagellates and mucoids are all present in this sample. Dinoflagellates and elongated round diatoms are also seen.

Station MC-11: 241 m (82-03456)

SPM conc. = 3.824 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 61

Description from SEM micrographs -

Numerous silt grains of 100µm or more are present. Consolidated flocs and individual particles are also abundant. There are remnant biogenics including concentric diatoms, silicoflagellates and mucoids.

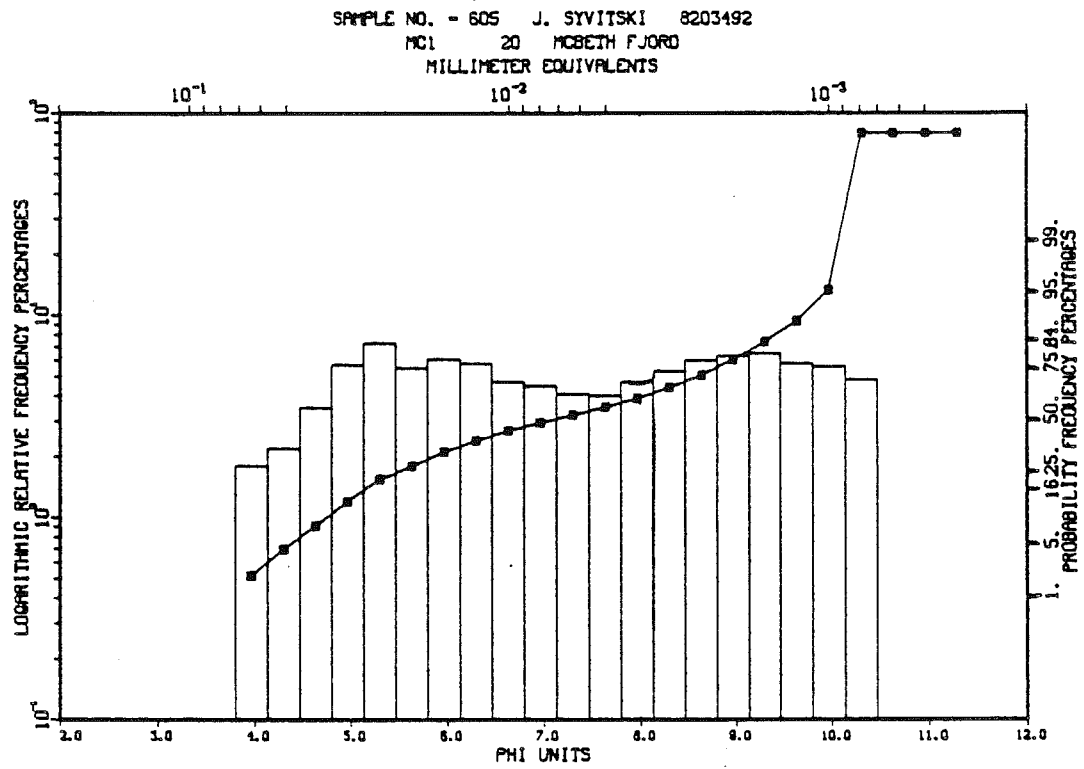


Fig. 28

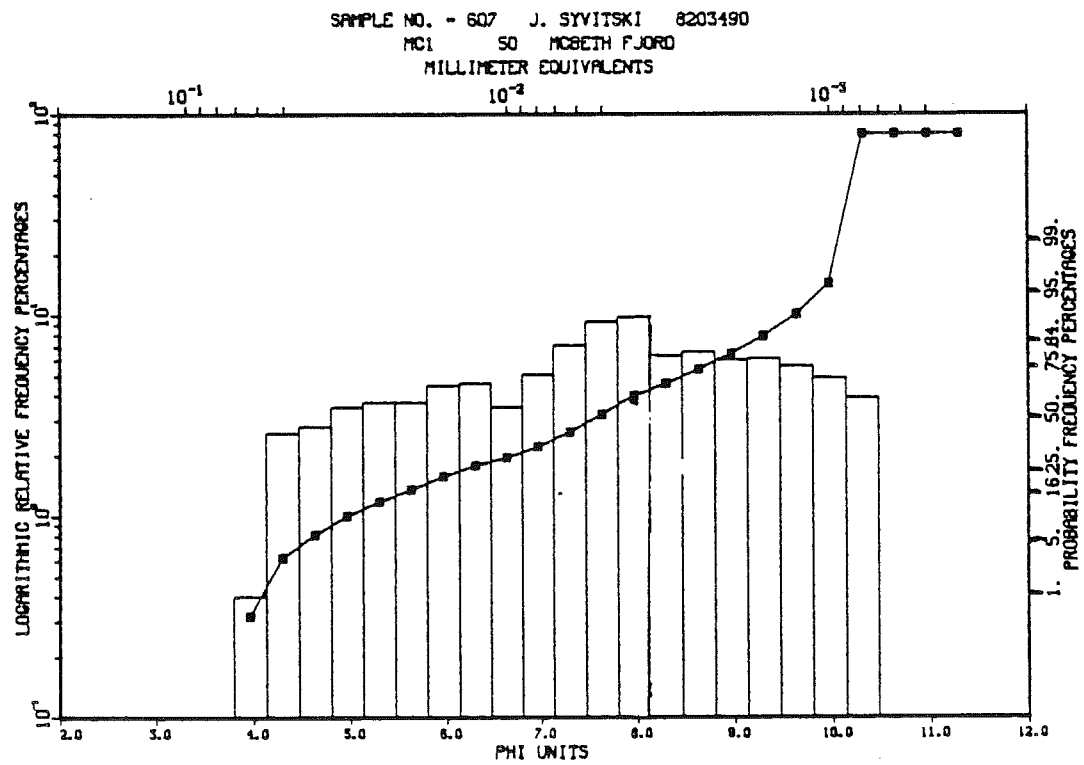


Fig. 29

SAMPLE NO. - 611 J. SYVITSKI 8203486  
 MC1 312 MCBETH FJORD  
 MILLIMETER EQUIVALENTS

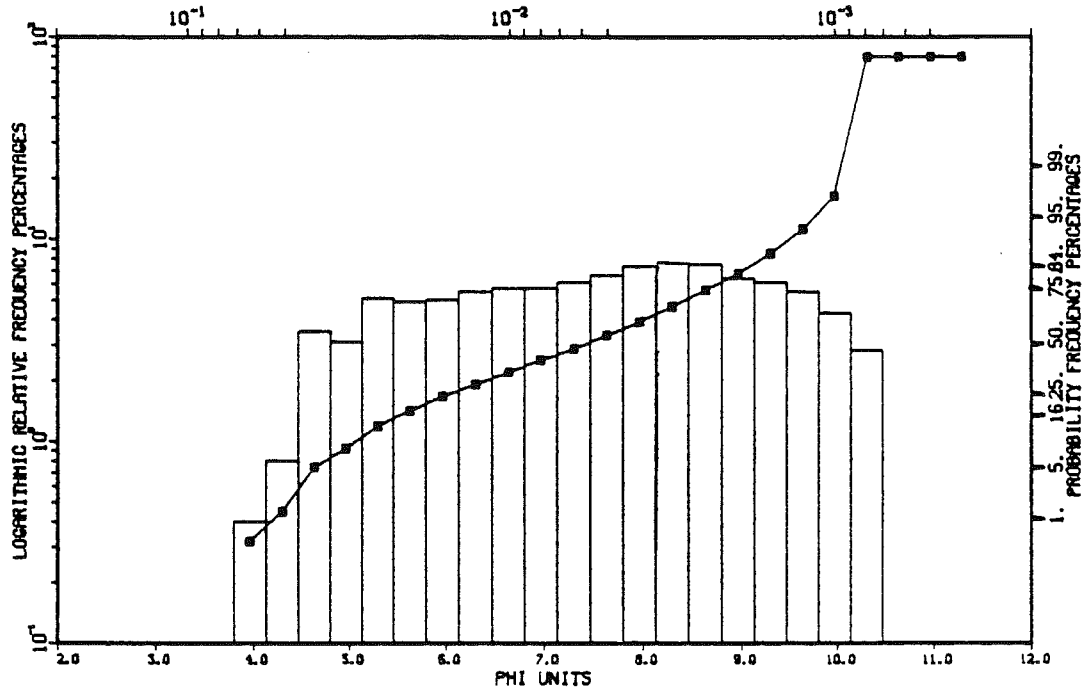


Fig. 30

SAMPLE NO. - 614 J. SYVITSKI 8203508  
 MC3 10 MCBETH FJORD  
 MILLIMETER EQUIVALENTS

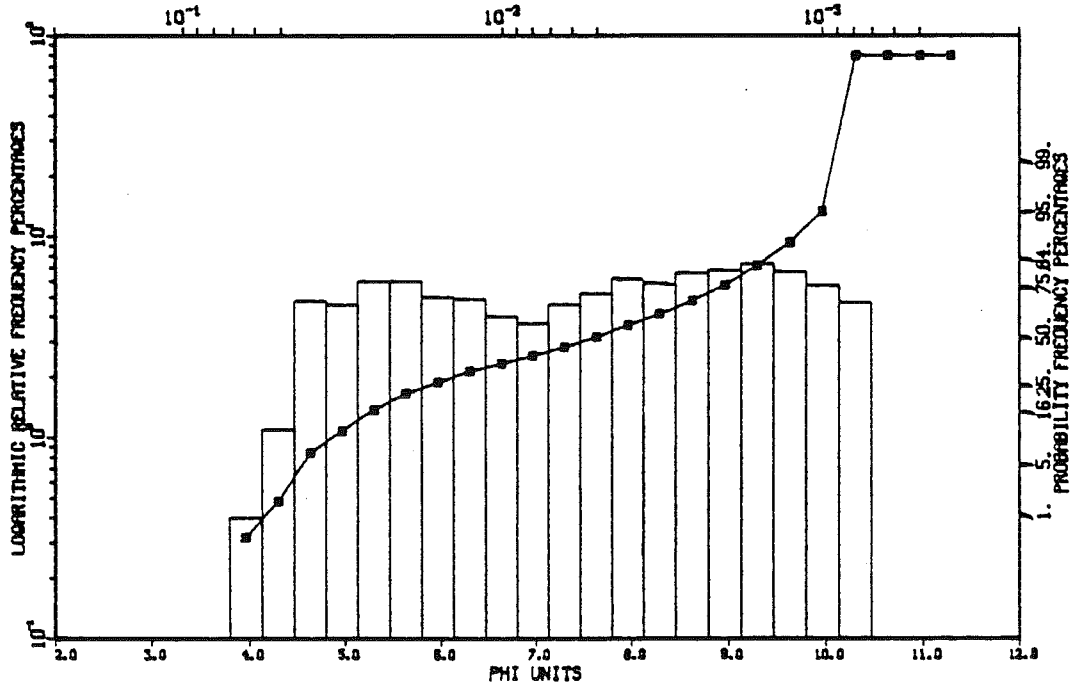


Fig. 31



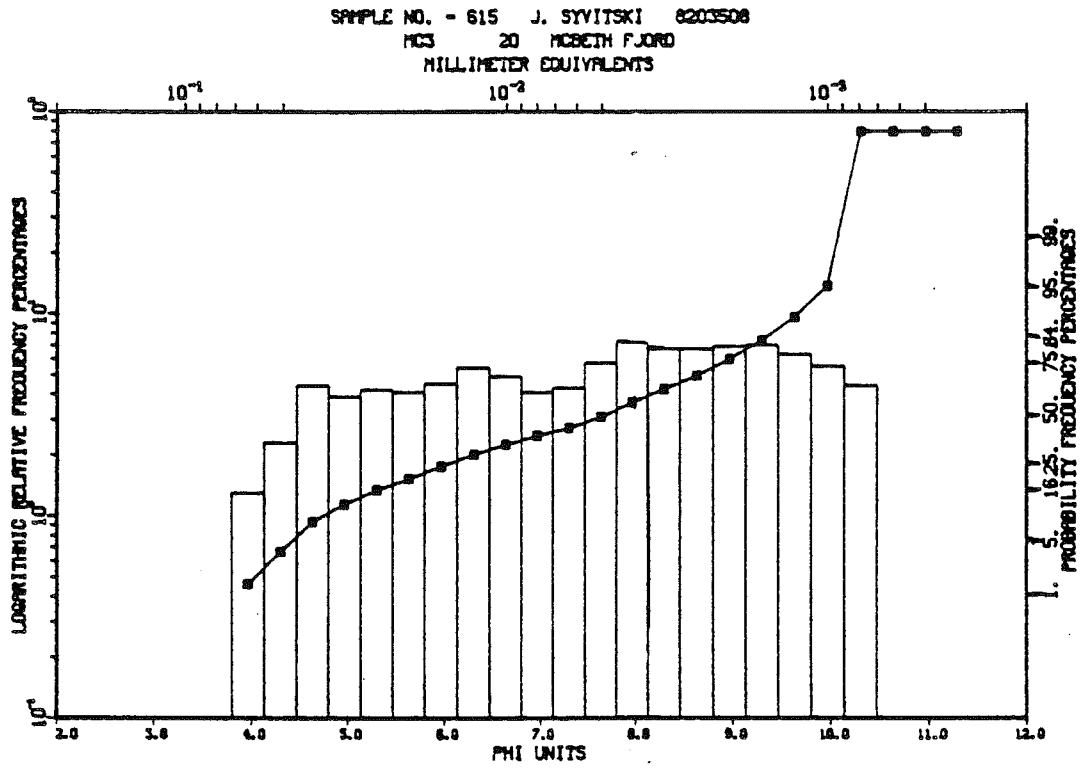


Fig. 32

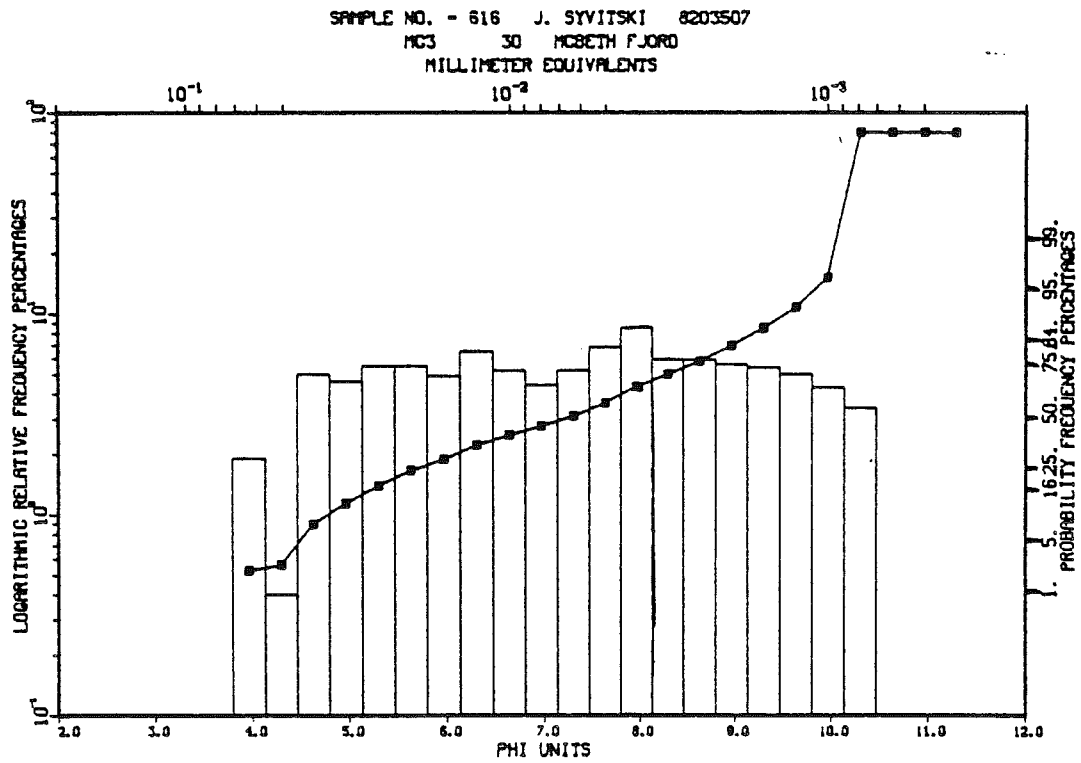


Fig. 33

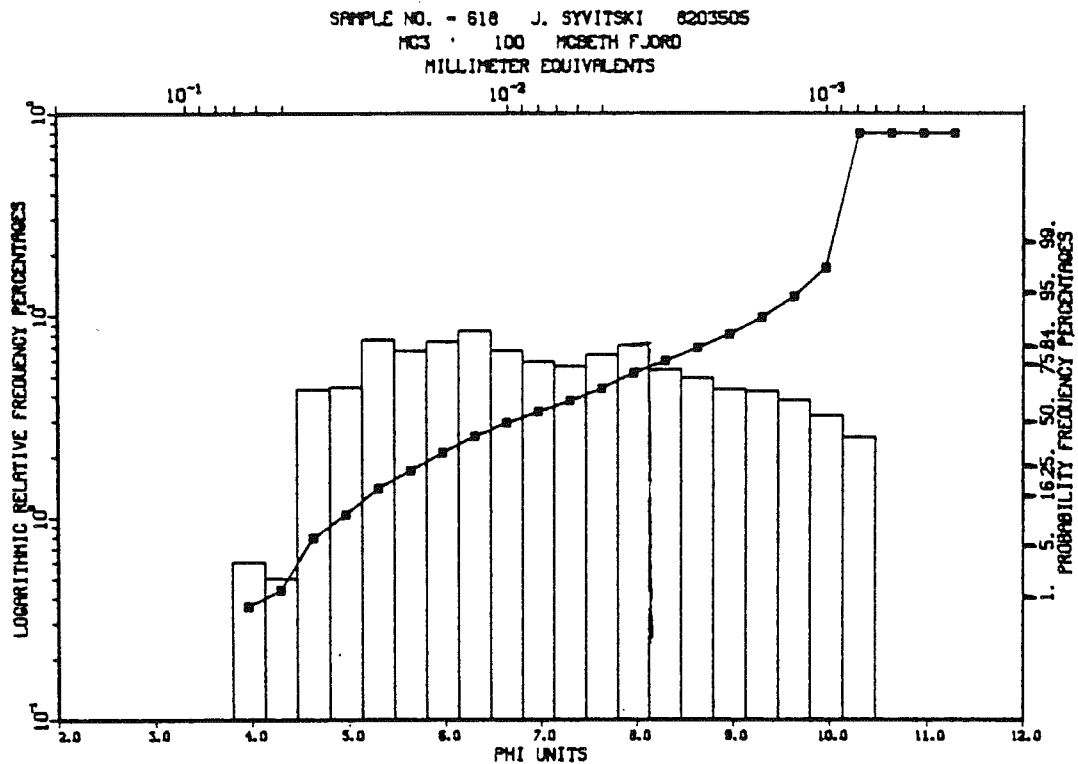


Fig. 34

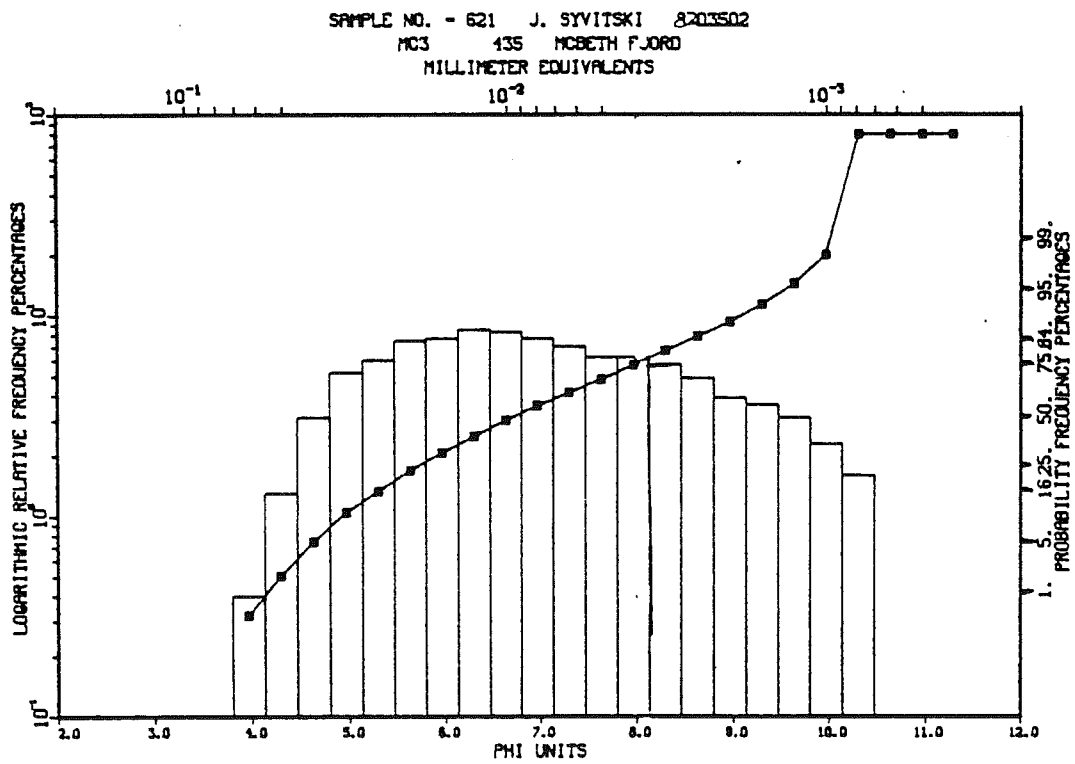


Fig. 35

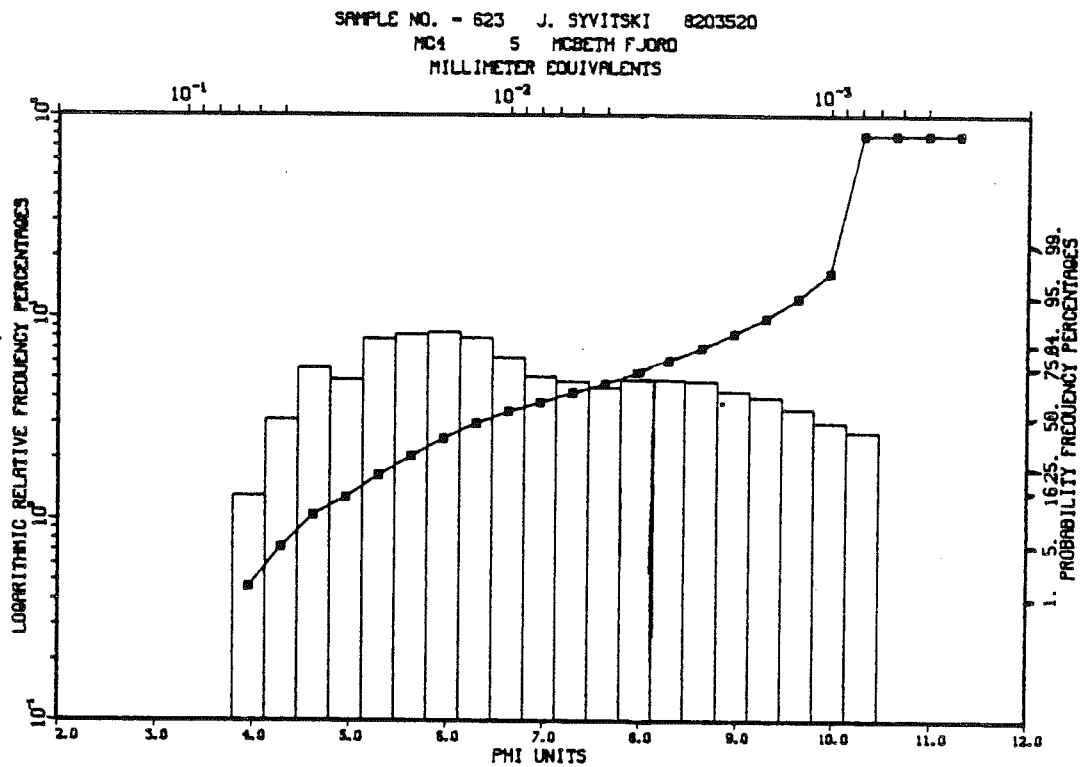


Fig. 36

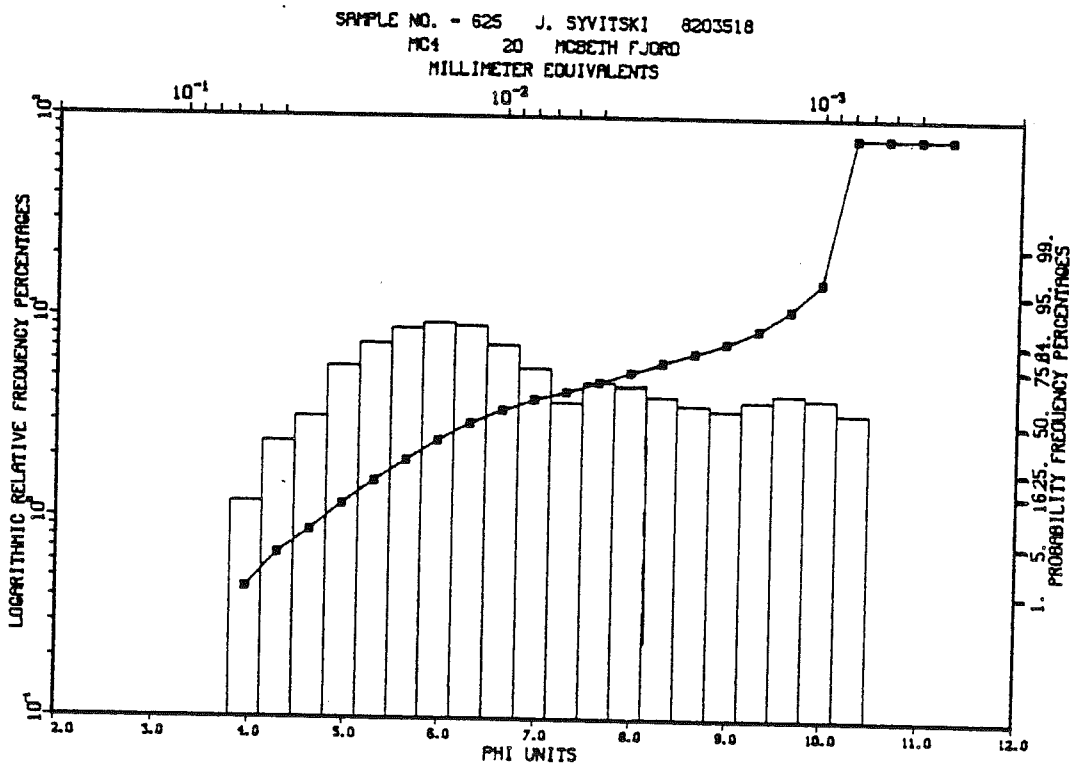


Fig. 37

SAMPLE NO. - 626 J. SYVITSKI 8203517  
 MC4 30 HOBETH FJORD  
 MILLIMETER EQUIVALENTS

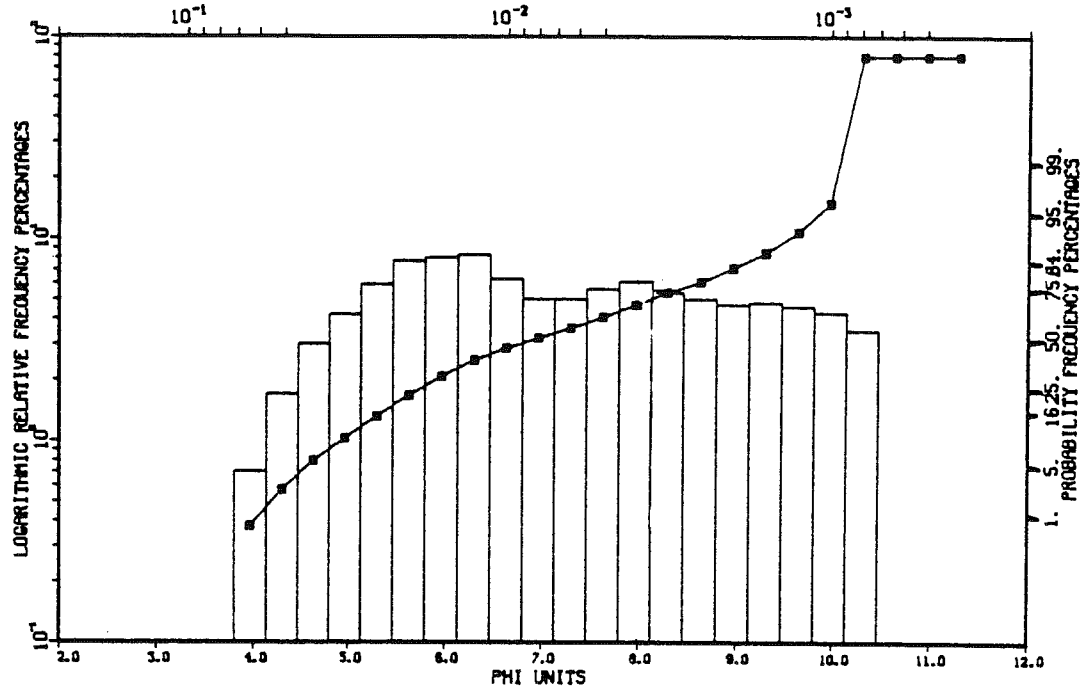


Fig. 38

SAMPLE NO. - 629 J. SYVITSKI 8203514  
 MC4 200 HOBETH FJORD  
 MILLIMETER EQUIVALENTS

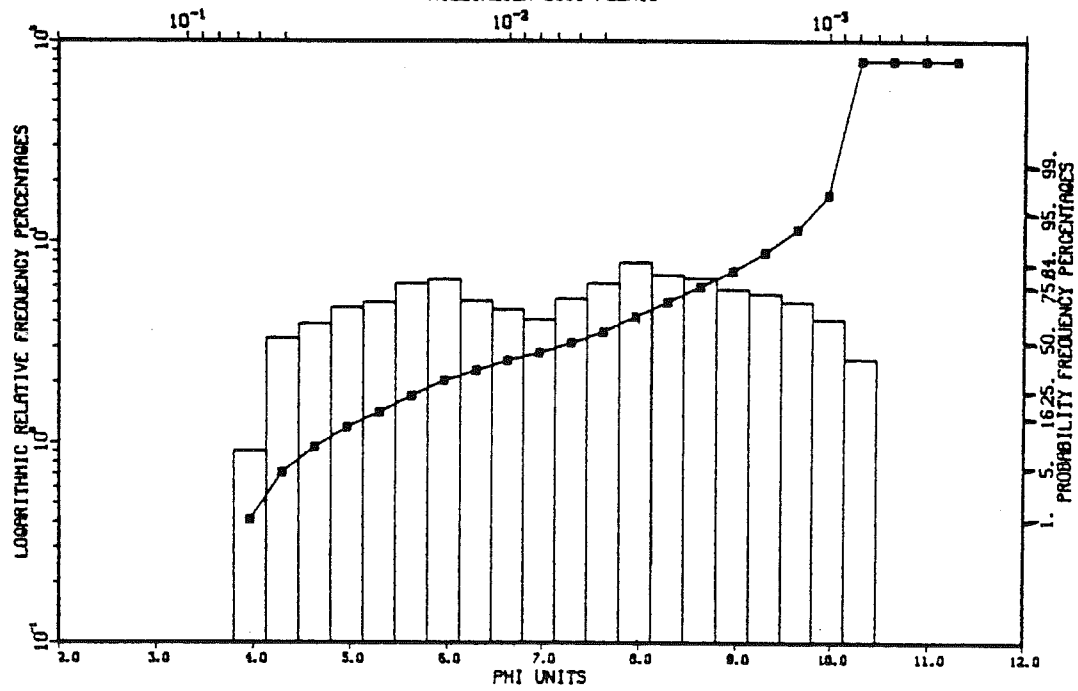


Fig. 39

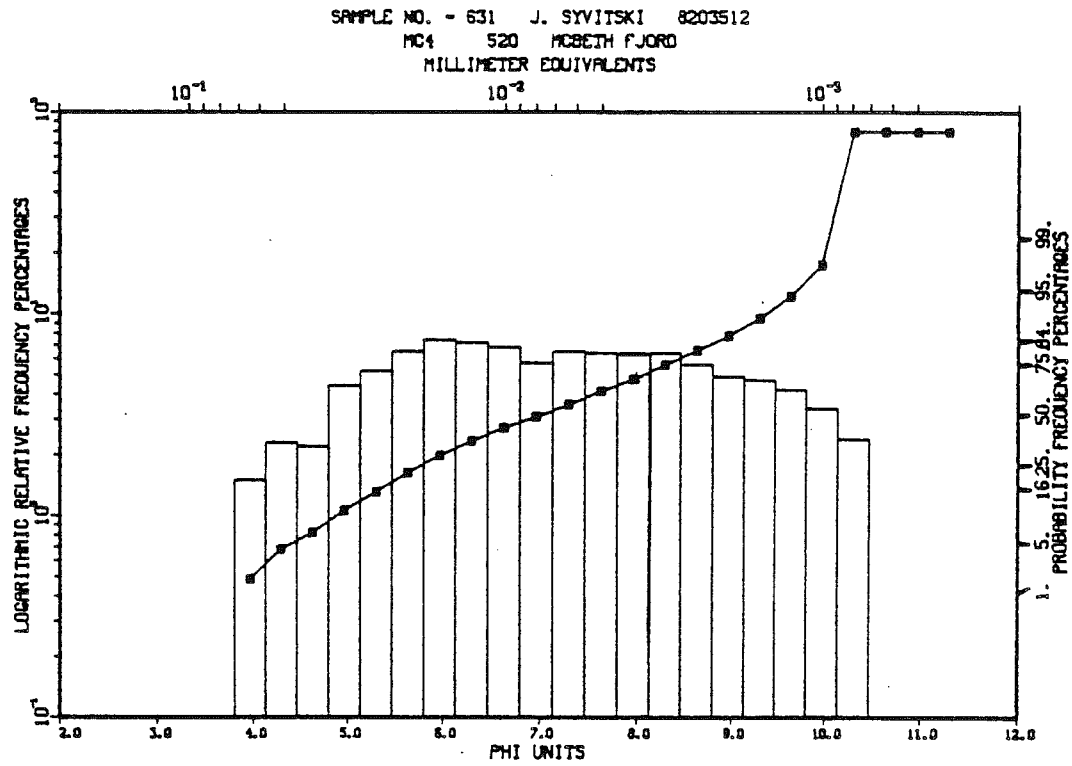


Fig. 40

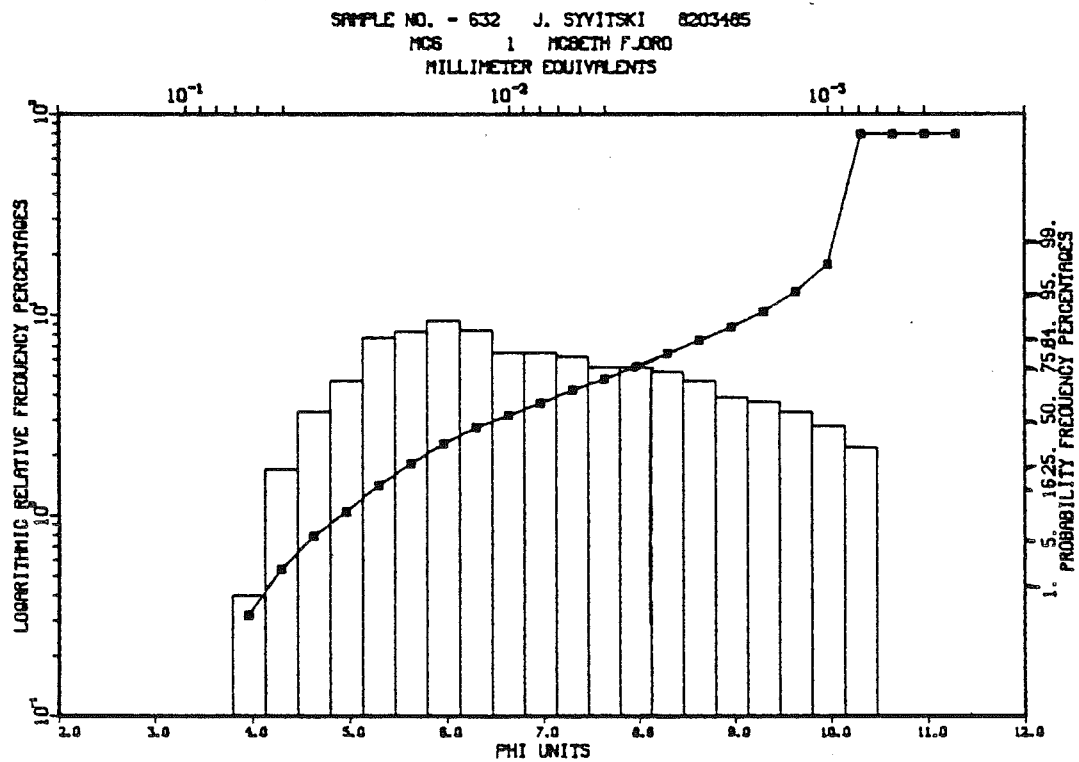


Fig. 41

SAMPLE NO. - 633 J. SYVITSKI 8203484  
HCS 5 HOBETH FJORD  
MILLIMETER EQUIVALENTS

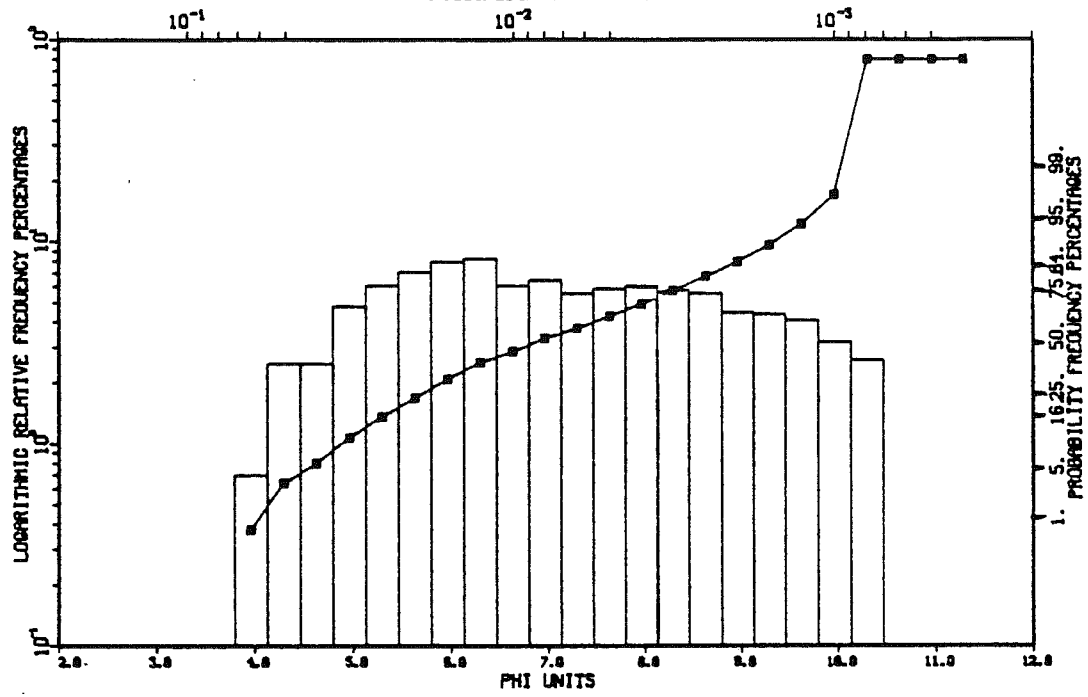


Fig. 42

SAMPLE NO. - 634 J. SYVITSKI 8203483  
HCS 10 HOBETH FJORD  
MILLIMETER EQUIVALENTS

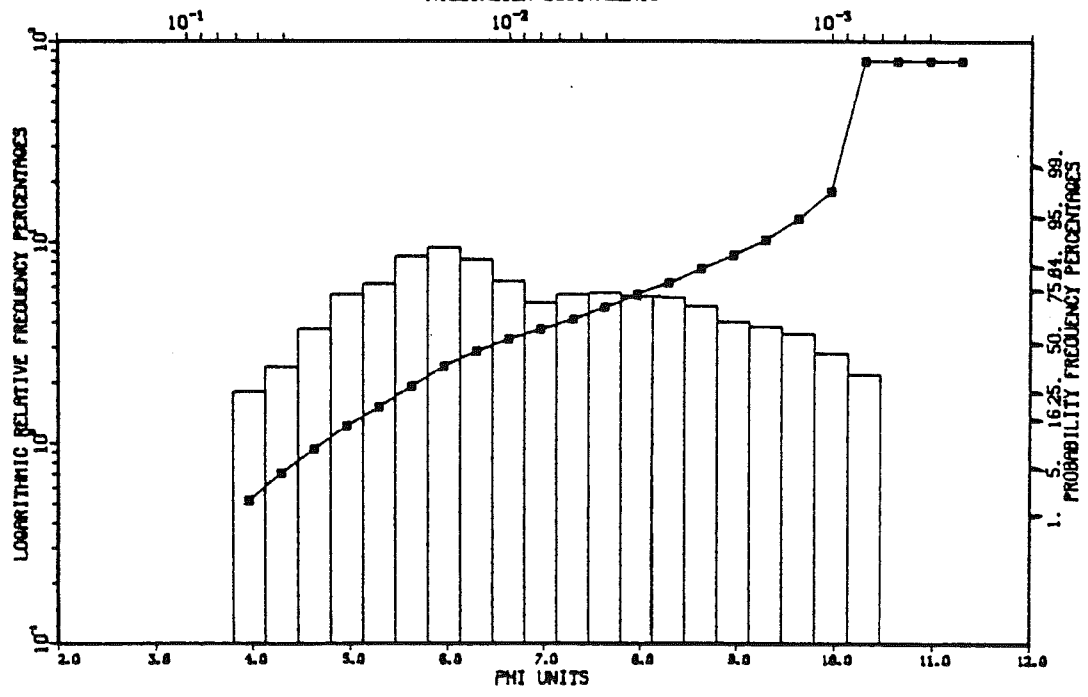


Fig. 43

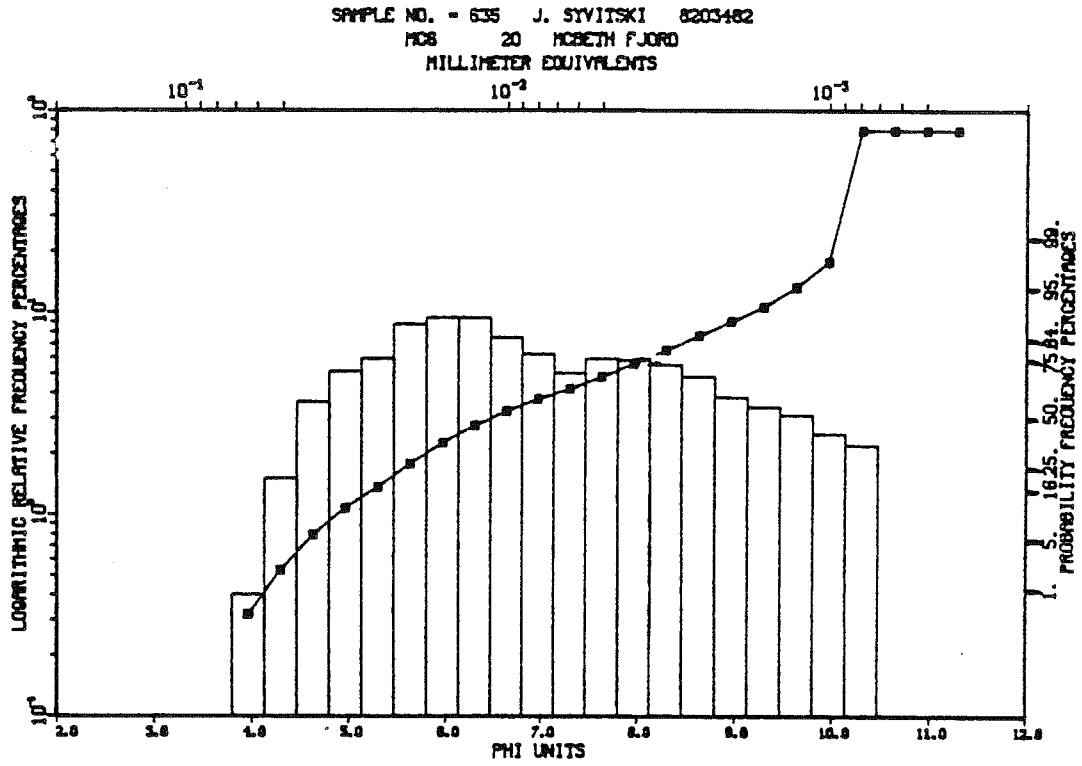


Fig. 44

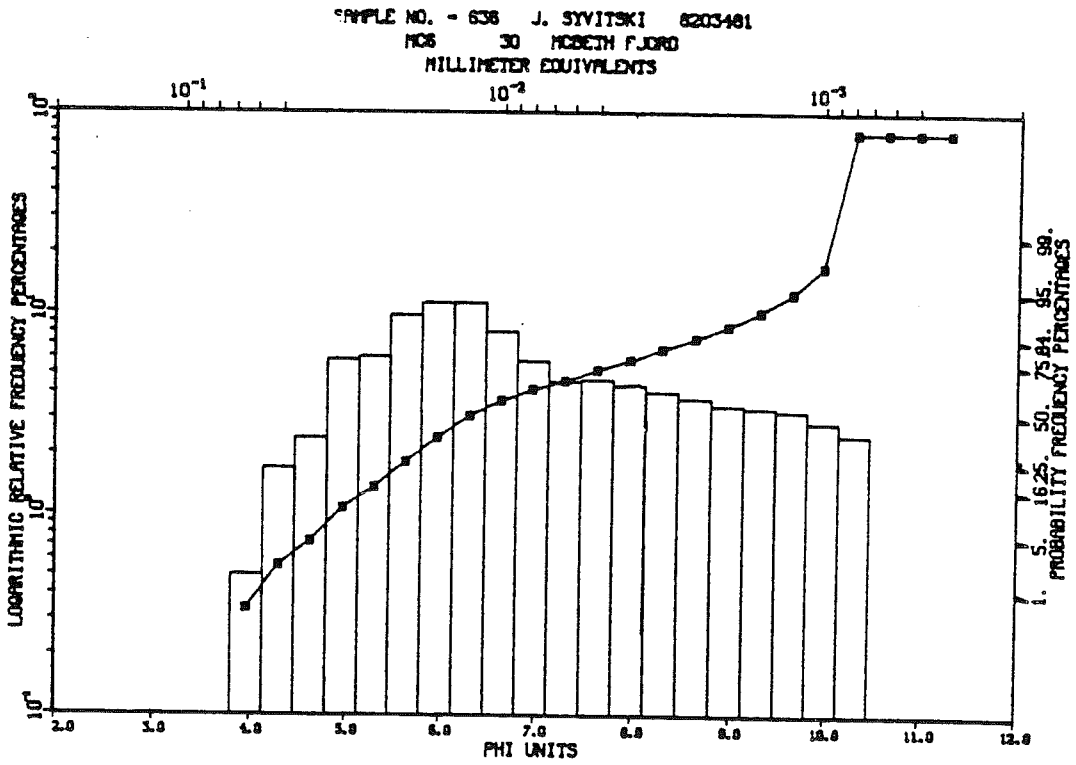


Fig. 45

SAMPLE NO. - 637 J. SYVITSKI 8203480  
MCS 50 MCSETH F.JORD  
MILLIMETER EQUIVALENTS

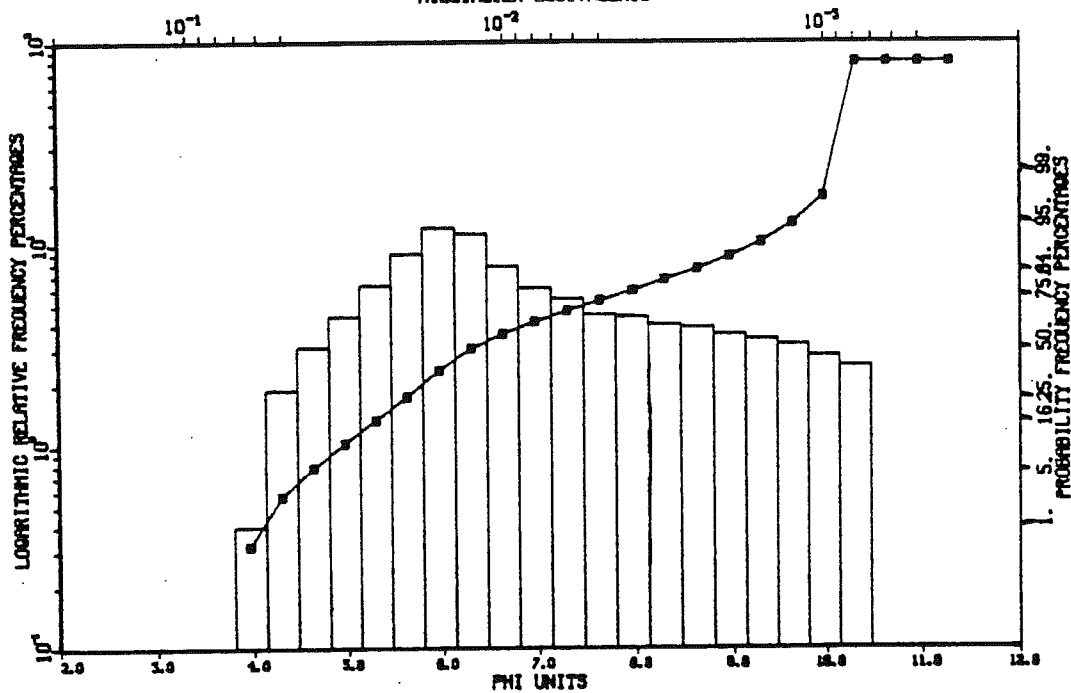


Fig. 46

SAMPLE NO. - 638 J. SYVITSKI 8203478  
MCS 100 MCSETH F.JORD  
MILLIMETER EQUIVALENTS

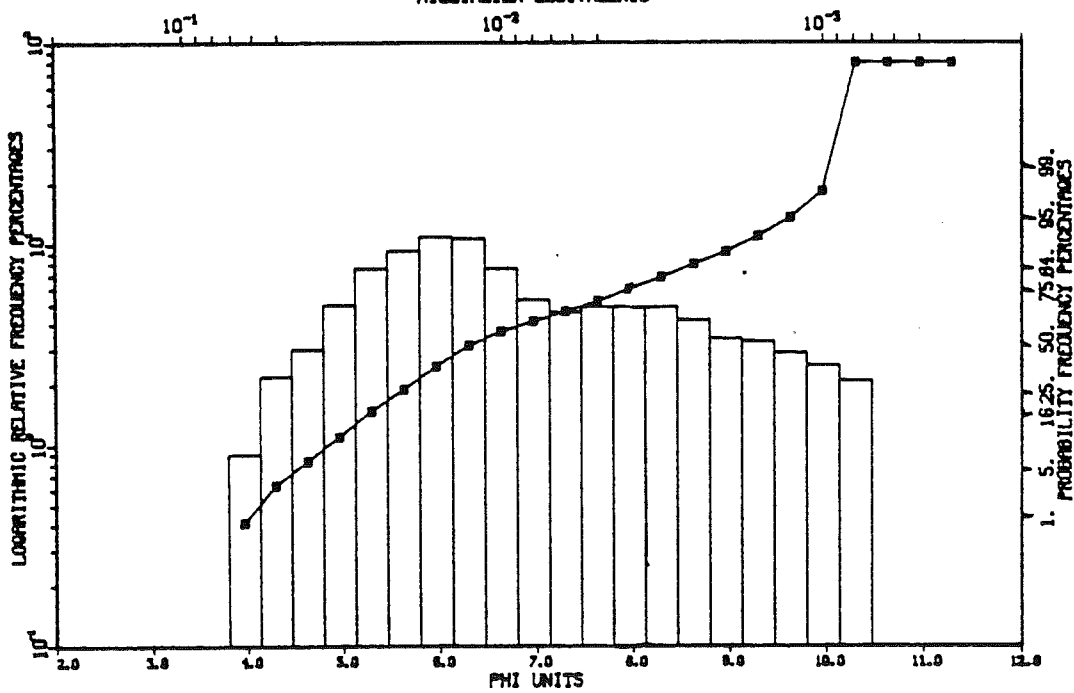


Fig. 47



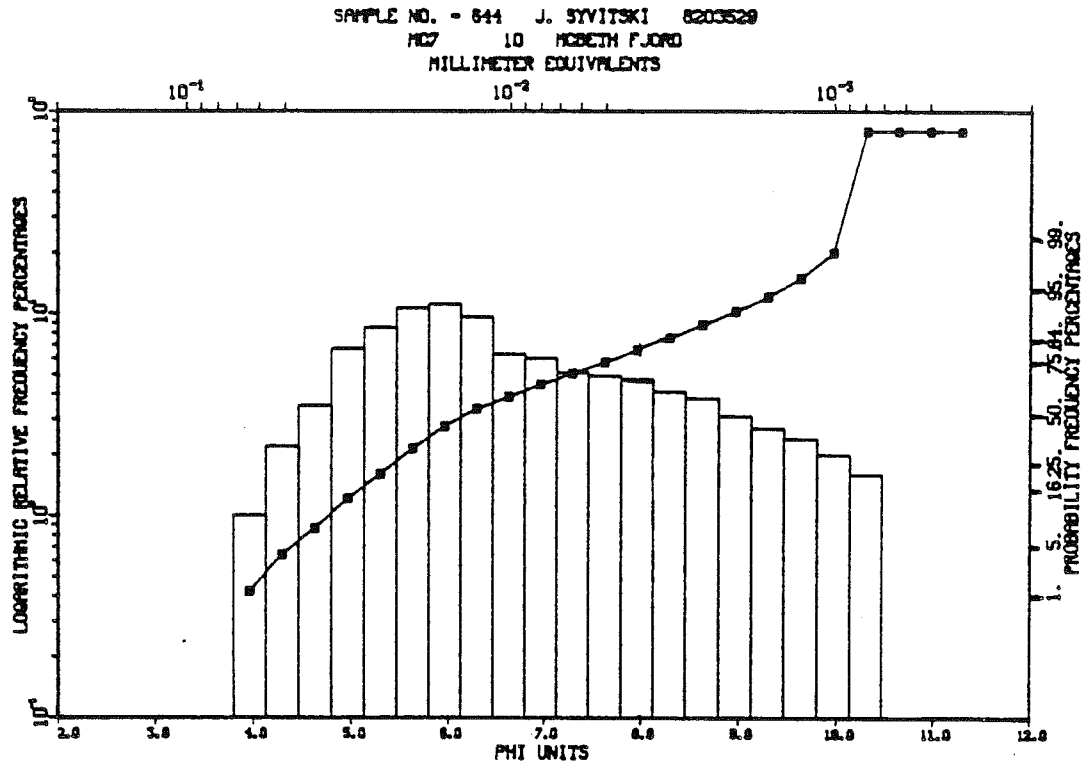


Fig. 48

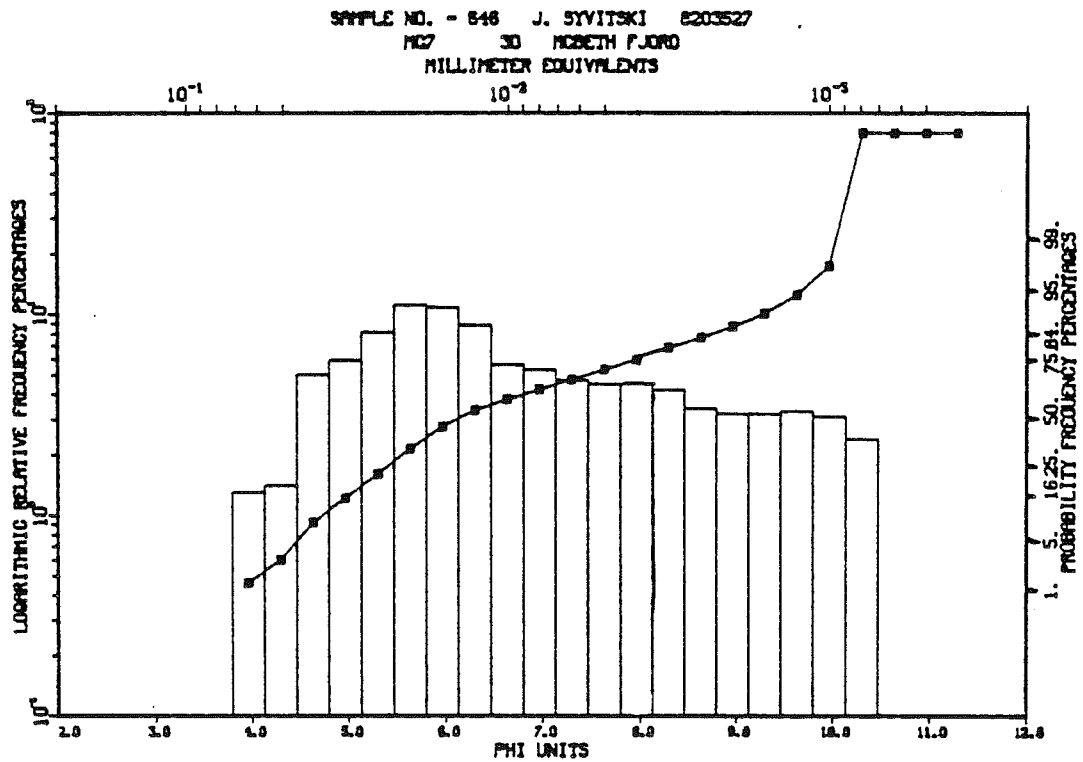


Fig. 49

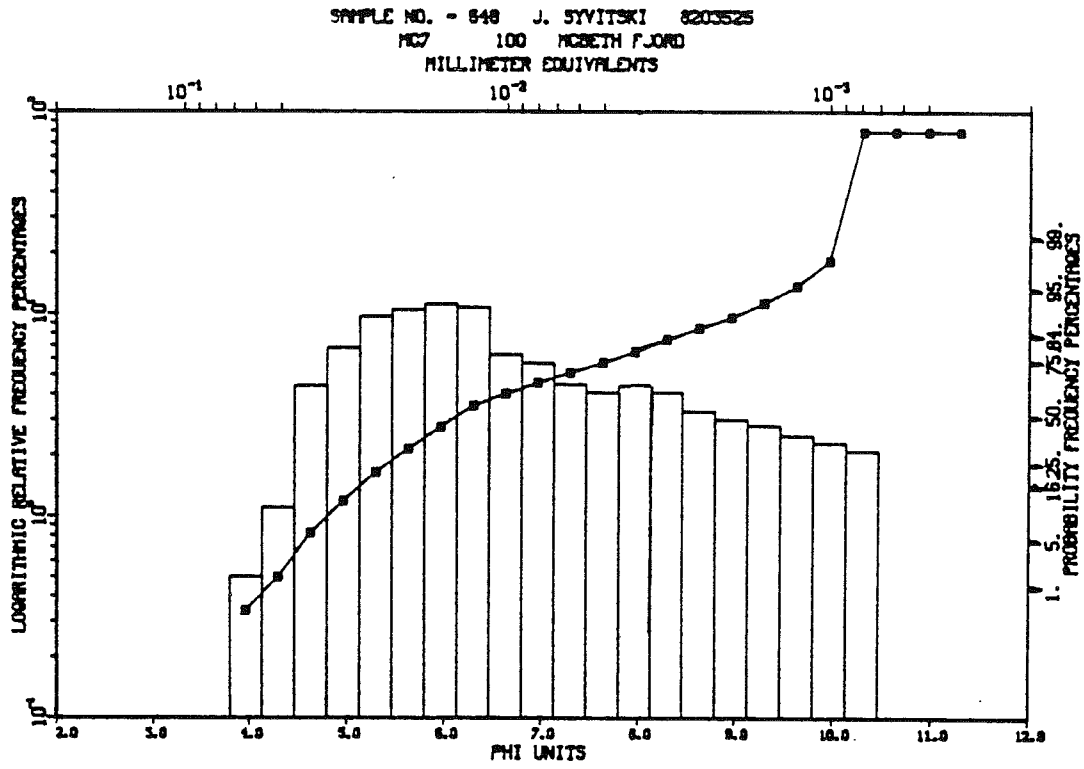


Fig. 50

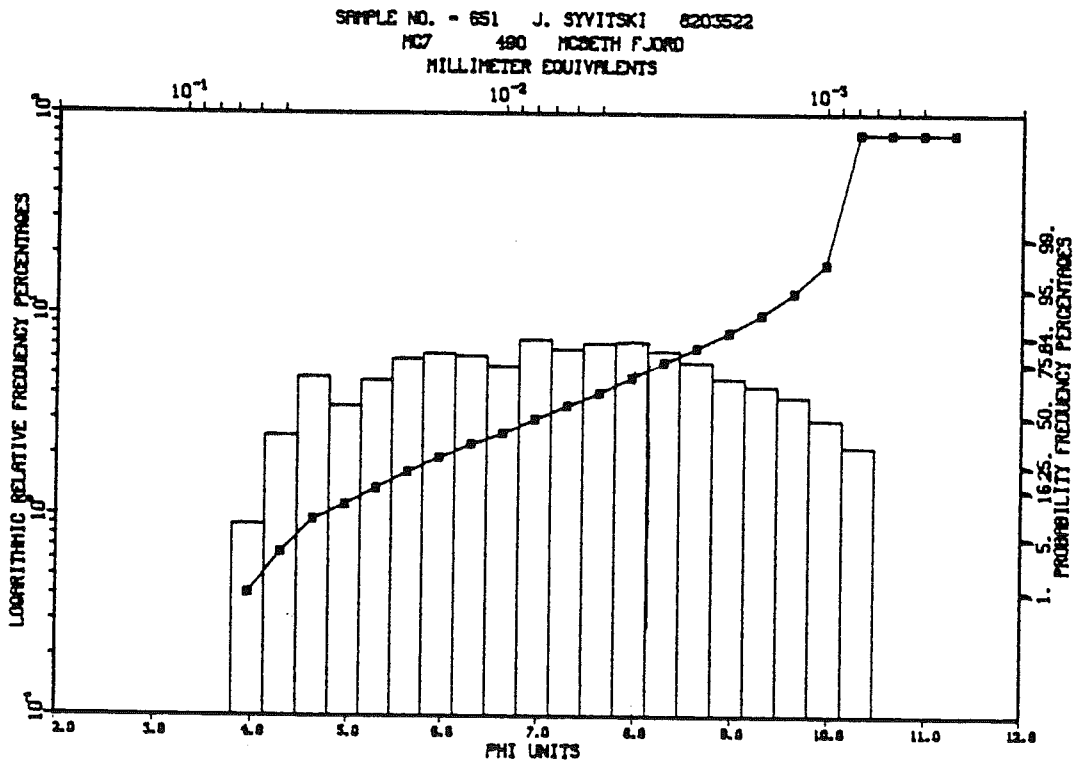


Fig. 51

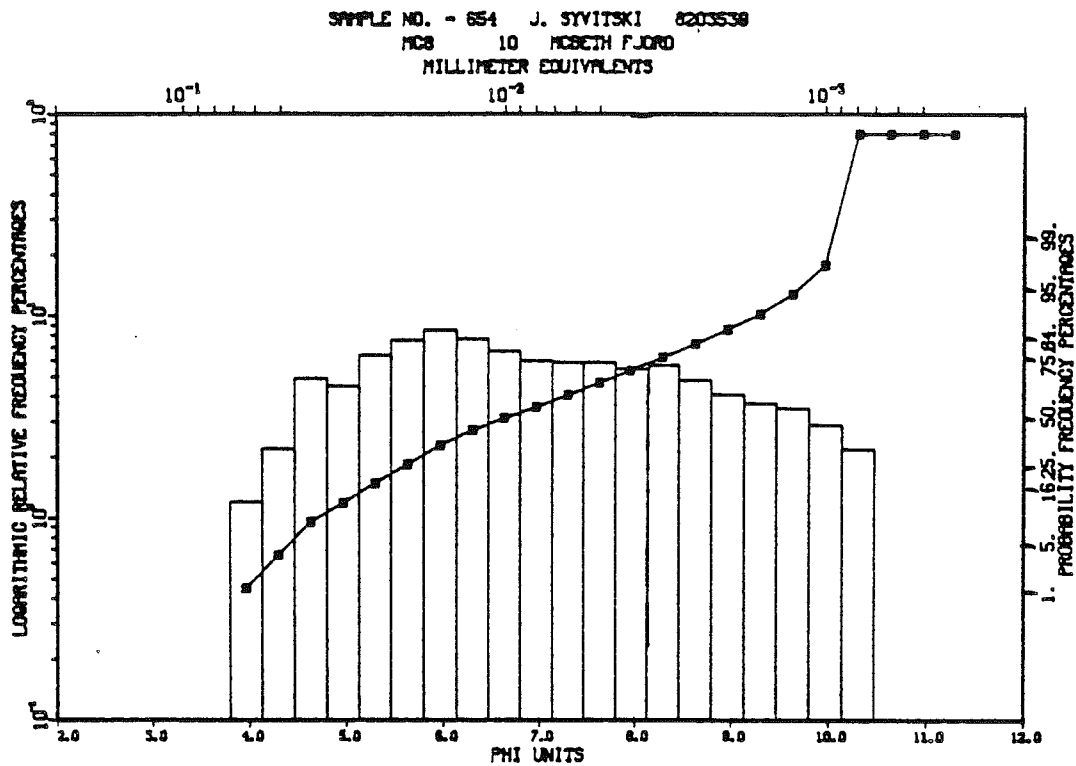


Fig. 52

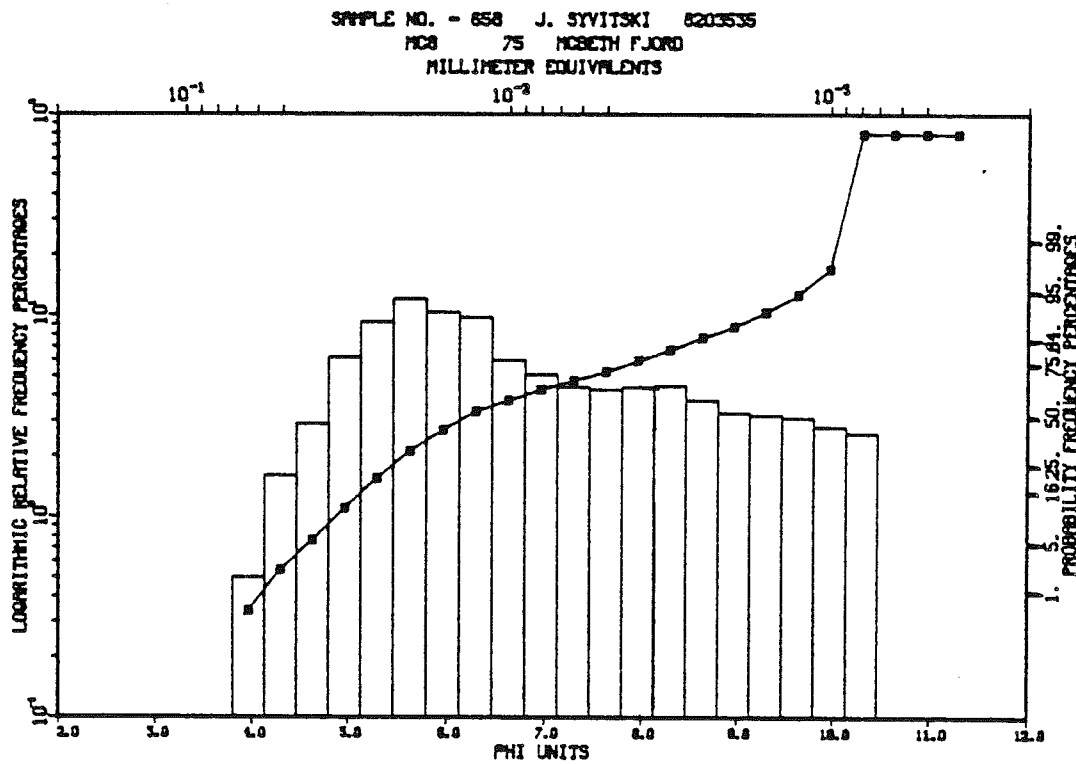


Fig. 53

SAMPLE NO. - 661 J. SYVITSKI 8203532  
MCS 287 MCBETH FJORD  
MILLIMETER EQUIVALENTS

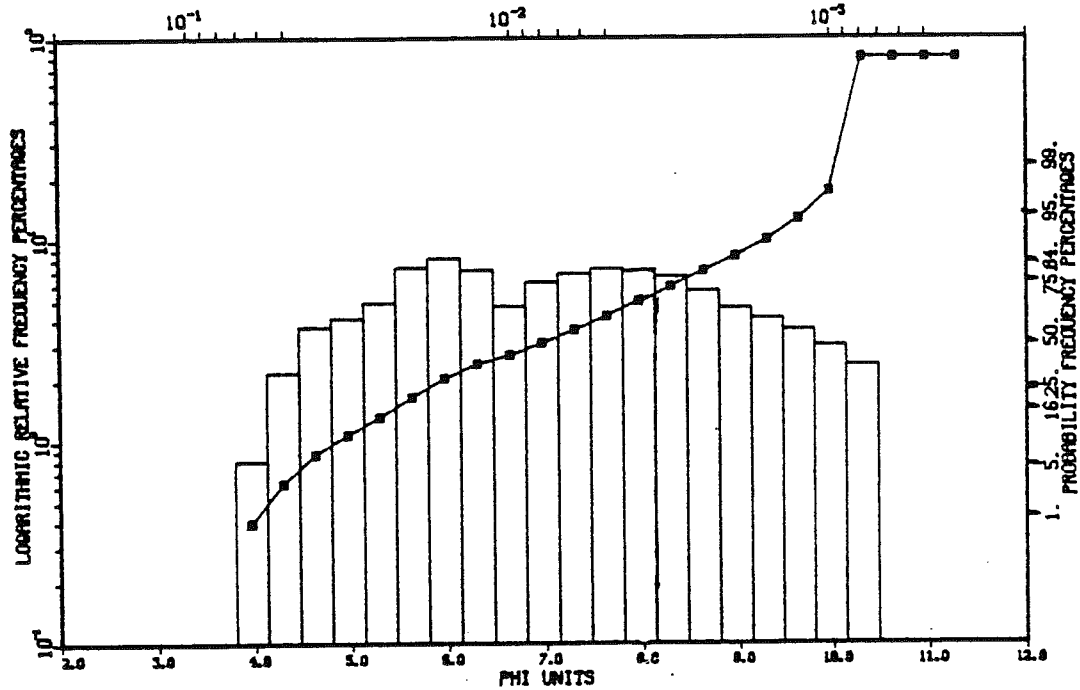


Fig. 54

SAMPLE NO. - 664 J. SYVITSKI 8203473  
MCS 10 MCBETH FJORD  
MILLIMETER EQUIVALENTS

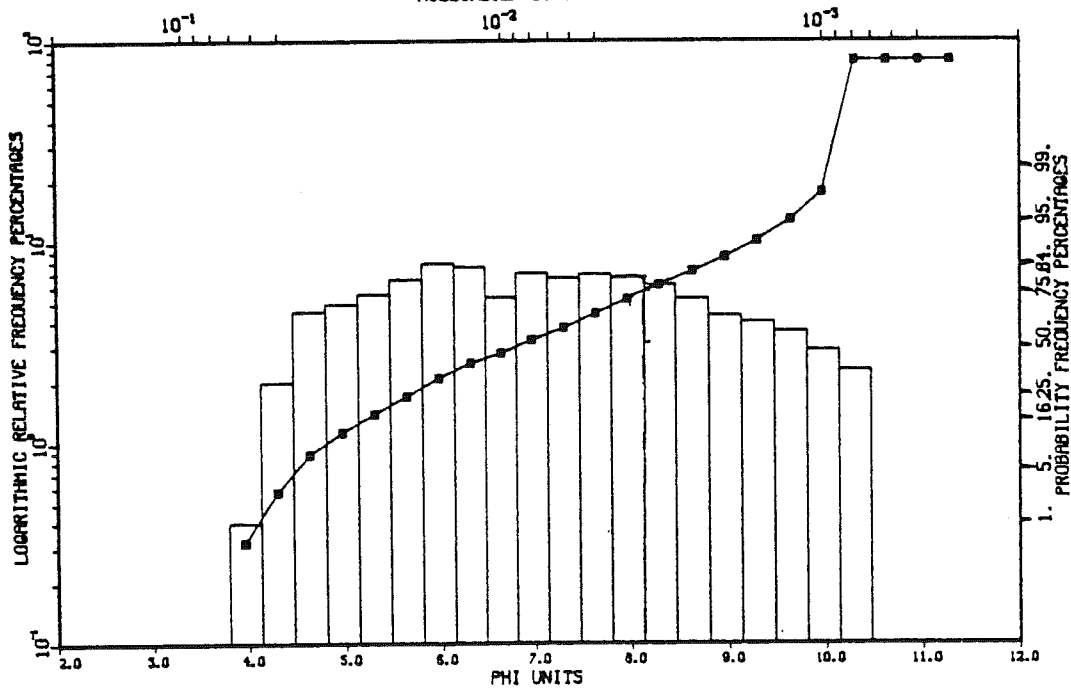


Fig. 55

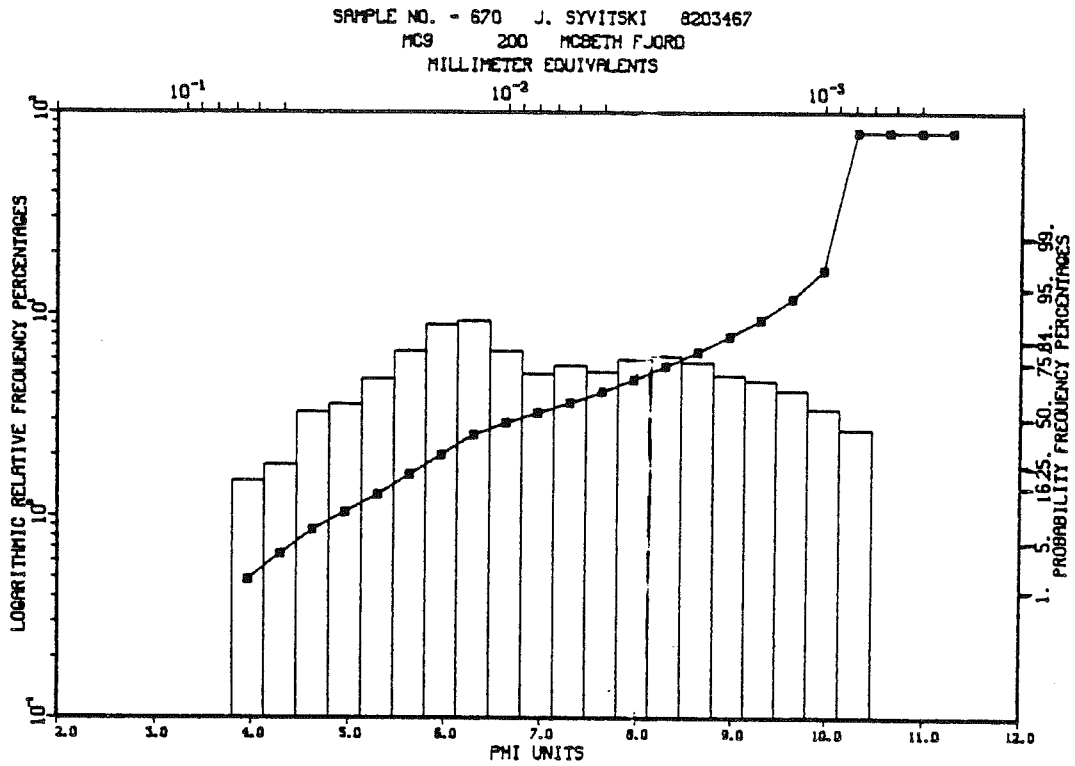


Fig. 56

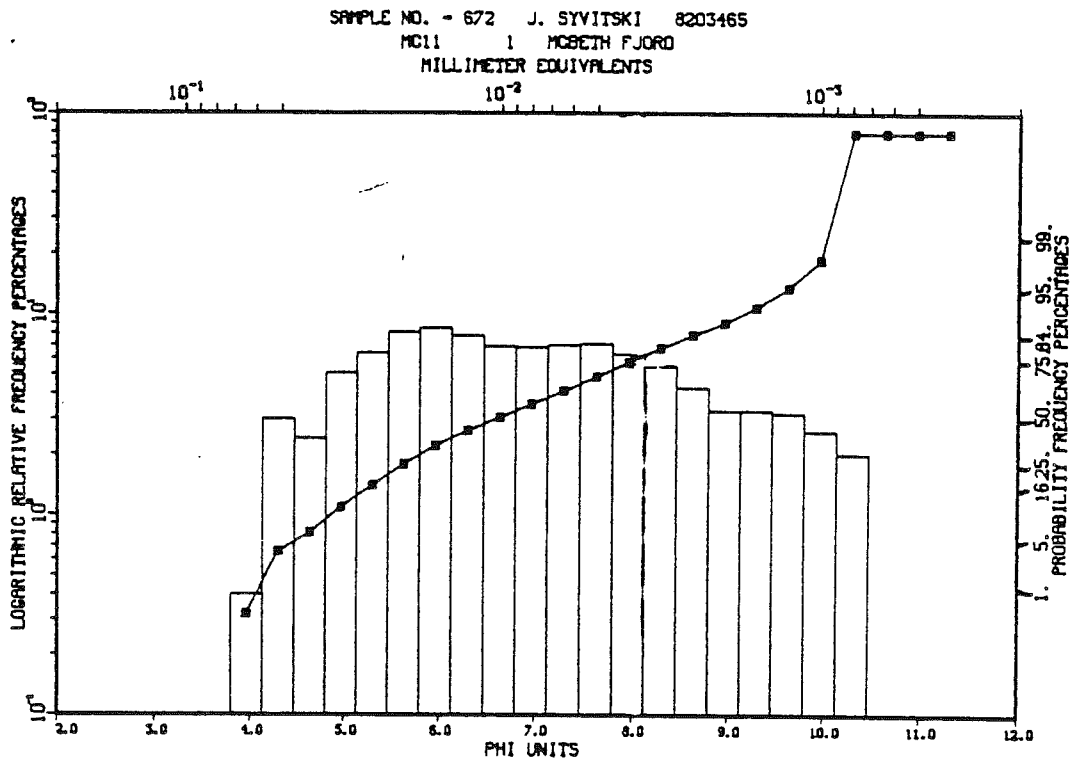


Fig. 57

SAMPLE NO. - 674 J. SYVITSKI 8203463  
 MC11 10 MCBETH FJORD  
 MILLIMETER EQUIVALENTS

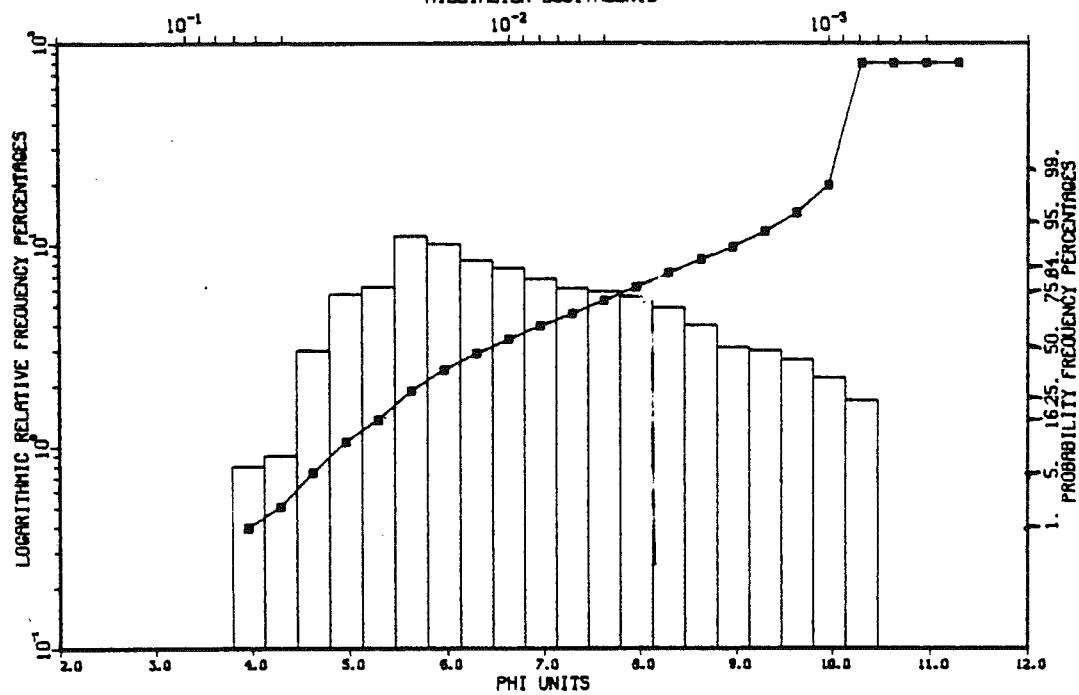


Fig. 58

SAMPLE NO. - 677 J. SYVITSKI 8203460  
 MC11 50 MCBETH FJORD  
 MILLIMETER EQUIVALENTS

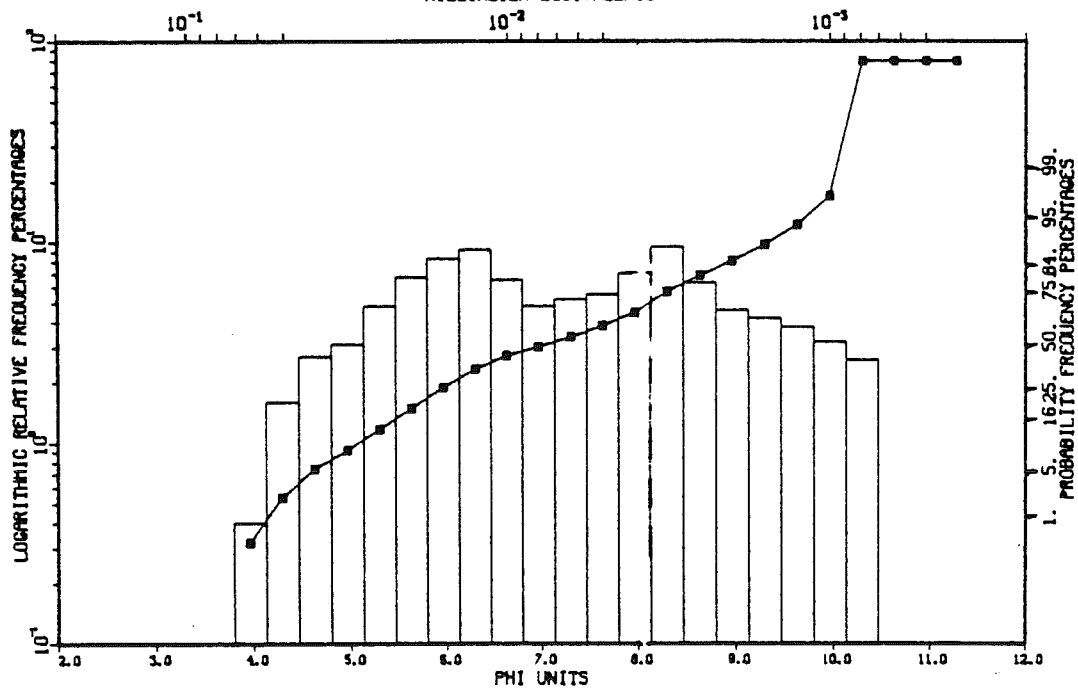


Fig. 59

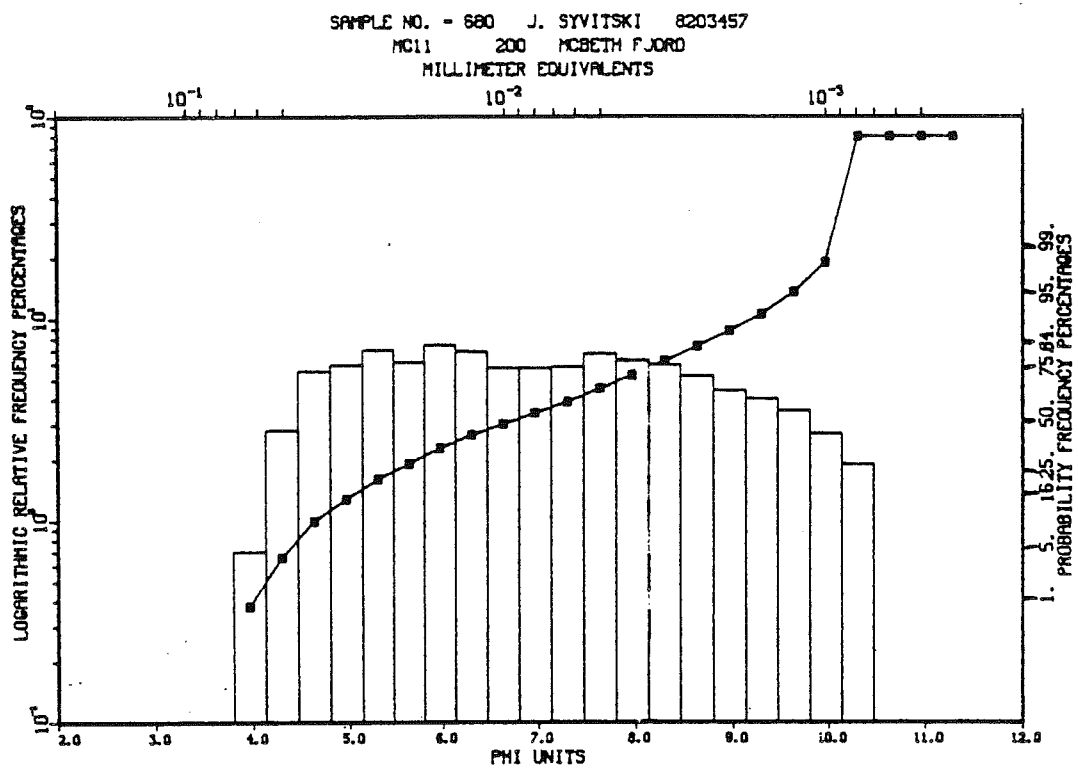


Fig. 60

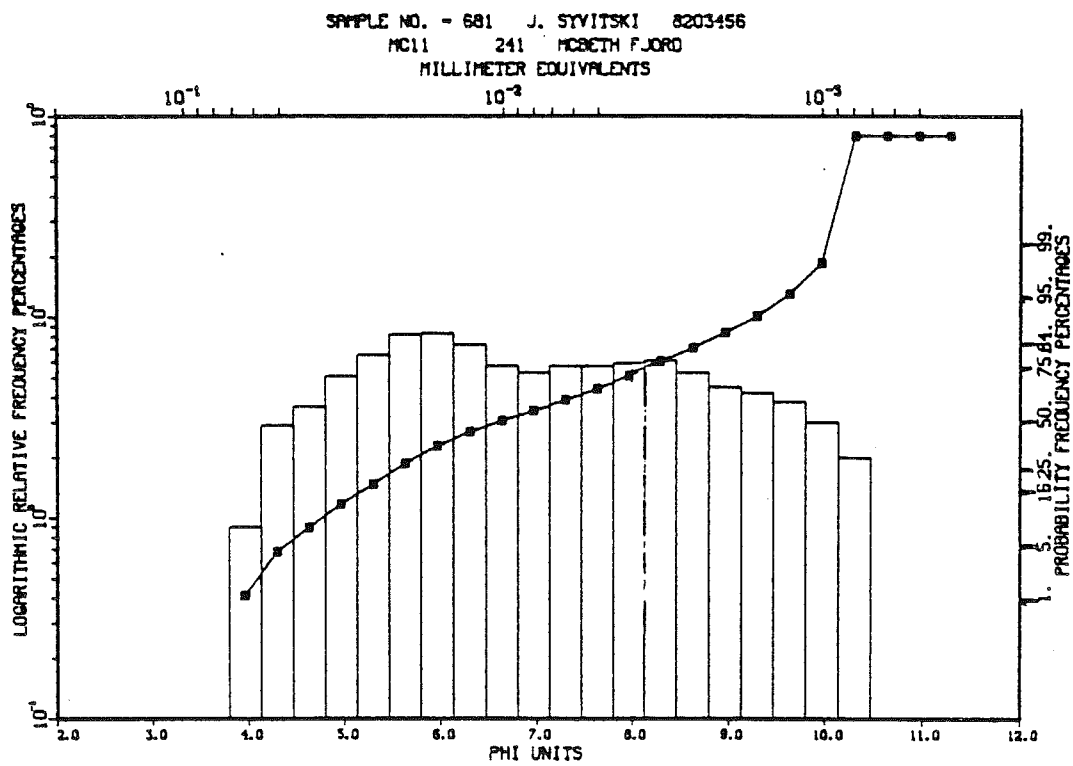
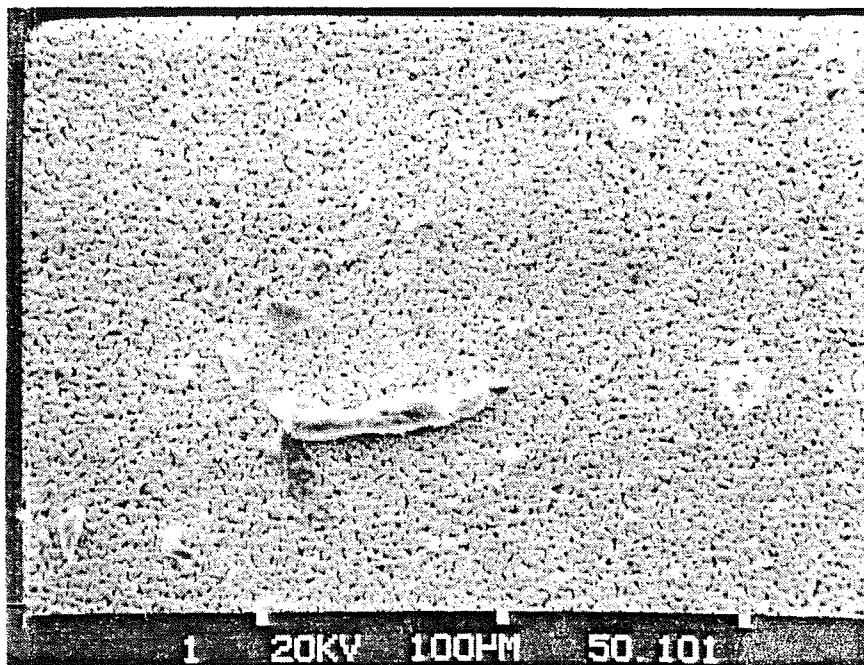


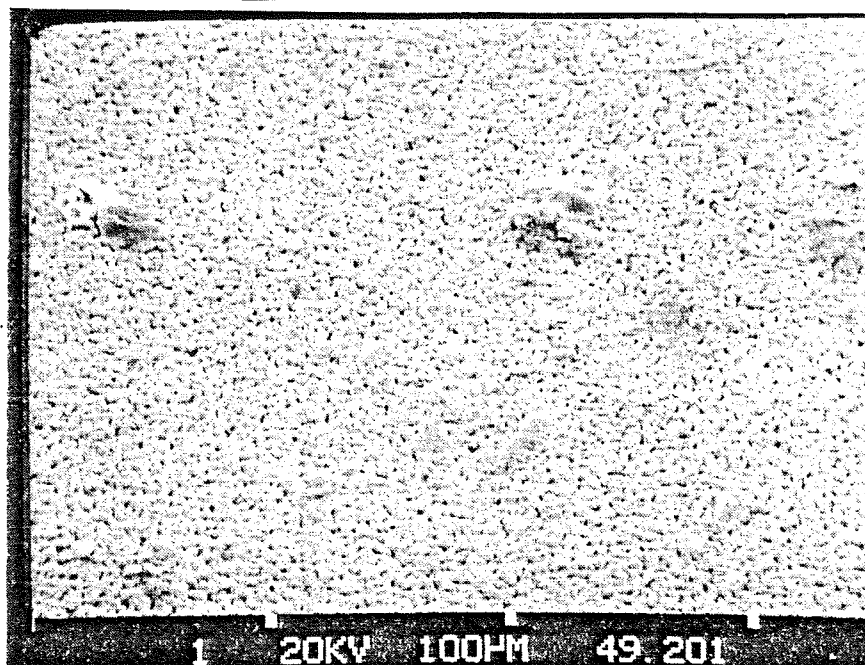
Fig. 61

Station MC-1: 1 m (82-03501)



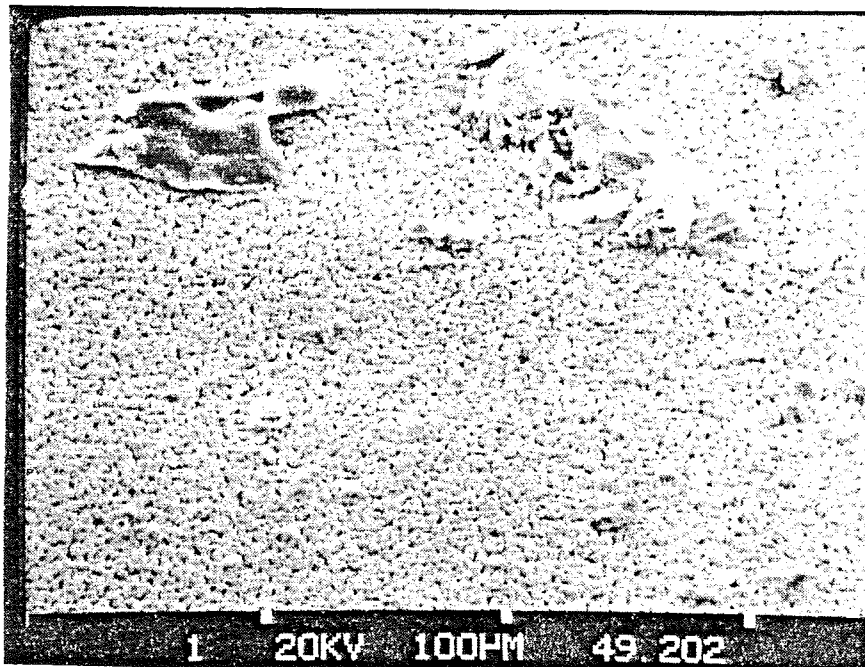
Micrograph 50.101 - fecal pellet, individual grains and silicoflagellates.

Station MC-1: 20 m (82-03492)



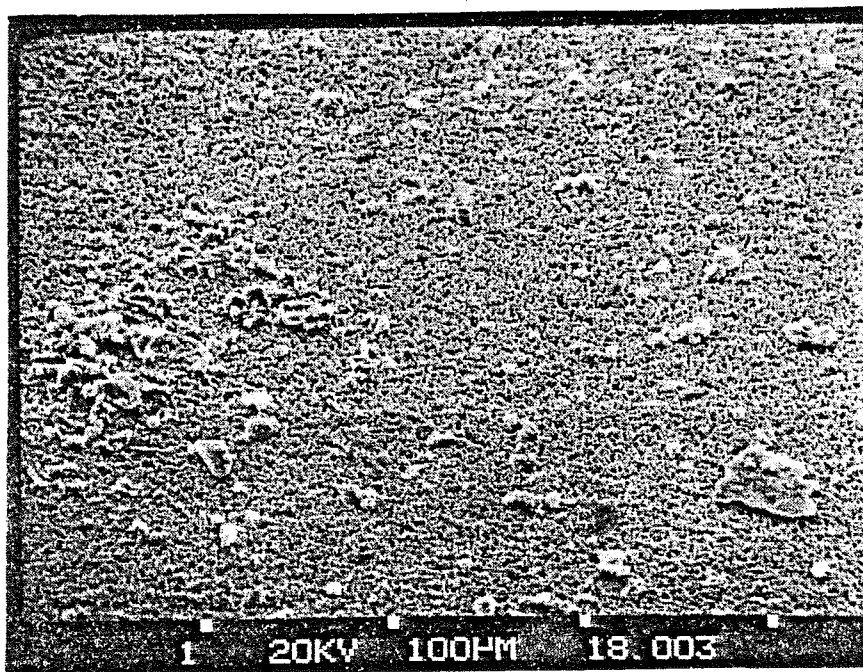
Micrograph 49.201 - general photo of sample.



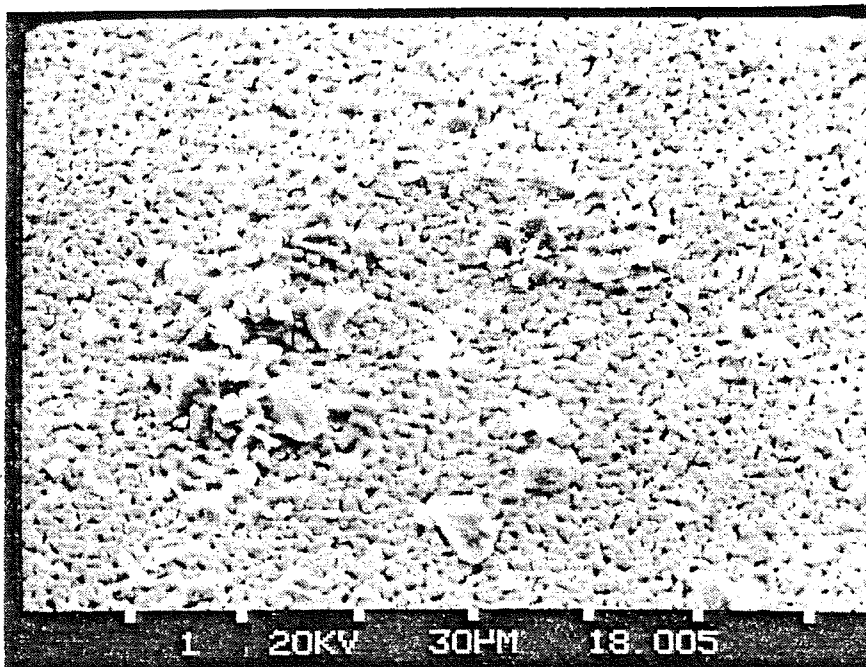


Micrograph 49.202 - mucoid floc and individual particles.

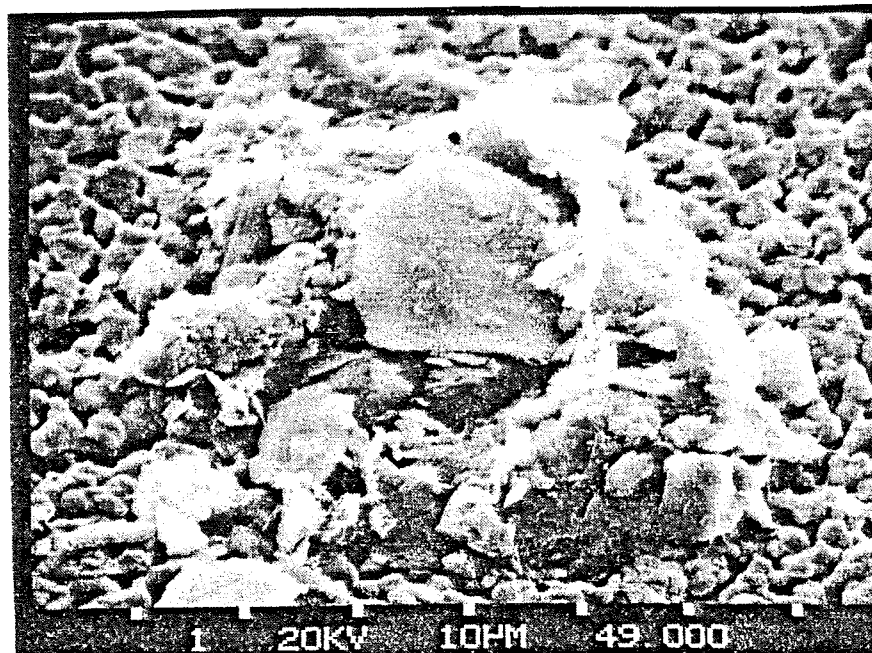
Station MC-1: 50 m (82-03490)



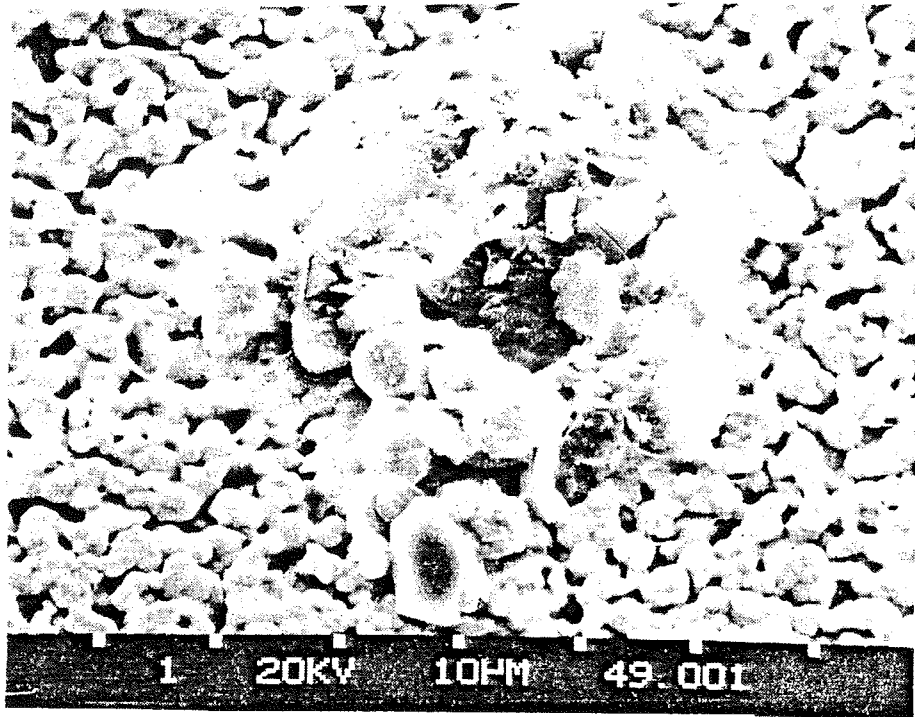
Micrograph 18.003 - general photo of sample.



Micrograph 18.005 - closeup of 18.003.

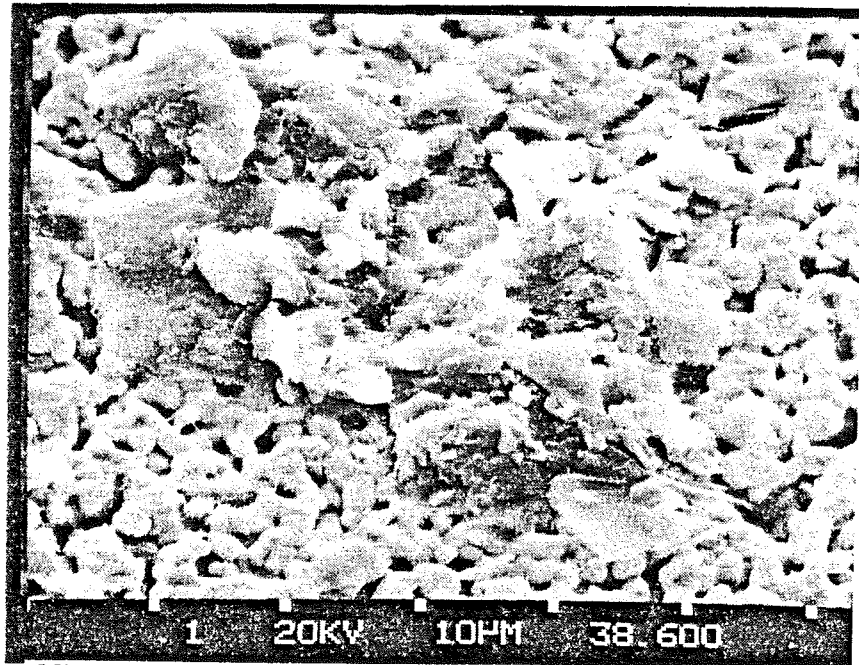


Micrograph 49.000 - inorganic floccule (spectrum A49000 gives composition).

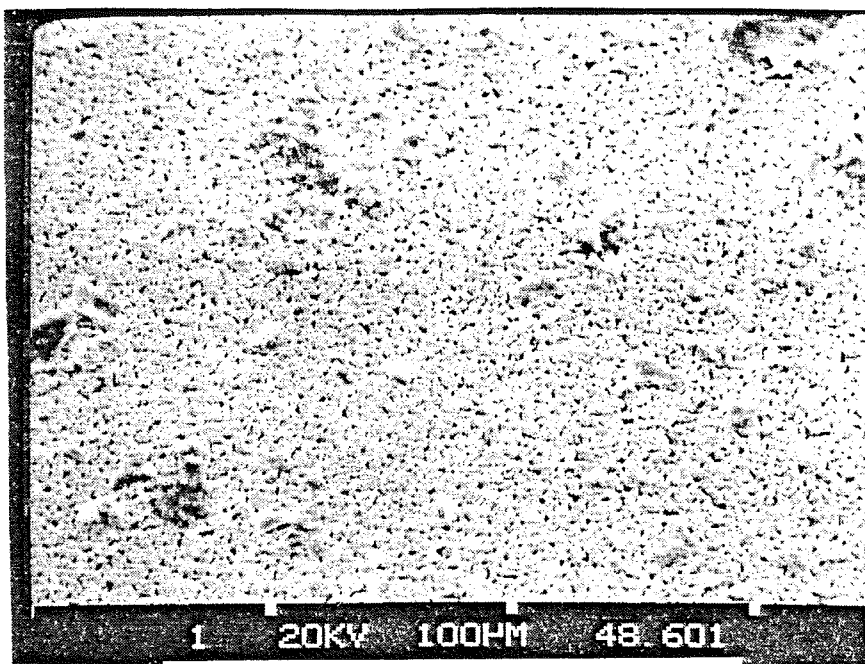


Micrograph 49.001 - floc of diatoms and clays

Station MC-1: 312 m (82-03486)

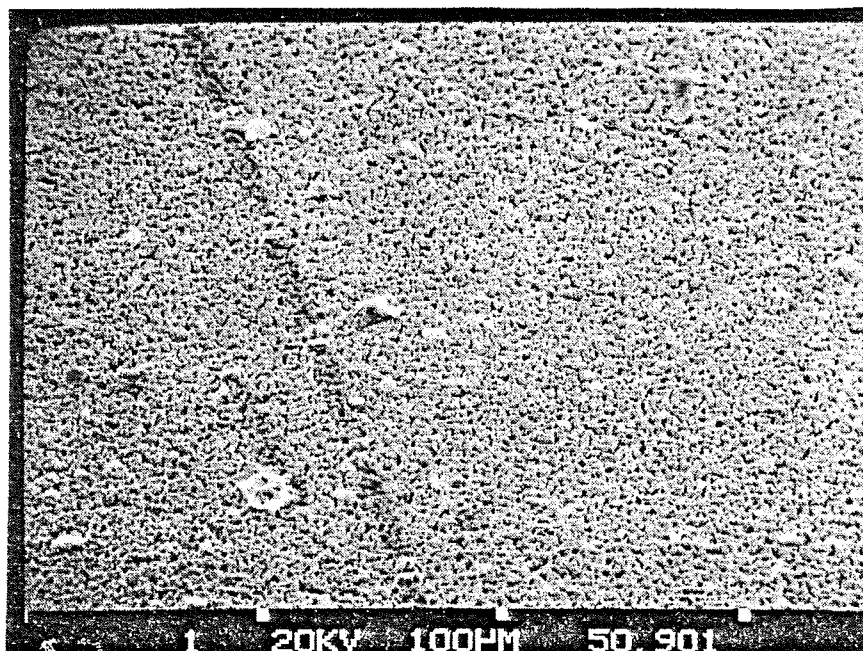


Micrograph 38.600 - inorganic floc with a light organic coating.

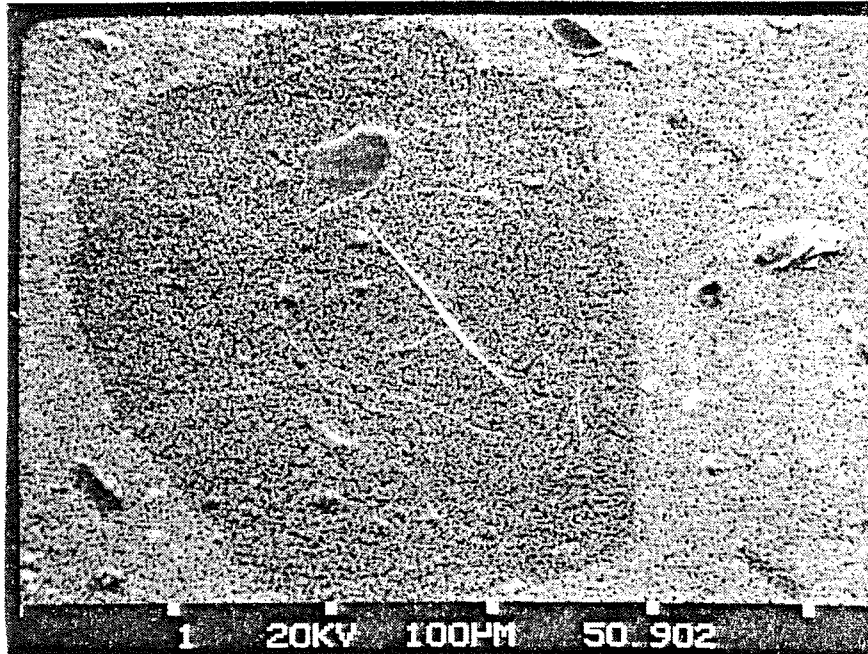


Micrograph 48.601 - general photo of sample.

Station MC-3: 10 m (82-03509)

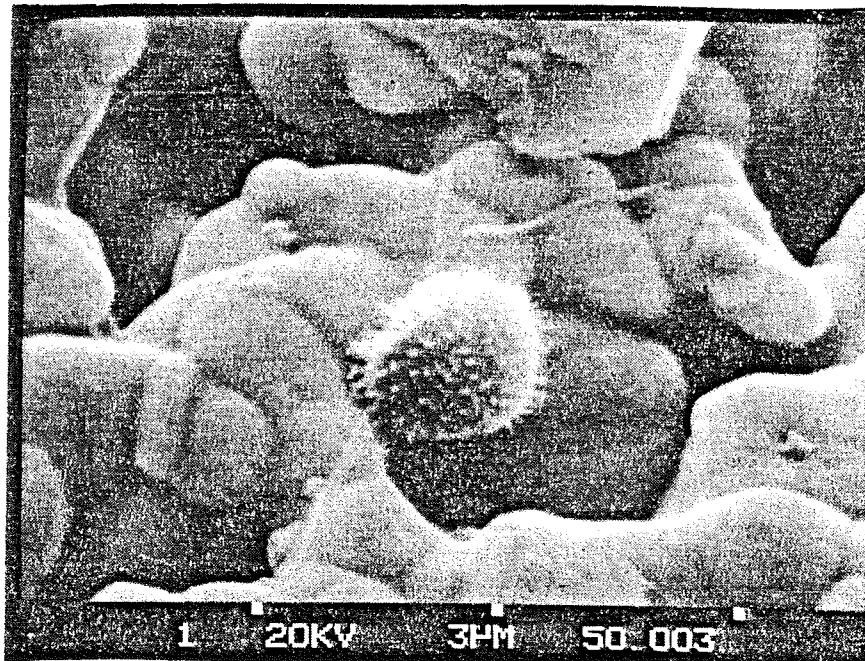


Micrograph 50.901 - chain diatoms, dinoflagellates, individual grains, mucoids and pellets.

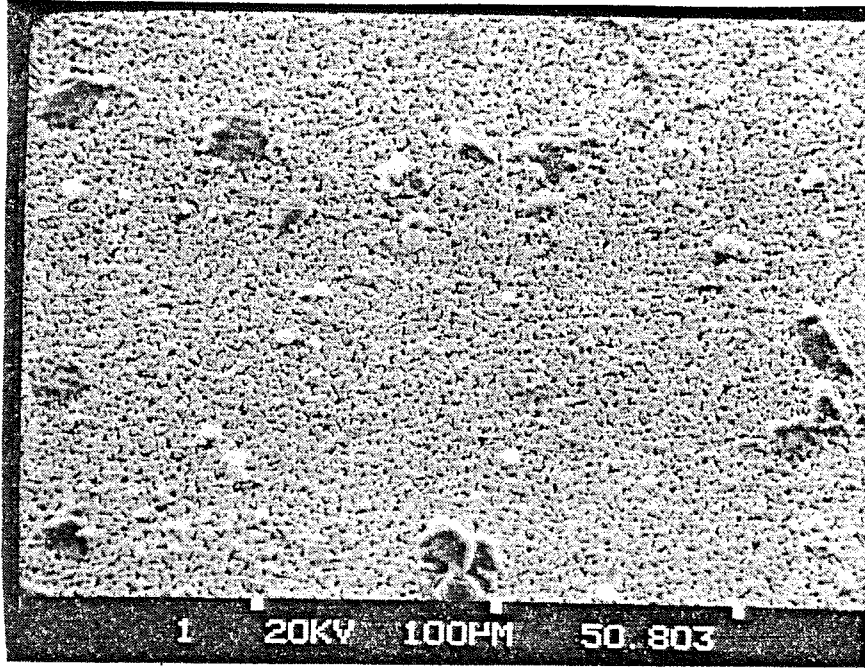


Micrograph 50.902 - muroid (300  $\mu\text{m}$  in diameter) with particles stuck in it. Zooplankton legs can be seen as well.

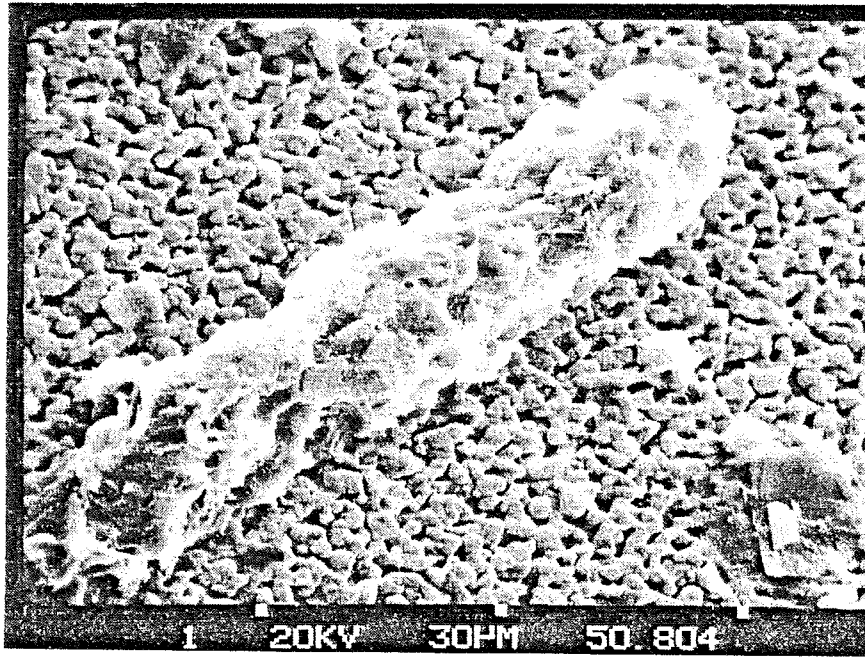
Station MC-3: 20 m (82-03508)



Micrograph 50.003 - picoplankton.

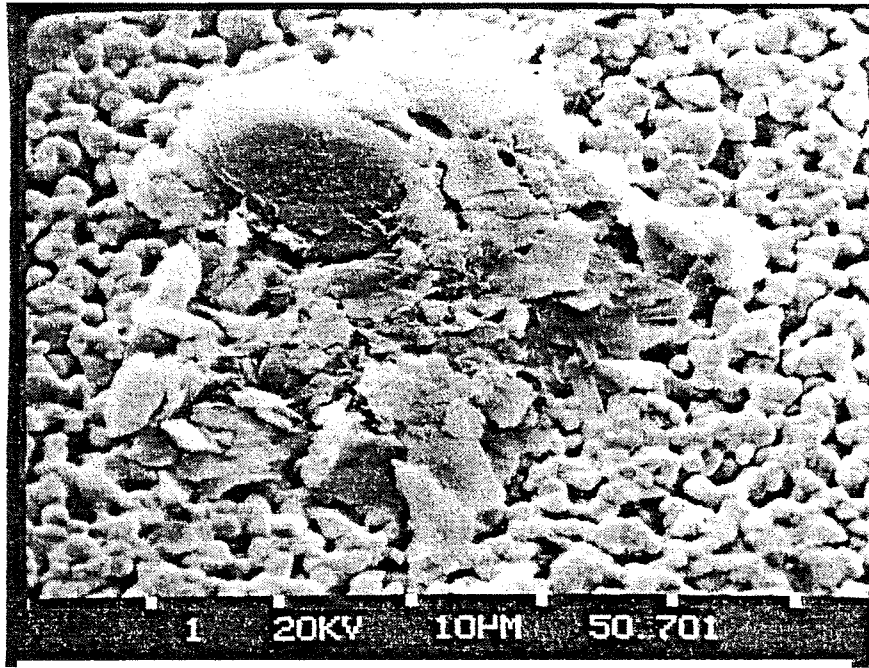


Micrograph 50.803 - general photo of sample.

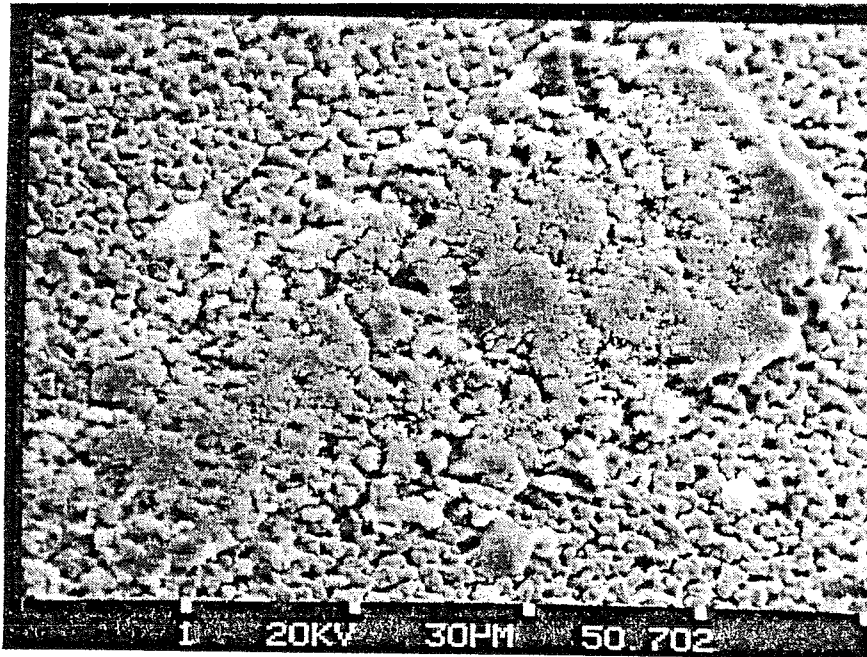


Micrograph 50.804 - fecal pellet held together with fibres in some places (see spectrum A50804 for analysis).

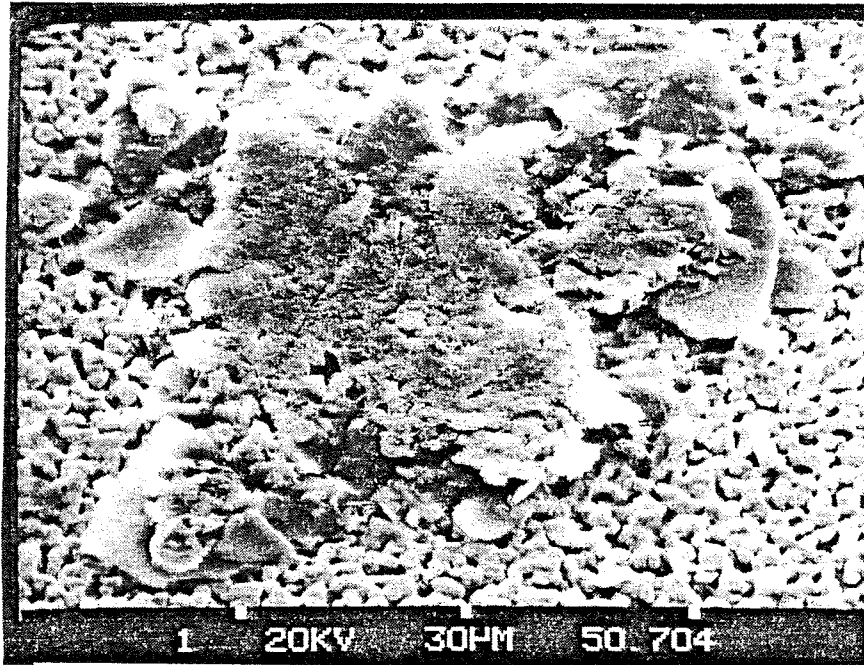
Station MC-3: 30 m (82-03507)



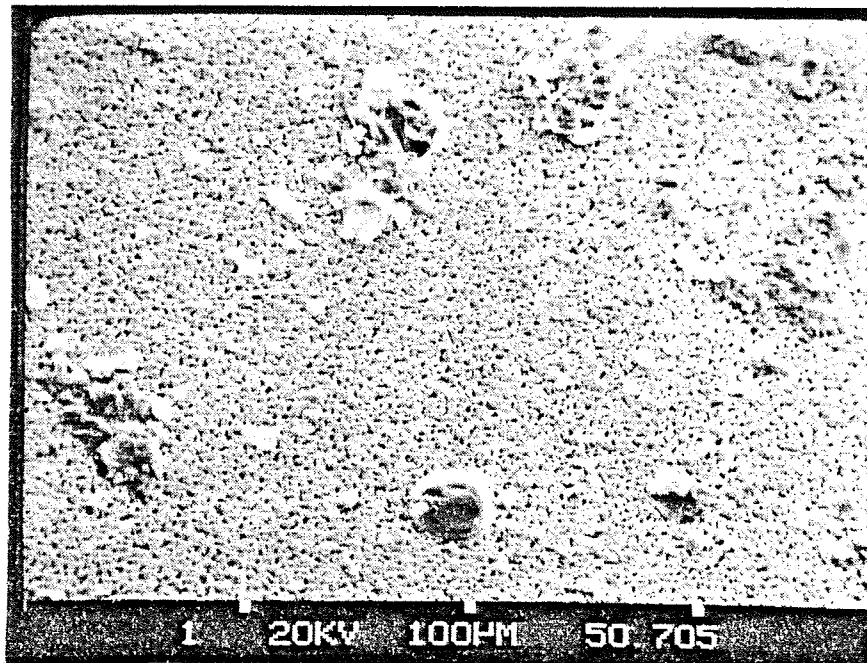
Micrograph 50.701 - small floc (see spectrum A50701 for analysis).



Micrograph 50.702 - floccule containing iron and phosphorus is tapered at one end and thick at the other (spectrum A50702).



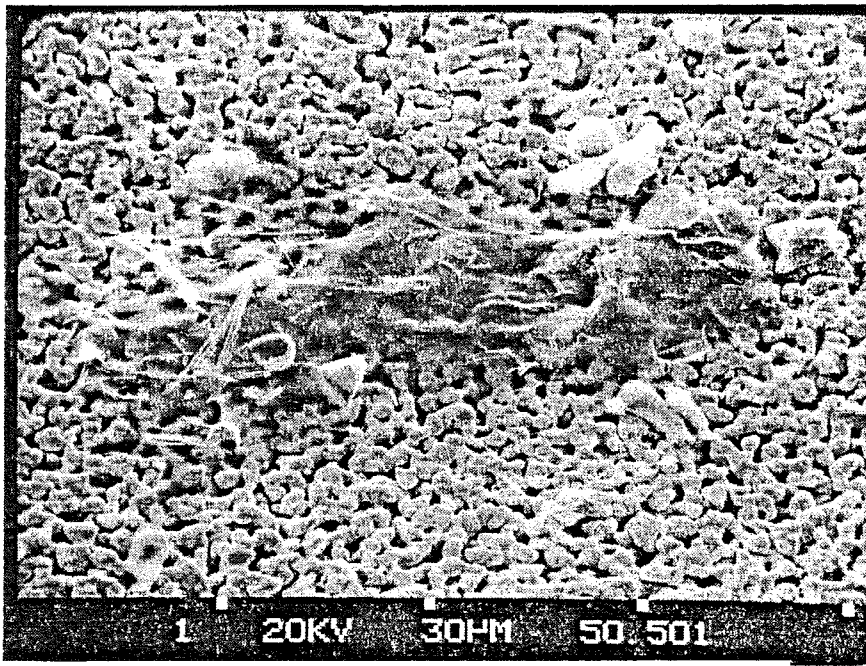
Micrograph 50.704 -floccule with clays (see spectrum A50703).



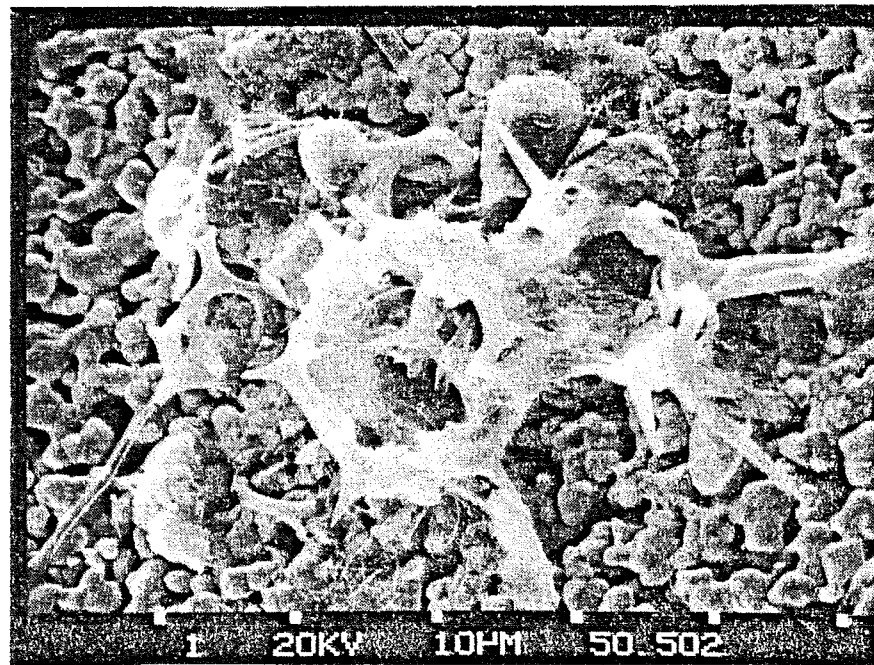
Micrograph 50.705 - general photo of sample.



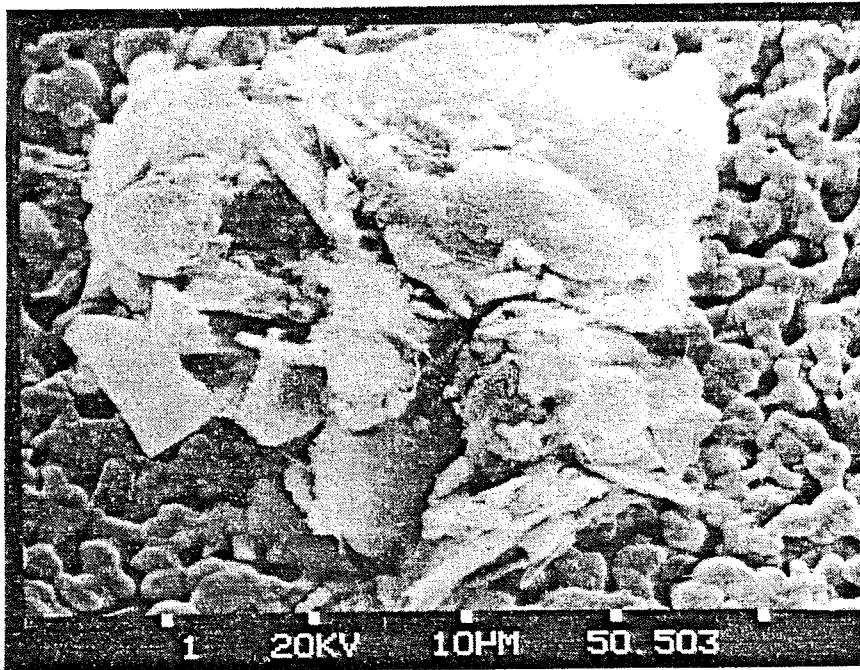
Station MC-3: 100 m (82-03505)



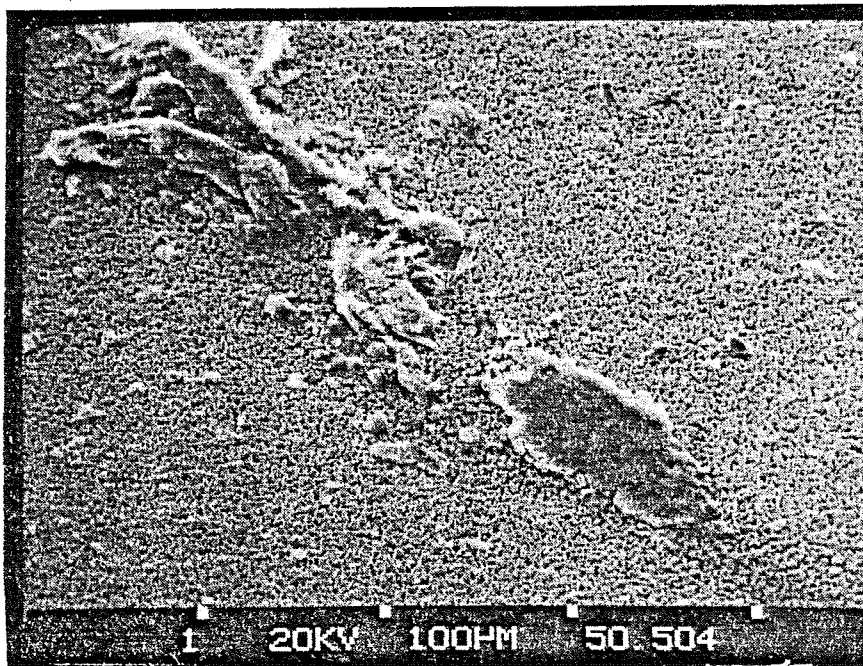
Micrograph 50.501 - mucoid enclosing organic remains.



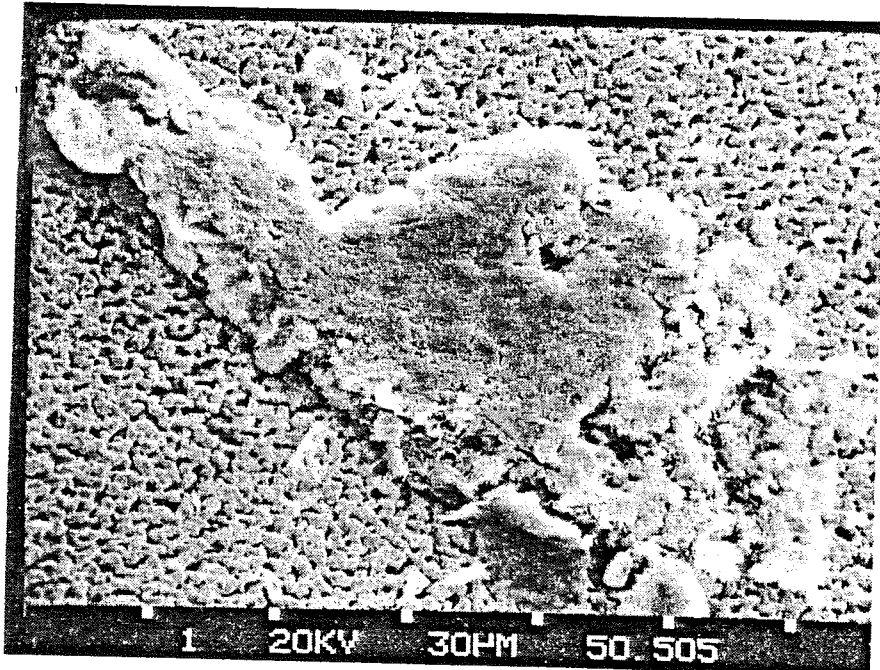
Micrograph 50.502 - silicoflagellates and diatoms.



Micrograph 50.503 -floccule with micas and biogenic detritus.

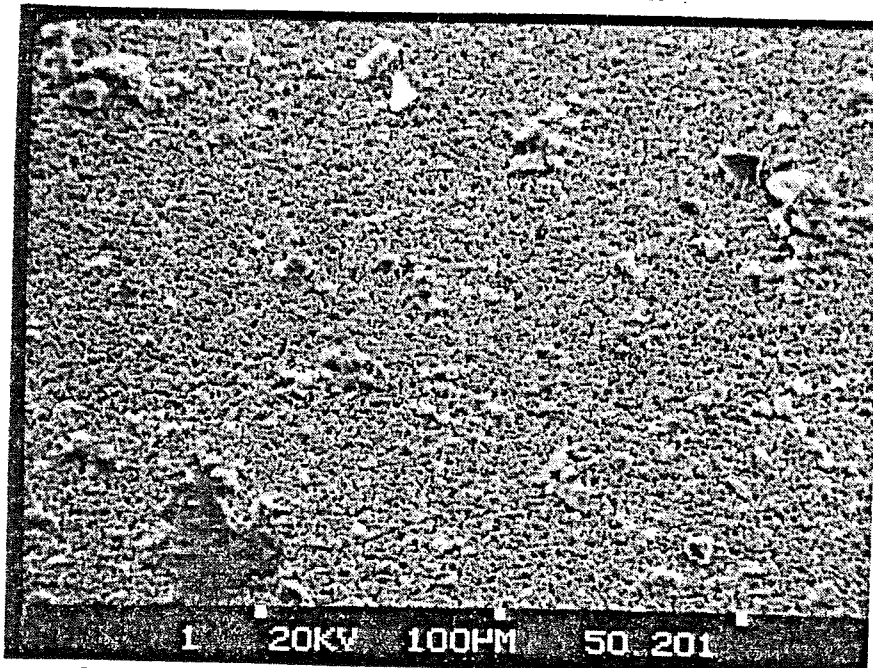


Micrograph 50.504 - fecal pellets, diatoms and flocs of clays.

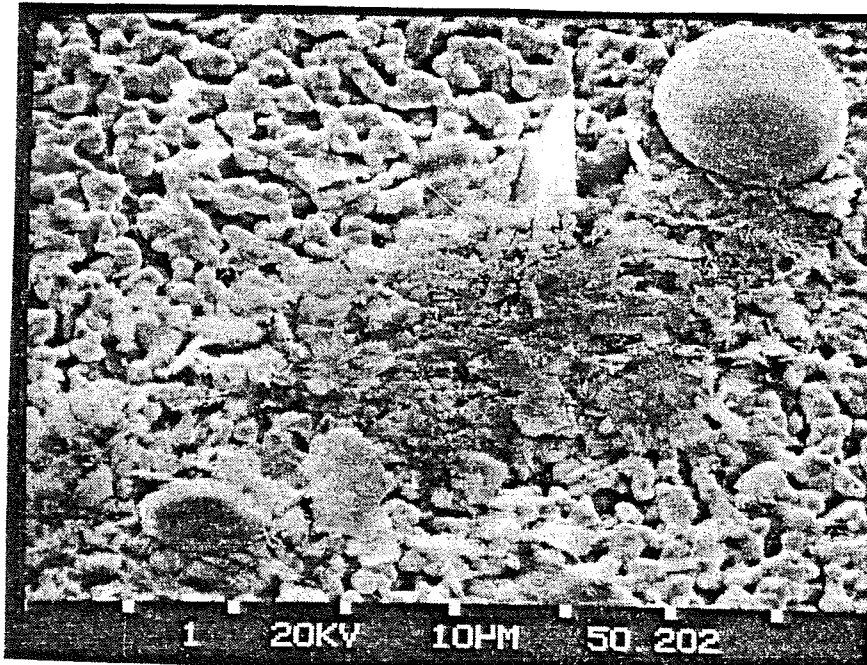


Micrograph 50.505 - floccule of small clay particles and diatoms (see spectrum A50505 for analysis).

Station MC-3: 435 m (82-03502)

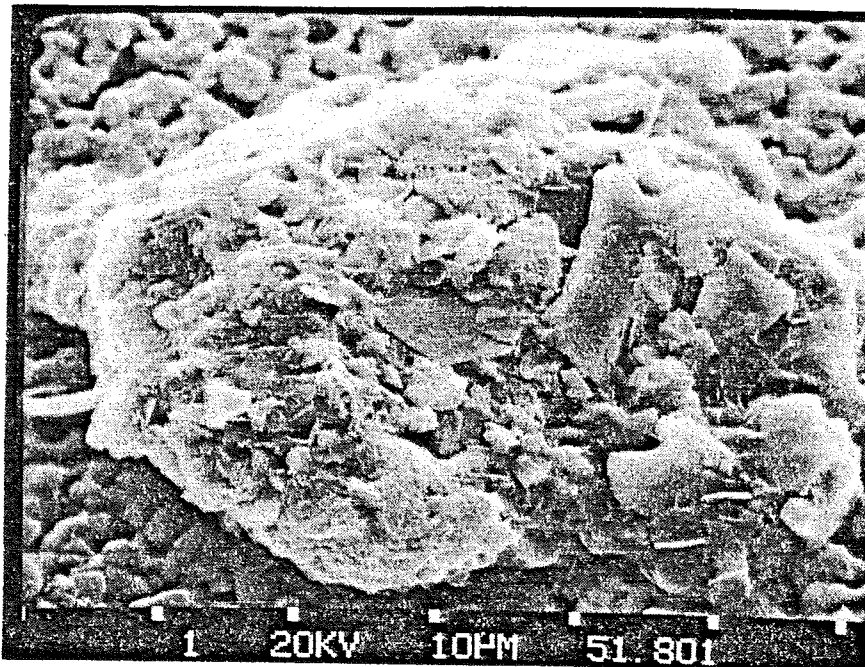


Micrograph 50.201 - general photo showing an agglomerate.

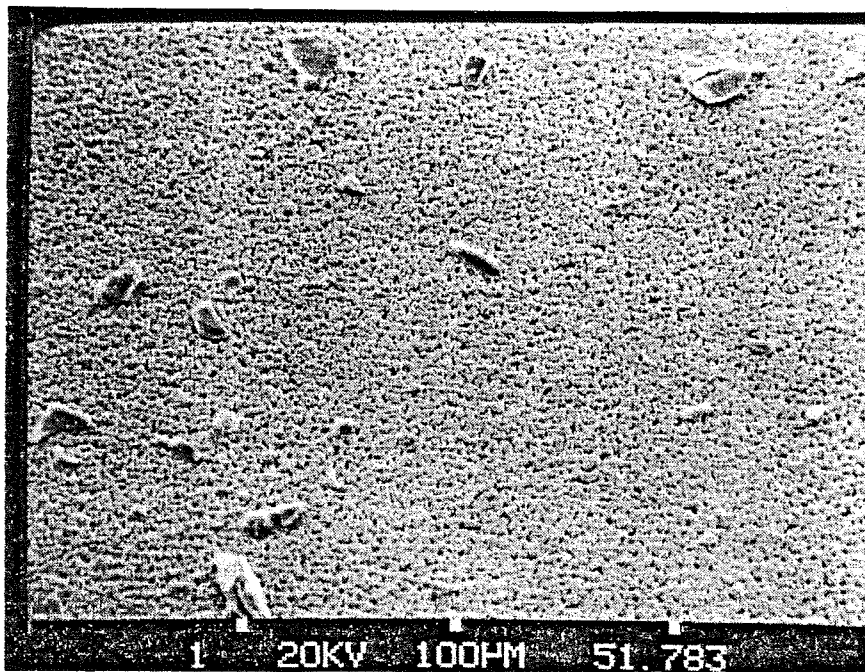


Micrograph 50.202 - small 10  $\mu$ m smooth organic grain (possibly pollen) and a floc of clays.

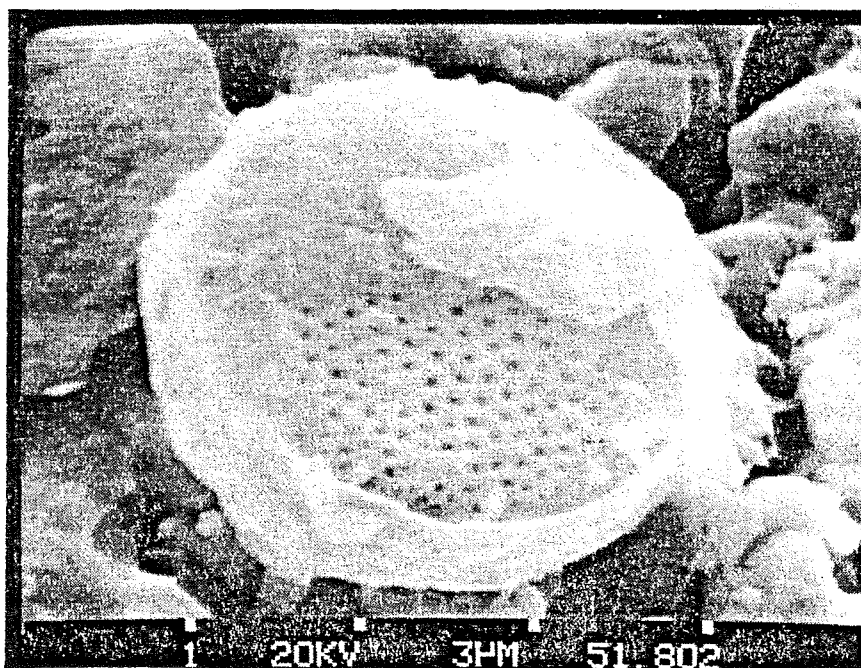
Station MC-4: 20 m (82-03518)



Micrograph 51.801 - floccule: hard and compact - could have been part of a pellet, very little mucoid material.

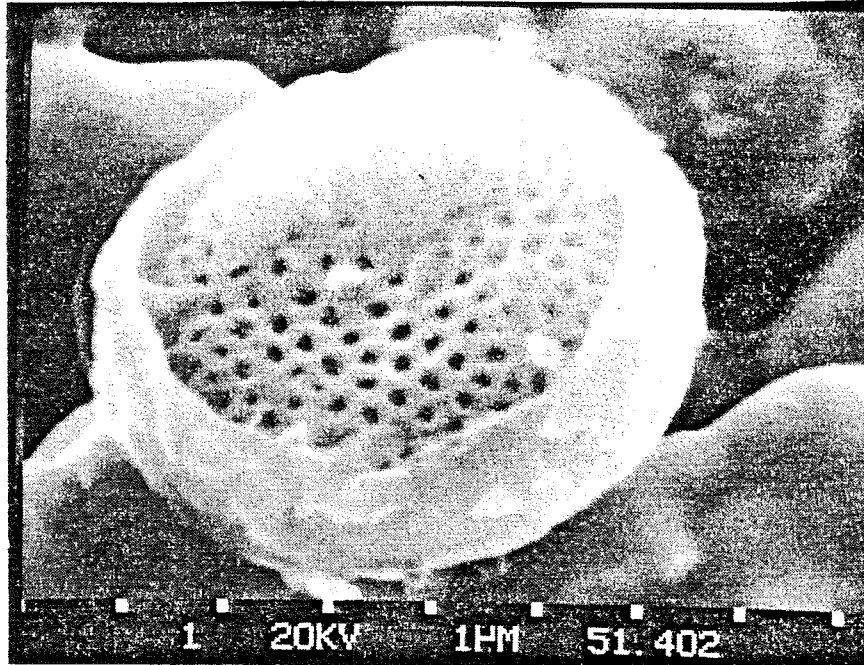


Micrograph 51.783 - general photo of sample.

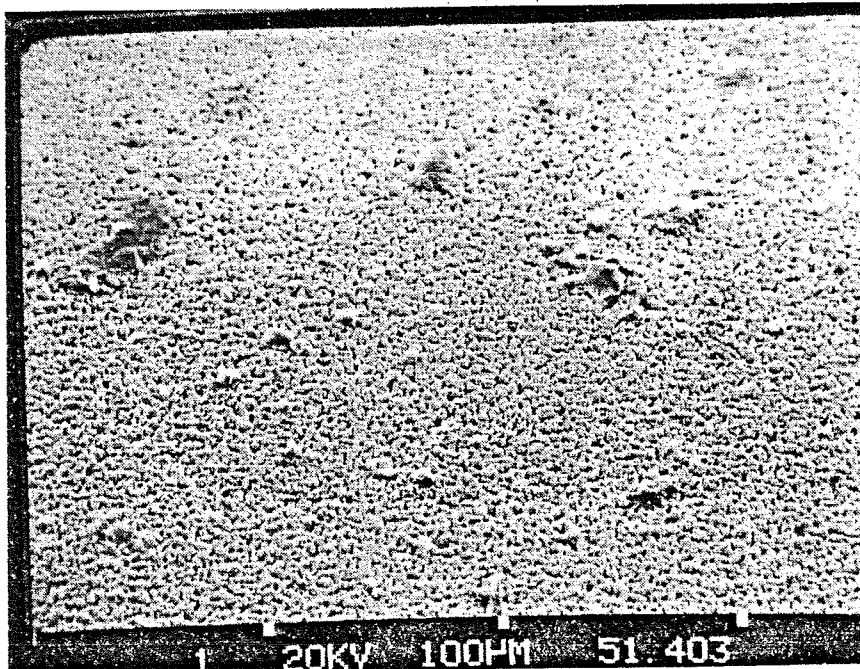


Micrograph 51.802 - diatom with clay particles stuck to it.

Station MC-4: 200 m (82-03514)

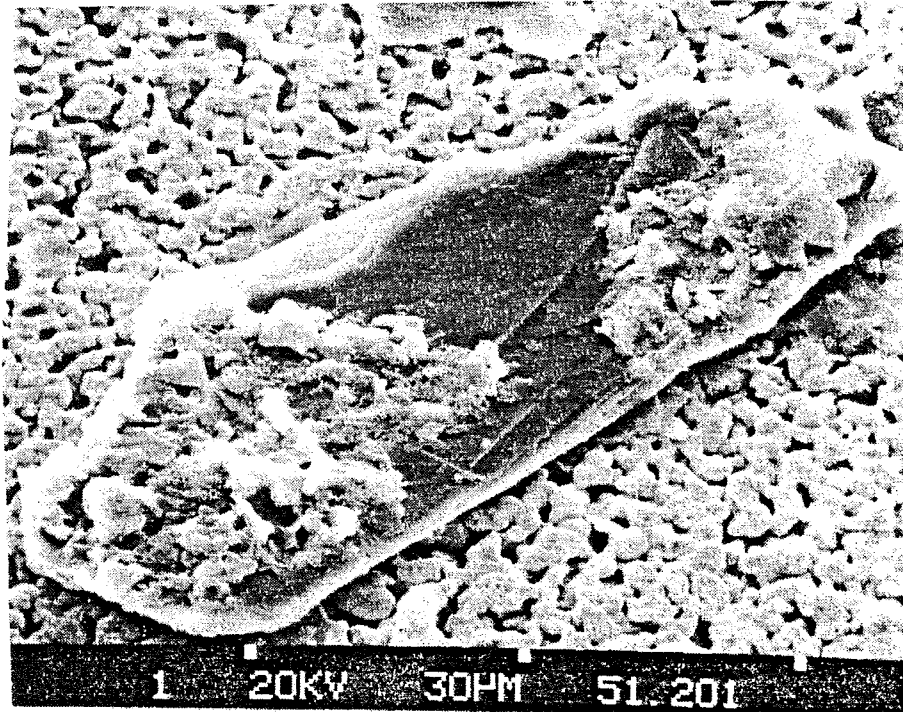


Micrograph 51.402 - diatom with clay particles.

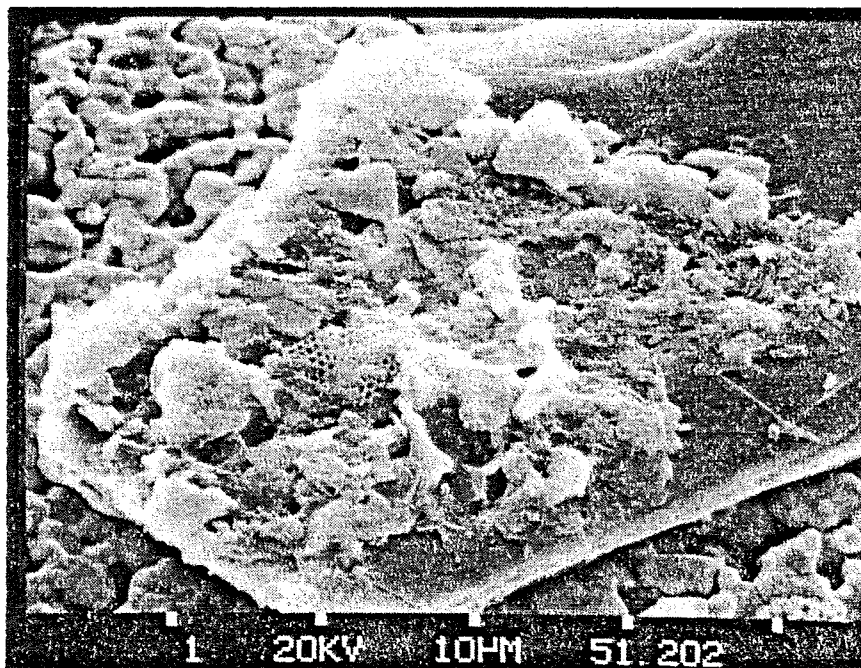


Micrograph 51.403 - general photo of sample.

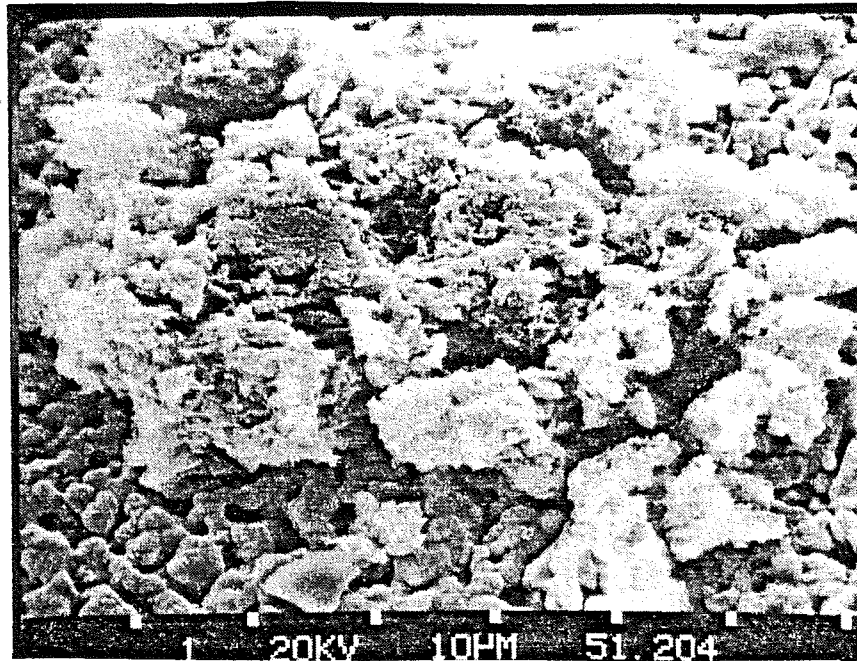
Station MC-4: 520 (82-03512)



Micrograph 51.201 - grain of biotite with a cluster of grains stuck to it (see spectrum A51201).

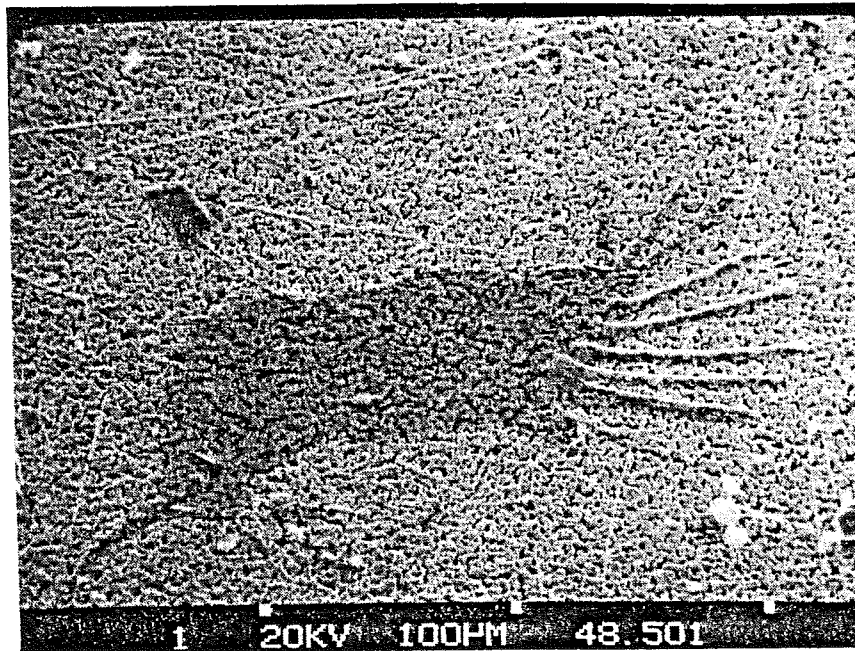


Micrograph 51.202 - close-up of small grains.



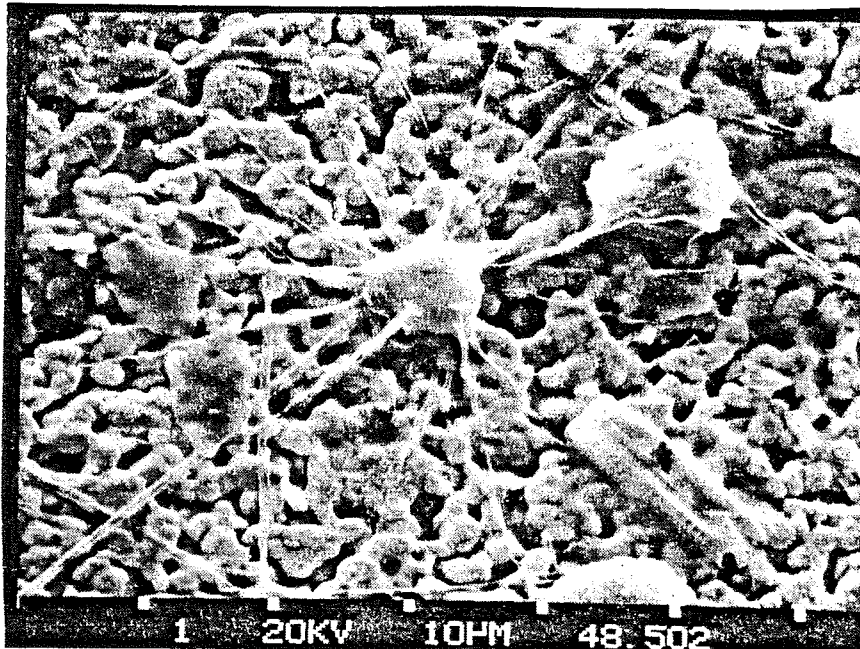
Micrograph 51.204 - iron-rich floccule (see spectrum A51204).

Station MC-6:1 m (82-03485)



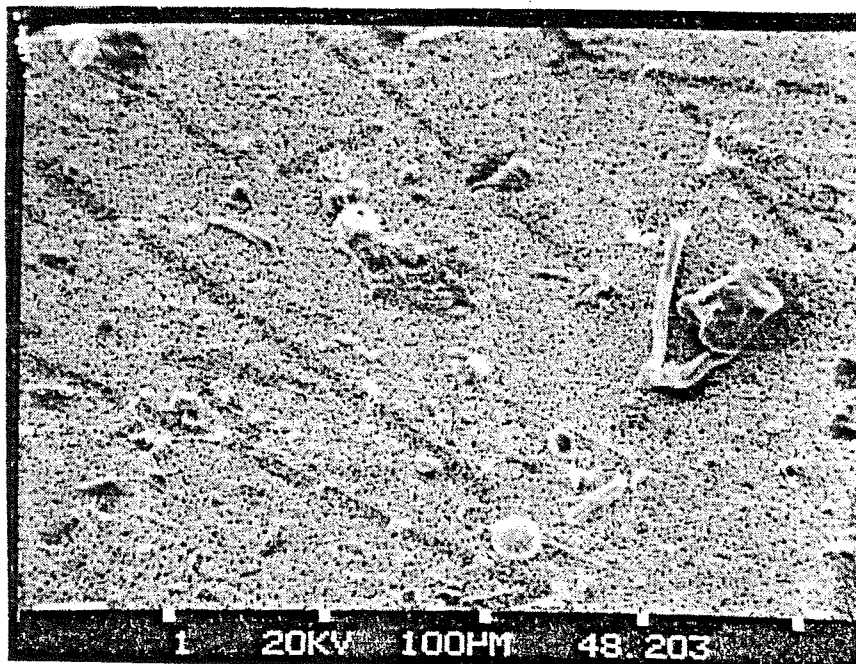
Micrograph 48.501 - chain diatoms, needles and a transparent mucoid with finger-like attachments.





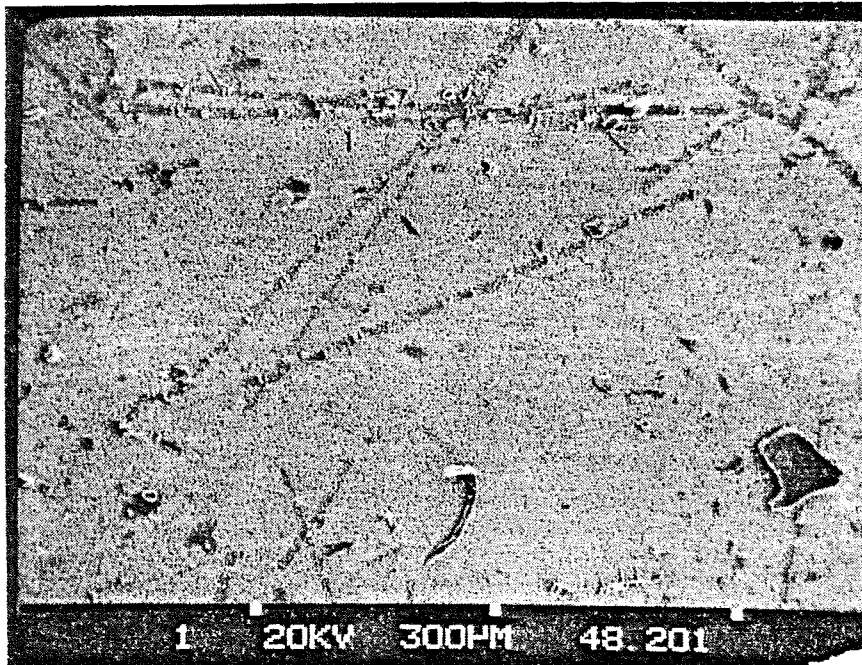
Micrograph 48.502 - small silica grain from which needles radiate. There appears to be a thin mucus membrane around the needles which trap other clay particles and micas. A fragment of a diatom is also trapped.

Station MC-6: 10 m (82-03483)

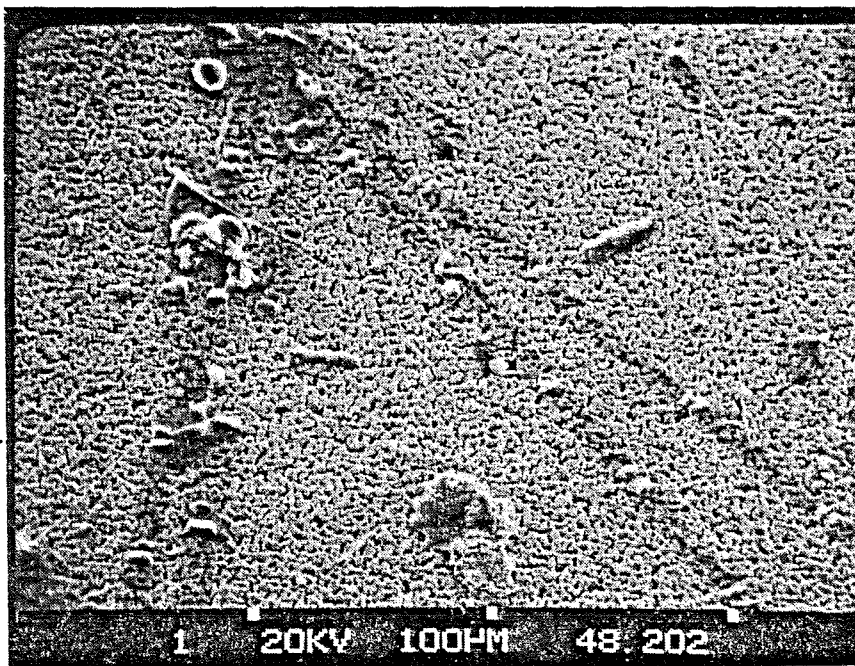


Micrograph 48.203 - general photo of sample (see spectrum A48102 for analysis).

Station MC-6: 20 m (82-03482)

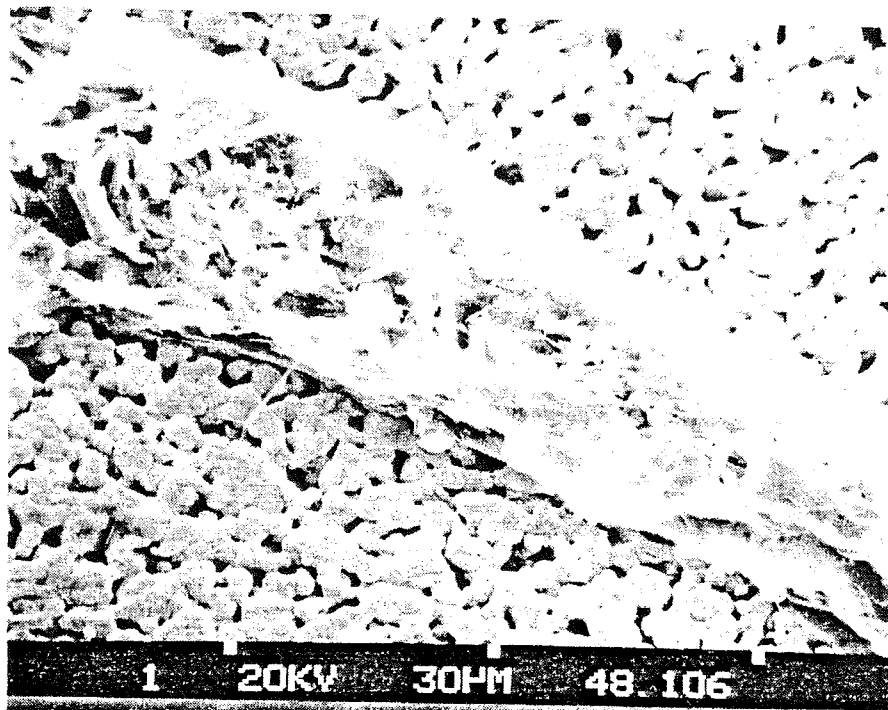


Micrograph 48.201 - general photo.

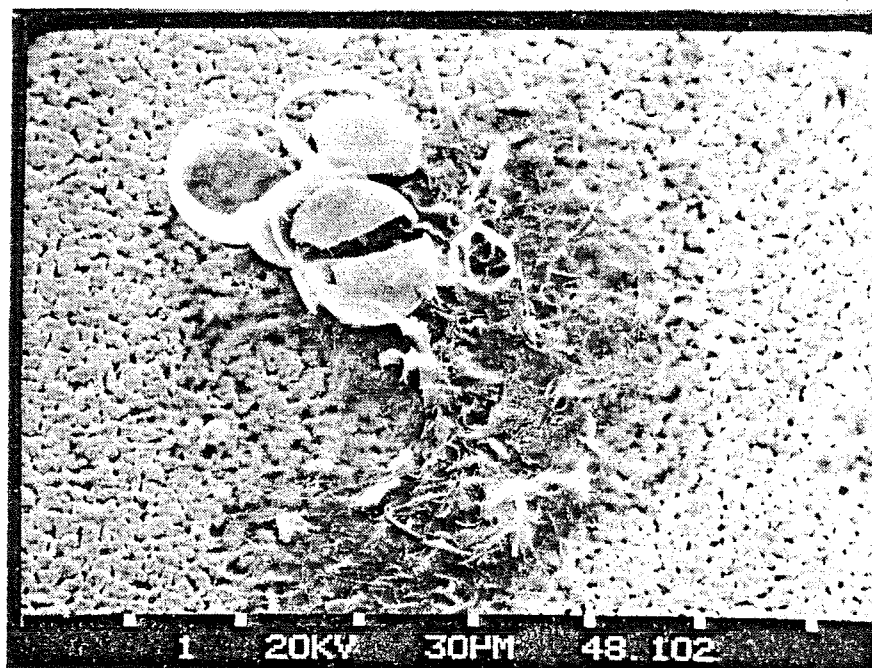


Micrograph 48.202 - closer view of 48.201.

Station MC-6: 30 m (82-03481)

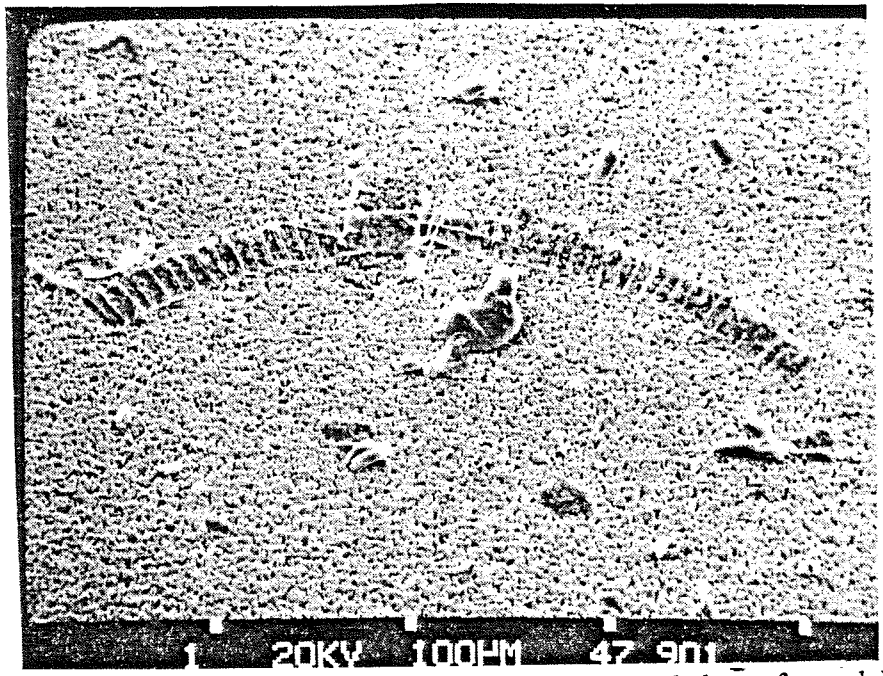


Micrograph 48.106 - fecal pellet made of filaments (diatoms, all silica). See spectrum A48106



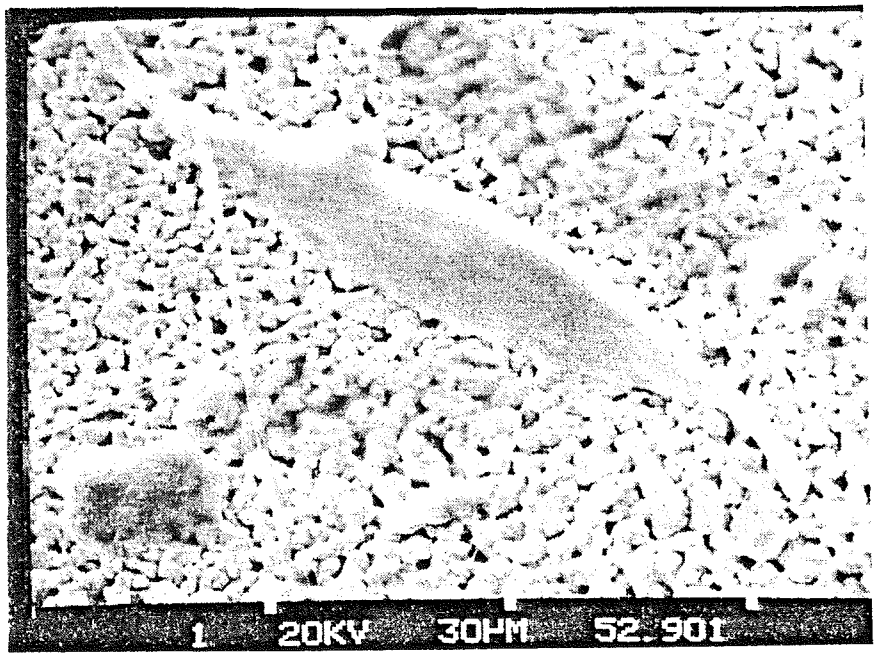
Micrograph 48.102 - agglomerate with remnant diatoms.

Station MC-6: 100 m (82-03479)

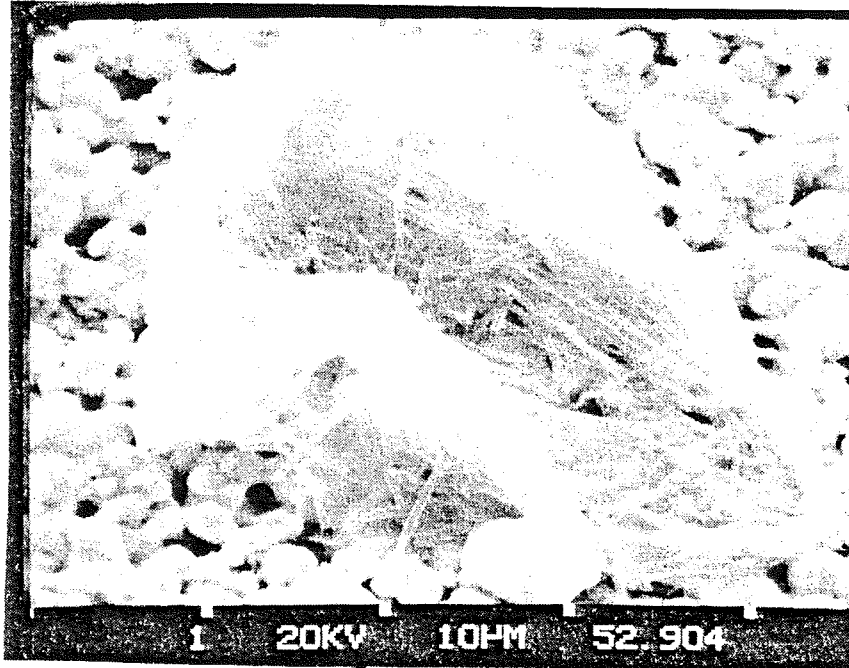


Micrograph 47.901 - diatoms, mucoids, etc. (general photo of sample).

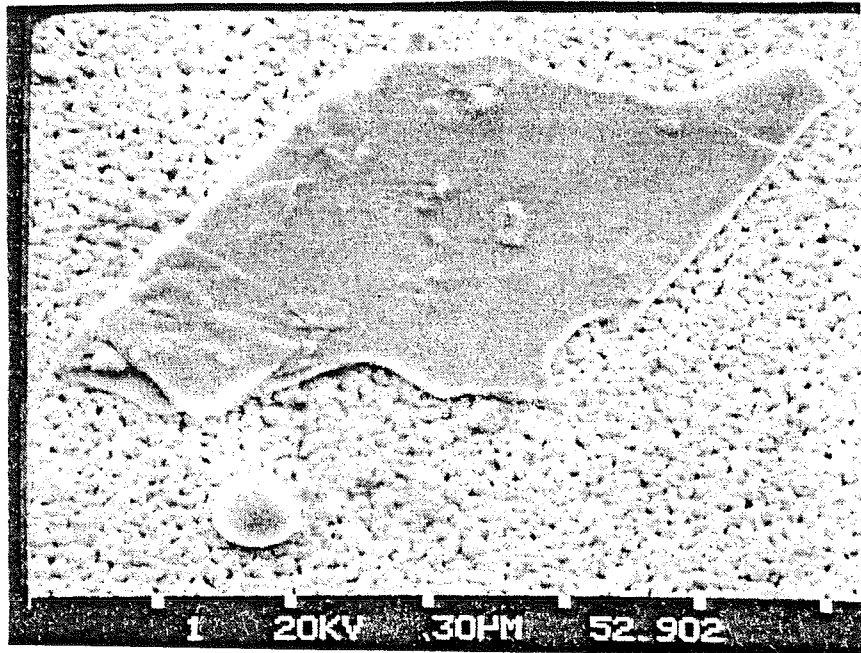
Station MC-7: 10 m (82-03529)



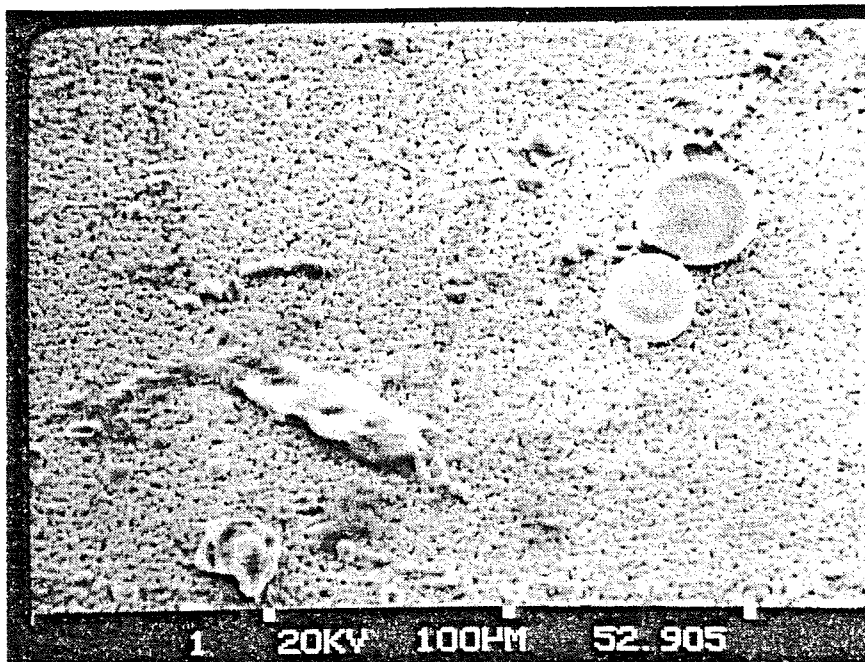
Micrograph 52.901 - pennate diatom composed of silica. Chain diatoms, spines and mucoids are also seen.



Micrograph 52.904 - 300µm mass of silica-rich tubes and clays.

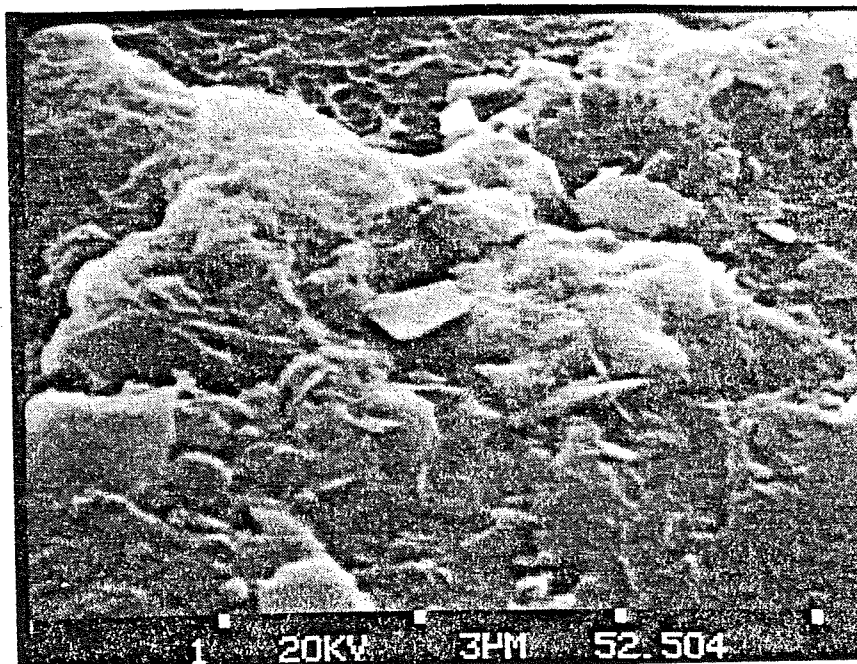


Micrograph 52.902 - mica (biotite) plate with attached debris (see spectrum A52902).



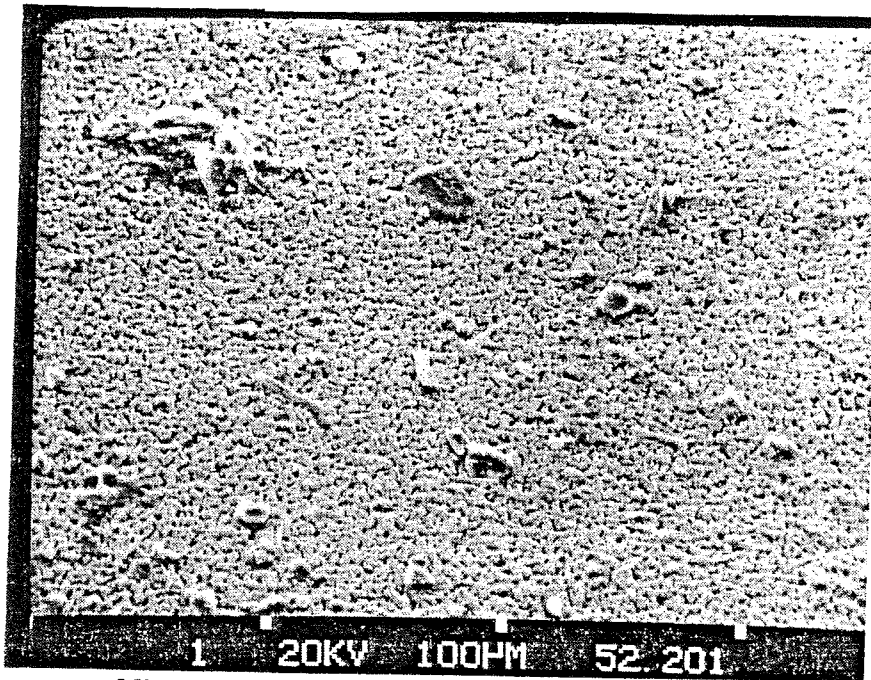
Micrograph 52.905 - general photo of sample.

Station MC-7: 100 m (82-03525)

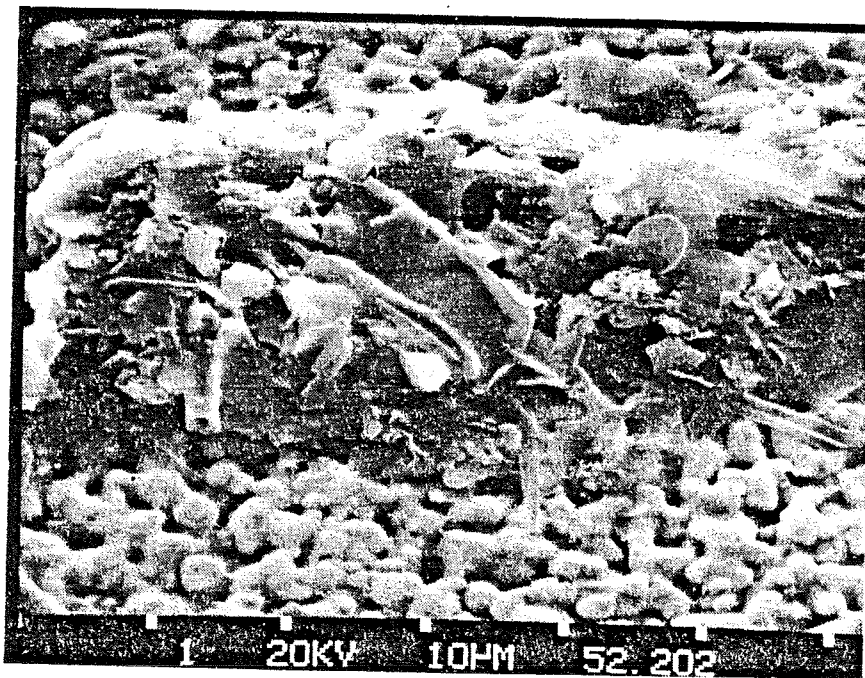


Micrograph 52.504 - close-up of small particles, the spectrum of which is included (A52504).

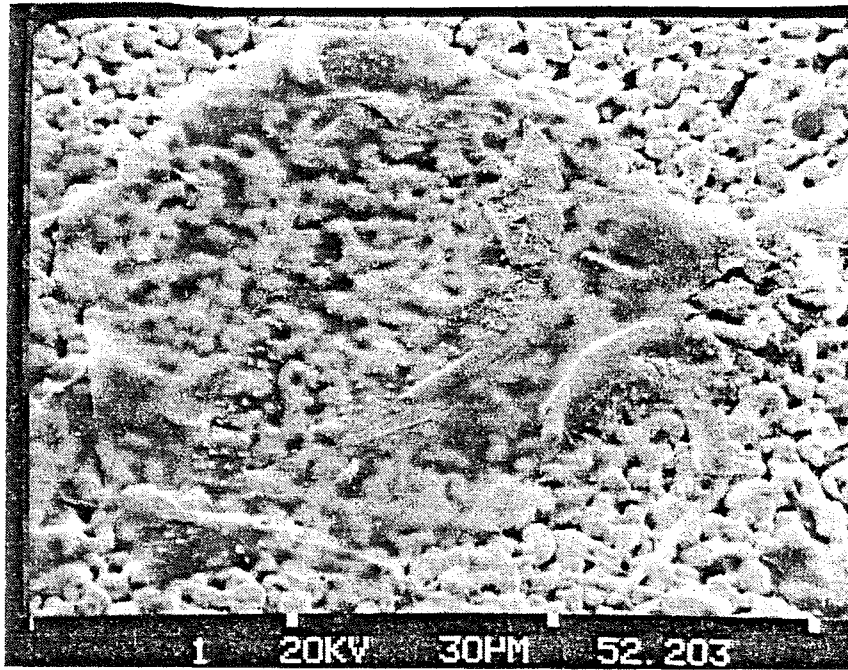
Station MC-7: 490 m (82-03522)



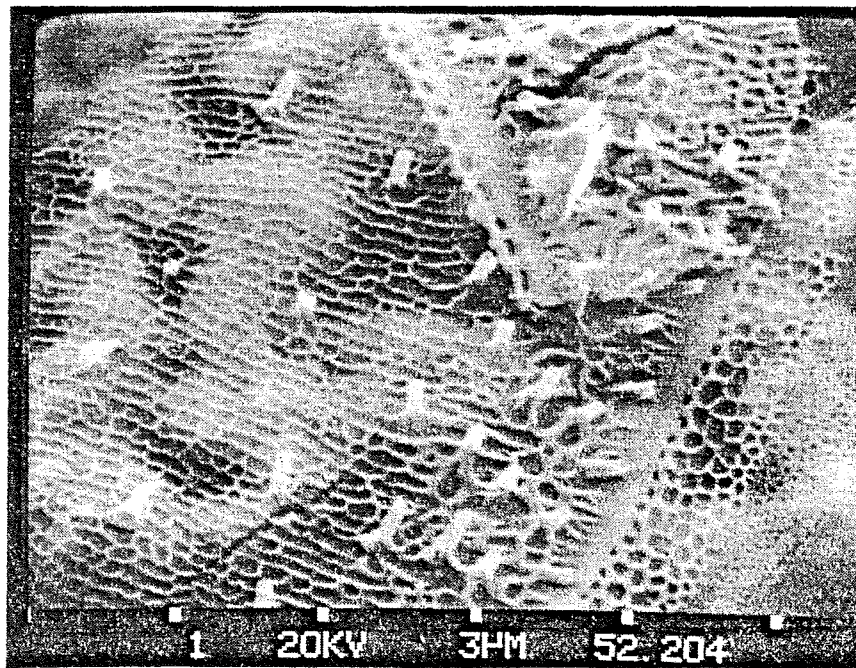
Micrograph 52.201 - floccule and individual particles.



Micrograph 52.202 - fecal pellet of clays and diatoms (see spectrum A52202).



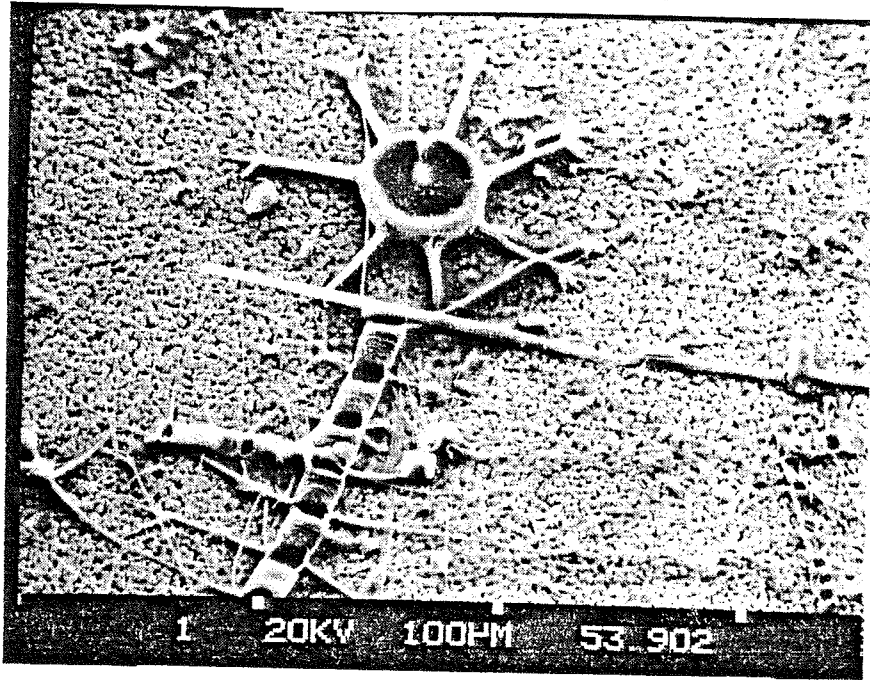
Micrograph 52.203 - mucoïd with internal structures.



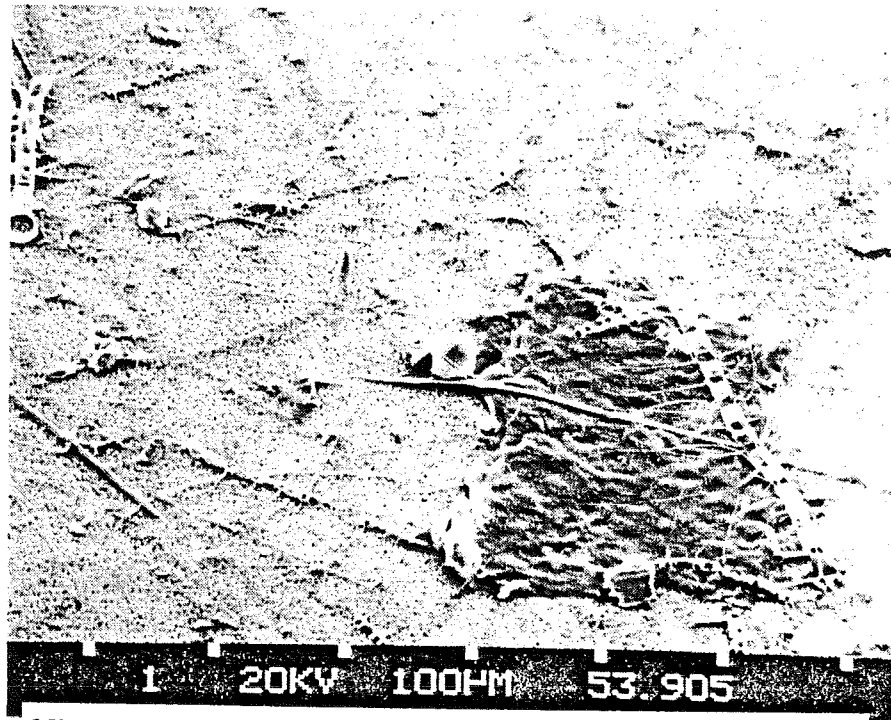
Micrograph 52.204 - close-up of above mucoïd.



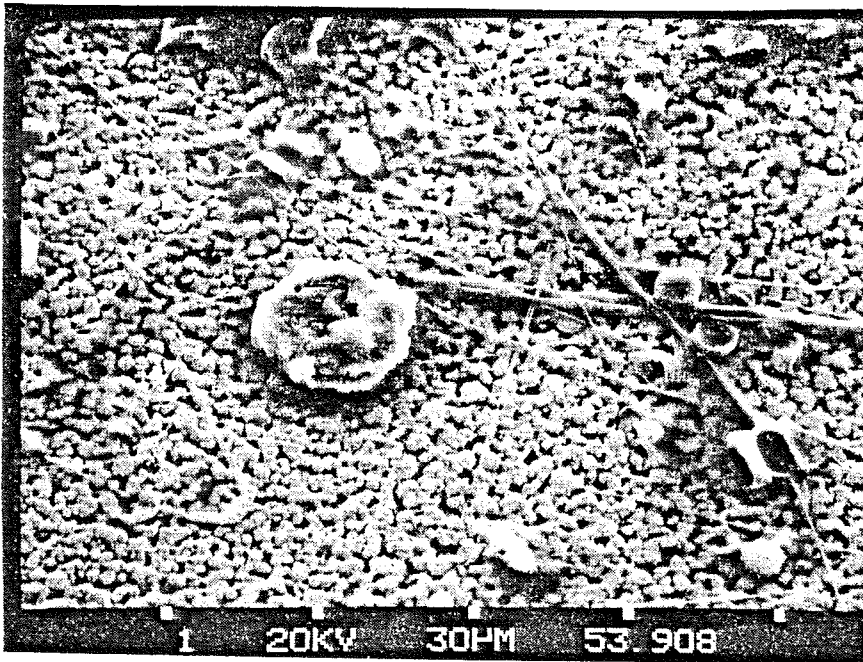
Station MC-8: 10 m (82-03539)



Micrograph 53.902 - diatoms and silicoflagellates.

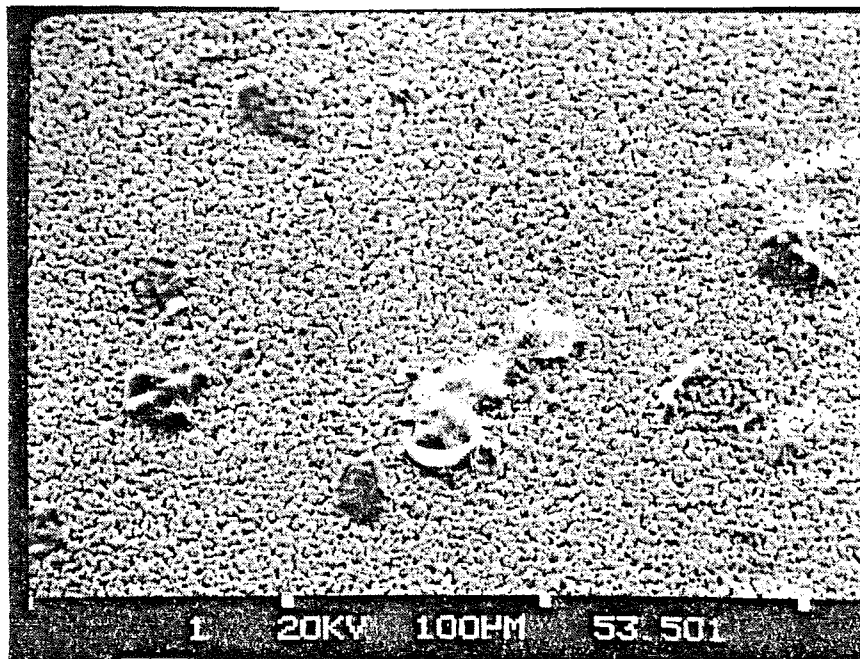


Micrograph 53.905 - large mucoïd, clay rosettes and chain diatoms.



Micrograph 53.908 - general photo, particles seem to be caught up in a thin mucus film.

Station MC-8: 75 m (82-03535)

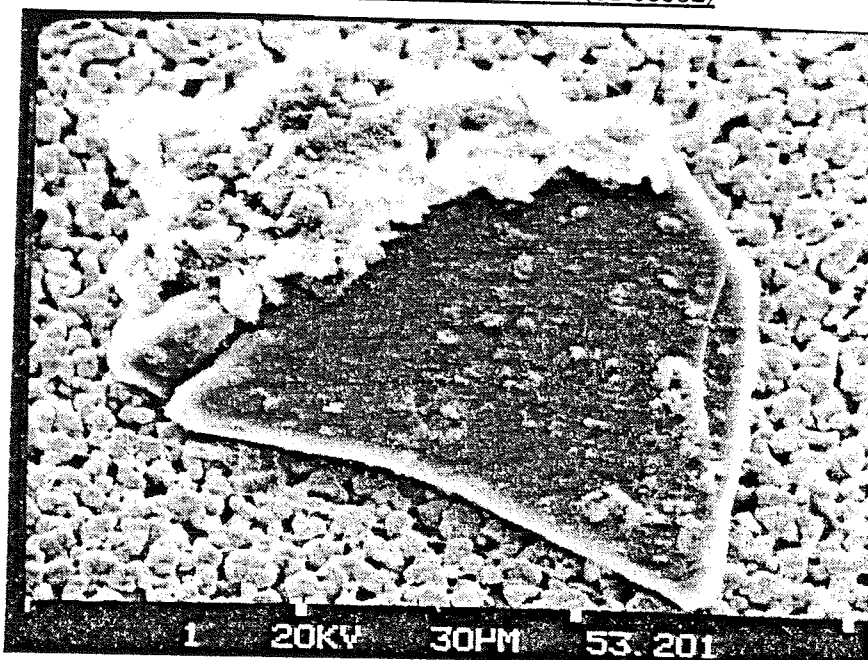


Micrograph 53.501 - mucoids and an organic floccule.

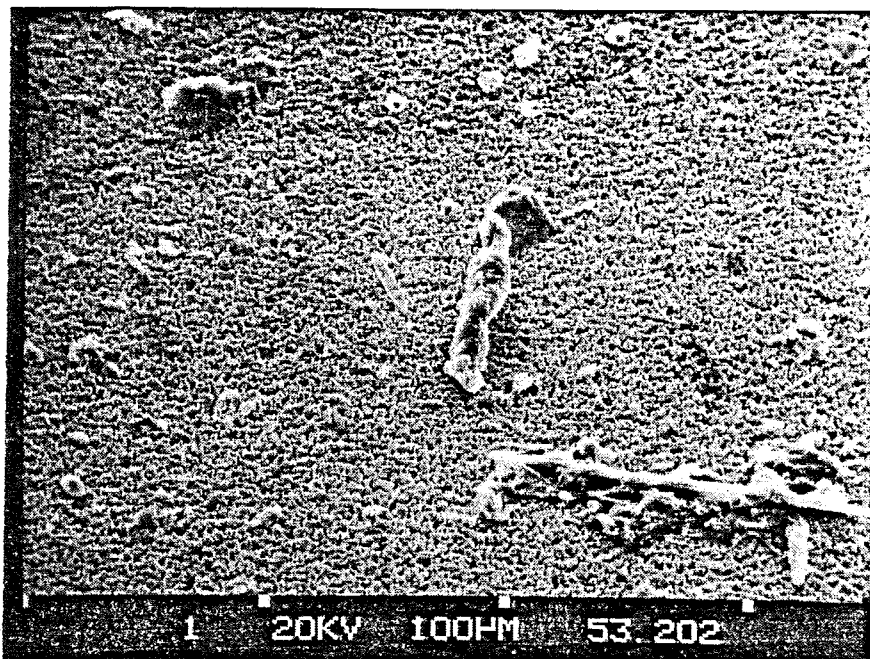


Micrograph 53.502 - close-up of floccule in 53.501.

Station MC-8: 287 m (82-03532)



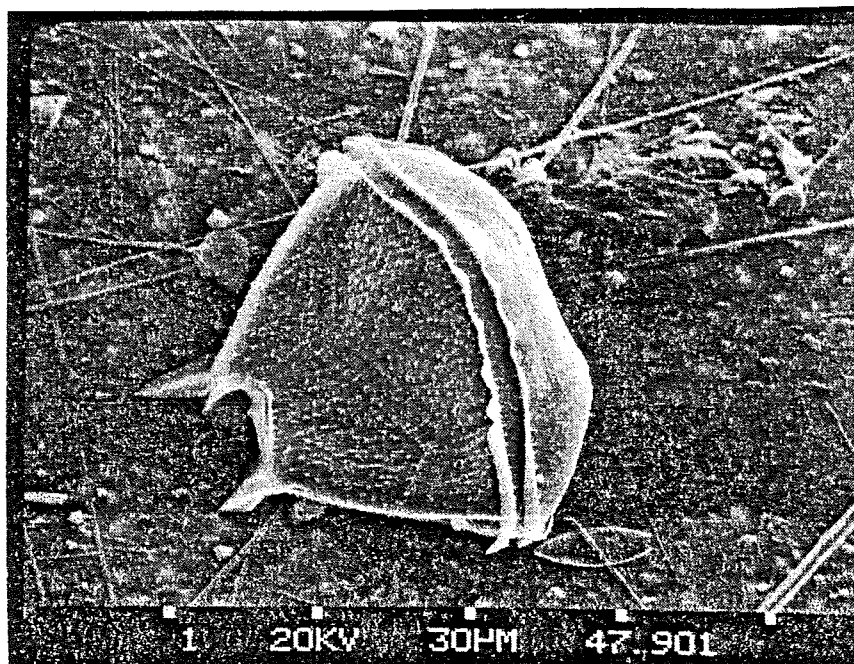
Micrograph 53.201 - a large mica grain with smaller grains stuck to it (possibly mobilized bottom sediments).



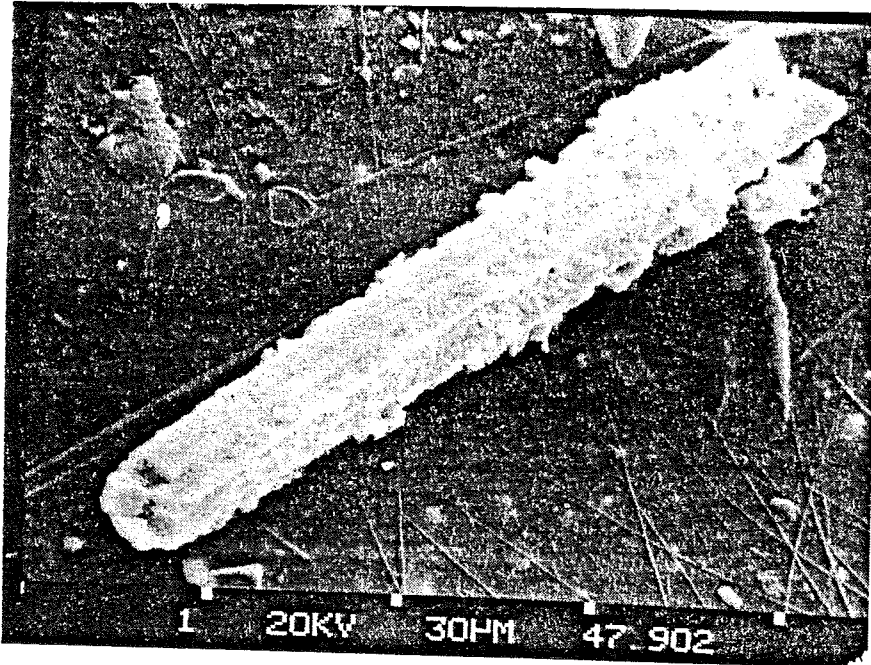
Micrograph 53.202 - general photo showing fecal pellet, floc and mucoids.

Two spectra (A53201 and B53201) are included to give an analysis of this sample.

Station MC-9: 10 m (82-03473)



Micrograph 47.901 - dinoflagellate.



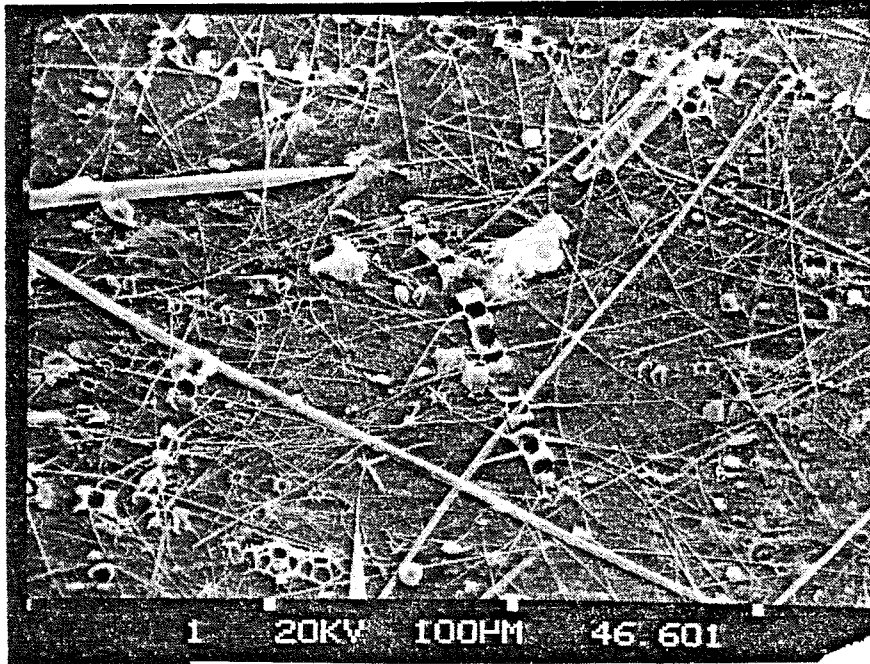
Micrograph 47.902 - silica elongated prism grain with iron coating. Small spheres of some kind are attached.

Station MC-9: 200 m (82-03467)

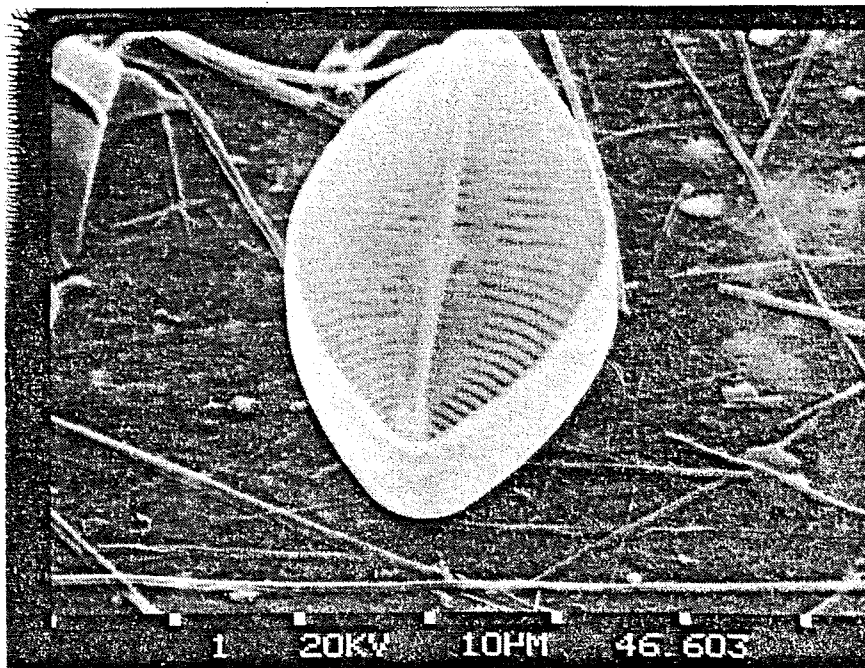


Micrograph 46.701 - silicoflagellates, diatom, plant debris, pico-plankton and NaCl cubes.

Station MC-11: 1 m (82-03465)

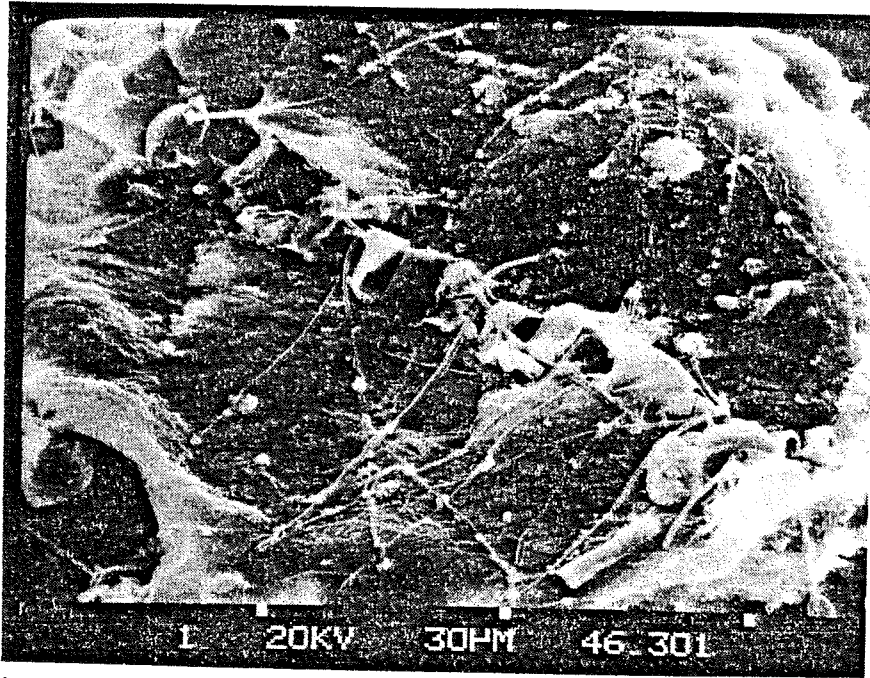


Micrograph 46.601 - general photo of sample.

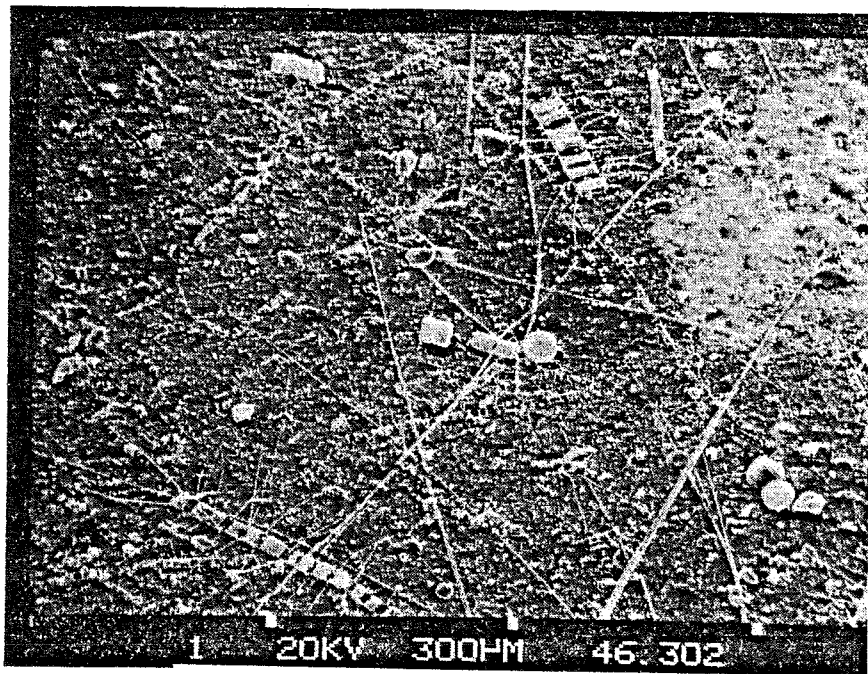


Micrograph 46.603 - diatom.

Station MC-11: 10 m (82-03463)

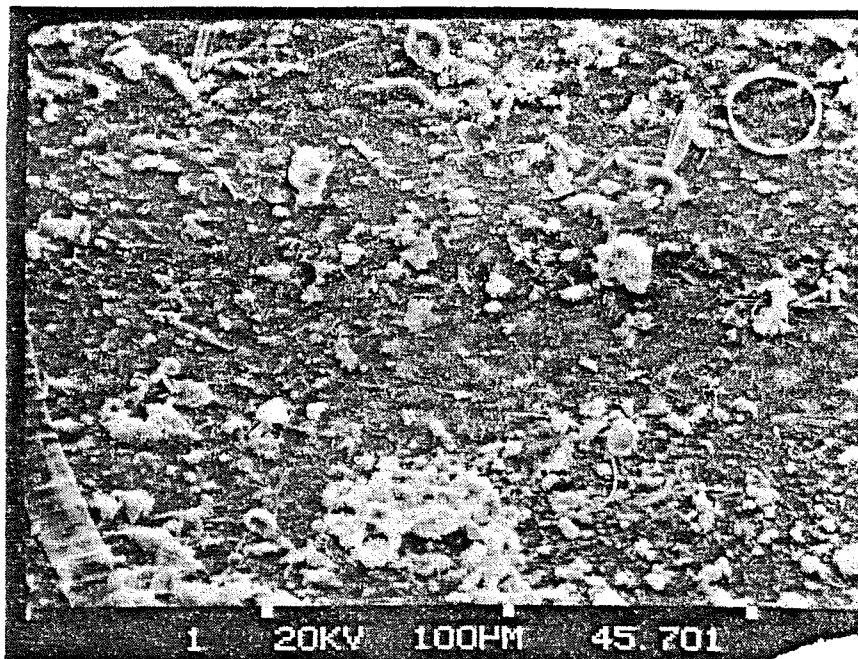


Micrograph 46.301 - diatom needles filled with minute salt particles (NaCl).



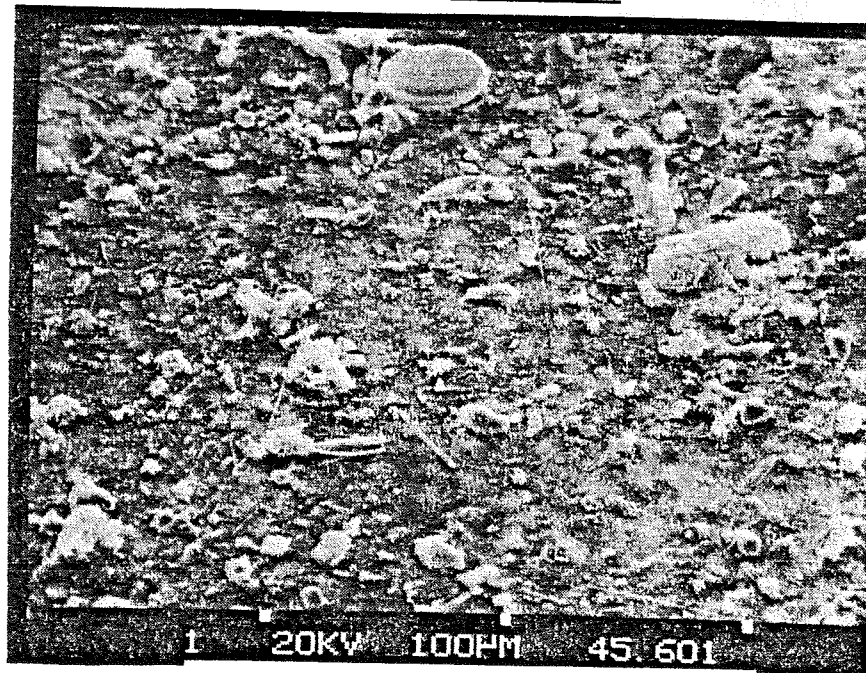
Micrograph 46.302 - general photo of sample.

Station MC-11: 200 M (82-03457)



Micrograph 45.701 - general photo of sample.

Station MC-11: 241 m (82-03456)



Micrograph 45.601 - general photo of sample.



ID:A49000  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	348
Mg	783
Al	9779
Si	33835
Cl	274
K	5768
Ca	592
Ti	280
Fe	3386
Bg	0

ID:A49000  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.04
Mg	0.08
Al	1.00
Si	3.46
Cl	0.03
K	0.59
Ca	0.06
Ti	0.03
Fe	0.35
Bg	0.00

ID:A49000  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	1.4
Al	17.8
Si	61.5
Cl	0.5
K	10.5
Ca	1.1
Ti	0.5
Fe	6.2

MC-1:50m  
Inorganic Floccule

ID:A50804  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	183
Mg	846
Al	4627
Si	20030
Cl	120
K	1800
Ca	734
Ti	144
Fe	2780
Bg	0

ID:A50804  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.04
Mg	0.18
Al	1.00
Si	4.33
Cl	0.03
K	0.39
Ca	0.16
Ti	0.03
Fe	0.60
Bg	0.00

ID:A50804  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	2.7
Al	14.8
Si	64.1
Cl	0.4
K	5.8
Ca	2.3
Ti	0.5
Fe	8.9

MC-3:20m  
Fecal Pellet

ID:A50701  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	99
Mg	514
Al	1818
Si	6058
Cl	1311
K	772
Ca	388
Ti	185
Fe	1521
Bg	0

ID:A50701  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.05
Mg	0.28
Al	1.00
Si	3.33
Cl	0.72
K	0.42
Ca	0.21
Ti	0.10
Fe	0.84
Bg	0.00

ID:A50701  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.8
Mg	4.1
Al	14.4
Si	47.8
Cl	10.4
K	6.1
Ca	3.1
Ti	1.5
Fe	12.0

MC-3:30m  
Small Floc

ID:A50702  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	78
Mg	134
Al	70
Si	391
Cl	1167
S	201
Ca	425
P	2173
Fe	17324
Bg	0

ID:A50702  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	1.11
Mg	1.92
Al	1.00
Si	5.59
Cl	16.69
S	2.87
Ca	6.07
P	31.06
Fe	247.63
Bg	0.00

ID:A50702  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.4
Mg	0.6
Al	0.3
Si	1.8
Cl	5.3
S	0.9
Ca	1.9
P	9.9
Fe	78.9

MC-3:30m  
Floccule of Iron and Phosphorus

ID:A50703  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	220
Mg	771
Al	3757
Si	14854
Cl	1819
K	2711
Ca	686
Ti	188
Fe	2270
Bg	0

ID:A50703  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.06
Mg	0.20
Al	1.00
Si	3.95
Cl	0.48
K	0.72
Ca	0.18
Ti	0.05
Fe	0.60
Bg	0.00

ID:A50703  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.8
Mg	2.8
Al	13.8
Si	54.5
Cl	6.7
K	9.9
Ca	2.5
Ti	0.7
Fe	8.3

MC-3:30m  
Floccule with Clays

ID:A50505 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	315
Mg	1927
Al	8672
Si	33097
Cl	259
K	4957
Ca	1610
Ti	562
Fe	5565
Bg	0

ID:A50505 EEDS-II  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.04
Mg	0.22
Al	1.00
Si	3.82
Cl	0.03
K	0.57
Ca	0.19
Ti	0.06
Fe	0.64
Bg	0.00

ID:A50505 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	3.4
Al	15.2
Si	58.1
Cl	0.5
K	8.7
Ca	2.8
Ti	1.0
Fe	9.8

MC-3:100m  
Floccule of Small Clay Particles and  
Diatoms

ID:A52001  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	220
Mg	19
Al	5184
Si	25287
Cl	-21
K	8212
Ca	56
Ti	96
Fe	49
Bg	0

ID:A52001  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.04
Mg	0.00
Al	1.00
Si	4.88
Cl	-0.00
K	1.58
Ca	0.01
Ti	0.02
Fe	0.01
Bg	0.00

ID:A52001  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	0.1
Al	13.3
Si	64.7
Cl	-0.1
K	21.0
Ca	0.6
Ti	21.0
Fe	0.1

MC - 4:5m  
K-Feldspar

ID:B52001 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	98
Mg	976
Al	1965
Si	19523
Cl	113
K	1286
Ca	67
Ti	207
Fe	1759
Bg	0

ID:B52001 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.05
Mg	0.50
Al	1.00
Si	9.94
Cl	0.06
K	0.66
Ca	0.03
Ti	0.10
Fe	0.89
Bg	0.00

ID:B52001 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.4
Mg	3.8
Al	7.6
Si	75.1
Cl	0.4
K	4.9
Ca	0.3
Ti	0.8
Fe	6.8

MC - 4:5m  
Mica

ID:C52001  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	55
Mg	102
Al	312
Si	22942
Cl	205
K	-33
Ca	80
Ti	-13
Fe	73
Bg	0

ID:C52001  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.18
Mg	0.33
Al	1.00
Si	73.63
Cl	0.66
K	-0.11
Ca	0.26
Ti	-0.04
Fe	0.23
Bg	0.00

ID:C52001  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.2
Mg	0.4
Al	1.3
Si	96.7
Cl	0.9
K	-0.1
Ca	0.3
Ti	-0.1
Fe	0.3

MC - 4:5m  
Diatom Material

ID: A51201  
SEMIQ; COUNTS

ELEMENTS	COUNTS
Na	-24
Mg	4724
Al	6083
Si	16929
Cl	42
K	4022
Ca	539
Ti	1304
Fe	6828
Bg	0

ID: A51201  
SEMIQ: RATIO/Al

ELEMENTS	RATIO
Na	-0.00
Mg	0.78
Al	1.00
Si	2.78
Cl	0.01
K	0.66
Ca	0.09
Ti	0.21
Fe	1.12
Bg	0.00

ID: A51201  
SEMIQ: NORMALIZE

ELEMENTS	%
Na	-0.1
Mg	11.7
Al	15.0
Si	41.9
Cl	0.1
K	9.9
Ca	1.3
Ti	3.2
Fe	16.9

MC-4:520m  
Biotite

ID: A51204  
SEMIQ; COUNTS

ELEMENTS	COUNTS
Na	625
Mg	171
Al	628
Si	1163
Cl	850
K	-325
Ca	73
Ti	50
Fe	13828
Bg	0

ID: A51204  
SEMIQ: RATIO/Al

ELEMENTS	RATIO
Na	0.99
Mg	0.27
Al	1.00
Si	2.78
Cl	1.35
K	-0.52
Ca	0.12
Ti	0.08
Fe	22.03
Bg	0.00

ID: A51204  
SEMIQ: NORMALIZE

ELEMENTS	%
Na	3.7
Mg	1.0
Al	3.7
Si	6.8
Cl	5.0
K	-1.9
Ca	0.4
Ti	0.3
Fe	81.0

MC-4:520m  
Iron-rich Floccule

ID: A48102  
SEMIQ; COUNTS

ELEMENTS	COUNTS
Na	89
Mg	311
Al	2664
Si	14997
Cl	299
K	1110
Ca	780
Ti	101
Fe	2282
Bg	0

ID: A48102  
SEMIQ: RATIO/Al

ELEMENTS	RATIO
Na	0.03
Mg	0.12
Al	1.00
Si	5.63
Cl	0.11
K	0.42
Ca	0.29
Ti	0.04
Fe	0.86
Bg	0.00

ID: A48102  
SEMIQ: NORMALIZE

ELEMENTS	%
Na	0.4
Mg	1.4
Al	11.8
Si	66.3
Cl	1.3
K	4.9
Ca	3.4
Ti	0.4
Fe	10.1

MC-6:10m  
General Analysis

ID: A48106  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	55
Mg	73
Al	204
Si	24268
Cl	185
K	-36
Ca	4
Ti	-30
Fe	44
Bg	0

ID: A48106  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.27
Mg	0.36
Al	1.00
Si	118.84
Cl	0.90
K	-0.18
Ca	0.02
Ti	-0.15
Fe	0.21
Bg	0.00

ID: A48106  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.2
Mg	0.3
Al	0.8
Si	98.0
Cl	0.7
K	-0.1
Ca	0.0
Ti	-0.1
Fe	0.2

MC-6:30m  
Fecal Pellet of Filaments

ID: A52902  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-105
Mg	2043
Al	5218
Si	16575
Cl	18
K	8532
Ca	-121
Ti	1663
Fe	9857
Bg	0

ID: A52902  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.02
Mg	0.39
Al	1.00
Si	3.18
Cl	0.00
K	1.63
Ca	-0.02
Ti	0.32
Fe	1.89
Bg	0.00

ID: A52902  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.2
Mg	4.7
Al	11.9
Si	37.9
Cl	0.0
K	19.5
Ca	-0.3
Ti	3.8
Fe	22.6

MC-7:10m  
Mica Plate

ID: A52504  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Mn	5467
Mg	1037
Al	3289
Si	9233
Cl	37
K	4967
Ca	497
Ti	231
Fe	5247
Bg	0

ID: A52504  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Mn	1.66
Mg	0.31
Al	1.00
Si	2.81
Cl	0.01
K	1.51
Ca	0.15
Ti	0.07
Fe	1.59
Bg	0.00

ID: A52504  
SEMIQ:NORMALIZE

ELEMENTS	%
Mn	18.2
Mg	3.5
Al	11.0
Si	30.8
Cl	0.1
K	16.6
Ca	1.7
Ti	0.8
Fe	17.5

MC-7:100m  
Small Particles

ID: A52202  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	175
Mg	435
Al	3260
Si	14730
Cl	121
K	1374
Ca	378
Ti	174
Fe	1789
Bg	0

ID: A52202  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.05
Mg	0.13
Al	1.00
Si	4.52
Cl	0.04
K	0.42
Ca	0.12
Ti	0.05
Fe	0.55
Bg	0.00

ID: A52202  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.8
Mg	1.9
Al	14.5
Si	65.7
Cl	0.5
K	6.1
Ca	1.7
Ti	0.8
Fe	8.0

MC-7:490m  
Fecal Pellet of Clays and Diatoms

ID:A53201  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	365
Mg	825
Al	9915
Si	40949
Cl	160
K	5841
Ca	1947
Ti	473
Fe	3277
Bg	0

ID:A53201  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.04
Mg	0.08
Al	1.00
Si	4.13
Cl	0.02
K	0.59
Ca	0.20
Ti	0.05
Fe	0.33
Bg	0.00

ID:A53201  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.6
Mg	1.3
Al	15.6
Si	64.2
Cl	0.3
K	9.2
Ca	3.1
Ti	0.7
Fe	5.1

MC-8:287m  
General Analysis

ID:B53201 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-184
Mg	3504
Al	9500
Si	25159
Cl	-147
K	10435
Ca	-123
Ti	1500
Fe	10987
Bg	0

ID:B53201 EEDS-II  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	-0.02
Mg	0.37
Al	1.00
Si	2.65
Cl	-0.02
K	1.10
Ca	-0.01
Ti	0.16
Fe	1.16
Bg	0.00

ID:B53201 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.3
Mg	5.8
Al	15.7
Si	41.5
Cl	-0.2
K	17.2
Ca	-0.2
Ti	2.5
Fe	18.1

MC-8:287m  
General Analysis

### SUNNESHINE FIORD

This fjord is at least 241 m deep, has a very long sill only 64 m deep, and is only 36 km long with a mean width of 3.6 km. The fjord has a very small hinterland (525 km<sup>2</sup>) and yet receives a relatively large annual input of freshwater runoff (0.34 km<sup>3</sup>). Sunneshine Fiord merits special attention within the SAFE project for it has the largest tidal prism (0.3 km<sup>3</sup>) of any of the SAFE-investigated fjords and with spring tides of over 4 m. Less than 28 % of the fjord hinterland is covered in glacial ice and 50 % of the land is at elevations in excess of 1000 m. The total input of SPM that annually enters the fjord is only 44,000 tonnes of sediment of which < 14 % enters through the head of the fjord. There are a couple of tidewater glaciers whose melt water enters along the margins of the fjord. These are presently retreating at  $\approx 8 \text{ m a}^{-1}$ .

At the time of sampling, Sunneshine Fiord had cold surface waters (-0.3 °C) and the water temperatures decreased with depth to -1.57 °C at 200 m (SU1: Fig. D). The salinity increased from 30.0 ‰ at the water surface to 33.3 ‰ at depth. The waters were very well oxygenated with the lowest dissolved oxygen values at 6.5 ml L<sup>-1</sup>.

Fifty SPM samples were collected (Fig. D). The mean grain size of the deflocculated SPM ranged from 6.5  $\phi$  to 7.5  $\phi$ , i.e. 18 % to 44 % clay. Mineralogy is dominated by mica, quartz, feldspar and heavy minerals. The atomic C/N of the suspended sediment was relatively high, between 5 and 25. The organic carbon fraction of the SPM was typically between 0.1 mg L<sup>-1</sup> to 0.3 mg L<sup>-1</sup>. The bottom sediments in the fjord contained 0.8 % organic carbon and these values decreased towards the shelf (unusual to other fjords) to 0.8 %.

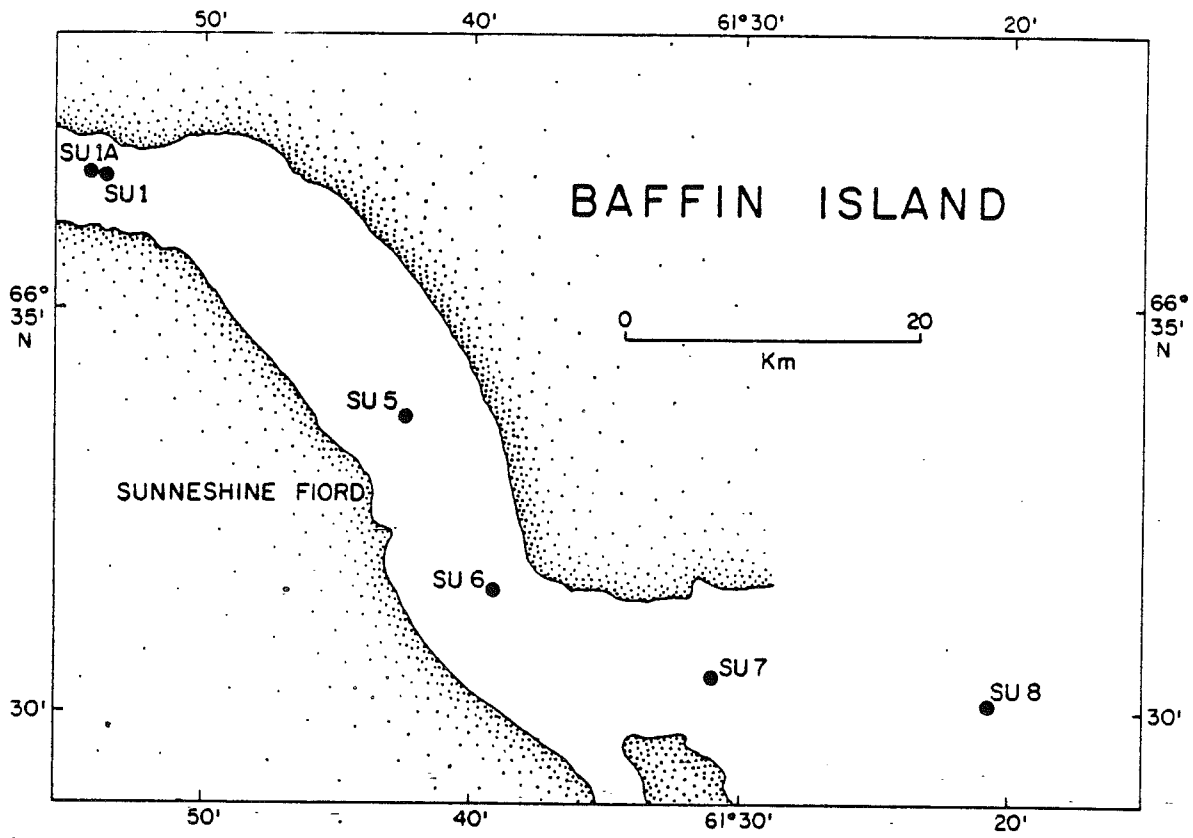


Fig. D- Stations of Sunneshine Fiord



Sunneshine Fiord

Station SU-1: 10 m (82-03108)

SPM conc. = 0.808 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 62

Description from SEM micrographs -

This sample is mostly diatoms, mucoids and silicoflagellates. Some mucoids are filled with diatom needles.

Station SU-1: 30 m (82-03106)

SPM conc. = 1.611 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 63

Description from SEM micrographs -

Chain diatoms, needles and agglomerates containing siliceous spines are seen in this sample. Fecal pellets 300µm in length and composed of diatoms are also found. A few large, dry-looking mucoids are present as well.

Station SU-1: 75 m (82-03104)

SPM conc. = 0.431 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 64

Description from SEM micrographs -

This sample contains small amounts of individual particles, mucoids, chain and concentric diatoms, agglomerates made of diatoms, spicules, inorganic flocs and long fecal pellet-like flocs composed of spicules. No photos were saved of this sample, however, a general spectrum analysis is included (A10401).

Station SU-1: 200 m (82-03101)

SPM conc. = 1.286 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 65

Description from SEM micrographs -

Small individual grains, fecal pellets, mucoids and small clay flocs are all present. Some mucoids have inclusions. There are also some flattened flocs with fine-grained material. A few diatoms were also present.

Station SU-5: 5 m (82-03119)  
SPM conc. = 1.424 mg L<sup>-1</sup>  
Histogram of grain size distribution - Fig. 66

Description from SEM micrographs -  
This sample is highly contaminated with smooth lumps, probably aluminum and chlorine. The sample consists of pico-plankton, silicoflagellates and spicules (needles). Chain diatoms are common.

Station SU-5: 30 m (82-03116)  
SPM conc. = 1.115 mg L<sup>-1</sup>  
Histogram of grain size distribution - Fig. 67

Description from SEM micrographs -  
This sample contains a few flocs of remnant concentric saucer-like diatoms as well as chain diatoms and spicules. Individual particles are common.

Station SU-5: 50 m (82-03115)  
SPM conc. = 0.728 mg L<sup>-1</sup>  
Histogram of grain size distribution - Fig. 68

Description from SEM micrographs -  
Contamination was noticed on the filter of this sample (Al and Cl spheres). This may have occurred during mounting. The sample is composed of individual grains, remnant chain diatoms, flocs, mucoids and fecal pellets.

Station SU-5: 150 m (82-03112)  
SPM conc. = 2.372 mg L<sup>-1</sup>  
Histogram of grain size distribution - Fig. 69.

Description from SEM micrographs -  
The sample contains numerous individual particles, clay rosettes and concentric diatoms (intact).

Station SU-6: 10 m (82-03128)

SPM conc. = 1.664 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 70

Description from SEM micrographs -

Chain diatoms of various types are common in this sample as well as mucoids filled with diatom material. Fecal pellets, individual particles and large (150µm) mica plates are also seen.

Station SU-6: 30 m (82-03126)

SPM conc. = 0.421 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 71.

Description from SEM micrographs -

There are numerous silt grains such as micas, feldspar and quartz. Fecal pellets seen often have a mucus coating so as to hide their contents.

Station SU-6: 75 m (82-03124)

SPM conc. = 0.609 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 72

Description from SEM micrographs -

Mucoid flocs, clay rosettes, fecal pellets and chain diatoms are all common in this sample.

Station SU-6: 150 m (82-03122)

SPM conc. = 1.589 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 73

Description from SEM micrographs -

Individual particles, organic and inorganic flocs are all common in this sample. Mucoids, silt grains, mica, feldspar, remnant concentric and chain diatoms are also found.

Station SU-7: 10 m (82-03131)

SPM conc. = 0.853 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 74

Description from SEM micrographs -

There are less diatoms present here as compared to other fjords at the same depth. There is a star-shaped organism with mucus around it as well as silt grains.

Station SU-7: 30 m (82-03133)

SPM conc. = 0.549 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 75.

Description from SEM micrographs -

Numerous mucoids, a few chain diatoms, flocs and individual particles are found in this sample. Large (100µm) concentric diatoms, silt grains, feldspars, quartz, fecal pellets and filaments are also seen.

Station SU-7:57 m (82-03131)

SPM conc. = 0.814 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 76

Description from SEM micrographs -

Individual grains, mucoids, remnant diatoms, large concentric diatoms, mica plates and organic flocs all populate this sample.

Station SU-8: 10 m (82-03145)

SPM conc. = 1.113 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 77

Description from SEM micrographs -

Plankton are abundant here. Biogenic material is found as well. Pseudo-pellets (flattened) are plankton-rich.

Station SU-8: 50 m (82-03142)

SPM conc. = 0.662 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 78

Description from SEM micrographs -

Individual particles, silt grains, mica plates, feldspars, chain diatoms, parts of pellets (pseudo) and flocs are all scattered throughout this sample.

Station SU-8: 75 m (82-03141)

SPM conc. = 0.244 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 79

Description from SEM micrographs -

Individual grains, pellets and remnant diatoms (pennate, chain and concentric) are all common in this sample. Clay flocs and mucoids are also found. No photos were taken.

Station SU-8: 150 m (82-03139)

SPM conc. = 0.793 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 80

Description from SEM micrographs -

This sample is mostly individual particles. A few organic flocs, large mica plates, mucoids and chain diatoms are found. Clay flocs and rosettes are also seen.

One floc consisting of Ca and Mg in a 5:1 ratio was analyzed. It's spectrum (B13901) is included.

SAMPLE NO. - 498 J. SYVITSKI 8203108  
 SUI 10 SUNSHINE FJORD  
 MILLIMETER EQUIVALENTS

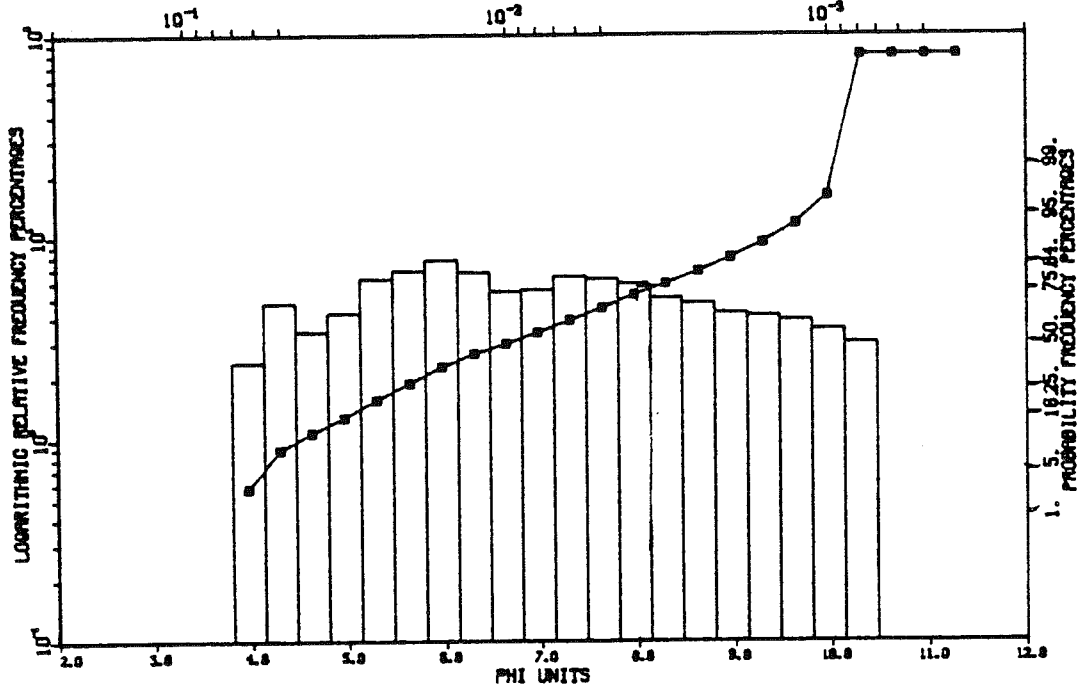


Fig. 62

SAMPLE NO. - 501 J. SYVITSKI 8203108  
 SUI 30 SUNSHINE FJORD  
 MILLIMETER EQUIVALENTS

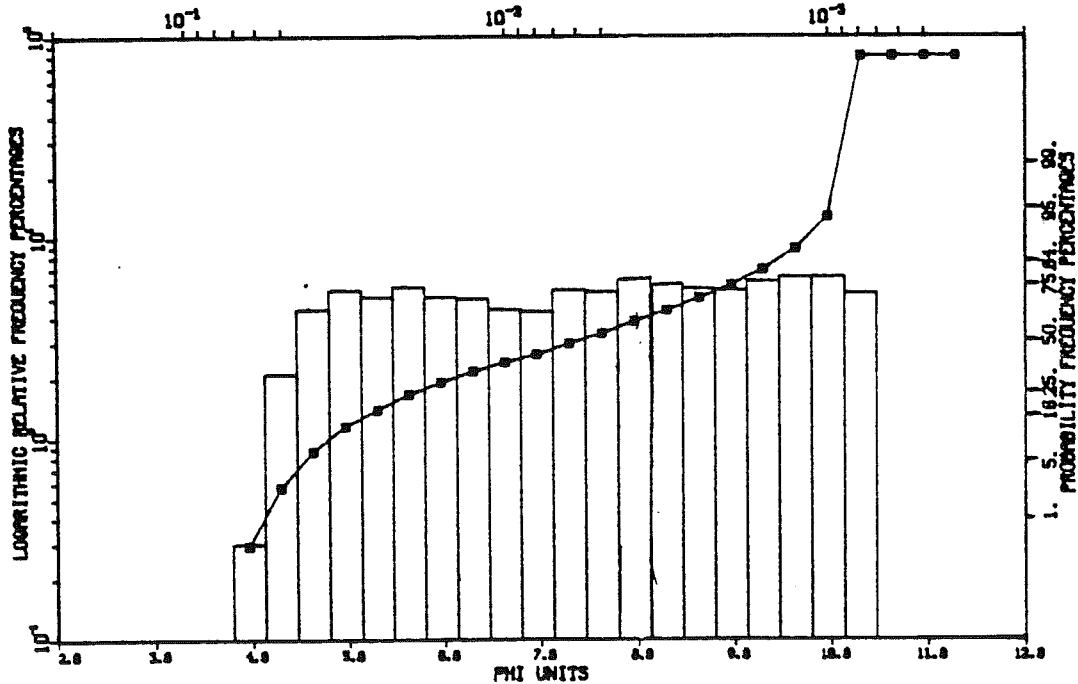


Fig. 63

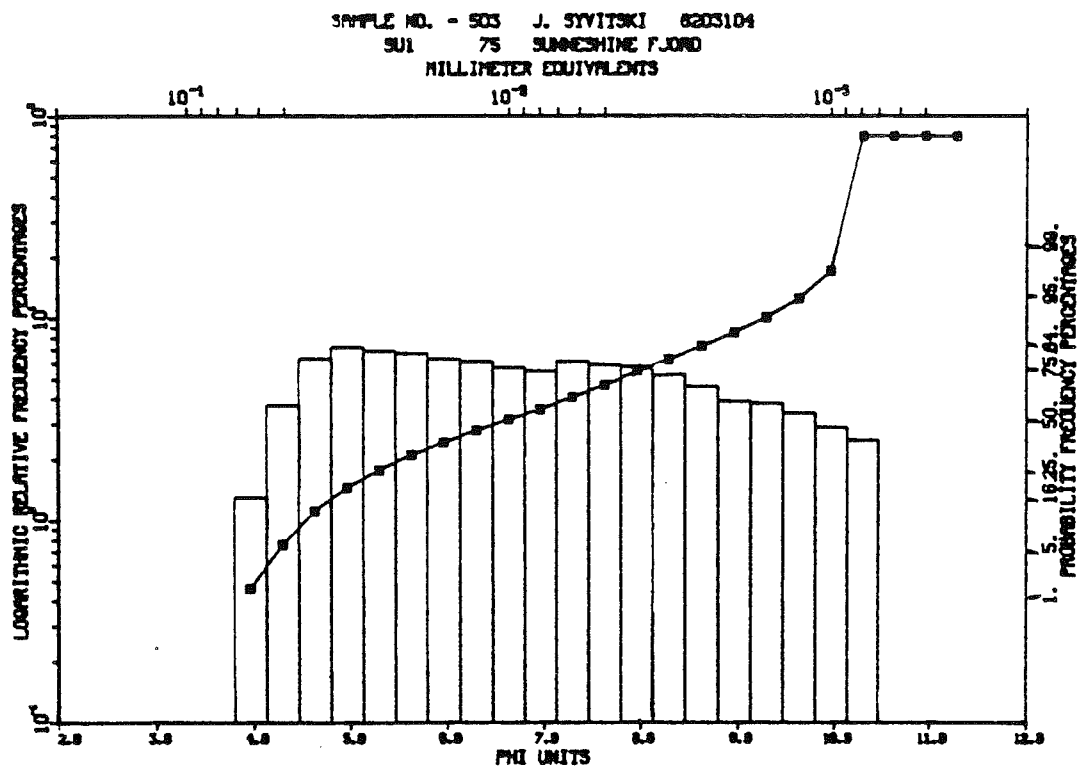


Fig. 64

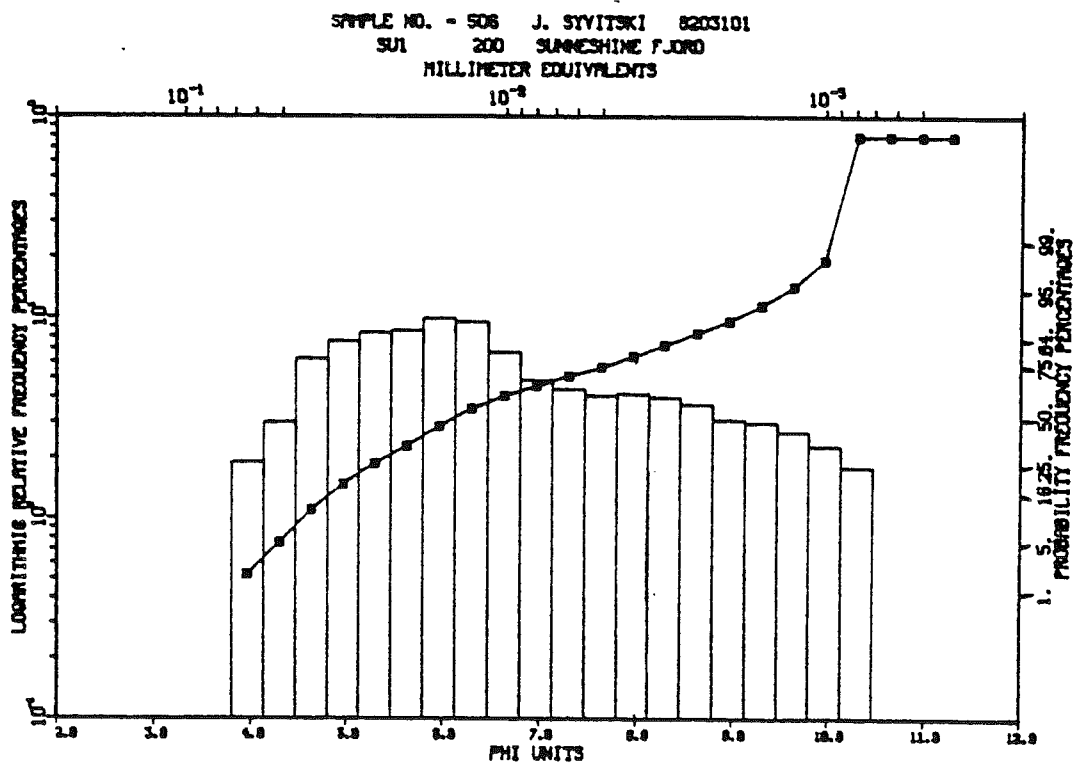


Fig. 65

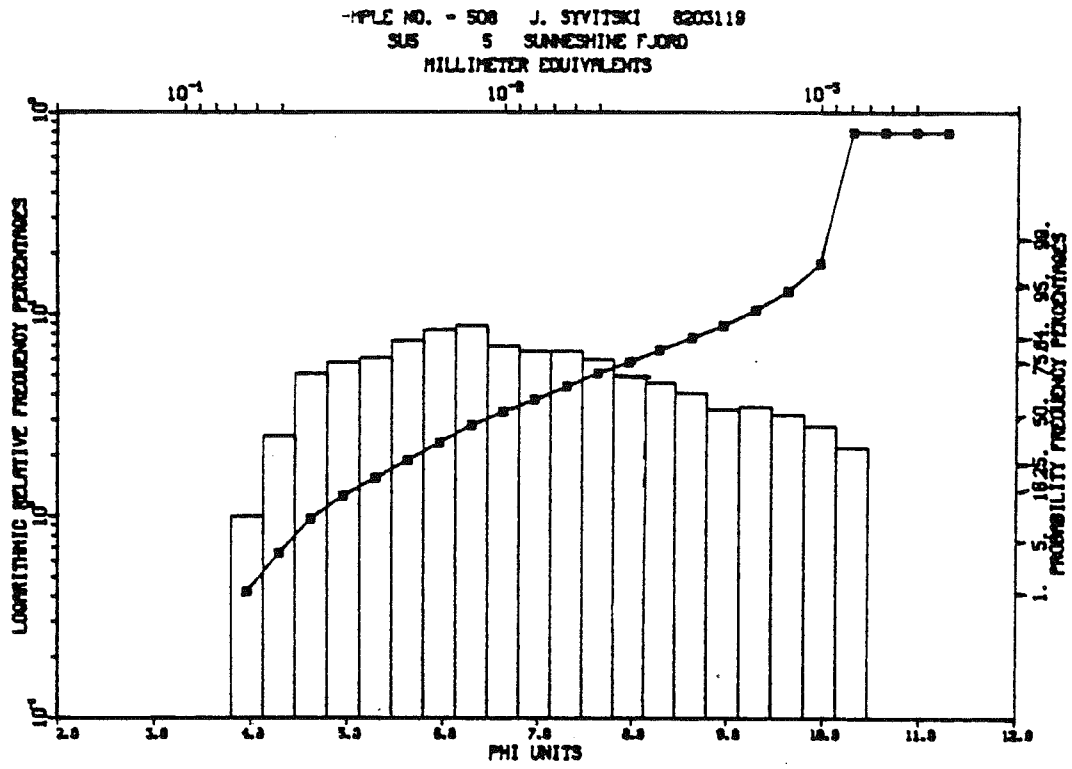


Fig. 66

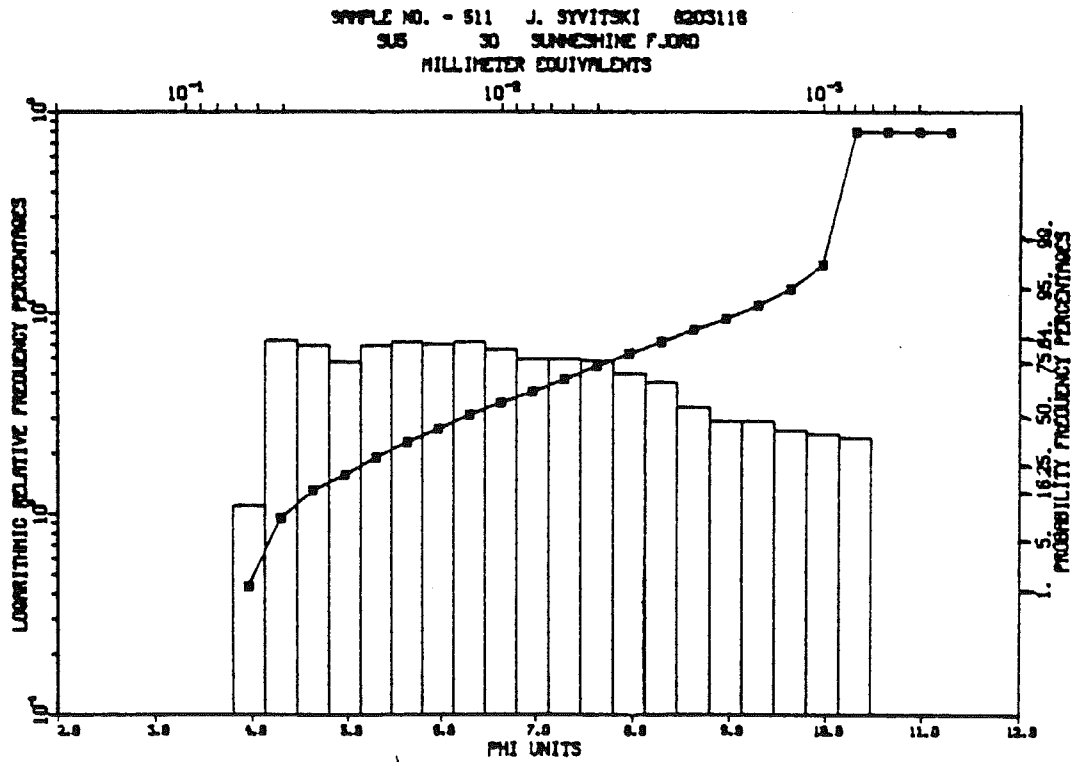


Fig. 67



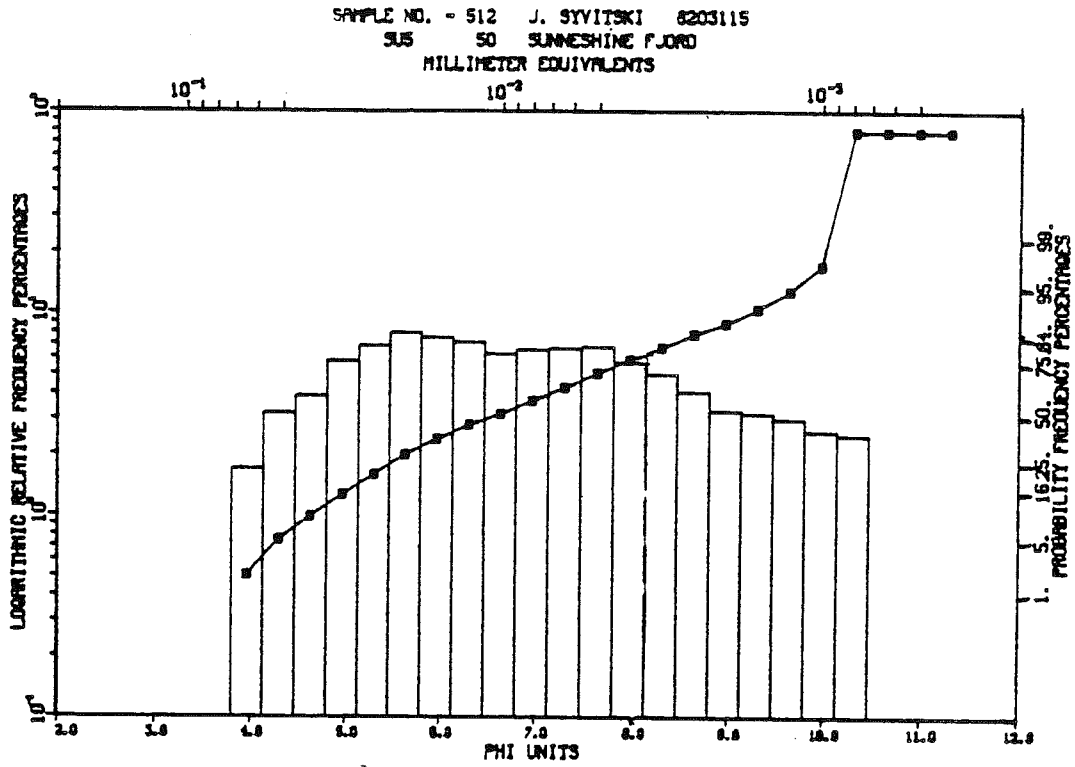


Fig. 68

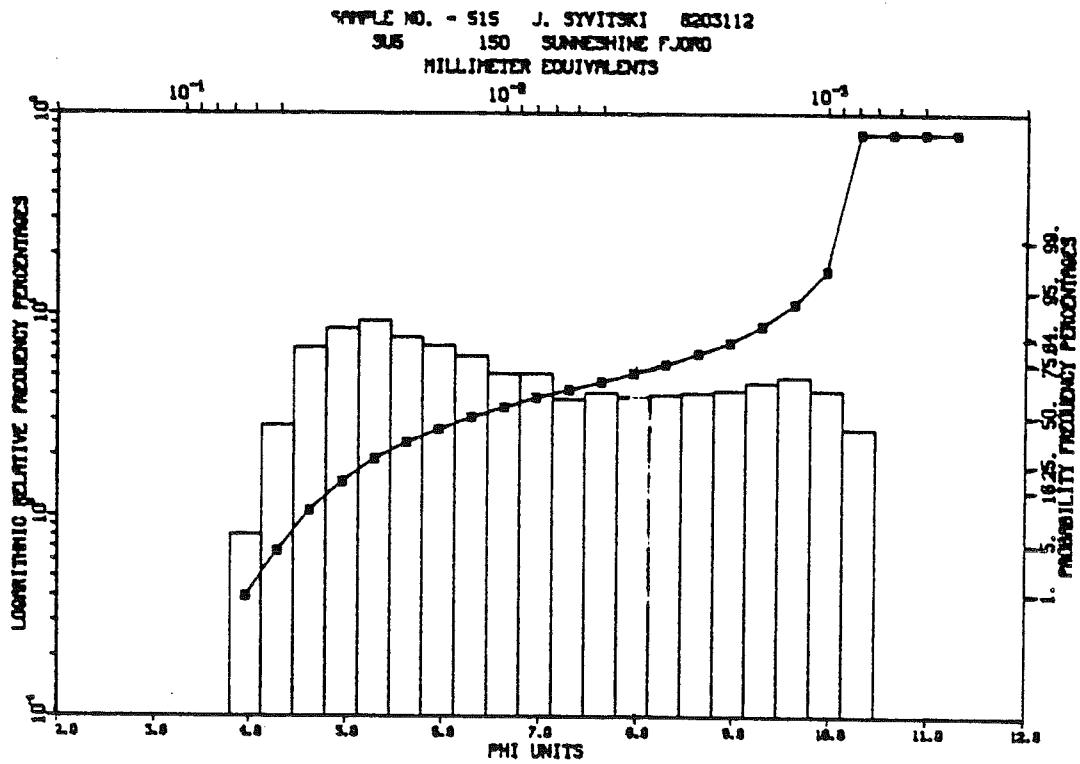


Fig. 69

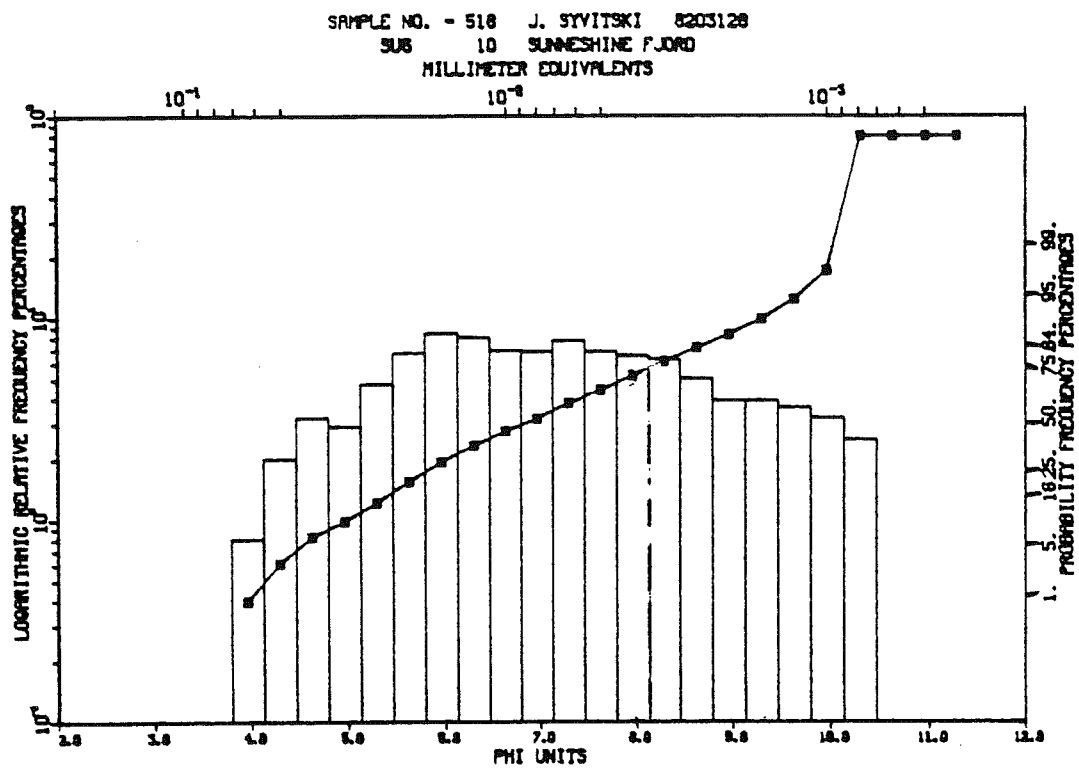


Fig. 70

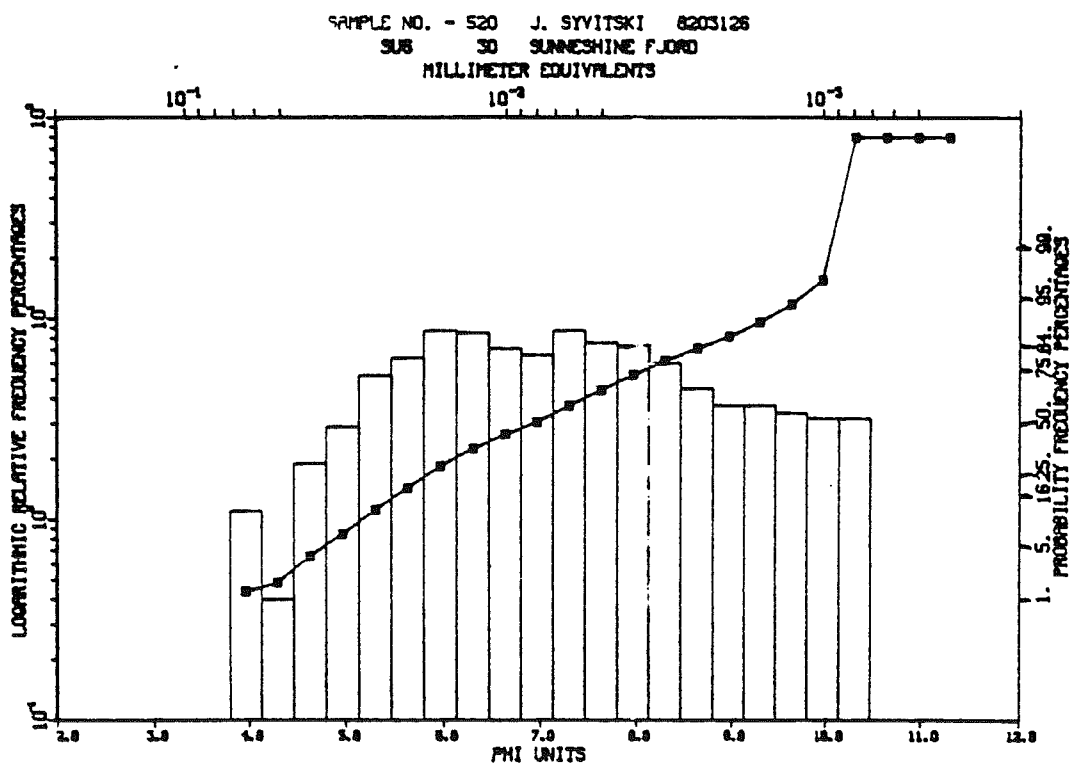


Fig. 71

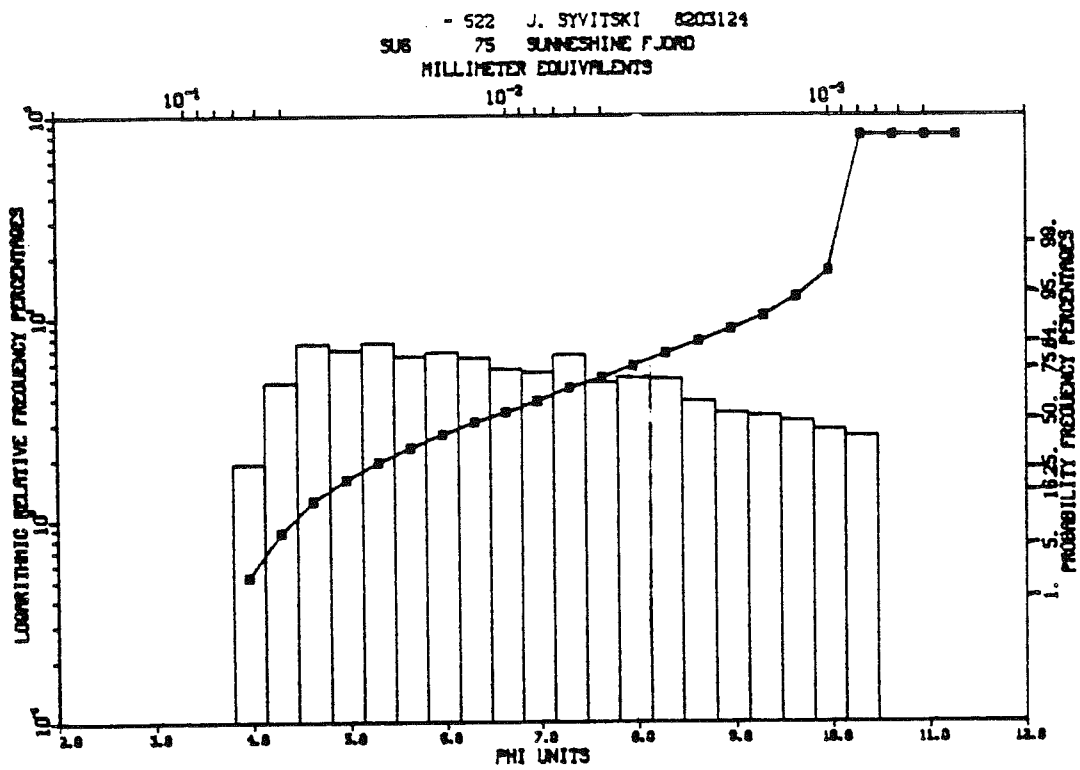


Fig. 72

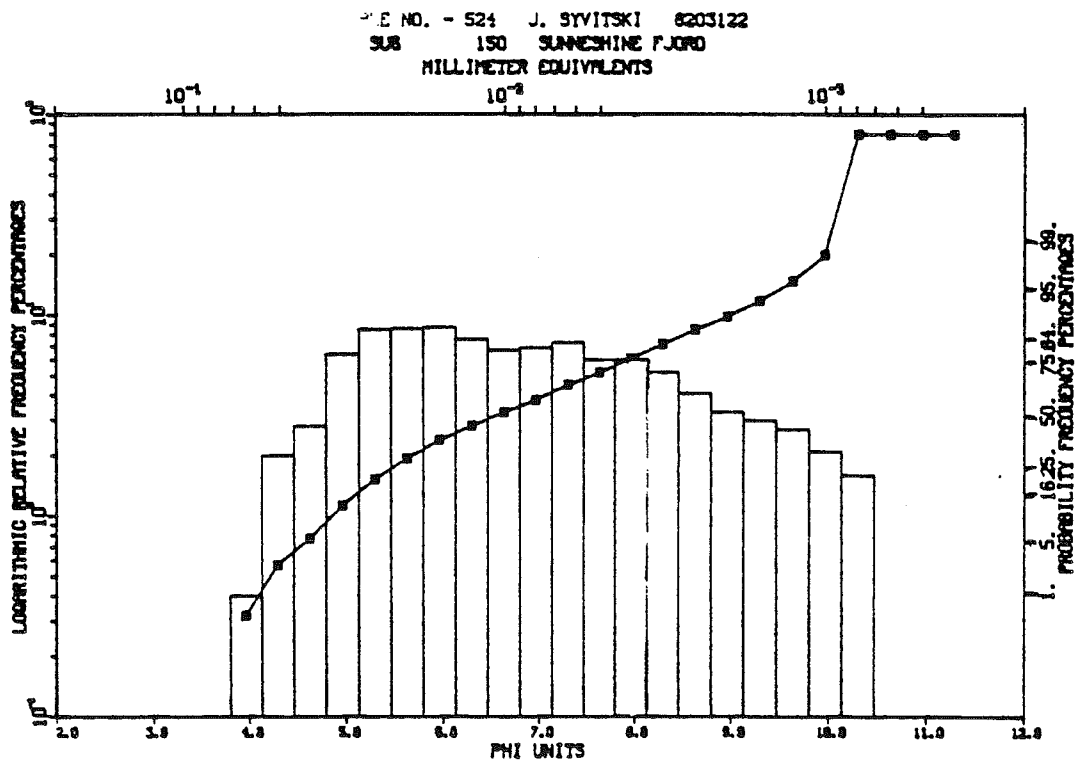


Fig. 73

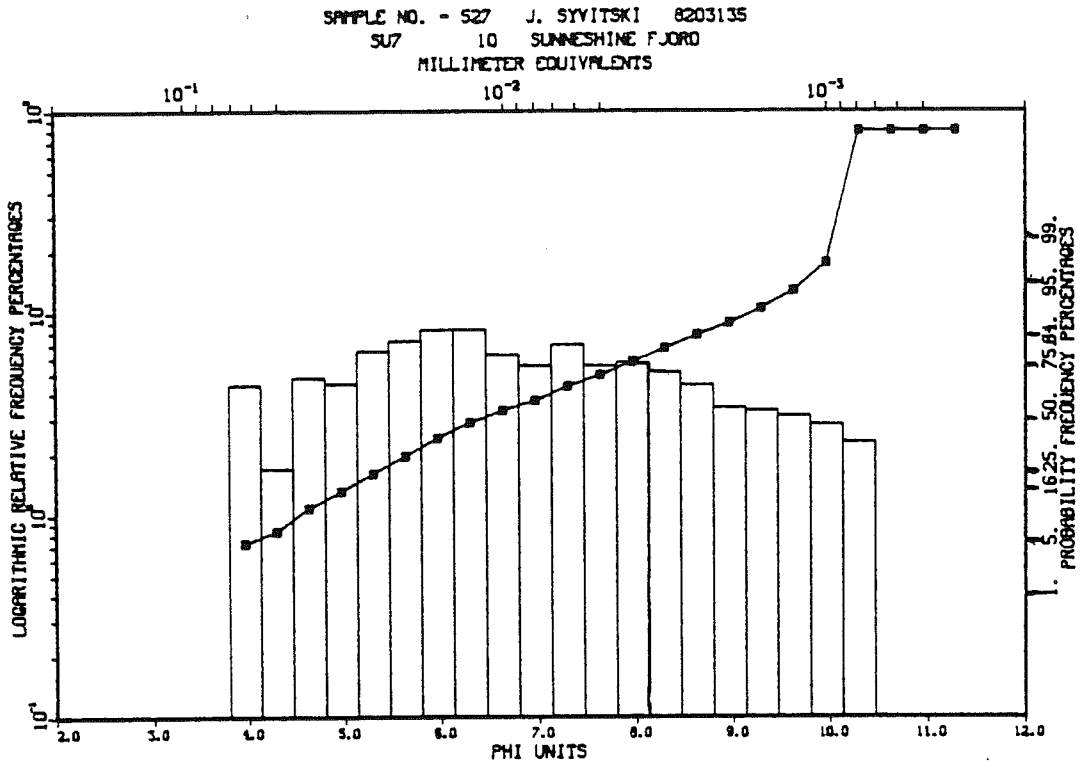


Fig. 74

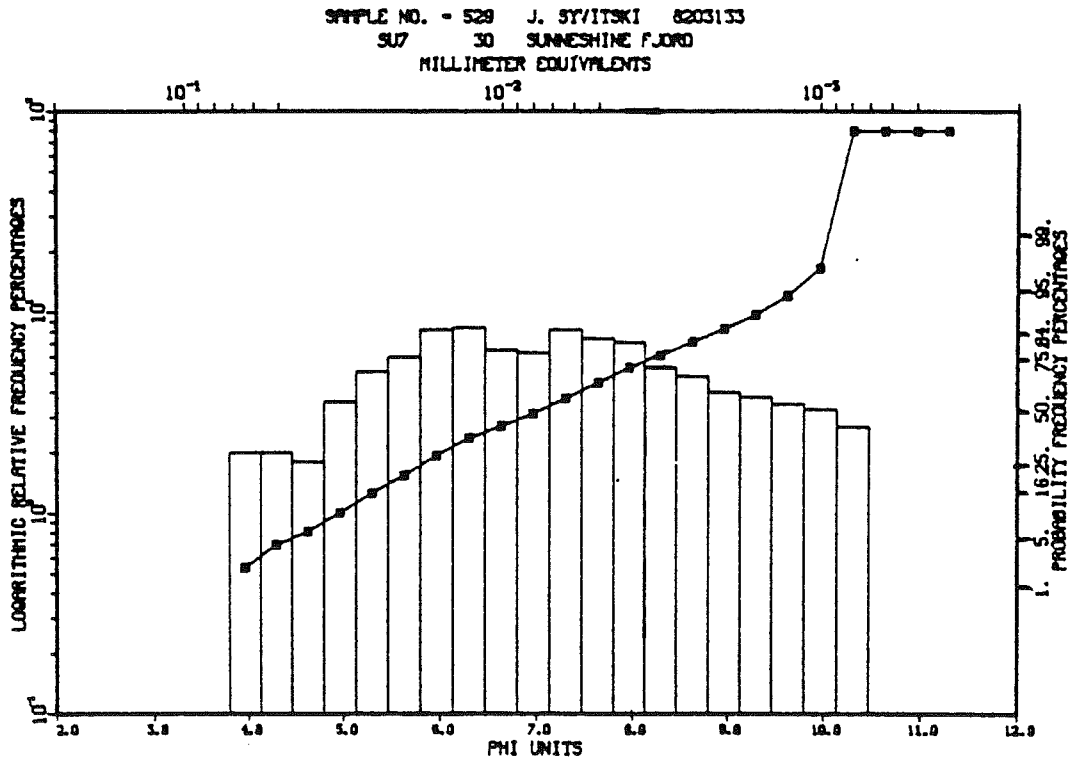


Fig. 75

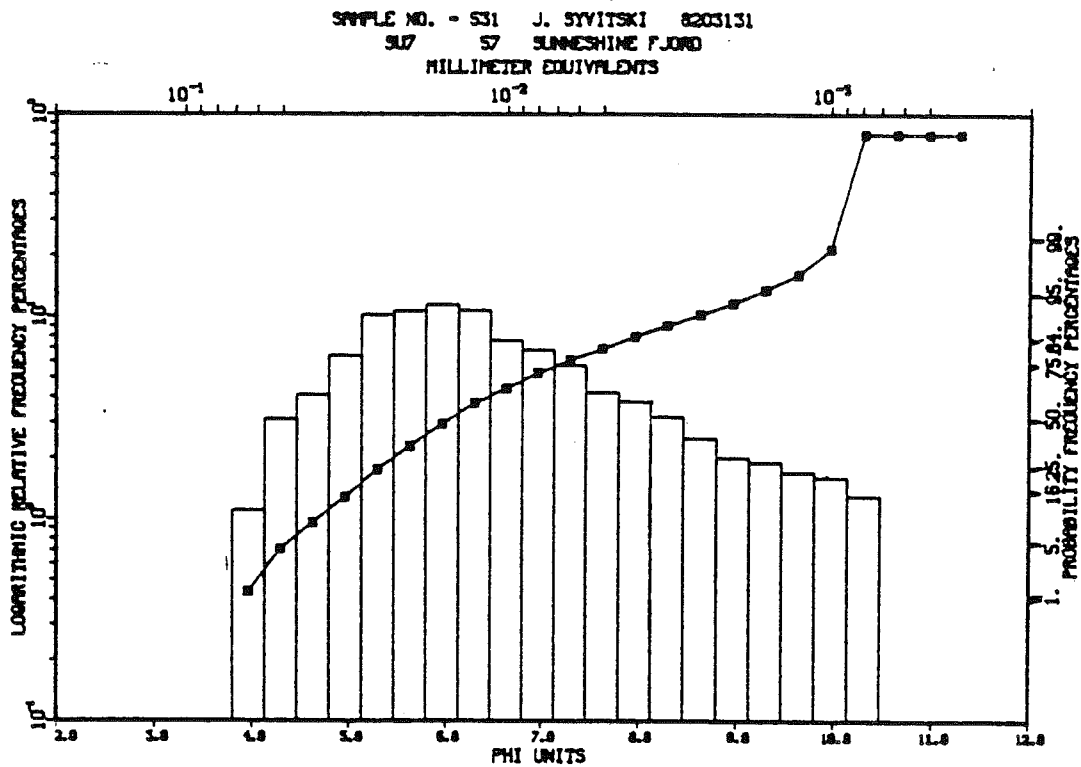


Fig. 76

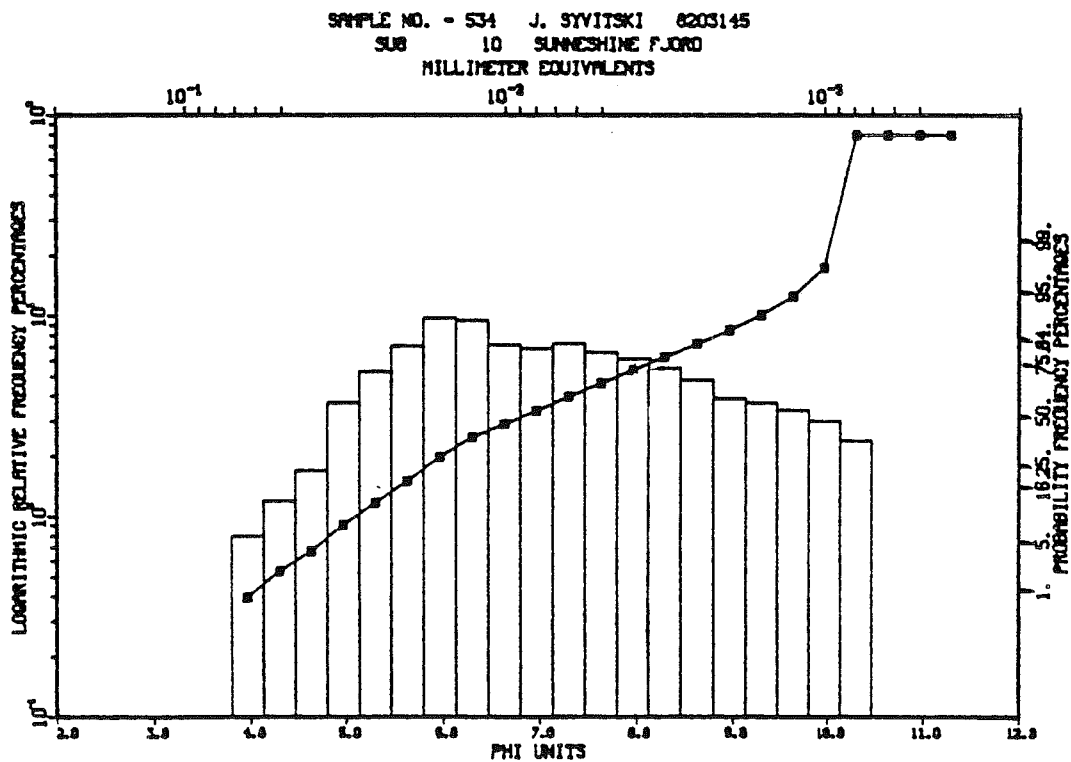


Fig. 77

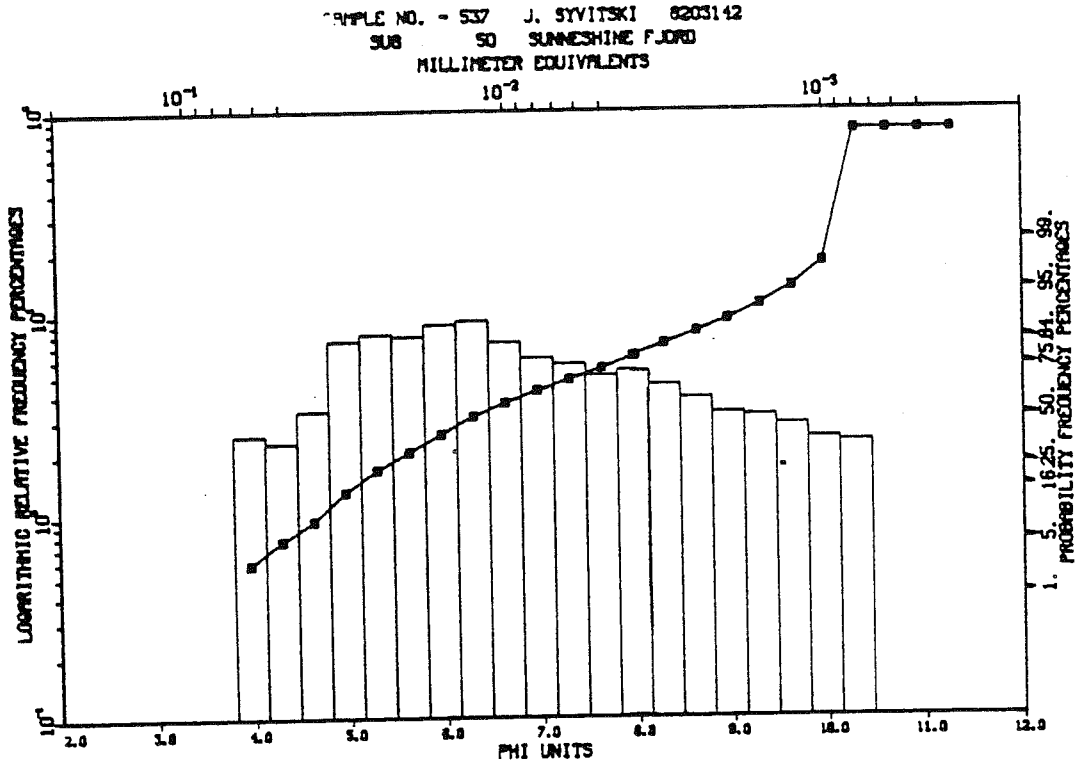


Fig. 78

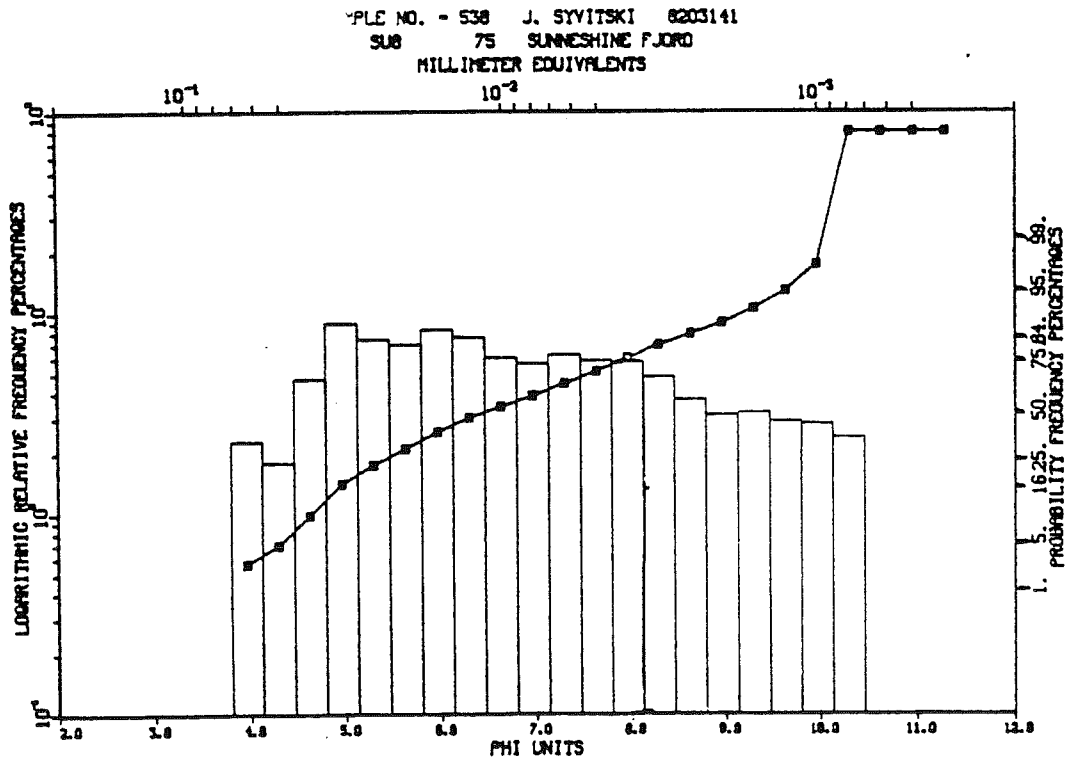


Fig. 79

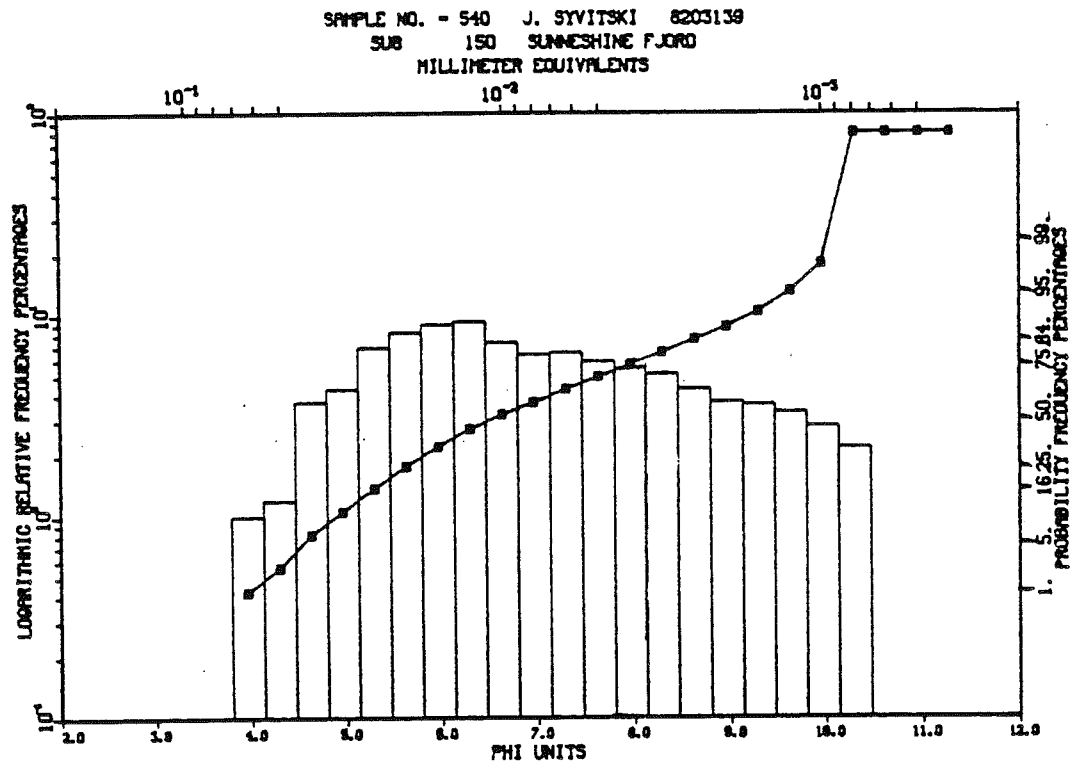
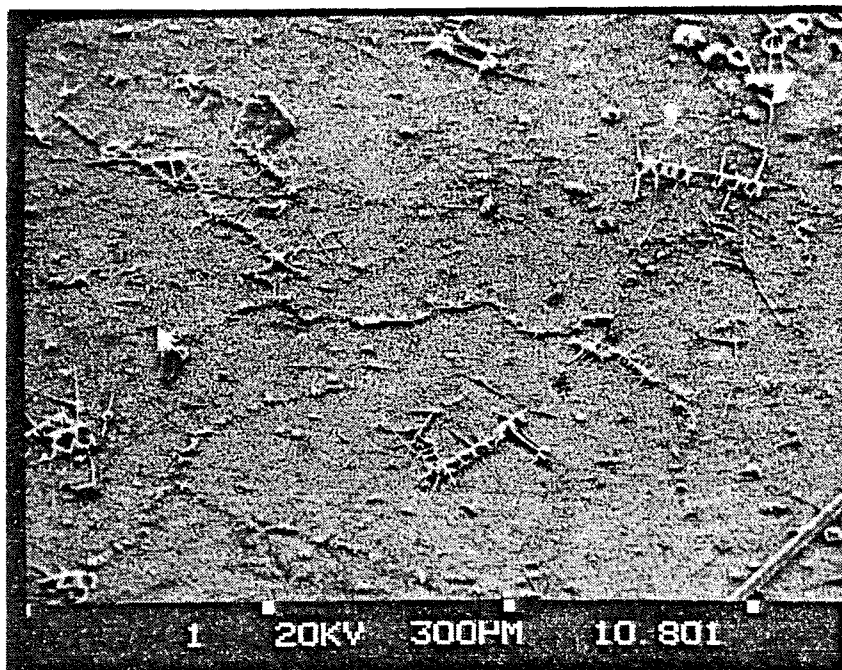
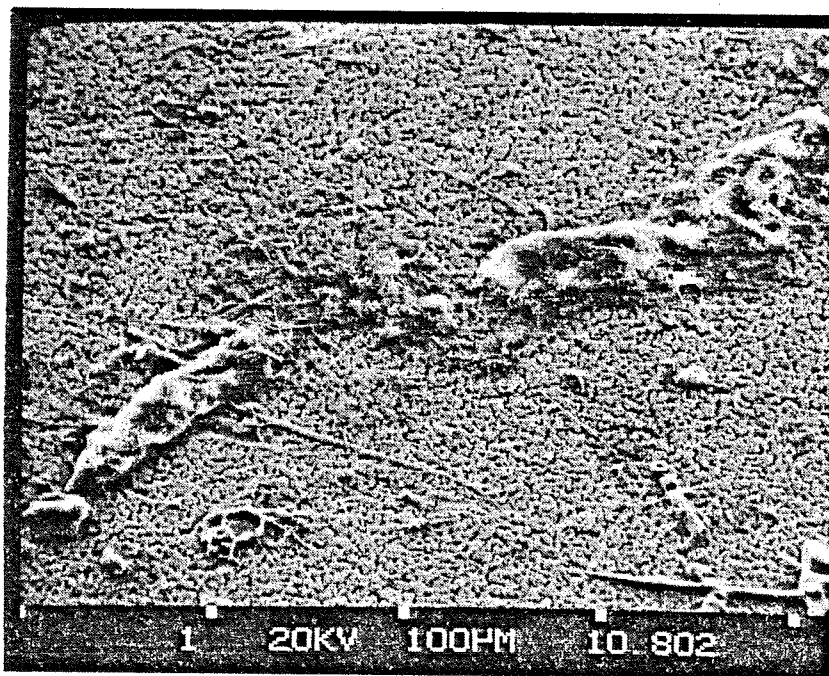


Fig. 80

Station SU-1: 10 m (82-03108)

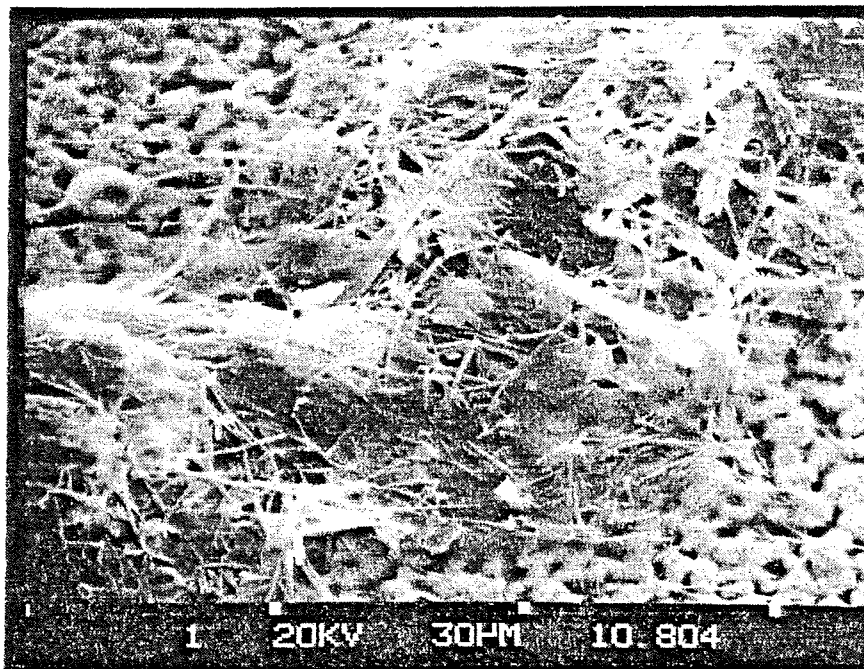


Micrograph 10.801 - general photo of sample.

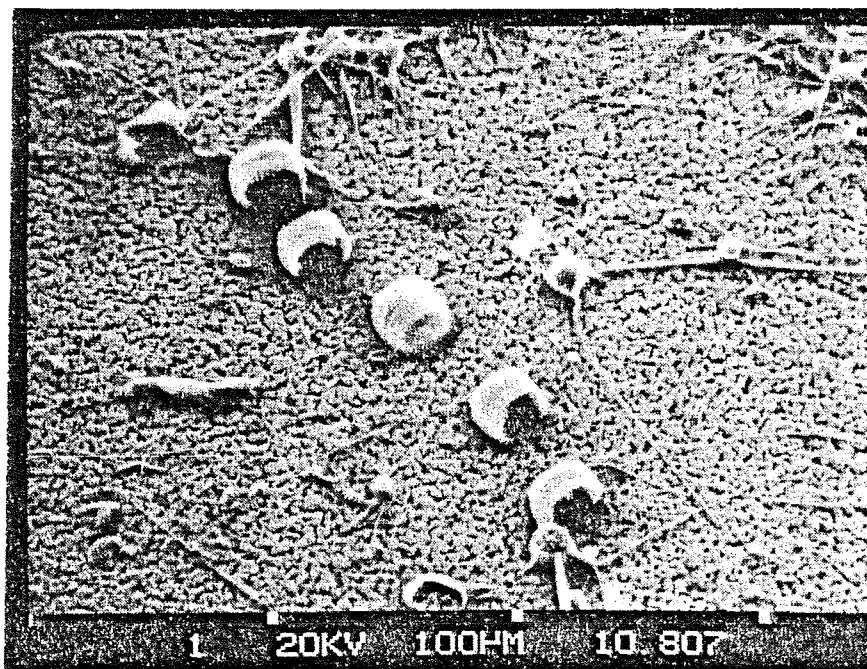


Micrograph 10.802 - fecal pellet filled with broken diatom material.



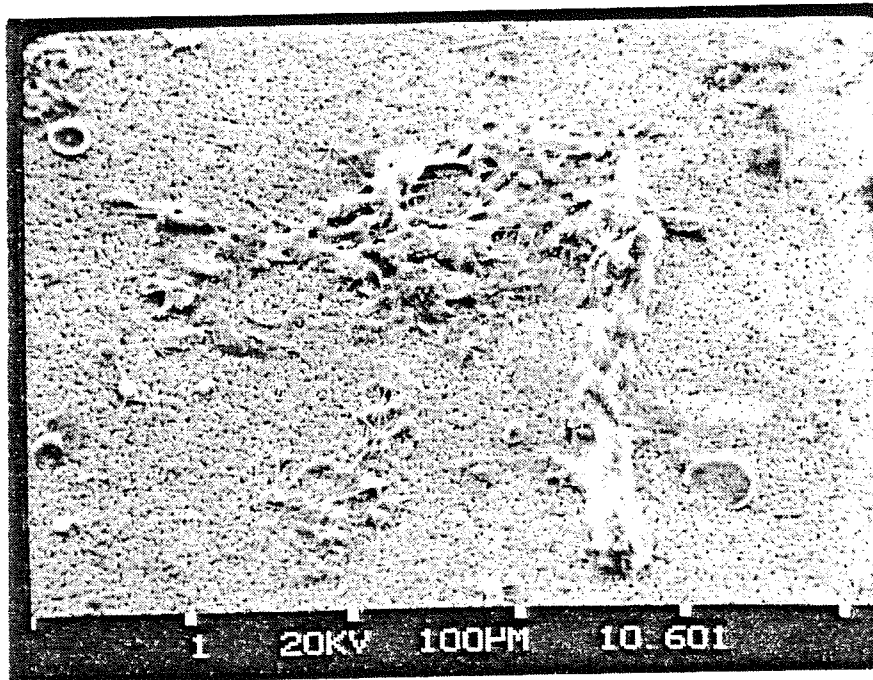


Micrograph 10.804 - close-up of fecal pellet contents.

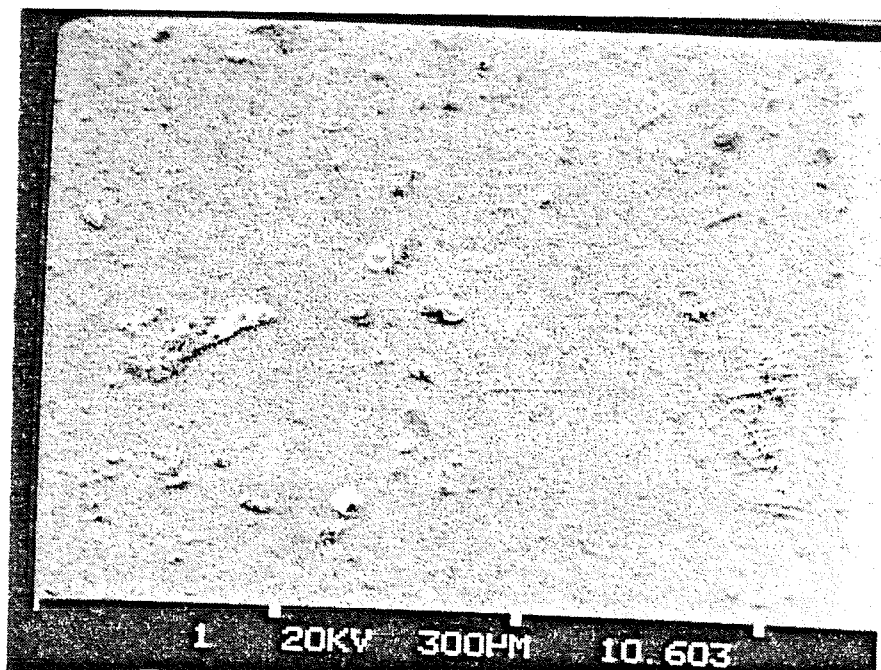


Micrograph 10.807 - concentric diatoms caught in a thin film of mucus.

Station SU-1: 30 m (82-03106)

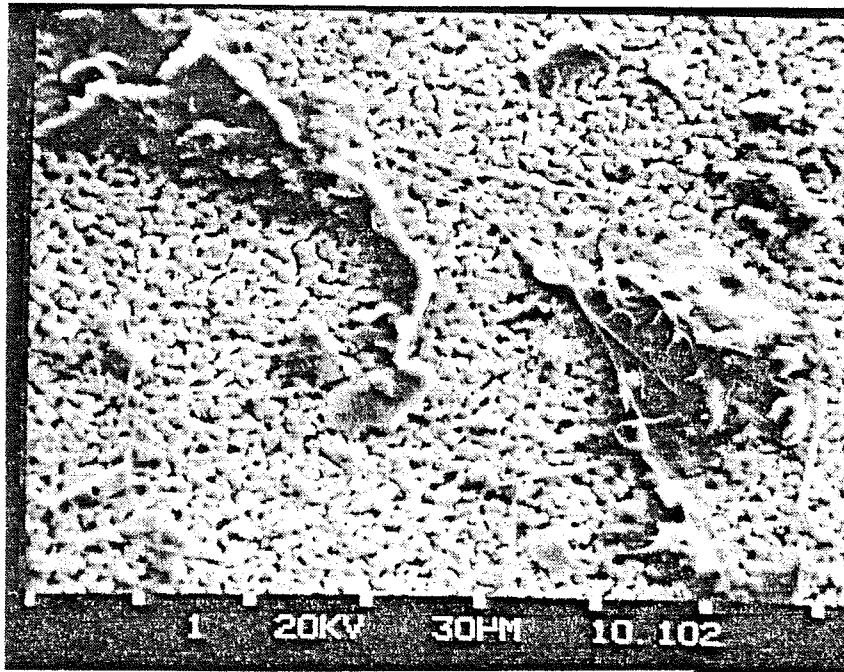


Micrograph 10.601 - agglomerate of diatoms.

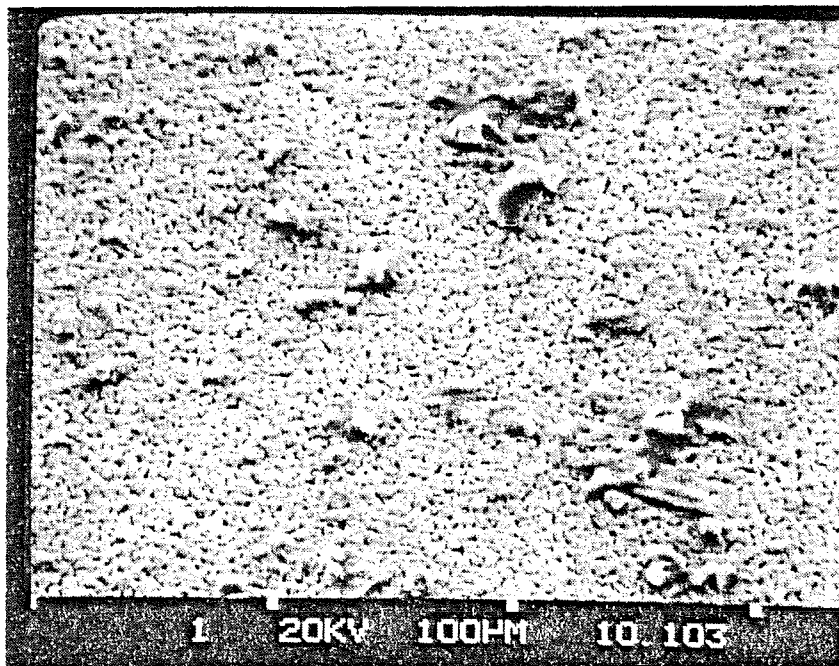


Micrograph 10.603 - general photo of sample.

Station SU-1: 200 m (82-03101)

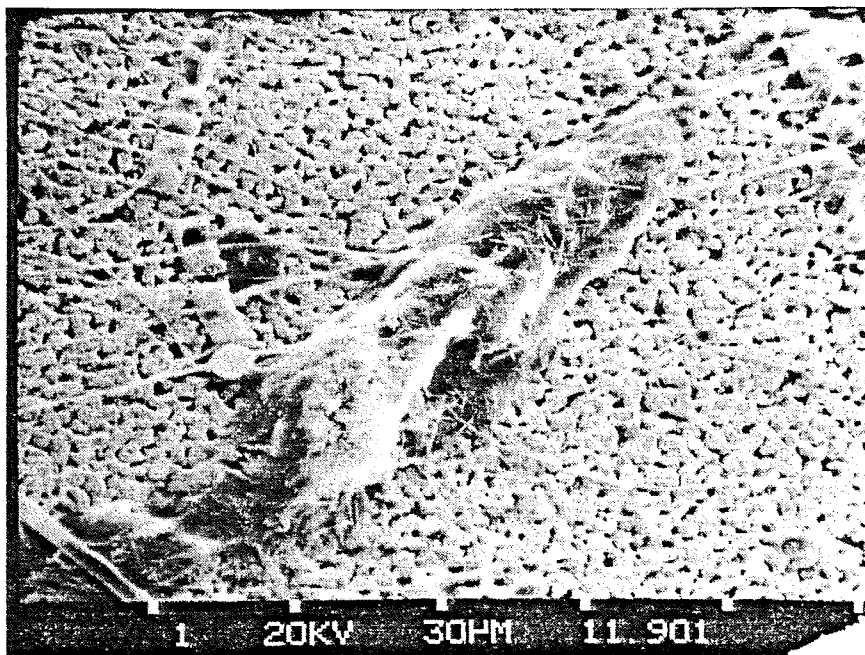


Micrograph 10.102 - organic-rich flocs.

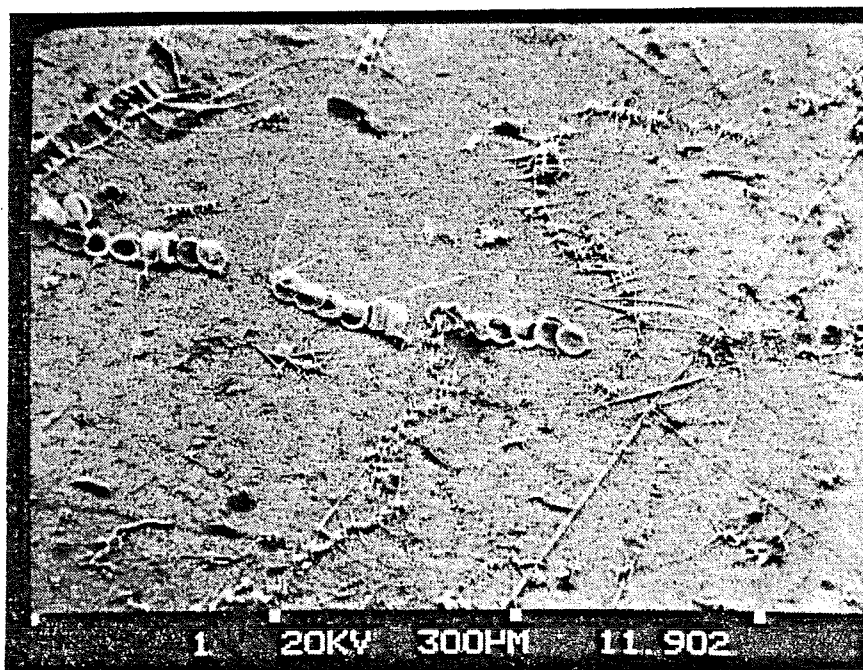


Micrograph 10.103 - individual grains trapped in a fine mucus.

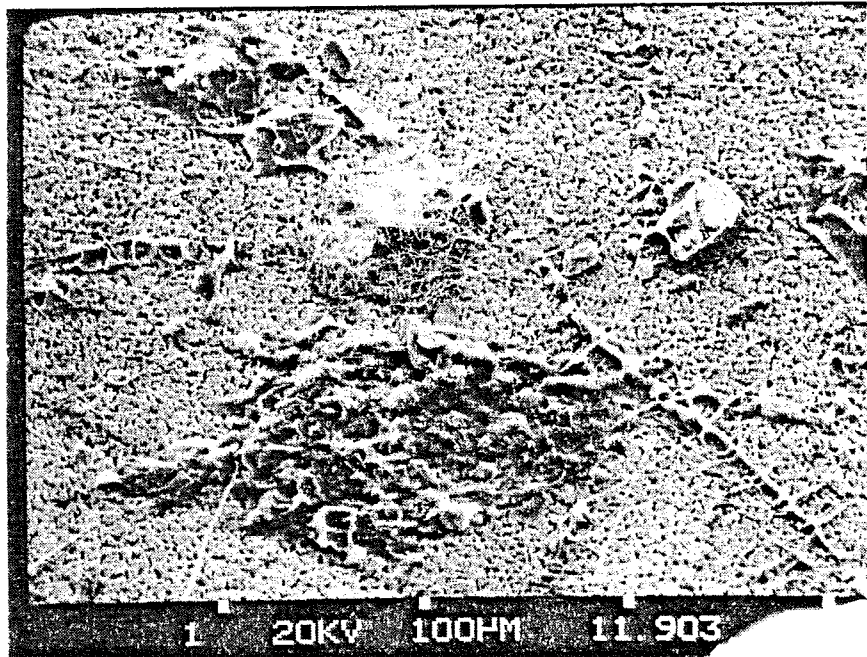
Station SU-5: 5 m (82-03119)



Micrograph 11.901 - fecal pellet covered by mucus. The pellet is largely composed of needles.

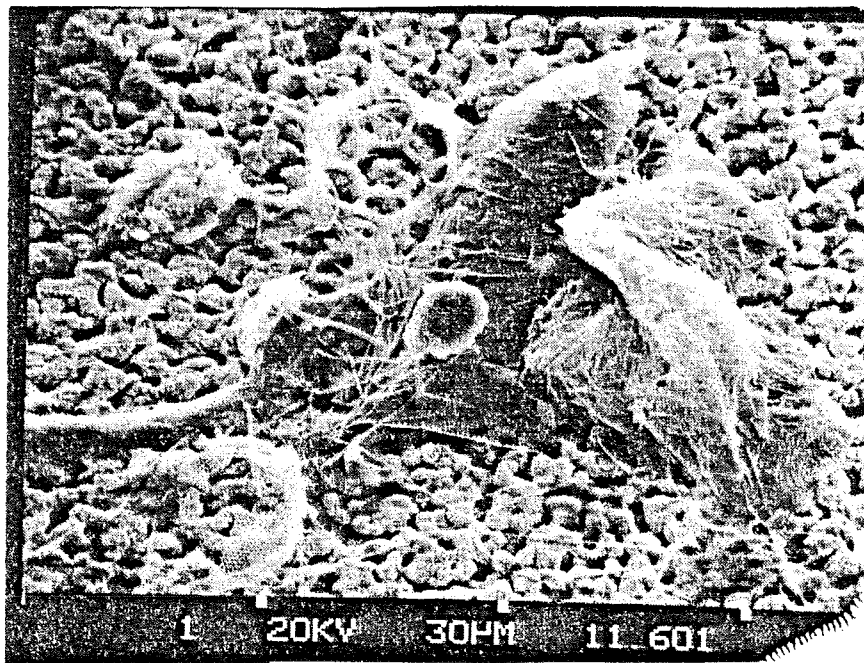


Micrograph 11.902 - general photo with diatoms and needles.

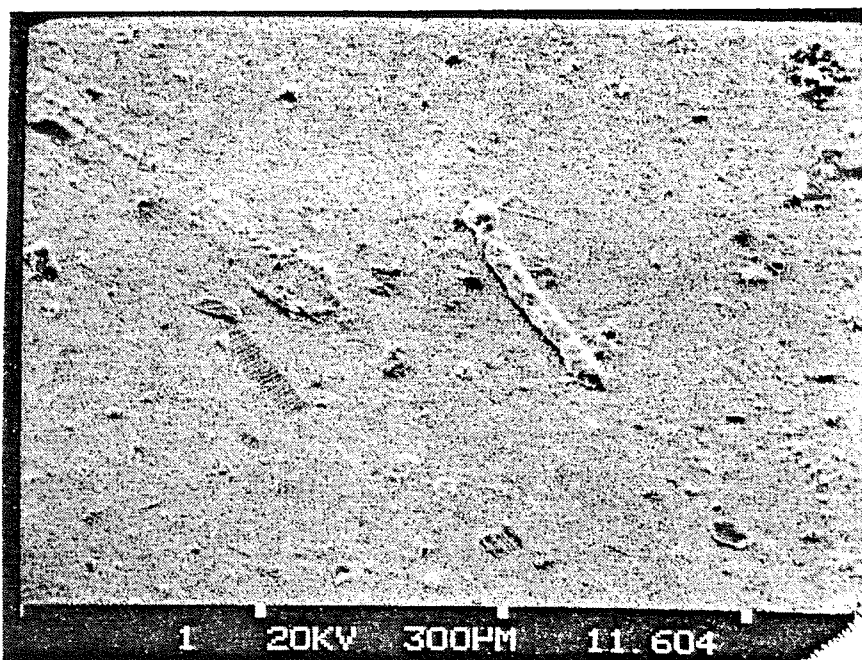


Micrograph 11.903 - 2 types of flocs and chain diatoms.

Station SU-5: 30 m (82-03116)

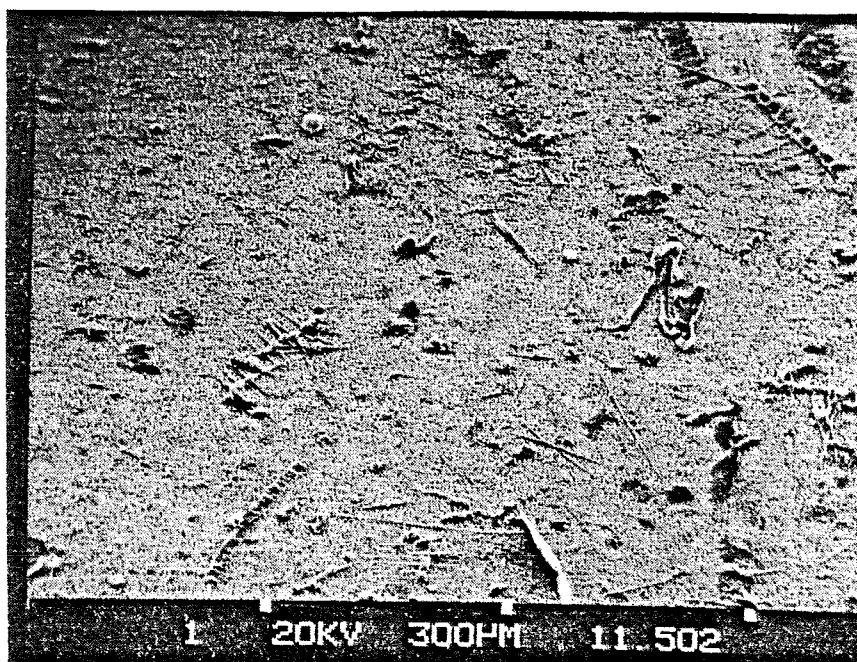


Micrograph 11.601 - floccule.

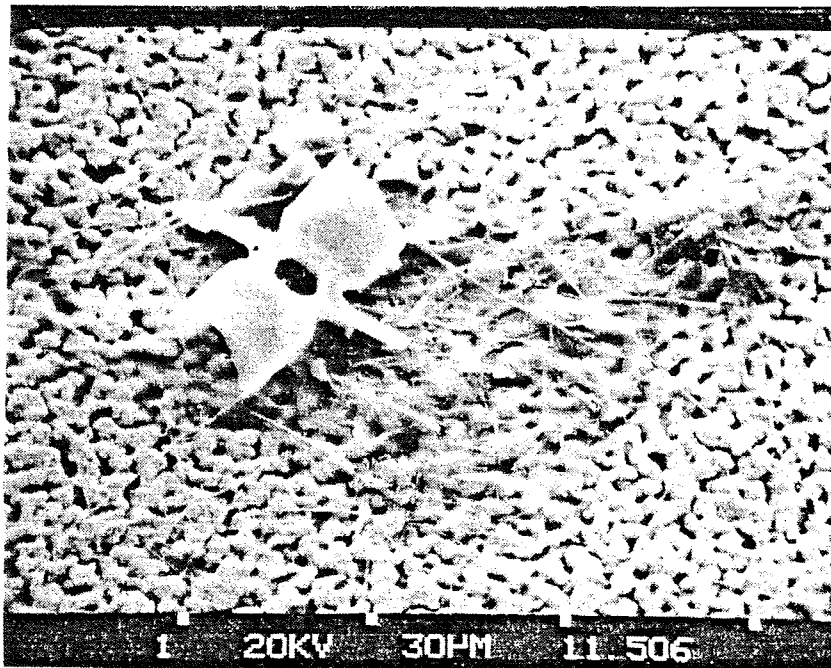


Micrograph 11.604 - general photo of sample showing fecal pellet, diatoms and individual grains.

Station SU-5: 50 m (82-03115)

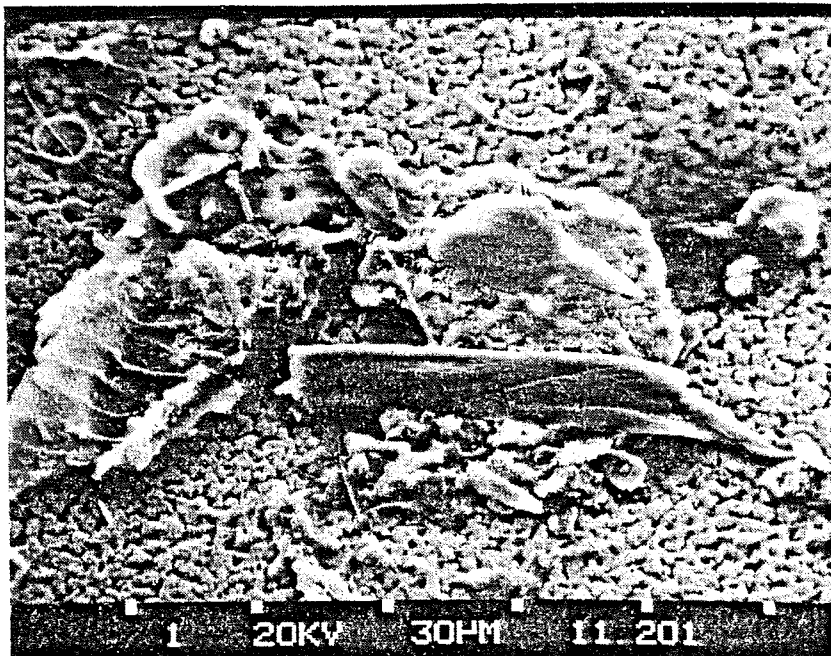


Micrograph 11.502 - general photo of sample.

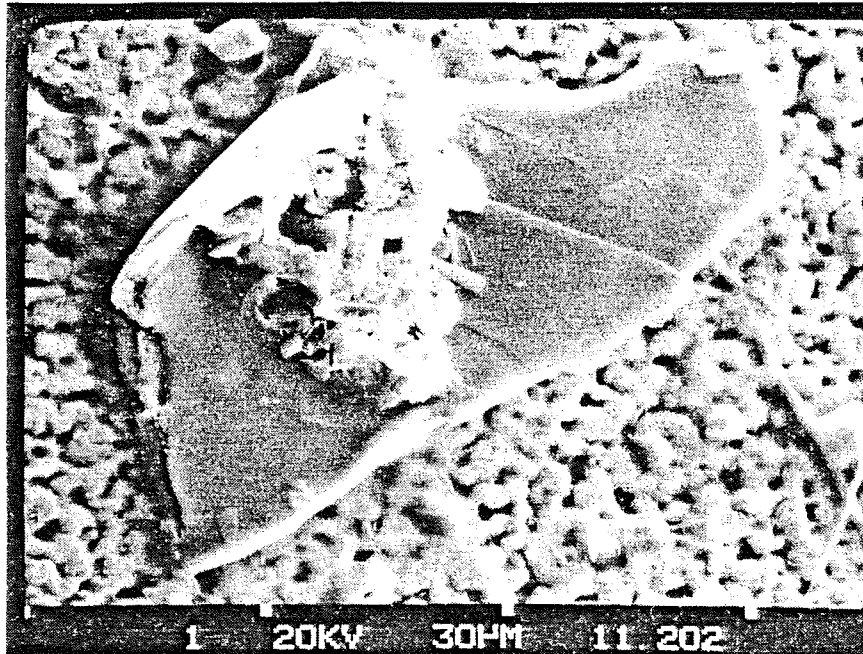


Micrograph 11.506 - floc or mucoide in which diatoms are trapped.

Station SU-5: 150 m (82-03112)

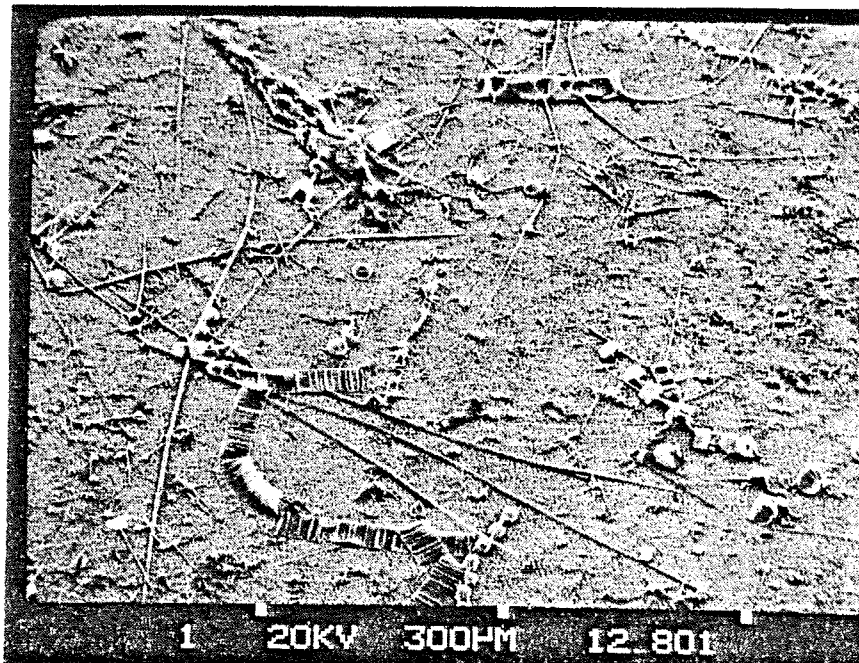


Micrograph 11.201 - floc consisting of a variety of particles surrounded by mucus, (appears to be resuspended sediment).



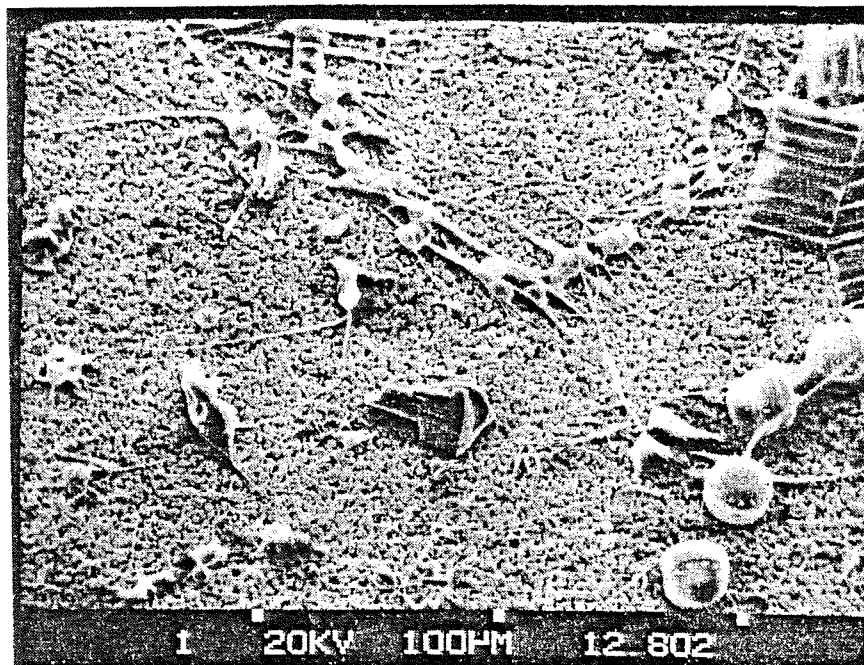
Micrograph 11.202 - mica plate with small grains attached to it (see spectra A11202 and B11202 for analyses).

Station SU-6: 10 m (82-03128)



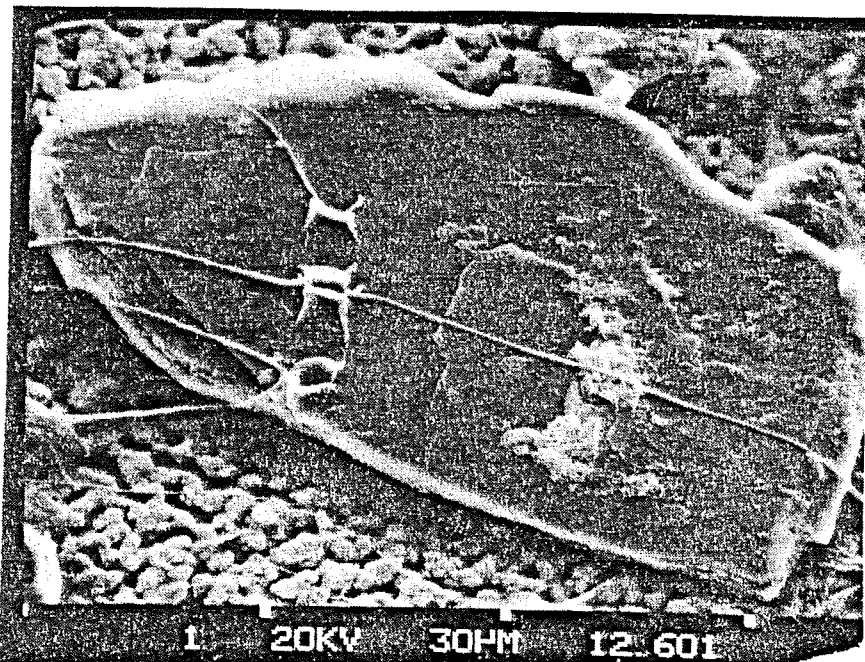
Micrograph 12.801 - general photo of sample.



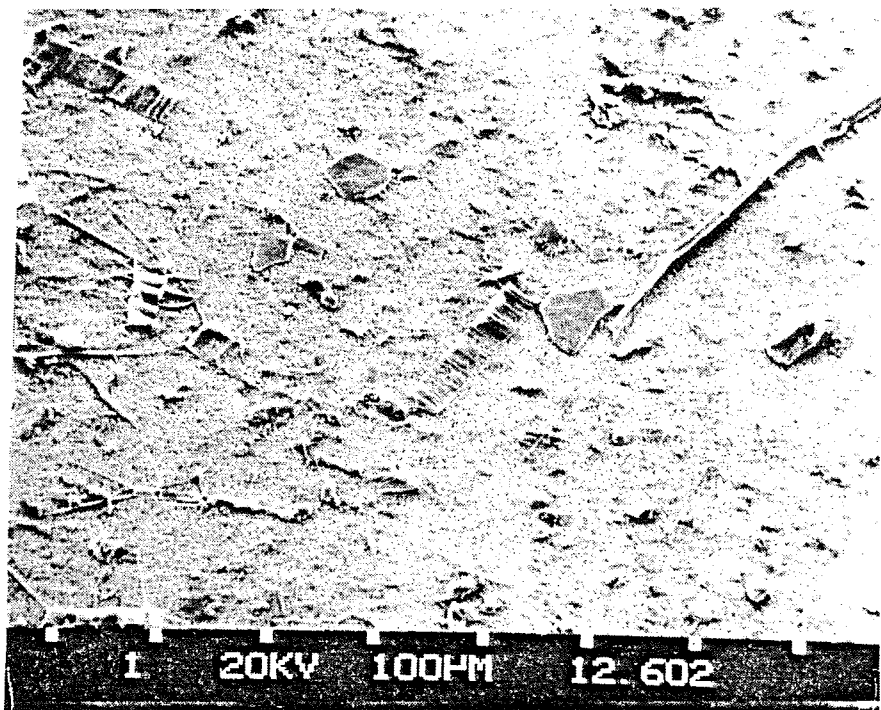


Micrograph 12.802 - fecal pellet, chain diatoms and individual grains.

Station SU-6: 30 m (82-03126)

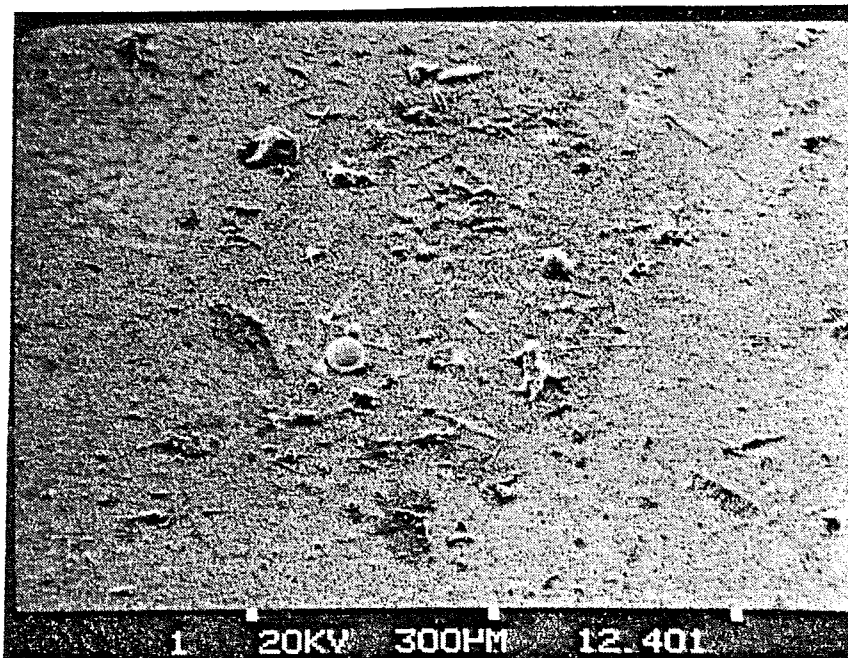


Micrograph 12.601 - biotite plate with diatom remnants stuck to it.



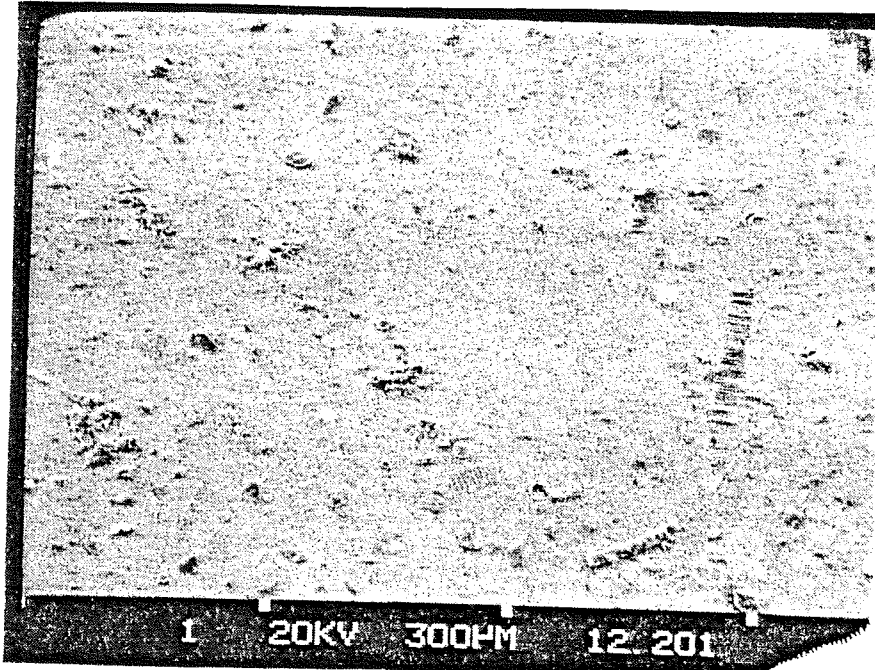
Micrograph 12.602 - general photo of sample.

Station SU-6: 75 m (82-03124)



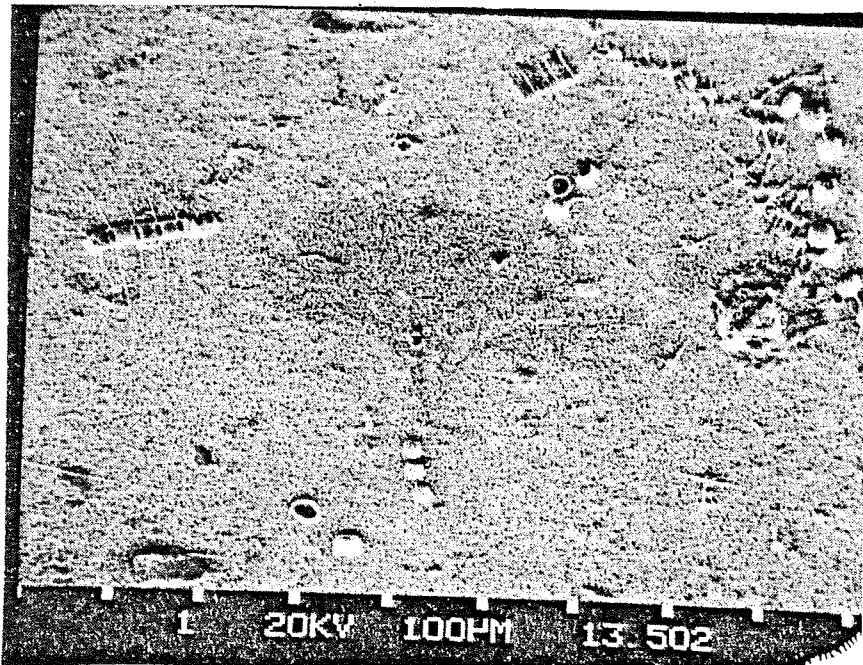
Micrograph 12.401 - high concentration of particles caught up in mucus.

Station SU-6: 150 m (82-03122)



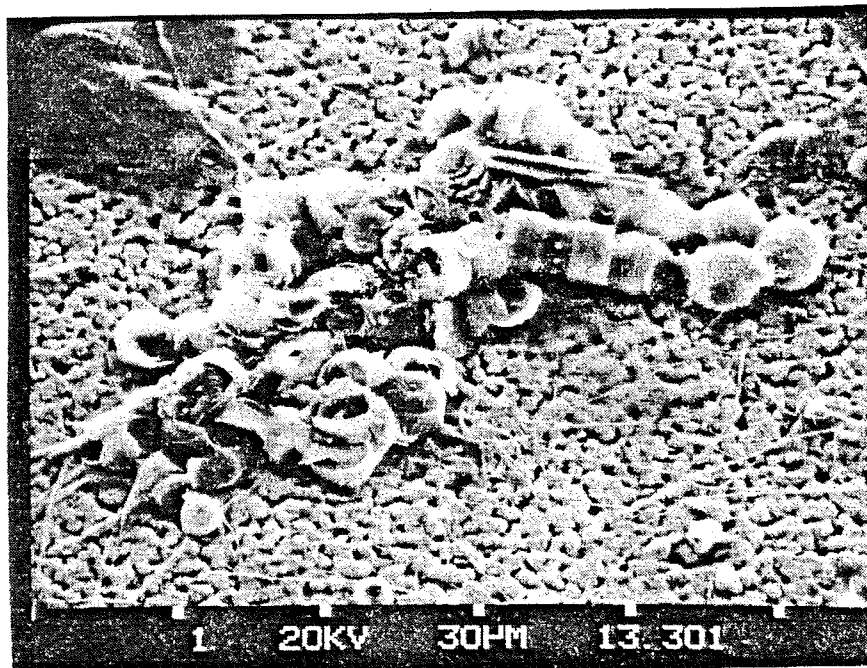
Micrograph 12.201 - general photo.

Station SU-7: 10 m (82-03131)

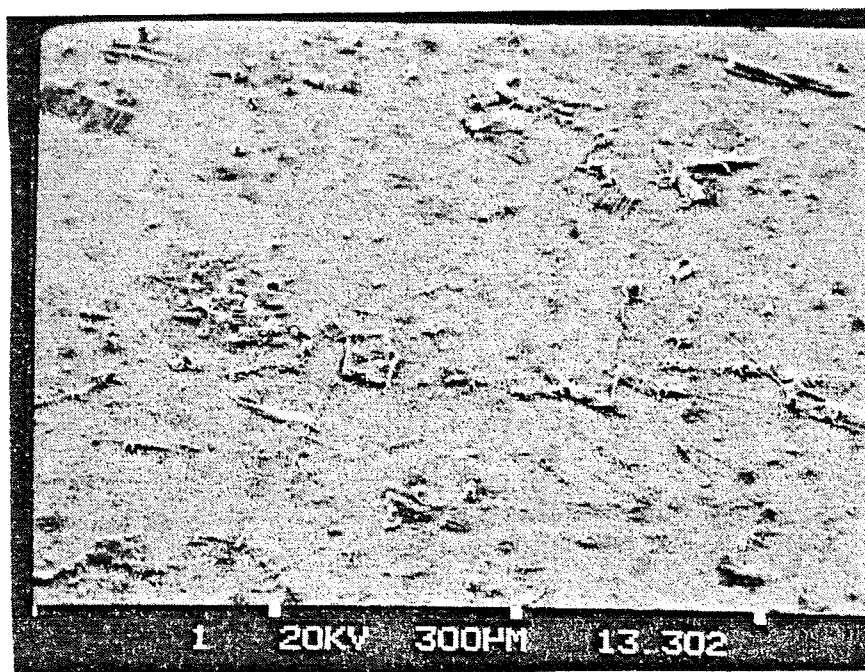


Micrograph 13.502 - general photo.

Station SU-7: 30 m (82-03133)

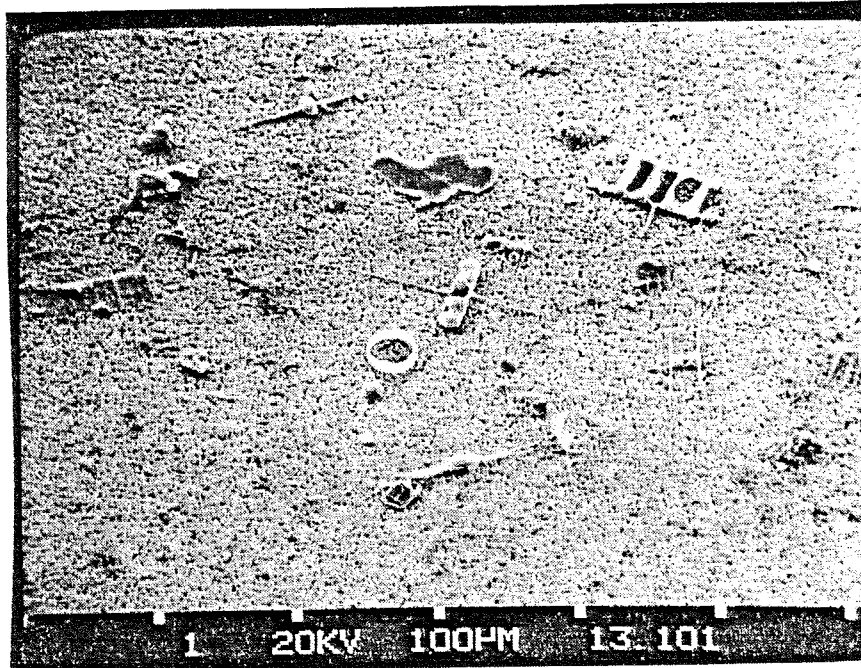


Micrograph 13.301 - floc of concentric diatoms and long organic filaments.



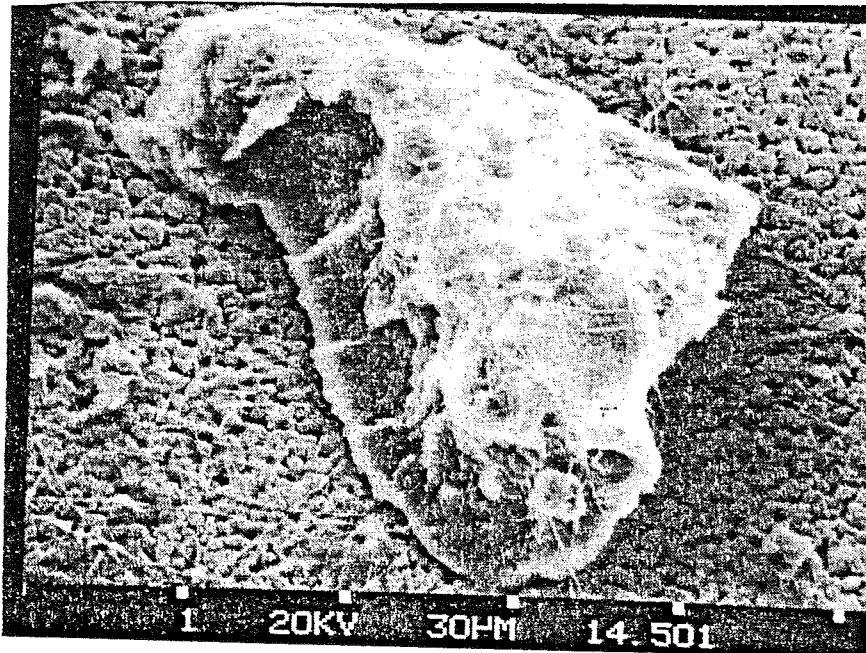
Micrograph 13.302 - general photo of sample.

Station SU-7:57 m (82-03131)



Micrograph 13.101 - general photo.

Station SU-8: 10 m (82-03145)



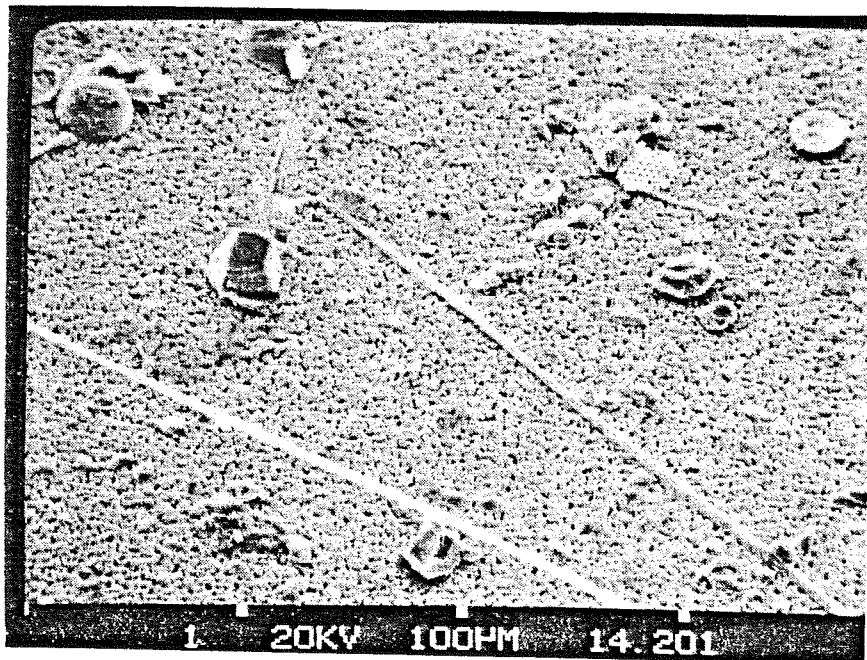
Micrograph 14.501 - grain of pure titanium (rutile?) with zinc coating (smithsonite?).

Spectrum A14501 yields an analysis of the coating in photo 14.501.



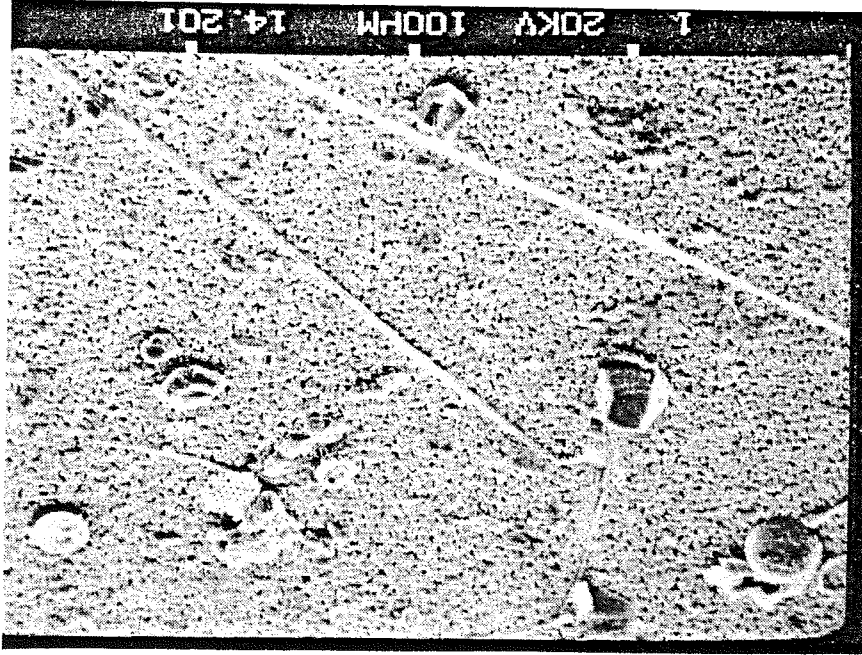
Micrograph 14.502 - floccule.

Station SU-8: 50 m (82-03142)



Micrograph 14.201 - general photo showing silicon needles (spicules).

Micrograph 14.201 - general photo showing silicon needles (spicules).



Station SU-8: 50 m (82-03142)

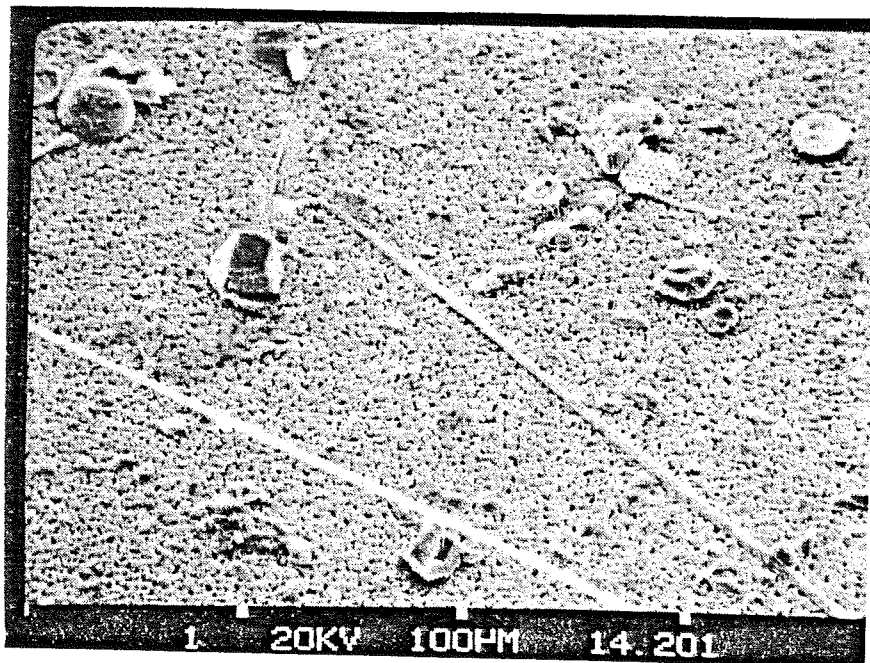
Micrograph 14.502 - floccule.





Micrograph 14.502 - floccule.

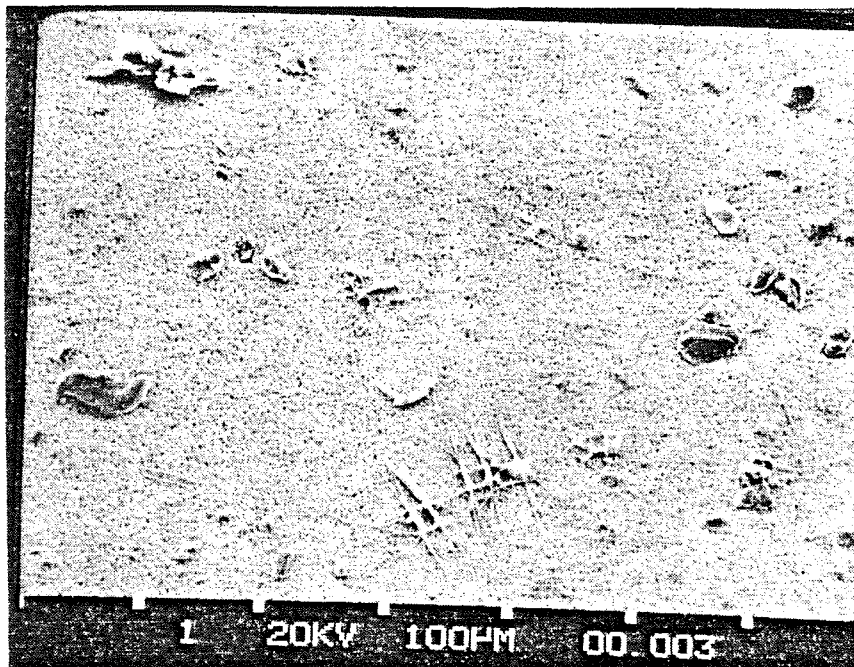
Station SU-8: 50 m (82-03142)



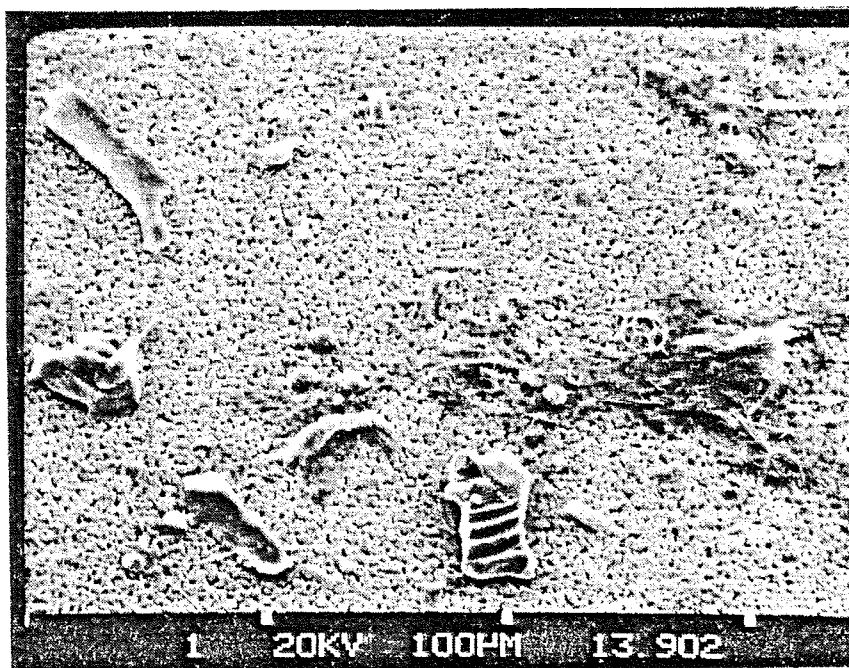
Micrograph 14.201 - general photo showing silicon needles (spicules).



Station SU-8: 150 m (82-03139)



Micrograph 00.003 - clay floc and individual particles.



Micrograph 13.902 - individual grain and rare organic flocs.

ID:A10401  
SEMIQ:COUNTS

ELEMENTS	COUNTS
S	1202
Mg	5670
Al	7455
Si	30450
Mn	674
K	996
Ca	37608
Ti	767
Fe	381
Bg	0

ID:A10401  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
S	0.16
Mg	0.76
Al	1.00
Si	4.08
Mn	0.09
K	0.13
Ca	5.04
Ti	0.10
Fe	0.05
Bg	0.00

ID:A10401  
SEMIQ:NORMALIZE

ELEMENTS	%
S	1.4
Mg	6.7
Al	8.7
Si	35.7
Mn	0.8
K	1.2
Ca	44.1
Ti	0.9
Fe	0.4

SU-1:75m  
General Analysis

ID:A11202  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	92
Mg	1140
Al	6870
Si	18628
Cl	41
K	3624
Ca	1482
Ti	211
Fe	7485
Bg	0

ID:A11202  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.01
Mg	0.17
Al	1.00
Si	2.71
Cl	0.01
K	0.53
Ca	0.22
Ti	0.03
Fe	1.09
Bg	0.00

ID:A11202  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.2
Mg	2.9
Al	17.4
Si	47.1
Cl	0.1
K	9.2
Ca	3.7
Ti	0.5
Fe	18.8

SU-5:150m  
Mica Plate

ID:B11202 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-93
Mg	2824
Al	10642
Si	22130
Cl	46
K	10259
Ca	71
Ti	1173
Fe	15397
Bg	0

ID:B11202 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.01
Mg	0.26
Al	1.00
Si	2.08
Cl	0.00
K	0.96
Ca	0.01
Ti	0.11
Fe	1.45
Bg	0.00

ID:B11202 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.1
Mg	4.5
Al	17.0
Si	35.4
Cl	0.1
K	16.4
Ca	0.1
Ti	1.9
Fe	24.7

SU-5:150m  
Mica Plate

ID:A14501  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	881
Mg	35
Al	640
Si	2346
Cl	420
S	339
Ca	376
Ti	1245
Fe	319
Bg	0

ID:A14501  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	1.38
Mg	0.06
Al	1.00
Si	3.66
Cl	0.66
S	0.53
Ca	0.59
Ti	1.94
Fe	0.50
Bg	0.00

ID:A14501  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	13.3
Mg	0.5
Al	9.7
Si	35.5
Cl	6.4
S	5.1
Ca	5.7
Ti	18.9
Fe	4.8

SU-8:10m  
Zinc Coating on Titanium

ID:B13901  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	1
Mg	3098
Al	309
Si	48
Cl	33
Mn	-27
Ca	18564
Ti	58
Fe	57
Bg	0

ID:B13901  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.01
Mg	10.03
Al	1.00
Si	0.16
Cl	0.11
Mn	-0.09
Ca	60.08
Ti	0.19
Fe	0.18
Bg	0.00

ID:B13901  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.0
Mg	14.0
Al	1.4
Si	0.2
Cl	0.1
Mn	-0.1
Ca	83.8
Ti	0.3
Fe	0.3

SU-8:150m  
Floccule of Ca and Mg

Inugsuin Fiord

Station IN-1:1 m (82-03581)

SPM conc. = 1.753 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 81

Description from SEM micrographs -

the sample is covered by an organic mucus. Individual particles, pico-plankton, remnant diatoms, silicoflagellates, chain diatoms, fecal pellets and spicules all make up this sample.

Station IN-1:20 m (82-03578)

SPM conc. = 1.364 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 82

Description from SEM micrographs -

A strange looking mucus covers this entire sample which consists of pico-plankton, some individual grains, flocs, mucoids and remnant chain diatoms.

Station IN-1:50 m (82-03576)

SPM conc. = 0.454 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 83

Description from SEM micrographs -

This sample consists mainly of small individual particles with numerous mucoids which are filled with small particles. Clear chain diatoms and pico-plankton are also present.

Station IN-1:125 m (82-03573)

SPM conc. = 0.411 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 84

Description from SEM micrographs -

Numerous individual grains and a few mucoids make up this sample.

Station IN-1:155 m (82-03572)

SPM conc. = not determined

Histogram of grain size distribution - Fig. 85

Description from SEM micrographs -

There are only a few grains discernable in this sample which contains individual particles and organic matter. No photos were taken.

Station IN-2:1 m (82-03591)

SPM conc. = 1.156 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 86

Description from SEM micrographs -

This sample is also covered with a mucus. Remnant diatoms are abundant.

Individual grains, flocs, organic segments (plant debris), spicules and silt grains are all found as well.

Station IN-2:20 m (82-03588)

SPM conc. = 1.449 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 87

Description from SEM micrographs -

The same mucus that appeared in some previous samples is also noticed here, except it is thicker. Individual particles, flocs of clay particles and clear diatom chains make up this sample.

Station IN-2:100 m (82-03584)

SPM conc. = 0.538 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 88

Description from SEM micrographs -

This sample does not contain mucus as did some previous samples. There are flocs which look like flattened fecal pellets, inorganic particles of fine clays, individual grains, mucoids, pico-plankton and some larger grains of mica and feldspar.

Station IN-2:270 m (82-03582)

SPM conc. = 0.408 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 89

Description from SEM micrographs -

There is no sign of mucus in this sample, it consists mainly of individual particles. There are a few fecal pellets and mucoids.

Station IN-3:1 m (82-03601)

SPM conc. = 0.629 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 90

Description from SEM micrographs -

Stringers are abundant here and mucus covers the entire sample. A large organism is present, possibly a dinoflagellate called Ceratium. Silt particles, mica, clay flocs, organics, filaments, spicules and mucoids are also found.

Station IN-3:20 m (82-03598)

SPM conc. = 0.930 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 91

Description from SEM micrographs -

This sample contains numerous components, some of which are: a floc of diatomaceous remains, remnant chain diatoms, clear (electron transparent) stringers, individual particles, flocs of small clays in a mucus, spicules and organic filaments.

Station IN-3:550 m (82-03592)

SPM conc. = 0.579 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 92

Description from SEM micrographs -

This sample is mostly small individual particles. A thin mucus holds these particles together. A few large silt grains and diatoms are also present. No photos are included.

Station IN-4:1 m (82-03611)

SPM conc. = 0.422 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 93

Description from SEM micrographs -

Numerous clear stringers, remnant pieces of fecal pellets and organics make up this sample. No photos are included.

Station IN-4:20 m (82-03608)

SPM conc. = 1.000 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 94

Description from SEM micrographs -

Flocs of organics are abundant as well as inorganic flocs of clays. Grains range in size from small to large (300µm). Concentric and chain diatoms are found along with inclusion-rich mucoids.

Station IN-4:560 m (82-03602)

SPM conc. = 1.076 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 95

Description from SEM micrographs -

This sample is mainly individual particles smaller than 30µm in size. There are a few flocs of inorganic material consisting of mica and diatomaceous matter. A few remnant diatoms are also seen.

Station IN-5:1 m (82-03613)

SPM conc. = 0.508 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 96

Description from SEM micrographs -

Numerous clear stringers and mucoid flocs are present. There are some individual particles as well. No photos were kept.

Station IN-5:100 m (82-03612)

SPM conc. = 0.776 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 97

Description from SEM micrographs -

Only a few remnant clear stringers are seen here. The sample is mainly composed of individual particles. A thin mucus surrounds most of these particles. There are a few mucoids and flocs of clays as well. No photos are included.



Station IN-6:5 m (82-03570)

SPM conc. - 2.062 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 98

Description from SEM micrographs -

There are numerous clear stringers in this sample along with chain diatoms and clay flocs. There are a few small fecal pellets.

Station IN-6:20 m (82-03568)

SPM conc. = 1.089 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 99

Description from SEM micrographs -

There are a few remnant compact fecal pellets, flocs of organics and one large grain of biotite.

Station IN-6:260 m (82-03562)

SPM conc. = 0.370 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 100

Description from SEM micrographs -

This sample is mainly individual grains. Some mucoids and organics are present. Numerous small compact flocs high in iron content are found as well as flocs of both an inorganic and organic nature. A few mica plates with grains stuck to them are also noticed.

Station IN-7:1 m (82-03561)

SPM conc. = 8.440 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 101

Description from SEM micrographs -

Numerous clear stringers and individual particles compose this sample. Pico-plankton and small mucoids are also seen.

Station IN-7:20 m (82-03558)

SPM conc. = 2.181 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 102

Description from SEM micrographs -

This sample is mainly diatom chains with a few clear stringers and organic flocs.

Station IN-7:378 m (82-03552)

SPM conc. = 1.123 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 103

Description from SEM micrographs -

This sample consists mainly of small individual particles with numerous organic mucoids, some of which contain small particles of clay and diatoms.

Station IN-8:1 m (82-03551)

SPM conc. = 0.842 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 104

Description from SEM micrographs -

This sample contains most types of particles. Individual grains (clay size to up to 300µm), diatoms, mucoids, mica plates, clay flocs, concentric diatoms covered by small clays, fecal pellets and inorganic flocs are all present.

Station IN-8:20 m (82-03548)

SPM conc. = 1.287 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 105

Description from SEM micrographs -

Individual particles are common as are chain diatoms and pico-plankton. Flocs are abundant as well.

Station IN-8:325 m (82-03542)

SPM conc. = 0.822 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 106

Description from SEM micrographs -

This sample is mainly individual particles with dry-looking, flattened flocs of inorganic material. Remnant diatoms are seen but are rare.

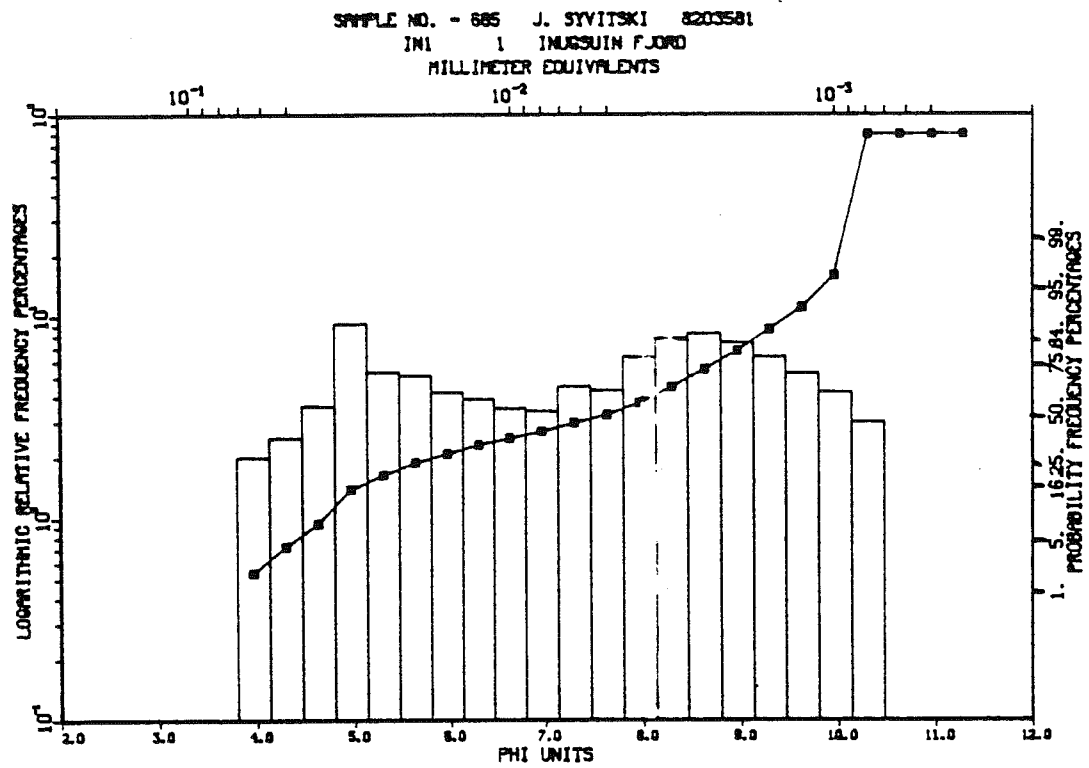


Fig. 81

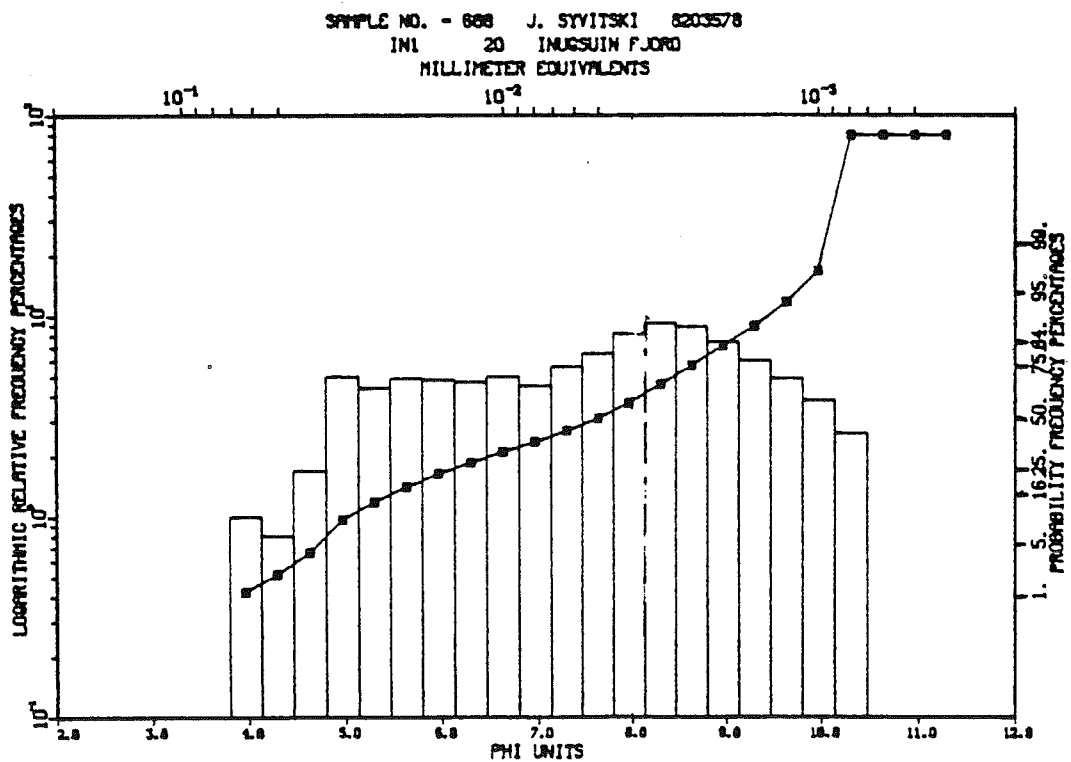


Fig. 82

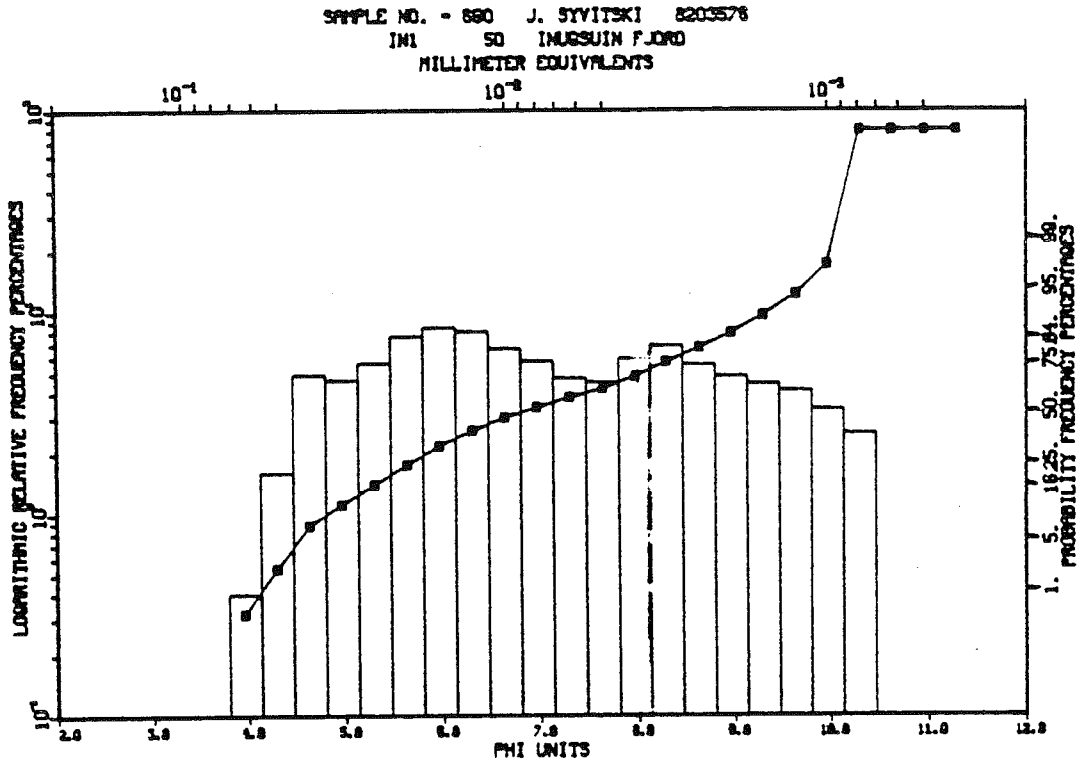


Fig. 83

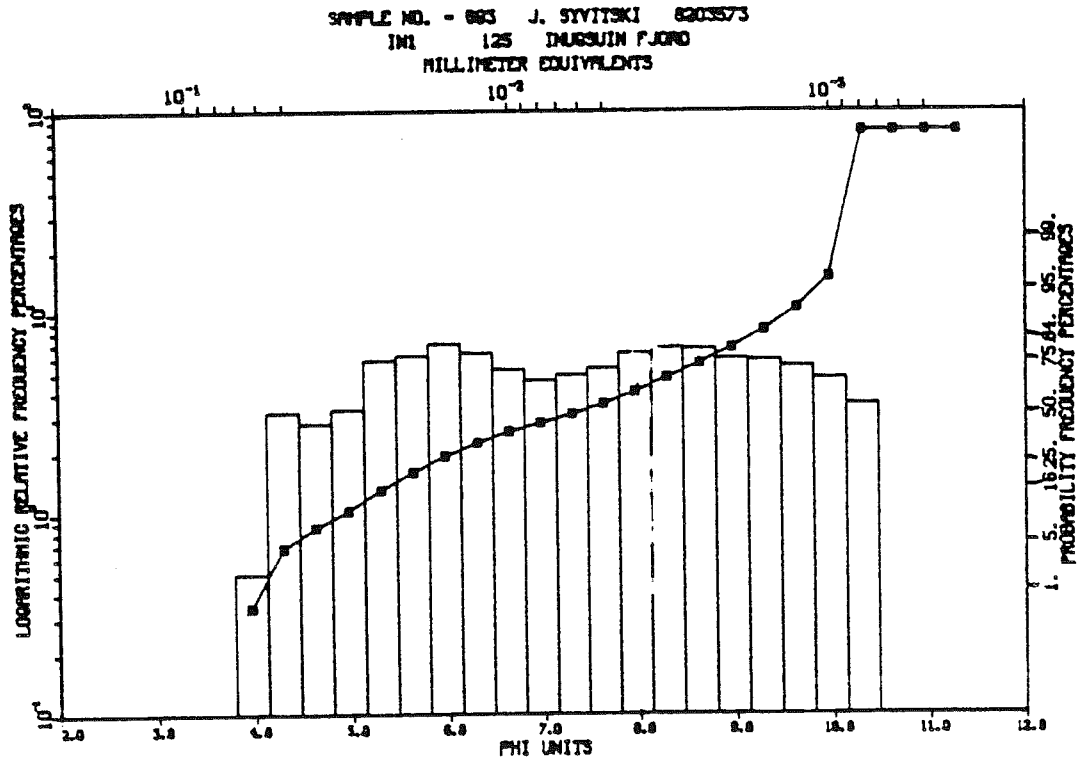


Fig. 84

SAMPLE NO. - 684 J. SYVITSKI 8203572  
 IN1 155 INUSSUIN FJORD  
 MILLIMETER EQUIVALENTS

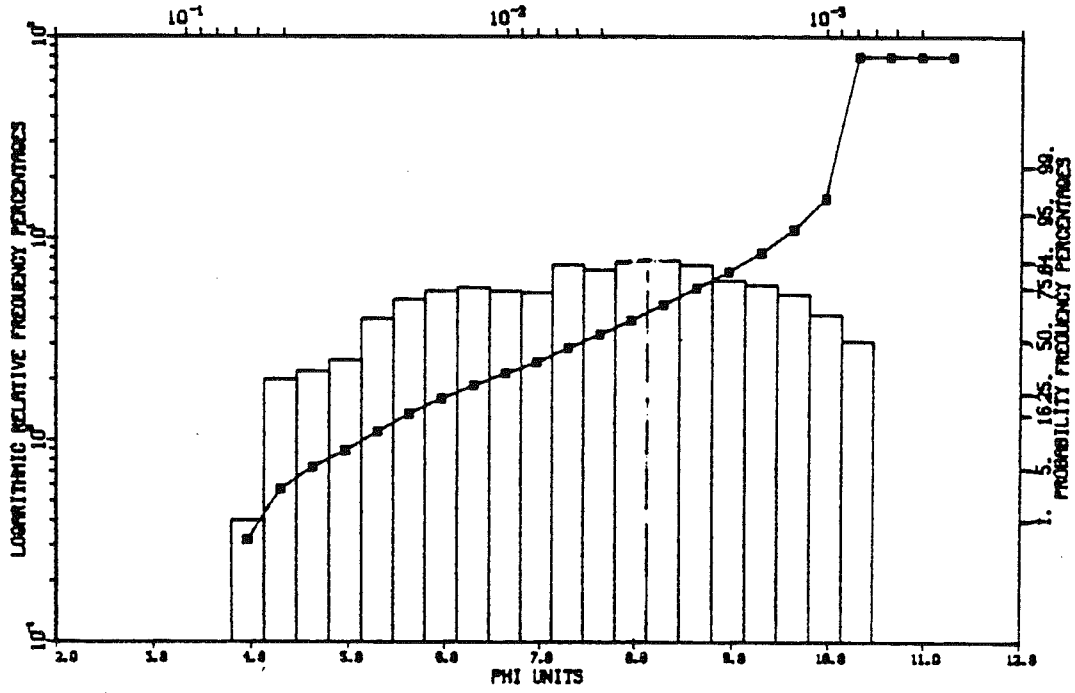


Fig. 85

SAMPLE NO. - 685 J. SYVITSKI 8203581  
 IN2 1 INUSSUIN FJORD  
 MILLIMETER EQUIVALENTS

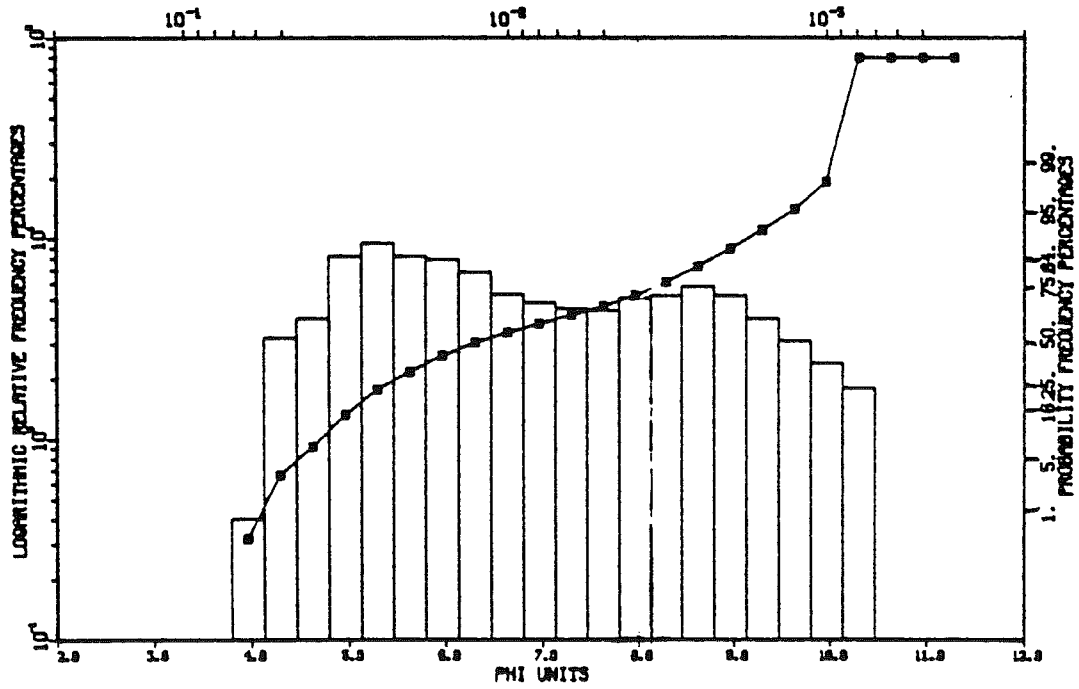


Fig. 86

SAMPLE NO. - 698 J. SYVITSKI 8203588  
IN2 20 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

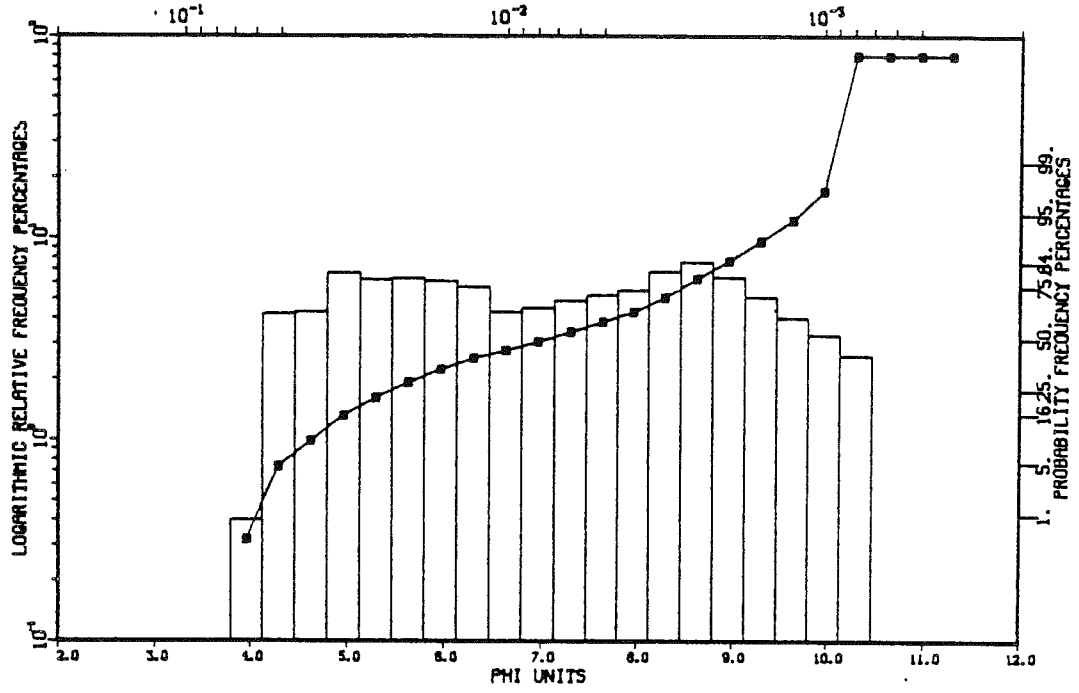


Fig. 87

SAMPLE NO. - 702 J. SYVITSKI 8203584  
IN2 100 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

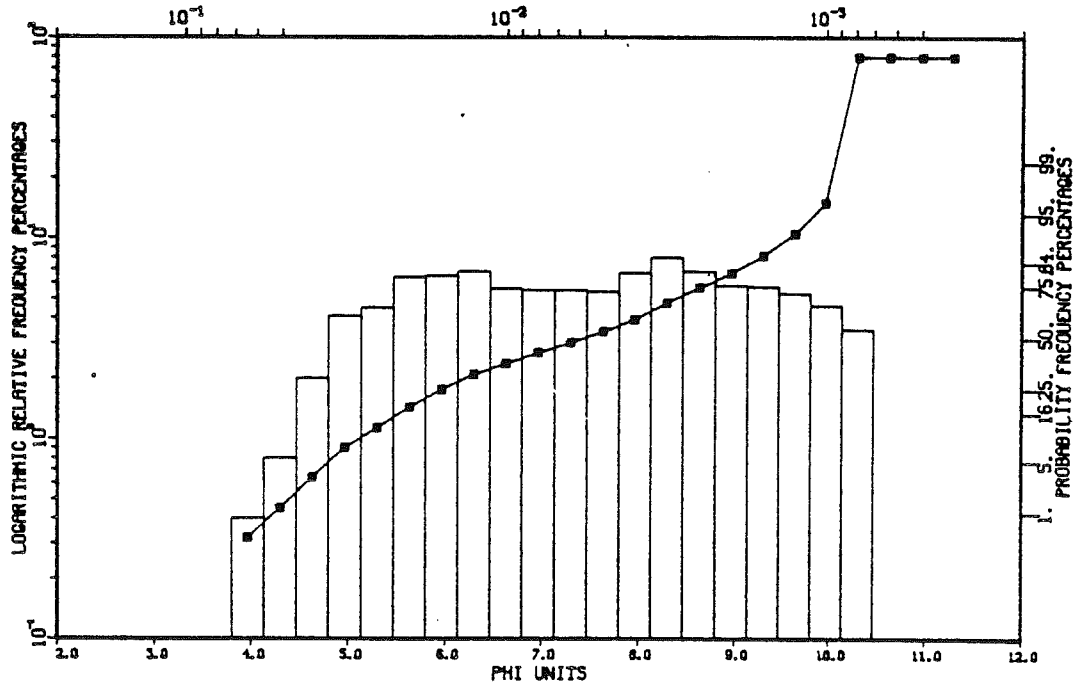


Fig. 88

SAMPLE NO. - 704 J. SYVITSKI 8203582  
 IN2 270 INUGSUIN FJORD  
 MILLIMETER EQUIVALENTS

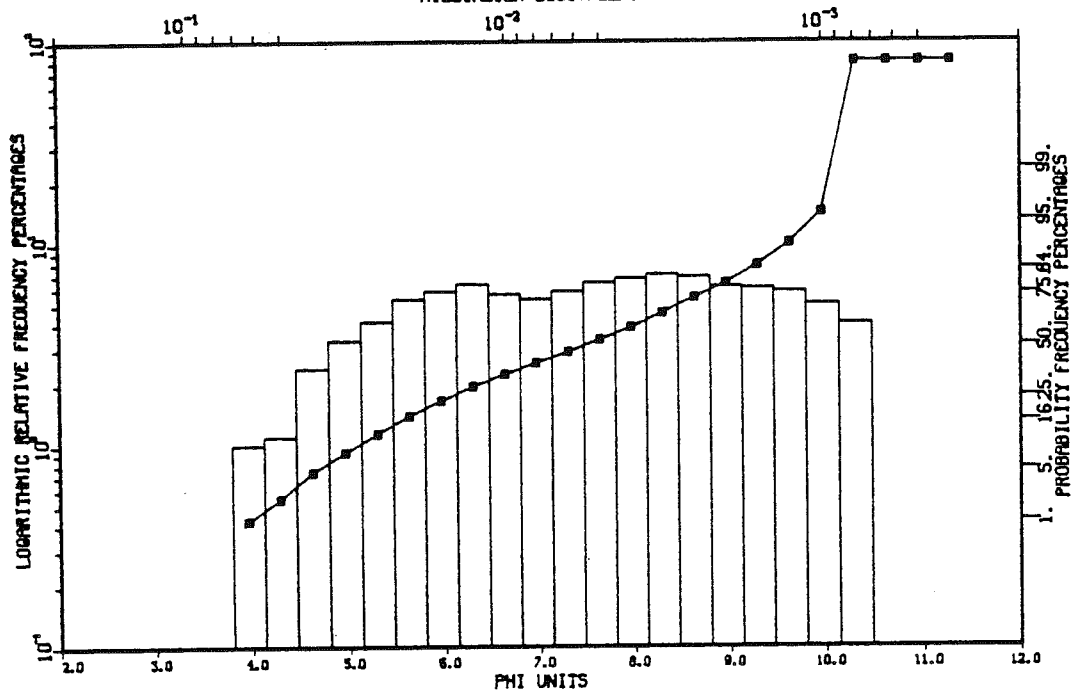


Fig. 89

SAMPLE NO. - 705 J. SYVITSKI 8203601  
 IN3 1 INUGSUIN FJORD  
 MILLIMETER EQUIVALENTS

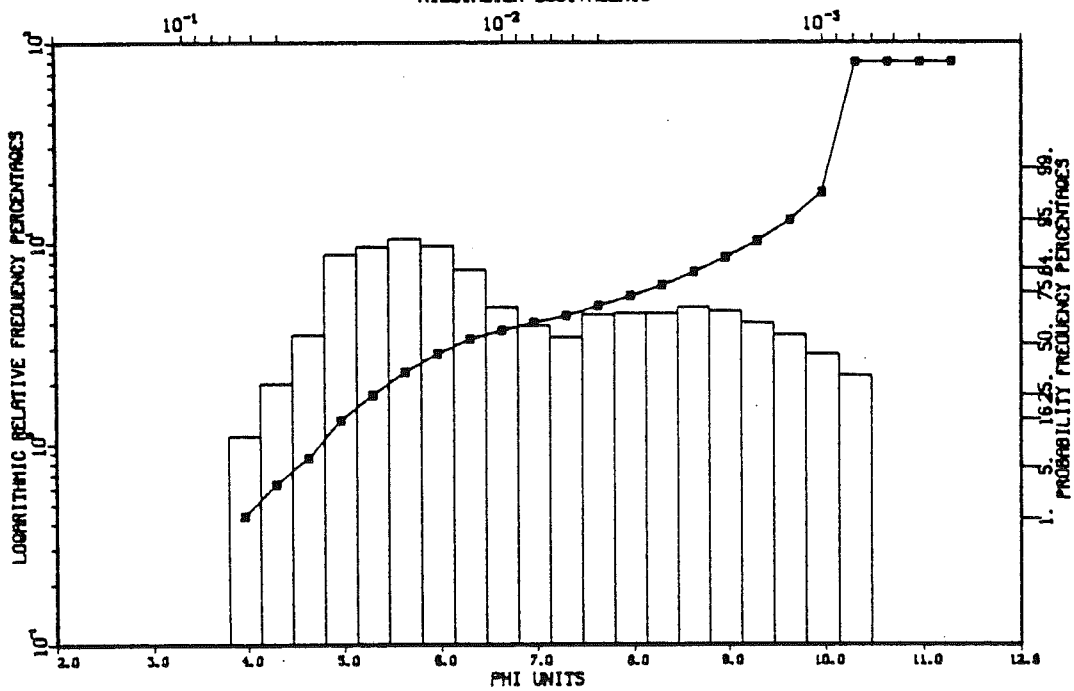


Fig. 90



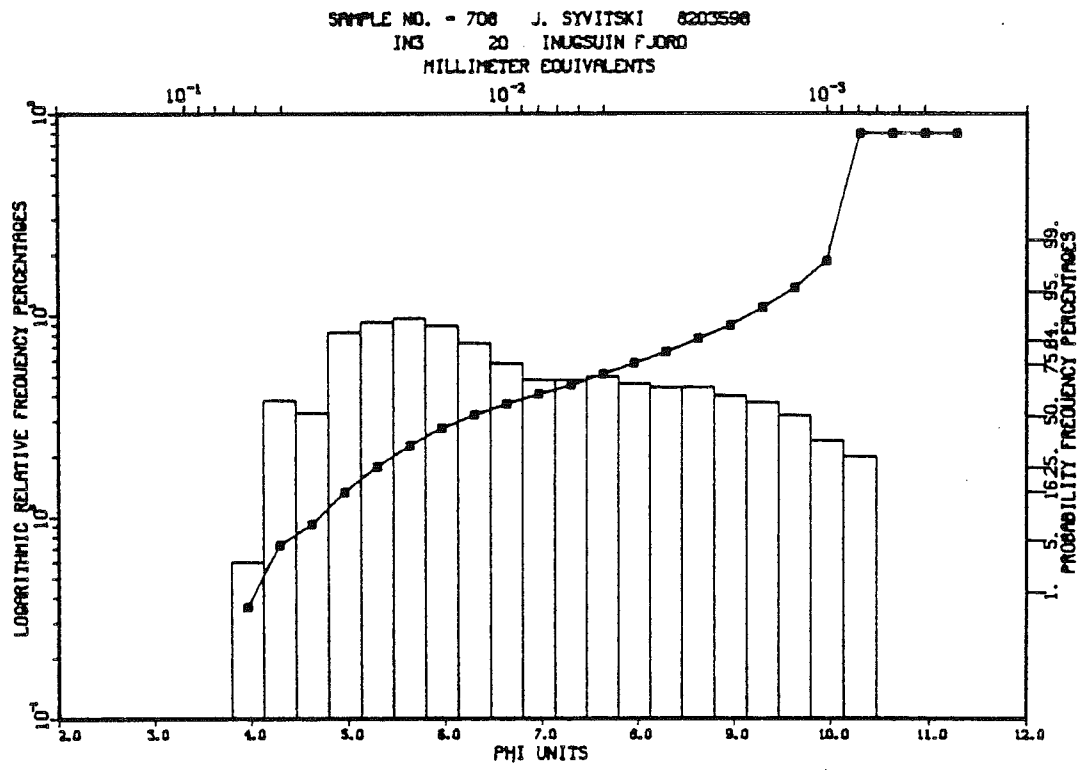


Fig. 91

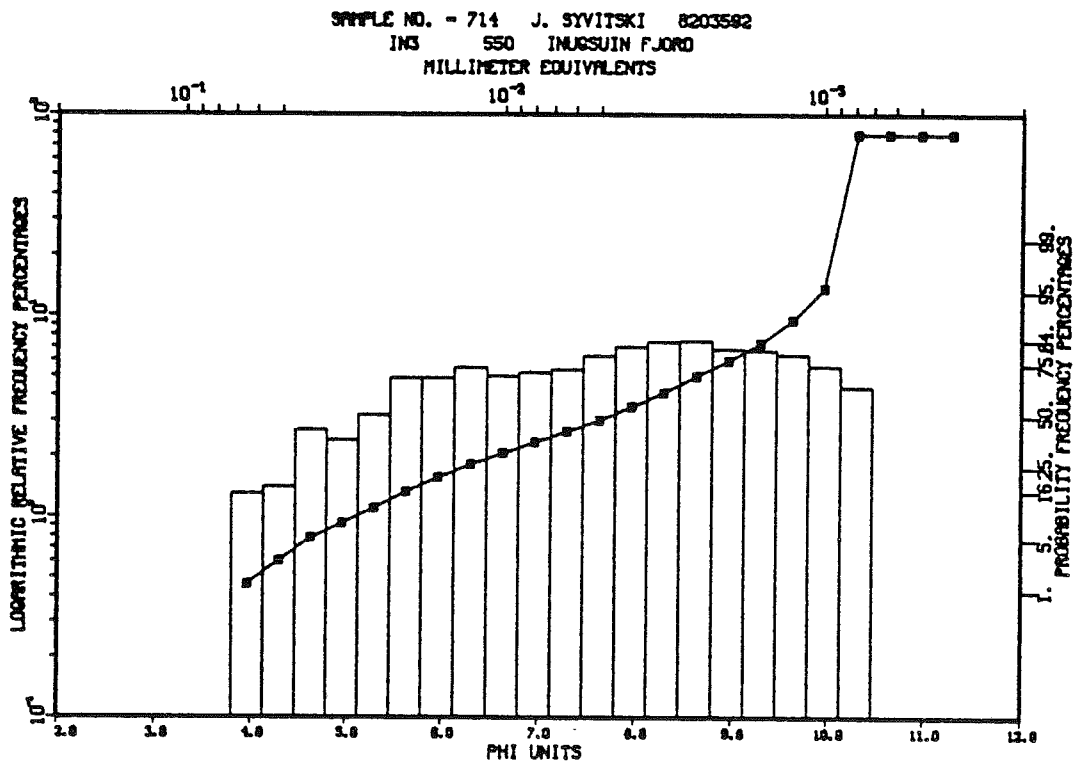


Fig. 92

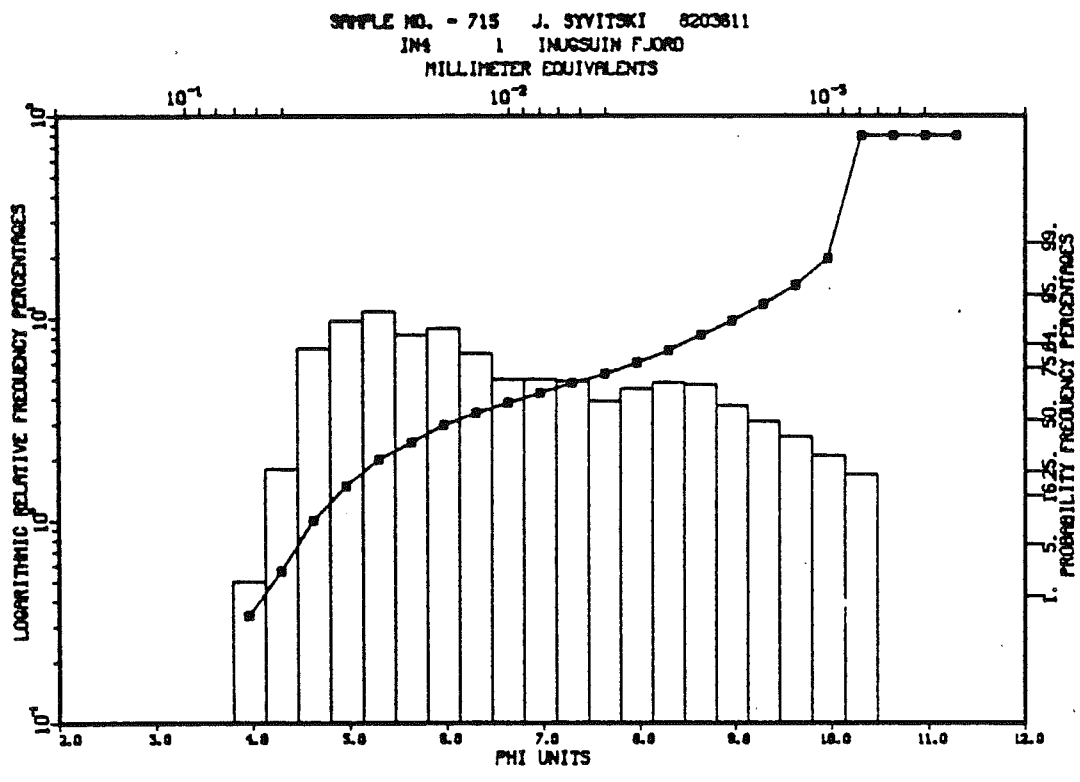


Fig. 93

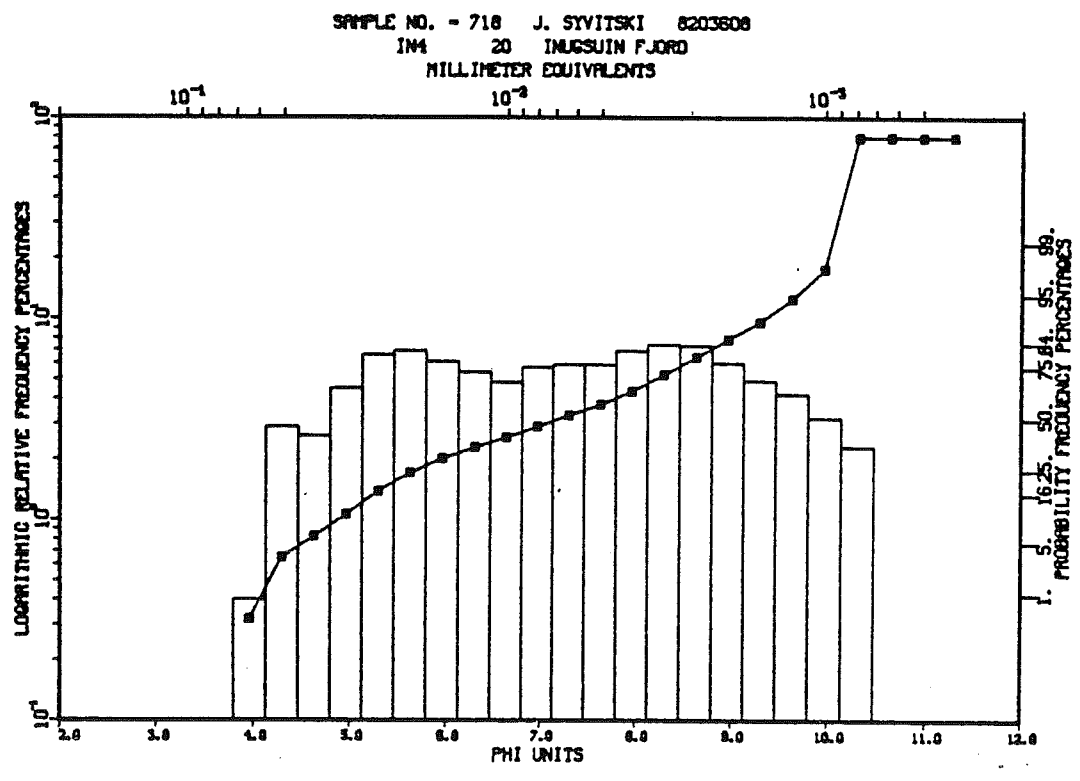


Fig. 94

SAMPLE NO. - 724 J. SYVITSKI 8203802  
IM4 580 INUGSUIV FJORD  
MILLIMETER EQUIVALENTS

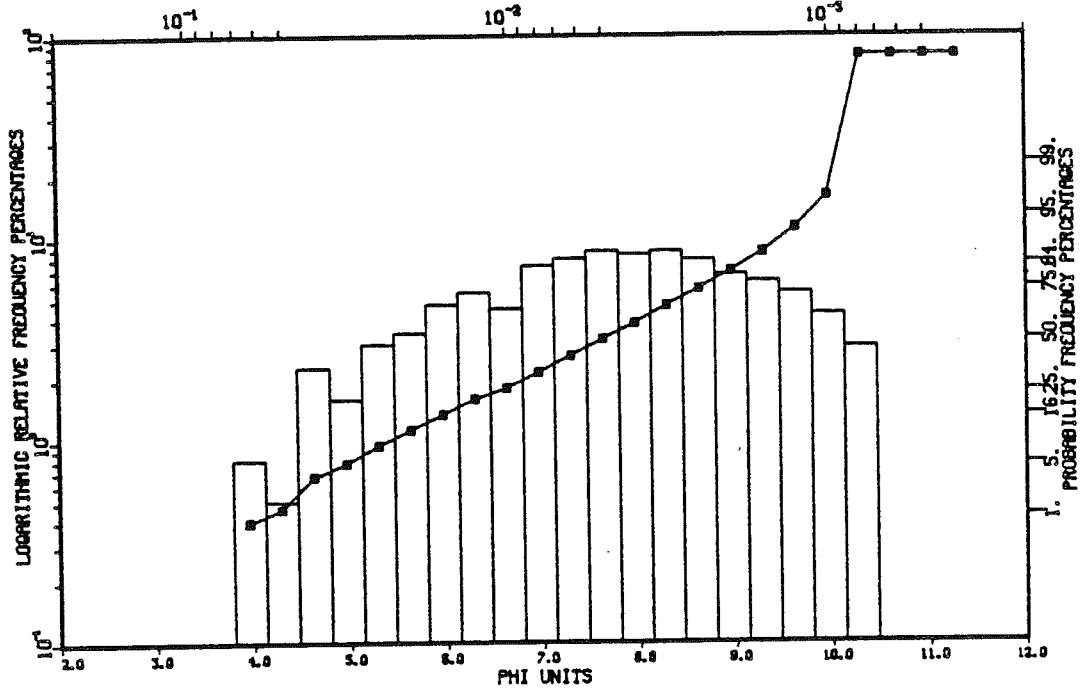


Fig. 95

SAMPLE NO. - 725 J. SYVITSKI 8203613  
INS 1 INUGSUIV FJORD  
MILLIMETER EQUIVALENTS

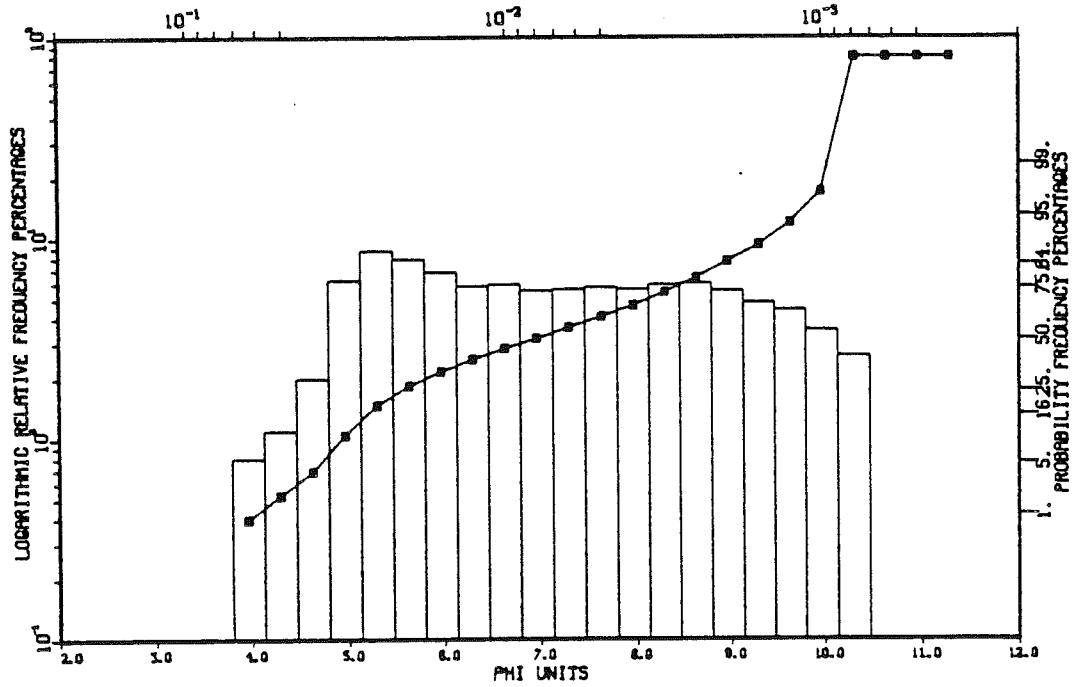


Fig. 96

SAMPLE NO. - 726 J. SYVITSKI 8203612  
INS 100 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

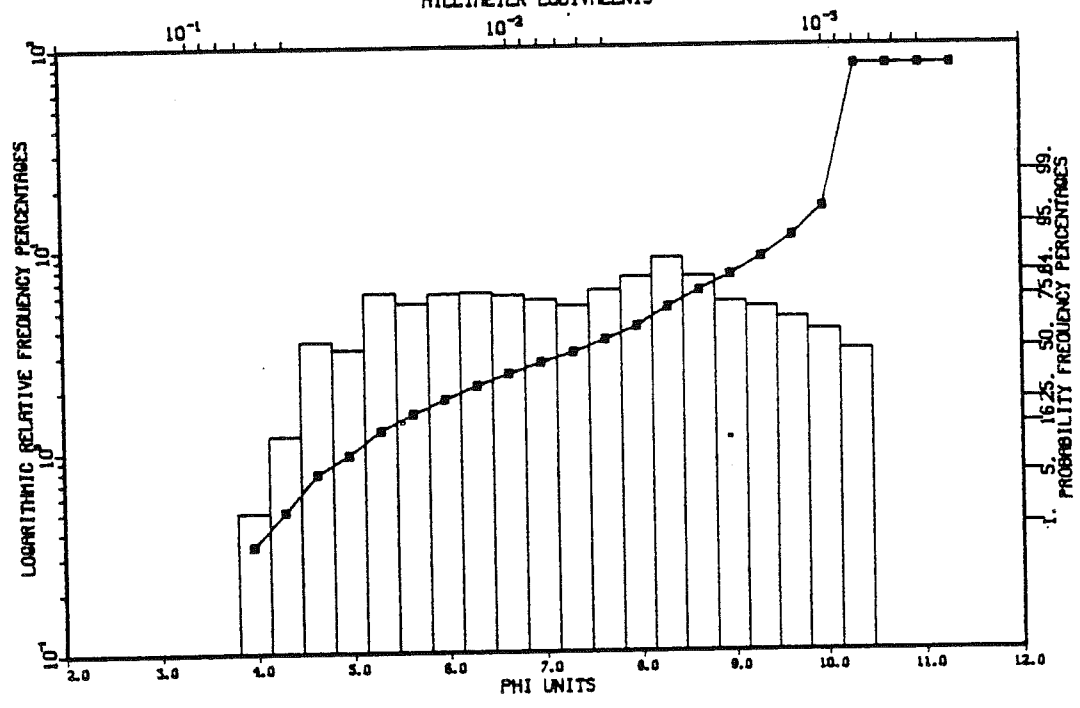


Fig. 97

SAMPLE NO. - 728 J. SYVITSKI 8203570  
INS 5 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

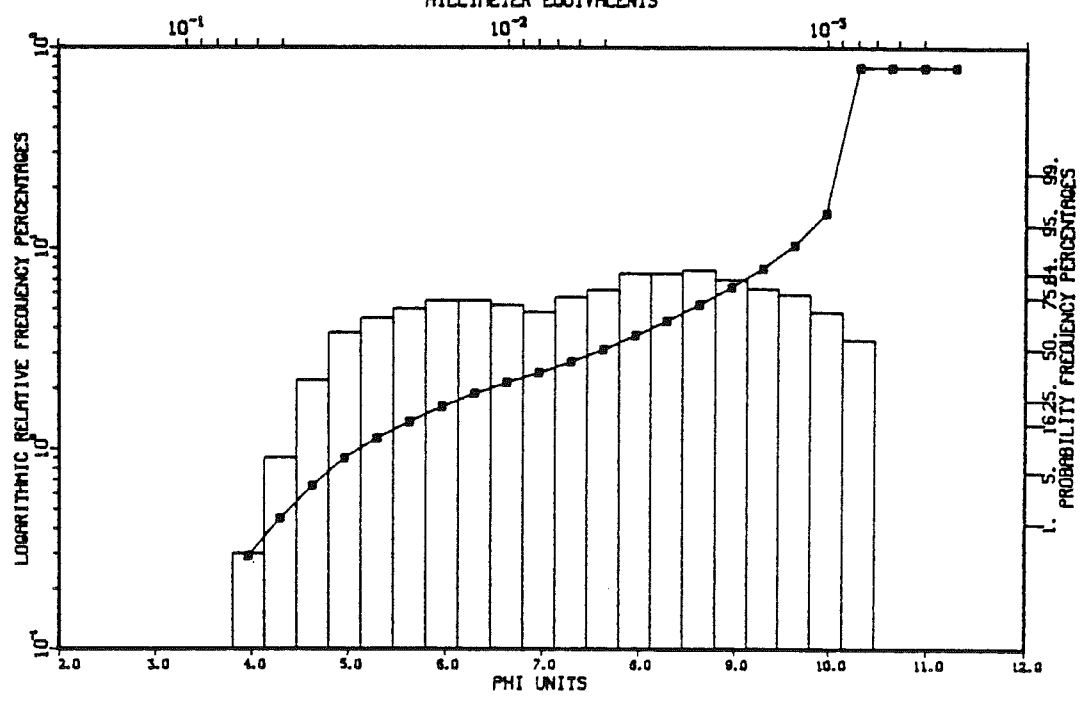


Fig. 98

SAMPLE NO. - 730 J. SYVITSKI 8203568  
 ING 20 INUGSUIN FJORD  
 MILLIMETER EQUIVALENTS

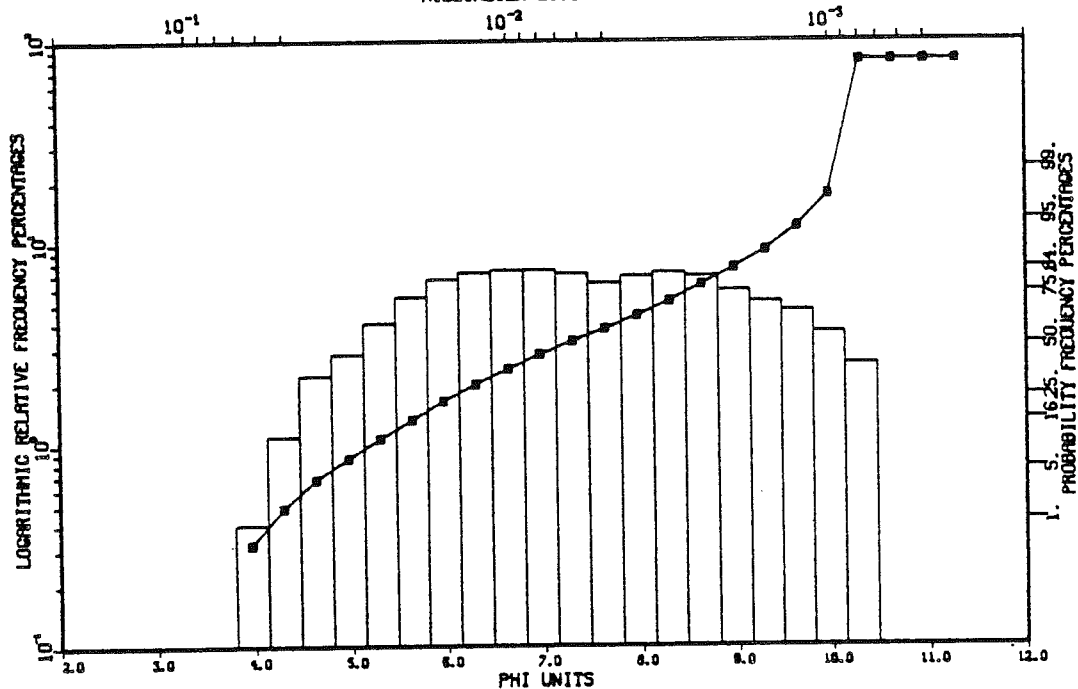


Fig. 99

SAMPLE NO. - 736 J. SYVITSKI 8203562  
 ING 260 INUGSUIN FJORD  
 MILLIMETER EQUIVALENTS

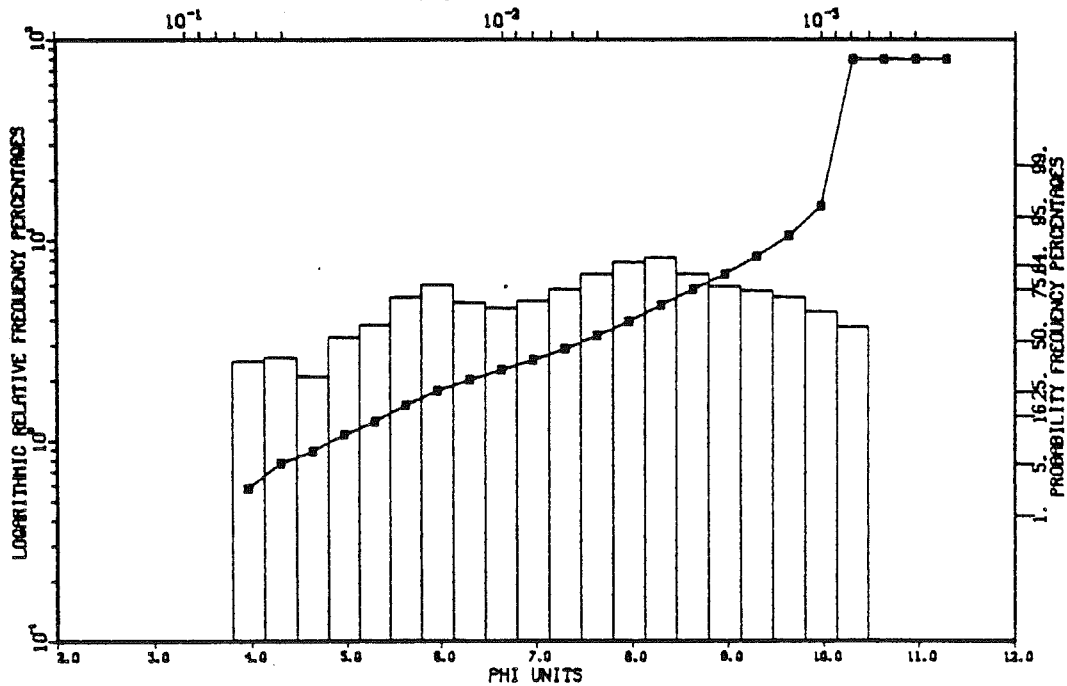


Fig. 100

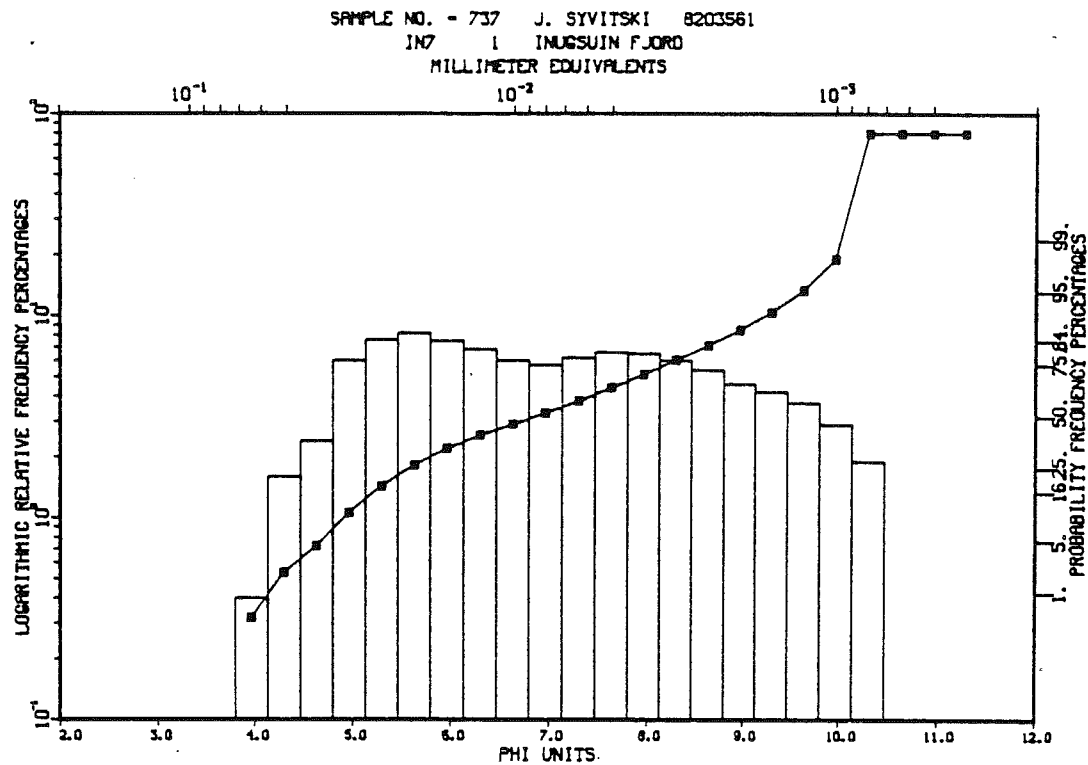


Fig. 101

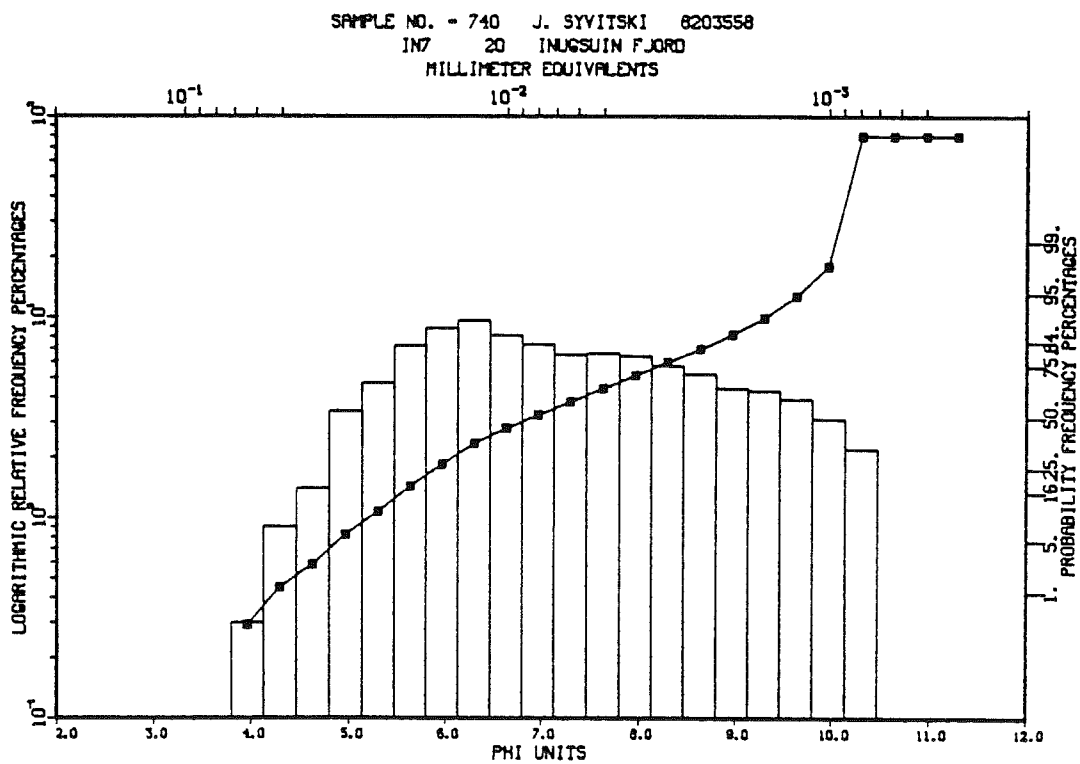


Fig. 102

SAMPLE NO. - 746 J. SYVITSKI 8203552  
IN7 378 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

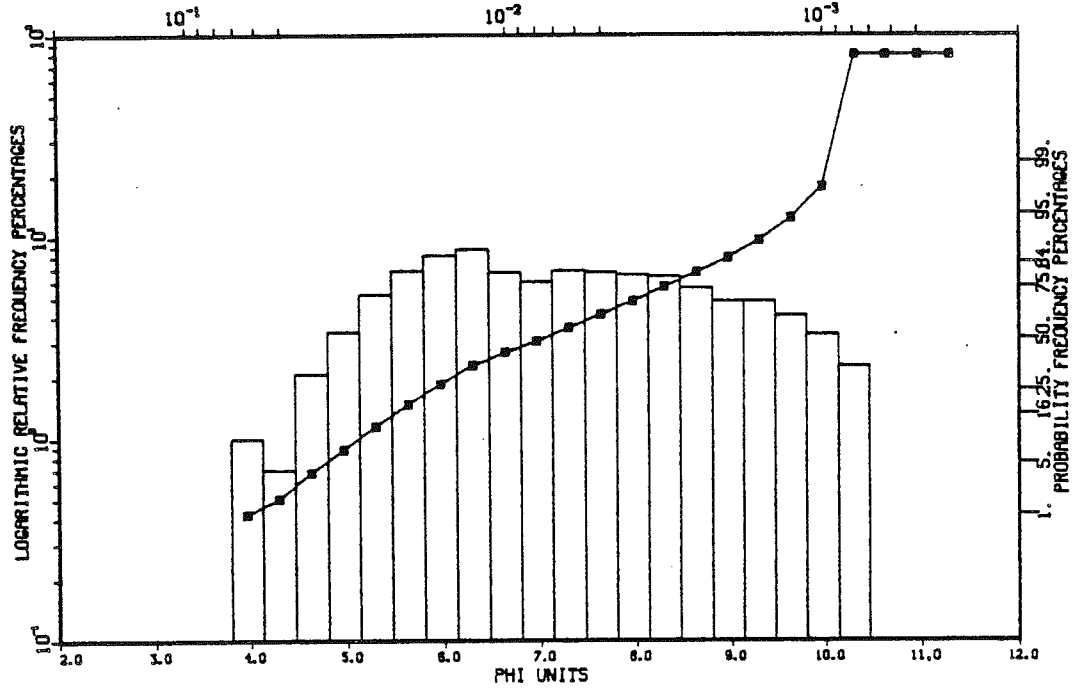


Fig. 103

SAMPLE NO. - 747 J. SYVITSKI 8203551  
IN8 1 INUGSUIN FJORD  
MILLIMETER EQUIVALENTS

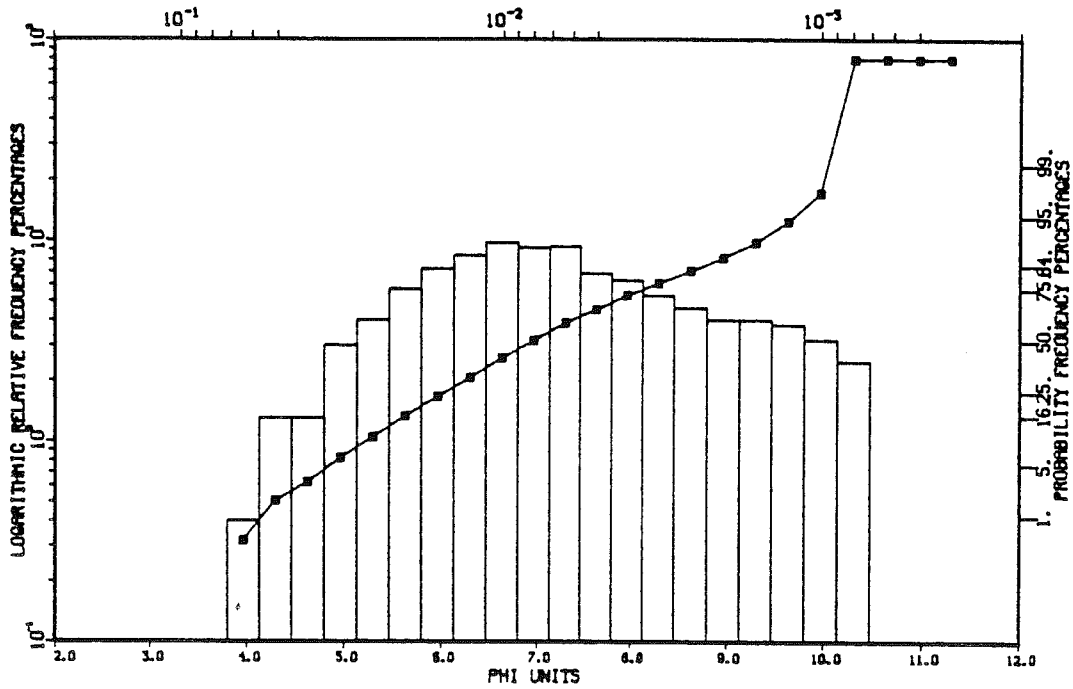


Fig. 104

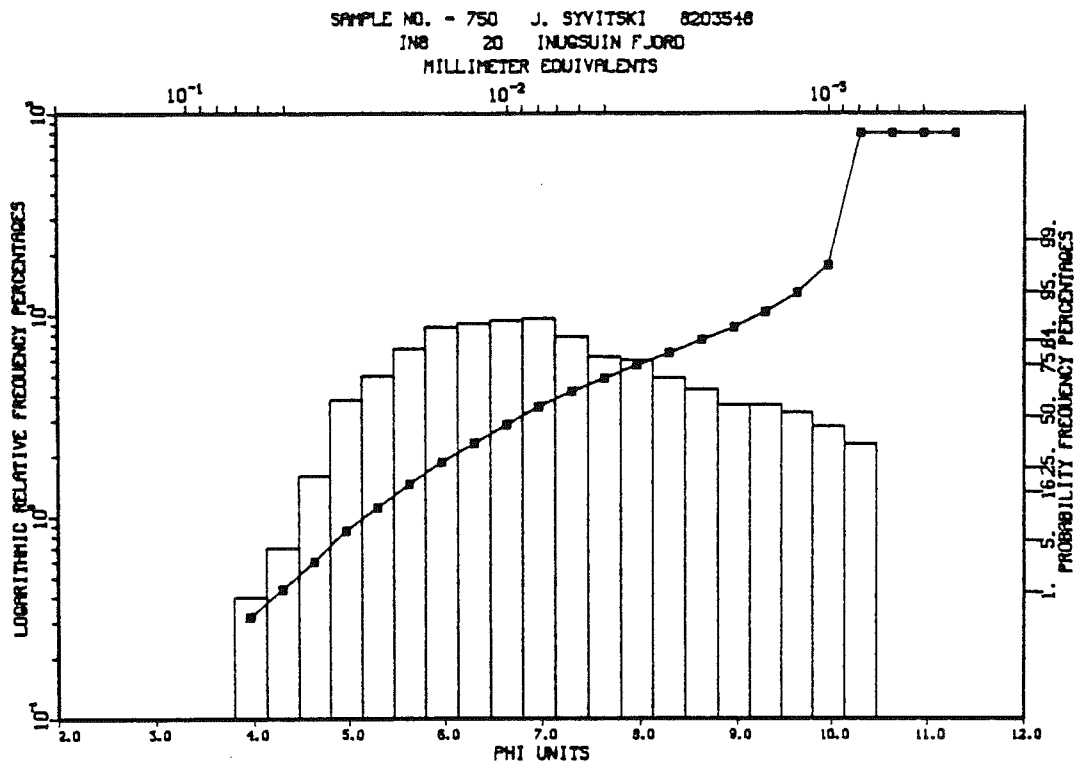


Fig. 105

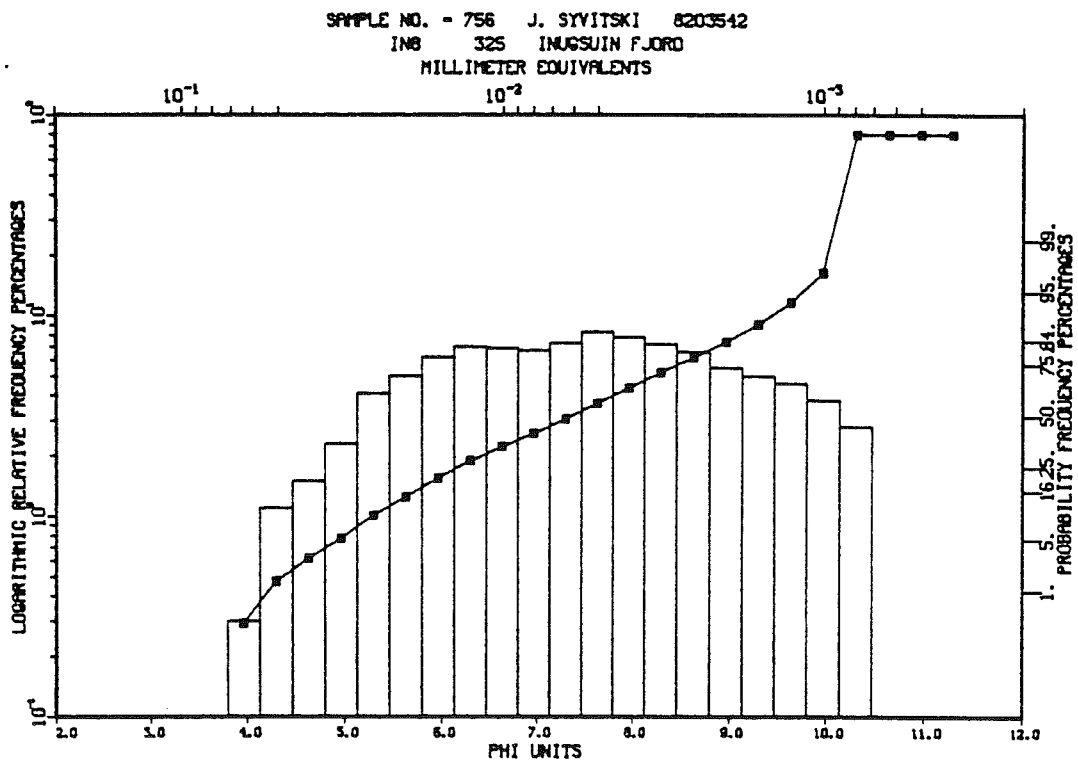
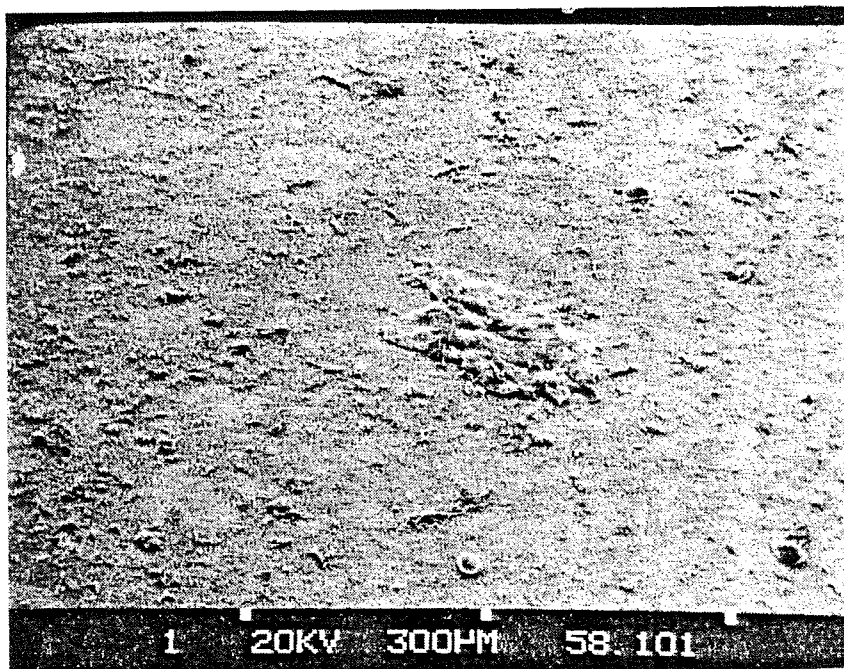


Fig. 106

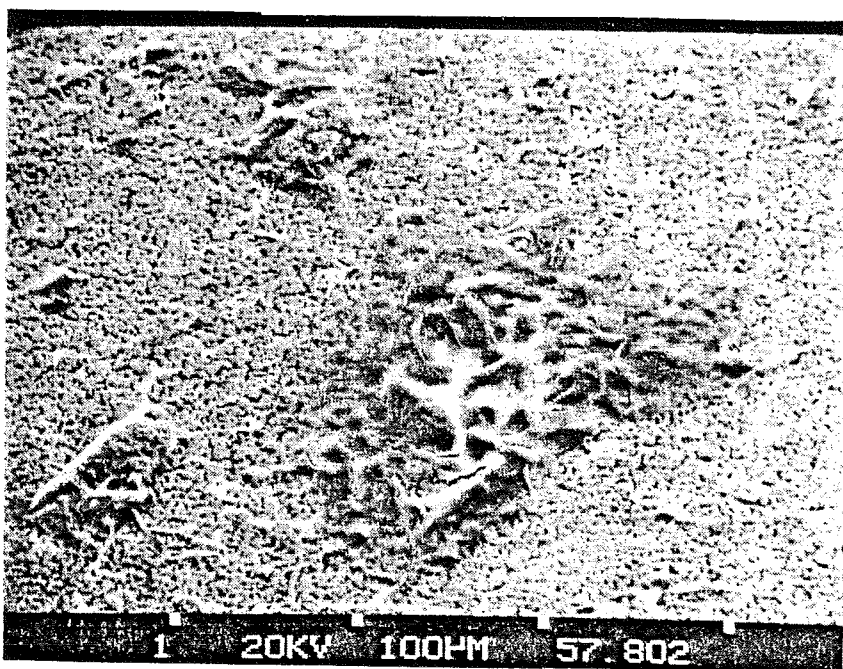


Station IN-1:1 m (82-03581)

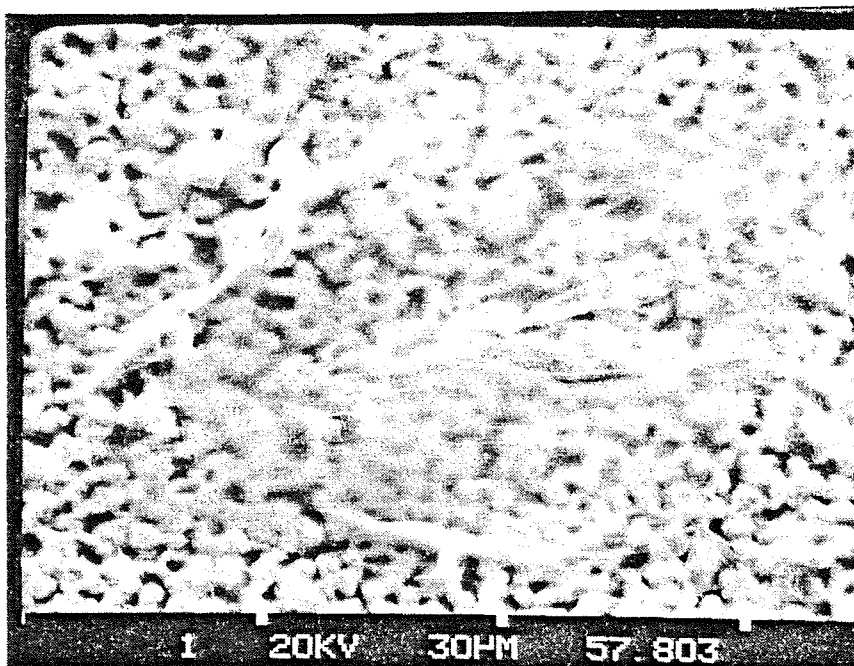


Micrograph 58.101 - general photo of sample showing floc of clays.

Station IN-1:20 m (82-03578)

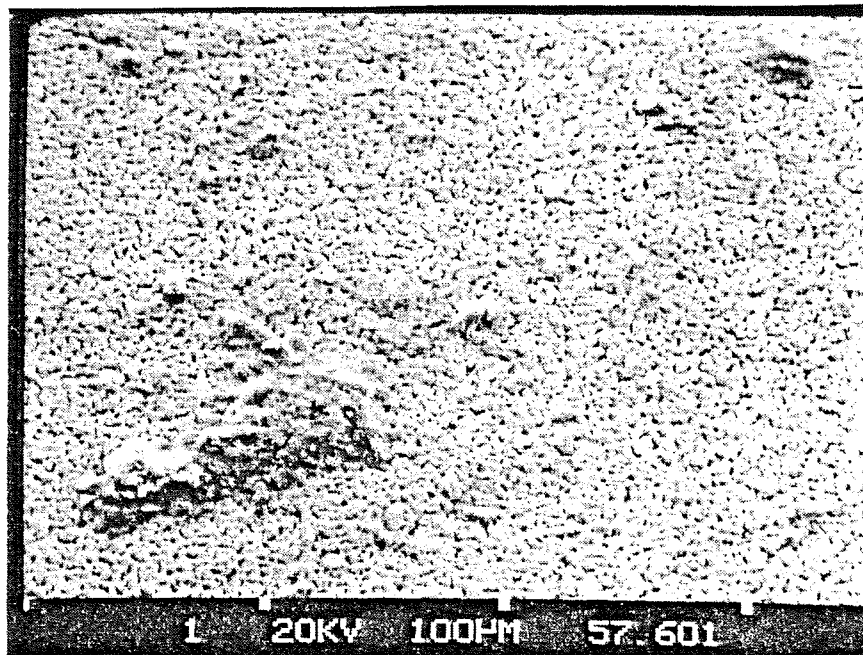


Micrograph 57.802 - large floc which resembles a mucoid. A few clay rosettes are present along with feldspars, micas and quartz.



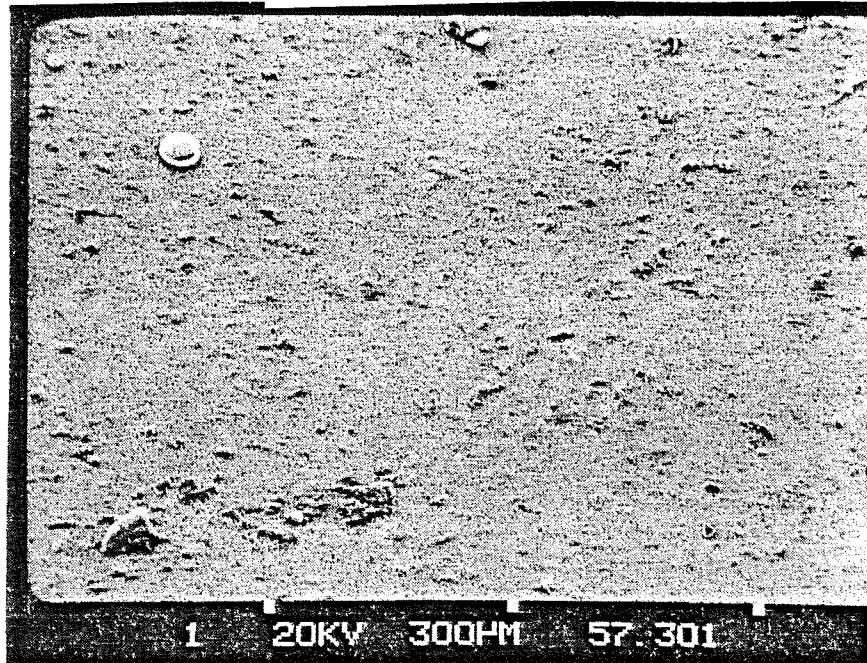
Micrograph 57.803 - evidence that the mucus on the sample is not contamination, it shows internal structure.

Station IN-1:50 m (82-03576)



Micrograph 57.601 - general photo showing floc made of small particles.

Station IN-1:125 m (82-03573)

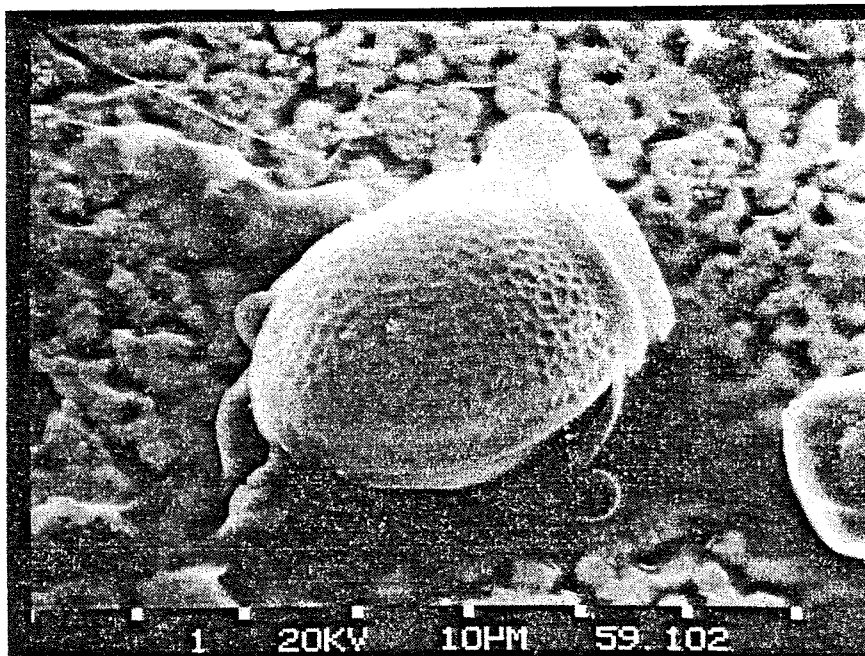


Micrograph 57.301 - general photo of sample.



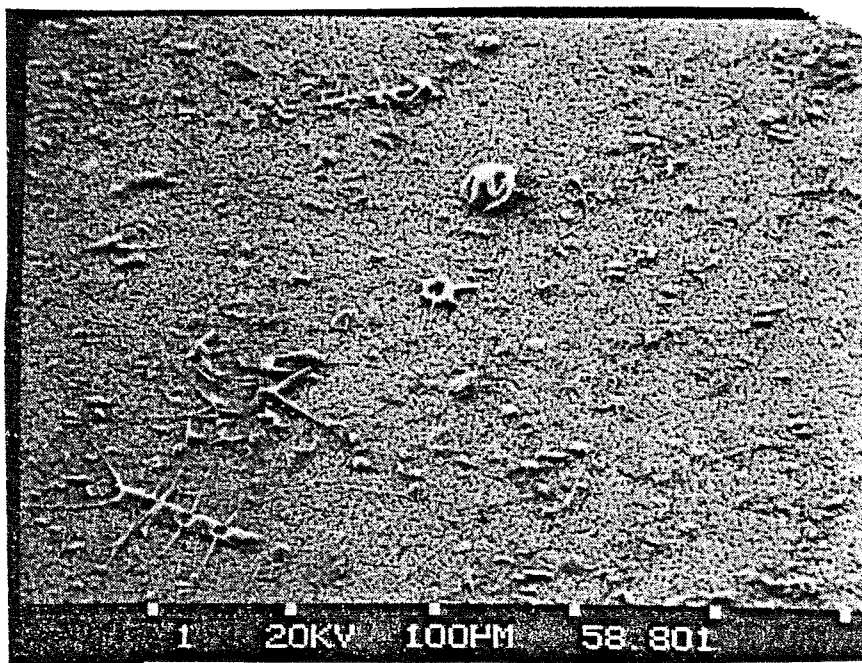
Microgram 57.303 - a typical floccule.

Station IN-2:1 m (82-03591)



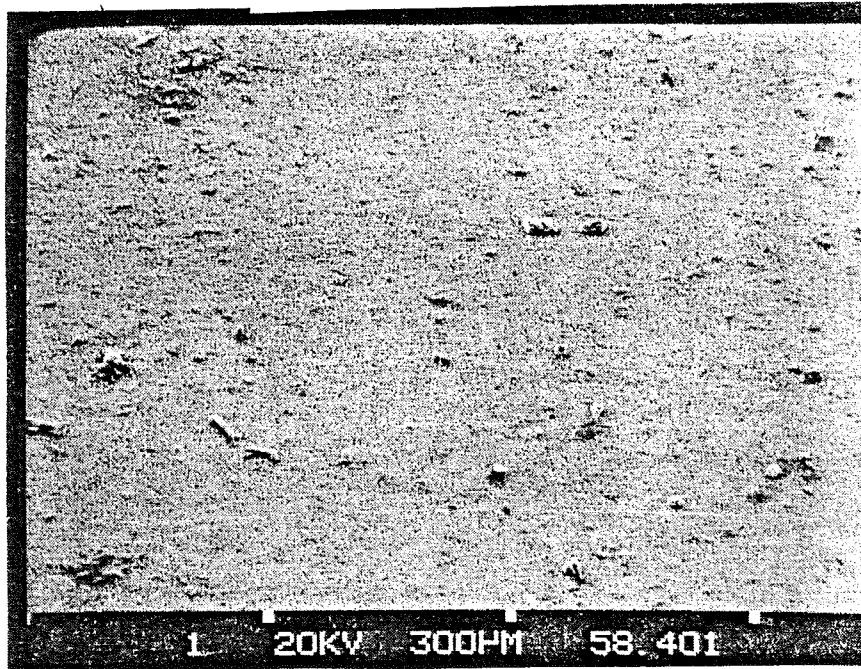
Micrograph 59.102 - an organism seen only in this sample; totally organic, therefore it is not a diatom.

Station IN-2:20 m (82-03588)



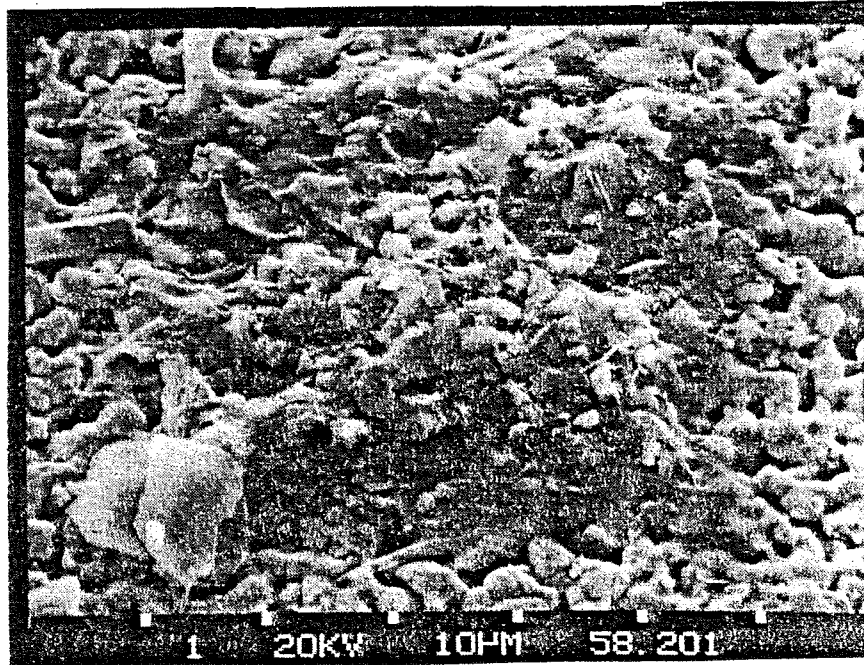
Micrograph 58.801 - general photo of sample.

Station IN-2:100 m (82-03584)



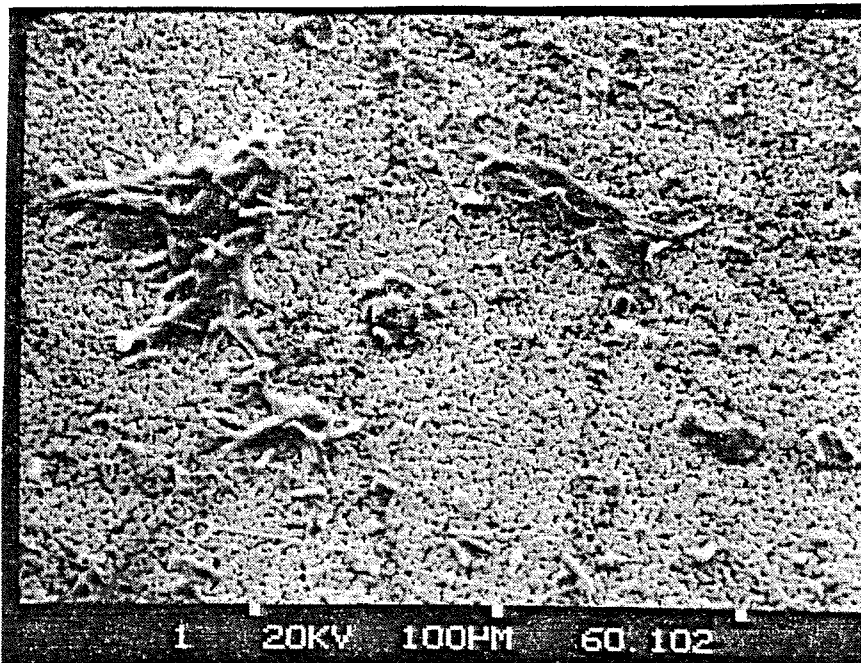
Micrograph 58.401 - general photo of sample.

Station IN-2:270 m (82-03582)

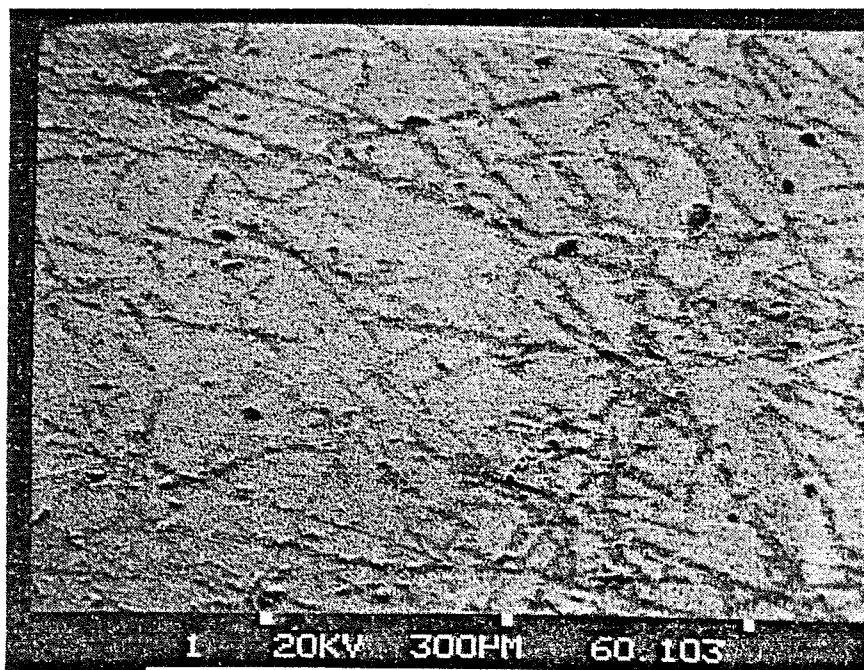


Micrograph 58.201 - floccule made of clays.

Station IN-3:1 m (82-03601)

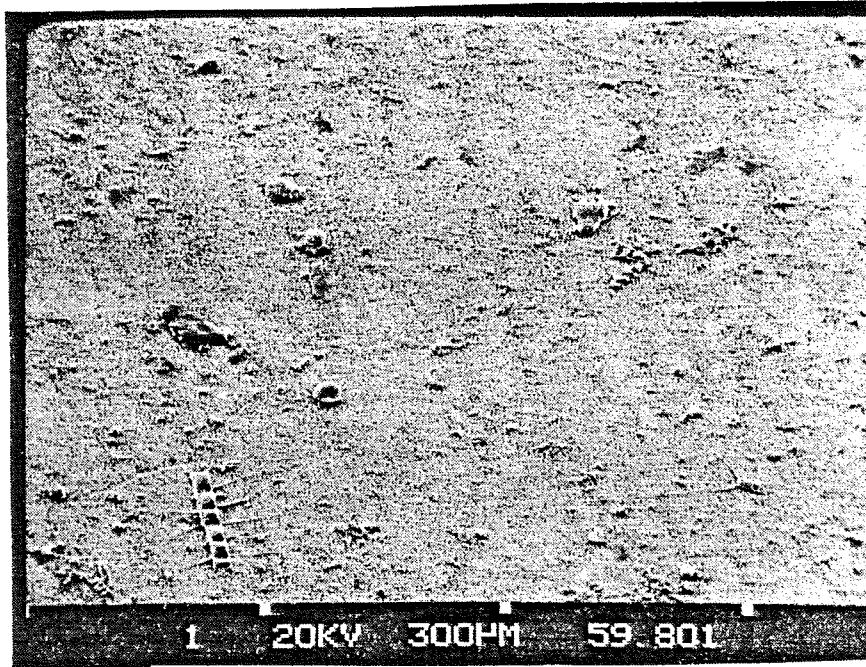


Micrograph 60.102 - floc with rod-like protrusions.



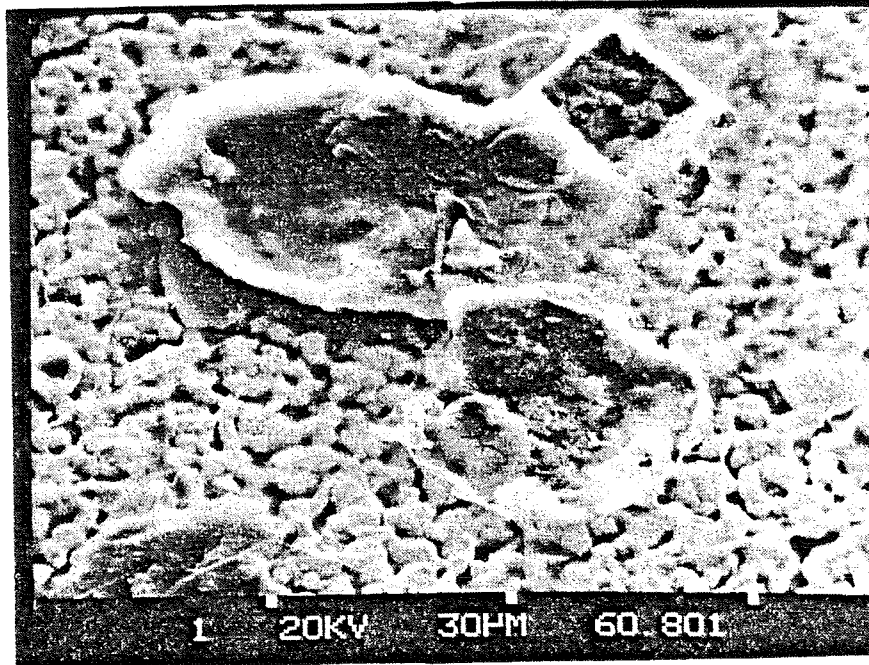
Micrograph 60.103 - general photo of sample.

Station IN-3:20 m (82-03598)

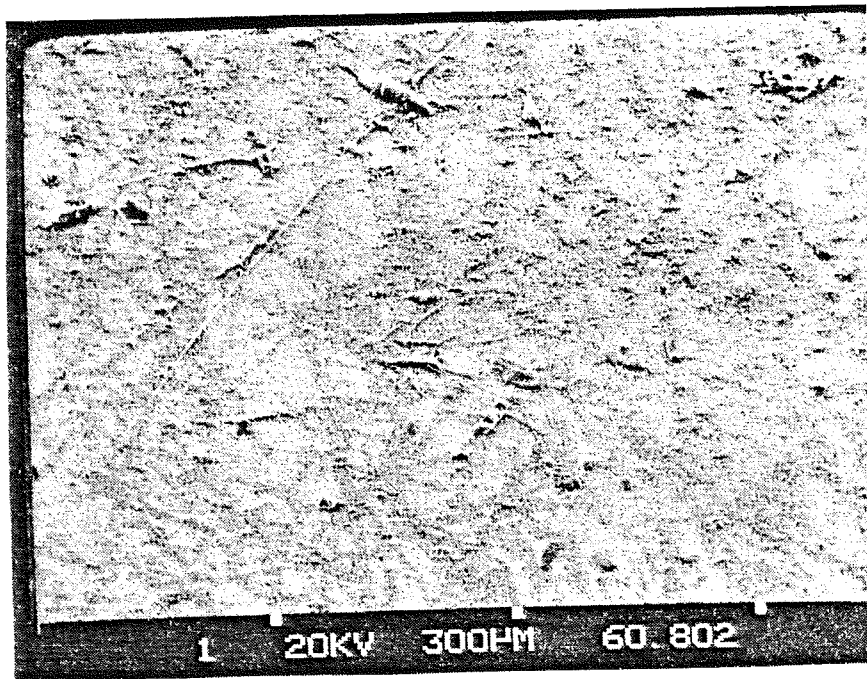


Micrograph 59.801 - general photo of sample.

Station IN-4:20 m (82-03608)

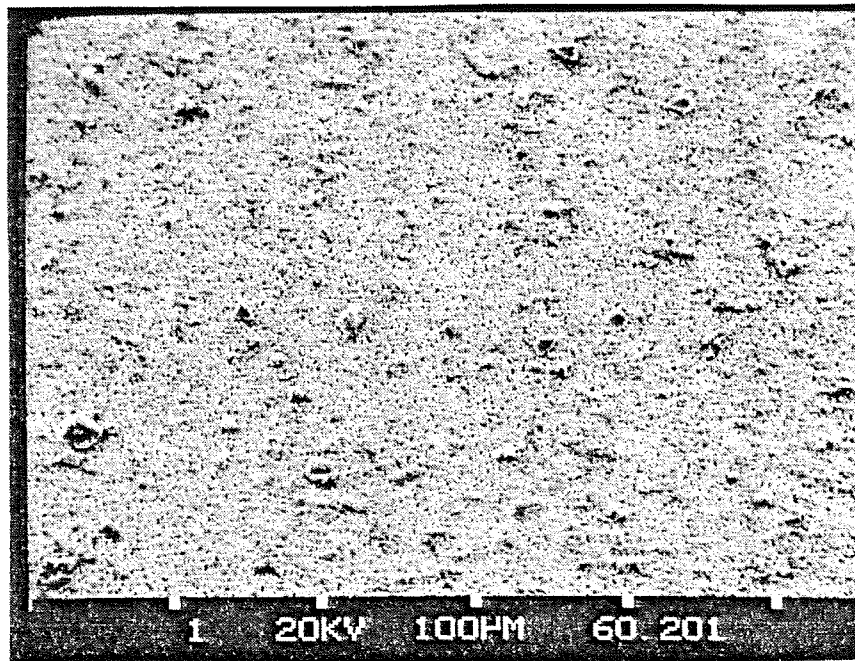


Micrograph 60.801 - mucoid.



Micrograph 60.802 - general photo of sample.

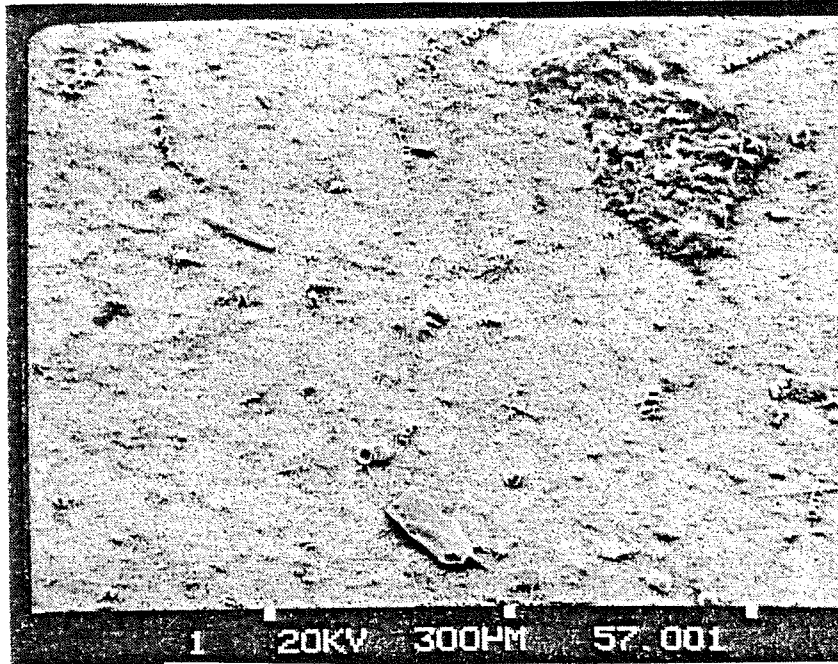
Station IN-4:560 m (82-03602)



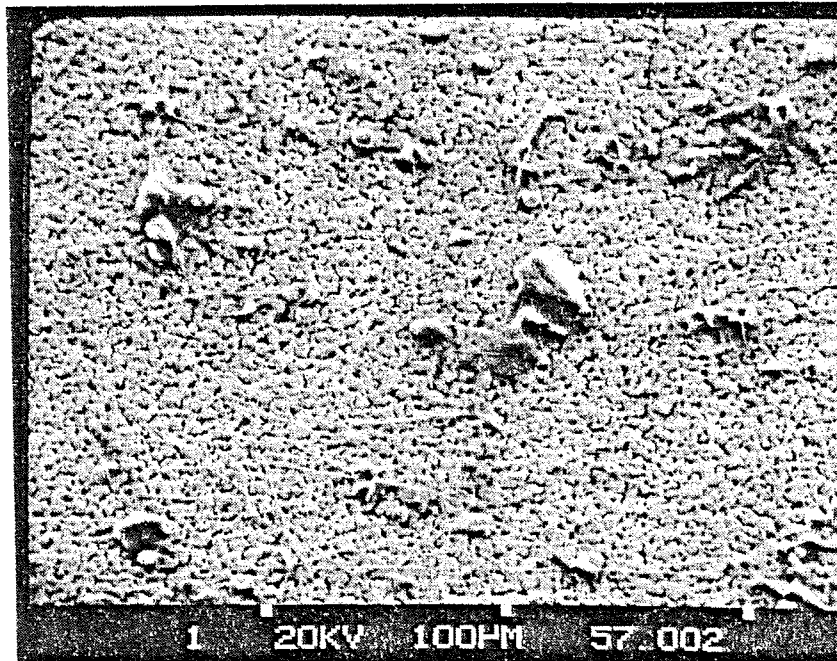
Micrograph 60.201 - general photo of sample.



Station IN-6:5 m (82-03570)

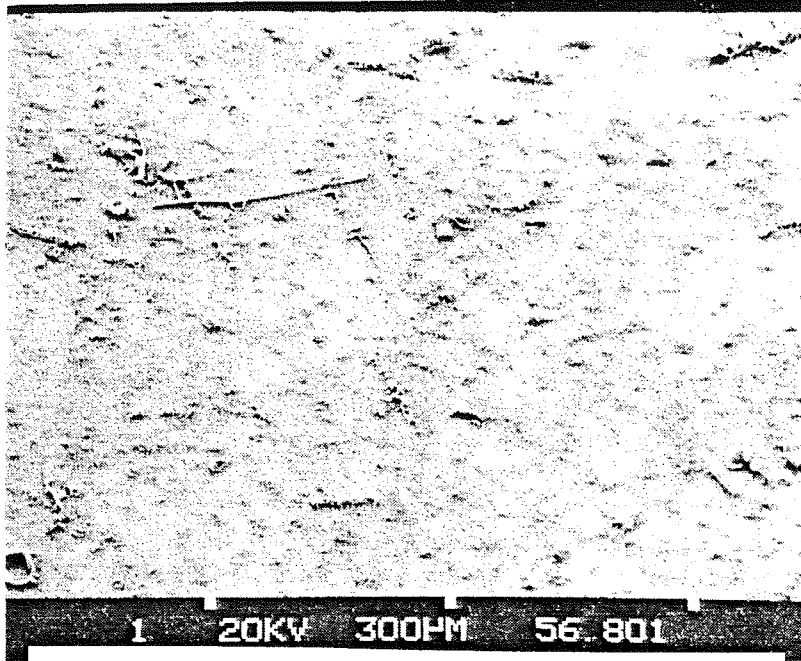


Micrograph 57.001 - mucoid (upper right).

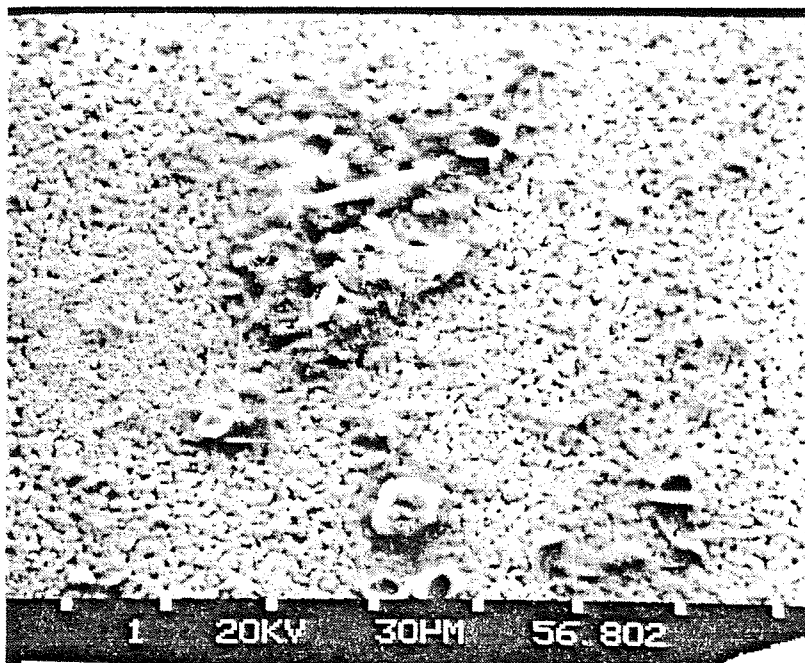


Micrograph 57.002 - close-up of mucus and diatom needles.

Station IN-6:20 m (82-03568)

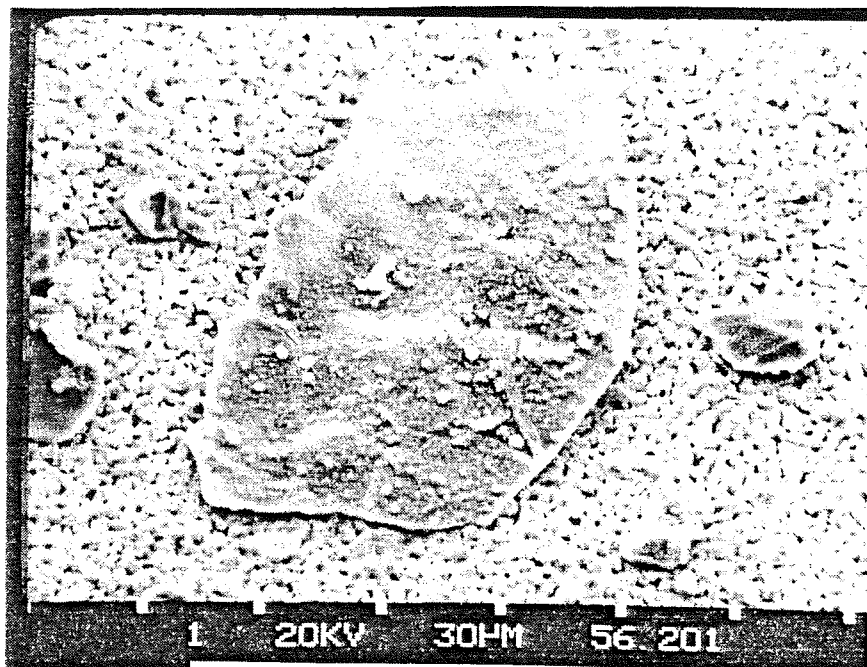


Micrograph 56.801 - general photo showing clear stringers.

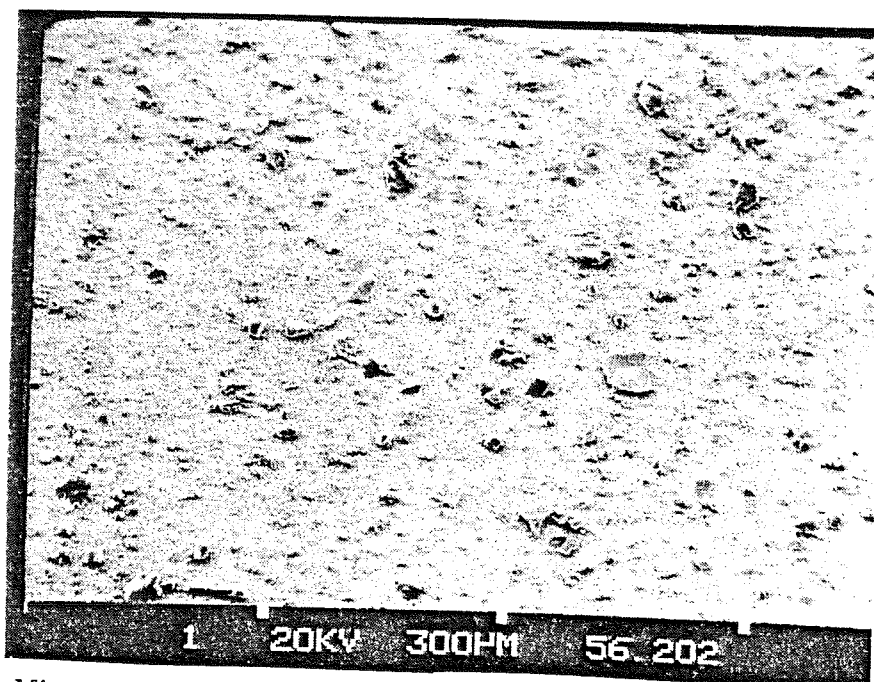


Micrograph 56.802 - diatoms, individual particles and flocs.

Station IN-6:260 m (82-03562)

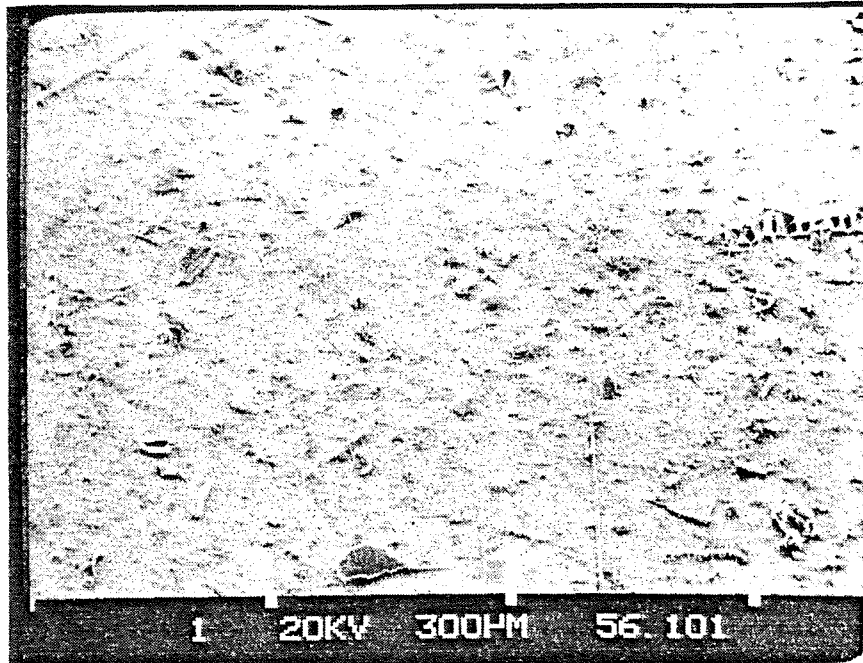


Micrograph 56.201 - large iron-rich grain.



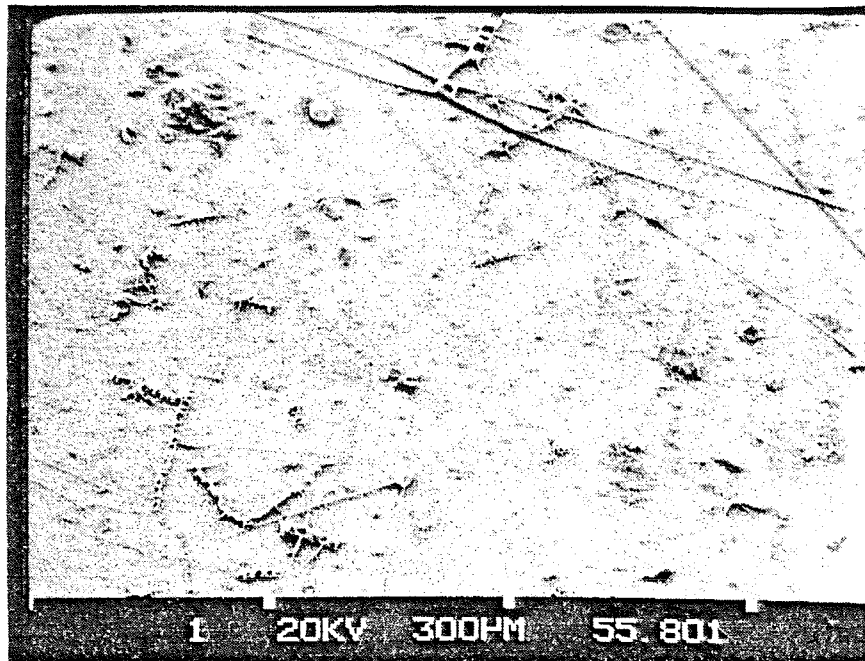
Micrograph 56.202 - general photo showing a variety of components.

Station IN-7:1 m (82-03561)



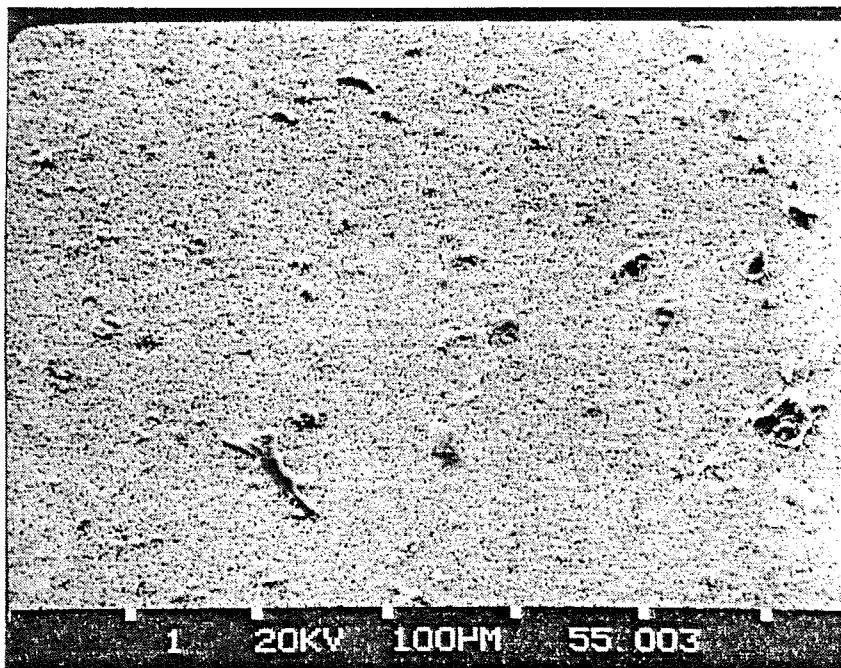
Micrograph 56.101 - general photo of sample.

Station IN-7:20 m (82-03558)

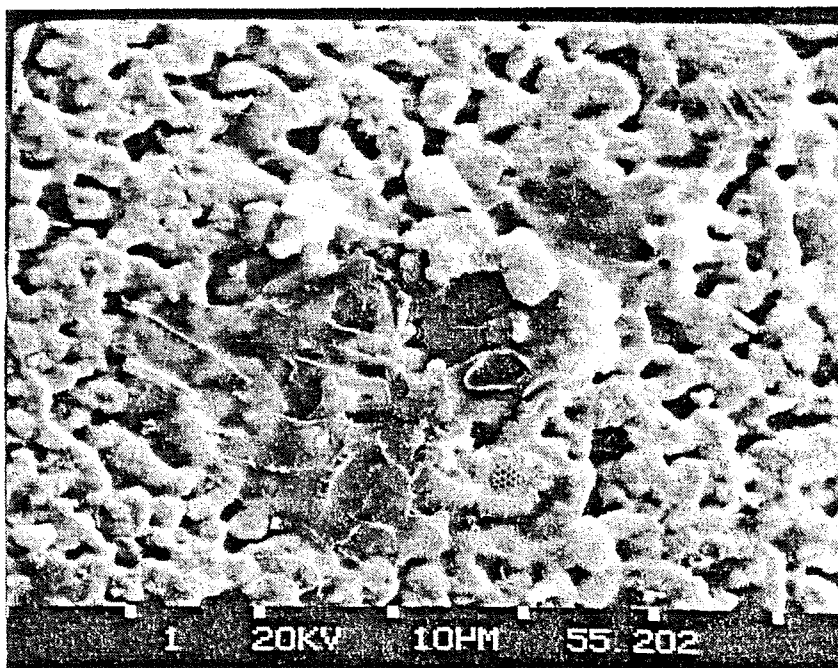


Micrograph 55.801 - general photo of sample.

Station IN-7:378 m (82-03552)

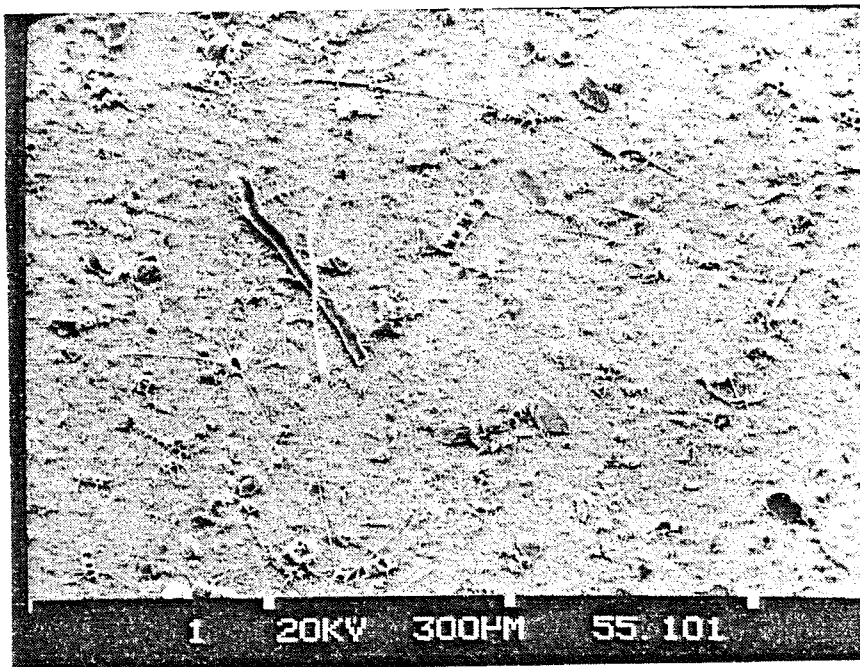


Micrograph 55.003 - general photo.

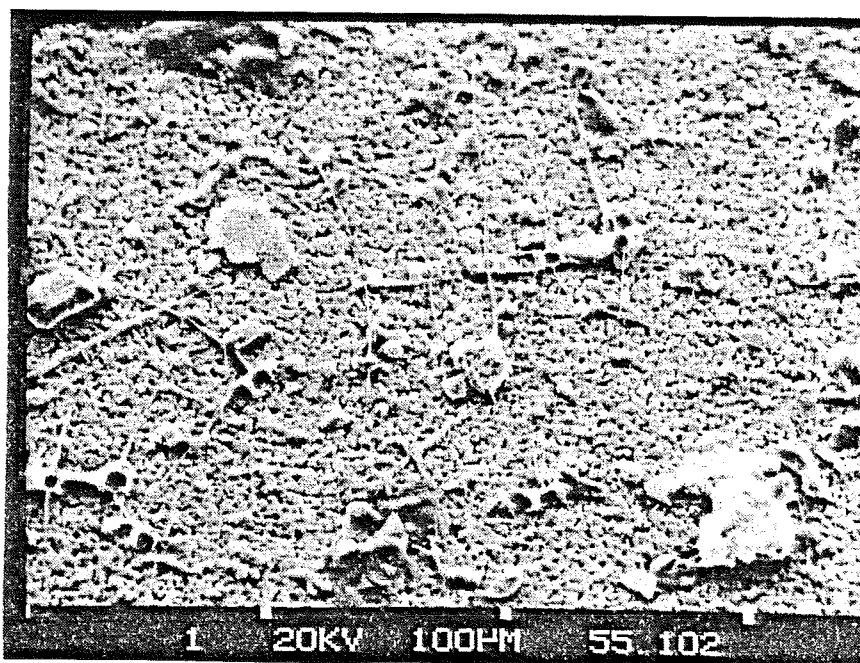


Micrograph 55.202 - mucoid floc.

Station IN-8:1 m (82-03551)

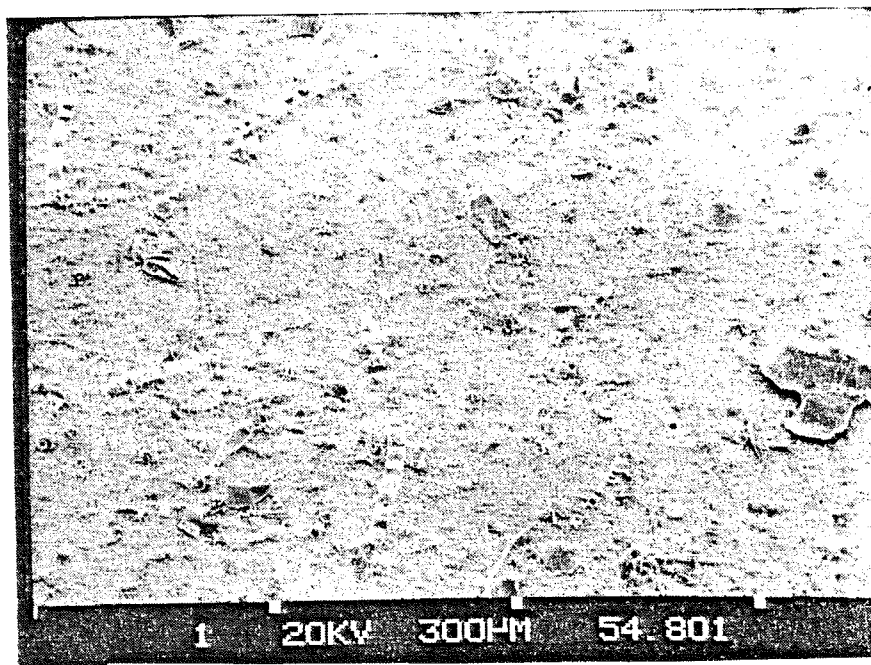


Micrograph 55.101 - general photo.



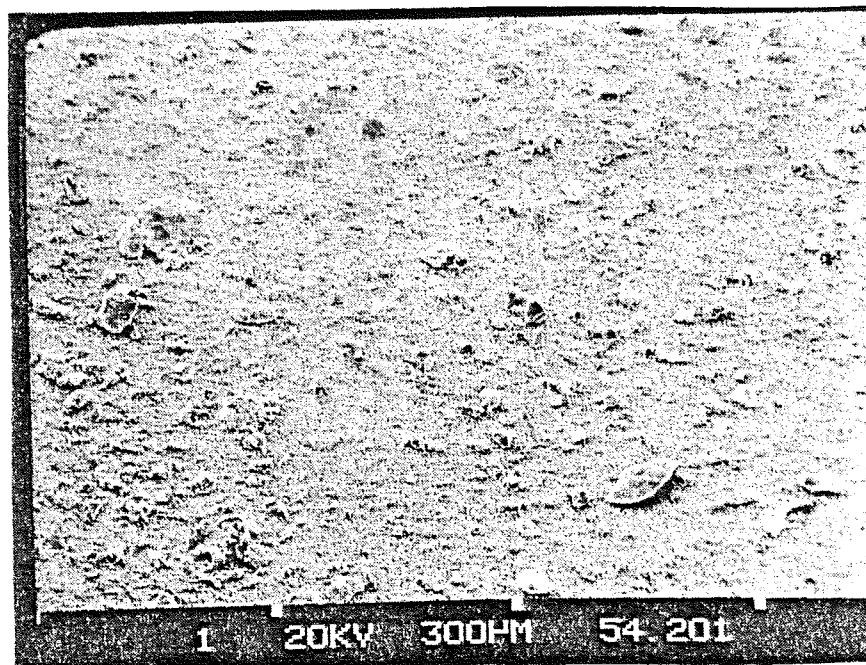
Micrograph 55.102 - another general photo (spectrum A55102 is included).

Station IN-8:20 m (82-03548)

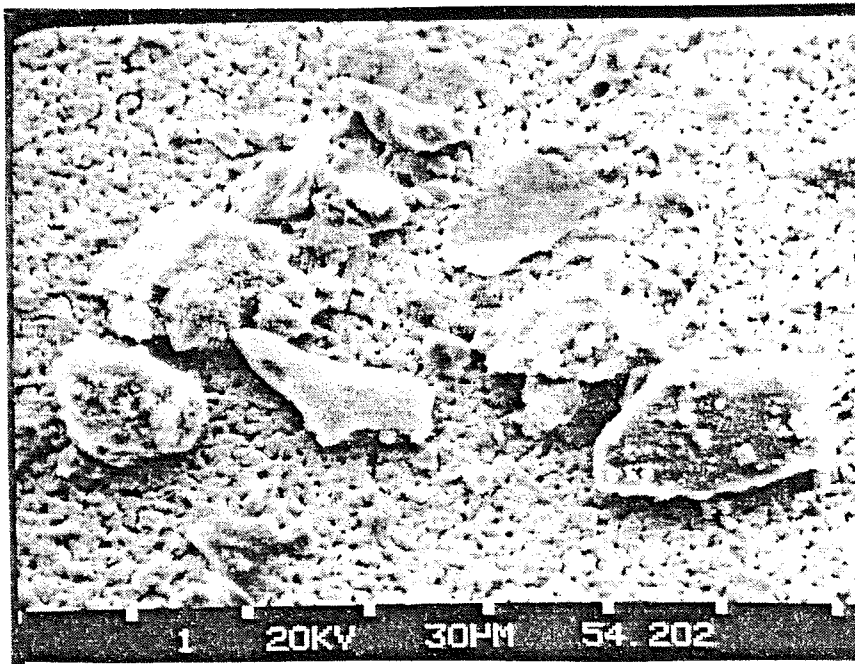


Micrograph 54.801 - general photo showing everything.

Station IN-8:325 m (82-03542)



Micrograph 54.201 - general photo of sample.



Micrograph 54.202 - collection of floes and silt size mineral grains.



ID:A55102 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	151
Mg	716
Al	9520
Si	32176
Cl	2678
K	530
Ca	25318
Ti	367
Fe	1663
Bg	0

ID:A55102 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.02
Mg	0.07
Al	1.00
Si	3.38
Cl	0.28
K	0.06
Ca	2.66
Ti	0.04
Fe	0.17
Bg	0.00

ID:A55102 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.2
Mg	1.0
Al	13.0
Si	44.0
Cl	3.7
K	0.7
Ca	34.6
Ti	0.5
Fe	2.3

IN-8:1m  
General Analysis

### MAKTAK FIORD

This fjord is very similar to Coronation Fjord described earlier in this report. It has a maximum water depth of 320 m, no sill and is 26 km long with a mean width of 2.3 km. It receives  $0.3 \text{ km}^3$  of freshwater runoff every year. Maktak Fjord merits special attention within the SAFE project for its similarities to Coronation Fjord --- but instead of having a prominent tidewater glacier at its head, Maktak has a large glacier filtered by an extensive sandur that supplies 432,000 tonnes of suspended sediment per annum. Thus Maktak Fjord acts as a control system to help understand the effects of direct glacial input of sediment. Forty seven percent of the fjord's hinterland is covered in glacial ice of which 50 % of the land is at elevations in excess of 1100 m. Of particular importance is that almost 100 % of the suspended sediment enters the fjord at the head of the fjord. The large Maktak Glacier is retreating at a rate of  $14 \text{ m a}^{-1}$ .

Maktak Fjord contains a water volume of  $10 \text{ km}^3$  and, at the time of sampling, the surface waters were relatively warm, up to  $3.7 \text{ }^\circ\text{C}$  at the inner station MA1 (Fig. F) decreasing to  $-0.2 \text{ }^\circ\text{C}$  outside the fjord. The coldest waters were located between 50 to 100 m water depth ( $-1.54 \text{ }^\circ\text{C}$ ) and warming thereafter with depth to  $-0.27 \text{ }^\circ\text{C}$  at 640 m at station MA6A. The salinity of the surface waters increased from  $25.4 \text{ }^\circ\text{‰}$  at MA1 to  $30.6 \text{ }^\circ\text{‰}$  at MA7. The salinity of the deepest water was  $34.0 \text{ }^\circ\text{‰}$ . The waters were well oxygenated with the lowest dissolved oxygen value at  $\approx 5.8 \text{ ml L}^{-1}$ .

Fifty-seven SPM samples were collected (Fig. F). The mean grain size of the deflocculated SPM ranged from  $7.2 \text{ } \mu\text{m}$  at station MA1 to  $6.7 \text{ } \mu\text{m}$  at the fjord mouth. The clay fraction of this SPM ranged from 10 % to 50 %. Based on more limited data, the atomic C/N of the suspended sediment was quite low ( $< 6$ ). The organic carbon fraction of the SPM was low, between 5 and 25 % or  $0.06 \text{ mg L}^{-1}$  to  $0.15 \text{ mg L}^{-1}$ . The bottom sediments contain little organic carbon near the fjordhead  $< 0.09 \text{ } \%$  increasing out the fjord to 1.7 % at MA6A.

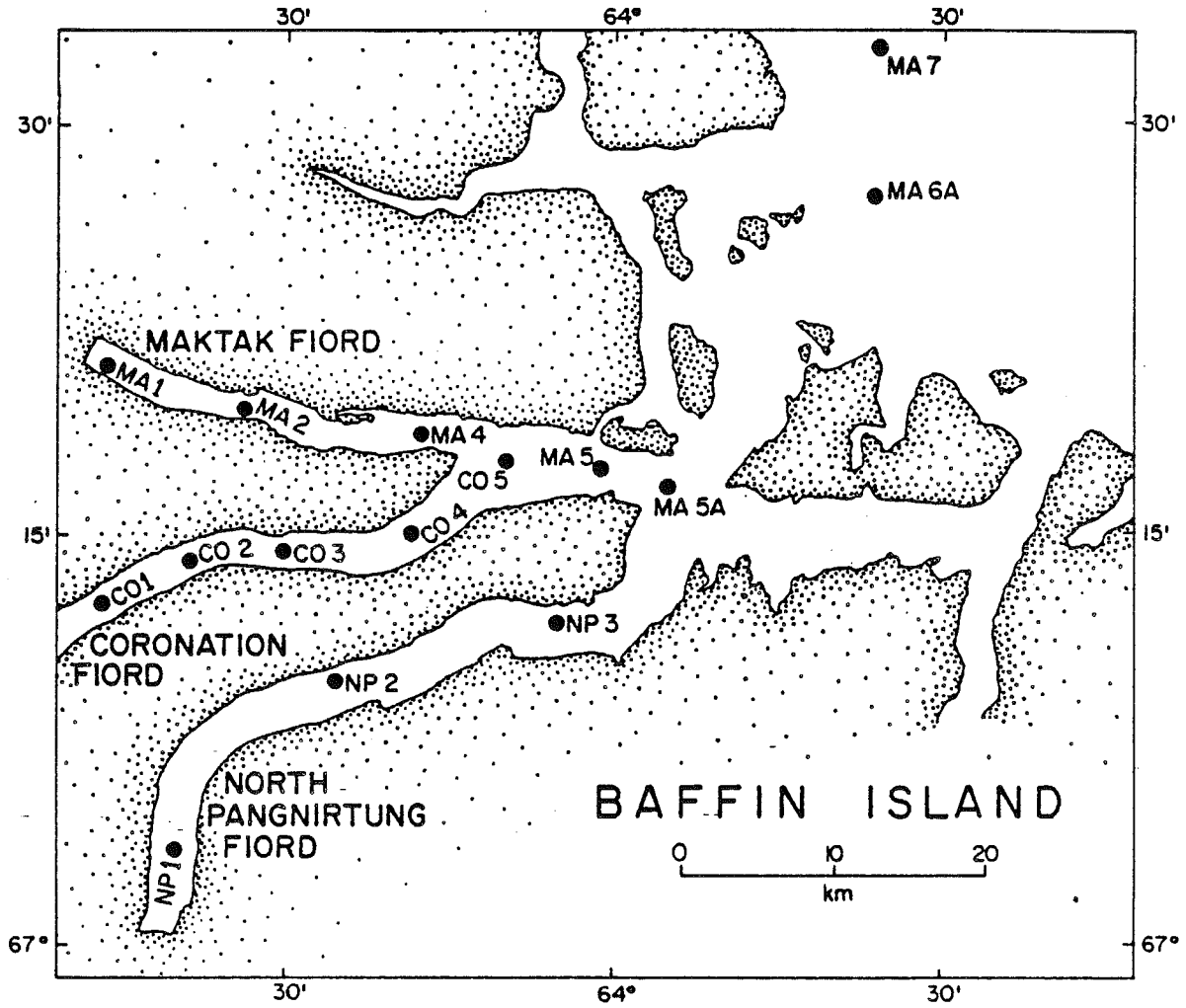


Fig. F- Stations of Maktak Fiord

Maktak Fiord

Station MA-1:1 m (82-03219)

SPM conc. = 1.711 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 107

Description from SEM micrographs -

Minute clays and salt cubes are abundant in this sample. Some star-shaped organisms are seen along with semi-compact clay flocs. Individual grains (some of which are silt sized) and filaments are seen as well.

Station MA-1:10 m (82-03217)

SPM conc. = 1.065 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 108

Description from SEM micrographs -

Numerous small diatoms (as in previous sample) surrounded by clays are apparent. Concentric diatoms with a clay coating, pennate diatoms and dinoflagellates (protophydinium) are also present. One large zooplankton (900µm), many individual particles and clay rosettes can be seen. Flocs may contain both biogenics and inorganics while others are made of clays. Plant debris, dry-looking mucoids and organic spheres (smooth, some with pores) are plentiful. There are also star-shaped organisms with filaments. No photos were saved.

Station MA-1:75 m (82-03213)

SPM conc. = 1.378 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 109

Description from SEM micrographs -

This sample is mostly individual particles (<10µm) and small clay flocs (<30µm). There are a few remnant biogenics, mucoids, silt grains, pennate diatoms and clay flocs. There is one large grain (mostly iron in composition) whose surface is rough (possibly magnetite).

Station MA-2:1 m (82-03229)

SPM conc. = 0.930 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 110

Description from SEM micrographs -

One dinoflagellate (*Ceratium*) is present with small quantities of pico-plankton, silicoflagellates, dinophysis, pennate diatoms and mucoids.

Station MA-2:10m (82-03227)

SPM conc. = 1.970 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 111

Description from SEM micrographs -

Remnant pennate diatoms, silicoflagellates, pico-plankton and concentric diatoms are all found in this sample. Large mucoids, small clay rosettes, flocs, chain diatoms and spheres are common as well.

Station MA-2:254 m (82-03220)

SPM conc. = 1.704 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 112

Description from SEM micrographs -

This sample is mostly individual particles and small clay flocs. There are a few remnant biogenics such as diatoms (concentric and pennate) and silicoflagellates. There are also compact flocs, possibly resuspended material as well as intact fecal pellets of clays. No photos were saved.

Station MA-4:1 m (82-03243)

SPM conc. = 1.151 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 113

Description from SEM micrographs -

This sample consists mostly of small individual grains of < 10µm. There are also several flocs.

Station MA-4:10 m (82-03241)

SPM conc. = 1.353 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 114

Description from SEM micrographs -

Chain diatoms are abundant and individual particles and flocs are numerous as well. There are a few flattened-out fecal pellets made of fibres (needles?).

Station MA-4; 320 m (82-03234)

SPM conc. = 0.908 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 115

Description from SEM micrographs -

This sample is mainly small grains (< 10µm) and small flocs (10-30µm) which are compact and inorganic in nature. Remnant diatoms and mucoids are seen as well. No photos were taken.

Station MA-5:1 m (82-03212)

SPM conc. = 1.546 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 116

Description from SEM micrographs -

Individual grains and mucoids are abundant in this sample. Diatoms, silt grains and flocs are also seen. The few fecal pellets present are smooth and consist of needles or fibres. Chain diatoms are noticed and have a thin mucus surrounding them.

Station MA-5:400 m (82-03204)

SPM conc. = 1.646 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 117

Description from SEM micrographs -

This sample is abundant with salt cubes (probably unwashed). Otherwise, it is mostly individual particles with some flocs of clays and a few remnant diatoms. No photos were taken.

Station MA-5:576m (82-03203)

SPM conc. = 0.784 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 118

Description from SEM micrographs -

Individual grains are abundant here along with a few large silt grains, some of which have small particles attached to them. There are numerous clay flocs ranging from loose to compact. There are a few remnant diatoms and several dry-looking mucoids and plant debris.

Station MA-6A:10 m (82-03252)

SPM conc. = 1.714 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 119

Description from SEM micrographs -

There are numerous biogenics here, mostly chain diatoms. Pico-plankton, mucoids and fecal pellets filled with diatom needles are also common.

Station MA-6A:50 m (82-03249)

SPM conc. = 2.402 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 120

Description from SEM micrographs -

Numerous biogenics are seen here and individual particles are increasing in number over previous samples. Many of the biogenics consist of concentric diatoms either individually or in chains. There are only a few fecal pellets and mucoids.

Station MA-6A:400 m (82-03246)

SPM conc. = 1.087 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 121

Description from SEM micrographs -

This sample consists mainly of small individual particles and biogenic debris. There are a few concentric diatoms, mucoids and one dinophysis. Flocs of any size are rare, but those present are made of clays and are compact.

Station MA-6A:640 m (82-03244)

SPM conc. = 0.617 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 122

Description from SEM micrographs -

Individual particles and biogenic debris are numerous in this sample. One large mucoid and a few biogenic flocs were also seen. No photos were saved.



Station MA-7:10 m (82-03261)

SPM conc. = 1.123 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 123

Description from SEM micrographs -

This sample consists mainly of chain and concentric diatoms, large fecal pellets of diatoms needles and pico-plankton. There are numerous individual grains and a remnant zooplankton 900µm wide and 1500µm long with appendages made of organics and phosphorus.

Station MA-7:50 m (82-03258)

SPM conc. = 0.820 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 124

Description from SEM micrographs -

Only a few chain diatoms are left at this depth. This sample is mainly individual particles smaller than 30µm. There are a few fecal pellets made of fibres. Small flocs of clays and biogenics are seen. Mucoids are rare but present.

Station MA-7:575 m (82-03254)

SPM conc. = 1.552 mg L<sup>-1</sup>

Histogram of grain size distribiton - Fig. 125

Description from SEM micrographs -

This sample is mostly individual particles with a few remnant diatoms and silicoflagellates.

SAMPLE NO. - 433 J. SYVITSKI MA1 1  
8203219 HAKTAK FJORD  
MILLIMETER EQUIVALENTS

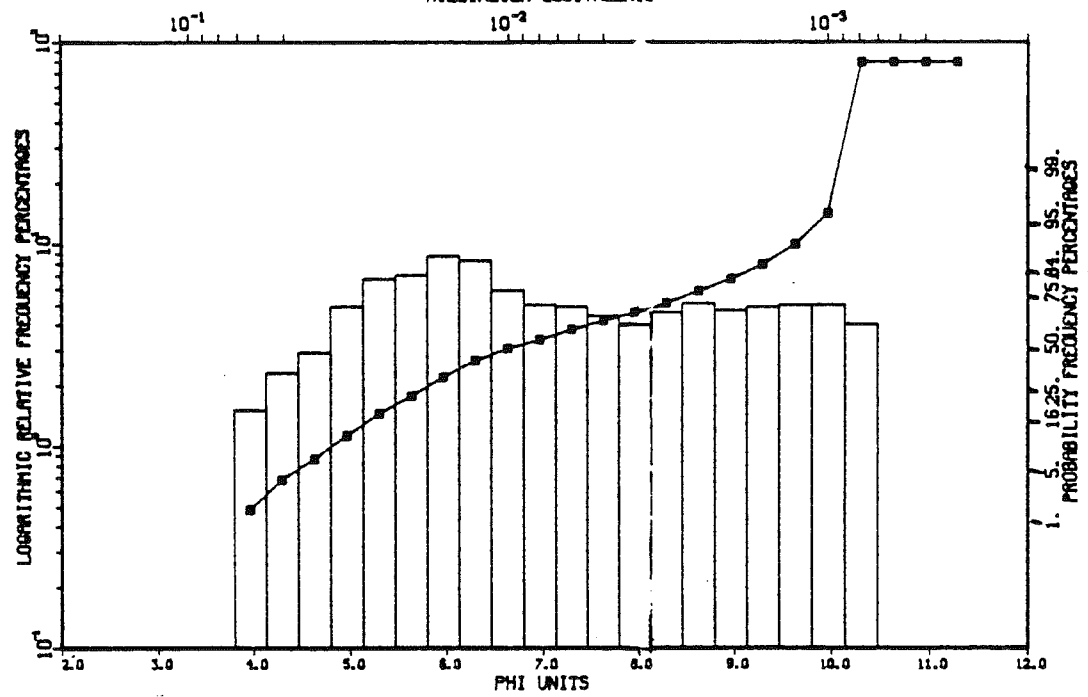


Fig. 107

SAMPLE NO. - 435 J. SYVITSKI MA1 10  
8203217 HAKTAK FJORD  
MILLIMETER EQUIVALENTS

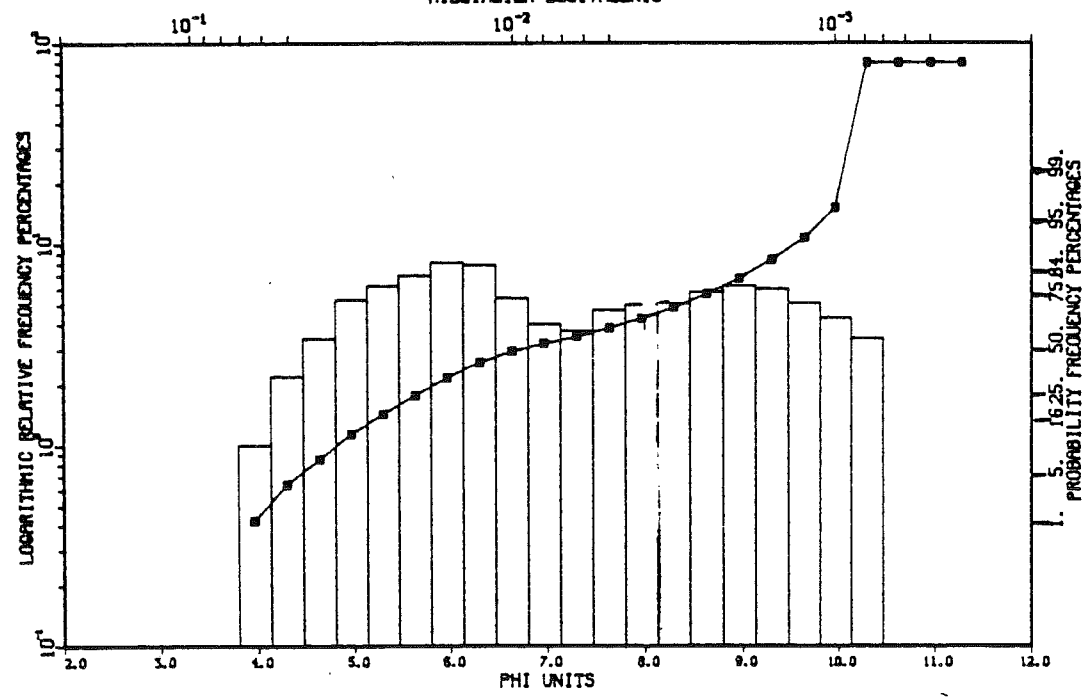


Fig. 108

SAMPLE NO. - 439 J. SYVITSKI MR1 75  
 8203213 MFKTAK FJORD  
 MILLIMETER EQUIVALENTS

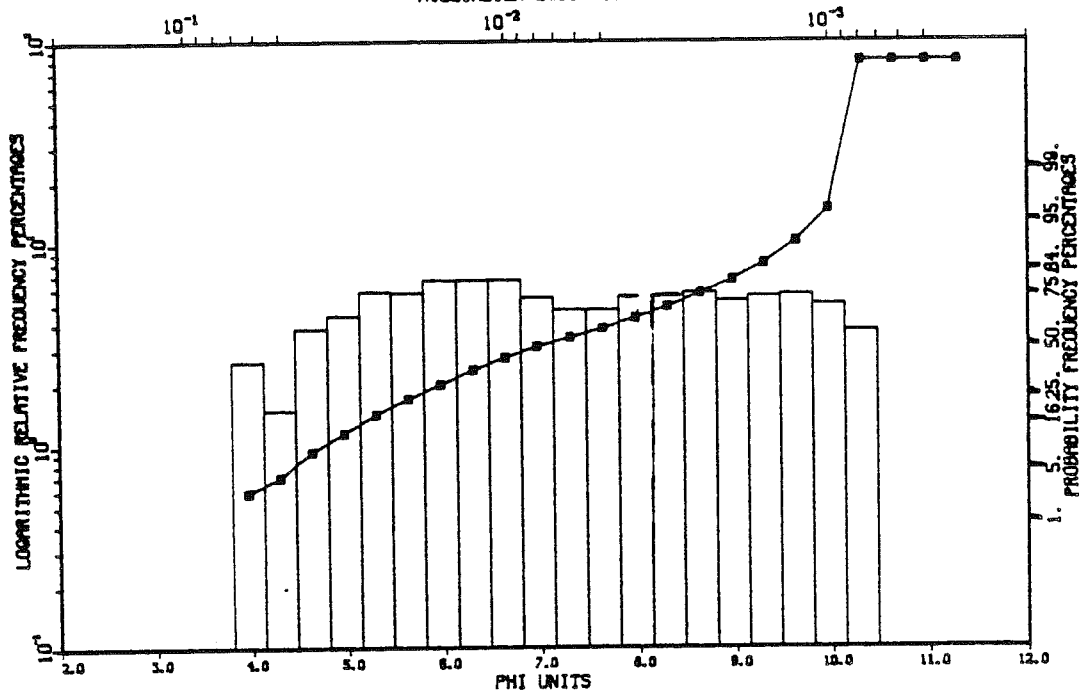


Fig. 109

SAMPLE NO. - 440 J. SYVITSKI MR2 1  
 8203229 MFKTAK FJORD  
 MILLIMETER EQUIVALENTS

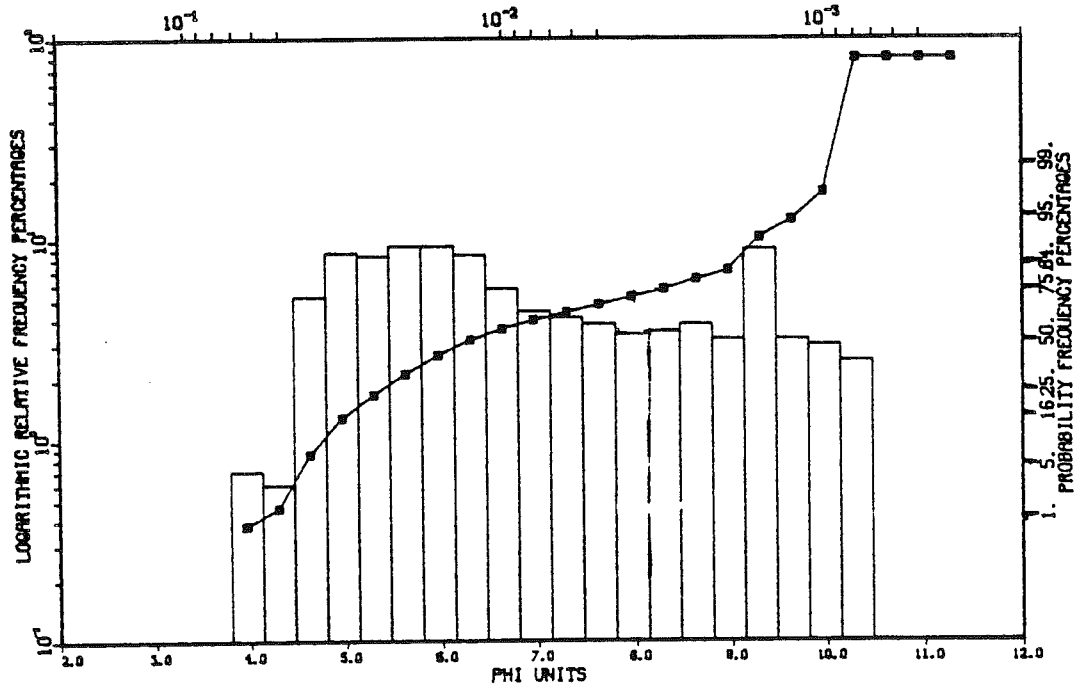


Fig. 110

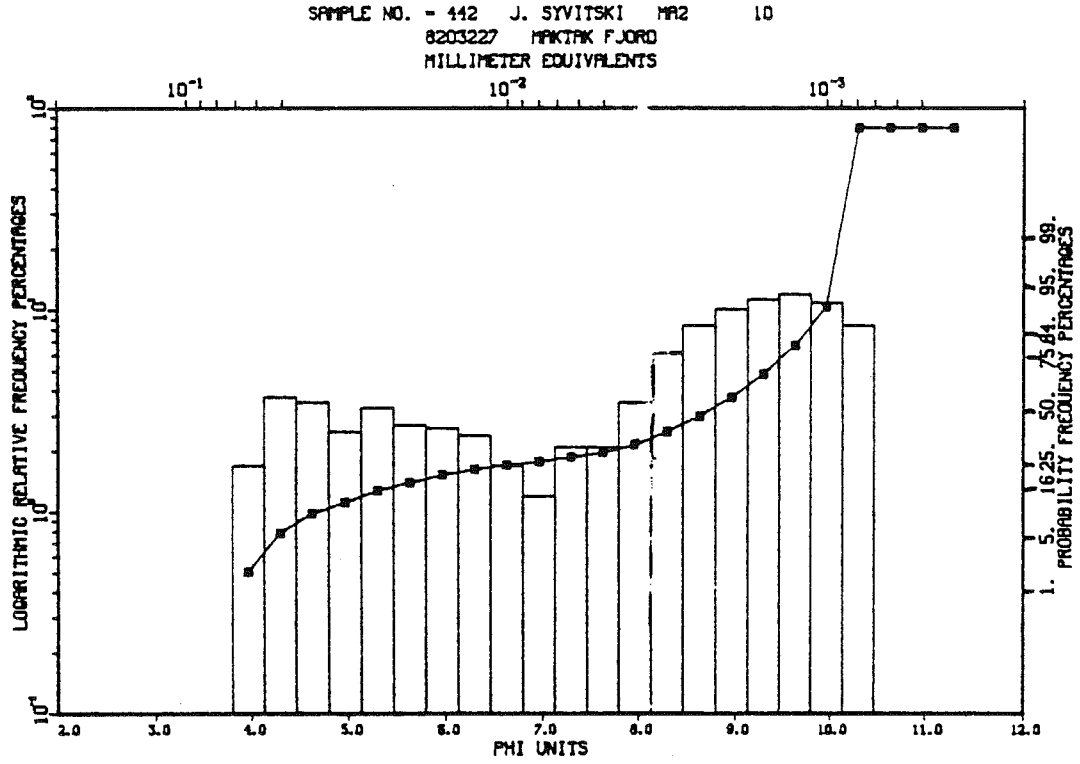


Fig. 111

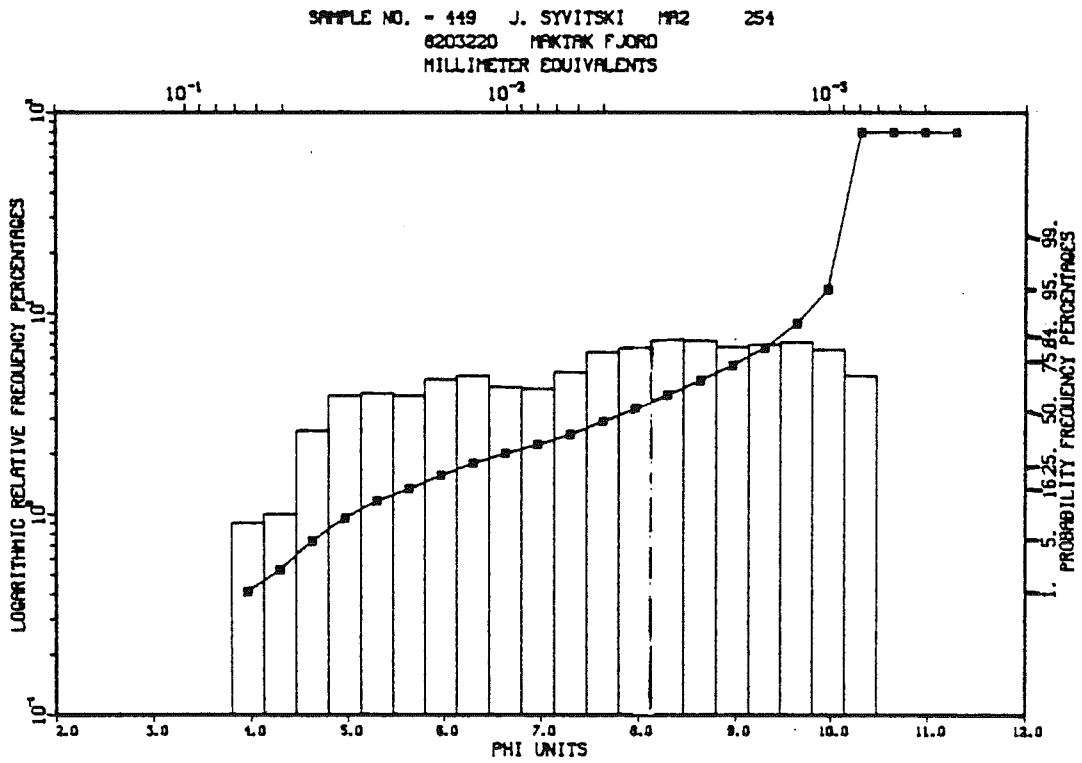


Fig. 112

SAMPLE NO. - 450 J. SYVITSKI MM4 1  
 8203243 MÅKTRAK FJORD  
 MILLIMETER EQUIVALENTS

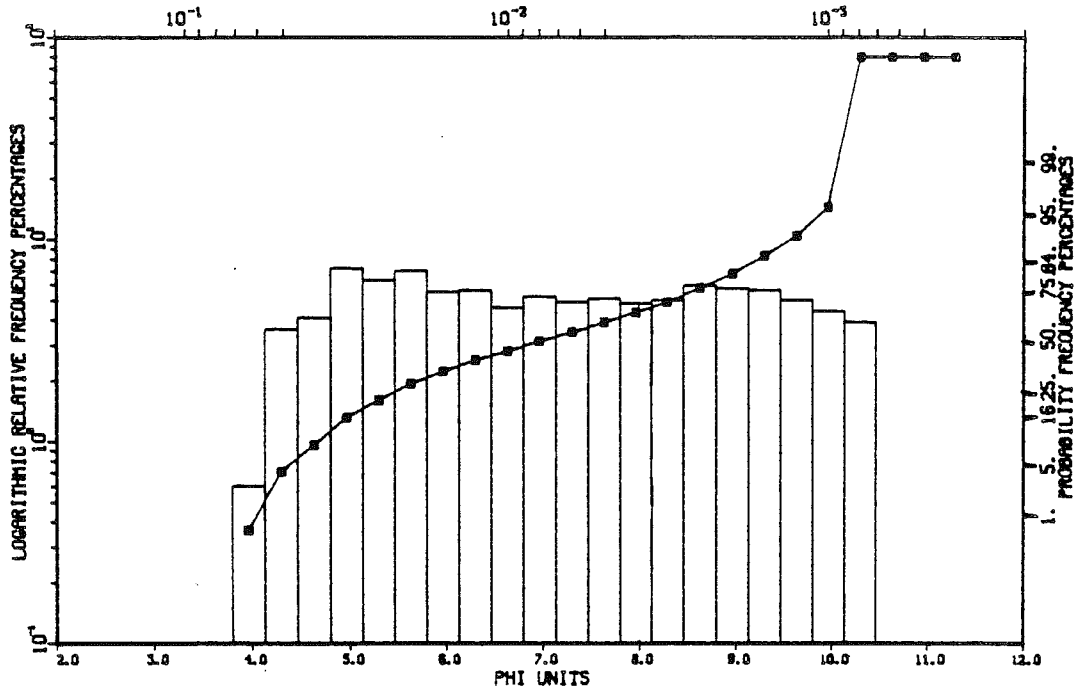


Fig. 113

SAMPLE NO. - 452 J. SYVITSKI MM4 10  
 8203241 MÅKTRAK FJORD  
 MILLIMETER EQUIVALENTS

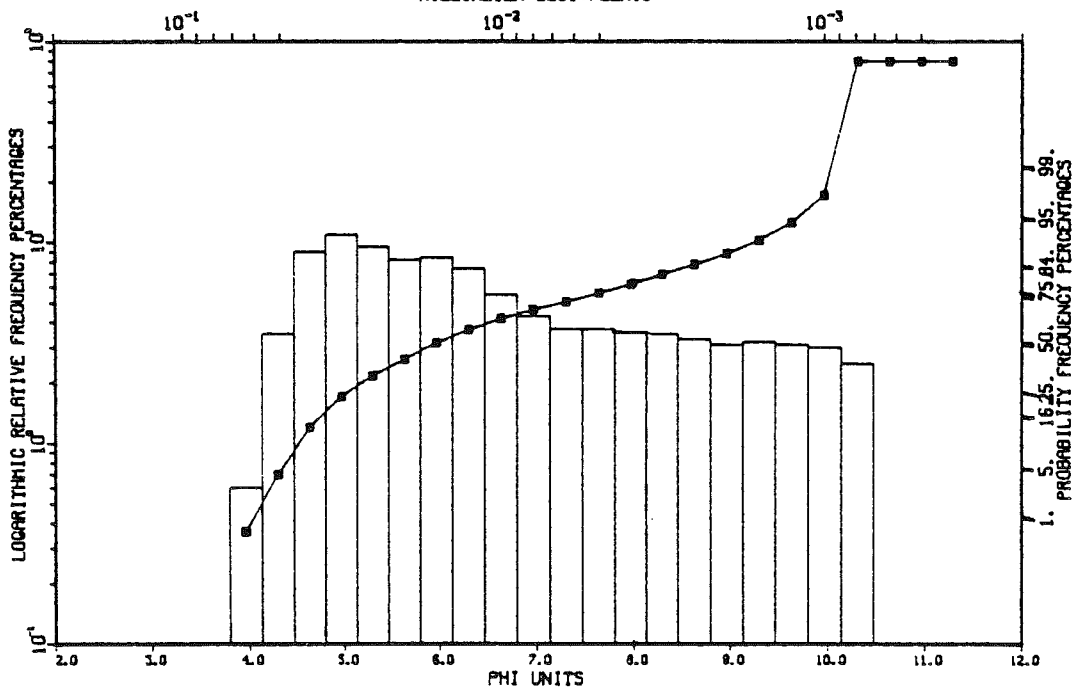


Fig. 114

SAMPLE NO. - 459 J. SYVITSKI MR4 320  
 8203234 MAFKAK FJORD  
 MILLIMETER EQUIVALENTS

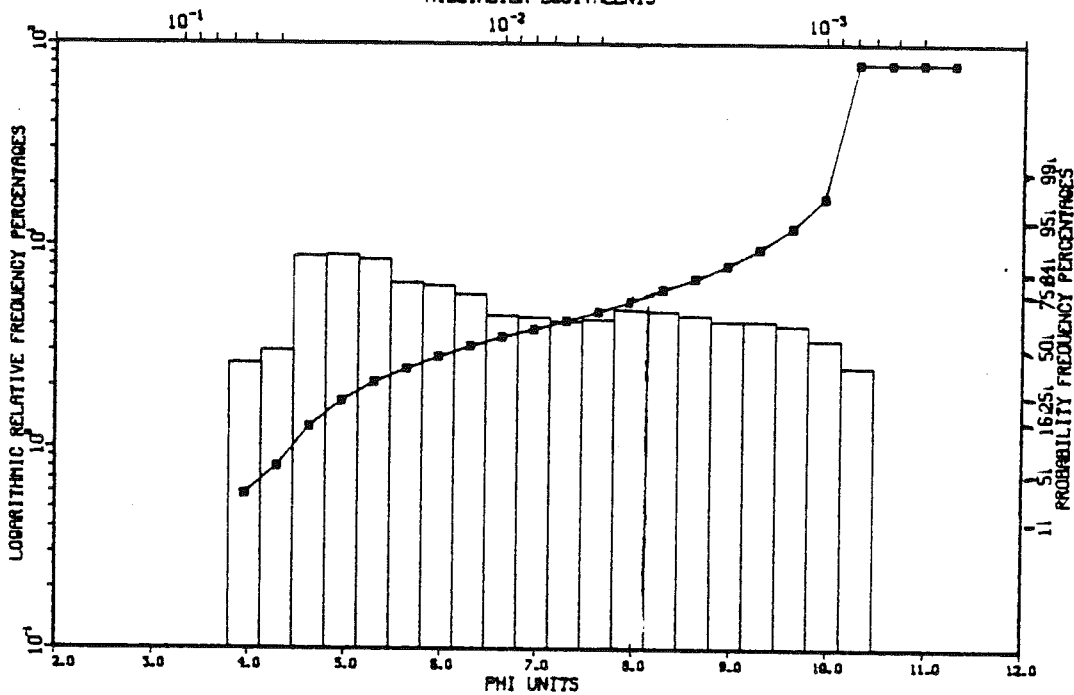


Fig. 115

SAMPLE NO. - 460 J. SYVITSKI MR5 1  
 8203212 MAFKAK FJORD  
 MILLIMETER EQUIVALENTS

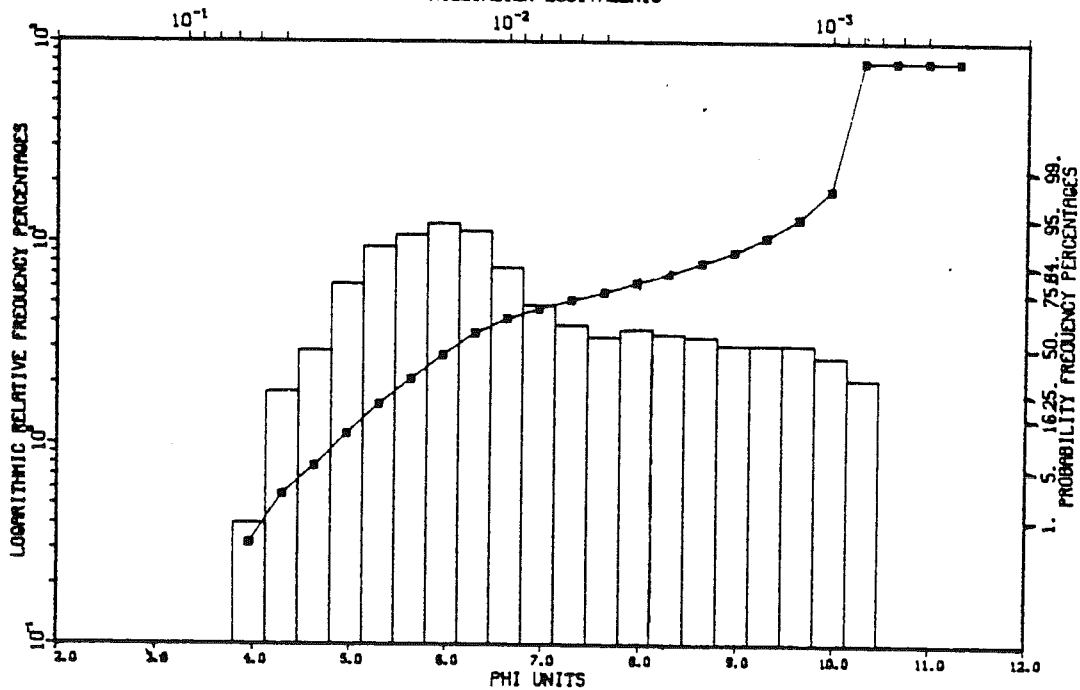


Fig. 116

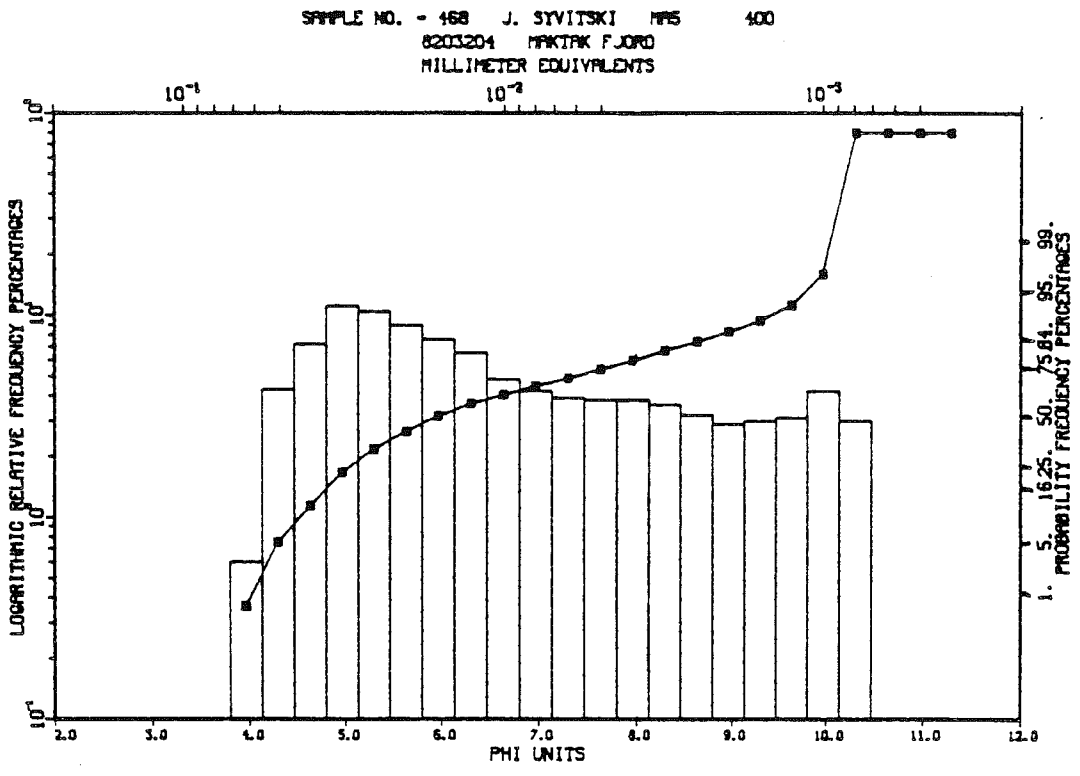


Fig. 117

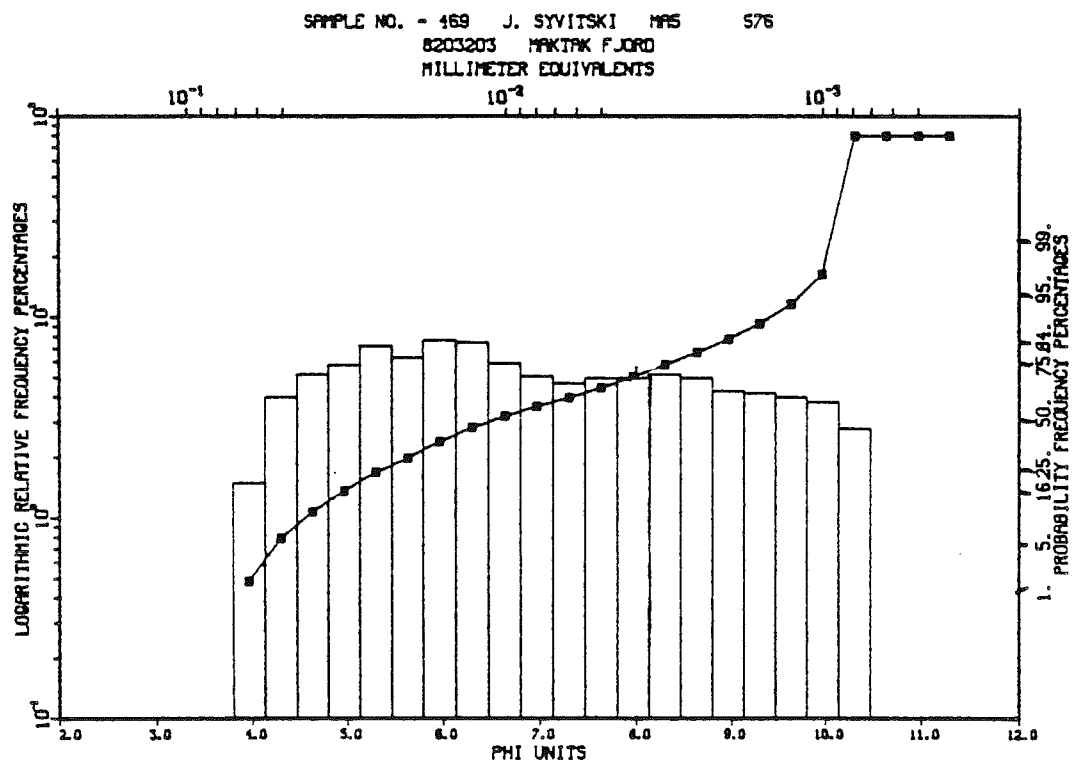


Fig. 118

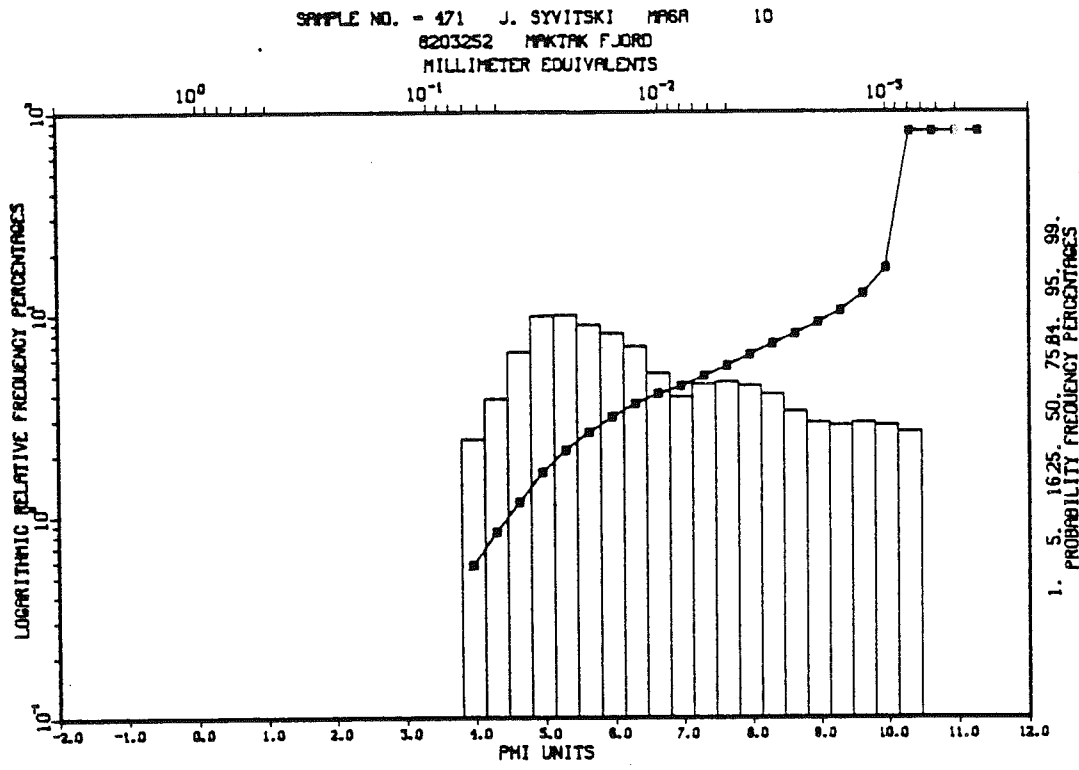


Fig. 119

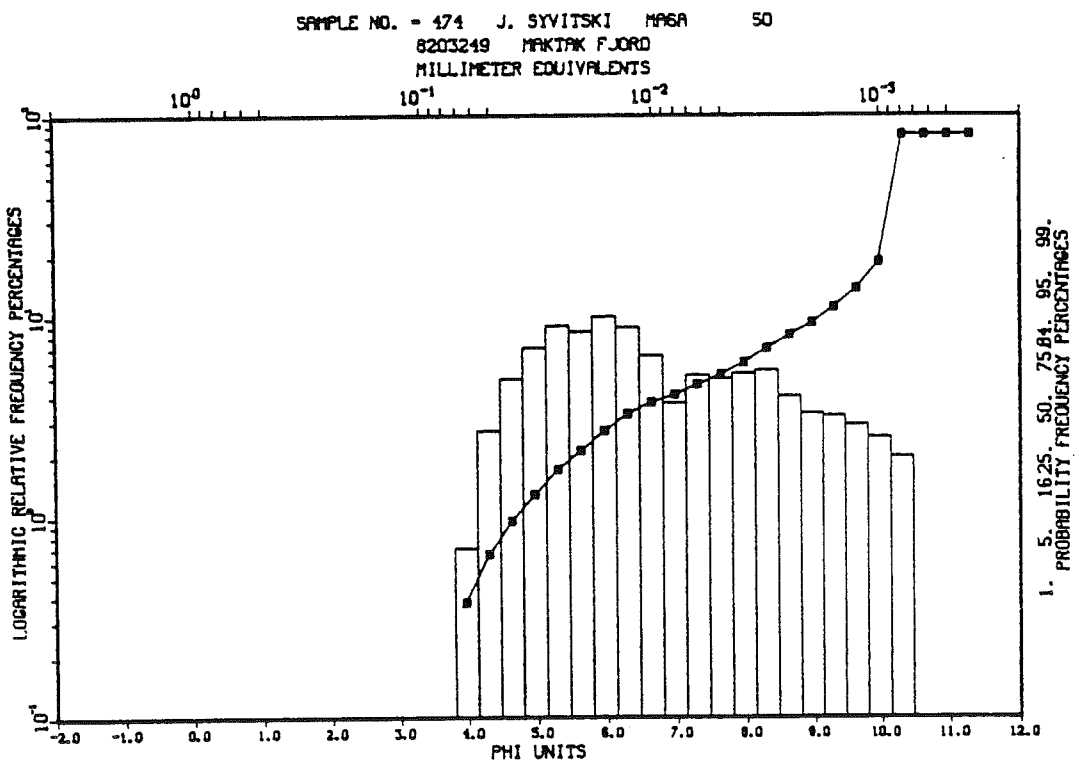


Fig. 120



SAMPLE NO. - 477 J. SYVITSKI HAGA 400  
8203246 HAKTAK FJORD  
MILLIMETER EQUIVALENTS

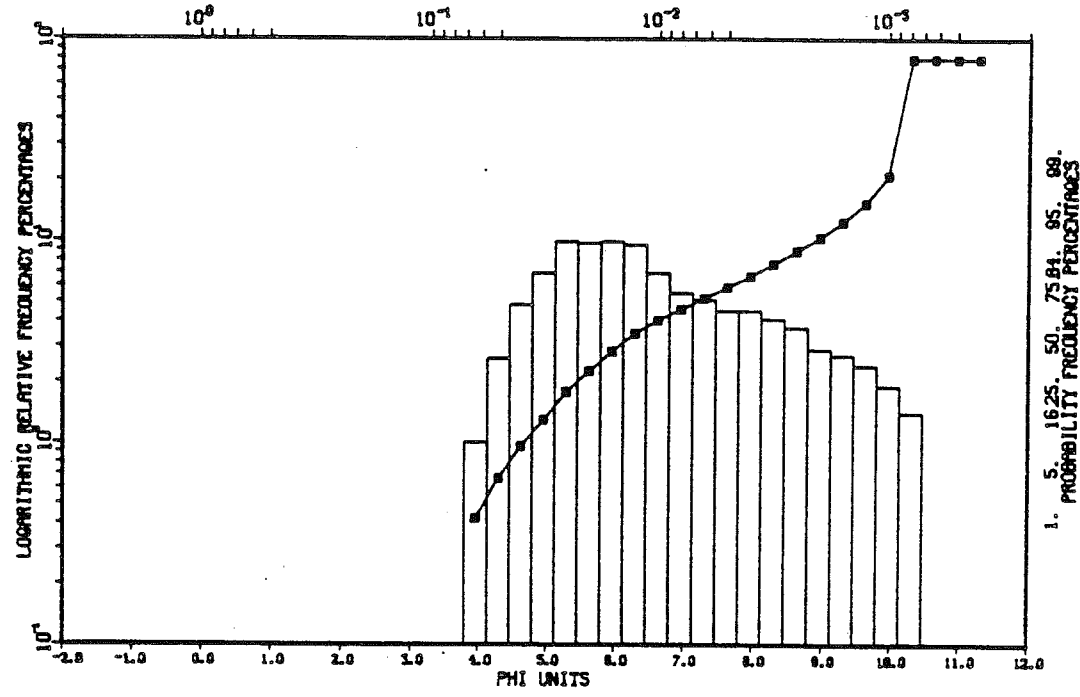


Fig. 121

SAMPLE NO. - 479 J. SYVITSKI HAGA 640  
8203244 HAKTAK FJORD  
MILLIMETER EQUIVALENTS

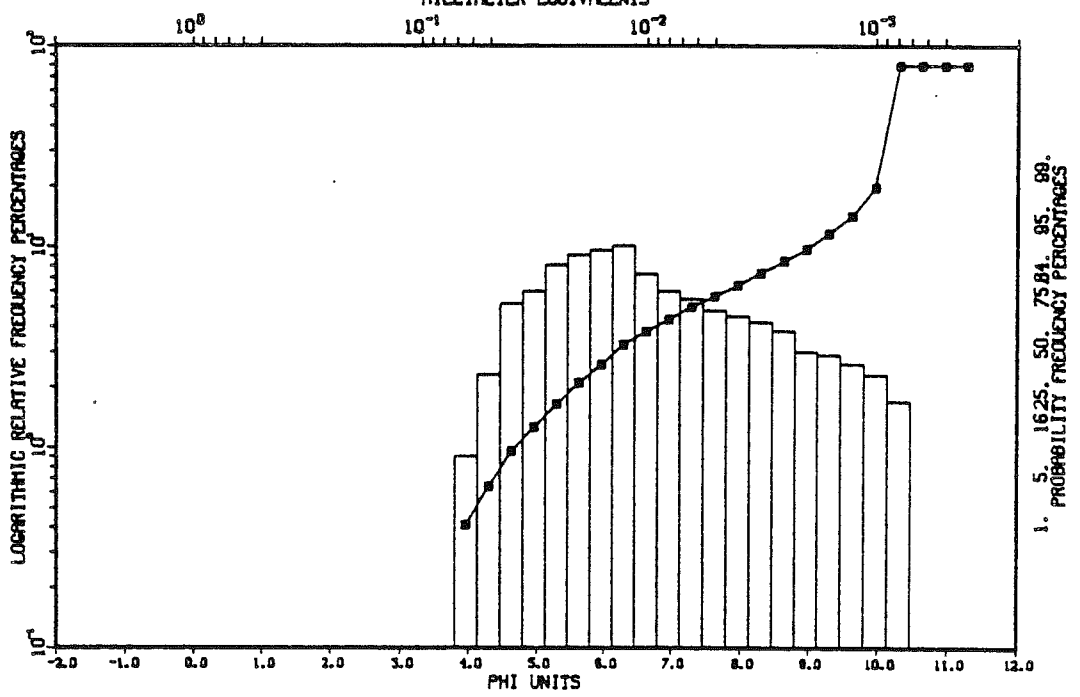


Fig. 122

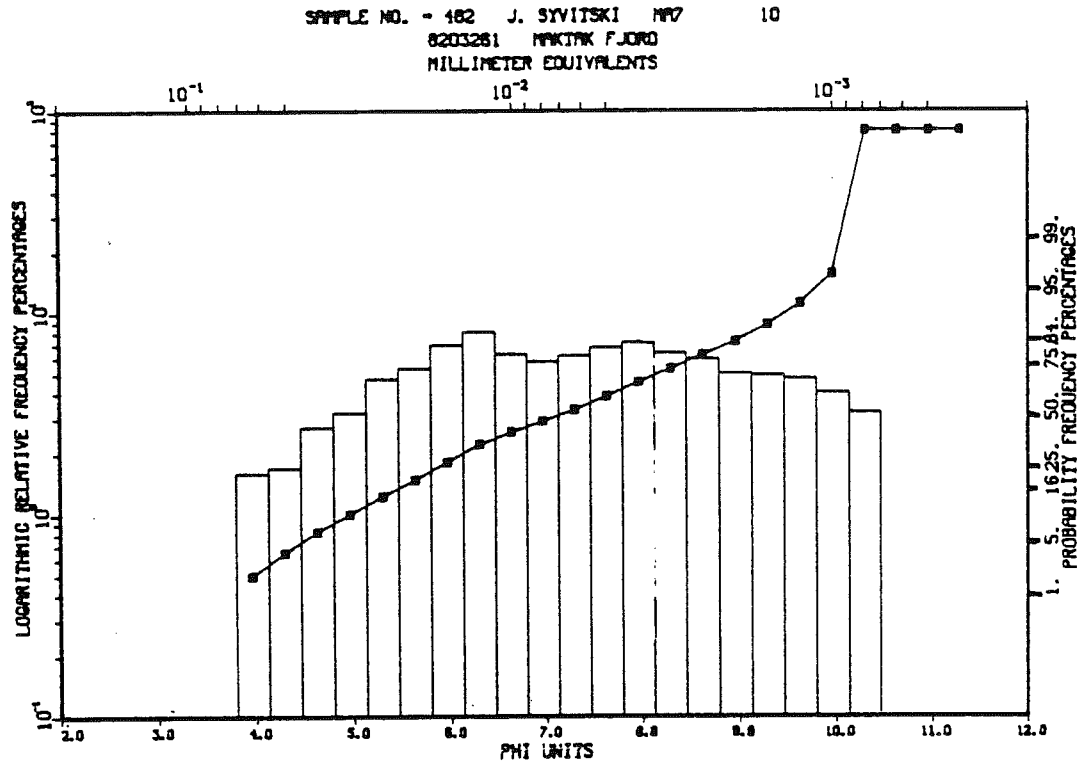


Fig. 123

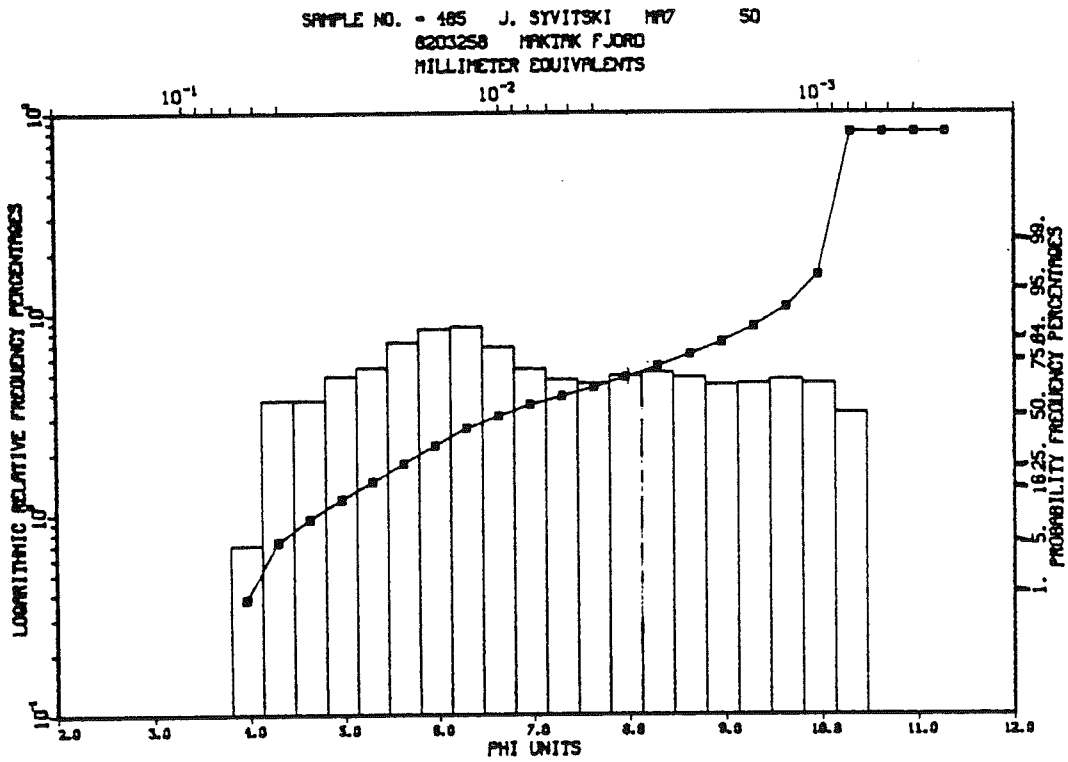


Fig. 124

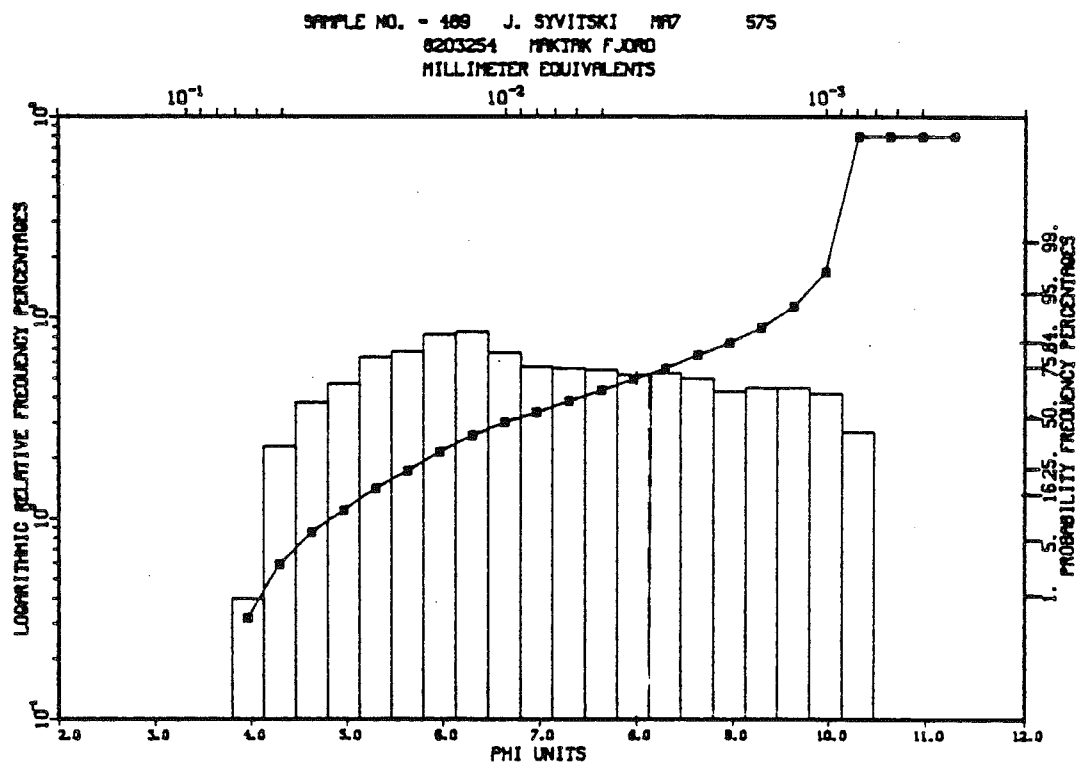
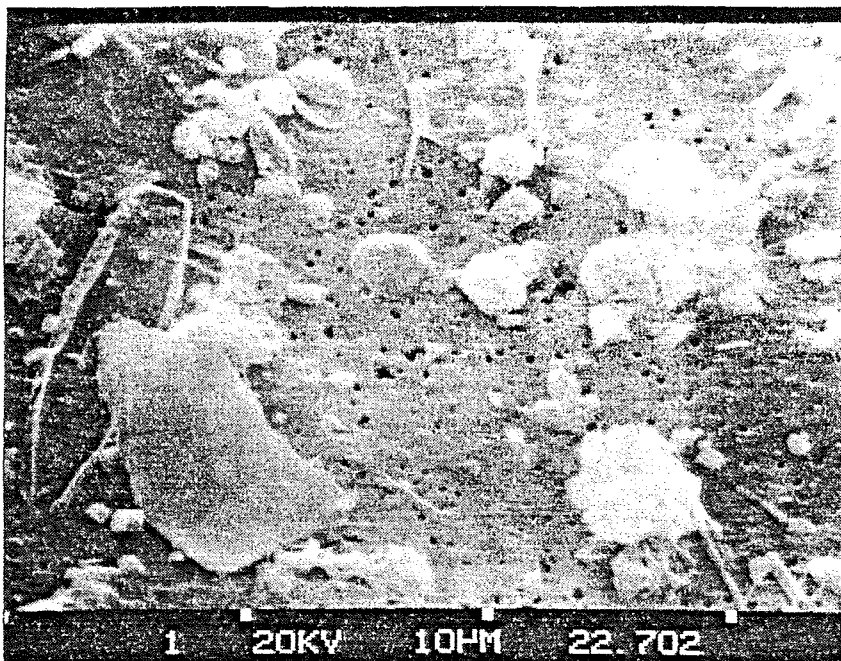


Fig. 125

Station MA-1:1 m (82-03219)



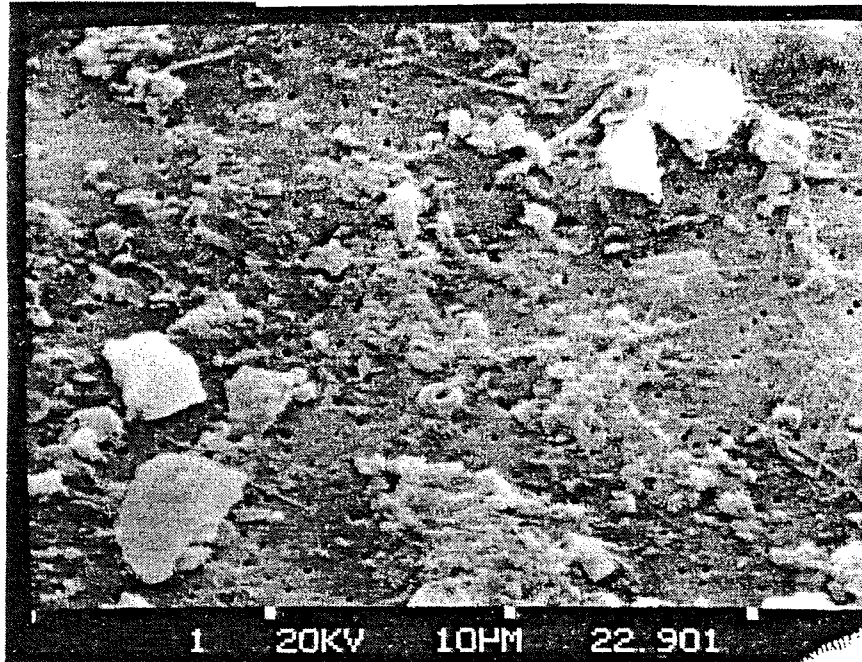
Micrograph 22.702 - small diatoms, dinophysis and pico-plankton.

Station MA-1:75 m (82-03213)

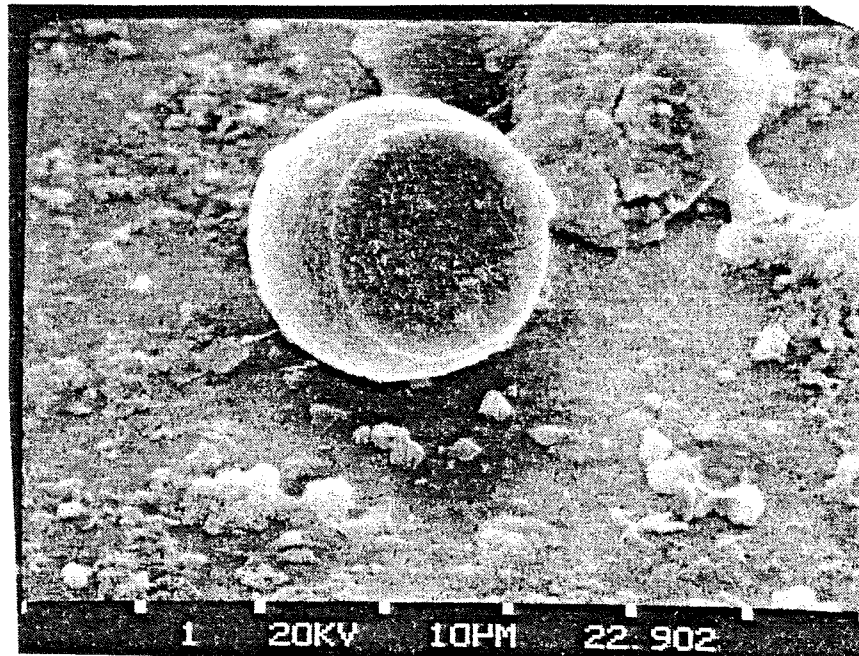


Micrograph 21.301 - general photo of sample.

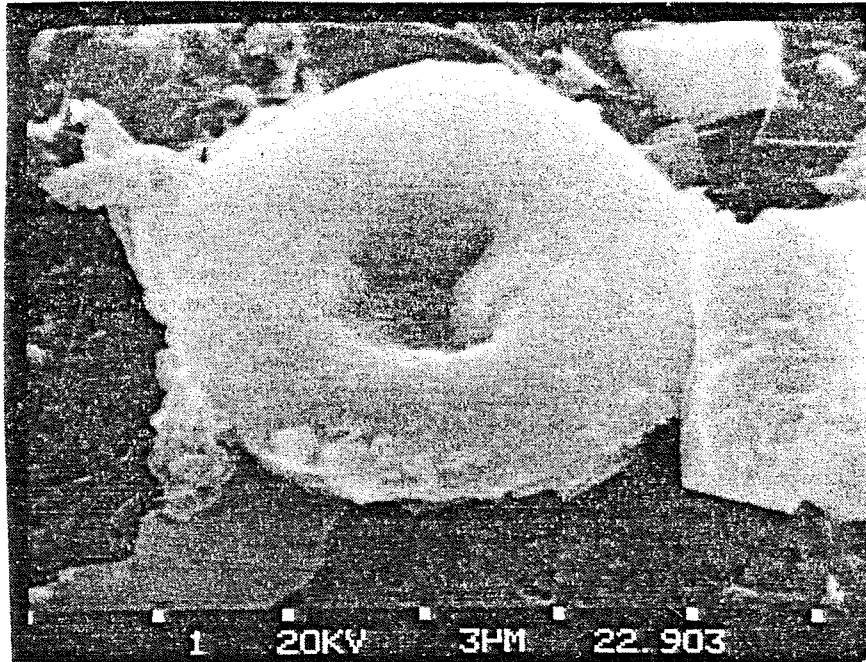
Station MA-2:1 m (82-03229)



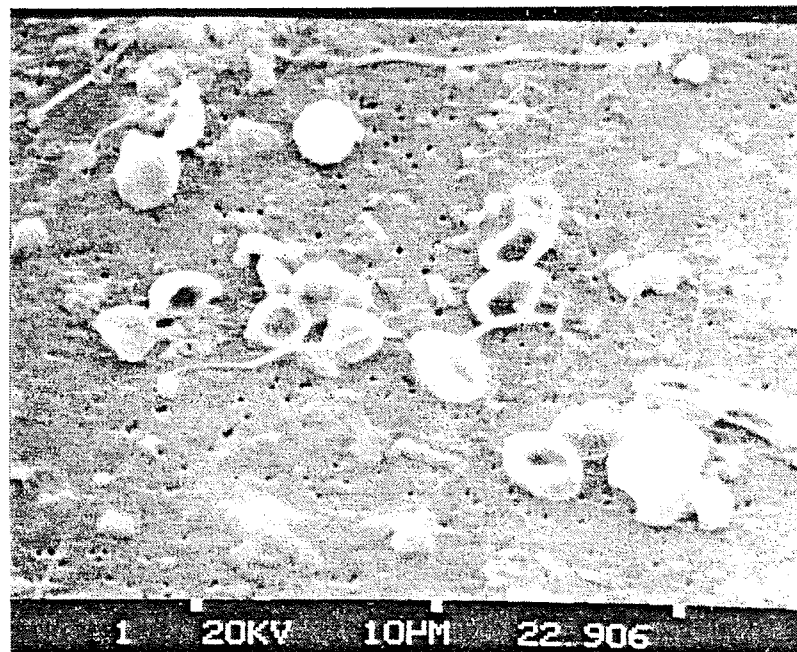
Micrograph 22.901 - minute clay fragments, larger flocs of fine particles and fibres.



Micrograph 22.902 - small sphere composed of titanium (spectrum A22902).

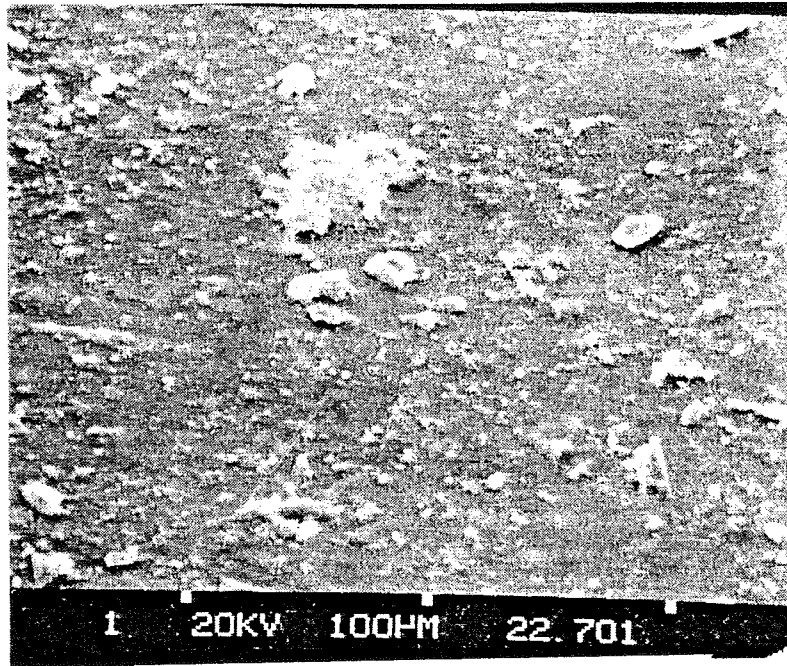


Micrograph 22.903 - doughnut-shaped grain of Si and Cl.



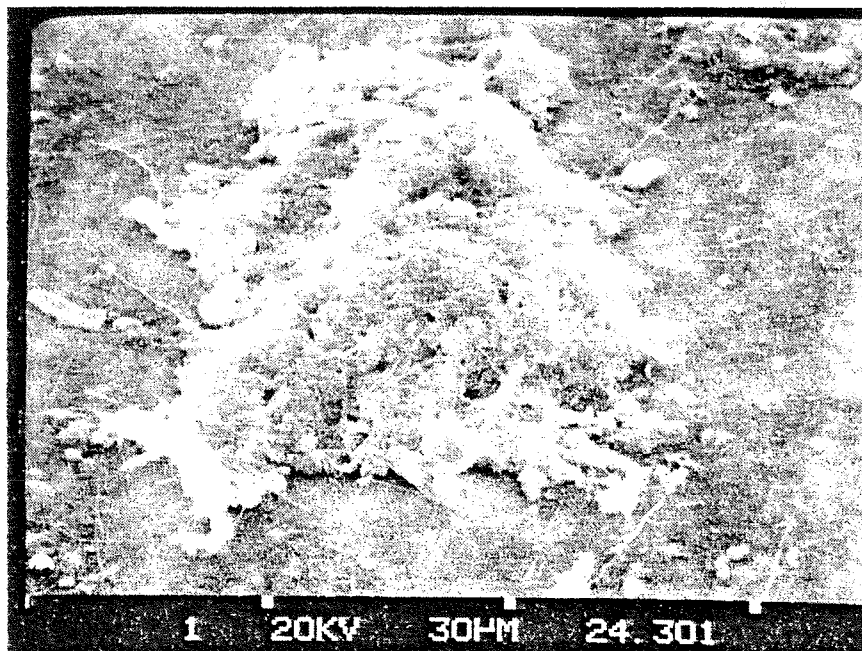
Micrograph 22.906 - soft-looking, smooth, organic spheres either with a pore or an indentation.

Station MA-2:10m (82-03227)

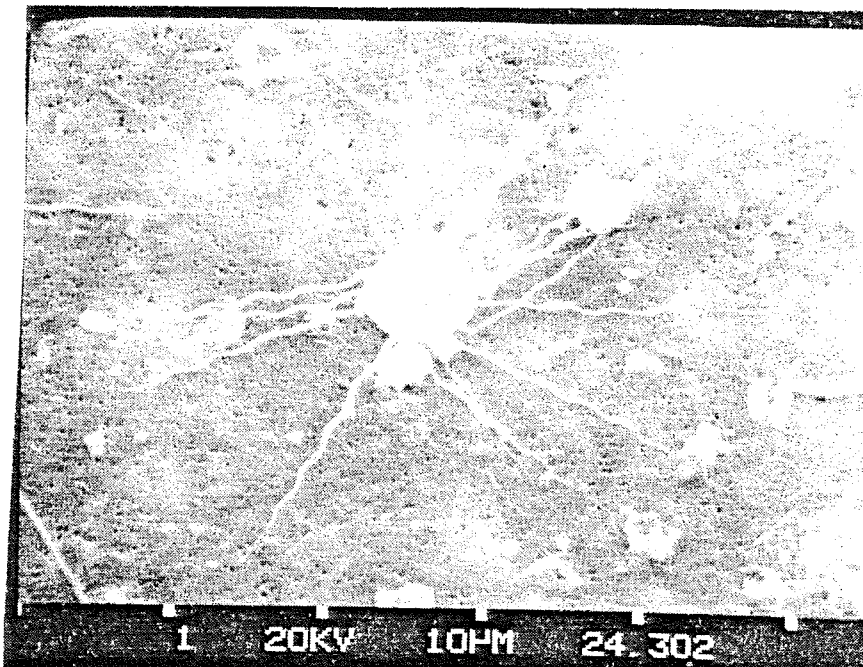


Micrograph 22.701 - general photo of sample.

Station MA-4:1 m (82-03243)

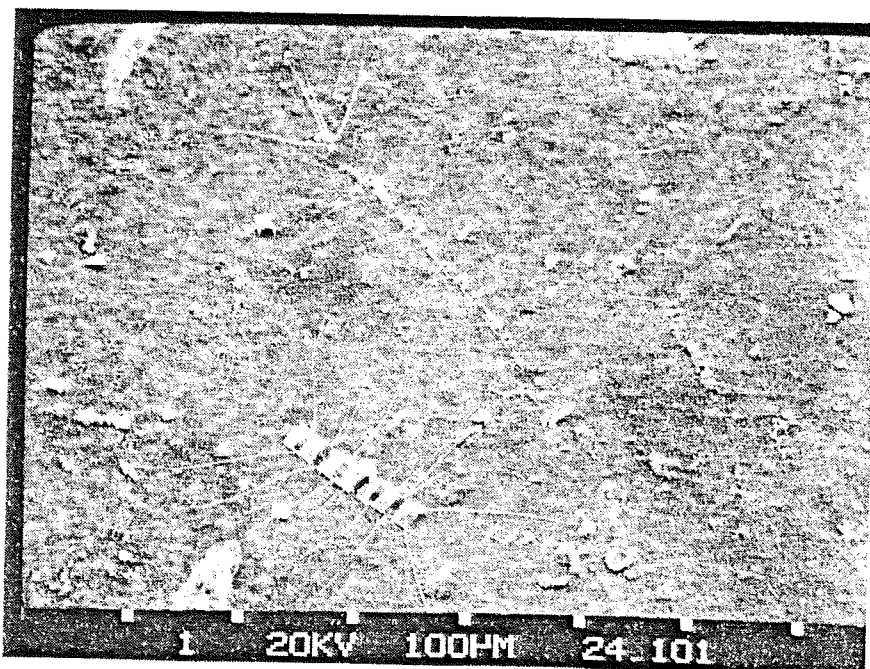


Micrograph 24.301 - floccule (see spectrum A24301 for an analysis).



Micrograph 24.302 - this organism is very common in this sample, the sphere is silicious and the needles appear to be attached.

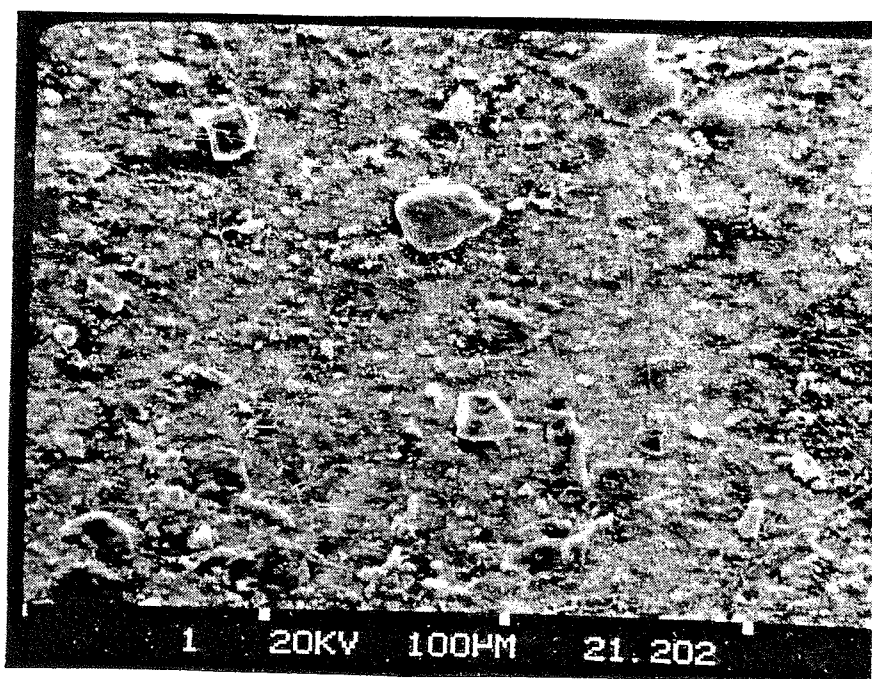
Station MA-4:10 m (82-03241)



Micrograph 24.101 - general photo showing fecal pellet, floc, diatoms and individual particles.

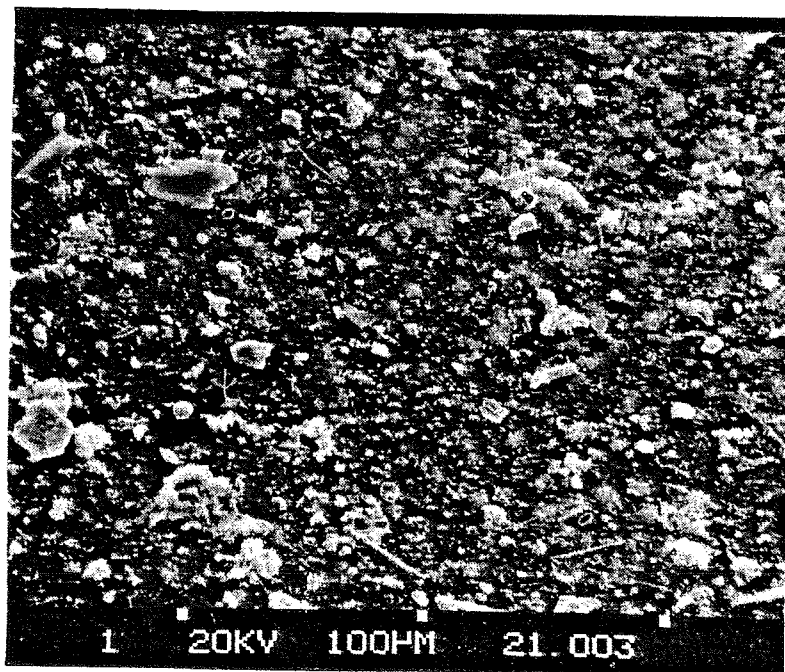


Station MA-5:1 m (82-03212)



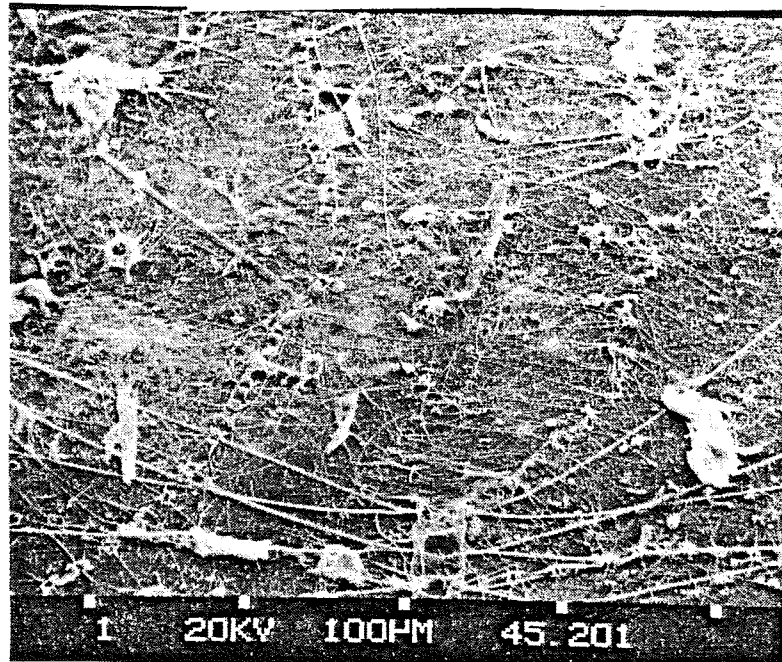
Micrograph 21.202 - general photo of sample.

Station MA-5:576m (82-03203)



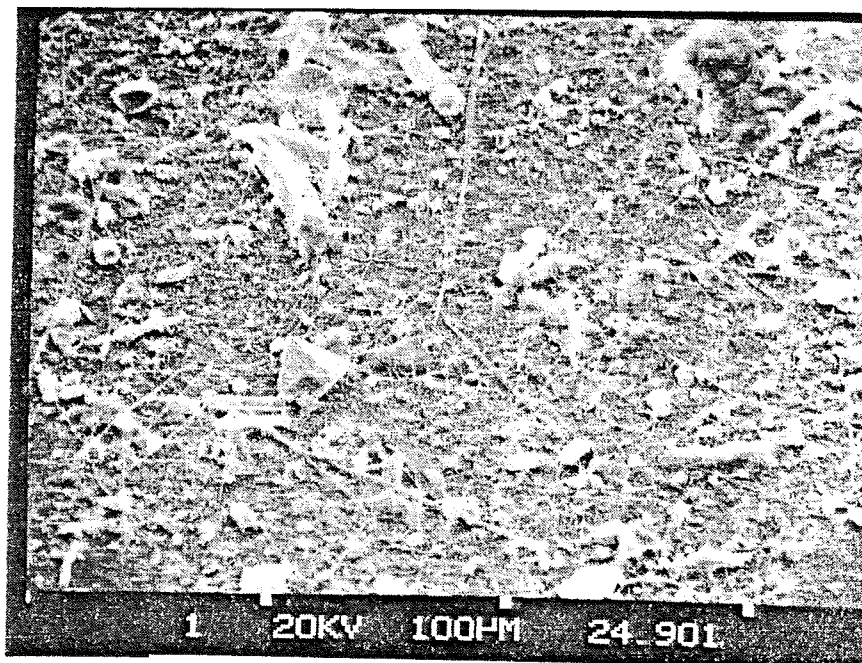
Micrograph 21.003 - general photo of sample.

Station MA-6A:10 m (82-03252)



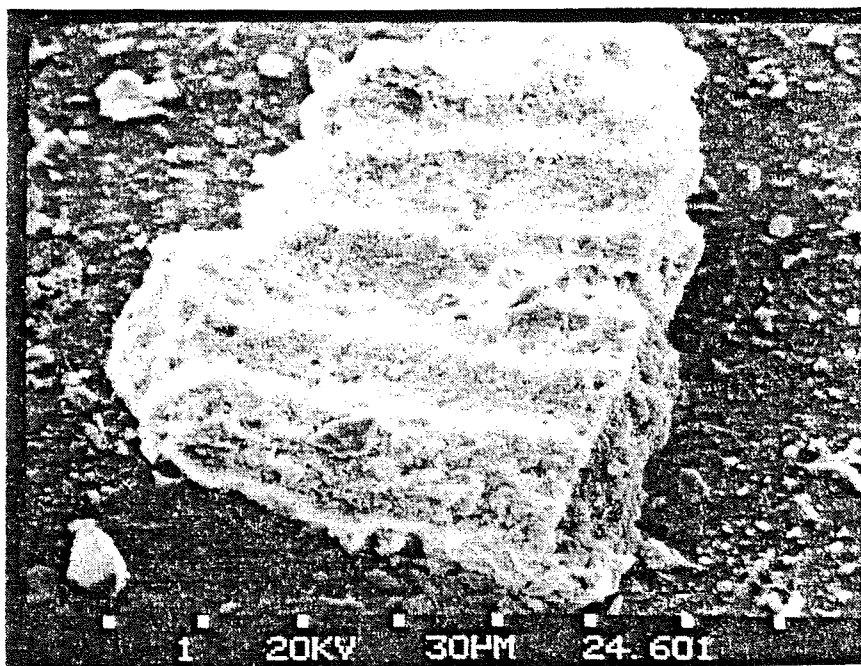
Micrograph 45.201 - general photo of sample.

Station MA-6A:50 m (82-03249)

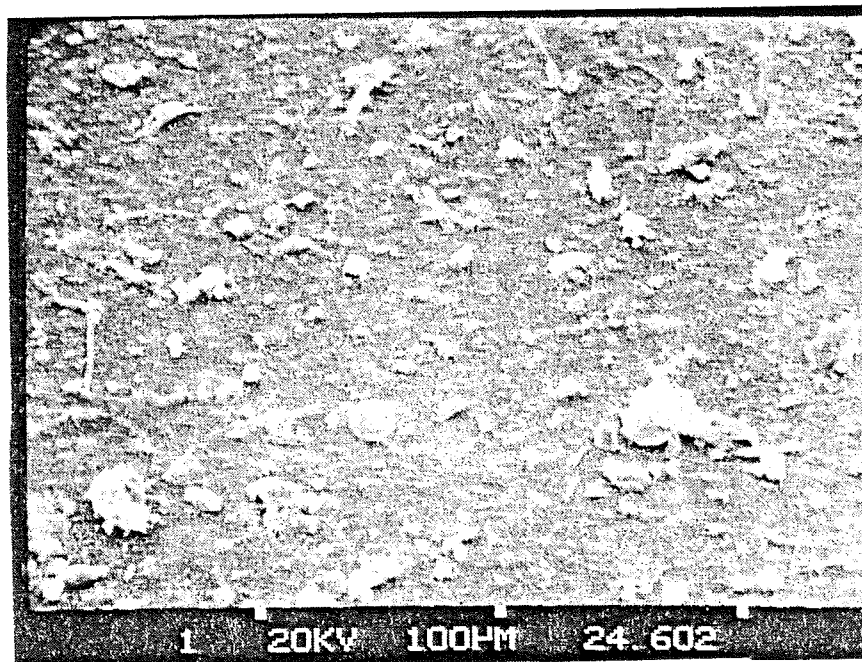


Micrograph 24.901 - general photo of sample.

Station MA-6A:400 m (82-03246)

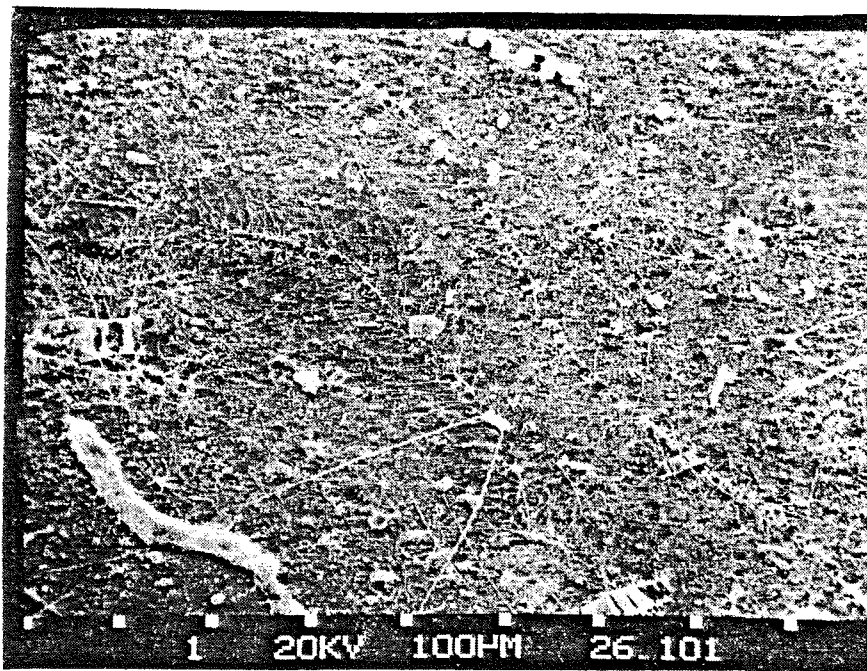


Micrograph 24.601 - clay floc.

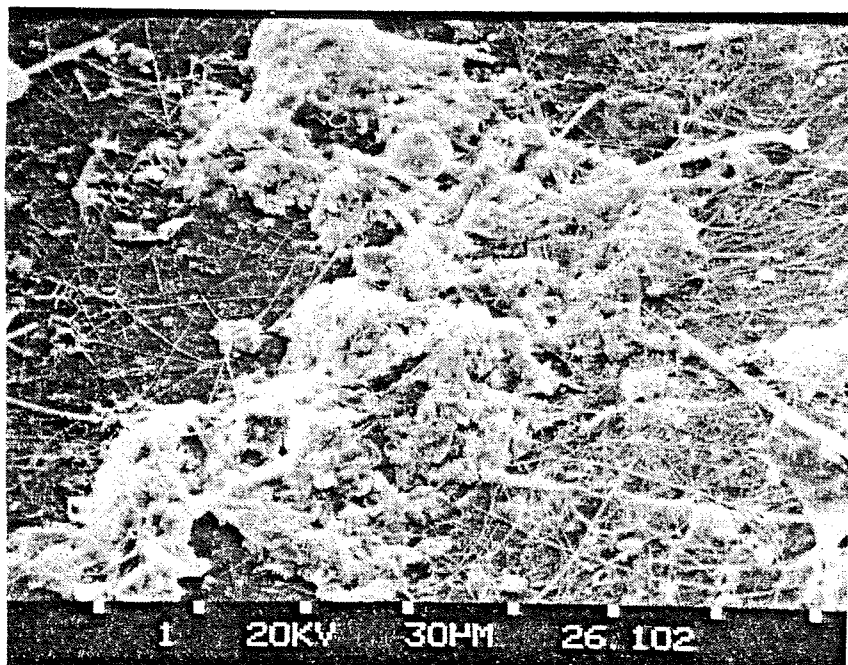


Micrograph 24.602 - general photo of sample.

Station MA-7:10 m (82-03261)

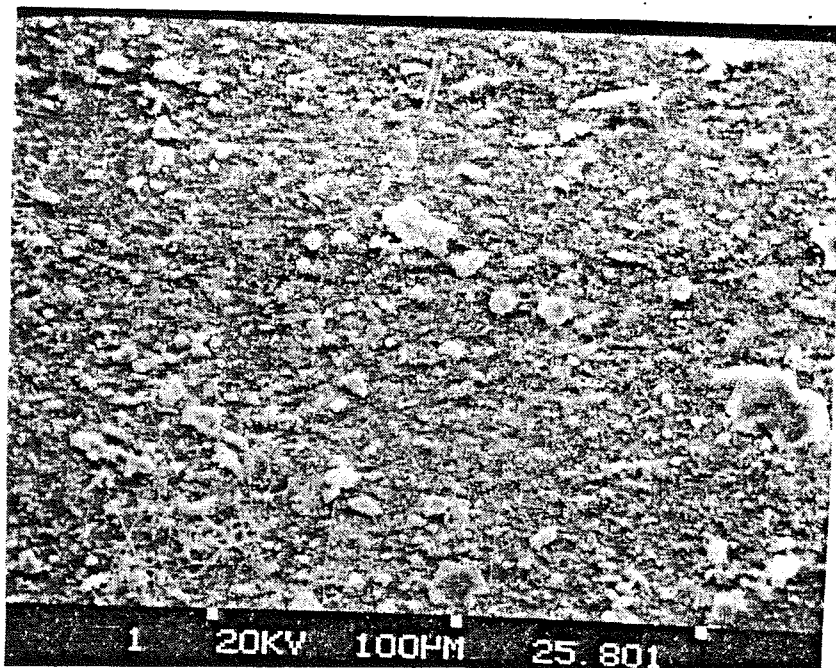


Micrograph 26.101 - general photo of sample.



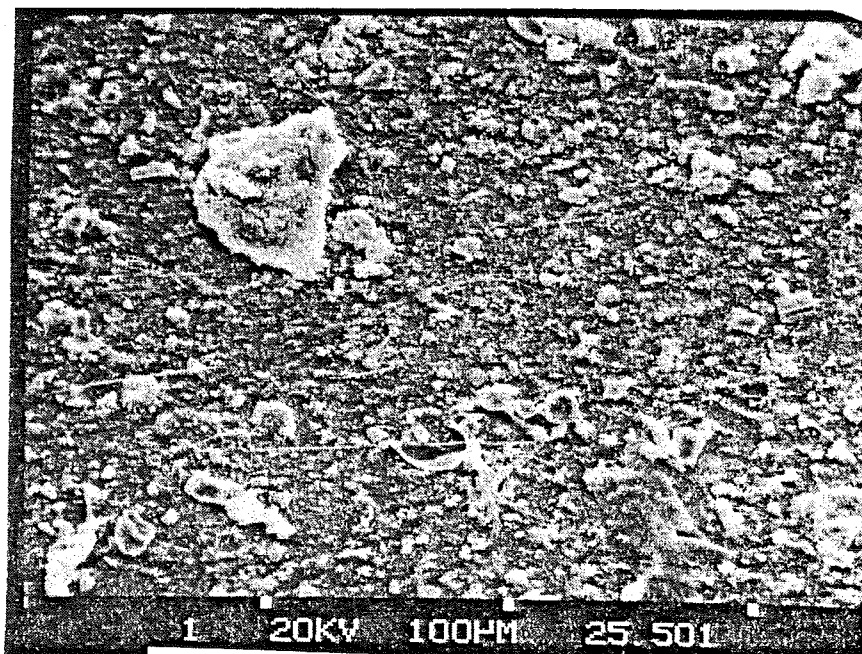
Micrograph 26.102 - floc of biogenics and clays.

Station MA-7:50 m (82-03258)



Micrograph 25.801 - general photo of sample.

Station MA-7:575 m (82-03254)



Micrograph 25.501 - general photo of sample.

ID:A22902 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	205
Cr	513
Al	1346
Si	2235
Cl	1156
K	307
Ca	323
Ti	14458
Fe	2694
Bg	0

ID:A22902 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.15
Cr	0.38
Al	1.00
Si	1.66
Cl	0.86
K	0.23
Ca	0.24
Ti	10.74
Fe	2.00
Bg	0.00

ID:A22902 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.9
Cr	2.2
Al	5.8
Si	9.6
Cl	5.0
K	1.3
Ca	1.4
Ti	62.2
Fe	11.6

MA-2:1m  
Small Sphere of Titanium

ID:A24301 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	529
Mg	849
Al	6549
Si	28076
Cl	672
K	5107
Ca	1721
Ti	377
Fe	3734
Bg	0

ID:A24301 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.08
Mg	0.13
Al	1.00
Si	4.29
Cl	0.10
K	0.78
Ca	0.26
Ti	0.06
Fe	0.57
Bg	0.00

ID:A24301 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	1.1
Mg	1.8
Al	13.8
Si	59.0
Cl	1.4
K	10.7
Ca	3.6
Ti	0.8
Fe	7.8

MA-4:1m  
Floccule

### TINGIN FIORD

This fjord has a total water volume of  $48 \text{ km}^3$ , a maximum water depth of 523 m, a 180 m deep sill situated, and is 47 km long with a mean width of 4.6 km. Tingin Fiord merits special attention within the SAFE project for it has the largest isostatically-raised delta sequence of any of the SAFE-investigated fjords. The Tingin drainage hinterland is  $1260 \text{ km}^2$  of which 37 % of the area is covered by glacial ice and 50 % of the land area is  $> 700 \text{ m}$ . Tingin Fiord receives an annual input of freshwater runoff of  $0.23 \text{ km}^3$ . The fjordhead sandur accounts for only 9 % of the 33,000 tonnes of suspended sediment that annually enters the fjord.

Tingin Fiord, at the time of sampling, had a thick (20 m) well-mixed surface layer where temperatures ranged from  $2.72 \text{ }^\circ\text{C}$  at the head of the fjord (TI1: Fig. G) to  $1.0 \text{ }^\circ\text{C}$  outside the fjord (TI6). The coldest waters were at 100 m water depth ( $-1.61 \text{ }^\circ\text{C}$ ) and temperatures warmed with depth to  $-0.9 \text{ }^\circ\text{C}$  at 475 m inside the fjord and to  $1.16 \text{ }^\circ\text{C}$  at 780 m outside the fjord. The salinity of the surface waters increased from  $28.3 \text{ }^\circ\text{‰}$  at TI1 to  $30.23 \text{ }^\circ\text{‰}$  at TI6. The deepest water in the fjord had a maximum salinity of  $33.8 \text{ }^\circ\text{‰}$ . The waters were well oxygenated with the lowest dissolved oxygen values in the deep water ( $\approx 5.6 \text{ ml L}^{-1}$ ).

Fourty-eight SPM samples were collected (Fig. G). The mean grain size of the deflocculated SPM ranged from  $7.0 \text{ } \mu\text{m}$  to  $8.0 \text{ } \mu\text{m}$ . The clay fraction of this SPM ranged from 27 % to 55 %. The bottom sediments had low organic carbon levels near the head of the fjord ( $<0.4 \text{ } \%$  at TI1) but with values increasing seaward towards the shelf (up to 1.9 % at TI6).

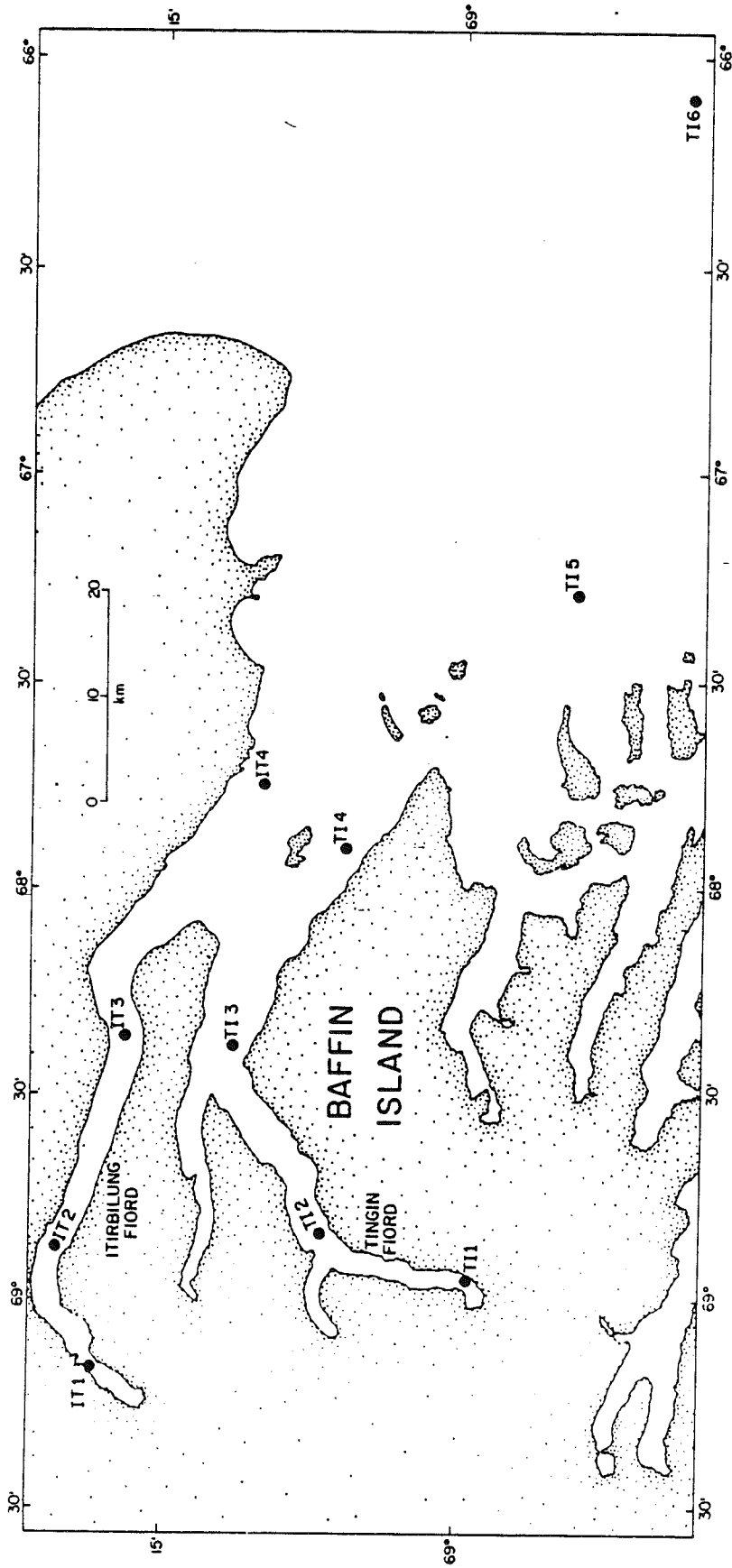


Fig. G- Stations of Tingin Fjord



Tingin Fiord

Station TI-1:1 m (82-03285)

SPM conc. = 1.322 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 126

Description from SEM micrographs -

Small mucoids, individual particles, clay flocs and biogenics are abundant. The biogenics include chain and pennate diatoms, dinophysis, silicoflagellates, star-shaped organisms, large zooplankton and fecal pellets. There is also a large agglomerate of bacteria (small organic spheres in mucus).

Station TI-1:85 m (82-03278)

SPM conc. = 1.174 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 127

Description from SEM micrographs -

This sample is mainly small individual particles. Small flocs of clays and other inorganic grains are abundant as well. Some compact grains seen here are possibly resuspended sediments. There are numerous smooth organic spheres, dry-looking mucoids and/or plant debris. There are also a few remnant biogenics. No photos are shown of this sample.

Station TI-2:1 m (82-03405)

SPM conc. = 2.682 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 128

Description from SEM micrographs -

This sample is mainly small individual grains and mucoids. Chain diatoms, dinophysis and silt grains are also common.

Station TI-2:100 m (82-03299)

SPM conc. = 1.101 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 129

Description from SEM micrographs -

This sample is similar to the previous one at 1m. There are flocs, individual particles, mucoids and biogenics. The biogenics include concentric and pennate diatoms (some of which form chains). Silt grains present include mica plates, feldspars, quartz and iron grains. Broken-up silicoflagellates are seen as well as a minute amount of pico-plankton. No photos were saved.

Station TI-2:300 m (82-03297)

SPM conc. = 2.360 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 130

Description from SEM micrographs -

This sample is similar to that at 100m in almost every detail.

Station TI-3:1m (82-03415)

SPM conc. = 1.347 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 131

Description from SEM micrographs -

This sample is composed of various types of chain diatoms, some of which are surrounded by a thin mucus. Fibres (needles), dinophysis, fecal pellets of silicon fibres, organic spheres, salt crystals, star-shaped organisms, concentric and pennate diatoms, remnant plant debris, silicoflagellates, dinoflagellates and large mucoids are all present. There are some biogenic agglomerates in mucus. Some feldspar grains are covered with a calcium-rich coating.

Station TI-3:475 m (82-03406)

SPM conc. = 0.522 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 132

Description from SEM micrographs -

This sample is mostly individual particles and a few small loose to compact clay flocs. There are pico-plankton, pennate and concentric diatoms with clay precipitation, remnant plant debris, broken-up clay fecal pellets, mucoids and one zooplankton as well.

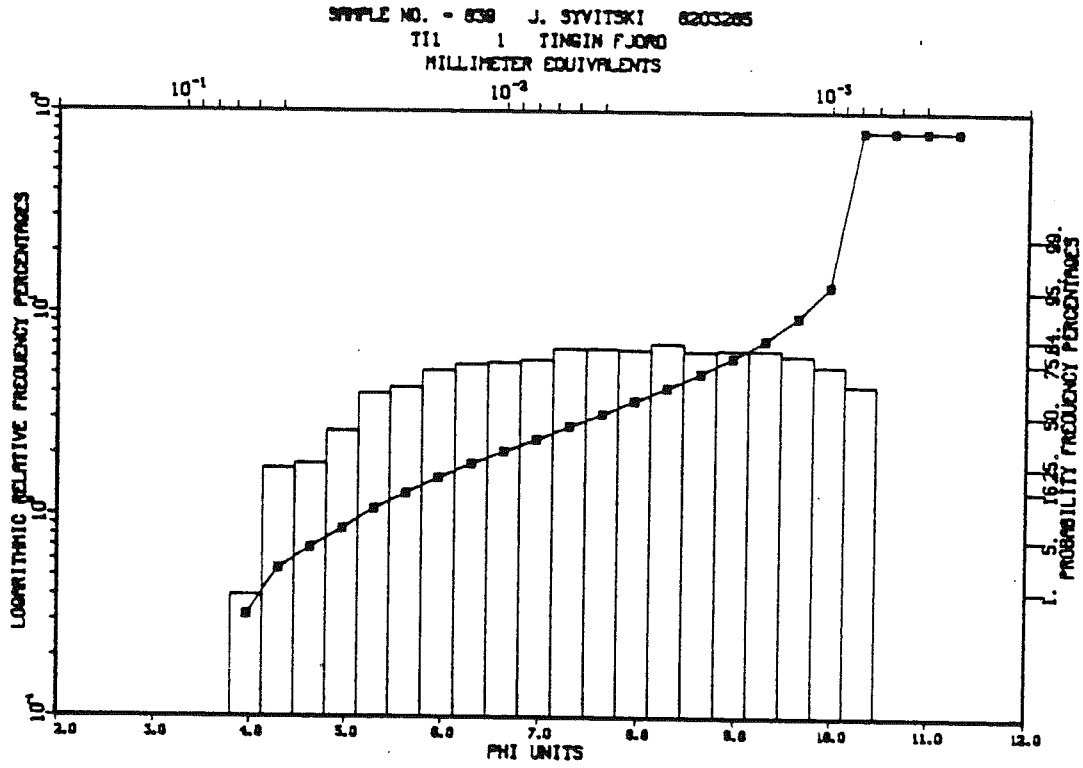


Fig. 126

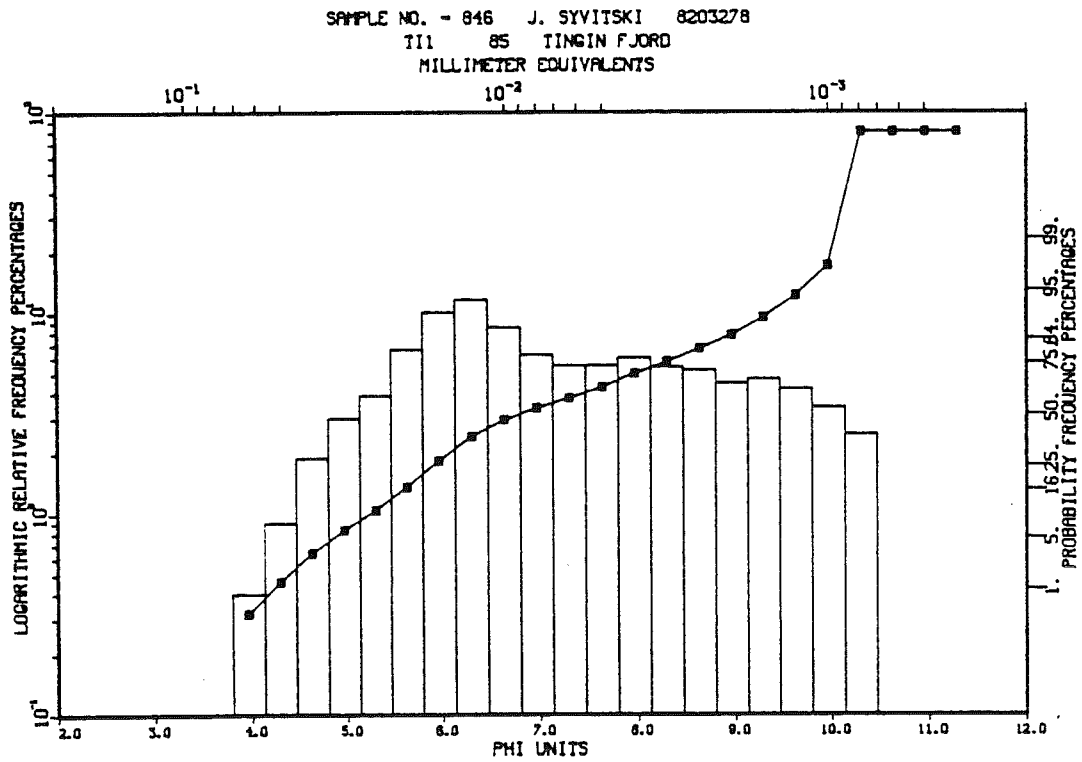


Fig. 127

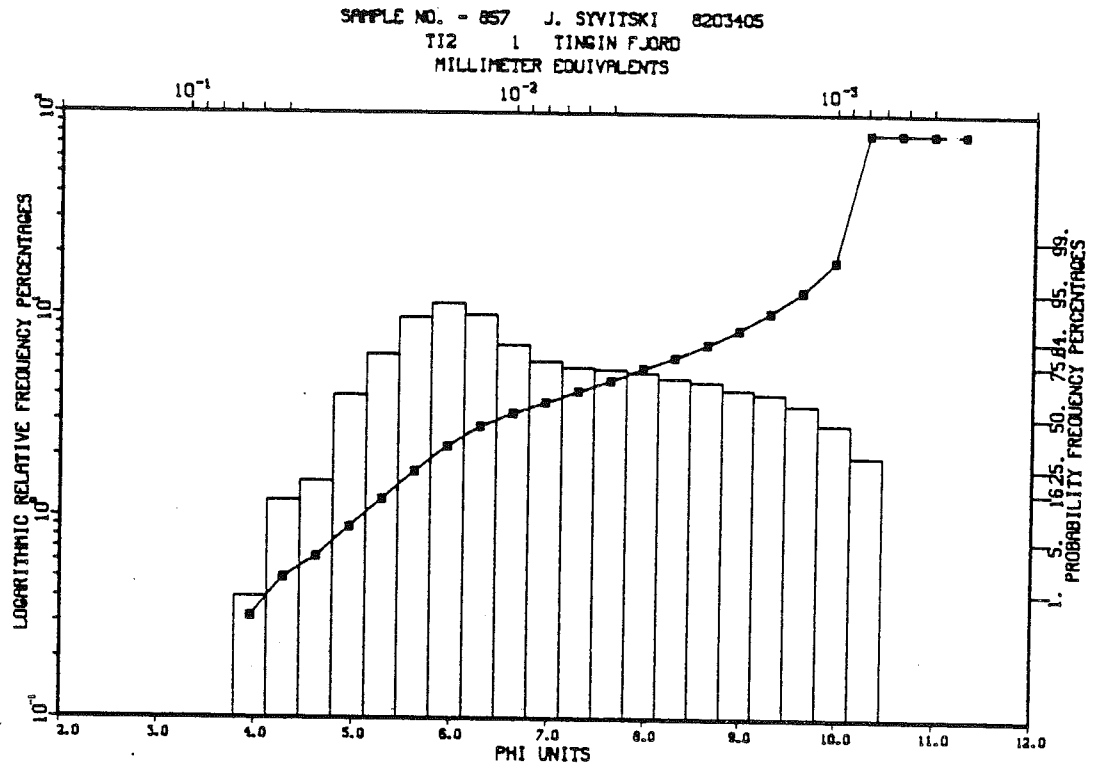


Fig. 128

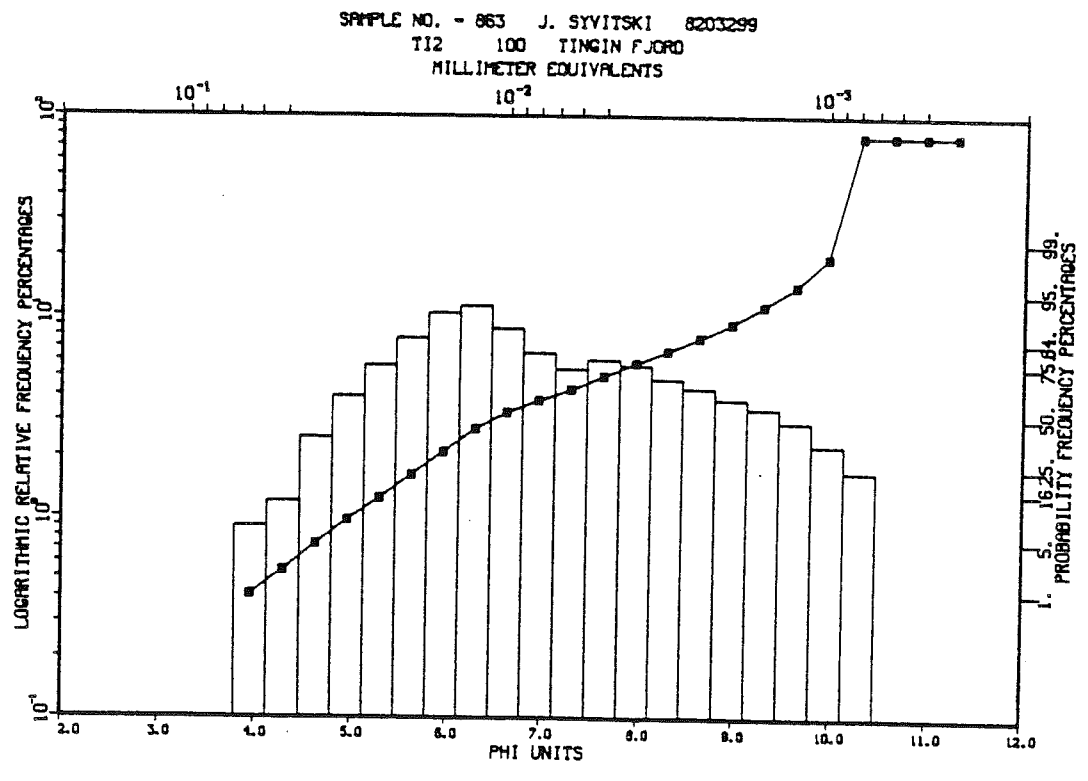


Fig. 129

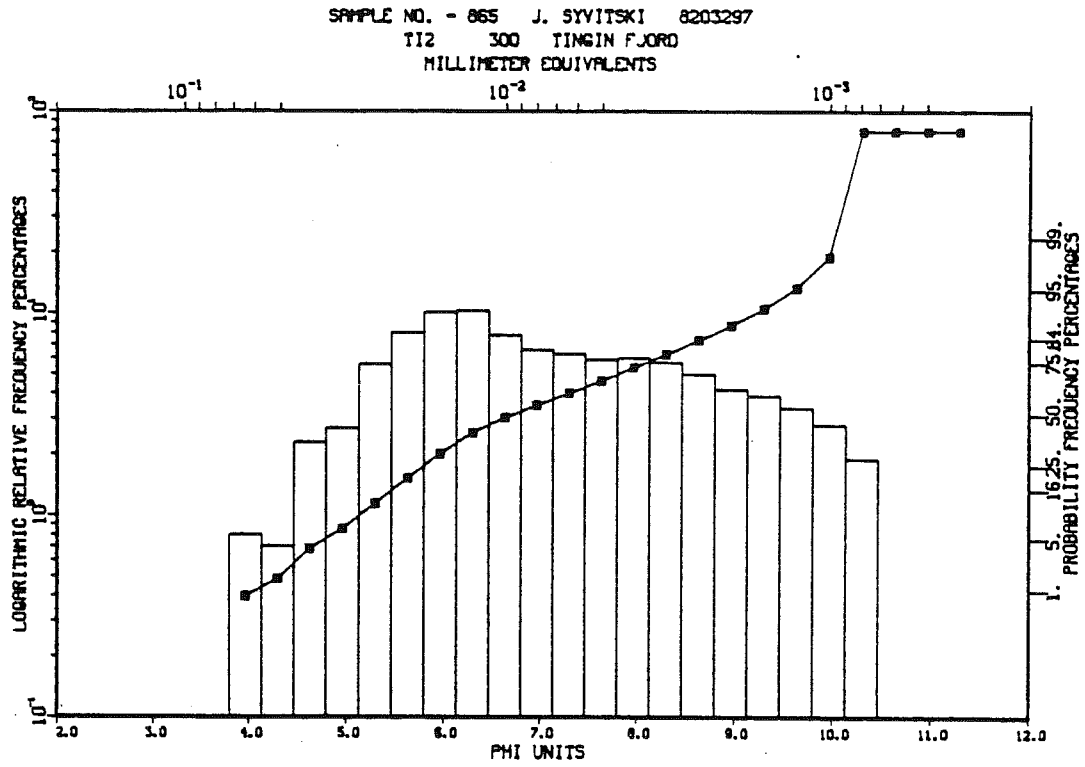


Fig. 130

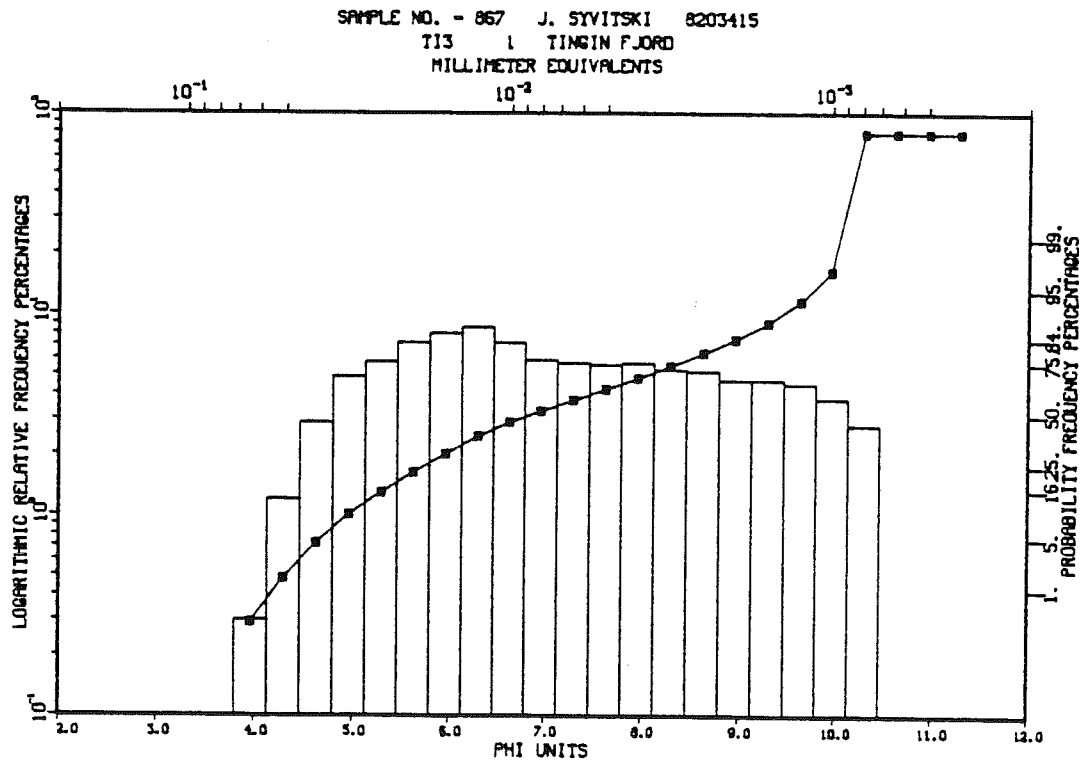


Fig. 131

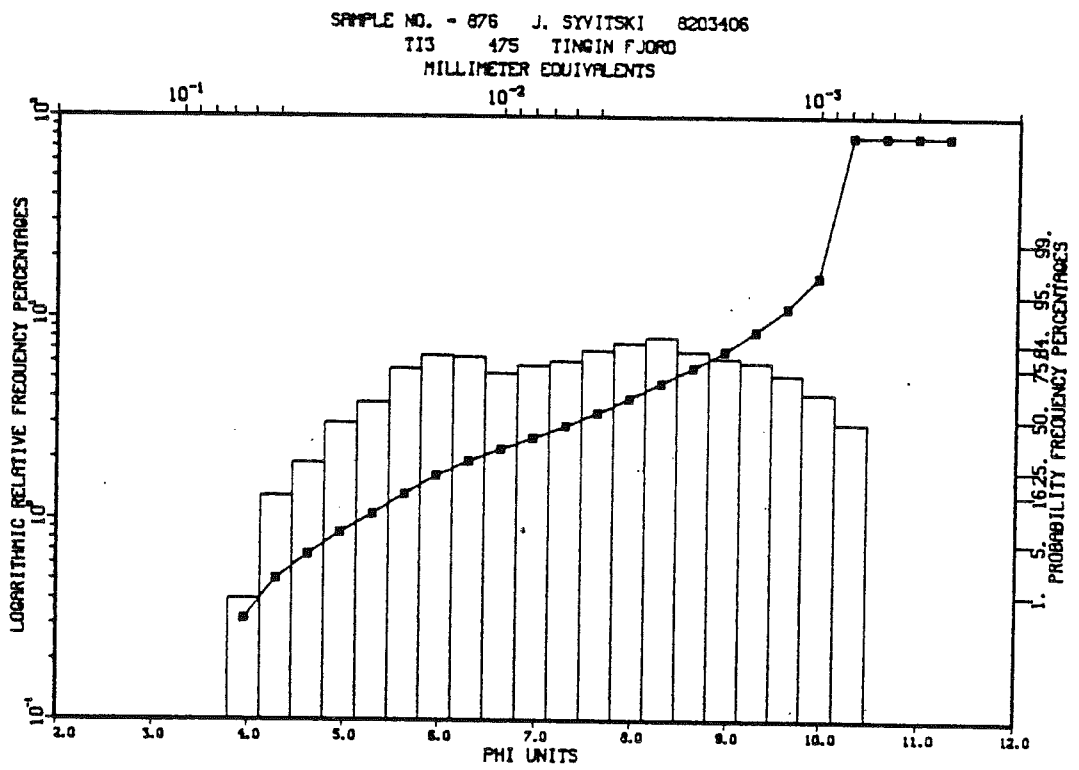
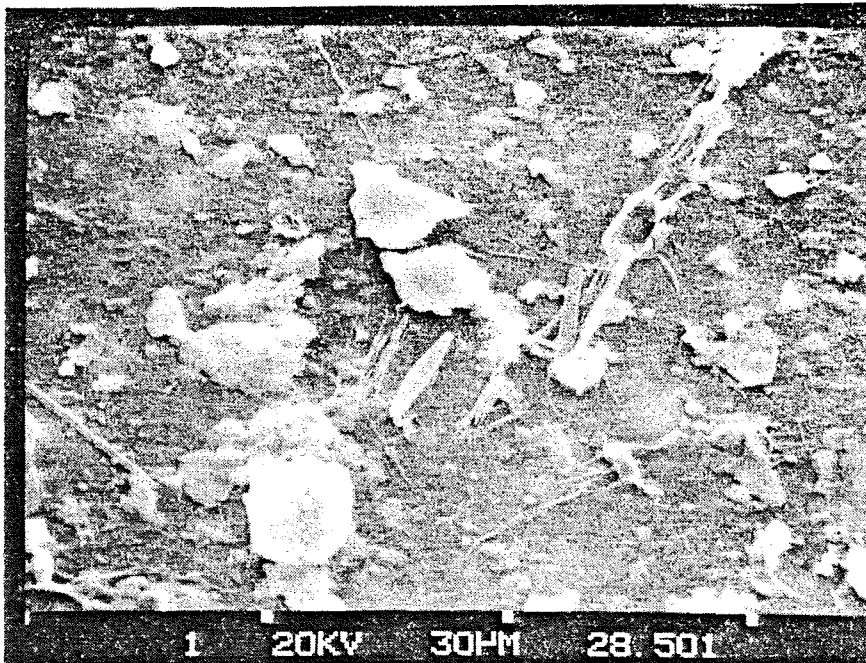


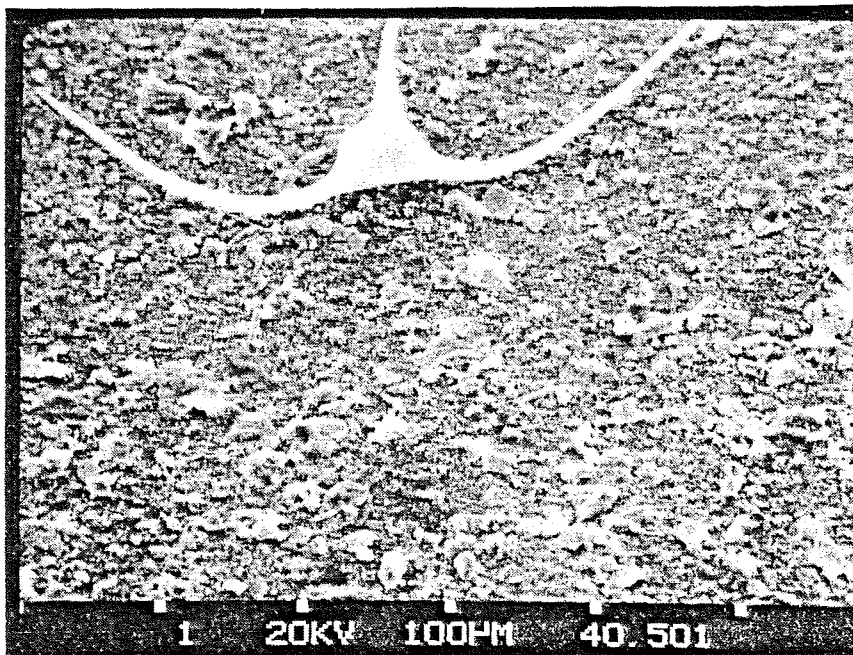
Fig. 132

Station TI-1:1 m (82-03285)



Micrograph 28.501 - general photo showing chain and pennate diatoms, clay flocs and individual particles.

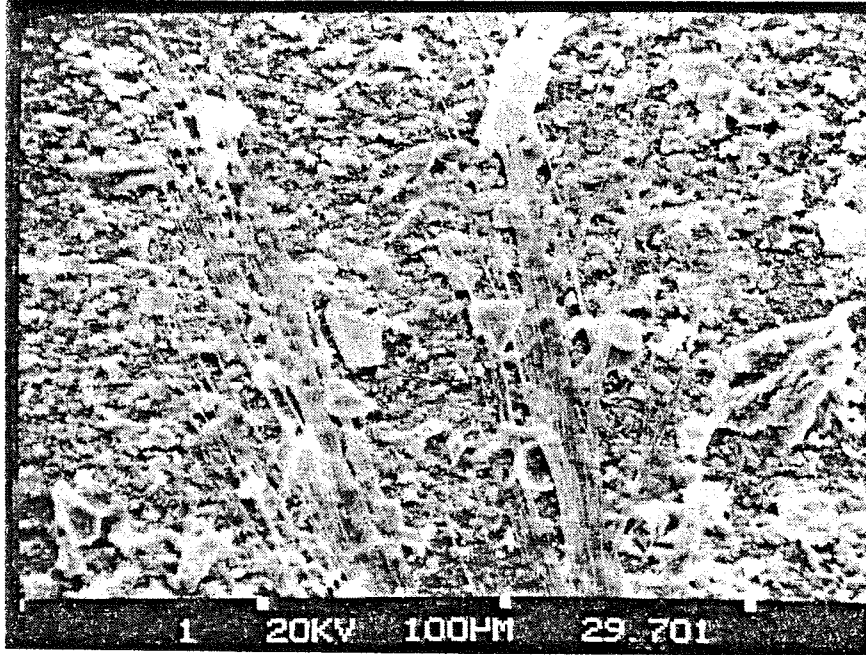
Station TI-2:1 m (82-03405)



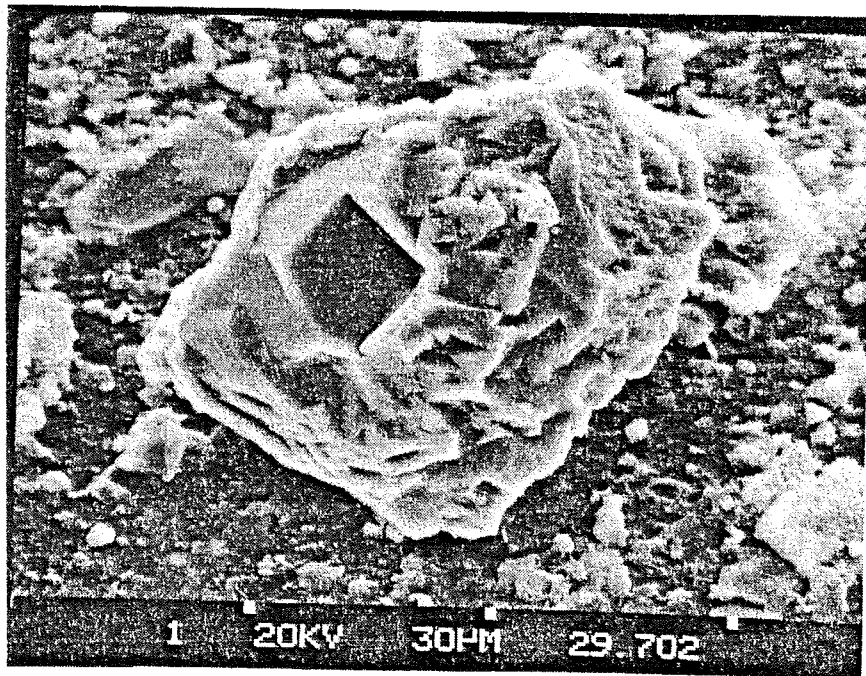
Micrograph 40.501 - general photo of sample



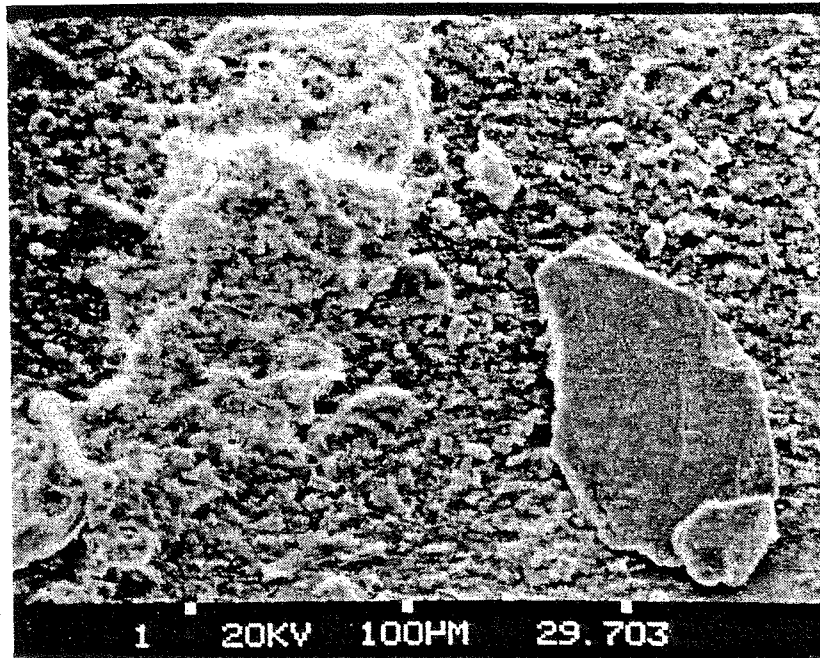
Station TI-2:300 m (82-03297)



Micrograph 29.701 - organic filaments trapping grains. These filaments appear to be part of a structured organism.

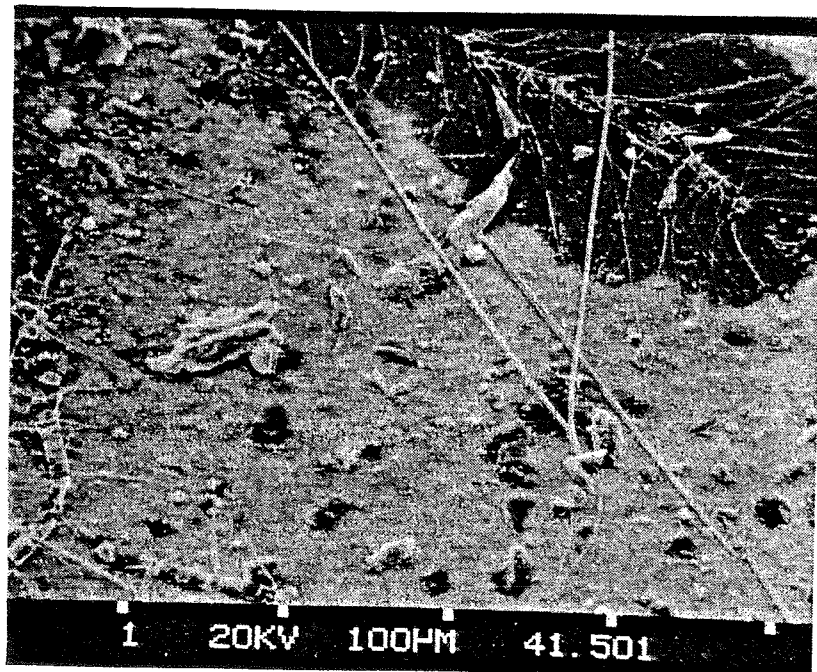


Micrograph 29.702 - silica grain with a hole in it.

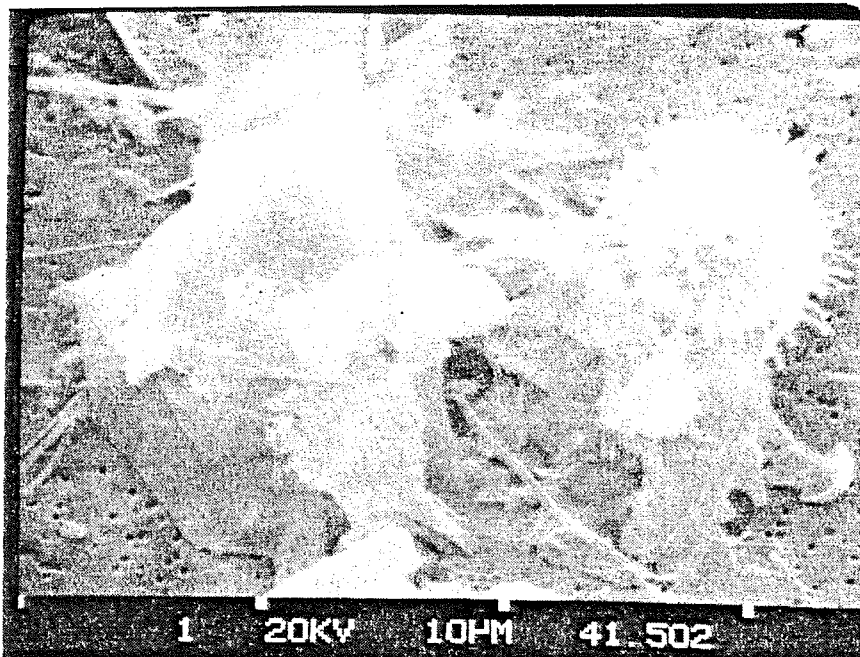


Micrograph 29.703 - large floc and a large grain. The large floc (agglomerate) includes diatoms, silicoflagellates, dinophysis, clays and fibres or needles. Spectrum B29703 gives its analysis.

Station TI-3:1m (82-03415)

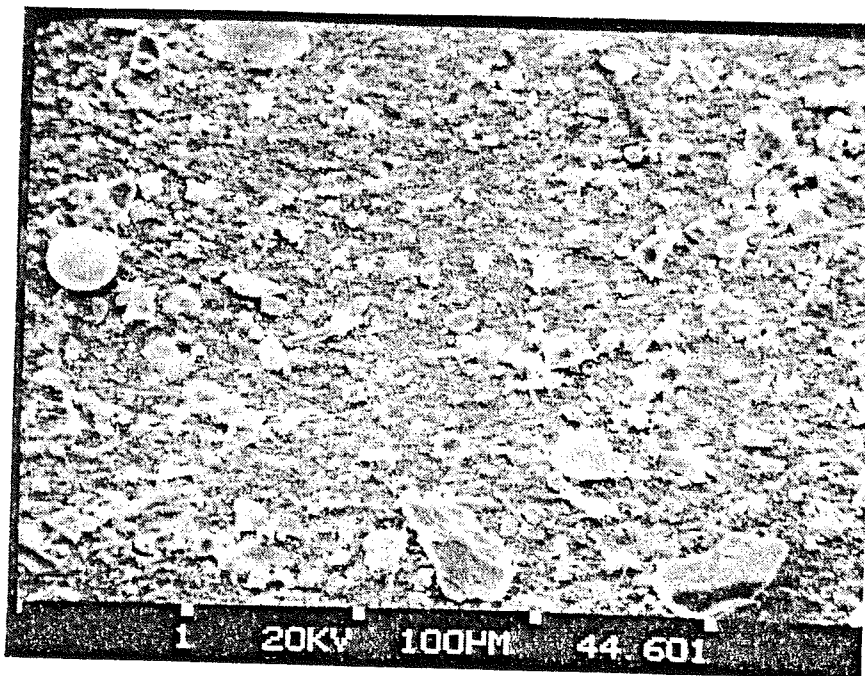


Micrograph 41.501 - pellet, mucoids, chain diatoms in mucus, dinoflagellates and fibres.



Micrograph 41.502 - pico-plankton with a pore.

Station TI-3:475 m (82-03406)



Micrograph 44.601 - general photo showing loose and compact floes, individual grains and biogenics.

ID:B29703 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	59
Mg	85
Al	3128
Si	13886
Cl	522
K	4884
Ca	898
Ti	599
Fe	7845
Bg	0

ID:B29703 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.01
Mg	0.03
Al	1.00
Si	4.44
Cl	0.17
K	1.56
Ca	0.29
Ti	0.19
Fe	2.51
Bg	0.00

ID:B29703 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.2
Mg	0.3
Al	9.8
Si	43.5
Cl	1.6
K	15.3
Ca	2.8
Ti	1.9
Fe	24.6

TI-2:300m  
Large Floc (Agglomerate)

### CLARK FIORD

This fjord is very deep at 720 m behind the outer sill (near its mouth) and 287 m behind the inner sill. There are two sills: the inner sill at 108 m and an outer sill at 185 m. The fjord is 67 km long with a mean width of 2.1 km. The fjord drains a hinterland area of 1549 km<sup>2</sup> that annually delivers 0.25 km<sup>3</sup> of freshwater runoff. Over 40 % of the fjord hinterland is covered in glacial ice and 50 % of the land is at elevations in excess of 800 m. Clark Fiord merits special attention within the SAFE project because, like Inugsuin Fiord, only 3 % of the total sediment delivery to the fjord ( at 31,000 tonnes per annum) enters through the head of the fjord. Most of the sediment delivered to the fjord is from the numerous side-entry glaciers whose melt water enters laterally into the fjord. The glacier complex at the fjordhead is retreating at a rate of 6 m/a. Also, like Maktak Fiord, Clark Fiord is a tributary (submarine hanging-valley) fjord to a main (Gibbs Fiord) complex.

Clark Fiord has a water volume of 107 km<sup>3</sup> and, at the time of sampling, had surface temperatures that increased seaward (unusual compared to most other SAFE fjords) from 1.68 °C at the head of the fjord (CL1: Fig. H) to 2.36 °C outside the fjord (CL7). The coldest waters were at 200 m water depth (-1.68 °C) and temperatures warmed with depth to 0.71 °C at 690 m. The salinity of the surface waters increased from 30.86 ‰ at CL1 to 31.15 ‰ at CL8. The deepest water in the fjord had a maximum salinity of 34.3 ‰. The waters were well oxygenated with the lowest dissolved oxygen values in the deep water ( $\approx 5.2 \text{ ml L}^{-1}$ ).

Eighty SPM samples were collected (Fig. H). The mean grain size of the deflocculated SPM ranged from 7.0  $\phi$  to 7.7  $\phi$  or 23 % to 46 % clay. The bottom sediments in the fjord contained levels of organic carbon that increased from 0.2 % at the head of the fjord (CL1) to 0.8 % outside the fjord.

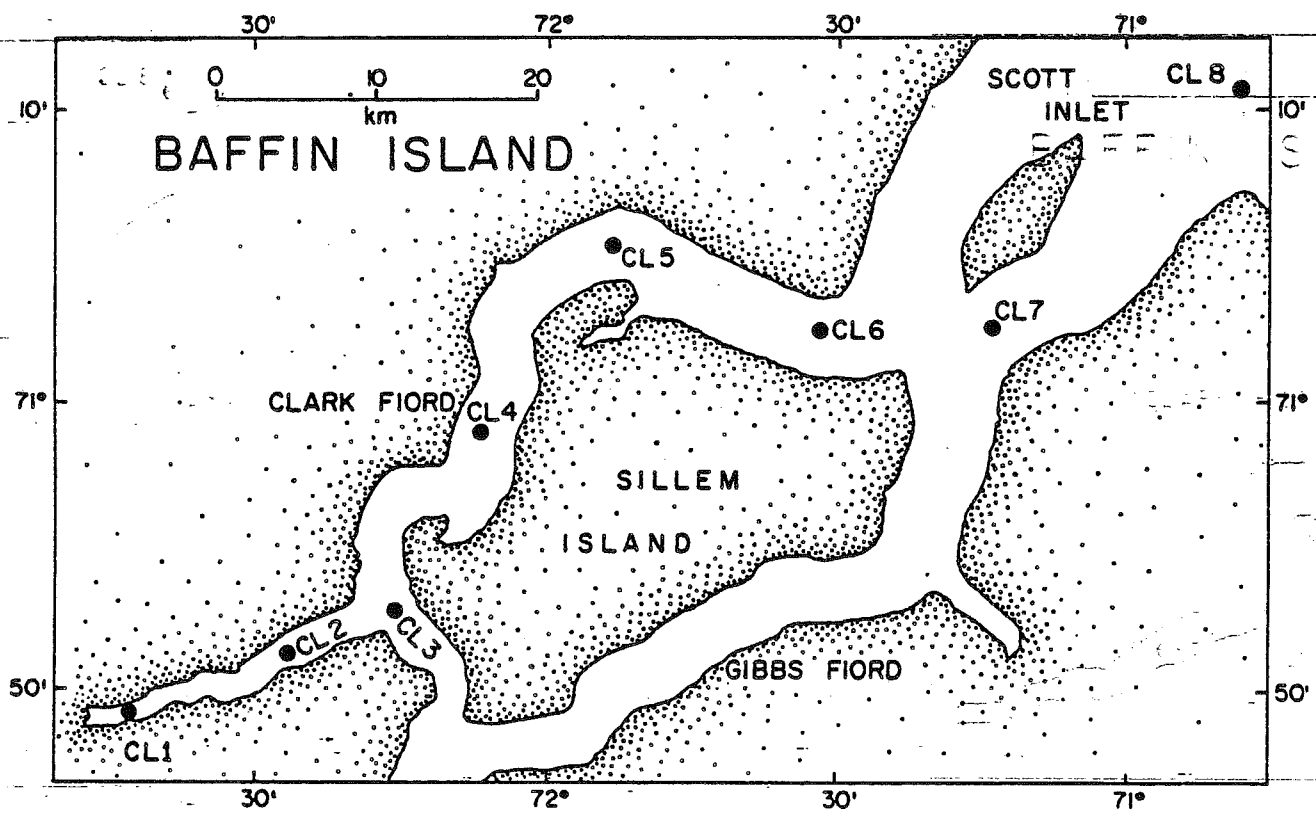


Fig. H- Stations of Clark Fiord

Clark Fiord

Station CL-1:1 m (82-03623)

SPM conc. = 1.226 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 133

Description from SEM micrographs -

Chain, concentric and pennate diatoms are predominant in this sample. There are some star-shaped organisms, dinophysis, silicoflagellates, dinoflagellates and pico-plankton as well. Individual particles, clay flocs, a large mica plate, and an agglomerate of bacteria in mucus are also present.

Station CL-1:100 m (82-03616)

SPM conc. = 0.537 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 134

Description from SEM micrographs -

There are only a few chain diatoms left at this depth. There are still some pennate and concentric diatoms seen along with silicoflagellates, pico-plankton, and star-shaped organisms. Some loose clay flocs are also present.

Station CL-1:180 m (82-03614)

SPM conc. = 1.285 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 135

Description from SEM micrographs -

This sample is mostly individual particles. There are remnant chain diatoms, broken-up fecal pellets, concentric diatoms with clay precipitation, pennate diatoms, silicoflagellates, organic spheres (bacteria) in mucus and mucoids. There are numerous compact clay flocs and a few silt grains.

## Station CL-3:1 m (82-03643)

SPM conc. = 0.860 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 136

## Description from SEM micrographs -

Biogenics are numerous and dominate the sample. Chain diatoms of various types, concentric diatoms, dinoflagellates, silicoflagellates, pico-plankton, dinophysis, pennate diatoms, star-shaped organisms and mucoids are all included. There are a few agglomerates - clays held together by mucus.

## Station CL-3:100 m (82-03636)

SPM conc. = 0.793 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 137

## Description from SEM micrographs -

This sample is similar to the previous sample (1m) but with less chain diatoms and slightly more individual particles. Flocs of clays and biogenics are common as well. There are silicoflagellates, mucoids, fecal pellets of biogenics, pico-plankton; plant debris, pennate diatoms, organic spheres, remnant concentric diatoms and chain diatoms. No photos were taken.

## Station CL-3:240 m (82-03634)

SPM conc. = 1.075 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 138

## Description from SEM micrographs -

This sample is mainly individual grains and flocs. The flocs range from small to large in size and most are fairly compact. There are also chain diatom remnants, concentric diatoms with clay precipitation, pennate diatoms, pico-plankton and mucoids. Loose flocs of clays and biogenics are also seen.



Station CL-4:1 m (82-03653)

SPM conc. = 2.388 mg L<sup>-1</sup>

Histogram of grain size distribution - not available

Description from SEM micrographs -

Biogenics and individual particles are numerous here. Star-shaped organisms of silicon are seen as well as mucoids, silicoflagellates, pennate diatoms, dinoflagellates, fecal pellets composed of fibres, zooplankton, small clay flocs, fibre flocs, silt grains, an agglomerate of clays in mucus and large grains of iron and zinc.

Station CL-4:100 m (82-03647)

SPM conc. = 0.480 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 139

Description from SEM micrographs -

This sample is abundant with biogenic debris. There are a few loose clay flocs, silt grains and small individual particles. Fecal pellets seen are composed of biogenic remains. Silicoflagellates, pico-plankton, chain and concentric diatoms are among the biogenic material present. No photos were taken.

Station CL-4:535 m (82-03644)

SPM conc. = 0.492 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 140

Description from SEM micrographs -

This sample is mainly individual particles (<10µm) and loose to fairly compact clay and biogenic flocs. Mucoids are abundant and pico-plankton and concentric diatoms are present. No photos are included.

**Station CL-6:1 m (82-03673)**

**SPM conc. = 1.299 mg L<sup>-1</sup>**

**Histogram of grain size distribution - Fig. 141**

**Description from SEM micrographs -**

This sample is abundant in biogenics such as chain diatoms, pennate diatoms, remnant concentric diatoms, silicoflagellates, dinoflagellates, dinophysis, pico-plankton, star-shaped organisms, agglomerates of bacteria in mucus, mucoids and plant debris. Floccs may be of a fibrous nature, are loose to fairly compact and are composed of clay and/or biogenics. Some are rich in phosphorus and iron. There are also some small clay rosettes. No photos were taken.

**Station CL-6:100 m (82-03668)**

**SPM conc. = 0.375 mg L<sup>-1</sup>**

**Histogram of grain size distribution - Fig. 142**

**Description from SEM micrographs -**

This sample is mostly biogenic material including pico-plankton, chain diatoms, plant debris, concentric diatoms, mucoids, star-shaped organisms, etc. Some floccs are composed of diatoms while others are fibres and/or clays. There are a few individual particles and silt grains as well as fecal pellets.

**Station CL-6:655 m (82-03664)**

**SPM conc. = 0.421 mg L<sup>-1</sup>**

**Histogram of grain size distribution - Fig. 143**

**Description from SEM micrographs -**

This sample is mainly individual particles ranging from 10µm to silt size. Inorganic, small to large and loose to compact floccs are also common. There are a few mucoids and biogenics. The sample contains one large radiolarian (intact) and some plant debris. No photos were saved.

Station CL-8:1 m (82-03693)

SPM conc. = 0.628 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 144

Description from SEM micrographs -

This sample appears contaminated with salt, however, it is composed mainly of biogenics and biogenic flocs. These include chain diatoms, star-shaped organisms, silicoflagellates, plant debris, pico-plankton, dinophysis, dinoflagellates and dry-looking mucoids. There are a few silt grains with smaller grains attached to them.

Station CL-8:100 m (82-03688)

SPM conc. = 0.538 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 145

Description from SEM micrographs -

Biogenics are abundant here, including chain and concentric diatoms, plant debris, mucoids, pico-plankton, collapsed fecal pellets of biogenics and fibres and star-shaped organisms.

Station CL-8:765 m (82-03684)

SPM conc. = 0.398 mg L<sup>-1</sup>

Histogram of grain size distribution - Fig. 146

Description from SEM micrographs -

This sample is again mainly individual particles and flocs. The flocs are loose to compact clays with some occasional biogenics. There are a few biogenic remnants and some rare mucoids. Photos taken were of poor quality and are not included.

SAMPLE NO. - 757 J. SYVITSKI 8203623  
CL1 1 CLARK FJORD  
MILLIMETER EQUIVALENTS

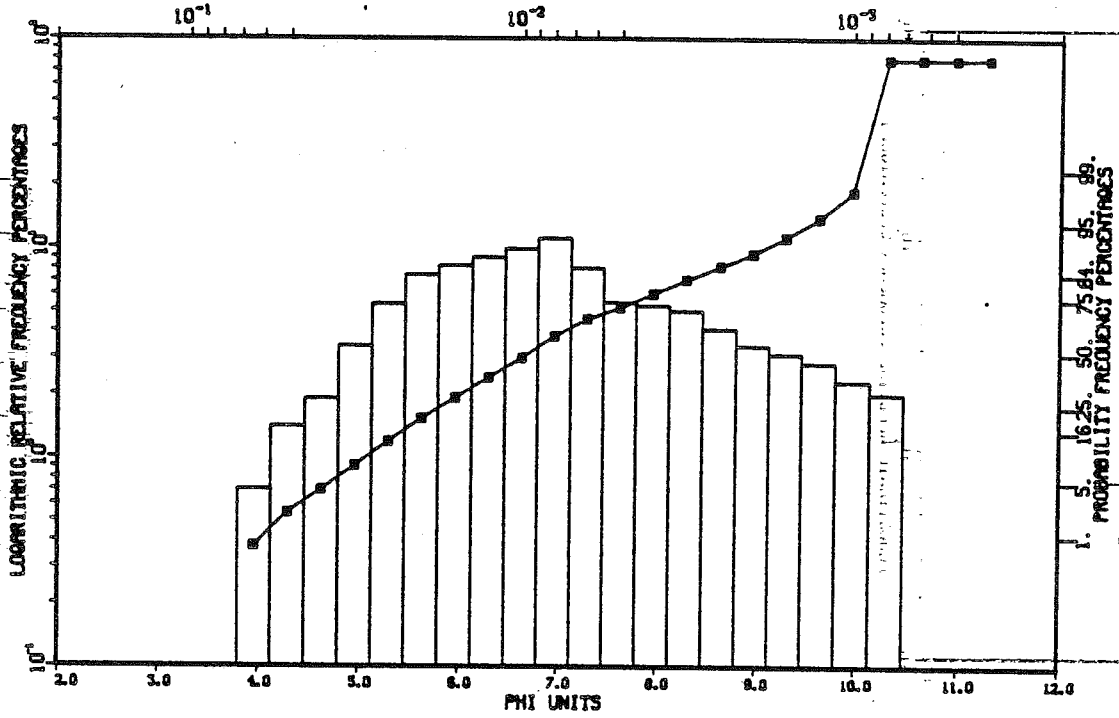


Fig. 133

SAMPLE NO. - 764 J. SYVITSKI 8203616  
CL1 100 CLARK FJORD  
MILLIMETER EQUIVALENTS

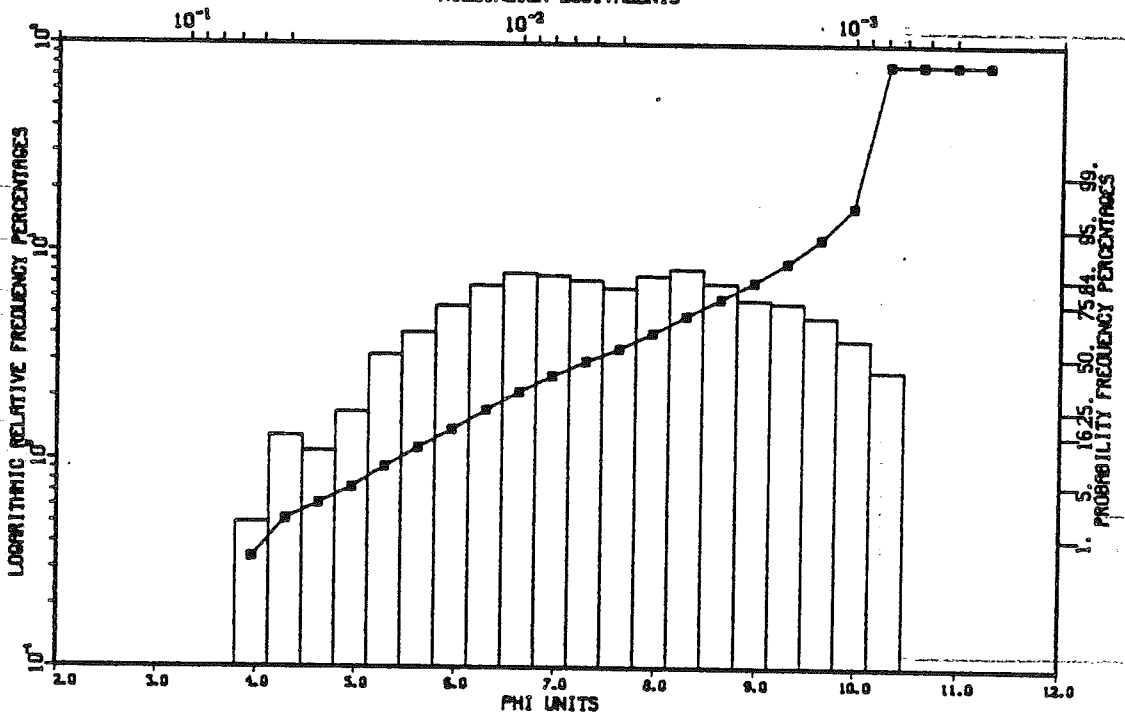


Fig. 134

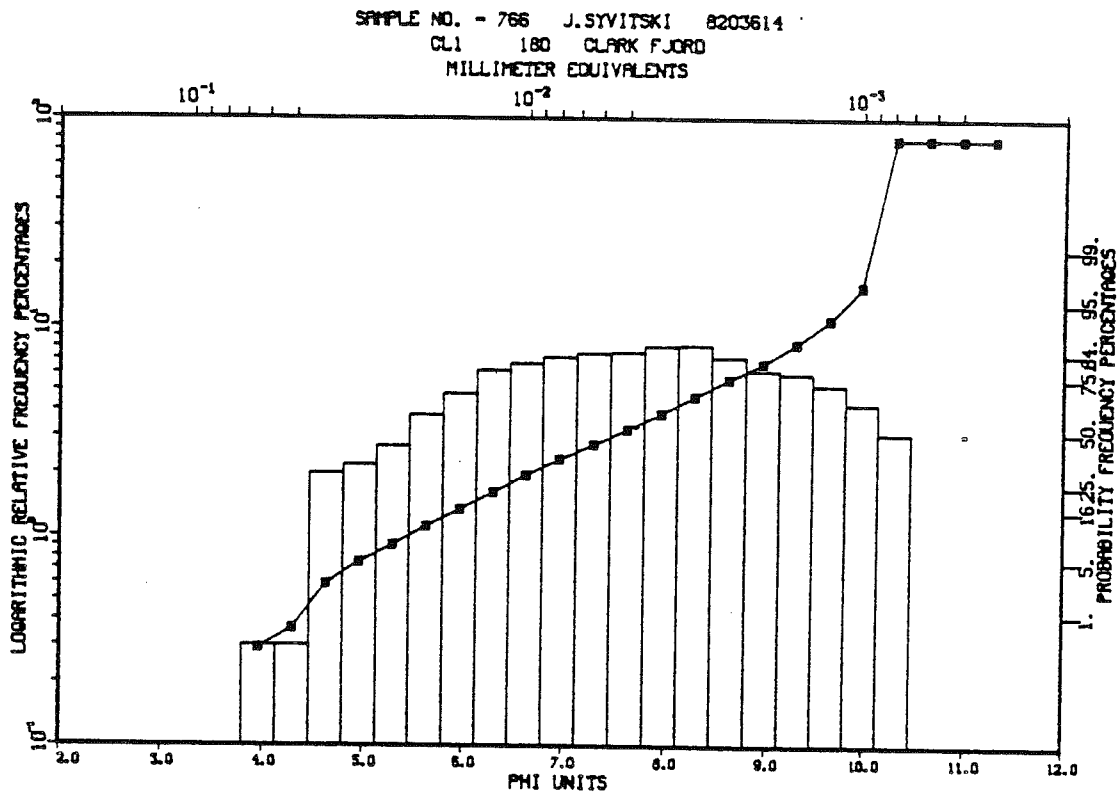


Fig. 135

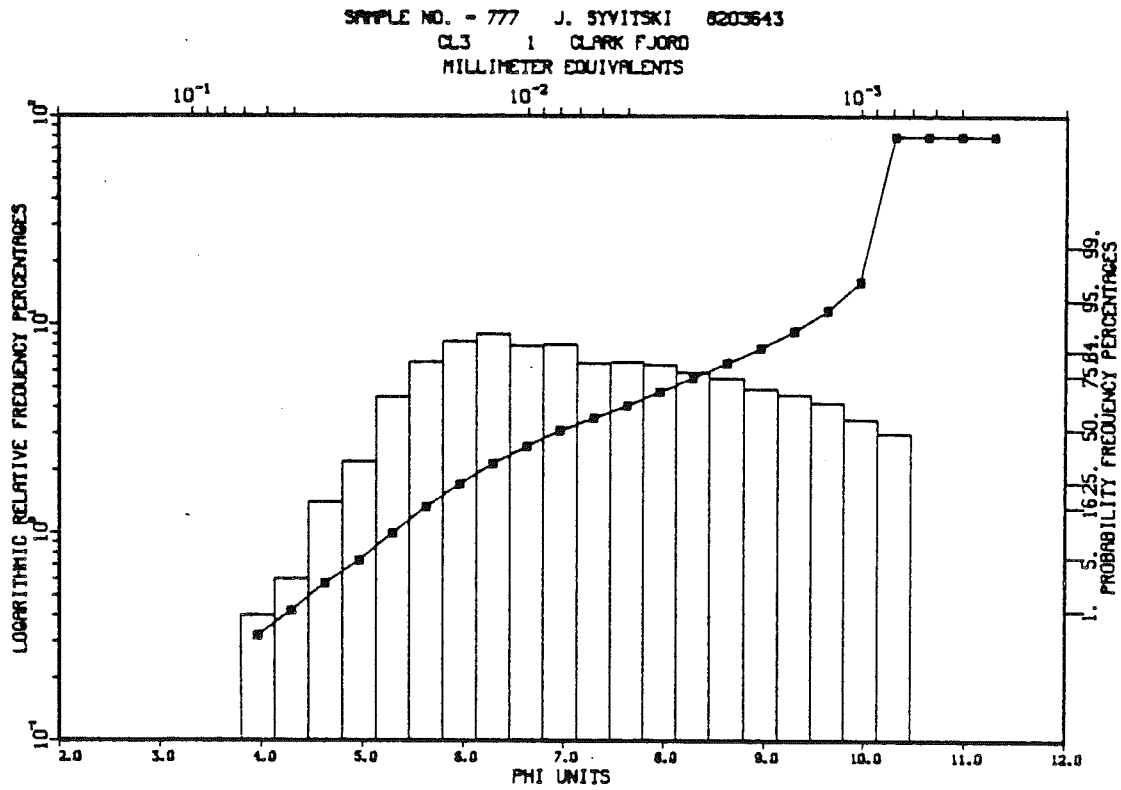


Fig. 136

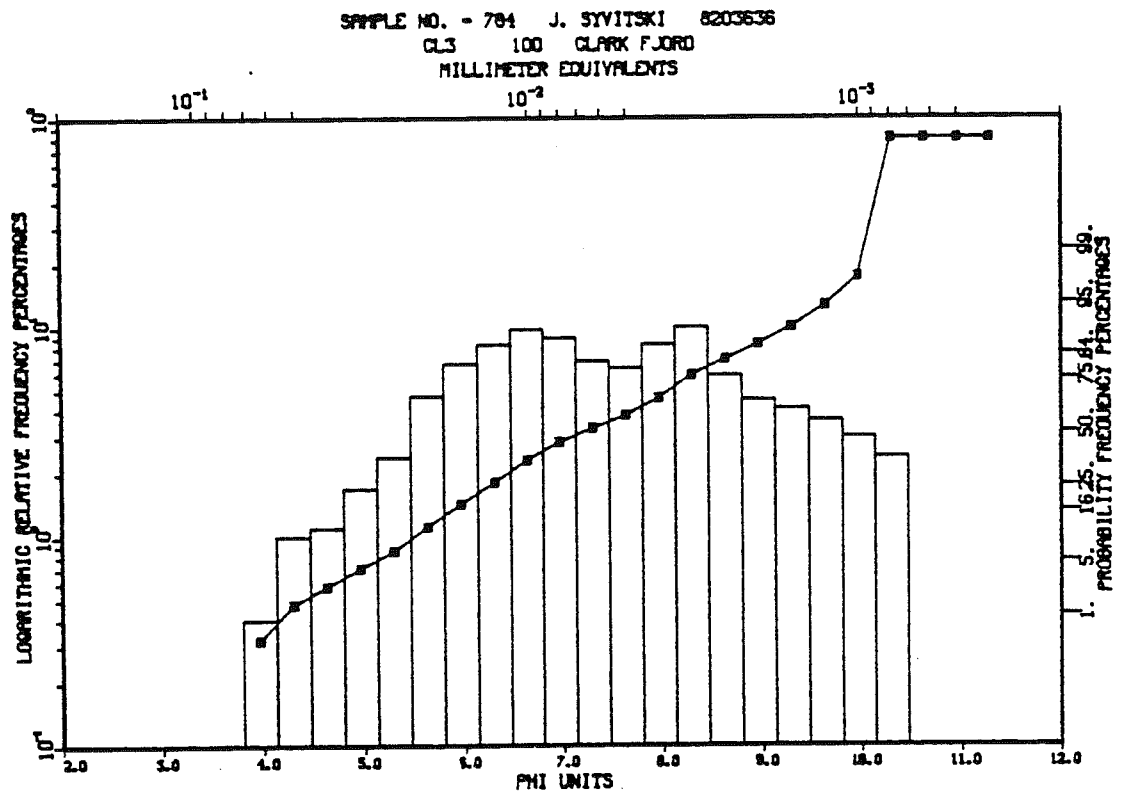


Fig. 137

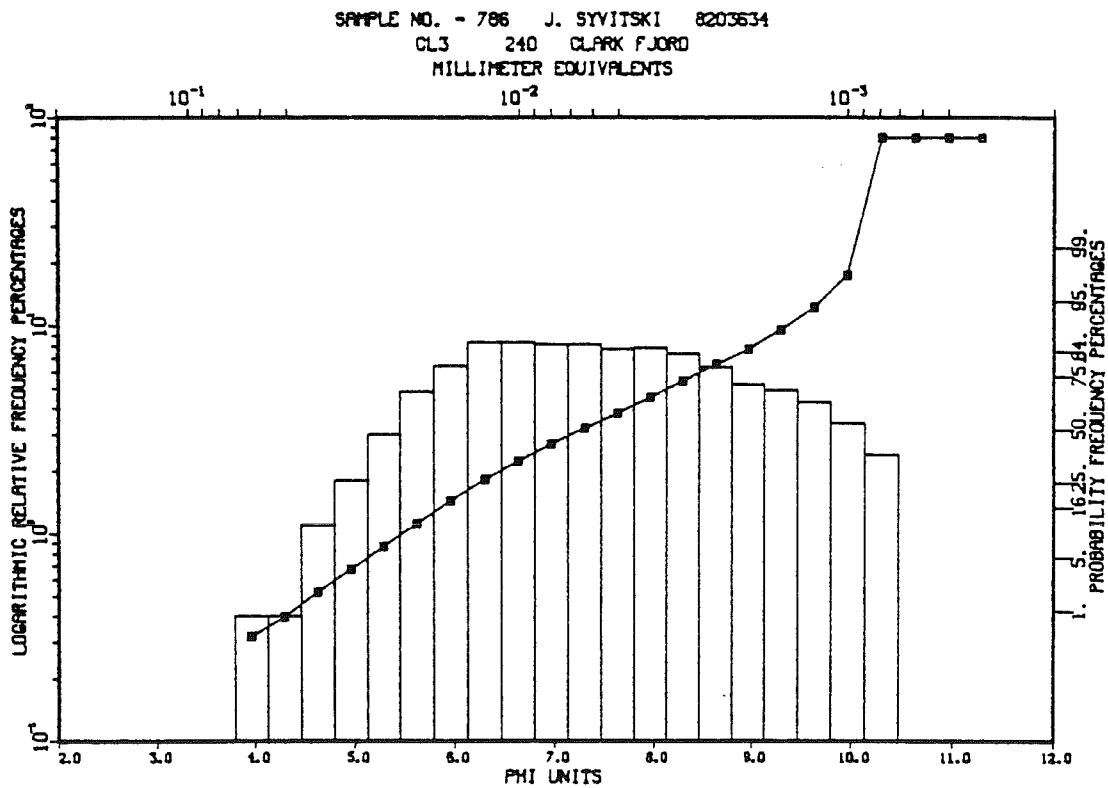


Fig. 138

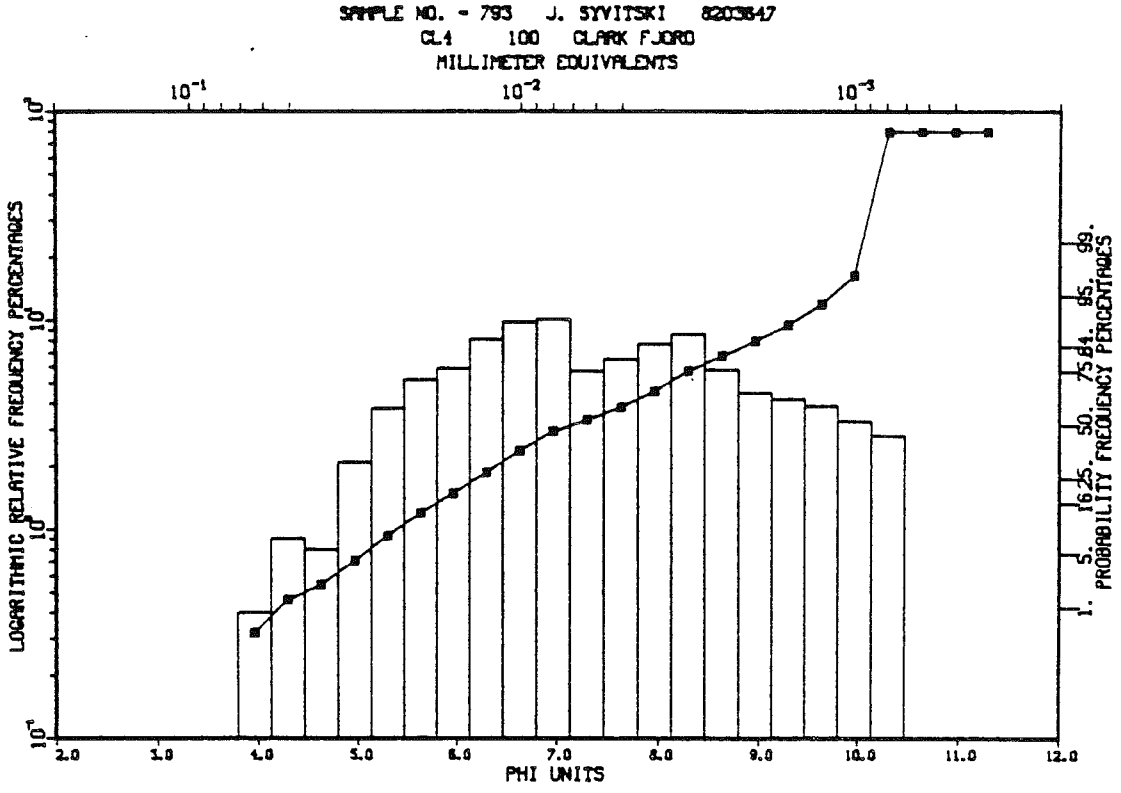


Fig. 139

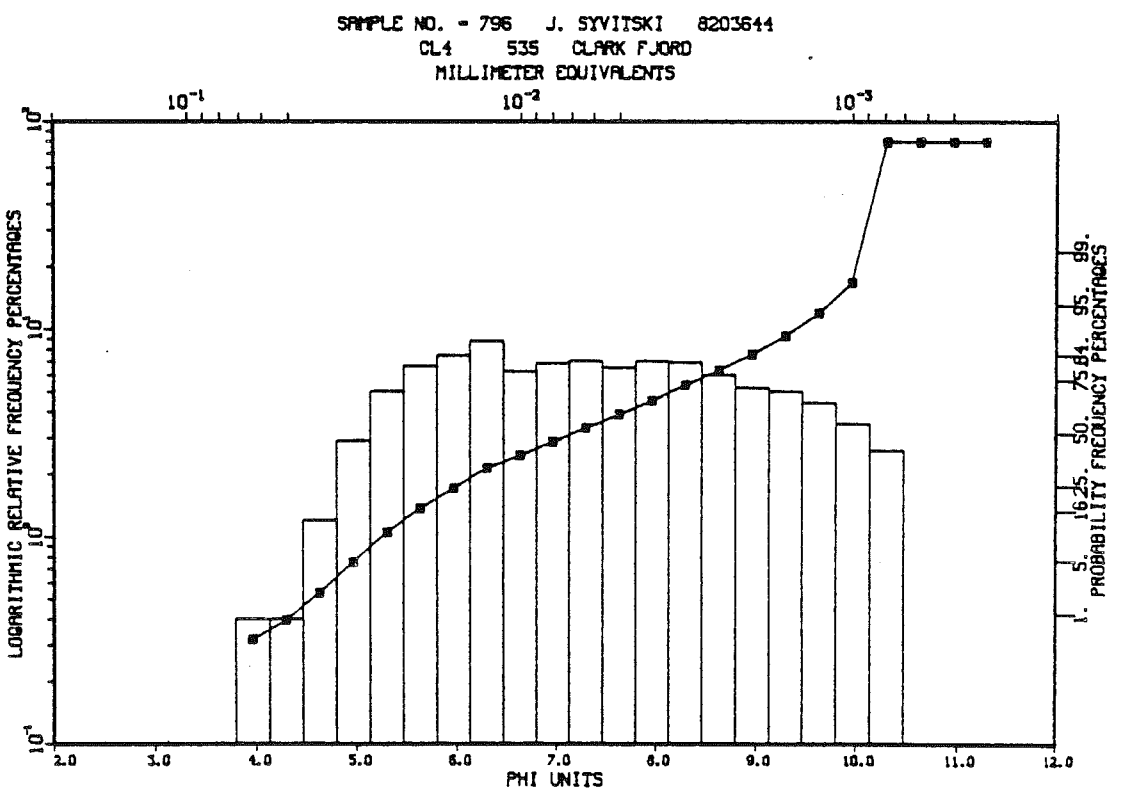


Fig. 140

SAMPLE NO. - 807 J. SYVITSKI 8203673  
CLS 1 CLARK FJORD  
MILLIMETER EQUIVALENTS

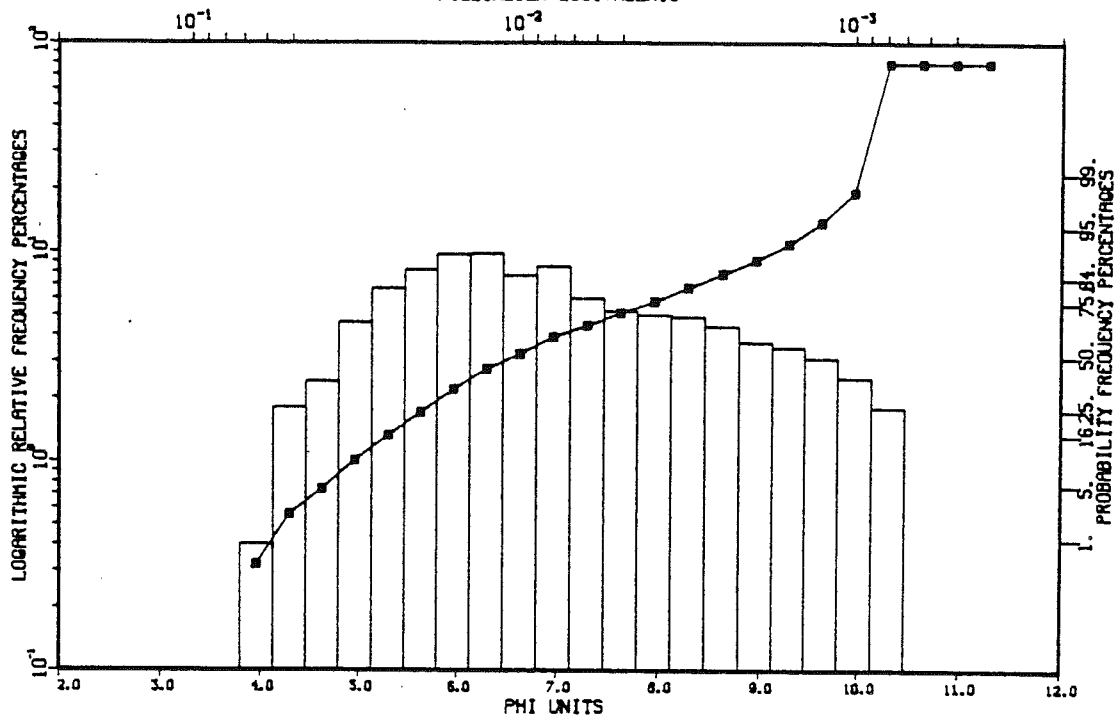


Fig. 141

SAMPLE NO. - 812 J. SYVITSKI 8203668  
CLS 100 CLARK FJORD  
MILLIMETER EQUIVALENTS

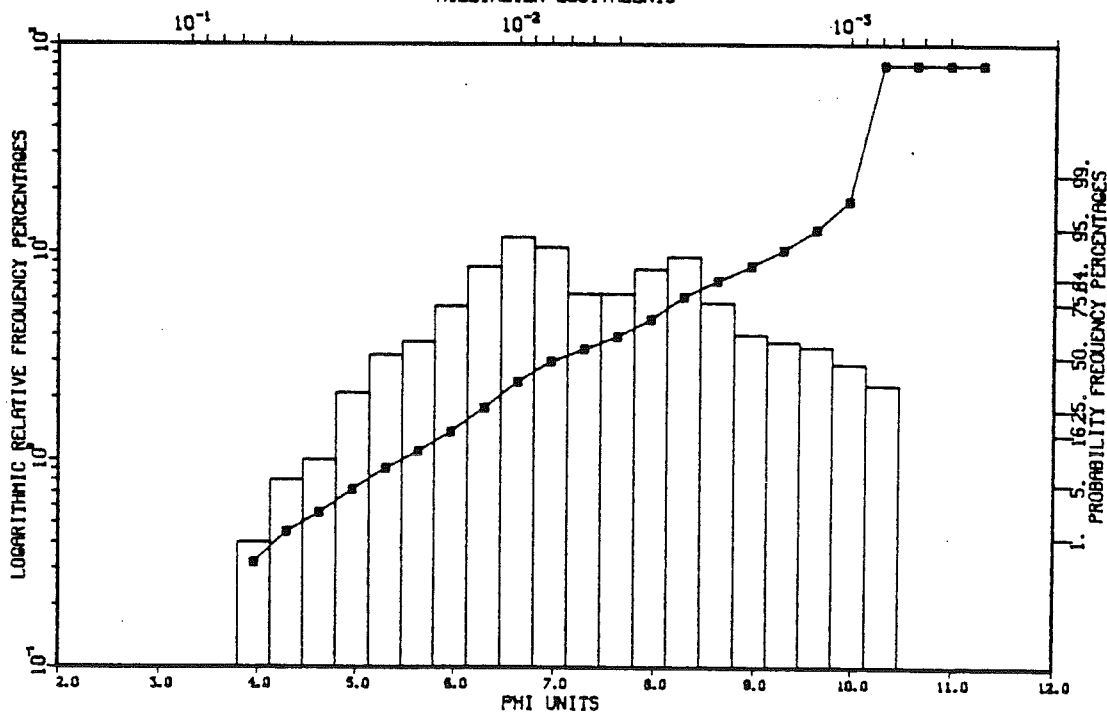


Fig. 142



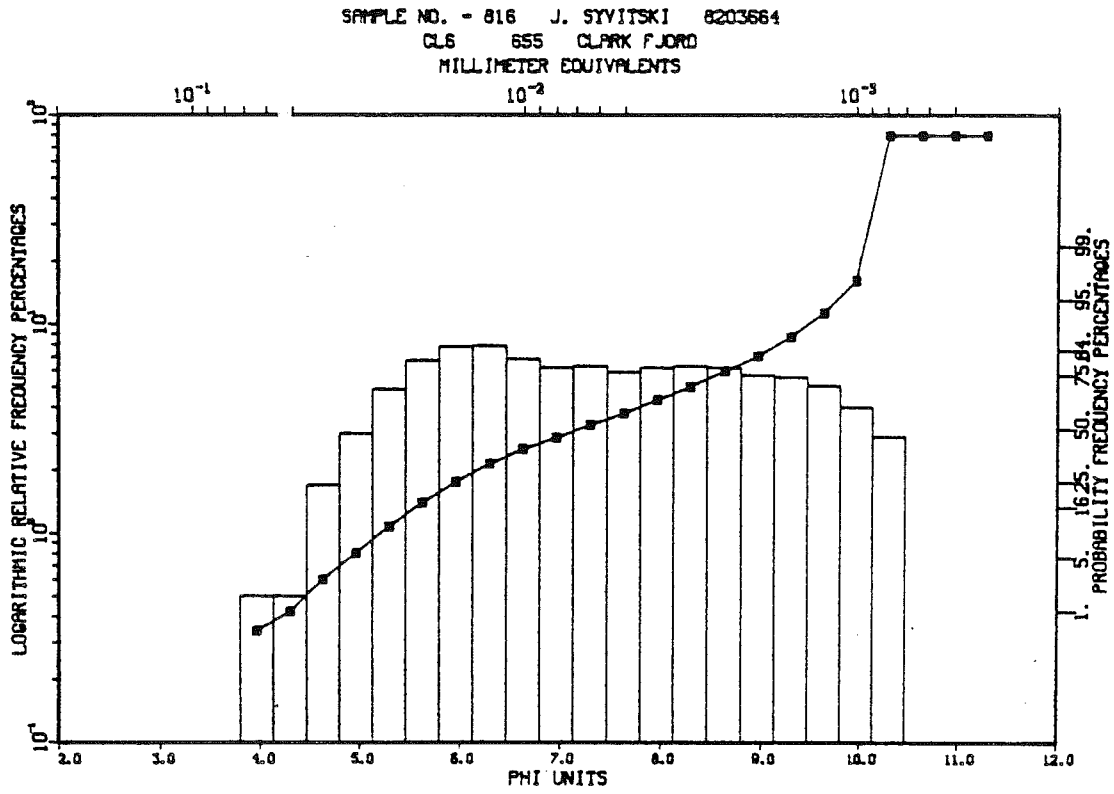


Fig. 143

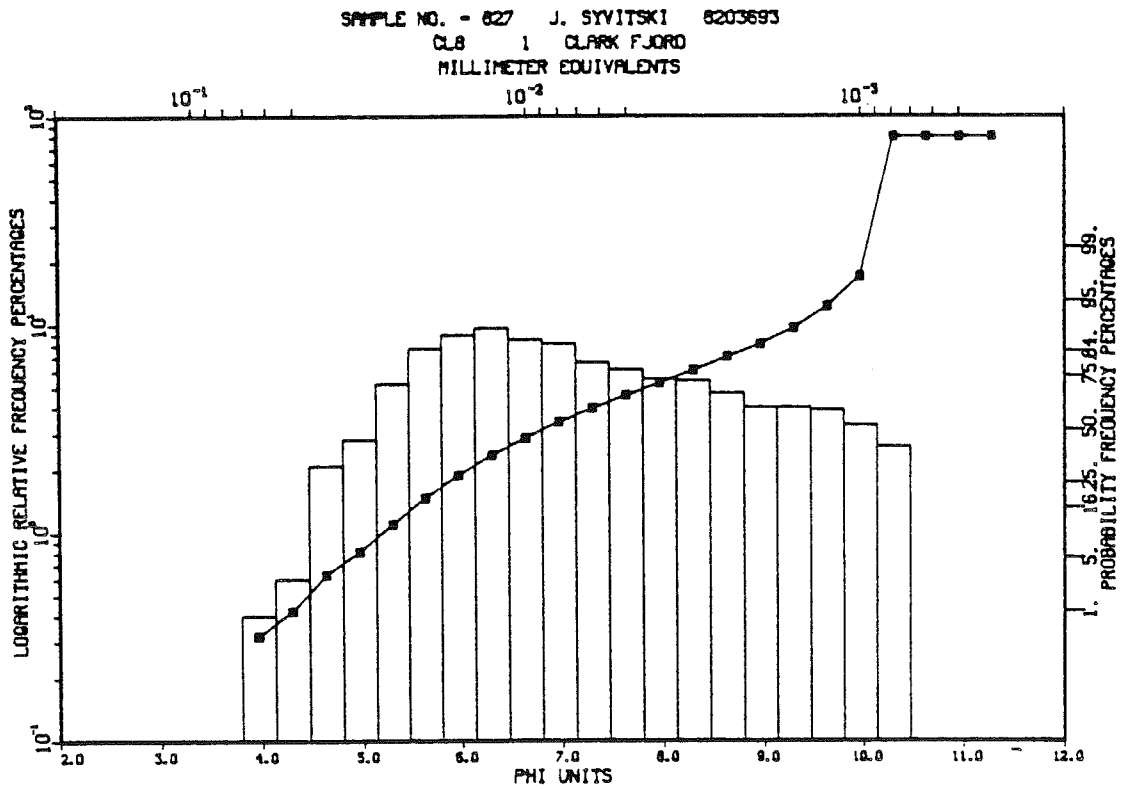


Fig. 144

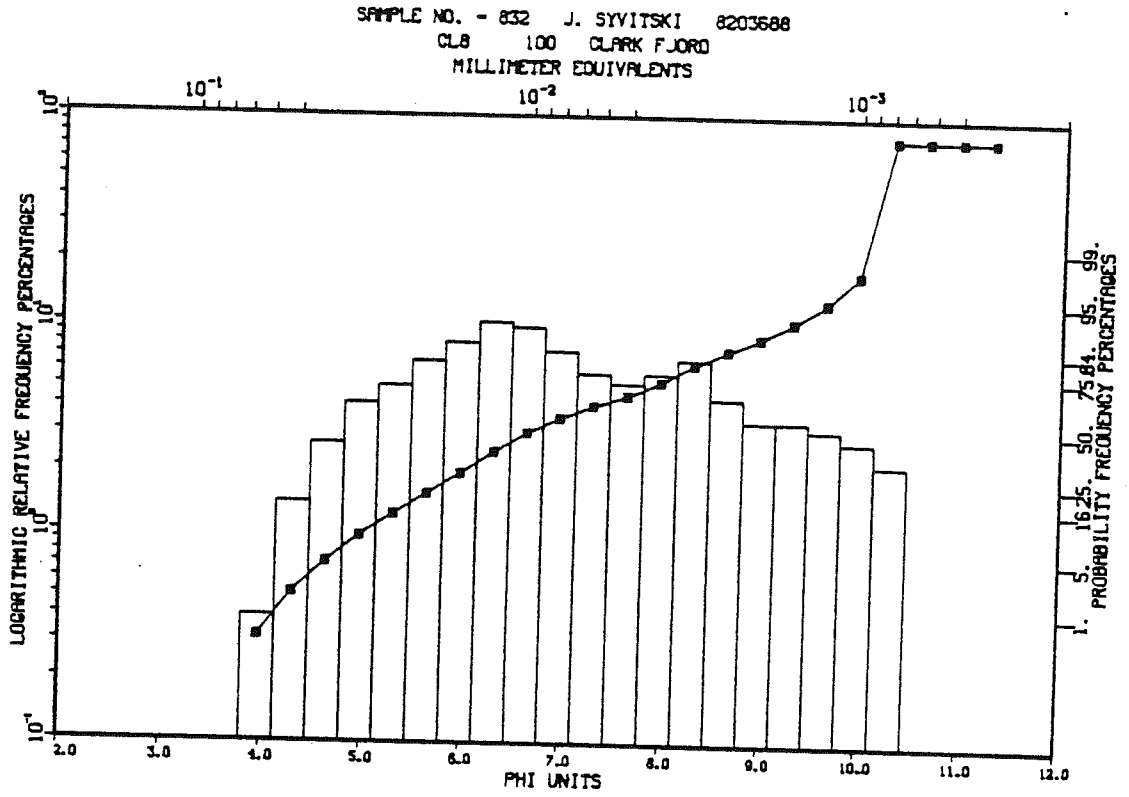


Fig. 145

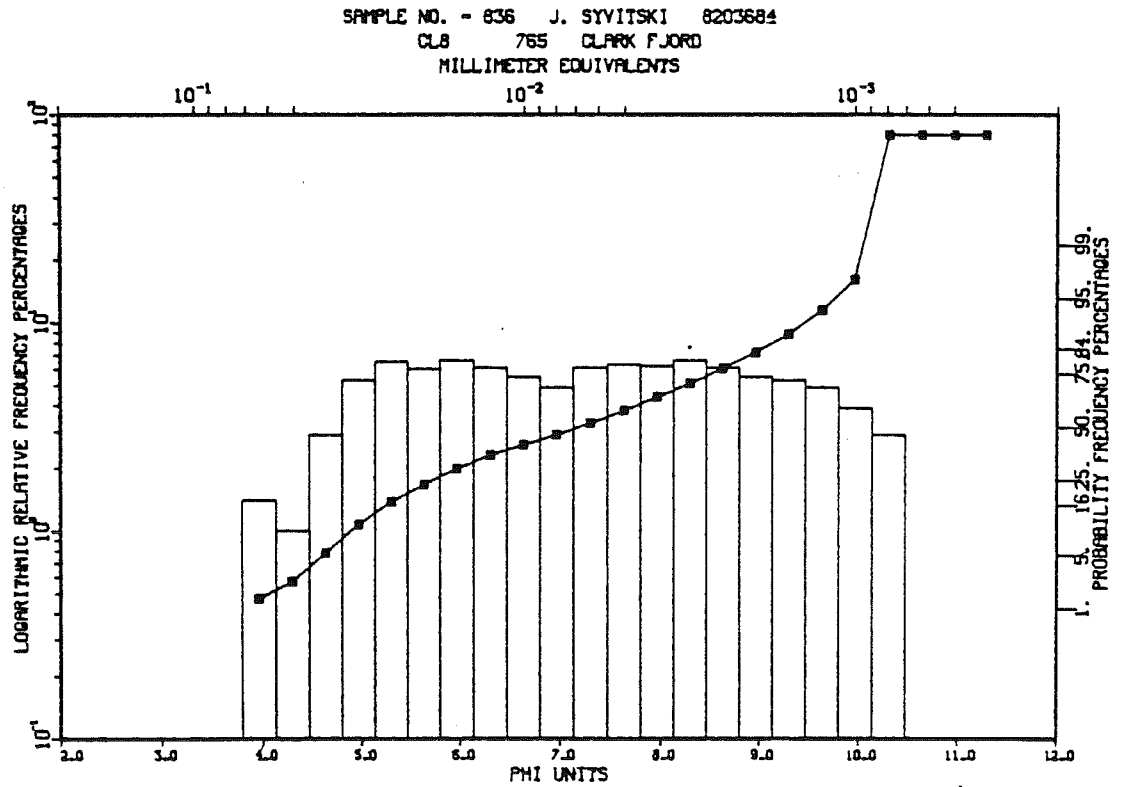
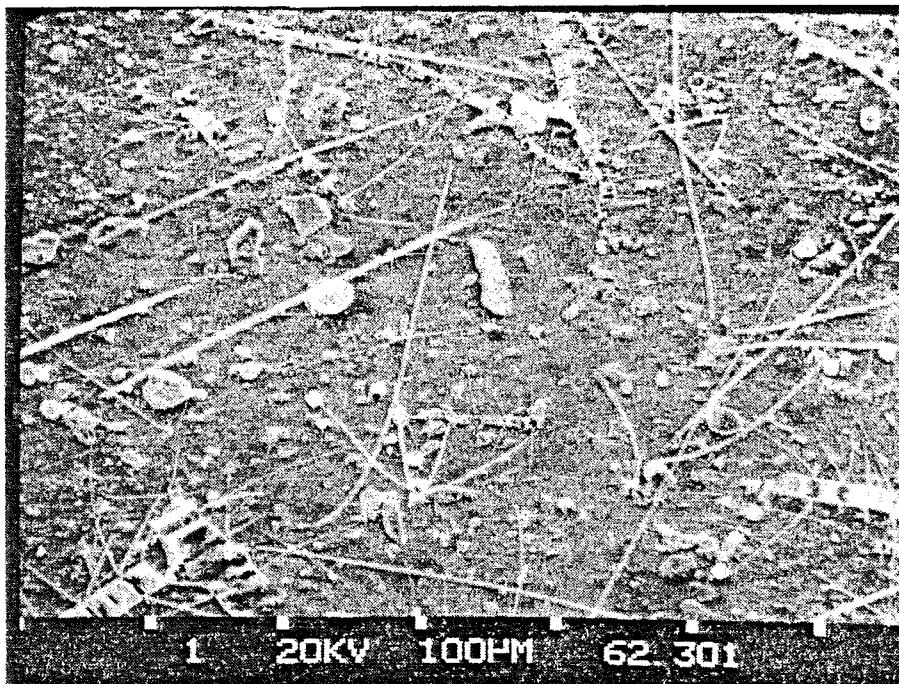
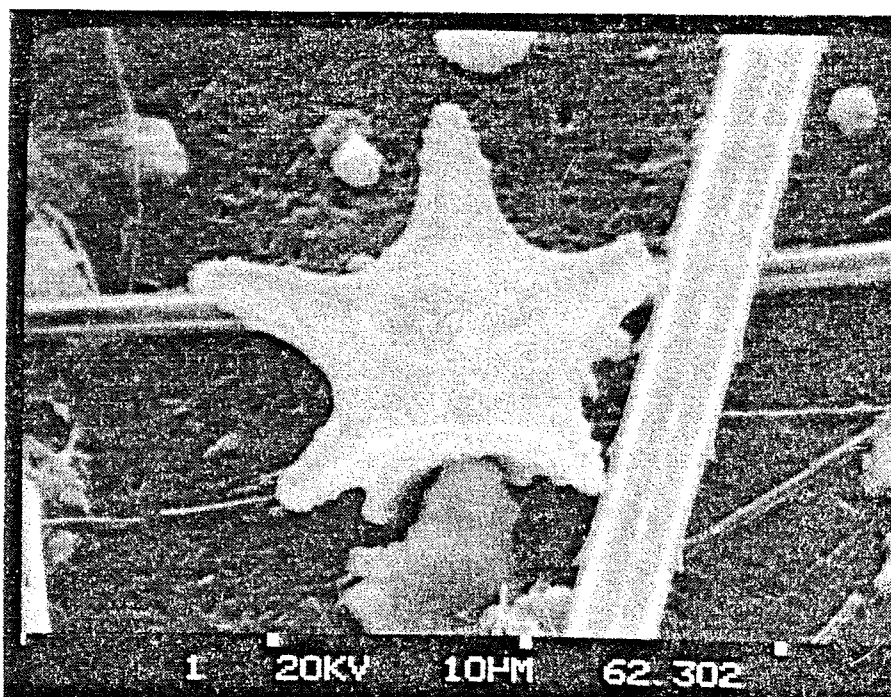


Fig. 146

Station CL-1:1 m (82-03623)

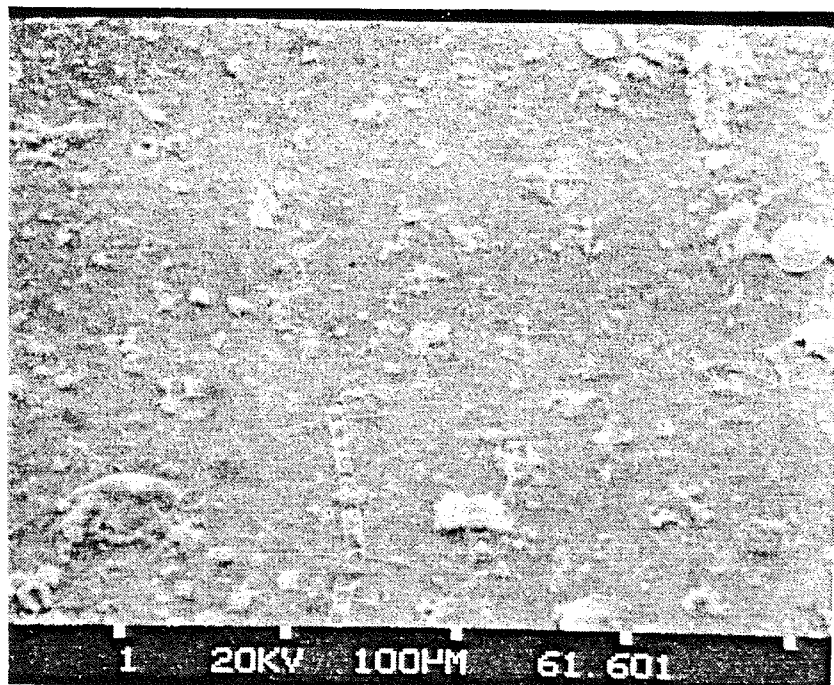


Micrograph 62.301 - general photo of sample.



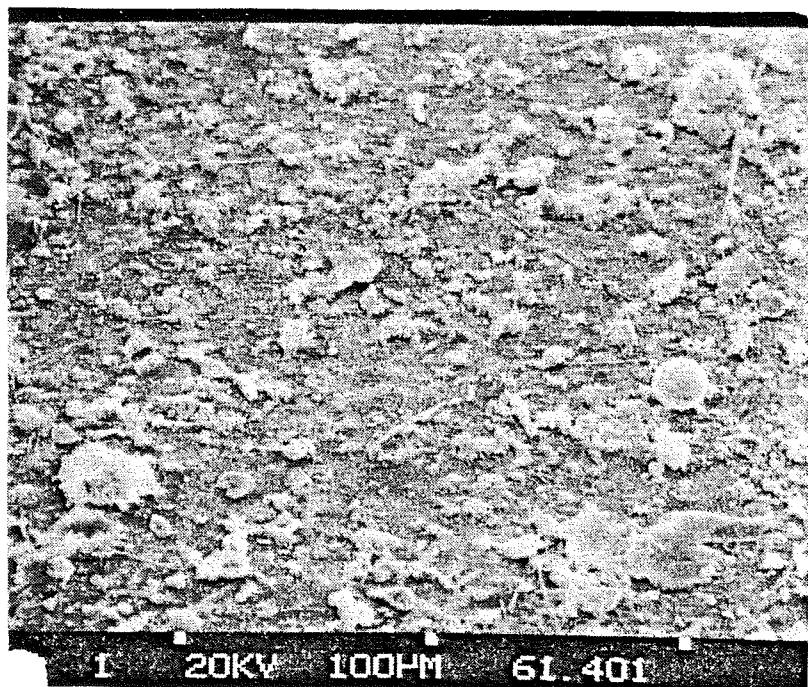
Micrograph 62.302 - silica-rich, star-shaped organism (common in this sample).

Station CL-1:100 m (82-03616)



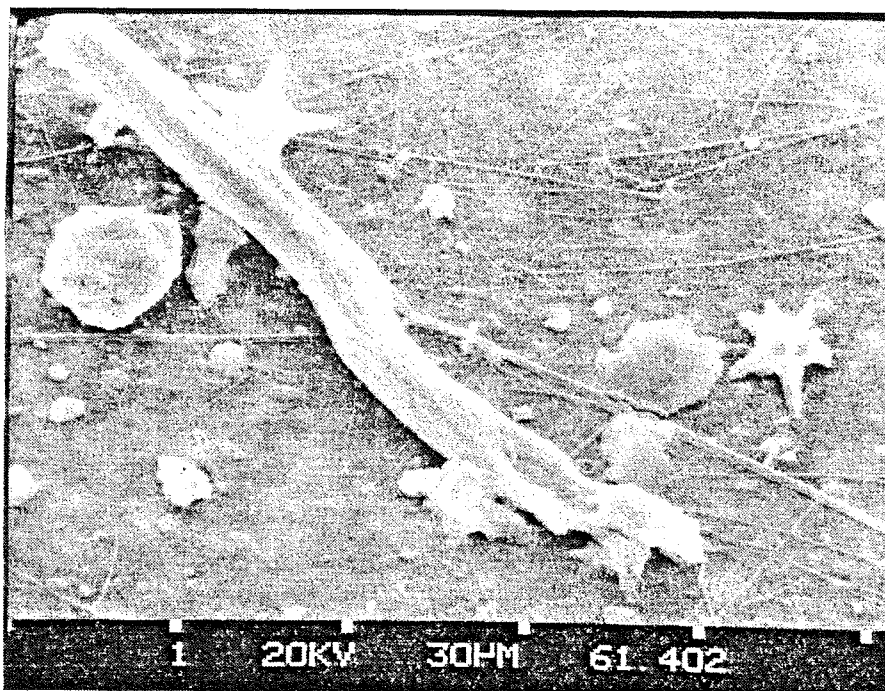
Micrograph 61.601 - general photo of sample.

Station CL-1:180 m (82-03614)

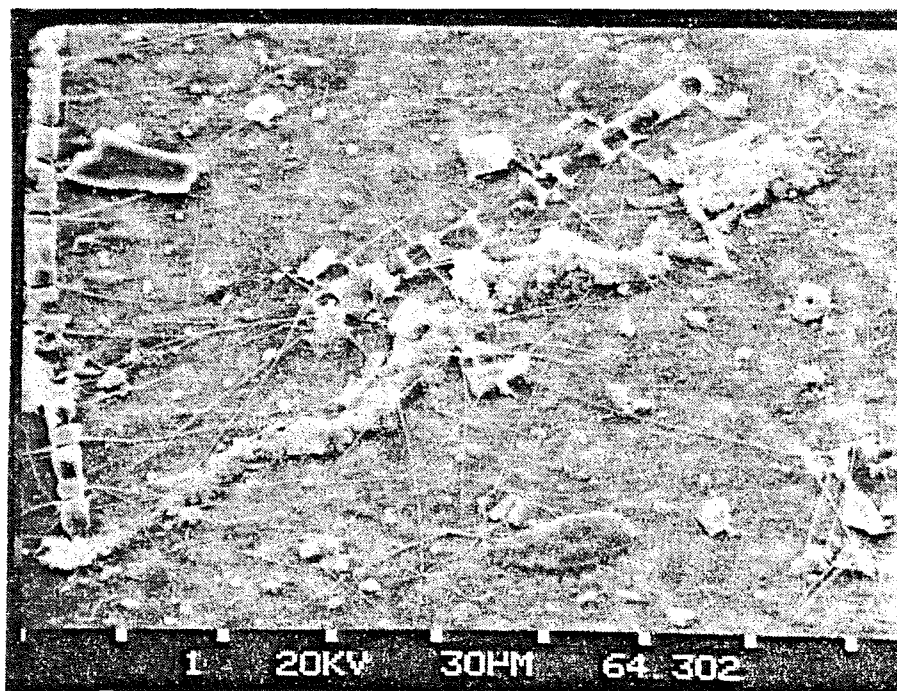


Micrograph 61.401 - general photo of sample.

Station CL-3:1 m (82-03643)

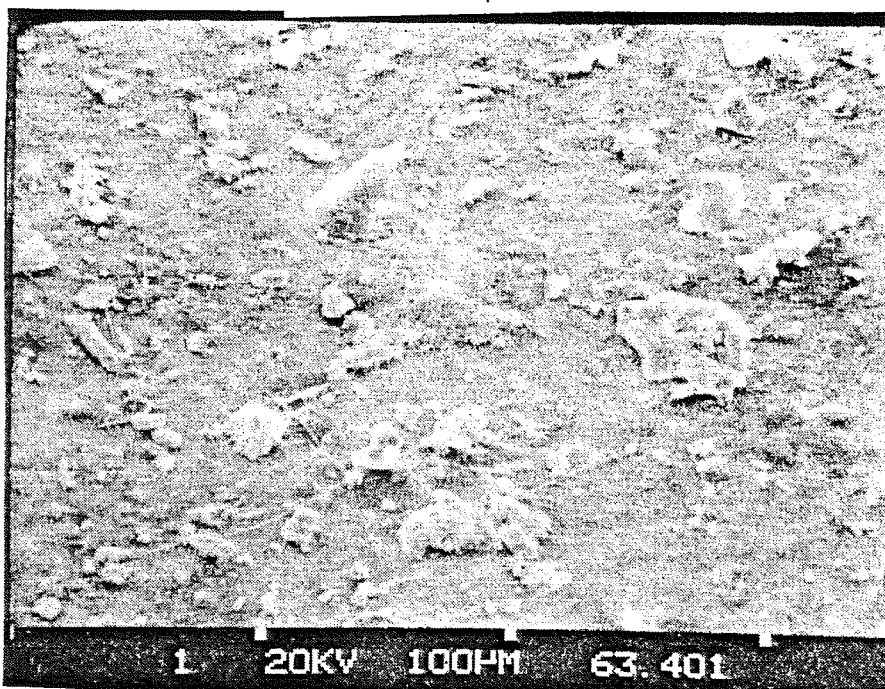


Micrograph 61.402 - plant debris, individual grains, bacterial spheres, small diatoms and 2 star-shaped organisms.



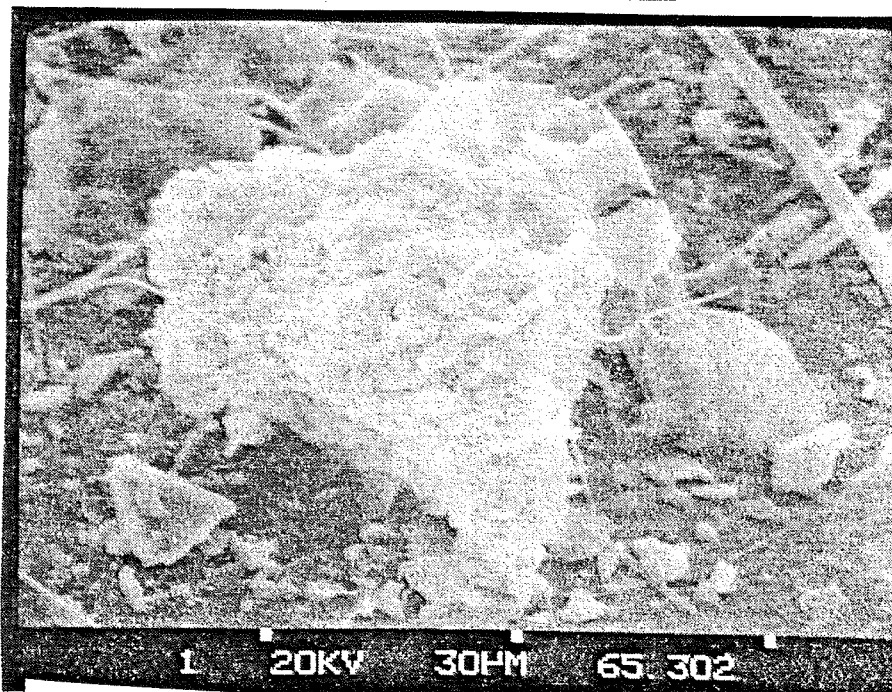
Micrograph 64.302 - long strand of clay and diatom debris.

Station CL-3:240 m (82-03634)



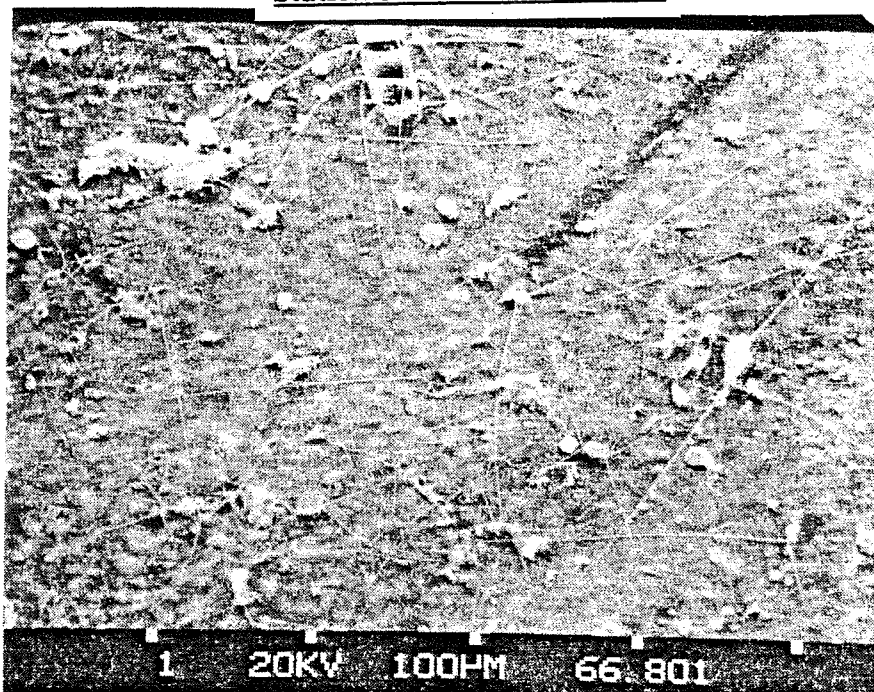
Micrograph 63.401 - this photo shows a compact floc, a fibre floc, mucoids, individual particles and biogenics.

Station CL-4:1 m (82-03653)



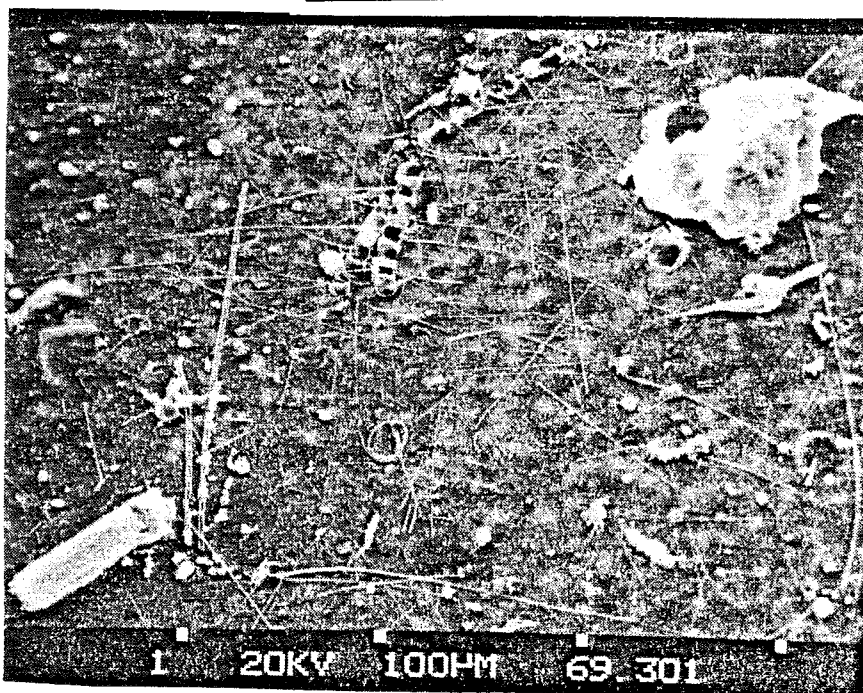
Micrograph 65.302 - lead-rich grain (spectrum A65301 included).

Station CL-6:100 m (82-03668)



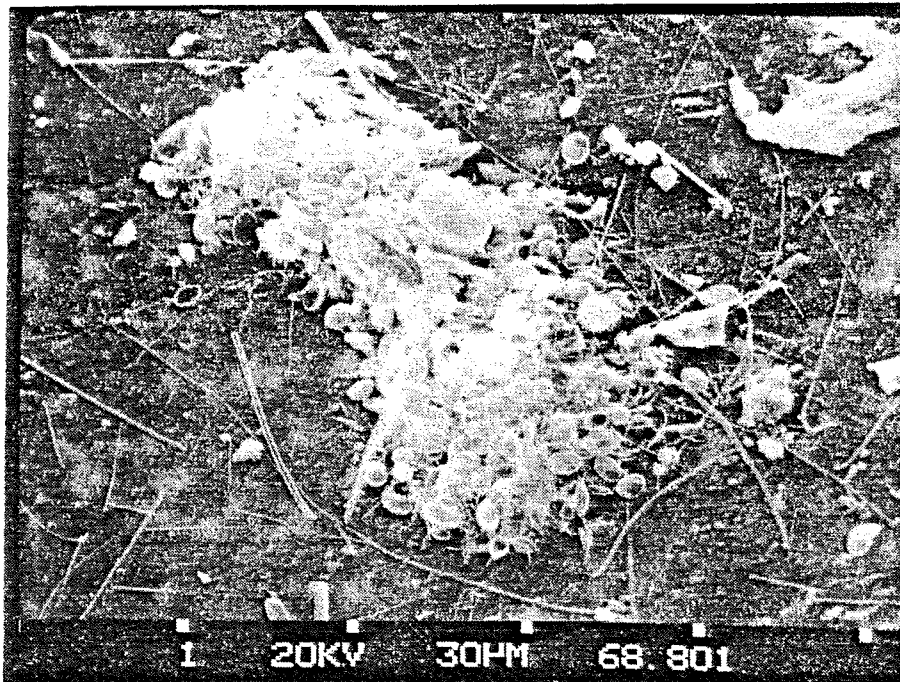
Micrograph 66.801 - general photo of sample (spectrum A66802 - analysis of core of sample, spectrum B66802 - analysis of spines).

Station CL-8:1 m (82-03693)

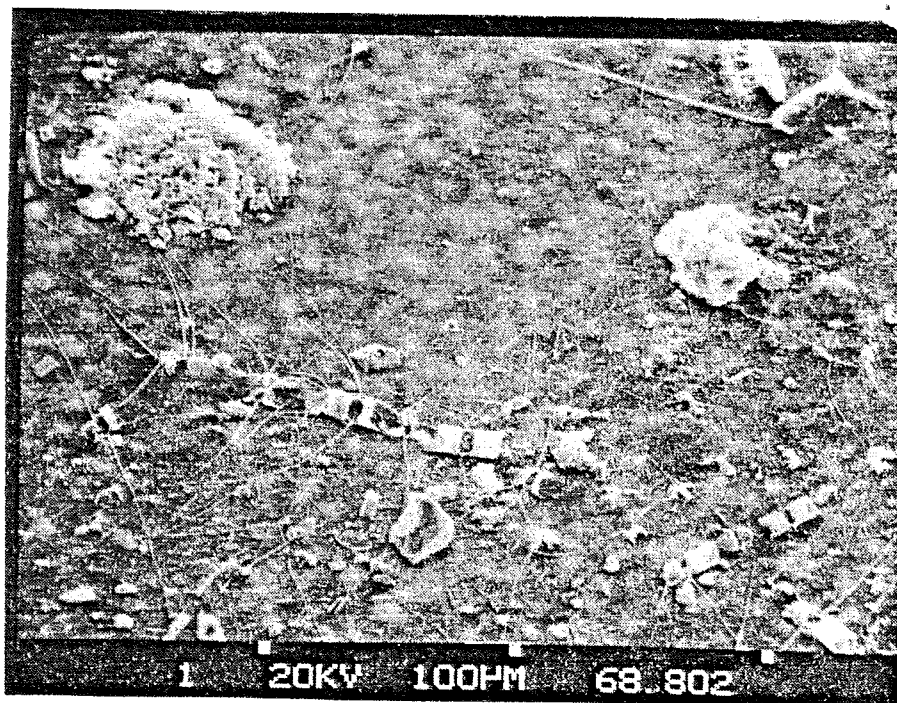


Micrograph 69.301 - general photo showing a magnesium-rich grain (lower left). The spectrum A69301 (included) is an analysis of the grain in the upper right corner.

Station CL-8:100 m (82-03688)



Micrograph 68.801 - agglomerate of biogenics (intact) loosely stuck in mucus.



Micrograph 68.802 - fibrous floc (right) and diatoms (left)



ID:A65301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	367
Pb	7330
Al	15590
Si	24462
Cl	-4445
Cu	784
Ca	372
Ti	203
Fe	392
Bg	0

ID:A65301  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.02
Pb	0.47
Al	1.00
Si	1.57
Cl	-0.28
Cu	0.05
Ca	0.02
Ti	0.01
Fe	0.02
Bg	0.00

ID:A65301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.8
Pb	16.3
Al	34.6
Si	54.3
Cl	-9.9
Cu	1.7
Ca	0.8
Ti	0.5
Fe	0.9

CL-4: 1m  
Lead-Rich Grain

ID:A66802  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	147
Mg	463
Al	393
Sr	9281
Cl	2602
S	6644
Ca	891
Cu	364
Fe	127
Bg	0

ID:A66802  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.37
Mg	1.18
Al	1.00
Sr	23.61
Cl	6.62
S	16.90
Ca	2.27
Cu	0.93
Fe	0.32
Bg	0.00

ID:A66802  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.7
Mg	2.2
Al	1.9
Sr	44.4
Cl	12.4
S	31.8
Ca	4.3
Cu	1.7
Fe	0.6

CL-6: 100m  
Core of Sample

ID:B66802 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	175
Mg	-33
Al	699
Sr	29726
Cl	-1148
S	15606
Ca	173
Cu	284
Fe	113
Bg	0

ID:B66802 EEDS-II  
SEMIQ:RATIO /Al

ELEMENTS	RATIO
Na	0.25
Mg	-0.05
Al	1.00
Sr	42.50
Cl	-1.84
S	22.31
Ca	0.25
Cu	0.41
Fe	0.16
Bg	0.00

ID:B66802 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	0.4
Mg	-0.1
Al	1.5
Sr	65.2
Cl	-2.5
S	34.2
Ca	0.4
Cu	0.6
Fe	0.2

CL-6: 100m  
Spines

ID:A69301  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	908
Mg	15718
Al	1164
Sr	27928
Cl	5257
Zn	2643
Ca	33639
Ti	76
Fe	956
Bg	0

ID:A69301  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.78
Mg	13.51
Al	1.00
Sr	24.00
Cl	4.52
Zn	2.27
Ca	28.91
Ti	0.06
Fe	0.82
Bg	0.00

ID:A69301  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	1.0
Mg	17.8
Al	1.3
Sr	31.6
Cl	6.0
Zn	3.0
Ca	38.1
Ti	0.1
Fe	1.1

CL-8: 1m  
Grain

### ITIRBILUNG FIORD

This fjord has a maximum water depth of 435 m, two sills (inner sill at 310 m and an outer sill at 249 m of water depth) and is 55 km long with a mean width of 3 km. It receives 0.47 km<sup>3</sup> of freshwater runoff every year. Thirty two percent of the fjord's hinterland is covered in glacial ice of which 50 % of the land is at elevations in excess of 750 m. Itirbilung Fjord has a very extensive fjordhead sandur supplying over 50 % of the 187,000 tonnes of suspended sediment delivered to the fjord per annum. Itirbilung Fjord merits special attention within the SAFE project for, like Maktak Fjord described earlier in this report, the high rates of prodelta sedimentation have lead to unstable seafloor slopes and thus the generation of turbidity currents. The Itirbilung River delta is prograding at a rate of 2.6 m/a. The three main side-entry glaciers are retreating at rates between 5 and 32 m a<sup>-1</sup>.

Itirbilung Fjord contains a water volume of 41 km<sup>3</sup> and, at the time of sampling, the surface water temperature increased seaward from 1.01 °C at the inner station IT1 (Fig. I), to 1.60 °C at IT4. The coldest waters were located at 100 m water depth (-1.56 °C) and warming thereafter with depth to -0.92 °C. The salinity increased with depth from 28.9 ‰ at the surface to 33.75 ‰ at 405 m. The waters were well oxygenated with the lowest dissolved oxygen value at ≈ 5.8 ml L<sup>-1</sup>.

Fourty SPM samples were collected (Fig. I). The mean grain size of the deflocculated SPM ranged from 6.5 Ø to 7.3 Ø. The clay fraction of this SPM ranged from 17 % to 38 %. The bottom sediments had organic carbon levels increase seaward from 0.4 % near the fjordhead delta to 1.4 % at IT4.

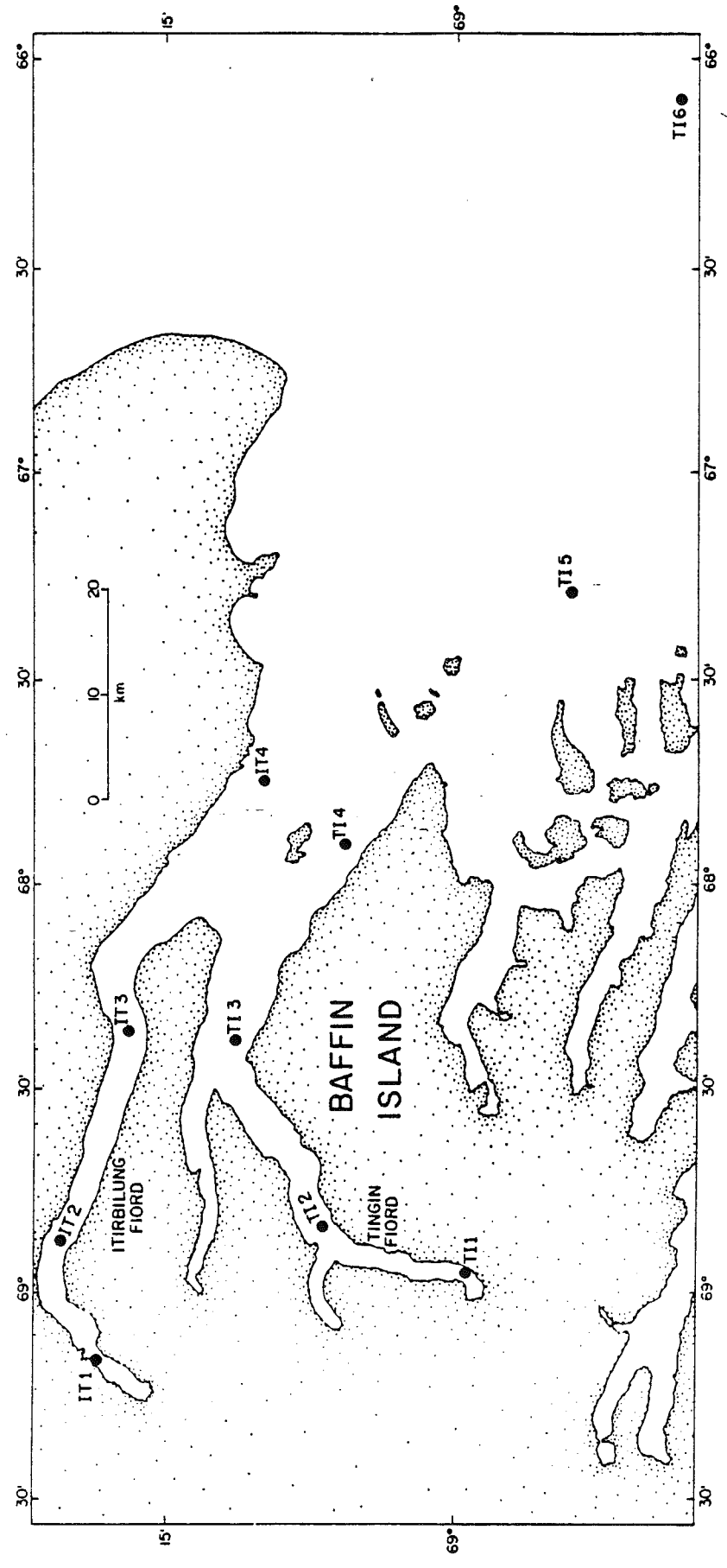


Fig. I- Stations of Iitribilung Fiord

Itirbilung Fiord

Station IT-1:40 m (82-03420)

SPM conc. = 4.140 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

Individual particles are abundant as well as clay and mica flocs. There are some biogenics including silicoflagellates, concentric and pennate diatoms and pico-plankton. Dinoflagellates (protoperidinium), plant fragments, fecal pellets and silt grains are also common.

Station IT-1:145 m (82-03416)

SPM conc. = 2.049 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

This sample consists of individual particles including several minute grains with rare biogenic remnants which include concentric and pennate diatoms and silicoflagellates.

Station IT-2:1 m (82-03435)

SPM conc. = 0.906 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

There are concentric diatoms with a clay coating (precipitation). Numerous small spheres were seen throughout the sample. There are a few other biogenics such as silicoflagellates, chain, concentric and pennate diatoms, mucoids and dinophysis. Some concentric diatoms form chains with the use of spines.

Station IT-2:30 m (82-03431)

SPM conc. = 1.531 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

Individual particles and organics (plant debris) make up the majority of this sample. Chain and concentric diatoms, silicoflagellates, pico-plankton and a few loose inorganic flocs are also present. No photos were taken.

Station IT-2:305 m (82-03426)

SPM conc. = 1.059 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

There are numerous individual grains and inorganic and/or biogenic flocs. There are a few concentric and pennate diatoms, pico-plankton and spicules. Resuspended grains are noticeable but are rare.

Station IT-3:1 m (82-03445)

SPM conc. = 0.885 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

Star-shaped organisms, pico-plankton, silicoflagellates, pennate and chain diatoms and organic spheres dominate this sample. Dinophysis, flocs, mucoids, spines and needles are also found.

Station IT-3:300 m (82-03437)

SPM conc. = 0.631 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

This sample consists of individual particles and biogenics. There are both loose flocs of biogenic material and clays and compact flocs of biogenics and clays (resuspended). Plant debris, concentric and pennate diatoms, mucoids, filaments, needles, diatomaceous debris and smooth organic spheres are also seen.

Station IT-3:405 m (82-03436)

SPM conc. = 1.418 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

This sample is similar to the one at 300m except it has more mucoids and individual grains and less biogenics. There are also flocs of clays (some compact and some loose). Remnant pennate and concentric diatoms and smooth organic spheres are still seen at this depth.

Station IT-4:1 m (82-03455)

SPM conc. = 1.043 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

This sample is mainly individual particles and loose to compact inorganic flocs with agglomerates (mucus with inclusions). Dinophysis, star-shaped organisms, organic spheres, chain diatoms, pico-plankton, silicoflagellates, dinoflagellates, pennate diatoms, silt grains, mucoids and plant debris are all found in low concentrations. No photos were taken.

Station IT-4:100 m (82-03448)

SPM conc. = 2.009 mg L<sup>-1</sup>

Histogram of grain size data - not available.

Description from SEM micrographs -

Small individual particles dominate this sample, however, flocs and biogenics, including concentric and chain diatoms, pico-plankton, clear stringers, mucoids, collapsed zooplankton and small fecal pellets are also found.

Station IT-4:290 m (82-03446)

SPM conc. = 2.264 mg L<sup>-1</sup>

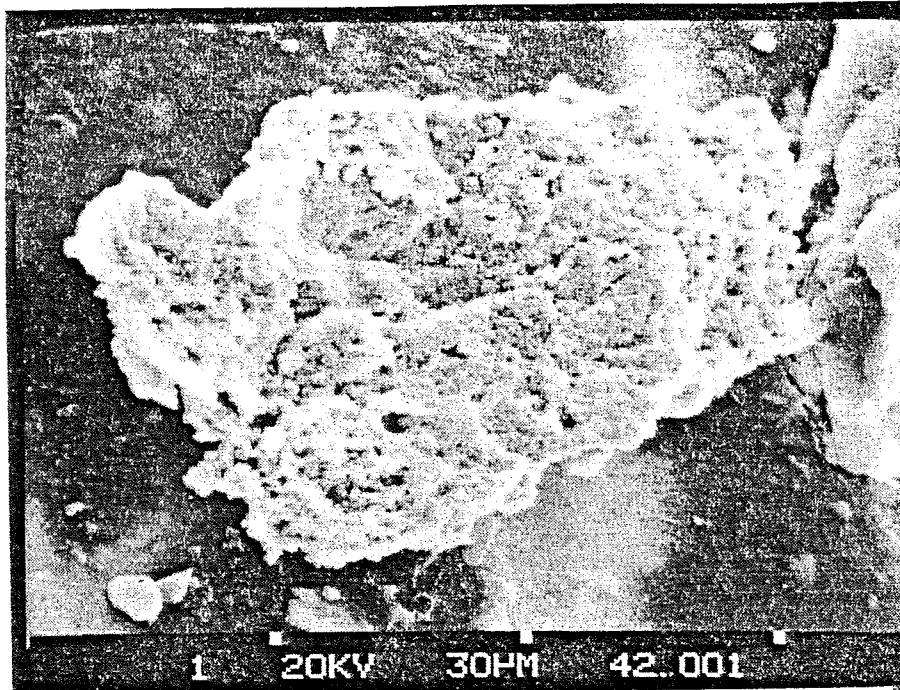
Histogram of grain size data - not available.

Description from SEM micrographs -

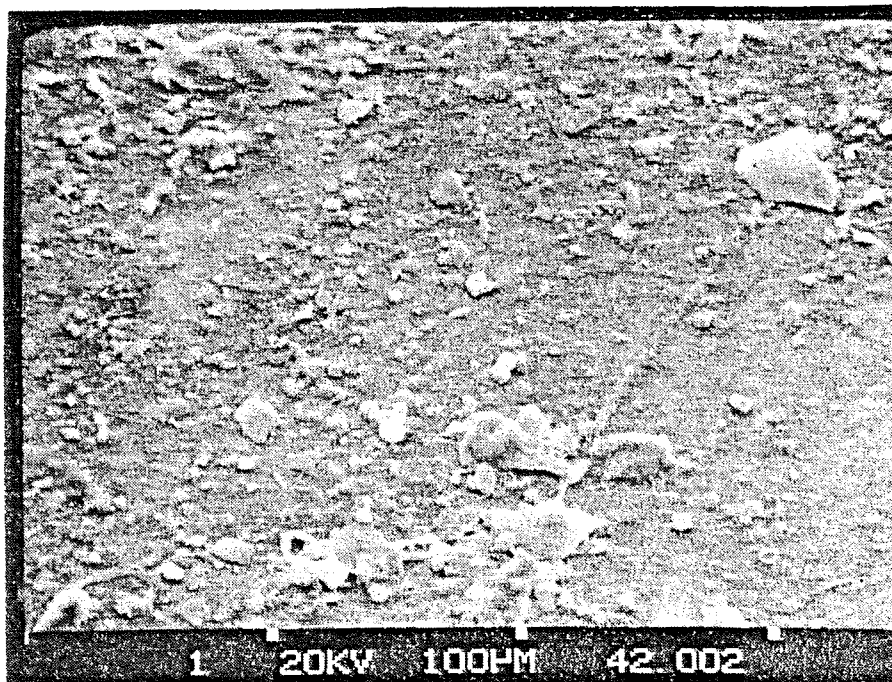
This sample is very similar to the one at 100m. It does however, have less biogenics and more compact clay flocs. There is an iron sulphide sphere (pyrite framboise), some resuspended grains and a few compact fecal pellets made of clays. Concentric and pennate diatoms and pico-plankton are found along with dry mucoids, plant debris, dinoflagellates and some large silt grains. No photos were saved.



Station IT-1:40 m (82-03420)

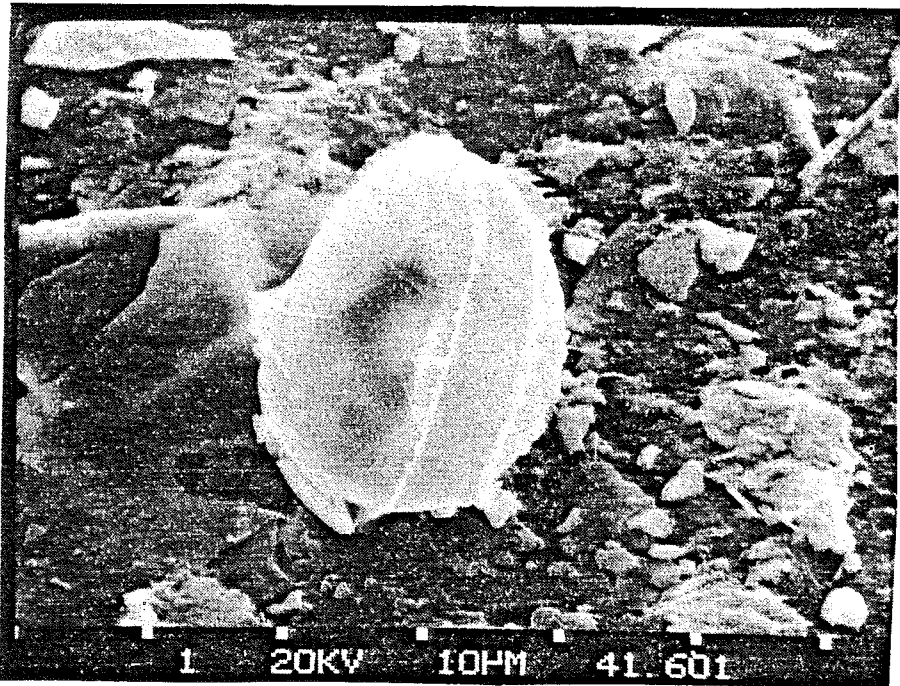


Micrograph 42.001 - large grain of copper (see spectrum A42001).



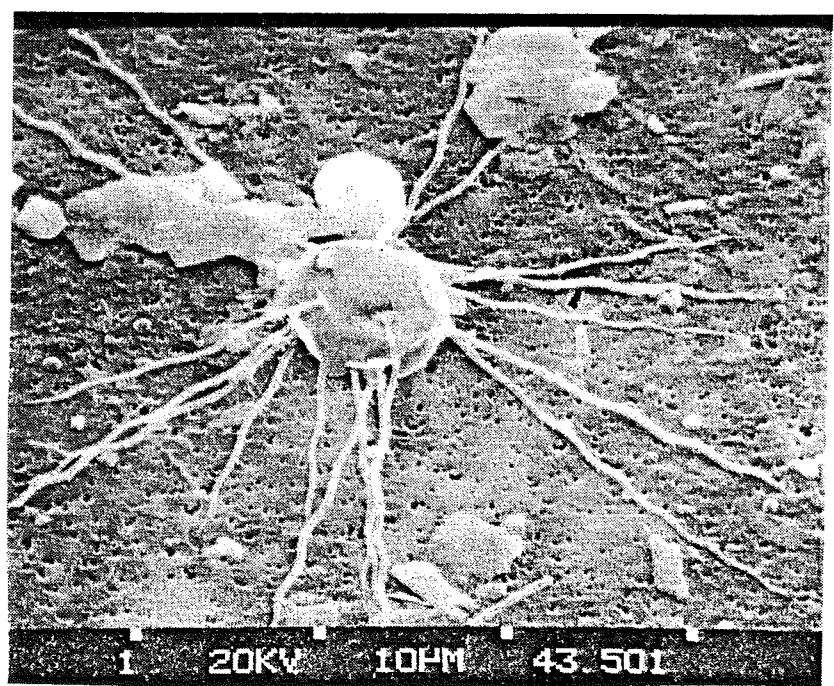
Micrograph 42.002 - general photo of sample.

Station IT-1:145 m (82-03416)



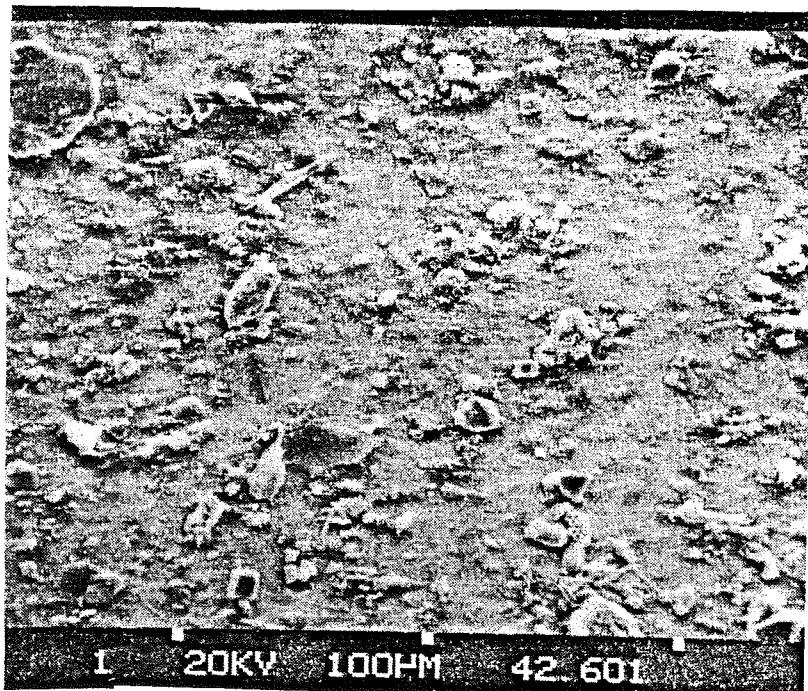
Micrograph 41.601 - dinoflagellate (possibly "Peridiniidae Diplopsalis"). This organism is made of plates and there appears to be an opening to the left side. It is organic in composition.

Station IT-2:1 m (82-03435)



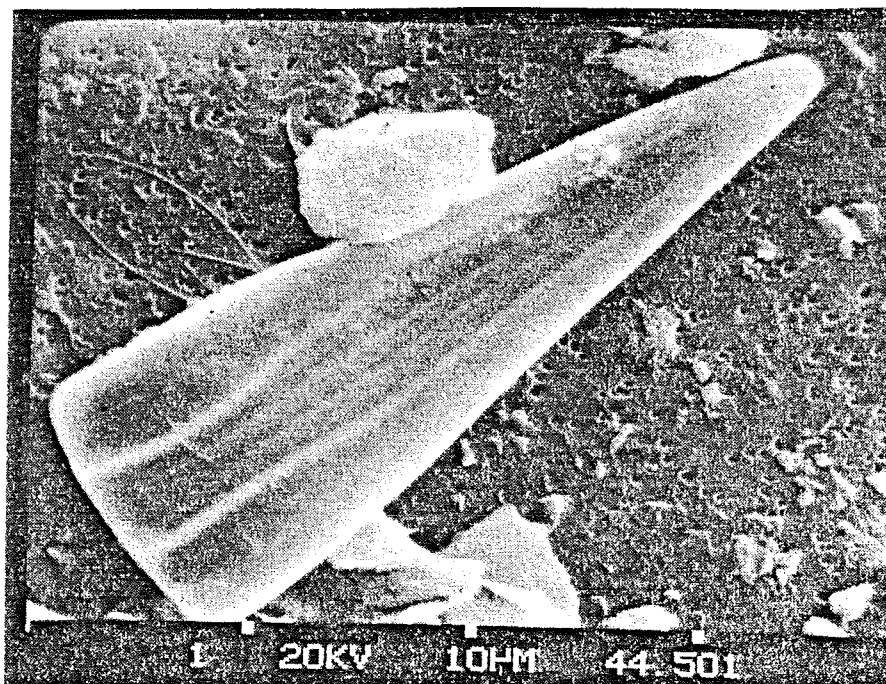
Micrograph 43.501 - spherical organism with spines radiating.

Station IT-2:305 m (82-03426)

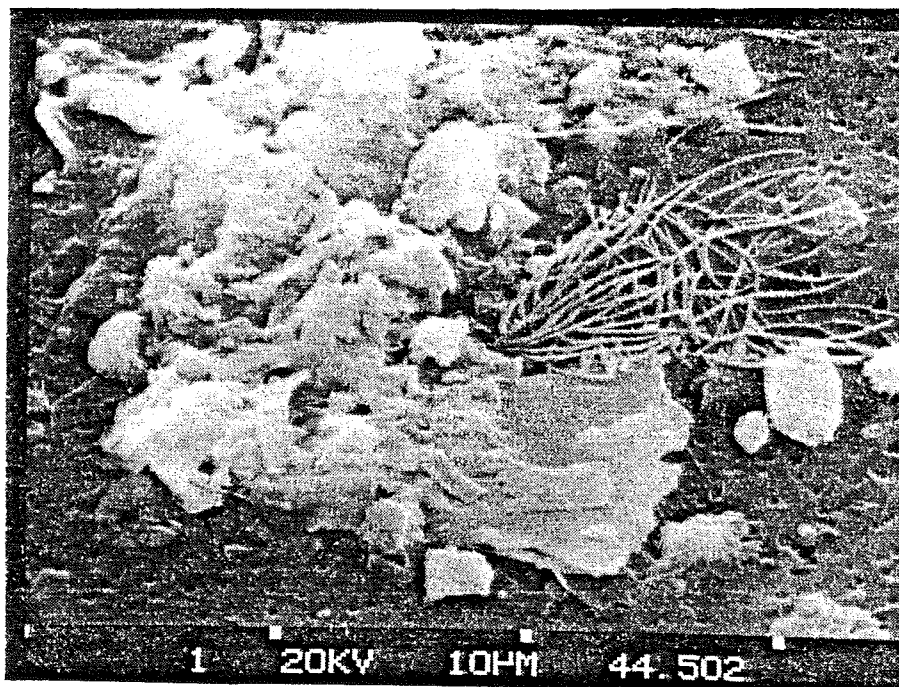


Micrograph 42.601 - general photo of sample.

Station IT-3:1 m (82-03445)

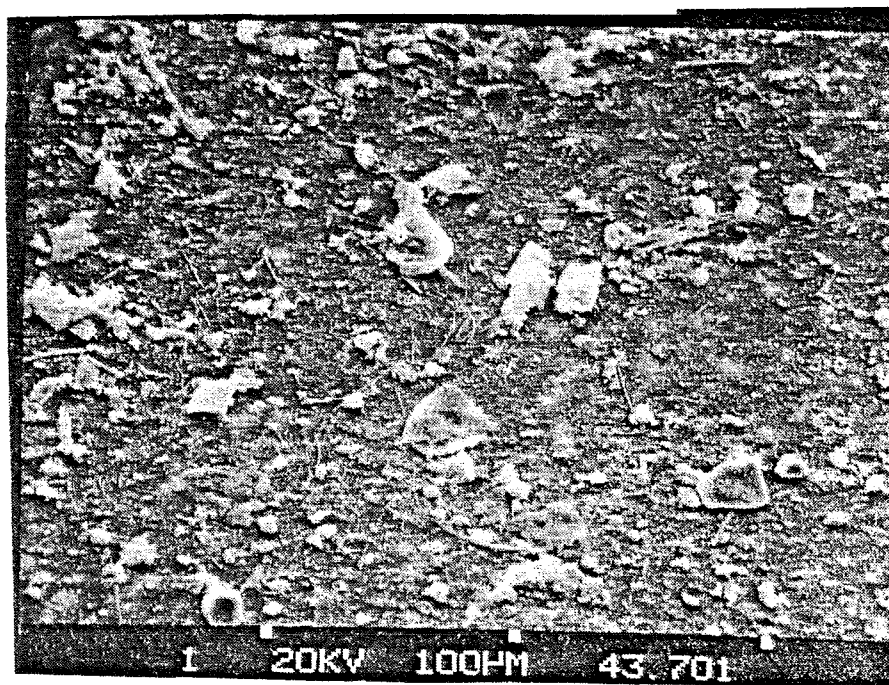


Micrograph 44.501 - diatom.



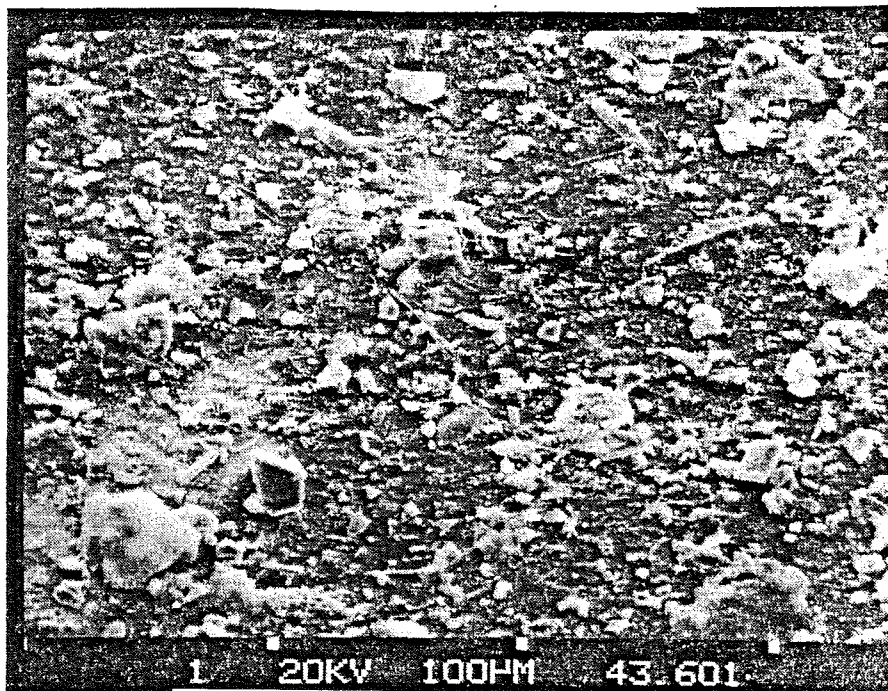
Micrograph 44.502 - floc with branch-like organics (these organics are common in this fjord).

Station IT-3:300 m (82-03437)

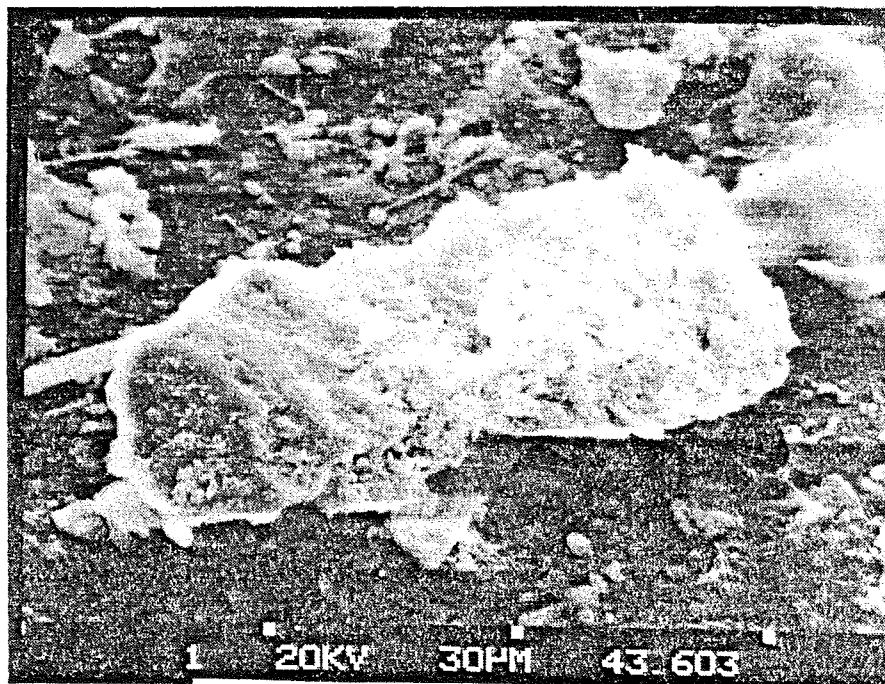


Micrograph 43.701 - general photo of sample.

Station IT-3:405 m (82-03436)

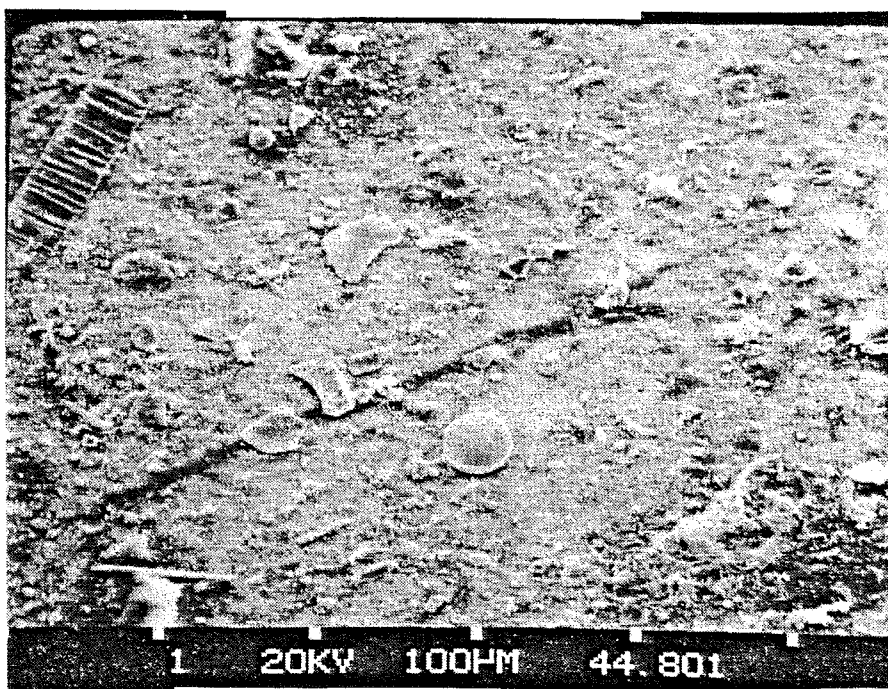


Micrograph 43.601 - general photo of sample.



Micrograph 43.603 - resuspended grain.

Station IT-4:100 m (82-03448)



Micrograph 44.801 - general photo of sample.

ID:A42001 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Cu	38270
Mg	-71
Al	209
Si	124
Cl	2898
K	146
Ca	-3
Ti	-20
Fe	279
Bg	0

ID:A42001 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Cu	182.99
Mg	-0.34
Al	1.00
Si	0.60
Cl	13.86
K	0.70
Ca	-0.01
Ti	-0.10
Fe	1.33
Bg	0.00

ID:A42001 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Cu	91.5
Mg	-0.2
Al	0.5
Si	0.3
Cl	6.9
K	0.3
Ca	-0.0
Ti	-0.0
Fe	0.7

IT - 1:40 m  
Grain of Copper

### CAMBRIDGE FIORD

This fjord is the most northerly of the SAFE fjords. It is very deep (708 m), has a 200 m deep sill situated some 14.5 km from the head of the fjord, and is 61 km long with a mean width of 3.6 km. The total hinterland area surrounding the fjord is 2045 km<sup>2</sup> of which only 12 % is covered by glacial ice and 50 % of the land area is above 500 m. The annual input of freshwater runoff is 0.42 km<sup>3</sup>. Cambridge Fiord merits special attention within the SAFE project for it has a large river (Keel R.) entering at the head of the fjord that presently drains an ice-free hinterland. The Keel River accounts for 64 % of the 37,000 tonnes of suspended sediment that annually enters the fjord. There are a number of terrestrial glaciers whose melt water enters along the margins of the fjord.

Cambridge Fiord contains a water volume of 70 km<sup>3</sup> and, at the time of sampling, the temperature of the surface waters were lowest at the head of the fjord (0.9 °C at CA1: Fig. J) increasing to 1.6 °C by CA7. The warmest waters were at 20 m (2.2 °C at CA4 and CA5). The coldest water was at 200 m (-1.64 °C) and warming with depth to 0.38 °C at 636 m. The salinity was lowest in the surface waters off CA5 and CA6 (29.75 ‰) increasing with depth to 34.21 ‰. The waters were well oxygenated except behind the inner sill which had the lowest dissolved oxygen values ( $\approx 3.45$  ml L<sup>-1</sup> at 309 m at CA2).

Eighty SPM samples were collected (Fig. J). The mean grain size of the deflocculated SPM ranged from 11  $\mu$ m to 52  $\mu$ m. The atomic C/N of the suspended sediment was relatively low (usually <6). The organic carbon fraction of the SPM ranged from 8 to 29 % (as low as 0.06 mg L<sup>-1</sup> and up to 0.18 mg L<sup>-1</sup>). The bottom sediments contain moderate levels of organic carbon landward of the inner sill (<0.9 %) only to decrease seaward to  $\approx 0.3$  % near side-entry tidewater glaciers and then to increase again towards the shelf (0.9%).



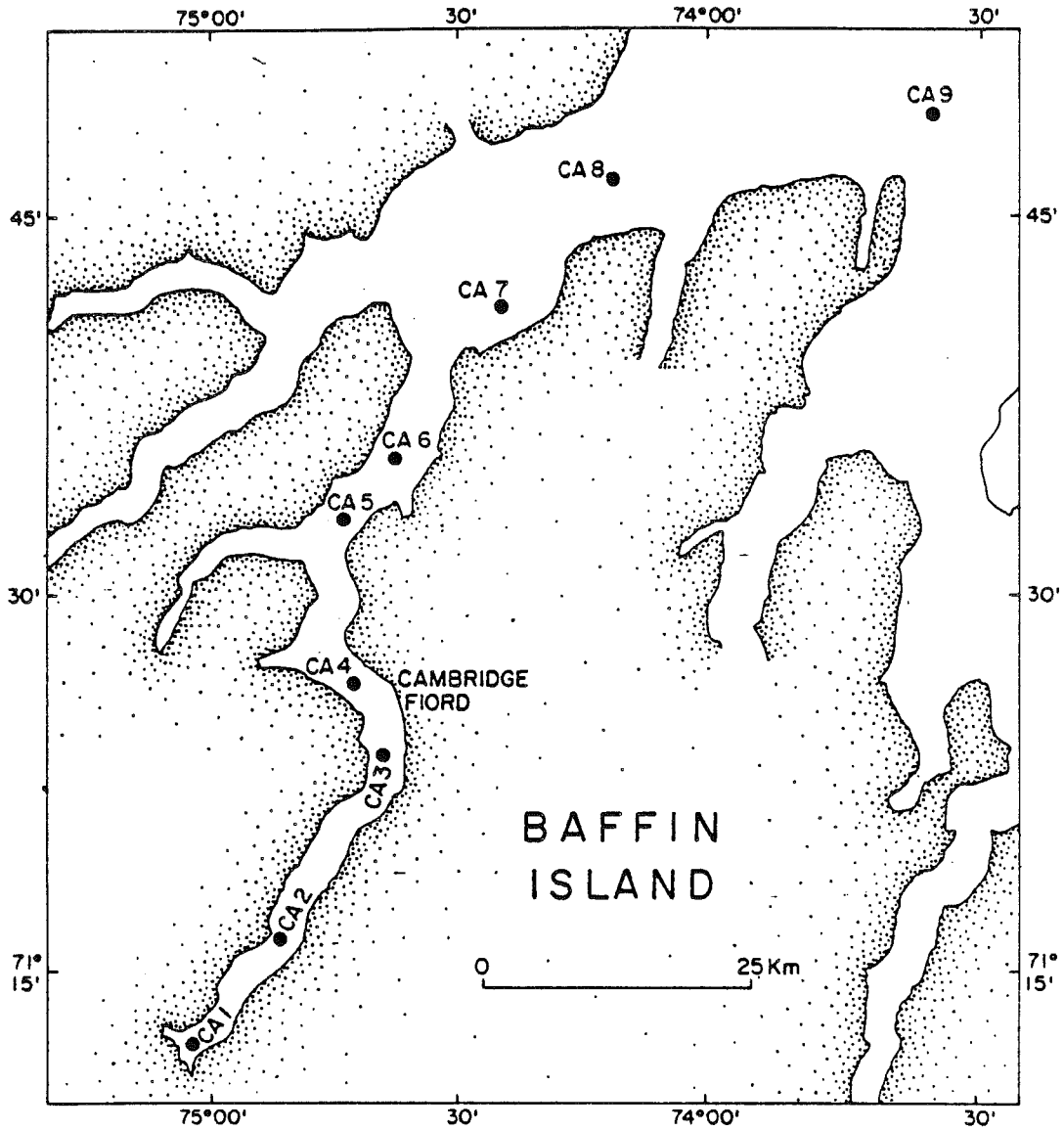


Fig. J- Stations of Cambridge Fiord

Cambridge Fiord

Station CA-1:1 m (82-03743)

SPM conc. = 0.433 mg L<sup>-1</sup>

Description from SEM micrographs -

Biogenics are the predominant feature of this sample. They include chain diatoms, clear stringers, algae, silicoflagellates, mucoids, pico-plankton, pennate diatoms, dinophysis and diatom fibres. There are also small clay flocs and individual particles. Fecal pellets are also found.

Station CA-1:185 m (82-03734)

SPM conc. = 0.684 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is mainly individual particles which appear to be caught up in a thin mucus. There are some silt-sized grains and small clay flocs caught in the same mucus. Large concentric diatoms up to 100µm, pennate diatoms and silicoflagellates are also found. No photos are shown.

Station CA-2:1 m (82-03753)

SPM conc. = 0.541 mg L<sup>-1</sup>

Description from SEM micrographs -

There are numerous biogenics here including concentric diatoms, clear stringer algae, chain diatoms, diatom fibres or needles, mucoids, plant debris, star-shaped organisms, pennate diatoms, silicoflagellates, pico-plankton, dinophysis and dinoflagellates. Flocs of biogenic debris, fibres and/or small clays are also common. These flocs range from loose to compact in nature. Some of the compact flocs are rich in iron. There are also organic spheres present.

Station CA-2:200 m (82-03745)

SPM conc. = 0.418 mg L<sup>-1</sup>

Description from SEM micrographs -

Organic spheres are present again in this sample. There are remnant biogenics left, mainly pennate and concentric diatoms and dinoflagellates. Flocs, individual particles and silt grains are common and mucoids are abundant. The flocs are either loose or compact and are mostly inorganic in nature.

Station CA-2:309 m (82-03744)

SPM conc. = 4.962 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is similar to the previous one at 200m. Here we have a few more flocs and coated grains. There are also grains present which have smaller grains stuck to them. Biogenic remnants are still found as well as some mucoids. Spectrum A74400 is an analysis of the coating found on some of the grains. No photos are shown.

Station CA-3:1 m (82-03763)

SPM conc. = 0.974 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is full of salt contamination, therefore, no photos were taken. The sample is mainly biogenics, such as concentric and chain diatoms, pico-plankton, silicoflagellates, dinophysis and an organism in the shape of a balloon. There are two collapsed pellets composed of clays, biogenics and fibres. There is one agglomerate: a mucoid with clays and biogenics stuck to it.

Station CA-3:200 m (82-03756)

SPM conc. = 0.391 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is mainly inorganic flocs, fairly compact to compact in nature. Individual grains are common and fecal pellets were found composed of clays and/or biogenics. Some of these pellets are collapsed. There are numerous loose biogenic and inorganic flocs.

Station CA-3:362 m (82-03754)

SPM conc. = 0.768 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is similar to the one at 200m but contains a higher concentration of individual grains. This may be due in part to salt contamination. Flocs present here are extremely compact.

Station CA-6:1 m (82-03733)

SPM conc. = 0.548 mg L<sup>-1</sup>

Description from SEM micrographs -

There are numerous biogenics, individual particles and flocs in this sample. Mucoids and fecal pellets are present also. The biogenics consist of chain, concentric and pennate diatoms, silicoflagellates, dinophysis, bacteria, fibres, and star-shaped organisms.

Station CA-6:636 m (82-03724)

SPM conc. = 0.852 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample consists mainly of individual particles and flocs, which are loose to very compact and small to large in size. Most of these flocs are composed of clays while others are inorganic grains. Some of the flocs are biogenic in nature. Remnant biogenics and mucoids are found. There are iron and zinc-rich flocs as well as calcium-rich flocs.

Station CA-8:1 m (82-03713)

SPM conc. = 2.280 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample also contains salt contamination, but mainly consists of biogenics including chain and concentric diatoms, dinoflagellates, plant debris, silicoflagellates, dinophysis, pico-plankton, pennate diatoms and star-shaped organisms. Clay flocs and mucoids are abundant.

Station CA-8:20 m (82-03711)

SPM conc. = 2.201 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is similar to the previous one at 1m of depth but contains more biogenics, individual particles and flocs. The remainder of the sample is composed of virtually the same particles as that of the sample at 1m.

Station CA-8:200 m (82-03706)

SPM conc. = 0.504 mg L<sup>-1</sup>

Description from SEM micrographs -

There are only a few biogenics left at this depth but mucoids are still abundant. Individual particles and flocs are common throughout the sample. The flocs are loose to fairly compact in nature and may contain biogenic remnants. Silt grains and plant debris are also present.

Station CA-8:630 m (82-03704)

SPM conc. = 0.461 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is similar to the one at 200m. It contains numerous individual particles and flocs. The flocs are loose to compact and are composed mainly of clays. There is a mica plate with smaller particles stuck to it. Remnant biogenics such as chain, pennate and concentric diatoms and pico-plankton are also present.

Station CA-9:1 m (82-03703)

SPM conc. = 0.729 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample contains numerous particles trapped in mucus. Biogenics are seen here also. There are some intact fecal pellets composed of remnant diatoms (silicon needles). Large mucoids and bacteria are also present. No photos are shown of this sample.

Station CA-9:200 m (82-03696)

SPM conc. = 0.727 mg L<sup>-1</sup>

Description from SEM micrographs -

Numerous biogenics including chain, concentric and pennate diatoms, mucoids, plant debris, silicoflagellates and pico-plankton are seen. The flocs present are fairly loose and are composed mainly of inorganics although some may contain biogenic material. Individual particles are common also. No photos were taken.

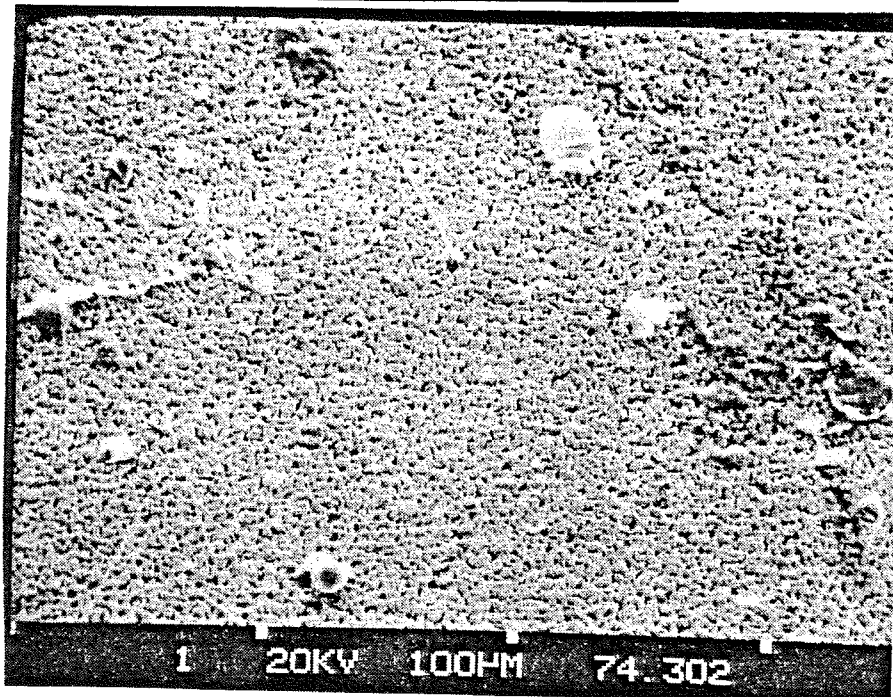
Station CA-9:600 m (82-03694)

SPM conc. = 0.467 mg L<sup>-1</sup>

Description from SEM micrographs -

This sample is mainly individual particles. There are numerous compact clay flocs. Concentric diatoms with a clay coating are present as well as mucoids, silt grains and biogenics. No photos were saved.

Station CA-1:1 m (82-03743)



Micrograph 74.302 - general photo of sample.

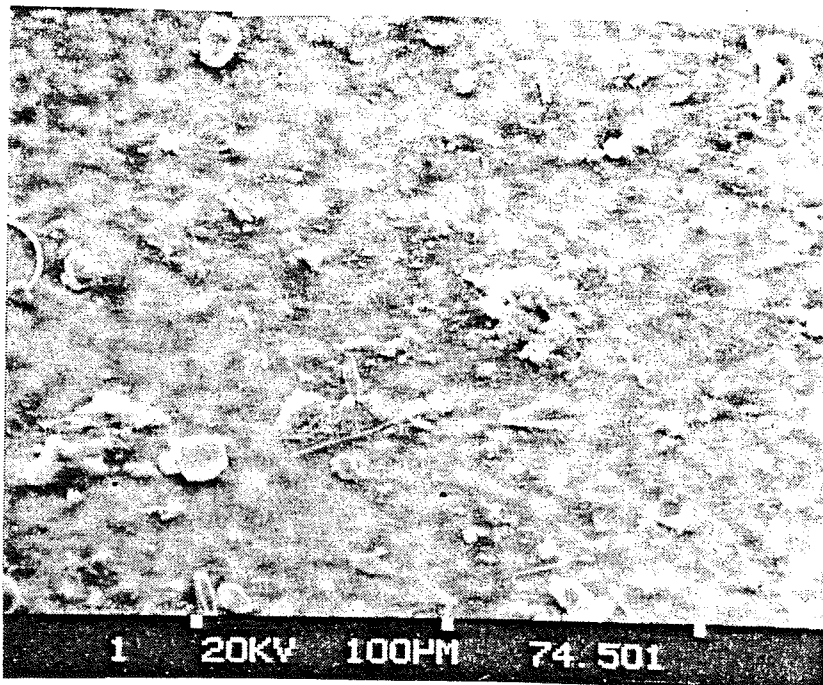
Station CA-2:1 m (82-03753)



Micrograph 75.301 - general photo of sample.

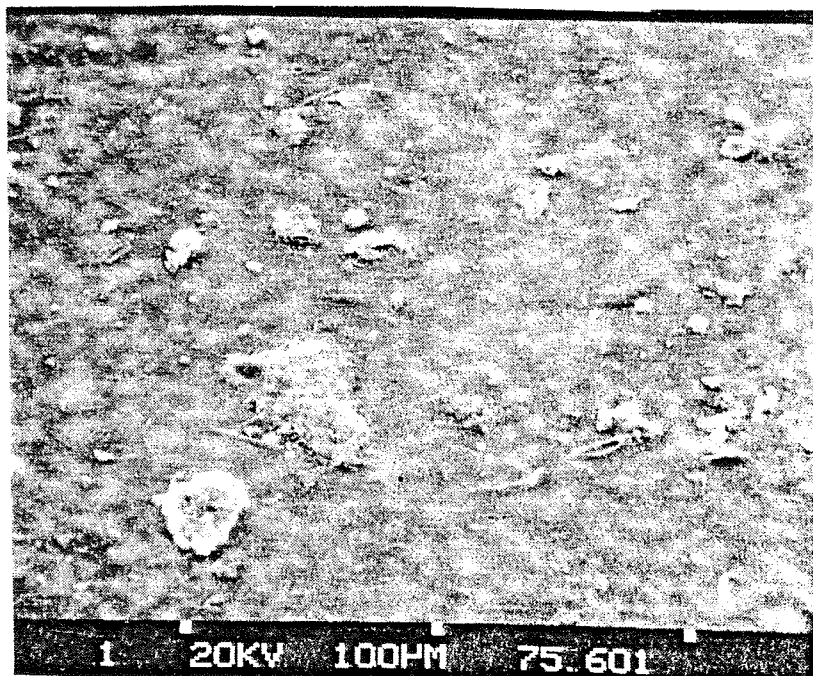


Station CA-2:200 m (82-03745)



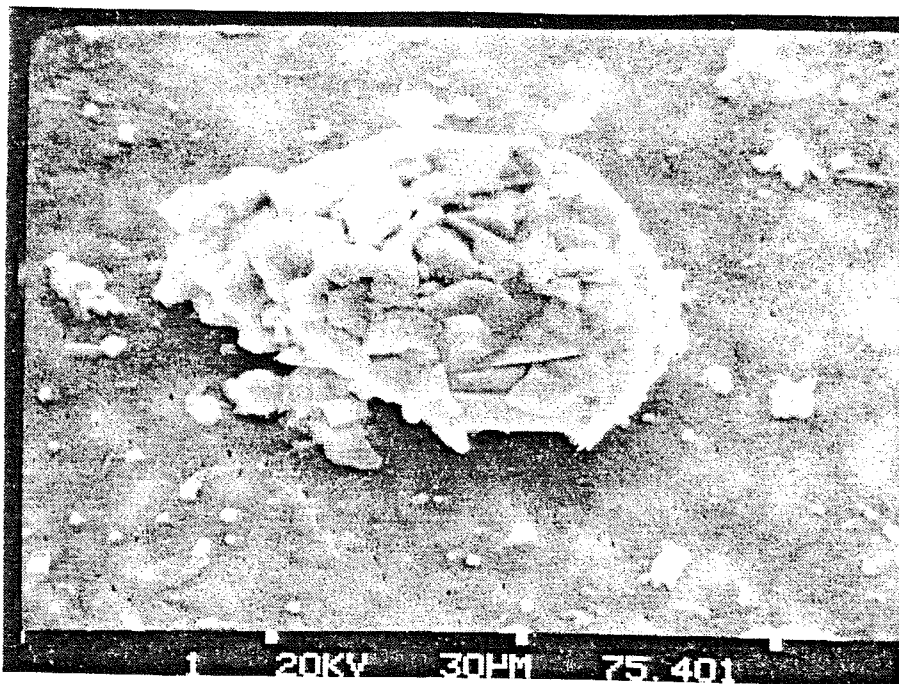
Micrograph 74.501 - general photo of sample.

Station CA-3:200 m (82-03756)

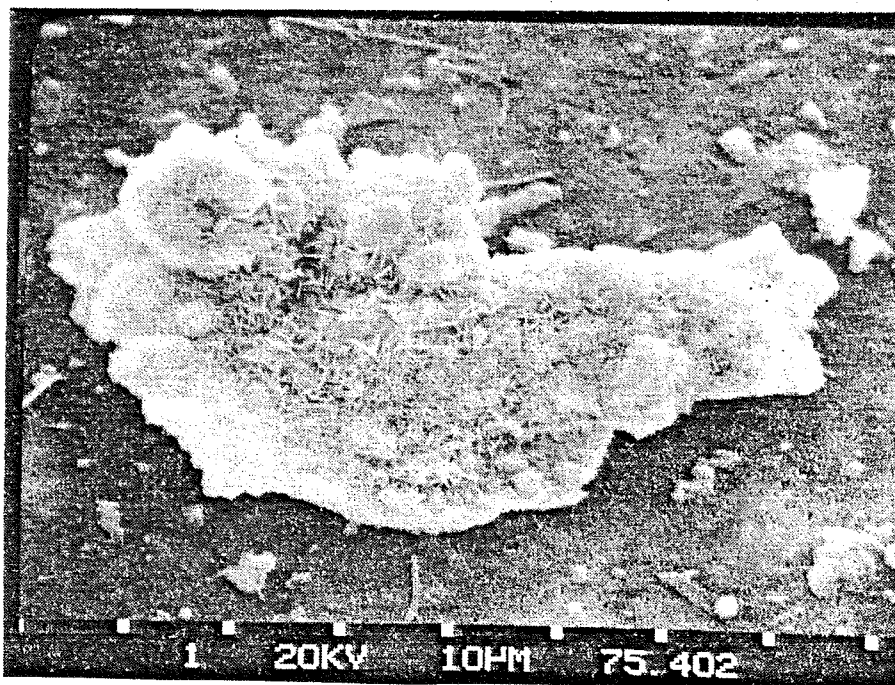


Micrograph 75.601 - general photo showing a fairly compact inorganic and biogenic floc as well as a compact floc. A few mucoids, bacterial spheres (cocci) in mucus and organic spheres are also shown.

Station CA-3:362 m (82-03754)

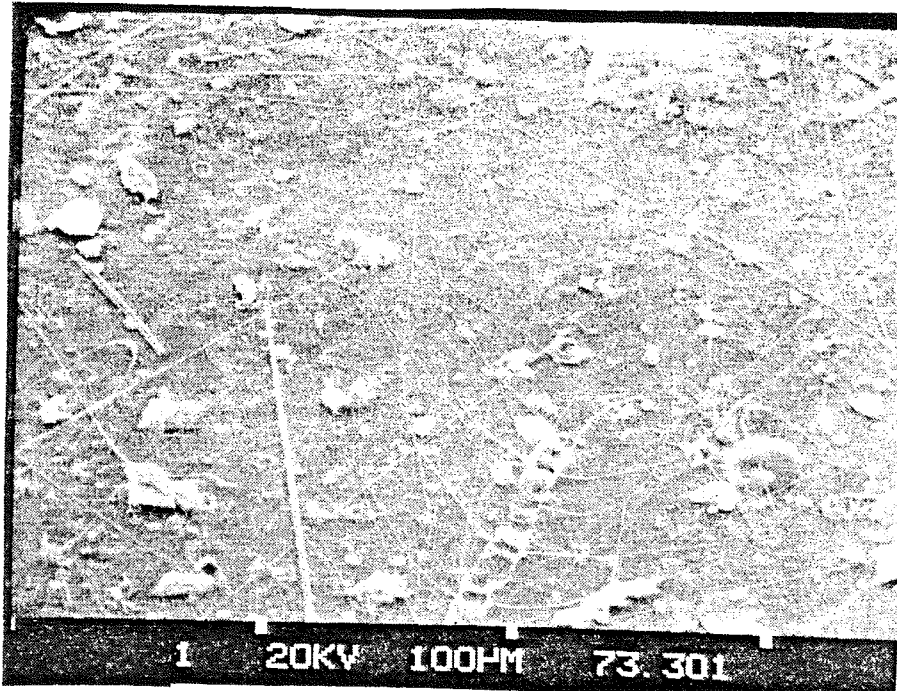


Micrograph 75.401 - compact floc (spectrum A75401 shows its analysis to be quartz and calcium silicate)



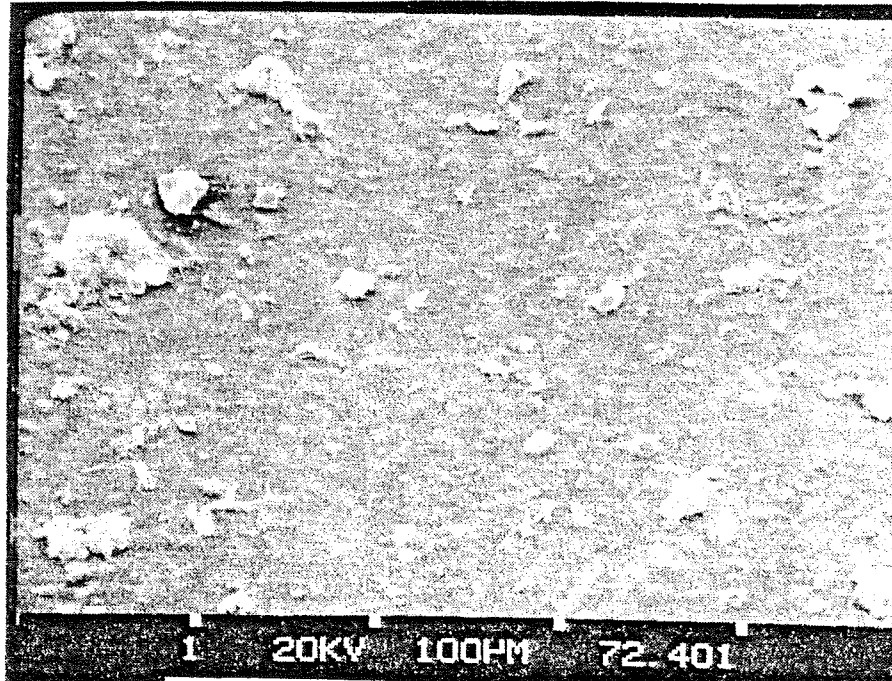
Micrograph 75.402 - mineral composed of iron, lead and a trace of copper as the partial spectrum A75402 indicates.

Station CA-6:1 m (82-03733)



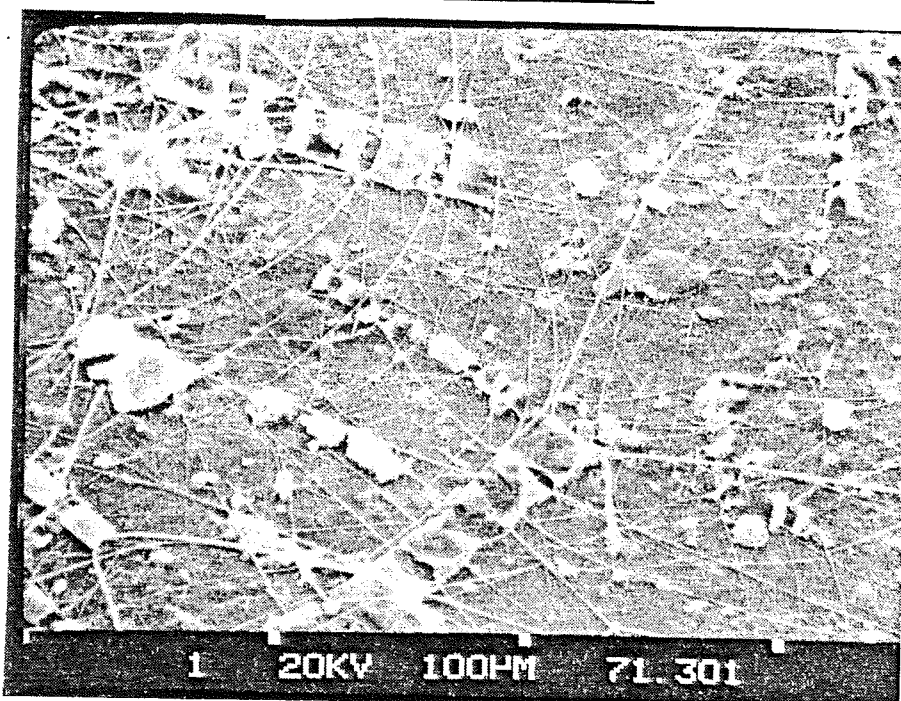
Micrograph 73.301 - general photo of sample.

Station CA-6:636 m (82-03724)



Micrograph 72.401 - general photo of sample.

Station CA-8:1 m (82-03713)



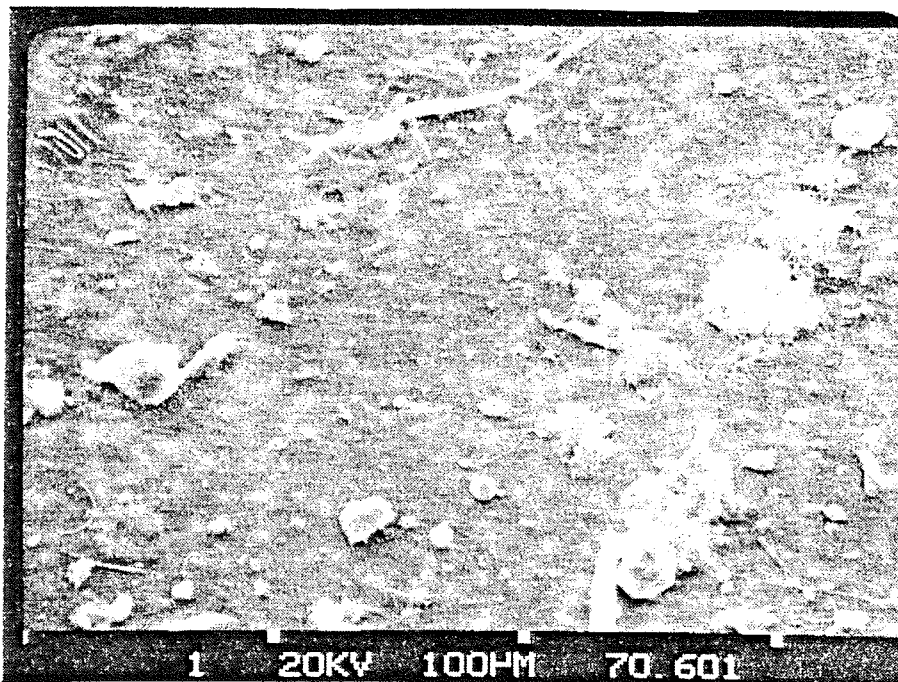
Micrograph 71.301 - general photo of sample.

Station CA-8:20 m (82-03711)



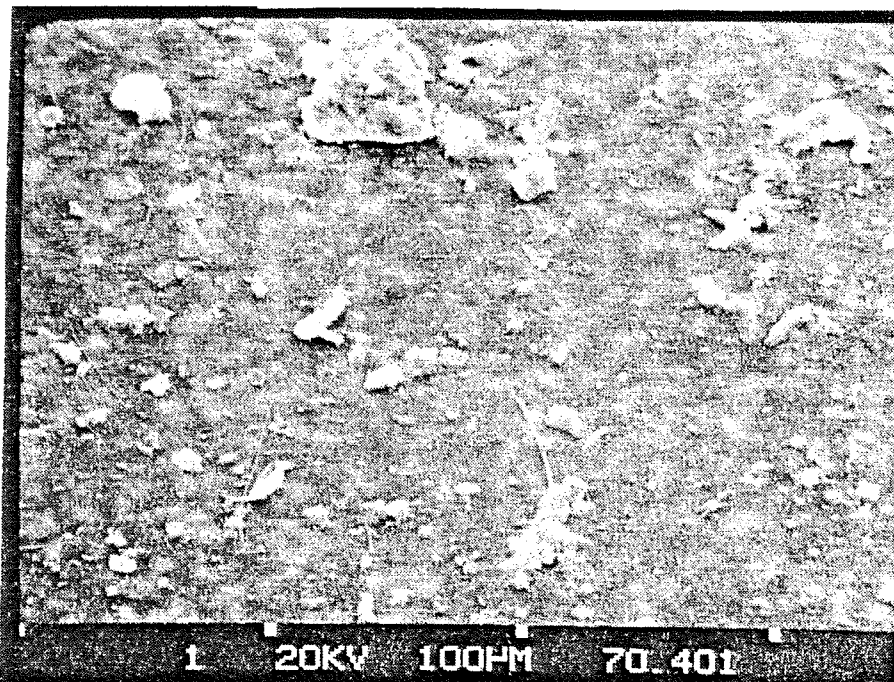
Micrograph 71.101 - general photo showing a pteropod.

Station CA-8:200 m (82-03706)



Micrograph 70.601 - general photo showing two types of flocs (one biogenic and one mainly inorganic).

Station CA-8:630 m (82-03704)



Micrograph 70.401 - general photo: the grain at the top is composed of iron, silicon, titanium and aluminum.

ID:A74400  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	-84
Mg	2218
Al	21690
Si	67271
Cl	114
K	532
Ca	13727
Ti	-7
Fe	3892
Bg	0

ID:A74400  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	-0.00
Mg	0.10
Al	1.00
Si	3.10
Cl	0.01
K	0.02
Ca	0.63
Ti	-0.00
Fe	0.18
Bg	0.00

ID:A74400  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	-0.1
Mg	2.0
Al	19.8
Si	61.5
Cl	0.1
K	0.5
Ca	12.6
Ti	-0.0
Fe	3.6

CA-2: 309 m  
Analysis of Coating Found  
On Some Grains

ID:A75401 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Na	1401
Mg	314
Al	14967
Si	86022
Cl	941
K	4094
Ca	7382
Ti	157
Fe	1614
Bg	0

ID:A75401 EEDS-II  
SEMIQ:RATIO/Al

ELEMENTS	RATIO
Na	0.09
Mg	0.02
Al	1.00
Si	5.75
Cl	0.06
K	0.27
Ca	0.49
Ti	0.01
Fe	0.11
Bg	0.00

ID:A75401 EEDS-II  
SEMIQ:NORMALIZE

ELEMENTS	%
Na	1.2
Mg	0.3
Al	12.8
Si	73.6
Cl	0.8
K	3.5
Ca	6.3
Ti	0.1
Fe	1.4

CA-3: 362 m  
Compact Floc

ID:A75402 EEDS-II  
SEMIQ:COUNTS

ELEMENTS	COUNTS
Pb	17318
Mg	3474
Cu	1177
Si	2982
Cl	14704
Mn	1144
Ca	3535
Ti	-44
Fe	69001
Bg	0

CA-3: 362 m  
Mineral

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